

READ AND SAVE THESE INSTRUCTIONS

This manual must be left with the owner and should be accessible for reference.

DRI-STEEM Models GTS[®] and GTS[®]-DI GAS-TO-STEAM HUMIDIFIERS

Installation, Operation and Maintenance Manual

WARNING: If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury, or loss of life.

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

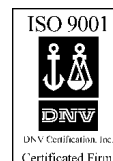
WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from an off-site phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.
- Installation and service must be performed by a qualified installer, service agency, or the gas supplier.

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



DRI-STEEM[®]
HUMIDIFIER COMPANY



FOREWORD

TO THE PURCHASER AND THE INSTALLER

Thank you for purchasing DRI-STEEM Model GTS® equipment. We have designed and built this equipment to give you total satisfaction and many years of trouble-free service. Proper installation and operating practices will assure you of achieving that objective. We therefore urge you to become familiar with the contents of this manual.

DRI-STEEM Humidifier Company

TABLE OF CONTENTS

GTS Program Code Nomenclature	4
Models GTS and GTS-DI	5
Safety Precautions	6
Specifications and Capacities	7
Dimensions	8
Installation	
Precautions	9
Required Clearance	9
Locating the Humidifier	10
Supply Water and Drain Overflow Connections	10
Makeup Water Piping and Material	11
Drain Piping and Material	11
Gas Piping	12
Gas Leak Testing	13
Electrical	13
Combustion and Ventilation Air	14
Flue Venting Guidelines (Stack Connection)	15
Mounting the Humidifier	
Standard	17
Indoor Cover	17
Outdoor Enclosure	18
Steam Supply Connection Methods	20
Condensate Return Piping	21
RAPID-SORB® Assembly and Installation	
Horizontal Duct Installation	22
Vertical Duct Installation	23
ULTRA-SORB® Installation	23
AREA-TYPE Application	24
Start-up and Operation	25
Maintenance	
GTS (Standard Model Only)	26
GTS-DI Model Only	26
Both GTS and GTS-DI	27
Replacement Parts	28
Wiring Diagrams	32
Caution Labels	36
Maintenance Service Record	37
Two-Year Limited Warranty	40

GTS PROGRAM CODE NOMENCLATURE

A 14-digit VAPOR-LOGIC₃ program code appears on the front of the control cabinet and on the wiring diagram inside the control cabinet. The program code specifies the parameters of the VAPOR-LOGIC₃ microprocessor, which controls your humidification system. An explanation of the program code is detailed below.

VAPOR-LOGIC₃ program code

A. VAPOR-LOGIC₃ system type:

G = GTS[®]
S = STS[®]
L = LTS[®]
V = VAPORSTREAM[®]
M = VAPORMIST[®]
C = CRUV[®]
U = ULTRA-FOG[®]
N = Steam Injection

B. VAPOR-LOGIC₃ board classification:

1 = One-tank system
2 = Two-tank system
3 = Three-tank system
4 = Four-tank system
5 = Five-tank system
6 = Six-tank system

C. Digital display/keypad features:

1 = Single keypad

D. Type of outputs:

0 = Steam valve/100% SSR
1 = One heat stage
2 = Two heat stages
3 = Three heat stages
4 = Four heat stages

E. System pounds output:

= Output capacity
(e.g., 00285 = output capacity in lbs/hr)

F. Type of water level control:

D = DI w/ manual drain
E = DI w/ end of season drain
M = Standard w/ manual drain
A = Standard w/ autodrain

G. Operating mode:

1 = Single staged
2 = Externally staged
3 = not used
4 = not used
5 = not used
6 = GTS
7 = TP
8 = SSR
9 = Steam valve

H. VAV options:

V = Option present
O = Option not selected
S = SDU option

I. Temperature compensation options:

T = Option present
O = Option not selected

J. Type of humidity sensing device:

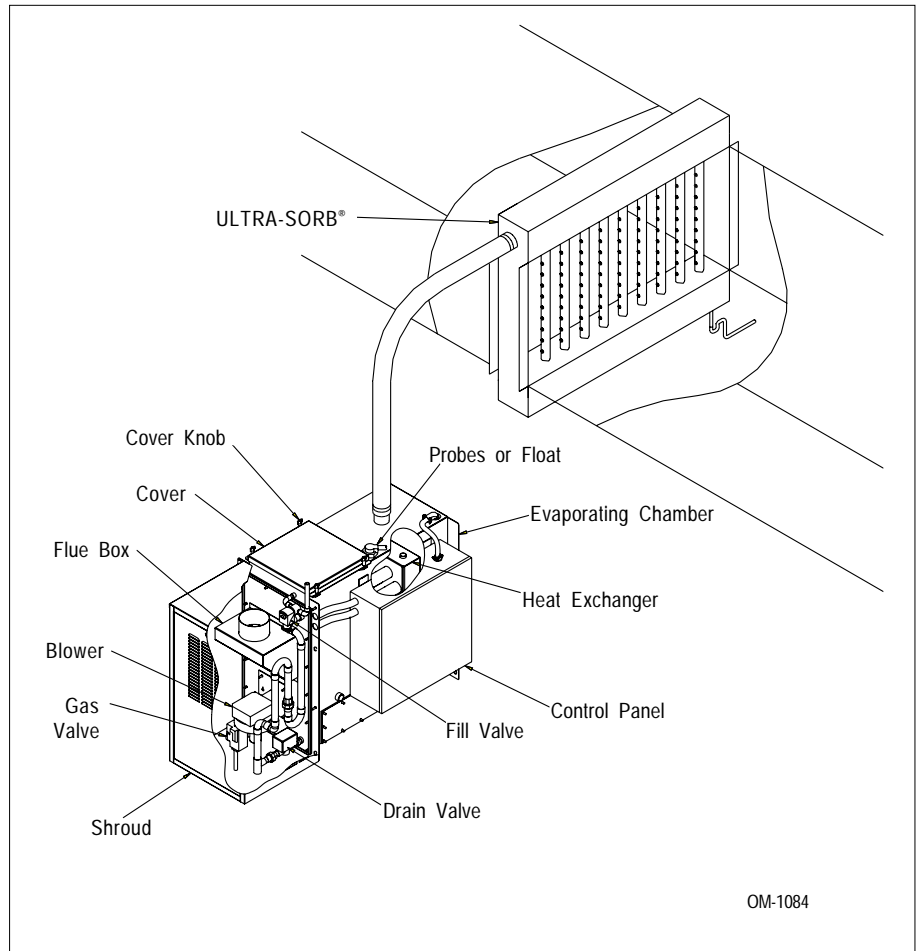
N = None, for on/off
C = 0-135 ohm humidistat
D = 6-9 VDC humidistat
H = 0-10 VDC humidistat
E = 4-20 mA humidistat
X = 4-20 mA transmitter
Q = Dew point transmitter
S = Special

GTS Gas-to-Steam Humidifier

The GTS is a gas-fired humidifier that burns either natural or propane gas to generate steam for humidification. The unit consists of one or two burners, which are fired into a heat exchanger. This heat exchanger is, in turn, submerged in a tank of water. When there is a call for humidity, the burners fire and generate steam until the call for humidity ends. The GTS is compatible with all types of DRI-STEEM dispersion devices, including RAPID-SORB® and ULTRA-SORB®.

The GTS humidifier is designed to be used with all water types. The standard GTS model supports softened or unsoftened water and uses a probe-type level control system. This probe requires water conductivity of 100 $\mu\text{m}/\text{cm}$ (about 2 gr/gal minimum) to function. Therefore, it will not operate on water treated by reverse osmosis or deionization.

The GTS-DI model is available for use with deionized or reverse osmosis water. This unit produces chemical-free steam and reliable, accurate humidification control. It is virtually maintenance-free, with no wasted water, heat, or downtime. The DI unit uses a float valve to control water levels. The standard GTS model can be converted to a GTS-DI model in the field.



SAFETY PRECAUTIONS

WARNING:

Improper installation, adjustment, alteration, service, maintenance, or use can cause carbon monoxide poisoning, an explosion, fire, electrical shock, or other conditions which may cause personal injury or property damage. 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. A failure to follow this warning can cause electrical shock, fire, personal injury, or death.

- Inspect humidifier and accessories upon arrival for damaged, missing, or improper parts. If there is a problem, call DRI-STEEM.
- 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 this literature, tags, and labels attached to or shipped with the unit and 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 use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

- Do not lift humidifier by gas controls, gas manifold, fire box, or control 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.

SPECIFICATIONS AND CAPACITIES

Table 7-1: Specifications

Model number	Steam capacity per hour in lbs/kg	MBH input (kW)	Steam outlet	Recommended Vent size in inches/mm (Class B)	Operating weight in lbs/kg	Shipping weight in lbs/kg	Outdoor enclosure operating weight in lbs/kg	Outdoor enclosure shipping weight in lbs/kg	115 volt, 60 Hz	230 volt, 50 Hz
									Full load amps	Full load amps
GTS-100	75 / 34	100 / 24	2" NPT or 2" hose	5 / 130	650 / 295	425 / 195	1075 / 490	850 / 385	1.8	2.9
GTS-200	150 / 68	200 / 59	2" NPT or 2" hose	5 / 130	650 / 295	425 / 195	1075 / 490	850 / 385	1.8	2.9
GTS-300	225 / 102	300 / 88	3" flange	7 / 180	900 / 410	500 / 225	1325 / 600	925 / 420	3.0	3.5
GTS-400	300 / 136	400 / 117	3" flange	7 / 180	900 / 410	500 / 225	1325 / 600	925 / 420	3.0	3.5

Capacity Notes

- Approximately 172 BTUs are required to raise the temperature of one pound of water from 40° to 212° F. (Approximately 402 kJ are required to raise the temperature of one kg of water from 4°C to 100°C.)
- An additional 970 BTUs are required to change one pound of water to water vapor. (An additional 2257 kJ are required to change one kg of water to water vapor.)
- Another factor to consider is condensation steam loss from hoses and tubes. Use the following steam loss guidelines:
 - vapor hose: 0.15 lbs/ft/hr (0.22 kg/m/h)
 - insulated pipe: 0.05 lbs/ft/hr (0.07 kg/m/h)
 - dispersion tubes: 0.50 lbs/ft/hr (0.7 kg/m/h)

LP gas:

Maximum input on the GTS-400 is derated 15 percent on LP gas. All other models operate at rated maximum input.

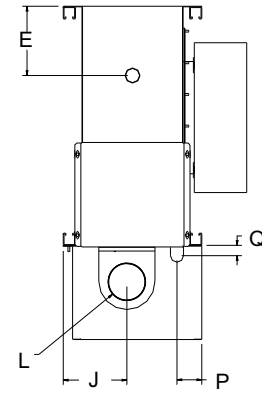
High altitude:

Contact DRI-STEEM factory regarding possible altitude derates for the GTS-400. All other models operate at rated maximum input.

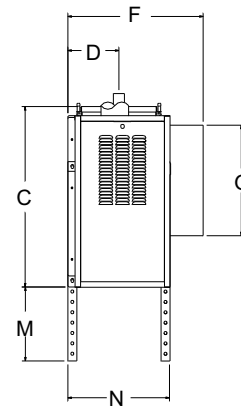
DIMENSIONS

Figure 8-1: Dimensions

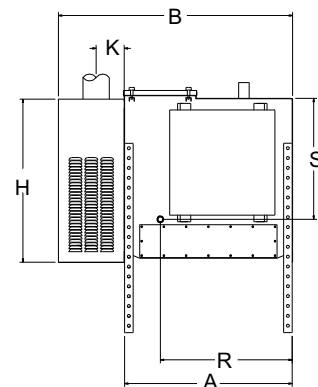
	Description	GTS-100 GTS-200 (One-burner) inches / mm	GTS-300 GTS-400 (Two-burner) inches / mm
A	Floor stand width	31.85 / 809	31.85 / 809
B	Overall length	44.50 / 1130	49.00 / 1245
C	Height of evaporating chamber	32.75 / 832	32.75 / 832
D	Steam outlet position	9.25 / 235	12.00 / 305
E		9.25 / 235	9.25 / 235
F	Overall width	25.00 / 635	30.50 / 775
G	Height of control cabinet	20.00 / 508	20.00 / 508
H	Shroud height	32.00 / 813	32.00 / 813
J	Flue position	8.50 / 216	12.00 / 305
K		5.00 / 127	5.50 / 140
L	Flue diameter	5.00 / 127	7.00 / 178
M	Leg height (distance from floor)	13.35 / 339	13.35 / 339
N	Leg width	18.50 / 470	24.00 / 610
P	Fill valve	3.30 / 84	3.30 / 84
Q	Connection point	1.38 / 35	1.38 / 35
R	Condensate return plug position	25.00 / 635	25.00 / 635
S		23.00 / 584	23.00 / 584



Top View



Front View



Side View

INSTALLATION

Precautions

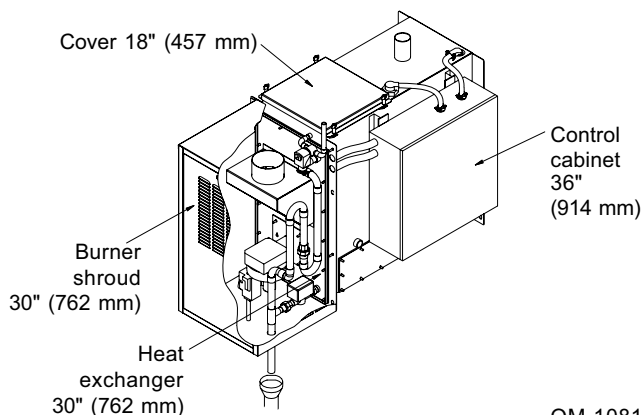
- Installation must conform to the requirements of the authority having jurisdiction or, in the absence of such requirements, to the National Fuel Gas Code, ANSI Z223.1 (latest edition). In Canada, the installation of this unit must comply with local plumbing or waste water codes and other applicable 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 Applications and Equipment."
- 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 will cause accelerated corrosion, resulting in a reduction of 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.
- 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, at least one near the bottom. The openings should provide one square inch of free area per 1000 BTUH input rating of the unit, with a minimum of 100 square inches for each opening. See table 14-1 and information on pages 14 and 15 for additional information.
- Remove all shipping brackets and materials before operating the humidifier.
- Humidifier flue gases must be vented to the outside atmosphere.
- 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 wiring diagram furnished with this unit.
- Turn off all gas while installing the gas piping and manual shut-off valve for the humidifier.

