
DRISTEEM[®]
The humidification experts

Vaporstream[®]

Electric Humidifier

**Installation, Operation
and Maintenance Manual**



ATTENTION INSTALLER

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

DRI-STEEM® technical support

800-328-4447

WARNING!

Disconnect electrical power before installing supply wiring. Contact with energized circuits can cause severe personal injury or death as a result of electrical shock.

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, and/or fire.

The humidifier tank, dispersion assembly, and all connected hose or piping can contain or discharge hot steam and/or hot water at 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.

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.

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

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Keypad and troubleshooting information

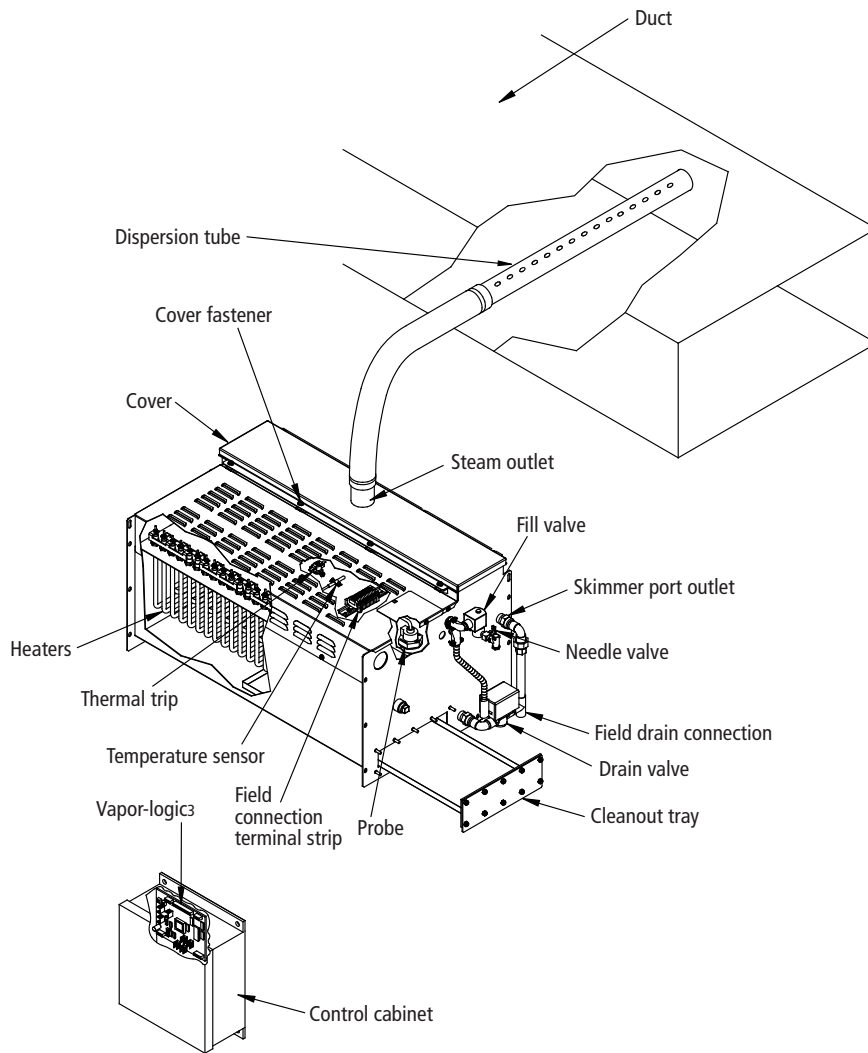
The *Vapor-logic³ Installation and Operation Manual*, which was shipped with your humidifier, is a comprehensive operation manual. Refer to it for information about using the keypad and for troubleshooting information.

Download DRI-STEEM literature

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

Model VLC

Figure 2-1:
Vaporstream® Model VLC (standard water model) system example



OM-628

Important notes:

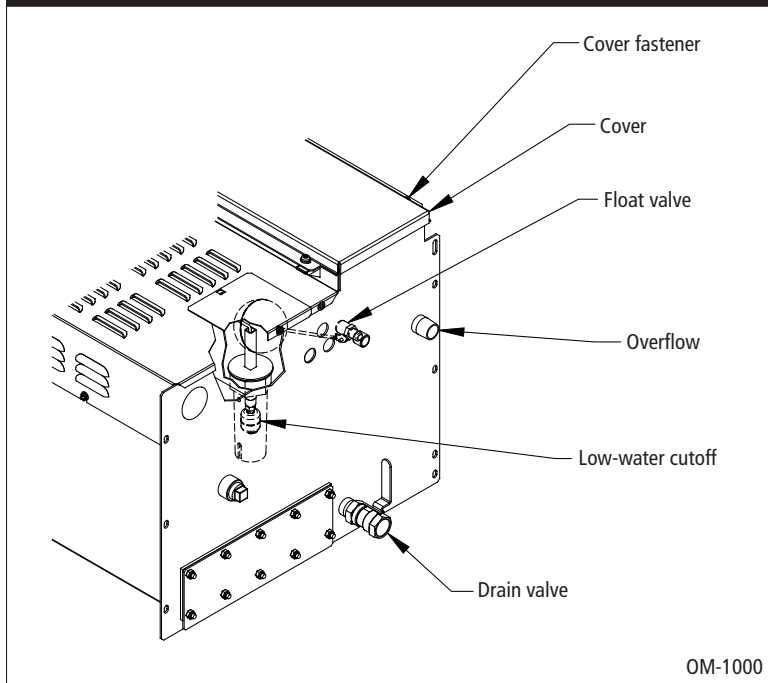
- Vaporstream VLC (standard water) models can be converted in the field for use with deionized/reverse osmosis (DI/RO) water. Vaporstream VLDI (DI water) models can be converted in the field for use with potable or softened water.
- Damage caused by chloride corrosion is not covered by your DRI-STEEM® warranty.

Standard water models (Model VLC)

Vaporstream VLC humidifiers use electricity to heat potable or softened fill water into steam for humidification. A conductivity probe monitors water level, requiring water conductivity to be at least 100 $\mu\text{S}/\text{cm}$ to operate properly. Therefore, VLC models will not operate with demineralized water. For demineralized water operation (using deionized or reverse osmosis treated water), use VLDI model humidifiers (described on next page).

Model VLDI

**Figure 3-1:
Vaporstream Model VLDI (DI/RO water model)**



OM-1000

Deionized water models (Model VLDI)

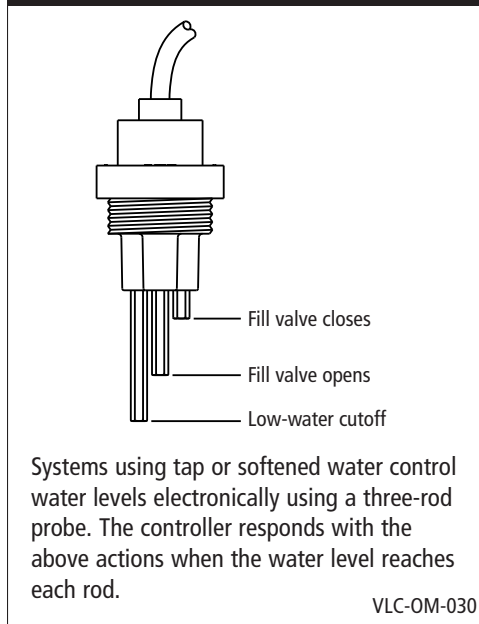
Vaporstream VLDI humidifiers use electricity to heat deionized (DI) or reverse osmosis (RO) fill water into steam for humidification. VLDI models control water level using a float valve with low water cutoff switch.

VLDI models are virtually maintenance-free and require very little or no downtime.

Note:

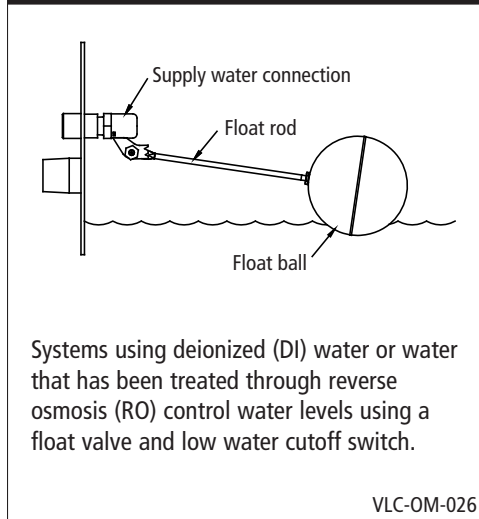
See Pages 23 and 24 for detailed installation drawings.

**Figure 3-2:
Water level control for standard water systems**



VLC-OM-030

**Figure 3-3:
Water level control for DI/RO water systems**



VLC-OM-026

Specifications

**Table 4-1:
Vaporstream capacities and electrical specifications**

VLC VLDI model (kW-stages)	Maximum steam capacity†		Heaters		Current draw (amps)									kW
					Single-phase					Three-phase***				
	lbs/hr	kg/h	Qty.	Stages**	120V	208V*	240V*	480V*	600V*	208V*	240V*	480V*	600V*	
2-1	5.7	2.6	1	1	16.7	9.6	8.3	4.2	3.3	—	—	—	—	2
3-1	8.6	3.9	1	1	25.0	14.4	12.5	6.3	5.0	—	—	—	—	3
4-1	11.4	5.2	1	1	33.3	19.2	16.7	8.3	6.7	—	—	—	—	4
5-1	15.2	6.9	1	1	—	25.6	22.2	11.1	8.9	—	—	—	—	5.33
6-1	17.1	7.8	3	1	—	28.8	25.0	12.5	10.0	16.7	14.4	7.2	5.8	6
9-1	25.7	11.6	3	1	—	43.3	37.5	18.8	15.0	25.0	21.7	10.8	8.7	9
12-1	34.2	15.5	3	1	—	—	—	25.0	20.0	33.3	28.9	14.4	11.5	12
16-1	45.6	20.7	3	1	—	—	—	33.3	26.7	44.4	38.5	19.2	15.4	16
21-1	59.9	27.1	3	1	—	—	—	43.8	35.0	—	—	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	25.0	20.0	33.3	28.9	14.4	11.5	12
18-2	51.3	23.3	6	2	—	86.5	75.0	37.5	30.0	50.0	43.3	21.7	17.3	18
24-2	68.4	31.0	6	2	—	—	—	50.0	40.0	66.6	57.7	28.9	23.1	24
32-2	91.2	41.4	6	2	—	—	—	66.7	53.3	88.8	77.0	38.5	30.8	32
42-2	119.7	54.3	6	2	—	—	—	87.5	70.0	—	—	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	37.5	30.0	50.0	43.3	21.7	17.3	18
27-3	77.0	34.9	9	3	—	129.8	112.5	56.3	45.0	74.9	65.0	32.5	26.0	27
36-3	102.6	46.5	9	3	—	—	—	75.0	60.0	99.9	86.6	43.3	34.6	36
48-3	136.8	62.0	9	3	—	—	—	100.0	80.0	133.2	115.5	57.7	46.2	48
63-3	179.6	81.4	9	3	—	—	—	131.3	105.0	—	—	75.8	60.6	63
75-3	213.8	96.9	9	3	—	—	—	—	125.0	—	—	90.2	72.2	75
24-4	68.4	31.0	12	4	—	115.4	100.0	50.0	40.0	66.6	57.7	28.9	23.1	24
36-4	102.6	46.5	12	4	—	173.1	150.0	75.0	60.0	99.9	86.6	43.3	34.6	36
48-4	136.8	62.0	12	4	—	—	—	100.0	80.0	133.2	115.5	57.7	46.2	48
64-4	182.4	82.7	12	4	—	—	—	133.3	106.7	177.6	154.0	77.0	61.6	64
84-4	239.4	108.6	12	4	—	—	—	175.0	140.0	—	—	101.0	80.8	84
100-4	285.0	129.3	12	4	—	—	—	—	166.7	—	—	120.3	96.2	100

Notes:

* 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.drirsteem.com

Dimensions

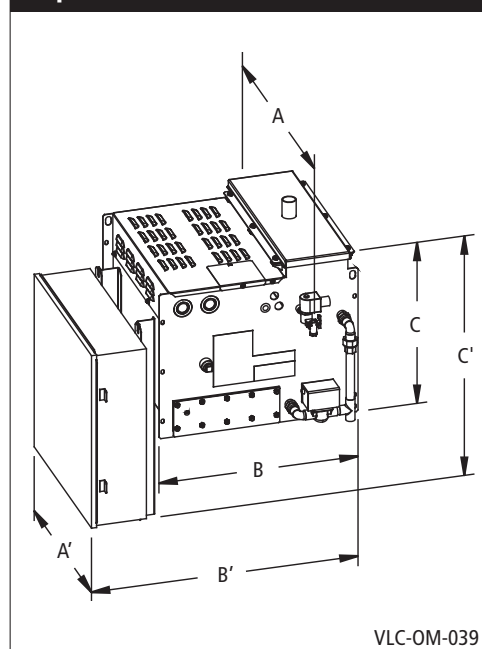
**Table 5-1:
Standard control cabinet dimensions and weights**

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

Notes:

* In addition to shipping weight of humidifier

**Figure 5-1:
Vaporstream dimensions**



VLC-OM-039

**Table 5-2:
Vaporstream dimensions**

VLC/VLDI 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/VLDI model (kW - stages)	Max. control cabinet size	With mounted control cabinet option					
		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.

Weights and cabinet sizes

**Table 6-1:
Vaporstream weights and control cabinet sizes by model**

VLC VLDI 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	480V	600V	208V	240V	480V	600V
2-1	35	16	79	36	M	M	M	M	M	—	—	—	—
3-1	35	16	79	36	M	M	M	M	M	—	—	—	—
4-1	35	16	79	36	M	M	M	M	M	—	—	—	—
5-1	35	16	79	36	—	M	M	M	M	—	—	—	—
6-1	57	26	157	71	—	M	M	M	M	M	M	M	M
9-1	57	26	157	71	—	M	M	M	M	M	M	M	M
12-1	57	26	157	71	—	—	—	M	M	M	M	M	M
16-1	57	26	157	71	—	—	—	M	M	M	M	M	M
21-1	57	26	157	71	—	—	—	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
18-2	79	36	237	108	—	L	L	L	L	L	L	L	L
24-2	79	36	237	108	—	—	—	L	L	L	L	L	L
32-2	79	36	237	108	—	—	—	L	L	L	L	L	L
42-2	79	36	237	108	—	—	—	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
27-3	110	50	326	148	—	XL	L	L	L	L	L	L	L
36-3	110	50	326	148	—	—	—	L	L	L	L	L	L
48-3	110	50	326	148	—	—	—	L	XXL	XL	L	L	L
63-3	110	50	326	148	—	—	—	XL	XXL	—	—	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
36-4	153	70	427	194	—	XL	XL	L	L	L	L	L	L
48-4	153	70	427	194	—	—	—	L	L	XL	L	L	L
64-4	153	70	427	194	—	—	—	XL	XXL	XL	XL	L	L
84-4	153	70	427	194	—	—	—	XL	XXL	—	—	L	L
100-4	153	70	427	194	—	—	—	—	XXL	—	—	L	XXL

Notes:

* 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. Control cabinet dimensions are shown on the next page.

† Operating weight does not include weight of the control cabinet.

Selecting a location

Locating the humidifier

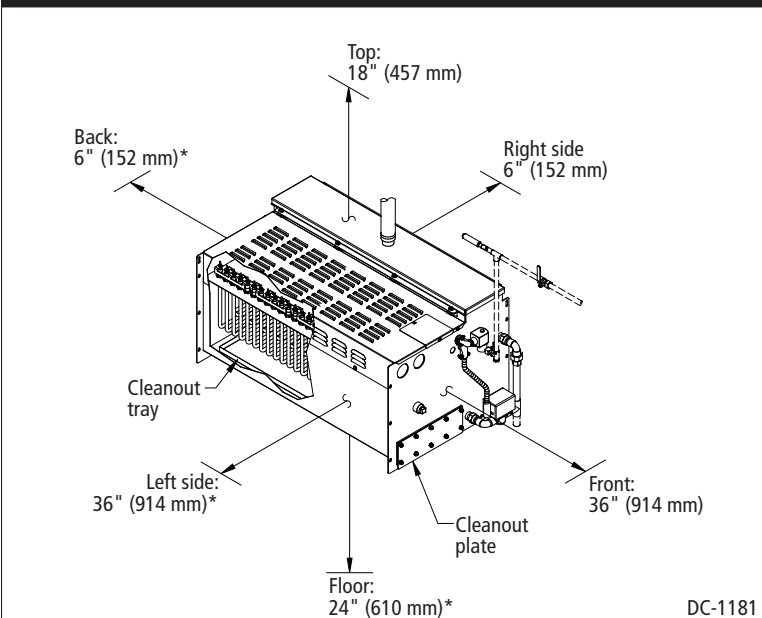
When selecting a location for the humidifier, consider the following:

- Maximum ambient temperature for the control cabinet is 104 °F (40 °C).
- Noises inherent to operation:
 - Humidifier: VLC water fill cycles (see Page 27 of this document regarding fill cycle noise)
 - Control cabinet: Cycling contactors
- Easy access for maintenance
- Critical service and maintenance clearances around humidifier — primarily top, left side, and front (see clearance recommendations below)
- 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 the 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.

Note:

See the dispersion section of this manual for dispersion assembly placement guidelines.

Figure 7-1:
Vaporstream clearance recommendations



Note:

* 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

Important:

Installation must comply with governing codes.

Mounting methods

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

For overhead installations, install a drip pan to prevent possible water damage (see drawing on the next page).

Support legs and wall brackets are not available for single-heater models (VLC/VLDI models 2-1, 3-1, 4-1, and 5-1). These models must be mounted using a trapeze or within an outdoor enclosure.

For information about mounting with an outdoor enclosure, see Pages 14-22.

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.

More on next page ►

**Table 8-1:
Mounting options by model**

Mounting method	VLC/VLDI 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
Weather cover		X		X
Outdoor enclosure		X		X

Mounting

Support legs

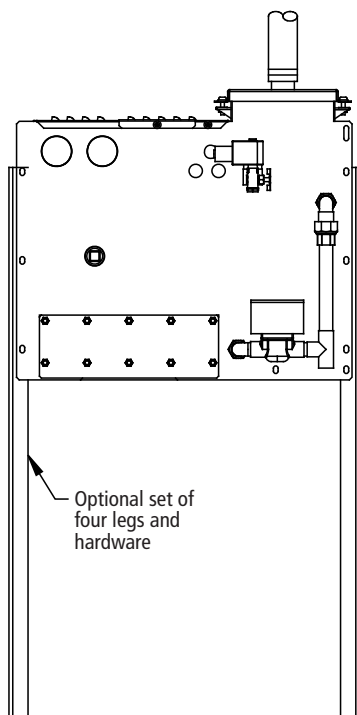
Use enclosed bolts, nuts, and washers to fasten legs to tank. Shim or adjust so the tank sets level side to side and front to back. Verify level after the tank is filled and is at operating weight.

