

READ AND SAVE THESE INSTRUCTIONS

# DRI-STEEM Models LTS<sup>®</sup> and LTS-DI<sup>®</sup>

## LIQUID-TO-STEAM HUMIDIFIERS

### Installation Instructions and Maintenance Operations Manual

For Toll-Free Customer Support,  
Call: 1-800-328-4447



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**DRI STEEM**<sup>®</sup>  
HUMIDIFIER COMPANY



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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.

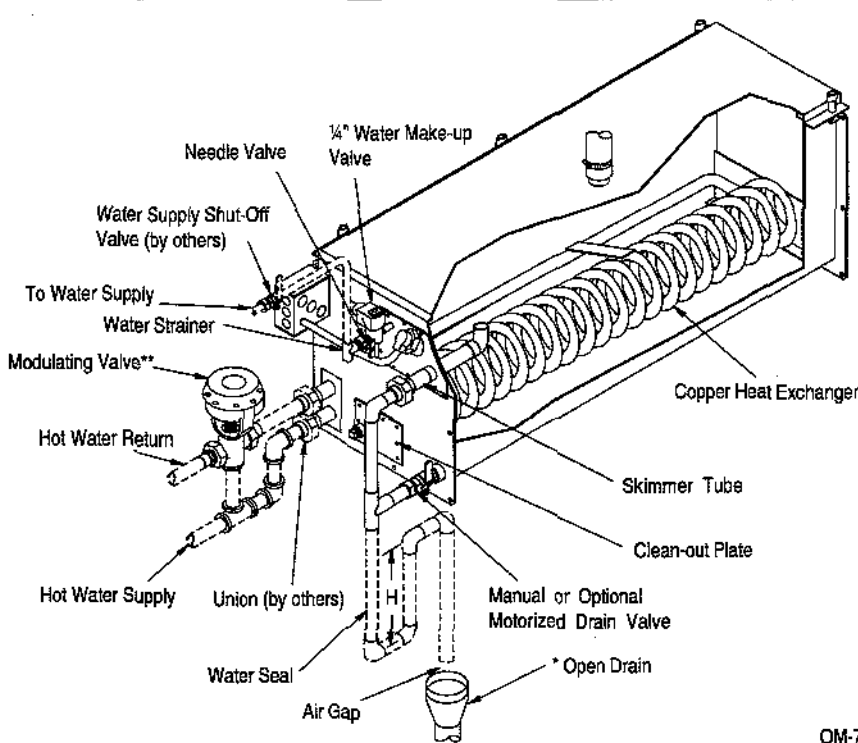
DRI-STEEM Humidifier Company

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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.



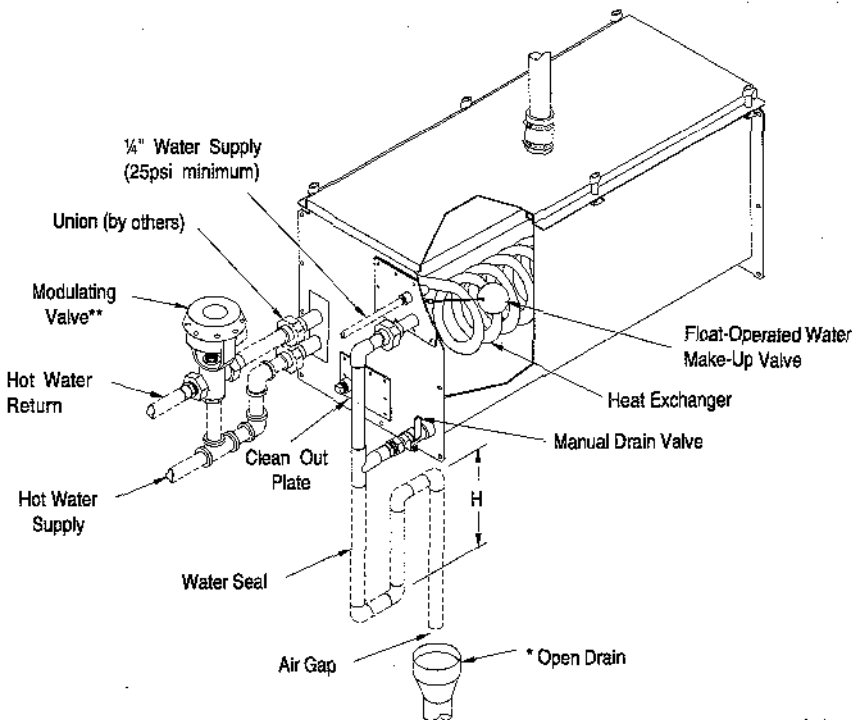
OM-726

\* 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.

## 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.



OM-727

\* 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.

# CAPACITIES

**Table 4-1: Capacities Model LTS®-25C**

Flow	Output (lbs/hr)				Pressure Drop Through Heat Exchanger
	Hot Water Supply Temperature				
GPM	240°F	250°F	260°F	280°F	psi
8	25	45	65	100	1.0
12	40	60	85	135	1.5
15	50	75	105	160	2.0
17	60	90	120	170	2.5

**Table 4-5: Capacities Model LTS-200S\***

Flow*	Output (lbs/hr)				Pressure Drop Through Heat Exchanger
	Hot Water Supply Temperature				
GPM	240°F	250°F	260°F	280°F	psi
15	60	75	105	135	2.5
20	80	110	145	180	4.0
30	90	125	165	205	7.0

\* 2 Heat exchangers and 2 valves

**Table 4-2: Capacities Model LTS-25S**

Flow	Output (lbs/hr)				Pressure Drop Through Heat Exchanger
	Hot Water Supply Temperature				
GPM	240°F	250°F	260°F	280°F	psi
4	9	13	17	21	3.0
6	11	15	19	23	5.5
7.5	12.5	16.5	21	25	8.0

**Table 4-6: Capacities Model LTS-400C\***

Flow*	Output (lbs/hr)				Pressure Drop Through Heat Exchanger
	Hot Water Supply Temperature				
GPM	240°F	250°F	260°F	280°F	psi
24	190	250	310	470	4.0
30	240	300	350	510	6.0
34	260	320	380	540	8.0

\* 2 Heat exchangers and 2 valves

**Table 4-3: Capacities Model LTS-100C**

Flow	Output (lbs/hr)				Pressure Drop Through Heat Exchanger
	Hot Water Supply Temperature				
GPM	240°F	250°F	260°F	280°F	psi
12	70	90	120	195	3.0
15	85	110	140	230	5.0
17	95	125	155	250	6.5

**Table 4-4: Capacities Model LTS-100S**

Flow	Output (lbs/hr)				Pressure Drop Through Heat Exchanger
	Hot Water Supply Temperature				
GPM	240°F	250°F	260°F	280°F	psi
7.5	33	40	48	59	2.0
10	38	47	56	69	3.0
15	45	55	65	80	6.0

Maximum operating pressure 250 psi.

**Table 4-7: Water Heating Systems (Medium and High Temperature)**

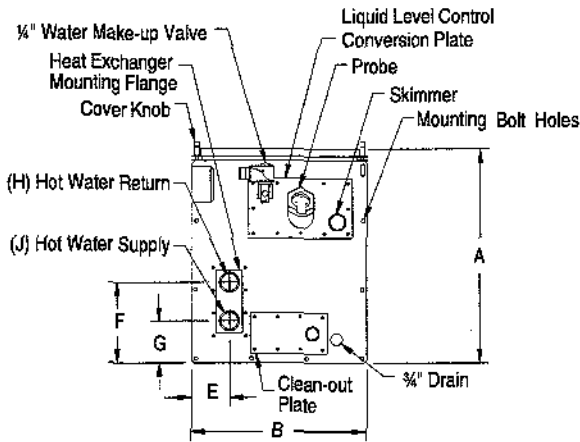
Properties of Water 212° to 340°F (100° to 171°C)			
Temperature		Pressure	
°F	°C	psia	kPa
212	100	14.7	101.3
220	104	17.2	118.4
230	110	20.8	143.2
240	116	25.0	172.0
250	121	29.8	205.5
260	127	35.4	244.1
270	132	41.9	288.4
280	138	49.2	339.0
290	143	57.6	396.6
300	149	67.0	461.7
310	154	77.7	535.2
320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

# DIMENSIONS

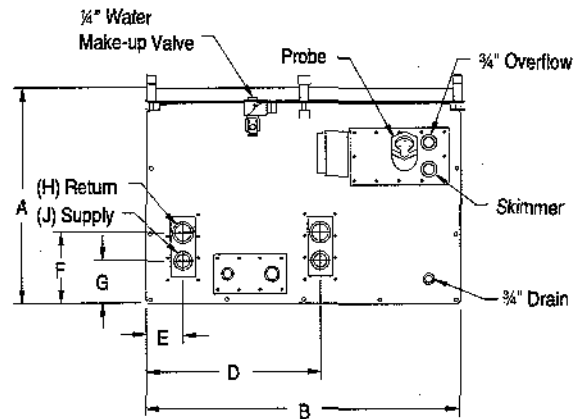
**Table 5-1: Dimensions**

Model	A		B		C		D		E		F		G		H	J
	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	inches
LTS-25C	18.13	460.5	14.75	374.7	23.50	596.9	--	--	3.20	81.28	6.67	169.4	3.67	93.22	1	1
LTS-25S	18.13	460.5	14.75	374.7	23.50	596.9	--	--	3.20	81.28	6.42	163.1	3.92	99.6	¾	¾
LTS-100C	18.13	460.5	19.25	489.0	39.50	1003	--	--	3.20	81.28	6.67	169.4	3.67	93.22	1	1
LTS-100S	18.13	460.5	19.25	489.0	39.50	1003	--	--	3.20	81.28	6.67	169.4	3.67	93.22	1	1
LTS-200S	18.13	460.5	28.25	717.6	55.00	1397	15.50	393.7	3.20	81.28	6.67	169.4	3.67	93.22	1	1
LTS-400C	18.13	460.5	28.25	717.6	55.00	1397	15.50	393.7	3.20	81.28	6.67	169.4	3.67	93.22	1	1

