

GTS®

Gas-to-Steam Humidifier

Installation, Operation, and Maintenance Manual

WARNING

Fire or explosion hazard

If the information in this manual is not followed exactly, a fire or explosion could result, causing property damage, personal injury, or death.

If you smell gas:

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from an off-site phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

Installation and service must be performed by a qualified installer, service agency, or the gas supplier.

For toll-free support call DriSteem Technical Support: 1-800-328-4447

Warnings and cautions

SAFE OPERATING INSTRUCTIONS

1. Read "Fire and explosion hazard" on the next page.
2. Set the humidistat to the lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device that automatically lights the burner. **Do not try to light the burner by hand.**
5. Remove the control access panel.
6. Unplug the black power plug on the gas valve (see detail of gas valve below).
7. Wait five minutes to clear out any gas.
If you still smell gas, STOP! Follow "B" on the next page.
If you do not smell gas, go to the next step.
8. Plug the black power plug back into the gas valve.
9. Replace the control access panel.
10. Turn on electric power to the appliance.
11. Set the humidistat to desired setting.
12. If the appliance does not operate, follow the instructions below under, "To turn off gas to appliance," and call your service technician or gas supplier.

Important: Troubleshooting information for this humidifier is located in the *Vapor-logic Installation and Operation Manual* shipped with your humidifier. If you do not have this manual, go to www.dristeem.com to download or order a copy.

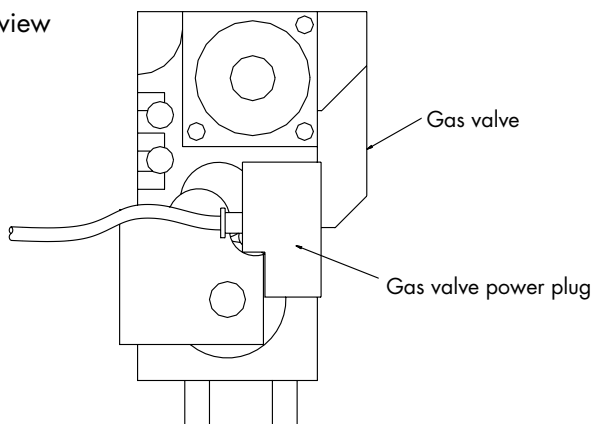
European models

The DriSteem GTS Gas-to-Steam Humidifier has been certified for compliance with harmonised European directives concerning gas appliances, low voltage, and emission (EU 2016/426, Gas Appliance Regulation (GAR) Testing was carried out by Intertek Testing & Certification Ltd. United Kingdom (Notified Body 0259), which is a recognized authority by the European bodies and the DTI in the United Kingdom.

Installation must conform to the requirements of the National Gas Safety (Installation & Use) Regulations.

DETAIL OF GAS VALVE


Top view







To turn off gas to appliance:

1. Set the humidistat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Remove control access panel.
4. Unplug the black power plug on the gas valve.
5. Replace control access panel.

Warnings and cautions

 <p>WARNING Indicates a hazardous situation that could result in death or serious personal injury if instructions are not followed.</p>	<p>CAUTION Indicates a hazardous situation that could result in damage to or destruction of property if instructions are not followed.</p>
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 <p>WARNING</p>	
 	<p>Fire or explosion hazard</p> <p>A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do NOT try to light the burner by hand.</p> <p>B. Before operating, smell all around the appliance area for gas. Be sure to smell next to the floor because gas can be heavier than air and settle on the floor.</p> <p>If you smell gas:</p> <ul style="list-style-type: none"> • Do not try to light any appliance. • Do not touch any electrical switch; do not use any phone in your building. • Immediately call your gas supplier from an off-site phone. Follow the gas supplier's instructions. • If you cannot reach your gas supplier, call the fire department. <p>C. Do not use this appliance if any part has been under water. Immediately call a qualified gas appliance service technician to inspect the appliance and to replace any part of the control system and any gas control that has been under water.</p>
	<p>Attention installer</p> <p>Read this manual before installing, and leave this manual with product owner. This product must be installed by qualified HVAC and electrical contractors. Installation must be code approved. Improper installation can cause property damage, severe personal injury, or death as a result of electric shock, burns, or fire.</p> <p>DriSteem® Technical Support: North America: 800-328-4447 Europe: +3211823595</p> <p>Read all warnings and instructions</p> <p>Read this manual before performing service or maintenance procedures on any part of the system. Failure to follow all warnings and instructions could produce the hazardous situations described, resulting in property damage, personal injury, or death.</p> <p>Failure to follow the instructions in this manual can cause moisture to accumulate, which can cause bacteria and mold growth or dripping water into building spaces. Dripping water can cause property damage; bacteria and mold growth can cause illness.</p>

Continued

Warnings and cautions



WARNING













Carbon monoxide, fire, explosion, and electrical shock hazards

Improper installation, adjustment, alteration, service, maintenance, or use can cause carbon monoxide poisoning, fire, explosion, electrical shock, and other hazardous conditions. These hazardous conditions could cause personal injury, property damage, or death. To prevent hazardous conditions, read all warnings; lock all power disconnect switches in the OFF position before removing any access panels; and consult a qualified installer, service agency, local gas supplier, or your distributor or branch for information or assistance. The qualified installer or agency must use only factory authorized and listed kits or accessories when modifying this product.

- Inspect humidifier and accessories upon arrival for damaged, missing, or improper parts. If there is a problem, call DriSteem.
- Application of this humidifier should have special attention given to vent sizing and material, gas input rate, and unit sizing. Improper installation or misapplication of the humidifier can cause excessive servicing or permanent component failure.
- When working on equipment, observe precautions in literature, tags, and labels attached to or shipped with the unit and observe other safety precautions that may apply. Wear safety glasses and work gloves. Have a fire extinguisher available during start-up, adjustment procedures, and service calls.
- Do not lift humidifier by gas controls, gas manifold, fire box, or shroud.
- Should overheating occur, or the gas supply fail to shut off, shut off the manual gas valve to the appliance before shutting off the electrical supply.
- The evaporating chamber is designed as a nonpressurized vessel. **DO NOT restrict piping where steam exits the humidifier.** Install drain piping and piping that connects the evaporating chamber to the dispersion assembly only as described in this manual. DO NOT install a shut-off valve on the piping connecting the evaporating chamber to the steam outlet.
- Check the humidifier name plate for the gas type indicated (natural gas or propane gas). Supply the humidifier only with the gas type indicated, or burner failure will result. To convert the humidifier to a different gas type, contact DriSteem Technical Support or your local DriSteem Representative/Distributor.
- Installation must conform to the requirements of the authority having jurisdiction or, in the absence of such requirements, must conform to:
 - **In the United States:** The National Fuel Gas Code, ANSI Z223.1 (latest edition).
 - **In Canada:** Local plumbing or waste water codes and other applicable codes and with the current code CAN/CGA-B149.1, "Installation Code for Natural Gas Burning Appliances and Equipment," or CAN/CGA-B149.2, "Installation Code for Propane Burning Appliances and Equipment."
 - **In Europe:** The National Gas Safety (Installation & Use) Regulations.
- Do not install in potentially explosive or flammable atmospheres laden with grain dust, sawdust, or similar airborne materials.
- Installation of humidifier in high humidity or salt water atmospheres causes accelerated corrosion, reducing the normal life-span of the unit.
- To prevent premature heat exchanger failure, do not locate any gas-fired unit in areas where chlorinated, halogenated, or acid vapors are present in the atmosphere.
- Locate the humidifier in an area clear of combustible materials, gasoline, and other flammable vapors and liquids.

Continued

Warnings and cautions

	WARNING
	Carbon monoxide, fire, explosion, and electrical shock hazards (continued)
	<ul style="list-style-type: none">• With the exception of sealed combustion units, do not locate units in tightly sealed rooms or small compartments without provision for adequate combustion air and venting. Room air combustion must be supplied through a minimum of two permanent openings in the wall, with at least one near the bottom. See "Combustion and ventilation air" for additional information.
	<ul style="list-style-type: none">• Remove all shipping brackets and materials before operating the humidifier.
	<ul style="list-style-type: none">• Do not locate humidifier in a negative pressure space. Combustion products could be suctioned from the venting.
	<ul style="list-style-type: none">• Humidifier flue gases must be vented to the outside atmosphere.
	<ul style="list-style-type: none">• Power supply disconnect switch must be in the off position while making wiring connections to prevent electrical shock and equipment damage. All units must be wired in strict accordance with the wiring diagrams furnished with this unit.
	<ul style="list-style-type: none">• Turn off all gas while installing the gas piping and manual shutoff valve for the humidifier.
	<ul style="list-style-type: none">• The appliance and its individual shut-off valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures exceeding 0.5 psig (3.5 kPa).
	Hot surfaces and hot water
	<p>This steam humidification system has extremely hot surfaces. Water in tank, steam tubing, and dispersion assemblies can be as hot as 212 °F (100 °C). Discharged steam is not visible. Contact with hot surfaces, discharged hot water, or air into which steam has been discharged can cause severe personal injury. To avoid severe burns, follow the cool-down procedure in this manual before performing service or maintenance procedures on any part of the system.</p>
	
	Disconnect electrical power
	<p>Disconnect electrical power before installing supply wiring or performing service or maintenance procedures on any part of the humidification system. Failure to disconnect electrical power could result in fire, electrical shock, and other hazardous conditions. These hazardous conditions could cause property damage, personal injury, or death.</p>
	<p>Follow the shutdown procedure on Page 54 before performing service or maintenance procedures on any part of the system.</p>

CAUTION	
Hot discharge water	
<p>Discharge water can be as hot as 212 °F (100 °C) and can damage some drain plumbing.</p>	
<p>The DriSteem Drane-kooler™ water tempering device needs fresh make-up water in order to function properly. Make sure the water supply to the Drane-kooler remains open during draining.</p>	
Excessive supply water pressure	
<p>Supply water pressure greater than 80 psi (550 kPa) can cause the humidifier to overflow.</p>	

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ATTENTION INSTALLER

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

DriSteem Technical Support
800-328-4447

Where to find more information

On our Web site:

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

- Catalogs:
 - GTS®
 - Ultra-sorb®
- Installation, Operation, and Maintenance manuals:
 - Ultra-sorb
 - Vapor-logic® (includes sensor placement recommendations and troubleshooting information)
- DriSteem Design Guide (includes steam loss tables and general humidification information)

In DriCalc:

DriCalc® is our humidification system sizing and selection software, which can be ordered from our website.

DriCalc includes a comprehensive library of installation guide documents, including:

- Rapid-sorb installation instructions for vertical airflows
- Recommended dispersion placement within a duct or air handler
- Recommended sensor placement

Or call us at 800-328-4447

While obtaining documents from our web site or from DriCalc is the quickest way to review our literature, we will also mail to you any literature you need.

Product overview

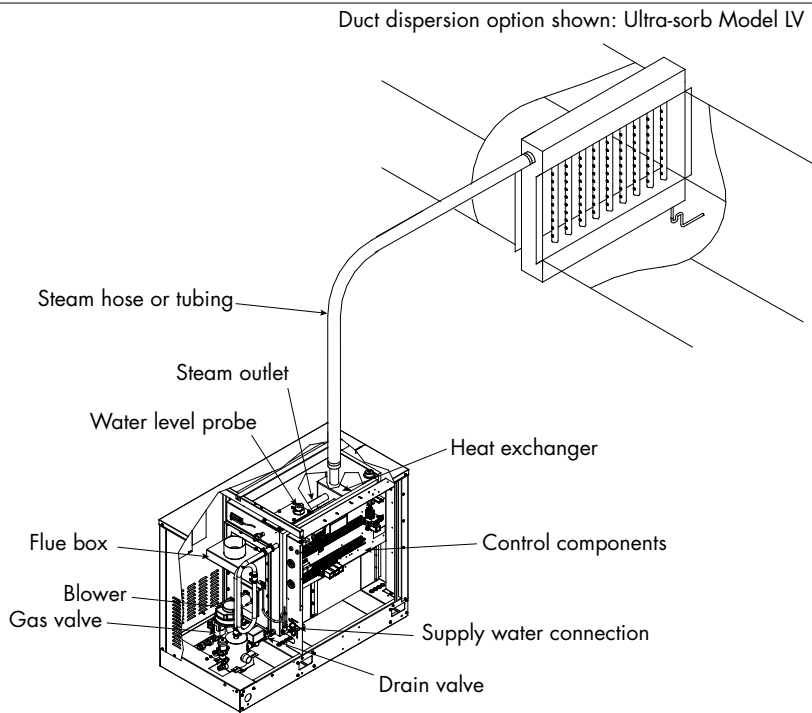
GTS humidifiers burn either natural or propane gas to heat fill water into steam for humidification. The unit has from one to four burners that fire into a heat exchanger submerged in a tank of water. When there is a call for humidity, the burners fire and generate steam until the call for humidity ends.

TAP/SOFTENED WATER

In tap/softened water GTS humidifiers, a conductivity probe (see Figure 3-2) monitors water level, requiring water conductivity to be at least 100 $\mu\text{S}/\text{cm}$ to operate properly. Therefore, GTS tap/softened water models do not operate with RO/DI water (water that has been treated using reverse osmosis or deionized water). For operation with RO/DI water, see "RO/DI water option" on the next page.

Note: GTS humidifiers for tap/softened water can be converted in the field with the RO/DI water option.

FIGURE 2-1: GTS HUMIDIFIER, TAP/SOFTENED WATER



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Supply water guidelines

Supply water quality is an important component of humidifier reliability and maintenance.

Examples:

- Corrosive water can decrease the service life of the humidifier.
- Excessive water hardness can increase the humidifier maintenance requirements.

To maximize humidifier service life and minimize humidifier maintenance, DriSteem has established guidelines for supply water. See Table 2-1.

**Table 2-1:
DriSteem supply water guidelines**

Chlorides*	
RO or DI water	< 5 ppm
Softened water	< 25 ppm
Tap water	< 50 ppm
* Damage caused by chloride corrosion is not covered by your DriSteem warranty.	
Total hardness	
Tap water	< 500 ppm
pH	
RO, DI, or softened water	7 to 8
Tap water	6.5 to 8.5
Silica	< 15 ppm
You may wish to take action to mitigate potential negative effects to your humidifier. Supply water outside of these guidelines may void your DriSteem warranty. Please contact your DriSteem Representative or DriSteem Technical Support if you need advice.	

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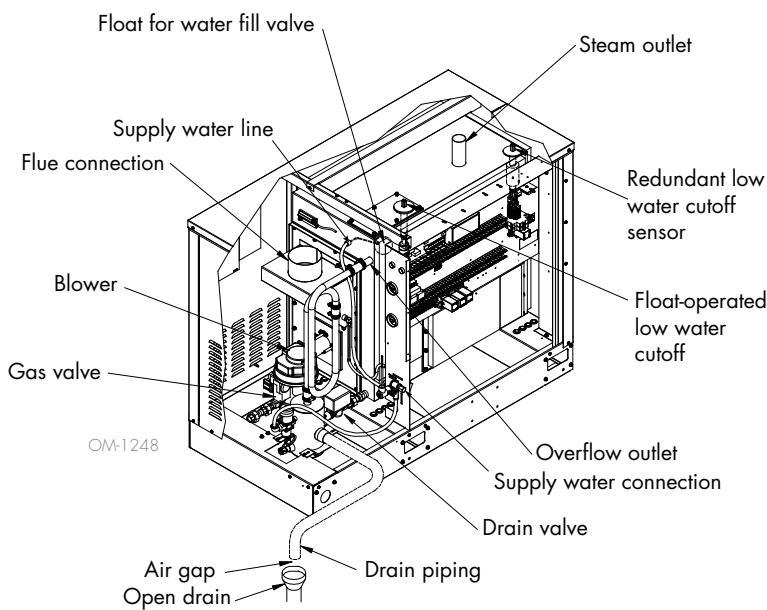
Product overview

RO/DI WATER OPTION

GTS humidifiers with the RO/DI water option control water level using a float valve (see Figure 3-2). These humidifiers produce chemical-free steam and provide accurate, reliable humidification control. These humidifiers are virtually maintenance-free and require very little or no downtime.

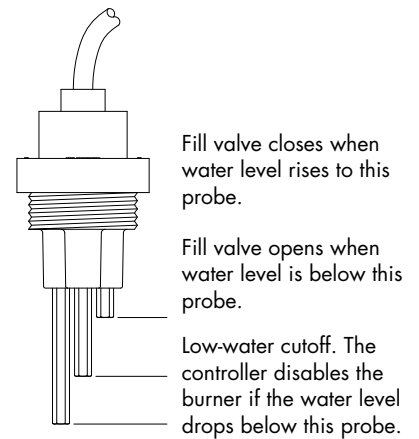
Note: GTS humidifiers with the RO/DI water option can be converted in the field for use with tap/softened water.

FIGURE 3-2: GTS HUMIDIFIER, RO/DI WATER OPTION



Note: Dashed lines indicate supplied by installer

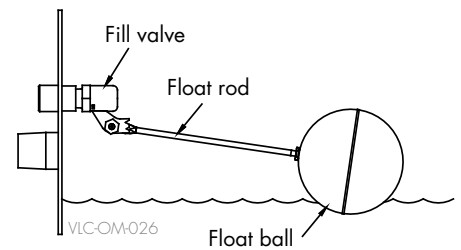
FIGURE 3-1: WATER LEVEL CONTROL FOR TAP/SOFTENED WATER



Humidifiers using tap or softened water control water levels electronically using a three-rod probe. The controller responds with the above actions when the water level reaches each rod.

VLC-OM-030

FIGURE 3-3: WATER LEVEL CONTROL FOR RO/DI-WATER OPTION



Humidifiers with the RO/DI water option control water level using a float valve. A low-water cutoff switch is used as a low-water safety.

Models, capacities, electrical specifications, and weights

Table 4-1:
GTS models, capacities, electrical specifications, and weights, North American models

GTS model	Number of burners	Maximum steam capacity		Input			Water usage at maximum capacity**		Tank volume		GTS				GTS with Outdoor Enclosure				Full load amps*	
		lbs/hr	kg/h	MBh	kW	m ³ /h	gals/hr	litres/hr	gals	litres	Operating weight		Shipping weight		Operating weight		Shipping weight		120V 60 Hz	230V 50 Hz
											lbs	kg	lbs	kg	lbs	kg	lbs	kg		
GTS-100	1	75	34	100	29	2.76	9	34.1	48	181.7	700	320	375	170	800	365	500	230	1.8	2.8
GTS-200	1	150	68	200	59	5.52	18	68.1	48	181.7	700	320	375	170	800	365	500	230	1.8	2.8
GTS-300	2	225	102	300	88	8.28	27	102.2	52	196.8	850	385	450	205	1000	455	600	270	3.0	4.0
GTS-400	2	300	136	400	117	11.04	36	136.3	52	196.8	850	385	450	205	1000	455	600	270	3.0	4.0
GTS-500	3	375	170	500	147	13.80	45	170.3	76	287.7	1100	500	600	270	1450	660	950	430	4.5	5.5
GTS-600	3	450	204	600	176	16.56	54	204.4	76	287.7	1100	500	600	270	1450	660	950	430	4.5	5.5
GTS-700	4	525	238	700	205	19.32	63	238.5	89	336.9	1400	635	700	320	1750	795	1050	475	6.0	7.0
GTS-800	4	600	272	800	234	22.08	72	272.5	89	336.9	1400	635	700	320	1750	795	1050	475	6.0	7.0

* Add 14 full load amps at 120V (6 full load amps at 230V) for an Outdoor Enclosure with heaters on all GTS models.

Add 1 full load amp for an Outdoor Enclosure without heaters.

** Add 10% to account for skim and automatic drain/flush features if utilized (tap/softened water units only).

CAPACITY NOTES

- At sea level, approximately 152 Btu are required to raise the temperature of one pound of water from 60 °F to 212 °F. (At sea level, approximately 352 kJ are required to raise the temperature of one kilogram of water from 16 °C to 100 °C.)
- An additional 970 Btu are required to change the state of one pound of 212 °F water to vapor. (An additional 2257 kJ are required to change the state of one kilogram of 100 °C water to vapor.)
- Another factor to consider is condensation steam loss from piping. See Table 32-2.

For more detailed information about condensation steam loss, see the *DriSteem Design Guide*, or see *DriCalc*, DriSteem’s free sizing and selection software, available at www.drirsteem.com.

LP GAS

All models operate at rated input

HIGH ALTITUDE

An input derate exists when operating units at a high altitude. See Table 4-2 for high altitude derate information.

Important: See Pages 70 and 71 for additional European model specifications and capacity notes.

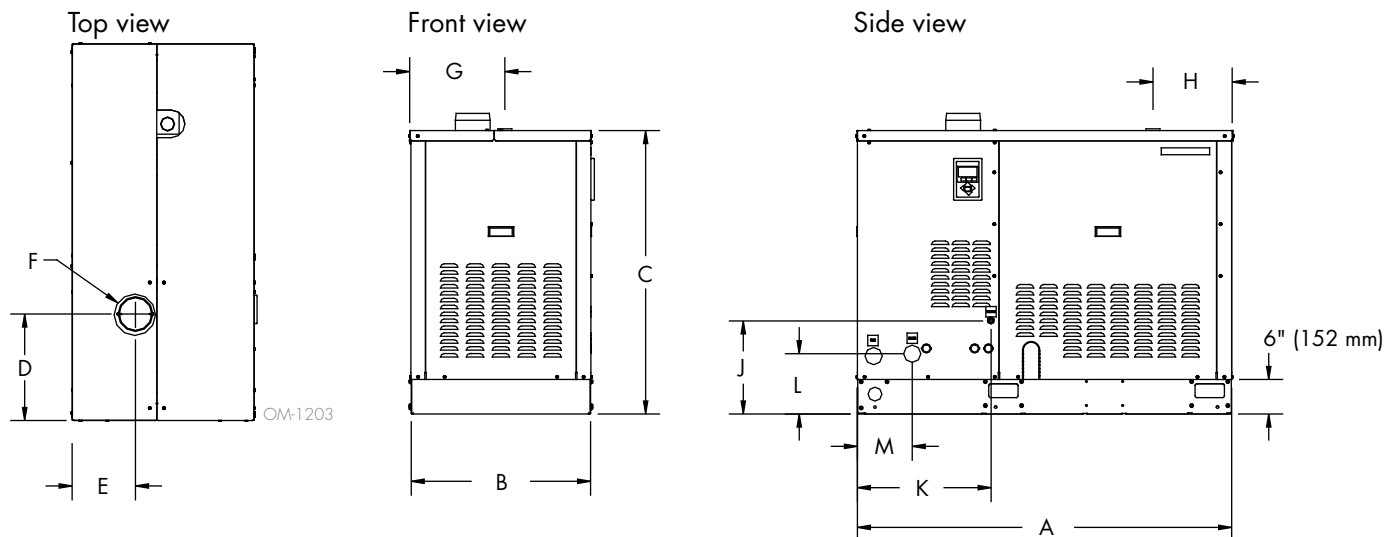
Table 4-2:
High altitude derate

Altitude		Input derate %
feet	meters	
0–2000	0–610	0
2001–2500	610–765	2*
2501–3000	765–915	4*
3001–3500	915–1065	6*
3501–4000	1065–1220	8*
4001–4500	1220–1370	10
4501–5000	1370–1525	12
5001–5500	1525–1675	14
5501–6000	1675–1830	16
6001–6500	1830–1980	18
6501–7000	1980–2135	20
7001–7500	2135–2285	22
7501–8000	2285–2440	24

* GTS-400 models are derated 10% from 2001 through 4500 ft in Canada.

Dimensions

FIGURE 5-1: DIMENSIONS



**Table 5-1:
Dimensions**

	Description	GTS-100 GTS-200		GTS-300 GTS-400		GTS-500 GTS-600		GTS-700 GTS-800	
		inches	mm	inches	mm	inches	mm	inches	mm
A	Overall length	54.35	1380	54.35	1380	54.35	1380	54.35	1380
B	Overall width	26.38	670	32.38	822	42.38	1076	48.38	1229
C	Shroud height	41.00	1040	41.00	1040	41.00	1040	41.00	1040
D	Flue position	15.50	394	14.75	375	14.95	375	14.00	356
E		9.13	232	13.13	334	16.63	422	19.13	486
F	Flue diameter	5.00	127	7.00	178	8.00	203	10.00	254
G	Steam outlet position	13.88	353	20.38	518	29.13	740	35.00	889
H		11.63	295	11.63	295	11.63	295	11.63	295
J	Fill valve connection position	13.50	343	13.50	343	13.50	343	13.50	343
K		19.38	492	19.38	492	19.38	492	19.38	492
L	Drain position	8.25	210	8.25	210	8.25	210	8.25	210
M		8.00	203	8.00	203	8.00	203	8.00	203

Location and clearance recommendations

FINDING A LOCATION

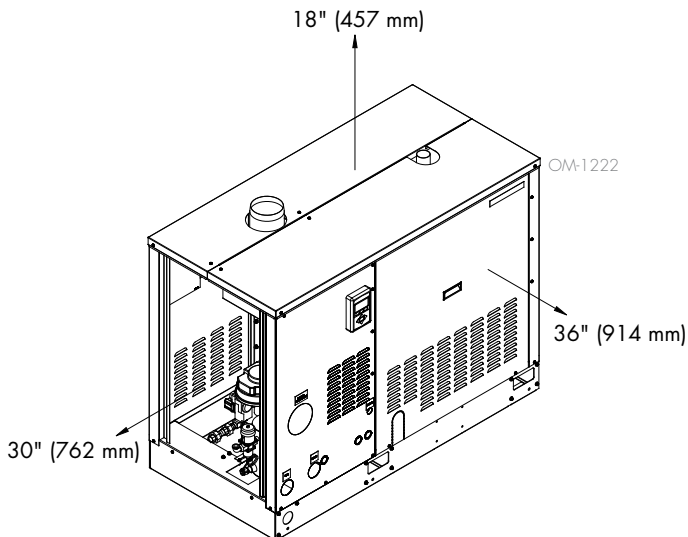
- Provide a level, solid foundation for the humidifier.
- Locate the humidifier as near as possible to a chimney or outside wall so that the flue pipe from the humidifier is short and direct.
- Locate the unit so it and its electrical components are protected from water during humidifier operation and service.
- Install the humidifier in a location away (and protected) from drafts. If installed in a separate room, follow the instructions concerning combustion and ventilation air.
- Locate the humidifier in an area where leakage from the tank or its connections will not result in damage to the adjacent structure or to lower floors of the structure. When such locations cannot be avoided, install a suitable drain pan (adequately drained) under the humidifier. The pan must not restrict combustion airflow.
- If located in an insulated space, keep the humidifier free and clear of insulating materials. Insulating material can be combustible. Inspect the humidifier area when the humidifier is installed or when insulation is added.