More on next page ►

WARNING!

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

Figure 9-1:
Support legs



VLC-OM-006

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.

Important:

Installation must comply with governing codes.

Trapeze hanger

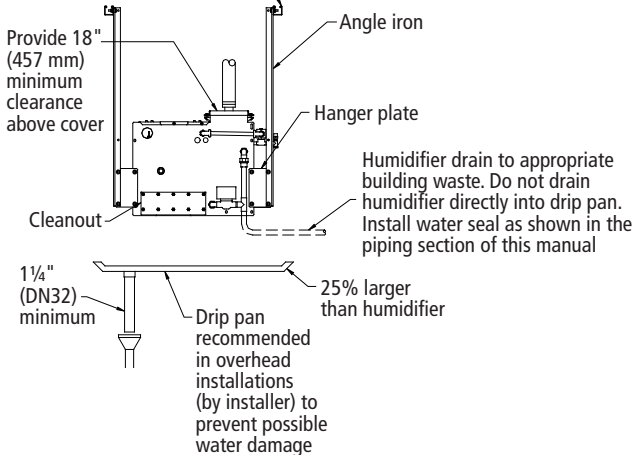
Secure trapeze hanger to an overhead structure that is strong enough to support the operating weight of the Vaporstream humidifier and field installed piping, plus the weight of the control cabinet if it is mounted on the humidifier.

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

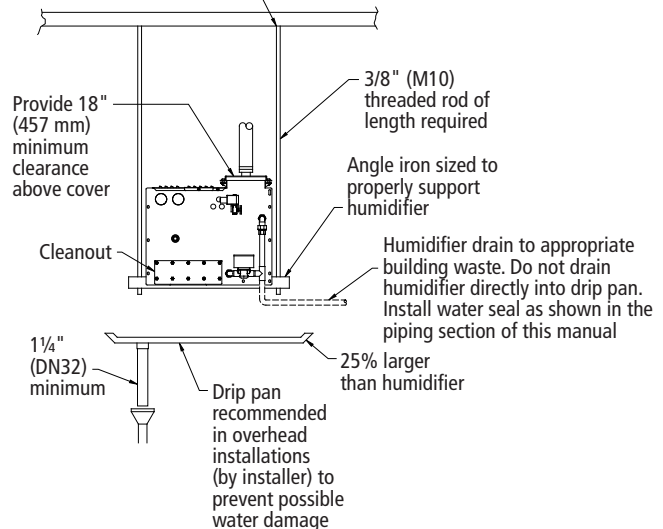
Vaporstream Models 2-1 through 5-1

Secure channel to an overhead structure that is strong enough to support the Vaporstream's operating weight. See the weight tables in this document.



Vaporstream Models 6-1 through 100-4

Secure rods to an overhead structure that is strong enough to support the Vaporstream's operating weight. See the weight tables in this document.



VLC-OM-038

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 below.
 - 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
- 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 side to side and front to back. Verify level after the tank is filled and is at operating weight.

Important:

Installation must comply with governing codes.

Figure 11-1:
Wall brackets

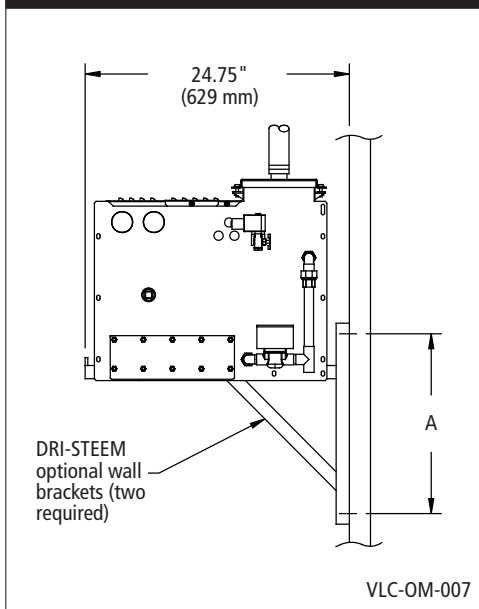


Table 11-1:
Wall brackets Dimension A
(center to center of mounting holes)

Vaporstream model	inches	mm
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

Notes:
 * Wall bracket installation on metal stud walls is not recommended for nine-heater and twelve-heater models
 • Wall brackets are not available for models 2-1, 3-1, 4-1, or 5-1.

Weather cover

Optional Vaporstream weather cover

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

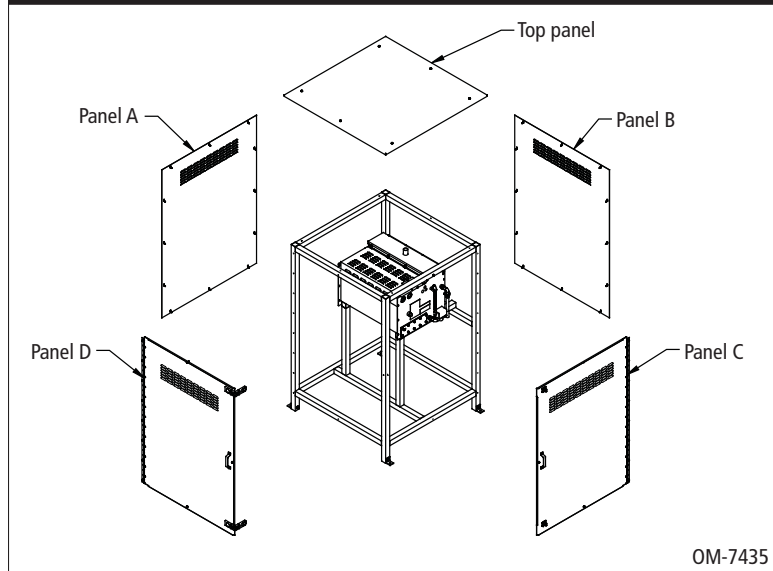
**Table 12-1:
Weather cover weights**

Weather cover size	lbs	kg
1-heater	390	172.4
3-heater	395	172.4
6-heater	430	181.4
9-heater	465	190.5
12-heater	500	199.6

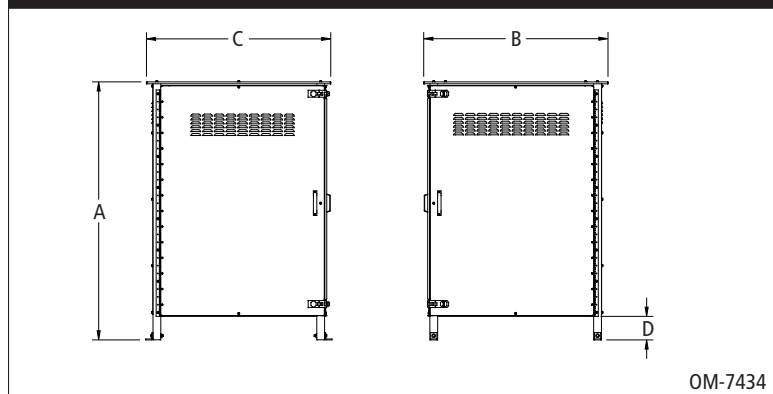
Note:

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

**Figure 12-1:
Weather cover exploded view**



**Figure 12-2:
Weather cover dimensions**



**Table 12-2:
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

Weather cover

The weather cover encloses the Vaporstream humidifier to protect it from wind, sun, and rain. The weather cover is fully assembled at the DRI-STEEM factory. It has been tested and evaluated by ETL Testing Laboratories, Inc., and is listed to UL Standard 1995 and CAN/CSA Standard C22.2 No. 236.

Installation notes

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

Installation issues specific to weather cover applications

- Installation must comply with all governing codes.
- The bottom of the weather cover is open to accommodate piping and electrical connections.
- Electrical connections must be made with approved, outdoor-rated, watertight conduit.
- Freeze protection must be provided on all water piping.
- Steam supply must be insulated.
- Avoid using 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

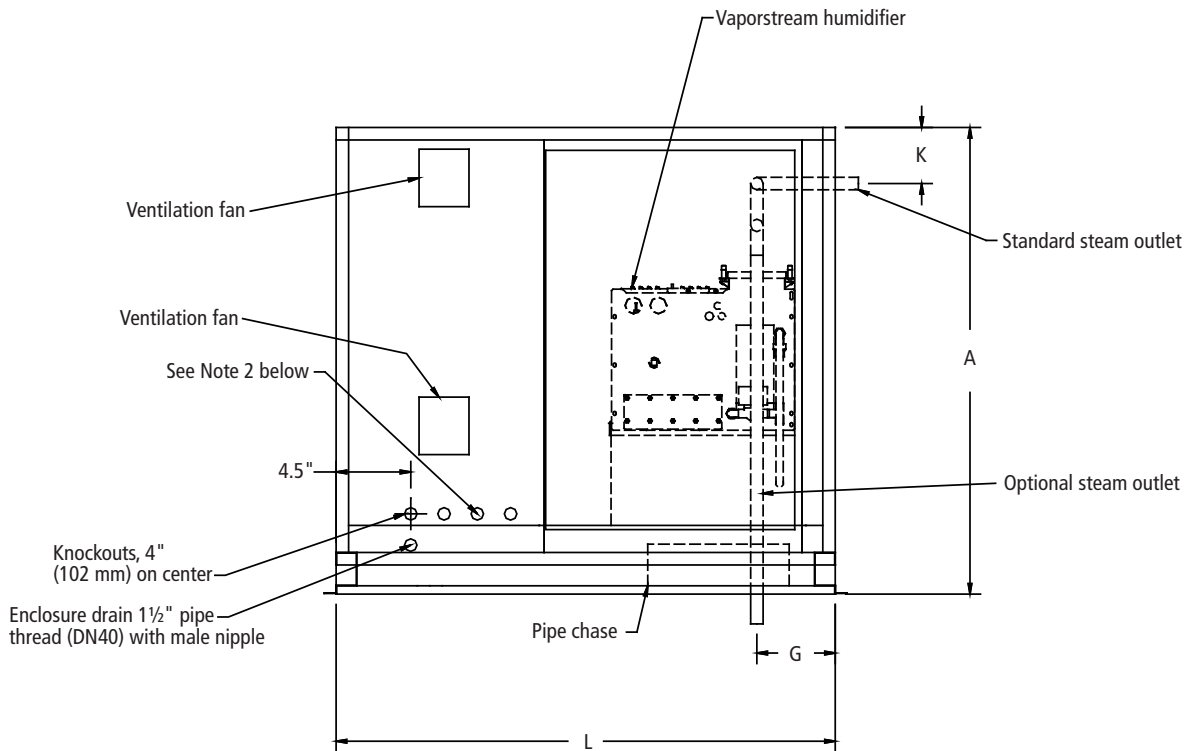
- Check all fasteners and verify they are secure.
- Check for any sign of leakage — trace back to origin and repair.

Note:

For information about the Vaporstream Outdoor Enclosure (a weather-tight enclosure with access doors, supplemental heating and cooling fan[s]), see Pages 14-22.

Outdoor enclosure

Figure 14-1:
Vaporstream outdoor enclosure with standard or optional steam outlet, elevation view



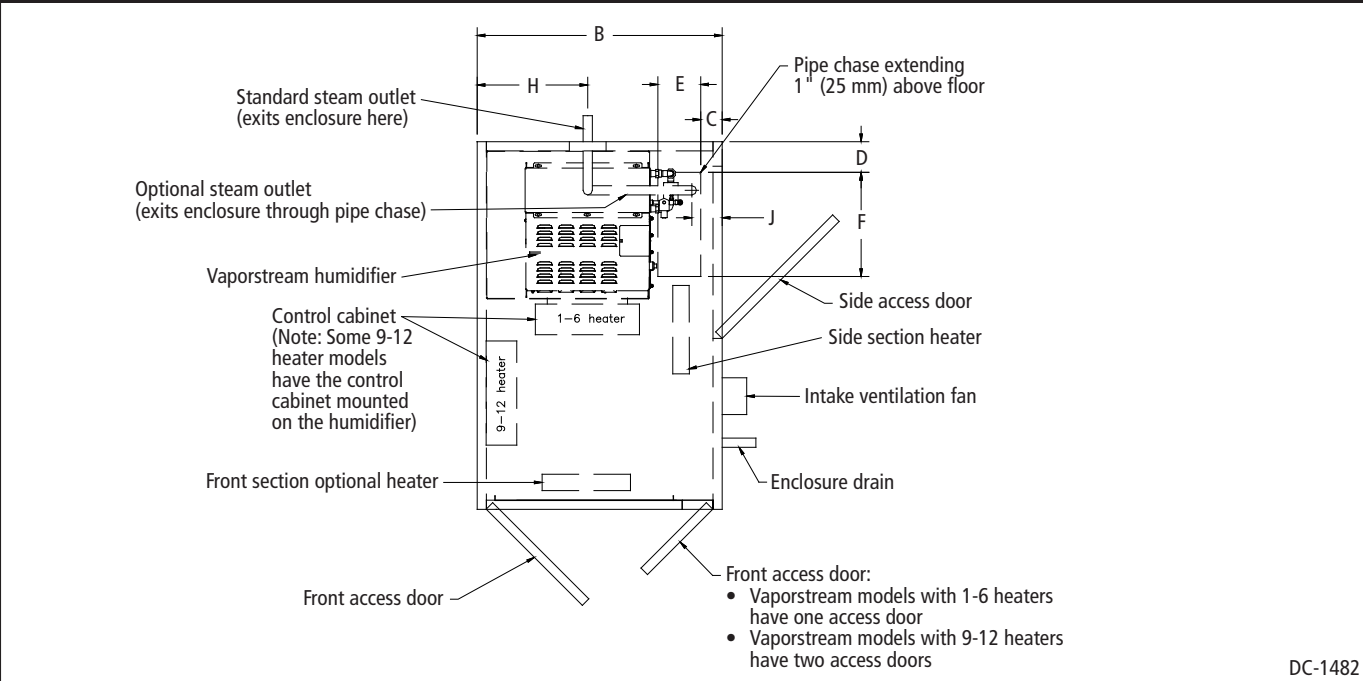
DC-1481

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, beginning on Page 32, 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.
4. See dimensions tables on the next page.

Outdoor enclosure

**Figure 15-1:
Vaporstream outdoor enclosure, top view**



**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	64	2.50	64
		2.50	64	2.50	64
E	Pipe chase size	8.00	203	8.00	203
		19.50	495	19.50	495
G		13.50	343	13.50	343
		22.00	559	29.50	899
H	Steam pipe position	7.00	178	7.00	178
		8.25	210	9.25	235
J		60.00	1524	64.00	1626
L	Length				

Note:
* See drawings above and on the previous page.

Note:
The Outdoor Enclosure is only available in the United States and Canada.

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

Note:
* Includes humidifier

Specifications

- See Page 4 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)	1/4" pipe thread (DN8)
Drain	3/4" (DN20)
Condensate return	3/4" pipe thread (DN20)

Outdoor enclosure

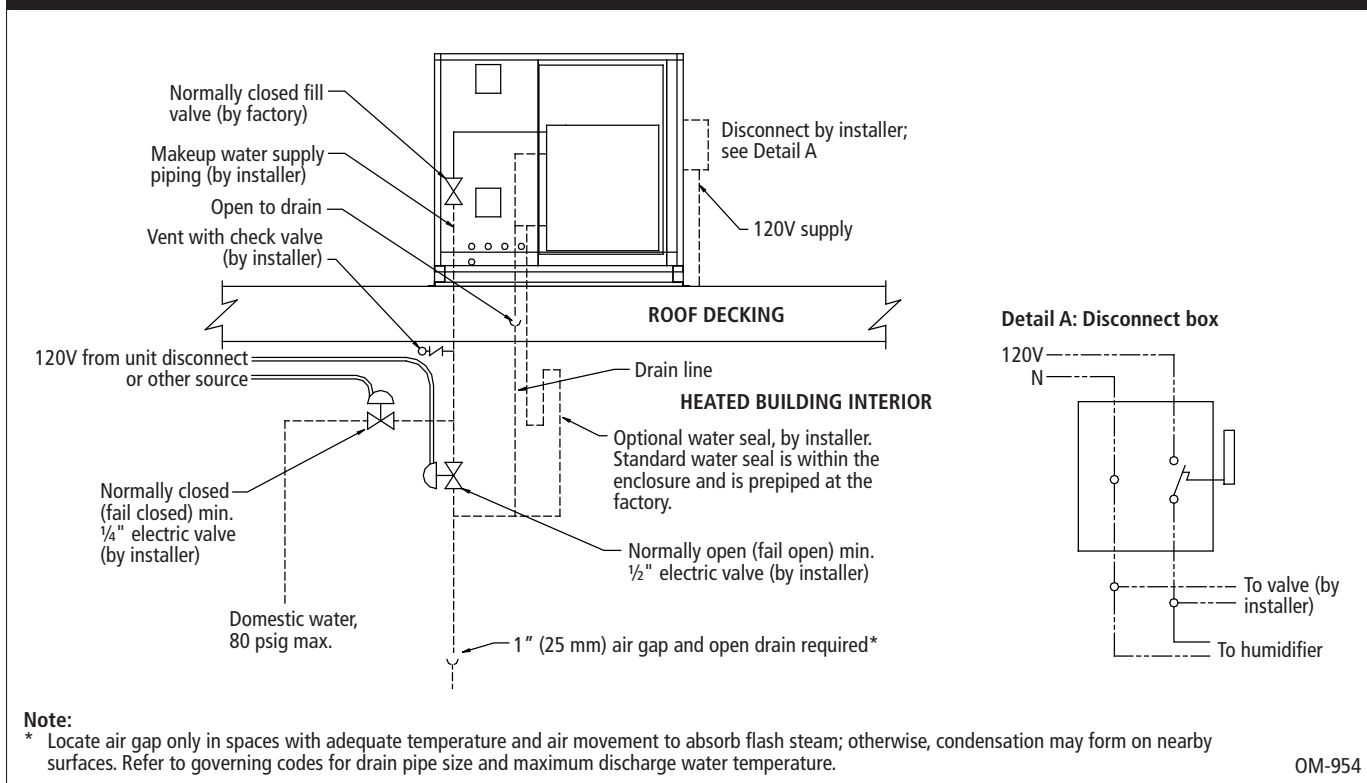
The outdoor enclosure option is used when DRI-STEEM humidifiers are installed outdoors. The following information is not intended to supersede any requirements of federal, state or local codes having jurisdiction; prior to installing the unit, consult authorities having jurisdiction.