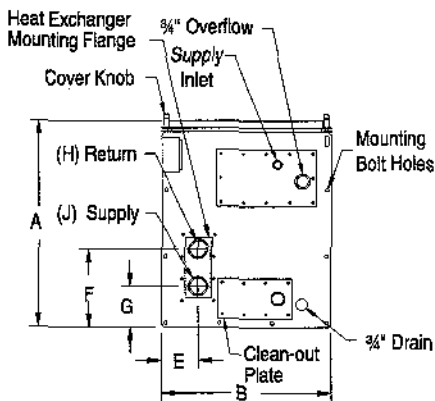
**Front View  
(LTS® 25C/S and 100C/S)**



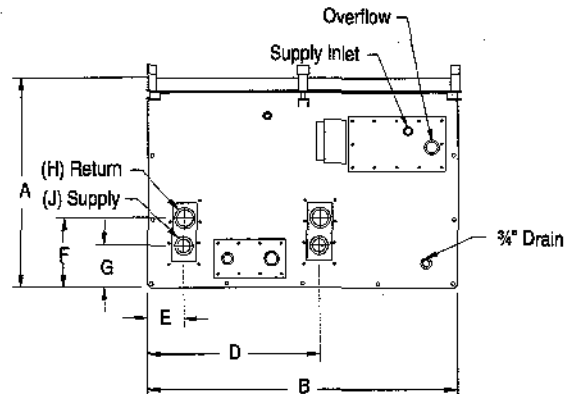
**Front View  
(LTS 200S and 400C)**



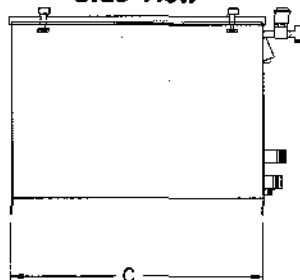
**Front View  
(LTS-DI 25C/S and 100 C/S)**



**Front View  
(LTS-DI 200S and 400C)**



**Side View**



# INSTALLATION

## Selecting the Location

When selecting the location, first consideration should be given to rapid, thorough absorption of the steam. The warmest air will most readily absorb steam. The most active part of the air stream will provide the best mixing of the steam and air. Avoid dead spots such as the inside curve of an elbow. The "fog" will travel some distance before "disappearing" and will collect on objects it touches that are closer than your absorption distance.\*

When the remote mounting method with a vapor hose kit is used, condensate will drain into the duct unless the dispersion tube is positioned correctly and the tube and vapor hose are pitched properly (see Figure 10-1 through 10-3, page 10). Preferably, the condensate should drain back to the humidifier in the vapor hose. When job conditions prevent this, an alternate method is used. Waterlogged low points in the hose will cause "gurgling" and in severe conditions, periodically, "slugs" of condensate may be discharged into the duct.

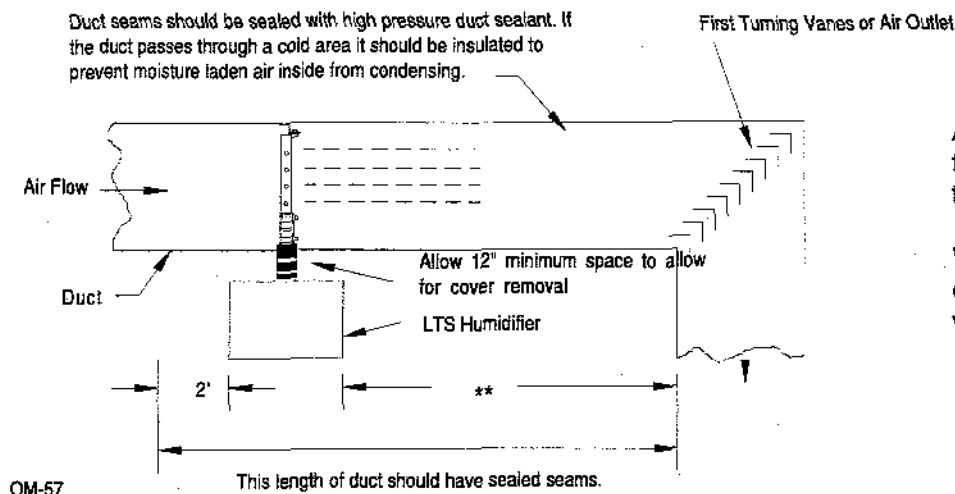
The location selected must also provide for electrical service, cold water for make-up and sanitary waste for drain.

## Simply Stated:

- 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 LTS® humidifier 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 unit too close to the intake of a high efficiency filter. The filter may remove the visible moisture and become waterlogged.\*
- D. Do not place unit where water vapor will impinge on a metal surface.
- E. Do not place the unit too close to a split in the duct. The unit may put more moisture in one branch than the other.

\* When adequate distance is not available, you should use a rapid absorption tube bank. Contact DRI-STEEM or your local representative.

**Figure 6-1: Vapor Absorption Distance**



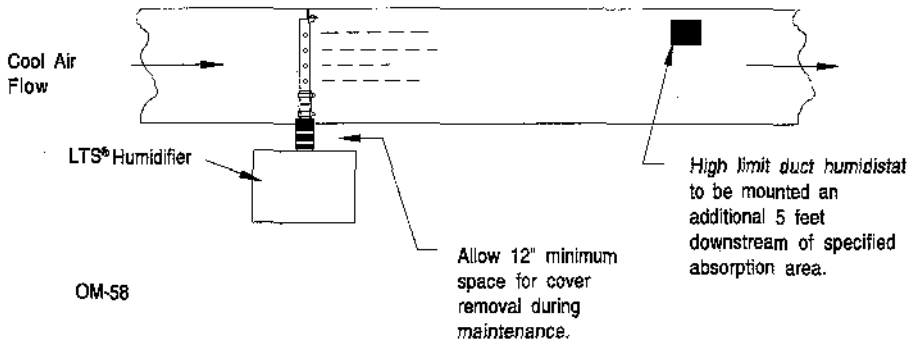
A distance of air travel is required for the steam to "disappear" or go into the gaseous state.

While visible, the steam may collect on internal devices, such as turning vanes, resulting in dripping.

\*\*A distance of 5 to 8 feet is recommended, depending on temperature. (When duct air is cooler than 80°F, up to 12 feet should be allowed.)

# INSTALLATION

**Figure 7-1: Installation in Cool Air Stream**



When a humidifier discharges into a duct that will carry cool air (under 70°F) periodically, the dew point temperature should be determined.

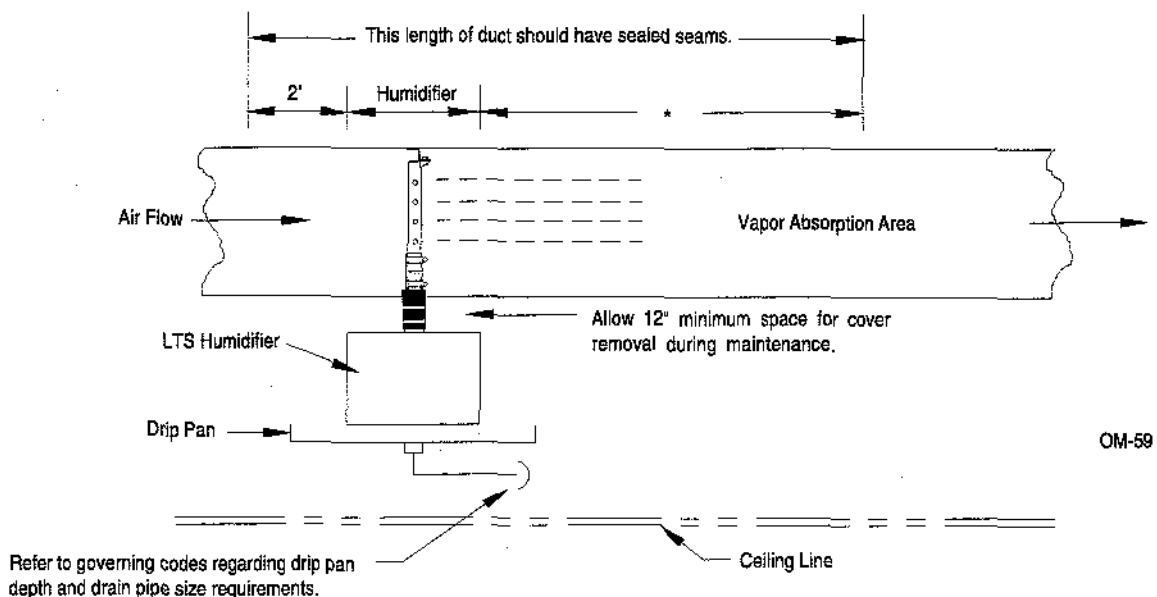
If the psychrometric chart reveals that saturation may occur, protection should be provided. A high limit humidistat or a thermostat, set to cut off the humidifier at a safe temperature, can be used for this purpose.

