

Installation, User & Maintenance Guide



IMPORTANT: Read and save this guide for future reference. This guide to be left with equipment owner.

FOR YOUR SAFETY:

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 telephone in your building.

Immediately call your gas supplier from a neighbor's telephone.

Follow the gas supplier's instructions. If you can not reach your gas supplier, call the fire department.

UNIT OPERATING RANGES:

Max. Ambient Temperature 104°F (40°C).

Min. Ambient Temperature 41°F (5°C).

Max. Relative Humidity (RH) non-condensing 95% RH.

Min. Relative Humidity (RH) non-condensing 5% RH.

WARNING:

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this manual. For assistance or additional information consult a qualified installer, service agency, or the gas supplier.

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.

IMPORTANT:

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GENERAL

This installation guide has been designed to provide assistance when installing, mounting, and commissioning a GS Series humidifier. Actual on site application may vary. Consult Technical Services or your local NORTEC representative.

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.
- Should overheating occur, or the gas fail to shut off, shut off the manual gas valve to the appliance before shutting off the electrical supply.
- 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.

DELIVERY

The standard delivery includes:

- Gas Steam humidifier equipped with desired options.
- In a bag you will find:
 - Manuals.
 - Adapter fittings for water connection.
 - Steamhose for steam outlet with clamps.
 - Hose and clamps for drain connection.
- The GS Indoor Series offers an optional telescopic stand mounted inside the unit legs. Stand cross bracing are shipped with the unit.
- The GS Outdoor Series comes with all required venting to be installed on site.
- Desired accessories ordered.

RECEIVING & UNPACKING EQUIPMENT

- Check packing slip to ensure ALL material has been delivered.
- All material shortages are to be reported to NORTEC within 48 hours from receipt of goods. NORTEC assumes no responsibility for any material shortages beyond this period.
- Inspect shipping boxes for damage and note on shipping waybill accordingly.
- After unpacking, inspect equipment for damage and if damage is found, notify the shipper promptly.
- All NORTEC products are shipped on an F.O.B. factory basis. Any and all damage, breakage or loss claims are to be made directly to the shipping company.

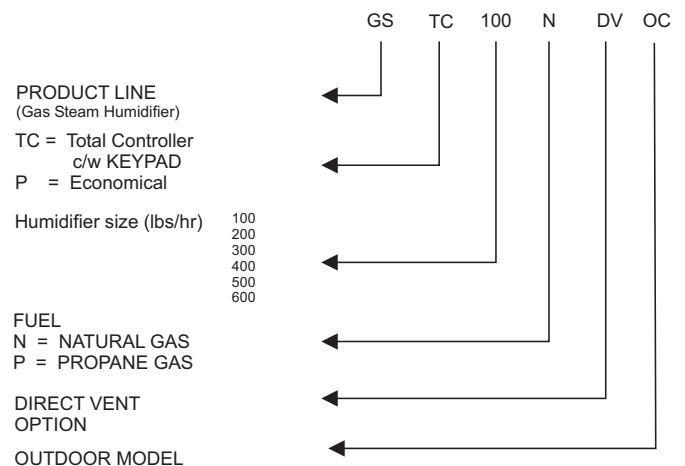
GENERAL SPECIFICATIONS

The NORTEC GS Series humidifier is a completely new patented design based on leading edge technology. The GS is designed to provide clean steam humidification at an economical price.

The GS Series humidifiers are designed exclusively for humidification in ventilation systems or direct room humidification. Any other type of application, without the written consent of Nortec or your Nortec agent, is considered as not conforming with the intended purposes. The manufacturer/supplier can not be made liable for any damages resulting from improper use.

MODEL DESIGNATION

The unit specification label indicates the model of gas humidifier according to the following chart:



MODEL SPECIFICATION

MODEL GS 100 SPECIFICATIONS				
FUEL	BLOWER SPEED	INPUT (BTUH)*	STEAM CAPACITY (LBS/HR)	MANIFOLD PRESS. IN W.C.
NATURAL GAS	MAX	140,000	105	-0.05
	MIN	45,000	25	-0.05
PROPANE	MAX	140,000	105	-0.35
	MIN	50,000	25	-0.35

MODEL GS 200 SPECIFICATIONS				
FUEL	BLOWER SPEED	INPUT (BTUH)*	STEAM CAPACITY (LBS/HR)	MANIFOLD PRESS. IN W.C.
NATURAL GAS	MAX	280,000	210	-0.05
	MIN	45,000	25	-0.05
PROPANE	MAX	280,000	210	-0.35
	MIN	50,000	25	-0.35

MODEL GS 300 SPECIFICATIONS				
FUEL	BLOWER SPEED	INPUT (BTUH)*	STEAM CAPACITY (LBS/HR)	MANIFOLD PRESS. IN W.C.
NATURAL GAS	MAX	420,000	315	-0.05
	MIN	45,000	25	-0.05
PROPANE	MAX	420,000	315	-0.35
	MIN	50,000	25	-0.35

MODEL GS 400 SPECIFICATIONS				
FUEL	BLOWER SPEED	INPUT (BTUH)*	STEAM CAPACITY (LBS/HR)	MANIFOLD PRESS. IN W.C.
NATURAL GAS	MAX	560,000	420	-0.05
	MIN	45,000	25	-0.05
PROPANE	MAX	560,000	420	-0.35
	MIN	50,000	25	-0.35

MODEL GS 500 SPECIFICATIONS				
FUEL	BLOWER SPEED	INPUT (BTUH)*	STEAM CAPACITY (LBS/HR)	MANIFOLD PRESS. IN W.C.
NATURAL GAS	MAX	700,000	525	-0.05
	MIN	45,000	25	-0.05
PROPANE	MAX	700,000	525	-0.35
	MIN	50,000	25	-0.35

MODEL GS 600 SPECIFICATIONS				
FUEL	BLOWER SPEED	INPUT (BTUH)*	STEAM CAPACITY (LBS/HR)	MANIFOLD PRESS. IN W.C.
NATURAL GAS	MAX	840,000	630	-0.05
	MIN	45,000	25	-0.05
PROPANE	MAX	840,000	630	-0.35
	MIN	50,000	25	-0.35

HIGH ALTITUDE - A derate in input exists for installations at higher altitudes. For Canadian models, an automatic 10% derate applies to installations from 2000-4500 feet. For U.S. Models, refer to the chart below for high altitude derate information.

FOR U.S. MODELS ONLY

Altitude		Derate %
Feet	Meters	
0-2000	0-610	0
2001-3000	610-915	8
3001-4000	915-1220	12
4001-4500	1220-1370	16
4501-higher	1370-higher	Contact Factory

Figure #1
Typical Installation (Indoor)

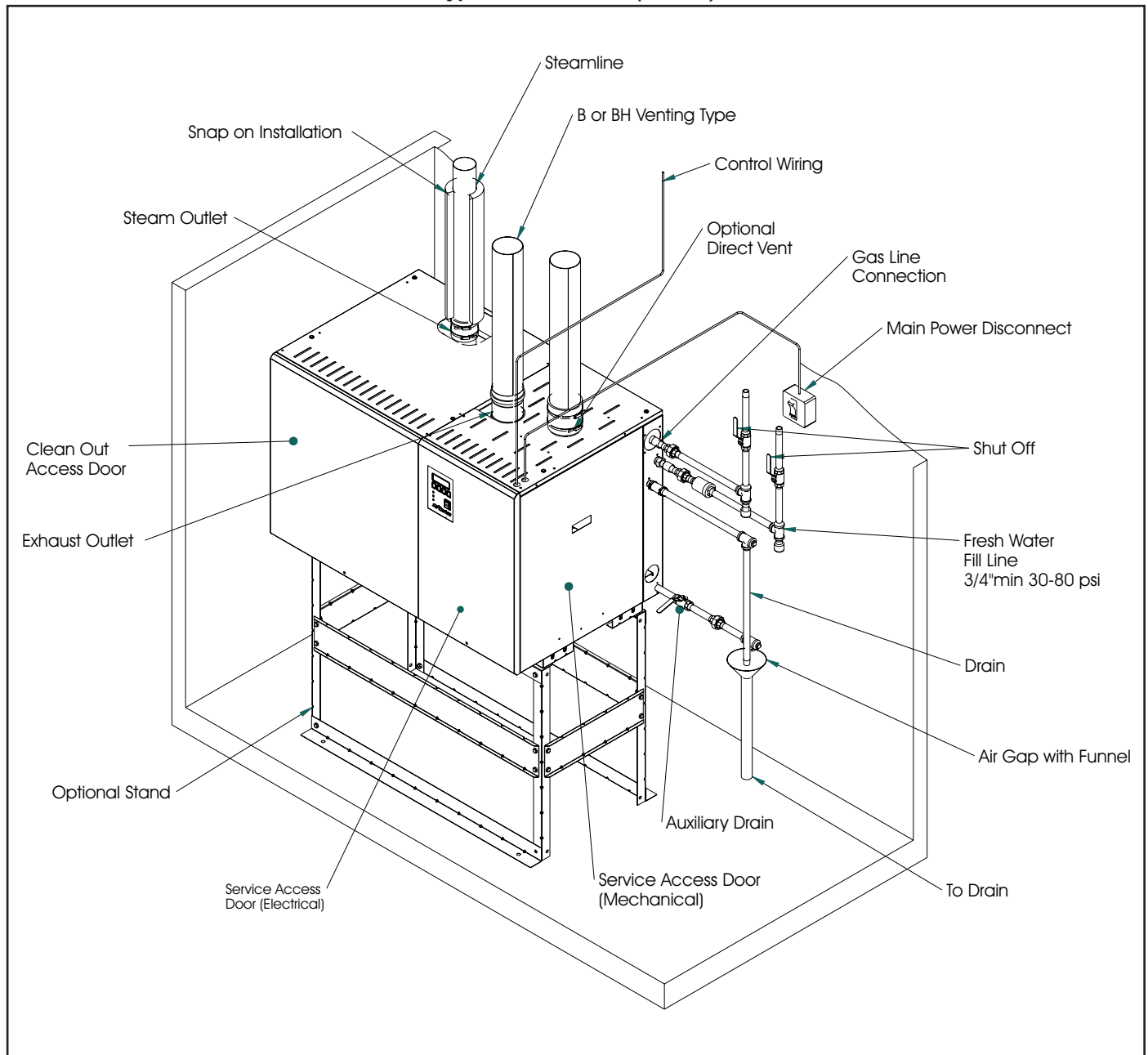
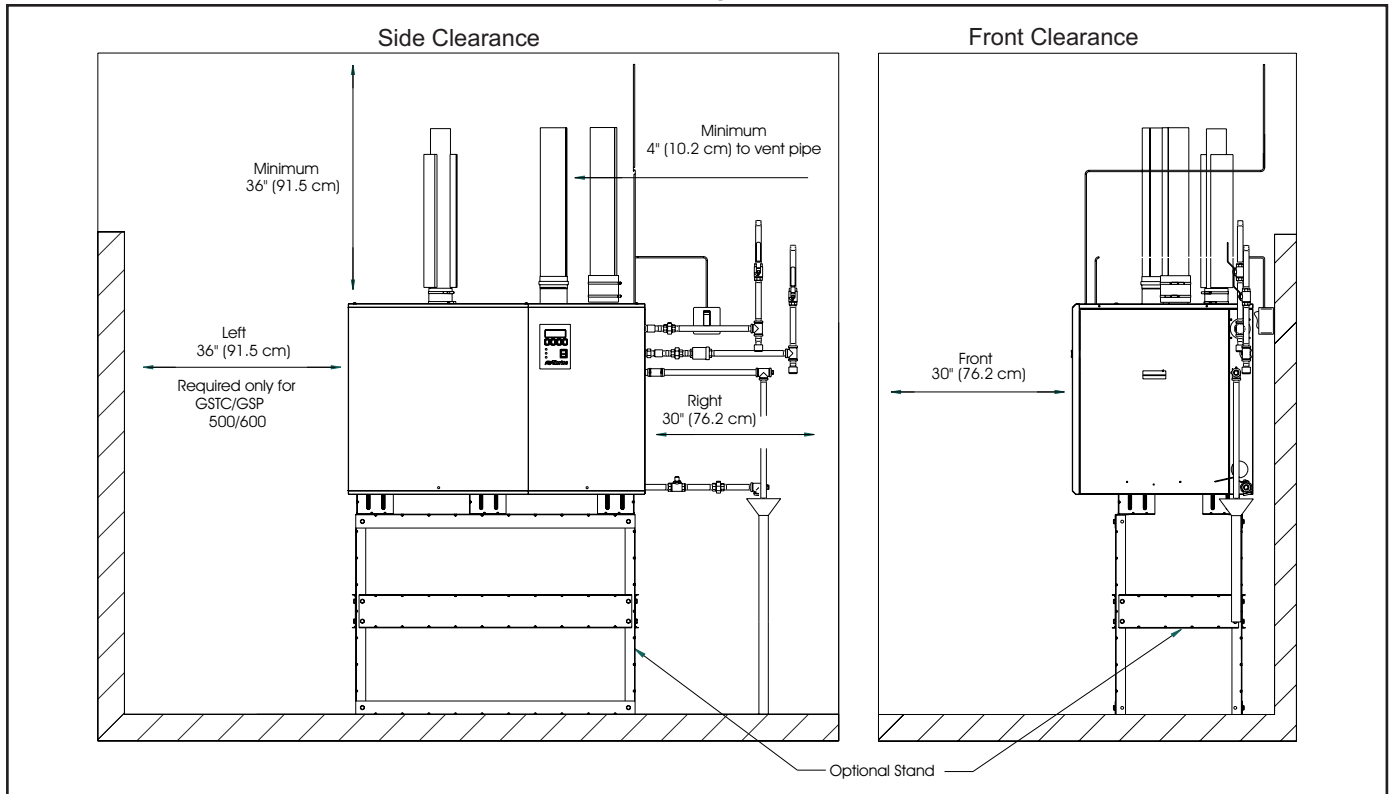


Figure #2
Clearance Requirements



INDOOR INSTALLATION

The installation must conform with local building codes or, in the absence of local codes, with the ANSI Z223.1, National Fuel Gas Code, and/or CAN/CGA B149 Installation Codes. Refer to the Gas Piping section of this manual.

LOCATING AND MOUNTING

GS Series humidifiers are designed for floor mounting or on a GS Stand (optional). The clearance dimensions shown in this manual are for reference only and are the minimum required for maintenance of the humidifier. Local and National Codes should be consulted prior to final location and installation of the humidifier. NORTEC cannot accept responsibility for installation code violations.

Figure #1 shows a typical installation with all required connections to the GS Humidifier. Careful consideration should be given to all of these connections when choosing a location for the humidifier.

WARNING: During installation cover the humidifier to prevent any dust or other contaminants from entering the cabinets when activities such as drilling are taking place.

- Ambient temperature location for humidifier: 41°F - 104°F (5°C - 40°C).
- Relative humidity location for humidifiers: 5% rh - 80% rh.
- All GS humidifiers are rated for the clearance to shown in Figure #2.
- Location of the steam distributor should be minimum of 36" above the humidifier.
- DO NOT locate humidifier any further than absolutely necessary from steam distributor location. Net output will be reduced as a result of heat loss through steam line. Also, increased static pressure (over 12" W.C.) will result in hot water going down the drain. Consult factory if this situation occurs.
- Where possible, mount humidifier at a height convenient for servicing.
- Make sure the humidifier is mounted level.
- DO NOT mount humidifier on hot surfaces.
- The humidifier must be installed so that all electrical components are protected from exposure to water.

- DO NOT mount humidifiers in an area where freezing may occur.
- If humidifiers are mounted on a roof, a properly ventilated, temperature controlled, (above freezing), weatherproof enclosure must be used.
- DO NOT mount humidifiers on vibrating surface. Consult factory.
- The humidifier shall not be installed directly on carpeting, tile or other combustible material other than wood flooring.
- Some insulating materials may be combustible. Prior to installing this appliance examine the area for insulating material. If this appliance is installed in an insulated space, it must be kept free and clear of insulating materials. If insulation is added after the appliance is installed, it will be necessary to examine the area again.

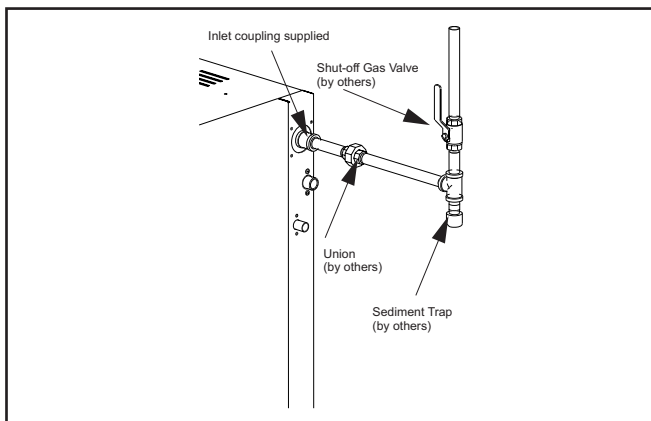
GAS PIPING

Installation of piping must be in accordance with local codes, and ANSI Z233.1, "National Fuel Gas Code," in the United States or CAN/CGA-B149 Installation Codes in Canada.

The following table indicates the maximum and minimum allowable gas pressures for the Gas Humidifier.

GAS	INCHES W.C.	
	MIN.	MAX.
Natural	4.5	9.0
Propane	9.0	13.0

Figure #3
Gas Connection



The gas inlet pipe size to the appliance is:

- 1/2" NPT for GS 100
- 3/4" NPT for GS 200
- 1" NPT for GS 300 / 400
- 1 1/4" NPT for GS 500 / 600

Provide an adequate size gas supply line.

In all installations, a certified manual shut off valve, located outside the cabinet, must be installed. When black iron gas pipe is used, a sediment trap must be located ahead of the humidifier gas controls. See Figure #3.

Leak test all gas connections external to the humidifier, using a commercial soap solution made to detect leaks. Bubbles indicate gas leakage. Seal all leaks before placing the humidifier in operation.

WARNING: Never use an open flame to check for gas leaks. If a leak does exist, a fire or explosion could occur, resulting in damage, injury or death.

The appliance must be isolated from the gas supply piping system by closing its individual manual shut-off valve during any pressure testing of the gas supply piping system at test pressures equal to or greater than 14" w.c. (3.5 kPa).

Dissipate test pressure from the gas supply line before re-opening the manual shut off valve to the appliance.

NOTES: (See pg 19 for additional Gas Piping information)

- Failure to follow this procedure may damage the gas valve. Over pressured gas valves are not covered by warranty.
- DO NOT use Teflon tape on gas line pipe threads. A flexible sealant suitable for use with Natural Gas and Propane Gas is recommended.
- Plan gas supply piping so it will not interfere with removal of gas valves or blower assemblies and front or side service doors.
- All gas piping should be adequately supported to prevent any strain on inlet piping.

The gas valve is provided with pressure taps to measure gas pressure upstream and downstream, (manifold pressure). The minimum gas pressure shown is for the purpose of input adjustment.

A 1/8" NPT plugged tapping, accessible for test gage connection, must be installed immediately

upstream of the gas supply connection to the appliance.

COMBUSTION AIR REQUIREMENTS

Provide for adequate combustion and ventilation air in accordance with Sections 8.3, Air for Combustion and Ventilation, of the National Fuel Gas Code, ANSI Z223.1, or Sections 7.2, 7.3, 7.4 of CAN/CGA B149 Installation Codes, or applicable provisions of the local building codes.

The required free area of supply air opening is:

13 in. sq. (8,387 mm ²),	for GS 100
23 in. sq. (14,839 mm ²),	for GS 200
35 in. Sq. (22,581 mm ²),	for GS 300
47 in. Sq. (30,323 mm ²),	for GS 400
59 in. Sq. (38,064 mm ²),	for GS 500
71 in. Sq. (45,806 mm ²),	for GS 600

Cabinet top and bottom contain air openings to provide combustion air to the forced draft blower. **DO NOT BLOCK THESE OPENINGS.**

Excessive exposure to contaminated combustion air will result in safety and performance related problems. Known contaminants include halogens, ammonia, and chlorides, excessive dust, lime or dirt. Excessive exposure of electronics to the contaminants will also result in performance related problems. Contact NORTEC Technical Services if you have any questions. If contaminants exist, isolate the unit from the contaminated space.

DIRECT VENT GUIDELINES

Installation of the combustion air supply line must be carried out by adequately qualified personnel. All local regulations relating to the provision of air supply systems must be observed and adhered to.

The maximum pipe length for the air supply line and exhaust is equivalent to 70' (21m). The vent pipe diameter must be maintained over the overall length of the vent.

All air piping must be listed type for direct vent application with sealed joints and seams, such as Z flex.

The air supply line should be approximately as long as the flue gas venting and must be supported at every 5 ft. (1.5 m) and additionally at every pipe bend.

The air supply line must be installed with air supply terminals provided.

At low temperatures, water condensation can form on the outside of the pipe. To prevent this, it is

recommended that the supply air line is insulated and an in line heat is added. Consult factory.

Attach the air supply line to the manifold using a hose clamp or hose coupling if required. See Figure #4.

WARNING: Air supply line should not obstruct any services going to the humidifier front and right side cabinet panels.

WARNING: BH Type venting must be used in a direct vent application.

The air intake terminal and the flue gas terminal must end at an outside location. See Figure #5.

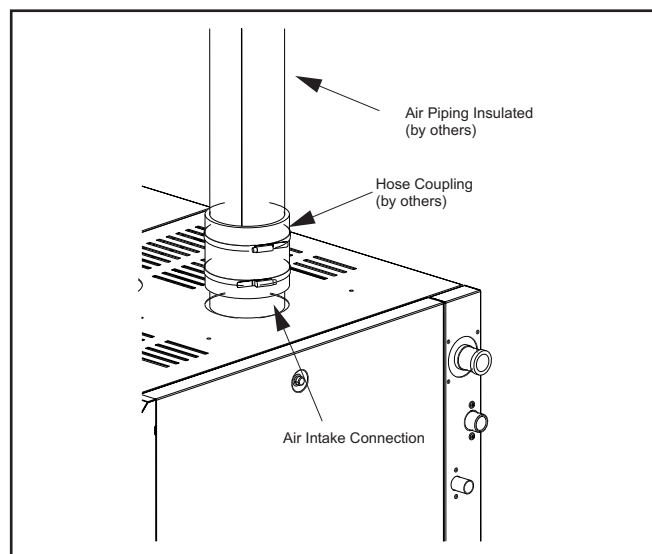
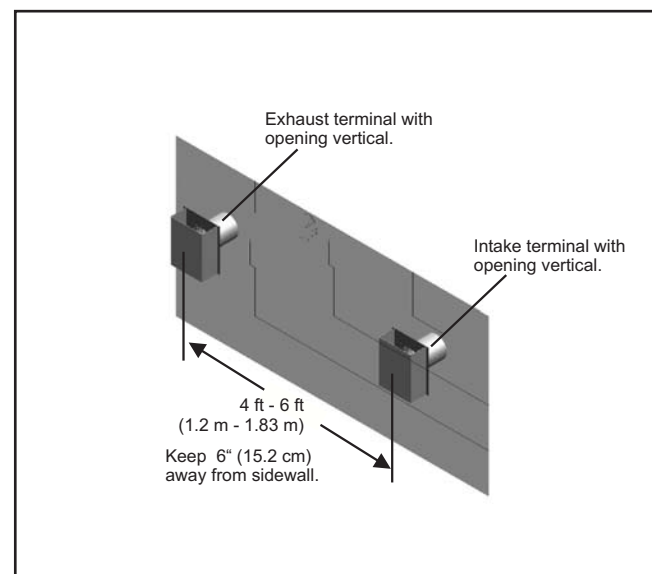


Figure #5
Direct Vent Side Wall Requirements



Location of air intake and flue gas terminal must comply with all local and national regulations.

EXHAUST VENTING

The GSTC and GSP are classed category I and III fan assisted gas appliances. This allows two methods of venting. Listed below are instructions for both venting systems, followed by specific requirements for each system.

Review the requirements for both category I and III installations and select the venting method best suited for the installation.

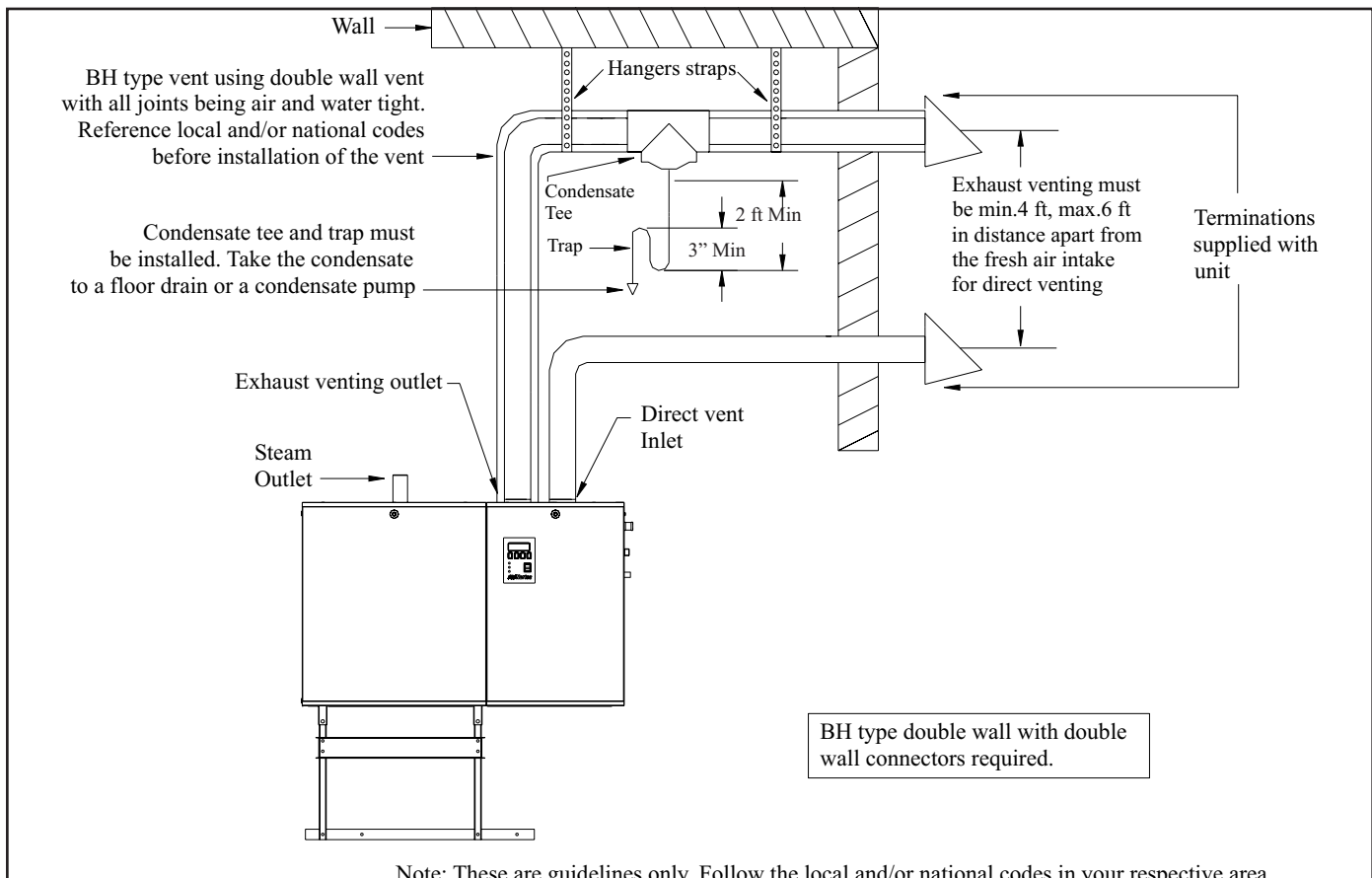
Category III class must be used in direct vent applications.

GENERAL REQUIREMENTS

- The vent systems shall be listed to UL or UL/CSA standard and meet the installation requirements of the National Fuel code in the USA (ANSI Z223.1) and the Canadian Standards CAN/CGA.B149 Installation Codes. Any local jurisdictions reflecting changes to the above codes should be observed.

- In applying the codes, reference should be given to the venting manufactures instructions, the serving gas supplier regulations, and the specific instructions provided in this manual.
- This appliance must be installed to comply with national regulations and codes. A qualified technician, competent with these codes and the local requirements of the jurisdiction must carry out the installation.
- Proper removal of combustion gases must be assured, and building materials must be protected from degradation by flue gases.
- Never mix venting types. (B to BH or visa versa.) Never use two different manufacturer's equipment for the same chimney.
- All vent runs should be as direct as possible with no more than 6 elbows in the system.
- Maintain an upward slope of $\frac{1}{4}$ " per ft on all horizontal vent pipe runs.
- This gas humidifier may not be used in conjunction with a power venter or draft inducer.

Figure #6
Horizontal Venting Using a Direct Vent Application Using BH Type Only



Note: These are guidelines only. Follow the local and/or national codes in your respective area.