Required Clearance:

For recommended service and maintenance purposes the following clearances should be maintained:

- Heat exchanger removal - front, 30"
- Burner shroud removal - front, 30"
- Control cabinet - right side, 36"
- Cover removal - top, 18"
- Distance from vent box to combustible floor - 30"

GTS clearance recommendations



OM-1081

INSTALLATION

Locating the Humidifier

- Provide a level, solid foundation for the humidifier. Locate the humidifier as near as possible to chimney or outside wall so that the flue pipe from the humidifier is short and direct. The location should also be such that the gas ignition system components are protected from water during humidifier operation and service.
- The humidifier should be installed in a location away from drafts and properly protected. If installed in a separate room, follow the instructions concerning combustion and ventilation air.
- The humidifier should be located 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, it is recommended that a suitable drain pan, adequately drained, be installed under the humidifier. The pan must not restrict combustion air flow.
- The humidifier must not be installed on carpeting, tile, or other combustible material other than wood flooring (indoor application only).
- Install humidifier so electrical components are protected from water.
- The appliance must be kept free and clear of insulating materials when located in an insulated space. Insulating material may be combustible. Inspection of the appliance area must be performed when the appliance is installed, or when insulation is added.

Supply Water and Drain Overflow Connections

IMPORTANT: The humidifier is shipped with the automatic drain valve locked in the manual open position. This position reduces the possibility of damaging the valve seat from the heat of sweating the drain connection during installation. After the drain connection has been completed, the “manual open” lever position must be reset to the auto position. Failure to close the drain valve will not allow the tank to fill.

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

- Union connections must be made at the humidifier on the cold water supply and drain/overflow lines.
- A shut-off valve should be provided in the supply water line to isolate the humidifier from the water system while servicing.
- If the water pressure is above 60 psig and/or water hammer would be objectionable, a pressure reducing valve or shock arrester should be installed.
- A 1" opening is provided in the humidifier tank to accommodate skim and/or overflow protection. (Note: Follow local code requirements regarding size of drain pipe.)
- Insulating unions or bushings must be used 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, be sure the humidifier tank is full of water and the water is free to flow into the tank.

INSTALLATION

Makeup Water Piping and Material

Minimum makeup water pressure must be 25 psi. When nonmetallic water piping is used, it must be rated to withstand 212°F or greater temperature. If not, the final three feet connected to the humidifier should be metallic and should not be insulated.

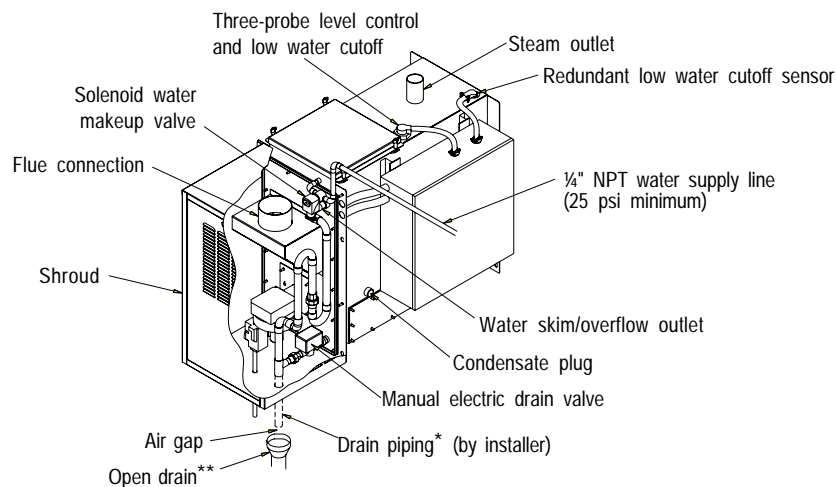
As part of the fill valve assembly, the needle valve restricts the rush of cold water entering the evaporating chamber during the fill cycle. Adjusting the supply water flow with the needle valve will reduce fill cycle noise from

the collapsing steam head in the humidifier. Adjusting the needle valve will also reduce the drop in output during a fill cycle. Care must be taken to not reduce the fill rate below the humidifier's capacity, as this will cause a low-water shutdown.

Drain Piping and Material

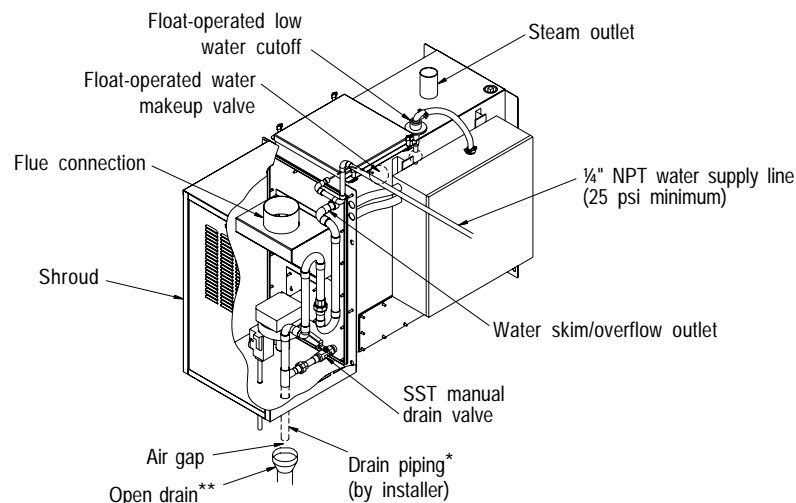
If nonmetallic pipe or hose is used, it must be capable of withstanding temperatures up to 212°F.

Standard Water



OM-736N

DI Water



OM-737N

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

** Refer to local codes for drain pipe sizing and maximum temperature requirements.

INSTALLATION

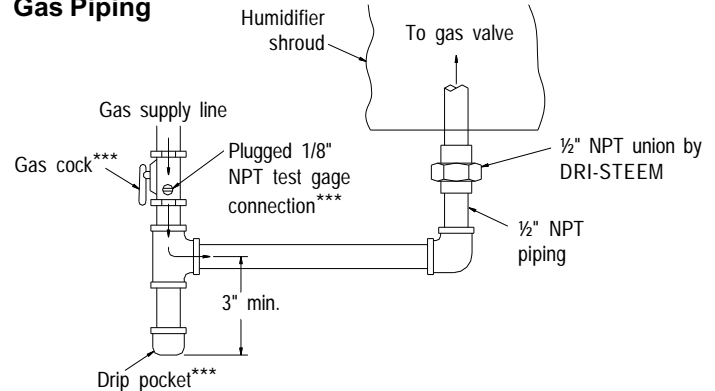
Gas Piping Guidelines

CAUTION:

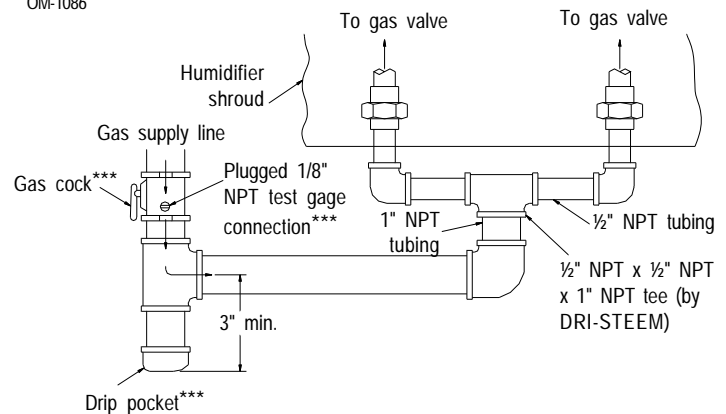
Gas pressure to humidifier controls must never exceed 24" wc. A 1/8" inch NPT plugged tapping, accessible for test gauge connection, must be installed immediately upstream of the gas supply connection to the appliance.

- After threading and reaming the ends, inspect piping and remove loose dirt and chips.
- Support piping so that no strains are imposed on unit or controls.
- Use two wrenches when connecting piping to unit 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 subject to wide temperature variations should be insulated.
- Pitch piping up toward unit at least 1/4" per 15' of horizontal run.
- Compounds used on threaded joints of gas piping must be resistant to the harmful action of liquefied petroleum gases.
- Purge air before lighting unit by disconnecting piping at gas control. **In no case should line be purged into heat exchanger.**
- 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 shut-off valve immediately upstream of the unit including a 1/8" NPT plugged tapping accessible for test gauge connection. Pressure tappings for test gauges are located on all gas valves.
- Allow at least 5' of piping between any high pressure regulator and unit pipe connection.

Gas Piping



OM-1086



OM-1087

- Piping installation must be in accordance with local codes, and ANSI Z233.1, "National Fuel Gas Code," or CAN/CGA-B149 in Canada. Do not use flexible connectors.
- Piping to units should conform with local and national requirements for type and volume and gas handled, and pressure drop allowed in the line. Refer to table 13-1 and 13-2 to determine the cubic feet per hour (cfh) for the type of gas and size of unit to be installed. 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 (cfh), and length of main must be considered. Avoid pipe sizes smaller than 1/2". Table 13-1 allows for the usual number of fittings with a 0.3" wc pressure drop.

Table 13-2 should be used when the specific gravity of the gas is other than .60 for natural gas or 1.53 for propane. Please refer to the following example for the use of both Tables 13-1 and 13-2.

INSTALLATION

Table 13-1: Gas Pipe Capacities for Gas Pressures of .5 PSIG or Less

Length of pipe feet	Gas flow in piping (cu. ft. per hr.) (at pressure drop of 0.3 in. water. specific gravity = 0.60)				
	Iron pipe diameter (NPT) inches				
	1/2"	3/4"	1"	1-1/4"	1-1/2"
10'	132	278	520	1050	1600
20'	92	190	350	730	1100
30'	73	152	285	590	890
40'	63	130	245	500	760
50'	56	115	215	440	670
60'	50	105	195	400	610
70'	46	96	180	370	560
80'	43	90	170	350	530
90'	40	84	160	320	490
100'	38	79	150	305	460

Example:

You begin by calculating the cubic feet/hour using the following formula:

Btuh input

Btus/cubic foot (calorific value of gas)

NOTE: The calorific value of natural gas is 1025 and of propane is 2500.

If you had a GTS-400 operating on natural gas, you would calculate the cubic feet/hour as follows:

$$400,000 \text{ btuh} \div 1025 \text{ btus/cubic foot} = 390 \text{ cubic feet/hour}$$

If you need to run your gas piping 60', you would refer to Table 13-1 and look horizontally across the 60' line until you located the next highest value above your calculated cubic feet/hour. In this example, you would be looking for the next highest value above 390, which would be 400 and would indicate the use of a 1 1/4" pipe for this application.

Using the same example, if the specific gravity of your natural gas was .55 (instead of the .60 standard) you would need to refer to Table 13-2 for an adjustment factor. In this case, the factor would be 1.04, which you would multiply by the 390 cubic feet/hour value. This gives you a new cubic feet/hour value of 406. Referring back to Table 13-1, you will see that in the same 60 foot length, you now would need to use 1 1/2" pipe due to the change in the specific gravity of the gas.

