

Installation and Operation Manual

NPF Condensing Hydro-furnace

Model | NPF700-060U3BH
NPF700-100U5CH
NPF700-060H3BH
NPF700-100H5CH



ALWAYS read and follow this manual completely before using the furnace. Save for future reference.

WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow safety warnings exactly could result in serious injury death or property damage.

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, ANSI Z223.1/NFPA 54 and/or CSA B149.1, Natural Gas and Propane Installation Code.

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Product Installation Information	
Model	
Date Purchased	
Gas Type	
Serial Number	

Important Safety Information



The following Safety Alert Symbols are used in this manual. They are used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible serious injury or death. This Safety Alert Symbol precedes any safety message about risk of personal injury. It may also be accompanied by one of the following signal words.

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

DANGER

Indicates a hazardous situation that if not avoided will result in death or serious injury.

WARNING

Indicates a hazardous situation that if not avoided could result in death or serious injury.

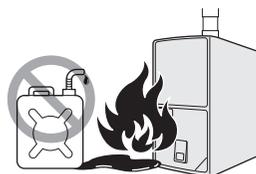
CAUTION

Indicates a potentially hazardous situation that if not avoided could result in minor or moderate injury.

NOTICE

Indicates information considered important but not hazard-related (such as property damage).

DANGER



If you smell gas:

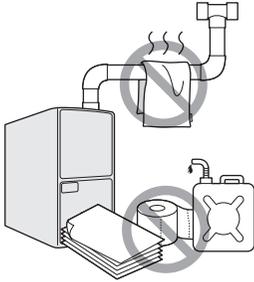
- Do not try to light any appliance.
- Do not touch any electrical switches or use landline phones.
- From a neighbor's phone, call your gas provider and follow their instructions.
- If you cannot reach your gas provider, call the fire department.
- Do not return to your home until authorized by your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

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

- The furnace 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 can be heavier than air. They can travel long distances along the ground and can be carried from other rooms to the furnace's main burner by air current.
- Keep all flammable products far away from the furnace and store them in approved containers. Keep the containers closed tightly and out of the reach of children and pets.

⚠ WARNING

To prevent death, serious injury, or property damage:



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

Failure to do so may result in property damage; personal injury; or death from fire, explosion, smoke, soot, condensation, electric shock, or carbon monoxide leakage.

- **Do not install the furnace in a mobile home, trailer, or recreational vehicle.**

Doing so may result in improper or dangerous operation and will void the manufacturer's warranty.

- **Do not operate the furnace without a filter installed in the product.**

Doing so may clog the heat exchanger with dust and reduce the furnace's performance.

- **Do not operate the heating function unless the doors are installed.**

Doing so may introduce exhaust gas into the room during operation.

- **Do not store or use gasoline or other flammable liquids near this furnace.**

Doing so may result in fire or explosion.

- **Do not place combustibles, such as newspapers or laundry, near the furnace 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 furnace or venting system, including the vent termination.**

Doing so may result in fire or explosion.

⚠ WARNING

- **Do not operate the furnace 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 the furnace 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 furnace with wet hands.**

Doing so may result in electric shock.

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

⚠ WARNING

Cancer and Reproductive Harm -
www.P65Warnings.ca.gov.

SAVE THESE INSTRUCTIONS

⚠ DANGER

Indicates a hazardous situation that if not avoided will result in severe injury or death.

⚠ WARNING

Indicates a hazardous situation that if not avoided could result in death or serious injury.

⚠ CAUTION

Indicates a potentially hazardous situation that if not avoided could result in minor or moderate injury.

NOTICE

Indicates information considered important but not hazard-related (such as property damage).

WARNING

To prevent death, serious injury, or property damage:

- **Do not turn on the furnace unless the water (when the water supply installed) and gas supplies are fully opened.**

Doing so may damage the furnace.

- **Do not use this furnace for anything other than its intended purpose, as described in this manual.**

- **Do not remove the front cover unless the power to the furnace is turned off or disconnected.**

Failure to do so may result in electric shock.

- **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 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 that could obstruct the airflow in or out of the furnace.**

- **This furnace has been approved for use in the USA and Canada only.**

Using the furnace in any other country will void the manufacturer's warranty.

WARNING

Carbon-Monoxide Poisoning Hazard

- To prevent severe personal injury or death due to carbon-monoxide poisoning:
 - Check that all openings in the outside wall around the vent (and air intake) pipes are sealed to prevent combustion products from infiltrating the building.
 - Check that the furnace vent (and air intake) terminals are not obstructed in any way.

Electrostatic Discharge Prevention

Do not touch the unit control or the connected wires before discharging your body's static electricity to ground.

NOTICE

Frozen and Burst Water Pipe Hazard

To avoid property damage, you must protect the furnace and all supply and/or drain water lines against the risk of freezing. Special precautions must be made when installing the furnace in an area that may reach temperatures below freezing. This can cause improper operation or equipment to damage. The drain traps, supply, and drain lines should be protected if the furnace environment is likely to freeze. Using accessory drain trap heaters and electrical thermal tape is recommended for these installations.

Note

The ambient temperature at the installation location of the furnace must be above 32°F (0°C) and below 125°F (52°C).

Codes and Standards

Follow all national and local codes and standards, including the guidelines below. Installation must comply with the regulations set forth by the serving gas supplier, local building, plumbing, and other regulations. In the absence of local regulations, installations must comply with the national regulations listed below and those of all authorities having jurisdiction. In the United States and Canada, follow all regulations and standards below.

Safety

- US: National Fuel Gas Code (NFGC) NFPA 54-2012/ANSI Z223.1-2012 and the Installation Standards, Warm Air Heating and Air Conditioning Systems ANSI/NFPA 90B
- Canada: National Standard of Canada, Natural Gas and Propane Installation Code (NSCNGPIC) CAN/CSA B149.1-2010

General Installation

- US: NFGC and the NFPA 90B. For copies, contact the National Fire Protection Association Inc., Batterymarch Park, Quincy, MA 02269; or for only the NFGC contact the American Gas Association, 400 North Capitol St NW, Washington DC 20001
- Canada: NSCNGPIC. For a copy, contact Standard Sales, CSA International, 178 Rexdale Boulevard, Etobicoke (Toronto), Ontario, M9W 1R3, Canada

Combustion and Ventilation Air

- US: Section 9.3 of the NFPA54/ANSI Z223.1-2012 Air for Combustion and Ventilation
- Canada: Part 8 of the CAN/CSA B149.1-2010, Venting Systems and Air Supply for Appliances

Duct Systems

US and Canada: Air Conditioning Contractors Association (ACCA) Manual D, Sheet Metal and Air Conditioning Contractors National Association (SMACNA), or American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) 2005 Fundamentals Handbook Chapter 35

Acoustical Lining and Fibrous Glass Duct

US and CANADA: Current edition of SMACNA, NFPA 90B as tested by UL Standard 181 for Class I Rigid Air Ducts

Gas Piping and Gas Pipe Pressure Testing

- US: NFPA 54/ANSI Z223.1-2012 NFGC; Chapters 5, 6, 7, and 8 and national plumbing codes
- Canada: CAN/CSA-B149.1-2010, Parts 4, 5, 6, and 9.
- In the state of Massachusetts: - This product must be installed by a licensed plumber or gas fitter. When flexible connectors are used, the maximum length should not exceed 36 in. (914 mm). When lever-type gas shutoffs are used, they should be the T-handle type. Using copper tubing for gas piping is not allowed in the state of Massachusetts.

Electrical Connections

- US: National Electrical Code (NEC) NFPA 70-2011
- Canada: Canadian Electrical Code CSA C22.1

Condensate Drain Connection

- US: National Standard Plumbing Code 2009, Section 8.7.
- Canada: National Plumbing Code of Canada 2010 in Canada.

Auxiliary Drain Pan Installation

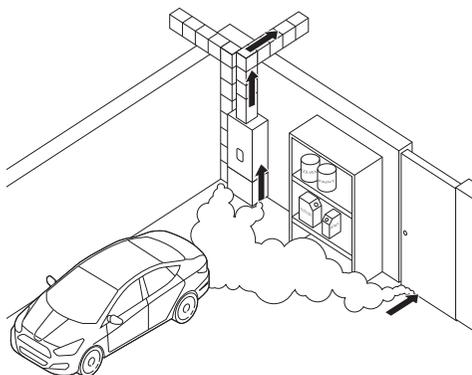
In accordance with approved regulations, installing an auxiliary drain pan under the evaporator coil installed in all areas of the furnace and structure.

- Furnace condensate treatment system
- Overflow by coil drain pan
- Where the main condensate pipeline can become clogged and cause damage to the building

Important Information About Efficiency and Indoor Air Quality

Central cooling and heating equipment, such as a furnace, can be efficient when a duct system can carry cooled or heated air properly. To improve efficiency, comfort and good indoor air quality, read the following guidelines:

- Maintain the proper balance between the air supplied to each room and the air returned to the cooling and heating units.
- Maintaining proper balance and tightness of the duct systems maximizes the efficiency of heating and air conditioning systems and improves indoor air quality by reducing the amount of pollutants contained in the air entering from the space where the ducts and equipment are located.
- Make sure that dangerous substances, fumes, and odors do not enter living spaces.
- The front covers of the furnace always must be closed properly. Always check if the screws on the front covers are fully tightened.



Note

Manufacturers and the US Environmental Protection Agency's Energy Star program recommend that central duct systems be inspected by qualified contractors for proper balance and tightness.

Receiving

Immediately upon receipt, all cartons and contents should be inspected for transit damage. Units with damaged cartons should be opened immediately. If damage is found, it should be noted on the delivery papers, and a damage claim filed with the last carrier.

- After the unit has been delivered to the job site, remove the carton taking care not to damage the unit.
- Check the unit rating plate to be sure equipment matches job specifications.
- Read the entire instructions before starting the installation.

1. About the Furnace

1.1 Product Features

The Navien NPF condensing hydro-furnace heats air and distributes the heated air through the house using ducts. The main features are as follows:

- It offers automatic capacity control, advanced setup capabilities and diagnostics.
- Can be installed as part of a non-communicating system using a standard 24 VAC thermostat. The NPF can be matched with single, two-stage and modulating air conditioners and heat pumps in dual fuel applications.
- Built-in temperature sensors in the supply air and return air. The temperature data is used by the system to modulate the capacity and automatically control the amount of heat and airflow supplied by the furnace.
- Field convertible to propane with an included LP orifice and dip switch setup. Field convertible for high altitude installations, up to 10,100 feet using the factory supplied high-altitude accessory.

1.2 Product Application (Intended Use)

The Navien NPF condensing hydro furnace is primarily designed for residential home heating applications. It is not designed or certified for use in mobile homes, trailers, or recreational vehicles. Neither is it designed or certified for outdoor applications.

WARNING

Do not install the furnace in an unconditioned space that is susceptible to freezing or a mobile home, trailer, or recreational vehicle. Doing so may result in improper or dangerous operation and will void the manufacturer's warranty.

The furnace must be installed indoors (i.e., attic space, crawl space, or garage area provided that the garage area is enclosed with an operating door). The furnace can be used in non-industrial commercial applications, such as schools, office buildings, churches, retail stores, nursing homes, hotels/motels, common areas, or offices; in such applications, the furnace must be installed with the following conditions:

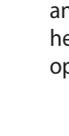
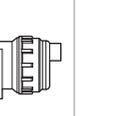
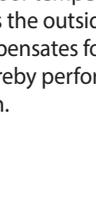
- It must be installed according to the installation instructions provided and local and national codes.
- It must be installed indoors in a building constructed on site.
- It must be part of a ducted system and not used in a free air delivery application.
- It must not be used as a "make-up" air unit.
- Non-direct vent central forced air furnace in which combustion air is taken from the installation area or a direct vent central forced air furnace in which all combustion air supplied directly to the furnace burners through a special air intake system outlined in these instructions.
- All other warranty exclusions and restrictions apply as this furnace is an appliance and is appropriate for use with natural or propane gas.

Note

If using propane gas, the proper Propane Gas & High Altitude Conversion Kits are supplied with the unit from the factory.

1.3 Included Items

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

	
Installation and Operation Manual, User's Information Manual	Quick Installation Manual
	
Propane Gas & High Altitude Conversion Kit*	High Altitude Conversion Kit (Natural Gas Only)*
	
Installation Parts Kit	Spare Parts
	
Intake Air Collar	Exhaust Air Collar
	
Condensate Trap (Upflow Models)	Condensate Trap (Horizontal Models)
	
Pressure Relief Valve	

* The Propane Gas & High Altitude Conversion Kit is included in the furnace packaging with the installation parts kit.

1.4 Accessories

The following optional accessories are available for the furnace.

	
Condensate Neutralizer Kit	Outdoor Temperature Sensor and Cable

Note The outdoor temperature sensor measures the outside air temperature and compensates for the amount of heat, thereby performing efficient operation.

1.5 Specifications

The following tables list the specifications for the furnace. Additional specifications for water, gas, electricity, and vent connections are provided in the Installation section.

Heating Capacity and Efficiency Information

Items		NPF700-060U3BH	NPF700-100U5CH	NPF700-060H3BH	NPF700-100H5CH
Heating (Gas Input) Natural/Propane Gas [BTU/H]	Max Heat	60,000	100,000	60,000	100,000
	Min Heat	9,000	14,000	9,000	14,000
AFUE (%)		97	97	97	97
Certified Temperature Rise Range [°F (°C)]	Max Heat	45–75 (25–42)			
	Min Heat	5–35 (3–19)	10–40 (6–22)	5–35 (3–19)	10–40 (6–22)
Burner Control		Modulating			

Airflow Capacity and Blower Information

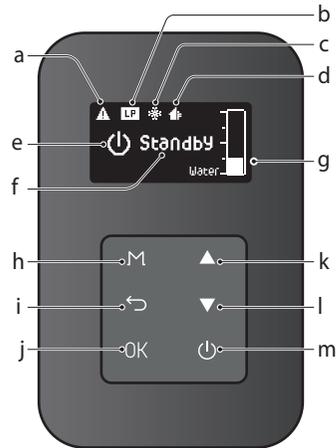
Items		NPF700-060U3BH	NPF700-100U5CH	NPF700-060H3BH	NPF700-100H5CH
Certified External Static Pressure (in W.C.)	Heating	Certified External Static Pressure should be 0.1–1.0 in w.c.			
	Cooling				
Airflow Delivery Range [CFM] (Rated ESP)	Max Heat	720–1,200	1,200–2,000	720–1,200	1,200–2,000
	Min Heat	350–1,200	400–2,000	350–1,200	400–2,000
	Cooling	1,200	2,000	1,200	2,000
Nominal Cooling Capacity (TON)	@400CFM	1.5–3.0	2.0–5.0	1.5–3.0	2.0–5.0
	@350CFM	1.5–3.5	2.0–5.5	1.5–3.5	2.0–5.5
Circulator Blower	D×W (in)	12×10	12×12	12×10	12×12
	Horsepower	½	1	½	1
	Motor Full Load Amps	7.6	11.0	7.6	11.0
	Motor Speed & Type	Variable, Electronically Commutated (ECM)			

General Product Information

Items		NPF700-060U3BH	NPF700-100U5CH	NPF700-060H3BH	NPF700-100H5CH
Installation Type		Upflow		Horizontal Left	
Venting Type		Forced Draft Direct Vent			
Maximum Vent Length	3 in	140 ft			
Ignition		Electronic Ignition			
Natural Gas Supply Pressure (from source)		3.5 in–10.5 in WC			
Propane Gas Supply Pressure (from source)		8.0 in–13.0 in WC			
Natural Gas Manifold Pressure		-0.01 to -0.02 in WC			
Propane Gas Manifold Pressure		-0.01 to -0.02 in WC			
Gas Connection Size		½ in NPT			
Water Connection Size		¼ in NPT			
Condensate Drain Size		¾ in NPT			
Materials	Casing	Corrosion resistant baked on pre-painted steel			
	Combustion Heat Exchanger	Stainless Steel			
	Hydronic Heat Exchanger	Copper & Aluminum			
Venting	Exhaust	2 in or 3 in PVC, CPVC, approved polypropylene* / 2 in or 3 in Special Gas Vent Type BH (Class III, A/B/C) / 2 in or 3 in Stainless Steel			
	Intake	2 in or 3 in PVC, CPVC, polypropylene / 2 in or 3 in Special Gas Vent Type BH (Class III, A/B/C) / 2 in or 3 in Stainless Steel, ABS			
	Vent Clearance	0 in to combustibles			
Safety Devices		Flame Rod, Ignition Operation Detector, Water Temperature High Limit Switch, High Limit Sensor for Exhaust Temperature, Vent Installation Detector (VID), Water Level Sensor, Burner High Limit Sensor, Pressure Relief Valve (PRV)			
Dimensions [in (CM)], WxDxH		17.5x31x34.5 (44.5x78.5x87.7)	21x31x34.5 (53.5x78.5x87.7)	34.5x31x17.5 (87.7x78.5x44.5)	34.5x31x21 (87.7x78.5x53.5)
Shipping Weight [LB (kg)]		145.0 (65.8)	167.6 (76.0)	145.0 (65.8)	167.6 (76.0)
Power Supply		120V AC, 60Hz			
Max Current (A)		10.9	14.3	10.9	14.3
CKT BKR Amps (A)		15	20	15	20
Wire Size (AWG)		14	12	14	12

1.6 About the Front Control Panel

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

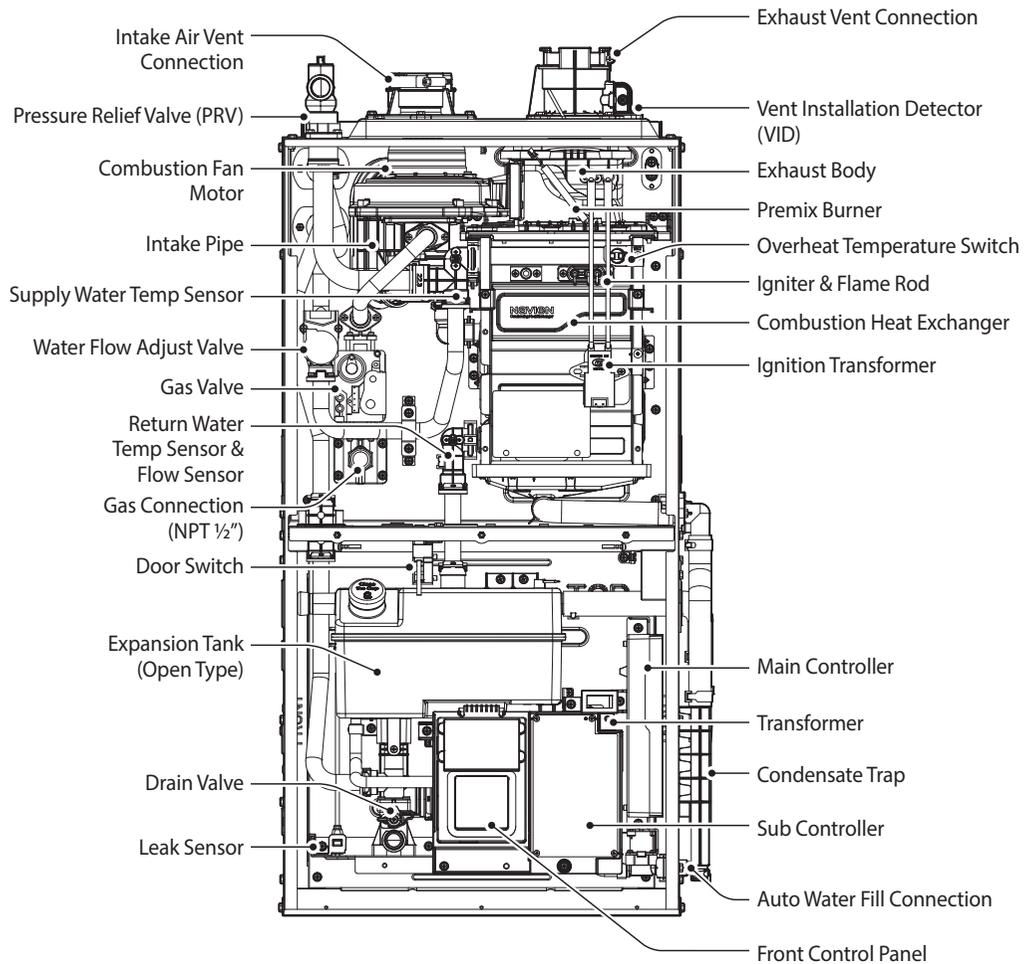


<p>a</p> 	<p>Error Displays when an error occurs.</p>	<p>b</p>  <p>Gas Type Displays the gas type.</p>
<p>c</p> 	<p>Freeze Protection Displayed when the furnace is operating in Freeze Protection mode.</p>	<p>d</p>  <p>Outdoor temperature Displays the outdoor temperature.</p>
<p>e</p> 	<p>Operating Status Icons Displays the current operating status with icons.</p> <ul style="list-style-type: none"> ⏻: Indicates standby operation. ❄️: Indicates cooling operation. 🌀: Indicates blower operation. 🔥: Indicates heating operation. 	<p>f</p>  <p>Operating Status Messages Displays the current operating status with messages.</p>
<p>g</p> 	<p>Water Level Displays the current water level.</p>	<p>h</p>  <p>Menu button Access to the Main menu screen.</p>
<p>i</p> 	<p>Back button Access to the previous screen.</p>	<p>j</p>  <p>OK button Access to the selected item.</p>
<p>k</p> 	<p>Up button Increase the temperature setting, parameter or moves up.</p>	<p>l</p>  <p>Down button Decrease the temperature setting, parameter or moves down.</p>
<p>m</p> 	<p>Power button Turns the furnace on or off (does not turn off line voltage to the unit).</p>	

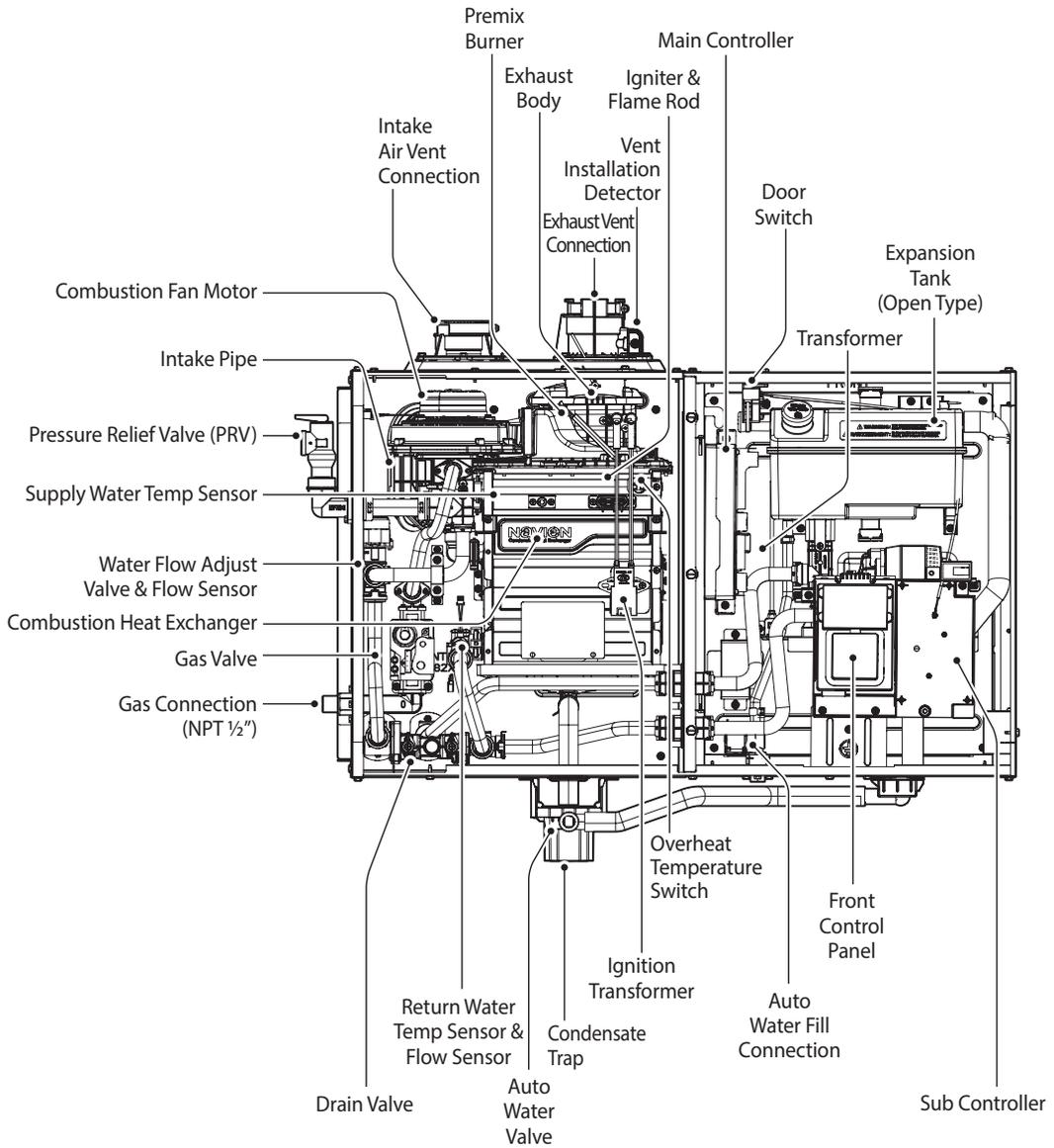
1.7 Components

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

NPF700-060U3BH/100U5CH



NPF700-060H3BH/100H5CH



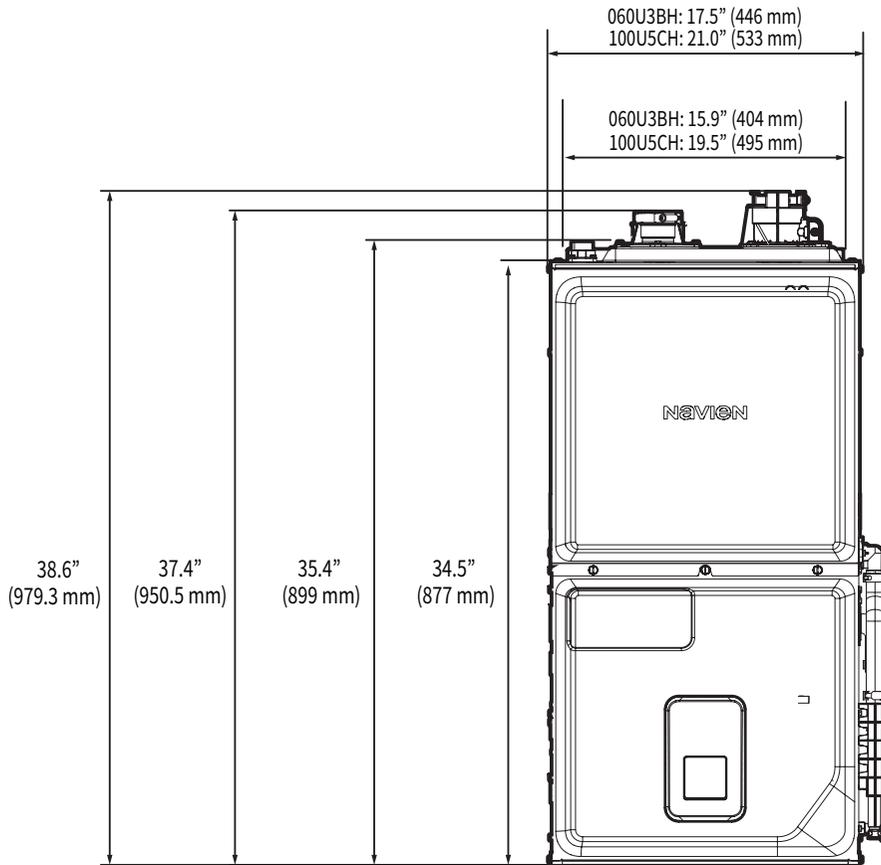
1.8 Dimensions

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

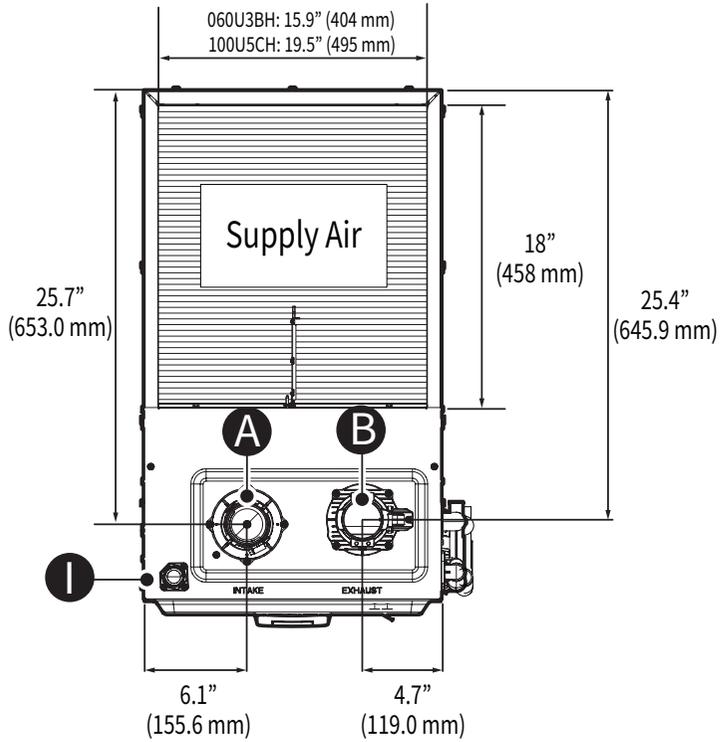
NPF700-060U3BH/100U5CH

Items	Dimensions								
	A	B	C	D	E	F	G	H	I
Name	Air intake	Exhaust gas vent	Gas connection	Condensate drain	Overflow connection	Low voltage electrical connection	Line voltage electrical connection	Water supply connection	Pressure relief valve connection
Diameter	2 in	2 in	1.8 in (NPT 1/2")	NPT 3/4"	1.8 in (Ø44.5 mm)	0.9 in (Ø22.2 mm)	0.9 in (Ø22.2 mm)	NPT 1/4"	NPT 3/4"

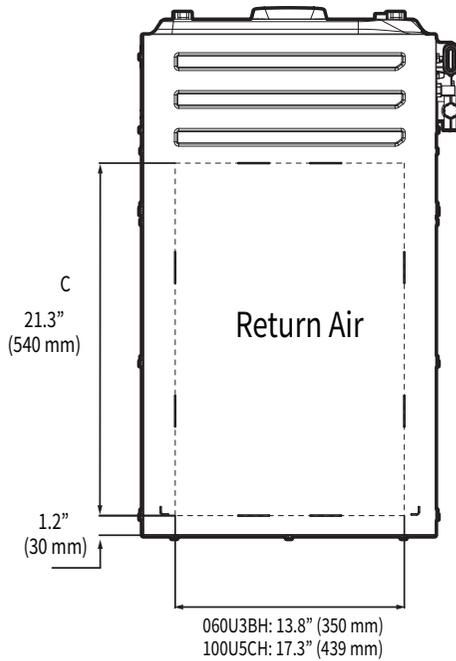
[Connections Size]



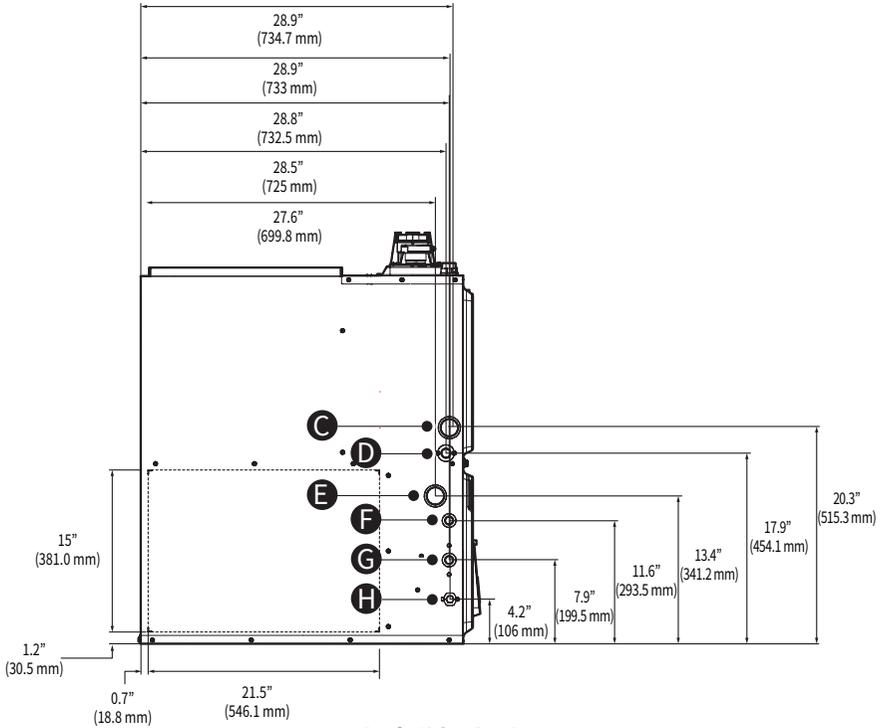
[Front View]



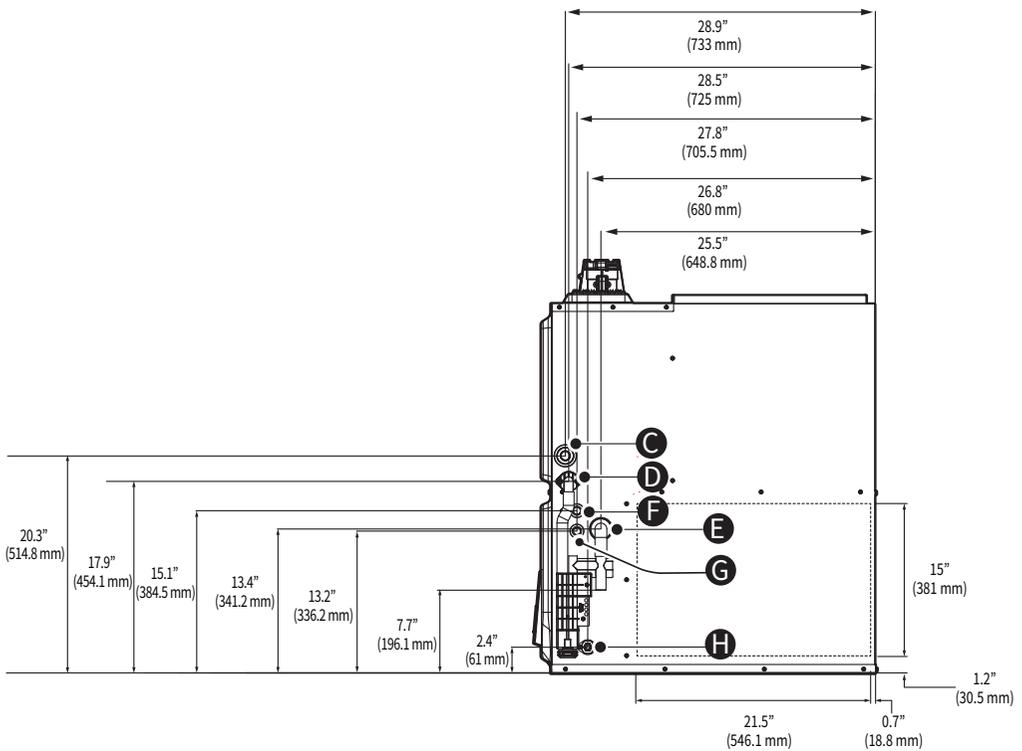
[Top View]



[Bottom View]



[Left Side View]

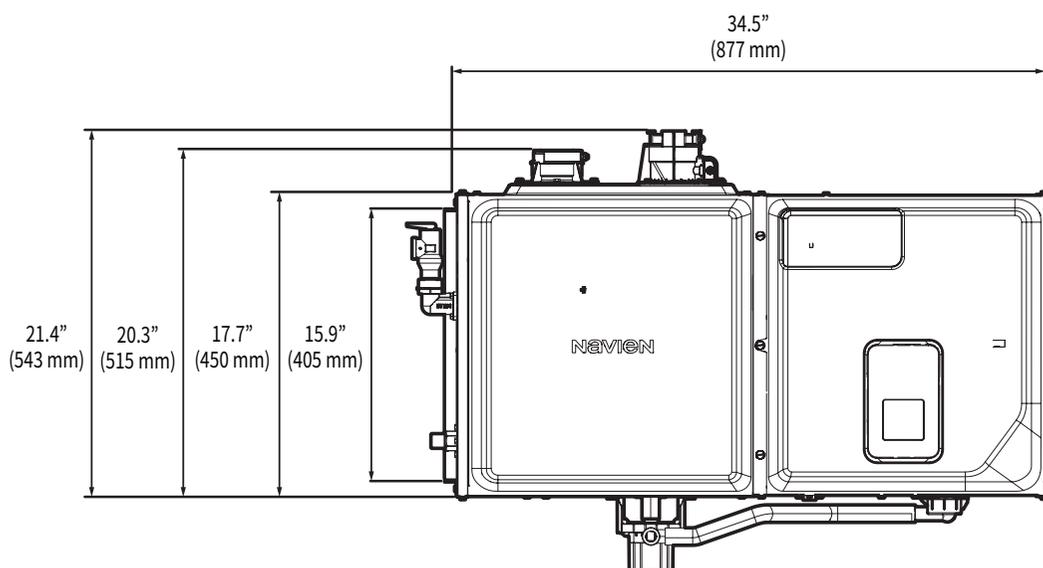


[Right Side View]

