

# Trinity Installation and Maintenance Instructions

**1.0 SPECIFICATIONS..... 2**

    1.1 HIGH ALTITUDE OPERATION..... 2

**2.0 INSTALLATION REQUIREMENTS ..... 3**

**3.0 VENTING..... 3**

    3.10 VENT PIPE MATERIAL ..... 3

    3.20 VENTING CLEARANCES ..... 3

    3.30 VENTING CONFIGURATIONS ..... 4

    3.40 DETERMINING VENT LENGTHS ..... 6

**4.0 CONDENSATE DRAIN..... 7**

**5.0 INSTALLING GAS PIPING ..... 7**

    5.10 INSTALLATION ..... 7

    5.20 TESTING AND SETTINGS..... 8

**6.0 HEATING SYSTEM PIPING ..... 9**

    6.10 HEATING SYSTEM PIPING (NON-COMBI)..... 9

    6.20 DOMESTIC HEATING INDIRECT SYSTEM (NON-COMBI)..... 10

    6.30 COMBI PIPING ..... 10

**7.0 WIRING..... 13**

**8.0 SENTRY 2100T CONTROLLER..... 14**

**9.0 LIGHTING BOILER ..... 17**

    9.10 INITIAL START-UP ..... 17

    9.20 RE-LIGHTING UNIT ..... 17

    9.30 TURN OFF BOILER ..... 17

**10.0 TROUBLE SHOOTING ..... 18**

**11.0 ANNUAL MAINTENANCE AND INSPECTION..... 19**

**12.0 INSTALLATION CHECKLIST ..... 19**

**13.0 PARTS LIST ..... 20**

**14.0 WARRANTY..... 21**



**SAVE THESE INSTRUCTIONS**

*Installer must leave, and affix these Instructions close or adjacent to the boiler*

**CAUTION: IT IS THE RESPONSIBILITY OF THE HOMEOWNER TO KEEP THE VENT TERMINAL CLEAR OF SNOW AND ICE.**

**Warning**

**THIS BOILER MUST HAVE WATER FLOWING THROUGH IT WHENEVER THE BURNER IS ON. FAILURE TO DO THIS WILL DAMAGE THE UNIT AND VOID THE WARRANTY.**

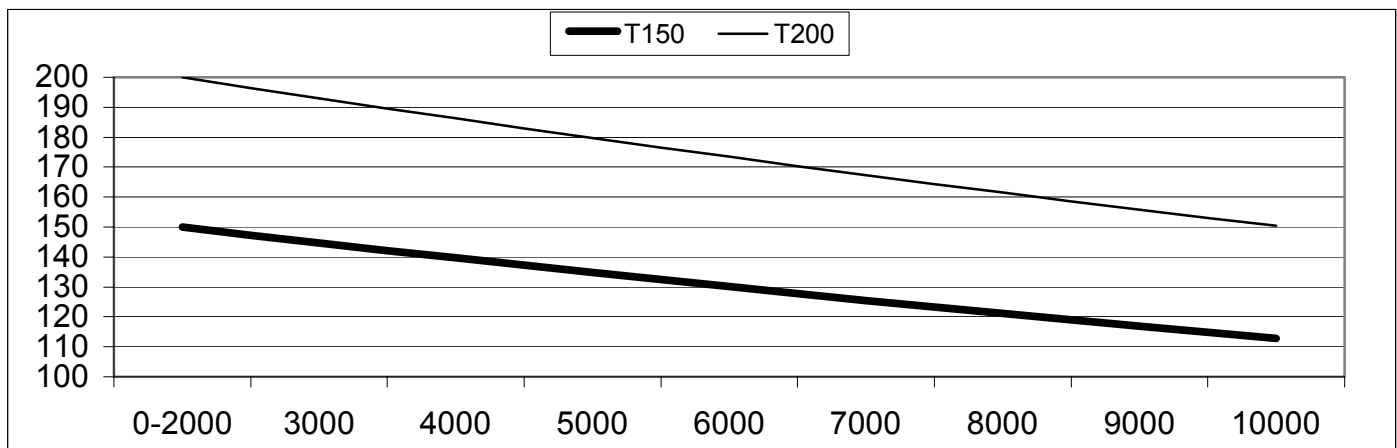
# Trinity

## 1.0 SPECIFICATIONS

Description	T150	T200
Input (BTUx1000)	Natural =145 / 50	Natural = 200 / 75
Input Capacity - Max. / Min.	Propane= 140 / 50	Propane= 190 / 75
Output (BTUx1000)	Nat=137 / 47.5	Natural= 188 / 70.5
Output Capacity - Max. / Min.	Propane = 133 / 47.5	Propane = 178.6 / 70.5
Steady State Efficiency	95%	94%
AFUE Efficiency	91.9%	90.8%
Venting material	ABS, CPVC, PVC, AL294C stainless	
Max. Vent lengths 2"	25 Equivalent Feet	-
Max. Vent lengths 3"	105 Equivalent Feet	
Weight	90 lbs.	
Dimensions L-W-D	23.75 – 20.5 – 15	
Clearance to Combustibles	0"	

### 1.1 High Altitude Operation

The Trinity boiler is designed to operate to capacity in installations with 2000 feet of elevation or less. As elevations higher than 2000 feet have less dense air, the unit is not capable of providing its specified capacity. The affect of elevation will derate the input by approximately 3.6% per 1000 foot of elevation, (see following Chart).



### CAUTION

At elevations greater than 2000 feet, the combustion of the Trinity must be checked with a calibrated combustion tester to ensure safe and reliable operation. Consult section 5.20 for instructions on adjusting the input to provide proper operation.

**It is the Installers responsibility to check the combustion, and to adjust the combustion to section 5.02**

## 2.0 INSTALLATION REQUIREMENTS

The installation of your NY Thermal Trinity gas boiler must conform to the requirements of 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

### **LIQUEFIED PETROLEUM (LP) PROPANE**

Liquefied petroleum (LP) propane gas is heavier than air, it is imperative that your boiler is not installed in a pit or similar location that will permit heavier than air gas to collect. Appliances fueled with LP gas shall not be installed in an above-grade, upper floor space or basement unless such location is provided with an approved means, of removing unburned gases.

#### 2.10 LOCATION

In all cases, the Trinity boiler must be installed indoors, in a dry location, such that the gas components are protected from dripping or spraying water or rain, during operation and servicing. The boiler location ambient temperature is maintained to a minimum of 50°F. Determine the best location of the vent termination, and if possible locate the boiler as close to the termination point as possible.

***To ensure proper and safe installation of your boiler, adhere to the following clearances to combustibles:***

Boiler Casing=0"      Floor = Combustible  
Flue Pipe: Boxed in or enclosed =2", In free air=1"

***For ease of servicing the following clearances are a guide for easy servicing:***

Back = 0"      Top = 20"      Sides = 24"      Front = 24"

Ensure that the desired boiler location is not subjected to flooding or high moisture levels, for damage to the boiler will occur, voiding your NY THERMAL warranty.

## 3.0 VENTING

The NY Thermal Trinity condensing gas boiler is a high efficiency boiler utilizing induced power venting, which is designed to be vented directly outdoors, using the venting method detailed in section 3.10. Under no conditions, may this unit vent gases into a masonry chimney, unless it is vacant, and utilizes the Trinity approved venting material (ABS Pipe, PVC, CPVC pipe, AL29-4C Stainless steel pipe) as illustrated in the figure on page 6.

#### 3.10 VENT PIPE MATERIAL

***Selection of the vent pipe material must be based upon the Local codes and regulations. The Trinity boiler is certified to operate under all conditions using PVC, ABS, or CPVC. Local codes may prohibit the use of plastics, and stainless venting must be used.***

#### 3.20 VENTING CLEARANCES

- 1. It is highly recommended that the vent terminal be located where it will not be exposed to normal prevailing winds.***
- 2. It is highly recommended that the vent terminal inlet be at least 24" above grade, or any surface that will support snow, ice, or debris.***
- 3. 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 3' diameter stainless, plastic, or vinyl shield can be used to flash the exterior of the residence.***

4. **The Air inlet Pipe must always be at least 12" above grade, and 12" below and 12" horizontal to the exhaust vent pipe.**

**The following are code restrictions for the location of the Flue gas vent terminal. Compliance to these requirements doesn't insure a satisfactory installation; good common sense must also be applied.**

**The vent terminal shall not be:**

- Directly above a paved sidewalk or a paved driveway that is located between two buildings, and that serves both buildings;
- Less than 7 feet above grade where located adjacent to a paved driveway or public walkway.
- Within 3' (three feet) horizontally of a window or door that can be opened, or non-mechanical air supply inlet to any building.
- Within 6' of a mechanical air supply inlet to any building, or roof eve containing soffit openings.
- Less than 4' feet horizontally from and in no case above or below, unless a 4 foot horizontal distance is maintained, from electric meters, gas meters, regulators, and relief equipment.
- Within 4' horizontally of the vertical centerline of the regulator vent outlet to a maximum vertical distance of 15'.
- Within 3' of any gas service regulator vent outlet.
- Less than 1' (one foot) above grade, or any surface that will support snow, ice, or debris. **Two (two feet) is highly recommended.**
- Underneath a verandah, porch, or deck.
- So situated that the flue gases are directed towards brickwork, siding, or other construction, in such a manner that may cause damage from heat or condensate from the flue gases
- Less than 3' from an inside corner of an L-shaped structure (including walls and fences).