Figure #7
Vertical Venting Application Using B or BH Venting

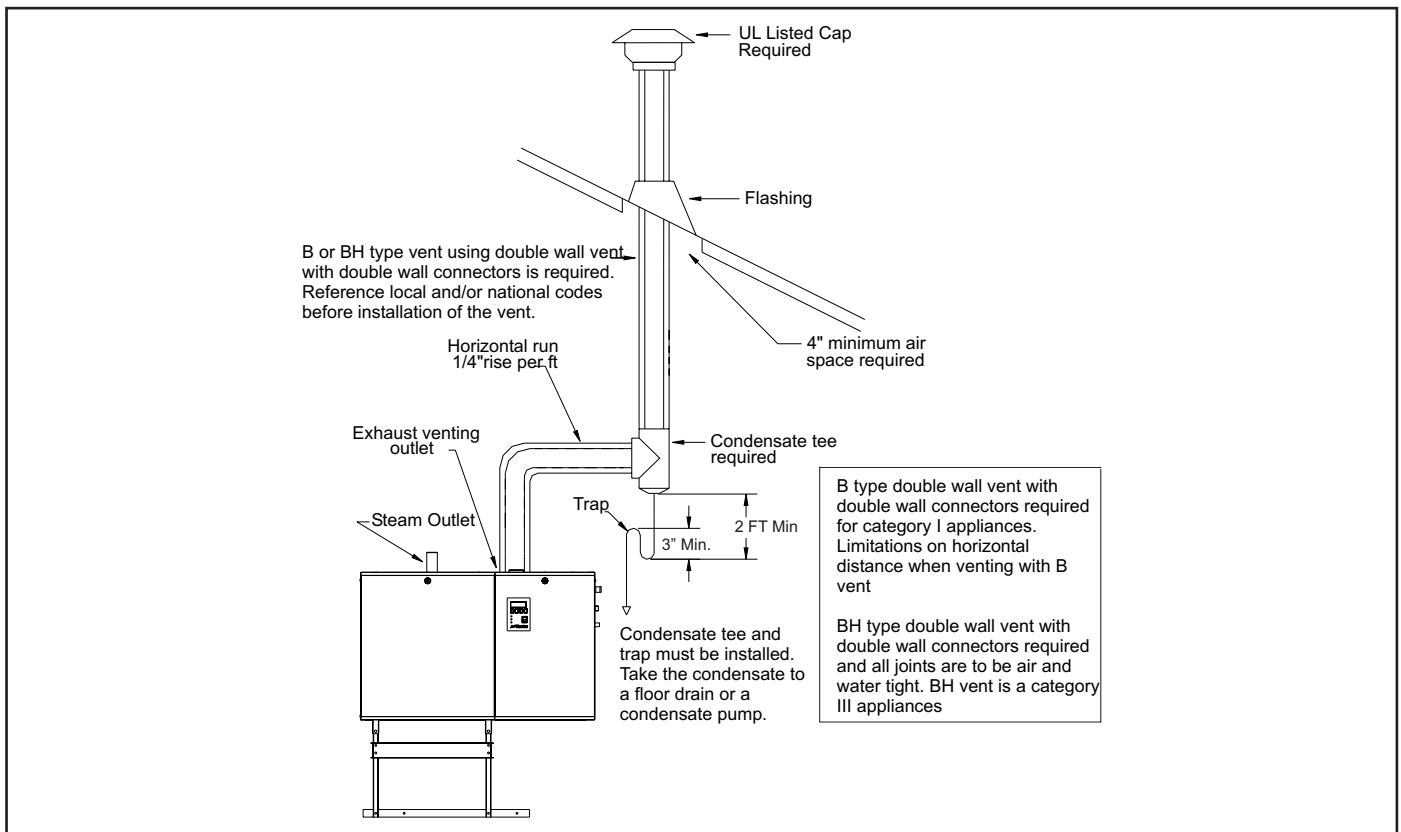


Figure # 8
Side Wall Venting Application Using BH Type Only

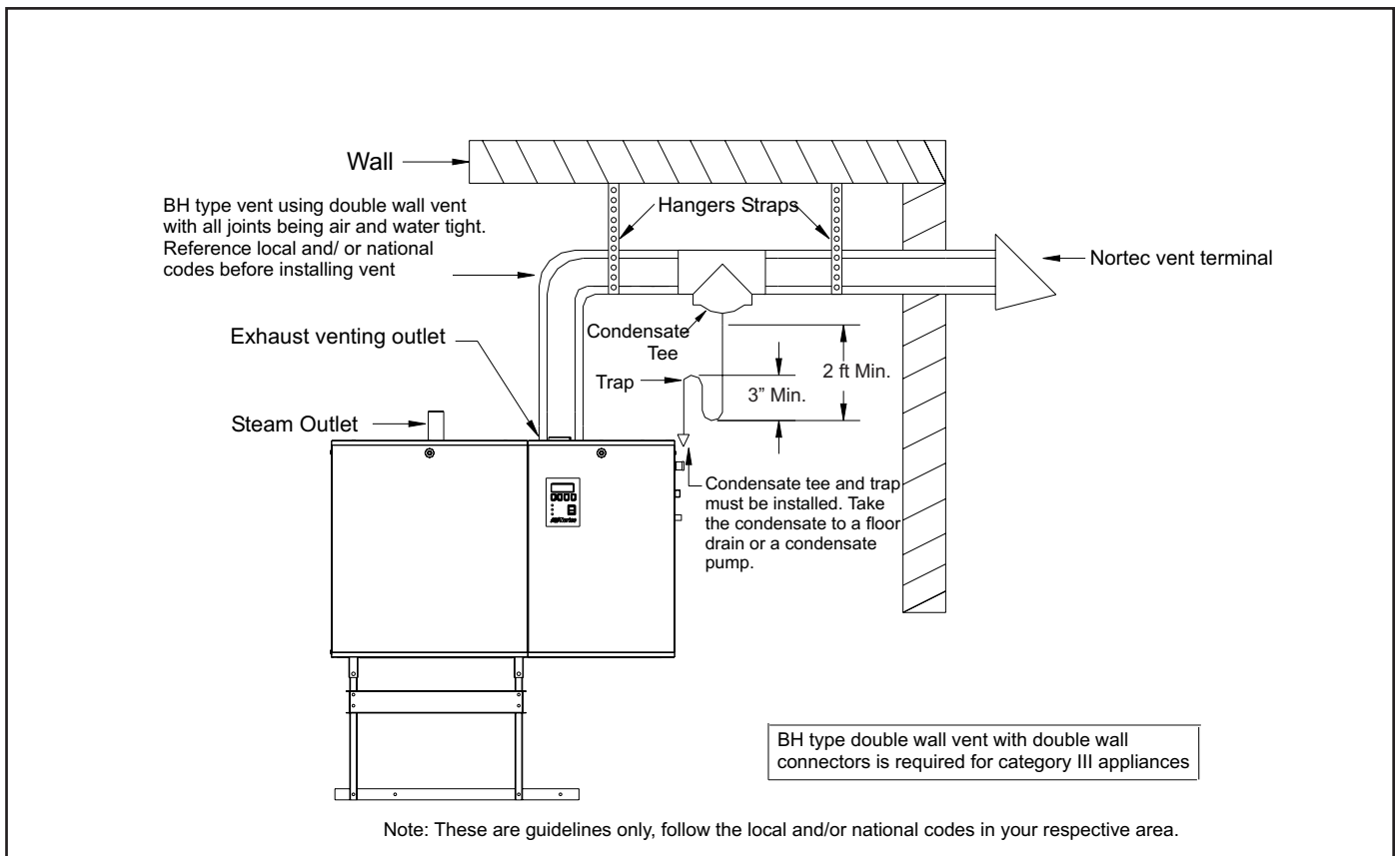
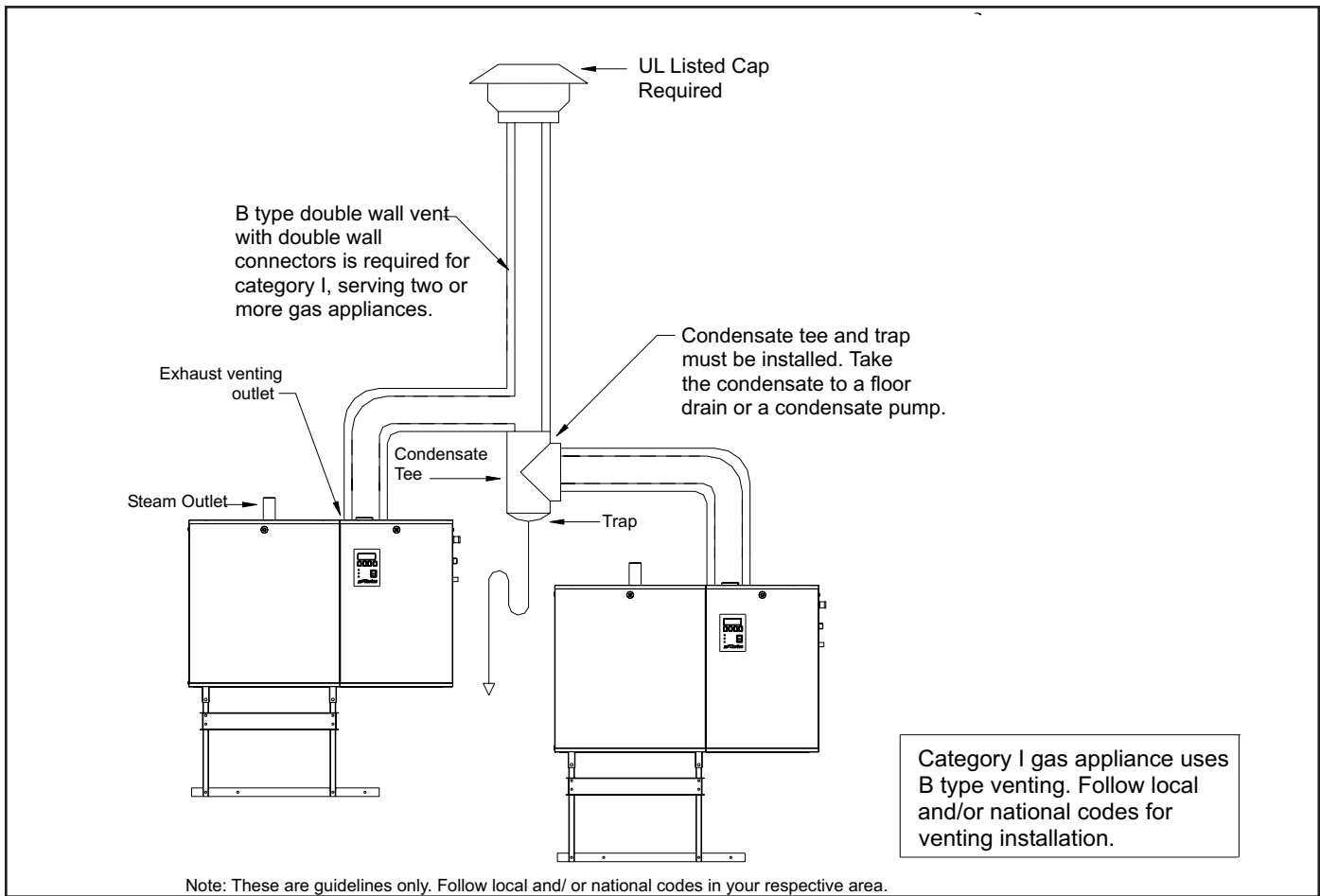


Figure # 9
Co-venting Application Using B Vent Only



- For any vent lengths over 20 feet long, insulate the vent pipe to reduce the amount of condensate that could form in the flue gases.
- When the venting passes through a cold area, or location that has large amounts of air passing over the venting, it should be insulated to prevent condensation from forming inside the venting.
- Vent pipe passing through walls, floors, and ceilings, must be installed with the proper clearances from combustible materials, and venting manufactures fire stop equipment.
- The venting shall not pass through any circulation air duct or plenum.

WARNING: Provide a screen or barrier to prevent personal injury in areas where personnel may come into contact with hot vent pipes.

- A drip "T" or flue box condensate port should be used for condensate removal. When a condensate drain is used it will be necessary to install a trap to prevent flue gases from escaping.

Install a trap with a minimum 12" standing water column.

- Prior to activating the appliance, ensure that the trap is filled with water and that the drain terminates in accordance with local plumbing codes.
- Never vent into a unlined masonry or concrete chimney.
- Chimney or vent should extend at least 3' (1 m) above a roof and at least 2' (.6 m) above any ridge within 10' (3 m) of the chimney. Local codes apply.
- Install venting so as to prevent accumulation of condensate and have a means for condensate removal.
- Plastic, PVC, CPVC and HTPV special gas vents are not approved for use with this appliance.
- The vent must terminate at a sufficient height above the roof to prevent blockage by expected snowfall.

- Vent pipe must be secured with hangers or pipe straps
- All horizontal runs must be adequately supported with hangers or straps to prevent sagging.

Installation as a Category I Appliance

- The GS series humidifiers have a fan-assisted combustion which operates with a non-positive vent static pressure when installed with the appropriate vent diameter.
- Category I appliances must be vented vertically or nearly vertical. (See Figure #7 & #9)
- This category appliance is restricted to vertical venting installations with limits placed on horizontal lengths and vent diameters. Refer to the tables in local and/or national codes. No sidewall termination is accepted.
- Vent piping must be UL or UL/CSA listed type B or B-W.

Recommended B-Venting Manufacturers

1. Simpson Dura-Vent
2. Selkirk Canada Corporation
3. American Metal Products
4. Metal-Fab Inc.

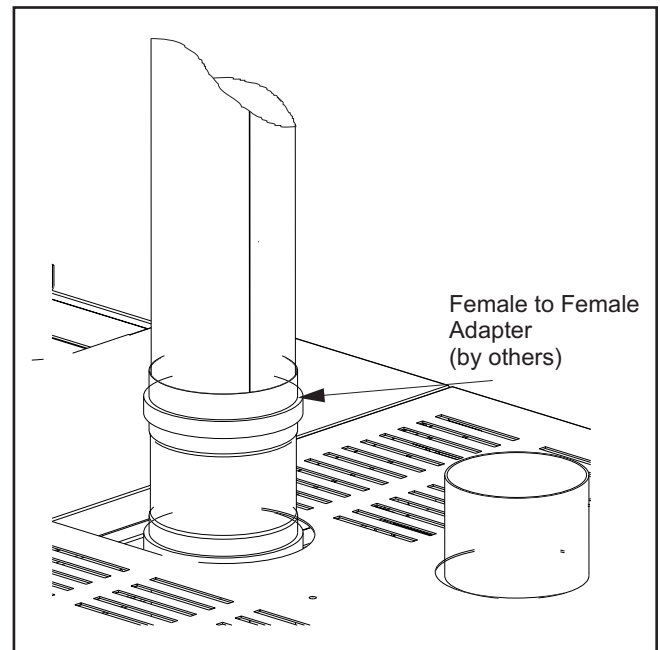
- The vent pipe exiting the humidifier is sized for Category III installations. A field supplied adapter is required to increase the pipe immediately at the exit of the humidifier. The vent pipe must be expanded to the minimum sizes listed below for each model, increasing as code requires.

GS 100	4" minimum diameter
GS 200	5"
GS 300/400	7"
GS 500/600	8"

- The termination at the humidifier is a MALE connection. Standard venting hook-ups require a female path. It is highly recommended that a female to female adapter be assembled onto the humidifier to establish the proper venting sequence. Consult with the venting manufacturer for proper hook up.

- Vent connectors shall not be connected into any portion of a mechanical draft system operating under positive pressure.
- Use only double wall (aluminum inner wall) B vent. Single wall venting can not be used due to the increased wet time in the lining. If the vent connector attaches 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 standards.
- An approved venting manufacturers termination cap for the stack outlet must be used.
- The maximum flue temperature is 400 degrees F. Normal operating range is 360 to 380 degrees F.
- When the category I installation is selected it may be commonly vented with other listed gas fire appliances. Total input rates of all appliances will determine the vent size the chimney must be sized and installed according to the provisions of the National Fuel Gas Code or Canadian CAN/CGA.B149 standards.
- A maximum of 4 gas appliances may be common vented on the same floor. Multiple story common venting is not recommended.
- Refer to the vent manufacturers instructions for proper clearances to combustibles.

**Figure #10
Exhaust Connection**



- This appliance should not be connected to a chimney flue servicing a separate appliance designed to burn solid fuel. Never connect this humidifier to a chimney servicing a fireplace.
- This venting category cannot be used in direct vent applications.

Installation as a Category III Appliance

- This venting system can be installed horizontally or vertically and can terminate on a rooftop or sidewall provided the NFGC (Nation Fuel Gas Code) and CAN/CGA- B149 codes are followed. The venting manufacturer instructions must also be followed. See Figure # 6,#7 & #8.
- This venting must be used in all direct vent applications.
- This category installation may not be common vented with any other natural draft gas appliance or power assist appliance. The humidifier cannot share a chimney flue servicing an appliance designed to burn solid fuel.
- Venting must be UL or UL/CSA listed, tested to ULC-5636 Standard. Venting may be BH or L vent. Special gas vent shall be listed and installed in accordance with the terms of the special gas vent listing and the manufacture's instructions. The special instructions listed below should be followed as well.
- All joints must be sealed using high temperature RTV silicone.

BH Vent Manufacturers

1. Flex-L International
2. Fas-N Seal
3. Heat-Fab Inc.
4. Z Flex

- The gas humidifier is supplied with the following exhaust outlets.

GS 100	3"
GS 200	4"
GS 300/400	5"
GS 500/600	6"

- The venting must remain the same diameter throughout the installation.

WARNING: Provide a screen or barrier to prevent personal injury in areas where inadvertent personnel contact with vent pipe can occur.

- A minimum equivalent vent length of 7 feet must be connected to the humidifier. Vent lengths must not exceed 100' (30 m). Each 90° elbow is equivalent to 10' and each 45° elbow equals 5'. The vent run should be as direct as possible with no more than 6 elbows in the system.
- Direct vent applications, length of vent should not exceed 70' in equivalent length.

ADDITIONAL REQUIREMENTS WHEN VENTING THROUGH A SIDEWALL

For sidewall venting, locate the humidifier as close as possible to the wall being used.

Locate the vent terminal at least three feet above any forced air inlet located within ten feet; or at least four feet below, four feet horizontally from, or one foot above any door, window, or gravity air inlet into any building.

A minimum horizontal clearance of four feet from electric meters, gas meters, regulator and relief equipment is required.

For sidewall vent terminations, the humidifier must be installed with the certified vent terminal that can be purchased from Nortec.

GS 100	3"	Nortec P/N 1502321
GS 200	4"	Nortec P/N 1502322
GS 300/400	5"	Nortec P/N 1507320
GS 500/600	6"	Nortec P/N 1507321

Locate the vent terminal at least seven feet above grade when it is adjacent to public walkways.

Locate the bottom of the vent terminal at least twelve inches above grade or ground, or normally expected snow accumulation level. The snow level may be higher on walls exposed to prevailing winds.

Avoid areas where local experience indicates that condensate drip may cause problems such as above planters, patios, or over public walkways, or over an area where condensate or vapor could create a nuisance or hazard, or could be detrimental to the operation of regulators, relief valves, or other equipment. Refer to the vent manufacturer's installation instructions.

The vent terminal must be installed in the same atmospheric pressure zone as the combustion air inlet of the humidifier. If this is not possible (as in cases of positive or negative room pressures) the humidifier should be installed with the direct vent option.

ELECTRICAL

PRIMARY WIRING

All work concerning the electrical installation must be performed by qualified personnel.

WARNING: The electrical parts inside the humidifier are very sensitive to electrostatic discharge. Appropriate measures against electrostatic discharge (ESD protection) must be taken when carrying out installation work.

- The humidifier should only be connected to primary power (mains power) after all installation work has been completed.
- An external disconnect switch must be installed close to the unit to allow for power interruption during servicing and/or maintenance.
- Humidifiers require field wiring to primary voltage terminal blocks. Power requirement must be 120V or 208-240 Vac, 15A separately fused circuit, single phase. Use only copper wire with a minimum 70 °C (158 °F) temperature rating. Wiring can be fed through a 7/8" hole on the bottom or the top of the control compartment. See Figure #1.
- When installed, the appliance must be electrically grounded in accordance with local codes or, in the absence of local codes, with the National Electrical Code, ANSI/NFPA 70, and/or the CSA C22.1 Electrical Code, if an external electrical source is utilized.
- External wiring sizes must be in accordance with NEC and/or CEC and existing local electrical codes and by-laws.

LOW VOLTAGE CONTROL WIRING

All GS models require at least one type of input control signal for unit operation. Refer to the sections below that detail the types of controls that can be used with each model.

Low voltage control terminal strips are provided in the electrical compartment. Internal sides are factory wired. External sides are to be field wired. Refer to the specific control-wiring diagram supplied with each unit.

Field wiring from humidistat to humidifier and between devices should be shielded 18 AWG or heavier and kept as short as possible.

Controls are available from NORTEC as accessories and can be ordered with the humidifier. Controls by others may also be used as long as they meet the criteria noted below. The following is a summary of the common types of controls that may be used with NORTEC Gas Humidifiers.

Wall or Duct Mounted Control On/Off Humidistat: Wired to make on drop in humidity, break on rise to setpoint. Set to desired RH. Can be a make/break set of contacts from a Building Automation System.

Duct Mounted Safety High Limit On/Off Humidistat: Wired to make on drop in humidity, break on rise to safety setpoint. Set to approximately 85% RH as a safety to prevent saturation and wetting in the duct. Highly recommended for ducted applications.

Duct Mounted Safety Air Proving On/Off Switch: Wired to make when sensing air flow, break when no air flow. Used as a safety to prevent saturation when there is no air flow. Highly recommended for ducted applications.

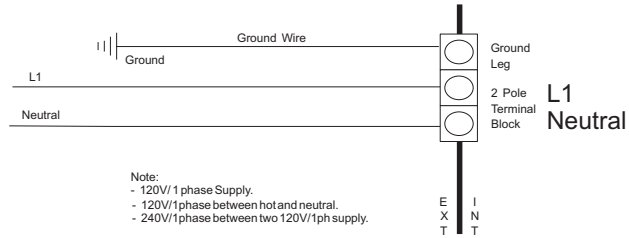
Wall or Duct Mounted Modulating Humidistat: Provides a modulating signal to the unit that represents the output (up to 100%) required from the humidifier. Signal type can be changed in the field via dip switch settings on the logic control board.

All GS models may be configured for either single or dual channel modulation. Control signals can be 0-10 VDC or 0-20 mA (0-5 VDC, 1-5 VDC, 4-20 mA and 2-10 VDC are also available). The unit must be ordered from the factory for the desired signal type and number of channels. When configured for 2-channel modulation the humidifier will generate steam only if both channels indicate a demand. If both channels are demanding steam the humidifier will satisfy the lower demand signal.

NOTE: Voltage At Terminal Block Must Be In Accordance With Spec. Label.
All Wiring To Be In Accordance With Existing National And Local Electrical Codes.

PRIMARY 120V 1 phase line voltage wiring to unit

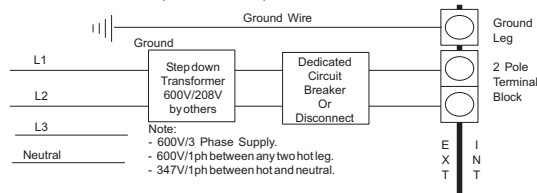
120V/1ph



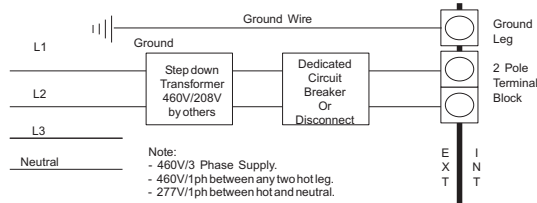
PRIMARY 208-240V 1 phase line voltage wiring to unit (BY OTHERS)

VOLTAGE
(ACTUAL)

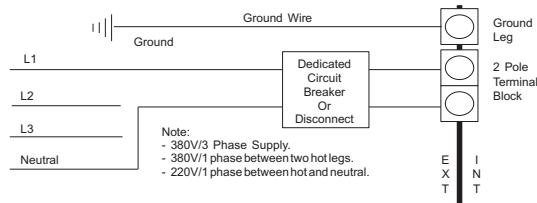
600V/3ph



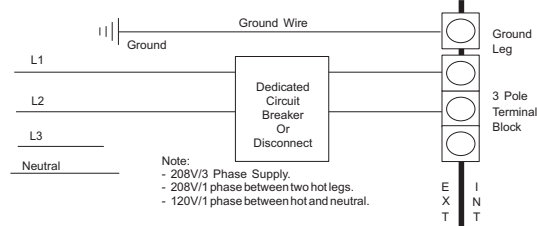
460V/3ph



380V/3ph

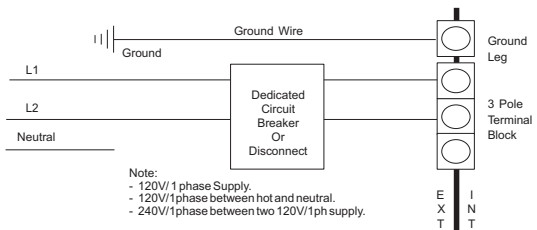


208V/3ph



120V/1ph

120V/1ph



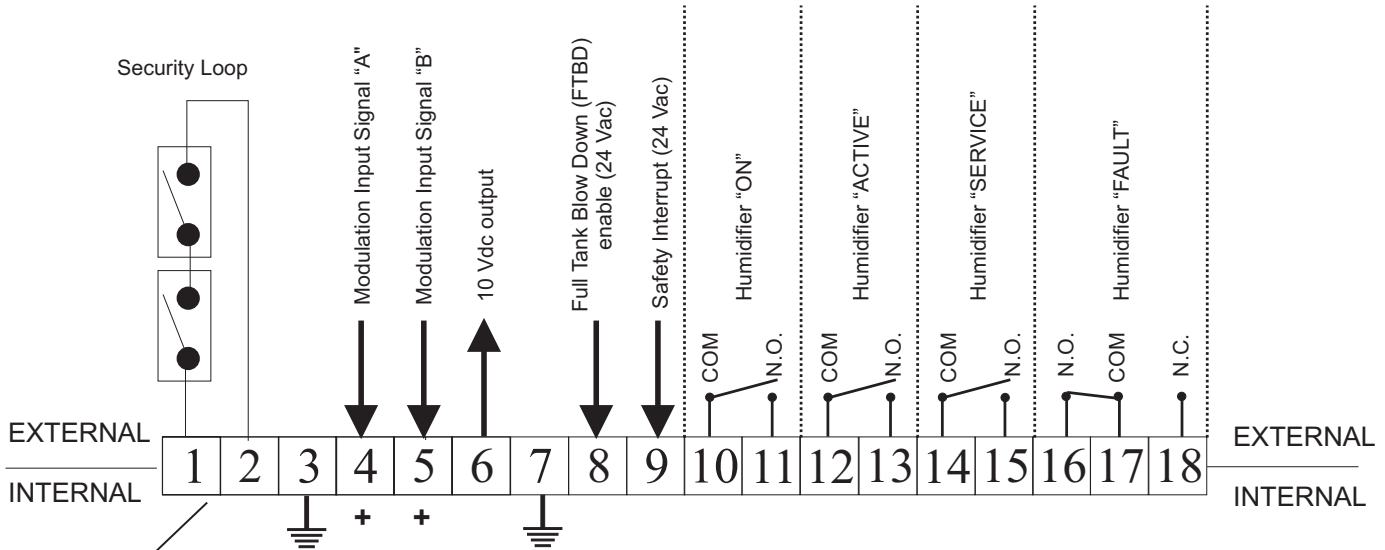
GS SERIES

EXTERNAL CONTROLS WIRING CONNECTIONS

LOW VOLTAGE TERMINAL STRIP

NOTE: This is a *generic* wiring diagram only. For specific wiring instructions, it is necessary to refer to the wiring diagram which is supplied with each unit.

WARNING: Failure to wire the controller in accordance with the wiring diagram that was supplied with the unit could permanently damage the GSTC/GSP board. Such errors will void the unit warranty.



NOTE: If no On/Off Control is used then a field jumper must be connected across terminals 1 and 2 in order for the humidifier to operate.

Low Voltage Terminal Strip

1 & 2: Wire all on/off controls and safeties between these two terminals. If not used, jumper 1 & 2 for the unit to operate.

4: Modulating input to humidifier "A".

5: Modulating input to humidifier "B".

6: 10 Vdc output.

8: When 24 Vac input received, the unit will initialize a full tank blowdown.

9: Safety interrupt (24 Vac).

10 & 11: Remote indication connection for humidifier "on" status indication.

12 & 13: Remote indication connection for humidifier "active" status.

14 & 15: Remote indication connection for service required indication.

16 & 17 & 18: Remote indication connection for fault indication.

CONTROL INSTALLATION

- Mount any wall humidistat (control or high limit) over standard electrical box at height similar to typical thermostat. Any wall humidistat should be in location representative of overall space being humidified and not in path of blower pack or air supply grille. Do not mount on an outside wall where temperature fluctuations can affect control response.
- Mount duct humidistat in location representative of overall air humidity, usually in return duct. Do not mount it directly in front of steam distributor or in turbulent or mixing zone. Mount humidistat where air's humidity and temperature are uniform and representative of spaces being humidified.
- Mount duct high limit humidistat downstream of steam distributors far enough that, under normal humidity and air flow conditions, steam will have been fully absorbed (typically at least 10 feet). It must be located to sense high humidity only when uniform and representative air is over-humidified or approaching saturation.
- Mount duct air-proving switch so that it is able to sense air flow or lack of it. Wire it to make when air flow is sensed and break when air flow fails.
- Check operation of all on/off controls before starting humidifier.
- Calibration of controls (on/off or modulation) in the field may be necessary due to shipping and handling. Verify humidistat accuracy before commissioning system.

PLUMBING

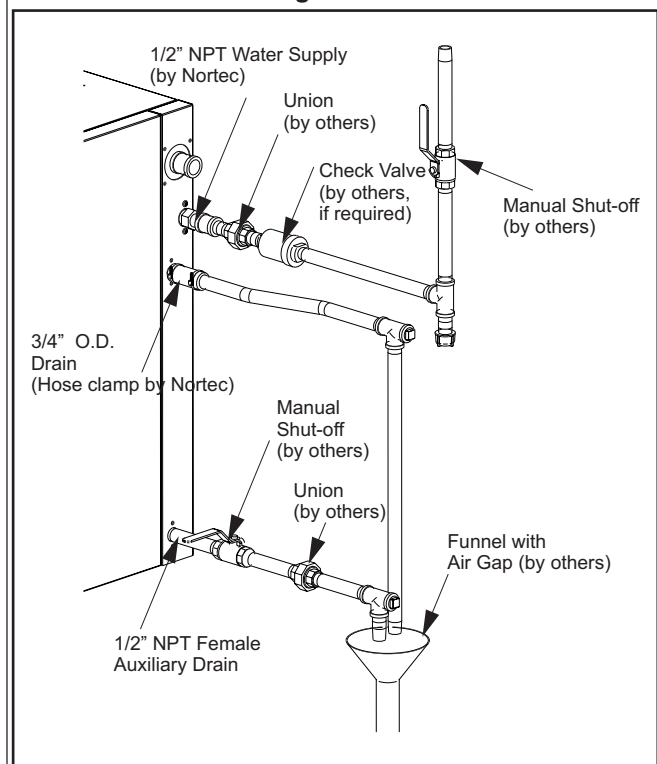
NOTE: All water supply and drain line connections should be installed in accordance with local plumbing codes.

