

READ AND SAVE THESE INSTRUCTIONS

DRI-STEEM Models LTS[®] and LTS-DI[®]

LIQUID-TO-STEAM HUMIDIFIERS

Installation Instructions and Maintenance Operations Manual

**For Toll-Free Technical Support,
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DRI-STEEM[®]
HUMIDIFIER COMPANY

A SUBSIDIARY OF RESEARCH PRODUCTS CORPORATION



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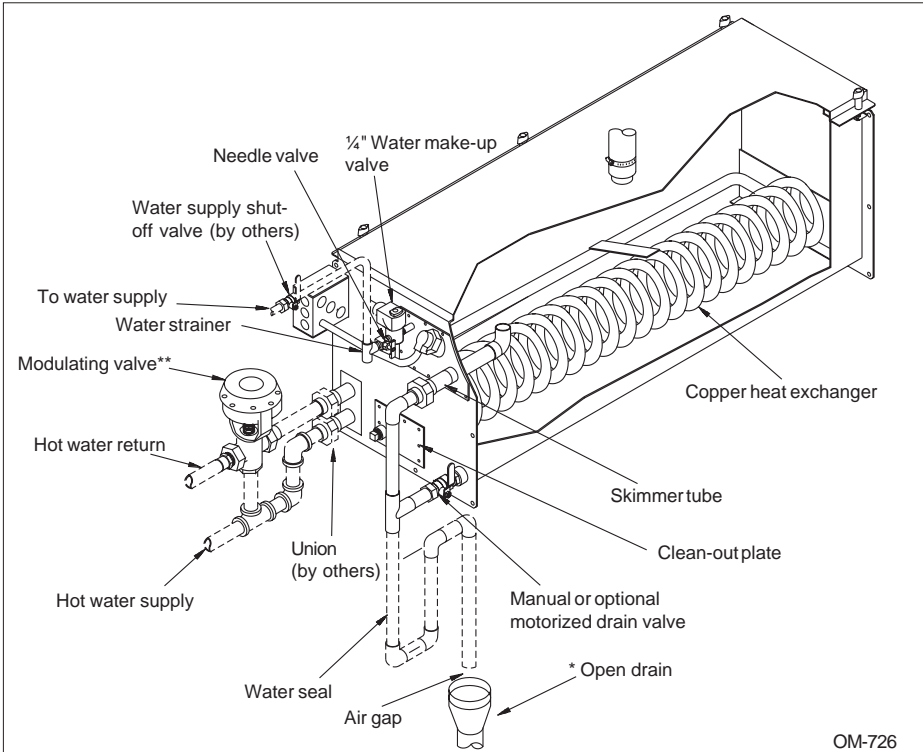
TO THE PURCHASER AND THE INSTALLER

Thank you for purchasing our LTS® humidification 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 urge you to become familiar with the contents of this manual.

DRI-STEEM Humidifier Company

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LTS® AND LTS®-DI HUMIDIFIERS

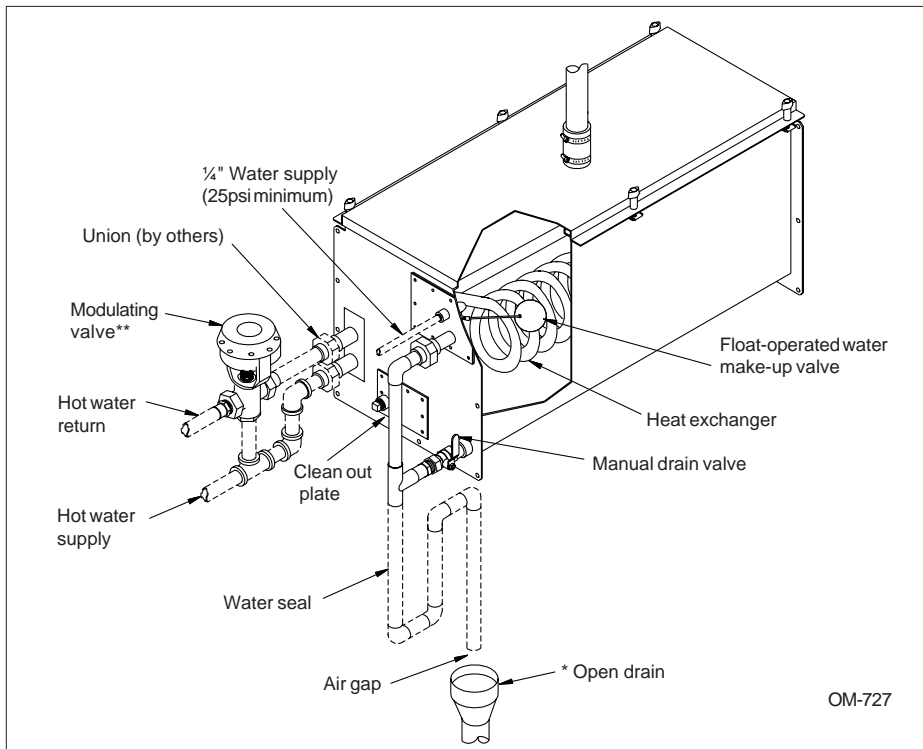


LTS Humidifier (For use with softened or unsoftened water.)

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

- * Drain piping material must be suitable for 212°F water.
- ** The piping shown is for the standard 3-way valve piped normally closed to the heat exchanger. The three way valve is recommended for constant system flow. If variable system flow is desired, a two way valve located in the hot water return line is recommended.

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LTS-DI Humidifier (For use with demineralized or reverse osmosis water.)

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, heat, or downtime.

- * Drain piping material must be suitable for 212°F water.
- ** The piping shown is for the standard 3-way valve piped normally closed to the heat exchanger. The three way valve is recommended for constant system flow. If variable system flow is desired, a two way valve located in the hot water return line is recommended.

OM-727

CAPACITIES

Table 4-1: Capacities for all models

Model			Output (lbs/hr and kg/h)								Pressure drop through heat exchanger			
			Flow		Hot water supply temperature									
					240°F	116°C	250°F	121°C	260°F	127°C			280°F	138°C
GPM	l/mn	lbs/hr	kg/h	lbs/hr	kg/h	lbs/hr	kg/h	lbs/hr	kg/h	psi	kPa			
LTS-25C	8	30	25	11	45	20	65	29	100	45	1.0	10		
	12	45	40	18	60	27	85	39	135	61	1.5	14		
	15	57	50	23	75	34	105	48	160	73	2.0	17		
	17	64	60	27	90	41	120	54	170	77	2.5	21		
LTS-25S	4	15	9	4	13	6	17	8	21	10	3.0	21		
	6	23	11	5	15	7	19	9	23	10	5.5	41		
	7.5	28	12.5	6	16.5	7	21	10	25	11	8.0	55		
LTS-100C	12	45	70	32	90	41	120	54	195	88	3.0	28		
	15	57	85	39	110	50	140	64	230	104	5.0	41		
	17	64	95	43	125	57	155	70	250	113	6.5	55		
LTS-100S	7.5	28	33	15	40	18	48	22	59	27	2.0	14		
	10	38	38	17	47	21	56	25	69	31	3.0	21		
	15	57	45	20	55	25	65	29	80	36	6.0	41		
*LTS-200S	15	57	60	27	75	34	105	48	135	61	2.5	21		
	20	76	80	36	110	50	145	66	180	82	4.0	28		
	30	114	90	41	125	57	165	75	205	93	7.0	48		
*LTS-400C	24	91	190	86	250	113	310	141	470	213	4.0	28		
	30	114	240	109	300	136	350	159	510	231	6.0	41		
	34	129	260	118	320	145	380	172	540	245	8.0	69		

Notes:

C= Copper

S= Stainless

* 2 heat exchangers and 2 valves

- Use with supply water above 250°F (121°C) is not approved by ASME
- Dimensions and specifications subject to change without notice

Table 4-2: Medium and high temperature water heating systems

Properties of water 212° to 340°F (100° to 171°C)			
Temperature		Pressure	
°F	°C	psia	kPa
212	100	14.7	101.3
220	104	17.2	118.4
230	110	20.8	143.2
240	116	25.0	172.0
250	121	29.8	205.5
260	127	35.4	244.1
270	132	41.9	288.4
280	138	49.2	339.0
290	143	57.6	396.6
300	149	67.0	461.7
310	154	77.7	535.2
320	160	89.7	617.8
330	166	103.1	710.1
340	171	118.0	813.1

DIMENSIONS

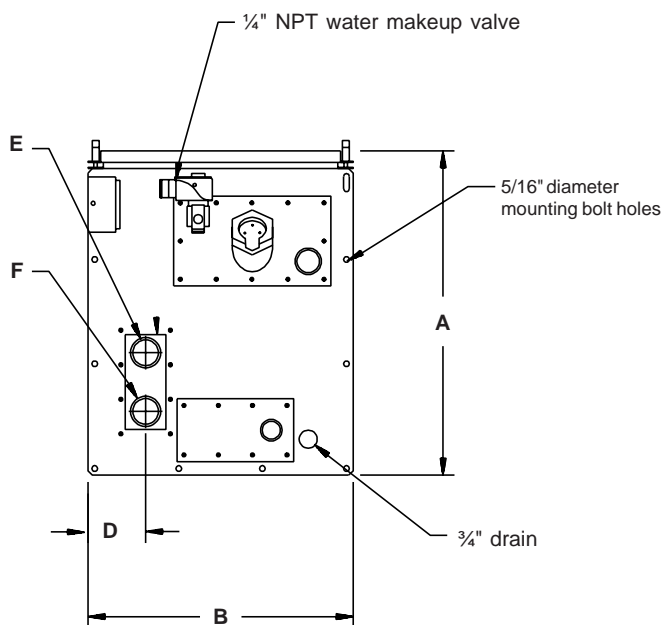
Table 5-1: Dimensions for LTS® and LTS®-DI, sizes 25 and 100 (single heat exchangers)

