

READ AND SAVE THESE INSTRUCTIONS

DRI-STEEM

MODEL STS and STS-

DI

STEAM-TO-STEAM HUMIDIFIERS

**Installation, Operation,
and**

**For toll-free technical support
call 1-800-328-4447**



DRI STEEM®



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Maintenance Manual

To the purchaser and the installer

Thank you for purchasing our Steam-to-Steam Model STS® humidifier. We have designed and built this equipment to give you complete satisfaction and trouble-free service for many years. Familiarizing yourself with this manual will help ensure proper operation of the equipment for years to come.

This manual covers installation, operation, and maintenance procedures for your STS humidifier.

DRI-STEEM Humidifier Company

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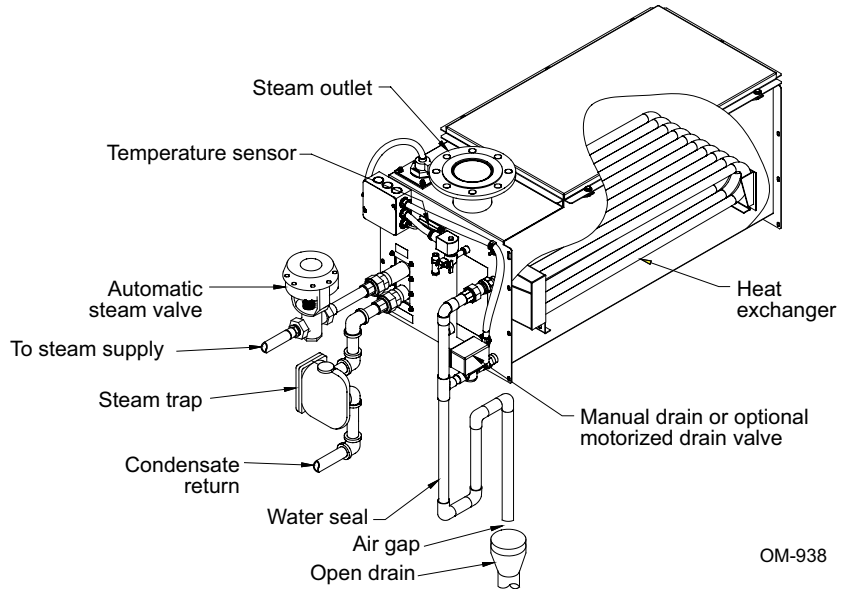
STS® AND STS-DI HUMIDIFIER OVERVIEW

Standard water models (STS)

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

This humidifier is designed to be used with either softened or unsoftened tap water.

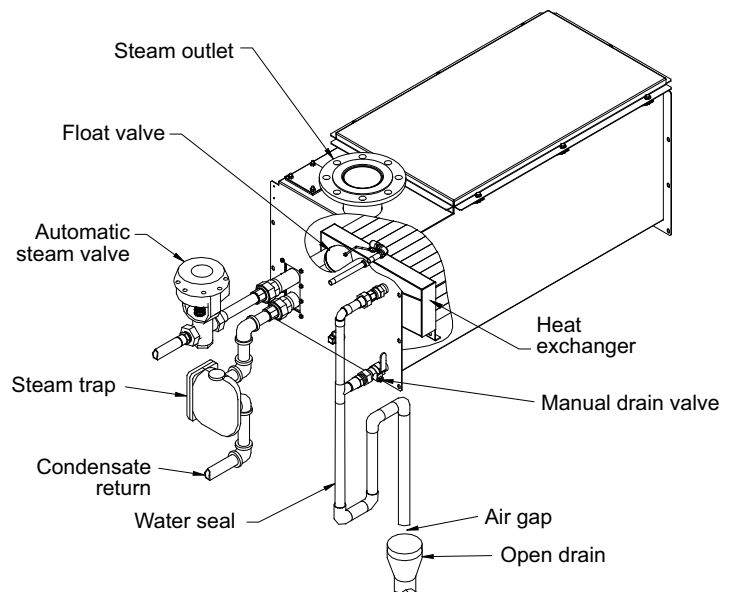
The standard water STS humidifier requires water conductivity of at least 100 $\mu\text{S}/\text{cm}$ (2 grains/gallon) to operate. It will not operate with water treated by reverse osmosis or deionization processes. However, STS humidifiers are available for use with these water types. See below.



Deionized water models (STS-DI)

The STS-DI, shown here, is designed specifically for use with deionized or reverse osmosis water.

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



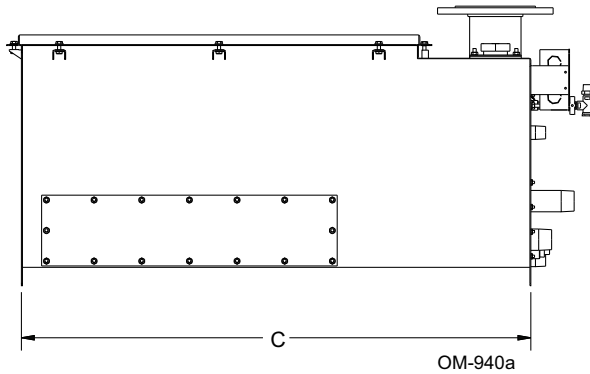
Both models can be converted in the field for use with softened/unsoftened tap water or deionized/reverse osmosis water.

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

STS® AND STS-DI DIMENSIONS AND WEIGHTS

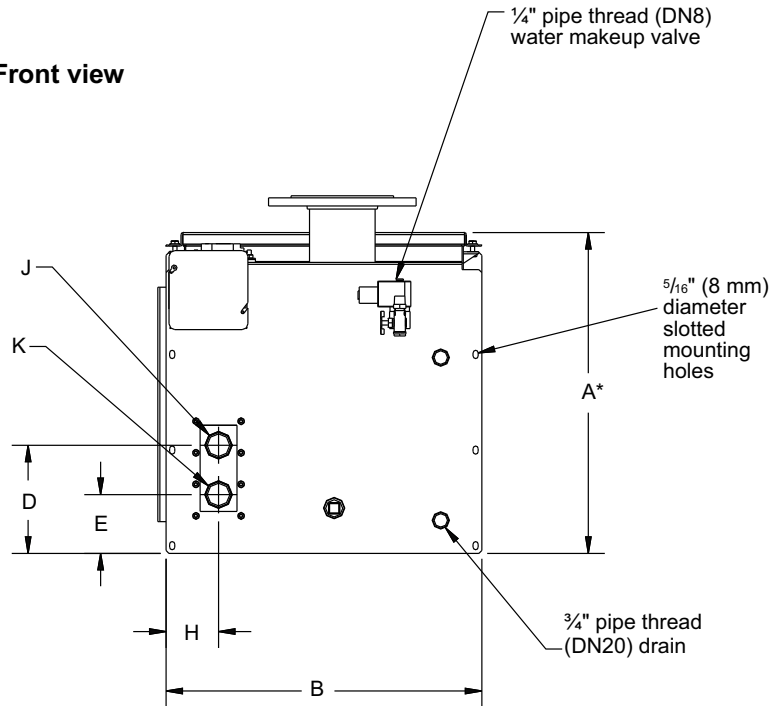
STS and STS-DI, all sizes

Side view



STS and STS-DI (single heat exchanger) sizes 25S, 25C, 50S, 50C, 100S, 100C, 200S, 400C, and 400SNC

Front view



* Add 23.5" (597 mm) to overall height when STS is mounted on support legs; add 22.5" (572 mm) when mounted on H-legs.

OM-940b

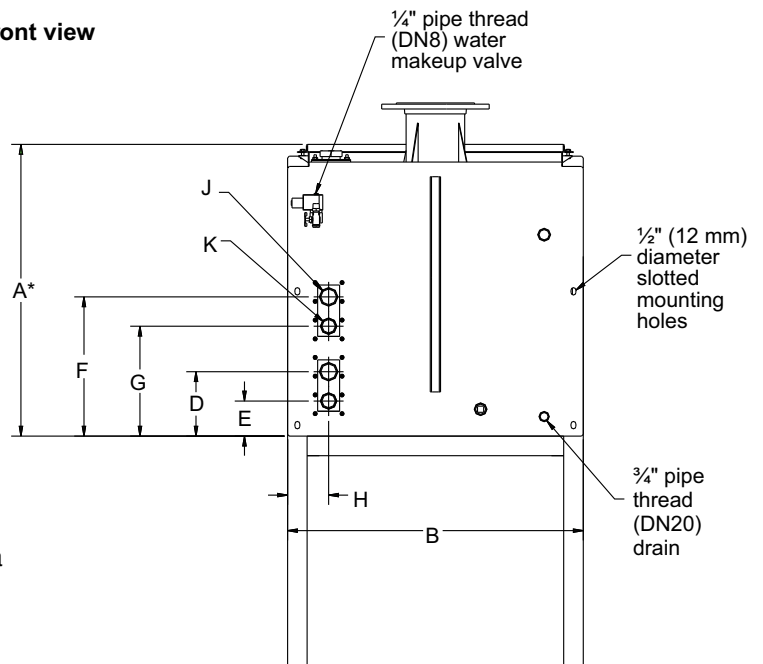
Table 4-1: Humidifier

Model number	Shipping weight		Operating weight*	
	lbs	kg	lbs	kg
STS-25	95	43	175	79
STS-50	125	57	336	152
STS-100	139	63	350	159
STS-200	245	111	850	386
STS-400	320	145	950	431
STS-800	410	186	1450	658

* Operating weight does not include weight of inter-connecting piping provided by installer.

STS and STS-DI (dual heat exchanger) size 800C and 800SNC

Front view



* Add 22.5" (572 mm) to overall height when STS is mounted on H-legs.

OM-940c

Note: See tables on pages 5 and 6 for dimensional data and capacities.

STS® AND STS-DI DIMENSIONS

Table 5-1: Mechanical dimensions for STS and STS-DI units with copper heat exchanger(s)

Description	STS and STS-DI model numbers									
	25C		50C		100C		400C		800C	
	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
A Overall height*	19.50	495	19.50	495	19.50	495	19.50	495	29.75	756
B Face width	14.75	375	14.75	375	19.25	489	30.25	768	30.25	768
C Face length	23.65	600	39.65	1007	39.65	1007	55.15	1401	55.15	1401
D Distance from bottom to supply inlet	6.63	168	6.63	168	6.63	168	6.63	168	6.63	168
E Distance from bottom to return outlet	3.63	92	3.63	92	3.63	92	3.63	92	3.63	92
F Distance from bottom to supply inlet of second heat exchanger	--	--	--	--	--	--	--	--	14.28	363
G Distance from bottom to return outlet of second heat exchanger	--	--	--	--	--	--	--	--	11.24	285
H Distance from side to heat exchanger	3.25	83	3.25	83	3.25	83	3.25	83	3.25	83
J Pressurized steam supply inlet	¾" pipe thread	DN20	1¼" pipe thread	DN32	1¼" pipe thread	DN32	1½" pipe thread	DN40	1½" pipe thread	DN40
K Pressurized steam return outlet	¾" pipe thread	DN20	¾" pipe thread	DN20	1¼" pipe thread	DN32	1¼" pipe thread	DN32	1¼" pipe thread	DN32

* Add 23.5" (597 mm) to overall height when STS is mounted on support legs; add 22.5" (572 mm) when mounted on H-legs.

Table note: C = Copper heat exchanger

Table 5-2: Mechanical dimensions for STS and STS-DI units with stainless steel heat exchanger(s)

Description	STS and STS-DI model numbers											
	25S		50S		100S		200S		400SNC		800SNC	
	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
A Overall height*	19.50	495	19.50	495	19.50	495	19.50	495	19.50	495	29.75	756
B Face width	14.75	375	14.75	375	19.25	489	30.25	768	30.25	768	30.25	768
C Face length	23.65	600	39.65	1007	39.65	1007	55.15	1401	55.15	1401	55.15	1401
D Distance from bottom to supply inlet	6.85	174	6.85	174	6.85	174	6.85	174	6.85	174	6.85	174
E Distance from bottom to return outlet	3.35	85	3.35	85	3.35	85	3.35	85	3.35	85	3.35	85
F Distance from bottom to supply inlet of second heat exchanger	--	--	--	--	--	--	--	--	--	--	14.5	368
G Distance from bottom to return outlet of second heat exchanger	--	--	--	--	--	--	--	--	--	--	11.00	279
H Distance from side to heat exchanger	3.25	83	3.25	83	3.25	83	3.25	83	3.25	83	3.25	83
J Pressurized steam supply inlet	¾" pipe thread	DN20	1" pipe thread	DN25	1" pipe thread	DN25	1½" pipe thread	DN40	1½" pipe thread	DN40	1½" pipe thread	DN40
K Pressurized steam return outlet	¾" pipe thread	DN20	¾" pipe thread	DN20	¾" pipe thread	DN20	¾" pipe thread	DN20	¾" pipe thread	DN20	¾" pipe thread	DN20

* Add 23.5" (597 mm) to overall height when STS is mounted on support legs; add 22.5" (572 mm) when mounted on H-legs.

