Trinity Lx

Model Numbers: Lx150-400
Version Date: 2009-07-20

INSTALLATION AND OPERATION INSTRUCTIONS FOR TRINITY LX SERIES

Refer to Appendices A, B & C for Controller-Display Setup & Applications

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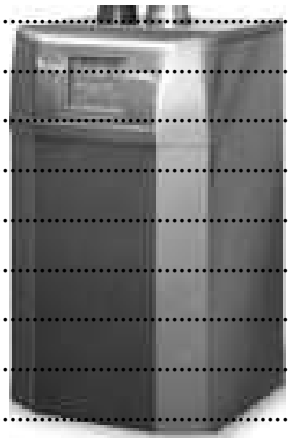


HAZARD SYMBOLS AND DEFINITIONS

⚠ DANGER Danger Sign: Indicates a hazardous situation which, if not avoided, will result in serious injury or death.

⚠ WARNING Warning Sign: Indicates a hazardous situation which, if not avoided, could result in serious injury or death.

⚠ CAUTION Caution Sign plus Safety Alert Symbol: Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

CAUTION Caution Sign without Safety Alert Symbol: Indicates a hazardous situation which, if not avoided, could result in property damage.

NOTICE Notice Sign: Indicates a hazardous situation which, if not avoided, could result in property damage.

⚠ WARNING This Appliance must be installed by a licensed and trained Heating Technician or the **Warranty is Void.** Failure to properly install this unit may result in property damage, serious injury to occupants, or possibly death.

Read Before Proceeding

⚠ WARNING If you do not follow these instructions exactly, a fire or explosion may result causing property damage, serious injury or death.

FOR YOUR SAFETY, READ BEFORE OPERATING

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

B) BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.
WHAT TO DO IF YOU SMELL GAS:
- Do not try to light any appliance.
- Do not touch any electric switch.
- Do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

C) Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D) 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.

OPERATING INSTRUCTIONS

1. STOP! Read the safety information above very carefully.
2. Set the thermostat to lowest setting. Turn off all electric power to the appliance.
3. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
4. Turn the manual gas valve to the OFF position. Remove front access panel.
5. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow “B” in the safety information above. If you don't smell gas, go to the next step.
6. Turn the manual gas valve ON. Wait an additional five (5) minutes smelling for gas.
7. Replace the front access panel.
8. Set thermostat to highest setting. Turn on all electric power to the appliance.
9. Ignition sequence is automatic. Combustion will occur after a brief fan purge.
10. If ignition does not occur, follow the instructions “To Turn Off Gas To Appliance” and call your service technician or gas supplier.

TO TURN OFF GAS TO THE APPLIANCE

1. STOP! Read the safety information above very carefully.
2. Turn off all electric power to the appliance
3. Turn the manual gas valve to the OFF position

⚠ WARNING Crystalline Silica – Certain components confined in the combustion chamber may contain this potential carcinogen. Improper installation, adjustment, alteration, service or maintenance can cause property damage, serious injury (exposure to hazardous materials) or death. Refer to Section 12.0 for information on handling instructions and recommended personal protective equipment. Installation and service must be performed by a qualified installer, service agency or the gas supplier (who must read and follow the supplied instructions before installing, servicing, or removing this appliance. This appliance contains materials that have been identified as carcinogenic, or possibly carcinogenic, to humans).

⚠ WARNING **Void Warranty -** This Appliance must have water flowing through it whenever the burner is on or it will damage the unit and void the warranty. Failure to follow these instructions may result in serious injury or death.

1.0 INTRODUCTION

IMPORTANT

Installation and Operation Instructions – These instructions apply to the installation and operation of Trinity Lx150-400 units and covers instructions that are common-to-both boiler and water heater applications. Troubleshooting instructions for the controller and display are covered in Appendix A. Appliance-specific plumbing and wiring instructions for Boilers and Water Heaters are covered in Appendix B and C, respectively. See Table 1-1 for a list of Application Manuals.

Terminology – The following terms in the instruction manuals are used to differentiate between which instructions are common-to-both and which are appliance-specific. The term "**APPLIANCE**" applies to both kinds of water heating appliances (boilers and water heaters) and is used when conveying instructions which are common-to-both. The term "**BOILER**" or "**WATER HEATER**" is used when conveying instructions which are appliance-specific or specific to one or the other, but not both.

Table 1-1 Instruction Manuals

Appliance	Model No.	Installation and Operation Instructions (Common-to-Both)	Application Manuals (Appliance-Specific)
Boiler	Lx150-400	Trinity Lx Series	Appendix B Boiler Applications
Water Heater	Lx200 & 400	Trinity Lx Series	Appendix C Water Heating Applications

General Installation Requirements

The installation of your NTI Trinity Lx gas appliance must conform to the requirements of this manual, your local authority, and the National Fuel Gas Code ANSI Z223.1 and or CAN/CGA B149 Installation Codes. Where required by the Authority, the installation must conform to the standard for "Controls and Safety Devices for Automatically Fired Boilers ANSI/ASME CSD-1.

This document pertains to the correct installation and operation of NTI Trinity Lx appliance, models numbers Lx150, Lx150E, Lx200 and Lx400. The instructions detailed in this document supersede any and all previous instructions provided by NTI, written or otherwise. Each unit is provided with the following:

1) Installation and Operation Instructions Manual for Trinity Lx Series,
2) Appendix A - Control and Touch Screen Display Instructions for Trinity Lx Series,
3) Appendix B - Boiler Applications: Plumbing and Wiring Instructions,
4) Appendix C - Water Heater Applications: Plumbing and Wiring Instructions, and
5) Natural to LP Conversion Kit *

* The conversion kit is required to convert the appliance so it will safely operate with Propane Gas.

⚠ DANGER

Read and understand this entire document prior to proceeding with the installation of the Trinity Lx. Failure to follow the instructions outlined in this document will result in property damage, serious injury or death.

User Responsibilities

This appliance must be installed and serviced by a qualified installer or service technician. This appliance must be serviced and inspected annually when operating in normal residential applications. Other applications (e.g. commercial or other more strenuous conditions) may require more frequent service and inspection. As the User/Owner of this equipment, you are responsible for ensuring the maintenance is performed at the required intervals. It is also the Users responsibility to ensure Vent and Combustion-Air Intake termination is kept clear of ice and snow or any other obstruction. Failure to follow these instructions could result in fire, serious injury, or death.

⚠ WARNING

Failure to have the appliance properly serviced and inspected on a regular basis may result in property damage, serious injury or death.

⚠ WARNING

Failure to keep the Vent and Combustion Air Intake clear of ice, snow, and other debris may result in property damage, serious injury, or death.

Installer Responsibilities

As the installing technician it is your responsibility to ensure the installation is performed in accordance with this instruction manual as well as any applicable local or National installation codes. It is also your responsibility to inform the User/Owner of their obligation with respect to the above description under "User Responsibilities". Failure to follow this warning could result in fire, serious injury, or death.

ATTENTION: LIQUEFIED PETROLEUM (LP) PROPANE

The Trinity Lx is factory set to operate with Natural Gas. BEFORE OPERATING WITH PROPANE, the specified LP Conversion Kit must be installed to convert the appliance so it will operate safely with LP Propane. Listed below are the relevant NTI appliance models and their corresponding Natural to LP Propane Conversion Kit number.

Liquefied Petroleum (LP) propane gas is heavier than air; therefore, it is imperative that your Trinity Lx appliance is not installed in a pit or similar location that will permit heavier than air gas to collect. Local Codes may require appliances fueled with LP gas be provided with an approved means of removing unburned gases from the room. Check your local codes for this requirement.

	Natural to LP Propane Conversion Kit	
NTI Series	**Model Number**	**Kit Number**
Trinity Lx	**150, 150E, 200**	**82650-1**
Trinity Lx	**400**	**83017-1**

⚠ DANGER Failure to use the appropriate Natural to LP Conversion Kit when operating the Trinity Lx wtih Propane will result in extremely dangerous burner operation leading to property damage, serious injury or death. Refer to section titled **ATTENTION: LIQUEFIED PETROLEUM (LP) PROPANE** for appliance models and corresponding conversion kit numbers.

Appliance Vent / Air-Intake Piping

⚠ DANGER The Trinity Lx is a "Direct Vent" appliance requiring a "Special Venting System". Both the Vent and Combustion-Air Intake piping must be piped to the outdoors, using the vent material and rules outlined in these instructions. Failure to follow these instructions will result in serious injury or death.

IN THE STATE OF MASSACHUSETTS ONLY

(a) For all horizontally vented gas fueled equipment installed in every dwelling, building or structure used in whole or in part for residential purposes, including those owned and operated by the Commonwealth and where the side wall exhaust vent termination is less than seven (7) feet above finished grade in the area of the venting, including but not limited to decks and porches, the following requirements shall be satisfied:

1. INSTALLATION OF CARBON MONOXIDE DETECTORS At the time of installation of the side wall horizontal vented gas fueled equipment, the installing plumber or gas fitter shall observe that a hard wired carbon monoxide detector with an alarm and battery back-up is installed on the floor level where the gas equipment is to be installed and on each additional level of the dwelling, building or structure served by the equipment. It shall be the responsibility of the property owner to secure the services of qualified licensed professionals for the installation of hard wired carbon monoxide detectors.

    a. In the event that the side wall horizontally vented gas fueled equipment is installed in a crawl space or an attic, the hard wired carbon monoxide detector with alarm and battery back-up may be installed on the next adjacent floor level.
    b. In the event that the requirements of this subdivision can not be met at the time of completion of installation, the owner shall have a period of 30 days to comply with the above requirements; provided, however, that during said 30 day period a battery operated carbon monoxide detector with an alarm shall be installed.

2. APPROVED CARBON MONOXIDE DETECTORS Each carbon monoxide detector as required in accordance with the above provisions shall comply with NFPA 720 and be ANSI/UL 2034 listed and IAS certified.

3. SIGNAGE A metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight (8) feet above grade directly in line with the exhaust vent terminal for the horizontally vented gas fueled heating appliance or equipment. The sign shall read, in print size no less than one-half (1/2) inch in size, *"**GAS VENT DIRECTLY BELOW. KEEP CLEAR OF ALL OBSTRUCTIONS**" (plate included with appliance).*

4. INSPECTION The state or local gas inspector of the side wall horizontally vented gas fueled equipment shall not approve the installation unless, upon inspection, the inspector observes carbon monoxide detectors and signage installed in accordance with the provisions of 248 CMR 5.08(2)(a)1 through 4.

(b) EXEMPTIONS: The following equipment is exempt from 248 CMR 5.08(2)(a)1 through 4:

1. The equipment listed in Chapter 10 entitled "Equipment Not Required To Be Vented" in the most current edition of NFPA 54 as adopted by the Board; and
2. Product Approved side wall horizontally vented gas fueled equipment installed in a room or structure separate from the dwelling, building or structure used in whole or in part for residential purposes.

(c) MANUFACTURER REQUIREMENTS – GAS EQUIPMENT VENTING SYSTEM PROVIDED: When the manufacturer of Product Approved side wall horizontally vented gas equipment provides a venting system design or venting system components with the equipment, the instructions provided by the manufacturer for installation of the equipment and the venting system shall include:

1. Detailed instructions for installation of the venting system design or the venting system components; and
2. A complete parts list for the venting system design or venting system.

(d) MANUFACTURER REQUIREMENTS – GAS EQUIPMENT VENTING SYSTEM NOT PROVIDED: When the manufacturer of a Product Approved side wall horizontally vented gas fueled equipment does not provide the parts for venting the flue gases, but identifies "special venting systems", the following requirements shall be satisfied by the manufacturer.

2.0 SPECIFICATIONS

Table 2-1 Specifications

DESCRIPTION	Lx150	Lx150E	Lx200	Lx400	
CSA Input Modulation [1] btu/hr [kw]	25,000 - 150,000 [2] [7.3 - 44.0]	25,000 - 150,000 [7.3 - 44.0]	25,000 - 199,000 [7.3 - 58.3]	75,000 - 399,000 [21.9 - 117]	
DOE Heating Capacity [1,3] btu/hr [kw]	136,000 [39.8]	139,000 [40.7]	182,000 [53.3]	374,000 [109.6]	
Net I=B=R Rating [1,3] btu/hr [kw]	118,000 [34.8]	121,000 [35.4]	158,000 [46.3]	325,000 [95.2]	
DOE AFUE [3] %	95.1	97.0	95.1	94.0 [6]	
Recovery Rating @ 100°F Rise, gal/hr	-	-	224	450	
Water Connections - NPT, in.	1 [4]	1	1	1-1/4	
Gas Connection - NPT, in.	1/2	1/2	1/2	3/4	
Vent/Air-Intake Pipe Diameter [5], in. [mm]	3 [76]	3 [76]	3 [76]	4 [102]	6 [152]
Vent/Air-Intake, Max. Length, NG / LP ft. [m]	105 / 50 [32 / 15.2]	105 / 50 [32 / 15.2]	105 / 50 [32 / 15.2]	30 [7] [9.1]	65 [7] [19.8]
Dimensions H x W x D in. [mm]	29.5 x 17 x 18.5 [749 x 432 x 470]	29.5 x 17 x 18.5 [749 x 432 x 470]	29.5 x 17 x 18.5 [749 x 432 x 470]	36 x 17 x 24 [915 x 432 x 610]	
Approx. Appliance Weight with Water, lbs [kg]	100 [45.3]	125 [56.7]	125 [56.7]	225 [102]	

Notes:

1. Listed Input and Output ratings are at minimum vent lengths at Sea Level. Numbers will be lower with longer venting and/or altitudes greater then 2000 feet [610 m].
2. The maximum output when operating on LP-Gas is limited to 145,000 Btu/hr [42.5 kW].
3. Based on rating plate input capacities, using standard test procedures prescribed by the U.S. Department of Energy. Ratings have been confirmed by AHRI (GAMA), excluding Lx400.
4. Units sold in Canada are 3/4" NPT.
5. Trinity Lx require a special venting system, use only vent materials and methods detailed in these instructions.
6. Steady-State Efficiency Rating.
7. Max. Length is the same for NG and LP for the Lx400 model only.

⚠ CAUTION This unit requires two people to lift it or property damage and personal injury may result.

High Altitude Operation

The Trinity is designed to operate at its maximum listed capacity in installations less than or equal to 2000 ft [610 m] above Sea Level. Since the density of air decreases as elevation increases, maximum specified capacity should be de-rated for elevations above 2000 ft [610 m] in accordance with Table 2-2.

Table 2-2 De-rate % for High Altitudes

Elevations	2000 ft [610 m]	3000 ft [914 m]	4000 ft [1219 m]	4500 ft [1372 m]	5000 ft [1524 m]
In Canada [1]	de-rate by 5%	de-rate by 5%	de-rate by 5%	de-rate by 5%	de-rate % may vary
In USA [2]	-	de-rate by 4%	de-rate by 8%	-	de-rate by 12%

Notes:

1. Canada: Altitudes between 2000-4500 ft [610-1372 m], de-rate by 5%. Consult local authorities for de-rating capacities for altitudes above 4500 ft [1372 m].
2. USA: De-rate capacity by 4% for every 1000 ft [305 m] over 2000 ft [610 m].

⚠ WARNING At elevations greater than 2000 feet, the combustion of the appliance must be checked with a calibrated combustion analyzer to ensure safe and reliable operation. Consult Section 9.0 for instructions on adjusting the input to provide proper operation. **It is the *Installers responsibility* to check the combustion, and to adjust the combustion in accordance to Section 9.0.** Failure to follow these instructions may result in property damage, serious injury, or death.

3.0 APPLIANCE LOCATION

In all cases, the Trinity Lx must be installed indoors in a dry location where the ambient temperature must be maintained above freezing and below 100°F [38°C]. Gas components must be protected from dripping, spraying water, or rain during operation and servicing. Consider the proximity of system piping, gas and electrical supply, condensate disposal drain, and proximity to vent termination when determining the best appliance location.

Floor Mounting

The Trinity Lx can be mounted directly on combustible flooring, with the exception of carpeting. Installing the appliance on carpeting is not permissible. Ensure the appliance is mounted above any anticipated flood level.

⚠ WARNING Water or flood damaged components must be replaced immediately with new factory-approved components as failure to do so may result in fire, serious injury, or death.

Appliance Area Ventilation Air Openings

If appliance area clearances are less then the recommended clearances specified in Table 3-1, the appliance area must be ventilated. Each ventilation air opening must meet the minimum requirements of 1 in^2 per 1000 Btu/hr, but not less then 100 in^2. The lower ventilation opening must be located within 6" of the floor while the upper opening must be located 6" from the top of the space.

Closet Installations

For closet installations, it is necessary to provide two ventilation air openings as shown in Figure 3-1(a) and (b), each providing a minimum area equal to 1 in^2 per 1000 Btu/hr, but not less then 100 in^2 and within 6" of the top and bottom of the closet door. All Vent and Air-Intake piping within the closet must be CPVC for both Canada and the US. See Table 3-1 for Minimum and Recommended Clearances.

Alcove Installations

Alcove installations have the same minimum clearances as closet installations, except the front must be completely open to the room at a distance no greater then 18" [457 mm] from the front of the appliance and the room is at least three (3) times the size of the alcove. Provided these conditions are met, the appliance requires no extra ventilation air openings to the space. See Table 3-1 for Minimum and Recommended Clearances.

Residential Garage Installations

When installed in a residential garage, mount the appliance a minimum of 18" [457 mm] above the floor. Locate or protect the appliance so it cannot be damaged by a moving vehicle. Check with your local authorities for other possible regulations pertaining to the installation of an appliance in a garage.

Wall Mounting Installations (Optional)

Each unit is shipped with wall mounting brackets to provide installers with the option of wall mounting the appliance. Refer to Figures 3-2(a) and 3-2(b) for instructions and illustrations on wall mounting the various models. Note that ***Water Heaters*** require "Mandatory Wall Mounting Protection". Refer to Section 1.0 in Appendix C, "Water Heater Applications: Plumbing & Wiring Instructions" for further details.

Table 3-1 Minimum Clearances for Installation and Service

Model No.	Clearances	Dimensions - inches [mm]					
		Front	Top	Left Side	Right Side	Rear	Bottom
Trinity Lx150-200	Minimum	24 [610] [1,3]	12 [305]	12 [305]	4 [102]	0	0
	Recommended	24 [610]	24 [610]	24 [610] [2]	4 [102]	0	0
Trinity Lx400	Minimum	24 [610] [1,3]	12 [305]	12 [305]	12 [305]	0	0
	Recommended	24 [610]	24 [610]	24 [610] [2]	12 [305]	0	0

Notes:

[1] 6" if surface is removable allowing 24" [610 mm] clearance (i.e. closet installation). See Ventilation Air Opening dimensions in Figure 3-1.

[2] Clearances can be as low as 12" [305 mm] if the right side has a clearance of 24" [610 mm].

[3] **Water Heaters** require a minimum clearance of 36" [915 mm] in front for burner access (Lx200 and Lx400 only).

Figure 3-1(a) Lx150-200 Models

Closet Installation, Minimum Clearances

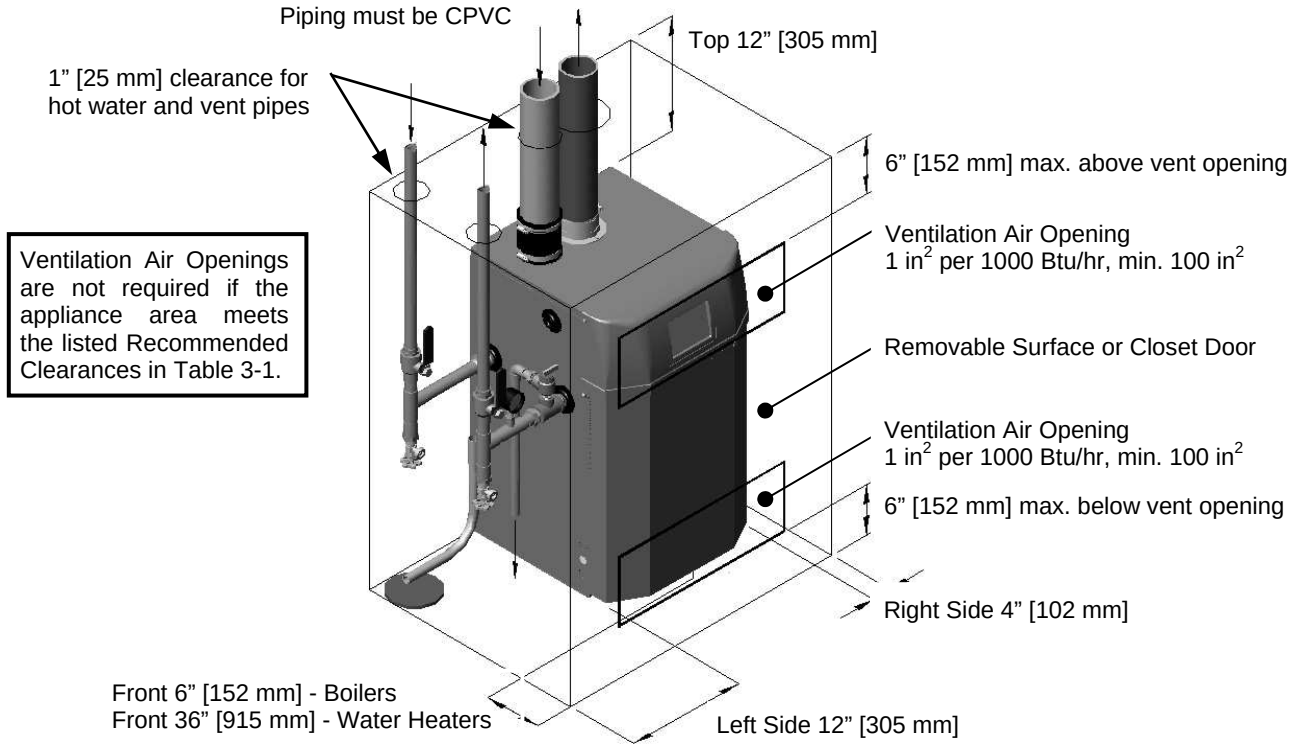


Figure 3-1(b) Lx400 Model

Closet Installation, Minimum Clearances

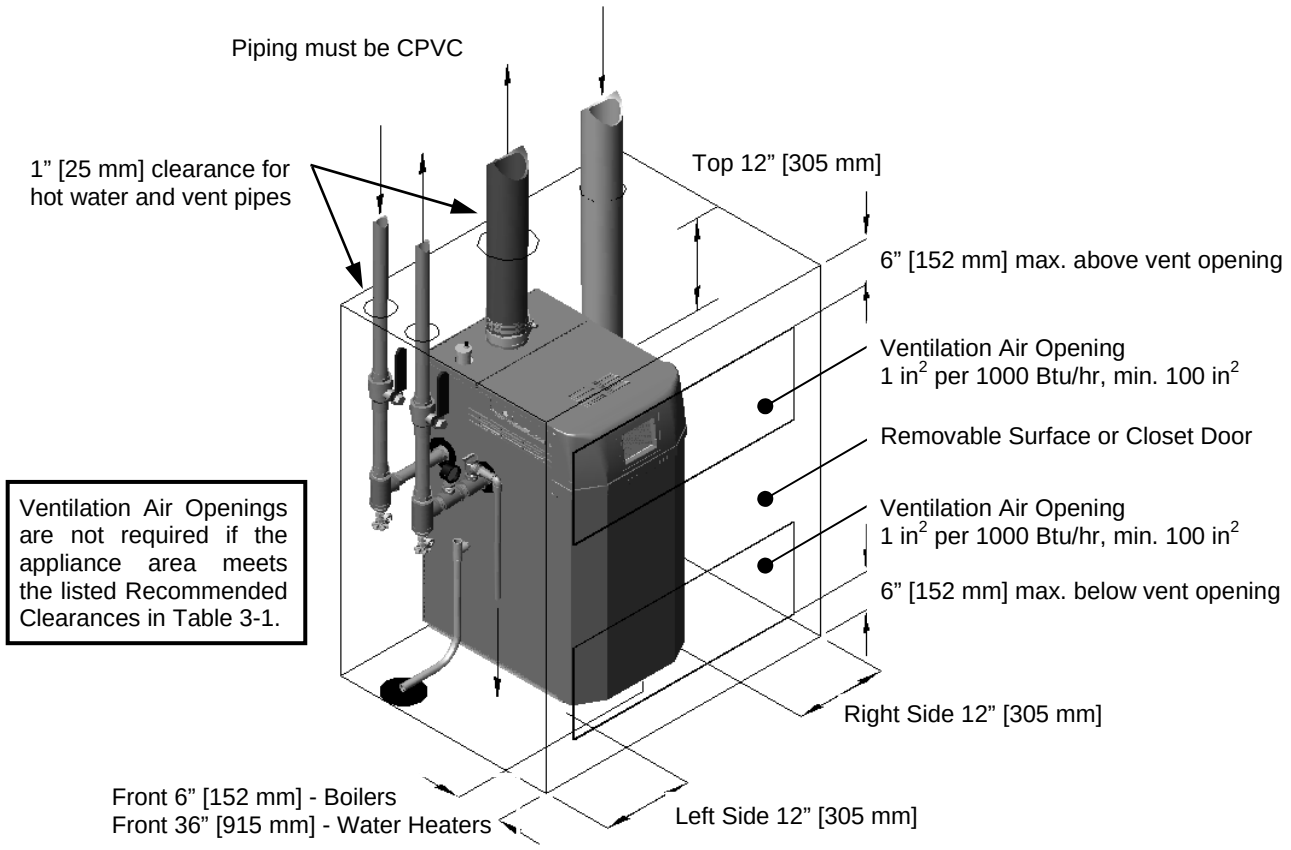


Figure 3-2(a) Lx150-200 Models
Wall Mounting Installations

❶ Remove the upper wall mount bracket from the back of the appliance.

❷ Secure the upper wall mount bracket to a solid wall using field supplied lag screws (anchors when mounting on a concrete wall) that are adequate to support the weight of the appliance. Ensure the bracket is mounted in the level position. Refer to Table 2-1 Specifications for appliance weight.

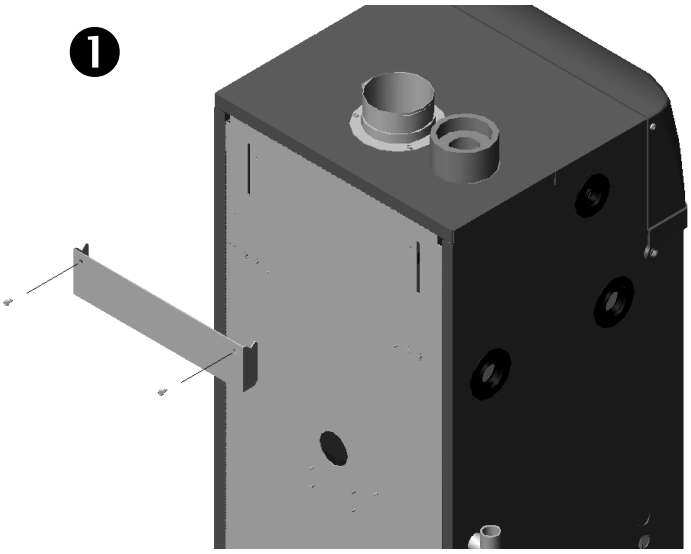
❸ Mount the appliance to the bracket by aligning the slots in the back of the appliance with the hooks protruding from the wall bracket. The top of the slots must rest at the bottom of the groove in the hooks of the wall mount bracket.

❹ Pull the bottom of the unit away from the wall to allow the installation of the lower wall mount bracket (included with appliance). The bracket will snap into place using the slots provided in the bottom of the unit (ensure the snaps lock into place, once installed the bracket should not be easily removed).

⚠ WARNING Failure to follow instructions may result in fire, serious injury, or death.

⚠ CAUTION This unit requires two people to lift it or damage and injury may result.

