# LX SERIES

Gas-to-Steam Humidifier





#### 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. Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

#### 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 offsite 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





Installation, Operation, and Maintenance Manual

### Read and save these instructions



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Indicates a hazardous situation that could result in death or serious personal injury if instructions are not followed.

### CAUTION

Indicates a hazardous situation that could result in damage to or destruction of property if instructions are not followed.

Fire	» or explosion hazard
A.	device which automatically lights the burner. Do NOT try to light the burner by hand.
В.	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.
	If you smell gas:
	<ul> <li>Do not try to light any appliance.</li> <li>Do not touch any electrical switch; do not use any phone in your building.</li> <li>Immediately call your gas supplier from an off-site phone. Follow the gas supplier's instructions.</li> </ul>
	• If you cannot reach your gas supplier, call the fire department.
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.
Att Rec ow cor cau ele	ention installer ad this manual before installing, and leave this manual with the product ner. This product must be installed by qualified HVAC and electrical atractors. Installation must be code approved. Improper installation can use property damage, severe personal injury, or death as a result of ctric shock, burns, or fire.
Dri	Steem® Technical Support: North America: 800-328-4447 Europe: +3211823595
Rea Rea any pro	ad all warnings and instructions ad this manual before performing service or maintenance procedures on 7 part of the system. Failure to follow all warnings and instructions could aduce the hazardous situations described, resulting in property damage, resonal injury, or death.
Fai acc into ano	lure to follow the instructions in this manual can cause moisture to cumulate, which can cause bacteria and mold growth or dripping water building spaces. Dripping water can cause property damage; bacteria d mold growth can cause illness.

### 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 your local DriSteem Representative/Distributor.
- 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.



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### Carbon monoxide, fire, explosion, and electrical shock hazards (continued)

- 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.
- Do not install the humidifier indoor directly on carpeting, tile, or other combustible material other than wood flooring. Outdoor units may be installed directly on combustible flooring or, in the U.S., on wood flooring or Class A, Class B or Class C roof covering materials.
- Remove all shipping brackets and materials before operating the humidifier.
- Do not locate humidifier in a negative pressure space. Combustion products could be suctioned from the venting. See page 52.
- Humidifier flue gases must be vented to the outside atmosphere.
- Do not interfere, disable, or tamper with the devices monitoring the combustion gas discharge, including the flue temperature and flue pressure sensors. Only authorized and trained technicians should perform any service on these items.
- Do not interfere or tamper with any sealed components. Only authorized and trained technicians should perform any service on these items.
- This humidifier is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- Children should be supervised to ensure that they do not play with the humidifier.
- The GTS humidifier LX series must be vented and supplied with combustion and ventilation air as described in this IOM. Ensure the vent and air piping and the combustion air supply comply with these instructions regarding vent, system, air system, and combustion air quality. Inspect finished vent and air piping thoroughly to ensure all are airtight and comply with the instructions provided and with all requirements of applicable codes. Failure to provide a properly installed vent and air system will cause severe personal injury or death.
- This humidifier requires a special venting system. Use only approved stainless steel, PVC, CPVC, or polypropylene pipe and fittings listed in this IOM. Failure to comply could result in severe personal injury, death, or substantial property damage.
- Do not connect any other appliance to the vent pipe or multiple humidifiers to a common vent pipe. Failure to comply could result in sever personal injury, death, or substantial property damage.
- The flue gas vent shall not pass through any air duct or plenum. Do not insulate plastic flue gas vent pipe.
- Do NOT mix components from different systems. The vent system could fail, causing leakage of flue products. Mixing
  of venting materials will void the warranty.
- 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.
- Turn off all gas while installing the gas piping and manual shutoff valve for the humidifier.
- 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).

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<b>(10)</b>	
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### WARNING Hot surfaces and hot water

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.

#### **Disconnect electrical power**

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.

Follow the shutdown procedure on Page 75 before performing service or maintenance procedures on any part of the system.

### CAUTION

### Hot discharge water

Discharge water can be as hot as 212 °F (100 °C) and can damage some drain plumbing.

The humidifier is equipped with integrated water drain tempering that needs make-up water no greater than 90°F (32 °C) in order to function properly. Make sure the water supply to the humidifier remains open during draining.

#### Excessive supply water pressure

Supply water pressure greater than 80 psi (550 kPa) can cause the humidifier to overflow.

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#### ATTENTION INSTALLER

#### **Original Instructions**

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

DriSteem Technical Support 800-328-4447

#### Website:

Documents can be viewed, printed or ordered from our website, www.dristeem.com.

#### DriCalc sizing and selection software:

DriCalc® is our humidification system sizing and selection software, which can be accessed from dristeem.com.



### Product overview

OVERVIEW

The GTS humidifier LX series is a high efficiency gas appliance that burns either natural or propane gas to heat and boil water into steam for humidification. The unit has either one or two burners that fire into a submerged heat exchanger.

The LX series is a Category IV (positive pressure, condensing) gas appliance with flue temperatures below  $140^{\circ}$ F (60°C) allowing it to be vented using PVC flue vent material.

The GTS humidifier can be installed indoors (with or without panels) or outdoors in a temperature-controlled enclosure.

#### FIGURE 8-1: GTS HUMIDIFIER LX SERIES COMPONENTS (MODELS LX-50 THROUGH LX-300)



### Product overview



#### FIGURE 9-1: GTS HUMIDIFIER LX SERIES COMPONENTS (MODELS LX-400 THROUGH LX-600)

# System overview

#### FIGURE 10-1: GTS HUMIDIFIER LX SERIES



OVERVIEW

# Models, capacities, electrical specifications, and weights

GTS model	Maximum steam capacity		Maximum steam Input capacity Input			GTS humidifier LX series*								
					Operating weight		Shipping (empty) weight**		Burner quantity	Turndown		Full load amps*		
	lbs/hr	kg/h	MBh	kW	m³/h	lbs	kg	lbs	kg		ratio	lbs/hr	120V 60 Hz	230V 50 Hz
LX-50	50	23	61	17.8	1.7	304	138	187	85	1	5:1	10	2.0	1.5
LX-75	75	34	91.5	26.8	2.5	304	138	187	85	1	6:1	12.5	2.0	1.5
LX-100	100	45	122	35.8	3.4	300	136	192	87	1	8:1	12.5	2.0	1.5
LX-150	150	68	183	53.6	5.1	450	204	242	110	1	6:1	25	2.5	2.0
LX-200	200	91	244	71.5	6.8	706	320	356	161	1	6.7:1	30	4.0	2.5
LX-250	250	113	305	89.4	8.5	706	320	356	161	1	8.3:1	30	4.0	2.5
LX-300	300	136	360	105.5	10	709	321	367	166	1	10:1	30	4.0	2.5
LX-400	400	181	488	143	13.5	1259	571	593	269	2	13.3:1	30	6.5	3.5
LX-500	500	227	610	178.8	16.9	1259	571	593	269	2	16.7:1	30	6.5	3.5
LX-600	600	272	720	211	20	1265	574	615	279	2	20:1	30	6.5	3.5

\*\* Add approximately 60-90 lbs (27-41 kg) for packaging material.

### LP GAS

All models operate at rated input

#### **HIGH ELEVATION**

The input shown in Table 11-2 is derate when operating units at a high elevation. See "Tuning the gas valve" on page 80 for adjusting oxygen levels on the LX series gas valve.

**Important:** See Pages 100 and 101 for additional European model specifications and capacity notes.

Table 11-2: High elevation derate							
Eleve	Input						
feet	meters	derate %					
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					

### SUPPLY WATER GUIDELINES

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

Examples:

- Corrosive water can significantly decrease the service life of the humidifier due to tank or heat exchanger failure.
- 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 13-1.

### WATER LEVEL CONTROL

DriSteem's GTS humidifier controls water level using a three-probe conductivity system (see Figure 12-1). The Vapor-logic controller automatically provides a steady steam output while maintaining the water level between the bottom and middle probes. The top probe is used for foam detection, and the humidifier will drain if that probe detects conductivity. If water falls off the bottom probe, power will be cut to the heating outputs to prevent the humidifier from operating with no water and over-heating.

#### UNIVERSAL WATER

DriSteem's GTS humidifier LX series incorporates universal water control for use with any water type (well, tap, softened, DI or RO water). There is no need to change control configurations based on water type when ordering equipment or retrofitting to fit new water sources in the field. The water level control algorithm monitors water quality and any changes over time to assure the user of accurate control no matter the type of water that is used.

#### FIGURE 12-1: WATER LEVEL CONTROL



Table 13-1:						
DriSteem supply water g	uidelines					
Chlorides*						
Tap water	< 50 ppm					
RO/DI water	< 5 ppm					
Softened water	< 25 ppm					
* Damage caused by chloride corrosion is not covered by your DriSteem warranty.						
Total hardness						
Tap water	< 500 ppm (29 gpg)					
рН						
Tap water	6.5 to 8.5					
RO/DI, softened water	7.0 to 8.0					
Silica	< 15 ppm					
Supply water outside of the guidelines may void your DriSteem warranty. Please contact your DriSteem Representative or DriSteem Technical Support if you need advice.						

Table 13-3: Fill and drain rates*										
	Maximum	Drain time,	Drain time,	Fill rate	Fill time to	Operating v	vater volume	Water usage at maximum capacity		
G15 model	(gpm)	(minutes)	(minutes)	(gpm)	(minutes)	Tank volume (gallon)	Tank volume (liters)	gals/hr	litres/hr	
LX-50	12	3	6	5.4	3	14	53	6	23	
LX-75	12	3	6	5.4	3	14	53	9	34	
LX-100	12	3	6	5.4	3	13	50	12	45	
LX-150	12	4	8	5.8	4	25	95	18	68	
LX-200	12	6	12	6.2	7	42	159	24	91	
LX-250	12	6	12	6.2	7	42	159	30	114	
LX-300	12	6	12	6.2	7	41	155	36	136	
LX-400	12	12	24	7.4	11	80	303	48	182	
LX-500	12	12	24	7.4	11	80	303	60	227	
LX-600	12	12	24	7.4	11	78	295	72	273	
*Fill and drain rates										

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Table 13-2:

Supply water pressure (static and dynamic) Supply water

flow rate

Supply water temperature

Supply water requirements

25-80 psi at 6.0 gpm flow rate

6.0 gpm

 $34^\circ\text{F}$  to  $90^\circ\text{F}$ 

172-552 kPa

21 L/min

1°C to 32°C

### SIZING A REVERSE OSMOSIS (RO) SYSTEM FOR YOUR DRISTEEM STEAM HUMIDIFIER

DriCalc<sup>®</sup> sizing and selection software uses the following method to properly size RO systems and RO permeate storage tanks for humidification applications. Under sizing your RO system will result in humidifiers that are slow to fill – potentially alarming out due to "Excessive fill time." On the flip side, over-sizing your RO system could result in water sitting stagnant in the system for unsafe amounts of time. The example given below is carried through to all three steps.

- 1. To begin, gather these three pieces of information:
  - a. Maximum steam capacity of humidifier (lbs/hr or kg/hr)
    - For multiple humidifiers, add the capacities of each humidifier together
  - b. Humidifier tank size (water capacity) (gallons or liters)
    - For multiple humidifiers, use the largest single tank size. Ensure tank drain times are staggered to allow for proper RO water regeneration. This setting is user-adjustable in the Vapor-logic controller.
  - c. Determine if the humidifier/s will be using integral tempering. Integral tempering is only an option on the GTS LX series and RTS RX series. Using integral drain water tempering will drive a larger permeate storage tank.

Example: Qty 4 LX-100 humidifiers:

- Max steam capacity = 4qty x 100 lbs/hr (45.4 kg/hr) = 400 lbs/hr (181.4 kg/hr)
- Tank size of an LX-100 = 13 gallons (49.2 liters)
- Integral tempering = Yes

 Determine RO system size using the following calculation: [humidifier capacity x 1.3]. Select an RO system with the capacity equal to or greater than this number.

Example: 400 lbs/hr (181.4 kg/hr) x 1.3 = 520 lbs/hr (235.8 kg/hr)

The RO system with enough capacity is DriSteem's RO-402. The RO-402 has a capacity of 829 lbs/hr (376 kg/hr) at 50°F (10°C).

- Determine permeate storage tank size using the following calculation. This will ensure any DriSteem humidifier will fill with water in ten minutes or less.
  - a. Using integrated tempering: [(2 x humidifier tank size) (selected RO capacity x 10 min ÷ 60min/hr ÷ 8.35lb/gal)]

Metric: [(2 x humidifier tank size) - (selected RO capacity x 10 min ÷ 60min/hr)]

b. Not using integrated tempering: [humidifier tank size - (selected RO capacity x 10 min ÷ 60min/hr ÷ 8.35lb/gal)]

Metric: [humidifier tank size - (selected RO capacity x 10 min  $\div$  60min/hr)]

Example:

- = (2 x 13 gallons (829 lbs/hr x 10 min ÷ 60 min/hr ÷ 8.35 lb/gal) Metric: = (2 x 49.2 liters – (376 kg/hr x 10 min ÷ 60 min/hr)
- = 26 gallons 16.5 gallons Metric: = (98.4 liters – 62.7 liters)
- 9.5 gallon active permeate storage capacity required for this application Metric = 35.7 liters active permeate storage capacity required for this application

DriSteem's 80-gallon (303-liter) pressurized storage tank has the capacity for this application with an 80-gallon (303-liter) total capacity and a 24-gallon (89-liter) active capacity. "Active" means the actual amount of water the storage tank can hold.

### Indoor dimensions

### FIGURE 16-1: LX MODELS 50 - 150 INDOOR UNIT DIMENSIONS



### FIGURE 16-2: LX MODELS 200 - 300 INDOOR UNIT DIMENSIONS

Side view Front view R ม ม ไ D 0 + F С e Т Т Ν ۷ • с C<sup>+</sup> ł U Β -M S Κ

Top view



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See "Indoor unit dimensions" on page 17-1.

### Indoor dimensions



#### FIGURE 17-1: LX MODELS 400 - 600 INDOOR UNIT DIMENSIONS

Table 17-1:										
Indoor	unit dimensions									
	Description		LX-50, LX-75, LX-100		LX-150		250, LX-300	LX-400, LX-500, LX-600		
	Description	inches	mm	inches	mm	inches	mm	inches	mm	
Α	Overall length	23.25	590	32.25	819	56	1422	56	1422	
В	Overall width	23.25	590	23.25	590	22	559	34	864	
С	Overall height	42.75	1085	42.75	1085	47	1194	53	1346	
D	EL AV	4.3	109	4.3	109	8.7	221	14.5	368	
E	Flue position	4.4	112	4.4	112	5.61	143	5.6	142	
F	Flue diameter	3	76	3	76	4	102	6	152	
G	Steam outlat position	3.8	97	3.8	97	7.1	180	7	178	
н	Steam outlet position	5.3	135	5.3	135	6.9	175	7.4	188	
J	Steam outlet diameter	2	51	2	51	3	76	4	102	
К		9.2	234	9.2	234	16.6	4022	16.6	422	
L	Gas inlet position	4.6	119	4.6	119	14.3	363	14.3	363	
м	Durin nasitian	3.5	89	3.5	89	11	279	11	279	
N	Drain position	4.5	114	4.5	114	8	203	8	203	
0		8.92	227	8.92	227	6.5	165	14.5	368	
Р		2.7	69	2.7	69	14	363	14.5	368	
Q	Combustion air diameter	3	76	3	76	4	102	6	152	
R	Flue and combustion air height	5.5	140	5.5	140	5.6	142	7.1	180	
S	E:	6.59	167	6.59	167	22.4	569	22.4	569	
Т	rill valve connection position	5.60	142	5.60	142	12.4	315	12.4	315	
U	Condensate Dania	11.8	300	11.8	300	7.3	185	7.3	185	
V	Condensate Drain	4.55	116	4.55	116	6.95	177	6.95	177	

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### Location and clearance recommendations

#### FINDING A LOCATION

- Provide a level, solid foundation for the humidifier.
- The GTS humidifier LX series vent and air piping can be installed through the roof or through a sidewall. Use only vent/air piping methods described in this IOM. Locate the humidifier as near as possible to an outside wall or accessible roof space so that the flue pipe from the humidifier is short, direct, and limited to wind exposure.
- 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. 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 (field supplied). 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.
- See the combustion air and flue gas venting section on page 52 for pipe termination locations and instructions.