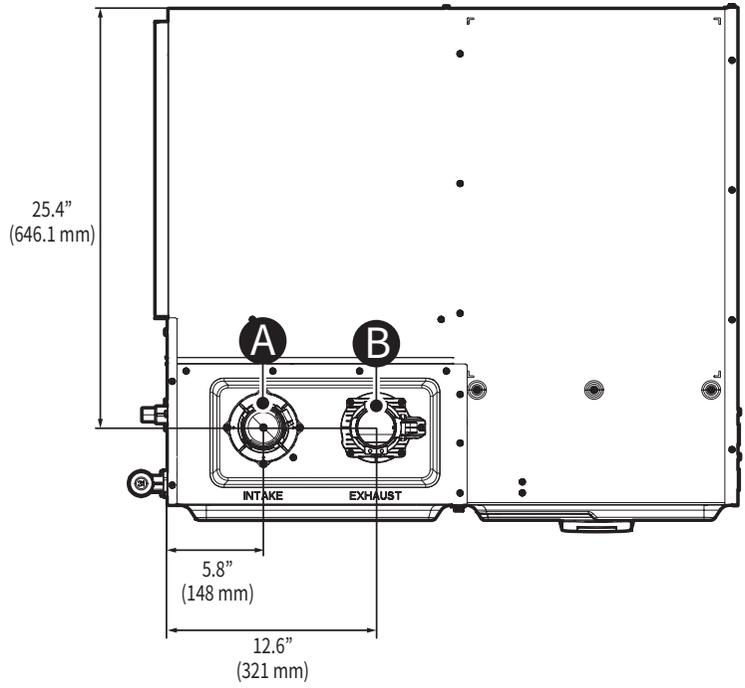
NPF700-060H3BH

Items	Dimensions								
	A	B	C	D	E	F	G	H	I
Name	Air intake	Exhaust gas vent	Gas connection	Condensate drain	Overflow connection	Low voltage electrical connection	Line voltage electrical connection	Water supply connection	Pressure relief valve
Diameter	2 in	2 in	1.8 in (NPT 1/2")	NPT 3/4"	1.8 in (Ø44.5 mm)	0.9 in (Ø22.2 mm)	0.9 in (Ø22.2 mm)	NPT 1/4"	NPT 3/4" (female)

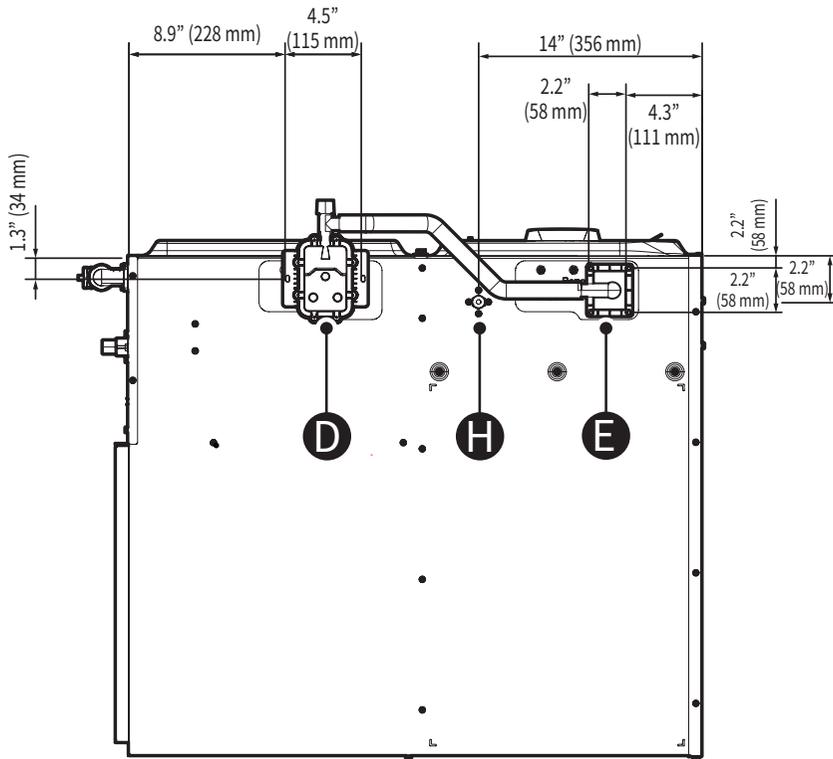
[Connections Size]



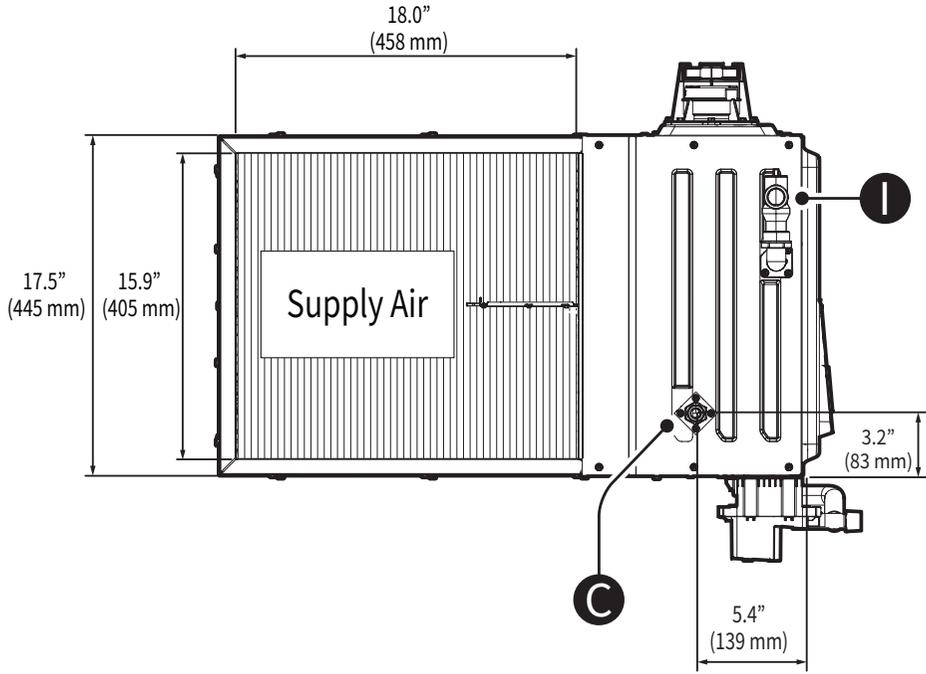
[Front View]



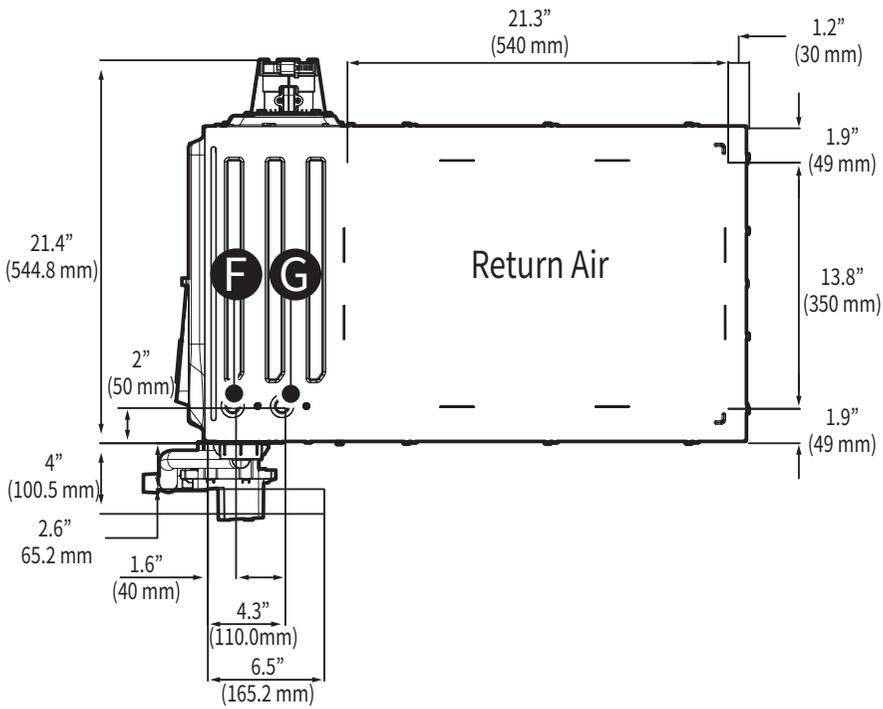
[Top View]



[Bottom View]



[Left Side View]

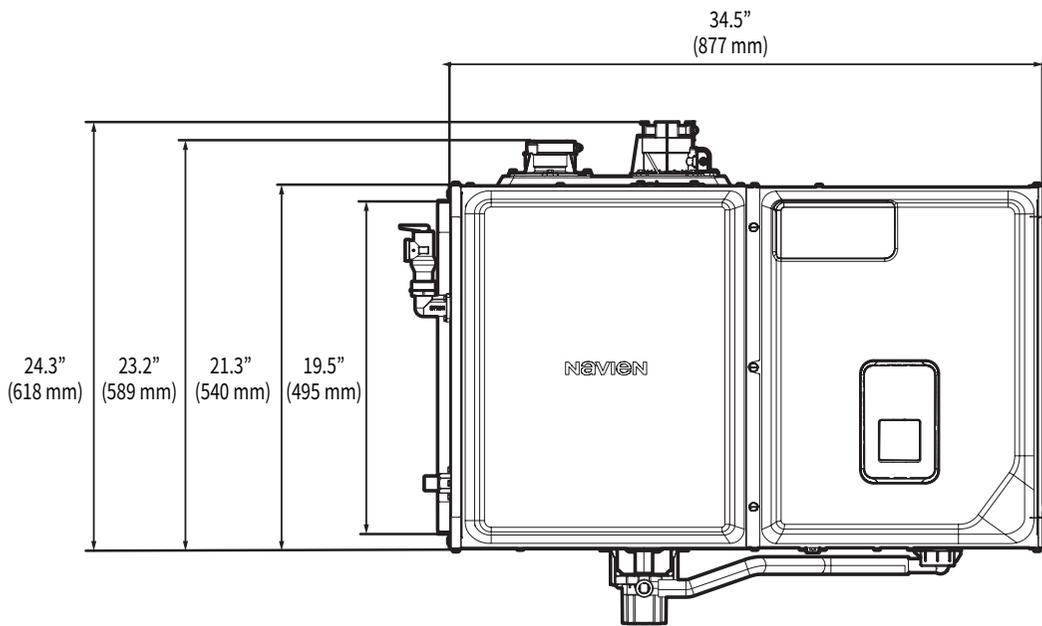


[Right Side View]

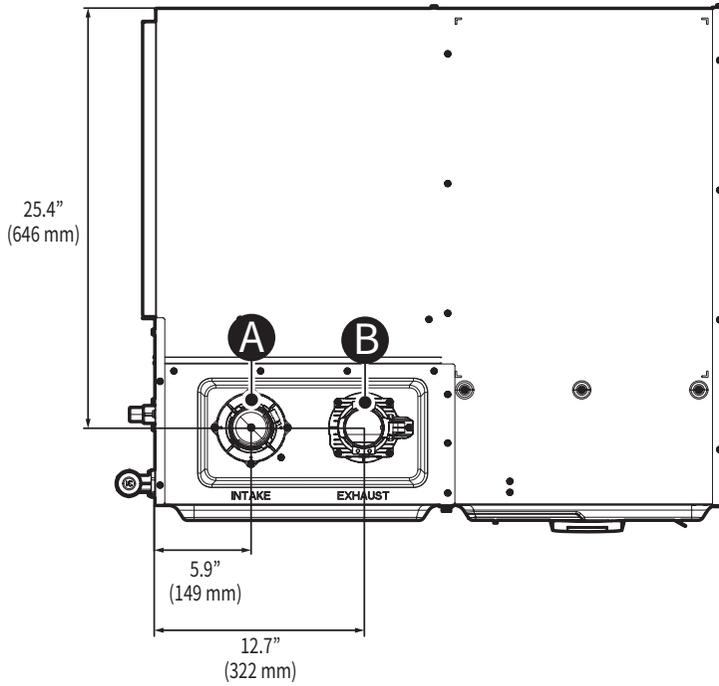
NPF700-100H5CH

Items	Dimensions								
	A	B	C	D	E	F	G	H	I
Name	Air intake	Exhaust gas vent	Gas connection	Condensate drain	Overflow connection	Low voltage electrical connection	Line voltage electrical connection	Water supply connection	Pressure relief valve
Diameter	2 in	2 in	1.8 in (NPT ½")	NPT ¾"	1.8 in (Ø44.5 mm)	0.9 in (Ø22.2 mm)	0.9 in (Ø22.2 mm)	NPT ¼"	NPT ¾" (female)

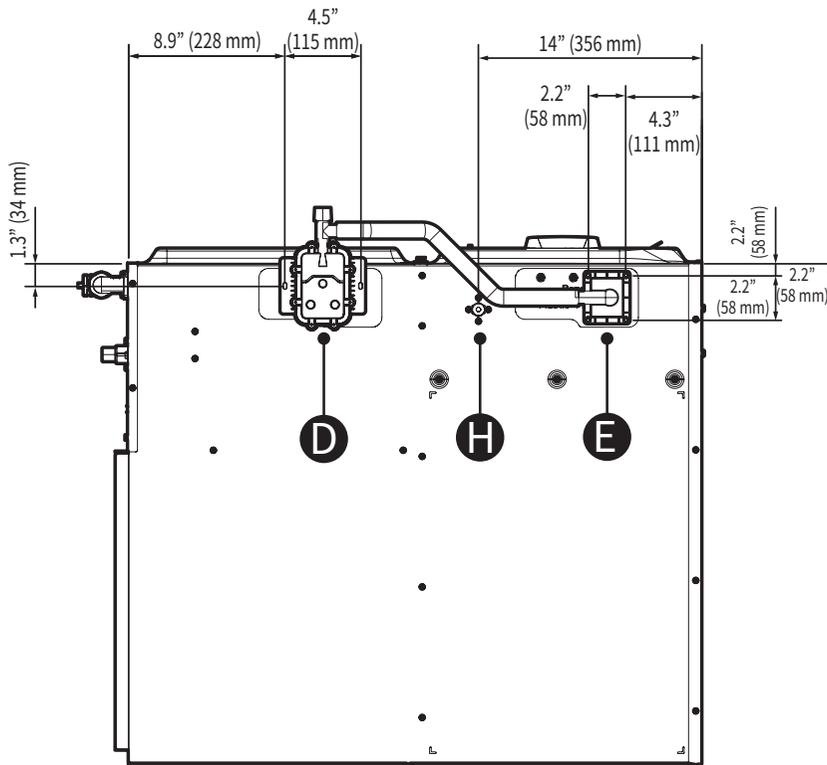
[Connections Size]



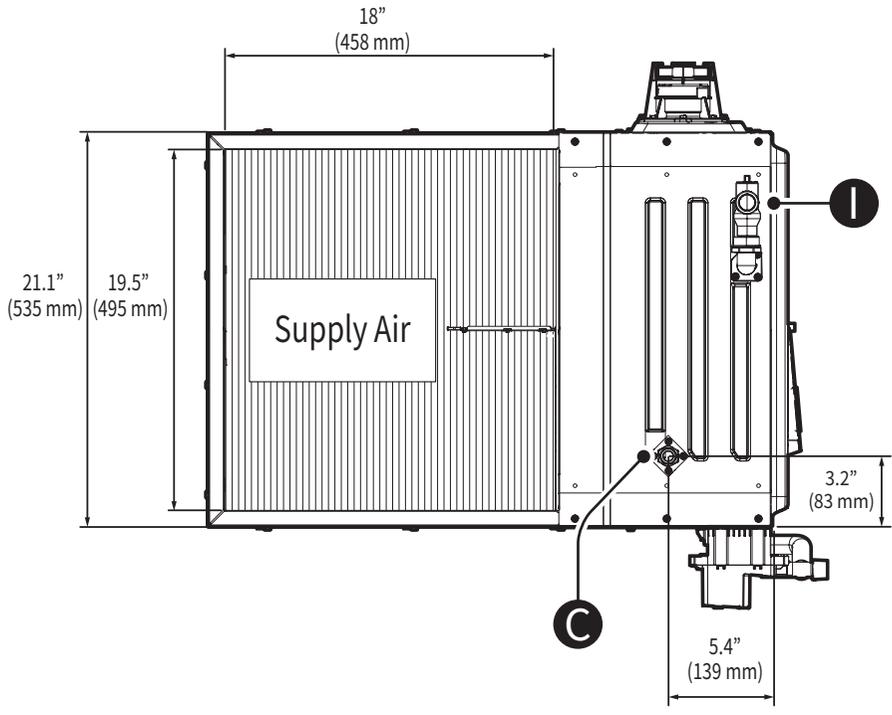
[Front View]



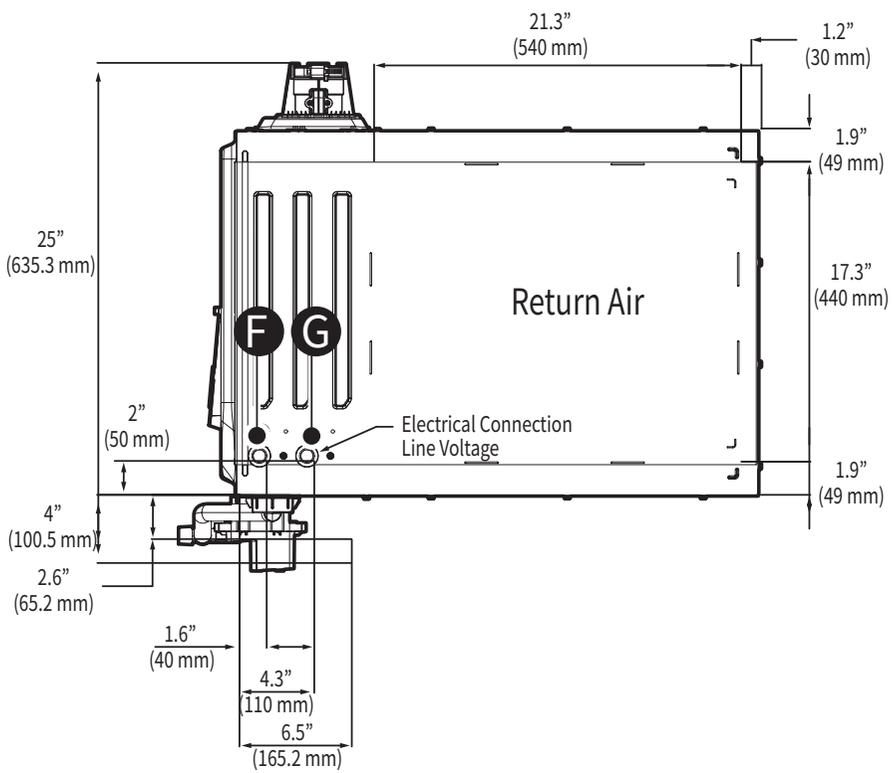
[Top View]



[Bottom View]



[Left Side View]

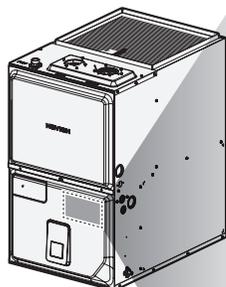


[Right Side View]

1.9 Rating Plate

The NPF furnaces come from the factory configured for use with Natural Gas (NG). **Before starting the installation**, check the rating plate located on the side of the furnace to ensure that the furnace matches the gas type, gas pressure, water pressure, and electrical supply available in the installation location. **If the furnace does not match each of these ratings, do not install the furnace.** If conversion to Propane Gas is required, the included gas conversion kit must be used. Refer to “6.1 Gas & High Altitude Conversion” on page 117 for details.

Note The Propane Gas & High Altitude Conversion Kit is included in the furnace packaging with the installation parts kit. If you need assistance, please call a licensed professional.



Rating Plate, *Plaque Signalétique

Gas Furnace *Fournaise au gaz
Navien, Inc.
20 Goodyear, Irvine, CA 92618
Tel: 1-800-519-8794

Model No., *Numéro de modèle
NPF700-060H3BH

Max. Input Rating, *Entrée nominale max.
60,000 Btu/h

Max. Air Temperature Rise, *Augmentation max.
de la température de l'air 45-75 °F

Design Max Outlet Air Temperature, * Température
maximale de l'air de sortie à la conception 170 °F

Max. Inlet Gas Pressure, *Pression max. de gaz
d'entrée 10.5 Inches W.C. *pouces W.C.

Manifold Pressure, *Pression d'admission
-0.01—0.02 Inches W.C

Electrical Rating, *Régime électrique nominal
AC *c.a. 120 Volts, 60 Hz, 1 PH

Max. Fuse or Circuit Breaker, *Max. pour le fusible ou le disjoncteur 15 A

ANSI Z21.47-2021 - CSA 2.3-2021 Central Furnace, Type FSP Category IV Direct or Non Direct vent forced air furnace for indoor installation in building constructed on site. *Type FSP catégorie IV générateur d'air chaud a évacuation directe ou non et a air force. A installer a l'intérieur seulement dans bâtiment construit sur place.

Orifices necessary for LP conversion are provided. *Les injecteurs nécessaires à la conversion au GPL sont fournis.

Failure to use the correct gas can cause problems which can result in death, serious injury or property damage. *Le fait de ne pas utiliser le bon gaz peut causer des problèmes qui peuvent mener à la mort, causer des blessures graves ou endommager la propriété.

Consult your installation manual for more information. *Consultez votre manuel d'installation pour plus d'information.

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 installations at altitudes up to 10,100ft (3,078m), follow the directions provided in the High Altitude Installation sections of the Installation Manual. *Cet appareil est certifié pour une utilisation à des altitudes de 0 à 4,500 pieds (1,370 m) conformément aux toutes les procédures d'installation à haute altitude CAN/CGA 2.17 à une pression normale. Pour des installations à des altitudes allant jusqu'à 3,078 m (10,100 pi), suivez les directives indiquées dans les sections Installation à haute altitude du Manuel d'installation.

This appliance must be installed in accordance with local codes or in the absence of local codes, the most recent edition of National Fuel Gas Code, ANSI Z223. 1, in Canada use CAN/CGA B149. 1 or 2 installation codes for Gas Burning Appliances.

*Cet appareil doit être installé conformément aux codes locaux, ou s'il n'y a pas de codes locaux, la plus récente version du National Fuel Gas Code des É.-U., ANSI Z223. 1, au Canada utilisez les codes d'installation CAN/CGA B149. 1 ou 2 pour les appareils à gaz.

FOR YOUR SAFETY *POUR VOTRE SÉCURITÉ

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other gas appliances. *Ne rangez pas et n'utilisez pas d'essence ou d'autres liquides ou vapeurs inflammables près de cet appareil ou de tout autre appareil électroménager.

Type of Gas *Type de gaz

Natural Gas

Min. Input Rating, *Entrée nominale min.

9,000 Btu/h

Min. Air Temperature Rise, *Augmentation min.

de la température de l'air 5-35 °F

Max. External Static Pressure, *Pression statique

externe max. 1.0 Inches W.C. *pouces W.C.

Min. Inlet Gas Pressure, *Pression min. de gaz

d'entrée 3.5 Inches W.C. *pouces W.C.

Max. Unit Amps, *Intensité de courant max. de l'appareil 10.9 A

NOx Emission Limit, *Limite d'émissions de NOx 14 ng/J



Intertek
5023321



⚠ WARNING

To prevent death, serious injury or property damage:

Before starting the installation, check the Rating Plate located on the side of the furnace to ensure that the furnace matches the gas type, gas pressure, and electrical supply available in the installation location.

If the furnace does not match each of these ratings, do not install the furnace. Using a different gas type will result in abnormal combustion and malfunction of the furnace.

- ONLY a licensed professional should connect the gas supply.
- ALWAYS leak test the appliance and the gas connections before operating the appliance.
- This furnace cannot be converted from natural gas to propane without a Navien Propane Gas & High Altitude Conversion Kit. NEVER attempt a field conversion of this furnace without using the Navien Propane Gas & High Altitude Conversion Kit. Doing so will result in dangerous operating conditions and will void the warranty.

Navien Inc. is not liable for any property damage, personal injury or death resulting from improper conversions.

This appliance complies with the requirements of SCAQMD Rule 1111 for NOx emissions of 14 ng/J or 20 ppm at 3% O₂.

2. Installing the Furnace

2.1 Choosing an Installation Location

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

WARNING

- Do not install outdoors. Outdoor installation will void the warranty and may result in property damage, severe personal injury, or death. Damage to the furnace resulting from installation outdoors is not covered by warranty.
- Do not install the furnace in a recreational vehicle, trailer, boat or other moving vehicles as it will result in a Carbon Monoxide Poisoning Hazard.

Note If the furnace is installed in Massachusetts, refer to “6.6 Requirements for the State of Massachusetts” on page 129.

Operating Temperature

The ambient temperature at the installation location must be above 32°F (0°C) and below 125°F (52°C).

Compliance Requirements

Install the furnace in accordance with any local code that may apply and the national codes.

Latest editions can be obtained from the National Fire Protection Association, Inc., Batterymarch Park, Quincy, MA 02269. These publications are:

- ANSI/NFPA No. 70-(Latest Edition) National Electrical Code.
- NFPA90A Installation of Air Conditioning and Ventilating Systems.
- NFPA90B Installation of warm air heating and air conditioning systems.
- In Canada CSA 22.2 Canadian Electrical Code.
- In Canada CSA B149.1; Canadian Natural Gas and Propane Installation Code.

This furnace may be used as a construction site heater **ONLY** if all of the following conditions are met:

- The vent system is permanently installed per these installation instructions.
- A room thermostat is used to control the furnace. Fixed jumpers that provide continuous heating **CANNOT** be used and can cause long term equipment damage.
- Return air ducts are provided and sealed to the furnace.
- A return air temperature range between 60°F (16°C) and 80°F (27°C) is maintained.
- Air filters are installed in the system and maintained during construction replaced as appropriate during construction, and upon completion of construction.
- The input rate and temperature rise are set per the furnace rating plate.
- 100% outside air is provided for combustion air requirements during construction. Temporary ducting can be used.

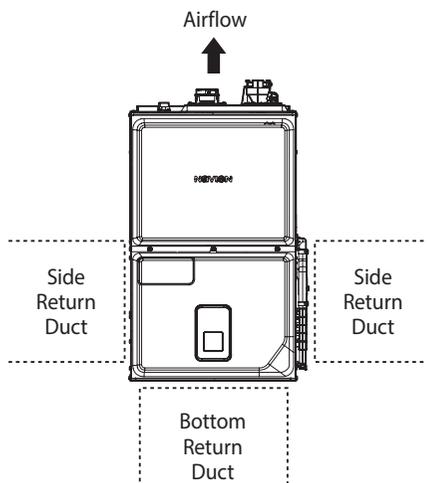
Note

- Do not connect the temporary duct directly to the furnace. The duct must be sized for adequate combustion and ventilation in accordance with the latest edition of the National Fuel Gas Code NFPA 54/ANSI Z223.1 or CAN/CSA B149.1 Installation Codes.
- The furnace heat exchanger, components, duct system, air filters and evaporator coils are thoroughly cleaned following final construction clean up.
- All furnace operating conditions (including ignition, input rate, temperature rise, and venting) are verified according to these installation instructions.

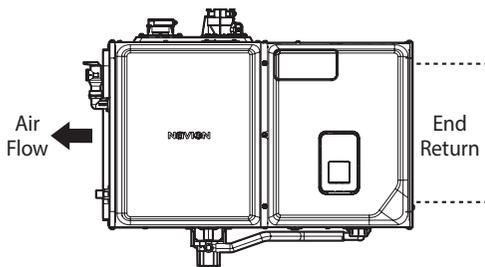
Installation Position

There are two NPF700 models available in upflow and horizontal left installations. The upflow model is installed vertically, and the horizontal left model is installed horizontally.

For the upflow furnace, the return air duct can be attached to either side or the bottom. For the horizontal left furnace, the return air duct must be attached to the bottom (the end opposite of the discharge outlet).



[Upflow Models]



[Horizontal Left Models]

Note Ducts cannot be attached to the back of the furnace.

Location Requirement and Considerations

To meet the requirements for proper installation, follow these guidelines:

- Locate the furnace centrally with respect to the proposed or existing air distribution system.
- Ensure the temperature of the return air entering the furnace is between 55°F (12°C) and 100°F (37°C) when the furnace is heating.

Note For proper airflow, make sure that the return air grilles and warm air registers must not be obstructed or closed.

- Provide provisions for venting combustion products outdoors through a proper venting system. Special consideration should be given to the vent/flue pipe routing and combustion air intake pipe when applicable. Refer to "2.7 Venting for Combustion Air" on page 48 for appropriate termination types and locations and to determine if the piping system from the furnace to termination can be achieved within the guidelines.

Note The length of flue and/or combustion air piping can be a limiting factor in the location of the furnace.

- Locate the furnace where condensate can flow downwards to the drain. Do not locate the furnace or its condensate drainage system in any area subject to below freezing temperatures without proper protection against freezing. Refer to "2.3 Connecting the Condensate Drain" on page 33 for more details.
- Ensure the furnace is provided with adequate combustion air. Refer to Combustion and Ventilation Air Requirements.

⚠ WARNING

Improper or insufficient combustion air can expose building occupants to gas combustion products, including carbon monoxide.

- Set the furnace on a level floor to ensure proper condensate drainage. If the floor is wet or damp at times, locate the furnace above the floor on a concrete base approximately 1-½" larger than the base of the furnace.
- Do not install the furnace directly on carpet or any other combustible material. Wood is the only combustible material allowed.

- Exposure to contaminated combustion air results in safety issues and degrades product performance. Do not install the furnace where the combustion air is exposed to the following substances:
 - Permanent wave solutions
 - Chlorinated waxes or cleaners
 - Chlorine-based swimming pool chemicals
 - Water softening chemicals
 - De-icing salts or chemicals
 - Carbon tetrachloride
 - Halogen type refrigerants
 - Cleaning solutions (such as perchloroethylene)
 - Printing inks
 - Paint removers
 - Varnishes
 - Hydrochloric acid
 - Cements and glues
 - Antistatic fabric softeners for clothes dryers and masonry acid washing materials
- Isolate a non-direct furnace from an area contaminated by any of the above substances. This protects the non-direct vent furnace from airborne contaminants. To ensure that the enclosed non-direct vent furnace has an adequate supply of combustion air, air must be ducted in from a nearby uncontaminated room or from outdoors. Refer to "2.7 Venting for Combustion Air" on page 48 for details.
- If the furnace is used in connection with a cooling unit, install the furnace upstream or in series with the cooling coil. Placing the cooling coil upstream of the furnace will result in premature heat exchanger failure.
- For vertical applications, the minimum cooling coil width must not be less than the furnace width minus 1". Additionally, a coil installed above an upflow furnace may be the same width as the furnace or may be one size larger than the furnace (e.g., a "C" width coil may be installed with a "B" width furnace). For upflow applications, the front of the coil and furnace must face the same direction.

This furnace may be used as a construction site heater ONLY if all of the following conditions are met:

- The vent system is permanently installed based on the provided guidelines.
- A room thermostat is used to control the furnace. Jumpers CANNOT be used for continuous heating and can cause excessive wear. Issues caused by improper or unapproved wiring will NOT be covered under warranty.
- Return air ducts are provided and sealed to the furnace.
- A return air temperature range must be between 55°F (12°C) and 100°F (37°C).
- Air filters installed in the system shall be maintained and replaced during and after construction.
- The input rate and temperature rise are properly set based on the rating plate.
- 100% outdoor air is provided for combustion air requirements during construction. Temporary ducting can be used.

Note

- Do not connect the temporary duct directly to the furnace. The duct must be sized for adequate combustion and ventilation in accordance with the latest edition of the National Fuel Gas Code NFPA 54/ANSI Z223.1 or CAN/CSA B149.1 Installation Codes.
- The furnace heat exchanger, components, duct system, air filters and evaporator coils are thoroughly cleaned following final construction clean up.
- All furnace operating conditions (including ignition, input rate, temperature rise, and venting) are verified according to these installation instructions.

- If the furnace is installed in a residential garage, position the furnace so that the burners and ignition source are located more than 18 inches (457 mm) above the floor. Protect the furnace from physical damage by vehicles.
- If the furnace is installed horizontally, ensure the access doors are not on the “up/top” or “down/bottom” side of the furnace.
- Do not connect the furnace to a chimney flue that serves a separate appliance designed to burn solid fuel.
- If installing the unit over a finished ceiling or living area, be sure to install an auxiliary condensate drain pan under the entire unit. This auxiliary drain pan should extend under any evaporator coil installed with the furnace and the open portion of the condensate drain assembly. “2.3 Connecting the Condensate Drain” on page 33 for more information.
- The furnace is approved for installation in attics, as well as alcoves, utility rooms, closets, and crawlspaces. Provisions must be made to prevent the freezing of condensate.

Freeze Protection

- For installations where the furnace may reach temperatures below 32°F (0°C) (such as in an alcove or attic), insulate the drain trap, connected drain pipe, and supply water line using a dry cloth or thermal insulator to make sure they do not freeze. Local codes and practices should be followed to prevent freezing.
- The drain trap is mounted outside the cabinet and it must be protected from freezing. Regardless of the location of the drain trap, any exposed drain piping must be protected from freezing, as required by local practices or codes. A UL or CSA listed heat tape or UL or CSA approved heating cable with a rating of 3–6 watts per foot is acceptable protection when installed and maintained in accordance with the manufacturer’s instructions. Good installation practices necessitate that the installer verify heat tape operation in accordance with the manufacturer’s instructions at the time of installation.

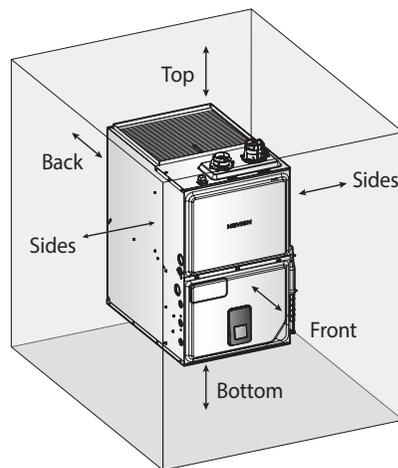
Clearances and Accessibility

NOTICE

Do not install the furnace on carpet.

Minimum Clearance

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



Note

- For servicing or cleaning the furnace, a front clearance of 24" is required.
- Unit connections, such as electrical, flue, and drain connections, may necessitate greater clearances than the minimum clearances listed above.
- In all cases, accessibility clearance must take precedence over clearances from the enclosure where accessibility clearances are greater.

Minimum Clearances to Combustible Materials

Based on the installation location, ensure that the following clearances to combustible materials are maintained:

Position	Upflow	Horizontal
Front	3"	Alcove
Sides	0"	6"
Rear	0"	0"
Top	1"	4"
Flue	0"	0"
Floor	0"	0"

Note If placed on a combustible floor, the floor MUST only be made out of wood.

Thermostat Location

The thermostat should be placed approximately 5 ft. from the floor on a vibration-free, inside wall in an area having good air circulation. Do not install the thermostat where it may be influenced by any of the following:

- Drafts or dead spots behind doors, in corners, or under cabinets
- Hot or cold air from registers
- Radiant heat from the sun
- Light fixtures or other appliances
- Radiant heat from a fireplace
- Concealed hot or cold water pipes, or chimneys
- Unconditioned areas behind the thermostat, such as an outside wall

Access to Utilities

- 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

The furnace produces a significant amount of condensate during operation.

The furnace should be located near a suitable drain and where damage from a possible leak will be minimal.

Installing the Furnace in a location without a drain will void the warranty and Navien will not be responsible for water damages that occur as a result.

For more information about condensate drainage, refer to "2.3 Connecting the Condensate Drain" on page 33.

The furnace 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 Furnace is highly recommended.

Adequate Venting and Ventilation

Select a location that requires minimal vent lengths. Consider venting restrictions caused by windows, doors, air intakes, gas meters, foliage, and other buildings. For more information about venting, refer to "2.7 Venting for Combustion Air" on page 48.

To ensure adequate venting and ventilation, follow these guidelines:

- Maintain proper clearances from any openings in the building.
- Ensure that the vent termination is at least 12 in (300 mm) above ground, 12 in (300 mm) above the highest anticipated snow level, or as required by local codes, whichever is greater.
- Do not enclose the vent termination.
- Install the exhaust vent in an area that is free from any obstructions, where the exhaust will not accumulate.
- Do not install the Furnace where moisture from the exhaust may discolor or damage walls.

Clean, Debris and Chemical-free Combustion Air

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

High Elevation Installations

- This unit may be installed at elevations up to 10,100 ft (3,078 m) for use with natural gas and propane.
- Refer to "3. Setting the DIP Switches" on page 78 for the appropriate altitude setting.

⚠ WARNING

- ALWAYS read and follow the Natural Gas High Altitude Conversion Guide when installing the gas orifice included with the kit in order to prevent death, serious injury or property damage.
- The front cover will need to be removed from the furnace to access the High Altitude Conversion Kit.

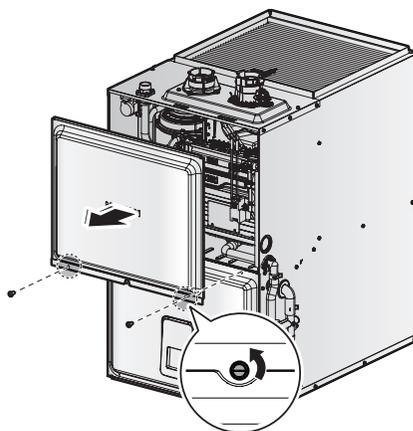
Installing the Included Items on the Furnace

Before installing the furnace after choosing a proper installation location, install the following included items on the furnace:

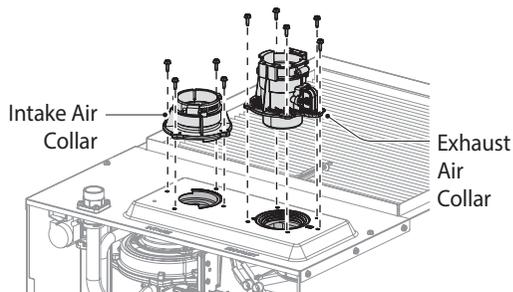
- Intake Air Collar
- Exhaust Air Collar
- Condensate trap (including the drain hose)

Note To check each included item, refer to "1.3 Included Items" on page 9.