### 3.30 VENTING CONFIGURATIONS

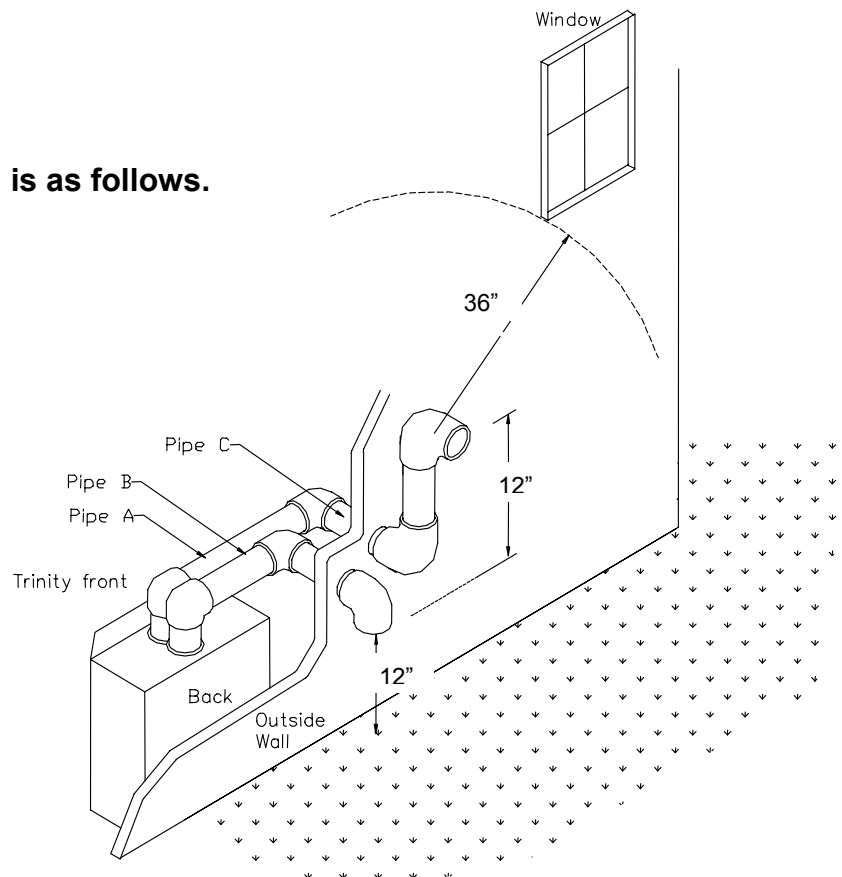
**Selection of acceptable venting materials is as follows.**

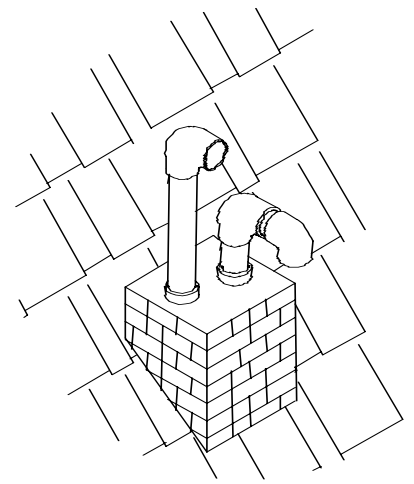
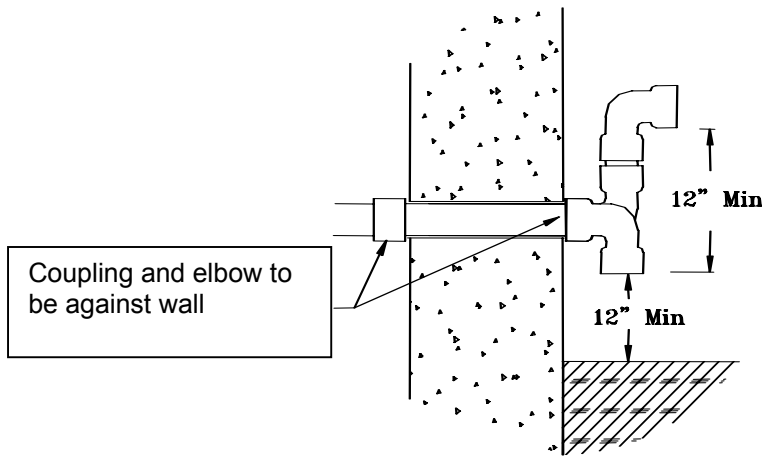
#### **Vent Piping A -C:**

- 2" and 3" ABS.
- 2" and 3" PVC schedule 40 pipe.
- 2" and 3" CPVC schedule 40 pipe.
- 3" AL29-4C flex Stainless vent
- 3" AL29-4C Rigid Stainless Vent.

#### **Air Supply Vent B:**

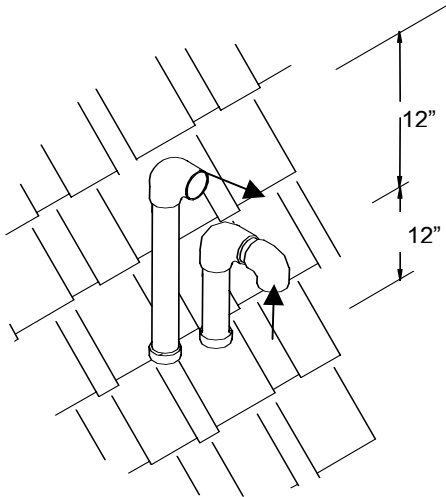
- 2" & 3" ABS.
- 2" & 3" PVC schedule 40 pipe.
- 3" Galvanized Steel pipe
- 3" PVC pipe
- 3" Flex Aluminum (MAX 20')





**Notes**

- 1.) Elbows on outside of wall must be no greater than 1/2" away from the wall.
- 2.) All exhaust piping must be on a slope back to the boiler 1/4" per lineal foot of vent.
- 3.) Inlet and outlet elbows must have screens installed at the outlet.
- 4.) Exhaust vent pipe can be secured to the wall for more rigidity.
- 5.) In all roof applications the discharge must point away from the pitch of the roof.
- 6.) Install adequate flashing where the pipe enters the roof, to prevent water leakage.



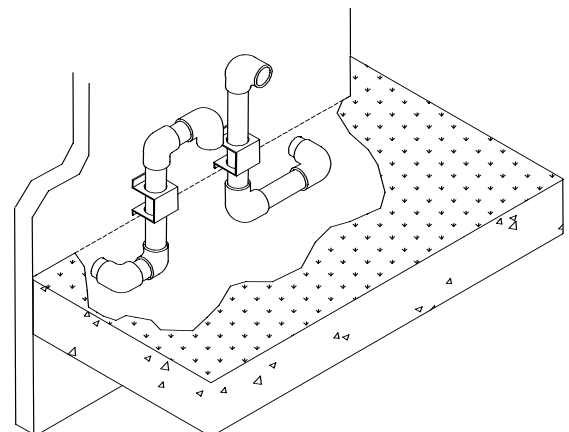
7.) Install and seal a rain cap over existing chimney openings, in vacant chimney applications.

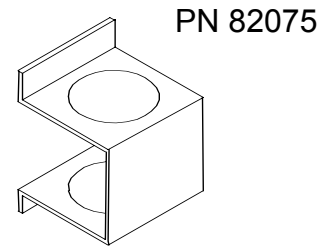
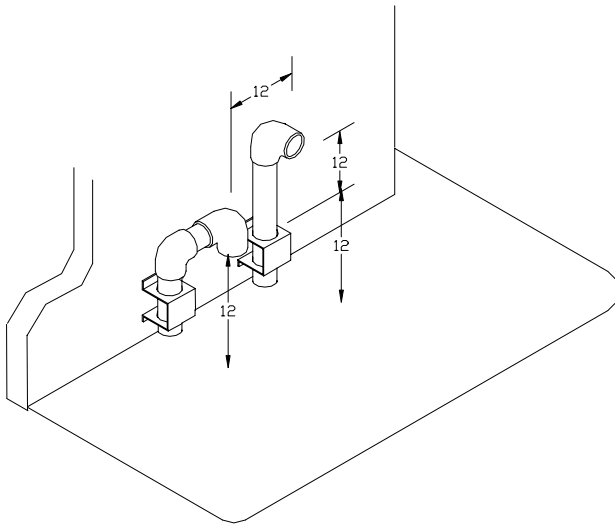
**Use of existing Chimney**

It is permissible to run vent pipe through an existing chimney as long as:

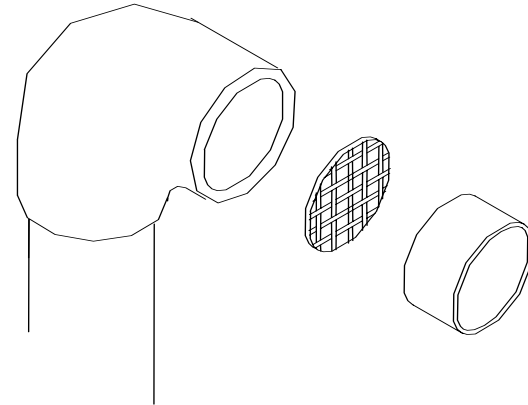
- 1) The chimney is not to be used by any other appliance.
- 2) Flue gases don't enter the vacant chimney.
- 3) Only ABS, PVC, CPVC, or AL294C pipe is used.
- 4) Vent lengths are within the maximums specified.

8.) For installations that exit the wall below grade. Excavate site as shown in figure, to a point below where the pipes are to exit. Ensure that the wall is fully sealed where the pipes penetrate the wall. The vent piping MUST be secured to the side of the building above grade, as shown, to provide rigidity. NTI Provides a mounting bracket PN. 82075 for securing the exhaust pipes. Ensure that the vent clearances are maintained (Inlet minimum 12" from grade, exhaust outlet 12" minimum above inlet).





