



TRX / FTVN SERIES II

Residential Condensing Gas Boiler

Installation Quick Guide

For models:

TRX150

TRX199 / TRX199C

FTVN085

FTVN110 / FTVN110C

FTVN150 / FTVN150C

FTVN199 / FTVN199C



IMPORTANT

BEFORE YOU INSTALL THE BOILER.

This boiler is configured for Natural Gas from the factory.

If conversion to Propane Gas is required, the conversion kit supplied with the boiler must be used.

This guide is designed to provide a quick overview to the qualified installer, service agency, or the gas supplier for installing the boiler models indicated above.

IT IS NOT A SUBSTITUTE FOR THE INSTALLATION START UP MAINTENANCE MANUAL SUPPLIED WITH THE BOILER.

The Installation Start Up Maintenance manual for each product contains the necessary safety and national/local code requirements which, if not followed exactly, may lead to property damages, personal injuries and/or loss of life.

NTI assumes no responsibility for damage(s) of any kind caused by inappropriate use of this guide and/or failure to read all technical literature provided.

STEP 1

Before Installing

This product must be installed and serviced by a licensed plumber, a licensed gas fitter, or a professional service technician. NTI is not liable for any damages or defects resulting from improper installation.

When applicable, the installation must conform with Manufactured Home Construction and Safety Standards, Title 24 CFR, Part 3280 and/or CAN/CSA Z240 MH Series, Mobile Homes.

Safety

DO NOT install in areas with excessively high humidity or poor air quality (dust, particulate matter, etc.)

CAUTION

Read both the Installation and User's Information Manuals before installing.

WARNING

Follow all local codes and/or the most recent edition of the National Fuel Gas Code (ANSI Z223.1/NFPA 54) in the USA, or the Natural Gas and Propane Installation Code in Canada (CAN/CGA B149.1).



1 Unpacking

When you unpack the boiler you will find the following items. Check for each of the following items before installing the appliance.

Nr.	Quantity	Description
1	1	Condensing Gas Boiler
2	1	Upper Bracket
3	2	Assembly Screws (Fischer Type SX)
4	1	Lower Bracket
5	1	Condensate Drain Pipe
6	1	CH Pressure Relief Valve
7	1	3" CPVC Pipe, 5" Long
8	2 + 2	2" Vent Screen + 3" Vent Screen
9	1	Tridicator
10	1	LP Gas Conversion Kit
11	1	Installation Manual (This Document)
	1	Cascade Installation manual
	1	Installation Quick Guide
	1	User's Information Manual
	1	LP Conversion Instructions
	1	Warranty
	1	Connectivity Quick Start Guide
12	1	Outdoor sensor Kit
13	1	3/4" Cap (Not Included with Combis, and not shown)

Table 1 - Included with the Boiler



Figure 1 - Included with the Boiler

2 Location Requirements

Install the boiler in an area that allows for service and maintenance access to utility connections, hydronic and gas piping, intake and exhaust piping, filters, and traps. Ensure the following clearances are maintained when choosing an installation location.

NOTE: The service clearances are recommendations. If you are unable to maintain those specific clearances, it might not be possible to service the boiler without removing it from the space.

NOTE: For closet installations, a combustible door or removable panel is acceptable front clearance.

A 3" minimum clearance must be provided from the appliance front cover to the removable panel or combustible door. When locating the boiler, it is essential that sufficient space be allotted for the installation and maintenance of components, such as: Flow Switch, Thermostatic Mixing Valve (TMV), Pressure Relief Valve (PRV), Shut-Off and Drain Valves, Expansion Tank, Condensate Drain and Assorted Equipment.

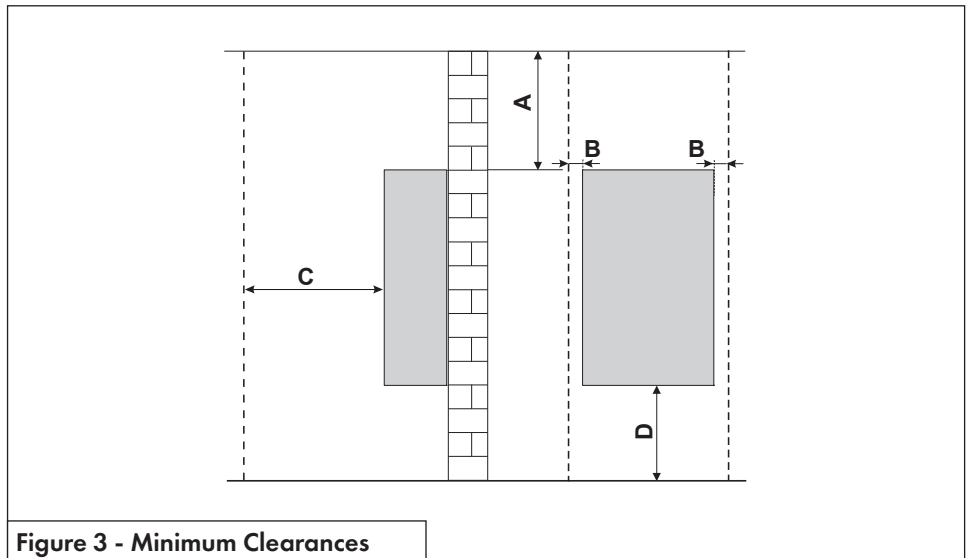


Figure 3 - Minimum Clearances

Dimension	Description	Clearance
A	Top	14" (355.6 mm)
B	Right or Left Side	2" (50.8 mm)
C	Front	18" (457.2 mm)
D	Bottom	12" (304.8 mm)
Not Displayed	Back	0" (0 mm)

Table 2 - Minimum Installation and Service Clearances

Minimum Clearances from Combustible Materials

Hot Water and Exhaust Vent pipes - at least 1" from combustible materials

3 Wall Mounting

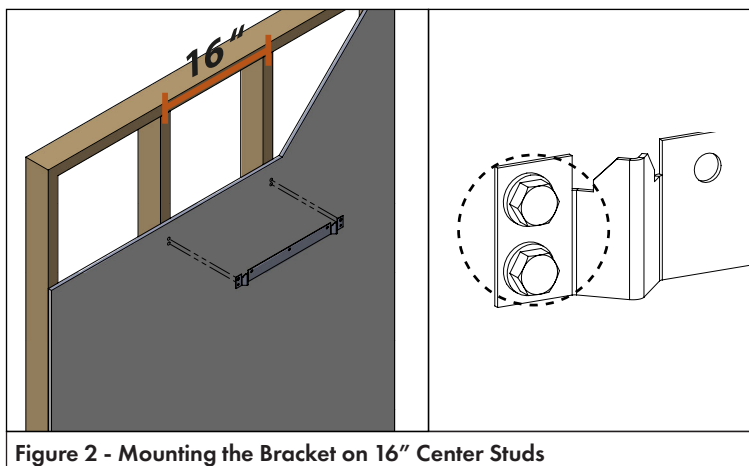


Figure 2 - Mounting the Bracket on 16" Center Studs

MOUNTING TO A WOOD STUDDED WALL

1. Position the upper wall mounting bracket on the wall. Ensure the bracket is level and the drilling holes are on stud. Then use the bracket as a template to mark four (4) drilling holes on the wall - two (2) on each side of the bracket. See Figure 2 for details.
2. Drill and plug the wall. Then secure the upper mounting bracket using the provided (Fischer S 10x50) screws and field provided washers for wood mounting.
3. Install the lower mounting bracket on the boiler. Then hang the boiler on the upper mounting bracket. Ensure the boiler is level. Then use the lower bracket to mark the lower bracket drilling holes.
4. Drill and plug the wall and secure the lower mounting bracket using field provided screws. Then adjust the lower mounting bracket on the boiler. Ensure the boiler is installed plumb. Tighten the bracket to the boiler.