Model	Description	LTS-25C*	LTS-25S**	LTS-100C*	LTS-100S**
		in (mm)	in (mm)	in (mm)	in (mm)
A	Overall height	18.13	18.13	18.13	18.13
		(460)	(460)	(460)	(460)
B	Face width	14.75	14.75	19.25	19.25
		(375)	(375)	(490)	(490)
C	Face length	23.50	23.50	39.50	39.50
		(600)	(600)	(1005)	(1005)
D	Distance to heat exchanger	3.20	3.20	3.20	3.20
		(80)	(80)	(80)	(80)
E	Return outlet	1.00	.75	1.00	1.00
		(25)	(20)	(25)	(25)
F	Supply inlet	1.00	.75	1.00	1.00
		(25)	(20)	(25)	(25)

Notes:

* C = Copper / **S = Stainless Steel

Figure 5-1: LTS and LTS-DI, sizes 25 and 100



OM-336y

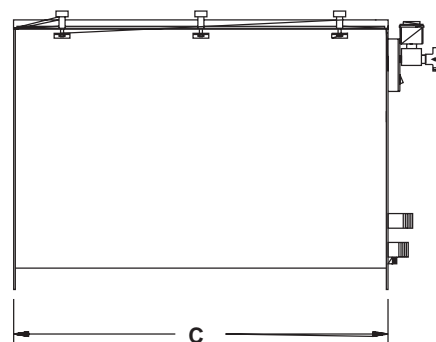
Table 5-2: Dimensions for LTS and LTS-DI, sizes 200 and 400 (dual heat exchangers)

Model	Description	LTS-200S*	LTS-400C**
		in (mm)	in (mm)
A	Overall height	18.13	18.13
		(460)	(460)
B	Face width	28.25	28.25
		(720)	(720)
C	Face length	55.00	55.00
		(1400)	(1400)
D	Distance to first heat exchanger	3.20	3.20
		(80)	(80)
E	Distance to second heat exchanger	15.50	15.50
		(395)	(395)
F	Distance from bottom to return outlet	6.67	6.67
		(170)	(170)
G	Distance from bottom to supply inlet	3.67	3.67
		(95)	(95)
H	Return Outlet	1.00	1.00
		(25)	(25)
J	Supply Inlet	1.00	1.00
		(25)	(25)

Notes:

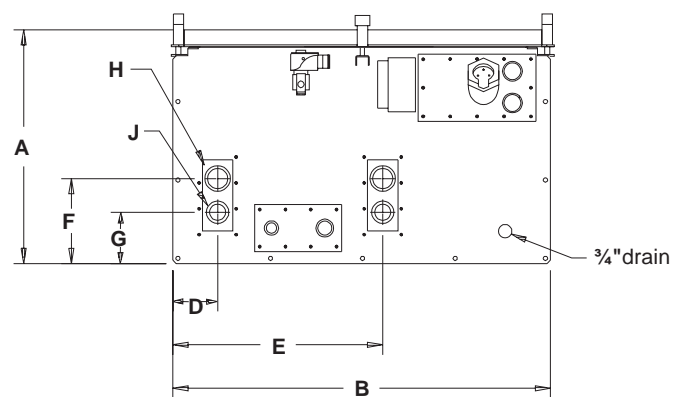
* C = Copper / **S = Stainless Steel

Figure 5-2: Side view all sizes



OM-336b

Figure 5-3: LTS and LTS-DI, sizes 200 and 400



OM-728z

MOUNTING METHODS

Mounting notes

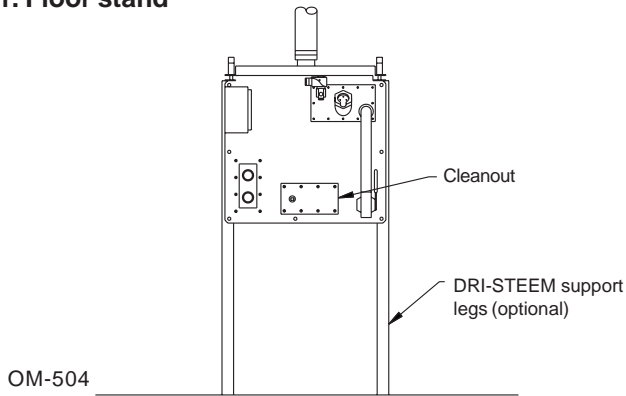
1. For the electrode probe water level control and the skimmer system to properly operate, the humidifier must be mounted level in both directions.
2. Access (12-18" minimum) for periodic removal of the top cover is recommended. In most cases, scale that forms on the heat exchanger continuously flakes off

as it forms and the loose scale settles to the bottom. The clean-out plate can be removed periodically providing access to clean the loose scale from the bottom of the tank.

3. Due to the size and weight of the LTS® 200S and 400C units, the trapeze hanger and wall brackets are not recommended.

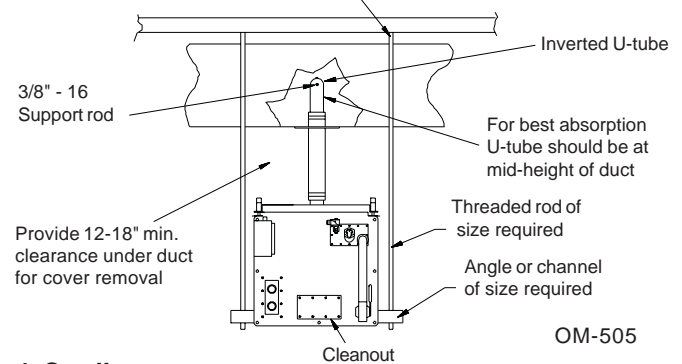
Figure 6-1: Mounting support methods

1. Floor stand

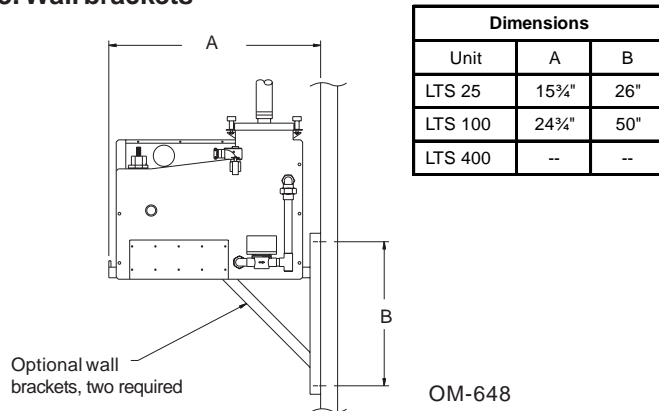


2. Trapeze hanger

Secure rods to overhead construction suitable for the operating weight of the humidifier

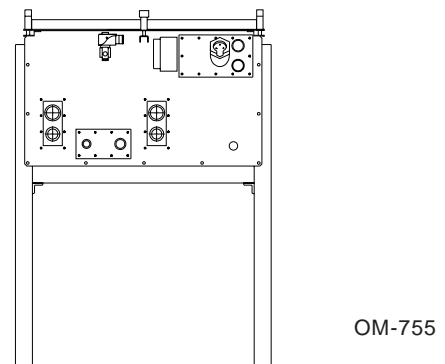


3. Wall brackets



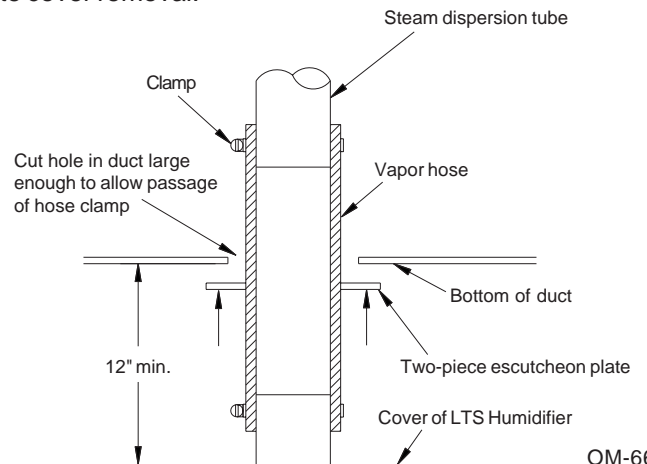
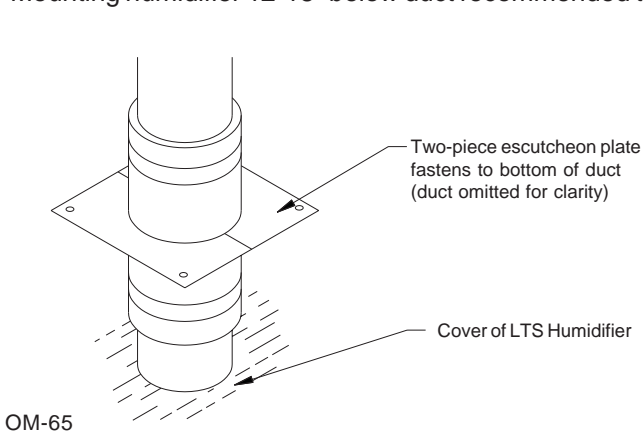
4. Cradle

Models LTS 200S and LTS 400C require cradle.



