

CONDENSING TANKLESS COMBI BOILER

Use and Care Manual

User's Information
Installation
Start-Up
Maintenance
Parts

100K Heating (180K DHW) Btu/h Models
120K Heating (199K DHW) Btu/h Models



NOTE TO CONSUMER: DO NOT DESTROY THIS MANUAL. PLEASE READ CAREFULLY AND KEEP ALL INSTRUCTIONS FOR FUTURE REFERENCE.

The surfaces of these products contacted by consumable water contain less than 0.25% lead by weight, as required by the Safe Drinking Water Act, Section 1417.

⚠ WARNING

WARNING: If the information in these instructions is not followed exactly, a fire or explosion may result causing property damage, personal injury or death.

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

WHAT TO DO IF YOU SMELL GAS

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

Improper installation, adjustment, alteration, service, or maintenance can cause injury, property damage, or death. Refer to this manual. Installation and service must be performed by a qualified installer, service agency, or gas supplier.

⚠ WARNING : Cancer and Reproductive Harm - www.P65Warnings.ca.gov.

FOR YOUR SAFETY READ BEFORE OPERATING

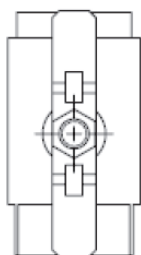
WARNING: If you do not follow these instructions exactly, a fire or explosion may result, causing property damage, personal injury or death.

- 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 electrical switch
 - do not use any phone in your building
 - If you cannot reach your gas supplier, call the fire department.
- C. Use only your hand to turn the gas control knob. Never use tools. If the handle will not 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.

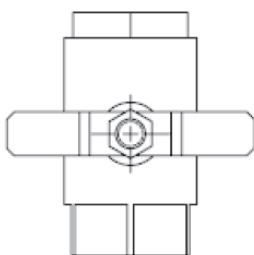
OPERATING INSTRUCTIONS

1. STOP! Read the safety information above.
2. Set the thermostat to lowest setting.
3. Turn off all electrical power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
5. Remove front cover.
6. Turn gas shutoff valve to "OFF" position. Handle will be across the piping, do not force.
7. Wait five (5) minutes to clear out any gas. If you then smell gas, STOP! Follow "B" in the safety information above on this label. If you don't smell gas, go to next step.
8. Turn gas shutoff valve to "ON" position. Handle will be in line with piping.
9. Install front cover.
10. Turn on all electrical power to the appliance.
11. Set thermostat to desired setting.
12. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.

**GAS VALVE
ON**



**GAS VALVE
OFF**



TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electrical power to the appliance if service is to be performed.
3. Remove front cover.
4. Turn gas shutoff valve "OFF" position. Handle will be across the piping. Do not force.
5. Install front cover.

SPECIAL ATTENTION BOXES

The following defined terms are used throughout this manual to bring attention to the presence of hazards of various risk levels, or to important product information.

⚠ DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION

CAUTION used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

NOTICE


NOTICE is used to address practices not related to personal injury.

SAFETY INSTRUCTIONS

SAFETY INSTRUCTIONS (or equivalent) signs indicate specific safety related instructions or procedures.

NOTE: Contains additional information important to a procedure.

⚠ DANGER



Vapors from flammable liquids will explode and catch fire causing death or severe burns. Do not use or store flammable products such as gasoline, solvents or adhesives in the same room or area near this appliance.


<p>Keep flammable products :</p> <ol style="list-style-type: none"> 1. Far away from the appliance 2. In approved containers 3. Tightly closed 4. Out of children's reach 	<p>Vapors</p> <ol style="list-style-type: none"> 1. Cannot be seen 2. Vapors are heavier than air 3. Go a long way on the floor 4. Can be carried from other rooms to the main burner by air currents
---	---

Installation warnings :

Do not install appliance where flammable products will be stored or used unless the main burner is at least 18" above the floor. This will reduce, but not eliminate the risk of vapors being ignited by the main burner.

Read and follow appliance warnings and instructions, if owners manual is missing, contact the retailer or manufacturer.

⚠ DANGER



Water Temperature over 125°F can cause severe burns instantly or death from scalds. Children, disabled and elderly are at highest risk of being scalded. See instruction manual before setting the DHW temperature at the Combi Boiler. Feel water before bathing or showering. Temperature limiting valves are available, see manual.

FOREWORD

This manual is intended to be used in conjunction with other literature provided with the appliance. This includes all related control information. It is important that this manual, all other documents included with this system, and additional publications including the National Fuel Gas Code, ANSI Z223.1-Latest Edition, be reviewed in their entirety before beginning any work.

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 boiler.

Authority Having Jurisdiction (AHJ) – The Authority Having Jurisdiction may be a federal, state, local government, or individual such as a fire chief, fire marshal, chief of a fire prevention bureau, labor department or health department, building official or electrical inspector, or others having statutory authority. In some circumstances, the property owner or his/her agent assumes the role, and at government installations, the commanding officer or departmental official may be the AHJ.

NOTE: Rheem reserves the right to modify product technical specifications and components without prior notice.

FOR THE INSTALLER

DANGER

This manual must only be used by a qualified heating appliance installer/service technician. Read all instructions in this manual before installing. Perform steps in the order given. Failure to comply could result in substantial property damage, severe personal injury, or death.

This appliance must be installed by qualified and licensed personnel. The installer should be guided by the instructions furnished with the appliance, and with local codes and utility company requirements. In the absence of local codes, preference should be given to the National Fuel Gas Code, ANSI Z223.1-Latest Edition.

INSTALLATIONS MUST COMPLY WITH:

Local, state, provincial, and national codes, laws, regulations and ordinances.

The latest version of the National Fuel Gas Code, ANSI Z223.1, from American Gas Association Laboratories, 8501 East Pleasant Valley Road, Cleveland, OH 44131.

In Canada – CAN/CSA - B149.1 (latest version) from Canadian Standards Association, 5060 Spectrum Way, Suite 100, Mississauga, Ontario, Canada L4W 5N6

The latest version of the National Electrical Code, NFPA No. 70.

NOTE:The gas manifold and controls met safe lighting and other performance criteria when the appliance underwent tests specified in ANSI Z21.13 – latest edition.

WARNING







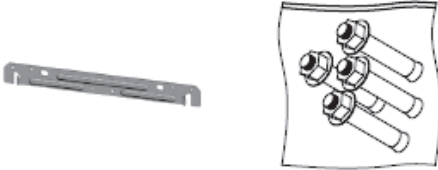
The hydronic supply and return connections of these products are for installation in closed loop systems ONLY! Use of this product in any manner other than described in this manual may result in premature product failure, substantial property damage, severe personal injury, or death. Damage or failure of this product (or the system in which it is installed) due to unauthorized use **IS NOT COVERED BY WARRANTY.**

TABLE OF CONTENTS

PART 1 – ITEMS SHIPPED WITH THE APPLIANCE	7
PART 2 – SAFETY REGULATIONS	8
A. OPERATION AND INSTALLATION WARNINGS.....	8
B. IMPROPER COMBUSTION.....	9
C. GAS.....	9
D. WHEN SERVICING THE APPLIANCE.....	9
E. WATER CHEMISTRY.....	10
F. FREEZE PROTECTION.....	10
G. SCALDING.....	10
H. HIGH ELEVATION INSTALLATIONS.....	10
PART 3 – TECHNICAL SPECIFICATIONS	11
PART 4 – PREPARE APPLIANCE LOCATION	13
A. UNCRATING THE APPLIANCE.....	13
B. BEFORE LOCATING THE APPLIANCE.....	14
C. LEVELING.....	15
D. CLEARANCES FOR SERVICE ACCESS.....	15
E. RESIDENTIAL GARAGE AND CLOSET INSTALLATIONS.....	16
F. EXHAUST VENT AND INTAKE PIPE.....	16
G. CARBON MONOXIDE DETECTORS.....	16
H. PREVENT COMBUSTION AIR CONTAMINATION.....	17
I. REMOVING AN APPLIANCE FROM A COMMON VENT SYSTEM.....	17
J. WALL-MOUNTING THE APPLIANCE.....	18
PART 5 – VENTING	19
A. INTAKE PIPE AND EXHAUST VENT GUIDELINES.....	19
B. APPROVED VENT MATERIALS.....	22
C. ALLOWED COMBINED VENT LENGTHS.....	22
D. TIGHTENING APPLIANCE COLLAR TO EXHAUST VENT AND INTAKE PIPE.....	23
E. VENT TERMINATION.....	24
1. Direct Vent, Two Pipe Roof and Sidewall Vent Terminations.....	24
2. Direct Vent, Optional Horizontal and Vertical Vent Kits.....	25
3. Screen Installation.....	25
4. Power Venting, Indoor Combustion Air Installation in Confined or Unconfined Space.....	26
PART 6 – INSTALL THE CONDENSATE DRAIN	28
PART 7 – GAS PIPING	29
A. GAS PIPE SIZING TABLES.....	29
1. Gas Pipe Sizing.....	29
Natural Gas Pipe Sizing.....	29
LP (Liquid Propane) Gas Pipe Sizing.....	29
B. GAS CONNECTION REQUIREMENTS.....	30
PART 8 – WATER PIPING	32
A. GENERAL PLUMBING CONNECTION GUIDELINES.....	32
B. DHW PIPING.....	32
C. CENTRAL HEATING PIPING SYSTEM WATER PIPING METHODS.....	34
D. CH AND DHW PRESSURE RELIEF VALVE.....	38
PART 9 – CONNECT ELECTRICAL POWER / INITIAL STARTUP	38
A. GENERAL OPERATING CONDITIONS.....	39
B. WIRING INFORMATION.....	39
C. DIP SWITCHES.....	39

PART 10 – OPERATING SYSTEM INSTRUCTIONS	45
A. CONTROL PANEL.....	45
B. LCD DISPLAY DESCRIPTIONS.....	46
C. START-UP SEQUENCE.....	46
D. CHANGING THE DHW SET-POINT.....	47
E. SETTING FOR DHW PREHEAT ACTIVATION.....	48
F. SETTING FOR DHW PREHEAT TIMER.....	48
G. STATUS DISPLAY MODE.....	49
H. CHANGE THE CH SET-POINT.....	49
I. INSTALLER MODE.....	50
J. ERROR MODE.....	53
K. OUTDOOR TEMPERATURE MODE (OPTIONAL).....	55
L. 0~10 VDC INPUT.....	55
PART 11 – START-UP PREPARATION	56
A. CHECK / CONTROL WATER CHEMISTRY	56
B. GLYCOL ANTIFREEZE SOLUTIONS.....	57
C. CHECK FOR GAS LEAKS	57
D. FILL AND TEST WATER SYSTEM.....	58
E. PURGE AIR FROM CH SYSTEM	58
F. PURGE AIR FROM DHW SYSTEM	59
G. CHECK THERMOSTAT CIRCUIT(S).....	59
H. CONDENSATE REMOVAL	60
I. FINAL CHECKS BEFORE STARTING APPLIANCE	60
J. ADJUSTING GAS PRESSURE AT THE APPLIANCE	60
K. SETTING AND VERIFYING THE COMBUSTION SETTING	61
PART 12 – INSTALLATION AND START-UP CHECKLIST	62
PART 13 – TROUBLESHOOTING	64
PART 14 – ANNUAL MAINTENANCE PROCEDURES	65
CASE PART	69
HEAT EXCHANGER PART.....	71
FAN MOTOR PART	73
START-UP REPORT	75
MAINTENANCE REPORT	76
MAINTENANCE NOTES	77
CUSTOMER INSTALLATION RECORD FORM.....	78

PART 1 – ITEMS SHIPPED WITH THE APPLIANCE

ITEM	DESCRIPTION	QUANTITY
Combi Appliance		1
Use and Care Manual		1
CH Pressure Relief Valve (CH Line 3/4" 30 psi)		1
Vent Screens (3")		2 Screens
Outdoor Temperature Sensor		1
Emergency Kit		1
Anchors and Wall Mounting Bracket		1


ITEM	DESCRIPTION	PART NUMBER
Vent Screens (2" Mesh)		2 Screens

Table 1 – Items Included with the Appliance

PART 2 –SAFETY REGULATIONS

- A. OPERATION AND INSTALLATION WARNINGS

To save time and money, review the following initial diagnostic steps before calling for service.

⚠ DANGER

Vapors from flammable liquids will explode and can cause a fire, resulting in personal injury or death. The appliance has a burner that can come on at any time and ignite vapors. DO NOT use or store flammable liquids around the appliance.

Improper venting can cause a build-up of carbon monoxide. Breathing carbon monoxide can result in brain damage or death. DO NOT operate the appliance unless it is properly vented to the outside and has an adequate fresh air supply for safe operation. Inspect the exterior exhaust gas outlet port and fresh air inlet port on a regular basis to ensure they are functioning properly.

A concentration of carbon monoxide as small as .04% (400 parts per million) in the air can be fatal. When making high fire or low fire adjustments, CO levels must be monitored using a flue gas analyzer such that a CO level of no more than 400 ppm is exceeded at any time during operation.

Adjusting the “low fire offset” on the gas valve in even small increments can result in a significant increase in CO concentration. To avoid serious injury or death, DO NOT make any adjustments to the gas valve without monitoring the exhaust gases with a fully functional and calibrated flue gas analyzer.

Failure to follow these statements will result in property damage, severe personal injury, or death.

⚠ WARNING

This appliance must be installed by a licensed plumber, licensed gas fitter, and/or professional service technician. Improper installation and/or operation can cause a potentially hazardous situation, which, if not avoided, could result in serious injury or death, and will void the warranty.

Rheem Manufacturing Company cannot anticipate every circumstance that might involve a potential hazard. Each installation has its own specialized characteristics, requirements, and possible hazards. Therefore, all possible incidents are not included in these warnings. Proper and safe installation, operation, and service are the responsibility of the professional service technician.

Proper care of the appliance is the user’s responsibility. Ensure the user carefully reads and understands the User’s Information Manual before operating and maintaining the appliance.

Make sure the user knows the location of the gas shut-off valve and how to operate it. Immediately close the gas shut-off valve if the appliance is subjected to fire, overheating, flood, physical damage, or any other damaging condition that might affect the operation of the unit. Have the appliance checked by a qualified technician before resuming operation.

Do not power up the unit unless the gas and water supply valves are fully opened. Make sure the fresh air intake port and exhaust gas port are open and functional.

No one but a professional service technician should attempt to install, service, or repair this appliance. There are no serviceable parts which can be changed by the user / owner. User / Owner: Contact the original professional service technician if the appliance needs repair or maintenance. If the original technician is unavailable, ask your gas supplier for a list of qualified service providers.

Keep the area around the appliance clean and free of all materials that can burn. DO NOT store or place gasoline, oils, spray paint, or other flammable products near the appliance.

DO NOT use spray paint, hair spray, or any other flammable spray near the appliance or near the exterior fresh air intake port. DO NOT place any items in or around the exterior exhaust gas outlet port and/or fresh air inlet port that could restrict or block the flow in or out of the vent system.

DO NOT store or place newspapers, laundry, or other combustible items near the appliance or the exterior exhaust gas outlet and/or fresh air inlet port.

The owner should inspect the system monthly for damage, water stains, signs of rust, corrosion, and exhaust vent and air intake blockage. If inspection of the unit shows signs of damage, the appliance should be shut off until the problem is repaired by a qualified technician.

⚠ WARNING

After installation, all appliance safety devices should be tested.

This appliance is certified for indoor installations only. The appliance consists of gas ignition system components which must be protected from water (dripping, spraying, etc.) during operation and service. Carefully consider installation location and the placement of critical components (circulators, condensate neutralizers, etc.) before installing the appliance.

DO NOT allow children to operate this unit. DO NOT use this unit if it does not appear to be operating correctly. A qualified technician should service and inspect the appliance annually.

The appliance DHW temperature is factory set to 125°F (51°C). To avoid scalding, always check the temperature of the hot water before bathing, showering, washing, etc. DO NOT adjust the water temperature while the appliance is being used by other persons.

If the appliance is exposed to the following, do not operate until all corrective steps have been made by a qualified service technician:

1. FIRE
2. DAMAGE
3. WATER

This appliance is equipped with a three prong 120 VAC plug. It should only be plugged directly into a properly grounded three prong 120 VAC receptacle. DO NOT remove the ground plug from the plug.

DO NOT alter or modify the appliance or appliance controls. This can be dangerous and WILL VOID the warranty.

Failure to follow these statements could result in property damage, severe personal injury, or death.

NOTICE

Any claims for damage or shortage in shipment must be filed immediately against the transportation company by the consignee.

This appliance provides a overheat shutdown limit. In the event the appliance water exceeds the set point of the control limit, the cutoff will trip and the appliance will shut down. Certain local codes require additional temperature limits. In addition, certain types of systems may operate at temperatures below the minimum set point of the limit provided with the appliance. Contact a qualified service technician for additional overheat controls.

NOTE: When inquiring about service or troubleshooting, reference the model and serial numbers from the appliance rating label.

⚠ WARNING

DO NOT USE THIS APPLIANCE IF ANY PART HAS BEEN SUBMERGED IN WATER. Immediately call a qualified service technician. The appliance MUST BE replaced if it has been submerged. Attempting to operate an appliance that has been submerged could create numerous harmful conditions, such as a potential gas leakage causing a fire and/or explosion, or the release of mold, bacteria, or other harmful particulates into the air. Operating a previously submerged appliance could result in property damage, severe personal injury, or death.

NOTE: Appliance damage due to flood or submersion is considered an Act of God, and IS NOT covered under product warranty.

Be sure to disconnect electrical power before opening appliance cabinet or performing service. Label all wires while performing service to ensure proper re-wiring of the appliance. Wiring errors can cause improper or dangerous operation. Failure to do so could result in an electrical shock, improper appliance operation, property damage, serious personal injury, or death.

CAUTION

Due to the low water content of the appliance, improper sizing of the appliance with regard to heating system load will result in excessive cycling and accelerated component failure. Rheem **DOES NOT** warrant failures caused by improperly sized appliance applications. **DO NOT** oversize the appliance to the system. Modular appliance installations greatly reduce the likelihood of appliance oversizing.

- B. IMPROPER COMBUSTION**⚠ WARNING**

Do not obstruct the flow of combustion and ventilating air. Adequate air must be provided for safe operation. Failure to keep the exhaust vent and intake pipe clear of ice, snow, or other debris could result in property damage, serious personal injury, or death.

- C. GAS

Should overheating occur or gas supply fails to shut off, do not turn off or disconnect electrical supply to the water heating appliance. Instead, shut off the gas supply at a location external to the appliance.

- D. WHEN SERVICING THE APPLIANCE

- To avoid electric shock, disconnect electrical supply before performing maintenance.
- To avoid severe burns, allow appliance to cool.
- Do not use petroleum-based cleaning or sealing compounds in an appliance system. Gaskets and seals in the system may be damaged, possibly resulting in substantial property damage.
- Always verify proper operation after servicing the appliance.

- E. WATER CHEMISTRY

CAUTION

Chemical imbalance of the water supply may affect efficiency and cause severe damage to the appliance and associated equipment. Water quality must be professionally analyzed to determine whether it is necessary to treat the water. Various solutions are available to adjust water quality. Adverse water quality will affect the reliability of the system. In addition, operating temperatures above 135°F will accelerate the build-up of lime scale and possibly shorten appliance service life. Failure of an appliance due to lime scale build-up, low pH, or other chemical imbalance IS NOT covered by the warranty.

The water must be potable, free of corrosive chemicals, sand, dirt, and other contaminants. It is up to the installer to ensure the water does not contain corrosive chemicals or elements that can damage the heat exchanger. Potable water is defined as drinkable water supplied from utility or well water in compliance with EPA secondary maximum contaminant levels (40 CFR Part 143.3) as shown in the table below. If the water contains contaminants higher than outlined by the EPA, water treatment is recommended and additional, more frequent maintenance may be required. If you suspect that your water is contaminated in any way, discontinue use of the appliance and contact an authorized technician or licensed professional.

Contaminant	Maximum Allowable Level	Contaminant	Maximum Allowable Level
Total Hardness (Residential Use - Below 140°F water temperature)	200 mg/l (12 grains/gallon)	Manganese	0.05 mg/l or PPM
Total Hardness (Commercial Use - 140°F and above water temperature)	120 mg/l (7 grains/gallon)	pH	6.5-8.5
Aluminum	0.05 to 0.2 mg/l or PPM	Sulfate	205 mg/l or PPM
Chloride	100 mg/l or PPM	Total Dissolved Solids (TDS)	500 mg/l or PPM
Copper	1 mg/l or PPM	Zinc	5 mg/l or PPM
Iron	0.3 mg/l or PPM	Dissolved Carbon Dioxide (CO ₂)	15 mg/l or PPM

Table 2 – Water Chemistry Specifications

- F. FREEZE PROTECTION

CAUTION

Consider appliance piping and installation when determining appliance location.

NOTE: Damages resulting from incorrect installation or from use of products not approved by Rheem ARE NOT covered by warranty.

- G. SCALDING

APPROXIMATE TIME / TEMPERATURE RELATIONSHIPS IN SCALDS

120°F	More than 5 minutes
125°F	1 ½ to 2 minutes
130°F	About 30 seconds
135°F	About 10 seconds
140°F	Less than 5 seconds
145°F	Less than 3 seconds
150°F	About 1 ½ seconds
155°F	About 1 second

Table 3 – Time and Temperature Relationship in Scalds

This heater can deliver scalding water. Be careful whenever using hot water to avoid scalding injury. Certain appliances, such as dishwashers and automatic clothes washers may require increased water temperature. By setting the thermostat on this heater to obtain the increased water temperature required by these appliances, you may create the potential for scald injury.

To protect against injury, you should install a mixing valve in the water system. This valve will reduce point of discharge temperature by mixing cold and hot water in branch supply lines. Such valves are available from your local plumbing supplier.

Table 3 details the relationship of water temperature and time with regard to scald injury and may be used as a guide in determining the safest water temperature for your applications.

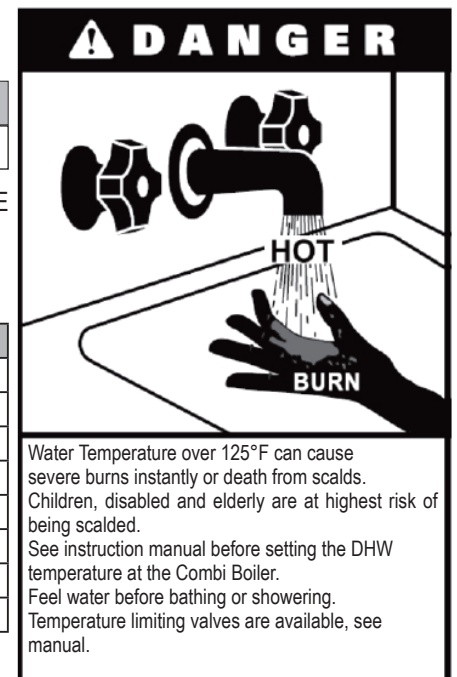
- H. HIGH ELEVATION INSTALLATIONS

WARNING

The water heater is certified for installations up to 2000 ft. (610 m) above sea level. The input rating of this water heater is based on sea level operation. At higher elevations, the actual input rate may be lower than the value listed on the rating label due to the derating of Natural Gas and LP Gas.

For installations above 2000 ft. (610 m) elevation, contact a qualified service technician to make the proper altitude adjustments.

To adjust parameters for high elevation, see INSTALLER MODE, this manual.



PART 3 – TECHNICAL SPECIFICATIONS

Model		120K Heating (199K DHW) Btu/hr	100K Heating (180K DHW) Btu/hr			
Gas Input Rate (DHW mode)	MAX	199,000 Btu/h (58.3 kW/h)	180,000 Btu/h (52.7 kW/h)			
	MIN	18,000 Btu/h (5.2 kW/h)	18,000 Btu/h (5.2 kW/h)			
DHW Capacity	35°F Rise	9.9 GPM (37.4 LPM)	9.0 GPM (34 LPM)			
	45°F Rise	7.7 GPM (29.1 LPM)	7.0 GPM (26.4 LPM)			
	77°F Rise	4.5 GPM (17 LPM)	4.1 GPM (15.5 LPM)			
Gas Input Rate (Heating mode)	MAX	120,000 Btu/h (35.1 kW/h)	100,000 Btu/h (29.3 kW/h)			
	MIN	18,000 Btu/h (5.2 kW/h)	18,000 Btu/h (5.2 kW/h)			
Installation		Indoor Wall Hung				
Flue System		Sealed Combustion Direct Vent, Single Vent				
Max Vent Run		2"(50ft) / 3"(100ft) Schedule 40 PVC, CPVC, PP				
Orifice Size	NG (Gas / Needle)	0.342"(8.7mm) / 0.354"(9.0mm)				
	LP (Gas / Needle)	0.259"(6.6mm) / 0.259"(6.6mm)				
Gas Supply Pressure	NG	3.5" WC to 10.5" WC (0.87 kPa to 2.62 kPa)				
	LP	8.0" WC to 14.0" WC (1.99 kPa to 3.49 kPa)				
Manifold Pressure	Gas Type		NG	LP	NG	LP
	Low Fire	2" / 3" VENT	-0.04" WC (-10 Pa)	-0.04" WC (-10 Pa)	-0.04" WC (-10 Pa)	-0.04" WC (-10 Pa)
	High Fire	2" / 3" VENT	-0.32" WC (-80 Pa)	-0.28" WC (-70 Pa)	-0.28" WC (-70 Pa)	-0.26" WC (-65 Pa)
Power Supply	Main Supply		120VAC 60Hz			
	Maximum Power Consumption		187W(71W+116W Pump)		180W (64W + 116W Pump)	
			120VAC Max 2A External Pump (Optional)			
Ignition System		Direct Electronic Ignition / Automatic Flame Sensing				
Burner System		Premixed Metal Fiber Burner				
Gas Valve System		Air Ratio Valve				
Minimum Flow Activation Flow		0.5 GPM (2 LPM)				
Internal Pipe Material		STS 304, Copper Tubing				
Dimensions		W17.3" – H28.7" – D14.8" (W440mm - H730mm - D375mm)				
Weight		90lb (40kg)				
Water Holding Capacity		Under 2 Gallons (7.5 Liters)				
Control Panel /Circuit Board		P-960C / NGTX-9600C				
Water Pressure	MAX	DHW 150 psi (10.5 kgf/cm ²) / Heating 30 psi (2.1 kgf/cm ²)				
	MIN	DHW 15 psi (1 kgf/cm ²) / Heating 12 psi (0.8 kgf/cm ²)				
Materials	Case	Cold Rolled Carbon Steel				
	Heat Exchanger	Primary Heat Exchanger : STS 304 Secondary Heat Exchanger : STS 304				
Safety Devices		Flame Sensor, High Limit Switch , Gas Leakage Detector , Water Leakage Detector Exhaust Thermistor, Pressure Sensor Heating Supply Thermistor				

Table 4 – Technical Specifications

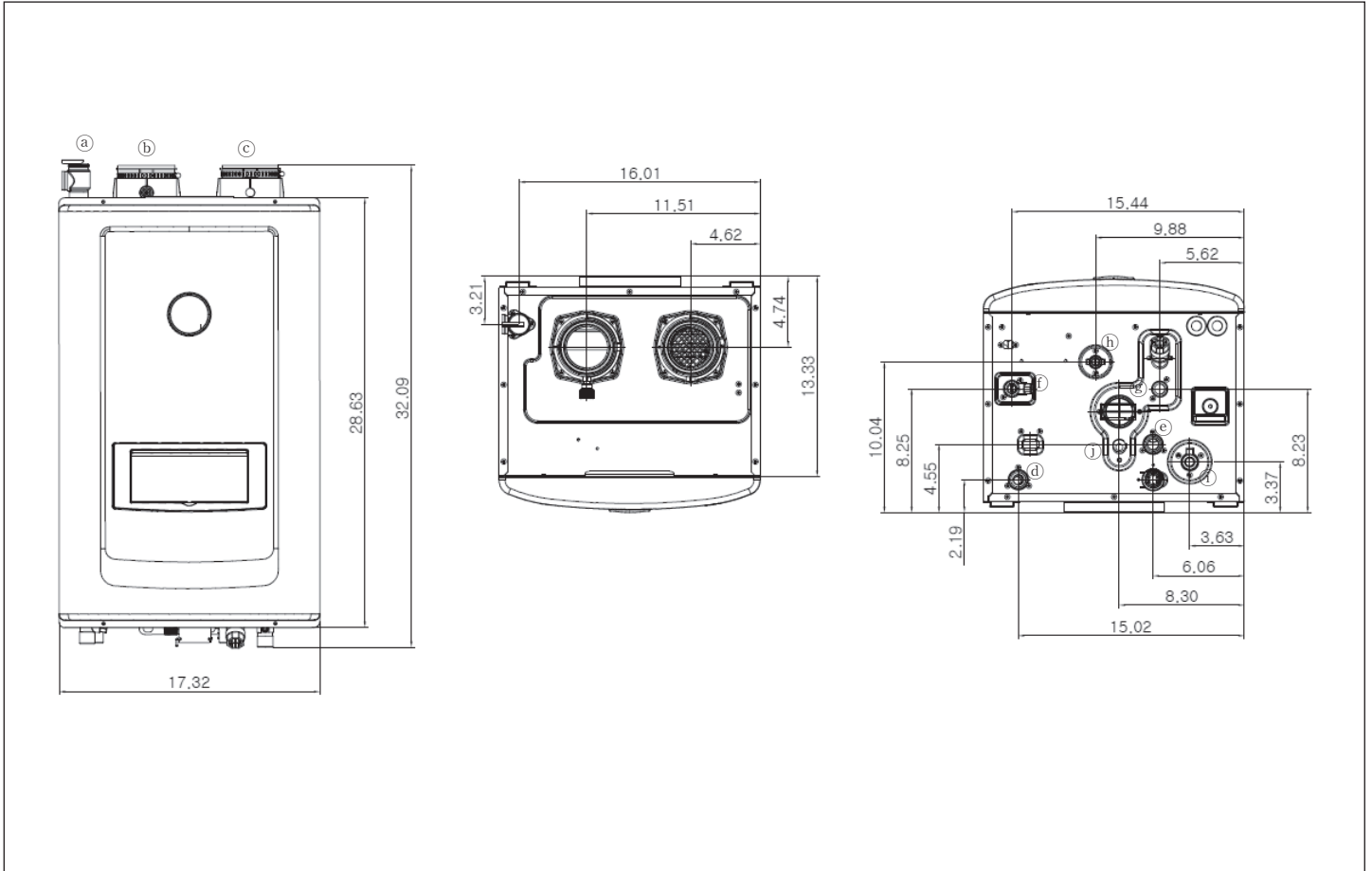


Figure 1 – Specifications and Dimensions

	DESCRIPTION	DIAMETER (ALL NPTM)
(a)	Pressure Relief Valve for Heating	3/4"
(b)	Exhaust Vent Connection	3"
(c)	Intake Pipe Connection	3"
(d)	CH Supply Connection	1"
(e)	CH Return Connection	1"
(f)	DHW Outlet Connection	3/4"
(g)	DHW Inlet Connection	3/4"
(h)	Auto Feeder Inlet Connection	1/2"
(i)	Gas Connection	3/4"
(j)	Condensate Drain Connection	1/2"

Table 5 – Adapter Specifications

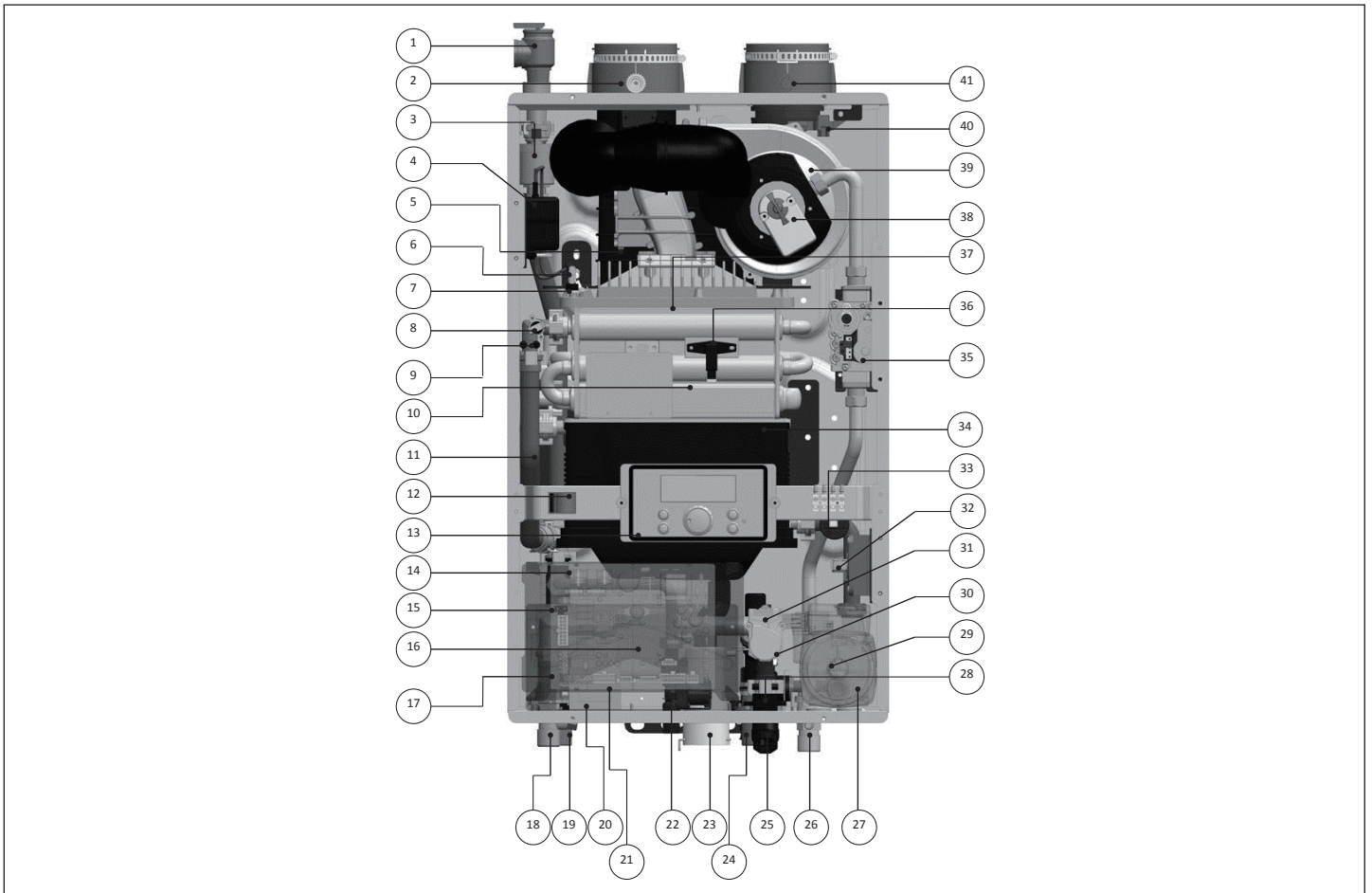


Figure 2 – Model Components

NO	Name of Component	NO	Name of Component	NO	Name of Component
1	Pressure Relief Valve	15	3-Way Valve	29	Heating Return Thermistor
2	Exhaust	16	DHW Plate Heat Exchanger	30	Water Flow Sensor
3	Air Vent	17	DHW Thermistor	31	Flow Control Valve
4	Igniter	18	DHW Connection	32	Air Pressure Switch
5	Exhaust Thermistor	19	Heating Supply Connection	33	Pressure Sensor
6	Ignition Rod	20	Water Leakage Detector	34	Secondary Heat Exchanger
7	Burner Limit Switch	21	AC 24V Transformer	35	Gas Valve
8	High Limit Switch	22	Auto Feeder Connection	36	Flame Sensor
9	Heating Supply Thermistor	23	Condensate Trap	37	Burner
10	Primary Heat Exchanger	24	Heating Return Connection (Filter)	38	AGM (Air Gas Mixer)
11	Heating Outlet Pipe	25	DHW Cold Water Connection	39	Fan Motor
12	Manual Power Switch	26	Gas Connection	40	Air Inlet Filter
13	Control Panel	27	Circulation Pump	41	Air Intake
14	Circuit Board	28	DHW Cold Water Thermistor		

Table 6 – Component List

PART 4 –PREPARE APPLIANCE LOCATION

- A. UNCRATING THE APPLIANCE

IMPORTANT

UNCRATING APPLIANCE – Any claims for damage or shortage in shipment must be filed immediately against the transportation company by the consignee.

