READ AND SAVE THESE INSTRUCTIONS

VAPORSTREAM®
Models VLC and VLDI
ELECTRIC STEAM HUMIDIFIERS

Installation Instructions
and
Maintenance Operations
Manual

For Toll-Free Technical Support,
Call 1-800-328-4447

UL LISTED **CUL LISTED**

DRI-STEEM® HUMIDIFIER COMPANY

ISO 9001 DNV Certification, Inc. Certificated Firm

TABLE OF CONTENTS

TO THE PURCHASER AND THE INSTALLER

Thank you for purchasing VAPORSTREAM® Model VLC equipment. We have designed and built this equipment to give you total satisfaction and many years of trouble-free service. Proper installation and operating practices will assure you of achieving that objective. We therefore urge you to become familiar with the contents of this manual.

This manual covers material for both VAPORSTREAM Model VLC and VAPORSTREAM Model VLDI humidifiers. Most of the application material will apply to both units. When information differs for the two units, it will be noted as such.

DRI-STEEM Humidifier Company

VAPORSTREAM Models VLC and VLDI 3

Mechanical Specifications and Capacities 4

Mechanical Specifications 5

VAPORSTREAM Model VLC AREA-TYPE Humidifier 6

Mounting Methods
- Mounting Procedures 7
- Electrical 8

Dispersion Tube Installation 9

Optional Weather Cover 11
- Weather Cover Dimensions 12

RAPID-SORB® Assembly and Installation
- Horizontal Duct Installation 13
- Vertical Duct Installation 14

Piping Methods
- Drain Piping 15
- Make-up Water Piping 15

Piping Diagrams: Steam, Water and Drain 16

Start-up Procedure 17

Operation 17

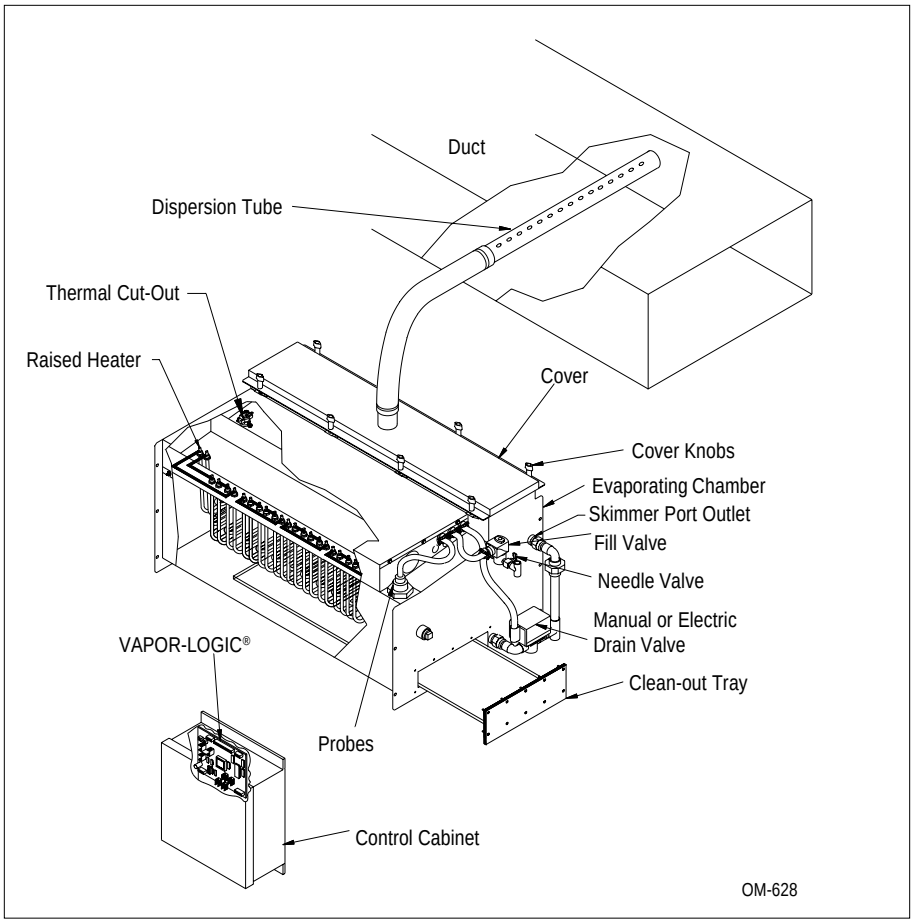
Recommended Maintenance 18

Trouble-Shooting Guide 18

Replacement Parts 19

Maintenance Service Record 21

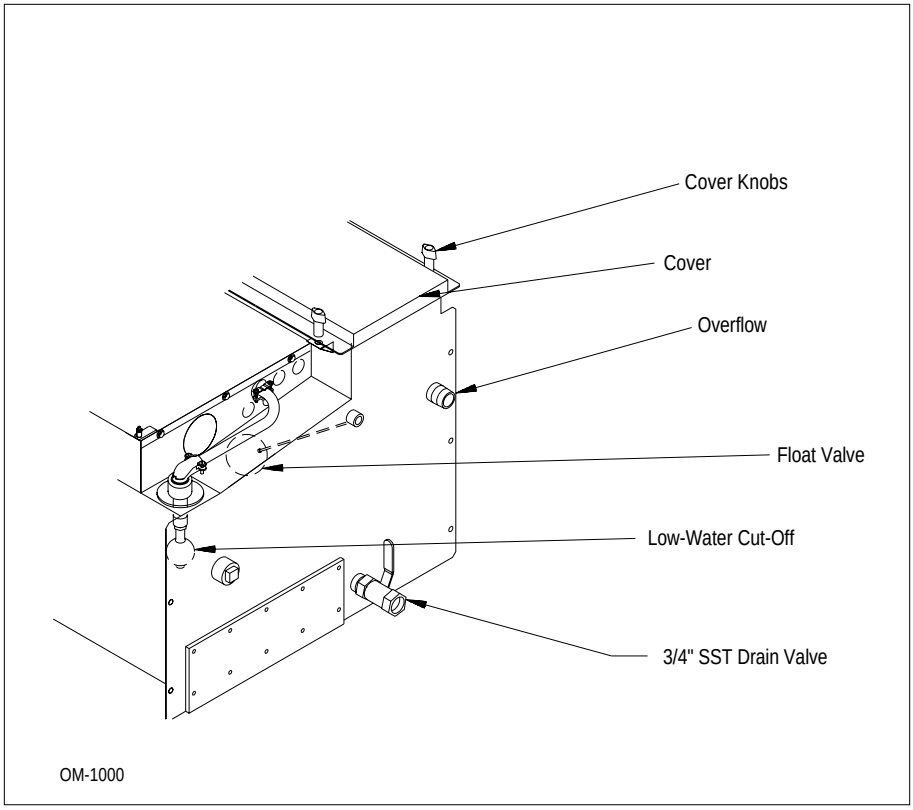
Two-Year Limited Warranty 23



VAPORSTREAM VLC Electric Humidifier

State-of-the-art technology in a simple, low-maintenance humidifier.

This humidifier is designed to be used with either softened or unsoftened water (preferably softened). The probe-type level control system requires water conductivity of 100 micromhos/cm (2 grains/gal) minimum to function, and therefore will not operate on water treated by reverse osmosis or deionization. However, VAPORSTREAM® Model VLC humidifiers are available for use with these water types. The standard humidifier can be converted in the field to a VLDI model. See below.



VAPORSTREAM VLDI Option

For use with deionized or reverse osmosis water. This unit produces chemical-free steam and reliable, accurate humidification control. It is virtually maintenance-free with no wasted water, no wasted heat, and very little or no downtime.

MECHANICAL SPECIFICATIONS AND CAPACITIES

Table 4-1: Mechanical Specifications and Capacities

Model number	Steam capacities per hour		Heaters		Current draw (amps) (A)									kW
					Single-phase					Three-phase**				
	Lbs.	Kg.	Qty.	Stages*	120V	208V	240V	480V	600V	208V	240V	480V	600V	
VLC/VLDI 2-1	5.7	2.6	1	1	16.7	9.6	8.3	4.2	3.3					2
3-1	8.6	4.0	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
VLC/VLDI 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	11.7	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	27.2	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
VLC/VLDI 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
VLC/VLDI 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	35.0	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	62.1	9	3				100.0	80.0	133.2	115.5	57.7	46.2	48
63-3	179.6	81.5	9	3				131.3	105.0			75.8	60.6	63
75-3	213.8	97.0	9	3					125.0			90.2	72.2	75
VLC/VLDI 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	62.1	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	108.7	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

* Heater stage identifies the number of contactors.

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

Capacity Notes

Approximately 172 BTUs (400 kJ) are required to raise the temperature of one pound (Kg) of water from 40° to 212° F (4° to 100°C). An additional 970 BTUs (2250 kJ) are required to change one pound (Kg) of water to water vapor.

The addition of ¾" (25 mm) rigid foil faced fiberglass insulation (optional) on all surfaces of evaporating chamber will increase unit efficiency by approximately 2%.