Water piping and humidifiers should not be installed above expensive apparatus or equipment. 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 7-2: Installation Above Valuable Equipment**



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

# 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.

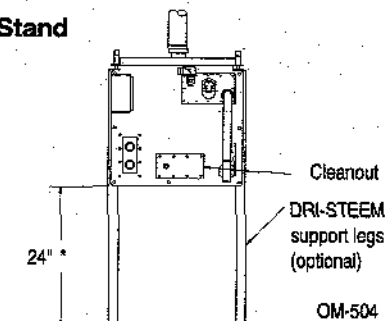
2. Access (12" minimum) for periodic removal of the top cover is recommended. In most cases, scale that forms on the heat exchanger continuously flakes off as it forms

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.

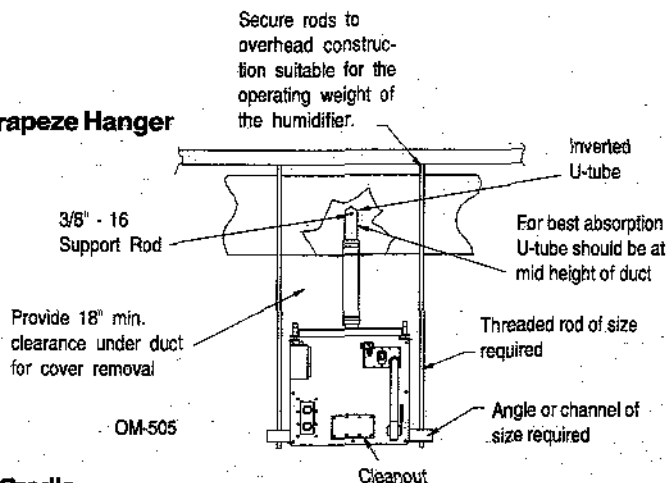
**Figure 8-1: Mounting Support Methods**

### Floor Stand

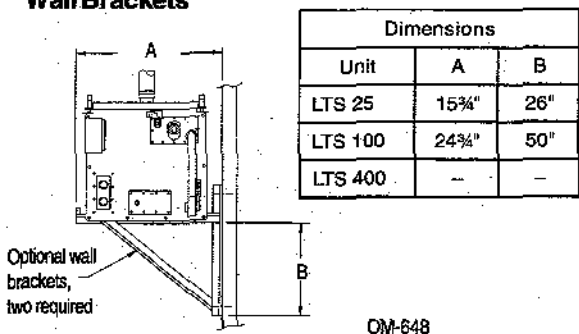


\*24" is standard, other lengths are optional.

### Trapeze Hanger

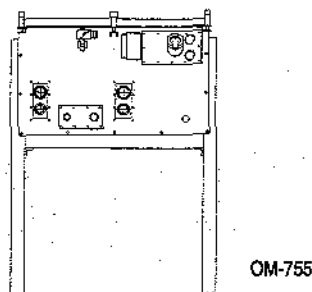


### Wall Brackets



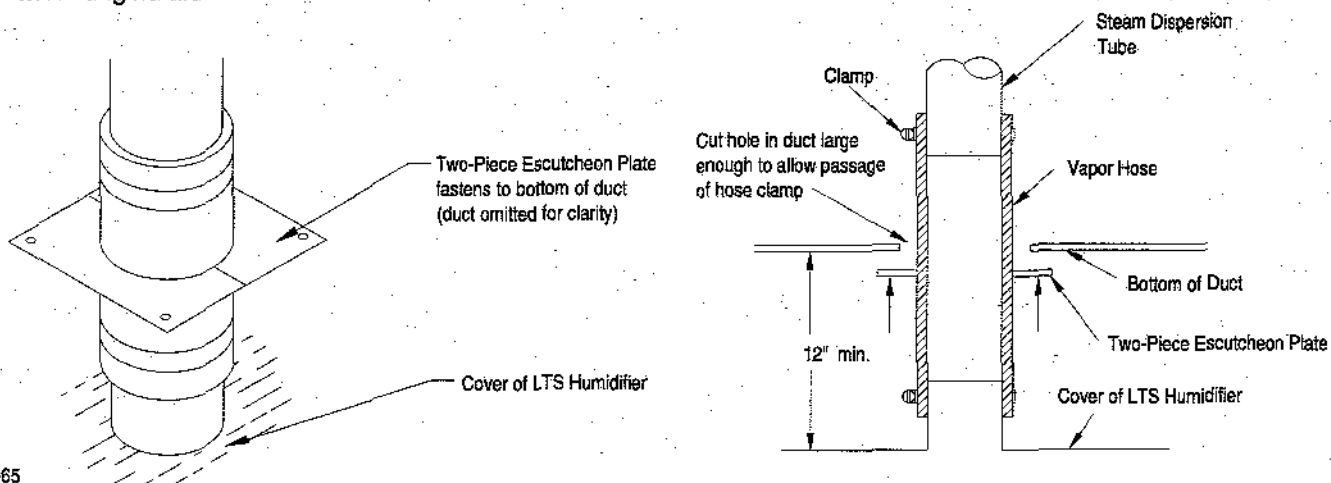
### Cradle

Models LTS 200S and LTS 400C require cradle.



**Figure 8-2: Mounting Unit on Underside of Duct**

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



OM-65

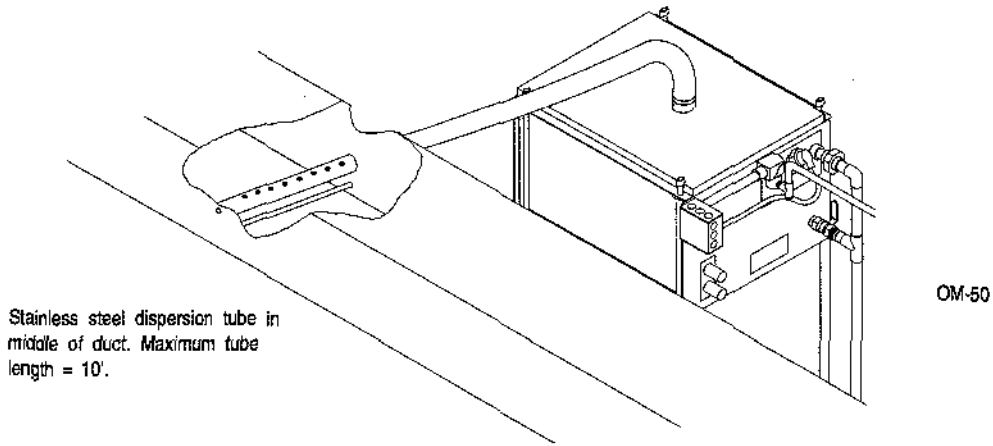
OM-66



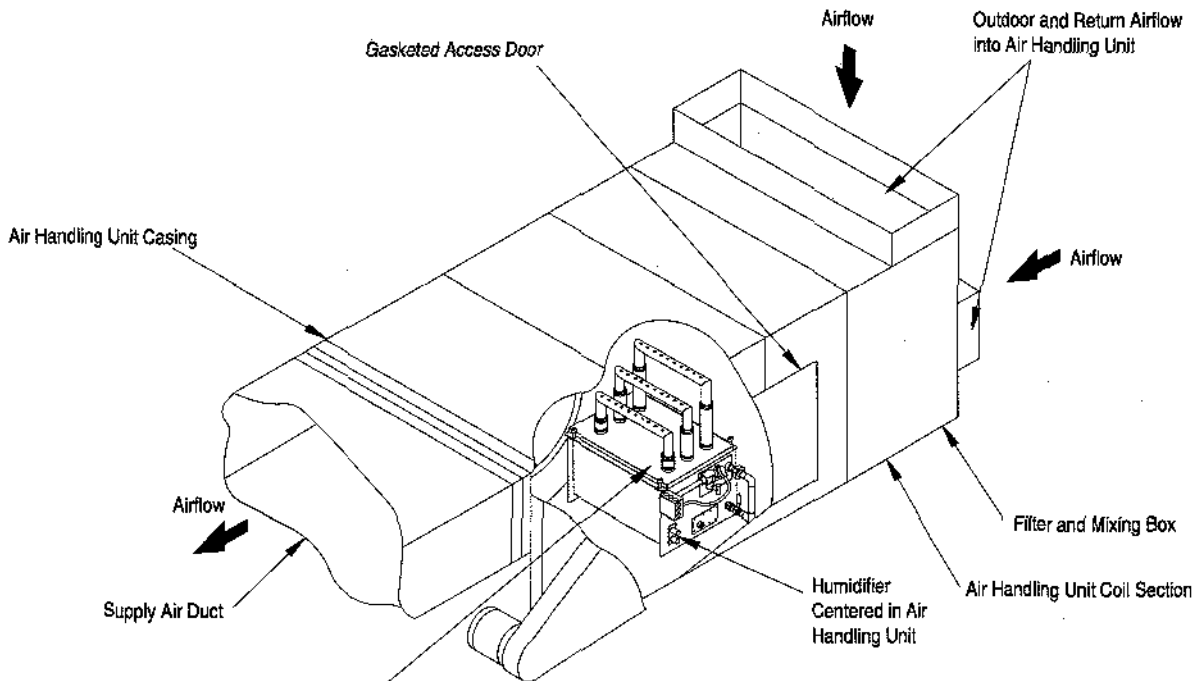
# MOUNTING METHODS

**Figures 9-1: Mounting Unit Away from Duct(s) Using Vapor Hose**

Vapor hose (pitch back minimum 2" per foot to humidifier with supports to prevent pockets). Maximum length 10'. Humidifier must be mounted level.



