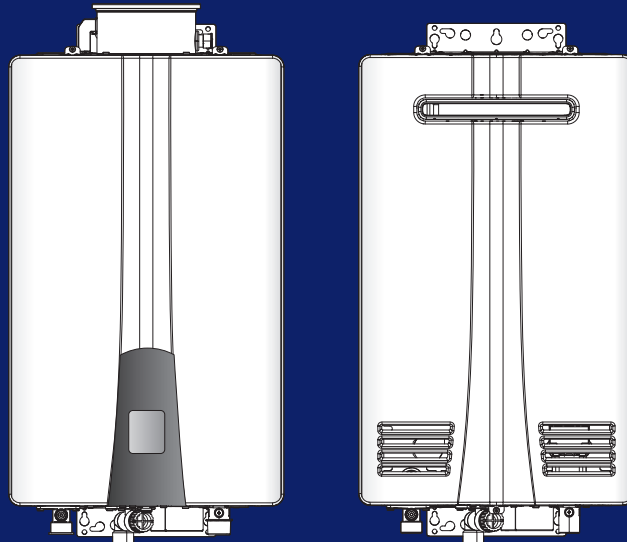


Installation & Operation Manual

NPN Non-Condensing Water Heaters

Model
NPN-160U
NPN-180U
NPN-199U
NPN-160E
NPN-180E
NPN-199E



* Lead Free

Keep this manual near this water heater for future reference whenever maintenance or service is required.

* The wetted surface of this product contacted by consumable water contains less than one quarter of one percent (0.25%) of lead by weight.



WARNING

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

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

What to do if you smell gas

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

Installation and service must be performed by a qualified installer, service agency or the gas supplier.

The installation must conform with local codes or, in the absence of local codes, the National Fuel Gas Code, ANSIZ223.1/NFPA 54.

When applicable, the installation must conform with the Manufactured Home Construction and Safety Standard, Title 24 CFR, Part 3280.

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1. Safety Information

The following safety symbols are used in this manual. Read and follow all safety instructions in this manual precisely to avoid unsafe operating conditions, fire, explosion, property damage, personal injury, or death.

DANGER

Indicates an imminently hazardous situation which, if not avoided, could result in severe injury or death.

WARNING

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

CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in property damage.

DANGER



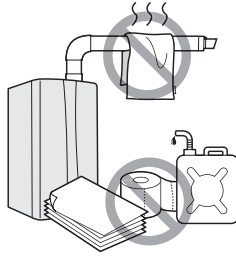
If you smell gas:

- Do not try to light any appliance.
- Do not touch any electrical switches or use landline phones.
- From a neighbor's phone, call your gas provider and follow their instructions.
- If you cannot reach your gas provider, call the fire department.

Do not use or store flammable products, such as gasoline, solvents, or adhesives in the same room or area as the water heater.

- The water heater has a main burner flame that can turn on at any time and can ignite flammable vapors. Vapors from flammable liquids can explode and catch fire, causing death or severe burns.
- Vapors cannot be seen and are heavier than air. They can travel long distances along the ground and can be carried from other rooms to the water heater's main burner flame by air current.
- Keep all flammable products far away from the water heater and store them in approved containers. Keep the containers closed tightly and out of the reach of children and pets.

 **WARNING**



- **Do not store or use gasoline or other flammable liquids near this water heater.**
Doing so may result in fire or explosion.
- **Do not place combustibles, such as newspapers or laundry, near the water heater or venting system.**
Doing so may result in a fire.
- **Do not place or use hair sprays, spray paints, or any other compressed gases near the water heater or venting system, including the vent termination.**
Doing so may result in fire or explosion.
- **Do not remove the front cover unless the power to the water heater is turned off or disconnected.**
Failure to do so may result in electric shock.
- **Do not operate the water heater with the front cover opened.**
Doing so may result in fire or carbon monoxide (CO) poisoning, which may result in property damage, personal injury, or death.
- **Do not operate this water heater without proper venting.**
Doing so may result in fire or carbon monoxide (CO) poisoning, which may result in property damage, personal injury, or death.
- **Do not touch the power cord or internal components of the water heater with wet hands.**
Doing so may result in electric shock.

 **CAUTION**

- **Do not turn on the water heater unless the water and gas supplies are fully opened.**
Doing so may damage the water heater.
- **Do not turn on the water if the cold water supply shut-off valve is closed.**
Doing so may damage the water heater.
- **Do not use this water heater for anything other than its intended purpose, as described in this manual.**
- **When servicing the controls, label all wires prior to disconnecting them.**
Failure to do so may result in wiring errors, which can lead to improper or dangerous operation. Verify proper operation after servicing.
- **Do not use unapproved replacement or accessory parts.**
Doing so may result in improper or dangerous operation and will void the manufacturer's warranty.
- **Do not place anything in or around the vent terminals, such as a clothes line, that could obstruct the air flow in or out of the water heater.**
- **This water heater has been approved for use in the USA only.**
Using the water heater in any other country will void the manufacturer's warranty.

California law requires the following Prop 65 warning to be provided:

 **WARNING**

This product can expose you to chemicals including lead, lead compounds, and carbon bisulfide which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov.

! DANGER



To prevent burns:

- Use the lowest operating temperature setting necessary to provide comfortably-hot water.
- If your household has children or elderly or disabled residents, using a lower temperature setting is recommended.
- Do not leave children, the elderly, or disabled persons unsupervised.
- Do not allow small children to play unsupervised in the bathroom.
- Do not allow anyone to change the water temperature while hot water is running.
- Read all the instructions in this manual carefully before changing the temperature setting.
- Feel the water before using it on children, the elderly, or the disabled.
- If it is necessary to set the water temperature above 125°F (52°C), consider installing a thermostatically-controlled mixing valve or temperature-limiting valve. Contact a licensed plumber or your local plumbing authority for more information.

! DANGER


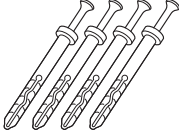
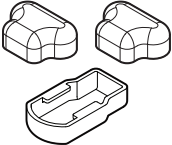

This water heater's water temperature is set to 120°F (49°C) at the factory for your safety and comfort. Increasing the temperature increases the risk of accidental scalding. Water temperatures at or above 125°F (52°C) can cause instant scalding, severe burns, or death. Before you decide to change the temperature setting, read the following charts carefully.

Water Temperature	Time in which a young child can suffer a full thickness (3rd degree) burn
160°F (70°C)	Less than 1 second
140°F (60°C)	1 second
130°F (55°C)	10 seconds
120°F (49°C)	10 minutes
100°F (37°C)	very low scald risk

2. About the Water Heater


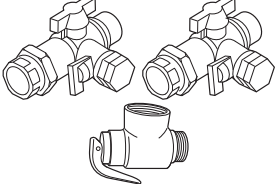
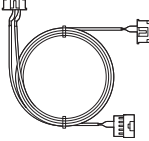
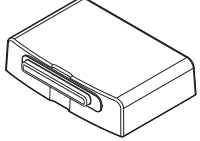

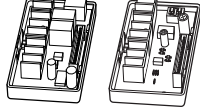

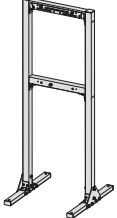
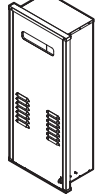
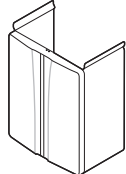

2.1 Items Included

When you open the box, you will find the following items with the water heater. Check the box for each of the following items before installing the water heater.

	
<p>Installation & Operation Manual, User's Information Manual</p>	<p>Tapping Screws & Anchors</p>
	
<p>Front Cover Caps</p>	<p>Remote Controller (outdoor models only)</p>

2.2 Accessories

The following optional accessories are available for the water heater:

	
<p>Remote Controller (indoor models only)</p>	<p>Plumb Easy Valve Set with Pressure Relief Valve</p>
	
<p>Ready-Link Communication Cable</p>	<p>Outdoor Vent Kit (indoor models only)</p>
	
<p>External Pump Connector (<150W, 1.5A)</p>	<p>Navien HotButton Kit / H2Air Add-on Controller Kit</p>
	
<p>Navi-Link (Wi-Fi Control System)</p>	<p>Ready-Link Rack</p>
	
<p>Recess Box (outdoor models only)</p>	<p>Pipe Cover</p>
	
<p>Gas Conversion Kit</p>	

2.3 Specifications

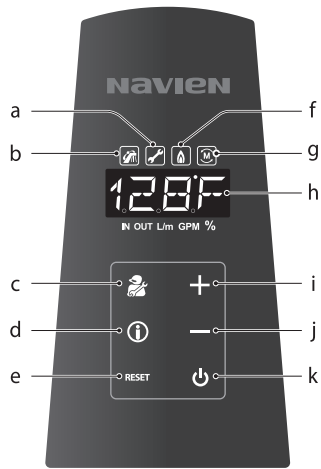
The following table lists the specifications for the water heater. Additional specifications about water, gas, electric, and air supplies (venting) appear in the Installation section.

Item		Universal			Outdoor		
		NPN-160U-NG NPN-160U-LP	NPN-180U-NG NPN-180U-LP	NPN-199U-NG NPN-199U-LP	NPN-160E-NG NPN-160E-LP	NPN-180E-NG NPN-180E-LP	NPN-199E-NG NPN-199E-LP
Heat Capacity (Input)	Natural Gas	10,700-160,000 BTU/H	10,700-180,000 BTU/H	10,700-199,900 BTU/H	10,700-160,000 BTU/H	10,700-180,000 BTU/H	10,700-199,900 BTU/H
	Propane Gas						
Energy Factor	UEF (for NG & LP)	0.81	0.81	0.81	0.81	0.81	0.81
Flow Rate (DHW)	45 °F (25 °C) Temp Rise	5.8 GPM (22 L/m)	6.6 GPM (25 L/m)	7.4 GPM (28 L/m)	5.8 GPM (22 L/m)	6.6 GPM (25 L/m)	7.4 GPM (28 L/m)
	67 °F (36 °C) Temp Rise	4.0 GPM (15 L/m)	4.5 GPM (17 L/m)	5.0 GPM (19 L/m)	4.0 GPM (15 L/m)	4.5 GPM (17 L/m)	5.0 GPM (19 L/m)
Dimensions		14.0 in (W) x 23.0 in (H) x 9.3 in (D)					
Weight (Gross)		55 lbs (25 kg)	60 lbs (27 kg)	60 lbs (27 kg)	55 lbs (25 kg)	60 lbs (27 kg)	60 lbs (27 kg)
Installation Type		Indoor Wall-Hung (Vent Kit Optional for Outdoor)			Only Outdoor Wall-Hung		
Venting Type		Forced Draft Direct Vent (Indoor only)					
Ignition		Electronic Ignition					
Water Pressure		15-150 PSI					
Natural Gas Supply Pressure (from source)		3.5 in WC-10.5 in WC					
Propane Gas Supply Pressure (from source)		8 in WC-13in WC					
Natural Gas Manifold Pressure (Max.-Min.)		2.83 in W.C, 0.70 in W.C	2.25 in WC, 0.53 in WC	2.81 in WC, 0.53 in WC	3.23 in W.C, 0.69 in W.C	2.38 in WC, 0.53 in WC	2.99 in WC, 0.52 in WC
Propane Gas Manifold Pressure (Max.-Min.)		5.93 in W.C, 1.38 in W.C	5.28 in WC, 1.31 in WC	6.55 in WC, 1.31 in WC	6.34 in W.C, 1.35 in W.C	5.39 in WC, 1.28 in WC	6.61 in WC, 1.28 in WC
Minimum Flow Rate		0.5 GPM (1.9 L/m)					
Connection Sizes	Cold Water Inlet	3/4 in NPT					
	Hot Water Outlet	3/4 in NPT					
	Gas Inlet	3/4 in NPT					
Power Supply	Main Supply	120 V AC, 60 Hz					
	Normal	90 W	88 W	120 W	90 W	88 W	120 W
	Standby	4 W					
	Anti-frost	114 W					
	External Pump	< 150 W, 1.5 A					
	Fuse	5.0 A					
Materials	Casing	Cold Rolled Carbon Steel					
	Heat Exchangers	Stainless Steel					
Safety Devices		Flame Rod, APS, Vent Installation Detector, Ignition Operation Detector, Water Temperature High Limit Switch, Power Surge Fuse					

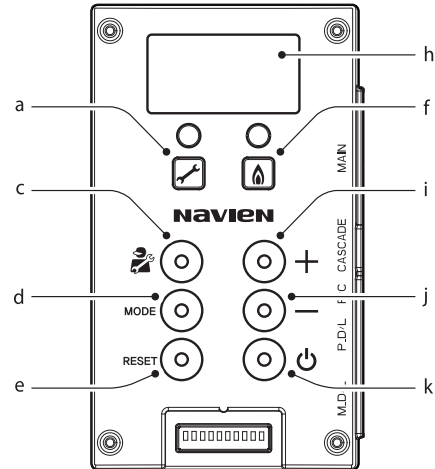
2.4 The Front Panel

The front panel allows you to adjust the water temperature and view the operating status or error codes. Remove the protective sheet from the front panel before using it.

Note The front panel of the outdoor model is placed inside the water heater. It is used only for installation and maintenance.



For indoor models



For outdoor models



Error

A code will appear on the display



Hot Water Recirculation

Recirculation Mode



Diagnostics button

For installers only



Information button

Shows basic information



Reset button

Resets the water heater (When an error occurs)



Combusting

When the gas burner is on



Master Unit

Cascade operation



Display



Up button

Increases the temperature



Down button

Decreases the temperature

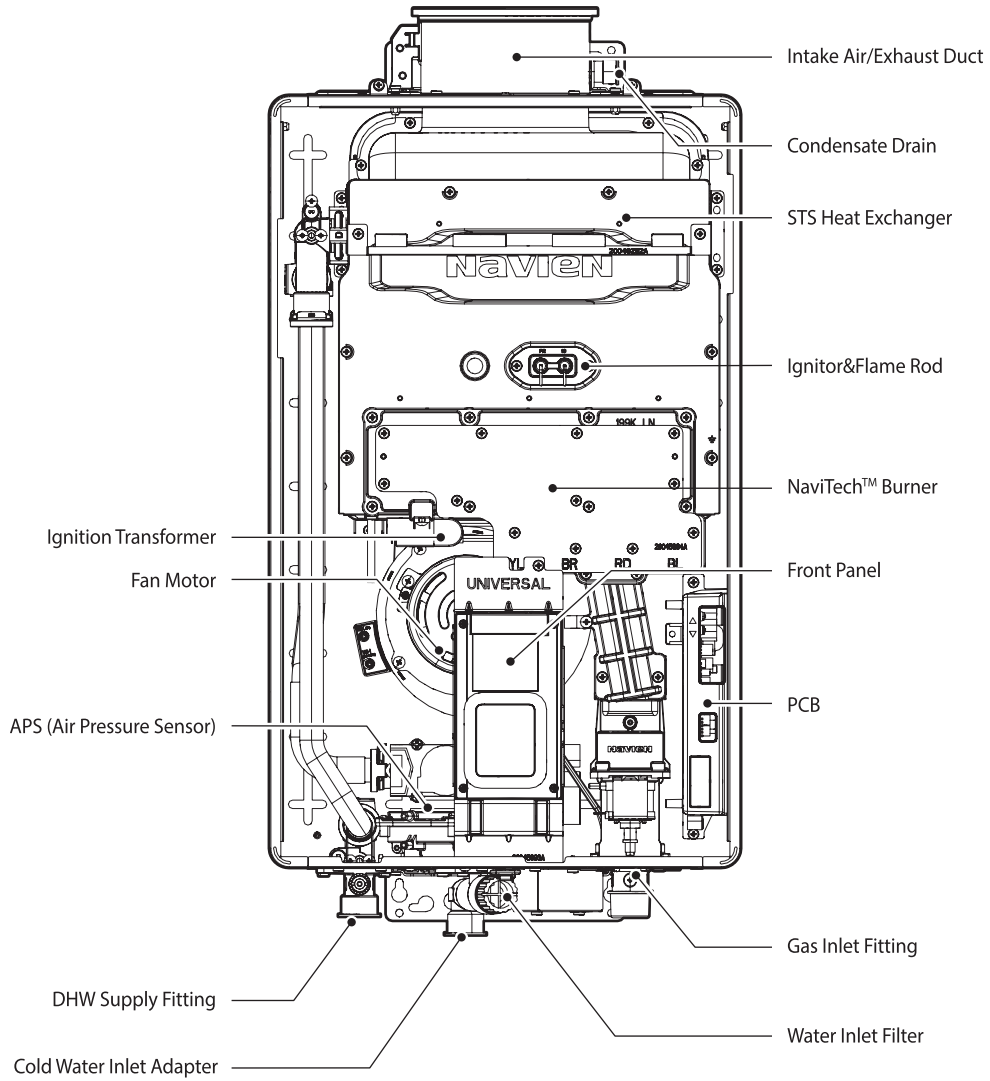


Power button

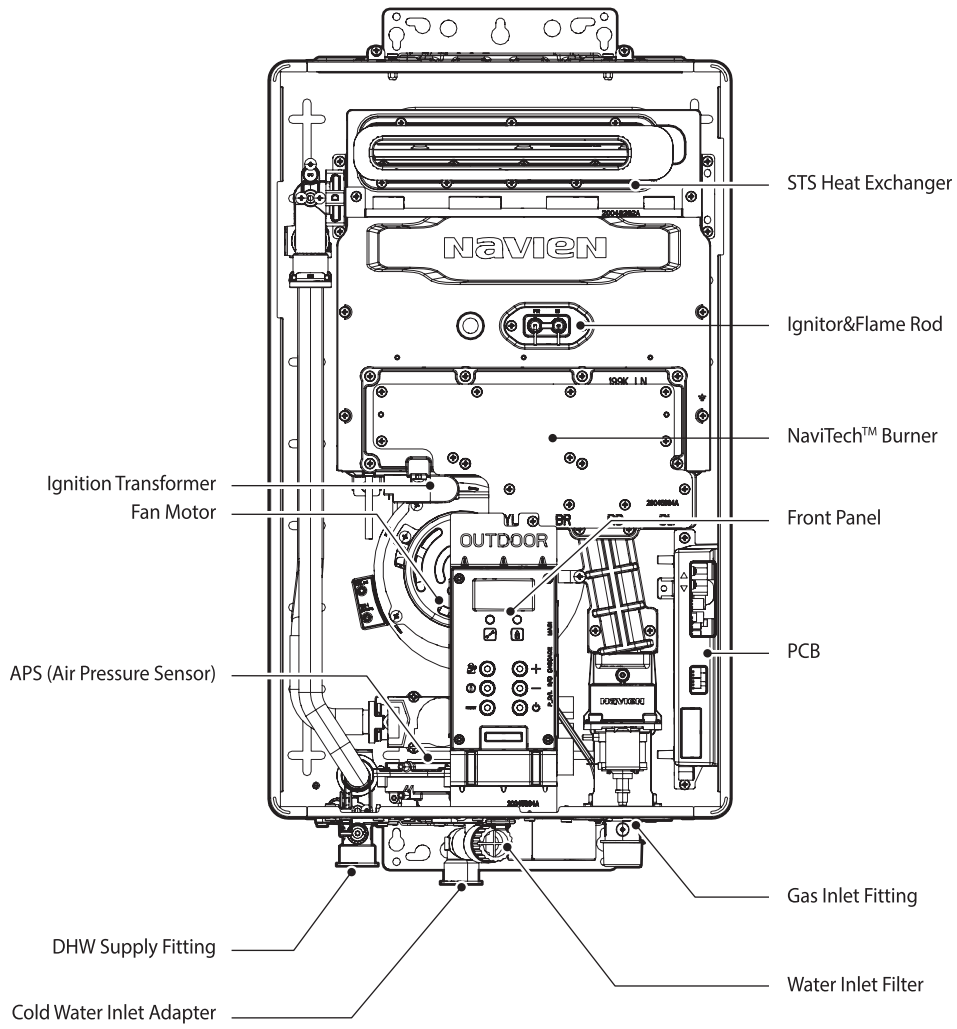
Turns the water heater on or off

2.5 Components

The following diagram shows the key components of the water heater. Component assembly diagrams and particular parts lists are included in the Appendixes.



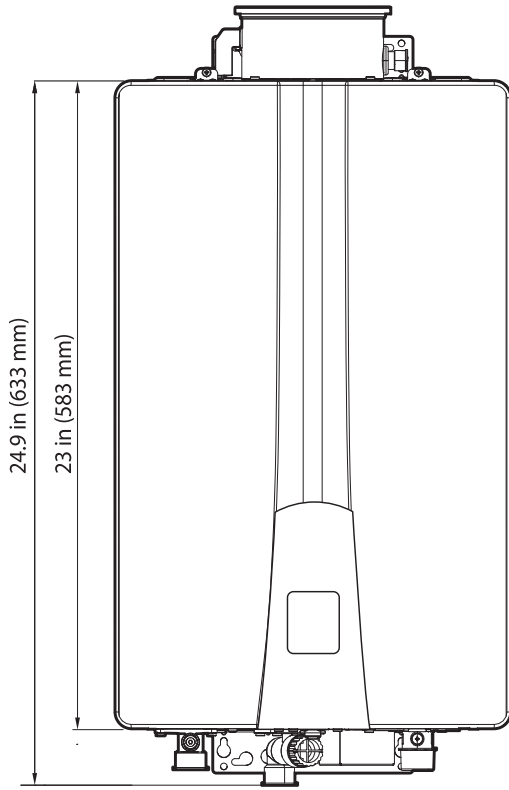
[NPN-160U/180U/199U]



[NPN-160E/180E/199E]

2.6 Dimensions

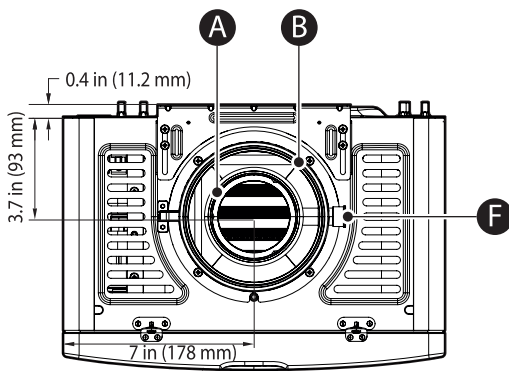
The following diagrams show the dimensions of the water heater and the table lists the supply connections.