❶



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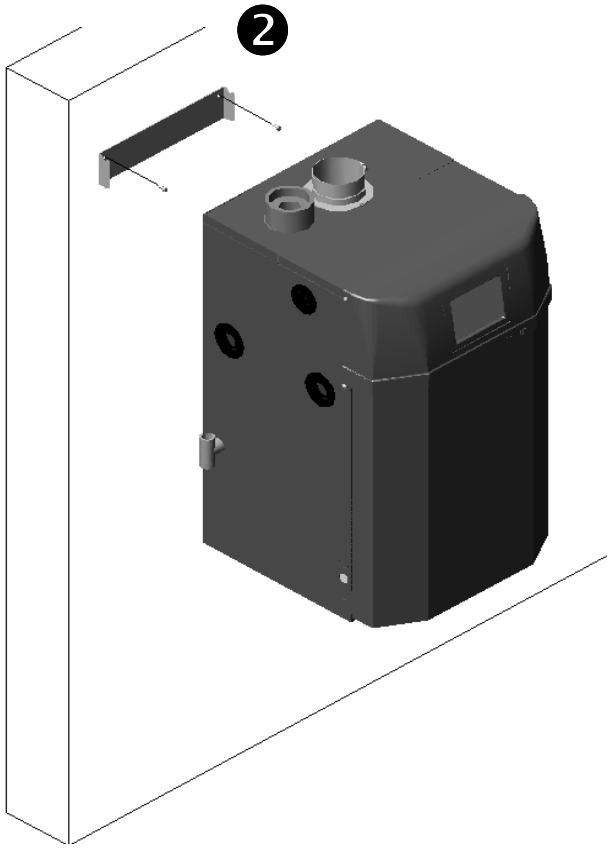

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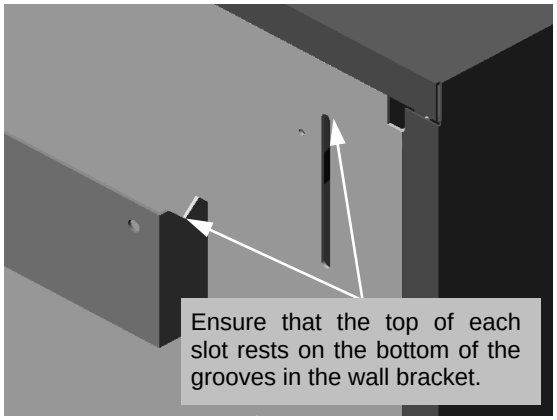

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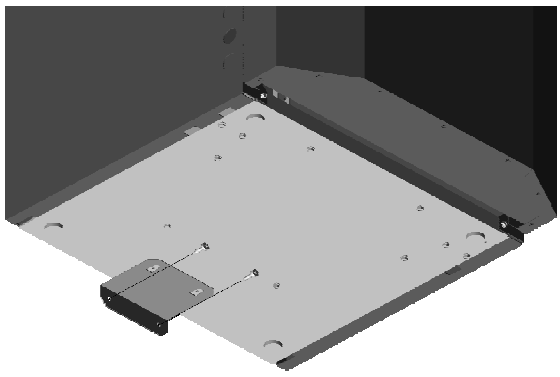


IMPORTANT **Water Heaters** require "Mandatory Wall Mounting Protection". Refer to Section 1.0 in Appendix C, "Water Heater Applications: Plumbing & Wiring Instructions".

Figure 3-2(b) Lx400 Model
Wall Mounting Installations

❶ While leaving the upper bracket intact (A), remove the wall mount bracket attached to the bottom-back of the appliance (B). Save the mounting hardware for Step 4.

❷ Secure the wall mount bracket, removed from the bottom of the boiler in Step 1, to a solid wall using field supplied lag screws (anchors when mounting to a concrete wall) that are adequate to support the weight of the appliance (refer to Table 2-1 Specifications). Ensure the wall mount bracket is mounted level and flush to the wall with mounting holes on the bottom, flange pointed upward and angled away from the wall.

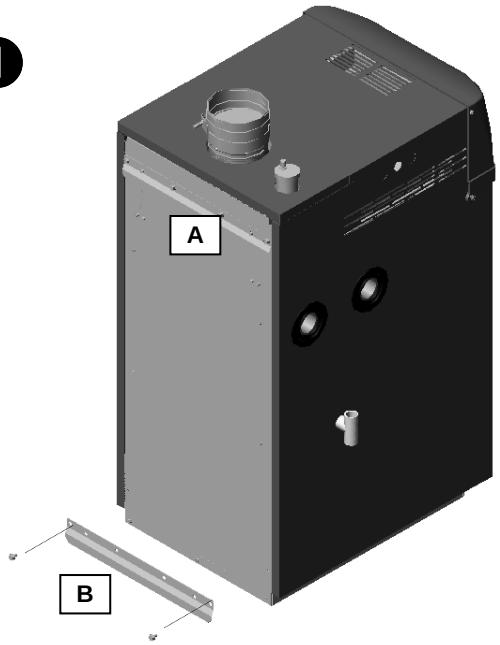
❸ Mount the appliance to the wall by aligning the upper bracket (A) with the wall mount bracket (B). Slide the upper bracket down over the wall mount bracket until it hooks.

❹ Once the appliance is resting securely on the upper bracket, secure the bottom bracket to the underside of the appliance using the mounting hardware removed in Step 1; then, anchor the bottom bracket to the wall as shown.

⚠ WARNING Failure to follow instructions may result in fire, serious injury, or death.

⚠ CAUTION This unit requires two people to lift it or damage and injury may result.

❶



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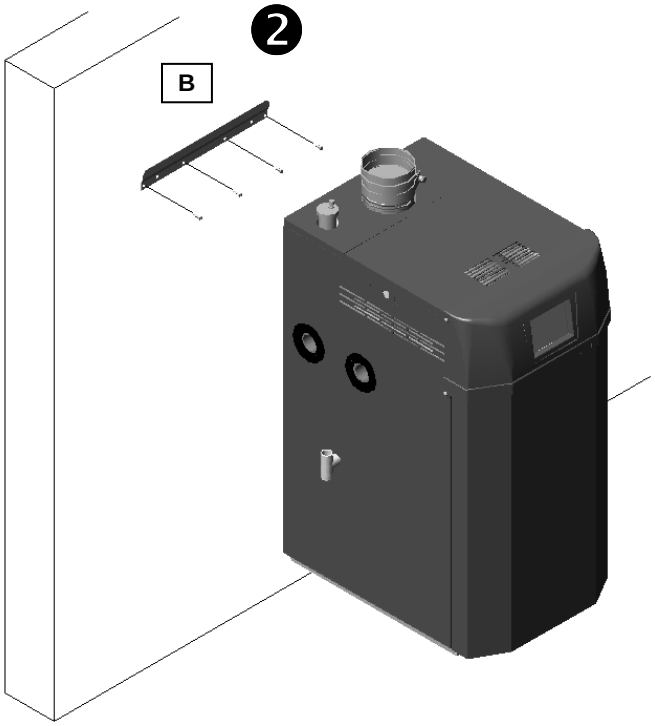

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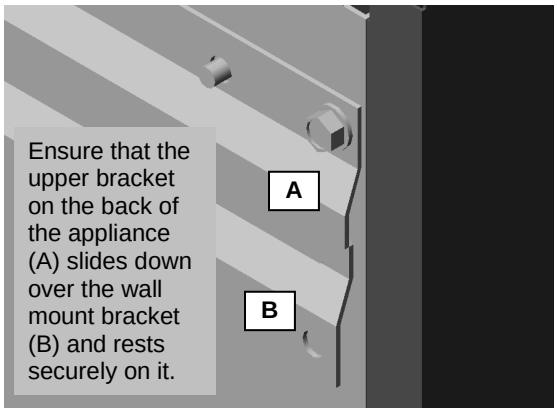

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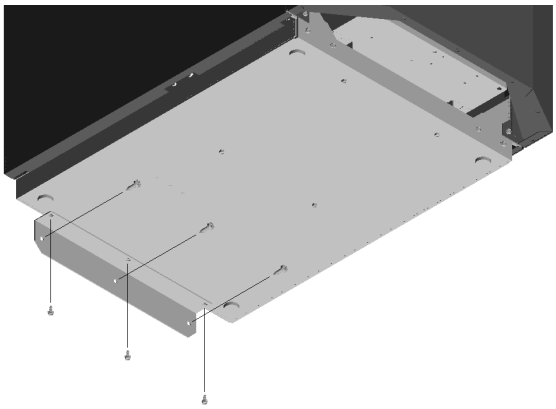


IMPORTANT **Water Heaters** require "Mandatory Wall Mounting Protection". Refer to Section 1.0 in Appendix C, "Water Heater Applications: Plumbing & Wiring Instructions".

4.0 GENERAL VENTING

The Trinity Lx is a "Direct Vent" appliance requiring a "Special Venting System" designed for pressurized venting. Both the Vent and Air-Intake piping must be piped to the outdoors, using the vent material and rules outlined in this section. Under no conditions may this unit vent gases into a masonry chimney, unless it is vacant, and utilizes the approved venting material and rules described in this section. Installations must comply with local requirements and with the National Fuel Gas Code, ANSI Z223.1 for U.S. installations or CSA B149.1 for Canadian Installations.

⚠ DANGER The Vent and Air-Intake for Trinity Lx appliances must be piped separately from each other and can not share a common Vent or Air-Intake with another Trinity Lx or any other appliance. Failure to follow these instructions will result in serious injury or death.

Combustion Air-Intake Contamination

Be careful not to locate the Air-Intake termination in an area where contaminants can be drawn in and used for combustion. Combustion air containing dust, debris or air-borne contaminants will drastically increase the required maintenance and may cause a corrosive reaction in the Heat Exchanger which could result in premature failure, fire, serious injury, or death. Listed below are some of the area's that should be avoided when terminating the combustion air-intake on Trinity Lx appliances:

Table 4-1 Corrosive Products and Contaminant Sources

Products to Avoid	Contaminated Sources to Avoid
Antistatic fabric softeners, bleaches, detergents, cleaners	Laundry facilities
Perchloroethylene (PCE), hydrocarbon based cleaners	Dry cleaning facilities
Chemical fertilizer, herbicides/pesticides, dust, methane gas	Farms or areas with livestock and manure
Paint or varnish removers, cements or glues, sawdust	Wood working or furniture refinishing shops
Water chlorination chemicals (chloride, fluoride)	Swimming pools, hot tubs
Solvents, cutting oils, fiberglass, cleaning solvents	Auto body or metal working shops
Refrigerant charge with CFC or HCFC	Refrigerant repair shops
Permanent wave solutions	Beauty shops
Fixer, hydrochloric acid (muriatic acid), bromide, iodine	Photo labs, chemical / plastics processing plants
Cement powder, crack fill dust, cellulose, fiber based insulation	Concrete plant or construction site

⚠ WARNING Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance. Failure to follow instructions may result in serious injury or death.

Near Appliance Vent/Air-Intake Piping

Trinity Lx appliances are equipped with a flue outlet adapter that accepts approved 3" venting material on models Lx150-200 and 4" venting material on model Lx400. **DO NOT** insert PVC pipe directly into the exhaust connection as the PVC pipe could become deformed by the clamping force of the gear clamp. Only use approved CPVC vent pipe for connection to the appliance flue outlet adapter. In Canada, all exhaust venting must be CPVC as per Table 4-3.

Each appliance supplied to the US is equipped with a short piece of approved CPVC vent pipe adequate to insert into the appliance flue outlet adapter with the other end being cemented to the field venting. This mandatory CPVC vent pipe should extend fully into the appliance flue outlet adapter (Table 4-2). Ensure that the venting system does not apply a load or strain on the appliance flue outlet adapter. To reduce potential strain, the manufacturer recommends using two elbows to create a "swing joint" as shown in Figure 4-1(a) and (b).

Table 4-2 Mandatory Vent Pipe

Model No.	CPVC Vent Pipe Length	Full Insertion Depth
Trinity Lx150-200	Minimum 5" [127 mm]	2-7/8" [73 mm]
Trinity Lx400	Minimum 4" [100 mm]	1-7/8" [48 mm]

⚠ WARNING **Improper seating can cause leakage and eventual failure of the sealing gasket.** Failure to follow these instructions may result in serious injury or death.

Figure 4-1(a) Lx150-200 Models

Near Appliance Venting (Canada)

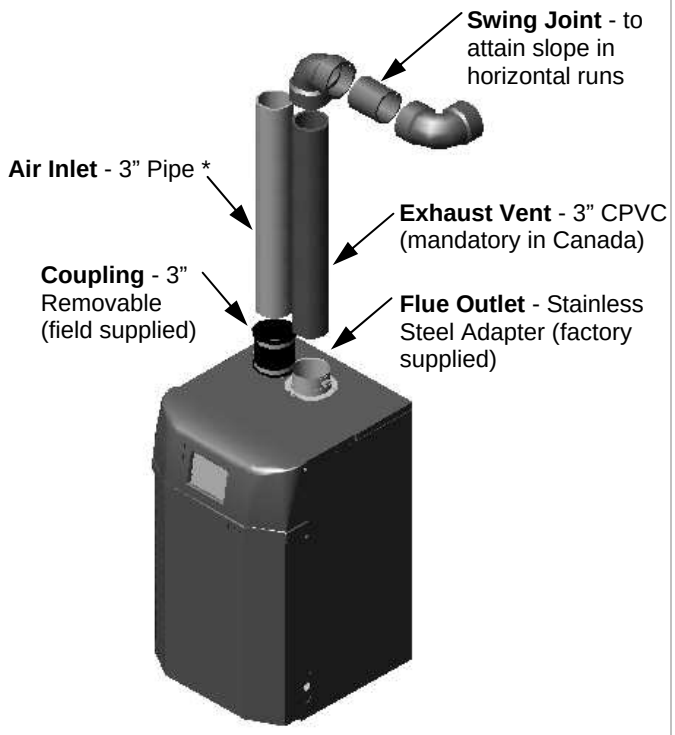


Figure 4-1(b) Lx150-200 Models

Near Appliance Venting (US)

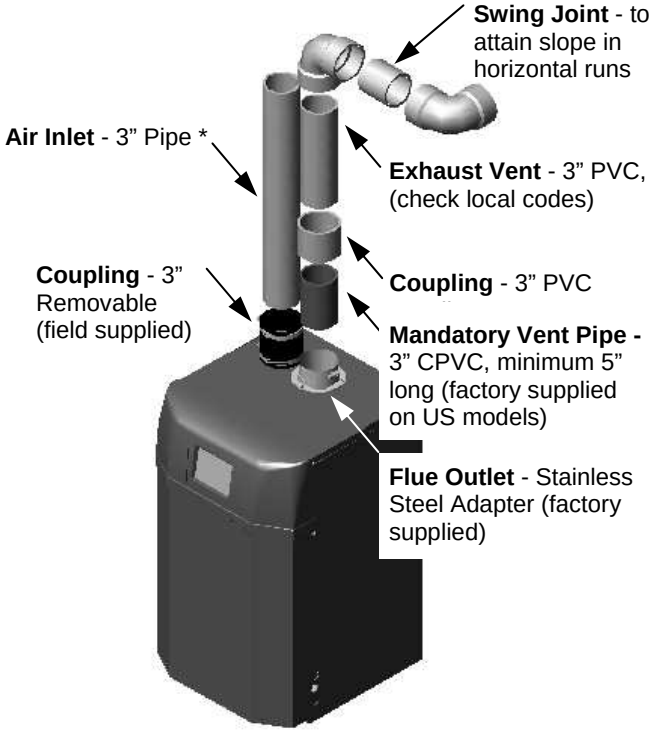


Figure 4-2(a) Lx400 Model

Near Appliance Venting (Canada)

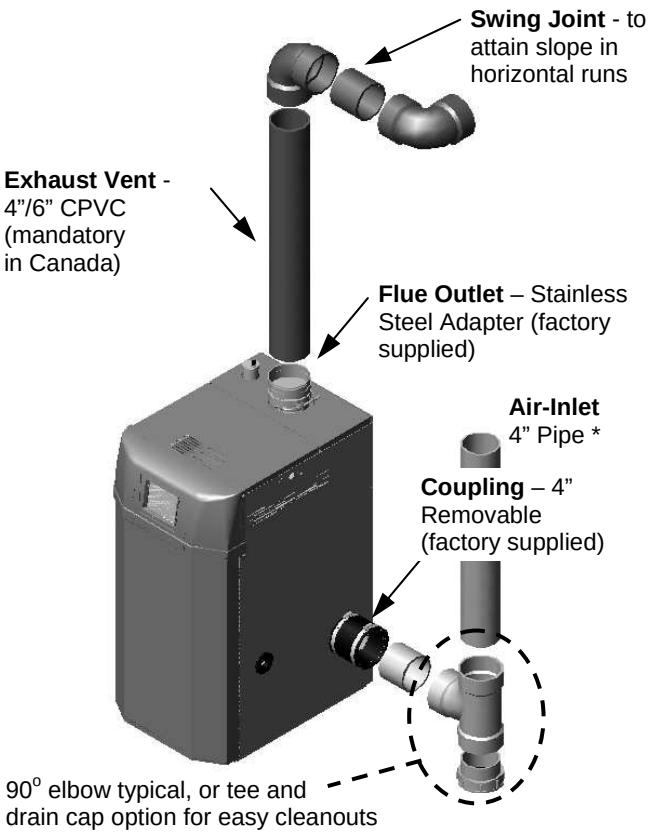
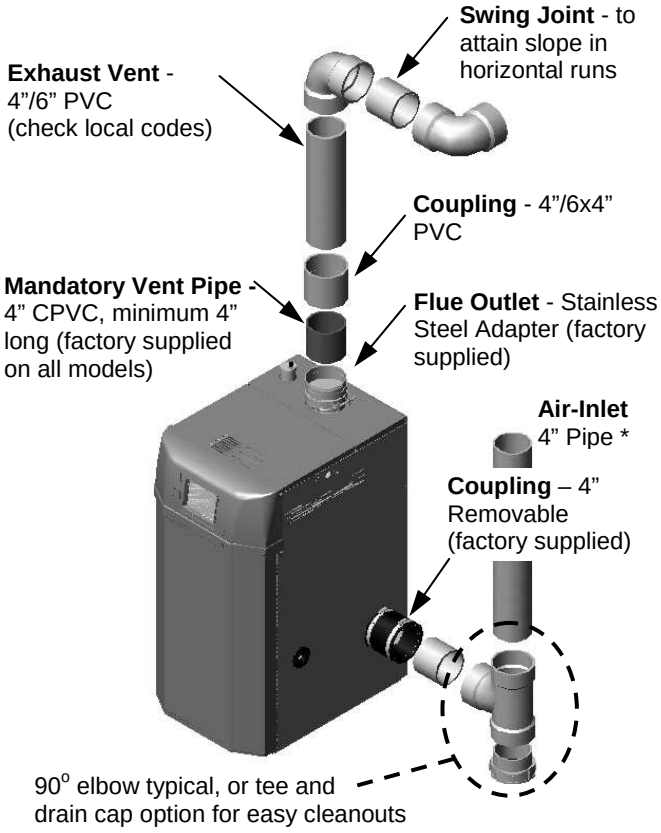


Figure 4-2(b) Lx400 Model

Near Appliance Venting (US)



* **Air-Inlet** - check with applicable local codes for acceptable pipe material.

Vent/Air-Intake Pipe Material

Table 4-3 Acceptable Vent and Air-Intake Pipe Material

Requirements [1]	Materials [3,4]	United States	Canada [2]
Vent Pipe and Fittings	PVC - DWV	ANSI/ASTM D2265	Not permitted
	PVC Schedule 40	ANSI/ASTM D1785	Not permitted
	CPVC Schedule 40	ANSI/ASTM F441	ULC S636
Pipe Cement	PVC	ANSI/ASTM D2564	Not permitted
	CPVC	ANSI/ASTM F493	ULC S636
Primers	PVC / CPVC	ANSI/ASTM F656	ULC S636

Notes:
[1] Refer to Table 4-4 for Allowable Vent and Air-Intake Pipe Sizes and Lengths.
[2] IPEX System 636 is an approved CPVC Flue Gas Venting System listed to ULC S636 (www.ipexinc.com).
[3] In Canada and the US, all Vent and Air-Intake piping and fittings for an appliance installation located within a closet, must be approved **CPVC** venting material, cement, and primers. PVC and cellular (foam) core pipe are not permitted.
[4] The Air-Intake does not require high temperature pipe material. Check applicable local codes for acceptable materials.

⚠ WARNING Only Vent and Air-Intake Materials listed in Table 4-3 should be used for gas-fired appliance installation. Failure to comply with these standards and their requirements could result in fire, serious injury, or death.

⚠ WARNING In Canada and the US, closet/alcove installations require approved **CPVC** exhaust vent piping and fittings. Cement and primers must also comply with the applicable standard for CPVC vent materials. See Table 4-3 Acceptable Vent and Air-Intake Pipe Material. Failure to comply may result in property damage, serious injury, or death.

NOTICE In Canada, the first **3 ft (915 mm)** of vent piping must be readily accessible for inspection.

Vent/Air-Intake Pipe Length Determination

Use Table 4-4 to determine the maximum pipe length that can be used. The table calculates sweep, 90º elbows, and 45º elbows at 5 equivalent feet [1.52 m] each. Allowable equivalent pipe lengths for vent and air-intake pipes are shown separately for Natural Gas and LP. ***Example*****:** An Lx200 can be installed with 105 equivalent feet [32 m] of air-intake piping and 105 equivalent feet [32 m] of vent piping when operating with Natural Gas.

IMPORTANT The length of one vent pipe (intake or exhaust) may not exceed the length of the other vent pipe by more than 20 equivalent feet (6.1 m).

- The three 90° elbows of the exterior vent piping (two outlet, and one inlet) do not have to be taken into consideration in the vent length calculations.
- When operating with Propane Gas (LP), Trinity Lx models are limited to a maximum vent length in equivalent feet of 50’ (3” pipe), 30’ (4” pipe) and 65’ (6” pipe) depending on model number. See Table 4-4.

Table 4-4 Allowable Vent and Air-Intake Pipe Size and Lengths

Model No.	Pipe Size	Gas	Length ft. [m]	Number of Elbows (90’s or 45’s) and Equivalent Feet [Meters]								
				1	2	3	4	5	6	7	8	9
Trinity Lx150 Trinity Lx150E Trinity Lx200	3”	Natural	105 [32]	100 [30.5]	95 [28.9]	90 [27.4]	85 [25.9]	80 [24.4]	75 [22.9]	70 [21.3]	65 [19.8]	60 [18.3]
	3”	LP	50 [15.2]	45 [13.7]	40 [12.2]	35 [10.7]	30 [9.1]	25 [7.6]	20 [6.1]	15 [4.6]	10 [3.0]	5 [1.5]
Trinity Lx400	4”	Natural & LP	30 [9.1]	25 [7.6]	20 [6.1]	15 [4.6]	10 [3.0]	5 [1.5]	-	-	-	-
	6”	Natural & LP	65 [19.8]	60 [18.3]	55 [16.8]	50 [15.2]	45 [13.7]	40 [12.2]	35 [10.7]	30 [9.1]	25 [7.6]	20 [6.1]

IMPORTANT **Venting Options -** Due to potential moisture loading (build-up) along the exterior wall, sidewall venting may not be the preferred venting option. See Figures 4-3(b) and 4-5(b).

Two-Pipe Venting Options

Figure 4-3(a) Lx150-200

Two-Pipe Side Wall Termination

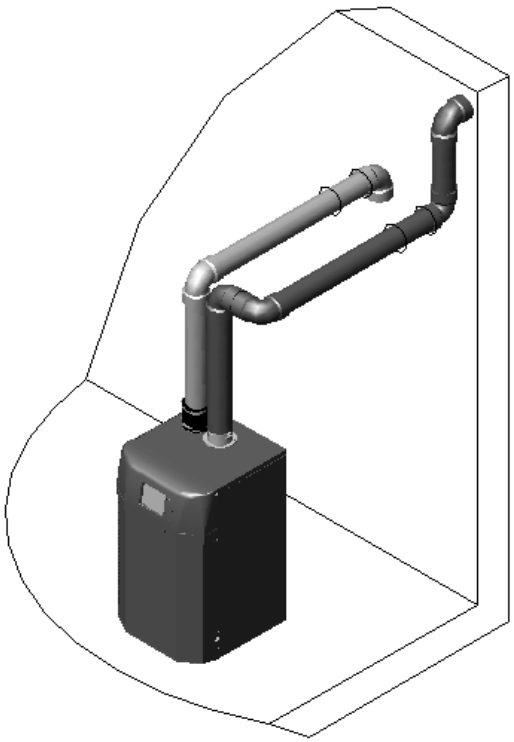


Figure 4-3(b) Typical for All Models

Two-Pipe Roof Termination

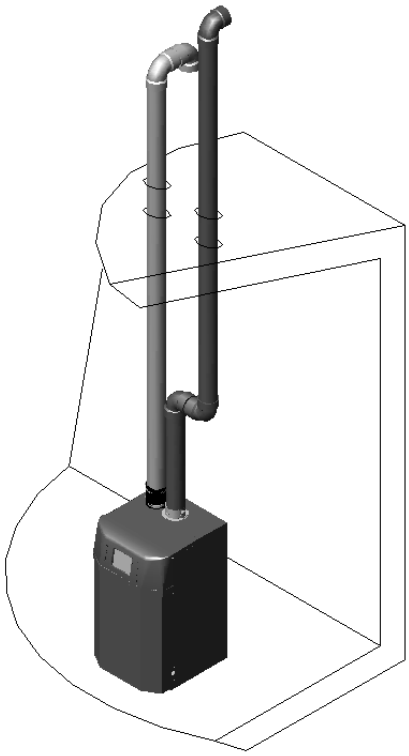


Figure 4-4(a) Lx400

Two-Pipe Side Wall Termination

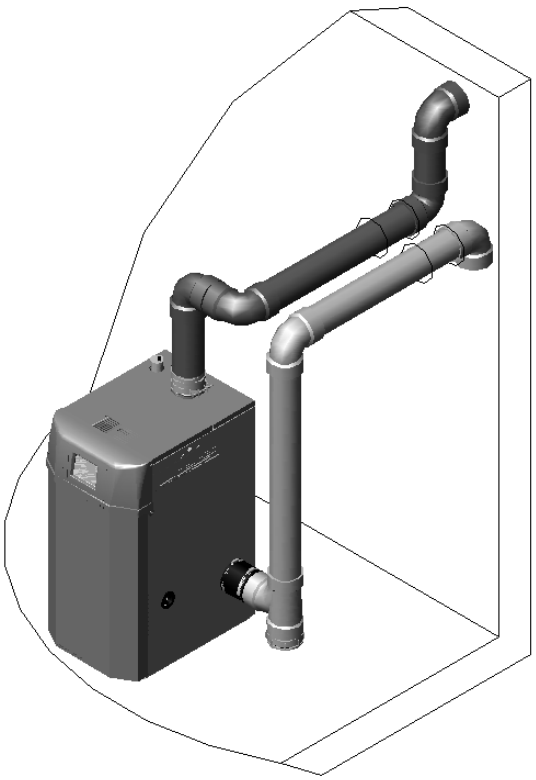
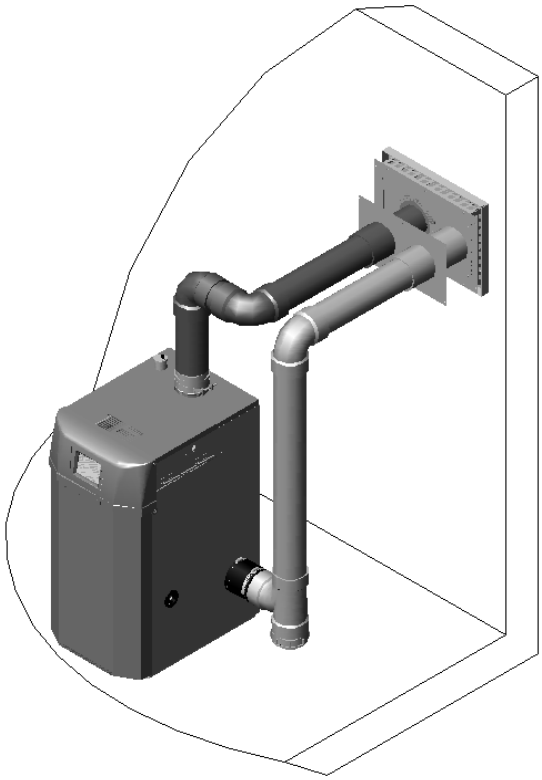


Figure 4-4(b) Lx400 Only

Two-Pipe Side Wall Termination (Optional Kit)



Concentric Venting Options

Figure 4-5(a) Lx150-200
Concentric Side Wall Termination (Optional Kit)

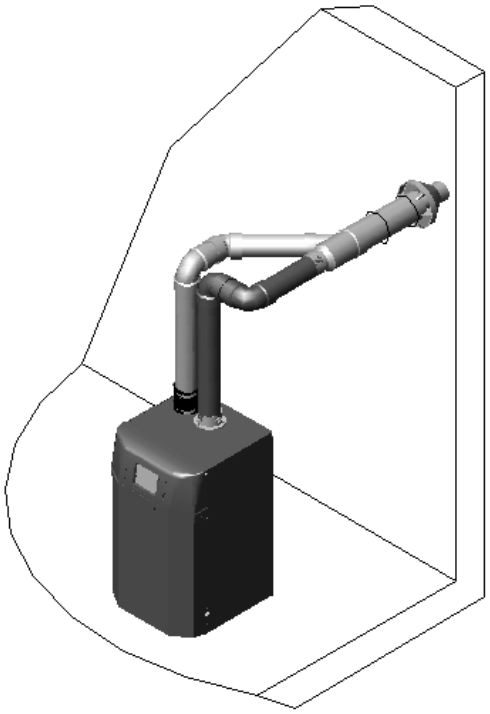
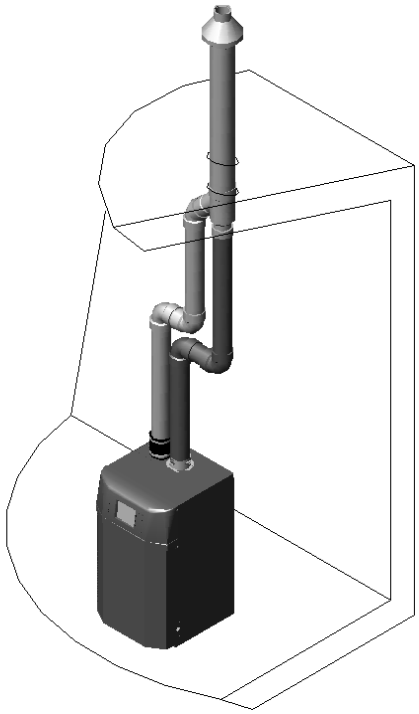


Figure 4-5(b) Lx150-200
Concentric Roof Termination (Optional Kit)



Optional Termination Kits

Lx400 Side Wall Termination Kit

- Use NTI part number 83236 (4" connections; if venting with 6", must adapt down to 4" at interior trim piece).
- Side-wall terminations only.
- Instructions included with vent terminal contain more detailed assembly and installation instructions.