### 

### 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.

### Location and clearance recommendations





### Optional floor stand mount (Models 50, 75,100, and 150 only)

#### FIGURE 20-1: LX SERIES FLOOR STAND MOUNT ASSEMBLY



#### FLOOR STAND MOUNTING INSTRUCTIONS

- 1. Use the hardware provided by DriSteem to assemble.
- 2. Arrange appropriate lifting mechanism and personnel to mount the GTS humidifier LX series on the floor stand. See Warning below.
- Use the lifting hole on the base of humidifier to carefully lift it off the ground. See Warning below.
- 4. Slowly lower the humidifier on the floor stand.
- 5. Secure the base of the humidifier to the floor stand using sheet metal screws.

### 

#### HEAVY OBJECT

To avoid muscle strain or back injury, use lifting aids and proper lifting techniques when removing or replacing.

Notes:

- Allows for condensate piping/pump
- Floor stand is not seismic rated.
- Bottom supply water connection is located underneath the side water connection. See fill valve connection position on page 17.
- Ensure the floor stand is level and shim as necessary.

Table 20-1: Floor stand weights (for indoor enclosures)							
		Weight configuration Assembled					
Part number	Unit size						
		(lbs)	(kg)				
600013	GTS LX-50, LX-75, LX-100	24	11				
600044	GTS LX-150	30	14				

# Optional floor stand mount (Models 50, 75,100, and 150 only)



#### FIGURE 21-1: LX SERIES WITH FLOOR STAND MOUNT (MODELS 50, 75, AND 100)

FIGURE 21-2: LX SERIES WITH FLOOR STAND MOUNT (MODEL 150)



### Optional wall mount (Models 50, 75 and 100 only)

#### FIGURE 22-1: LX SERIES WITH WALL MOUNT







OM-7992

Table 22-1: Wall mount weights (for indoor enclosures)							
Part number	Unit size	Weight configuration Assembled					
		(lbs)	(kg)				
600052-001	GTS LX-50, LX-75, LX-100	32	15				

# Optional wall mount (Models 50, 75 and 100 only)

- Assemble the plate to the wall mount brackets using the supplied ¼-20 nuts and bolts and torque to 6 lb-ft (8 N-m), see Figure 22-1.
- Ensure the selected mounting location provides adequate maintenance clearances and is at an easily serviceable height.
- Install a drain pan where appropriate to prevent equipment or building water damage.
- A structural engineer must ensure the wall mounting surface and fasteners are suitable and properly installed for the weight of the LX see weights on page 11.
- Attach the wall mount with one fastener to the wall, level it and mark the remaining three attachment points and install the remaining fasteners.
- Arrange appropriate lifting mechanism and personnel to mount the GTS LX humidifier on the wall mount. See Warning below.
- Use the lifting holes on the base of humidifier to carefully lift it off the ground. See Warning below.
- Slowly lower the humidifier on the wall mount, placing the humidifier frame inside the wall mount plate flanges.
- Ensure proper humidifier orientation to allow access for service.
- Attach the humidifier to the wall mount plate flange using all four of the supplied #12 sheet metal screws, see Figure 22-1.
- Floor stand is not seismic rated.

### 

### HEAVY OBJECT

To avoid muscle strain or back injury, use lifting aids and proper lifting techniques when removing or replacing.

### Overview

### FIGURE 24-1: LX SERIES FIELD PIPING OVERVIEW - MODELS LX-50 THROUGH LX-150 Shock arrester recommended to reduce water hammer (by installer) Supply water line; water pressure range Steam hose or tubing 25 to 80 PSI (172 to 582 kPa); static and to dispersion dynamic (see page 29) Steam outlet (see page 28) Install level Flue gas vent (see page 43) Combustion air intake (see page 43) Install level 7/8" (22mm) electrical field connection (see page 57) Minimum 2" (51mm) Gas inlet connection (see page 39) Flue gas condensate Vacuum breaker (by installer) (see page 37) Drain piping must be rated for Overflow bypass 212 °F (100 °C) (see page 30) Optional condensate neutralizer (as required) 1" (25 mm) air gap OM-8176 Open drain required. See first note below.

#### 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.
- If a field-supplied backflow prevention device is used, it should be installed within 40' (12m) of the humidifier.
- Damage caused by chloride corrosion is not covered by your DriSteem warranty.
- Optional Condensate Neutralization Kit is shipped with unit as selected. The Condensate Neutralizer should be installed per instructions provided with kit. This kit can be installed on a wall or on a floor and must have an overflow bypass line with Y connector. The bypass line is a safety overflow in the event of condensate drain becomes clogged. Severe damage may result if the condensate neutralizer is not installed properly. Your DriSteem warranty does not cover damage caused by mis-installed condensate neutralization kit.

### Overview

#### FIGURE 25-1: LX SERIES FIELD PIPING OVERVIEW - MODELS LX-200 THROUGH LX-600



#### 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 2" (51 mm) above skim/overflow port, eliminating the possibility of backflow or siphoning from tank. No additional backflow prevention is required; however, governing codes prevail.
- If a field-supplied backflow prevention device is used, it should be installed within 40' (12m) of the humidifier.
- Damage caused by chloride corrosion is not covered by your DriSteem warranty.
- Optional Condensate Neutralization Kit is shipped with unit as selected. The Condensate Neutralizer should be installed per instructions provided with kit. This kit can be installed on a wall or on a floor and must have an overflow bypass line with Y connector. The bypass line is a safety overflow in the event of condensate drain becomes clogged. Severe damage may result if the condensate neutralizer is not installed properly. Your DriSteem warranty does not cover damage caused by mis-installed condensate neutralization kit.

### Piping: Connection details

### FIGURE 26-1: CONNECTION DETAILS GTS LX 50 - 150



### Β. F С A D.

FIGURE 26-2: CONNECTION DETAILS GTS LX 200 - 300

Ε· G С

Note: Field connections plate not shown.

OM-8178

Note: Field connections plate not shown.

OM-8179

#### FIGURE 26-3: CONNECTION DETAILS GTS LX 400 - 600



Note: Field connections plate not shown.

# Piping: Connection sizes

Tak Co	Table 27-1: Connection sizes										
	Description	LX-50, LX-75, LX-100	LX-150		LX-200, LX-250, LX-30	LX-400, LX-500, LX-600					
	Description	inches	DN	DN inches DN		inches	DN	inches	DN		
A	Gas supply	1/2 (pipe thread)	15	1/2 (pipe thread)	15	3/4 (pipe thread)	20	1 ¼ (pipe thread)	32		
В	Sealed combustion piping	3	80	3	80	4	100	6	150		
c	Flue vent	3	80	3	80	4	100	6	150		
D	Supply water	3/8 (pipe thread - side) 1/2 (pipe thread - bottom)	10 15	3/8 (pipe thread - side) 1/2 (pipe thread - bottom)	10 15	3/8 (pipe thread - side) 1/2 (pipe thread - bottom)	10 15	3/8 (pipe thread - side) 1/2 (pipe thread - bottom)	10 15		
E	Drain	1 (drain block)	25	1 (drain block)	25	1 (drain block)	25	1 (drain block)	25		
F	Steam outlet*	2 (all steam: hose/pipe thread)	50	2 (all steam: hose/pipe thread)	50	3 (all steam: flange/pipe thread)	80	4 (all steam: flange/pipe thread)	100		
G	Flue gas condensate	5/8 (OD)	18	5/8 (OD)	18	5/8 (OD)	18	5/8 (OD)	18		
Н	Condensate return (recommended)	3/4 (pipe thread)	20	3/4 (pipe thread)	20	3/4 (pipe thread)	20	3/4 (pipe thread)	20		
Note	Notes: - For pipe thread steam outlet options, see DriCalc, DriSteem's free sizing and selection software, available at youry dristoom com										

# Piping: Steam

DriSteem humidifiers operate with several types of dispersion assemblies for open spaces, ducts, and air handling units. Information on placement, sizing, support, and best practices for interconnecting piping can be found in the Installation and Operation Manual for the dispersion device operating with this humidifier and in the DriSteem Interconnecting piping instructions.

- Dispersion assemblies in ducts and air handling units must be positioned where the water vapor being discharged is carried off with the airstream and is absorbed before it can cause condensation or dripping.
- The steam outlet on the humidifier is sized to the output of the humidifier. Do not use steam hose or interconnecting tubing with an inside diameter smaller than the humidifier steam outlet.
- Support interconnecting piping between the humidifier steam outlet and the dispersion system with pipe hangers. Failure to properly support the entire steam piping weight can cause damage to the humidifier tank and void the warranty.
- Maximum recommended length for steam hose is 10' (3 m). Longer distances can cause kinking or low spots.
- Pitch steam piping away from the humidifier if the total developed length is greater than 20' (6m)
- Use thread sealant for NPT/BSP connections.

# Piping: Supply water

#### SUPPLY WATER CONNECTIONS

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

- Supply water connection size and type are listed on page 26 and 27.
- There is one water connection to the humidifier. Water is connected in the field to the fill water manifold. The fill water manifold provides water to the humidifier tank through the secondary heat exchanger. The water provided to the tank is also used for tempering drain water.
- Make union connections at the humidifier on the make-up water supply line.
- 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.
- Do not use heated supply water. Using supply water over 90°F (32 °C) will adversely effect the performance of the GTS humidifier LX series.
- Water inlet and outlet must be permanent pipe connections shown in Table 27-1. Do not connect with hose-sets or other non-permanent methods.

#### SUPPLY WATER PIPING

- Provide a shutoff valve in the supply water line to isolate the humidifier from the water system while servicing.
- The GTS humidifier has a 2" (51 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).
- 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.
- Supply water tubing must be rated for at least 80 psi (552 kPa) at 140°F (60 °C) continuous service.

### Table 29-1:

#### DriSteem supply water guidelines Chlorides\* Tap water < 50 ppm RO/DI water < 5 ppm Softened water < 25 ppm \* Damage caused by chloride corrosion is not covered by your DriSteem warranty. Total hardness < 500 ppm Tap water (29 gpg) pН Tap water 6.5 to 8.5 RO/DI, softened water 7.0 to 8.0 < 15 ppm Silica Supply water outside of the guidelines

Supply water outside of the guidelines may void your DriSteem warranty. Please contact your DriSteem Representative or DriSteem Technical Support if you need advice.

#### 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 13-1.

Table 29-1: Supply water requirements		
Supply water pressure (static and dynamic)	25-80 psi at 6.0 gpm flow rate	172-552 kPa
Supply water flow rate	6.0 gpm	21 L/min
Supply water temperature	34°F to 90°F	1°C to 32°C

# Piping: Drain

#### DRAIN

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

- Supply water connection size and type are listed on page 26 and 27.
- The drain line piped from the humidifier must be run to an approved sanitary waste or suitable drain.
- Drain piping must be pitched a minimum of 1/8"/ft (1%) toward the drain. Governing codes may require more pitch. Consult MEP drawings for appropriate slope.
- Ensure the drain piping configuration (diameter, length, slopes, elbows, hangers, funnels, etc.) supports a 12 gpm flow rate for proper drain operation and to prevent overflow and spillage from an open drain with air gap. If combining multiple drain lines together, ensure proper common pipe sizing practices are used.
- An open drain with a 1" (25 mm) air gap between the drain piping and the building 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.
- A vacuum breaker must be installed on the drain line within 8 vertical inches (203 mm) or 24 horizontal inches (610 mm) of the unit. Even in horizontal drain installs, the vertical drop of the drain line cannot exceed 8" (203 mm) prior to the vacuum breaker. Failure to follow this instruction will create a siphon during drain events, disrupting normal drain operation and allowing steam to enter the drain through the overflow p-trap outlet (see Figure 30-1).
  - The mechanical tempering device contains a vacuum breaker, so if the unit is an outdoor unit or a mechanical tempering device is being used inside the enclosure, an additional vacuum breaker is not required.
- 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.

#### FIGURE 30-1: VERTICAL DRAIN



Optional Condensate Neutralization Kit is shipped with unit as selected. The Condensate Neutralizer should be installed per instructions provided with kit. This kit can be installed on a wall or on a floor and must have an overflow bypass line with Y connector. The bypass line is a safety overflow in the event of condensate drain becomes clogged. Severe damage may result if the condensate neutralizer is not installed properly. Your DriSteem warranty does not cover damage caused by mis-installed condensate neutralization kit.

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# Piping: Drain

- Make a union connection at the humidifier on the drain line.
- Although the GTS humidifier is equipped with integral water tempering, if nonmetallic drain pipe or hose is used, it should be rated for 212°F (100°C) minimum continuous operating temperature.
- The GTS humidifier has an auxiliary 3/4" (20 DN) drain outlet located on or near the cleanout plate. 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. If this connection is used, install a union to facilitate removal of the cleanout plate.

#### **OPTIONAL CONDENSATE PUMP**

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). A check valve is required on the discharge of the pump (see Figure 31-1). Electrical power for the pump is independent of the humidifier.

#### FIGURE 31-1: LIFTING DRAIN WATER



Note: Size water pump to handle a minimum of 12 gpm (45.4  $\mbox{L/m}).$ 

### CAUTION

### Hot discharge water

Discharge water can be as hot as 212 °F (100 °C) and can damage the drain plumbing.

Most GTS units are shipped with integrated drain water tempering turned on. Validate the status of drain water tempering by using the Vaporlogic display. See the Vapor-logic touchscreen IOM for instructions.

# Piping: Optional mechanical drain water tempering

Although the humidifier has integrated drain water tempering (see page 68), there are instances where an alternate mechanical tempering device (see Figure 33-1) may be needed. If the unit is ordered from the factory with a mechanical tempering device, it will be installed on the unit. For retrofits, see installation instructions on page 33.

- All outdoor enclosure units ship with the thermostatic tempering installed. This is to allow for drain water tempering during a power outage. Outdoor humidifiers ship with normally open drain valves.
- If drain water tempering is required, the mechanical tempering device is required when using mini-drain operating mode.
- The GTS humidifier is not set up to allow for tempering to be done with an alternate water source that feeds to the humidifier. If such an install is desired, the mechanical tempering device can be used. Ensure that the automatic drain water tempering is turned off on the Vapor-logic controller (see page 34-1).

### Piping: Optional mechanical drain water tempering

### REPLACING THE DRAIN MANIFOLD WITH DRAIN WATER TEMPERING ASSEMBLY

- 1. Put the GTS humidifier into Standby.
- 2. Shut off water supply to the LX humidifier.
- 3. Put the LX humidifier into Test Run, Test Outputs and energize the fill valve to relieve water pressure.
- 4. Put the LX humidifier into Standby.
- 5. Remove the enclosure doors.
- 6. Remove the drain piping from drain manifold outlet.
- Using a 5/16" nut driver, loosen hose clamps holding 1" hoses to drain manifold.
- 8. Using a ½" open end wrench, remove the drain temperature sensor.
- 9. Using a 5/16" nut driver, remove the screws holding drain manifold bracket to frame.
- 10.Remove the drain manifold.
- 11.Using a 5/16" nut driver, loosen hose clamp holding p-trap to tank overflow.
- 12.Remove p-trap.
- 13.Replace the 3/8" NPT pipe plug in the supply water manifold below the water strainer with the elbow fitting using teflon tape.
- 14.Install the second elbow fitting into the drain tempering device valve, using teflon tape.
- 15.Install drain tempering device with new p-trap.
- 16.If necessary, loosen brackets holding condensate p-trap and move as needed to clear the drain tempering device bracket.
- 17.Pull on the tubing ends to ensure they are seated in the fittings and install the locking clips.
- 18.Install drain inlet hose and p-trap hose and tighten clamps.
- 19.Adapt the drain piping to the 1" NPT male fitting on the drain tempering device outlet (drain manifold has 1" NPT female connection).
- 20. Wrap teflon tape onto drain temperature sensor threads, pre-wind the sensor cable counterclockwise a few turns and install into fitting on outlet of drain tempering device.
- 21.Test run LX to make steam and then drain, while checking for leaks.
- 22.Install doors and put LX into the desired drain and operating modes.

#### FIGURE 33-1: REPLACING THE DRAIN MANIFOLD WITH DRAIN WATER TEMPERING ASSEMBLY



### Piping: Optional mechanical drain water tempering

### SEPARATE WATER SOURCE FOR DRAIN WATER TEMPERING

- 1. Put the GTS humidifier into Standby.
- 2. Shut off water supply to the LX humidifier.
- 3. Put the LX humidifier into Test Run, Test Outputs and energize the fill valve to relieve water pressure.
- 4. Put the LX humidifier into Standby.
- 5. Remove the enclosure doors.
- 6. Locate the hose feeding water from the fill manifold to the mechanical drain tempering device.
- Remove the hose and fitting from the fill manifold and install a 3/8" NPT pipe plug with Teflon tape on the threads.
- 8. Remove the hose and fitting from the drain tempering device valve.
- Connect alternative water supply for tempering to the 3/8" NPT female connection on the tempering valve.
- 10.Turn on water to both the fill manifold and tempering device and check for leaks.
- 11.Install doors and put the LX humidifier into the desired operating mode.