9.) Install the stainless steel screens into **both the inlet and exit** vent terminal elbows. The screen must be on the outside of the last elbow. Install the screw 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 for 3" pipe and two screens for 2" pipe are provided in the package.



### 3.40 DETERMINING VENT LENGTHS

Use the following chart to determine the maximum amount of vent pipe that can be used. This chart includes sweep and 45° elbows.

**Warning**

**Combustion air that contains chloride, fluoride, bromine, or iodine can cause corrosion of the heat exchanger, voiding your warranty.**

**IMPORTANT: The vent lengths for the air inlet must NEVER EXCEED THE LENGTH OF THE EXHAUST. The exhaust pipe may exceed the inlet pipe by as much as 50 equivalent feet.**

**The three 90° elbows (two outlet, and one inlet) do not have to be included, as they are taken into consideration in the vent calculations.**

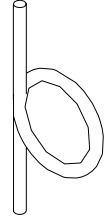
Model	Pipe size	Max. Equiv. Length	Number of Elbows								
			1	2	3	4	5	6	7	8	9
T150	2"	25	20	15	10	5					
T150 & T200	3"	105	100	95	90	85	80	75	70	65	60

## 4.0 CONDENSATE DRAIN

This unit produces water as a product of combustion. Much of this water condenses on the heat exchanger and in the venting system. All exhaust piping must be on a slope back to the boiler  $\frac{1}{4}$ " per lineal foot of vent. Steps must be taken to ensure that condensate does not collect in the venting system. Condensate must be drained from the furnace into a household drain. (Note check with your municipality, or local gas company to determine if disposal of combustion condensate is permitted)

The following are important notes that must be taken into consideration:

- Construct a small loop using  $\frac{1}{2}$ " vinyl or nylon tubing to create a trap, so that combustion products do not escape into the room via the drain. This trap must be primed with water, by adding a cup of water into this loop, prior to connecting it to the unit.
- A frozen or blocked drain will cause the condensate to fill the combustion chamber. This will result in a no heat condition, for the unit will shut down, and damage to the flame sensor, and components can occur.
- When a condensate pump is used or required, select a pump that is designed for residential furnaces.



## 5.0 INSTALLING GAS PIPING

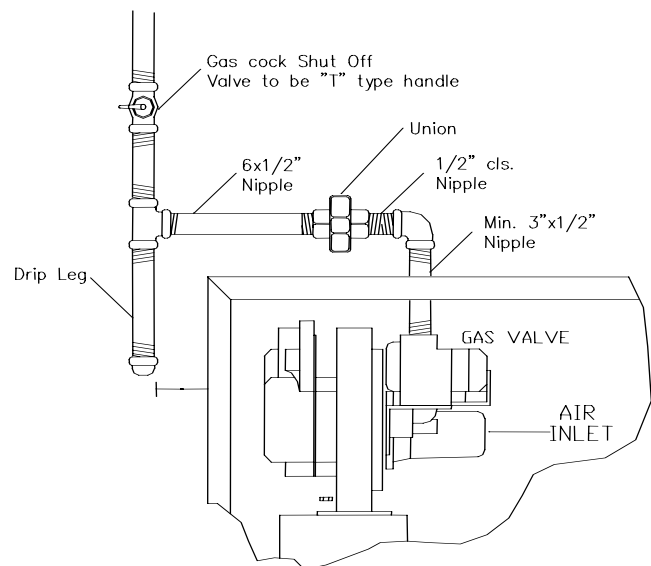
### 5.10 Installation

Refer to the current **National Fuel Gas Code ANSI Z223.1/NFPA 54 or CAN/CGA B149** 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.

#### Insure that:

- 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 Boiler 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 or manifold pressure should occur when any unit (or combination of units) lights or runs.
- Always use a pipe-threading compound that is resistant to propane (LP) gas solvent action. Use 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 for damage to



the valve or motor can occur.


- Install a manual “equipment Shut-Off Valve” as shown. Valve must be listed by a nationally recognized testing lab.

### 5.20 Testing and settings

The line pressure supplying the unit must be **7 inches w.c. for Natural gas installations and 11” for propane installations.**

Ensure that the regulator is capable of maintaining this pressure under all operational conditions.

The gas valve is equipped with two bleed ports; one is for the Manifold pressure, which must be 0.00” w.c. and the other is the line pressure. (7” natural, 11” Propane)

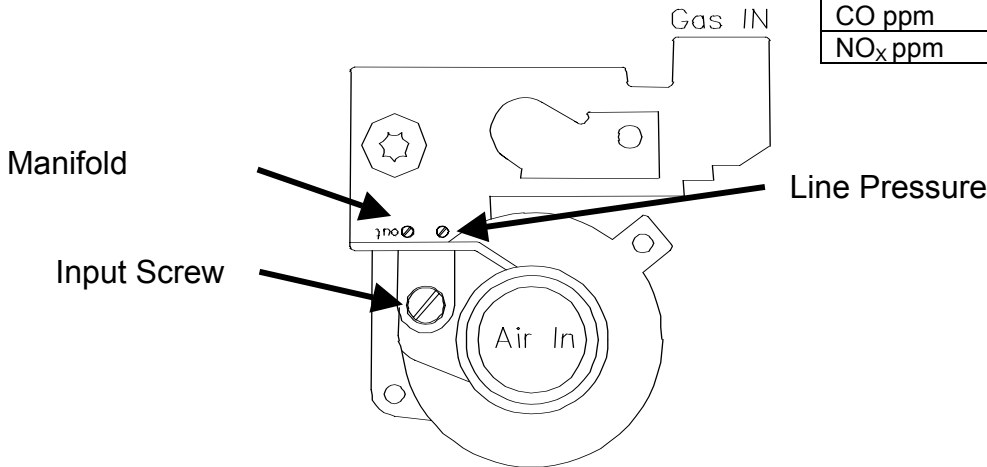


**Warning**

***If line pressure exceeds ½ PSI (14 inches w.c.) completely disconnect line to gas valve. This excessive pressure can damage valve, causing a leak resulting in fire or explosion.***

#### Normal Ranges Gases in Flue Gases (At maximum input 205)

	Natural Gas	Propane
Carbon Dioxide CO <sub>2</sub> %	8-9.5	9-10.5
Carbon Monoxide CO ppm	25-175	25-175
NO <sub>x</sub> ppm	30-50	30-50



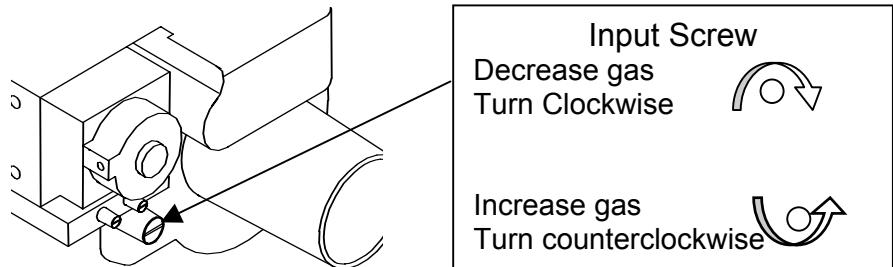
**IF FOR ANY REASON THE SCREW IS ADJUSTED, A “COMBUSTION ANALYZER” MUST BE USED TO ENSURE SAFE AND PROPER OPERATION.**

The input Screw **“MUST NEVER BE ADJUSTED”** unless you have a calibrated combustion analyzer to verify the combustion properties are within normal operating ranges.

***The Trinity boiler employs a pneumatic modulation system. This modulation system increases or decreases the velocity of the blower, to meet the demand for heating. The gas valve, senses this change, in blower pressure, and introduces the required amount of gas, to ensure correct combustion.***

**Caution**


**The Trinity is tested with natural gas having a heating value of 1020 BTU per cubic foot. For areas with lower heating values, a combustion test is required to obtain optimum operation.**



## 6.0 HEATING SYSTEM PIPING

**Caution:** *This boiler is designed to operate in residential and commercial heating systems, and is not intended for:*

1. *Outdoor installations, or unheated spaces, which can cause freezing.*
2. *Process heating of potable water, or any other fluids.*
3. *Un-pressurized, and gravity feed heating systems.*
4. *Heating systems with very low pressures (min 5 psi) or flow. (min 6 GPM)*



**Warning**

**THIS BOILER MUST HAVE WATER FLOWING THROUGH IT WHENEVER THE BURNER IS ON. FAILURE TO DO THIS WILL DAMAGE THE UNIT AND VOID THE WARRANTY.**

The Trinity boiler comes in two versions, heating and Combi.

**Heating Version** – The standard heating version is designed to operate in a hydronic heating system as illustrated in Section 6.01. This standard configuration is designed to operate with an indirect as illustrated in Figure 6.02.

**Combi Version** – This special version is equipped with internal components to provide hydronic heating and domestic hot water heating, as illustrated in Section 6.03.

### 6.10 HEATING SYSTEM PIPING (non-Combi)

**Circulating Pump** Due to the Trinity design, the boiler is more restrictive than a conventional boiler, thus greater consideration must be given to the capabilities of the system-circulating pump.

The following is a listing of the recommended circulators.