Table notes: S = Stainless steel heat exchanger

SNC = Stainless steel heat exchanger with no Teflon coating (for use with DI/RO water only)

STS® AND STS-DI CAPACITIES

Table 6-1: Capacities for units with copper heat exchangers

Model number	Output capacities with copper heat exchangers							
	Steam pressure*							
	psi	kPa	psi	kPa	psi	kPa	psi	kPa
	5	34	10	69	13	90	15	103
STS-25C	20 lbs/hr	9 kg/h	70 lbs/hr	32 kg/h	100 lbs/hr	45 kg/h	120 lbs/hr	54 kg/h
STS-50C	50 lbs/hr	23 kg/h	150 lbs/hr	68 kg/h	200 lbs/hr	91 kg/h	240 lbs/hr	109 kg/h
STS-100C	100 lbs/hr	45 kg/h	300 lbs/hr	136 kg/h	400 lbs/hr	181 kg/h	480 lbs/hr	218 kg/h
STS-400C	300 lbs/hr	136 kg/h	580 lbs/hr	263 kg/h	720 lbs/hr	327 kg/h	790 lbs/hr	358 kg/h
STS-800C	650 lbs/hr	295 kg/h	1275 lbs/hr	578 kg/h	1500 lbs/hr	680 kg/h	1600 lbs/hr	726 kg/h

Table 6-2: Capacities for units with stainless steel heat exchangers

Model number	Output capacities with stainless steel heat exchangers							
	Steam pressure*							
	psi	kPa	psi	kPa	psi	kPa	psi	kPa
	5	34	10	69	13	90	15	103
STS-25S	10 lbs/hr	5 kg/hr	25 lbs/hr	11 kg/hr	30 lbs/hr	14 kg/hr	35 lbs/hr	16 kg/hr
STS-50S	30 lbs/hr	14 kg/hr	55 lbs/hr	25 kg/hr	75 lbs/hr	34 kg/hr	80 lbs/hr	36 kg/hr
STS-100S	60 lbs/hr	27 kg/hr	110 lbs/hr	50 kg/hr	140 lbs/hr	64 kg/hr	150 lbs/hr	68 kg/hr
STS-200S	150 lbs/hr	68 kg/hr	290 lbs/hr	132 kg/hr	360 lbs/hr	163 kg/hr	390 lbs/hr	177 kg/hr
STS-400SNC**	170 lbs/hr	77 kg/hr	392 lbs/hr	178 kg/hr	552 lbs/hr	250 kg/hr	637 lbs/hr	289 kg/hr
STS-800SNC**	212 lbs/hr	96 kg/hr	825 lbs/hr	374 kg/hr	1095 lbs/hr	497 kg/hr	1223 lbs/hr	555 kg/hr

Table 6-1 and 6-2 notes:

* Steam pressure at connection to the STS steam valve (provided by DRI-STEEM®)

** SNC = Stainless steel heat exchanger with no Teflon coating (for use with DI/RO water only)

Notes about heat exchangers and water type:

- For use with standard water:
 - Copper heat exchangers, which have a nickel coating (STS models ending in “C”)
 - Stainless steel heat exchangers WITH Teflon coating (STS models ending in “S”)
- For use with DI/RO water:
 - Copper heat exchangers, which have a nickel coating (STS models ending in “C”)
 - Stainless steel heat exchangers WITH Teflon coating (STS models ending in “S”)
 - Stainless steel heat exchangers WITHOUT Teflon coating (STS models ending in “SNC”)

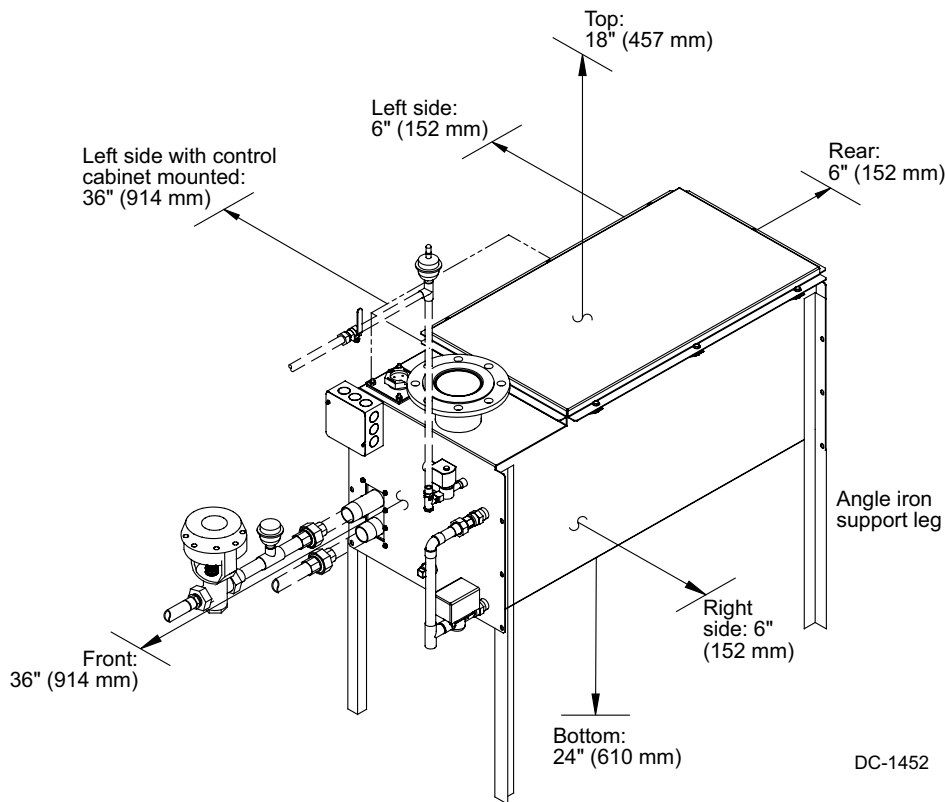
STS® AND STS-DI LOCATION

Locating the humidifier

When selecting the location of the humidifier, consider the following:

- Maximum ambient temperature for control cabinet is 104 °F (40 °C).
- Noises inherent to operation such as STS water fill cycles
- Easy access for maintenance
- Critical service and maintenance clearances around humidifier — primarily top, left side, and front (see clearance recommendations below)
- Convenient location to dispersion system for routing of vapor hose, tubing, or piping
- Electrical connections — power, control, and safety circuits
- Steam supply piping connections — inlet steam piping, condensate piping, and optional equipment (see page 12 of this manual)
- Plumbing connections — supply water, drain piping, and condensate return piping
- Water seal requirements
- Avoid locations above critical equipment or processes.
- Avoid locations close to sources of electromagnetic emissions such as power distribution transformers and high horsepower motors controlled by variable frequency drives.

Figure 7-1: STS clearance recommendations



STS® AND STS-DI MOUNTING

IMPORTANT: Installation must comply with local governing codes.

Mounting methods

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

For overhead installations, install a drip pan to prevent possible water damage.

Support legs, trapeze hanger, and wall brackets are not available for STS/STS-DI models 200, 400, and 800.

The following mounting methods are the only options available to maintain compliance to the UL 998 standard; alternate mounting methods will compromise the humidifier's CE, ETL, and C-ETL approval.

Support legs (STS/STS-DI models 25, 50, 100 only)

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

Trapeze hanger (STS/STS-DI models 25, 50, 100 only)

Secure threaded rod to an overhead structure that is strong enough to support the operating weight of the STS/STS-DI humidifier and field installed piping, plus the weight of the control cabinet if it is mounted on the humidifier.

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

H-legs (STS and STS-DI models 200, 400, 800 only)

While the STS and STS-DI tank is securely held in the air, attach front and rear supports using the supplied 3/8" (M10) bolts, nuts, and washers. **MAKE SURE THE BOTTOM OF THE TANK IS SUPPORTED BY THE H-LEG SUPPORTS.** This can be accomplished by having the bolts slightly loose as the tank is lowered to the floor. Then tighten them after the unit is place.

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

Wall brackets (STS/STS-DI models 25, 50, 100 only)

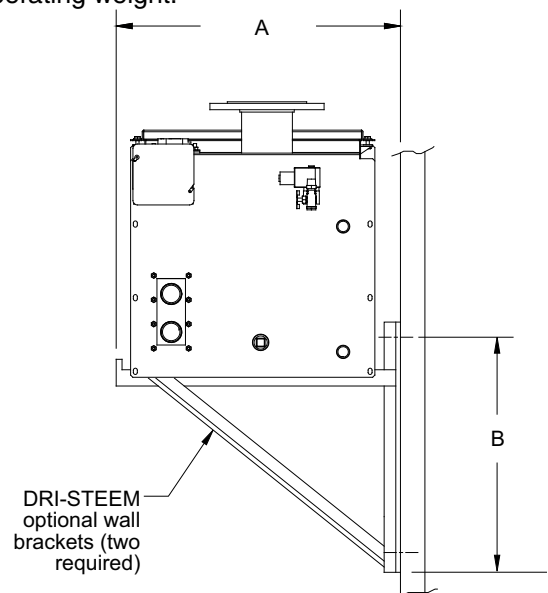
DRI-STEEM® recommends using 3/8" (M10) fasteners.

- Concrete or block walls — use concrete anchors (expansion bolts) rated for the operating weight of the STS/STS-DI humidifier. Locate the wall brackets so they are flush to the front and back flanges of the tank.
- Metal stud wall — follow the 2 × 4 (100 mm × 50 mm timber) wood stud wall guidelines below, but provide a second set of 2 × 4s (100 mm × 50 mm timbers) on the backside of the wall. Run a bolt with a washer through the face 2 × 4 (100 mm × 50 mm timber), the metal stud, and the backside 2 × 4 (100 mm × 50 mm timber) with washer and nut to connect the 2 × 4s (100 mm × 50 mm timbers). DRI-STEEM does not recommend mounting the 200, 400, and 800 models on a metal stud wall.
- Wood stud wall, recommended mounting — two horizontal 2 × 4s (100 mm × 50 mm timbers) with center line spaced at dimension shown in the table below.
 - STS 25: lag bolt (coach screw) both horizontal 2 × 4s (100 mm × 50 mm timbers) to two vertical studs (16" [404 mm] on center)
 - STS 50: lag bolt (coach screw) to three studs
 - STS 100: lag bolt (coach screw) to four studs

Lag bolt (coach screw) wall brackets to the horizontal 2 × 4s (100 mm × 50 mm timbers). Locate the wall brackets so they are flush to the front and back flanges of the tank.

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

STS model	A		B	
	inches	mm	inches	mm
25C 25S 50C 50S	15½	394	24	610
100C 100S	21	533	30	762



STS® AND STS-DI PIPING

Drain piping

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

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

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

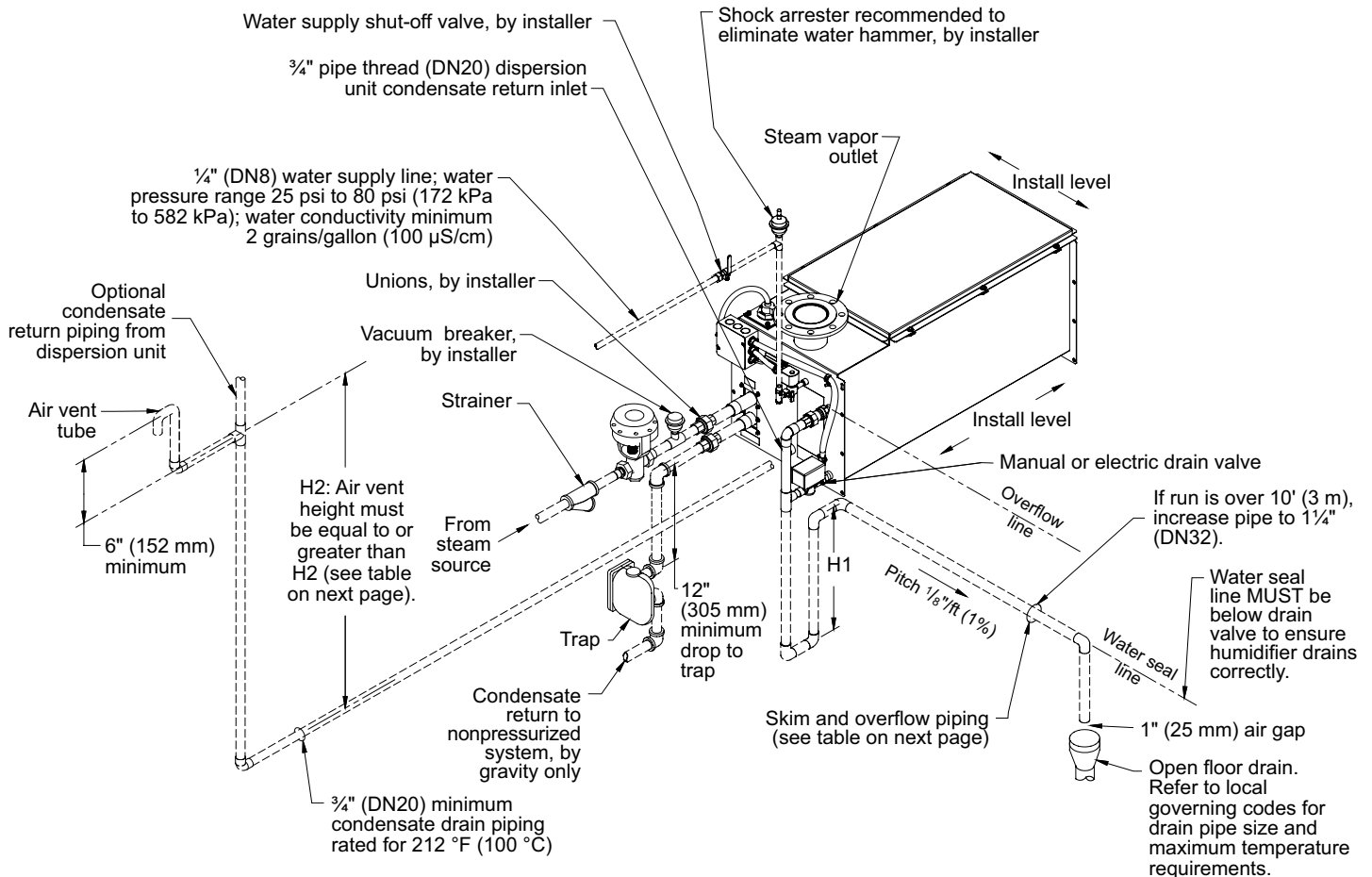
Governing codes may require that the 212 °F (100 °C) drain and skim water from the humidifier be tempered before it is discharged into the building drain piping. The DRANE-KOOLER™ option will temper 6 gpm (22.7 L/m) of 212 °F (100 °C) water to 140 °F (60 °C).