### FIGURE 34-1: SEPARATE WATER SOURCE FOR DRAIN WATER TEMPERING



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## Piping: Optional condensate return

#### FIGURE 35-1: LX SERIES CONDENSATE RETURN FIELD PIPING - MODELS LX-50 THROUGH LX-150

The purpose of the condensate return is to return condensate from the dispersion device instead of sending that condensate to drain. This is an optional connection. See connection size and type on pages 26 and 27.



## Piping: Condensate return

#### FIGURE 36-1: LX SERIES CONDENSATE RETURN FIELD PIPING - MODELS LX-200 THROUGH LX-600



## Piping: Flue gas condensate drain

The GTS LX Series is a condensing gas-fired appliance. Condensate drains from the secondary heat exchanger and needs to be managed. Flue gas condensate may also need to be drained from the flue vent piping. See Figure 37-1 and the Caution statement on this page.

#### FLUE CONDENSATE PIPING GUIDELINES

- Flue gas condensate drain connection size and type are listed on page 26 and 27.
- Follow local code requirements for discharge of condensate. The flue gas condensate will have a 2-4 pH range and may need to be treated prior to discharge.
- If treatment is needed, a Condensate Neutralization Kit can be shipped with the unit as selected. The Condensate Neutralizer should be installed per instructions provided with kit. This kit can be installed on a wall or on a floor and must have an overflow bypass line with Y connector. The bypass line is a safety overflow in the event of condensate drain becomes clogged. Severe damage may result if the condensate neutralizer is not installed properly. Your DriSteem warranty does not cover damage caused by misinstalled condensate neutralization kit.

#### CAUTION

#### Flue condensate removal (For Models LX-50 - LX-300 only).

Install a drip tee within the first 3' (1 m) of flue venting for flue condensate removal. Failure to follow these instructions could reduce the service and efficiency of the secondary heat exchanger.

If flue vent is less than 10' (3 m) long and a sidewall exit, then no drip tee needed.

#### WARNING

Do not plumb the tank drain through the condensate neutralizer.

Plumbing the tank drain through the condensate neutralizer will cause the humidifier drain to back up, potentially causing building damage.



#### FIGURE 37-1: FLUE GAS CONDENSATE PIPING - MODELS LX-50 THROUGH LX-300

Notes:

- Use flexible tubing that is rated for acidic condensate.
- All tubing must allow flow away for humidifier to condensate neutralizer (if equipped).
- Condensate neutralizer can be installed horizontally or vertically as long as gravity flow is maintained.
- If floor drain is greater than 5' (1.5 m) from humidifier, use 1/2" (13 mm) PVC pipe instead of hose.
- Optional Condensate Neutralization Kit is shipped with unit as selected. The Condensate Neutralizer should be installed per instructions provided with kit. This kit can be installed on a wall or on a floor and must have an overflow bypass line with Y connector. The bypass line is a safety overflow in the event of condensate drain becomes clogged. Severe damage may result if the condensate neutralizer is not installed properly. Your DriSteem warranty does not cover damage caused by mis-installed condensate neutralization kit.

## Piping: Flue gas condensate

#### FIGURE 38-1: FLUE GAS CONDENSATE PIPING - MODELS LX-400 THROUGH LX-600



Notes:

- Use flexible tubing that is rated for acidic condensate.
- All tubing must allow flow away for humidifier to condensate neutralizer (if equipped).
- Condensate neutralizer can be installed horizontally or vertically as long as gravity flow is maintained.
- If floor drain is greater than 5' (1.5 m) from humidifier, use 1/2" (13 mm) PVC pipe instead of hose.
- Models LX-400 through LX-600 do not require a drip tee on the flue vent, as it is integrated into the unit.
- Optional Condensate Neutralization Kit is shipped with unit as selected. The Condensate Neutralizer should be installed per instructions provided with kit. This kit can be installed on a wall or on a floor and must have an overflow bypass line with Y connector. The bypass line is a safety overflow in the event of condensate drain becomes clogged. Severe damage may result if the condensate neutralizer is not installed properly. Your DriSteem warranty does not cover damage caused by mis-installed condensate neutralization kit.

### Piping: Gas

#### GAS PIPING GUIDELINES

- Gas connection size and type are listed on page 26 and 27.
- Gas piping must be properly supported to minimize strain on the LX series gas valve.
- 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 tightening 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.

### 

#### 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).
- 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.

### 

#### 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.

Table 39-1: Gas Pressure (static and dynamic)							
Natural LP							
Minimum	6" wc	6" wc					
Recommended	7" wc	11" wc					
Maximum	13" wc	13" wc					

### CAUTION

### Install connection for gas pressure test gauge

Gas pressure to the humidifier controls must never exceed 13" wc (3 kPa, 32 mbar), or the gas valve will become damaged and require replacement.

The gas pressure diagnostic port on the gas valve can be used to check pressure. Loosen the screw and push a 5/16" ID hose over the fitting connected to a gauge. Remove the hose and tighten the screw when finished.

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 (continued)

- 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 ft<sup>3</sup>/hr or m<sup>3</sup>/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 40-2 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 40-1.

Gas pipe capacities for gas pressures of 0.5 psig (3.45 kPa) or less													
Gas flow in piping in ft³/hr and m³/hr at pres Specific gravity = (						at pressu wity = 0.	ure drop 60	of 0.3" \	wc (0.07	kPa)			
Leng pi	th of pe	Nominal iron pipe diameter in inches (DN)											
		1/2" (	DN15)	3/4" (	DN20)	1" (D	N25)	11⁄4" (	DN32)	11⁄2" (DN40)			
ft	m	ft³/hr	m³/hr	ft³/hr	m³/hr	ft³/hr	m³/hr	ft³/hr	m³/hr	ft³/hr	m³/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		

#### Table 40-1: Specific gravity conversion factors

Natural gas						
Specific gravity	Factor					
0.55	1.04					
0.60	1.00					
0.65	0.962					
Prope	ane gas					
Specific gravity	Factor					
1.50	0.633					
1.53	0.626					

#### Note:

1.60

Use the above multiplying factor with Table: 40-2 when the specific gravity of gas is other than 0.60 (natural gas) or 1.53 (propane).

0.612

#### See example on page 41

Table 40-2:

## Piping: Gas (continued)

#### EXAMPLE

For this example, refer to the tables on Page 40.

To determine gas piping size, begin by calculating the cubic feet/hour (ft<sup>3</sup>/hr) or m<sup>3</sup>/hr using the following formula:

• Btuh (kW) input / calorific value of gas

Calorific values are:

- Natural gas: 1025 Btu/ft<sup>3</sup> (10.6 kW-hr/m<sup>3</sup>)
- Propane: 2500 Btu/ft<sup>3</sup> (25.9 kW-hr/m<sup>3</sup>)

For example, if you have a GTS LX-200 operating on natural gas, calculate the  $ft^3/hr$  or  $m^3/hr$  as follows:

Input BTUH for LX-200 is 244,000 Btuh or 71.5 kW.

244,000 Btuh / 1025 Btu/ft<sup>3</sup> = 238 ft<sup>3</sup> per hour

71.5 kW / 10.6 kW-hr/m<sup>3</sup> =6.74 m<sup>3</sup> per hour

If you need to run your gas piping 40 feet (12 m), see Table 40-2, and look horizontally across the 40 ft (12 m) row until you locate the next highest value above your calculated ft<sup>3</sup>/hr or m<sup>3</sup>/hr. In this example, you are looking for the next highest value above **238 ft<sup>3</sup>/hr (6.74 m<sup>3</sup>/hr)**, which is 245 ft<sup>3</sup>/hr (6.9 m<sup>3</sup>/hr) and indicates the use of a 1" (DN25) 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 40-1 for an adjustment factor. In this case, the factor would be 1.04, which you multiply by the **238 ft<sup>3</sup>/hr (6.74 m<sup>3</sup>/hr)** value. This gives you a new value of 248 ft<sup>3</sup>/hr (7 m<sup>3</sup>/hr). Referring again to Table 40-2, you see that for the same 40 ft (12 m) length, you now need to use 1-1/4" (DN32) 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 13" wc (3 kPa). Isolate the humidifier from the gas supply piping system by closing its field-installed manual shutoff valve during any pressure not equal to 13" wc (3 kPa).
- With the burner running at full capacity, 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 (continued)

#### FIGURE 42-1: GTS GAS PIPING

All Models



### Venting

#### GUIDELINES

- The GTS humidifier LX series is a Fan Assisted Category IV (condensing, positive pressure) Appliance.
- Flue gas condensate is produced and drains from the secondary heat exchanger. Piping instructions for this connection can be found on Page 37.
- Maximum flue temperature is 140 °F (60 °C).
- Vent piping must be UL or UL/CSA listed PVC, CPVC, polypropylene or any other vent type approved for a Category IV appliance.
- Follow supplier fitting and cement/primer instructions to ensure proper fit, adhesion, and assembly.
- Clean and seal inlet piping per the pipe manufacturer's recommended solvents and cements. Follow manufacturer's recommended procedures for pipe and fitting preparation, cutting and attachment with appropriate solvents and cements for the material.
- Do not use vent equipment from more than one application/manufacturer.
- Do not insulate the flue vent piping or locate it within enclosed spaces or within walls.
- 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.

Table 43-1:   Approved PVC/CPVC flue gas vent pipe and fittings							
ltem	Vent material	United States	Canada				
	PVC	ANSI/STM D2665		ULC S636			
	PVC, Sch. 40	ANSI/ASTM D1785					
Piping	PVC, SDR series	ANSI/ASTM D2241					
	CPVC, Sch. 40	ANSI/ASTM F441					
	CPVC, SDR series	ANSI/ASTM F422					
	PVC, DWV, Sch. 40	ANSI/ASTM D2665	IPEX system				
	PVC, Sch. 40	ANSI/ASTM 2466	1738				
Fittings	PVC, Sch. 80	ANSI/ASTM 2467					
	CPVC, Sch. 40	ANSI/ASTM F438					
	CPVC, Sch. 80	ANSI/ASTM F439					
Cement,	PVC	ANSI/ASTM D2564					
primer	CPVC	ANSI/ASTM F493					
Note: Do not use cellular (foam) core PVC, DWV pipe, ASTM F891, or cellular core CPVC or RADEL (Polyphenylsulfone).							

#### 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.



#### Installation requirements

Failure to properly seal all joints and seams as required in the air inlet piping may result in flue gas recirculation, spillage of flue products and carbon monoxide emissions causing severe personal injury or death.

Table 43-2: Approved vent manufacturers						
ltem	Manufacturer					
Polymanylana	Centrotherm Eco Systems*					
Folypropylene	DuraVent (M&G Group)					
	DuraVent (M&G Group)					
	Z-Flex					
Stainless steel	Heat Fab					
	Metal Fab					
	Security Chimney					
* 6″ requires a 150mm to 160mm Centrotherm adapter						



Do not interfere, disable, or tamper with the devices monitoring the combustion gas discharge, including the flue temperature and flue pressure sensors. Only authorized and trained technicians should perform any service on these items. If the unit fails repeatedly due to a discharge (flue) fault, have the device serviced and tested by authorized and trained technicians.

### Venting: General

- 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 vent piping as direct as possible, with a minimum number of turns or elbows.
- For Models LX-50 LX-300 only: Install a drip tee within the first 3' (1 m) of flue venting for flue condensate removal. If flue vent is less than 10' (3 m) long and a sidewall exit, then no drip tee needed. See Figure 51-1. **Warning:** Failure to follow these instructions could reduce the service and efficiency of the secondary heat exchanger.
- The purpose of venting the gas humidifier is to completely remove all products of combustion and ventilation gases to the outside air.
- Maintain a minimum upward slope of 1/4" per linear foot (2%) and supported every 4' (1 m) on all horizontal runs of the flue gas. Maintain proper support of vent connections and joints. Observe clearances (in accordance with applicable codes) from all combustible materials.
- Inspect for proper and tight construction. Clean and remove any restrictions or obstructions. An existing chimney may be used as a chase.
- Do not connect this humidifier to a chimney flue servicing any other appliance.

	Maximum equivalent pipe length ft (m)										
Model		Combustio	n air intake			Flue g	as vent				
-	2" (60 mm)	3" (80 mm)	4" (mm)	6" (mm)	2" (60 mm)	3" (80 mm)	4" (mm)	6" (mm)			
LX-50	100 (30)	500 (152)			100 (30)	500 (152)					
LX-75	50 (15)	250 (76)			50 (15)	250 (76)					
LX-100	25 (8)	150 (46)	550 (168)		25 (8)	150 (46)	550 (168)				
LX-150		100 (30)	275 (84)			100 (30)	275 (84)				
LX-200		40 (12)	200 (61)			40 (12)	200 (61)				
LX-250		30 (9)	125 (38)	600 (183)		30 (9)	125 (38)	600 (183)			
LX-300		25 (8)	100 (30)	475 (145)		25 (8)	100 (30)	475 (145)			
LX-400			50 (15)	325 (99)			50 (15)	325 (99)			
LX-500			35 (10)	225 (69)			35 (10)	225 (69)			
LX-600				175 (53)				175 (53)			

### Venting: General

- The flue gas outlet and combustion air inlet pressures at the vent adapters on the LX series GTS humidifier must be within the ranges shown in Table 46-2 from full output to minimum output.
- Flue gas outlet and combustion air inlet adapters accept PVC, CPVC, Polypropylene and stainless steel piping.
- If the flue vent outlet or combustion air inlet is downsized or upsized per Table 44-1, the adapters must be installed vertically to the GTS LX humidifier.
- Never connect this humidifier to an existing chimney.
- Rigidly support the vent pipe every 3' (1 m) or less with hangers or straps to ensure there is no movement after installation. The humidifiers secondary heat exchanger 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.
- 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.
- 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.

#### **DETERMINE A LOCATION**

Consider the surroundings when terminating the vent and air:

- 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.
- Combustion air and flue gas terminations should be seated in the same atmospheric zones.

## Venting: General

#### Table 46-1: Equivalent vent lenath

Equivalent vent lengths								
Description	2" - 3" (	diameter	4" dia	ameter	6" diameter			
Description	feet	meter	feet	meter	feet	meter		
Long radius 90° elbow	3	0.9	4	1.2	6	1.8		
Medium radius 90° elbow	5	1.5	7	2.0	10	3.0		
Mitered 90° elbow	8	2.4	11	3.3	16	4.9		
Long radius 45° elbow	1.5	0.5	2	0.6	3	0.9		
Medium radius 45° elbow	2.5	0.8	3	1.0	5	1.5		
Mitered 45° elbow	4	1.2	5	1.6	8	2.4		
Concentric vent termination	5	1.5	7	2.0				
Тее	16	4.9	21	6.5	32	9.8		
3" to 2" (80 to 60 mm) step down adapter	5	1.5	7	2.0	10	3.0		

Table 46-2: Venting pressure							
Description	Minimum	Maximum					
Flue gas outlet pressure	-0.05" WC (+12 Pa)	+0.45" WC (+112 Pa)					
Combustion air inlet pressure	-0.45" WC (-112 Pa)	+0.05" WC (+12 Pa)					

#### FIGURE 46-1: VENT ELBOWS AND TEES



Note: A maximum of eight elbows, including terminations, are allowed.

The GTS humidifier is pre-plumbed to support 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 humidifier 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 humidifier 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 47-1 outlines four types of locations, and the requirements of each.



#### 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, chlorine and other household products.

When the GTS is located in an environment with negative pressure or toxic air, pipe the sealed combustion connection to fresh supply air at atmospheric pressure.

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

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Location of humidifier c	and required	air openings	(non-ducted	l combustion c	air

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 <sup>2</sup> ) per opening per 1000 Btu/hr (293 W) input The minimum free area of all openings combined is 100 sq. in. (645 cm <sup>2</sup> ).				
Confined space with all air from outside the building through air ducts	Two openings, 2 ducts, 1 sq. in. (6.5 cm²) 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 cm²) 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" × 3" (76 mm × 76 mm).					