Model	Restriction Head Loss	Minimum Flow (us GPM)	Max. Temp. Rise	Minimum Pump Size	
T150	7' at 6 GPM	6	45°F	Grundfos UP 26-64	Taco 008
T200	10' at 8 GPM	8	45°F	Grundfos UP 26-99	Taco 011

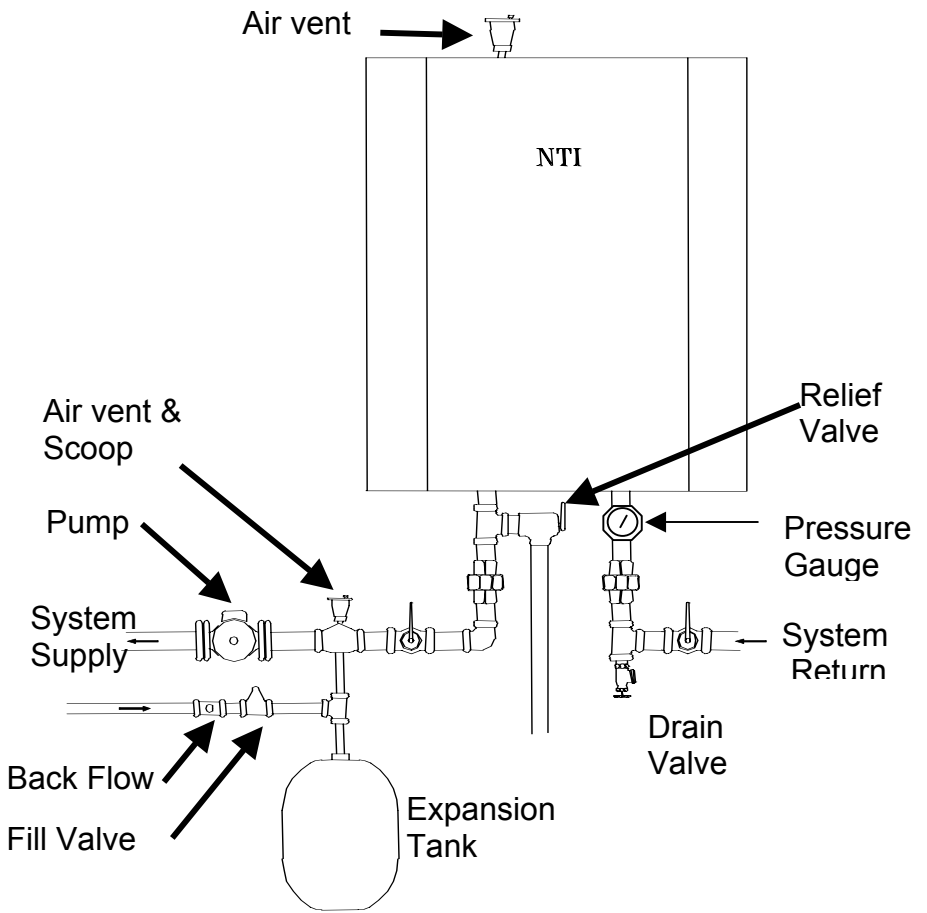
**Relief Valve (30PSI)** Is provided with the system, and it is to be mounted as shown in the diagram. Ensure that the discharge of the pressure relief is piped to a location where steam or water won't cause personal injury or appliance and property damage.

**Boiler Venting** Hot water boilers are designed to operate with airless water in the system. The Trinity boiler is provided with a 1/8 Air vent located on the top of the unit. This Air vent is intended to vent the boiler on initial startup. This device will continuously vent air collecting in the manifold of the boiler, but it is not intended to be the primary venting device. The Air Scoop as shown in the diagram is the primary venting location. If air continues to be a problem an air scrubber must be used (recommend Spriovent # 1007).

**Flow:** The Trinity boiler must have water flow going through the boiler whenever the flame is on.

**CAUTION: DAMAGE WILL OCCUR IF THE BOILER IS FIRED WITH NO WATER IN IT, OR REPETATIVE NO FLOW OPERATIONS, WHICH WILL VOID THE WARRANTY.**

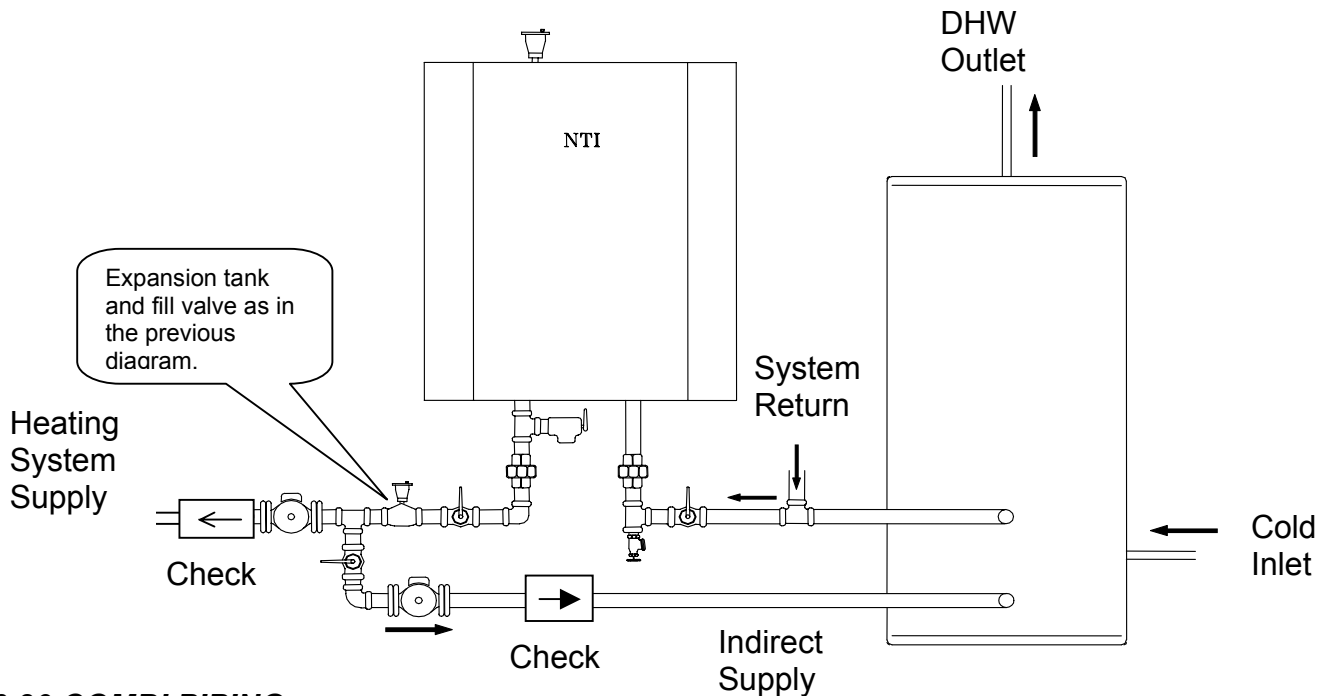
**Low Water cutoff** A certified low water cutoff is not provided in the package, however it is to be field installed in any application where the boiler is located above **ALL** the radiation. Wire the normally open contacts of the LWCO in series with the main power to the boiler.



**6.20 DOMESTIC HEATING INDIRECT SYSTEM (non-Combi)**

The Trinity is permitted for operation with non-oxygen barrier tubing.

**If the Trinity is required for “Domestic Hot Water” DHW heating, an indirect water heater can be used, as per the figure below.**



**6.30 COMBI PIPING**


The Trinity Combi incorporates all the feature of the Standard Heating version, plus an internal: circulating pump, Plate heat exchanger, flow switch, and strap-on thermister.

## COMBI Sequence of operation

When water flow greater than .5 GPM passes through the flow switch, it closes a contact to terminals A-C on the Sentry 2100 controller. The boiler is immediately energized (if not already on), the 3-way diverting valve moves to the domestic position “A”, and the internal circulator is energized. Hot water is circulated through the plate heat exchanger. The flame is modulated to maintain the “LO” setting on the Sentry control. The Sentry uses the heating thermister to read the water temperature of the heating loop. Heating is not provided during a call for domestic. Once the flow stops or drops below .5 GPM, the diverting valve moves to the heating position “B”, the boiler determines if there is a need for heating:

- If so, the boiler returns to the “Hi” setting (based upon the outdoor air temperature), and the circulating pump is reactivated
- If not, the boiler and pump turn off.

**Anti-Scald Valve** A Sparcomiz AM101-US-1 is provided with your package. This valve regulates the water temperature leaving the plate heat exchanger, and must be used in every instance. The dial can be set to 1-4 to the desire temperature required. Consult the Honeywell manual *SD/IS150* for detailed instructions and settings.