Gas Leak Testing

• When leak testing the gas supply piping system, the humidifier and its gas shut-off valve must be disconnected during any pressure in excess of 24" wc. The humidifier

Table 13-2: Specific Gravity Conversion Factors

Multiplying factor to be used with table 13-1 when the specific gravity of gas is other than 0.60 (natural gas) or 1.53 (propane).

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

must be isolated from the gas supply piping system by closing its field-installed manual shut-off valve during any pressure not equal to 24" wc.

• Check gas supply pressure with all burners running at inlet pressure tap of combination gas control. The **recommended** supply pressure should be 7" wc on natural gas or 11" wc on LP gas. Purging of gas piping should be performed as described in ANSI Z223.1 (latest edition) or, in Canada, in CAN/CGA-B149 codes. The **minimum** supply pressure is 6" wc for natural gas and 10" wc for LP gas.

Electrical Connections

CAUTION:

Do not connect aluminum wire between disconnect switch and humidifier. Use only copper wire.

WARNING:

The cabinet **must** have an uninterrupted or unbroken ground according to National Electrical Code, ANSI/NFPA 70 and Canadian Electrical Code, CSA C22.1, or local

codes to minimize personal injury if an electrical fault should occur. This may 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 need to be supplied with 120-volt AC, 60-Hz, separately fused electrical service. The GTS humidifier is equipped with a transformer to step down the voltage to 24 VAC control voltage.

• When installed, the GTS humidifier must be electrically grounded in accordance with local codes or, in the absence of local codes, with the National Electrical Code ANSI/NFPA No. 70-1987. The electrical conductors shall be Type MTW (105°C) AWG #14 wire for line voltage (120V), with BLACK WIRE for HOT; WHITE WIRE for NEUTRAL, GREEN WIRE for GROUND; and #18 gauge 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 humidifier is adjusted for correct performance. Do not alter throttle setting or restrict venturi opening.

• The current characteristics, and capacity requirements should be checked against the nameplates. All wiring must be in accordance with all governing codes, and with GTS wiring diagram located inside the control cabinet. See table 7-1 for information on the various models.

• Refer to VAPOR-LOGIC®₃ Installation, Operations, and Maintenance Manual for additional information on the specific controller furnished with this GTS humidifier.

INSTALLATION

Combustion and Ventilation Air

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

Room Air Combustion

CAUTION:

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

CAUTION:

The operation of exhaust fans, kitchen ventilation fans, clothes dryers, or fireplaces could create a negative pressure condition at the humidifier. Makeup air must be provided for the ventilation devices, in addition to that required by the humidifier. Units that may be operated in toxic environments should be equipped with sealed combustion piping.

- All fuel burning equipment must be supplied with air for combustion of the fuel. Sufficient air **must** be provided to ensure there will not be a negative pressure in the equipment room or space.
- Provisions for adequate combustion and ventilation air must be provided in accordance with Section 5.3, Air for Combustion and Ventilation, of the National Fuel Gas Code, ANSI Z223.1-1988, or applicable provisions of the local building codes. Canadian installations must be installed in accordance with sections 7.2, 7.3, and 7.4 of the CAN/CGA.B149 Installation Codes, and all authorities having jurisdiction.

- For proper and safe operation this appliance needs air for combustion and ventilation. **Do not** block or obstruct air openings on the appliance, spaces around the appliance, or air openings communicating with the appliance area.

- **Do not** 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 in which the heater is located. Enclosed spaces, such as equipment rooms, must be vented at the blower for combustion air. The size of air openings must be based on all gas-burning equipment installed in the space involved. Four types of locations, and the requirements of each, are outlined in table 14-1.

Sealed Combustion

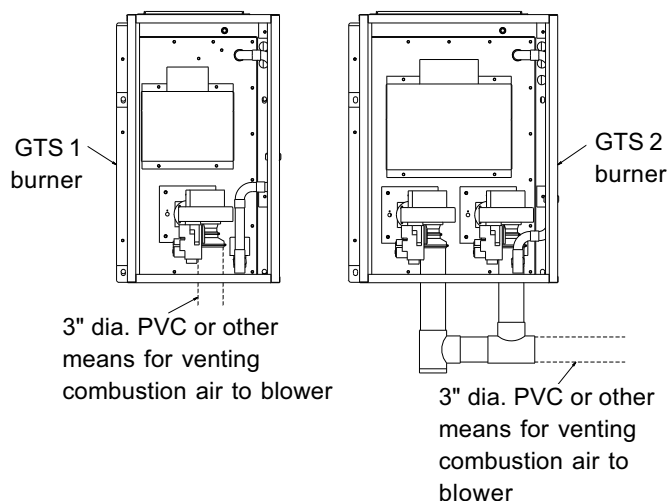
The GTS will support sealed combustion utilizing 3" PVC or CPVC piping. When the GTS is ordered in a sealed combustion configuration, DRI-STEEM will provide a field connection point within the GTS shroud. On the GTS-100 and GTS-200, there will be a single point connection to the

Table 14-1: Location of Humidifier and Required Air Openings to Confined Space

Confined Space - All air from inside the building; conventional frame. Brick or stone construction with normal infiltration. (Can only be rarely used with larger input units.)	Two openings, 1 square inch per opening per 1000 BTU/hr. input.* The minimum free area of opening is 100 square inches.
Confined Space - All air from outside the building through air ducts.	Two openings, 2 ducts, 1 square inch per opening per 2000 BTU/hr. input.*
Confined Space - All air from outside the building, through wall openings only (no ducts.)	Two openings, 1 square inch per opening per 4000 BTU/hr. input.*
Unconfined Space - All air from outside the building.	Same as confined space, all air from outside the building.*

*Note: The minimum dimension of any opening is 3" by 3".

Sealed combustion connection



blower. On the GTS-300 and GTS-400, there will be a single point connection to a manifold.

When running PVC or CPVC piping for sealed combustion, the maximum allowable distance to the outdoor air source is 40' with a 5' equivalent length for elbows. The outside air source may 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 shall be covered with a large mesh screen to prevent the introduction of unwanted

INSTALLATION

materials without restricting airflow. The air intake point must be located at least 10' (3 m) from the flue vent on horizontally vented units.

Note: GTS outdoor enclosures are always provided with a sealed combustion connection.

Vertical and Horizontal Venting Guidelines (Stack Connection)

- The GTS® is a fan assisted category II appliance.
- Maximum flue temperature is 460°F (390°F + ambient).
- The purpose of venting the gas humidifier is to completely remove all products of combustion and ventilation gases to the outside air.
- When connecting the humidifier to a gas vent or chimney, the installation shall 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, the local building codes, and the vent manufacturer's instructions.
- Do not reduce the vent diameter, and avoid short turns in the vent piping. Use the same size stack as the vent furnished with the humidifier. Maintain a minimum upward slope of ¼" per linear foot on all horizontal runs. Maintain proper support of vent connections and joints. Observe clearances (in accordance with applicable codes) from all combustible materials, and obtain an approved cap for the stack outlet. The bottom of the cap must be one stack diameter above the top of the stack.
- Inspect for proper and tight construction. Any restrictions or obstructions must be removed. An existing chimney may require cleaning.
- Chimney or vent must extend at least 3' above its passage through a roof and at least 2' above any ridge within 10' of the chimney. (Local codes apply.)
- This humidifier must not be connected to a chimney flue servicing a separate appliance designed to burn solid fuel.
- Never connect this humidifier to a chimney serving a fireplace, unless the fireplace opening is permanently sealed off.
- Venting into an unlined masonry or concrete chimney is prohibited by code.
- If this humidifier is connected to a lined, masonry chimney, the chimney must be sized and installed according to the provisions of the National Fuel Gas Code or Canadian CAN/CGA.B149 requirements.
- Insulation must be added to any vent connector which will be exposed to ambient temperatures of 30°F or less, especially any application using single-wall vent pipe as a connector.
- Do not insulate vent pipe exposed to outdoor weather conditions (i.e. above roof lines).
- Installation of the vent pipe should be as direct as possible, with a minimum number of turns or elbows.
- Rigidly support the vent pipe every 5' or less with hangers or straps to ensure that there will be no movement after installation. The humidifier vent box should not be supporting the weight of the vent piping.
- No portion of the vent system shall extend into, or pass through, any circulation air duct or plenum.
- The vent system shall terminate above the roof surface per the National Fuel Gas Code or CAN/CGA.B149 requirements, and shall include a UL or CUL listed vent cap or roof assembly, unless prohibited by local codes.
- This humidifier may be commonly vented with other listed gas-fired appliances. Total input rates of all appliances will determine the vent size.
- All vent pipe passing through floors, ceilings, and walls must be installed with the proper clearances from combustible material, and be fire-stopped according to the National Fuel Gas Code requirements and Canadian Standards CAN/CGA.B149.
- In replacement installation, where an existing vent system may be used, the vent system must be inspected 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 installations shall 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, the local building codes, and the vent manufacturer's instructions.
- **For all applications, the horizontal length of the vent and vent connector must not exceed the height of the vent system.**

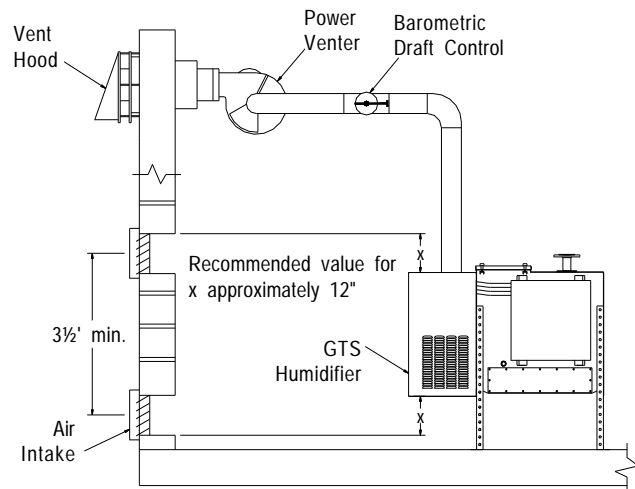
INSTALLATION

Special Horizontal Venting Requirements

- Distances from the vent terminal to adjacent public walkways, buildings, and openable windows and building openings should be consistent with the National Fuel Gas Code, ANSI Z223.1, and/or CAN/CGA B149 Installation Codes.
- In areas accessible to the public, the vent terminal shall be at least 7' above ground level to prevent burns from touching the 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 should be protected from degradation by flue gases.
- A minimum horizontal clearance of 4' (1.22 m) from electric meters, gas meters, regulators, and relief equipment must be maintained.
- 100' maximum, 10' minimum equivalent length of vent pipe.
- A vent box pressure of -0.01" wc is specified and set by adjusting power venter and barometric damper, with all burners running.

Model	Equivalent Length of Vent Pipe/Elbow	Vent Terminal Model Number	Power Venter	Barometric Damper
GTS - 100	5'	SWH-1-5 (5")	5" PVO-600	5"
GTS - 200				
GTS - 300				
GTS - 400				

Figure 16-1: GTS Venting



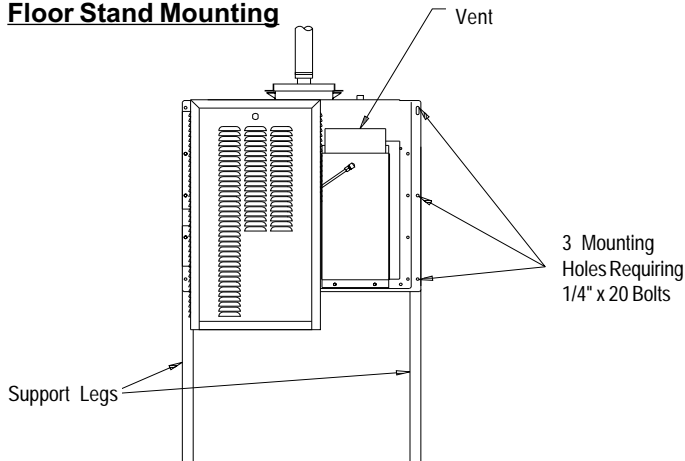
Note: Refer to power venter manual for clearance requirements relative to combustion air openings.

Equipment Required for Horizontal Venting

- Power Venter: Field controls, see above table for model numbers.
- Barometric Damper: Field controls model # MG-1 (5").
- Vent Terminal: Field controls, see table at left for model numbers.

MOUNTING THE HUMIDIFIER

Floor Stand Mounting



For proper operation of the electrode-probe, water-level control and the skimmer system, the humidifier must be mounted level left to right and front to rear.

Proper access (18" minimum) for periodic removal of the top cover is recommended. In most cases, scale that forms on the heat exchanger continuously flakes off as it forms and settles to the bottom.