WARNING

Installation requirements

The humidifier must be installed by a qualified technician and meet the requirements of all governing codes. Failure to follow these instructions could cause severe bodily injury or death.

FIGURE 6-1: GTS CLEARANCE RECOMMENDATIONS



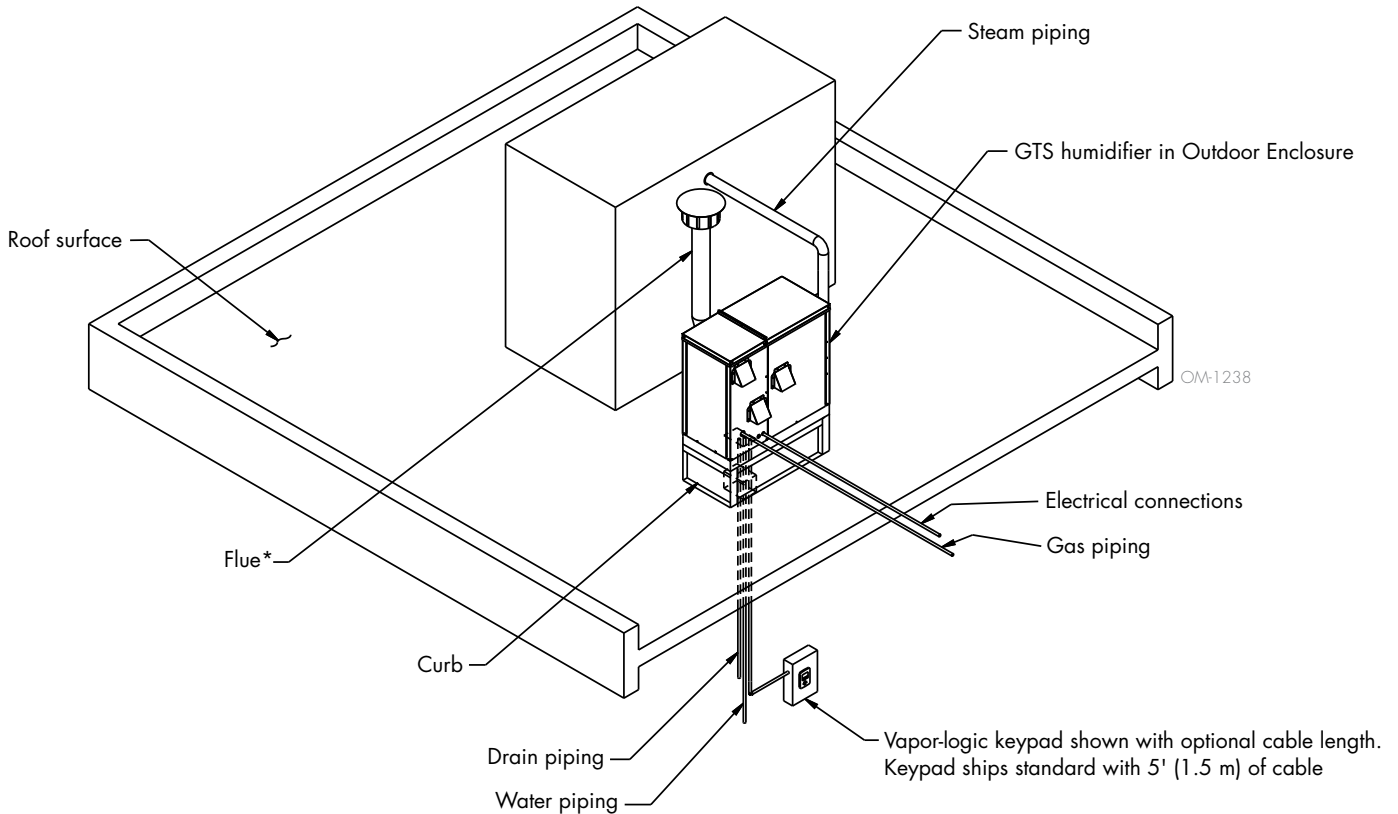
Note: DriSteem recommends a minimum of 1" (25 mm) clearance between hot surfaces and combustible walls.

Outdoor Enclosure: Mounting

OUTDOOR ENCLOSURE MOUNTING OPTION

The Outdoor Enclosure option is used when the GTS is installed outdoors. The following information is not intended to supersede any requirements of federal, state, or governing codes having jurisdiction; prior to locating the unit, authorities having jurisdiction should be consulted.

FIGURE 7-1: OUTDOOR ENCLOSURE TYPICAL INSTALLATION OVERVIEW



* DriSteem recommends installing a drip tee directly after the factory supplied vent connection. Vertical section of flue must be at least 5' or meet all governing codes, whichever is greater. DriSteem recommends installing a high wind vent cap on all GTS humidifiers.

Outdoor Enclosure: Mounting

LIFTING

The GTS Outdoor Enclosure must be lifted from the bottom base in a fashion that holds it level and keeps it from tipping, falling, or twisting. If the unit is severely twisted during handling, permanent damage can occur. It is the installer's responsibility to verify the handling equipment's capability to safely handle the unit.

Lift the Outdoor Enclosure by using special lifting lug hooks installed on the unit. All lifting operations must be accomplished with a load spreader of sufficient width to ensure that the lifting cables clear the side of the unit.

Outdoor Enclosure: Mounting

LOCATION

- The GTS Outdoor Enclosure must be level and located so there is enough clearance for opening the access panels.
- Verify that the position of pad or curb properly supports the unit and that support structure dimensions coincide with unit dimensions.
- Do not locate unit in areas where the surrounding air has high levels of particulates, such as some industrial parks or areas near highways.
- Locate unit so air intakes are not too close to exhaust fan outlets, gasoline storage, or other contaminants that potentially could cause dangerous situations. Using and storing gasoline or other flammable vapors and liquids in open containers in the vicinity of this appliance is hazardous.
- When located on the roof, the air intakes must be a minimum of 14" (360 mm) off the roof to prevent intake of snow or splashed rain. The unit should be located so prevailing winds do not blow into the air intakes.
- An emergency drain is provided. In case of any water leak, water drains onto the roof through this emergency drain.
- A keypad with standard 5' (1.5 m) cable ships mounted to the subpanel in the GTS Outdoor Enclosure. The keypad must not come in contact with the strip heaters or block the intake ventilation hood.
- If constant monitoring of the unit is desired, or if the unit is located in a severe climate, install a remote mount keypad. Additional cable lengths up to 500' (152 m) are available as an option for this mounting configuration.
- Curbs (optional) are shipped knocked down for ease of transporting to the roof. Curbs are manufactured of 14-gauge galvanized steel and shipped with all hardware for bolt-together assembly. All holes are matched before leaving the factory. Curb is to be a minimum of 14" (360 mm) high. A closed-cell curb gasket with adhesive on one side is supplied with hardware. An installation drawing also is included. To prevent moisture from leaking into the building from either driving rain or melting snow, install the gasket between the top of the curb and the base surface of the unit.

Outdoor Enclosure: Mounting

BEFORE YOU BEGIN

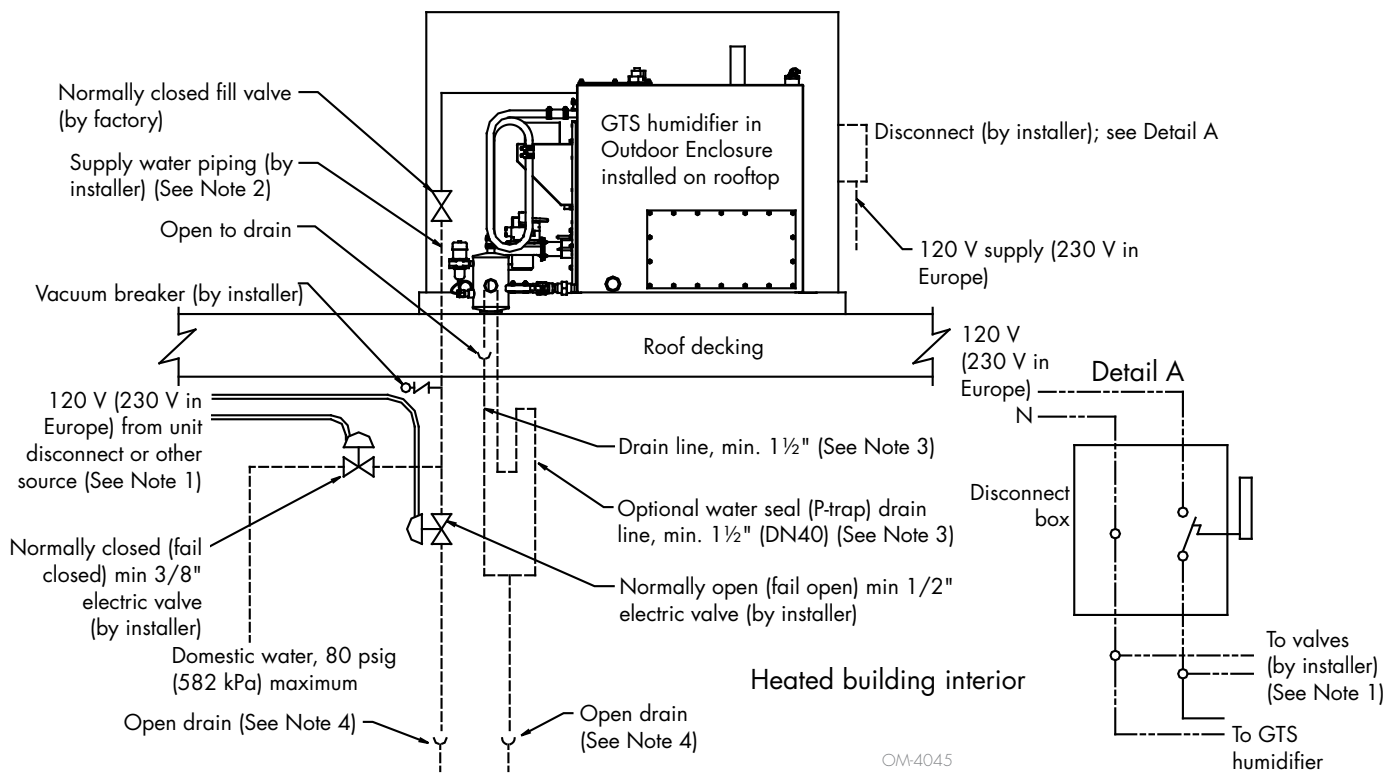
- Prior to installing the unit, remove all packaging.
- During the transit, unloading, and setting of the unit, bolts and nuts may become loose. Check that all nuts are tightened as required.
- There are three knockouts located on the right and left side of the enclosure. DriSteem recommends running electrical power into the enclosure at these knockouts.
- When pad-mounted or when the pipe chase cannot be used, the supply water and drain piping can be run through the knockouts, although preferably on the opposite side from the gas and electric.
- When unit is mounted on an outdoor curb, there must be a gasket between the top of the curb and the base surface of the unit to prevent moisture from leaking into the building from either driving rain or melting snow.
- The Outdoor Enclosure has two available steam distribution configurations. The standard configuration has a steam outlet at the back of the Outdoor Enclosure for connecting to steam dispersion unit piping. The optional internal steam distribution configuration routes steam within the Outdoor Enclosure and down through the pipe chase into a building. See Figures 11-1 and 12-1.

Important: A pipe chase is located inside the burner section of the enclosure. DriSteem recommends using this pipe chase for both the supply water piping and drain piping. Use insulation to completely fill the area around the pipes to maintain proper enclosure pressure and protect unit components from elevated moisture levels within building; insulation must serve as an effective vapor barrier. Use the provided pipe chase cover to seal off the pipe chase. Cut necessary holes and seal after installation.

- The heater package has two thermostat-controlled heaters: one strip heater is located in the control section, and one strip heater is located in the burner section to keep the enclosure at a constant minimum temperature. Once the humidifier tank is full and up to temperature, the tank will keep the enclosure at an appropriate temperature. The heaters will turn off.
- See “Wiring” on Page 15 and “Piping” beginning on Page 16 for directions on installing electrical, gas, flue, drain, and water connections. A separate electrical service connection for the outdoor GTS is recommended. Insulation and/or heat taping of water piping is recommended.

Outdoor Enclosure: Mounting

FIGURE 11-1: OUTDOOR ENCLOSURE INSTALLATION DETAIL

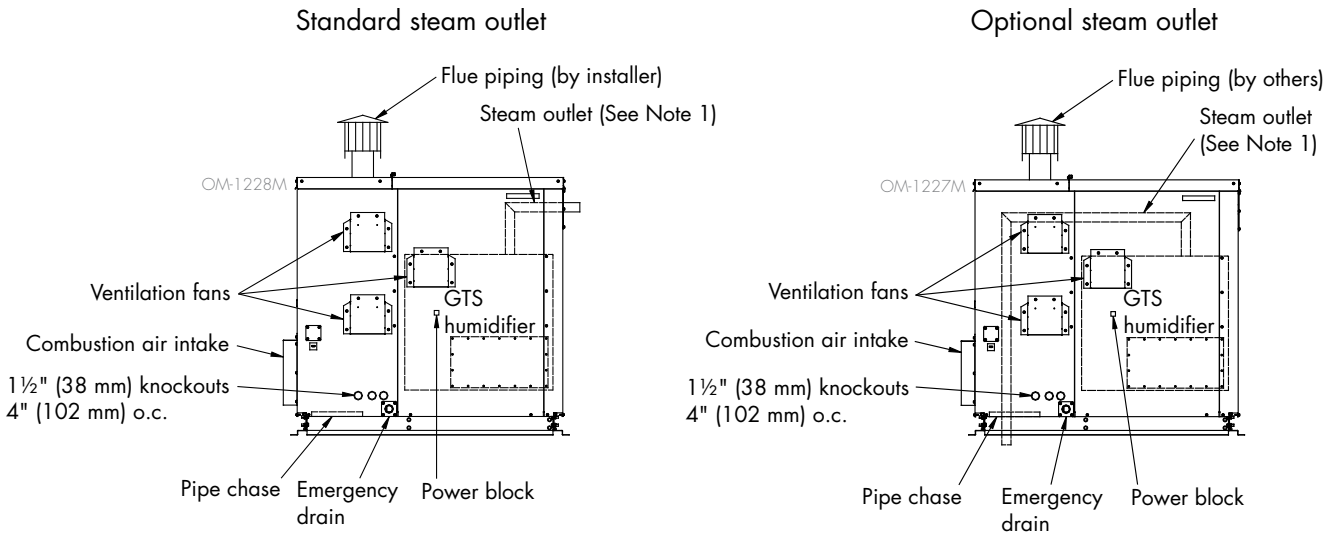


Piping notes:

1. Insulate supply water piping to avoid dripping from condensation. To ensure that water does not remain in the fill line and freeze if there is a loss of power, DriSteem recommends field installing additional valves upstream of the fill valve in a conditioned space. Power these valves on the same circuit as the GTS; if the power goes off, water drains out of the fill line to prevent freezing (see above). Supply power for these valves from the same circuit that supplies the GTS.
2. Ensure that water lines are protected from freezing conditions.
 - Install heat tracing and insulation on fill piping inside the Outdoor Enclosure.
 - In extreme or critical applications in which the unlikely event of a water leak could cause severe damage, DriSteem recommends a thermostat with a remote sensor on the fill line to cut power to the GTS and safety valves to stop fill water to the GTS and drain the fill piping when the temperature is below freezing.
3. DriSteem recommends copper or iron drain piping for Outdoor Enclosures. On a loss of power the tank water will drain, but not be cooled by the Drane-kooler because of the field supplied safety shut-off valves. If it is critical to keep the Drane-kooler functional in the case of a power loss, disconnect the Drane-kooler and relocate it down inside the conditioned space of the building. Pipe the supply water for the Drane-kooler before the safety shut-off valves.
4. If copper or iron piping is used for both the fill and drain piping, these drains may be tied together. Locate 1" air gap only in spaces with adequate temperature and air movement to absorb flash steam; otherwise, condensation may form on nearby surfaces. Refer to governing codes for drain pipe size and maximum discharge water temperature.

Outdoor Enclosure: Mounting

FIGURE 12-1: GTS OUTDOOR ENCLOSURE WITH STANDARD OR OPTIONAL STEAM OUTLET, ELEVATION VIEW



Notes:

1. The Outdoor Enclosure has two available steam distribution configurations. The standard configuration has a steam outlet at the back of the Outdoor Enclosure for connecting to steam dispersion unit piping. The optional internal steam distribution configuration routes steam within the Outdoor Enclosure and down through the enclosure pipe chase into a building.
2. There are three knockouts located on the right and left side of the enclosure. Run the electrical power and gas piping into the enclosure at these knockouts.
3. Piping from the GTS unit to the steam outlet is stainless steel pipe. Piping from the steam outlet to the dispersion assembly is provided by the installer. Choose interconnecting steam piping material that is appropriate for the application (e.g., for high-purity steam applications, consider using stainless steel interconnecting steam tubing). See Table 18-1 for steam outlet sizes.
4. The GTS housed in an Outdoor Enclosure will operate properly in operating temperature of -40°F to 122°F (-40°C to 50°C).
5. Install external flue piping shall be provided by installers and field installed. The flue of the Outdoor Enclosure exits out the left side of the unit and a vertical stack must be constructed. The stack must be a minimum of 5–10 feet (1.5–3.0 m) above the top of the roof. However, the exact height varies depending on unit size, climate, etc. Governing codes prevail. A UL or UL/CSA (or equivalent) listed cap must be used and a drip tee included. DriSteam recommends installing a high-wind vent cap on all GTS humidifiers.

Table 12-1:
Outdoor Enclosure dimensions

	Description	GTS-100 GTS-200		GTS-300 GTS-400		GTS-500 GTS-600		GTS-700 GTS-800	
		inches	mm	inches	mm	inches	mm	inches	mm
A	Enclosure height	54.63	1388	54.63	1388	54.63	1388	54.63	1388
B	Enclosure width	26.00	660	32.00	813	42.00	1067	48.00	1219
C	Enclosure length	57.25	1454	57.25	1454	57.25	1454	57.25	1454

Outdoor Enclosure: Mounting

FIGURE 13-1: OUTDOOR ENCLOSURE TOP VIEW

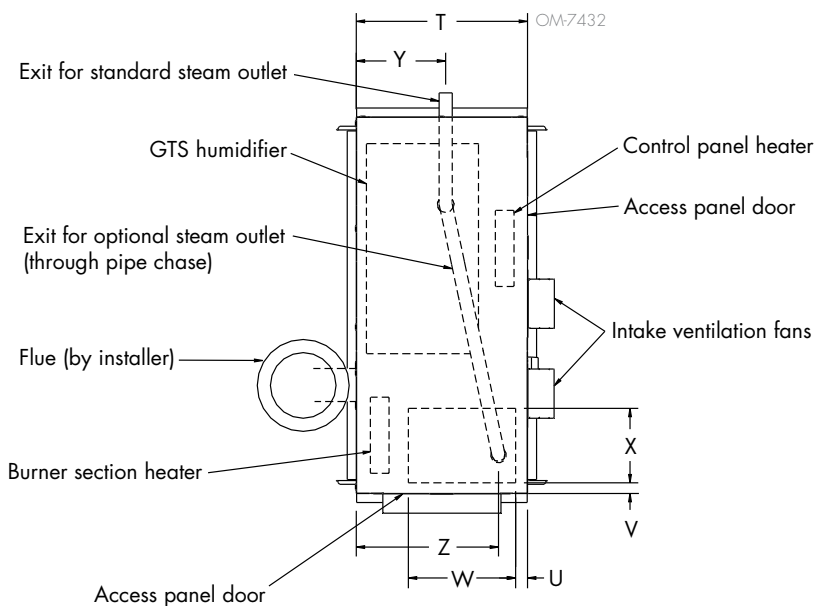


FIGURE 13-2: OUTDOOR ENCLOSURE MOUNTED ON A CURB

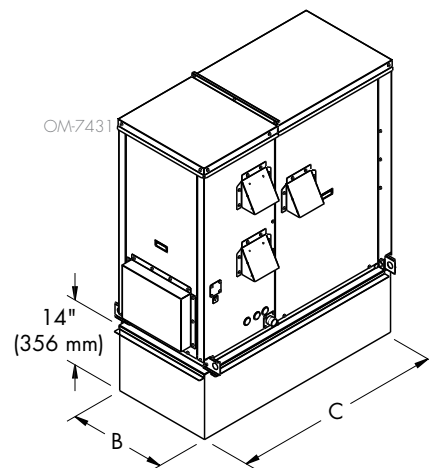


FIGURE 13-3: OUTDOOR ENCLOSURE MOUNTED FLUSH

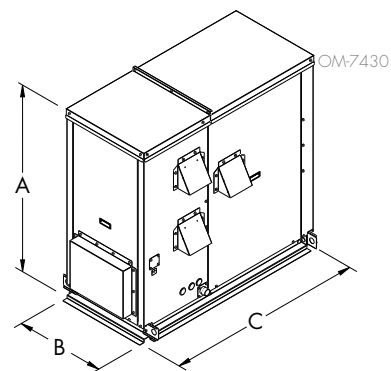


Table 13-1: Outdoor Enclosure top view dimensions									
	Description	GTS-100 GTS-200		GTS-300 GTS-400		GTS-500 GTS-600		GTS-700 GTS-800	
		inches	mm	inches	mm	inches	mm	inches	mm
T	Enclosure width	26.00	660	32.00	813	42.00	1067	48.00	1219
U	Pipe chase position	3.00	76	3.00	76	3.00	76	3.00	76
V		3.00	76	3.00	76	3.00	76	3.00	76
W	Pipe chase size	16.00	406	16.00	406	16.00	406	16.00	406
X		11.00	279	11.00	279	11.00	279	11.00	279
Y	Steam pipe position	14.12	359	20.12	511	30.12	765	36.12	917
Z		21.00	533	27.00	686	37.00	940	43.00	109

Outdoor Enclosure: Operation

SEQUENCE OF OPERATION

- Power is applied to the Outdoor Enclosure.
- If the ambient temperature in the enclosure is below 50 °F (10 °C), the strip heaters are powered up. The strip heaters remain on until the enclosure reaches 50 °F (10 °C) to ensure that the temperature inside the enclosure does not drop below the freezing point.
- When there is no call for humidity, an aquastat maintains tank temperature at the factory default of 70 °F (21 °C). This temperature can be reset in the field to be from 40-180 °F (4-82 °C).
- When the ambient temperature in the enclosure reaches 85 °F (29 °C), two ventilation fans turn on to cool the electronic components. A high limit is also provided to power down the GTS if the enclosure temperature reaches 150 °F (66 °C). In a high limit situation, the ventilation fans continue to run and once the enclosure temperature falls below 130 °F (54 °C), the GTS automatically resumes normal operation.
- A normally open drain valve is provided on the GTS Outdoor Enclosure to drain the tank in the event of a power loss.

Wiring

WARNING

Grounding

Installation must meet the requirements of governing codes or, in the absence of governing codes, in accordance with the National Electrical Code, ANSI/NFPA 70, or Canadian Electrical Code, CSA C22.1, or IEE wiring regulations (BS7671). The electrical subpanel must have an uninterrupted or unbroken ground to minimize personal injury if an electrical fault should occur. This ground can consist of electrical wire or conduit approved for electrical ground when installed in accordance with existing electrical codes. Do not use gas piping as an electrical ground.

WARNING

Fire hazard

Do not connect aluminum wire between disconnect switch and humidifier. Use only copper wire. Failure to follow these instructions could cause a fire, resulting in severe bodily injury, death, or significant property damage.