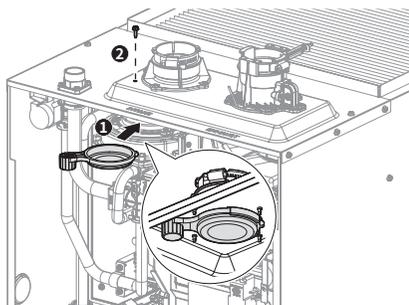
1. Loosen the 2 screws on the bottom corner of the upper-front cover, and then remove the upper-front cover from the furnace.



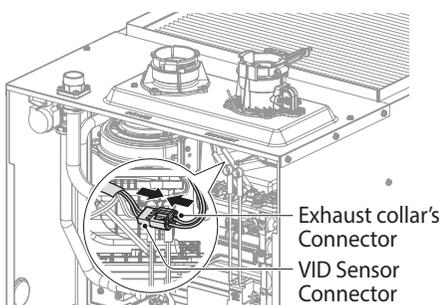
2. Connect the intake air collar and exhaust air collar to the duct holes on the furnace and then tighten the mounting screws to secure the collars.



3. Insert the intake filter at the bottom of the intake air collar.



4. Connect the exhaust collar's connector to the VID sensor connector inside the furnace.



Note To operate the furnace properly, be sure to connect the exhaust collar's connector to the VID sensor connector inside the furnace. If the connectors are not connected after installing the exhaust vent, an E762 error will occur and furnace will not operate. For more information about the error codes, refer to "5.15 Understanding Error Codes" on page 111.

5. Install the condensate trap on the left or right side of the furnace. For more information about condensate trap installation, refer to "2.10 Conversions" on page 75.

Pressure Relief Valve

To complete the installation of the NPF700, a 30 psi (maximum) pressure relief valve must be installed on a $\frac{3}{4}$ inch adapter on the upper cover.

The ASME approved Watt (MT330-MT) Pressure Release Valve ($\frac{3}{4}$ in., HV, up to 30 psi) is supplied with the furnace.

! WARNING

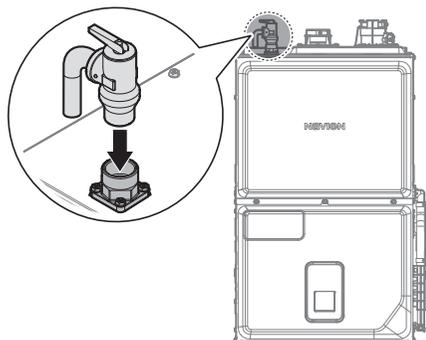
- Installing the pressure relief valve improperly may result in property damage, personal injury, or death. Follow all instructions and guidelines when installing the pressure relief valve. The valve should be installed only by a licensed professional.
- The pressure relief valve must be installed at the furnace outlet and in the vertical position, as shown in this section, with the drain pipe outlet exiting the side of the pressure relief valve horizontally and elbowing down.

! CAUTION

Do not install any valves between the pressure relief valve and the furnace. Follow the guidelines below when installing the pressure relief valve:

- Use the pressure relief valve included with the product.
- Do not allow the pressure relief valve's outlet to splash hot water on an operator or the furnace.
- Install an outlet line for the pressure relief valve and place the end of the outlet line toward the drain pan.
- Make sure any water from the outlet line is drained properly.
- Do not install a reducing coupling or anything else restricting the flow on the discharge line.
- Do not plug up the relief valve.

The illustration below shows an example of a pressure relief valve installed with furnace.



CAUTION

All separately purchased pressure relief valves must be ASME certified.

2.2 Removing Existing (Old) Furnaces

Note

- When an existing furnace is removed from a venting system serving other appliances, the venting system may be too large to properly vent the remaining attached appliances.
- The following vent testing procedure is reproduced from the American National Standard/National Standard of Canada for Gas-Fired Central Furnaces ANSI Z21.47, CSA- 2.3 latest edition Section 4.23.6.

1. Inspect the venting system for proper size and horizontal pitch, as required by the National Fuel Gas Code, ANSI Z223.1 or the Natural Gas and Propane Installation Code, CSA B149.1-15 and these instructions. Determine that there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition. Make sure the existing system falls within the venting requirements of the specific NPF being installed. If not, replace the vent system properly designed and sized.

2. As far as practical, close all building doors and windows and all doors between the space in which the appliance(s) connected to the venting system are located and other spaces of the building.
3. Close fireplace dampers.
4. Turn on clothes dryers and any appliance not connected to the venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they shall operate at maximum speed. Do not operate a summer exhaust fan.
5. Follow the start-up instructions. Place the appliance being inspected in operation. Adjust thermostat so appliance shall operate continuously.
6. Test for spillage from draft hood of other appliances at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle.
7. If improper venting is observed during any of the above tests, the venting system must be corrected in accordance with the National Fuel Gas Code ANSI Z223.1/ NFPA 54 and/or National Gas and Propane Installation Code CSA B149.1-15.
8. After it has been determined that each appliance connected to the venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas burning appliance to their previous conditions of use.

If resizing is required on any portion of the venting system, use the appropriate table in Appendix G in the latest edition of the National Fuel Gas Code ANSI Z223.1 and/or CSA B149.1-15 Installation Codes.

2.3 Connecting the Condensate Drain

The Navien NPF furnace creates condensation when it operates. This condensation has an acidic pH of 3-5. Follow all local codes and regulations when disposing of condensate from the furnace.

NOTICE

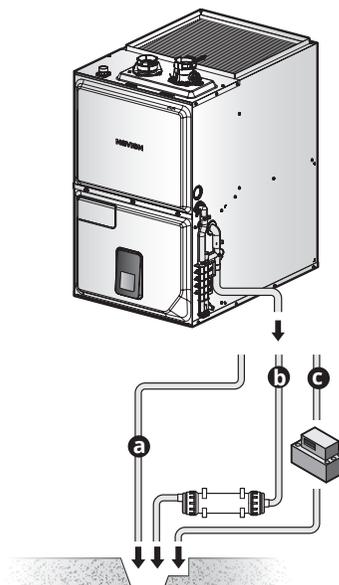
- Fill the condensate trap with water after installing the condensate drain pipe.
- Do not cap or plug the integrated condensate line. If prevented from draining, condensate can damage the furnace.
- The condensate line must have a negative slope to drain properly.
- NEVER drink or allow animals to drink condensate. The pH of the condensate could cause serious injury.

Note

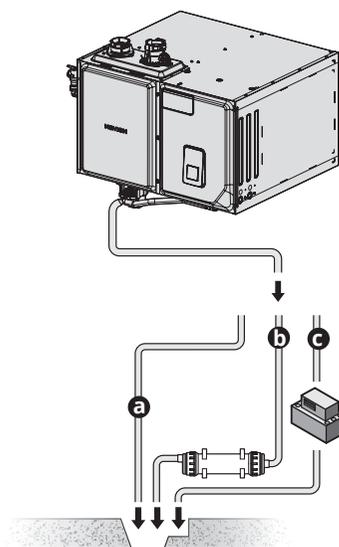
Follow the guidelines below to install the drain system properly.

- The drain trap supplied with the furnace must be used.
- The drain trap must be primed during installation.
- The drain line between the furnace and drain location must meet the local and national codes.
- The drain line between the furnace and drain location must maintain a $\frac{1}{4}$ inch per foot downward slope toward the drain.
- Do not add any trap onto the drain line coming from the furnace drain line.
- If the drain line is routed through an area which may see temperatures near or below freezing, precautions must be taken to prevent condensate from freezing within the drain line.
- If an air conditioning coil is installed with the furnace, a common drain may be used. An open tee must be installed in the drain line, near the cooling coil, to relieve positive air pressure from the coil's plenum. This is necessary to prohibit any interference with the function of the furnace's drain trap.

Before connecting the condensate drain, choose one of the following disposal options:



[Upflow Models]



[Horizontal Models]

- a. From the furnace directly into an external drain
- b. From the furnace, through a neutralizing agent, and then into an external drain

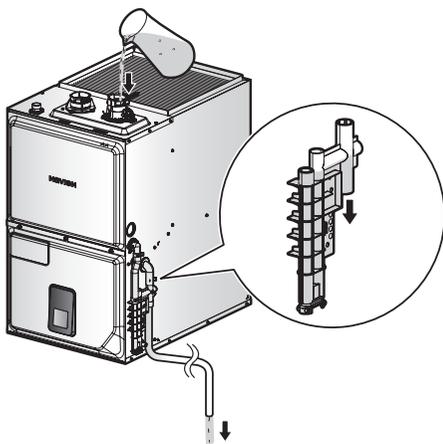
Note If you choose this option, the neutralizing agent must be replaced periodically. Depletion of the neutralizing agent will vary, based on the usage rate of the furnace. Follow the neutralizer manufacturer's recommendation for checking and maintaining the neutralizer when necessary.

- c. From the furnace into a condensate pump, and then into a suitable drain.

Note A pump can be used when there is a long distance between the furnace and accessible drain.

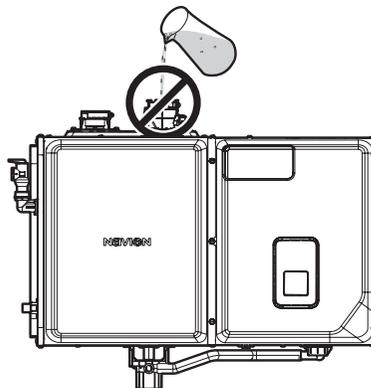
To connect the condensate drain:

1. Place the free end of the drain line into an appropriate drain.
2. Fill the condensate trap by pouring water into the furnace's exhaust vent until water flows through the condensate drain (NPT 3/4").



! WARNING

Do not fill the condensate trap by pouring water into the furnace's exhaust vent for the horizontal models.



NOTICE

To prevent property damage, do not allow condensate line to freeze or become obstructed or condensate can flow from the drain.

2.3.1 Condensate Neutralizer Kit

⚠ WARNING

To prevent serious injury or death:

- DO NOT allow exhaust flue gases to vent through the neutralizer. Inhalation of flue gases can result in carbon monoxide poisoning.
- ALWAYS install the neutralizer so its inlet and discharge are closer to the floor than the condensate drain.
- ALWAYS install an overflow bypass connection between the appliance and the neutralizer to prevent the backflow of condensate into the appliance.
- DO NOT connect more than one appliance to the neutralizer.

If option 'b' is selected for condensate disposal, the Navien condensate neutralizer kit is recommended. The condensate from the appliance flows through the neutralizing media and increases the pH of the condensate. An increased pH prevents corrosion of the installation's drainage system and the public sewer system.

Installation

- The inlet has a center connection port and the outlet has an offset connection.
- Install the neutralizer on the wall or the floor and secure it using the brackets supplied with the kit.
- If the neutralizer is installed horizontally, rotate the neutralizer to position the outlet at the highest point (Figure 1).
- If the neutralizer is mounted vertically, ensure that the outlet is higher than the inlet (Figure 2).
- Ensure that the condensate runs freely to the drain.
- Ensure all connections are made to prevent the backflow of condensate. Use corrosion resistant piping and secure all piping to prevent movement.

Note

- For increased safety when the condensate drain blocks, install a Y-fitting. Connect the Y-fitting as shown in the installation diagram and ensure that the condensate runs freely to the drain.
- Ensure that the discharge connection is accessible. Access to the discharge connection is required for maintenance and pH testing.
- If there is insufficient gradient for drainage, install a drainage pump designed for boilers, water heaters and furnaces condensate removal.

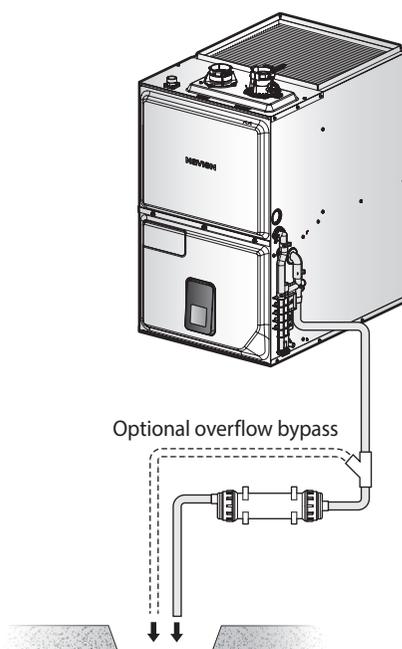


Figure 1. Horizontal installation

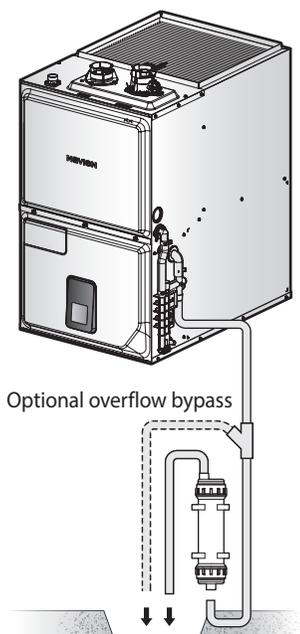


Figure 2. Vertical installation

Maintenance

Periodically monitor the level of media in the neutralizer and test the pH level at the outlet. We recommend an annual pH test using recognized test strips or an electronic pH meter to obtain precise measurements. Replace the neutralizing media when the pH drops below the minimum level required by the local water authority. If the pH level is not specified, replace the neutralizing media when the pH is below 6.0. For replacement media, contact your local Navien distributor.

2.4 Filling the System

The hydro-furnace can be filled automatically or manually. If you connect a pipe to the auto water fill connection on the furnace, you can use the automatic water fill function. To manually fill the furnace, you can fill the furnace's expansion tank with water.

2.4.1 Manual Water Fill

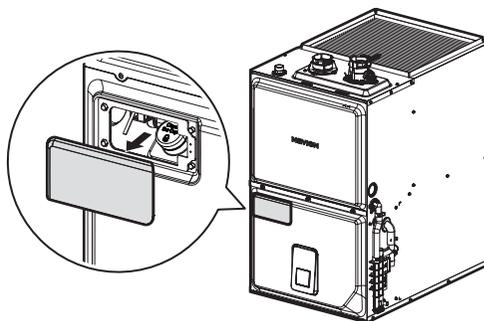
If the water level is at $\frac{1}{4}$ level or below, water must be added to the expansion tank. Follow the instructions to proceed with the manual water fill.

Note Perform the manual water fill when the furnace is installed completely and it is turned on.)

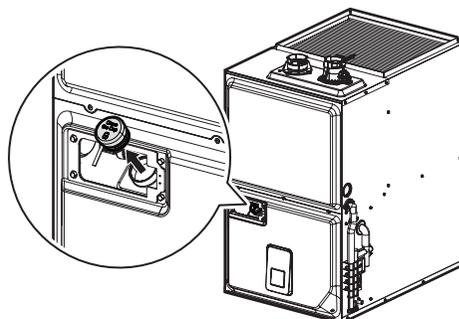
1. Check the water level on the front control panel.



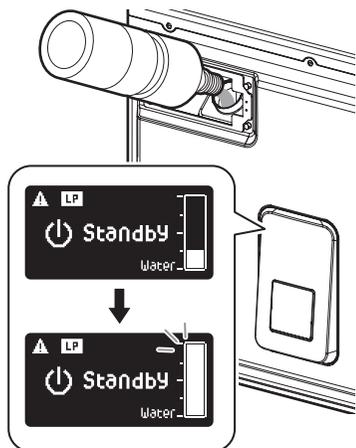
2. Open the water inlet cover on the lower-front cover.



3. Remove the water inlet plug.

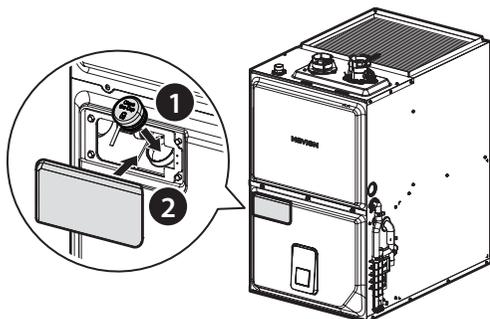


- Fill with water through the water inlet and Check the water fill level on the front control panel.



Note Stop filling when the water level is full. If too much water is added, it will be discharged via the drain line.

- When filling is complete, install the water inlet plug, and then close the water inlet cover on the lower-front cover.



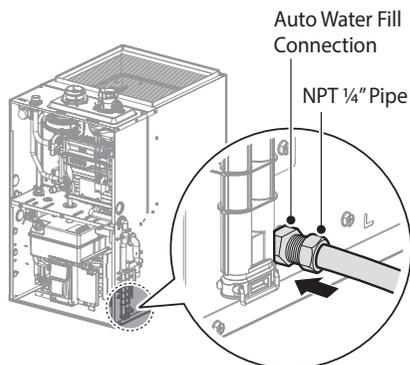
Note If the water inlet plug is not closed, the water in the water tank will evaporate and you will need to refill the water frequently.

⚠ DANGER

Be sure to close the water inlet plug and cover. If they are not closed, there is an interlock switch that will prevent the unit from operating.

2.4.2 Auto Water Fill

The hydro-furnace is equipped with an auto-feeding water connection and motorized feeding valve. Therefore, installing an additional water fill connection is not necessary. Refer to the following figure for an example of installing a water fill connection using the built-in connection.



Auto Water Fill Connection

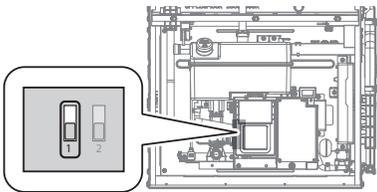
NPT 1/4" Pipe

2.5 Connecting the Gas Supply

⚠ WARNING

To prevent death, serious injury or property damage:

- ALWAYS check the Rating Plate located on the side of the product matches the gas type, gas pressure, water pressure, and electrical supply available for the unit.
- CHECK the #1 DIP switch setting on the Front control panel matches the type of gas supplied to the unit (OFF for Natural Gas and ON for Propane Gas).



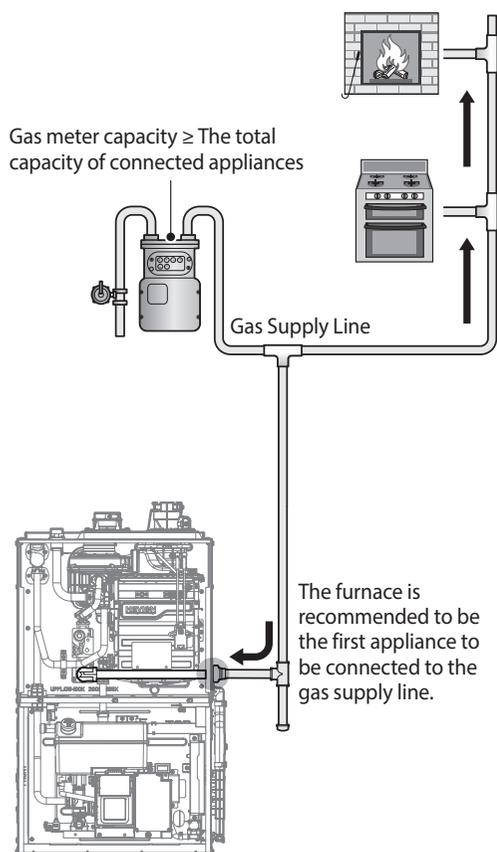
Switch	Function	Setting	
1	Gas Type	Natural Gas	1-OFF
		Propane Gas	1-ON

- Before connecting the gas supply, determine the gas type and pressure for the furnace 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 furnace. Gas supplies should be connected by a licensed professional only.
- To avoid damaging the connectors on the furnace, use two wrenches when tightening piping to the furnace. Use one wrench to prevent the furnace's connector from turning, and use the other wrench to tighten the connection. Damaged connectors may result in system leaks.
- Properly support the piping with hangers. Do not allow the piping to be supported by the furnace or its accessories.

⚠ WARNING

- Ensure that the gas piping is protected from physical damage. 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 into operation.
- To avoid danger from explosion and fire, do not use a 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.
- Immediately turn off the furnace and stop the gas supply if a gas leak is detected. Perform a bubble test to find the leak and repair the leak immediately. Do not start the furnace again until the leak is repaired. Operating the furnace with a gas leak could result in substantial property damage, severe personal injury, or death.
- This furnace 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 furnace without a Navien gas conversion kit. Doing so will result in dangerous operating conditions and will void the warranty.

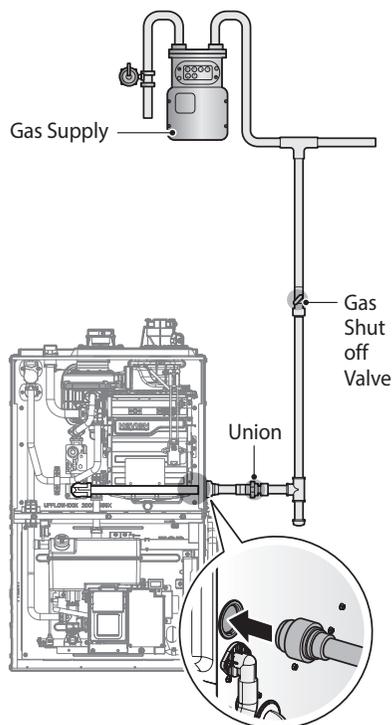
Navien recommends connecting the furnace as the first appliance downstream of the gas meter, to ensure a sufficient gas supply.



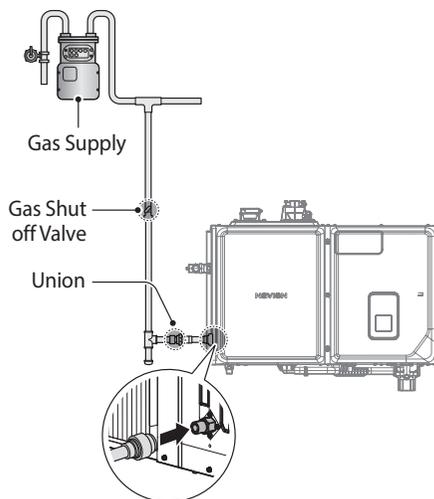
To connect the gas supply:

1. Determine the gas type and pressure for the furnace 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.

6. Connect the gas supply line.



[Upflow Models]



[Horizontal Models]

Note

- Tighten the furnace connection with care to avoid damage.
- Gas piping may be routed into the unit through either the left- or right-hand side in upflow applications, and either the top or bottom in horizontal applications.

- Test the supply line, all connection points, and the furnace for gas leaks.

NOTICE

- Install a manual gas shut-off valve between the gas supply line and the furnace.
- A drop leg must be installed.

Note

- The gas connection fitting on all furnaces is 1/2 in.
- 1/2 in rigid pipe can be used; refer to the sizing tables on the proceeding pages for limitations. Do not use 1/2 in corrugated connectors or tubing as noise may occur.

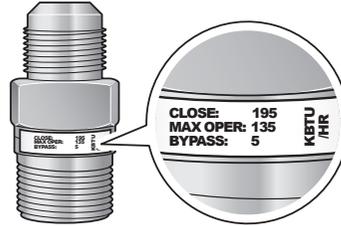


Corrugated Connector

- Do not run a flexible gas connector inside the furnace. The gas pipe gasket in the cabinet does not seal around a flexible gas line. If local codes allow the use of a flexible gas appliance connector, always use a new listed connector. Do not use a connector which has previously serviced another gas appliance. Massachusetts law requires that all flexible connectors be less than 36".
- 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 furnace, to facilitate any future maintenance or service.

NOTICE

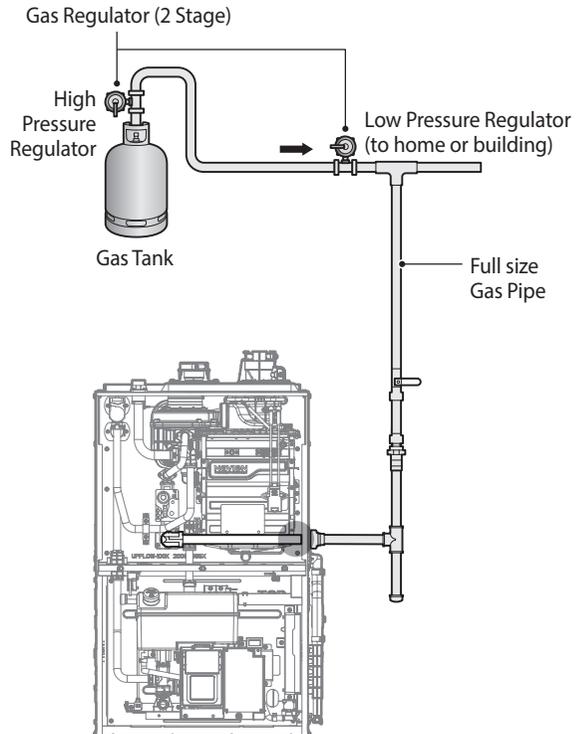
Prior to using an excess flow valve (EFV) in the gas line, check the manufacturer's minimum and maximum flow capacity rating. An improperly sized EFV will not allow for a full flow of gas to the furnace and may cause improper operation.



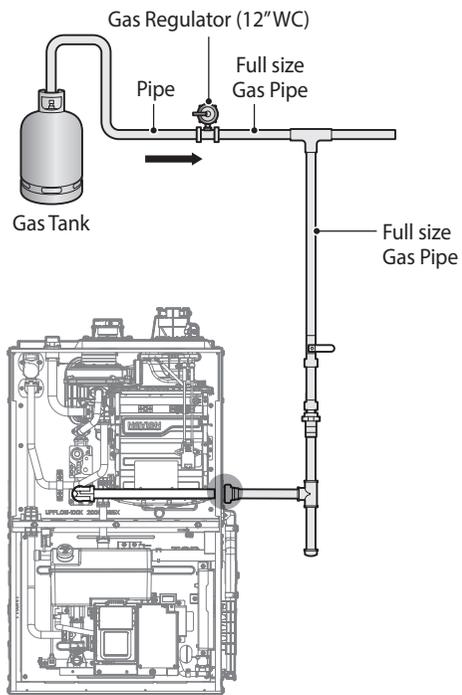
Excess Flow Valve

Typical LP Gas piping examples:

2 Stage System with Multiple Regulators (Recommended)



Single Regulator System



2.5.1 Gas Pipe Sizing Tables

The following tables are referenced from the 2012 National Fuel Gas Code and are for reference only. Please consult the gas pipe manufacturer for actual pipe capacities.

Maximum Natural Gas Delivery Capacity

0.60 Specific Gravity; 0.5 in WC Pressure Drop

In Cubic Feet (ft³) per Hour. Contact your gas supplier for BTU/ft³ ratings. Use 1,000 BTU/ft³ for simplified calculations. This table is recommended for supply pressures less than 6 in WC.

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

0.60 Specific Gravity; 0.3 in WC Pressure Drop

In Cubic Feet (ft³) per Hour. Contact your gas supplier for BTU/ft³ ratings. Use 1,000 BTU/ft³ for simplified calculations. This table is recommended for supply pressures of 6 in WC or greater.

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)
½ in	454	312	250	214	190	172	158	147	138	131	116
¾ in	949	652	524	448	397	360	331	308	289	273	242
1 in	1,787	1,228	986	844	748	678	624	580	544	514	456
1 ¼ in	3,669	2,522	2,025	1,733	1,536	1,392	1,280	1,191	1,118	1,056	936
1 ½ in	5,497	3,778	3,034	2,597	2,302	2,085	1,919	1,785	1,675	1,582	1,402

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

2.5.2 Measuring the Inlet Gas Pressure

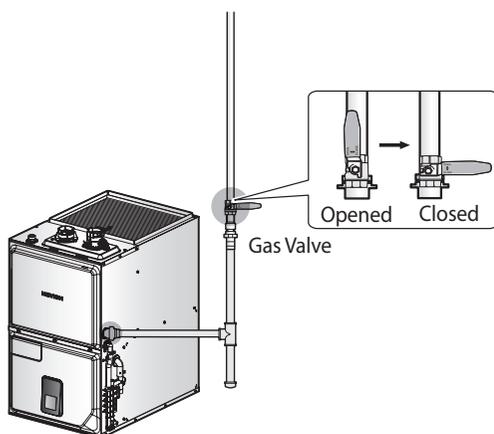
WARNING

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

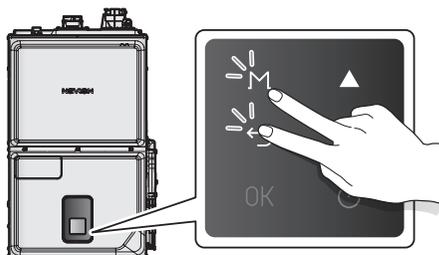
- The inlet gas pressure must be maintained between 3.5 in and 10.5 in WC for natural gas and between 8.0 in and 13.0 in WC for liquefied propane.
- The appliance and its individual shutoff valve must be isolated from the gas supply piping system during any pressure testing of the system at test pressures in excess of ½ 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 ½ psi (3.5 kPa).

To measure the inlet gas pressure:

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



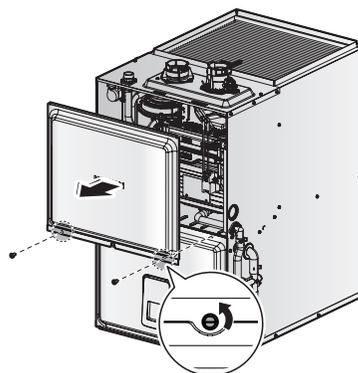
2. Press and hold the Menu button (M) and the Back button (↩) simultaneously for 3 seconds, and then select **Special Operations**.



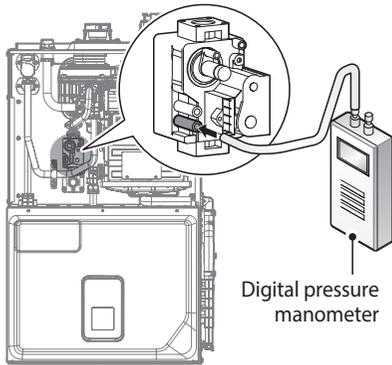
Service / Installer

1. Installer Menu
2. Special Operations
3. Test Mode

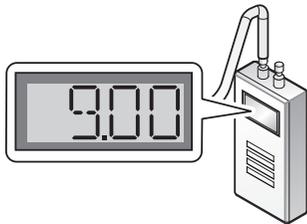
3. Press the Up button (▲) or the Down button (▼) to move to **MAX**, and then press the OK Button (OK) to select the operation mode.
4. Press the Back button (↩) twice to return to normal operation mode.
5. Run space heating. The gas in the gas supply line will be purged.
6. Leave the furnace on until the furnace shuts down due to a lack of gas supply, and then turn off the furnace.
7. Loosen the 2 screws on the bottom corner of the upper-front cover, and then remove the upper-front cover from the furnace.



- Loosen the screws indicated in the figure below and connect a manometer to the pressure port. Reset the manometer to zero before use.



- Re-open the manual gas valve and check for leaks.
- Once the furnace is restarted, the MAX setting should allow the burner and fan to operate at their maximum capacities.
- When the furnace 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 11.



2.5.3 Propane Gas Tanks and Piping

⚠ WARNING

If the furnace is installed in a basement, an excavated area or confined space, it is recommended to install a gas detecting warning device in case of a gas leak. Since propane gas is heavier than air, any leaking gas can settle in low areas or confined spaces. Propane gas odorant may fade, making the gas undetectable except with a warning device.

A gas detecting warning device is the only reliable way to detect a propane gas leak. Rust and soil can reduce the level of odorant in propane gas. Do not rely on your sense of smell. Contact a local propane gas supplier about installing a gas detecting warning system. If the presence of gas is suspected, follow the instructions listed in the Safety Considerations section of this manual.

All propane gas equipment must conform to the safety standards of the National Board of Fire Underwriters, NBFU Manual 58. CANADA: National Standard of Canada, Natural Gas and Propane Installation Code (NSCNGPIC) CSA B149.1-15.

For satisfactory operation, propane gas pressure must be 10"WC + .5"WC at the furnace manifold with all gas appliances in operation. Maintaining proper gas pressure depends on three main factors:

- Vaporization rate, depending on temperature of the liquid, and "wetted surface" area of the container or containers.
- Proper pressure regulation. (Two-stage regulation is recommended for both cost and efficiency).
- Pressure drop in lines between regulators, and between second stage regulator and the appliance. Pipe size will depend on length of pipe run and total load of all appliances.

Complete information regarding tank sizing for vaporization, recommended regulator settings, and pipe sizing is available from most regulator manufacturers and propane gas suppliers.

Since propane gas will quickly dissolve white lead and most standard commercial compounds, special pipe dope must be used. Pipe dope used on propane gas installations must be approved for use with propane gas. For proper propane gas installations and piping, refer to the propane gas tank manufacturer's installation manual.

2.6 Furnace Ducting

2.6.1 Airflow

Duct systems must be properly designed for the CFM and external static pressure rating of the furnace. In compliance with the ducting installation standard, refer to the following documents.

- Air Conditioning Contractors of America (ACCA)'s Manual D.
- Standards of the National Board of Fire Underwriters for the Installation of Air Conditioning, Warm Air Heating and Ventilating Systems, Pamphlets No. 90A and 90B

A closed return duct system must be used, with the return duct connected to the furnace.

Note Do not attach ducts to the back of the furnace.

For upflow installations that require 1800 CFM or more, use either two side returns or a combination of side and bottom.

WARNING

Do not use a room, closet, or alcove as a return air chamber.

2.6.2 Checking Duct Static

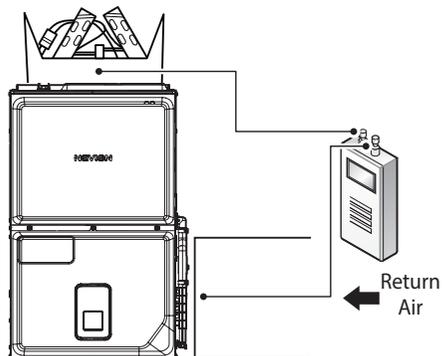
To see the maximum External Duct Static (ESP) rating, refer to the rating plate attached to the furnace. Total external static refers to everything external to the furnace cabinet. Cooling coils, filters, ducts, grilles, and registers must be considered when reading your total external static pressure.

The supply duct pressure must be read between the furnace and the cooling coil. This reading is usually taken by removing the A-shaped block off plate from the end on the coil, drilling a test hole in it, and reinstalling the block off plate.

Take a duct static reading at the test hole and then tape up the test hole after your test is complete. The negative pressure must be read between the filter and the furnace blower.

CAUTION

Excessive external static pressure causes insufficient air, which increases the temperature excessively. This may cause limit switch tripping and intermittent operation, shortening the service life of the appliance.



To determine total external duct static pressure:

1. With clean filters in the furnace, measure the static pressure of the return duct at the inlet of the furnace using a draft gauge (inclined manometer). (Negative Pressure)
2. Measure the static pressure of the supply duct. (Positive Pressure) The difference between the two numbers is your total external static pressure.
 - Example:
 - Static reading from return duct = -0.1" W.C.
 - Static reading from supply duct = +0.3" W.C.
 - Total external static pressure on this system = 0.4" W.C.

Note Both readings may be displayed on the manometer simultaneously. Read directly on the manometer if so desired. If an air conditioner coil or electronic air cleaner is used in conjunction with the furnace, the readings must also include these components.

3. Cooling will always require the greatest amount of airflow. Consult the airflow requirements of the AC or HP unit being installed with the furnace. This furnace uses an ECM variable speed blower motor as such it will hold the selected CFM under static of 0.1"-1.0" WC and during set-up select your cooling design CFM and as long as your duct system static falls within the static requirements of the motor, no additional action is necessary. Should the system static, in cooling mode at rated CFM selection fall outside of the ability of the unit then the ductwork system must be corrected before proceeding.

If the total external static pressure exceeds the maximum listed on the furnace's rating plate, check for closed dampers, registers, undersized, and/or oversized poorly laid out duct work. The temperature rise of the furnace must be within the temperature rise range listed on the furnace's rating plate.

2.6.3 Installing the Ducts

When the furnace is used in connection with a cooling unit, the furnace should be installed on the upstream side of the cooling unit.

Note When the furnace is heating, the temperature of the return air entering the furnace must be between 55°F (12°C) and 100°F (37°C).

Upflow Installation

Air Supply Connections

For a furnace without a cooling coil, the outlet duct should be provided with a removable access panel.

Connect the air supply duct to the flanges on the furnace's air supply outlet. The air supply duct must be connected to **ONLY** the furnace supply outlet air duct flanges or air conditioning coil casing (when used). Never screw directly into the top of the furnace.

! WARNING

- DO NOT cut the side of the main furnace casing to attach the air supply duct, humidifier, or other accessories. All supply side accessories **MUST** be connected to an external duct of the main furnace casing. Failure to do so may cause injury, death, or property damage.
- Do not attach return air ducts to the back of the furnace.

Horizontal Installation

The furnace can be installed horizontally in an attic or crawlspace for left hand discharge. The furnace can be hung from floor joists, rafters or trusses or installed on a non-combustible platform, blocks, bricks, or pad.

Platform Furnace Support

Construct a working platform in a location where all required furnace clearances are met. For more information about clearances, refer to “Clearances and Accessibility” on page 28.

For crawlspace installations, if the furnace is not suspended from the floor joists, the ground underneath furnace must be level and the furnace must be set on blocks or bricks.

Suspended Furnace Support

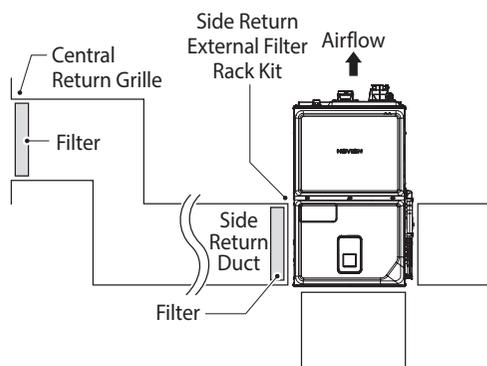
The furnace must be supported under the entire length of the furnace with a threaded rod and angle iron making sure not to restrict access to filters or furnace doors. For more information about suspended furnace installation refer to “2.8 Examples of Horizontal Applications and Considerations” on page 64.