FILL WATER SUPPLY LINE

- Each unit is supplied with an adapter for the fill valve ($\frac{1}{2}$ "NPT). Fill rate 10 l/min all unit sizes. Size of piping is a minimum $\frac{1}{2}$ " copper, recommend $\frac{3}{4}$ " up to within 4 feet of unit.
- Standard fill valves are sized for water pressure ranging from 30 to 80 psig (ideally 55 to 60 psig). For other pressures, consult factory. This pressure should be measured at the humidifier if the water pressure is suspect.

- It is recommended to have a faucet installed close to the humidifier to allow quick filling of the system on initial start up. This can also be very useful for mandatory cleaning of the unit.
- ALWAYS supply and install a shut off valve and union in the water supply line dedicated to the humidifier to facilitate servicing.
- If water hammer occurs, install a shock arrester on the fill water line just before the inlet to the fill valve. Water hammer will damage the fill valve.
- A 1" air gap is designed into the fill system of the GS humidifier. Some local plumbing codes may still require the installation of a double check valve on the fill line to the humidifier to prevent contamination of the supply water system. Verify with local codes and install if necessary.

Figure # 11
Plumbing Connections



DRAIN LINE

- The humidifier is equipped with a $\frac{3}{4}$ "O.D. Unthread ed drain outlet connection on the side of the humidifier. A vacuum break valve is installed internal to the unit on the drain line. The drain water line must be piped to a drain funnel to provide an air gap before connection to the building drainage system.

- The drain line should not end in a sink used frequently by personnel, or where plumbing codes prohibit it. Route to a floor drain or equivalent for safety reasons. Internal drain water tempering will ensure a maximum of 140°F (60°C) exiting water temperature.
- Never install PVC piping as a drain line material. Always use material suitable for with-standing 140°F (60°C).
- Keep drain lines as short as possible. Keep drain lines sloped down, not level and not up since low spots in drain lines will accumulate sediment and cause backup. The drain line should be 1-1.5" O.D. or larger. Consult local codes.
- When the drain pump is activated, the tank drains at a rate of 7-8 gal/min (18-20 l/min).

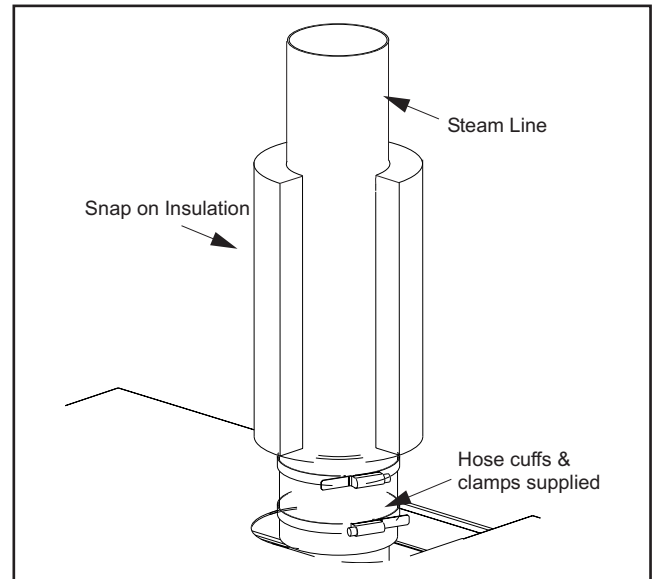
AUX DRAIN PORT

- An auxiliary drain port is also provided on the side of the humidifier. It can be used to manually drain the unit, if required. The unit is shipped with this connection plugged. It is recommended to install a shut off valve on this line (see Figure #11).
- The auxiliary drain port is used when the freeze protection option is required. Install a shut off valve on this line and pipe to the drain funnel (see Figure #11). The manual shut off valve must always be in the open position when the unit is operating but can be closed for servicing of the unit.

STEAM LINES AND CONDENSATE LINE

- Steam hoses and clamps are provided with the GS humidifier for connection to the steam lines. Refer to Figure #12 for connection details.
- For steam line installation between the humidifier and distribution system, consult the distribution system installation manual. Steam Distributor Installation Manual - Form #XX-231 and SAM-e Short Absorption Manifold - Form #XX-249.
- The GS series of Gas-Steam humidifiers can develop steam pressures up to 12" w.c. to overcome duct and steam line pressures. An enclosed trap on the drain line prevents steam from going to drain. Duct pressures above 12" will cause steam to exits through the drain line. Consult factory.

**Figure #12
Steam Line Connection**



GS Outdoor Installation

GS Outdoor units are CSA certified for outdoor installation and come complete with exhaust venting and internal ventilation (cooling) for the electronics. Optional heaters for freeze protection in cold climates are available.

All installations must conform with local building codes or, in the absence of local codes, with the National Fuel Gas Code ANSI Z223.1 in the United States or CAN/CGA B149 Installation codes in Canada. NORTEC can not accept responsibility for installation code violations.

MOUNTING

- Typical rooftop installations are shown in Figure #13 & #14.
- The GS Outdoor unit comes standard with cutouts in the base to allow for lifting by a forklift. When lifting by this method, ensure that the forks extend across the entire base to prevent tipping or damage to the unit.
- The enclosure also comes complete with four (4) removable lifting lugs fastened to the base. All four lugs must be utilized if moving the unit in this manner. Protect the cabinet from damage from the lifting cables/chains during lifting. The lifting lugs should be removed from the base once the unit has been correctly positioned on the curb mounting.
- See Figure #15 for clearance details.

Figure # 13
GSTC Outdoor Typical Installation Rooftop

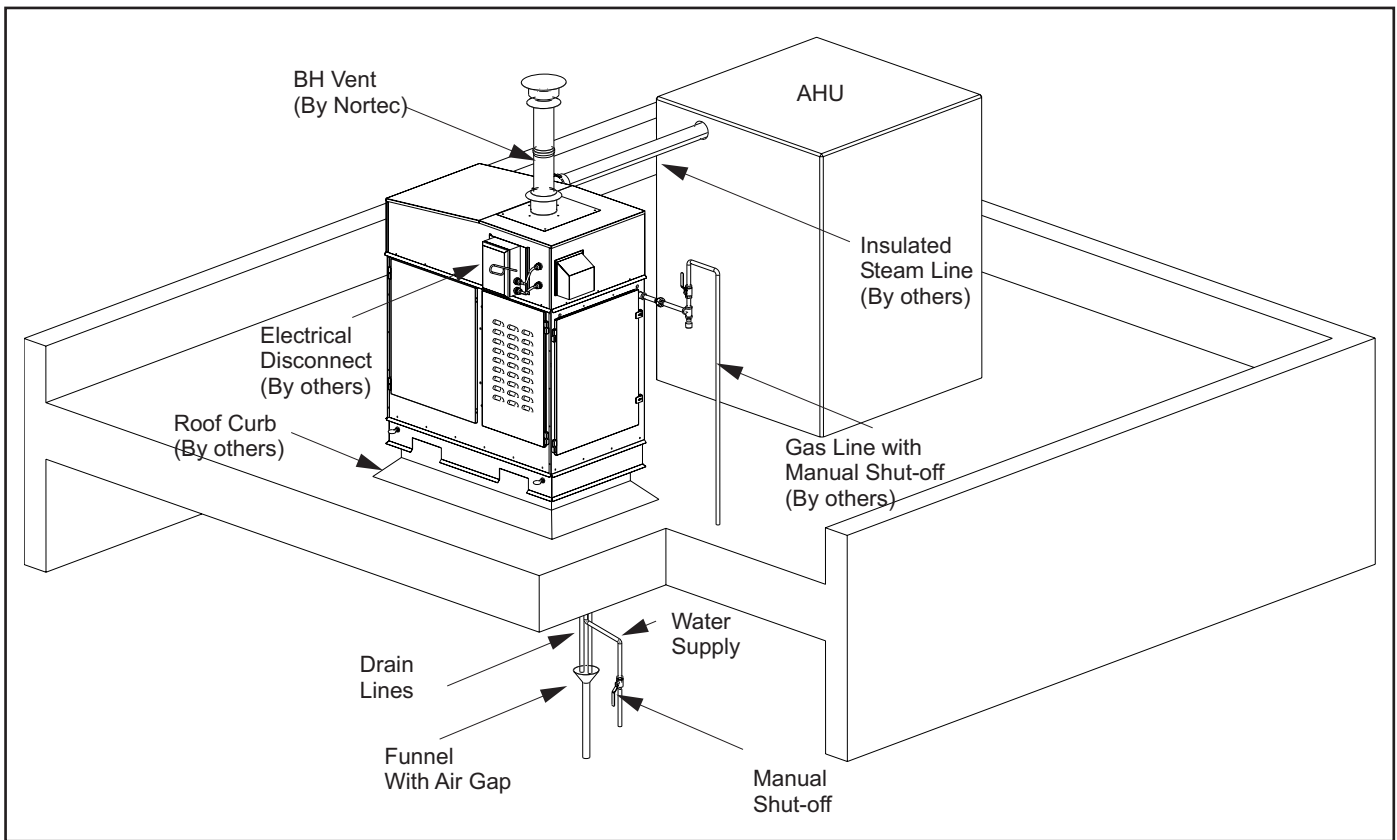


Figure # 14
GS Outdoor Typical Installation Rooftop

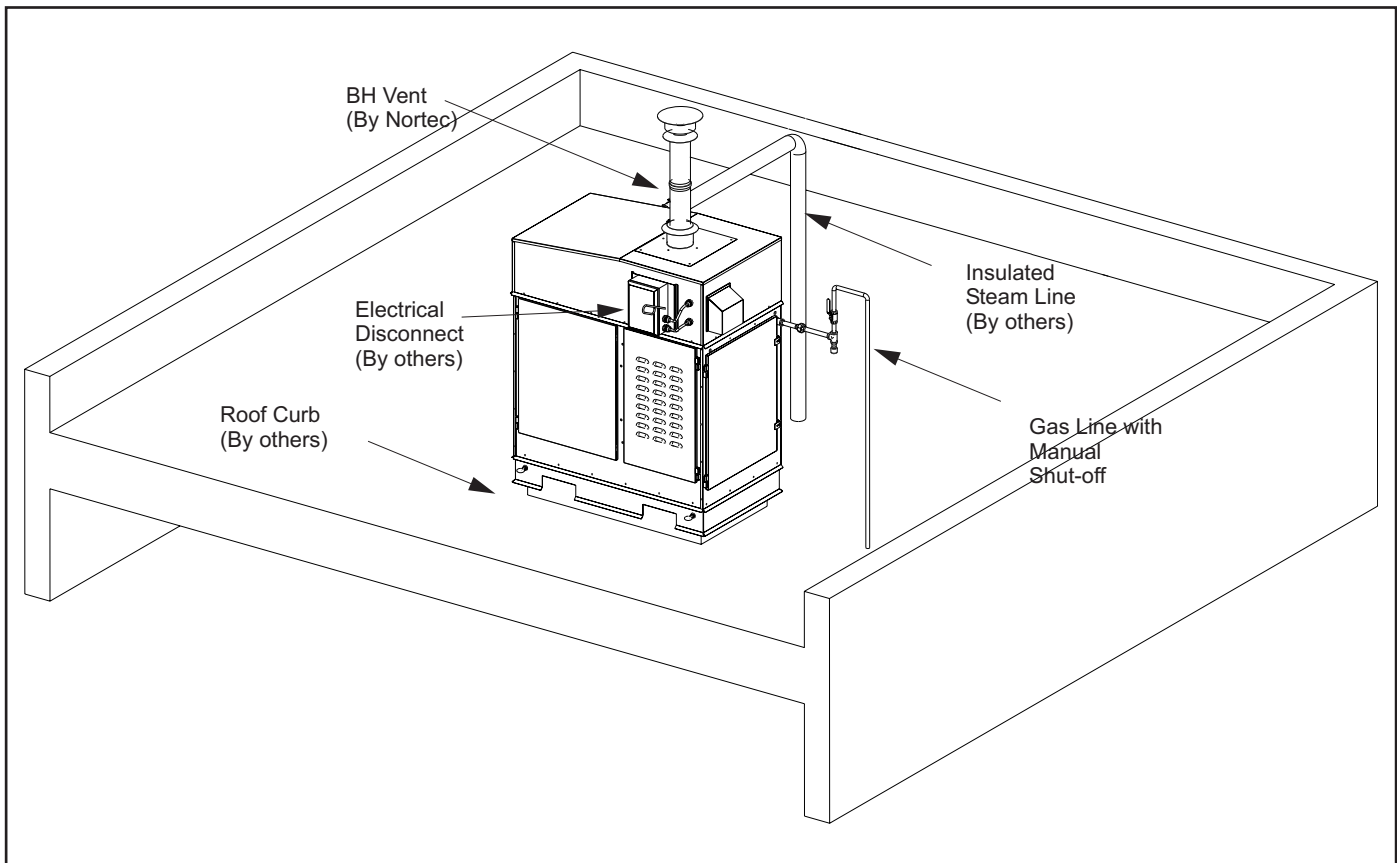


Figure # 15
GSTC Outdoor Clearance

Model	Minimum Required Clearances			
	Front	Left	Right	Back
GSTC Outdoor 100	30" (76cm)	0	40" (101.6 cm)	6" (15.25 cm)
GSTC Outdoor 200	30" (76cm)	0	40" (101.6 cm)	6" (15.25 cm)
GSTC Outdoor 300	30" (76cm)	30" (76cm)	40" (101.6 cm)	6" (15.25 cm)
GSTC Outdoor 400	30" (76cm)	30" (76cm)	40" (101.6 cm)	6" (15.25 cm)
GSTC Outdoor 500	30" (76cm)	30" (76cm)	40" (101.6 cm)	6" (15.25 cm)
GSTC Outdoor 600	30" (76cm)	30" (76cm)	40" (101.6 cm)	6" (15.25 cm)

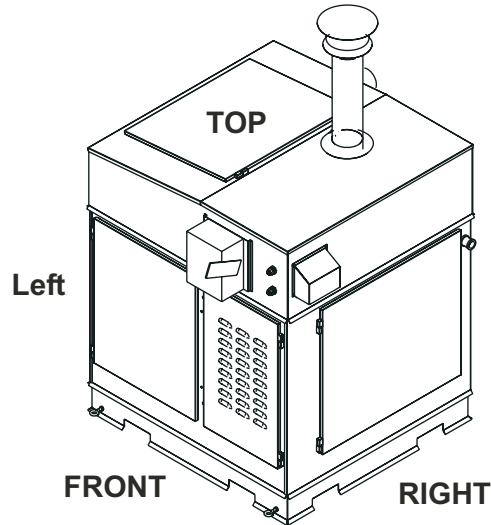
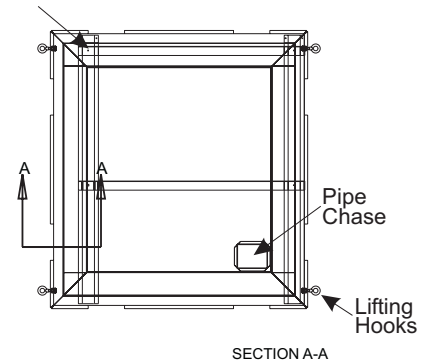
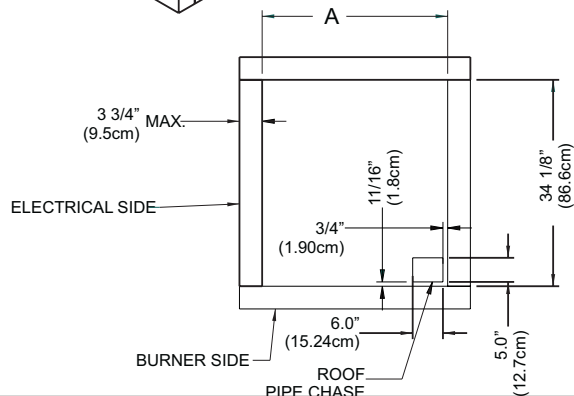
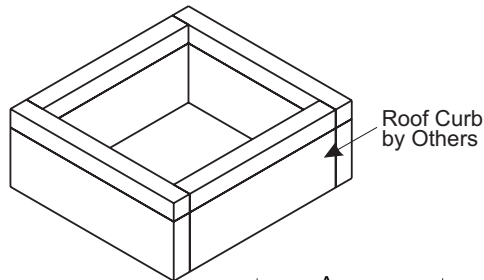


Figure # 16
Roof Curb Dimensions

Model	Roof Curb Dimensions			
	Dimension A	Curb Height	Shipping Weight	Operating Weight
GSTC Outdoor 100	8.63" (27.91cm)	15" (38.1cm) Min.	400 lbs (181 kg)	556 lbs (252 kg)
GSTC Outdoor 200	15.06" (38.25cm)	15" (38.1cm) Min.	500 lbs (227 kg)	744 lbs (338 kg)
GSTC Outdoor 300	30.63" (77.8cm)	15" (38.1cm) Min.	700 lbs (318 kg)	1185 lbs (539 kg)
GSTC Outdoor 400	30.63" (77.8cm)	15" (38.1cm) Min.	745 lbs (339 kg)	1210 lbs (550 kg)
GSTC Outdoor 500	46.25" (117.5cm)	15" (38.1cm) Min.	800 lbs (363 kg)	1505 lbs (684 kg)
GSTC Outdoor 600	46.25" (117.5cm)	15" (38.1cm) Min.	844 lbs (384 kg)	1525 lbs (693 kg)



BASE FRAME
ELEMENT

CURB

- The integral base of the GS Outdoor model is designed to mount on a curb. The curb must be built to structurally support the entire weight of the humidifier when in operation. Required curb dimensions are given in Figure #16 .
- Ensure that the humidifier is mounted level.
- The pan in the bottom of all outdoor models has a pipe chase for routing of services into the humidifier from below.
- It is not necessary to make the hole in the roof the same size as the curb. The curb drawing shows the location and size of the pipe chase required. The pipe chase should be sealed when the installation is complete to ensure positive or negative pressure from the building.
- The panels of the outdoor model have louvers to provide ventilation for the electronics and air for the combustion process. Locate the unit so that louvered panels are a minimum of 10 ft from any mechanical exhaust outlet.
- When mounted on the curb, the lowest air intake louvers must be a minimum of 12" above any surface where snow or ice could accumulate. In areas where normal snow accumulation is higher, mount the unit accordingly.
- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of the humidifier.
- The humidifier 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.

GAS PIPING

- Installation of piping must be in accordance with local codes, and the National Fuel Gas Code ANSI Z223.1 in the United States or CAN/CGA-B149 Installation Codes in Canada.
- Refer to the indoor gas piping installation guidelines for gas line sizes, pressures, leak testing procedures, and safety instructions.

- Gas lines are to be routed to the outside connection on the right side near the back of the unit. The installation of a sediment trap and a certified manual shut-off valve are required outside of the unit. The gas piping must not block access to or prevent opening of the right side service door. Refer to Figure #17 for details.
- Nortec recommends that each Gas Fired Humidifier has it's own regulator installed in line to the unit. Th operating Natural Gas pressure supplied for the GS units must be in the range of 5-9 " of Water Column and propane version 10-14" of Water Column.
- Over pressure protection devices shall be provided to prevent the pressure in the piping system from exceeding that value that would cause unsafe operation of any connected and properly adjusted Gas utilization equipment. See Figure #18
- If the system has a pressure that is higher than the max working pressure of our humidifier, then an Over pressure protection system is required. If there is an Over pressure protection device installed, it MUST consist of 2 devices in series. (A pressure regulator plus one other device) Both these devices must be able to work on their own without damaging any downstream piping or appliance, and the only way the downstream

Figure #17
Gas Piping

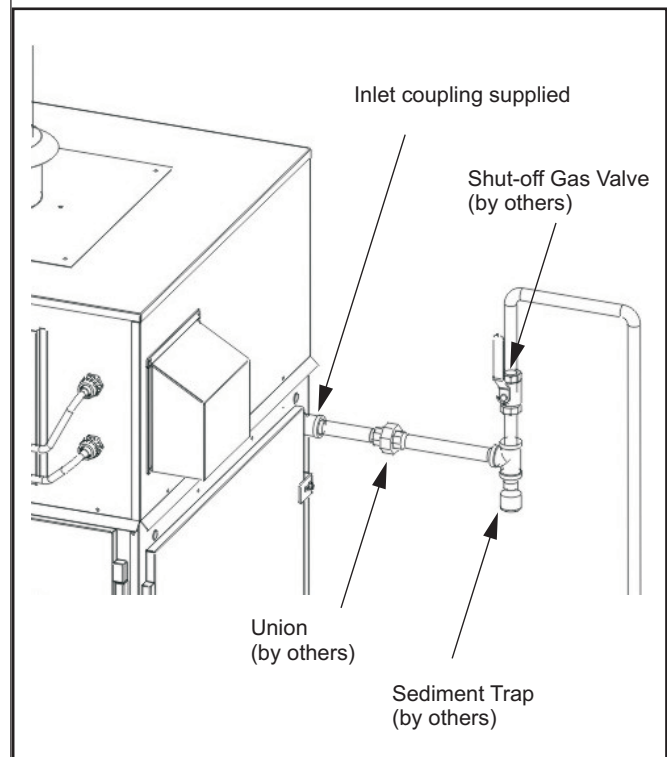
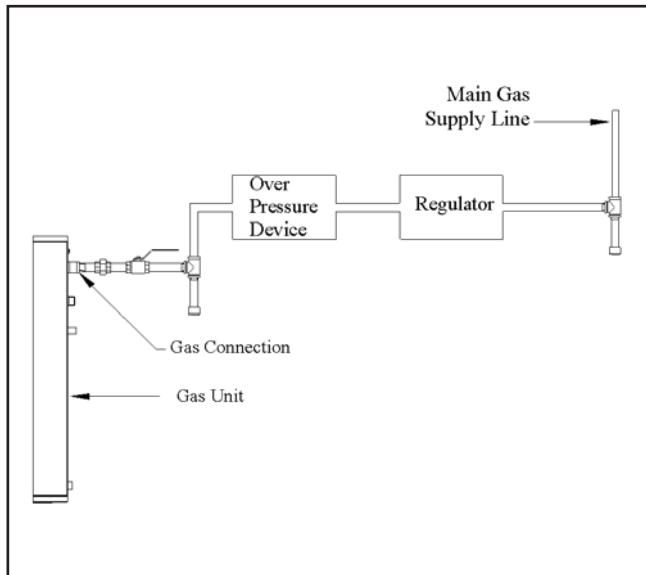


Figure #18
GasPiping

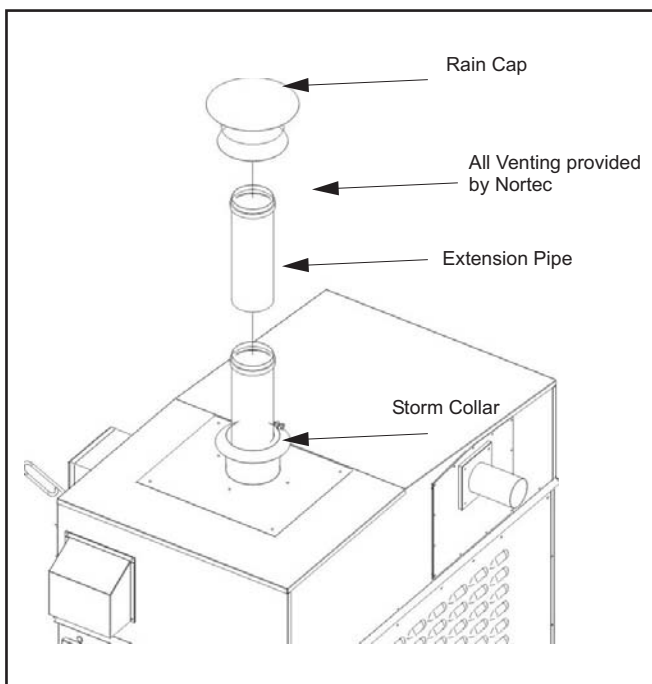


system can be damaged is by the failure of both devices.

EXHAUST VENTING - OUTDOOR UNITS

- All required exhaust venting is provided with each GS Outdoor model, by Nortec, including rain cap and storm collar. All venting components external to the unit are shipped with the unit and must be installed on site. Refer to Figure #19 for venting components.

Figure #19
Exhaust - Outdoor Units

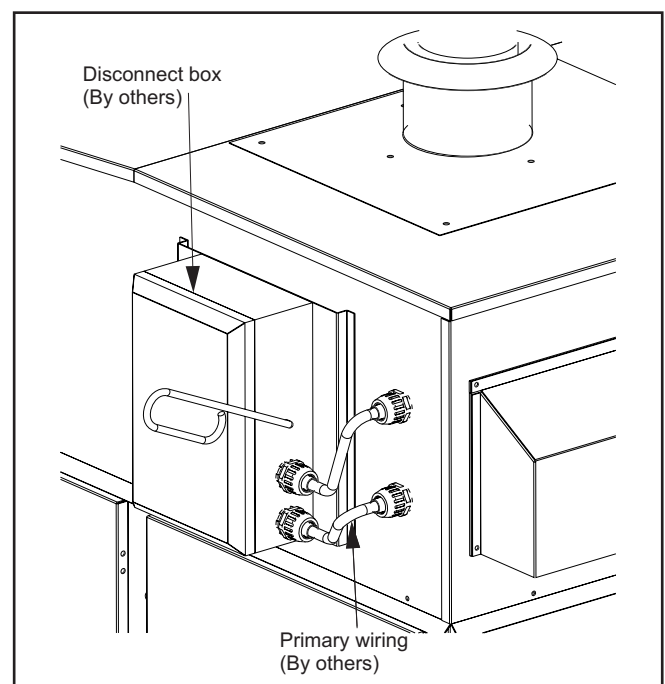


- Each vent length and the rain cap have a built-in mechanical locking band and gasket. Simply push together each component to the stop bead, which provides an air & water-tight seal. Then tighten the integrated locking band on each component to complete the installation of the exhaust venting.
- The rain cap must extend at least 2 feet above any ridge within 10 feet of the unit. The exhaust venting can be extended using additional vent lengths purchased from Nortec.

ELECTRICAL INSTALLATION

- Power and control wiring is to be routed into the humidifier through the pipe chase in the base pan of the outdoor models located in the burner area.
- Installation details for primary and low voltage control wiring are the same as for indoor units.
- A field supplied NEMA rated weatherproof disconnect switch must be mounted external to the GS Outdoor unit to allow for power interruption during servicing and/or maintenance. A mounting plate, located on the front of each outdoor model above the electrical access door, is available for mounting of the disconnect switch. Two electrical conduits are provided for routing the primary wiring to the disconnect switch and then back inside the enclosure to the main power terminal strip. See Figure #20 for details.

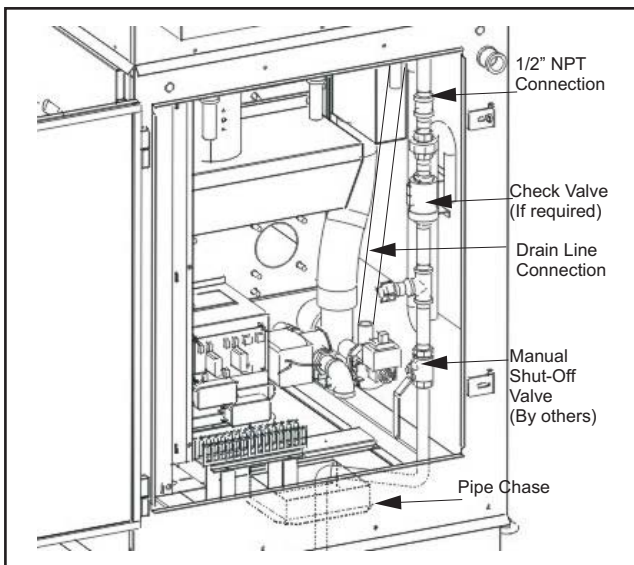
Figure #20
Electrical Box



FILL WATER SUPPLY LINE

- Each unit is supplied with a ½" NPT male connection to the fill valve. Refer to Figure #21 for connection details. A minimum fill rate of 10 l/min (2.6 gal/min) is required for all unit sizes. Allowable pressure range is 30-80 psig.
- Always install a manual shut off within the building to allow isolation of the water to the unit. A union must be installed on the fill line prior to the fill valve to allow for servicing.
- Heat trace fill line piping above rooftop from the pipe chase up to the fill valve.

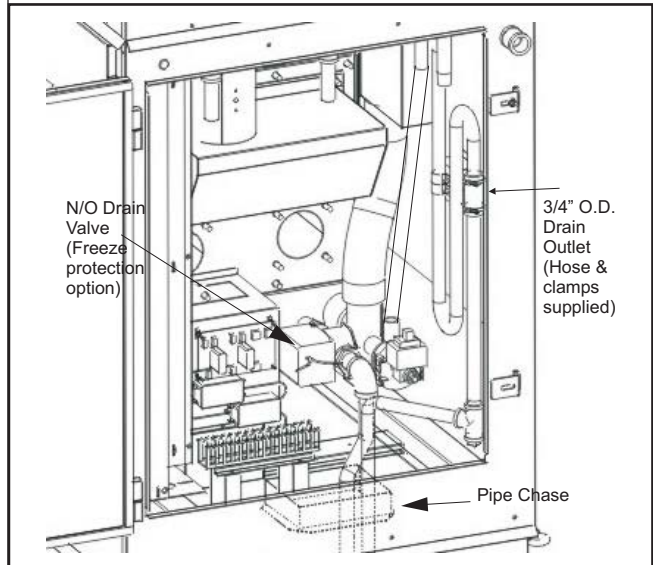
Figure #21
Fill Water Connection



DRAIN LINE

- GS Outdoor units have an integrated 12" w.c. trap and vacuum break valve on the drain line. A drain hose, connected to the outlet of the internal trap, terminates at the pipe chase in the burner section.
- Route the drain hose to a drain funnel in the building to provide an air gap before entering main building drain/sewage system.
- When the drain pump is activated, the tank drains at a rate of 18-20 l/min (7-8 gal/min).
- Internal drain water tempering will ensure a maximum of 140°F (60°C) during normal operation.