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#### Combustion air quality (list of contaminants)

Sample list of contaminants to be avoided:

The recommended source of combustion air is to use the outdoor air supply. However, the use of indoor air in most applications is acceptable except as follows:

- 1. If the furnace is installed in a confined space it is recommended that the necessary combustion air come from the outdoors by way of attic, crawl space, air duct, or direct opening.
- 2. If outdoor combustion air is used, there must be no exposure to the installations or substances listed in "3" below.
- 3. The following types of installation may require OUTDOOR AIR for combustion, due to chemical exposures:
- Commercial buildings
- Buildings with indoor pools
- Furnaces installed in laundry rooms
- Furnaces installed in hobby or craft rooms
- Furnaces installed near chemical storage areas

Exposure to the following substances in the combustion air supply may also require OUTDOOR AIR for combustion:

- Permanent wave solutions
- Chlorinated waxes and cleaners
- Chlorine based swimming pool chemicals
- Water softening chemicals
- De-icing salts or chemicals
- Carbon tetrachloride
- Halogen type refrigerants
- Cleaning solvents (such as perchloroethylene)
- Printing inks, paint removers, varnishes, etc.
- Hydrochloric acid
- Cements and glues
- Antistatic fabric softeners for clothes dryers
- Masonry acid washing materials

### Flue gas vent to outside Quantity of two 90° elbows (See Table 44 for vent size) 24" (607 mm) Bird screen 3" to 2" (80 to 60 mm) reducer (user installed) 6" - 8" (152 - 203 mm) 3" (80 mm) air intake) Flue gas condensate See Table 44-1 for flue venting sizes and lengths. To drain or 00 condensate neutralizer OM-7978 Note: Field piping supplied by others.

#### FIGURE 49-1: ROOM AIR COMBUSTION FOR THE LX-50 THROUGH LX-150

### CAUTION

Flue condensate removal (For Models LX-50 - LX-150 only).

Install a drip tee within the first 3' (1 m) of flue venting for flue condensate removal. Failure to follow these instructions could reduce the service and efficiency of the secondary heat exchanger.

If flue vent is less than 10' (3 m) long and a sidewall exit, then no drip tee needed.

#### FIGURE 50-1: ROOM AIR COMBUSTION FOR THE LX-200 THROUGH LX-600



## Venting: Sealed combustion

#### SEALED COMBUSTION (COMBUSTION AIR FROM OUTSIDE THE BUILDING)

- The GTS is pre-plumbed to support sealed combustion using PVC, CPVC ABS, polypropylene, or stainless steel (see Figure 51-1). All GTS models have a single point connection on top of the humidifier shroud.
- When running piping for sealed combustion, see Tables 44-1 and 46-1 for maximum and minimum equivalent length of vent pipe and equivalent length of each elbow (maximum of eight elbows including terminations). 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.
- In cold climates, if sealed combustion piping passes through warm, humidified spaces insulate the piping to prevent condensation.

If the LX is installed in a warm, humidified space, insulate both the sealed combustion piping and the LX combustion air hose(s) from the sealed combustion piping to the secondary heat exchanger air inlet(s) to prevent condensation. Do not insulate the hose(s) between the secondary heat exchanger outlet(s) and combustion blower(s). Pipe wrap insulation tape can be used on the LX combustion air hose(s). Use a 25/50 flame smoke rated insulation (see Figure 51-2).

#### FIGURE 51-1: LX SERIES SEALED COMBUSTION CONNECTION



Note: Field piping supplied by others.

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#### 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 51-2: INSULATING COMBUSTION HOSES



### Venting: Vertical

In addition to this section, please see General venting on page 44.

• 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. Install a high-wind vent cap on all GTS humidifiers.

#### FIGURE 52-1: CONCENTRIC VENT ROOF INSTALLATION



### Venting: Vertical

#### FIGURE 53-1: GTS VERTICAL VENTING



#### Notes:

- For Models LX-50 LX-300 only: Install a drip tee within the first 3' (1 m) of flue venting for flue condensate removal.
- If flue vent is less than 10' (3 m) long and a sidewall exit, then no drip tee needed. See Figure 51-1.
- Required distance between air intake and vent hood is defined by governing codes.
- Slope flue gas vent horizontal runs 1/4"/ft (2°) back towards the tee at humidifier.
- 4' (1.2 m) minimum from any cable, dormer, or other roof structure with building interior access (e.g. vent or window).
- 10' (3 m) minimum from any forced air inlet to the building, including make up air inlets such as dryer or furnace areas.

### Venting: Sidewall

In addition to this section, please see General venting on page 44.

See Figures 56-1 and Figures 56-2.

- The combustion **air** piping must end in a down-turned elbow. This arrangement avoids recirculation of flue products into the combustion air stream.
- The flue gas **vent** piping may terminate in an elbow pointed outward or away from the air inlet at least 12" (305 mm) above the combustion air inlet, or use a tee as a termination to minimize effects of wind.

#### **DETERMINE A LOCATION**

Additional placement considerations when the flue gas vent and combustion air intake are exiting a sidewall:

- Position the vent where vapors will not damage nearby shrubs, plants, or air conditioning equipment or be objectionable.
- The flue will form a noticeable plume as it condenses in cold air. Avoid areas where the plume could obstruct window views.
- Prevailing winds could cause freezing of condensate and water/ice buildup where flue products impinge on building surfaces or plants.
- Avoid possibility of accidental contact of flue gas with people or pets.

#### FIGURE 54-1: GTS HUMIDIFIER LX SERIES SIDEWALL VENTING



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A gas vent extending through an exterior wall shall not terminate adjacent to wall or below building extensions such as eaves, parapets, balconies, or decks. Failure to comply could result in severe personal injury, death, or substantial property damage.

Sidewall vent and air inlet terminations must terminate in the same pressure zone.

#### CAUTION

Sidewall venting commercial products will result in large exhaust plumes in cold climates. Consideration should be taken when locating in proximity to windows, doors, walkways, etc.

### Venting: Sidewall

#### FIGURE 55-1: GTS HUMIDIFIER LX SERIES SIDEWALL VENTING



## Venting: Sidewall

- Do not locate the vent where wind could affect performance or cause recirculation, such as inside building corners, near adjacent buildings or surfaces, window wells, stair wells, alcoves, courtyards, or other recessed areas.
- Do not locate the vent above any door or window. Condensate can freeze, causing ice formations.
- Locate or guard vent to prevent condensate damage to exterior finishes.
- The vent must end:
  - At least 6' (1.8 m) from adjacent walls.
  - No closer than 12" (305 mm) below roof overhang.
  - At least 3' (0.9 m) above any forced air intake within 10' (3 m).
  - No closer than 12" (305 mm) below or horizontally from any door or window or any other gravity air inlet.
- Air inlet must be at least 12" (305 mm) above grade or snow line; at least 12" (305 mm) below the vent end; and the vent pipe must not extend more than 24" (610 mm) vertically outside the building unless supports are added.

#### FIGURE 56-2: GTS HUMIDIFIER LX SERIES SIDEWALL VENTING WITH CONCENTRIC VENT



#### Maximum outside vent piping length 24" (610 mm) Bird screen Flue gas vent Bird screen Combustion 12" Use a tee in high (305 mm) air intake wind areas Bird screen Bird screen 12" (305 mm) OM-7981 Grade/snow line

#### FIGURE 56-1: GTS HUMIDIFIER LX SERIES SIDEWALL VENTING

### Wiring

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#### 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.

- 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 transformers 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 mm<sup>2</sup>) 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 mm<sup>2</sup>) for 120 V line voltage. Use #18 gauge (1 mm<sup>2</sup>) for control wiring.
- In Europe, the electrical conductors shall be Type MTW (105 °C) 2.5 mm<sup>2</sup> wire for line voltage (230V), with BLACK WIRE for LINE, BLUE WIRE for NEUTRAL, GREEN AND YELLOW WIRE for GROUND, and 2.5 mm<sup>2</sup> 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 at the factory. 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 11-1 (North America) and Table 101-1 (Europe).
- Refer to the <u>Vapor-logic Installation and Operation Manual</u> for additional information on the controller furnished with this GTS humidifier.

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#### 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.

### Outdoor enclosure: Overview

#### GENERAL DESCRIPTION

- The outdoor GTS is CSA/ETL approved for installation outdoors. It uses an optional heater and fans to properly operate in operating temperatures of -40 °F to 122 °F (-40 °C to 50 °C). The unit is intended to be mounted on a concrete pad or rooftop curb. Properly sized curbs are available from DriSteem.
- The knockouts located on the front of the unit are used to run electrical power and gas to the unit. There is a pipe chase located inside the enclosure that is used for both the supply water and drain piping. Supply water and drain piping will need to come through the knockouts at the front of the unit if the chase cannot be used. Combustion air is drawn from within the enclosure, and flue gas is vented out the back of the enclosure.
- An emergency drain is provided on the front of the unit. In case of a water leak, water drains onto the roof through this emergency drain. The drain is intended to have a field installed water seal.
- If constant monitoring of the unit is desired, or if the unit is located in a severe climate, install a remote mount display. Additional cable lengths up to 500' (152 m) are available as an option.
- In cold climates, Freeze Protection Piping (see page 65), is an important component to the proper operation of the outdoor humidifier.

#### FIGURE 58-1: OUTDOOR ENCLOSURE TYPICAL INSTALLATION OVERVIEW



### Outdoor enclosure: Operation

If the ambient temperature in the enclosure is below 50 °F (10 °C), the heater is powered up. The heater remains powered up until the enclosure reaches 60 °F (15.5 °C). When there is no call for humidity, an aquastat maintains tank temperature at the factory default of 50 °F (10 °C). This temperature can be reset in the field to be from 50-180 °F (10-82 °C). If for any reason the tank temperature falls below 40°F (4 °C), the tank will drain to keep the unit from freezing.

When the temperature of the enclosure reaches 85°F (29 °C), the ventilation fans turn on to cool the electronic components. If the enclosure temperature reaches 150°F (66 °C), the Vapor-logic controller will extinguish any operating burners and allow the ventilation fans to cool the enclosure. When the enclosure temperature falls below 150°F (66 °C), the GTS humidifier automatically resumes normal operation.

In the event of a power loss, the drain valve will open and drain the tank to prevent the water from freezing. The water will be cooled by the mechanical tempering device that is installed on all outdoor LX series units. See page 33 for more information.



#### FIGURE 59-1: OUTDOOR ENCLOSURE MOUNTED ON A CURB



OM-8008

DM-8009

### Outdoor enclosure: Location

- 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.
- The GTS must be level and located so there is enough clearance for opening the access panels (see recommended clearances on Page 19).
- Do not locate unit in areas where the surrounding air has high levels of particulates, such as some industrial parks or areas near highways. In situations such as these, you will need to filter the air inlets.
- The unit should be located so prevailing winds do not blow into the air intakes.
- When located on the roof, the air intakes must be a minimum of 14" (360mm) off the roof to prevent intake of snow or splashed rain.
- Locate unit so air intakes are not too close to other exhaust fan outlets, gasoline storage, or other contaminants that could potentially cause dangerous situations. Using and storing gasoline or other flammable vapors and liquids in open containers near this appliance is hazardous.

### Outdoor enclosure: Dimensions



#### DIMENSIONS

- For outdoor unit weights, see Table 64-1.
- For clearances, see Figure 19-1.

Table 61-1: Outdoor unit dimensions										
	Description	LX-50, LX-7	75, LX-100	LX-1	50	LX-200, LX-2	250, LX-300	LX-400, LX-5	500, LX-600	
	Description	inches	mm	inches	mm	inches	mm	inches	mm	
A	Enclosure length	36	914.4	45	1143	57.35	1456.59	57.35	1456.59	
В	Enclosure width	27.35	694.7	27.35	694.7	27.35	694.69	39.10	993.04	
С	Enclosure height	57	1447.8	57	1447.8	62	1574.8	62	1574.8	
D	Dine share neething	2.05	52.02	2.05	52.02	2.05	52.0	2.05	52.02	
E	ripe chase position	6.51	165.28	6.51	165.3	3.05	77.4	2.05	52.04	
F		7	177.8	7	177.8	7	177.8	10	254	
G	Pipe chase size	11	279.4	11	279.4	14	355.6	16	406.4	
Н		22.77	578.358	20.83	529.082	22.16	562.864	31.48	799.592	
J	Internal steam pipe position	9.5	241.3	8.45	214.63	6.5	165.1	6.1	154.94	
К	F	6.46	164.084	6.46	164.084	9.17	232.918	8.96	227.584	
L	External steam pipe position	50.37	1279.398	50.37	1279.398	55.25	1403.35	54.91	1394.714	
м	Height to bottom of flue outlet	48.35	1228.1	48.35	1228.09	49.49	1257.05	46.65	1184.91	
N	Length to Side of flue outlet	13.57	344.678	13.57	344.678	3.38	85.852	2.24	56.896	
Р	Curb height	14.0 - 36.0	356 - 914	14.0 - 36.0	356 - 914	14.0 - 36.0	356 - 914	14.0 - 36.0	356 - 914	

OM-8010

### Outdoor enclosure: Mounting

- Verify that the position of the pad or curb properly supports the unit and that support structure dimensions coincide with unit dimensions.
- DriSteem rooftop curbs are shipped knocked down for ease of transporting to the roof. The curb is manufactured out of 14-gauge galvanized steel and is shipped with all hardware for bolt-together assembly, a curb gasket for sealing between the curb and the unit, and an installation drawing. All holes are matched before leaving the factory.
- Roof curbs supplied by others must be at least 14" high, and 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.
- Prior to installation, remove all of the unit packaging.
- The GTS outdoor enclosure must be lifted by the lift plates (See Figure 62-1) on the base of the unit. It must be lifted 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.
  - 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.

#### FIGURE 62-1: OUTDOOR ENCLOSURE MOUNTING WITH LIFT BRACKET



### Outdoor enclosure: Piping

#### FIGURE 63-1: GTS OUTDOOR ENCLOSURE STEAM OUTLET OPTIONS



See Piping beginning on Page 24 for directions on installing water, drain, flue gas condensate, and gas on the GTS humidifier LX series. For Outdoor Enclosure specific items, see below.

#### SUPPLY WATER AND DRAIN

#### Using the pipe chase

Use insulation to completely fill the area around the pipes in the chase to maintain proper enclosure pressure and protect unit components from elevated moisture levels within the 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.

- Using the knockouts on the front of the unit Heat trace and insulate piping if freezing temperatures is a concern.
- **Insulate supply water piping** inside the unit to avoid dripping from condensation.
- For **cold climates**, see Freeze Protection Piping on Page 65.

#### FLUE GAS CONDENSATE

For cold climates, do not drain condensate on roof. This will cause the condensate to freeze and back up. Follow local code requirements.

#### STEAM

The humidifier has two available steam distribution configurations. The standard configuration has a steam outlet on the right side of the enclosure. The optional internal steam distribution configuration routes steam within the enclosure and down through the pipe chase into a building.

#### VENTING

See General Venting beginning on Page 44 for directions on venting. For Outdoor Enclosure specific items, see below.

- Flue gas venting should end with a tee to the back of the unit to minimize effects of wind. Governing codes prevail.
- Combustion air is drawn from within the DriSteem outdoor enclosure which is sufficiently vented.
- Venting material requirements are the same for both indoor and outdoor LX series units.

# Outdoor enclosure: Electrical

Table 64-1: Outdoor unit amps and weights								
Model	Full Load Amps** (Heater Package)		Full Load Amps** (No Heater Package)		Operating weight		Shipping (empty) weight*	
	120V 60 Hz	230V 50Hz	120V 60Hz	230V 50Hz	lbs	kg	lbs	kg
LX-50	7.0	4.5	3.0	2.5	479	217	362	164
LX-75	7.0	4.5	3.0	2.5	479	217	362	164
LX-100	7.0	4.5	3.0	2.5	475	216	367	166
LX-150	7.5	5.0	3.5	3.0	629	285	421	191
LX-200	9.0	5.5	5.0	3.5	914	415	564	256
LX-250	9.0	5.5	5.0	3.5	914	415	564	256
LX-300	9.0	5.5	5.0	3.5	916	415	574	260
LX-400	16.5	8.5	7.5	4.5	1606	729	940	426
LX-500	16.5	8.5	7.5	4.5	1606	729	940	426
LX-600	16.5	8.5	7.5	4.5	1612	731	962	436
* Add approximately 60-90 lbs (27-4) ka) for packaging material.								

\*\* Full load amps listed are for the humidifier and the enclosure.

### Outdoor enclosure: Freeze Protection Piping



#### **Piping notes:**

- 1. Insulate supply water piping to avoid dripping from condensation.
- 2. To ensure that water does not remain in the fill line and freeze if there is a loss of power, use field installed 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). If these valves are used, a vacuum breaker needs to be installed on the fill line near the unit.
- In extreme or critical applications in which the unlikely event of a water leak could cause severe damage, use a thermostat with a remote sensor on the fill line to cut power to the Model LX and safety valves to stop fill water to the Model LX and drain the fill piping when the temperature is below freezing.
- 4. 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.
- 5. If the valves are installed as per note 2 and drain water tempering is required during a power outage, a LX series mechanical tempering device needs to be installed inside the building. Piping between the unit and the tempering device must be rated for 212°F water.
- 6. Optional Condensate Neutralization Kit is shipped with unit as selected. The Condensate Neutralizer should be installed per instructions provided with kit. This kit can be installed on a wall or on a floor and must have an overflow bypass line with Y connector. The bypass line is a safety overflow in the event of condensate drain becomes clogged. Severe damage may result if the condensate neutralizer is not installed properly. Your DriSteem warranty does not cover damage caused by mis-installed condensate neutralization kit. (\*Shown schematic for LX400-600).
- 7. DriSteem is not responsible for any freeze related damage to the humidifier or lines leading to the humidifier.