4 Checking the Rating Plate

CAUTION

The boiler is factory configured to operate on **Natural Gas**. If conversion to Propane Gas is required, the conversion kit supplied with the boiler must be used.

! DANGER

- Before connecting the gas supply, determine the gas type and pressure for the boiler by referring to the rating plate. Use only the gas type indicated on the rating plate. Using a different gas type will result in abnormal combustion and malfunction of the boiler. Gas supplies should be connected by a licensed professional only.
- The boiler and its gas connection must be leak tested before placing the boiler in operation.
- The boiler cannot be converted from Natural Gas to Propane or vice versa without the supplied gas conversion kit. **DO NOT** attempt a field conversion of the boiler without a gas conversion kit. Doing so will result in property damage, serious personal injury, or death.

NTI IS NOT LIABLE FOR ANY DAMAGES (PROPERTY DAMAGES, PERSONAL INJURIES, OR DEATHS) RESULTING FROM IMPROPER CONVERSIONS.

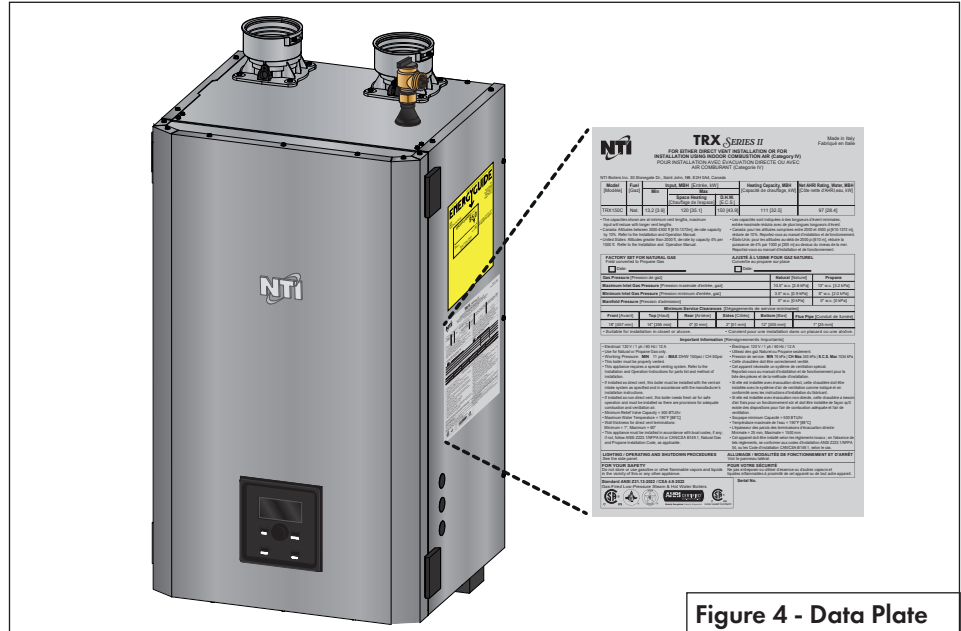


Figure 4 - Data Plate

5 Preparing for Exhaust Vent and Intake Air Piping

Clean and dry the boiler connection.

DO NOT use primer or cement on the boiler connection.

When preparing pipe for installation:

Ensure cuts are square.

Bevel cut edges by 1/16" - 1/8".

Deburr the pipe.

Lubricate the gasket.

1. Push the length of pipe into the connection until it touches the bottom of the fitting.
2. Tighten the clamps using a screwdriver.
3. Ensure the pipe is secure before continuing installation.

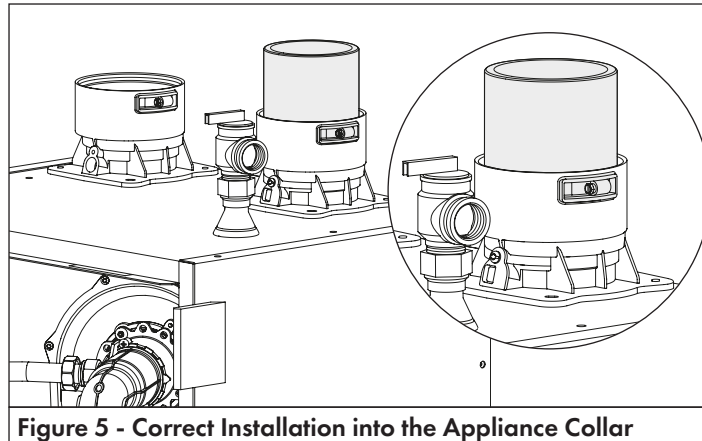


Figure 5 - Correct Installation into the Appliance Collar

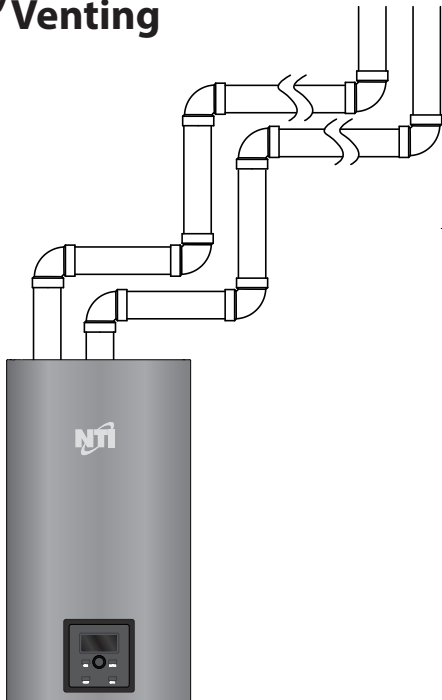
CAUTION

When venting with PVC, first install the included 5" length of 3" CPVC (included) into the boiler's exhaust connection, then adapt to PVC using approved CPVC to PVC transition cement. Installing PVC pipe into the boiler's exhaust connection is strictly prohibited - the strain of the gear clamp combined with heat can deform PVC over time and result in flue gas leakage causing property damage, severe personal injury, or death.

SEE INSTALLATION MANUAL FOR DETAILS ON COMPLETING VENT INSTALLATION.

6 Venting

2" or 3" Venting



Friction Loss Equivalent in Piping and Fittings	
Fittings or Piping	Equivalent Feet
	2" or 3"
90 Degree Elbow*	5'
45 Degree Elbow	3'
Coupling	0'
One Foot of Straight Pipe	1'
Concentric Kit	3'
V Series Vent Kit	1'
AL29-4C Vent Terminal	1'

Table 4 - *Friction loss for long radius elbow is 1 foot less.