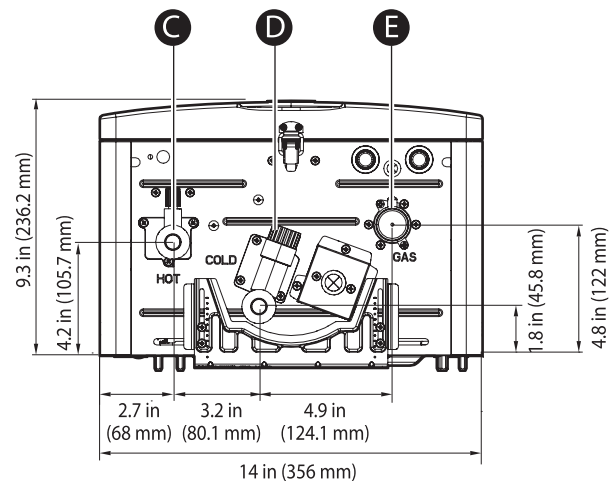
Supply Connections

	Description	Diameter
A	Exhaust Gas Vent	3 in
B	Air Intake	5 in
C	Hot Water Outlet	$\frac{3}{4}$ in
D	Cold Water Inlet	$\frac{3}{4}$ in
E	Gas Inlet	$\frac{3}{4}$ in
F	Condensate Drain	$\frac{5}{8}$ in

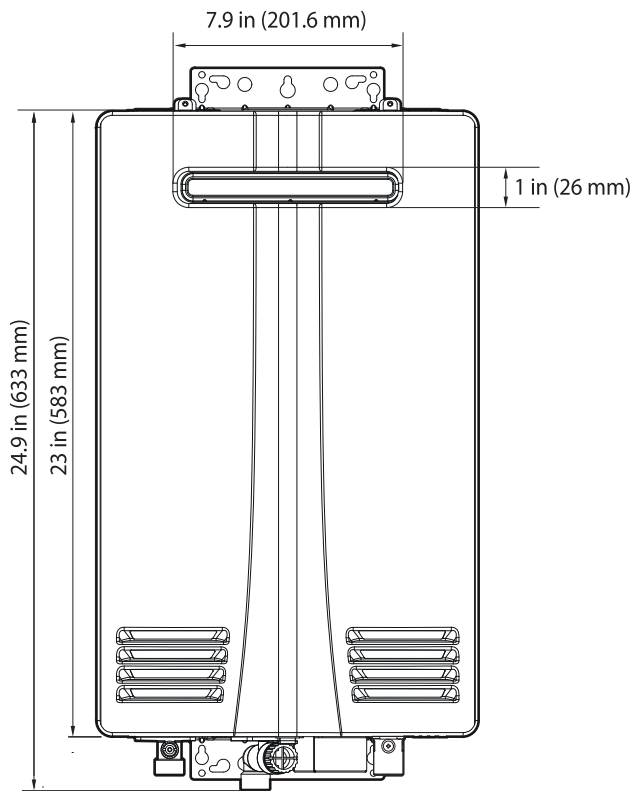
Overhead View



Supply Connections



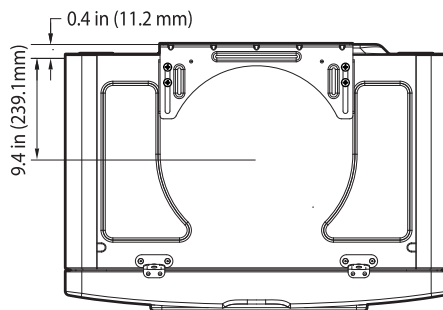
[NPN-160U/180U/199U]



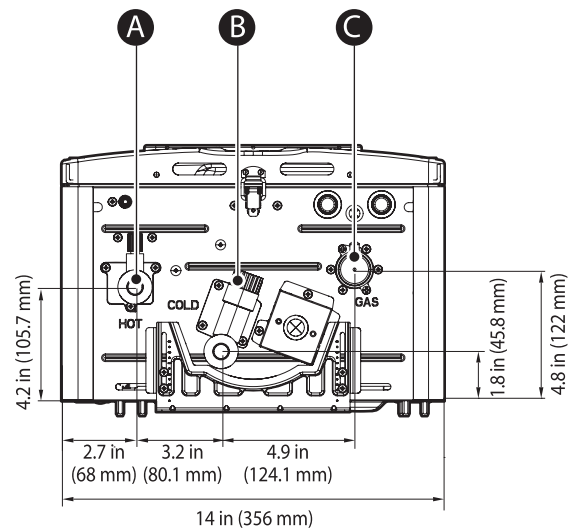
Supply Connections

	Description	Diameter
A	Hot Water Outlet	$\frac{3}{4}$ in
B	Cold Water Inlet	$\frac{3}{4}$ in
C	Gas Inlet	$\frac{3}{4}$ in

Overhead View



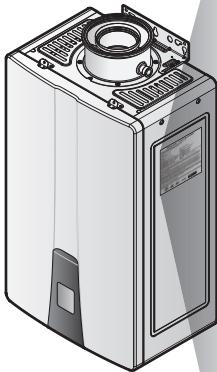
Supply Connections



[NPN-160E/180E/199E]

2.7 Rating Plate

Water Heaters come from the factory configured for use with Natural Gas (NG) or Propane Gas(LP). **Before starting the installation**, check the rating plate located on the side of the water heater to ensure that the water heater matches the gas type, gas pressure, water pressure, and electrical supply available in the installation location. **If the water heater does not match each of these ratings, do not install the water heater.** If conversion to Propane Gas or Natural Gas is required, the Gas conversion kit (optional) must be used.



Rating Plate

Direct Vent Automatic Instantaneous Water Heater For Indoor, Outdoor or Manufactured Home (Mobile Home) Installation

Navien, Inc.
20 Goodyear, Irvine, CA 92618
Tel: 1-800-519-8794

Model No.	Type of Gas
NPN-180U-NG	NG
Max. Input Rating	Min. Input Rating
180,000 Btu/h	10,700 Btu/h
Recovery Rating	270 Gallons/Hour
Max. Inlet Gas Pressure	10.5 Inches W.C.
Min. Inlet Gas Pressure	3.5 Inches W.C.
Max. Manifold Pressure	2.25 Inches W.C.
Min. Manifold Pressure	0.53 Inches W.C.
Electrical Rating	AC 120 Volts 60Hz, less than 2 amperes
Max. Water Pressure	150 psi
Category of water heater	Category III ANSI Z21.10.3 · CSA 4.3-2017

Failure to use the correct gas can cause problems which can result in death, serious injury or property damage.

Consult your installation manual for more information.

Suitable for combination water (potable) heating and space heating and not suitable for space heating applications only.

This appliance is certified for use at altitudes up to 4,500 ft (1,370 m) in accordance to the latest CAN/CGA 2.17-High Altitude Installation procedures at normal manifold pressure. For installation instructions at altitudes higher than 4,500 ft, please contact Navien.

This appliance must be installed in accordance with local codes, or in the absence of local codes, the National Fuel Gas Code, ANSI Z223.1/NFPA 54 or the CSA B149.1, Natural Gas and Propane Installation Code.

FOR YOUR SAFETY

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



WARNING

- Be sure the gas type and electricity voltage match the rating plate. Using a different gas type will cause abnormal combustion, excessive carbon monoxide emissions and water heater malfunction.
- Using abnormally high or low AC voltage may cause abnormal operation, and may reduce the life expectancy of this product.

3. Installing the Water Heater

3.1 Choosing an Installation Location

When choosing an installation location, you must ensure that the location provides adequate clearance for the water heater, adequate venting and drainage options, and sufficient access to gas, water, and electrical supplies. Carefully consider the following factors when choosing an installation location:

CAUTION

Review the entire installation information in this manual before starting installation. Consider all the requirements for venting, piping, and wiring.

About Water Quality

Proper maintenance of the water heater is required when water quality does not meet EPA standards. Damage caused by poor water quality is not covered under warranty. The following table shows the maximum contaminant levels allowed, based on the EPA National Secondary Drinking Water Regulations (40 CFR Part 143.3). If you suspect that your water is contaminated in any way, discontinue use of the water heater and contact an authorized technician or licensed professional.

Contaminant	Maximum Allowable Level
Total Hardness	Up to 200 mg/l (12 grains/gallon)
Aluminum	0.05 to 0.2 mg/l
Chloride	Up to 250 mg/l
Copper	Up to 1.0 mg/l
Iron	Up to 0.3 mg/l
Manganese	Up to 0.05 mg/l
pH	6.5 to 8.5
Sulfate	Up to 250 mg/l
Total Dissolved Solids (TDS)	Up to 500 mg/l
Zinc	Up to 5 mg/l
Chlorine	Up to 4 mg/l

If your local water is hard, please review the following recommended treatment and flushing guidelines.

Hardness Level		Treatment Method	Flush Frequency*
Soft	0-4 grains/gal (0-60 mg/L)	None	None
Moderately Hard	4-7 grains/gal (61-120 mg/L)	Water Softener** or Navien PeakFlow is Recommended	Once/Year
Hard	7-9 grains/gal (121-160 mg/L)		
Very Hard	9-12 grains/gal (161-200 mg/L)	Water Softener** or Navien PeakFlow is HIGHLY Recommended	Residential: Once/Year
Extremely Hard	>12 grains/gal (200 mg/L)	Water Softener** or Navien PeakFlow is Required	

* **Flushing is recommended if a treatment device is not installed.** This procedure should be performed using white vinegar or solutions that are specifically formulated for use on tankless water heaters. See Water Heater Flush Procedures.

**Check local codes for any restrictions on use of water softeners

Water Heater Flushing Procedures

CAUTION

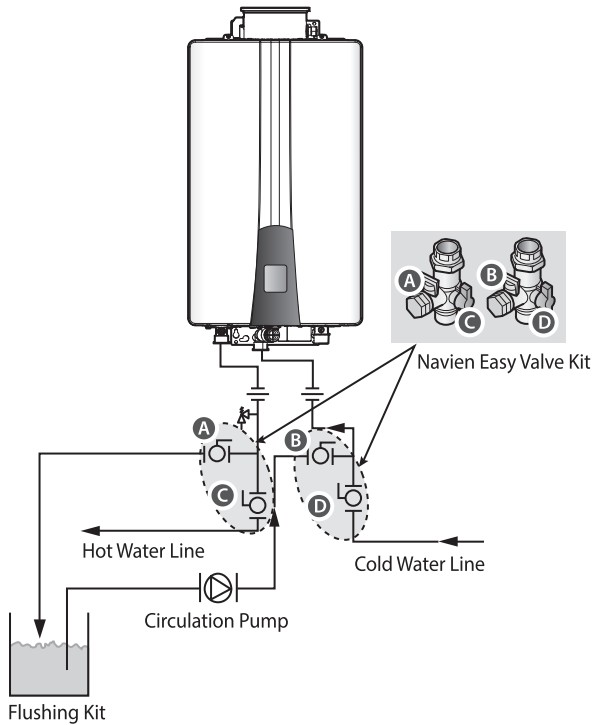
Flushing the Heat Exchanger is a somewhat complicated procedure. Read the following instructions carefully before attempting this procedure. If you are uncertain about any of the steps in the procedure, contact an authorized technician or licensed professional. Keep in mind that improper maintenance can void your warranty.

Refer to "Dimensions" on page 11 for details about part locations.

Before flushing the Heat Exchanger, gather the following items:

- A bucket that is 5 gallons or larger
- Cleaning solution diluted with water
- 3 hoses
- A water circulation pump

To flush the Heat Exchanger:



1. Press the Power button on the front panel to turn off the water heater.
2. Disconnect the power supply to the water heater.
3. Close the "C" and "D" valves on the hot and cold water lines.
4. Connect one tube to the "A" valve and place the free end in the bucket.
5. Connect one of the tubes to the circulation pump outlet and the cold water line at the "B" valve.
6. Connect one tube to the circulation pump inlet and place the free end in the bucket.
7. Pour the cleaning solution into the bucket.
8. Open both "A" and "B" valves.
9. Turn on the circulation pump and allow the solution to circulate through the water heater for at least 45 minutes.

10. Rinse the cleaning solution from the water heater:
 - a. Remove the free end of the drain tube from the bucket and place it in the condensate drain or laundry tub (wherever the water heater drains).
 - b. Close the "B" valve and open the "D" valve. Do not open the "C" valve yet.
 - c. Allow water to flow through the water heater for 5 minutes.
 - d. Close the "A" valve and open the "C" valve.
11. Disconnect all tubes.
12. Remove the cold water inlet filter from the water heater and clean out any residue.
13. Reinsert the filter and ensure the filter cap is securely tightened.
14. Reconnect the power supply to the Water Heater.
15. Press the Power button on the front panel to turn on the water heater.

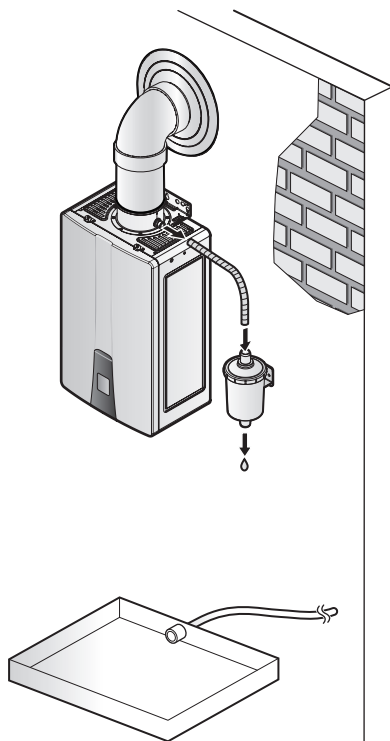
Access to utilities

- Water – the installation location should be near where the domestic water supply enters the building.
- Gas – the installation location should be near where the gas supply enters the building.
- Electricity – the installation location should be near where the electrical supply enters the building.

Adequate Drainage

This non-condensing water heater may produce condensate due to the condition of the installation. Condensate can be drained through the condensate collector. The water heater should be located near a suitable drain and where damage from a possible leak will be minimal. Installing the water heater in a location without a drain will void the warranty and Navien will not be responsible for water damages that occur as a result.

The water heater must be located in an area where leakage of the unit or connections will not result in damage to the area adjacent to the appliance or to lower floors of the structure. When such locations cannot be found, installation of an adequately drained drain pan under the water heater is highly recommended. When installing the drain pan, ensure that the installation does not restrict combustion air flow.



Adequate Venting and Ventilation

Select a location that requires minimal venting. Consider venting restrictions caused by windows, doors, air intakes, gas meters, foliage, and other buildings. For more information about venting, refer to “3.5 Venting the Water Heater (Indoor Models Only)” on page 31.

WARNING

Improper venting of the water heater can result in excessive levels of carbon monoxide, which can lead to severe personal injury or death. **This water heater 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 in the USA, as well as all applicable local building codes and regulations.** Follow all instructions and guidelines when venting the water heater. Venting should be performed only by a qualified service agency.

To ensure adequate venting and ventilation, follow these guidelines:

- Maintain proper clearances from any openings in the building.
- Install the water heater with a minimum clearance of 12 in (300 mm) above an exterior grade or as required by local codes.
- Maintain a minimum clearance of 4 ft (1.2 m) from heating and cooling vents.
- Do not enclose the vent termination.
- Install the exhaust vent in an area that is free from obstructions and does not allow the exhaust to accumulate.
- Do not install the water heater where moisture from the exhaust may discolor or damage walls.
- Do not install the water heater in bathrooms, bedrooms, or any other occupied rooms that are normally kept closed or that are not adequately ventilated.
- Install a carbon monoxide detector in the dwelling area that is closest to the appliance.

Proximity to fixtures and appliances

Install the water heater near fixtures that deliver or use hot water, such as bathroom, kitchen, and laundry room faucets. Select a location that minimizes the water piping required between major fixtures. If the distances are long or if the water heater requires “instant” hot water, we recommend running a recirculation line back to the water heater from the furthest fixture. Insulate as much of the hot water supply and recirculation lines as possible. For more information about the water supply, refer to “3.4 Connecting the Water Supply” on page 25.

Adequate installation clearances

Install the water heater in an area that allows for service and maintenance access to utility connections, piping, filters, and traps. Based on the installation location, ensure the following clearances are maintained:

For indoor installation

Clearance from:	to Combustibles	to Non-Combustibles
Top	6 in (152 mm) minimum	2 in (51 mm) minimum
Back	0 in (0 mm) minimum	0 in (0 mm) minimum
Front	6 in (152 mm) minimum	6 in (152 mm) minimum
Sides	2 in (51 mm) minimum	1/2 in (13 mm) minimum
Ground/ Bottom	12 in (305 mm) minimum	12 in (305 mm) minimum
Vent	0 in (0 mm) minimum	0 in (0 mm) minimum

For outdoor installation

Clearance from:	to Combustibles	to Non-Combustibles
Top	12 in (305 mm) minimum	2 in (51 mm) minimum
Back	0 in (0 mm) minimum	0 in (0 mm) minimum
Front (panel)	24 in (610 mm) minimum	0 in (0 mm) minimum
Front (exhaust)	24 in (610 mm) minimum	24 in (610 mm) minimum
Sides	6 in (152 mm) minimum	1/8 in (3.2 mm) minimum
Ground/ Bottom	12 in (305 mm) minimum	2 in (51 mm) minimum

Clean, debris and chemical-free combustion air

- Do not install the water heater in areas where dust and debris may accumulate or where hair sprays, spray detergents, chlorine, or similar chemicals are used.
- Do not install the water heater in areas where gasoline or other flammables are used or stored.
- Ensure that combustible materials are stored away from the water heater and that hanging laundry or similar items do not obstruct access to the water heater or its venting.

Note

The combustion air must be free of flammable vapors or corrosive chemical fumes. Common corrosive chemical fumes to avoid include fluorocarbons and other halogenated compounds such as Freon, trichloroethylene, perchlorethylene, chlorine, which can be found in refrigerants or solvents. When these chemicals burn, they produce acids that corrode the stainless steel heat exchanger, gaskets, and the flue and vent system.

- In commercial locations, do not install the water heater in areas with greasy fumes or heavy amounts of steam or take measures to prevent fumes and steam from entering the water heater.

High Elevation Installations

This water heater may be installed at elevations up to 10,100 ft (3,078 m) for use with Natural Gas and 4,500 ft (1,370 m) for use with Propane. Refer to "3.7.2 Setting the Front Panel DIP Switches" on page 42 for the appropriate altitude setting.

Coastal Installations

For installations in sea or marine environments, the salty air can cause corrosion to the water heater. The water should be protected and enclosed to minimize exposure to the corrosive atmosphere. Damage due to a corrosive environment is not covered under warranty.

Operating Temperature

The ambient temperature at the installation location must be above freezing temperature and below 100°F (38°C).

3.2 Mounting the Water Heater to the Wall

Navien water heaters come with two upper and lower mounting brackets that are pre-drilled at 16 in for easy installation on standard wall studs. If the strength of the wall is insufficient or if the framing is non-standard or uneven, reinforce the area before installing the water heater. Avoid installation on common walls as the unit will make some operational noises while it is running.

WARNING

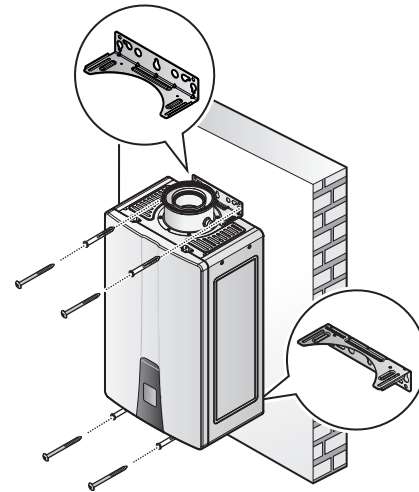
- If the water heater is not properly and securely attached to the wall, it could become dislodged causing the exhaust vent pipe to separate. This can result in carbon monoxide emissions which could cause severe personal injury or death.
- Be careful not to drop the water heater while lifting or handling it to avoid bodily injury or damage to the unit.
- **Do not** rest the water heater on the bottom end after removing it from the shipping carton. Doing so may result in excessive pressure on protruding pipes and cause product damage. If you must put the water heater down, lay it on its back or put it inside the protective shipping base.
- Install the water heater upright in the vertical position. Installation in any other orientation will result in improper water heater operation and property damage, and could result in serious personal injury or death.

CAUTION

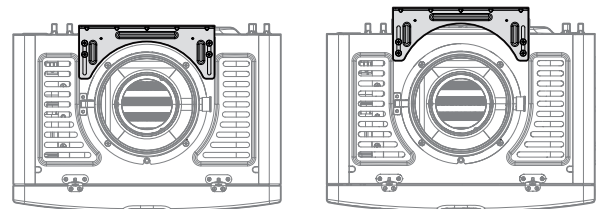
- Ensure that the structure of the installation location is sturdy enough to support the full installed weight of the water heater, including water content of the heat exchanger and related piping.
- The wall must be vertical, and it must be capable of carrying the weight of the water heater.
- Do not mount the water heater to dry wall that has not been reinforced.

To mount the water heater to the wall:

1. Ensure that the strength of the wall is sufficient to support the weight of the water heater.
2. Securely attach the water heater to the wall by affixing the brackets at the top and bottom of the water heater.



3. Ensure that the water heater is level using a leveling tool.
4. The top and bottom mounting brackets are adjustable to provide flexibility in aligning the vent with the vent collar on the water heater.