Operating temperatures

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

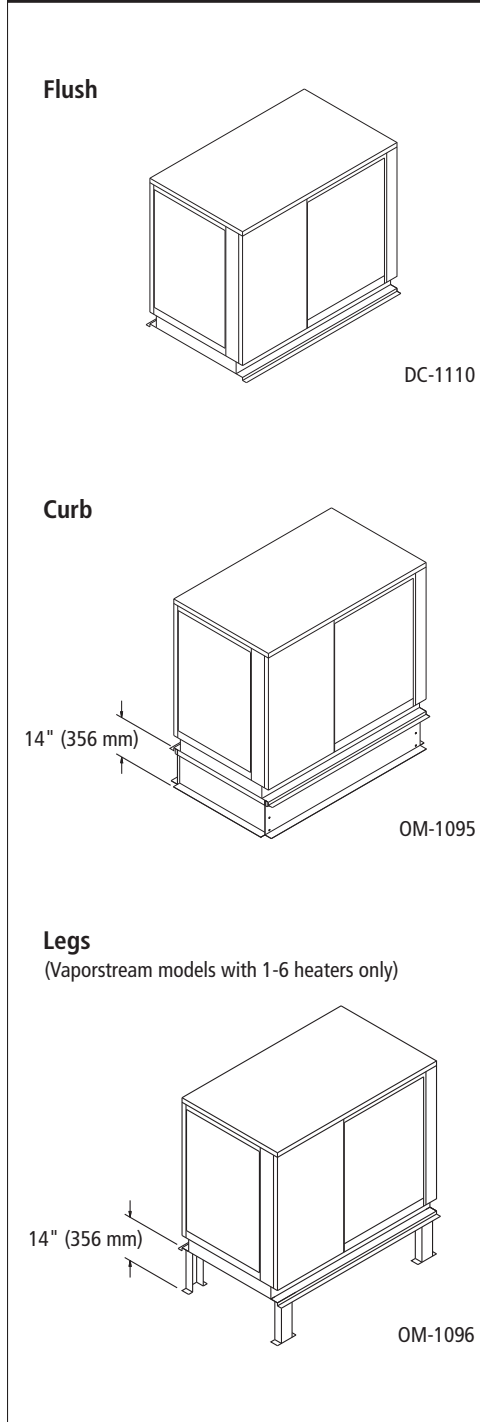
Insulate supply water piping to avoid dripping from condensation. To ensure that water will not remain in the fill line and freeze if there is a loss of power, field-install additional valves in a conditioned space upstream of the fill valve. These valves should be powered on the same circuit as the 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



Outdoor enclosure

Figure 18-1:
Outdoor enclosure mounting options



Outdoor enclosure mounting

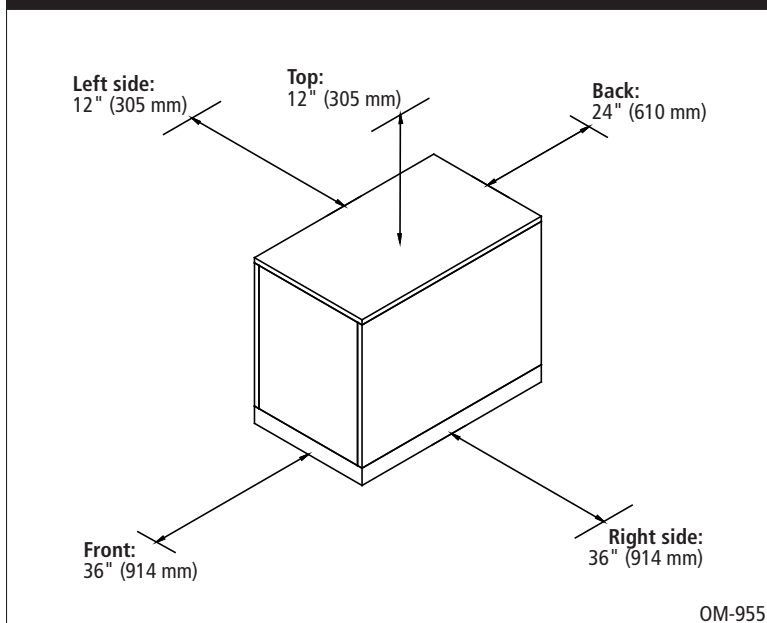
- The outdoor enclosure must be level and located so that there is enough clearance for opening the access doors.
- Verify that the position of support legs, pad, or curb properly support the unit and that support structure dimensions coincide with unit dimensions.
- Locate unit so that air intakes are not too close to any exhaust fan outlets, gasoline storage, or other contaminants that could potentially cause dangerous situations. The use and storage of gasoline or other flammable vapors and liquids in open containers in the vicinity of this appliance is hazardous.
- When located on the roof, the outdoor enclosure air intakes must be a minimum of 14" (356 mm) above the roof to prevent intake of snow or splashed rain. Locate the outdoor enclosure so that prevailing winds do not blow into the air intakes.
- Be sure to remove all shipping brackets and other packaging prior to installing the unit.
- During transit, unloading, and setting of the unit, bolts and nuts may have become loosened. Check that all nuts are tightened.
- There are four knockouts located on the right and left side of the enclosure. It is recommended that the electrical power is run into the enclosure at these knockouts.
- The outdoor enclosure is designed for handling by two methods. In both cases it must be lifted from the bottom base using a method that holds it level, and keeps it from tipping, falling, or twisting. If the unit is severely twisted during handling, permanent damage may occur. It is the installer's responsibility to verify the handling equipment's capability to safely handle the unit.
- The preferred method of lifting is by forklift. This is only possible if forks extend across the entire unit. Forks that do not extend across the entire unit could cause tipping resulting in unsafe conditions or damage to the unit.
- The alternative method of handling is through the unit's channel base frame and/or special lifting lug hooks installed on the unit. All lifting operations must be accomplished with a load spreader of sufficient width to ensure that the lifting cables clear the side of the unit. If this type of spreader is not available, wood strips should be inserted between the cables and unit where necessary. All four lifting points must be used and will be marked "lift here" on the unit.

Outdoor enclosure

- The outdoor enclosure has two available steam distribution configurations. The standard configuration has a steam outlet on one side of the outdoor enclosure for connecting to steam dispersion unit piping. The optional internal steam distribution configuration routes steam within the outdoor enclosure and down through the pipe chase into a building. See Page 15 for outdoor enclosure dimensions.
- A pipe chase is located inside the enclosure. A cover for the pipe chase is provided to maintain proper pressure within the enclosure in the event that this opening is not utilized. However, it is recommended that this pipe chase be used for both the supply water piping and drain piping, in which case the pipe chase cover should be removed. Install insulation rated for 212 °F (100 °C) to completely fill the area around the pipes to maintain proper enclosure pressure.
- When the enclosure is pad-mounted or when the pipe chase cannot be used, the supply water and drain piping can be run through the knockouts, although preferably on the opposite side from the utility connections.

More on next page ►

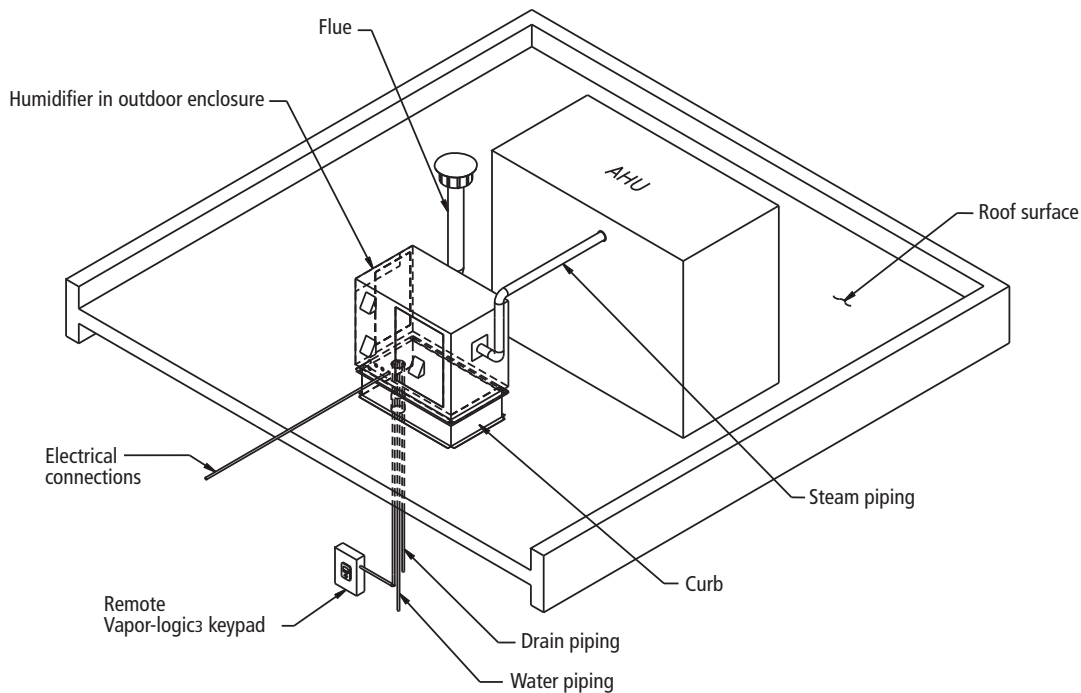
Figure 19-1:
Outdoor enclosure clearances



Outdoor enclosure

- When ordered with the heater package, two thermostat-controlled heaters are provided: one strip heater is located in the control cabinet section, and one strip heater is located in the front section to keep the enclosure at a constant minimum temperature.
- An enclosure drain is provided. In case of a water leak, water will drain from the enclosure through this drain.
- For humidifiers with Vapor-logic^{®3} control, a keypad with standard 5' (1.5 m) cable ships mounted to the subpanel in the outdoor enclosure. The keypad must not come in contact with the strip heaters or block the intake ventilation hood.
- If constant monitoring of the unit is desired, or if the unit is located in a severe climate, a remote mount keypad should be installed. Additional cable lengths up to 500 feet (152 m) are available as an option for this mounting configuration (Vapor-logic³ control required).

Figure 20-1:
Typical rooftop installation overview



DC-1210M

Outdoor enclosure

- Curbs (optional) will be shipped knocked down for ease of transporting to the roof. Curbs are manufactured of 16-gauge galvanized steel and shipped with all hardware for bolt-together assembly. All holes are matched before leaving the factory. Curb is to be a minimum of 14" (356 mm) high. A 2" × ½" closed-cell curb gasket with adhesive on one side is supplied with hardware. The gasket must be installed between the top of the curb and the base surface of the outdoor enclosure to prevent moisture from leaking into the building from either driving rain or melting snow. An installation drawing is also included.
- Stand legs (optional): Four symmetrically-shaped stand legs are provided with all the necessary hardware for elevating the outdoor enclosure 14" (356 mm) from the ground. The stand legs should be securely mounted to the grade by the installing contractor. To prevent the outdoor environment from penetrating the enclosure, close-off provisions must be made between the stand legs.
- All piping from the humidifier 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.

More on next page ►

Outdoor enclosure

Operation

When power is applied to the outdoor enclosure:

- If the ambient temperature in the enclosure is below 50 °F (10 °C), the enclosure strip heaters are powered up. The humidifier is not allowed to operate unless the temperature inside the enclosure is equal to or greater than 35 °F (2 °C). The strip heaters will power down when the temperature inside the enclosure reaches 50 °F (10 °C). The aquastat feature of the humidifier will allow the humidifier to continue operating until it reaches a factory default tank temperature of 70 °F (21 °C). This temperature can be reset in the field to be up to 180 °F (82 °C)
- If the ambient temperature in the 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 the ambient temperature in the enclosure is 150 °F (66 °C) or greater, a high limit switch powers down the humidifier. The ventilation fans will continue to run and, once the enclosure temperature falls below 130 °F (54 °C), the humidifier will automatically resume normal operation.
- If there is a power loss to the enclosure, the normally-open (fail-open) drain valve will drain the humidifier.

Piping: Overview

Figure 23-1:
Field piping overview for Vaporstream Model VLC (standard water models)

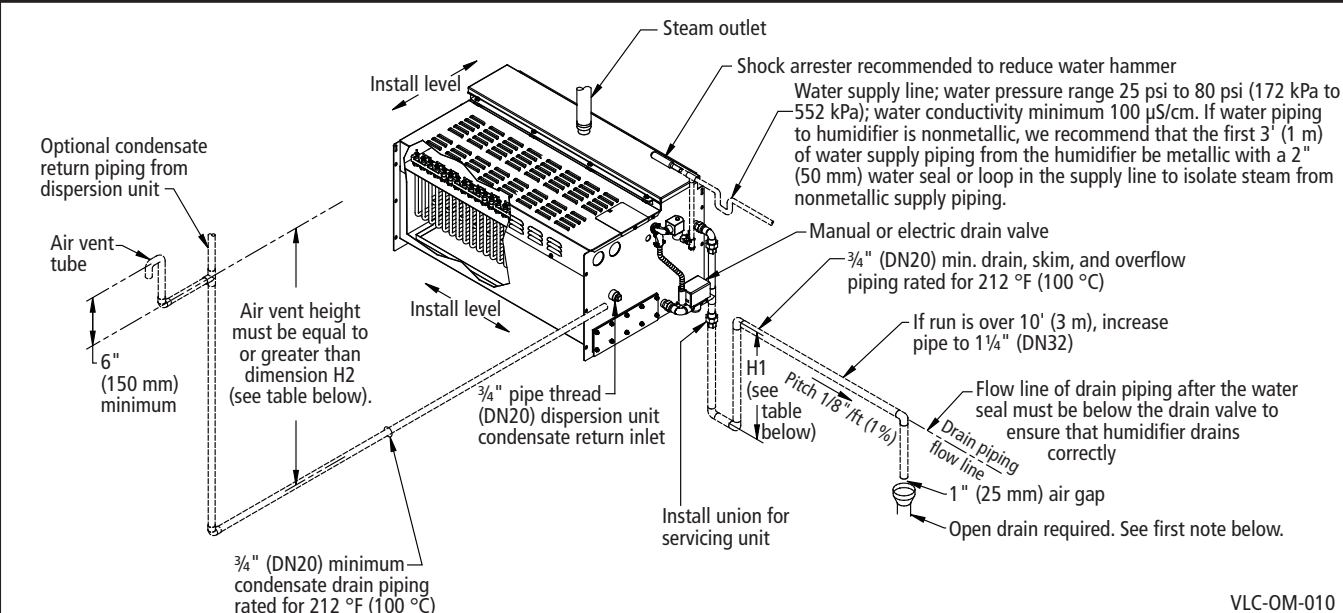


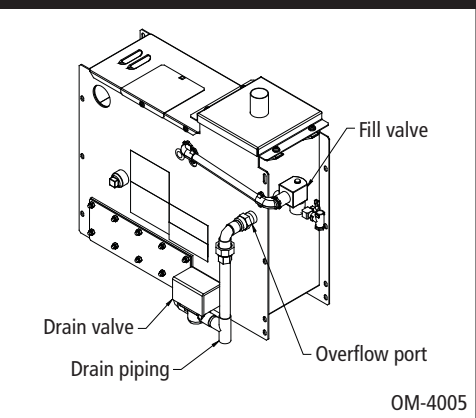
Figure 23-1 notes:

- 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 piping 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.
- See the next page for recommended water supply piping for Model VLDI (DI/RO water model).
- See the dispersion section of this manual for more information about condensate piping and piping that connects the humidifier to the dispersion assembly.

Table 23-1:
Heights required to overcome Vaporstream internal pressure (H1, H2)

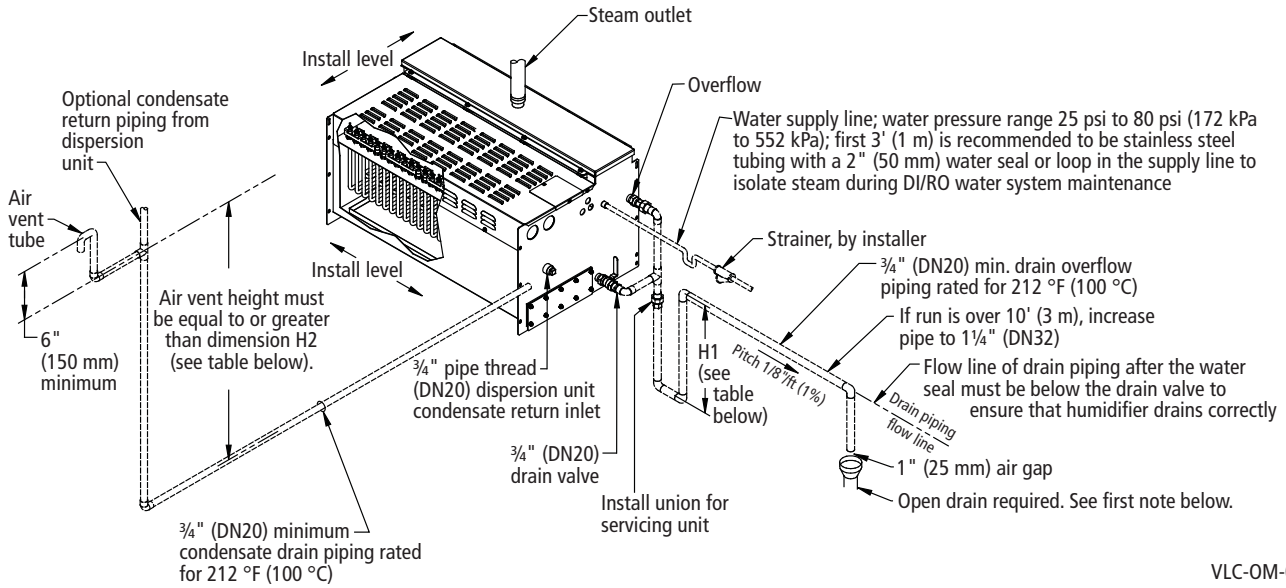
Unit output			Water seal height (H1)		Air vent height (H2)	
kW	lbs/hr	kg/h	inches	mm	inches	mm
≤ 48	≤ 138	≤ 62	12	305	22.5	572
49-64	139-183	63-83	15	381	27.5	699
> 64	> 183	> 83	18	457	30.5	775

Figure 23-2:
VLC Models 2-1 through 5-1 piping



Piping: Overview

Figure 24-1:
Field piping overview Vaporstream Model VLDI (DI/RO water models)

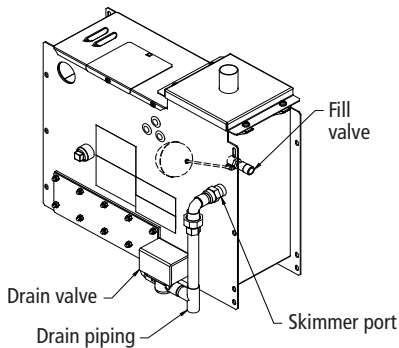


VLC-OM-011

Figure 24-1 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.
- See the previous page for recommended water supply piping for Model VLC (standard water system).
- See the dispersion section of this manual for more information about condensate piping and piping that connects the humidifier to the dispersion assembly.