### Installation checklist

#### MOUNTING

See page 18 for more information.

- □ Humidifier is securely installed and level.
- □ Humidifier has adequate clearance for maintenance (see page 19).

#### INTERCONNECTING STEAM PIPING

See page 28, Interconnecting piping instructions, and the dispersion installation manual for more information.

- □ Steam piping is properly supported to minimize strain on the humidifier tank and steam outlet.
- □ Steam piping is properly sloped and drip tee's installed to ensure condensate drainage.
- Steam piping diameter and developed length supports the maximum steam capacity without exceeding back pressure limits.
- □ Steam piping has not been downsized from humidifier outlet size.
- Dispersion condensate p-trap/water seal has a 2" drop with seal depth equal to 1" larger than the static pressure of the AHU/duct with minimum of 5".
- □ Steam piping is pitched away from the generator if developed length is greater than 20'.

#### SUPPLY WATER

See page 12 for more information.

- □ Shut-off valve installed to isolate humidifier from the water system while servicing.
- □ Shock arrester installed to reduce risk of water hammer.
- □ Union installed at the unit to easily disconnect.
- Supply water pressure is between 25 and 80 psi at both dynamic (6 gpm flow rate) and static (no flow) conditions.
- □ Supply water temperature is between 34°F and 90°F (1°C and 32°C).

#### TANK DRAIN

See page 30 for more information.

- Drain pipe size, slope and fittings are sized to support 12gpm maximum tank drain flow rate.
- A vacuum relief valve is installed on the drain line to prevent siphoning of the internal p-trap (see page 30). Not needed on outdoor units or if the mechanical tempering device is being used inside the enclosure.
- Open drain installed between the humidifier drain line and the building drain.
- Open drain is placed so that flash steam from hot drain water will not damage equipment or building surfaces.
- □ Union installed at the unit to easily disconnect drain connection.
- The tank drain water is NOT plumbed to go through the condensate neutralizer (see warning on page 30).

#### FLUE GAS CONDENSATE DRAIN

See page 37 for more information.

Condensate neutralizer installed. Ensure tank drain is NOT plumbed through the condensate neutralizer. (see warning on page 37).

### Installation checklist

- Flue gas condensate neutralizer and piping are located below outlet of flue gas condensate tube from LX to ensure proper drainage.
- $\Box$  Flue gas condensate drain piping pitched toward drain a minimum of 1/8''/ft (1%).

#### GAS

See page 39 for more information.

- D Manual shut-off valve has been installed immediately upstream of the humidifier.
- □ The gas type supplied to the humidifier matches the unit nameplate label.
- Gas pressure is adequate at both dynamic (max BTUH input) and static conditions (See Table 40-2).
- Connections and humidifier gas train have been tested for leaks.
- Gas piping is properly supported to minimize strain on the LX gas valves.
- □ Air has been purged from the gas line.

#### VENTING

See page 43 for more information.

- Humidifier has been vented as a Category IV gas-fired appliance (positive pressure, condensing) according to all local codes and ordinances.
- □ Humidifier has a dedicated flue vent and is not vented with another LX series or any other gas-fired appliance.
- □ Flue vent lengths comply with Table 42-1.
- □ Flue vent is NOT insulated.
- Minimum upward slope of 1/4" per linear foot (2%) and supported every 4' (1 m) on all horizontal runs of the flue vent.
- □ Drip tee installed on flue within the first three feet from the unit (LX-50 LX-300 only). If flue vent is less than 10' and a sidewall exit, then no drip tee is needed. This condensed flue gas is draining through the condensate neutralizer.
- □ Sealed combustion piping (if used) is insulated if passing through warm and humid spaces.
- The combustion air hose entering the secondary heat exchanger is insulated in applications where the outside air temperature is below freezing and the LX is located within a space that can condense moisture onto the air hose.

#### WIRING AND CONTROLS

See page 57 and the Vapor-logic Installation and Operation Manual for more information.

Wiring and controls have been wired according to all governing codes and as stated in the wiring diagrams and Vapor-logic Installation and Operation Manual that shipped with the unit.

#### OUTDOOR ENCLOSURE

See page 59 for more information.

- Derive Pipe chase is sealed.
- □ Freeze-protection piping installed if necessary.

### Operation overview

Upon a call for humidity, the blower(s) will power up, the ignition module will turn the gas valve(s) on and the enhanced spark ignition system ignites the burner(s). The burner(s) fire into the primary heat exchanger in the tank causing the water to heat and eventually boil. When the water is heating, the blower(s) are fully on to reduce heat up time. Once the unit starts humidifying, the blower(s) and gas valve(s) modulate in accordance with the humidification demand. There are many features built in to the GTS LX to keep it operating efficiently and safely.

#### **OPERATIONAL FEATURES**

- **Fill Valves:** The precision fill valves(s) are controlled by Vapor-logic's learning algorithm to ensure consistent steam output by injecting water at a rate proportional to steam output. Additionally, the secondary heat exchanger(s) pre-heats the water before it enters the tank, thus further enhancing steam output consistency. The fast fill valve provides rapid tank filling, tempering and drain port/valve flushing.
- **Probe Check:** The probe check ensures that the conductivity probes are accurately sensing water level for all water types. The humidifier will fill with water to just above the middle probe, and then it will skim off the surface of the water to remove any surfactants that might be floating on the surface of the water. The drain will turn on and stay open until the water level has fallen below all three probes. Then the water will return to its normal operating level. The frequency of probe checks is based on water type. The humidifier will do this every time after a drain. Probe checks only happen at allowed drain times, which is user adjustable.
- Condensing Operation: The primary heat exchanger and secondary heat exchanger are designed to cool the flue temperatures to below 140°F (60°C). The secondary heat exchanger is actually two heat exchangers. One is pre-heating the combustion air and the other one is preheating the inlet water. Flue gas is the source of heat for both heat exchangers.

#### • Integrated Drain Water Tempering:

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 LX series is shipped with drain water tempering enabled. This feature can be disabled in the Vapor-logic controller. When drain water tempering is enabled, the following steps will take place to ensure drain water is less than 140°F (60 °C):

- a. Water greater than 140°F (60 °C) is detected in the drain assembly with a temperature sensor.
- b. Fill valves open, directing cool water to the drain port within the tank.
- c. Hot and cold water mix in the tank near the drain port.
- d. Drain port valve opens and sends tempered water to the drain piping.
- e. The Vapor-logic controller controls the drain and fill valves using input from the drain temperature sensor to enable closed-loop control of drain water temperature, thus ensuring it does not exceed 140°F (60°C) while minimizing water usage.

Note: During an integral drain tempering event, cold water in the internal drop tube may cause a low rolling sound.

### Operation overview

 Draining: There are a few options when it comes to draining. The Smart Drain setting (default) will detect the cleanliness of the water and drain accordingly. In User Drain the user is able to set how often the humidifier drains. Both Smart Drains and User Drains can be scheduled to happen at a specific time in the day (default is 12:00am). The user can also specify Full Drain (default) or Mini-drain. A Full Drain will drain the tank completely. A Mini-drain will partially drain the tank. If full tank drains are not permitted, mini-drain shuts the electronic drain water tempering off. An external thermostatic tempering device would need to be installed to maintain drain water tempering.

#### SAFETY FEATURES

- Enhanced Spark Ignition: Direct spark ignition is enhanced by targeting the spark in a fuel enriched zone for reliable ignition events.
- Flue Temperature Sensor and Switch: Both a flue temperature sensor and switch are located in the flue gas outlet of the secondary heat exchanger. The Vapor-logic controller continuously monitors flue temperature and will temporarily reduce or stop output if temperatures elevate and automatically resume full output after cooling down. This ensures safe operation with approved PVC and other flue venting. As a redundant safety, the flue temperature switch disables the gas valve(s) if flue temperatures elevate.
- Flue Pressure Switch: The flue pressure switch is connected to the flue gas outlet. If the flue venting is blocked or restricted the humidifier will shut down until the issue is resolved and the alarm is cleared.
- **Blower Speed:** 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 speed is outside of an acceptable range, the GTS will not operate.
- Tank Temperature Sensor and Switch: The tank temperature sensor and switch is mounted in the tank above the burner tube. When the tank temperature exceeds safe operating temperatures, the Vapor-logic controller will shut the unit down. As a redundant safety, the switch is also tied directly to the power source of the gas valves.
- Drain Temperature Sensor: The drain temperature sensor is in the drain manifold. When tempering is enabled, the sensor ensures that the drain water is below 140°F (60°C).
- **Foam Detection:** The top probe of the three-probe system detects foam that may form in the tank. In the case of a foam event, the tank will completely drain and refill before continuing operation.
- End-of-Season Drain: The humidifier will automatically drain after 72-hours of non-use. This is a user-adjustable setting. See the Vapor-logic controller operation manual for instructions on how to adjust this feature.
- Freeze Protection: If, for any reason, the tank temperature falls below 40°F (4°C), the humidifier will drain.

# Start-up

#### START-UP CHECKLIST

After the system is installed and connected to gas, electrical, water supplies, controls, steam dispersion, and drain 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 (page 18)
  - <u>Vapor-logic Installation and Operation Manual</u> (shipped with the humidifier)
    - Installation section
    - Installation checklist
  - Interconnecting piping instructions
  - Dispersion Installation and Operation Manual
  - 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.)
  - Verify that adequate gas pressure is available. See Table 39-1.
- Delta Placement Ensure all clearances are met. See page 18.
- Piping (flue gas condensate)—Ensure flue gas is being drained and neutralized (as necessary) from the secondary heat exchanger and flue piping (if applicable) See page 37.
  - Ensure tank drain is not being run through the condensate neutralizer.
- □ **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.
- Verify that the humidifier tank is securely installed and level before filling with water (see the operating weights in Table 11-1.
- Verify that the humidifier tank is level front to back and side to side after it is full of water.



#### 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:

- Display setup and menu information
- Control input signals and functions
- Drain, flush, and skim features
- Safety features
- Alert 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

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

- 1. Verify the installer has followed the "Install Checklist" on Page 66 of this manual.
- 2. Complete the "Start-up Checklist" on Page 70 of this manual.
- 3. Prime the condensate p-trap at the base of the secondary heat exchanger and the p-trap off of the drip-tee (if required) on the flue. See warning on right.
- 4. Make sure gas and water are free to flow to the humidifier.
- 5. Power up the humidifier. When the humidifier is first powered up, the control cabinet fan will turn on. The blower fan(s) will also turn on and then shut off after a few seconds. At this point, the humidifier is considered disabled, because it is in Standby mode.
- 6. Follow the Vapor-logic on-screen set-up steps, ensuring that wiring is accurate and that start-up and installation checklists have been followed.
- 7. Change mode from Standby to Auto in order for the humidifier to operate. The humidifier must also be showing a demand before it will start. Alternatively, place the humidifier in "Test Run" mode to set a temporary relative humidity set point for test purposes. See more information in the <u>Vapor-logic Installation</u>, Operation, and Maintenance Manual.
- 8. The humidifier will then perform several steps to prepare for humidification:
  - The LX will immediately begin a line flush with 5 gpm water running through the fill and drain lines. The purpose of this flush is to clean any debris out of the lines leftover from installation. The drain flush takes about one minute, and you may hear the humidifier draining.
  - Next, the humidifier will start to fill the tank with water and perform a probe check using the Vapor-logic controller. See page 68 for a description of a probe check. At this time, the water will be skimmed off the surface to prime the p-trap. A partial drain is part of the probe check; so again, you may hear the unit draining. This process will take anywhere from six to eighteen minutes depending on the size of your humidifier.
  - After the probe check is complete, the blower(s) will power up, the ignition module will turn the gas valve(s) on and the enhanced spark ignition system ignites the burner(s). The burner(s) fire into the primary heat exchanger in the tank causing the water to heat and eventually boil. When the water is heating, the blower(s) are fully on to reduce heat up time. Once the unit starts humidifying, the blower(s) and gas valve(s) modulate in accordance with the humidification demand. Time to boil ranges from small to large units but is around four minutes.
- Monitor oxygen levels and adjust if out of range. Desired oxygen range is 5.5% +/- 1.0% at 100%. See page 81 for instructions on how to adjust oxygen levels.
- 10.See page 68 for continuous operation and safety features of the GTS LX and page 89 for troubleshooting.



### Startup

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



Failure to prime all flue gas condensate traps (tees and secondary heat exchanger P-trap) with water will result in combustion gas entering the living space (which may contain carbon monoxide).

To avoid the risk asphyxiation from carbon monoxide, never operate the humidifier unless the condensate drip tees and secondary heat exchanger P-trap are sealed with water.

# Commissioning checklist

Visit date	Job site representation:				
Model #					
Serial #					
Тад #					
<b>Important:</b> 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	Dedicated flue gas and combustion air piping				
RO	□ Slight pitch toward drip tee				
DI DI	All pipe connections sealed and tight				
Softened	All flue gas condensate traps primed.				
🖵 Potable	Plastic flue gas vent pipe is <b>not</b> insulated.				
Grains hardness	Total developed length does not exceed maximums.				
Water pressure (static and dynamic) psi	Flue and combustion air pressures within spec at 100% output				
(must be between 25 and 80 psi	Required clearances				
[1/2 and 582 kPa] at 6.0 gpm)	□ Top 18" (457 mm)				
Supply water piping is sufficient size to maintain 25-80 psi at 6.0 gpm.	□ Front 36" (914 mm)				
Drain water	🗅 Right 1" (25 mm)				
<ul> <li>Drain pipe size, stope and minings are sized to support 12gpm maximum tank drain flow rate</li> <li>A vacuum relief valve is installed on the drain line to</li> </ul>	□ Left 30" (762 mm) for LX-50 through LX-150 54" (1372 mm) for LX-200 through LX-600				
<ul> <li>Open drain installed between the humidifier drain line and the building drain</li> </ul>	Wiring				
Gas supply	Control transmitter, numicistat or BAS demana signal				
□ Natural	□ 18-gauge twisted pair shielded				
□ LP	High limit duct transmitter or humidistat				
Manifold pressure inches wc kPa mbar	18-gauge twisted pair shielded				
Supply shutoff valve is adequate distance from humidifier	Airflow proving switch				
Supply line size is adequate	18-gauge twisted pair shielded				
No leaks present	Optional external fault contact (qty 2)				
Flue piping	18-gauge twisted pair shielded				
<ul> <li>Flue piping material</li> <li>PVC</li> </ul>	<ul> <li>Twisted pair communication connection between boards (multi-tank units only)</li> </ul>				
Polypropylene					
Stainless steel					
Size					
Kise					
KUN					