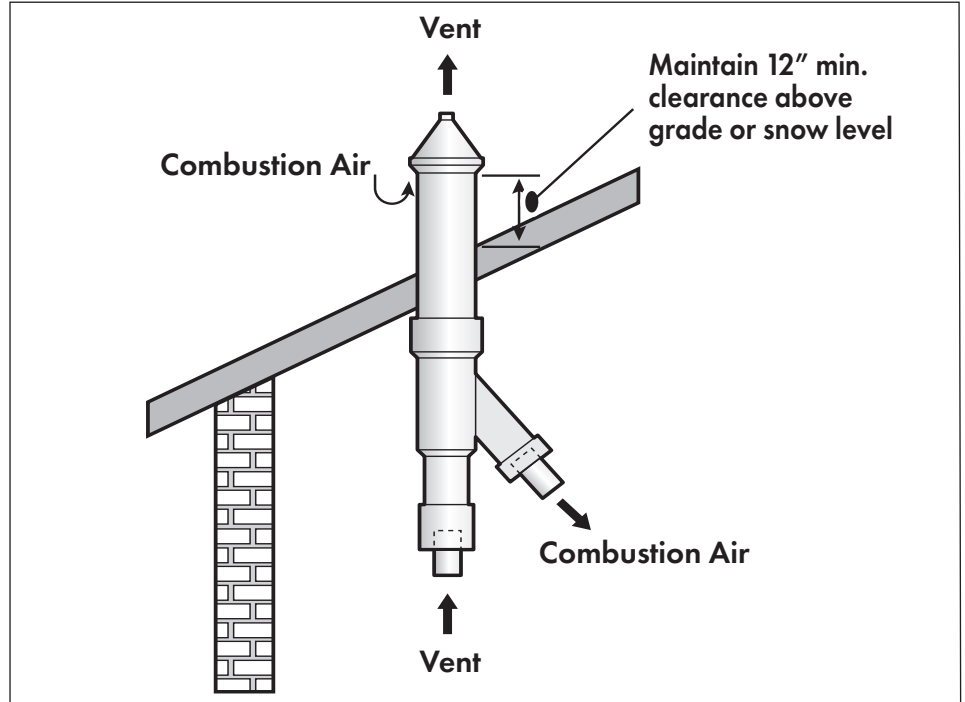
NOTE: Consult Polypropylene venting instructions for friction loss and pressure drop equivalents.

Minimum - Maximum Vent Run Lengths		
Diameter	2"	3"
Intake Air Pipe Run	0 - 100 feet	0 - 150 feet
Exhaust Vent Run	6 - 100 feet	6 - 150 feet