**Figure 9-2: Mounting In Air Handling Unit**



Set unit level. Locate unit so that steam dispersion assembly is in the most active part of the air stream.

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# STEAM DISPERSION INSTALLATION

## Dispersion Tube Installation with Condensate Drain (over 28pph per dispersion tube)

### 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(s) exceeds 10 feet, consult factory for special recommendations.

### Vapor Rigid Piping (when used)

- Vapor 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 without condensate return lines with outboard end 2" higher than supply end (figure 10-1, example A).
  - Mount dispersion tube level for tubes with condensate return lines (figure 10-1, example B).
  - 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.

Table 10-1: Dispersion Tube Capacities

Tube Diameter	Capacity		A	B
	Without Drain	With Drain		
1½"	30 lbs/hr	57 lbs/hr	3.25"	1.51"
2"	57 lbs/hr	85 lbs/hr	5.00"	2.03"

Figure 10-1: Single Tube

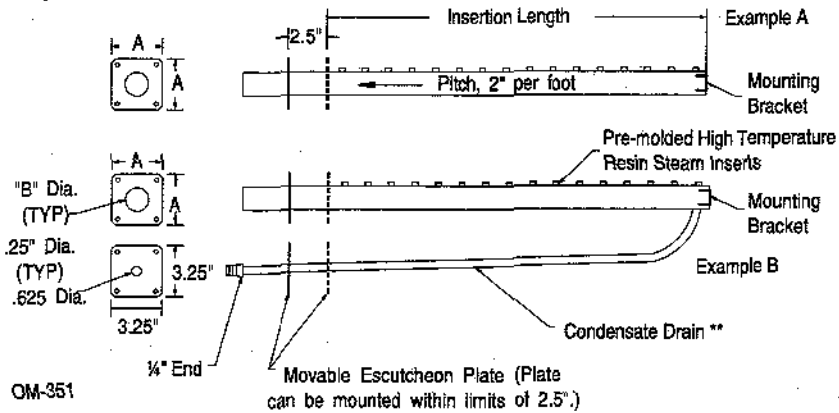


Figure 10-2: Multiple Tube with Condensate Wasted to Floor Drain

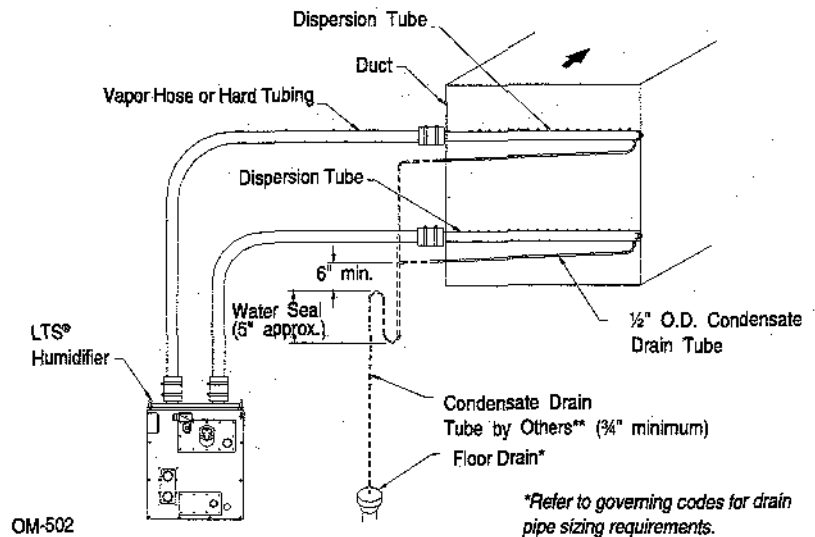
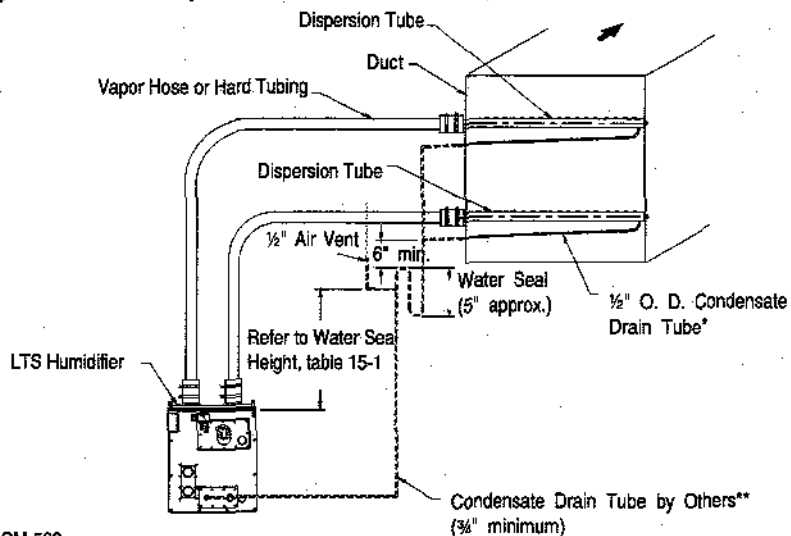


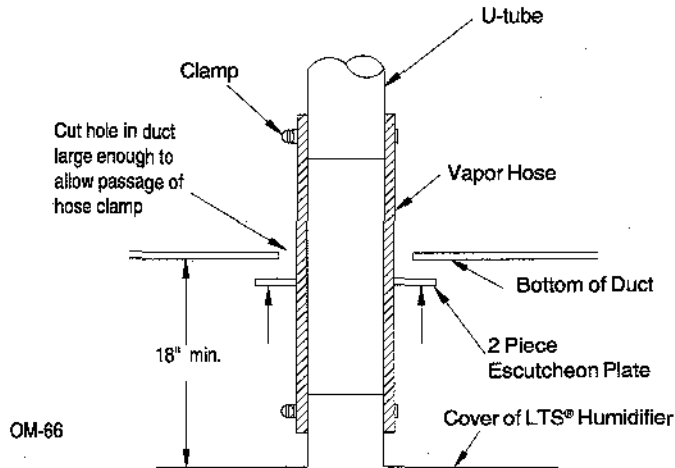
Figure 10-3: Multiple Tube with Condensate Return to Humidifier



# STEAM DISPERSION INSTALLATION

## U-Tube Installation

Figure 11-1: Detail of Connection to U-Tube



**Note:** Local regulations may not permit combustibles (steam hose) inside of duct. When necessary U-tubes can be specified to have extended legs of length necessary to reach below floor of duct.

Figure 11-2: U-tube Spacing for Tall Ducts  
Improves absorption in 'tall' air streams.

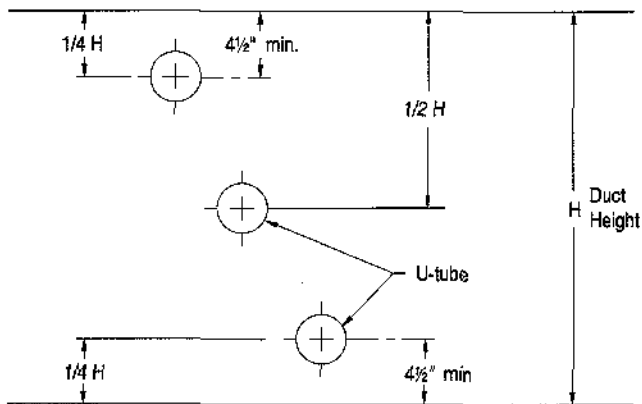


Figure 11-3: Multiple Inverted U-tubes

Provides extra steam dispersion capacity needed for larger LTS units.

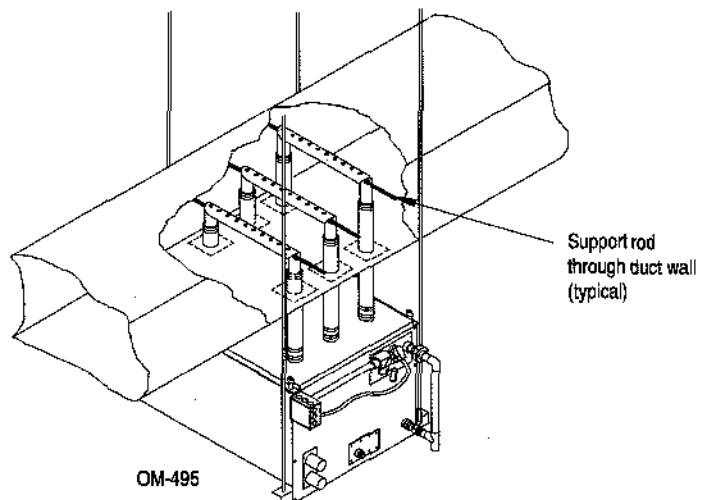


Table 11-1: U-tube Spacing for Improved Absorption

Duct Height	Number of U-Tubes
Up to 12"	1
13 to 24"	2
25 to 36"	3

# 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 12-2), 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 12-1.):** 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.