Return Air Connections

The return air duct may be connected to the bottom or either side of the furnace (both sides or one side and bottom to provide adequate return air surface area for the design CFM).

Filters

Filters must be installed with the furnace. You can install the filter on the central return grille or side return external filter rack kit. Before installing the filter, discuss filter maintenance with the building owner.



[Possible Upright/Upflow Filter Locations]

Note

- Filters do not come with this furnace, and must be field provided, sized, and installed external to the furnace by the installer.
- Filters must comply with UL900 or CAN/ULCS111 standards. Damage or repairs due to installing the furnace without filters are not covered under the warranty.
- Consider installing an air cleaner with deep-pleated media filter at the time of furnace installation. A deep pleated filter with a MERV rating of 8 (minimum) will provide better filtration to protect equipment and the air distribution system than a standard 1" disposable fiberglass filter and will have lower static pressure loss than a high-efficiency filter (1"). Also, a deep pleated filter will typically require less frequent replacement.
- Avoid using highly restrictive 1" filters which produce excessive static pressure loss greater than 25" W.C.

On upflow units, guide dimples locate the side return cutout locations. Use a straight edge to scribe lines connecting the dimples. Cut out the opening on these lines. DO NOT make the opening larger than marked as it can cut into the water compartment and/or the burner area possibly causing air contamination or leaks.

Note

- An undersized opening will cause reduced airflow.
- Refer to the Filter Sizing Chart to determine filter area requirements. Change filters before occupants take ownership of a new home.

Installation Type	Description
Upright	<p>Depending on the installation or preference, you can vary the filter arrangements. Filters can be installed in the central return register or a side panel external filter rack kit (upflows).</p> <p>Note As an alternative a media air filter or electronic air cleaner can be used as the requested filter.</p>
Horizontal	Filters must be installed in either the central return register or in the return air duct work.

2.7 Venting for Combustion Air

Additional Guidelines for Combustion Air

! WARNING

Carbon Monoxide Hazard

The installation of carbon monoxide detectors may be required in your area for the furnace or other gas fired appliances. Check applicable codes for the installation location of the furnace.

Carbon monoxide detectors should comply with NFPA 720 and be ANSI/UL 2034 listed and IAS certified.

- Combustion air piping to the outside is recommended. (Direct Venting)
- The furnace may be installed with a single pipe carrying the flue products to the outside while using combustion air from the equipment room, providing the room has enough volume. To use the room air venting option, specific conditions and considerations must be followed. For more information, refer to “2.7.3 Selecting a Vent Type” on page 55.

WARNING

To prevent death, serious injury, or property damage:

- Do not install the furnace or combustion air piping in areas with contaminated air (containing a high level of dust, sawdust, sand, flour, aerosols, fluorine or chlorine compounds), as contaminants can cause severe problems.

- Pool and laundry products and common household cleaning products can contain corrosive compounds. If any of the chemicals or vapors enter the furnace, this can result in serious product damage that can even cause the potential for flue gas leakage in extreme cases.

To prevent the potential of severe personal injury or death, check for areas and products listed in the following tables before installing the furnace or air inlet piping.

If contaminants are found in the combustion air, you MUST Remove contaminants permanently or Relocate air inlet and vent terminations to other clean areas.

- If you must install the furnace in an area with contaminated air, use direct venting to supply clean air from outside the building. We recommend regular filter cleaning and maintenance in these areas.

Note

The warranty does not cover damage caused by air contaminants.

Corrosive Contaminants

Muriatic acid/hydrochloric acid

Refrigerant leaks

Chlorine-type bleaches, detergents, and cleaning solvents found in household laundry rooms

Varnish removers or paint

Adhesives used to fasten building products and other similar products

Chlorine-based swimming pool chemicals

Permanent wave solutions

Anti-static fabric softeners used in clothes dryers

Calcium chloride used for thawing

Spray cans containing chloro/fluorocarbons

Cements and glues

Sodium chloride used for water softening

Chlorinated waxes/cleaners

Corrosive Sources

Remodeling areas

Refrigeration repair shops

New building construction

Metal fabrication plants

Laundry areas and establishments/dry cleaning

Swimming pools

Auto body shops

Furniture refinishing areas and establishments

Garages with workshops

Plastic manufacturing plants

Beauty shops

Photo processing plants

2.7.1 Venting the Furnace

DANGER

This appliance is certified as a Category IV appliance and requires a special venting system. The vent system operates with a positive pressure in the pipe.

To prevent serious injury or death:

- ALWAYS vent exhaust gases directly outdoors using the recommended vent materials and following these specific instructions.
- If this furnace replaces a furnace that was connected to a vent system or chimney, the vent or vent connectors of other remaining appliances should be evaluated to make sure it meets the specific requirements of the NPF and may need to be re-sized. Vent systems or vent connectors of other appliances must be sized to the minimum size as determined using appropriate table found in the current edition of National Fuel Gas Code NFPA 54/ANSI Z223.1. In Canada, refer to CAN/CSA-B149.1. An abandoned masonry chimney may be used as a raceway for properly insulated and supported combustion-air (when applicable) and vent pipes. Each furnace must have its own set of combustion-air and vent pipes and be terminated individually. A furnace shall not be connected to a chimney flue serving a separate appliance designed to burn solid fuel.

WARNING

Improper venting of the furnace can result in excessive levels of carbon monoxide and can lead to serious injury or death.

This furnace 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 and/or the “Venting systems and air supply for furnaces” section of the latest version of the CAN/CGA B149.1 Natural Gas and Propane Installation Code in Canada, as well as all applicable local building codes and regulations.

To prevent serious injury or death:

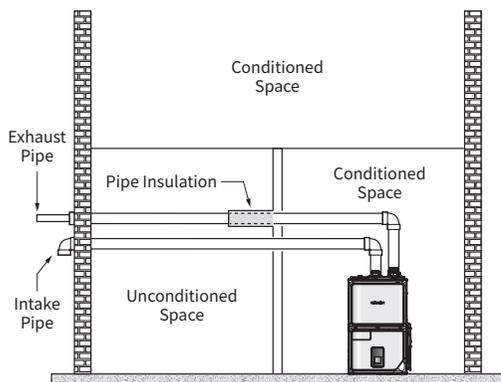
- ONLY licensed professionals should install venting.
- ALWAYS follow all regulations, codes, and instructions when venting the furnace.
- ALWAYS seal the venting system gastight to prevent flue gas leakage and carbon monoxide emissions.
- The building owner is responsible to maintain the exhaust and intake terminations free of snow, ice, or other potential blockages, as well as scheduling routine maintenance.

The furnace 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. When venting the furnace, follow these guidelines:

- Do not install the furnace 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. If you must install the furnace in an area with contaminated air, use direct venting to supply air from outside the building. We recommend regular filter cleaning and maintenance in these areas.
- For best results, keep the venting system as short and straight as possible.
- Locate the furnace as close as possible to the vent termination.
- Do not connect the furnace vent to a vent for any other gas furnace or appliance.
- For horizontal runs, slope the horizontal section upward toward the vent termination at a rate of $\frac{1}{4}$ in per foot (2 % slope).
- Create an airtight seal at each joint in the exhaust and intake air pipes from the furnace collar to the vent termination (see below).

Note

Should the vent pipe pass horizontally through an unconditioned space it should be insulated to prevent condensation from freezing.



Connecting the Pipe to the Vent Collar

Note

Do not use primer or cement on the appliance connection.

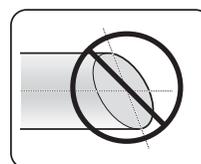
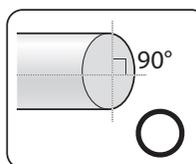
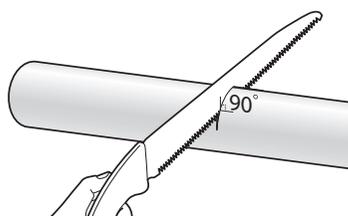
! WARNING

ALWAYS properly cut the pipe at a 90° angle and deburr the vent pipe before installing so the pipe is fully connected to the exhaust gas vent fitting.

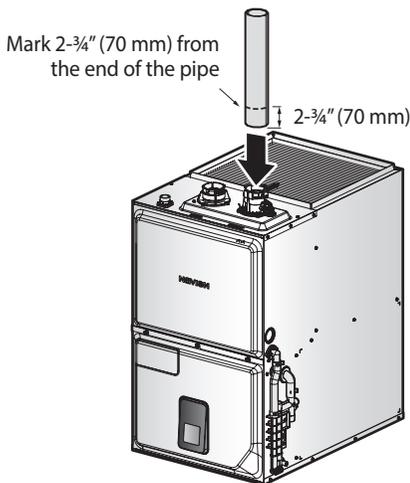
Use water (NOT grease) to lubricate the end of the vent pipe before inserting into the collar.

ALWAYS insert the vent pipe 2- $\frac{3}{4}$ " (70 mm) into the appliance exhaust collar using a twisting motion until the end reaches the bottom of the socket.

If flue gas leaks, inhalation of carbon monoxide may result in serious injury or death.



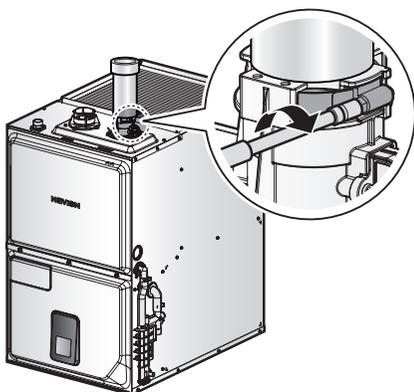
1. Measure 2-3/4" (70 mm) from the end of the vent pipe, then draw a mark at that distance.



2. Insert the pipe into the vent collar to start the vent run. Make sure to completely slide the vent into the collar until the end makes contact with the bottom of the socket.

Note Verify that 2-3/4" (70 mm) of the pipe has been completely inserted into the collar and that the mark is no longer visible.

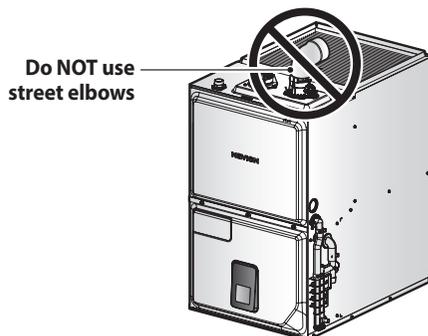
3. Tighten the clamp with a socket wrench (5/16" (8 mm)) to properly seal the joint.



⚠ WARNING

NEVER start the vent run with a **street elbow** at the vent collar as it will not allow for a tight seal between the appliance and the vent pipe and could cause injury or death.

ALWAYS use a length of straight pipe when starting the vent run.



- To avoid moisture and frost build-up and to maintain clearances to openings on adjacent homes, 45° elbows, 90° elbows, or tees may be attached to the end of the termination vent pipe to direct the exhaust plumes away from buildings, as long as the total equivalent vent length is observed.
- Support the vent pipe with hangers at regular intervals or as required by local codes. Exhaust and intake air pipes must be supported at least every 4 ft (1.2 m). The vent for this appliance shall not terminate over public walkways; or near soffit vents or crawl space vents or 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.
- Do not store hazardous or flammable substances near the vent termination.
- If this furnace 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 (300 mm) above the highest anticipated snow line, or as required by local codes, whichever is greater.

⚠ WARNING

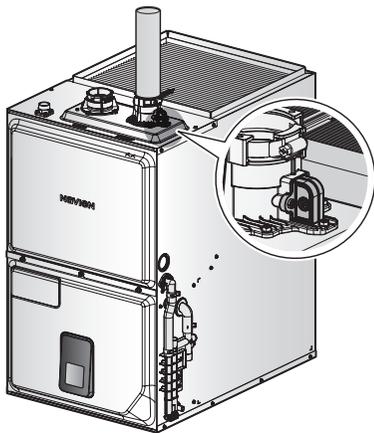
ALWAYS turn on the furnace and test for gas leaks along the exhaust vent using a bubble test kit.

If the connections leak, carbon monoxide in the flue gas may cause serious injury or death.

2.7.2 About the Vent Installation Detector

This furnace unit comes with a unique feature, a Vent Installation Detector ("VID") to assure the vent pipe is properly installed into the vent collar.

How It Works



As shown, the VID is a device integral to the vent collar which detects whether the vent pipe has been inserted to a sufficient depth during its installation.

During installation, the VID detects whether the vent pipe is fully inserted (at least 2-³/₄" (70 mm)) into the collar. If a correctly sized vent pipe (2.0 inches) 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

⚠ WARNING

Periodically inspect all vent pipe connections.

The Vent Installation Detector (VID) will NOT detect the separation of connected vent pipe if the joints become detached or are leaking flue gas that may contain carbon monoxide.

The VID is not intended and should not be relied upon to detect all instances of vent pipe movement or separation from the collar.

Various factors, including but not limited to sensor failure, switch sticking and corrosion, may cause the VID to not properly function if the vent pipe separates from the collar.

Limitations

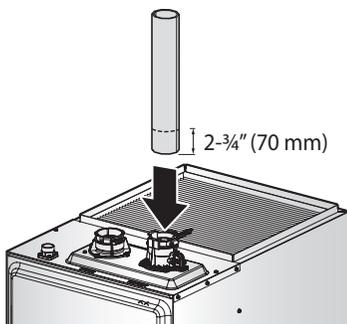
The VID is not an alarm, safety device or a substitute for a carbon monoxide detector. The VID may not cause the unit to stop operating if the vent pipe is partially or completely dislodged. Other factors can impact the performance of the VID causing it to be unable to function as intended. Such factors 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

Carbon Monoxide Hazard

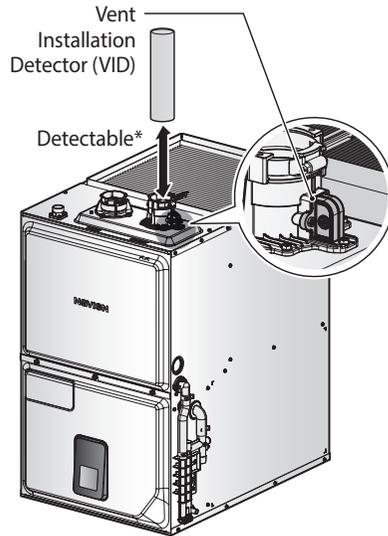
To prevent serious injury or death:

- ALWAYS insert vent pipe 2-3/4" (70 mm) into the furnace exhaust collar.
- If the vent pipe is not fully inserted, the vent installation detector switch may not detect its presence and the furnace may not operate.
- ALWAYS only use the correctly sized vent pipe materials or an error code E762 can appear on the front control panel if the vent pipe is not properly installed.
- The factors that can effect the performance of the VID 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.
- ALWAYS visually inspect the vent pipe before inserting the vent pipe into the furnace exhaust collar. The vent pipe inserted into the furnace exhaust collar must be free from damage or defects 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 furnace exhaust collar if fully inserted 2-3/4" (70 mm). The vent installation detector will not detect the separation of connected vent pipe if the joints become detached or are leaking flue gas that may contain carbon monoxide.
- It is the installer's responsibility to install the vent pipe properly, to check for leaks, and to adequately secure the furnace to the wall.

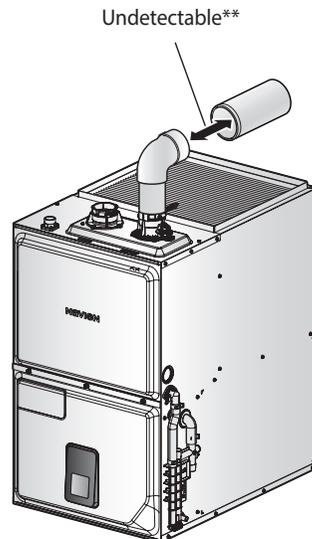


⚠ WARNING

Periodically inspect all vent pipe connections. The VID is not intended and should not be relied upon to detect all instances of vent pipe movement or separation from the collar.



*If inserted 2-3/4" (70 mm), then VID should detect vent pipe.



**VID cannot detect if the vent pipe is leaking or disconnected at any point between the furnace and the exterior vent location or if the vent is blocked for any reason.

2.7.3 Selecting a Vent Type

All Navien furnaces are Category IV appliances and prepared at the factory to be direct vented (sealed combustion). Navien recommends direct vent installations whenever possible to assure clean and adequate combustion air so the operation of the furnace does not impact the building envelope. If you cannot use a direct vent, ensure that an ample supply of make-up air is available in the installed location.

Navien also recommends installing a new vent system with this appliance. If reusing an existing vent system, thoroughly inspect it to make sure it meets the requirements of the new NPF furnace while also inspecting for punctures, cracks, or blockages prior to connecting it to the furnace.

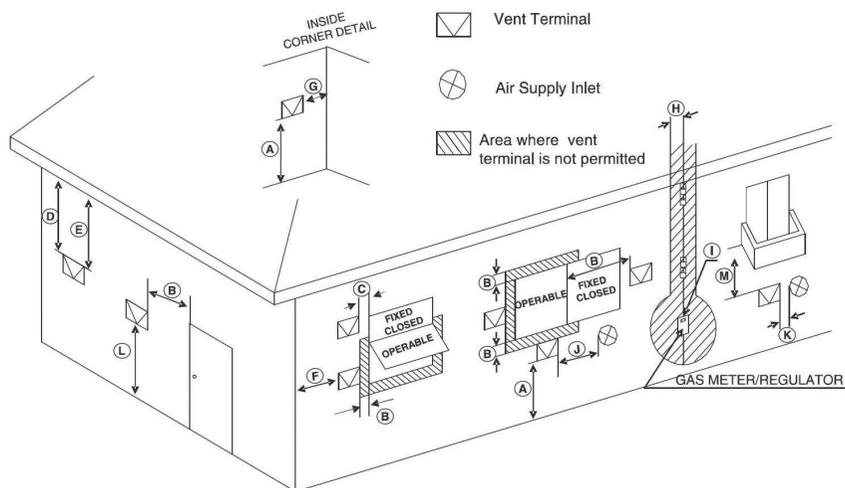
Direct Venting

The furnace can use a 2 in or 3 in diameter exhaust and a 2 in or 3 in diameter air intake pipes. To ensure the draw of air directly from and exhaust of air directly to the outside of the building, create an airtight seal from the furnace collar to the vent termination.

Intake materials can be made of ABS, PVC, CPVC, PP, galvanized or stainless steel.

When using in a direct vent application, maintain the following venting clearances, as required by **ANSI Z21.10.3 and the National Fuel Gas Code, ANSI Z223.1/NFPA 54, and CAN/CGA B149.1 Natural Gas and Propane Installation Code:**

Termination Clearances for Direct Vent Installations



Ref	Description	Canadian Direct Vent Installations ¹	US Direct Vent Installations ²
A	Clearance above grade, veranda, porch, deck, or balcony	12 in (30 cm)	12 in (30 cm)
B	Clearance to window or door that may be opened	12 in (30 cm) for inputs of 100,000 BTU/h and below / 36 in (91 cm) for inputs above 100,000 BTU/h	12 in (30 cm)
C	Clearance to permanently closed window	0 in (0 cm) ⁵	0 in (0 cm) ⁵

Ref	Description	Canadian Direct Vent Installations ¹	US Direct Vent Installations ²
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	Equal or greater than soffit depth ^{4,5}	Equal or greater than soffit depth ^{4,5}
E	Clearance to unventilated soffit	Equal or greater than soffit depth ^{4,5}	Equal or greater than soffit depth ^{4,5}
F	Clearance to outside corner	2 ft (61 cm)*	2 ft (61 cm)*
G	Clearance to inside corner	12 in (30 cm)*	12 in (30 cm)*
H	Clearance to each side of center line extended above meter/regulator assembly	3 ft (91 cm) within a height 15 ft above the meter/regulator assembly	3 ft (91 cm) within a height of 15 ft (4.6 m)*
I	Clearance to service regulator vent outlet	3 ft (91 cm)	3 ft (91 cm)*
J	Clearance to nonmechanical air supply inlet to building or the combustion air inlet to any other appliance	36 in (91 cm)	12 in (30 cm)
K	Clearance to a mechanical air supply inlet	6 ft (1.83 m)	3 ft (91 cm) above if within 10 ft (3 m) horizontally
L	Clearance above paved sidewalk or paved driveway located on public property	7 ft (2.13 m) [†]	7 ft (2.13 m) [†]
M	Clearance under veranda, porch deck, or balcony	12 in (30 cm) [‡]	12 in (30 cm) - open on 3 sides*

* Suggested clearances by the manufacturer. If the clearances required by local codes are different from those from the table above, the greater clearance should apply. Direct exhaust vapors and condensate away from building materials to avoid degradation.

The minimum distance from adjacent public walkways, adjacent buildings, openable windows, and building openings shall not be less than those values specified in the National Fuel Gas Code, ANSI Z223.1/NFPA 54, and/or the Natural Gas and Propane Installation Code, CSA B149.1.

1 In accordance with the current CSA B149.1 Natural Gas and Propane Installation Code

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

3 If locally adopted installation codes specify clearances different than those illustrated, then the most stringent clearance shall prevail.

4 Soffit with 12" depth requires a minimum of 12" vertical clearance from the termination (36" soffit requires a minimum of 36" vertical clearance)

5 In the areas where corrosion and discoloration of building materials can occur, a minimum clearance of 12" shall apply.

† 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.

Non-Direct Venting (Single Pipe)

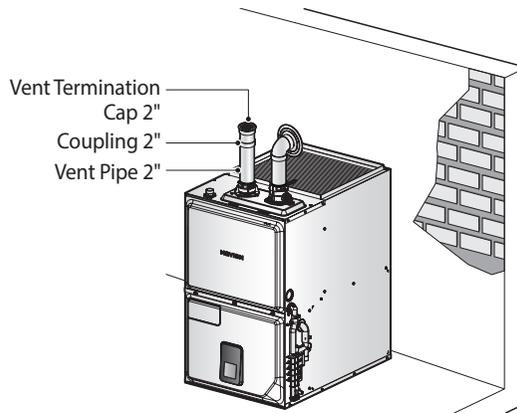
If, at any time, the installation location could experience negative pressure, there is a possibility of back drafting cold air through the furnace's heat exchanger. This situation could lead to the freezing of the heat exchanger and malfunction of the furnace.

However, building codes in most jurisdictions disallow negative pressures in residences. In a home with a well-balanced air supply, the heat exchanger should not be in danger of freezing. Because the cause of back drafting is not considered a manufacturing problem, any freezing damage which occurs from back drafting will not be covered by the Navien warranty. If there is any question about the possibility of back drafting in the installation location, use a direct venting system for the furnace.

When using non-direct venting, maintain non-direct vent clearances shown on page 58 as required by **ANSI Z21.10.3 and the National Fuel Gas Code, ANSI Z223.1/NFPA 54, and CAN/CSA B149.1 Natural Gas And Propane Installation Code.**

To use non-direct venting for the furnace:

1. Insert the termination end cap into the intake air duct. Do not glue the end cap, to allow for easy removal and cleaning of the cap.

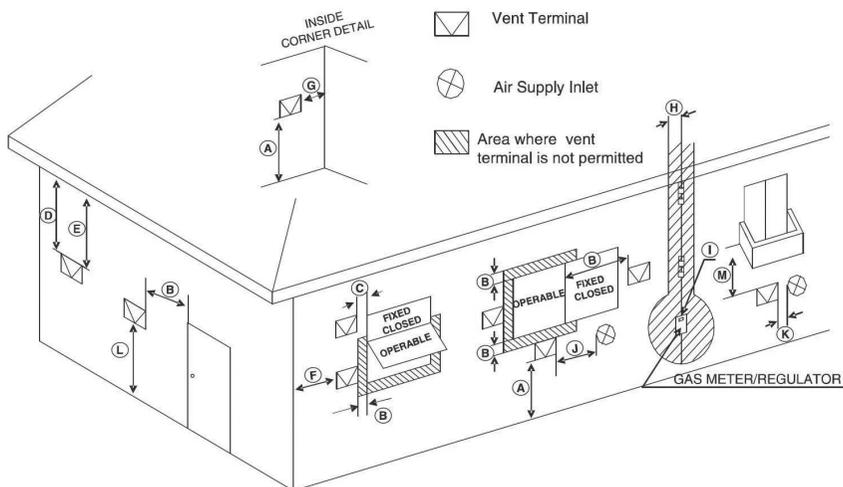


[Non-Direct Venting]

2. Provide two openings to allow for circulation of combustion air as specified by ANSI Z223.1/NFPA 54 or CAN/CGA B-149.1:

Maximum Input (BTU/H)	Indoor make up air is provided, a minimum free area of 1 in ² , per 1,000 BTU/H
100,000	100 in ² 10 in (W) × 10 in (H)
60,000	60 in ² 8 in (W) × 8 in (H)

Termination Clearances for Non-Direct Vent Installations



Ref	Description	Canadian Non-Direct Vent Installations ¹	US Non-Direct Vent Installations ²
A	Clearance above grade, veranda, porch, deck, or balcony	12 in (30 cm)	12 in (30 cm)
B	Clearance to window or door that may be opened	12 in (30 cm) for inputs of 100,000 BTU/h and below / 36 in (91 cm) for inputs above 100,000 BTU/h	48 in (120 cm) below or to side of opening; 12 in (30 cm) above opening
C	Clearance to permanently closed window	0 in (0 cm) ⁵	0 in (0 cm) ⁵
D	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (61 cm) from the center line of the terminal	Equal or greater than soffit depth ^{4,5}	Equal or greater than soffit depth ^{4,5}
E	Clearance to unventilated soffit	Equal or greater than soffit depth ^{4,5}	Equal or greater than soffit depth ^{4,5}
F	Clearance to outside corner	2 ft (61 cm)*	2 ft (61 cm)*
G	Clearance to inside corner	12 in (30 cm)*	12 in (30 cm)*
H	Clearance to each side of center line extended above meter/regulator assembly	36 in (91 cm) within a height 15 ft (4.57 m) above the meter/regulator assembly	3 ft (91 cm) within a height of 15 ft (4.6 m)*
I	Clearance to service regulator vent outlet	36 in (91 cm)	3 ft (91 cm)*
J	Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other appliance	12 in (30 cm) for inputs of 100,000 BTU/h and below / 36 in (91 cm) for inputs above 100,000 BTU/h	48 in (120 cm) below or to side of opening; 12 in (30 cm) above opening
K	Clearance to a mechanical air supply inlet	6 ft (1.83 m)	36 in (91 cm) above if within 10 ft (3 m) horizontally
L	Clearance above paved sidewalk or paved driveway located on public property	7 ft (2.13 m) [†]	7 ft (2.13 m) [†]
M	Clearance under veranda, porch deck, or balcony	12 in (30 cm) [‡]	12 in (30 cm) - open on 3 sides*

* Suggested clearances by the manufacturer. If the clearances required by local codes are different from those from the table above, the greater clearance should apply. Direct exhaust vapors and condensate away from building materials to avoid degradation.

The minimum distance from adjacent public walkways, adjacent buildings, openable windows, and building openings shall not be less than those values specified in the National Fuel Gas Code, ANSI Z223.1/NFPA 54, and/or the Natural Gas and Propane Installation Code, CSA B149.1.

1 In accordance with the current CSA B149.1 Natural Gas and Propane Installation Code

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

3 If locally adopted installation codes specify clearances different than those illustrated, then the most stringent clearance shall prevail.

4 Soffit with 12" depth requires a minimum of 12" vertical clearance from the termination (36" soffit requires a minimum of 36" vertical clearance)

5 In the areas where corrosion and discoloration of building materials can occur, a minimum clearance of 12" shall apply.

† 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.

2.7.4 Selecting Vent Pipe Materials

Venting requirements differ in the US and Canada. Consult the following chart or the most recent edition of ANSI Z223.1/NFPA 54 or CAN/CGA B149.1, as well as all applicable local codes and regulations when selecting vent pipe materials. Do not use cellular core PVC (ASTM F891), cellular core CPVC, or Radel® (polyphenolsulfone) for the exhaust vent.

WARNING

Carbon Monoxide Hazard

To prevent serious injury or death:

- ONLY use approved venting materials.
- NEVER mix different types of vent pipe materials. The vent system may fail and harmful flue products may leak into the living space. The use of more than one type of pipe for the vent piping will also void the warranty and certification of the furnace.

Locale	Recommended Vent Materials
USA	<ul style="list-style-type: none"> • PVC/CPVC Schedule 40 or 80 (Solid Core) • UL1738 approved PVC or CPVC • Approved Polypropylene (PP) • Approved Stainless Steel (SS)
Canada*	<ul style="list-style-type: none"> • Type BH Special Gas Vent Class IIA (PVC) • Type BH Special Gas Vent Class IIB (CPVC) • Type BH Special Gas Vent Class IIC (Polypropylene/Stainless Steel)

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

The vent system shall be installed in accordance with the furnace manufacturer and, if applicable, the venting system manufacturer's instructions.

This product is set to use **SCHEDULE 40 PVC** as the default vent pipe material. If the flue temperature exceeds 149°F (65°C), the exhaust limit control enable option must be set to off on the front control panel. For more information about the settings, refer to "5.11.3.8 Setting the Model Details" on page 108. Otherwise, the furnace will control and maintain the flue temperature below 150°F (65°C).

Note

If the exhaust limit control enable option is set to off on the front control panel, ensure that CPVC, polypropylene or stainless steel piping is used for exhaust venting.

CAUTION

- This furnace has a built-in control to limit the exhaust temperature to 149°F (65°C). As a result, the furnace can be vented with Schedule 40 PVC.
- In high temperature applications, the exhaust temperature can exceed 149°F (65°C). In that case, you must use Schedule 40/80 CPVC or Approved Polypropylene/Stainless Steel in the USA or Type BH Special Gas Vent Class IIB (CPVC) or Class IIC (Polypropylene/SS) that conforms to ULC-S636 in Canada.
- When using 2 in. vent, if the exhaust temperature exceeds 149°F (65°C), CPVC pipe (field supplied) must be used for the first 3 feet of equivalent pipe length. For systems using 3 in. vent, the first 5 in. of length must be CPVC pipe.

The following **polypropylene** vent components are approved for use with this appliance:

DuraVent PolyPro® SW (Rigid) (Certified to ULCS636)
2PPS-xxx (2") or 3PPS-xxx (3")

Centrotherm Innoflue® SW (Rigid) (Certified to UL1738 and ULCS636)
ISxx02xx (2") or ISxx03xx (3")

Z-Flex Z-DENS SW (Rigid) (Certified to UL1738 and ULCS636)
2ZDP ____ (2" or 3")

The following **stainless steel** vent components are approved for use with this appliance:

DuraVent FasNSeal® (Rigid) (Certified to UL1738 and ULCS636)
FSA-PVC3 (3" PVC to FasN Seal Appliance Adapter)
FSxxxxx03 (3")

Heat Fab Saf-T Vent® EZ Seal (Certified to UL1738 and ULCS636)
 9301PVC (3" PVC/CPVC Outlet Furnace Adapter)
 93xx (3")

Z-Flex Z Vent (Certified to UL1738 and ULCS636)
 2SVSTTA023 (2" x 3" Appliance Adapter)
 2SVEPSCF030X (Straight Pipe)
 2SVEEWCFO390 (90° Elbow)
 2SVEEWCFO345 (45° Elbow)

ECCO Polypropylene Vent (Rigid) (Certified to ULCS 636)
 2xxPPP (2") or 3xxPPP (3")
 245PEL/287PEL (2" 45°/90° Elbow)
 345PEL/387PEL (3" 45°/90° Elbow)
 203PINC (2" x 3" Increaser)

Note

- Only the vent pipe models listed above are approved for use with this appliance.
- Refer to the vent manufacturer's instructions for detailed installation procedures and guidelines.
- Do not use Schedule 40 or 80 polypropylene pipe used for water or waste systems within the vent run.

2.7.5 Measuring Vent Length

The intake and exhaust vent pipes can be of different lengths as the furnace will adjust for pressure imbalances within the system. Maximum vent lengths are reduced according to the number of elbows used, as shown in the following table:

Vent Size	Model	Maximum Length	Maximum # of Elbows	Equivalent Length
2 in	060MBH	70 ft (21.3 m)	6	Reduce the maximum vent length accordingly for each elbow used: <ul style="list-style-type: none"> • Each 90° elbow equates to 8 linear feet of vent • Each 45° elbow equates to 4 linear feet of vent
	100MBH			
3 in	060MBH	140 ft (42.7 m)	9	Reduce the maximum vent length accordingly for each elbow used: <ul style="list-style-type: none"> • Each 90° elbow equates to 5 linear feet of vent • Each 45° elbow equates to 3 linear feet of vent
	100MBH			

Note

- To set the DIP switches based on the measured vent length, refer to "3. Setting the DIP Switches" on page 78.
- The Maximum Length does not include any elbows.
- The use of a PVC or polypropylene termination kit counts as 5 linear feet (1.5 m) of vent.
- The use of a tee counts for the same equivalent length as a 90° elbow for the vent size.
- The maximum vent lengths at high altitudes are the same as shown in the table above.

2.7.6 Terminating the Vent

Before installing the furnace, determine what type of vent termination is appropriate for the installation location and materials. The subsections that follow describe some typical venting configurations, but do not include all possible options. For more information refer to "Furnace Vent Installation Examples" on page 61.

The following **PVC** vent terminations are approved for use with this appliance:

- **PVC Concentric Vent Kit** (Sch 40 - UL1738/ULC S636):
 2 in Vent Kit
 3 in Vent Kit
- **IPEX Low Profile Termination Kit** (Certified to ULCS636)
 2 in Low Profile Vent Kit #196984
 3 in Low Profile Vent Kit #196985
- **IPEX Low Profile Termination Kit** (Certified to UL1738)
 2 in Low Profile Vent Kit #397984
 3 in Low Profile Vent Kit #397985

The following **polypropylene** vent terminations are approved for use:

- **DuraVent PolyPro** Horizontal Concentric Termination Kit (Certified to ULCS636)
 2 in x 4 in Concentric Vent Kit #2PPS-HKC
 3 in x 5 in Concentric Vent Kit #3PPS-HKC
- **Centrotherm InnoFlue** Low Profile Termination Kit (Certified to UL1738 and ULCS636)
 2 in Vent Kit #ISLPT0202
 3 in Vent Kit #ISLPT0303
- **Centrotherm InnoFlue** Concentric Vent Kit (Certified to UL1738 and ULCS636)
 2 in Vent Kit #ICWT242
 3 in Vent Kit #ICWT352

- **Z-Flex Z DENS** Horizontal Termination Kit (Certified to UL1738 and ULCS636)
2 in Vent Kit #2ZDHK2
3 in Vent Kit #2ZDHK3

The following **polypropylene** vent components are approved for use as terminations:

DuraVent PolyPro® (Certified to ULCS636)
2PPS-E90L or 3PPS-E90L (2" or 3" 90° Elbow)
2PPS-E45L or 3PPS-E45L (2" or 3" 45° Elbow)
2PPS-TL or 3PPS-TL (2" or 3" Tee)
2PPS-BG or 3PPS-BG (2" or 3" Birdscreen)

Centrotherm InnoFlue® (Certified to UL1738 and ULCS636)
ISELL0287 or ISELL0387 (2" or 3" 87° Elbow)
ISELL0245 or ISELL0345 (2" or 3" 45° Elbow)
IST02 or IST03 (2" or 3" Tee)
IASPP02 or IASPP03 (2" or 3" Birdscreen)

The following **stainless steel** (AL29-4C) vent components are approved for use as terminations:

DuraVent FasNSeal® (Certified to UL1738 and ULCS636)
FSELB9003 (3" 90° Elbow)
FSELB8803 (3" 88° Elbow)
FSELB4503 (3" 45° Elbow)
FST3 (3" Tee)
FSBS3 (3" Birdscreen)

Heat Fab Saf-T Vent® **EZ Seal** (Certified to UL1738 and ULCS636)
9314(LR) or 9314TERM (3" 90° Elbow)
9311 (3" 45° Elbow)
9390TEE (3" Tee)
9392 (3" Birdscreen)

Z-Flex Z Vent (Certified to UL1738 and ULCS636)
2SVEEWC0390 (90° Elbow)
2SVEEWC0345 (45° Elbow)
2SVSTTF03 (3" Tee)

Note

- Only the termination models listed above are approved for use with this appliance.
- Only terminations of the same manufacturer as the vent system must be used.
- Refer to the vent manufacturer's instructions for detailed installation procedures and guidelines.

Furnace Vent Installation Examples

! WARNING

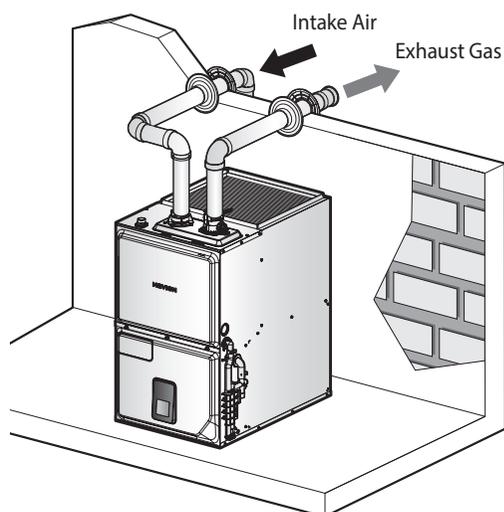
Fire and Explosion Hazard

To prevent death, serious injury or property damage:

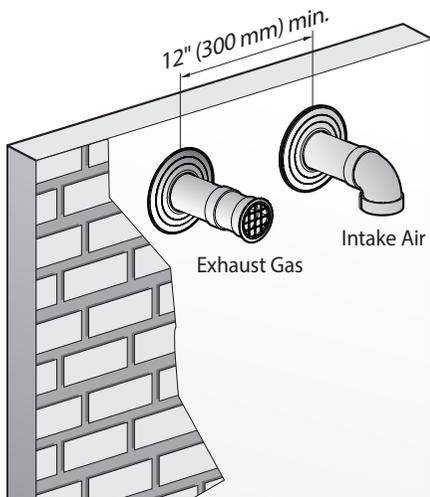
- ALWAYS make sure to follow the provided clearance requirements.
- Failure to do so may result in circulating exhaust gas and cause dangerous operation of the furnace.