Another factor to consider is condensation steam loss from hoses and tubes. Use the following steam loss guidelines:

- vapor hose: 0.15 lbs/ft/hr (223 g/m/h)
- insulated pipe: 0.05 lbs/ft/hr (74 g/m/h)
- dispersion tubes: 0.5 lbs/ft/hr (744 g/m/h)

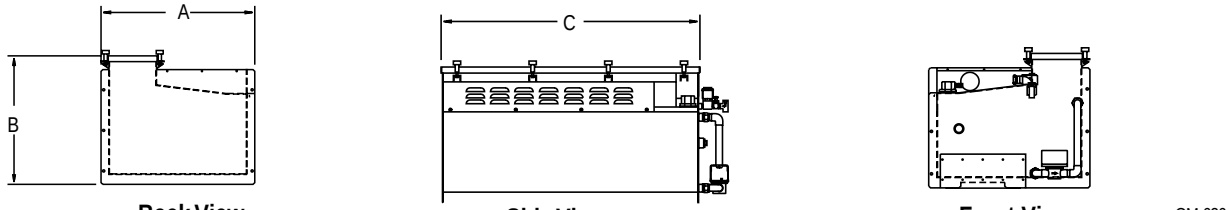
MECHANICAL SPECIFICATIONS

Table 5-1: Mechanical Specifications

Model Number	A (width)		B (height)		C (length)		Weight empty (lbs)	Weight empty (kg)	Weight full (lbs)	Weight full (kg)	Control cabinet sizes
	in.	mm	in.	mm	in.	mm					
VLC/VLDI 2-1	20.25	515	16.85	430	7.52	190	35	16	79	36	M
3-1	20.25	515	16.85	430	7.52	190	35	16	79	36	M
4-1	20.25	515	16.85	430	7.52	190	35	16	79	36	M
5-1	20.25	515	16.85	430	7.52	190	35	16	79	36	M
VLC/VLDI 6-1	22.00	560	18.38	465	12.85	325	57	26	157	71	M
9-1	22.00	560	18.38	465	12.85	325	57	26	157	71	M
12-1	22.00	560	18.38	465	12.85	325	57	26	157	71	M
16-1	22.00	560	18.38	465	12.85	325	57	26	157	71	M
21-1	22.00	560	18.38	465	12.85	325	57	26	157	71	M
25-1	22.00	560	18.38	465	12.85	325	57	26	157	71	M
VLC/VLDI 12-2	22.00	560	18.38	465	20.35	515	79	36	237	108	M
18-2	22.00	560	18.38	465	20.35	515	79	36	237	108	M
24-2	22.00	560	18.38	465	20.35	515	79	36	237	108	M
32-2	22.00	560	18.38	465	20.35	515	79	36	237	108	M
42-2	22.00	560	18.38	465	20.35	515	79	36	237	108	M
50-2	22.00	560	18.38	465	20.35	515	79	36	237	108	M
VLC/VLDI 18-3	22.00	560	18.38	465	27.85	705	110	50	326	148	L
27-3	22.00	560	18.38	465	27.85	705	110	50	326	148	L
36-3	22.00	560	18.38	465	27.85	705	110	50	326	148	L
48-3	22.00	560	18.38	465	27.85	705	110	50	326	148	L
63-3	22.00	560	18.38	465	27.85	705	110	50	326	148	L
75-3	22.00	560	18.38	465	27.85	705	110	50	326	148	L
VLC/VLDI 24-4	22.00	560	18.38	465	35.35	900	153	70	427	194	XL
36-4	22.00	560	18.38	465	35.35	900	153	70	427	194	XL
48-4	22.00	560	18.38	465	35.35	900	153	70	427	194	XL
64-4	22.00	560	18.38	465	35.35	900	153	70	427	194	XL
84-4	22.00	560	18.38	465	35.35	900	153	70	427	194	XL
100-4	22.00	560	18.38	465	35.35	900	153	70	427	194	XL

* Refer to table 5-2 for Control Cabinet dimensions

Figure 5-1: Dimensions



Back View | Side View | Front View | OM-626

Table 5-2: Control Cabinet Dimensions

Size	Inches	mm	Shipping weight*	
M	14 w x 16h x 6d	355 w x 400 h x 150d	32 lbs.	15 kg
L	20w x 20h x 7d	500 w x 500 h x 180d	55 lbs.	25 kg
XL	24w x 24h x 7d	600w x 600h x 1180d	73 lbs.	33 kg

* In addition to the shipping weight of the humidifier.

AREA-TYPE Humidifier Application Information

The operating characteristics of AREA-TYPE steam humidifiers should be considered when selecting humidifier capacities and choosing mounting locations.

Steam discharge from the humidifier quickly cools and turns to visible, warm, microscopic drops or particles of water (fog) which are lighter than air.

Should this fog contact any solid surface (columns, beams, ceiling, pipes, etc.) before it disappears, it may collect and drip, as water.

The greater the space relative humidity, the higher and farther the "fog" will carry and rise in the space before disappearing.

The table at right states the vertical (rise), horizontal (throw), and width (spread) dimensions that can be expected with the AREA-TYPE humidifiers.

To avoid steam impingement on surrounding areas, these dimensions should be observed.

Note: Tank dimension "C," in figure 5-1 on page 5, must be at least 12.85" (325 mm) and output should not exceed 285 lbs/hr (130 Kg/h).

Figure 6-1: Principle of Operation

Steam created in the evaporating chamber (1) flows up through the chute (2), and is distributed into the space (3) via the fan.

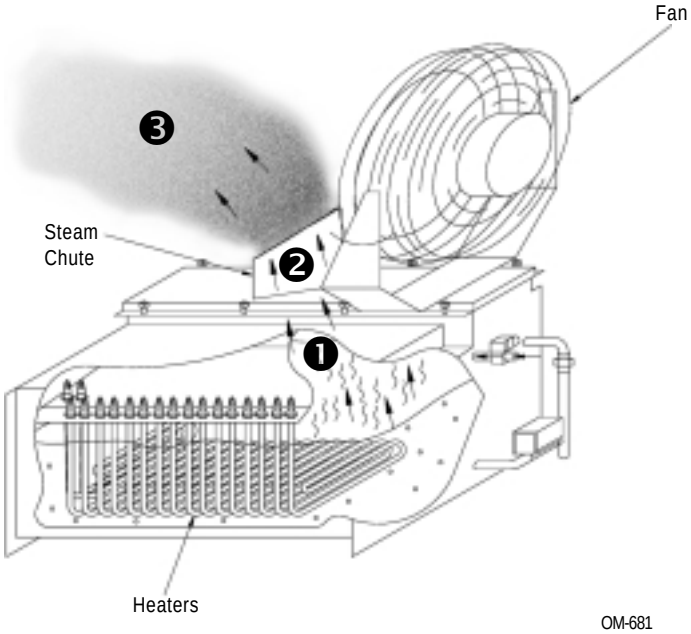


Table: 6-1: Minimum Distance for Rise, Spread and Throw

Space temp.	Space RH		50 lbs/hr	20 kg/hr	100 lbs/hr	45 kg/hr	150 lbs/hr	65 kg/hr	200 lbs/hr	90 kg/hr	250 lbs/hr	110 kg/hr	285 lbs/hr	130 kg/hr
60° F 16° C	30%	Rise	1 ft.	0.5 m	4 ft.	1.5 m	6 ft.	2.0 m	7 ft.	2.5 m	8 ft.	2.5 m	9 ft.	3.0 m
		Spread	2 ft.	1.0 m	4 ft.	1.5 m	5 ft.	2.0 m	7 ft.	2.5 m	8 ft.	2.5 m	9 ft.	3.0 m
		Throw	6 ft.	2.0 m	10 ft.	3.0 m	12 ft.	4.0 m	13 ft.	4.0 m	15 ft.	5.0 m	17 ft.	5.5 m
	40%	Rise	1 ft.	0.5 m	4 ft.	1.5 m	6 ft.	2.0 m	8 ft.	2.5 m	9 ft.	3.0 m	10 ft.	3.0 m
		Spread	2 ft.	1.0 m	4 ft.	1.5 m	5 ft.	2.0 m	7 ft.	2.5 m	9 ft.	3.0 m	10 ft.	3.0 m
		Throw	6 ft.	2.0 m	10 ft.	3.0 m	12 ft.	4.0 m	14 ft.	4.5 m	16 ft.	5.0 m	18 ft.	5.5 m
	50%	Rise	1 ft.	0.5 m	4 ft.	1.5 m	6 ft.	2.0 m	8 ft.	2.5 m	9 ft.	3.0 m	10 ft.	3.0 m
		Spread	2.5 ft.	1.0 m	5 ft.	2.0 m	5 ft.	2.0 m	7 ft.	2.5 m	9 ft.	3.0 m	10 ft.	3.0 m
		Throw	6 ft.	2.0 m	10 ft.	3.0 m	12 ft.	4.0 m	14 ft.	4.5 m	16 ft.	5.0 m	18 ft.	5.5 m
70° F 21° C	30%	Rise	1 ft.	0.5 m	3 ft.	1.0 m	4 ft.	1.5 m	5 ft.	2.0 m	5 ft.	2.0 m	7 ft.	2.5 m
		Spread	1.5 ft.	0.5 m	3 ft.	1.0 m	4 ft.	1.5 m	5 ft.	2.0 m	5 ft.	2.0 m	7 ft.	2.5 m
		Throw	4 ft.	1.5 m	8 ft.	2.5 m	10 ft.	3.0 m	11 ft.	3.5 m	12 ft.	4.0 m	14 ft.	4.5 m
	40%	Rise	1 ft.	0.5 m	3 ft.	1.0 m	4 ft.	1.5 m	5 ft.	2.0 m	6 ft.	2.0 m	7 ft.	2.5 m
		Spread	2 ft.	1.0 m	3 ft.	1.0 m	4 ft.	1.5 m	5 ft.	2.0 m	6 ft.	2.0 m	7 ft.	2.5 m
		Throw	4 ft.	1.5 m	8 ft.	2.5 m	11 ft.	3.5 m	12 ft.	4.0 m	13 ft.	4.0 m	15 ft.	5.0 m
	50%	Rise	1 ft.	0.5 m	3 ft.	1.0 m	4 ft.	1.5 m	5 ft.	2.0 m	5 ft.	2.0 m	7 ft.	2.5 m
		Spread	2 ft.	1.0 m	3 ft.	1.0 m	4 ft.	1.5 m	5 ft.	2.0 m	5 ft.	2.0 m	7 ft.	2.5 m
		Throw	4 ft.	1.5 m	8 ft.	2.5 m	11 ft.	3.5 m	12 ft.	4.0 m	14 ft.	4.5 m	16 ft.	5.0 m

MOUNTING METHODS

Mounting Procedures

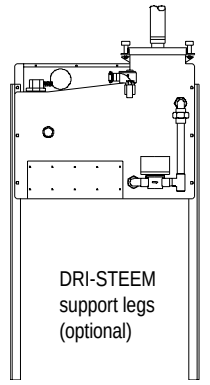
For proper operation of the electrode probe water level control and the skimmer system, the humidifier must be mounted level in both directions.