Figure 24-2:
VLDI Models 2-1 through 5-1 piping



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Table 24-1:
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

Piping: Drain

Drain piping

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 a sufficient height to contain the pressure developed in the humidifier system. See the tables on Pages 23 and 24 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. A check valve is required on the discharge of the pump (see Figure 26-1). 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.

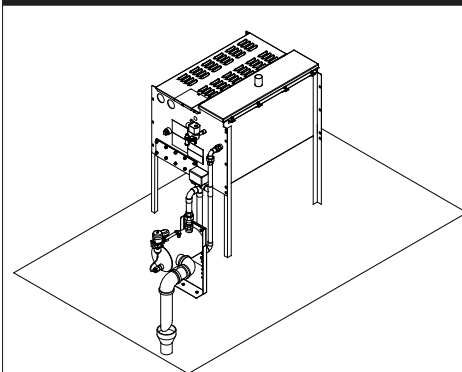
More on next page ►

CAUTION!

Opening the drain valve when the tank is hot can discharge water as hot as 212 °F (60 °C) into the drain system. This can damage the drain plumbing if the humidifier is not properly connected to a water tempering device such as a DRI-STEEM Drane-kooler. To prevent such damage from humidifiers without water tempering, allow the tank to cool before draining.

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Figure 25-1:
Drane-kooler water tempering device

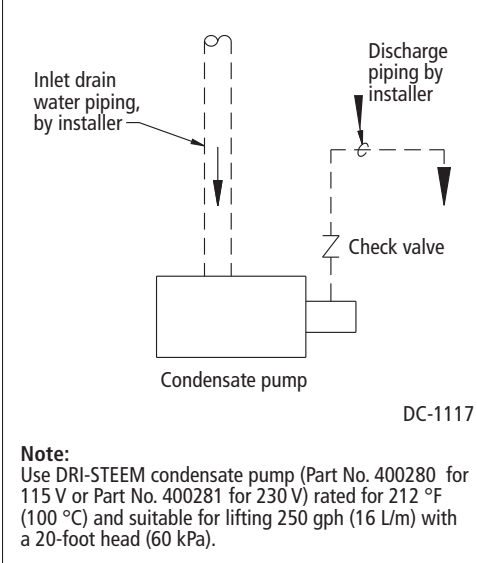


DRI-STEEM's Drane-kooler, shown mounted to a Vaporstream humidifier, tempers discharged water temperature. For other Drane-kooler mounting options or for more information, contact DRI-STEEM or view the Drane-kooler product data sheet in the literature section at www.dristeem.com

OM-956

Piping: Drain

**Figure 26-1:
Lifting drain water**



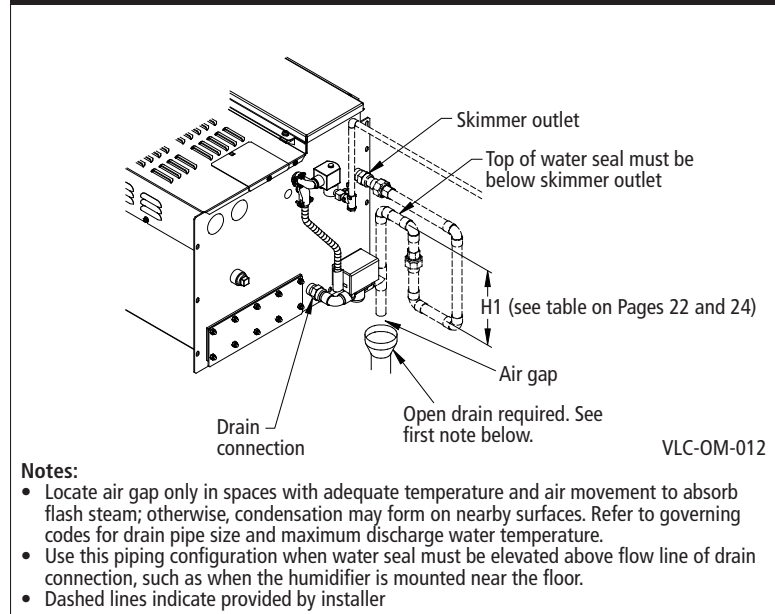
Model VLC humidifier. The drain connection to a VLC standard water humidifier is a ¾" (DN20) sweat (soldered) fitting. The installer should place a union directly after the factory drain fitting, provide a water seal of height H1 (from the table on Page 23), and pipe. To mount the humidifier closer to the floor, use the "Alternate water seal and drain valve piping" diagram shown on this page. 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.

The **VLDI humidifier** has 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 the table on Page 24), and pipe. To mount the humidifier closer to the floor, use the "Alternate water seal and drain valve piping" diagram shown on this page.

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 26-2:
Alternate water seal and drain valve piping**



Piping: Water supply

Water supply piping general instructions

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

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

VLC model (standard water) water supply piping

The water supply assembly includes a strainer, needle valve, and fill solenoid, and has a ¼" pipe thread (DN8) connection, except in Europe where it has a 3/8" pipe thread (DN10) connection. Since the primary component of the water supply assembly is a solenoid valve, there may be noise issues that surface during a fill cycle.

If water piping to the humidifier is nonmetallic, we recommend that the first 3' (1 m) of water supply piping from the humidifier be metallic with a 2" (50 mm) water seal or loop in the supply line to isolate steam from nonmetallic supply piping (see Figure 23-1 on Page 23).

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

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

The minimum water conductivity for the VLC standard water model is 100 µS/cm.

More on next page ►

Piping: Water supply

WARNING!

Do not supply a Vaporstream Model VLDI humidifier with tap water. Tap water causes the float valve assembly to become clogged with particulate accumulating on the low water cutoff switch (float switch), causing a critical safety circuit to fail. This can cause a dry tank fire, which can cause severe personal injury or death.

Note:

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

VLDI model water supply piping

VLDI models control water level with a float valve, and have a ¼" pipe thread (DN8) connection, except in Europe where they have a 3/8" pipe thread (DN10) connection. For DI models 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-logics 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 a 3' (914 mm) piece of noninsulated stainless steel pipe directly off the humidifier prior to connecting to the nonmetallic tubing. When using nonmetallic tubing, DRI-STEEM recommends the installer place a 2" (50 mm) water seal/loop in the supply line to isolate steam during DI/RO water system maintenance. (See Figure 24-1 on page 24.)

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.

Wiring

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).

More on next page ►

WARNING!

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 the control cabinet door or remove the heater terminal cover until electrical power is disconnected. When drilling penetrations in the control cabinet, make sure the unit is powered off. Contact with energized circuits can cause property damage, severe personal injury, or death as a result of electrical shock.

CAUTION! 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

Wiring requirements

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.

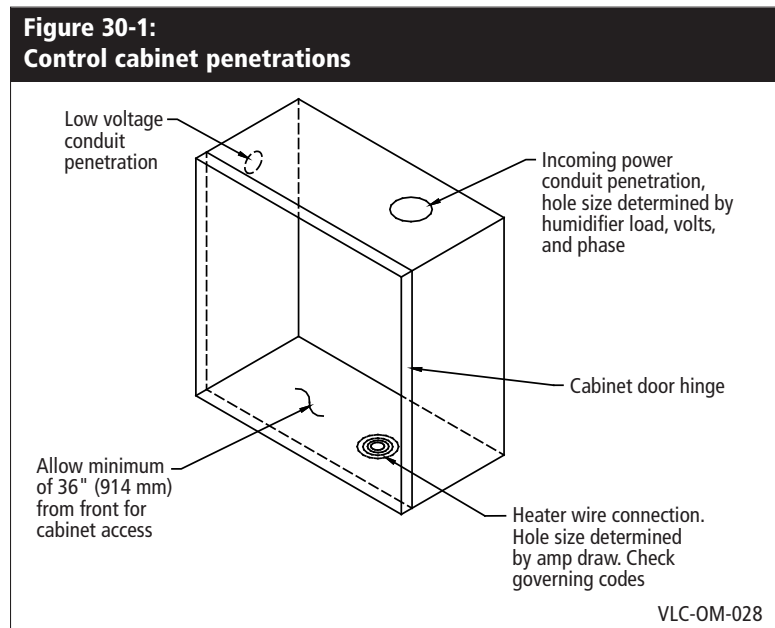
The control cabinet should be mounted in a location convenient for service with a minimum of 36" (914 mm) clearance in front of the door.

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.

Component torque requirements:

- The contactor screw connection requires 16 inch-lbs (1.8 Nm) of torque.
- The heater lug torque depends on the 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)



Wiring

Proper wiring prevents 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 mm²) 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.**

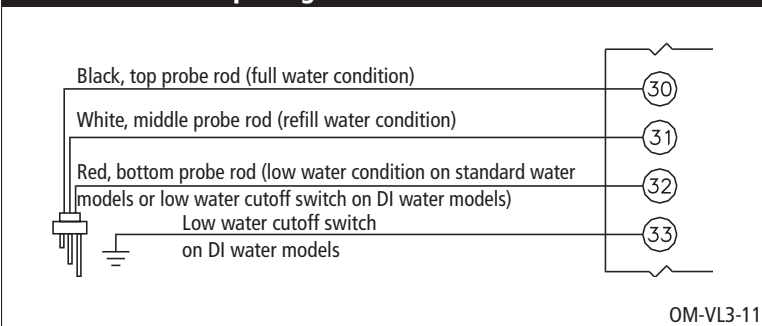
More on next page ►

WARNING!

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.

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

Figure 31-1:
Humidifiers with Vapor-logic³ control



Wiring

Important: Installing the keypad

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

Note that the keypad 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 instructions

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 mm²) plenum rated, shielded (screened), twisted pair wire with a bare drain wire for grounding.
- Airflow proving switch wiring must be minimum 18-gauge (1 mm²) stranded wire run in conduit. The airflow proving switch can be wired using minimum 18-gauge (1 mm²) plenum rated, shielded (screened), twisted pair wire with a bare drain wire for grounding.
- The shield (screen) wire should be connected to the shield (screen) ground terminal/lug with a length less than 2" (51 mm). Do not ground the shield (screen) wire on the humidistat or transmitter end.
- Water level control device, 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 mm²) stranded wire if the control cabinet is located within 10' (3 m) of the humidifier. For wire lengths of 10' to 50' (3 m to 15 m), use 18-gauge (1 mm²) plenum rated, **shielded (screened)**, twisted pair wire with a bare drain wire for grounding.

Grounding requirements

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

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

When the control cabinet is mounted remotely from the humidifier, a ground wire is necessary from the machine ground lug on the humidifier to the machine ground lug in the control cabinet. The bonding machine ground wire should be the same AWG (mm) as the largest heater wire or sized per NEC or IEC 60364 requirements.

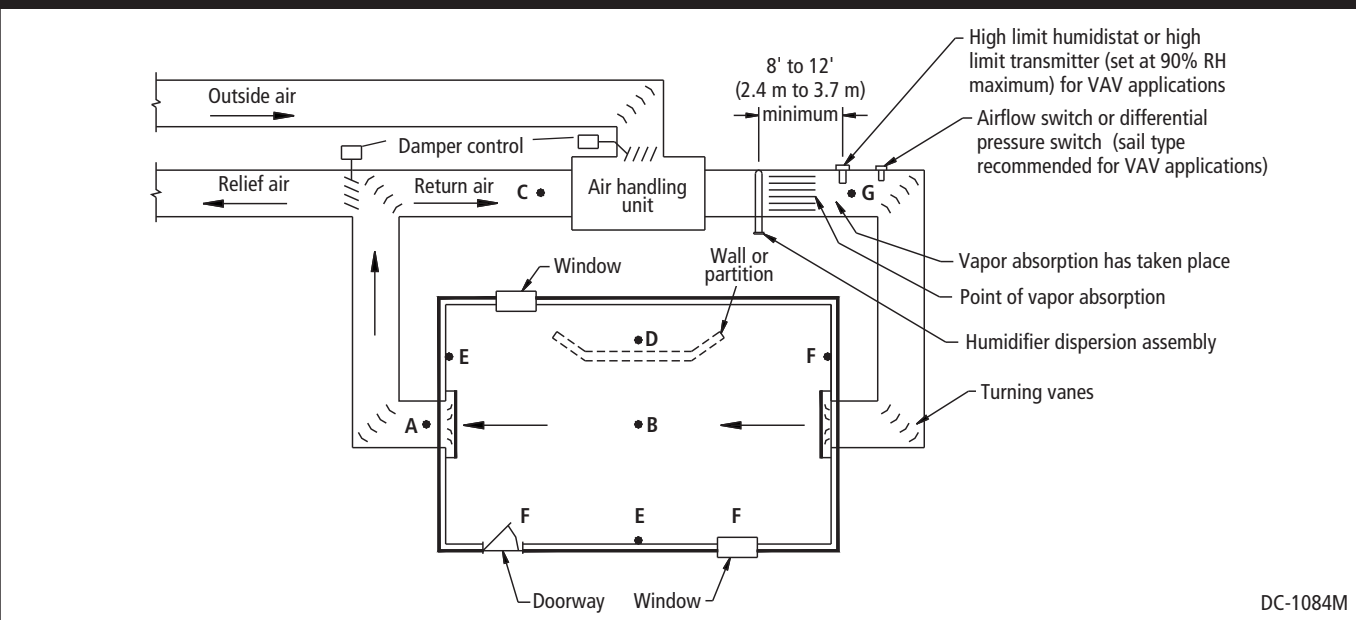
Humidistat and transmitter placement

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.

Figure 33-1:
Recommended humidistat and transmitter locations



DC-1084M

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Dispersion: General instructions

Where to find more information

In this document:

- Interconnecting piping and drip tee installation, Pages 35-37
- Single tube and multiple tube installation instructions, Pages 38-42
- Rapid-sorb® installation instructions, Pages 43-49
- SDU-I and SDU-E (space distribution units) information, Pages 50-54
- Area-type fan information, Pages 55-56

On our web site:

The following documents can be viewed, printed or ordered from our web site, www.dristeem.com

- Catalogs (include dispersion nonwetting distance graphs):
 - Vaporstream
 - Ultra-sorb®
- Installation, Operation and Maintenance manuals:
 - Ultra-sorb
 - Vapor-logic3 (includes sensor placement recommendations and troubleshooting information)
- *DRI-STEEM Design Guide* (includes steam loss tables and general humidification information)

On Dri-calc:

Dri-calc® is our humidification system sizing and selection software, and may be ordered at our web site, www.dristeem.com.

Included in Dri-calc:

- A comprehensive library of installation guide documents, including:
 - Rapid-sorb installation instructions for vertical airflows
 - Recommended dispersion placement within a duct or air handler
 - Recommended sensor placement

Or call us at 800-328-4447

While obtaining documents from our web site or from Dri-calc is the quickest way to review our literature, we'd also be happy to mail to you any literature you need.

Selecting the dispersion assembly location

- For each dispersion device, DRI-STEEM documents distances required for non-wetting to occur. If you have questions about absorption non-wetting distances, see the non-wetting tables in the Vaporstream catalog, available for viewing, printing or ordering at www.dristeem.com
- It is important that the dispersion assembly be positioned where the water vapor being discharged is carried off with the airstream and is absorbed before it can cause condensation or dripping in the duct.
- In general, the dispersion assembly is best placed where the air can most readily 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. The filter can remove the visible moisture and become waterlogged.
- Place the dispersion assembly such that absorption will occur before coming in contact with any metal surface.
- Place the dispersion assembly such that absorption will occur before fire or smoke detection devices.
- Place the dispersion assembly such that absorption will occur before a split in the duct. Otherwise, the dispersion assembly may direct more moisture into one duct than the other.
- When draining dispersion condensate to an open drain, provide a 1" (25 mm) gap between the condensate drain piping and the drain. Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam; otherwise, condensation may form on nearby surfaces.

Dispersion: Interconnecting piping requirements

Connecting humidifier to dispersion assembly with vapor hose

- Support vapor hose to prevent sags, or low spots, and to maintain a minimum pitch of 2"/ft (15%) back to the humidifier.
- 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.]
- See the maximum steam carrying capacity table on the next page.
- Use DRI-STEEM vapor hose. Other manufacturers of vapor 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 vapor hose in outdoor applications.
- Do not insulate vapor hose. Insulation causes accelerated heat aging, causing the vapor hose to become hard and susceptible to failure due to cracks.
- The steam outlet on the humidifier is sized to the output of the humidifier. DO NOT use hose with an inside diameter (ID) smaller than the humidifier steam outlet.
- If the humidifier must be located above the dispersion assembly, use the recommend installation as shown on Page 37.
- For single tube applications, see the hose kit sizing chart on Page 38.

Connecting humidifier to dispersion assembly with tubing or pipe

- See the table on Page 39 for interconnecting tubing and pipe pitch requirements for single tube and multiple tube applications. See the table on Page 44 for interconnecting tubing and pipe pitch requirements for Rapid-sorb applications.
- The steam outlet on the humidifier is sized to the output of the humidifier. DO NOT use interconnecting tubing or pipe with an inside diameter (ID) smaller than the humidifier steam outlet. **REDUCING THE INSIDE DIAMETER OF THE INTERCONNECTING PIPING WILL RESULT IN THE INTERNAL HUMIDIFIER SYSTEM PRESSURE EXCEEDING THE PARAMETERS FOR ACCEPTABLE PERFORMANCE.**
- 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.

More on next page ►

WARNING!

Dispersion tube, vapor 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.

**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

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(s).

Connecting humidifier to dispersion assembly with tubing or pipe (continued)

- 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.
- If the humidifier must be located above the dispersion assembly, use the recommend installation as shown on Page 37.
- See the maximum steam carrying capacity table below.