The following are some possible indoor venting options:

- Two-Pipe Sidewall Venting

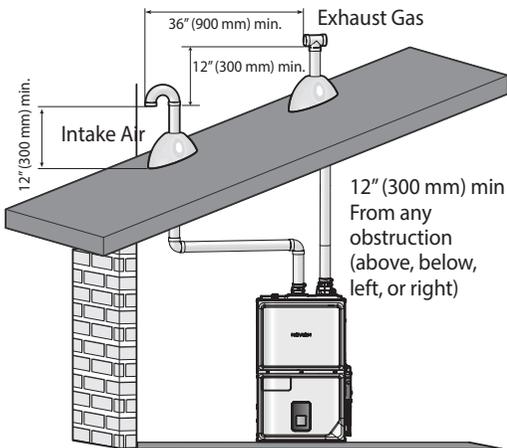


Interior View



Exterior View

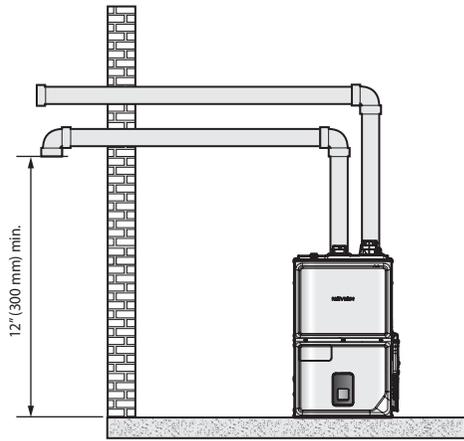
- Two-pipe Vertical Venting - Intake and exhaust pipes do not have to terminate in the same area.



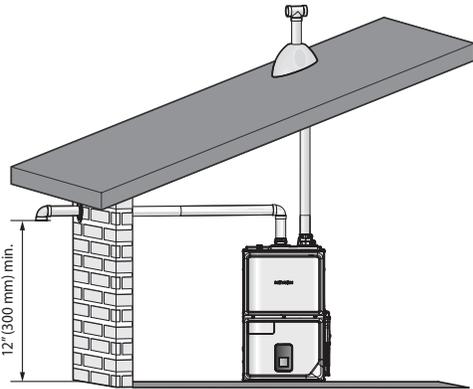
- Non-Concentric Sidewall Venting - Air is drawn from a different location that is at least 12 in (300 mm) away from the exhaust termination. The exhaust termination can be located either on the sidewall or roof. Try to minimize the length of the intake air pipe when installing the vent.

Note

Ensure that the vent termination is at least 12 in (300 mm) above ground, 12 in (300 mm) above the highest anticipated snow level, or meets the required by local codes, whichever is greater.

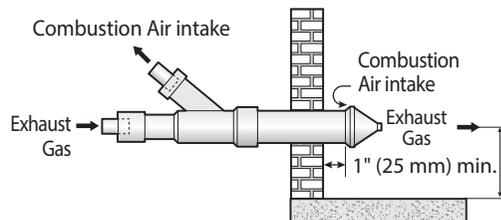


Sidewall Exhaust Termination



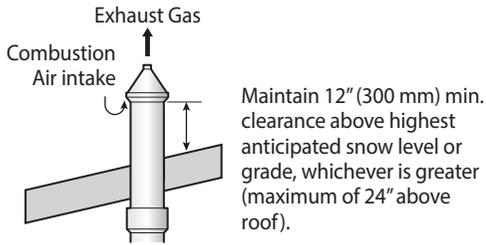
Roof Exhaust Termination

- Concentric Sidewall Venting



Maintain 12" (300 mm) min. clearance above highest anticipated snow level or grade, whichever is greater.

- Concentric Vertical Venting

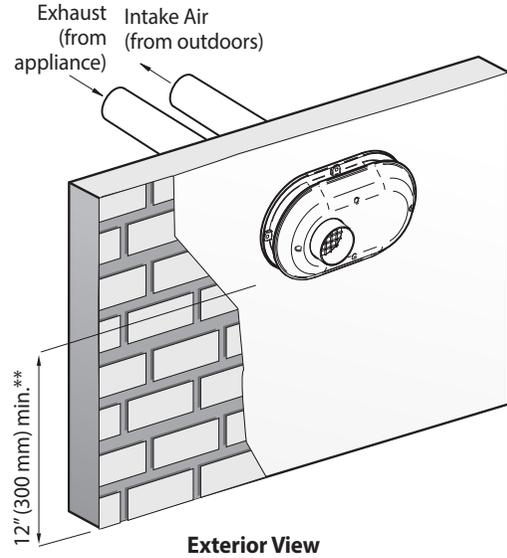


CAUTION

Do not vertically stack concentric terminations on sidewalls.

Furnace Vent Installation Examples (continued)

- Low Profile Two-Pipe Sidewall Venting*



* IPEX and Centrotherm Low Profile terminations only

** Clearance above highest anticipated snow level or grade, or as required by local codes, whichever is greater

Note Only the following orientations are allowed for twin pipe terminations.

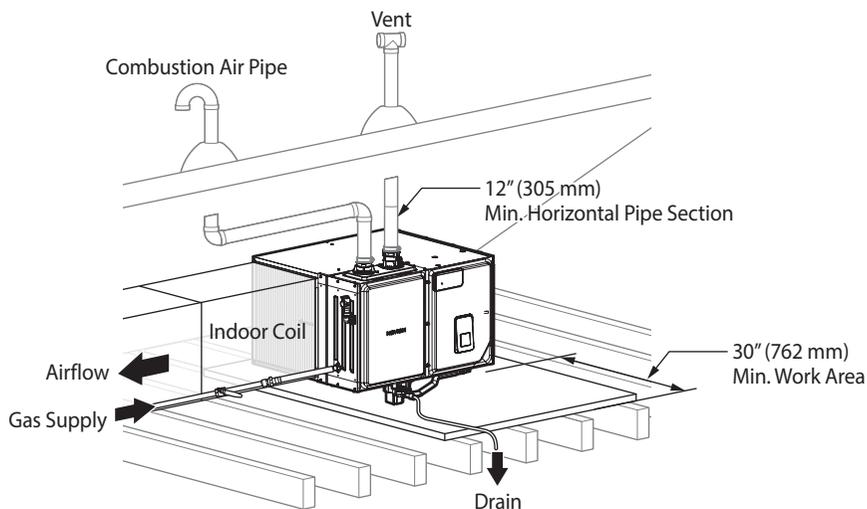


NEVER install in this orientation with the exhaust located nearest to the ground.

2.8 Examples of Horizontal Applications and Considerations

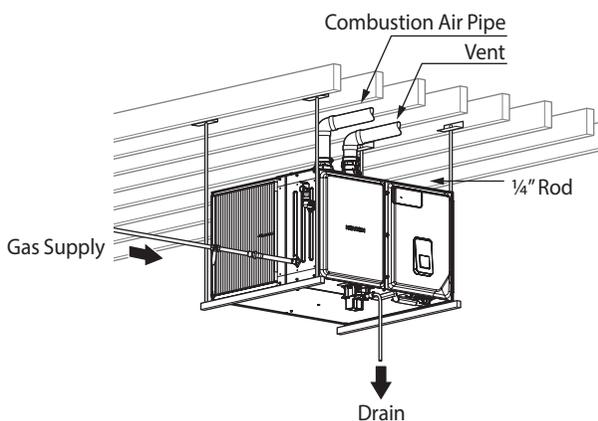
Working Platform for Attic Installation

The following illustration shows an example of attic furnace installation. For more information about vent application, refer to “2.7.1 Venting the Furnace” on page 50.



Suspended Furnace Installation

The following illustration shows an example of suspended furnace installation. For more information about vent application, refer to “2.7.1 Venting the Furnace” on page 50.



Note

- Use a support deck or board to make sure that the furnace's weight is properly supported.
- Local codes may require a secondary drain pan when the furnace is installed over a finished ceiling.
- Extend the angle iron out for coil support if required.
- An inch (25 mm) of minimum clearance should be maintained between top of the furnace and combustibles.
- The entire length of the furnace must be supported when the furnace is used in horizontal position to ensure proper drainage.

2.9 Connecting the Power Supply

WARNING

Electric Shock Hazard

To prevent serious injury or death:

- ALWAYS 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 or the latest edition of CSA C22.1 Canadian Electrical Code Part 1 in Canada.
- ONLY licensed professionals should connect the power supply.
- ALWAYS label all wires before disconnecting them when you work on the controls.
- Wiring errors can cause improper and dangerous operation.
- ALWAYS verify proper operation after servicing.

When connecting the power supply, follow these guidelines:

- Do not connect the electric supply until all plumbing and gas piping is complete and the furnace has been filled with water.
- The furnace must be connected to a dedicated 110-120V AC power supply with circuit breaker. Do NOT connect the furnace to a 220-240V AC power supply. Doing so will damage the furnace and void the warranty.

CAUTION

Ensure that the power supply to the furnace is disconnected to prevent injury due to electrical shock.

- The furnace must be electrically grounded. Ensure that the power supply connected to the furnace is properly grounded.
- Do not attach the ground wire to gas or water pipes as plastic pipe or dielectric unions may prevent proper grounding.
- We recommend using a surge protector to protect the furnace from power surges.
- If there is a power failure in cold weather areas, the freeze prevention system in the furnace will not operate and may result in the heat exchanger freezing. In cold areas where power failures are common, you must completely drain the furnace to prevent damage if power outages last for extended periods. A battery back-up (available at most computer retailers) may be used to supply heat during power outages. Damage caused by freezing is not covered under warranty.

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

1. Completely drain the water out of the furnace by emptying the expansion tank. For more information, refer to "6.4 Water Drain" on page 126.
2. Disconnect the power supply to the furnace.

This prevents your furnace from freezing and being damaged.

WARNING

Electric Shock Hazard

To prevent serious injury or death:

- Wiring to the device must be grounded.
- The furnace integrated control requires both polarity and proper ground. Both polarity and proper grounding should be checked before attempting to operate the furnace on either permanent or temporary power.
- Disconnect the power before repairing or changing the electrical wiring.
- When servicing the unit control, label all wires before disconnecting them. Wiring errors can lead to improper and dangerous operation. Check if it works properly after service.

About Wiring Harness

The wiring harness is an integral part of the furnace. Wires are color coded for identification purposes. If any of the original wire that is supplied with the furnace must be replaced, it must be replaced with wiring material that has a temperature rating of at least 221°F (105°C). All replacement wiring must be a copper conductor.

Note

For more information about the wiring diagram for wire routings, refer to “6.5 Wiring Diagram” on page 127.

About 120 Volt Line Connections

- Before proceeding with electrical connections, ensure that the supply voltage, frequency, and phase correspond to what is specified on the unit rating plate.
- The power supply to the furnace must be NEC Class 1, and must comply with all applicable codes.
- The furnace must be electrically grounded in accordance with local codes or, in their absence, with the latest edition of the National Electric Code, ANSI NFPA 70, or the Canadian Electric Code CSA C22.1.
- Use a separate fused branch electrical circuit containing a properly sized wire and fuse or circuit breaker. The fuse or circuit breaker must be sized in accordance with the maximum overcurrent protection specified on the unit rating plate.
- An electrical disconnect must be provided in the location of the furnace.
- Connect the black (hot), white (neutral) and green (ground) wires as shown in the wiring diagram located on the unit’s blower door. For more information about the wiring diagram for wire routings, refer to “6.5 Wiring Diagram” on page 127.
- For direct vent applications, the cabinet opening to the junction box must be sealed air tight using either a UL approved bushing, such as Heyco Liquid Tight, or by applying a non-reactive UL approved sealant to the bushing.
- Line voltage connections can be made through either the right or left side panel. The furnace is shipped configured for a right side electrical connection with the junction box located inside the burner compartment. To make electrical connections through the opposite side of the furnace, the junction box must be relocated to the other side of the burner compartment prior to making electrical connections. To relocate the junction box, follow the steps below.

Note

The wire routing must not interfere with filter removal, or routine maintenance.

Relocating the Junction Box

WARNING

Edges of sheet metal holes may be sharp. Use gloves as a precaution when removing hole plugs.

1. Remove the burner compartment door.
2. Remove and save the two screws that secure the junction box to the side panel.
3. Relocate the junction box and associated plugs and grommets to the opposite side panel. Secure them with the screws removed in the previous step.

WARNING

Electric Shock Hazard

To prevent serious injury or death:

- The furnace must be electrically grounded in accordance with the local codes or, in their absence, with the latest edition of the national electrical code.
- To ensure proper unit grounding, an earth ground wire must be connected between the furnace ground screw located inside the furnace junction box and the electrical service panel.

Note

- Do not use gas piping as an electrical ground.
- The furnace is equipped with a blower door interlock switch which interrupts the unit voltage when the blower door is opened for servicing. Do not deactivate this switch.

NOTICE

- The wire routing must not interfere with filter removal, or routine maintenance.
- A light green removable plug connector is provided with the sub-controller to make thermostat wire connections. This plug can be removed, and wire connections can be made to the plug and replaced. It is **STRONGLY** recommended that multiple wires be joined with a wire and a single conductor be inserted under the terminal screw. Failure to do so may result in intermittent operation.

Thermostat Connections

Possible thermostat connections:

- Furnace with A/C
 - 1-stage heat/1-stage cool
 - 1-stage heat/2-stage cool
 - 2-stage heat/1-stage cool
 - 2-stage heat/2-stage cool
- Furnace with Heat Pump (Dual Fuel)
 - 1-stage heat/1-stage H/P
 - 1-stage heat/2-stage H/P
 - 2-stage heat/1-stage H/P
 - 2-stage heat/2-stage H/P

Note

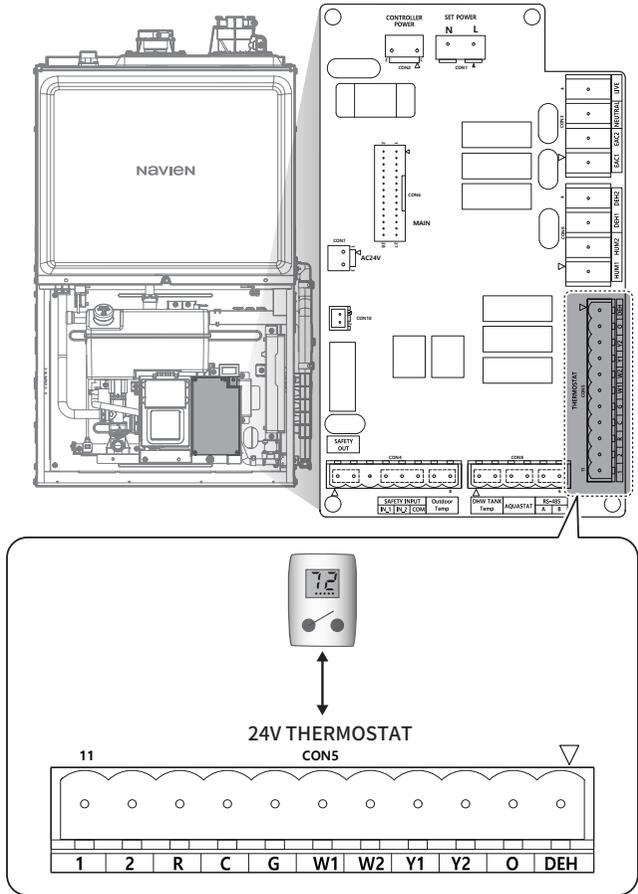
The furnace whether connected to a single stage or two stage thermostat for heating will always function in variable capacity mode.

Before wiring a thermostat to the furnace, set the thermostat type and stages connected to the furnace on the front control panel. For more information about thermostat settings, refer to "5.11.3.1 Setting the Thermostat" on page 98.

Note

- Refer to the following figures for proper connections to the sub controller.
- This furnace is equipped with a 75 VA transformer to facilitate use with most cooling equipment. Consult the wiring diagram part on page 127 or line voltage accessories part on page 71 for details on 120 volt and 24 volt wiring.

Low voltage connections are connected to the sub controller. The thermostat wiring entrance holes are located in the blower compartment. The following figure shows the connections for a "heat/cool system."

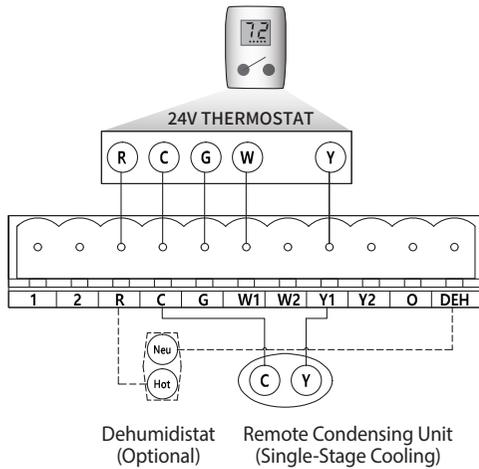


[24V Thermostat Connections]

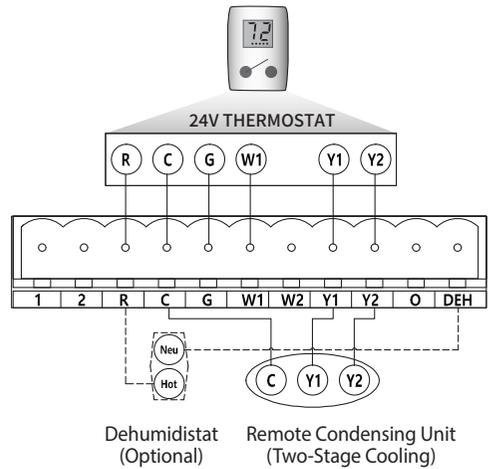
Note

To use a single-stage or two-stage heating thermostat, you must set it up on the front control panel.

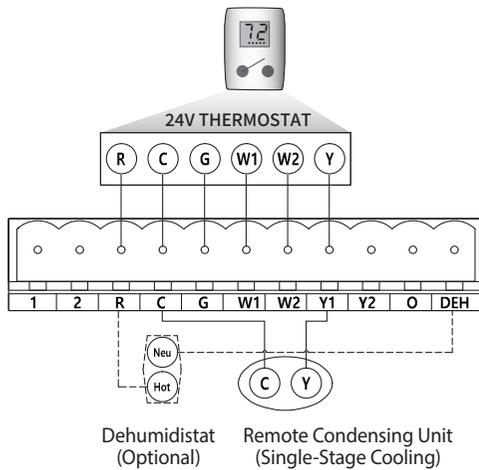
Furnace with A/C



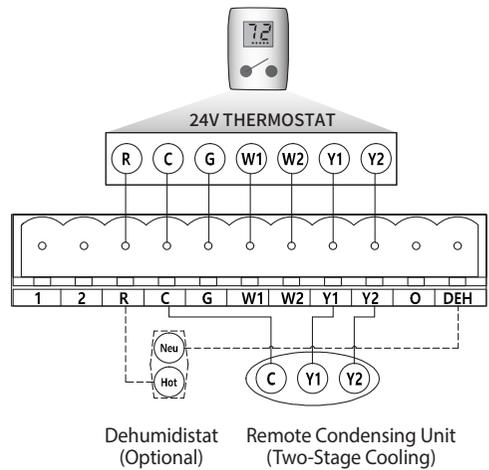
[1-Stage Heat/1-Stage Cool]



[1-Stage Heat/2-Stage Cool]

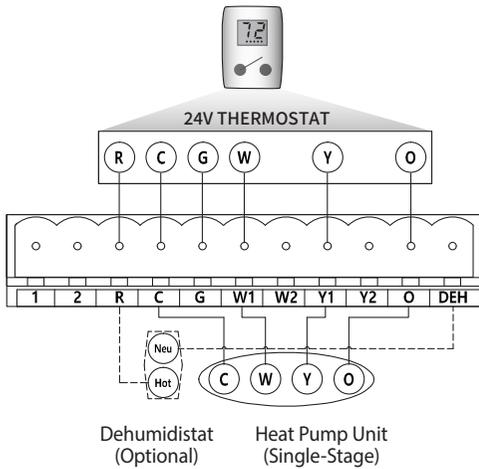


[2-Stage Heat/1-Stage Cool]

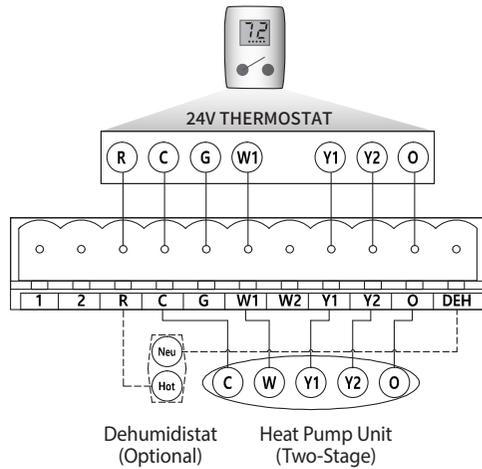


[2-Stage Heat/2-Stage Cool]

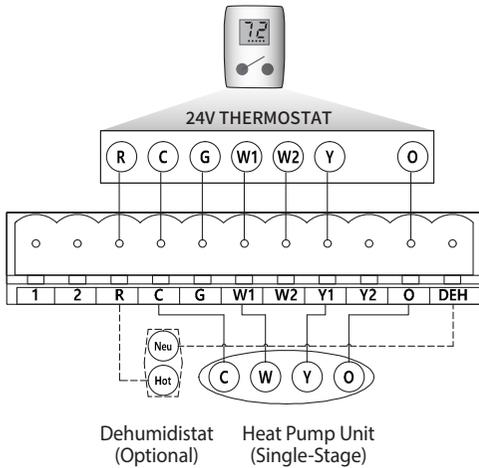
Furnace with Heat Pump (Dual Fuel)



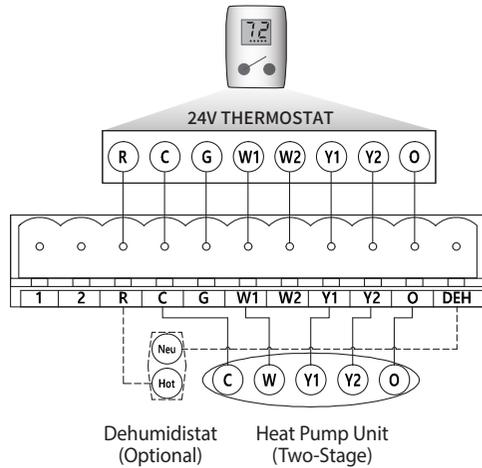
[1-Stage Heat/1-Stage H/P]



[1-Stage Heat/2-Stage H/P]



[2-Stage Heat/1-Stage H/P]



[2-Stage Heat/2-Stage H/P]

24 Volt Dehumidistat Wiring

The optional usage of a dehumidistat allows the furnace's circulator blower to operate at a slightly lower speed (85% of the desired speed) during a combined thermostat call for cooling and dehumidistat call for dehumidification. This can be done through an independent dehumidistat or through a thermostat's DEH terminal (if available). This lower blower speed enhances the dehumidification of the conditioned air as it passes through the AC coil. For proper function, a dehumidistat applied to this furnace must operate on 24 VAC and utilize a switch which opens when humidity rises. For additional wiring details, refer to "Thermostat Connections" on page 67.

To install or connect a dehumidistat:

1. Turn off the power to the furnace.
2. Secure the dehumidistat neutral wire (typically the white lead) to the terminal marked "DEH" on the sub controller.
3. Secure the dehumidistat hot wire (typically the black lead) to the terminal marked "R" on the sub controller.
4. Secure the dehumidistat ground wire (typically the green lead) to the ground screw on the furnace junction box.

Note

Ground wires may not be present on some dehumidistats.

5. Press the Power button on the front control panel to turn on the furnace, and then activate the dehumidification function.

Note

For more information about the dehumidification function, refer to "5.11.3.7 Setting Other Functions" on page 106.

Line Voltage Accessories

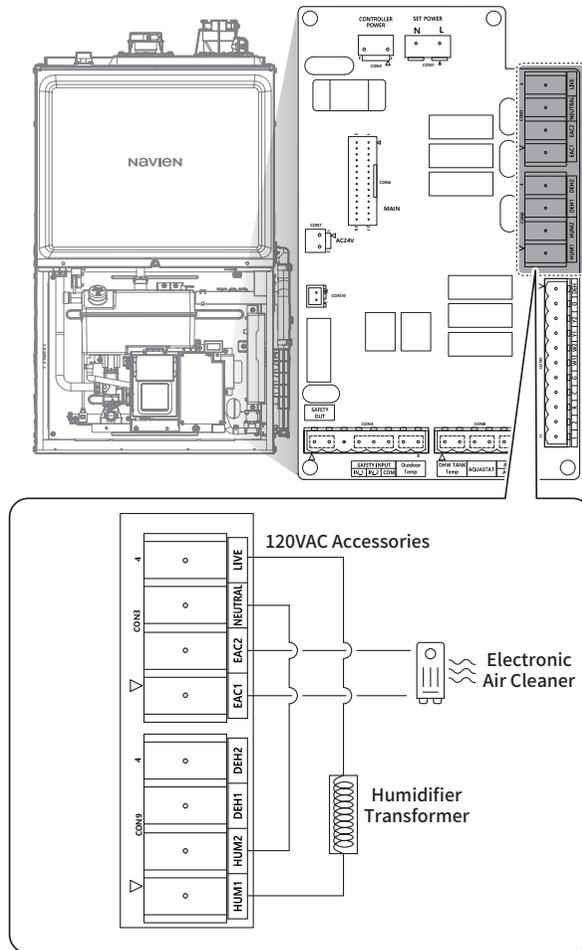
The furnace control board is equipped with line voltage accessory terminals for controlling power to an electronic air cleaner. The maximum accessory load specifications are as follows.

Optional Device	Specifications
Humidifier	0.5 Amp maximum at 120 VAC (Dry Contact)
Dehumidifier	0.5 Amp maximum at 120 VAC (Dry Contact)
Electronic Air Cleaner	1.0 Amp maximum at 120 VAC

Note

- Turn off the power to the furnace before installing any accessories.
- Follow the humidifier or air cleaner manufacturers' instructions for locating, mounting, grounding, and controlling these accessories.

Accessory wiring connections are to be made through the #5 Ring terminals provided on the sub controller. The electronic air cleaner hot terminal is identified as "EAC1". The EAC neutral terminal is identified as "EAC2". A line voltage humidifier may be connected between one of the HUM contacts and NEUTRAL. The other HUM contact must be fed from the LIVE terminal. Line voltage dehumidifiers are connected in the same way as line voltage humidifiers (In case of dehumidifier, be connected DEH terminal).



[Accessory Connections]

The schematic diagram of accessory connections shows an example of the connection of a line voltage humidifier.

If it is necessary for the installer to supply additional line voltage wiring to the inside of the furnace, the wiring must conform to all local codes and have a minimum temperature rating of 105°C.

All line voltage wire splices must be made inside the furnace junction box. The furnace control board HUM (dry contacts) are closed whenever the indoor blower is running with a call for heat.

The integrated control module electronic air cleaner (EAC) terminals are powered with 120 volts whenever the circulator blower is energized.

24 Volt Humidifier

A 24 volt humidifier can be powered by feeding one of the HUM terminals with a field installed wire from the R terminal.

Dual Fuel Applications

The furnace can be paired with a heat pump to create a dual fuel system. Dual fuel operation uses an outdoor temperature sensor so a balance point can be set (at what outdoor temperature the system switches from heat pump heat to Hydro furnace heat).

Note

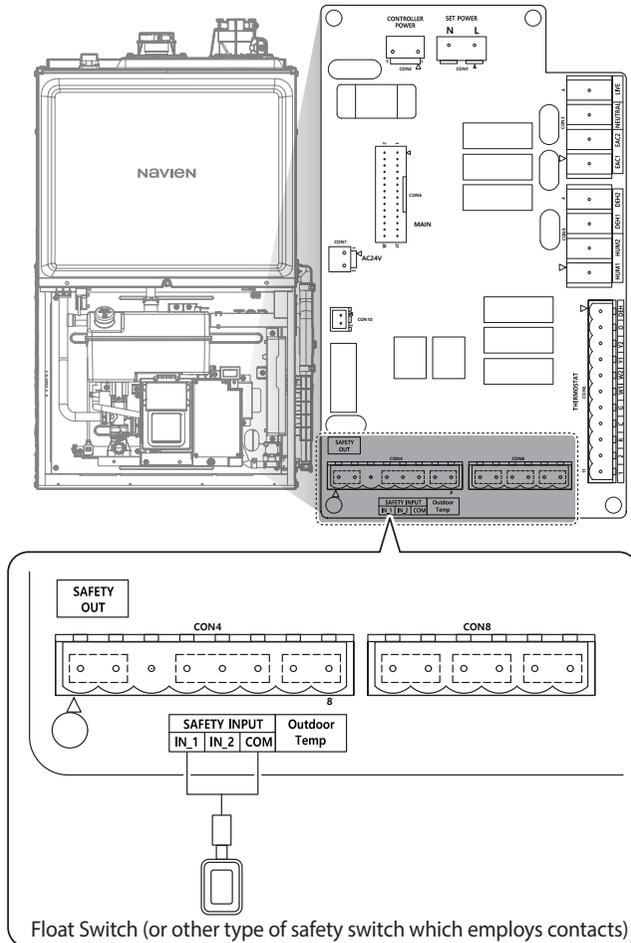
- Follow the installation instructions for the dual fuel thermostat for wiring. All gas furnace thermostat control connections must be made on the “FURNACE” control board and dual fuel thermostat.
- To use a heat pump with the furnace, set it up on the front control panel before connecting a heat pump to the furnace. For more information about heat pump connection settings, refer to “5.11.3.2 Setting the Heating Function” on page 98.

Accessory Safety Input

External safety devices, such as a float switch, can be connected to the “Accessory Safety Input” terminal on the sub controller. The auxiliary contacts may be wired to function as a NO or NC input. In the event that the safety is actuated, the gas heat and cooling will be disabled until the condition is corrected. These 24 volt terminals are powered internally. You must not apply another voltage source to these terminals. You can select the contact option from Normal Open (default) or Close depending on the switch specifications.

To install or connect an external safety device:

1. Turn off the power to the furnace.
2. Connect the safety device wires to the “IN_1” and “COM” terminals on the sub controller on the furnace.



[Safety Device Connections]

Note

- If the external device is initially connected to the “IN_1” terminal on the sub controller, the “E774” error code is displayed on the front control panel and the furnace stops operating. To clear the error code, press the Back button (↩) on the front control panel to reset the furnace.
- The “IN_2” terminal is only used when Auto Reset is required. If the external device is initially connected to the “IN_2” terminal on the sub controller, the “E775” error code is displayed on the front control panel and the furnace stops its operation. If there is no signal between the external device and the terminal on the sub controller, the error will be cleared automatically.

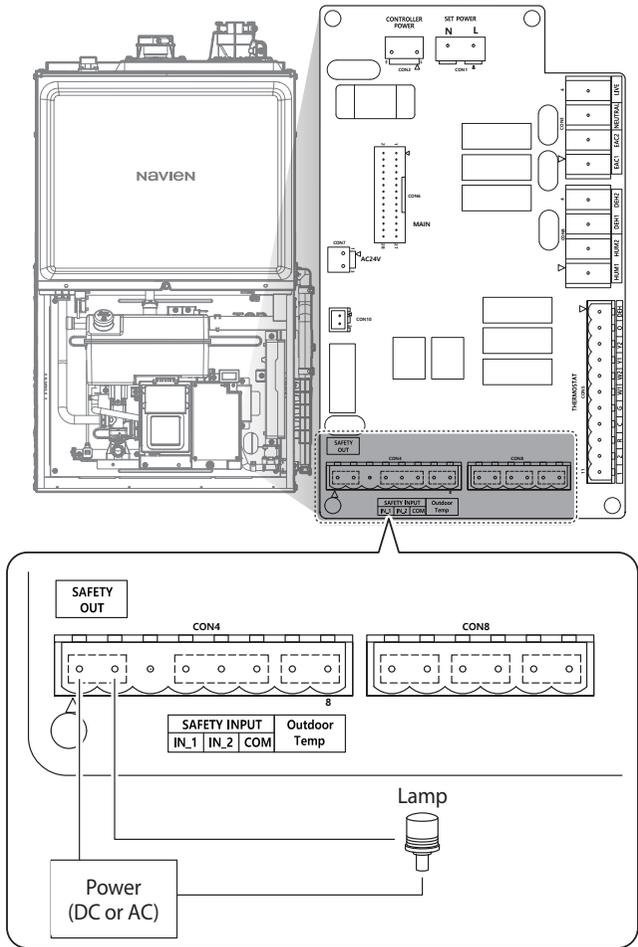
3. Press the Power button on the front control panel to turn on the furnace.

Note

If the safety device type is different from the default settings for the furnace, you must set the parameters on the front control panel.

Safety State Output Contact

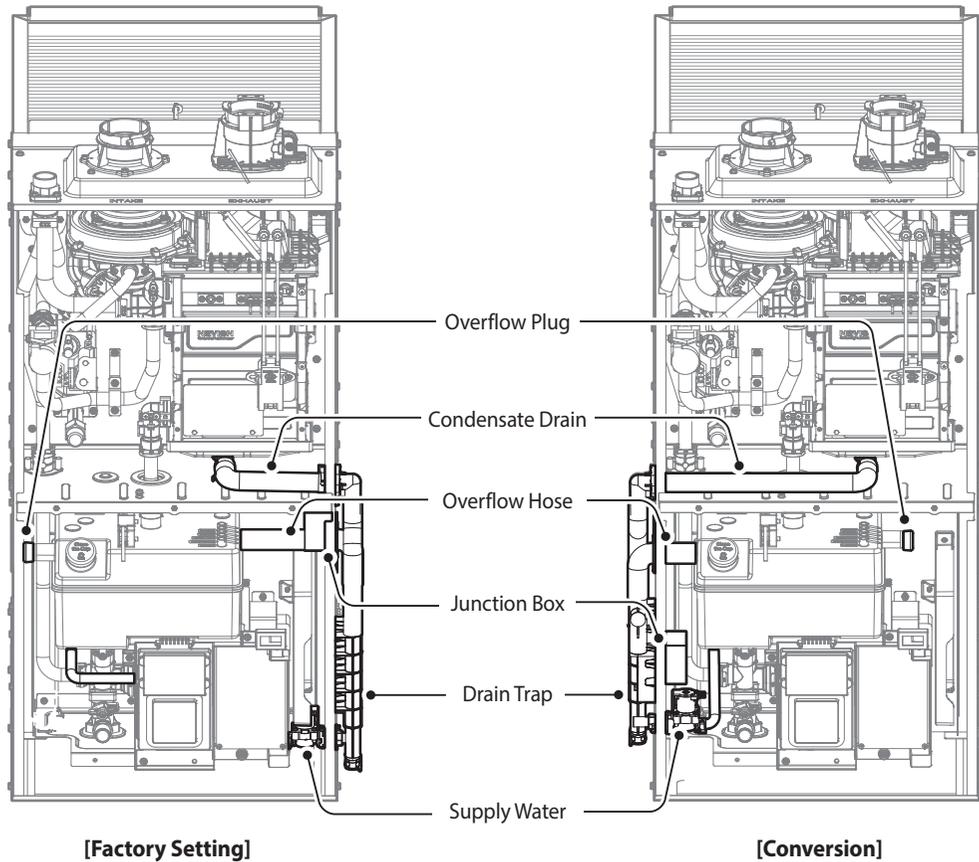
The safety state output terminal on the sub controller allows external devices for the furnace to be contacted by the terminal when an error occurs during furnace operation. You can connect a lamp to the “SAFETY OUT” terminal on the sub controller.



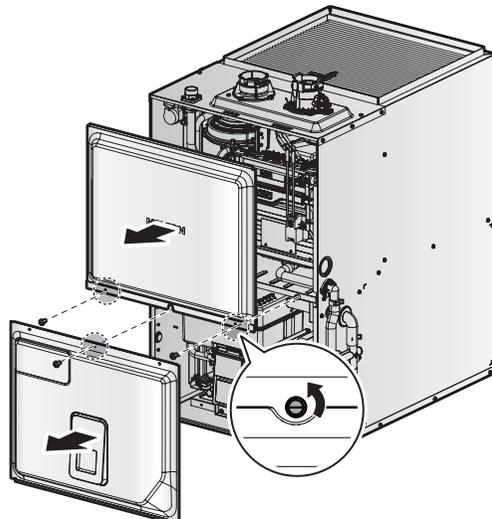
[External Device Connections]

2.10 Conversions

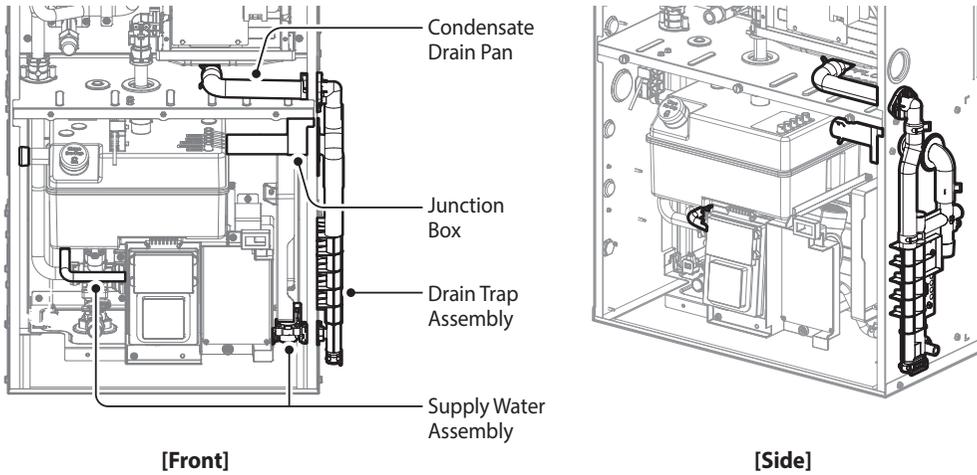
The NPF700 Upflow furnace is shipped with the drain trap, junction box, and hoses installed on the right side. Follow the instructions below for right-side wall installation at the installation site.