Access,18" minimum (460 mm), for periodic removal of the top cover is recommended. The cover is removed for inspection and cleaning of the evaporating chamber. In most cases, scale that forms on the heating elements continuously flakes off as it forms and the loose scale settles to the bottom. A clean-out tray on the floor of the tank may be removed periodically through the front clean-out opening. Allow space for withdrawal of the tray when installing the humidifier.

In some installations, an overflow drain pan may be necessary to prevent possible damage to flooring. This may be caused by a rapid or sudden drainage of the contents of the humidifier. The drain pan must be connected to the sanitary waste water system.

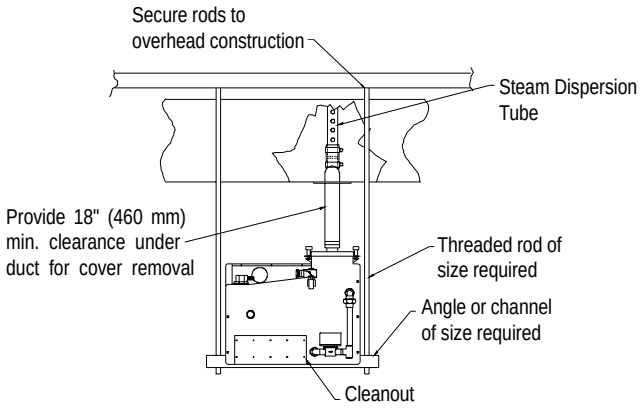
Figure 7-1: VLC Mounting Methods

1. Floor Stand Method



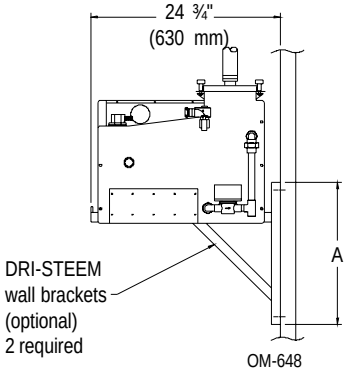
OM-646

2. Trapeze Hanger Method



OM-647

3. Wall Brackets Method

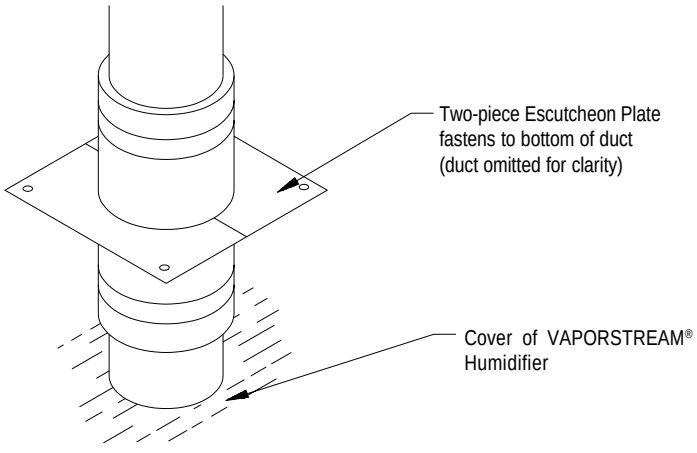


OM-648

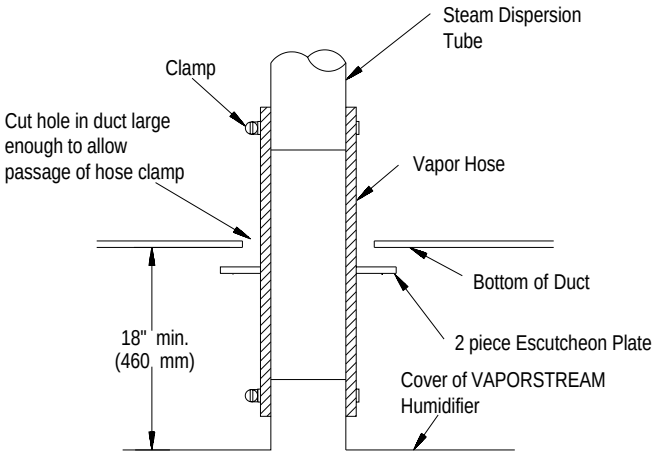
Unit	Dimensions for A (in inches)	Dimensions for A (in mm)
3 heater	19	480
6 heater	19	480
9 heater	30	760
12 heater	36	915

4. Mounting Unit Below Duct

Mounting humidifier 18" (460 mm) below duct is recommended to facilitate cover removal.



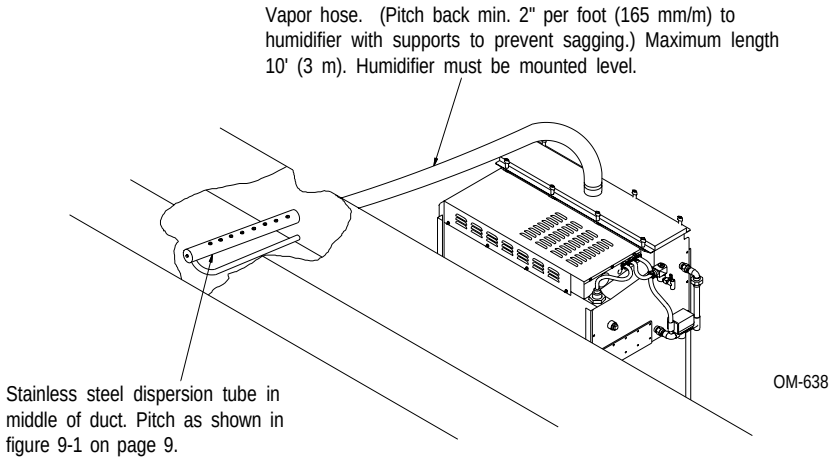
OM-65



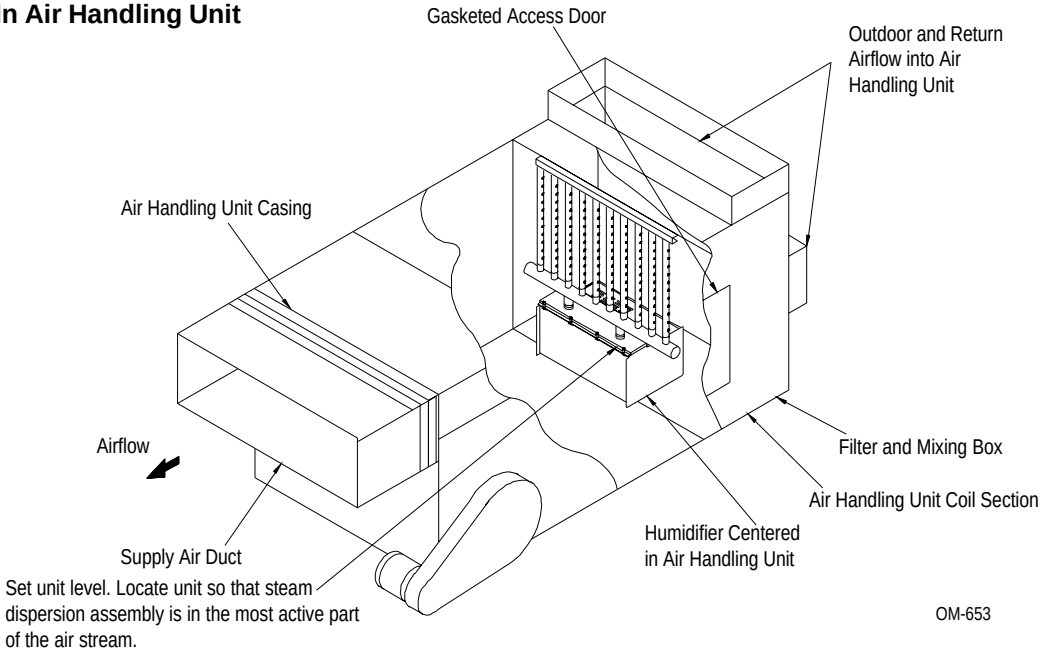
OM-66

MOUNTING METHODS

5. Mounting Units Away from Duct(s) Using Vapor Hose



6. Mounting In Air Handling Unit



Electrical

The current characteristics, and capacity requirements should be checked against the nameplates. The control cabinet should be mounted in a location convenient for service. All wiring must be in accordance with all local codes, and with VAPORSTREAM® Model VLC wiring diagram. The diagram is inside the control cabinet. The wiring between the control cabinet and humidifier must be rated at 105°C minimum.

Caution: Only qualified electrical personnel should perform installation procedures.

Dispersion Tube Installation with Condensate Drain

Vapor Hose
When a vapor hose and stainless steel dispersion tube are used, they should be pitched back to the humidifier. A minimum slope of 2" per foot (165 mm/m) (with no "low spots") is recommended. Vapor hose should be supported to prevent sags or low spots. When this is not possible due to duct elevation or an obstruction, alternate arrangements should be used as shown in figure 15-1 or 15-2.