- GTS humidifiers must be supplied with 120 Vac, 60 Hz (North American models) or 230 Vac, 50 Hz (European models) separately fused electrical service. The GTS humidifier is equipped with a transformer to step down the voltage to 24 Vac control voltage.
- When installed, the GTS humidifier must be electrically grounded in accordance with governing codes or, in the absence of governing codes, in accordance with the National Electrical Code, ANSI/NFPA 70; or Canadian Electrical Code, CSA C22.1; or IEE wiring regulations (BS7671).

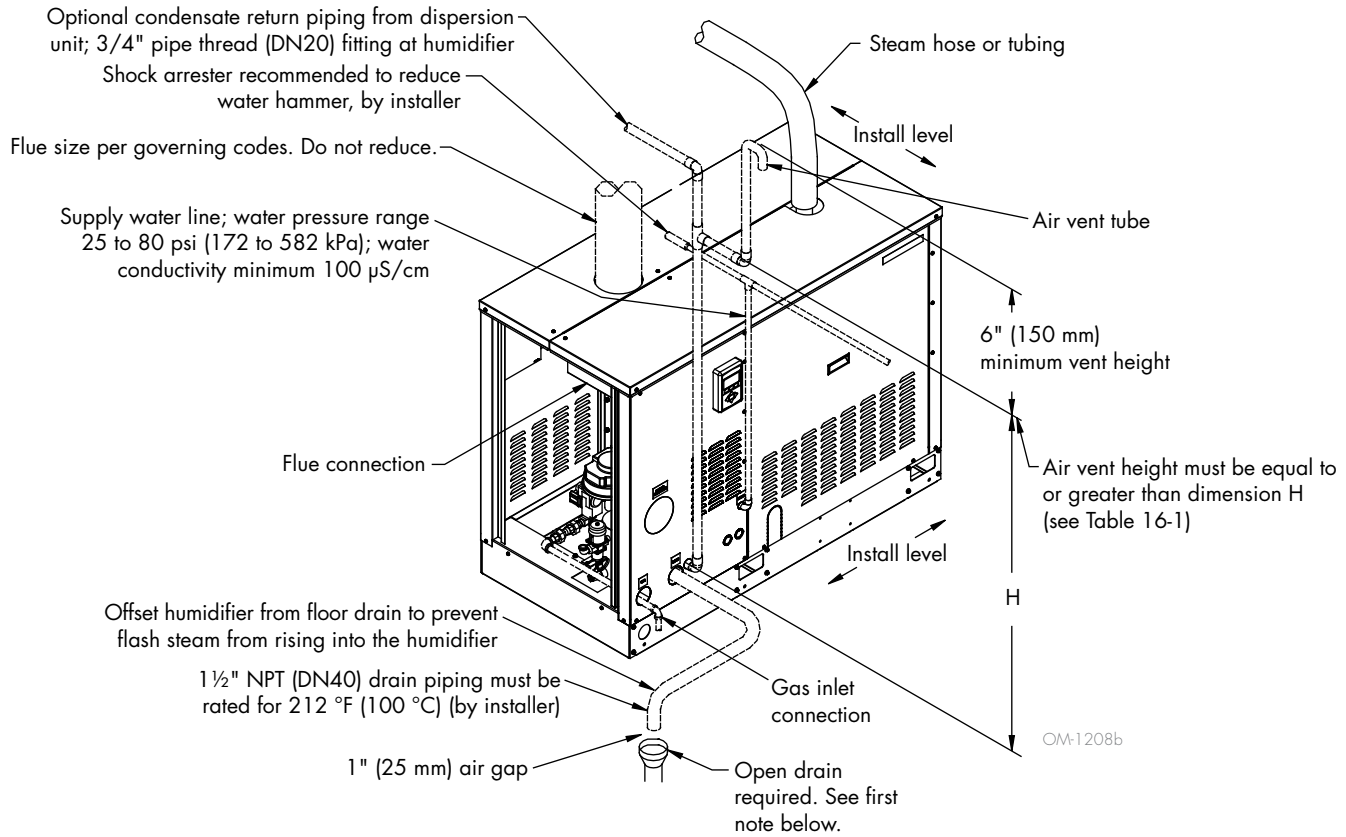
In North America, the electrical conductors shall be Type MTW (105 °C) AWG #14 (2.5 mm²) wire for 120 V line voltage, with BLACK WIRE for HOT, WHITE WIRE for NEUTRAL, GREEN AND YELLOW WIRE for GROUND. Units with Outdoor Enclosure must use AWG #12 (4 mm²) for 120 V line voltage. Use #18 gauge (1 mm²) for control wiring.

In Europe, the electrical conductors shall be Type MTW (105 °C) 2.5 mm² wire for line voltage (230V), with BLACK WIRE for LINE, BLUE WIRE for NEUTRAL, GREEN AND YELLOW WIRE for GROUND, and 2.5 mm² wire for control wiring.

- All electrical components and wiring must be protected from mechanical damage and water. The control system requires an earth ground for proper operation.
- The GTS humidifier is adjusted for correct performance. Only a qualified gas appliance technician may alter throttle setting.
- Check the electric current characteristics and capacity requirements against the nameplate. All wiring must be in accordance with all governing codes and with the GTS wiring diagrams located inside the control cabinet. See the electrical specifications in Table 4-1 (North America) and Table 71-1 (Europe).
- Refer to the *Vapor-logic Installation and Operation Manual* for additional information on the controller furnished with this GTS humidifier.

Piping: Tap/softened water

FIGURE 16-1: GTS FIELD PIPING OVERVIEW, TAP/SOFTENED WATER



Notes:

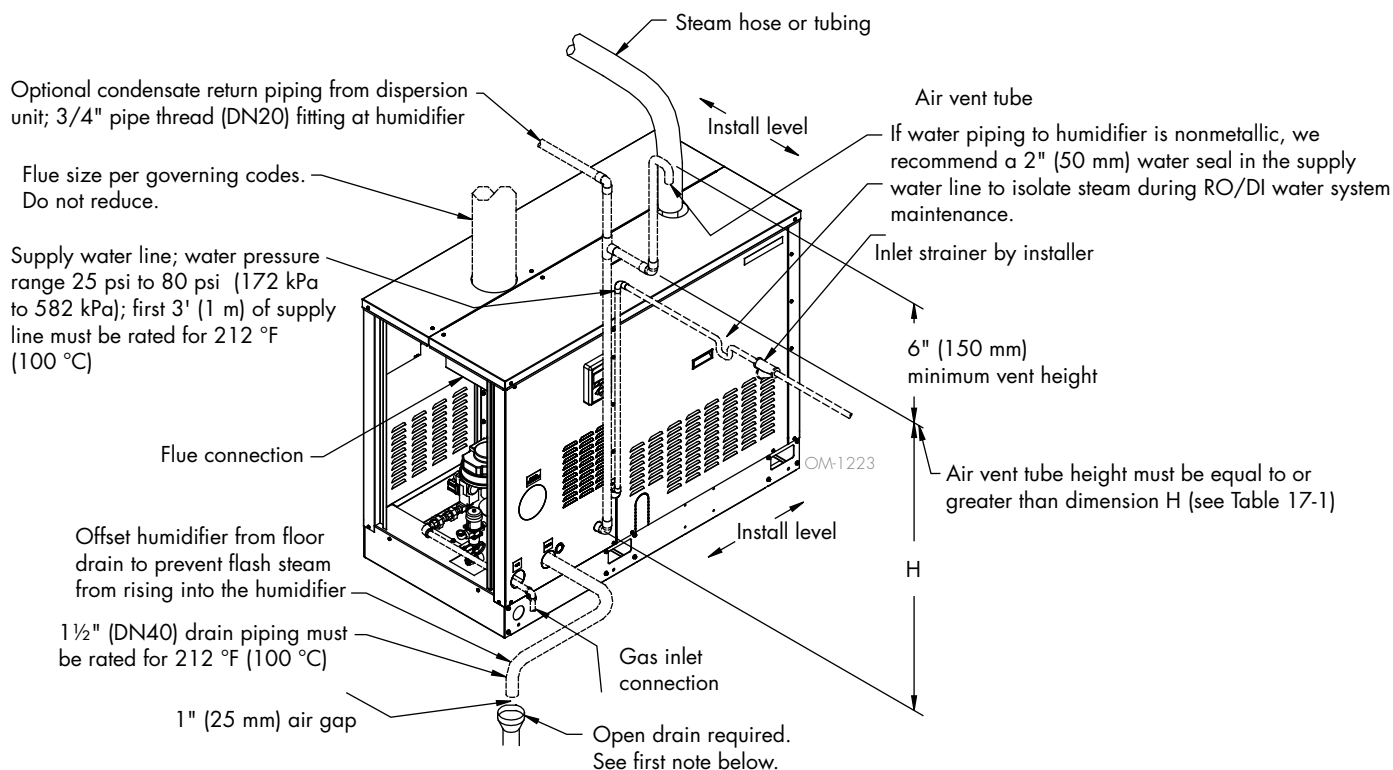
- Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam; otherwise, condensation may form on nearby surfaces. Refer to governing codes for drain pipe size and maximum discharge water temperature.
- Dashed lines indicate provided by installer.
- Humidifier flue gases must be vented to the outside atmosphere.
- Supply water inlet is more than 1" (25 mm) above skim/overflow port, eliminating the possibility of backflow or siphoning from tank. No additional backflow prevention is required; however, governing codes prevail.
- Damage caused by chloride corrosion is not covered by your DriSteam warranty.
- See the next page for recommended supply water piping for RO/DI water models.

Table 16-1:
Height (H) required to overcome GTS internal pressure (H)

GTS model (tap/softened water)	Dimension H in drawing above = height required to overcome humidifier internal pressure	
	inches	mm
100, 200	35	889
300, 400, 500, 600, 700, 800	41	1041

Piping: RO/DI water option

FIGURE 17-1: GTS FIELD PIPING OVERVIEW, RO/DI WATER OPTION



Notes:

- Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam; otherwise, condensation may form on nearby surfaces. Refer to governing codes for drain pipe size and maximum discharge water temperature.
- Dashed lines indicate provided by installer.
- Humidifier flue gases must be vented to the outside atmosphere.
- Supply water inlet is more than 1" (25 mm) above overflow port, eliminating the possibility of backflow or siphoning from tank. No additional backflow prevention is required; however, governing codes prevail.
- Damage caused by chloride corrosion is not covered by your DriSteam warranty.
- In order to minimize RO/DI water use, disconnect factory piping to the water tempering device and pipe directly to tap water.
- See the previous page for recommended supply water piping for tap/softened water models.

Table 17-1:
Height (H) required to overcome GTS internal pressure

GTS model (RO/DI water option)	Dimension H in drawing above = height required to overcome humidifier internal pressure	
	inches	mm
100, 200	35	889
300, 400, 500, 600, 700, 800	41	1041

Piping: Supply water and drain overflow connections

Regardless of the type of water used, the following general instructions **MUST** be followed:

- Make union connections at the humidifier on the make-up water supply and drain/overflow lines.
- Provide a shutoff valve in the supply water line to isolate the humidifier from the water system while servicing.
- Shock arrester, provided by installer, is recommended to reduce water hammer.
- A 1" (25 mm) opening is provided in the humidifier tank to accommodate skim and/or overflow protection.

Note: Follow governing code requirements regarding size of drain pipe.

- Use insulating unions or bushings to make connections between copper and other dissimilar metal fittings, such as galvanized steel. These insulating fittings are required to minimize electrolytic corrosion, which results from the direct connection of dissimilar metals in a water system.
- Before beginning ignition sequence of the humidifier at a new installation, make sure the humidifier tank is full of water and the water is free to flow into the tank.
- If planning to use heated supply water, disconnect the supply water line to the water tempering device at the fill manifold and reconnect it to a cold water supply. This will ensure that the water tempering device operates properly.

Table 18-1:
Connection sizes

Description	GTS-100 and GTS-200		GTS-300 and GTS-400		GTS-500 and GTS-600		GTS-700 and GTS-800	
	inches	DN	inches	DN	inches	DN	inches	DN
Gas supply	1/2 (pipe thread)	15	1 (pipe thread)	25	1 (pipe thread)	25	1 1/4 (pipe thread)	32
Sealed combustion piping (optional)	4	100	4	100	4	100	4	100
Flue vent	5	125	7	180	8	200	10	250
Supply water to fill valve and tempering device*	3/8 (pipe thread)	10	3/8 (pipe thread)	10	3/8 (pipe thread)	10	3/8 (pipe thread)	10
Drain	1 1/2 (pipe thread)	40	1 1/2 (pipe thread)	40	1 1/2 (pipe thread)	40	1 1/2 (pipe thread)	40
Steam outlet**	2 (hose)	50	3 (flange)	80	4 (flange)	100	4 (flange)	100
Condensate return (recommended)	3/4 (pipe thread)	20	3/4 (pipe thread)	20	3/4 (pipe thread)	20	3/4 (pipe thread)	20

Notes:

- * To minimize RO/DI water use, disconnect factory piping to the water tempering device and pipe directly to tap water.
- ** For pipe thread steam outlet options, see DriCalc, DriSteam's free sizing and selection software, available at www.dristeem.com.
- If planning to use heated supply water, disconnect the water line to the water tempering device at the fill manifold, and reconnect it to a cold water supply. This will ensure that the water tempering device operates properly.

Piping: Supply water

SUPPLY WATER PIPING GENERAL INSTRUCTIONS

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

TAP/SOFTENED SUPPLY WATER PIPING

The supply water assembly has a 3/8" pipe thread (DN10) connection. Since the primary component of the supply water 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 factory-supplied needle valve (installed prior to the fill valve) to decrease the water fill rate, and/or use hot supply water.

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

The minimum water conductivity for the GTS tap/softened water model is 100 µS/cm.

Piping: Supply water

SUPPLY WATER PIPING, RO/DI WATER OPTION

GTS humidifiers with the RO/DI water option control water level with a float valve, and have a 3/8" pipe thread (DN10) connection. For models with the end-of-season drain option, a solenoid valve is installed prior to the float valve. The end-of-season feature shuts off the supply water and drains the tank when there is no demand for humidity for 72 hours. (This length of time is a default setting and is user-adjustable. See the *Vapor-logic Installation and Operation Manual* for more information.)

When using nonmetallic tubing for supply water, it must be rated for 212 °F (100 °C) minimum continuous operating temperature. DriSteem recommends installing a 3' (1 m) piece of noninsulated stainless steel pipe directly off the humidifier prior to connecting to the nonmetallic tubing. When using nonmetallic tubing, DriSteem recommends the installer place a 2" (50 mm) water seal/loop in the supply water line to isolate steam during RO/DI water system maintenance. See Figure 17-1.

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

In order to minimize RO/DI water use, disconnect factory piping to the water tempering device and pipe directly to tap water.

Important: Damage caused by chloride corrosion is not covered by your DriSteem warranty. See "Supply water guidelines" on Page 2.

WARNING

Fire hazard

If a GTS humidifier with the RO/DI water option is supplied with tap water, the float valve assembly will become clogged, and particulate will accumulate on the low water cutoff switch (float switch). This will cause failure of a critical safety circuit and the potential for a dry tank fire. A dry tank fire can cause heat exchanger, steam hose, and wire insulation failure, severe property damage, severe personal injury, or death.

Piping: Drain

The drain line piped from the humidifier must be run to an approved sanitary waste or suitable drain. Although the GTS humidifier is equipped with integral water tempering, if nonmetallic drain pipe or hose is used, DriSteem recommends it be rated for 212 °F (100 °C) minimum continuous operating temperature.

Minimum drain pipe size is 1½" (DN40) inside diameter. Do not reduce the size of the drain piping. If the length of the drain piping exceeds 10' (3 m), increase the pipe size. If combining multiple drain lines together, ensure proper common pipe sizing practices are used.

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

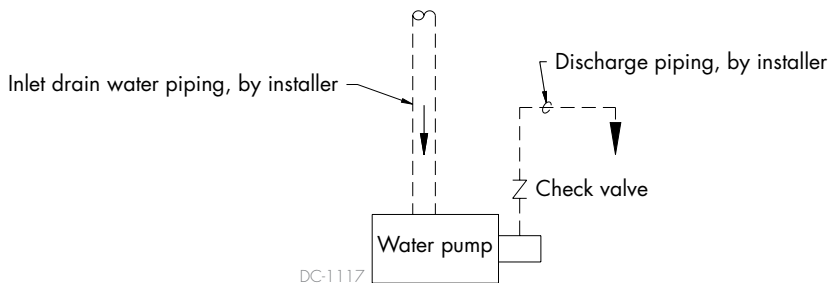
An open drain with a 1" (25 mm) air gap between the drain piping and the drain is required. Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam; otherwise, condensing on nearby surfaces may occur.

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, use a water pump with capacity of at least 12 gallons per minute (gpm) or 45.4 litres per minute (L/m). Contact DriSteem to order a drain pump suitable for your installation. A check valve is required on the discharge of the pump (see Figure 21-1). Electrical power for the pump is independent of the humidifier.

The GTS humidifier has an auxiliary 1½" (DN40) drain outlet located below the subpanel. This drain outlet can be hard-piped during installation to enable rapid tank draining before maintenance. This outlet can also provide access for removing scale from the tank bottom.

FIGURE 21-1: LIFTING DRAIN WATER



Note: Size water pump to handle a minimum of 12 gpm (45.4 L/m).

Integral water tempering chamber

Governing codes may require that the 212 °F (100 °C) drain and skim/overflow water from the humidifier be tempered before it is discharged into the building drain piping. The GTS humidifier has an integral water tempering chamber that tempers 6 gpm (22.7 L/m) of 212 °F (100 °C) water to 140 °F (60 °C). The water tempering sequence of operation is:

1. Hot water discharged from the humidifier enters the water tempering chamber from either the skim/overflow port or the tank drain.
2. Cold water enters the water tempering chamber through a temperature-actuated valve to mix with the hot discharged water.
3. Tempered water at 140 °F (60 °C) maximum exits through the water tempering chamber side outlet for safe discharge into a municipal sewer system or PVC pipe.
4. In order to minimize RO/DI water use, disconnect factory piping to the water tempering device and pipe directly to tap water.
5. If planning to use heated supply water, disconnect the water line to the water tempering device at the fill manifold, and reconnect it to a cold water supply. This will ensure that the water tempering device operates properly.

Table 21-1:
Integral water tempering specifications

Water type	Maximum low rate		Maximum temperature	
	U.S. gpm	L/m	°F	°C
Hot water inflow	6	22.7	212	100
Cold water inflow*	6	22.7	70	21
Tempered water outflow	12	45.4	140	60

* Cold water inflow pressure must be between 25 psi and 80 psi (172 kPa and 552 kPa).

Piping: Flue Gas Condensate

Install a flue box condensate drain to the p-trap for start-up flue condensate removal. See Caution statement.

CAUTION

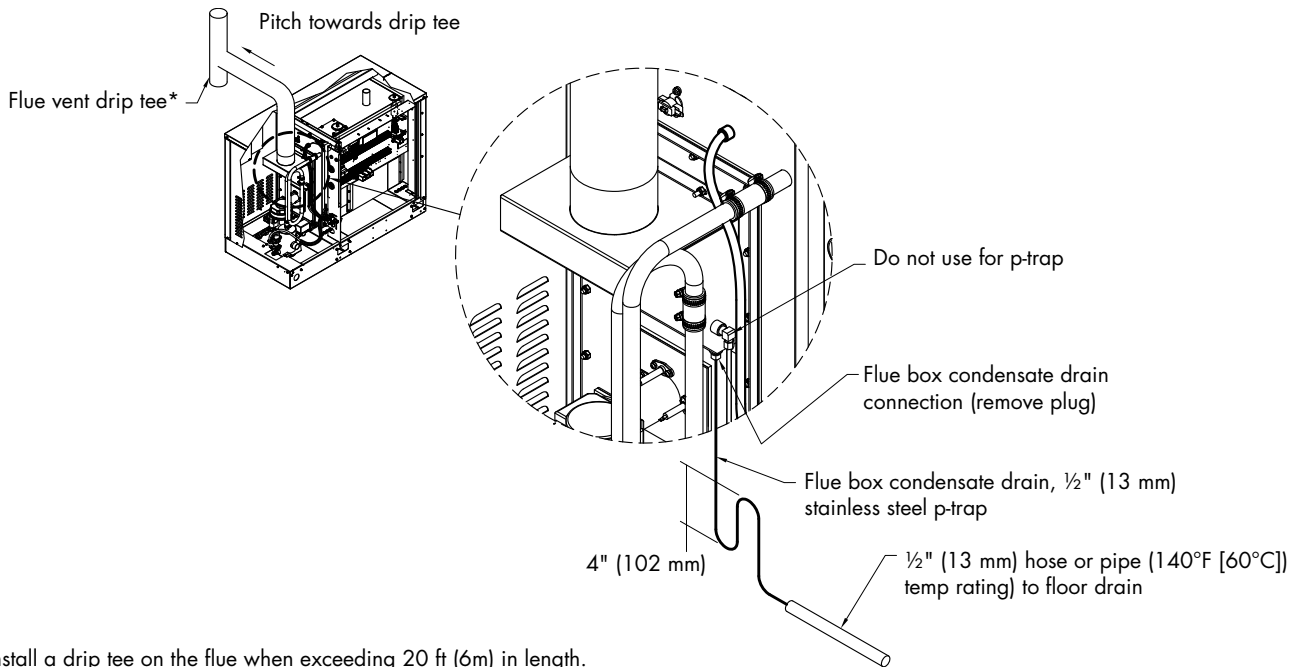
Flue condensate removal

See Figure 22-1.

Install a flue box condensate drain to the p-trap for start-up flue condensate removal. Failure to follow these instructions could cause water to accumulate in the enclosure.

Install a drip tee on the flue when exceeding 20 ft (6m) in length.

FIGURE 22-1: FLUE CONDENSATE PIPING



*Install a drip tee on the flue when exceeding 20 ft (6m) in length.

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Piping: Gas

GAS PIPING GUIDELINES

- After threading and reaming the ends of the pipes, inspect piping and remove loose dirt and chips.
- Support piping so there are no strains imposed on unit or controls.
- Use two wrenches when connecting piping to unit or controls.
- Provide a drip pocket before each unit and in the line where low spots cannot be avoided.
- Takeoff to unit should come from top or side of main to avoid trapping condensate.
- Piping that is subject to wide temperature variations should be insulated.
- Pitch piping up toward unit at least 1/4" (6 mm) per 15' (4.5 m) of horizontal run.
- Compounds used on threaded joints of gas piping must be resistant to the harmful action of liquefied petroleum gases.

WARNING

Fire or explosion hazard

Purge air before lighting unit by disconnecting piping at gas control. In no case should line be purged into heat exchanger. Failure to follow these instructions could cause a fire or explosion, resulting in bodily injury, death, or significant property damage.

- After installation, check field piping and humidifier gas train for gas leaks.
- Do not use soap solution or open flame on humidifier gas train. A gas leak detector is recommended.
- Install a ground joint union and a manual shutoff valve immediately upstream of the unit. Install a plugged tapping upstream of the shut-off valve, accessible for test gauge connection (see Caution at left). Pressure tappings for test gauges are located on all gas valves.
- Allow at least 5' (1.5 m) of piping between any high pressure regulator and unit pipe connection.
- Piping installation must conform to the requirements of the authority having jurisdiction or, in the absence of such requirements, must conform to:

In the United States: The National Fuel Gas Code, ANSI Z223.1 (latest edition).

In Canada: Local plumbing or waste water codes and other applicable codes and with the current code CAN/CGS-B149.1, "Installation Code for Natural Gas Burning Appliances and Equipment," or CAN/CGA-B149.2, "Installation Code for Propane Burning Appliances and Equipment."

In Europe: The National Gas Safety (Installation & Use) Regulations.

WARNING

Fire hazard

Supply the humidifier only with the gas type (natural gas or LP gas) listed on the humidifier name plate. Failure to supply the humidifier with the listed gas type could result in burner failure or a fire, causing property damage, personal injury, or death.

To convert the humidifier to natural gas or LP gas, contact DriSteem Technical Support or your DriSteem Representative/Distributor.

Important: For North American models, the recommended supply pressure is 7" wc (1.75 kPa) for natural gas or 11" wc (1.83 kPa) for LP gas.

For European models, the required supply pressure is 20 or 25 mbar for natural gas and 30, 37, or 50 mbar for propane gas.

CAUTION

Install connection for gas pressure test gauge

Gas pressure to the humidifier controls must never exceed 24" wc (6 kPa, 60 mbar), or the gas valve will become damaged and require replacement. Install a 1/8" pipe thread (DN6) plugged tapping, accessible for test gauge connection, immediately upstream of the gas supply connection to the appliance.

Piping: Gas

- Do not use flexible connectors.
- Piping to units should conform with local and national requirements for type, volume, and gas handled and for pressure drop allowed in the line. Refer to the tables on this page to determine the gas flow in ft³/hr or m³/hr for the type of gas and size of unit to install. Using this value and the length of pipe necessary, determine the pipe diameter. Where several units are served by the same main, the total capacity, gas flow, and length of main must be considered. Avoid pipe sizes smaller than 1/2" (DN15). Table 24-2 allows for the usual number of fittings with a 0.3" wc (0.07 kPa) pressure drop.
- When the specific gravity of the gas is other than 0.60 for natural gas or 1.53 for propane, use Table 24-1.