Figure #22
Drain Connection



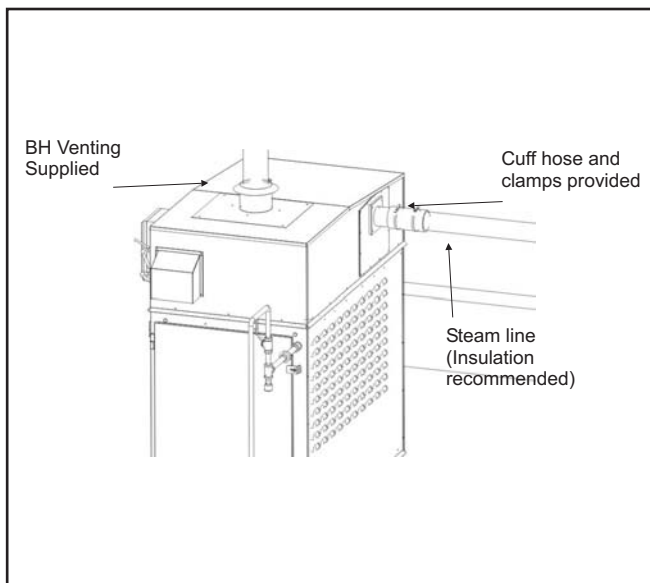
AUXILIARY DRAIN

- Standard GS Outdoor units come with a capped ¾" NPT auxiliary drain connection at the bottom of the tank. It is recommended to install a manual shut-off valve on this connection and route to drain (provide an air gap).
- GS Outdoor units equipped with a freeze protection package have a normally open drain valve mounted at the auxiliary drain connection and piping that terminates at the pipe chase in the base pan. This valve opens and will drain the contents of the tank in the event of a power failure. See Figure #22. Install a manual shut off valve on this line and pipe to the drain funnel. This valve must always be left in the open position when in operation but can be closed for servicing of the unit.
- Drain pipe should be capable of withstanding 200°F temperatures.

STEAM LINES

- The steam outlet connection is located at the back of the GS Outdoor unit. Steam hose(s) and clamps are supplied with the unit and are intended to provide a flexible coupling outside of the unit to the building steam lines. See Figure #23.
- GS Outdoor models can develop steam pressures up to 12" w.c. to overcome duct and steam line pressures. Pressures above 12" w.c. will cause steam to exit through the drain line.
- Steam lines can be routed to an air handler on the roof or pipe chased (external to the unit) through the rooftop to enter the building.
- All steam lines must be insulated to reduce losses.
- For steam line installation guidelines, consult the distribution system installation manual (Steam Distributor Installation Manual Form #XX-231 and SAM-e Short Absorption Manifold Form #XX-249).

Figure #23
Steam Connection



PRINCIPLES OF OPERATION

Combustion

The combustion system is based on a fully modulating forced draft combustion air blower(s), a negative pressure regulated gas valve, and a 100% premix burner. On a call for humidity, the combustion air blower(s) starts and creates a negative pressure(s) across an orifice located at the air inlet. The blower is energized to purge the system, then the hot surface ignitor is activated. During this time the electronic ignition module does a diagnostic check of safety systems including the air proving switch which senses the negative pressure at the air inlet orifice. After the function of the safety systems has been verified, the gas valve(s) will open and the gas/air mixture is ignited by the hot surface ignitor. If a flame is sensed by the flame sensor, the gas valve(s) remains open and combustion continues. If a flame is not sensed, the above sequence is repeated to a maximum of three times after which the ignition module will lock out. The gas valve(s) maintains a constant ratio air to gas independent of blower speed or external conditions. This air and fuel is thoroughly mixed in the blower(s) and then forced through the burner ports where ignition occurs.

Hot products of combustion are forced through a baffle inside the heat exchanger and then vented outside. The heat exchanger has a large flat surface to minimize scale build-up and promote scale shedding to the bottom of the tank. This self-cleaning action helps to maintain the efficiency of the heat exchanger while the smooth surfaces allow for easy cleaning when necessary.

The GS 100 has a single removable combustion chamber/heat exchanger. The combustion system is duplicated on larger units with multiple chambers inside a common tank.

WATER MANAGEMENT

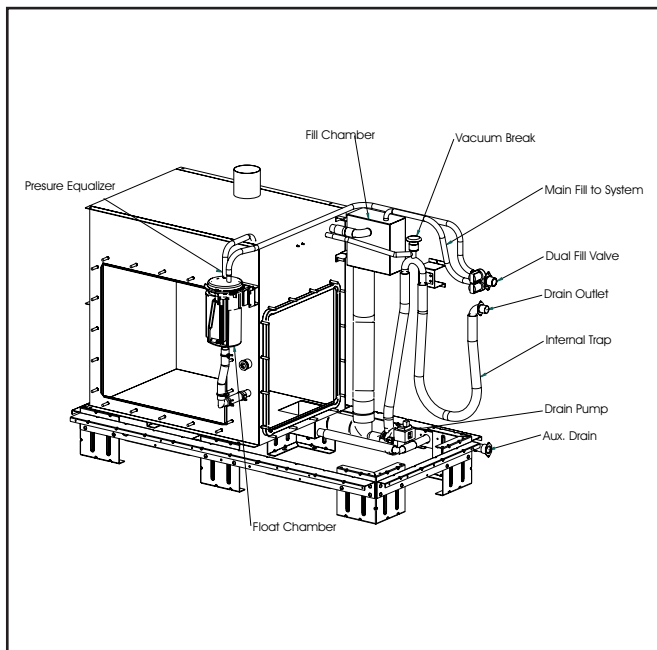
The GS Series of humidifiers is equipped with a unique float chamber water level monitoring device. Two magnetic floats (one is a backup) measure 5 different water levels in the humidifier for proper operation. The float chamber and board are located away from the boiling action to increase reading accuracy and reduce mineral build-up since it is not in the boiling water. The float chamber is connected to the tank under the water level and above the water level to ensure equalization of pressure between the tank and float chamber. In addition, cooling water is introduced in the float chamber to reduce scale build-up. The unit also includes an internal 1" air gap and a vacuum breaker to prevent siphoning effect.

On initial start-up, the solenoid operated fill valve fills the tank. The water level reaches the backup float first and then the main float. If the backup and main floats do not read the same water level during the operation of the unit, the unit will shut down on a fault. The unit will continue to fill the unit to the top green position. The drain pump will then be energized to drain the water level down to just below the bottom red position and then the fill valve will energize again to fill the unit to the middle yellow position. During this time the software is performing a test on the fill valve and drain pump.

If a demand signal is present, the unit will then begin the combustion sequence. As the unit operates, the fill valve will be pulsed to maintain the water level between the yellow and green positions. During steam production the unit will also check if the floats and drain pump are operational by activating a drain sequence every 24 hours. (adjustable to time of day)

START UP PROCEDURE

Figure #24
Plumbing Connections



START-UP CHECKLIST

Before the GS humidifier is operated for the first time, a complete inspection must be performed to ensure that the installation and all water, gas, steam, electrical and venting connections to the humidifier conform to the guidelines in this manual. Complete the checklist on pages 25 & 26 before commissioning the unit.

Qualified personnel must correct any deficiencies with the installation before commissioning takes place.

Prior to starting the humidifier, it is necessary to ensure that no dirt or dust has accumulated in the electronics compartment or the burner area. A build up of dust on the electronics can cause overheating and early failure of the components. If necessary, clean the area around the humidifier to prevent contaminants from being drawn into the combustion blowers.

FILLING THE SYSTEM

Before the GS unit will initiate combustion it must be filled with water and the internal controller must have completed a self-test to verify that the water fill system, level controller, and drain pump are functioning correctly.

- Close the shut-off valve in the gas supply line
- Remove any demand signal to the unit
- Open the shut-off valve in the water supply line
- Switch the humidifier on
- The fill valve will energize and the tank will begin to fill (fill time is approximately 10 to 30 minutes depending on unit size). Once the float chamber has registered low water level, the unit will perform an internal test of the fill and drain system as described in the Water Management section
- At the completion of the test, the float chamber will indicate middle float position (green LED) and the unit will go into standby mode until a demand signal is received
- Proceed to the safety shut-off test

TESTING THE IGNITION SAFETY SHUT-OFF

Test the ignition system safety shut-off in the following method.

- Close the shut-off valve in the gas supply line
- Set the demand signal to the humidifier to 100%
- Ensure all external controls connected to the security loop are closed
- Switch the humidifier on

- At the completion of the float test, the humidifier will begin the combustion sequence by energizing the combustion blowers
- All blowers will run at full output for 30 seconds to pre-purge the combustion chamber. During this time the controller will monitor that all air proving switches closed to prove air flow
- The igniter(s) will be energized for 15 seconds, allowing it time to heat to the appropriate ignition temperature and the gas valve will be energized
- After 4 seconds both the gas valve(s) and the igniter will be de-energized
- After three trials for ignition (complete with pre-purge) the red LED on the ignition control module will begin blinking to indicate a safety lockout and a fault message will be displayed on the humidifier display
- **NOTE:** On multiple burner models, each burner tries to ignite in sequence. It is necessary to wait for all burners to cycle to complete the test.
- Manually re-open the gas supply to the humidifier. No gas should flow to the burner(s)
- To reset the humidifier, shut off the power switch, then turn the power back on

STARTING THE HUMIDIFIER

Once the tank has been filled and the ignition safety test has been performed as outlined above, the humidifier is ready to be put into operation.

- Verify that the inspection checklist has been completed and all deficiencies with the installation have been corrected
- Open the shut-off valve in the gas supply line
- Open the shut-off valve in the water supply line
- Ensure all external controls connected to the security loop are closed
- Verify that the building demand signal is connected to the humidifier
- Install and secure all cabinet service doors
- Switch the humidifier on

- At the completion of the float test, the humidifier will begin the combustion sequence and each burner will ignite in sequence
- Depending on the system demand the combustion blowers will modulate faster or slower to control the burner input
- The water in the tank will heat up and begin to boil, delivering steam to the distribution system
- During the boiling sequence the water fill valve will periodically activate to replenish water that has evaporated from the tank
- Once the humidity requirements have been satisfied (demand drops below minimum %) all gas valves will be de-energized and the blowers will be shut off after performing a post purge of the combustion chamber
- The humidifier will go into standby mode until the next call for humidity (demand rises above minimum %) at which time the unit will again begin the combustion sequence

TAKING OUT OF OPERATION

If it is required that the humidifier be taken out of operation (e.g. for service or end of season shut-down), proceed as follows:

- If the unit is firing, remove the demand signal or open the security loop, allowing the burners to shut off and the blowers to perform a post purge of the heat exchangers before shutting off
- Switch the main power switch from On to Off and then to the Drain position. The drain pump will be energized and the tank will begin to drain
- Once the tank has completely emptied shut off the drain switch
- Close the shut-off valve in the gas supply line

GS INSPECTION CHECK LIST

HUMIDIFIER MOUNTING

- ☐ Verify proper clearances around the unit
- ☐ Humidifier mounted level
- ☐ Humidifier properly secured to stand and stand bolted to floor
- ☐ All service doors accessible
- ☐ Roof curb sized correctly (Outdoor Model Only)

GAS PIPING

- ☐ Correct gas line size installed
- ☐ Certified manual shut off valve and union installed
- ☐ Sediment trap installed
- ☐ Gas piping leak tested
- ☐ Air purged from lines
- ☐ Proper gas supply pressure
- ☐ Regulator dedicated for each gas unit

EXHAUST GAS VENTING

- ☐ Comply with local regulations
- ☐ Proper venting materials used (B or BH) – refer to gas codes
- ☐ Maximum vent length of 100 feet (70 feet for direct vent models)
- ☐ Proper pipe diameter used
- ☐ Condensate tee installed

STEAM LINES

- ☐ Slope up 2" per 12"
- ☐ Sloped back to drain
- ☐ Slope down ½" per 12"
- ☐ Trapped 2" more than static duct pressure
- ☐ Traps Size _____
- ☐ Insulated
- ☐ Length/Size _____
- ☐ 90 deg. Elbows qty: _____
- ☐ 45 deg. Elbows qty: _____
- ☐ Can condensate be trapped anywhere in the steam line? yes ☐ no ☐

CONDENSATE LINES

- ☐ Sloped back to drain
- ☐ Trap is greater than 2" duct static pressure
- ☐ Size of trap _____

SUPPLY WATER LINE

- ☐ Nortec supplied adapter installed on fill valve (1/2"NPT)
- ☐ Manual shut off valve and union installed
- ☐ Verified pressure (30 – 80 psig)
- ☐ Water source of 10 l/min (2.6 gpm)
- ☐ Leak tested
- ☐ 1/2" dia. At max 4ft of the unit

DRAIN LINES

- ☐ Air gap located within 3ft of the unit
- ☐ Minimum drain line size of 1" in dia.
- ☐ Downward slope
- ☐ Tundish (funnel) installed to provide air gap
- ☐ Temperature rating of piping
- ☐ Hose connections tightened
- ☐ Auxiliary drain piped with shut off valve to tundish

WATER QUALITY

- Well water ☐ - City water ☐ - Softened water ☐ - RO/DI water ☐

Conductivity: _____ mhos Hardness: _____ GPG Silica _____ ppm Chlorides: _____ ppm
pH: _____

NOTE: Failure due to chloride corrosion is not covered under Nortec's standard warranty. Consult factory for more information.

ELECTRICAL INSTALLATION

- ☐ Comply with local regulations
- ☐ Proper supply voltage (must match rating plate) and breaker size
- ☐ Electrical disconnect switch close to humidifier
- ☐ Cables properly affixed
- ☐ Low voltage wiring & control signal(s) wired to correct terminals
- ☐ Humidifier configured for correct control signal(s)

TYPE OF CONTROLS INSTALLED/ LOCATION/ WIRING/ SETTING

- ☐ High Limit _____
- ☐ Air Proving _____
- ☐ Modulation Control _____
- ☐ On/Off Control _____
- ☐ Controls by Nortec _____
- ☐ Controls by Others _____

- Close the shut-off valve in the water supply line
- Isolate the humidifier from the electrical power supply at the main disconnect switch

SCALE MANAGEMENT

The gas humidifier will periodically “blowdown” water from the tank to reduce the concentration of total dissolved solids that accumulate during long term operation. Gas Humidifiers are shipped factory set with a blowdown of 25%. This setting ensures that scale build-up will be minimized for all water conditions.

Once the water conditions are known, the blowdown rate can be adjusted by software (GSTC models) or by using dip switches on the logic control board (GSP models).

Another effective means of controlling the amount of scale in the tank is with the use of the Full Tank Blowdown (FTBD) built into the software. When this feature is activated, the drain pump will be energized to drain the entire contents of the tank and then the tank will be refilled with fresh water, thus keeping the amount of total dissolved solids to a minimum. The feature can be programmed in the software to occur after a specific amount of operating time and can also be triggered by a signal sent to the humidifier from a building management system.

WATER QUALITY

Due to the wide range of water conditions found throughout North America it is important that the blowdown is set according to the local water conditions. By water conditions we are referring to the hardness of the water supplied to the humidifier. The hardness is measured in grains per gallon. It is also important to test for silica content. Silicates may cause foaming and contribute to scale buildup in the humidifier tank and float chamber.

If you are unaware of the hardness or silica content of your water supply, there are many “do it yourself” kits which can be purchased, or there are several companies that will perform the tests for a reasonable price. You can even contact your municipality for your water condition or order the NORTEC water test kit.

Figure #25
Site Water Test Kit P/N 1507214



Note: Water quality conditions resulting in component failures are not covered under NORTEC's standard warranty.

- **Silica Test:** Measured in ppm (parts per million). Follow the directions with the kit. A high reading will decrease the performance of your system. The recommended operating range for silica is 0 ppm to 14 ppm. Note: A high silica content along with a high hardness content may increase the service intervals of the system. Consult the factory if this condition exists at the site.
- **Hardness:** Measured in gpg (grains per gallon). Follow the instructions on each individually wrapped test strip and use the colour chart provided. The recommended operating range for hardness is 0 gpg to 12 gpg. Note: High hardness along with high silica may increase the service intervals of the system. Consult the factory if this condition exists at the site.
- **pH:** Follow the directions on the test strip bottle. The recommended operating range for pH is 6.5 to 7.5 on the colour scale. Consult the factory if outside these parameters.
- **Chlorides:** Measured in ppm (parts per million). Follow the directions on the test strip bottle. The recommended level for chlorides is not to exceed 25 ppm.

NOTE: Failure due to chloride corrosion is not covered under Nortec's standard warranty. Consult factory for more information.

- High levels of chlorides will attack stainless steel. Consult the factory for additional information if your water contain high levels of chlorides.

- Conductivity: Measured in micromhos. Follow the directions for the conductivity pen found inside the box. Multiply the digital reading by 1.5. The recommended operating range for conductivity is 0 - 1500 micromhos. Consult the factory if you measure outside these parameters.

Tech-nology	Water Type	Water Cond. Range	Hard-ness Range	Silica Range	Alkalinity Range	Chlor. Range
Gas-Fired		Micromhos	GPG	PPM	pH	PPM
	Potable	0-1500	0-12	0-14	6.5-7.5	0-25
	Treated	0-100	0-1	0-1	7-7.5	0-25

- NORTEC recommends performing a semi-annual water analysis to ensure optimal performance.
- The humidifier is intended to operate on cold potable tap water.
- DO NOT use a hot water source to supply the humidifier. Minerals will adhere more easily to surfaces and the fill valve's small flow regulating orifice could become plugged.
- Consider using a water softener. Longer operating times between tank cleaning will be reached on softened water.
- Reverse osmosis (RO) water can provide very long times before cleaning is required since it is cleaner than softened water. Deionized (DI) water may be used with all models. Consult your NORTEC representative for quote on a water treatment system.

SAFETY INSTRUCTIONS

Refer to front cover and page 1 of this guide.

FAULT CONDITIONS

This appliance is equipped with a self diagnostic ignition module which identifies a fault code when it occurs. Refer to the fault & warning list on pg 60.

GSTC MODELS

Faults are indicated with a fault message on the display of GSTC models. Recovery from lockout requires resetting of the humidifier. This can be achieved by momentarily shutting off the power switch then turning it back on, or by pressing the reset button on the logic control board mounted inside the electrical cabinet.

A history of all faults is stored in memory of the software and can be viewed through the service level on the display. Refer to the keypad display menu structure at the end of the manual.

GSP MODELS

Faults are indicated on GSP models with a fault code on the small display screen attached to the logic control board. The display can be viewed by removing the front electrical door. Check the display for the fault code before shutting off power to the unit. Resetting the humidifier clears the fault. This can be achieved by shutting off the power switch, then turning it back on, or by pressing the reset button on the logic control board. A list of all fault codes and the type of fault they represent is located near the back of the manual.

MAINTENANCE

To ensure proper performance and long operating life of the GS humidifier, it is recommended that the appliance and installation be inspected at least once a year by a qualified service person. A proper maintenance schedule should be followed. Since the amount and type of maintenance required is generally as a result of how much the humidifier operates, all GS humidifiers monitor the amount of steam produced over time and will indicate when service is required. All units come factory set with a service interval of 500 hours. This service interval can be adjusted through software (GSTC models) or by dip switch settings (GSP models) on the logic control board.

All maintenance work must be performed by experienced and trained personnel.

Periodic cleaning of the screens in the vent terminal (where applicable) is recommended.

NOTE Use only NORTEC original parts to replace damaged or defective components. Failure to do so may cause improper operation of the humidifier and will void warranty.

DRAINING THE TANK

- During extended periods of inactivity such as off season or periods of very low demand, it is advisable to drain the water from the tank. On all models this is accomplished by switching the unit to "Drain".
- Do not remove the front clean out port on the tank until the unit has completely drained. On GS 300-600 units do not remove the top clean out ports on the tank unless the water has cooled or the unit has completely drained.

MANDATORY MAINTENANCE SCHEDULE

PARTS	30 DAYS after initial start-up	MID	END OF SEASON	WHAT NEEDS TO BE DONE?	
				REGULAR MAINTENANCE	PREVENTIVE MAINTENANCE
Hot Surface Ignitor			X	- Check for continuity.	- Replace hot surface ignitor and flame sensor with replacement kit.
Flame Sensor			X	- Check that Flame Sensor is straight.	
				- Clean sensor with fine steel wool.	
Gas Burner			X	- Remove from the unit and clean with compressed air from outside matting.	
				NOTE: It is recommended to replace the burner gasket each time a burner is removed.	
Drain Lines			X	- Switch to drain and make sure water flows freely.	
Tank	X	X	X	- Adjust blow down time when required. Check that scale has not accumulated above 2".	- Drill out tank nipples when required to ensure nipples are not blocked with scale.
				- Clean tank when required.	- Clean tank.
Float Chamber	X	X	X	- Ensure floats move freely.	- Clean scale from float chamber and hose connecting to hit.
Fill Lines	X	X	X	- Inspect for leaks.	
Drain Lines	X	X	X	- Inspect for leaks at the drain pump, fill cup and float chamber.	
Gas Venting	X	X	X	- Inspect for leaks. Ensure terminal cap is clear and any condensation produced flows to condensate traps. Flue temp should be between 350-400°F.	
Direct Vent		X	X	- Inspect for leaks. Ensure intake terminal is clear.	
H/L Stack Sensor	X	X	X	- Visual check that sensor is intact, wired and attached to the exhaust.	

- Ensure that power is switched on again during periods of demand.
- The GSTC model of the Gas Steam humidifier includes a pre-cleaning sequence feature. When activated (through the keypad), the unit will flush the humidifier, refill with cold water, and flush again reducing the scale accumulated at the bottom of the tank.

CLEANING THE STEEL TANK

CAUTION: Water and scale may be hot enough to cause burns. Turn off humidifier and allow it to cool before cleaning.

It is recommended that the tank be cleaned at least once every season to maintain optimum operation. It may be necessary to increase the frequency of cleaning or increase the blowdown setting in areas of hard water or prolonged annual usage (see the Blowdown Setting section of this manual).

Cleaning of the humidifier is mandatory and must be performed on a regular basis.

To reduce cleaning time, use the pre-cleaning sequence on the GSTC model to help evacuate mineral debris from the unit. Check the controller operation to activate this feature.

The combustion chamber walls are usually self cleaning. The mineral buildup flakes off, due to the expansion and contraction and violent boiling action during on/off cycles, and settles to the bottom of the tank. The combustion end block will have scale build up, as will the heat transfer tubes. These surfaces must be cleaned at regular intervals.

Frontal port cleaning will be done through the front door of the unit. Remove cabinet door on the left of the LCD display using a Philips screwdriver. Remove the side tank port opening, by removing the 3 / 16 nuts ($\frac{1}{2}$ " key or socket is needed).

Additional clean out ports are available on the top of the 300/400 and 500/600 lb/h tanks. To access these ports, remove the top cabinet panel using a Phillips screwdriver. Remove the top clean out ports by removing the nuts.

Removal of the heat exchanger(s) is not necessary to clean the inside of the tank.

Scoop out loose scale with a small shovel such as those used for gardening. Once loose scale is removed, use a scraper such as a plastic windshield scraper to remove scale adhering to the tank or heat

exchanger walls. DO NOT use a metal scraper that will scratch the stainless steel surfaces of the tank. Once all large pieces of scale have been removed, vacuum the tank out with a shop vacuum, fill part way with water, and flush remaining sediment from the tank through the drain.

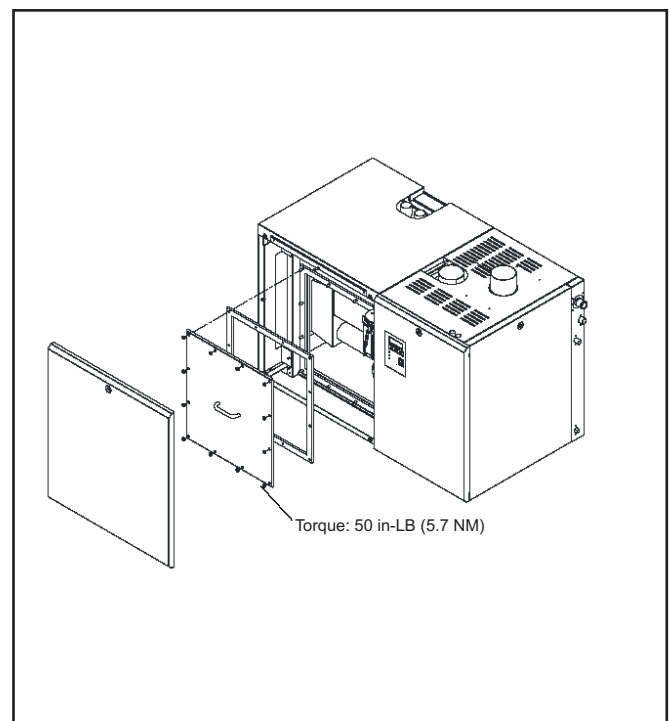
Due to the presence of polymer gaskets around the heat exchanger, do not use any harsh cleaning chemicals. Please consult NORTEC prior to using any chemicals. Once the lid has been replaced, fill the unit with water and examine for leaks.

Inspect the drain and fill lines assembly for scale build-up and if necessary remove them from the humidifier for cleaning. If the blowdown assembly becomes blocked, scale build-up in the tank will be accelerated and damage to the humidifier could result. The drain pump may be opened and cleaned. Consult NORTEC for proper procedure.

Reassemble the drain and blowdown if they were removed. Re-install tank top and side lids making sure tank cover gasket is intact. Do not over tighten hold down nuts. If using a torque wrench do not exceed 50 in/lb (5ft/lb). Re-seal all cabinet lids.

Cleaning the float chamber is accomplished by removing the hold down screws to access the floats and using a small brush to gently clean the scale from the floats and chamber. Ensure that floats are back in place and o-ring is properly seated before tightening screws on float chamber. Special attention must be used when removing or re-installing the float chamber.

Figure #26
Cleaning Tank Access



The switch board must be replaced into the same position as before cleaning and the tie-wrap must be used to hold the float chamber in position.

SERVICING THE UNIT

Caution: Disconnect power before servicing this appliance.

Caution: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.

The combustion chamber, heat exchanger and flue baffles are all fabricated from stainless steel and do not require internal cleaning.

Should the main burner fail to light, or flame is not detected during the first trial for ignition period, the gas valve is de-energized and the control goes through an interpurge delay before another ignition attempt. The control will attempt two additional ignition trials before going into lockout. The valve relay will be de-energized immediately, and the combustion blower will be turned off.

SERVICE CHECKS

COMBUSTION BLOWER

The combustion air blower motors are permanently lubricated and do not require lubrication. Clean out any dust that has accumulated in the blower housing using an air gun.

BURNER

The burners are made of ceramic fabric material and operate in the infrared mode. Depending on the environment, the burner(s) may require removal of lint or grease-laden dust periodically. This may be achieved by removing the burner and applying pressurized air to the external surface of the material. Refer to the Servicing Section related to burner removal.

Flame Sensor

Flame current is the current which passes through the flame from the sensor to ground. The ignition module must detect a minimum flame current of 0.7 microamps or a flame proving lockout will occur. To measure flame current, connect an DC micrometer to the FC- FC+ terminals on the module. Meter should read 0.7 uA or higher. If meter reads below "0" on scale, meter leads are reversed. Disconnect power and reconnect meter leads for proper polarity.

NOTE: Proper polarity of supply voltage to the unit is necessary for flame sensing to occur. Oxidation on flame sensing rod can reduce measured current. The oxidation can be cleaned from the sensing rod using steel wool or an emery cloth.

Igniter Check

If the igniter is suspected of being defective then the following test may be carried out;

1. Ensure that the power and gas is switched off before servicing.
2. To test the igniter, disconnect the igniter leads from their terminal connections.
3. Using a multimeter set the Ohm's scale and place one of the meter leads on one of the igniter wire ends and the other meter lead on the end of the other igniter wire.

Gas Valve Setting

The gas valves used in the GS series humidifier are negative-pressure-regulated valves. The valve setting listed on the product rating plate is shown relative to atmosphere – this setting will always remain constant.

The valves come preset from the factory for the correct gas type. If an adjustment is required, use the following steps:

1. Remove the screw from the pressure port marked "out" on the back side of the gas valve.
2. Connect a hose from a digital manometer (or an inclined manometer capable of reading below 0.1"w.c.) to the "out" pressure port.
3. Activate the humidifier and measure the gas valve pressure once the valve is energized and a flame is established in the combustion chamber. Verify this pressure to the pressure listed on the unit specification label.
4. If the pressure needs adjusting, remove the locking cap on the top of the gas valve.
5. Below the locking cap is an adjustment screw. Increase the pressure by turning the adjustment screw clockwise, decrease by turning counter-clockwise.

NOTE: The pressure will fluctuate slightly as the unit operates, especially with very sensitive measuring devices. Use the mean pressure value as the set pressure.

6. Once the pressure has been adjusted, replace the locking cap.
7. Replace the screw in the "out" pressure port and tighten firmly.

COMPONENT REPLACEMENT

CONSULT FACTORY PRIOR TO THE REPLACEMENT OF ANY COMPONENT.

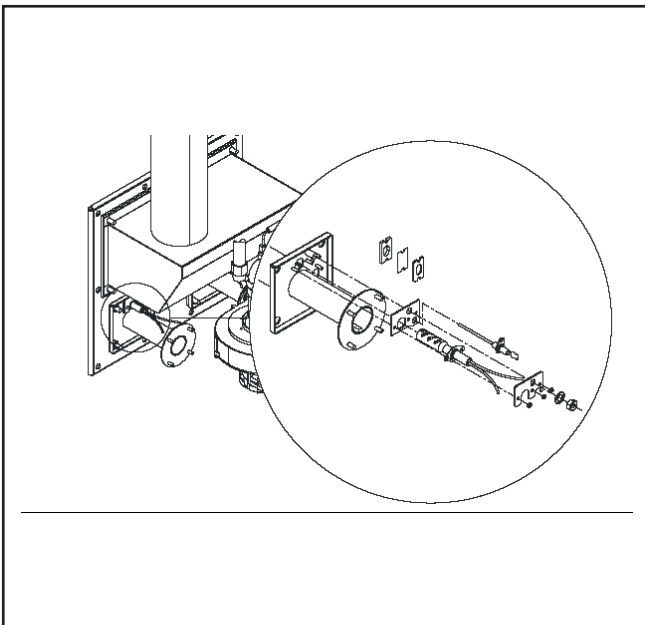
All service work must be performed by experienced and trained personnel.