# Commissioning checklist

Outlet size       Low water test         Insulated       High humidity limit test         Steam hose (do not insulate)       Aquastat test         Rise       Blocked flue test         Rise       Blocked flue test         Rise       Aquastat test         Beam pipe pitched away from humidifier if greater than 20' developed length       Additional comments         Dispension       Additional comments         Dispension       Image: State sta	Steam pipe		Safety testing to verify function					
Hard pipe High humidity limit test   Insulated Airflow test   Istem hose (do not insulate) Aquestat test   Rive Blocked flue test   Bocked flue test Blocked flue test   Steam pipe pitched away from humidifier if greater than 20' developed length Additional comments   Steam pipe pitched away from humidifier if greater than 20' developed length Additional comments   Steam pipe pitched away from humidifier if greater than 20' developed length within allowable distance Additional comments   Dispersion Image: Steam pipe pitched away from humidifier if greater than 20' developed length within allowable distance   Dispersion Image: Steam pipe pitched away from humidifier if greater than 20' developed length within allowable distance   Dispersion Image: Steam pipe pitched away from humidifier if greater than 20' developed length within allowable distance   Dispersion Image: Steam pipe pitched away from humidifier if greater than 20' developed length within allowable distance   Dispersion Image: Steam pipe pitched away from humidifier if greater than 20' developed length within allowable distance   Dispersion Image: Steam pipe pitched away from humidifier if greater than 20' developed length within allowable distance   Dispersion Image: Steam pipe pitched away from humidifier if greater than 20' developed length within allowable distance   Biggie tube Image: Steam pipe pitched away from humidifier if greater than 20' developed length within allowable distance   Burner 1 lights after: If is first try   Burner 1 color after 15 minutes: Image: Steam pip	Outlet size		Low water test					
Insulated Airflow test	🗅 Hard pipe		High humidity limit test					
Steam hose (do not insulate)       Aquastat test         Rise       Blocked flue test         Run       Blocked flue test         Steam pipe pitched away from humidifier if greater than 20' developed length       Additional comments         Other pipe pitched away from humidifier if greater than 20' developed length       Additional comments         Observion       Additional comments         Observion       Blocked flue test         Steam pipe pitched away from bunidifier if greater than 20' developed length within allowable distance       Additional comments         Dispersion       Blocked flue test         Bigle tube       Blocked flue test         Single tube       Blocked flue test         Single tube       Blocked flue than 1000000000000000000000000000000000000	Insulated		Airflow test					
Rise	🗅 Steam hose (do not	insulate)	Aquastat test					
Run	Rise		Blocked flue test					
Steam pipe pitched away from humidifier if greater than 20' developed length       Additional comments         Isteam piping is not smaller than outlet size       Additional comments         Isteam piping is not smaller than outlet size       Additional comments         Ultra-sorb	Run							
45° or long radius 90° elbows used in piping         Steam piping is not smaller than outlet size         Additional comments         Dispersion         Ultrosorb         Rapidsorb         Single tube         Single tube         Space distribution unit         Actor type fan         Appropriate height ptrap/water seal on the dispersion         [should be 1" taller than duct static pressure]         Cold-start burner ignition         Burner 1 lights after:         Blue         Orange         Red roge         Burner 2 lights after:         Blue	Steam pipe pitched 20' developed leng	away from humidifier if greater than th						
Steam piping is not smaller than outlet size       Additional comments         Dispersion	□ 45° or long radius 9	90° elbows used in piping						
Total developed length within allowable distance  Dispersion  Ultra sorb  Single tube  Single tube  Single tube with drain  Space distribution unit  Area type fan  Appropriate height ptrap/water seal on the dispersion (should be 1* taller than duct static pressure)  Cold-start burner ignition  Burner 1 lights after:  Burner 1 color after 15 minutes:  Burner 2 lights after:  Burner 3 lights after:  Burner 4 light after:  Burner 4 light after:  Burner 5 color after 15 minutes:  Burner 5 color after 15 minutes:  Burner 6 color after 15 minutes:  Burner 7 lights after:  Burner 1 color after 15 minutes:  Burner 2 lights after:  Burner 2 lights after:  Burner 2 lights after:  Burner 3 light after:  Burner 4 light after:  Burner 4 light after:  Burner 5 color after 15 minutes:  Burner 4 light after:  Burner 4 light after:  Burner 5 color after 15 minutes:  Burner 5 color after 15 minutes:  Burner 5 color after 15 minutes:  Burner 6 color after 15 minutes:  Burner 6 color after 15 minutes:  Burner 7 light after: Burner 7 color after 15 minutes: Burner 7 colo	Steam piping is not	smaller than outlet size	Additional commonts					
Dispersion   Ultra-sorb   Rapid-sorb   Rapid-sorb   Single tube   Single tube with drain   Single tube with drain   Space distribution unit   Area type fan   Appropriate height ptrap/water seal on the dispersion   (should be 1" taller than duct static pressure)    Cold-start burner ignition  Eurner 1 lights after:    Burner 1 color after 15 minutes:    Burner 2 lights after:    First try   Second try   Burner 2 lights after:    First try   Burner 2 lights after:    Burner 2 color after 15 minutes:    Burner 2 lights after:    Burner 2 color after 15 minutes:    Burner 2 lights after:    Burner 2 lights after:    Burner 2 color after 15 minutes:    Burner 2 color after 15 minutes:    Burner 2 color after 15 minutes:    Burner 2 lights after:    Burner 2 color after 15 minutes:    Burner 2 color after 15 minutes:    Burner 3 color after 15 minutes:    Burner 4 color after 15 minutes:    Burner 5 Congn Color after 15 minutes:	🖵 Total developed leng	gth within allowable distance	Additional comments					
Ultrasorb         Rapidsorb         Single tube         Single tube with drain         Space distribution unit         Area type fan         Appropriate height p-trap/water seal on the dispersion         (should be 1" taller than duct static pressure)         Cold-start burner ignition         Burner 1 lights after:         Bilue         Orange         Red-orange         Burner 2 lights after:         First try         Second try         Third try         Burner 2 lights after:         Bilue         Orange         Red-orange         Burner 2 color ofter 15 minutes:         Blue         Orange         Red-orange         Burner 2 color ofter 15 minutes:         Blue         Orange         Red-orange         Burner 2 color ofter 15 minutes:         Blue         Orange         Red-orange         Blue         Orange         Red-orange         Red-orange         Red-orange         Red-orange         Red-orange         Red-orange         Red-	Dispersion							
Rapid-sorb         Single tube         Single tube         Single tube with drain         Space distribution unit         Area type fan         Appropriate height ptrap/water seal on the dispersion (should be 1" taller than duct static pressure)         Cold-start burner ignition         Burner 1 lights after:         Burner 1 lights after:         Blue         Orange         Red-orange         Burner 2 lights after:         Birst try         Second try         Third try         Burner 2 lights after:         Birst try         Burner 2 color after 15 minutes:         Bilue         Orange         Bilue         Orange         Bilue         Orange         Bilue         Orange         Bilue         Orange         Bilue	Ultra-sorb							
Single tube         Single tube with drain         Space distribution unit         Area type fan         Appropriate height ptrap/water seal on the dispersion         (should be 1" taller than duct static pressure)         Cold-start burner ignition         Burner 1 lights after:         First try         Second try         Third try         Burner 1 color after 15 minutes:         Blue         Red-orange         Burner 2 lights after:         First try         Second try         Burner 2 lights after:         Bilue         Orange         Burner 2 lights after:         First try         Second try         Burner 2 lights after:         Bilue         Orange         Burner 2 lights after:         Bilue         Burner 2 color after 15 minutes:         Bilue         Bilue         Bilue         Bilue         Bilue         Bilue         Bilue         P flue gas coxygen range 5.5% ± 1.0 at 100% and low fire	Rapid-sorb							
Single tube with drain	Single tube							
Space distribution unit  Area type fan  Appropriate height p-trap/water seal on the dispersion (should be 1" taller than duct static pressure)  Cold-start burner ignition  Burner 1 lights after:  Burner 1 color after 15 minutes:  Burner 2 lights after:  Burner 2 lights after:  Burner 2 color after 15 minutes:  Burner 2 color after 15 minutes: Burner 2 color after 15 minutes: Burner 2 color after 15 minutes: Burner 2 color after 15 minutes: Burner 2 color after 15 minutes: Burner 2 color after 15 minutes: Burner 2 color after 15 minutes: Burner 2 color after 15 minutes: Burner 2 color after 15 minutes: Burner 2 color after 15 minutes: Burner 2 color after 15 minutes: Burner 2 color after 15 minutes: Burner 2 color after 15 minutes: Burner 2 color after 15 minutes: Burner 2 color after 15 minutes: Burner 2 color after 15 minutes: Burner 2 color after 15 minutes: Burner 2 color a	Single tube with dra	in						
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		-60 ppm typical						

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# Water quality and maintenance

### WATER QUALITY RECOMMENDATIONS

The best way to determine how often your particular system needs maintenance is to remove the clean-out plate at the front of the tank and inspect the interior of the unit 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.

Maintaining your humidifier tank and primary heat exchanger is critical to the operation of the LX series humidifier. Scale buildup on the humidifier heat exchanger acts as an insulator, reducing humidifier output while increasing energy costs. In addition, flue temperatures will begin to rise, rendering the humidifier inoperable until the primary heat exchanger has been cleaned.

### 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
  - Occasional skimming and draining
- 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
  - More frequent skimming and draining
  - Periodic drain and flush cycles
- Softened water dramatically reduces mineral accumulation Note: Solids, like silica, are not removed in the softening process.
- RO/DI water virtually eliminates the build-up of minerals.

### **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 that use RO/DI water do not require regular cleaning, although at least annual inspections are advised.
- GTS humidifiers that use RO/DI require significantly less frequent skimming or draining and flushing to remove precipitated minerals.

Table 74-1:	
DriSteem supply water g	juidelines
Chlorides*	
Tap water	< 50 ppm
RO/DI water	< 5 ppm
Softened water	< 25 ppm
* Damage caused by chloride corrosion is not covered by your DriSteem warranty.	
Total hardness	
Tap water	< 500 ppm (29 gpg)
рН	
Tap water	6.5 to 8.5
RO/DI, softened water	7.0 to 8.0
Silica	< 15 ppm
Supply water outside of the may void your DriSteem w	e guidelines arranty.

Please contact your DriSteem Representative or DriSteem Technical Support if you need advice.

### 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 13-1.

# Preparing for maintenance

### 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 display screens in Settings/Water Management) is less than room temperature (default setting is 50 °F [10 °C]) so the burners do not energize while cooling down the tank.
- Use the display to perform the cool down process.
- 1. Go to the Home screen.
- 2. Change mode to Drain, and allow approximately half the water to drain out of the tank. The fill valves may also be on to temper the water.
- 3. Change the mode back to Auto; the fill valve opens and the humidifier cools down with the additional cool water.
- 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 display, see the Vapor-logic Installation and Operation Manual.

### **REPLACEMENT PARTS**

When servicing or repairing this equipment, use only DriSteem-approved service replacement parts. Complete replacement part lists are on Pages 90 through 98. 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.

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### 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 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.

### **USER INSPECTION EVERY 30 DAYS**

- Vent adapter and flue gas inspection port are in place with vent pipe seated and secured.
- 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 when operated under low demand, and primarily blue in color when operated under high demand.
- Check for alarms and messages through the alert log. See Vapor-logic controller instruction manual for description and troubleshooting.
- Check ignition sequence:
  - 1. Blower RPMs ramp up and then level off.
  - 2. Gas valve on (click) 4 seconds after blower starts
  - 3. Flame on the burner
  - 4. Flame rectification flame is sensed
  - 5. Burner stays on visual flame/glow

# 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, CO<sub>2</sub>%, O<sub>2</sub>%, flue temperature, and burner efficiency at 100% demand with the tank at a boil. Verify that measurements are within the guidelines described in Table 69-1; if not, consult DriSteem.
- Flue passageways external to the appliance, such as vent connector, sealed combustion piping, and chimney, are clear and free of obstructions.
- Upgrade Vapor-logic software to the latest version.
- Remove and clean flame sensor rod and ignitor. See page 86. These components should be replaced at least once every five years.
- 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.
  - 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.

Table 76-1: GTS products of combustion guidelines (at 100% demand)					
со	Must be less than 400 ppm. 0-60 ppm typical.				
CO <sub>2</sub> %	8-9% is typical for natural gas, 9-10% is typical for LP gas				
O <sub>2</sub> %	5.5% ±1.0%				
Flue temperature	Less than 140°F (Less than 60°C)				
Thermal efficiency	Greater than 91%				
NOx	20 ppm max, (domestic units)				

### Troubleshooting

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

### SEASONAL START-UP

(also recommended when maintenance is performed)

- Ensure water, gas, and power are freely flowing to the humidifier.
- Ensure humidifier is in Auto mode.
- Inspect tank, piping, and gaskets for water and gas leaks.
- Inspect condensate lines for blockage and verify condensate neutralizer is in working condition (pH above 5).
- Inspect venting bird screens for blockage. Clean or replace if damaged.
- 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.
  - Flue temperature sensor. Observe the temperature read out on the Vapor-logic display during normal operation. The temperature will fluctuate slightly during refill events.
  - Tank temperature sensor. Observe the tank temperature read out on the Vapor-logic home screen during a cold start of the humidifier. The temperature will gradually increase to boiling temperature.
- 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.

### MID-SEASON / END-OF-SEASON

(or every three months the humidifier is active)

- Clean tank and primary heat exchanger
  - Drain 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 through the round pop cover on the roof panel.
  - 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.
  - 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 head for any signs of cracking, roughness, or deterioration. If found, replace entire probe assembly.
  - Reassemble the probe assembly. Replace the probe gasket if necessary.
- Clean the skim/overflow port
  - Water should drain from the skimmer drain pipe after each daily probe check. 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 tank temperature probe Inspect the probe for mineral accumulation. The probe is located on the heat exchanger plate just above the combustion assembly. Use stainless steel wool to clean the probe.
- Clean the strainer on the inlet line every three years by removing it from the unit and back flushing with a combination of water and compressed air.
- Inspect blower motor for proper operation.
- 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.

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### Follow the shutdown procedure

Follow the shutdown procedure on Page 75 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.

- When the maintenance requirements are complete:
  - Replace cleanout plate and tighten the nuts on the plate. Torque the nuts to 60 in-lb (6.8 N-m).
     Note: Always install a new gasket when the clean out plate is reassembled.
  - Verify that the probe head 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.
- After confirming the plumbing connections are secure, perform a tank descaling procedure using the DriSteem GTS humidifier tank de-scaling kit.

### MID-SEASON

- When the chemical de-scaling process is complete:
  - 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.
- Verify proper operation of the humidifier after servicing is complete.

### END-OF-SEASON

- When the chemical de-scaling process is complete:
  - Dry the inside of the humidifier tank.
  - Replace and secure all covers and doors.
  - After cleaning, the humidifier should remain empty until humidification is required.

### Important:

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



### **Prevent wiring errors**

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

### 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.

### TUNING THE GAS VALVE

- The LX series gas valve is factory-adjusted, although it must be checked, and adjusted if necessary, by a qualified gas appliance technician upon installation and annually thereafter.
- The GTS LX gas valve has both high-fire (throttle screw) and low-fire (offsetscrew) adjustments. Both screws need to be adjusted in order for the humidifier for proper operation.
- A long 2mm Hex Key/Allen wrench will be needed to adjust both the throttle and offset screws.
- Refer to the installation and start-up details to ensure it is safe to start the GTS LX humidifier.
- Check for proper gas supply pressure. See the humidifier nameplate label.
- Ensure the vacuum reference fitting on the gas valve has a hose connected from it to the correct location per Table 80-1:



### FIGURE 81-1:



LX-Valve-01

#### FIGURE 81-2: DETAIL OF GAS VALVE



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### **HIGH-FIRE GAS VALVE TUNING**

- 1. Apply power and gas to the humidifier.
- 2. Generate a call for humidity:

Vapor-logic has a Test Run capability to confirm system functionality. This capability allows a technician to simulate demand for steam production when there is not a demand (such as when performing routine maintenance).

To confirm functionality:

- a. Go to the Test Run section of the Diagnostics menu.
- b. Set system demand percent to 100%, and set Test Run time duration.
- c. Push the Start button.

The humidifier mode changes to Test. The burners will light and ramp up to 100%.

### NOTE

If the burner will not light, or lights roughly and will not remain lit, put the humidifier in Standby mode and reset the throttle screw by turning it in, clockwise, gently, until it stops. Turn the throttle screw out counter-clockwise per the chart below, re-start the unit, and continue. See Table 82-1.

- 3. Run the unit at 100% output for at least 20 minutes until the water is heated and the system is stabilized.
- 4. Use a combustion analyzer set for the proper fuel to determine the oxygen levels.
  - a. For LX-50 to LX-300, insert the flue gas analyzer probe into the diagnostic port on the flue adapter. See Figure 82-1.
  - b. For LX-400 to LX-600, remove the plug from the top of a secondary heat exchanger, and insert the flue gas analyzer probe. See Figure 82-2. The right gas valve corresponds to the right secondary heat exchanger, and the left to the left. When completed with one side, remove the probe and install it in the other secondary heat exchanger to tune the other gas valve.

Table 82-1: Throttle Screw - Number of Turns Out, Counter-clockwise (Turn = 360°)						
	GTS LX-50, LX-75, LX-100	GTS LX-150	GTS LX-200 to LX-600			
Natural Gas	9 - 11	11 - 12	4 - 5			
Propane	3 - 5	5 - 7	2 - 3			

### FIGURE 82-1: LX-50 - LX-300



FIGURE 82-2: LX-400 - LX-600



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- 5. Guidelines for products of combustion are:
  - a. O2: 5.5% +/- 1%
  - b. CO: < 400 ppm; 0-60 ppm is typical
  - c. NOx (3) < 20 ppm (with Natural Gas)
  - d. Flue temperature: 100°F 130°F (38°C 54°C) Varies with output %, supply water temperature, fuel, etc.
  - e. Burner efficiency: 90% 98% Varies with output%, supply water temperature, fuel, etc.
  - f. On a cold start flue temperatures may elevate to approximately 140°F (60°C) until the unit has stabilized.
  - g. Color of flame: Orange at low fire, blue at high fire
- 6. Locate the throttle screw on the gas valve assembly. See Figure 81-1. Use a long 2mm Hex Key/Allen wrench to turn the throttle screw. It is best to start either lean or rich and slowly turn the throttle screw in one direction. The hysteresis of the throttle screw adjustment makes small back and forth turns a challenging way to achieve target O2%.
  - a. If O2% is above target, slowly turn the throttle screw out, counterclockwise to add fuel and reduce O2% to the target
  - b. If O2% is below target, slowly turn the throttle screw in, clockwise, to reduce fuel and increase O2% to the target.
- 7. High-fire gas valve tuning is complete.