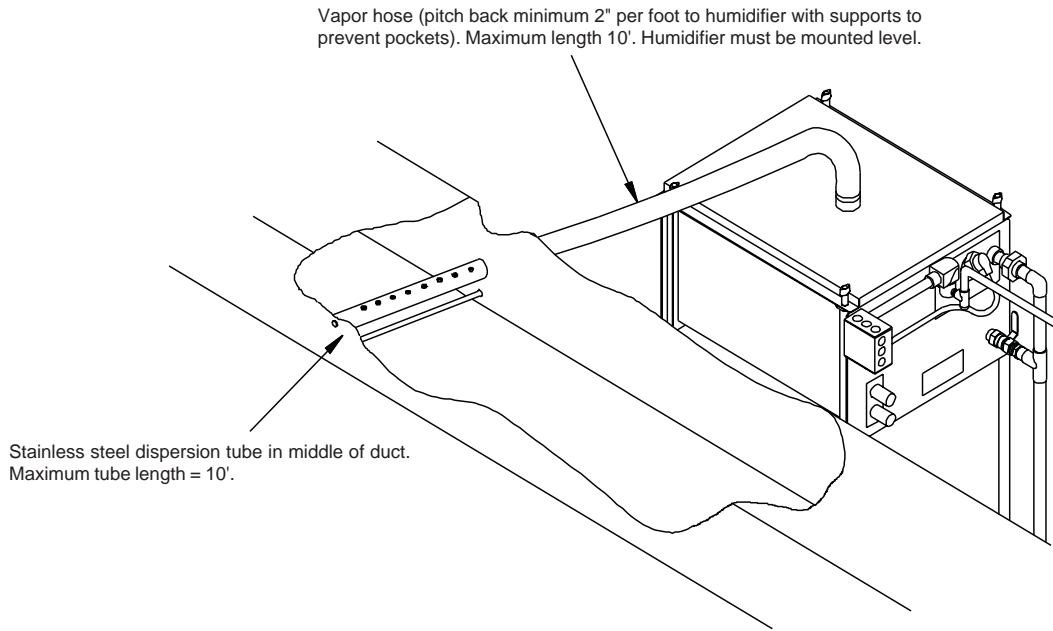
5. Mounting unit on underside of duct

Mounting humidifier 12-18" below duct recommended to facilitate cover removal.



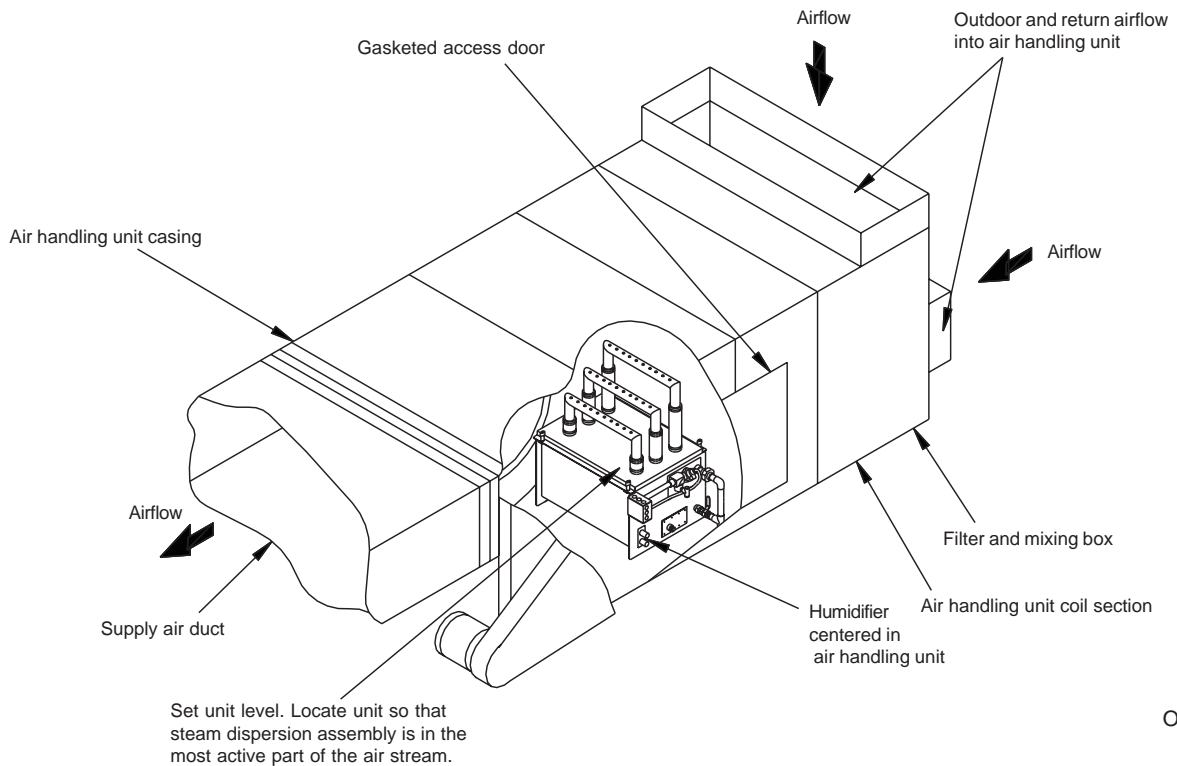
MOUNTING METHODS

6. Mounting unit away from duct(s) using vapor hose



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7. Mounting in air handling unit



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PIPING

Medium temperature water supply

The heat exchanger in the LTS® standard humidifier is designed for a maximum operating pressure of 75 psi and a maximum operating temperature of 280°F. The steam valve, trap and strainer are shipped loose for field installation.

Make-up water piping

Either cold or hot water can be used for make-up. If the water pressure is above 60 psi and/or water hammer would be objectionable, a pressure reducing valve or shock arrester should be installed. Even though the LTS has an inner 1" air gap, some local codes may require a vacuum breaker in the water supply pipe.

Make-up water considerations

When non-metallic water piping is used, it must be rated to withstand 212°F or greater temperature. If not, the final 3 feet connected to the humidifier should be metallic and should not be insulated.

As part of the fill valve assembly, a needle valve is provided. It restricts the rush of cold water entering the evaporating chamber during each fill cycle. The needle valve may be adjusted to minimize output disruption and potential "water hammer" (water pressure must be between 25 and 100 psi).

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 10-1 on page 10.

Softened water

There are two major advantages derived from using softened water instead of potable water (assuming the untreated supply water hardness is over 10 grains per gallon): maintenance and accuracy of control.

Maintenance

The skimmer, in conjunction with softened water, is an unbeatable combination for eliminating scale formation in the evaporating chamber. Several seasons of operation with no need for cleaning is normal, even with water having up to 30 grains of dissolved minerals per gallon prior to being softened.

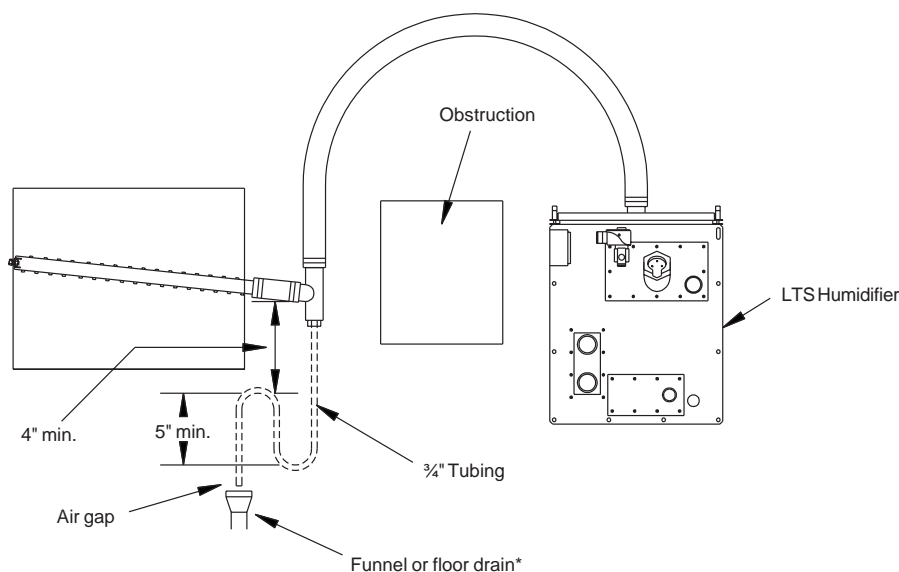
Accuracy of control

Reducing the higher skimmer quantity and eliminating the drain/flush cycle (both of which are accomplished by the use of softened water) improves controllability.

Softened water reduces water usage

The fewer number of make-ups per unit of time and the lesser the amount of water per make-up, the more "on time" or actual humidifying time will occur thus improving control accuracy. This is especially true when modulating control of the steam input to the humidifier is used.

Figure 8-1: Piping method recommended when obstruction prevents dispersion tube from being continuously pitched back to humidifier.



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* Refer to governing codes for drain pipe size requirements

PIPING

Potable water

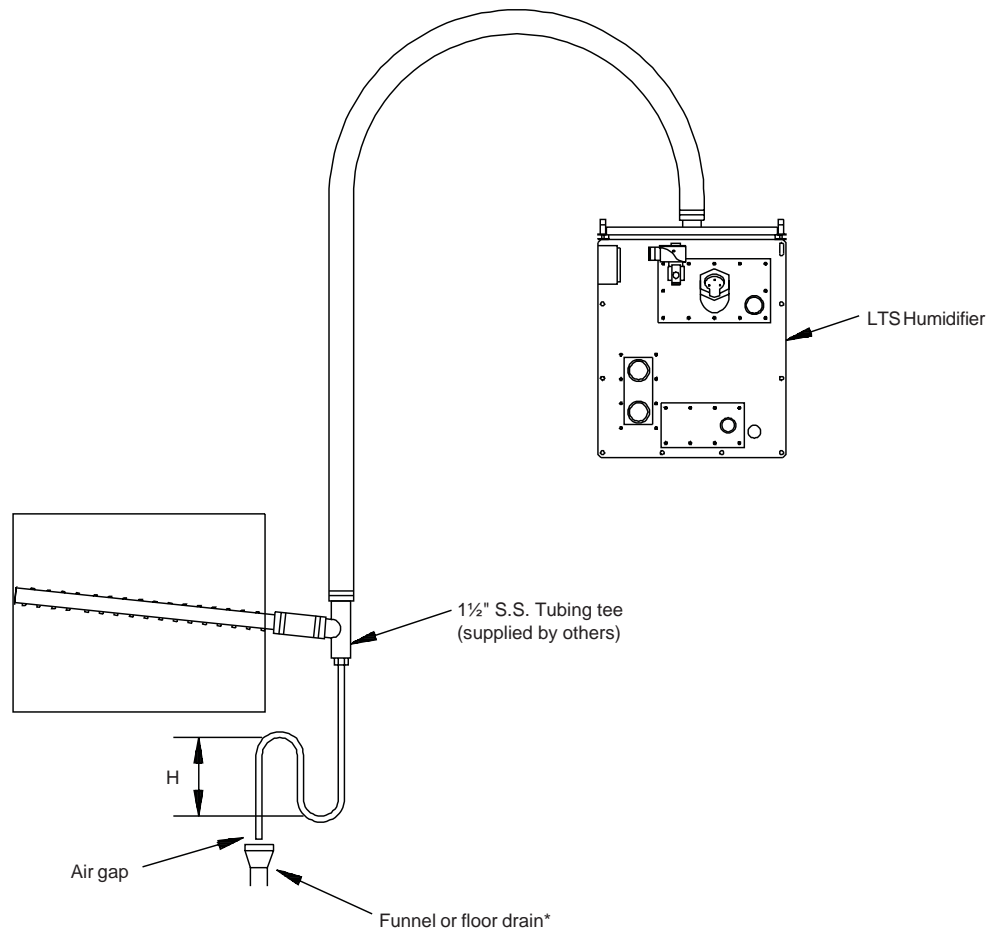
For water less than 10 grains per gallon hardness the skimmer system alone, without softening, usually provides a full season or more of humidification without a need for cleaning the evaporator.