Only use original NORTEC spare parts to replace defective components. Damage caused by non-approved parts is not covered under NORTEC's standard warranty.

Hot Surface Igniter and Flame Sensor Replacement

1. Shut off electrical power and gas supply to the humidifier.
2. Remove the right side service access door.
3. Disconnect all wiring to the igniter and flame sensor.
4. Unscrew the fixing nuts for the igniter and flame sensor. Carefully remove the igniter and flame sensor.
5. Reverse the sequence above to install the new igniter and flame sensor. Always install a new

Figure #27
Flame Sensor and Ignitor Assembly



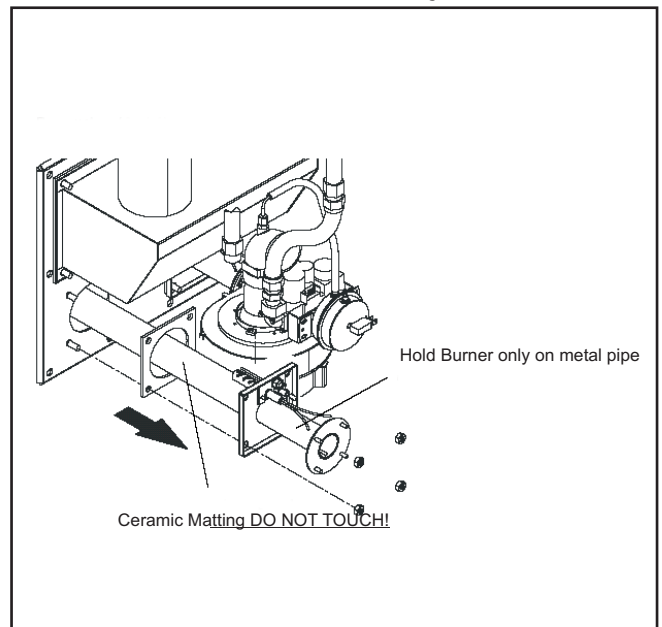
gasket when replacing the flame sensor and igniter.

CAUTION: The silicon carbide igniter is breakable. Handle with great care to avoid damage.

Burner Removal and Installation

1. Shut off electrical power and gas supply to the humidifier.
2. Remove the right side service access door.
3. Disconnect all wiring to the combustion blower, gas valve, air proving switch, igniter and flame sensor (note the connector assignment).
4. Undo the union on the flexible gas hose and disconnect the gas hose from the gas valve.
5. Undo the 4 nuts on the blower outlet and remove blower, leaving the gas valve/air inlet assembly and the fan-board mounting bracket (if present) mounted to the blower.
6. Undo the 4 large nuts that secure the burner mounting plate to the face of the heat exchanger and **carefully** remove the burner assembly. Handle the burner only by the metal surfaces. Do not grip the ceramic matting as grease, dust or dirt can affect the performance of the burner.
7. Reverse the sequence above to re-install the burner after cleaning or, if necessary, replace

Figure #28
Burner Assembly



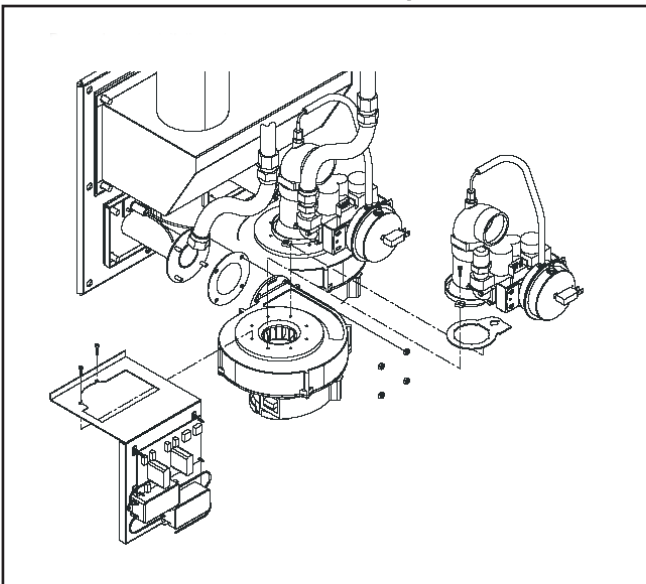
with a new burner. Inspect and replace any gaskets that may be damaged. Tighten the 4 brass nuts of burner mounting plate to a torque of 95 in-lb.

8. Leak test the gas train before re-commissioning the humidifier.

Removal and Installation of the Combustion Blower

1. Shut off electrical power and gas supply to the humidifier.
2. Remove the right side service access door.
3. Disconnect all wiring to the combustion blower, gas valve and air proving switch (note the connector assignment).
4. Undo the coupling on the flexible gas hose and disconnect the gas hose from the gas valve.
5. Undo the 2 screws that mount the gas valve/air inlet assembly to the blower and remove the assembly.
6. Undo the 2 screws of the fan-board mounting bracket (if present) and remove bracket, leaving electronic board and igniter jump start module(s) attached.
7. Undo the 4 nuts on the blower outlet and remove blower.
8. Reverse the sequence above to install the new combustion blower. Inspect and replace

Figure #29
Combustion Blower Replacement



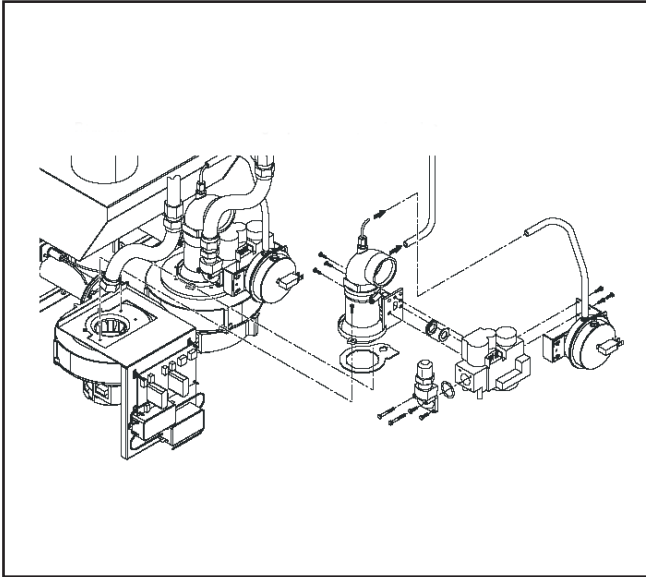
any gaskets that may be damaged. When mounting the gas valve/air inlet assembly to the combustion blower, ensure that the cork gasket is properly oriented or gas flow through the valve will be impeded.

9. Leak test the gas train before re-commissioning the humidifier.

Gas Valve Replacement

1. Shut off electrical power and gas supply to the humidifier.
2. Remove the right side service access door.
3. Disconnect all wiring to the gas valve and air proving switch (note the connector assignment).
4. Undo the coupling on the flexible gas hose and disconnect the gas hose from the gas valve.
5. Remove the hoses from the air proving switch (note the connection layout).
6. Undo the 2 screws that mount the gas valve/air inlet assembly to the blower and remove the assembly.
7. Undo the 4 screws and remove the gas pipe connection from the inlet of the gas pressure regulating valve.
8. Undo the 3 screws that hold the air inlet venturi to the gas valve. Remove the rubber grommet and brass orifice mounted in the outlet of the gas valve.
9. Undo the 3 screws of the pressure switch support bracket and remove the assembly from the gas valve.
10. Reverse the sequence above to install the new gas pressure regulating valve. Inspect and replace any gaskets that may be damaged. When mounting the gas valve/air inlet assembly to the combustion blower, ensure that the cork gasket is properly oriented or gas flow through the valve will be impeded.

Figure #30
Gas Valve Replacement

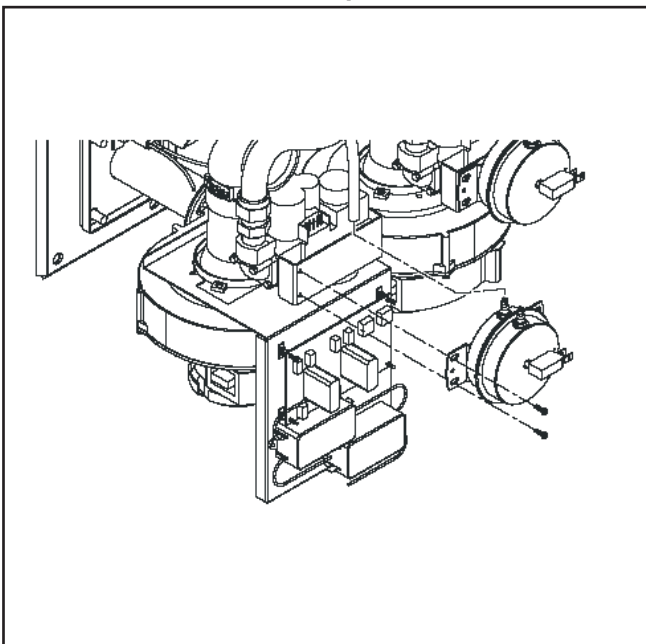


11. Leak test the gas train before re-commissioning the humidifier.

Air Switch Replacement

1. Shut off electrical power to the appliance.
2. Remove right side service panel.
3. Remove wiring connections to switch.
4. Remove pressure hose(s) from switch noting proper location.

Figure #31
Air Switch Replacement

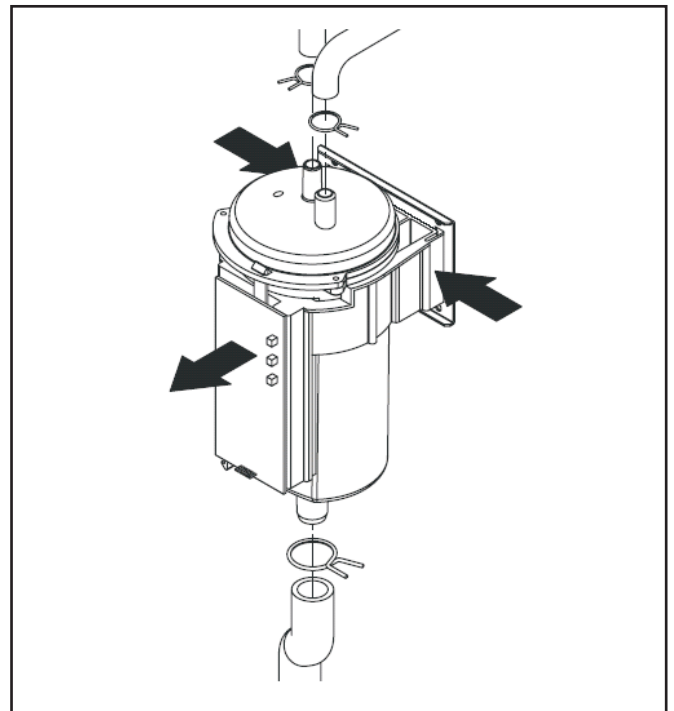


5. Remove screws (2) holding the switch.
6. Reverse above procedure to re-install.

Float Chamber Replacement

1. Drain the contents of the tank and then shut off electrical power and water supply to the humidifier.
2. Remove the left front service access door.
3. Remove the cable connection to the float board.
4. Remove the hose clamps on the float chamber and remove all hoses (note the correct hose assignment).
5. Squeeze both sides of the mounting bracket to release it from the slots in the support bracket behind the float chamber.
6. Reverse the above sequence to install the new module.
7. Leak test all water connections before re-commissioning the humidifier.

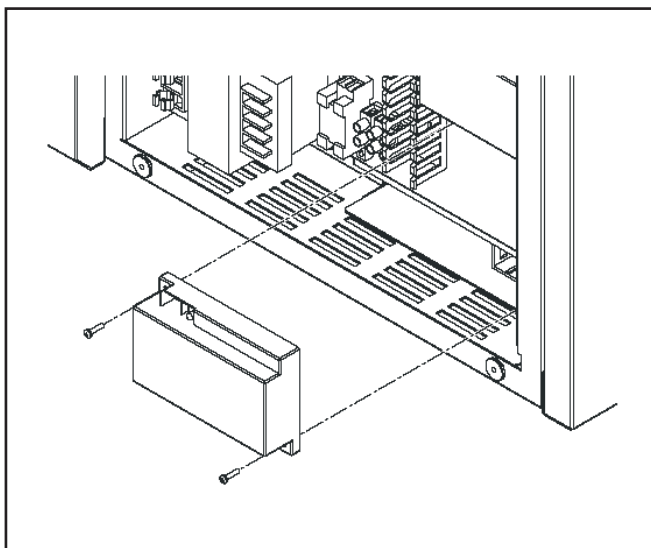
Figure #32
Float Chamber Replacement



Ignition Module Replacement

1. Shut off electrical power to the humidifier.
2. Remove the front electrical access door.
3. Disconnect all wiring connections to the ignition module, labeling as required.
4. Remove the 2 screws securing the ignition module and remove.
5. Reverse the above sequence to install the new module.

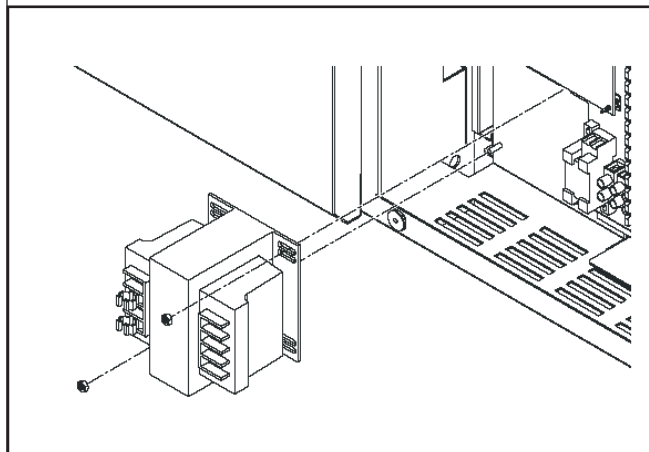
***Figure #33
Ignition Module Assembly***



Transformer Replacement

1. Shut off electrical power to the appliance.
2. Remove front access door.
3. Disconnect wiring connections from transformer leads labeling as required.
4. Remove screws (2) holding transformer.
5. Reverse above procedure to re-install.

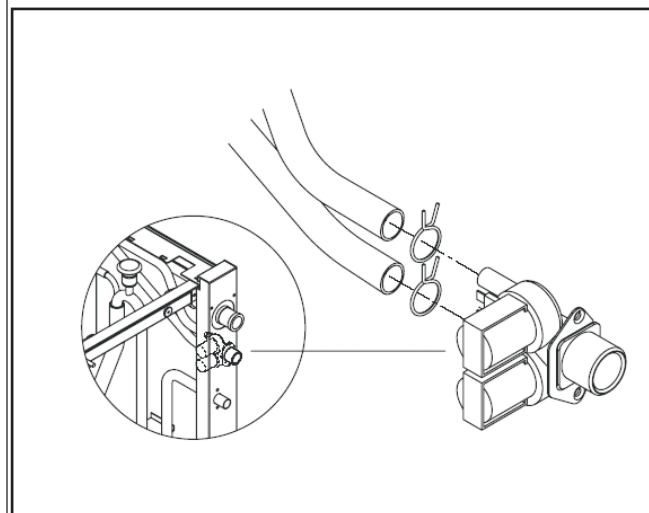
***Figure #34
Transformer Assembly***



Fill Valve Replacement

1. Shut off electrical power and water supply to the humidifier.
2. Remove the right side service access door.
3. Remove all wiring connections to the fill valve.
4. Remove the hose clamps on the fill valve outlets and remove hoses (note the correct hose assignment).
5. Remove the 2 screws securing the fill valve to the cabinet and remove the valve.
6. Reverse the above sequence to install the new module.
7. Leak test all water connections before re-commissioning the humidifier.

***Figure #35
Fill Valve Replacement***

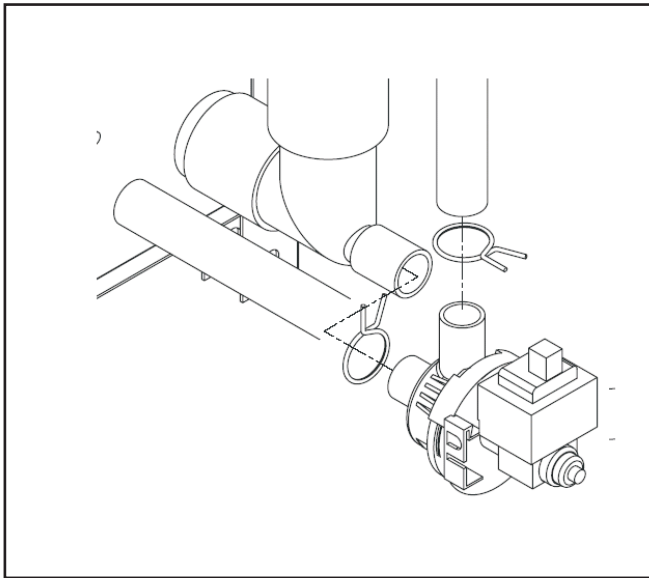


Drain Pump Replacement

1. Drain the unit completely. If the pump is broken use the auxiliary drain out port.
2. Shut off electrical power to the appliance.
3. Remove front and right doors.
4. Remove wiring connections to the pump.
5. Remove hoses attached to the pump.
6. Reverse above procedure to re-install.

NOTE: To avoid water spillage (some water will be left on the tank bottom after manual draining) use shop vac to remove left over water.

Figure #36
Drain Pump Assembly



Fill Box Replacement

Leak test all water connections before re-commissioning the humidifier.

Removal of Heat Exchanger

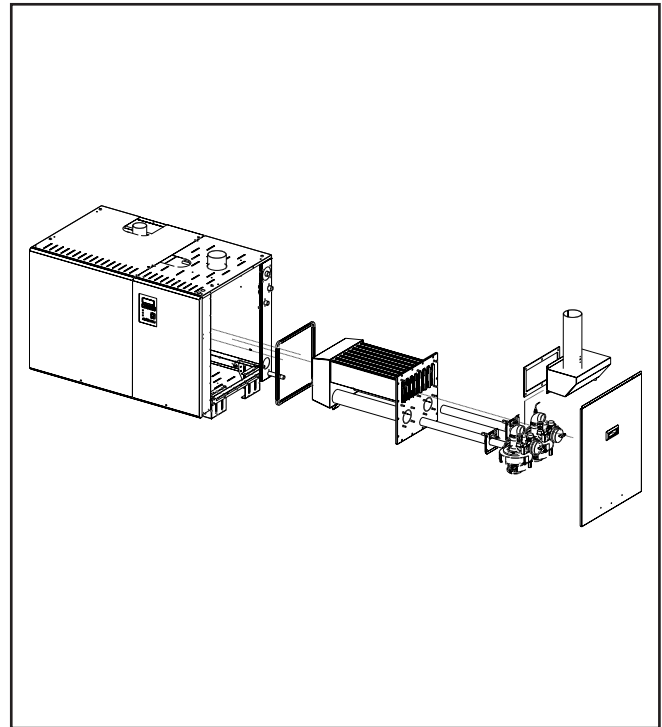
1. Take the humidifier out of operation.
2. Disconnect the gas supply pipe from the connection on the humidifier and close off the pipe.
3. Unlock and remove the right side panel(s).
4. **On Direct Vent units only:** Remove hoses from air intake manifold and air inlet elbows.
5. Dismount flue gas pipe at the flue gas outlet connection.
6. **On Direct Vent units only:** Dismount air supply pipe at the air supply connection.
7. Unlock and remove the left and the right top panels.
8. Free all cable connections to the components (combustion blower, ignition module, air pressure switch, etc.) of the respective heat exchanger.

IMPORTANT: Note the connector assignment.

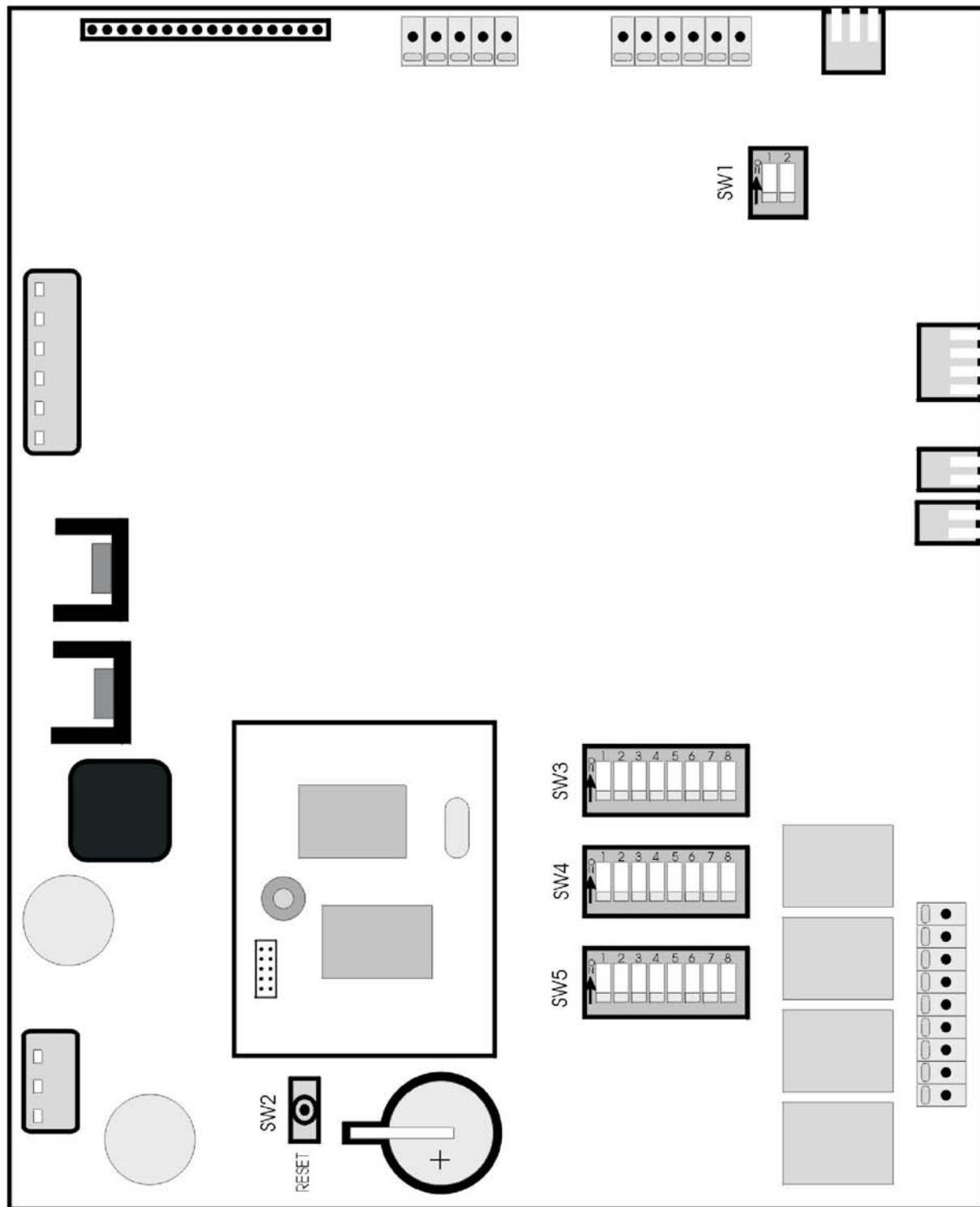
9. Undo the coupling of the respective flexible gas pipe and remove the flexible gas pipe.
10. Dismount the burner with the air blower and the gas pressure regulating valve of the respective heat exchanger.
11. Unscrew the nuts and remove the flue gas manifold from the tank.
12. Unscrew the nuts on the heat exchanger and pull out the heat exchanger from the tank.

Re-installation is carried out in the reverse sequence. Replace all seals with new ones.

Figure #38
Heat Exchange Assembly



DIP Switch Settings



3 DAY DRAIN

3 DAY DRAIN FUNCTION	SW3/7
Function Disabled	OFF
Function Enabled (Factory set)	ON

KEEP WARM

3 DAY DRAIN FUNCTION	SW5/7
Function Enabled	ON
Function Disabled (Factory set) - 3 day drain	OFF

MAINTENANCE (GSP)

MAINTENANCE INTERVAL (GSP)	SW3/8
500 hour (Factory set)	OFF
1000 hour	ON

ANALOG CHANNEL 1

Input Range	SW1/1	SW4/1	SW 4/2
0-10V input	OFF	OFF	OFF
0-5V input	OFF	ON	OFF
2-10V input	OFF	OFF	ON
1-5V input	OFF	ON	ON
0-20mA input	ON	OFF	OFF
0-10mA input	ON	ON	OFF
4-20mA input	ON	OFF	ON
2-10mA input	ON	ON	ON

ANALOG CHANNEL 2

Input Range	SW1/2	SW4/1	SW 4/2
0-10V input	OFF	OFF	OFF
0-5V input	OFF	ON	OFF
2-10V input	OFF	OFF	ON
1-5V input	OFF	ON	ON
0-20mA input	ON	OFF	OFF
0-10mA input	ON	ON	OFF
4-20mA input	ON	OFF	ON
2-10mA input	ON	ON	ON

INPUT CHANNEL

DUAL CHANNEL FUNCTION	SW4/5
One Channel Input	OFF
Dual Channel Inputs	ON

TIME PROPORTIONING

TIME PROPORTIONING	SW4/7
Disabled (Factory set)	OFF
Enabled	ON

BLOWDOWN (GSP)

BLOWDOWN	SW5/1	SW 5/2	SW5/3
5%	ON	OFF	OFF
10%	OFF	ON	OFF
15%	ON	ON	OFF
20%	OFF	OFF	ON
25% (Factory set)	ON	OFF	ON
30%	OFF	ON	ON
35%	ON	ON	ON

MAINTENANCE SHUTDOWN

MAINTENANCE SHUTDOWN FUNCTION	SW5/4
Unit will shutdown 72 hours after service time expired, by generating an error.	OFF
Unit will display warning but continues to operate. (Factory set)	ON

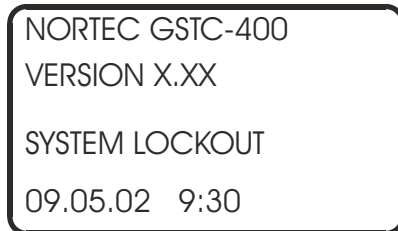
FULL TANK BLOWDOWN

FULL TANK BLOWDOWN FUNCTION	SW5/8
Disabled	OFF
Enabled (Factory set)	ON

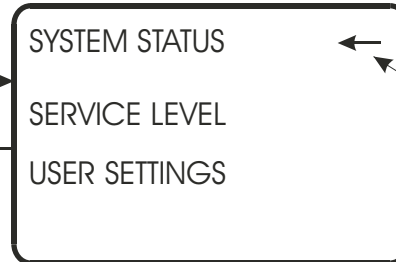
NORTEC TC CONTROLLER

Menu Structure

INTRODUCTORY SCREEN



MAIN MENU



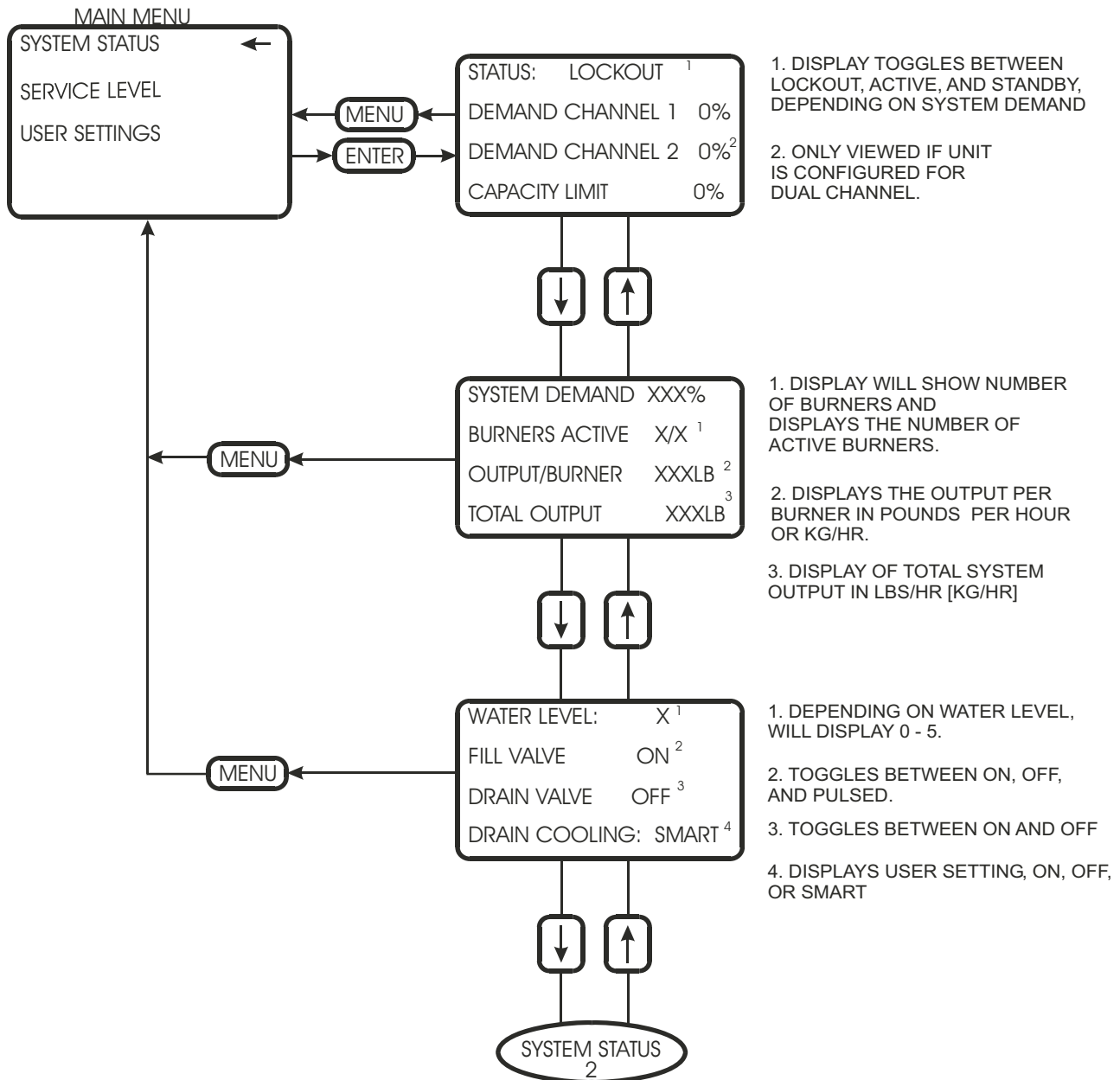
USE THE
UP/DOWN
ARROWS
TO MOVE THE
POINTER TO
SELECT A
MENU ITEM.

