Condensing

NAVIEN

Navigating Energy and Environment

Installation Manual

For potable water heating and space heating

MODEL

CH-180 ASME
CH-210 ASME
CH-240 ASME

Keep this manual near the navien Combination Boiler for future reference whenever maintenance or service is required.

⚠ WARNING

If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

- **Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or 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 performed by a qualified installer, service agency or the gas supplier.**

⚠ CAUTION

This product warranty is valid only used in the America and Canada but automatically be voided for other countries. (for America and Canada unit standard only)

Please return the "Installation Manual" to the customer after installing.

KD NAVIEN

Navien Gas Combination Boiler

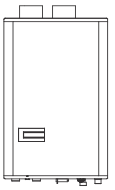
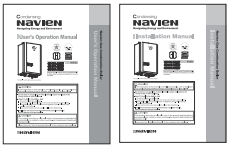
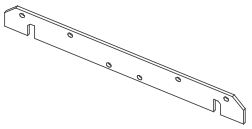
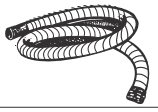
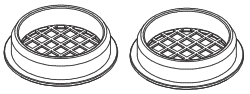
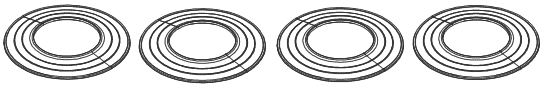
Installation Manual

CONTENTS

Installation Manual - Contents

Accessories:

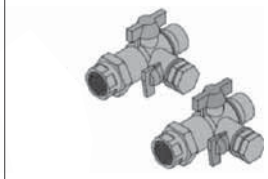
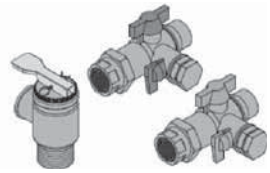
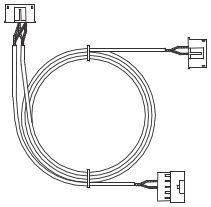
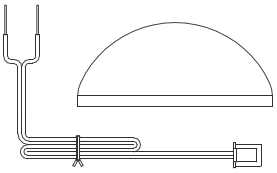
1 Included with the Combination Boiler:

Item	Description	Qty
Navien Condensing Combination Boiler		1
Remote Controller		1
Operation and Installation Manual		1
Wall Mounting Bracket		1
Condensate Drain Hose		1
Tapping Screws & Anchors		4
Vent terminators		2
Wall Flanges		4
Pressure Reducing Valve Kit		3

! Check that you have received all of the above parts before installing the Combination Boiler.

Optional Accessories:

2 Optional Accessories:

Item	Description
Navien Plumb Easy Valve Set (Pressure Relief Valve) – Heating	
Navien Plumb Easy Valve Set (Pressure Relief Valve) – Domestic Water	
Navien Condensate Neutralizer	
Navien Ready-Link Communication Cable	
Outdoor Temperature Sensor with Cable	

! Contact your Navien combination Boiler supplier for optional accessories.

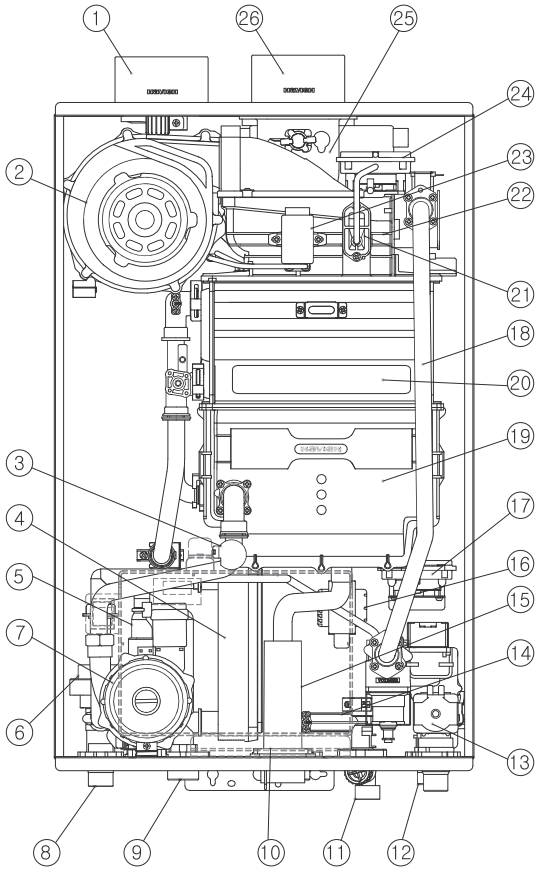
Specifications:

Please review these specifications before installation to confirm proper unit selection: As Navien is dedicated to continuous product improvement, Navien reserves the right to change specifications as well as re-design and/or discontinue any model or feature without prior notice and without incurring obligations.

Item		CH-180 ASME	CH-210 ASME	CH-240 ASME
Heat Capacity (Input)		Min: 17,000 Btuh Max: 150,000 Btuh	Min: 20,000 Btuh Max: 175,000 Btuh	Min: 20,000 Btuh Max: 199,000 Btuh
Flow Rate (DHW)	77℉(43℃) Temp Rise	3.4 GPM	4.0 GPM	4.5 GPM
Dimensions		W17" x H28"x D12"	W17" x H28"x D12"	W17" x H28" x D12"
Weight		74 lbs	84 lbs	84 lbs
Efficiency AFUE	NG	91%	91%	91%
	Propane	90.5%	90.2%	90.8%
Installation Type		Indoor Wall-Hung		
Venting Type		Forced Draft Direct Vent		
Ignition		Electronic Ignition		
Water Pressure (min-max)		15 – 150 PSI		
Gas Supply Pressure (from source; min-max)		NG: 5.0" WC ~ 10.5" WC	LP : 8.0" WC ~ 13.5" WC	
180 Manifold Gas Pressure (min-max)		NG: 0.4" WC ~ 3.7" WC	LP : 0.8" WC ~ 7.3" WC	
210 Manifold Gas Pressure (min-max)		NG: 0.4" WC ~ 3.0" WC	LP : 0.8" WC ~ 5.3" WC	
240 Manifold Gas Pressure (min-max)		NG: 0.6" WC ~ 4.0" WC	LP : 1.0" WC ~ 7.0" WC	
Minimum Flow Rate		0.5 GPM		
Connection Sizes	S/Heating Supply/ S/Heating Return	1" NPT		
	DHW Cold Water Inlet/ DHW How Water Supply	3/4" NPT		
	Auto Feeder	1/2" NPT		
	Gas Inlet	3/4" NPT		
Power Supply	Main Supply	120VAC, 60Hz		
	Maximum Power Consumption	200W (max 2A)		
Materials	Casing	Cold Rolled Carbon Steel		
	Heat Exchangers	Primary Heat Exchanger: Stainless Steel Secondary Heat Exchanger: Stainless Steel Domestic water Heat Exchanger: Stainless Steel		
Venting	Exhaust (ø3")	ø3" PVC,CPVC Polypropylene, ø3" Special Gas Vent Type BH (Class IIIA/B/C)		
	Intake (ø3")	ø3" PVC,CPVC Polypropylene, ø3" Special Gas Vent Type BH (Class IIIA/B/C)		
	Vent Clearances	0" to combustibles		
Safety Devices		Flame Rod, Thermal Fuse(Overheat Cut Off device) APS, GPS, Gas-Valve Operation Detector, Ignition Operation Detector, Water Temperature High Limit Switch, Exhaust Temperature High Limit Switch		
Accessories		Plumb Easy Valve Set, Venting Kit, Condensate Neutralizer		

Key Components: CH

NAVIEN Combination Boiler

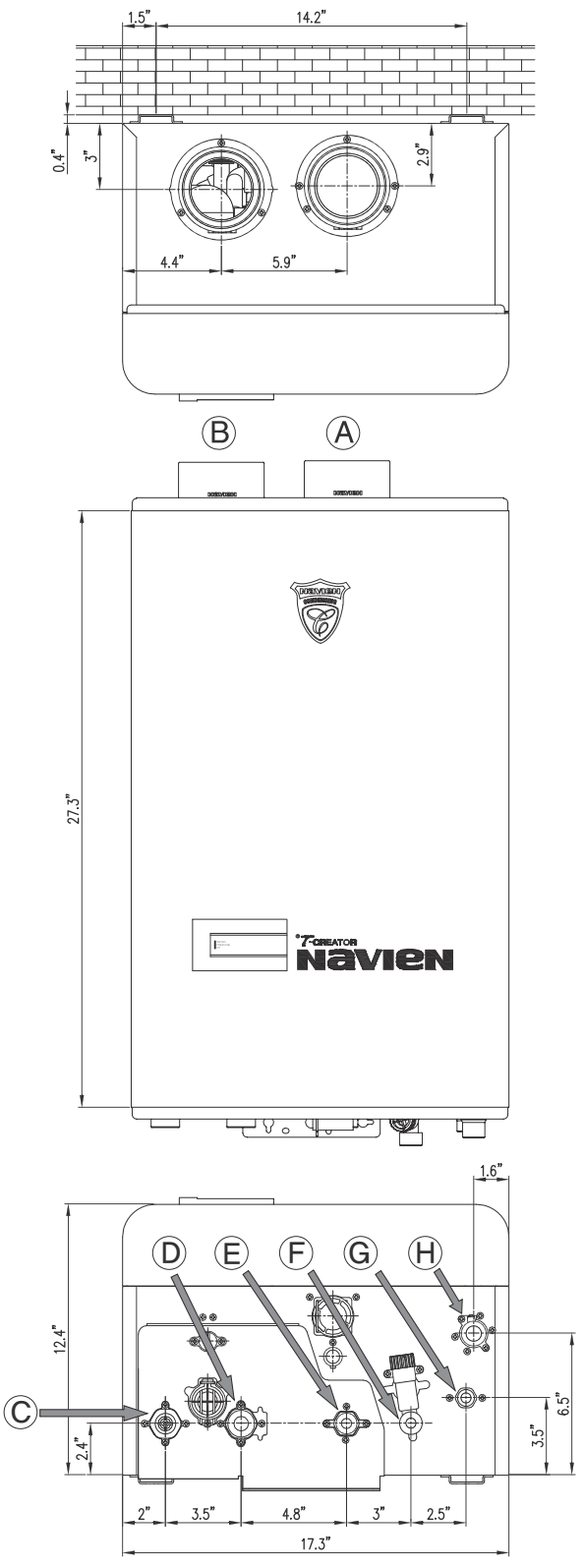


No	Description	Navien Part No.	No	Description	Navien Part No.
1	Intake Air Duct	BH2505400B	14	DHW Flow Sensor	BH1406005A
2	Fan Motor	NAFA9GLPCT01	15	Syphon	BH2501442C
3	WPS	BH2507535A	16	Transformer	BH1205011A
4	DHW Heat Exchanger	PAS30KHE_004	17	Gas Pressure Sensor	NASS9EXGPS01
5	S/H Strainer	BH1301020B	18	Gas Pipe	BH2546021A
6	Motorized 3-Way Valve	AAVC9EX00018	19	Secondary Heat Exchanger	-
7	Circulation Pump	NAPU9GLPCT10	20	Primary Heat Exchanger	-
8	S/H Supply Adaptor	BH2507639A	21	APS Venturi	BH2501413A
9	S/H Return Adaptor	BH2507639A	22	Burner	PABNCW48KDN_002
10	PCB Board	NACR1GS32301	23	Ignition Transformer	BH1201045A
11	DHW Cold Water InletAdapter	30010315A, 30010316A, 30010317A	24	Air Pressure Sensor	NASS9EX00009
12	Auto Feeder Valve	30005993C	25	Exhaust Duct	BH2544007D
13	Main Gas Valve	BH0901018A	26	Exhaust Pipe	BH2505401B

Dimensions: CH Models

■ CH

	Description	Diameter
A	Exhaust Pipe	3"
B	Intake Air Duct	3"
C	Space Heating Supply Connection	1"
D	Space Heating Return Connection	1"
E	DHW Supply Connection	3/4"
F	DHW Cold Water Inlet Connection	3/4"
G	Auto Feeder Connection	1/2"
H	Gas Inlet Connection	3/4"



Installation Warnings:

⚠ WARNING

Read all safety warnings in the "User's Operation Manual". The additional safety issues outlined below must also be followed completely when installing this Navien Combination Boiler.

⚠ WARNING

Failure to remove or maintain the area free of combustible material, gasoline and other flammable liquids or vapors can result in severe personal, injury, death or substantial property damage.

1. All applicable local, state, national and provincial codes, ordinanes, regulations and laws.
2. For installations in Messachusetts – code requires the boiler to be installed by a licensed plumbing or gas fitter.
3. The National Fuel Gas Code NFPA 54/ ANSI Z223.1
4. National Electric Code ANSI/NFPA 70.
5. For Installations in Canada – "Installation Code for Gas Burning Eqiupment" CGA/B 149.1 or B149.2 Canadian Electrical Code Part 1 CSA C22.1
6. Standard for Controls and satety devices for automatically fired boilers, ANSI/ASME CSD-1, when requred.
7. The installation must conform to the requirements of the authority having jurisdiction or, in the absence of such requirements, to the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/or CAN/CSA B149.1, Natural Gas and Propane Installation Code.

⚠ WARNING

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

8. This unit is designed for indoor/outdoor installations. DO NOT operate this unit without the vent piping connected. Exhaust gases must be completely expelled out of the building.
9. DO NOT use this appliance if any part has been underwater. Immediately call a qualified service technician to inspect the appliance and replace any part of the control system and any gas control which has been underwater.
10. Be sure not to reverse the water and gas connections as this may damage the gas valves.
11. Water temperature over 125°F can cause severe burns instantly or death from scalding. If the proposed Boiler outlet temperature is above 125°F, a thermostatically controlled mixing valve (or a temperature limiting valve) for reducing point of use water temperature is recommended to reduce the risk of scald injury. Contact a licensed plumber or the local plumbing authority for further information.
12. The appliance should be located in an area where leakage within the unit or at its connections will not result in damage to the surrounding area. Navien will not be responsible for any damage resulting from leaking if adequate drainage is not provided.
13. DO NOT use this combination Boiler for any purpose other than water heating and space heating.
14. If the water quality is known to be highly acidic and/or extremely hard, water treatments (i.e water softners) are recommended to maintain full warranty. Consult the local water authority.

Installation Warnings:

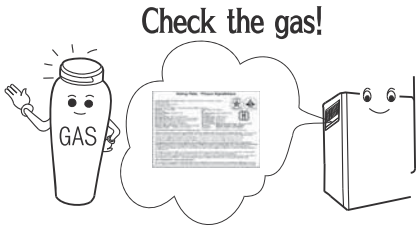
15. Protect against snow accumulation around the vent terminations. Ensure the exhaust pipe and the intake air pipe remain clear from obstructions at all times.
16. DO NOT overtighten fittings as pipe and/or fitting damage may occur causing leakage.
17. DO NOT install the combination Boiler where subject to vibrations.
18. The vent for this appliance shall not terminate over public walkways, or near soffit vents, crawl space vents and other areas where condensate or vapor could create a nuisance, hazard or cause property damage. Or where condensate and vapor could cause damage to or could be detrimental to the operation of regulators, relief valves, or other equipment.
19. For other than a direct vent appliance, the appliance must be located as close as possible to a chimney or gas vent.
20. Should overheating occur or the gas supply fails to shut off, turn off the manual gas control valve to the appliance. Contact a Service Technician immediately.
21. The gas connections and water connections must be leak tested before placing into operation.
22. After placing into operation the ignition safety device must be tested.
23. Visually inspect the venting system for proper size and horizontal pitch and determine there is not blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.
24. Insofar as is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other space of the building. Turn on cloths dryers and any appliance not connected to the common venting system. Turn on any exhaust fans, such ar range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
25. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.
26. After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their pervious condition of use.
27. Any improper operation of the common venting system should be corrected so the installation conforms with the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/or CAN/CSA B149.1, Natural Gas and Propane Installation Code. When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in Appendix F in the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/or CAN/CSA B149.1, Natural Gas and
28. Propane Installation Codes.
    The instructions for the installation of the venting system shall specify that the horizontal portions of the venting system shall be supported to prevent sagging; the methods of and intervals for support shall be specified. These instructions shall also specify that the venting system:
    - For Category I, II and IV boilers, have horizontal runs slopping upwards not less than 1/4 inch per foot (21 mm/m) from the boiler to the vent terminal;
    - For Category II and IV boilers, be installed so as to prevent accumulation of condensate; and
    - For Category II and IV boilers, where necessary, have means provided for drainage of condensate.
29. “Caution: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.”
30. “Verify proper operation after operation servicing.”

Getting Started:

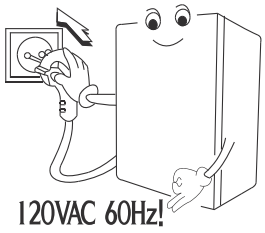
CHECK THE RATING PLATE

Navien units come from the factory configured for use with either Liquid Propane (LP) or Natural Gas (NG). **Before starting the installation,** check the rating plate (side of unit) of the combination Boiler to ensure the unit matches gas type, gas pressure, water pressure and electrical supply. **If the unit does not match the following requirements, Do Not Install.**

WARNING **Be sure the gas type and electricity voltage match the Rating Plate.**



- Use only the gas type indicated on the rating plate of the Navien Combination Boiler. Using a different gas type will cause abnormal combustion and Boiler malfunction.



- Be sure to use 120VAC 60Hz minimum 2A current. Using abnormally high or low AC voltage may cause abnormal operation, and may reduce the life expectancy of this product.

  If not certain, please contact Navien immediately.

- The appliances comply with SCAQMD 2012 requirements.
  NOx emission level of less than 14 nanograms of NOx (calculated as NO_2) per joule of heat output or less than or equal 20 ppm of NOx emissions (at 3% O_2 dry).

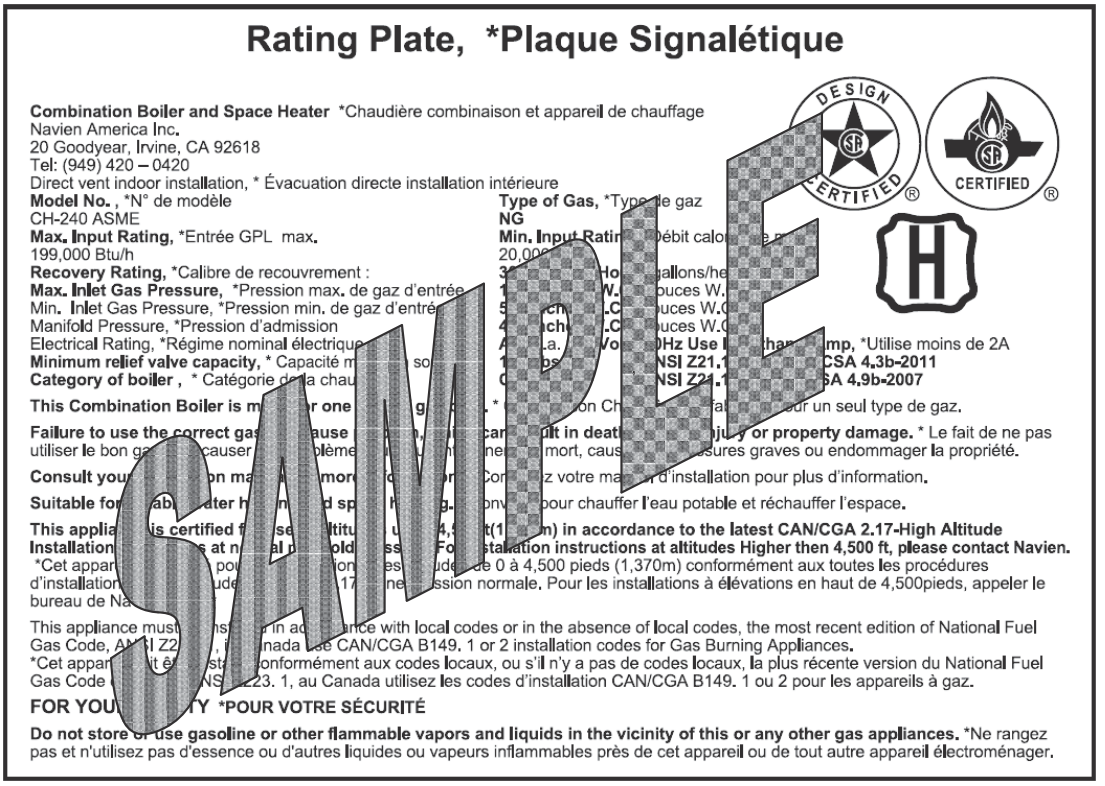
WARNING

Conversion of this unit from natural gas to propane or vise versa cannot be done in the field. Please re-confirm gas type on the rating plate (side of unit) before installing. DO NOT attempt any field conversion; this will result in dangerous operating conditions and will void all warranty.

Navien America Inc. is not liable for any property damage and/or personal injury resulting from unauthorized conversions.

Check Rating Plate

Sample Rating Plate



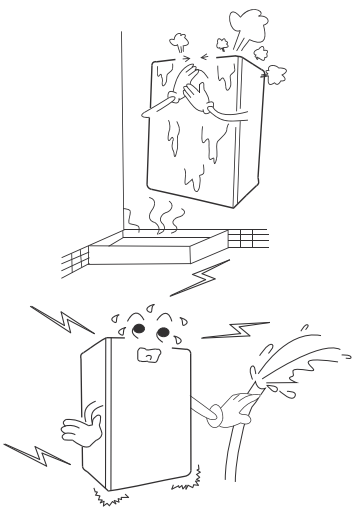
Rating Plate, *Plaque Signalétique

Combination Boiler and Space Heater *Chaudière combinaison et appareil de chauffage
Navien America Inc.
20 Goodyear, Irvine, CA 92618
Tel: (949) 420 – 0420
Direct vent indoor installation, * Évacuation directe installation intérieure
Model No. , *N° de modèle
CH-240 ASME
Max. Input Rating, *Entrée GPL max.
199,000 Btu/h
Recovery Rating, *Calibre de recouvrement :
Max. Inlet Gas Pressure, *Pression max. de gaz d'entrée
Min. Inlet Gas Pressure, *Pression min. de gaz d'entré
Manifold Pressure, *Pression d'admission
Electrical Rating, *Régime nominal électrique
Minimum relief valve capacity, * Capacité m
Category of boiler , * Catégorie de la chau
Type of Gas, *Type de gaz
NG
Min. Input Ratin Débit calo
20,00
3 Ho gallons/he
1 W. ouces W.
5 ch C ouces W.C
4 ch C ouces W.C
A La. Vo 0Hz Use l ha mp, *Utilise moins de 2A
1 ps NSI Z21.1 CSA 4.3b-2011
C NSI Z21.1 SA 4.9b-2007
This Combination Boiler is m r one g * on Ch fa our un seul type de gaz.
Failure to use the correct gas cause it in deat jury or property damage. * Le fait de ne pas utiliser le bon ga causer blème ne mort, caus sures graves ou endommager la propriété.
Consult you on ma mor Con z votre ma d'installation pour plus d'information.
Suitable fo ater h d sp g. onv pour chauffer l'eau potable et réchauffer l'espace.
This appli is certified f se ltitu 4, t(1 m) in accordance to the latest CAN/CGA 2.17-High Altitude Installation s at n al p old ss Fo tallation instructions at altitudes Higher then 4,500 ft, please contact Navien.
*Cet appar po ion es ude de 0 à 4,500 pieds (1,370m) conformément aux toutes les procédures d'installation ude 17 ne ssion normale. Pour les installations à élévations en haut de 4,500pieds, appeler le bureau de Na
This appliance must ns in ac ance with local codes or in the absence of local codes, the most recent edition of National Fuel Gas Code, AN Z2 , in nada e CAN/CGA B149. 1 or 2 installation codes for Gas Burning Appliances.
*Cet appar it ê st conformément aux codes locaux, ou s'il n'y a pas de codes locaux, la plus récente version du National Fuel Gas Code NS 223. 1, au Canada utilisez les codes d'installation CAN/CGA B149. 1 ou 2 pour les appareils à gaz.
FOR YOU TY *POUR VOTRE SÉCURITÉ
Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other gas appliances. *Ne rangez pas et n'utilisez pas d'essence ou d'autres liquides ou vapeurs inflammables près de cet appareil ou de tout autre appareil électroménager.