Table 24-1:
Specific gravity conversion factors

Natural gas	
Specific gravity	Factor
0.55	1.04
0.60	1.00
0.65	0.962
Propane gas	
Specific gravity	Factor
1.50	0.633
1.53	0.626
1.60	0.612

Note:
Use the above multiplying factor with Table: 24-2 when the specific gravity of gas is other than 0.60 (natural gas) or 1.53 (propane).

Table 24-2:
Gas pipe capacities for gas pressures of 0.5 psig (3.45 kPa) or less

Length of pipe		Gas flow in piping in ft ³ /hr and m ³ /hr at pressure drop of 0.3" wc (0.07 kPa) Specific gravity = 0.60									
		Nominal iron pipe diameter in inches (DN)									
		1/2" (DN15)		3/4" (DN20)		1" (DN25)		1 1/4" (DN32)		1 1/2" (DN40)	
ft	m	ft ³ /hr	m ³ /hr	ft ³ /hr	m ³ /hr	ft ³ /hr	m ³ /hr	ft ³ /hr	m ³ /hr	ft ³ /hr	m ³ /hr
10	3	132	3.7	278	7.9	520	14.7	1050	29.7	1600	45.3
20	6	92	2.6	190	5.4	350	9.9	730	20.7	1100	31.1
30	9	73	2.1	152	4.3	285	8.1	590	16.7	890	25.2
40	12	63	1.8	130	3.7	245	6.9	500	14.2	760	21.5
50	15	56	1.6	115	3.3	215	6.1	440	12.5	670	19.0
60	18	50	1.4	105	3.0	195	5.5	400	11.3	610	17.3
70	21	46	1.3	96	2.7	180	5.1	370	10.5	560	15.9
80	24	43	1.2	90	2.5	170	4.8	350	9.9	530	15.0
90	27	40	1.1	84	2.4	160	4.5	320	9.1	490	13.9
100	30	38	1.1	79	2.2	150	4.2	305	8.6	460	13.0

See example on page 24.

Piping: Gas

EXAMPLE

For this example, refer to the tables on Page 24.

To determine gas piping size, begin by calculating the cubic feet/hour (ft³/hr) or m³/hr using the following formula:

$$\text{Btuh (kW) input} / \text{calorific value of gas}$$

Calorific values are:

- Natural gas: 1025 Btu/ft³ (10.6 kW-hr/m³)
- Propane: 2500 Btu/ft³ (25.9 kW-hr/m³)

For example, if you have a GTS-400 operating on natural gas, calculate the ft³/hr or m³/hr as follows:

$$400,000 \text{ Btuh} / 1025 \text{ Btu/ft}^3 = 390 \text{ ft}^3 \text{ per hour}$$

$$117.2 \text{ kW} / 10.6 \text{ kW-hr/m}^3 = 11.1 \text{ m}^3 \text{ per hour}$$

If you need to run your gas piping 60 feet (18 m), see Table 24-2, and look horizontally across the 60 ft (18 m) row until you locate the next highest value above your calculated ft³/hr or m³/hr. In this example, you are looking for the next highest value above 390 ft³/hr (11.05 m³/hr), which is 400 ft³/hr (11.3 m³/hr) and indicates the use of a 1 ¼" (DN32) pipe for this application.

Using the same example, if the specific gravity of your natural gas was 0.55 (instead of the 0.60 standard), see Table 24-2 for an adjustment factor. In this case, the factor would be 1.04, which you multiply by the 390 ft³/hr (11.05 m³/hr) value. This gives you a new value of 406 ft³/hr (11.49 m³/hr). Referring again to Table 24-2, you see that for the same 60 ft (18 m) length, you now need to use 1 ½" (DN40) pipe due to the change in the specific gravity of the gas.

Gas leak testing

- When leak-testing the gas supply piping system, disconnect the humidifier and its gas shutoff valve during any pressure in excess of 24" wc (6 kPa). Isolate the humidifier from the gas supply piping system by closing its field-installed manual shutoff valve during any pressure not equal to 24" wc (6 kPa).
- With all burners running, check gas supply pressure at the inlet pressure tap of the combination gas control valve.

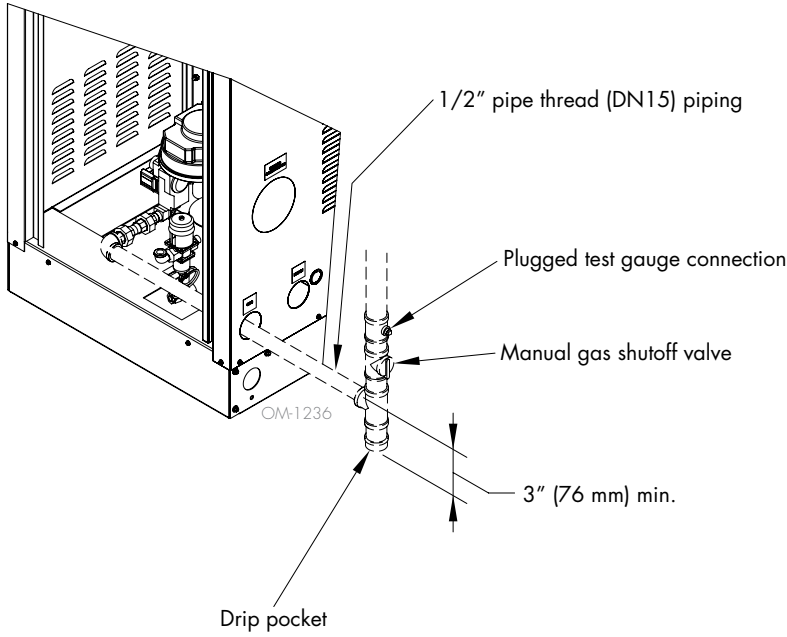
For North American models, the recommended supply pressure is 7" wc (1.75 kPa) for natural gas or 11" wc (1.83 kPa) for LP gas. Perform gas piping purging as described in ANSI Z223.1 (latest edition) or in Canada, CAN/CGA-B149 codes. The minimum supply pressure is 6" wc (1 kPa) for natural gas or LP gas.

For European models, the required supply pressure is 20 or 25 mbar for natural gas and 30, 37, or 50 mbar for propane gas.

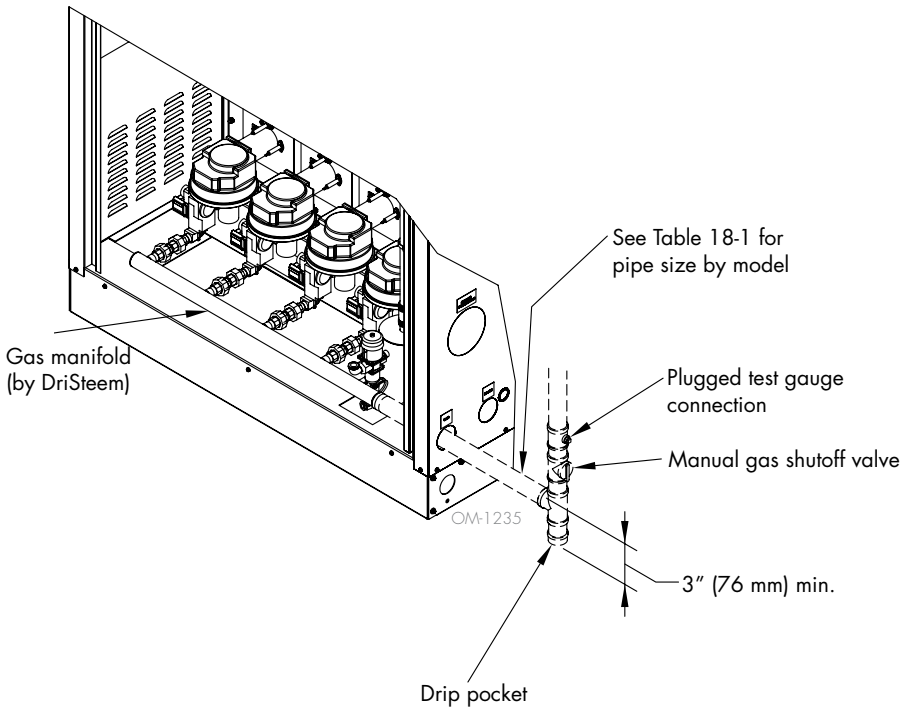
Piping: Gas

FIGURE 26-1: GTS GAS PIPING

Models 100, 200



Models 300-800



Note: Dashed lines indicate supplied by installer

Combustion and ventilation air

The GTS humidifier supports both room air and sealed combustion. See Warning. Requirements and recommendations for each follow.

ROOM AIR COMBUSTION

- All fuel burning equipment must be supplied with air for combustion of the fuel. Sufficient air must be provided to ensure there is not a negative pressure in the equipment room or space.
- Provide adequate combustion and ventilation air in accordance with Section 5.3, Air for Combustion and Ventilation, of the National Fuel Gas Code, ANSI Z223.1 or applicable provisions of governing codes. Canadian installations must be installed in accordance with sections 7.2, 7.3, and 7.4 of the CAN/CGA.B149 Installation Codes and all authorities having jurisdiction.
- For proper and safe operation this appliance needs air for combustion and ventilation. **Do not** block or obstruct air openings on the appliance, spaces around the appliance, or air openings communicating with the appliance area.
- Do not locate in a dusty environment.
- **Do not** block the flow of combustion and ventilation air. To provide for necessary oxygen for proper combustion, openings must be provided to allow outside air to enter the space where the humidifier is located. Enclosed spaces, such as equipment rooms, must be vented for combustion air. The size of air openings must be based on all gas-burning equipment installed in the space involved. Table 27-1 outlines four types of locations, and the requirements of each.

WARNING

Air for combustion

Air for combustion must not be contaminated by halogen compounds, which include fluoride, chloride, bromide, and iodide. These elements are found in aerosol sprays, detergents, bleaches, cleaning solvents, salts, air fresheners, and other household products.

When the GTS is located in an environment with negative pressure or toxic air, it must have sealed combustion.

Failure to follow these instructions could cause severe bodily injury or death.

Table 27-1:
Location of humidifier and required air openings

Location description	Required air opening
Confined space with all air from inside the building; conventional frame, brick or stone construction with normal infiltration (Note: this location rarely provides enough air for higher capacity units.)	Two openings, 1 sq. in. (6.5 cm ²) per opening per 1000 Btu/hr (293 W) input The minimum free area of all openings combined is 100 sq. in. (645 cm ²).
Confined space with all air from outside the building through air ducts	Two openings, 2 ducts, 1 sq. in. (6.5 cm ²) per opening per 2000 Btu/hr (586 W) input*
Confined space with all air from outside the building from through-wall openings only (no ducts)	Two openings, 1 sq. in. (6.5 cm ²) per opening per 4000 Btu/hr (1172 W) input*
Unconfined space with all air from outside the building	Same as confined space; all air from outside the building

* The minimum dimension of any opening is 3" x 3" (76 mm x 76 mm).

Combustion and ventilation air

SEALED COMBUSTION

The GTS supports sealed combustion using 4" (DN100) PVC or CPVC piping (see Figure 28-1). All GTS models have a single point connection to the blower inside the humidifier shroud.

When running PVC or CPVC piping for sealed combustion, the maximum allowable distance to the outdoor air source is 70' (21.3 m) including 7' (2.1 m) equivalent length for each elbow (total allowable maximum of six elbows). The outside air source can be either a final connection outside the building or a connection to an outdoor air plenum within the building. When the combustion air origination point is outside the building, the opening must be covered with a large mesh screen to prevent the introduction of unwanted materials without restricting airflow.

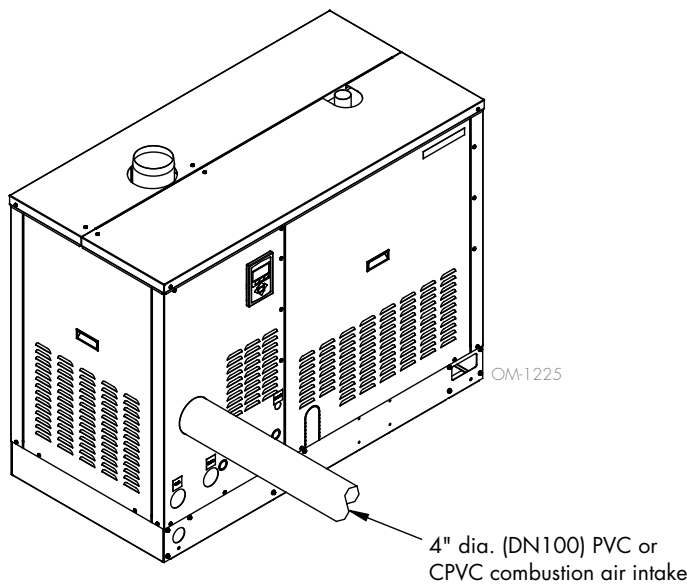
If sealed combustion piping is less than 20 ft (6 m), we recommend insulating piping to prevent condensation.

WARNING

Requirement for manifolding sealed combustion piping runs

When installing sealed combustion piping for more than one GTS humidifier, do not commonly manifold multiple sealed combustion piping runs without having the manifold sized for the specific installation by a licensed engineer. Failure to follow these instructions could starve the GTS humidifier of combustion air resulting in either the unit not being able to light or high carbon monoxide (CO) levels, which may cause severe personal injury or death.

FIGURE 28-1: GTS OPTIONAL SEALED COMBUSTION CONNECTION



Vertical and horizontal venting

GUIDELINES (STACK CONNECTION)

- The GTS is a Fan Assisted Category I (natural draft) Appliance. Installations where the vent terminates in a side wall of the building, or where the overall horizontal run exceeds the overall vertical run require a power venter. See Page 30.
- Maximum flue temperature under normal operating conditions is 400 °F (205 °C) plus ambient.
- Maximum abnormal-operation flue temperature is 658 °F (348 °C) plus ambient.
- Flue draft negative pressure greater than 0.2" wc (50 Pa) may cause unacceptable post ignition.
- Vent piping must be UL or UL/CSA listed type B, B-W, or any other vent type approved for a Category I appliance.
 - Type B: Double wall construction, inner wall aluminum, outer wall galvanized steel
 - Type B-W: Same as type B except fabrication in oval shapes only

Do not use more than one type of venting per application Required clearance for Type B and B-W vent piping is 1" (25 mm).
- Do not use vent equipment from more than one manufacturer.

WARNING

Installation requirements

The humidifier must be installed by a qualified technician and meet the requirements of all governing codes. Failure to follow these instructions could cause severe bodily injury or death.

Note:

For European models, contact your distributor for horizontal venting parts.

Vertical and horizontal venting

- When connecting the humidifier to a gas vent or chimney, installation must be in accordance with Part 7, Venting of Equipment, of the National Fuel Gas Code, ANSI Z223.1; or Section 7, Venting Systems and Air Supply Appliances, of the CAN/CGA B149 Installation Codes; or National Gas Safety Code (Installation & Use) Regulations (latest revision); governing codes, and the vent manufacturer's instructions.
- When applying the codes, reference also the venting manufacturer's instructions, the service gas supplier's regulations, and the specific instructions provided in this manual.
- Install a flue box condensate drain with p-trap for start-up flue condensate removal. See page 22.
- Install a drip tee on the flue when exceeding 20 ft (6m) in length. See Caution statement and Figure 30.
- The purpose of venting the gas humidifier is to completely remove all products of combustion and ventilation gases to the outside air.
- For vertical vent pipe terminations only: Do not reduce the vent diameter and avoid short turns in the vent piping. Use the same size stack as the vent furnished with the humidifier. Maintain a minimum upward slope of 1/4" per linear foot (2%) on all horizontal runs. Maintain proper support of vent connections and joints. Observe clearances (in accordance with applicable codes) from all combustible materials and install an approved cap for the stack outlet. The bottom of the cap must be one stack diameter above the top of the stack.
- Inspect for proper and tight construction. Remove any restrictions or obstructions. An existing chimney may require cleaning.
- For vertical vent pipe terminations only: Extend chimney or vent at least 3' (1 m) above its passage through a roof and at least 2' (0.6 m) above any ridge within 10' (3 m) of the chimney (governing codes apply).
- Do not connect this humidifier to a chimney flue servicing a separate appliance designed to burn solid fuel.

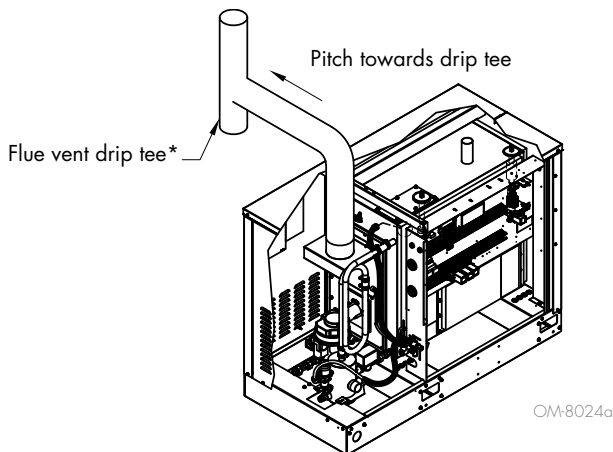
CAUTION

See Figure 30-1.

Install a flue box condensate drain with p-trap for start-up flue condensate removal. Failure to follow these instructions could cause water to accumulate in the flue box.

Install a drip tee on the flue when exceeding 20 ft (6m) in length.

FIGURE 30-1: DRIP TEE



*Install a drip tee on the flue when exceeding 20 ft (6m) in length.

Vertical and horizontal venting

- Never connect this humidifier to a chimney serving a fireplace, unless the fireplace opening is permanently sealed off.
- Code prohibits venting into an unlined masonry or concrete chimney.
- If this humidifier is connected to a lined, masonry chimney, the chimney must be sized and installed according to the provisions of the National Fuel Gas Code or Canadian CAN/CGA.B149 requirements, or governing codes.
- Vent connector serving this appliance shall not be connected into any portion of mechanical draft systems operating under positive pressure.
- Add insulation to any roof or wall penetration vent connector that is exposed to ambient temperatures of 30 °F (0 °C) or less, especially any application using single-wall vent pipe as a connector.
- Do not insulate vent pipe exposed to outdoor weather conditions (e.g., above roof lines).
- Install vent piping as direct as possible, with a minimum number of turns or elbows (total allowable maximum of six elbows).
- Rigidly support the vent pipe every 5' (1.5 m) or less with hangers or straps to ensure there is no movement after installation. The humidifier vent box should not support the weight of the vent piping.
- No portion of the vent system should extend into, or pass through, any circulation air duct or plenum.
- The vent system must terminate above the roof surface per the National Fuel Gas Code, CAN/CGA.B149, or National Gas Safety Code (Installation & Use) Regulations (latest revision) requirements or governing codes, and must include a UL or UL/CSA listed vent cap or roof assembly, unless prohibited by governing codes. DriSteem recommends installing a high-wind vent cap on all GTS humidifiers.
- For vertical vent pipe terminations only: This humidifier may be commonly vented with other listed Category I gas-fired appliances. Total input rates of all appliances determines the vent size.
- Install and fire-stop all vent pipe passing through floors, ceilings, and walls with the proper clearances from combustible material according to the National Fuel Gas Code, Canadian Standards CAN/CGA.B149, the National Gas Safety Code (Installation & Use) Regulations (latest revision), or governing codes.
- In replacement installation where an existing vent system may be used, inspect the vent system for condition, size, type of vent material, and height to meet the requirements in these instructions. When connecting the humidifier to a gas vent or chimney, the installation must be in accordance with Part 7, Venting of Equipment, of the National Fuel Gas Code, ANSI Z223.1; Section 7, Venting Systems and Air Supply Appliances, of the CAN/CGA B149 Installation Codes; The National Gas Safety Code (Installation & Use) Regulations (latest revision), governing building codes, and the vent manufacturer's instructions.

WARNING

Horizontal

For applications where the vent pipe terminates in a vertical position, the horizontal length of the vent and vent connector must not exceed the height of the vent system unless a power vent is used. Failure to follow these instructions could cause flue gases to exit the vent piping, causing severe personal injury or death.

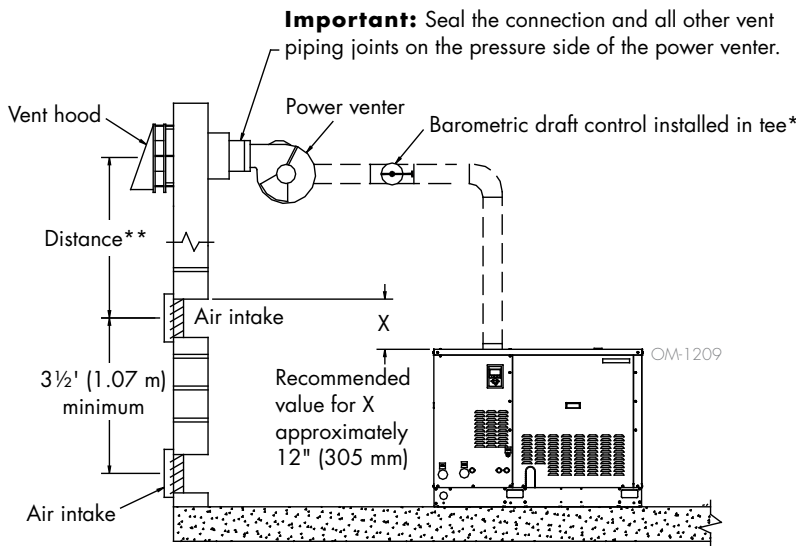
All applications where the vent pipe terminates in a horizontal position, a DriSteem vent cap/ terminal must be used. DriSteem part #405732-005 (Model GTS-100 to GTS-400) or #405732-008 (Model GTS-500 to GTS-800). Refer to venting instructions on page 27 through page 32.

Vertical and horizontal venting

SPECIAL HORIZONTAL VENTING REQUIREMENTS

- Ensure that distances from vent terminal to adjacent public walkways, buildings, and openable windows and building openings are consistent with National Fuel Gas Code, ANSI Z223.1, CAN/CGA B149 Installation Codes, National Gas Safety Code (Installation & Use) Regulations (latest revision), or governing codes.
- In areas accessible to the public, vent terminal must be at least 7' (2.1 m) above ground level to prevent burns from hot terminal surface.
- The vent terminal and air intake locations must be at sufficient height above ground level to prevent blocking by expected snowfall.
- Building materials must be protected from degradation by flue gases.
- Maintain minimum horizontal clearance of 4' (1.22 m) from electric meters, gas meters, regulators, and relief equipment.
- Maximum equivalent length of vent pipe is 100' (30 m). Minimum equivalent length of vent pipe is 10' (3 m). See power venter installation manual for equivalent lengths of fittings.
- Vent box pressure must be $-0.01''$ wc (-2.5 Pa). Set by adjusting power venter and barometric damper with all burners running (see manufacturer's instructions included with power venter and damper).

FIGURE 32-1: GTS VENTING



- Notes:
- * Install a tee after the first elbow from the humidifier as shown. Use the open end of this tee for the location of the barometric damper.
 - ** Required distance between air intake and vent hood is defined by governing codes.
 - Refer to power venter manual for clearance requirements relative to combustion air openings.

Table 32-1: Equipment required for horizontal venting

Item	Field controls model number for GTS models 100, 200, 300, 400	Field controls model number for GTS models 500, 600, 700, and 800
Power venter	PVO-600 (5")	PVE-1200 (8")
Barometric damper	MG-1 (5")	MG-1 (8")
Vent hood	SWH-1-5 (5")	SWH-8
Electrical ratings	120 VAC 60 Hz 2.1 A	120 VAC 60 Hz 2.5 A

Note: For European models, contact your distributor for horizontal venting parts.

Table 32-2: Recommended minimum vent sizes

Model	Minimum vent size			
	Vertical vent		Horizontal vent	
	inches	mm	inches	mm
GTS-100	5	130	5	130
GTS-200	5	130	5	130
GTS-300	7	180	5*	130
GTS-400	7	180	5*	130
GTS-500	8	205	8	205
GTS-600	8	205	8	205
GTS-700	10	255	8*	205
GTS-800	10	255	8*	205

Note: For best results, make transition to smaller vent diameter as close to the power venter as possible.

Dispersion: Selecting a location

SELECTING THE DISPERSION ASSEMBLY LOCATION

- Non-wetting distance is the dimension downstream from the leaving side of the steam dispersion assembly to the point where wetting will not occur, although wisps of steam may be present. This distance was calculated during humidification system design and is dependent on several application parameters. To determine your dispersion assembly's non-wetting distance, consult your system's design engineer or project documentation. Non-wetting distance can also be calculated using DriSteem's DriCalc sizing and selection software, available at www.dristeem.com. Note that your current design conditions may vary from conditions used for system design.
- It is important that the dispersion assembly is positioned where the water vapor being discharged is carried off with the airstream and is absorbed before it can cause condensation or dripping in the duct.
- In general, the dispersion assembly is best placed where the air can most readily absorb the moisture being added without causing condensation at or after the unit. This normally is after the heating coil or where the air temperature is highest.
- Place the dispersion assembly so that absorption occurs before the intake of a high efficiency filter. The filter can remove the visible moisture and become waterlogged.
- Place the dispersion assembly so absorption occurs before coming in contact with any metal surface.
- Place the dispersion assembly so absorption occurs before fire or smoke detection devices.
- Place the dispersion assembly so absorption occurs before a split in the duct. Otherwise, the dispersion assembly may direct more moisture into one duct than the other.
- When draining dispersion condensate to an open drain, provide a 1" (25 mm) gap between the condensate drain piping and the drain. Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam; otherwise, condensing on nearby surfaces may occur.