To allow normal operation and prevent steam from escaping through the drain line, the installer must provide a water seal of a sufficient height to contain the pressure developed in the humidifier system. See the table on the following page for water seal heights.

Drain piping after the water seal must be pitched a minimum of 1/8"/ft (1%) toward the drain. Governing codes may require more pitch.

If the proximity of a drain requires the humidifier drain and skim water to be lifted by a pump, DRI-STEEM® offers a condensate pump option. A check valve is required on the discharge of the pump. Electrical power for the pump is independent of the humidifier. Plug the pump into a wall outlet; an integral float switch turns the

Figure 9-1: Field piping overview



DC-1451

STS® AND STS-DI PIPING

pump on and off.

Drain piping, continued

STS humidifier — the drain connection to an STS humidifier is a pipe thread sweat (soldered) fitting. The installer should place a union directly after the factory drain fitting, provide a water seal of height H1 (see table below), and pipe. To mount the humidifier closer to the floor, use the “Alternate water seal and drain valve piping” diagram shown on the right. The installer needs to rework the factory piping that connects the drain valve to the skim/overflow fitting, cut out the elbow, and repipe per the diagram.

The **STS-DI humidifier** has a pipe thread fitting on the drain valve and on the skim/overflow fitting. Prior to dumping into a drain, the installer needs to connect the drain and skim/overflow, provide a water seal of height H1 (see table below), and pipe. To mount the humidifier closer to the floor, use the “Alternate water seal and drain

valve piping” diagram shown on the right.

Alternate water seal and drain valve piping

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

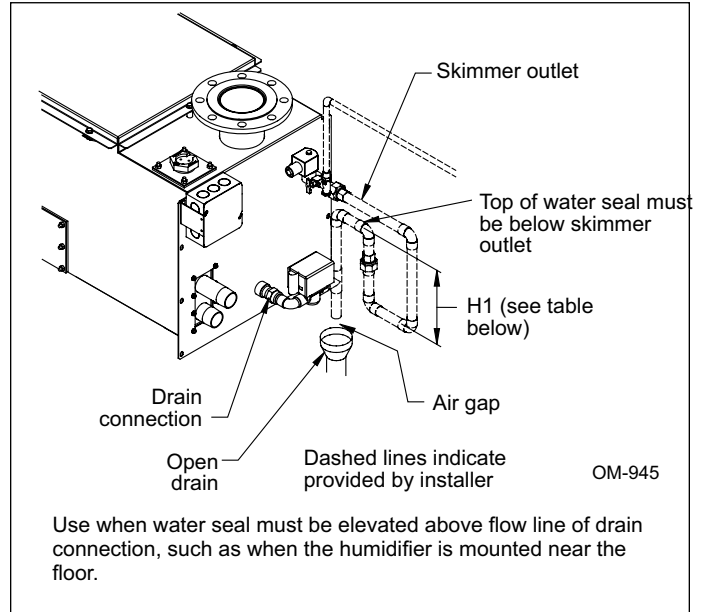


Table 10-1: H1 and H2: Heights required to overcome humidifier internal pressure

Unit output		Water seal height (H1)		Air vent height (H2)			
		All STS models		STS models 25C, 25S, 50C, 50S, 100C, 100S, 200S, 400C		STS model 800C	
lbs/hr	kg/h	inches	mm	inches	mm	inches	mm
up to 138	62	12	305	27	686	–	–
139 to 183	63 to 83	15	381	30	762	–	–
184 and greater	84	18	457	33	838	42.25	1073

STS® AND STS-DI PIPING

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

Water supply piping

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

The supply water pressure range must be 25 psi to 80 psi (172 kPa to 552 kPa) for all STS and STS-DI models except the STS-DI 800.

The STS-DI 800 supply water pressure range must be 60 psi to 80 psi (414 kPa to 552 kPa). An optional fill assembly is available to allow a minimum water pressure of 25 psi (172 kPa) at an additional cost.

STS model

Water supply assembly includes a strainer, needle valve, and fill solenoid — ¼" pipe thread (DN8) connection. European models are provided with a ⅜" pipe thread (DN10) connection. Since the primary component of the water supply assembly is a solenoid valve, there may be noise issues that surface during a fill cycle.

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

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

The minimum water conductivity for the probe-type water level control system to work is 100 µS/cm (2 grains/gallon).

STS-DI model

A float valve controls the water supply — ¼" pipe thread (DN8) connection. European models are provided with a ⅜" pipe thread (DN10) connection. For the DI end-of-season drain option, a solenoid valve is added on the inlet of the float valve. This option shuts off the fill water supply and drains the tank when there is no demand for humidity for 72 hours. (This is a default setting, which is adjustable. To modify this value, see the **VAPORLOGIC₃ Installation and Operation Manual.**)

When using nonmetallic tubing for supply water, it must be rated for 212 °F (100 °C) minimum continuous operating temperature. DRI-STEEM recommends installing a three-foot (914 mm) piece of noninsulated stainless steel pipe directly off the humidifier prior to connecting to the nonmetallic tubing. When using nonmetallic tubing, DRI-STEEM recommends the installer place a 2" (50 mm) water seal/loop in the supply line to isolate steam during DI/RO water system maintenance.

DRI-STEEM recommends installing a strainer in the water supply line to prevent clogging of the float valve orifice. A strainer is highly recommended when the humidifier has the end-of-season drain option. The strainer will prevent particulate from collecting at the solenoid valve seat.

If the STS-DI humidifier is supplied with tap water, the float valve assembly will become clogged and run without water.

STS[®] AND STS-DI PIPING

Steam supply piping

The heat exchanger in the STS humidifier is designed for a maximum steam pressure of 15 psi. The steam valve, trap, and strainer are shipped loose for field installation.

The figure below shows piping of an STS unit from an overhead steam supply main with condensate returned to a vented gravity flow return system. Note the steam trap installed at the bottom of the branch feeding the steam valve of the STS. Failure to install this trap will cause water hammer, which could damage the STS heat exchanger.

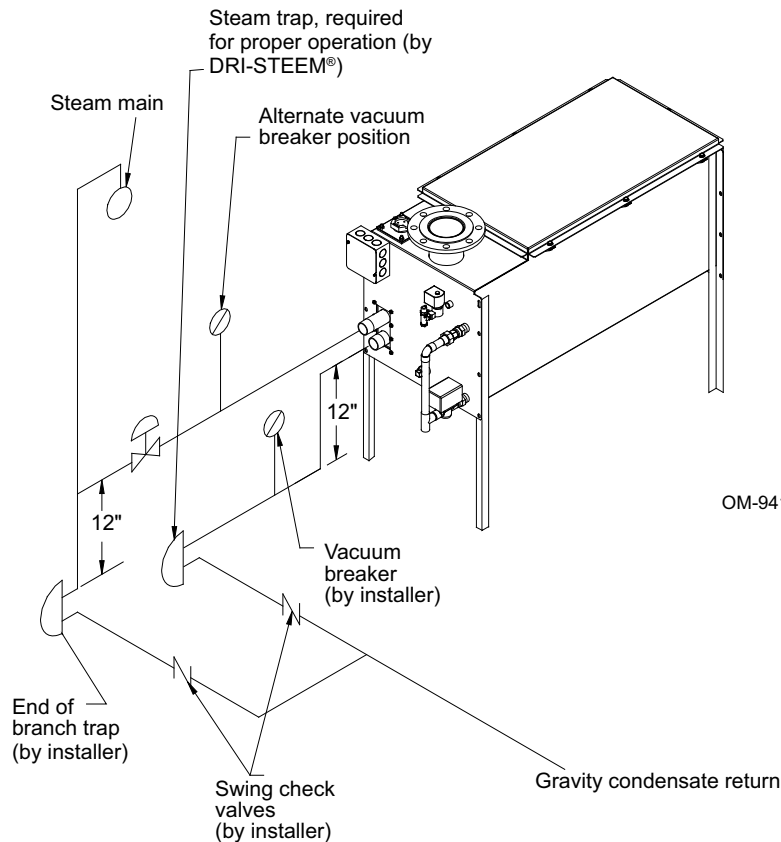
Vacuum breakers are necessary to ensure condensate

can drain from the heat exchanger when the steam valve closes.

Lifting condensate with pressurized steam is not recommended. Premature heat exchanger failure and erratic control can occur when using pressurized steam to lift condensate. A steam condensate pump is recommended when lifting condensate in a pressurized system.

Note for STS-800 models: To guarantee steam output capacities, a dedicated steam valve and steam trap is required for each heat exchanger.

Figure 12-1: Steam supply piping



STS® AND STS-DI WIRING

Caution: Only qualified electrical personnel should perform installation procedures.

Electrical wiring diagrams provided with humidifier and control cabinet

- Ladder style wiring diagrams (located inside control cabinet door) show power, control, and humidifier to control cabinet interconnection requirements.
- External connections diagrams (located inside control cabinet door) show connection points to the microprocessor-based controller and wire terminals for external safety and control devices: airflow proving switches, high limits, transmitters, or humidistats.

All wiring must be in accordance with all governing codes and with STS wiring diagrams.

Electrical installation

Wiring and branch circuit protection is provided by the installer per the National Electrical Code (NEC) or in Europe, IEC 60364. For power supply and machine ground connections, size the wire using the 75 °C wiring table, per the NEC (or IEC 60364). Then use copper conductors rated for a 105 °C environment. The wiring from the control cabinet to the humidifier must be rated for 105 °C.

All STS humidifiers have a 120-volt, single phase electrical supply. Verify current characteristics and capacity requirements against those listed on the name plate.

Wiring requirements

The length of wire from the control cabinet to the humidifier must not exceed 50' (15 m) for the VAPOR-LOGIC₃ or 30' (9 m) for the LW417.

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

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

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

The installer is responsible for making electrical connections at the power terminals.

CAUTION: When drilling holes in the control cabinet, protect all internal components from debris and VACUUM OUT THE CONTROL CABINET when finished. Failure to comply with this directive can damage sensitive electronic components and void your DRI-STEEM® warranty.

STS® AND STS-DI WIRING

CAUTION: When drilling holes in the control cabinet, protect all internal components from debris and VACUUM OUT THE CONTROL CABINET when finished. Failure to comply with this directive can damage sensitive electronic components and void your DRI-STEEM® warranty.

Control wiring

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

- Humidistat, RH transmitter, and temperature transmitter wiring must be minimum 18-gauge (1 mm²) plenum rated, shielded (screened), twisted pair wire with a bare drain wire for grounding.
- Airflow proving switch wiring must be minimum 18-gauge (1 mm²) stranded wire run in conduit. The airflow proving switch can be wired using minimum 18-gauge (1 mm²) plenum rated, shielded (screened), twisted pair wire with a bare drain wire for grounding.
- The shield (screen) wire should be connected to the shield (screen) ground terminal/lug with a length less than 2" (51 mm). Do not ground the shield (screen) wire on the humidistat or transmitter end.
- Water level control device, fill valve, and drain valve wiring must be minimum 18-gauge stranded wire run in a separate conduit from power wires. DO NOT USE SHIELDED (SCREENED) CABLE FOR WATER LEVEL CONTROL DEVICES.
- The tank temperature sensor can be run with 18-gauge (1 mm²) stranded wire if the control cabinet is located within 10' (3 m) of the humidifier. For wire lengths of 10' to 50' (3 m to 15 m), use 18-gauge (1 mm²) plenum rated, shielded (screened), twisted pair wire with a bare drain wire for grounding.