Concentric Vent Termination Kit - United States

- Use NTI part number 82666 (York part number 1CT0303). ***Kits no longer approved for use in Canada***.
- Optional for Trinity models Lx150-200 only (not for use with Lx400).
- Instructions included with vent terminal contain more detailed assembly and installation instructions.
- Clearance requirements in this manual supersede those of the instructions included with the vent terminal.
- Terminal **MUST** be cemented together during installation.

Concentric Vent Termination Kit - Canada

- Use IPEX part number 196006 (Concentric Kit) and 196051 (Vent Screen), certified to ULC S636. Use of this material is subject to approval by local authorities. ***Kit 82666/ 1CT0303 no longer approved for Canada.***
- Optional for Trinity models Lx150-200 only (not for use with Lx400).
- Instructions included with termination kits contain more detailed assembly and installation instructions.
- Clearance requirements in this manual supersede those of the instructions included with the vent terminal.

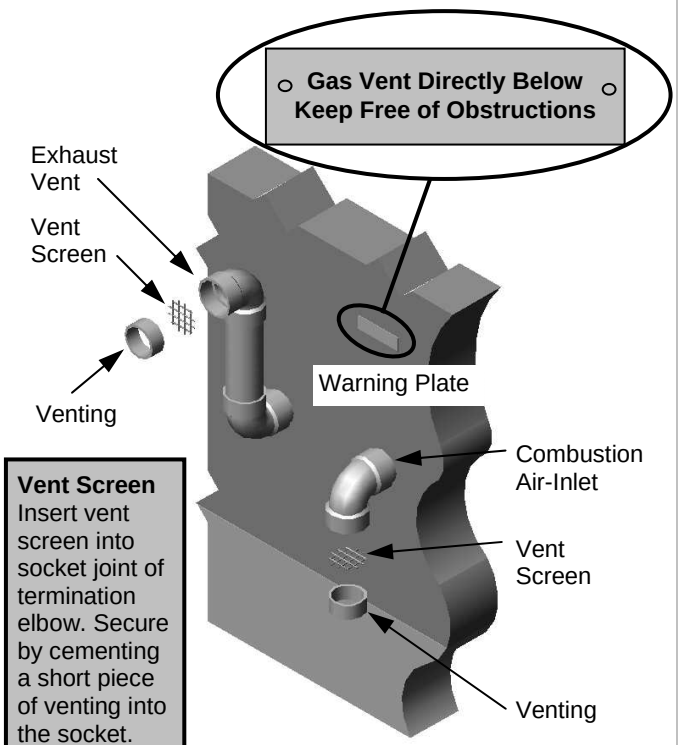
NTI does not stock System 636 PVC Concentric Vent Termination Kits as they are readily available from IPEX via Canadian wholesalers. Canadian customers wanting more information on System 636 Concentric Vent Kits or wholesaler locations can contact IPEX directly at 1-866-473-9462 (toll free in Canada) or www.ipexinc.com.

IMPORTANT In Canada, safety authorities in some jurisdictions are not allowing the use of PVC vent terminals with appliances of any kind, even if System 636 certified; therefore, please verify compliance with your local safety inspector prior to installing a PVC Concentric Vent Kit with a Trinity Lx appliance.

Labeling and Identification – Side Wall Terminations

Figure 4-6(a) Typical for All Models

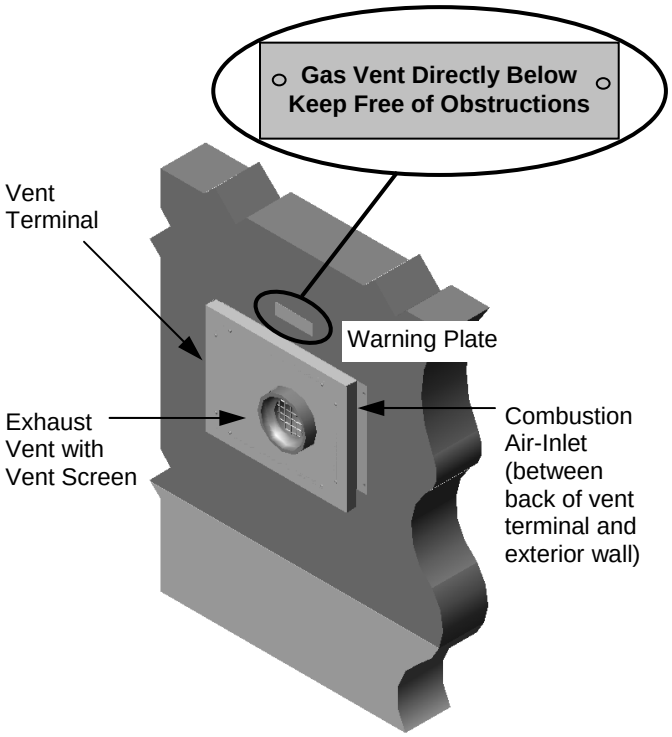
Two-Pipe Side Wall Termination



Vent Screen
Insert vent screen into socket joint of termination elbow. Secure by cementing a short piece of venting into the socket.

Figure 4-6(b) Lx400 Only

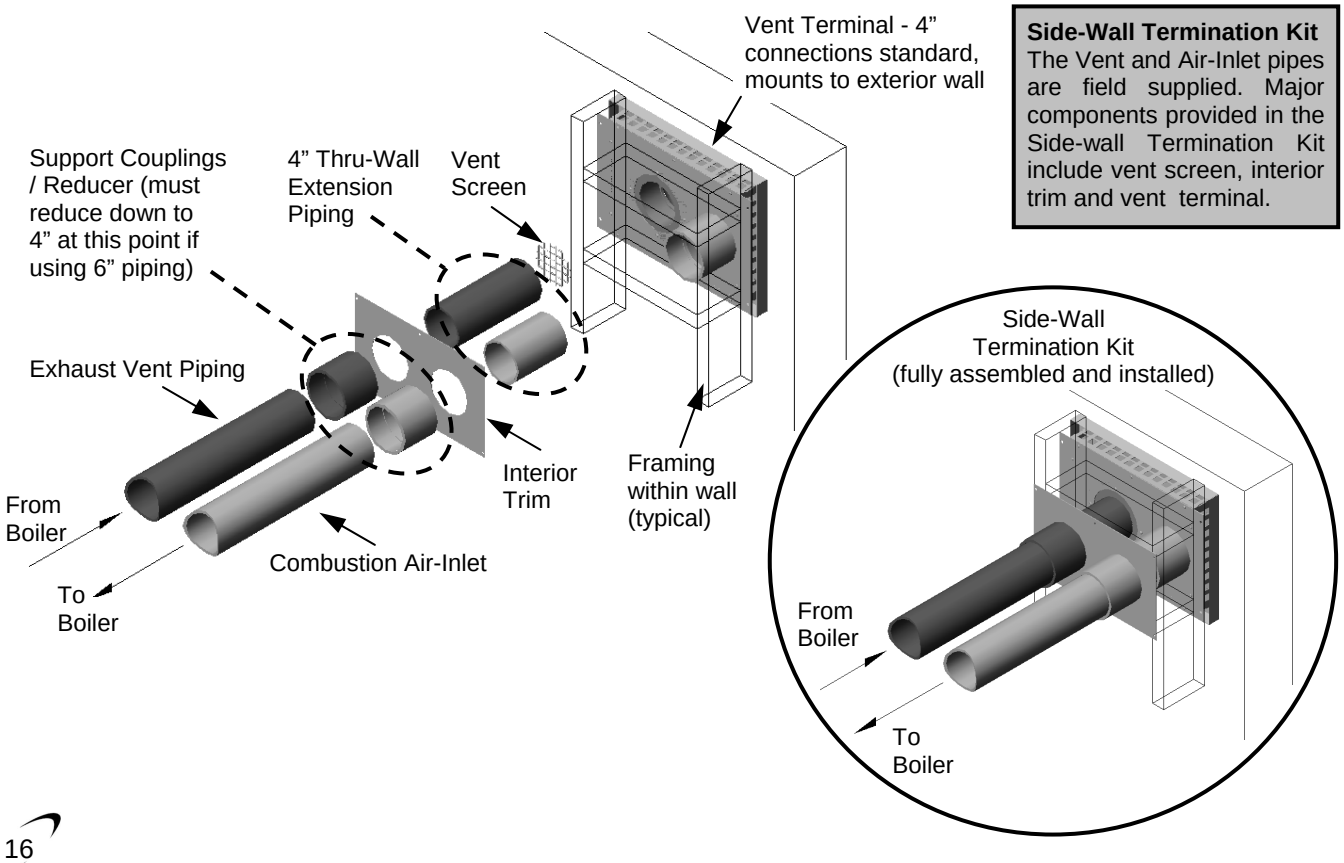
Two-Pipe Side Wall Termination (Optional Kit)



Labeling and Identification – Lx400 Side Wall Termination Kit

Figure 4-7 Lx400 Only

Two-Pipe Side Wall Termination (Optional Kit)



Side-Wall Termination Kit
The Vent and Air-Inlet pipes are field supplied. Major components provided in the Side-wall Termination Kit include vent screen, interior trim and vent terminal.

Labeling and Identification – Concentric Vent Kit

Figure 4-8(a) Lx150-200

Concentric Vent Side Wall Termination

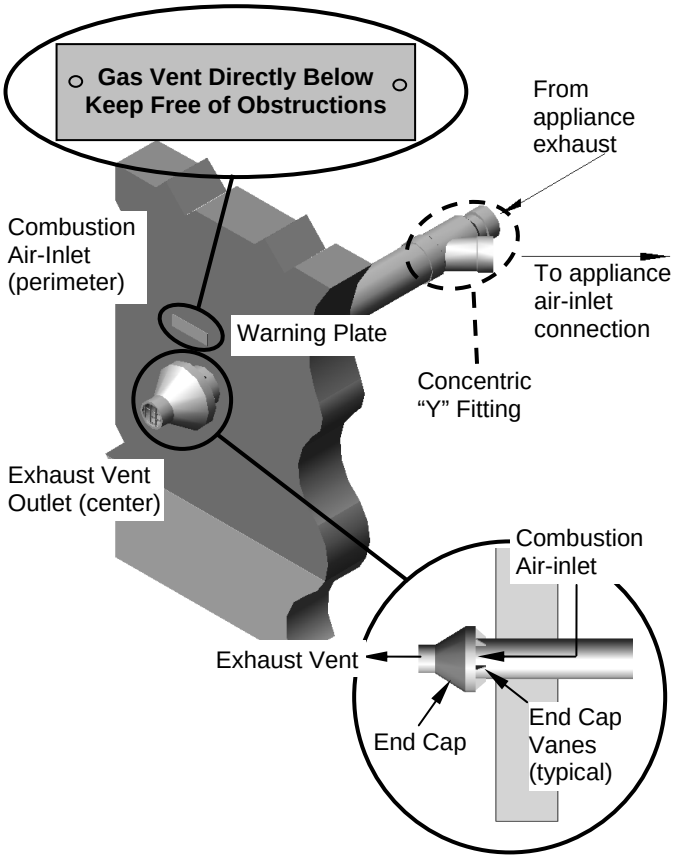
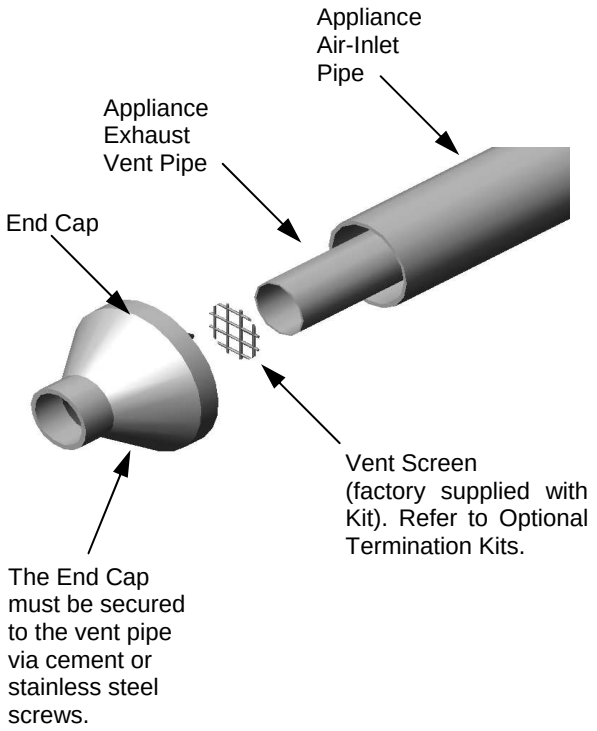


Figure 4-8(b) Lx150-200

Concentric Vent Detail with Vent Screen

Insert vent screen between the end of the appliance exhaust vent and the end cap as shown.



Labeling and Identification – Roof Top Terminations

Figure 4-9(a) All Models

Two-Pipe Roof Top Termination

Two-pipe terminations typically penetrate the roof surface. An alternative is to use an existing chimney as a chase way. See Figure 4-12 for more details.

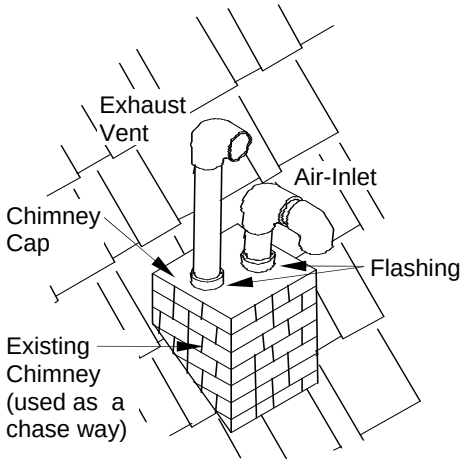
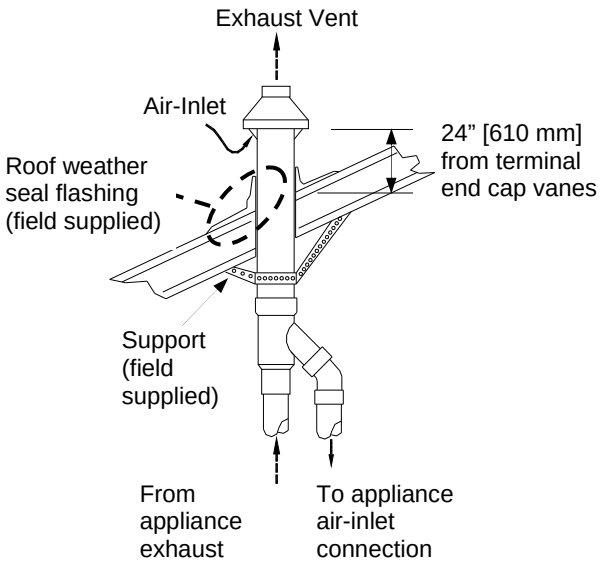


Figure 4-9(b) Lx150-200

Concentric Vent Roof Top Termination

To prevent water leakage, install adequate roof weather seal flashing (not included) around roof penetration as shown.



Venting Rules and Guidelines

1. **Prevailing Winds:** Ensure the vent is located where it will not be exposed to normal prevailing winds.
2. **Combustion Air-Intake Contamination:** Air for combustion must be drawn from outdoors from an area free of dust and contaminants. Combustion air containing chemicals such as chloride, fluoride, bromine or iodine or dust and debris will cause corrosion damage of the heat exchanger voiding your NTI warranty. Refer to Table 4-1 for a list of corrosive products and contaminants sources to avoid.
3. **Vertical Separation:** The exhaust must be a minimum of 18" [457 mm] above the air inlet, and the air inlet must always be a minimum of 12" [305 mm] plus snow allowance above any surface that will support snow. (Two feet plus snow allowance is highly recommended). Consult your weather office, for the maximum typical snowfall for your region.
   Example: New Brunswick Canada - typical maximum snowfall is 19", thus the inlet must be (12"+19") = 31" above grade and exhaust must be (31"+18") = 49" above grade.
4. **Horizontal Separation:** The horizontal distance between the inlet and exhaust must be a minimum of 4" [102 mm] center to center. When the horizontal distance between the inlet and exhaust is greater than 12" [305 mm], the difference in horizontal distance must be determined and the vertical separation increased by the same amount.
   Example: The horizontal distance (HD) = 24" [610 mm], and the vertical separation (VSmin) = 18" [457 mm], the new vertical separation (VSnew) can be calculated using the following equation:
   VSnew = (HD - 12") + VS, where VSnew = (24" - 12") + 18" = 30".
   (If the horizontal distance is greater than 6' [1.83 m], no additional vertical spacing is required. Vertical separation is never required to be greater than 36" [915 mm].
5. **Wall Flashing:** Under normal operating conditions this appliance will produce a plume of white gases, and should be taken into consideration when selecting an adequate location. A 36" [915 mm] diameter stainless, plastic, or vinyl shield can be used to flash the exterior of the residence.
6. **Flue Gas Hazard:** Position the vent termination where vapors cannot make accidental contact with people and pets or damage nearby shrubs and plants.
7. **Elbow Extensions:** Elbows on outside of wall must be no more than ½" [13 mm] away from the wall.
8. **Vent Sloping:** All indoor exhaust piping must be on a slope back to the appliance a minimum of ¼" per linear foot of vent [6.25 mm per linear 305 mm]. For applications where excessive condensation is possible ½" per linear foot [13 mm per linear 305 mm] is recommended.
9. **Vent Supports:** Where required Vent and Air-intake piping shall be secured to the wall for more rigidity. All interior vent pipe shall be supported a minimum of every 36" [915 mm]. If 6" diameter pipe is used with the Lx400, it need only be supported every 48" [1.22 m].
10. **Roof Exhaust:** In all roof applications the discharge must point away from the pitch of the roof.
11. **Roof Flashing:** Install adequate flashing where the pipe enters the roof, to prevent water leakage.
12. **Rain Cap:** Install and seal a rain cap over existing chimney openings, in vacant chimney applications.
13. **Venting Below Grade:** For installations that exit the wall below grade refer to Figure 4-9.
14. **Vent Screens:** Install factory supplied vent screens on the outside of the last elbow for both the inlet and exhaust vent terminal elbows. Install the screen into the female opening of the elbow. Then cut a small piece of pipe to sandwich the screen into the elbow. NOTE be sure that the small piece of pipe cut, does not extend past the end of the elbow. Two screens are provided in the package. See Figures 4-6(a) and (b) and Figures 4-8(a) and (b).
15. **Pipe Sizing:** It is extremely important that the intake and exhaust vent piping be adapted to the appropriate size immediately upon exiting the appliance cabinet. Refer to Table 4-2.
16. **Condensate Hazard:** Do not locate vent over public walkways, driveways or parking lots where condensate could drip and/or freeze and create a nuisance or hazard or could be damaged by machinery or vehicles.
17. **Warning Plate:** Install the warning plate "Gas Vent Directly Below", directly above (within 4 ft [1.22 m] vertically) the location of the air inlet pipe, so it is visible from at least 8 ft [2.4 m] away. See Figure 4-10.
18. **Wall Thickness:** Direct vent terminations are designed to work with any standard wall thickness. Installation guidelines for min/max wall thickness are as follows: Min.= 1" [25mm], Max.= 60" [1.52 m].
19. **Venting Options:** Due to potential moisture loading (build-up) along the exterior wall, sidewall venting may not be the preferred venting option. Refer to Figures 4-3(b) and 4-5(b) for alternative venting options.

Figure 4-10 All Models

Venting Below Grade

For installations that exit the wall below grade:

1. Excavate site as shown in Figure 4-9, to a point below where the pipes are to exit.
2. Ensure that the wall is fully sealed where the pipes penetrate the wall.
3. The Vent/Air-intake piping MUST be secured to the side of the building above grade, as shown, to provide rigidity.
4. NTI Provides a mounting bracket PN. 82075 for securing the exhaust pipes.
5. Ensure that the Vent/Air-Intake clearances are maintained, see Section 5.0 for details.

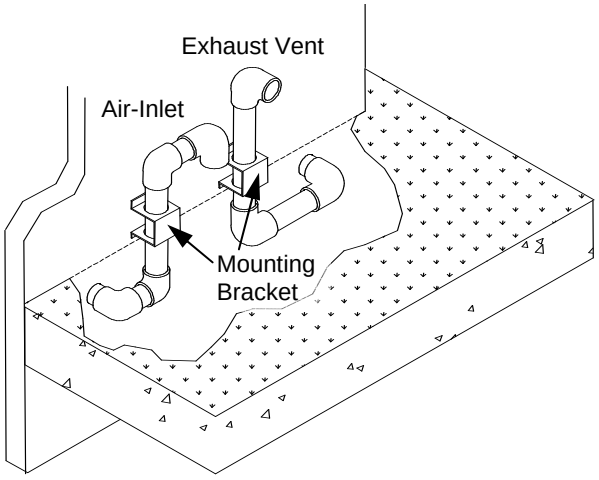


Figure 4-11 All Models

Outdoor Horizontal Venting

Vent piping outside the Building is permitted under the following conditions:

1. The maximum length outside the building is 20 feet [6.1 m]. Note that outdoor length must be included in the overall vent length calculation.
2. Only 3" pipe can be used for Lx150-200 models, only 4" pipe can be used for the Lx400 model.
3. All normal termination clearances are maintained.
4. All exterior exhaust vent pipes are insulated with 3½" [89 mm] - ID for Lx150-200, or 4½"[114 mm] - ID for Lx400, ½" [13 mm] thick, **Closed Cell Foamed Polyolefin Tubing** i.e., *"Tundra Seal Plus"* or equivalent.
5. The pipe is supported every 24" [610 mm].
6. The exhaust and inlet are sloped back to the appliance ½" elevation for every linear foot [13 mm for every linear 305 mm].

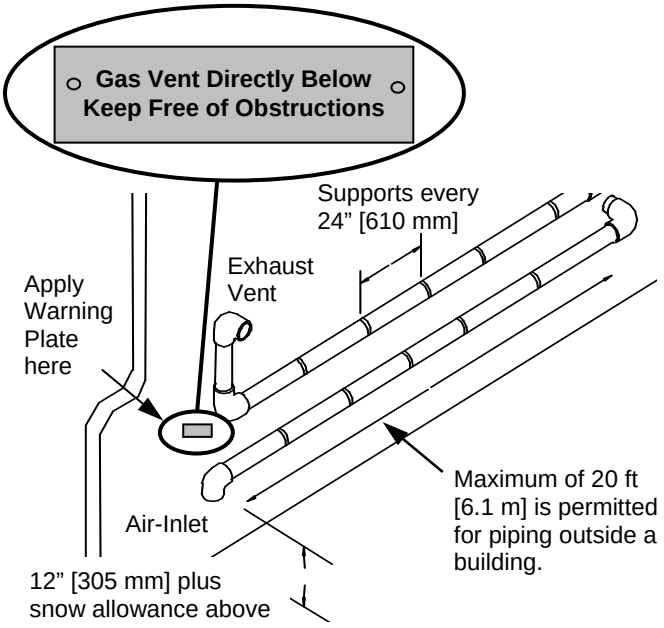
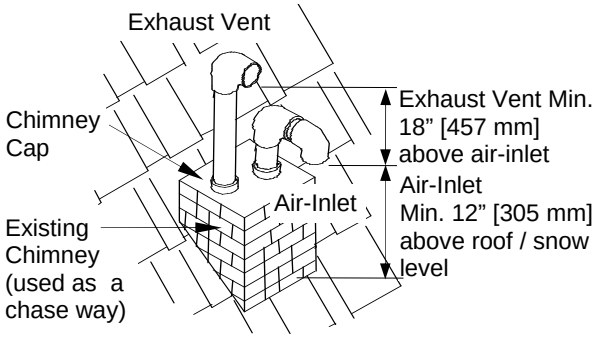


Figure 4-12 All Models

Existing Chimney Chase Way

It is permissible to use an existing chimney as a chase way to run the Vent/Air-Intake piping as long as:

1. The chimney is not being used by any other appliance.
2. Flue gases don't enter the vacant chimney.
3. Only Trinity certified venting materials are used, see Section 4.0.
4. Vent lengths are within the maximums specified.
5. The top of the chimney is capped and the Vent/Air-Inlet pipes are flashed to prevent leakage into the vacant chimney.



5.0 VENT/AIR-INTAKE TERMINATION CLEARANCES

⚠ WARNING The quick reference table below is to be read in conjunction with the numbered notes as indicated, Figures 5-1 through 5-6, and the Venting Rules and Guidelines in Section 4.0. The instructions detailed in this section are a combination of Trinity Lx specific and National Gas Code restrictions. Compliance alone doesn't insure a satisfactory installation as good common sense must also be applied. Failure to follow these instructions may result in fire, property damage, serious injury or death.

Table 5-1 Termination Clearances Quick Reference Table

Clearances to Air-Inlet Termination	Canada [1]		USA [2]	
	Min. Distance		Min. Distance	
A Above grade/roofline and snow level [8]	12 in.	305 mm	12 in.	305 mm
B Above roof line - Concentric Vent [6, 11, 13]	24 in.	610 mm	24 in.	610 mm
C To exhaust vent from any other appliance	36 in.	915 mm	12 in.	305 mm
Clearances to Exhaust Vent Termination	**Min. Distance**		**Min. Distance**	
D Minimum vertical separation above air inlet [9]	18 in.	457 mm	18 in.	457 mm
E Minimum horizontal separation from air inlet [3]	4 in.	102 mm	4 in.	102 mm
F Window, door or building opening	36 in.	915 mm	12 in.	305 mm
G To combustion air inlet from any other appliance	36 in.	915 mm	12 in.	305 mm
H Non-mechanical air supply inlet to building	36 in.	915 mm	12 in.	305 mm
I Mechanical air supply inlet to building [4]	6 ft.	1.83 m	3 ft.	915 mm
J Soffit, overhang, eave or parapet	24 in.	610 mm	24 in.	610 mm
K Soffit vent or vent opening in an overhang, eave or parapet	6 ft.	1.83 m	6 ft.	1.83 m
L Outside corner [10]	-	-	-	-
M Inside corner of an L-shaped structure (including walls and fences)	36 in.	915 mm	36 in.	915 mm
N Electric meters, gas meters, regulators and relief equipment	6 ft.	1.83 m	4 ft.	1.22 m
P Each side of center line above or below meters, regulators and relief devices [5]	36 in.	915 mm	36 in.	915 mm
Q Above a paved sidewalk, driveway, or parking lot on public property if adjacent [12]	7 ft.	2.13 m	7 ft.	2.13 m
R Above a sidewalk, driveway, or parking lot on public property	x	x	x	x
S Above a sidewalk, driveway on private property between / serving both dwellings	x	x	x	x
T Under a concrete veranda, porch, deck, or balcony [7]	24 in.	610 mm	24 in.	610 mm
U Above, under or near exterior stairs	x	x	x	x
V Into a canopy or carport	x	x	x	x

Notes:

1 - Canadian installations must comply with the current CSA B149.1 Natural Gas and Propane Installation Code and local building codes.

2 - US installations must comply with current ANSI Z223.1/ NFPA 54 National Fuel Gas Code and local building codes.