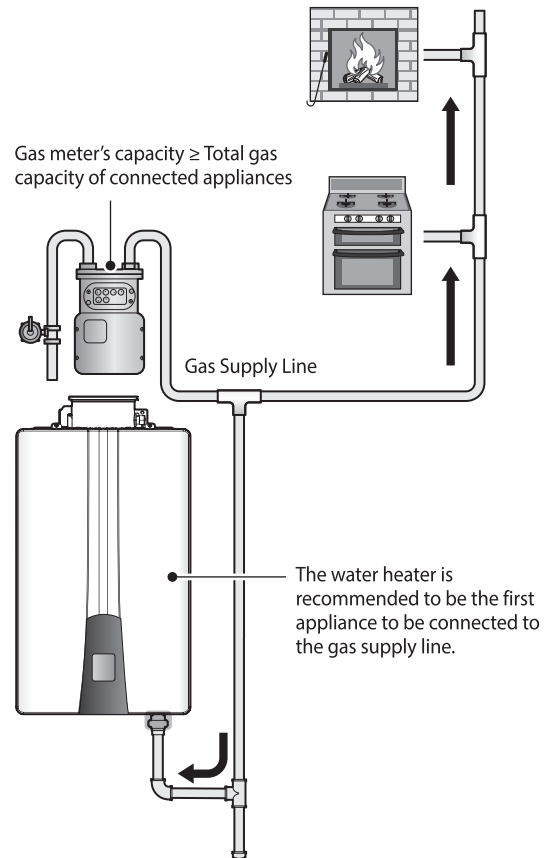


3.3 Connecting the Gas Supply

WARNING

- Before connecting the gas supply, determine the gas type and pressure for the water heater by referring to the rating plate. Use only the same gas type indicated on the rating plate. Using a different gas type will result in abnormal combustion and malfunction of the water heater. Gas supplies should be connected by a licensed professional only.
- To avoid damaging the connectors on the water heater, use two wrenches when tightening pipings to the water heater. Use one wrench to prevent the connector at the water heater from turning, and use the other wrench to tighten the connection. Damaged connectors may result in system leaks.
- Properly support the pipings with hangers. Do not allow the pipings to be supported by the water heater or its accessories.
- Ensure that the gas piping is protected from physical damage and freezing, where required. Failure to follow these instructions could result in gas leakage, and result in fire, explosion, property damage, severe personal injury, or death.
- The appliance and its gas connection must be leak tested before placing the appliance in operation.
- To avoid danger of explosion and fire, do not use flame to check for a gas leak. Perform a bubble test on the joints to check for gas leaks. If a leak exists, bubbles will form at the leaking joint. A gas leak could result in substantial property damage, severe personal injury, or death.
- This water heater cannot be converted from natural gas to propane or vice versa without a Navien gas conversion kit. Do not attempt a field conversion of this water heater without a Navien gas conversion kit installed by a qualified service agency.

Navien recommends connecting the water heater as the first water heater downstream of the gas meter, to ensure a sufficient gas supply.

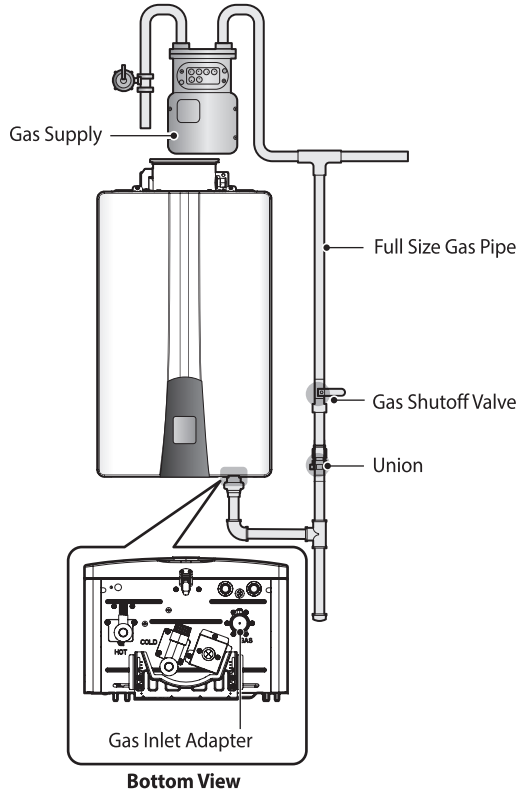


DANGER

If the connections leak, harmful flue gas may cause personal injury or death. After completing the installation and filling the water heater with water, turn on the water heater and test for leaks using a bubble test kit. After applying the soap solution, bubbles, will form on the connection if any leaks exist.

To connect the gas supply:

1. Determine the gas type and pressure for the water heater by referring to the rating plate.
2. Perform a pressure test on the main gas supply line.
3. Purge the gas line of any debris.
4. Determine the proper size and type for the gas line. Refer to the tables that follow.
5. Install certified full port valves on the gas supply line and water heater.
6. Connect the gas supply line.
7. Test the supply line, all connection points, and the water heater for gas leaks.

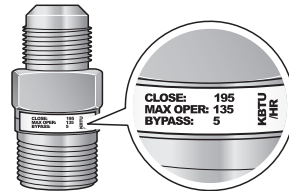


Note

- Tighten the water heater connection valves with care to avoid damage.
- The gas connection fitting on all water heaters is $\frac{3}{4}$ in.
- When using flexible gas lines, ensure that the pipe's inner diameter and connector is sufficient to supply the required BTUs. Also, ensure that the flexible line has no crimps or tight bends in it, as this will restrict gas flow.
- When using rigid pipe, Navien recommends the installation of a union on the gas supply line close to the water heater, to facilitate any future maintenance or service.

CAUTION

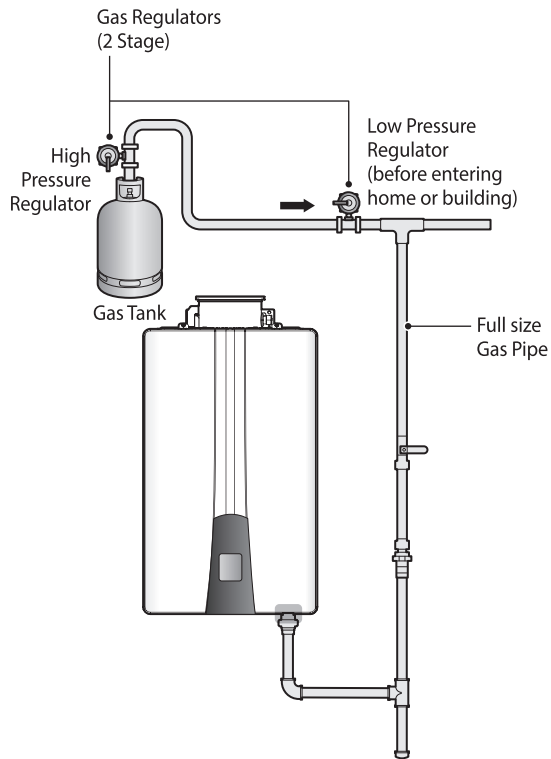
Prior to using an excess flow valve (EFV) in the gas line, check the manufacturer's minimum and maximum flow capacity rating. An improperly sized EFV will not allow for a full flow of gas to the water heater and may cause improper operation.



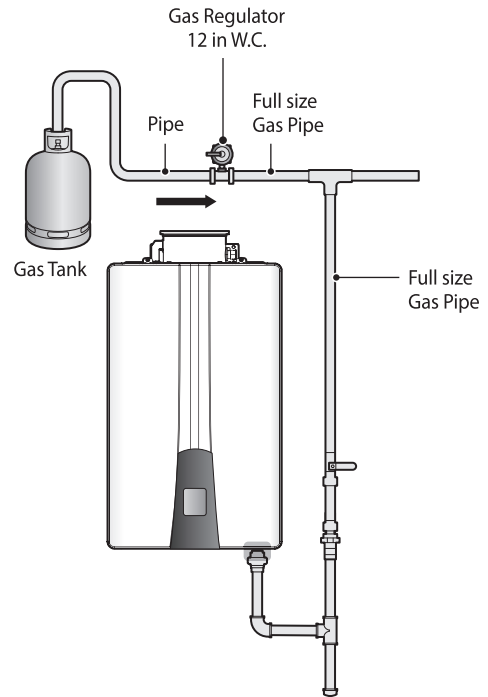
Excess Flow Valve

Typical LP Gas piping examples:

2 Stage System with Multiple Regulators (Recommended)



Single Regulator System



3.3.1 Gas Pipe Sizing Tables (Referenced from 2012 National Fuel Gas Code)

These tables are for reference only. Please consult the gas pipe manufacturer for actual pipe capacities.

Maximum Natural Gas Delivery Capacity

In cubic feet (ft³) per hour (0.60 specific gravity; 0.5 in WC pressure drop). Contact your gas supplier for BTU/ft³ ratings. Use 1,000 BTU/ft³ for simplified calculations.

Pipe Size	Length (including fittings)										
	10 ft (3 m)	20 ft (6 m)	30 ft (9 m)	40 ft (12 m)	50 ft (15 m)	60 ft (18 m)	70 ft (21 m)	80 ft (24 m)	90 ft (27 m)	100 ft (30 m)	125 ft (38 m)
¾ in	360	247	199	170	151	137	126	117	110	104	92
1 in	678	466	374	320	284	257	237	220	207	195	173
1 ¼ in	1,390	957	768	657	583	528	486	452	424	400	355
1 ½ in	2,090	1,430	1,150	985	873	791	728	677	635	600	532
2 in	4,020	2,760	2,220	1,900	1,680	1,520	1,400	1,300	1,220	1,160	1,020
2 ½ in	6,400	4,400	3,530	3,020	2,680	2,430	2,230	2,080	1,950	1,840	1,630
3 in	11,300	7,780	6,250	5,350	4,740	4,290	3,950	3,670	3,450	3,260	2,890
4 in	23,100	15,900	12,700	10,900	9,660	8,760	8,050	7,490	7,030	6,640	5,890

Maximum Liquefied Propane Delivery Capacity

In thousands of BTU/H (0.5 in WC pressure drop)

Pipe Size	Length (including fittings)												
	10 ft (3 m)	20 ft (6 m)	30 ft (9 m)	40 ft (12 m)	50 ft (15 m)	60 ft (18 m)	80 ft (24 m)	100 ft (30 m)	125 ft (38 m)	150 ft (45 m)	175 ft (53 m)	200 ft (60 m)	250 ft (76 m)
½ in	291	200	160	137	122	110	101	94	89	84	74	67	62
¾ in	608	418	336	287	255	231	212	197	185	175	155	140	129
1 in	1,150	787	632	541	480	434	400	372	349	330	292	265	243
1 ¼ in	2,350	1,620	1,300	1,110	985	892	821	763	716	677	600	543	500
1 ½ in	3,520	2,420	1,940	1,660	1,480	1,340	1,230	1,140	1,070	1,010	899	814	749
2 in	6,790	4,660	3,750	3,210	2,840	2,570	2,370	2,200	2,070	1,950	1,730	1,570	1,440

3.3.2 Measuring the Inlet Gas Pressure

 **WARNING**

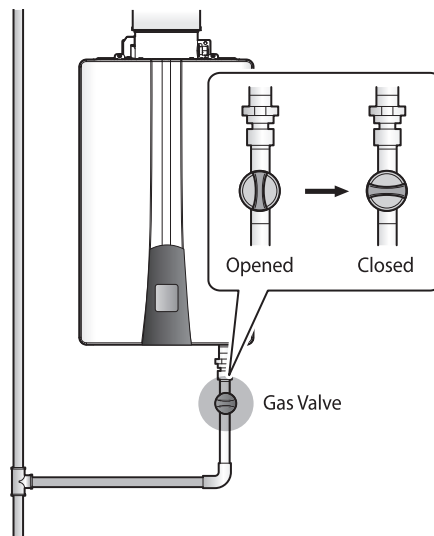
The water heater cannot function properly without sufficient inlet gas pressure. Measuring the inlet gas pressure should be performed by a licensed professional only.

- The inlet gas pressure must be maintained between 3.5 in and 10.5 in WC for natural gas and between 8.0 in and 13 in WC for liquefied propane.
- The appliance and its 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 $\frac{1}{2}$ psi (3.5 kPa). The appliance must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than $\frac{1}{2}$ psi (3.5 kPa).

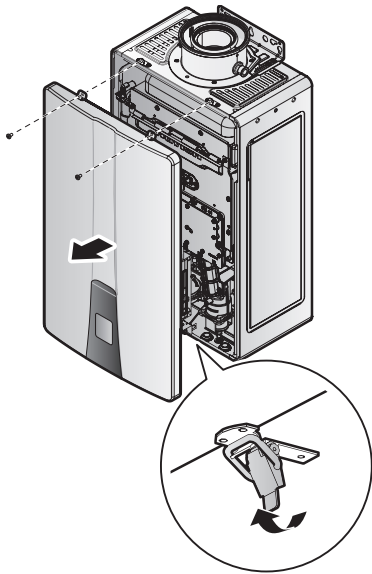
Note If gas pressure is out of the acceptable range or an excessive pressure drop is observed, contact the gas supplier or qualified installer to supply proper gas pressure to the unit.

To measure the inlet gas pressure:

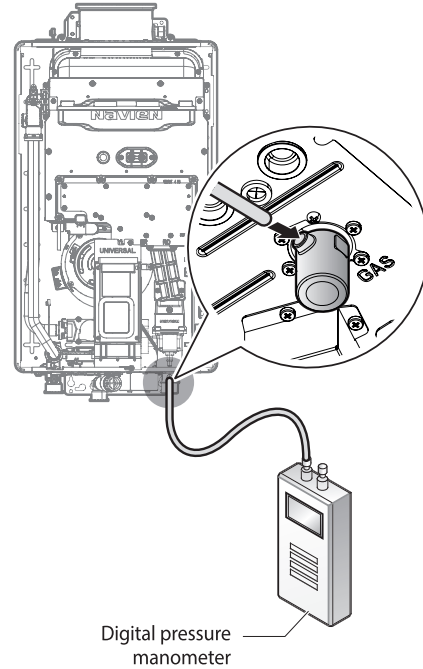
1. Shut off the manual gas valve on the gas supply line.



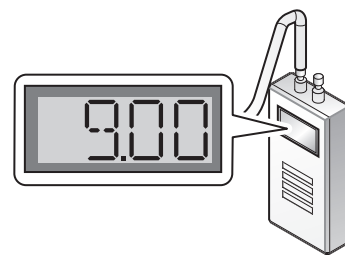
2. Open a hot water faucet. The water heater should turn on and the gas in the gas supply line will be purged.
3. Leave the faucet on until the water heater shuts down due to a lack of gas supply, and then turn off the hot water faucet.
4. Remove the two upper screws from the front cover assembly using a Phillips head screwdriver. Then, release the toggle latch from the bottom of the front cover assembly to gain access to the internal components.



5. Remove the screw from the gas inlet fitting and connect a manometer to the pressure port. Reset the manometer to zero before use.



6. Re-open the manual gas valve and check for leaks.
7. Open multiple fixtures that have high flow rates, such as bathtub and shower faucets, to ramp the water heater up to its maximum firing rate.
8. When the water heater reaches its maximum firing rate, check the inlet gas pressure reading on the manometer. The gas pressure must fall within the ranges specified on page 23.

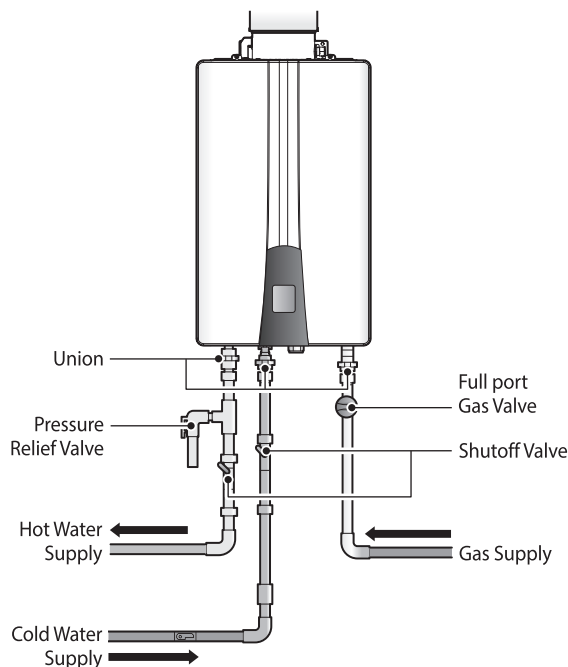


3.4 Connecting the Water Supply

The water fittings on the water heater are $\frac{3}{4}$ in. If the installation site only has $\frac{1}{2}$ in plumbing throughout, it is not necessary to upsize the water lines to $\frac{3}{4}$ in.

When connecting the water supply, follow these guidelines:

- Use only pipes, fittings, valves, and other components, such as solder, that are approved for use in potable water systems.
- Tighten the water heater connection valves with care to avoid damage.
- We recommend using unions and manual shut-off valves on the cold water inlet and DHW outlet.
- Strive to make the hot water piping system as short as possible, to deliver hot water to the fixtures more quickly.
- To conserve water and energy, insulate all water piping—especially the hot water line. Never cover the drain or pressure relief valve. If the water heater 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. Contact the water supplier or local plumbing inspector for information about how to control this situation.
- After installing the water heater, clean the inlet water filter that is located inside the cold water inlet, and then test the water heater for proper flow and inspect for leaks. Instruct the water heater owner that the filter must be cleaned periodically to maintain proper water flow.



* The illustration above provides a typical water piping installation example and is for reference only.

3.4.1 Using the Water Heater for Combination Water Heating and Space Heating

When using the water heater for both water (potable) heating and space heating, follow these guidelines:

- Ensure that all piping and components connected the water heater are suitable for potable water applications.
- Do not introduce toxic chemicals, such as water treatments, into the potable water.
- On Combi applications, circulators suitable for DHW applications must be used.
- Do not connect the water heater to any heating systems or components that have been previously used with non-potable water heaters.
- If the system requires varying temperatures for water—for example, hotter water for space heating than for other uses—install a mixing valve to temper the water and reduce the potential for scalding.
- Do not use the water heater for space heating only.
- Make sure circulator flow rate through the Water Heater does not exceed 4 GPM.

CAUTION

Do not configure the system for DHW recirculation when it is configured to run an air handler using the H2Air add-on controller. DHW recirculation and Navien H2Air configurations cannot be used at the same time.

3.4.2 External Pump Wire Connection

An external pump may be connected to the water heater for recirculation applications. When selecting a circulator, it shall be sized to maintain a flow of 2-4 GPM through the water heater. Follow the instructions below when connecting the pump wire accessory to the PCB.

WARNING

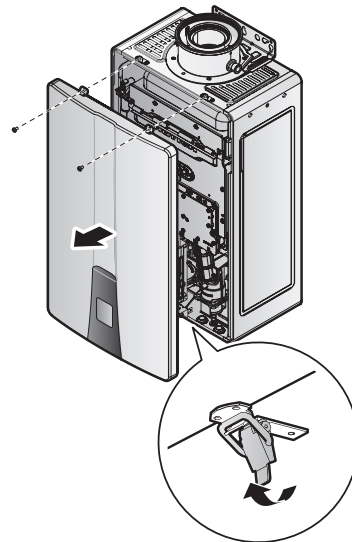
Failure to follow the instructions below may result in property damage, personal injury or death. To avoid the danger of electric shock, make sure that the water heater is turned off before connecting the wire to the PCB.

CAUTION

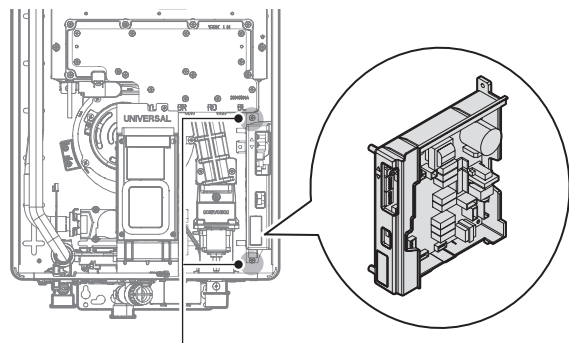
- **Do not remove the front cover unless the power to the water heater is turned off or disconnected.** Failure to do so may result in electric shock.
- Configure only the DIP switches that require adjustment according to the instructions in this manual. Do not adjust any other DIP switches.
- An external pump cannot be used in an external recirculation mode application utilizing a by-pass Valve.

<Specifications>

- Maximum Power Consumption: 150W, 1.5A
 - Length: 6 ft (183 cm)
- ※ When using a pump with larger power requirements than the listed specification above, a relay should be used to ensure proper operation.
1. Remove the two upper screws from the front cover assembly using a Phillips head screwdriver. Then, release the toggle latch from the bottom of the front cover assembly to gain access to the internal components.

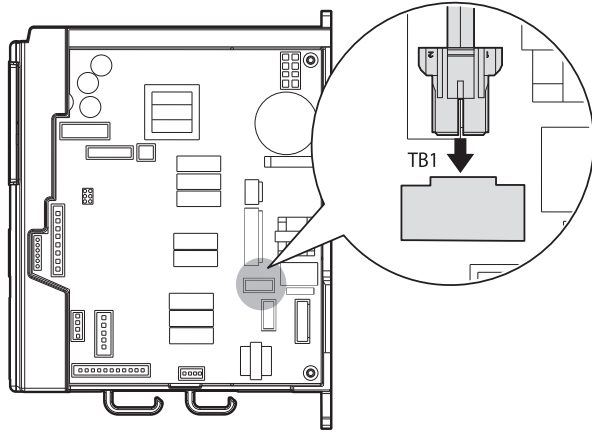


2. Disconnect the power supply to the water heater.
3. Remove the 2 screws holding the PCB box in place and remove the PCB box from the system.

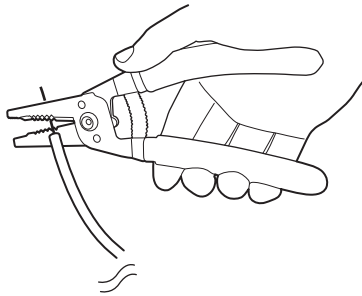


Remove Screws here.

4. Connect the external pump wiring connector to the connector socket on the PCB (TB1).



5. Put the PCB box back in its original place and secure it using the 2 mounting screws.
6. Remove the plastic insulation from the external pump wire with a wire stripper before connecting it to the pump.