Any condensate that forms in the vapor hose must be removed. Preferably, it should be returned to an open drain with a water seal of sufficient height to contain the duct static pressure, as shown in figure 10-1.

The condensate can also be returned to the VAPORSTREAM® VLC, as shown in figure 10-2, with an air vent. This method requires a water seal and an air gap to prevent back pressure from the VLC chamber. Excessive back pressures imposed on the humidifier may lead to dispersion tube(s) spitting, lost water seals, or leaking gaskets. When the distance between the humidifier and the dispersion tube(s) exceeds 10 feet (3 m), consult factory for special recommendations.

Hard Piping (when used)
- Hard piping should have a minimum I.D. of 1½" (35 mm).
- A minimum pitch of 2" per foot (165 mm/m) back to the humidifier must be maintained.
- 90° elbows are not recommended; use two 45° elbows one foot apart instead.
- Thin-walled tubing will heat up faster and cause less start up loss than heavy-walled pipe.
- Insulating the rigid piping will reduce output loss due to condensation.

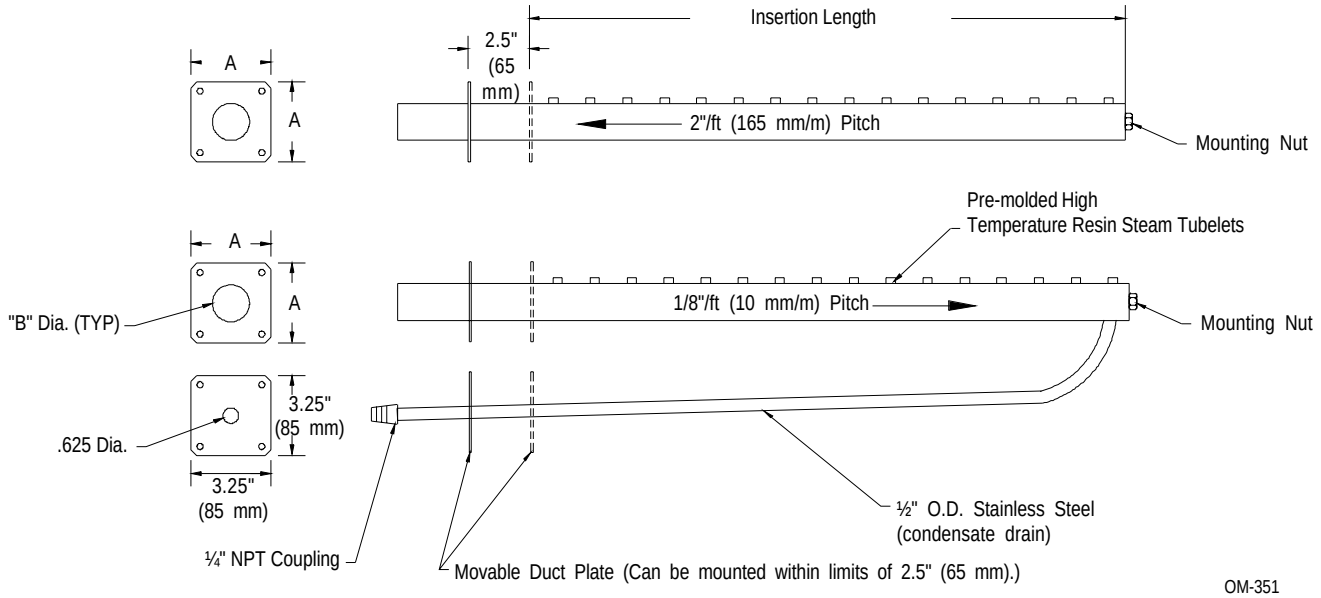
Tube Mounting
- Mount dispersion tubes pitched as stated above.
- Tubelets must discharge perpendicular to air flow.
- Return line piping material must be suitable for 212°F (100°C) water.

Min. Condensate Drain Line Sizing
- One or two tubes: 3/4" (20 mm) I.D.
- Three or more tubes: 1" (25 mm) I.D.

Table 9-1: Dispersion Tube Capacities

	Capacity			
Tube Dia.	**Without Drain**	**With Drain**	**A**	**B**
1½" (38 mm)	28 lbs/hr (13 Kg/h)	57 lbs/hr (26 Kg/h)	3.25" (85 mm)	1.51" (40 mm)
2" (50 mm)	57 lbs/hr (26 Kg/h)	85 lbs/hr (39 Kg/h)	5.00" (130 mm)	2.03" (50 mm)

Figure 9-1: Single Tube



OM-351

DISPERSION TUBE INSTALLATION

Figure 10-1: Multiple Tube with Condensate Wasted to Floor Drain

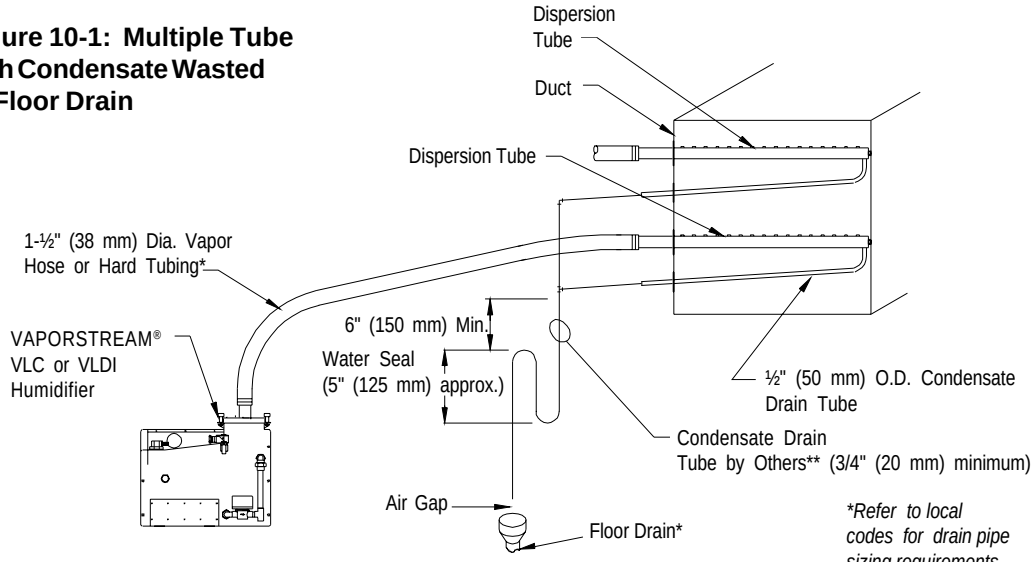


Figure 10-2: Multiple Tube with Condensate Return to Humidifier

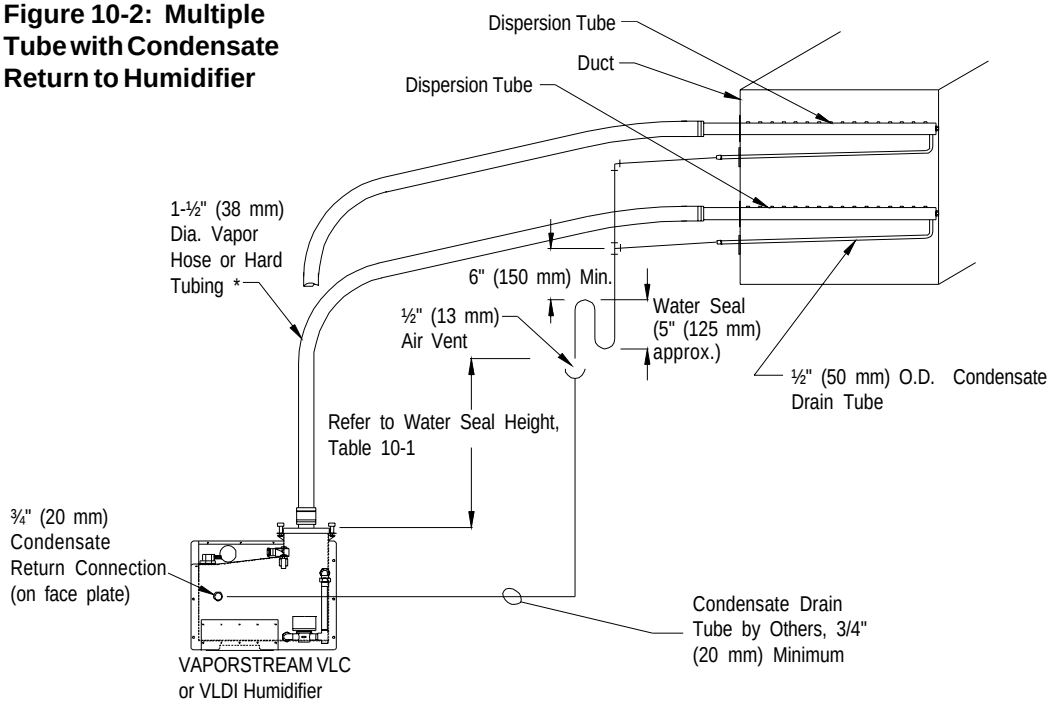


Table 10-1: Water Seal Minimum Height*

Humidifier	Lbs/Hr	Kg/h	Height (Inches)	Height (mm)
Up to 48 KW	5-138	2-62	12	305
49 KW to 64 KW	139-183	63-83	15	380
65 KW to 100 KW	184-227	84-103	18	460

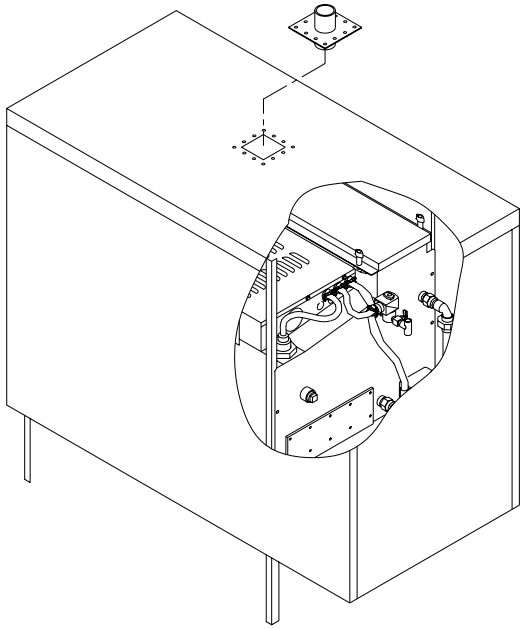
OM-697

* Height required to overcome humidifier internal pressure.