CAUTION

Cold weather handling – If appliance has been stored in a very cold location (below 0°F) before installation, handle with care until the plastic components come to room temperature.

Remove all sides of the shipping crate to allow the appliance to be lifted into its installation location.

CAUTION

Carefully consider installation when determining appliance location. Please read the entire manual before attempting installation. Failure to properly take factors such as appliance venting, piping, condensate removal, and wiring into account before installation could result in wasted time, money, and possible property damage and personal injury.

- B. BEFORE LOCATING THE APPLIANCE**⚠ WARNING**

Incorrect ambient conditions can lead to damage to the heating system and put safe operation at risk. Ensure that the appliance installation location adheres to the information included in this manual. Failure to do so could result in property damage, serious personal injury, or death.

CAUTION

Failure of appliance or components due to incorrect operating conditions IS NOT covered by product warranty.

1. Installation Area (Mechanical Room) Operating Conditions

- Ensure ambient temperatures are higher than 32°F/0°C and lower than 104°F/40°C.
- Prevent the air from becoming contaminated by the products, places, and conditions listed in this manual.
- Avoid continuously high levels of humidity
- Never close existing ventilation openings

CAUTION

The service life of the appliance's exposed metallic surfaces, such as the casing, as well as internal surfaces, such as the heat exchanger, are directly influenced by proximity to damp and salty marine environments. In such areas, higher concentration levels of chlorides from sea spray coupled with relative humidity can lead to degradation of the heat exchanger and other appliance components. In these environments, appliances must not be installation using direct vent systems which draw outdoor air for combustion. Such appliances must be installed using room air for combustion. Indoor air will have a much lower relative humidity and, hence, potential corrosion will be minimized.

⚠ WARNING

This appliance is certified for indoor installations only. Do not install the appliance outdoors. Failure to install this appliance indoors could result in substantial property damage, severe personal injury, or death.

This appliance must be installed as described in this manual: upright, with the vent adapters in the vertical position. DO NOT attempt to install this appliance in any other orientation. Doing so will result in improper appliance operation and property damage, and could result in serious personal injury or death.

2. Check for nearby connections to:

- System water piping
- Venting connections
- Gas supply piping
- Electrical power
- Condensate drain

CAUTION

Locate the appliance where any leakage from the relief valve, related piping, tank, or connections will not result in damage to surrounding areas or lower floors of the building. The appliance should be located near a floor drain. RHEEM WILL NOT be held liable for leakage damages.

To conserve water and energy, insulate all water piping, especially the hot and recirculation water lines.

3. Check area around appliance. Remove any combustible materials, gasoline, and other flammable liquids.

⚠ WARNING

Failure to keep appliance area clear and free of combustible materials, liquids, and vapors can result in substantial property damage, severe personal injury, or death.

4. Gas control system components must be protected from dripping water during operation and service.

5. If the appliance is to replace an existing appliance, check for and correct any existing system problems, such as:

- System leaks
- Location that could cause the system and appliance to freeze and leak.
- Incorrectly-sized expansion tank

⚠ WARNING

Do not connect the appliance to any heating systems or components that have been previously used for non-potable applications.

Do not introduce toxic chemicals, such as antifreeze or appliance treatments, into the appliance or any piping meant for potable water purposes.

Ensure that all piping and components connected to the appliance are suitable for potable water applications.

Do not use this appliance only for space heating applications.

Failure to follow these instructions could result in property damage, personal injury, or death.

6. Clean and flush system when reinstalling an appliance.

NOTE: When installing in a zero clearance location, it may not be possible to read or view some product labeling. It is recommended to make note of the appliance model and serial number.

- C. LEVELING

To save time and money, review the following initial diagnostic steps before calling for service.

CAUTION

In order for the condensate to properly flow out of the collection system, the appliance must be installed level. Failure to ensure the appliance is installed level will result in improper appliance operation.

- D. CLEARANCES FOR SERVICE ACCESS

See Figure 3 and Table 7 for recommended service clearances. If these minimum clearances are not provided, it may not be possible to service the appliance without removing it from the space.

⚠ WARNING

Space must be provided with combustion/ventilation air openings correctly sized for all other appliances located in the same space as the appliance. The appliance cover must be securely fastened to prevent it from drawing air from the appliance room. This is particularly important if the appliance is in a room with other appliances. Failure to comply with the above could result in substantial property damage, severe personal injury, or death.

MINIMUM CLEARANCES

Installation Clearances from Non-Combustibles / Combustibles	Recommended Service and Proper Operation Clearances
Top	18 in. (45.7 cm)
Back	0 in. (0 cm)
Bottom	12 in. (30.45 cm)
Front	24 in. (60.9 cm)
Right Side	3 in. (7.6 cm)
Left Side	

Table 7 – Minimum Installation and Service Clearances

NOTE: 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.

MINIMUM CLEARANCES FROM COMBUSTIBLE MATERIALS

- Hot water pipes – at least 1"(2.5cm) from combustible materials.
- Exhaust vent pipe – at least 1"(2.5cm) from combustible materials

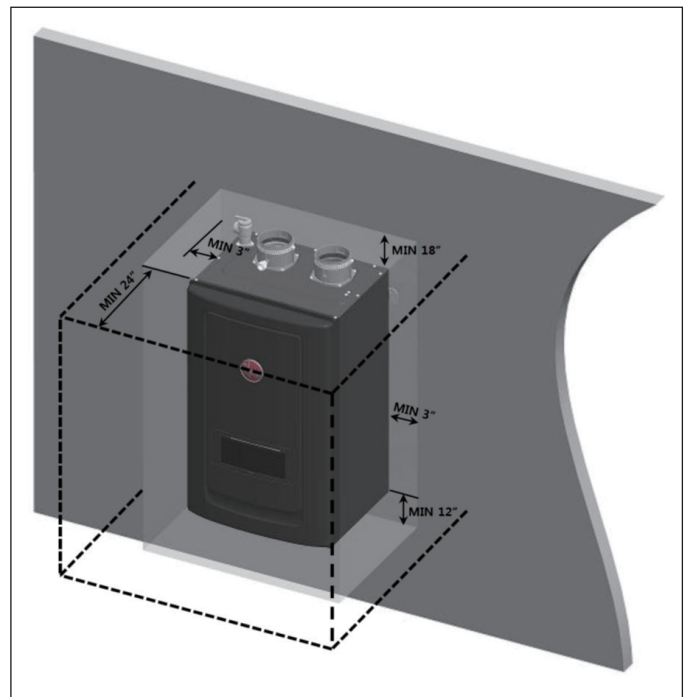


Figure 3 – Minimum Service Clearances

CAUTION

Always take future maintenance into consideration when locating the appliance. If the appliance is located in an installation location with limited clearances, it may be necessary to remove the appliance from the space to perform maintenance. Failure to consider maintenance when determining installation location could result in property damage.

- E. RESIDENTIAL GARAGE AND CLOSET INSTALLATIONS

CAUTION

Check with your local Authority Having Jurisdiction for requirements when installing appliance in a garage or closet. Please read the entire manual before attempting installation. Failure to properly take factors such as venting, piping, condensate removal, and wiring into account before installation could result in wasted time, money, and possible property damage and personal injury.

PRECAUTIONS

If the appliance is located in a residential garage, it should be installed per the latest edition of the National Fuel Gas Code, ANSI Z223.1, and CAN/CSA B149 Installation Code in Canada.

- Mount the bottom of the appliance a minimum of 18" above the floor of the garage, to ensure the burner and ignition devices are well off the floor.
- Locate or protect the appliance so it cannot be damaged by a moving vehicle.

⚠ WARNING

The space must be provided with correctly sized combustion/ventilation air openings for all other appliances located in the space with the appliance. For power venting installations using room air for combustion, refer to the venting section, this manual, for descriptions of confined and unconfined spaces. Do not install the appliance in an attic. Failure to comply with these warnings could result in substantial property damage, severe personal injury, or death.

- F. EXHAUST VENT AND INTAKE PIPE

⚠ WARNING

Vents must be properly supported. The appliance exhaust and intake connections are not designed to carry heavy weight. Vent support brackets must be within 1' of the appliance and the balance at 4' intervals. Venting must be readily accessible for visual inspection for the first 3' from the appliance.

NOTE: To prevent combustion air contamination, see Table 9 in this section when considering exhaust vent and intake pipe termination.

The appliance is rated ANSI Z21.13 Category IV (pressurized vent, likely to form condensate in the vent), and requires a special vent system designed for pressurized venting.

Exhaust vent and intake pipe may be vented vertically through the roof or out a side wall. Venting methods are detailed in the Venting Section. Do not attempt installation using any other means. Be sure the appliance exhaust vent and intake can be routed through the building and properly terminated. Exhaust vent and intake piping lengths, routing, and termination method must comply with methods and limits given in the venting section.

- G. CARBON MONOXIDE DETECTORS

In the Commonwealth of Massachusetts and As Required by State and Local Codes

Installation of Carbon Monoxide Detectors: At the time of installation or replacement of the vented gas fueled appliance, 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 appliance is installed, unless the appliance is located in a detached, uninhabitable structure separate from the dwelling, building, or structure used in whole or in part for residential purposes.

In addition, 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 each additional level of the dwelling, building, or structure served by the vented gas appliance. It shall be the responsibility of the property owner to secure the service of qualified licensed professionals for the installation of hard wired carbon monoxide detectors.

- In the event that the vented gas fueled appliance is installed in a crawl space or attic, the hard wired carbon monoxide detector with alarm and battery back-up shall be installed on the next adjacent floor level.
- In the event that these requirements cannot be met at the time of completion of installation, the owner shall have a period of thirty (30) days to comply with the above requirements; provided, however, that during said thirty (30) day period, a battery operated carbon monoxide detector with an alarm shall be installed.

⚠ WARNING

Failure to comply with these requirements could result in product damage, severe personal injury, or death.

Approved Carbon Monoxide Detectors: Each carbon monoxide detector as required in accordance with the above provisions shall comply with NFPA 70 and be ANSI/UL 2034 listed and CSA certified.

- H. PREVENT COMBUSTION AIR CONTAMINATION

Install intake piping for the appliance as described in the Venting section. Do not terminate exhaust in locations that can allow contamination of intake air.

⚠ WARNING

Ensure that the intake air will not contain any of the contaminants below. For example, do not pipe intake near a swimming pool. Avoid areas subject to exhaust fumes from laundry facilities. These areas always contain contaminants. Contaminated air will damage the appliance, resulting in possible substantial property damage, severe personal injury, or death.

PRODUCTS TO AVOID	AREAS LIKELY TO HAVE CONTAMINANTS
Spray cans containing fluorocarbons	Dry cleaning/laundry areas and establishments
Permanent wave solutions	Swimming pools
Chlorinated waxes/cleaners	Metal fabrication plants
Chlorine-based swimming pool chemicals	Beauty shops
Calcium chloride used for thawing	Refrigeration repair shops
Sodium chloride used for water softening	Photo processing plants
Refrigerant leaks	Auto body shops
Paint or varnish removers	Plastic manufacturing plants
Hydrochloric or Muriatic acid	Furniture refinishing areas and establishments
Cements and glues	New building construction
Antistatic fabric softeners used in clothes dryers	Remodeling areas
Chlorine-type bleaches, laundry detergents, and cleaning solvents	Garages and workshops
Adhesives used to fasten building products	

Table 8 – Products and Areas Likely to Have Contaminants

NOTE: DAMAGE TO THE APPLIANCE CAUSED BY EXPOSURE TO CORROSIVE VAPORS IS NOT COVERED BY WARRANTY.
(Refer to the limited warranty for complete terms and conditions).

- I. REMOVING AN APPLIANCE FROM A COMMON VENT SYSTEM

⚠ DANGER

Do not install the appliance into a common vent with any other appliance. This will cause flue gas spillage or appliance malfunction, resulting in possible substantial property damage, severe personal injury, or death.

⚠ DANGER

Failure to follow all instructions can result in flue gas spillage and carbon monoxide emissions, causing severe personal injury or death.

⚠ WARNING

Breathing Hazard – Carbon Monoxide Gas



- Do not operate heater if flood damaged.
- Install vent system in accordance with local codes and manufacturers installation instructions.
- Do not obstruct heater air intake or exhaust, Support all vent piping per manufacturers installation instructions.
- Do not place chemical vapor emitting products near unit.
- According to NFPA 720, carbon monoxide detectors should be installed outside each sleeping area.
- Never operate the heater unless it is vented to the outdoors.
- Analyze the entire vent system to make sure that condensate will not become trapped in a section of vent pipe and therefore reduce the open cross sectional area of the vent.

Breathing carbon monoxide can cause brain damage or death. Always read and understand instruction manual.

Figure 4 – CO Warning Label

When removing an existing heater, follow the steps below.

1. Seal any unused openings in the common venting system.
2. Visually inspect the venting system for proper size and horizontal pitch to determine if there is blockage, leakage, corrosion, or other deficiencies that could cause an unsafe condition.
3. If practical, close all building doors, windows, and doors between the space in which the water heater remains connected to the common venting system and other spaces in the building. Turn on clothes dryers and any appliances not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, at maximum speed. Do not operate a summer exhaust fan. Close all fireplace dampers.
4. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust the thermostat so the 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.
6. After it has been determined that each appliance remaining connected to common venting system properly vents when tested as outlined, 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 to the National Fuel Gas Code, ANSI Z223.1. 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 Appendix G in the National Fuel Gas Code, ANSI Z 223.1.

- J. WALL-MOUNTING THE APPLIANCE

⚠ WARNING

The appliance must be installed on a wall that can bear its weight (more than 90 lbs. when fully plumbed and full of water). Installing the appliance on a wall which cannot support its weight could result in property damage, personal injury, or death.

The appliance may be installed on any suitable internal wall (suitable sound-proofing may be required when installing onto a stud partition wall).

⚠ WARNING

This appliance is too heavy for one person to lift. It is highly recommended to install the appliance with two people. Use caution as to not drop the appliance, which could damage the appliance and cause property damage and/or severe personal injury. Verify that the appliance is properly and securely mounted before leaving unsupervised. Failure to comply with the above and properly mount the appliance could result in substantial property damage, severe personal injury, or death.

⚠ WARNING

This wall mounting system is not seismic rated and should not be applied as such. Failure to comply with the above and properly mount the appliance could result in substantial property damage, severe personal injury, or death.

POSITIONING THE APPLIANCE ON THE WALL

1. Attach the wall bracket on the location where you want to install the appliance. Ensure it is level and on stud (16" centers) before proceeding.
2. Mark the two drill holes with a pencil or marker. Remove the wall bracket.
3. Drill two (2) holes using a 5/32 drill bit at the marked hole locations.
4. Mount the wall bracket to the wall with the two (2) included anchor bolts. Ensure the mounted bracket is level. See Figure 5A.
5. Align the heater bracket grooves on the back of the appliance with the tongues on the wall bracket and hang the appliance on the bracket. See Figure 5B.

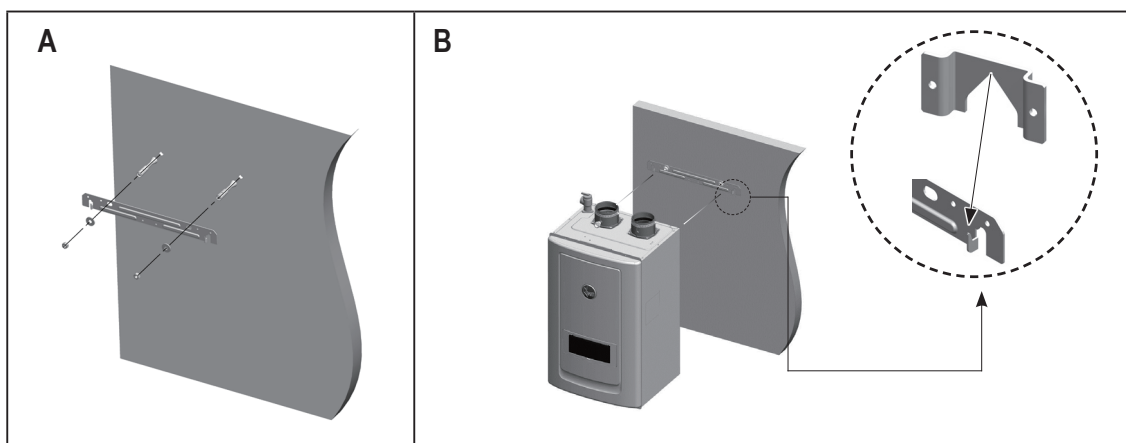


Figure 5 – Wall Mounting the Appliance

PART 5 – VENTING

DANGER

Vent this appliance in accordance with these instructions. Failure to do so will result in property damage, severe personal injury, or death.

WARNING

DO NOT mix vent systems or materials unless specifically told to do so in this manual.

DO NOT thermally insulate the exhaust vent or intake pipes.

DO NOT use an electric damper, vent damper, or draft hood with this appliance.

DO NOT locate the exhaust vent or intake pipe terminations where exposed to prevailing winds.

Moisture will be produced by the exhaust vent. Take precautions when determining exhaust vent termination. Moisture may fall from the vent termination to the ground and turn to ice in freezing conditions. Moisture or ice can produce a hazardous condition.

Exhaust condensate is acidic, and could deteriorate the surface below the exhaust vent termination. Ensure this surface is in good repair (sealed, painted, etc.) to prevent deterioration.

Pitch the exhaust vent pipe $\frac{1}{4}$ " per foot back to the appliance. This ensures that condensate in the exhaust vent returns to the appliance and drains properly.

Failure to follow these instructions could result in property damage, severe personal injury, or death.

▪ **A. INTAKE PIPE AND EXHAUST VENT GUIDELINES**

1. Vent system must be installed in accordance with local codes, or, in absence of local codes, the National Fuel Gas Code, ANSI Z223.1 / NFPA 54 and/or CSA B149.1, Natural Gas and Propane Installation Code.
2. For installation in Canada, installer supplied plastic vent piping must comply with CAN/CSA B149.1 and be certified to the Standard for Type BH Gas Venting Systems, ULC-S636. Components of this listed system must not be interchanged with other vent systems or unlisted pipes or fittings. All plastic components and specified primers and glues must be from a single system manufacturer and must not be intermixed with another system manufacturer's products. Clean and dry all applicable surfaces before applying cement.
3. This appliance is designed to be installed in a power vent (using indoor air for combustion and vented to the outdoors) type, or as a direct vent (sealed combustion) type. In power vent installations, indoor air is used for combustion and exhaust gases are vented directly to the outdoors through a sealed exhaust vent piped through the wall or roof. In direct vent installations, combustion air must be supplied directly from the outdoors to the burner, and the flue (exhaust) gases should be vented directly to the outdoors through the wall or roof.
4. This appliance uses 2" or 3" diameter pipe for exhaust vent and intake pipe. It is important to ensure an airtight seal from the appliance collar to the vent terminations. See Table 10 for a list of Approved Vent Materials.
5. Do not install venting system components on the exterior of the building except as specifically required by these instructions.
 - Vent terminals must be at least 1 foot from any door, window, or gravity inlet into the building.
 - Maintain the correct clearance and orientation between the exhaust vent and intake pipe terminals.
 - The exhaust vent and air intake terminals must be at the same height and their center lines must be spaced apart 1 foot minimum.
 - The bottom of the exhaust vent and intake pipe terminals must be at least 1 foot above the normal snow accumulation level. In no case should these terminals be installed less than 1 foot above normal snow accumulation level.
 - Do not install the exhaust vent terminals directly above windows or doors.
 - Intake pipe terminal must not terminate in areas that might contain combustion air contaminants, such as near swimming pools.
 - For sidewall venting, the minimum horizontal distance between adjacent exhaust vent terminations is 1 foot. It is recommended this distance be greater than 1 foot to better avoid frost damage to building surfaces.
 - For roof venting, minimum horizontal distance between any adjacent exhaust vent termination is 1 foot.
 - If the exhaust vent is to be terminated in a walled off area (such as a roof with a parapet wall), ensure the exhaust vent terminates a minimum of 10' from nearest wall and extends level with or above the top of the wall. This will ensure flue gas does not get trapped and possibly recirculated into the intake air pipe, which could contaminate the combustion air.
 - Do not locate vent over public walkways, driveways, or parking lots. Condensate could drip and freeze, resulting in a slip hazard or damage to vehicles and machinery.

- DO NOT vent near soffit vents, crawl space vents, or other areas where condensate or vapor could create a nuisance or hazard or cause property damage.
- DO NOT vent where condensate vapor could cause damage or could be detrimental to the operation of regulators, relief valve, or other equipment.
- Maximum Snow Level Determination: These installation instructions reference snow levels in establishing a minimum height for the installation of exhaust vent or air intake terminations. Snow levels shall be determined as follows:
 - a. The installation location may, by ordinance, designate how snow levels are calculated in that location; or
 - b. In the absence of specific ordinances, snow levels shall be calculated from the average monthly maximum depth of snow accumulation as indicated by the National Weather Service's 10 year statistics for the installation location/geographical area.

In addition:

- Total length of vent piping shall not exceed the limits specified in this manual.
- The flue products coming from the exhaust vent will create a large plume when the heater is in operation. Avoid venting in areas that will affect neighboring buildings or be considered objectionable.
- DO NOT locate exhaust vent or intake pipe in a parking area where machinery may damage the pipe.

In the Commonwealth of Massachusetts and as Required by State and Local Codes:

- The vented gas fueled appliance shall not be installed so its combustion, ventilation, or dilution air is obtained from a bedroom or bathroom.
- Signage: Whenever any through-the-wall (horizontal or sidewall) vent is installed less than seven feet above the finished grade, a metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight feet above grade directly in line with the exhaust vent terminal. The sign shall read, in print no less than 0.5 inches in size, "GAS VENT DIRECTLY BELOW. KEEP CLEAR OF ALL OBSTRUCTIONS".
- Marking of Exhaust Vent and Intake Pipe: Piping used for ventilation, make-up, or combustion air intake shall be labeled as follows:
 - a. Throughout the entire developed length:
 - i. Labels must be placed every ten feet for exposed/visible piping; or
 - ii. Labels must be placed every three feet for concealed piping.
 - b. At all changes of direction;
 - c. On each side of a penetration through a partition, wall or ceiling; and
 - d. The labels shall be black lettering that:
 - i. Indicates that the piping is used for ventilation, make-up, or combustion air intake, and
 - ii. The letters shall be sized equal to a minimum of the pipe diameter. However, for piping with a diameter exceeding two inches, said lettering does not need to be larger than two inches.

 WARNING

The building owner is responsible for keeping the exhaust and intake terminations free of snow, ice, or other potential blockages, as well as scheduling routine maintenance. Failure to keep the vent piping terminations clear and properly maintain the heater could result in property damage, severe personal injury, or death.

For each floor containing bedroom(s), a carbon monoxide detector and alarm shall be placed in the living area outside the bedrooms, as well as in the room that houses the heater. Detectors and alarms shall comply with NFPA 720 (latest edition). Failure to comply with these requirements could result in product damage, severe personal injury, or death.

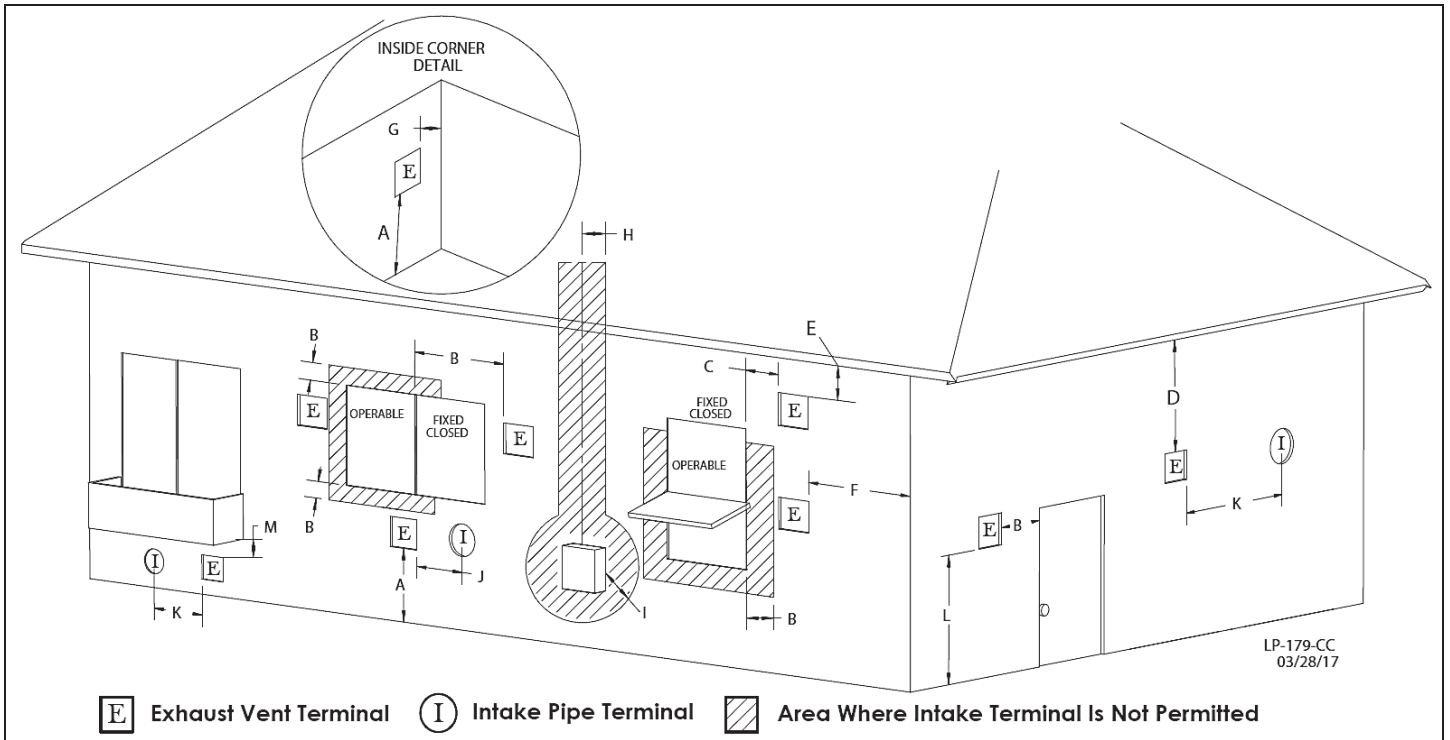


Figure 6 – Vent Termination Detail

	DESCRIPTION	US	CANADA
A	Clearance above grade, veranda, porch, deck, or balcony	1 foot (30 cm)	
B	Clearance to window or door that may be opened	Direct Vent	36 in (91 cm)
		Power Vent	
C	Clearance to permanently closed window	*	
D	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet from the center line of the terminal	*	
E	Clearance to unventilated soffit	*	
F	Clearance to outside corner	*	
G	Clearance to inside corner	*	
H	Clearance to each side of center line extended above meter / regulator assembly	*	
I	Clearance to service regulator vent outlet	*	Above a regulator within 3 feet (91 cm) horizontally of the vertical center line of the regulator vent outlet to a maximum vertical distance of 15 ft (4.5 m)
J	Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other appliance	Direct Vent	3 feet (91 cm)
		Power Vent	
K	Clearance to a mechanical air supply inlet	3 feet above if within 10 feet horizontally	6 feet (1.83 cm)
L	Clearance above paved sidewalk or driveway located on public property	Direct Vent	7 feet (2.13 m)
		Power Vent	
M	Clearance under veranda, porch, deck, or balcony	1 foot (30 cm)	

Table 9 – Vent Termination Clearances

NOTE: For clearances not specified in ANSI Z223.1/NFPA 54 or CAN/CSA-B 149.1, please use clearances in accordance with local installation codes and the requirements of the gas supplier.

- B. APPROVED VENT MATERIALS

NOTICE

Consult Table 10 or the most recent edition of ANSI Z223.1/NFPA 54 or CAN/CSA B149.1 as well as all applicable local codes and regulations when selecting vent pipe materials.

APPROVED EXHAUST VENT AND INTAKE PIPE MATERIAL			
Item	Material	Standards for Installation in:	
		United States	Canada
Exhaust vent or Intake pipe and fittings	CPVC schedule 40	ASTM-D2846	PP, CPVC, and PVC venting must be ULC-S636 Certified. IPEX is an approved manufacturer in Canada, supplying vent material listed to ULC-S636.
	PVC schedule 40	ANSI/ASTM D1785	
	Polypropylene	ULC-S636, UL-1738	
	Stainless Steel AL29-4C	Certified for Category IV and direct vent appliance venting	Certified for Category IV and direct vent appliance venting
Pipe Cement	PVC	ANSI/ASTM D2564	IPEX System 636 Cements & Primers
	CPVC	ANSI/ASTM F493	
Pipe Primer	PVC / CPVC	ASTM F656	

Table 10 – Approved Venting Materials

⚠ DANGER

- The Exhaust and intake venting installed with this Combi Boiler must be approved materials listed above. DO NOT REMOVE the factory installed vent collars. Doing so WILL VOID warranty.
 - PVC/CPVC pipe and fittings of the same diameter are considered interchangeable.
 - Use of cellular core pipe PVC (ASTM F891), cellular core CPVC, or Radel® (polyphenylsulfone) in nonmetallic venting systems is prohibited.
 - DO NOT connect PVC/CPVC to Polypropylene without an approved vent connector.
 - Any transition to Polypropylene MUST be done in the vertical within five (5) feet of the appliance.
 - When installing AL29-4C vent piping, install a PVC-to-stainless adapter at the water heater vent connection, and at the termination when using a RHEEM PVC termination kit. DO NOT mix AL29-4C piping from different manufacturers unless using adapters specifically designed for the purpose by the manufacturer.
 - Covering non-metallic vent pipe and fittings with thermal insulation is prohibited.
 - DO NOT obstruct the flow of combustion or ventilation air.
 - When using Pipe Cement/Primer, follow the instructions included with the Cement/Primer closely. Clean and dry all applicable surfaces before applying.
- Failure to follow these directions will result in substantial property damage, severe personal injury, or death.

⚠ WARNING

Vent adaptors are not designed as load-bearing devices, and must not be used to support exhaust vent piping. All vent pipes must be properly connected, supported, and the exhaust must be pitched a minimum of ¼" per foot back to the appliance to allow drainage of condensate. Failure to properly support vent piping and follow the information in this statement could result in product damage, severe personal injury, or death.

CAUTION

High heat sources (sources generating heat 100°F / 37°C or greater, such as stove pipes, space heaters, etc.) may damage plastic components of the appliance as well as plastic vent pipe materials. Such damages ARE NOT covered by warranty. It is recommended to keep a minimum clearance of 8" from high heat sources. Observe heat source manufacturer instructions, as well as local, state, provincial, and national codes, laws, regulations and ordinances when installing this appliance and related components near high heat sources.

- C. ALLOWED COMBINED VENT LENGTHS

2" VENT				3" VENT			
EXHAUST (EQUIVALENT LENGTHH)		INTAKE (EQUIVALENT LENGTHH)		EXHAUST (EQUIVALENT LENGTHH)		INTAKE (EQUIVALENT LENGTHH)	
MINIMUM	MAXIMUM	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
14' (4.2M)	50' (15M)	14' (4.2M)	50' (15M)	14' (4.2M)	100' (30M)	14' (4.2M)	100' (30M)

Table 11 – Approved Vent Lengths

Total equivalent vent length should not exceed fifty (50) feet (15M) in 2" pipe, or one hundred (100) feet (30M) in 3" pipe for the exhaust venting. Total equivalent vent length should not exceed fifty (50) feet (15M) in 2" pipe, or one hundred (100) feet (30M) in 3" pipe for the intake piping.