**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

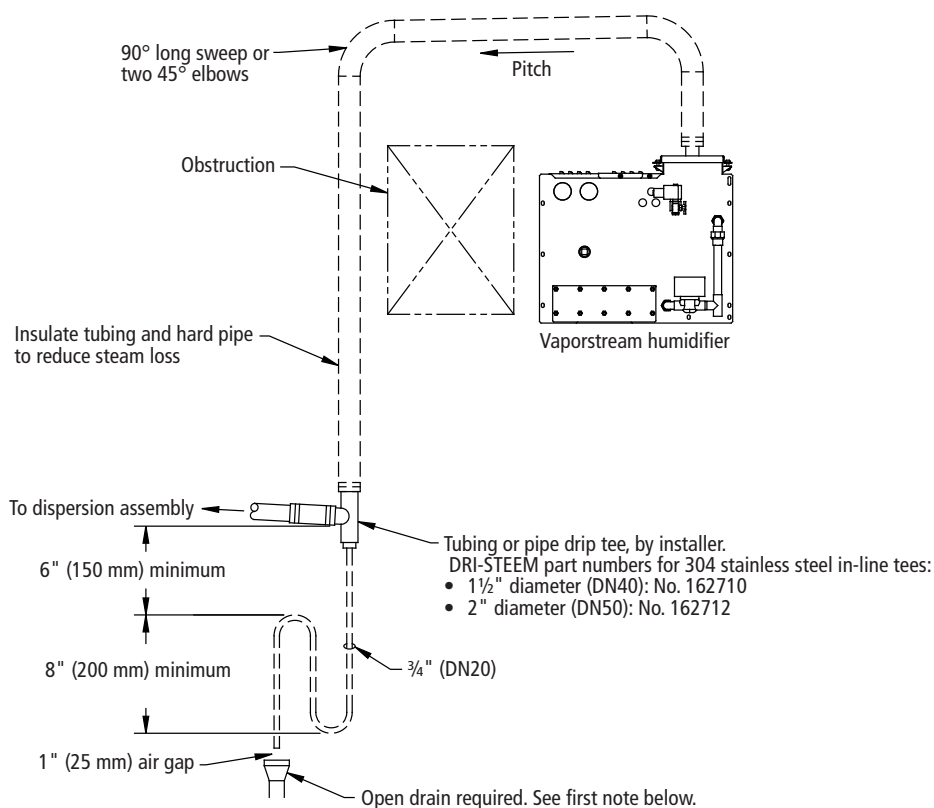
* Based on total maximum pressure drop in hose, tubing, or pipe of 5" wc (1244 Pa)
 ** Maximum recommended length for vapor hose is 10' (3 m). Longer distances can cause kinking or low spots.
 *** To minimize loss of capacity and efficiency, insulate tubing and pipe.
 † Developed length equals measured 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: Drip tee installation

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

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

Figure 37-1:
Drip tee installation (piping over an obstruction)



DC-1166

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

Important:

Failure to follow the recommendations in this section can result in excessive back pressures 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(s).

**Table 38-1:
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.

Installation

- See the following pages for detailed drawings and notes for installing single tube and multiple tube dispersion assemblies.
- See the hose kit sizing table on this page for single tube applications.

Dispersion tube mounting

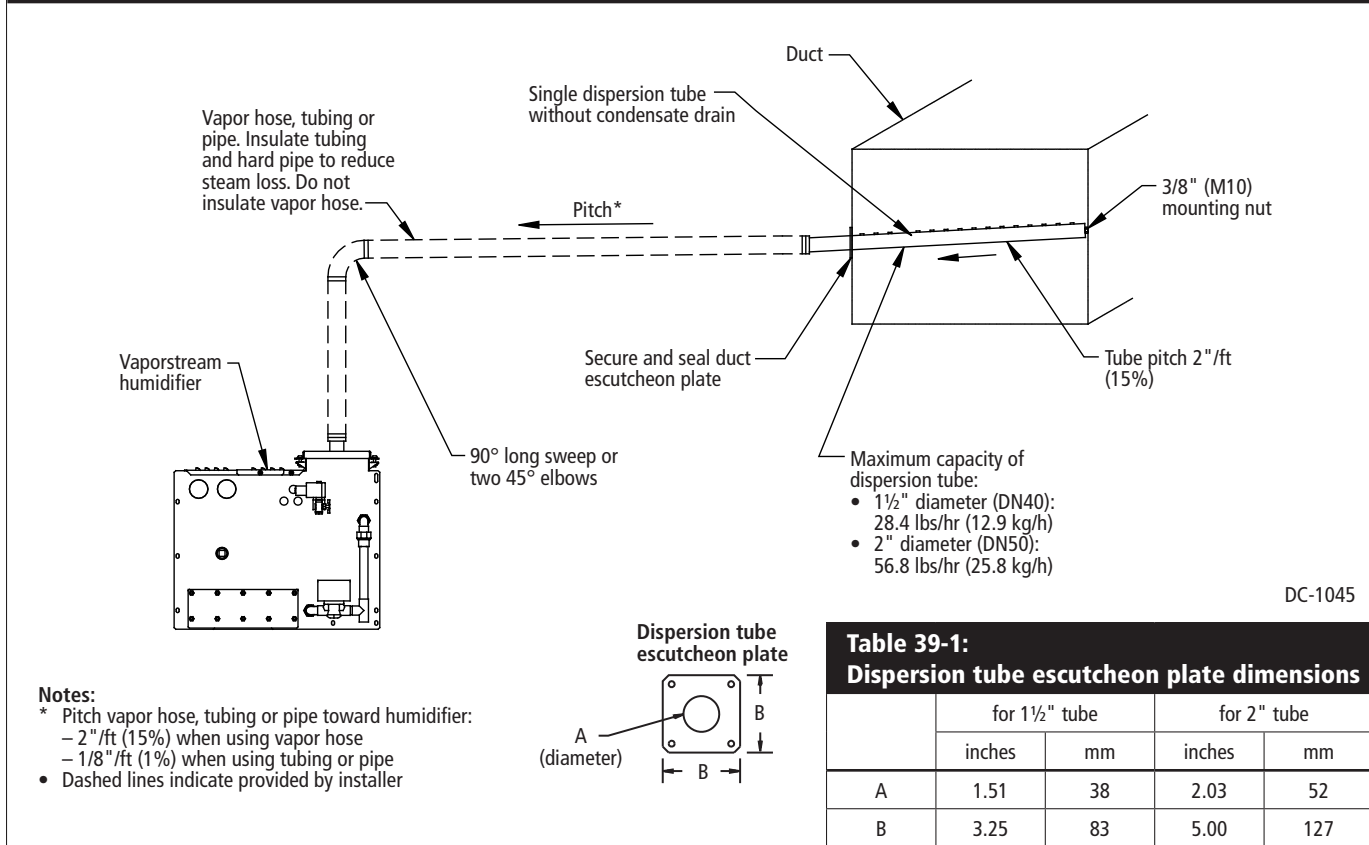
- Orient dispersion tube(s) so that tubelets (steam orifices) point up.
- See the table on the next page for dispersion tube pitch requirements.
- When mounting the humidifier above the level of the dispersion tube(s), see the drip tee installation drawing on Page 37.

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.

Dispersion: Single tube and multiple tube

**Figure 39-1:
Single tube dispersion without condensate drain**



DC-1045

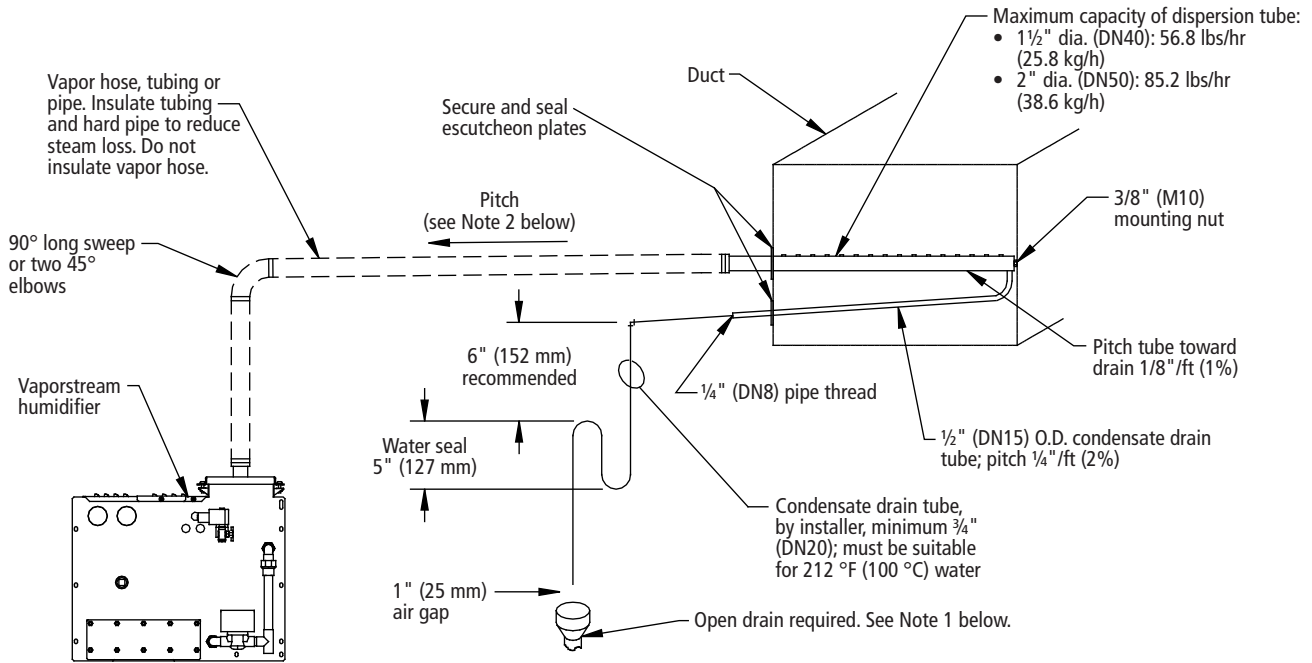
**Table 39-2:
Pitch of dispersion tube(s) and interconnecting piping for Single tube or multiple tube evaporative dispersion units***

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	1 1/2" (DN40)	2"/ft (15%) toward humidifier	2"/ft (15%) toward humidifier	No drain
		2" (DN50)			
	Tubing or pipe	1 1/2" (DN40)	1/8"/ft (1%) toward humidifier		
		2" (DN50)			
With drain	Vapor hose	1 1/2" (DN40)	2"/ft (15%) toward humidifier	1/8"/ft (1%) toward condensate drain	1/4"/ft (2%) toward floor drain or toward humidifier if humidifier is below dispersion unit
		2" (DN50)			
	Tubing or pipe	1 1/2" (DN40)	1/2"/ft (5%) toward humidifier		
		2" (DN50)	1/4"/ft (2%) toward humidifier		

Note:
 * When piping over an obstruction, see the drip tee installation illustration on Page 37.

Dispersion: Single tube and multiple tube

Figure 40-1:
Single tube dispersion with condensate wasted to floor drain

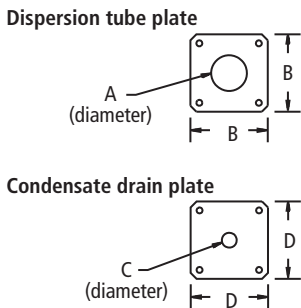


Notes:

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

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Figure 40-2:
Dispersion tube and condensate drain escutcheon plates



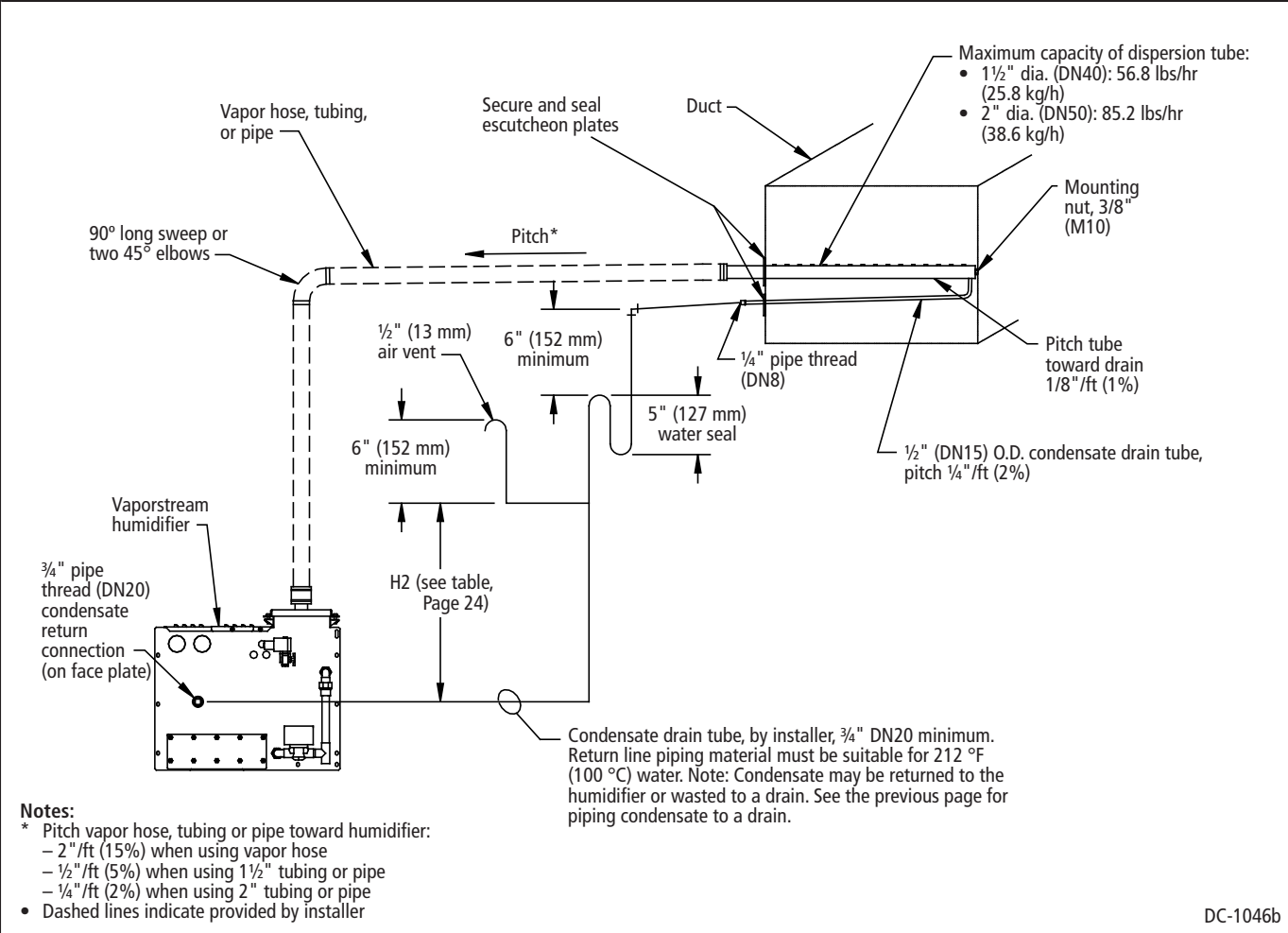
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Table 40-1:
Dispersion tube and condensate drain escutcheon plate dimensions

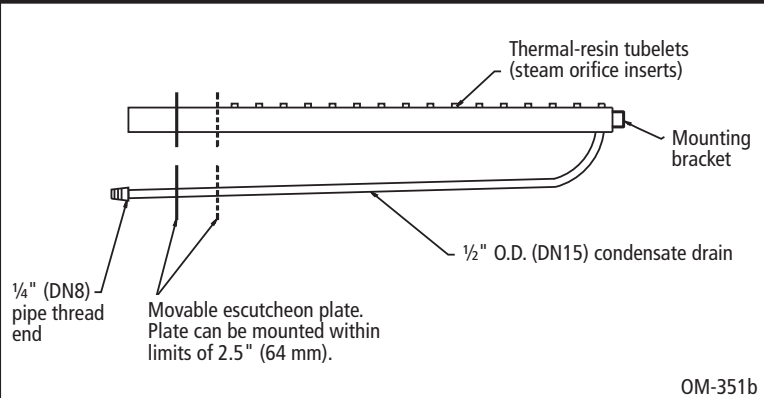
	for 1½" tube		for 2" tube	
	inches	mm	inches	mm
A	1.51	38	2.03	52
B	3.25	83	5.00	127
C	0.75	19	0.75	19
D	3.25	83	3.25	83

Dispersion: Single tube and multiple tube

**Figure 41-1:
Single tube with condensate returned to humidifier**

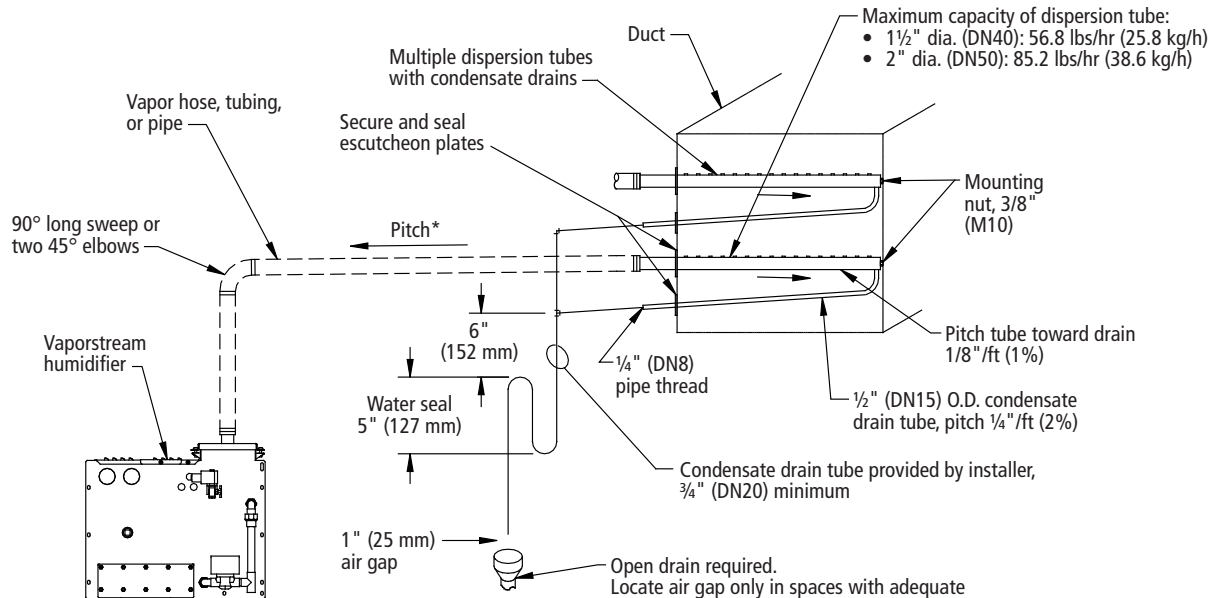


**Figure 41-2:
Single tube dispersion with condensate drain**



Dispersion: Single tube and multiple tube

**Figure 42-1:
Multiple tube with condensate wasted to floor drain**



Notes:

- * 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
- Dashed lines indicate provided by installer

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Dispersion: Rapid-sorb

General Rapid-sorb installation instructions

- Before you begin installation, read all dispersion instructions in this manual.
 - Before you begin installation, unpack shipment and verify receipt of all Rapid-sorb components with packing list. Report any shortages to DRI-STEEM factory immediately. The components typically include the following:
 - Multiple dispersion tubes
 - Header
 - $\frac{3}{4}$ " \times 2" (19 mm \times 51 mm) L-bracket
 - 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 are in a plastic bag.
 - The bolts and washers for mounting the dispersion tubes to the bracket will be in the end of the tubes or packaged in a bag with the other accessories.
 - The tubes, header, and L-bracket are tagged with the customer requested identification number written on each component.
 - When choosing a location for installation, select a 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.
 - Rapid-sorbs are provided with an L-bracket for installation:
 - L-brackets that are 50" (1270 mm) or less in length have a hole 4" (102 mm) in from each end to mount the L-bracket to the duct or air handler wall.
 - L-brackets that are greater than 50" (1270 mm) in length have an additional hole in the center of the L-bracket.
- 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 the table on Page 44). The size, quantity, and location of penetrations are determined by the specific dimensions and configuration of the Rapid-sorb assembly you received.
- Note:** The hardware for mounting the L-bracket to the duct or air handler wall and the hardware for the header support bracket is not provided.
- The Rapid-sorb instructions that follow are for the most typical Rapid-sorb installations — installed in a duct horizontal airflow 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.