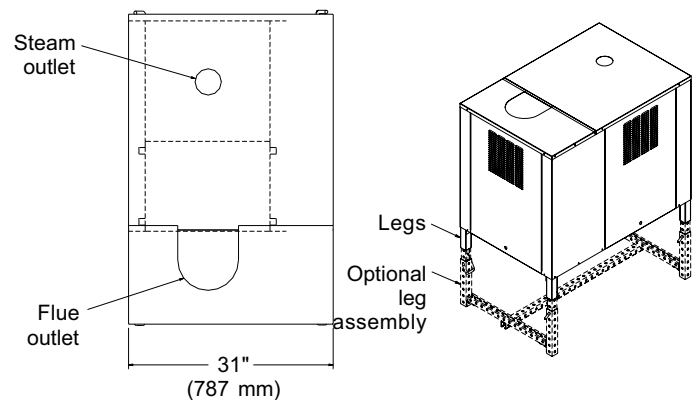
Indoor Cover Mounting Option

The GTS indoor cover shall be shipped with the GTS unit factory mounted in it. The unit shall only be moved into place by lifting the unit from under its base frame. The indoor cover can be mounted as is, or it can be mounted on an optional adjustable leg assembly (see adjustable leg assembly). All of the necessary plumbing and electrical wires are to be run under the cover and into the appropriate access locations. There are two clearly marked removable access doors. One of them, on the front of the unit, is to gain access to the water fill connection, drain connection, gas connection, and the flue box outlet. The other door, on the side of the unit, is to gain access to the electrical sub panel, cleanout plate, and the steam outlet connection.

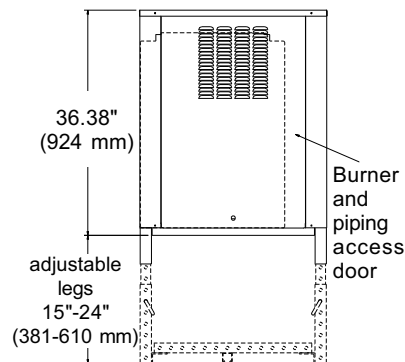
The top of the indoor cover consists of two pieces, which are removable. These two pieces may be removed to gain further access to the flue box connection, steam outlet connection, and the inspection cover. The two pieces are removed by backing off the sheet metal screws which secure it to the sides of the cover. To reduce the risk of damage to the cover, reattach the two pieces whenever the unit is in operation or when the unit is being moved.

The **adjustable leg assembly**, if ordered, will be packaged separately from the GTS indoor cover. The legs will raise the base of the unit off the floor from 15" to 24". To ease installation; the leg assembly should be assembled and the height adjusted prior to mounting the unit on it. Hand tighten all nuts and bolts. Do not make any electrical, gas or plumbing connections to the unit, nor fill the tank prior to setting it on the legs. Place the leg assembly on a solid level surface where the unit is to be mounted, and place the unit on it. Once the unit has been placed on the legs; square and level the assembly and then tighten the nuts and bolts securely. Never move the assembly with the unit mounted on it.

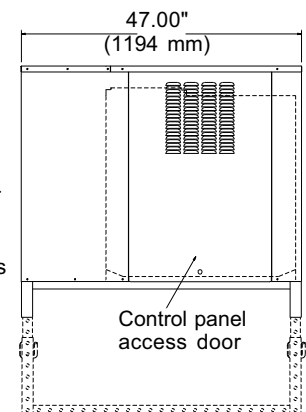
Top view indoor cover



Front view indoor cover



Side view indoor cover



MOUNTING THE HUMIDIFIER

Outdoor Enclosure Mounting Option

The outdoor enclosure option is used when the GTS® will be located outside of the space it will be humidifying. The following information is not intended to supplant any requirements of federal, state, or local codes having jurisdiction. Prior to locating the unit, authorities having jurisdiction should be consulted.

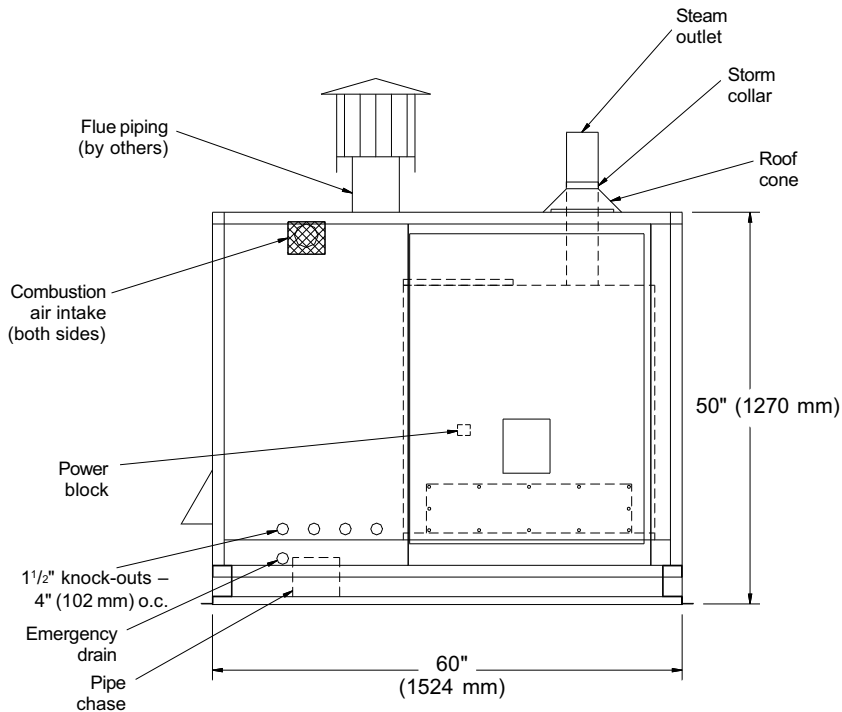
- The GTS outdoor enclosure must be level and located so that there is enough clearance for opening the access doors.
- Verify that the position of support legs, pad, or curb properly support the unit and that support structure dimensions coincide with unit dimensions.
- Locate unit so that air intakes are not too close to any exhaust fan outlets, gasoline storage, or other contaminants that could potentially cause dangerous situations. The use and storage of gasoline or other flammable vapors and liquids in open containers in the vicinity of this appliance is hazardous.
- When located on the roof, the air intakes must be a minimum of 14" off the roof to prevent intake of snow or splashed rain. The unit should be located so that the prevailing winds do not blow into the air intakes.

Installation

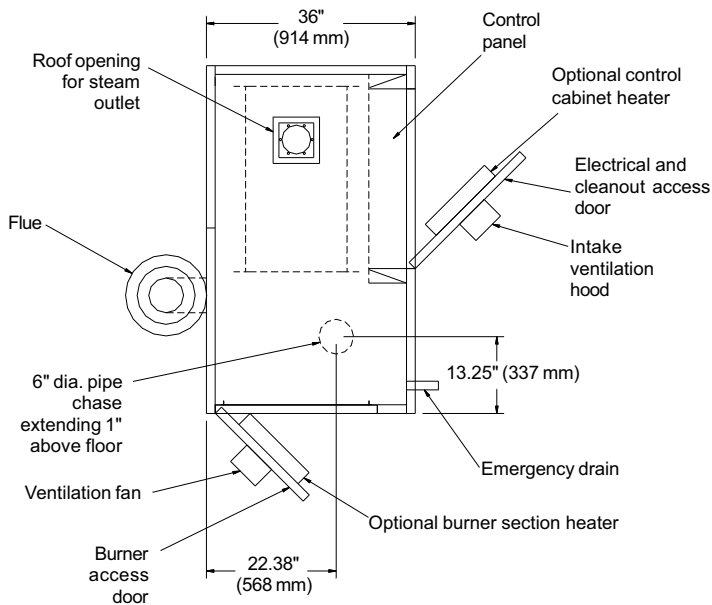
- Be sure to remove all shipping brackets and other packaging prior to installing the unit.
- During the transit, unloading, and setting of the unit, bolts and nuts may have become loosened. Check that all nuts are tightened as required.
- There are four knockouts located on the right and left side of the enclosure. It is recommended that the electrical power and gas piping are run into the enclosure here.
- When unit is to be mounted on an outdoor curb, there must be a gasket between the top of the curb and the base surface of the unit to prevent moisture from leaking into the building from either driving rains or melting snow.
- The GTS outdoor enclosure is designed for handling by two methods. In both cases it is lifted from the bottom base in a fashion that holds it level, and keeps it from tipping, falling, or twisting. If the unit is severely twisted during handling, permanent damage may occur. It is the installer's responsibility to verify the handling equipment's ability is adequate to safely handle the unit.
- The preferred method of lifting is by forklift. This is only possible if forks extend across the entire unit. Forks that do not extend across the entire unit could cause tipping resulting in unsafe conditions or damage to the unit.
- The alternative method of handling is through the unit's channel base frame and/or special lifting lug hooks installed on the unit. All lifting operations must be accomplished with a load spreader of sufficient width to ensure that the lifting cables clear the side of the unit. If this type of spreader is not available, wood strips should be inserted between the cables and unit where necessary. All lifting points must be used and will be marked "lift here" on the unit.
- Inside the burner section of the enclosure is a pipe chase. It is recommended that the supply water and drain piping be run down through the pipe chase and into the building.
- When pad mounted or when the pipe chase cannot be used, the supply water and drain piping can be run through the knockouts, although preferably on the opposite side from the gas and electric.
- Sealed combustion air is piped directly from the outside of the enclosure to the burner, so no conditioned air will be removed from the space below. This is factory piped and no assembly is required. Check tightness of pipe clamps.
- Refer to the main installation section of this manual for directions on installation of electrical, gas, flue, and water connections. A separate electrical service connection for the outdoor GTS is recommended
- When ordered with the optional heater package, two thermostat-controlled heaters are provided: one strip heater is located in the control cabinet section, and one strip heater is located in the burner section to keep the enclosure at a constant minimum temperature.
- An emergency drain is provided. In case of any water leak, water will drain onto the roof through this emergency drain.
- External flue piping shall be provided by others and field installed. The flue of the outdoor enclosure exits out the left side of the unit and a vertical stack must be constructed. The stack must be a minimum 5' above horizontal run from the enclosure. A UL/CUL (or equivalent) listed cap must be used and a drip tee included.

MOUNTING THE HUMIDIFIER

Right side view - outdoor enclosure



Top view - outdoor enclosure

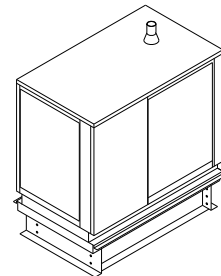


- Curbs (optional) shall be knocked down for ease of transporting them to the roof. Curbs shall be manufactured of 16 gauge galvanized steel with all the hardware for bolt-together assembly. All holes shall be matched before leaving the factory. Curb is to be a minimum of 14" high. A 2" by 1/2" closed cell curb gasket with adhesive on one side is to be supplied with hardware. Installation drawing shall be included with the hardware.

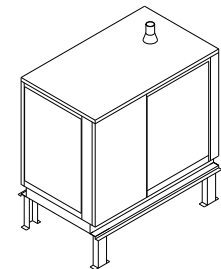
- Stands (optional): four symmetrical shaped stand legs shall be provided with all the necessary hardware for elevating the unit 12" from the ground. The stand legs shall be designed to be securely mounted to the grade by the installing contractor.

Outdoor enclosure mounting options

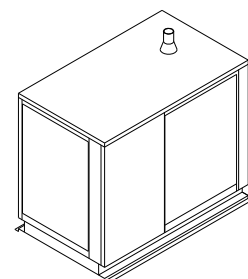
Curb



Legs



Flush



STEAM SUPPLY CONNECTION METHODS

Vapor Hose Piping

When a vapor hose and stainless steel dispersion tubes are used, they should be pitched back to the humidifier. A minimum slope of 2" per foot (with no "low spots") is recommended. When this is not possible due to duct elevation or an obstruction, alternate arrangements may be used as shown in Figures 20-3 and 20-4 at right.

Any condensate that forms in the vapor hose must be removed. Preferably, it should be returned to an open drain with a water seal of sufficient height to contain the duct static pressure, as shown in Figure 20-3.

The condensate also can be returned to the GTS, as shown in Figure 21-1 with an air vent. This method requires a water seal and an air gap to prevent back pressure from the GTS chamber. Excessive back pressures imposed on the humidifier may lead to dispersion tube(s) spitting, lost water seals, or leaking gaskets. When the distance between the humidifier and the dispersion device exceeds 10' (3 m), consult factory for special recommendations.

Figure 20-1: Steam Supply Using Vapor Hose

Vapor hose. See Table 23-1 for sizing. (Pitch back min. 2" per foot to humidifier with supports to prevent sagging.) Maximum length 10'. Humidifier must be mounted level.