OPTIONAL WEATHER COVER

A weatherproof enclosure is available, as an option, for the VAPORSTREAM® VLC. This weather cover is available in either galvanized or stainless steel and comes in four sizes, designed to fit over a 3, 6, 9, or 12 heater VLC (see figure 12-2 for dimensional data on the four sizes). The weather cover encloses the VLC to protect it from wind and water, and is ETL listed to conform to UL standard 988. The weather cover is fully assembled at the DRI-STEEM factory and is available with a remotely mounted controller.

Figure 11-1: VLC Weather Cover



Instructions for Installation (See Page 12, Figures 12-1 and 12-2):

1. Remove the weather cover top and panels C and D to access the water and electrical connections. A 7/16" socket wrench is required.
2. Connect water supply and drain piping (panel C).
3. Terminate main power to unit (panel D).
4. Check the hose cuff(s) and hose clamp(s) for looseness created during shipment.
5. Re-attach the weather cover top and panels C and D which were removed in step #1.
6. Check that all bolts are securely fastened.
7. Connect steam dispersion device(s) to the outlet(s) on the humidifier.
8. Verify that a good seal is maintained after making the connections.

NOTES:

The bottom of the weather cover is open to accomodate piping and electrical connections. These connections must be run in watertight plastic conduit due to the outdoor environment.

Other modifications may need to be made by the installer including:

- freeze protection on all water piping
- insulation of hard piping between humidifier and dispersion device

Maintenance:

Periodic maintenance of the weather cover itself is recommended in order to insure it's continued wind/water proof state.

1. Periodically check the condition of the gasket(s). Replace as needed or on an annual basis.
2. Annually check for loose bolts or connections.
3. Annually check the hose cuff(s) for signs of wear. Replace as needed or on an annual basis.
4. Annually check the cover for any signs of corrosion or degradation. Repair as needed.

WEATHER COVER DIMENSIONS

Figure 12-1: Weather Cover Exploded View

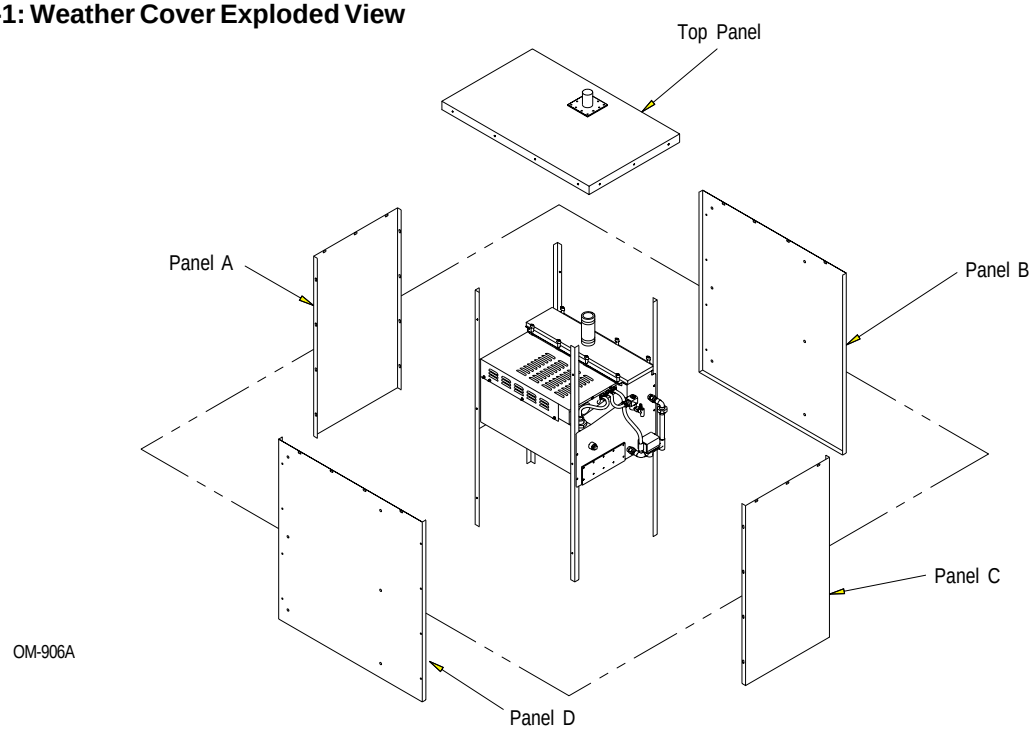


Figure 12-2: Weather Cover Dimensions

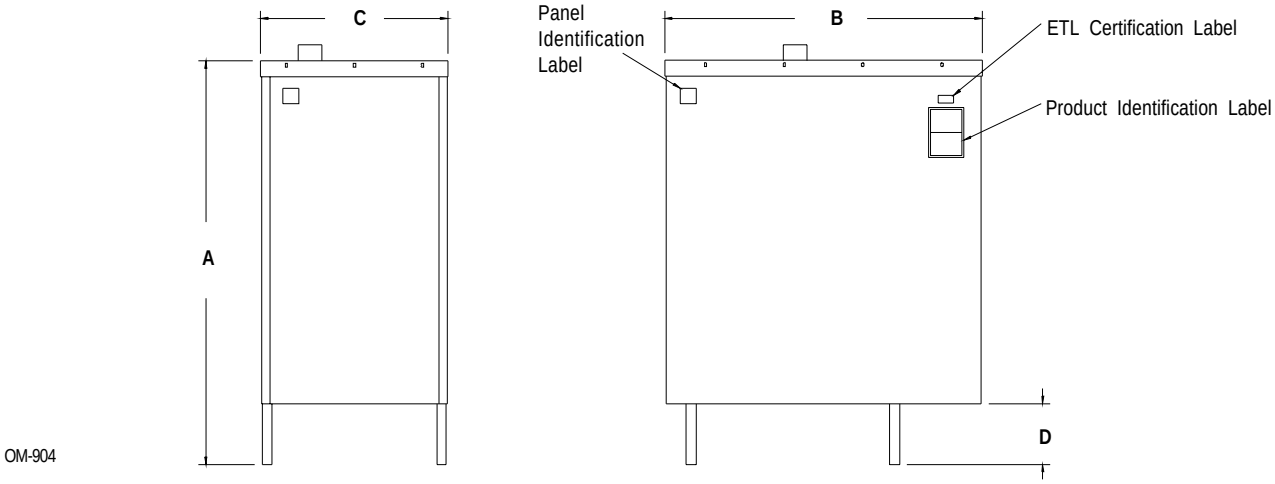


Table 12-1: 3, 6, 9, and 12 Heater Overall Dimensions of Weather Cover

Figure 12-2: Callout Letter	Callout Description	Three (inches	Three (mm)	Six (inches	Six (mm)	Nine (inches)	Nine (mm)	Twelve (inches)	Twelve (mm)
A	Height	50¾	1290	50¾	1290	50¾	1290	50¾	1290
B	Length	23½	600	32	815	40	1015	47½	1205
C	Width	25	635	23½	600	23½	600	23½	600
D	Distance from bottom	7¾	200	7¾	200	7¾	200	7¾	200

Instructions for Horizontal Duct

1. Unpack shipment and verify receipt of all RAPID-SORB components with packing list. Report any shortages to the DRI-STEEM factory immediately.

2. Provide necessary access in and around duct work.

3. Locate 1" x 1½" (25 mm x 38 mm) stainless steel channel inside the duct. Hang the channel from the top of the duct, centered between duct side walls, with the two mounting holes provided.

4. If hose cuffs are used, slide cuffs over the open end of each tube. Install a pair of hose clamps on each tube.

5. Note direction of air flow within duct, then arrange each dispersion tube so steam will discharge perpendicular to the air flow. Use the hex bolts provided to attach tubes to overhead 1" x 1½" (25 mm x 38 mm) channel. Do not secure. If the header is outside the duct (see figure 13-2), punch-out necessary clearance holes in the base of the duct to slide dispersion tubes up from bottom.

6. **For a Header Inside the Duct** (See figure 13-1.): Punch or cut out necessary clearance holes for RAPID-SORB header. Slide header into the duct, position header and slide the dispersion tube hose cuffs or slip couplings over the header dispersion tube nipples.

Position the header so vertical dispersion tubes are perpendicular to duct and pitch the header to condensate drain. Secure header to the mounting bracket. Use escutcheon plates to secure header where it enters the duct.

Check that the dispersion tubes discharge steam perpendicular to the air flow. Secure tubes to the overhead channel. Secure the channel to the duct. Position hose cuffs or slip couplings over tube and header tube nipples, and secure with clamps.

For a Header Outside the Duct (See figure 13-2.): Position header under dispersion tubes, then slide hose cuffs or slip couplings over header dispersion tube nipples.

Position the header so dispersion tubes are perpendicular to duct and pitch the header to condensate drain. Secure dispersion tubes in place with the tube escutcheon plates provided.