SAMPLE

DO NOT install the Navien Combination Boiler in areas with excessive high humidity:

- DO NOT install the unit in a location where there is excessive high humidity such as a bathroom, damp crawl space and other areas such as this. This may cause the unit to malfunction.
- To avoid possible electrical shock, DO NOT touch the internal components of the combination boiler or the power plug with wet hands.
- DO NOT splash excessive water on the combination boiler or remote controller when cleaning; they are water resistant, not water proof.



Locating the Combination Boiler:

WARNING

Considering the Location " in accordance to ANSI Z223.1/ NFPA 54 and/or CAN/CSA B149.1 Gas Installation Code"

Location selection may not necessarily affect the operation of the Navien Combination Boiler but it will affect the customer's experience and level of satisfaction with the product. Understanding that each building is different, the contractor will have to select the best location based on a combination of the following factors:

1. Locate the Navien Combination Boiler close to a drain where condensed water and possible water leakage will not do damage to surrounding areas. A significant amount of condensed water will be produced each time the combination boiler is used. In addition, as with any water heating appliance, the potential for leakage at some time in the life of the product does exist. If there is no drain, Navien will not be responsible for any water damage that may occur.

2. Locate where the city water supply comes into the building.

3. Locate where the gas supply comes into the building.

4. Locate the main fixtures in the home (bathrooms, kitchen, laundry, etc.). Select a location that minimizes the water piping distance between the major fixtures.

5. Consider venting options: Select a location that minimizes the amount of venting required. Consider venting restrictions from windows, doors, air intakes, gas meters, neighbor's house, etc.

   - ❑ Maintain proper clearances from any openings in the building (see chart in venting section).
   - ❑ Navien combination boiler requires a minimum clearance of 12 inches above the exterior grade..
   - ❑ Do not install the boiler where moisture from the exhaust may cause discoloration or damage to walls.
   - ❑ Install the exhaust vent so that there are no obstacles around the termination and so that exhaust cannot accumulate.
   - ❑ Do not enclose the termination.
   - ❑ Do not install the combination boiler near vents for heating or cooling. A minimum distance of 4 feet (1.2m) should be maintained.

6. It is not recommended to install the combination boiler in bathrooms, bedrooms, any occupied rooms normally kept closed, or in indoor areas without proper venting.

   - ❑ This boiler must not be installed over carpeting.

Locating the Combination Boiler:

7. Select a location that ensures the boiler will have sufficient and clean, combustion air; avoid installation where dust or debris will accumulate; avoid installation where chemical agents (e.g., hair spray, spray detergent, chlorine, chemicals) are used.
8. If installing into a very tight space or corner, please ensure there is sufficient service and maintenance access to all gas and water piping to ensure that regular maintenance (such as cleaning the water filter, the air filter and the condensate trap) will not become problematic.
   Allow sufficient clearance:

	Indoor Install
Top of Boiler	Min. 9 inches
Back of Boiler	Min. 0.5 inches
Front of Boiler	Min 4 inches
Sides of Boiler	Min. 3 inches
Bottom of Boiler	Min. 12 inches

9. DO NOT install in an area that contains or stores gasoline or other flammables.
10. Ensure that combustibles are clear of the immediate area. Ensure hanging laundry or other such items will not impede the air movement into or out of the Combination Boiler or its venting.
11. For commercial applications, avoid greasy fumes or a large amount of steam; take measures to prevent the fumes and steam from entering in the equipment.
12. The boiler piping system of a hot water boiler connected to heating coils located in air handling units where they may be exposed to refigerated air circulation must be equipped with flow control valves or other automatic means to prevent gravity circulation of the boiler water duriing the cooling cycle.

Mounting the Unit to the Wall:

1. All Navien units come with an upper mounting bracket pre-drilled at 16" on center for easy installation on standard stud walls. Affix the bracket to the wall securely, ensuring that it is level and that it can support the weight of the combination Boiler. If the strength of the wall it not sufficient, reinforce the area to prevent any unsafe situations.
2. If the framing is not standard, reinforcement of the wall is required or if installing on an uneven surface, fasten 3/4" plywood to the stud wall and then attach the mounting brackets to the plywood.
3. When using the supplied mounting bracket, it creates a 5/8" clearance from the back of the unit.
4. The upper bracket is installed on the wall and the combination Boiler is then hung on the bracket. On the back of the combination Boiler at each of the top corners, there is a hanger bracket on the back of the combination Boiler that interlocks with a tabs on the wall mounting bracket.

Plumbing:

Plumbing and Water Connection Guidelines

- ❑ The piping materials used should meet local codes and industry standards.
- ❑ Piping must be cleaned and flushed-out before installation.
- ❑ Do not apply torch heat within 12" of the bottom connections of the unit.
- ❑ Perform all solder connections at a safe distance from the (brass) male connectors below the unit. Allow fittings to cool, before attaching to unit. Use only approved coupling unions with O-rings to attach field piping to unit.
- ❑ The 'heating' pipe should be 1" or bigger diameter copper or PEX. Never use aluminum, PVC or galvanized steel piping.
- ❑ The pipe size used for supply heating water should be the same size used for the return heating water.
- ❑ Use only copper piping with lead-free solder for the domestic water side.
- ❑ The size of the domestic hot water pipe should be 1" diameter.
- ❑ The length of piping should be as short as possible and the piping should have minimal number of bends and connections.
- ❑ Use only ball type isolating valves. Do not use gate valves.
- ❑ Never leave the heating pipes disconnected while operating the unit as a Combination Boiler. This will cause damage to the heat exchanger and void the manufacturers warranty.
- ❑ All piping should be insulated.
- ❑ After making the piping connections, check for gas or water leaks.
- ❑ If the water supply pressure is 142 psi or higher, install the water pressure regulator on the water supply piping.

CAUTION

Do Not open the Auto Feeder Connection cap, unless the pipe is connected to the Auto Feeder valve.

Plumbing:

WARNING

Failure to properly pipe Boiler may result in improper operation and damage to the Combination Boiler or structure.

CAUTION

This Combination Boiler must only be used with the following water supply system conditions.

- ❑ With clean, potable water free of corrosive chemicals, sand, dirt, or other contaminates.
- ❑ With inlet water temperatures above 32°F(0°C), but not exceeding 140°F(60°C).
- ❑ Free of lime and scale deposits.

Low Water Cut Off device

1. Navien Combination Boiler is equipped with a factory installed pressure sensor type Low Water Cut Off device.
2. The Mininum operation system pressure allowable with this device is 7 psig.
3. Check local code if a Low Water Cut Off is requred. If so, determine if this device meets the requirements of the local codes.
4. If a separate LWCO device is required by certain local jurisdications or when the Navien Combination Boiler is installed above the system piping, the following guidelines must be followed:

   - The LWCO device must be installed in a tee connection on the Boiler /supply piping above the Boiler.

CAUTION

If the installation is to comply with ASME or Canadian requirements, an additional high temperaure limitation device may be needed. Consult local code requirements to determine compliance.

Backflow Preventer

- ❑ Use a backflow preventer valve in the make-up water supply to the unit as required by local codes.

Space Heating Freeze Protection

- ❑ Space heating system freeze protection products may be used in lieu of product referenced above. In general, freeze protection for new or existing systems must use specially formulated glycol, which contains ingibitors, preventing the glycol from attacking the metallic system components. Insure that system fluid contains proper glycol concentration and ingibitor level.
- ❑ The system should be tested at least once a year and as recommended by the manufacturer of the glycol solution. Allowance should be made for expansion of the gloycol solution.

CAUTION

Use only inhibited propylene glycol solutions specifically formulated for hydronic systems. Do not use ethylene glycol, which is toxic and can attack gaskets and seals used in hydronic systems.

Plumbing

Expansion Tank

- The expansion tank must be located as shown in A~F basic application drawings.(page 20 ~ 25) (Refer to the expansion tank manufacturer's instructions for additional installation details.)
- Connect the expasion tank to an air separator only if the air separator is located on the suction side of the system circulator.
- Always locate and install the system fill connection at the same location as the expansion tank's connection to the system.
- If the expansion tank must be replaced, consult the expansion tank manufacturer's literature for proper sizing.

Diaphragm Expansion Tank

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

Closed-Type Expansion Tank

- It is recommanded to pitch any horizontal piping upward toward the expasion tank 1 inch per 5 feet of piping.
- Use 3/4" piping for the expansion tank to allow air within the system to rise.

CAUTION

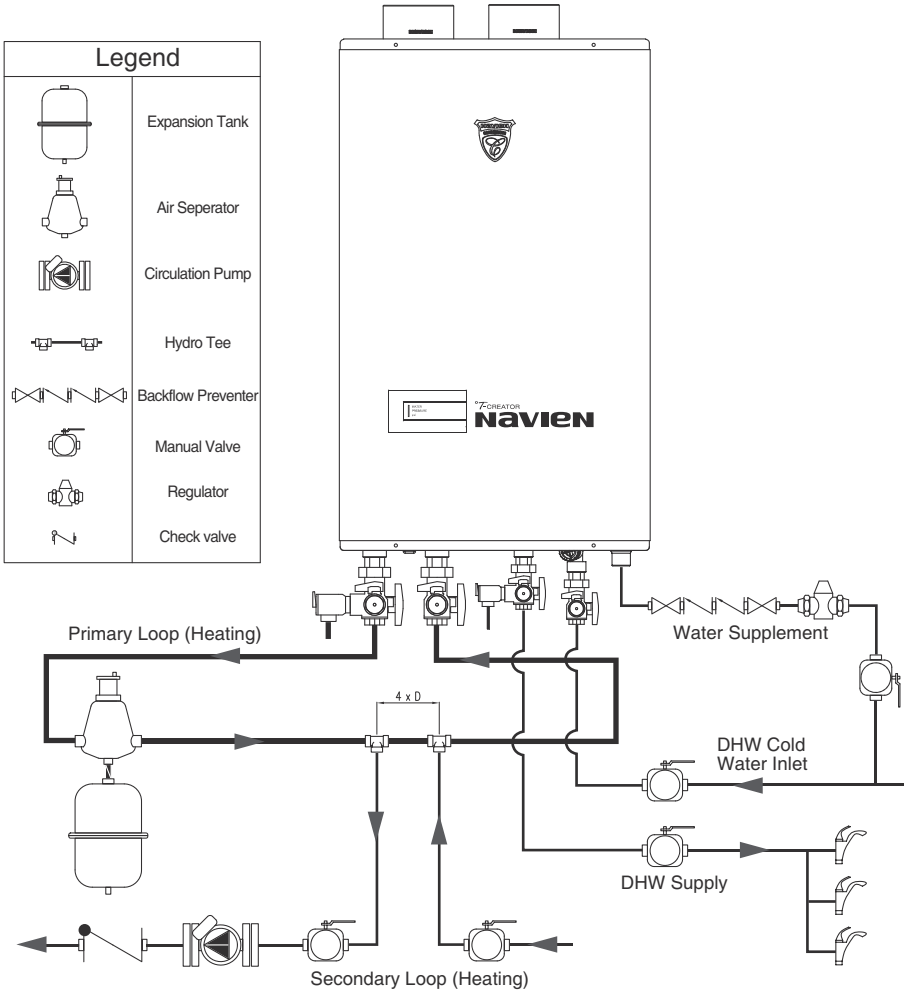
Do not install automatic air vents on a closed-type expansion tank system. Air must remain in the system and be returned to the expansion tank to provide an air cushion.

Plumbing: Guide Line

CAUTION

This drawing can be a useful guideline when installing a unit. However, installation may vary depending on the location circumstances, local building codes or state regulation. Ma ke sure to check the local building codes and state regulation before installation, and comly with it.

Case I. With backflow preventer Installation



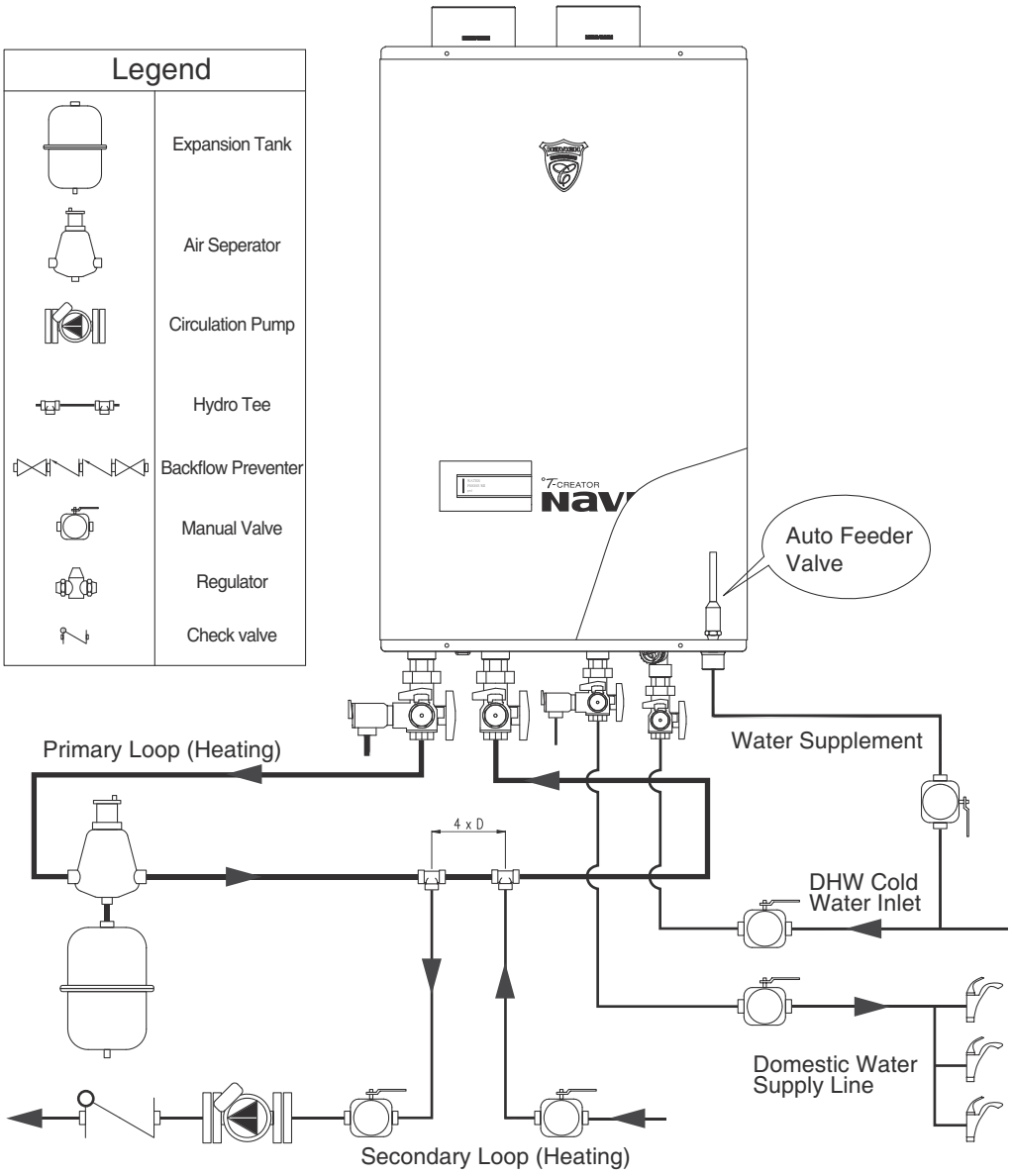
NOTICE : If using mixing valves on the domestic hot water outlet, choose one which prevents cold water pressure from overcoming hot water line pressure.
The flow rate of hot water may vary when more than two faucets (appliances, fixtures, etc.) are being used simultaneously.
If a combination Boiler is installed in a closed water supply system, such as one having a backflow preventer in the cold water supply line, means shall be provided to control thermal expansion device. Contact the water supplier or local plumbing inspector on how to control this situation.

As shown above, Navien recommends installing the water supplement plumbing.

Plumbing

Plumbing Guideline

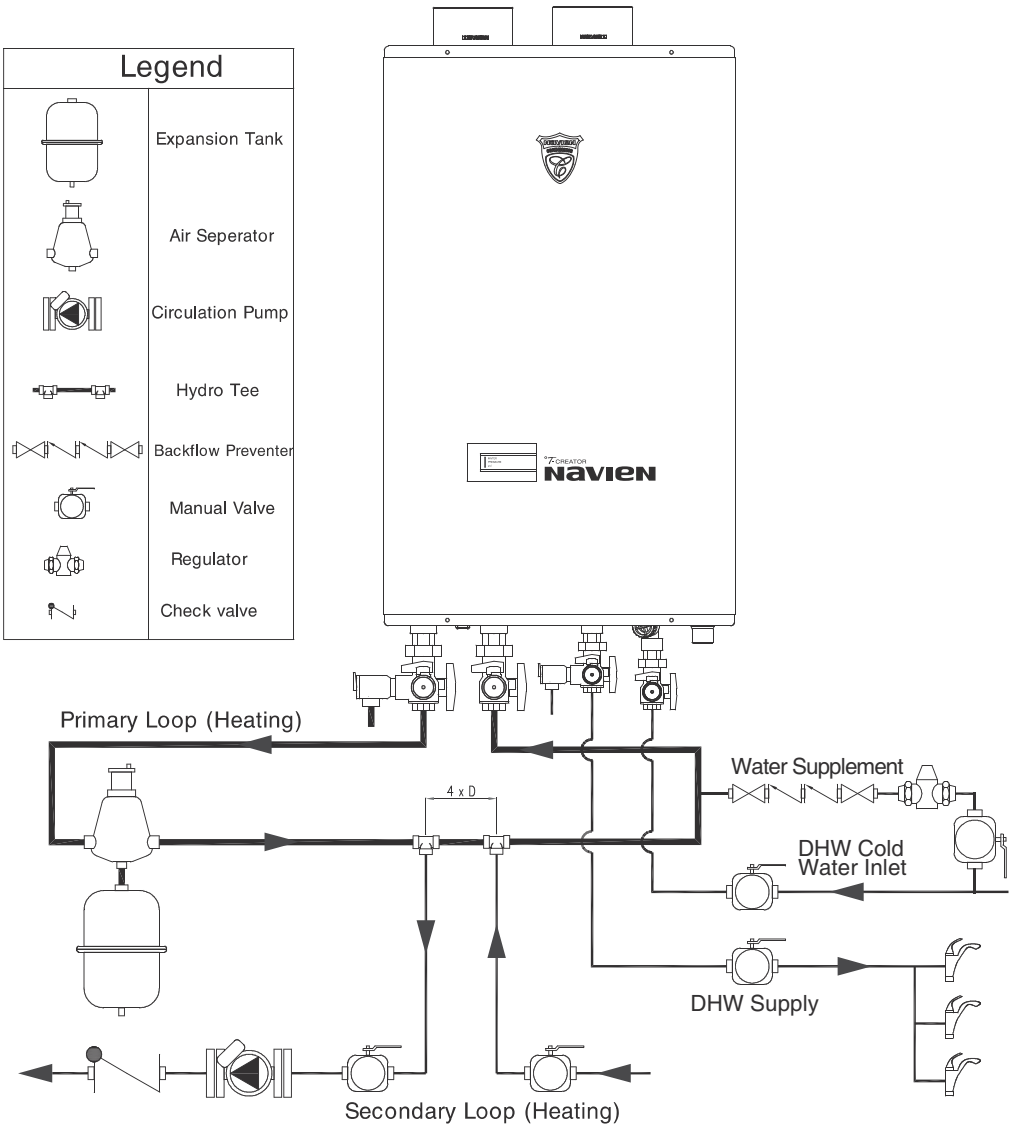
Case II. Non-backflow preventer Installation



NOTICE : If using mixing valves on the domestic hot water outlet, choose one which prevents cold water pressure from overcoming hot water line pressure.
Hot water Temperature may vary when more than two faucets (appliances, fixtures, etc.) are being used simultaneously.

Plumbing

Case III. Non-Auto supplement backflow preventer Installation



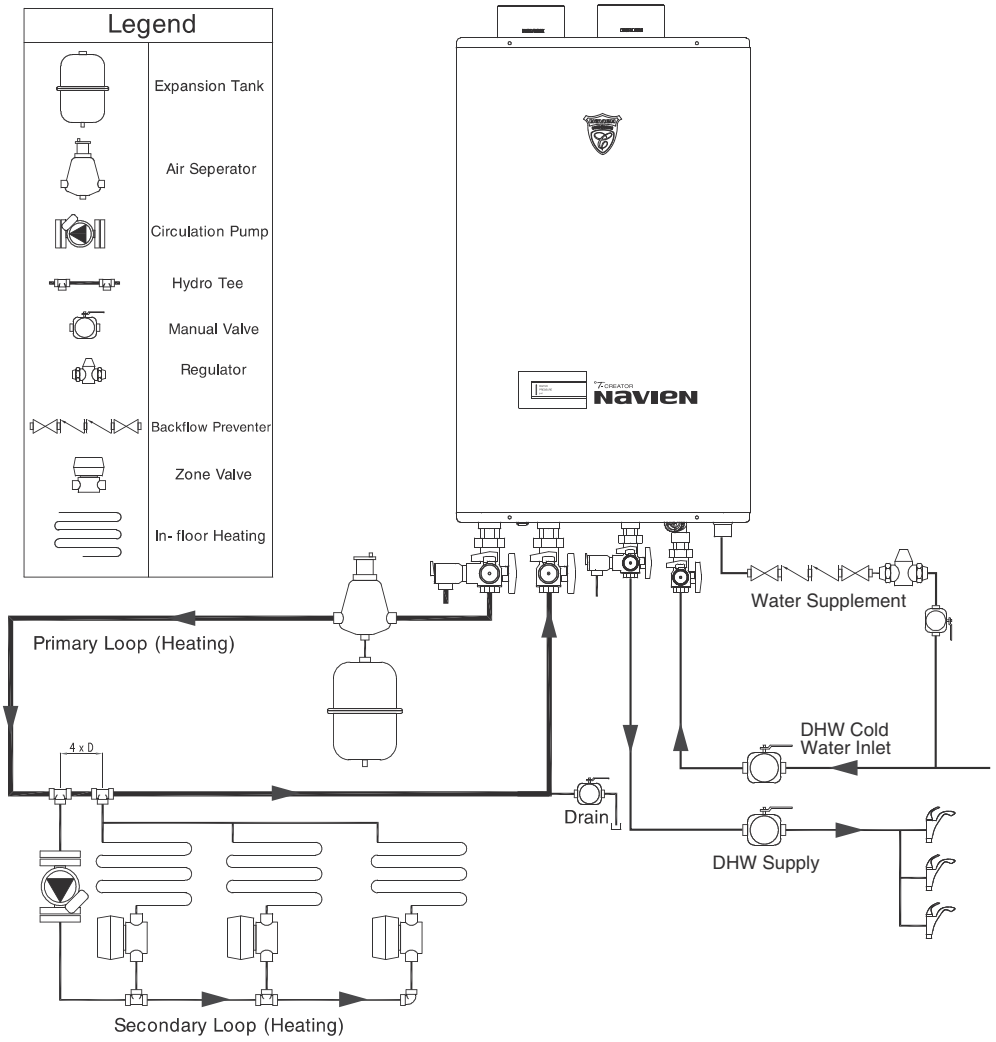
As shown above, Navien's have to establish the water supplement plumbing is not recommended.