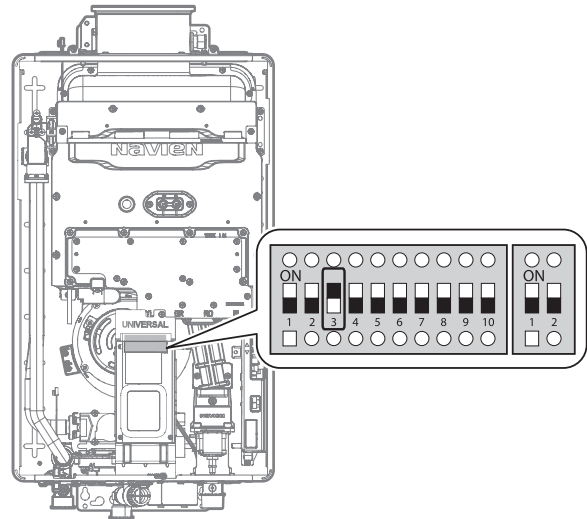


7. Connect the External Pump Wire to the proper wires from the pump junction box.

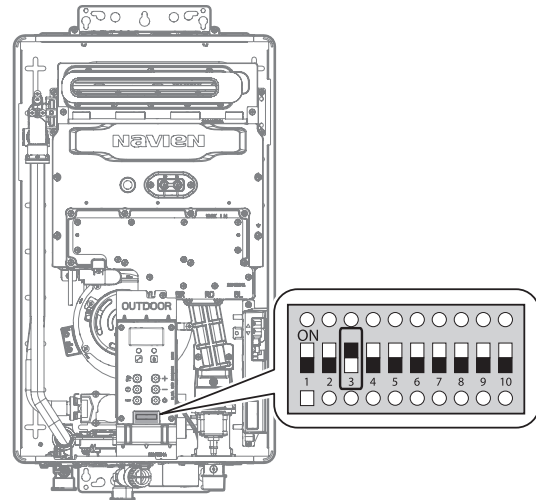
⚠ WARNING

To avoid the danger of electric shock, turn on the water heater ONLY after connecting the wire to the external pump.

8. Locate the 10-switch DIP (SW1) on the front panel and turn on the proper switches based on the desired recirculation setting (see Recirculation Dipswitch Settings below).

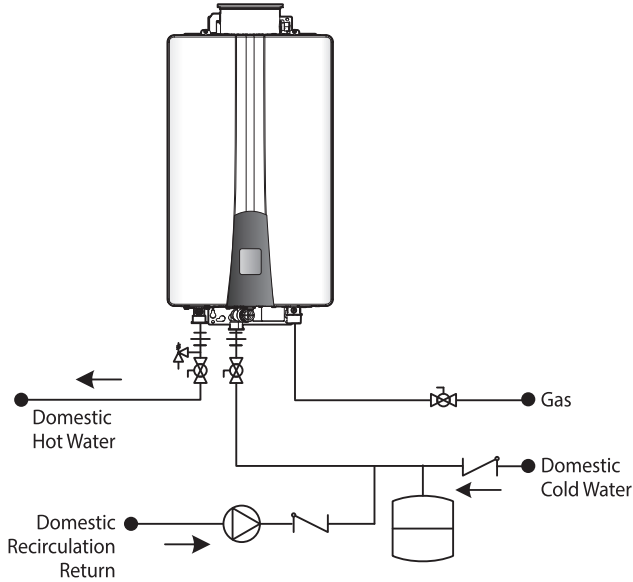


[NPN-160U/180U/199U]



[NPN-160E/180E/199E]

9. Turn on the switch beside the front panel.
10. Put the water heater cover back on and secure it with the 4 screws.



Recirculation Using External Pump Only

3.4.3 Adjusting the Recirculation Parameters

Entering the R&D Information Menu

Follow the instructions below to enter the R&D information menu.

1. On the Front panel, press the Power button to turn off the water heater.
2. Enter the R&D information menu by pressing the Up (+) button three times, the Down (-) button three times, and then the Up (+) button four more times.
3. In the R&D information menu, use the Up (+) or Down (-) buttons to move to 2.PAR (Parameter information mode), and then press the Info button.

No.	Mode	Display
1	Technical Information	1.TEC
2	Parameter Information	2.PAR

4. To return to the previous menu (R&D information menu), press the [Reset] button once.

Items	Name	Description	Display
12. P12	Pump Cycle Interval	Set the maximum time for pump operation or on-demand operation.	00:00
14. P14	Pump Sampling Time	Set the pump cycle ON interval.	00:00
15. P15	Differential OFF Temp	Set the offset temperature to turn off the preheating operation (function disabled with HotButton Kit).	00:00

Pump Cycle Interval Time Settings Mode (P.12)

1. When the P.12 item is displayed on the <PARAMETER INFORMATION MENU MODE> segment, press the [Info] button once to enter the <Preheat Pump Output Time Settings Mode>.
2. Once you enter the mode, enter the parameter values and the item will start to flash.
3. Press the [+] or [-] button in the <Preheat Pump Output Time Settings Mode> to change the value of the PARAMETER.
4. The set item is sent to the controller when you press the [Info] button once or if there is no key input for 10 seconds. If it has been sent properly, the last selected item is set and will start to flash.
5. Press the [Reset] button once to return to the <PARAMETER INFORMATION MENU MODE> (to the previous item of display).
6. If there is no key input for 5 minutes, it is automatically returned to the <PARAMETER INFORMATION MENU MODE> (to the previous item of display).

Items	Description	Display
1-120 (Unit: 1 min), maximum 5 min with optional HotButton Kit	Set the maximum time for pump operation or on-demand operation. (Default: 20 min, maximum 5 min with optional HotButton Kit.) If Cascade is set, the Sub unit will be fixed with the Main unit value.	

Pump Sampling Time Settings Mode (P.14)

Items	Description	Display
1-120 (Unit: 1 min)	Set the pump to periodically cycle ON. (Default: 30 min) If Cascade is set, the Sub unit will be fixed with the Main unit value.	

Differential OFF Temp Settings Mode (P.15)

Items	Description	Display
5 °F (3 °C) – 54 °F (30 °C) [Unit: 1 °F (0.5 °C)]	Set the offset temperature to turn OFF the preheating operation. [Default: 9 °F (5 °C)] If Cascade is set, the Sub unit will be fixed with the Main unit value.	
Not available	Setting is not available with the optional HotButton Kit.	

3.4.4 Connecting a Pressure Relief Valve

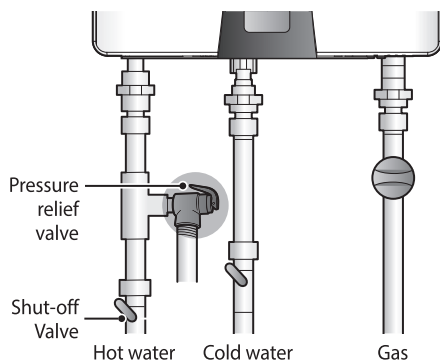
WARNING

Improper installation of the pressure relief valve may result in property damage, personal injury, or death. Follow all instructions and guidelines when installing the pressure relief valve. The valve should be installed only by a licensed professional.

To complete the installation of the water heater, you must install an approved $\frac{3}{4}$ in, maximum 150 PSI pressure relief valve on the hot water outlet. The water heater has a built-in high temperature shut off switch, so install a "pressure only" relief valve. This valve is not supplied, but is required. The following examples are approved for use with the water heater:

- Wilkins P-1000A (Zurn Industries)
- Conbraco 17-402-04
- Watts Industries 3L(M7)
- Cash Acme FWL-2, $\frac{3}{4}$ in

The pressure relief valve should be placed as close to the water heater as possible. No other valve should be placed between the pressure relief valve and the water heater.



WARNING

To avoid water damage or scalding, direct the discharge line to a safe place for disposal.

When installing the valve, follow these guidelines:

- Ensure that the discharge capacity of the pressure relief valve is equal to or greater than the maximum pressure rating of the water heater.
- Ensure that the maximum BTU/H rating on the pressure relief valve is equal to or greater than the maximum input BTU/H rating of the water heater.
- Direct the discharge piping of the pressure relief valve so that hot water will not splash on anyone or any nearby equipment.
- Attach the discharge line to the pressure relief valve and run the end of the line to within 6-12 in (150-300 mm) of the floor drain making discharge clearly visible.
- Ensure that the discharge line will allow free and complete drainage without restriction. Do not install a reducing coupling or other restriction on the discharge line.
- Do not direct the discharge line to a location where freezing could occur.
- Ensure that the discharge line is not plugged or obstructed.
- After filling and pressurizing the system, test the relief valve operation by lifting the lever. If the valve fails to operate correctly, immediately replace the relief valve.
- If the relief valve discharges periodically, this may be due to thermal expansion in a closed water supply system. Contact the water supplier or local plumbing inspector on how to correct this situation. Do not plug the relief valve.

CAUTION

- To avoid potential property damage or personal injury, check the pressure relief valve at least once every three years by manually operating the valve to ensure proper operation.
- Before manually operating the valve, check the discharge line and make sure that the hot discharge water will not cause personal or property damages. Contact with the discharge water may result in severe personal injury.

3.5 Venting the Water Heater (Indoor Models Only)



DANGER

The vent system will operate with a positive pressure in the pipe. Exhaust gases must be piped directly outdoors using the vent materials and rules outlined in these instructions. Do not connect vent connectors serving appliances vented by natural draft into any portion of mechanical draft systems operating under positive pressure. Follow the venting instructions carefully. Failure to do so will result in substantial property damage, severe personal injury, or death.



WARNING

- Improper venting of the water heater can result in excessive levels of carbon monoxide, which can lead to severe personal injury or death. **This water heater 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 in the USA, as well as all applicable local building codes and regulations.** Follow all instructions and guidelines when venting the water heater. Venting should be performed only by a qualified service agency.
- Venting system must be sealed gastight to prevent flue gas spillage and carbon monoxide emissions, which will result in severe personal injury or death.
- The building owner is responsible for keeping the exhaust and intake terminations free of snow, ice, or other potential blockages, as well as scheduling routing maintenance. Blocked or obstructed vent piping terminations could result in property damage, severe personal injury, or death.

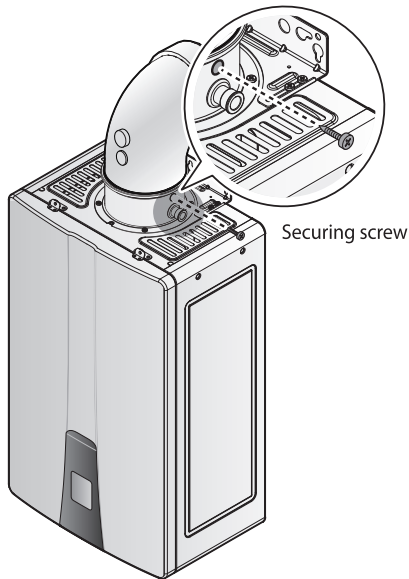
The water heater is designed for a concentric venting system, which uses one pipe with two ducts for combustion air and exhaust air, respectively.

The water heater must be properly vented to ensure a constant supply of clean intake air and to ensure that exhaust air is properly removed from living areas. The vent system must vent directly to the outside of the building and use outside air for combustion. When venting the water heater, follow these guidelines:

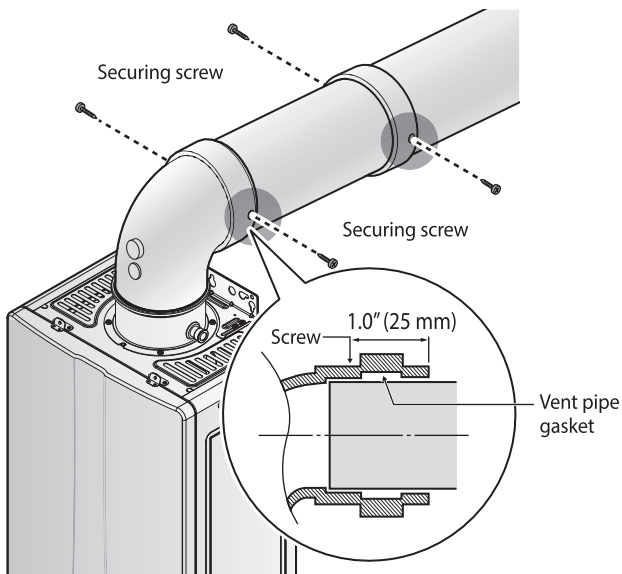
- Do not install the water heater in areas with contaminated air (containing a high level of dust, sawdust, sand, flour, aerosols, or any other such airborne contaminants), as contaminants can cause operational problems. The warranty does not cover damage caused by contaminants in the installation area.
- Do not use PVC, CPVC, ABS, or any galvanized material to vent the water heater.
- Do not combine any vent components or parts from different manufacturers.
- Do not lessen the vent diameter.
- Do not connect the venting system with an existing vent or chimney.
- Do not vent in common with the vent pipe of any other water heater or appliance.
- For best results, keep the venting system as short and straight as possible.
- Locate the water heater as close as possible to the vent termination.
- For horizontal runs, slope the horizontal section upward toward the vent termination at a rate of $\frac{1}{4}$ in per foot (2 % slope) when using a condensate collector. Slope the horizontal section downward toward the vent termination when not using a condensate collector. Refer to the manufacturer's instructions for using a condensate collector.
- Create an airtight seal at the joint in the vent pipe that leads from the water heater collar to the vent termination by fully inserting the vent pipe into the water heater collar. The vent pipe must be inserted 1.3 in (34 mm) into the water heater collar. Once fully inserted, mark the vent pipe with a permanent marker directly above the water heater collar to observe any displacement during the installation process. If displaced, then readjust the vent pipe to ensure full insertion into the water heater collar.

! WARNING

- The vent piece connected to the water heater must be secured by one self-tapping screw.



- Each pipe must be secured using two self-tapping screws when connecting extension pipes or the elbow to the vent piece. When inserting the screws, ensure that you place the screws at a point 1.0 in (25 mm) from the vent pipe end to avoid damaging the vent pipe gasket.



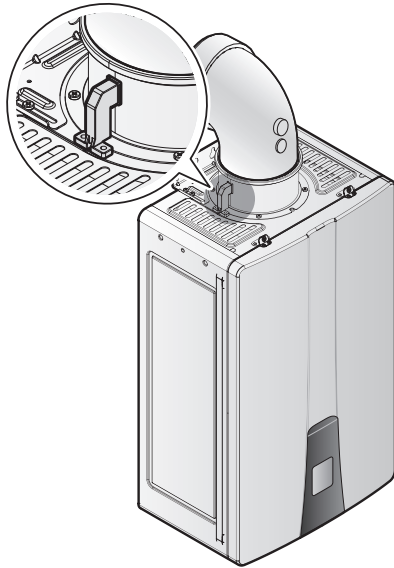
- Ensure that the self-tapping screws are used to secure the pipes together as well as the pipes to the water heater. Failure to do so may result in the pipes being loose and thereby cause property damage, personal injury, or death.

- Do not store hazardous or flammable substances near the vent termination.
- If this water heater will be installed in areas where snow is known to accumulate, protect the vent termination from blockage.
- Ensure that the vent termination is at least 12 in (305 mm) above the highest anticipated snow line, or as required by local codes, whichever is greater.
- Support the vent pipe with hangers at regular intervals or as required by local codes.
- Vent pipes must be supported at least every 4 ft (1.2 m) horizontally and every 6 ft (1.83 m) vertically.
- The vent for this appliance shall not terminate over public walkways; or near soffit vents or crawl space vents or where condensate or vapor could create a nuisance or hazard or cause property damage; or where condensate or vapor could cause damage or could be detrimental to the operation of regulators, relief valves, or other equipment.

3.5.1 About the Vent Installation Detector

The NPN unit comes pre-installed with a Vent Installation Detector ("VID") to assist the installer in properly installing the Intake Air/Exhaust Vent Pipe ("Vent Pipe") into the Intake Air/Exhaust vent collar.

How It Works



As shown, the VID is a device connected to the vent collar which is intended to detect whether the Vent Pipe has been inserted to a sufficient depth into the collar during its initial installation.

During installation, the VID detects whether the vent pipe is fully inserted (at least 1.3 inches or 34 mm) into the collar. If a correctly sized vent pipe (5.0 inch diameter) is fully inserted into the collar, it will press against a switch to activate the VID. If the vent pipe is not fully inserted into the collar, the unit will display an error message and will not operate. Make sure the vent pipe is correctly sized and has been inserted properly if Error 762 appears.

Purpose

The VID's purpose is to guide the installer to fully insert the vent pipe to a depth of at least 1.3 inches or 34 mm, into the collar. If the vent pipe is not properly inserted and installed, it could separate from the collar resulting in flue gas spillage and carbon monoxide emissions which will result in severe personal injury or death.

WARNING

The VID is not intended and should not be relied upon to detect all instances of the vent pipe's vertical movement or separation from the collar. Various factors, including but not limited to sensor failure, switch sticking and corrosion, may cause the VID to remain activated after the vent pipe separates from the collar.

Limitations

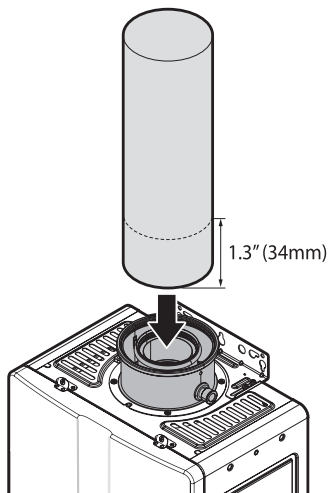
The VID is not an alarm, safety switch or a substitute for a carbon monoxide detector. The VID may not cause the unit to stop operating if the vent pipe is partially or completely dislodged. Other factors can impact the performance of the VID causing it to be unable to function as intended. Such factors include, but are not limited to, deformity of the vent pipe, not using a correctly sized vent pipe, misalignment of the vent pipe into the collar, vertical movement of the vent pipe caused by improper installation, and other misuse or non-conformance with installation instructions.

WARNING

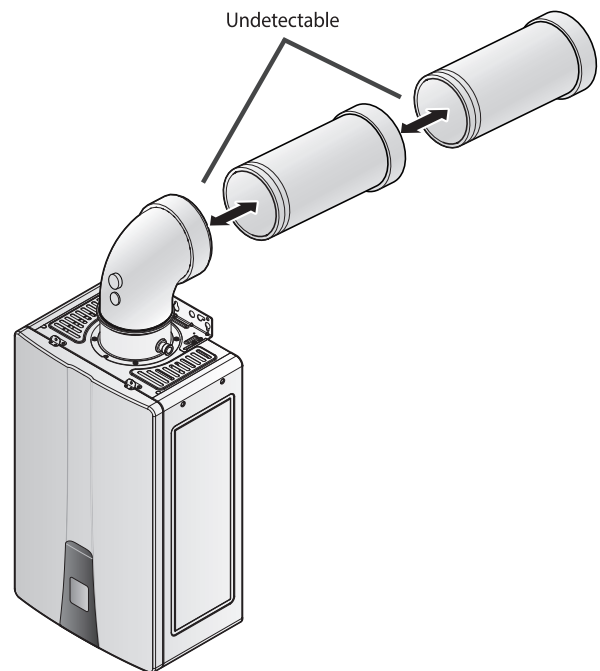
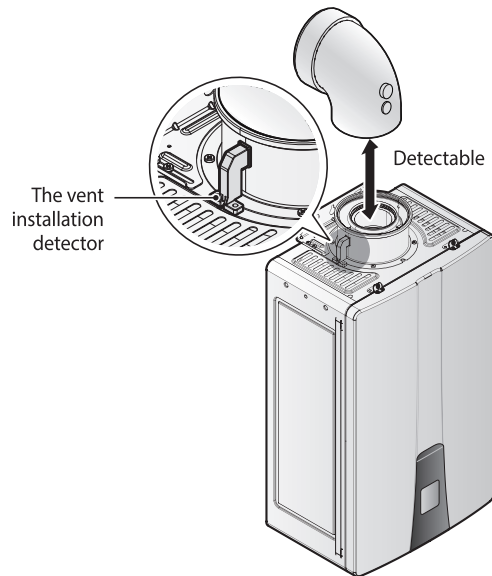
- The list above does not represent an exhaustive list of situations that may prevent proper operation of the VID. It is the installer's responsibility to install the vent pipe properly and to adequately secure the unit to the wall.
- The VID should not be relied upon as a mechanism to secure or hold the vent pipe in the collar. The installer must use the fastening screws provided to secure the vent pipe to the collar as well as follow all other installation directions and requirements. Over tightening of the fastening screws may puncture the vent pipe.

! WARNING

- The vent pipe must be inserted 1.3 in (34 mm) into the water heater collar. If the vent pipe is not fully inserted, the vent installation detector switch will detect it and the water heater may not operate. Make sure that the pipe is inserted properly and that only the correctly sized vent pipe materials are used or an error code E762 can appear on the front panel.
- The failure to properly install the vent pipe into the water heater collar or using incorrectly sized vent pipe materials in strict compliance with installation instructions may cause the vent pipe to separate from the water heater which will result in excessive carbon monoxide emissions and extremely dangerous conditions which can lead to severe personal injury and/or death.
- Be sure to conduct a visual inspection of the vent pipe before inserting the vent pipe into the water heater collar. The portion of the vent pipe inserted into the water heater collar must be free from damage or defects in order for the vent installation detector to operate properly. If the vent pipe is damaged, then replace it with new vent pipe. The vent installation detector only detects separation of the vent pipe from the water heater collar if fully inserted 1.3 in (34 mm). The vent installation detector will not detect the separation of connected vent pipe if the joints become detached.



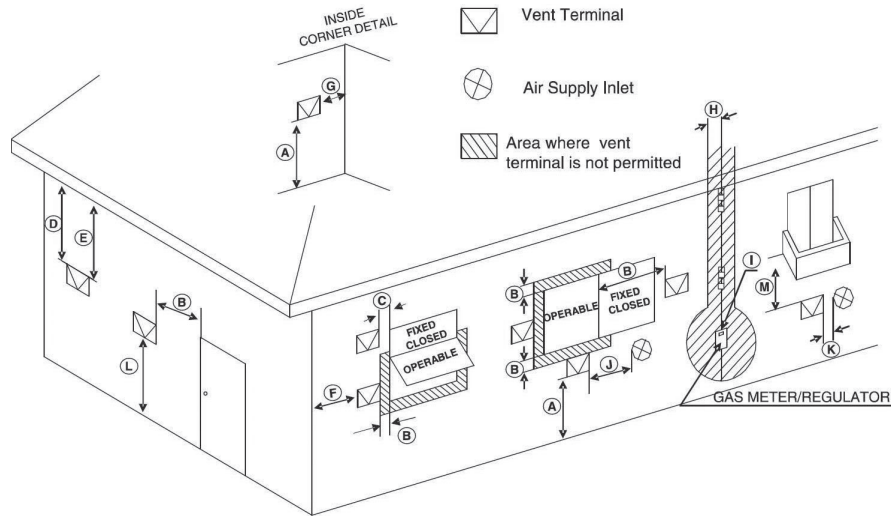
! WARNING



3.5.2 Maintaining Clearances

Terminal clearances

Maintain the following venting clearances, as required by **ANSI Z21.10.3** and the **National Fuel Gas Code, ANSI Z223.1/NFPA 54**:



For indoor models (direct vent)

Ref	Description	Direct Vent Installations ¹
A	Clearance above grade, veranda, porch, deck, or balcony	12 in (30 cm)
B	Clearance to window or door that may be opened	12 in (30 cm)
C	Clearance to permanently closed window	*
D	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 ft (61 cm) from the center line of the terminal	*
E	Clearance to unventilated soffit	*
F	Clearance to outside corner	*
G	Clearance to inside corner	*
H	Clearance to each side of center line extended above meter/regulator assembly	*
I	Clearance to service regulator vent outlet	*
J	Clearance to nonmechanical air supply inlet to building or the combustion air inlet to any other appliance	12 in (30 cm)
K	Clearance to a mechanical air supply inlet	3 ft (91 cm) above if within 10 ft (3 m) horizontally
L	Clearance above paved sidewalk or paved driveway located on public property	*
M	Clearance under veranda, porch deck, or balcony	*

¹ In accordance with the current ANSI Z223.1 / NFPA 54 National Fuel Gas Code

† A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings.