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 12-2.):** 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.

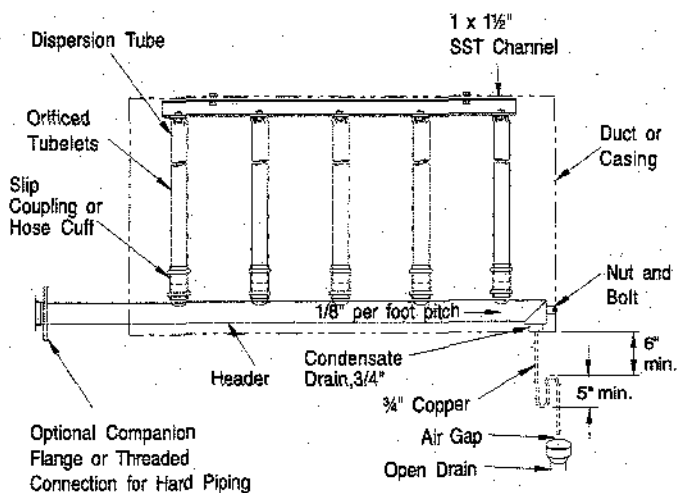
7. Connect a condensate drain to the header, provide the water trap as shown, and run to open drain, sized according to governing codes.

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.

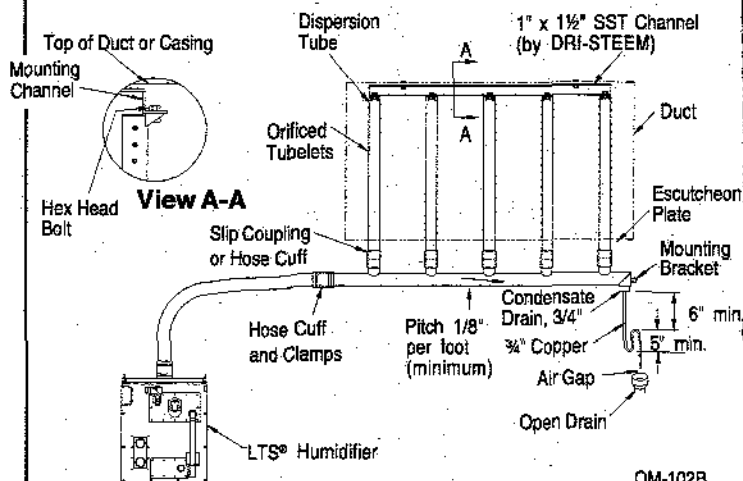
**Note:** Refer to page 10 for vapor hose information on routing and for alternate vapor hose installation methods.

**Figure 12-1: RAPID-SORB Unit Header Inside Duct**



OM-101

**Figure 12-2: RAPID-SORB Unit Header Under Duct**



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# 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 13-1, 13-2, and 13-3.

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

Figure 13-1: Plan View

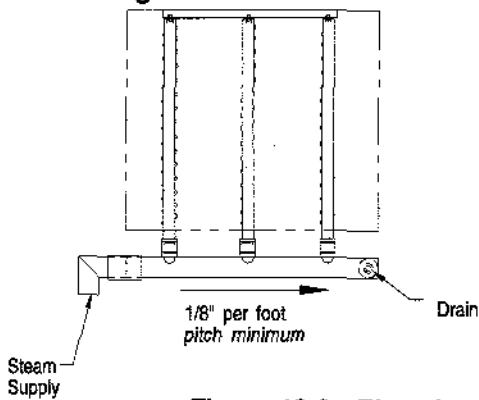


Figure 13-2: Elevation View  
Tube without Drain

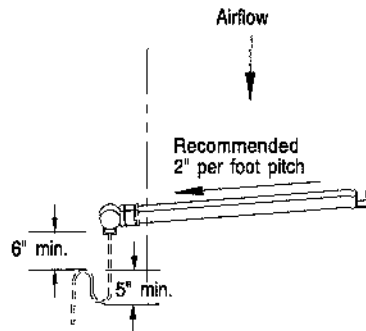
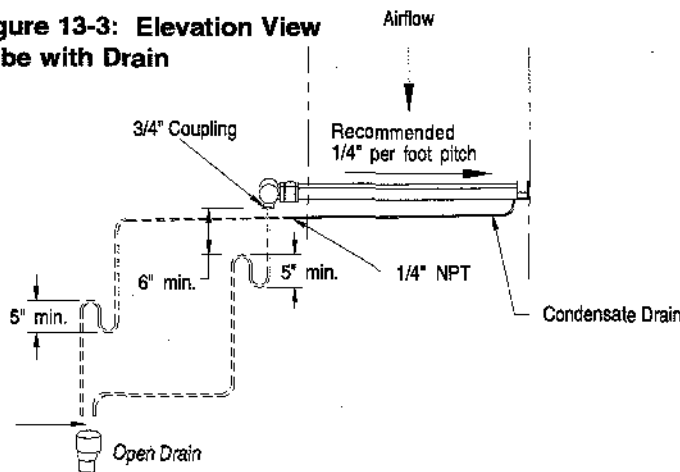


Figure 13-3: Elevation View  
Tube with Drain



Dashed line indicates field piping.

## PIPING METHODS

### Make-up Water Piping and Material

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.

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.

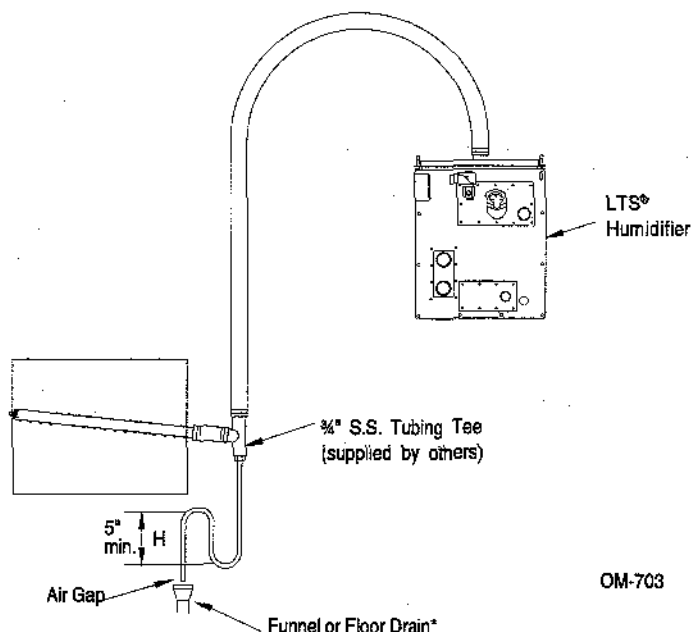
As part of the fill valve assembly, a needle valve is provided. It restricts the rush of cold water entering the evaporating chamber during each fill cycle. The needle valve should be adjusted to minimize output disruption and potential "water hammer" (water pressure at 25 psi minimum).

### Drain Piping and Material

See illustration on page 15. If non-metallic pipe or hose is used, it must be capable of withstanding temperatures up to 212°F.

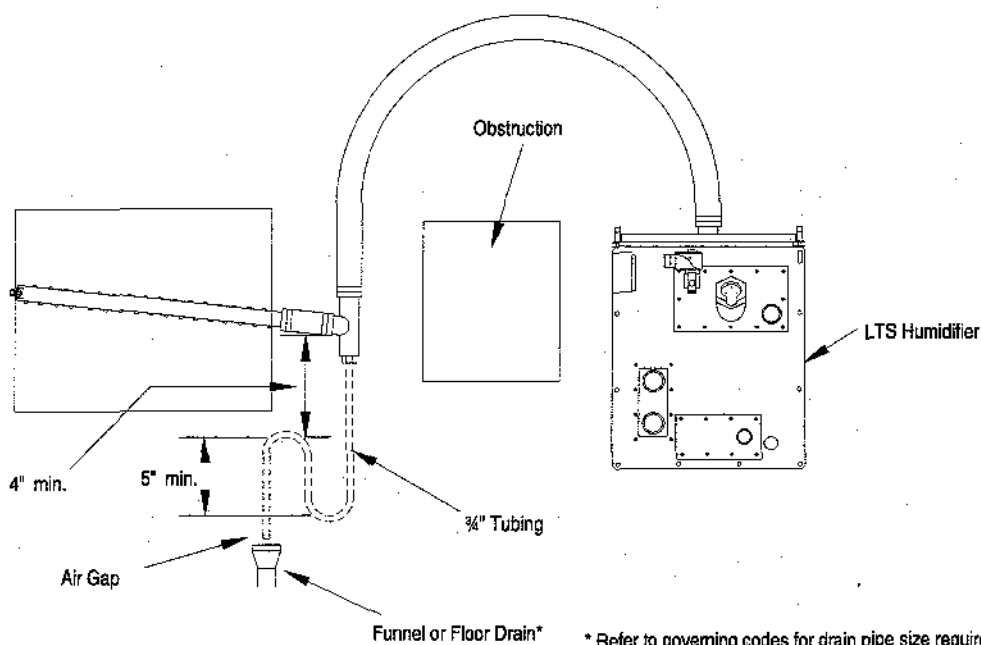
To prevent steam from escaping out the drain line, a **water seal must be provided** in the drain line of sufficient height to contain the pressure developed within the humidifier and steam dispersion system. To determine the proper height of the water seal, see table 15-1.