**Warning**

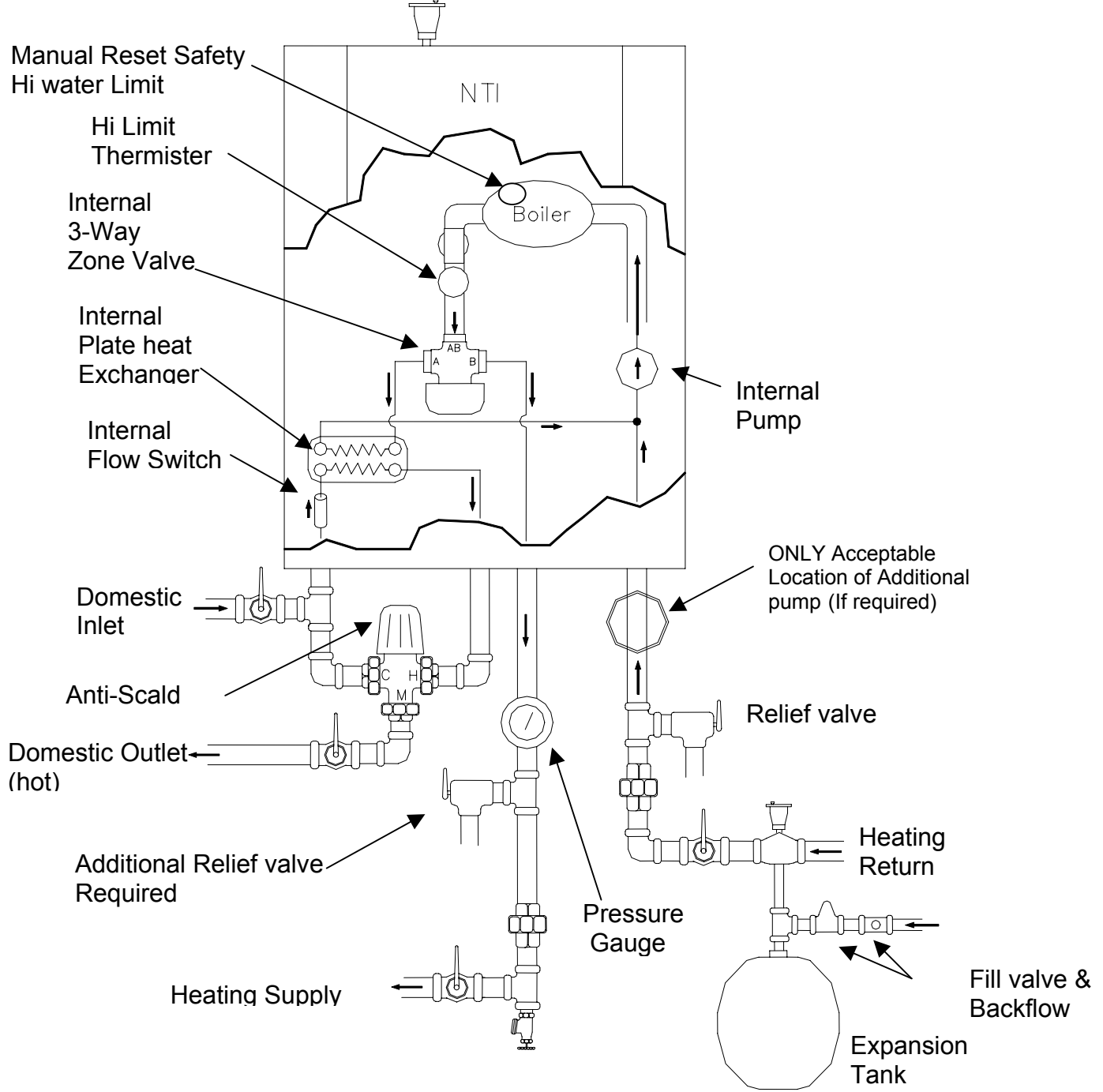
**If the Anti-Scald Valve is not installed to the Honeywell Sheet SD/IS150, and this manual, operation may supply SCALDING hot water to the occupants.**

**Setting Domestic Water temperature** The setting of the domestic water temperature is accomplished in two steps:

- 1) Set the “LO” setting on the Sentry controller to a value 30°F higher than the value desired temperature at the fixture.
- 2) Set the Sparcomiz AM101-US-1 dial to fine-tune the domestic setting. Approximate settings are shown in the chart, put consult manual *SD/IS150* for precise settings.

	Desired Domestic water at Fixtures (°F)			
	110	120	130	140
“LO” setting	140	150	160	170
Sparcomiz Dial	1	2	3	4

**Hard Water** Hard water conditions will cause the components of this appliance to form scale and impede the normal operation of the unit. Water with hardness higher than 50 ppm Calcium carbonate must incorporate a “Water Softener” prior to entering the appliance. Plugging of domestic system by scaling or accumulation of dirt is not the responsibility of NY Thermal Inc., and suitable steps shall be taken to avoid it.



**Domestic Water capacities** The following chart are typical capacities based upon 45°F inlet water.

GPM Flow at various desired temperatures

110°F 120°F 130°F

	110°F	120°F	130°F
T150	4.0	3.5	3.1
T200	5.5	4.8	4.5

**Combi Limitations** As the Trinity is an instantaneous water heater, there are inherent limitations that this system has.

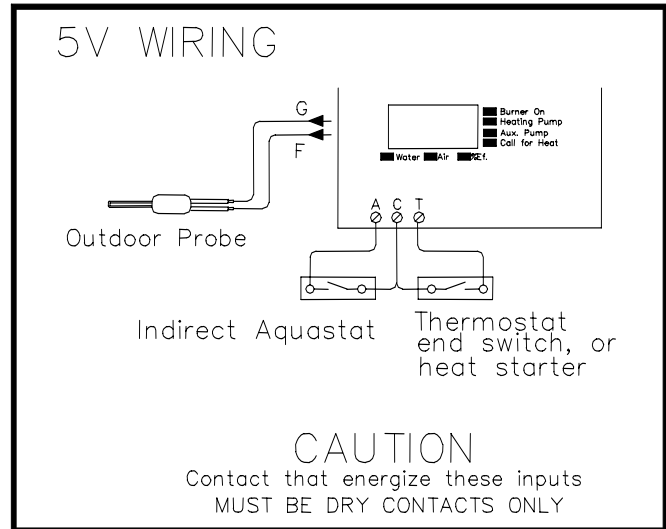
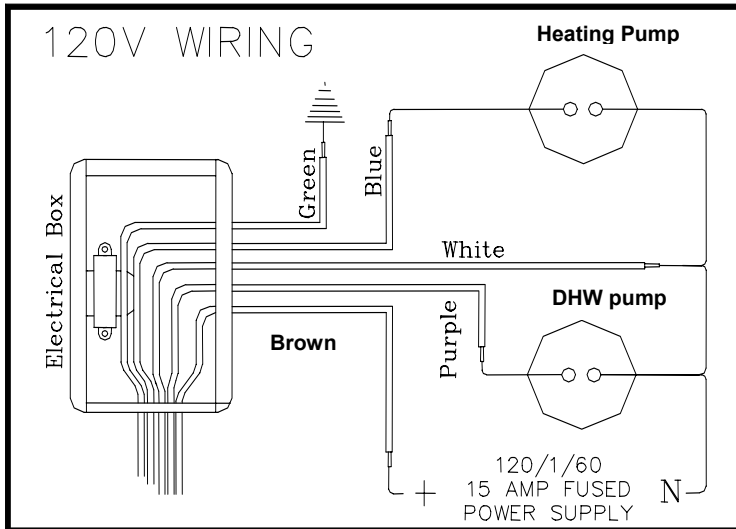
- 1) **NO STORAGE** - As there is no water storage, the boiler can only provide water at the temperature specified with the at the corresponding flow rates. Flow through the fixtures must be regulated so flows don't exceed the ability of the boiler to heat the water. **MORE FLOW = LESS TEMPERATURE**
- 2) **DOESN'T MAINTAN TEMPERATURE** - When there is no call for domestic the unit is off. From a dead stop the unit will detect flow and start providing heat in 15 seconds, and be up to capacity by 25 seconds. Once running, the unit can provide an endless amount of hot water. If the flow is momentary turned off for whatever reason, the unit will turn off. Once off, the unit must relight, and not provide heat for 15-25 seconds. This will cause cold unheated water to pass through the unit, and advance through the domestic plumbing between the previously heated (hot) water, and the new (hot) water. **This can be mistaken for an inability to adequately heat the water.**

## 7.0 WIRING

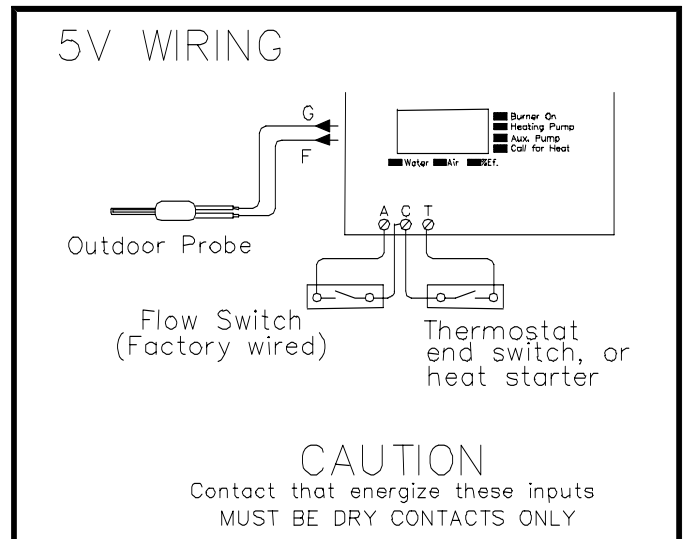
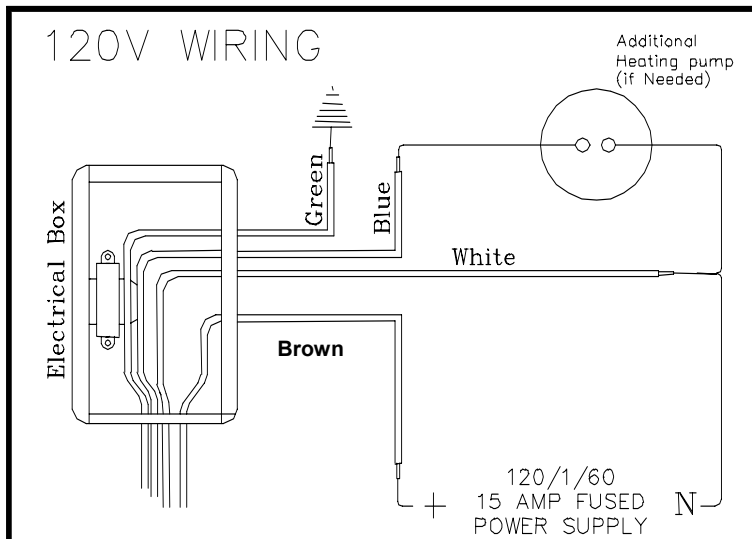
All wiring must be in accordance with the Canadian Electrical code, CSA C22.2, and any applicable local codes.