Check the position of the tubes for steam release perpendicular to the air flow. Secure tubes to the overhead channel, and secure channel to the duct. With header pitched to condensate drain, slip hose cuffs or slip couplings over tube nipples and secure with clamps.

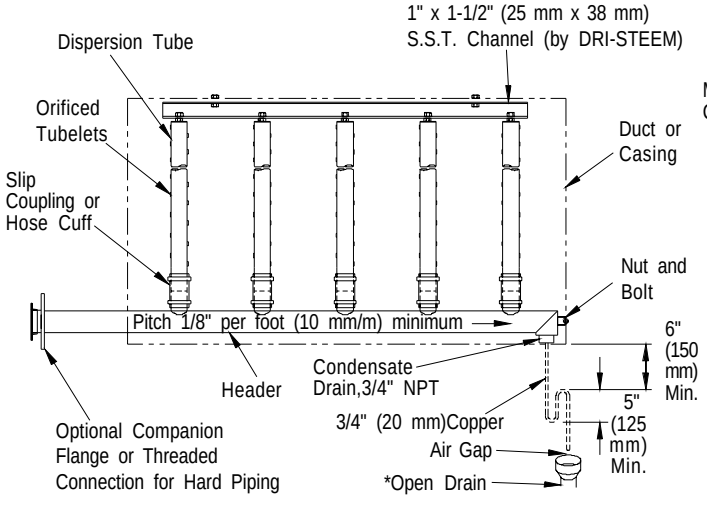
7. Connect a condensate drain to the header, provide the water trap as shown, and run to open drain, sized according to local codes.

8. Attach the header steam supply connector to main header using the hose cuff and clamps provided, but do not secure.

9. Route the necessary number of vapor hoses or pipes from the humidifier tank, position connector to accept the hoses or pipes and secure.

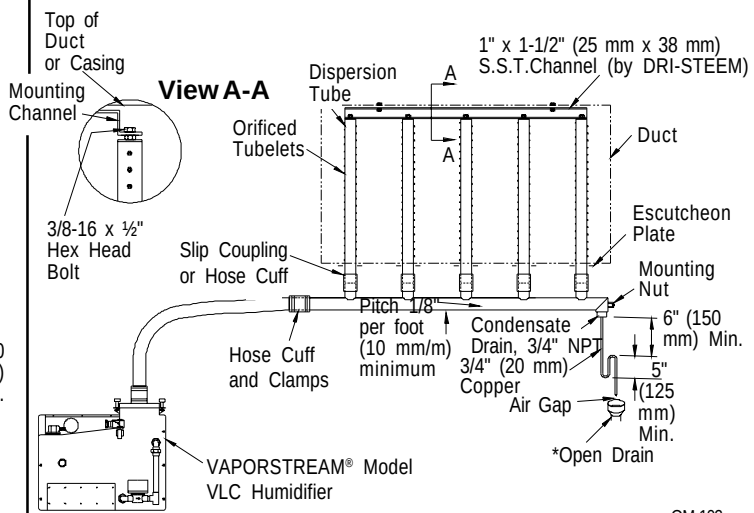
Note: Refer to page 15 for vapor hose information on routing and for alternate vapor hose installation methods.

Figure 13-1: RAPID-SORB Unit
Header Inside Duct



OM-101

Figure 13-2: RAPID-SORB Unit
Header Under Duct



OM-102

* Refer to local codes for drain pipe size requirements.

Vertical Duct Installation

Install the RAPID-SORB with dispersion tubes and header pitched to condensate drain as shown in figures 14-1,14-2, and 14-3.

See "Instructions for Horizontal Duct" for additional information on page 13, as applicable.

Figure 14-1: Plan View

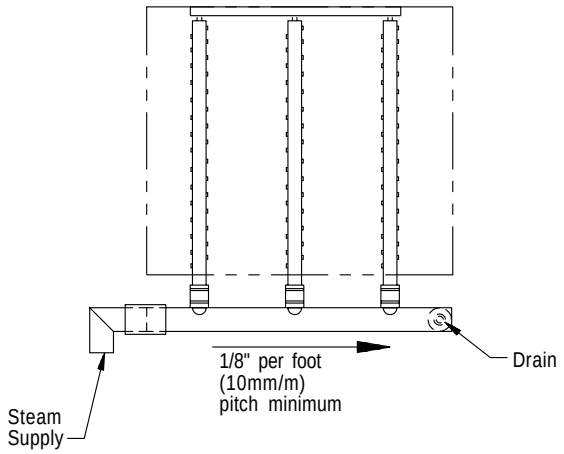


Figure 14-2: Elevation View Tube without Drain

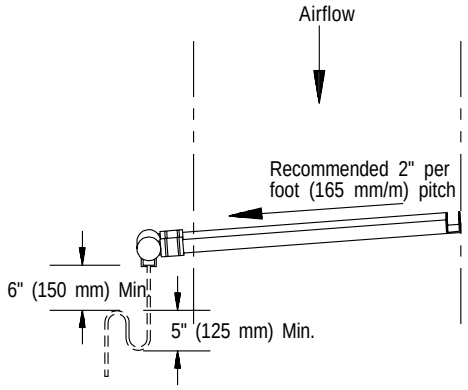


Figure 14-3: Elevation View Tube with Drain

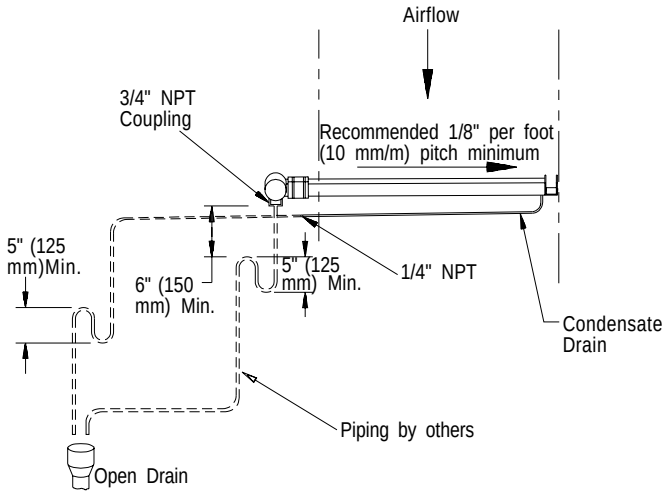


Table 14-1*: Maximum Steam Carrying Capacity in Lbs/Hr and Kg/Hr

Vapor Hose			Copper or Stainless Steel Tubing and Schedule 40 Steel Pipe		
Hose I.D.	Developed Length of 10' (3.0 Meters)**		Tube or Pipe Size	Base on Developed Length of 20' (6 Meters)**	
1½" (38 mm)	150 lbs/hr	68 kg	1½" (38 mm)	150 lbs/hr	68 kg/h
2" (50 mm)	250 lbs/hr	115 kg	2" (50 mm)	220 lbs/hr	100 kg/h
			3" (75 mm)	450 lbs/hr	205 kg/h
			4" (100 mm)	750 lbs/hr	340 kg/h
			5" (125 mm)	1400 lbs/hr	635 kg/h
			6" (150 mm)	2300 lbs/hr	1043 kg/h

* Based on total pressure drop in piping/hose of 5" (12.65 mm) W.C.
** For developed length add 50% to measured length for pipe fittings.
Note: To minimize lossof humidifier capacity and efficiency, it is recommended that tubing/piping be installed.

PIPING METHODS

Drain Piping

A drain line should be extended from the skimmer connection to a sanitary waste or suitable drain. If non-metallic pipe or hose is used, it must be capable of withstanding temperatures up to 212°F (100° C).

To prevent steam from escaping out the drain line, a **water seal must be provided** in the drain line of sufficient height to contain the pressure developed within the humidifier and steam dispersion system. To determine the proper height of the water seal, see table 16-1.

Make-up Water Piping

When non-metallic water piping is used, it must be rated to withstand 212°F (100° C) or greater temperature. If not, the final three feet (one meter) connected to the humidifier should be metallic and should not be insulated.

As part of the fill valve assembly, the needle valve restricts the rush of cold water entering the evaporating chamber during the fill cycle. Cold water could drop the chamber water temperature and collapse the steam. If the rumbling sound occurs during the fill cycle, adjust the needle valve to decrease the water fill rate.

The VAPORSTREAM® Model VLC has a one-inch (25 mm) internal "air gap". However, local codes may require a vacuum breaker.