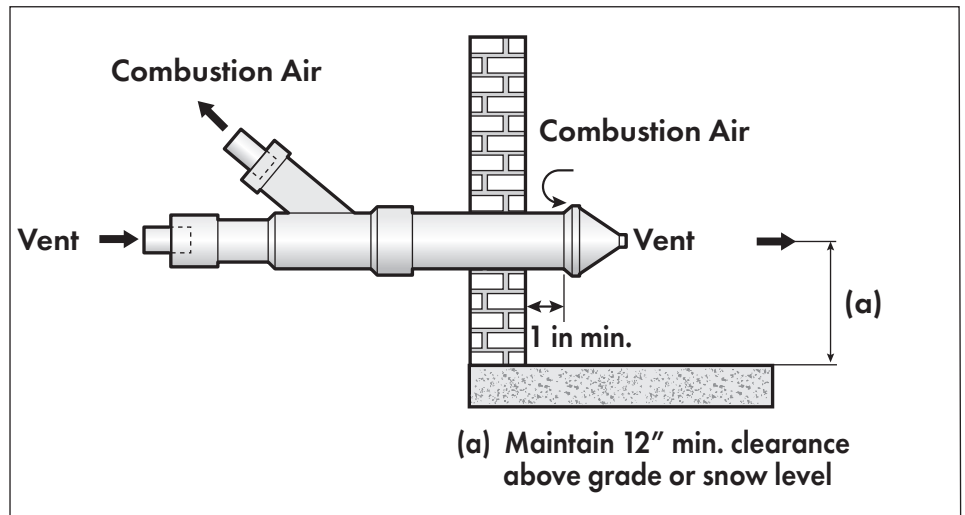
Table 3 - Minimum - Maximum Vent Runs

6.1 Vent Termination Options

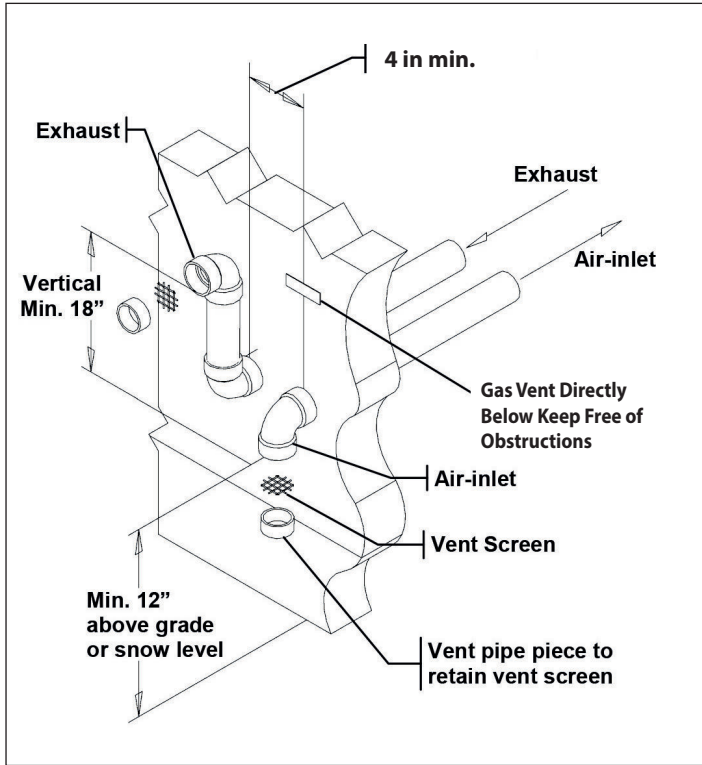
Concentric Vent Roof Termination



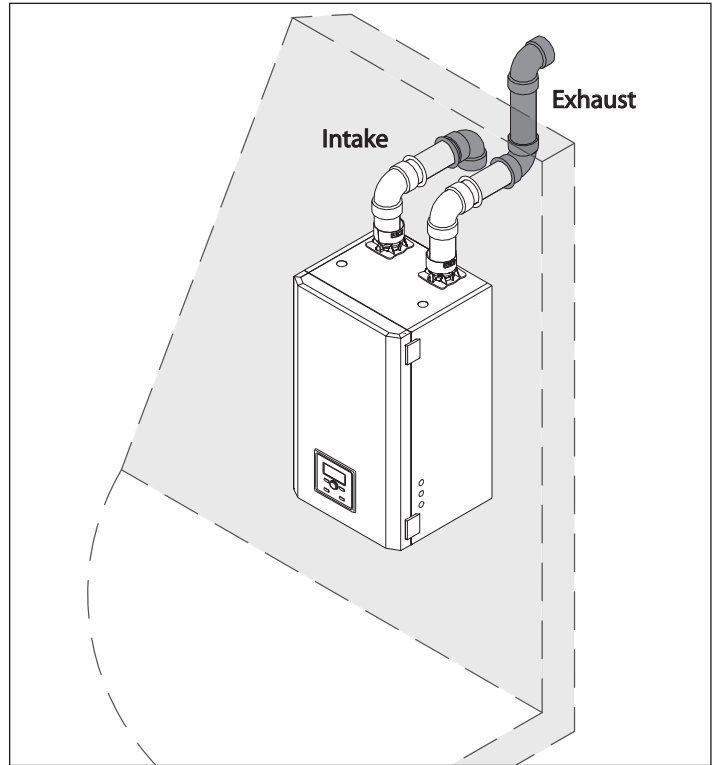
Concentric Vent Sidewall Termination



Two-pipe Sidewall Termination

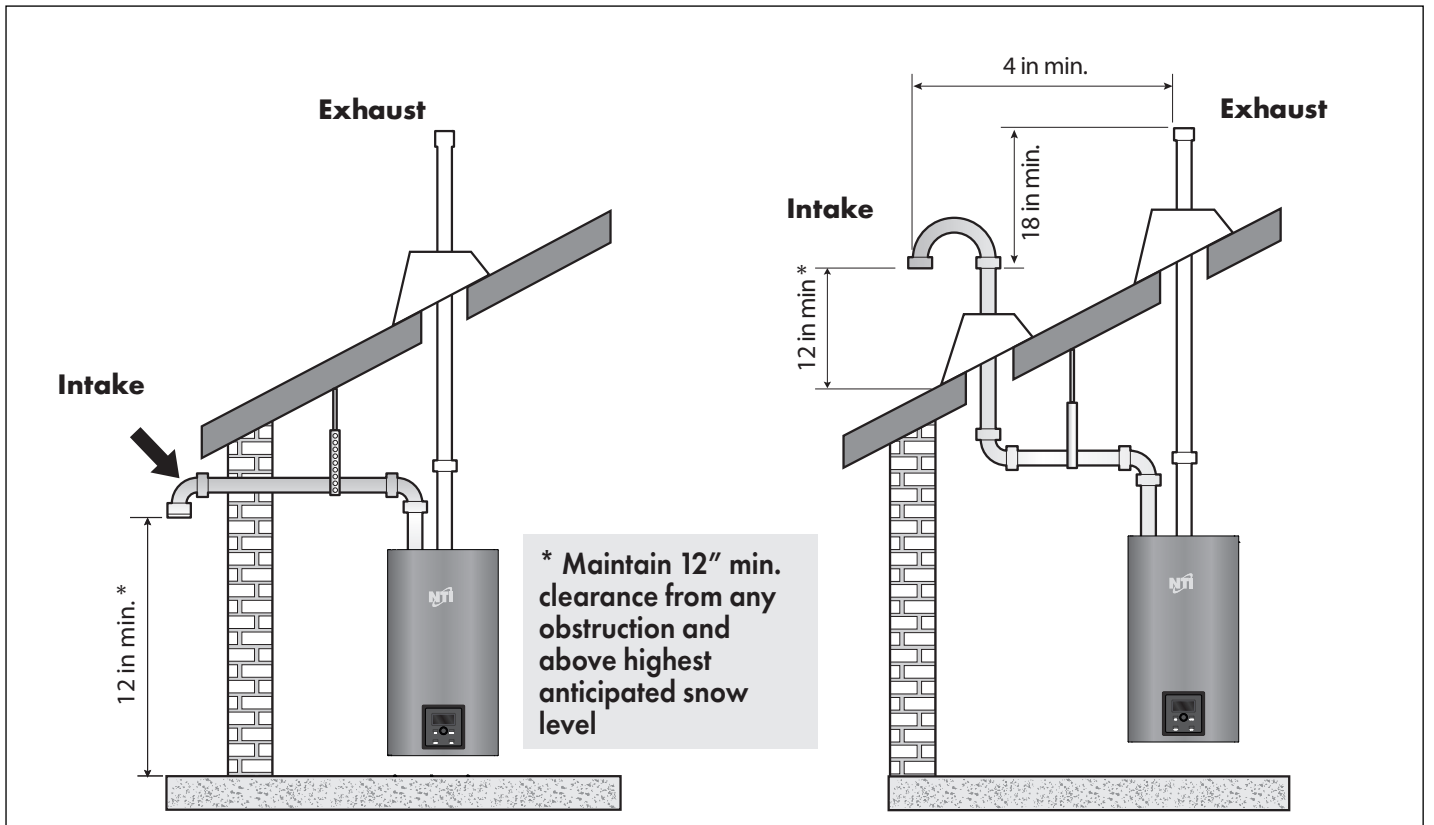


Exterior View



Interior View

Two-pipe Roof Termination



6.2 Intake Air and Exhaust Vent Materials

CAUTION

This boiler is certified as a “Category IV” appliance and requires a special venting system. The vent system will operate with a positive pressure in the pipe. Exhaust gases must be piped directly outdoors using the vent materials and rules outlined in the installation manual.

Do not connect vent connectors serving appliances vented by natural draft into any portion of mechanical draft systems operating under positive pressure.

Follow the venting instructions carefully. Failure to do so will result in substantial property damage, severe personal injury, or death.

1. Installation should be made in accordance with the regulations of the Authority Having Jurisdiction, local code authorities, and utility companies which pertain to this type of water heating equipment.
2. Install the venting system in accordance with these instructions and with the National Fuel Gas Code, ANSI Z223.1/NFPA 54, CAN/CGA B149, and / or applicable provisions of local building codes.
3. This boiler must be vented with materials, components, and systems listed and approved for Category IV appliances. Consult the following chart and the most recent edition of ANSI Z223.1/NFPA 54, CAN/CGA B149, and / or applicable provisions of local building codes when selecting vent pipe materials.
DO NOT use cellular core PVC (ASTM F891), cellular core CPVC, or Radel® (polyphenolsulfone) for the exhaust vent.

Item	Material	Standards for Installation In:	
		United States	Canada
Pipe and Fittings Approved for Intake ONLY	ABS*	ANSI/ASTM D2661	ANSI/ASTM D2661
Pipe Approved for Intake OR Exhaust Vent	PVC Schedule 40/80	UL-1738 or ANSI/ASTM D1785	UL-1738 or ULC-S636
	PVC-DWV Schedule 40/80	UL-1738 or ANSI/ASTM D2665	
	CPVC Schedule 40/80	UL-1738 or ANSI/ASTM F441	
	Polypropylene	UL-1738 or ULC-S636	
	Stainless Steel AL29-4C	Certified for Category IV and Direct Vent Appliance Venting	

Table 5 - Approved Materials for Exhaust Vent and Intake Pipe

*ABS may be used for air intake applications ONLY.

Contact the venting material manufacturer if there is any question about the applicability of the proposed venting material. Failure to follow these directions will result in substantial property damage, severe personal injury, or death.

7 Plumbing

7.1

Plumbing of this product should only be done by a qualified, licensed plumber/installer in accordance with all local plumbing codes.

FTVN085, FTVN110, FTVN150, FTVN199, TRX150 & TRX199 - The boiler may be connected to an indirect water heater to supply domestic hot water.

NTI offers indirect water heaters in a wide range of gallon sizes in stainless steel construction.

7.2

The water connections must be installed in accordance with all local and National plumbing codes, or any applicable standard which prevails.

Pipe material must be suitable to meet local codes and industry standards.

The pipe must be cleaned and without blemish before any connections are made.

The size of the DHW pipes should be 3/4" diameter, and the CH pipes should be 1" diameter.

Isolation (shut-off valves) and unions should be used on both the CH and DHW loops to ease future servicing.

All piping should be insulated.

If there is a backflow preventer or any type of non-return valve in the DHW supply system, install a suitable expansion tank downstream.