CAUTION

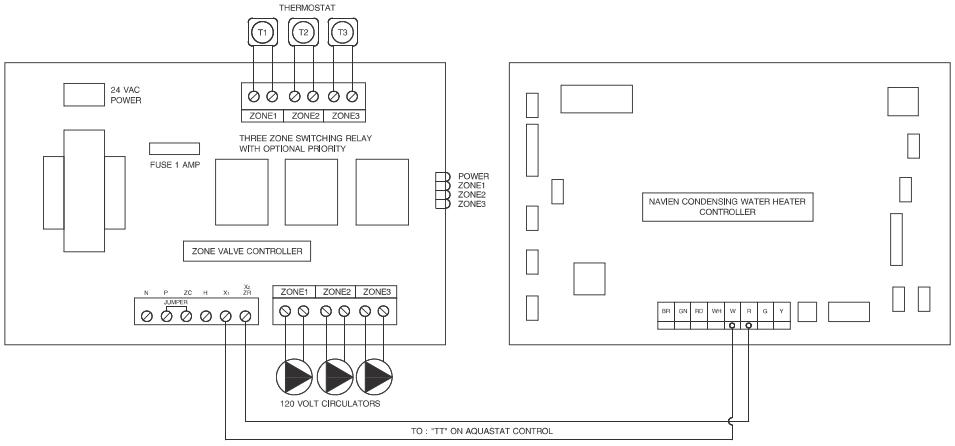
Do Not open the Auto Feeder Connection cap, unless the pipe is connected to the Auto Feeder valve.

Plumbing :

A. In-Floor Heating (Zoning Control) System (with Wiring Diagram)

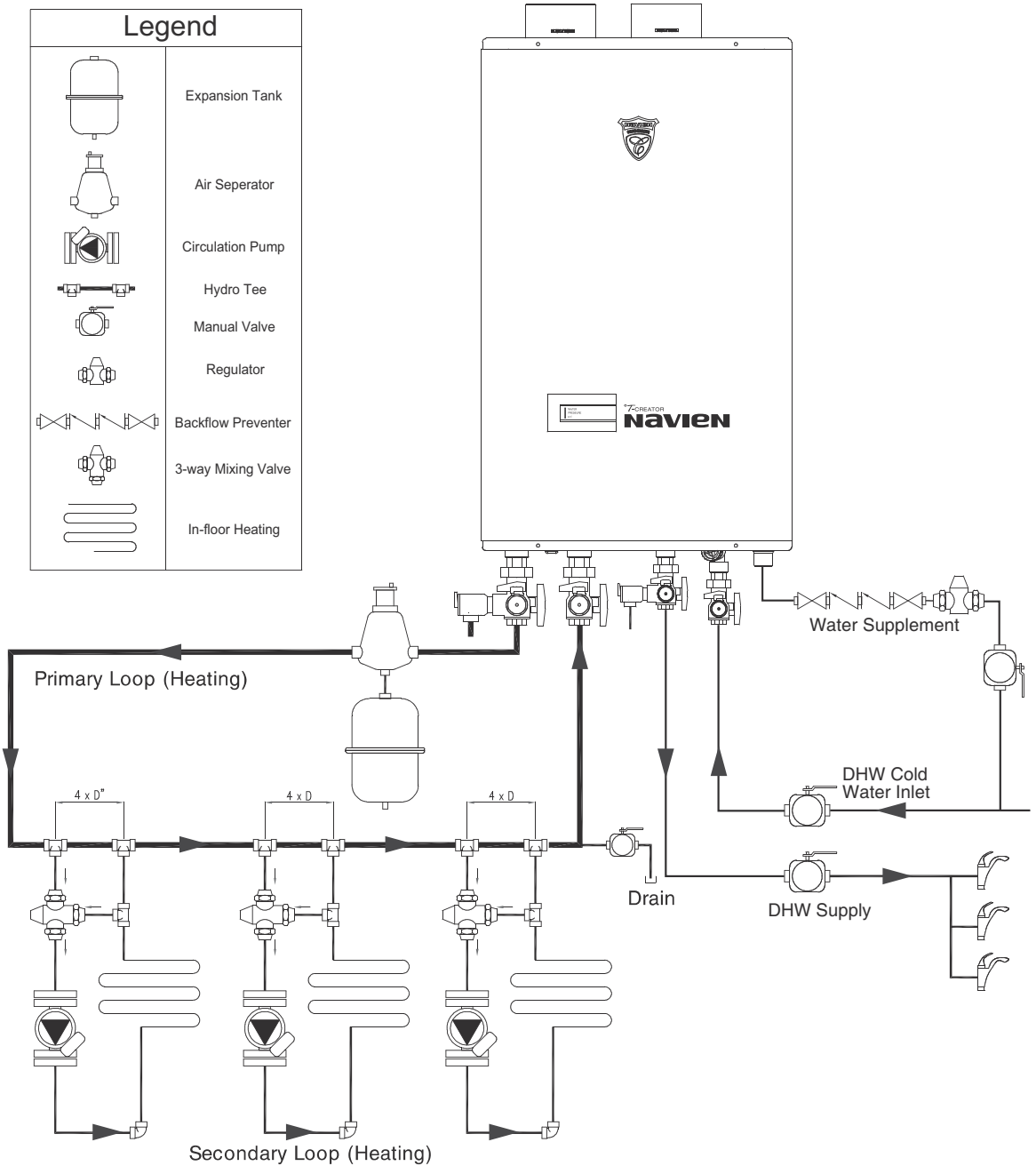


Wiring Daigram



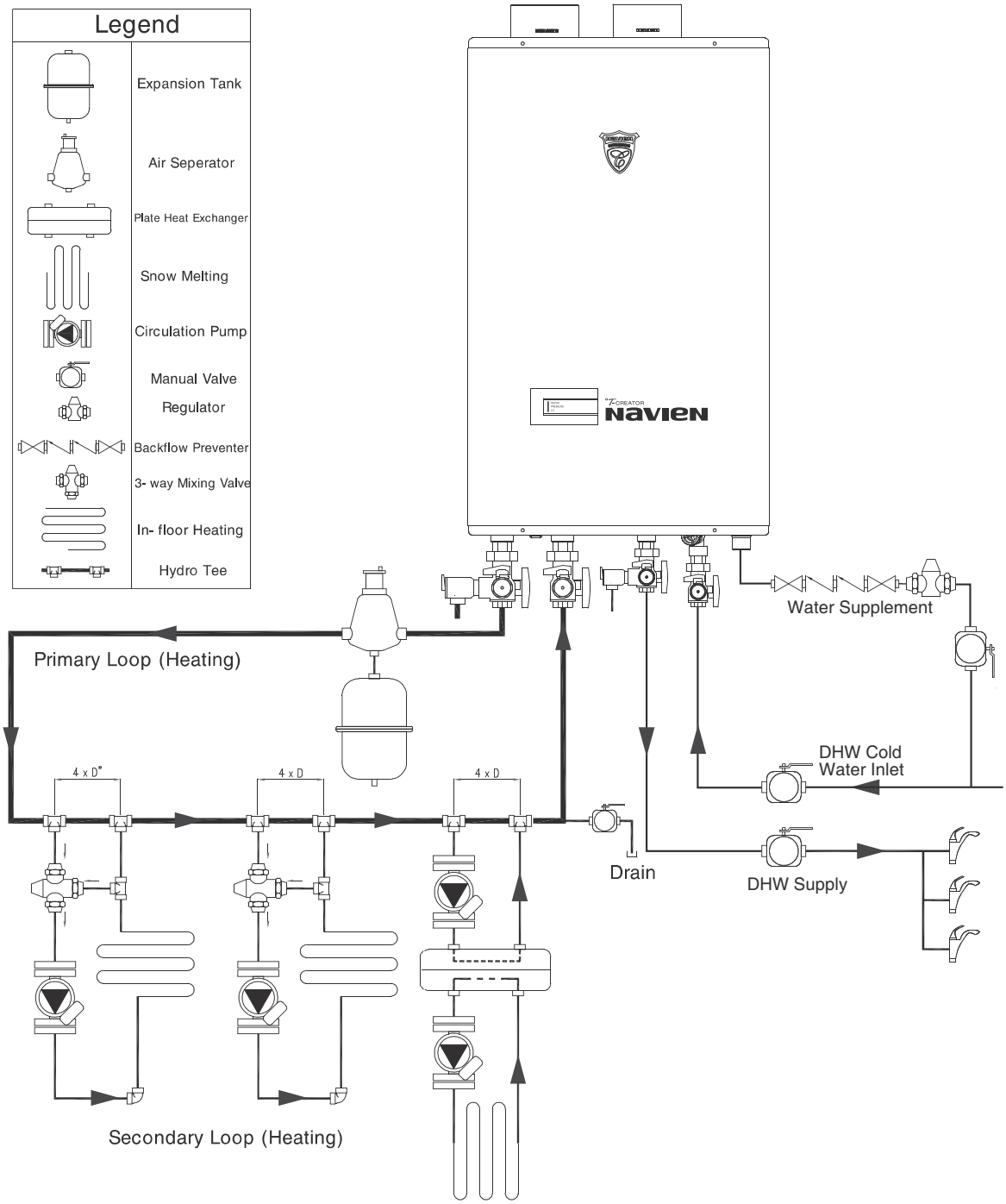
Plumbing :

B. In-Floor Heating System (Recovery Control)



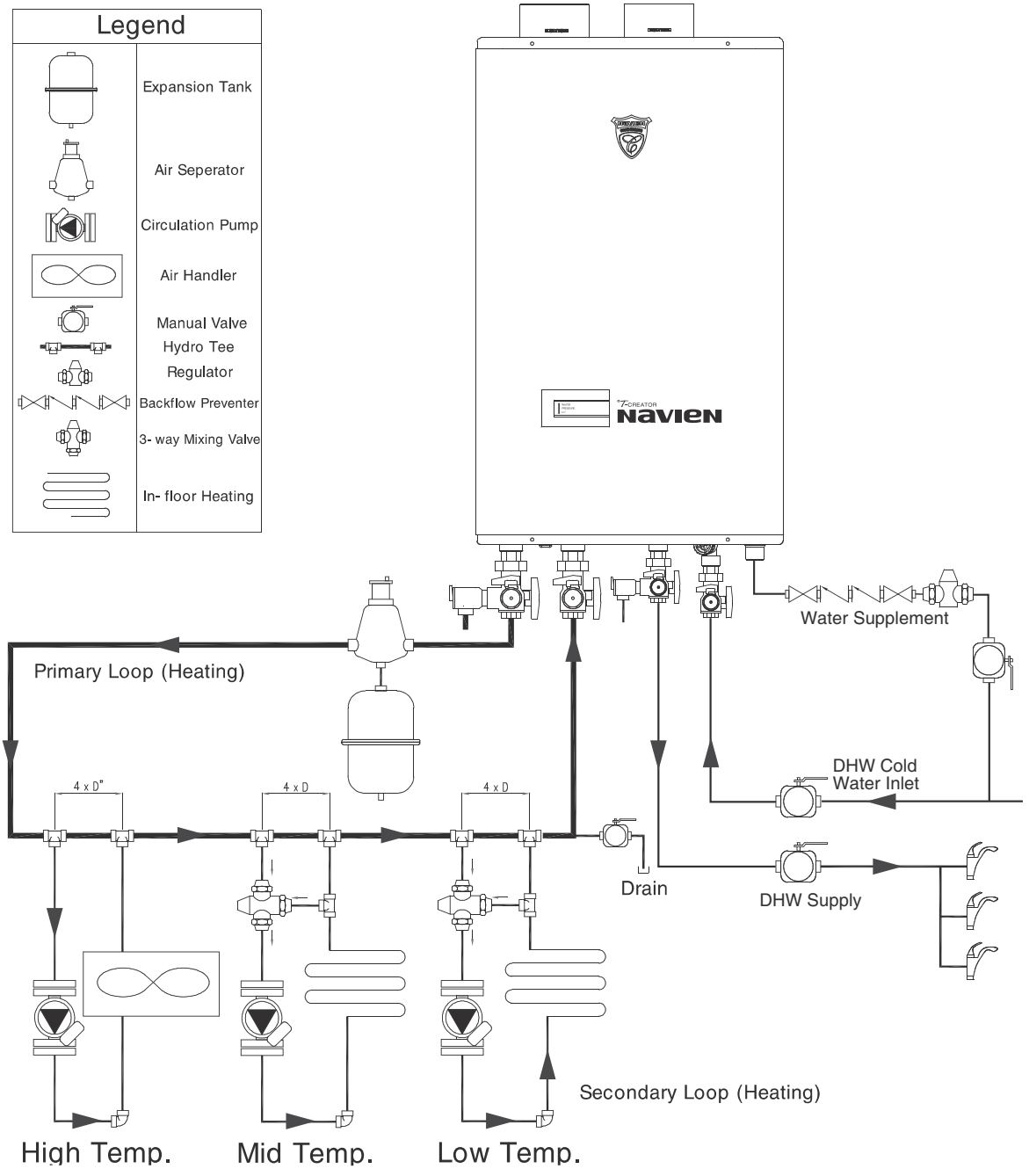
Plumbing :

C. Snow Melting System.



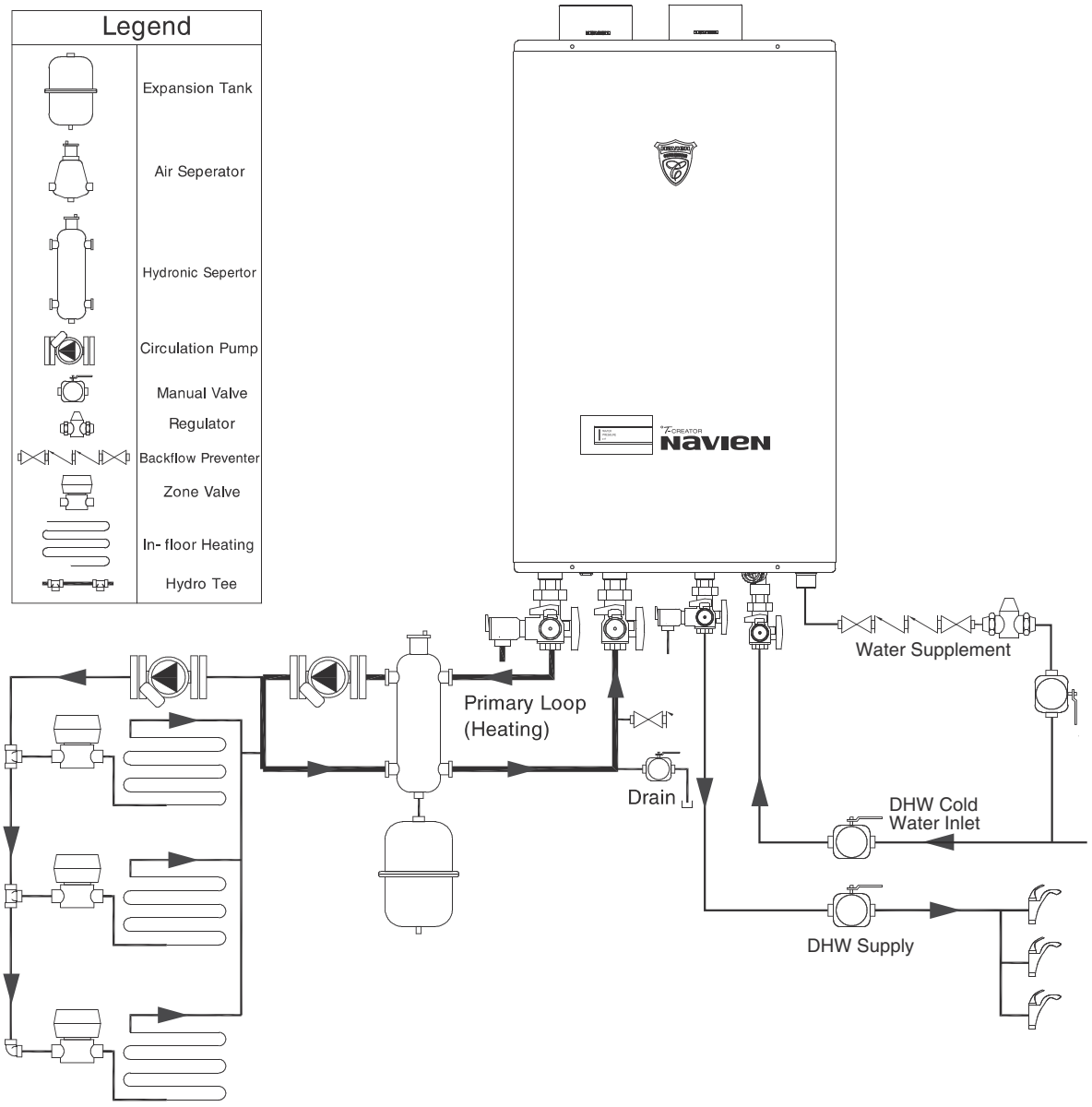
Plumbing :

D. High - Low Temperature System.



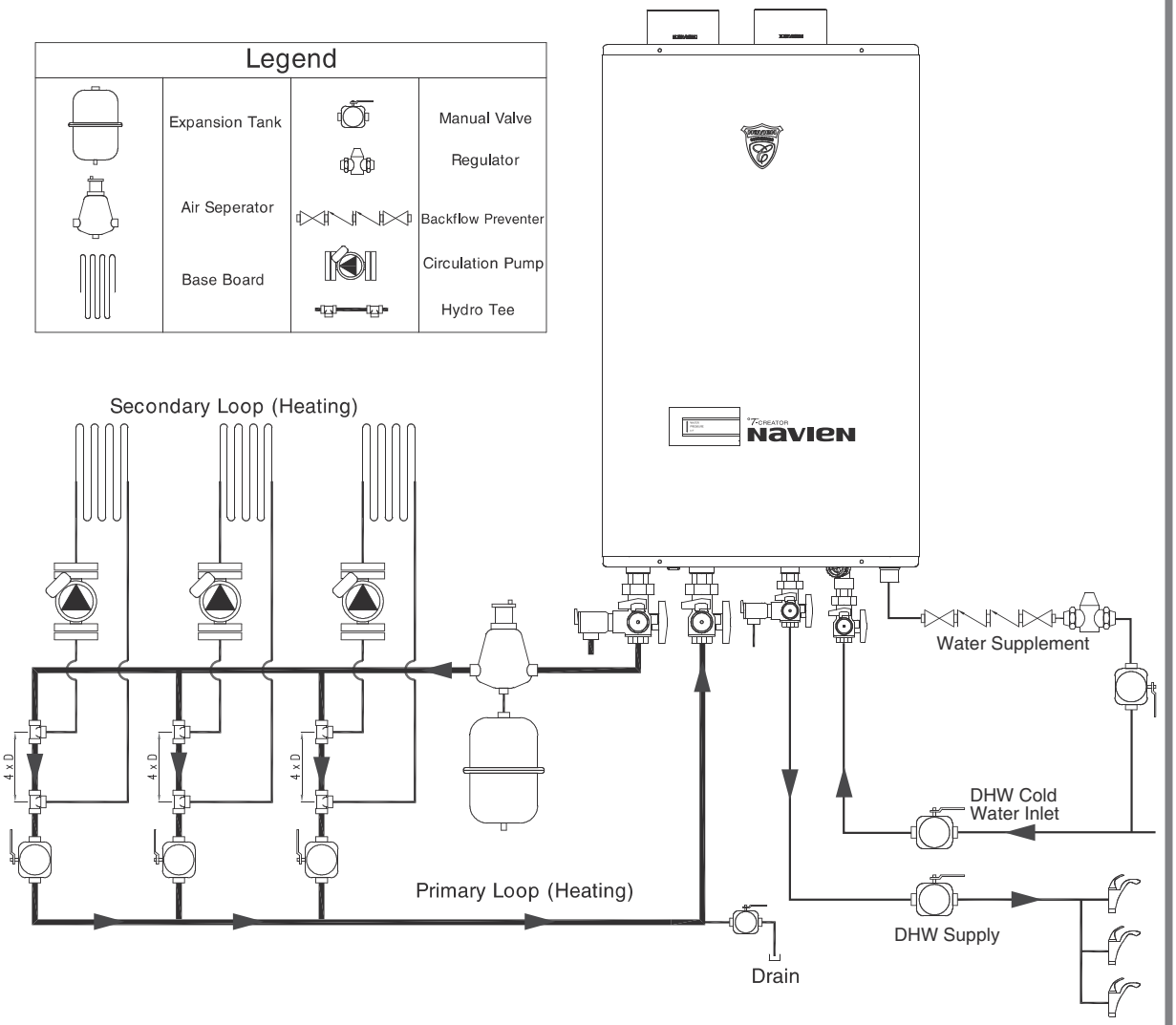
Plumbing :

E. Hydro - Seperator System



Plumbing :

F. Base Board System.



Pressure Relief Valve:

WARNING

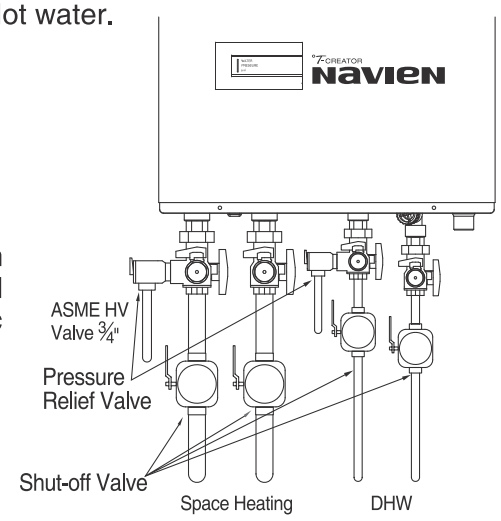
Failure to comply with the guidelines on installing the pressure relief valve and discharge piping can result in personal injury, death or substantial property damage.

- An approved ASME HV Valve (size 3/4”, setting pressure 30 psi relief valve) must be installed on the hot water outlet for hydronic space heating loop as close to the unit as possible. Please see below for more information on approved pressure relief valves.
- Each Navien combination boiler has a high-temperature shut off switch built in as a standard safety feature (called a temperature high limit switch) therefore a “pressure only” relief valve is required. This unit does not come with a pressure relief valve but one must be installed on the hot water outlet.
- The discharge capacity of the pressure relief valve must be at least equal to the maximum pressure rating of the combination boiler.
- The maximum input BTU rating on the valve must be equal to or greater than the maximum input BTU rating of the combination boiler.
- The discharge piping for the pressure relief valve must be directed so that the hot water cannot splash on anyone or on nearby equipment. Attach the discharge tube to the pressure relief valve and run the end of the tube to within 6” from the floor. This discharge tube must allow free and complete drainage without any restrictions. No reducing coupling or other restriction may be installed in the discharge line.
- The following 1/2”, maximum 150 psi valves are examples of valves approved for use with all Navien products for domestic Hot water.

  1. Wilkins P-1000A (Zurn Industries)
  2. Conbraco 17-402-04
  3. Watts Industries 3L (M7)
  4. Cash Acme FWL-2 3/4”

- The following 3/4” space heating, maximum 30 psi valves are examples of valves approved for use with all Navien products for hydronic space heating loop.

  5. Conbraco 10-407-HV-05
  (ASME HV Valve, Navien will supply)



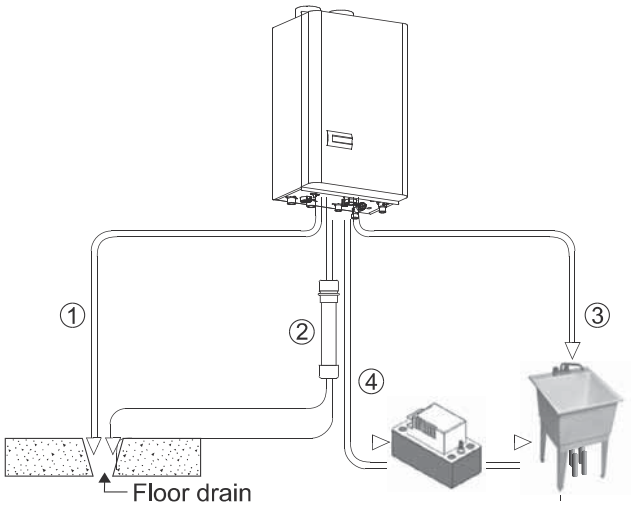
Instructions for pressure, temperature and vacuum relief valves shall specify that no valve is to be placed between the relief valve and the tank. The instructions shall specify installation in such a manner that the discharge from temperature and pressure relief valves will be conducted to a suitable place for disposal when relief occurs and that no reducing coupling or other restriction be installed in the discharge line.