‡ Permitted only if veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor.

* Clearance in accordance with local installation codes and the requirements of the gas supplier.

For outdoor models (other than direct vent)

Ref	Description	Non-Direct Vent Installation Clearance ¹
A	Clearance above grade, veranda, porch, deck, or balcony	12 in (30 cm)
B	Clearance to window or door that may be opened	4 ft (1.2 m) below or to side of opening; 1 ft (300 mm) above opening
C	Clearance to permanently closed window	*
D	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 ft (61 cm) from the center line of the terminal	*
E	Clearance to unventilated soffit	*
F	Clearance to outside corner	*
G	Clearance to inside corner	*
H	Clearance to each side of center line extended above meter/regulator assembly	*
I	Clearance to service regulator vent outlet	*
J	Clearance to nonmechanical air supply inlet to building or the combustion air inlet to any other appliance	4 ft (1.2 m) below or to side of opening; 1 ft (300 mm) above opening
K	Clearance to a mechanical air supply inlet	3 ft (91 cm) above if within 10 ft (3 m) horizontally
L	Clearance above paved sidewalk or paved driveway located on public property	*
M	Clearance under veranda, porch deck, or balcony	*

¹ In accordance with the current ANSI Z223.1 / NFPA 54 National Fuel Gas Code

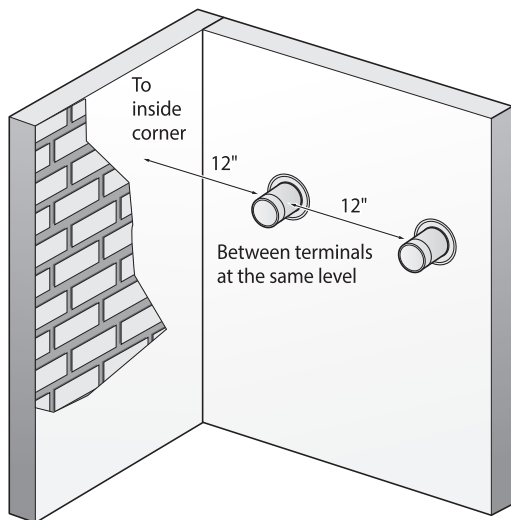
† A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings.

‡ Permitted only if veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor.

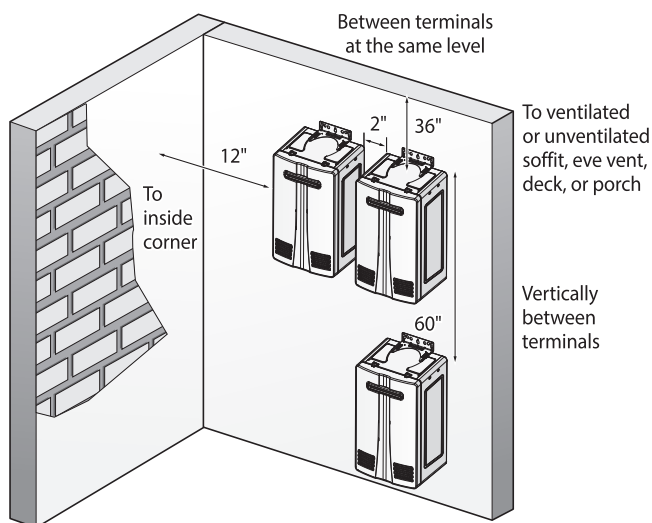
* Clearance in accordance with local installation codes and the requirements of the gas supplier.

Clearances for sidewall terminations

Multiple-unit, concentric wall terminals: Space each concentric wall terminal at least 12 in (30 cm) apart, regardless of the orientation. A concentric wall terminal must also be at least 12 in (30 cm) away from the inside corner of a wall. If the adjacent wall is less than 12 in (30 cm) in length, the minimum required distance away from the inside corner will be equal to the length of the adjacent wall.



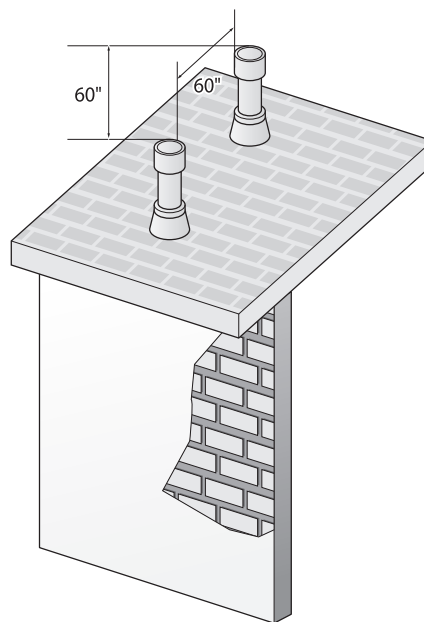
[NPN-160U/180U/199U]



[NPN-160E/180E/199E]

Clearances for rooftop terminations

The minimum spacing required between multiple concentric terminals on different levels of a rooftop is 60 in (150 cm).



[NPN-160U/180U/199U]

3.5.3 Measuring Vent Length (Indoor Models Only)

Refer to the table to find the maximum vent length based on the number of elbows. (Two 45 degree elbows count as one 90 degree elbow.)

Vent type	Diameter	Max number of 90° Elbows	Max. Vertical and Horizontal (Total) Vent Length
Concentric	3 in. / 5 in. (80 mm / 125 mm)	4	43 ft (13 m)

Number of 90° Elbows	Maximum vent length
0	43 ft (13 m)
1	38 ft (11.5 m)
2	33 ft (10 m)
3	28 ft (8.5 m)
4	23 ft (7.0 m)

Note The Maximum Length does not include any elbows.

3.5.4 Terminating the Vent







Before installing the water heater, determine what type of vent termination is appropriate for the installation location and situation. Examples in this section describe typical venting configurations, but they do not include all possible options.






The following terminations can be used. Refer to the vent manufacturer's instructions for detailed installation procedures.

DuraVent, Inc. Venting Components

Note Refer to the contact information of the manufacturer if necessary:

- Manufacturer: DuraVent
- Tel: 800-835-4429
- E-mail: customerservice@duravent.com
- Website: www.duravent.com

Concentric Sidewall Termination Kit		Vent Pipe Extension		Concentric Elbow	
					
11-1/2" (292mm) Length Navien Part #GXXX001891 UPC #884954220925	21" (533mm) Length Navien Part #GXXX001892 UPC #884954220932	10" (254mm) Length Navien Part #GXXX001896 UPC #884954220970	39" (533mm) Length Navien Part #GXXX001897 UPC #884954220987	45° Elbow Navien Part #GXXX001894 UPC #884954220956	90° Elbow Navien Part #GXXX001895 UPC #884954220963
* Includes: One Sidewall Termination, One 90° Elbow, Two Wall Plates					

Replacement Gasket		Concentric Roof Termination		
				
Blue Silicone Navien Part #GXXX001898 UPC #884954220994	Black EPDM Navien Part #GXXX001899 UPC #884954221007	18" Length Navien Part #GXXX001893 UPC #884954220949	Ø5" Flat Roof Flashing Navien Part #GXXX001900 UPC #884954221014	Ø5" Adjustable Roof Flashing Navien Part #GXXX001901 UPC #884954221021

Metal Wall Strap	Condensate Trap
	
6 Straps per Box Navien Part #GXXX001902 UPC #884954221038	Navien Part #GXXX001952 UPC #884954228150

Metal-Fab, Inc. Venting Components

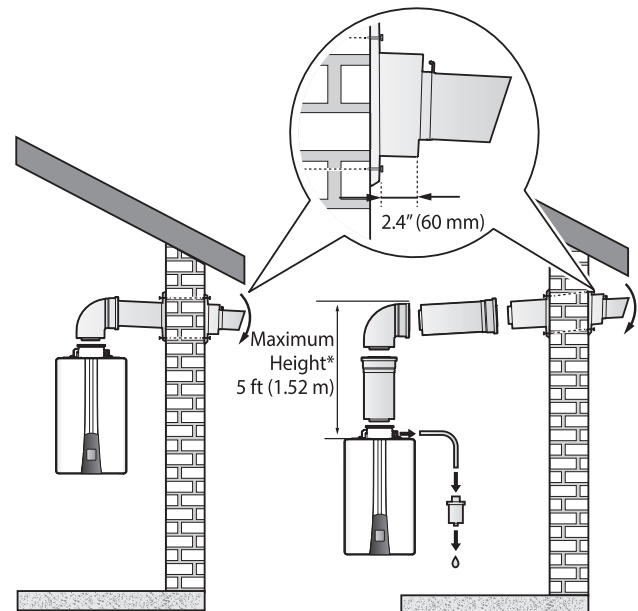
Note Refer to the contact information of the manufacturer if necessary:

- Manufacturer: Metal-Fab
- Tel: 800-835-2830
- E-mail: info@mtlfab.com
- Website: www.metal-fabinc.com

No.	Item
RTG20151D-1	36" Vent Pipe
RTG20151C-1	24" Vent Pipe
RTG20151R	12" Vent Pipe
RTG20151W	6" Vent Pipe
RTG20151E-1	7.5"-22" Adjustable Vent Pipe
RTG20151Y	13"-20" Adjustable Vent Pipe
RTG20151B-1	45 degree Elbow
RTG20151A-1	90 degree Elbow
RTG20211	Vent Termination Kit, contain storm collar, pitched cone flashing, vertical termination with rain cap
RTG20151P	Roof Termination
RTG20151M-1	Storm Collar
RTG20151(K,L,J)-1	Roof Flashing
RTG20151T	Support Plate
RTG20151AA	Trim Ring
RTG20151(G,H)	Metal Wall Strap
RTG20151(X,Z)	Wall Thimble
RTG20210	10" Side Wall Termination Kit. Includes one side wall termination, one 90 degree elbow, one wall plate.
RTG20231	6" Side Wall Termination Kit. Includes one low-profile side wall termination, one 90 degree elbow, one wall plate.
RTG20234	8" Side Wall Termination Kit. Includes one low-profile side wall termination, one 90 degree elbow, one wall plate.
RTG20257	10" Side Wall Termination Kit. Includes one low-profile side wall termination, one 90 degree elbow, one trim ring.
RTG20258	12" Side Wall Termination Kit. Includes one low-profile side wall termination, one 90 degree elbow, one trim ring.
RTG20230	4" Low-Profile Termination
RTG20233	6" Low-Profile Termination
RTG20259	8" Low-Profile Termination
RTG20260	10" Low-Profile Termination

Horizontal Termination

Regions with cold climates will produce more condensate in the vent system. The condensate collector should be used in cold climates. If more than one elbow is used in the vertical section, the condensate collector must be used. The condensate collector must also be used in horizontal terminations if a vertical rise in the vent system exceeds 5 ft. Slope the vent $\frac{1}{4}$ " per foot downward towards the termination or upward if using a condensate collector as illustrated below.

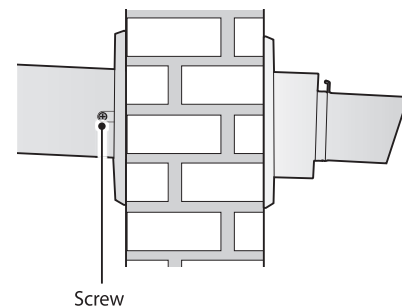


[Example of Termination without Condensate Collector]

[Example of Termination with Condensate Collector]

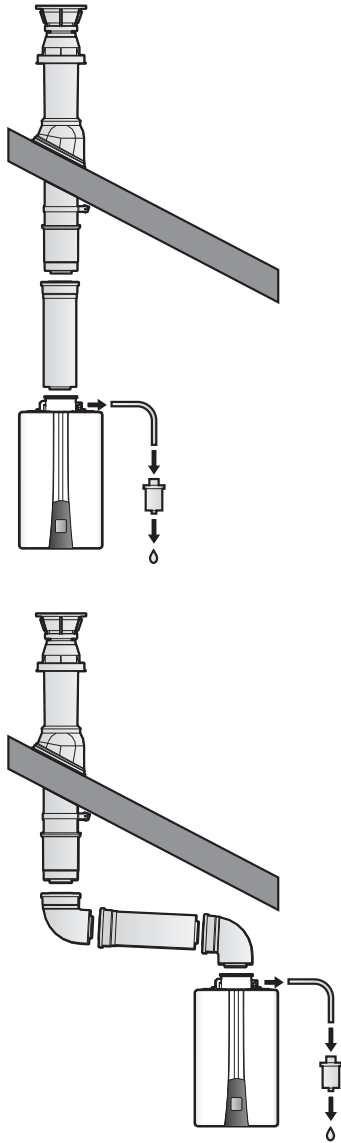
Note

Secure the wall thimble plate to the vent pipe and the wall by tightening the provided screws in the left and right screw holes.



Vertical Termination

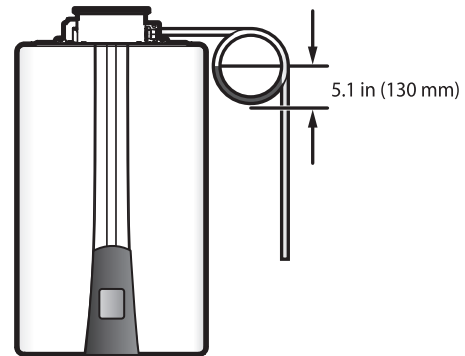
Use a condensate collector in all installations.



3.5.5 Draining Condensate (Indoor Models Only)

WARNING

If a condensate trap hose is installed, the water inside the hose should be higher than 5.1 in (130 mm), and water should be inside the hose before operating the water heater. Do not remove the condensate collector cap unless a condensate trap is attached. If a condensate trap is not installed properly as explained above, it could result in injury or death.



The water heater will create condensation when it operates.

Condensate will eventually damage the heat exchanger if it is not drained properly. Follow all local codes and regulations when disposing the condensate from the water heater.

Installation

- For vertical terminations, install a condensate drain and trap as close to the appliance as possible.
- Slope the vent in accordance with the vent manufacturer's installation instructions.
- Use only corrosion resistant materials for the condensate drain lines, such as PVC pipe or plastic hose.
- The condensate drain pipe (along its entire length) must be at least the same diameter as the drain line (5/8 inch).
- The end of the condensate drain pipe should be open. The end should not be under water or any other substances.
- To help prevent the condensate from freezing, run the condensate drain line through an interior wall or between insulation and an interior wall.
- The condensate collector should be used for all combination domestic/hydronic heating applications.

Guidelines

- Do not allow condensate to enter the water heater.
- Do not connect the condensate drain pipe directly to the storm sewer.
- Do not connect the condensate drain line with the evaporator coil drain of an air conditioner.
- Do not connect the condensate drain line to the pressure relief valve or the line of the appliance.
- Use only venting that is approved and identified as acceptable for your particular model.

3.6 Connecting the Power Supply

WARNING

Improperly connecting the power supply can result in electrical shock and electrocution. Follow all applicable electrical codes 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 USA**. Connecting the power supply should be performed only by a licensed professional.

When connecting the power supply, follow these guidelines:

- Do not connect the electric supply until all plumbing and gas piping is complete and the water heater has been filled with water.
- Do not connect the water heater to a 220-240 V AC power supply. Doing so will damage the water heater and void the warranty.
- Universal models come with a factory-installed, 3-pronged (grounded) plug. The water heater can be plugged into any grounded electrical outlet nearby, as it requires only 2-4 Amps. It is not necessary to run a dedicated electrical line to the water heater.
- Keep power cord free of dust.
- Do not use a broken or modified power cord.
- Do not bind, bend or stretch power cords.
- If local codes require the water heater to be wired directly, remove and discard the factory-installed plug. Install a power switch between the breaker and the water heater to facilitate end-user maintenance and servicing. Connect the water heater to a 110-120 V AC at 60 Hz with a maximum of 2 A (4 A if an external pump is connected) rating electrical supply.
- A junction box is provided underneath the water heater if a direct electrical connection is required.
- The water heater must be electrically grounded. If using the power plug, ensure that the electrical outlet you connect the water heater to is properly grounded. If wiring the water heater directly to a power supply, do not attach the ground wire to either the gas or the water piping as plastic pipe or dielectric unions may prevent proper grounding.

- We recommend using a surge protector to protect the water heater from power surges.
- If there is a power failure in cold weather areas, the freeze prevention system in the water heater 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 water heater 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 temperatures due to power loss is not covered under warranty.

If you are not using your water heater for a long period of time:

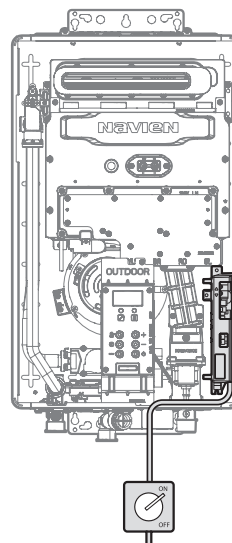
1. Completely drain the water out of the water heater.
2. Disconnect the power supply to the water heater. This prevents your water heater from freezing and being damaged.

CAUTION

Label all wires before disconnecting them when you work on the controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

Disconnect Switch (Outdoor Models Only)

On outdoor models, there must be a disconnect switch installed for the incoming 120 V AC power. It should be designed to be suitable for outdoor use. Make sure that you are in compliance with the National Electrical Code, ANSI/NFPA 70, and your local codes to ensure that you are using a proper switch type for your area.



3.7 Setting the DIP Switches

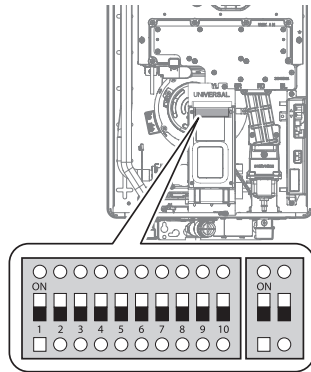
The water heater has two DIP switch locations: on the main circuit board (PCB) and on the front panel. Each location has two sets of DIP switches that control the functionality of the water heater. Set the DIP switches appropriately, based on the installation environment.

3.7.1 Circuit Board DIP Switches

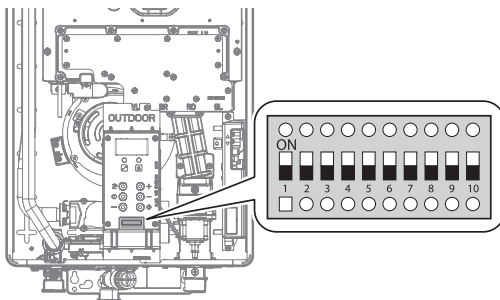
The two sets of DIP switches on the circuit board configure the water heater's model settings. These configurations are set at the factory and should not be changed.

3.7.2 Setting the Front Panel DIP Switches

The two sets of DIP switches on the front panel configure the water heater's pump & recirculation, display, well pump, storage tank & solar system, lime alarm, high altitude, cascade venting and gas type settings. Some of these configurations are set at the factory and should not be changed. The following tables describe the functions of the DIP switches and their settings:



[NPN-160U/180U/199U]



[NPN-160E/180E/199E]

• 10-switch Panel:

Switch	Function		Setting	Remark
1	Gas Type	Off	Natural Gas	This can only be selected when the power is on or when the DIP switch error has been solved.
		On	Propane Gas	
3	Recirculation Mode-External Pump Connected**		Preheating*	3: ON
4	Display Temperature Unit		Celsius	4: ON
			Fahrenheit	4: OFF
5	Well Pump		Well Pump Operation	5: ON
			Do Not Use Well Pump	5: OFF
6	DHW Storage Tank		Storage Tank Operation	6: ON
			Do Not Use Storage Tank	6: OFF
7	Commercial Lock		Temperature can be set.	7: OFF
			Temperature cannot be set.	7: ON
8	Limescale Detection Alarm		Disable the limescale detection alarm.	8: OFF
			Use limescale detection alarm. (12 month interval)	8: ON
9 & 10	High Altitude ***		0–1,999 ft (0–609 m)	9: OFF, 10: OFF
			2,000–5,399 ft (610–1,645 m)	9: ON, 10: OFF
			5,400–7,699 ft (1,646–2,346 m)	9: OFF, 10: ON
			7,700–10,100 ft (2,347–3,078 m)	9: ON, 10: ON

***Preheating:**

- Preheating starts when remote controller is not connected.
- When remote controller is connected, preheating starts and operates based on the timer.
- Set the timer on the remote controller to use hot water at the time of your choice.
- Preheating does not function in Cascade Mode (Preheating OFF).
- Freeze protection is still available with preheating OFF.

****External Pump:**
These settings are to be used when an external pump is wired to the water heater.

*****High Altitude**
Above 2,000 ft (610 m), the water heater will de-rate by 4% for each 1,000 ft (305 m) of altitude gain.

Note This water heater may be installed at elevations up to 10,100 ft (3,078 m) for use with Natural Gas and Propane. To use the water heater at a specific altitude, the DIP switches should be set as described above.


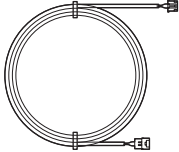

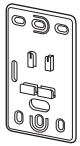
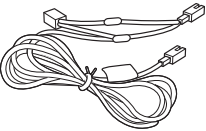
 **CAUTION**

Do not configure the system for DHW recirculation when it is configured to run an air handler using the H2Air controller. DHW recirculation and Navien H2Air configurations cannot be used at the same time.