- a. The equivalent lengths of friction loss in elbows are listed below:
- 5 feet (1.5M) for each additional 3" 90° elbow
 - 2.5 feet (.75M) for each additional 3" 45° elbow
 - 8 feet (2.4M) for each additional 2" 90° elbow
 - 4 feet (1.2M) for each additional 2" 45° elbow
 - Some terminations are considered elbows, and deduction should be applied. For example, a turndown 90° or an open T termination should be considered a 90° elbow.
 - For 2" diameter installations, install a reducing coupling in a vertical section of pipe ABOVE the pipe clamp installed on the Boiler. See Figure 8.
- b. For example: If the 2" exhaust vent has two 90° elbows and 10 feet of PVC pipe we will calculate: Exhaust Vent Equivalent Length = (2x8) + 10 = 26 feet.
- Further, if the 2" intake pipe has one 90° elbow, one 45° elbow, and 10 feet of PVC pipe, the following calculation applies: Intake Pipe Equivalent Length = 8 + 4 + 10 = 22 feet.

NOTE: The intake pipe and exhaust vent lengths do not have to be of equal length. There is no balancing requirement between intake and exhaust.

⚠ WARNING

Vent adaptors are not designed as load-bearing devices, and must not be used to support exhaust vent piping. All vent pipes must be properly connected, supported, and the exhaust must be pitched a minimum of ¼" per foot back to the boiler to allow drainage of condensate. Failure to properly support vent piping and follow the information in this statement could result in product damage, severe personal injury, or death.

CAUTION

Failure to provide a minimum total vent length of 14 equivalent feet could result in property damage and improper appliance operation.

CAUTION

This Combi Boiler has a built-in control to limit the exhaust temperature to 149°F (65°C).
As a result, the Combi Boiler can be vented with Schedule 40 PVC.
In high temperature applications, the exhaust temperature can exceed 149°F (65°C).
In that case, you must use Schedule 40 CPVC or Approved Polypropylene (PP) in the USA or Type BHSpecial Gas Vent Class IIB (CPVC) or Class IC(Polypropylene) that conforms to ULC-S636 in Canada.

PVC Venting

This Combi Boiler is set to "PVC" (factory default). The Combi Boiler will control and maintain the exhaust temperature below 144°F (62°C) and the Combi Boiler will shut down when the exhaust temperature exceeds 149°F (65°C).

CPVC or Polypropylene(PP) Venting

When you design a high temperature application (the exhaust temperature can exceed 149°F (65°C)), you must use Schedule 40 CPVC or Approved Polypropylene (PP) in the USA or Type BH Special Gas Vent Class IIB (CPVC) or Class IC(Polypropylene) that conforms to ULC-S636 in Canada and must change the Vent Material Setting as follows.

In this case, the Combi Boiler will control and maintain the exhaust temperature below 195°F (90.5°C) and the Combi Boiler will shut down when the exhaust temperature exceeds 200°F (93°C).

▪ D. TIGHTENING APPLIANCE COLLAR TO EXHAUST VENT AND INTAKE PIPE

This appliance uses 2" or 3" diameter pipe for exhaust vent and intake pipe. In order to use 2" pipe, it is required to reduce pipe size in a vertical length of pipe with a reducing coupling (not included). Follow the steps below to install 2" or 3" pipe into the appliance collar. See Figure 7 & 8 for additional details.

1. Clean and dry the appliance connection. DO NOT use primer or cement on the appliance connection.
2. Tighten the clamps using a screwdriver.
3. Ensure the pipe is secure before continuing installation.
4. For 2" installations, install a reducing coupling in a vertical section of pipe. See Figure 8.

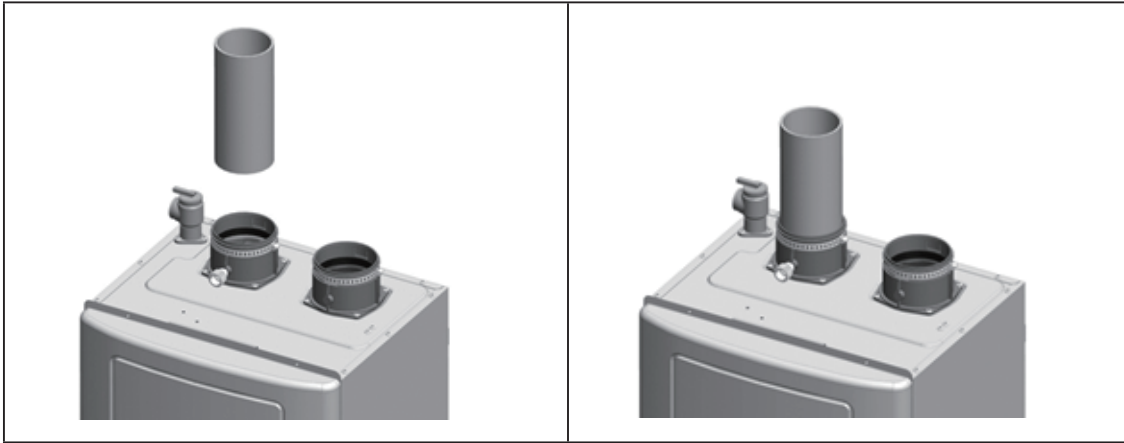


Figure 7 – Installing the 3" Pipe into the Exhaust Vent Connection

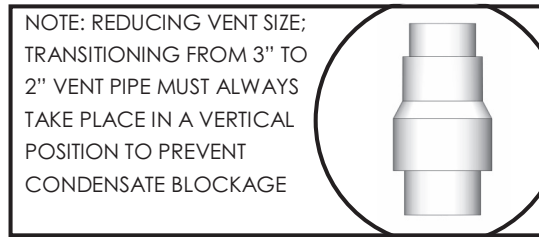


Figure 8 – Transitioning from 3" to 2" Vent Pipe

- E. VENT TERMINATION

1. Direct Vent, Two Pipe Roof and Sidewall Vent Terminations

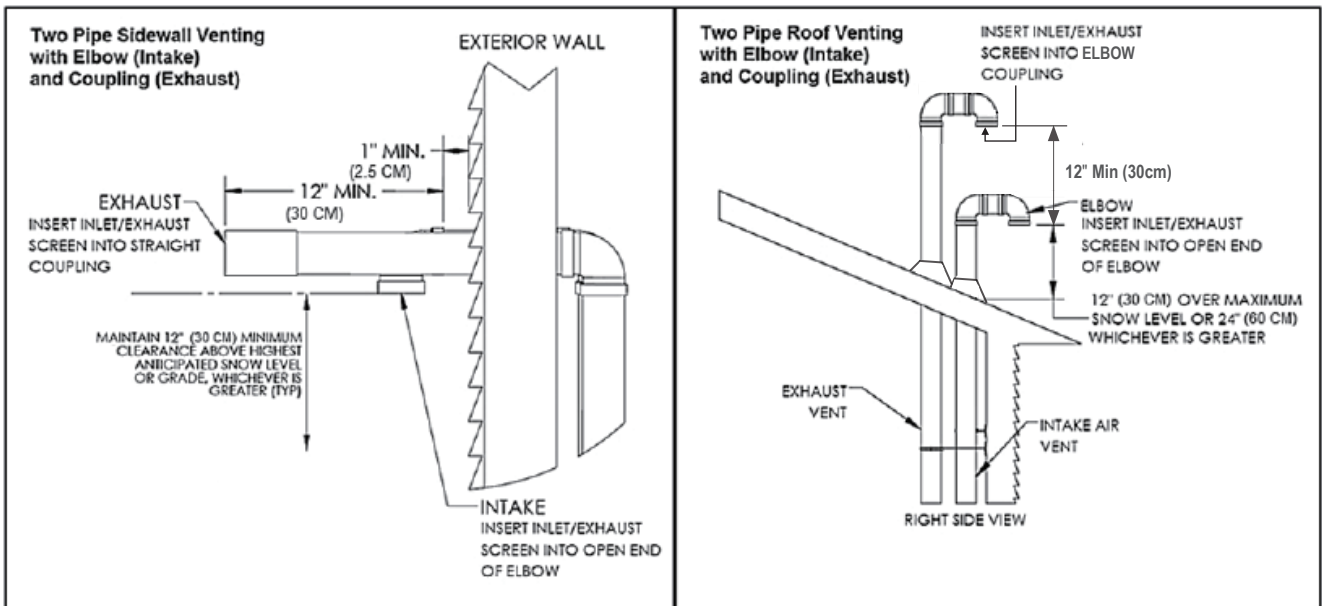


Figure 9 – Direct Vent, Roof and Sidewall Vent Terminations

⚠ WARNING

All PVC vent pipes must be glued, properly supported, and the exhaust must be pitched a minimum of 1/4" per foot back to the appliance to allow drainage of condensate. When placing support brackets on vent piping, the first bracket must be within 1 foot of the appliance and the balance at 4 foot intervals on the vent pipe. Appliance venting must be readily accessible for visual inspection for the first three feet from the appliance.

2. Direct Vent, Optional Horizontal and Vertical Vent Kits

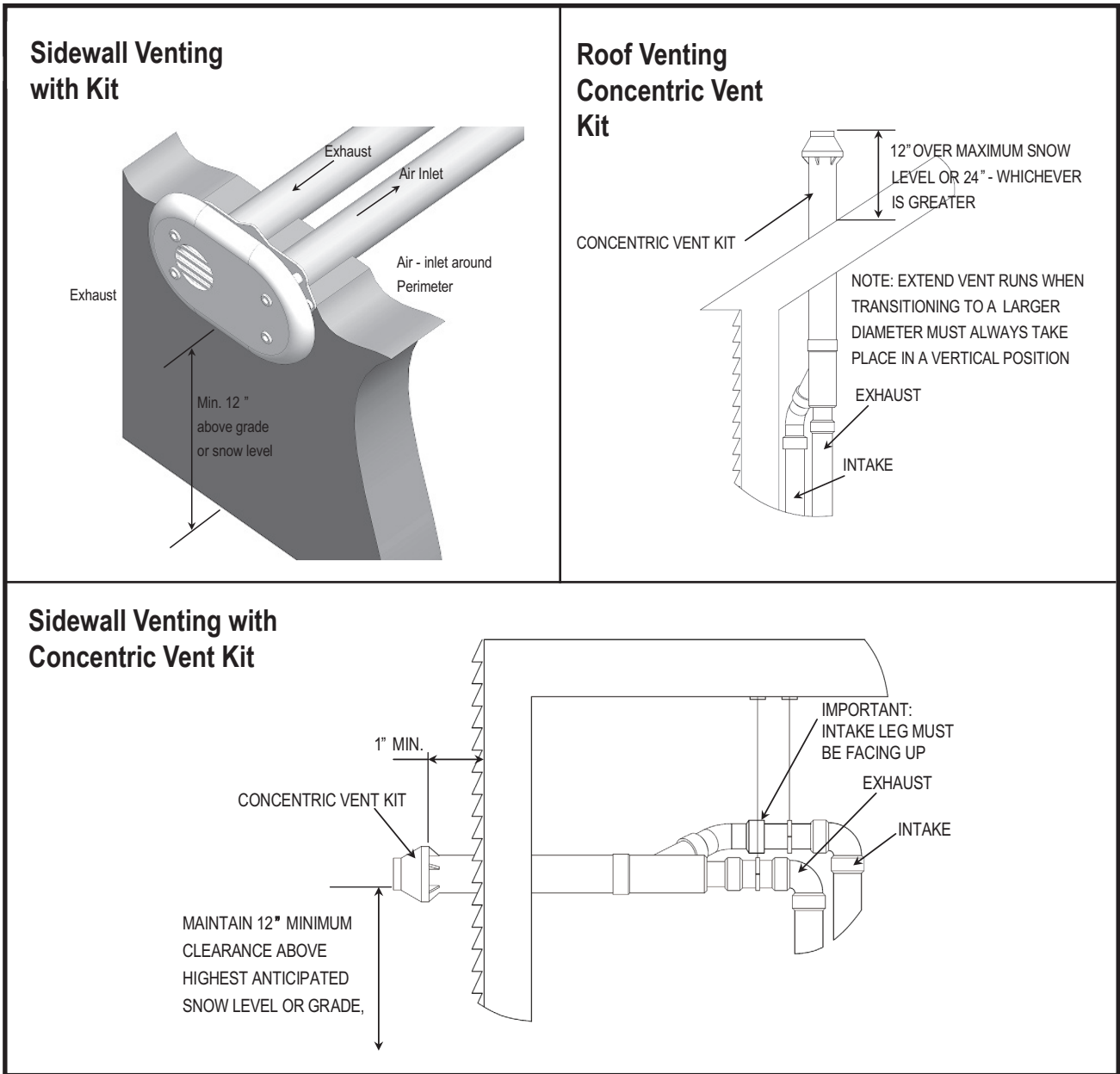


Figure 10 – Direct Vent, Vent Terminations (with Optional Kits)

⚠ WARNING

All PVC vent pipes must be glued, properly supported, and the exhaust must be pitched a minimum of 1/4" per foot back to the appliance to allow drainage of condensate. When placing support brackets on vent piping, the first bracket must be within 1 foot of the appliance and the balance at 4 foot intervals on the vent pipe. Appliance venting must be readily accessible for visual inspection for the first three feet from the appliance.

3. Screen Installation

After connecting the intake air and exhaust vent pipes, it is required to install the included screens into the exhaust vent and intake pipe terminations to prevent damages to the unit due to blockages. Clean the vent terminations and glue the screens into the terminations. See Figure 13 for installation detail.

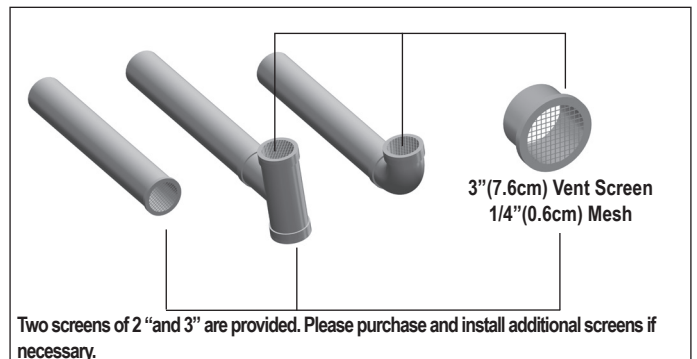


Figure 11 – Screen Installation

SAFETY INSTRUCTIONS

Do not connect any other appliance vents to the appliance exhaust vent or intake pipes.

4. Power Venting, Indoor Combustion Air Installation in Confined or Unconfined Space

This heater requires fresh, uncontaminated air for safe operation and must be installed in a mechanical room where there is adequate combustion and ventilating air. NOTE: To prevent combustion air contamination, see Table 8.

Combustion air from the indoor space can be used if the space has adequate area or when air is provided through a duct or louver to supply sufficient combustion air based on the heater input. Never obstruct the supply of combustion air to the heater. If the heater is installed in areas where indoor air is contaminated (see Figure 13) it is imperative that the heater be installed as direct vent so that all combustion air is taken directly from the outdoors into the heater intake connection.

Unconfined space is space with volume greater than 50 cubic feet per 1,000 Btu/hour (4.8 cubic meters per kW) of the total input rating of all fuel-burning appliances installed in that space. Rooms connected directly to this space, through openings not furnished with doors, are considered part of the space.

Confined space is space with volume less than 50 cubic feet per 1,000 Btu/hour (4.8 cubic meters per kW) of the total input rating of all fuel-burning appliances installed in that space. Rooms connected directly to this space, through openings not furnished with doors, are considered part of the space.

When drawing combustion air from inside a conventionally constructed building to a confined space, such space should be provided with two permanent openings: one located 6" (15 cm) below the space ceiling, the other 6" (15cm) above the space floor. Each opening should have a free area of one square inch per 1,000 Btu/hr (22cm²/kW) of the total input of all appliances in the space, but not less than 100 square inches (645cm²).

If the confined space is within a building of tight construction, air for combustion must be obtained from the outdoors as outlined in the Venting section of this manual. See Figure 13.

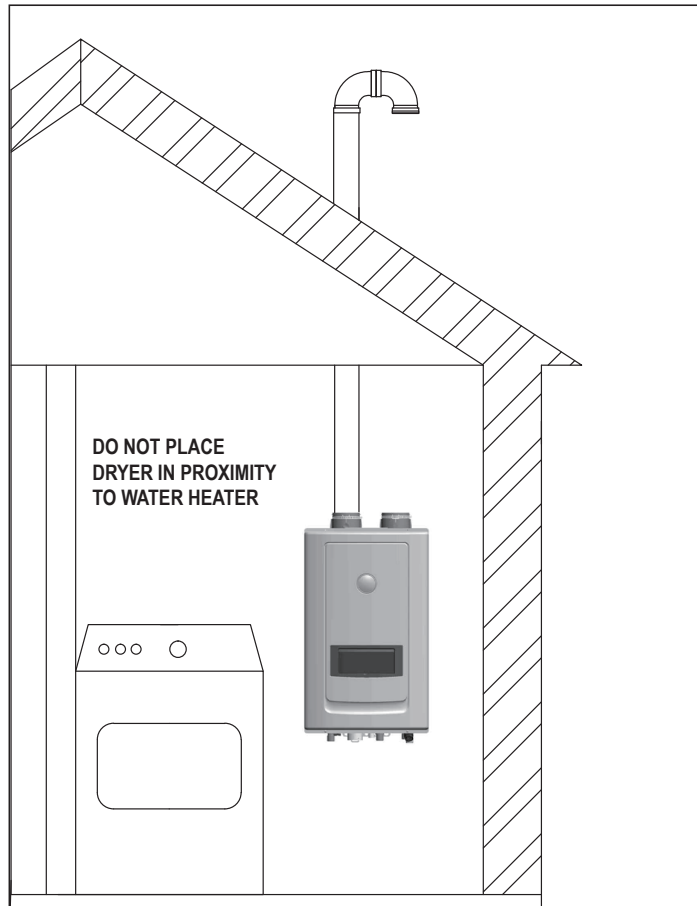


Figure 12 – Do Not Install in a Contaminated Space

⚠ WARNING

Breathing Hazard – Carbon Monoxide Gas



- Do not operate heater if flood damaged.
- Install vent system in accordance with local codes and manufacturers installation instructions.
- Do not obstruct heater air intake or exhaust, Support all vent piping per manufacturers installation instructions.
- Do not place chemical vapor emitting products near unit.
- According to NFPA 720, carbon monoxides detectors should be installed outside each sleeping area.
- Never operate the heater unless it is vented to the outdoors.
- Analyze the entire vent system to make sure that condensate will not become trapped in a section of vent pipe and therefore reduce the open cross sectional area of the vent.

Breathing carbon monoxide can cause brain damage or death. Always read and understand instruction manual.

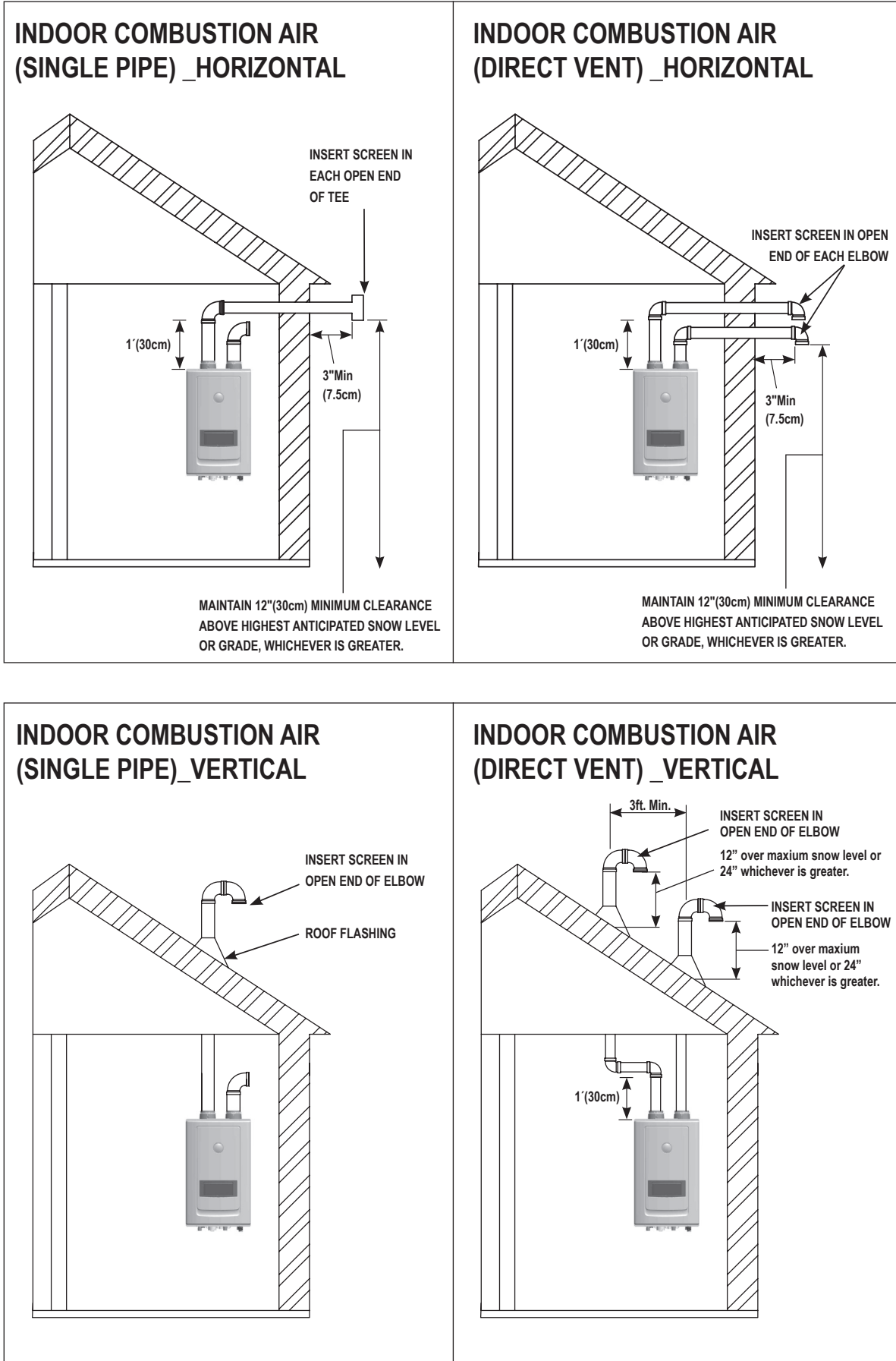


Figure 13 – NOTE: These drawings are meant to demonstrate system venting only. The installer is responsible for all equipment and detailing required by local codes.

PART 6 – INSTALL THE CONDENSATE DRAIN

1. Due to its efficient design, the appliance produces condensate (water) as a normal by-product. This condensate is acidic, with a pH level between 3 and 4. This condensate must be drained away from the appliance and disposed in accordance with all local regulations.
2. Use corrosion-resistant materials approved by the Authority Having Jurisdiction (AHJ) to drain condensate. In the absence of an AHJ, the included flexible plastic hose, or field supplied 1/2" PVC and CPVC drain pipe complying with ASTM D1785, F441, or D2665 may be used. Cement must comply with ASTM D2564 for PVC or F493 for CPVC. For Canadian applications, use CSA or ULC certified PVC or CPVC pipe, fittings, and cement.
3. Local building codes may require an in-line neutralizer to be installed (not included) to treat the condensate. Follow all the installation instructions included with the neutralizer. If a neutralizer is installed, periodic replacement of the limestone (or neutralizing agent) will be required. The rate of depletion of the limestone varies with usage of the appliance. During the first year of appliance operation, check the neutralizer every few months for depletion.
4. Route the drain line to a nearby floor drain, laundry tub, or condensate pump.

NOTE: If a nearby laundry tub is used as a disposal for waste water from the washing machine, draining the condensate into this tub allows the soapy water discharge to neutralize the acidic condensate.
5. An error will appear on the appliance display if condensate line is blocked. The appliance will not operate with a blocked condensate line. It is extremely important to have this condition repaired by a qualified service technician.

NOTE: This appliance has an internal condensate trap that must be cleaned and maintained. See Maintenance section of this manual for instructions on maintaining the trap.

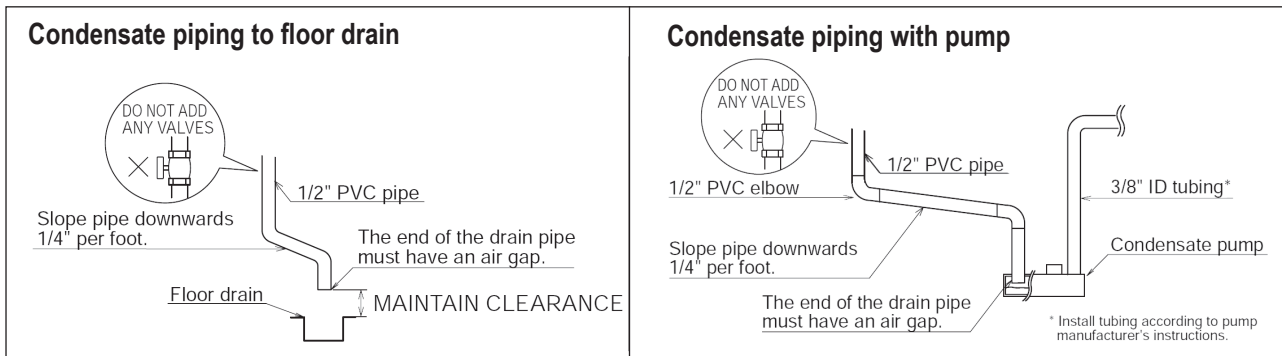


Figure 14 – Condensate Piping to Floor Drain and with Pump

NOTES:

1. Condensate line must be pitched at least 1/4" per foot to properly drain. If this cannot be done, or a very long length of condensate hose is used, you must increase the condensate line to a minimum of 1" ID and place a tee in the line after the condensate neutralizer to properly reduce vacuum lock in the drain line.
2. Plastic pipe should be the only material used for the condensate line. Steel, brass, copper, or other materials will be subject to corrosion or deterioration.
3. NEVER install condensate lines outside. It is very important that the condensate line is not exposed to freezing temperatures or any type of blockage. Damages due to frozen or blocked condensate lines ARE NOT covered by warranty.
4. Support of the condensate line may be necessary to avoid blockage of the condensate flow.

CAUTION
If using a condensate pump, select one approved for use with condensing appliances and furnaces. The pump should have an overflow switch to prevent property damage from condensate spillage.
CAUTION
It is very important that the condensate piping be no smaller than 1/2". To prevent sagging and maintain pitch, condensate piping should be supported with pipe supports, and pitched 1/4" per foot to allow for proper drainage.
CAUTION
The condensate line must remain unobstructed, allowing free flow of condensate. If condensate freezes in the line, or if line is obstructed in any other manner, condensate can exit from the tee, resulting in potential water damage to property.

PART 7 – GAS PIPING

WARNING

FIRE AND/OR EXPLOSION HAZARD

To avoid serious injury or death, the gas line installation and the gas line inlet pressure test must be done by a licensed professional.

Always match the appliance with the type of gas supplied to the unit (natural gas or LP gas). This appliance must be converted into propane operation unless specifically manufactured for use with propane. Follow Gas Conversion Manual instructions (separate document). Propane ready appliances have the suffix "LP" after the model serial number.

Failure to ensure the appliance is set to operate on the provided gas supply could result in property damage, personal injury, or death.

- A. GAS PIPE SIZING TABLES

1. Gas Pipe Sizing

This information is for reference use only. Refer to gas pipe manufacturer specifications for actual delivery capacity. The DOE standard for Natural Gas is 1100 BTU/ft³. Contact the local gas supplier for actual BTU/ft³ rating.

Maximum Natural Gas Delivery Capacity (0.5" WC Pressure Drop)

Pipe size	Length (ft)										
	10'(3m)	20'(6m)	30'(9m)	40'(12m)	50'(15m)	60'(18m)	70'(21m)	80'(24m)	90'(27m)	100'(30m)	125'(37.5m)
3/4"	360	247	199	170	151	137	126	117	110	104	92
1"	678	466	374	320	284	257	237	220	207	195	173
1-1/4"	1390	957	768	657	583	528	486	452	424	400	355
1-1/2"	2090	1430	1150	985	873	791	728	677	635	600	532
2"	4020	2760	2220	1900	1680	1520	1400	1300	1220	1160	1020
2 1/2"	6400	4400	3530	3020	2680	2430	2230	2080	1950	1840	1630
3"	11300	7780	6250	5350	4740	4290	3950	3670	3450	3260	2890
4"	23100	15900	12700	10900	9660	8760	8050	7490	7030	6640	5890

Table 12. For Less than 8" WC initial supply pressure

Contact the Gas Supplier for Btu/Cubic Ft. of the Supplied Gas. 1000 BTU/Cubic Ft. is a Typical Value

Maximum Natural Gas Delivery Capacity (3.0" WC Pressure Drop).

Pipe size	Length (ft)										
	10'(3m)	20'(6m)	30'(9m)	40'(12m)	50'(15m)	60'(18m)	70'(21m)	80'(24m)	90'(27m)	100'(30m)	125'(37.5m)
1/2"	454	312	250	214	190	172	158	147	138	131	116
3/4"	949	652	524	448	397	360	331	308	289	273	242
1"	1787	1228	986	844	748	678	624	580	544	514	456
1-1/4"	3669	2522	2025	1733	1536	1392	1280	1191	1118	1056	936
1-1/2"	5497	3778	3034	2597	2302	2085	1919	1785	1675	1582	1402
2"	10588	7277	5844	5001	4433	4016	3695	3437	3225	3046	2700
2 1/2"	16875	11598	9314	7971	7065	6401	5889	5479	5140	4856	4303
3"	29832	20503	16465	14092	12489	11316	10411	9685	9087	8584	7608
4"	43678	30020	24107	20632	18286	16569	15243	14181	13305	12568	11139

Table 13. For 8" WC ~ 10.5" WC initial supply pressure

Pipe size	Length (ft)												
	10'(3m)	20'(6m)	30'(9m)	40'(12m)	50'(15m)	60'(18m)	80'(24m)	100'(30m)	125'(38m)	150'(45m)	175'(53m)	200'(60m)	250'(76m)
1/2"	291	200	160	137	122	110	101	94	89	84	74	67	62
3/4"	608	418	336	287	255	231	212	197	185	175	155	140	129
1"	1150	787	632	541	480	434	400	372	349	330	292	265	243
1-1/4"	2350	1620	1300	1110	985	892	821	763	716	677	600	543	500
1-1/2"	3520	2420	1940	1660	1480	1340	1230	1140	1070	1010	899	814	749
2"	6790	4660	3750	3210	2840	2570	2370	2200	2070	1950	1730	1570	1440

Table 14. Maximum Undiluted Propane (LP) Delivery Capacity in Thousands of Btu/H (0.5" WC Pressure Drop)

** For reference only. Please consult gas pipe manufacturer for actual pipe capacities.

B. GAS CONNECTION REQUIREMENTS

1. The gas connection fitting on the appliance is 3/4" male NPT.

NOTE: The pipe size must not be less than 1/2".

2. The supply line must be sized for the maximum output of the appliance being installed. If there are additional gas appliances from the main supply line, measure the size of the supply line according to the COMBINED total maximum BTUH 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 appliance. Appliance must be installed downstream of the gas meter to ensure adequate gas supply. Use the tables in this manual or refer to the gas line manufacturer's sizing information to determine the correct supply pipe size.
4. A manual gas shut-off valve should be installed in the gas supply line close to the appliance. See Figure 15 for detail.
5. 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 connection on the appliance.
6. Test the gas pressure to make sure it meets the minimum standards and does not exceed the maximum standards of the appliance.
7. Leak test the gas line pipe before placing the appliance in operation. Only use approved leak detector liquid solutions to check for leaks.
8. Do not operate the appliance until all connections have been completed and the heat exchanger is filled with water.

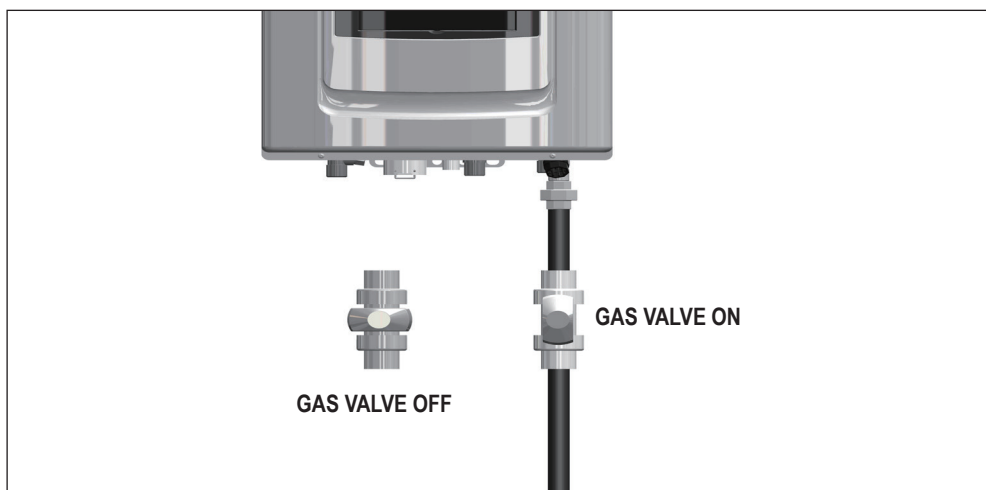


Figure 15 – Gas Line with Shut-Off Valve Detail

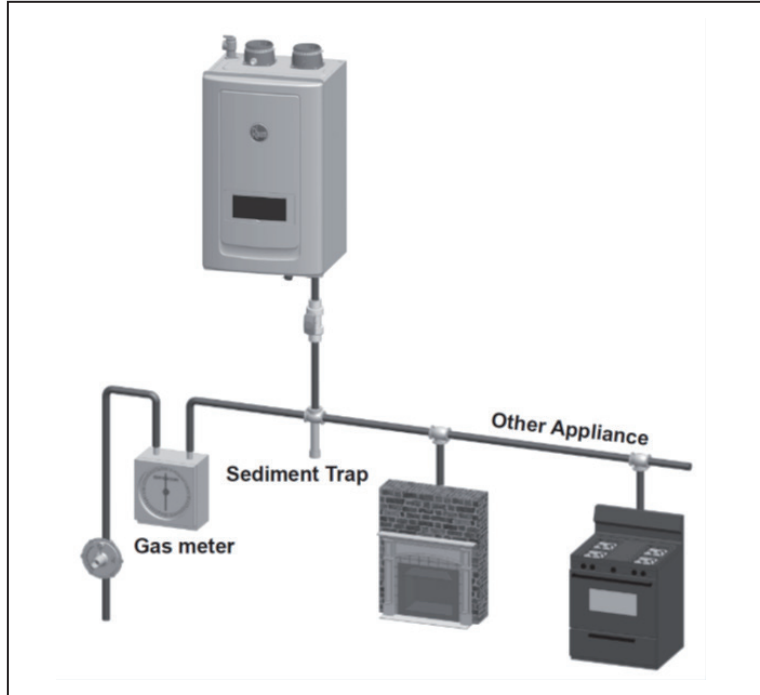


Figure 16 – Natural Gas Piping Installation

NOTE: Capacity to be Not Less than Total Capacity of Connected Appliances.