Dispersion: Interconnecting piping requirements

- The steam outlet on the humidifier is sized to the output of the humidifier. **DO NOT** use interconnecting piping with an inside diameter smaller than the humidifier steam outlet.
- See the maximum steam carrying capacities and maximum piping lengths in Table 33-1.
- See the steam loss data in Table 33-2.
- See the Table 37-1 for pitch of dispersion tubes and interconnecting piping for single tube and multiple tube applications. See Table 42-1 for pitch of interconnecting piping, dispersion tubes, and headers for Rapid-sorb applications.
- If the humidifier must be located higher than the dispersion assembly, use the recommended installation shown in Figure 35-1.
- For single tube applications, see the capacities in Table 39-1.

CONNECTING TO DISPERSION ASSEMBLY WITH STEAM HOSE

- Support steam hose to prevent sags or low spots and to maintain a minimum pitch of 2"/ft (15%) back to the humidifier.
- Use DriSteem steam hose. Other manufacturers of steam 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 steam hose in outdoor applications.
- Do not insulate steam hose. Insulation causes accelerated heat aging, causing the steam hose to become hard and susceptible to failure due to cracks.

CONNECTING TO DISPERSION ASSEMBLY WITH TUBING

- Support interconnecting piping between the humidifier steam outlet and the dispersion system with pipe hangers. Failure to properly support the entire steam piping weight may cause damage to the humidifier tank and void the warranty.
- 90° elbows are not recommended; use two 45° elbows, 1' (0.3 m) apart.
- Insulate tubing to reduce the loss in output caused by condensation.

WARNING

Prevent pressure build-up in evaporating chamber

The evaporating chamber is designed as a nonpressurized vessel. **Do not restrict piping where steam exits the humidifier.** Do not install a shut-off valve on the piping connecting the evaporating chamber to the steam outlet.

Important:

Failure to follow the recommendations in this section can result in excessive back pressure on the humidifier. This will result in unacceptable humidification system performance such as leaking gaskets, blown water seals, erratic water level control, and spitting condensate from dispersion tubes.

Dispersion: Interconnecting piping requirements

Table 35-1:
Maximum steam carrying capacity and length of interconnecting steam hose or tubing

Steam hose ¹						Copper or stainless steel tubing					
Hose I.D.		Maximum capacity		Maximum length ²		Tubing size		Maximum capacity ³		Maximum developed length ⁴	
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
1. When using steam hose, use DriSteam steam hose for best results. Field-supplied hose may have shorter life and may cause foaming in the evaporating chamber resulting in condensate discharge at the dispersion assembly. Do not use steam hose for outdoor applications. 2. Maximum recommended length for steam hose is 10' (3 m). Longer distances can cause kinking or low spots.						3 ⁵	80 ⁵	450	204	80	24
						4 ⁵	100 ⁵	750	340	100	30
						3. Insulate tubing to minimize loss of capacity and efficiency. 4. Developed length of tubing equals measured length plus 50% of measured length, to account for fittings. Longer tubing lengths are possible at capacities lower than listed maximums. Consult factory. 5. Requires flange connection.					

Note: Capacities and lengths in this table are based on total maximum pressure drop in hose or tubing of 5" wc (1250 Pa).

Table 35-2:
Steam loss of interconnecting steam hose or tubing

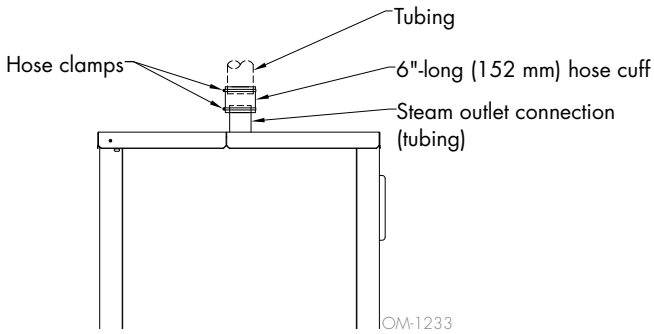
Description	Nominal hose or tubing size		Steam loss				Insulation thickness	
			Noninsulated		Insulated			
	inches	DN	lbs/hr/ft	kg/h/m	lbs/hr/ft	kg/h/m	inches	mm
Hose	1½	40	0.15	0.22	N/A	N/A	N/A	N/A
	2	50	0.20	0.30	N/A	N/A	N/A	N/A
Tubing	1½	40	0.11	0.16	0.020	0.030	2.0	50
	2	50	0.14	0.21	0.025	0.037	2.0	50
	3	80	0.20	0.30	0.030	0.045	2.5	64
	4	100	0.26	0.39	0.030	0.045	3.0	76

Note: Data based on an ambient air temperature of 80 °F (27 °C), fiberglass insulation, and copper tubing.

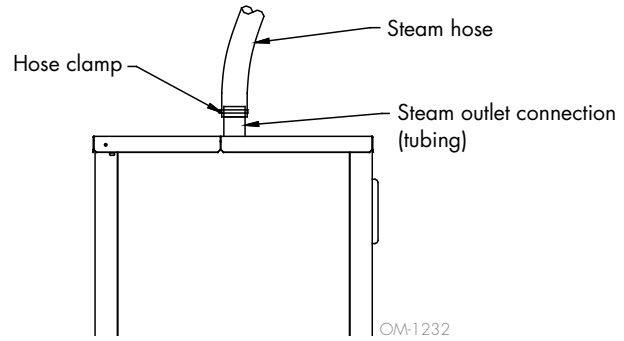
Dispersion: Steam outlet connections

FIGURE 36-1: STEAM OUTLET CONNECTIONS

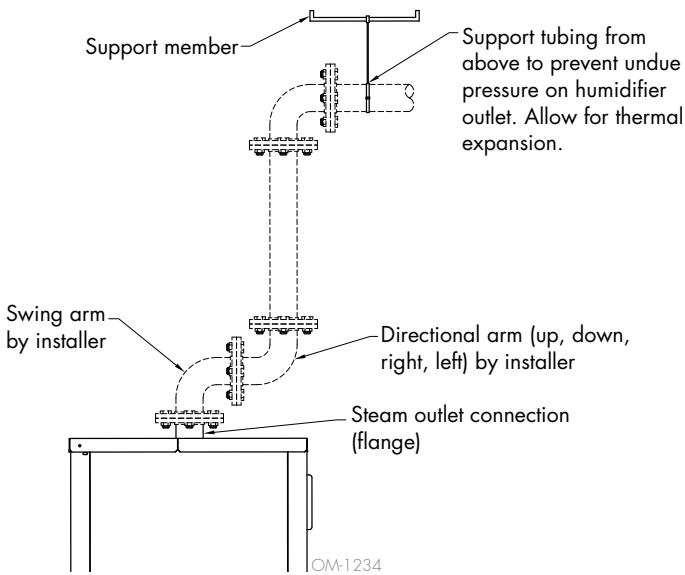
Tubing using hose cuff with clamps



Hose connection



Flange connection



Notes:

- Dashed lines indicate provided by installer.
- Diameter of interconnecting steam hose or tubing must be equal to or greater than the diameter of the steam outlet. Do not use steam hose or tubing that is smaller than the steam outlet.

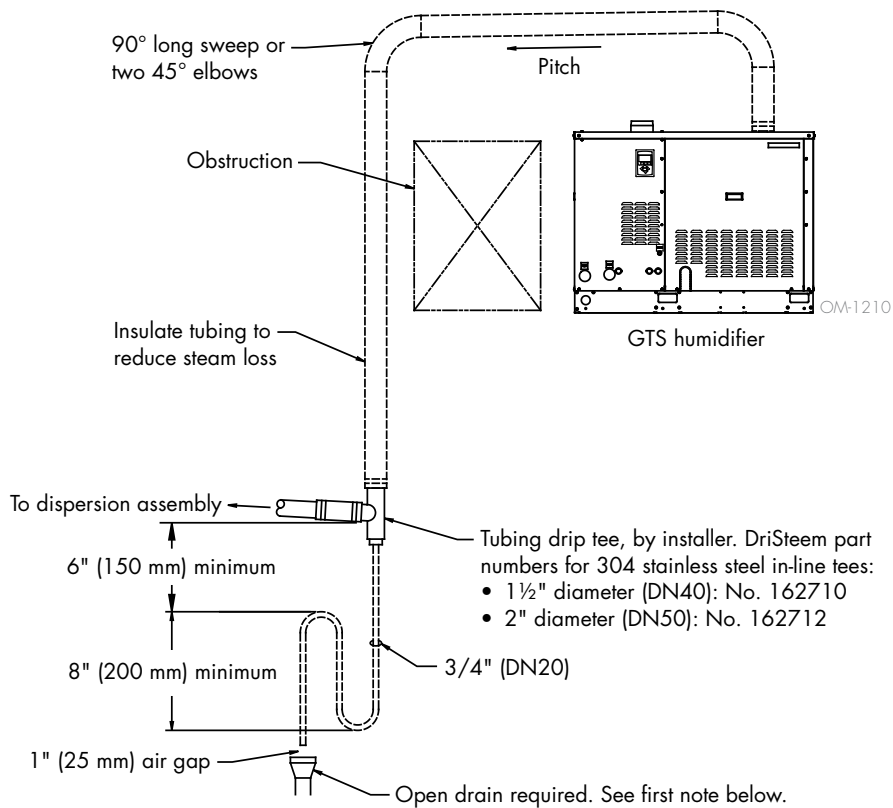
Dispersion: Drip tee installation

Install a drip tee as shown below

- When the humidifier is mounted higher than the dispersion assembly
- When interconnecting hose or piping needs to go over an obstruction
- When interconnecting piping runs are long

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

FIGURE 37-1: DRIP TEE INSTALLATION (PIPING OVER AN OBSTRUCTION)



Notes:

- Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam, or condensing on nearby surfaces may occur. Refer to governing codes for drain pipe size and maximum discharge water temperature.
- Support steam hose so there are no sags or low spots
- Dashed lines indicate provided by installer

Dispersion: Single tube and multiple tube

INSTALLATION

See the following pages for detailed drawings and notes for installing single tube and multiple tube dispersion assemblies.

DISPERSION TUBE MOUNTING

- Orient dispersion tube(s) so the tubelets (steam orifices) point up.
- See Table 37-1 for dispersion tube pitch requirements.
- If mounting the humidifier above the level of the dispersion tube(s), see Figure 35-1.

CONDENSATE DRAIN PIPING

- Minimum diameter (ID) for draining from one or two dispersion tubes: 3/4" (DN20)
- Minimum diameter (ID) for draining from three or more dispersion tubes: 1" (DN25)
- Condensate drain piping must be rated for 212 °F (100 °C) continuous operating temperature.
- Condensate drain line must be piped as shown in the figures on the following pages. Provide a 6" (152 mm) drop prior to a 5" (127 mm) water seal to ensure drainage of condensate from the header and to keep steam from blowing out of the drain line
- After the water seal, run the drain line to an open drain with a 1" (25 mm) vertical air gap. Cut the drain line at a 45° angle on the end above the drain to permit a direct stream of water into the drain pipe while maintaining a 1" (25 mm) air gap. Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam, or condensing on nearby surfaces may occur.
- All drain lines must be installed and sized according to governing codes.

Important:

Failure to follow the recommendations in this section can result in excessive back pressure on the humidifier. This will result in unacceptable humidification system performance such as leaking gaskets, blown water seals, erratic water level control, and spitting condensate from dispersion tubes.

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Dispersion: Single tube and multiple tube

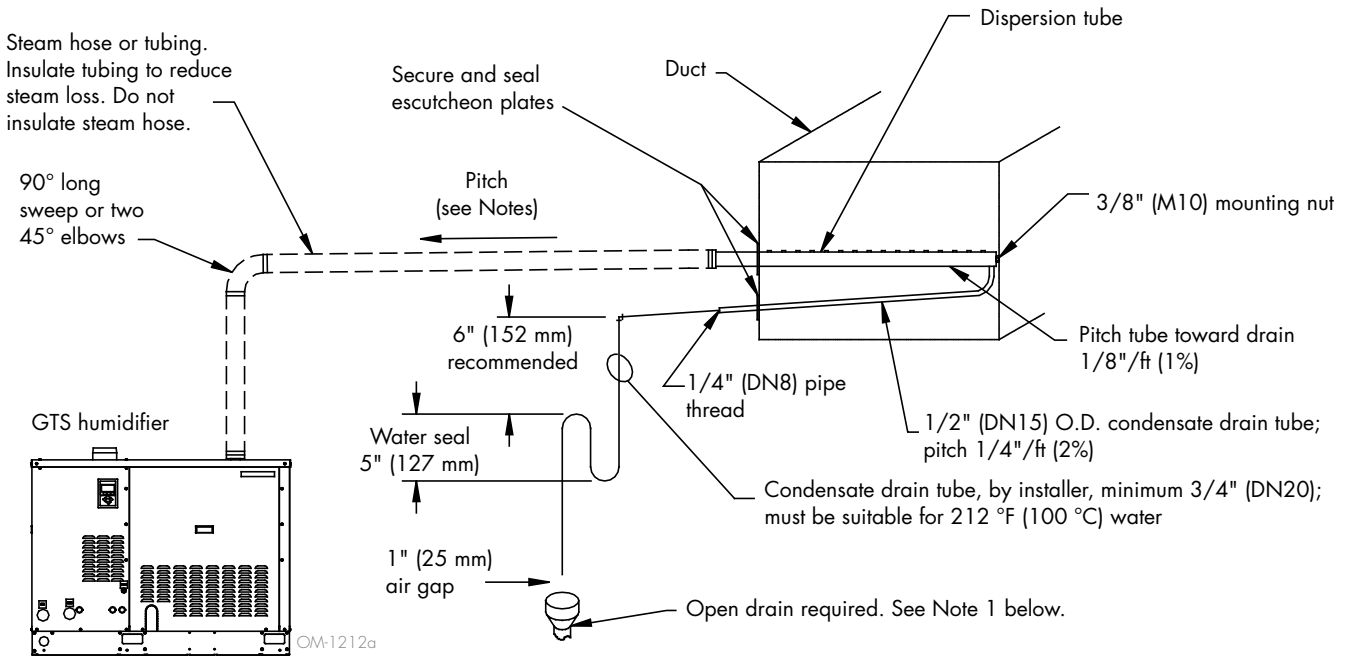
Table 39-1:
Pitch of dispersion tubes and interconnecting piping for single tube or multiple tube evaporative dispersion units*

Condensate drain	Type of interconnecting piping	Diameter of dispersion tube and interconnecting piping	Pitch of interconnecting piping toward humidifier	Pitch of dispersion tube(s)	Pitch of condensate drain
Without drain	Steam hose	1 1/2" (DN40)	2"/ft (15%)	2"/ft (15%) toward humidifier	No drain
		2" (DN50)			
	Tubing	1 1/2" (DN40)	1/8"/ft (1%)		
		2" (DN50)			
With drain	Steam hose	1 1/2" (DN40)	2"/ft (15%)	1/8"/ft (1%) toward condensate drain	1/4"/ft (2%) toward floor drain or toward humidifier if humidifier is below dispersion unit
		2" (DN50)			
	Tubing	1 1/2" (DN40)	1/2"/ft (5%)		
		2" (DN50)	1/4"/ft (2%)		

Notes:
 * When piping over an obstruction, see the drip tee installation illustration Figure 37-1.
 • Assemble multiple dispersion tubes or use a Rapid-sorb or Ultra-sorb dispersion assembly to accommodate maximum humidifier load.
 • The smallest GTS humidifier steam outlet is 2" (DN50). Install an adaptor manifold if using multiple 1 1/2" (DN40) dispersion tubes. See Table 35-1.

Dispersion: Single tube and multiple tube

FIGURE 40-1: SINGLE TUBE DISPERSION WITH CONDENSATE WASTED TO FLOOR DRAIN

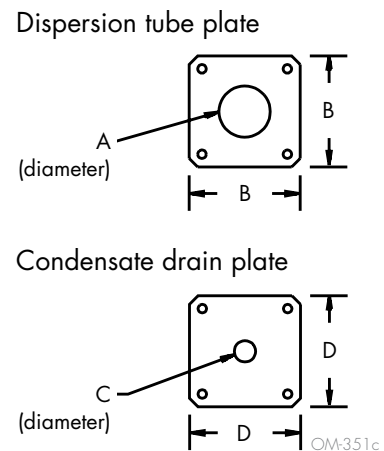


- Notes:
1. Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam, or condensing on nearby surfaces may occur. Refer to governing codes for drain pipe size and maximum discharge water temperature.
 2. Assemble multiple dispersion tubes or use a Rapid-sorb or Ultra-sorb dispersion assembly where necessary to accommodate maximum humidifier load.
 3. The smallest GTS humidifier steam outlet is 2" (DN50). Install an adaptor manifold if using multiple 1½" (DN40) dispersion tubes. See also Table 37-1.
 4. Pitch steam hose or tubing toward humidifier:
 - 2"/ft (15%) when using steam hose
 - 1/2"/ft (5%) when using 1½" tubing
 - 1/4"/ft (2%) when using 2" tubing
 5. Dashed lines indicate provided by installer

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

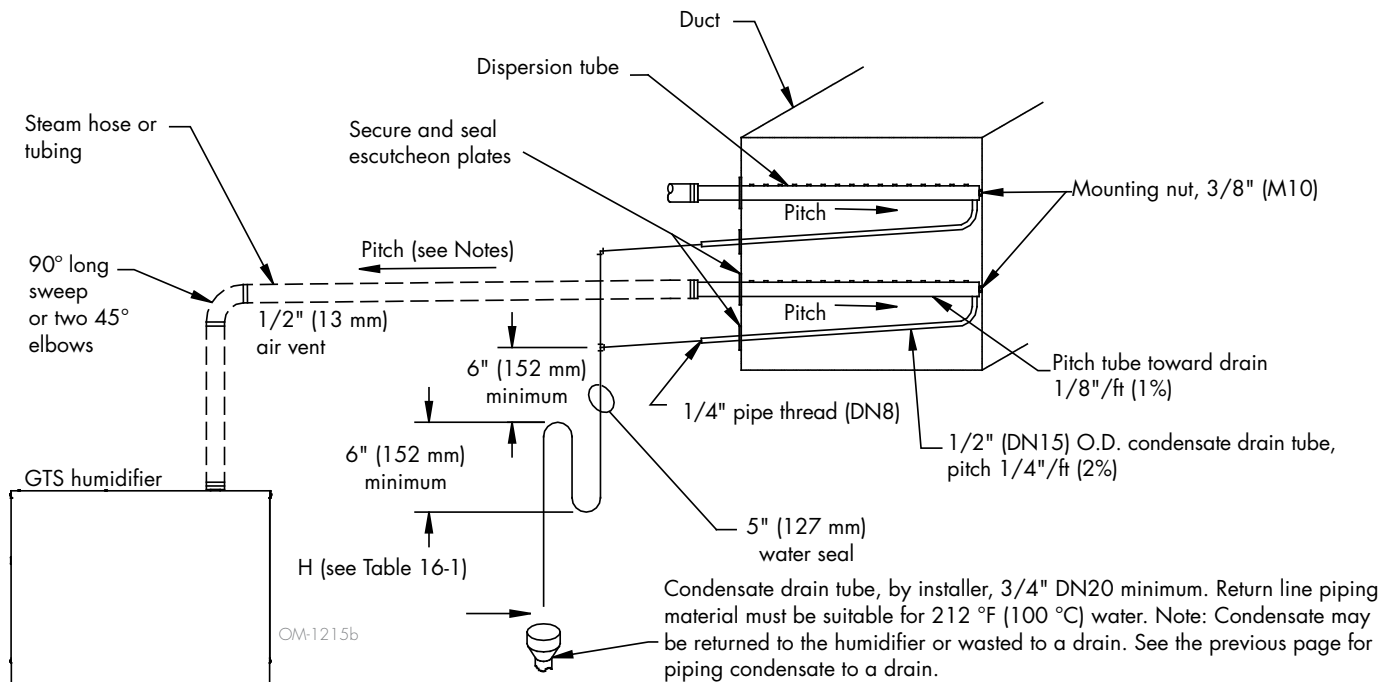
	for 1½" (DN40) tube		for 2" (DN50) tube	
	inches	mm	inches	mm
A	1.51	38	2.03	52
B	3.25	83	5.00	127
C	0.75	19	0.75	19
D	3.25	83	3.25	83

FIGURE 40-2: DISPERSION TUBE AND CONDENSATE DRAIN ESCUTCHEON PLATES



Dispersion: Single tube and multiple tube

FIGURE 41-1: SINGLE TUBE WITH CONDENSATE RETURNED TO HUMIDIFIER



Notes:

1. Assemble multiple dispersion tubes or use a Rapid-sorb or Ultra-sorb dispersion assembly where necessary to accommodate maximum humidifier load.
2. The smallest GTS humidifier steam outlet is 2" (DN50). Install an adaptor manifold if using multiple 1 1/2" (DN40) dispersion tubes. See also Table 37-1.
3. Pitch steam hose or tubing toward humidifier:
 - 2"/ft (15%) when using steam hose
 - 1/2"/ft (5%) when using 1 1/2" (DN40) tubing
 - 1/4"/ft (2%) when using 2" (DN50) tubing
4. Dashed lines indicate provided by installer

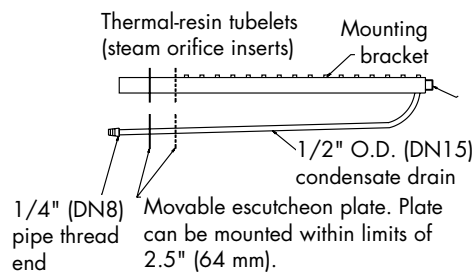
Table 41-1: Single dispersion tube capacities*

Tube size		Insulated (High-Efficiency Tubes)				Uninsulated			
		Without drain		With drain		Without drain		With drain	
inches	DN	lbs/hr	kg/h	lbs/hr	kg/h	lbs/hr	kg/h	lbs/hr	kg/h
1 1/2	40	29	13.2	65	29.5	28	12.7	62	28.2
2	50	65	29.5	97	44.1	62	28.2	93	42.3

Notes:

- * If face width is <19" (483 mm), tube capacity may be reduced. Consult DriSteem or see DriCalc for the correct capacity.
- Single dispersion tube available with face width between 6" (152 mm) up to 120" (3048 mm) in 1" (25 mm) increments.
- Hose kits are available that include dispersion tube, 10 ft (3 m) of steam hose, and hardware
- The smallest GTS humidifier steam outlet is 2" (DN50). Install an adaptor manifold if using multiple 1 1/2" (DN40) dispersion tubes.

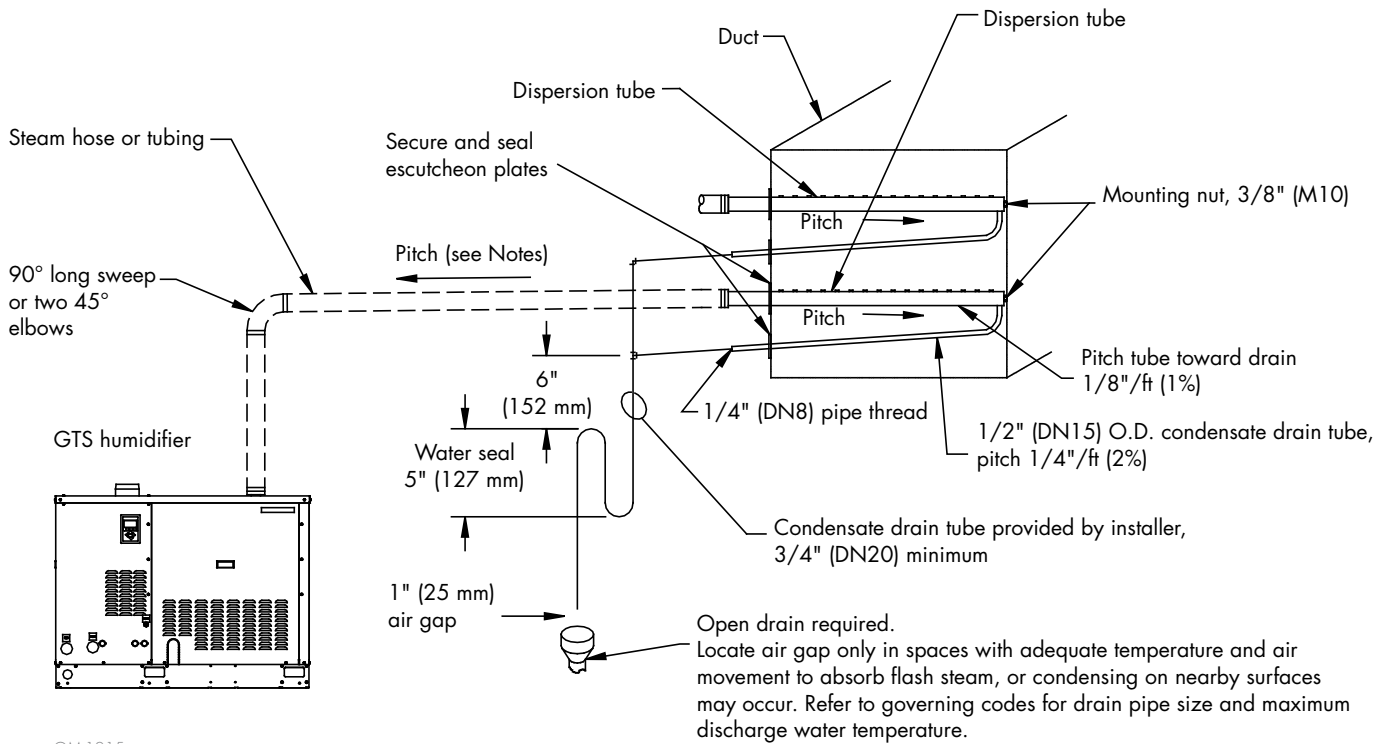
FIGURE 41-2: SINGLE TUBE DISPERSION WITH CONDENSATE DRAIN



OM-351b

Dispersion: Single tube and multiple tube

FIGURE 42-1: MULTIPLE TUBES WITH CONDENSATE WASTED TO FLOOR DRAIN



OM-1215a

- Notes:
1. Assemble multiple dispersion tubes or use a Rapid-sorb or Ultra-sorb dispersion assembly where necessary to accommodate maximum humidifier load.
 2. The smallest GTS humidifier steam outlet is 2" (DN50). Install an adaptor manifold if using multiple 1½" (DN40) dispersion tubes. See also Table 37-1.
 3. Pitch steam hose or tubing toward humidifier:
 - 2"/ft (15%) when using steam hose
 - 1/2"/ft (5%) when using 1½" (DN40) tubing
 - 1/4"/ft (2%) when using 2" (DN50) tubing
 4. Dashed lines indicate provided by installer

Dispersion: Rapid-sorb

GENERAL INSTALLATION INSTRUCTIONS

Before you begin installation, read all dispersion instructions in this manual.