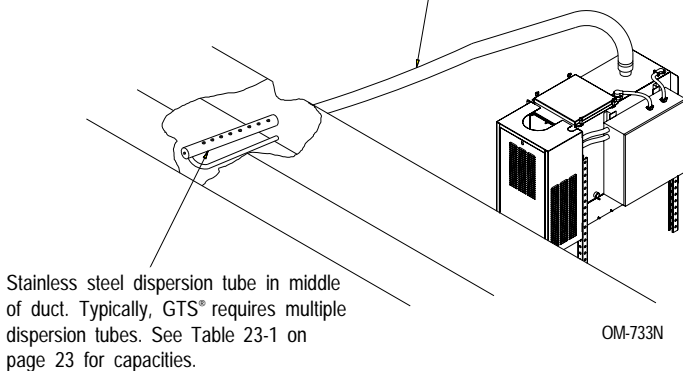


Figure 20-2: Steam Supply Using Pipe or Tubing (Flange option available)

Pipe Insulation Recommended

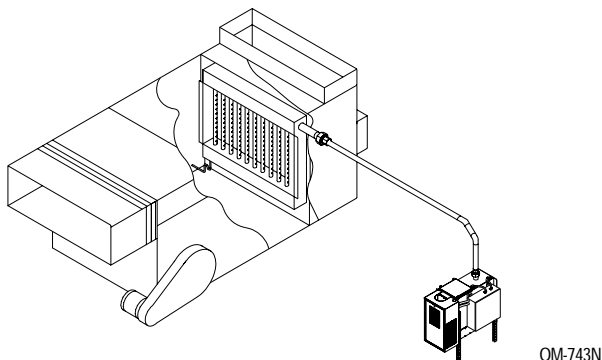
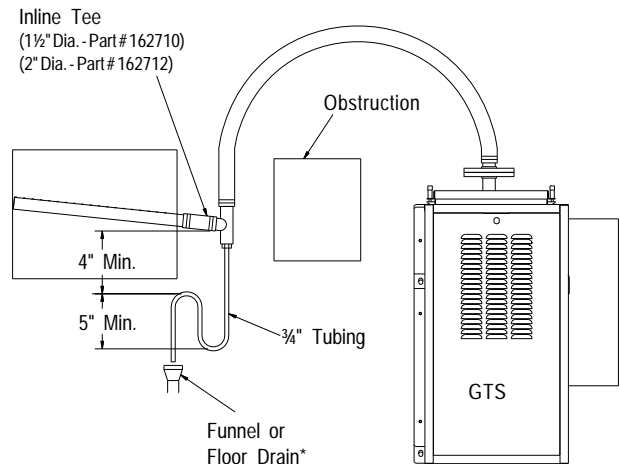


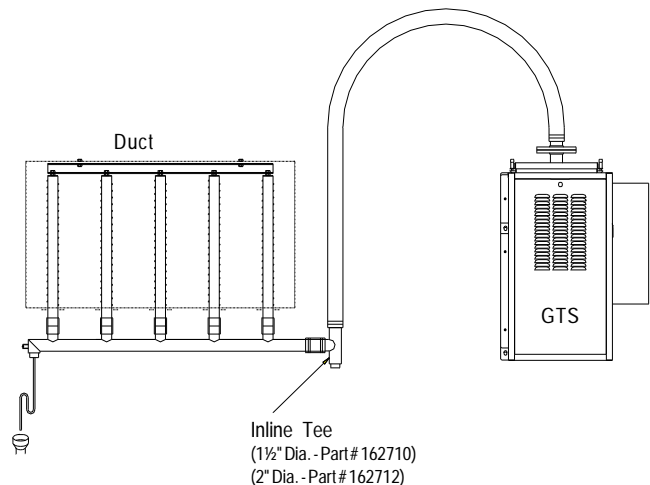
Figure 20-3: Piping method recommended when obstruction prevents dispersion tube from being continuously pitched back to humidifier



Notes:

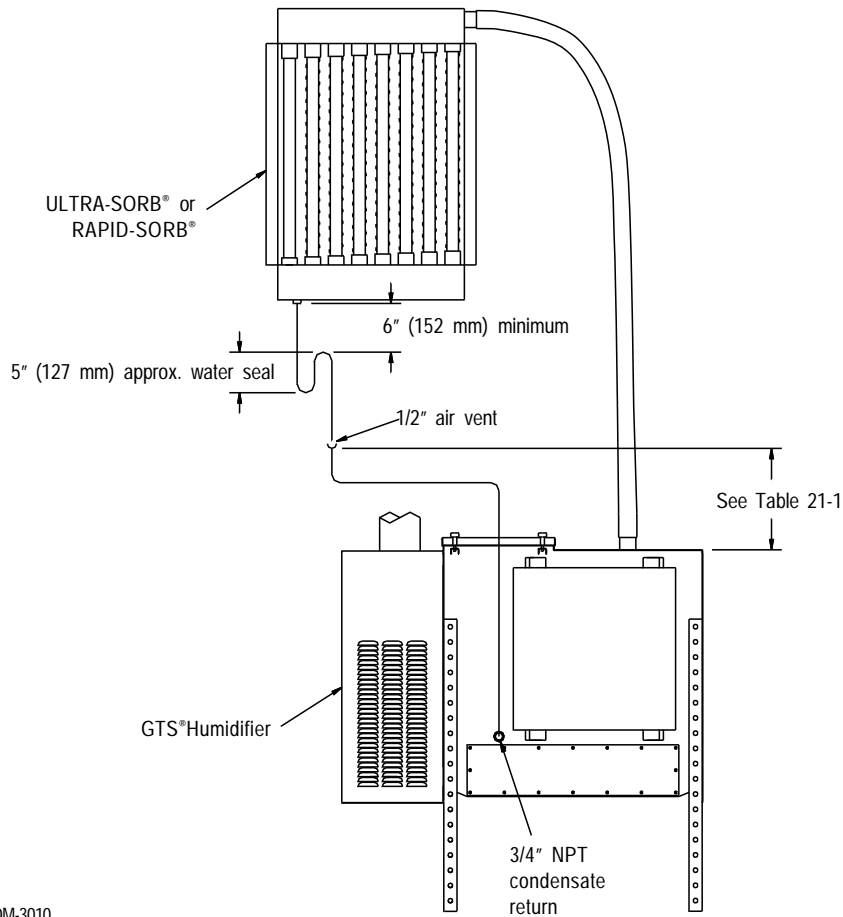
- The GTS typically requires multiple dispersion tubes.
- * Refer to local codes for drain pipe size requirements.

Figure 20-4: Piping method recommended when humidifier must be mounted higher than the duct



CONDENSATE RETURN PIPING

Figure 21-1: Condensate return to humidifier



OM-3010

Table21-1

Humidifier Model	Height required to overcome humidifier internal pressure	
	Inches	mm
GTS-100	12	305
GTS-200	12	305
GTS-300	18	457
GTS-400	18	457

RAPID-SORB® ASSEMBLY AND INSTALLATION

Horizontal Duct Installation

1. Unpack shipment and verify receipt of all RAPID-SORB® components with packing list. Report any shortages to the DRI-STEEM factory immediately.
2. Provide necessary access in and around duct work.
3. Locate 1" x 1½" stainless steel channel inside the duct. Hang the channel from the top of the duct, centered between duct side walls, with the two mounting holes provided.
4. If hose cuffs are used, slide cuffs over the open end of each tube. Install a pair of hose clamps on each tube.
5. Note direction of air flow within duct, then arrange each dispersion tube so steam will blow perpendicular to the air flow. Use the hex bolts provided to attach tubes to overhead 1" x 1½" channel. Do not secure. If the header is outside the duct punch-out necessary clearance holes in the base of the duct to slide dispersion tubes up from bottom.
6. Choose header location and refer to appropriate section

a. For a Header Inside the Duct (See figure 22-1):

1. Punch or cut out necessary clearance holes for RAPID-SORB header. Slide header into the duct, position header and slide the dispersion tube hose cuffs or slip couplings over the header dispersion tube nipples.
2. Position the header so vertical dispersion tubes are perpendicular to duct and pitch the header to condensate drain. Secure header to the mounting bracket. Use escutcheon plates to secure header where it enters the duct.

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

b. For a Header Outside the Duct (See figure 22-2):

1. Position header under dispersion tubes, then slide hose cuffs or slip couplings over header dispersion tube nipples.
2. Position the header so dispersion tubes are perpendicular to duct and pitch the header to condensate drain. Secure dispersion tubes in place with the tube escutcheon plates provided.
3. Check the position of the tubes for steam release perpendicular to the air flow. Secure tubes to the overhead channel, and secure channel to the duct. With header pitched to condensate drain, slip hose cuffs or slip couplings over tube nipples and secure.
4. Connect a condensate drain to the header, provide the water trap as shown, and run to open drain, sized according to governing codes.
5. Attach the header steam supply connector to main header using the hose cuff and clamps provided, but do not secure.
6. Route the necessary number of vapor hoses or pipes from the humidifier tank, position connector to accept the hoses or pipes and secure.

Note: Refer to page 20 for vapor hose information on routing and for alternate vapor hose installation methods.

Figure 22-1: RAPID-SORB Unit Header Inside Duct

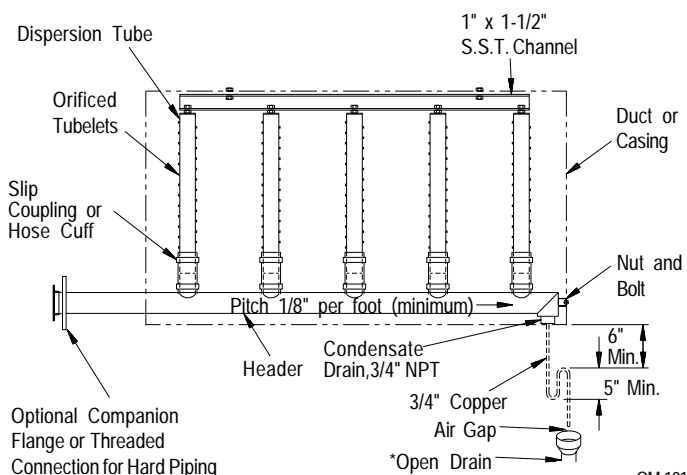
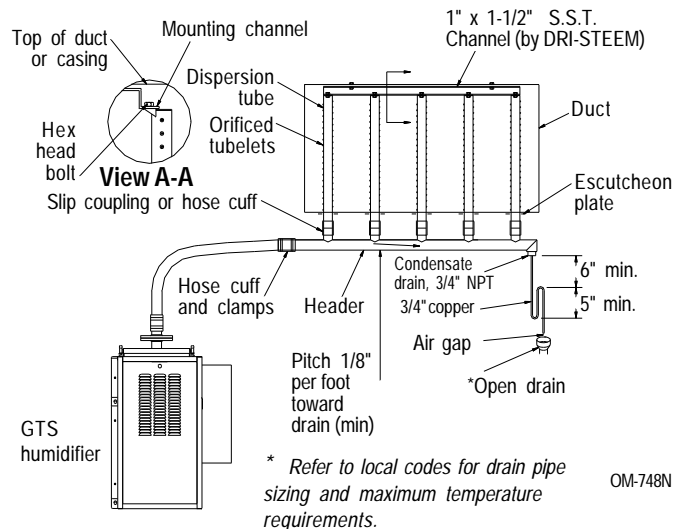


Figure 22-2: RAPID-SORB Unit Header Under Duct



* Refer to local codes for drain pipe sizing and maximum temperature requirements.

RAPID-SORB® ASSEMBLY AND INSTALLATION

Piping/Hose Sizing from the GTS® to a RAPID-SORB panel

Table 23-1: Maximum Steam Carrying Capacity*

Vapor Hose			Copper or Stainless Steel Tubing or Schedule 40 Steel Pipe		
Hose I.D.	10 Feet (**) Developed Length in Feet(**)		Tubing O.D.	20 Feet (**) Developed Length in Feet(**)	
	lbs/hr	kg/hr		lbs/hr	kg/hr
1 1/2"	150	68	1 1/2"	140	64
2"	250	113	2"	210	95
--	--	--	3"	410	186
--	--	--	4"	700	318
--	--	--	5"	1300	590
--	--	--	6"	2100	953

* Based on total pressure drop in piping/hose of 5" (12.65 mm) wc.

** For developed length add 50% to measured length for pipe fittings.

Note: To minimize loss of humidifier capacity and efficiency, the tubing/piping should be insulated.

Vertical Duct Installation

Install the RAPID-SORB with dispersion tubes and header pitched to condensate drain as shown in figures 23-2, 23-3, and 23-4. See "Instructions for Horizontal Duct" for additional information, as applicable.