Disposal of Condensate:

- This Navien combination boiler is a high efficiency gas appliance that creates condensation when it operates. Condensation has an acidic (pH) of approximately 3~4. Follow your local code with regards to the disposal of condensation. Here are several options for the Disposal of Condensate (see below):

  ① From combination boiler direct to drain.
  ② From combination boiler to neutralizer to drain.
  ③ From combination boiler to laundry tub (bottom of combination boiler must be above the height of laundry tub; must have a negative slope to properly drain).
  ④ From combination boiler to condensate pump to laundry tub (for long distances between combination boiler and laundry tub or when bottom of combination boiler is installed below height level of laundry tub).

- All Navien's CH model combination boiler are condensing gas appliances. A condensate trap comes factory installed inside each boiler.
- All condensate must be drained in accordance with all local regulations. Navien recommends draining the condensate to a laundry tub as the alkalie in the detergent from the washing machine will neutralize the acid in the condensation. If a laundry tub is not close by, you may need to install a condensate pump to push the condensate to the nearest laundry tub or consider installing a condensate neutralizer so that you can release the neutralized (non-acidic) water into a regular, nearby drain.
- If a neutralizer is installed, periodic replacement of the lime stone (or neutralizing agent) will be required. The rate of depletion of the lime stone varies upon usage of the combination boiler. During the first year of operation, please check the neutralizer every few months for depletion. If you notice any depletion order some replacement neutralizer lime stone.
- Use only corrosion-resistant materials for the condensate drain lines such as 1/2" PVC, CPVC, Polypropylene pipe or included plastic hose.

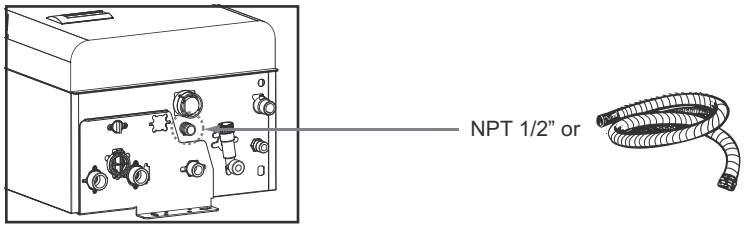


Note: Do not cap(or plug) the intergrated condensate line. Without proper drainage or disposal, condensate will damage the Navien Boiler.

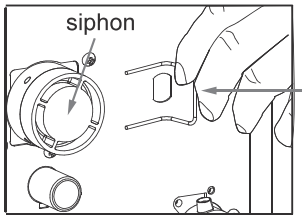
Condensate Drain & Cleaning:

Condensate Drain

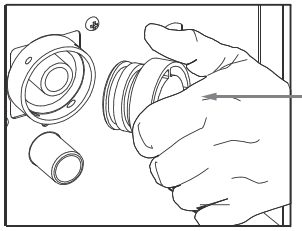
- A condensate drain line must be connected the port at the bottom of the unit(see below). The end of pipe should drain to a laundry tub or to a floor drain.
- A condensate drain tube is included with the Navien Combination Water/Space Heater. This tube must be connected to the port at the bottom of the unit (see figure below).The end of the tube should drain to a laundry tub or to a floor drain. If additional tubing is required, any ¾" polyvinyl tubing should suffice.
- Condensate pipe line should be installed under the bottom of the water heater.
- Condensate pipe should be as short as possible and have a downward.



- Over time, blockage of the siphon by debris may occur. When the condensate cannot be released, the boiler will go into error and will shut down. When this occurs, the siphon must be cleaned. To clean, you will need a bucket to collect any residual water. (See figures below)

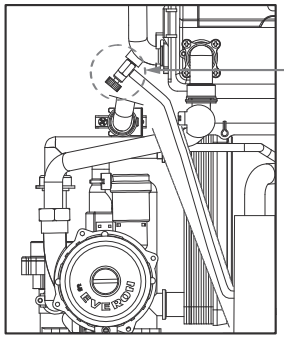


Remove retaining syphon clip



Prepare bucket, twist and remove cap, drain, clean out syphon and re-insert cap and retaining syphon clip.

- Once the cap and clip have been re-inserted, the syphon must be re-filled. See figure below

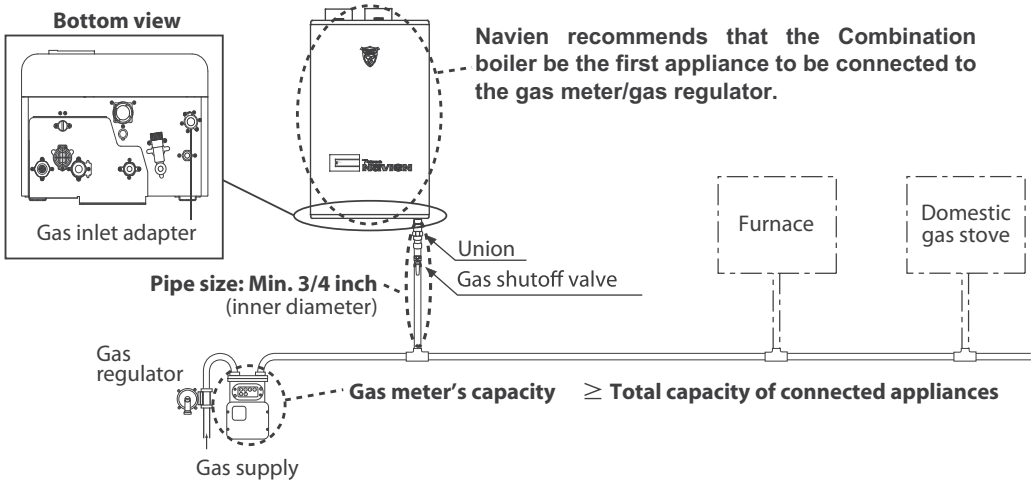


- Open the valve and water will begin to fill in the syphon. Fill the syphon to the top and then close the valve.
- Open a hot water faucet; examine the open end of the condensate drain line to ensure no flue gases are exiting from that pipe. If the flue gases are exiting, immediately stop the unit and call Navien for additional instructions

Gas Piping:

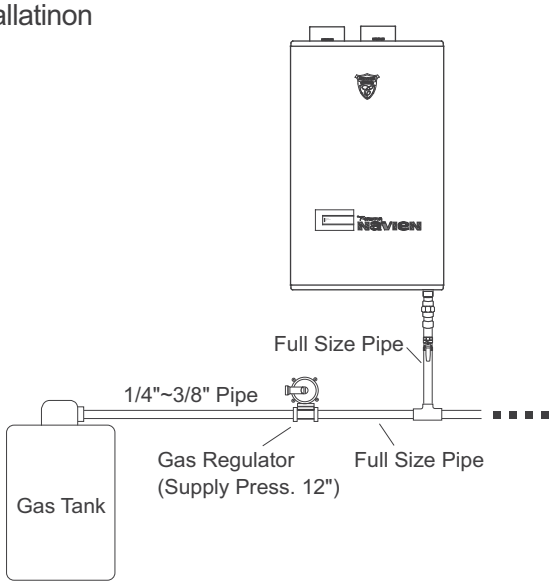
Gas Piping Guidelines:

- ❑ Navien recommends the combination Boiler be the first appliance installed downstream of the gas meter to ensure it will have sufficient gas supply.

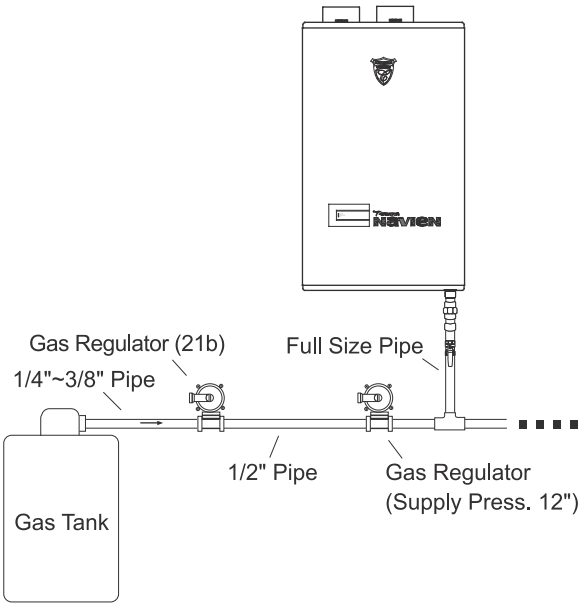


- ❑ Use the charts on the following pages to properly size the gas supply line.
- ❑ The gas connection fitting on all Navien units is 3/4". **DO NOT** use less than 3/4" piping.
- ❑ When using flexible gas line, ensure the pipe's inner diameter is sufficient to supply the required BTUs, also ensure that the flexible line has no crimps or tight bends as this will restrict gas flow.
- ❑ Install a manual gas shut-off valve on the gas supply line and the Boiler.
- ❑ When using rigid pipe, Navien recommends the installing a union on the gas supply line close to the Boiler to facilitate any future maintenance and service.
- ❑ A sediment trap must be provided upstream of the gas contols.
- ❑ LP Gas Piping Installatinon

  -. Regular System



-. 2lb System



Gas Supply Line Pressures:

1. The minimum and maximum inlet gas pressures are:

   Natural Gas Min. 5.0" WC - Max. 10.5" WC

   Propane Gas Min. 8.0" WC ~ Max. 13.5" WC

2. Gas pressures over and above the specified ranges will result in adverse performance and dangerous operating conditions; any damage resulting from extreme gas supply pressures will not be covered by the limited warranty.
3. Until pressure testing of the main gas supply line is completed, ensure the gas line to the Navien Combination Boiler is disconnected to avoid any damage to the Boiler.
4. The appliance must be isolated from the gas supply piping system by closing its individual manual shut-off valve during any pressure testing of the gas supply system at test pressures equal to or less than 0.5 psi (3.5 kPa).
5. The gas appliance and its gas connections must be leak tested before placing the appliance in operation. Leaks can be found by using a gas leak detection device or by applying soapy water to all gas fittings. Should bubbles occur tighten those connections and re-test.
6. Always purge the gas line for any debris before connecting to the Boiler gas inlet.
7. Never use an open flame to test for gas leaks as property damage, personal injury or death could result.

Gas Pipe Sizing Chart:

Referenced from Uniform Plumbing Code 1997

Maximum Natural Gas Delivery Capacity

in Cubic Feet (ft^3) per Hour (0.60 Specific Gravity, 0.5" WC Pressure Drop)

Pipe Size	Length in Feet										
	10'	20'	30'	40'	50'	60'	70'	80'	90'	100'	125'
3/4"	363	249	200	171	152	138	127	118	111	104	93
1"	684	470	377	323	286	259	239	222	208	197	174
1 1/4"	1,404	965	775	663	588	532	490	456	428	404	358
1 1/2"	2,103	1,445	1,161	993	880	798	734	683	641	605	536
2"	4,050	2,784	2,235	1,913	1,696	1,536	1,413	1,315	1,234	1,165	1,033
2 1/2"	6,455	4,437	3,563	3,049	2,703	2,449	2,253	2,096	1,966	1,857	1,646
3"	11,412	7,843	6,299	5,391	4,778	4,329	3,983	3,705	3,476	3,284	2,910
3 1/2"	16,709	11,484	9,222	7,893	6,995	6,338	5,831	5,425	5,090	4,808	4,261
4"	23,277	15,998	12,847	10,995	9,745	8,830	8,123	7,557	7,091	6,698	5,936

Contact your gas supplier for BTU/ft^3 rating. Use 1000 BTU/ft^3 for implied calculation.

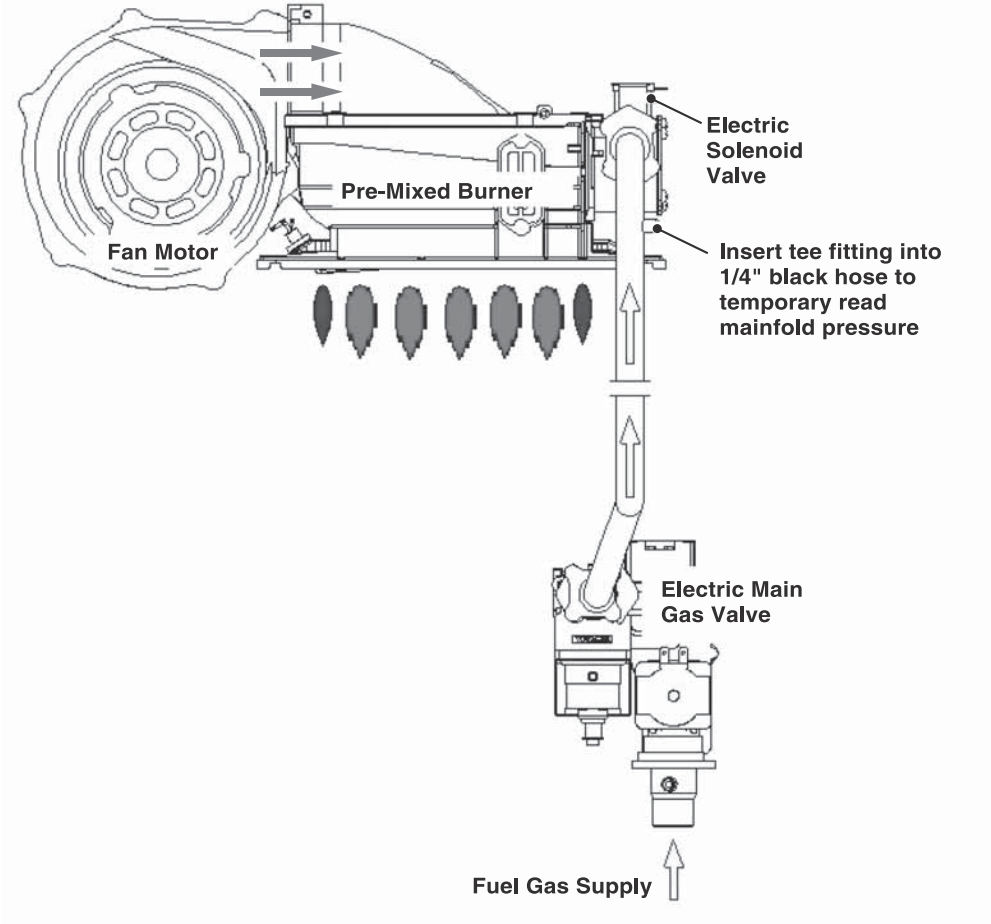
Maximum Liquefied Propane Delivery Capacity

in Thousands of BTU/Hour(0.5" WC Pressure Drop)

Pipe Size	Length in Feet												
	10'	20'	30'	40'	50'	60'	70'	80'	90'	100'	125'	150'	200'
3/4"	567	393	315	267	237	217	196	185	173	162	146	132	112
1"	1,071	732	590	504	448	409	378	346	322	307	275	252	213
1 1/4"	2,205	1,496	775	663	588	532	490	456	428	404	358	511	440
1 1/2"	3,307	2,299	1,161	993	880	798	734	683	641	605	536	787	675
2"	6,221	4,331	2,235	1,913	1,696	1,536	1,413	1,315	1,234	1,165	1,033	1,496	1,260

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

Measuring Inlet Gas Pressure:



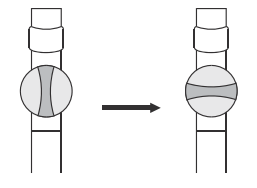
The Navien Combination Boiler cannot operate properly without sufficient inlet gas pressure and volume. Below are instructions on how to check the inlet gas pressure.

CAUTION

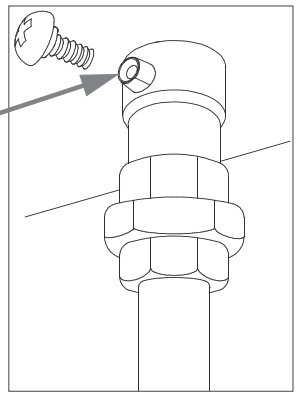
THIS IS ONLY TO BE DONE BY A LICENSED PROFESSIONAL

Procedure to measure the inlet gas pressure:

1. Shut off the manual gas valve on the supply line.
2. Open a hot water faucet. The unit should turn on and the gas in the gas pipe line should purge. Leave the faucet on to keep the unit running until the unit shuts down due to lack of gas supply. Then shut off the hot faucet.
3. Remove the screw for the pressure port located on the gas inlet of the Boiler.



Measuring Inlet Gas Pressure:



4. Connect a manometer to the pressure port and reset it to zero.
5. Re-open the manual gas valve. Check to see that there are no gas leaks.
6. Open multiple fixtures that have high flow rates (i.e. bathtub, showers, kitchen sink) to ramp the Boiler up to its maximum burn.
7. When the Navien Boiler is at maximum burn, check the inlet gas pressure reading on the manometer, it should read between 5.0" and 10.5" WC for Natural Gas / 8.0" and 13.5”WC for Propane gas.
8. The maximum inlet gas pressure must not exceed the value specified by the manufacturer and that the minimum value listed is for the purposes of input adjustment.
9. The Boiler and individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 psi (3.5 kPa).
10. The Boiler must be isolated from the gas supply system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressrues equal to or less than 1/2 psi (3.5 kPa).

Venting:

WARNING

Improper venting of Combination Boiler can result in excessive levels of carbon monoxide which can result in severe personal injury or death. This Combination Boiler must be vented in accordance with the “Venting of Equipment" section of the latest edition of the ANSI Z223.1 / NFPA 54 Natural Fuel Gas Code and/or the “Venting systems and air supply for appliances” section of the latest version of the CAN/CGA B149.1 Natural Gas and Propane Installation Code in Canada and in accordance with all applicable local building codes.

WARNING

This Navien Combination Water / Space Heater can be vented with PVC, CPVC or Approved Polypropylene. SCH40 PVC vent can be used in all cases **EXCEPT** when space heating media temperature sets exceed 140°F (60°C). IF you space heating water temperature set at a temperature higher than 140°F (60°C), you **MUST** use:

- In the USA, CPVC(Schedule 80) or stamped Polypropylene with minimal 194°F(90°C).
- In Canada, Type BH Special Gas Vent Class IIB (CPVC) or Class IIC (Polypropylene) approved to ULC-S636.
- Never intermingled with different materials mentioned above. One material type to be used throughout the whole installation.

WARNING

- Please use Approved to ULC-S636 PVC and CPVC Glue, because Navien vent collar material is PVC and CPVC.
- After vent installation there should be no leakage of exhaust gases, because leakage of exhaust gases can bring catastrophic harm.

Venting Guidelines

- ❑ For best results, keep the vent system as short and straight as possible.
- ❑ Locate the combination Boiler as close as possible to the vent terminator.
- ❑ The combination Boiler vent must not be common vented with any other gas appliance or vent stack.
- ❑ Slope the vent toward the vent terminal at a rate of 1/4" per foot (2% slopes).
- ❑ When slopping the vent using any other manufacturer’s stainless steel vent, the assembly of the vent pipe must be such that it is male-to-female in the direction of the flow of condensate.
- ❑ The exhaust pipe and intake air pipe must be sealed air tight at each joint from exhaust pipe to terminator.
- ❑ Make sure that the seam of the vent pipe in horizontal runs toward the top of the installation.

Note: To avoid moisture and frost build-up and to maintain clearances to openings on adjacent homes, 45° elbows, 90° elbows or tees may be attached to the end of the termination vent pipe to direct the exhaust plumes away from any adjacent house as long as the total allowable vent lengths, maximum number of elbows and distance to air intake restrictions are observed.

Venting:

- ❑ Do not store hazardous or flammable substances near the vent terminator.
- ❑ If this product will be installed in an area where snow is known to accumulate, protect the vent termination from blockage.
- ❑ Vent terminator must be a minimum of 12" above ground.
- ❑ Support the vent pipe with hangers at regular inte¬rvals or as required by local code; the weight of the vent pipe must not rest on the Boiler.
- ❑ Exhaust pipe and intake air pipe must be supported every 5 feet.
- ❑ The installation of the venting system shall specify that the horizontal portions of the venting system shall be supported to prevent sagging;
  - Have horizontal runs sloping upwards not less than 1/2 inch per foot from the boiler to the vent terminal;
  - Be installed so as to prevent accumulation of condensate; and
  - Where necessary, have means provided for drainage of condensate.

Navien and Direct Vent:

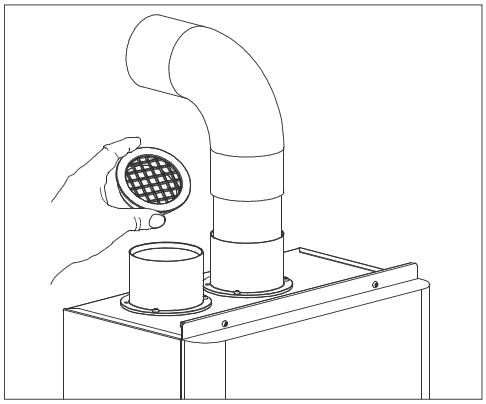
- ❑ All Navien Combination Boilers are prepared at the factory to be direct vent (sealed combustion) units which draw all of their required combustible air directly from outside the building.
- ❑ All Navien Combination Boilers use 3" diameter exhaust and 3" diameter intake air duct. To ensure the draw and exhaust of air directly to and from the outside, the exhaust pipe and intake air duct must be sealed airtight from unit collar to terminator.
- ❑ **The air intake vent materials** can be made of PVC, CPVC, Polypropylene corrugated aluminum or any other such materials. If you are using a corrugated material, ensure there is no inadvertent crimping of, or damage to, the intake air pipe.

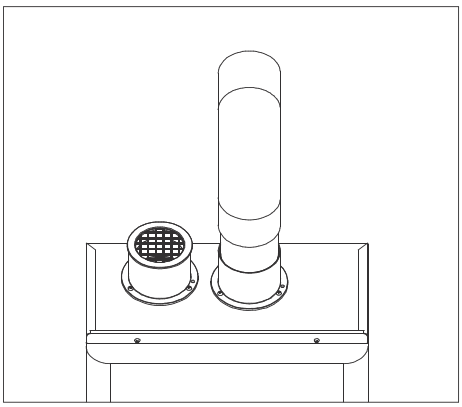
Navien and Non-Direct Vent:

- ❑ Navien recommends direct vent installations whenever possible to avoid back drafting cold air through the unit, if you cannot use direct vent, it is essential to have an ample supply of make-up air.
- ❑ If at any time, the building experiences a negative pressure situation when using a non-Direct Vent unit, there is a possibility of back drafting cold, winter air from outside through the heat exchanger of the Boiler. This situation may freeze the Boiler's heat exchanger. According to the building codes in most jurisdictions, a negative pressure in homes is not allowed. In a home with a well-balanced air supply, freezing of the heat exchanger will not occur.
- ❑ Since the cause of the back drafting is insufficient make-up air within the home or building. This will not be deemed a manufacturing problem and any freezing damage which occurs from back drafting will not be covered under warranty. To avoid any such issues in colder climates, Navien requires the use of direct vent.

Venting:

- To fit the unit for non-direct venting, insert the termination end cap (provided with the Boiler) into the intake air duct. Do not glue to allow for easy removal and cleaning of the cap.





Combustion Air Supply Requirement for Non-Direct Vent:

- When a Navien Combination Boiler is installed without a dedicated intake air pipe (non-Direct Vent) communicating directly with the outdoors, combustion air must be supplied to the space. The opening sizes below are Navien's minimum requirements. Follow the latest version of the National Fuel Gas Code (ANSI Z223.1 / NFPA 54) or CAN/CGA B-149.1.

Model	CH-180 ASME	CH-210 ASME	CH-240 ASME
Maximum Input (BTU)	150,000	175,000	199,000
Outdoor make up air is provided, a minimum free area of 1 in^2	5.3 in^2 3" (W) x 2" (H) or 3" round	6.1 in^2 2.5" (W) x 2.5" (H) or 3" round	7 in^2 2¾" (W) x 2¾" (H) or 3" round
Indoor make up air is provided, a minimum free area of 1 in^2	150 in^2 12¼" (W) x 12¼" (H)	175 in^2 13¼" (W) x 13¼" (H)	199 in^2 14¼" (W) x 14¼" (H)

- Have to enough make up air for all other gas appliances that may be located in the vicinity as well.