TO OPEN THE
SELECTION,
PRESS THE ENTER
BUTTON.

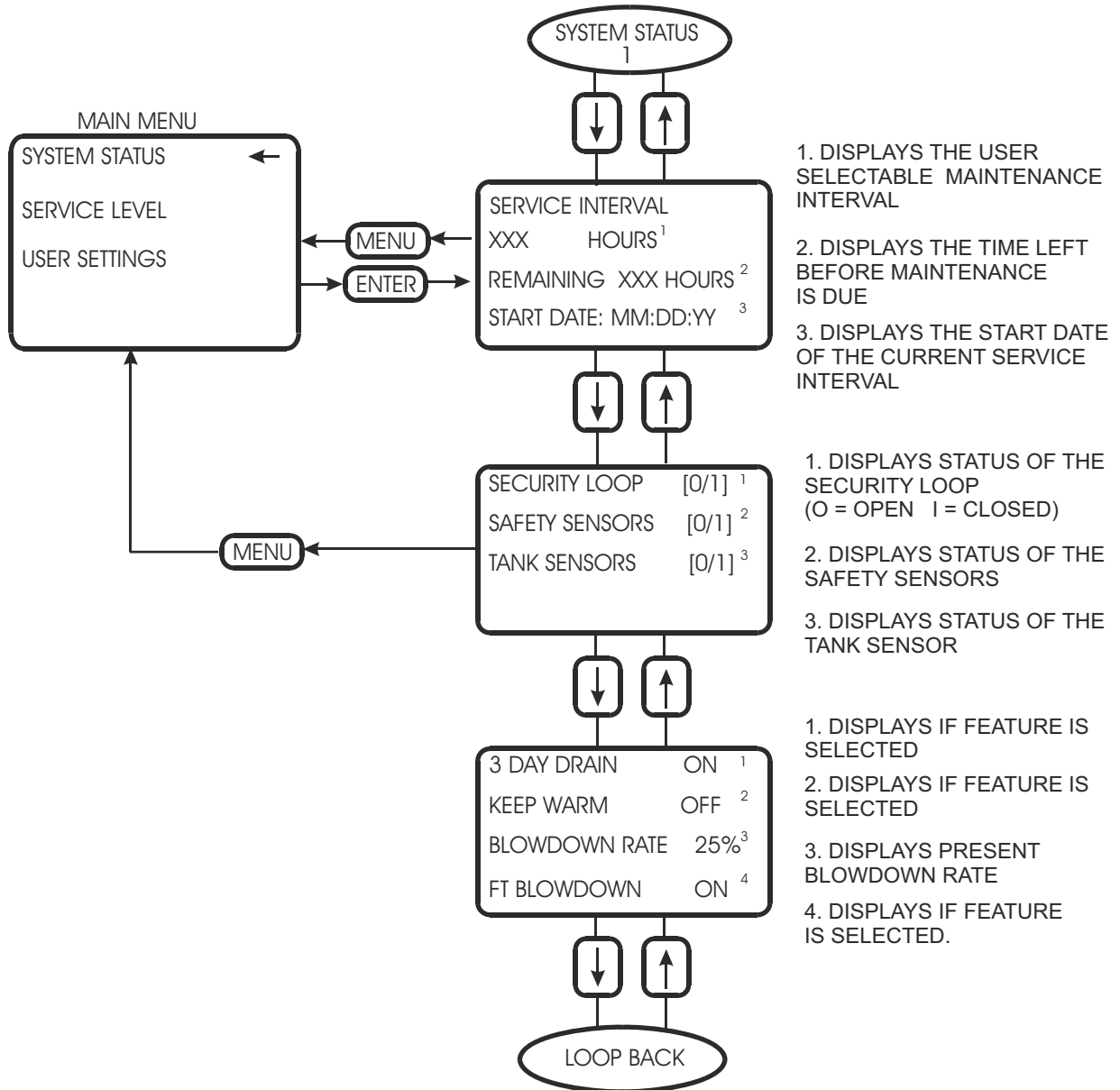
NOTES:

Go To: System Status - page 22
Service Level - page 24
User Setting - page 26

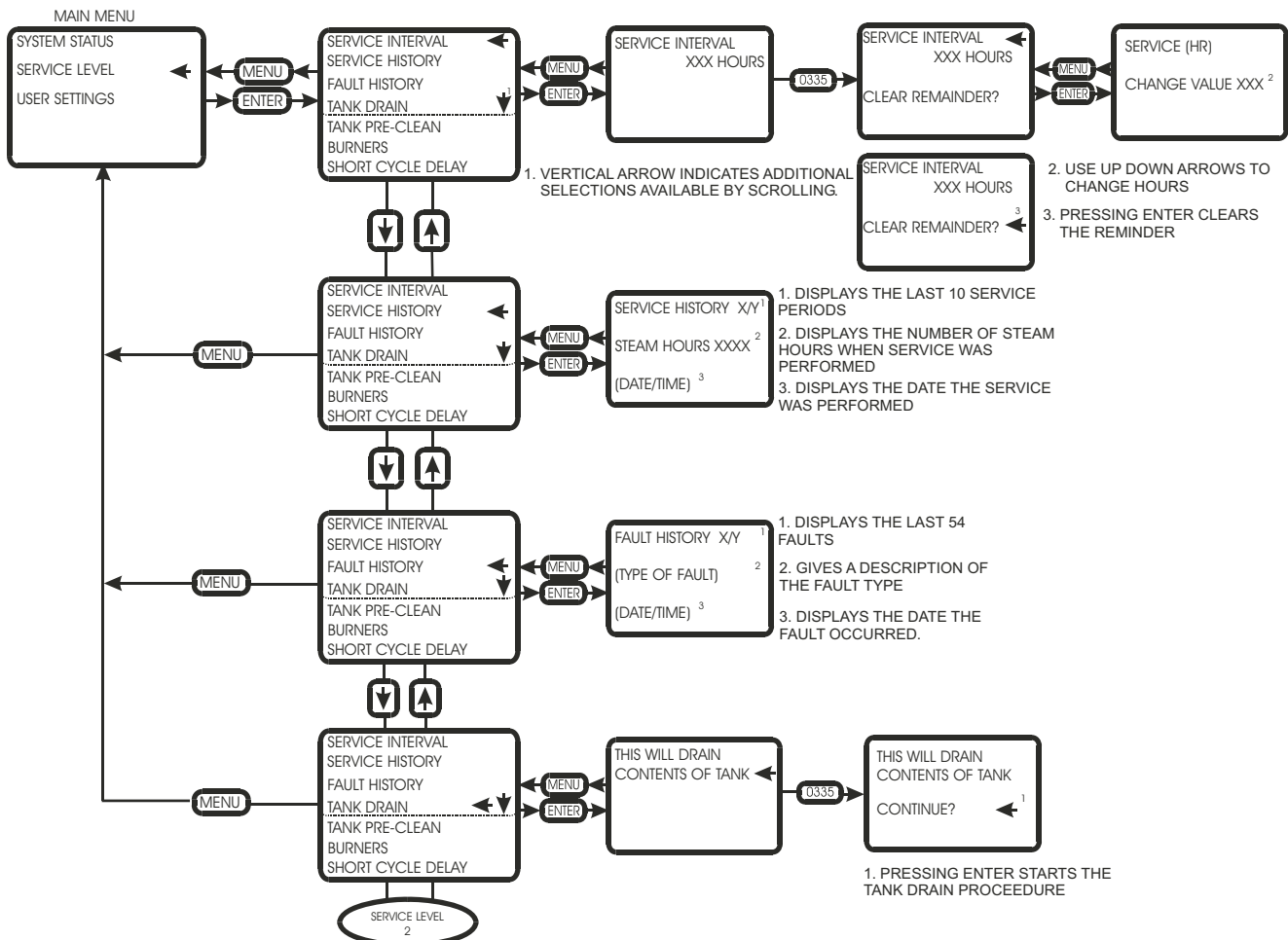
SYSTEM STATUS 1 of 2



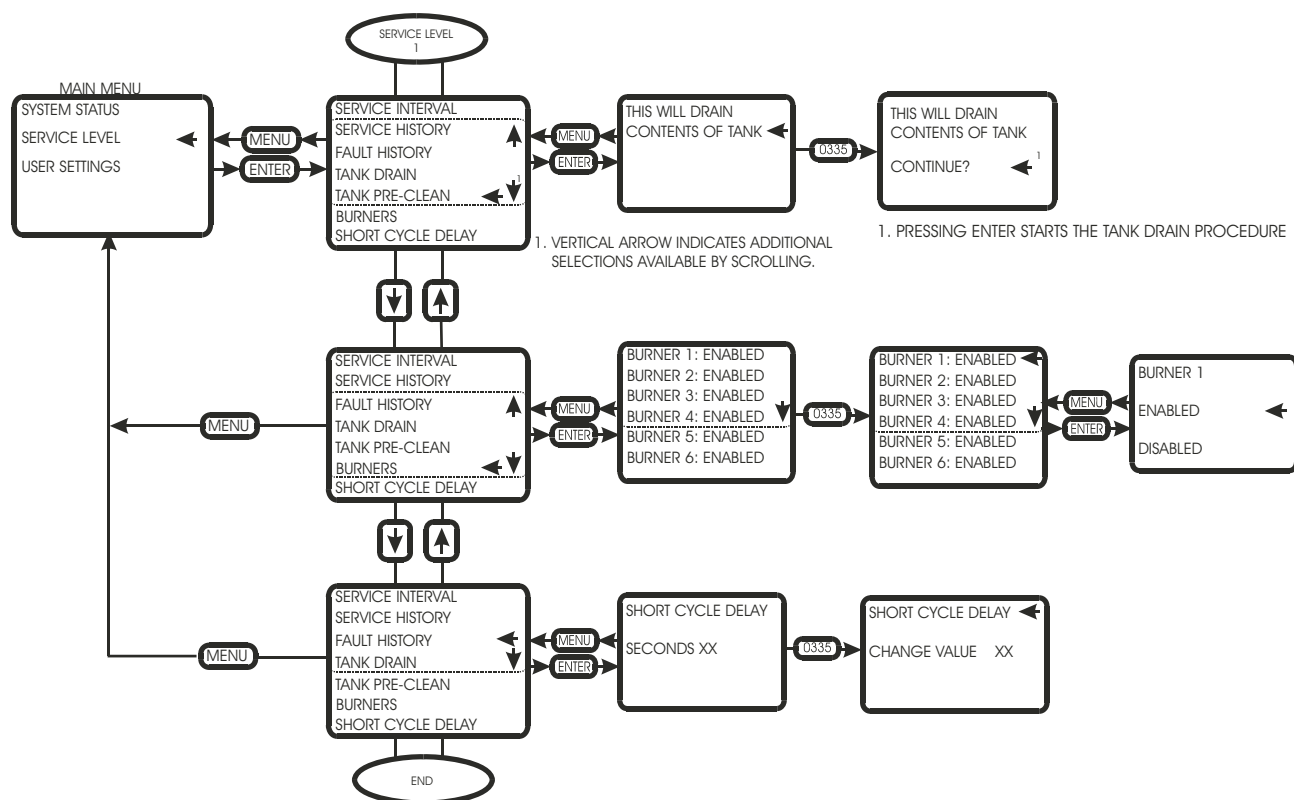
SYSTEM STATUS 2 of 2



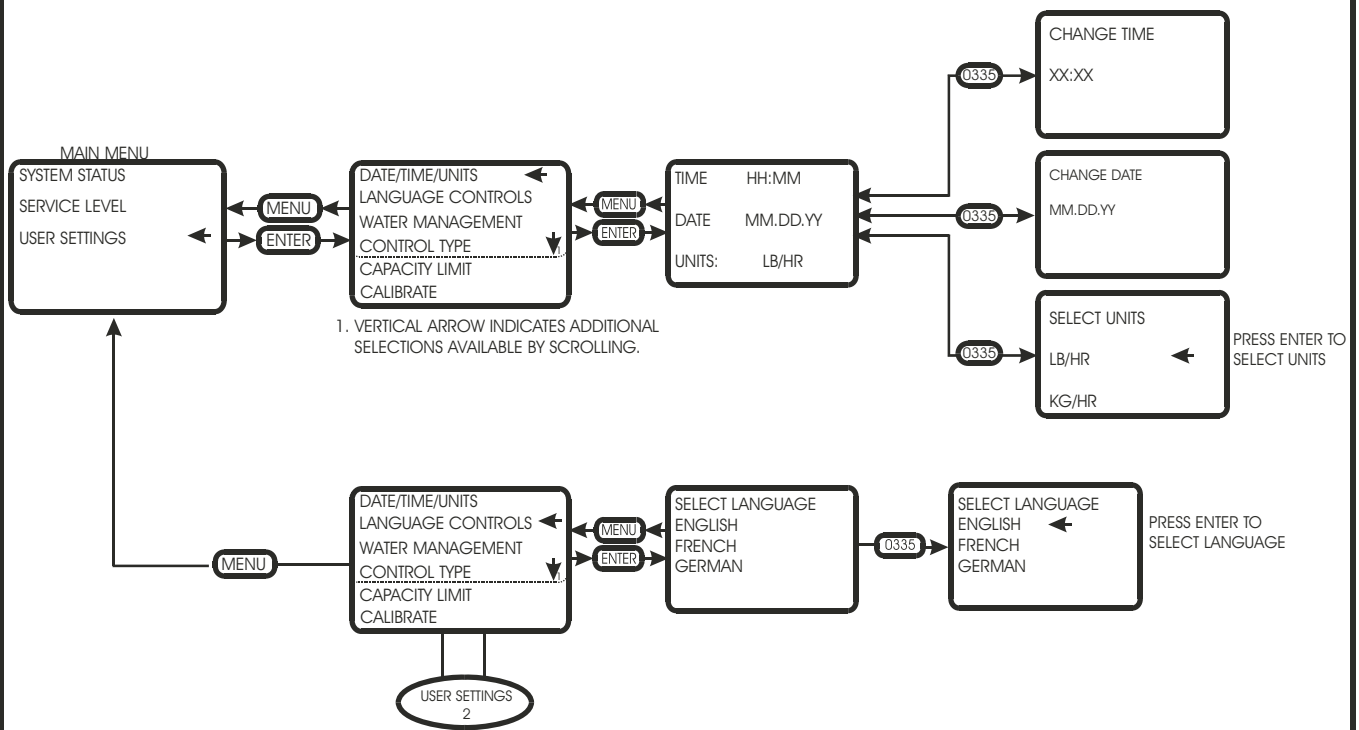
SERVICE LEVEL 1 of 2



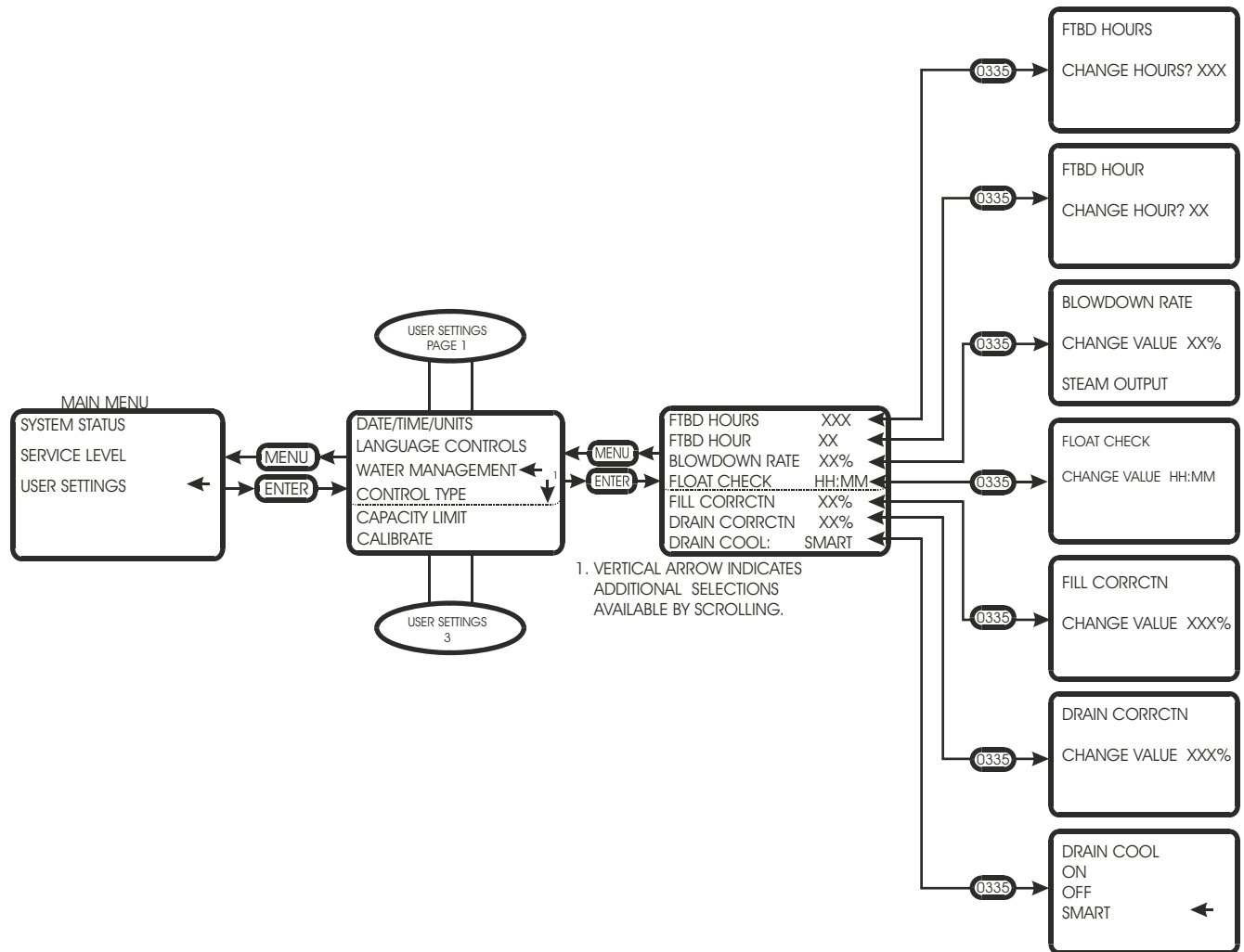
SERVICE LEVEL 2 of 2



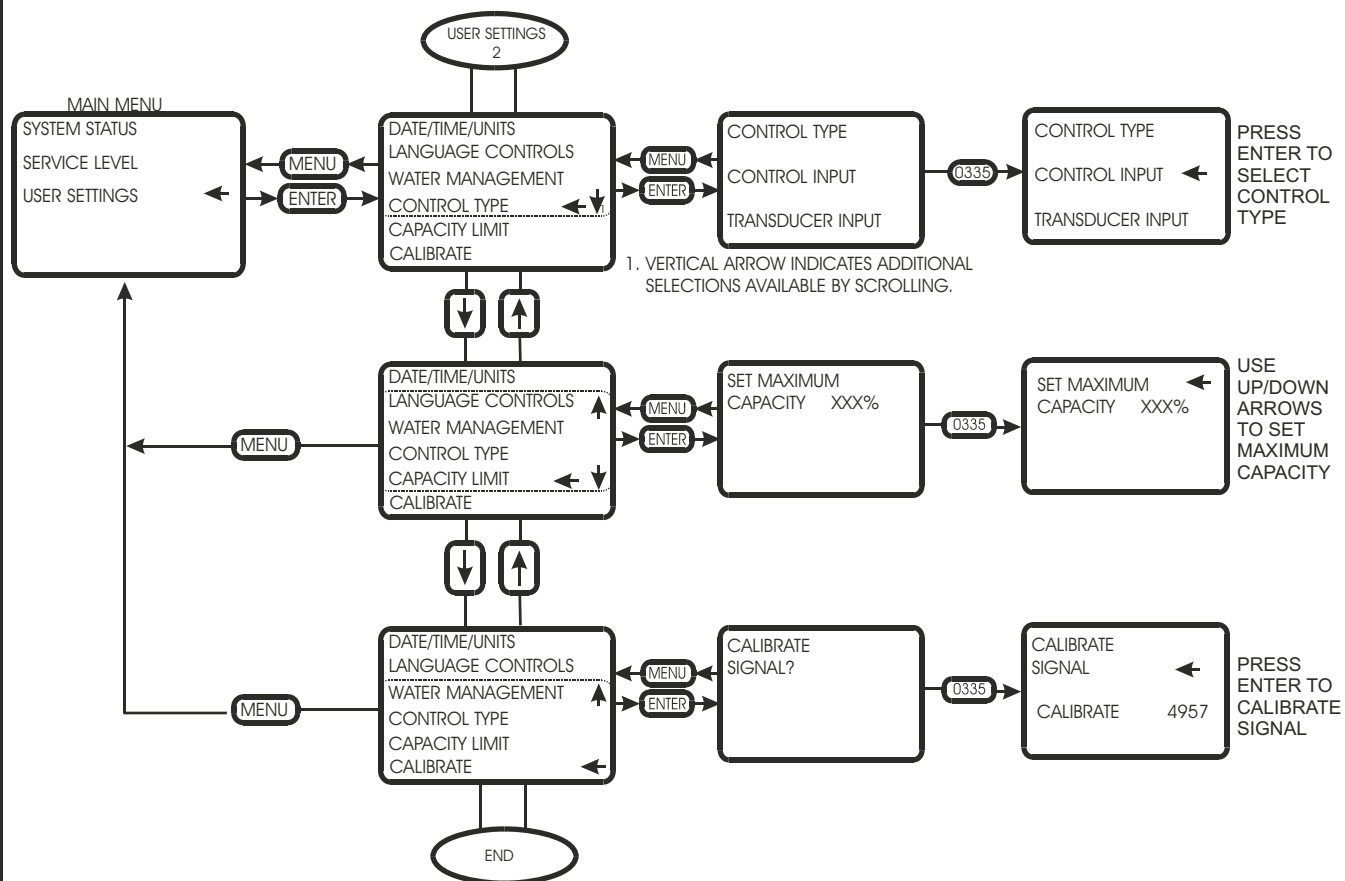
USER SETTINGS 1 of 3



USER SETTINGS 2 of 3

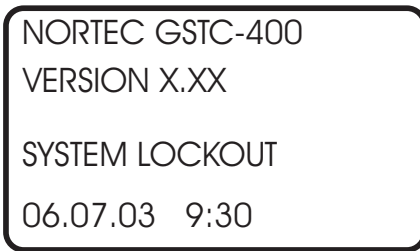


USER SETTINGS 3 of 3



NORTEC TC CONTROLLER

INTRODUCTORY SCREEN



Product name

NORTEC GSTC (100-600)

Version

The display will indicate the revision level of the control software

System

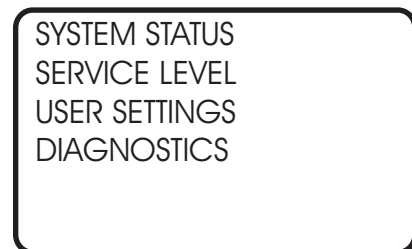
Depending on system activity, the display will toggle between LOCKOUT, ACTIVE or STANDBY.

Date/Time

The actual date and time will be displayed.

MAIN MENU

The main menu lists the available sub menus where system adjustments can be made. Some of the menus are password and jumper protected to



block access by unauthorized personnel.

System status

Displays various system parameters as the user scrolls through the lists. For further details see specific section below.

Service Level: (password protected)

This section is specific to all service related activity. For further details see specific section below.

User Settings: (password protected)

This section allows the user to set parameters specific to their requirements. For further details see specific section below.

Diagnostics: (safety loop protected)

Allows the user to activate and monitor various system operations.

Service checklist: (not available for first release)

Troubleshooting: (not available for first release)

SYSTEM STATUS

SCREEN 1:

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STATUS:	LOCKOUT
DEMAND CHANNEL 1	0%
DEMAND CHANNEL 2	0%
CAPACITY LIMIT	0%

Displays the present status of the system. Depending on system activity at the time, the field could display: lockout (security loop open), active (unit generating steam) or standby (security loop closed but no modulation demand signal).

Demand channel 1:

This field will display the modulation demand input on that channel.

Demand channel 2:

Field only visible if the unit is configured for dual modulation. This field will display the modulation demand input on that channel.

Capacity limit:

This field displays the user adjusted capacity limit set for the humidifier.

SCREEN 2:

System demand:

SYSTEM DEMAND	XXX%
BURNERS ACTIVE	X/X
OUTPUT/BURNER	XXXLB
TOTAL OUTPUT	XXXLB

This field displays the total system demand as a percentage.

Burners active:

This field displays the number of active burners and the number of available burners.

Output/Burner:

This field will display the actual output of steam generated by each burner (kg/hr or lbs/hr).

Total output:

This field will display the total system steam output (kg/hr or lbs/hr).

SCREEN 3:

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WATER LEVEL:	X
FILL VALVE	ON
DRAIN VALVE	OFF
DRAIN COOLING:	SMART

This field displays the present water level detected by the float system.

Fill valve:

This field displays status of fill valve, on, off, or pulsed.

Drain valve:

This field displays status of drain pump, on or off.

Drain cooling:

This field displays the user (or factory default) setting.

OFF: fill will not activate when drain is activated.

ON: fill will activate whenever the drain activates.

SMART: fill will activate only when drain water is hot.

SCREEN 4:

SERVICE INTERVAL	XXX HOURS
REMAINING	XXX HOURS
START DATE:	MM:DD:YY

Service interval:

This field displays the user (or factory default) setting for the humidifiers service reminder in steam hours.

Remaining:

This field displays the amount of time (steam hours) remaining before the next service is to be performed.

Start Date:

This field displays the date this service interval began.

SCREEN 5:

SECURITY LOOP	[0/1]
SAFETY SENSORS	[0/1]
TANK SENSORS	[0/1]

Security loop:

This field displays the status of the security loop (terminals 1 and 2 on LV terminal strip). If it is open the display will indicate "0", if it is closed the display will indicate "1".

Safety sensors:

This field displays the status of the safety sensors* input. If it is open the display will indicate "0", if it is closed the display will indicate "1".

*There are two safety sensors on the GSTC. One for tank over temperature and one for stack over temperature. Both sensors are wired in series.

Tank sensor

This field displays the status of the tank sensor input. If it is open the display will indicate "0", if it is

closed the display will indicate "1". Closed indicates that the tank temperature is above 160°F (70°C).

This input is used for the "keep warm" feature and for activating the fill valve during blowdown cycles.

SCREEN 6:

3 DAY DRAIN	1
KEEP WARM	0
BLOWDOWN RATE	XX%
FT BLOWDOWN	1

3 day drain

This field indicates if the feature has been selected (0 = no, 1 = yes).

Keep warm

This field indicates if the feature has been selected (0 = no, 1 = yes).

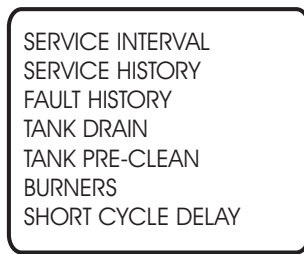
Blowdown rate:

This field displays the selected blowdown rate.

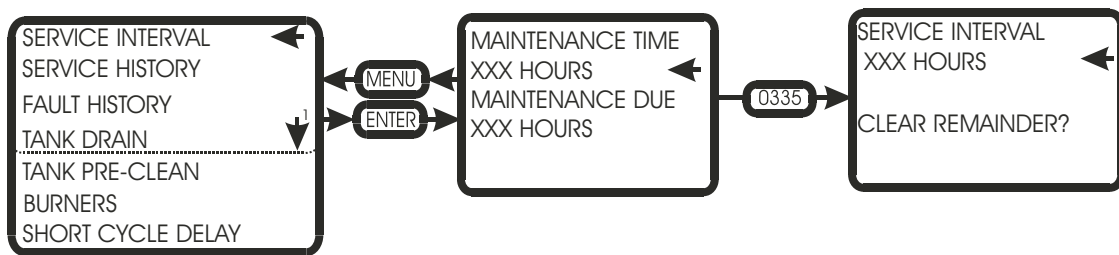
Full tank blowdown

This field indicates if the feature has been selected (0 = no, 1 = yes).

SERVICE LEVEL



The service level area is where service related tasks are performed. Below is a description of each field and what can be performed in them. When a parameter requires a change, press the two arrow keys and enter the password (0335). As long as you remain in this section, you will not need to enter the password more than once.



Service interval

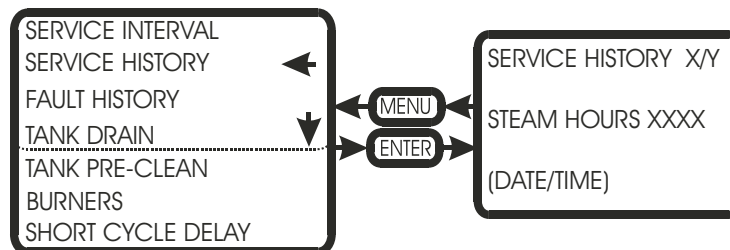
In this area the customer can set a service interval for humidifier MAINTENANCE.

MAINTENANCE TIME
XXX HOURS

This field displays the user selected MAINTENANCE time. To change the time selected enter the user code and adjust the time in SET MAINT. TIME (0-3000 hours, 0 = disabled).

MAINTENANCE DUE
XXX HOURS

This field displays the time remaining until the next service interval. To reset the MAINTENANCE due time, enter the user code and select CLEAR REMINDER?



Service history

In this area the customer can view the history of service maintenance performed on the humidifier.