IMPORTANT: Failure to follow these wiring procedures can result in erratic operation or failure.

This product has been tested at the factory for proper operation. Product failures resulting from faulty handling, incorrect wiring, or shorting of wires together on external components are not covered under your DRI-STEEM warranty. Review information and diagrams before proceeding.

Grounding requirements

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

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

When the control cabinet is mounted remotely from the humidifier, a ground wire is necessary from the machine ground lug on the humidifier to the machine ground lug in the control cabinet. The bonding machine ground wire should be no less than 14-gauge AWG (mm²) or sized per NEC or IEC 60364 requirements.

Figure 14-1: Humidifiers with VAPOR-LOGIC®₃

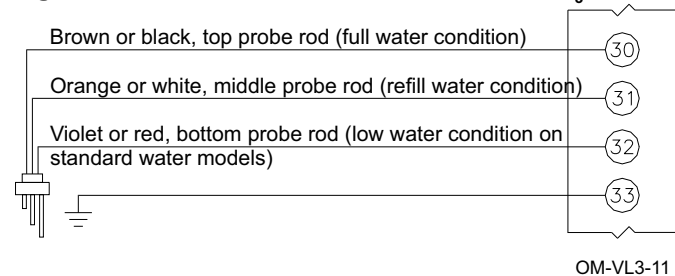
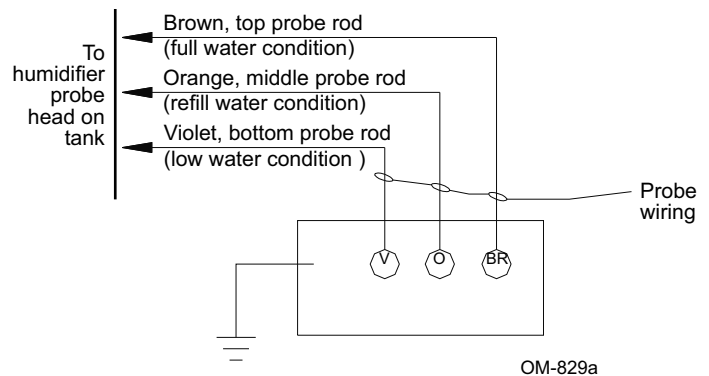


Figure 14-2: Humidifiers with LW417



STS® AND STS-DI STEAM DISPERSION INSTALLATION

STS dispersion tube installation with condensate drain

Vapor hose

- Support vapor hose to prevent sags or low spots and to maintain a minimum pitch of 2" per foot (15%) back to the humidifier.
- When mounting the humidifier above the level of dispersion tube, make sure there are no sags in the hose.

Failure to follow the recommendations above can result in excessive back pressures being imposed on the humidifier. This in turn can 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' (3 m), consult DRI-STEEM® for special recommendations.

Hard piping

- Hard piping should have a minimum I.D. of 1½" (DN40).
- Maintain a minimum pitch back to the humidifier. See Figure 15-2 for recommended values.
- 90° elbows are not recommended; use two 45° elbows 1' (0.3 m) apart.
- 90° elbows are not recommended; use two 45° elbows 1' (0.3 m) apart.
- Thin wall tubing heats up faster and causes less start-up loss than heavy wall pipe.
- Insulating hard piping reduces the loss in output caused by condensation.

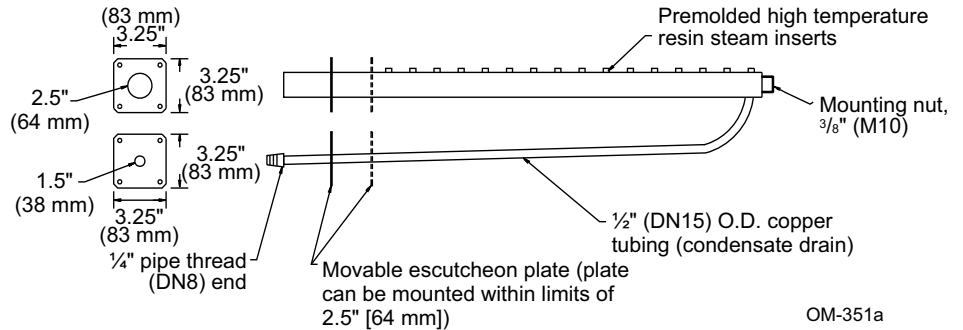
Tube mounting

- Best vapor absorption occurs when the dispersion tube discharges against the airflow.

Minimum condensate drain line sizing

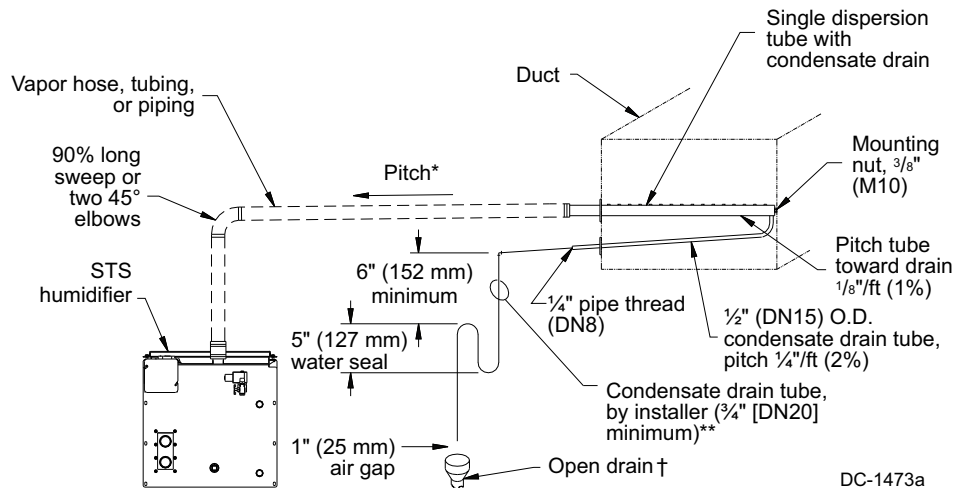
- One or two tubes: ¾" (DN20) I.D.

Figure 15-1: Single tube and escutcheon plates



OM-351a

Figure 15-2: Single tube with condensate wasted to floor



DC-1473a

* Pitch — Vapor hose: 2"/ft (15%)
1½" tubing or pipe: ½"/ft (5%)
2" tubing or pipe: ¼"/ft (2%)

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

† Refer to local governing codes for drain pipe size requirements.

continued . . .

STS® AND STS-DI STEAM DISPERSION INSTALLATION

STS dispersion tube installation with condensate drain, continued

Figure 16-1: Multiple tube with condensate returned to humidifier

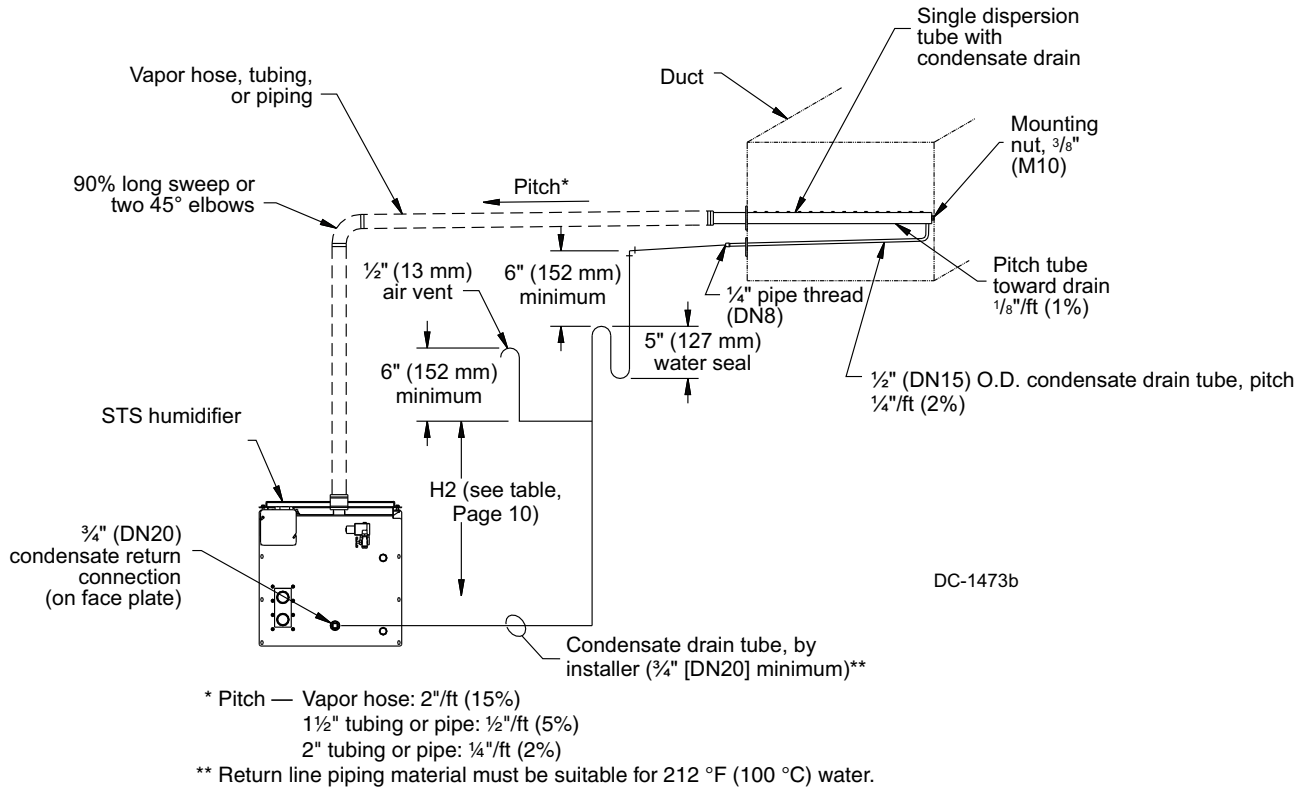
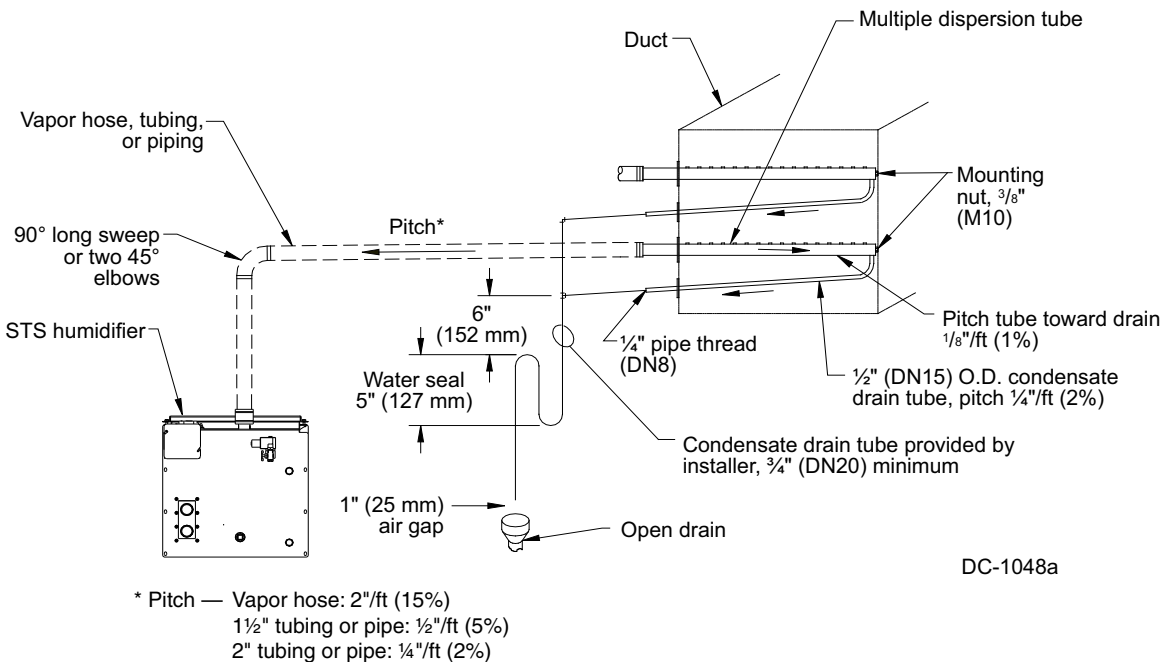


Figure 16-2: Multiple tube with condensate wasted to floor



Notes:

1. Dashed lines indicate provided by installer.
2. Review drawings and tables on all pages of this document.

STS® AND STS-DI STEAM DISPERSION INSTALLATION

Selecting the location

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

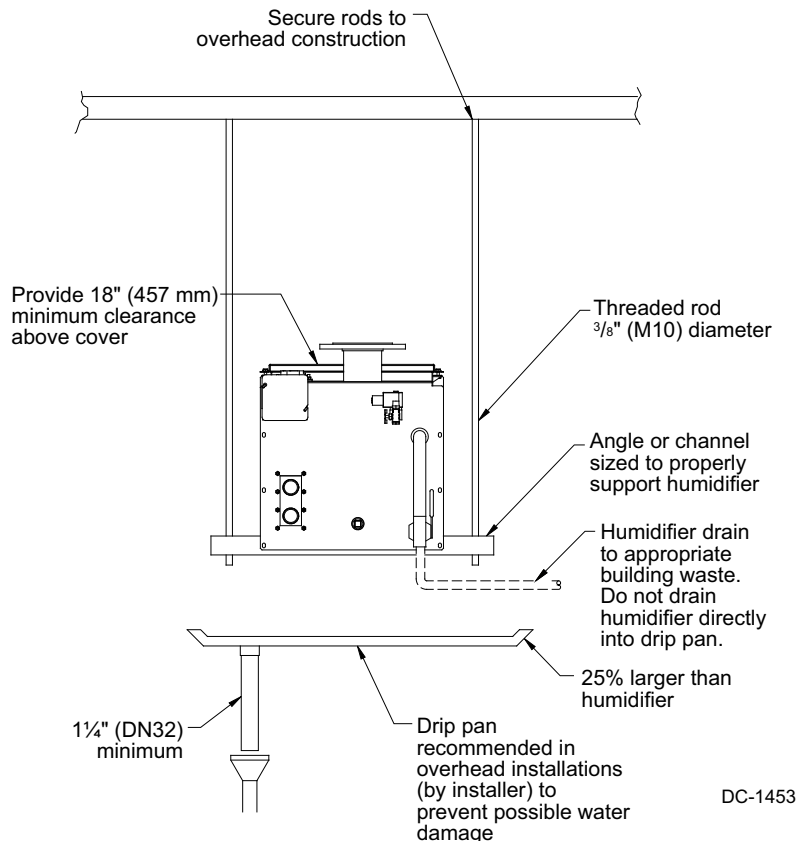
Overhead installation

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

If this type of installation cannot be avoided, install a drip tray constructed of galvanized sheet metal under the humidifier, valve, etc. to catch any possible water drip (see figure below).

It is advisable to terminate the drain above an open floor drain. The overflow from the STS should be piped separately to a floor drain. Do not drain the STS directly into the drip pan.

Figure 17-1: Overhead installation



RAPID-SORB® LOCATION

Horizontal duct installation

Before you start

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

Locating the RAPID-SORB

- Provide necessary access in and around ductwork or air handler.
- The RAPID-SORB typically is centered side to side in the duct or across the face of a coil in an air handler.
- The center line of the outer dispersion tubes should never be closer than 4.5" (114 mm) to the side of the ductwork.
- L-brackets
 - L-brackets 50" (1270 mm) or less in length have a hole 4" (102 mm) in from each end to mount the L-bracket to the duct.
 - L-brackets greater than 50" (1270 mm) in length have an additional hole in the center of the L-bracket.

IMPORTANT: Before marking and drilling the holes in the duct or air handler, refer to ALL pitch requirements for the RAPID-SORB assembly you received. The size, quantity, and location of penetrations are determined by the specific dimensions and configuration of the RAPID-SORB assembly you received.

Note: The hardware for mounting the L-bracket to the duct/air handler and for the header support bracket is not provided.

Pitch

When installing RAPID-SORB with the header outside a horizontal airflow duct, consider the following pitch issues:

- 1½" (DN40) dispersion tubes — use a fastener of sufficient length to accommodate the 1/8"/ft (1%) pitch requirements toward the ¾" pipe thread (DN20) header drain fitting.
- 2" (DN50) dispersion tubes — the bracket can be mounted flush to the ductwork. The 1/8"/ft (1%) pitch typically can be accomplished in the length of the hose cuffs used to connect the tubes to the header.

When using vapor hose

Figure 18-1: RAPID-SORB installed in a horizontal airflow with header outside the duct

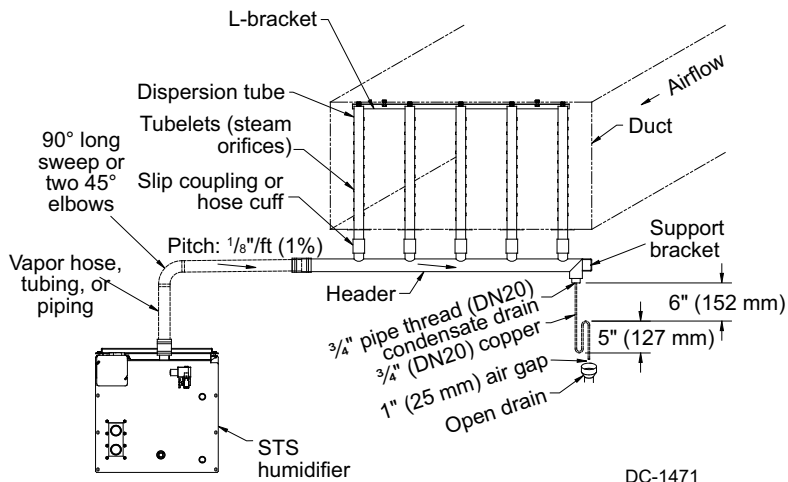
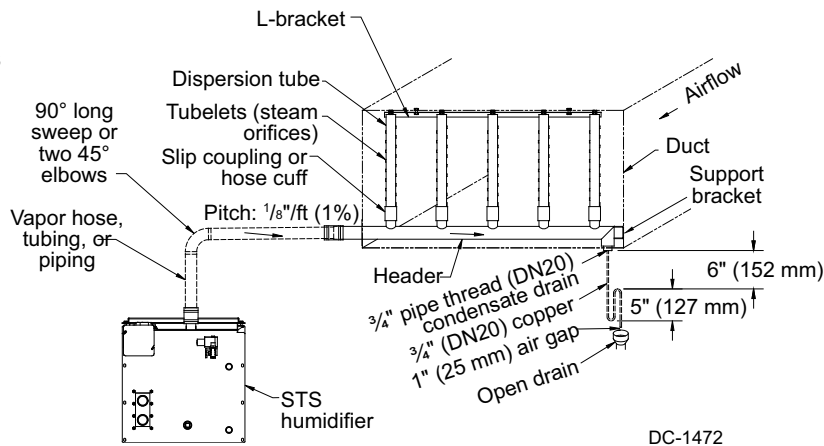


Figure 18-2: RAPID-SORB installed in a horizontal airflow with header inside the duct



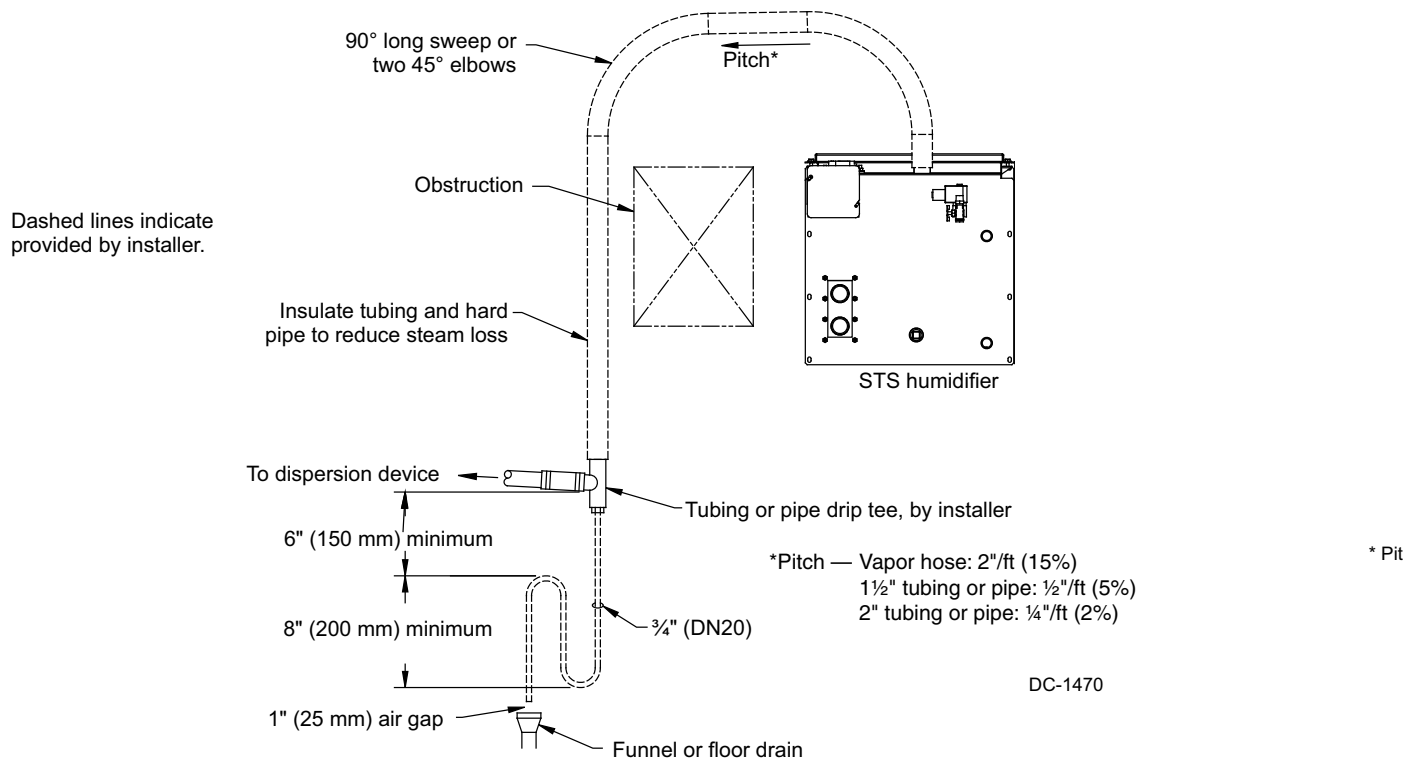
RAPID-SORB® PIPING

IMPORTANT: FAILURE to follow the recommendations on these pages and all enclosed documents can result in excessive back pressures on the humidification system. This will result in unacceptable humidification system performance such as leaking gaskets, blown water seals, erratic water level control, and spitting condensate from dispersion tube.

- Use DRI-STEEM® vapor hose.
 - Other manufacturers of vapor hose may use unacceptable release agents or material mixes that can affect humidifier system performance adversely. Using hose from alternative manufacturers increases the possibility of tank foaming and accelerated aging. Foaming causes condensate discharge at the dispersion assembly.
- Do not use vapor hose in outdoor applications.
- Provide appropriate support for vapor hose to prevent sags or low spots.
- If the humidifier must be located above the RAPID-SORB, use the recommended installation as shown in the drawing below.
- **DO NOT INSULATE VAPOR HOSE.** Insulation causes accelerated heat aging. The vapor hose becomes hard and susceptible to failure due to cracks.
- See tables and notes on the following page.
- The steam outlet on the humidifier is sized to the output of the humidifier. **DO NOT** reduce the inside diameter of the interconnecting steam supply to the RAPID-SORB. **REDUCING THE INSIDE DIAMETER WILL RESULT IN THE INTERNAL HUMIDIFIER SYSTEM PRESSURE EXCEEDING THE PARAMETERS FOR ACCEPTABLE PERFORMANCE.**
- Steam supply adapters are available from DRI-STEEM. The adapters convert tubing on the humidifier to pipe threads for hard piping of the same diameter.
- When using hard pipe, take care to remove **ALL** traces of lubricants used to thread the pipe. This will minimize the possibility of tank foaming. Denatured alcohol or mineral spirits work best for removing lubricant.
- If the humidifier must be located above the dispersion tube, use the recommended installation as shown in the drawing below.
- See tables and notes on the following page.

When using tube or pipe

Figure 19-1: Drip tee installation (piping over obstruction)



RAPID-SORB® PIPING

Table 20-1: Steam loss of interconnecting vapor hose, tubing, and pipe

Description	Nominal hose, tubing or pipe size		Steam loss				Insulation thickness	
			Noninsulated		Insulated			
	inches	DN	lbs/hr/ft	kg/h/m	lbs/hr/ft	kg/h/m	inches	mm
Hose	1½	40	0.15	0.22	N/A	N/A	N/A	N/A
	2	50	0.20	0.30	N/A	N/A	N/A	N/A
Tubing	1½	40	0.11	0.16	0.020	0.030	2.0	50
	2	50	0.14	0.21	0.025	0.037	2.0	50
	3	80	0.20	0.30	0.030	0.045	2.5	63
	4	100	0.26	0.39	0.030	0.045	3.0	75
	5	125	0.31	0.46	0.035	0.052	3.0	75
	6	150	0.36	0.54	0.039	0.058	3.0	75
Pipe	1½	40	0.22	0.33	0.020	0.030	2.0	50
	2	50	0.25	0.37	0.025	0.037	2.0	50
	3	80	0.39	0.58	0.030	0.045	2.5	63
	4	100	0.49	0.73	0.030	0.045	3.0	75
	5	125	0.59	0.88	0.035	0.052	3.0	75
	6	150	0.70	1.04	0.039	0.058	3.0	75

Note: Data based on ambient air temperature of 80 °F (267 °C), fiberglass insulation, copper tubing, and Schedule 40 pipe.