7.3

Water / Gas Connections

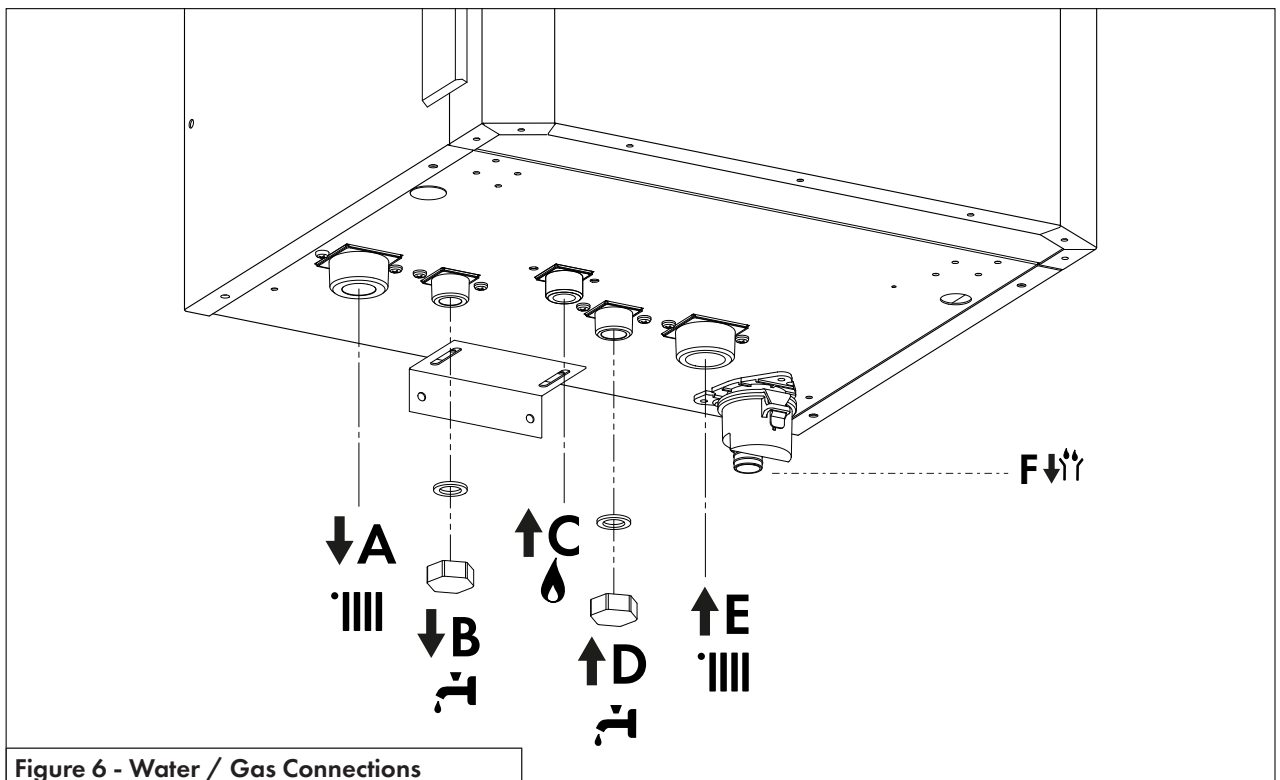


Figure 6 - Water / Gas Connections

System models

- A. CH Supply 1-1/4"
- B. Supply to Indirect Water Heater 3/4" (Cap if not in use)
- C. Gas Inlet 3/4"
- D. N/A
- E. CH Return 1-1/4"
- F. Condensate Discharge

Combi models

- A. CH Supply 1-1/4"
- B. DHW Outlet 3/4"
- C. Gas Inlet 3/4"
- D. DHW Inlet 3/4"
- E. CH Return 1-1/4"
- F. Condensate discharge

7.4 CH PRESSURE RELIEF VALVE

This boiler is provided with a CH pressure relief valve that complies with the ANSI/ASME Boiler and Pressure Vessel Code, Section IV (Heating Boilers).

The included 30 psi CH Pressure Relief Valve must be installed at the top of the boiler, using the included pipe adapter and grommet, as illustrated.

DO NOT install a relief valve with a pressure rating in excess of 50 psi - the maximum allowable operating pressure of the boiler. The relief valve capacity must exceed the BTU/H input capacity of the boiler. To install the pressure relief valve follow the instructions in the installation manual.

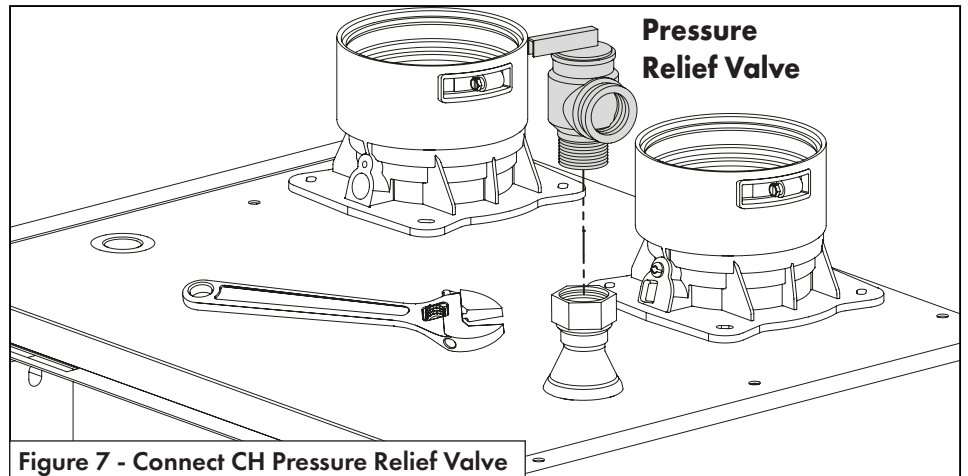


Figure 7 - Connect CH Pressure Relief Valve

! WARNING

Ensure the discharge of the pressure relief valve is piped to a location where the steam or water will not cause property damage or serious injury.

! WARNING

Improper installation of the pressure relief valve may result in property damage, personal injury, or death. Follow all instructions and guidelines when installing the pressure relief valve.

THE VALVE SHOULD BE INSTALLED ONLY BY A LICENSED PROFESSIONAL.

7.5 DHW Pressure Relief Valve (Combi Models)

The DHW piping must be provided with a DHW pressure relief valve that complies with local codes, and meets the requirements of Relief Valves for Hot Water Supply Systems, ANSI Z21.22 / CSA4.4.

A DHW pressure relief valve is not included with the boiler, and is to be field supplied and installed in the DHW piping. DO NOT install a DHW relief valve with a pressure rating greater than 150 psi - the maximum allowable operating pressure of the boiler's DHW circuit.

After installing the relief valves and filling and pressurizing the system, test the operation of the valves by lifting the levers.

Make sure the valves discharge freely. If a valve fails to operate correctly, replace it with a new relief valve. The relief valve capacity must exceed the BTU/H input capacity of the boiler.

7.6 Connecting the Condensate Drain

This boiler is shipped from the factory with a pre-installed condensate trap and a separate drain hose.