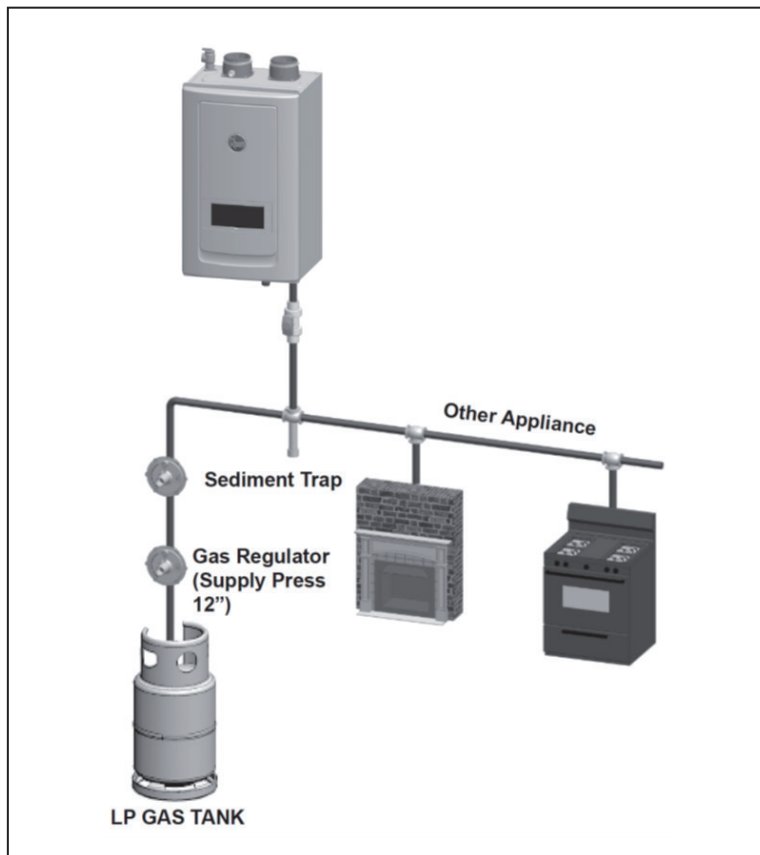


Figure 17 – LP Gas Piping Installation

NOTE: Capacity to be Not Less than Total Capacity of Connected Appliances.

PART 8 – WATER PIPING

• A. GENERAL PLUMBING CONNECTION GUIDELINES

- 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.
- Do not apply a torch within 12" of the appliance. Doing so could damage the appliance. Such damages ARE NOT covered by product warranty.
- The size of the hot water pipe should be $\frac{3}{4}$ " diameter and the central heating water pipe should be 1" in diameter.
- To ease future maintenance isolation valves are recommended on both the CH and DHW loops.
- All piping should be insulated.

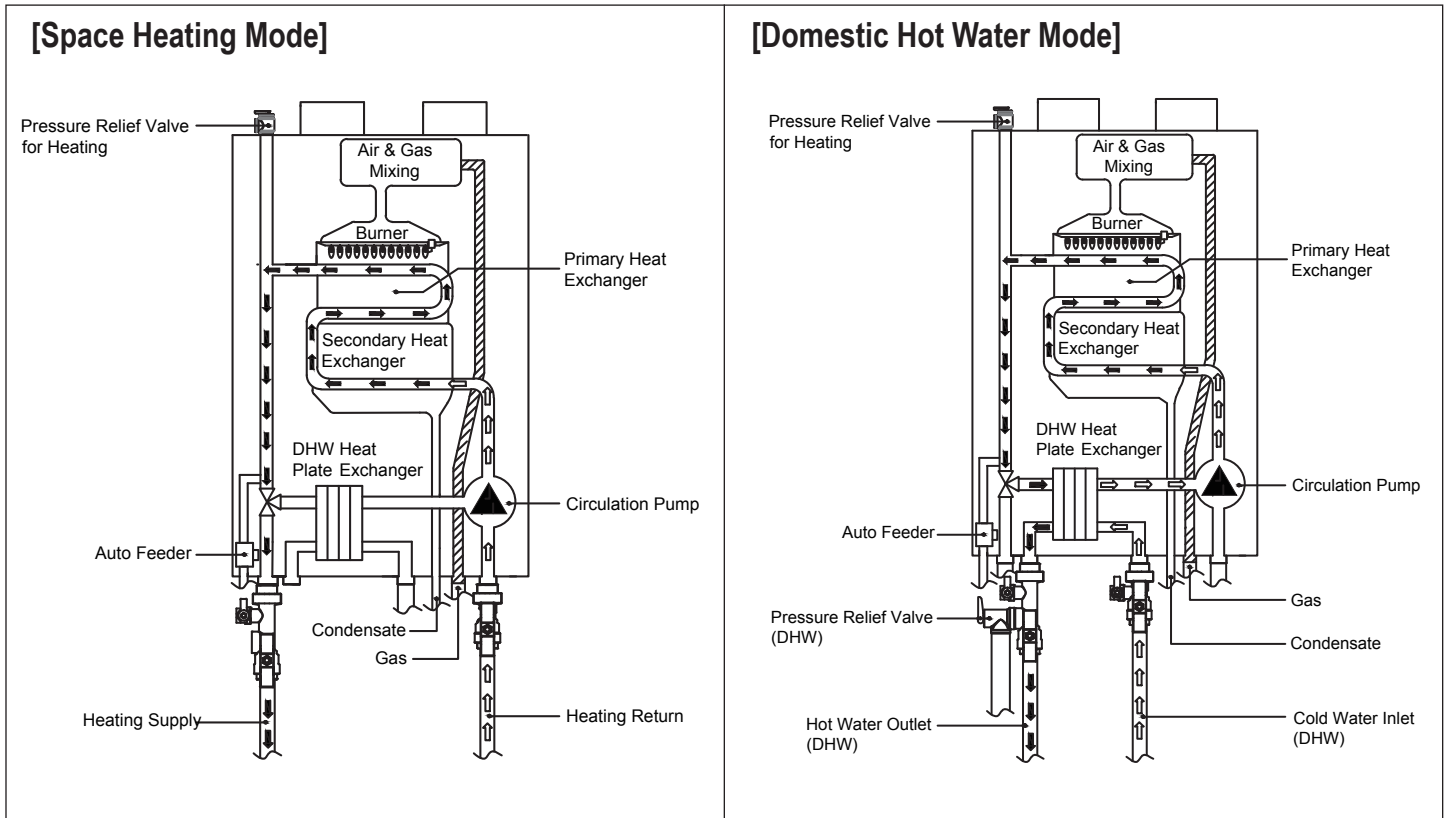


Figure 18 – Operating Description – Water Flow

• B. DHW PIPING

Use both thread tape and pipe dope to connect to the $\frac{3}{4}$ " domestic water inlet and outlet. A shut off valve between the city water supply and DHW inlet is recommended for ease of service. Rheem offers threaded $\frac{3}{4}$ " Rheem tankless isolation valves with DHW pressure relief valve for ease of installation and future service. See Optional Equipment, this manual.

It may be recommended to use a back flow preventer – check local codes. If a back flow preventer or a no return valve is used, a thermal expansion tank must be installed on the cold water supply between the appliance and valve.

⚠ WARNING

To control thermal expansion, a thermal expansion tank suitable for potable water should be installed in systems with an installed backflow preventer. DO NOT use a closed type expansion tank. Follow expansion tank manufacturer's specifications to properly size an expansion tank to the installation. Failure to properly accommodate thermal expansion could result in property damage, severe personal injury, or death.

• C. CENTRAL HEATING PIPING SYSTEM WATER PIPING METHODS

EXPANSION TANK AND MAKE-UP WATER

1. Ensure that the expansion tank is designed and sized to correctly handle system water volume and temperature.

⚠ WARNING

Expansion tanks must be sized according to total system volume. This includes all length of pipe, all fixtures, appliances, etc. Failure to properly size system expansion could result in wasted time, money, and possible property damage, personal injury, or death.

CAUTION

Undersized expansion tanks cause system water to be lost from the relief valve, causing make-up water to be added. Eventual appliance failure can result due to excessive make-up water addition. **SUCH FAILURE IS NOT COVERED BY WARRANTY.**

- The expansion tank must be located following recognized design methods. See expansion tank manufacturer's instructions for details.
- Connect the expansion tank to the air separator only if the air separator is on the suction side of the circulator. Always install the system fill connection at the same point as the expansion tank connection to the system.

DIAPHRAGM (OR BLADDER) EXPANSION TANK

Always install an automatic air vent on top of the air separator to remove residual air from the system.

CAUTION

Use at least the MINIMUM pipe size for all appliance loop piping (connecting appliance to and from the primary/secondary connection). DO NOT pipe the appliance in any configuration other than primary/secondary. All piping methods shown in this manual use primary/secondary connection. This is to avoid the possibility of inadequate flow through the appliance. Using less than the required minimum pipe size and piping in anything other than a primary/secondary installation could result in system problems, property damage, and premature appliance failure. Such problems ARE NOT covered by product warranty.

Use both thread tape and pipe dope to connect to the 1" heating water outlet and inlet.

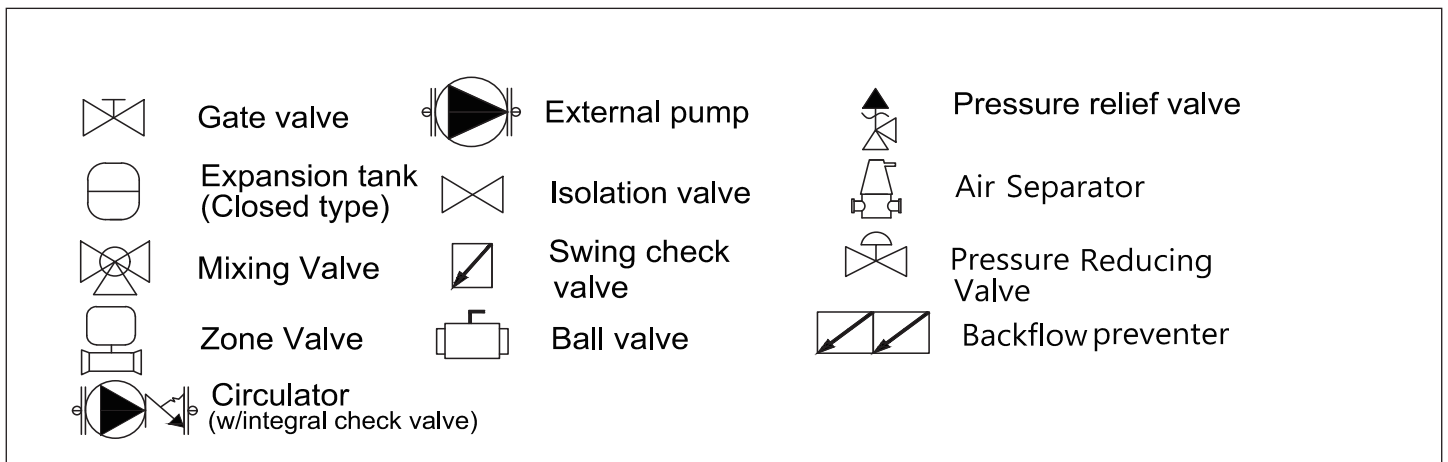
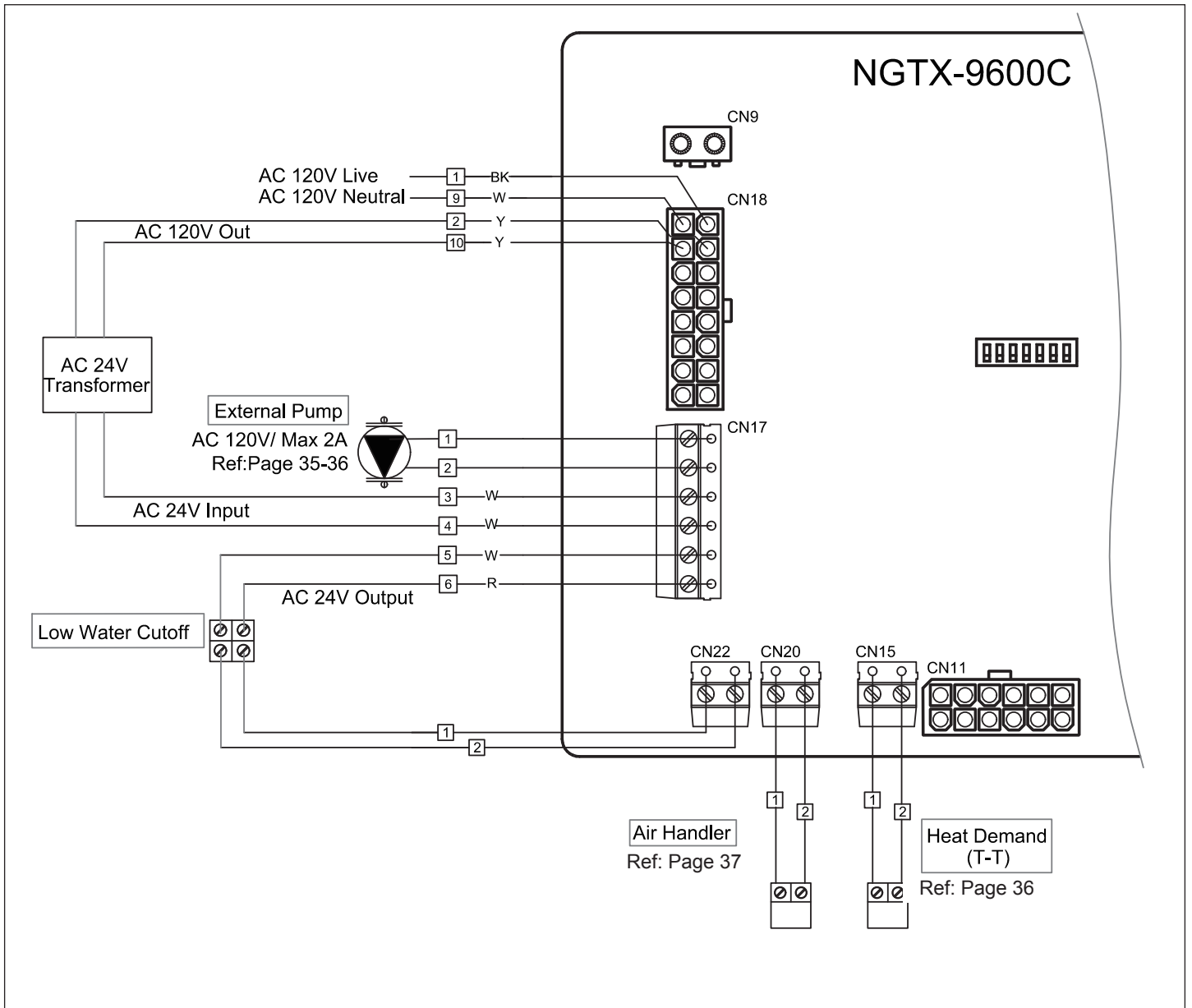
Piping symbol legend

Figure 19 – Piping Legend

- This drawing is meant to show system piping concept only. Installer is responsible for all equipment and detailing required by local codes.
- All closely spaced tees shall be within 4 pipe diameters center to center spacing.
- A minimum of 6 pipe diameters of straight pipe shall be installed upstream and downstream of all closely spaced tees.
- The minimum pipe size of DHW piping should be 3/4" diameter and Heating piping should be 1" in diameter.
- Piping shown is Primary/Secondary. System flow (secondary loop) must be greater than the appliance's primary loop flow.
- Install a minimum of 12 diameters of straight pipe upstream of all circulators.
- In a valve-based system, each heating zone has a zone valve which opens when that zone calls for heat. Each zone thermostat is wired to its corresponding zone valve. Contacts in the zone valves provide a signal to the appliance to operate when there is a call for heat.
- Unit is equipped with built-in primary pump for the heating loop. This pump is sized to ensure proper flow rate through the appliance heat exchanger and related piping. On long pipe runs, it is recommended to keep the pump at maximum speed (setting 3). DO NOT lower it from the factory default.
- Install a backflow preventer valve in the make-up water supply to the unit as required by local codes.

Wiring diagram for External Options



Note:

- * 1 External Pump Terminal : '10:EP' should be 'on' in Installer Mode to activate this terminal.
- * 2 Air Handler Terminal : '8:AH' should be 'on' in Installer Mode to activate this terminal.

Primary / Secondary Piping with Zone Valves DHW Priority.

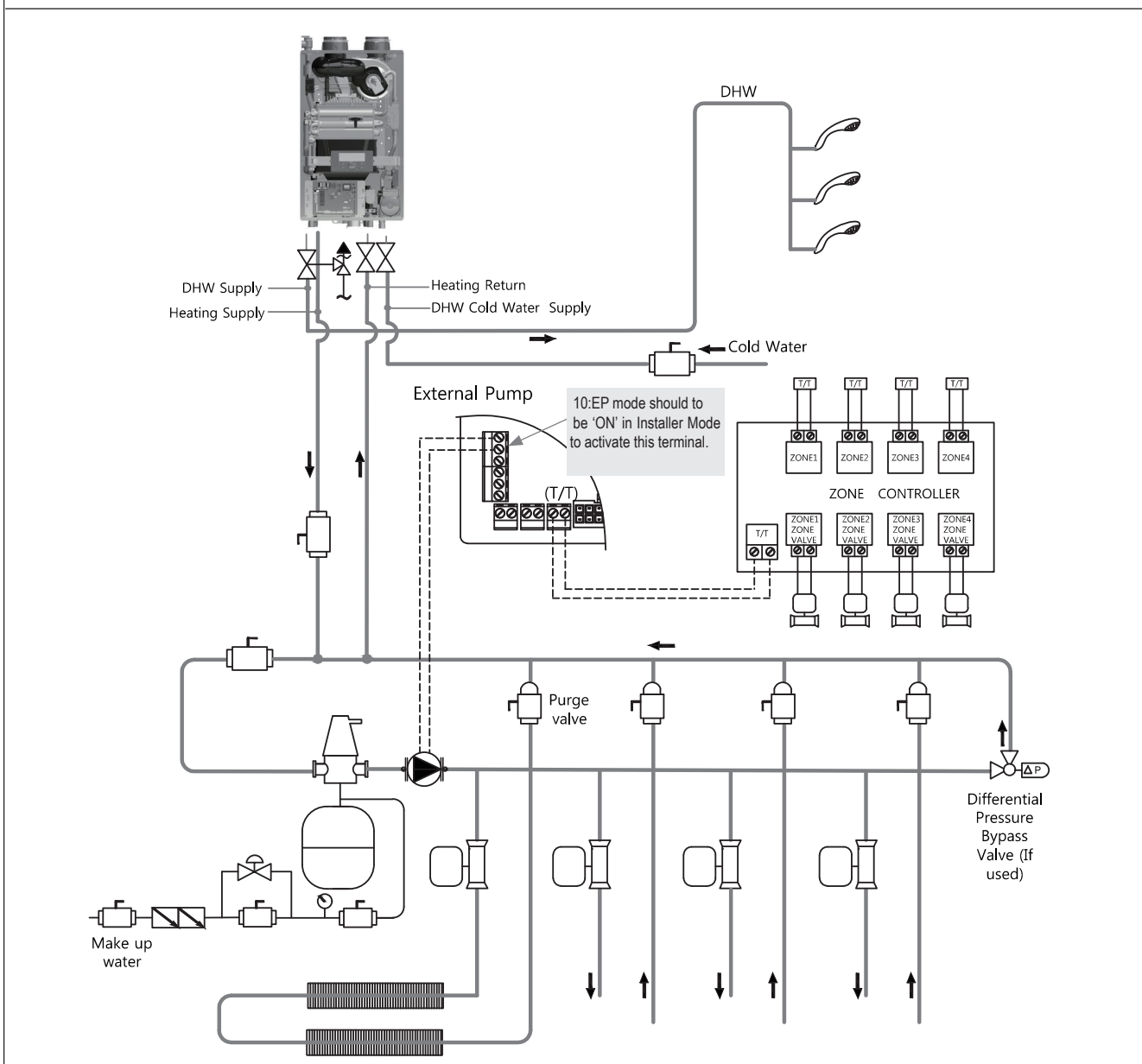


Figure 20 – CH and DHW Piping

NOTES:

1. This drawing is meant to show system piping concept only. Installer is responsible for all equipment and detailing required by local codes.
2. All closely spaced tees shall be within 4 pipe diameters center to center spacing.
3. A minimum of 6 pipe diameters of straight pipe shall be installed upstream and downstream of all closely spaced tees.
4. The minimum pipe size of DHW piping should be $\frac{3}{4}$ " diameter and CH piping should be 1" in diameter.
5. Circulators are shown with isolation flanges. The alternative is standard flanges with full port ball valves. Purge valves can be used with circulator flanges as an alternative.
6. Piping shown is Primary/Secondary. System flow (secondary loop) must be greater than the appliance's primary loop flow.
7. Install a minimum of 12 diameters of straight pipe upstream of all circulators.
8. **VERY IMPORTANT** – Minimum flow rates outlined in this manual must be maintained through the heat exchanger to minimize short cycling.
9. In a valve-based system, each heating zone has a zone valve which opens when that zone calls for heat. Each zone thermostat is wired to its corresponding zone valve. Contacts in the zone valves provide a signal to the appliance to operate when there is a call for heat.
10. Unit is equipped with built-in primary pump for the heating loop. This pump is sized to ensure proper flow rate through the appliance heat exchanger and related piping. On long pipe runs, it is recommended to keep the pump at maximum speed (setting 3). DO NOT lower it from the factory default.
11. **NOTE:** DO NOT INSTALL a flow check or a pump with flow check on the return line of the primary loop going to the appliance. This will isolate the appliance from the expansion tank, causing pressure to build up in the unit and the Pressure Relief Valve to discharge.

Primary / Secondary Piping with Zone Pumps DHW Priority. (Outdoor Reset)

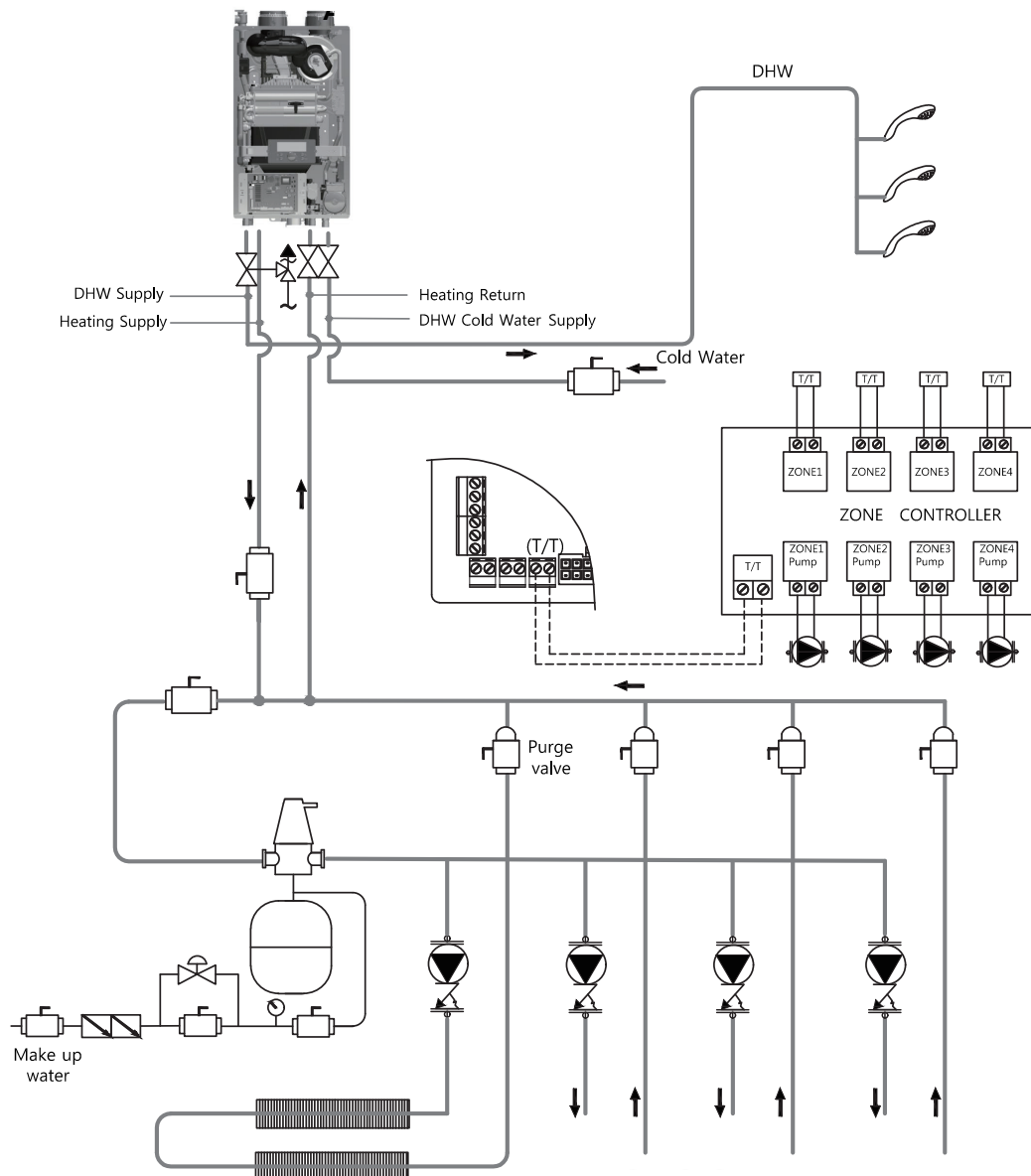


Figure 21 – CH Piping – Zoning with Pumps

NOTES:

1. This drawing is meant to show system piping concept only. Installer is responsible for all equipment and detailing required by local codes.
2. All closely spaced tees shall be within 4 pipe diameters center to center spacing.
3. A minimum of 6 pipe diameters of straight pipe shall be installed upstream and downstream of all closely spaced tees.
4. The minimum pipe size of DHW piping should be $\frac{3}{4}$ " diameter and CH piping should be 1" in diameter.
5. Circulators are shown with isolation flanges. The alternative is standard flanges with full port ball valves. Purge valves can be used with circulator flanges as an alternative.
6. Piping shown is Primary/Secondary. System flow (secondary loop) must be greater than the appliance's primary loop flow.
7. Install a minimum of 12 diameters of straight pipe upstream of all circulators.
8. **VERY IMPORTANT** – Minimum flow rates outlined in this manual must be maintained through the heat exchanger to minimize short cycling.
9. Each heating zone of a pump-based system has its own circulator which turns on when a zone thermostat calls for heat.
10. Unit is equipped with built-in primary pump for the heating loop. This pump is sized to ensure proper flow rate through the appliance heat exchanger and related piping. On long pipe runs, it is recommended to keep the pump at maximum speed (setting 3). DO NOT lower it from the factory default.
11. **NOTE:** DO NOT INSTALL a flow check or a pump with flow check on the return line of the primary loop going to the appliance. This will isolate the appliance from the expansion tank, causing pressure to build up in the unit and the Pressure Relief Valve to discharge.

Air Handler Piping.

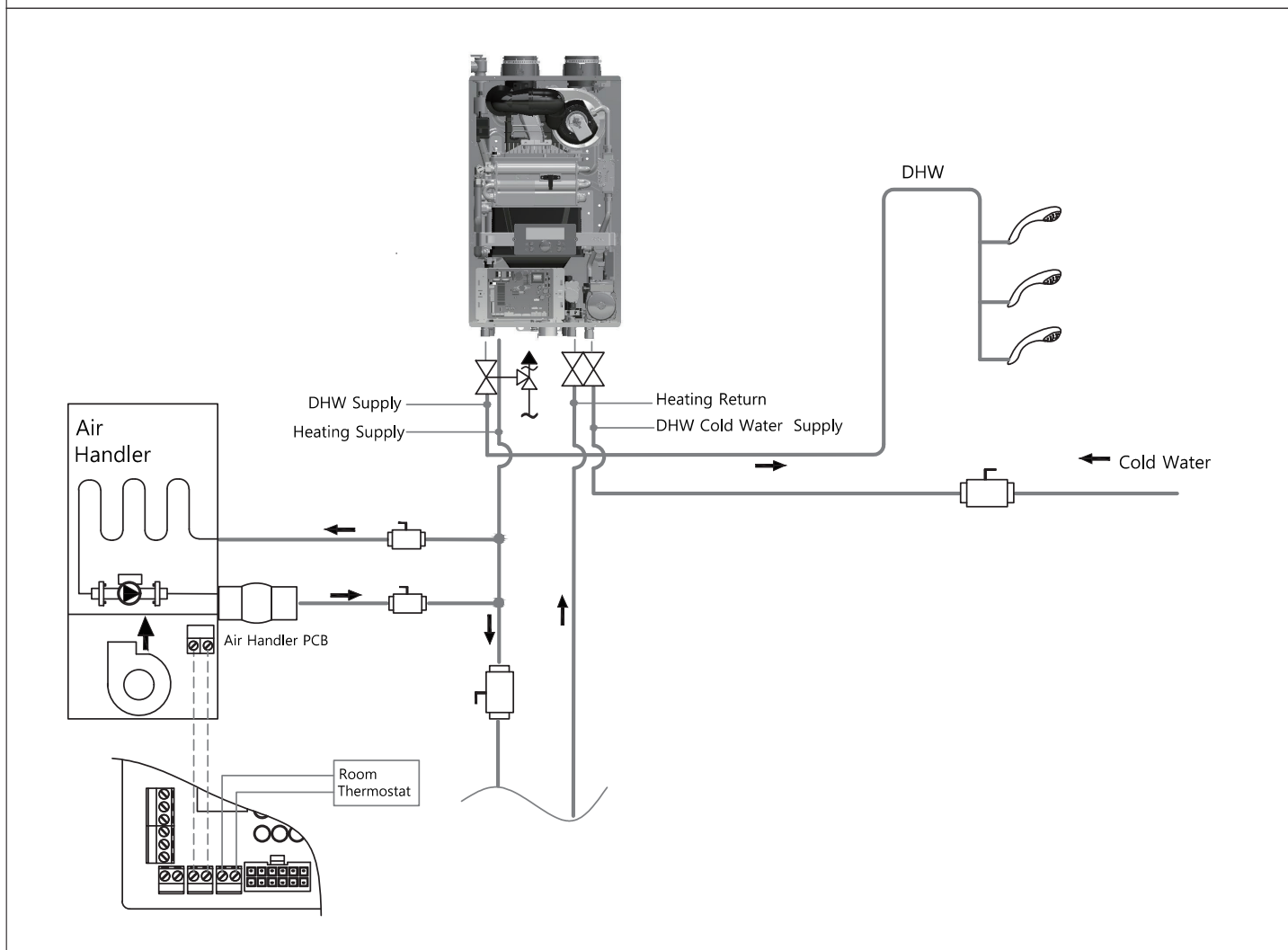


Figure 22 – CH Piping with Air Handler

NOTES:

1. This drawing is meant to show system piping concept only. Installer is responsible for all equipment and detailing required by local codes.
2. This Rheem Combi Boiler can control the operation of an Air Handler when a thermistor is used in combination with the Air Handler.
3. The minimum pipe size of DHW piping should be 3/4" diameter and CH piping should be 1" diameter.
4. Unit is equipped with built-in primary pump for the Air Handler. This pump is sized to ensure proper flow rate through the appliance heat exchanger and related to Air Handler. On long pipe runs, it is recommended to keep the pump at maximum speed (setting 3).
5. The Air Handler function is designed to stop the Air Handler's pump and fan operation when the Combi Boiler's heating function is not operating due to DHW operation, Combi Boiler errors or Low Water in the Combi Boiler.
6. The Air Handler turns off when the following conditions arise:
 - Thermistor open or short.
 - The Combi Boiler is supplying DHW, or it is in stand-by for DHW mode.
 - The Combi Boiler is turned off.
7. Make-up water (Auto feed mode) is in progress.
8. In order to set up the Air Handler, from Installer Mode 8:AH mode should be activated.

- D. CH AND DHW PRESSURE RELIEF VALVES

An external pressure relief valve must be installed on this appliance for both the CH and DHW loops. When installing, observe the following guidelines. Pressure relief valves must be installed as close to the appliance as possible. No other valves should be placed between the pressure relief valve and the appliance. Failure to comply with these guidelines can result in substantial property damage, personal injury, or death.

This appliance has a high-temperature shut-off switch built in as a standard safety feature. Therefore, a "pressure only" relief valve is required. DO NOT operate this appliance before the supplied pressure relief valve is installed with sufficient relieving capacity in accordance with the ASME rating plate on the appliance.