Figure 15-1: Piping method recommended when obstruction prevents dispersion tube from being continuously pitched back to humidifier:

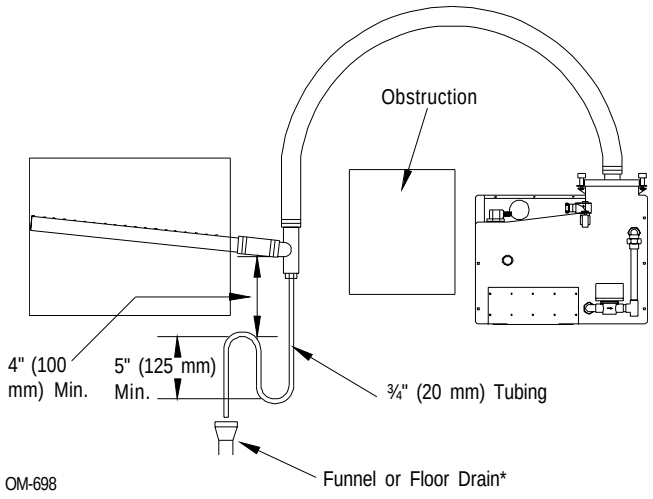
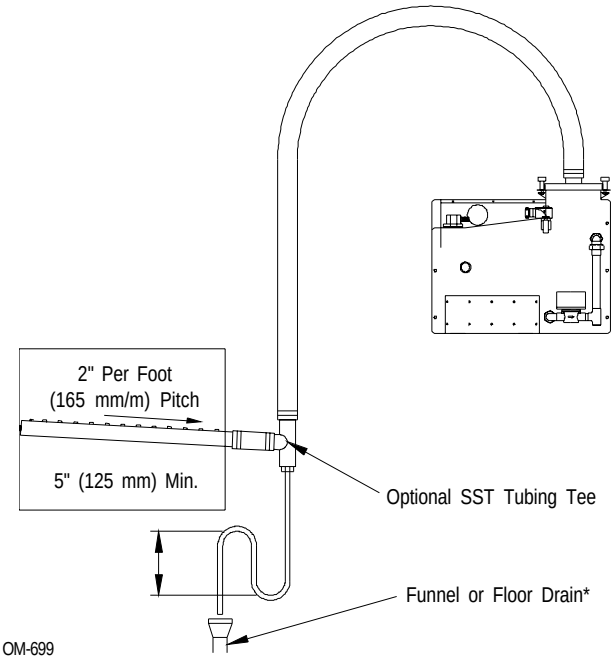


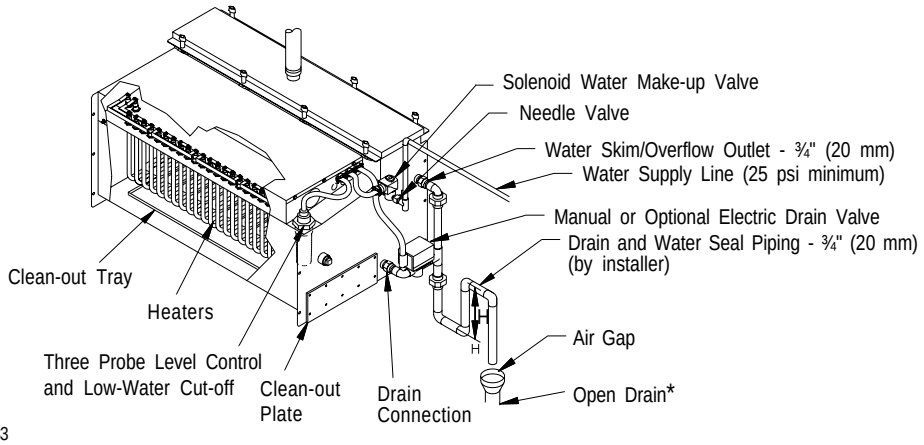
Figure 15-2: Piping method recommended when humidifier must be mounted higher than the duct:



* Refer to local codes for drain pipe size requirements.

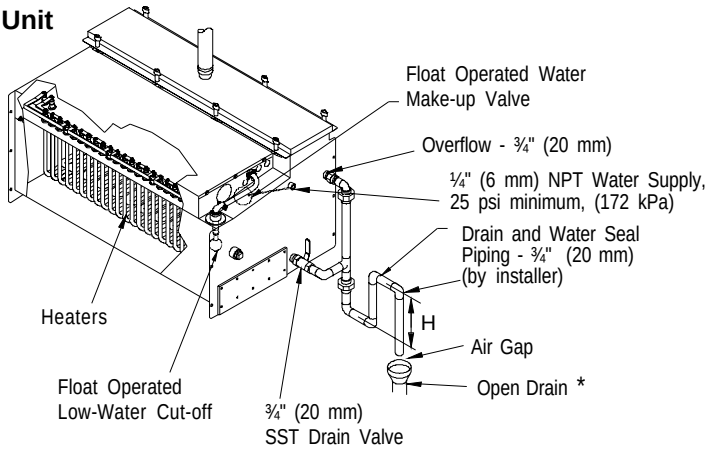
PIPING DIAGRAMS: STEAM, WATER AND DRAIN

Standard Unit (Non-DI/RO Water)



OM-633

DI/RO Water Unit

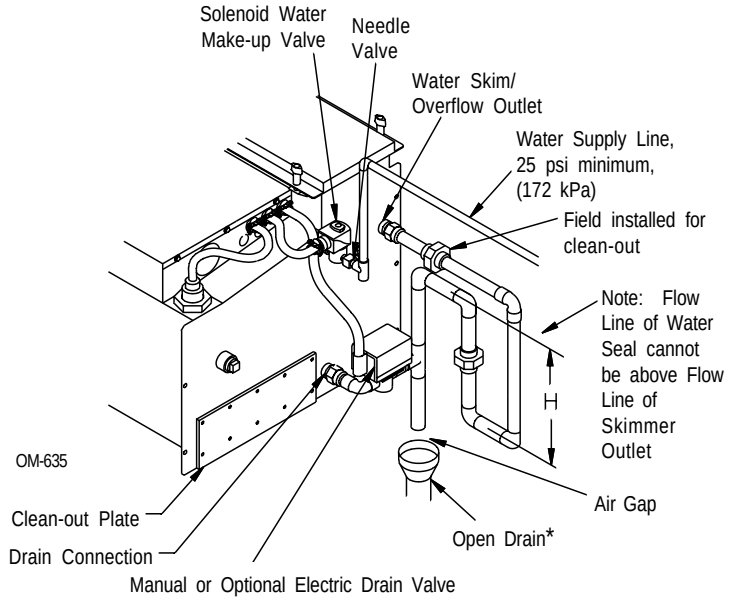


OM-634

Note: Drain piping material must be suitable for 212°F (100°C) water.

Alternate Water Seal and Drain Valve Piping (by installer)

Used when water seal must be elevated above flow line of drain connection (humidifier near floor)



OM-635

Table 16-1: Water Seal Height (H) Recommendations

Humidifier	Lbs/Hr	Kg/h	Height (Inches)	Height (mm)
Up to 48 KW	5-138	2-62	12	305
49 KW to 64 KW	139-183	63-83	15	380
65 KW to 100 KW	184-227	84-103	18	460

Note: *If piping to dispersion tube is over 20 feet (6 meters) increase water seal height by 15%.*

* Refer to local codes for drain pipe sizing and maximum temperature requirements.

START-UP PROCEDURE

Introduction

After the system has been properly installed and connected to both electrical and water supplies, it may then be started.

Start-up and Checkout Procedures

Mounting

Check mounting to see that unit is level and securely supported before filling with water.

Piping

Verify that all piping connections have been completed as recommended and that water pressure is available.

Electrical

Verify that all wiring connections have been made in accordance with all governing codes and the enclosed VAPORSTREAM® VLC wiring diagram.

Caution: Only qualified electrical personnel should perform start-up procedure.

Control System

For start-up instructions, see the operations and maintenance manual for your humidifier control system.

Caution: Overtightening cover will cause leaks.
All cover knobs are turned down at the factory until the bottom of the knob makes contact with the flange, then one half turn further. If more compression is required, turn all knobs a half turn more. Do not turn knobs more than a half turn before identifying that a leak still exists.

OPERATION

For operating instructions, see the *VAPOR-LOGIC® Installation Instructions and Maintenance Operations Manual.*

RECOMMENDED MAINTENANCE

VAPORSTREAM® Model VLC Only

Using softened water will significantly reduce mineral build-up in the humidifier. When softened water is not available, the VAPORSTREAM VLC is designed to deal with water hardness in one of two ways depending on the degree of hardness. For light to moderate hardness, up to 10 grains per gallon (170 mg/l), using the surface water skim time feature with annual cleaning is recommended. For high mineral content water, above 10 grains per gallon (170 mg/l), a periodic drain and flush through the motorized drain valve, in addition to the surface water skim time feature, is recommended. The frequency of cleaning will depend on water condition and evaporation load.

The humidifier should be inspected for leaks at least annually. Also, the current draw of the heaters should be checked and all safety devices in the control circuit should be cycled on and off to verify that they are functioning.

Caution: *When performing maintenance on the VAPORSTREAM Model VLC, always set control module switch to "STBY" position, place main disconnect in "OFF" position, and close manual water shut-off valve.*

Seasonally or as Required

1. Cleaning Tank - Slide the clean-out tray out and dispose of any loose scale that has collected in the tray. This should be done before the build-up reaches the underside of the heating elements.

2. Cleaning Probes - Disconnect the plug and cable assembly and unscrew the probe holder from the VAPORSTREAM VLC unit. The scale will easily flake off from the sensing portion. The sensing portion, bottom 3/8" (10 mm), of the probe should be brushed clean with stainless steel wool.

3. Cleaning Skim Overflow Port - Loosen deposits with a long tool, such as a screwdriver. Proper skimmer drainage should be verified by a weekly visual inspection. Water should drain from skimmer drain pipe after each fill cycle. (For cleaning piping, disconnect and flush out. If mineral deposits have restricted the flow, replace piping.)

Summer Maintenance

After the humidification season, a complete inspection and cleaning of the heaters, probe control, skimmer port, and water chamber is recommended. After cleaning, the unit should remain empty until humidification is required.

Adjusting the Surface Skim Bleed-Off Quantity

The skim time determines the quantity of water skimmed with each fill cycle. The skim time is field adjustable using the VAPOR-LOGIC® keypad.

Each time the VAPORSTREAM VLC refills, it fills to an elevation near the lip of the skim overflow fitting. A portion of the refill water then flows to drain carrying the minerals floating on the water with it. This reduces the mineral concentration, thereby reducing the frequency of cleaning needed.

The heated water that flows to drain is a cost of operation. Cleaning the humidifier is also an operational cost. Therefore, it is recommended that the user observe and adjust the skimming quantity. By doing so, a balance between minimizing mineral build-up and conserving hot water can be achieved.

VAPORSTREAM Model VLDI Only

The humidifier should be inspected for leaks at least annually. Also, the current draw of the heaters should be checked and all safety devices in the control cabinet should be cycled on and off to verify that they are functioning.