3 - Horizontal separation center-to-center (c.c.) 4"-12" (102-305 mm). Refer to "Venting Rules and Guidelines" for horizontal separation > 12" c.c. as it may impact vertical separation clearances.

4 - For US installations, an exhaust vent may be 3 ft above a mechanical air supply inlet if within 10 ft. [3 m] horizontally.

5 - Horizontal clearance must be observed up to a height of 15 ft. [4.6 m] above/below the meter, regulator, or relief devices.

6 - Concentric Vent must protrude from the roof precisely 24" [610 mm] measuring from the terminal end-cap vanes.

7 - Permitted if veranda, porch, deck, or balcony is made of concrete and a minimum of two sides are fully open beneath.

8 - 24" is the recommended snow level allowance above grade/roofline or any surface that will support snow, debris, or ice (i.e. for roof venting clearances - roofline and snow level). If living in a snowfall region, consult your local weather office for the maximum typical snowfall for your area.

9 - Note that the vent must maintain a minimum vertical distance above the air inlet. Example: Vent height = 18" (457 mm) above air inlet + 12" (305 mm) for air inlet above grade/roof line and snow level = 30" (762 mm) above grade and snow level.

10 - Clearances to an outside corner to be in accordance with local installation codes.

11 - In Canada, concentric vent materials are subject to approval by local inspectors. See Termination Kits in Section 4.0.

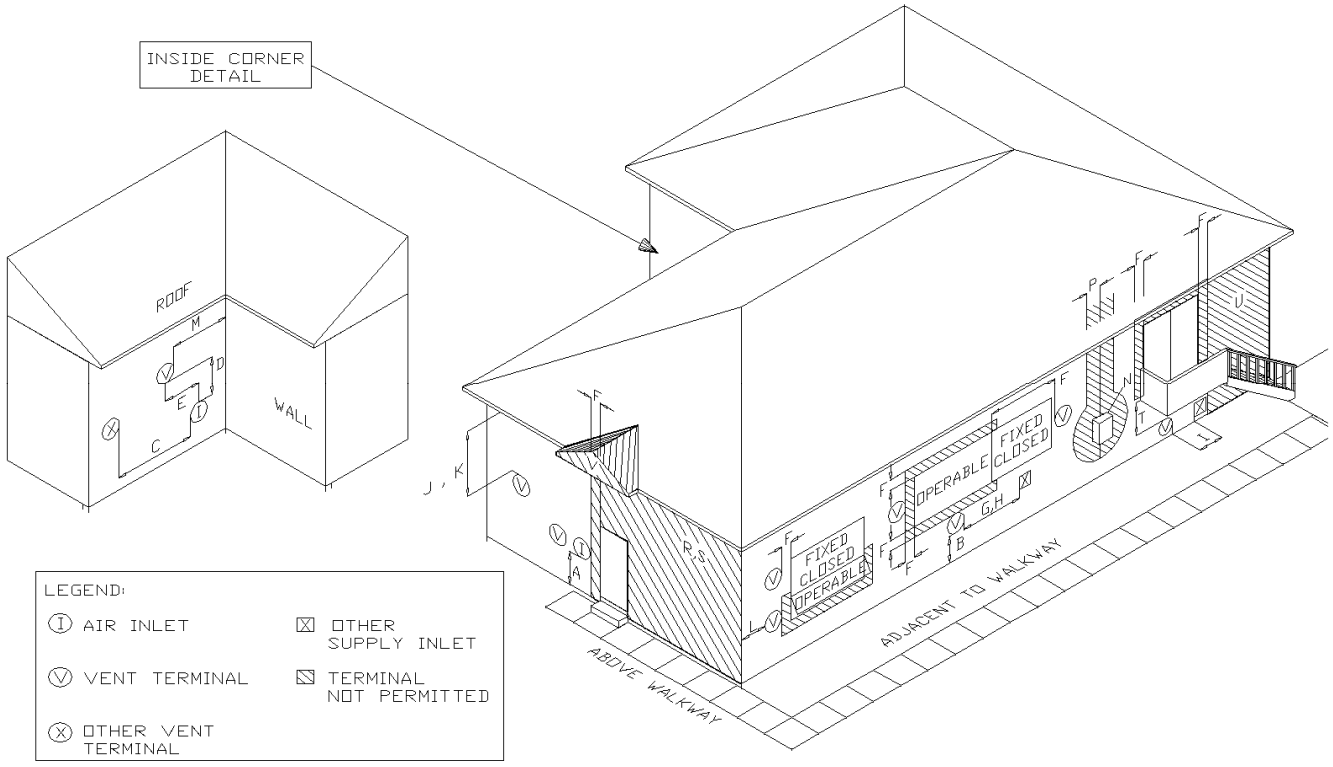
12 - Above public walkways, driveways or parking lots if adjacent to it and condensate cannot drip, freeze, or create a hazard.

13 - Contact the manufacturer for special exemptions relating to multiple appliance installations using concentric vents.

x - Not permitted by National gas code(s) and/or recommended by appliance manufacturer.

Figure 5-1 All Models

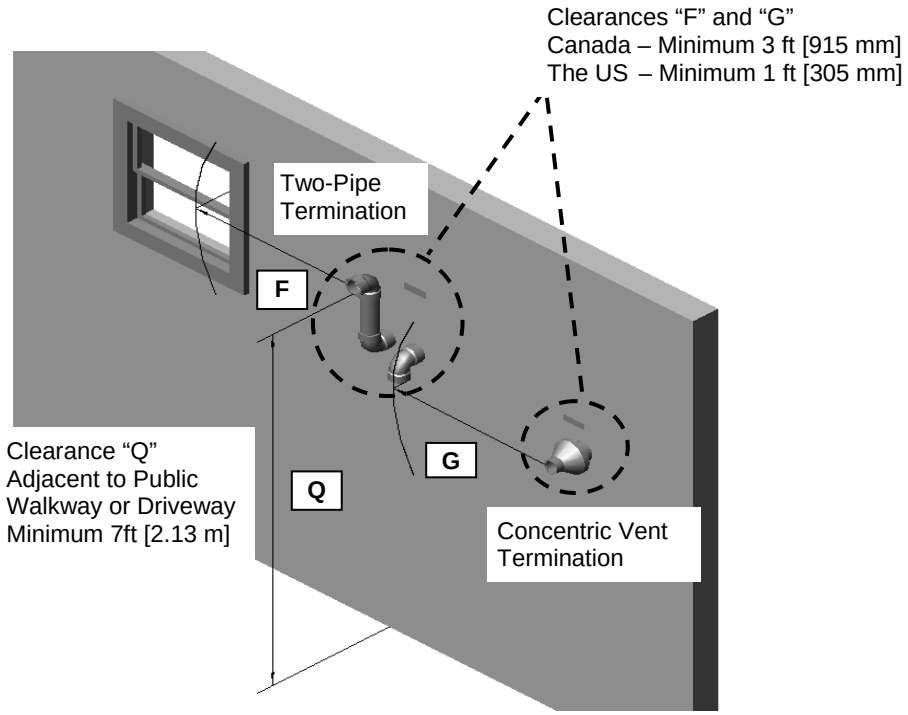
Termination Clearances Quick Reference Diagram



Illustrations of Termination Clearances

Figure 5-2 All Models

Side Wall Termination - Clearances Above Grade



G – Letter represents a specific Termination Position. Refer to Table 5-1 for corresponding termination clearances.

Figure 5-3 All Models

Two-Pipe Side Wall Clearances

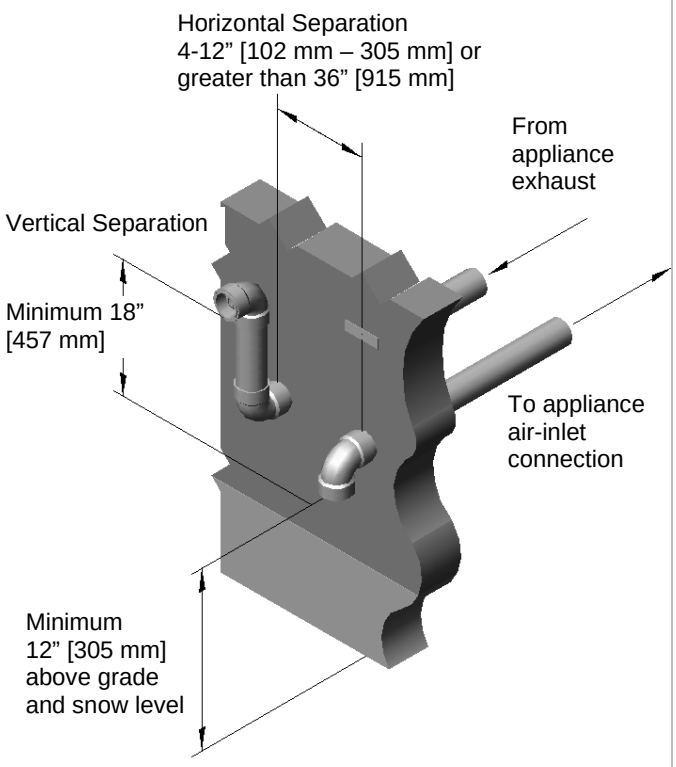


Figure 5-4 Lx400 Only

Termination Kit Side Wall Clearances

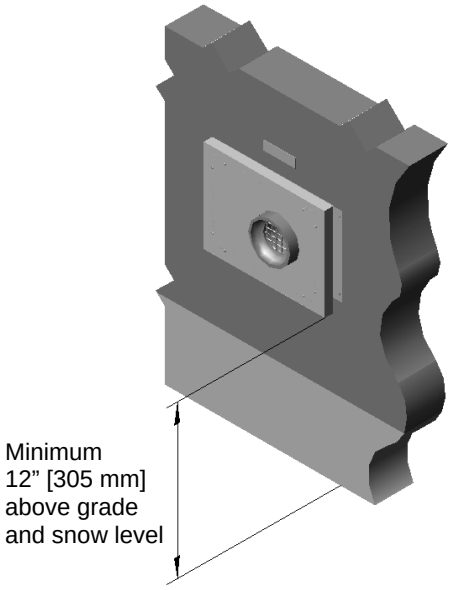


Figure 5-5 Lx150-200 Models

Concentric Vent Side Wall Clearances

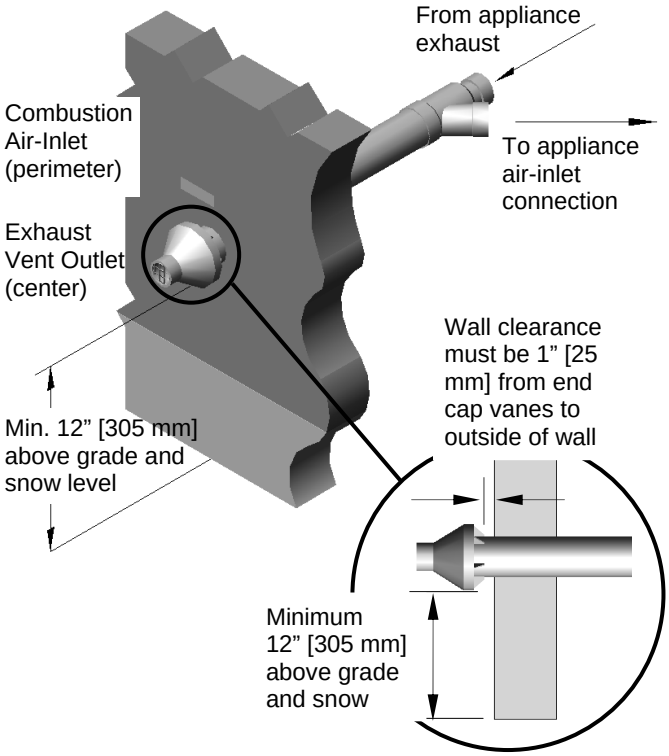
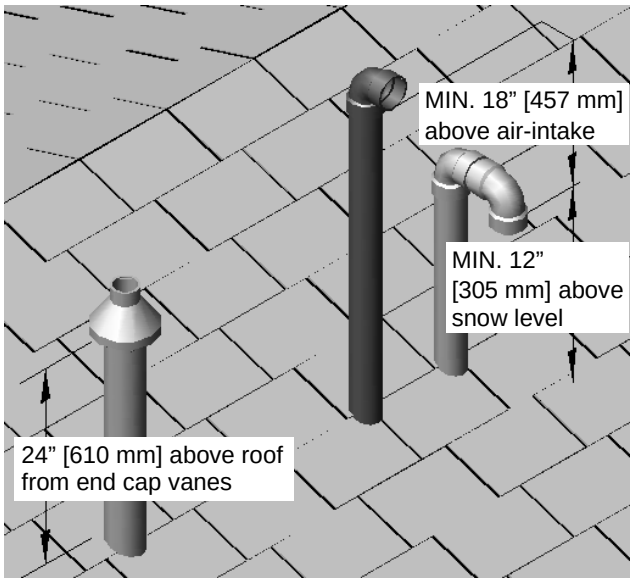


Figure 5-6 Model Specific

Roof Top Termination Clearances

Trinity Lx can also be vented through the roof. The same clearances apply to roof-top terminations as for two-pipe sidewall terminations.



⚠ WARNING Extra precaution must be taken to adequately support the weight of the Vent/Air-Intake piping in applications using roof-top terminations. Failure to follow these instructions may result in venting or appliance component failure resulting in flue gas spillage leading to property damage, serious injury or death.

⚠ DANGER Under no circumstances may an existing chimney or chase-way be used to vent or provide combustion intake air to a Trinity Lx. Failure to follow these instructions will result in fire, property damage, serious injury or death.

Removing an Existing Boiler from Common Venting System

⚠ DANGER Do not install the Trinity Lx into a common venting system with any other appliances. Failure to comply with this warning will cause flue gas spillage and leech carbon monoxide emissions into the surrounding air resulting in serious injury or death.

⚠ WARNING When an existing boiler is removed from a common venting system, the common venting system is likely to be too large for proper venting of the remaining appliances connected to it. Instructions have been provided on how to remove the existing boiler and how to resize the remaining venting system. Failure to follow these instructions may result in property damage, serious injury or death.

At the time of removal of an existing boiler, the following steps shall be followed with each appliance remaining connected to the common venting system placed in operation, while the other appliances remaining connected to the common venting system are not in operation.

Steps to Removing an Existing Boiler

1. Seal any unused openings in the common venting system.
2. Visually inspect the venting system for proper size and horizontal pitch. Verify that there is no blockage, restriction, leakage, corrosion or other deficiencies which could cause an unsafe condition.
3. Insofar as is practical, close fireplace dampers, all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliance not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan.
4. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.
5. Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar or pipe.
6. After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas burning appliance to their previous condition of use.
7. Any improper operation of the common venting system should be corrected so the installation conforms with the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/or CAN/CSA B149.1, Natural Gas and Propane Installation Code. When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in Part 11 of the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/or CAN/CSA B149.1, Natural Gas and Propane Installation Code.

6.0 CONDENSATE DRAIN

This unit produces liquid condensate in the heat exchanger and venting system as a product of combustion. Steps must be taken to ensure that condensate does not collect in the venting system; therefore, all exhaust piping must slope back to the appliance a minimum 1/4" per linear foot of vent. Condensate must be drained from the unit into a household drain.

NOTICE Check with your municipality, or local gas company to determine if the disposal of combustion condensate is permitted in your area (e.g. in the **State of Massachusetts** the condensate must be neutralized prior to entering a drain).

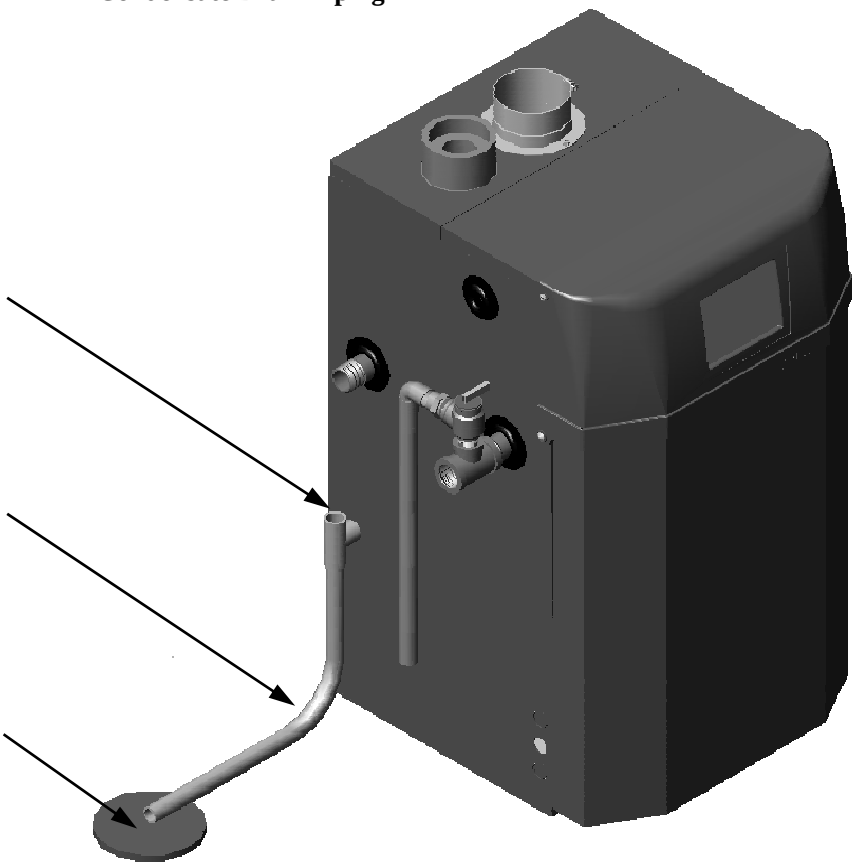
The following are important notes that must be taken into consideration when constructing the condensate drain system (See Figure 6-1 for further details):

- **DO NOT** install condensate lines outside. A frozen or blocked drain will cause the condensate to fill the combustion chamber. This will result in a no heat condition, as the unit will shut down, and damage to the flame sensor, and components can occur.
- **NEVER** use copper, steel, or galvanized piping in the construction of the condensate system (condensate is very corrosive and will corrode most metals).
- When a condensate pump is used or required, select a pump that is designed for residential furnaces.

⚠ WARNING If the combustion chamber has been flooded due to the condensate drain backing up, or for any other reason, the combustion chamber door must be removed and the inside of the appliance must be inspected for component damage, e.g. the internal insulation at the front and back of the chamber. Failure to follow these instructions may result in fire, property damage, serious injury or death.

Figure 6-1 All Models

Condensate Drain Piping



Drain Vent
Do not block or install piping into the top branch of the condensate drain tee.

Drain Pipe
Connection to the bottom of the condensate drain tee must be made using 1/2" Schedule40 PVC pipe. Secure using appropriate PVC cement. All piping must be below the level where the condensate leaves the boiler.

Floor Drain
Check with your local authorities regarding disposal of condensate (regulation may require the use of a neutralizer).

7.0 INSTALLING GAS PIPING

⚠ WARNING The Trinity Lx is factory equipped to operate with Natural Gas, the installation of a conversion kit is required prior to operating with Propane Gas. The Natural to LP Conversion Kit (see Table 7-1) must be installed prior to installing the gas piping to the appliance. Failure to properly convert the unit to operate with Propane may result in property damage, serious injury or death.

⚠ WARNING Liquefied Petroleum (LP) propane gas is heavier than air; therefore, it is imperative that your appliance is not installed in a pit or similar location that will permit heavier than air gas to collect. Check with Local Codes as they may require appliances fueled with LP gas be provided with an approved means of removing unburned gases from the room. Failure to follow these instructions may result in serious injury or death.

Table 7-1 Natural to LP Propane Conversion Kit

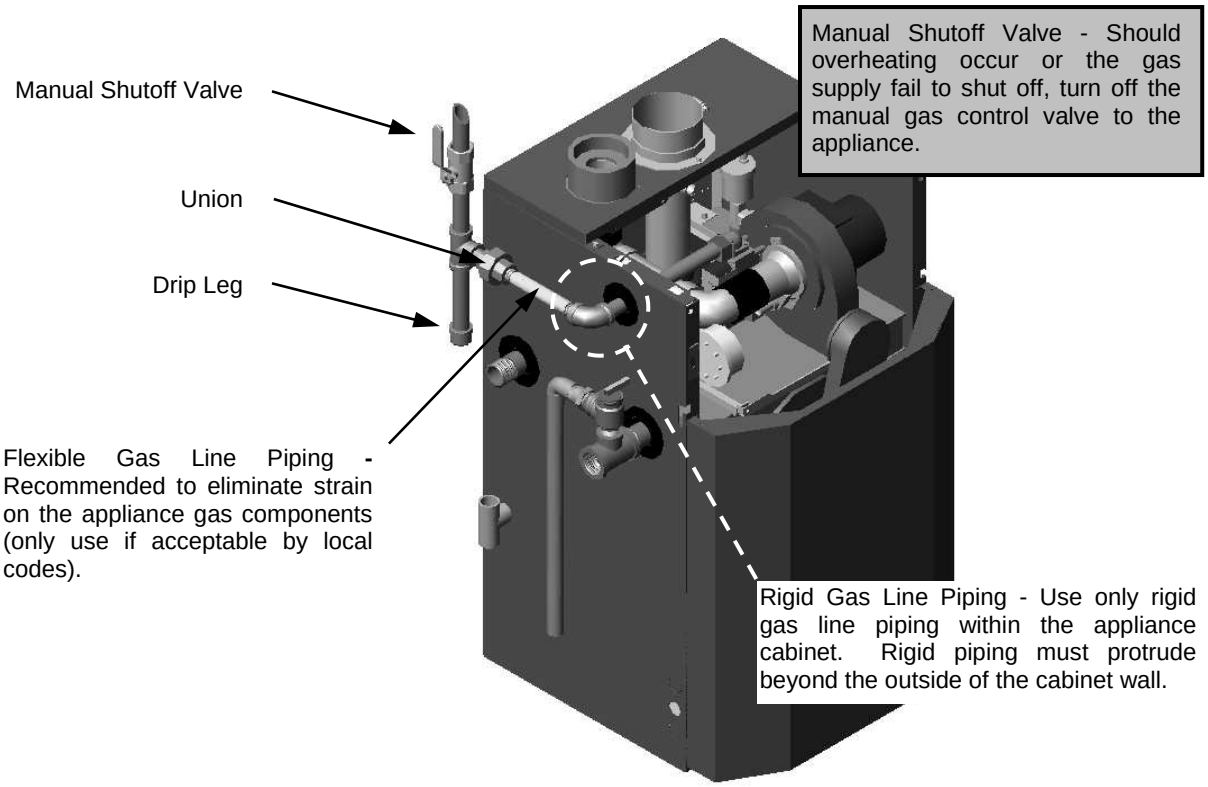
Series	Model	Kit Number
Trinity Lx	Lx150, Lx150E, Lx200	82650-1
Trinity Lx	Lx400	83017-1

Installation

Refer to the current **National Fuel Gas Code ANSI Z223.1/NFPA 54 or CAN/CGA B149.1** installation codes, and local codes for gas piping requirements and sizing. Pipe size running to the unit depends on:

- Length of pipe.
- Number of fittings.
- Type of gas.
- Maximum input requirement of all gas appliances in the residence.

Figure 7-1 All Models
Gas Line Connection



Ensure that:

- The gas line connection to the appliance does not apply any weight to the gas valve. NTI recommends using approved flexible gas piping (if acceptable by local codes) to connect the appliance to the gas supply (See Figure 7-1 for details).
- You plan the installation so that the piping does not interfere with the vent pipe, or the removal of the valve, burner, and serviceable components.
- The Appliance shall be installed such that the gas ignition system components are protected from water (dripping, spraying, rain etc.) during installation and servicing.
- The gas piping is large enough for all the appliances in the home. No appreciable drop in line pressure should occur when any unit (or combination of units) lights or runs. Use common gas-line sizing practices.
- Always use a pipe-threading compound that is resistant to propane (LP) gas solvent action. Apply sparingly to all male threads, starting at two threads from the end. Over doping or applying dope to the female end, can result in a blocked gas line.
- DO NOT TIGHTEN FITTINGS WITHOUT SUPPORTING THE GAS VALVE as damage to the valve or blower motor can occur.
- Install a manual "Equipment Shut-Off Valve" as shown in Figure 7-1. Valve must be listed by a nationally recognized testing lab.
- The gas line piping can safely be removed from the appliance for servicing, by strategically placing the gas line shutoff and union; see example in Figure 7-1.
- All gas piping, including gas components in the appliance, are checked for leaks using a "Bubble Test", prior to operating the appliance.

Strain on the gas valve and fittings may result in vibration, premature component failure and leakage and may result in a fire, explosion, property damage, serious injury or death.

Flexible gas piping cannot be used within the appliance cabinet and cannot pass through the cabinet wall, use rigid piping as shown in Figure 7-1. Failure to follow these instructions may result in fire, property damage, serious injury or death.

Do not use an open flame to test for gas leaks. Failure to follow these instructions may result in fire, property damage, serious injury or death .

When performing a pressure test on the gas line piping, be sure the appliance is disconnected or isolated if the test pressure is expected to exceed 1/2 PSI (14" w.c.), as damage to the valve could occur resulting in fire, property damage, serious injury or death.

8.0 LIGHTING THE APPLIANCE

⚠ WARNING Do not store or use gasoline or other flammable vapors & liquids in the vicinity of this or any other appliance. Failure to follow instructions could result in explosion causing property damage, serious injury or death.

⚠ DANGER Prior to turning the gas supply on and lighting the appliance, ensure all aspects of the installation are complete and in conformance with the instructions provided in this manual, including the Vent/Air-Intake, Condensate Drain, and System Water Piping. Failure to precisely follow these instructions will cause a fire or explosion resulting in property damage, serious injury or death.

⚠ WARNING If you do not follow these instructions exactly, a fire or explosion may result causing property damage, serious injury or death.

⚠ WARNING Should overheating occur or the gas supply fail to shut off, turn off the manual gas control valve to the appliance. Failure to follow instructions could result in explosion causing property damage, serious injury or death.

FOR YOUR SAFETY, READ BEFORE OPERATING

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

B) BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.
WHAT TO DO IF YOU SMELL GAS:
- Do not try to light any appliance.
- Do not touch any electric switch.
- Do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

C) Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D) 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.

OPERATING INSTRUCTIONS

1. STOP! Read the safety information above very carefully.
2. Set the thermostat to lowest setting. Turn off all electric power to the appliance.
3. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
4. Turn the manual gas valve to the OFF position. Remove front access panel.
5. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow “B” in the safety information above. If you don't smell gas, go to the next step.
6. Turn the manual gas valve ON. Wait an additional five (5) minutes smelling for gas.
7. Replace the front access panel.
8. Set thermostat to highest setting. Turn on all electric power to the appliance.
9. Ignition sequence is automatic. Combustion will occur after a brief fan purge.
10. If ignition does not occur, follow the instructions “To Turn Off Gas To Appliance” and call your service technician or gas supplier.

TO TURN OFF GAS TO THE APPLIANCE

1. STOP! Read the safety information above very carefully.
2. Turn off all electric power to the appliance
3. Turn the manual gas valve to the OFF position

⚠ WARNING The initial lighting of the appliance must be performed by a licensed Gas Technician. Failure to follow instructions may result in property damage, serious injury or death.

- Ensure the appliance is wired in accordance with this manual.
- Ensure the gas shut-off valve is turned on, and that the gas system has been fully tested for leaks.
- Ensure the system is completely filled with water, and that ALL the air is purged out.

Initial Start-Up

1. Turn on power to the Trinity Lx and turn-up the Thermostat(s). The appliance should run through a purge, and combustion should occur. (The control system has a built in ignition retry, allowing the system to try at least three times, before locking-out.)
2. With the unit operating at full capacity, verify that the gas line pressure is 4-10.5 inches w.c. for Natural gas, and 9-13 inches w.c. for Propane (See Section 9.0 for details).
3. Using an appropriate Oxygen or Carbon Dioxide analyzer, take a sample of the flue gas. The sample must fall within the acceptable ranges for Carbon Dioxide, which is 8.5% - 9.5% for Natural gas, and 9.5%-10.5% for propane (See Section 9.0 for details).
4. Perform at least three lights in succession to ensure proper operation.
5. After the three successive lights, unplug the flame probe, and allow the unit to cycle again. Ensure that it tries to light, and locks out on safety reset. Once you have successfully activated the flame safety system, replace the wire on the flame sensor, and reconfirm proper lighting.

⚠ WARNING If the unit fails to light consistently and smoothly, contact NTI for assistance at 1-800-688-2575. Never allow the appliance to continue to operate if the ignition or operation of the burner is rough or erratic. Failure to follow these instructions could result in serious injury or death.