Figure 23-2: Plan View

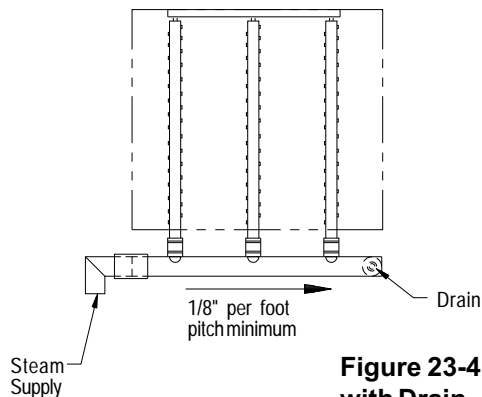


Figure 23-3: Elevation View Tube without Drain

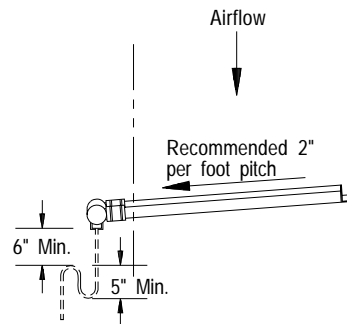
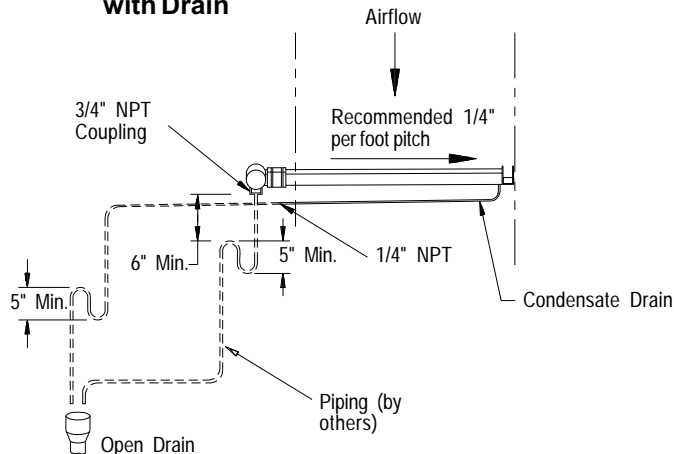


Figure 23-4: Elevation View Tube with Drain



OM-700

ULTRA-SORB® INSTALLATION

See the ULTRA-SORB Installation Instructions and Maintenance Operation Manual.

GTS® AREA-TYPE HUMIDIFIER

AREA-TYPE Humidifier Application Information

The operating characteristics of AREA-TYPE steam humidifiers should be considered when selecting humidifier capacities and choosing mounting locations.

Steam discharge from the humidifier quickly cools and turns to visible, warm, microscopic drops or particles of water (fog), which are lighter than air.

Should this fog contact any solid surface (columns, beams, ceiling, pipes, etc.) before it disappears, it may collect and drip, as water.

The greater the space relative humidity, the higher and farther the “fog” will carry and rise in the space before disappearing.

The table at right states the vertical (rise), horizontal (throw), and width (spread) dimensions that can be expected with the Area-Type humidifiers.

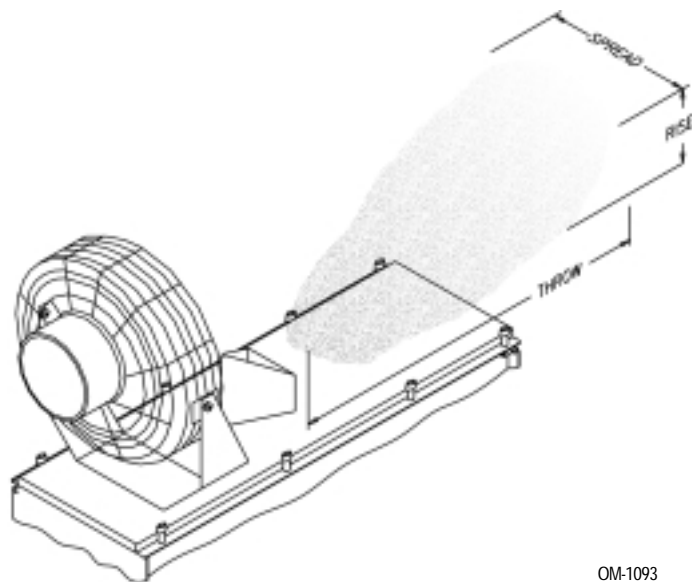
To avoid steam impingement on surrounding areas, these dimensions should be observed.

Note: The AREA-TYPE fan and brackets are shipped separately and field installed on the GTS. After mounting the fan, terminate the wires as specified on the enclosed wiring diagram.

Table 24-1 Minimum Distance for Rise, Spread and Throw

Space Temp.	Space RH		150 lbs/hr	225 lbs/hr	300 lbs/hr	75 lbs/hr
60°F	30%	Rise	6 ft.	7 ft.	9 ft.	3 ft.
		Spread	5 ft.	7 ft.	9 ft.	3 ft.
		Throw	12 ft.	13 ft.	17 ft.	8 ft.
	40%	Rise	6 ft.	8 ft.	10 ft.	3 ft.
		Spread	5 ft.	7 ft.	10 ft.	3 ft.
		Throw	12 ft.	14 ft.	18 ft.	8 ft.
	50%	Rise	6 ft.	8 ft.	10 ft.	3 ft.
		Spread	5 ft.	7 ft.	10 ft.	4 ft.
		Throw	12 ft.	14 ft.	18 ft.	8 ft.
70°F	30%	Rise	4 ft.	5 ft.	7 ft.	2 ft.
		Spread	4 ft.	5 ft.	7 ft.	2 ft.
		Throw	10 ft.	11 ft.	14 ft.	6 ft.
	40%	Rise	4 ft.	5 ft.	7 ft.	2 ft.
		Spread	4 ft.	5 ft.	7 ft.	2.5 ft.
		Throw	11 ft.	12 ft.	15 ft.	6 ft.
	50%	Rise	4 ft.	5 ft.	7 ft.	2 ft.
		Spread	4 ft.	5 ft.	7 ft.	2.5 ft.
		Throw	11 ft.	12 ft.	16 ft.	6 ft.

Figure 24-1 AREA-TYPE Fan



OM-1093

Fan Specifications

Motor 120V, 50/60 Hz (18", 45.7 cm)

Blade diameter 18" (45.7 cm)

Speeds 3

Control Rotary Switch

Speed	High	Medium	Low
CFM	5350	4180	3010
M ³ /s	2.52	1.97	1.42
RPM	1600	1275	950
Amps	1.65	1.27	.95
Watts	194	148	110
dB A	67	58	49

START-UP AND OPERATION

Introduction

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

Start-up and Checkout Procedures

Mounting

Check mounting to see that unit is level and securely supported before filling with water.

Piping (Gas)

Verify that all field and humidifier gas piping has been tested for leaks. (Soap and water are not recommended near gas valves.)

Piping (Steam, Drain, Water Supply)

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 local codes and the enclosed GTS® wiring diagram.

Controls

Before proceeding with the start-up and operation, verify that all control wiring has been completed as specified and required for correct and safe operation of the GTS Humidifier.

For your particular control system, refer to the manual that was enclosed with the product shipment.

Also see the separate Installation Instructions and Maintenance Operations Manual for the Controls for the GTS and GTS-DI Gas-to-Steam Humidifiers.

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

Safety Systems

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

- The negative pressure gas valves used on the GTS are designed to keep a constant ratio of air and gas throughout the operating range of the blower. If the flue becomes blocked or the blower fails to run, the gas valve will not pass any gas to the burner and will shut down the humidifier.
- During operation, the water level in the tank is monitored by a probe system for standard water units and a low water float for DI/RO units. These water monitors tie into the microprocessor in the control cabinet. If the water level ever drops below a safe point, the humidifier is shut down.
- In standard water applications, the water level in the tank is also monitored by a redundant low water system that runs independently of the microprocessor. This system is tied directly into the power source for the burners. If this system detects a low water condition, the humidifier is shut down.
- In addition to monitoring the water level, there is a temperature sensor located near the top of the heat exchanger. If the water level drops too low and both the main and redundant low water sensors fail to detect it, the temperature sensor will shut the humidifier down before an unsafe condition occurs.
- For standard water systems, an additional low water safety system exists. The microprocessor keeps track of approximately how much water has left the tank in the form of steam. If this total amount exceeds a preset limit without the fill valve being energized, a low water condition is assumed and the humidifier is shut down. Each time the fill valve is energized, the total amount is reset to zero. (This system is not implemented on a DI/RO humidifier because the float valve is not of the electric-solenoid type. On a DI/RO tank, a mechanical fill valve maintains the proper water level. This fill valve runs independently of the microprocessor. Therefore, there is no way to reset the steam total to zero as the tank fills.)
- First, when there is a call for humidity, all of the combustion blowers must start. Each combustion blower sends a signal to the microprocessor relaying its current speed. If this actual speed is different from the demand speed, the GTS will not operate.

MAINTENANCE

For high performance, and to minimize possible equipment failure, it is essential that periodic maintenance and inspections be performed on this appliance.

GTS® Standard Model Only

Using softened water will significantly reduce mineral buildup in the humidifier. When softened water is not available, the GTS is designed to deal with water hardness in one of two ways depending on the degree of hardness. For light to moderate hardness (up to 10 grains per gallon), using the surface water skim time feature with annual cleaning is recommended. For high mineral content water (above 10 grains per gallon), a periodic drain and flush through the motorized drain valve, in addition to the surface water skim time feature, is recommended. The frequency of cleaning will depend on water condition and evaporation load.

The humidifier and piping should be inspected for water and gas leaks at least annually, all safety devices in the control circuit should be cycled on and off to verify that they are functioning.

CAUTION: When performing maintenance on the GTS, always place main electrical power disconnect switch in the off position and close manual water and gas valves.

Seasonally or as Required

Cleaning Evaporating Chamber - Remove the cleanout plate and dispose of any loose scale that has collected in the bottom of the tank. This should be done before the buildup reaches the underside of the heat exchanger.

Cleaning Water Level Probes - Disconnect the plug and cable assembly and unscrew the probe holder from the GTS unit. The scale will easily flake off from the sensing portion. The sensing portion (bottom 3/8") of the probe should be brushed clean with stainless steel wool.

Cleaning Low Water Cut-Out Probe

Remove the humidifier cover and inspect the probe rod for mineral accumulation. The rod comes from the top of the tank near the back. The probe should be brushed clean with stainless steel wool.

Cleaning Skim Overflow Fitting - Loosen deposits with a long tool, such as a screwdriver. Proper skimmer drainage should be verified by a weekly visual inspection. Water should drain from skimmer drain pipe after each fill cycle. (For cleaning piping, disconnect and flush out. If mineral deposits have restricted the flow, replace piping.)

Blower Motor - Lubrication port is not provided, therefore lubrication is not recommended.

Remove Dust - Using a vacuum, remove all dust from the areas around the motor and vent fan (s) and the louvers that provide air to the shrouded area.

Off-season Maintenance

After the humidification season, a complete inspection and cleaning of the probe control, skimmer, and water chamber is recommended. After cleaning, the unit should remain empty until humidification is required.

Adjusting the Surface Skim Bleed-Off Quantity

The skim time determines the quantity of water skimmed with each fill cycle. The skim time is field adjustable using the microprocessor.

Each time the GTS refills, it fills to an elevation near the lip of the skim overflow fitting. A portion of the refill water then flows to drain carrying the minerals floating on the water with it. This reduces the mineral concentration, thereby reducing the frequency of cleaning needed.

The heated water that flows to drain is a cost of operation. Cleaning the humidifier is also an operational cost. Therefore, it is recommended that the user observe and adjust the skimming quantity. By doing so, a balance between minimizing mineral buildup and conserving hot water can be achieved.

GTS-DI Model Only

The humidifier and piping should be inspected for water and gas leaks at least annually. Also, all safety devices in the control cabinet should be cycled on and off to verify that they are functioning.

Makeup Water Piping

Use cold or hot makeup water. Even though the GTS has an internal 1" air gap, some local codes may require a vacuum breaker.

Caution: Minimum water supply pressure is 25 psi.

Cleaning Evaporating Chamber

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

Blower Motor - Lubrication port is not provided, therefore lubrication is not recommended.

Remove Dust - Using a vacuum, remove all dust from the areas around the motor and vent fan (s) and the louvers that provide air to the shrouded area.

Off-season Maintenance

After the humidification season, inspect floats and water chamber, drain and rinse. Empty unit.

Caution: Label all areas prior to disconnection when servicing controls, wiring errors can cause improper and dangerous operation.

MAINTENANCE

When servicing or repairing this equipment, use only DRI-STEEM approved service replacement parts. A complete replacement parts list are on pages 29 and 31. Refer to the rating plate on the unit for complete unit model number, serial number and company address. Any substitution of parts or controls not approved by DRI-STEEM will be at owner's risk and will void the warranty.