Make-up Water Piping

Use cold or hot makeup water. If the water pressure is above 60 psi (410 kPa) and/or water hammer would be objectionable, a pressure reducing valve or shock arrester should be installed. Even though the VAPORSTREAM VLC has an internal 1" (25 mm) air gap, some local codes may require a vacuum breaker.

Caution: Minimum water supply pressure is 25 psi (172 kPa).

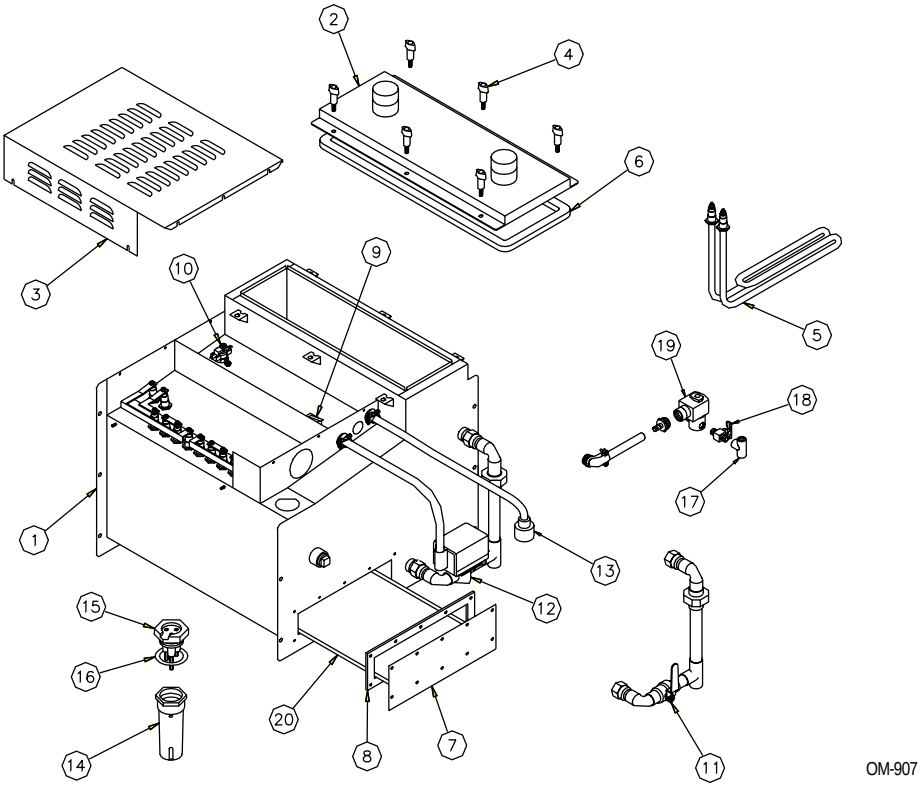
Cleaning Evaporating Chamber

As long as mineral-free water is used in the VAPORSTREAM VLDI, no cleaning or flushing of the evaporating chamber should be necessary.

TROUBLE-SHOOTING GUIDE

For trouble-shooting instructions, see the *VAPOR-LOGIC® Installation Instructions and Maintenance Operations Manual.*

VAPORSTREAM® Model VLC Humidifier



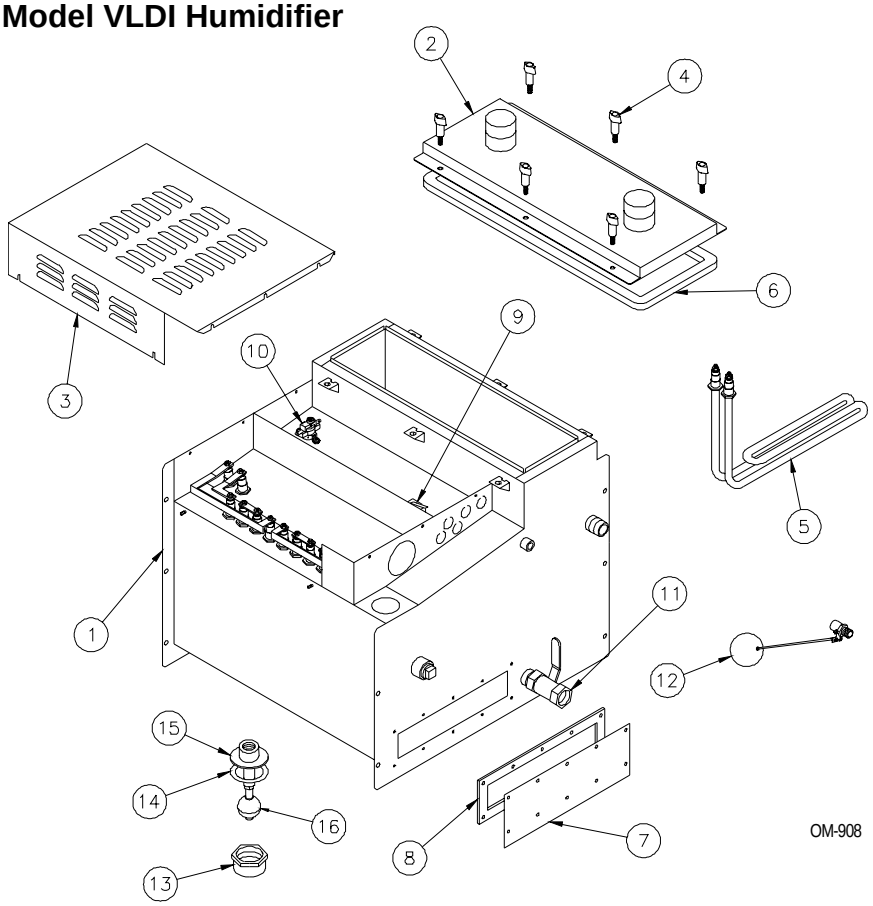
No.	Description	Part No.
1	Tank	167700-TAB
2	Cover, One Heater	167710-TAB
2	Cover, Three Heater	167715-TAB
2	Cover, Six Heater	167720-TAB
2	Cover, Nine Heater	167725-TAB
2	Cover, Twelve Heater	167730-TAB
3	Cover, Heater Louvered	167740-TAB
4	Knob, T-Handled Utility	700725
5	Heater	409600-TAB
6	Gasket, Cover	160691-TAB
7	Clean-Out Plate	165472
8	Gasket, Clean-Out Plate	308225
9	Switch Door Interlock	408475
10	Thermal Cut-Out	409560-001
11	Valve, ¾" Ball (Manual Drain)	505011
12	Valve, ¾" Electric (Auto Drain)	505400-001
13	Probe Plug	406050-004
14	Probe Housing	308500
15	Probe Assembly	406015
16	Gasket, Probe	309750-004
17	Strainer, ¼" Sediment	300050
18	Valve, ¼" Needle	505070-001
19	Fill Valve, ¼" Solenoid	505084
20	Clean-Out Tray	167770-TAB

TAB - Specify humidifier model and serial numbers when ordering.

Notes:

1. For dispersion tube(s) specify type (L-tube, straight tube, RAPID-SORB®, etc) humidifier model and serial numbers.
2. Parts not itemized are typical hardware stock items.

VAPORSTREAM Model VLDI Humidifier



No.	Description	Part No.
1	Tank	167700-TAB
2	Cover, One Heater	167710-TAB
2	Cover, Three Heater	167715-TAB
2	Cover, Six Heater	167720-TAB
2	Cover, Nine Heater	167725-TAB
2	Cover, Twelve Heater	167730-TAB
3	Cover, Heater Louvered	167740-TAB
4	Knob, T-Handled Utility	700725
5	Heater	409600-TAB
6	Gasket, Cover	160691-TAB
7	Clean-Out Plate	165472
8	Gasket, Clean-Out Plate	308225
9	Switch Door Interlock	408475
10	Thermal Cut-Out	409560-001
11	Valve, ¾" Ball (Manual Drain)	505000-001
12	Float Valve Assembly	505210
13	DI Housing	167780
14	Gasket, Low Water Tube	160698
15	Low Water Tube	167785
16	Low Water Cut-Out Switch	408420-001

TAB - Specify humidifier model and serial numbers when ordering.

Notes:
1. For dispersion tube(s) specify type (L-tube, straight tube, RAPID-SORB®, etc) humidifier model and serial numbers.
2. Parts not itemized are typical hardware stock items.

MAINTENANCE SERVICE RECORD

DATE INSPECTED	PERSONNEL	OBSERVATION	ACTION PERFORMED

MAINTENANCE SERVICE RECORD

DATE INSPECTED	PERSONNEL	OBSERVATION	ACTION PERFORMED

TWO-YEAR LIMITED WARRANTY

DRI-STEEM Humidifier Company ("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 re-installation of any defective product.

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.

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.

DRI-STEEM® HUMIDIFIER COMPANY

ISO 9001 DNV Certification, Inc. Certificated Firm

14949 Technology Drive • Eden Prairie, MN 55344
Phone: (952) 949-2415 • 800-328-4447 • Fax: (952) 949-2933
E-Mail: sales@dristeem.com • Web: www.dristeem.com
Europe Office:
Bell Place, Bell Lane • Syresham, Brackley • NN13 5HP, U.K.
Phone: +44 1280 850122 • Fax: +44 1280 850124
E-Mail: 106277.1443@compuserve.com

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

DRI-STEEM, RAPID-SORB, STS, LTS, VAPOR-LOGIC and VAPOR-LOGIC$_2$ are Registered Trademarks of the DRI-STEEM Humidifier Company.
TEFLON is a Registered Trademark of Dupont.

Form No. VLCOM-0300 **Copyright © 2000 DRI-STEEM Humidifier Company** **Printed in U.S.A.**