### LOW-FIRE GAS VALVE TUNING

- 1. In the Test Run settings, reduce the demand to 35% and allow exhaust gas analyzer readings to stabilize. The guidelines for products of combustion remain the same.
- 2. If O2% remains within 5.5% +/- 1.0% then reduce output slowly to the target output % per Table 84-1.
- 3. If O2% is outside the 5.5% +/- 1.0% tolerance at 35%, adjust the offset screw until O2% is 5.5% +/- 1.0% before reducing output to the target output % per Table 84-1.
  - Offset screw adjustment is sensitive AND BACKWARDS compared to the throttle screw. Only adjust in ½ -¼ turn or less increments. Full adjustment range is only about 1½ turns.
  - If O2% is above target, slowly turn the offset screw in, clockwise to add fuel and reduce O2% to the target 5.5% +/- 1.0%
  - If O2% is below target, slowly turn the offset screw out, counterclockwise, to reduce fuel and increase O2% to 5.5% +/- 1.0% target.
  - Both burners should be lit on LX-400, LX-500 and LX-600 models when running at the target low fire output % in Table 84-1. If not, turn up the output until both burners are lit, and reduce output more slowly until the target output % is achieved.
- 4. After completing the low-fire gas valve tuning, increase output to 100% and verify that O2% is still 5.5% + /-1.0%.
- 5. Re-install the diagnostic cap into the flue vent adapter or rubber plugs into the secondary heat exchangers.

Table 84-1: Output % target by LX Model for Low-Fire Gas Valve Tuning										
Model	LX-50	LX-75	LX-100	LX-150	LX-200	LX-250	LX-300	LX-400	LX-500	LX-600
Output %	22%	19%	15%	19%	17%	14%	12%	18%	15%	13%

### 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 on page 86.

### **REMOVING THE COMBUSTION ASSEMBLY**

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 the shutdown procedure on Page 75.
- 2. Remove shroud.
- 3. Remove secondary heat exchanger (see page 87 for instructions).
- Disconnect wiring to blowers, flame sensors, gas valves, and ignition controllers. Remove sealed combustion tube, pressure equalization tube, primary gas line and enhanced spark ignition gas supply line.
- 5. Remove the four burner assembly nuts from each assembly and pull the entire valve, blower, and burner assembly out.
- 6. Perform maintenance as required.
- 7. Reinstall the combustion assembly with the new gasket.
- 8. Reconnect all electrical wiring, intake venting, pressure switches, and gas supply lines.
  - Note: To ease reassembly, disconnect components from one burner assembly at a time, and clean each individually.

### **BURNER MAINTENANCE INSTRUCTIONS**

To service the burner system, clean both the blower and the burner. Remove the four nuts from each burner assembly 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.

### **IGNITOR AND FLAME SENSOR ROD**

The enhanced spark ignition and flame sensor rod, as well as their supporting gaskets, should be replaced at the same time at least every 5 years. These components should be removed and cleaned annually. The entire combustion assembly does not need to be removed to replace these components.

- 1. Follow the shutdown procedure on Page 75.
- 2. Remove shroud.
- 3. Disconnect flame sensor wire, ignition wire and enhanced spark ignition from gas line.
- 4. Remove the mounting nuts and pull the components free from the assembly.
- 5. Replace or clean the components. To clean:
  - a. Gently rub the metal rods (and nothing else) with a very light grit sandpaper. Remember, you are just ridding the sensor rod of any buildup.
  - b. Use a clean paper towel to wipe clean any dust left behind by the sanding. Once you've cleaned the flame sensor rod/ignitor rod, remount the components on the burner assembly using new gaskets and install back with #8-32 nuts.
- 6. Reconnect flame sensor wire, ignition wire and enhanced spark ignition to the gas line.
- 7. Replace shroud.



### 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.

# Removing the heat exchangers

### **REMOVING THE PRIMARY HEAT EXCHANGER**

- 1. Disconnect:
  - Incoming gas line
  - Water lines (at the primary tank secondary tank and Drain-kooler water tempering device)
  - Main drain line
  - Component power connections (blower, ignition module and tank temp sensor)
- 2. Remove secondary heat exchanger. See instructions.
- 3. Remove the water tempering device.
- 4. Remove nuts around the perimeter of the heat exchanger face.
- Pull heat exchanger out horizontally Note: Support the heat exchanger face once it is free of the studs.
- Reverse this procedure to reassemble. Note: Always install a new gasket when the heat exchanger is reassembled.

### **REMOVING THE SECONDARY HEAT EXCHANGER(S)**

- 1. Drain the humidifier tank.
- 2. Follow the shut down procedure on page 75.
- 3. Disconnect from the secondary heat exchanger(s):
  - Combustion air hoses
  - Combustion air vacuum line
  - Incoming water
  - Discharge water
  - Pressure equalization hose
  - Pressure switch
  - Temperature switch
  - Condensate p-trap
- 4. Remove the tri-clover clamp connecting the primary and secondary heat exchanger(s).
- 5. Loosen the worm gear clamp on the stainless steel collar at the top of the heat exchanger(s).
- 6. Remove eight bolts and nuts from the flange at the secondary heat exchanger(s) flue gas outlet.
- Remove the four nuts from the bracket securing the secondary heat exchanger(s) to the primary tank, and allow it to drop free from the plastic flue adapter.

# Troubleshooting

# Table 88-1: Model LX humidifier troubleshooting guide

Problem	Possible cause	Action		
		Check main power supply and switch.		
	No power to humiditier	Check for proper voltage across all terminals.		
		Check all connections.		
Humidifier will	Field-wired terminal connections	Check wiring connections and settings on accessory items such as high limit switch and airflow proving switch.		
		Follow the shutdown procedure on Page 75. Confirm electrical connections are powered off at terminal block.		
	Internal connections	Check that terminals from internal components are securely attached to proper tabs on circuit boards.		
	No power to 24V control circuit	Check reset switch on transformer.		
	Wrong type of drain valve	Contact factory.		
	Malfunctioning drain valve	Check valve function using Test Mode.		
Water constantly	Debris in drain valve preventing it from closing	Remove drain block plug, and clean debris from drain valve.		
runs down drain.	Water flowing from	Check internal hoses, and remove kinks or blockage.		
	overflow port	Check level probe function.		
	Tempering valve failed on the mechanical tempering device	Replace tempering valve.		
		Check all connections and fittings on the fill block manifold. Tighten as necessary.		
	Loose plumbing connections	Check internal hose clamp connections. Reposition clamps and tighten as needed.		
Water is leaking		Check steam hose connection on top of tank. Tighten clamp or piping as needed.		
from nomidifier.	Failure at tank welds due to corrosive water	Consult factory.		
	Tank gasket life exceeded	Replace gasket.		
	Excess condensate in steam hose	Make sure steam hose has constant downward slope to humidifier or to tees and traps in low spots of hose.		
Humidifier makes gurgling sound.	Integral drain water tempering	It is normal operation for the humidifier to make a low rumbling noise when its tempering drain water.		
	Incorrect drain piping	Confirm drain piping is done correctly, including the installation of a vacuum breaker.		
Fill valve makes	Water hammer from line	Make sure water supply line does not contact ductwork.		
banging sound.	pressure	Install shock arrestor.		
	Field-installed supply water shut- off valve not open	Open valve.		
not fill.	Malfunctioning fill valve	Check valve function using Test mode.		
	Inadequate water supply	Confirm adequate water pressure and flow.		
Humidifier will	Debris in drain valve blocking outlet port	Remove drain block plug and clean debris from drain valve.		
not drain.	Malfunctioning drain valve	Check valve function using Test mode.		

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# Troubleshooting

Model LX humidifier trou	bleshooting guide (continued)					
Problem	Possible cause	Action				
		Confirm that tempering is turned on.				
Humidifier draining hot water.	Malfunctioning drain tempering device.	Check the fill and drain valves are operating correctly.				
		Confirm the tempering sensor is operating correctly.				
	Control setting too low	Adjust control to higher setting.				
L	Control mounted in wrong location	See the Vapor-logic controller installation manual for correct control mounting location.				
demand.	Significant amount of hard water scale on primary heat exchanger.	Perform tank cleaning.				
	Operating conditions changed and humidifier is now undersized	Consult factory.				
	Control setting too high	Adjust control to lower setting.				
	Control mounted in wrong location	See the Vapor-logic controller installation manual for correct control mounting location.				
Excess humidity.	Operating conditions changed and humidifier is now undersized	Consult factory.				
	Malfunctioning control system	Contact factory.				

### Table 88-1:

### MODEL LX TROUBLESHOOTING

Follow the procedure below to resolve issues with LX series humidifiers:

- 1. Review possible causes and recommended actions in the Troubleshooting guide in the Vapor-logic Installation and Operation Manual.
- 2. If the Troubleshooting guide does not help you solve the issue, call DriSteem with the following information available:
  - Humidifier model number, serial number, and firmware version (see ٠ nameplate on side of the humidifier and steam blower)
  - To access firmware version: •
    - Display: Select Settings from the home screen, select Display, select Humidifier Info, see Firmware Version
    - Web interface: Click **Diagnostics** in the toolbar, click **Humidifier info**, see Firmware version below.
  - When issue began
    - Example: Always, after remodel, after a change in weather, etc. -
  - Issue description
    - Example: water leaking, low humidity, high humidity, etc.
  - System changes
    - Example: Pressure, new service, new controller, relocation, change in maintenance, etc.

### DriSteem Technical Support

Have the following information ready when calling Technical Support. See phone number inside front cover of this manual.

Humidifier model number
Humidifier serial number
Firmware version
When issue began
Issue description

# GTS humidifier (Models LX-50 through LX-150)

### FIGURE 90-1: GTS HUMIDIFIER LX SERIES REPLACEMENT PARTS (MODELS LX-50 THROUGH LX-150)



OM-7966

# GTS humidifier LX series (Models LX-50 through LX-150)

Tabl GTS	Table 91-1: GTS humidifier LX series replacement parts (Models LX-50 through LX-150)								
No.	Description	Part no.	No.	Description	Part no.				
1	LEFT BURNER SHROUD GTS LX 50-150	600273		TANK ASSY LX 50/75/100 304SST	184400-050				
	BACK SHROUD GTS LX 50/75/100	600274	1.5	TANK ASSY LX 50/75/100 316SST	184401-050				
2	BACK SHROUD GTS LX 150	600278	15	TANK ASSY LX 150 304SST	184400-100				
	TOP SHROUD GTS LX 50/75/100	600271		TANK ASSY LX 150 316SST	184401-100				
3	TOP SHROUD GTS LX 150	600276	17	FRAME GTS LX 50/75/100 22.75 X 22.75,BLK	601341-001				
4	RIGHT SHROUD GTS LX 50-150	600275	10	FRAME GTS LX 150 22.75 X 31.75, BLK	601341-002				
_	FRONT SHROUD GTS LX 50/75/100	600272	17	PROBE ASSY LX, SHORT MIDPROBE, EPDM	184315-004				
5	FRONT SHROUD GTS LX 150	600277		KIT, NG, GTS LX BURNER ASSY 50/75/100	184443-100				
6	HANDLE DOOR PLASTIC BLACK	405805-003	1 18	KIT, NG, GTS LX BURNER ASSY 150	184443-150				
	DRAIN MANIFOLD ASSY GTS LX	600199-100	19	IGNITION CONTROL 24VAC SPARK	405811-001				
	DRAIN MANIFOLD ASSY GTS LX EURO	600199-101	20	VALVE 3/4'' NPT SST (NC) 2M CABLE	505077-005				
7	DRANE-KOOLER WATER TEMPERING ASSY LX NPT	600199-105	21	INTERCONNECTING PIPING SEC HEAT EXCH 5''	161125-001				
	DRANE-KOOLER WATER TEMPERING ASSY LX BSP	600199-106	22	GASKET 5.75 X 5.75 CONN 3" PIPING EPDM	600697-001				
0	BLOWER ASSY GTS LX 50/75/100	400092-050	22	DRAIN 3/4'' INDOOR ASSY LX	184325-001				
0	BLOWER ASSY GTS LX 150	400092-150	23	DRAIN 3/4'' OUTDOOR ASSY LX	184325-002				
9	FLUE FLANGE 5'' TO 3'' WELD	161145-001	24	MANIFOLD 2'' SQUARE POLYPROPYLENE NPT	501914-012				
	SECONDARY HX ASSY LX 50-100	601094-100	24	MANIFOLD 2'' SQUARE POLYPROPYLENE BSP	501914-112				
10	SECONDARY HX ASSY LX 50-100 SEISMIC	601091-101	25	ADAPTER 3 TO 1 DURO VENT 3"	305394-003				
10	SECONDARY HX ASSY LX 150	601094-150	26	VALVE FILL SST ¼" 24V 0.125 ORF	505095				
	SECONDARY HX ASSY LX 150 SEISMIC	601094-151	27	TRICLOVER CLAMP 3" C	207001-300				
	PRI. HEAT EX WELDMENT LX 50/75 SST 316	601090-076	28	TRICLOVER GASKET 3" O-RING EPDM	207002-300				
11	PRI. HEAT EX WELDMENT LX 100 SST 316	601090-101	29	PRESSURE SWITCH 1" WC	127601-001				
	PRI. HEAT EX WELDMENT LX 150 SST 316	601090-151	30	SUBPANEL ASSY GTS LX	Contact DriSteem				
12	GASKET HT EXCH PRIMARY EPDM LX 50-300	600696-001	21	SPARK IGNITOR ASSY GTS LX	184430-001				
12	GASKET CLEANOUT PLATE LX 50/75/100 EPDM	600696-003	51	SPARK IGNITOR ASSY, PROPANE, LX	184430-002				
13	GASKET CLEANOUT PLATE LX 150 EPDM	600696-004	32	FLAME SENSE ASSY GTS LX #	184425-001				
	CLEANOUT PLATE ASSY GTS LX 50/75/100 304	184405-050	33	CUT-OUT THERMO VF/VM/CRU/VLC	409560-001				
11	CLEANOUT PLATE ASSY GTS LX 50/75/100 316	184406-050	34	PROBE FLUE TEMP/SENSOR 155F 1/4" NPT	600430				
14	CLEANOUT PLATE ASSY GTS LX 150 304	184405-100	35	GASKET BURNER MOUNT 2.70" HOLE	600394				
	CLEANOUT PLATE ASSY GTS LX 150 316	184406-100							

# GTS humidifier (Models LX-200, LX-250, and LX-300)

### FIGURE 92-1: GTS REPLACEMENT PARTS (MODELS LX-200 THROUGH LX-300)



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# GTS humidifier LX series (Models LX-200, LX-250, and LX-300)