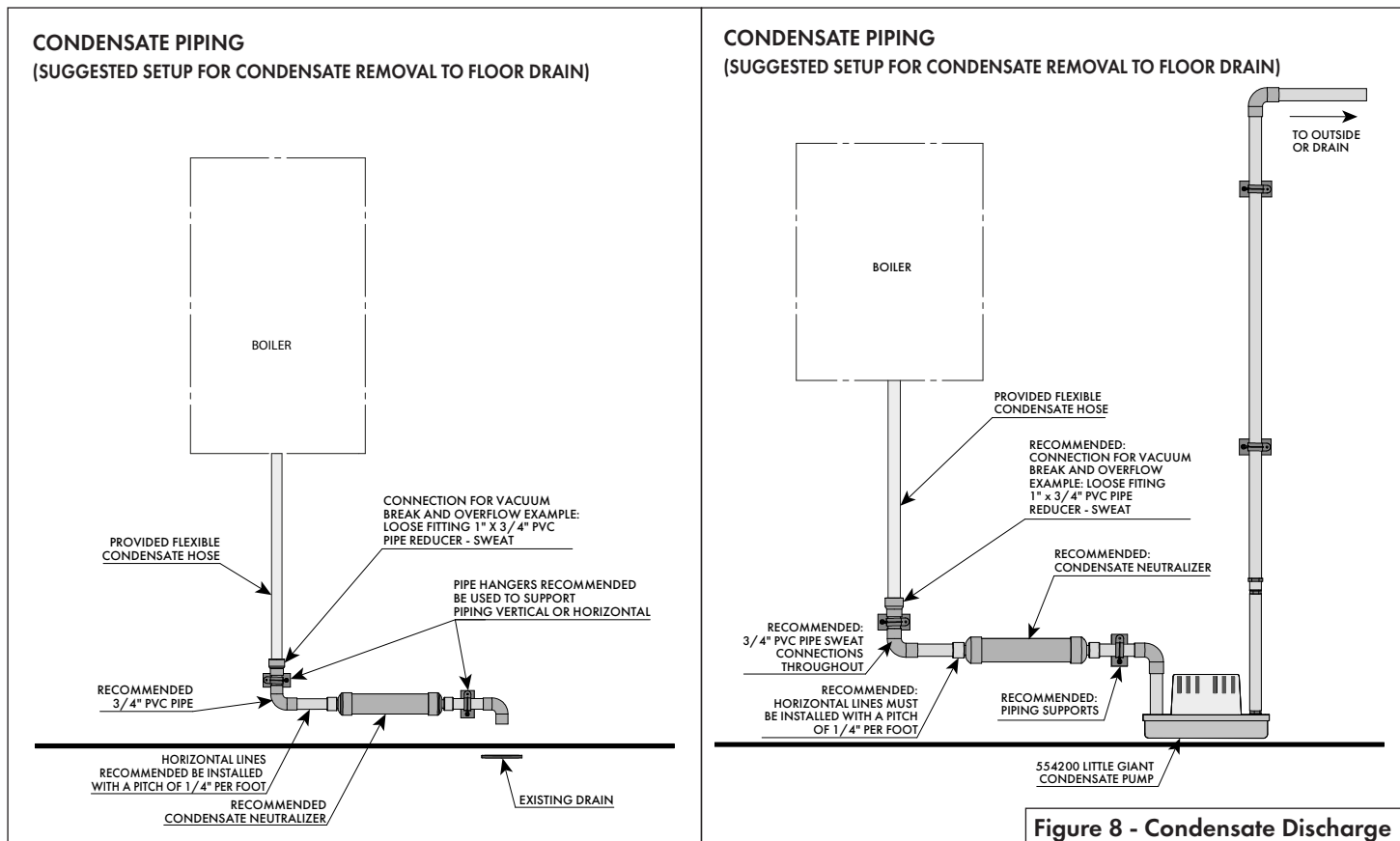
The supplied drain hose must be connected before routing the condensate to one of the following disposal options:

- Direct to drain
- Drain via neutralizer
- Direct to laundry tub
- To drain via condensate pump

FOLLOW BOILER INSTALLATION MANUAL WHEN INSTALLING THE CONDENSATE DRAIN.

CAUTION

Do not use metal pipe for draining condensate.



To connect the condensate drain:

- Condensation is slightly acidic (typically with a pH of 3 to 5) and must be piped with the correct materials. Never pipe the condensate using metal pipe subject to corrosion. Plastic PVC or CPVC pipe are the only approved materials. A condensate neutralizer, if required by local authorities, can be made up of lime, marble, or phosphate chips that will neutralize the condensate.
- The boiler is equipped with a barbed outlet fitting. Connect the supplied hose to the fitting and route it with a downward slope away from the boiler to a local drain. If the boiler condensate outlet is lower than the drain, use a condensate removal pump. This pump has two leads to connect an alarm or other warning device to alert the user of an overflow, which could cause property damage.
- If a long horizontal run is used, create a vent in the horizontal run to prevent a vacuum lock in the condensate line.
- DO NOT** expose the condensate to freezing temperatures.
- It is very important you support the condensation line to assure proper drainage.

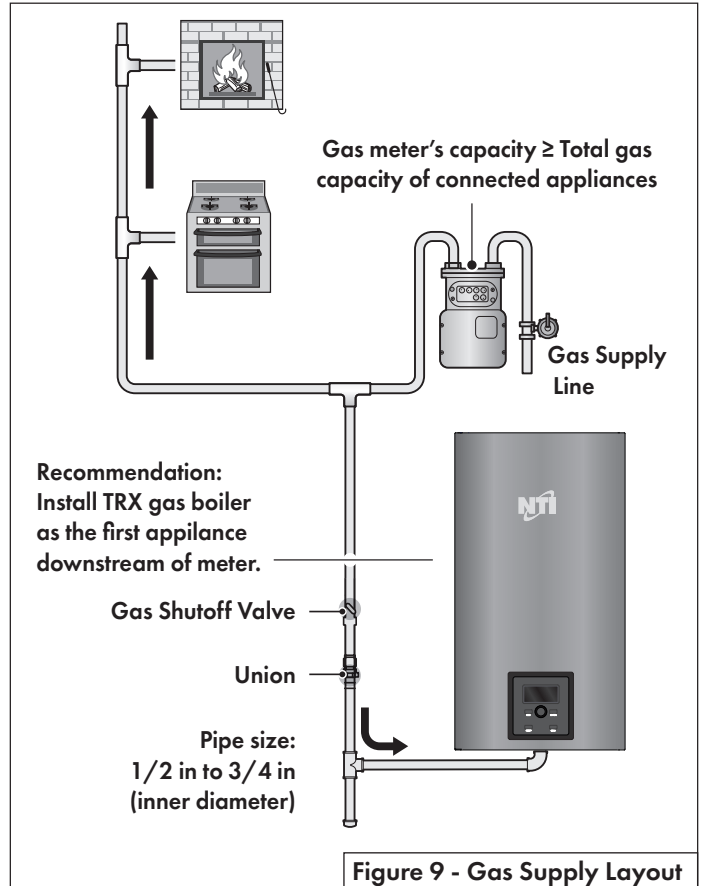
7.9 Gas Connection

It is recommended that this boiler be connected as the first appliance downstream of the gas meter to ensure a sufficient gas supply.

To connect the gas supply:

1. The gas connection fitting on the boiler when the supplied adapter is installed is 3/4" NPT. The pipe size must not be less than 3/4".
NOTE: DO NOT USE 1/2" quick flex gas lines! Doing so will result in improper appliance operation.
2. The supply line must be sized for the maximum input of the boiler being installed. If there are additional gas appliances on the main supply line, measure the size of the supply line according to the COMBINED total maximum BTU/H draw for the appliances as if they were operating at the same time.
3. Measure the length of the gas supply line from the gas meter to the boiler. The boiler must be installed downstream of the gas meter to ensure adequate gas supply.
Use the tables in the installation manual or refer to the gas line manufacturer's sizing information to determine the correct supply pipe size.
4. The National Fuel Gas Code (NFPA 54) requires that a sediment trap (drip leg) be installed in the gas line on boilers not so equipped. The drip leg must be accessible, a minimum of 3" in length, and not subject to freezing conditions.
5. A manual gas shut-off valve should be installed in the gas supply line close to the boiler. See Figure 9.
6. To facilitate any future maintenance, it is also recommended that an approved gas union fitting be installed in the supply line between the shut-off valve and the 3/4" NPT connection on the boiler.
7. Use a manometer to test the gas pressure to make sure it meets the minimum standards and does not exceed the maximum standards of the boiler.
8. Leak test the gas line pipe before placing the boiler in operation. Only use approved leak detector liquid solutions to check for leaks.
9. Do not operate the boiler until all connections have been completed and the heat exchanger is filled with water and purged of air.