Insure that the wiring is in accordance with this manual.

### Standard heating Wiring (non-Combi)



### Combi Wiring



The boiler must be electrically grounded in accordance with the National Electrical Code ANSI/NFPA 70, or local codes, and/or the Canadian Electrical Code CSA C22.1.

**Warning!!! A bad installation could ruin the Sentry Board and void your warranty.**

- Before providing 120 Volts to the boiler, do a continuity check between all wires and ground to make sure that there are no electrical leaks that could damage the board.
- Do not use magnetic tip screwdriver near the Sentry board.
- Verify that the wires connected to the sentry TC and AC terminals are not grounded, or have any voltage applied to them, or voltage to ground (dry contact closure only).
- Insure that the probe wire is not damaged.
- Caution: Label all wires prior to disconnecting them when servicing controls. Wiring errors can cause improper and dangerous operation

## 8.0 SENTRY 2100T CONTROLLER

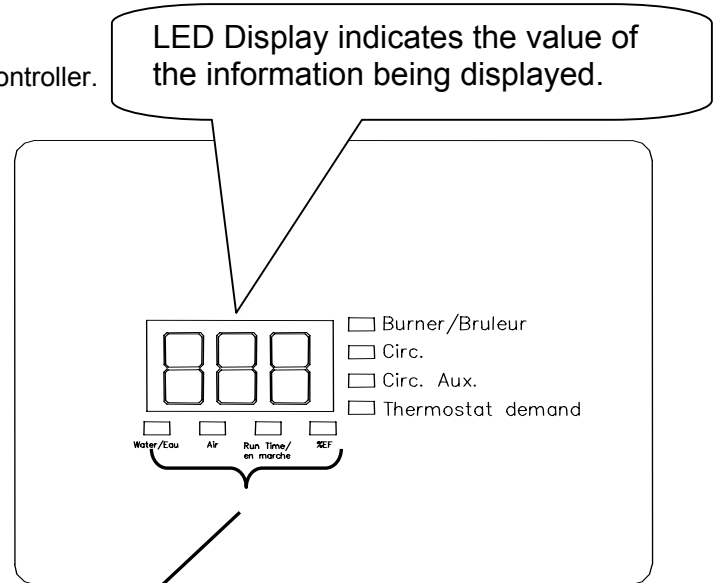
*The Sentry controller is the central controller for the Trinity boiler. The Sentry handles all the combustion logic, together with the energy management functions. The Sentry 2100T operates in two different modes, reset or conventional. The mode is automatically determined by the presence of the outdoor sensor. When the Sentry 2100 detects the presence of the outdoor sensor the controller will operate in Reset Mode. If the outdoor sensor is not installed, the controller will operate in Conventional Mode.*

### Sentry Display

The following describe the meaning of the lights on the Sentry controller.

#### Green Lights

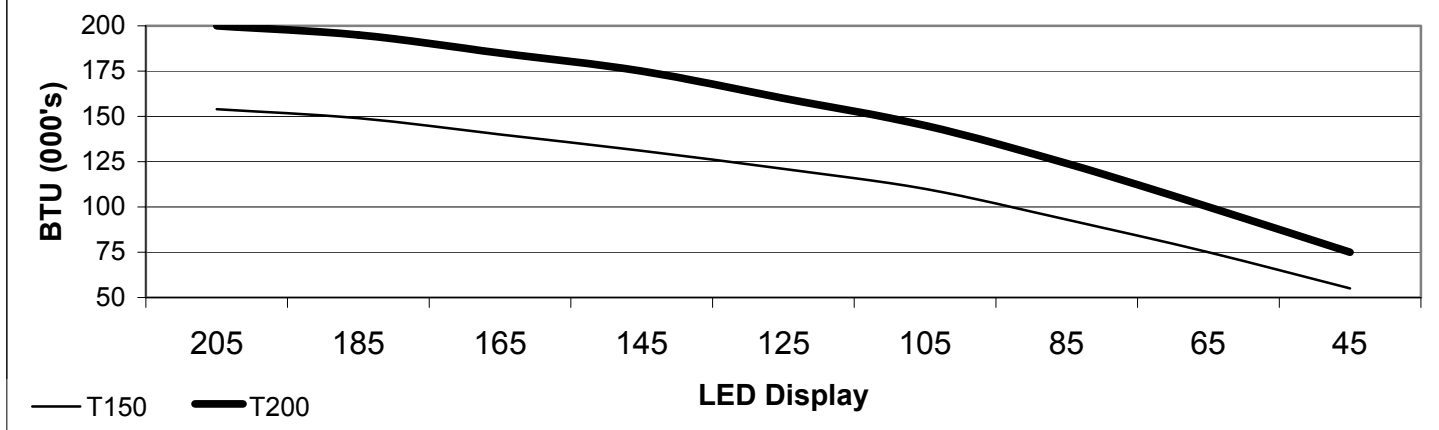
- Burner/Bruleur** = Indicates that the ignition system is activated
- Circ.** = Indicates that the heating pump is energized
- Circ. Aux.** = Indicates that the Auxiliary pump for the indirect water heater is active.
- Thermostat Demand** = Indicates that terminals T-C are closed, initiating a call for heat.



#### Yellow Lights

- |   |  |   |                                 |
|---|--|---|---------------------------------|
| <p><b>Water/Eau</b> = When illuminated, indicates that the display is showing boiler water temperature.</p> | <p><b>Air</b> = If the air sensor is being used. When illuminated, indicates that the display is showing outdoor air temperature</p> | <p><b>Gas Input</b> = When illuminated, indicates that the display is showing the current input level (45-205). See Chart to determine input.</p> | <p><b>% Eff.</b> = not used</p> |
|---|--|---|---------------------------------|

# Display Data - Input conversion chart



## Setting Sentry 2100T Operation

The Trinity boiler employs a pneumatic modulation system. This modulation system increases or decreases the velocity of the blower, to meet the demand for heating. The gas valve, senses this change, in blower pressure, and introduces the required amount of gas, to ensure correct combustion. The term “Set Point” is used to indicate the desired temperature that the Trinity will try and maintain, by increasing or decreasing the input.

### Indirect Water Heaters

The Sentry 2100 comes with an input and output for a 120-volt indirect pump. When the A-C terminals are closed (dry contact) the boiler will go immediately to indirect domestic mode, whereby the indirect pump is activated, and the boiler will modulate to the LO setpoint.

## Conventional Mode

	T-C & A-C Open	T-C Closed & A-C open	T-C Closed & A-C Close	T-C Open & A-C Closed
Condition	Standby	Heating Only	Domestic Only	Domestic Only
Set Point	-	HI	L0	L0
Burner On	-	HI - DIF	LO-10	LO-10
Burner Off	-	HI + 10	200°F	200°F
Heat Circ.	Off	On	Off <sup>Note 1</sup>	Off <sup>Note 1</sup>
Aux. Circ.	Off	Off	On <sup>Note 2</sup>	On <sup>Note 2</sup>

## Reset Mode

	T-C & A-C Open	T-C Closed & A-C open	T-C Closed & A-C Close	T-C Open & A-C Closed
Condition	Standby	Heating Only	Domestic Only	Domestic Only
Set Point	-	HI <sub>Calc</sub>	L0	L0
Burner On	-	HI <sub>Calc</sub> - DIF	LO-10	LO-10
Burner Off	-	HI <sub>Calc</sub> + 10	200°F	200°F
Heat Circ. (C1)	Off	On	Off <sup>Note 1</sup>	Off <sup>Note 1</sup>
Aux. Circ. (Ap)	Off	Off	On <sup>Note 2</sup>	On <sup>Note 2</sup>

Note:

- 1- For combi units the Heating Circ. (C1) is powered for both heating and domestic hot water.
- 2- For combi units the Aux Circ. (Ap) powers the 3-way diverter valve. (located in the boiler)

## Determining Reset Temperature HI<sub>Calc</sub>

Once the control identifies the presence of a good outside sensor, the control will automatically reduce the HI setting, based upon the outdoor temperature. The calculated HI setpoint (**HI<sub>Calc</sub>**) is calculated as follows:  
 Example: Hi=200, RES=70, Air Temperature=32

**RESET RATIO**  
 = (High Setting - RES)/RES  
 = (200 - 70) / 70  
 = 1.85

**RESET TEMPERATURE HI<sub>Calc</sub>**  
 = [(RES - Outdoor Air) x Reset Ratio] + RES  
 = [(70 - 32) x 1.85] + 70  
 = [73] + 70  
 = 140.3°F

### Setting Sentry 2100 control

Programming is accomplished by a series of three push buttons located on the bottom side of the control. (**Function** ↑ and ↓). To enter the programming mode, press the function key once. To scroll through the various menu options depress ↑ until the menu is displayed. To alter the value press **Function** once, and the current value will be displayed, then use the ↑ for up, and ↓ for down, until the desired value is obtained. To enter the selected value press **Function**, which will return to the menu. When all desired values are inputted, scroll to the RUN menu, and press Function, which exits the Programming Mode and initiates normal operation. A safety feature has been added to ensure that the control is not left in the Program Mode, the unit will enter operational mode if left in program mode longer than 30 seconds without receiving an input. Press **Function** once to continue programming.