⚠ WARNING The flame probe uses a single electrode located in the burner door at the 6 O'clock position. DO NOT remove the wire from the dual electrode located in the burner door at the 3 O'clock position; this device is used for spark igniting and delivers a high voltage potential which would result in an EXTREME ELECTRICAL SHOCK possibly causing serious injury or death.

Re-lighting Unit

1. Stop and read these instructions very carefully.
2. Set the thermostat to the lowest setting, and then turn off all power to the appliance.
3. This appliance does not have a pilot. It is equipped with an ignition device that automatically lights the burner. Do not try to light the burner by hand.
4. Turn the gas shut-off valve to the off position, and then remove the front cover.
5. Wait five (5) minutes to clear out any gas. Then check for gas, including near the floor. If you smell gas "Stop" and follow "B" above. If you don't detect any gas proceed to the next step.
6. Turn the gas shut-off valve to the on position, wait an addition five (5) minutes and check for gas.
7. Replace the front cover.
8. Set the thermostat to the highest setting, and then turn on all power to the appliance.
9. Ignition sequence is automatic, combustion will occur after a brief fan purge. Ignition will retry 3 times.
10. If ignition does not occur, "Turn off the gas and electricity to the appliance" and contact a professional service technician, or gas supplier.

Turning Off The Appliance

1. Set the thermostat to the lowest setting, and then turn off all power to the appliance.
2. Turn the gas shut-off valve to the off position.

9.0 GAS VALVE AND BURNER SET-UP

⚠ WARNING Set-up of the Trinity Lx gas valve must be performed by a licensed Gas Technician. Failure to perform the set-up correctly may result in incorrect operation, component failure, property damage, serious injury or death.

Gas Line Pressure

The appliance gas valve is equipped with a line pressure test port; see Figures 9-1 and 9-2. Use the following procedure to measure the gas line pressure to the appliance to ensure if falls within the range given in Table 9-1:

1. Turn the supply of gas to the appliance off.
2. Open the bleed screw of the line pressure test port approximately 1-1/2 turns. This port is directly connected to the gas line feeding the appliance.
3. Force 1/4" ID tubing over the housing of the line pressure test port; install the other end of the tubing to an appropriate line pressure test gauge or manometer. Ensure both ends of the tubing make a tight connection.
4. Open the supply of gas to the appliance and check for gas leaks.
5. Observe the line pressure under static conditions and compare it to Table 9-1. The pressure will be greatest under static conditions.
6. With all other gas appliances in the applications running, operate the burner to the maximum firing rate (See Table 9-2) and compare the observed line pressure with Table 9-1. The pressure will be lowest during the maximum flow of gas.
7. Adjust the gas line pressure to ensure the parameters in Table 9-1 are attained under all conditions. If possible adjust the line pressure to the "Nominal/Desired" value listed in Table 9-1, while the unit is operating at the maximum modulation rate, see Table 9-2.
8. Continue observing the gas line pressure until the completion of the combustion analyses, incase adjustments need to be made.
9. Upon completion of the line pressure testing, return the bleed screw of the Line Pressure Test Port to the closed position.

NOTICE The line pressure is a function of the gas supply and is affected solely by field provided parameters such as line size and regulator settings. Under no circumstances can the appliance gas valve influence or be used to adjust the gas line pressure.

⚠ DANGER Failure to close the bleed screw of the Line Pressure Test Port will cause a severe leakage of gas, resulting in a fire or explosion causing property damage, serious injury or death.

Table 9-1 Line Pressure and Combustion Parameters

Gas	Line Pressure (inches wc)			CO_2 (%)*		CO (ppm) Max.
	Nominal/Desired	Min.	Max.	Min.	Max.	
Natural	7	4	10.5	8.5	9.5	175
Propane	11	8	13	9.5	10.5	175

*Note: it is permissible to have higher CO_2 values with the burner operating at the minimum modulation rate.

Table 9-2 Minimum and Maximum Modulation Rates

Model	Min. Modulation Rate (RPM)	Max. Modulation Rate (RPM)
Lx150	1150	5850
Lx150E	925	4450
Lx200	925	5950
Lx400	1550	7200

⚠ WARNING Never leave the unit operating while producing Carbon Monoxide (CO) concentrations in excess of 175ppm. Failure to follow this warning may result in serious injury or death.

⚠ WARNING DO NOT adjust or measure the Manifold Pressure of the appliance. Correct manifold pressure is factory set. Field adjustment could result in improper burner operation resulting in fire, explosion, property damage or death.

Figure 9-1 Lx150 Orientation

Gas Valve and Venturi Assembly
(Front View)

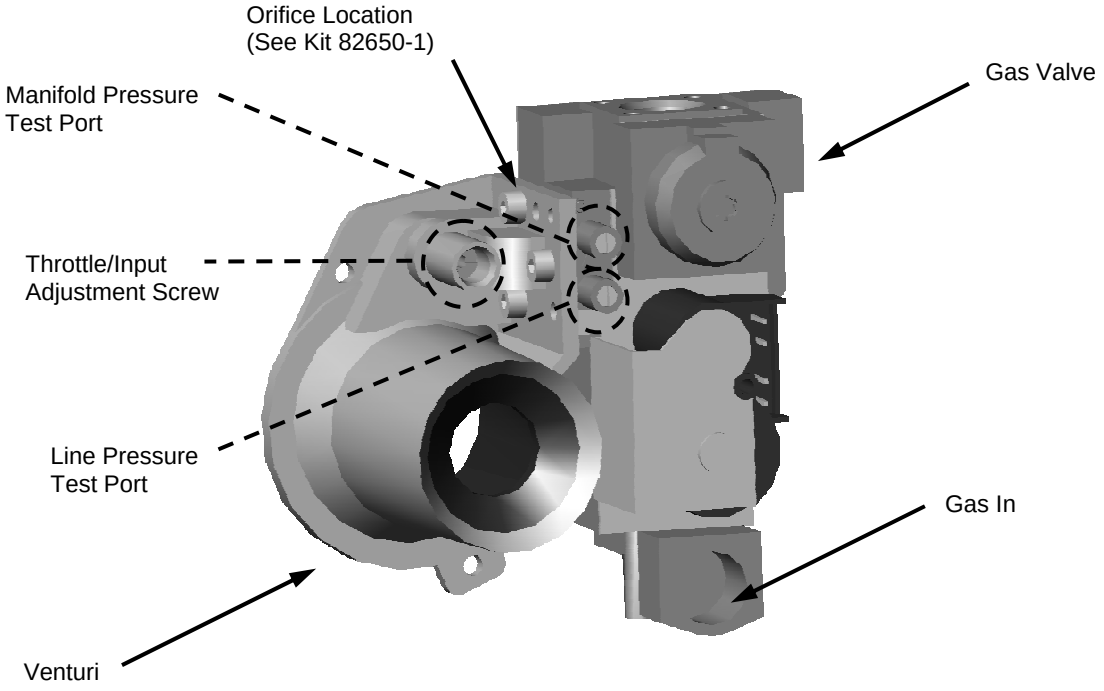


Figure 9-2 Lx150E and Lx200 Orientation

Gas Valve and Venturi Assembly
(Front View)

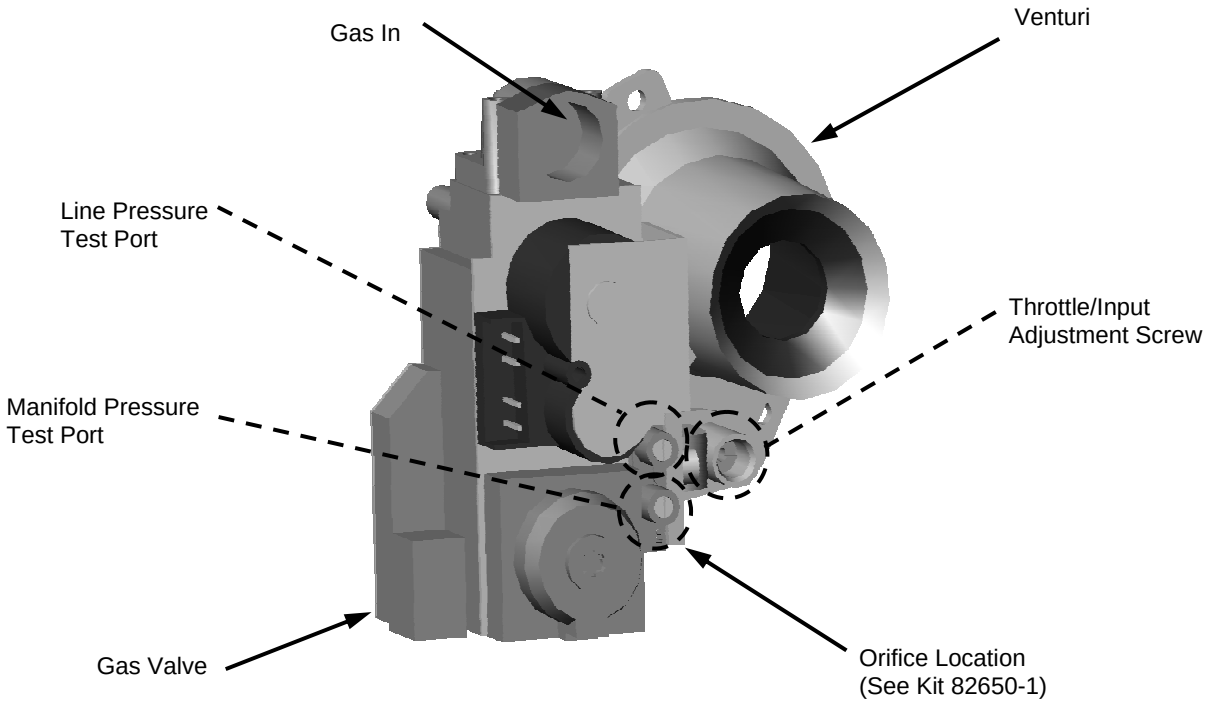
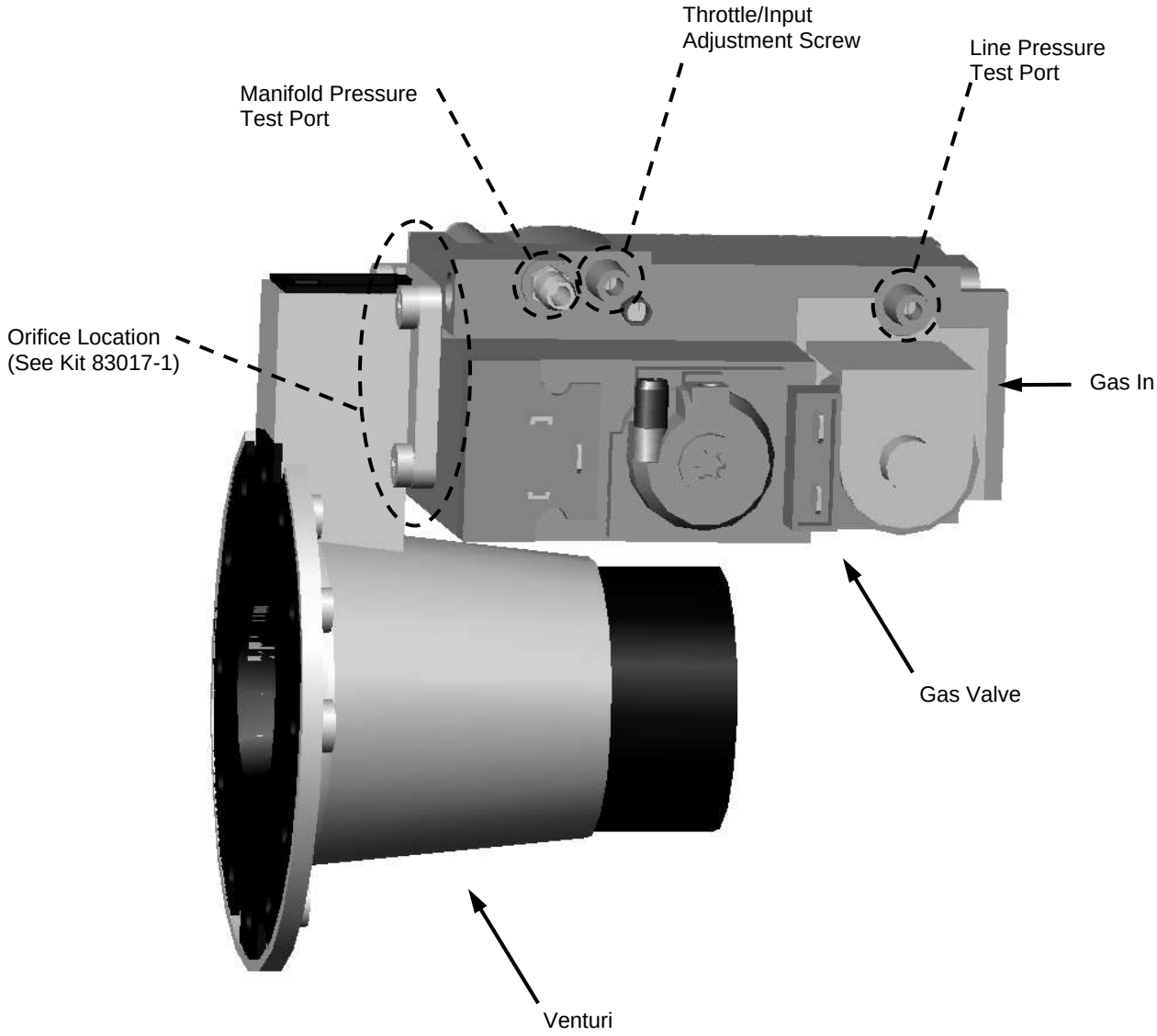


Figure 9-3 Lx400 Orientation

Gas Valve and Venturi Assembly
(Front View)



Adjustment

Input Screw Adjustments - The appliance is equipped with a Throttle/Input Adjustment Screw, located on the Gas Valve and Venturi Assembly. The Throttle screw is used to adjust the flow of gas leaving the gas valve, entering the Venturi and hence entering the combustion air stream. By turning the adjustment screw in, clockwise, the flow of gas is reduced and the combustion becomes leaner, thus reducing the concentration of CO_2 in the flue gases. To increase the CO_2 the Throttle screw must be adjusted out, counterclockwise, thus increasing the flow of gas from the gas valve to the combustion air stream.

Lx150-200 Adjustments - The input screw for models Lx150-200 is a multiple turn valve. Fully open to close is approximately 17 turns. Typical adjustment for Natural Gas is 0-1 full turns in or out. Typical adjustment for LP Gas is 0-3 full turns in or out. See Figures 9-1 and 9-2 for input screw location.

Lx400 Adjustments - The input screw for the Lx400 is a geared valve with a 4:1 ratio. Adjusting input screw 4 complete turns will returned the valve to the original location, 2 turns from fully open will completely close the valve. Typical adjustment required is 0-1/4 turns in or out. See Figure 9-3 for input screw location.

Throttle/Input Adjustment Screw

Decrease gas
Turn Clockwise

Increase gas
Turn Clockwise

⚠ WARNING Adjustments to the Throttle screw may only be made by a qualified gas technician, while using a calibrated combustion analyzer capable of measuring CO_2 and CO. Failure to follow these instructions may result in serious injury or death.

⚠ WARNING Adjustments to the Throttle screw may only be performed if the gas line pressure is maintained above minimum levels throughout the duration of the test; see Table 9-1. Failure to follow these instructions may result in serious injury or death.

Combustion Calibration - To calibrate burner operation, perform the following procedure using a calibrated combustion analyzer capable of measuring CO_2 and CO from Natural and Propane Gas burning appliances:

1. Operate the unit at the maximum modulation rate, see Table 9-2.
2. Ensure the gas line pressure is maintained within tolerance, see Table 9-1.
3. While at the maximum modulation rate, measure the CO_2 and CO; adjust as necessary, using the Throttle Screw, to be within the limits listed in Table 9-1.
4. Operate the unit at the minimum modulation rate (Table 9-2). Ensure the combustion remains smooth and CO_2 and CO remain within the limits (Table 9-1). If not, do not adjust further, contact NTI for assistance.

Flue Gas Analysis and Adjustment

Each Trinity Lx is factory set to operate with Natural Gas, for appliances field converted to operate with Propane Gas, a flue gas analysis and adjustment is mandatory. See Table 7-1 and propane conversion instructions.

⚠ WARNING Failure to perform the flue gas analysis and adjustment detailed in this section may result in erratic and unreliable burner operation, leading to reduced efficiency, increased fuel consumption, reduced component life, heat exchanger combustion deposits, and general unsafe operation. Failure to follow these instructions may result in serious injury or death.

Analysis – The Trinity Lx is equipped with a flue gas test port located in the flue outlet adapter assembly. For models Lx150-200, test port access is from within the appliance cabinet (Figure 9-3). For Lx400 model, test port access is from outside the appliance cabinet (Figure 9-4). Remove the test port plug and perform the flue gas analysis and adjust modulation rate as required until CO_2 and CO levels are within acceptable limits. Once flue gas sampling is completed, re-install the test port plug and seal the threads using Teflon tape.

⚠ DANGER Failure to re-install the test port plug will result in damage to the unit, property damage, fire, explosion, serious injury or death.

Figure 9-3 Lx150-200 Models

Flue Gas Sampling Using Test Port

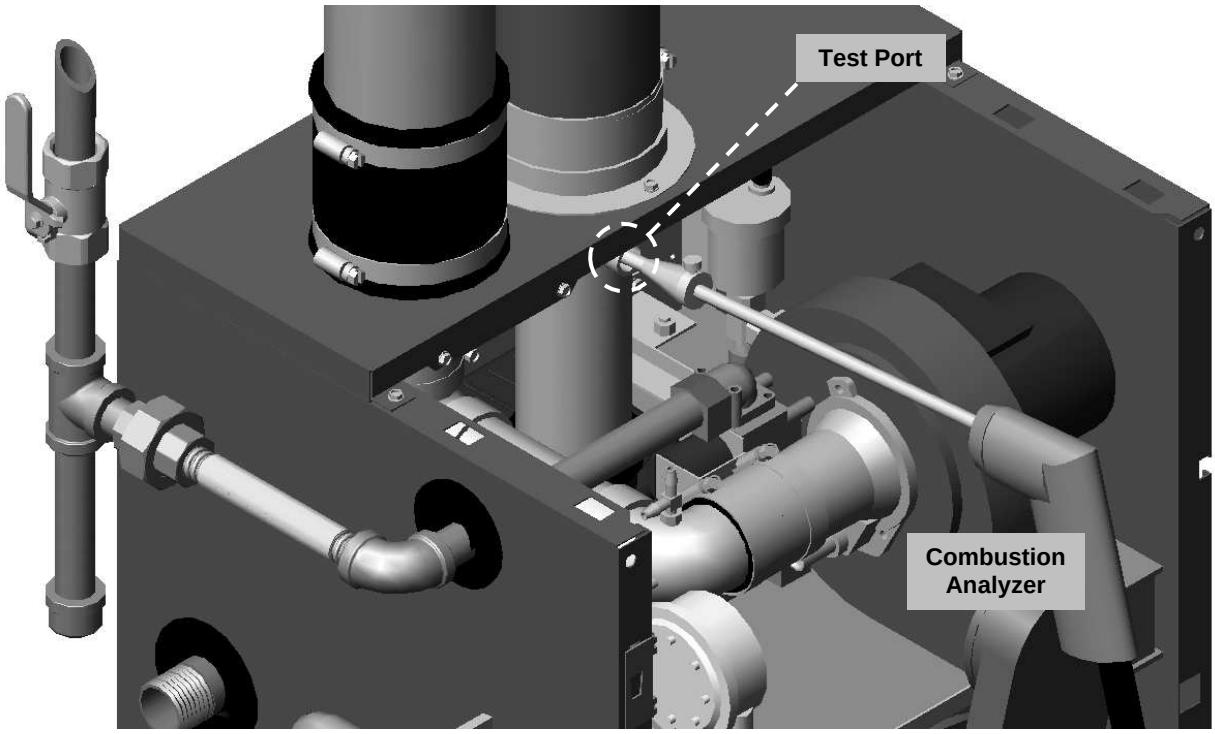
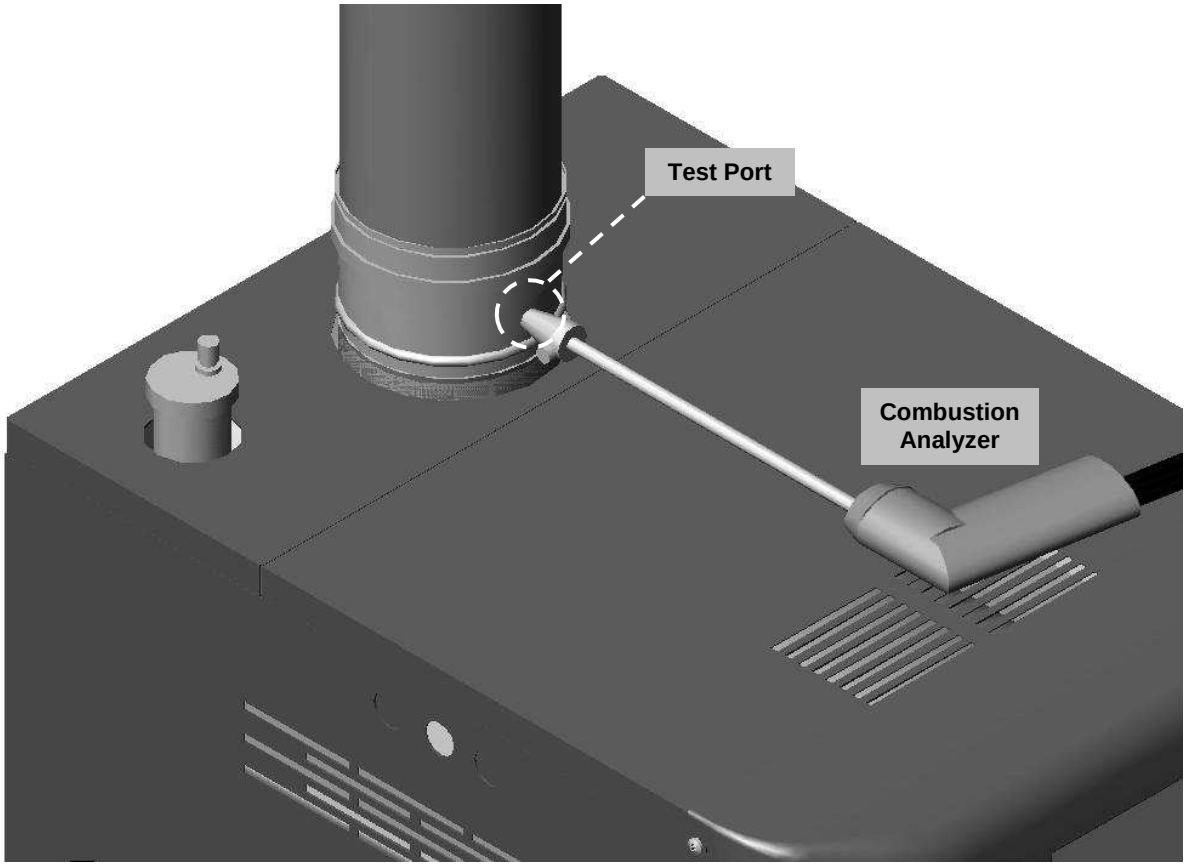


Figure 9-4 Lx400 Model

Flue Gas Sampling Using Test Port



10.0 WIRING SCHEMATICS

Figure 10-1(a) All Models

Connection Diagram

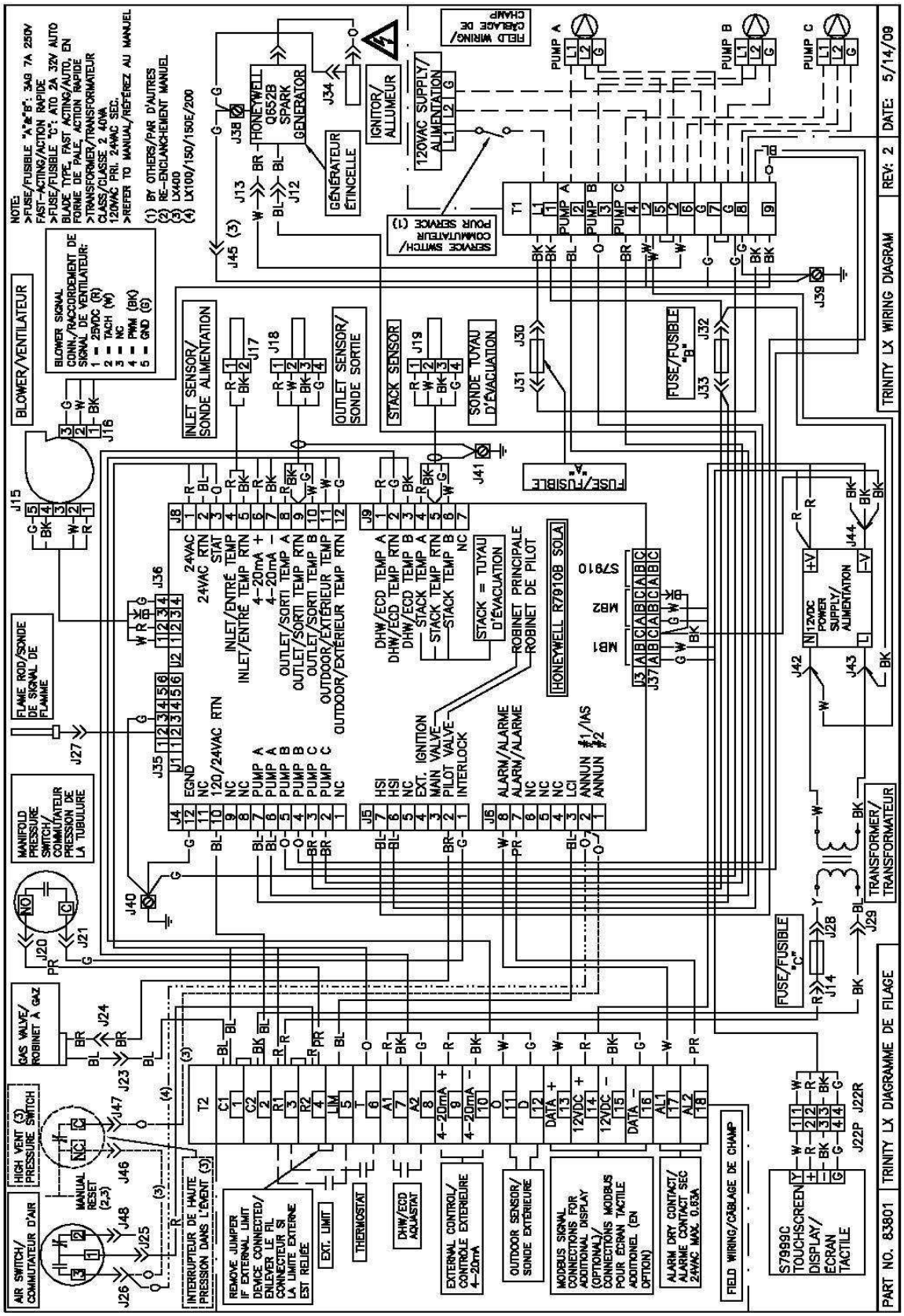
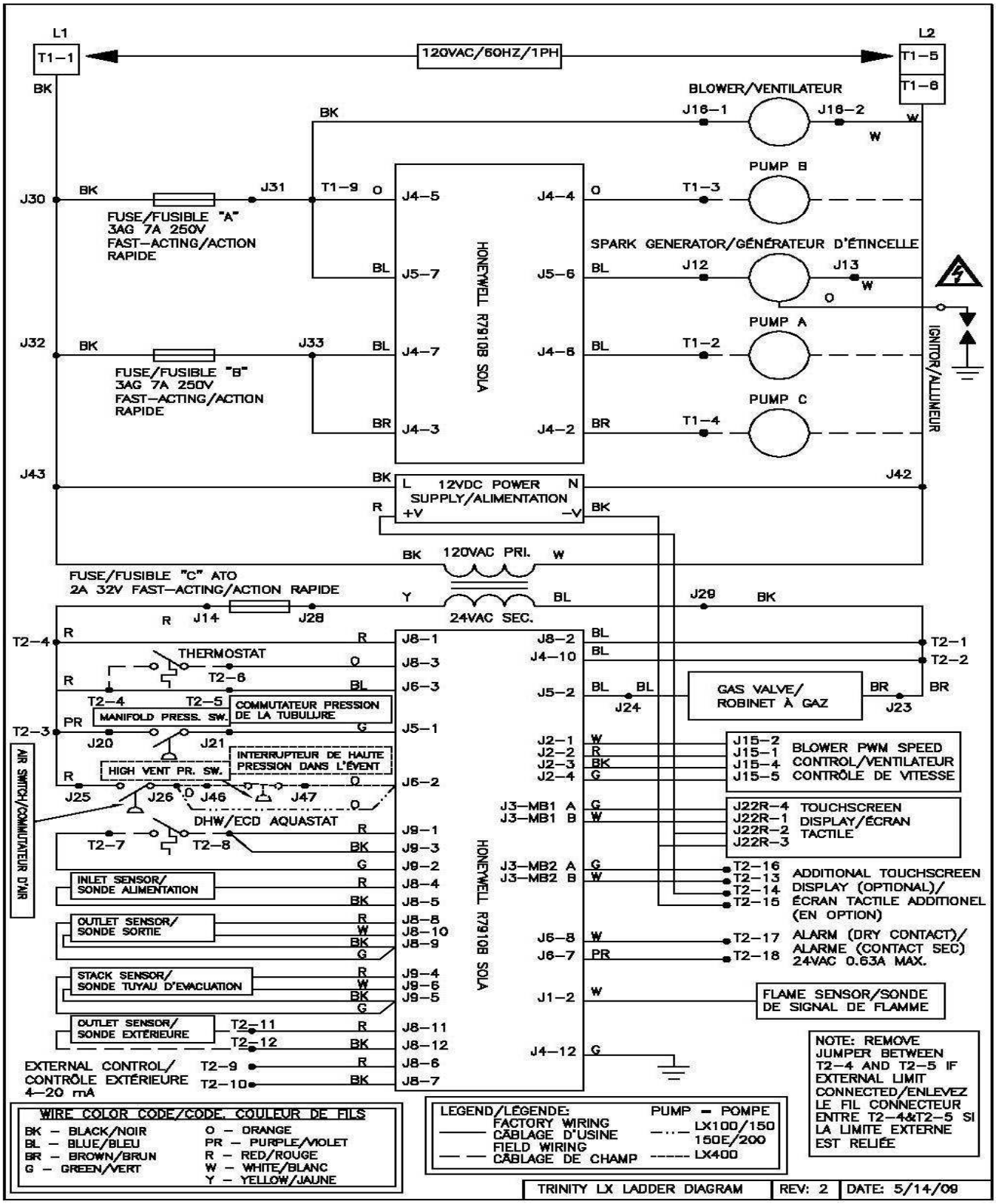


Figure 10-1(b) All Models

Ladder/Logic Diagram



11.0 INSTALLATION CHECKLIST

Installation

- ☐ 1. If operating on Propane Gas, convert appliance using kit number 82650-1.
- ☐ 2. Locate the appliance in accordance with Section 3 of this manual.
- ☐ 3. Install the Vent/Air-Intake piping in accordance with Sections 4.0 and 5.0 of this manual. Ensure all joints are secured and cemented properly. Both the Vent and Air-Intake pipes must terminate outdoors.
- ☐ 4. Connect the condensate drain in accordance with Section 6.0 of this manual.
- ☐ 5. Connect the gas supply in accordance with Section 7.0 of this manual.
- ☐ 6. Install the plumbing in accordance with the appropriate Applications Manual (Boiler or Water Heater) Flush/clense the internals of the heating system.
  Boiler Application - treat system water with Fernox F1 Protector. See Table 2-1 in Appendix B.
- ☐ 7. Connect field wiring in accordance with Section 9.0 of this manual.
- ☐ 8. Advise home/building owner of their responsibilities with respect to maintaining the appliance.