- Unpack shipment and verify receipt of all Rapid-sorb components with packing list. Report any shortages to DriSteem factory immediately. The components typically include the following:
 - Multiple dispersion tubes
 - Header
 - 3/4" x 2" (19 mm x 51 mm) L-bracket
 - A single duct escutcheon plate the size of the header
 - Slip couplings or hose cuffs and clamps.
 - Accessories such as duct plates, slip couplings, or hose cuffs (in plastic bag)
 - Bolts and washers for mounting dispersion tubes to bracket (in end of tubes or packaged in a bag with other accessories)
 - Tubes, header, and L-bracket are tagged with customer requested identification number written on each component.
 - When choosing a location for installation, select a location that provides necessary access in and around ductwork or air handler.
 - Rapid-sorb is typically installed centered side to side in duct, or across face of coil in air handler.
 - Center line of outer dispersion tubes should never be closer than 4.5" (114 mm) from side of ductwork or air handler wall.
 - Rapid-sorbs are provided with an L-bracket for installation:
 - L-brackets 50" (1270 mm) or shorter have a hole 4" (102 mm) from each end for mounting L-bracket to duct or air handler wall.
 - L-brackets longer than 50" (1270 mm) have an additional hole in center of L-bracket.
 - **Important:** Before marking and drilling holes in duct or air handler, refer to ALL pitch requirements for the Rapid-sorb assembly you received (see Table 42-1). Size, quantity, and location of penetrations are determined by specific dimensions and configuration of Rapid-sorb assembly you received.
- Note: Hardware for mounting L-bracket to duct or air handler wall and hardware for header support bracket is not provided.
- The Rapid-sorb instructions are for the most typical Rapid-sorb installations
 - installed in a duct horizontal airflow with Rapid-sorb header either inside or outside of duct. See DriCalc Installation Guides library or contact your representative/distributor or DriSteem for installation instructions for air handler or vertical airflow applications.

Important:

Failure to follow the recommendations in this section can result in excessive back pressure on the humidifier. This will result in unacceptable humidification system performance such as leaking gaskets, blown water seals, erratic water level control, and spitting condensate from dispersion tubes.

Table 43-1:
Rapid-sorb tube capacities*

Tube diameter		Insulated (High-Efficiency Tubes)		Uninsulated	
inches	DN	lbs/hr	kg/h	lbs/hr	kg/h
1½	40	43	19.5	40	18.2
2	50	80	36.4	77	35

* Capacities shown are for horizontal airflow. See DriCalc for vertical airflow capacities. If face height is <22" (559 mm), tube quantity per panel may need to increase to compensate for reduced capacity of short tubes. Consult DriSteem or see DriCalc for the correct calculation.

Table 43-2:
Rapid-sorb header capacities

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

Dispersion: Rapid-sorb

PITCH REQUIREMENTS

- When installing Rapid-sorb with header outside a horizontal airflow duct, consider the following pitch issues:
 - For 1 ½" (DN40) dispersion tubes, use a fastener of sufficient length to accommodate 1/8"/ft (1%) pitch requirements toward the 3/4" pipe thread (DN20) header drain fitting.
 - For 2" (DN50) dispersion tubes, bracket can be mounted flush to ductwork. The 1/8"/ft (1%) pitch typically can be accomplished in length of hose cuffs used to connect tubes to header.
- See the table below and the drawings on the following pages for pitch requirements.

Table 44-1:
Pitch of interconnecting piping, dispersion tubes, and headers for Rapid-sorb evaporative dispersion units

Airflow	Type of interconnecting piping	Diameter of interconnecting piping	Pitch of interconnecting piping	Pitch of dispersion tubes	Pitch of header
Horizontal	Steam hose	1 ½" (DN40), 2" (DN50)	2"/ft (15%) toward Rapid-sorb	Vertically plumb	1/8"/ft (1%) toward condensate drain
	Tubing	1 ½" (DN40), 2" (DN50), 3" (DN80), 4" (DN100), 5" (DN125), 6" (DN150)	1/8"/ft (1%) toward Rapid-sorb		
Vertical	Steam hose	1 ½" (DN40), 2" (DN50)	2"/ft (15%) toward Rapid-sorb	2"/ft toward header	1/8"/ft (1%) toward condensate drain
	Tubing	1 ½" (DN40), 2" (DN50), 3" (DN80), 4" (DN100), 5" (DN125), 6" (DN150)	1/8"/ft (1%) toward Rapid-sorb		

Dispersion: Rapid-sorb

RAPID-SORB HEADER OUTSIDE OF DUCT (HORIZONTAL AIRFLOW)

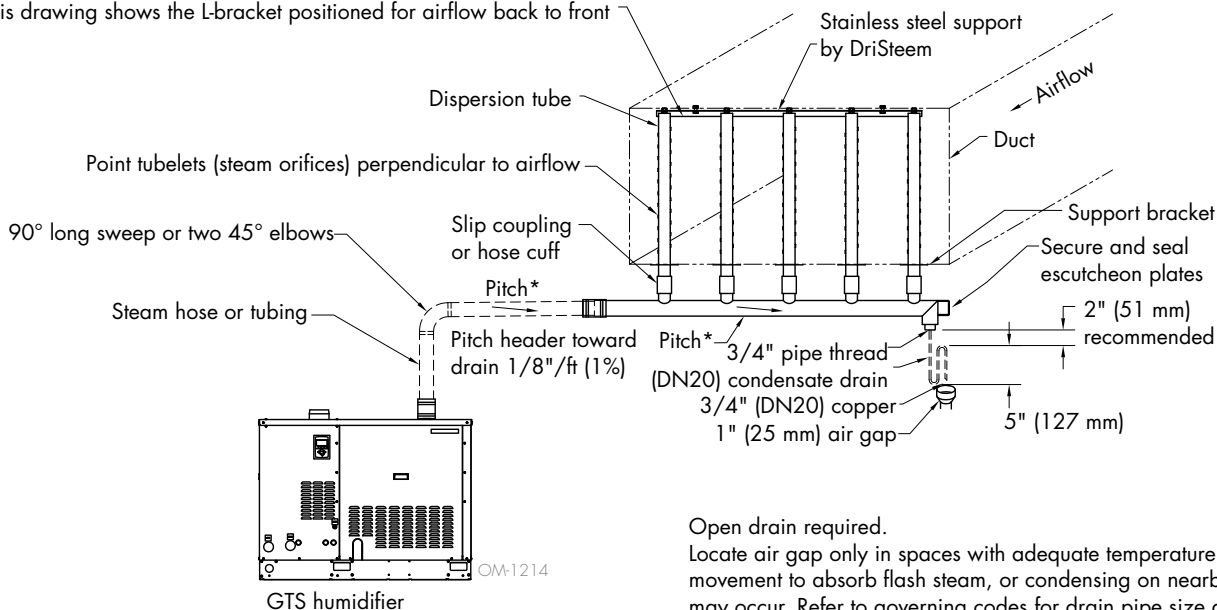
1. Locate and cut holes in ductwork for dispersion tubes. Use L-bracket as a template to locate holes on duct floor.
2. Temporarily, loosely suspend or support header below final location — vertical balance point of the dispersion tube length dictates where header should be suspended or supported temporarily.
3. Mount dispersion tubes to header with provided connector, either a slip coupling or a hose cuff.
 - When installing slip couplings for 1 1/2" (DN40) dispersion tubes, take care not to shear O-rings.
 - Set slip coupling on header stub or dispersion tube so O-ring is resting on face of tubing.
 - Rotate slip coupling as you push them onto tubing.
 - O-rings are lubricated at factory. If additional lubrication is necessary, DO NOT use a petroleum-based lubricant.
4. Position flange of L-bracket so it is upstream of tubes when assembly is raised and fastened into position. Fasten L-bracket to end of dispersion tubes with provided bolt, lock washer, and flat washer.

Note:
See Figure 45-1 for steam supply and condensate drain line connection instructions.

Continued

FIGURE 45-1: RAPID-SORB WITH HEADER OUTSIDE THE DUCT, HORIZONTAL AIRFLOW

Position L-bracket so that flange is upstream of dispersion tubes.
This drawing shows the L-bracket positioned for airflow back to front



Open drain required.
Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam, or condensing on nearby surfaces may occur. Refer to governing codes for drain pipe size and maximum discharge water temperature.

* Pitch steam hose or tubing toward Rapid-sorb:
 - 2"/ft (15%) when using steam hose
 - 1/8"/ft (1%) when using tubing

Dispersion: Rapid-sorb

5. Before tightening L-bracket bolts to dispersion tubes:
 - For 1 ½" (DN40) dispersion tubes:
 - Dispersion tube will rotate in slip coupling. Verify that dispersion tube orifices are directed perpendicular to airflow.
 - Dispersion tube and slip coupling must be fully engaged onto header stub for O-rings to provide a seal.
 - For 2" (DN50) dispersion tubes:

Before securing hose cuff in place with hose clamps on dispersion tube and header stub, verify that dispersion tube orifices are directed perpendicular to airflow.
6. Slide assembly up until L-bracket aligns with mounting holes in duct.
 - For 1 ½" (DN40) dispersion tubes:
 - Header pitch is duplicated in L-bracket.
 - Dispersion tube and slip coupling must be fully engaged on header stub for O-rings to provide a seal.
 - High end of L-bracket can be fastened tightly to duct or air handler.
 - On low end of L-bracket, fastener must be long enough to compensate for pitch, and a nut should be provided and secured on both sides of L-bracket and duct or air handler for stability.
 - For 2" (DN50) dispersion tubes:
 - Fasten bracket to top of duct, and use hose cuffs to compensate for pitch of header.
 - Before securing hose cuff in place with hose clamps on dispersion tube and header stub, verify that header pitch of 1/8"/ft (1%) toward drain, is maintained.
7. Permanently secure both ends of the header and verify that the header pitch, 1/8"/ft (1%) toward drain, is maintained.
8. Verify that all fasteners are secure:
 - L-bracket to duct
 - Dispersion tubes to L-bracket
 - Hose clamps on 2" (DN50) tubes
9. Secure and seal dispersion tube escutcheon plate and condensate drain tube escutcheon plate around respective tubes, if applicable.

Dispersion: Rapid-sorb

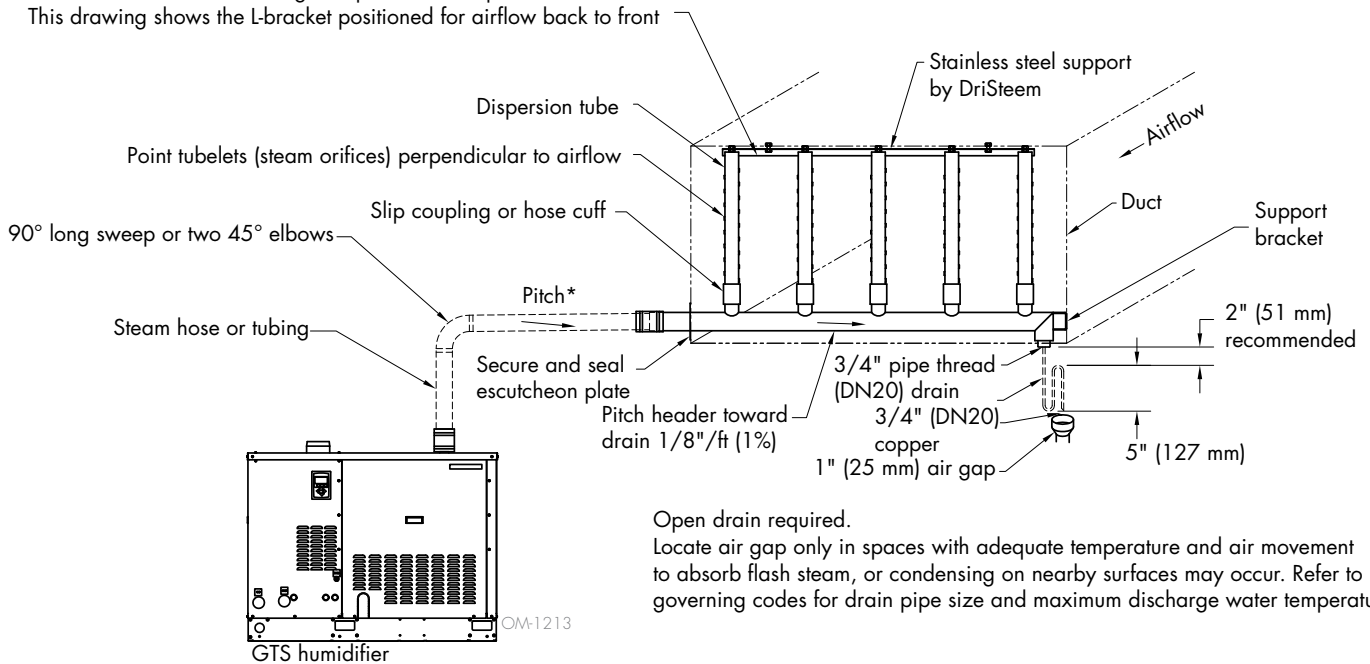
RAPID-SORB HEADER INSIDE OF DUCT (HORIZONTAL AIRFLOW)

1. Locate and cut the holes in ductwork or air handler for steam header penetration, condensate drain piping, and header support bracket fastener. Allow 1/8"/ft (1%) header pitch toward the support bracket when you drill the hole for the header support bracket fastener.
2. Loosely fasten the header in place.
3. Rotate the header 90° so the header stubs point horizontally in the duct. When installing in an air handler, the rotation of the header is often less than 90°. Typically, due to the condensate drain piping requirements, the header can be set on the floor of the air handler, assembled in the vertical position, and then raised and mounted in place.

Continued

FIGURE 47-1: RAPID-SORB HEADER INSIDE THE DUCT, HORIZONTAL AIRFLOW

Position L-bracket so that flange is upstream of dispersion tubes.
This drawing shows the L-bracket positioned for airflow back to front



Open drain required.
Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam, or condensing on nearby surfaces may occur. Refer to governing codes for drain pipe size and maximum discharge water temperature.

- * Pitch steam hose or tubing toward Rapid-sorb:
- 2"/ft (15%) when using steam hose
 - 1/8"/ft (1%) when using tubing

Dispersion: Rapid-sorb

4. Mount the dispersion tubes on the header with the slip couplings or hose cuffs.
 - When installing slip couplings for 1 ½" (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.
 - 1 ½" (DN40) dispersion tubes
 - The header pitch is duplicated in the L-bracket.
 - The dispersion tube and slip coupling must be fully engaged on to the header stub for the O-rings to provide a seal.
 - The high end of the L-bracket can be fastened tight to the duct or air handler.
 - On the low end of the L-bracket, the fastener must be long enough to compensate for the pitch, and a nut should be provided and secured on both sides of the L-bracket and the duct or air handler for stability.
 - 2" (DN50) dispersion tubes
 - Fasten the bracket to the top of the duct or air handler and use the hose cuffs to compensate for the pitch of the header.
 - Before securing the hose cuff in place, with the hose clamps on the dispersion tube and the header stub, verify that the dispersion tube orifices are directed perpendicular to the airflow.
8. Verify that all fasteners are secure:
 - L-bracket to duct
 - Dispersion tubes to L-bracket
 - Hose clamps on 2" (DN50) tubes
 - Header support bracket fastener
9. Secure and seal the header escutcheon plate around the header.
10. See Figure 45-1 for steam supply and condensate drain line connection instructions.

Dispersion: Rapid-sorb

STEAM SUPPLY CONNECTIONS TO THE RAPID-SORB HEADER

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

CONDENSATE DRAIN CONNECTIONS TO THE RAPID-SORB HEADER

1. Piping must be minimum 3/4" I.D. (DN20) and rated for 212 °F (100 °C) minimum continuous operating temperature.
2. Condensate drain line must be piped as shown in the figures on the previous pages. Provide a 6" (152 mm) drop prior to a 5" (127 mm) water seal to:
 - Ensure drainage of condensate from the header
 - Keep steam from blowing out of the drain line
3. After the water seal, run the drain line to an open drain with a 1" (25 mm) vertical air gap. Cut the drain line at a 45° angle on the end above the drain to permit a direct stream of water into the drain pipe while maintaining a 1" (25 mm) air gap. Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam, or condensing on nearby surfaces may occur.
4. All drain lines must be installed and sized according to governing codes.

Dispersion: Area-type fan

Table 50-1:
Area-type (evaporative steam) minimum non-wetting distances*

Maximum steam capacity		60 °F (16 °C)																	
		30% RH						40% RH						50% RH					
		Rise		Spread		Throw		Rise		Spread		Throw		Rise		Spread		Throw	
lbs/hr	kg/h	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m
50	20	1.0	0.3	2.0	0.6	6.0	1.8	1.0	0.3	2.0	0.6	6.0	1.8	1.0	0.3	2.5	0.8	6.0	1.8
75	34	3.0	0.9	3.0	0.9	8.0	2.4	3.0	0.9	3.0	0.9	8.0	2.4	3.0	0.9	4.0	1.2	8.0	2.4
100	45	4.0	1.2	4.0	1.2	10.0	3.1	4.0	1.2	4.0	1.2	10.0	3.1	4.0	1.2	5.0	1.5	10.0	3.1
150	68	6.0	1.8	5.0	1.5	12.0	3.7	6.0	1.8	5.0	1.5	12.0	3.7	6.0	1.8	5.0	1.5	12.0	3.7
200	90	7.0	2.1	7.0	2.1	13.0	4.0	8.0	2.4	7.0	2.1	14.0	4.3	8.0	2.4	7.0	2.1	14.0	4.3
225	102	7.0	2.1	7.0	2.1	13.0	4.0	8.0	2.4	7.0	2.1	14.0	4.3	8.0	2.4	7.0	2.1	14.0	4.3
250	110	8.0	2.4	8.0	2.4	15.0	4.6	9.0	2.7	9.0	2.7	16.0	4.9	9.0	2.7	9.0	2.7	16.0	4.9
285	130	9.0	2.7	9.0	2.7	17.0	5.2	10.0	3.1	10.0	3.1	18.0	5.5	10.0	3.1	10.0	3.1	18.0	5.5
300	136	9.0	2.7	9.0	2.7	17.0	5.2	10.0	3.1	10.0	3.1	18.0	5.5	10.0	3.1	10.0	3.1	18.0	5.5
Maximum steam capacity		70 °F (21 °C)																	
		30% RH						40% RH						50% RH					
		Rise		Spread		Throw		Rise		Spread		Throw		Rise		Spread		Throw	
lbs/hr	kg/h	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m
50	20	1.0	0.3	1.5	0.5	4.0	1.2	1.0	0.3	2.0	0.6	4.0	1.2	1.0	0.3	2.0	0.6	4.0	1.2
75	34	2.0	0.6	2.0	0.6	6.0	1.8	2.0	0.6	2.5	0.8	6.0	1.8	2.0	0.6	2.5	0.8	6.0	1.8
100	45	3.0	0.9	3.0	0.9	8.0	2.4	3.0	0.9	3.0	0.9	8.0	2.4	3.0	0.9	3.0	0.9	8.0	2.4
150	68	4.0	1.2	4.0	1.2	10.0	3.1	4.0	1.2	4.0	1.2	11.0	3.4	4.0	1.2	4.0	1.2	11.0	3.4
200	90	5.0	1.5	5.0	1.5	11.0	3.4	5.0	1.5	5.0	1.5	12.0	3.7	5.0	1.5	5.0	1.5	12.0	3.7
225	102	5.0	1.5	5.0	1.5	11.0	3.4	5.0	1.5	5.0	1.5	12.0	3.7	5.0	1.5	5.0	1.5	12.0	3.7
250	110	6.0	1.8	6.0	1.8	12.0	3.7	6.0	1.8	6.0	1.8	13.0	4.0	6.0	1.8	6.0	1.8	14.0	4.3
285	130	7.0	2.1	7.0	2.1	14.0	4.3	7.0	2.1	7.0	2.1	15.0	4.6	7.0	2.1	7.0	2.1	16.0	4.9
300	136	7.0	2.1	7.0	2.1	14.0	4.3	7.0	2.1	7.0	2.1	15.0	4.6	7.0	2.1	7.0	2.1	16.0	4.9

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

Dispersion: Area-type fan

Table 48-1 lists the Area-type steam minimum rise, spread, and throw nonwetting dimensions. Surfaces or objects located within this minimum dimension can cause condensation and dripping.

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

The Area-type fan, brackets, and wiring are factory installed on the humidifier.

Note: For European Area-type models, contact your Distributor for parts.

FIGURE 51-2: AREA-TYPE RISE, SPREAD, THROW

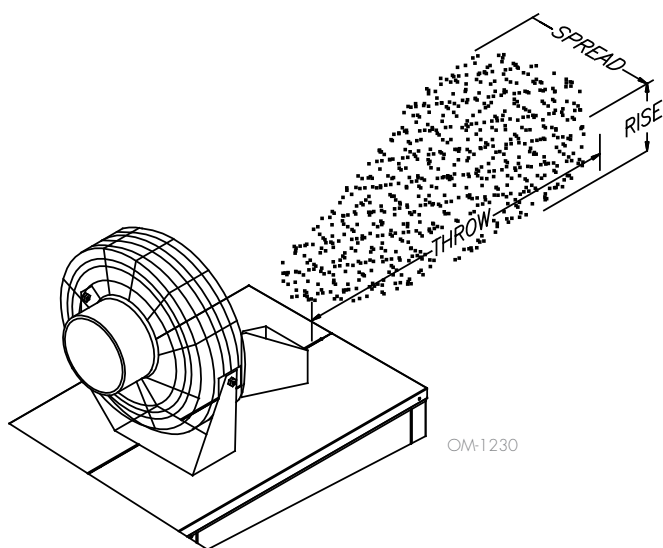


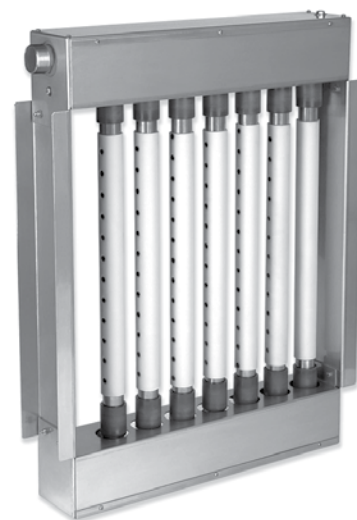
Table 51-1: Area-type electric fan specifications	
Motor	120 V, 50/60 Hz
Blade diameter	18" (457 mm)
Speeds	3
Control	Rotary switch
RPM (high speed)	1500
Amps (high speed)	1.52

Ultra-sorb

For Ultra-sorb steam dispersion panel instructions, see the installation, operation, and maintenance manual shipped with the Ultra-sorb.

Also see Figure 51-1.

FIGURE 51-1: ULTRA-SORB WITH THE HIGH-EFFICIENCY TUBE OPTION



High-efficiency Tube option

Dispersion assemblies with the High-efficiency Tube option are designed to produce significantly less dispersion-generated condensate and airstream heat gain, which reduces wasted energy by up to 85%. These improvements are accomplished by reducing the thermal conductivity of the tubes with 1/8" of polyvinylidene fluoride (PVDF) insulating material on the outside of the tubes. These assemblies require careful unpacking, installation, and handling.