4. Configuring the Remote Controller System

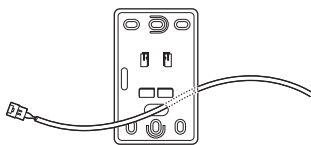
4.1 Included Items

When you open the box, you will find the following items with the remote controller. Check the box for each of the following items before installing the remote controller.

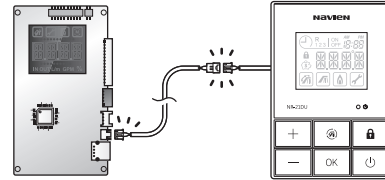
	
Remote Controller	Extension Cable
	
2 Tapping Screws	Wall Mounting Bracket
	
Multi Remote Controller Cable (optional)	

4.2 Connecting the Extension Cable

1. Connect one end of the extension cable to the port on the front panel of the water heater.
2. Pass the other end of the extension cable through the hole in the bracket.

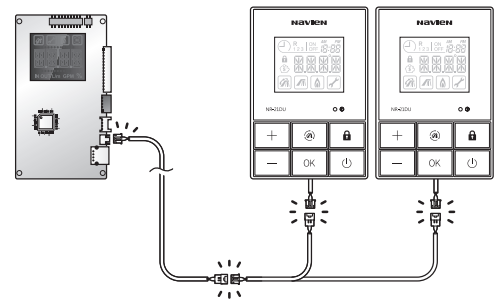


3. Connect the end of the extension cable to the cable connected to the remote controller.



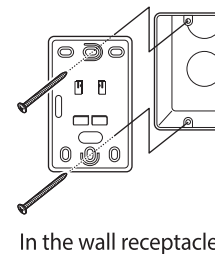
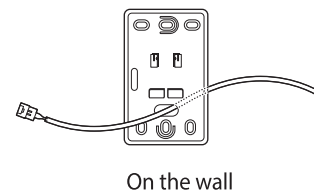
Note

You can connect up to 2 remote controllers if necessary. (Optional)



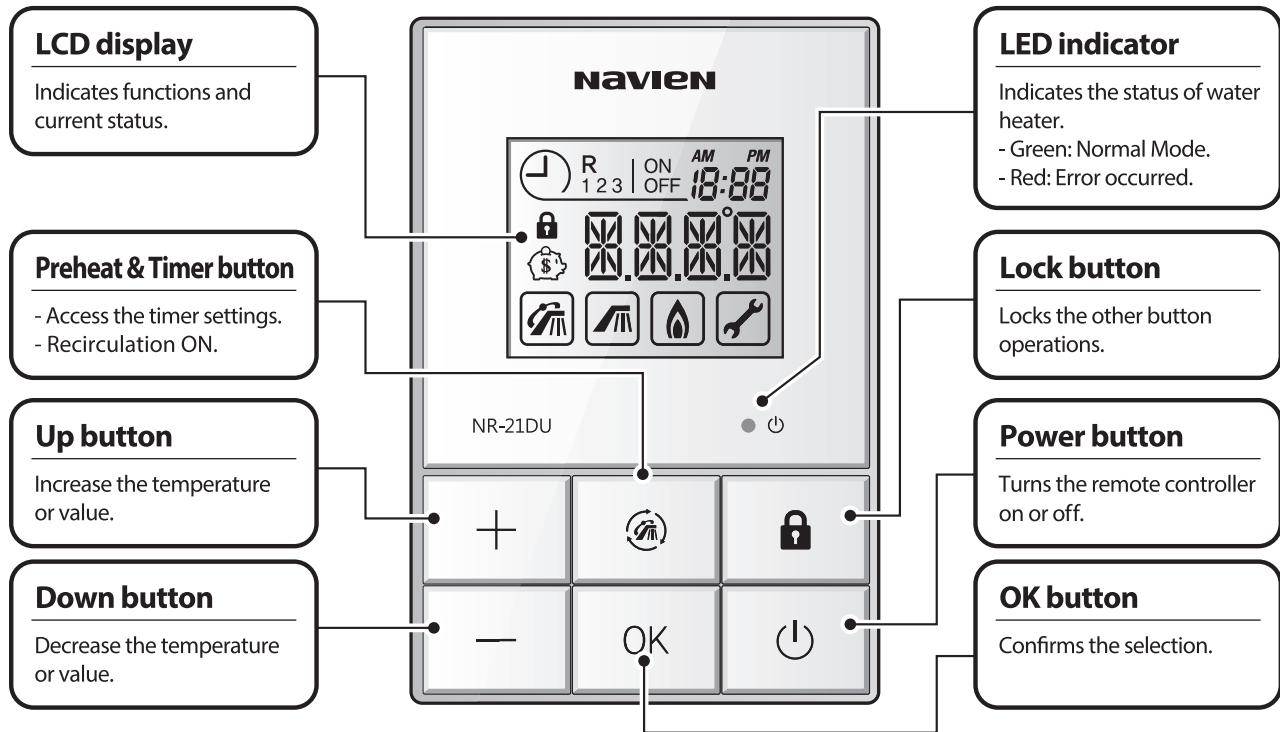
4.3 Attaching the Wall Mounting Bracket

1. Affix the bracket securely to the wall by fastening 2 screws to the wall or to the 2 holes in the wall receptacle.



2. Hang the remote controller on the bracket by aligning the hooks.

4.4 Remote Controller



Timer is set.



Recirculation Mode.



Displays the current time.



Hot water is in use.



Displays the current set temperature.



Water heater operation is in progress.



Operations are locked.



An error code will appear on the display.

4.5 Multi Remote Controller System

The multi remote controller system consists of one main remote controller and one sub remote controller. The system must have only one main remote controller.

4.5.1 Initially Setting the Multi Remote Controller System

If you turn on the water heater with the front panel connected to two remote controllers, one of the controllers is set to the main controller randomly. The other controller will display "MAIN" on its LCD display and you have to set its operation mode to Sub.



The remote controller that does not display "MAIN" is already operating as the main controller, you don't have to set its operation mode.

You can set the operation mode of the remote controller that displays "MAIN." When you set the controller as a sub, the multi remote controller system configuration completes.

Note

If you press the OK button on the controller displaying "MAIN" and set its operation mode to Main while the main controller has already been determined, the other controller will display "MAIN" to indicate that you must set the main and sub operation modes properly.

1. Press the Down button on the remote controller displaying "MAIN" to set its operation mode to "SUB."



Then, press the OK button to set the operation mode to Sub.

2. "SL.xx" appears on the display.
It represents the standby status to receive the sub remote controller ID from the main remote controller synced to the front panel of the water heater.



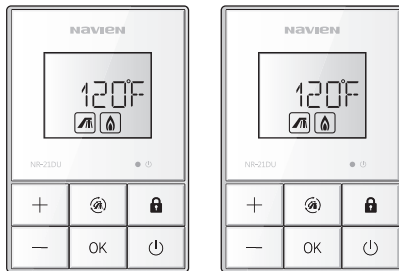
3. When the ID is assigned, the ID appears and flashes on the LCD display for 2 seconds.



- "SYNC" appears on the LCD display for 5-10 seconds until it syncs with the connected panel and the main remote controller after the ID is assigned.



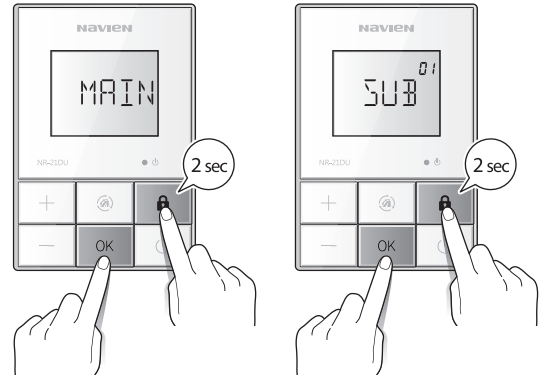
- When the synchronization completes, identical information will appear on the displays of the main and sub controllers. The two controllers and front panel will be controlled simultaneously by controlling only one controller.



4.5.2 Checking the Multi Remote Controller System Setting

After completing the multi remote controller setting, you can check the setting by pressing the OK button and Lock button simultaneously for 2 seconds.

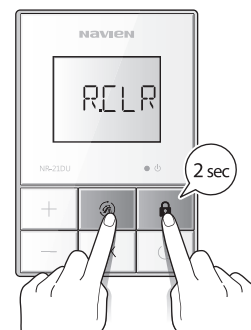
Verify that the setting is successful by confirming that one controller displays "MAIN" and the other one displays "SUB."



4.5.3 Initializing the Multi Remote Controller System Setting

You can initialize the multi remote controller system when you have to reset or replace the multi remote controllers. Press the Preheat & Timer button and Lock button simultaneously for 2 seconds on any of the controllers.

After initializing the setting, repeat the instructions from the "4.5.1 Initially Setting the Multi Remote Controller System" on page 46.



Note

If you initialize only one of the controllers, the other one is initialized automatically.

4.6 Entering Lock Mode

To prevent accidental pressing of the buttons and to prevent children from adjusting the controller, you can activate the Temperature Lock Mode.

To activate or deactivate Lock Mode, press the Lock button for 2 seconds.



When Lock Mode is activated,

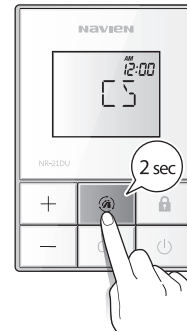
- The Lock icon appears on the display.
- All buttons except for Lock button are locked.

Note

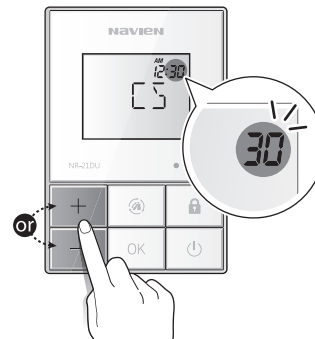
- Resetting errors or alarms is still available with Lock Mode activated.
- You can change the settings from the front panel with Lock Mode activated.

4.7 Setting the clock

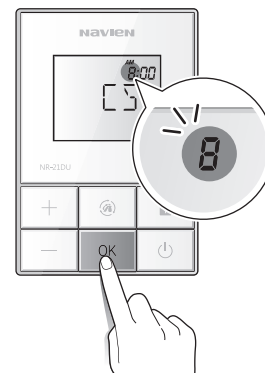
1. Press the Preheat & Timer button for 2 seconds.



2. Adjust the minutes by pressing the Up or Down Button. Press the OK button to set the minutes.



3. Once the minutes are set, adjust the hour by pressing the Up or Down button.



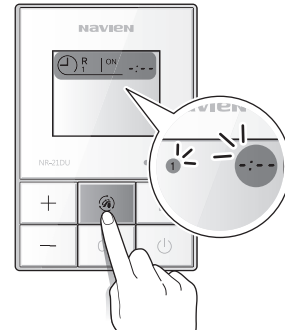
4. Press the OK button to finish and save the updated time.



4.8 Setting the Recirculation timer

1. Press the Preheat & Timer button to set the Recirculation timer while setting the clock.

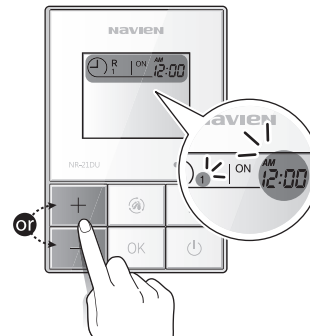
Reservation Schedule #1 is ready to be set.



Note

This feature is available only when external circulating pumps are connected and ON.

2. Set the recirculation activation time by pressing the Up or Down button.

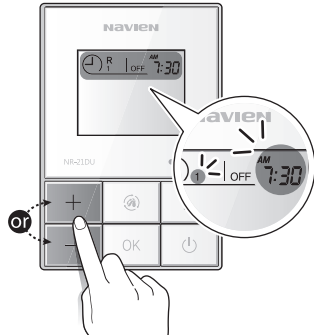


Then, press the OK button to set the deactivation time.

Note

The recirculation timer settings are divided in 30 minute increments.

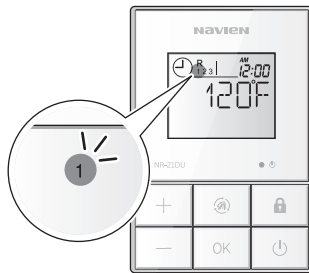
- Set the deactivation time by pressing the Up or Down button.



- Press the OK button to save the timer setting. Repeat these procedures for Reservation Schedule Settings #2 and #3.



- During the reservation schedule, the preheating icon turns on and the Reservation area starts flashing.



Note

This is applied to A models with the preheating function only.

4.9 Starting Recirculation

Press the Preheat & Timer button to start recirculation immediately, regardless of the reservation schedule.

"HEAT" appears for 4 seconds on the display and then recirculation runs once.



During the recirculation, the preheating icon flashes continuously.

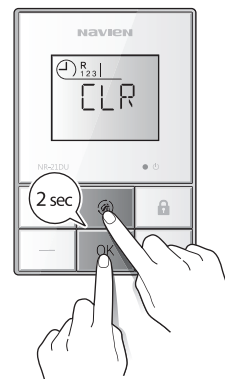
Note

- This feature is available only when external circulating pumps are connected and ON.
- This feature runs during the recirculation time set on the front panel which the remote controller is connected to.

4.10 Canceling all timer settings

Press and hold the Preheat & Timer and OK button simultaneously for 2 seconds.

"CLR" appears for 3 seconds and all timer settings are canceled.



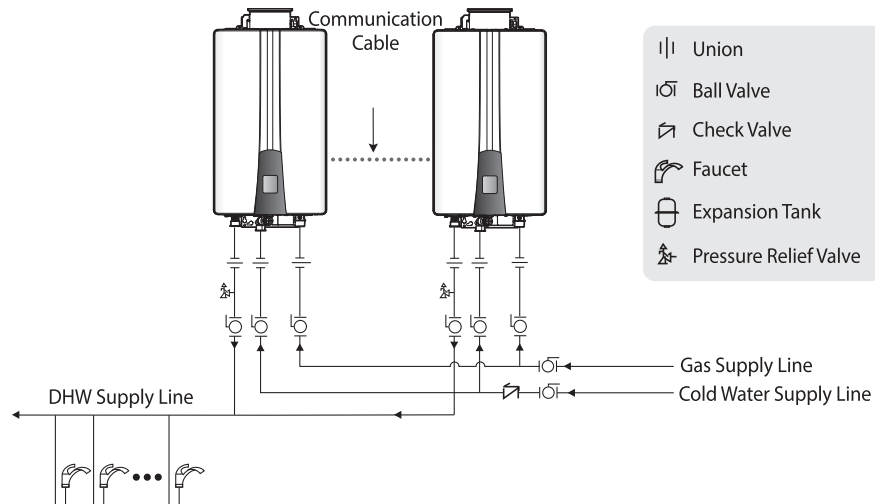
5. Installing a Cascade System

When installing a cascade system, carefully consider the design of the system and the features of the installation location. Follow all local codes and regulations, as well as all guidelines for installing the water heater. The following sections describe additional considerations that are specific to installing cascade systems. Read them carefully before designing or installing the system.

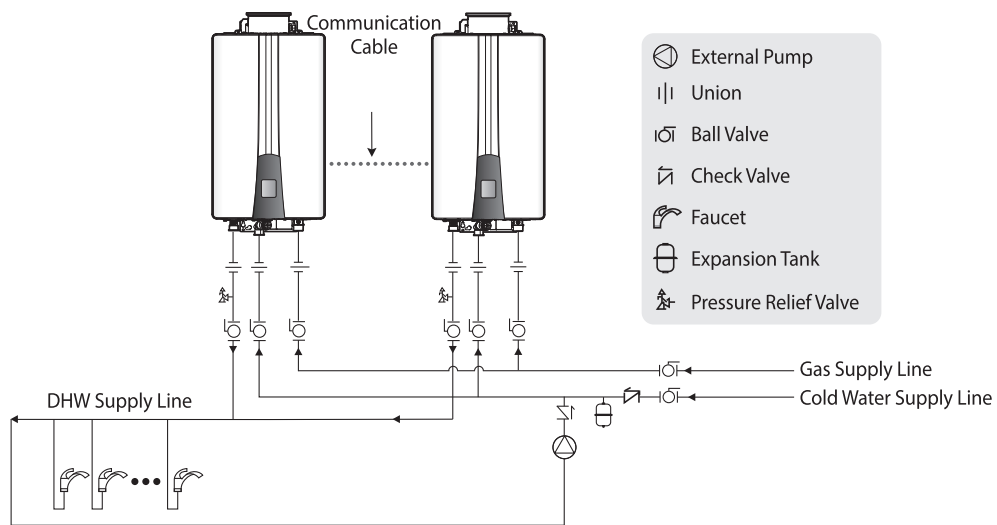
5.1 Connecting Water Supplies

Several options are available for plumbing a cascade system of water heaters. The options shown here are only examples. The setup you choose will vary based on the installation location, local building codes, and other factors. Follow all applicable regulations when installing a cascade system.

You can connect up to two water heaters to meet high-volume hot water demands.



[Example of Water Heater 2-Unit Cascade System]



[Example of Water Heater 2-Unit Cascade System with Recirculation]

5.1.1 Piping Sizes and Considerations

When plumbing a cascade system, consider the following pipe diameters and flow rates. Note that flow rates above 6.6 ft/s may cause pipe erosion. These specifications may vary depending on installation conditions.

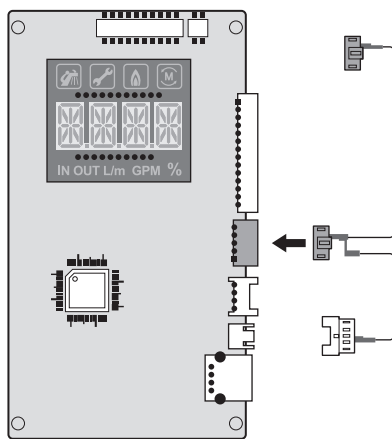
Qty	$\Delta T=54^{\circ}F$ Flow rate (GPM)	Water Velocity (ft/s)	Pipe Diameter (mm/in)	
1	6.02	4.38	20A	$\frac{3}{4}$ in
2	12.04	4.92	25A	1 in

Note The table above is based on model NPN-199.

5.2 Connecting the Communication Cables

Two water heaters can be connected with Navien Ready-Link communication cables. Select one of the water heaters in the cascade system as the Main water heater, and then connect the other water heater to it as the Sub. Before making any connections, ensure that the power is turned off to all water heaters.

Connect the Ready-Link cables to the J6 ports on the right side of the front panel:

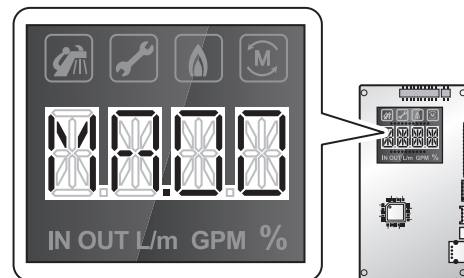


5.2.1 Configuring the Communication Settings

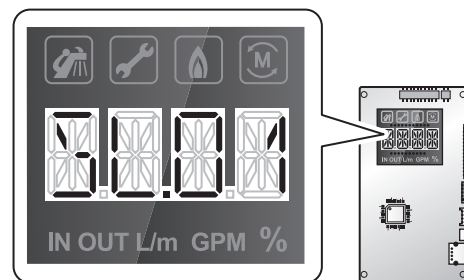
After connecting the Ready-Link communication cables, restore power to the water heater and turn on all water heaters using the Power button.

To configure the communication settings:

1. On the Main water heater, press and hold the **Diagnostic** and **Up(+)** buttons for more than 5 seconds. "MA.00" will appear on the display to confirm that this water heater is set as the Main.



2. On the Sub water heater, press and hold the **Diagnostic** and **Down(-)** buttons for more than 2 seconds. "SL.01" will appear on the display to confirm that this water heater is set as the Sub.



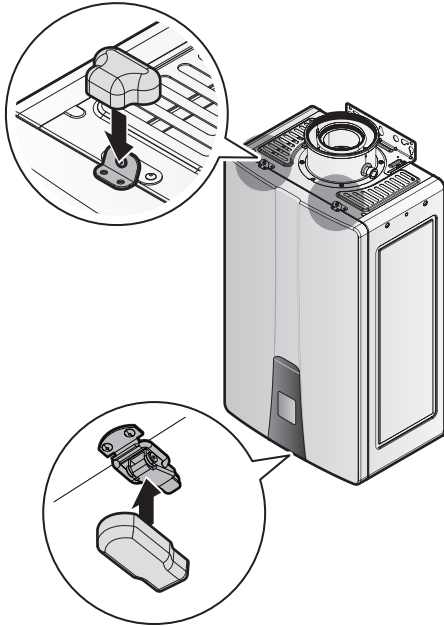
3. On the Main water heater, press and hold the **Diagnostic** and **Up(+)** buttons for more than 5 seconds. The display screen on the configured water heater will return to the temperature display.

Note To cancel the cascade communication setup, on the Main water heater, press and hold the **Diagnostic** and **Reset** buttons for more than 5 seconds. The water heater will revert to independent operation. Repeat steps 1-3 to reassign the Main water heater.

6. Appendixes

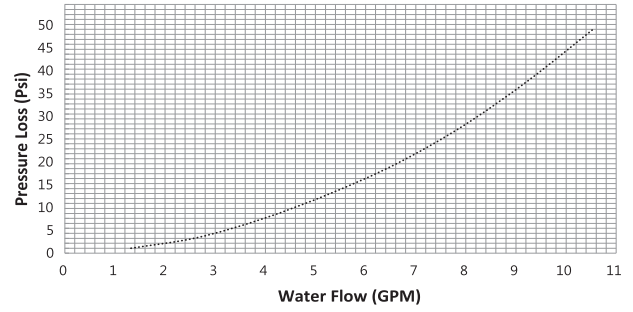
6.1 Covering the Clamps with Front Cover Cap

After installing the water heater completely, cover the indicated clamps with the front cover caps provided with the product.