**Figure 14-2:** This piping method is recommended when humidifier must be mounted higher than the duct.



OM-703

**Figure 14-1:** Piping method recommended when obstruction prevents dispersion tube from being continuously pitched back to humidifier.

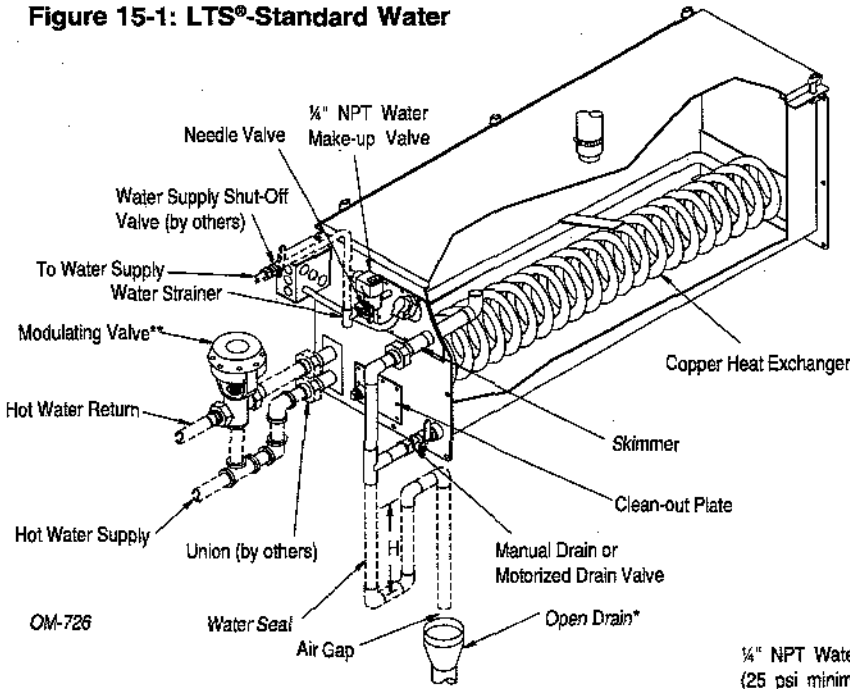


\* Refer to governing codes for drain pipe size requirements.

OM-702

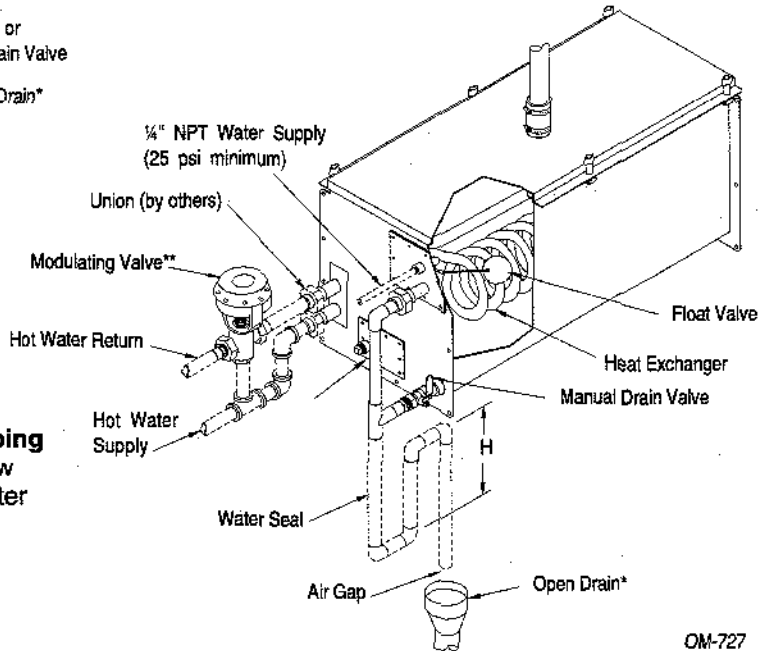
# DRAIN PIPING DIAGRAMS

**Figure 15-1: LTS®-Standard Water**

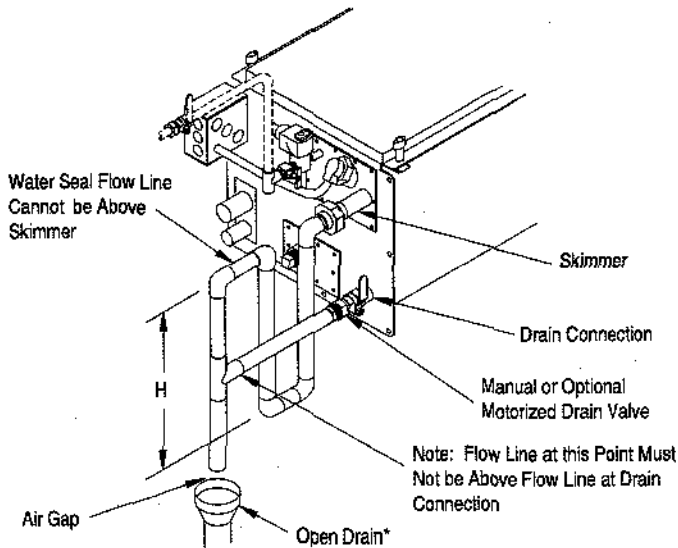


\*\* The piping shown is for the standard 3-way valve pipe normally closed to the heat exchanger. The three way valve is recommended for constant system flow. If variable system flow is desired, a two way valve located in the hot water return line is recommended.

**Figure 15-2: LTS-DI Model**



**Figure 15-3: 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 15-1.



**Table 15-1: 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.**

\* Refer to governing codes for drain pipe sizing  
Note: Drain piping material must be suitable for 212°F water.

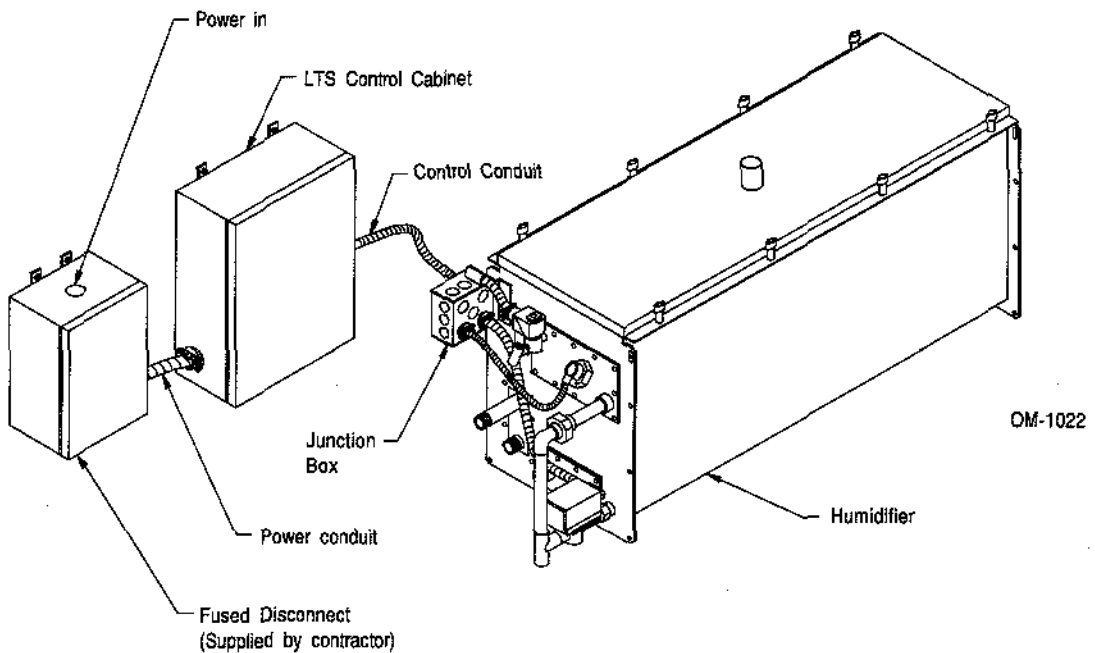
## ELECTRICAL

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.

The LTS standard humidifier is designed for use with either softened or unsoftened water. The probe type level control system requires water conductivity of 100 micromhos/cm (2 grains per gallon) minimum to function and therefore, will not operate with water treated by the reverse osmosis or deionizing processes. However, special design LTS-DI humidifiers are available for use with these water types, which do not require electrical power except when a VAPOR-LOGIC<sub>2</sub> microprocessor is used.

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

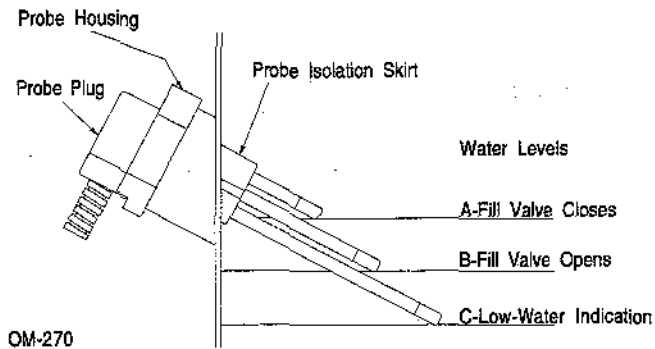
**Figure 16-1: Typical LTS Connection Layout**





## OPERATION

**Figure 17-1: Reliable Electronic Probe Control Maintains Water Level**



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

The LTS® humidifier is available with either the standard LW415 Electronic Water Level Control Module or the optional VAPOR-LOGIC® microprocessor control system. If the system is equipped with the VAPOR-LOGIC<sub>2</sub> system, see the *VAPOR-LOGIC<sub>2</sub> Operations and Maintenance Manual* for more information. Then continue reading this manual beginning at the maintenance section on page 18.