For water hardness above 10 grains per gallon and where softened water is not available the timer operated drain/flush feature is available. The humidifier control module contains an integral adjustable timer which accumulates the "on" or actual humidifying time of the unit. When this accumulated time reaches the amount previously pre-set in the control module, the drain/flush cycle is activated.

Drain piping

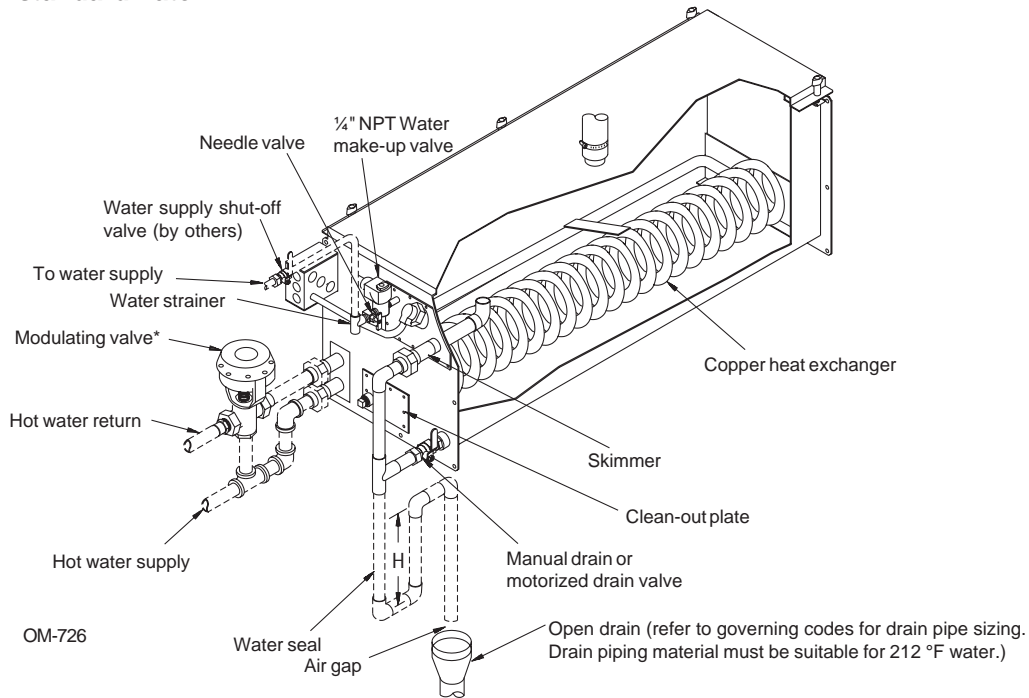
A drain line should be extended from the skimmer/drain connection to a sanitary waste. A water seal should be provided in the drain line of sufficient height to contain the pressure developed within the humidifier. Without this, steam will be forced through the drain line which would be objectionable. The depth of the water seal must be sufficient to overcome the static pressure of the air handling system plus the pressure developed by the humidifier itself. (Refer to Table 10-1 on page 10.)

Figure 9-1: This piping method is recommended when humidifier must be mounted higher than the duct.



DRAIN PIPING DIAGRAMS

Figure 10-1: LTS®-standard water



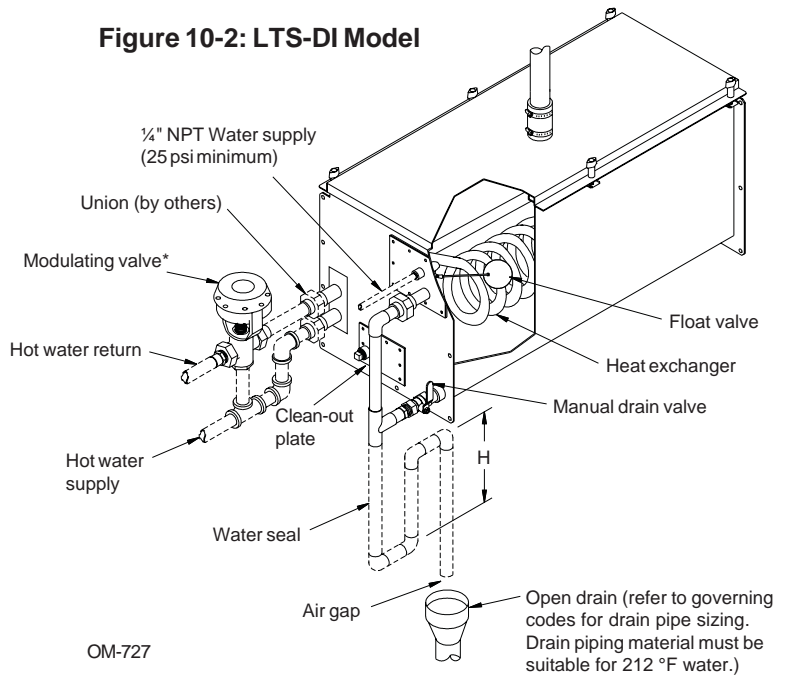
* The piping shown is for the standard 3-way valve pipe normally closed to the heat exchanger. The three way valve is recommended for constant system flow. If variable system flow is desired, a two way valve located in the hot water return line is recommended.

Table 10-1: Water seal height recommendations

Water Seal Height (H)	
Unit Output	H (Inches)
5-138	12
139-183	15
184 and higher	18

A water seal is necessary to prevent steam from escaping down drain line.

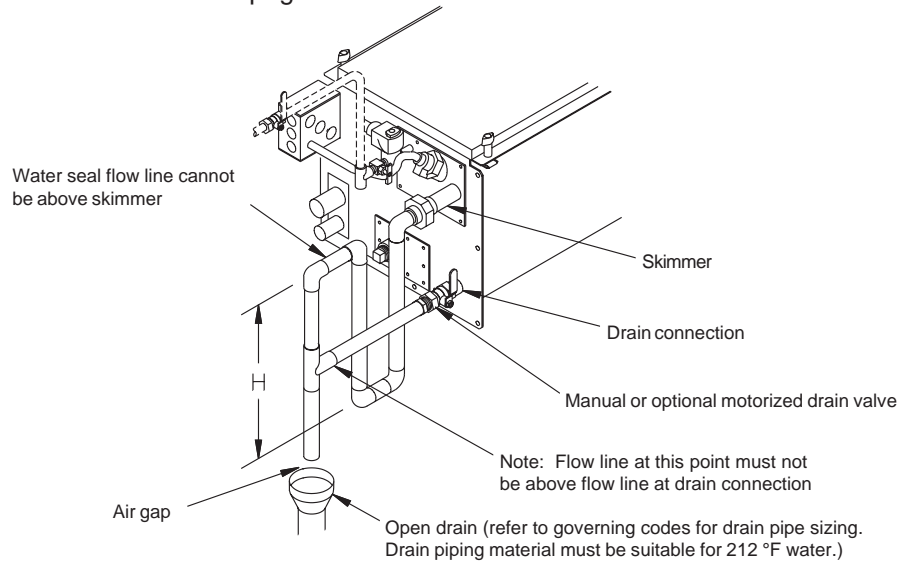
Figure 10-2: LTS-DI Model



DRAIN PIPING DIAGRAMS

Figure 11-1: Alternate water seal and valve piping

Used when water seal must be elevated above flow line of drain connection (humidifier near floor). Water seal height recommendations refer to Table 10-1 on page 10.



ELECTRICAL

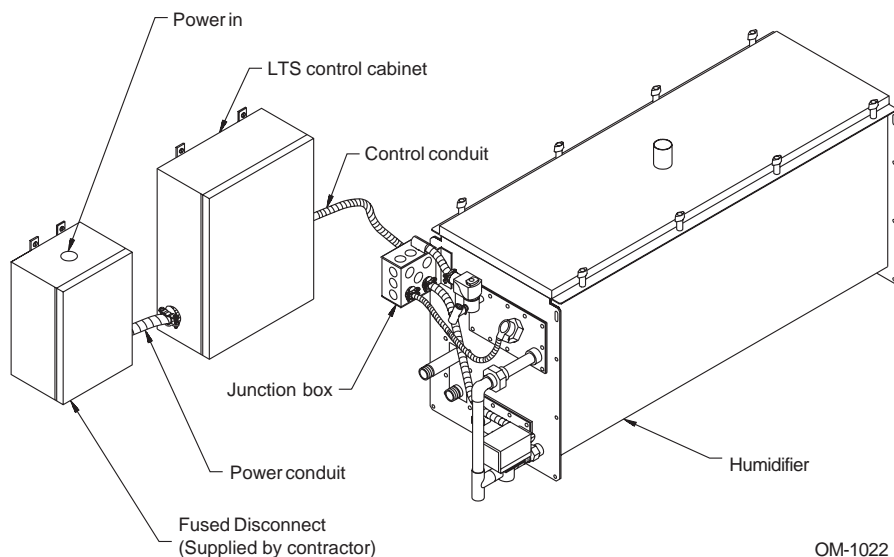
The electrical supply rating is specified on the LTS[®] control cabinet. The control cabinet should be mounted in a location for service. The external fused power disconnect supplied by the contractor should accommodate a minimum wire size of 14 gauge and a maximum fuse size of 15 amps. (The recommended combination is 14 gauge power supply wire and 3 amp fusing.) Size ½" conduit is the minimum recommended size for all wiring conduit. The connections to the control cabinet should be made in the locations

specified on the cabinet. A wiring diagram is provided inside the control cabinet. The wiring between the control cabinet and the humidifier must be 105° C rated copper wire minimum.