***WARNING: If the boiler is connected to Liquefied Propane Gas (LP) it MUST be converted using the LP Conversion Kit included with the boiler. Failure to do so could cause severe injury or death.**



Combustion Analysis

Each TRX / FTVN boiler is factory-tested before shipping. However, combustion values should be verified when the boiler is installed, as installation conditions differ by location.

TRX				
	Natural Gas		LP Gas	
Power	Max Power (100%)	Min Power (10%)	Max Power (100%)	Min Power (10%)
CO (ppm)	≤175		≤175	
CO ₂ (%)	9.0-9.7	8.5-9.2	10.0-10.7	9.5-10.2
Gas Pressure	3.5 - 10.5" w.c.		8 - 13" w.c.	
NOTICE: the CO ₂ at Min Power must be set lower than the CO ₂ at Max Power by 0.5-1.0%				
Example (NG): If CO ₂ at Max Power = 9.4%, then CO ₂ at Min Power must = 8.5-8.9%				
Example (LP): If CO ₂ at Max Power = 10.4%, then CO ₂ at Min Power must = 9.5-9.9%				

Table 6 - Combustion Settings - TRX

FTVN				
	Natural Gas		LP Gas	
Power	Max Power (100%)	Min Power (10%)	Max Power (100%)	Min Power (10%)
CO (ppm)	≤175		≤175	
CO ₂ (%)	8.7-10.0	8.5-9.8	9.7-11.0	9.5-10.8
Gas Pressure	3.5 - 10.5" w.c.		8 - 13" w.c.	
NOTICE: The CO ₂ at Min Power must be set lower than the CO ₂ at Max Power by 0.2-1.0%				
Example (NG): If CO ₂ at Max Power = 9.2%, then CO ₂ at Min Power must = 8.5-9.0%				
Example (LP): If CO ₂ at Max Power = 10.2%, then CO ₂ at Min Power must = 9.5-10.0%				

Table 7 - Combustion Settings - FTVN

8 Wiring

***WARNING:** Install wiring and electrically ground boiler in accordance with the authority having jurisdiction or, in the absence of such an authority, follow the National Electrical Code, NFPA 70, and/or CSA C22.1 Electrical Code-Part 1 in Canada.

Failure to follow all applicable local, State, and National regulations, mandates, and building supply codes could result in property damage, serious personal injury, or death.

The boiler is equipped with a three prong power cord.

The electrical rating of the boiler is 120V / 1 Phase / 60 Hz at less than 12 Amps

1. This boiler must be properly grounded. Ensure the electrical receptacle is properly grounded. Do not remove the grounding prong from the boiler plug.
2. Do not attach the ground wire to either the gas or water piping.
3. The wiring diagrams in this manual are to be used for reference purposes only.
4. Refer to these diagrams and the wiring diagrams of any external controls used with the installation when wiring the boiler. Read, understand, and follow all wiring instructions supplied with the controls.
5. Do not disconnect the power supply when the boiler is in normal operation.

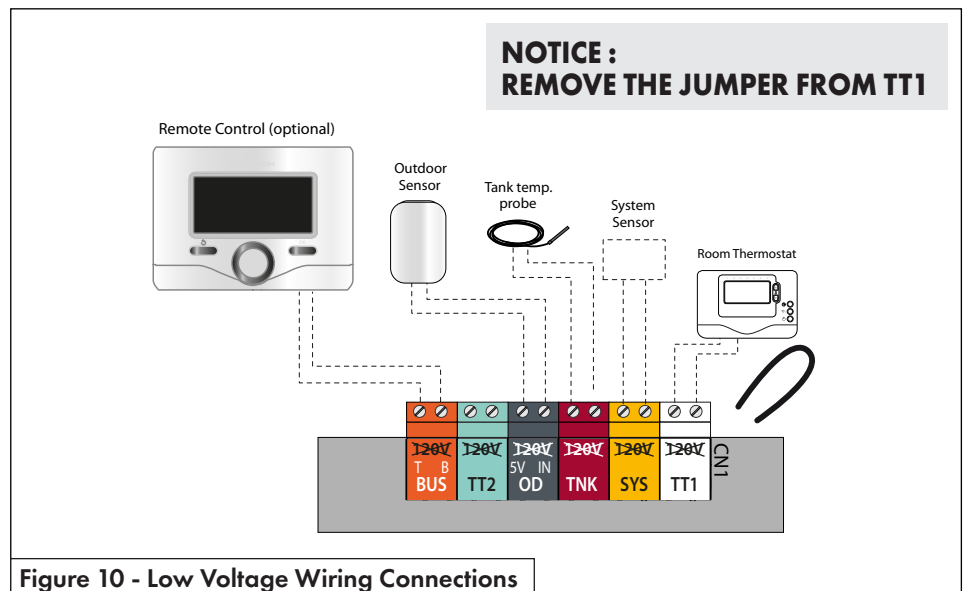
NOTE: For additional electrical protection, the use of a whole house surge protector is recommended. Damage caused by power surges IS NOT covered by the warranty.

Low Voltage Wiring Connections

To access the low voltage wiring connections:

1. Shut off the power supply at the boiler and at the circuit breaker.
2. Shut off the gas at the manual shutoff.
3. Remove the boiler front cover.
4. Rotate the control panel while pulling it forwards.
5. Disconnect the two clips and open the control panel cover to access the main PCB.

Low Voltage Wiring Connections	
BUS	Remote Control Connection
TT2	Room Thermostat 2
OD	Outdoor Sensor
TNK	Tank Temperature Sensor (Probe / Aquastat)
SYS	System Sensor (Cascade Master boiler only)
TT1	Room Thermostat 1



STEP 2

Installing

1. Connecting Power for DHW & CH Pumps (120V) and Zone Outputs (dry contact)

To connect power for the CH and DHW external pumps and zone loads (pumps or valves) at the boiler junction box:

1. Shut off the power supply at the boiler and at the circuit breaker.
2. Shut off the gas at the manual shutoff.
3. Remove the boiler front cover.
4. Unlatch the bottom clips securing the junction box cover and rotate the cover upwards unhooking the cover at the top.
5. Insert the field wiring through the hole in the side panel; use an appropriate strain relief/ conduit hub to secure the cable to the side panel.
6. Connect the field wiring to the respective output; see Figure 11.

NOTE: CH PUMP & DHW PUMP output 120V directly.

NOTE: ZONE 1 & ZONE 2 outputs are dry contact; power must be applied to one side.

7. Reconnect the cover of the junction box.
8. Reinstall the boiler front cover
9. Restore gas to the boiler.
10. Restore power to the boiler.