CH Loop

This appliance is provided with a CH pressure relief valve that complies with the ANSI/ASME Appliance and Pressure Vessel Code, Section IV (Heating Appliances). The included 30 psi CH Pressure Relief Valve must be installed on the CH supply line to ensure a compliant installation and safe operation. The valve is meant to be field installed. DO NOT install a CH pipe line relief valve with a pressure rating greater than 30 psi. This is the maximum allowable CH relief valve setting for this appliance.

DHW Loop

This appliance must be installed with a DHW pressure relief valve that complies with local codes, but not less than valves certified as meeting the requirements of Relief Valves for Hot Water Supply Systems, ANSI Z21/CSA4.4 by a nationally recognized lab that maintains periodic inspection of production listed equipment. A DHW pressure relief valve is not included with the appliance, and is to be field supplied and installed. DO NOT install a DHW relief valve with a pressure rating greater than 150 psi. This is the maximum allowable DHW relief valve setting for this appliance.

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. Ensure that the maximum BTU/H rating on the pressure relief valve is equal to or greater than the maximum input BTU/H rating of the combination appliance.

⚠ WARNING

To avoid water damage or scalding due to relief valve operation:

- Discharge line must be connected to relief valve outlet and run to a safe place of disposal. Terminate the discharge line in a manner that will prevent possibility of severe burns or property damage should the relief valve discharge.
- Discharge line must be as short as possible and the same size as the valve discharge connection throughout its entire length. Failure to follow these directions will result in substantial property damage, severe personal injury, or death.
- Discharge line must pitch downward from the valve and terminate at least 6" above the floor drain, making discharge clearly visible.
- The relief line cannot be in contact with any live electrical parts.
- Discharge line shall terminate plain, not threaded, with a material serviceable for temperatures of 375°F or greater.
- Do not pipe discharge to any location where freezing could occur.
- No shutoff valve may be installed between the relief valve and appliance or in the discharge line. Do not plug or place any obstruction in the discharge line.
- Test the operation of the relief valve after filling and pressurizing the system by lifting the lever. Make sure the valve discharges freely. If the valve fails to operate correctly, replace it with a new relief valve.
- Test relief valve at least once annually to ensure the waterway is clear. If valve does not operate, turn the appliance "off" and call a plumber immediately.
- Take care whenever operating relief valve to avoid scalding injury or property damage.
- For appliances installed with only a pressure relief valve, the separate storage vessel must have a temperature and pressure relief valve installed. This relief valve shall comply with Relief Valves for Hot Water Supply Systems, ANSI Z21.22/CSA4.4.

FAILURE TO COMPLY WITH THE ABOVE GUIDELINES COULD RESULT IN FAILURE OF RELIEF VALVE OPERATION, RESULTING IN POSSIBILITY OF SUBSTANTIAL PROPERTY DAMAGE, SEVERE PERSONAL INJURY, OR DEATH.

PART 9 – CONNECT ELECTRICAL POWER / INITIAL STARTUP

⚠ WARNING

Install wiring and electrically ground appliance 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 for guidelines to install the electrical power supply could result in property damage, serious personal injury, or death.

⚠ WARNING

ELECTRICAL SHOCK HAZARD – To ensure safety, turn off electrical power supply at service entrance panel before making any electrical connections to avoid possible electric shock hazard. Failure to do so could result in property damage, serious personal injury, or death.

▪ A. GENERAL OPERATING CONDITIONS

- Temperature
 - Operating Ambient Temperature Range: 14 ~ 140°F (-10 to 60°C)
 - Operating Relative Humidity: Up to 90% at 104°F (40°C)

▪ B. WIRING INFORMATION

1. This appliance must be properly grounded. Ensure the electrical outlet (120V / 15 Amp minimum) that the appliance will be plugged into is properly grounded.

⚠ WARNING

This appliance is equipped with a three prong plug. It should only be plugged directly into a properly grounded three prong receptacle. DO NOT remove the ground plug from the plug. Doing so could result in property damage, serious personal injury, or death.

2. The wiring diagrams contained in this manual are to be used for reference purposes only.
3. Refer to these diagrams and the wiring diagrams of any external controls used with the installation when wiring the appliance. Read, understand, and follow all wiring instructions supplied with the controls.
4. Do not disconnect the power supply when the appliance is in normal operation.

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

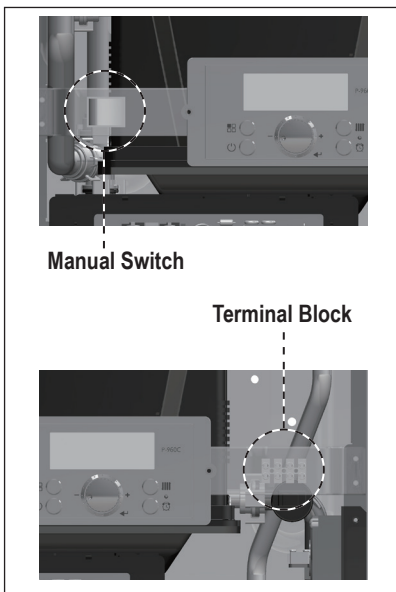
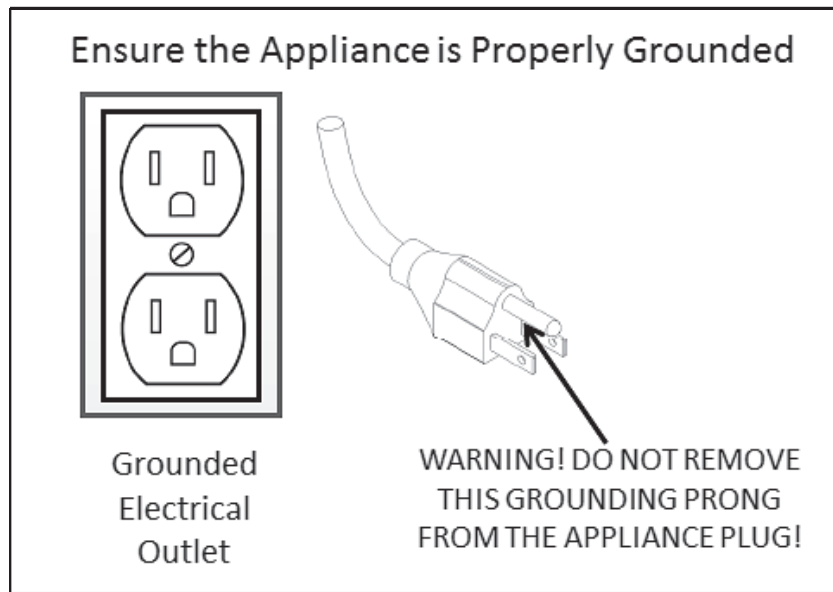


Figure 23 – Manual Power Switch and Appliance Plug Details

**NOTICE**

If the appliance display does not come ON, first check the plug. Then check the electrical panel circuit breaker and reset it if necessary. If the circuit breaker trips again, do not reset. Disconnect the plug and have a qualified technician diagnose the problem.

▪ C. DIP SWITCHES

There is one set of DIP switches. The appliance is default set at the factory to operate on Natural Gas with a 3" vent.

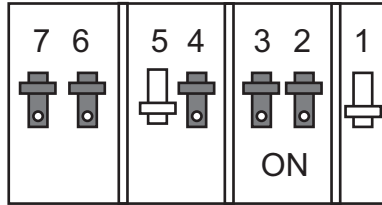


Figure 24 – Dip Switch Detail

DIP SWITCH		OFF	ON
1 – 3	Factory Use Only	Factory Use Only	
4	Factory Use Only	Factory Use Only	
5	Gas Type	LP	NG
6	High Fire	Normal	High Fire
7	Low Fire	Normal	Low Fire

Table 15 – Dip Switch Detail

MAXIMUM FLAME DETECTING VOLTAGE	2.5V
PRE-PURGE TIME (Tp)	Maximum 10 seconds , Minimum 1 seconds
SAFETY TIME (IGNITING TIME) (Ts)	2 seconds
IGNITING INTERVAL TIME	2 seconds
POST-PURGE TIME (Tip)	170 seconds
OVER-HEATING PROTECTION DETECTION TIME	<3 seconds

Table 16 – System Control Settings

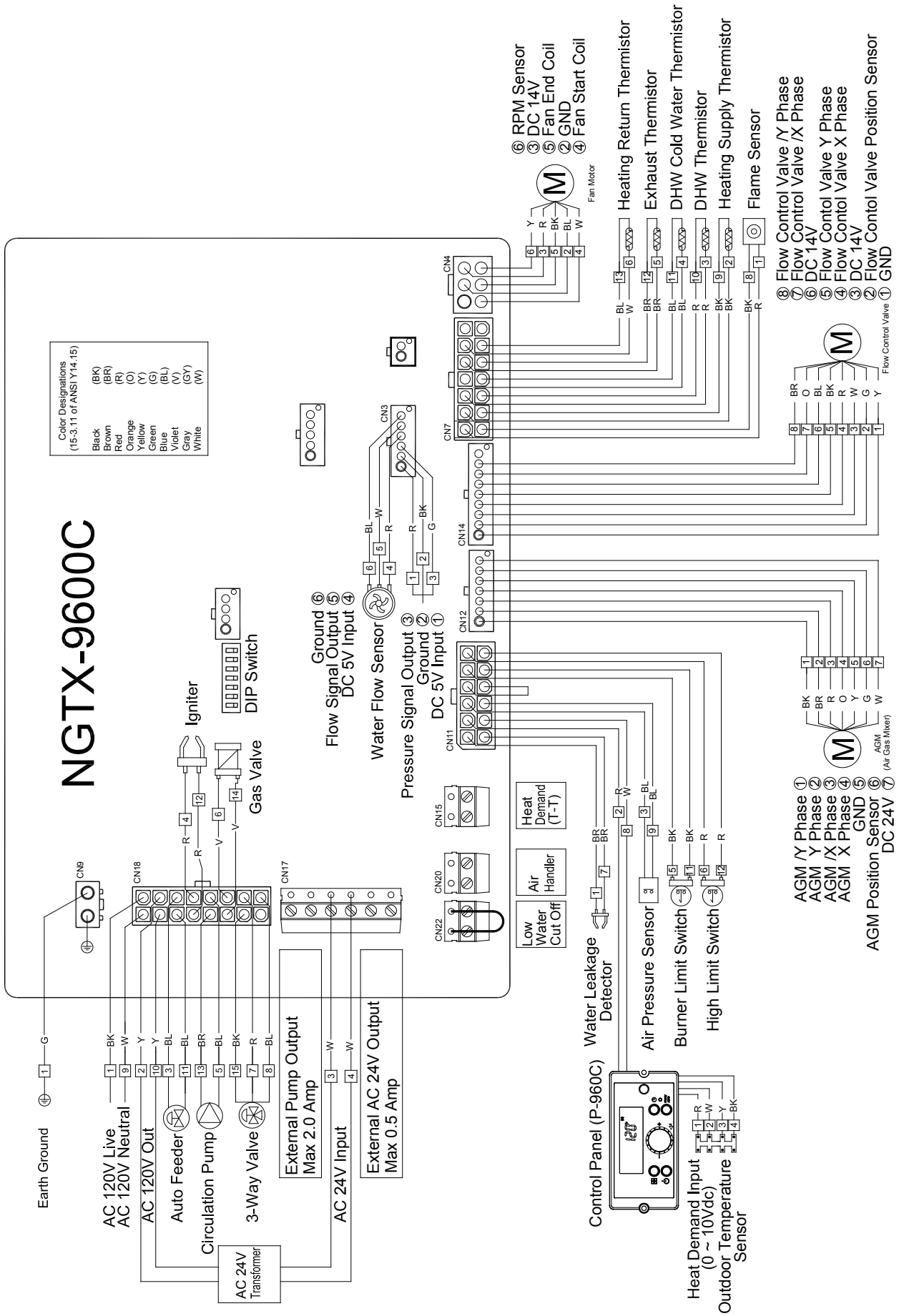


Figure 25 – Electrical Wiring Diagram

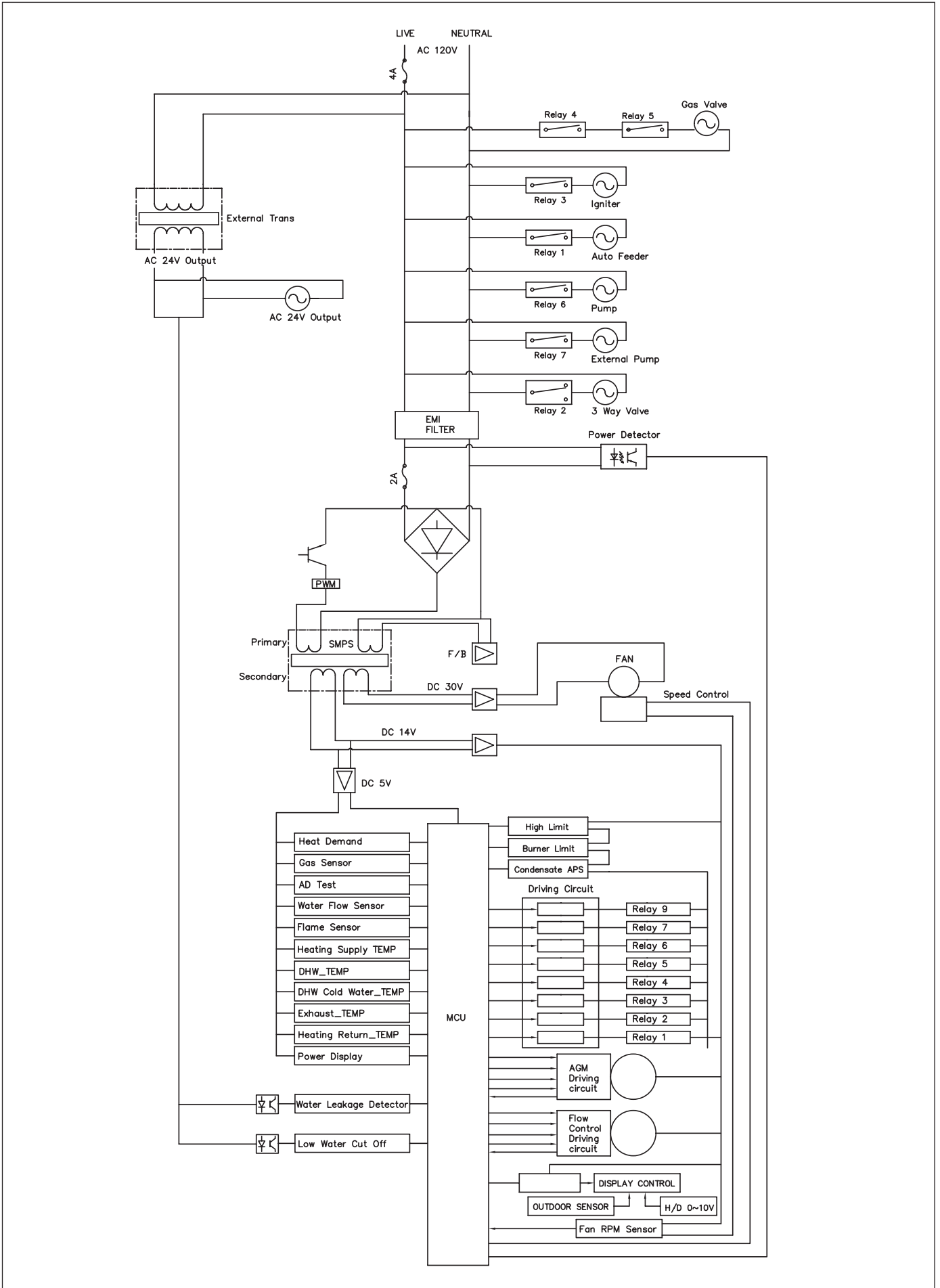


Figure 26 – Ladder Diagram

CN No.	Pin No.	Part	Color	Normal Value	
CN18	1,9	AC120V Input	BK/W	AC 120 V	
	2,10	AC120V Output	Y/Y	AC 120 V	
	3,11	Auto Feeder	BL/BL	AC 120 V	
	4,12	Igniter	R/R	AC 120 V	
	5,13	Circulation Pump	BL/BR	AC 120 V	
	6,14	Gas Valve	V/V	AC 120 V	
	7	3-Way Valve	Heating	R	AC 120 V
	8		DHW	BL	
	15		Common	BK	Common
	16	N/A		-	-
CN11	1	Water Leakage Detector	BR	DC 14 V	
	7		BR		
	2	Control Panel (P-960C)	R	DC 14 V	
	8		W		
	3	Air Pressure Sensor	BL	DC 14 V	
	9		BL		
	4	N/A	-	-	
	10		-		
	5	Burner Limit Switch (Overheat Limit Switch)	BK	DC 14 V	
	11		BK		
	6	High Limit Switch (Overheat Limit Switch)	R	DC 14 V	
	12		R		
CN17	1	External Pump	-	AC 120 V	
	2		-		
	3	AC 24V Input	W	AC 24 V	
	4		W		
	5	AC 24V Output	-	AC 24 V	
	6		-		
CN20	1	Air Handler	-	-	
	2		-	-	
CN22	1	Low Water Cut Off	-	-	
	2		-	-	
CN15	1	Heat Demand (T-T)	-	-	
	2		-	-	
CN4	1	N/A	-	-	
	2	Ground	BL	DC 30 V	
	3	Fan VDD	R	DC 14 V	
	4	Fan Start Coil	W	DC 30 V	
	5	Fan End Coil	BK	DC 30 V	
	6	Fan RPM Sensor	Y	DC 14 V	

Table 17 – Appliance Wiring 1

CN No.	Pin No.	Part	Color	Normal Value
CN7	1	Flame Sensor	R	DC 5 V
	8		BK	
	2	Heating Supply Thermistor	BK	DC 5 V
	9		BK	
	3	DHW Thermistor	R	DC 5 V
	10		R	
	4	DHW Cold Water Thermistor	BL	DC 5 V
	11		BL	
	5	Exhaust Thermistor	BR	DC 5 V
	12		BR	
	6	Heating Return Thermistor	W	DC 5 V
	13		BL	
	7	N/A	-	-
	14		-	
CN12	1	AGM /Y Phase	BK	DC 24 V
	2	AGM Y Phase	BR	DC 24 V
	3	AGM /X Phase	R	DC 24 V
	4	AGM X Phase	O	DC 24 V
	5	Ground	Y	DC 24 V
	6	AGM Position Sensor	G	DC 24V
	7	VDD	W	DC 24 V
CN14	1	GND	Y	DC 14 V
	2	Flow Control Valve Position Sensor	G	DC 14 V
	3	DC 14V	W	DC 14 V
	4	Flow Control Valve X Phase	R	DC 14 V
	5	Flow Control Valve Y Phase	BK	DC 14 V
	6	DC 14V	BL	DC 14 V
	7	Flow Control Valve /X Phase	O	DC 14V
	8	Flow Control Valve /Y Phase	BR	DC 14 V
CN3	1	VCC	R	DC 5 V
	2	Ground	BK	
	3	Pressure Sensor	G	
	4	VCC	R	
	5	Water Flow Sensor	W	
	6	Ground	BL	
CN9	1	Case Earth	G	-
	2	N/A	-	-

Table 18 – Appliance Wiring 2

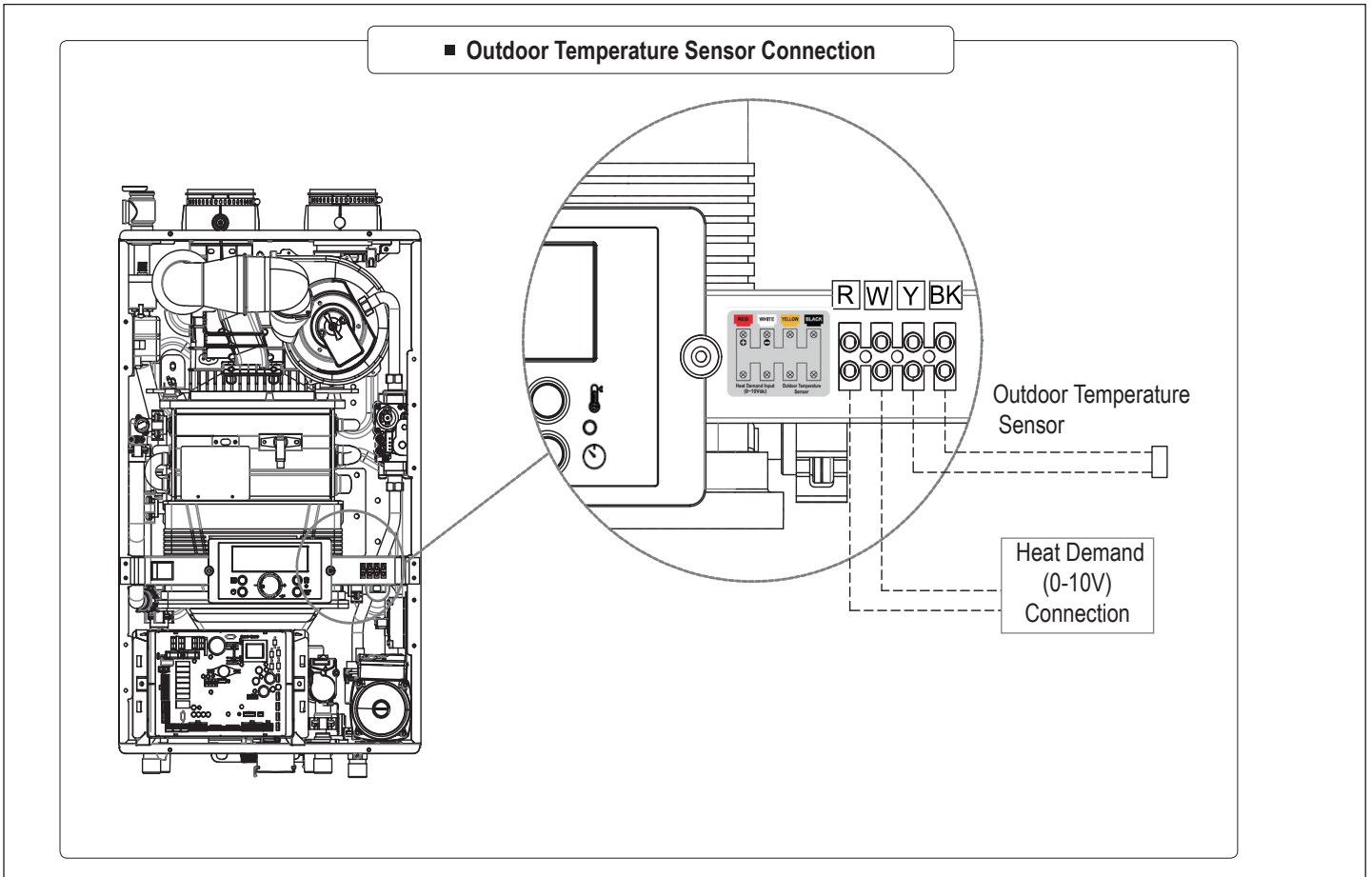


Figure 27 – Terminal Block Wiring Detail

PART 10 – OPERATING SYSTEM INSTRUCTIONS

• A. CONTROL PANEL

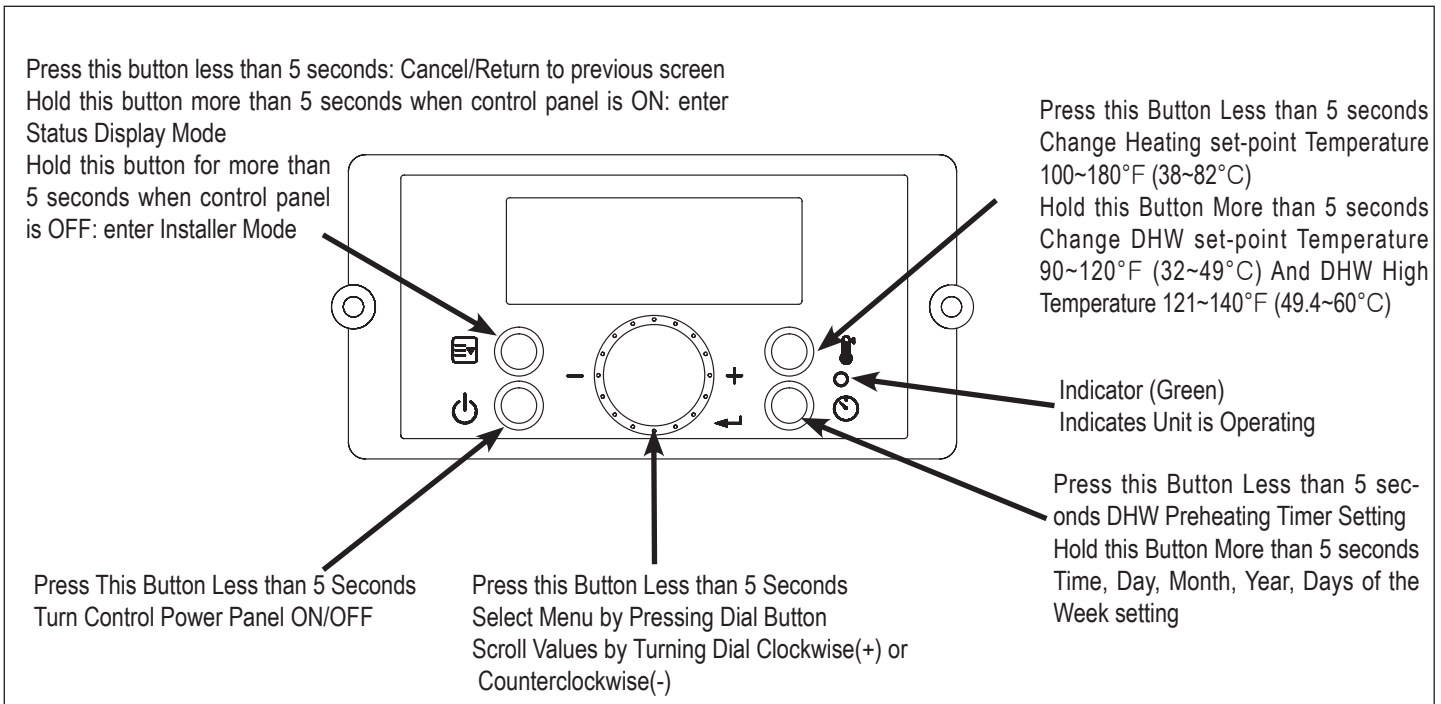


Figure 28 – Appliance Control Panel Detail

B. LCD DISPLAY DESCRIPTIONS

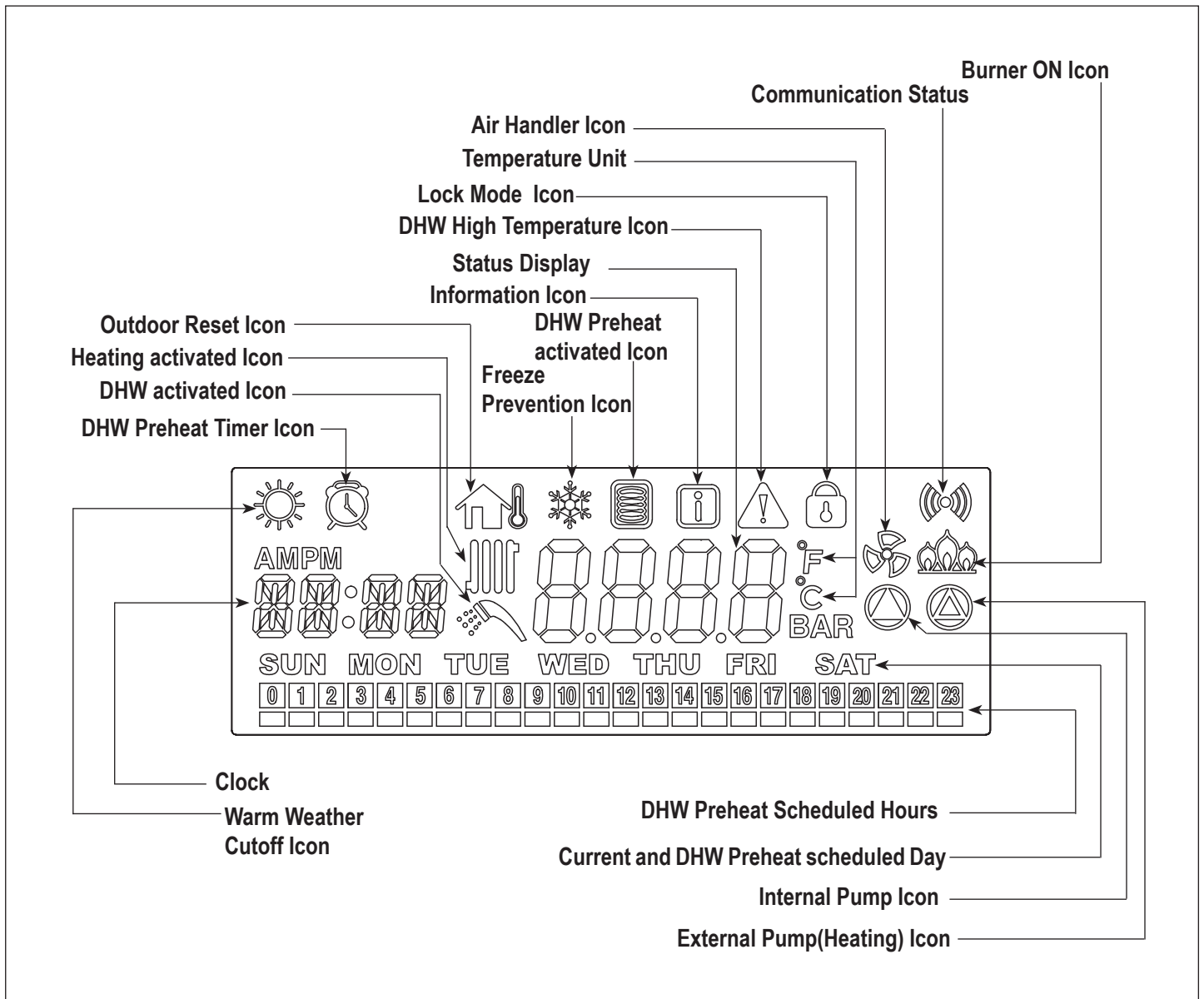


Figure 29 – LCD Display Detail

LCD also features a backlit lamp that will illuminate:

- When a user action is detected (a button is pressed)
- The display will turn off after approximately 20 seconds if no buttons are pressed

C. START-UP SEQUENCE

After the appliance is powered ON, the LCD display shows a sequence of information. The icons will flash, followed by various indicators that describe the appliance controller and software versions. It will take the appliance roughly 15 seconds to cycle through the Start-Up Sequence.

Display Items	Time for Display	Remarks
LCD Test	1 Sec	All segments "ON"
	0.5 Sec	All segments "OFF"
Category	1 Sec	Pdn
	1 Sec	0051
Software Version for Front Panel	1 Sec	SPn
	1 Sec	00.XX
Software Version for Appliance	1 Sec	SFn
	1 Sec	XX.XX
Hardware Version for Appliance	1 Sec	Hdn
	1 Sec	00XX

Table 19 – Start-Up Sequence

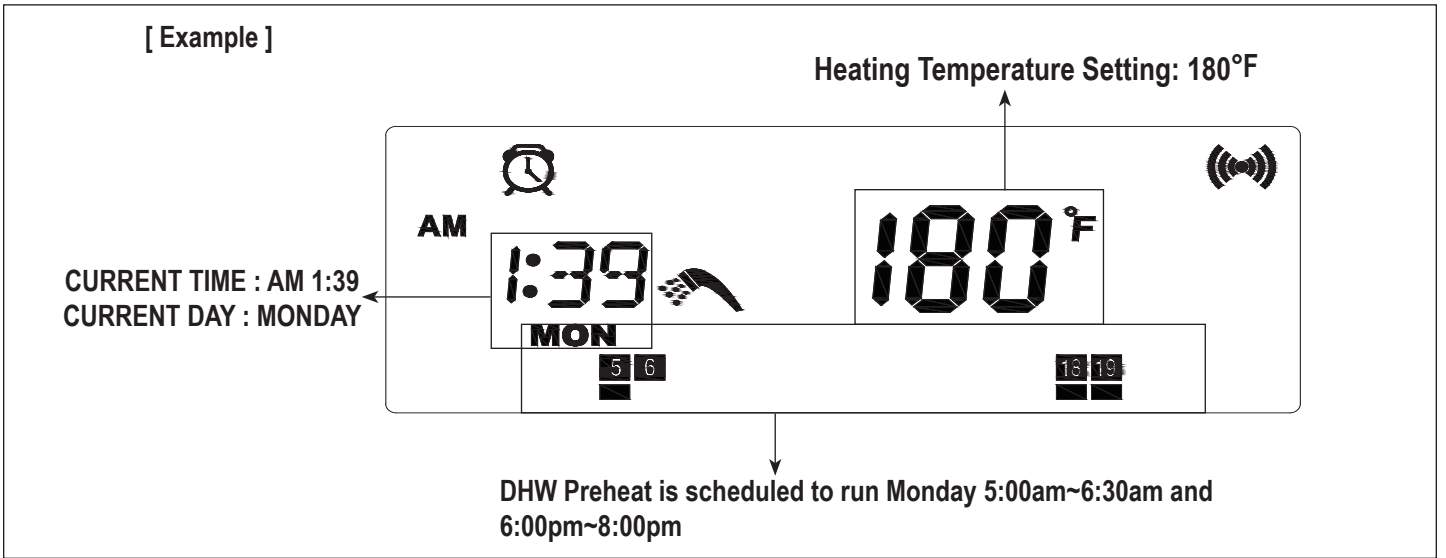


Figure 30 – Initial Display Screen Example

NOTE: The initial display screen will differ depending on a number of factors, including whether the appliance detects a call for heat or hot water.