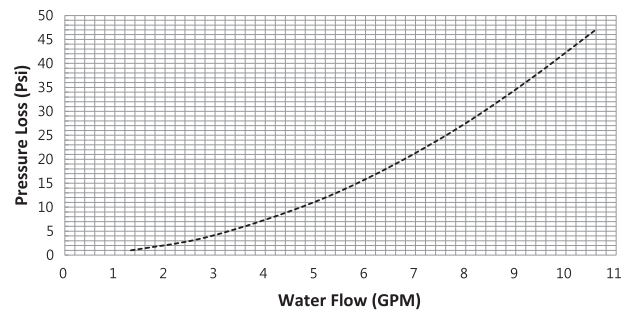


6.2 Technical Data

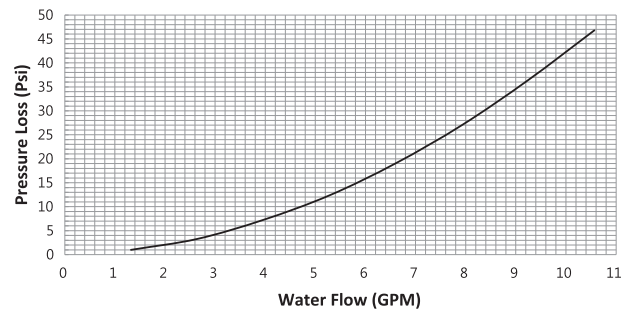
6.2.1 Pressure Drop Curve



[NPN-160U/160E]

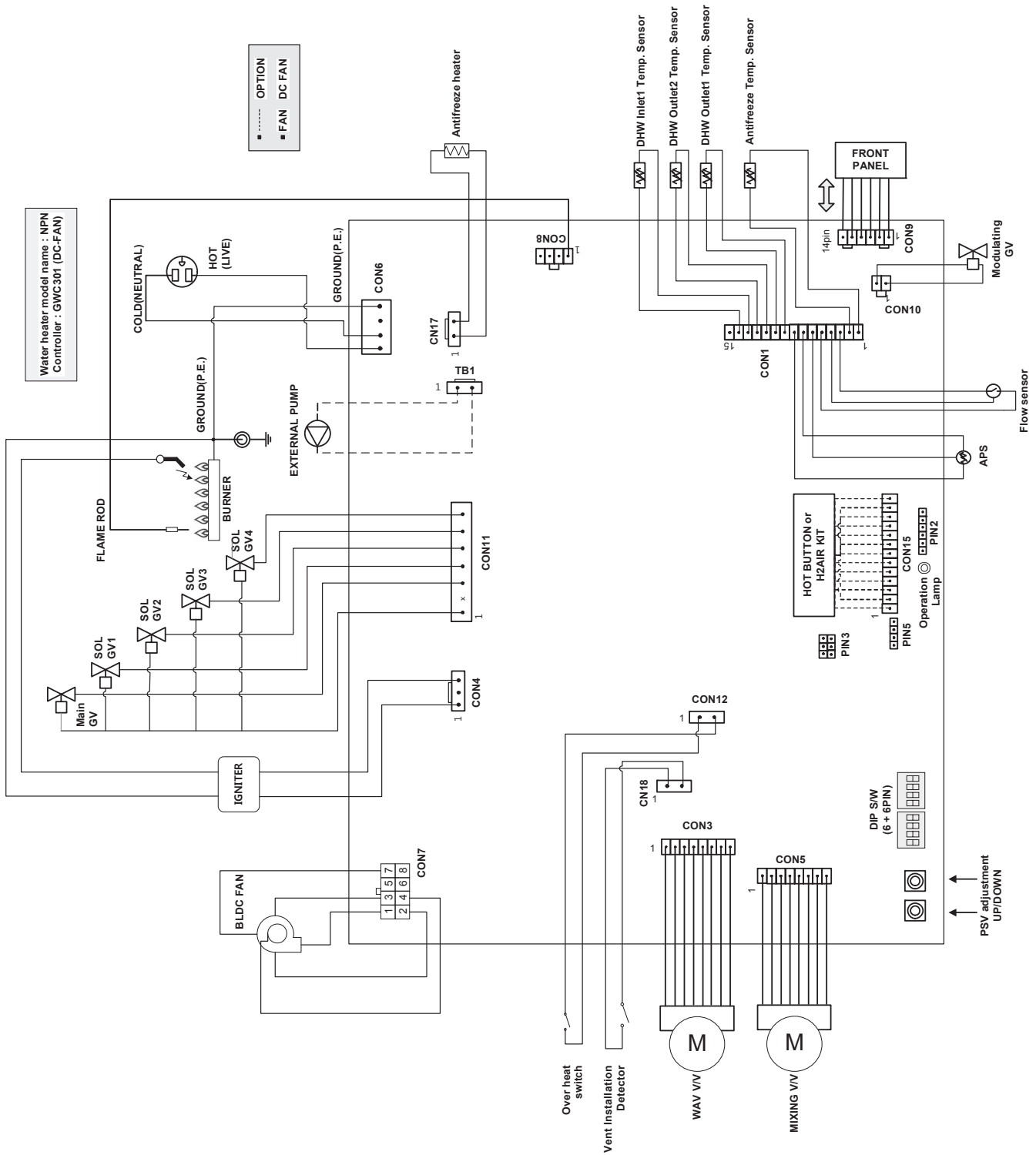


[NPN-180U/180E]

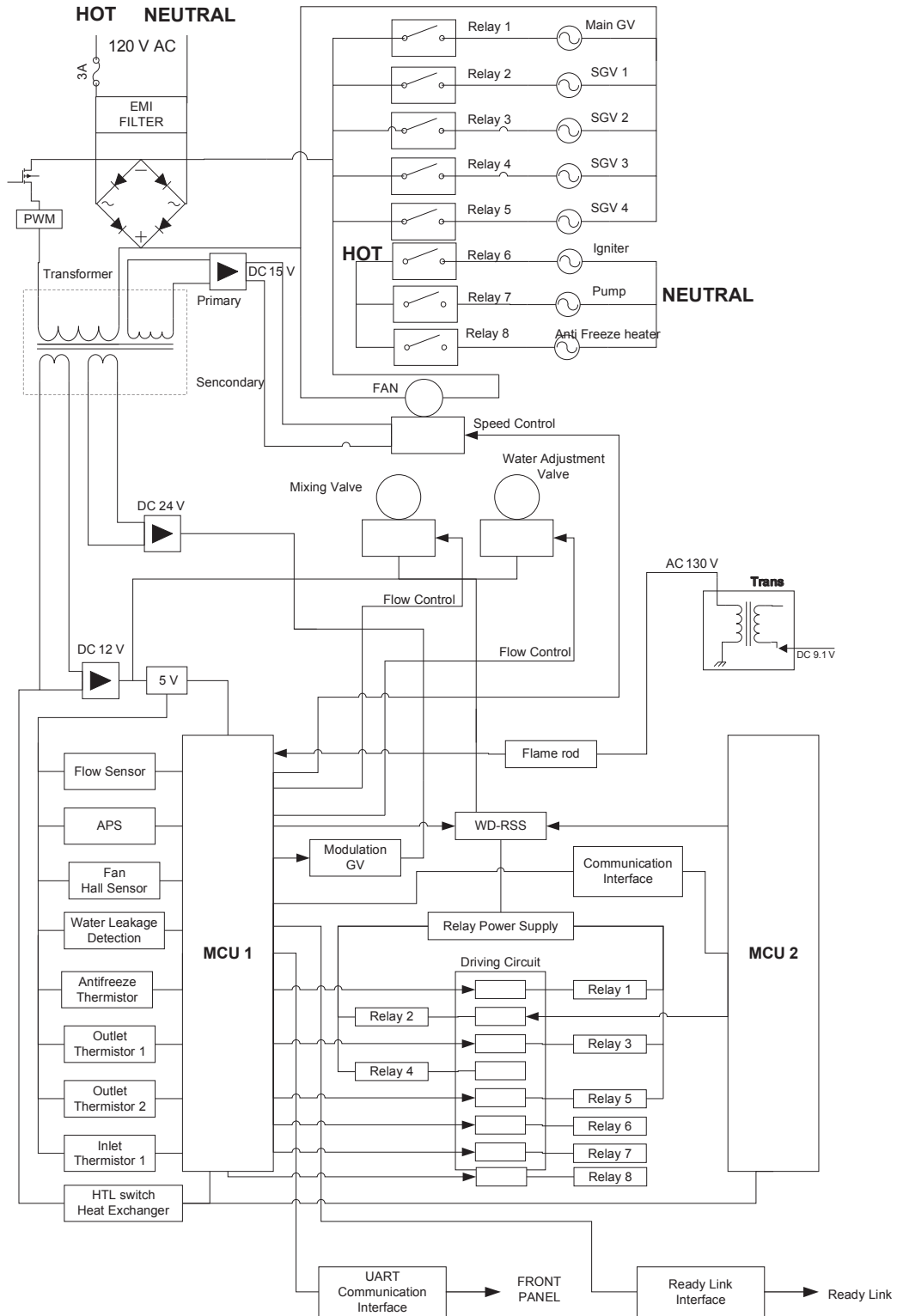


[NPN-199U/199E]

6.3 Wiring Diagram

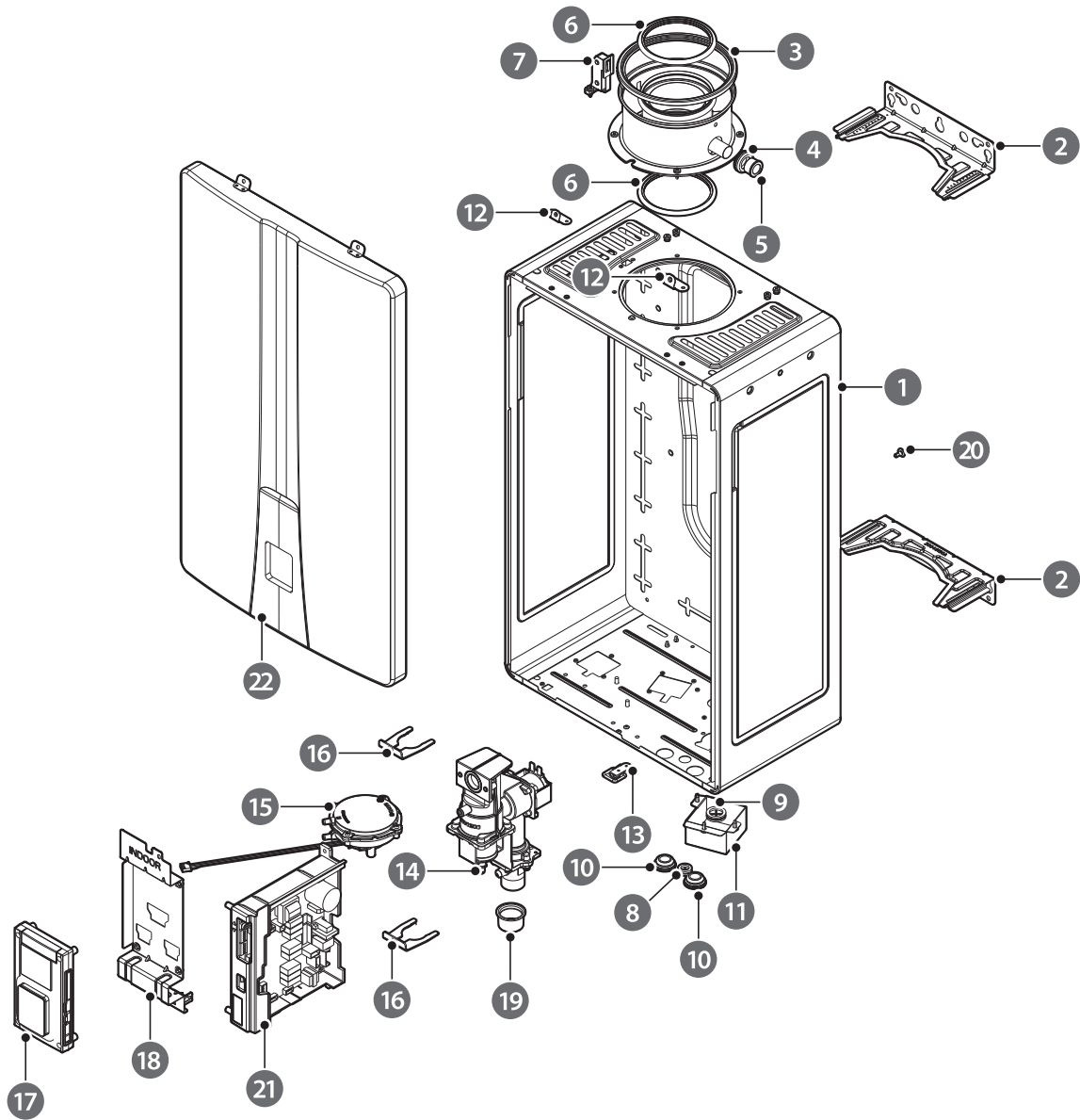


6.4 Ladder Diagram



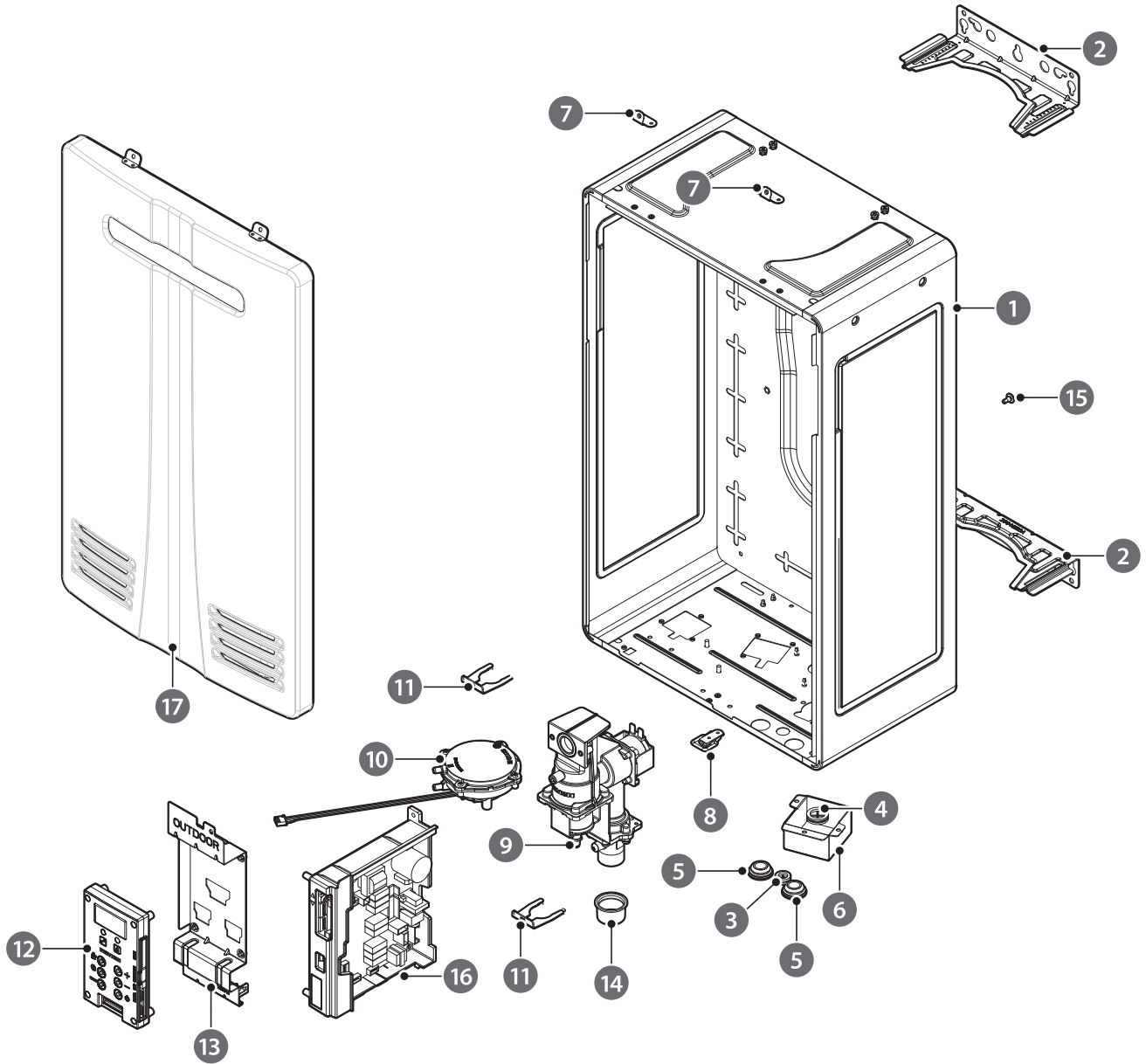
6.5 Component Assembly Diagrams and Parts Lists

6.5.1 Case Assembly (NPN-160U/180U/199U)



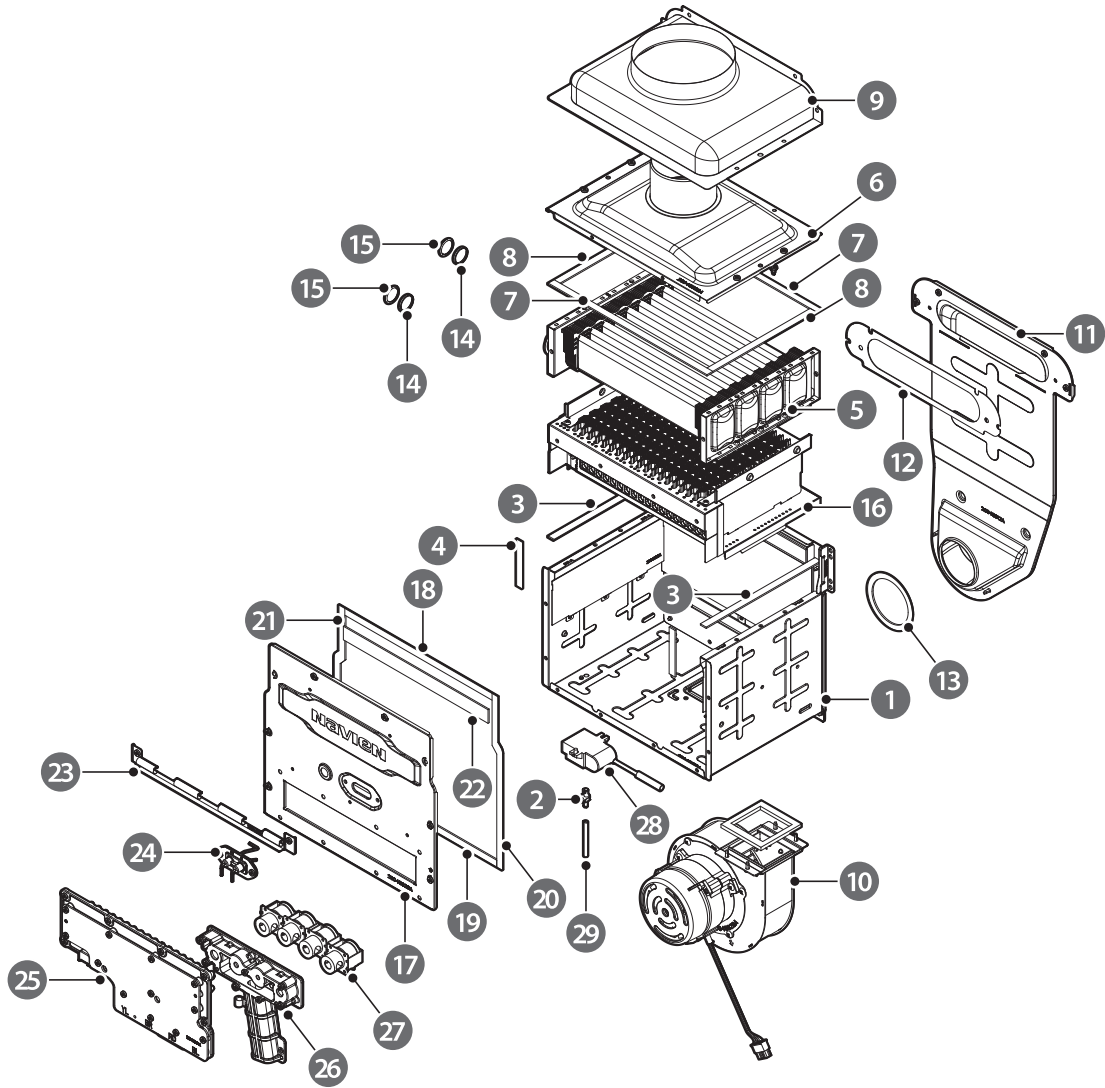
#	Description	Service Part #	Part #	Remark
1	Case		20045902*	
2	Case Bracket		20048190*	
3	Intake Gasket		20046639*	
4	Condensate Drain Gasket		20046641*	
5	Condensate Drain Cap		20046642*	
6	Exhaust Gasket		20046640*	
7	Exhaust Switch		30024038*	
8	Rubber Ring		20006973*	
9			20025127*	
10			20029318*	
11	Junction Box		20046065*	
12	Front Cover Bracket		20024042*	
13	External Base Toggle Latch		20007514*	
14	Gas Control Valve		30022700*	
15	Air Pressure Sensor		30010238*	
16	Pipe Clip		20045992*	
17	Front Panel		30008333*	
18	Front Panel Bracket		20045993*	
19	Pipe Cap		20012835*	
20	Rubber Seal Plug		20036041*	
21	PCB		30022714*	
22	External Cover		30022670*	