Table 20-2: Maximum steam carrying capacity and length of interconnecting vapor hose, tubing, and pipe*

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

Notes:

- * Based on total maximum pressure drop in vapor hose, tubing, or piping of 5" wc (1244 Pa)
- ** Maximum recommended length for vapor hose is 10' (3 m). Longer distances can cause kinking or low spots.
- *** To minimize loss of capacity and efficiency, insulate tubing and piping.
- † Developed length equals measured length plus 50% of measured length to account for pipe fitting.
- †† Requires flange connection
- ††† When using vapor hose, use DRI-STEEM® vapor hose for best results. Field supplied hose can have shorter life and can cause foaming in the evaporating chamber resulting in condensate discharge at the dispersion assembly. Do not use vapor hose for outdoor applications.

Header outside the duct

To assemble

1. Locate and cut the holes in ductwork for the dispersion tubes.
Use the L-bracket as a template to locate the holes on the duct floor.
2. Temporarily, loosely suspend or support the header below the final location — the vertical balance point of the dispersion tube length dictates where the header should be suspended or supported temporarily.
3. Mount the dispersion tubes on to the header with the provided connector, either a slip coupling or a hose cuff.
 - When installing slip couplings for 1½" (DN40) dispersion tubes, take care not to shear the O-rings.
 - Set the slip coupling on the header stub or dispersion tube so the O-ring is resting on the face of the tubing.
 - Rotate the slip coupling as you push it on to the tubing.
 - The O-rings are lubricated at the factory. If additional lubrication is necessary, DO NOT use a petroleum-based lubricant.
4. Position the flange of the L-bracket so it is upstream of the tubes when the assembly is raised and fastened into position.
Fasten the L-bracket to the end of the dispersion tubes with the provided bolt, lock washer, and flat washer .
5. Before tightening the L-bracket bolts to the dispersion tubes follow these instructions:
 - 1½" (DN40) dispersion tubes
 - The dispersion tube will rotate in the slip coupling — verify that the dispersion tube orifices are directed perpendicular to the airflow.
 - The dispersion tube and slip coupling must be fully engaged on to the header stub for the O-rings to provide a seal.
 - 2" (DN50) dispersion tubes
 - Before securing the hose cuff in place with the hose clamps on the dispersion tube and the header stub, verify that the dispersion tube orifices are directed perpendicular to the airflow.
6. Slide the assembly up until the L-bracket aligns with the mounting holes in the duct.
 - 1½" (DN40) dispersion tubes
 - The header pitch is duplicated in the L-bracket.
 - The dispersion tube and slip coupling must be fully engaged on to the header stub for the O-rings to provide a seal.
 - The high end of the L-bracket can be fastened tight to the duct or air handler.
 - On the low end of the L-bracket, the fastener must be long enough to compensate for the pitch, and a nut should be provided and secured on both sides of the L-bracket and the duct or air handler for stability.
 - 2" (DN50) dispersion tubes
 - Fasten the bracket to the top of the duct and use the hose cuffs to compensate for the pitch of the header.
 - Before securing the hose cuff in place with the hose clamps on the dispersion tube and the header stub, verify that the header pitch, 1/8"/ft (1%), is maintained.
7. Permanently secure both ends of the header and verify that the header pitch, 1/8"/ft (1%), is maintained.
8. Verify that all fasteners are secure:
 - L-bracket to duct
 - Dispersion tubes to L-bracket
 - Hose clamps on 2" (DN50) tubes
9. Secure and seal the dispersion tube escutcheon plate and condensate drain tube escutcheon plate around the respective tubes, if applicable.

Steam supply connections to RAPID-SORB

RAPID-SORB® ASSEMBLY AND INSTALLATION

Header inside the duct

To assemble

1. Locate and cut the holes in ductwork or air handler for steam header penetration, condensate drain piping, and header support bracket fastener.
Allow $\frac{1}{8}$ "/ft (1%) header pitch toward the support bracket when you drill the hole for the header support bracket fastener.
2. Loosely fasten the header in place.
3. Rotate the header 90 degrees so the header stubs point horizontally in the duct.
 - When installing in an air handler, the rotation of the header is often less than 90 degrees. Typically, due to the condensate drain piping requirements, the header can be set on the floor of the air handler, assembled in the vertical position, and then raised and mounted in place.
4. Mount the dispersion tubes on the header with the slip couplings or hose cuffs.
 - When installing slip couplings for 1½" (DN40) dispersion tubes, take care not to shear the O-rings.
 - Set the slip coupling on the header stub or dispersion tube so the O-ring is resting on the face of the tubing.
 - Rotate the slip coupling as you push it on to the tubing.
 - The O-rings are lubricated at the factory. If additional lubrication is necessary, DO NOT use a petroleum-based lubricant.
5. Allow the dispersion tubes to rest against the bottom of the duct.
6. Position the flange of the L-bracket so it is upstream of the tubes when the assembly is rotated into position.
Fasten the L-bracket to the end of the dispersion tubes with the provided bolt, lock washer, and flat washer .
7. Rotate the assembly up until the L-bracket aligns with the mounting holes in the duct or air handler.
 - 1½" (DN40) dispersion tubes
 - The header pitch is duplicated in the L-bracket.
 - The dispersion tube and slip coupling must be fully engaged on to the header stub for the O-rings to provide a seal.
 - The high end of the L-bracket can be fastened tight to the duct or air handler.
 - On the low end of the L-bracket, the fastener must be long enough to compensate for the pitch, and a nut should be provided and secured on both sides of the L-bracket and the duct or air handler for stability.
 - 2" (DN50) dispersion tubes
 - Fasten the bracket to the top of the duct or air handler and use the hose cuffs to compensate for the pitch of the header.
 - Before securing the hose cuff in place, with the hose clamps on the dispersion tube and the header stub, verify that the dispersion tube orifices are directed perpendicular to the airflow.
8. Verify that all fasteners are secure:
 - L-bracket to duct
 - Dispersion tubes to L-bracket
 - Hose clamps on 2" (DN50) tubes
 - Header support bracket fastener
9. Secure and seal the header escutcheon plate around the header.

RAPID-SORB® ASSEMBLY AND INSTALLATION

header

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

Condensate drain connections to

RAPID-SORB header

1. Piping must be minimum 3/4" I.D. (DN20) and rated for 212 °F (100 °C) minimum continuous operating temperature.
2. Drain line must be piped as shown in the figure on Page 18. Provide a 6" (152 mm) drop prior to a 5" (127 mm) water seal to
 - Ensure drainage of condensate from the header
 - Keep steam from blowing out of the drain line
3. After the water seal, run the drain line to an open drain with a 1" (25 mm) vertical air gap.

Cut the drain line at a 45 degree angle on the end above the drain to permit a direct stream of water into the drain pipe while maintaining a 1" (25 mm) air gap.
4. All drain lines must be installed and sized according to local governing codes.

STS® AND STS-DI START-UP PROCEDURE

Introduction

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

Start-up and checkout procedures

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

1. Verify that the STS humidifier, controls, piping, electrical connections, steam supply, and dispersion unit(s) are installed according to the following:
 - Installation section on Pages 7 through 23
 - **VAPOR-LOGIC₃® Installation and Operation Manual**
 - Installation section
 - Installation checklist
 - LW417 wiring instructions on Page 14 (if using the LW417 water level control option).
 - Ladder style wiring diagram (inside control cabinet)
 - External connections wiring diagram (inside control cabinet)
 - All governing codes
2. Verify that the humidifier is mounted level and securely supported before filling with water (see the operating weights on Page 4).
3. Verify that the humidifier is level front to back and side to side after it is full of water.
4. Refer to the **VAPOR-LOGIC₃® Installation and Operation Manual**—the “Operation” section and the “Start-up checklist” (it is critical that the installer follow this checklist)—or the LW417 section of this start-up procedure.
5. During start-up, do not leave the humidifier unattended.
6. Monitor humidifier operation through multiple fill cycles.
7. At start-up, DRI-STEEM® recommends initially running the humidifier with the factory default setting for skim time. (See the “STS and STS-DI operation information” section on Page 27.)
8. Water skims from the humidifier after every fill cycle. Adjust the amount of skim by increasing or decreasing the skim time (see the **VAPOR-LOGIC₃® Installation and Operation Manual** or the LW417 “Skim duration” section on Page 27).

STS® AND STS-DI START-UP PROCEDURE

LW417 electronic water level control option (for standard water units only)

The LW417 is a custom microprocessor-based water level controller developed to operate with DRI-STEEM® humidifiers. The features of this controller are:

- Water level control (for standard water units)
- Automatic drain and flush
- Variable skim times
- End-of-season drain
- Onboard diagnostics: “Ready water,” “Full,” and “Drain” LEDs to assist troubleshooting

When power is activated, the solenoid-operated water fill valve opens, filling the evaporating chamber. Filling continues until the water reaches level A (see figure below), at which time the fill valve closes. To ensure that a water seal is created in the field installed water seal, disconnect the probe plug and cable from the probe rod assembly (located on top of the tank), allowing the fill valve to re-energize and overfill the humidifier tank. This process takes a short time. Reconnect the probe plug and cable. Create a call for humidify to ensure the steam valve opens.

IMPORTANT: Timer logic input wire (see diagram on next page) must be connected per wiring diagram for proper automatic drain and flush and end-of-season drain operation. The “Power” light blinks off twice at one-second intervals when these functions are disabled. Verify wiring with diagram supplied with unit.

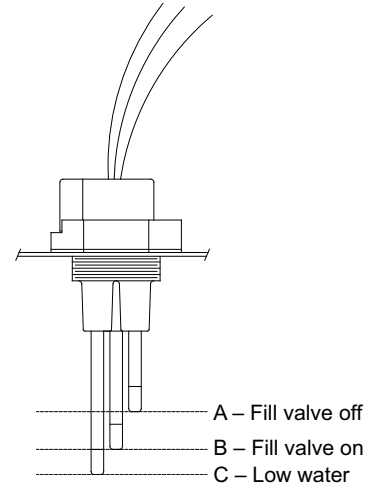
Water refill

During operation, when the water line drops below level B, the fill valve opens and remains open until the water line returns to level A (see figure below).

Low water condition

Should the water line drop below level C, the steam valve is de-energized and remains OFF until the water line is restored to level C.

Electronic probe control for maintaining proper water level



STS® AND STS-DI START-UP PROCEDURE

Automatic drain and flush

This control module contains an integral electronic timer that 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, draining the mineral laden water from the evaporating chamber.
2. The default drain time is 10 minutes.
3. Flushing occurs during the last 10% of drain period.

The electronic timer is factory set for drainage after 40 hours of operation. Alternate settings of 20 hours and 80 hours are available. See the wiring diagram(s) attached to the unit for timer board location and instructions for changing the timer setting or refer to the table below.

Autodrain settings					
	Switch			Drain time	Interval time
	1	2	3		
Self test	OFF	OFF	OFF	10 minutes	2 minutes
Disabled	ON	OFF	OFF	—	—
Option	OFF	ON	OFF	10 minutes	20 hours
Option	ON	ON	OFF	30 minutes	20 hours
Factory settings	OFF	OFF	ON	10 minutes	40 hours
Option	ON	OFF	ON	30 minutes	40 hours
Option	OFF	ON	ON	10 minutes	80 hours
Option	ON	ON	ON	30 minutes	80 hours

Test cycling the drain/flush system

The level control board incorporates a set of slide switches marked 1 through 8. To test:

1. Place "SW1" slide switches 1, 2, and 3 to the off position.
2. Set the humidistat high enough so the unit remains "on call" for at least 15 minutes.
3. After about 2 minutes of operation, activation takes place, causing the drain valve to open. The water level then drops to level C (see figure on the previous page) and allows the fill valve to open. Both valves will remain open for the remainder of the autodrain and flush period.
4. The drain valve then closes, and the water level rises to level A (see figure on the previous page), causing the fill valve to close.
5. Once the test cycle is complete, return the slide switches back to the desired operating mode.
Failure to do so will result in a drain/flush cycle every 2 minutes.

Variable skim times

The skim time feature removes surface solids and foam from the water. This keeps the fill valve open for a certain amount of time after the water reaches level A (see figure on the previous page). The skim time is factory set for 3 seconds but can be changed in the field for locations with water that requires more skimming. See "Adjusting skim duration" on the following page. See wiring diagram(s) attached to the unit for timer board location and instructions for changing the skim time setting.