Start-up

START-UP CHECKLIST

After the system is installed and connected to gas, electrical, water supplies, and controls, check the following items:

- Verify that the GTS humidifier, controls, piping, electrical connections, steam supply, and dispersion unit(s) are installed according to the following:
 - Installation instructions in this manual
 - *Vapor-logic Installation and Operation Manual* (shipped with the humidifier)
 - Installation section
 - Installation checklist
 - Ladder style wiring diagram (shipped inside unit)
 - External connections wiring diagram (shipped inside unit)
 - Gas connection instructions in this manual
 - Mounting instructions in this manual
 - All governing codes
- Piping (gas)
 - Verify that the gas type supplied to the humidifier matches the unit nameplate label.
 - Verify that all field and humidifier gas piping has been tested for leaks. (Soap and water are not recommended near gas valves.)
- Piping (steam, drain, supply water)**—Verify that all piping connections have been completed as recommended and that water pressure is available.
- Electrical**—Verify that all wiring connections have been made in accordance with all governing codes and the GTS wiring diagrams.
- Controls**—Verify that all control wiring has been completed as specified and required for correct and safe operation of the GTS humidifier. Refer to the *Vapor-logic Installation and Operation Manual*.
- Insure proper RH sensor and high limit placement to minimize short-cycling of the GTS humidifier. Refer to the *Vapor-logic Installation and Operation Manual*.
- Venting**—Verify a flue box condensate drain is installed on the flue box p-trap. Ensure the p-trap is primed. See page 22.
- Venting**—Verify a drip tee has been installed when exceeding 20 ft (6m) in length.
- Verify the ignitor resistance is less than 100 ohms (120V ignitor) (See Figure 53-1).
- Verify that the humidifier tank is securely installed and level before filling with water (see the operating weights in Table 4-1).
- Verify that the humidifier tank is level front to back and side to side after it is full of water.

WARNING

Startup

Only qualified electrical and gas personnel should perform the start-up procedure.

The *Vapor-logic Installation and Operation Manual* is a comprehensive operation manual. Refer to it for information regarding the following features:

- Keypad display setup and menu information
- Control input signals and functions
- Drain, flush, and skim features
- Safety features
- Alarm screens and fault messages

The manual was shipped with your humidifier. Additional copies can be viewed, printed, or ordered on our website: www.dristeem.com

Start-up

START-UP PROCEDURE

1. Refer to the *Vapor-logic Installation and Operation Manual*, and verify that the installer has followed the Pre-installation Checklist (including proper wiring).

2. Follow the "Start-up commissioning checklist" on Pages 52 and 53 of this manual.

Note: During start-up, do not leave the humidifier unattended.

3. Monitor the humidifier operation through multiple fill cycles. The humidifier operating status appears on the Vapor-logic keypad/display.

Notes:

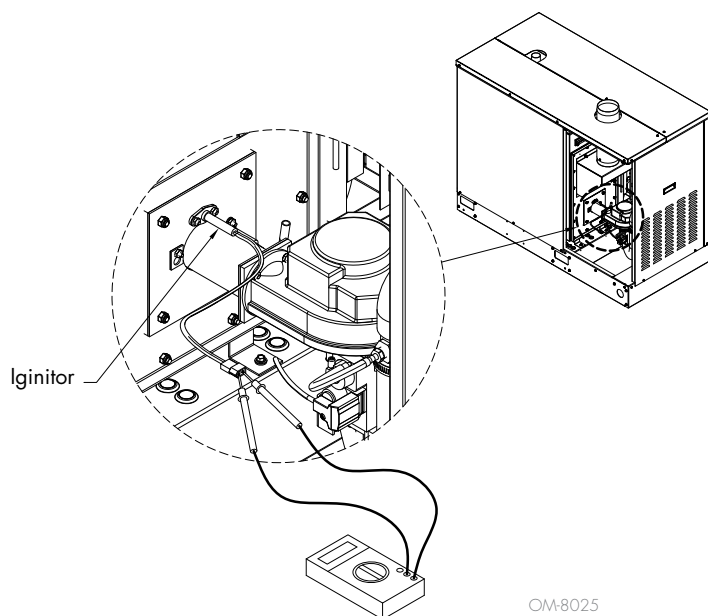
- On tap/softened water units, water skims from the humidifier after every fill cycle. Adjust the amount of skim by increasing or decreasing the skim time (see the *Vapor-logic Installation and Operation Manual*).
- At start-up, DriSteem recommends initially running the humidifier with the factory default setting for skim time. See "Adjusting skim duration" on Page 56, and see the Vapor-logic controller Setup menu.

For complete operating instructions, read and follow the instructions in the "Operation" section of the *Vapor-logic Installation and Operation Manual*.

IGNITOR RESISTANCE CHECK

1. Follow shutdown procedure on Page 56.
2. Unplug the electrical connector to the ignitor.
3. Using a multi-meter set to ohms, insert a probe into each terminal of the connector (see Figure 53-1).
4. Replace ignitor if resistance exceeds 500 ohms (120V ignitor).

FIGURE 53-1: IGNITOR RESISTANCE CHECK



Systems and safeguards

The GTS humidifier has a number of systems and safeguards to ensure proper operation.

- When there is a call for humidity, all of the combustion blowers must start. Each combustion blower sends a signal to the microprocessor relaying its current speed. If this actual speed is outside an acceptable range, the GTS will not operate.
- The negative pressure gas valves used on the GTS are designed to keep a constant ratio of air and gas throughout the operating range of the blower. If the flue becomes blocked or the blower fails to run, the blocked flue sensor will shut down the humidifier.
- During operation, the water level in the tank is monitored by a probe system for tap/softened water units and by a low water float for RO/DI units. These water monitors tie into the Vapor-logic controller. If the water level drops below a safe point, the controller turns heaters off and tries to fill. If humidifier is unable to fill within a defined time period, an "Excessive refill time" alarm appears in the Vapor-logic Alarm Log. The heaters will remain off until this alarm is cleared. (For more about alarms, see the *Vapor-logic Installation and Operation Manual*.)
- In tap/softened water applications, the water level in the tank is also monitored by a redundant low-water system that runs independently of the Vapor-logic. This system is tied directly into the power source for the gas valves. If this system detects a low water condition, the humidifier shuts down until water is present or until the a "GTS low water" alarm is cleared from the Vapor-logic Alarm Log.
- In addition to monitoring the water level, there is a temperature sensor located near the top of the heat exchanger. If the water level drops too low and both the main and redundant low water sensors fail to detect it, the temperature sensor shuts down the humidifier before an unsafe condition occurs.

Start-up commissioning checklist

Visit date _____
 Model # _____
 Serial # _____
 Tag # _____

Job site representation:

Important: Troubleshooting information for this humidifier is located in the *Vapor-logic Installation and Operation Manual* shipped with your humidifier. If you do not have this manual, go to www.dristeem.com to download or order a copy.

Job name _____
 Program code _____
 DriSteem rep _____

Supply water

- RO
- DI
- Softened
- Potable
- Grains hardness _____
- Hot*
- Cold
- Water pressure _____ psi
 (must be between 25 and 80 psi
 [172 and 582 kPa])
- Supply water piping is 3/8" pipe thread (DN10) minimum
 Float adjustments (DI system)

Required clearances

- Top cover removal 18" (457 mm)
- Distance vent box to combustible 30" (762 mm)
- Cleanout plate side 36" (914 mm)

Wiring

- Control transmitter
 Gauge _____
- Shield
- High limit duct humidistat
 Gauge _____
- Shield
- Airflow proving switch
- Power vent
- Combustion air damper
- Area-type fan
- External fault contact
- Twisted pair connection between boards
 (for multiple units only)

* If using heated supply water, disconnect the supply water line to the water tempering device at the fill manifold and reconnect it to a cold water supply. This will ensure that the water tempering device operates properly.

Gas supply

- Natural
- LP
- Manifold pressure _____ inches wc (_____ kPa)
- Supply shutoff valve distance _____
- Supply line size _____

Steam pipe

- Outlet size _____
- Flange
- Hard pipe
- Insulated
- Steam hose (do not insulate)
- Rise _____
- Run _____
- Pitched back to humidifier
- 45° angles used in piping

Flue piping

- Class _____
- Size _____
- Rise _____
- Run _____
- Slight pitch toward drip tee
- Termination point capped and covered
- Power venter location _____
- Barometric damper location _____

Continued

Start-up commissioning checklist

Dispersion

- Ultra-sorb
- Rapid-sorb
- Single tube
- Single tube with drain
- Area-type fan

Condensate/drain piping

Water seal height of dispersion system _____

- Air gap
- Condensate return to tank
- Drane-kooler

Cold-start burner ignition

Burner 1 lights after: First try
 Second try
 Third try

Burner 1 color after 15 minutes:
 Blue
 Orange
 Red-orange

Burner 2 lights after: First try
 Second try
 Third try

Burner 2 color after 15 minutes:
 Blue
 Orange
 Red-orange

Burner 3 lights after: First try
 Second try
 Third try

Burner 3 color after 15 minutes:
 Blue
 Orange
 Red-orange

Burner 4 lights after: First try
 Second try
 Third try

Burner 4 color after 15 minutes:
 Blue
 Orange
 Red-orange

Ignitor

Starting resistance (ohms) (Less than 100 ohms)
 (120V ignitor)

Ignitor 1 _____
 Ignitor 2 _____
 Ignitor 3 _____
 Ignitor 4 _____

Products of combustion (see Table 56-1):

CO _____
 CO₂% _____
 O₂% _____
 Flue temperature _____
 Burner efficiency _____

Safety testing to verify function

Low water test _____
 High humidity limit test _____
 Airflow test _____
 Aquastat test _____

Additional comments

Inspection recommendations

USER INSPECTION EVERY 30 DAYS

- Vent connector is in place, sloping upward and is physically sound without holes or excessive corrosion.
- Physical support of the appliance is sound without sagging, cracks, or gaps between floor stand or tank flanges.
- There are no obvious signs of deterioration of the appliance.
- Burner flame is primarily orange in color — up to a 1/4" (6 mm) from the surface of the burner.
- Check for alarms and messages through the message/alarm log. See Vapor-logic controller instruction manual for description and troubleshooting.
- Check ignition sequence:
 1. Blower on.
 2. Ignitor energized - visual orange glow noted at the burner sight glass
 3. Gas valve on (click) 6 seconds after ignitor glows
 4. Flame on the burner
 5. Flame rectification - flame is sensed
 6. Burner stays on - visual inferred glow (brilliant orange)
- Check ignitor and replace when (whichever one comes first). See Figure 53-1:
 1. The ignitor resistance is greater than 500 ohms (120V ignitor)
 2. The cycle count exceeds 80,000.
 - Notification will appear on Vapor-logic controller
 - First alarm at 80,000 cycles
 - Second alarm and shut-off at 100,000 cycles
 - Replacement verification required to re-start cycle count

Note: If replacing the ignition ignitor, reset the GTS ignitor counter through the Vapor-logic controller setup screen. See the Vapor-logic Installation and Operation Manual for instructions.

WARNING

Shutdown procedure

To prevent severe personal injury or death from electrical shock, fire, or explosion, follow this shutdown procedure before performing service or maintenance procedures on this humidifier.

1. Use Vapor-logic keypad/display, change the control mode to Standby.
2. Place all power disconnects in OFF position and lock in OFF position.
3. Close field-installed manual supply water shut-off valve.
4. Close gas shut-off valves.

Table 56-1:
GTS products of combustion guidelines (at 100% demand)

CO	Less than 40 ppm; 0 or low single digits is typical
CO ₂ %	8-10%; 9% is typical for natural gas, 10% is typical for LP gas
O ₂ %	4-7%
Flue temperature	Less than 400°F plus room temperature (Less than 204.4°C plus room temperature)
Burner efficiency	Greater than 80%

Troubleshooting

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

Inspection recommendations

APPLIANCE SYSTEM INSPECTED AT A MINIMUM ONCE A YEAR BY A QUALIFIED SERVICE PERSON (ANNUAL PRE-SEASONAL INSPECTION)

- Proper field operation of burner. Measure CO, CO₂%, O₂%, flue temperature, and burner efficiency at 100% demand with the tank at a boil. Verify that measurements are within the guidelines described in Table 56-1; if not, consult DriSteem.
- Flue passageways external to the appliance, such as vent connector and chimney, are clear and free of obstructions.
- Upgrade Vapor-logic software to the latest version.
- At least annually, inspect the ventilation apparatus, ensuring the following:
 - Vent connector is in place, sloping upward, and physically sound without holes or excessive corrosion.
 - Physical support of the appliance is sound without sagging, cracks, or gaps between floor stand or tank flanges.
 - Check flue box and seal for condensate leakage.
 - If sealed combustion unit shows signs of condensation on the combustion blower, consult factory.
 - Adequate combustion and ventilation air in accordance with Section 5.3, Air for Combustion and Ventilation, of the National Fuel Gas Code, ANSI Z223.1 or applicable provisions of governing codes.
Canadian installations must be installed in accordance with sections 7.2, 7.3, and 7.4 of the CAN/CGA.B149 Installation Codes and all authorities having jurisdiction.

REPLACEMENT PARTS

When servicing or repairing this equipment, use only DriSteem-approved service replacement parts. Complete replacement part lists are on Pages 66 through 73. Refer to the rating plate on the GTS humidifier for complete unit model number, serial number, and company address. Any substitution of parts or controls not approved by DriSteem will be at owner's risk and will void the warranty.

Burners

BURNER ASSEMBLIES AND HEAT EXCHANGER TUBES

This is not a regular maintenance item, but if the heat exchanger tubes contain carbon deposits, soot, or other residue, clean as follows:

1. Follow shutdown procedure on Page 56.
2. Remove gas train shroud.
3. Disconnect wiring to blowers, flame sensors, gas valves, and ignition controllers. Remove burner assemblies (each assembly is mounted with four bolts).
4. Remove vent box.
5. Use a 6" (150 mm) flue brush with a 24" (600 mm) extension and reversible drill. Work brush in and out of all combustion chambers.
 Note: To ease reassembly, disconnect components from one burner assembly at a time, and clean each corresponding combustion chamber individually.
6. Remove loose deposits and residue that falls into rear header with vacuum cleaner and hose extension.
7. Inspect 1½" (DN40) return tubes. Clean if necessary.
8. Run thin brush between turbulator and tube wall on all four sides.
9. Reinstall burner assemblies and gaskets, vent box and gasket, all electrical wiring, gas train shroud, and pressure switch connections.

MAINTENANCE FREQUENCY

Under normal use conditions, the burner(s) should not need cleaning for a minimum of five years. However, depending on the operating environment, the burner(s) may require periodic cleaning to remove accumulated materials. Failure to clean burners can result in reduced unit capacity. Use sealed combustion in dirty environments. See burner maintenance instructions below.

BURNER MAINTENANCE INSTRUCTIONS

To service the burner system, clean both the blower and the burner. Remove the blower(s) from the system and clean dust from the wheel. Remove the burner(s) for cleaning. Removing and cleaning one burner at a time eases reassembly. To dislodge particulate matter from the burner surface matrix, use compressed air (100 psig [700 kPa] maximum). Keep the air nozzle about 2" (50 mm) from the burner's surface, blowing air perpendicular to the burner surface while moving the nozzle back and forth lengthwise. This dislodges particles trapped in the matrix, pushing them back inside the burner. Avoid blowing air across the surface, which tends to have a destructive effect on the burner surface. Allow particulate matter to fall from the burner through the air/gas inlet. To assist in removing the particulate matter, use a vacuum at the burner's air/gas inlet.

WARNING

Respiratory hazard

When cleaning burners with compressed air, wear appropriate respiratory protection. Failure to do so may cause severe bodily injury.

Note:

Soot and carbon deposits may indicate a combustion problem that needs to be corrected. Consult the factory.

Tap/softened water

WATER QUALITY RECOMMENDATIONS

The best way to determine how often your particular system needs maintenance is to remove the probe plate 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 dramatically reduces mineral accumulation inside tap/softened water models.

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. Skim time is field adjustable using the Vapor-logic keypad.

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

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

Humidifier De-scaling solution

Scale buildup on humidifier heat exchangers acts as an insulator, reducing humidifier performance while increasing energy costs. To keep humidifiers operating as efficiently as possible, remove scale with DriSteem's Humidifier De-scaling Solution, available for purchase from your DriSteem representative or distributor.

The De-scaling Solution cleans without risk of corroding humidifier tanks or welds. The De-scaling Solution also cleans surfaces unreachable by hand scraping.

DriSteem's Humidifier De-scaling Solution is the only approved cleaner/de-scaler for use with DriSteem humidifiers. Use of other cleaners/de-scalers may void your DriSteem warranty.

Tap/softened water

COOL DOWN PROCEDURE

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

- Insulated and uninsulated tanks will have hot surfaces.
- Verify that there is no call for humidity and that the aquastat set point (adjusted using the keypad/display Set Up screens) is less than room temperature (default setting is 40 °F [4 °C]) so the burners do not energize while cooling down the tank.
- Models with a standard drain valve:
 1. Manually open the drain valve by moving the valve lever located on the back of the drain valve to the manual open position.
 2. The fill valve eventually opens.
 3. Let the fill water run until the tank is cooled; then shut off the field-installed manual supply water shut-off valve.
 4. Let the tank drain; then manually close the drain valve.
- For models without a manually operated drain valve, use the keypad to perform the cool down process.
 1. From the Main menu, enter the Tank Status submenu.
 2. Change mode to Drain, and allow approximately half the water to drain out of the tank.
 3. Change the mode back to Auto; the fill valve opens and the humidifier cools down.
 4. When the fill valve closes, go back into Drain mode, and allow the tank to drain completely. The humidifier should be cool enough to work on.

Note: For more information about using the keypad, see the *Vapor-logic Installation and Operation Manual*.

Tap/softened water

INSPECTION AND MAINTENANCE

1. **Annually** (also recommended when maintenance is performed)
 - Inspect tank, piping, and gaskets for water and gas 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 plug; fill valve should energize.
 - Redundant low water level probe
2. **Seasonally** (or as required, depending on water quality)
 - Clean tank
 - Remove cleanout plate and dispose of any loose scale that has collected in the tank. Do this 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.
 - Dismantle and clean drain valve and associated piping
 - Clean the probes
 - Access the probe assembly either from the electrical panel or by removing the roof panel above the electrical area.
 - Disconnect the probe plug and cable assembly and unscrew the probe rod assembly from the humidifier probe housing.
 - Inspect the probe housing and clean, ensuring that all the housing passageways are clear. Remove the housing from the tank by removing the cover plate from the tank.
 - The scale should flake off easily from the probe assembly rods.
 - The bottom 3/8" (10 mm) of each rod is the sensing portion; clean these areas with a wire brush, abrasive pad, or steel wool.
 - Inspect the composite plastic probe rod assembly for any signs of cracking, roughness, or deterioration. If found, replace probe assembly.
 - Reassemble the probe assembly.

WARNING

Follow the shutdown procedure

Follow the shutdown procedure on Page 54 before performing service or maintenance procedures on this humidifier. Failure to follow the shutdown procedure could cause electrical shock, fire, or explosion and severe personal injury or death.

Tap/softened water

- Clean the skim/overflow port
 - Water should drain from the skimmer drain pipe after each fill cycle. This should be verified visually by a weekly inspection.
 - Loosen deposits in and around the skimmer/overflow port with a long tool such as a screwdriver.
 - If flow through the water seal/P-trap is diminished due to mineral accumulation:
 - Remove the water seal piping from the humidifier and flush out.
 - Replace the water seal with new piping if the minerals have hardened in the water seal.
- Clean the low water cutout probe — Remove the shroud cover and inspect the probe rod for mineral accumulation. The rod is located on the top of the tank near the back. Use stainless steel wool to clean the probe.
- Inspect blower motor — A lubrication port is not provided, therefore lubrication is not required.
- Remove dust — Using a vacuum, remove all dust from areas around the motor, vent fan(s), and louvers that allow air to the shrouded area.
- When the maintenance requirements are complete:
 - Replace cleanout plate and tighten the nuts on the plate. Torque the nuts to 25 to 35 in-lb (2.8 to 4.0 N-m).
 - Verify that the probe rod holder is secure and that the probe plug and cable assembly are plugged into the probe rod holder.
 - Verify that the drain valve assembly is in the closed position.
 - Replace and secure all covers and doors.
 - Turn on the water supply.
 - Turn on the electrical power.
 - Turn on gas.
 - 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.

Important:

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

3. Off-season maintenance

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

RO/DI water option

RO/DI WATER QUALITY RECOMMENDATIONS

- Verify regularly that water processing equipment is operating correctly. The presence of chlorides in improperly processed DI water can cause pitting and failure of the tank and heat exchanger. Your DriSteem warranty does not cover damage caused by chloride corrosion.
- GTS humidifiers with the RO/DI water option do not require regular cleaning, although regular inspections are advised.
- GTS humidifiers with the RO/DI water option do not require skimming or draining and flushing to remove precipitated minerals. However, at the end of a humidification season, drain all DI humidifiers either by manually opening the drain valve or by programming the humidifier to automatically drain at end-of-season (electric fill and drain valve required).

WARNING

Follow the shutdown procedure

Follow the shutdown procedure on Page 54 before performing service or maintenance procedures on this humidifier. Failure to follow the shutdown procedure could cause electrical shock, fire, or explosion and severe personal injury or death.

RO/DI water option

COOL DOWN PROCEDURE

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

Note: Fresh make-up water is used to speed up cooling. Do not close the manual water supply before cooling down the humidifier; otherwise the tank could stay hot for several hours.

- Tanks will have hot surfaces.
- Verify that there is no call for humidity and that the aquastat set point (adjusted using the keypad/display Set Up screens) is less than room temperature (default setting is 40 °F [4 °C]) so the burners do not energize while cooling down the tank.
- Models with a standard drain valve:
 - Manually open the drain valve.
 - The float valve opens.
 - Let the fill water run until the tank is cooled; then shut off the field-installed manual supply water shut-off valve.
 - Let the tank drain; then manually close the drain valve.
- For models without a manually operated drain valve, use the keypad to perform the cool down process.
 - From the Main menu, enter the Tank Status submenu.
 - Change mode to Drain, and allow approximately half the water to drain out of the tank.
 - Change the mode back to Auto; the fill valve opens and the humidifier cools down.
 - When the fill valve closes, go back into Drain mode, and allow the tank to drain completely. The humidifier should be cool enough to work on.
 - For more information about using the keypad, see the *Vapor-logic Installation and Operation Manual*.

RO/DI water option

INSPECTION

1. **Annually** (also recommended when maintenance is performed)
 - All safety devices in the control circuit should be cycled on and off to verify they are functioning. These include:
 - High limit switch
 - Airflow proving switch
 - Low water cutoff switch
 - Redundant low water cutoff switch
 - Inspect tank and gaskets for leaks.
 - Verify that the float valve is closing off. If the float valve will not shut off, there may be particulate on the valve seat, or the EPDM seat may be worn and in need of replacement.
 - As long as mineral-free water is used in the GTS, no cleaning or flushing of the humidifier should be necessary.
2. **Seasonally** (or as required, depending on water quality)
 - Inspect blower motor. Since a lubrication port is not provided, lubrication is not required.
 - Remove dust — Using a vacuum, remove all dust from areas around the motor, vent fan(s), and louvers that allow air to the shaded area.
3. **Off-season maintenance**
 - Perform a complete inspection of the following:
 - Float valve
 - Low water cutoff switch
 - Redundant low water cutoff switch
 - Humidifier tank and gaskets
 - Heat exchanger
 - Drain humidifier tank and rinse.
 - After inspection, the humidifier should remain empty until humidification is required.