6.5.2 Case Assembly (NPN-160E/180E/199E)



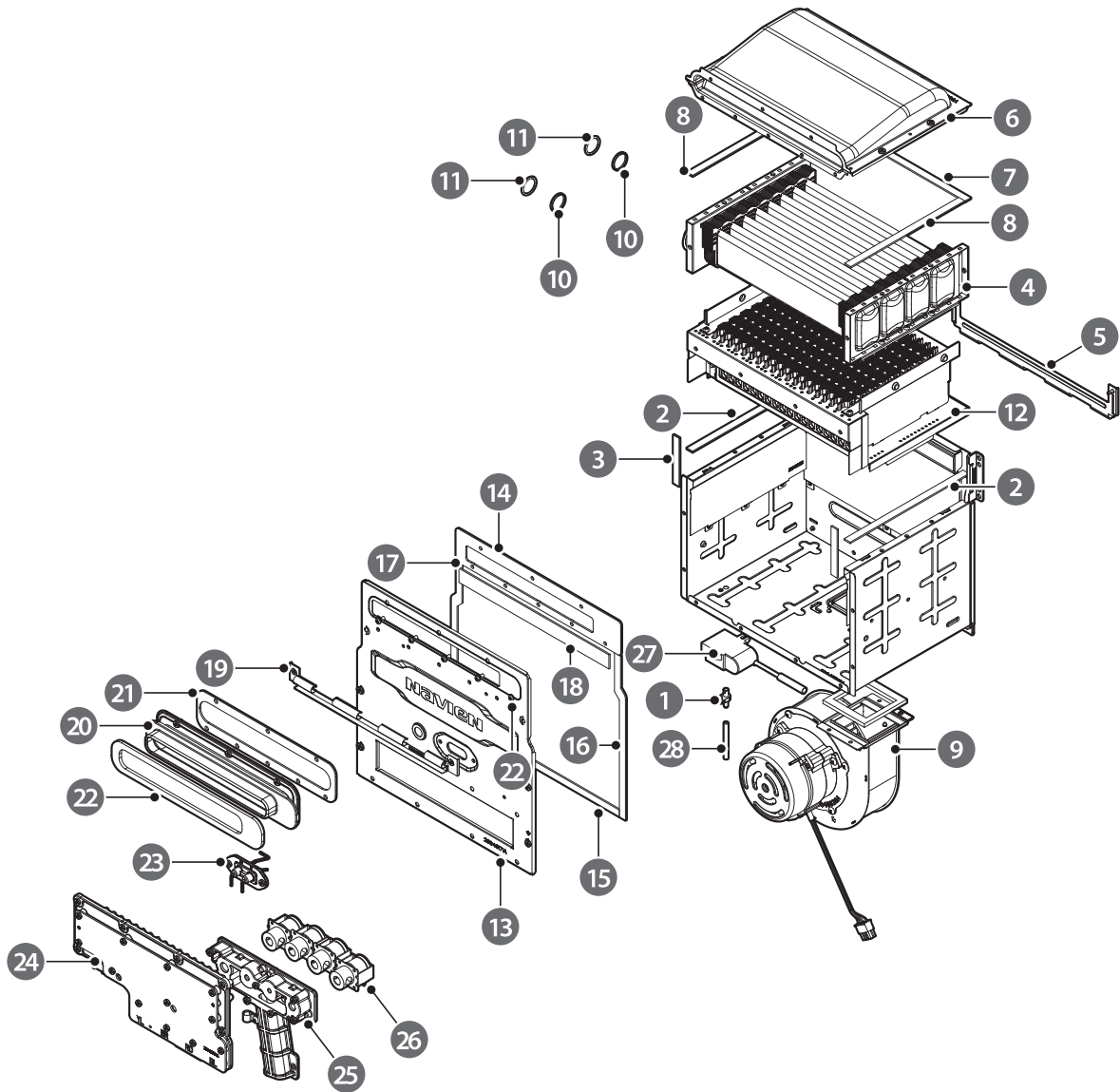
#	Description	Service Part #	Part #	Remark
1	Case		20046059*	
2	Case Bracket		20048190*	
3	Rubber Ring		20006973*	
4			20025127*	
5			20029318*	
6	Junction Box		20046065*	
7	Front Cover Bracket		20024042*	
8	External Base Toggle Latch		20007514*	
9	Gas Control Valve		30022700*	
10	Air Pressure Sensor		30010238*	
11	Pipe Clip		20045992*	
12	Front Panel		30022765*	
13	Front Panel Bracket		20045994*	
14	Pipe Cap		20012835*	
15	Rubber Seal Plug		20036041*	
16	PCB		30022714*	
17	External Cover		30022752*	

6.5.3 Burner Assembly (NPN-160U/180U/199U)



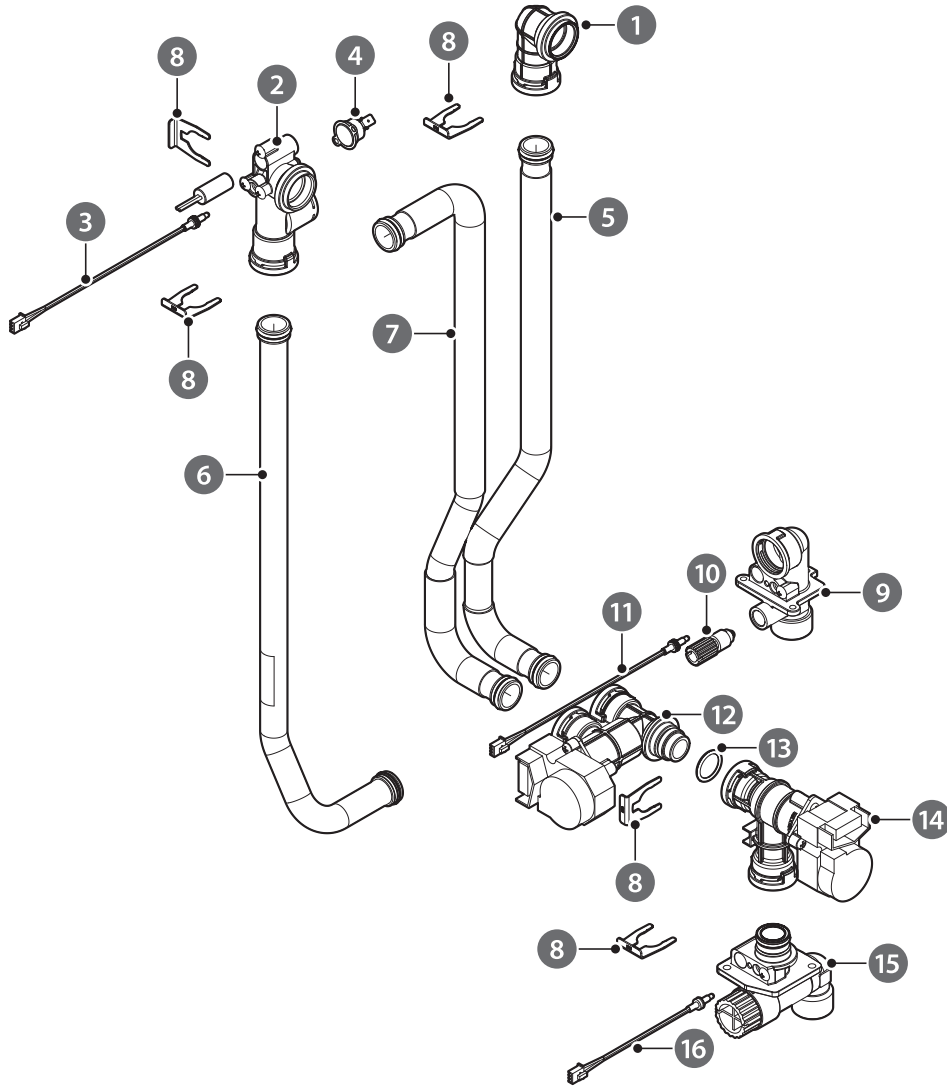
#	Description	Service Part #	Part #	Remark
1	Chamber Case		30023299*	
2	Pressure Test Nipple		20048333*	
3	Gasket		20047192*	
4			20048027*	
5	Heat Exchanger		30022701*	
6	Exhaust Duct		30022676*	
7	Gasket		20045926*	
8			20045927*	
9	Intake Duct Cap		20045920*	
10	Fan Assembly		30023778*	
11	Intake		30022671*	
12	Gasket		20045914*	
13	Intake Packing		20045915*	
14	Heat Exchanger Back-Up Ring		20021730*	
15	Heat Exchanger O-Ring		20017211*	
16	NaviTech Burner		30022679*	
17	Chamber Cover		30022675*	
18	Gasket		20045931*	
19			20045932*	
20			20045933*	
21			20048024*	
22			20048026*	
23	Fuse Bracket		20048292*	
24	Ignitor		30022787*	
25	Gas Manifold		20045981*	
26	Gas Stage Valve Body		20045978*	
27	Gas Stage Valve		30004431*	
28	Ignition Transformer		30023297*	
29	Tube		20046835*	

6.5.4 Burner Assembly (NPN-160E/180E/199E)



#	Description	Service Part #	Part #	Remark
1	Pressure Test Nipple		20048333*	
2	Gasket		20047192*	
3			20048027*	
4	Heat Exchanger		30022701*	
5	Fuse Bracket (Back)		20048402*	
6	Exhaust Duct		30022753*	
7	Gasket		20045926*	
8			20046426*	
9	Fan Assembly		30022770*	
10	Heat Exchanger Back-Up Ring		20021730*	
11	Heat Exchanger O-Ring		20017211*	
12	NaviTech Burner		30022679*	
13	Chamber Cover		30022831*	
14	Gasket		20047857*	
15			20045932*	
16			20048025*	
17			20046172*	
18			20048026*	
19	Fuse Bracket (Back)		20048292*	
20	Exhaust		30022755*	
21	Exhaust Flange Gasket		20046071*	
22	Exhaust Packing		20046073*	
23	Ignitor		30022787*	
24	Gas Manifold		20045981*	
25	Gas Stage Valve Body		20045978*	
26	Gas Stage Valve		30004431*	
27	Ignition Transformer		30023297*	
28	Tube		20046835*	

6.5.5 Water Assembly



#	Description	Service Part #	Part #	Remark
1	Heat Exchanger Inlet Adapter		20045990*	
2	Heat Exchanger Outlet Adapter		30022786*	
3	Outlet Temperature Sensor		30015178*	
4	High Limit Switch		30002577*	
5	Inlet Pipe		30022711*	
6	Outlet Pipe		30022712*	
7	Mixing Pipe		30022713*	
8	Pipe Clip		20045992*	
9	Hot Water Supply Adapter		30023810*	
10	Drain Cock		30008630*	
11	DHW Outlet Temperature Sensor		30015178*	
12	Mixing Valve		30022124*	
13	O-Ring		20006947*	
14	Water Adjustment Valve		30022123*	
15	Direct Water Inlet Adapter		30022708*	
16	DHW Outlet Temperature Sensor		30008366*	

6.6 Installation Check list

After installing the water heater, review the following checklist. You should be able to answer “Yes” to all of the items in the checklist. If not, review the appropriate sections to complete the installation. To troubleshoot any operational problems refer to “Troubleshooting” in the Owner’s Manual.

If you have additional questions or need assistance with installation, contact Technical Support at 1-800-519-8794 or 1-949-420-0420, or refer to the technical support section of Navien’s website (www.navien.com).

Installing the Water Heater	Yes	No
Have you maintained the required clearances from building openings and intake air vents?		
Have you minimized the distance between the water heater and the vent termination?		
Have you minimized the distance between the water heater and major fixtures?		
Have you maintained the proper service and maintenance clearances?		
Is the make-up air supply sufficient for proper operation?		
Is the make-up air supply free from dust, dirt, corrosive elements, and flammable vapors?		
Is the water heater and vent piping clear of combustible materials, including clothing, cleaning materials, and rags?		

Connecting the Gas Supply	Yes	No
Does the gas supply match the type specified on the water heater’s rating plate?		
Is the gas line at least 1/2 in or 3/4 in ID (Inner Diameter)?		
Is the gas supply line sufficient in length and diameter to deliver the required BTUs?		
Have you measured the pressure of the gas supply line?		
Is the gas supply pressure within the recommended ranges specified in this manual?		
Is the gas supply line equipped with a manual full port valve?		
Have you tested the gas line pressure and all fittings for leaks?		
Has the gas company inspected the installation, if required?		

Connecting the Water Supply	Yes	No
Is the water supply pressure sufficient (greater than 40 PSI)?		
Have you installed shut off valves on the inlet and outlet to facilitate cleaning of the inlet water filter?		
Have you bled the air out at each fixture?		
Have you checked each fixture to ensure hot water is being supplied?		
Have you cleaned the inlet water filter?		
If you installed a recirculation line, have you insulated the hot water pipes and the return line?		

Connecting a Pressure Relief Valve	Yes	No
Have you installed an approved pressure relief valve on the water heater?		
Does the rating of the pressure relief valve match or exceed the maximum BTU rating of the water heater?		
Is the pressure relief valve at least $\frac{3}{4}$ in in diameter?		
Have you installed the pressure relief valve on the hot water outlet pipe near the water heater?		
Have you installed a discharge drain tube from the pressure relief valve to within 6–12 in (150–300 mm) of the floor?		

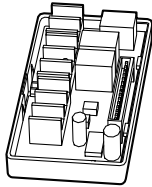
Venting the Water Heater	Yes	No
Have you ensured that there are proper clearances around the vent and air intakes?		
Have you ensured that only the approved vent materials listed in this manual are used as venting for the water heater?		
Have you ensured that 1.3" of vent was inserted into the water heater vent collar then affixed with the included screws?		
Is the vent sloped upward toward the vent termination at a rate of $\frac{1}{4}$ in per foot (2 % grade)?		
Are all vent runs properly supported?		
Have you properly supported the vent termination?		
Have you properly sealed all air intake and exhaust joints, from the flue collar to the to the vent termination?		
Have you installed an end cap on the vent pipe?		
Have you checked the venting for leaks?		
Is the vent termination at least 12 in (300 mm) above the exterior grade?		
Have you ensured that sufficient make-up air is available?		
Is the total vent length within the maximum vent length restriction?		

Connecting the Power Supply	Yes	No
Is the supplied voltage 110-120 V AC?		
Is the water heater plugged into a properly grounded outlet?		
If you have made a direct power supply connection, have you installed a power switch to facilitate end-user maintenance?		
Have you checked the polarity of the electrical connection?		
Is the system properly set up for cascade operation (Main and Sub water heaters), if applicable?		

Setting the DIP Switches	Yes	No
Have you verified the positions of all DIP switches on the circuit board?		
Have you verified the positions of all DIP switches on the front panel?		

Operating the Water Heater	Yes	No
Have you shown the owner how to clean the inlet water filter?		
Have you given the Installation Manual and Owner's Manual to the owner for future reference?		
Have you shown the owner how to shut off the gas in case of an emergency?		

6.7 Navien H2Air Add-on Controller Kit (Optional)



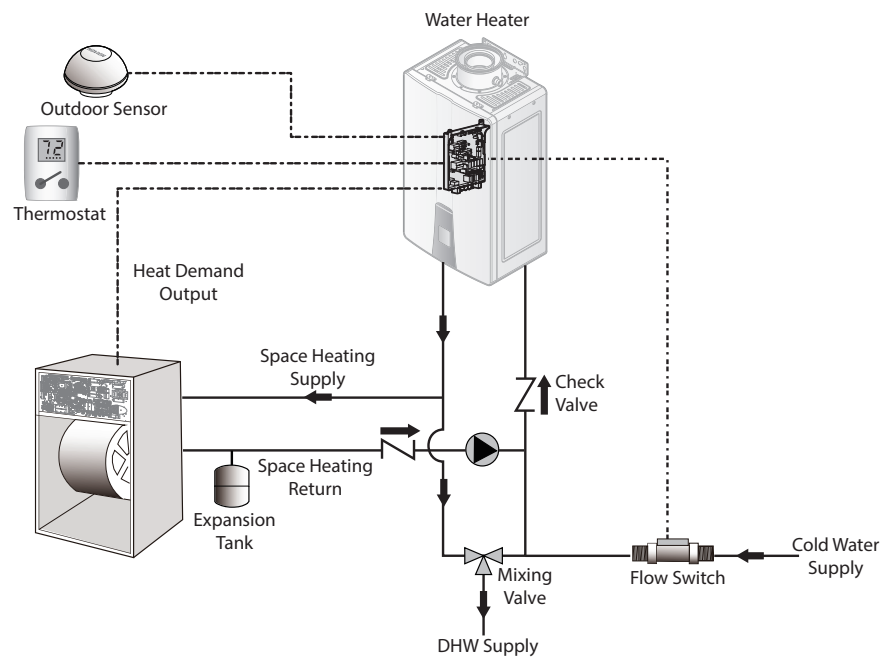
The Navien H2Air is an add-on controller for the water heater. It adds input and output functions to the water heater for a combination application where space heating and domestic hot water (DHW) are supplied simultaneously. With this add-on controller, a thermostat (1 or 2-stage) and an outdoor sensor can be installed along with a hydronic air handler to add space heating functionality to the system.

6.7.1 Basic Principles

The following diagram shows the basic operation of the heater system with the Navien H2Air add-on controller.

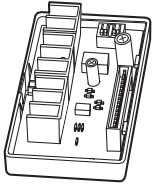
CAUTION

Do not configure the system for DHW recirculation when it is configured to run an air handler using the H2Air add-on controller. DHW recirculation and Navien H2Air configurations cannot be used at the same time.



For details, refer to the installation manual that is provided with the H2Air add-on controller kit.

6.8 Navien HotButton Kit (Optional)



The Navien HotButton kit is an add-on input board for the water heater. It adds signal input functions to the water heater for more efficient DHW hot water recirculation functionality.

With the HotButton kit, DHW recirculation is carried out exactly when the actual demands arise. This prevents energy loss caused by unnecessary operation of the burner and pump throughout the day.

The HotButton kit can receive signals from multiple push buttons installed in various areas and performs optimal DHW recirculation only when there is a demand for hot water.

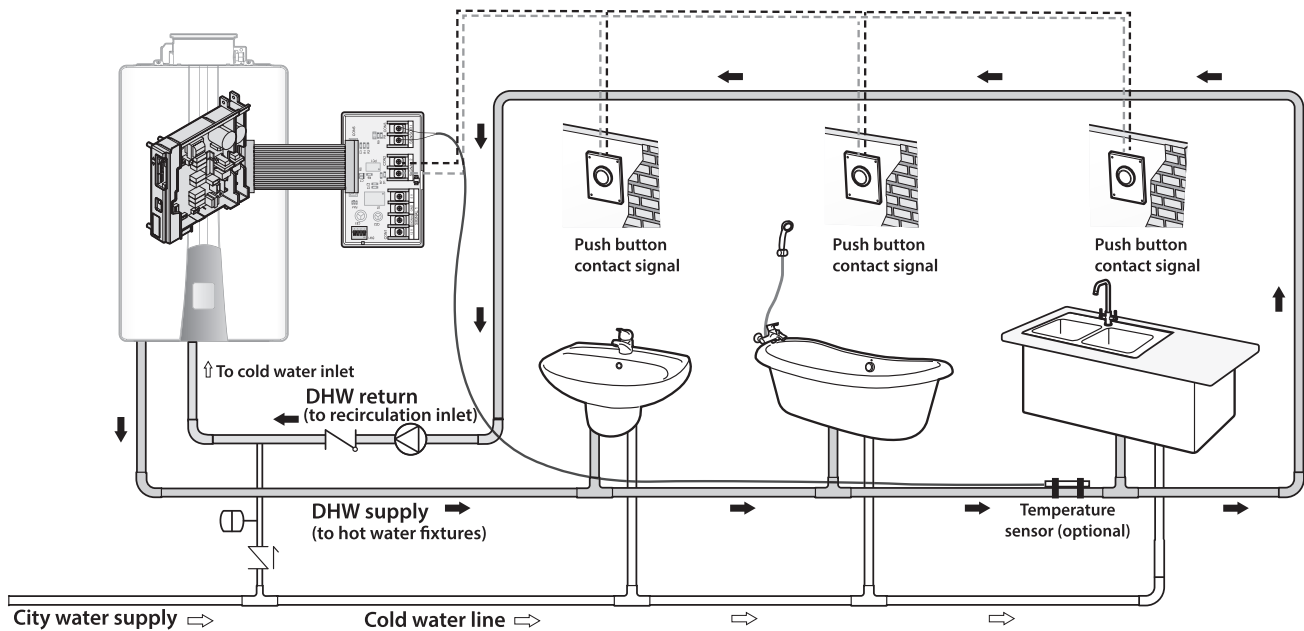
6.8.1 Basic Principles

The following diagram shows the basic operation of the water heater system with the Navien HotButton kit.



CAUTION

The Navien HotButton can be used ONLY with a water heater system configured for DHW recirculation.



* When the optional temperature sensor is installed, it must be insulated.
The sensor wire may be extended by up to 100 ft (30 m) using 22AWG wire.

6.9 Requirements for the State of Massachusetts

NOTICE BEFORE INSTALLATION

This appliance must be installed by a licensed plumber or gas fitter in accordance with the Massachusetts Plumbing and Fuel Gas Code 248 CMR Sections 4.00 and 5.00.

IMPORTANT: In the State of Massachusetts (248 CMR 4.00 & 5.00)

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

1. **INSTALLATION OF CARBON MONOXIDE DETECTORS.** No installation or replacement of a vented gas appliance shall be permitted unless a battery powered or electrically hard wired carbon monoxide detector is present on the same floor as the appliance or on the next adjacent floor when the appliance is located in a crawl space unless the appliance is located in a detached, uninhabitable garage. For all residential dwellings, a carbon monoxide detector must also be present on each habitable level of the dwelling. These requirements shall not be deemed to waive any additional requirements imposed by M.G.L. c. 148 §26F1/2.
2. **APPROVED CARBON MONOXIDE DETECTORS.** Each carbon monoxide detector as required in accordance with the above provisions shall comply with NFPA 720 and be ANSI/UL 2034 listed and IAS certified.
3. **SIGNAGE.** Whenever any through-the-wall vent is installed less than seven feet above the finished grade, a metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight feet above grade directly in line with the exhaust vent terminal. The sign shall read, in print size no less than 0.5 inches in size, **"GAS VENT DIRECTLY BELOW. KEEP CLEAR OF ALL OBSTRUCTIONS"**.
4. **INSPECTION.** The state or local gas inspector of the side wall horizontally vented gas fueled equipment shall not approve the installation unless, upon inspection, the inspector observes carbon monoxide detectors and signage installed in accordance with the provisions of 248 CMR 5.09 and 5.12.

Installation & Operation Manual

NPN Non-Condensing Water Heaters

Getting Service

If your water heater requires service, you have several options for getting service:

- Contact Technical Support at 1-800-519-8794 or on the website: www.NavienInc.com
- For warranty service, always contact Technical Support first.
- Contact the technician or professional who installed your water heater.
- Contact a licensed professional for the affected system (for example, a plumber or electrician).

When you contact Technical Support, please have the following information at hand:

- Model number
- Serial number
- Date purchased
- Installation location and type
- Error code, if any appears on the front panel display

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