Please refer to the VAPOR-LOGIC[®]₂ Operations Manual for electrical connection information on the controller.

Caution: Only qualified electrical personnel should perform installation and start-up procedures.

Figure 11-2: Typical LTS connection layout



STEAM DISPERSION INSTALLATION

Dispersion tube installation with condensate drain

Vapor hose

- Vapor hose should be supported to prevent sags or low spots and to maintain a minimum pitch of 2" per foot back to the humidifier.
- When mounting the humidifier above the level of dispersion tube, see page 14, Figure 14-2.

Failure to follow the above recommendation may result in excessive back pressures being imposed on the humidifier. This in turn may lead to dispersion tube(s) spitting, lost water seals or leaking gaskets. When distance between the humidifier and the dispersion tube exceeds 10 feet, consult factory for special recommendations.

Hard piping

- Hard piping should have a minimum I.D. of 1½".
- A minimum pitch of 2" per foot back to the humidifier should be maintained.
- 90° elbows are not recommended; use two 45° elbows one foot apart instead.
- Thin wall tubing will heat up faster and cause less start up loss than heavy wall pipe.
- Insulating the rigid piping will reduce the loss in output caused by condensation.

Tube mounting

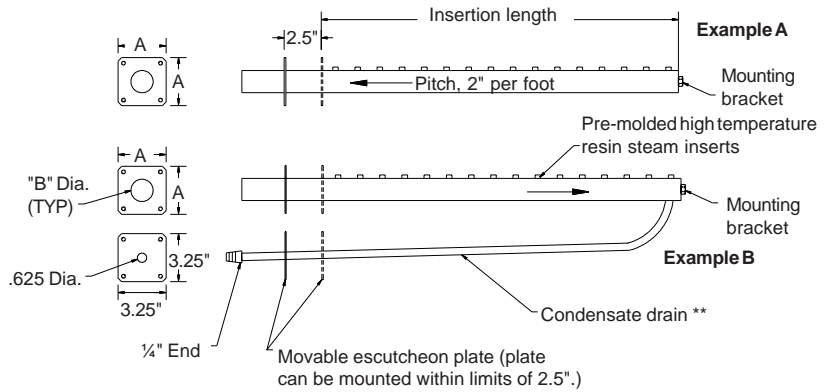
- Mount dispersion tubes level
- Best vapor absorption occurs when dispersion tube discharges against the air flow.

** Return line piping material must be suitable for 212°F (100°C) water.

Minimum condensate drain line sizing

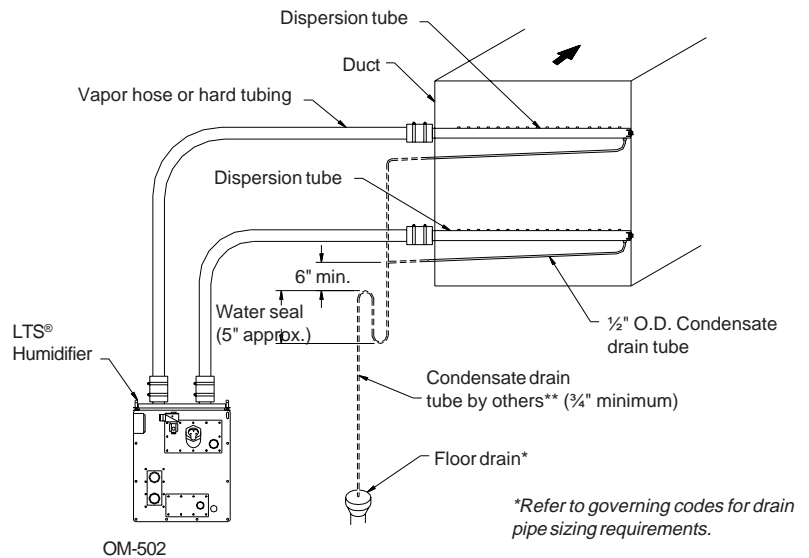
- One or two tubes: ¾" I.D.
- Three or more tubes - 1" I.D.

Figure 12-1: Single tube



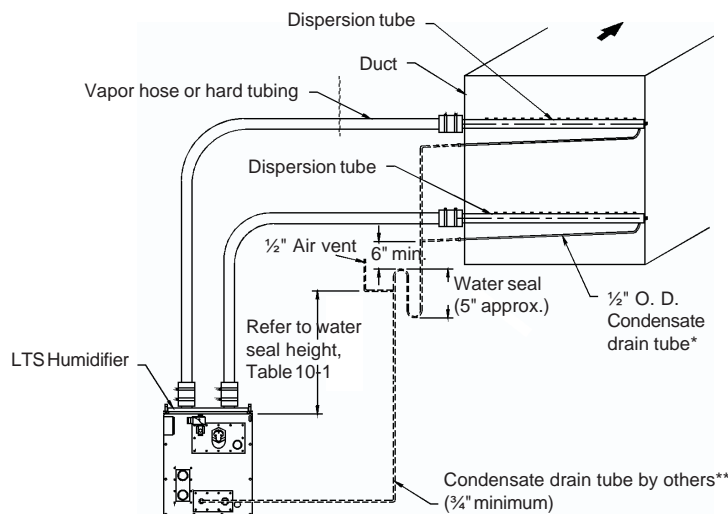
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Figure 12-2: Multiple tube with condensate wasted to floor drain



OM-502

Figure 12-3: Multiple tube with condensate return to humidifier



OM-503

STEAM DISPERSION INSTALLATION

Selecting the location:

- A. It is very important that the dispersion tube be located where the water vapor being discharged will be carried off with the airstream and will not cause condensation and dripping from the duct.
- B. In general, the dispersion method is best placed where the air can most readily absorb the moisture being added without causing condensation at or after the unit. This will normally be after the heating coil or where the air temperature is highest.
- C. Do not place the dispersion method too close to the intake of a high efficiency filter. The filter may remove the visible moisture and become waterlogged.
- D. Do not place dispersion method where water vapor will impinge on a metal surface.
- E. Do not place the dispersion method too close to a split in the duct. The unit may put more moisture in one branch than the other.

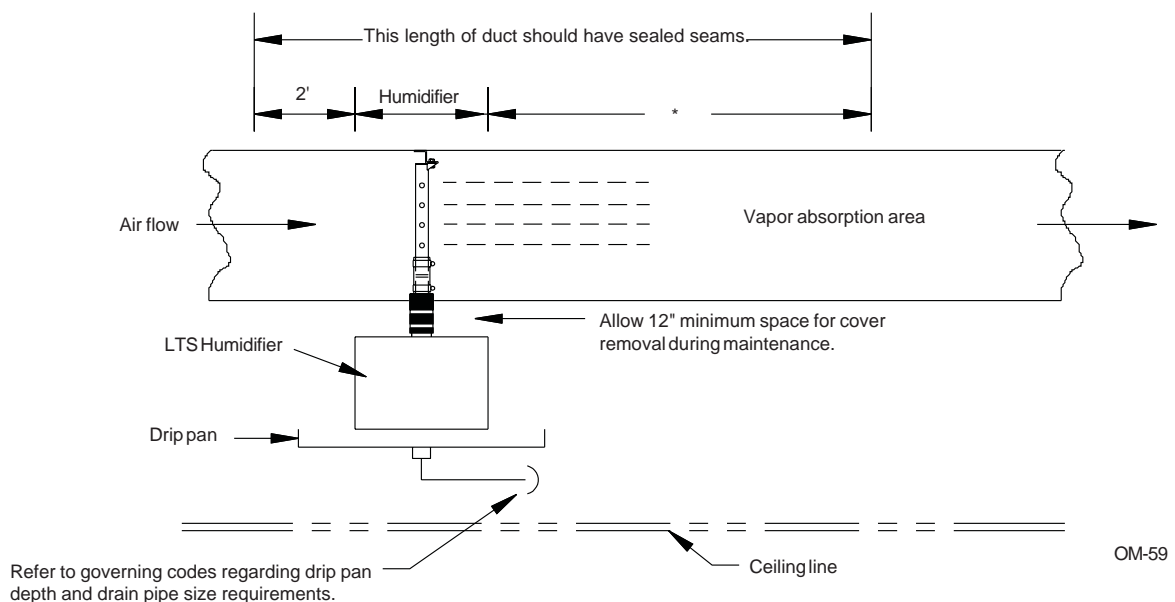
Installation above valuable equipment

Water piping and humidifiers should not be installed above expensive apparatus or equipment. The risk of a broken water pipe, leaking valve gland, condensation or other water leaks may occur causing serious damage and costly repairs to the equipment below.

Where this type of installation cannot be avoided install a drip tray constructed of galvanized sheet under the humidifier, valve, etc., to catch any possible water drip.

It is advisable to terminate the drain above an open floor drain. The overflow from the LTS® should be piped separately to a floor drain rather than the drip pan.

Figure 13-1: Installation above valuable equipment



* The distance steam will travel within a given airstream is predictable and can be determined using the DRI-STEEM LTS catalog. If this has already been done, the travel distance should be specified; if not, consult the DRI-STEEM LTS catalog or contact your DRI-STEEM representative or the DRI-STEEM factory.