More on next page ►

Important:

Failure to follow the recommendations in this section can result in excessive back pressures 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(s).

Table 43-1:
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

Table 43-2:
Rapid-sorb header capacities

Header capacity		Header diameter	
lbs/hr	kg/h	inches	DN
≤ 250	≤ 113	2	50
251-500	114-227	3	80
501-800	228-363	4	100

Dispersion: Rapid-sorb

Rapid-sorb pitch requirements

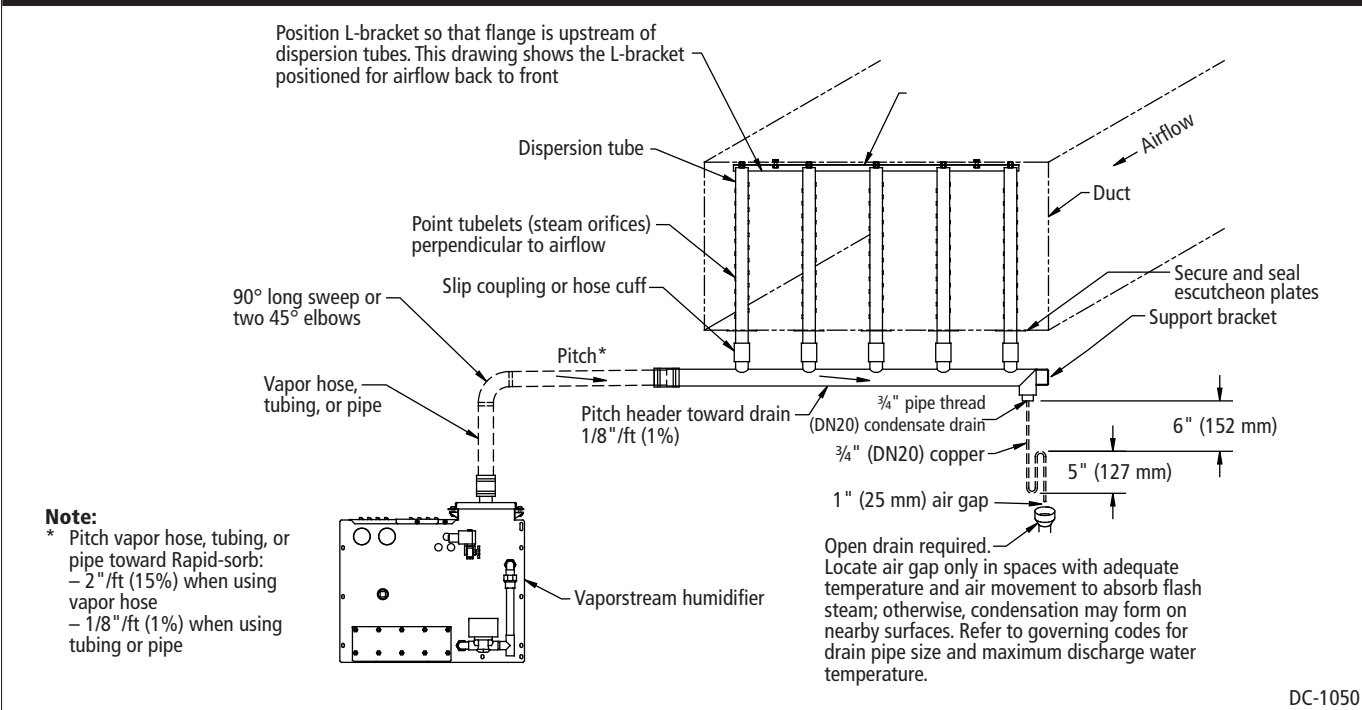
- When installing Rapid-sorb with the header outside a horizontal airflow duct, consider the following pitch issues:
 - For 1½" (DN40) dispersion tubes, use a fastener of sufficient length to accommodate the 1/8"/ft (1%) pitch requirements toward the ¾" pipe thread (DN20) header drain fitting.
 - For 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 the table below and the drawings on the following pages for pitch requirements.

**Table 44-1:
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	Vapor 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	Vapor 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		

Dispersion: Rapid-sorb

**Figure 45-1:
Rapid-sorb installed in a horizontal airflow with header outside the duct**



Assembly and installation instructions for a Rapid-sorb installed with header outside the duct (horizontal airflow)

1. Locate and cut the holes in the ductwork for the dispersion tubes. Use the L-bracket as a template to locate the holes on the duct floor.
2. Temporarily, loosely suspend or support the header below the final location — the vertical balance point of the dispersion tube length dictates where the header should be suspended or supported temporarily.
3. Mount the dispersion tubes to the header with the provided connector, either a slip coupling or a hose cuff.
 - 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 on to the tubing.
 - The O-rings are lubricated at the factory. If additional lubrication is necessary, DO NOT use a petroleum-based lubricant.
4. Position the flange of the L-bracket so it is upstream of the tubes when the assembly is raised and fastened into position. Fasten the

More on next page ►

Dispersion: Rapid-sorb

Note:

See Page 47 for steam supply and condensate drain line connection instructions.

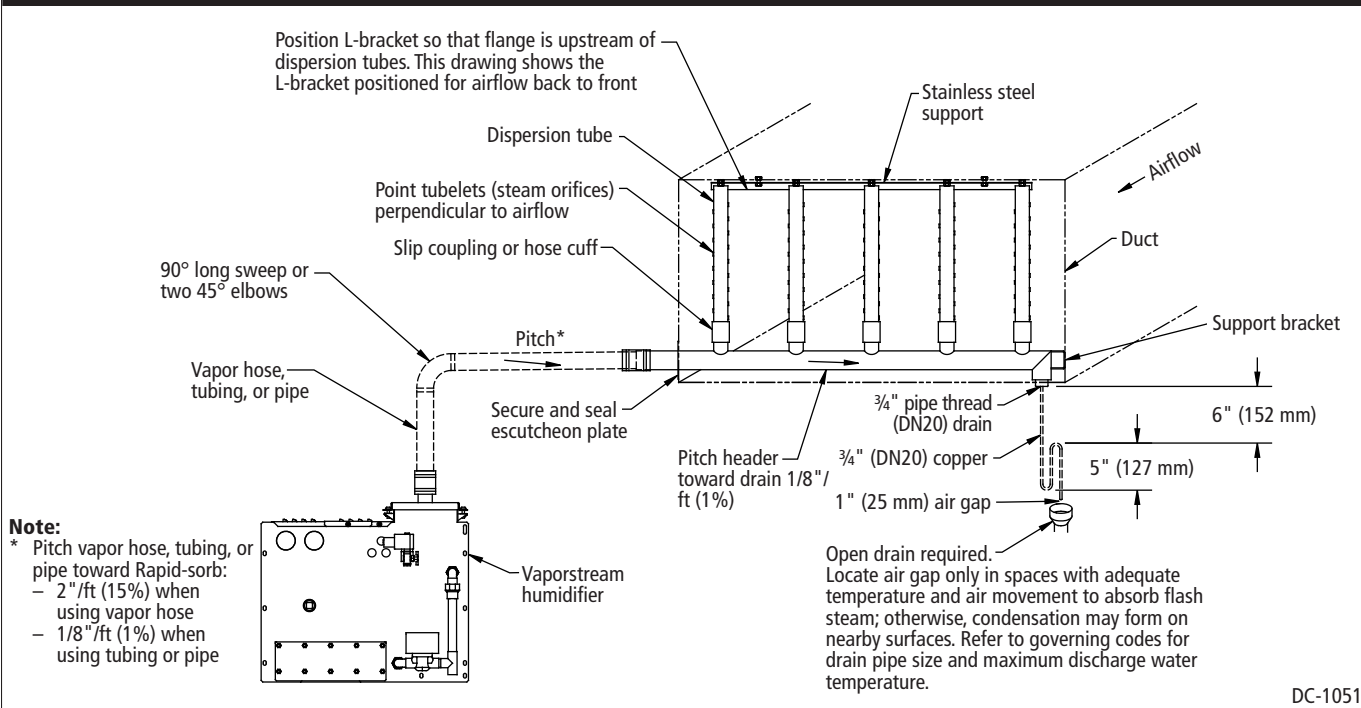
Assembly and installation instructions for a Rapid-sorb installed with header outside the duct (continued)

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 follow these instructions:
 - For 1½" (DN40) dispersion tubes:
 - The dispersion tube will rotate in the slip coupling. Verify that the dispersion tube orifices are directed perpendicular to the airflow.
 - The dispersion tube and slip coupling must be fully engaged on to the header stub for the O-rings to provide a seal.
 - For 2" (DN50) dispersion tubes:
 - Before securing the hose cuff in place with the hose clamps on the dispersion tube and the header stub, verify that the dispersion tube orifices are directed perpendicular to the airflow.
6. Slide the assembly up until the L-bracket aligns with the mounting holes in the duct.
 - For 1½" (DN40) dispersion tubes:
 - The header pitch is duplicated in the L-bracket.
 - The dispersion tube and slip coupling must be fully engaged on to the header stub for the O-rings to provide a seal.
 - The high end of the L-bracket can be fastened tight to the duct or air handler.
 - On the low end of the L-bracket, the fastener must be long enough to compensate for the pitch, and a nut should be provided and secured on both sides of the L-bracket and the duct or air handler for stability.
 - For 2" (DN50) dispersion tubes:
 - Fasten the bracket to the top of the duct and use the hose cuffs to compensate for the pitch of the header.
 - Before securing the hose cuff in place with the hose clamps on the dispersion tube and the header stub, verify that the header pitch, 1/8"/ft (1%) toward drain, is maintained.
7. Permanently secure both ends of the header and verify that the 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.

Dispersion: Rapid-sorb

**Figure 47-1:
Rapid-sorb installed in a horizontal airflow with header inside the duct**



Assembly and installation instructions for a Rapid-sorb installed with header inside the duct (horizontal airflow)

1. Locate and cut the holes in ductwork or air handler for steam header penetration, condensate drain piping, and header support bracket fastener. Allow 1/8"/ft (1%) header pitch toward the support bracket when you drill the hole for the header support bracket fastener.
2. Loosely fasten the header in place.
3. Rotate the header 90° so the header stubs point horizontally in the duct.
 - When installing in an air handler, the rotation of the header is often less than 90°. Typically, due to the condensate drain piping requirements, the header can be set on the floor of the air handler, assembled in the vertical position, and then raised and mounted in place.
4. Mount the dispersion tubes on the header with the slip couplings or hose cuffs.
 - When installing slip couplings for 1/2" (DN40) dispersion tubes, take care not to shear the O-rings.
 - Set the slip coupling on the header stub or dispersion tube so the O-ring is resting on the face of the tubing.

More on next page ►

Dispersion: Rapid-sorb

Assembly and installation instructions for a Rapid-sorb installed with header inside the duct (continued)

- Rotate the slip coupling as you push it on to the tubing.
 - The O-rings are lubricated at the factory. If additional lubrication is necessary, DO NOT use a 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.
 - 1½" (DN40) dispersion tubes
 - The header pitch is duplicated in the L-bracket.
 - The dispersion tube and slip coupling must be fully engaged on to the header stub for the O-rings to provide a seal.
 - The high end of the L-bracket can be fastened tight to the duct or air handler.
 - On the low end of the L-bracket, the fastener must be long enough to compensate for the pitch, and a nut should be provided and secured on both sides of the L-bracket and the duct or air handler for stability.
 - 2" (DN50) dispersion tubes
 - Fasten the bracket to the top of the duct or air handler and use the hose cuffs to compensate for the pitch of the header.
 - Before securing the hose cuff in place, with the hose clamps on the dispersion tube and the header stub, verify that the dispersion tube orifices are directed perpendicular to the 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.
 10. See Page 49 for steam supply and condensate drain line connection instructions.

Dispersion: Rapid-sorb

Steam supply connections to the Rapid-sorb header

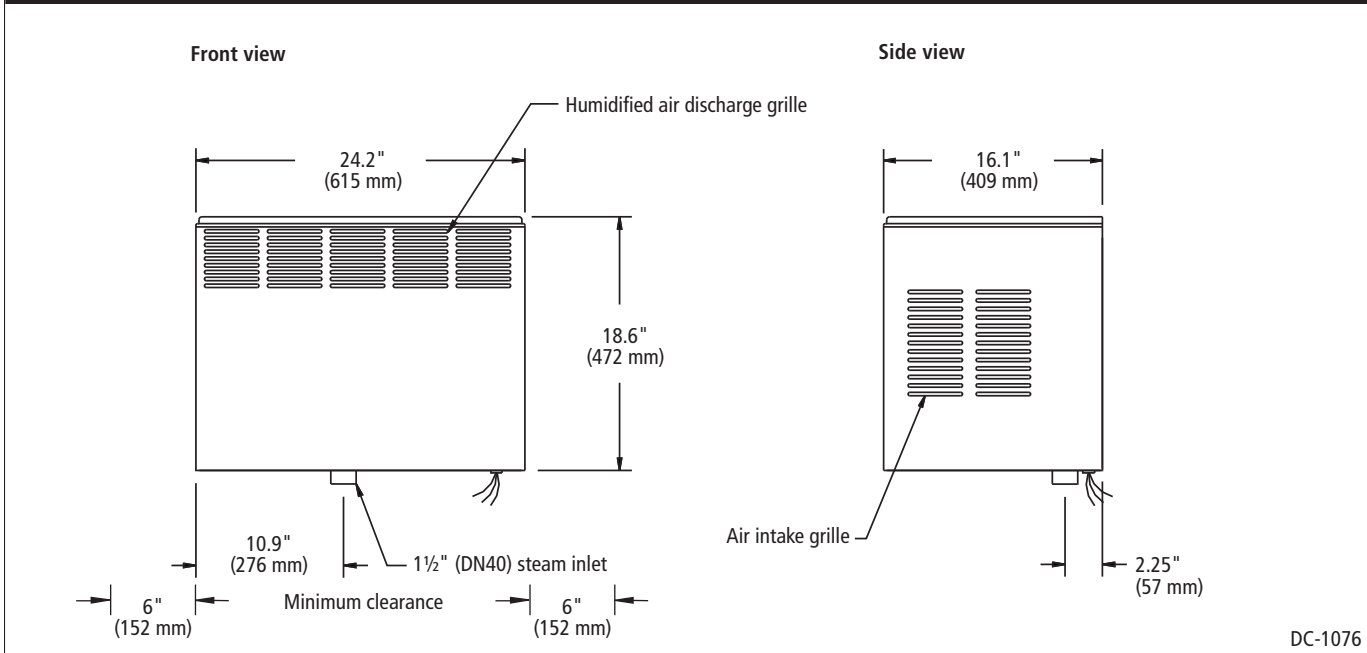
1. Connect the steam supply interconnecting piping from the humidifier to the Rapid-sorb. The steam supply piping requires a minimum of 1/8"/ft (1%) pitch toward the header.
2. If multiple humidifiers are supplying one Rapid-sorb, a multiple steam supply connector is provided.
 - Typically, the multiple steam supply connector attaches to the Rapid-sorb header supply end with hose cuff and clamps.
 - Route the necessary number of steam supplies from the humidifier tanks to the steam supply connector.
 - Position the steam supply connector to accept the steam supplies while maintaining the necessary pitch.
 - Make sure the hose clamps on the steam supply connector and header are tight.

Condensate drain connections to the Rapid-sorb header

1. Piping must be minimum 3/4" I.D. (DN20) and rated for 212 °F (100 °C) minimum continuous operating temperature.
2. Condensate drain line must be piped as shown in the figures on the previous 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
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° 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.
4. All drain lines must be installed and sized according to governing codes.

Dispersion: SDU-I

Figure 50-1:
SDU-I fan unit (Space Distribution Unit, internal absorption)



Space Distribution Unit, internal absorption (SDU-I)

The SDU-I, designed for maximum capacity of 30 lbs/hr (13.6 kg/h), draws in room air, humidifies that air with steam, and then discharges the humidified air into the room with no visible vapor trail.

Choosing a location for the SDU-I fan unit

When used with a Vaporstream, the SDU-I can be located:

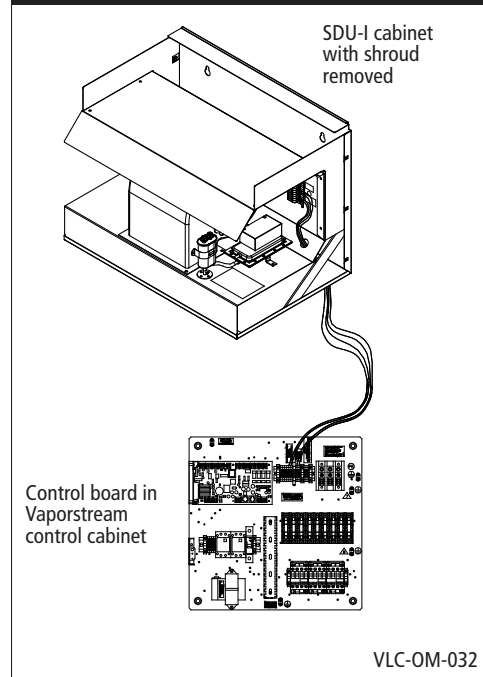
- A minimum of 18" (457 mm) above a Vaporstream humidifier; or
- Remotely from the humidifier (see interconnecting piping table on Page 36 to determine maximum distance).

Dispersion: SDU-I

Mounting the SDU-I fan unit

- Installation must comply with governing codes.
- 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 1/4" (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.
- Provide at least 6" (152 mm) clearance on each side of the SDU-I.
- 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.
- The fan and airflow proving switch terminals are labeled in the humidifier and in the SDU-I. Minimum wire size for field wiring is 18-gauge (1.5 mm²) stranded wire.
- If mounting the SDU-I remotely from the humidifier, see the tables on Page 36 for interconnecting piping requirements, and the drip tee installation instructions on Page 37.
- To provide power to the SDU-I, 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.