Venting :

Contaminated Make-up Air Will Damage the Unit

- Do not operate the combination Boiler in an area that is or will be under construction or renovation.
- Do not install the combination Boiler in an area with contaminated air (containing a high level of dust, sawdust, sand, flour, aerosols or any other such airborne contaminants) as those contaminants will cause operational problems.
- The Navien warranty will not cover damage caused to the unit due to installation in a contaminated environment.
- To minimize operational problems, direct venting (sealed combustion) must be used such that contaminant free combustion air will be supplied directly from outside. Even with direct venting, regular filter cleaning and maintenance is recommended for these types of environments.

Exhaust Gas Pipe Materials

- Venting requirements in USA and Canada are different. Please consult the chart below and the most recent edition of the National Fuel Gas Code (ANSI Z223.1 / NFPA 54) or CAN/CGA B-149.1 as well as local codes for applicable venting regulations and restrictions;
- All Navien Boilers are Category IV appliances;

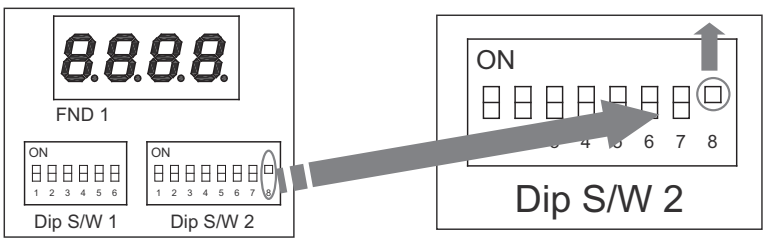
Navien Recommended Vent Materials Setting Temperature Under 140°F(60°C)	
USA	**CANADA**
PVC Schedule 40 CPVC Schedule 80 Approved Polypropylene	Type BH Special Gas Vent Class IIA (PVC) Type BH Special Gas Vent Class IIB (CPVC) Type BH Special Gas Vent Class IIC (Polypropylene)

Navien Recommended Vent Materials Setting Temperature Above 140°F(60°C)	
USA	**CANADA**
CPVC Schedule 80 Approved Polypropylene	Type BH Special Gas Vent Class IIB (CPVC) Type BH Special Gas Vent Class IIC (Polypropylene)

Warning: This combination water/space heater is factory set for return loop water temperature to be less than 140°F (60°C) and for use with SCH 40 PVC Vent.

If you requested higher than 140°F (60°C) return water back to combination boiler, you must set the Dip Switch as illustrated (Dip Switch No.2 and Bank #8 ON). Refer to Bottom Figure.

If this Dip Switch not in “ON” position, system will control and maintain flue temperature below 150°F (65°C) and hot water will not be above 140°F (60°C).



[DIP Switch Setting of High Temperature Applications]

IMPORTANT NOTE ON VENT MATERIAL SELECTION: When space heating loop water temperature sets below 140°F (60°C), this appliance has a built in PCB for Max 150°F (65°C) exhaust temperature as a result of this limited controlling, Exhaust temperature cannot be over a 150°F (65°C). Following this limited contol, Navien combination appliance can be vented with SCH40 PVC vent.

However, **IF** you set the space heating working fluid temperature higher than 140°F (60°C), In this situation you **MUST** use Schedule 80 CPVC or Approved Polypropylene (in the USA) or Type BH Special Gas Vent Class IIB (CPVC) or Class IIC (Polypropylene) approved to ULC-S636 (in Canada)

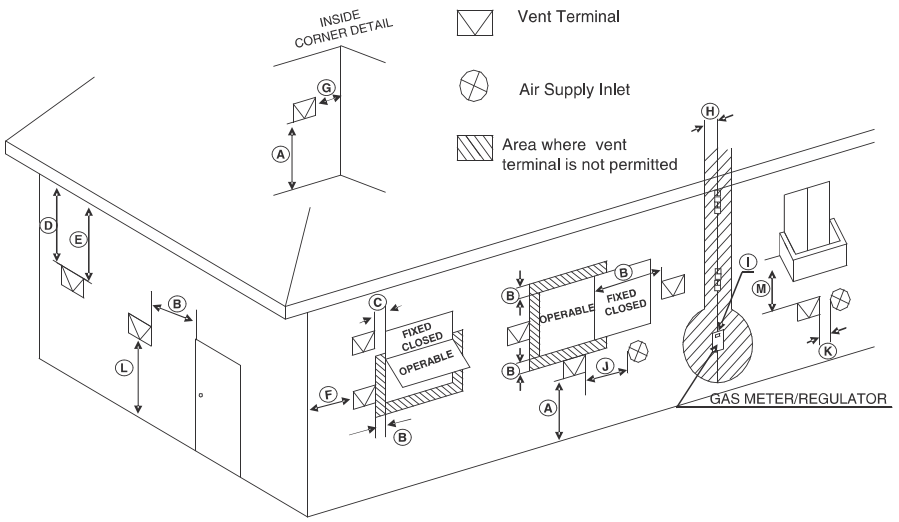
A New requirement for Canada

For installation in Canada, field supplied plastic vent piping must comply with CAN/CGA B149.1 (latest edition)and be certified to the Standard For Type BH Gas Venting Systems, ULC **S636** Components of this listed system shall not be interchanged with other vent systems or unlisted pipe/fittings. All plastic components and specified primers and glues of the certified vent system must be from a single system manufacturer and not intermixed with other system manufacturer's vent system parts.
The supplied vent connector and vent termination are certified as part of the Combination Water/Space Heater.

Venting Clearances:

All clearance requirements are in accordance with ANSI Z21.10.3 and the National Fuel Gas Code, ANSI Z223.1 / NFPA 54 and CGA B149.1 Natural Gas and Propane Installation Code.

ANSI Z233.1 / NFPA 54 and CGA B149.1 Natural Gas and Propane Installation Code.



	Clearance To:	US Direct Vent Indoor Installation	Canada Direct Vent Indoor Installation
A	Above grade, veranda, porch, deck or balcony	1'	1'
B	Window or door that may be opened	1'	3'
C	Permanently closed window	*	*
D	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet from the center of the terminal	*	*
E	Unventilated soffit	*	*
F	Outside corner	*	*
G	Inside corner	*	*
H	Each side of center line extended above meter/regulator assembly	*	3' within a height 15' above meter/regulator assembly
I	Service regulator vent outlet	*	3'
J	Non-mechanical air supply inlet or combustion air inlet to any other appliance	1'	3'
K	Mechanical air supply inlet	3' above if within 10' horizontally	6'
L	Above paved sidewalk or paved driveway located on public property	*	7'
M	Under veranda, porch, deck, or balcony	*	1'

Venting:

Allowable 3" Vent Lengths

MAX LENGTH	MAX # of ELBOWS	EQUIVALENT LENGTHS
100	6	Reduce the maximum vent length accordingly for each elbow used: Each 90˚ elbow equates to 6 linear feet of vent. Each 45˚ elbow equates to 3 linear feet of vent.
NOTE: The maximum lengths listed above are for the exhaust vent section only. The intake vent length can be of equal length. The Maximum Lengths listed does not include any elbows.		

Allowable 2" Venting

Navien does allow the reduction from 3” to 2” diameter venting up to 2,000 feet above sea level. Installations above 2,000 feet all require 3” venting.

MAX LENGTH	MAX # of ELBOWS	EQUIVALENT LENGTHS
24	2	Reduce the maximum vent length accordingly for each elbow used: Each 90˚ elbow equates to 6 linear feet of vent. Each 45˚ elbow equates to 3 linear feet of vent.
NOTE: The maximum lengths listed above are for the exhaust vent section only. The intake vent length can be of equal length. The Maximum Lengths listed does not include any elbows.		

When an existing boiler is removed from a common venting system, the common venting system is likely to be too large for proper venting of the appliances remaining connected to it.

Test Procedure to common vent system

1. Seal any unused openings in the common venting system.
2. Visually inspect the venting system for proper size and horizontal pitch and deter mine there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.
3. Insofar as is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliance not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhaust, so they will operate at maximum spped. Do not operate a summer exhaust fan. Close fireplace dampers.
4. Place in operatino the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.
5. Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match of candle, or smoke from a cigarette, cigar of pipe.
6. After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return door, windows, exhaust fans, fireplace dampers and any other gas burning appliance to their previous condition of use.

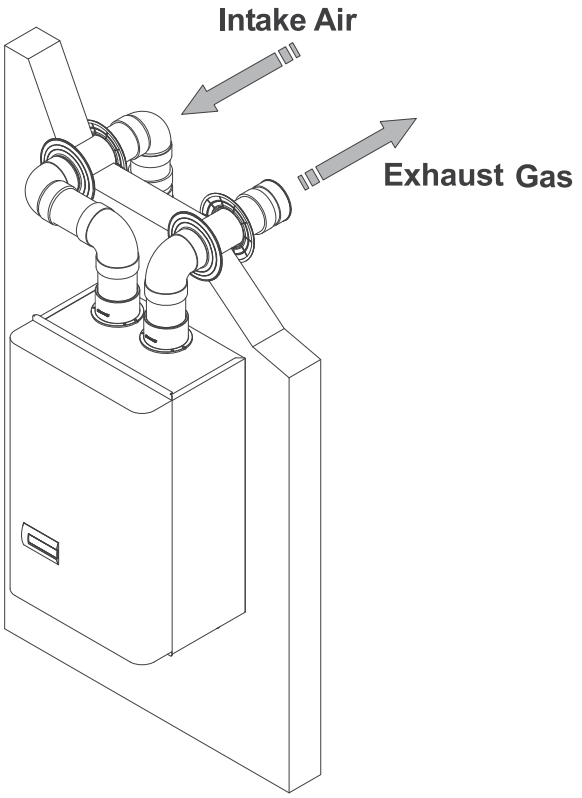
Venting:

7. Any improper operatino of the common venting system should be corrected so the installation conforms with the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/or CAN/CSA B149.1, Natrual Gas and Propane Installation Code, When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in Part 11 of the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/or CAN/CSA B149.1, Natural Gas and Propane Installation Code.

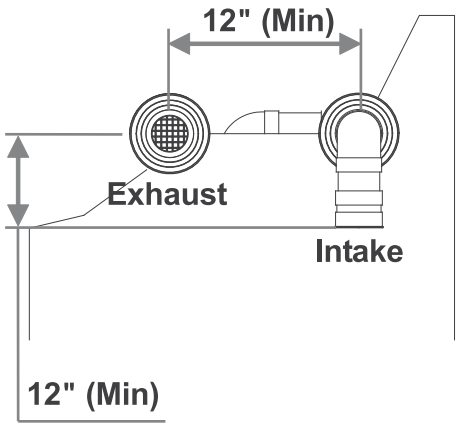
Vent Configuration Options:

The following diagrams represent some typical venting configurations and are included to assist you in designing your vent system. Possible configurations are not limited to these diagrams.

Option #1: 3" 2-pipe side wall vent



Interior View



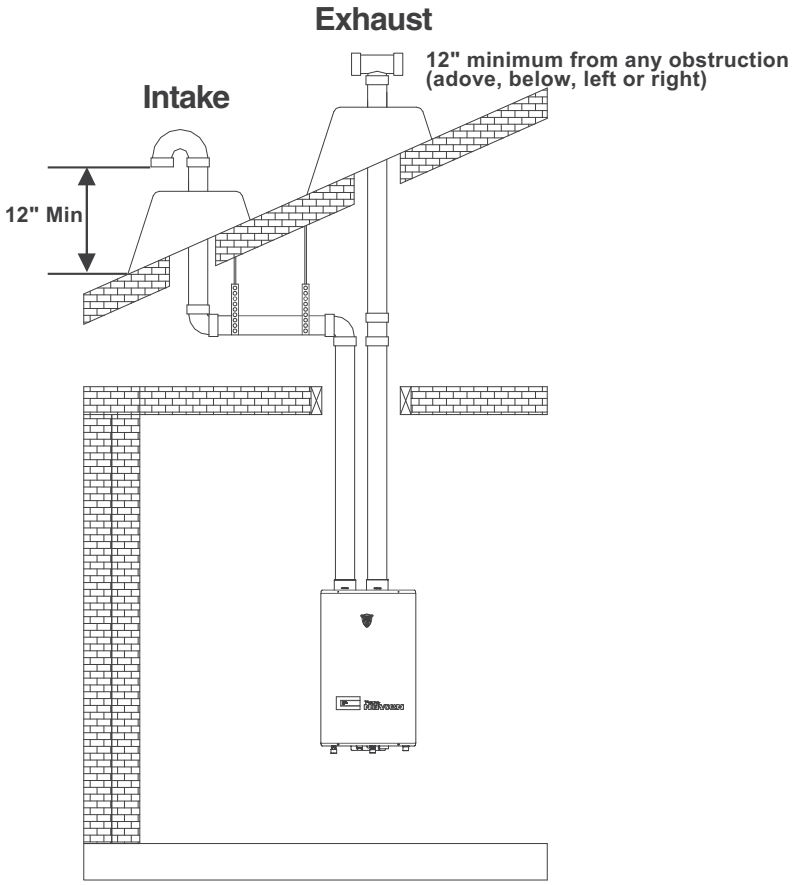
Exterior View

Option #2: Non-concentric venting through a side wall. Air is drawn from different location at a **minimum** of 12" from the termination. Please try to minimize the length of the intake air pipe length.

Venting:

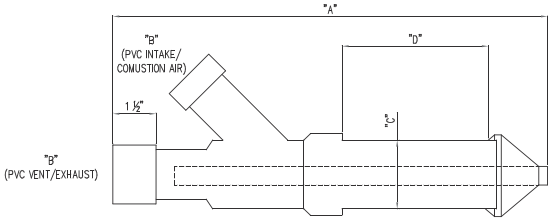
Option #3: 3" 2-Pipe Vertical Vent Termination

Where shown Tee as vent terminator is just an idea. Please find and use proper termintor Following each jurisdiction.



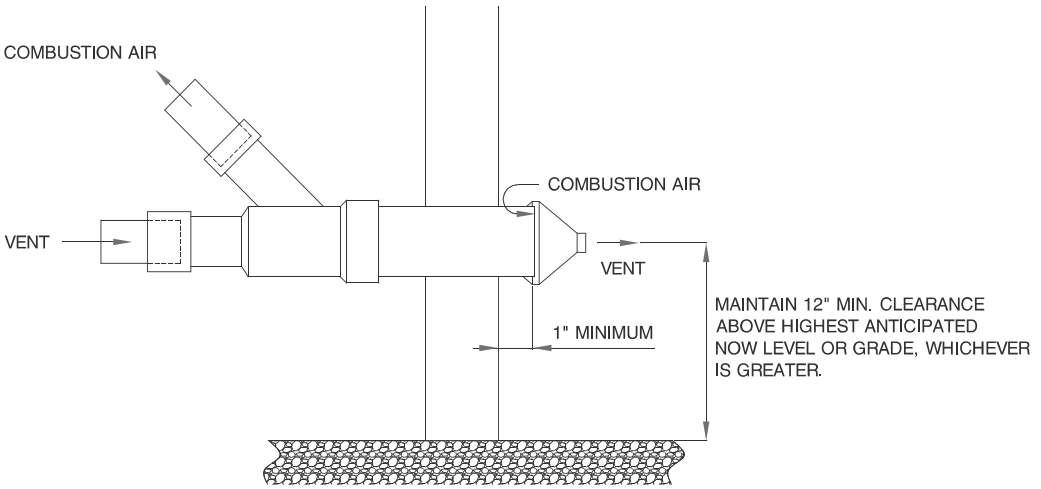
Venting:

CONCENTRIC VENT TERMINATION

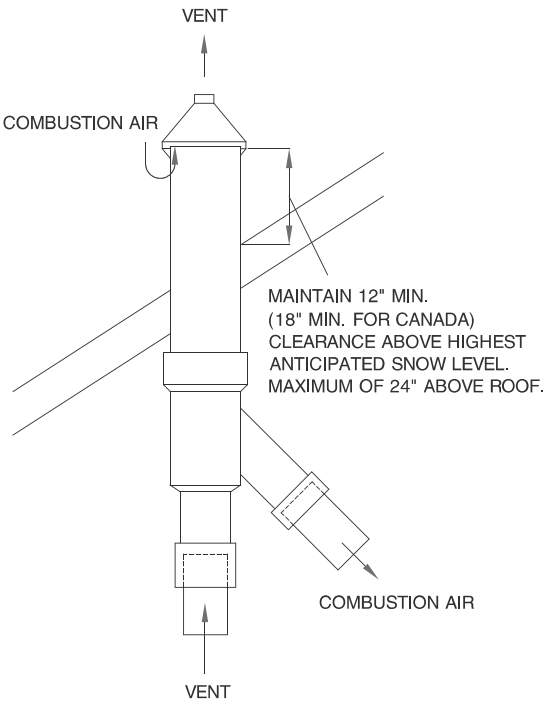


	"A"	"B"	"C"	"D"
DIMENSION	38- 7/8"	3"	4- 1/2"	21- 1/8"

1. Sidewall Installation



2. Roof Installation



⚠ WARNING

Read all safety warnings in the "User's Operation Manual". The additional safety issues outlined below must also be followed completely when installing this Navien Combination Boiler:

⚠ WARNING

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

- Vent terminal should not be pointing toward any opening of the building or windows. Do not install the Boiler in crevices to prevent gas from accumulating.
- Prevent debris, liquid or flammable gas from entering the Combination Boiler intake air pipe terminal. It may cause damage to the Combination Boiler and warranty will be avoided.
- Install the Combination Boiler outdoor under the overhang with 3 feet or more from the eaves to the top of the Combination Boiler vent terminal. Boiler must have open space around all 3 sides.
- Boiler vent terminal should be 1ft(united state)/3ft(Canada) or more from windows and doors.

Pressure Reducing Valve

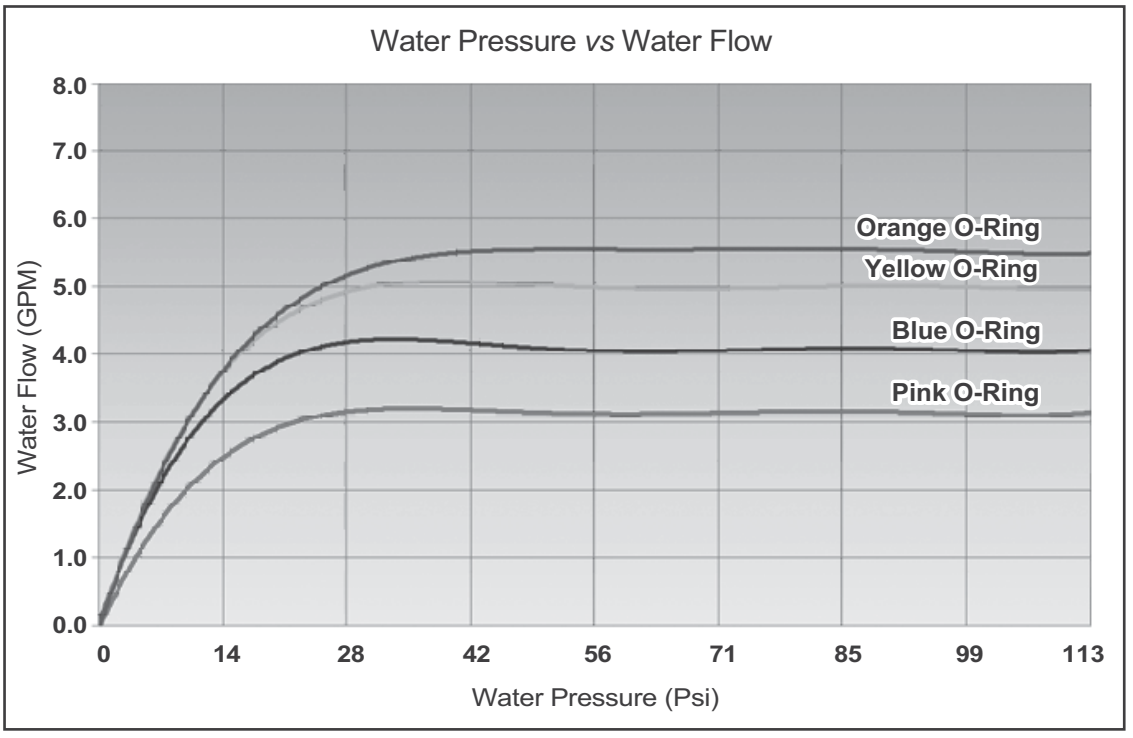
CAUTION

Please do not deliberately remove the pressure reducing valve installed in the body of DHW Cold Water Inlet Adapter. Please refer to the graph and change the Water Pressure Reducing valve for proper operation.

1. Included Accessories

No.	Part	Figure	Q'ty
1	Water Pressure Reducing Valve		3
2	Installation Manual	-	1

2. Characteristic curve of the Pressure Reducing Valve



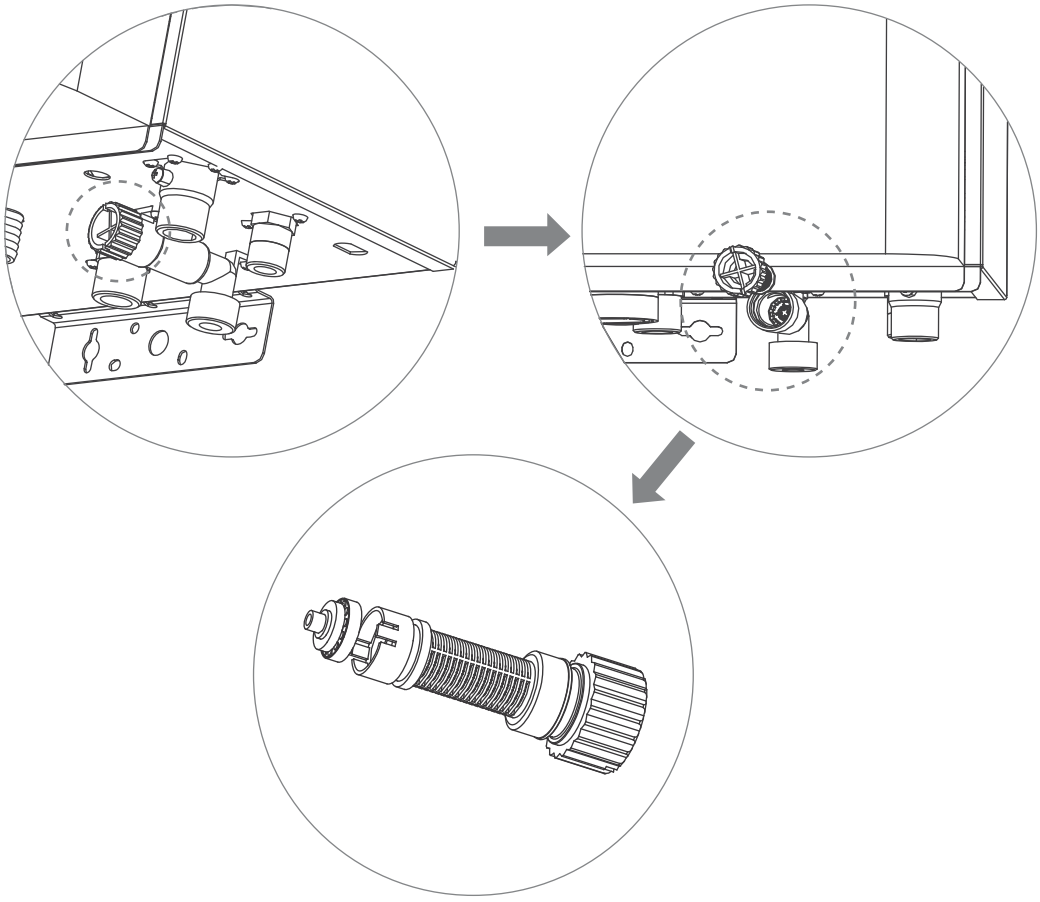
See graph above for the water flow(GPM) and water pressure(psi) to install the pressure reducing valve.

Pressure Reducing Valve

3. Installation Example

All CH models are shipped from the factory with a package of 3 flow regulators for use with various flow rates. Each included reducing valve (flow regulator) allows for a specific amount of water flow through the unit and is installed at the DHW cold water inlet adapter (the flow rate capacities were determined when tested with 56 psi water pressure from the factory). The ORANGE piece comes pre-installed on the CH-240 model and allows up to 5.6 GPM of flow. The YELLOW piece comes pre-installed with the CH-210 model and allows up to 5.0 GPM. The BLUE piece comes pre-installed with the CH-180 model and allows up to 4.0 GPM, The PINK piece allows up to 3.2 GPM.