Both GTS® and GTS-DI

Inspecting the Burner Assemblies and Heat Exchanger Tubes

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

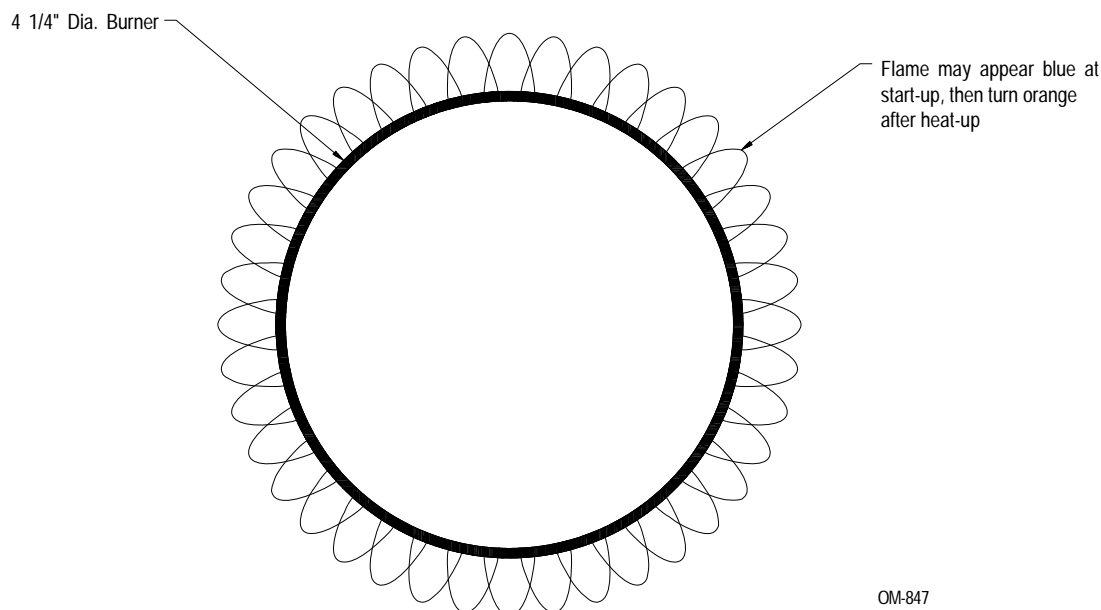
This is not regular maintenance, but if the heat exchanger tubes contain carbon deposits, soot or other residue, clean as follows:

- Turn off gas, electrical power, and water supply.
 - Remove gas train shroud.
 - Disconnect wiring to blowers, flame sensors, gas valves, and ignition controllers.
 - Remove burner assemblies (each assembly is mounted with four bolts).
 - Remove vent box.
 - Use a six-inch flue brush with a 24" extension and reversible drill. Work brush in and out of all combustion chambers.
 - Remove loose deposits and residue that falls into rear header with a vacuum cleaner and hose extension.
- Inspect 2" return tubes and clean if necessary.
 - Run thin brush between turbulator and tube wall on all four sides.
 - Reinstall burner assemblies and gaskets; vent box and gasket; all electrical wiring; gas train shroud; and pressure switch connections.

2. **Burner:** The burner surface is a self cleaning ceramic fabric which does not require maintenance. Contact DRI-STEEM regarding any burner adjustments.

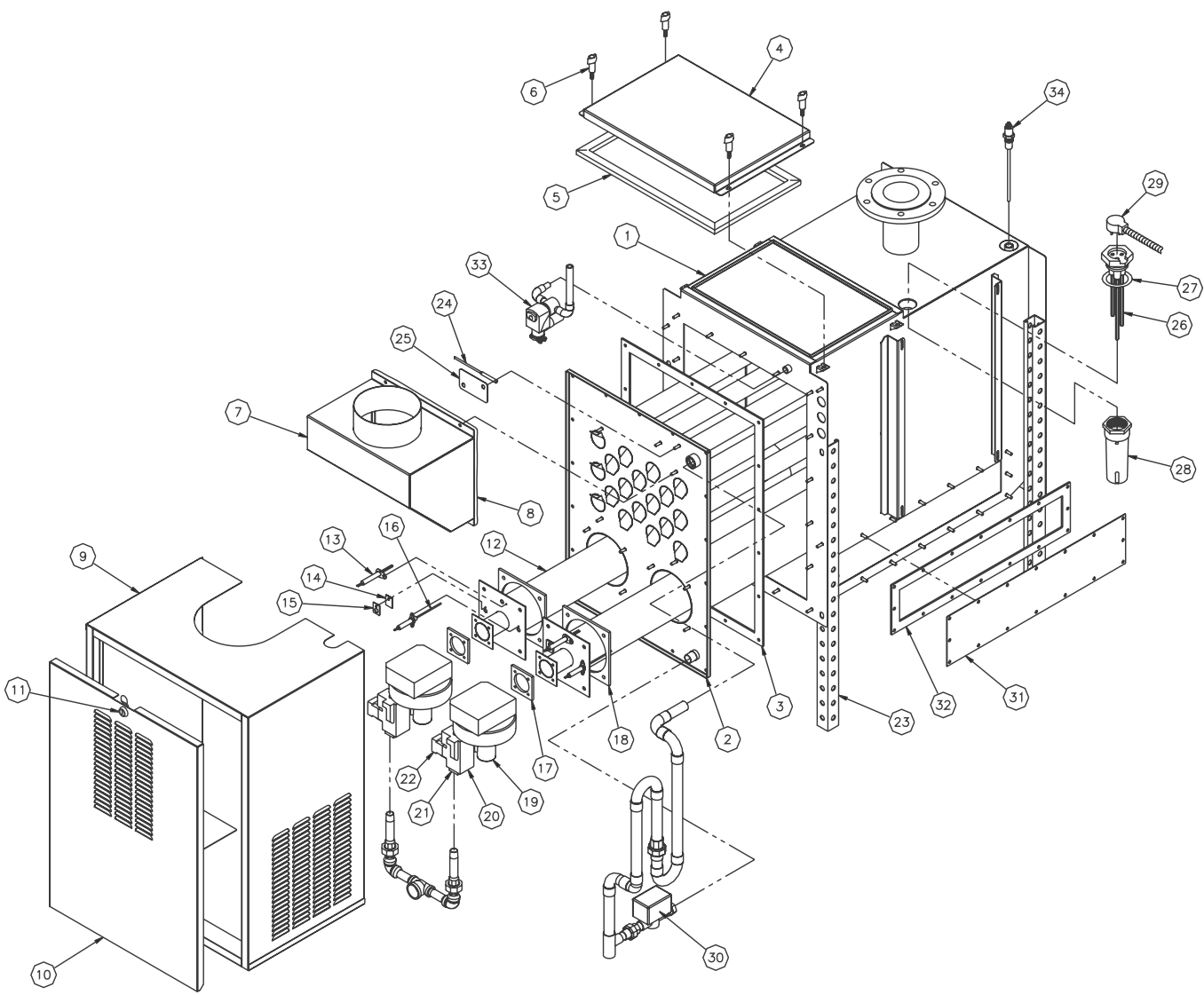
3. **INSPECTION RECOMMENDATIONS** by user every 30 days. Appliance system should be inspected once a year by a qualified service person.
 - Flue passageways external to the appliance such as vent connector and chimney to be clear and free of obstructions.
 - Vent connector is in place, sloping upward and is physically sound without holes or excessive corrosion.
 - Physical support of the appliance is sound without sagging cracks, gaps between floor stand legs or tank flanges.
 - Verify there are no obvious signs of deterioration of the appliance.
 - Burner flame will operate blue or orange in color - up to a 1/4" from the surface of the burner. See figure 27-1.
 - See "Cleaning Water Level Probes" and "Cleaning Low Water Cut-Out Probe" on page 26.

Figure 27-1: Burner Assembly Flame



REPLACEMENT PARTS

Figure 28-1: Standard GTS®



REPLACEMENT PARTS

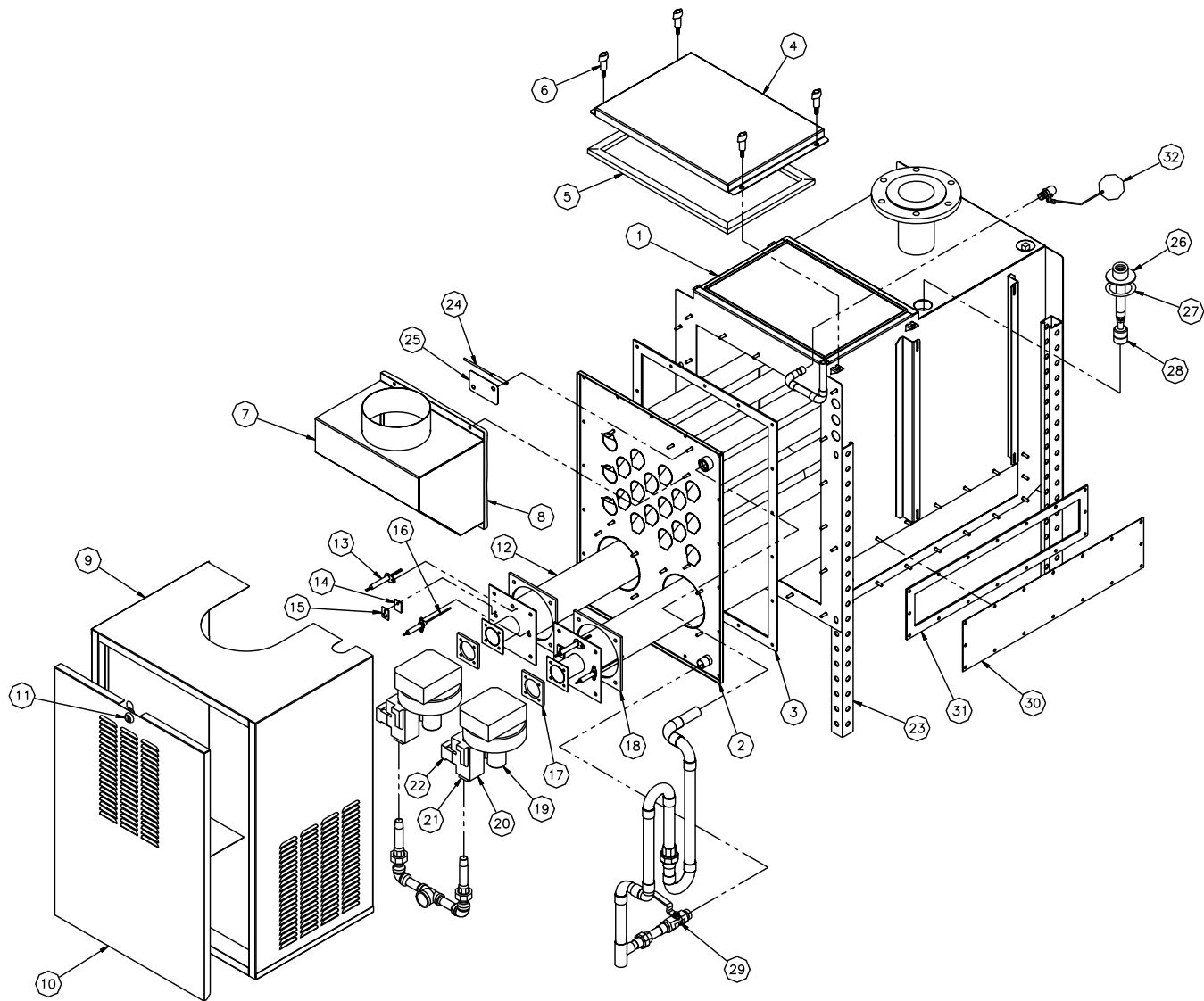
Table 29-1: GTS Replacement Parts (STD) (see Figure 28-1 on Page 28)

ITEM	DESCRIPTION	PART NUMBER
1	Tank	168000-TAB
2	Heat Exchanger	168001-TAB
3	Gasket, Heat Exchanger	308230-TAB
4	Cover	167742-TAB
5	Gasket, Cover	308230-TAB
6	Cover Knob	700725
7	Flue Box	168005-TAB
8	High Temp RTV	320001
9	Shroud	168008-TAB
10	Shroud Door	128622-TAB
11	Door Lock with Key	700700
12	200K Burner	405800-002
13	Ignitor	405715
14	Sight Glass	405720
15	Sight Glass Bracket	128661
16	Flame Rod	405725
17	Gasket, Blower Mounting	308230-007
18	Gasket, Burner Mounting	308230-006
19	Blower	405800-TAB
20	Gas Valve	405800-007
21	Flange, Gas Valve	405800-009
22	Cable, Gas Valve	405800-010
23	Leg	405800-013
24	Temperature Sensor	405760
25	Mounting Plate, Temp Sensor	167402
26	Probe Assembly	406280
27	Gasket, Probe Assembly	309750-003
28	Probe Housing	308500
29	Probe Plug Assembly	406050-004
30	Valve, Electric Drain	505400-001
31	Clean Out Plate	167401
32	Gasket, Clean Out Plate	308230-005
33	Valve, Solenoid Fill	505084
34	Redundant low water electrode	405726-001

TAB = Refer to your specific model number for correct part.
A four burner assembly is shown above.