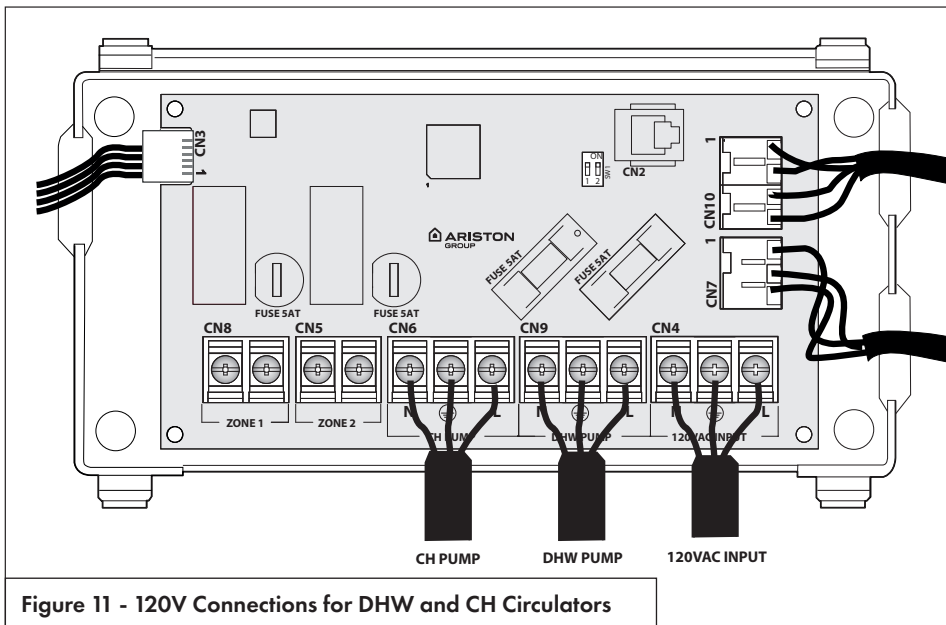


Figure 11 - 120V Connections for DHW and CH Circulators

9 User Interface

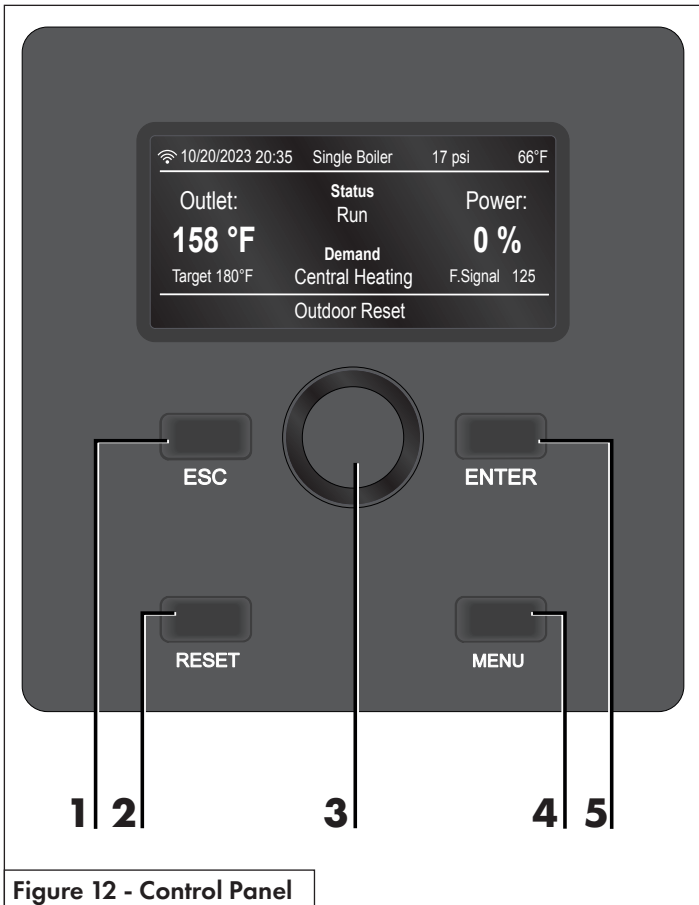


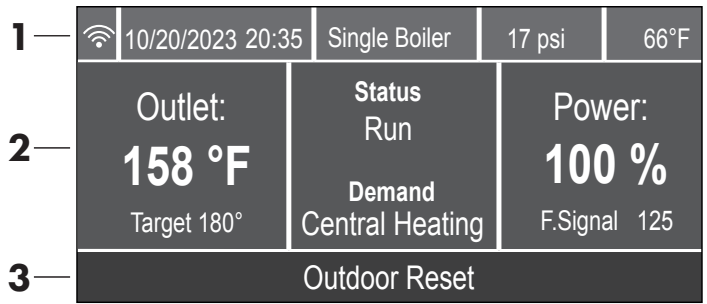
Figure 12 - Control Panel

Item #	Description
1	ESC - back/exit
2	RESET - resets lockouts
3	Dial - use to navigate inside each menu
4	MENU - enters the main menu
5	ENTER (or OK) - confirms selection

Table 8 - Control Descriptions

NOTICE

Refer to **Part 9 Controls** of INSTALLATION, START UP and MAINTENANCE MANUA.



Description									
1	General Information								
	<table border="1"> <tr> <td>10/20/2023 20:35</td> <td>Single Boiler</td> <td>17 psi</td> <td>66°F</td> </tr> </table>	10/20/2023 20:35	Single Boiler	17 psi	66°F				
10/20/2023 20:35	Single Boiler	17 psi	66°F						
a.	WiFi Status								
	<table border="1"> <tr> <td></td> <td>WiFi Upgrade</td> </tr> <tr> <td></td> <td>WiFi Active</td> </tr> <tr> <td></td> <td>WiFi connected to the local network, but without access to the server</td> </tr> <tr> <td></td> <td>WiFi not configured</td> </tr> </table>		WiFi Upgrade		WiFi Active		WiFi connected to the local network, but without access to the server		WiFi not configured
	WiFi Upgrade								
	WiFi Active								
	WiFi connected to the local network, but without access to the server								
	WiFi not configured								
b.	10/20/2023 20:35 Date and Time								
c.	Single Boiler Boiler configuration (Single Boiler, Manager, or Follower #)								
d.	17 psi Boiler water pressure								
e.	66 °F Outdoor temperature (a flashing house with thermometer icon will appear if AUTO Function (Outdoor Reset) is enabled while no outdoor temperature reading is available)								
2	Boiler working mode								
2a	<table border="1"> <tr> <td>Outlet: 158 °F Target 180°</td> <td>Boiler Outlet temperature and Target, or DHW temperature and Target</td> </tr> </table>	Outlet: 158 °F Target 180°	Boiler Outlet temperature and Target , or DHW temperature and Target						
Outlet: 158 °F Target 180°	Boiler Outlet temperature and Target , or DHW temperature and Target								
2b	<table border="1"> <tr> <td>Status Run Demand Central Heating</td> <td>Burner Status Demand type</td> </tr> </table>	Status Run Demand Central Heating	Burner Status Demand type						
Status Run Demand Central Heating	Burner Status Demand type								
2c	<table border="1"> <tr> <td>Power: 100 % F.Signal 125</td> <td>Burner power (%) and flame signal</td> </tr> </table>	Power: 100 % F.Signal 125	Burner power (%) and flame signal						
Power: 100 % F.Signal 125	Burner power (%) and flame signal								
3	Additional details								
3a	<table border="1"> <tr> <td>Outdoor Reset</td> </tr> </table> Working mode, functional, or error details	Outdoor Reset							
Outdoor Reset									

Table 9 - Display Descriptions



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