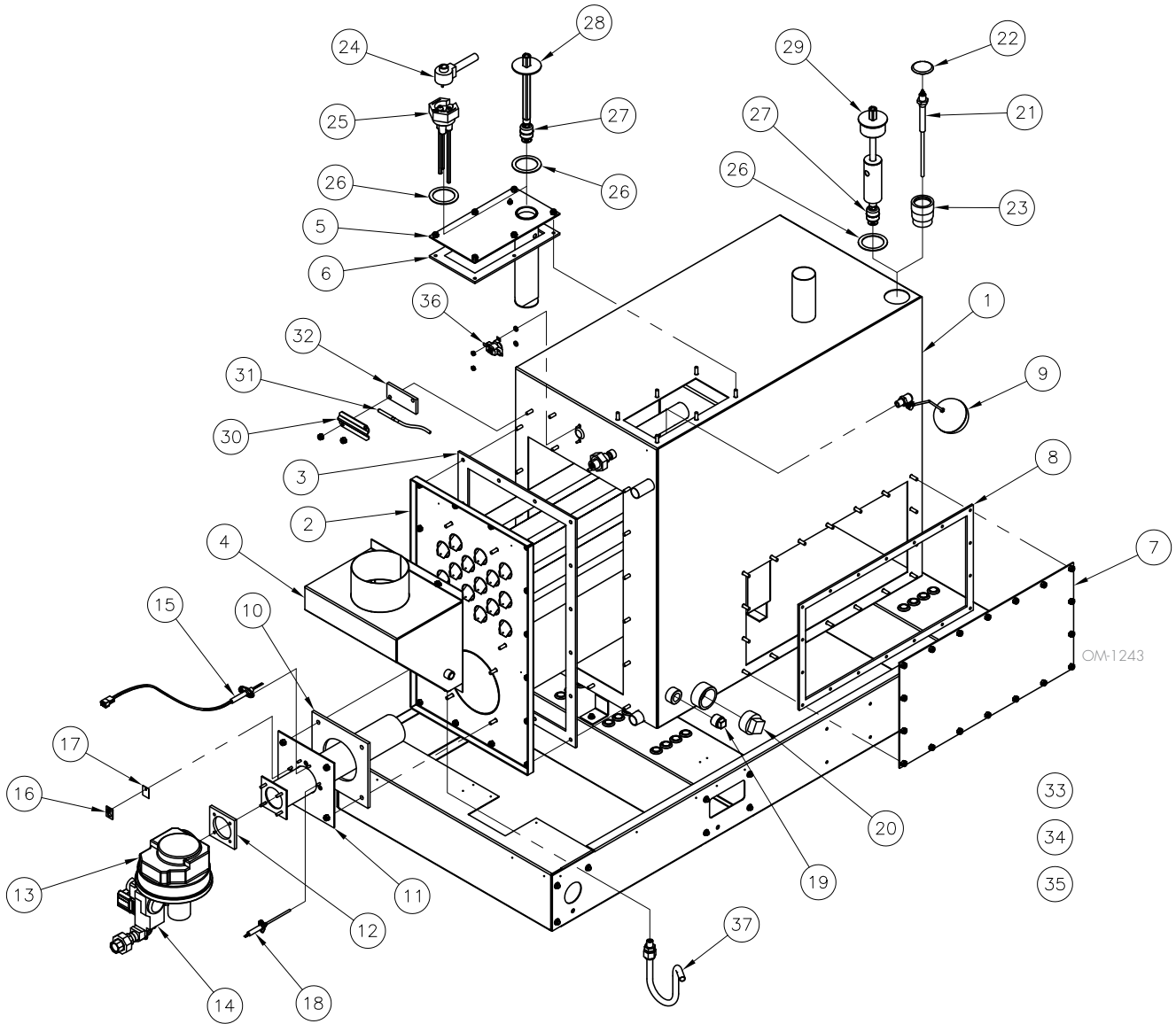
WARNING

Prevent wiring errors

When servicing controls, before disconnecting, label all areas. Wiring errors can cause explosion or fire, resulting in severe bodily injury, death, or significant property damage.

GTS humidifier

FIGURE 66-1: GTS REPLACEMENT PARTS



GTS humidifier

Table 67-1:
GTS replacement parts

No.	Description	Part no.	No.	Description	Part no.
1	Tank	Consult factory	19	Plug, 3/4"	250192-002
2	Heat exchanger	Consult factory	20	Plug, 1 1/2"	250681-002
3	Heat exchanger gasket	Consult factory	21	Redundant probe *	405726-001
4	Flue box	Consult factory	22	Bushing	405805-004
5	Probe plate	165302-005	23	Adapter weld *	168010-005
6	Probe plate gasket	308235	24	Probe plug *	406050-100
7	Cleanout plate	165479-001	25	Probe assembly *	406303-110
8	Cleanout plate gasket	308235	26	Probe gasket	309750-004
9	DI float valve assembly **	Consult factory	27	DI float switch **	408420-002
10	Burner gasket	308230	28	DI float weld **	167789
11	Burner	Consult factory	29	Redundant DI float weld **	167789-002
12	Blower gasket	308230	30	Temperature sensor bracket	128666-001
13	Blower	405800-003	31	Temperature sensor	405760
14	Gas valve	405800-007	32	Temperature sensor gasket	308230
15	Ignitor, 120 V US/Canada	405718	33	Gas manifold weld ***	Consult factory
	Ignitor, 230 V Europe	405718-001	34	Sealed combustion assembly ***	Consult factory
16	Sight glass bracket	128661	35	Pallet/shroud components ***	Consult factory
17	Sight glass	405720	36	Thermal cut-out	409560-001
18	Flame sensor	405725	37	Drain assembly flue box p-trap GTS	198135

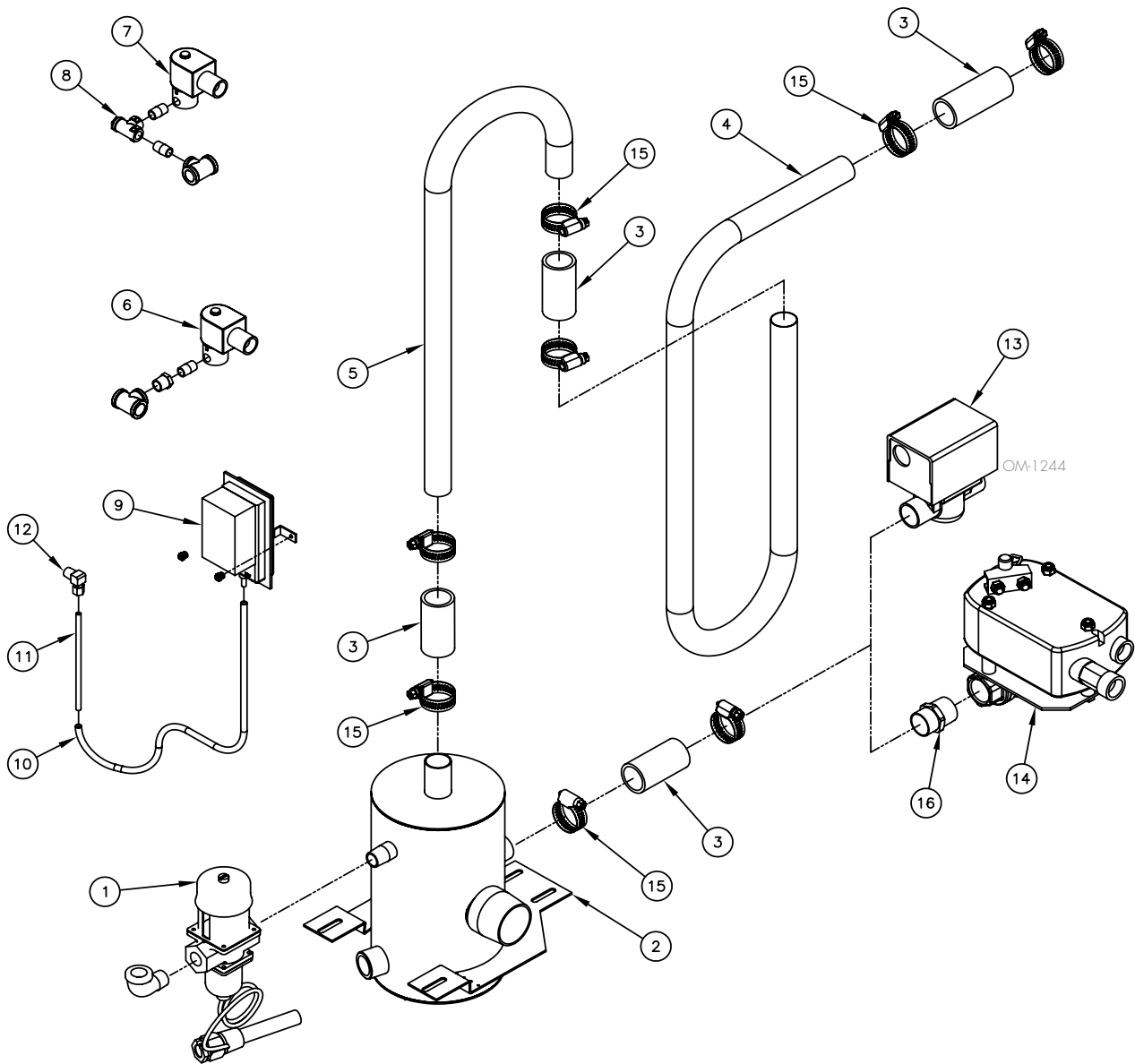
* Tap/softened water GTS only

** GTS with RO/DI water option only

*** Not shown

Fill, drain, and blocked flue sensor

FIGURE 68-1: GTS FILL, DRAIN, AND BLOCKED FLUE REPLACEMENT PARTS



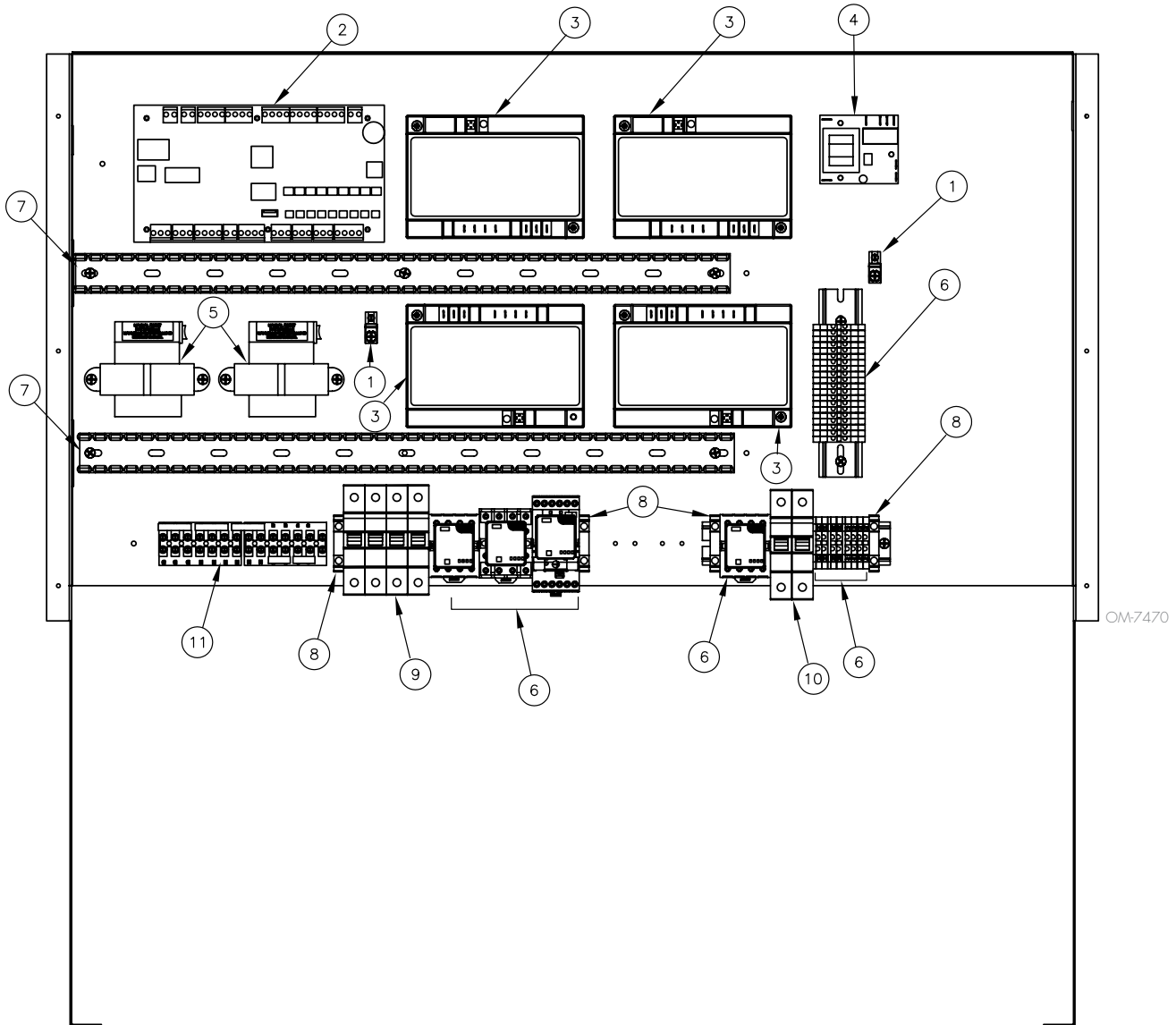
Fill, drain, and blocked flue sensor

Table 69-1:
GTS fill, drain, and blocked flue sensor replacement parts

No.	Description	Part no.
1	Water tempering valve	505090
2	Water tempering tank	Consult factory
3	Drain hose cuff	305389-003
4	Top water seal tube	204812-201
5	Bottom water seal tube	204812-202
6	Fill valve, DI EOS models **	505086
7	Fill valve, tap/softened water models *	505095
8	Strainer *	300050
9	Blocked flue sensor	406190
10	Flexible tubing	405722
11	Copper tubing	100038-025
12	Compression elbow	405723
13	Drain valve, tap/softened water models *	505075
14	Drain valve, DI-EOS models **	193458
15	Hose clamp	700560-100
16	Adapter, NPT × C	204700
17	Fill hose ***	Consult factory
18	Water tempering hose ***	Consult factory
* Tap/softened water GTS only ** GTS with RO/DI water option only *** Not shown		

Electrical parts

FIGURE 70-1: GTS ELECTRICAL REPLACEMENT PARTS



OM-7470

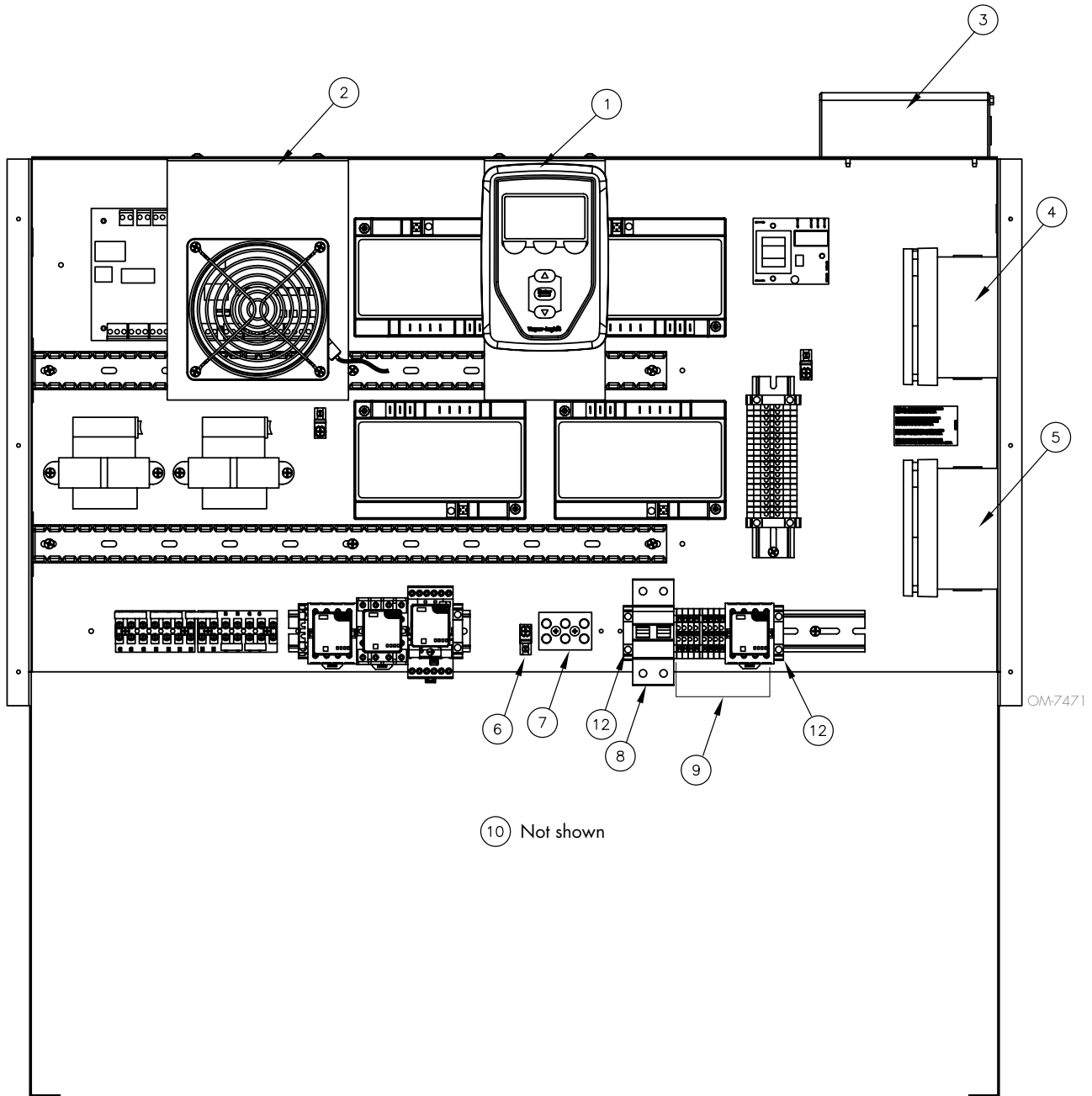
Note: See Pages 68 and 69 for GTS Outdoor Enclosure replacement parts.

Electrical parts

Table 71-1: GTS electrical replacement parts		
No.	Description	Part no.
1	Ground wire lug	409250-003
2	Vapor-logic main board	183504-014
3	Ignition module (for North America)	405800-006
	Ignition module (for Europe)	405800-005
4	Low water board *	405726 *
5	Transformer (for North America)	408965-001
	Transformer (for Europe)	408985
6	Relays, Sockets, time delay	Consult factory
7	Wire channel	408999-001
8	DIN-rail end bracket	408252-006
9	Circuit breaker, 2-pole (for Europe only)	406775-004
10	Circuit breaker, single-pole (for SDU option only)	406775-009
11	Terminal strip	Consult factory
* Tap/softened water GTS only		

Outdoor Enclosure

FIGURE 72-1: OUTDOOR ENCLOSURE ELECTRICAL REPLACEMENT PARTS



Note: For European models, refer to Fisair diagrams

Outdoor Enclosure

Table 73-1:
Outdoor Enclosure electrical replacement parts

No.	Description	Part no.
1	Vapor-logic display with back	
2	Fan assembly (for North America)	185110-003
	Fan assembly (for Europe)	185110-004
3	High limit stat	405800-065
4	Fan stat (for North America)	405800-067
	Fan stat (for Europe)	405871-002
5	Heater stat (for North America)	405800-066
	Heater stat (for Europe)	405871-001
6	Ground wire lug	409250-003
7	Power block	408300-002
8	Circuit breaker	406775-005
9	Relays, sockets, time delay	Consult factory
10	Heater assembly, 600W *	183502-044
12	DIN-rail end bracket	408252-006
* Not shown		

European models only

This equipment has been tested by the Canadian Standards Association International to the Low Voltage, Gas Appliance, and EMC directives and has been certified by AFNOR for use in all EU countries.

Electrical warning label



Location: Control cover, shroud
 Definition: Electrical shock hazard

AUTHORIZED COUNTRIES OF DESTINATION

GTS humidifiers bearing the CE mark are authorized for use in the European countries listed below.

Austria	AT	Greece	GR
Belgium	BE	Ireland	IE
Switzerland	CH	Iceland	IS
Germany	DE	Italy	IT
Denmark	DK	Luxembourg	LU
Spain	ES	Netherlands	NL
Finland	FI	Norway	NO
France	FR	Portugal	PT
United Kingdom	GB	Sweden	SE

Important:

This equipment is for use with second family (G20, G25) natural gases; and third family (G30, G31) propane gas. Contact your distributor before converting to another group or supply pressure.

APPLIANCE CATEGORY

In relation to the country of destination, this humidifier is classified under one of the following boiler categories: category I_{2H}, I_{2L}, I_{2E}, I_{2E+}, I_{2LL}, I_{2ES}, I_{2Fi}, I_{2ER}, I_{3B/P}, I_{3P}

See the unit data plate for the specific category of your appliance.

Table 74-1:
 Gas specifications for European models

GTS model	Volumetric flow rate by gas category					Average flue temperature	Minimum draught requirement	Mass flow rate of combustion products
	2H-G20-20 mbar 2E-G20-20 mbar 2Es-G20-20 mbar	2L-G25-25 mbar 2LL-G25-20 mbar 2Ei-G25-25 mbar	2E+G20/G25-20/25 mbar 2ER-G20/G25-20/25 mbar	3B-G30-30 mbar 3B-G30-50 mbar	3P-G31-30 mbar 3P-G31-37 mbar 3P-G31-50 mbar			
100	2.31 m ³ /h	2.82 m ³ /h	2.31-2.82 m ³ /h	1.31 m ³ /h	1.49 m ³ /h	121 °C	-0.025 mbar	6.9 g/s
200	4.62 m ³ /h	5.64 m ³ /h	4.62-5.64 m ³ /h	2.62 m ³ /h	2.98 m ³ /h	163 °C	-0.025 mbar	13.8 g/s
300	6.93 m ³ /h	8.46 m ³ /h	6.92-8.46 m ³ /h	3.93 m ³ /h	4.47 m ³ /h	191 °C	-0.025 mbar	20.7 g/s
400	9.24 m ³ /h	11.28 m ³ /h	9.24-11.28 m ³ /h	5.24 m ³ /h	5.96 m ³ /h	218 °C	-0.025 mbar	27.6 g/s
500	11.55 m ³ /h	14.10 m ³ /h	11.55-14.10 m ³ /h	6.55 m ³ /h	7.45 m ³ /h	218 °C	-0.025 mbar	34.5 g/s
600	13.86 m ³ /h	16.92 m ³ /h	13.85-16.92 m ³ /h	7.86 m ³ /h	8.94 m ³ /h	218 °C	-0.025 mbar	41.4 g/s
700	16.17 m ³ /h	19.74 m ³ /h	16.17-19.74 m ³ /h	9.17 m ³ /h	10.43 m ³ /h	218 °C	-0.025 mbar	48.3 g/s
800	18.48 m ³ /h	22.56 m ³ /h	18.47-22.56 m ³ /h	10.48 m ³ /h	11.92 m ³ /h	218 °C	-0.025 mbar	55.2 g/s

European models only

Table 75-1:
GTS models, capacities, electrical specifications, and weights, European models

GTS model	Steam capacity per hour in kg*	P = (kW)	Q = (kW)	Steam outlet	Recommended flue size (Class B)	Operating weight in kg	Shipping weight in kg	Full load amps
GTS-100	34	0-24	0-29	DN50 (2") BSPT or DN50 hose	DN125 (5")	320	170	2.8
GTS-200	68	0-48	0-59	DN50 (2") BSPT or DN50 hose	DN125 (5")	320	170	2.8
GTS-300	102	0-72	0-88	DN80 (3") flange	DN180 (7")	385	205	4.0
GTS-400	136	0-96	0-117	DN80 (3") flange	DN180 (7")	385	205	4.0
GTS-500	170	0-120	0-147	DN100 (4") flange	DN200 (8")	500	270	5.5
GTS-600	204	0-144	0-176	DN100 (4") flange	DN200 (8")	500	270	5.5
GTS-700	238	0-168	0-205	DN100 (4") flange	DN250 (10")	635	320	7.0
GTS-800	272	0-192	0-234	DN100 (4") flange	DN250 (10")	635	320	7.0

* Maximum steam capacities listed may be as much as 10% lower than the given values due to local variations in the Wobbe index of G20 and G25 gases.

CAPACITY NOTES

- At sea level, 402 kJ are required to raise the temperature of one kilogram of water from 4 °C to 100 °C.
- An additional 2257 kJ are required to change the state of one kilogram of 100 °C water to vapor.
- Another factor to consider is condensation steam loss from piping. See Table 35-2.

LP GAS

All models operate at rated kW input.

OPERATING CHARACTERISTICS

- Unit is capable of operating in ambient conditions of 5 °C to 40 °C.
- Unit is capable of operating in ambient conditions between 30% RH and 95% RH (noncondensing).
- NO_x class 5

GAS SUPPLY PRESSURE

20 or 25 mbar for natural gas (depending on gas group), and 30, 37 or 50 mbar for propane gas (depending on gas group)

PMS (ALL UNITS)

7.0 bar

ELECTRIC SUPPLY

230V, 667W to 2415W (see data plate)

MAX INLET WATER TEMPERATURE

90 °C

CAUTION**Install connection for gas pressure test gauge**

Gas pressure to the humidifier controls must never exceed 6 kPa (60 mbar), or the gas valve will become damaged and require replacement. Install a 1/8" pipe thread (DN6) plugged tapping, accessible for test gauge connection, immediately upstream of the gas supply connection to the appliance.

Notes

Notes

Expect quality from the industry leader

Since 1965, DriSteem has led the industry with innovative methods for humidifying and cooling air with precise control. Our focus on ease of ownership is evident in the design of the GTS humidifier, which features cleanable, stainless steel construction. DriSteem also leads the industry with a Two-year Limited Warranty and optional extended warranty.

For more information

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For the most recent product information visit our website: www.drirsteem.com

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Continuous product improvement is a policy of DriSteem; therefore, product features and specifications are subject to change without notice.

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Form No. GTS-IOM-EN-REVN-0220
Part No. 890000-101 Rev N

Two-year Limited Warranty

DRI-STEEM Corporation ("DriSteem") 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 DriSteem ships such product, whichever date is the earlier.

If any DriSteem product is found to be defective in material or workmanship during the applicable warranty period, DriSteem'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 DriSteem's election. DriSteem shall not be liable for any costs or expenses, whether direct or indirect, associated with the installation, removal or reinstallation of any defective product. Excluded from the Limited Warranty are all consumable and wear and tear items such as cylinders, membranes, filters, or media replacements. These items are subject to usual wear and tear during usage.

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

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

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

By purchasing DriSteem's products, the purchaser agrees to the terms and conditions of this Limited Warranty.

Extended warranty

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

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