4. Replace the Pressure Reducing Valve procedure



- ❑ Find water inlet adapter located on the bottom of the unit.
- ❑ Release inserted water inlet filter from water inlet adapter turning counterclockwise.
- ❑ Check the ass'y of water pressure reducing valve inside of water inlet adapter.
- ❑ Pull the ass'y of water pressure reducing valve out from water inlet adapter.

Outdoor Temperature Sensor (Optional):

Outdoor Temperature Sensor Installation

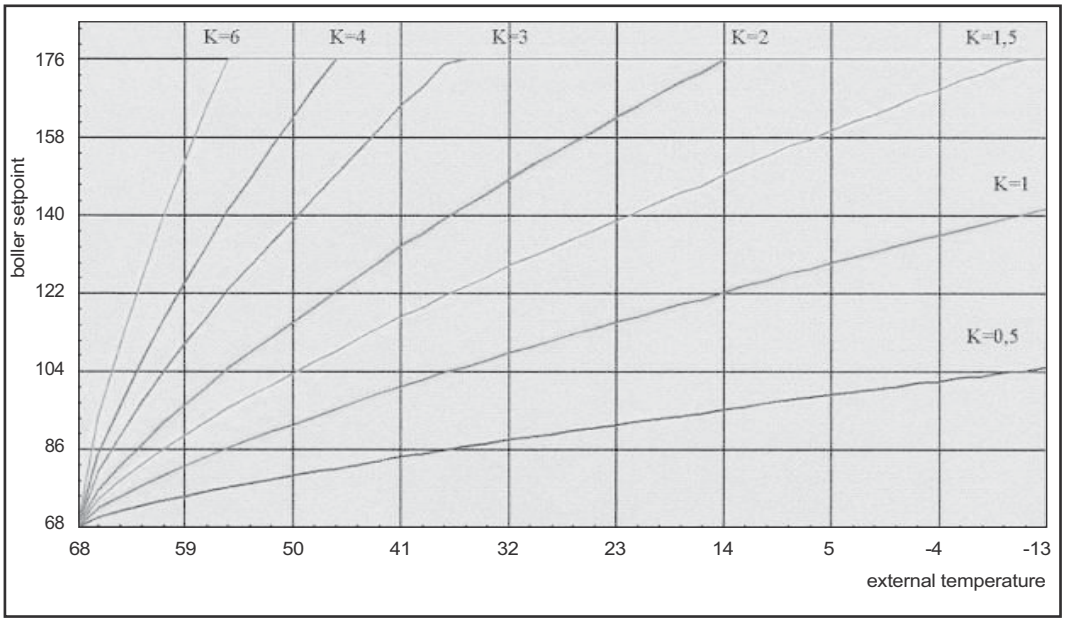
- ❑ Pull the terminal block out
- ❑ Attach the body to the wall with screws/anchors provided
- ❑ Run wire into the body through grommet opening
- ❑ Connect wires to the terminal block
- ❑ Reinstall the terminal block into the Attach the cap to the body
- ❑ Attach the cap to the body

Outdoor Temperature Sensor Installation Guidelines

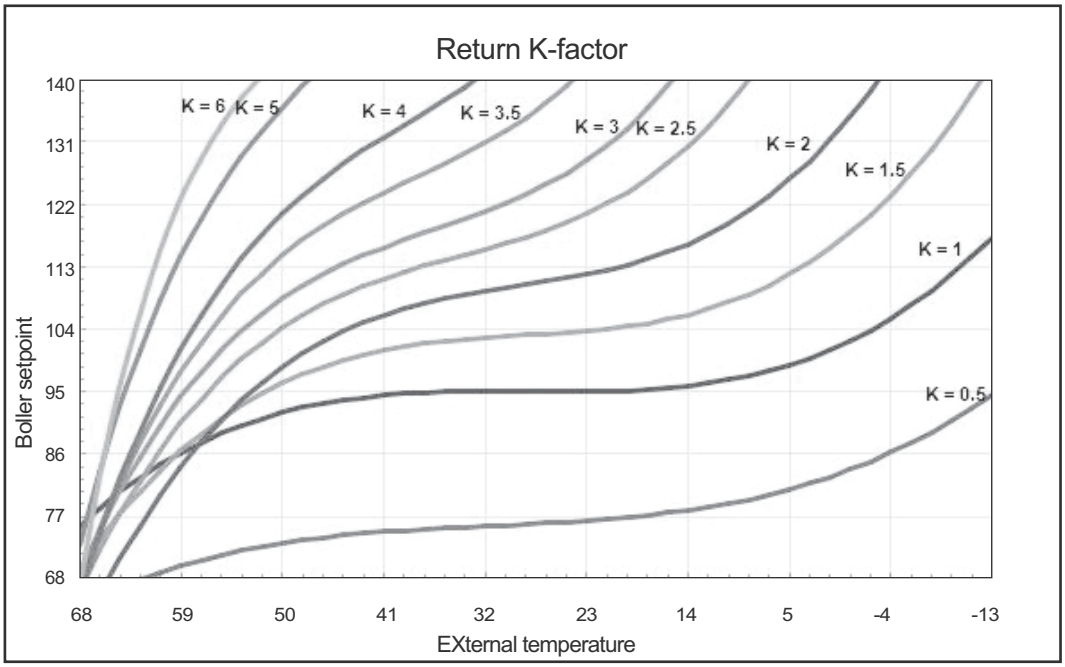
- ❑ Avoid areas with temperature fluctuations caused by direct sunlight, and not representative of true outdoor temperature.
- ❑ Best location is on North or Northeast side of structure under eave or shielded from direct sunlight.
- ❑ Avoid placing sensor in close proximity of heat sources that may affect correct temperature sensing. (fans, exhausts, vents, lights)
- ❑ Avoid placing sensor in area subjected to excessive moisture.
- ❑ Use 18 gauge wiring (thermostat wiring) with no splices. (except at unit harness connection with yellow leader wire)
- ❑ Caution should be taken to avoid potential electromagnetic interference (EMI) by routing separately from potential sources such as line voltage wiring. When necessary, shielded cable may be used.
- ❑ Make sure wiring connections are secure before closing the cap.
- ❑ References for the data and temperature of sensor are on the back of this page.
- ❑ The unit is a water resistant device, but any damage to the device may require replacing the entire component.

Outdoor Temperature Sensor (Optional):

K-Factor (Supply Temperature Setting)



K-Factor (Return Temperature Setting)



[Dip Switch #4 of 8 on]

DHW Heat Exchanger:

General Information

The DHW heat exchanger was tested and certified in accordance with IAPMO standard PS 92-2010. The DHW Heat exchanger is included in the boiler.

Water Quality

The water media pH value should be maintained at 7.4 (not less than 7.0 and no higher than 8.0) for proper heat exchanger life expectancy.

Freeze Protection

Navien recommends heat tracing and insulating DHW hot and DHW cold water pipes connecting units. Pipe cover enclosures may be packed with insulation for added freeze protection.

CAUTION

This information applies only to the DHW Piping Lines.

Running a low volume of water through the water heater to prevent freezing

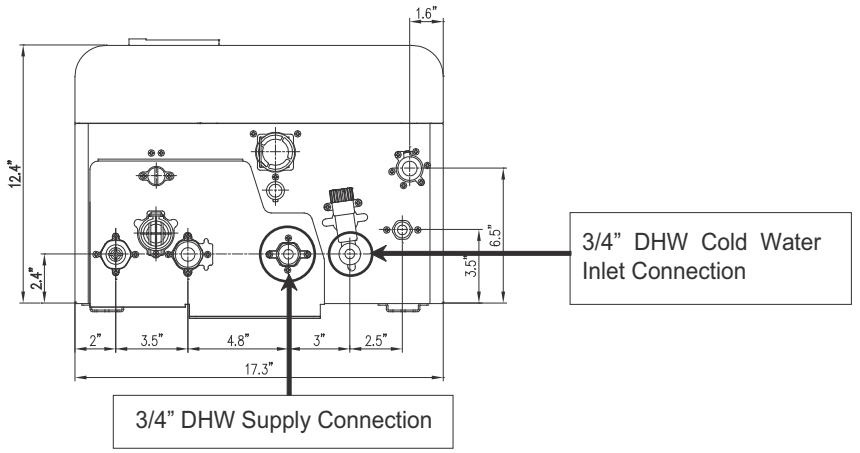
If the temperature exceeds the ability of the water / space heater to freeze protect itself, the following steps may prevent the water / space heater and external piping from freezing.

1) Turn off the water / space heater.
2) Close the gas supply valve.
3) Reduce the flow to about 0.1 gal/min or to where the stream is about 0.2” thick.

When the water heater or external piping has frozen

1) Do not operate the water / space heater if it or the external piping is frozen.
2) Close the gas and water valves and turn off the power.
3) Wait until the water thaws. Check by opening the water supply valve.
4) Check the water heater and the piping for leaks.

Navien recommended, When frozen pipes please contact the installer or Navien’s technical department toll-free at 1-800-519-8794



Electrical Connections:

WARNING

Follow the electrical code requirements of the local authority having jurisdiction. In the absence of such requirements, follow the latest edition of the National Electrical Code (NFPA 70) in the U.S. or the latest edition of CGA C22.1 Canadian Electrical Code - Part 1 in Canada.

Electric Wiring: Grounding and Surges

- All units come with a factory installed 3-pronged (grounded) plug end. The combination boiler can be plugged into any electrical outlet close to the unit as it requires only 2 Amperes. It is not necessary to run a dedicated electrical line to the combination boiler.
- If the local jurisdiction requires the unit to be wired directly, remove and discard the factory installed plug. An ON/OFF switch controlling the main power between the breaker and the Navien boiler should be provided to facilitate end-user maintenance and servicing.
- The combination boiler must be electrically grounded. Ensure the electrical receptacle, in which the boiler will be plugged into, is properly grounded; if wiring directly, does not attach the ground wire to either the gas or the water piping as plastic pipe or dielectric unions may isolate the boiler electrically.
- The use of a surge protector is recommended to protect from power surges.
- **Do not plug electrical power to the unit until all plumbing and gas piping is complete and the combination boiler has been filled with water.**
- The electrical supply required by the Boiler is 110~120VAC at 60Hz with a maximum 2A rating with proper grounding.
- **Do not connect 220~240VAC to this Navien Combination boiler. It will damage the combination boiler and this damage is not covered under warranty.**
- Do not disconnect the power supply when the unit is in normal operation.
- If there is a power failure in cold weather areas, the freeze prevention system in the boiler will not operate and may result in freezing of the heat exchanger; in cold weather areas where power failures are common, you must completely drain the unit to prevent damage if the power will be off for any extended period of time.
- A battery back-up (available at most computer retailers) may be used to supply hot water during periods of power outages.
- Damage caused by freezing is not covered under warranty.

CAUTION

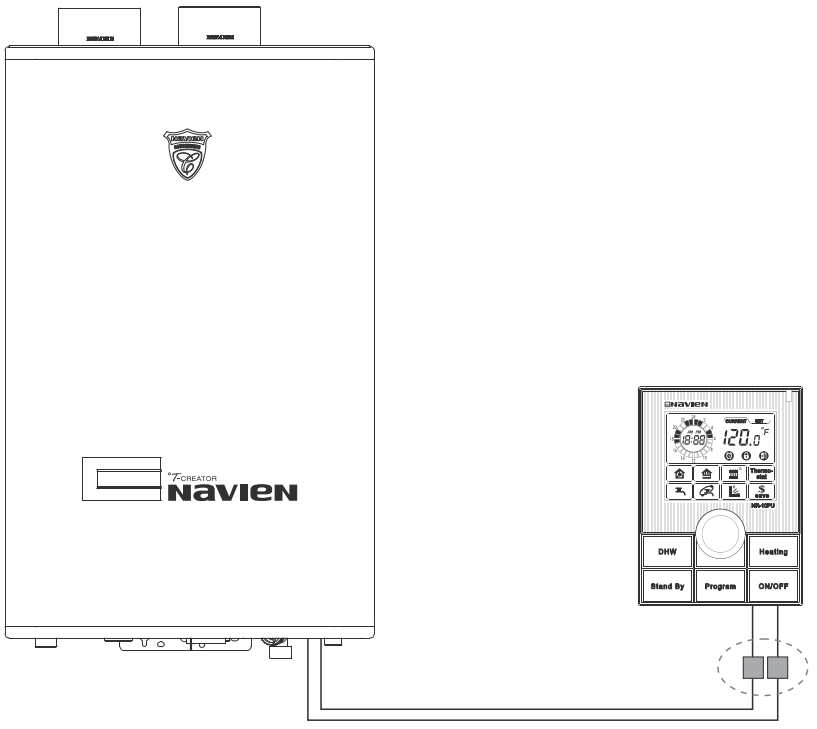
Label all wires prior to disconnection when servicing coltrols.
Wiring errors can cause improper and dangerous operation.
Verify proper opation after servicing.

Remote Controller Installation:

Remote Controller NR-10PU

The following are considerations for determining the location of the remote controller:

- ❑ Disconnect the power to the combination boiler before installing the remote controller.
- ❑ The wire on the reserve of a remote contoller is connected to the orange wire on the PCB board which is located on bottom of the combination boiler. The naked wire must be completely insulated after connection. **DO NOT** connect 110~120VAC to this remote controller.
- ❑ The maximum length of wire between the combination boiler and the remote controller installation location is limited to a maximum of 300 feet.
- ❑ There is no polarity.
- ❑ The remote controller is water resistant but not water proof.
- ❑ Do not install the remote controller outdoors.
- ❑ Do not install the remote controller in any area where the controller will be directly exposed to water, heat, humidity or steam.
- ❑ Place remote controller out of children's reach.
- ❑ Do not disassemble the remote controller.
- ❑ Feed the remote controller wire through the black rubber seal at the bottom, right hand, back corner of the case.



PCB Board Settings:

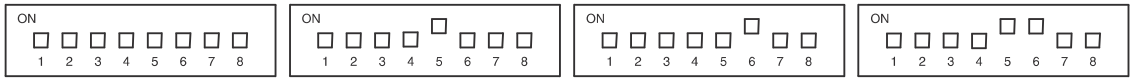
Combination Boiler Temperature Settings:

⚠ WARNING

Hot water temperatures over 125°F can cause severe burns instantly or death from scalding.

- With the Navien Combination Boiler, the temperature has been preset at the factory to 120˚C(49˚C) (Only DHW mode). The PCB board will electronically control this temperature. The output hot water temperature can be adjusted either manually using the PCB board's DIP switches or with the remote controller. Using the dipswitches, 4 hot water output temperature can be selected. Please refer to the chart below.
- Once the remote controller is **connected** to the combination Boiler, it overrides the PCB board dipswitch settings. If the remote controller is disconnected from the unit, the PCB board will automatically revert to the temperature indicated by the dipswitches. The PCB board does not store the remote controller's temperature in memory. As such, the remote controller must remain connected to the Boiler at all times to maintain any temperature other than the 4 presets.

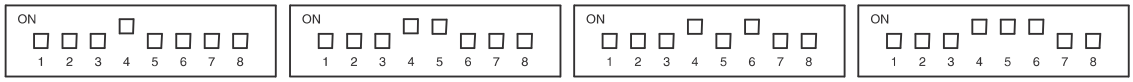
SUPPLY TEMPERATURE SETTING



120˚F | 140˚F | 160˚F | 180˚F

Warning: Only change relevant switches. DO NOT touch any other switches.

RETURN TEMPERATURE SETTING



95˚F | 110˚F | 125˚F | 140˚F

Warning: Only change relevant switches. DO NOT touch any other switches.

! NOTICE

The Factory default setting temperature 125˚F (51˚C) for Return control mode.

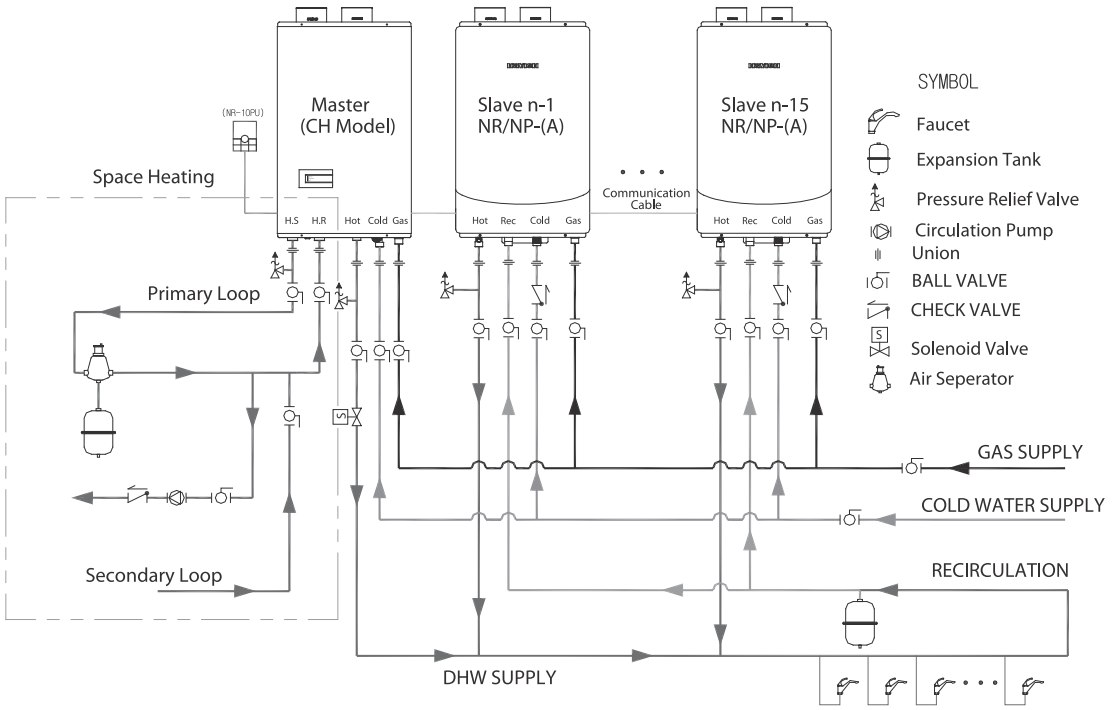
Cascade Connection and Set-up Procedures:

CAUTION

This drawing can be a useful guideline when installing a unit. However, installation may vary depending on the location circumstances, local building codes or state regulation. Make sure to check the local building codes and state regulation before installation, and comply with it.

1. Step 1: Plumbing

Only 1 Combination Boiler can be installed in a cascade system and it must be the master. The slave units can only be Navien NR-(A) or NP-(A) Water Heater. The maximum number of units per cascade is 16, supplying as much hot water as needed. (In case of cascade setting with CR/CC model, additional download is needed. In case of cascade setting with NP model, the maximum hot water temperature is limited to 140˚F)



- Install check valve in the “A” series cold water inlet for cascade system.
- When linking with CH series connect the solenoid valve wire to the external power wire of CH series.

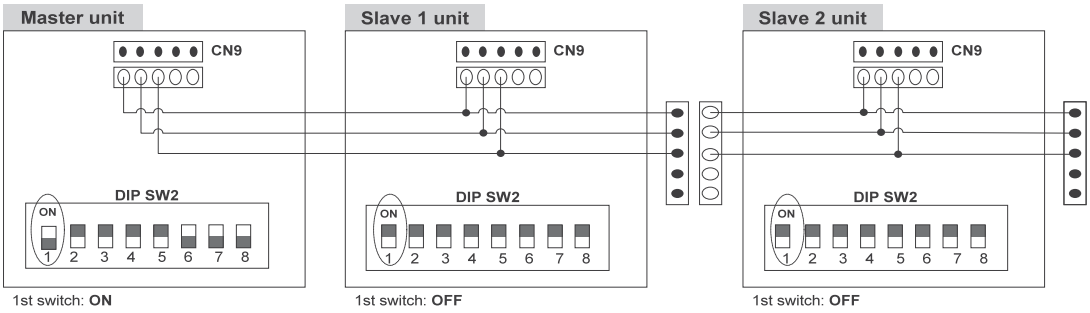
The trunk line should be sized properly to fit individual applications.
During step 1, the power supply should be OFF.
In case of installing solenoid valves to CH model pipes (supply hot water); the connection should be made to PCB board external power port. (refer to wiring diagram)

2. Step 2: Cable connection and DIP switch change

A multiple unit, which is composed of 1 combination Boiler and up to 15 Water Heater(NP Series), can be connected by using Naviens' Multi-Link communication cables inside.

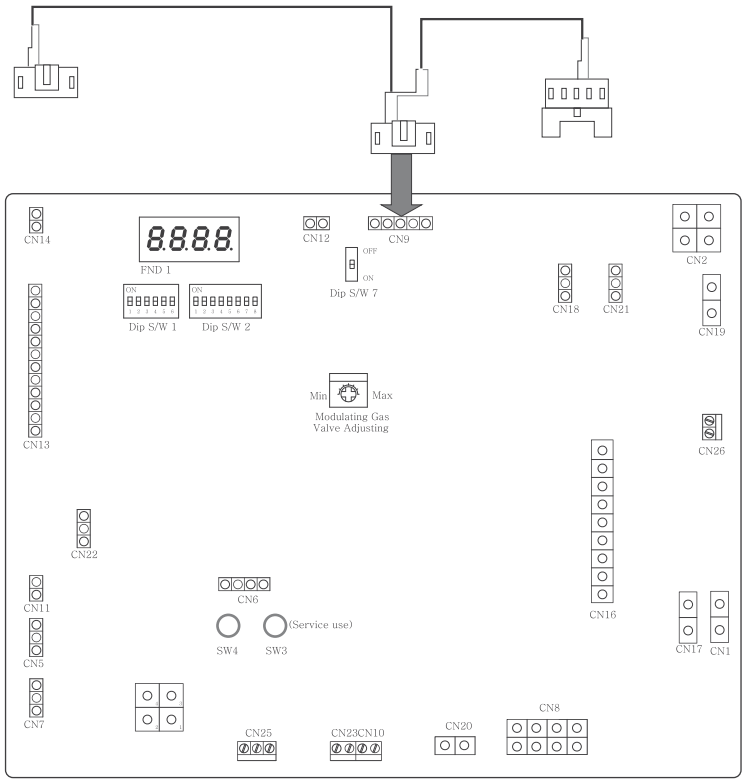
The combination Boiler shall be set as a master unit, which can be done by switching the 1st switch of DIP SW2 on. All Water Heater shall be set as slave units, which also can be done by switching the 1st switch of DIP SW2 off. (as shown in the figure below)

During step 2, the power supply should be OFF.

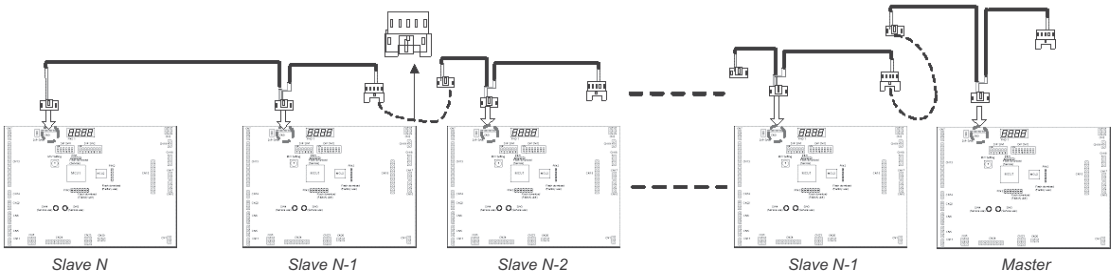


Cable connection and DIP switch set-up

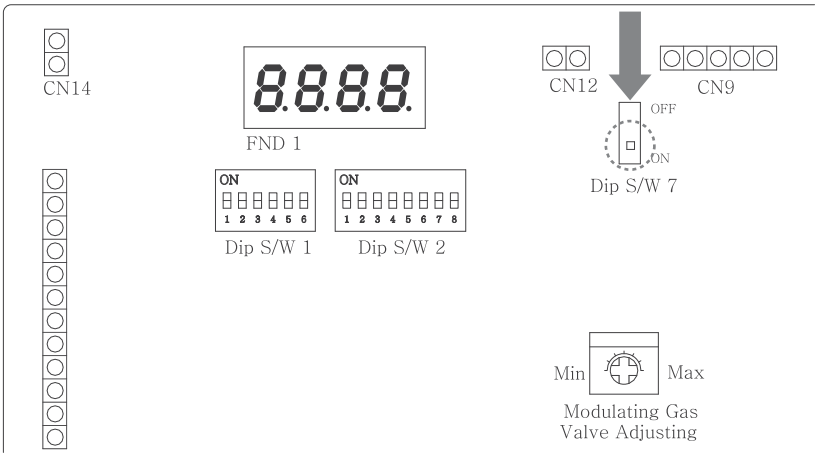
- cascade communication cable PCB connecting adapter PCB CN9 port.