The Control System can operate through user and service modes that have specific LCD outputs and dedicated controls, including:

- Change the Heating / DHW Set-Point Temperature
- Lock Mode
- Error Mode
- Status Display Mode
- Outdoor Temperature Mode
- Installer Mode

- D. CHANGING THE DHW SET-POINT

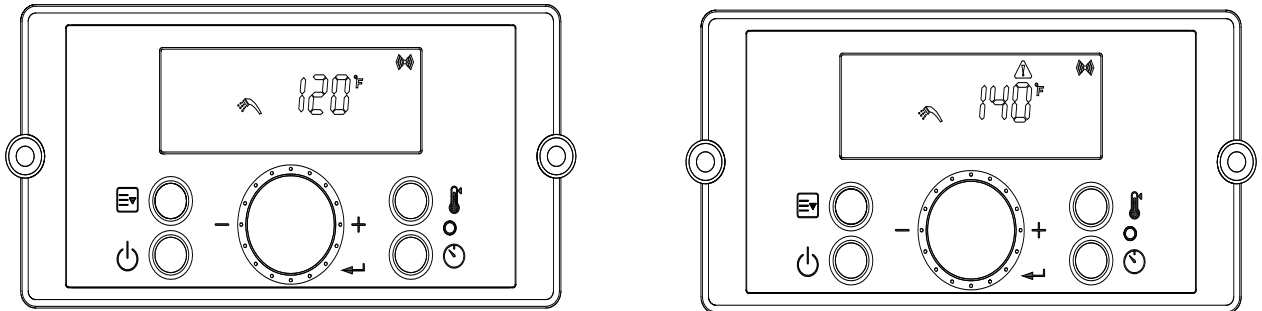


Figure 31 – DHW Set-Point Screens

NOTE: The operation of the high temperature Domestic Hot Water can be set separately.

	General temperature range				High temperature range		
°F	90	.....	120	121	.....	140
Factory Default							
°C	32	.....	49	49.5	.....	60

Press and hold the button for 5 seconds when the display is powered ON to change the DHW Set-Point for General Temperature Range. The DHW icon and current Set-Point will display and flash. This indicates that the DHW Set-Point can be changed. Factory DHW Set-Point is 120°F (49°C). Initial and General Temperature DHW Set-Point Range is 90~120°F (32~49°C).

The recommended starting temperature is 120°F (49°C).

Turn the dial counterclockwise to lower and clockwise to raise the DHW Set-Point. After changing the temperature, press the dial button to save the Set-Point.

To change the DHW Set-Point above 121°F (49.5°C) of High Temperature Range, press and hold the button for 5 seconds to get to General Temperature Range, then press and hold the button again for 5 seconds for High Temperature Range Set-Point.

High Temperature DHW Set-Point Range is 121~140°F (49.5~60°C).

Turn the dial counterclockwise to lower and clockwise to raise the DHW Set-Point. After changing the temperature, press the dial button to save the Set-Point.

⚠ DANGER

Hotter water increases the risk of scald injury. Scalding may occur within 5 seconds at a setting of 140°F (60°C). Water temperature over 125°F can instantly cause severe burns, or death, from scalds. Children, disabled, and elderly are at the highest risk of being scalded. See instruction manual before setting temperature at appliance. Feel water before bathing or showering!

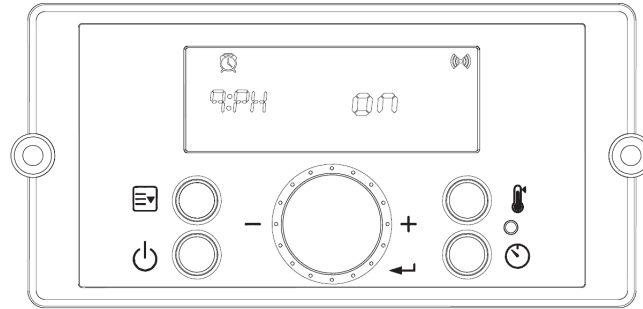
▪ E. SETTING FOR DHW PREHEAT ACTIVATION

Figure 32 – DHW Preheat Activation Screen

NOTE: The operation of the DHW preheat activated setting can be set separately.

Press the . The control panel must be off.

Press and hold the for 5 seconds to enter 'Installer Mode'.

Turn the clockwise until 9:PH is displayed. Then press the so is blinking.

Turn the clockwise so 'on' and are blinking.

Then press the to save the setting.

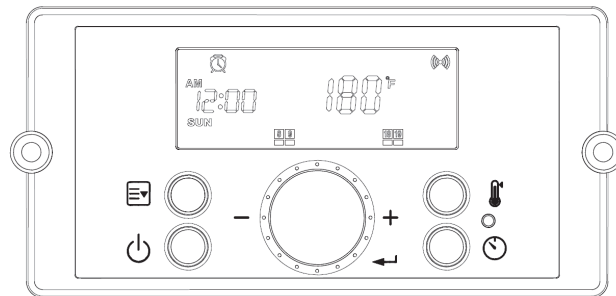
▪ F. SETTING FOR DHW PREHEAT TIMERV

Figure 33 – DHW Preheat Timer Screen

[For Example] Today is Sunday DHW Preheat is scheduled to run Sunday 8:00am~10:00am and 6:00pm~8:00pm.

1. Press the ON.

2. Press the . Then, is displayed and blinking.

3. Press the again so today's day [For Example: Sunday] is blinking. Then turn the clockwise or counterclockwise until the 'the desired day' is displayed.

4. Press the to save the Day.

5. Current Time is blinking, then turn the clockwise or counterclockwise until 'the desired hour' is displayed. Press the to save the Hour (Icon is lit). Then the next 'Time Icon' will be blinking. Continue pushing the to select each 30 minute time block that is consecutive. To skip some time blocks turn the to next desired time and press the to select the next time blocks. Press the to save the setting.

6. Press the to return to 'Day'. Repeat steps 3-5 for each day of the week.

7. After completing all settings, press the three times to return to normal mode.

- G. STATUS DISPLAY MODE (or USER MODE)

Status Display Mode will activate when  is pressed and held for 5 seconds when the display panel is turned on at Standby Mode.

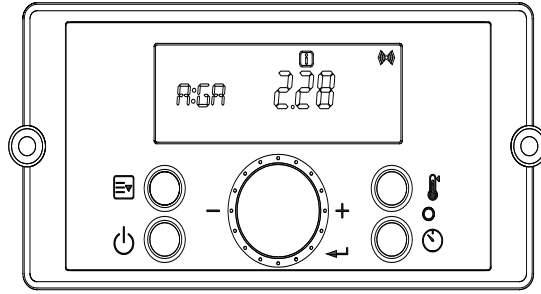


Figure 34 – Status Mode Screen


Parameter	Detail	Description
A:GAL	DHW Flow Rate	Current Flow Rate (GA: GPM/°F/psi(Default) or L: LPM/°C/BAR)
b:FM	Fan Speed	Current Fan Speed
C:TL	Lock Mode	Lock mode is used (On) or unused (off)
d:TP	H.SUP	Current (Heating Supply Thermistor) temperature (°F/°C)
	H.rEt	Current (Heating Return Thermistor) temperature (°F/°C)
	d.Hot	Current (DHW Thermistor) temperature (°F/°C)
	d.CLd	Current (DHW Cold Water Thermistor) temperature (°F/°C)
	Eht	Current (Exhaust Thermistor) temperature (°F/°C)
Od	Current (Outdoor Temperature Sensor) temperature (°F/°C)	
E:WP	Heating Water Pressure	Current Heating Water Pressure (psi/BAR)
F:FS	Voltage of Flame Sensor	Current Flame Sensor (Vdc)
g:EH	Error History	View the Error History (E0:XX ~ E9:XX)
H:RH (Running History)	PLUg	X 1000 hour (Power-on Time)
	bnH.H	X 1000 hour (Heating Burn Hour)
	bnH.d	X 1000 hour (DHW Burn Hour)
	bnC.H	X 1000 Time (Heating Burn Cycle)
	bnC.d	X 1000 Time (DHW Burn Cycle)
PPHr	X 1000 hour (Pump Running Time)	
I:MD	199A / 180A	Model [199A:100k (180k DHW) BTU/hr, 180A:120k (199k DHW) BTU/hr]
J:GT	ng/LP	Current Gas type
K:Pr	Pcb / PnL	Current Software version(Pcb:Circuit Board, PnL:Control Panel)


Table 20 – Status Mode Display Screen Descriptions

This function can be checked and set in User Mode as above parameters.

To enter the User Mode, Press the  button on.


Press and hold the  button around 5 seconds.

And then "A:GA" is first displayed on the display screen, turn the  dial button clockwise or counterclockwise to scroll through the displayed parameters in this mode.

Press the  button again to return to normal mode.

NOTE: The control system will not allow the changes if Lock Mode (C:TL) is activated. Lock Mode (C:TL) will have to be turned off before making further changes.

- H. CHANGE THE CH SET-POINT

Press the  button when the display panel is powered ON. The display will appear as follows. The set-point will flash when the CH Set-Point can be changed.

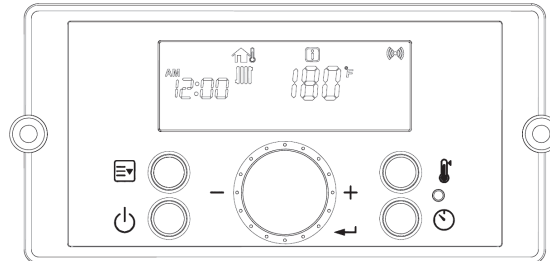






Figure 35 – CH Set-Point Screen


NOTE: The operation of the DHW preheat activation setting can be set separately.

- Blinking  on the control panel is not an Error Status.
- The unit has the 'Outdoor Reset (Energy Saving)' feature, but this feature is disabled(Factory Default).
-  is lit on the control panel, the Outdoor Reset (Energy Saving) is enabled.
- Heating Temperature is changing automatically based on the Outdoor Temperature.

Press the  ON. Press the  Button.




The  and 'current Heating temperature setting' will be blinking.

Heating temperature can be adjusted by turning the  from 100°F to 180°F (38°C~82°C) in 1°F(0.5 °C) intervals.

Press the  to set the Heating Temperature and return to normal mode.

I. INSTALLER MODE

How To Enter "Installer Mode"

1. Turn off the power to the Control Panel.
2. Press and hold the  button for more than 5 seconds to get into the 'Installer Mode'.
3. Turn the  clockwise or counterclockwise to search to the desired selection in the 'Installer Mode'.
4. Press  to save setting value.

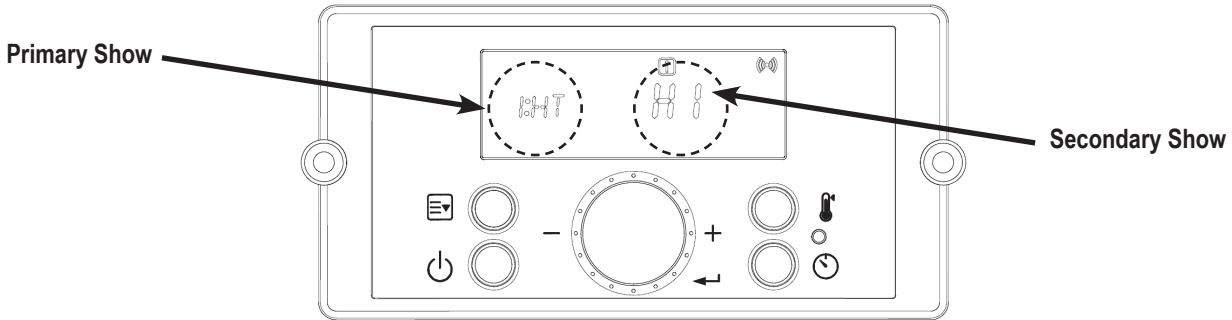




Figure 36 – Installer Mode Screen

Primary Show		Secondary Show				Description
Parameter	Index	Step 1	Step 2	Step 3	Default	
1:HT	Heating Temp Range	HI	121~180°F (49.5~82°C)	-	180°F (82°C)	This setting is for changing the heating set temperature range. • You can change the Highest Set Temperature (HI) and the Lowest Set Temperature (Lo) by adjusting the numbers on the display. • If 2:TR (Outdoor Temperature Reset) is activated ('on') then the settings for 1:HT will be overridden by 2:TR settings.
		Lo	80~120°F (26~49°C)	-	100°F (38°C)	
2:TR	Outdoor Temp Reset	oFF	-	-	0	This setting activates or deactivates the Outdoor Temperature Reset function. •  appears and lights up when the Outdoor Temperature Reset function is activated. • Please check the connection of the outdoor temperature sensor if  blinking. • You can't change the heating set temperature manually while this function is on, because the heating set temperature is determined by the outdoor temperature automatically.
		on	-	-	-	
3:TY (This parameter doesn't show if 2:TR is Off)	Type of Heating System	A.Ftb	-	-	0 120~180°F (49~82°C)	This section is used to select which type of Heating System is being used. • There are 6 typical Heating Systems that are available -Finned Tube Baseboard -Air Handler -Cast Iron Baseboard -Low Mass Radiant Floor -High Mass Radiant Floor -Radiator • For these 6 heating types the low and high temperature points are pre-programmed. (See ranges to the left) * If b.AH is selected, additional steps are needed to be programmed, see 8:AH below • If you would like to use custom low and high temperature points, select G.CUS and follow the sub menus to set custom low and high temperature points.
		b.AH	-	-	140~180°F (60~82°C)	
		C.Cib	-	-	100~170°F (38~76.5°C)	
		d.LrF	-	-	80~140°F (26.5~60°C)	
		E.rF	-	-	80~120°F (26.5~49°C)	
		F.rAd	-	-	120~170°F (49~76.5°C)	
		G.CUS	HI	121~180°F (49.5~82°C)	180°F (82°C)	
LO	80~120°F (26.5~49°C)		100°F (38°C)			

Primary Show		Secondary Show				Description
Parameter	Index	Step 1	Step 2	Step 3	Default	
4:Od (This parameter doesn't show if 2:TR is Off)	Outdoor Temp	A.HI	23~110°F (-5~43°C)	-	0 70°F (21°C)	<p>The Combi Boiler will automatically use the Outdoor Temperature Settings and the Heating Application to adjust the set temperature of the unit for the most comfortable and economical heating temperature.</p> <ul style="list-style-type: none"> •A.HI (Outdoor High Temperature Setting) This should be set at the highest average outdoor temperature in which the customer would like the heating system to continue to heat the home. •b.noH (Warm Weather Shutdown Temperature Setting) - When 'on' the unit will go into energy saving mode and automatically stop heating when the outdoor temperature is 5°F (3°C) over the A.HI set point. - When 'oFF' the unit will continue to heat at the lowest temperature setting even if the outdoor temperature is greater than A.HI set point. •C.Lo (Outdoor Low Temperature Setting) This should be set at the lowest average outdoor temperature during the winter season. (not the lowest possible outdoor temperature) •When the Warm Weather Cutoff is on the ☀ will flash on the control panel.
		b.noH	on	-	0	
			oFF	-	-	
C.Lo	-4~61°F (-20~16°C)	-	0 20°F (-6.5°C)			
5:bs (This parameter doesn't show if 2:TR is Off)	Boost Timing	oFF	-	-	0	<p>The setting is to increase the set temperature of the unit on cold start ups if the actual room temperature doesn't reach the thermostat set temperature quick enough, the Boost time function will increase the set temperature of the Combi Boiler 10°F (5.5°C) after the selected Boost time setting has passed.</p> <p>Example : Room thermostat set at 72°F, Combi Boiler set temp at 140°F, and Boost time function set to 30 min. If the room temperature does not reach 72°F within 30 min then the Combi Boiler will increase its set temp from 140°F to 150°F</p>
		1~120 min	-	-	-	
6:Vt	Vent Material	PVC	-	-	0	<p>Vent Material function is used to limit the maximum exhaust temperature for the vent material used. For safety reasons the Combi Boiler operation will stop if the exhaust temperature exceeded maximum allowable temperature for the venting material.</p> <ul style="list-style-type: none"> •PVC maximum exhaust temperature is 149°F (65°C) •CPVC and PP/STS maximum exhaust temperature is 200°F (93°C)
		CPVC	-	-	-	
7:EL	High Elevation	0-2	-	-	0	<p>Select an altitude range from the following four options based on where the Combi Boiler is installed.</p> <ul style="list-style-type: none"> •0-2 : 0~1,999ft (0~609m) •2-5 : 2,000~4,999ft (610~1,523m) •5-8 : 5,000~7,999ft (1,524~2,438m) •8-10 : 8,000~10,000ft (2,439~3,048m)
		2-5	-	-	-	
		5-8	-	-	-	
		8-10	-	-	-	
8:AH	Air Handler	oFF	-	-	0	<p>This function needs to be turned 'on' if an Air Handler is being used as a heating type.</p> <ul style="list-style-type: none"> •When heating side is running the fan and pump for the Air Handler will be on. •If the DWH side is running the fan and pump for the Air Handler will be off. •If this is not set to 'on' the Air Handler fan will be running with no hot supply water from the Combi Boiler and blow cold air into the home while the DHW side is running. •When the Air Handle is operating, the ⚙ will display on the control panel.
		on	-	-	-	



Primary Show		Secondary Show				Description
Parameter	Index	Step 1	Step 2	Step 3	Default	
9:PH	Pre-Heating	oFF	-	-	0	This function is used to preheat the internal DHW plate heat exchanger during selected times set. •After turning on this function the timer will need to be set. •When Pre Heating function is activated the  will be displayed on the control panel.
		on	-	-	-	
10:EP	External Pump	oFF	-	-	0	This setting can activate or deactivate the terminals in the Combi Boiler for an External Pump (secondary pump) on the circuit board. •When the External Pump is activated the  will display on the control panel.
		on	-	-	-	
11:WP	Water Pressure	12~26 PSI	-	-	-	This function is to control the water pressure on the heating side of the Combi Boiler. This will ensure there is enough water inside the Combi Boiler to operate correctly. •The Auto Feeder will fill the system within 10 minutes. When the pressure of the system is over 2 PSI of Water Pressure Setting the Auto Feeder will close and water will stop filling the Combi Boiler. •Water Refilling Pressure: Set Valve - 4 PSI (0.002 BAR) •Water Refilling Stop Pressure: Set Valve + 2 PSI (0.001 BAR)
12:IV	Interval	0~20 min	-	-	3 min	This function is to set up the Interval Time in Heating Mode to prevent inconsistency of heating •If the selected time passes and the Combi Boiler's inside temperature drops, this function will automatically reignite the burner in the Combi Boiler.
13:Or	Pump Overrun Time	HEAt	0~60 min	-	20 min	This mode is to control how long the pump will run after the heating or DHW demand is satisfied. •This setting is to prevent unnecessary running of the pump and extend the life of the pump. •HEAt is used for the time after the heating system stops burning. •Do.H is used for the time after the DHW system stops burning.
		Do.H	1~20 min	-	3 min	
14:bt	Burner Set Temp	A.oFF	0~30°F (0~16.5°C)	-	10°F (5.5°C)	This mode is to set the activation points for the Heating Mode. •When the internal temperature of the Combi Boiler is too high or low the unit will stop burning or start burning. •Burner Stop Temperature = Heating Set Temperature + A.oFF •Burner Operating Temperature = Heating Set Temperature - b.on
		b.on	1~30°F (0.5~16.5°C)	-	30°F (16.5°C)	
15:CK	Check Parts	A.PP	on		oFF	This function can check the status of the part. •A.PP : Pump operation mode.(On 60 seconds, Stop 10 seconds repeat) •b.Fan : Fan operation mode.(0 ~ 100%) •C.Ag : AGM zero point check mode. •d.3-Y : 3 way valve operation mode.(Heating side 10 seconds, DHW side 10 seconds repeat) •E.FC : Flow rate control valve zero point check mode.
			oFF			
		b.Fan	0~100		0	
			on			
		C.Ag	oFF		oFF	
on						
d.3-Y	oFF		oFF			
	on					
E.FC	oFF		oFF			
	on					
16:CL	Clear	EHIS	no		no	This function can delete memory. •EHIS : Delete error history •SyS : System Initialization
			YES			
		SyS	no		no	
			YES			
17:FS	Fan Compensation	A.FH2	-30~30		Factory use only	This function can compensate fan and AGM. •A.FH2 : Maximum fan RPM compensation when heating mode. •b.FH1 : Maximum fan RPM compensation when DHW mode. •C.FL : Minimum fan RPM compensation •d.Ag : AGM compensation
		b.FH1	-30~30		Factory use only	
		C.FL	-30~30		Factory use only	
		d.Ag	-50~50		Factory use only	
18:CP	Combustion rate	HEAt	50~100		100	This function can adjust combustion rate. •HEAt : Adjust combustion rate when heating mode •do.H : Adjust combustion rate when DHW mode
		do.H	50~100		100	

Table 21 – Installer Mode Descriptions

▪ J. ERROR MODE

The following screen will display when the appliance encounters an error.

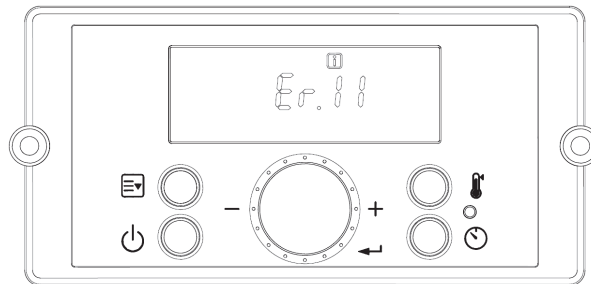


Figure 37 – Error Mode Screen

Code	Error Code Description	Possible Remedies
Er11	Ignition Failure	<ul style="list-style-type: none"> • Make sure that the main gas supply valve is open. • Make sure that the gas supply and inlet gas is within specification.
Er12	Flame Loss	<ul style="list-style-type: none"> • Clean the intake air filter. • Make sure that the main gas supply valve is fully open or have a professional check the gas supply pressure.
Er16	Overheating Heating Supply Thermistor during DHW Operation (Exceed 205°F (96°C))	<ul style="list-style-type: none"> • Turn off the Combi Boiler for at least 30 minutes, and then restarts it. • Clean the heating return filter. • Check the circulation pump operation or speed setting as speed. • Flush the heat exchanger.
Er20	High Limit Switch Abnormality	<ul style="list-style-type: none"> • Turn off the Combi Coiler for at least 30 minutes, and then restart it. • Clean the heating return filter. • Check the circulation pump speed setting as speed 1. • Flush the primary heat exchanger.
Er29	Air Pressure Switch Abnormality	<ul style="list-style-type: none"> • Make sure that the exhaust pipe is free of obstructions. • Clean the intake air filter. • Make sure that the condensate trap or drain pipe is not clogged.
Er30	Outdoor Temperature Sensor Open or Short Circuit	<ul style="list-style-type: none"> • Check outdoor temperature sensor. Ensure connections are secure. • Check sensor resistance. If resistance is zero, replace the sensor. • Contact technical support.
Er31	DHW Cold Water Thermistor Open or Short Circuit	<ul style="list-style-type: none"> • Ensure connections are secure. • Check sensor resistance. If resistance is zero, replace the sensor.
Er32	DHW Thermistor Open or Short	
Er33	Heating Supply Thermistor Open or Short Circuit	
Er34	Heating Return Thermistor Open or Short Circuit	
Er35	Exhaust Thermistor Open or Short Circuit	
Er38	Abnormal Operation; Memory Error on the Circuit Board	<ul style="list-style-type: none"> • Try to reset first → Still the same Error Code → Contact Technical Support.
Er39	False Flame Detection	<ul style="list-style-type: none"> • Clean the flame window. • Make sure that the front cover is closed securely. • Check the flame sensor.
Er40	Gas Leakage	<ul style="list-style-type: none"> • Turn off the gas. • Contact technical support.
Er41	Fan Speed Error	<ul style="list-style-type: none"> • To reset this error code, the power needs to be disconnected and then reconnected.
Er43	Burner Limit Switch Abnormality	<ul style="list-style-type: none"> • Contact technical support.
Er45	Water Leakage	<ul style="list-style-type: none"> • Close the water inlet valve before contacting technical support. • Contact technical support.
Er54	Low Heating Water Pressure	<ul style="list-style-type: none"> • Water pressure lower than [Setting Pressure - 4] psi • Check the auto feeder. • Check the auto feeder inlet pressure. • Check the pressure sensor.

Code	Error Code Description	Possible Remedies
Er55	Stop Supply Inlet Water.	<ul style="list-style-type: none"> • If the water pressure is not rising supplement progress at least 13 psi. • Check supply water and inlet shut off valve. This valve must be open. • Check the auto feeder.
Er56	High Heating Water Pressure	<ul style="list-style-type: none"> • Water pressure higher than 50 psi. • Check the pressure sensor. • Contact technical support.
Er58	LWCO Abnormality	<ul style="list-style-type: none"> • Ensure the LWCO wiring connection on circuit board. • Measuring output AC24V from terminal on circuit board in the case of external LWCO install. • Make-up water to the system if necessary. • Contact technical support.
Er59	Pressure Sensor Abnormality	<ul style="list-style-type: none"> • Check the pressure sensor. • Contact technical support.
Er61	RPM Sensor	<ul style="list-style-type: none"> • Check fan motor.
Er63	Overheating Heating Supply Thermistor during Heating Operation (Exceed 205°F(96°C))	<ul style="list-style-type: none"> • Turn off the Combi Boiler for at least 30 minutes, and then restart it. • Clean the heating water return filter. • Flush the primary heat exchanger.
Er65	Flow Control Valve Abnormality	<ul style="list-style-type: none"> • Check flow control valve.
Er67	AGM Abnormality	<ul style="list-style-type: none"> • Try main power switch OFF/ON → Still the same Error Code → AGM failure.
Er72	Flame Detected before Ignite Abnormality	<ul style="list-style-type: none"> • Measure the current from the Flame Sensor when there is no flame. • To reset this error code, the power needs to be disconnected and then reconnected.
Er73	DIP Switch Setting Abnormality	<ul style="list-style-type: none"> • Check the DIP Switch settings.
Er76	Communication Error between Control Panel and Circuit Board.	<ul style="list-style-type: none"> • Check connections from Circuit Board to Control Panel. • To reset this error code, the power needs to be disconnected and then reconnected.
Er94	Overheating Exhaust Thermistor (The Combi Boiler shuts down when the exhaust temperature exceeds 149°F (65°C) for PVC vent or 200°F (93°C) for CPVC vent.	<ul style="list-style-type: none"> • Turn off the Combi Boiler for at least 30 minutes, and then restart it. • Check the exhaust thermistor and related wiring. • Make sure that the vent / air intake are properly installed. • Flush the heat exchanger.

Table 22 – Error Codes with Linked Components, Effects, and Actions

▪ K. OUTDOOR TEMPERATURE MODE

NOTE: If the system requires a fixed operating temperature, the outdoor sensor is not required and should not be installed.

There is no connection required if an outdoor sensor is not used in the installation.


1. Use a minimum 18 AWG wire for runs of up to 150 feet.

2. Mount the outdoor sensor on an exterior surface of the building, preferably on the north side in an area that will not be affected by direct sunlight and will be exposed to varying weather conditions.

NOTE: For correct mounting procedures, follow instructions provided with the sensor.

NOTE: If sensor wires are located in an area with sources of potential electromagnetic interference (EMI), the sensor wires should be shielded, or the wires routed in a grounded metal conduit. If using shielded cable, the shielding should be connected to the common ground of the appliance.

NOTE: Outdoor Temperature Mode Icon on the display will flash if an Outdoor Sensor or 0~10 Volt is not connected to the appliance. See Figure 38 to set your Outdoor Reset Curve.

To check the CH Target Temperature while using Outdoor Temperature Mode, press the  button while the appliance is operational and the display panel is powered on.

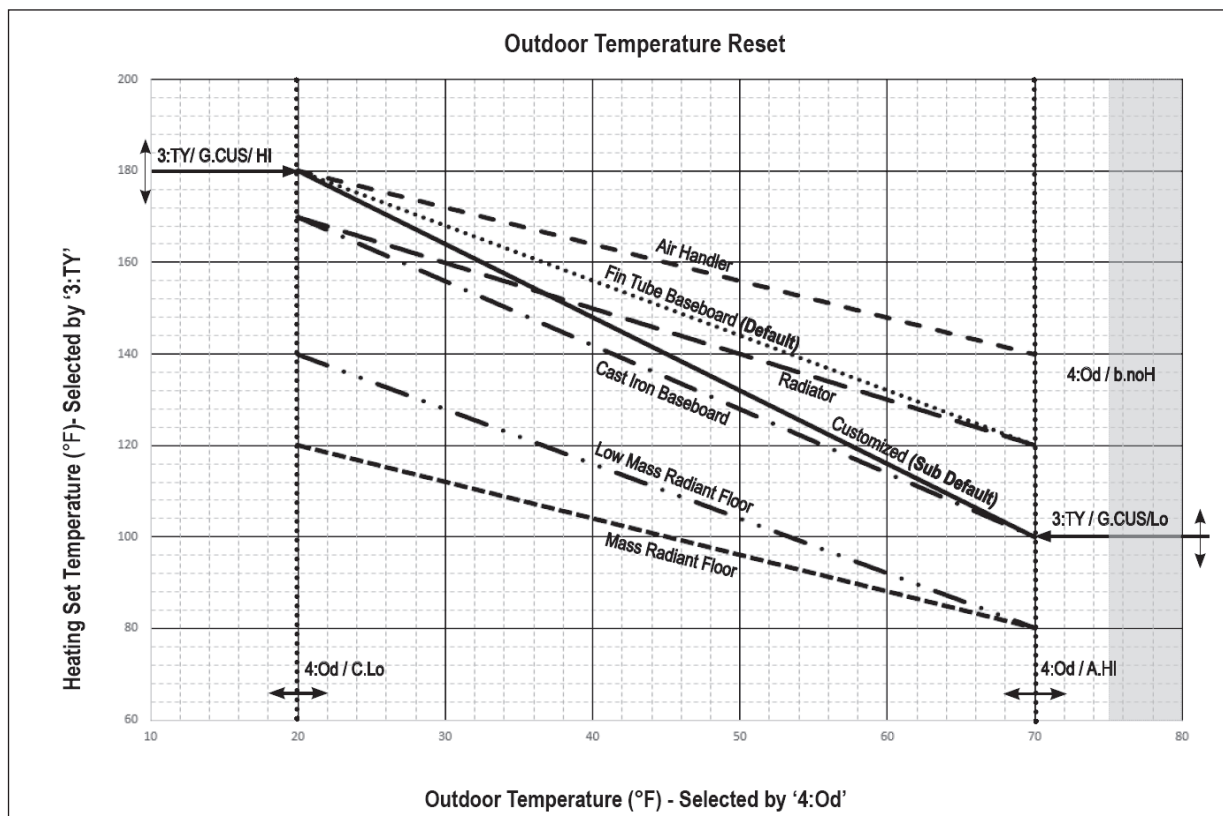


Figure 38 – Outdoor Reset Curve – See Installer Mode for Curve Setting Descriptions

NOTE: The optimal set up should be determined for each job location. Default setting: Max Temperature: 180 °F, Min Temperature: 120°F

▪ L. 0~10 VOLT INPUT

1. A signal from a building management system may be connected to the appliance to enable remote control. This signal should be a 0~10 volt positive-going DC signal. When the 0~10V input is wired to the appliance terminal strip, a building control system can be used to control the set point temperature of the appliance. The control interprets the 0~10 volt signal as follows; when the signal is between 0 and 1.5 volts, the appliance will be in standby mode, not firing. When the signal rises above 1.5 volts, the appliance will ignite. As the signal continues to rise towards its maximum of 10 volts, the appliance will increase in set point temperature.

2. Connect a building management system or other auxiliary control signal to the terminals marked for this purpose on the appliance terminal block (shown in Piping Diagrams, this manual). Caution should be used to ensure that the 0~10 VOLT + connection does not become connected to ground.

NOTE: Ensure that the polarity of the connections from the external modulating appliance controller to the appliance is correct. Reversed polarity could lead to erratic and/or no response from the appliance controller.

NOTE: Outdoor Temperature Mode Icon on the display will flash if an Outdoor Sensor or 0~10 Volt is not connected to the appliance. Reversed polarity could lead to erratic and/or no response from the appliance controller.

0-10 V INPUT TABLE:

When outside voltage is applied to the connector (2) in the wiring diagram,

1. The Outdoor temperature sensor does not work.
2. Symbol is displayed.
3. The heating temperature is automatically set according with the external voltage input.

NOTE: 0~10V is prioritized. If input voltage is less than 1.5V then T/T will operate.

The range of input voltage is approximately 1.5[V] ~ 10[V] and the heating temperature settings according to this range are as follows. Reversed polarity could lead to erratic and/or no response from the appliance controller.

Input Voltage[V]	Heat Temperature [°C]	Heat Temperature [°F]
1.5	30.0	86
2.0	32.7	91
2.5	36.1	97
3.0	38.8	102
-	-	-
9.0	75.0	167
9.5	77.7	172
10	82.2	180

Table 23 – 1~10V Input Voltage and Associated Temperature

PART 11 – START-UP PREPARATION

WARNING

Thoroughly clean and flush any system that has used glycol before installing the appliance.

CAUTION

Chemical imbalance of the water supply may affect efficiency and cause severe damage to the appliance and associated equipment. Water quality must be professionally analyzed to determine whether it is necessary to treat the water. Various solutions are available to adjust water quality. Adverse water quality will affect the reliability of the system. In addition, operating temperatures above 135°F will accelerate the build-up of lime scale and possibly shorten appliance service life. Failure of an appliance due to lime scale build-up, low pH, or other chemical imbalance IS NOT covered by the warranty.

▪ A. CHECK / CONTROL WATER CHEMISTRY

The water must be potable, free of corrosive chemicals, sand, dirt, and other contaminants. It is up to the installer to ensure the water does not contain corrosive chemicals or elements that can damage the heat exchanger. Potable water is defined as drinkable water supplied from utility or well water in compliance with EPA secondary maximum contaminant levels (40 CFR Part 143.3) as shown in the table below. If the water contains contaminants higher than outlined by the EPA, water treatment is recommended and additional, more frequent maintenance may be required.

If you suspect that your water is contaminated in any way, discontinue use of the appliance and contact an authorized technician or licensed professional.