End-of-season drain

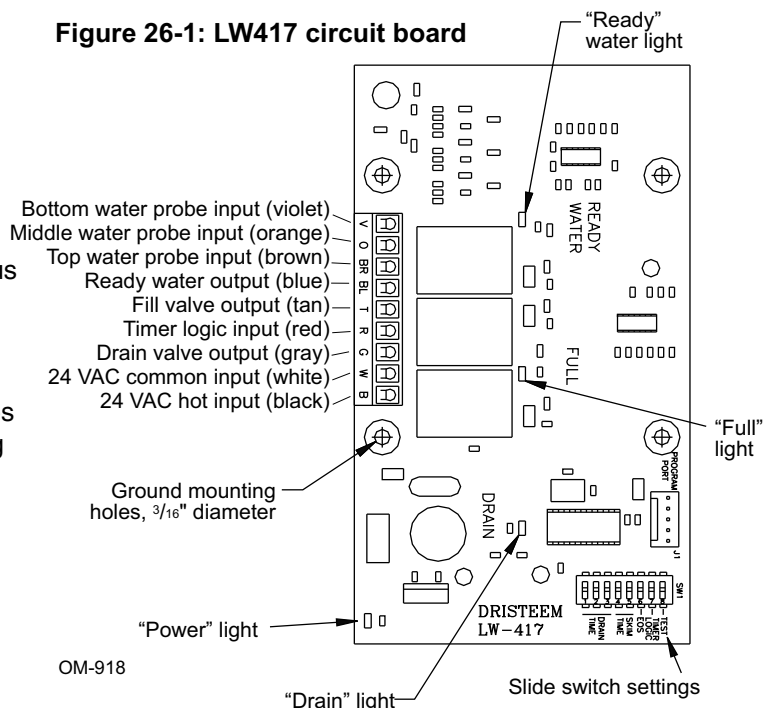
The end-of-season drain feature drains the tank after 72 hours of no system demand to minimize microbial growth inside the humidifier. When there is a demand for humidity, the tank fills and the unit runs when the operating level is reached.

Onboard diagnostics

When the green "Power" light blinks on for one second and then is off for one second, enough scale has accumulated on the probes to begin to compromise the quality of the water level detection. Remove the probe assembly and brush off all scale and tarnish. See the LW417 section of the troubleshooting guide on Page 31 for any water level control module issues.

IMPORTANT: Timer logic input wire (see diagram below) must be connected per wiring diagram for proper automatic drain and flush and end-of-season drain operation. The "Power" light blinks off twice at one-second intervals when these functions have been disabled. Verify wiring with diagram supplied with unit.

Figure 26-1: LW417 circuit board



STS® AND STS-DI OPERATION AND MAINTENANCE INFORMATION

STS water quality recommendations

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

Water quality makes a difference

- Light to moderately hard water (2 to 10 grains hardness per gallon [35 mg/L to 170 mg/L]) requires:
 - Annual cleaning
 - Regular skimming
- High mineral content water (more than 10 grains hardness per gallon [more than 170 mg/L]) requires:
 - Cleaning frequency determined by use and water quality
 - Regular skimming
 - Periodic drain and flush cycles
- Softened water, which dramatically reduces mineral accumulation inside the standard water models, requires:
 - Increased skim time
 - No drain and flush cycles

(Note: Solids, like silica, are not removed in the softening process.)

Adjusting skim duration

The skim time duration determines the quantity of water skimmed with each fill cycle. The skim time is field adjustable using the VAPOR-LOGIC[®] keypad or the dip switches on the LW417. See the table below.

	Skin time settings		Skin time
	Switch		
	4	5	
Option	OFF	OFF	3 seconds
Option	ON	OFF	9 seconds
Factory settings	OFF	ON	32 seconds
Option	ON	ON	45 seconds

lip of the skim overflow fitting. A portion of the refill water then flows to the drain carrying most of the minerals left by the previous evaporating cycle. This reduces the mineral concentration, thereby reducing the frequency of cleaning needed.

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

STS-DI water requirements

- Regular verification that water processing equipment is operating correctly. The presence of chlorides in improperly processed DI water eventually causes pitting and failure of the heat exchanger tank and its components. Your DRI-STEEM warranty does not cover damage caused by chloride corrosion.
- No cleaning (regular inspections are advised)
- No skimming, drain, or flush cycles

Standard water unit maintenance

Cool down

Before performing any maintenance, allow the tank to cool down.

- Insulated and uninsulated tanks will have hot surfaces.
- Close the manual shut-off valve on the inlet steam supply.
- **Standard drain valve with VAPOR-LOGIC₃:**
 - For drain valves without the manual open lever, use the keypad to perform the cool down process. Refer to the **VAPOR-LOGIC₃ Installation and Operation Manual**.
 - Select **Manual Drain** in the control modes screen.
 - Allow approximately half the water to drain out of the tank.
 - Select **Auto** in the control modes screen; the fill valve opens and the humidifier cools down.
 - When the fill valve closes, select **Manual Drain** in the control modes screen and allow the tank to drain dry. The humidifier should be cool enough to work on.
- **Alternative method with the LW417 electronic water level control option**
 - Manually open the drain valve by moving the valve lever located on the back of the drain valve to the manual open position.
 - The fill valve opens when the water drops below the middle probe.
 - Let the fill water run until the tank is cooled; then shut off the field installed manual supply water shut-off valve.
 - Let the tank drain; then manually close the drain valve.

Safety

IMPORTANT: When performing maintenance on the STS humidifier (after the tank has cooled down and drained),

- Always switch the keypad control mode to **Standby** (VAPOR-LOGIC₃ only).
- Place all power disconnects in **OFF** position and lock in **OFF** position.
- Close the field installed manual supply water shut-off valve.
- Close the manual shut-off valve on the inlet steam supply.

Inspection

Annual (also recommended when maintenance is performed)

- Inspect tank and gaskets for leaks.
- All safety devices in the control circuit should be cycled on and off to verify they are functioning. These include:
 - High limit switch
 - Airflow proving switch
 - Low water level probe — pull out probe plugs and valve should de-energize.

continued . . .

Standard water unit maintenance, continued

Seasonal (or as required, depending on water quality)

Cleaning tank

- Remove cleanout plate and dispose any loose scale that has collected in the bottom of the tank — this should be done before the scale buildup reaches the bottom of the heat exchanger.
- Inspect the area inside the tank in front of the drain valve fitting and thoroughly clean all scale and mineral buildup from that area.

Cleaning the probes

- Disconnect the probe plug and cable assembly (located on top of the tank) and unscrew the probe rod assembly from the STS humidifier probe housing.
- Inspect the probe housing and clean, ensuring that all the housing passageways are clear. To detach the housing from the tank, remove the four bolts that attach it to the tank. Then slide the housing vertically out of the tank.
- The scale should flake off easily from the probe assembly rods.
- The bottom $\frac{3}{8}$ " (10 mm) is the sensing portion of the probe rod; it should be brushed clean with a wire brush, abrasive pad, or steel wool.
- Inspect the composite plastic probe rod assembly for any signs of cracking, roughness, or deterioration. If found, replace probe assembly.
- Reassemble the probe assembly.

Cleaning skim overflow port

- Water should drain from the skimmer drain pipe after each fill cycle. This should be verified visually by a weekly inspection.
- Loosen deposits in and around the skimmer overflow port with a long tool such as a screwdriver.
- If flow through the water seal/P-trap is diminished due to mineral accumulation,
 - Remove the water seal piping from the humidifier and flush out.
 - Replace the water seal with new piping if the minerals have hardened in the water seal.
 - Install a union at the base of the water seal to ease removal if water quality causes the water seal to become clogged often with scale.

- Tighten down the nuts on the cleanout plate.
- Verify that the probe rod holder is secure and that the probe plug and cable assembly are plugged into the probe rod holder.
- Replace and secure all covers.
- Verify that the drain valve assembly is in the closed position.
- Turn on the water supply.
- Turn on the electrical power.
- Do not leave humidifier unattended. Allow the humidifier to cycle through multiple fill cycles and verify that the humidifier cover, cleanout plate, and probe holder gasket are not leaking.

Off-season maintenance

- Perform complete inspection and cleaning of the following:
 - Heat exchanger
 - Probe rods
 - Skimmer port and water seal
 - Humidifier tank
- After cleaning, the humidifier should remain empty until humidification is required.

When the maintenance requirements are complete,

Deionized water unit maintenance

Cool down

Before performing any maintenance, allow the tank to cool down.

- Insulated and uninsulated tanks will have hot surfaces.
- Close the manual shut-off valve on the inlet steam supply.
- **Standard drain valve:**
 - Manually open the drain valve.
 - The float valve opens.
 - Let the fill water run until the tank is cooled; then shut off the field installed manual supply water shut-off valve.
 - Let the tank drain; then manually close the drain valve.
- **End-of-season drain option (VAPOR-LOGIC₃® only):**
 - Use the keypad to perform the cool down process. Refer to the **VAPOR-LOGIC₃® Installation and Operation Manual**.
 - Select **Manual Drain** in the control modes screen.
 - Allow approximately half the water to drain out of the tank.
 - Select **Auto** in the control modes screen; the fill valve opens and the humidifier cools down.
 - When the fill valve closes, select **Manual Drain** in the control modes screen and allow the tank to drain completely dry. The humidifier should be cool enough to work on.

Safety

IMPORTANT: When performing maintenance on the steam-to-steam humidifier (after the tank has cooled down and drained),

- Always switch the keypad control mode to **Standby** (VAPOR-LOGIC₃® only).
- Place all power disconnects in **OFF** position and lock in **OFF** position.
- Close the field installed manual supply water shut-off valve.
- Close the manual shut-off valve on the inlet steam supply.

Inspection

Annual (also recommended when maintenance is performed)

- Inspect tank and gaskets for leaks.
- All safety devices in the control circuit should be cycled on and off to verify they are functioning. These include:
 - High limit switch
 - Airflow proving switch
- Verify that the float valve is closing off. If the float valve will not shut off, there may be particulate on the valve seat, or the stopper may be worn and need replacing.

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

Off-season maintenance

- Perform a complete inspection of the following:
 - Heat exchanger
 - Float valve
 - Humidifier tank and gaskets
- After inspection, the humidifier should remain empty until humidification is required.

After the humidification season, DRI-STEEM® recommends a complete inspection and cleaning of the heat exchanger, skimmer, and water chamber. 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.

STS® AND STS-DI TROUBLESHOOTING GUIDE

Symptom	Possible cause	Recommended action
Humidifier will not heat	<p>No control transformer output</p> <p>Humidistat is not calling</p> <p>Safety controls open (high limit, air proving, etc.)</p> <p>Faulty control board</p> <p>Probe corrosion</p> <p>Steam stop valve closed</p> <p>Steam trap plugged</p> <p>Low or no steam</p> <p>Steam strainer plugged</p>	<p>Verify control voltage. Set humidistat to "call."</p> <p>Inspect for faulty humidistat.</p> <p>Check safety controls.</p> <p>See VAPOR-LOGIC[®]₃ or LW417 troubleshooting guide.</p> <p>Replace probes.*</p> <p>Verify valve is opened.</p> <p>Clean trap body.</p> <p>Verify steam is present.</p> <p>Clean strainer.</p>
Humidifier will not fill	<p>No water pressure</p> <p>Faulty water fill valve</p> <p>Plugged water strainer</p> <p>Plugged valve</p> <p>Faulty control board</p>	<p>Verify manual water supply valve is open, minimum 25 psi (172 kPa) supply pressure.</p> <p>Verify action of fill solenoid valve; verify control voltage present at coil. Audible click should be heard as solenoid operates.</p> <p>Clean strainer.</p> <p>Clean valve.</p> <p>Verify control voltage.</p>
Humidifier does not stop filling	<p>Lack of tank-to-probes continuity</p> <p>Water conductivity less than 100 micromhos/cm minimum (2 grains per gallon)</p> <p>Manual drain not fully closed</p> <p>Fill valve stuck open</p> <p>Fill valve installed backward</p>	<p>Jumper wires violet, orange, and then brown to ground. If water stops, verify tank ground.</p> <p>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 not fully closed</p> <p>Excessive skimming amount</p> <p>Fill valve stuck open</p> <p>Low supply steam pressure</p> <p>Steam valve inoperable</p> <p>Steam trap blocked.</p> <p>Scale coated heat exchanger</p>	<p>Clean ball and seat of valve.</p> <p>Close manual ball valve.</p> <p>Reduce skim time.</p> <p>Check valve for foreign matter. Check if valve installed backward.</p> <p>Check steam supply pressure. Provide steam pressure as specified on unit.</p> <p>Valve not opening fully. Check signal to valve.</p> <p>Trap not passing condensate.</p> <p>Clean heat exchanger.</p>

* Although the three stainless steel electrode probes eventually will erode due to corrosion, they usually are functional up to approximately 5,000 hours of operation.