REPLACEMENT PARTS

Figure 30-1: GTS®-DI



REPLACEMENT PARTS

Table 31-1: GTS®-DI Replacement Parts (see Figure 30-1 on Page 30)

ITEM	DESCRIPTION	PART NUMBER
1	Tank	168000-TAB
2	Heat Exchanger	168001-TAB
3	Gasket, Heat Exchanger	308230-TAB
4	Cover	167742-TAB
5	Gasket, Cover	308230-TAB
6	Cover Knob	700725
7	Flue Box	168005-TAB
8	High Temp RTV	320001
9	Shroud	168008-TAB
10	Shroud Door	128622-TAB
11	Door Lock with Key	700700
12	200K Burner	405800-002
13	Ignitor	405715
14	Sight Glass	405720
15	Sight Glass Bracket	128661
16	Flame Rod	405725
17	Gasket, Blowing Mounting	308230-007
18	Gasket, Burner Mounting	308230-006
19	Blower/Gas Valve Assembly	405800-TAB
20	Leg	405800-013
21	Temperature Sensor	405760
22	Mounting Plate, Temp Sensor	128666
23	Low Water Float Switch	167789
24	Gasket, Low Water Float Switch	309750-003
25	Valve, Manual Drain	505000-001
26	Clean Out Plate	167401
27	Gasket, Clean Out Plate	308230-005
28	Float Valve	505320

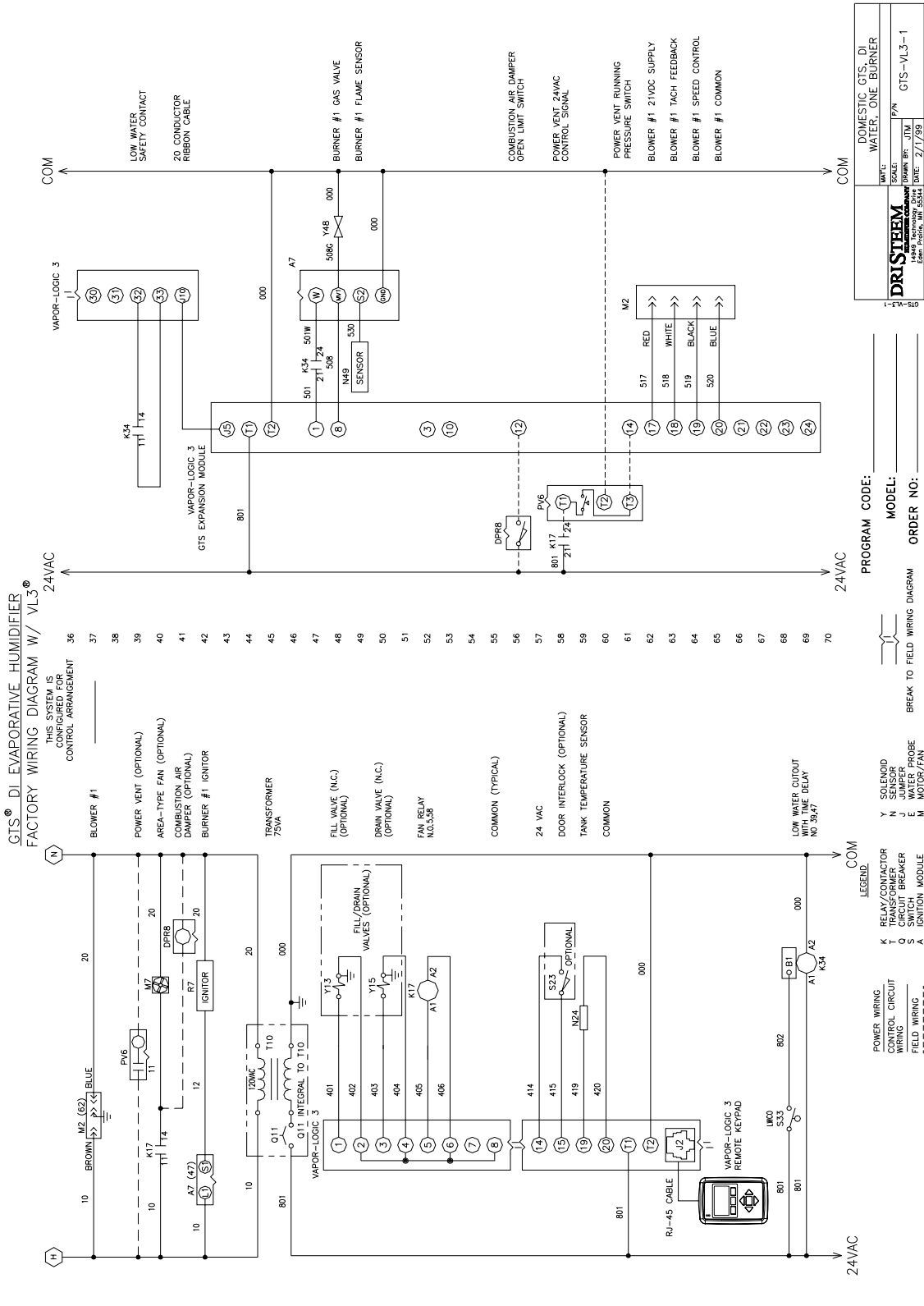
TAB = Refer to your specific model number for correct part.

CONFIDENTIAL



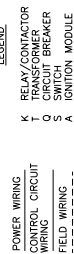
WIRING DIAGRAM

CONFIDENTIAL



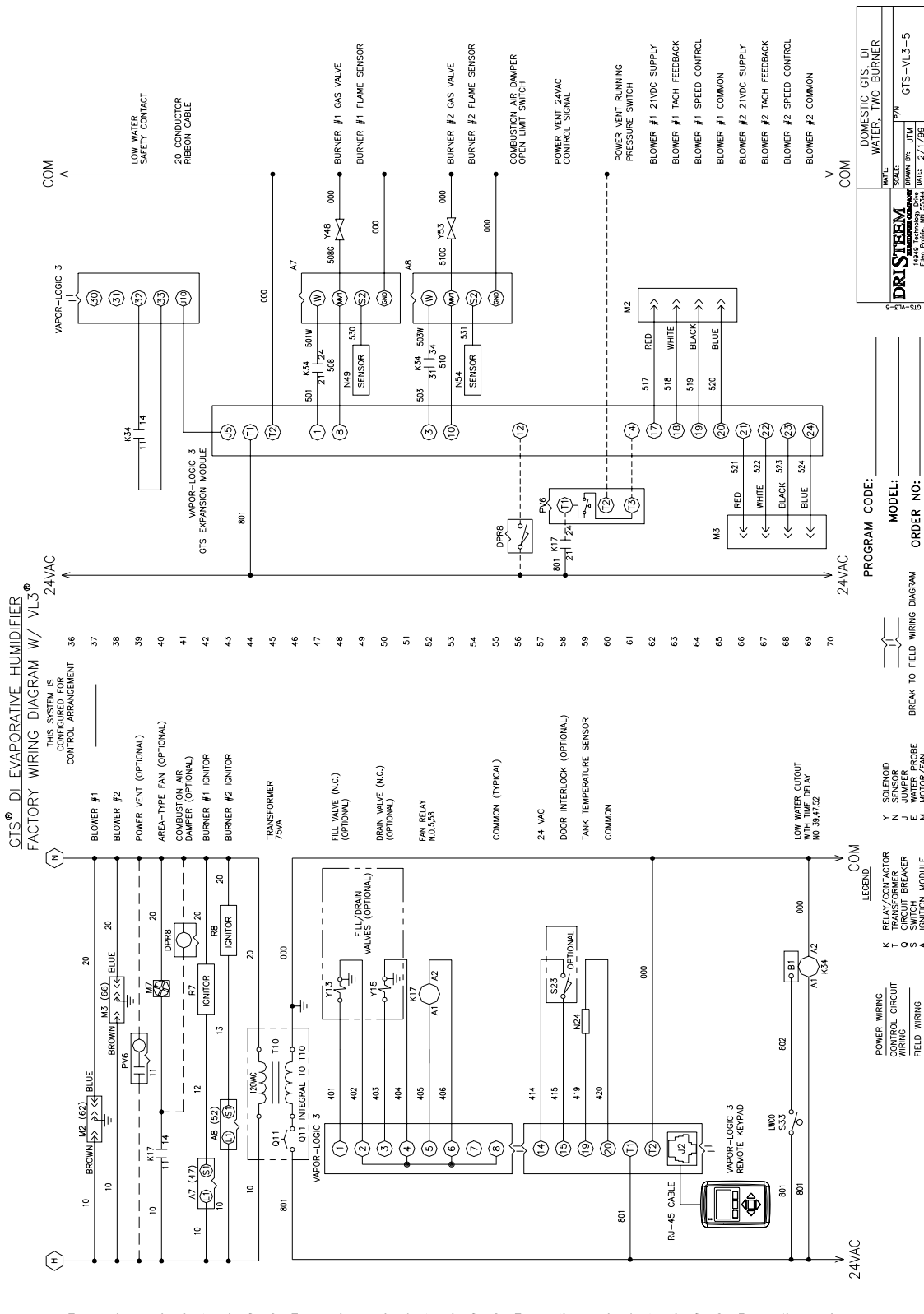
34

GTS® EVAPORATIVE HUMIDIFIER
FACTORY WIRING DIAGRAM W/ VL3®



WIRING DIAGRAM

CONFIDENTIAL



FOR YOUR SAFETY READ BEFORE OPERATING



If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do **not** try to light the burner by hand.

B. **BEFORE OPERATING** smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

FOR YOUR SAFETY “WHAT TO DO 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.

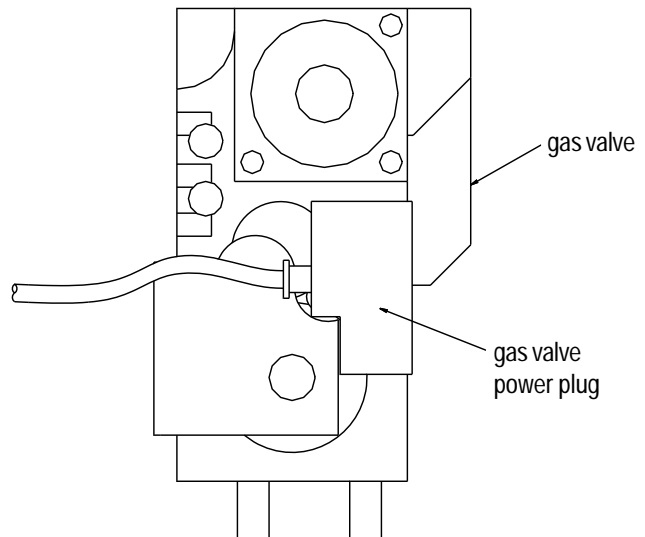
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.

- 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.

OPERATING INSTRUCTIONS

1. **STOP!** Read the safety information above on this label.
2. Set the humidistat to lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device that automatically lights the burner. Do not try to light the burner by hand.
5. Remove control access panel.
6. Unplug the black power plug on the gas valve.
7. Wait five (5) minutes to clear out any gas. If you then smell gas, **STOP!** Follow “B” in the safety information above on this label. If you don't smell gas, go to the next step.
8. Plug the black power plug back into the gas valve.
9. Replace control access panel.
10. Turn on all electric power to the appliance.
11. Set humidistat to desired setting.
12. If the appliance will not operate, follow the instructions “To Turn Off Gas To Appliance” and call your service technician or gas supplier.



TO TURN OFF GAS TO APPLIANCE

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

MAINTENANCE SERVICE RECORD

DATE INSPECTED	PERSONNEL	OBSERVATION	ACTION PERFORMED

NOTES

NOTES

TWO-YEAR LIMITED WARRANTY

DRI-STEEM Humidifier Company ("DRI-STEEM") warrants to the original user that its products will be free from defects in materials and workmanship for a period of two (2) years after installation or twenty-seven (27) months from the date DRI-STEEM ships such product, whichever date is the earlier.

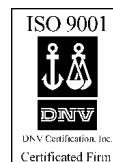
If any DRI-STEEM product is found to be defective in material or workmanship during the applicable warranty period, DRI-STEEM's entire liability, and the purchaser's sole and exclusive remedy, shall be the repair or replacement of the defective product, or the refund of the purchase price, at DRI-STEEM's election. DRI-STEEM shall not be liable for any costs or expenses, whether direct or indirect, associated with the installation, removal or reinstallation of any defective product.

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

DRI-STEEM's limited warranty is made in lieu of, and DRI-STEEM 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 DRI-STEEM has notice of the possibility of such damages.

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



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Printed on recycled paper. Minimum
10% Post Consumer Waste.

Continuous product improvement is a policy of DRI-STEEM Humidifier Company therefore, product features and specifications are subject to change without notice.

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