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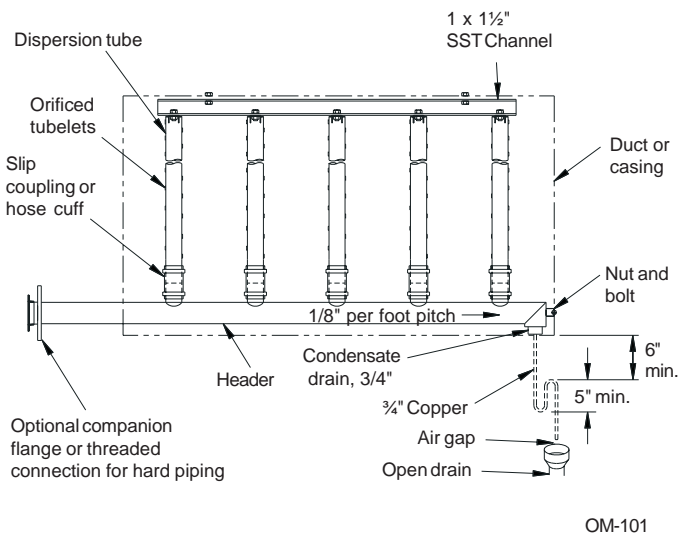
RAPID-SORB® ASSEMBLY AND INSTALLATION

Horizontal duct installation

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" 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 cuff.
5. Note direction of air flow within duct, then arrange each dispersion tube so steam will be discharged perpendicular to the air flow. Use the hex bolts provided to attach tubes to overhead 1" x 1½" channel. Do not secure. If the header is under the duct (see figure 14-2), 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 14-1.): 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 toward condensate drain. Secure header to the mounting bracket. Use escutcheon plates to secure header where it enters the duct.

Figure 14-1: RAPID-SORB unit
Header inside duct



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

For a header under the duct (see Figure 14-2.): 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.

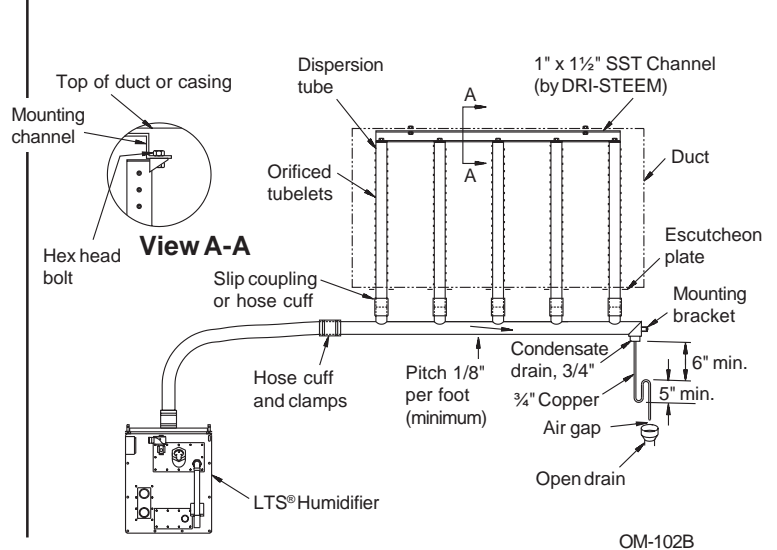
7. Connect a condensate drain to the header, provide the water trap as shown, and run to open drain, sized according to governing codes.

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 7 for vapor hose information on routing and for alternate vapor hose installation methods.

Figure 14-2: RAPID-SORB unit
Header under duct



RAPID-SORB® ASSEMBLY AND INSTALLATION

Vertical duct installation

Install the RAPID-SORB with dispersion tubes and header pitched to condensate drain as shown in Figures 15-1, 15-2, and 15-3.

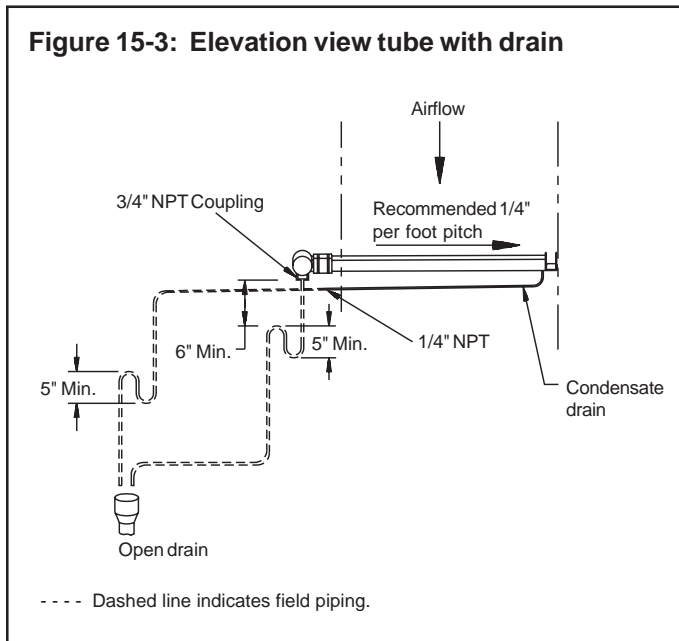
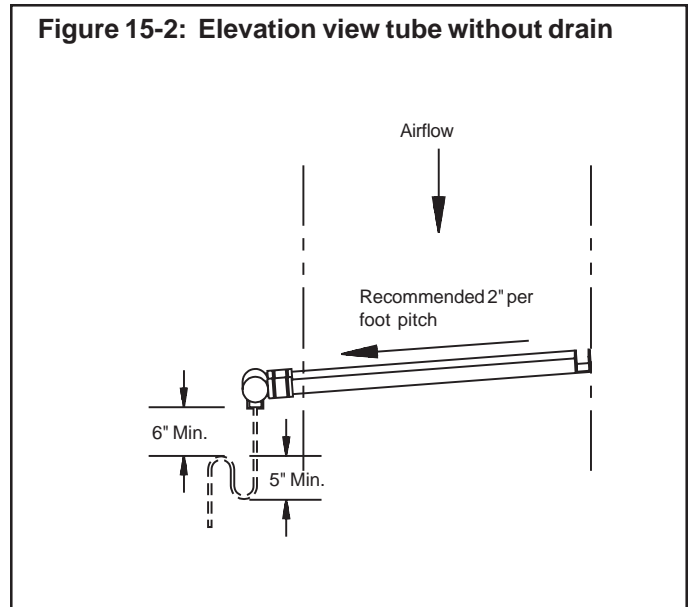
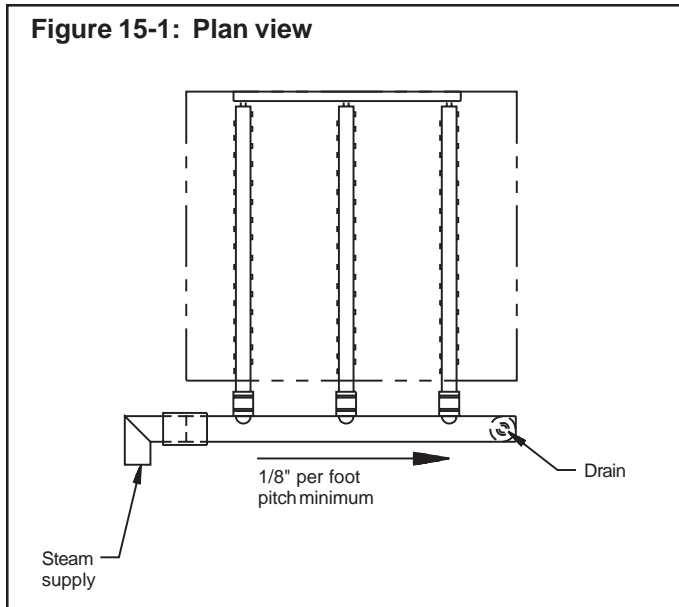


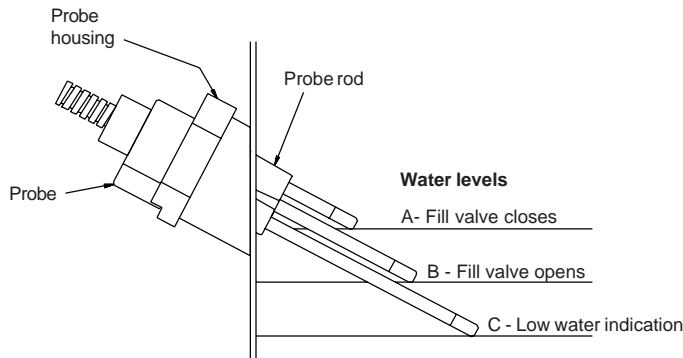
Table 15-1*: Maximum steam carrying capacity in lbs/hr and kg/hr

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)**		
1 1/2" (38 mm)	150 lbs/hr 68 kg	1 1/2" (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 loss of humidifier capacity and efficiency, it is recommended that tubing/piping be insulated.

START-UP AND OPERATION

Figure 16-1: Reliable electronic probe control maintains water level



OM-270

A simple three-probe conductivity sensor cycles a solenoid-operated water fill valve to maintain the proper water levels.

The LTS[®] humidifier is provided with a standard VAPOR-LOGIC[®]₂ microprocessor control system, see the VAPOR-LOGIC₂ *Installation and Operations Manual* for more information. Then continue reading this manual beginning at the maintenance section on page 17.

Water control with VAPOR-LOGIC₂

When the power is activated the solenoid-operated water fill valve will open, filling the evaporating chamber. Filling will continue until water reaches level A, at which time the fill valve will close. To ensure that the water seal is filled with water, disconnect probe plug and cable from probe rod assembly (located on face plate), allowing the fill valve to re-energize and overflow humidifier tank. This process will take only seconds; probe plug and cable must then be reconnected.

Water refill

During operation, the water line will drop to level B. At this level the fill valve opens, and remains open until the water line returns to level A.