SERVICE HISTORY X/Y

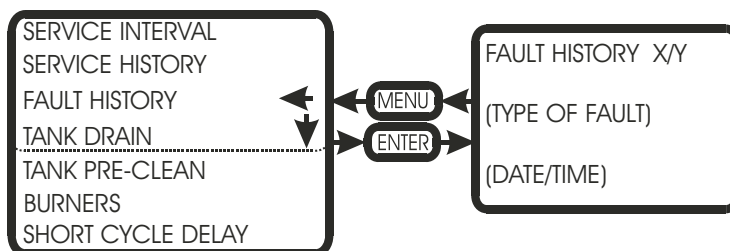
The service history stores the last 10 service periods.

X = service occurrence, where 1 is the most recent.

Y = total number of recorded services (up to 10 maximum).

STEAM HOURS XXX
(DATE/TIME)

This field displays the steam hours and the date and time when the specific service (X) was performed.



Fault history

In this area the customer can view the history of recorded faults for the humidifier.

FAULT HISTORY X/Y

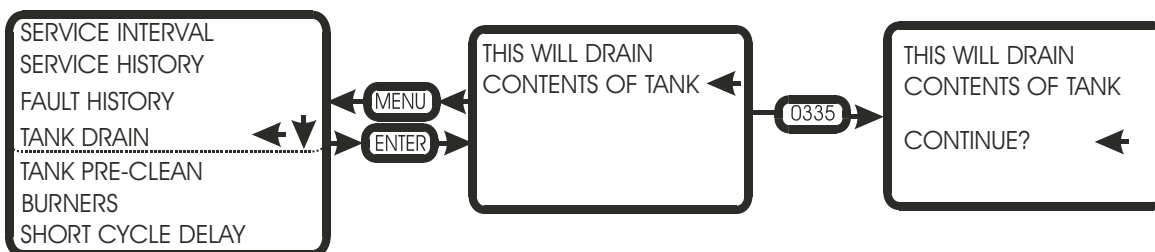
The fault history stores the last 54 system faults.

X = fault occurrence, where 1 is the most recent.

Y = total number of recorded faults (up to 54 maximum).

(type of fault) and (date/time)

A description of the fault type is displayed along with a date and time stamp when the fault occurred.



Tank Drain

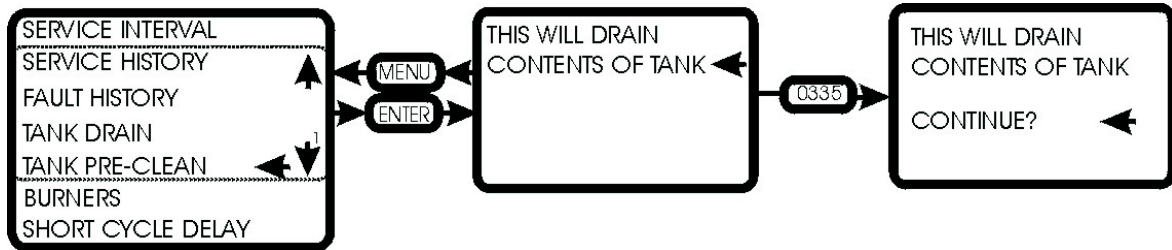
The tank drain feature, when activated, will activate the drain valve for a fixed period of time (depending on unit size).

To drain the tank press enter when CONTINUE is selected. During the tank drain cycle the display will indicate the tank is draining and the amount of time remaining on the cycle. To interrupt the cycle the unit must be switched off then on. Must enter service password to activate this function.

Tank Pre-Clean

The tank pre-clean feature when activated will activate the drain valve for a fixed period of time (depending on unit size). The fill valve will then activate, filling the tank partially with cold water. At the completion of the fill cycle the tank will once again drain.

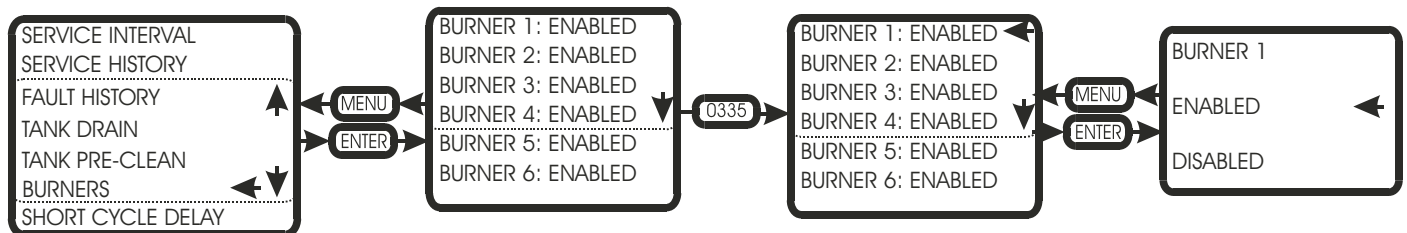
This will help to flush out any accumulated minerals as well as cool the tank for the service personnel.



To pre-clean the tank press enter when CONTINUE is selected. During the tank pre-clean cycle the display will indicate the tank is draining and the amount of time remaining on the cycle. To interrupt the cycle the unit must be switched off then on. Must enter service password to activate this function.

Burners

This field allows the user to enable and disable individual burners for service reasons. Depending on the GSTC model, only the number of burners installed will be displayed

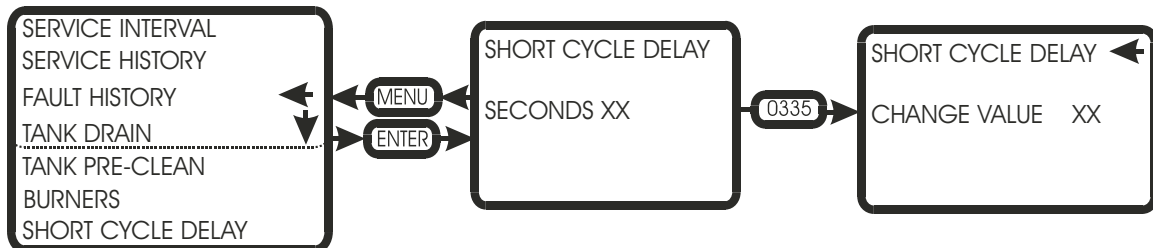


After entering the user code (0335) the individual burner can be highlighted. Once ENTER is pressed, the burner can be enabled or disabled.

Short Cycle Delay

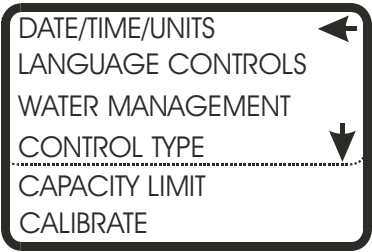
The short cycle delay feature can be used to reduce the amount of ON/OFF cycles during operation. The feature will cause a delay between cycles by forcing the system to wait a pre set period (seconds) before responding to a

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The delay can be set from 1 to 1000 seconds. The default shall be 1 second since any larger value can result in a less dynamic response of the system as a whole. This feature should only be used once a short cycle condition has been identified.

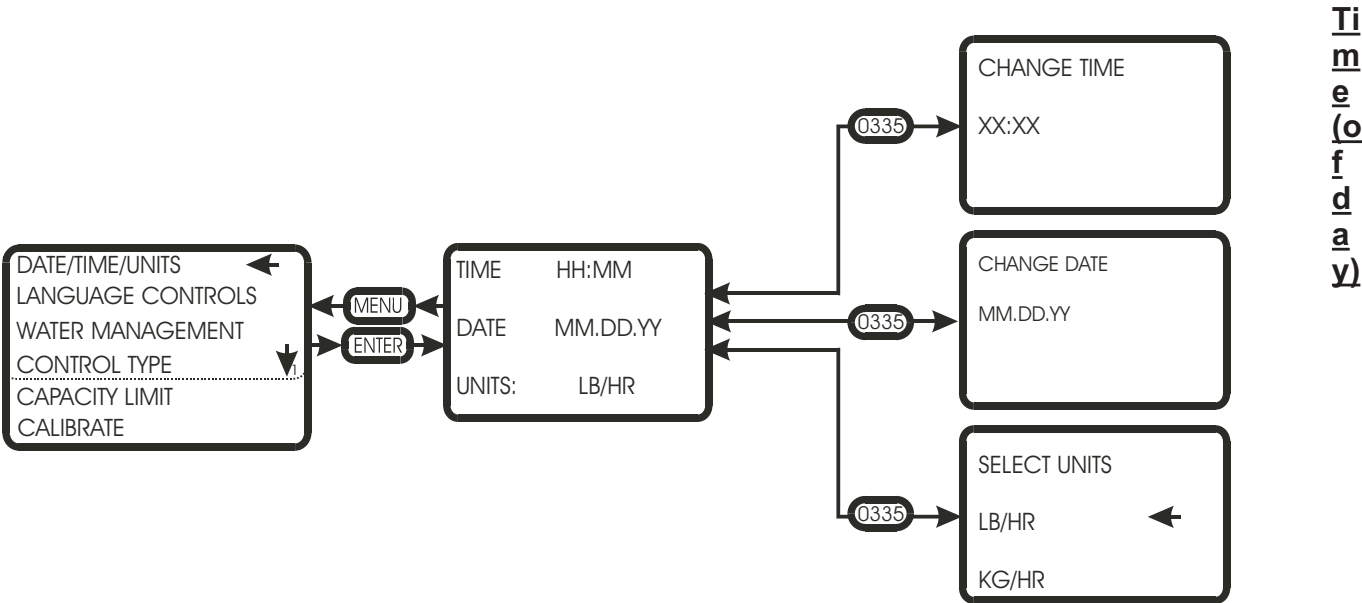
User Settings



When a parameter requires a change, press the two arrow keys and enter the password (0335). As long as you remain in this section, you will not need to enter the password more than once.

Date / Time Units

This field is used for modifying the Date, time and the units of measurement. The date and time are important parameters when features such as full tank blowdown are enabled.



To set the time of day, highlight the selection then enter the user code (0335). Press enter. Use the UP/DOWN arrows to adjust the hours (24 hour format). Pressing enter saves the setting and indexes the display to minutes. Use the UP/DOWN arrows to adjust the minutes. Pressing enter saves the setting and returns the user to the previous menu.

Date

To set the date, highlight the selection then enter the user code (0335). Press enter. Use the UP/DOWN arrows to select the month. Pressing enter saves the setting and indexes the display to number of the month. Use the UP/DOWN arrows to adjust the number. Pressing enter saves the setting and indexes the display to year. Use the UP/DOWN arrows to adjust the year. Pressing enter saves the setting and returns the user to the previous menu.

Units

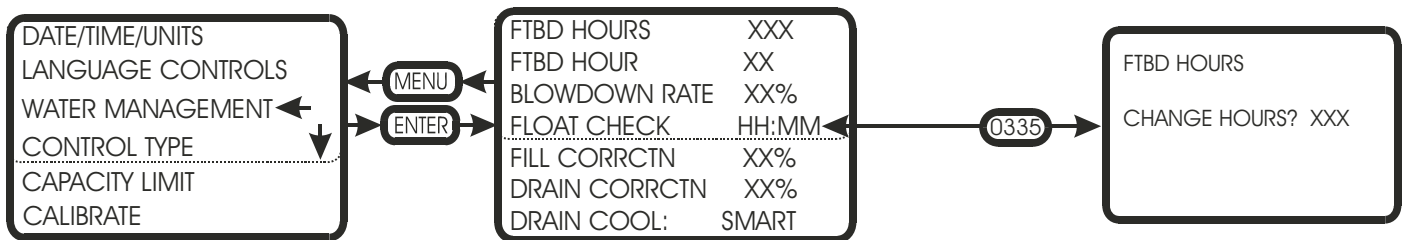
Here the user can select the unit of steam production rate. To set the units, highlight the selection then enter the user code (0335). Press enter. Use the UP/DOWN arrows to select the units (LB/HR or KG/HR). Pressing enter saves the setting and returns the user to the previous menu.

Language Controls



This field allows the user to select the menu language of choice (English, French, German)

Here the user can select the language of choice for the menu displays. To set the language, highlight the selection then enter the user code (0335). Press enter. Use the UP/DOWN arrows to select the choice (English, French, German). Pressing enter saves the setting and returns the user to the previous menu.



NOTE: ONLY ENGLISH AVAILABLE AS OF 05/03

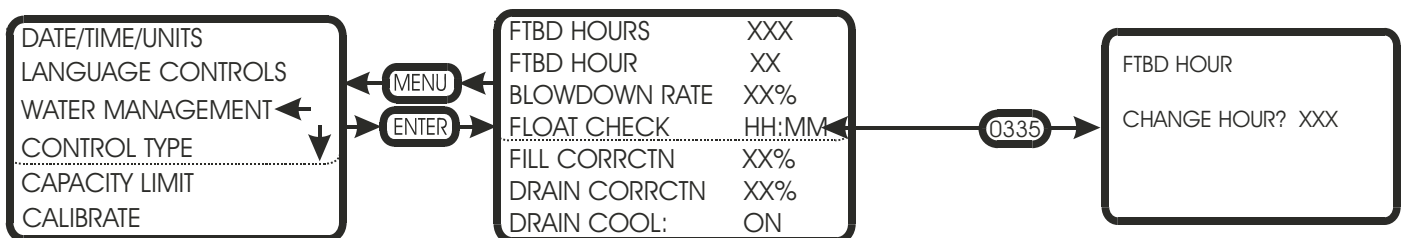
Water Management

This section allows the user to set time based parameters and adjust water control parameters.

FTBD Hours

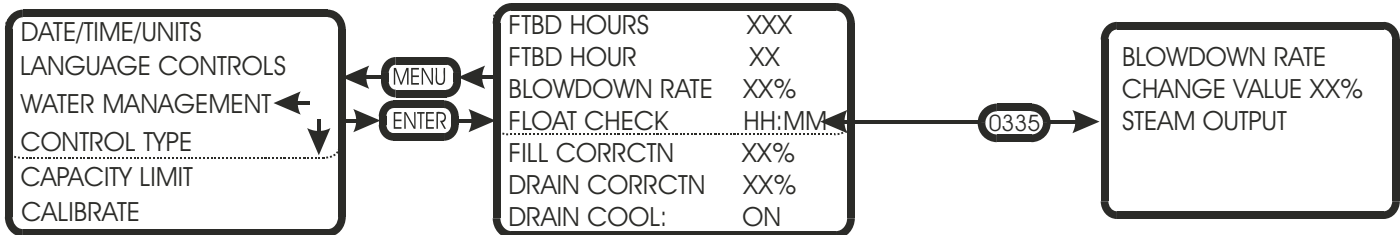
This section allows the user to set the frequency of full tank blowdowns (FTBD). FTBD's drains and re-fills the entire contents of the humidifier after a preset accumulated operating time. Run time is measured in steam hours (weighted run time hours), and can be adjusted from 0 hours (feature off) to 400 hours in 25 hour increments.

Once the FTBD time has expired, the controller will wait until the FTBD hour to initiate the cycle. This prevents random drains at times when they would be inconvenient.



FTBD Hour

Works in conjunction with FTBD hours.

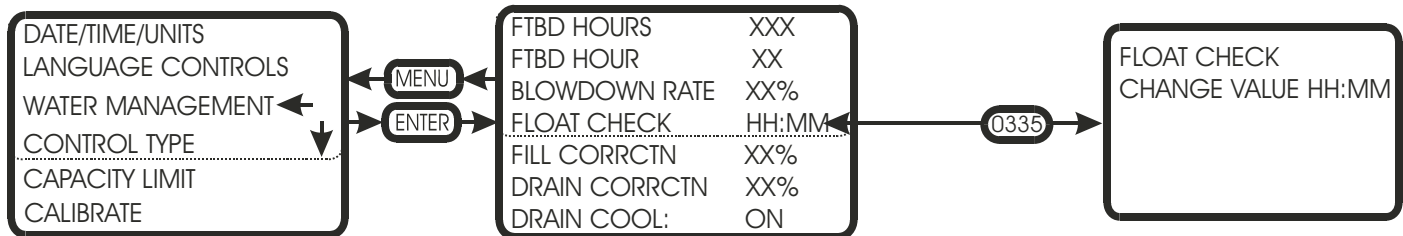


Here the user sets the time of day (24 hour format) when they want the FTBD to execute. The time can be set to trigger the cycle during off hours, when the humidity requirements are minimal.

The time is adjusted in one-hour increments.

Blowdown Rate

This parameter adjusts the frequency of blowdown cycles.



Depending on water quality, the blowdown rate can be adjusted from 5% to 50%. The percentage is based on the steam production rate i.e. a 10% BD rate will drain 10 kg. of water for every 100 kg. of steam produced.

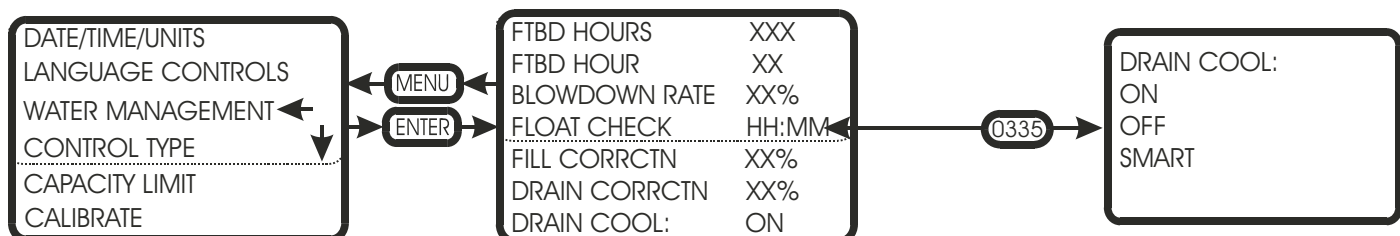
The higher the mineral content of the water the higher the BD rate should be set.

Float Check

This parameter sets the time of day the controller will force a float check.

Float checks are important to ensure the water level detection system is operating correctly. The float check also tests the fill and drain system and will report any problems detected.

To set the time of day, highlight the selection then enter the user code (0335). Press enter. Use the UP/DOWN arrows to adjust the hours (24 hour format). Pressing enter saves the setting and indexes the display to minutes. Use the UP/DOWN arrows to adjust the minutes. Pressing enter saves the setting and returns the user to the previous menu.



Fill CORRCTN (correction)

Used for adjusting the fill rate. Adjustments to be made under factory direction only.

Drain CORRCTN (correction)

Used for adjusting the drain rate. Adjustments to be made under factory direction only.

Drain Cool

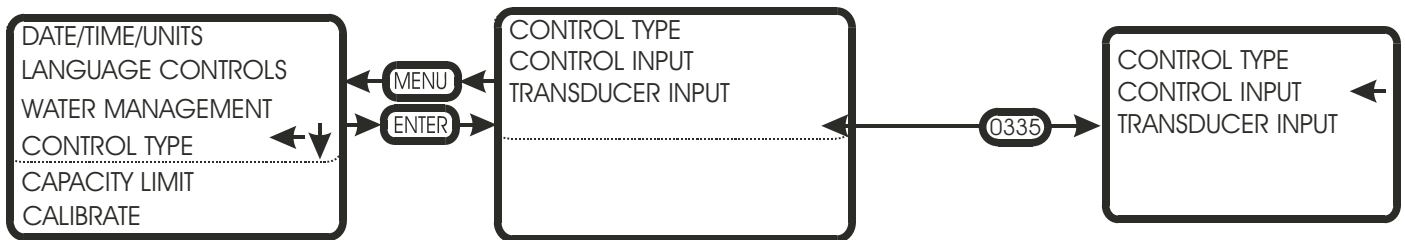
The customer can select the type of drain water tempering they require (depending on local plumbing codes)

The customer can select ON, OFF, or SMART.

ON – whenever the drain valve is activated through software, the fill valve will automatically activate. This is the factory default setting, but is the most wasteful of water since it will activate even if the drain water is cool.

OFF – The drain water is never tempered. This can be used where plumbing codes permit. Some process waters are very expensive, so the customer may choose to temper the drain water through other means.

SMART – The humidifier has a tank sensor that communicates the water temperature to the controller. If the water is hot during drain cycles the fill valve will be activated. This is the most “water smart” of the settings.

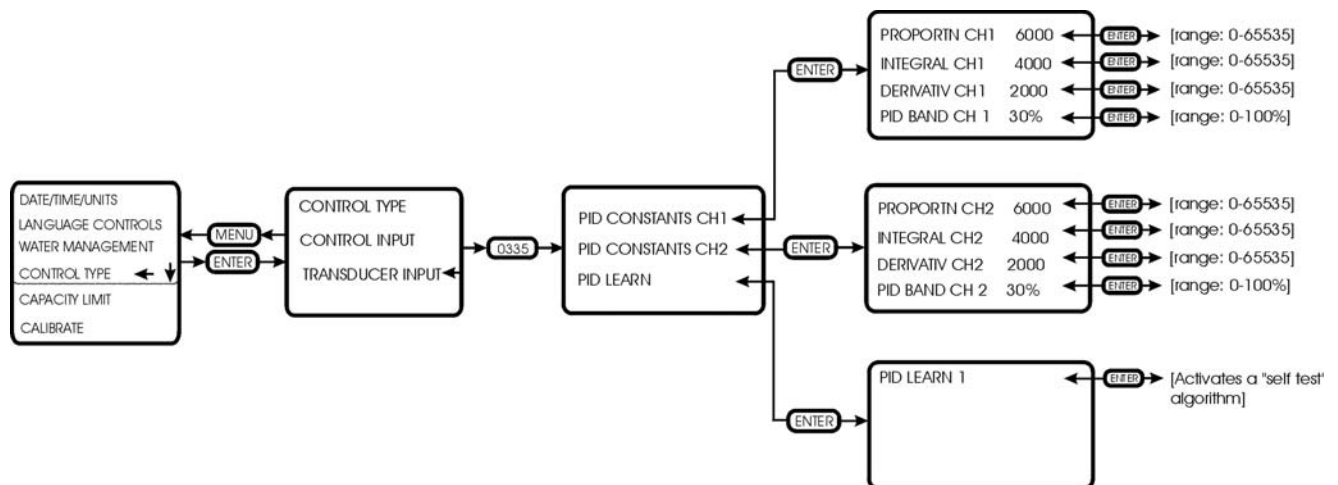


Control Input

This section is used for configuring the controller for a controller input or a transducer input.

To select control input, highlight the selection then enter the user code (0335). Press enter. Use the UP/DOWN arrows to select control input.

The controllers dip switches then determine the type (0-10 Vdc, 0-20 mA, etc.) of control signal to process.



Transducer Input

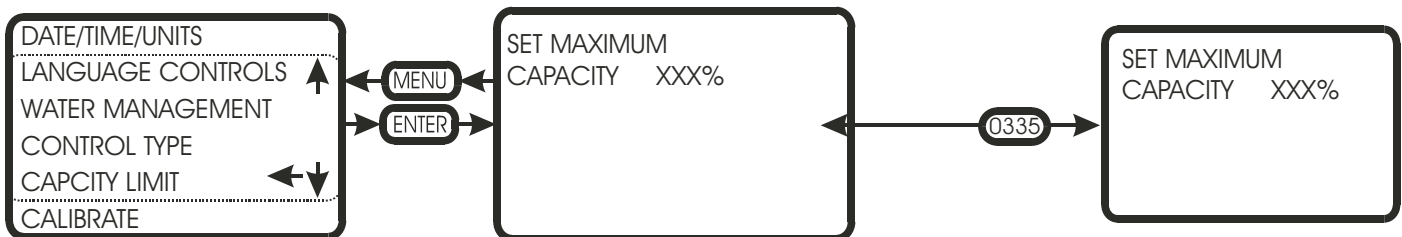
This section is used to configure the controller for transducer signals

In this section you can adjust the proportional, integral and derivative constants. There is also a PID learn algorithm which will tune the various PID constants for optimal performance.

Capacity Limit

In this section the customer can adjust the maximum output of the humidifier between 25-100%.

To adjust the maximum capacity, highlight the selection then enter the user code (0335). Press enter. Use the UP/DOWN arrows to adjust the output between 25 and 100%.



Calibrate

This selection is used to fine-tune the operating range of the controller. Some modulation signals are not precisely as stated e.g. a 0-10 controller could actually modulate over a 0-11 volt range.

This selection should only be used by factory-trained individuals.

FAULT LIST

GSTC fault displayed	GSP fault code displayed	Description of fault	Troubleshooting
FAULT NO BURNERS AVAILABLE	NBF	Once the GS controller detects an ignition module fail, it will index to the next available ignition module. If all ignition modules have failed or there are none available (in the case of a 100 unit) this fault will be generated	-Check red LED's on all modules for flashing fault code -Ensure there is gas supply to the humidifier -Ensure that the burners have not been disabled in the software -Consult factory
FAULT AIR PROVING SWITCH X OPEN WITH BLOWERS ACTIVE	AOF-X	On startup after 3 tries if the AP switch does not close within the proving period, this fault will be generated	-Check that blue hoses on the Air Proving switch have not come loose. -Check that wires on the Air Proving switch are on the N/O contacts -If available, swap Air Proving switch with another and see if the fault follows the air proving switch, if so, replace switch -Consult factory
FAULT AIR PROVING SWITCH X CLOSED WITH BLOWERS INACTIVE	ACF-X	On initial startup if any of the A/P switches are closed this fault will be generated.	-Ensure that wiring on the air proving switch is on the N/O contacts -Ensure that there is no continuity between the switch with the wires off, if so replace switch -Ensure that there is not a strong positive pressure in the room holding the switch closed -Consult factory
FAULT BLOWER X RPM HIGH	BHF-X	If the blower RPM is above the RPM tolerance for more than 10 seconds, this fault is generated and the humidifier stops.	-Check wiring to lead blower and ensure a good connection. -Check lead blower for any restrictions by testing it in the diagnostics screen. -Consult factory
FAULT BLOWER X RPM LOW	BLF-X	If the blower RPM is below the RPM tolerance for more than 10 seconds, this fault is generated and the humidifier stops	-Check wiring to blower X and ensure a good connection. -Check blower X for any restrictions by testing it in the diagnostics screen. -Consult factory
FAULT BLOWER X NOT OPERATIONAL	BNF-X	On startup, if the blower RPM does not exceed 500 RPM within 5 seconds or if during operation, the RPM drops below 500 RPM for more than 5 seconds this fault is generated	-Ensure there is power to the blower and that all wires are making a proper connection. -Consult factory
FAULT ILLEGAL GAS VALVE BURNER X	GVF-X	If the controller detects that a gas valve has activated at a time it should not this fault is Generated.	-Ensure that the ignition module is not miswired or that the module is not faulty by swapping it with a known good one. If the problem follows the ignition module, replace the module -Consult factory

FAULT LIST

FAULT GAS RE-IGNITION BURNER X	GIF-X	Following an ignition module fault if the modules gas valve activates this fault will be generated.	-Ensure that the ignition module is not miswired or that the module is not faulty by swapping it with a known good one. If the problem follows the ignition module, replace the module -Consult factory
FAULT DRAIN NOT WORKING DRAIN IS BLOCKED	DBF	There are many time windows in the GS software. If, during a drain cycle, the time window for the water level to drop is exceeded, this fault is generated	-Ensure that pump is being energized -Check for blockage in all aspects of the drain system -Float board defective -Consult factory
FAULT FLOAT CHECK	FCF	Once every 24 hours (provided the unit is powered and in an operating or standby condition) the controller will test the water level detection circuit. If the test fails this fault is displayed	-Ensure the proper operation of the fill valve and drain valve via the diagnostics screen -Float board is defective -Consult factory
FAULT ILLEGAL FLOAT COMBINATION	WLF	If the controller detects two or more float level readings, which are not expected (ex. Switch 1 and 3 ON or switch 1, 2, and 3 ON) this fault will be recorded.	-Miswired float board -Defective float board -Consult factory
FAULT FILL VAVLE ON DETECTION INCONSISTENT	FDF	The controller monitors the water level as it fills and drains. It expects to see the levels increase logically (1-2-3-4-5). If the water level increases and jumps a step (1-2-4-5) this fault will be generated. The same holds for water level decreasing.	-Float board defective -Contact agent for replacement float board
FAULT KEEP WARM TIME OUT TOO LONG TO HEAT	KWF	During a keep warm cycle, if the tank temperature sensor does not open within a certain time window, this fault is generated.	-Ensure that the tank temperature sensor is connected -Defective tank temperature switch -Contact agent for replacement switch.
FAULT STACK OVER TEMP. SWITCH TRIPPED	OTF	If input TB5, # 4 on the logic board goes low (no 24 Vac detected) this fault will be generated. This could indicate either the tank over temperature switch has opened or the stack over temperature switch has opened.	-Do not operate and consult the factory
FAULT MAINTENANCE TIME HAS ELAPSED	HMF	In the user menu the user sets the maintenance time. Once this time expires a warning is displayed. 72 hours later the warning changes to this fault. The maintenance time is measured in weighted operational hours. With switch 5, #4 deactivated, this fault is enabled	-Perform tank cleaning and all other maintenance requirements outlined in the manual.
FAULT WATER FILL FAIL	FTF	Fill time-out fault during fill process. The GS software monitors the changes in water level during filling sequence. If ware level changes do not occur within an expected time interval, this fault will be generated.	-Verify water supply is open -Verify adequate water supply to unit (30-80psi, 10L/min, minimum ½” dia. Line size) -Verify wire harness and connection between float chamber and I/O board (TB)

WARNING LIST

GSTC Warning displayed	GSP warning displayed	Description of warning:	Troubleshooting
WARNING IGNITION MODULE X FAIL	IMW-X	Once the controller activates an ignition module, it will allow 4 minutes for the gas valve to activate. After the trial period, if the gas valve has not activated, a fault will be generated. The module will be locked out and the next burner will be indexed.	SEE FAULT LIST
WARNING AIR PROVING SWITCH X OPEN WITH BLOWERS ACTIVE	APW-X	Should the air proving switch open while the unit is operating this warning is generated. The controller shuts down and retries. There are no limits to the amount of times this warning is generated.	SEE FAULT LIST
WARNING AIR PROVING SWITCH X OPEN WITH BLOWERS ACTIVE	AOW-X	On startup if the AP switch does not close within the proving period. After 3 tries, a fault will be generated.	SEE FAULT LIST
WARNING BLOWER X RPM HIGH	BHW-X	If a blower RPM is above the RPM tolerance limit this warning is generated. If it is above the RPM tolerance limit for more than 10 seconds a fault will be generated.	SEE FAULT LIST
WARNING BLOWER X RPM LOW	BLW-X	If a blower RPM is below the RPM tolerance limit this warning is generated. If it is below the RPM tolerance limit for more than 10 seconds a fault will be generated.	SEE FAULT LIST
WARNING MAINTENANCE TIME HAS ELAPSED	HMW	In the user menu the user sets the maintenance time. Once this time expires this warning is displayed. The maintenance time is measured in weighted operational hours. With switch 5, #4 activated, this warning will remain until the warning is reset in the User level	SEE FAULT LIST
WARNING Too LONG TO FILL	UNW-6	Low water level has not been reached within expected time interval during initial fill sequence. Unit will continue filling while warning is displayed. A Water Fill Fail fault will be generated if the low water level is not reached after an additional length of time.	SEE FAULT LIST
WARNING KEEP WARM ACTIVE SYSTEM DEMAND ACTIVATED AT 75%	UNW-C	Keep warm feature has initiated combustion sequence at 75% output. This occurs when keep warm feature has been activated via dip-switch settings, the system demand is below minimum and the tank temperature sensor is registering cold (open contacts).	-Warning message will stop being displayed once tank temperature sensor indicates water is warm -Keep warm feature can be disabled using dip-switch settings

This exploded view diagram illustrates the assembly of a mechanical unit, likely a pump or motor. The components are numbered 1 through 34, with some parts having a quantity of 2. The assembly is shown in a disassembled state to show the relationship between parts. Key components include a base plate (1), a motor housing (2), a pump head (3), a shaft (4), a coupling (5), a drive shaft (6), a pump shaft (7), a pump housing (8), a pump head (9), a pump housing (10), a pump head (11), a pump housing (12), a pump head (13), a pump housing (14), a pump head (15), a pump housing (16), a pump head (17), a pump housing (18), a pump head (19), a pump housing (20), a pump head (21), a pump housing (22), a pump head (23), a pump housing (24), a pump head (25), a pump housing (26), a pump head (27), a pump housing (28), a pump head (29), a pump housing (30), a pump head (31), a pump housing (32), a pump head (33), and a pump housing (34). The diagram shows the assembly sequence from the base plate up to the final pump housing.