Figure 51-1:
SDU-I field wiring



Control board in Vaporstream control cabinet

VLC-OM-032

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.

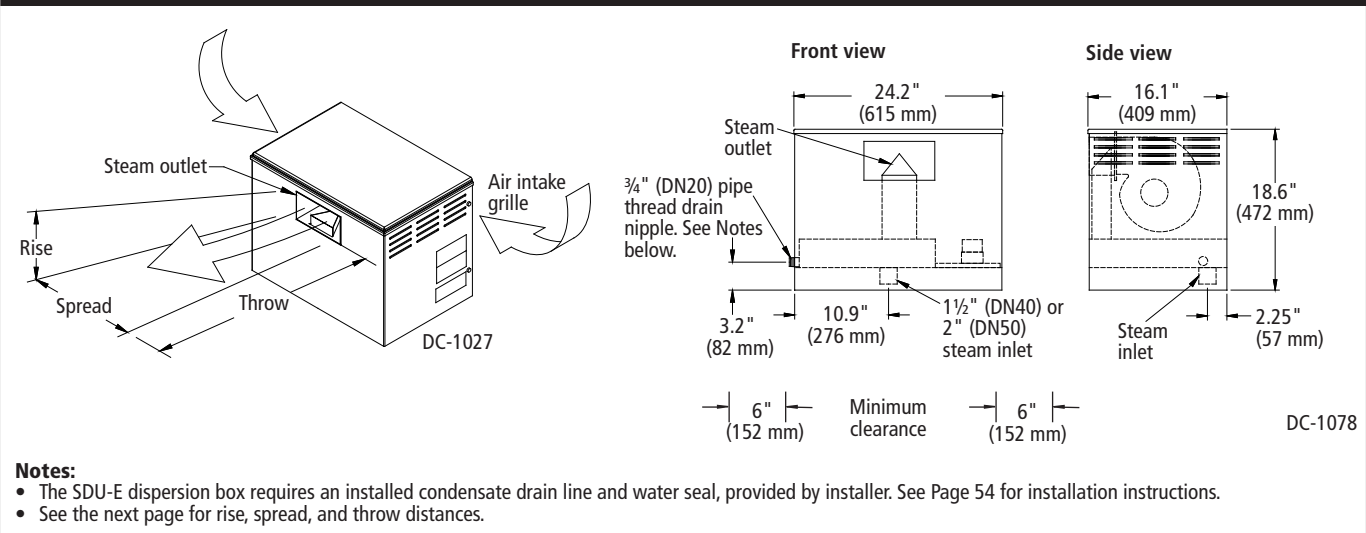
Table 51-1:
SDU-I specifications

Maximum capacity		Shipping weight		Amps at 120V (50/60 Hz)	Horsepower	CFM	m ³ /s	dB*
lbs/hr	kg/h	lbs	kg					
30	13.6	68	31	3.20	1/5	760	0.36	58

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

Dispersion: SDU-E

Figure 52-1:
SDU-E fan unit (Space Distribution Unit, external absorption)



Space Distribution Unit, external absorption (SDU-E)

The SDU-E, designed for maximum capacity of 102 lbs/hr (46.3 kg/h), draws in room air, humidifies it with steam, and discharges it back into the room (visible steam absorbs outside the enclosure).

Choosing a location for the SDU-E fan unit

When used with a Vaporstream, the SDU-E can be located:

- A minimum of 18" (457 mm) above a Vaporstream humidifier; or
- Remotely from the humidifier (see interconnecting piping tables on Page 36 to determine maximum distance).
- Allow 6" (152 mm) clearance on each side of SDU.

Mounting the SDU-E unit

- The SDU-E dispersion box requires an installed condensate drain line and water seal, provided by installer. See the next page for installation instructions.
- Installation must comply with governing codes.
- 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) center on a stud. Mark hole locations and predrill 1/4" (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.
- Make sure the SDU-E frame is installed level and plumb.
- Provide at least 6" (152 mm) clearance on each side of the SDU-E. Spread dimensions greater than 3' (1 m) may require more clearance (see Table 53-2 on the next page).

More on next page ►

Dispersion: SDU-E

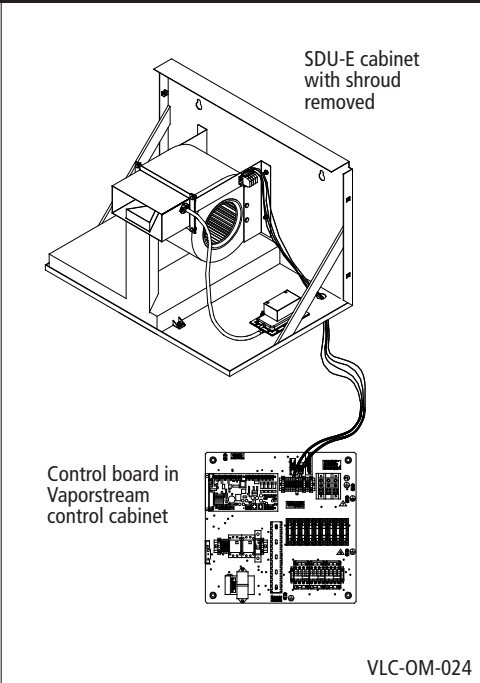
- Field wiring is required to connect the SDU fan and airflow proving switch terminals to the humidifier electrical panel terminals. Refer to the external connections diagram in the package shipped with the unit.
- The fan and airflow proving switch terminals are labeled in the humidifier and in the SDU-E. Minimum wire size for field wiring is 18-gauge (1.5 mm²) stranded wire.
- If mounting the SDU-E remotely from the humidifier, see the tables on Page 36 for interconnecting piping requirements, and the drip tee installation instructions on Page 37.
- To provide power to the SDU-E, 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.

**Table 53-1:
SDU-E specifications**

Maximum capacity		Shipping weight		Amps at 120V (50/60 Hz)	Horsepower	CFM	m ³ /s	dB*
lbs/hr	kg/h	lbs	kg					
102	46.3	61	28	2.07	1/8	545	0.26	64

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

**Figure 53-1:
SDU-E field wiring**



**Table 53-2:
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:

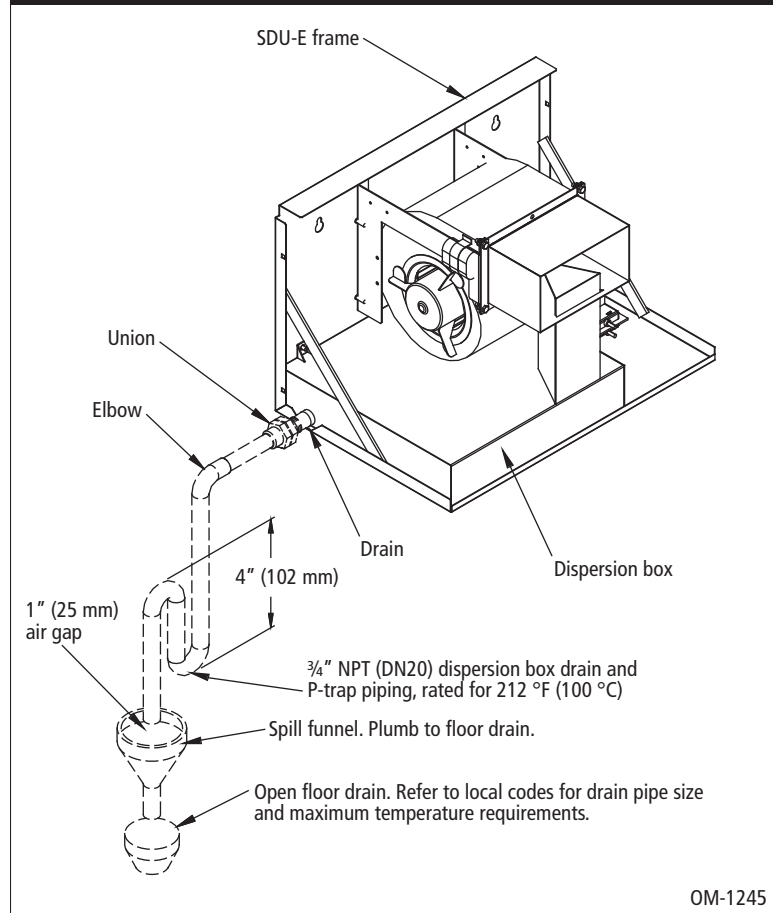
- Surfaces or objects directly in the path of vapor discharge may cause condensation and dripping.
- To avoid steam impingement on surrounding areas, observe the minimum nonwetting dimensions in this table.
- Rise: The minimum nonwetting height above the steam outlet of the SDU-E.
- Spread: The minimum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

Dispersion: SDU-E

Condensate drain connection to SDU-E fan unit

1. Piping must be minimum $\frac{3}{4}$ " I.D. (DN20) and rated for 212 °F (100 °C) minimum continuous operating temperature.
2. Drain line must be piped as shown in the drawing to the right. Provide a 6" (152 mm) drop prior to a 4" (102 mm) water seal to:
 - Ensure drainage of condensate from the dispersion box
 - 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 $\frac{3}{4}$ " 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 $\frac{3}{4}$ " nipple. **If the condensate is not drained from the dispersion box, standing water will accumulate.**
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.

**Figure 54-1:
SDU-E condensate drain connection**



OM-1245

WARNING!

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

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

Dispersion: Area-type fan

Area-type fan dispersion

The table on the following page 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.

- Rise: The minimum nonwetting height above the steam chute
- Spread: The minimum nonwetting width from the steam chute
- Throw: The minimum nonwetting horizontal distance from the steam chute

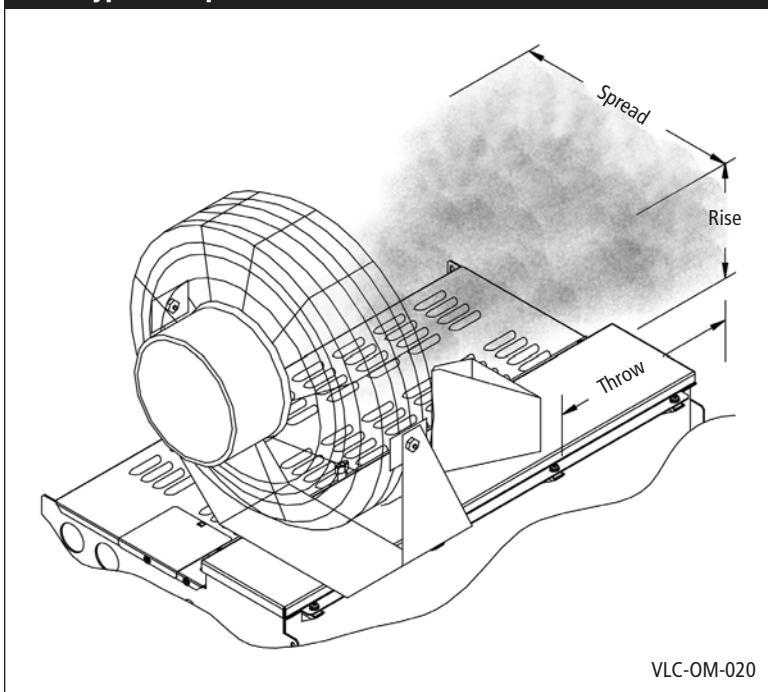
The greater the space relative humidity, the higher and farther the discharged steam will carry and rise in the space until becoming absorbed.

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.

Table 55-1: 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

Figure 55-1:
Area-type rise, spread, throw



Dispersion: Area-type fan

**Table 56-1:
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 (21 °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

Notes:

- * With fan on high speed
- Rise: Minimum non-wetting height above the steam chute
- Spread: Minimum non-wetting width from the steam chute
- Throw: Minimum non-wetting horizontal distance from the steam chute

Start-up procedure

Start-up procedure

After the system is installed and connected properly, you can begin start-up procedures.

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-logics Installation and Operation Manual*
 - Installation section
 - 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 torque requirements on Page 30.)

3. **WARNING!**

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

4. Verify that the humidifier is mounted level and securely supported before filling with water (see the operating weights table in this manual).
5. Verify that the humidifier is level front to back and side to side after it is full of water.
6. Refer to the following sections in the *Vapor-logics Installation and Operation Manual*:
 - Operation section
 - Start-up checklist (it is critical that the installer follow this checklist)
7. During start-up, do not leave the humidifier unattended.
8. Monitor humidifier operation through multiple fill cycles. The humidifier operating status appears on the keypad/display.
9. On standard 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-logics Installation and Operation Manual*). However, at start-up, DRI-STEEM recommends initially running the humidifier with the factory default setting for skim time. (See the maintenance information section in this manual.)

WARNING!

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.

CAUTION! 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.

Note:

The *Vapor-logics 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 *Vapor-logics* manual was shipped with your humidifier. Additional copies can be viewed, printed, or ordered at www.dristeem.com

Standard water models

WARNING!

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

CAUTION! Opening the drain valve when the tank is hot can discharge water as hot as 212 °F (60 °C) into the drain system. This can damage the drain plumbing if the humidifier is not properly connected to a water tempering device such as a DRI-STEEM Drane-kooler. To prevent such damage from humidifiers without water tempering, allow the tank to cool before draining.

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Vaporstream troubleshooting guide

The *Vapor-logic3 Installation and Operation Manual*, which was shipped with your humidifier, is a comprehensive operation manual. Refer to it for troubleshooting information.

Download DRI-STEEM literature

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

Vaporstream VLC standard water quality recommendations

The best way to determine how often your particular system needs maintenance is to remove the tank cover and inspect it for mineral deposits after three months of duty. Potable water carries a variety of minerals and other materials in a mix that varies from location to location. This variation in water quality, combined with the hours of operation and duty cycle, will determine your own unique maintenance schedule.

Water quality makes a difference

- Light to moderately hard water (2 to 10 grains hardness per gallon [35 mg/L to 170 mg/L]) requires:
 - Annual cleaning
 - Regular skimming
- High mineral content water (more than 10 grains hardness per gallon [more than 170 mg/L]) requires:
 - Cleaning frequency determined by use and water quality
 - Regular skimming
 - Periodic drain and flush cycles
- Softened water, which dramatically reduces mineral accumulation inside the standard water models, requires:
 - Increased skim time
 - No drain and flush cycles
 (Note: Solids, like silica, are not removed in the softening process.)

Adjusting skim duration

The skim time duration determines the quantity of water skimmed with each fill cycle. The skim time is field adjustable using the Vapor-logic3 keypad.

Each time the Vaporstream refills, it fills to an elevation near the lip of the skim/overflow fitting. A portion of the refill water then flows to the drain carrying most of the minerals left by the previous evaporating cycle. This reduces the mineral concentration, thereby reducing the frequency of cleaning needed.

The heated water that flows to the drain is an operational cost. Cleaning the humidifier is also an operational cost. Therefore, DRI-STEEM recommends that the user observe and adjust the skimming quantity to achieve a balance between minimizing mineral buildup and conserving heated water.

Standard water models

Cool down humidifier before beginning maintenance

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 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.
- For 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-logics Installation and Operation Manual*.

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.

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More on next page ►

WARNING!

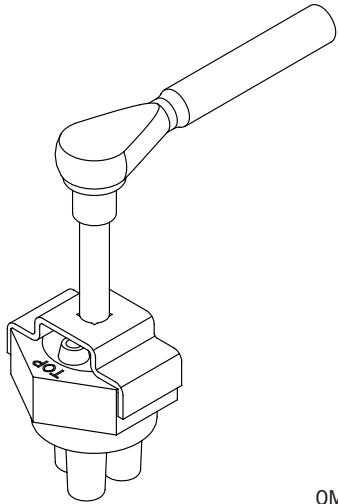
When performing maintenance on the Vaporstream humidifier:

- 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.

Failure to follow these instructions can cause severe personal injury or death as a result of electrical shock.

Standard water models

**Figure 60-1:
Probe tool**



OM-7395

Remove and install the probe assembly with the probe tool supplied with your Vaporstream humidifier. 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).

Inspection and maintenance (continued)

2. Seasonally (or as required, depending on water quality)

- Cleaning tank
 - Remove cleanout plate; slide the cleanout tray out (when provided) 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.

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- 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 shown in Figure 60-1 connected to a 3/8" square drive.
 - 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 shown in Figure 60-1 connected to a 3/8" square drive. Torque probe assembly to 120 in-lbs (10 ft-lbs; 13.6 N-m).

mc_052708_1225

More on next page ►

Standard water models

Inspection and maintenance (continued)

- 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.

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- 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.
 - Tighten down the nuts on the cleanout plate. Torque the 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.

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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.

mc_052708_1210

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; and there is no off-gassing, flammability, or added heat risks associated with other cleaning solutions. 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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DI water models

WARNING!

When performing maintenance on the Vaporstream-DI humidifier (after the tank has cooled down and drained):

- Always switch the keypad control mode to Standby (Vapor-logic3 only).
- Place all power disconnects in OFF position and lock in OFF position.
- Close the field installed manual supply water shut-off valve.

Failure to follow these instructions can cause severe personal injury or death as a result of electrical shock.

Vaporstream troubleshooting guide

The *Vapor-logic3 Installation and Operation Manual*, which was shipped with your humidifier, is a comprehensive operation manual. Refer to it 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

Vaporstream VLDI models DI water quality recommendations

- 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 VLDI models do not require regular cleaning, although regular inspections are advised.
- Vaporstream VLDI models do not require skimming or draining and flushing to remove precipitated minerals. However, all DI 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 beginning maintenance

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 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, see the *Vapor-logic3 Installation and Operation Manual*.

mc_052708_0840

DI water models

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 Vaporstream VLDI, 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.

Note:

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

mc_052708_0845

Outdoor enclosure

CAUTION! Always shut off electrical service disconnect prior to working on the humidifier.

- 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 Pages 58-63 for complete maintenance of your humidifier.