Adjustable surface skimmer

Each time the evaporating chamber refills, the upper ¼" of water is immediately drained off through the skimmer. This carries away the mineral residue formed during the previous evaporating cycle. This skimming action effectively removes most of the mineral concentration in much the same way as the surface blowdown does in a steam boiler. This simple device greatly reduces the frequency of cleaning the evaporating chamber.

Note: Preferably this humidifier should be supplied with softened water. However, the probe type level control system requires water conductivity of 100 micromhos/cm (2 grains/gal) minimum to function and may not operate in water treated by the reverse osmosis or deionizing process. Specially designed LTS Model DI humidifiers are available for use with these water types.

RECOMMENDED MAINTENANCE

Caution: Allow unit to cool before performing any maintenance. Manually open the drain valve and the fill valve will be energized. Let the fill water run until the tank is cooled then shut off the contractor/field installed supply water valve.

Model LTS®

The LTS 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), using the surface water skim time feature with annual cleaning is recommended. For high mineral content water (above 10 grains per gallon), a periodic drain and flush along with periodic cleaning may be helpful.

The humidifier should be inspected for leaks at least annually. 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 LTS, always place main disconnect in OFF position, and close manual water shut-off valve.*

Seasonally or as required

1. Clean the tank - Remove loose scale in humidifier tank before build-up reaches the underside of the heat exchanger(s).

2. Clean probes - Remove the cap assembly and unscrew the probe holder from the LTS unit. The scale will easily flake off from the sensing portion. The sensing portion (bottom 3/8") of the probe should be brushed clean with stainless steel wool. Re-install the probe holder with arrows up and "top" marking the top.

3. Clean surface skimmer - Remove the elbow section of the skimmer and rotate tube so loosened material will drop out. Loosen deposits with a long tool, such as a screwdriver and reassemble elbow. Proper skimmer drainage should be verified by a periodic 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.)

4. Inspect gaskets - Replacement procedures are provided with new gaskets.

Summer maintenance

After the humidification season, a complete inspection and cleaning of the heat exchanger, probe control, skimmer, and water chamber is recommended. After cleaning, the unit should remain empty until humidification is required. **On units with TEFLON® coated heat exchangers, do not use a sharp object when cleaning.** Cuts or scratches on the heat exchanger will impair its ability to shed scale during operation, and could cause the TEFLON to separate from the metal surface.

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-LOGIC₂ keypad.

Model LTS®-DI only

The humidifier should be inspected for leaks at least annually. All safety devices in the control cabinet should be cycled on and off to verify that they are functioning.

Cleaning the evaporating chamber

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

LTS®-DI START-UP AND RECOMMENDED MAINTENANCE

Introduction

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

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 adequate water pressure is available.

Electrical

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

Control system

For VAPOR-LOGIC[®]₂ microprocessor control system, refer to the Installation and Operations Manual enclosed with the product shipment.

Control circuits (for LTS-DI only)

1. Adjust humidistat to “call” setting.
2. Open shut-off valve on water supply line. Water should flow through float valve.
3. After evaporating chamber has filled, turn electric power on to control cabinet (if applicable).
4. Fill the water seal in drain line by manually opening drain valve for a few seconds.
5. Open field-installed service valve. Hot water should be heard passing through the control valve into the humidifier heat exchanger.
6. Check out function of field-installed air flow switch, high limit duct humidistat, and controlling humidistat to ensure they are controlling the control valve.

Recommended maintenance

LTS-DI system (deionized water)

The LTS-DI humidifier does not require regular maintenance. A periodic visual inspection is recommended to identify gasket or piping leaks. Control circuit and safety switches should be checked to verify they properly control the valve.

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

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.

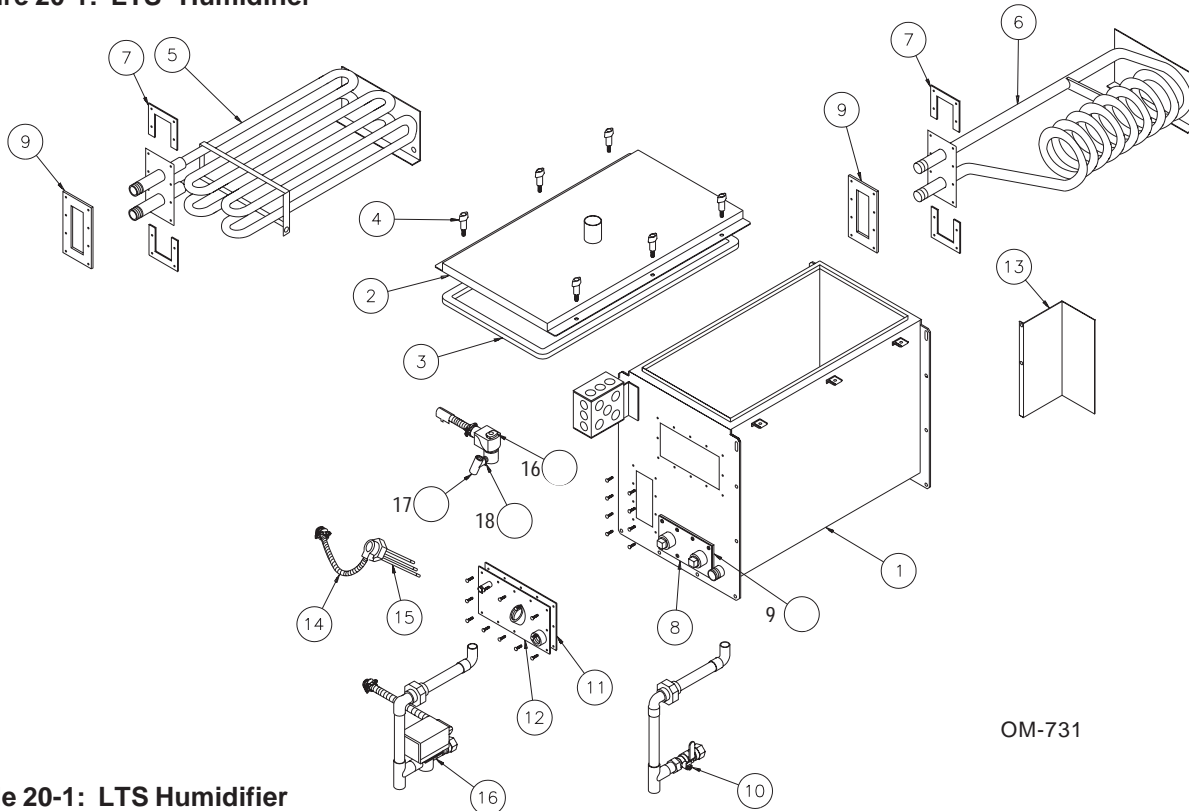
TROUBLE-SHOOTING GUIDE

Symptom	Possible Cause	Recommended Action
Humidifier Will Not Heat	<p>No control transformer output. Humidistat is not calling.</p> <p>Safety controls open (high limit, air proving, etc...)</p> <p>Faulty level control board.</p> <p>Probe corrosion.</p> <p>Liquid control valve closed.</p> <p>Low or no liquid flow.</p> <p>Liquid strainer plugged.</p>	<p>Verify control voltage. Set humidistat to "call". Inspect for faulty humidistat.</p> <p>Check safety controls.</p> <p>Verify control voltage and probe. Wires are connected correctly.</p> <p>Replace probes*.</p> <p>Verify valve is open.</p> <p>Check high temperature liquid source.</p> <p>Clean strainer.</p>
Humidifier Will Not Fill	<p>No water pressure.</p> <p>Faulty water fill valve.</p> <p>Plugged water strainer. Plugged valve. Faulty level control board.</p>	<p>Verify manual water supply valve is open.</p> <p>Verify action of fill solenoid valve, verify control voltage present at coil. Audible click should be heard as solenoid operates.</p> <p>Open strainer. Clean valve. Verify control voltage at fill valve.</p>
Humidifier Does Not Stop Filling	<p>Lack of tank-to-probes continuity. Water conductivity under 100 micro ohms/cm (2 grains per gallon).</p> <p>Manual drain is not fully closed.</p> <p>Fill valve is stuck open.</p> <p>Fill valve installed backwards.</p>	<p>Jumper terminals 1 & 3 if water stops, verify tank ground to term 3 check water supply conductivity; then consult factory.</p> <p>Close manual ball valve.</p> <p>Check valve for foreign matter.</p> <p>Check for correct water flow, through valve, note arrow.</p>
Low Output	<p>Automatic drain valve not seating.</p> <p>Manual drain is not fully closed.</p> <p>Excessive skimming amount.</p> <p>Fill valve is stuck open.</p> <p>Low liquid or no liquid flow.</p> <p>Liquid control valve.</p> <p>Scale coated heat exchanger.</p>	<p>Clean ball and seat of valve.</p> <p>Close manual ball valve.</p> <p>Reduce skimmer drain amount.</p> <p>Check valve for foreign matter.</p> <p>Check high temperature liquid source.</p> <p>Not opening fully.</p> <p>Clean heat exchanger.</p>
Makeup Water Valve Short Circuits	<p>Electrode probes may be incorrectly wired.</p> <p>Probes are scale coated.</p>	<p>Confirm that wiring agrees with diagram.</p> <p>Clean probes.</p>

*Although the three electrode probes may eventually corrode, they are usually functional for up to approximately 5000 hours of operation.