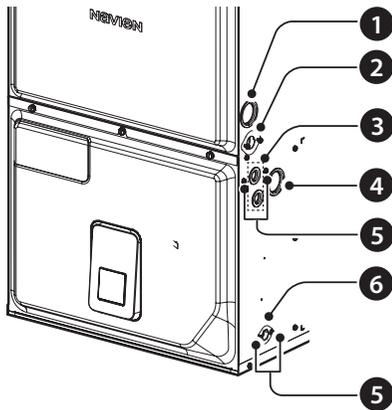
1. Loosen the 3 screws (in the middle of the front covers), and then remove the front covers from the furnace.



2. Disconnect the following parts and each hose, and then loosen the hose clip using a plier.

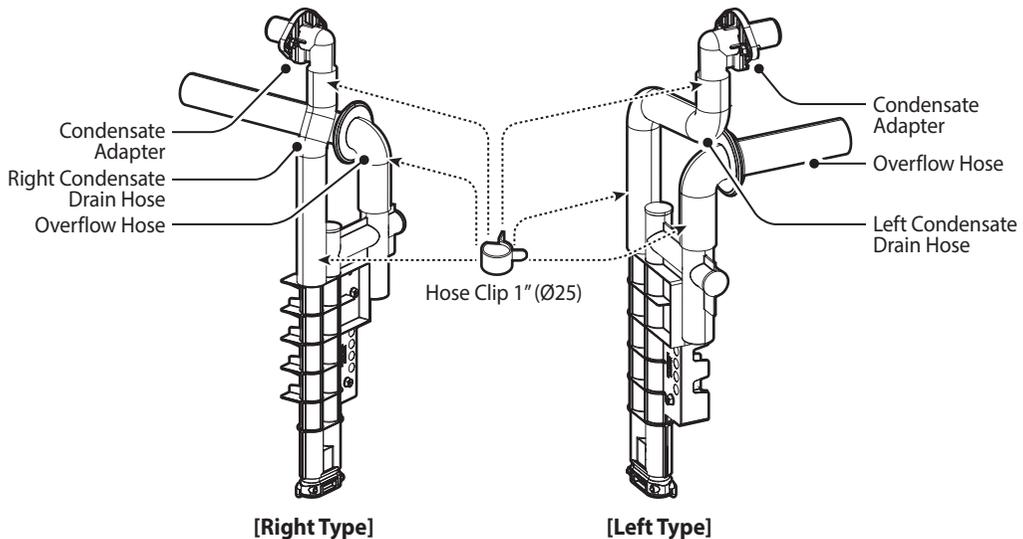


3. Remove the grommets on the left and install them where the parts on the right where removed.

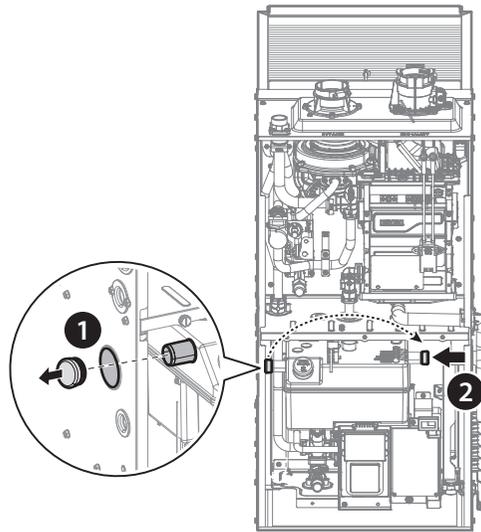


#	Part	Description
1		Gas pipe hole grommet
2		Condensate hole grommet
3		Electrical line hole grommet
4		Overflow and gas pipe hold grommet
5		Screw hole grommet
6		Supply water hole grommet

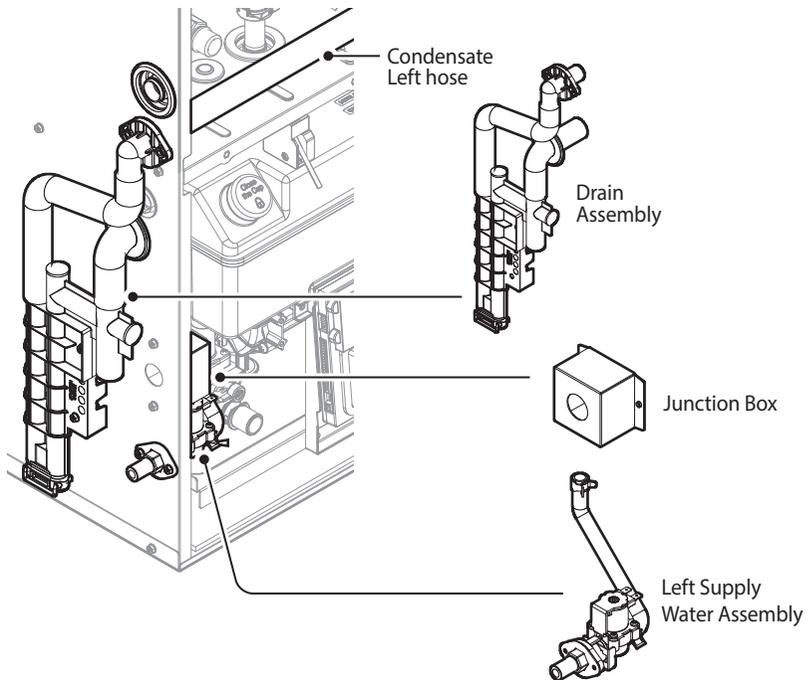
4. Convert the drain trap assembly as follows. Replace it with the included left dedicated drain hose and overflow hose and assemble as shown in the figure. Hose clips are assembled/disassembled using a plier.



- Before installing the drain trap assembly on the left side, disconnect the plug installed on the left overflow outlet of the tank and reinstall it on the right side overflow outlet.



- Install the left drain trap assembly, junction box, and supply water assembly that were separated as shown in the figure below.



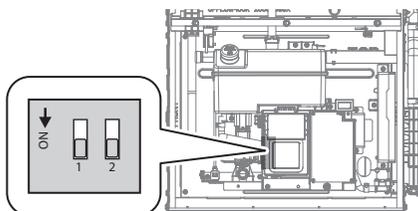
- When the furnace is commissioned and running, make sure there are no leaks in the hose connections.

3. Setting the DIP Switches

⚠ WARNING

- **Do not remove the front cover unless the power to the furnace 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.

The DIP switches on the circuit board configures the gas type.



Switch	Function	Setting		
1	Gas Type	Natural Gas	1-OFF	
		Propane Gas	1-ON	
2	Vent Type	Short	2" 0 - 40 ft	2-OFF
			3" 0 - 80 ft	
		Long	2" 40 - 70 ft	2-ON
			3" 80 - 140 ft	

4. Installation Checklist

After installing the furnace, 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 User’s Information 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.navieninc.com).

Installing the Furnace	Yes	No
Have you maintained the required clearances from building openings and intake air vents?		
Have you minimized the distance between the furnace and the vent termination?		
Have you maintained the proper service and maintenance clearances?		
Is the make-up air supply sufficient and free from dust, dirt, corrosive elements, and flammable vapors?		
Is the furnace 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 furnace’s rating plate?		
Is the gas line at least ½ or ¾ 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 shut-off valve?		
Have you tested the gas line pressure and all fittings for leaks?		
Has the gas company inspected the installation, if required?		

Connecting the Power Supply	Yes	No
Is the supplied voltage 120V?		
Is the furnace hard wired into a line voltage and properly grounded?		
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?		

Connecting the Condensate Drain	Yes	No
Have you installed a condensate drain line from the furnace to a drain or condensate pump?		
Is the trap filled with water?		
Is the drain pipe tilted toward the drain port?		
Have you checked that the condensate drain line hoses are connected and secured?		
Is an anti-freeze device (if required) installed?		

Duct Static Pressure	Yes	No
Record the duct static pressure at maximum heating operation.		
Record the air temperature rise at maximum heating operation.		
Record the air temperature rise at minimum heating operation.		
Record the duct static pressure at maximum cooling operation.		
Record the air temperature rise at maximum cooling operation.		

Venting the Furnace	Yes	No
Have you vented the furnace with 2 in or 3 in schedule 40 PVC, CPVC, polypropylene, Type BH Special Gas Vent (ULC-S636) for Category IV furnaces (Canada), or in accordance with all local codes and the guidelines in this manual?		
Have you ensured that ABS or PVC cellular core pipe has not been used as venting for the furnace?		
Is the vent sloped upward toward the vent termination at a rate of ¼ in per foot (2% grade)?		
Are all vent runs properly supported?		
Is the vent termination properly supported?		
Are the air intake and exhaust connections on the flue and vent lines correctly sealed?		
Have you installed termination screen caps on the exhaust and intake pipes?		
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?		

Panel DIP Switch Setting (DIP Switches)	Yes	No
Gas type: Is switch #1 set correctly for LP (ON) or NG (OFF)?		

Operating the Furnace	Yes	No
Have you given the Installation and Operation Manual and User's Information Manual to the owner for future reference?		
Have you shown the owner how to shut off the gas in case of an emergency?		

5. Operating the Furnace

⚠ WARNING

To prevent death, serious injury or property damage:

- Ensure that the furnace is filled with water before turning on the furnace.
- If overheating occurs or the gas supply fails to shut off, shut off the gas supply to the furnace at the manual gas valve.

5.1 Operating the Furnace for the First Time

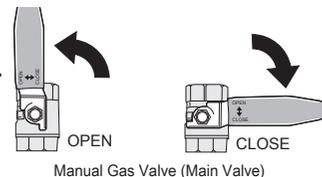
FOR YOUR SAFETY READ BEFORE OPERATING

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

- This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do NOT try to light the burner by hand.
- BEFORE OPERATING, smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.
WHAT TO DO IF YOU SMELL GAS
 - Do NOT try to light any appliance.
 - Do NOT touch any electrical switch.
 - Do NOT use any phone in your building.
 - 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.
- Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a licensed professional. Force or attempted repair may result in a fire or explosion.
- Do not use this appliance if any parts have been under water. Immediately call a licensed professional to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

OPERATING INSTRUCTIONS

- STOP! Read the safety information above this label.
- Turn off all electrical power of the appliance.
- Set the thermostat or other operating control to the lowest setting.
- This appliance is equipped with an ignition device which automatically lights the burner.
Do NOT try to light the burner by hand.
- Close the main gas shut off valve. 
- Wait (5) minutes to clear out any gas. Then smell for gas around the appliance and near the floor.
If you smell gas, STOP! Follow "B" in the safety information above.
If you don't smell gas, go to the next step.
- Open the main shut off valve. 
- Turn on the appliance.
- Set the thermostat or other operation control to desired setting.
- If the appliance will not operate, refer to "5.13 Diagnosing the Furnace System" on page 109 for diagnosing the furnace to identify the underlying issue.



TO TURN OFF GAS TO APPLIANCE

- Turn off all electric power to the appliance if service is to be performed.
- Set the thermostat or other operating control to the lowest setting.
- Close the main gas shut off valve. 

5.2 About Furnace Modes

5.2.1 Heating Mode

Whenever there is a Heat Demand (W1 or W1+W2) from the thermostat, the furnace will enter Heating mode and perform a heating operation sequence (controlling the firing rate (capacity) and airflow). For more information about the heating function, refer to "5.11.3.2 Setting the Heating Function" on page 98.

Water Coil Preheating

Whenever there is a Heat Demand (W1 or W1+W2) from the thermostat, the furnace will preheat the water coil. Water coil preheating continues until the water inside the water coil reaches the set control temperature and does not exceed 150 seconds. During water coil preheating, the blower will not operate. When water coil preheating is complete, the furnace will control the air temperature and airflow set in the Installer menu for the heating function.

Supply Air (SA) Control (Default)

This mode is used to constantly supply heating air (from supply air) at the SA set temperature.

- **SA Set Temperature (Default: 110°F [43.5°C])**

The discharge air temperature for heating can be adjusted from 95°F (35°C) to 150°F (65.5°C).

- **Capacity Control**

The furnace measures the temperature of the supply air discharged from the water coil and controls the firing rate to supply the air at the temperature selected during set-up.

- **Blower Control Mode**

The blower can be set to operate and provide the desired airflow using either of the below settings:

- **Constant Air Volume (CAV):**

Whenever there is a call for heating the unit will automatically adjust to deliver the selected CFM and automatically adjust the coil temperature to maintain the set discharge air temperature.

- **Variable Air Volume (VAV) (Default):**

As the load on the condition space varies throughout the day the NPF system will vary both heat capacity and airflow to precisely match that changing demand.

Return Air (RA) Control

This mode uses the return air temperature to the furnace to determine needed airflow and capacity rate.

- **RA Set Temperature (Default: 72°F [22°C])**

The return air temperature during heating can be adjusted to the desired temperature (Setting range: 65–90°F [18.5–32°C]). Also, it can be controlled automatically by the furnace.

Note

Since the furnace performs the heating operation at the set temperature, when the heating temperature set via the thermostat differs from the initially set temperature on the furnace, the following should be noted.

- If the thermostat set temperature is higher than the furnace RA Set Temperature, the heating duration may be prolonged due to insufficient heat to the home. Therefore, the RA Set Temperature must be set higher than or equal to the thermostat set temperature.
- If the heating operation duration lasts more than four hours, the Boost function will activate to induce the furnace to satisfy the thermostat.

- **Indoor Estimate Temp Mode (Default)**

If Indoor estimate temperature mode is enabled, the furnace estimates the set temperature of the indoor thermostat based on the heating operation information. The RA Set Temperature does not need to be set, since the furnace automatically estimates the set temperature of the indoor thermostat.

To allow the furnace to estimate the set temperature, the furnace performs the heating operation and stops its operation at least once.

The furnace also measures the heating operation time. If the current heating operation time is maintained for more than average heating hours, the Supply Boost function will be activated to induce the furnace to satisfy the thermostat.

• **Capacity Control**

The furnace estimates the heating load for the home based on the difference between the RA set temperature and measured RA temperature. From this, it determines the appropriate Supply Air Temperature. The furnace will automatically modulate the temperature in the water coil to simultaneously maintain the desired supply air temperature and firing rate.

The furnace detects the temperature of the supply air discharged from the water coil and controls the firing rate to supply the set air temperature.

• **Airflow Control**

Regardless of the heating stage set by the thermostat, the furnace operates with variable airflow.

The furnace detects the return air temperature and then supplies variable airflow to provide the RA set temperature.

Water Flow Control

To increase heating efficiency and save energy during heating operation, the furnace controls the amount of water circulating in the water coil.

After 5 minutes have elapsed from the beginning of heating and combustion and heating control is stabilized, the furnace controls the circulating flow rate. When the furnace stops the heating operation, the flow control valve will return to the stand-by position.

Blower HEAT Off Delay (Default: 60 sec)

With the removal of a Heat Demand (W1 or W1+W2) while the furnace is in heating operation, the furnace stops the heating operation and performs a post-purge.

The airflow value at the time of Heat Demand OFF will be applied to the airflow value during the post-purge. The post-purge is performed for the time the unit was installed and configured (Setting range: 30–120 sec).

Furnace Emergency Heat

If the supply air temperature sensor is abnormal (open or short), the furnace switches to Emergency heat mode to continue operation in heating.

When the supply air temperature sensor is replaced, the furnace switches back to Normal operation mode and performs a heating operation.

When operating in Emergency heat mode, the furnace proportionally controls the firing rate so as to maintain the heating coil temperature at 140°F (60°C). Also, airflow is controlled in the same way as in Normal operation mode.

5.2.2 Cooling Mode

When there is a Cool Demand (Y or Y1+Y2) from the thermostat, the furnace will enter Cooling mode and perform a cooling operation sequence delivering the desired airflow for each stage of cooling operation input during set-up. Each time there is a cooling cycle the selected blower profile will be applied. For more information about the cooling function, refer to “5.11.3.3 Setting the Cooling Function” on page 103.

Blower COOL On Delay (Default: 30 sec)

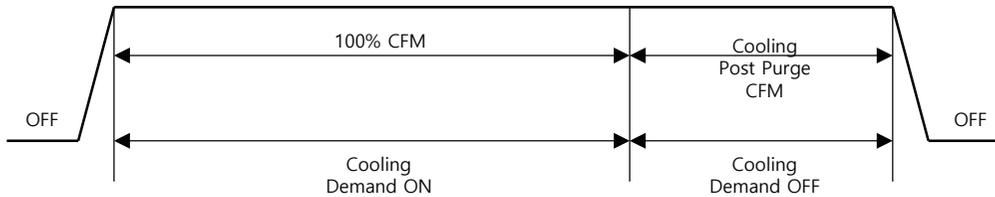
Whenever there is a Cool Demand (Y or Y1+Y2) from the thermostat, the furnace displays the blower operation during the set Blower ON Delay Time. After the set Blower ON Delay Time (Setting range: 0–120 sec), the furnace starts controlling airflow according to the set Ramping Profile.

Blower Ramping Profile

The furnace provides four types of Ramping Profiles to choose from. You can choose a desired profile depending on the cooling environments.

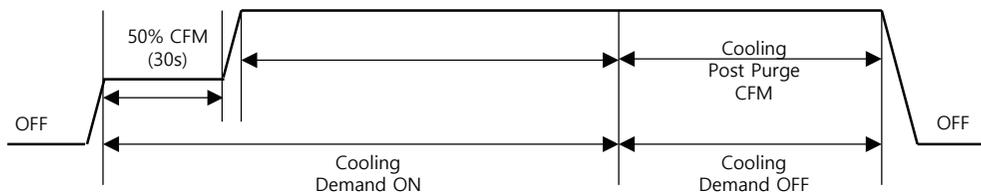
- **A (Fast Ramping)/(Default)**

For quick ramping of the airflow.



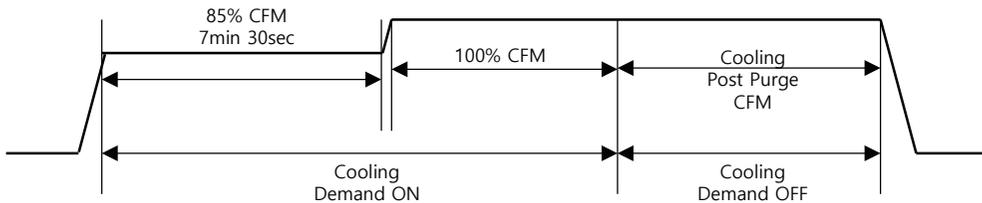
- **B (Slow Ramping)**

For reaching nominal airflow quickly, but with a lower ramping time.



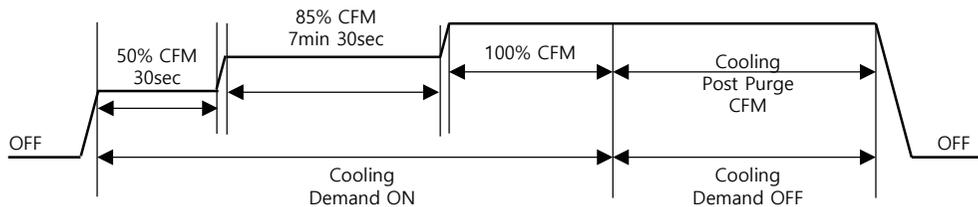
- **C (Dehumidification)**

If dehumidification is required immediately when cooling mode begins.



- **D (Dehum+Slow Ramping)**

If a slower airflow ramping time is required in addition to dehumidification.



Airflow Control

On a call for cooling, depending on the stage, the furnace will provide the CFM input during setup in conjunction with the ramping profile selected.

Blower COOL Off Delay (Default:60 sec)

If a Cool Demand (Y or Y1+Y2) is removed via the thermostat while the furnace is controlling the airflow during Cooling mode, the furnace performs a post-purge. The airflow value at the time of Cool Demand OFF will be applied to the airflow value during the post-purge. The post-purge is performed for the time set by users. Also, the post-purge time can be changed depending on the cooling environment (Setting range: 0–120 sec).

Dehumidification Cooling

If Demand (DEHUM) is set to “on” by the thermostat during Cooling mode, the airflow currently being supplied is reduced to 85%.

5.2.3 Continuous Blower Mode

When Continuous Blower Demand (G) is set to “on” by the thermostat, the furnace will perform an airflow operation sequence (controlling the airflow according to the Blower-on CFM value selected during set-up).

5.2.4 IAQ Devices

Electronic Air Cleaner (EAC)

When the blower is energized, the 120VAC EAC contact output is on. When the blower is turned off, the 120VAC EAC output is removed.

Humidifier

The humidifier is energized when the furnace operates in Heating mode and the humidistat has a demand (need for humidification). When the blower is turned off, the HUM contact output is removed.

Dehumidifier

When the dehumidifier is enabled and the furnace operates in Fan mode while the blower is turned on, the DEHUM contact output is on. When the blower is turned off, the DEHUM contact output is off.

5.2.5 Heating and Cooling Control Using a Heat Pump

If the furnace is paired with a heat pump to create a dual fuel system the furnace can be configured to control the airflow desired during heat pump heating or heat pump cooling. Heating priority can be based on heat pump capacity or energy costs for the market the products are installed in.

Heat Pump Heating Mode

Every time there is a Heat Demand (Y or Y1+Y2) from the thermostat, the furnace will perform a sequence of heating specific to the heat pump.

- **Blower HEAT On Delay (Default: 30 sec)**

Whenever there is a Heat Demand (Y or Y1+Y2) from the thermostat, the furnace activates the blower after the set Blower ON Delay Time (Setting range: 0–120 sec). Once the blower is active, the furnace will control the air flow.

- **Airflow Control**

Based on the heat stage of the thermostat, a constant airflow will be supplied. The airflow CFM operation is determined by the heating stage.

- **Blower HEAT Off Delay (Default: 60 sec)**

If the Heat Demand (Y or Y1+Y2) is removed by the thermostat while the furnace is in heating operation, the furnace stops the heating operation and performs a post-purge. The airflow value at the time of Heat Demand OFF will be applied to the airflow value during the post-purge. The post-purge is performed for the time selected during set-up. Also, the post-purge time can be changed depending on the heating environment (Setting range: 30–180 sec).

Cooling Mode

When a Cool Demand ([O] and [Y1 or Y1+Y2]) is set to "on" via the thermostat, the furnace will enter Cooling mode and perform a cooling operation sequence by the blower ramping profile selected during set-up. For more information about the cooling function, refer to "5.11.3.3 Setting the Cooling Function" on page 103.

- **Blower COOL On Delay (Default: 30 sec)**

Whenever a Cool Demand ([O] and [Y1 or Y1+Y2]) is set to "on" via the thermostat, the furnace delays blower operation for the set Blower ON Delay Time (Setting range: 0–180 sec). After the set Blower ON Delay Time, the furnace starts controlling the airflow according to the set Ramping Profile.

- **Blower Ramping Profile**

Each time the unit cycles in cooling mode the ramping profile selected during unit set-up will be followed. For more information, refer to "Blower Ramping Profile" on page 85.

- **Airflow Control**

According to the cooling stage set by the thermostat, the constant volume of the airflow is supplied. The airflow value for the cooling stage is determined by the set value for each cooling stage. The set cooling airflow is applied based on 100% air volume of the Blower Ramping Profile.

- **Blower COOL Off Delay**

For more information about blower post-purges, refer to "Blower COOL Off Delay (Default:60 sec)" on page 86.

- **Dehumidification Cooling**

For more information about dehumidification cooling, refer to "Dehumidification Cooling" on page 86.

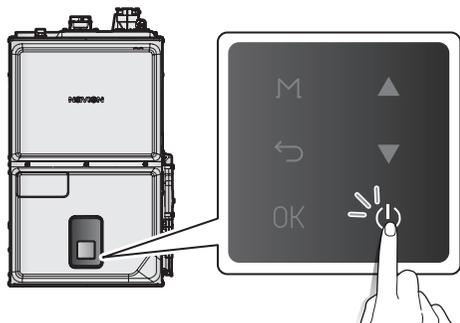
5.3 About the buttons on the Front Control Panel

The buttons on the front control panel are described in the following table. For more information about the buttons and icons on the front control panel, refer to "1.6 About the Front Control Panel" on page 12.

	Menu button Access to the Main menu screen.		Up button Increase the temperature setting, parameter or moves up.
	Back button Access to the previous screen.		Down button Decrease the temperature setting, parameter or moves down.
	OK button Access to the selected item.		Power button Turns the furnace on or off (Dose not turn off line voltage to the unit).

5.4 Turning the Furnace On or Off

To turn the furnace on or off, press the Power button (⏻) on the front control panel.



Note When the furnace is turned off, line voltage and control voltage are still present. To turn the power off to the furnace, disconnect the power supply.

The furnace will be in Normal Operation and the Standby icon will appear on the front control panel display after the power is turned on. But, when the power is turned on for the first time, you must complete the start-up wizard.



5.5 Start-Up Wizard

The setup wizard should run the first time the unit is powered on. The wizard must be completed before the furnace can be used.

When the setup wizard is displayed after turning on the furnace first time, press the Up button (▲) or the Down button (▼) to switch between the items in the Start-Up Wizard, and then, press the OK button (OK) to confirm and continue. To return to the setup wizard menu, press the Back button (←).

1. Set the time.
 - YYYY:MM:DD:HH:MM:SS:AM
2. Set the units to display.
 - °F, Feet
 - °C, Meter
3. Check the gas type.
 - Natural Gas
 - Propane Gas
4. Set the installation elevation.
 - 0–2,000 ft (0–610 m)
 - 2,000–5,400 ft (610–1,646 m)
 - 5,400–7,700 ft (1,646–2,347 m)
 - 7,700–10,100ft (2,347–3,078 m)

Note When prompted, please confirm the installation elevation by using the provided QR code. You can also access the following website (<https://www.navianinc.com/elevation>) and enter the proper zip/postal code.



5. Water Fill Type
 - Water Line Connected: Enable the function.
 - Manual Fill: Disable the function.
6. Thermostat Setup
 - 6-1. Heat Stage
 - 1STG or 2STG
 - 6-2. Cool Stage
 - 1STG or 2STG or No Cooling (Heat Only)
 - No Cooling: Set to use heating only.

7. Heat Setup

7-1. Air Temp Control Mode

- Supply Air
- Return Air

7-2. Supply Setting Temperature

- Set the temperature for the supply air control

Note This item is displayed when the Air Temp Control mode is set to "Supply Air".

7-3. Airflow Control Mode

- Constant Air Volume (CAV) or Variable Air Volume (VAV)
- Set the airflow's variable and fixed control settings for supply air control.

Note This item is displayed when the Air Temp Control mode is set to "Supply Air".

7-4. Airflow Setting

- Set the airflow for Heat mode.
- Set the airflow for each stage according to the Heat Stage parameters.

Note This item is displayed when the following items are set as follows:

- Air Temp Control Mode: Supply Air
- Airflow Control Mode: CAV

7-5. Estimate Indoor Setting Temp

- Enable: Enable the function.
- Disable: Disable the function.

7-6. Return Setting Temperature

- Set the temperature for return air control

Note This item is displayed when the following items are set as follows:

- Air Temp Control Mode: Return Air
- Estimate Indoor Setting Temp: Disable

7-7. Heat Setup Result

- Displays the set items.

8. Cool Setup

If the Cool Stage function is set to "No Cooling (Heat Only)", you can proceed with Fan Setup directly.

8-1. Cooling Appliance

- AC or Heat Pump
- Select the cooling appliance to be connected to the furnace.

8-2. Climate Compensation

- Normal / Humid / Dry
- Select the climate.

8-3. Cooling TON

- 1.5–3.0 TON (60 MBH) or 2.0–5.0 TON (100 MBH)
- Set the outdoor unit's ton.

8-4. Airflow Setting

- Set the airflow for Cool mode.
- Set the airflow for each stage according to the Cool Stage parameters.

8-5. Heat Pump Heat Mode Airflow Setting

- Set the airflow for the Heat Pump heating mode.

Note This item is displayed when Cooling Appliance is set to "Heat Pump".

8-6. Airflow Profile

- A (Fast Ramping)/B (Slow Ramping) / C(Dehumidification)/D(Dehum+Slow Ramping)
- Set the airflow operation type for each profile (A–D).

Note For more information about ramping profiles, refer to "Blower Ramping Profile" on page 85.

9. Continuous FAN Setup

- Set the airflow for FAN mode.
- Setting range: 450–1200 (60 MBH), 450–2000(100 MBH)

10. Air Test Mode

- Set the minimum and maximum airflow via an air test using the fan.

10-1. Min Airflow

- Set the minimum airflow.

10-2. Max Airflow

- Set the maximum airflow.

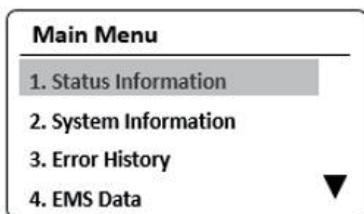
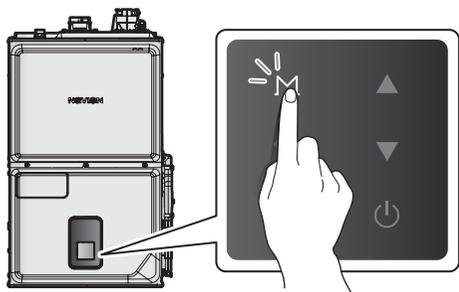
11. Setup Summary

Once the Setup Wizard is finished, a summary of the settings will be displayed. Press the OK button (OK) at each summary screen until the main screen is displayed. Settings made in the Setup Wizard can be adjusted from Installer Menu as described in Section 5.11 on page 95.

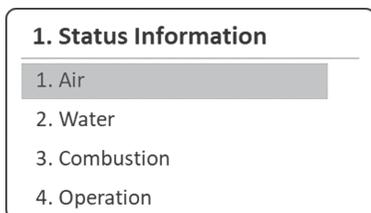
5.6 Viewing Status Information

On the Status Information menu, you can view the current operating status of the furnace components.

1. Press the Menu (M) button, and then select **Status Information**.



2. Press the Up button (▲) or the Down button (▼) to switch between the sub menu of Status Information, and then Press the OK button (OK) to select an item and view its information.



5.6.1 Viewing the Air Information

1. From the Status Information menu, select **Air**.
2. Press the Up button (▲) or the Down button (▼) to switch between information items, and then press the OK button (OK) to select an item to view its information.

Item	Description
1. Supply Air Temp	Displays the temperature of supplied air.
2. Return Air Temp	Displays the temperature of return air.
3. Air Temperature Rise	Displays the temperature difference between the supply and return air.
4. Blower CFM	Displays the circulation blower's airflow CFM.
5. Blower RPM	Displays the circulation blower's RPM.
6. Blower Torque	Displays the circulation blower's torque.
7. Outdoor Temp	Displays current outdoor temperature. Note This item is enabled when a furnace outdoor sensor is installed.
8. Indoor Set Temp (estimate)	Displays estimated indoor temperature.

3. Press the Back button (↶) to exit the Air Status Information view mode.

5.6.2 Viewing the Water Information

1. From the Status Information menu, select **water**.
2. Press the Up button (▲) or the Down button (▼) to switch between information items, and then press the OK button (OK) to select an item to view its information.

Item	Description
1. Supply Water Temp	Displays the supply water temperature.
2. Return Water Temp	Displays the return water temperature.
3. Water Temperature Rise	Displays the temperature difference between the supply and return water.
4. Water Flow	Displays the water flow rate.
5. Water Adjust Valve	Displays the flow regulating valve state.
6. Pump Status	Displays the pump status.

3. Press the Back button (↶) to exit the Water Status Information view mode.

5.6.3 Viewing the Combustion Information

1. From the Status Information menu, select **Combustion**.
2. Press the Up button (▲) or the Down button (▼) to switch between information items, and then press the OK button (OK) to select an item to view its information.

Item	Description
1. Heat Capacity	Displays the heat capacity.
2. Flame Value	Displays the flame detection AD value.
3. Inducer Fan RPM	Displays the inducer fan's RPM.
4. Exhaust Temp	Displays the exhaust gas temperature.

3. Press the Back button (↶) to exit the Combustion Status Information view mode.

5.6.4 Viewing Operation Information

The Operation Information menu provides the current input or output status of the furnace controls, such as the heat/cool demand, or IAQ functions.

1. From the Status Information menu, select **Operation**.
2. Press the Up button (▲) or the Down button (▼) to switch between information items, and then press the OK button (OK) to select an item to view its information.

Item	Description
1. Operation State	Displays the furnace's operation status.
2. Heat Stage	Displays the set heating stages.

Item	Description
3. Cool Stage	Displays the cooling stage. Note This item is displayed when the Heat Only function is set to "No". For more information about thermostat settings, refer to "5.11.3.1 Setting the Thermostat" on page 98.
4. Heat Only	Displays the set option for the Heat Only function.
5. 24VAC T/T-W1 Input Status	Displays the input status from W1 first stage heating.
6. 24VAC T/T-W2 Input Status	Displays the input status from W2 second stage heating.
7. 24VAC T/T-Y1 Input Status	Displays the input status from Y1 first stage cooling.
8. 24VAC T/T-Y2 Input Status	Displays the input status from Y2 second stage cooling.
9. 24VAC T/T-G Input Status	Displays the input status from G.
10. 24VAC T/T-O Input Status	Displays the input status from O.
11. 24VAC T/T-DEHUM Input Status	Displays the input status from DEHUM.
12. Humidity Output status	Displays the humidity output status.
13. Dehumidity Output status	Displays the dehumidity output status.
14. EAC Output Status	Displays the electronic air cleaner (EAC)'s output status.

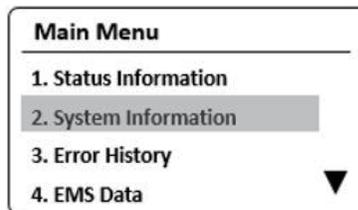
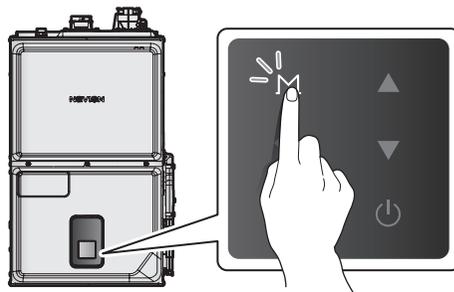
- Press the Back button (↩) to exit the Operation Status Information view mode.

Note Depending on the parameter settings, the items in the table above may not be displayed.

5.7 Viewing System Information

You can view the furnace's system information such as the gas, altitude, vent and furnace's firmware version.

- Press the Menu (M) button, and then select **System Information**.



- Press the Up button (▲) or the Down button (▼) to switch between information items, and then press the OK button (OK) to select an item to view its information.

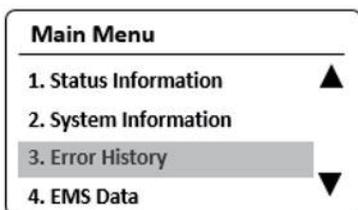
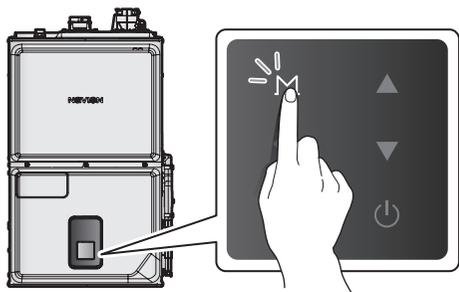
Item	Description
1. Max Capacity	Displays the maximum combustion rate in BTU.
2. Gas	Displays the gas type selected for the furnace.
3. Altitude	Displays the altitude value selected for the installation.
4. Vent	Displays the set vent option.
5. Panel F/W Ver	Displays the version of the front control panel.
6. Main F/W ver	Displays the firmware version of the main controller.

- Press the Back button (↩) to exit the System Information view mode.

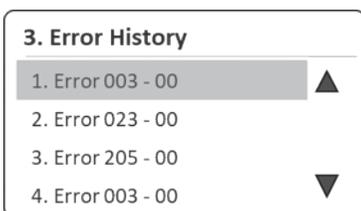
5.8 Viewing the Error History

You can view a list of recent errors and check for details. For more information about the error codes, refer to "5.15 Understanding Error Codes" on page 111.

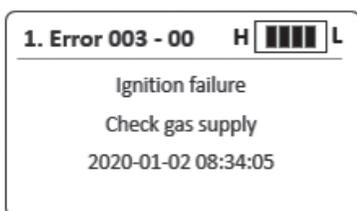
1. Press the Menu (M) button, and then select **Error History**.



A list of 10 recent errors are displayed on the screen, with the most recent error displayed at the top of the list.



2. Press the Up button (▲) or the Down button (▼) to switch between the list of errors, and then Press the OK Button (OK) to select an error to view detailed information.



3. Press the Back button (↶) to return to the previous screen or menu.

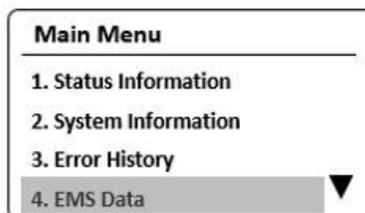
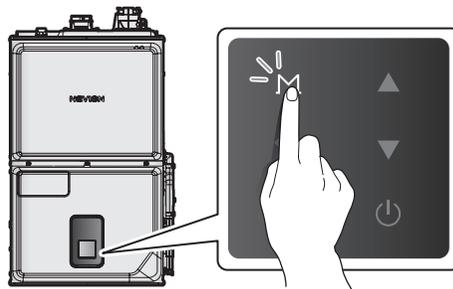
Note

- The front control panel display flashes in red and the error icon is displayed (flashing) when a level 1 error is detected. You can press the OK Button (OK) to enter error display mode. Furnace operation is maintained during a level 1 error.
- Level 1 errors are automatically cleared when the problem is resolved.
- You can press the Back button (↶) to clear a level 1 error. The error is then cleared if the problem has been resolved.
- You can press and hold the back button (↶) for 5 seconds to clear all the previous error codes.