### LW415 Electronic Water Level Control Module

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 overfill humidifier tank. This process will take only a few seconds; probe plug and cable can 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 most of 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 gr/gal) minimum to function and will not operate with water treated by the reverse osmosis or deionizing processes. Specially designed LTS Model DI humidifiers are available for use with these water types.

### Drain/Flush Feature

This control module contains an integral electronic timer which tracks the humidifying time of the unit. When this accumulated time reaches what has been set in the timer, the drain/flush cycle is activated.

Upon activation, the following sequence occurs:

1. The drain valve opens and begins to drain surface water and minerals from the evaporating chamber.
2. When the height of the water drops to the "REFILL" level, the fill valve opens.
3. The drain and fill valves remain open for ten more minutes, thus flushing the chamber.
4. The drain valve then closes, the chamber refills, and the fill valve closes. The timer begins to track the time as the unit resumes normal operation.

The electronic timer comes factory-set for drainage after 40 hours of operation time. Alternate settings of 20 hours and 80 hours can be made. See wiring diagram(s) attached to the unit for timer board location and instructions for changing the timer setting.

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## OPERATION

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### Test Cycling the Drain/Flush System

The timer board contains four pairs of terminal pins which are marked 20, 40, 80 and "T" (TEST). To test:

1. Pull the pin block off the pair of pins in use, move it to the "T" pair, and push it on.
2. Set the humidistat high enough so that unit will remain "on call" for at least one hour.
3. After about 35 minutes of operation, a drain/flush cycle will take place.
4. Once the test cycle is completed, move the pin block back to the desired pair of pins. Failure to do so will result in a drain/flush cycle every 35 minutes.

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## RECOMMENDED MAINTENANCE

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**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®

Using softened water will significantly reduce mineral build-up in the humidifier. When softened water is not available, 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 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. 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. **Cleaning the Evaporating Chamber** - This should be done before the build-up reaches the underside of the heat exchanger(s).
2. **Cleaning Probes** - Disconnect the plug and cable 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.
3. **Cleaning Surface Skimmer** - Loosen deposits with a long tool, such as a screwdriver. 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.

## RECOMMENDED MAINTENANCE

### 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 Skimmer

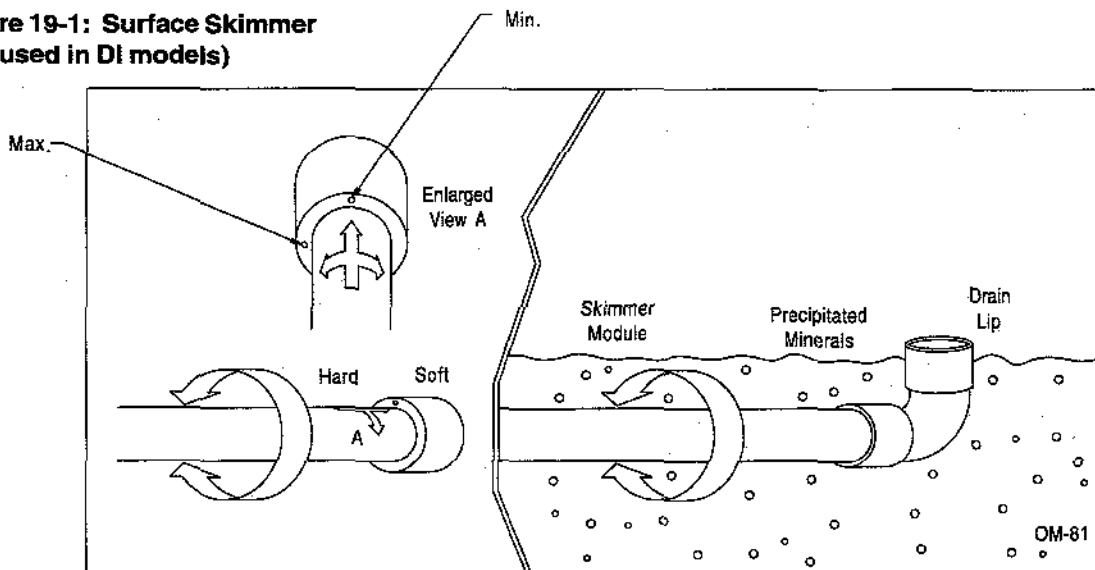
The elevation of the lip of the skimmer tube with respect to the water line determines the quantity of "skimming" that takes place with each fill cycle. The height is field adjustable by slightly rotating the tube.

As evaporation takes place, a portion of the dissolved minerals precipitate out on the water surface. Each time the LTS® refills, it fills to an elevation above the lip of the skimmer tube. A portion of the refill water then flows to drain, carrying the precipitated minerals with it. This action constantly reduces both the mineral concentration of the water and the frequency of cleaning needed.

The heated water that flows to drain is a cost of operation. Cleaning the humidifier is also a cost, as well as an inconvenience. Therefore, it is recommended that the user, at the time of the initial start-up, observe and adjust the skimming quantity. By doing so, a balance between minimized mineral build-up and water conservation can be achieved.

The quantity of skimming water drained off per fill cycle is adjusted by rotating the skimmer tube. This alters the height of the overflow lip. It is factory set to skim about 5 to 10% of the total evaporating capacity of the unit.

**Figure 19-1: Surface Skimmer**  
(not used in DI models)



By rotating the skimmer tube, the height of the drain lip is adjusted. This alters the amount of the bleed-off that occurs with each refill.

To adjust, loosen the union nut and rotate the tube to the desired percentage of skimming rate.

Allow the LTS to operate five or ten days and then inspect it. If a mineral build-up is evident, increase the skim amount. If not, it may be reduced. Repeat the above process until the proper skim amount has been attained.

### Adjusting the Surface Skim Bleed-Off Quantity (VAPOR-LOGIC®<sub>2</sub> microprocessor control option only)

The skim time determines the quantity of water skimmed with each fill cycle. The skim time is field adjustable using the VAPOR-LOGIC<sub>2</sub> 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.

# START-UP PROCEDURE

## 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 your particular humidifier control system, refer to the Operations and Maintenance Manual enclosed with the product shipment (LW415 control module, VAPOR-LOGIC®, or VAPOR-LOGIC®<sub>2</sub>).