- The diagram above displays the master unit and slave unit connected with the ready link communication cable.



- The recommended location for the master unit is in the center.
- The Dip SW7, which is used only for organizing cascade system. Be switches ON if the corresponding unit is the first or the last unit of cascade connection.



3. Step 3: Communication set-up

After the cable connections and DIP switches are set-up, the communication set-up should be done.

3.1 Master set-up

After the power ON, each FND1 will display on the PCB as below:

Unit	Master Unit	Slave 1 Unit	Slave 2 Unit
FND1	H.00.1.	S.000.	S.000.

FND1 display: Master set-up

3.2 Slave set-up

After the master set-up, push and hold the Tack SW3 and Tack SW4 of slave 1 unit simultaneously for 3 seconds.

FND1 of the slave 1 unit will read “S001”.
Slave 2 unit also can be set-up as above.
After the slave set-up, each FND1 will read as below:

Unit	Master Unit	Slave 1 Unit	Slave 2 Unit
FND1	H.0.0. 1.	S.0.0. 1.	S.0.0.2.

FND1 display : Slave set-up

3.3 Set-up finish

After the slave set-up, push and hold the Tack SW3 and Tack SW4 of the master unit simultaneously for 3 seconds.
All the FNDs will display the setting temperature and set-up procedures are finished.

4. Master unit Change

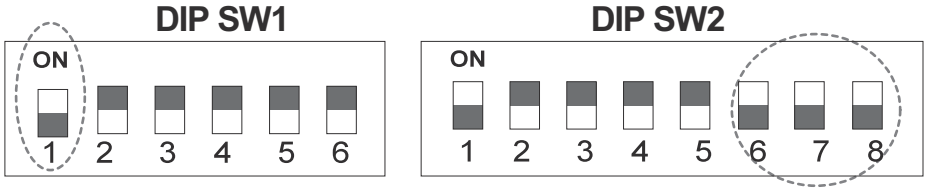
Because a multiple unit shall use only 1 combination boiler and the combination boiler shall be a master unit, it is impossible to change the master unit.

5. Slave unit Addition/Removal

It is always possible to add or remove the slave unit. After all unit power OFF, the communication cable is added or removed on the PCB according to slave unit addition or removal.
There are two cases for system set-up;
Master unit unchanged: In this case, it is necessary to change the processing mechanism of the master unit. The set-up procedures are as below: (**5.1 – 5.3**)

5.1 Master unit set-up

To add or remove the slave unit, DIP SW1 and SW2 of the master unit PCB are changed as below:



DIP Switch set-up of the master unit PCB: Slave unit addition/removal

#1 switch (DIP SW1) and #6-8 switches (DIP SW2) should be set to ON position.
After all unit power ON, push and hold the Tack SW3 and Tack SW4 of the master unit simultaneously for 3 seconds.
Each FND1 will display on the PCB as below:

Unit	Master Unit	Slave 1 Unit	Slave 2 Unit	Slave 3 Unit
FND1	H.0.0. 1.	S.0.0.0.	S.0.0.0.	S.0.0.0.

FND1 display: Master set-up (slave unit addition)

5.2 Slave unit set-up

This procedure is same as the 3.2 Slave set-up of Step 3: Communication set-up.
After the slave set-up, each FND1 will display on the PCB as below:

Unit	Master Unit	Slave 1 Unit	Slave 2 Unit	Slave 3 Unit
FND1	H.0.0. 1.	S.0.0. 1.	S.0.0.2.	S.0.0.3.

5.3 Set-up finish

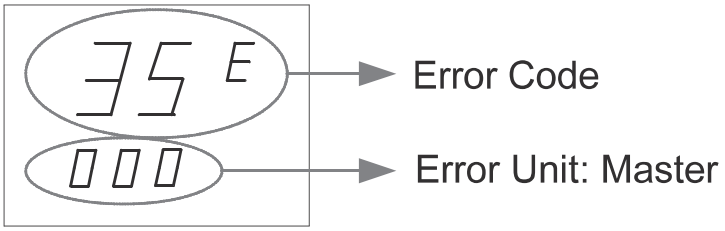
After the slave set-up, DIP SW1 and DIP SW2 should be set to the original position and push and hold the Tack SW3 and Tack SW4 of the master unit simultaneously for 3 seconds.
All the FND's will display the setting temperature and set-up procedures are finished.

6. Error display

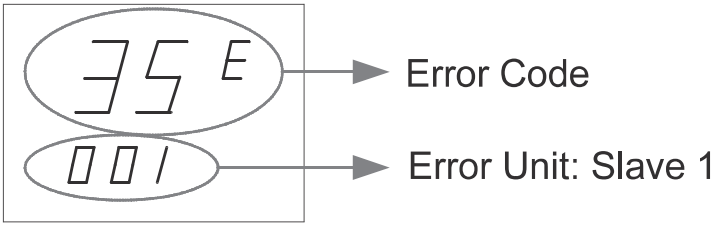
In case of the error condition in the cascade system, a relevant error and unit are displayed on the remote controller.
If a master unit is in DHW operation mode, instead of slave error code, the hot water temperature of the master unit is displayed.

Error display example:

1) Error code 35 of the master unit



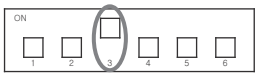
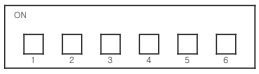
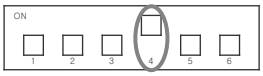
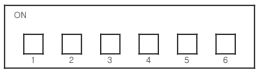
2) Error code 35 of the slave 1 unit



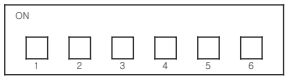
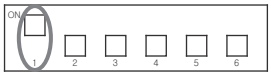
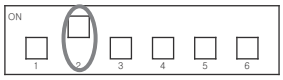
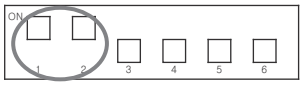
Combination Boiler DIP Switch Settings:

There are two sets of DIP switches; one set has 6 switches and the other has 8 switches.

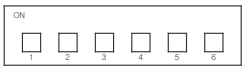
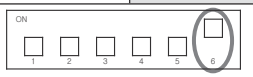
Set of Dip Switch #1. (6 Switches):

NO	Description		
	Function	ON	OFF
1	Operation Select 1	(1) Operation Mode Select	
2	Operation Select 2		
3	Gas Type Select	Liquid Propane Gas	Natural Gas
			
4	Vent Select	Cascade Individual Vent	Cascade Common Vent
			
5	Model Select 1	Factory Setting	
6	Model Select 2		

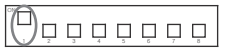
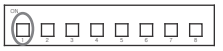
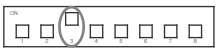
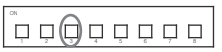
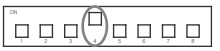
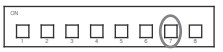
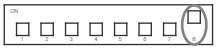
1 & 2: Burner Operation Mode Select (Do Not Used)

Operation Mode	DIP Switch	
	1	2
Normal Operation	**OFF**	**OFF**
		
Maximum Operation	**ON**	OFF
		
Minimum Operation	OFF	**ON**
		
3 Stage Minimum	**ON**	**ON**
		

#5 & 6: Model Selection (Do Not Used)

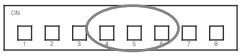
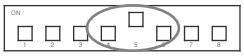
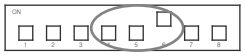
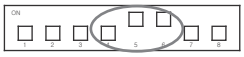
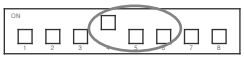
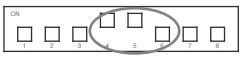
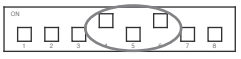
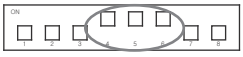
Model	DIP S/W	
	5	6
CH-180	OFF	OFF
		
CH-210	ON	OFF
		
CH-240	OFF	ON
		

Set of 8 Switches: Operation Mode Selection

DIP S/W No.	Description			
	Function		ON	OFF
1	Ready-Link Multi-System Select		Ready-Link Multi-System Master	Single Unit Operation
				
2	Hot Water Pre-heating Function	Using Remote Controller	Depends on the timer setting of Remote Controller	
		Non-Using Remote Controller	Using Hot Water Pre-heating Function	Non-Using Hot Water Pre-heating Function
				
3	External Thermostat Select	Using Remote Controller	Using External Thermostat	Non-Using External Thermostat
				
		Non-Using Remote Controller	Always Using External Thermostat	
4	Space Heating Temperature Control		Return Temperature Control	Supply Temperature Control
				
5	Space Heating Temperature 1		Refer to next page (#5 & 6)	
6	Space Heating Temperature 2			
7	DHW Temperature 1		**140A℉ (60℃)**	**120℉ (49℃)**
				
8	Heating Applications		High Temperature	Low Temperature
				

#4 & 5& 6 (Space Heating Used Only):

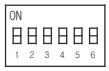
Supply / Return Temperature Selection

Temperature	DIP Switch		
	4	5	6
120℉(49℃)	OFF (Supply)	OFF	OFF
			
140℉(60℃)		ON	OFF
			
160℉(71℃)		OFF	ON
			
180℉(82℃)		ON	ON
			
95℉(35℃)	ON (Return)	OFF	OFF
			
110℉(43℃)		ON	OFF
			
125℉(51℃)		OFF	ON
			
140℉(60℃)		ON	ON
			

Dip Switch 7:

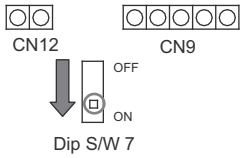
The dip switch 7, which is used only for organizing cascade system, be switched ON if the corresponding unit is the first or the last unit of cascade connection.

FND 1



Dip S/W 1

Dip S/W 2



Dip S/W 7

Installation Checklist:

❑ Selecting the location and installing the combination boiler:

- Are the proper clearances from windows, doors and other intake vents maintained?
- Is the distance between the combination boiler and point of vent termination minimized?
- Is distance between combination boiler and major fixtures within the house minimized?
- Are the proper service clearances maintained?
- Is the make-up air supply sufficient for proper operation of the combination boiler?
- Is the make-up air supply free of dust, dirt, corrosive elements and flammable vapors?
- Is there a drain in close proximity of the combination boiler?
- Are all combustible materials including clothing, cleaning materials, rags, etc. clear of the combination boiler and vent piping?
- Is the combination boiler securely mounted to the wall?

❑ Water Supply

- Is the water supply pressure sufficient (should be greater than 40psi)?
- Are there shut-off valves on the inlet and outlet to facilitate cold water inlet filter cleaning?
- Has the air been bled out of each fixture?
- Has each fixtures been checked to ensure hot water is being supplied?
- Has the cold inlet water filter been cleaned?
- If a recirculation line has been installed, have all of the hot water pipes and the recirculation return lines been insulated?

❑ Pressure Relief Valve

- Is there an approved pressure relief valve installed on the hot water outlet and space heating outlet?
- Does the rating plate on the pressure relief valve indicate a BTU level equal to the maximum BTU rating of the combination boiler?
- Is the pressure relief valve 1/2” on the hot water outlet?
- Is the pressure relief valve 3/4” on the space heating outlet?
- Has the pressure relief valve been installed on the hot outlet pipe and space heating outlet close to the exit of the combination boiler?
- Has a discharge drain tube been installed from the pressure relief valve to within 6~8” of the floor?

❑ Gas Supply

- Does the gas supply match the combination boiler’s gas type indicated on the rating plate?
- Is the gas line a minimum of 3/4” ID (inner diameter)?
- Is the gas supply line length and diameter sufficient to deliver the required BTUs?
- Has the gas supply line pressure been measured?
- Is the gas supply pressure sufficient for proper operation (within the ranges indicated in the specifications section of this manual)?
- Is the gas line equipped with a manual shut-off valve?
- Has the gas line been pressure tested and/or have all fittings been checked for leaks?
- Has the gas company inspected the installation (if required)?

❑ Venting

- Has the combination Boiler been vented with 3" PVC, CPVC, Polypropylene or BH Special Gas Vent (S636 PVC) for Category IV appliances or in accordance with this manual and/or your local code?
- Ensure that ABS cellular core or PVC cellular core pipe has not been used as venting for this boiler.
- Is the vent sloped upwards toward the vent terminal at a rate of 1/4" per foot (2% grade)?
- Are all vent runs properly supported?
- Has the vent terminal been properly supported?
- Have all air intake and exhaust joints from flue collar to termination been properly sealed?
- Have the vent end caps been installed on the exhaust and the intake pipes?
- Has the venting been checked for leakage?
- Is the vent terminal a minimum of 12" above the exterior grade?
- Has sufficient make-up air been supplied?
- Is the total vent length within the stated maximum vent length restriction?
- Has a condensation drain line been installed from the combination Boiler to a floor drain or laundry tub?

❑ Electrical Wiring

- Is the supplied voltage 110~120VAC?
- Is the combination boiler plugged into a properly grounded electrical outlet?
- If the supplied power cord has been discarded to meet local codes, has an “ON/OFF” switch been installed to facilitate end-user maintenance?

❑ DIP Switch Settings:

For the set of 6 DIP switches:

- Are switch #1 and #2 in the down (OFF) position?
- Is switch #3 properly set for the gas supply type?
- Is switch #4 properly set for the cacade vent type? (Individual vent or common vent)
- Are switch #5 and #6 set for the proper model number?

For the set of 8 DIP switches:

- Unless using quick link multi-system, is switch #1 in the down (OFF) position?
- When the Remote Controller is used, is switch #2 in the down (OFF) position?
- Is switch #2 in the down (OFF) position?
- Unless using Thermostat, is switch #3 in the down (OFF) position?
- Is switch #4 properly set for the Supply control or Return control mode?
- Are switches #5 and #6 set to the customer's desired CH temperature?
- Are switches #7 and #8 set to the customer's desired DHW temperature? Recommended temperature should not exceed 140°F.

❑ Final

- Has the owner been advised of the minimum flow rate to trigger the burner?
- Has the owner been shown how to clean the cold water inlet filter?
- Has the owner been left with the operation and installation manual for future reference?
- Has the owner been shown how to shut off the gas in case of an emergency?

Maintenance

Annual Maintenance and Inspection

IMPORTANT

This unit requires very little maintenance, however a qualified technicial should inspect it at the beginning of every heating season and/or when have a problem Unit.

❑ Make sure:

- The condensate freely flows from the unit, and is cleaned of sediment.
- Air Vent and/or Relief valves are not weeping.

- Low water cut off is flushed. (as applicable)
- Examine all venting, for evidence of leaks, and vent screens are cleaned.

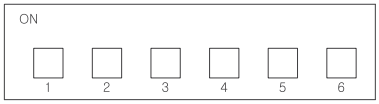
- Peridoic examination of venting systems. Ensure that no debris is in the entrance of inlet air pipe and no debris at the exhaust pipe.

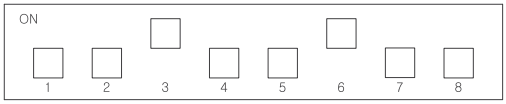
- Use a large bottle brush for cleaning flue gas passgeways.
- Peridoic cleaning of the condensate collection and disposal system(s). (as applicable) Every 6 months, pull off condensate hose and ensure no debris is in the hose.
- If you suspect the burners need cleaning, call a Navien-approved technician. Do not open the burner compartment.
- Peridoic visual check of burner flames through burner window. You should see 1/2"~ 3/4" blue flame.
- Keeping boiler area clear and free from combustable meterials, gasoline and other flammable vapors and liquids.
- No obstruction of combustion and ventilati on air. Keep objects and loose meterial away from vent inlet/exhausts.
- Ensure PVC venting and fittings are tight. If cracked or loose, replace fittings and apply proper silicone sealing.

Factory Default Setting of Dip Switch:

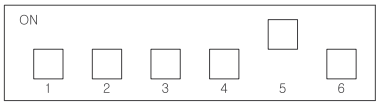
NG

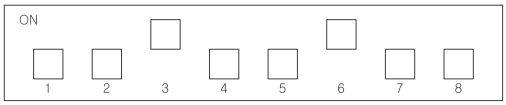
CH-180



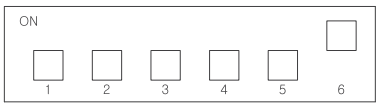


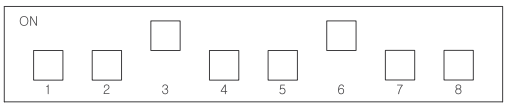
CH-210





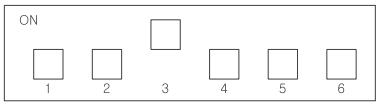
CH-240

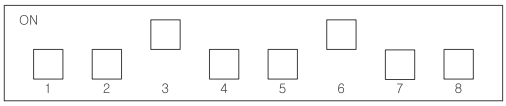




Propane

CH-180





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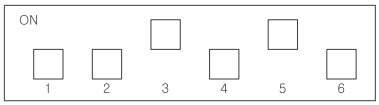

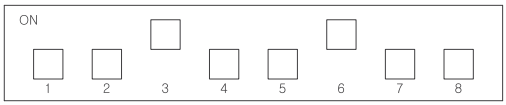

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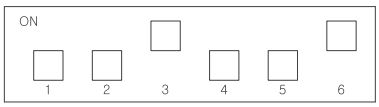
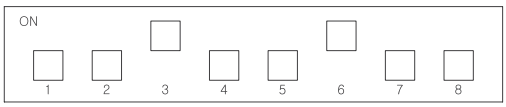


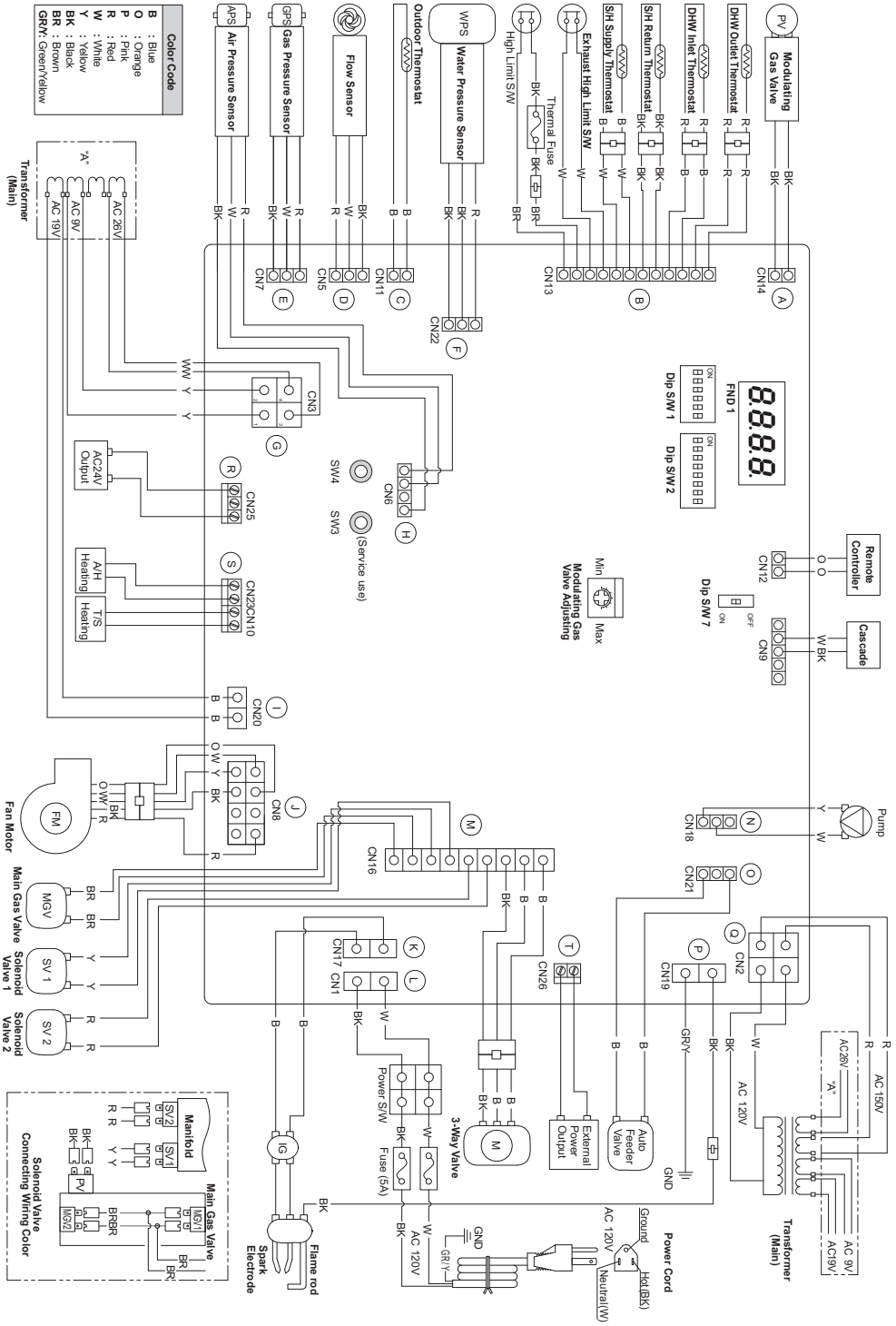


Completing the Install:

If you answered “yes” to all of the questions in the above checklist, your install is now complete. If you answered “no” to any of the points in the checklist, please review the installation and operation manuals to confirm your installation. For any troubleshooting issue, see the “Error Codes” section of the operating manual. For any questions or problems during the installation, contact Navien’s technical department toll-free at 1-800-519-8794 (949-420-0420) or visit the technical support section of the website at:

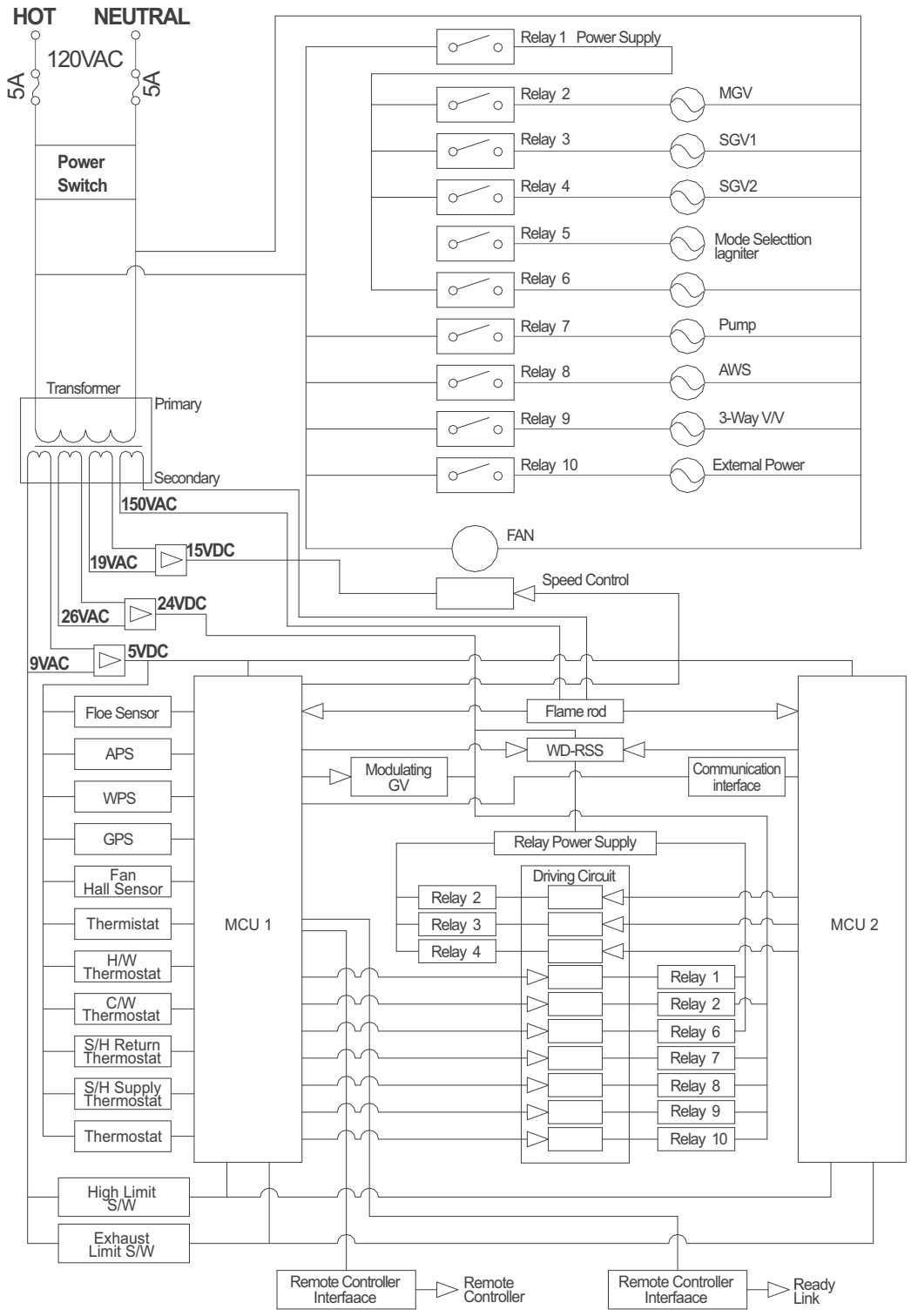
www.navienamerica.com

Wiring Diagram:



If any of the original wire as supplied with the combination boiler must be replaced, it must be replaced with its equivalent.