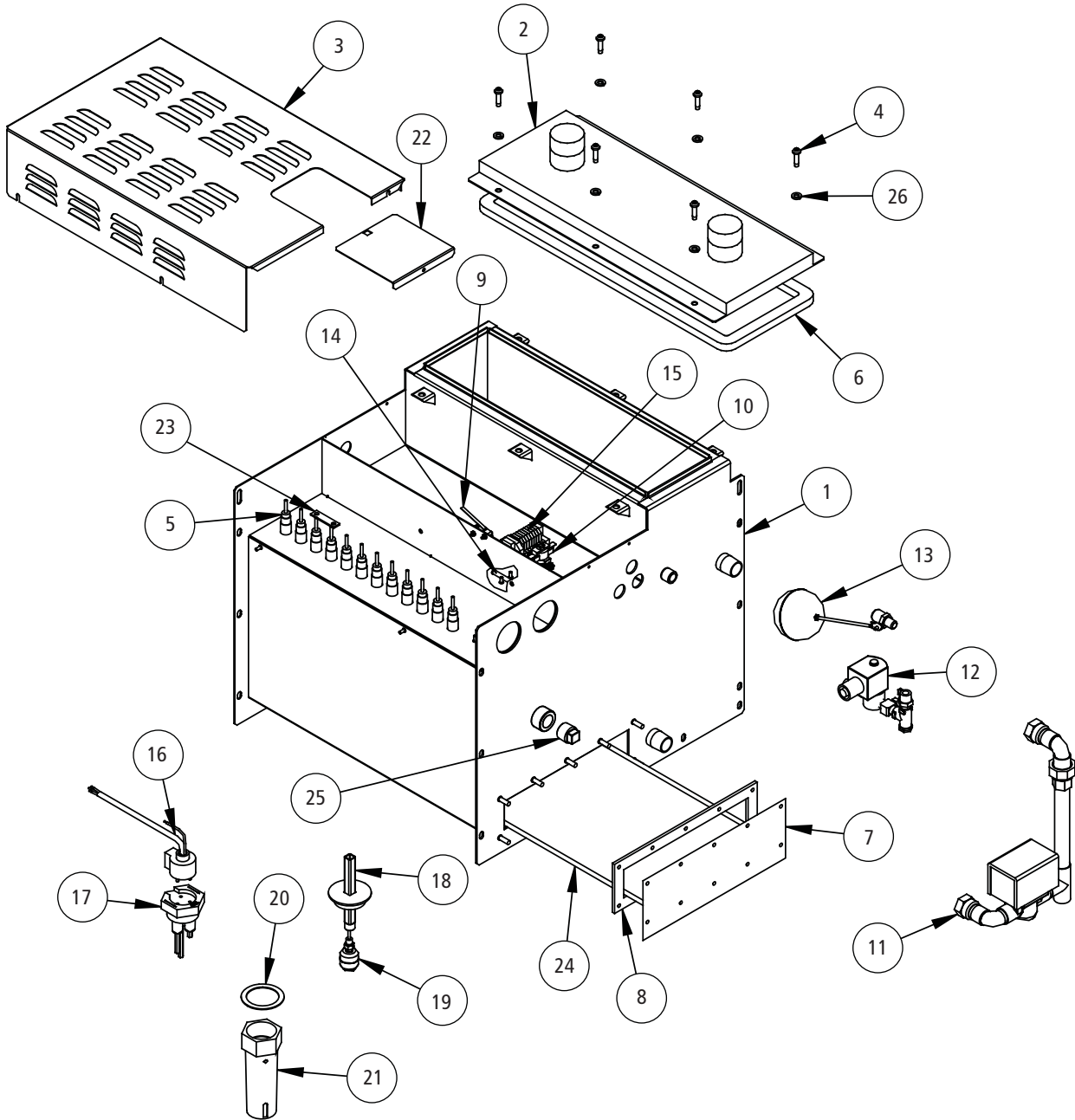
**Table 64-1:
Outdoor enclosure troubleshooting guide**

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.

Notes

Humidifier tank

Figure 66-1:
Vaporstream tank replacement parts



Note:

- Components may be in a different location or have a different orientation than shown in drawing.
- See table on the next page for part numbers.

VLC-OM-033

Humidifier tank

**Table 67-1:
Tank replacement parts list**

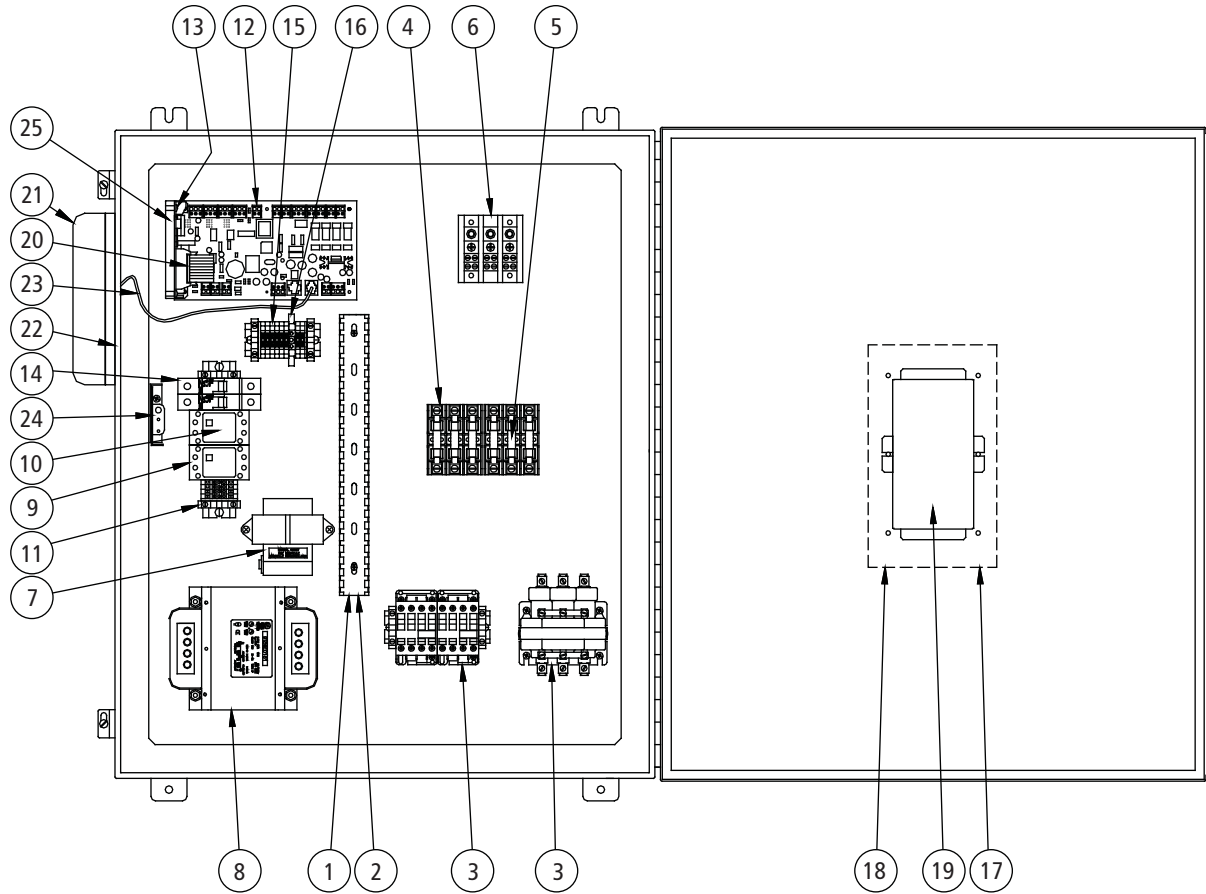
No.	Description	Models used	Part no.
1	Tank	All	*
2	Cover	All	*
3	Cover, heater louvered	All	167745- *
4	Pan-head mach. screw, 1/4 - 20 x 1"	All	700300-013
5	Heater	All	409600- *
6	Gasket, cover	All	160691- *
7	Cleanout plate	All	165472
8	Gasket, cleanout plate	All	308225
9	Switch, door interlock	All	408475
10	Thermal cut-out	All	409560-001
11	Drain valve assembly	All	*
12	Fill valve assembly	VLC and models with end-of-season drain	*
13	Float valve assembly	VLDI	*
14	Temperature sensor	All	405760-002
15	DIN rail mounted terminals	All	*
16	Probe plug assembly	VLC	406050-101
17	Probe assembly	VLC	406303-011
18	Low water tube	VLDI	167790
19	Low water cut-out switch	VLDI	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 VLC	167770- *
25	Plug, 3/4" NPT	All	250192-075
26	Washer, 1/4" standard lock	All	700300-005

Notes:

- * Specify humidifier model and serial number when ordering.
- Numbers in first column correspond with drawing on previous page.

Control cabinet

Figure 68-1:
Control cabinet replacement parts



Note:

- Components may be in a different location or have a different orientation than shown in drawing.
- See table on the next page for part numbers.

VLC-OM-035

Control cabinet

**Table 69-1:
Control cabinet replacement parts**

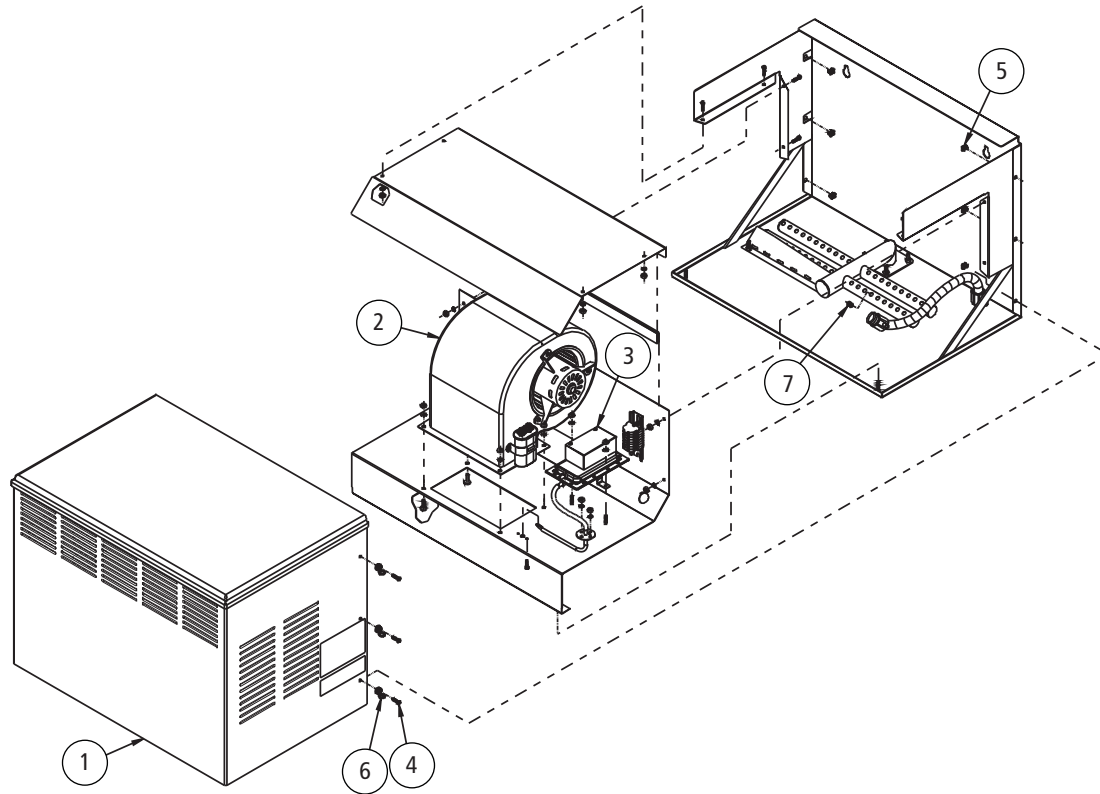
No.	Description	Models that use this part	Part no.
1	Wire channel, 1" x 1"	All	408999-001
2	Wire channel, cover	All	408999-002
3	Contactora	Standard	407001- *
3	Contactora, 3-pole mercury	Mercury contactora option	407004- *
4	Fuse holder	Model and voltage dependent	*
5	Fuse	Model and voltage dependent	*
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	All	407900-011
10	Relay, 24V DPDT	All	407900-016
11	Terminal end bracket	All	408252-006
12	Board, Vapor-logic3 main microprocessor	All	408491- *
13	Board, Vapor-logic3 Vaporstream expansion	Multiple stage	408490-003
14	Circuit breaker, single pole	Optional SDU or Area-type fan dispersion	406775- *
15	20 amp DIN rail terminal	All	408252-001
16	Terminal ground	All	408252-010
17	SSR	SSR control	*
18	Gasket, SSR	SSR control	*
19	Cover, SSR	SSR control	165545
20	Ribbon cable	Multiple stage	408490-016
21	Board, Vapor-logic3 keypad	All	408491- *
22	Vapor-logic3 jack with plate	Mounted keypad	408490-017
23	Cable assembly, Vapor-logic3 keypad	All	408490- *
24	Door interlock, electric switch	Door interlock option	408470
25	Expansion board bracket	Multiple stage	167748

Notes:

- * Specify humidifier model and serial number when ordering.
- Numbers in first column correspond with drawing on previous page.

SDU-I

**Figure 70-1:
SDU-I replacement parts**



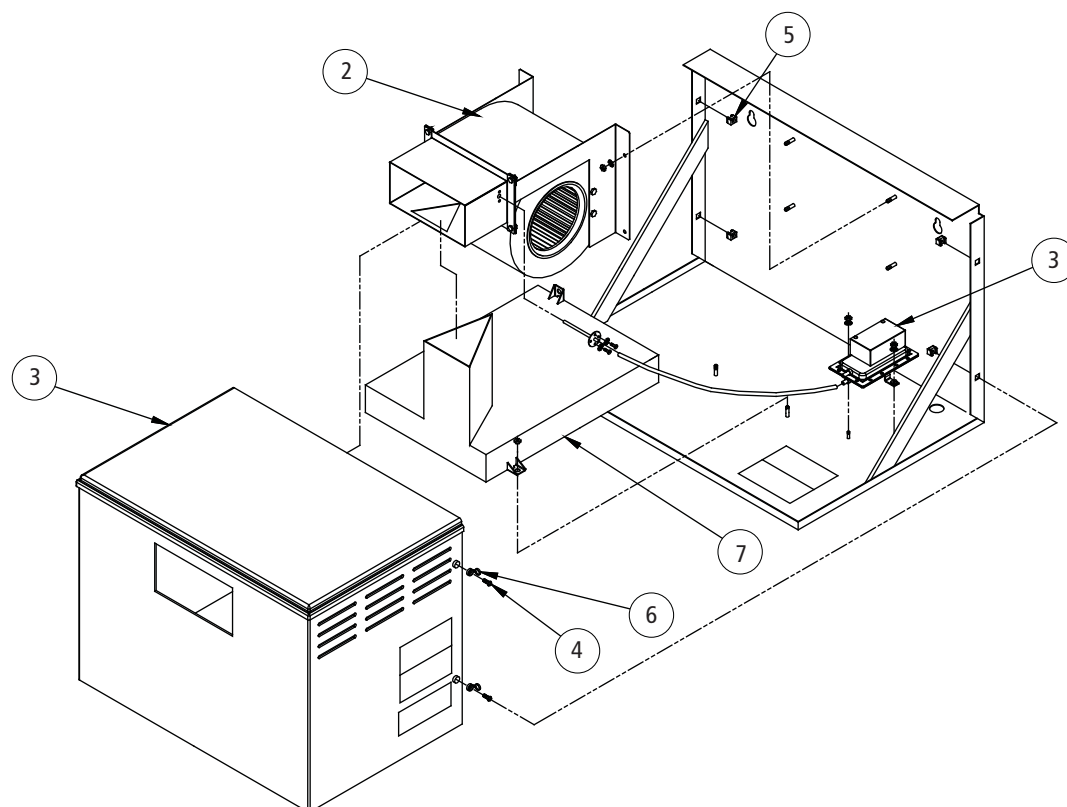
OM-1504

**Table 70-1:
SDU-I replacement parts**

No.	Description	Quantity	Part no.
1	Shroud	1	330001-002
2	Blower	1	409540-003
3	Switch, airflow	1	406190
4	Screw, 8-32 × ½" 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	310285-006

SDU-E

Figure 71-1:
SDU-E replacement parts



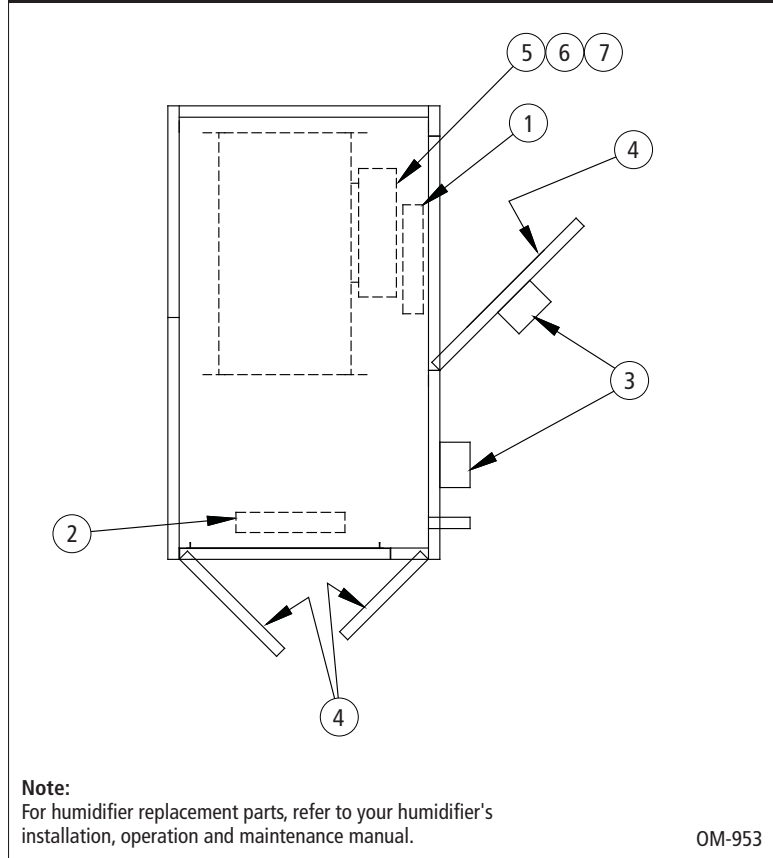
OM-1503

Table 71-1:
SDU-E replacement parts

No.	Description	Quantity	Part no.
1	Shroud	1	330002-001
2	Blower	1	409540-003
3	Switch, airflow	1	406190
4	Screw, 8-32 × 1/2" PHMS Phillips	6	700170-007
5	Nut retainer, 8-32	6	409593-001
6	Cap, black	6	409593-002
7	Dispersion chamber for SDU with 1 1/2" outlet	1	160445-003
	Dispersion chamber for SDU with 2" outlet	1	160445-004

Outdoor enclosure

**Figure 72-1:
Outdoor enclosure replacement parts**



**Table 72-1:
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 40 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, which features cleanable, stainless steel construction, and an industry-leading Two-year Limited Warranty.

For more information

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Form No. VLC-IOM-1009
Part No. 890000-801 Rev C

Two-year Limited Warranty

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

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

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

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

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

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

Extended warranty

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

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

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