Contaminant	Maximum Allowable Level	Contaminant	Maximum Allowable Level
Total Hardness (Residential Use - Below 140°F water temperature)	200 mg/l (12 grains/gallon)	Manganese	0.05 mg/l or PPM
Total Hardness (Commercial Use - 140°F and above water temperature)	120 mg/l (7 grains/gallon)	pH	6.5-8.5
Aluminum	0.05 to 0.2 mg/l or PPM	Sulfate	205 mg/l or PPM
Chloride	100 mg/l or PPM	Total Dissolved Solids (TDS)	500 mg/l or PPM
Copper	1 mg/l or PPM	Zinc	5 mg/l or PPM
Iron	0.3 mg/l or PPM	Dissolved Carbon Dioxide (CO ₂)	15 mg/l or PPM

Table 24 – Water Chemistry Specifications

Clean system to remove sediment*

1. You must thoroughly flush the system (without the appliance connected) to remove sediment. The high-efficiency heat exchanger can be damaged by buildup or corrosion due to sediment.
2. For zoned systems, flush each zone separately through a purge valve. (If purge valves and isolation valves are not already installed, install them to properly clean the system.)
3. Flush system until water runs clean and you are sure piping is free of sediment.

NOTE: It is recommended you clean heat exchanger at least once a year to prevent lime scale buildup. Follow the maintenance procedure to clean the heat exchanger in this manual

NOTE: APPLIANCE FAILURE DUE TO IMPROPER WATER CHEMISTRY IS NOT COVERED BY WARRANTY.

- **B. GLYCOL ANTIFREEZE SOLUTIONS**

⚠ WARNING

Use only inhibited propylene glycol solutions which are specially formulated for hydronic systems. Ethylene glycol is toxic and can attack gaskets and seals used in hydronic systems. Glycol mixtures should not exceed 50%.

- Glycol in hydronic applications should include inhibitors that prevent the glycol from attacking metallic system components. Make certain that the system fluid is checked for the correct glycol concentration and inhibitor level.
- The glycol solution should be tested at least once a year or as recommended by the glycol manufacturer.
- Anti-freeze solutions expand more than water. For example: A 50% by volume solution expands 4.8% in volume for a temperature increase from 32°F to 180°F, while water expands 3% over the same temperature rise. Allowances must be made in system design for expansion.
- A 30% mixture of glycol will result in a BTU output loss of 15% with a 5% increase in head against the system circulator.
- A 50% mixture of glycol will result in a BTU output loss of 30% with a 50% increase in head against the system circulator.
- **NOTE:** BTU losses apply to both CH and DHW.

⚠ CAUTION

It is highly recommended to carefully follow the glycol manufacturer's recommended concentrations, expansion requirements, and maintenance recommendations (pH additive breakdown, inhibitor reduction, etc.) You must carefully calculate the additional friction loss in the system as well as the reduction in heat transfer coefficients.

- **C. CHECK FOR GAS LEAKS**

⚠ WARNING

Before starting the appliance, and during initial operation, smell near the floor and around the appliance for gas odorant or any unusual odor. Remove appliance front door and smell interior of appliance enclosure. Do not proceed with startup if there is any indication of a gas leak. Repair any leaks at once.

PROPANE APPLIANCES ONLY – Both natural gas and propane (LP) have an odorant added to aid in detecting a gas leak. Some people may not physically be able to smell or recognize this odorant. If you are unsure or unfamiliar with the smell of natural gas or LP, ask the gas supplier. Other conditions, such as "odorant fade," which causes the odorant to diminish in intensity, can also hide or camouflage a gas leak.

⚠ WARNING**FOR YOUR OWN SAFETY READ BEFORE OPERATING**

1. This appliance does not have pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
2. 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 suppliers' instructions.
 - If you cannot reach your gas supplier, call the fire department.
 - Turn off gas shutoff valve (located outside of the appliance) so that the handle is crosswise to the gas pipe. If the handle will not turn by hand, don't try to force or repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
4. 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 that has been damaged.
 5. The appliances shall be installed so the gas ignition system components are protected from water (dripping, spraying, rain, etc.) during appliance operation and service (circulator replacement, condensate trap, control replacement, etc.)
- Failure to follow these instructions could result in property damage, serious personal injury, or death.

⚠ WARNING

If you discover any evidence of a gas leak, shut down the appliance at once. Find the leak source with a bubble test and repair immediately. Do not start the appliance again until the leak is repaired. Failure to comply could result in substantial property damage, severe personal injury, or death.

- D. FILL AND TEST WATER SYSTEM**⚠ WARNING**

Ensure the appliance is full of water before firing the burner. Failure to do so will damage the appliance. Such damage IS NOT covered by warranty, and could result in property damage, severe personal injury, or death.

1. Fill the system only after ensuring water chemistry meets the requirements listed in this manual.
2. Close the manual and automatic air vents and appliance drain valve.
3. Fill to the correct system pressure. Correct pressure will vary with each application.
 - a. Typical cold water fill pressure for a CH residential system is 12 psi.
 - b. Pressure will rise when appliance is turned on and system water temperature increases. Operating pressure of the CH system should never exceed 25 psi, and must never exceed the relief valve pressure setting.
4. At initial fill and during appliance startup and testing, check system thoroughly for leaks. Repair all leaks before proceeding further.

⚠ WARNING

Eliminate all system leaks. Continual fresh make-up water will reduce appliance life. Minerals can build up in the heat exchanger, reducing heat transfer, overheating the heat exchanger, causing heat exchanger failure and possibly resulting in property damage, severe personal injury, or death.

5. The system may have residual substances that could affect water chemistry. After the system has been filled and leak tested, verify that water pH and chlorine concentrations are acceptable by sample testing.






⚠ CAUTION

It is important to purge the system of air to avoid damage to the appliance

- E. PURGE AIR FROM CH**CAUTION**

IMPORTANT! While commissioning the system, the air vent on top of the appliance must remain fully open to allow the appliance to properly fill. Failure to keep the air vent open could lead to improper appliance and system operation.

To purge air from the system:

- a. Connect a hose to the purge valve and route hose to an area where water can drain and be seen.
- b. Close the appliance or system isolation valve between the purge valve and fill connection to the system.
- c. Close zone isolation valves.
- d. Automatic water replenishment in progress when the Combi Boiler is less than the internal pressure 12psi.
- e. Open purge valve.
- f. Open the isolation valves one zone at a time. Allow water to run through the zone, pushing out the air. Run water until no noticeable air flow is present. Close the zone isolation valves and proceed with the next zone. Follow this procedure until all zones are purged.
- g. Close the purge valve and remove the hose. Open all isolation valves. 'Error Code 54' will be indicated at the beginning of auto feeding. This is normal operation. When auto feeding is completed, 'Error Code 54' turns off automatically. It is recommended that you put the pumps into manual operation to assist in purging the circuits.
- h. Disconnect the wires that are connected to the THERMOSTAT terminals of the terminal block. Apply power to the appliance. After the control goes through the start-up sequence, the display will turn off.
- i. Press and hold the  button for more than 5 seconds. Then scroll to 15:CK by turning the  dial. Press the  button. A.PP will show on the display. Press the  button to run the test pump operation. The default is Maximum 10 minutes for 60sec-on and 10sec-off. Turn the  dial counterclockwise from off to on.
- j. The CH and internal circulation pumps will come on. Run pumps as required to help bleed out all entrapped air. Some good indicators that air is removed include the absence of gurgling noises in the pipes and pump operation becoming very quiet. Test mode will stop automatically after the Maximum time (fixed value is 10 minutes), or press the button to leave it manually.
- k. After the system has operated for some time, eliminate any residual air by using the manual air vents located throughout the system.
- l. If purge valves are not installed in the system, open manual air vents in the system one at a time, beginning with the lowest floor. Close vent when water squirts out. Repeat with remaining vents.

- F. PURGE AIR FROM DHW SYSTEM

1. Make sure CH and DHW lines to the appliance are open and full of water. Turn on all electric power to appliance.

 WARNING

Ensure the appliance is full of water before firing the burner. Failure to do so will damage the appliance. Such damage IS NOT covered by warranty, and could result in property damage, serious personal injury, or death.

2. Open hot water faucets in the DHW system. Start with the faucets nearest the appliance.
3. Keep faucets open until water runs freely and all air is purged. Then move on to faucets further away from the appliance in the system.
4. When water flows freely from all hot water faucets, DHW purging is complete.

- G. CHECK THERMOSTAT CIRCUIT(S)

1. Disconnect the two external wires connected to the appliance thermostat terminals (low voltage terminal strip).
2. Connect a voltmeter across these two incoming wires with power supplied to the thermostat circuits. Close each thermostat, zone valve and relay in the external circuit one at a time and check the voltmeter reading across the incoming wires.
3. There should NEVER be a voltage reading.
4. If a voltage reading does occur under any condition, check and correct the external wiring. (This is a common problem when using 3-wire zone valves.)
5. Once the external thermostat circuit wiring is checked and corrected if necessary, reconnect the external thermostat circuit wires to the appliance low voltage terminal strip. Allow the appliance to cycle.

H. CONDENSATE REMOVAL

1. This is a high efficiency condensing appliance. Therefore, the appliance has a condensate drain. Condensate fluid is nothing more than water derived from combustion products, similar to that produced by an automobile when it is initially started.

Condensate is slightly acidic (typically with a pH of 3 to 5) and must be piped with the correct materials. Never pipe the condensate using steel, copper, brass or other materials that will be subject to corrosion. Plastic PVC or CPVC pipe are the only approved materials.

A condensate neutralizer, if required by local authorities, may be purchased from aftermarket

2. It is very important that the minimum ½" condensate line is sloped downward away from the appliance to a suitable inside drain. If the condensate outlet on the appliance is lower than the drain, you must use a condensate removal pump, available from aftermarket. This pump is equipped with two leads that can be connected to an alarm or another type of warning device to alert the user of a condensate overflow, which, if not corrected, could cause property damage.

3. If a long horizontal run is used, it may be necessary to create a vent in the horizontal run to prevent a vacuum lock in the condensate line.

4. Do not expose the condensate to freezing temperatures.

5. It is very important you support the condensate line to ensure proper drainage.

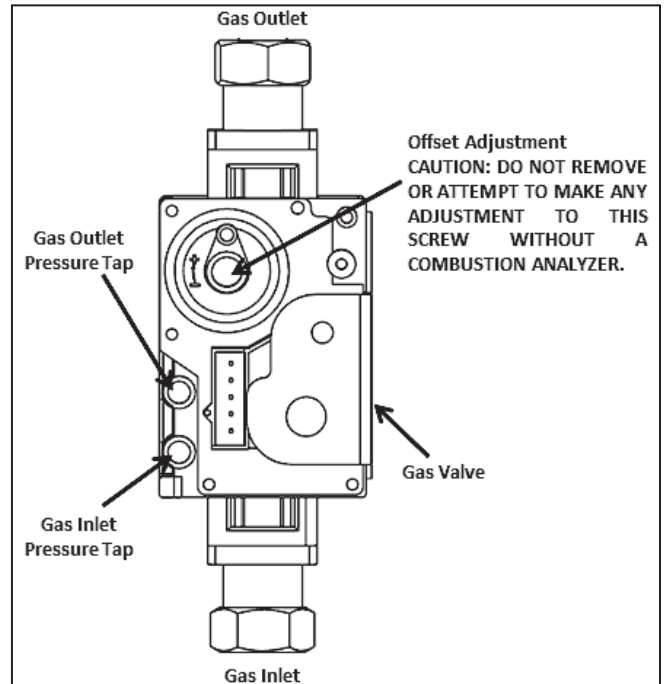


Figure 39 – Gas Valve Detail

I. FINAL CHECKS BEFORE STARTING APPLIANCE

1. Verify the appliance and system are full of water and all system components are correctly set for operation.

2. Fill the condensate trap with water.

3. Verify electrical connections are correct and securely attached.

4. Inspect exhaust vent and intake piping for signs of deterioration from corrosion, physical damage, or sagging. Verify exhaust vent and intake piping are intact and correctly installed per Venting Section (this manual) and local codes.

J. ADJUSTING GAS PRESSURE AT THE APPLIANCE

NOTE: Refer to Figure 39 when adjusting gas pressure. Loosen the screw before checking the gas inlet pressure.

1. The appliance and its individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of the system at test pressures greater than ½ psi (3.5 kPa).

2. The appliance must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than ½ psi (3.5 kPa).

NOTICE

Do not fire (operate) the appliance until all connections have been completed and the heat exchanger is filled with water. Doing so will damage the appliance and void the warranty.

ADJUSTING GAS PRESSURE AT THE APPLIANCE

1. Open the gas line and water valves.

2. Use a Phillips Head screwdriver to remove the appliance top cover. Remove the front cover.

3. Loosen the gas inlet pressure tap screw three turns with a screwdriver. Connect the manometer to the inlet gas pressure port. See Figure 39.

4. Turn on power to the appliance and open a hot water faucet.

5. The minimum and maximum inlet gas line pressures must meet the requirements shown in Table 25.

LP GAS		NATURAL GAS	
Minimum Pressure	8.0" WC	Minimum Pressure	3.5" WC
Maximum Pressure	14.0" WC	Maximum Pressure	10.5" WC

Table 25 – Gas Pressure Requirements

6. Remove the manometer. Close the screw on the gas inlet pressure tap.

- K. SETTING AND VERIFYING THE COMBUSTION SETTING

1. After the appliance has fired, flip DIP switch seven (7) to the ON position (low fire). Proceed to check appliance combustion values.

NOTE: Use a combustion analyzer to ensure CO and CO₂ values are within the range shown in Table 26.

⚠ WARNING

It is required to use a combustion analyzer to verify final adjustment according to the combustion chart (Table 26). Failure to do so could result in serious personal injury or death.

If the readings obtained are lower or higher than the combustion readings in Table 26, use a 4mm Allen key to adjust the offset screw in a clockwise (positive) or counterclockwise (negative) direction (approximately 1/4 turn). See Figure 40. Check your combustion values. Repeat this procedure until the values obtained on the combustion analyzer agree with those stated in Table 26.

NOTE: If the appliance makes a whistling sound (harmonics) at low fire, adjust the offset screw in a clockwise (positive) direction (approximately 1/8 turn). Check your combustion values and ensure they agree with those stated in Table 26 before proceeding.

⚠ WARNING

It is very important that gas conversion be set within the recommended CO measurements listed in Table 26. Visually looking at the burner does not determine combustion quality. Failure to measure combustion with a Combustion Analyzer and set the throttle within the recommended CO measurements could result in property damage, severe personal injury, or death.

COMBUSTION SETTINGS				
	NATURAL GAS		LP GAS	
FAN SPEED	LOW	HIGH	LOW	HIGH
CO PPM	<60	<200	<60	<200
CO ₂ (%)	8 - 10	8 ½ - 10 ½	9 – 10 ½	9 ½ - 10 ½

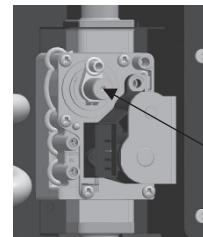


Figure 40 – Gas Valve Offset Screw

Offset Screw

Table 26 – Combustion Settings

2. When low fire settings have been obtained, flip DIP switch seven (7) to its original (OFF) position. This will return the appliance to normal mode.
- *3. Flip DIP switch six (6) to ON (high fire). Again check combustion readings with a combustion analyzer.
4. When complete, flip DIP switch six (6) to its original (OFF) position. This will return the appliance to normal mode.
5. Allow appliance to operate normally. Ensure it is operating properly.
6. Reinstall the appliance front cover.
7. Use a Phillips Head screwdriver to reinstall the appliance top cover.

*In order to increase CO₂ values on high fire, the gas orifice size can be increased to achieve the maximum CO₂ value listed in Table 26. Contact the factory for recommended orifice sizes to achieve the desired setting.

PART 12 – INSTALLATION AND START-UP CHECKLIST

LIGHT OFF ACTIVITIES	DATE COMPLETED		
	YES	NO	
1) Fill the Heating System with Water	Has the system been cleaned and flushed?		
	Does water chemistry meet requirements?		
	If water chemistry does not meet requirements, are treatment measures put in place?		
	Check all water piping and connections. Are all leak free and properly supported?		
2) Exhaust Vent and Intake Piping	Has the CH system been pressure tested and pressurized to 12 – 25 psi? Has the DHW system been pressure tested?		
	Has the appliance been vented in accordance with the methods and materials listed in this manual and to meet local codes (vented in approved materials, air supply sufficient for proper operation, combined vent length within the maximum vent length restriction, vent lengths minimized, installed with proper terminations, clearances, and pitch, etc.?)		
	Is vent piping properly supported?		
	Has exhaust vent piping been checked for leaks?		
3) Condensate Piping / Tubing and Components	Have the exhaust vent and intake pipes been properly installed into the connectors provided on the appliance?		
	Have all condensate line components included with the appliance been installed?		
	Is the condensate line piped with the approved materials listed in this manual?		
	Has the condensate line been routed to a laundry tub or other drain?		
4) Gas Piping	If necessary, has a condensate pump and/or neutralizer been installed?		
	Has the gas supply line been piped in accordance with the methods listed in this manual (supply line no less than 1/2" gas line is allowed in diameter, length and diameter adequate to deliver the required BTUs, union and shut-off valve installed, etc.)?		
	Does the gas type match the type indicated on the appliance rating plate?		
	Has gas supply line pressure been measured (between 3.5 and 14" WC)?		
5) Pressure Relief Valves	Has the gas supply line been leak tested per locally approved methods?		
	Have you installed approved pressure relief valves on the appliance?		
	Is the pressure relief valve in the CH line at least 1" in diameter and rated to 30 psi?		
6) Wire the Appliance	Is the pressure relief valve in the DHW line at least 3/4" in diameter and rated to 150 psi?		
	Have you connected the power and control wiring per appliance wiring diagram, this manual?		
	Have all DIP switches been set on the main appliance board?		
	Is electrical connection polarity within appliance requirements?		
7) Start-Up, Adjust, and Test	Do power specifications meet appliance requirements? 120V AC?		
	If necessary, has the appliance been converted to operate on the proper fuel type?		
	Has the appliance been started?		
	Has CO ₂ and CO been checked to ensure proper combustion?		
	If necessary, has the appliance gas valve been adjusted to achieve proper combustion?		
	Has the installation been customized per location requirements?		
	Have all customized system parameters been tested?		
FINAL INSTALLATION APPROVALS	Has proper appliance operation been confirmed?		
	Has the burner flame been checked? Is the burner flame a proper blue color? See Figure 41 for flame sight glass window location.		
	If the flame does not appear normal, the combustion system may need to be cleaned or adjusted by a qualified service technician.		
	SIGNED BY TECHNICIAN	DATE	

Table 27 – Final Installation Checklist

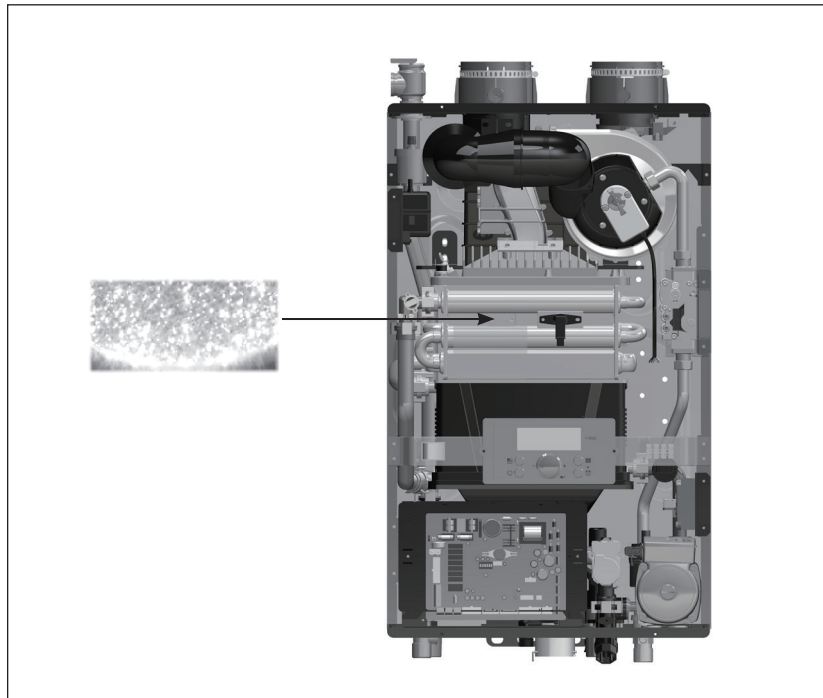


Figure 41 – Flame Sight Glass

CH Return Temperature Sensor Exhaust Temperature Sensor		CH Supply Temperature Sensor DHW Temperature Sensor		Outdoor Temperature Sensor	
Temperature (°F)	Resistance (Ω)	Temperature (°F)	Resistance (Ω)	Temperature (°F)	Resistance (Ω)
-4	62162	-4	28409	-4	99200
5	48440	5	22152	5	74229
14	38045	14	17408	14	56090
23	30107	23	13782	23	42790
32	23998	32	10990	32	32930
41	19261	41	8824	41	25550
50	15562	50	7131	50	19990
59	12655	59	5800	59	15760
68	10353	68	4747	68	12510
77	8520	77	3906	77	10000
86	7051	86	3233	86	8050
95	5867	95	2690	95	6520
104	4908	104	2250	104	5310
113	4125	113	1891	113	4350
122	3485	122	1598	122	3590
131	2957	131	1356		
140	2520	140	1155		
149	2157	149	989		
158	1854	158	850		
167	1600	167	733		
176	1386	176	635		
185	1205	185	552		
194	1051	194	482		
203	920	203	421		
212	808	212	370		

Table 28 – Temperature Sensor Resistance

PART 13 – TROUBLESHOOTING

TROUBLESHOOTING CHART		
PROBLEM	POSSIBLE CAUSES	POSSIBLE REMEDIES
No electrical power to the appliance	<ol style="list-style-type: none"> 1. Is the plug on the power supply cord unplugged from the electrical outlet? 2. Is electrical panel's 10 Amp circuit breaker tripped? 3. Is the fuse on the circuit board good? 4. Is there a power outage to the home? 	<ol style="list-style-type: none"> 1. Reset the plug. 2. Reset the circuit breaker. 3. If the display panel is blank, unplug the unit or contact an authorized service technician. 4. Contact the power company.
No water available when a faucet is opened	<ol style="list-style-type: none"> 1. Is the water supply valve shut off at the meter (do cold water faucets work)? 2. Is the water supply valve near the unit open? 3. Is the water pipe frozen? 4. Is an error code flashing on the display panel (leak detected)? 	<ol style="list-style-type: none"> 1. Open the closed supply valve. 2. Open the water supply valve. 3. Turn OFF the unit, close all water valves and the gas valve. Contact an authorized service technician. 4. Refer to error code information and contact an authorized service technician.
Hot water is not available when the faucet is opened.	<ol style="list-style-type: none"> 1. Does the appliance have power (plugged in)? 2. Is the appliance turned ON? 3. Is an error code flashing on the display panel? 4. Is the gas supply valve open or shut off at the meter (do other gas devices work)? 	<ol style="list-style-type: none"> 1. Restore electrical power to the unit. 2. Press and hold the Power button to turn the unit ON. 3. Refer to the Diagnostic and Error Codes section in this manual. 4. Open the gas supply valve.
The water temperature is not hot enough or turns cold during use.	<ol style="list-style-type: none"> 1. Is the faucet open enough to draw at least 0.6 gallons (2.3L) per minute through the appliance? 2. Is an error code flashing on the display panel? 3. Is the outlet water temperature set too low? 	<ol style="list-style-type: none"> 1. Open the faucet to allow more water flow. 2. Refer to the Diagnostic and Error Codes section in this manual. 3. Adjust the outlet water temperature (refer to the procedure in this manual).
It takes a long time before hot water flows from the faucet.	Is the faucet some distance from the appliance?	<ol style="list-style-type: none"> a. Allow time for the cold water already in the pipes to flow from the faucet. b. Have recirculation valves and/or plumbing return line(s) installed and program the unit for recirculation mode.
The water is not hot enough.	Is the water temperature set too low?	Adjust the temperature setting.
The water at the faucet is too hot.	Is the water temperature set too high?	Adjust the temperature setting.
A fan can be heard even when the unit is not operating.	<ol style="list-style-type: none"> 1. The fan continues to operate after the burner shuts off to clear the exhaust vent of combustion gases. 2. The fan may run to help prevent freezing. 	<ol style="list-style-type: none"> 1. This is normal operation – no action is required. 2. Protect the appliance from freezing temperatures or shut off and drain the unit.
White "smoke" can be seen coming out of the exterior exhaust gas vent.	Depending on the outside temperature, water vapor can be produced as the exhaust is vented.	This is normal operation – no action is required.

Table 29 – Troubleshooting Chart

DIAGNOSTICS AND SUGGESTED CORRECTIVE ACTIONS

The appliance control is able to record information about the appliance's condition at the time of the five previous faults or errors. This information is available to view in the Installer Mode under the History screen.

The following screens may be displayed when reviewing the appliance history. The table below also includes diagnostic information and possible corrective actions.

Display	Condition	Diagnostic	Possible Corrective Actions
Nothing appears on the display control panel but the blower runs at full speed Nothing appears on the display control panel and no other appliance components are operating	Control is not receiving power Control is not receiving 120V power	Check wiring for short circuit or incorrect wiring	Correct wiring per wiring diagram including connection of transformer to the control
		Check transformer connection to the control per wiring diagram. Check for 12V output of transformer	Replace transformer if it is receiving 120V, but not outputting 12 VAC
		Ensure service switch and/or circuit breaker to appliance is turned ON	Turn on service switch or circuit breaker to power appliance
		Is there 120V at the service switch	Troubleshoot and correct the power supply to the manual switch
		Is the ON/OFF switch inside the appliance cabinet is turned on	Turn ON the manual power switch inside the appliance cabinet
		Check for 120V at the line voltage terminal block located inside the appliance cabinet	Correct wiring inside the appliance cabinet using the wiring diagram in the installation manual
		Inspect the fuse. Replace as necessary	Replace the fuse with the proper part found in the replacement part section of this manual. If fuse blows again, recheck the wiring per diagram

Display	Condition	Diagnostic	Possible Corrective Actions
Nothing appears on the display control panel, but the appliance is operating	Occurs when communications is lost from the control to the display	Check for loose connections and proper pin alignment / engagement on the control's plug	Check for continuity on the wire harness from the display to the control. See repair parts section for proper replacement part.
		Cycle power off and on using appliance power switch and check for operation	Replace with new display module. See repair parts section for proper replacement part.
Display repeatedly goes through initialization sequence	Occurs when control does not receive signal from fan	Cycle power off and on using appliance power switch and check for operation	Replace fan.

Table 30 – Diagnostics and Suggested Corrective Actions

PART 14 – ANNUAL MAINTENANCE PROCEDURES

DANGER

The appliance must be inspected and serviced annually, preferably at the start of the heating season, by a qualified service technician. In addition, the maintenance and care of the appliance as outlined in this manual must be performed by the user/owner to ensure maximum efficiency and reliability. Follow the maintenance procedures given throughout this manual. Failure to perform the service and maintenance or follow the directions in this manual could damage the appliance or system components, resulting in substantial property damage, severe personal injury, or death.

Check the Surrounding Area

DANGER

To prevent the potential of substantial property damage, severe personal injury, or death, eliminate all the materials listed in Table 8 from the area surrounding the appliance and the vicinity of the combustion air intake. If contaminants are found:

- Remove products immediately from area.
- If contaminants have been there for an extended period, call a qualified service technician to inspect the appliance for possible damage from acid corrosion.

If products cannot be removed, immediately call a qualified service technician to re-pipe the combustion air intake piping away from the contaminated areas.

Combustible/Flammable Materials

Do not store combustible materials, gasoline, or other flammable vapors or liquids near the appliance. If found, remove these materials immediately.

Air Contaminants

If allowed to contaminants combustion air, products containing chlorine or fluorine will produce acidic condensate that will cause significant damage to the appliance. Read the list of potential contaminants and areas likely to have these contaminants in Table 8. If any of these contaminants are in the room where the appliance is located, or combustion air is taken from one of the areas listed, the contaminants must be removed immediately or the intake pipe must be relocated to another area.

Ensure the Appliance Cabinet is Closed

Ensure the appliance cabinet is closed. Tighten the two upper and lower screws to secure it. The cabinet must be closed while the appliance is running.

Check the Power Source

Make sure the power cord is properly connected. The main power line is connected to the manual switch box inside the appliance.

Check the Status of the Control Panel

Observe the Control Panel to ensure the appliance is powered on, and to check for any error codes. Clear any debris from the panel.

Check Exhaust Vent and Intake Pipe Terminations

Verify that the appliance exhaust vent and intake pipe terminations are clean and free of obstructions. Remove any debris from the exhaust vent or intake pipe openings. If removing the debris does not allow the appliance to operate correctly, contact your qualified service technician to inspect the appliance and the vent system.

Cleaning the Air Intake Filter

The air intake filter should be cleaned once a month. If not, the combi boiler could encounter combustion problems.

To clean the air intake filter:

1. Press the Power button on the control panel to turn off the combi boiler.
2. Disconnect the power supply from the combi boiler.
3. If water heater has been operating, wait for it to cool before continuing.
4. Remove the front cover of the combi boiler cabinet.
5. Pull the filter out of the air intake adapter.
6. Remove the filter from the plastic assembly and clean it with a toothbrush and clean running water. See Figure 42

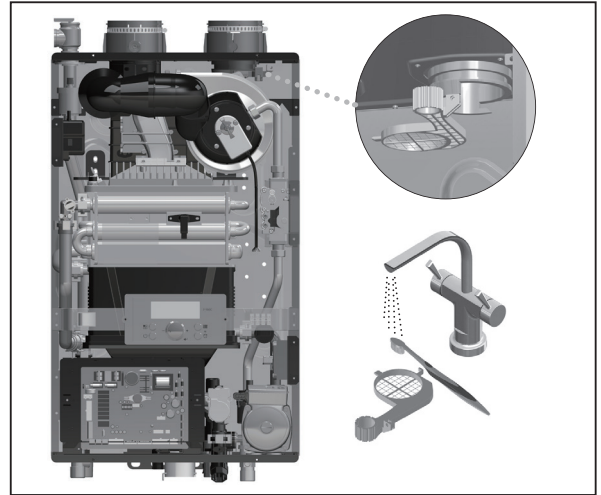


Figure 42 – Cleaning the Air Intake Filter

Check Exhaust Vent and Intake Piping

Visually inspect the exhaust vent for any signs of blockage, leakage, or deterioration of the piping. Inspect the exhaust vent bracing. Ensure bracing is undamaged and in good condition. Notify a qualified service technician immediately if any problems are found.

⚠ WARNING

Failure to inspect the venting system and have it repaired by a qualified service technician can result in vent system failure, causing severe personal injury or death.

Visually inspect the intake piping for any signs of blockage. Inspect the entire length of the intake pipe to ensure piping is intact and all joints are properly sealed. Inspect the intake pipe bracing. Ensure bracing is undamaged and in good condition. Notify a qualified service technician if any problems are found.

Check Pressure Relief Valve

- Visually inspect the primary pressure relief valve and discharge pipe for signs of weeping or leakage.
- If the pressure relief valve often weeps, the expansion tank may not be operating properly. Immediately contact a qualified service technician to inspect the appliance and system.

Check Vent Condensate Drain System

- While the appliance is running, check the discharge end of the condensate drain tubing. Ensure no flue gas is leaking from the condensate drain tubing by holding your fingers near the opening.
- If you notice flue gas leaking from the opening, this indicates a dry condensate drain trap. If problem persists, contact a qualified service technician to inspect the appliance and condensate line and refill the condensate trap.
- If applicable, check the condensate neutralizer and ensure it is full of condensate neutralizing marble chips.

Check the Air Vent

Loosen cap one counterclockwise turn to allow air vent to operate. See Figure 43. If the air vent valve works freely without leaking, close the valve by turning clockwise. If vent does not operate correctly, contact a qualified service technician to replace the vent.

Check Primary and Gas Piping

- Remove the appliance cover and perform a gas leak inspection following Operating Instructions, page 2, this manual. If gas odor or leak is detected, follow procedures on page 2. Call a qualified service technician.
- Visually inspect for leaks around the internal appliance water connections and around the heat exchanger. Visually inspect the external system piping, circulators, and system components and fittings. Immediately call a qualified service technician to repair any leaks.

⚠ WARNING

Have leaks fixed at once by a qualified service technician. Failure to comply could result in substantial property damage, severe personal injury, or death.

Operate Pressure Relief Valve

- Before proceeding, verify that the relief valve outlet has been piped to a safe place of discharge, avoiding any possibility of scalding from hot water.

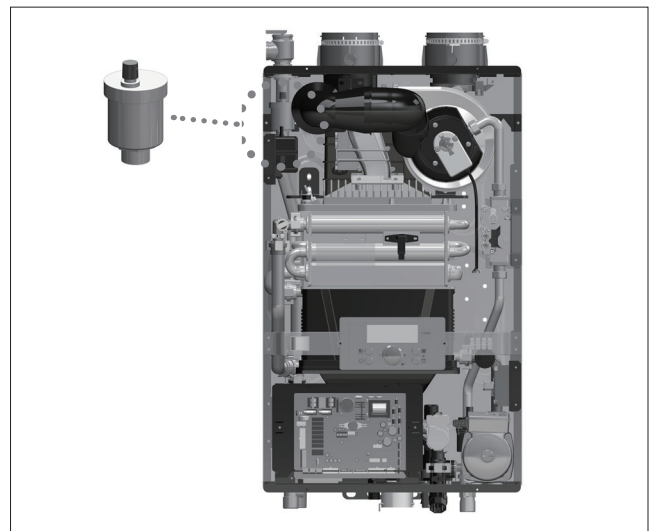


Figure 43 – Air Vent Detail

- Read the temperature and pressure gauge to ensure the system is pressurized. Minimum is 10 psi. Maximum is 25 psi. Lift the relief valve top lever slightly, allowing water to relieve through the valve and discharge piping.
- If water flows freely, release the lever and allow the valve to seat. Watch the end of the relief valve discharge pipe to ensure that the valve does not weep after the line has had time to drain. If the valve weeps, lift the lever again to attempt to clean the valve seat. If the valve does not properly seat and continues to weep, contact a qualified service technician to inspect the valve and system.
- If water does not flow from the valve when you completely lift the lever, the valve or discharge line may be blocked. Immediately shut the appliance down per instructions on page 2 and call a qualified service technician to inspect the valve and system.