⚠ WARNING The building owner is responsible for keeping the Vent/Air-Intake termination free of snow, ice, or other potential blockages and for scheduling routine maintenance on the appliance (see Section 14.0). Failure to properly maintain the appliance may result in serious injury or death.

Start-up

- ☐ 1. Turn gas shut-off valve to the ON position.
- ☐ 2. Turn Power on to appliance.
- ☐ 3. Set Controller to the desired settings.
- ☐ 4. Turn thermostat up, Ignition will occur.

Operational Checklist

- ☐ 1. System is free of gas leaks.
- ☐ 2. System is free of water leaks.
- ☐ 3. Water pressure is maintained above 15 PSI.
- ☐ 4. All air is purged from the heating system piping.
- ☐ 5. Ensure proper water flow rate; unit must not kettle, bang, hiss or flash the water to steam.
- ☐ 6. Ensure gas line pressure is in accordance with Section 9.0.
- ☐ 7. System is free of combustion leaks.
- ☐ 8. Unit must operate smoothly.
- ☐ 9. Ensure the flue gas combustion readings are within the tolerances listed in Table 9-1.
- ☐ 10. Each ignition must be smooth.
- ☐ 11. Verify that all condensate lines are clean and drain freely.

Before Leaving

- ☐ 1. Remove line pressure gauge from gas valve, tighten bleed screw, test screw for leaks. See Section 11.0.
- ☐ 2. Install plug into the flue gas test port and test for leaks, see Section 11.0.
- ☐ 3. Allow the appliance to complete at least one heating cycle, or to operate for at least 15 minutes.
- ☐ 4. Always verify proper operation after servicing.

Instructions to Installing Contractor

- ☐ 2. Ensure that the customer receives the Warranty Documentation included with the installation manual.
- ☐ 3. Leave the manual with the customer so they know when to call for annual maintenance and inspection.

⚠ WARNING **Void Warranty -** This Appliance must have water flowing through it whenever the burner is operating. Failure to do this will not only damage the unit and void the warranty, but may also cause serious injury or death.

⚠ WARNING Allowing the appliance to operate with a dirty combustion chamber will adversely affect its operation and void the warranty. Failure to clean the heat exchanger on a frequency that matches the need of the application may result in fire, property damage, or death.

12.0 ANNUAL MAINTENANCE AND INSPECTION

This unit must be inspected at the beginning of every heating season by a Qualified Technician.

Annual Inspection Checklist

- ☐ 1. Lighting is smooth and consistent, and the combustion fan is noise & vibration free.
- ☐ 2. The condensate freely flows from the unit, and is cleaned of sediment.
- ☐ 3. Relief Valve and air vents are not weeping.
- ☐ 4. Low water cut off is flushed (if applicable)
- ☐ 5. Examine all venting, for evidence of leaks, and vent screens are cleaned.
- ☐ 6. Check the burner plate for signs of leaking.
- ☐ 7. The combustion chamber must be inspected and cleaned.
- ☐ 8. Listen for water flow noises indicating a drop in appliance water flow rate.
  Boilers Only - The hydronic system may need to be flushed to eliminate hard water scale (Use Fernox DS-40 Descaler – NTI PN: 83450).

⚠ DANGER **Explosion Hazard** (Lx400 models) - The metallic tubing connecting the blower and the high-vent pressure switch contains Fuel/Air Mixture. Refer to ***Combustion Chamber Cleaning Procedure*** for instructions on disconnecting the metallic tubing. Failure to follow these instructions will result in serious injury or death.

IMPORTANT **Crystalline Silica** - Read carefully the warnings and handling instructions pertaining to Refractory Ceramic Fibres before commencing any service work in the combustion chamber. Take all necessary precautions and use recommended personal protective equipment as required.

Combustion Chamber Cleaning Procedure

Units operating with LP Gas or in an industrial environment will have to be cleaned a minimum of once per year. Other applications will require the combustion chamber to be cleaned after the first year of operation, with subsequent cleanings scheduled based on the condition of the combustion chamber at the time. Unless a step is identified as model specific, the following combustion chamber cleaning procedure is the same for all models:

- ☐ 1. Initiate a post-purge cycle to clear any gas from the combustion chamber, then turn gas valve off.
- ☐ 2. **Lx400 only:** To disconnect the metallic tubing between the blower and the high-vent pressure switch, loosen the compression fitting at the high-vent pressure switch with a 1/2" wrench. At the blower end, support the brass fitting body with a 1/2" wrench to keep it from rotating while loosening the compression fitting nut with a 9/16" wrench. Remove tubing assembly from blower.
- ☐ 3. Access the combustion chamber by removing the aluminum burner door assembly of the appliance.
- ☐ 4. Remove the insulation disc (P/N 83112) located in the back of the combustion chamber to avoid damaging it during the cleaning process. The disc is held in place with a 2.5mm "Allen-head" screw.
- ☐ 5. Use a vacuum with a high efficiency filter to remove any loose debris or dust.
- ☐ 6. Wet the inside of the combustion chamber with water. Use a garden hose with a trigger nozzle to direct pressurized water through the gaps between the heat exchanger tubes. The water should pass in-between the heat exchanger tubes and exit via the condensate drain. This process may require the use of some dry rags or plastic to protect electrical components from being damaged by dripping or spraying water.
- ☐ 7. Use a nylon or other non-metallic brush to loosen the incrustations and any other contaminates that have remained stuck on and in-between the tubes.
- ☐ 8. Repeat steps 3 and 4 until the heat exchanger is clean and water from the condensate drain runs clear.
- ☐ 9. Re-install the insulation disc (part no. 83112) to the back of the combustion chamber.
- ☐ 10. Inspect the insulation disc located on the back-side of the burner door (p/n 83884). Replace if damaged.
- ☐ 11. Re-install the burner door, gas-supply and Air-inlet pipe, check for gas leaks.
- ☐ 12. **Lx400 only:** Reconnect the metallic tubing between the blower and the high-vent pressure switch. Ensure the brass fitting body at the blower remains stationary and does not rotate during reconnection.
- ☐ 13. Perform the Operational Check List detailed in Section 13.0.

⚠ WARNING Replace any gaskets or insulation discs that show any signs of damage. Do not re-use. Failure to follow these instructions may result in fire, property damage or death.

Refractory Ceramic Fibres (RFC)

IMPORTANT **Personal Protective Equipment Recommended -** Read the following warnings and handling instructions carefully before commencing any service work in the combustion chamber. The insulating material on the inside of the burner door and at the back of the combustion chamber contain *Refractory Ceramic Fibres* and should not be handled without personal protective equipment.

⚠ WARNING **Potential Carcinogen** - Use of *Refactory Ceramic Fibres* in high temperature applications (above 1000°C) can result in the formation of Crystalline Silica (cristobalite), a respirable silica dust. Repeated airborne exposure to crystalline silica dust may result in chronic lung infections, acute respiratory illness, or death. Crystalline silica is listed as a (potential) occupational carcinogen by the following regulatory organizations: International Agency for Research on Cancer (IARC), Canadian Centre for Occupational Health and Safety (CCOHS), Occupational Safety and Health Administration (OSHA), and National Institute for Occupational Safety and Health (NIOSH). Failure to comply with handling instructions in Table 14-1 may result in serious injury or death.

⚠ WARNING **Crystalline Silica -** Certain components confined in the combustion chamber may contain this potential carcinogen. Improper installation, adjustment, alteration, service or maintenance can cause property damage, serious injury (exposure to hazardous materials) or death. Refer to Table 14-1 for handling instruction and recommended personal protective equipment. Installation and service must be performed by a qualified installer, service agency or the gas supplier (who must read and follow the supplied instructions before installing, servicing, or removing this appliance. This appliance contains materials that have been identified as carcinogenic, or possibly carcinogenic, to humans).

Table 14-1 Handling Instructions for Refactory Ceramic Fibres (RCF)

Reduce the Risk of Exposure	Precautions and Recommended Personal Protective Equipment
Avoid contact with skin and eyes	• Wear long-sleeved clothing, gloves, and safety goggles or glasses.
Avoid breathing in silica dust	• Wear a respirator with a N95-rated filter efficiency or better. [1] • Use water to reduce airborne dust levels when cleaning the combustion chamber. • Do not dry sweep silica dust. Pre-wet or use a vacuum with a high efficiency filter.
Avoid transferring contamination	• When installing or removing RFCs, place the material in a sealable plastic bag. • Remove contaminated clothing after use. Store in sealable container until cleaned. • Wash contaminated clothing separately from other laundry.
First Aid Measures	If irritation persists after implementing first aid measures consult a physician. • **Skin** - Wash with soap and water. • **Eyes** - Do not rub eyes; flush with water immediately. • **Inhalation** – Breathe in fresh air; drink water, sneeze or cough to clear irritated passage ways.

Notes:

[1] Respirator recommendations based on CCOHS and OSHA requirements at the time this document was written. Consult your local regulatory authority regarding current requirements for respirators, personal protective equipment, handling, and disposal of RCFs.

For more information on Refractory Ceramic Fibres, the risks, recommended handling procedures and acceptable disposal practices contact the organization(s) listed below:

Canada (CCOHS): Telephone directory listing under Government Blue Pages Canada—Health and Safety—Canadian Centre for Occupational Health and Safety; or website http://www.ccohs.ca.

United States (OSHA): Telephone directory listing under United States Government—Department of Labor—Occupational Safety and Health Administration; or website http://www.osha.gov.

13.0 PARTS LIST

Building owners must contact their local Installer or Wholesaler. Replacement parts are available from your stocking wholesaler. Installers or Wholesalers may contact NY Thermal Inc. for assistance at 1-506-657-6000.

Figure 13-1(a) Lx150-200 Models

Cabinet, Vent and Air-Intake Parts

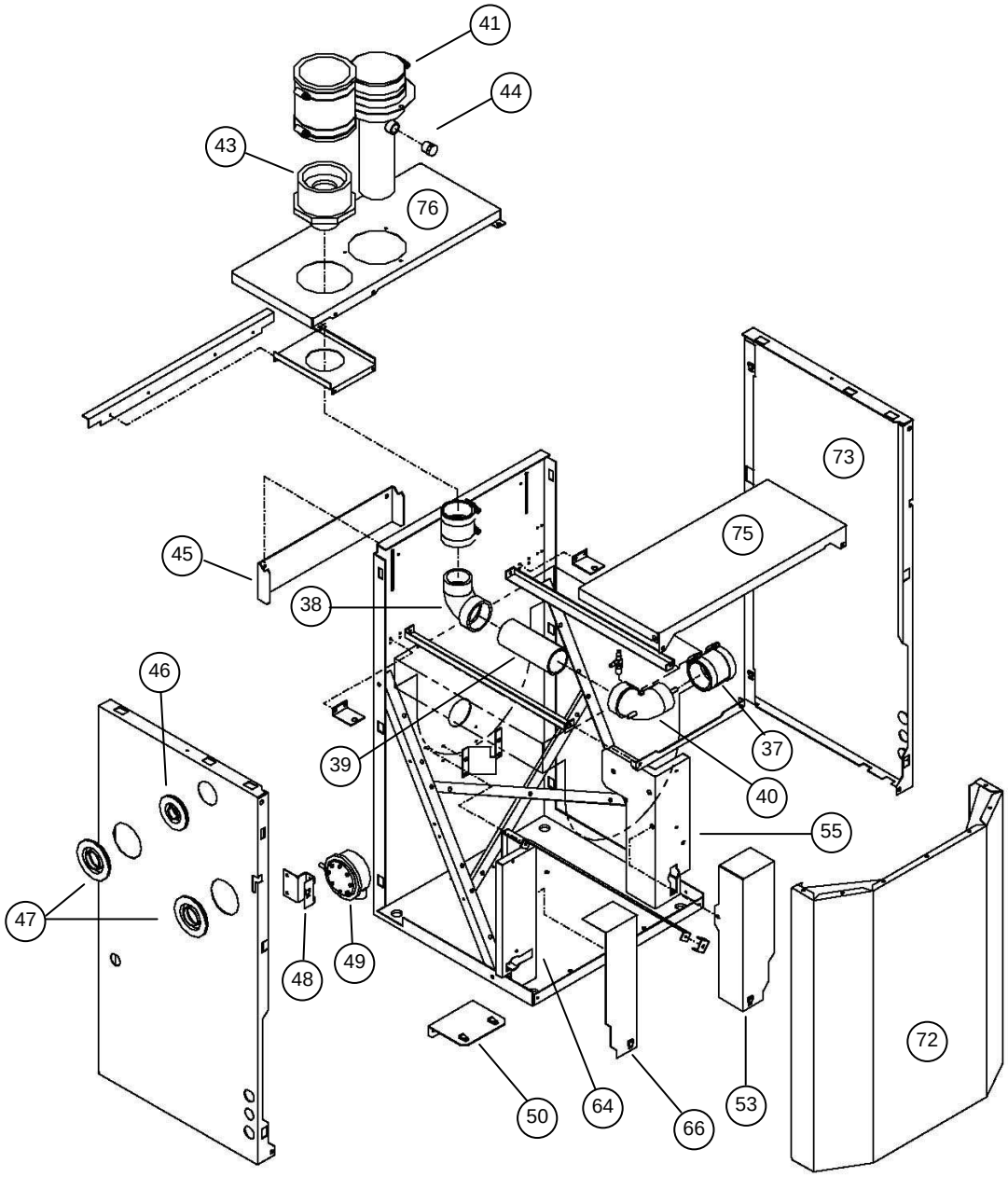


Figure 13-1(b) Lx150-200 Models

Heat Exchanger, Gas Valve, Blower and Burner Assembly

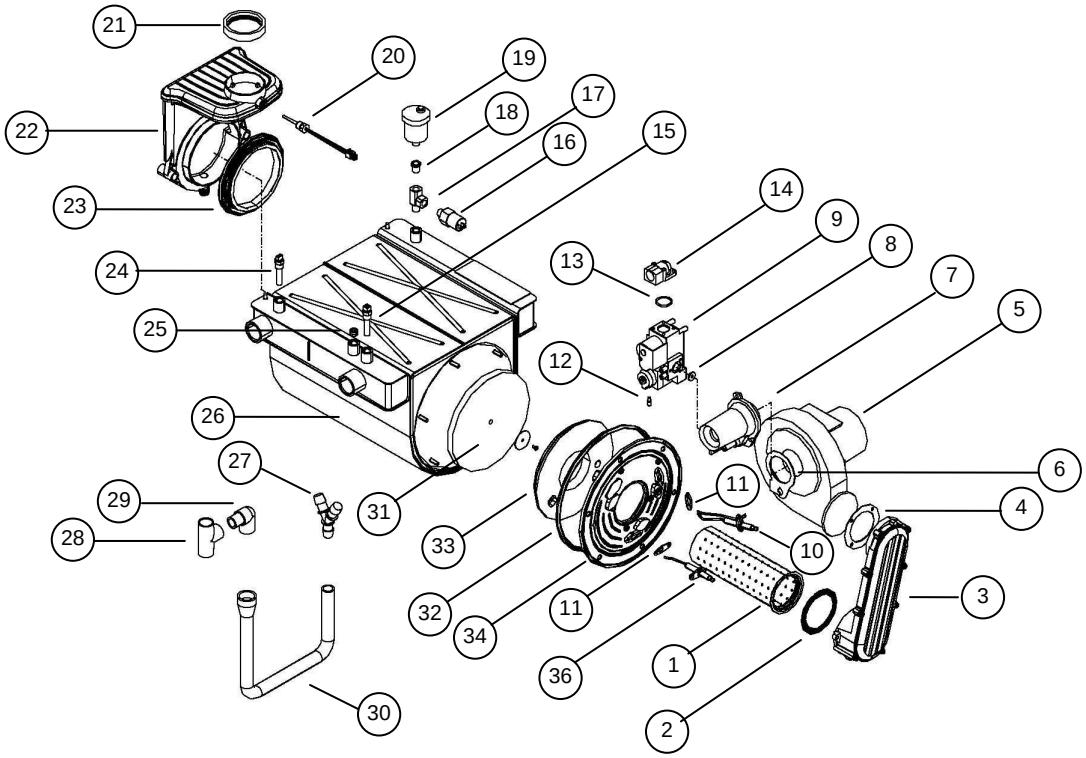


Figure 13-2 Common to All Models (Lx150-400)

Electrical Housing, Controller, and Display Module

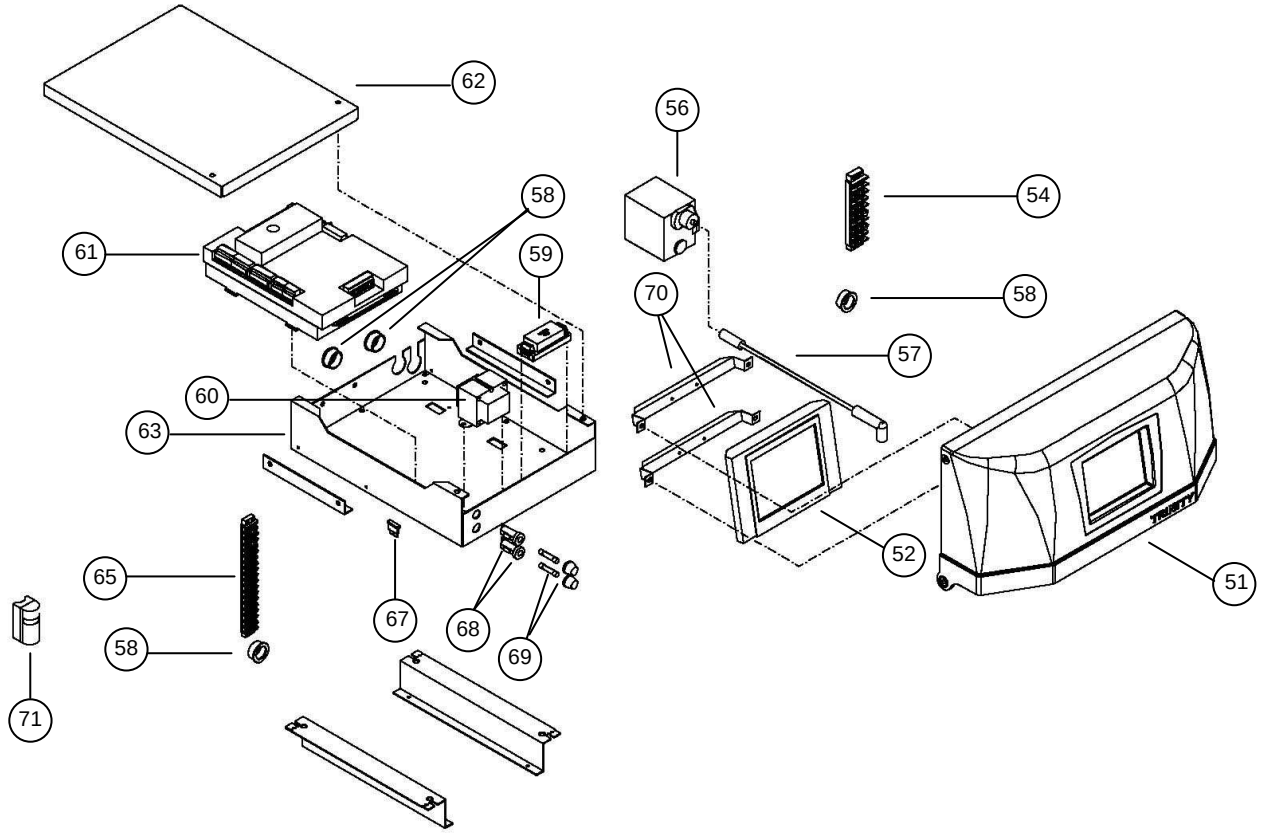


Figure 13-3(a) Lx400 Model

Cabinet, Vent and Air-Intake Parts

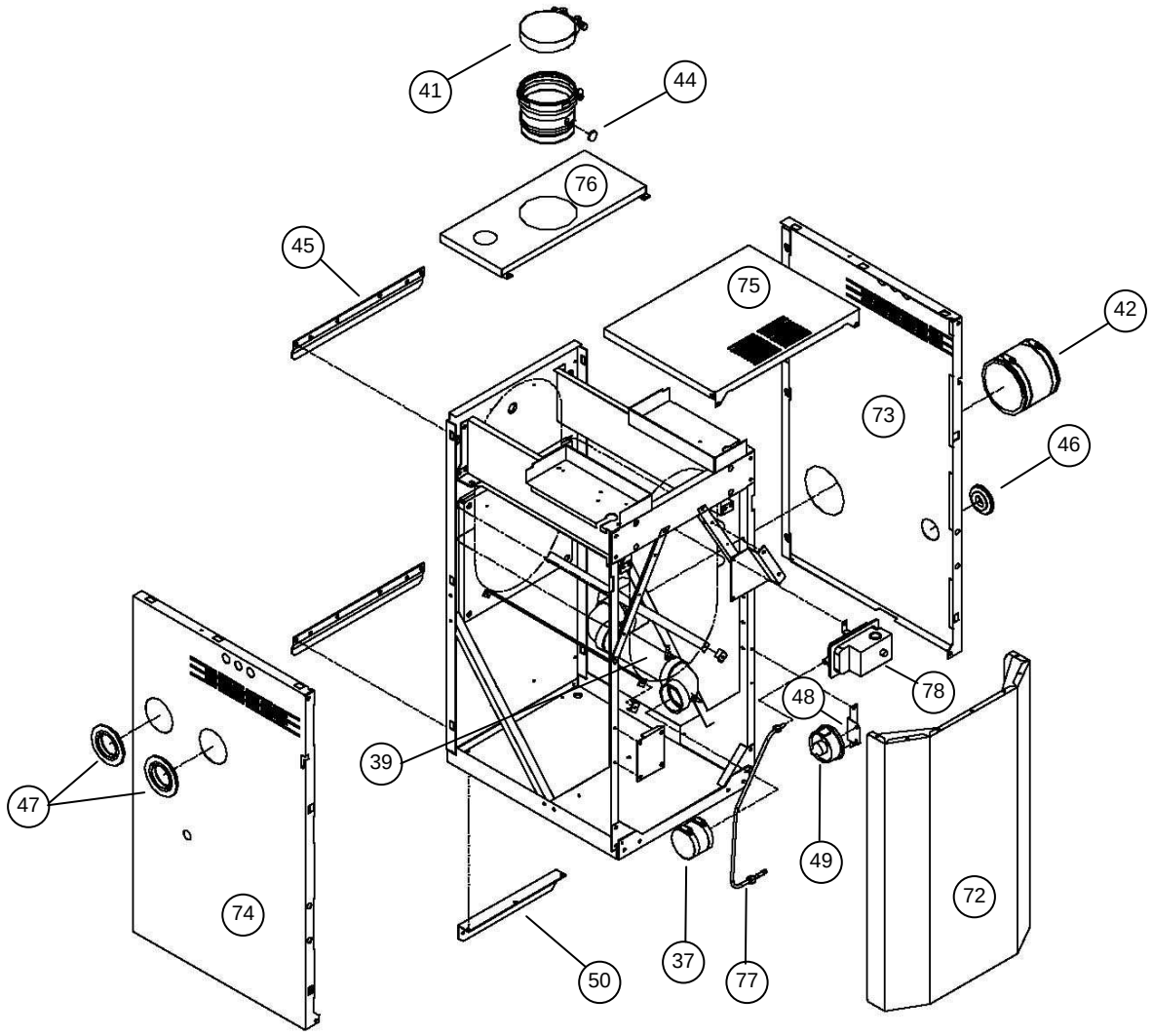


Figure 13-3(b) Lx400 Model

Heat Exchanger, Gas Valve, Blower and Burner Assembly

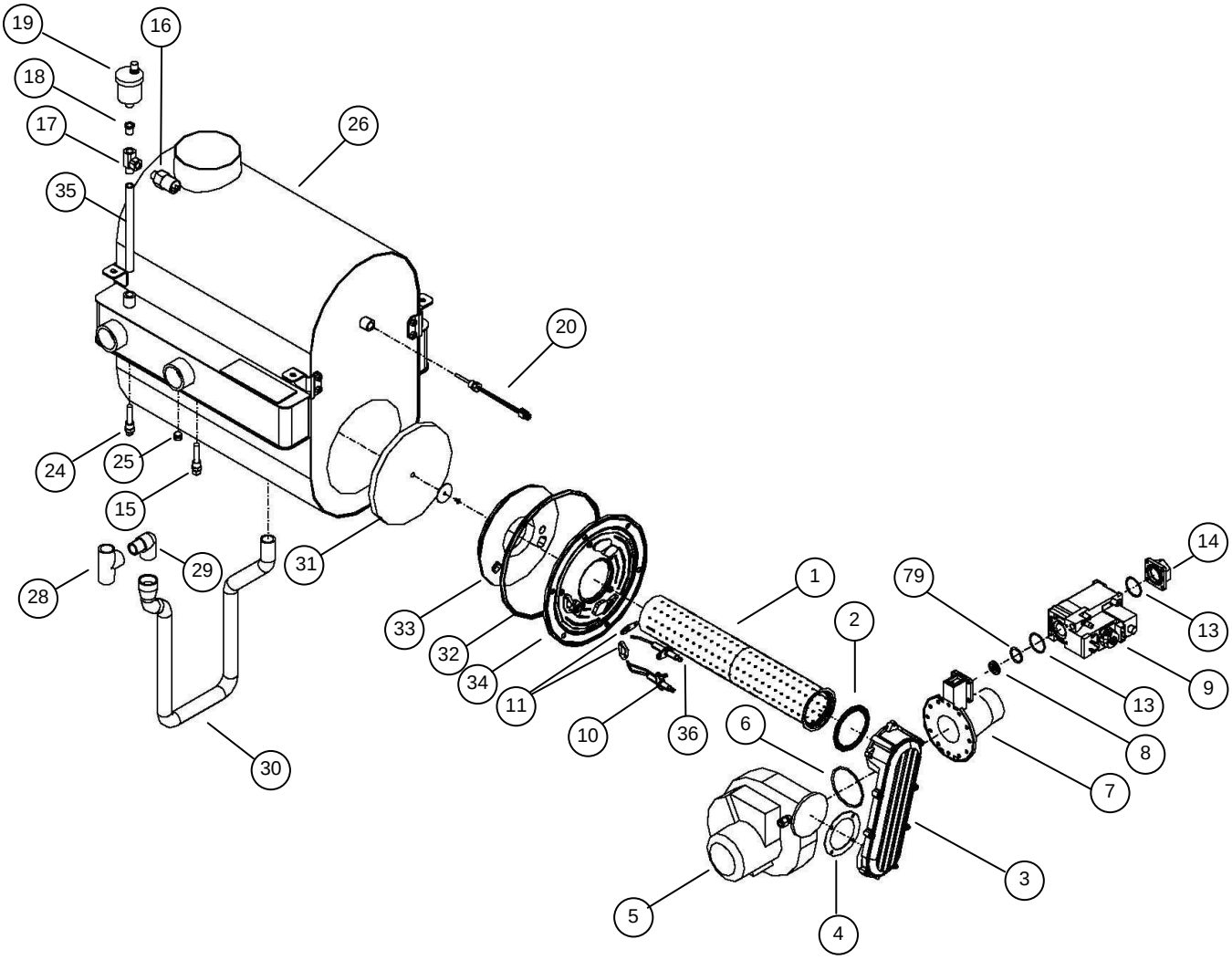


Table 13-1 Parts List: Lx150-400 Models

Item	Part #	Models	Description
1	82657	150	Premix burner 135.8 (Lx100-150; not Lx150E)
1	82658	150E, 200	Premix burner, 200.6 (Lx150E, Lx200)
1	83173	400	Premix burner, 327 (Lx400)
2	82761	All Models	Premix Burner Gasket (Lx Series)
3	82771	150,150E,200	Extended Air Tube (Lx100-200)
3	83195	400	Extended Air Tube (Lx400)
4	82766	All Models	Blower Gasket (Lx Series)
5	82052	150	EBM Blower RG130 (Lx100-150, not Lx150E)
5	82661	150E,200	EBM Blower RG148/1200-3633 (Lx150E, Lx200)
5	82994	400	EBM Blower RG148/Enhanced (Lx400)
6	82054-2	150,150E,200	CVI Venturi Gasket
6	83106	400	O-ring, Venturi to Blower (Lx400)
7	82054-1	150,150E,200	CVI Venturi 01 (Lx150-200)
7	82990	400	CVI Venturi (Lx400)
8	82650	150,150E,200	CVI 5.20mm Orifice #45.900.444.107B (field installed on LP converted units)
8	82993	400-NG	Gas Valve Orifice, 8.0mm, NG (Lx400)
8	83017	400-LP	Gas Valve Orifice, 6.2mm, LP (Lx400)