5.9 Viewing the System Operation Information

You can view the furnace's system operation information, such as information about heating, the cooling, fan, gas consumption, and the heat pump.

1. Press the Menu (M) button, and then select **EMS Data**.



- Press the Up button (▲) or the Down button (▼) to switch between information items, and then press the OK button (OK) to select an item to view its information.

Item	Description
1. HEAT Operation Time	Displays the monthly heating time.
2. COOL Operation Time	Displays the monthly cooling time.
3. Cont.FAN Operation Time	Displays the monthly fan operation time.
4. Gas Consumption	Displays the monthly gas consumption.
5. HP Operation Time	Displays the monthly heat pump operation time.

- Press the Back button (↶) to exit the System Operation Information view mode.

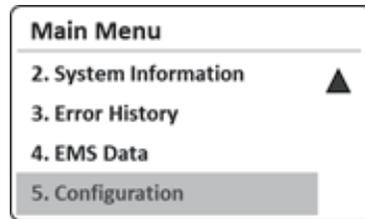
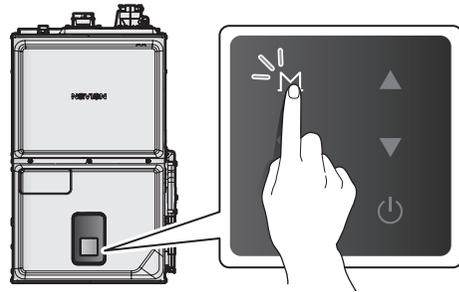
Note

- Gas consumption is calculated for the furnace only and may differ from the amount measured on the gas meter.
- Gas consumption may differ from the amount measured on the gas meter due to the season, gas pressure, calorific value, gas meter error, other gas equipment usage, or other variables.

5.10 Setting the Display Options

You can set the display options such as unit, time and backlight on the front control panel.

- Press the Menu (M) button, and then select **Configuration**.



- Press the Up button (▲) or the Down button (▼) to switch between information items, and then press the OK button (OK) to select an item to set its configuration.

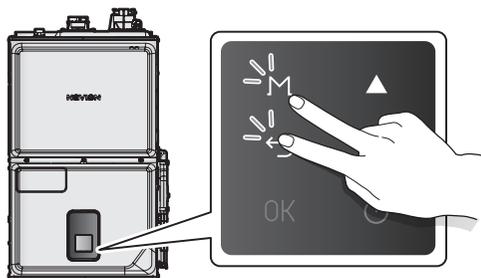
Item	Description
1. Display Units Setting	Set the display units. 1. °F, Feet 2. °C, Meter • Default: °F, Feet
2. Time Setting	Set the time format. • Display: YYYY.MM.DD / HH:MM:SS:AM
3. Backlight Time Setting	Set the backlight time. • Setting range: 0–60 min • Default: 1 min
4. Sound Setting	Set the beep sound. • Setting range: ON/OFF • Default: ON

- Press the Back button (↶) to return to the previous screen or menu.

5.11 Viewing and Setting Installer Information

You can view the detailed operation information for service, initialize all settings, or change the Installer's menu password.

1. Press the Menu button (M) and the Back button (↩) simultaneously for 3 seconds, and then select **Installer Menu**.

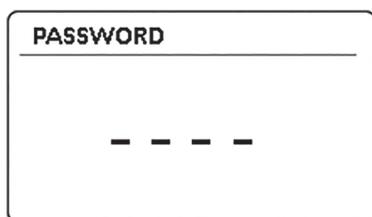


Service / Installer

1. Installer Menu
2. Test Mode
3. Special Operations

2. In the Password screen, press the Up button (▲) or the Down button (▼) to change numbers and places and press the OK button (OK) to enter the password. If the password is correct, the Installer Menu will be displayed.

Note The factory default password is "1234."



3. Press the Up button (▲) or the Down button (▼) to switch between sub menu of the Installer menu. Press the OK Button (OK) to select an item to view the information or set the configuration.

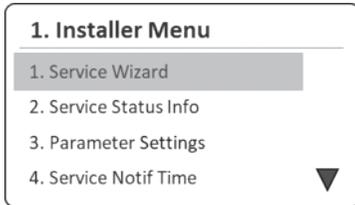
Item	Description
1. Service Wizard	Perform a furnace self-check.
2. Service Status Info	Check the operation data of the furnace.
3. Parameter Settings	Set the furnace parameters.
4. Service Notif Time	Set the service notification time. <ul style="list-style-type: none"> • Setting range: 30–3,650 days (set in 10 day increments) • Default: 1,820 days
5. Service Notif Cycle	Set the service notification Cycle. <ul style="list-style-type: none"> • Setting range: 300–36,500 cycles (set in 100 cycle increments) • Default: 18,200 cycles
6. Service Contact #	View the service contact information. <ul style="list-style-type: none"> • Default: 1-800-519-8794
7. Factory Reset	Initialize all parameter settings (panel and main controller) to the factory default.
8. P/W Change	Change the Installer Menu password.

- Note**
- If you enter an incorrect password 10 times or make no input for 1 minute, the furnace will return to Normal mode.
 - To return to the previous mode, press the Back button (↩).

4. Press the Back button (↩) to return to the previous screen or menu.

5.11.1 Service Wizard

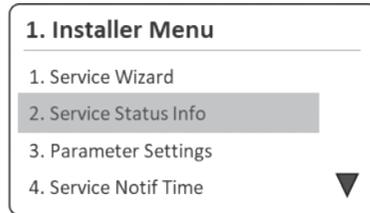
From the Installer menu, select **Service Wizard**. When you enter the Service Wizard screen, the furnace will perform a self-check process on the following items.



Item	Description
1. Fill Water Check	Check the water level on the water tank by filling the water tank to the maximum level.
2. Combustion Fan check	Check the fan motor's operation status by operating the fan motor at the minimum and maximum RPMs.
3. Water Circulation Check	Check the water circulation by opening and closing the water adjustment valve and turning the pump on and off.
4. Blower Check	Check the blower's status by operating the blower.
5. Combustion Check	Check the combustion performance.

5.11.2 Viewing the Service Status Info

- From the Installer menu, select **Service Status Info**.



- Press the Up button (▲) or the Down button (▼) to switch between information items, and then press the OK button (OK) to select an item to view its information.

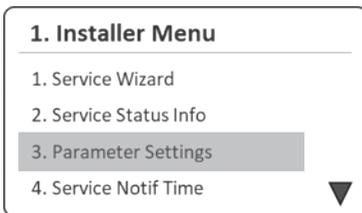
Item	Description
1. Elapsed time after install	Displays the elapsed time since furnace installation.
2. HEAT Op - No. of Times	Displays the number of times of the heating operation has been performed.
3. Pump Op - No. of Times	Displays the number of times the pump has operated
4. Flame Loss - No. of Times	Displays the number of times flame loss has occurred.
5. 2nd Ignition - No. of Times	Displays the number of times the 2nd ignition has operated.
6. 3rd Ignition - No. of Times	Displays the number of times the 3rd ignition has operated.
7. 4th Ignition - No. of Times	Displays the number of times the 4th ignition has operated.
8. 5 - 10th Ignition - No. of Times	Displays the number of times 5–10th ignition has operated.
9. COOL Op - No. of Times	Displays the number of times the cooling operation has been performed.
10. FAN Op - No. of Times	Displays the number of times the fan has operated.

Item	Description
11. Blower Op - No. of Times	Displays the number of times the blower has operated.
12. AWS Op - No. of Times	Displays the number of times the auto water fill system has operated.
13. HP Op - No. of Times	Displays the number of times the heat pump has operated.

3. Press the Back button (←) to return to the previous screen or menu.

5.11.3 Setting the Operation Parameters

1. From the Installer menu, select **Parameter Settings**.



Note The parameters are separated into sub menus based on the system in the furnace. You can view or adjust relevant settings in the corresponding sub menu.

2. Press the Up button (▲) or the Down button (▼) to switch between the parameters or to increase or decrease setting values. Press the OK Button (OK) to select a sub menu of parameter.

Item	Description
1. Thermostat	Set the thermostat parameters.
2. HEAT	Set the heating parameters.

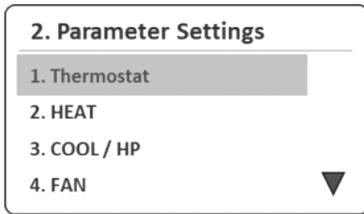
Item	Description
3. COOL / HP	Set the cooling or heat pump functions parameters. Note This item is displayed when the Heat Only function is set to "No". For more information about thermostat settings, refer to "5.11.3.1 Setting the Thermostat" on page 98.
4. FAN	Set the fan parameters.
5. Airflow	Set the airflow's minimum and maximum value.
6. Protection	Set the protection function parameters.
7. etc	Set the IAQ setup parameters.
8. Installation	Set the parameters for the product installation environment.

3. Press the Back button (←) to return to the previous screen or menu.

Note Depending on the parameter settings, the items in the table above may not be displayed.

5.11.3.1 Setting the Thermostat

- From the Parameter Settings sub menu, select **Thermostat**.



- Press the Up button (▲) or the Down button (▼) to switch between the parameters or to increase or decrease setting values. Press the OK Button (OK) to select a Thermostat parameter or to confirm after making changes.

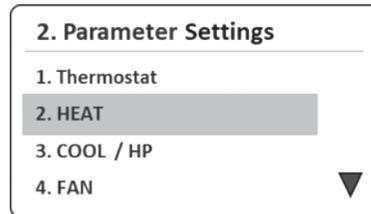
Item	Description
1. HEAT Only	Set the Heat Only function. <ul style="list-style-type: none"> Setting range: Yes / No Default: No
2. HEAT Stage	Set the heating stage. <ul style="list-style-type: none"> Setting range: 1 STG / 2STG Default: 2STG
3. COOL Stage	Set the cooling stage. <ul style="list-style-type: none"> Setting range: 1 STG / 2STG Default: 2STG <p>Note This item is displayed when the Heat Only function is set to "No".</p>

- Note**
- Depending on the parameter settings, the items in the table above may not be displayed.
 - If you make no input for 10 seconds in the Parameter Edit mode, the current parameter value will be saved automatically.
 - Press and hold the Back button (↩) in Parameter Edit mode for 5 seconds to reset individual parameters to their default values.

- Press the Back button (↩) to return to the previous screen or menu.

5.11.3.2 Setting the Heating Function

- From the Parameter Settings sub menu, select **HEAT**.



- Press the Up button (▲) or the Down button (▼) to switch between the parameters or to increase or decrease setting values. Press the OK Button (OK) to select a HEAT parameter or to confirm after making changes.

Item	Description
1. HEAT Control	Set the outdoor temperature control mode. <ul style="list-style-type: none"> Setting range : Supply Air / Return Air Default: Supply Air
2. HEAT Set Supply Air Temp	Set the supply air temperature for heating. <ul style="list-style-type: none"> Setting range: 95°F–150°F (35°C–65.5°C) Default: 110°F (43.5°C) <p>Note This item is displayed when the HEAT Control option is set to "Supply Air".</p>
3. HEAT Set Return Air Temp	Set the return air temperature. <ul style="list-style-type: none"> Setting range: 65°F–90°F (18.5°C–32°C) Default: 72°F (22°C) <p>Note This item is displayed when the HEAT Control option is set to "Return Air".</p>

Item	Description
4. HEAT Set Return Air ATR Rate	<p>Adjust the ATR rate to increase or decrease the target temperature. Increasing the percentage will raise the SA temperature.</p> <ul style="list-style-type: none"> • Setting range: 50%–100% • Default: 60% <p>Note</p> <p>This item is displayed when the HEAT Control option is set to “Return Air”.</p>
5. Airflow Control Mode	<p>Set the fan control mode.</p> <ul style="list-style-type: none"> • Setting range: CAV (Constant Air Volume)/VAV (Variable Air Volume) • Default: VAV (Variable Air Volume) <p>Note</p> <p>This item is displayed when the HEAT Control option is set to “Supply Air”.</p>
6. HEAT 1 Stage Airflow Setting	<p>Set the 1 stage’s blower CFM value (when the 2 stage is used).</p> <ul style="list-style-type: none"> • Setting range: ±15 % based on the default value • Default: <ul style="list-style-type: none"> – 60 MBH: 630 CFM – 100 MBH: 1050 CFM <p>Note</p> <p>This item is displayed when the following items are set as follows:</p> <ul style="list-style-type: none"> • HEAT Stage: 2STG • HEAT Control: Supply Air • Airflow Control Mode: CAV <p>For more information about thermostat settings, refer to “5.11.3.1 Setting the Thermostat” on page 98.</p>

Item	Description
7. HEAT 2 Stage Airflow Setting	<p>Set the 2 stage’s blower CFM value (when the 2 stage is used).</p> <ul style="list-style-type: none"> • Setting range: ±15 % based on the default value • Default: <ul style="list-style-type: none"> – 60 MBH: 900 CFM – 100 MBH: 1500 CFM <p>Note</p> <p>This item is displayed when the following items are set as follows:</p> <ul style="list-style-type: none"> • HEAT Stage: 2STG • HEAT Control: Supply Air • Airflow Control Mode: CAV <p>For more information about thermostat settings, refer to “5.11.3.1 Setting the Thermostat” on page 98.</p>
8. HEAT Airflow Setting	<p>Set the heating blower CFM.</p> <ul style="list-style-type: none"> • Setting range: ±15 % based on the default value • Default: <ul style="list-style-type: none"> – 60 MBH: 900 CFM – 100 MBH: 1500 CFM <p>Note</p> <p>This item is displayed when the following items are set as follows:</p> <ul style="list-style-type: none"> • HEAT Stage: 1STG • HEAT Control: Supply Air • Airflow Control Mode: CAV <p>For more information about thermostat settings, refer to “5.11.3.1 Setting the Thermostat” on page 98.</p>

Item	Description
9. HEAT Blower Compensation (VAV)	<p>Adjust the Heat Blower Compensation (VAV) to increase or decrease the target CFM that the furnace will provide. The default airflow (0 step) is calculated based on the heating input.</p> <ul style="list-style-type: none"> Setting range: -15--+15 step Default: 0 step <p>Note</p> <p>This Item is displayed when the following items are set as follows:</p> <ul style="list-style-type: none"> HEAT Control: SUPPLY FAN Control Mode: VAV
10. Blower Heat Off Delay	<p>Set the heating post purge time.</p> <ul style="list-style-type: none"> Setting range: 30–120 sec Default: 60 sec
11. Air Boost Start Time	<p>The air boost will increase the blower CFM if a heat demand continues for the set duration. Adjust air boost start time to increase or decrease the heat call duration prior to the CFM increase.</p> <ul style="list-style-type: none"> Setting range: 0 (DISABLE), 1–720 min Default: 240 min
12. Indoor Estimate Temp Mode	<p>The Indoor Estimate Temp Mode will operate the furnace based on a calculated room temperature. Disable the mode to operate the furnace based on a fixed return temperature.</p> <ul style="list-style-type: none"> Setting range: ON / OFF Default: ON <p>Note</p> <p>This item is displayed when the HEAT Control option is set to "Return Air".</p> <p>For more information about thermostat settings, refer to "5.11.3.1 Setting the Thermostat" on page 98.</p>

Item	Description
13. Outdoor Reset	<p>Outdoor reset mode will vary the supply air temperature based on the outdoor temperature. Set the outdoor reset mode.</p> <ul style="list-style-type: none"> Setting range: ON / OFF Default: OFF <p>Note</p> <ul style="list-style-type: none"> This item is displayed when the the outdoor sensor is installed and the HEAT Control option is set to "Supply Air". To set the detailed settings for the outdoor reset mode, this item must be set to "ON".
14. Outdoor Reset - Set Min temp	<p>Set the minimum air supply temperature for Outdoor Reset mode.</p> <ul style="list-style-type: none"> Setting range: 95°F (35°C)–[Supply Air Temperature Max - 18°F (10°C)] Default: 98°F (36.5°C)
15. Outdoor Reset - Set Max temp	<p>Set the maximum air supply temperature for Outdoor Reset mode.</p> <ul style="list-style-type: none"> Setting range: [Supply Air Temperature Min + 18°F (10°C)]–150°F (65.5°C) Default: 130°F (54.5°C)
16. Outdoor Reset - Out Min temp	<p>Set the minimum outdoor temperature for Outdoor Reset mode.</p> <ul style="list-style-type: none"> Setting range: -4°F (-20°C)–[Outdoor Temperature Max -9°F (5°C)] Default: 10°F (-12°C)

Item	Description
17. Outdoor Reset - Out Max temp	<p>Set the maximum outdoor temperature for Outdoor Reset mode.</p> <ul style="list-style-type: none"> Setting range: [Outdoor Temperature Min + 9°F (5°C)]–104°F (40°C) Default: 60°F (15.5°C)
18. Outdoor Reset Boost Temp	<p>Set the boost temperature for Outdoor Reset mode.</p> <ul style="list-style-type: none"> Setting range: 2°F–9°F (1°C–5°C) Default: 4°F (2°C)
19. Outdoor Reset Boost Interval Time	<p>Set the boost interval time for Outdoor Reset mode.</p> <ul style="list-style-type: none"> Setting range: 0–120 min Default: 0 min
20. WWSD Temp	<p>Warm Weather Shut Down (WWSD) will disable the heating operation when the outdoor temperature exceeds the set temperature. WWSD requires the outdoor sensor to be installed.</p> <ul style="list-style-type: none"> Setting range: OFF <-> 50°F–104°F (10°C–40°C) Default: OFF
21. WWSD ON Diff	<p>Set the differential from the WWSD Temp to make sure the outdoor temperature falls before heating operation restarts.</p> <ul style="list-style-type: none"> Setting range: 0°F–36°F (0°C–20°C) Default: 5°F (3°C)

Note

- Depending on the parameter settings, the items in the table above may not be displayed.
- If you make no input for 10 seconds in the Parameter Edit mode, the current parameter value will be saved automatically.
- Press and hold the Back button (←) in Parameter Edit mode for 5 seconds to reset individual parameters to their default values.
- The selected airflow CFM parameter setting may be slightly different than the actual CFM due to various installation conditions.
- The Warm Weather Shut Down (WWSD) function enables or disables heating depending on the ambient temperature.
 - Disables heating when the outdoor temp is greater than the WWSD Temp set.
 - Re-enable heating when the outdoor temp is lower than [WWSD temp - WWSD Diff Temp].

- Press the Back button (←) to return to the previous screen or menu.

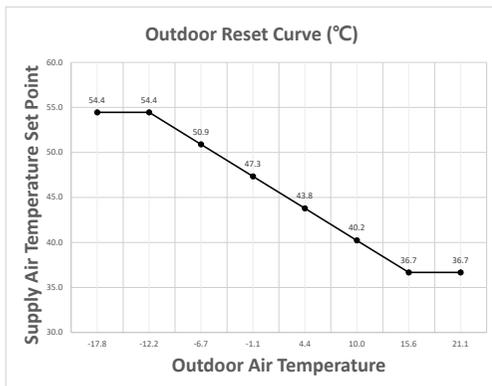
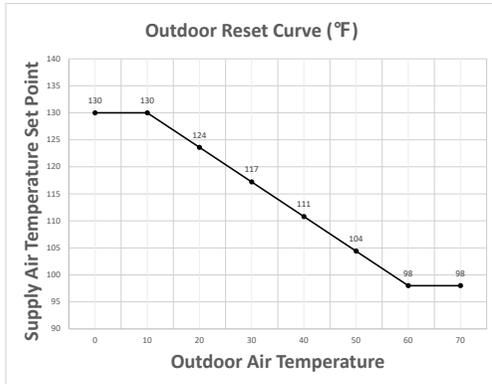
Outdoor Reset Control

The Outdoor Reset Control feature can be used to enhance energy efficiency while maintaining optimal heating performance.

Outdoor Reset Control automatically changes the space heating temperature setting based on the outdoor temperature.

To achieve optimal heating performance, configure the following set-points: the Outdoor Low Temperature, the Outdoor High Temperature, configuration must be based on the installation environment.

Refer to the following examples in the graph to configure the Outdoor Reset Control feature.



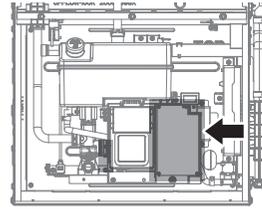
* The graph above is an example of a few possible outdoor reset parameter settings. For more information about settings, refer to the following information.

* If the Outdoor Reset On (Outdoor Reset == ON) is set and the outdoor temperature sensor is not connected, or the outdoor temperature sensor value is outside the normal range, the '740' error message is displayed and the system operates the same way as with the Outdoor Reset OFF (Outdoor Reset == OFF) setting.

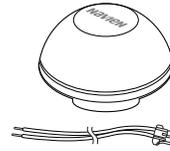
Outdoor Temperature Sensor Installation

1. Pull out the sensor body from the cap.
2. Attach the body to the wall using the screws/anchors provided with the device.
3. Run the wires into the device body through the grommet opening.

4. Connect the wires to the terminal block (sub controller).



5. Attach the cap to the body.



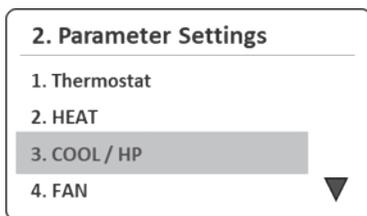
[Navien Outdoor Temperature Sensor Kit]

Outdoor Temperature Sensor Installation Guidelines

- Avoid areas with temperature fluctuations by direct sunlight, and where the temperature may not be representative of true outdoor temperature.
- Best location to install the temperature sensor is on a North or Northeast side of a structure under eaves where the sensor is shielded from direct sunlight.
- Avoid placing sensor in close proximity of heat sources that may affect correct temperature sensing. (fans, exhausts, vents, lights)
- Avoid installing the sensor in areas where the sensor is subjected to excessive moisture.
- Use 18 gauge wiring (thermostat wiring) with no splices.
- Caution should be taken to avoid potential electromagnetic interference (EMI) by routing separately from potential sources such as line voltage wiring. When necessary, shielded cable may be used.
- Make sure wiring connections are secure before closing the cap.
- The sensor is a water resistant device.
- Any damage to the device may require the replacement of the entire component.

5.11.3.3 Setting the Cooling Function

- From the Parameter Settings sub menu, select **COOL / HP**.



- Press the Up button (▲) or the Down button (▼) to switch between the parameters or to increase or decrease setting values. Press the OK Button (OK) to select a COOL / HP parameter or to confirm after making changes.

Item	Description
1. Heatpump Connect	Set the heat pump connections. <ul style="list-style-type: none"> Setting range: ON/OFF Default: OFF
2. COOL Climate	Set the compensation. <ul style="list-style-type: none"> Setting range: Normal/ Humid/Dry Default: Normal <p>Note</p> <p>Changing the value of this parameter affects the COOL Airflow setting value.</p>
3. COOL Ton	Set the outdoor unit's ton. <ul style="list-style-type: none"> Setting range: 1.5–3 TON (60 MBH) or 2–5 TON (100 MBH) Default: <ul style="list-style-type: none"> – 60 MBH: 3 Ton – 100 MBH: 5 Ton <p>Note</p> <p>Changing the value of this parameter affects the COOL Airflow setting value and HP Airflow setting value.</p>

Item	Description
4. HP HEAT 1 Stage Airflow Setting	Set the 1 Stage CFM for the Heatpump HEAT blower CFM. <ul style="list-style-type: none"> Setting range: ±15 % based on the default value Default: Determined by the Ton value (ex. 3 Ton: 840 CFM, 5 Ton: 1400 CFM) <p>Note</p> <ul style="list-style-type: none"> This item is displayed when the Cool Stage is set to "2STG" and HeatPump Connect option is set to "ON". For more information about thermostat settings, refer to "5.11.3.1 Setting the Thermostat" on page 98.
5. HP HEAT 2 Stage Airflow Setting	Set the 2 Stage CFM for the Heatpump HEAT blower CFM. <ul style="list-style-type: none"> Setting range: ±15 % based on the default value Default: Determined by the Ton value (ex. 3 Ton: 1200 CFM, 5 Ton: 2000 CFM) <p>Note</p> <ul style="list-style-type: none"> This item is displayed when the Cool Stage is set to "2STG" and HeatPump Connect option is set to "ON". For more information about thermostat settings, refer to "5.11.3.1 Setting the Thermostat" on page 98.

Item	Description
6. HP HEAT Airflow Setting	<p>Set the Heatpump HEAT blower CFM.</p> <ul style="list-style-type: none"> Setting range: $\pm 15\%$ based on the default value Default: Determined by the Ton value (ex. 3 Ton: 1200 CFM, 5 Ton: 2000 CFM) <p>Note</p> <p>This item is displayed when the Cool Stage is set to "1STG" and Heatpump Connect option is set to "ON".</p>
7. COOL 1 Stage Airflow Setting	<p>Set the 1 Stage CFM for the cooling blower.</p> <ul style="list-style-type: none"> Setting range: $\pm 15\%$ based on the default value Default: Determined by the COOL Ton and Climate (ex. 3 Ton: 840 CFM, 5 Ton: 1400 CFM) <p>Note</p> <p>This item is displayed when the Cool Stage is set to "2STG".</p> <p>For more information about thermostat settings, refer to "5.11.3.1 Setting the Thermostat" on page 98.</p>

Item	Description
8. COOL 2 Stage Airflow Setting	<p>Set the 2 Stage CFM for the cooling blower.</p> <ul style="list-style-type: none"> Setting range: $\pm 15\%$ based on the default value Default: Determined by the COOL Ton and Climate (ex. 3 Ton: 1200 CFM, 5 Ton: 2000 CFM) <p>Note</p> <p>This item is displayed when the Cool Stage is set to "2STG".</p> <p>For more information about thermostat settings, refer to "5.11.3.1 Setting the Thermostat" on page 98.</p>
9. COOL Airflow Setting	<p>Set the cooling blower CFM.</p> <ul style="list-style-type: none"> Setting range: $\pm 15\%$ based on the default value Default: Determined by the COOL Ton and Climate (ex. 3 Ton: 1200 CFM, 5 Ton: 2000 CFM) <p>Note</p> <p>This item is displayed when the Cool Stage is set to "1STG".</p> <p>For more information about thermostat settings, refer to "5.11.3.1 Setting the Thermostat" on page 98.</p>
10. COOL Ramping Profile	<p>Set the cooling ramping profile.</p> <ul style="list-style-type: none"> Setting range: <ul style="list-style-type: none"> A (Fast Ramping) B (Slow Ramping) C (Dehumidification) D (Dehum+Slow Ramping) Default: A (Fast Ramping)

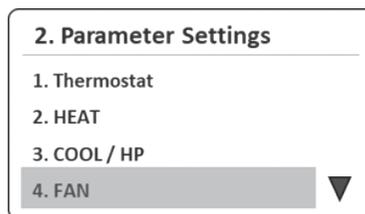
Item	Description
11. Blower COOL On Delay	<p>Set the initial cooling on delay time.</p> <ul style="list-style-type: none"> Setting range: 0–120 sec Default: 30 sec <p>Note If the Heatpump Connect option is set to “ON”, the HP ON Delay settings will be displayed.</p>
12. Blower COOL Off Delay	<p>Set the cooling post purge time.</p> <ul style="list-style-type: none"> Setting range: 30–180 sec Default: 60 sec <p>Note If the Heatpump Connect option is set to “ON”, the HP OFF Time settings will be displayed.</p>
13. A-Coil Overcool Temp	<p>If the SA sensor reaches the A-coil overcool temperature, an error code E822 occurs. Adjust the setting to change the error temperature.</p> <ul style="list-style-type: none"> Setting range: 43°F–50°F (6°C–10°C) Default: 43°F (6°C)

- Note**
- Depending on the parameter settings, the items in the table above may not be displayed.
 - If you make no input for 10 seconds in the Parameter Edit mode, the current parameter value will be saved automatically.
 - Press and hold the Back button (↩) in Parameter Edit mode for 5 seconds to reset individual parameters to their default values.
 - In the case of airflow setting in parameter setting, there may be a 1% error with the display specification in the setup wizard.

- Press the Back button (↩) to return to the previous screen or menu.

5.11.3.4 Setting the Fan On Function

- From the Parameter Settings sub menu, select **FAN**.



- Press the Up button (▲) or the Down button (▼) to switch between the parameters or to increase or decrease setting values. Press the OK Button (OK) to select a FAN parameter or to confirm after making changes.

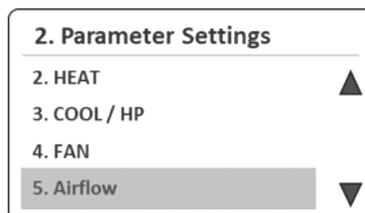
Item	Description
1. Setting the Fan On Function	<p>Set the fan on blower CFM.</p> <ul style="list-style-type: none"> Setting range: 450–1200 (60 MBH), 2000(100 MBH) Default: <ul style="list-style-type: none"> – 60 MBH: 600 CFM – 100 MBH: 1000 CFM

- Note**
- If you make no input for 10 seconds in the Parameter Edit mode, the current parameter value will be saved automatically.
 - Press and hold the Back button (↩) in Parameter Edit mode for 5 seconds to reset individual parameters to their default values.

- Press the Back button (↩) to return to the previous screen or menu.

5.11.3.5 Setting the Airflow Control

- From the Parameter Settings sub menu, select **Airflow**.



- Press the Up button (▲) or the Down button (▼) to switch between the parameters or to increase or decrease setting values. Press the OK Button (OK) to select a Airflow parameter or to confirm after making changes.

Item	Description
1. Min	Set the minimum value of the blower. <ul style="list-style-type: none"> Setting range: 450–Max CFM Default: The CFM set via the setup wizard
2. Max	Set the maximum value of the blower. <ul style="list-style-type: none"> Setting range: Min CFM–1200 (60 MBH), 2000 (100 MBH) Default: The CFM set via the setup wizard

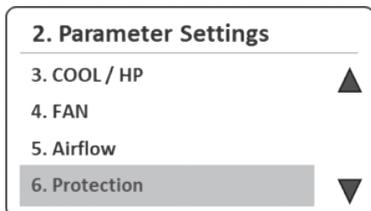
Note

- If you make no input for 10 seconds in the Parameter Edit mode, the current parameter value will be saved automatically.
- Press and hold the Back button (↩) in Parameter Edit mode for 5 seconds to reset individual parameters to their default values.

- Press the Back button (↩) to return to the previous screen or menu.

5.11.3.6 Setting the Protection Function

- From the Parameter Settings sub menu, select **Protection**.



- Press the Up button (▲) or the Down button (▼) to switch between the parameters or to increase or decrease setting values. Press the OK Button (OK) to select a Protection parameter or to confirm after making changes.

Item	Description
1. Pump Freeze Protection	Set the pump freeze protection temperature. <ul style="list-style-type: none"> Setting range: 43°F–50°F (6°C–10°C) Default: 50°F (10°C)

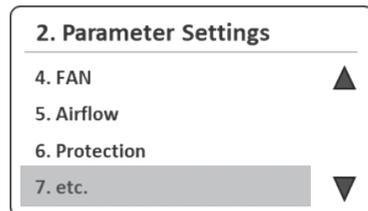
Note

- If you make no input for 10 seconds in the Parameter Edit mode, the current parameter value will be saved automatically.
- Press and hold the Back button (↩) in Parameter Edit mode for 5 seconds to reset individual parameters to their default values.
- Pump Freeze Protection protects the product from freezing, and the furnace must be turned on to operate. Freezing damage is not covered under the Navien warranty, so check if the installation and application steps have been taken to prevent conditions that may cause freezing.

- Press the Back button (↩) to return to the previous screen or menu.

5.11.3.7 Setting Other Functions

- From the Parameter Settings sub menu, select **etc.**



- Press the Up button (▲) or the Down button (▼) to switch between the parameters or to increase or decrease setting values. Press the OK Button (OK) to select a etc parameter or to confirm after making changes.

Item	Description
1. Dehumidifier Out Control	Set whether to use the dehumidifier output control function. <ul style="list-style-type: none"> Setting range: ON / OFF Default: ON
2. Humidifier Out Control	Set whether to use the humidifier output control function. <ul style="list-style-type: none"> Setting range: ON / OFF Default: ON
3. Dehumidifier/COOL Mode	Set whether to use the dehumidifier for cooling. <ul style="list-style-type: none"> Setting range: ON / OFF Default: ON
4. Air Filter Change Alert Set	Set the notification time for air filter replacement. <ul style="list-style-type: none"> Setting range: 0 (DISABLE), 3–48 months Default: 0 (DISABLE)
5. Air Filter Change Alert Init	Initialize the set notification time for air filter replacement. <ul style="list-style-type: none"> Setting range: Yes / No Default: No
6. Humidifier Maintenance Alert Set	Set the notification time for humidifier pad replacement. <ul style="list-style-type: none"> Setting range: 0 (DISABLE), 3–48 months Default: 0 (DISABLE)
7. Humidifier Maintenance Alert Init	Initialize the set notification time for humidifier pad replacement. <ul style="list-style-type: none"> Setting range: Yes / No Default: No

Item	Description
8. UV Light Maintenance Alert Set	Set the notification time for UV light replacement. <ul style="list-style-type: none"> Setting range: 0 (DISABLE), 3–48 months Default: 0 (DISABLE)
9. UV Light Maintenance Alert Init	Initialize the set notification time for UV light replacement. <ul style="list-style-type: none"> Setting range: Yes / No Default: No
10. Safety System Err 1 Point Type	Set the contact type for external safety control when a level 1 error occurs. <ul style="list-style-type: none"> NO : Normal Open NC : Normal Close
11. Safety System Err 2 Point Type	Set the contact type for external safety control when a Level 2 error occurs. <ul style="list-style-type: none"> NO : Normal Open NC : Normal Close
12. Gas Usage Compensation	Adjust the gas usage compensation based on the local requirements. <ul style="list-style-type: none"> Setting range: -25--+25% Default: 0% <p>Note Gas usage compensation only affects EMS data, and does not factor into combustion control.</p>

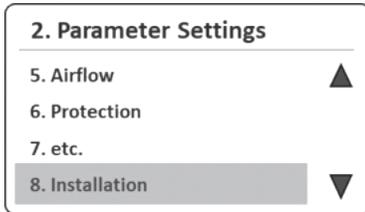
Note

- If you make no input for 10 seconds in the Parameter Edit mode, the current parameter value will be saved automatically.
- Press and hold the Back button (↩) in Parameter Edit mode for 5 seconds to reset individual parameters to their default values.

3. Press the Back button (↩) to return to the previous screen or menu.

5.11.3.8 Setting the Model Details

1. From the Parameter Settings sub menu, select **Model**.



2. Press the Up button (▲) or the Down button (▼) to switch between the parameters or to increase or decrease setting values. Press the OK Button (OK) to select a Model parameter or to confirm after making changes.

Item	Description
1. Water Fill Type	Set whether to use the auto water fill system. <ul style="list-style-type: none"> • Setting range: Water Line Connected/ Manual Fill • Default: Water Line Connected
2. Altitude	Set the altitude. <ul style="list-style-type: none"> • Setting range: 0–10,100ft (0–3,078 m) • Default: 0–2,000ft (0–610 m)

Item	Description
3. Exhaust Limit Control Enable	Set whether to use the exhaust limit control function. <ul style="list-style-type: none"> • Setting range: ON/OFF • Default: ON <p>Note</p> If this item is disabled, the exhaust temperatures may exceed the limits for PVC venting. You must verify the proper vent material requirements prior to disabling the exhaust limit control.

Note

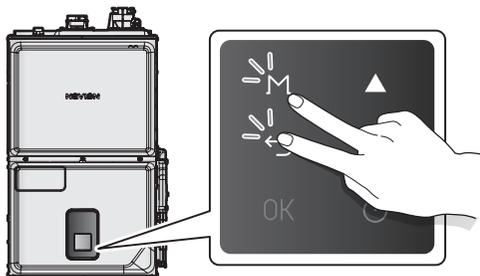
- If you make no input for 10 seconds in the Parameter Edit mode, the current parameter value will be saved automatically.
- Press and hold the Back button (↩) in Parameter Edit mode for 5 seconds to reset individual parameters to their default values.

3. Press the Back button (↩) to return to the previous screen or menu.

5.12 Setting the Special Operation Modes

The Special Operations Mode will set the furnace operation mode and firing rate. MIN or MAX settings may only be used for service or verifying the gas pressure settings.

1. Press the Menu button (M) and the Back button (↶) simultaneously for 3 seconds, and then select **Special Operations**.



Service / Installer

1. Installer Menu
2. Special Operations
3. Test Mode

2. Press the Up button (▲) or the Down button (▼) to switch between the information items, and then press the OK Button (OK) to select an item to run a special operation mode.

Item	Description
1. Normal	Set the furnace to run in the normal mode.
2. MIN	Set the furnace to run in the minimum operation mode. <ul style="list-style-type: none"> • 060MBH: 9,000 BTU/404 CFM • 100MBH: 14,000 BTU/500 CFM

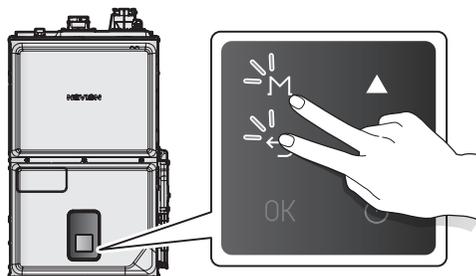
Item	Description
3. MAX	Set the furnace to run in the maximum operation mode. <ul style="list-style-type: none"> • 060MBH: 60,000 BTU/900 CFM • 100MBH: 100,000 BTU/1500 CFM

3. Press the Back button (↶) to return to the previous screen or menu.

5.13 Diagnosing the Furnace System

You can diagnose each system (fan motor, circulation pump and valves) for the furnace.