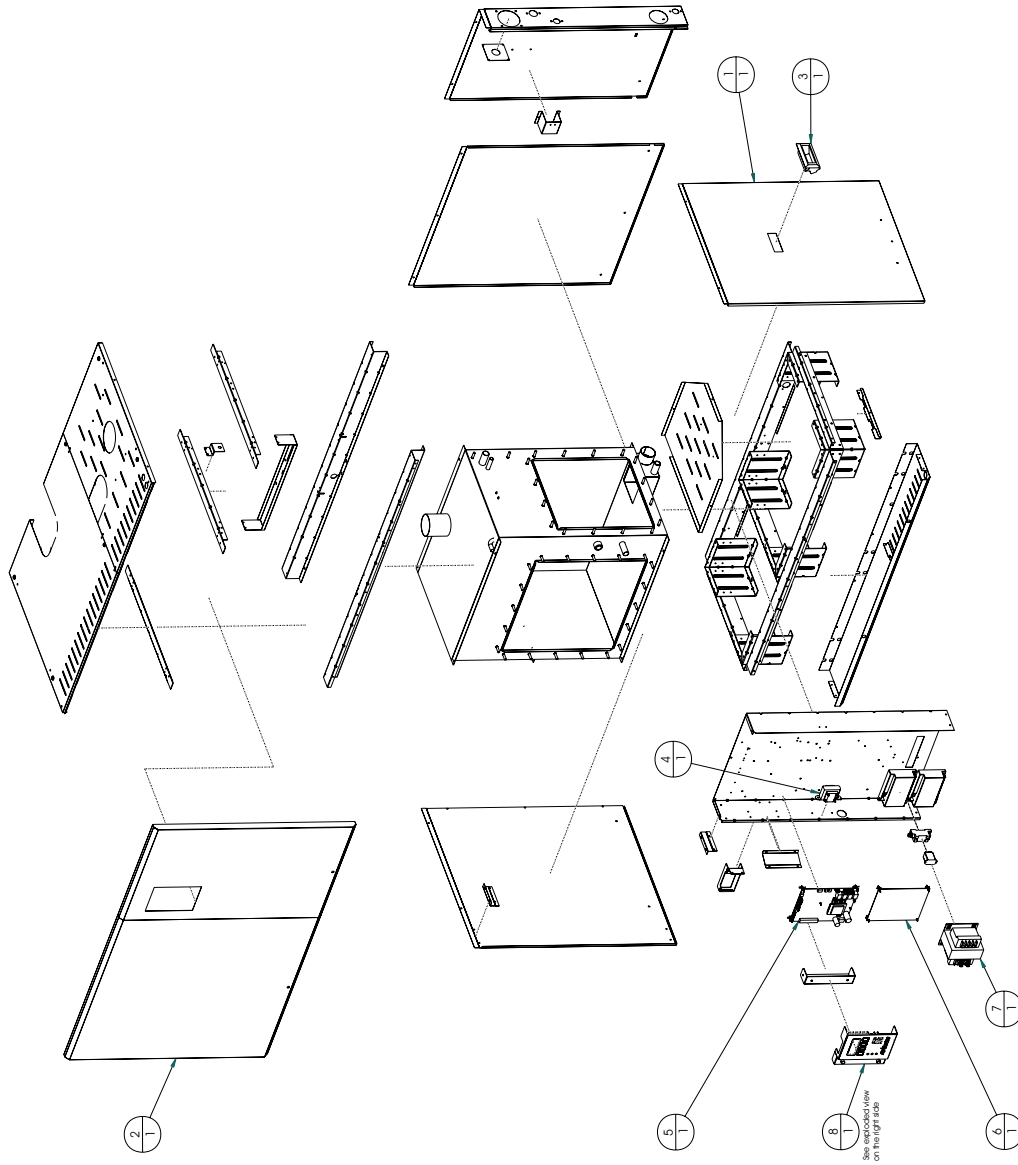
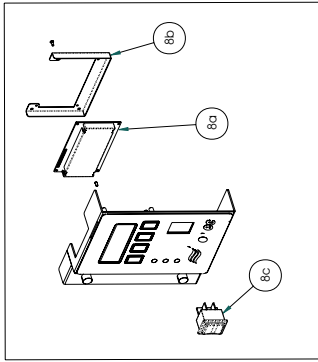
GS Series Internal Components Exploded View



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GS Series Internal Components Spare Parts

	Description	Part #	GS 100	GS 200	GS 300	GS 400	GS 500	GS 600
1	Clean-Out Port Tank Cover	1506990	1	1	2	2	3	3
2	Gasket, Tank Cover Plate	1505949	1	1	2	2	3	3
3	Tank Replacement Kit GS 100	1507653	1					
	GS 200	1507654		1				
	GS 300	1507655			1			
	GS 400	1507656				1		
	GS 500/600	1507700					1	1
4	Secondary Safety Switch	1504832	1	1	1	1	1	1
5	Fill Box	1505801	1	1	1	1	1	1
6	Vacuum Break Valve 1/2"npt	1505959	1	1	1	1	1	1
7	P-Trap Assembly (complete)	1507023	1	1	1	1	1	1
8	Dual Fill Valve 10.0 l/min & 0.35 l/min	1505759	1	1	1	1	1	1
9	Heat Exchanger Gasket Single	1505972	1					
	Dual	1505941		1	2	2	3	3
10	Direct Vent Air Manifold GS 100	1506140	1					
	GS 200	1506141		1				
	GS 300/400	1506142			1	1		
	GS 500/600	1506143					1	1
11	Heat Exchanger kit Single	1507709	1					
	Single	1507710			1		1	
	Dual	1507711		1	1	2	2	3
12	Stack High Limit Switch	1506745	1	1	1	1	1	1
13	Exhaust Manifold Gasket Single	1505973	1					
	Dual	1505942		1	2	2	3	3
14	Exhaust Manifold GS 100	1505875	1					
	GS 200	1505861		1				
	GS 300/400	1505843			1	1		
	GS 500/600	1505828					1	1
15	Flexible Gas Hose with fittings	1505960	1	2	3	4	5	6
16	Elbow Assembly for Air Intake	1504204	1	2	3	4	5	6
17	Gas Valve Assembly (Natural Gas)	1507713	1	2	3	4	5	6
	or (Propane)	1507714	1	2	3	4	5	6
18	Air Proving Switch (differential 0.25"wc)	1504175	1	2	3	4	5	6
19	Bracket, Fan Board Mount	1505899	1	1	2	2	3	3
20	Fan Board	1505689	1	1	2	2	3	3
21	Igniter Jump Start Module	1506793	1	2	3	4	5	6
22	Combustion Blower with Integral Driver	1502289	1	2	3	4	5	6
23	Burner/Blower Gasket	1708208	1	2	3	4	5	6
24	Replacement Burner Assembly	1507669	1	2	3	4	5	6
25	Burner Plate Gasket	1505936	1	2	3	4	5	6
26	Auxilliary Drain Plug	1507043	1	1	1	1	1	1
27	Auxilliary Drain termination	1506925	1	1	1	1	1	1
28	Drain Pump 24v 60 hz	1502644	1	1	1	1	1	1
29	Lower Mixing Box	1506749	1	1	1	1	1	1
30	Tank Thermal sensor	1506026	1	1	1	1	1	1
31	Float Chamber	1115933	1	1	1	1	1	1
32	Float Chamber Mounting Bracket	1113777	1	1	1	1	1	1
33	Float Board	2511137	1	1	1	1	1	1
34	Sight Port Replacement kit	1507668	1	2	3	4	5	6
35	Igniter/flame sensor gasket	1506892	1	2	3	4	5	6
36	Flame Sensor Replacement Kit	1507694	1	2	3	4	5	6
37	Hot Surface Igniter Replacement Kit	1507695	1	2	3	4	5	6
	Igniter/flame sensor Replacement Kit	1507712	1	2	3	4	5	6
Not Shown								
	Hose Replacement kit	1507696	1	1	1	1	1	1
	Flexible hose for Direct Vent	1502148	1	2	3	4	5	6
	1/4" Tube for air proving (per inch)	1605227	order (by foot) as required					

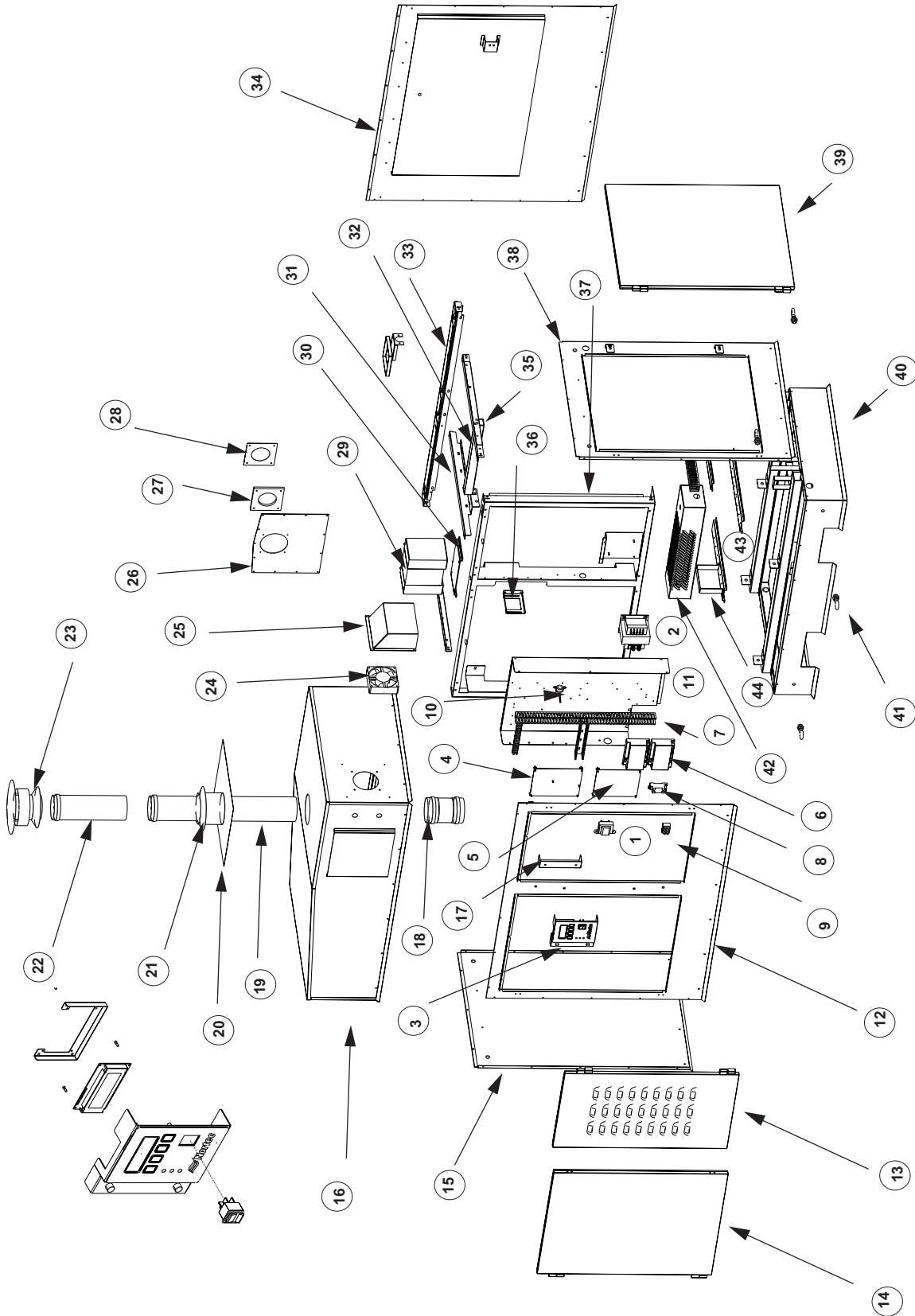


GS Series Indoor Cabinetry
Exploded View

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GS Series Indoor Cabinetry Spare Parts

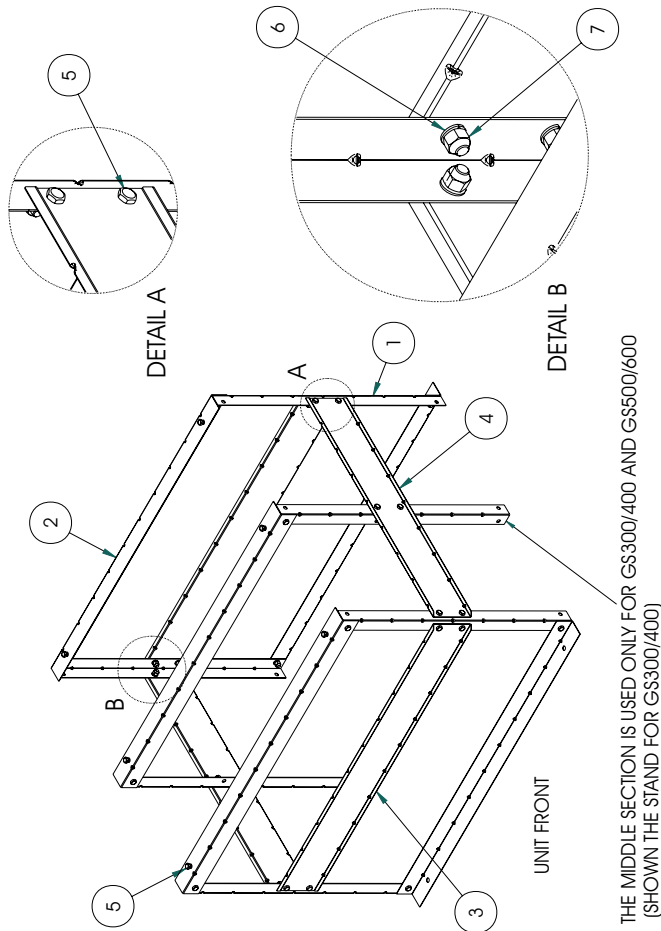
Item	Part Number	Title	Qty	Item	Part Number	Title	Qty
1	2525209	Bose Assy, Single, GS-SE, B-style	1	24	2523552	KEYPAD STIFFENER, GS-SE, B STYLE	1
2	2523439	TANK ASSEMBLY, GH5-6, GHE20-24, SE	1	25	1506950	DISPLAY PANEL BRACKET, GS SERIES	1
3	2524394	PANEL, LEFT, SINGLE CABINET, GS-SE, B STYLE	1	26	1508357	SETC LOGIC BOARD ASSM	1
4	2524402	SERVICE DOOR, SINGLE CABINET, GS-SE, B STYLE	1	27	2525914	Ignition Module, 120V, CSA, GS Series	2
5	2523593	PANEL,TANK REAR, CABINET, GS-SE, B STYLE	1	28	1703250	Relay Mount Socket	1
6	2523590	PANEL, REAR ELECTRICAL, CABINET, GS-SE, B STYLE	1	29	1504760	I/O BOARD, GS-SE SERIES	1
7	2523592	PANEL, UNIT FRONT, CABINET, GS-SE, B STYLE	1	30	1504859	Transformer 120/24 Vac 150VA	1
8	2524398	PANEL, ELECTRICAL BOTTOM, SINGLE, GS-SE, B STYLE	1	31	1505760	Transformer 24V / 16VAC 15VA 50-60Hz	1
9	2524399	PANEL, ELECTRICAL TOP, SINGLE, GS, B STYLE	1	32	1453020	RELAY DPDT, SECURITY CHAIN	1
10	2524396	PANEL, TANK TOP, SINGLE CABINET, GS-SE, B STYLE	1				
11	2524392	FRAME, CROSS, SINGLE CABINET, GS-SE, B STYLE	3				
12	2523596	BRACKET, HI- LIMIT SWITCH MOUNT, GS, B STYLE	1				
13	2523460	HANGER, INLET GAS OR STEAM, GS-SE SERIES	1				
14	2523470	FRAME , TOP, CABINET, GS-SE, B STYLE	2				
15	2523591	BRACKET, P-TRAP MOUNT, GS-SE, B STYLE	1				
16	2524382	SUPPORT PLATE, 0.75 NPT GAS, GS, B STYLE	1				
17	2523597	DOOR FRONT, CABINET, GS-SE, B STYLE	1				
18	2523589	PANEL, ELECTRICAL CABINET, GS-SE, B STYLE	1				
19	2523595	LOCKING TAB, CABINET, GS-SE, B STYLE	1				
20	2523463	BRACKET, FLOAT CHAMBER MOUNT, GS-SE, B STYLE	1				
21	2523444	Recessed Handle, Plastic, 3.5in wide	1				
22	2523594	SUPPORT TAB, CABINET, GS-SE, B STYLE	2				
23	1506213	Display Panel Assy, GSTC-SETC	1				
23a	1504549	LCD Display, 4x20 line, backlight, GS	1				
23b	1506027	LCD Mounting Bracket, GS-SE Series	1				
23c	1453001	Switch On-Off Drain	1				



GS Series Outdoor Cabinetry
Exploded View

GS Outdoor Spare Parts List								
	Description	Part #	GS 100	GS 200	GS 300	GS 400	GS 500	GS 600
1	Transformer 24/16V 15VA	1505760	1	1	1	1	1	1
2	Transformer 208-24Vac 250VA	1506719	1	1	1	1	1	1
	Fuse 6.25 Amp for 208V transformer	1505020	1	1	1	1	1	1
3a	LCD Display Assembly	1507741	1	1	1	1	1	1
3b	LCD Mounting Bracket	1506951	1	1	1	1	1	1
3c	On-Off-Drain Switch	1453001	1	1	1	1	1	1
4	Logic Control Board	1505762	1	1	1	1	1	1
5	I/O Board	1504760	1	1	1	1	1	1
6	Ignition Control Module	1505987	1	2	3	4	5	6
7	Slotted wire duct	1506041	order by length required					
8	Relay Mount Socket	1703250	1	1	1	1	1	1
9	Blower Relay	1453020	1	1	1	1	1	1
10	Thermostat, On/Off, 80F	1508042	1	1	1	1	1	1
11	Electrical Cabinet	1506989	1	1	1	1	1	1
12	Front Panel	1507783	1	1	1	1	1	1
13	Access Door, Electronics	1507801	1	1	1	1	1	1
14	Access Door, Tank	1507800	1	1	1	1	1	1
15	Left Panel	Mini 1508096	1					
		Single 1508095		1				
		Double 1507861			1	1		
		Triple 1507804					1	1
16	Top Cap Assembly	Mini 1508100	1					
		Single 1508099		1				
		Double 1507863			1	1		
		Triple 1507806					1	1
17	Display Bracket Holder	1506950	1	1	1	1	1	1
18	Female to Female Coupling	3" Dia. 1508136	1					
		4" Dia 1508135		1				
		5" Dia 1507886			1	1		
		6" dia 1507880					1	1
19	Vent Pipe, 24" Long	3" Dia 1508132	1					
		4" Dia 1508131		1				
		5" Dia 1507888			1	1		
		6" dia 1507882					1	1
20	Chimney Flashing,	for 3" vent pipe 1508138	1					
		for 4" vent pipe 1508137		1				
		for 5" vent pipe 1507885			1	1		
		for 6" vent pipe 1508150					1	1
21	Storm Collar,	for 3" vent pipe 1508140	1					
		for 4" vent pipe 1508139		1				
		for 5" vent pipe 1507890			1	1		
		for 6" vent pipe 1507884					1	1
22	Vent Pipe, 12" Long	3" Dia 1508134	1					
		4" Dia 1508133		1				
		5" Dia 1507884			1	1		
		6" dia 1507881					1	1
23	Rain Cap	Mini 1508130	1					
		Single 1508129		1				
		Double 1507889			1	1		
		Triple 1507883					1	1
24	Cooling Fan	1507891	1	1	1	1	1	1

25	Fan Hood	1507811	1	1	1	1	1	1
26	Cover Plate Top Panel	1508109	1	1	1	1	1	1
27	Gasket, Steamline	100 1508105	1					
	200/300	1507872		1	1			
	400/500/600	1507871				1	1	1
28	Cover Plate Steam Line	100 1508106	1					
	200/300	1507870		1	1			
	400/500/600	1507810				1	1	1
29	Step-up transformer (120/240V option)	1508167	1	1	1	1	1	1
30	Mounting bracket, step-up transformer	1507759	1	1	1	1	1	1
31	Mid Cross Member	Mini 1506958	1					
	Single	1506978		1				
	Double	1506983			1	1		
	Triple	1506972					1	1
32	Gas Line Bracket	1506960	1	1	2	2	2	2
33	Rear Frame Element	1506963	1	1	1	1	1	1
34	Rear Panel	1507785	1	1	1	1	1	1
35	Cross Member	Mini 1506957	2					
	Single	1506979		2				
	Double	1506981			2	2		
	Triple	1506971					2	2
36	Mounting bracket, float chamber	1508114	1	1	1	1	1	1
37	Front Frame	1506959	1	1	1	1	1	1
38	Right Panel	Mini 1508087	1					
	Single	1508097		1				
	Double	1507862			1	1		
	Triple	1507803					1	1
39	Access Door, Side	1507801	1					
		1507800		1			2	2
		1507860			1	1		
40	Base Assembly	Mini 1508123	1					
	Single	1508122		1				
	Double	1508017			1	1		
	Triple	1508018					1	1
41	Lifting Lug	1507901	4	4	4	4	4	4
42	Pump House Heater 500 watts	1508039	1	1	2	2	3	3
43	Mounting Bar Pump House Heater, Mini	1508113	2					
	Single	1508112		2				
	Double	1508111			2	2		
	Triple	1508164					2	2
44	Strapping, Pump House Heater	1508110	1	1	2	2	3	3



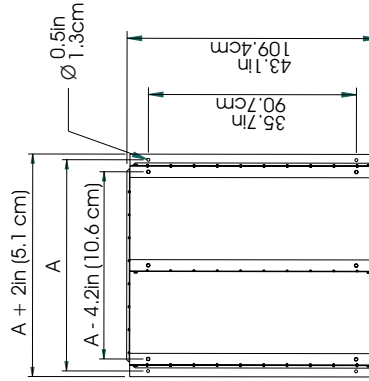
THE MIDDLE SECTION IS USED ONLY FOR GS300/400 AND GS500/600
(SHOWN THE STAND FOR GS300/400)

ASSEMBLY INSTRUCTIONS

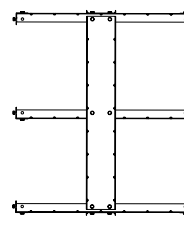
1. UNPACK STAND AND CHECK THAT ALL PIECES ARE PRESENT AND UNDAMAGED.
2. ASSEMBLE STAND TO CONFIGURATION SHOWN. HAND TIGHTEN ALL BOLTS ONLY.
3. HOIST HUMIDIFIER UP ABOVE THE FLOOR A MINIMUM OF 32 in (812.8 mm).
4. POSITION STAND BELOW THE LEGS OF THE HUMIDIFIER. ALIGN HUMIDIFIER WITH STAND SO THAT HOLES IN THE HUMIDIFIER BASE ALIGN WITH HOLES IN STAND.
5. LOWER HUMIDIFIER 1/4" ABOVE STAND TO ALIGN WITH NEAREST HOLE.
6. FASTEN STAND TO HUMIDIFIER USING THE BOLTS. LOCKWASHERS AND NUTS PROVIDED.
7. TIGHTEN NUT AND BOLT PAIRS TO 200 in-lb (22.6 Nm) OR UNTIL SECURE.
8. LOWER ENTIRE ASSEMBLY TO FLOOR AND ENSURE THAT IT IS STABLE.
9. IF NECESSARY, SHIM BELOW THE LEGS OF THE STAND TO ENSURE HUMIDIFIER IS LEVEL.
10. PERMANENTLY SECURE THE STAND TO THE FLOOR VIA THE HOLES IN THE LEG SUPPORT PLATES.

PARTS LIST

ITEM	DESCRIPTION	QTY			
		GS100 SE100/175	GS200 SE250/300	GS300/400 SE475/675	GS500/600 SE950/1050
1	FLOOR STAND LEG	4	4	6	6
2	CARRIER PLATE	4	4	5	5
3	COMMON BRACE	2	2	2	2
4	CROSS BRACE	2	2	2	2
5	BOLT, 3/8-16UNC X 3/4	28	28	36	36
6	LOCKWASHER	28	28	36	36
7	NUT, 3/8-16 UNC	28	28	36	36



UNIT SIZE	DIMENSION A
GS100 SE100/175	14.85in (37.7 cm)
GS200 SE250/300	21.15in (53.7 cm)
GS300/400 SE475/675	36.7in (93.3 cm)
GS500/600, SE950/1050	52.35in (133 cm)



UNIT FRONT

GS Quick Reference

Item	GS 100	GS 200	GS 300	GS 400	GS 500	GS 600
Gas Pressure						
Natural Gas min "wc/mbar	5/14					
Natural Gas max "wc/mbar	9/22					
Propane min	10/23					
Propane max	14/34					
Min free air opening in/cm	13/33	23/58	35/89	47/119	59/150	71/180
Input BTU's						
Max	140,000	280,000	420,000	560,000	700,000	840,000
Min GSTC	45,000					
Direct vent min	60,000					
Gas Piping Size in/cm	1/2/1.3	3/4/1.9	1/2.5	1/2.5	1.25/3.2	1.25/3.2
"BH" Vent	X	X	X	X	X	X
"B" Vent	X	X	X	X	X	X
"BH" Exhaust Piping in/cm	3/7.6	4/10.2	5/12.7	5/12.7	6/15.2	6/15.2
	4/10.2	5/12.7	7/17.8	7/17.8	8/20.3	8/20.3
Appliance Category	I or III	I or III	I or III	I or III	I or III	I or III
Full Weight In lbs./kg	416/188	588/266	954/432	974/441	1340/607	1360/616
Empty Weight In lbs./kg	266/120	354/160	485/217	529/239	659/298	703/318
User level password	0335					
Water consumption (25% bd)						
Gallons/litres	433/1639	866/3278	1300/4921	1733/6560	2166/8199	2600/9842
Tank Water Volume						
Gallons/litres	18/71	29/111	58/221	55/210	84/320	81/309
Fill valve flow rates						
To tank: Gallons/litres	2.64/10					
To float chamber: Gallons/litres	0.09/0.35					
Supply water pressure						
Min. psi/kpa	30/206					
Max. psi/kpa	80/551					
Drain rate (includes D.W.C)						
Gallons/Litres per minute	5.2/20					
Min drain pipe size in/cm	1 to 1.5 / 2.5 to 3.8 OD or larger					
Power supply requirements						
120 volts a/c	Transformer Required					
208-240 volts a/c 1PH	X	X	X	X	X	X
Steam Outlet size in/cm	1.75/4.4	3/7.6	3/7.6	4/10.2	4/10.2	4/10.2

LIMITED WARRANTY

AXAIR NORTEC INCORPORATED and/or AXAIR NORTEC LIMITED (hereinafter collectively referred to as THE COMPANY), warrant for a period of two years from date of shipment, that THE COMPANY's manufactured and assembled products, not otherwise expressly warranted, are free from defects in material and workmanship. No warranty is made against corrosion, deterioration, or suitability of substituted materials used as a result of compliance with government regulations.

THE COMPANY's obligations and liabilities under this warranty are limited to furnishing replacement parts to the customer, F.O.B. THE COMPANY's factory, providing the defective part(s) is returned freight prepaid by the customer. Parts used for repairs are warranted for the balance of the term of the warranty on the original humidifier or 90 days, whichever is longer.

The warranties set forth herein are in lieu of all other warranties expressed or implied by law. No liability whatsoever shall be attached to THE COMPANY until said products have been paid for in full and then said liability shall be limited to the original purchase price for the product. Any further warranty must be in writing, signed by an officer of THE COMPANY.

THE COMPANY's limited warranty on accessories, not of NORTEC's manufacture, such as controls, humidistats, pumps, etc. is limited to the warranty of the original equipment manufacturer from date of original shipment of humidifier.

THE COMPANY makes no warranty and assumes no liability unless the equipment is installed in strict accordance with a copy of the catalog and installation manual in effect at the date of purchase and by a contractor approved by THE COMPANY to install such equipment.

THE COMPANY makes no warranty and assumes no liability whatsoever for consequential damage or damage resulting directly from misapplication, incorrect sizing or lack of proper MAINTENANCE of the equipment.

THE COMPANY retains the right to change the design, specification and performance criteria of its products without notice or obligation.



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