REPLACEMENT PARTS

Figure 20-1: LTS® Humidifier



OM-731

Table 20-1: LTS Humidifier

No.	Description	Part No.
1	Tank Weld, LTS-25C/S	164404-025
1	Tank Weld, LTS-100C/S	164404-100
1	Tank Weld, LTS-200S and 400C	164404-400
2	Cover Weld, LTS-25C/S	165359-*
2	Cover Weld, LTS-100C/S	165365-*
2	Cover Weld, LTS-200S and 400C	165369
3	Gasket Cover, LTS-25	160690-224
3	Gasket Cover, LTS-100	160690-340
3	Gasket Cover, LTS-200,400	160690-200
4	Knob, T-Handle Utility	700725
5	Heat Exchanger, LTS-25S	164440-101
5	Heat Exchanger, LTS-100S	164440-102
5	Heat Exchanger, LTS-200S	164440-103
6	Heat Exchanger, LTS-25C	164452-101
6	Heat Exchanger, LTS-100C	164452-103
6	Heat Exchanger, LTS-400C	164452-104
7	Support, Heat Exchanger MTG Plate	124437

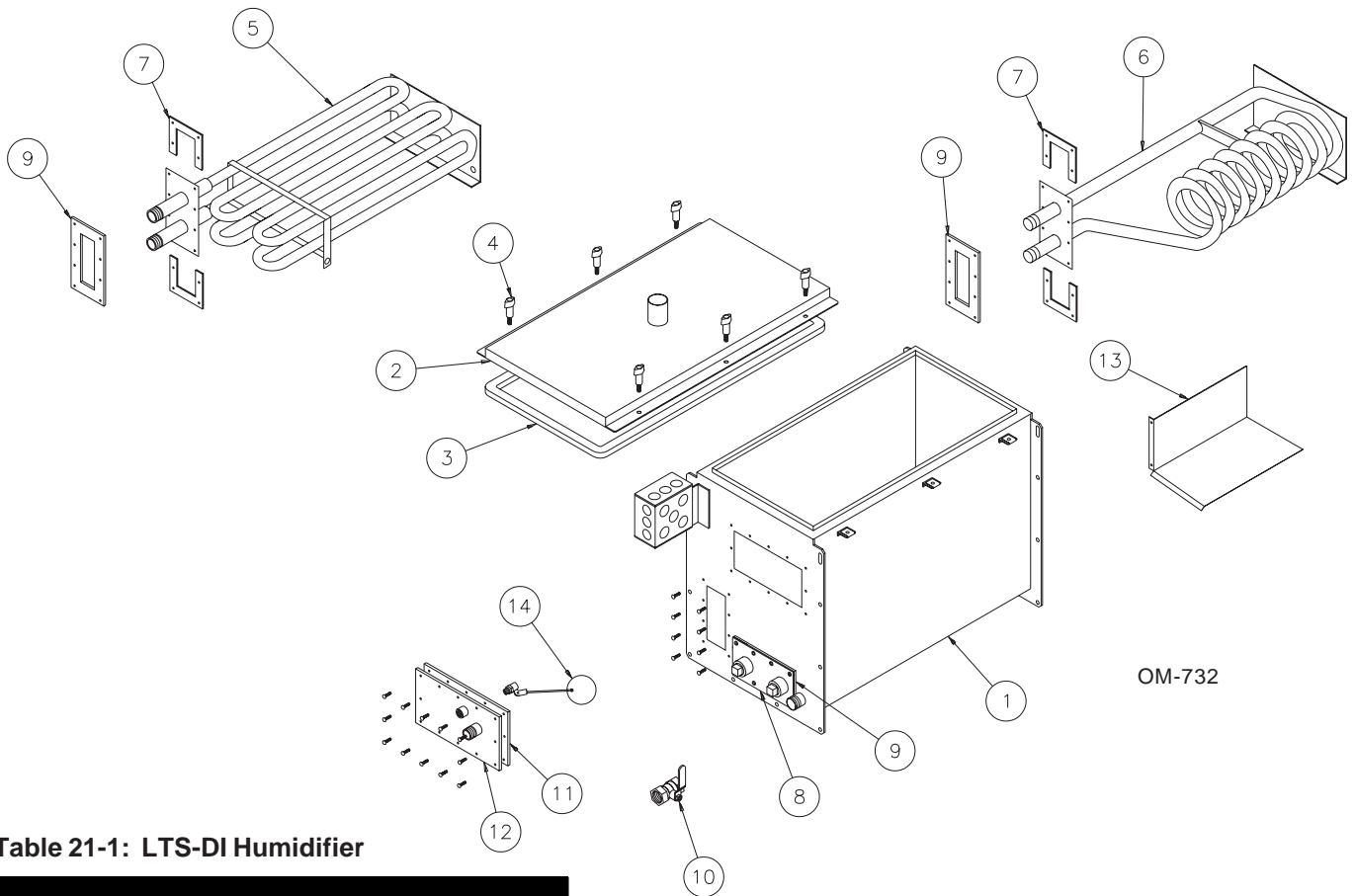
* Specify humidifier model and serial numbers when ordering.

Table 20-1: continued

No.	Description	Part No.
8	Clean Out Plate	165470
9	Gasket, Clean Out and MTG Plate	308220
10	Valve ¾" Electric (Auto Drain)	505400-001
10	Valve ¾" Brass Ball (Manual Drain)	505011
11	Gasket, Probe/Float Plate	308220-001
12	Probe Plate, LTS-25, 100	164411
12	Probe Plate, LTS-200,400	164411-002
13	Baffle, Probe Plate	124443
14	Probe Plug Wire Assembly	406050-002
15	Probe Assembly	406060
16	Fill Valve, ¼" Solenoid, LTS-25,100	505084
16	Fill Valve, ¼" Solenoid, LTS-400	505085
17	Stainer, ¼" NPT Sediment	300050
18	Valve, Needle ¼" NPT	505070-*

REPLACEMENT PARTS

Figure 21-1: LTS®-DI Humidifier



OM-732

Table 21-1: LTS-DI Humidifier

No.	Description	Part No.
1	Tank, LTS-25C/S	164404-025
1	Tank, LTS-100C/S	164404-100
1	Tank, LTS-200S and 400C	164404-400
2	Cover, LTS-25C/S	165359-*
2	Cover, LTS-100C/S	165365-*
2	Cover, LTS-200S and 400C	165369
3	Gasket Cover, LTS-25	160690-224
3	Gasket Cover, LTS-100	160690-340
3	Gasket Cover, LTS-200,400	160690-200
4	Knob, T-Handle Utility	700725-*
5	Heat Exchanger, LTS-25S	164440-101
5	Heat Exchanger, LTS-100S	164440-102
5	Heat Exchanger, LTS-200S	164440-103
6	Heat Exchanger, LTS-25C	164452-101
6	Heat Exchanger, LTS-100C	164452-103
6	Heat Exchanger, LTS-400C	164452-104

* Specify humidifier model and serial numbers when ordering.

Table 21-1: continued

No.	Description	Part No.
7	Support, Heat Exchanger Mtg Plate	124437
8	Clean Out Plate	165470
9	Gasket, Clean Out and Mtg Plate	308220
10	Valve, 3/4" Stainless Steel Ball	505000-001
11	Gasket, Probe/Float Plate	308220-001
12	Plate Weld, Float LTS-25, 100	164410
12	Plate Weld, Float LTS-200,400	164410-002
13	Baffle, Float Plate	124442
14	Float Valve Assembly, Straight	505210

REPLACEMENT PARTS

Figure 22-1: LTS[®] control cabinet

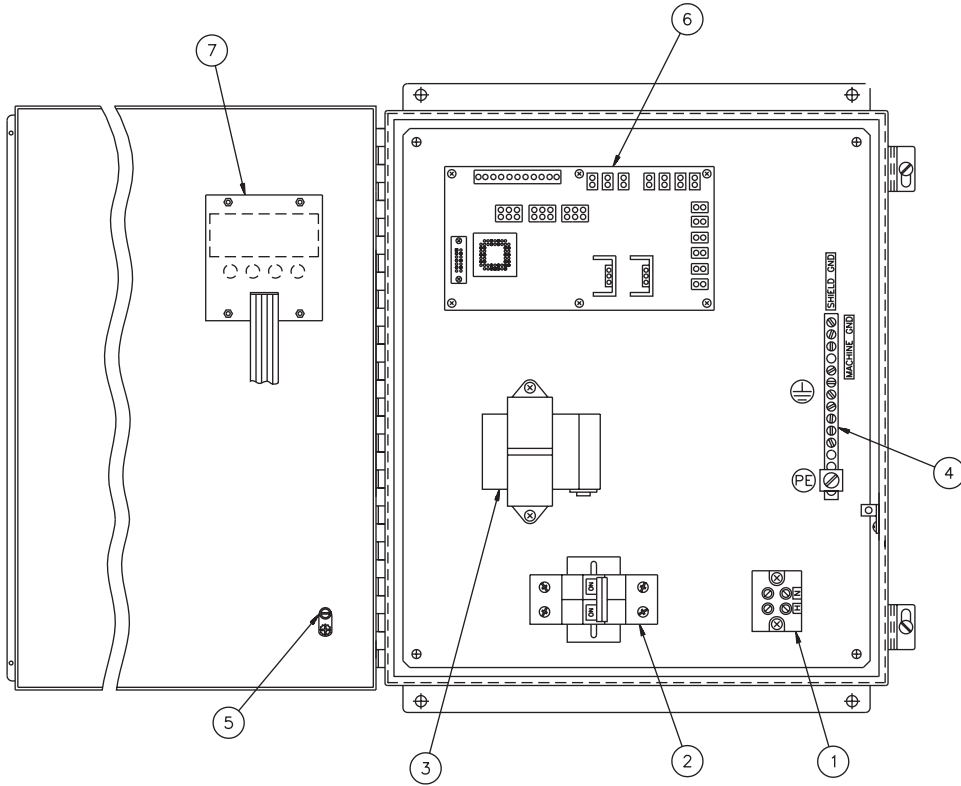


Table 22-1: LTS control cabinet

No.	Description	Part No.
1	Power Block	408300-001
2	Circuit Breaker	406775
3	Transformer	408960
4	Grounding Bar	408225
5	Ground Lug	409250-017
6	VAPOR-LOGIC ₂ Microprocessor Board	408641
7	Keypad / Display Board	408651

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.

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By purchasing DRI-STEEM's products, the purchaser agrees to the terms and conditions of this limited warranty.

DRI STEEM[®] **HUMIDIFIER COMPANY**

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