Item	Part #	Models	Description
9	82054	150,150E,200	GAS VALVE (CVI) VK8115F1134B (Valve Only)
9	82989	400	Gas Valve VR8615VB 1044B (Lx400)
10	83870	All Models	Ignition Electrode, Dual – c/w gasket (Lx Series)
11	82774	All Models	Flame Probe Gasket (Lx Series)
12	82600	150,150E,200	Gas Valve Regulator Vent Adapter
13	83883	150,150E,200	CVI Gas Valve Inlet O-ring Gasket
13	83194	400	Gas Valve Connector O-ring, Large (Lx400)
14	82065	150,150E,200	Gas Valve (CV1) 1/2" NPT elbow #45.900.400-132B
14	82991	400	Gas Valve Adapter 45900400-138B, 3/4" NPT (Lx400)
15	83606	All Models	Outlet Sensor, Dual (Lx Series)
16	83223-1	All Models	Low Water Pressure Switch, 1/4" NPT (Lx Series)
17	83462	150,150E,200	Street Tee, Brass, 1/4"
17	82698	400	1/4" NPT Brass Tee (Lx400)
18	83007	All Models	1/4"x 1/8" Bushing Brass (Lx Series)
19	82539	All Models	Automatic Air Vent 1/8" (Lx Series)
20	83608	All Models	Flue Sensor, Dual (Lx Series)
21	82765	150,150E,200	Composite Flue Outlet Gasket (Lx100-200)
22	82763	150,150E,200	Composite Flue Box (Lx100-200)
23	82764	150,150E,200	Trinity Flue Box to Heat Exchanger Gasket
24	83605	All Models	Inlet Sensor, Single (Lx Series)
25	83706	All Models	Plug, Brass, 1/4" NPT (Lx Series)
26	83395	150 – CAN	Heat Exchanger (CAN - Lx100-150, not Lx150E) – Canada Only
26	83012	150 – US	Heat Exchanger-ASME (US - Lx100-150, not Lx150E) – US Only
26	83396	150E, 200	Heat Exchanger-ASME (Lx200, Lx150E)
26	82926	400	Heat Exchanger-ASME (Lx400)
27	83042	150,150E,200	Y-Drain Fitting 5/8", White
28	83721	All Models	Tee, PVC, 1/2", Sch.40, White (Lx Series)
29	83720	All Models	Elbow, Street, PVC, 1/2", Sch.40, White (Lx Series)
30	83715	150,150E,200	Condensate Drain Tube (Lx150-200)
30	83907	400	Condensate Drain Tube (Lx400)
31	83112	All Models	Trinity Divider Plate Insulation c/w Washer & Screw (Lx Series)
32	82770	All Models	Burner Door Viton Gasket (Lx Series)
33	83808	150,150E,200	Burner Door Ceramic Disc (Lx150-200)
33	83950	400	Burner Door Ceramic Disc (Lx400)
34	83885	150,150E,200	Cast Alum Burner Door (Lx150-200)
34	83949	400	Cast Alum Burner Door (Lx400)
35	83934	400	Nipple, 1/4" x 6", Brass 113-B6 (Lx400)
36	82762	All Models	Flame Rod Rauschert (Lx Series)
37	82099	150,150E,200	1-1/2" MJ Coupling
37	83951	400	2" Gear Clamp Assembly (Lx400)
38	83425	150,150E,200	Elbow, Street 90, PVC Sys 15,1-1/2"
39	83426-1	150 – US	1-1/2" PVC Pipe, Sys 15, 1.75" Long
39	83426-2	150E,200	1-1/2" PVC Pipe, Sys 15, 4.5" Long
39	83952	400	Air Inlet Assembly (Lx400)
40	83425-1	150,150E,200	Air Metering Elbow (Lx150-200)
41	83712	150,150E,200	Flue Outlet Adapter (Trinity Lx 3” PVC), c/w plug
41	83213	400	Flue Outlet Adapter (Lx400)
42	82882	400	Coupling, Rubber , 4", Fernco (Lx400)
43	83477	150,150E,200	Bushing, PVC Sch. 40, 3"x1.5"
44	83712-1	150,150E,200	3/8" Stainless Steel Plug

Item	Part #	Models	Description
44	83034	400	Exhaust Test Plug (Lx400)
45	83873	150,150E,200	TiS Wall Mount Bracket 2 (Lx150-200)
45	83953	400	Wall Mounting Clip (Lx400)
46	83505	150,150E,200	Grommet, Vinyl, 7/8" OD
46	83923	400	Grommet, Vinyl, 3/4" OD (Lx400)
47	83506	150,150E,200	Grommet, Vinyl, 1-3/8" OD
47	83924	400	Grommet, Vinyl, 2" OD (Lx400)
48	83874	150,150E,200	TiS Air Switch Support Clip II (Lx100-200)
48	83954	400	Air Switch Bracket (Lx400)
49	82662	All Models	Air Switch Huba 604.E021180 set @ .15" w.c. (Lx Series)
50	83875	150,150E,200	TiS Wall Stand-Off - Bottom (Lx150-200)
50	83955	400	Wall Mounting Support, Bottom (Lx400)
51	83508	All Models	Display Molding (Lx Series)
52	83592	All Models	Trinity Touch Screen Display (Lx Series)
53	83876	150,150E,200	Electrical J-box Cover R1, Left (Lx100-200)
54	83872	All Models	Barrier Strip, Line Voltage (Lx Series)
55	83877	150,150E,200	Electrical J-box, Line Voltage (Lx100-200)
56	83707	All Models	Ignition Coil Q652B1006/B (Lx Series)
57	83724	All Models	Spark Igniter Wire, 12" (Lx Series)
58	82250	All Models	SNAP BUSHING, 1" (Lx Series)
59	83592-1	All Models	Power Supply – Touch Screen (Lx Series)
60	83190	All Models	Transformer, 24V, 40VA (Lx Series)
61	83589	All Models	ICP Honeywell Sola Controller R7910B1015/B (Lx Series)
62	83878	All Models	Drawer Cover (Lx Series)
63	83879	All Models	Drawer (Lx Series)
64	83880	150,150E,200	Electrical J-box, Low Voltage (Lx150-200)
65	83871	All Models	Barrier Strip, Low Voltage (Lx Series)
66	83876-1	150,150E,200	Lx150-200 Electrical J-box Cover R1 (Right)
67	83517	All Models	Fuse, Matrix/Lx, 2 Amp (Lx Series)
68	83881	All Models	Fuse Holder, 20 Amp at 250VAC Max (Lx Series)
69	83837	All Models	Fuse, Littlefuse 7A, 250VAC, Fast Blow (Lx Series)
70	83882	All Models	Touch Screen Display Support (Lx Series)
71	81027-1	All Models	Outdoor Sensor, 10K (Lx Series)
72	83886	150,150E,200	Cover (Lx150-200)
72	83956	400	Cover (Lx400)
73	83887	150,150E,200	Right Side (Lx150-200)
73	83597	400	Right Side R1 (Lx400)
74	83888	150 - CAN	Lx150 Left Side (CAN)
74	83888-1	150 - US	Lx150 Left Side (US), not 150E
74	83888-2	150E,200	Lx150E-200 Left Side
74	83958	400	Left Side (Lx400)
75	83889	150,150E,200	Front Top (Lx150-200)
75	82959	400	Front Top (Lx400)
76	83890	150,150E,200	Top Panel Back R1 (Lx150-200)
76	83960	400	Rear Top (Lx400)
77	83961	400	Fuel-Air Metallic Tubing with Ends (Lx400)
78	83915	400	High-Vent Pressure Switch (Lx400)
79	83962	400	Gas Valve Orifice O-ring, Large (Lx400)
80	83001	400	Test Port Retaining clamp (Lx400)

14.0 TROUBLESHOOTING

⚠ WARNING Observe the following precautions when servicing the appliance. Failure to comply with these may result in fire, property damage, serious injury or death.

Servicing the Appliance

- Disconnect or shut off all energy sources to the appliance: 120VAC power, water and gas.
- Identify and mark wires before disconnecting or removing them.
- Never bypass electrical fuses or limit devices except temporarily for testing.
- Use proper personal protective equipment (PPE) i.e. eye protection, safety footwear.

These procedures should only be performed by qualified service personnel, when abnormal operation of the appliance is suspected. The appliance incorporates a sophisticated microprocessor based control which normally responds appropriately to varying conditions. If the appliance operation appears to be incorrect, or it is not responding at all to a demand for heat, the following is suggested to determine and correct the problem.

NOTICE Before undertaking any troubleshooting procedures it is highly recommended to have available a digital multimeter(s) capable of measuring AC and DC volts and amperes, resistance (Ohms) and continuity.

Check 120VAC and 24VAC at the Appliance

First, verify the following:

- There is 120V being supplied to the appliance:
  - The circuit breaker in the electrical panel supplying power to the appliance is not tripped.
  - The service switch (if applicable) is in the ON position.
- There is a heat call from the thermostat:
  - Verify 24VAC to thermostat.
  - The thermostat is placed at a sufficiently high setting to create a call for heat to the appliance.

To check for the presence of 120VAC and 24VAC at the appliance follow this procedure:

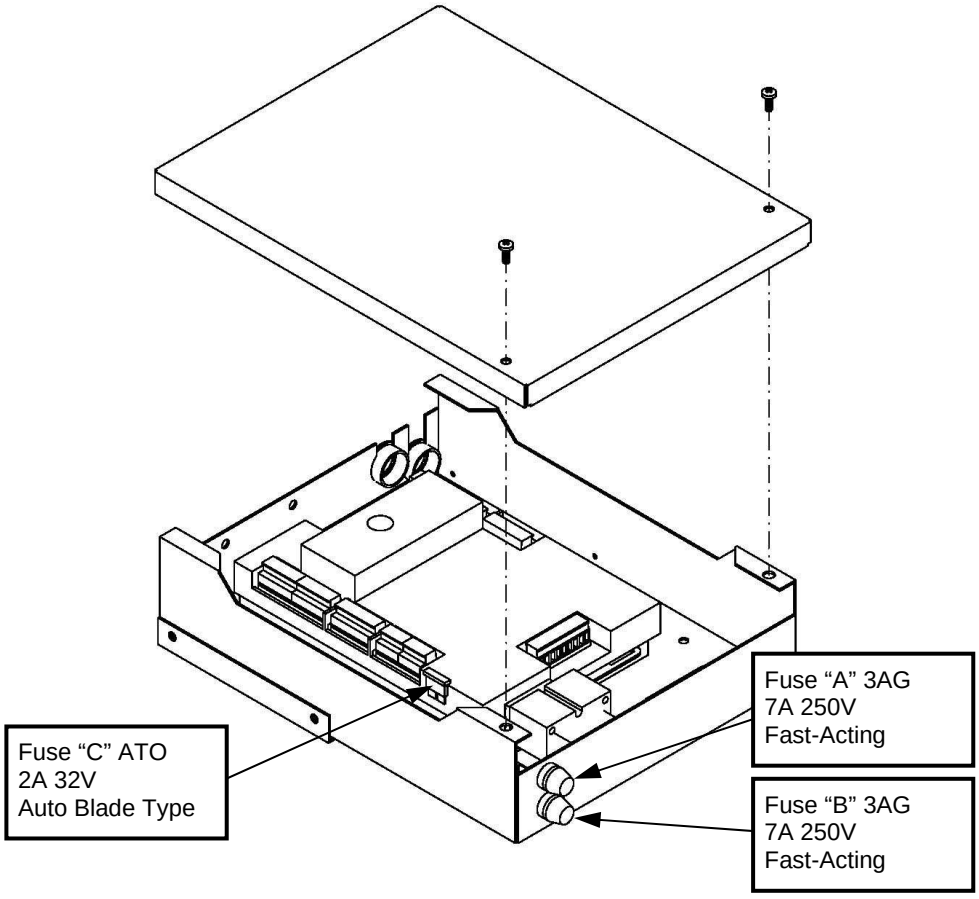
- Remove the appliance front cover.
- 120VAC
  - Remove the Line Voltage junction box cover. First remove the #10 pan-head Phillips screw securing the cover to the junction box. Lift the cover to release it from the appliance base and withdraw the cover from the appliance cabinet. This will expose the Line Voltage barrier strip.
  - With an AC voltmeter set on the appropriate scale, measure the voltage across the L1 and L2 terminals (terminals 1 and 5).
  - If 120VAC is not detected, check the electrical service as suggested above. If the service is verified, inspect the circuit wiring from the panel to the appliance for broken or disconnected conductors.
- 24VAC (only check if 120VAC supply is verified).
  - Remove the Low Voltage junction box cover. First remove the #10 pan-head Phillips screw securing the cover to the junction box. Lift the cover to release it from the appliance base and withdraw the cover from the appliance cabinet. This will expose the Low Voltage barrier strip.
  - With an AC voltmeter set on the appropriate scale, measure the voltage across the R and C terminals (terminals 3 and 1).
  - If 24VAC is not detected, check Fuse "C" (see below).

Fuses

There are three (3) fuses associated with the Trinity Lx controller. Check these fuses before replacing the controller or any other electrical component; if the fuse is blown, it will prevent the protected device(s) from functioning.

Figure 14-1 All Models

Control Panel Fuse Location



To check, and if necessary replace, the fuses:

- Remove all 120VAC power from the appliance. Be careful to check that the unit is not powered from more than one source e.g. a UPS (uninterruptible power supply).
- Remove the front cover.
- The control panel is located below the heat exchanger. Fuses "A" and "B" are accessible by removing the spring-loaded knurled knob of their respective holders. Push the knob toward the panel, and twist approximately 1/4 turn counter-clockwise.
- To access Fuse "C", remove the two #10 pan-head Phillips screws and lift the top cover from the panel. The auto blade type fuse is installed in an "inline" style fuse holder.

After inspecting and if necessary replacing fuses, replace the panel cover and front cover. Restore power to the appliance and confirm proper operation.

⚠ WARNING Only replace fuses with identical parts, see Figure 14-1. Failure to follow this warning may result in component failure, fire, property damage, serious injury or death.

Display

A blank screen does not necessarily indicate a problem; the display may be configured to automatically blank the screen after a pre-set interval. Simply touch the screen to activate it. Confirm that 120V power is being supplied to the appliance. Then, if the screen does not become active, check Figures 14-2 and 14-3 and follow the verification procedures as outlined below:

Figure 14-2 All Models

Controller Connection Verification

Ensure the display is connected to the controller via its 4-conductor signal cable by following the procedure below:

1. Remove the unit front cover.
2. Remove the two #10 pan-head Phillips screws securing the plastic display housing to the cabinet.
3. Pivot the housing down until its bottom edge rests against the extended air tube or cabinet sides.
4. Verify that the two mating 4-position single-row Molex housings are securely connected as illustrated.

Position Display Plug

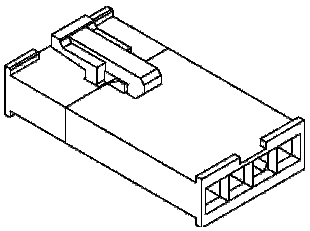


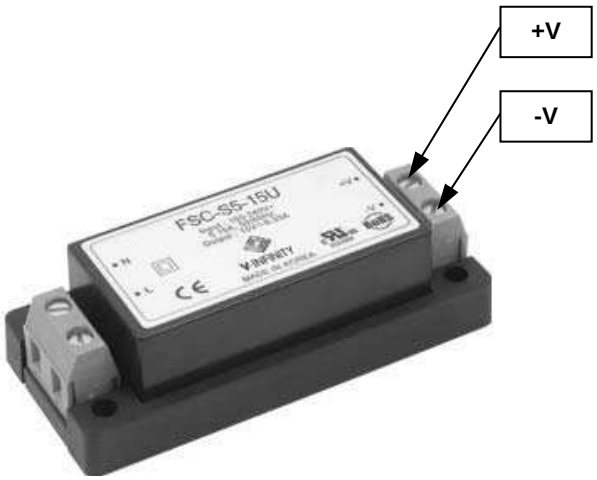
Figure 14-3 All Models

Display Power Supply Verification

Ensure that the display power supply is operating properly by following the procedure below:

1. Using a DC voltmeter, check for 12VDC across the +V and –V terminals of the power supply
2. Remove the unit front cover.
3. Remove the two #10 pan-head Phillips screws and lift the panel cover off.
4. Locate the 12VDC power supply at the front right corner of the panel.
5. Measure the voltage across the +V and –V terminals on the right-hand end of the supply.
6. If 12VDC is not detected across +V and –V, replace the power supply with NTI PN83592-1.

Display Power Supply Unit



CAUTION DO NOT drop the plastic housing or allow it to swing down freely, it may be damaged by forceful impact.

Summary and Diagnostics Display – The Trinity Lx controller and Touchscreen display provides detailed operational and diagnostic information for aid in troubleshooting. When power is applied to the appliance the initial page displayed is the Summary page. Information presented on the Summary page includes Demand source, Burner state, status of sensors and pumps, and so forth. Any current Alert or Lockout condition is also displayed. Accessible from the Summary page are the Diagnostics pages. Refer to the controller manual for more information.

Lockout and Alert History – The controller maintains a record of the fifteen (15) most recent events for both Lockouts and Alerts. To display the logs, touch the History button on the Summary page (refer to page 26 in the controller manual for more information). In any situation where malfunction is suspected, always check the Alerts and Lockouts history. Entries recorded in the history provide useful information for determining the cause of the malfunction.

Controller and Plug In Module Replacement – The Trinity Lx controller is supplied with a removable memory module called a PIM (Plug In Module). The PIM contains a copy of the non-safety configuration parameters for the specific Trinity Lx model it is installed in. In the event that the controller must be replaced, remove the PIM from the controller being replaced and insert it into the new controller (Note: the PIM may be inserted and removed from the controller with power applied). Restore the settings to the new controller with the following procedure:

- If the display is not showing the Summary page, touch the Home icon  at the upper left corner of the screen.
- Touch the Configure button at the lower left corner of the Summary page.
- Touch the Display Setup button at the lower right corner of the Configuration page.
- Touch the Program Module button located near the center of the Display Setup page.
- Touch the Login button at the lower right and enter the correct password; “sola”.
- Touch the Restore Parameters button.
- Confirm the restore operation by touching the Yes button.

Table 14-1 Troubleshooting Chart

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
Display shows “System Disconnected” constantly	Blown 24VAC fuse	Check Fuse "C" using procedure above.
	Faulty 24VAC transformer	Check Power LED on controller. Verify 24VAC to controller by measuring voltage at terminals J8 1 & 2. If no 24VAC detected and Fuse "C" ok, replace transformer.
	Faulty controller	If 24VAC present at controller terminals J8 1 & 2, check Power LED on controller. Verify that connector J8 is securely plugged into the controller. Recycle power to appliance, if controller does not operate, replace the controller.
Burner not operating	Heat demand satisfied; no call for heat	Check Demand and Set points via Touchscreen. Check thermostat and DHW aquastat (if applicable) setting.
	Appliance outlet temperature exceeded “Off Hysteresis”	Check outlet temperature, setpoint and hysteresis settings via Touchscreen. By design, if the outlet temperature exceeds the demand setpoint plus the Off Hysteresis, the burner shuts down.
	Hold or Delay	Check Summary page on Touchscreen for specific cause of hold or delay.
	Lockout	Check Summary page on Touchscreen for lockout code.
	Burner switch off	Check Summary page, if Demand indicates “Burner switch off” go to diagnostics burner test page and switch on.

Table 14-1 Troubleshooting Chart

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
Hold 61 – Anti short-cycle	Demand off	Check demand. Delay is to prevent rapid cycling of burner.
Hold 62 – Fan speed not proved	Burner ignition	Hold 62 is normally seen for a brief period prior to burner ignition.
	- Blower problem - Faulty controller	If Hold 62 persists for 15 seconds or more, check "Fan speed" on Touchscreen. If "LOW RPM", "HIGH RPM" or rapidly changing RPM value is displayed, try connecting another blower. If problem remains, replace controller.
	Wiring defect	Inspect blower wiring, ensure connectors at controller and blower are securely attached.
Hold 63 – LCI OFF (Limit control input)	External limit	Check if one (or more) external limit device(s) tripped.
Hold 65 – Interrupted Air Switch OFF	Blocked venting	Check for blockage of the exhaust vent.
	Blocked air inlet	Check for blockage of the air inlet.
	Disconnected, damaged or blocked tubing	Inspect the clear vinyl tubing connecting the air switch + and – ports to the air metering elbow. Condensation or other foreign matter may be obstructing the tubing, preventing the switch from sensing differential pressure caused by air flow through the metering elbow.
	Incorrect air switch setting	Contact NTI technical support.
	Faulty air switch	Disconnect red and orange wires from air switch and check for open circuit between terminals 1 &3. If circuit is open, replace air switch.
	Incorrect air switch wiring	Check that the red and orange wires are connected to quick connect tabs 3 and 1 respectively.
	Blown fuse	Check Fuse "A", blown fuse prevents blower from operating.
	Blower problem	See "Blower not operating" below.
Hold 66 – Interrupted air switch ON	Incorrect air switch setting	Contact NTI technical support.
	Disconnected, damaged or blocked tubing	Inspect the clear vinyl tubing connecting the air switch + and – ports to the air metering elbow. Condensation or other foreign matter may be obstructing the tubing, preventing the switch from sensing differential pressure caused by air flow through the metering elbow.
	Faulty air switch	Disconnect red and orange wires from air switch and check for open circuit between terminals 1 & 3. If continuity detected, replace air switch.
	Incorrect air switch wiring	Check that the red and orange wires are connected to quick connect tabs 3 and 1 respectively.
	Blower problem	See “Blower operating at high speed while burner off” below.
Hold 67 – ILK OFF	Insufficient water pressure	Ensure at least 15PSI at appliance outlet. Refer to Supplementary Documentation section 2.0 System Piping.
Hold 79 – Outlet High Limit	CH or DHW settings	Check if CH and/or DHW set point temperature plus off hysteresis exceeds 210°F (99°C).
	CH or DHW pump problem	See "Inoperative CH or DHW pump" below.

Table 14-1 Troubleshooting Chart

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
Lockout 81 – Delta T limit OR Appliance making banging or hissing sounds	Insufficient water flow	• Check Fuse "A" • Check appliance pump. • Ensure plumbing is correct. Refer to Supplementary Documentation section 2.0 System Piping. Check that water pressure is at least 15PSI. • **Boilers Only** - Boiler heat transfer surfaces may be fouled with scale or magnetite. Clean with Fernox DS-40 Descaler and Cleanser. See Table 2-1 in Appendix B.
Lockout 82 – Stack limit	Dirty heat exchanger	Inspect and if required clean the combustion chamber and/or heat exchanger. Refer to 14.0 Annual Manintenance and Inspection and Supplementary Documentation section 2.0 System Piping.
	Faulty sensor	Check resistance of stack sensor and compare to thermistor resistance chart, see Table 14-2.
Hold 91 – Inlet sensor fault	Sensor disconnected	• Verify that 2-position Molex connector on wiring harness is securely attached to mating connector on inlet sensor. • Inspect sensor wiring.
	Faulty sensor	Check resistance of sensor and compare to thermistor resistance chart, see Table 14-2.
Hold 92 – Outlet sensor fault	Sensor disconnected	• Verify that 4-position Molex connector on wiring harness is securely attached to mating connector on outlet sensor. • Inspect sensor wiring.
	Faulty sensor	Check resistance of sensor and compare to thermistor resistance chart, see Table 14-2.
Hold 95 – Stack sensor fault	Sensor disconnected	• Verify that 4-position Molex connector on wiring harness is securely attached to mating connector on stack sensor. • Inspect sensor wiring.
	Faulty sensor	Check resistance of sensor and compare to thermistor resistance chart, see Table 14-2.
Hold 110 -Ignition failure occurred (failure to prove flame after 3 ignition attempts)	Spark cable disconnected	Ensure that the high voltage spark cable is securely connected to the spark generator and the igniter electrode. Check that the green ground wire is securely attached to the ¼" quick connect tab on the igniter electrode.
	Insufficient gas line pressure	Ensure the manual gas shutoff valve is open. Refer to manual section 9.0 GAS VALVE AND BURNER SETUP.
	Flame rod disconnected	Verify that the flame rod signal wire is securely attached to the flame rod, which is located bottom center of the burner door.
	No 120VAC to Spark Generator	Check wiring from controller to spark generator. With an AC voltmeter measure voltage across J5-6 and ground (the controller chassis is connected to the 120VAC supply ground) during trial for ignition.
	Faulty Spark Generator	During trial for ignition check for arc on spark electrode via the observation port located next to the spark electrode in the burner door. If the spark generator is receiving 120VAC and no spark is observed, replace the spark generator.