### MENU

Stores Values & initiates normal

↑  
**RUN**

DHW  
 80-200°F

↑  
**LO**

Max. Heating Water  
 80-200°F

↑  
**HI**

Hi & LO Differential  
 10-40°F

↑  
**dIF**

Sets Outdoor  
 Reset curve Slope

↑  
**RES**

**To start the control operation, you must return to RUN on the menu, and press Function. Normal operation will begin.**

### Recommended settings:

**When determining the setting, ask yourself, what is the hottest boiler temperature required on the coldest day=HIGH SETTING, and what is the temperature I want to generate for my indirect =LOW SETTING. Keep in mind, that the lower the water temperature the boiler operates at, the higher the system efficiency will be.**

System	Hi	Dif	RES
Hot water baseboard, Fan coil	190°F	20°F	80°F
Cast Iron radiators, in-floor radiant	130°F	20°F	85°F

**The LO setting** is only used if A-C terminal are closed. Set the LO to the temperature you require for the Indirect Water Heater (**recommend 140°F**) or at least 20°F higher than the indirect Aquastat. Recommended setting for the indirect Aquastat is 110°F. If the A-C terminal are not used, the LO setting can be left to the default setting.

**Outdoor Sensor** – Shall be installed to take advantage of the energy saving features of the Sentry Controller. Install the sensor preferably on the north, or coldest side of the building, not within 10 feet of the discharge of the gas vent outlet, or other sources of heat.

## 9.0 LIGHTING BOILER

### 9.10 INITIAL START-UP

- Ensure that the boiler is wired in accordance with this manual.
  - Ensure that the gas shut-off valve is turned on, and that the gas system has been fully tested for leaks.
  - Ensure that the system is completed filled with water, and that ALL the air is purged out.
1. Turn on power to the Trinity Boiler. The boiler should run through a purge, and combustion should occur. (The control system has a built in ignition retry, allowing the system to retry at least four times, before locking-out.)
  2. Verify that the gas line is 7"wc. for natural gas, and 11" wc. for propane.
  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% - 9.5% for natural gas, and 9.0%-10.0% for propane. **If the reading does not fall within this range, contact NY Thermal, for assistance.**
  4. Perform at least three lights in succession to insure 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.

### For Your Safety, Read before operating

- A. 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.
- B. BEFORE OPERATING, smell all around the appliance area for gas. Be sure to smell next to the floor, as some gases are heavier than air, and will settle on the floor.
- C. Use only your hand to turn gas knobs, never use a tool. Forcing the valve, or attempting to repair it can cause fire or explosion.
- D. Do not use the appliance if any part is under water.



### **Warning**

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

### 9.20 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 boiler.
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 smell for gas, including near the floor. If you smell gas "Stop" and follow "B" above. If you don't smell 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 smell for gas.
7. Replace the front cover.
8. Set the thermostat to the highest setting, and then turn on all power to the boiler.
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 boiler" and contact a professional service technician, or gas supplier.

### 9.30 TURN OFF BOILER

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

## 10.0 TROUBLE SHOOTING

This section is intended to assist the service technician in detecting and correcting common errors. The Sentry 2100 is equipped with an internal diagnostic system that verifies control operation. The following series of error codes has been developed to aid in diagnosing control problems:

Problem	Detected Problem	Remedy
<b>ER1</b> On Display <b>(Safety Limit)</b>	The Safety High Limit of 250° F, has been reached	1- Check to see if water is dripping on the sensor. 2- Reduce limit setting (and/or) ensure that there is proper water circulation in the system.
<b>ER2</b> On Display (Water probe)	The water probe is transmitting an invalid signal. Closed circuit.	Check wiring
<b>ER3</b> On Display (Water probe)	The water probe is not connected. Open circuit.	Check wiring
<b>ER4</b> On Display	Unit has been running for 1 hour without reaching 80 of it's set point	Check to see if water probe is displaying the correct water temperature.
<b>ER5</b> On Display DHW Problem	The control has determined an Indirect problem, the boiler has cycled off 3 times during a call for domestic. The Indirect call will now be ignored, until power is reset or the indirect call is over. ((Not activated on Combi version))	1-Not enough flow to keep boiler from tripping on limit. Verify that a min. of 5 GPM flow is going through boiler & indirect circuit. 2- Reduce indirect Aquastat setting, or Increase difference between (Lo Setting) and (indirect Aquastat setting). 3- Indirect limit or wiring failure.
<b>ASO</b>	<b>Indicates that the Air Switch is Open</b> This is displayed when the boiler is expecting the air switch to be closed by positive pressure from the blower. It can occur momentarily during normal operation. A problem is indicated when ASO is displayed continuously.	1-Is the vinyl tube connected between the air switch and the fan discharge. 2-Is the fan running. If so check the connection between the vinyl tube and blower discharge for blockage.  When the fan is turned on, the air switch is closed by positive pressure at the blower.
<b>ASC</b>	<b>Indicates that the Air Switch is Closed</b> This is displayed when the boiler has turned the blower off and is expected the air switch to be open. It can occur momentarily during normal operation. A problem is indicated when ASC is displayed continuously.	1-Is the fan running. If so check for 24V between C and D terminals (see wiring diagram). 2-Check venting termination with required venting described in manual.
Display goes Blank	Verify that there is 120 Volts between terminals L1 & L2	1 - Check power Supply for 120 volt (Brown wire and white wire) 2 – If supply power OK, check the water safety limits & Stack safety limit, which are in series between incoming power and 120v power to the Sentry control.
	Water Safety Limit trips (Automatic reset) ((Located on the supply pipe inside the boiler cabinet))	Caused by an error in the reading of the temperature of the water by the Sentry control. Ensure that the thermister is firmly attached to the supply line. Watch cycle, and ensure the Sentry is displaying the water temperature and is modulating.
	Low Flow Limit Trips (Manual Reset) ((Located on front manifold of boiler))	This device protects the boiler from overheating due to a lack of flow passing through the unit when the burner is on. <b>FLOW MUST NEVER BE BLOCKED BY A MIXING OR GATE VALVE WHEN THE "THERMOSTAT DEMAND" LIGHT IS ON.</b> Install unit as described in the manual.
	Stack Safety Limit Trips (Manual Reset) ((Located inside the boiler cabinet, between the flue box support bracket and the flue box))	This device protects the integrity of the plastic venting material. If the temperature of the flue box exceeds 225° F the limit will cut power to the control. Blocked internal tubes can increase the stack temperature to an unacceptable level. Flush out the boiler.

## 11.0 ANNUAL MAINTENANCE AND INSPECTION

This unit requires very little maintenance, however a Qualified Technician should inspect it at the beginning of every heating season. **Inspection Check list:**

- 1.) Lighting is smooth and consistent.
- 2.) The condensate freely flows from the unit.
- 3.) The combustion fan is noise & vibration free.
- 4.) Relief Valve and air vents are not weeping.
- 5.) Low water cut off is flushed (if applicable)
- 6.) Vent screens are cleaned.
- 7.) Condensate tubing and system is cleaned.
- 8.) Examine all venting, for evidence of leaks.
- 9.) Check the burner plate for signs of leaking.
- 10.) Verify the 12" min. from vent to grade.

## 12.0 INSTALLATION CHECKLIST

### **Installation**

- a) Connect all plumbing, and ensure that there are no system leaks.
- b) Connect, secure, and glue all vent piping.
- c) Install all gas piping as per this manual, and local codes. Pressure test, to detect any gas leaks.

### **Start-up**

1. Install pressure gauge (Gauge= 0" w.c. 15" w.c. scale) and check line and manifold pressures. (See "section 5.20")
2. Turn gas shut-off valve to the ON position.
3. Turn Power on to boiler.
4. Set Sentry Controller to desired settings.
5. Turn thermostat up, Ignition will occur.