## 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.

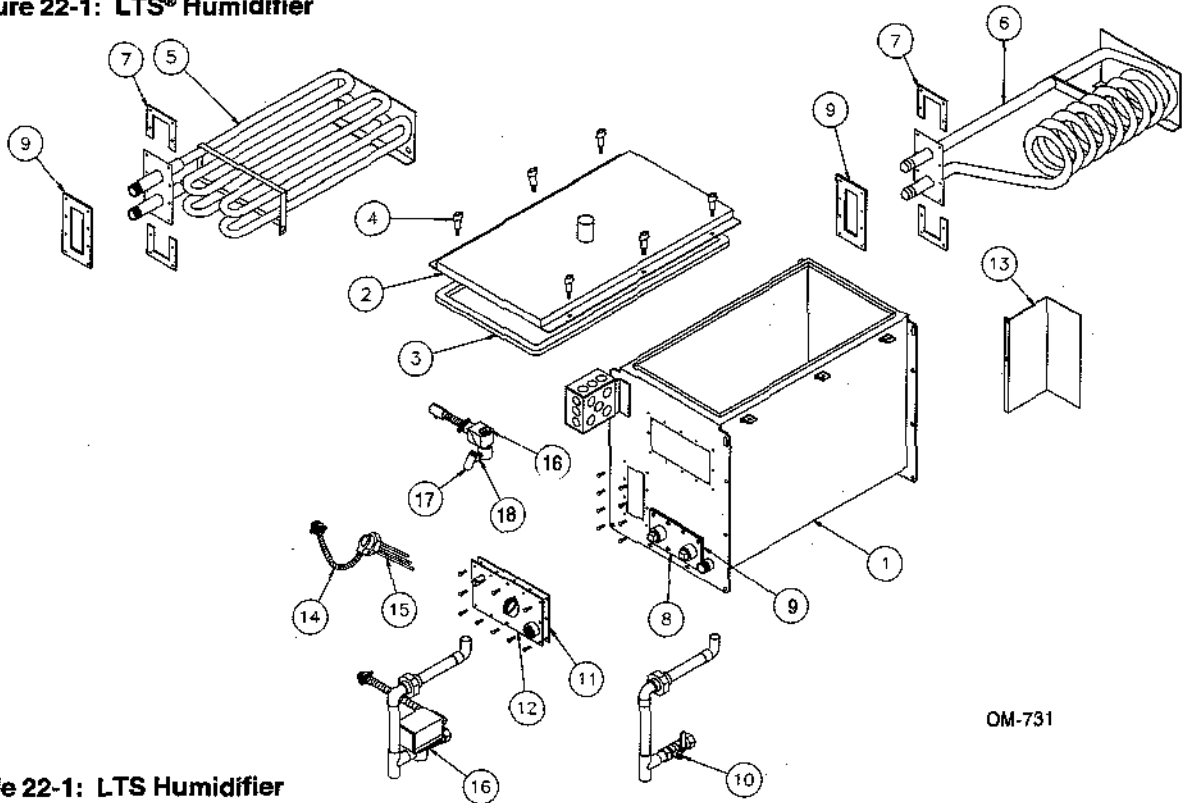
## TROUBLE-SHOOTING GUIDE

Symptom	Possible Cause	Recommended Action
Humidifier Will Not Heat	<p>No control transformer output. Humidistat is not calling.</p> <p><i>Safety controls open (high limit, air proving, etc...)</i> Faulty level control board.</p> <p><i>Probe corrosion.</i> Steam stop valve closed. Steam trap plugged. Low or no steam. Steam strainer plugged.</p>	<p>Verify control voltage. Set humidistat to "call". Inspect for faulty humidistat.</p> <p><i>Check safety controls.</i></p> <p>Verify control voltage and probe. Wires are connected correctly.</p> <p><i>Replace probes*.</i> Verify valve is opened. Clean trap body. Verify steam is present. 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 micromhos/cm (2 grains per gallon).</p> <p>Manual drain is not fully closed.</p> <p>Fill valve is stuck open.</p> <p><i>Fill valve installed backwards.</i></p>	<p>Jumper terminals 1 &amp; 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><i>Check for correct water flow, through valve, note arrow.</i></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 steam pressure.</p> <p>Steam valve.</p> <p>Steam trap.</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 steam supply pressure.</p> <p>Not opening fully.</p> <p>Not passing condensate.</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 22-1: LTS® Humidifier**



OM-731

**Table 22-1: 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 (1)
2	Cover Weld, LTS-100C/S	165365 (1)
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 (1)
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

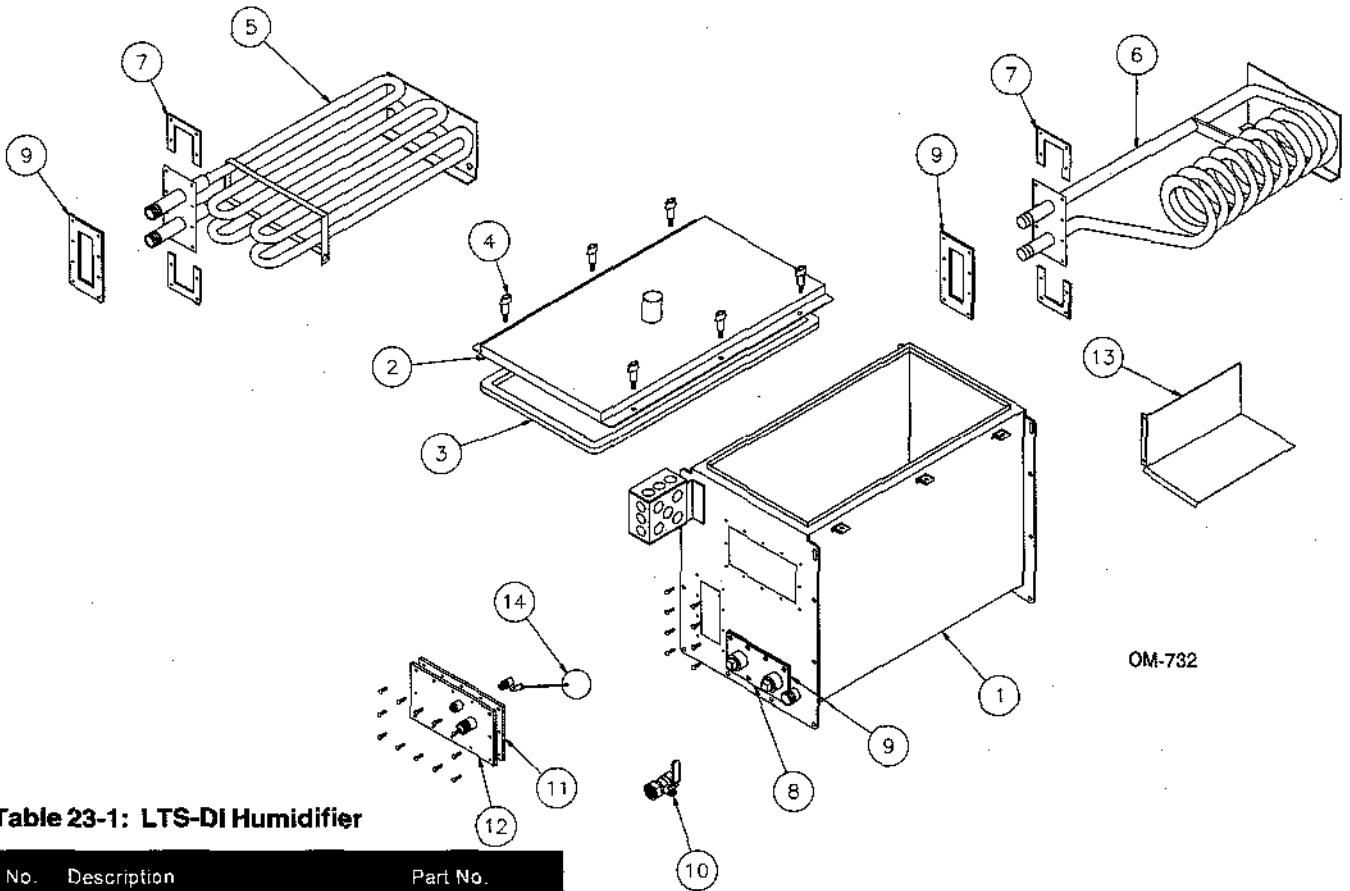
**Table 22-1: continued**

No.	Description	Part No.
8	Clean Out Plate	165470
9	Gasket, Clean Out and MTG Plate	308220
10	Valve 1/2" Electric (Auto Drain)	505400-001
10	Valve 1/2" 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, 1/2" Solenoid, LTS-25,100	505084
16	Fill Valve, 1/2" Solenoid, LTS-400	505085
17	Strainer, 1/4" NPT Sediment	300050
18	Valve, Needle 1/4" NPT	505070-001 (1)

\* Specify humidifier model and serial numbers when ordering.

# REPLACEMENT PARTS

Figure 23-1: LTS®-DI Humidifier



OM-732

Table 23-1: 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 (1)
2	Cover, LTS-100C/S	165365 (1)
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 (1)
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

Table 23-1: 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

\* Specify humidifier model and serial numbers when ordering.

# REPLACEMENT PARTS

Figure 24-1: LTS® Control Cabinet

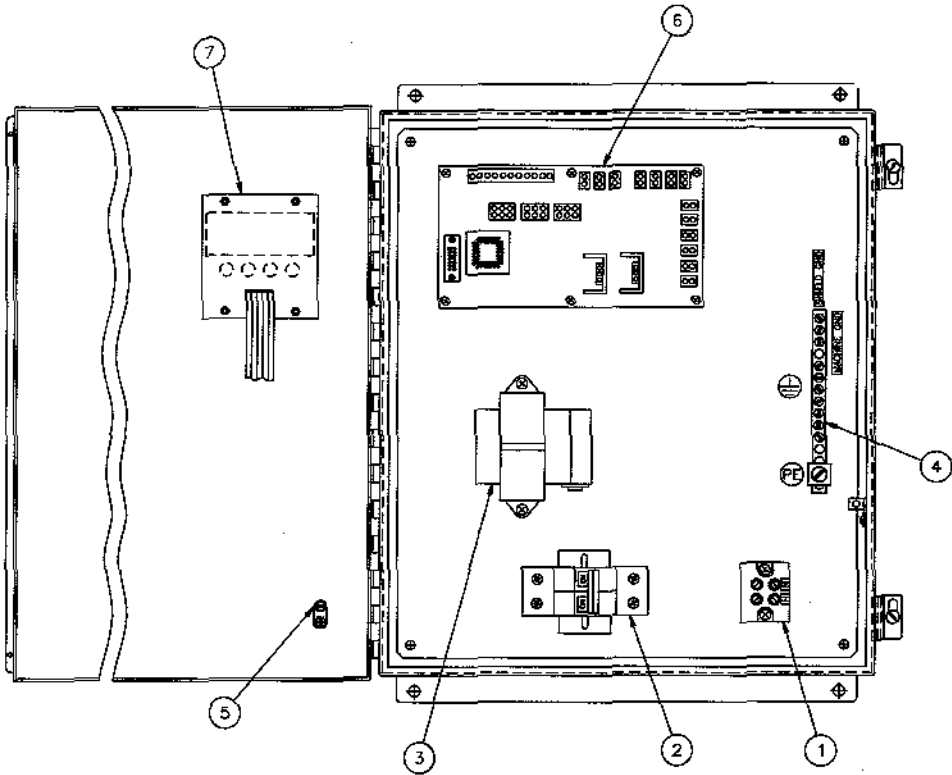


Table 24-1: LTS Control Cabinet

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	LW 430, Microprocessor Board	408641
7	LW 440, Display Board	408651



# MAINTENANCE SERVICE RECORD

DATE INSPECTED	PERSONNEL	OBSERVATION	ACTIONS PERFORMED

# MAINTENANCE SERVICE RECORD

DATE INSPECTED	PERSONNEL	OBSERVATION	ACTIONS 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.

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

# **DRI STEEM<sup>®</sup>**

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