Check the Burner

Clean the exterior of the burner.

Flushing the CH Closed Loop Heat Exchanger

Flushing the heat exchanger is a complicated procedure that should only be performed by a qualified service technician. It is recommended to flush the heat exchanger annually if water hardness exceeds 12 grains per gallon (considered extremely hard water). If water hardness falls below 12 grains per gallon it is recommended to flush the heat exchanger every two to three years.

NOTE: Improper maintenance WILL VOID appliance warranty.

1. Disconnect electrical power to the appliance.
2. Close the shutoff valves on both CH supply and CH return lines (V1 and V2). See Figure 44.
3. Connect one hose (D1, Figure 44) to the valve (V3) and place the free end in a bucket. Connect one of the hoses (D3) to the circulation pump outlet and the cold water inlet line to valve V4. Connect the other hose (D2) to the circulation pump inlet and place the free end in the bucket.
4. Pour tankless cleaning solution into the bucket. Use an FDA approved cleaner for potable systems on the heat exchanger. Place the drain hose (D1) and hose D2 to the pump inlet in the cleaning solution.
5. Open service valves (V3 and V4) on the hot water outlet and cold water inlet lines.
6. Turn on the circulation pump. Operate the pump and allow the cleaning solution to circulate through the appliance for at least 1 hour at a rate of 4 gallons per minute.
7. Rinse the cleaning solution from the heat exchanger as follows:
 - a. Remove the free end of drain hose D1 from the bucket.
 - b. Close service valve V4 and open shutoff valve V2.
 - c. Do not open shutoff valve V1.
 - d. Allow water to flow through the appliance for 5 minutes.
 - e. Close shutoff valve V2.
8. Disconnect hoses from lines. Properly dispose of used cleaning solution.
9. Remove the CH filter from the appliance and clean out any residues.
10. Repeat process on the DHW loop of the appliance.

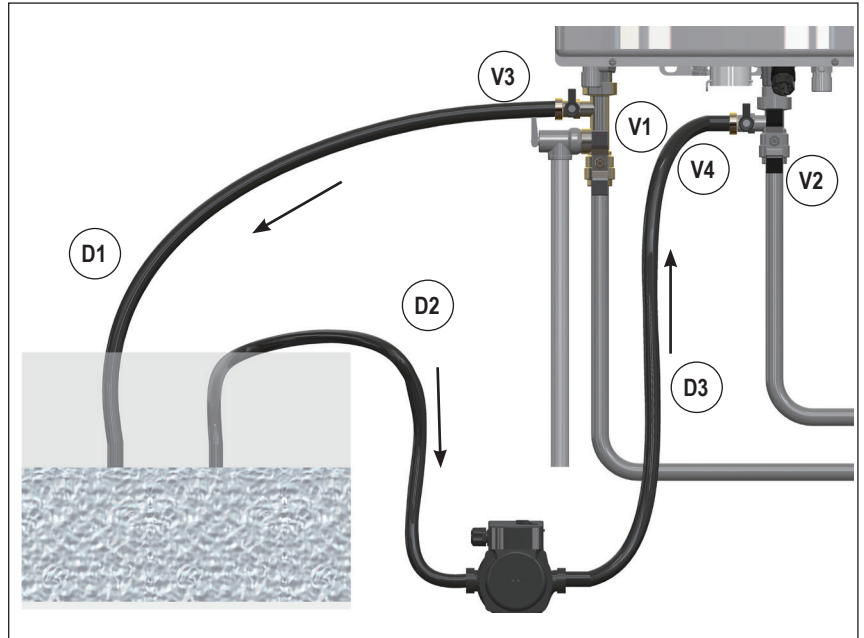


Figure 44 – Valve and Hose Connection Details

Cleaning the CH and DHW Inlet Filters (Draining the Appliance)

1. Place a bucket under the appliance to collect the residual water inside the appliance.
2. Press the Power button on the control panel to turn off the electrical power to the appliance. Then turn off the gas valve.
3. Valve off the appliance from the system. If the appliance cannot be isolated from the system, turn off the main water valve.
4. Open the hot water faucets in the system to aid in draining the system.

WARNING

Water drained from the appliance could be scalding hot. Wait for the appliance to cool before removing the CH or DHW inlet filters. Failure to do so could result in property damage, personal injury, or death.

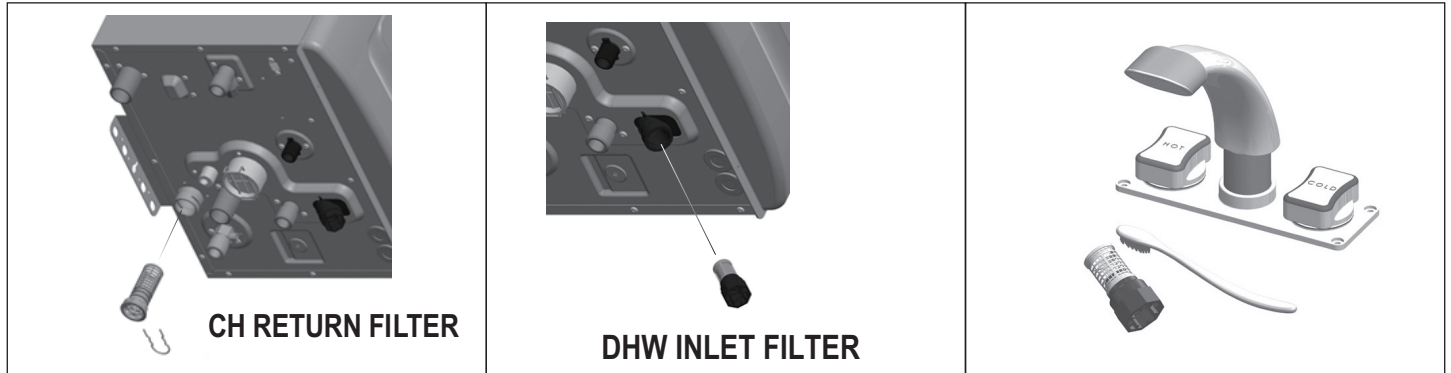


Figure 45 – Cleaning the Inlet Filter

5. Remove the DHW inlet filter. Then clean it with a toothbrush and clean running water. See Figure 45.
6. Reinstall the DHW inlet filter.
7. Purge air from the DHW lines by opening a hot water faucet in the system. When water flows freely, all air is purged.
8. Repeat the process on the CH inlet filter on the appliance.
9. Reinsert the filter and ensure the filter cap is securely tightened.
10. Connect electrical power to the appliance.
11. Restore water service to the appliance by opening the isolation valves, or turning on the main water valve.
12. Turn on the gas valve. Turn on electrical power to the appliance and press the Power button to turn the appliance on.

PART I _ CASE PART

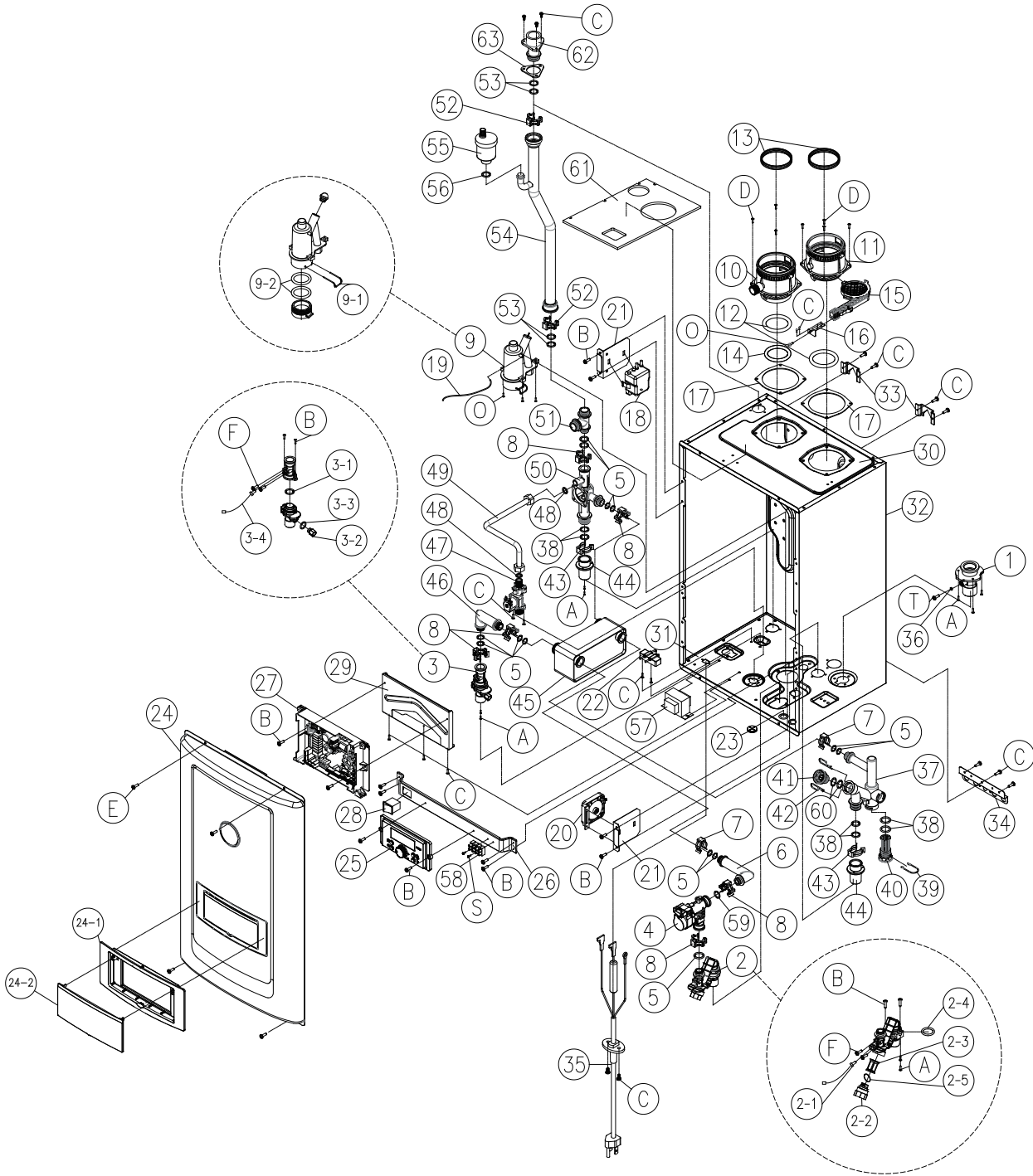


Figure 46 – CASE PART

Item	Description	Part Number	Qty
1	Gas Inlet Connection	RTG20298A	1
2	Water Inlet Valve Assy	RTG20298B	1
2-1	Cold Water Temperature Sensor	RTG20298C	1
2-2	Cold Water Filter Cap	RTG20298D	1
2-3	Cold Water Filter	RTG20316BU	1
2-4	O-ring (P20)	RTG20298F	1
2-5	O-ring (P18)	RTG20298G	1
3	Hot Water Pipe Assembly	RTG20316CD	1
3-1	O-ring (P20)	RTG20298F	1
3-2	Hot Water Plug	RTG20298K	1
3-3	O-ring (P10)	RTG20298L	1
3-4	Hot Water Temperature Sensor	RTG20316AF	1
4	Flow Control Valve	RTG20298N	1
5	O-ring (P16)	RTG20299AE	13
6	Water Inlet Elbow	RTG20316BL	1
7	Clip(Circle-Small)	RTG20316AX	2
8	Clip(Star-Small)	RTG20299AU	6
9	Condensate trap	RTG20298U	1
9-1	Condensate clip	RTG20298V	1
9-2	O-ring (P44)	RTG20298W	2
10	Exhaust Assembly	RTG20316F	1
11	Air Intake Assembly	RTG20298Y	1
12	O-ring (P85)	RTG20298Z	2
13	Exhaust and Intake Packing	RTG20298AA	2
14	O-ring (P75)	RTG20298AB	1
15	Air intake filter	RTG20298AC	1
16	Air Intake Filter Bracket	RTG20298AD	1
17	Gasket	RTG20298AE	2
18	Igniter	RTG20316Y	1
19	Siphon Air Pressure Hose	RTG20316AW	1
20	Air Pressure switch	RTG20298AH	1
21	Bracket (Igniter, Air Pressure Switch)	RTG20316H	2
22	Water Leak Detector	RTG20298AK	1
23	Wiring Through Way Packing	RTG20298AL	1
24	Front Cover Assembly	RTG20316A	1
24-1	Control Panel Bracket	RTG20298AN	1
24-2	Control Panel Window	RTG20298AP	1
25	Control Panel	RTG20316V	1
26	Control Panel Steel Bracket	RTG20316K	1

Item	Description	Part Number	Qty
27	PCB (Control Board)	RTG20316U	1
28	Rocker Switch	RTG20298AV	1
29	Control Board Bracket	RTG20316BE	1
30	Case (Top)	RTG20316C	1
31	Case (Bottom)	RTG20316B	1
32	Case	RTG20298AZ	1
33	Case Bracket	RTG20316G	1
34	Case Bracket (Bottom)	RTG20298BB	1
35	Power Cord	RTG20316AA	1
36	O-ring (P4)	RTG20316BZ	1
37	Heating Return Block	RTG20316R	1
38	O-ring (P22A)	RTG20316BY	6
39	Filter Clip	RTG20316BD	1
40	Heating Return Block Filter	RTG20316S	1
41	Heating Return Block Cap	RTG20316BV	1
42	Cap Clip	RTG20316AY	2
43	Clip (Φ25-Φ31)	RTG20316AZ	2
44	Heating Supply / Return Connection	RTG20316BR	2
45	Hot Water Plate Heat Exchanger	RTG20316AD	1
46	Hot Water Elbow	RTG20316BK	1
47	Auto Feeder	RTG20316BS	1
48	Packing (10A)	RTG20316BW	2
49	Auto Feeder Pipe	RTG20316AS	1
50	3 - Way Valve	RTG20316AN	1
51	T-Elbow	RTG20316BM	1
52	Clip (Star-large)	RTG20316BC	2
53	O-ring (P22)	RTG20316BX	4
54	Relief Valve Pipe	RTG20316AU	1
55	Air Vent	RTG20316AM	1
56	15A Packing	RTG20300J	1
57	Power Transformer	RTG20316Z	1
58	Terminal Block	RTG20316AB	1
59	O-ring (P15)	RTG20299AH	1
60	O-ring (P20)	RTG20298F	2
61	Top Case Packing	RTG20316CA	1
62	Relief Valve Adapter	RTG20316BN	1
63	Relief Valve Adapter Gasket	RTG20316CN	1

Table 31 – Case Part

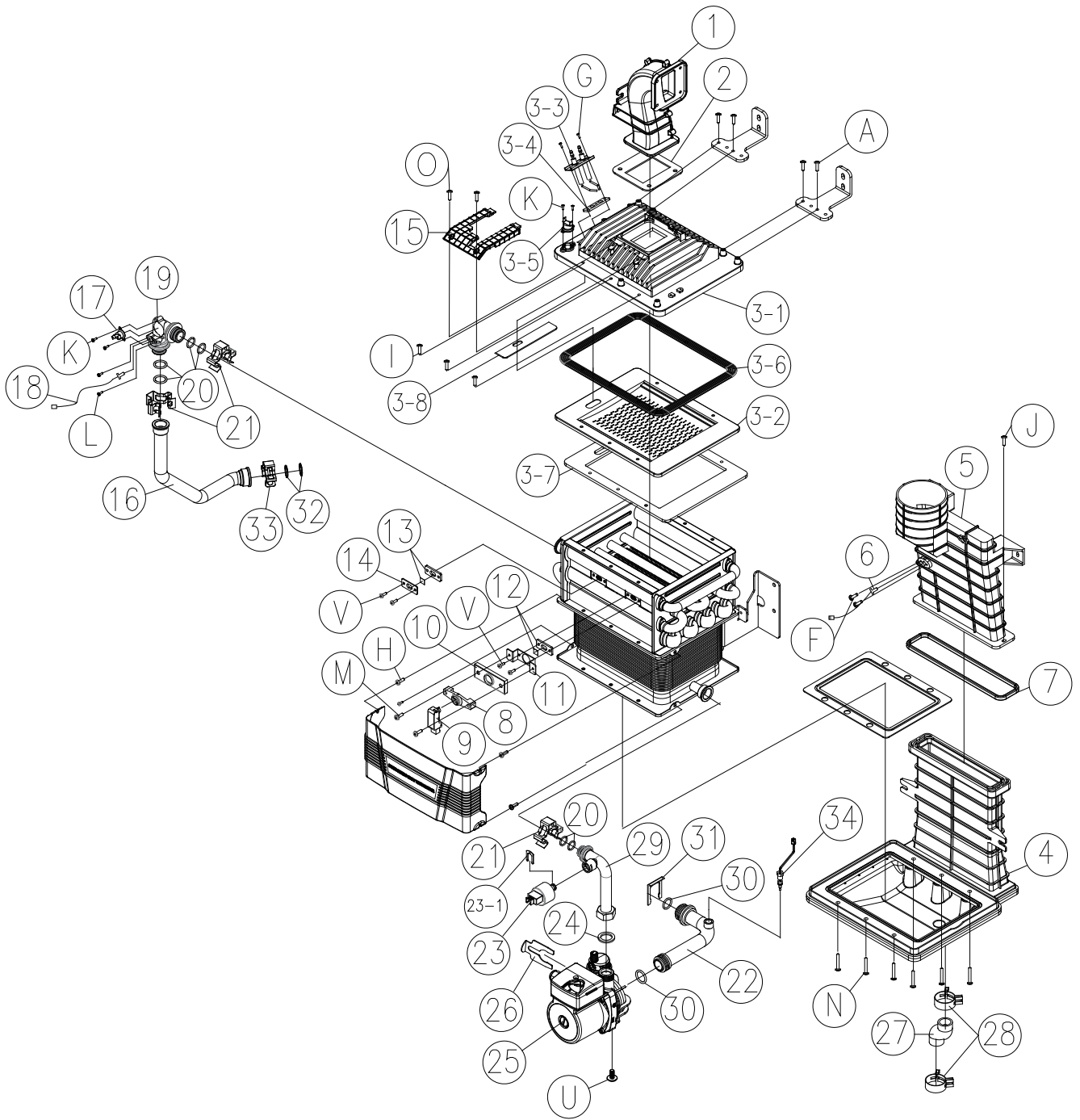


Figure 47 – Heat Exchanger Part

Item	Description	Part Number	Qty
1	Blower Connector	RTG20299A	1
2	Blower Connector Packing	RTG20299B	1
3	Burner Assembly	RTG20299C	1
3-1	Burner Head	RTG20299D	1
3-2	Burner Flange	RTG20316BF	1
3-3	Ignition Rod	RTG20299F	1
3-4	Ignition Rod Gasket	RTG20299G	1
3-5	Overheat Switch (Burner)	RTG20316AK	1
3-6	Burner head packing	RTG20299J	1
3-7	Burner head gasket 1	RTG20316CB	1
3-8	Burner head gasket 2	RTG20299L	1
4	Exhaust Pipe Assembly (Lower)	RTG20316BT	1
5	Exhaust Pipe Assembly (Upper)	RTG20299R	1
6	Exhaust Temperature Sensor	RTG20316AH	1
7	Exhaust Duct Packing	RTG20316CE	1
8	Flame Detector Sensor Bracket	RTG20299W	1
9	Flame Detector Sensor	RTG20299X	1
10	Flame Detector Metal Plate	RTG20316CF	1
11	Flame Observation Bracket	RTG20316CG	1
12	Flame Observation Glass & Gasket	RTG20316CH	1
13	Flame View Glass & Gasket	RTG20316CJ (Glass) RTG20316CK (Gasket)	1
14	Flame View Bracket	RTG20316CL	1

Item	Description	Part Number	Qty
15	Burner Fixing Bracket	RTG20299Y	1
16	Hot Water Outlet Pipe	RTG20316AT	1
17	Overheat Sensor	RTG20316AJ	1
18	Water Temperature Sensor	RTG20316AE	1
19	Hot Water Outlet Elbow	RTG20316BJ	1
20	O-ring (P16)	RTG20299AE	6
21	Clip (Star-Small)	RTG20316BG	3
22	Water Inlet Pipe	RTG20316BP	1
23	Pressure Transmitter	RTG20316AL	1
23-1	Pressure Transmitter Clip	RTG20316BA	1
24	Packing (20A)	RTG20299AK	1
25	Circulation Pump	RTG20316W	1
26	Pump Clip	RTG20299AR	1
27	Condensate Hose	RTG20316AV	1
28	Condensate Hose Clip	RTG20299AT	2
29	Pump Outlet Pipe	RTG20316AR	1
30	O-ring (P20)	RTG20298F	2
31	Water Inlet Pipe Clip	RTG20316BB	1
32	O-ring (P22)	RTG20316BX	2
33	Clip (Star-large)	RTG20316BC	1
34	Water Return Temperature Sensor	RTG20316AG	1

Table 32 – Heat Exchanger Part

PART III _ FAN MOTOR PART

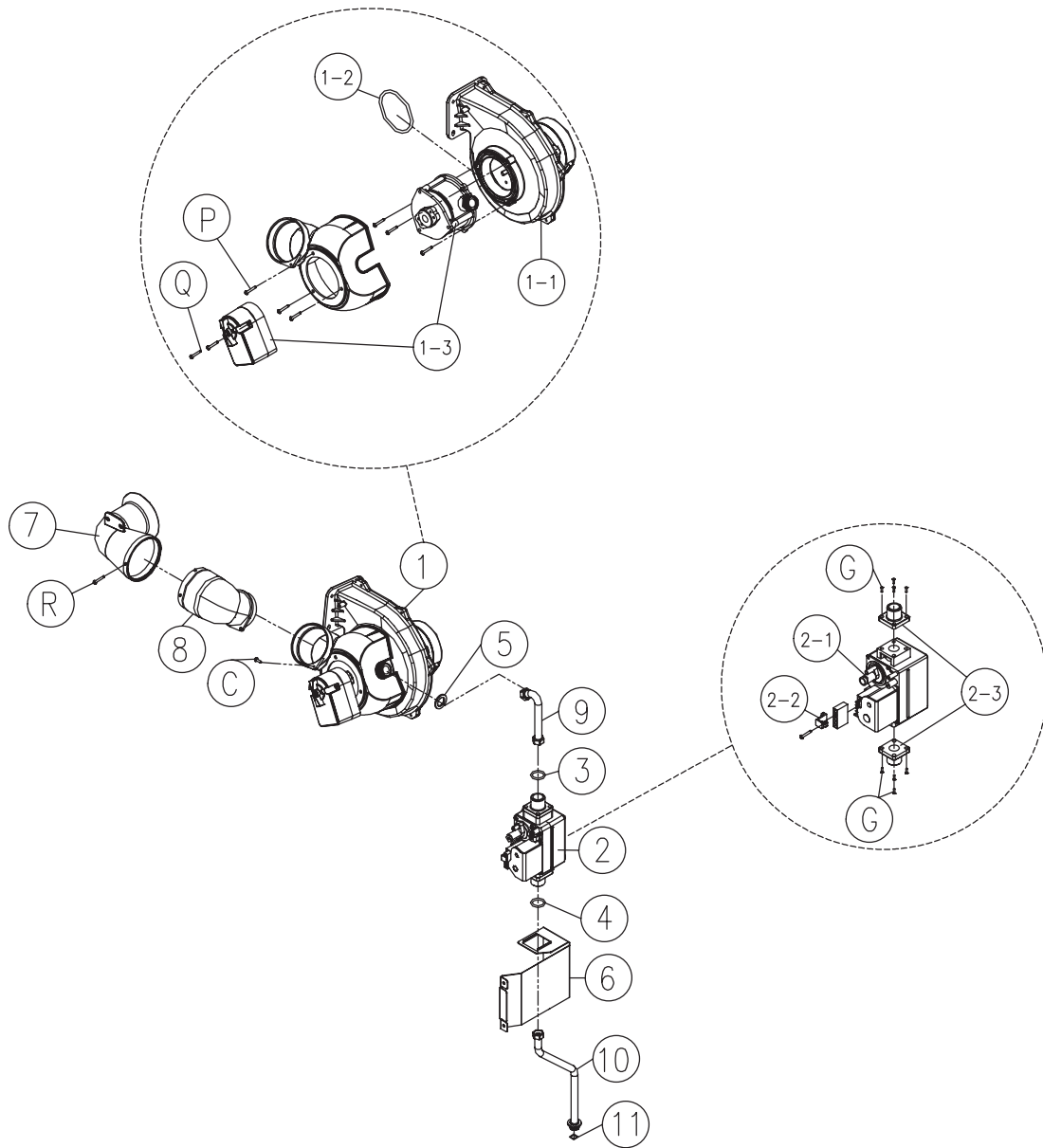


Figure 48 – Fan Motor Part

Item	Description	Part Number	Qty
1	Fan & AGM Assy NG	RTG20316L	1
1	Fan & AGM Assy LP	RTG20316M	1
1-1	Fan	RTG20300B	1
1-2	O-ring (P62)	RTG20300C	1
1-3	AGM (Actuator) NG	RTG20316N	1
1-3	AGM (Actuator) LP	RTG20316P	1
2	Gas Valve Assembly	RTG20316CM	1
2-1	Gas Valve	RTG20316X	1
2-2	Gas Valve Plug Bracket	RTG20316T	1

Table 33 – Fan Motor Part

Item	Description	Part Number	Qty
2-3	Gas Valve Adapter (Straight)	RTG20316AP	2
3	15A Packing (Non-asbestos)	RTG20316CC	1
4	15A Packing	RTG20300J	1
5	Gas Mixer Packing	RTG20300K	1
6	Gas Valve Bracket	RTG20300L	1
7	Silencer Body	RTG20300M	1
8	Silencer Elbow	RTG20300N	1
9	Gas Pipe (Upper)	RTG20300P	1
10	Gas Pipe (Lower)	RTG20300R	1
11	O-ring (P18)	RTG20298G	1

Screw

Item	Description	Length
A	Truss Head Machine Screw	M4 x 8
B	Flat Head Machine Screw	M4 x 8
C	Truss Head Tapping Screw	M4 x 10
D	Truss Head Tapping Screw	M4 x 12
E	Truss Head with PC Washer Tapping Screw	M4 x 10
F	Truss Head Tapping Screw	M4 x 6
G	Round Head Machine Screw	M4 x 12
H	Round Head with Flange Tapping Screw	M3 x 6
I	Hexagon Head with Flange Machine Screw	M5 x 16
J	Truss Head Tapping Screw	M4 x 16
K	Round Head Machine Screw	M3 x 6

Table 34 – Screw Part

Item	Description	Length
L	Truss Head Machine Screw	M4 x 6
M	Round Head Tapping Screw	M4 x 16
N	Truss Head Machine Screw	M5 x 30
O	Hexagon Head with Flange Machine Screw	M5 x 12
P	Truss Head Machine Screw	M4 x 25
Q	Round Head Tapping Screw	M4 x 30
R	Binding Head Tapping Screw	M4 x 10
S	Round Head Tapping Screw	M3 x 16
T	Round Head Machine Screw	M4 x 10
U	Round Head Machine Screw	M5 x 12
V	Round Head Tapping Screw	M4 x 8

START-UP REPORT

LIGHT OFF ACTIVITIES		DATE COMPLETED			
		Yes	No		
1) Fill the heating system	Check all piping and gas connections, verify all are tight				
	Has the system been cleaned and flushed?				
	Has the appliance and the system been purged of all air? Refer to Start-Up Preparation, this manual.				
	Has the auto air purge feature been used / set? Refer to Start-Up Preparation, this manual.				
	Pressurize system (12 – 15 psi) CH	_____ PSI			
	Pressurize system domestic HW				
	Add water to prime condensate cup				
	Percentage of glycol in system (0 – 50%)	_____ %			
	Verify proper near appliance piping (Primary/Secondary)				
2) Electrical	Have the power and control wiring been connected per the wiring diagram in this manual?				
	Is the supply voltage 120v and polarity correct?				
3) Check gas pipe	Leak test using locally approved methods (consult jurisdictional code book)				
	Has the gas supply line been verified to deliver the required BTU of the appliance?				
	Has a union and shut-off valve (no less than 3/4") been installed?				
	Does the gas type match the type indicated on the rating plate?				
	Check incoming gas pressure (Max is 10.5" for NG and 13" for LP)	_____ in w.c.	Static		
	If necessary, convert the appliance to the proper gas type				
	Locate the stickers in the appropriate locations on the appliance				
	If applicable, have all dip switches been set and verified to match system requirements?				
	Verify combustion settings after gas conversion, Carbon Dioxide	_____ % CO ₂	High Fire	_____ % CO ₂	Low Fire
	Verify combustion settings after gas conversion, Carbon Monoxide	_____ ppm CO	High Fire	_____ ppm CO	Low Fire
	What is the "drop" on light off (No more than 1" W.C.)?	_____ in w.c.	Dynamic		
4) Venting	Has the appliance been vented with 2" or 3" PVC, CPVC, Polypropylene, or (AL294C) Stainless for Cat IV appliances?				
	Ensure no ABS or PVC Cellular core has been used				
	Is the vent sloped upward toward the terminal at a rate of 1/4" per ft. or 2% grade?				
	Have all intake and exhaust joints been properly sealed and tested?				
	Are all vent runs properly supported?				
	Have the termination screens been installed?				
	Is the vent termination a min of 12" above grade or the highest anticipated snow level?				
	Is the total developed vent length including elbows within the stated max vent length restriction?				
5) Condensate piping / tubing	Is the condensate line piped with the approved materials listed in this manual?				
	Does the condensate line have an air inlet at the top/ beginning of the drain? Refer to Install the Condensate Drain, this manual.				
	Has the condensate been piped over to a drain, and checked to be free flowing?				
	If necessary, has a condensate pump and /or a neutralizer been installed?				
FINAL	SIGNED BY TECHNICIAN	DATE			

Table 35 – Start-Up Report

MAINTENANCE REPORT**CAUTION**

In unusually dirty or dusty conditions, care must be taken to keep appliance cabinet door in place at all times. Failure to do so VOIDS WARRANTY!

The appliance requires minimal periodic maintenance under normal conditions. However, in unusually dirty or dusty conditions, periodic vacuuming of the cover to maintain visibility of the display and indicators is recommended.

Periodic maintenance should be performed once a year by a qualified service technician to ensure that all the equipment is operating safely and efficiently. The owner should make necessary arrangements with a qualified heating contractor for periodic maintenance of the appliance. Installer must also inform the owner that the lack of proper care and maintenance of the appliance may result in a hazardous condition.

INSPECTION ACTIVITIES		DATE LAST COMPLETED			
PIPING		1 st YEAR	2 nd YEAR	3 rd YEAR	4 th YEAR*
Near appliance piping	Check appliance and system piping for any sign of leakage. Leaking pipes could cause property damage. Make sure all piping is properly supported.				
Vent	Check condition of all vent pipes and joints. Ensure all vent piping is properly supported. Check for obstructions exhaust and intake termination points.				
Gas	Check Gas piping, test for leaks and signs of aging. Make sure all pipes are properly supported.				
SYSTEM					
Visual	Do a full visual inspection of all system components.				
Functional	Test all functions of the system (central heating, water heating, safeties)				
Temperatures	Verify safe settings on appliance or Anti-Scald Valve				
Temperatures	Verify programmed temperature settings				
ELECTRICAL					
Connections	Check wire connections. Make sure they are tight.				
Smoke and CO detector	Verify devices are installed and working properly. Change batteries if necessary.				
Circuit Breakers	Check to see that the circuit breaker is clearly labeled. Exercise circuit breaker.				
Switch and Plug	Verify ON/OFF switch and convenience plug are both functional				
CONDENSATE					
Neutralizer	Check condensate neutralizer. Replace if necessary.				
Condensate hose	Disconnect condensate hose. Clean out dirt and re-install. (NOTE: Verify the flow of condensate, making sure that the hose is properly connected during final inspection.)				
GAS					
Pressure	Measure incoming gas pressure (Max is 10.5" for NG and 13" for LP)				
Pressure Drop	Measure drop in pressure on light off (no more than 1" W.C.)				
Check gas pipe for leaks	Check piping for leaks. Verify that all are properly supported.				
COMBUSTION					
CO/CO2 Levels	Check CO and CO ₂ levels in Exhaust. Record at high and low fire.				
SAFETIES					
ECO (Energy Cut Out)	Check continuity on Flue ECO. Replace if corroded.				
CH AND DHW LOOPS					
	It is recommended to flush the CH and DHW heat exchangers annually if water hardness exceeds 12 grains per gallon (considered extremely hard water). If water hardness falls below 12 grains per gallon it is recommended to flush the heat exchanger every two to three years. In addition, it is recommended to clean the CH and DHW inlet filters annually.				
FINAL INSPECTION					
Check list	Verify that you have completed entire check list. WARNING: FAILURE TO DO SO COULD RESULT IN SERIOUS INJURY OR DEATH.				
Homeowner	Review what you have done with the homeowner.				
TECH SIGN OFF					

Table 36 – *Continue annual maintenance beyond the 4th year as required.

CUSTOMER INSTALLATION RECORD FORM

The following form should be completed by the installer for you to keep as a record of the installation in case of a warranty claim. After reading the important notes at the bottom of the page, please also sign this document.

Customer's Name:	
Installation Address:	
Date of Installation:	
Installer's Code/Name:	
Product Serial Number(s):	
Model Number:	
Combustion Setting at Time of Installation:	
Comments:	
Installer's Phone Number:	
Signed by Installer:	
Signed by Customer:	

IMPORTANT NOTES:

Customer: Please only sign after the installer has reviewed the installation, safety, proper operation and maintenance of the system. In the case that the system has any problems, please call the installer. If you are unable to make contact, please contact your Sales Representative.

Distributor/Dealer: Please insert contact details.