LW417* TROUBLESHOOTING GUIDE

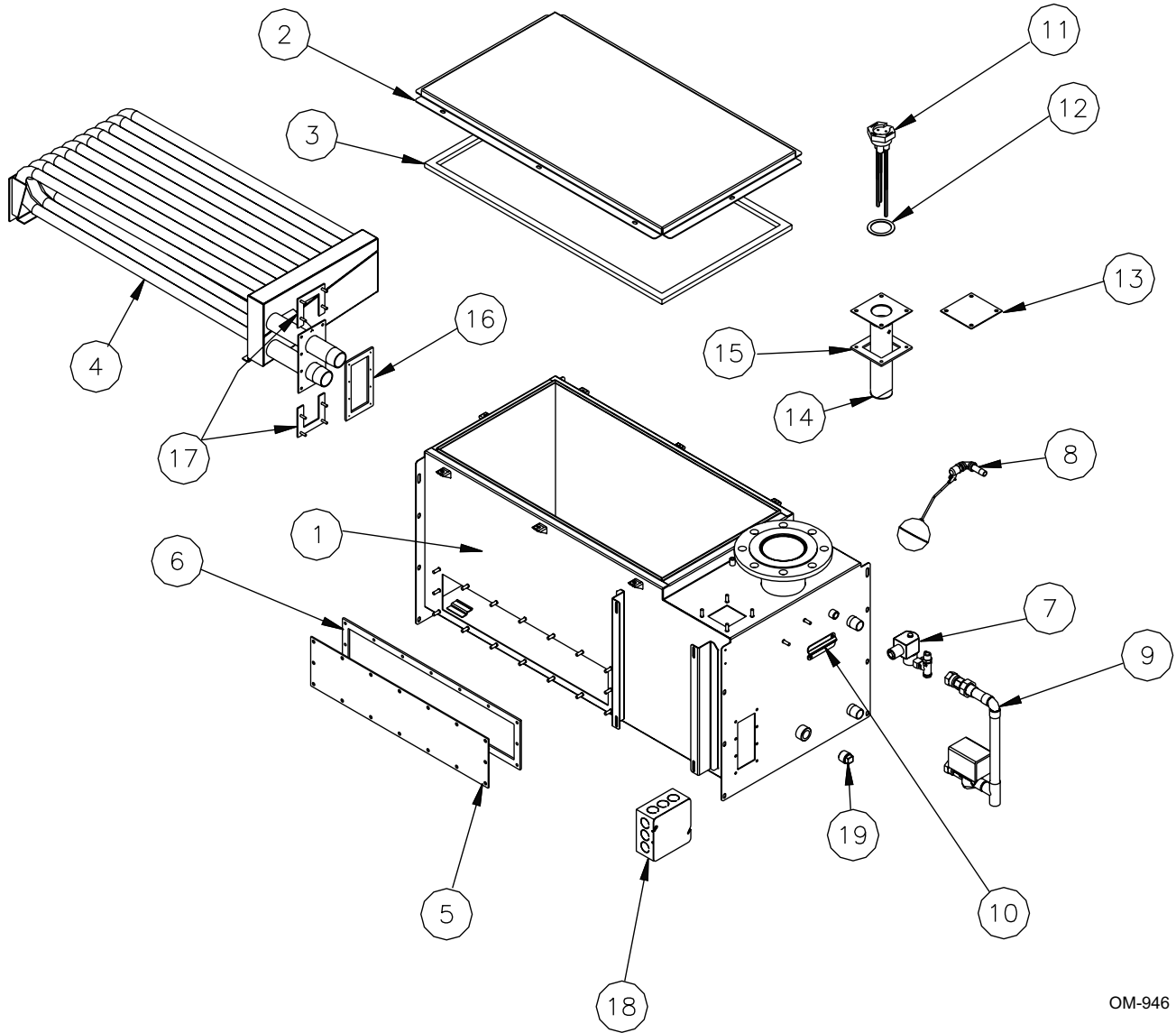
Symptom	Module indicating lights			Possible cause	Recommended action				
	Full	Ready water	Drain						
Humidifier will not heat	Off	Off	Off	Control transformer	Verify control voltage across secondary leads of transformer. Reset transformer circuit breaker.				
	On	On	Off	Humidistat is not calling Safety controls open Faulty control board	Set humidistat to call. Inspect for faulty humidistat or wiring. Check safety controls, airflow switch, high limit humidistat, etc. Verify control voltage between input terminals "B & W."				
"Ready Water" indicator "off" but enough water in tank	Off	Off	Off	Not enough water in tank; water supply closed	Open water valve.				
				Low water conductivity	If water in tank, add salt (100µS/cm [2 grains/gallon] minimum).				
				Probe corrosion	Clean water probe tips.**				
				Wiring or module	Connect jumper wire from violet to white wire. If "Ready Water" indicator remains "off," replace module.				
				Water detection wire	Check that tank has common water detection wire to ground with 24 VAC common "white" wire.				
Blinking "green" LED power light (on 1 second, off 1 second)	Off	Off	Off	System detected faulty probe rod assembly	Clean or replace probe rod.				
				Humidifier will not fill	On	Off	Off	Faulty "full" relay on LW417 board	Unplug probe plug from humidifier probe head. "Fill" LED light should be off. Check for 24 VAC across fill valve coil. If not present, FULL relay is defective. Replace module.
					Off	Off	Off	Wiring	Ensure that <ul style="list-style-type: none"> - Fill valve is wired to drain valve output. - Water detection probe wiring is correct. - Wiring distance between humidifier tank and water level control is not greater than 30 feet (9 m).
Off	On	Off	System in end-of-season drain mode	Create a call for humidity to reset the system and energize fill valve.					
Humidifier does not stop filling	Off	Off	On	Autodrain mode	Ten minutes must complete first.				
	On	Off	Off	Faulty fill valve relay in LW417	If "Full" LED light on control module is "on" and fill valve is energized, module is defective. Replace.				
	Off	Off	Off	Control module wiring	Check wires for proper connections to control module; see diagram. Ensure wiring distance between humidifier tank and water level control is not greater than 30 feet (9 m).				
Faulty control logic from LW417				If "Full" LED light on control module is "off" and tank is full, module is defective. Replace.					
Low output	On	On	Off	Faulty "Ready Water" detection	Install jumper wire between "violet and white" wire leads, which should activate "Ready Water" LED light and relay. If not activated, module is defective. Replace. Ensure wiring distance between humidifier tank and water level control is not greater than 30 feet (9 m). Do not use shielded (screened) cable when wiring water detection probe system between humidifier and controller; use 18-gauge (1 mm ²) individual stranded wire.				
	On	Off	Off	Controls and safeties No call from humidistat or duct high limit humidistat Airflow proving switch miswired or is defective.	Replace airflow proving switch.				
Unit short cycles	On & Off	On	Off	Probes incorrectly wired or need cleaning	Confirm that unit is wired per diagram. Clean probe rod tips with steel wool.				

* For VAPOR-LOGIC₃ troubleshooting, see the **VAPOR-LOGIC₃ Installation and Operation Manual**, a comprehensive operation manual.

** Probe rod corrosion or probe head material aging may cause level control system failure.

STS® AND STS-DI TANK REPLACEMENT PARTS

Figure 33-1: Tank replacement parts



OM-946

STS® AND STS-DI TANK REPLACEMENT PARTS LIST

Table 34-1: Tank replacement parts list

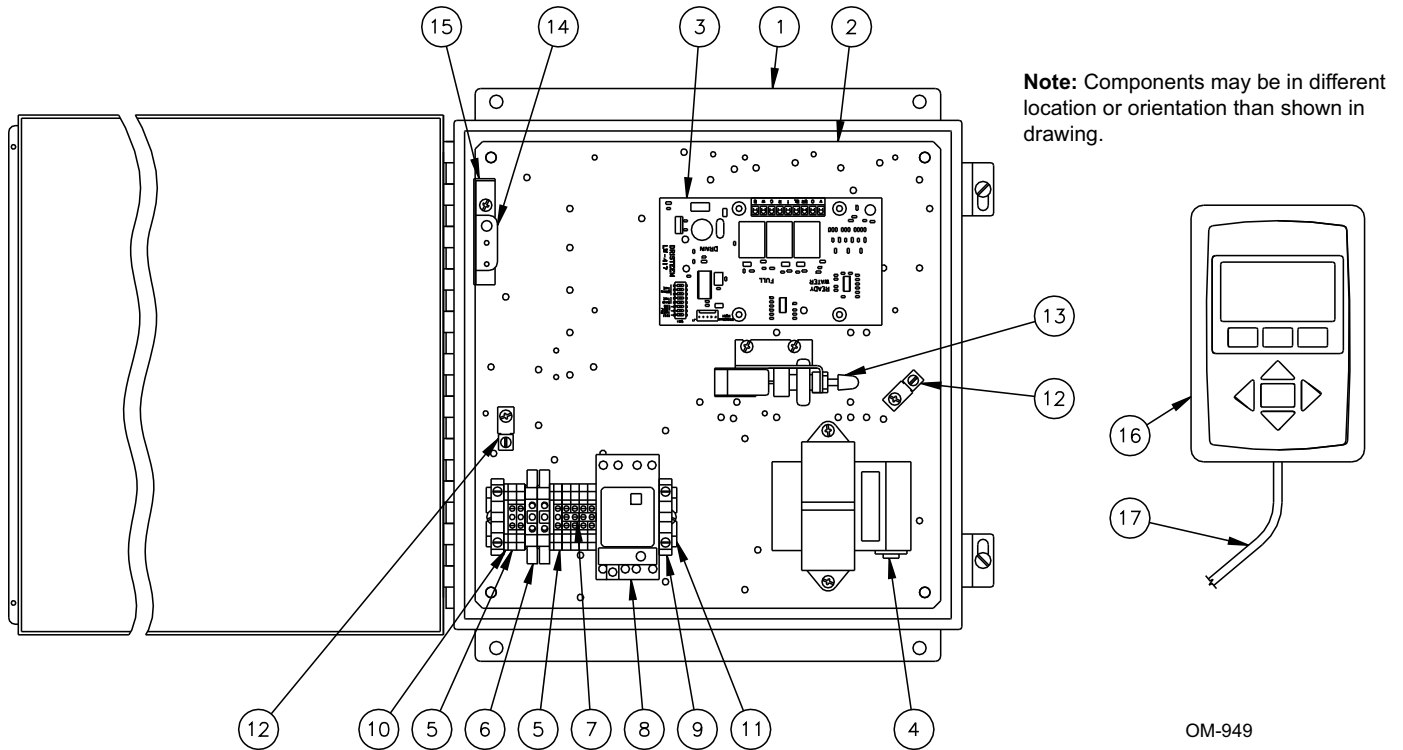
Note: Components may be in different location or orientation than shown in drawing on previous page.

No.	Description	Part number
1	Tank, STS	*
2	Cover, STS-25	165341-001
2	Cover, STS-50	165341-002
2	Cover, STS-100	165341-003
2	Cover, STS-200/400/800	165341-004
3	Cover gasket, STS-25	160692-001
3	Cover gasket, STS-50	160692-002
3	Cover gasket, STS-100	160692-003
3	Cover gasket, STS-200/400/800	160692-004
4	Heat exchanger, STS	*
5	Cleanout plate, STS-25	165481-001
5	Cleanout plate, STS-50/100	165481-002
5	Cleanout plate, STS-200/400/800	165481-003
6	Cleanout plate gasket, STS-25	308015-001
6	Cleanout plate gasket, STS-50/100	308015-002
6	Cleanout plate gasket, STS-200/400/800	308015-003
7	Fill assembly	*
8	Float fill assembly, STS-25/50/100	505315
8	Float fill assembly, STS-200/400/800	505305
9	Drain assembly	*
10	Temperature sensor assembly	405760
11	Probe assembly, STS-25/50/100/200/400	406195-001
11	Probe assembly, STS-800	406195-002
12	Probe gasket	309350-004
13	Probe plate, DI water	120370-020
14	Probe weld, standard water	165301
15	Probe plate/weld gasket	308416-001
16	Heat exchanger gasket, STS	308220
17	Heat exchanger mounting plate	164581-001
18	Junction box	407134-005/006
19	Condensate return plug	250192-075

* Contact your local representative with your model number to get the correct component

STS® AND STS-DI CONTROL CABINET

Figure 35-1: Control cabinet replacement parts



No.	Description	Part number
1	Control cabinet, 12 x 12	407100-003
2	Subpanel, STS	165720-002
3	Control board, VAPOR-LOGIC ₃	408632
3	Control board, LW417	408490-001
4	Transformer, 120V to 24V	408965-001
5	Terminal block	408252-001
6	Ground terminal	408252-010
7	Terminal jumper	408252-009
8	AREA-TYPE™ time delay relay	407900-010/016/018
9	DIN-rail end cap	408252-006
10	Terminal spacer	408252-005
11	DIN-rail, 6.5" (165 mm)	167765-006
12	Ground lug	409250-003
13	P-E switch	408100
14	Interlock switch	408470
15	Interlock switch bracket	165614
16	VAPOR-LOGIC ₃ keypad	408490-002
17	VAPOR-LOGIC ₃ keypad cable, 5' (1.5 m)	408490-009

* Specify humidifier model and serial numbers when ordering.

NOTES

NOTES

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 reinstallation 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®



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