### **Operational Checklist**

Ensure that Carbon Dioxide Readings are within the acceptable ranges. Using an appropriate Oxygen or Carbon Dioxide analyzer, take a sample of the flue gas. The sample must fall within the acceptable carbon Dioxide ranges, which is 8% - 9.5% for natural, and 9.0%-10.0% for propane. (See "section 5.20")

### **Before Leaving**

- Remove gauge from gas valve and tighten bleed screw and test plug for leaks.
- Allow boiler to complete at least one complete cycle, or at least 15 minutes running time.
- **Always verify proper operation after servicing**

### **IMPORTANT**

*It is imperative that you explain to the homeowner that it is their responsibility to:*

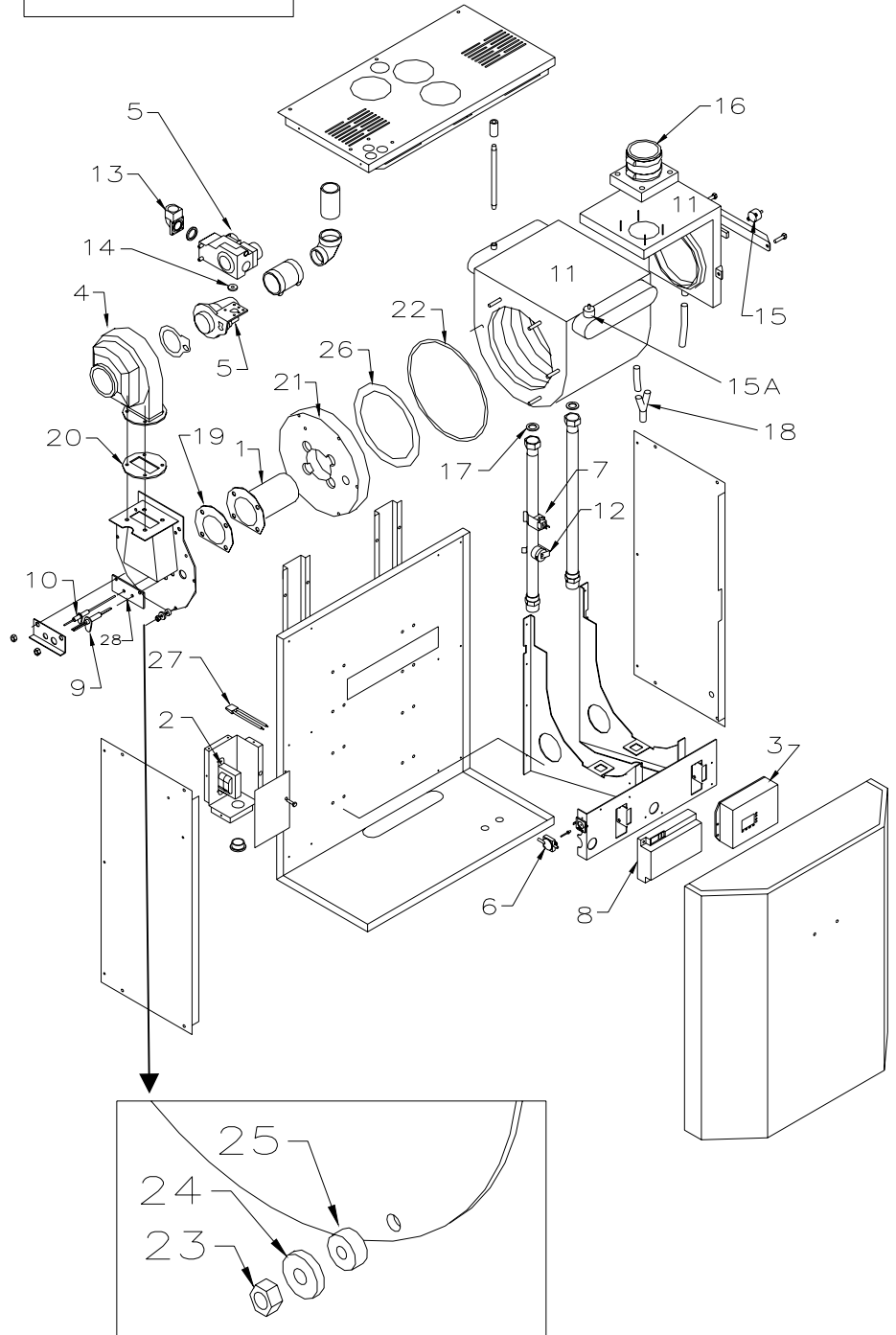
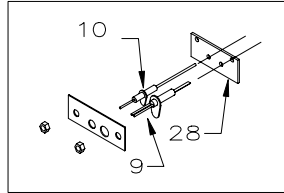
- **Keep the vent terminal free of snow and ice.**
- **Periodically check the vent terminal for debris.**

# 13.0 PARTS LIST

No.	P.N.	Description
1	81038	Premix burner, V10C, (T150 boiler Only)
1	8126	Premix burner, V21C, (T200 boiler Only)
2	81457	Transformer, 24V , Frost, FTB1224PAA100
3	82013	Sentry 2100 Assembly #CNTLNY04 (PWM)
4	82053	EBM BLOWERS #RG148/1200
5	82054	Gas Valve (CVI) VK8115F1134B
6	82056	Air switch (n.o.)MPL 501 @ .1"wc. & 15-001-G-05
7	82057	Thermister #t7335 115 Honeywell 1 Mohn
8	82058	Ignition Moduel Fenwall #2465H-006-11
9	82059	IGNITER, Norton 601, 120v, 5 sec, 2.5" insertion
10	82060	Flame probe, Fenwal # 22-100001-62
11	82061	T-150 boiler, c/w flue outlet, gasket
11	82062	T-200 boiler c/w flue outlet, gasket
12	82232	Safety Limit# 37T31 #31466
13	82065	Gas Valve (CVI) 1/2" npt elbow #45.900.400-132B
14	82066	CVI 5.55mm Nat - LP orifice #45.900.444.118
15	81873	Stack Safety Sensor (manual Reset)
15a	81873	NO Flow Sensor (manual Reset)
16	82267	Flue pipe connector
17	82368	Compression nut Washer
18	82127	Condensate nylon Y
19	82188	Trinity burner gasket
20	82186	Trinity blower gasket
21	82231	Ceramic burner door disc
22	82342	Burner door O-Ring
23	82178	M6 Brass Nut
24	82369	M6 Zinc Washer
25	82292-1	Door Stud Gasket
26	82343	Burner door 3/8"H.D. Rope Gasket
27	82248	Snubber Circuit
28	82187	Trinity Igniter gasket
	81396*	Circ Pump, Grundfos UP 15-42B7 3/4"
	81896*	FLOW SWITCH FS-380, .5 ACTIVATION, 1/2"
	82011*	BRAZE PLATE HEAT EXCHANGER LA1430
	82159*	3 WAY VALVE ACTUATOR VU444A1007B
	82160*	3 WAY VALVE VU54S2016B, 3/4" sweat
	82228*	TEMPERING VALVE SPARCO #AM101-US-1

\* Used on Combi Only

Replacement parts are available from your stocking wholesaler. Homeowners must contact their local Installer or Wholesaler. Installers or Wholesalers may contact NY Thermal Inc. for assistance at 506-432-1130. Notes: \*Used for Combi version Only.



## 14.0 WARRANTY

### What is Covered.

We the manufacturer, warrant that any parts or components of each new boiler will be supplied free of defects in material or workmanship. This warranty replaces any other warranty implied or expressed. All the duration's, terms and conditions mentioned hereafter are for manufacturer defects due to material or workmanship only, and do not include misuse or normal wear of the equipment. Equipment returned for warranty consideration, will be evaluated upon the condition of the part when examined by NY Thermal or an authorized service representative. Undue care taken during handling may VOID the warranty.

### Basic Coverage A

We will repair or replace any component supplied, or manufactured by NY Thermal INC., that is found to be defective for a period of one (1) year, from date of installation, if found to be in concurrence with the original manufacturers warranty.

### Extended Coverage B

If the homeowner registers the installation with NY Thermal within 1 year of the original date of installation, we will repair or replace the pressure vessel, if found to be defective for a period of five (5) years, from the date of installation, if found to be in concurrence with the recommended installation and terms and conditions of this warranty.

### Extended Coverage C

If the homeowner registers the installation with NY Thermal within 1 year of the original date of installation, we will repair or replace the pressure vessel, found to be defective from year 6 through year 10, on a pro rated bases from 80% of a new pressure vessel in year 6 to 10% of a new pressure vessel in year 10, if found to be in concurrence with the recommended installation and terms and conditions of this warranty. Labor to install is not covered by the warranty.

#### TERMS AND CONDITIONS

1. These terms and conditions void any of the preceding warranty statements:
  - A. Damage due to installation not in accordance with this manual and local codes, and regulations.
  - B. Any repairs or replacements made without authorization or notification to the manufacturer.
  - C. This warranty doesn't cover the labor and shipping costs associated with installing a repaired or replaced boiler.
  - D. Decision of warranty repairs or replacements to boiler will be at the discretion of the manufacturer or authorized service representative.
  - E. Corrosion or pitting of the heat exchanger caused by air that contains chloride, fluoride, bromine, iodine or other hazardous or corrosive gases.
  - F. Corrosion or pitting of the heat exchanger caused by oxygen, or contaminants in the heating system.
  - G. Damage or corrosion to the heat exchanger, caused by hard water, sludge, excessive scaling, or sulfur in the fuel greater than 30 mg/m<sup>3</sup>.
  - H. Damages due to the system not provide and ensuring flow through the boiler when the burner is on.
2. NY Thermal Inc. is not responsible for reimbursement for labor, fuel, or punitive damages caused by the operation or failure of the equipment.

#### WHAT TO DO IN THE CASE OF A WARRANTY SERVICE PROBLEM

1. Contact your installing contractor or burner service company
2. If your contractor or service representative requires further help, they will contact us directly.
3. If for any reason you cannot contact your contractor or service rep. contact us at **(506) 432-1130** to the attention or the service department.
4. Please realize that we as the boiler manufacturer will replace or credit the parts under warranty credits are at our cost, so don't purchase replacement parts from suppliers with hopes of receiving 100% credit. Thus it is recommended to receive all your warranty parts from your authorized service rep. or us directly, at no charge (if under the warranty coverage).
5. We are very concerned about the service that you receive, so if you have complaints concerning the authorized service representative we would very much appreciate your evaluation.

#### Warranty Registration Form (Must be received within 1 year of installation)

Name: \_\_\_\_\_ Address: \_\_\_\_\_ City: \_\_\_\_\_

Province: \_\_\_\_\_ Boiler Model \_\_\_\_\_ Serial Number \_\_\_\_\_

Installers Name \_\_\_\_\_ Date of Installation: \_\_\_\_\_

Return to: **NY Thermal Inc.**, 31 Industrial Drive, Sussex, NB, E2E 2R7