Table 14-1 Troubleshooting Chart

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
	No 24VAC to Gas Valve	Check the wiring harness for loose or interrupted connections of the gas valve wiring. With an AC voltmeter, measure the voltage from controller terminals J5-2 to J4-10. There should be 24VAC present during trial for ignition.
	Faulty Gas Valve	The gas valve emits an audible click when it switches on or off. If the controller is providing 24VAC to the gas valve, and the wiring is intact, it should be possible to detect if the valve is responding.
Alert 128 - Modulation rate was limited due to IAS was open (Air switch open while burner firing)	Blocked venting	Check for blockage of the exhaust vent.
	Blocked air inlet	Check for blockage of the air inlet.
Alert 248 – CH outdoor temperature was invalid	Outdoor sensor not connected	The Trinity Lx is factory set with Outdoor Reset enabled. Connect outdoor sensor or disable Outdoor Reset.
	Outdoor sensor wiring	Check wiring of outdoor sensor. Wires should connect to Low Voltage barrier terminals 11 & 12.
	Faulty sensor	Check sensor. Should be free of ice and snow. Check resistance of sensor and compare to thermistor resistance chart, see Table 14-2.
Alert 311 – Run was terminated due to interrupted air flow switch was off	Blocked venting	Check for blockage of the exhaust vent.
	Blocked air inlet	Check for blockage of the air inlet.
	Disconnected, damaged or blocked tubing	Inspect the clear vinyl tubing connecting the air switch + and – ports to the air metering elbow. Condensation or other foreign matter may be obstructing the tubing, preventing the switch from sensing differential pressure caused by air flow through the metering elbow.
	Incorrect air switch setting	Contact NTI technical support.
	Blown fuse	Check Fuse "A".
Inoperative CH and/or DHW pump	Blown fuse	Check Fuse "B".
	Faulty controller	If Fuse “B” not blown, and controller is operating, navigate to pump diagnostic on display. Manually switch pump on, check for 120VAC at pump connection terminal on line voltage barrier strip. If 120VAC not detected, replace controller.
	Faulty pump	If 120VAC supplied to pump, and pump does not operate, replace pump.
Blower operating at high speed while burner off	Blower signal cable disconnected	• Verify that the 5-position Molex connector on the wiring harness is securely connected to its mating connector on the blower. • Check that the 4-position Molex connector on wiring harness is securely connected to its mating connector on the controller.
	No 24VAC to controller	• Check Power LED on controller. • Check Fuse "C". • With an AC voltmeter measure voltage at terminals J8 1 & 2, 24VAC should be present.
Blower not operating	Blower signal cable disconnected	Verify that the 5-position Molex connector on the wiring harness is securely connected to its mating connector on the blower.
	Blower power disconnected	Verify that the 3-position Molex connector on the wiring harness is securely connected to its mating connector on the blower.

Table 14-1 Troubleshooting Chart

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
	Blown fuse	Check Fuse "A" using the procedure described above. Fuse "A" protects the blower as well as the ignition spark generator and appliance pump.
	Faulty blower	Measure voltage across pins 1 & 2 (black and white wires) of 3-position connector on wiring harness. If 120VAC detected, replace power connector and remove 5-position signal connector. Blower should rotate at high speed. If blower does not rotate, replace blower.

Table 14-2 Thermistor Resistance vs. Temperature

Temp °F (°C)	Resistance Ohms (Ω)	Temp °F (°C)	Resistance Ohms (Ω)
-22 (-30)	176,133	122 (50)	3,603
-4 (-20)	96,761	131 (55)	2,986
14 (-10)	55,218	140 (60)	2,488
32 (0)	32,650	149 (65)	2,083
41 (5)	25,390	158 (70)	1,752
50 (10)	19,900	167 (75)	1,481
59 (15)	15,710	176 (80)	1,258
68 (20)	12,490	185 (85)	1,072
77 (25)	10,000	194 (90)	918
86 (30)	8,057	203 (95)	789
95 (35)	6,531	212 (100)	680
104 (40)	5,327	230 (110)	506
113 (45)	4,369	-	-

Table 14-3 Hold and Lockout Codes

Code	Description	Note
0	None	Hold / No lockout
1	Unconfigured safety data	Lockout
2	Waiting for safety data verification	Lockout
3	Internal fault: Hardware fault	Hold
4	Internal fault: Safety Relay key feedback error	Hold
5	Internal fault: Unstable power (DCDC) output	Hold
6	Internal fault: Invalid processor clock	Hold
7	Internal fault: Safety relay drive error	Hold
8	Internal fault: Zero crossing not detected	Hold
9	Internal fault: Flame bias out of range	Hold
10	Internal fault: Invalid Burner control state	Lockout
11	Internal fault: Invalid Burner control state flag	Lockout
12	Internal fault: Safety relay drive cap short	Hold
13	Internal fault: PII shorted to ILK	Hold / Lockout
14	Internal fault: HFS shorted to LCI	Hold / Lockout
15	Internal fault: Safety relay test failed due to feedback ON	Lockout
16	Internal fault: Safety relay test failed due to safety relay OFF	Lockout
17	Internal fault: Safety relay test failed due to safety relay not OFF	Lockout
18	Internal fault: Safety relay test failed due to feedback not ON	Lockout
19	Internal fault: Safety RAM write	Lockout

Table 14-3 Hold and Lockout Codes

Code	Description	Note
20	Internal fault: Flame ripple and overflow	Hold
21	Internal fault: Flame number of sample mismatch	Hold
22	Internal fault: Flame bias out of range	Hold
23	Internal fault: Bias changed since heating cycle starts	Hold
24	Internal fault: Spark voltage stuck low or high	Hold
25	Internal fault: Spark voltage changed too much during flame sensing time	Hold
26	Internal fault: Static flame ripple	Hold
27	Internal fault: Flame rod shorted to ground detected	Hold
28	Internal fault: A/D linearity test fails	Hold
29	Internal fault: Flame bias cannot be set in range	Hold
30	Internal fault: Flame bias shorted to adjacent pin	Hold
31	Internal fault: SLO electronics unknown error	Hold
32	Internal fault: Safety Key 0	Lockout
33	Internal fault: Safety Key 1	Lockout
34	Internal fault: Safety Key 2	Lockout
35	Internal fault: Safety Key 3	Lockout
36	Internal fault: Safety Key 4	Lockout
37	Internal fault: Safety Key 5	Lockout
38	Internal fault: Safety Key 6	Lockout
39	Internal fault: Safety Key 7	Lockout
40	Internal fault: Safety Key 8	Lockout
41	Internal fault: Safety Key 9	Lockout
42	Internal fault: Safety Key 10	Lockout
43	Internal fault: Safety Key 11	Lockout
44	Internal fault: Safety Key 12	Lockout
45	Internal fault: Safety Key 13	Lockout
46	Internal fault: Safety Key 14	Lockout
47	Flame rod to ground leakage	Hold
48	Static flame (not flickering)	Hold
49	24VAC voltage low/high	Hold
50	Modulation fault	Hold
51	Pump fault	Hold
52	Motor tachometer fault	Hold
53	AC inputs phase reversed	Lockout
54-57	RESERVED	
58	Internal fault: HFS shorted to IAS	Lockout
59	Internal fault: Mux pin shorted	Lockout
60	Internal fault: HFS shorted to LFS	Lockout
61	Anti short cycle	Hold
62	Fan speed not proved	Hold
63	LCI OFF	Hold
64	PII OFF	N/A
65	Interrupted Airflow Switch OFF	Hold
66	Interrupted Airflow Switch ON	Hold
67	ILK OFF	Hold
68	ILK ON	N/A
69	Pilot test hold	Hold
70	Wait for leakage test completion	Hold
71-77	RESERVED	

Table 14-3 Hold and Lockout Codes

Code	Description	Note
78	Demand lost in run	Hold
79	Outlet high limit	Hold
80	DHW high limit	Disabled
81	Delta T limit	Lockout
82	Stack limit	Lockout
83-90	RESERVED	
91	Inlet sensor fault	Hold
92	Outlet sensor fault	Hold
93	DHW sensor fault	Hold
94	Header sensor fault	Hold
95	Stack sensor fault	Hold
96	Outdoor sensor fault	Hold
97	Internal fault: A2D mismatch	Lockout
98	Internal fault: Exceeded VSNSR voltage tolerance	Lockout
99	Internal fault: Exceeded 28V voltage tolerance	Lockout
100	Pressure sensor fault	Hold
101-104	RESERVED	
105	Flame detected out of sequence	Hold / Lockout
106	Flame lost in MFEP	Lockout
107	Flame lost early in run	Lockout
108	Flame lost in run	Lockout
109	Ignition failed	Lockout
110	Ignition failure occurred	Hold
111	Flame current lower than WEAK threshold	Hold
112	Pilot test flame timeout	Lockout
113	Flame circuit timeout	Lockout
114-121	RESERVED	
122	Light off rate proving failed	Lockout
123	Purge rate proving failed	Lockout
124	High fire switch OFF	Hold
125	High fire switch stuck ON	Hold
126	Low fire switch OFF	Hold
127	Low fire switch stuck ON	Hold
128	Fan speed failed during pre-purge	Hold / Lockout
129	Fan speed failed during pre-ignition	Hold / Lockout
130	Fan speed failed during ignition	Hold / Lockout
131	Fan movement detected during standby	Hold
132	Fan speed failed during run	Hold
133-135	RESERVED	
136	Interrupted Airflow Switch failed to close	Hold
137	ILK failed to close	Hold
138-148	RESERVED	
149	Flame detected	Hold / Lockout
150	Flame not detected	Hold
151	High fire switch ON	Hold / Lockout
152	Combustion pressure ON	Hold / Lockout
153	Combustion pressure OFF	Hold / Lockout
154	Purge fan switch ON	Hold / Lockout
155	Purge fan switch OFF	Hold / Lockout

Table 14-3 Hold and Lockout Codes

Code	Description	Note
156	Combustion pressure and Flame ON	Hold / Lockout
157	Combustion pressure and Flame OFF	Lockout
158	Main valve ON	Lockout
159	Main valve OFF	Lockout
160	Ignition ON	Lockout
161	Ignition OFF	Lockout
162	Pilot valve ON	Lockout
163	Pilot valve OFF	Lockout
164	Block intake ON	Lockout
165	Block intake OFF	Lockout
166-171	RESERVED	
172	Main relay feedback incorrect	Lockout
173	Pilot relay feedback incorrect	Lockout
174	Safety relay feedback incorrect	Lockout
175	Safety relay open	Lockout
176	Main relay ON at safe start check	Lockout
177	Pilot relay ON at safe start check	Lockout
178	Safety relay ON at safe start check	Lockout
179-183	RESERVED	
184	Invalid BLOWER/HSI output setting	Lockout
185	Invalid Delta T limit enable setting	Lockout
186	Invalid Delta T limit response setting	Lockout
187	Invalid DHW high limit enable setting	Lockout
188	Invalid DHW high limit response setting	Lockout
189	Invalid Flame sensor type setting	Lockout
190	Invalid interrupted air switch enable setting	Lockout
191	Invalid interrupted air switch start check enable setting	Lockout
192	Invalid Igniter on during setting	Lockout
193	Invalid Ignite failure delay setting	Lockout
194	Invalid Ignite failure response setting	Lockout
195	Invalid Ignite failure retries setting	Lockout
196	Invalid Ignition source setting	Lockout
197	Invalid Interlock open response setting	Lockout
198	Invalid Interlock start check setting	Lockout
199	Invalid LCI enable setting	Lockout
200	Invalid light off rate setting	Lockout
201	Invalid Light off rate proving setting	Lockout
202	Invalid Main Flame Establishing Period time setting	Lockout
203	Invalid MFEP flame failure response setting	Lockout
204	Invalid NTC sensor type setting	Lockout
205	Invalid Outlet high limit response setting	Lockout
206	Invalid Pilot Flame Establishing Period setting	Lockout
207	Invalid PII enable setting	Lockout
208	Invalid pilot test hold setting	Lockout
209	Invalid Pilot type setting	Lockout
210	Invalid Post-purge time setting	Lockout
211	Invalid Power up with lockout setting	Lockout
212	Invalid Pre-ignition time setting	Lockout
213	Invalid Pre-purge rate setting	Lockout

Table 14-3 Hold and Lockout Codes

Code	Description	Note
214	Invalid Pre-purge time setting	Lockout
215	Invalid Purge rate proving setting	Lockout
216	Invalid Run flame failure response setting	Lockout
217	Invalid Run stabilization time setting	Lockout
218	Invalid Stack limit enable setting	Lockout
219	Invalid Stack limit response setting	Lockout
220	Unconfigured Delta T limit set point setting	Lockout
221	Unconfigured DHW high limit set point setting	Lockout
222	Unconfigured Outlet high limit set point setting	Lockout
223	Unconfigured Stack limit set point setting	Lockout
224	Invalid DHW demand source setting	Lockout
225	Invalid Flame threshold setting	Lockout
226	Invalid Outlet high limit set point setting	Lockout
227	Invalid DHW high limit set point setting	Lockout
228	Invalid Stack limit set point setting	Lockout
229	Invalid Modulation output setting	Lockout
230	Invalid CH demand source setting	Lockout
231	Invalid Delta T limit delay setting	Lockout
232	Invalid Pressure sensor type setting	Lockout
233	Invalid IAS closed response setting	Lockout
234	Invalid Outlet high limit enable setting	Lockout
235	Invalid Outlet connector type setting	Lockout
236	Invalid Inlet connector type setting	Lockout
237	Invalid DHW connector type setting	Lockout
238	Invalid Stack connector type setting	Lockout
239	Invalid Header connector type setting	Lockout
240	Invalid Outdoor connector type setting	Lockout
241-255	RESERVED	

Table 14-4 Alert Codes

Code	Description
0	None (No alert)
1	Alert PCB was restored from factory defaults
2	Safety configuration parameters were restored from factory defaults
3	Configuration parameters were restored from factory defaults
4	Invalid Factory Invisibility PCB was detected
5	Invalid Factory Range PCB was detected
6	Invalid range PCB record has been dropped
7	EEPROM lockout history was initialized
8	Switched application annunciation data blocks
9	Switched application configuration data blocks
10	Configuration was restored from factory defaults
11	Backup configuration settings was restored from active configuration
12	Annunciation configuration was restored from factory defaults
13	Annunciation configuration was restored from backup
14	Safety group verification table was restored from factory defaults
15	Safety group verification table was updated
16	Invalid Parameter PCB was detected

Table 14-4 Alert Codes

Code	Description
17	Invalid Range PCB was detected
18	Alarm silence time exceeded maximum
19	Invalid safety group verification table was detected
20-26	RESERVED
27	Safety processor was reset
28	Application processor was reset
29	Burner switch was turned OFF
30	Burner switch was turned ON
31	Program Module (PM) was inserted into socket
32	Program Module (PM) was removed from socket
33	Alert PCB was configured
34	Parameter PCB was configured
35	Range PCB was configured
36	Program Module (PM) incompatible with product was inserted into socket
37	Program Module application parameter revision differs from application processor
38	Program Module safety parameter revision differs from safety processor
39	PCB incompatible with product contained in Program Module
40	Parameter PCB in Program Module is too large for product
41	Range PCB in Program Module was too large for product
42	Alert PCB in Program Module was too large for product
43	IAS start check was forced on due to IAS enabled
44	Low voltage was detected in safety processor
45	High line frequency occurred
46	Low line frequency occurred
47	Invalid subsystem reset request occurred
48	Write large enumerated Modbus register value was not allowed
49	Maximum cycle count was reached
50	Maximum hours count was reached
51	Illegal Modbus write was attempted
52	Modbus write attempt was rejected (NOT ALLOWED)
53	Illegal Modbus read was attempted
54	Safety processor brown-out reset occurred
55	Application processor watchdog reset occurred
56	Application processor brown-out reset occurred
57	Safety processor watchdog reset occurred
58	Alarm was reset by the user at the control
59	Burner control firing rate was > absolute max rate
60	Burner control firing rate was < absolute min rate
61	Burner control firing rate was invalid, % vs. RPM
62	Burner control was firing with no fan request
63	Burner control rate (non-firing) was > absolute max rate
64	Burner control rate (non-firing) was < absolute min rate
65	Burner control rate (non-firing) was absent
66	Burner control rate (non-firing) was invalid, % vs. RPM
67	Fan off cycle rate was invalid, % vs. RPM
68	Set point was over ridden due to sensor fault
69	Modulation was over ridden due to sensor fault
70-74	RESERVED
75	Absolute max fan speed was out of range

Table 14-4 Alert Codes

Code	Description
76	Absolute min fan speed was out of range
77	Fan gain down was invalid
78	Fan gain up was invalid
79	Fan minimum duty cycle was invalid
80	Fan pulses per revolution was invalid
81	Fan PWM frequency was invalid
82-89	RESERVED
90	Modulation output type was invalid
91	Firing rate control parameter was invalid
92	Forced rate was out of range vs. min/max modulation
93	Forced rate was invalid, % vs. RPM
94	Slow start ramp value was invalid
95	Slow start degrees value was invalid
96	Slow start was ended due to outlet sensor fault
97	Slow start was end due to reference set point fault
98	CH max modulation rate was invalid, % vs. RPM
99	CH max modulation rate was > absolute max rate
100	CH modulation range (max minus min) was too small (< 4% or 40 RPM)
101	DHW max modulation rate was invalid, % vs. RPM
102	DHW max modulation rate was > absolute max rate
103	DHW modulation range (max minus min) was too small (< 4% or 40 RPM)
104	Min modulation rate was < absolute min rate
105	Min modulation rate was invalid, % vs. RPM
106	Manual rate was invalid, % vs. RPM
107	Slow start enabled, but forced rate was invalid
108	Analog output hysteresis was invalid
109	Analog modulation output type was invalid
110	IAS open rate differential was invalid
111	IAS open step rate was invalid
112-114	RESERVED
115	Fan was limited to its minimum duty cycle
116	Manual rate was > CH max modulation rate
117	Manual rate was > DHW max modulation rate
118	Manual rate was < min modulation rate
119	Manual rate in Standby was > absolute max rate
120	Modulation commanded rate was > CH max modulation rate
121	Modulation commanded rate was > DHW max modulation rate
122	Modulation commanded rate was < min modulation rate
123	Modulation rate was limited due to outlet limit
124	Modulation rate was limited due to Delta-T limit
125	Modulation rate was limited due to stack limit
126	Modulation rate was limited due to anti-condensation
127	Fan Speed out of range in RUN
128	Modulation rate was limited due to IAS was open
129	Slow start ramp setting of zero will result in no modulation rate change
130	RESERVED
131	CH demand source was invalid
132	CH P-gain was invalid
133	CH I-gain was invalid

Table 14-4 Alert Codes

Code	Description
134	CH D-gain was invalid
135	CH OFF hysteresis was invalid
136	CH ON hysteresis was invalid
137	CH sensor type was invalid
138	CH hysteresis step time was invalid
139	CH remote control parameter was invalid
140	CH ODR not allowed with remote control
141-145	RESERVED
146	CH control was suspended due to fault
147	CH header temperature was invalid
148	CH outlet temperature was invalid
149	CH steam pressure was invalid
150-156	RESERVED
157	DHW demand source was invalid
158	DHW P-gain was invalid
159	DHW I-gain was invalid
160	DHW D-gain was invalid
161	DHW OFF hysteresis was invalid
162	DHW ON hysteresis was invalid
163	DHW hysteresis step time was invalid
164	DHW sensor type was invalid
165	Inlet sensor type was invalid for DHW
166	Outlet sensor type was invalid for DHW
167-170	RESERVED
171	DHW control was suspended due to fault
172	DHW temperature was invalid
173	DHW inlet temperature was invalid
174	DHW outlet temperature was invalid
175-182	RESERVED
183	Lead Lag P-gain was invalid
184	Lead Lag I-gain was invalid
185	Lead Lag D-gain was invalid
186	Lead Lag OFF hysteresis was invalid
187	Lead Lag ON hysteresis was invalid
188	Lead Lag slave enable was invalid
189	Lead Lag hysteresis step time was invalid
190-203	RESERVED
204	Lead Lag master was suspended due to fault
205	Lead Lag slave was suspended due to fault
206	Lead Lag header temperature was invalid
207	Lead Lag was suspended due to no enabled Program Module installed
208	Lead Lag slave session has timed out
209-221	RESERVED
222	CH frost protection temperature was invalid
223	CH frost protection inlet temperature was invalid
224	DHW frost protection temperature was invalid
225-230	RESERVED
231	LL set point was invalid
232	LL time of day set point was invalid

Table 14-4 Alert Codes

Code	Description
233	LL outdoor temperature was invalid
234	LL ODR time of day set point was invalid
235	LL ODR time of day set point exceeded normal set point
236	LL max outdoor set point was invalid
237	LL min outdoor set point was invalid
238	LL min water set point was invalid
239	LL outdoor temperature range was too small (minimum 12 C / 22 F)
240	LL water temperature range was too small (minimum 12 C / 22 F)
241-245	RESERVED
246	CH set point was invalid
247	CH time of day set point was invalid
248	CH outdoor temperature was invalid
249	CH ODR time of day setpoint was invalid
250	CH ODR time of day set point exceeds normal set point
251	CH max outdoor set point was invalid
252	CH min outdoor setp oint was invalid
253	CH min water set point was invalid
254	CH outdoor temperature range was too small (minimum 12 C / 22 F)
255	CH water temperature range was too small (minimum 12 C / 22 F)
256-260	RESERVED
261	DHW set point was invalid
262	DHW time of day set point was invalid
263-271	RESERVED
272	Abnormal Recycle: Pressure sensor fault
273	Abnormal Recycle: Safety relay drive test failed
274	Abnormal Recycle: Demand off during Pilot Flame Establishing Period
275	Abnormal Recycle: LCI off during Drive to Purge Rate
276	Abnormal Recycle: LCI off during Measured Purge Time
277	Abnormal Recycle: LCI off during Drive to Light off Rate
278	Abnormal Recycle: LCI off during Pre-Ignition test
279	Abnormal Recycle: LCI off during Pre-Ignition time
280	Abnormal Recycle: LCI off during Main Flame Establishing Period
281	Abnormal Recycle: LCI off during Ignition period
282	Abnormal Recycle: Demand off during Drive to Purge Rate
283	Abnormal Recycle: Demand off during Measured Purge Time
284	Abnormal Recycle: Demand off during Drive to Light off Rate
285	Abnormal Recycle: Demand off during Pre-Ignition test
286	Abnormal Recycle: Demand off during Pre-Ignition time
287	Abnormal Recycle: Flame was on during Safe Start check
288	Abnormal Recycle: Flame was on during Drive to Purge Rate
289	Abnormal Recycle: Flame was on during Measured Purge Time
290	Abnormal Recycle: Flame was on during Drive to Light off Rate
291	Abnormal Recycle: Flame was not on at end of Ignition period
292	Abnormal Recycle: Flame was lost during Main Flame Establishing Period
293	Abnormal Recycle: Flame was lost early in Run
294	Abnormal Recycle: Flame was lost during Run
295	Abnormal Recycle: Leakage test failed
296	Abnormal Recycle: Interrupted air flow switch was off during Drive to Purge Rate
297	Abnormal Recycle: Interrupted air flow switch was off during Measured Purge Time

Table 14-4 Alert Codes

Code	Description
298	Abnormal Recycle: Interrupted air flow switch was off during Drive to Light off Rate
299	Abnormal Recycle: Interrupted air flow switch was off during Pre-Ignition test
300	Abnormal Recycle: Interrupted air flow switch was off during Pre-Ignition time
301	Abnormal Recycle: Interrupted air flow switch was off during Main Flame Establishing Period
302	Abnormal Recycle: Ignition failed due to interrupted air flow switch was off
303	Abnormal Recycle: ILK off during Drive to Purge Rate
304	Abnormal Recycle: ILK off during Measured Purge Time
305	Abnormal Recycle: ILK off during Drive to Light off Rate
306	Abnormal Recycle: ILK off during Pre-Ignition test
307	Abnormal Recycle: ILK off during Pre-Ignition time
308	Abnormal Recycle: ILK off during Main Flame Establishing Period
309	Abnormal Recycle: ILK off during Ignition period
310	Run was terminated due to ILK was off
311	Run was terminated due to interrupted air flow switch was off
312	Stuck reset switch
313	Run was terminated due to fan failure
314	Abnormal Recycle: Fan failed during Drive to Purge Rate
315	Abnormal Recycle: Fan failed during Measured Purge Time
316	Abnormal Recycle: Fan failed during Drive to Light off Rate
317	Abnormal Recycle: Fan failed during Pre-Ignition test
318	Abnormal Recycle: Fan failed during Pre-Ignition time
319	Abnormal Recycle: Fan failed during Ignition period
320	Abnormal Recycle: Fan failed during Main Flame Establishing Period
321	Abnormal Recycle: Main Valve off after 10 seconds of RUN
322	Abnormal Recycle: Pilot Valve off after 10 seconds of RUN
323	Abnormal Recycle: Safety Relay off after 10 seconds of RUN
324	Abnormal Recycle: Hardware flame bias
325	Abnormal Recycle: Hardware static flame
326	Abnormal Recycle: Hardware flame current invalid
327	Abnormal Recycle: Hardware flame rod short
328	Abnormal Recycle: Hardware invalid power
329	Abnormal Recycle: Hardware invalid AC line
330	Abnormal Recycle: Hardware SLO flame ripple
331	Abnormal Recycle: Hardware SLO flame sample
332	Abnormal Recycle: Hardware SLO flame bias range
333	Abnormal Recycle: Hardware SLO flame bias heat
334	Abnormal Recycle: Hardware SLO spark stuck
335	Abnormal Recycle: Hardware SLO spark changed
336	Abnormal Recycle: Hardware SLO static flame
337	Abnormal Recycle: Hardware SLO rod shorted
338	Abnormal Recycle: Hardware SLO AD linearity
339	Abnormal Recycle: Hardware SLO bias not set
340	Abnormal Recycle: Hardware SLO bias shorted
341	Abnormal Recycle: Hardware SLO electronics
342	Abnormal Recycle: Hardware processor clock
343	Abnormal Recycle: Hardware AC phase
344	Abnormal Recycle: Hardware A2D mismatch
345	Abnormal Recycle: Hardware VSNSR A2D
346	Abnormal Recycle: Hardware 28V A2D

Table 14-4 Alert Codes

Code	Description
347	Abnormal Recycle: Hardware HFS IAS shorted
348	Abnormal Recycle: Hardware PII INTLK shorted
349	Abnormal Recycle: Hardware HFS LCI shorted
350	Abnormal Recycle: Hardware HFS LFS shorted
351	Abnormal Recycle: Invalid zero crossing
352	Abnormal Recycle: fault stack sensor
353	Abnormal Recycle: stack limit
354	Abnormal Recycle: delta T limit
355	Abnormal Recycle: fault outlet sensor
356	Abnormal Recycle: outlet high limit
357	Abnormal Recycle: fault DHW sensor
358	Abnormal Recycle: DHW high limit
359	Abnormal Recycle: fault inlet sensor
360	Abnormal Recycle: Check Parameters Failed
361	Internal error: No factory parameters were detected in control
362	Internal error: PID iteration frequency was invalid
363	Internal error: Demand-Rate interval time was invalid
364	Internal error: Factory calibration parameter for modulation was invalid
365	Internal error: CH PID P-scaler was invalid
366	Internal error: CH PID I-scaler was invalid
367	Internal error: CH PID D-scaler was invalid
368	Internal error: DHW PID P-scaler was invalid
369	Internal error: DHW PID I-scaler was invalid
370	Internal error: DHW PID D-scaler was invalid
371	Internal error: Lead Lag master PID P-scaler was invalid
372	Internal error: Lead Lag master PID I-scaler was invalid
373	Internal error: Lead Lag master PID D-scaler was invalid
374-459	RESERVED
460	LCI demand lost in run
461	Demand lost in run
462	STAT demand lost in run
463	Demand lost in run due to no flame
464-466	RESERVED
467	Internal error: EEPROM write was attempted before EEPROM was initialized
468	Internal error: EEPROM cycle count address was invalid
469	Internal error: EEPROM days count address was invalid
470	Internal error: EEPROM hours count address was invalid
471	Internal error: Lockout record EEPROM index was invalid
472	Internal error: Request to write PM status was invalid
473	Internal error: PM parameter address was invalid
474	Internal error: PM safety parameter address was invalid
475	Internal error: Invalid record in lockout history was removed
476	Internal error: EEPROM write buffer was full
477	Internal error: Data too large was not written to EEPROM
478	Internal error: Safety key bit 0 was incorrect
479	Internal error: Safety key bit 1 was incorrect
480	Internal error: Safety key bit 2 was incorrect
481	Internal error: Safety key bit 3 was incorrect
482	Internal error: Safety key bit 4 was incorrect

Table 14-4 Alert Codes

Code	Description
483	Internal error: Safety key bit 5 was incorrect
484	Internal error: Safety key bit 6 was incorrect
485	Internal error: Safety key bit 7 was incorrect
486	Internal error: Safety key bit 8 was incorrect
487	Internal error: Safety key bit 9 was incorrect
488	Internal error: Safety key bit 10 was incorrect
489	Internal error: Safety key bit 11 was incorrect
490	Internal error: Safety key bit 12 was incorrect
491	Internal error: Safety key bit 13 was incorrect
492	Internal error: Safety key bit 14 was incorrect
493	Internal error: Safety key bit 15 was incorrect
494	Internal error: Safety relay timeout
495	Internal error: Safety relay commanded off
496	Internal error: Unknown safety error occurred
497	Internal error: Safety timer was corrupt
498	Internal error: Safety timer was expired
499	Internal error: Safety timings
500	Internal error: Safety shutdown

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