Table GTS	e 93-1: replacement parts for Models IX-200 throug	h I X-300)			
No.	Description	Part no.	No.	Description	Part no.
1	LEFT BURNER SHROUD GTS LX 200-300	600172		Cleanout plate LX 200-600 304 SST	184405-600
2	Shroud Back left gts LX 200-300	600407	18	CLEANOUT PLATE LX 200-600 316 SST	184405-601
3	SHROUD BACK RIGHT GTS LX 200-300	600408		TANK ASSY GTS LX 200-300 304	184400-300
4	TOP SHROUD GTS LX 200-300	600169	19	TANK ASSY GTS LX 200-300 316	184400-301
5	RIGHT SHROUD GTS LX 200-300	600173	20	FRAME 200/300 21.52 X 55.75 X 6.13, BLK	600153-001
6	SHROUD FRONT LEFT GTS LX 200-300	600409	21	PROBE ASSY LX, SHORT MIDPROBE, EPDM	184315-004
7	SHROUD FRONT RIGHT GTS LX 200-300	600410	22	KIT, LP, GTS LX BURNER ASSY 200 TO 600	184443-601
8	SUPPORT, CENTER GTS LX 200-300	600411	23	IGNITION CONTROL 24VAC SPARK	405811-001
9	SUPPORT, CORNER GTS LX 200-300	600412	24	INTER CONN. PIPING SECONDARY HX	600108
10	HANDLE DOOR PLASTIC BLACK	405805-003	25	GASKET 5.75 X 5.75 CONN 3" PIPING EPDM	600697-001
	DRAIN MANIFOLD ASSY GTS LX	600199-100	26	drain 3/4'' indoor assy lx	184325-001
11	DRAIN MANIFOLD ASSY GTS LX EURO	600199-101	20	DRAIN 3/4'' OUTDOOR ASSY LX	184325-002
	DRANE-KOOLER WATER TEMPERING ASSY LX NPT	600199-105	27	MANIFOLD 2'' SQUARE POLYPROPYLENE NPT	501914-012
	DRANE-KOOLER WATER TEMPERING ASSY LX BSP	600199-106		MANIFOLD 2'' SQUARE POLYPROPYLENE BSP	501914-112
12	BLOWER ASSY GTS LX 200-600 120V	400092-200	28	VALVE 3/4'' NPT SST (NC) 2M CABLE	505077-005
	BLOWER ASSY GTS LX 200-600 230V (PP)	400092-241	29	SUBPANEL ASSY GTS LX	Contact DriSteem
13	SECONDARY HX ASSY LX 200-300	601094-300	30	MOUNT INTAKE/EXHAUST LX 200-300	600207
14	PRESSURE SWITCH 1" WC	127601-001	31	Adapter 3 to 1 duro vent 4"	305394-004
15	PRI. HEAT EX WELDMENT LX 200/250 SST 316	601090-251	32	TRICLOVER GASKET 4" O-RING EPDM	600248
	PRI. HEAT EX WELDMENT LX 300 SST 316	601090-301	33	TRICLOVER CLAMP 4"	600048
16	GASKET HT EXCH PRIMARY EPDM LX 50-300	600696-001	34	COMBUSTION AIR INTAKE HOSE ASSY -2.5 DIA	600196
17	GASKET CLEANOUT EPDM LX 200-600	600696-005	35	VALVE FILL SST ¼" 24V 0.125 ORF	505095
			36	SPARK IGNITOR ASSY GTS LX	184430-001
				SPARK IGNITOR ASSY, PROPANE, LX	184430-002
			37	FLAME SENSE ASSY GTS LX #	184425-001
			38	CUT-OUT THERMO VF/VM/CRU/VLC	409560-001
			39	PROBE FLUE TEMP/SENSOR 155F 1/4" NPT	600430
			40	GASKET BURNER MOUNT 2.70" HOLE	600394

## GTS humidifier (Models LX-400 through LX-600)

### FIGURE 94-1: GTS REPLACEMENT PARTS (MODELS LX-400 THROUGH LX-600)



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# GTS humidifier LX series (Models LX-400 through LX-600)

Tabl GTS	e 95-1: replacement parts for Models LX-400 throuc	ıh LX-600)			
No.	Description	Part no.	No.	Description	Part no.
1	LEFT BURNER SHROUD GTS LX 400-600	600149	26	KIT, LP, GTS LX BURNER ASSY 200 TO 600	184443-601
2	LEFT BACK SHROUD GTS LX	600401	27	IGNITION CONTROL 24VAC SPARK	405811-001
3	RIGHT BACK SHROUD GTS LX	600402	28	VALVE 3/4'' NPT SST (NC) 2M CABLE	505077-005
4	TOP SHROUD GTS LX 400-600	600146	29	INTERCONNECTING PIPING SEC HEAT EXCHANGER 5"	600108
5	right shroud gts lx	600150	30	GASKET 5.75 X 5.75 CONN 3" PIPING EPDM	600697-001
6	FRONT SHROUD GTS LX LEFT	600403	21	DRAIN 3/4" INDOOR ASSY LX	184325-001
7	FRONT SHROUD GTS LX RIGHT	600404	51	DRAIN 3/4'' OUTDOOR ASSY LX	184325-002
8	SUPPORT, CENTER GTS LX 400-600	600405	30	MANIFOLD 2'' SQUARE POLYPROPYLENE NPT	501914-012
9	SUPPORT, CORNER GTS LX 400-600	600406	52	MANIFOLD 2'' SQUARE POLYPROPYLENE BSP	501914-112
10	HANDLE DOOR PLASTIC BLACK	405805-003	33	ADAPTER 3 TO 1 DURO VENT 6"	305394-006
	DRAIN MANIFOLD ASSY GTS LX	600199-100	34	SUB PANEL ASSY GTS LX	600562
	DRAIN MANIFOLD ASSY GTS LX EURO	600199-101	35	MOUNT INTAKE/EXHAUST LX 400-600	600113
11	DRANE-KOOLER WATER TEMPERING ASSY LX NPT	600199-105	36	MAINFOLD WELD GAS 2 BURNER	600268
	DRANE-KOOLER WATER TEMPERING ASSY LX BSP	600199-106	37	TRICLOVER GASKET 4" O-RING EPDM	600248
12	BLOWER ASSY GTS LX 200-600 120V	400092-200	38	HIGH POLISH QUICK CLAMP	600048
12	BLOWER ASSY GTS LX 200-600 230V	400092-241	39	COUPLING 6" X 4" FERNCO, LX400-600	601121
13	WELD FLUE ADAPTER 5" TO 6"	600534	40	2.5" Y SPLITTER TO 4" FITTING, LX400-600	601120
14	SECONDARY HX ASSY LX 400-600	601094-600	41	VALVE FILL SST 1/4" 24V 0.125 ORF	505095
1.0	PRI. HEAT EX WELDMENT LX 400/500 SST 316	601090-501	42	PRESSURE SWITCH 1" WC	127601-001
15	PRI. HEAT EX WELDMENT LX 600 SST 316	601090-601		SPARK IGNITOR ASSY GTS LX	184430-001
16	GASKET HEAT EXCHANGER EPDM LX-400 TO LX-600	600696-002	43	SPARK IGNITOR ASSY, PROPANE, LX	184430-002
17	GASKET CLEANOUT PLATE LX 400-600 EPDM	600696-005	44	FLAME SENSE ASSY GTS LX #	184425-001
22	CLEANOUT PLATE ASSY GTS LX 200-600 304	184405-600	45	CUT-OUT THERMO VF/VM/CRU/VLC	409560-001
	CLEANOUT PLATE ASSY GTS LX 200-600 316	184405-601	46	PROBE FLUE TEMP/SENSOR 155F 1/4" NPT	600430
23	TANK ASSY GTS LX 400-600 304	184400-600	47	GASKET BURNER MOUNT 2.70" HOLE	600394
	TANK ASSY GTS LX 400-600 316	184400-601			
24	FRAME GTS LX 400/600 32.75 X 59.75, BLK	600093-001			
25	PROBE ASSY LX, SHORT MIDPROBE, EPDM	184315-004			

Electrical parts

### FIGURE 96-1: GTS ELECTRICAL REPLACEMENT PARTS



Note: See Pages 98 and 99 for GTS Outdoor Enclosure replacement parts.

# Electrical parts

Table 97-1: GTS electrical replacement parts					
No.	Description	Part no.			
1	MAIN CONTROLLER VAPOR LOGIC 6	183504-014			
2	DISPLAY VAPOR-LOGIC TOUCHSCREEN	183508-001			
3	TRANSFORMER 120/277/600V - 24V 50/60HZ	408980-001			
4	TRANSFORMER, 230/400, 24V SEC - 100VA (EUROPEAN)	408985-201			
	TRANSFORMER, 230/400, 24V SEC - 150VA (EUROPEAN)	408895-203			
5	TRANSFORMER, 230/400, 115V SEC - 150VA (EUROPEAN)	408985-202			
6	FAN SQ 24V 36CFM 3.13" X 1.5"	407115			
7	TERMINAL 3 POSITION 10MM SPACING WECO (SDU OPTION)	530010-073			
8	TERMINAL 20A DIN RAIL MOUNT DINKLE	600916			
9	SOCKET RELAY DPDT W/OUT TIME DELAY	407900-019			
10	RELAY 24V DPDT FINDER	407900-016			
11	BREAKER CIRCUIT 2A 480V 1POLE CG D-CURVE (EUROPEAN)	406775-207			
12	BREAKER CIRCUIT 6A 480V 1POLE CG D-CURVE (EUROPEAN)	406775-212			
13	BREAKER CIRCUIT 4A 480V 1POLE CG D-CURVE (SDU OPTION)	406775-209			

.

## Outdoor enclosure

### FIGURE 98-1: OUTDOOR ENCLOSURE ELECTRICAL REPLACEMENT PARTS



# Outdoor enclosure

Table 99-1: Outdoor Enclosure electrical replacement parts					
No.	Description	Part no.			
1	MAIN CONTROLLER VAPOR LOGIC 6	183504-014			
2	DISPLAY VAPOR-LOGIC TOUCHSCREEN	183508-001			
3	TRANSFORMER 120/277/600V - 24V 50/60HZ	408980-001			
	TRANSFORMER, 230/400, 24V SEC - 100VA (EUROPEAN)	408985-201			
4	TRANSFORMER, 230/400, 24V SEC - 150VA (EUROPEAN)	408895-203			
5	TRANSFORMER, 230/400, 115V SEC - 150VA (EUROPEAN) 408985				
4	FAN ASSY CABINET 120V	185110-003			
0	FAN ASSY EURO CABINET 230V	185110-004			
7	TERMINAL 3 POSITION 10MM SPACING WECO (SDU OPTION)	530010-073			
8	TERMINAL 20A DIN RAIL MOUNT DINKLE	600916			
9	SOCKET RELAY DPDT W/OUT TIME DELAY	407900-019			
10	RELAY 24V DPDT FINDER	407900-016			
11	BREAKER CIRCUIT 2A 480V 1POLE CG D-CURVE (EUROPEAN)	406775-207			
12	BREAKER CIRCUIT 6A 480V 1POLE CG D-CURVE (EUROPEAN)	406775-212			
13	BREAKER CIRCUIT 4A 480V 1POLE CG D-CURVE (SDU OPTION)	406775-209			
14	BREAKER CIRCUIT 10A 480V 2POLE CG CURVE	406775-213			
14	BREAKER CIRCUIT 4A 480V 2POLE CG D-CURVE	406775-204			
	dual thermostat, degree fahrenheit	600293			
	DUAL THERMOSTAT, DEGREE CELSIUS	600293-001			
	HEATER O.E. 120V 400W GTS LX*	600390			
	HEATER O.E. 230V 400W GTS LX*	600390-001			
*QTY	2 REQUIRED FOR LX-400 - LX-600				

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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.

### 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	СН	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

### Electrical warning label



Location: Control cover, shroud Definition: Electrical shock hazard

### 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  $I_{2H'}$ ,  $I_{2L'}$ ,  $I_{2E'}$ ,  $I_{2E'}$ ,  $I_{2E'}$ ,  $I_{2E'}$ ,  $I_{2F'}$ ,  $I_{2E'}$ ,  $I_{3B/P'}$ ,  $I_{3P}$ 

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

Table 100-1:							
Gas speci	Volumetric flow rate by gas category						
Model GTS LX Series	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		
LX-50	1.41 m³/h	1.72 m³/h	1.41-1.72 m³/h	0.80 m³/h	0.91 m³/h		
LX-75	2.11 m³/h	2.58 m³/h	2.11-2.58 m³/h	1.20 m³/h	1.36 m³/h		
LX-100	2.82 m³/h	3.44 m³/h	2.82-3.44 m³/h	1.60 m³/h	1.82 m³/h		
LX-150	4.23 m³/h	5.16 m³/h	4.23-5.16 m³/h	2.40 m³/h	2.73 m³/h		
LX-200	5.64 m³/h	6.88 m³/h	5.64-6.88 m³/h	3.20 m³/h	3.64 m³/h		
LX-250	7.05 m³/h	8.60 m³/h	7.05-8.60 m³/h	4.00 m³/h	4.54 m³/h		
LX-300	8.32 m³/h	10.15 m³/h	8.32-10.15 m³/h	4.72 m³/h	5.36 m³/h		
LX-400	11.27 m³/h	13.76 m³/h	11.27-13.76 m³/h	6.39 m³/h	7.27 m³/h		
LX-500	14.09 m³/h	17.20 m³/h	14.09-17.20 m³/h	7.99 m³/h	9.09 m³/h		
LX-600	16.63 m³/h	20.30 m³/h	16.63-20.30 m³/h	9.43 m³/h	10.73 m³/h		

Table 101-1: Specifications for European models						
Model GTS LX Series	Average flue temperature	Maximum flue back pressure	Mass flow rate of combustion products	Minimum mass flow rate of combustion products		
LX-50	50 °C	1.2 mbar	5.9 g/s	1.2 g/s		
LX-75	50 °C	1.2 mbar	8.9 g/s	1.8 g/s		
LX-100	50 °C	1.2 mbar	11.8 g/s	2.4 g/s		
LX-150	50 °C	1.2 mbar	17.8 g/s	3.6 g/s		
LX-200	50 °C	1.2 mbar	23.7 g/s	3.6 g/s		
LX-250	50 °C	1.2 mbar	29.6 g/s	3.6 g/s		
LX-300	50 °C	1.2 mbar	35.0 g/s	3.6 g/s		
LX-400	50 °C	1.2 mbar	47.4 g/s	3.6 g/s		
LX-500	50 °C	1.2 mbar	59.2 g/s	3.6 g/s		
LX-600	50 °C	1.2 mbar	69.9 g/s	3.6 g/s		

### Table 101-2:

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	Operating weight in kg	Shipping weight in kg	Full load amps
LX-50	23	0-17	0-18	DN50 (2") hose/BSP	DN50 or 80 (2" or 3")	217	164	1.5
LX-75	34	0-25	0-27	DN50 (2") hose/BSP	DN80 (3")	217	164	1.5
LX-100	45	0-33	0-36	DN50 (2") hose/BSP	DN80 (3")	216	166	1.5
LX-150	68	0-50	0-54	DN50 (2") hose/BSP	DN80 (3")	285	191	2.0
LX-200	91	0-67	0-72	DN80 (3") hose/BSP/flange	DN100 (4")	415	256	2.5
LX-250	113	0-82	0-89	DN80 (3") hose/BSP/flange	DN100 (4")	415	256	2.5
LX-300	136	0-98	0-106	DN80 (3") hose/BSP/flange	DN100 (4")	415	260	2.5
LX-400	181	0-132	0-143	DN100 (4") BSP/flange	DN150 (6")	729	426	3.5
LX-500	227	0-166	0-179	DN100 (4") BSP/flange	DN150 (6")	729	426	3.5
LX-600	272	0-195	0-211	DN100 (4") BSP/flange	DN150 (6")	731	436	3.5

\* 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.

### 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).
- NOx class 5
- Maximum flue temperature under normal operating conditions: 68.3 °C
- Maximum flue temperature safety lockout 82.2°C

### 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)

### INLET WATER TEMPERATURE

See Table 29-1.

### **TYPE C3 BOILERS**

The terminal outlets from separate combustion and air supply circuits shall fit inside a square of 100 cm and that the distance between the planes of the two orifices shall be less than 100 cm.

### TYPE C5 AND C6 BOILERS

The terminals for the supply of combustion air and for the evacuation of combustion products shall not be installed on opposite walls of the building.

### **TYPE C6 BOILERS**

- With all non-certified control devices defeated during a worst case boil down condition, overheat combustion product temperature rating will not exceed 82.2°C.
- Minimum combustion product temperature output is 30°C.
- CO<sub>2</sub> content at normal operating conditions is 8.5%.
- Maximum allowable pressure difference is 125 Pa Flue gas outlet maximum =112 Pa at maximum Flue gas outlet minimum = -12.5 Pa

Inlet air maximum =12.5 Pa Inlet air minimum = -112 Pa

- 25 m/s maximum allowable draught
- Condensate return into the humidifier is allowed but should be minimized.
- Maximum allowable recirculation rate of 10% under worst case wind conditions.

### CAUTION

## Install connection for gas pressure test gauge

Gas pressure to the humidifier controls must never exceed 3 kPa (32 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

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#### 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

www.dristeem.com sales@dristeem.com

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

#### **DRI-STEEM Corporation**

a subsidiary of Research Products Corporation DriSteem U.S. operations are ISO 9001:2015 certified

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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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Patents pending.



Form No. GTS-LX-IOM-EN-REVJ-0125 Part No. 890000-261 REV J

### **Two-year Limited Warranty**

DriSteem 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 twentyseven (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. The Limited Warranty does not include consumables, including but not limited to: cylinders, filters, membranes, nozzles, and piezoelectric transducer replacement.

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.

DRI-STEEM SHALL NOT, UNDER ANY CIRCUMSTANCES BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS, REVENUE OR BUSINESS) OR DAMAGE OR INJURY TO PERSONS OR PROPERTY IN ANY WAY RELATED TO THE MANUFACTURE OR THE USE OF ITS PRODUCTS. The exclusion applies regardless of whether such damages are sought based on breach of warranty, breach of contract, negligence, strict liability in tort, or any other legal theory, even if 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, twenty four (24) months, or thirty-six (36) months<sup>(1)</sup> 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.

<sup>(1)</sup> 36 month extended warranty automatically included for all DriSteem Dehumidifiers.