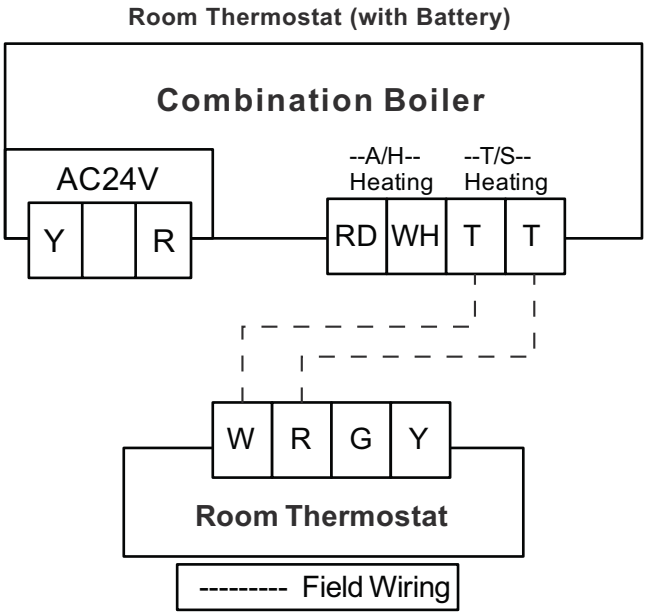
Ladder Diagram:



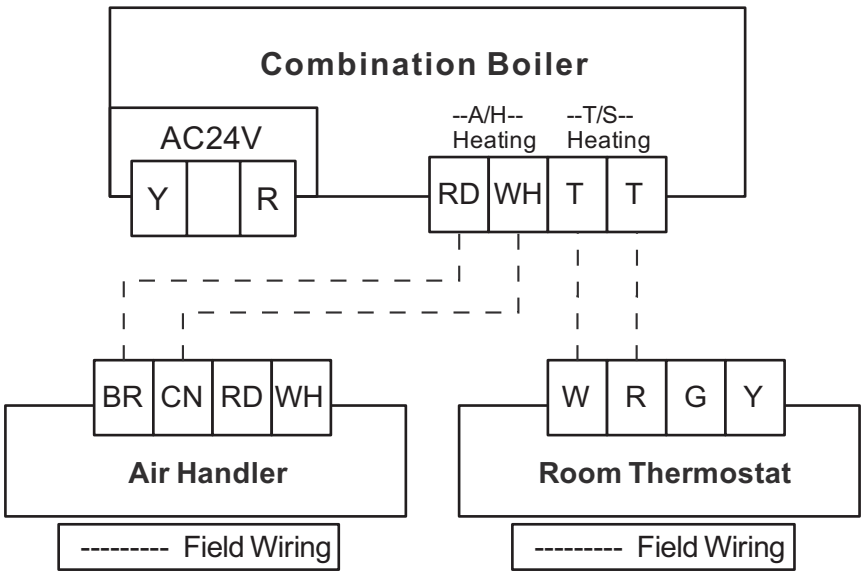
Wiring:

- The unit must be in OFF position before connecting the electrical wires.
- Make sure the circuit breaker on the distribution panel is OFF or ON/OFF switch in the Navien Combination Boiler is OFF.
- From the bottom of Navien combination boiler, connect the 120 VAC.
- When Room Thermostat needs external 24 VAC power, Navien Combination Boiler provides 24 VAC power for your convenience or having external 24 VAC transformer.
- Terminal for connecting Thermostat R and W not required any power.
- It works as contact point.
- It is advised that main supply voltage fluctuations are not to exceed 10 percent of the nominal supply voltage.
- It is specified that a switch or circuit-breaker shall be included in the building installation, it shall be in close proximity to the equipment, and it shall be marked as the disconnecting device for the equipment.
- It is required to have insulation for external circuits to conform to the requirements for protection against electric shock.
- It is required to have over current protection devices when installed indoors.

❑ **In-Floor Radiant Heating System and Baseboard Heating System**

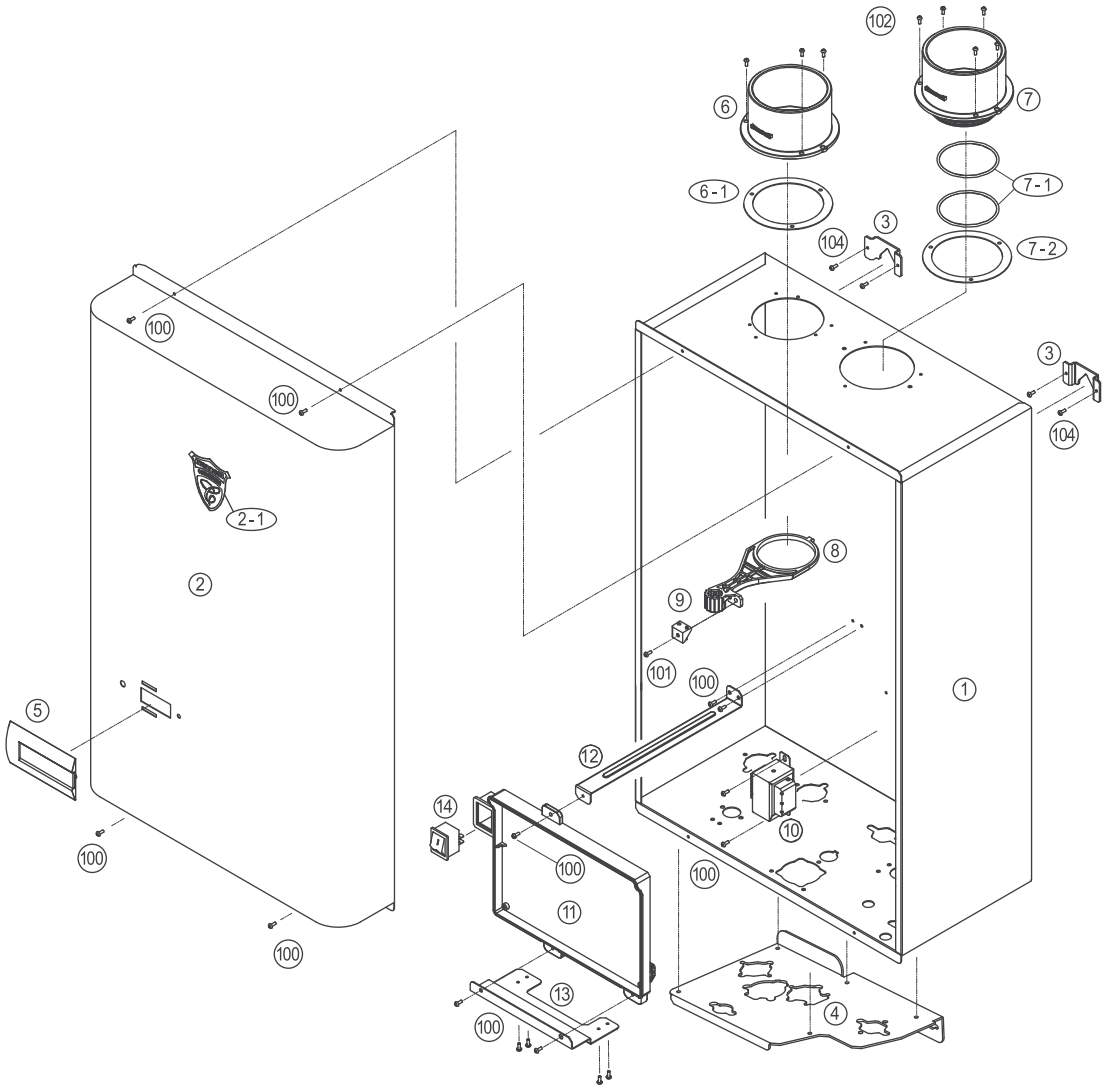


❑ **Fan-Assisted Hydro Heating System**



Components Diagram & Parts List:

1.1 Case Disassemble

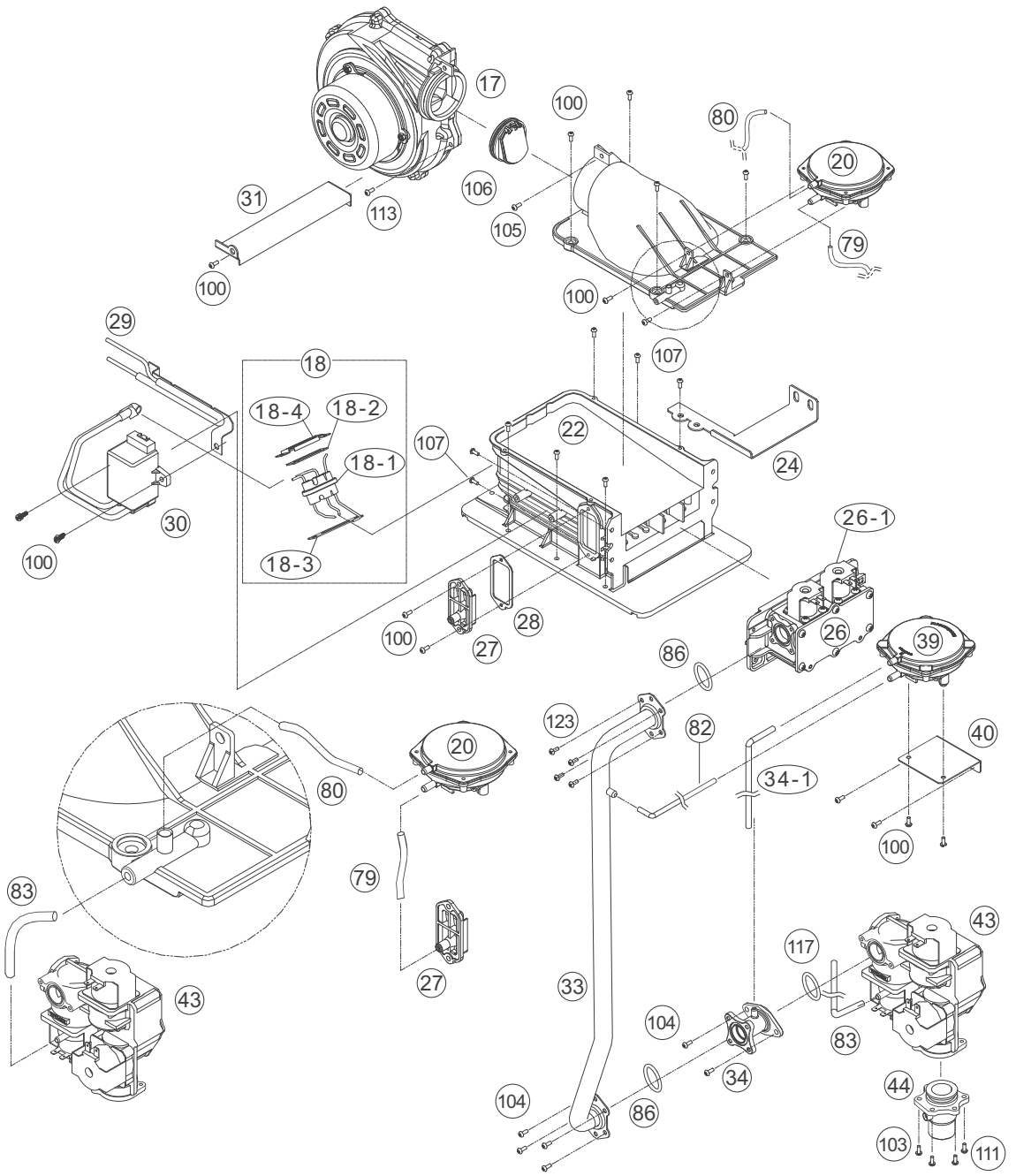


1-2. Case Part List

NO	Description	Navien Part No.	Remark
1	Case	BBK05011089	
2	Cover	BBR15012136	
2-1	Emblem	BH2603008A	
3	Case Upper Bracket	BH2505277A	
4	Case Lower Bracket	BBK05197001	
5	Deco	BH2602012A	Pressure Indicator
6	Intake Air Duct Ass'y	BH2505400B	
6-1	Intake Air Duck Packing	-	No.6 Ass'y
7	Exhaust Pipe Ass'y	BH2505401B	
7-1	Exhaust Pipe O-Ring	-	No.7 Ass'y
7-2	Exhaust Pipe Packing	-	No.7 Ass'y
8	Intake Air Filter	BH2505416A	
9	Intake Air Filter Support	BH2505417A	
10	Transformer	BH1205011A	
11	PCB Board	NACR1GS32301	
12	PCB Board Bracket(Upper)	BH2505413A	
13	PCB Board Bracket(Lower)	BH2505414A	
14	Power Switch	BH1426002A	
100	Screw D4 x 8L	BH1705007A	
101	Bolt M4 x 16L	BH1603009A	
102	Screw D4 x 12L	BH1612005A	
104	Bolt D4 x 10L (STS)	BH1611006A	

Components Diagram & Parts List:

2-1. Burner Disassemble



2-2. Burner Part List

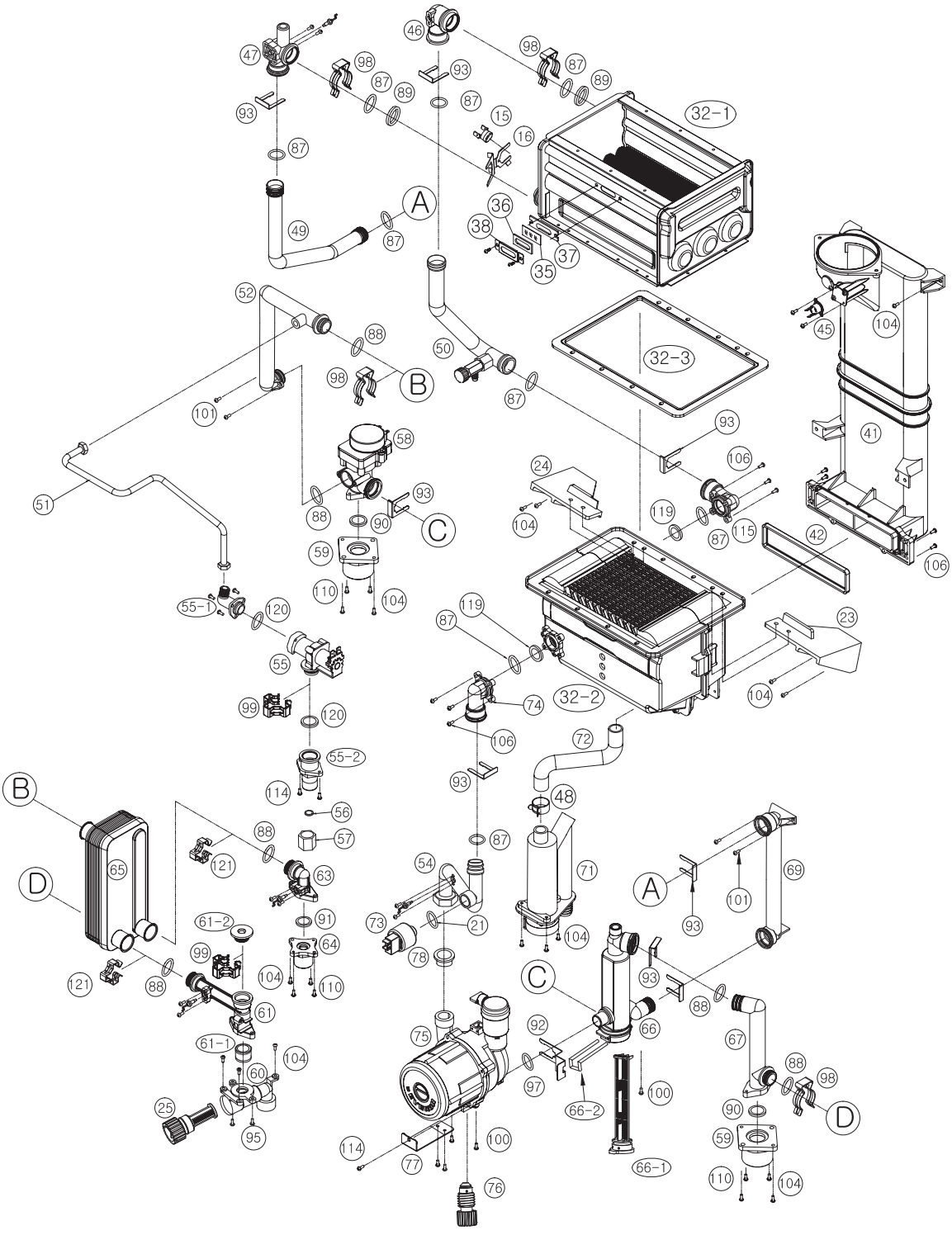
NO	Description	Navien Part No.	Remark
17	Fan Motor	NAFA9GSFB002	
18	Flame rod ass'y	PH1603058D	NG
		PH1603059D	LP
18-1	Flame rod	BH2501679A	NG
		BH2501680A	LP
18-2	Flame rod packing A	BH2505054A	
18-3	Flame rod packing B	BH2405051A	
18-4	Flame rod bracket	BH2505681A	
20	Air Pressure Sensor	NASS9EX00009	
22	Burner	PABNCW48KDBN_002	NG
		PABCR210/240ABN_002	LP
24	Burner Bracket (L)	BH2501444C	
26	Manifold	PABCC210AMF_001	NG
		PABCC210AMF_002	LP
26-1	Solenoid valve	PH0905028A	
27	APS venturi	BH2501413A	
28	APS venturi packing	BH2405031A	
29	Thermal fuse	BH1419013A	
30	Ignition transformer	BH1201045A	
31	Fan motor bracket	BH2501604A	
33	Gas Pipe	BH2546021A	NG
		BH2546025A	LP
34	GPS venturi	BH2507360B	NG
		BH2507422B	LP
34-1	GPS venturi tube	BH2203002A	
39	Gas pressure sensor	NASS9EXGPS01	
40	GPS bracket	BH2507346A	
43	Main gas valve	BH0901018A	
44	Gas inlet adapter	BH2507396A	
79	Tube	BH2202025A	

2-2. Burner Part List

NO	Description	Navien Part No.	Remark
80	Tube	BH2202024A	
82	Tube (550L)	BH2203001A	
83	Tube	BH2202041A	
86	O-Ring	BH2421008A	
100	Screw D4 × 8L	BH1705007A	
103	Screw D4 × 6L	BH1612004A	
104	Bolt D4 × 10L (STS)	BH1611006A	
105	Screw D4 × 14L	BH1701031A	
107	Screw D4 × 14L	BH1708006A	
111	Bolt M4 × 12L (STS)	BH1603007A	
113	Screw D4 × 25L	BH1701030A	
116	Fan Motor Damper	BH2505403B	
117	O-Ring	BH2421003A	
123	Screw D4 × 4L	BH1710001A	

Components Diagram & Parts List:

3-1. Water Way Disassemble



3-2. Water Way Part List

NO	Description	Navien Part No.	Remark
15	High Limit Switch	BH1401022A	
16	High Limit Switch Bracket	BH2501541A	
21	WPS Packing	BH2406054A	
23	H/E Bracket R	BH2501704A	
24	H/E Bracket L	BH2501703A	
25	Inlet Water Filter	BH1303035A	
32	Heat Exchanger Ass'y	BBM20341022	
41	Exhaust Duct	BH2544007D	
42	Exhaust Duct Packing	BH2406050A	
45	Exhaust Limit Switch	BH1401027A	
46	Primary H/E Inlet Adapter	BH2507645A	
47	Primary H/E Outlet Adapter	BH2507640A	
49	H/E Outlet Pipe	BH2507654A	
50	H/E Middle Pipe	PACCONNECTING-T_001	
51	Auto Feeder Pipe	BH2507552A	
52	SPH Inlet Pipe	PACINLET-T_002	
54	H/E Inlet Pipe	PACINLET-T_001	
55	Auto Feeder Valve	30005993C	
56	Auto Feeder Packing	BH2406063A	
57	Auto Feeder Cover	BH0712006A	
58	3-Way Valve	AAVC9EX00018	
59	S/H Return Adapter	BH2507639A	
60	DHW Inlet Adapter	30010315A, 30010316A, 30010317A	
61	DHW Flow Sensor	BH1406005A	
63	DHW Outlet Pipe Ass'y	BH2507641A	
64	DHW Outlet Adapter	BH2507642A	
65	DHW Heat Exchanger	PAS40KHE_004	
66	S/H Strainer	BH1301020B	
67	S/H Return Pipe	PACRETURN-T_001	
69	S/H Pipe	PACSUPPLY-T_002	
71	Siphon	BH2501442C	
72	Siphon Hose	BH2204047A	

NO	Description	Navien Part No.	Remark
73	Water Pressure Sensor	BH2507535A	
74	Secondary H/E Inlet Adapter	BH2507646A	
75	Circulation Pump	NAPU9GLPCT10	
76	Drain Coke	BH2505314A	
77	Pump Bracket	BH2501447A	
78	Pump Packing	BH2406039A	
81	Fastener C	BH2507018B	
87	O-Ring (φ17.5x2.7t)	BH2423055A	
88	O-Ring (P16)	BH2423053A	
89	Back-up Ring	BH2507308A	
90	Packing Ring (3/4”)	BH2406025A	
92	Pump Fastener	BH2507445A	
93	Clip A	BH2507013A	
94	Clip C	BH2507345A	
95	Screw D4 x 16L	BH1708004A	
97	O-Ring (φ24.8x φ17.8t)	BH2423058A	
98	Fastener B	BH2507016A	
99	Fastener D	BH2507402B	
100	Screw D4 x 8L	BH1705007A	
101	Bolt M4 x 16L	BH1603009A	
104	Bolt D4 x 10L (STS)	BH1611006A	
106	Bolt M4 x 12L	BH1612007A	
110	Screw D4 x 14L	BH1701003A	
114	Bolt M4 x 8L	BH1603015A	
119	H/E Packing	BH2406048A	
120	O-Ring (P16)	BH2422017A	
121	Fastener A	BH2507400B	
-	CH-240-ASME Relief Valve	BH0916001A	

Memo

Memo

Memo

Memo

Memo

Condensing

NAVIEN

Navigating Energy and Environment

Navien Gas Combination Boiler

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Version : 4.01(Dec. 27. 12)

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