1. Press the Menu button (M) and the Back button (↶) simultaneously for 3 seconds, and then select **Test Mode**.



Service / Installer

1. Installer Menu
2. Special Operations
3. Test Mode

2. Press the Up button (▲) or the Down button (▼) to switch between the information items, and then press the OK Button (OK) to select an item to run a special operation mode.

Item	Description
1. Fan Motor	This procedure slowly increase the RPM of the fan motor from 0 to 6500 RPM, decreases it to 0 (for 10 seconds), and then stops the fan motor operation (for 2 seconds). After the test, the current APS and RPM values are displayed on the front control panel.
2. Circulation Pump	Press the Up button (▲) or the Down button (▼) to turn the circulation pump on or off. If the circulation pump on the furnace does not operate for 5 minutes, the test will end.
3. Water Flow Adjust Valve	This procedure turns the valve to a fully open position and then to a full closed position over approximately 12 seconds. A value between 0–100% will be displayed on the front control panel. <ul style="list-style-type: none"> • Check the feedback during the procedure. • When the procedure is complete, the valve returns to the latest status.
4. Water Fill Valve	Press the Up button (▲) or the Down button (▼) to close or open the AWS valve. After the test, the current water level is displayed on the front control panel. <p>Note</p> This item is displayed when the AWS Enable option is set to "ON". For more information about AWS settings, refer to "5.11.3.8 Setting the Model Details" on page 108.

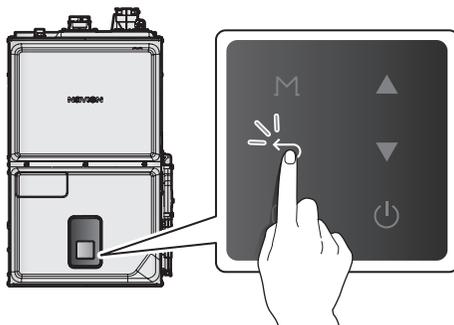
Item	Description
5. Blower	<p>5.1 Auto Mode (Auto Test)</p> The auto mode (Auto Test) is performed in the following procedures. <ol style="list-style-type: none"> 1. Stops the circulator operation for 3 seconds. 2. Operates the blower at the blower's minimum limit CFM. 3. Increases the blower operation by 300 CFM at 10-second intervals until the blower operates at the maximum CFM. 4. Decreases the blower operation by 300 CFM at 10-second intervals until the blower operates at the minimum CFM. 5. Stops blower operation for 3 seconds. After the auto mode (Auto Test) is complete, the current RPM and torque values will be displayed on the front control panel. <p>5.2 Manual Mode (Manual Test)</p> Press the Up button (▲) or the Down button (▼) to operate the blower manually. <ul style="list-style-type: none"> • Setting range: 450–1200 (60 MBH) CMF, 2000 (100 MBH) CMF • Default: The current set CFM

Note Depending on the parameter settings, the items in the table above may not be displayed.

6. Press the Back button (↩) to return to the previous screen or menu.

5.14 Resetting the Furnace

If an error message appears, you can try resetting the furnace to resolve the problem. To reset the furnace, press the Back button (↶).



If resetting the furnace does not solve the problem, refer to the Troubleshooting section of this manual.

5.15 Understanding Error Codes

When an error code appears on the front control panel, refer to the following table for a definition and possible remedy for the situation.

Note If any of these remedies do not resolve the problem, contact Technical Support at 1-800-519-8794.

Error Code	Sub Code	Reason	Self-diagnostic / Action
E003	00	Ignition failure Clogged vents	<p>This error occurs when ignition fails or is not detected due to a flame not being detected.</p> <ul style="list-style-type: none"> • Check if the main gas supply is open. • Check if the exhaust duct is blocked or damaged. • Check if the condensate drain is clogged. • Check the amount of remaining propane gas in the gas tank. If necessary, replace it with a new gas tank. • If the furnace is continuously inoperable, contact Technical Support at 1-800-519-8794.
E004	0	False-flame	<p>This error occurs when the flame detector does not operate properly.</p> <ul style="list-style-type: none"> • If the furnace is operating properly, this error will be cleared automatically. • If the furnace is continuously inoperable, contact Technical Support at 1-800-519-8794.
E012	00	Flame loss during combustion	<p>This error occurs when the flame detector does not operate properly.</p> <ul style="list-style-type: none"> • Check if the supply and exhaust pipes connected to the furnace are installed properly. • If the furnace is continuously inoperable, contact Technical Support at 1-800-519-8794.

Error Code	Sub Code	Reason	Self-diagnostic / Action
E016	00	Overheating of the heat exchanger	This error occurs when the overheat controller on the heat exchanger is initiated during combustion due to the heat changer overheating. <ul style="list-style-type: none"> If the furnace is continuously inoperable, contact Technical Support at 1-800-519-8794.
E030	02	Abnormal exhaust gas temperature (Lock Out)	This error occurs when the overheat controller on the exhaust is initiated due to an abnormal exhaust gas temperature. <ul style="list-style-type: none"> Stop operating the furnace and contact Technical Support at 1-800-519-8794.
E031	00	Overheating of the burner	This error occurs when the overheat controller on the burner is initiated during combustion due to the burner overheating. <ul style="list-style-type: none"> If the furnace is continuously inoperable, contact Technical Support at 1-800-519-8794.
E046	00	Abnormal limit control operation on the heat exchanger	This error occurs when the limit control on the heat exchanger does not operate properly. <ul style="list-style-type: none"> Stop operating the furnace and contact Technical Support at 1-800-519-8794.
E047	01	Abnormal exhaust temperature sensor operation	This error occurs when the exhaust temperature sensor does not operate properly. <ul style="list-style-type: none"> Turn off the furnace, turn it on again and check if the furnace operates properly. If the furnace is continuously inoperable, contact Technical Support at 1-800-519-8794.
	02	Abnormal exhaust temperature sensor operation	
E109	00	Abnormal inducer fan operation	This error occurs when the fan's RPM is abnormal. <ul style="list-style-type: none"> Turn off the furnace, turn it on again and check if the furnace operates properly. If the furnace is continuously inoperable, contact Technical Support at 1-800-519-8794.
E205	01	Abnormal supply water-temp sensor operation for lower limit	This error occurs when the water temperature for supply or return does not operate properly. <ul style="list-style-type: none"> Turn off the furnace, turn it on again and check if the furnace operates properly. If the furnace is continuously inoperable, contact Technical Support at 1-800-519-8794.
	02	Abnormal supply water-temp sensor operation for upper limit	
E218	01	Abnormal return water-temp sensor operation for lower limit	
	02	Abnormal return water-temp sensor operation for upper limit	

Error Code	Sub Code	Reason	Self-diagnostic / Action
E238	01	Abnormal recirculation pump operation <ul style="list-style-type: none"> • The pump is turned ON. • Water flow is NOT detected. 	<p>This error occurs when the sensor on the furnace for recirculation pump operation does not operate properly.</p> <ul style="list-style-type: none"> • Turn off the furnace, turn it on again, and check if the furnace operates properly. • If the furnace is continuously inoperable, contact Technical Support at 1-800-519-8794.
	02	Abnormal recirculation pump operation <ul style="list-style-type: none"> • The pump is turned OFF. • Water flow is detected. 	
E302	00	Low water level	<p>This error occurs when the water tank in the furnace is not filled with enough water. (When the water filling option is set to manual.)</p> <ul style="list-style-type: none"> • Open the water inlet cover on the lower-front cover of the furnace, and then fill the water tank with water.
E311	00	Abnormal water level	<p>This error occurs when the sensor on the furnace for water level detection does not operate properly.</p> <ul style="list-style-type: none"> • Turn off the furnace, turn it on again and check if the furnace operates properly. • If the furnace is continuously inoperable, contact Technical Support at 1-800-519-8794.
E351	00	Abnormal water fill	<p>This error occurs when the auto water fill valve does not operate properly (when auto water fill is set).</p> <ul style="list-style-type: none"> • Check if the water valve to the furnace is open. • If this error occurs continuously, contact Technical Support at 1-800-519-8794.
E360	00	Abnormal cover opening	<p>This error occurs:</p> <ul style="list-style-type: none"> - When the water inlet cover or lower-front cover opens. - When the AC 24 V transformer's voltage output is abnormal. • Check if the water inlet cover or lower-front cover is properly closed. • Check the AC 24 V transformer's voltage output.

Error Code	Sub Code	Reason	Self-diagnostic / Action
E515	01	Abnormal WD-PSS1 status	<p>This error occurs when there is abnormal operation in the main controller (PCB).</p> <ul style="list-style-type: none"> If this error occurs continuously, contact Technical Support at 1-800-519-8794.
	02	Abnormal WD-PSS2 status	
	03	Abnormal MGVI status	
	04	Abnormal MGVI status	
	09	Abnormal Fan Control	
	10	Abnormal monitoring device status	
	16	Abnormal AWS Feedback	
	24	Abnormal Leakage input	
E517	00	Abnormal DIP switch settings	<p>This error occurs when the furnace's capacity does not match with the main controller.</p> <ul style="list-style-type: none"> If this error occurs continuously, contact Technical Support at 1-800-519-8794
E593	00	Abnormal Panel Key	<p>This error occurs when the buttons on the front control panel do not operate properly.</p> <ul style="list-style-type: none"> If this error occurs continuously, contact Technical Support at 1-800-519-8794.
E594	00	Abnormal EEPROM operation	<p>This error occurs when the main controller does not operate properly.</p> <ul style="list-style-type: none"> Turn off the furnace, turn it on again, and check if the furnace is operating properly. If this error occurs continuously, contact Technical Support at 1-800-519-8794.
E615	01	Abnormal overheat controller feedback	
	03	Abnormal flame signal input	
	04	Abnormal ADC's reference voltage	
	05	Abnormal MCU	
E740	01, 02	Abnormal outdoor temperature sensor operation	<p>This error occurs when the outdoor temperature sensor does not operate properly.</p> <ul style="list-style-type: none"> Turn off the furnace, turn it on again, and check if the furnace is operating properly. If this error occurs continuously, contact Technical Support at 1-800-519-8794.
E762	00	Improper vent pipe installation	<p>This error occurs when the vent pipes are not installed properly.</p> <ul style="list-style-type: none"> Check if the vent pipes are installed properly on the furnace. If this error occurs continuously, contact Technical Support at 1-800-519-8794.

Error Code	Sub Code	Reason	Self-diagnostic / Action
E774	00	Abnormal external safety system operation 1	<p>This error occurs when an external device for the furnace does not operate properly.</p> <ul style="list-style-type: none"> • Check the external device operation status.
E775	00	Abnormal external safety system operation 2	
E782	00	Abnormal operation: Controller-Panel communication	<p>This error occurs when the controller and panel are not communicated properly.</p> <ul style="list-style-type: none"> • Check if the front control panel is connected to the controller properly.
E786	00	Abnormal front control panel connection	<p>This error occurs when a different type of a front control panel is connected to the furnace.</p> <ul style="list-style-type: none"> • Check if the front control panel connected to the furnace is appropriate for the NPF Series furnace.
E788	00	Abnormal gas type settings	<p>This error occurs when the DIP switches are not set properly.</p> <ul style="list-style-type: none"> • Check if the DIP switch settings for the furnace's gas type are set properly.
E799	00	Leak detected	<p>This error occurs when a leak occurs in the furnace.</p> <ul style="list-style-type: none"> • Open the lower-front cover and check for leaks in the furnace. • If you find any leaks in the furnace, contact Technical Support at 1-800-519-8794.
E805	01	Abnormal supply air-temp sensor operation for lower limit	<p>This error occurs when the air temperature for the supply or return does not operate properly.</p> <ul style="list-style-type: none"> • Turn off the furnace, turn it on again, and check if the furnace operates properly. • If this error occurs continuously, contact Technical Support at 1-800-519-8794.
	02	Abnormal supply air-temp sensor operation for upper limit	
E818	01	Abnormal return air-temp sensor operation for lower limit	
	02	Abnormal return air-temp sensor operation for upper limit	

Error Code	Sub Code	Reason	Self-diagnostic / Action
E810	00-09	Abnormal circulator operation (inoperable)	This error occurs when the ECM Motor is inoperable. <ul style="list-style-type: none"> • Check the filter's status. • Check the SA or RA ducts.
E811	00	Abnormal circulator operation (inoperable)	<ul style="list-style-type: none"> • Check if foreign substances are inside the furnace. • Turn off the furnace, turn it on again, and check if the furnace operates properly. • If this error occurs continuously, contact Technical Support at 1-800-519-8794.
E822	00	Overcooling of the air conditioning coil (A-Coil).	This error occurs when the supply air (SA) temperature is abnormal. <ul style="list-style-type: none"> • Check the status of the air conditioning coil (A-Coil). • Check if the duct's filter is clean. • Check if the set cooling airflow is suitable for the cooling capacity.
E890	00	Abnormal circulator communication	This error occurs when the cables to the ECM motor are not connected properly. <ul style="list-style-type: none"> • Turn off the furnace, turn it on again, and check if the furnace operates properly. • If this error occurs continuously, contact Technical Support at 1-800-519-8794.
E860	01	Replace the circulator filter with a new one, and then reset the furnace.	This error occurs when the circulator filter needs to be replaced with a new one. <ul style="list-style-type: none"> • Replacement alert for the IAQ devices (Circulator filter replacement)
	02	Replacement alert for the IAQ devices (Humidifier pad replacement)	This error occurs when the humidifier pad needs to be replaced with a new one. <ul style="list-style-type: none"> • Replace the humidifier pad with new one, and then reset the furnace.
	03	Replacement alert for the IAQ devices (UV light replacement)	This error occurs when the UV light needs to be replaced with a new one. <ul style="list-style-type: none"> • Replace the UV light with a new one, and then reset the furnace.

6. Appendixes

6.1 Gas & High Altitude Conversion

This furnace is configured for Natural Gas at the factory.

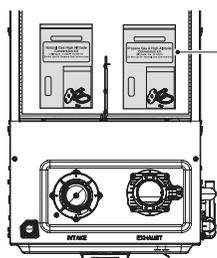
- If conversion to Propane Gas is required by the furnace, use the PROPANE GAS & HIGH ALTITUDE CONVERSION KIT supplied with the furnace.
- If the furnace is installed at a high altitude (above 5,400 ft) for NG, use the NATURAL GAS HIGH ALTITUDE CONVERSION KIT supplied with the furnace.

Note For Propane gas high altitude conversion, use the PROPANE GAS & HIGH ALTITUDE CONVERSION KIT. Note that the Gas Orifice from the PROPANE GAS & HIGH ALTITUDE CONVERSION KIT covers the furnace's installation at an altitude of 0 to 10,100 ft.

⚠ DANGER

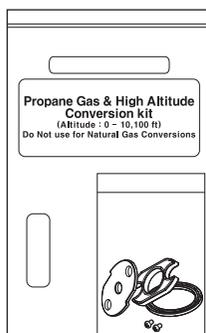
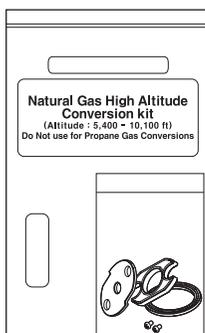
DO NOT perform a gas & High Altitude conversion without an officially approved conversion kit and the instructions supplied by Navien. Gas & High Altitude conversion using any other parts will result in extremely dangerous burner operation, leading to fire, explosion, severe personal injury or death.

Note The Propane Gas & High Altitude Conversion Kit is included in the furnace packaging with the installation parts kit.



High Altitude Conversion Kit (a) and Propane Conversion Kit (b)

a. High Altitude Conversion Kit b. Propane Conversion Kit



⚠ WARNING

Fire and Explosion Hazard

To prevent serious injury or death:

- ONLY a qualified service agency* is required to install a conversion kit in accordance with Navien's instructions and all applicable codes and requirements of the authority having jurisdiction.
- The qualified service agency is responsible for the proper installation of this kit. The installation is not proper and complete until the operation of the converted appliance is checked as specified in the manufacturer's instructions supplied with the kit.

BEFORE starting the gas conversion:

- ALWAYS turn off electrical power supply to the furnace and close the manual gas shut-off valve.
- ALLOW the furnace to cool if it has been operating.
- For propane furnaces: The propane supplier mixes an odorant with the propane to make its presence detectable. In some instances the odorant can fade, and the gas may no longer have an odor. Before startup (and periodically thereafter), have the propane supplier verify the correct odorant level in the gas.

* A qualified service agency is any individual, firm, corporation or company which either in person or through a representative is engaged in and is responsible for the connection, utilization, repair or servicing of gas utilization equipment or accessories; who is experienced in such work, familiar with all precautions required, and has complied with all of the requirements of the authority having jurisdiction.

In Canada: The conversion shall be carried out in accordance with the requirements of the provincial authorities having jurisdiction and in accordance with the requirements of the CAN-B149.1 and CAN1-B149.2 Installation Code.

Tools Required:

- Phillips Screwdriver
- Flathead Screwdriver
- 5/32 in or 4 mm Allen Wrench
- Combustion Analyzer or Dual Port Manometer
- Gas Leak Detector

Included Items:

- Gas Orifice (Table 1)
- Gas Pressure and Conversion Kit Number Labels

NPF Orifice Identification

Gas Type	Natural Gas		Propane Gas
Altitude	0-5,399 ft	5,400-10,100 ft	0-10,100 ft
Orifice	 Factory installed	 For high altitude	 For Propane
Orifice Size	<ul style="list-style-type: none"> • NPF700-060: Ø4.35 • NPF700-100: Ø5.9 	<ul style="list-style-type: none"> • NPF700-060: Ø4.4 • NPF700-100: Ø5.95 	<ul style="list-style-type: none"> • NPF700-060: Ø3.6 • NPF700-100: Ø4.95

Table 1. Orifice Size

Note

Please confirm the installation elevation by using the provided QR code to access the following website (<https://www.navieninc.com/elevation>) and entering the proper zip/postal code.



WARNING

Fire and Explosion Hazard

To prevent serious injury or death:

- Be careful not to confuse the PROPANE GAS & HIGH ALTITUDE CONVERSION KIT. Do NOT use the NATURAL GAS HIGH ALTITUDE CONVERSION KIT for NG when converting to PROPANE gas.
- Make sure that the conversion is completed with the proper orifice. If the installed orifice does not conform to the specifications in Table 1, incomplete combustion may occur, resulting in personal injury or property damage.

Procedure:

Note

The procedure below can be applied to both Propane conversion and High Altitude conversion. Distinguish the kit supplied with the furnace before installing.

1. Turn off the power, gas, and water supply (when supply water valve is used) to the furnace.
2. Remove the upper-front cover and gain access to the internal components. See Figure 1 for illustration of removing the upper-front cover.

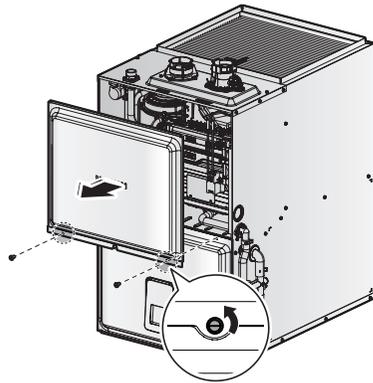


Figure 1. NPF Series Upper-Front Cover

3. Remove the upper-front cover and place it in a safe location to prevent accidental damage.
4. With the internal components exposed, locate the gas inlet pipe and the gas valve, as shown in Figure 2.

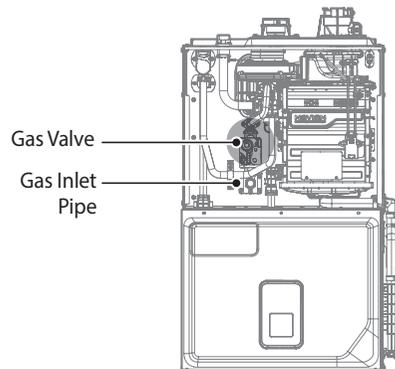


Figure 2. NPF Series Internal Components

- Remove the two screws using a Phillips-head screwdriver at location A – the connection above the gas valve where it connects to the gas valve outlet adapter. See Figure 3 for reference.
- Find location B - the connection above the gas valve where it is attached to the single venturi. Carefully remove the two screws using a Phillips-head screwdriver and pull the gas valve connecting pipe from the fan assembly to access the gas orifice.

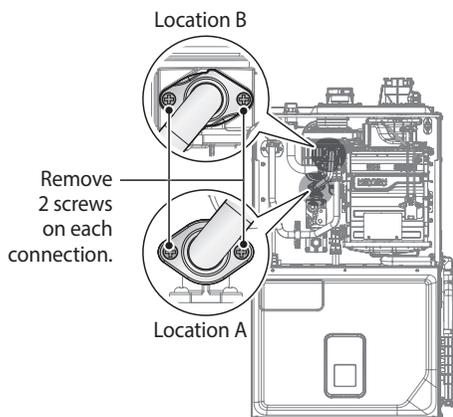


Figure 3. Detaching the Gas Valve Outlet Adapter from the Gas Valve and Fan Motor Assembly

- Once the Gas Orifice is exposed, remove the two screws that hold the part in place. Remove the Gas Orifice from its housing and prepare the new Gas Orifice for the Propane or High Altitude conversion for installation.

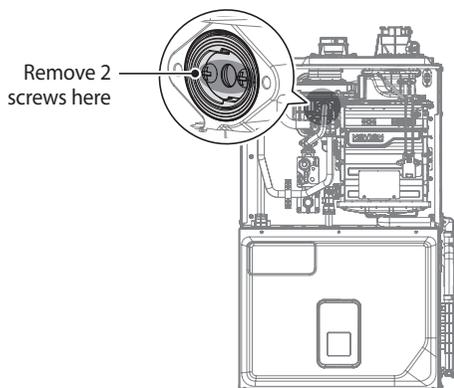


Figure 4. Access to Gas Orifice in Fan Assembly

! WARNING

Fire and Explosion Hazard

To prevent serious injury or death:

- DO NOT adjust or attempt to measure gas valve outlet pressure. The gas valve is factory-set for the correct outlet pressure. This setting is suitable for natural gas and propane, requiring no field adjustment.
- Attempting to alter or measure the gas valve outlet pressure could result in damage to the valve, causing potential severe personal injury, death or substantial property damage. Navien NPF furnaces are shipped ready to fire natural gas ONLY.

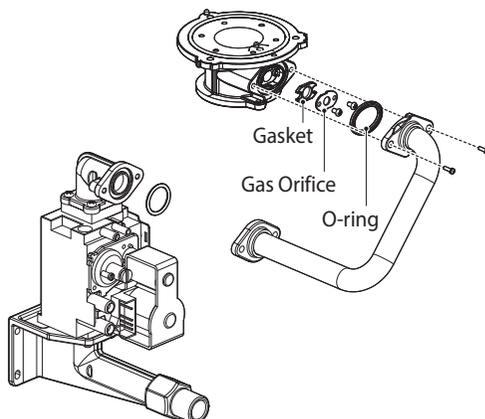


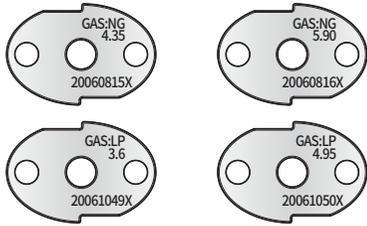
Figure 5. Exploded View of Gas Pipe Assembly

! DANGER

Fire and Explosion Hazard

To prevent serious injury or death:

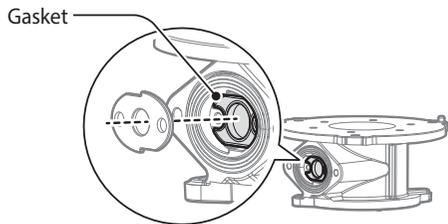
- ALWAYS inspect the O-ring between the gas valve and gas valve inlet adapter whenever they are disassembled (see Figure 5).
- The O-ring must be in good condition and must be installed. Replace O-ring if needed.



<NPF Orifice Identification>

Figure 6. Orifice Identification

- Remove the Gas Orifice, ensure that the gasket is properly seated inside the port, and then install the new Gas Orifice for use with Propane gas. Ensure that the Orifice is properly seated on the gasket inside the port before proceeding to the next step.



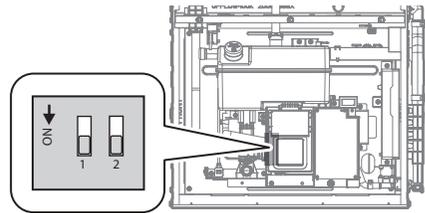
- Replace the gas valve outlet adapter to its original position and use all screws to secure all connections.

Note Do not overtighten as this may damage or crack the components.

- Set the panel DIP switch to change the gas type. For LP, set the DIP SW #1 to ON. For NG, set the DIP SW #1 to OFF.

! WARNING

Ensure that you have turned off the power to the furnace before accessing the DIP switches.



Switch	Function	Setting	Comment	
1	Gas Type	Natural Gas	1-OFF	Refer to Table 1 on page 118.
		Propane Gas	1-ON	

When converting to propane gas, configure the DIP switch setting as shown below.

- Set front control panel DIP switch 1 to ON to change the gas type.
- Turn on the power to the furnace. Then, error 788 will occur.
- In error display mode, press the Back button (←) to execute the Gas Type Check menu under Start-Up Wizard.
- Set the Gas Type Check option to Propane Gas.
- When the gas type is identified as changed in the Gas Conversion Kit Required option, the error is cleared and the furnace starts to operate normally.

Note

- Please confirm the installation elevation by using the provided QR code to access the following website (<https://www.navieninc.com/elevation>) and entering the proper zip/postal code.



Note

- This unit may be installed at elevations up to 10,100 ft (3,078 m) for use with natural gas and propane. To use the unit at a specific altitude, turn on the furnace and set the altitude on the front control panel. For more information about the settings, refer to "5.11.3.8 Setting the Model Details" on page 108.
- High Altitude: Above 2,000 ft (610 m), the unit will de-rate by 3% for each 1,000 ft (305 m) of altitude gain.
- For Natural Gas, if you install the unit at above 5,400 ft (1,646 m), it is required to change the Gas Orifice for high altitude. Be careful not to confuse it with the Gas Orifice for Propane.
- Note that the Gas Orifice from the PROPANE GAS & HIGH ALTITUDE CONVERSION KIT covers the furnace's installation at an altitude of 0 to 10,100 ft.

WARNING

Ensure that the High Altitude setting reflects the actual location of the furnace. If not, it may cause personal injury or malfunction of the furnace.

WARNING

To prevent serious injury or death:

- ALWAYS check the panel DIP SW #1 is set according to the supply gas type.
- For natural gas, only install the gas orifice for high altitude when the furnace is installed at above 5,400 ft.
- Be careful to install the NATURAL GAS HIGH ALTITUDE CONVERSION KIT and not to confuse it with the PROPANE GAS & HIGH ALTITUDE CONVERSION KIT.
- Failure to properly install the High Altitude Conversion Kit or to not use the appropriate Altitude Settings could cause carbon monoxide poisoning, resulting in serious injury or death.

11. Turn on the gas and water supply (when supply water valve is used) to the furnace.

12. Measure and adjust the gas/air ratio.

Option 1. Using Combustion Analyzer (recommended)

- Remove the analyzer port's cap.
- Insert the analyzer into the port (Figure 7).

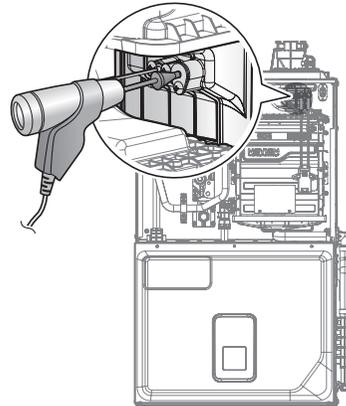


Figure 7. Insert the Analyzer

Model	Altitude	Fuel	High fire	Low fire
			%CO ₂	%CO ₂
NPF700-060U3BH	0-5,399 ft	Natural Gas	8.6	8.6
		Propane Gas	10.5	10.5
NPF700-060H3BH	5,400-10,100 ft	Natural Gas	8.3	8.6
		Propane Gas	10.5	10.5
NPF700-100U5CH	0-5,399 ft	Natural Gas	8.6	8.6
		Propane Gas	10.5	10.5
NPF700-100H5CH	5,400-10,100 ft	Natural Gas	8.3	8.6
		Propane Gas	10.5	10.5

Table 2. CO₂ value

(CO₂ values must be within 0.5% of the values listed.)

- c. Activate heating mode and set the furnace to operate at MIN mode.

Note For operation mode selection, refer to “5.12 Setting the Special Operation Modes” on page 109.

Measure the CO₂ value at low fire.
If the CO₂ value is not within 0.5% of the value listed in Table 2, the gas valve set screw will need to be adjusted.
If adjustment is necessary, locate the set screw as shown in Figure 8. Using a 5/32 in or 4 mm Allen wrench, turn the set screw no more than 1/4 turn clockwise to raise or counterclockwise to lower the CO₂ value.

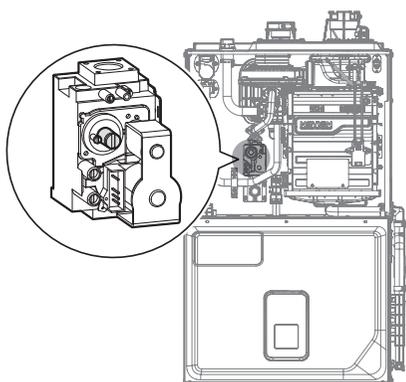


Figure 8. Set Screw Location

Note The set screw is located behind the screw-on cover. This must be removed first.

- d. Activate heating mode and set the furnace to operate at MAX mode (refer to “5.12 Setting the Special Operation Modes” on page 109). Measure the CO₂ value at high fire.
If the CO₂ values do not match Table 2 at high fire, do not adjust the gas valve. Check for the proper Gas Orifice.

⚠ WARNING

Improper gas valve settings can cause severe personal injury, death or substantial property damage.

Option 2. Using Digital Manometer

- a. Open the offset pressure port by loosening the screw two turns as shown in Figure 9.

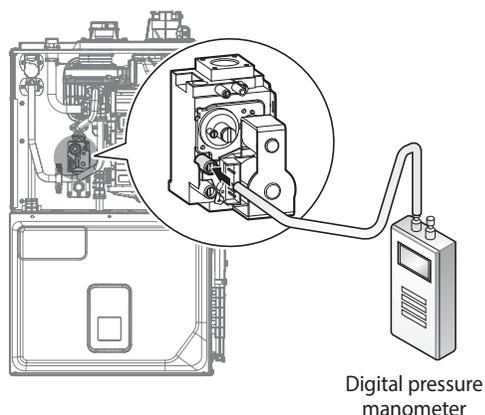


Figure 9. Connect Digital Pressure Monometer

- b. Connect a manometer to the offset pressure port. For dual port manometers, use the positive pressure side.

Model	Altitude	Kit Part No.	Gas Type	Offset
NPF700-060U3BH NPF700-060H3BH	0–5,399 ft	-	Natural Gas	-0.00in ±0.01in
	5,400–10,100 ft	NAC-NH060		
	0–10,100ft	NAC-L060	Propane Gas	-0.00in ±0.01in
NPF700-100U5CH NPF700-100H5CH	0–5,399 ft	-	Natural Gas	-0.00in ±0.01in
	5,400–10,100 ft	NAC-NH100		
	0–10,100 ft	NAC-L100	Propane Gas	-0.00in ±0.01in

Table 3. Offset value for low fire

- c. Activate heating mode and set the furnace to operate at MIN mode (refer to “5.12 Setting the Special Operation Modes” on page 109). Measure the offset value at low fire and compare it to the values in Table 3. If the offset value is out of range, the gas valve set screw will need to be adjusted.

If adjustment is necessary, locate the set screw as shown in Figure 10. Using a $\frac{5}{32}$ in or 4 mm Allen wrench, turn the set screw no more than $\frac{1}{4}$ turn clockwise to raise or counterclockwise to lower the offset value.

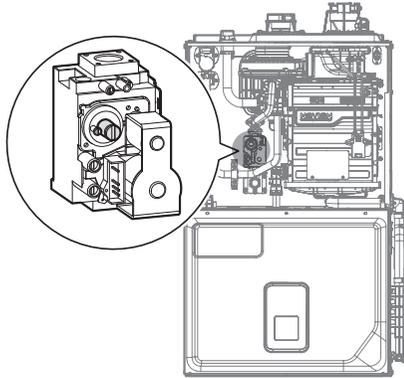


Figure 10. Set Screw Location

Note The set screw is located behind the screw-on cover. This must be removed first.

- d. At high fire, do not check the offset value and never adjust the gas valve.

⚠ WARNING

Improper gas valve settings can cause severe personal injury, death or substantial property damage.

13. Once the CO₂ or offset values have been confirmed, apply the included conversion stickers to show that the appliance has been converted to Propane Gas or High Altitude. Place these labels adjacent to the rating plate as shown in Figure 11.

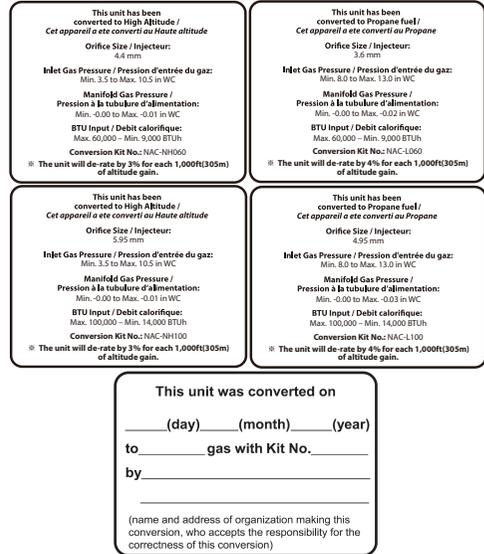


Figure 11. Proper Placement of Gas Conversion Labels

Note The gas conversion rating plate varies depending on the model. Check the conversion kit number before attaching the labels.

6.2 Air Temperature Rise

NOTICE

If the temperature rise is higher or lower than the stated range, the heat exchanger may overheat or heating performance may degrade. This could result in injury or death and could void the manufacturer's warranty for this product.

The measured temperature rise should be as close as possible to the middle of the stated range. For example, if the rise range is 45°F (7°C) to 75°F (24°C), the middle of the rise range is 60°F (15°C). In all applications, you should adjust the temperature rise to be as close as possible to the “middle” point. Also, the temperature rise should not be higher or lower than the stated range. Refer to the following table for the proper range of the air temperature rise.

Model	High Fire	Low Fire
NPF700-060U	45–75°F (25–42°C)	5–35°F (3–20°C)
NPF700-100U		10–40°F (6–22°C)
NPF700-060H		5–35°F (3–20°C)
NPF700-100H		10–40°F (6–22°C)

6.3 Circulator Blower Speeds (Airflow Data)

Refer to the following table for the recommended air temperature rise range for each furnace model.

Model/Air Temp Rise Range (High/Mid/Low)	NPF700-060U3BH		NPF700-100U5CH		NPF700-060H3BH		NPF700-100H5CH	
	CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise
Recommended CFM for 100% firing rate & expected temperature rise	900	60	1,500	60	900	60	1,500	60
Lowest recommended CFM for 100% firing rate & expected temperature rise	720	75	1,200	75	720	75	1,200	75
Maximum CFM for 100% firing rate & expected temperature rise	1,200	45	2,000	45	1,200	45	2,000	45

Cooling Speed

Model	Tons	High-Stage	Low-Stage
NPF700-060U3BH NPF700-060H3BH	1.5	600	420
	2	800	560
	2.5	1,000	700
	3	1,200	840
NPF700-100U5CH NPF700-100H5CH	2	800	560
	3	1,200	840
	4	1,600	1,120
	5	2,000	1,400

Note

- All furnaces are shipped with the high-speed cooling setting by default. Adjust the blower speed if necessary.
- About 400 CFM per ton of cooling is appropriate.
- Do not operate above 0.5" W.C. ESP in heating mode. Operating CFM between 0.5" and 0.8" W.C. is tabulated for cooling purposes only.

Air Delivery (CFM)

Input Btu/h	Setting	External Static Pressure (inch W.C.)									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
60,000	400	322	371	385	382	378	371	364	350	336	318
	600	583	611	604	601	601	590	580	562	551	541
	1,000	1,007	1,060	1,060	1,064	1,064	1,053	1,042	1,025	1,018	1,004
	1,200	1,208	1,261	1,290	1,283	1,290	1,276	1,237	1,205	1,163	1,110
100,000	800	806	830	852	859	859	848	841	823	802	788
	1,000	1,021	1,042	1,057	1,067	1,071	1,071	1,064	1,053	1,046	1,032
	2,000	2,014	2,049	2,085	2,120	2,138	2,138	2,155	2,067	1,979	1,837

Note

- About 400 CFM per ton of cooling is supplied.
- The maximum cooling airflow can be set on the front control panel.
- The heating CFM can be set on the front control panel.
- The duct size must be adjusted for the maximum heating CFM within the ESP operating range. An ESP value of more than 1.0 is not recommended.

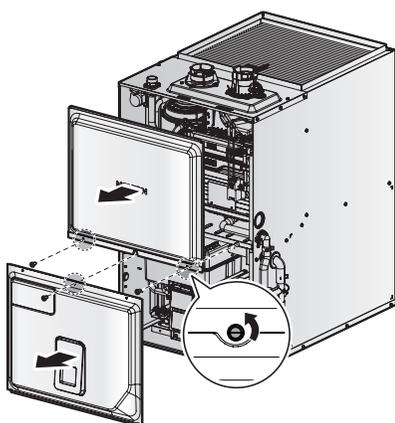
6.4 Water Drain

NOTICE

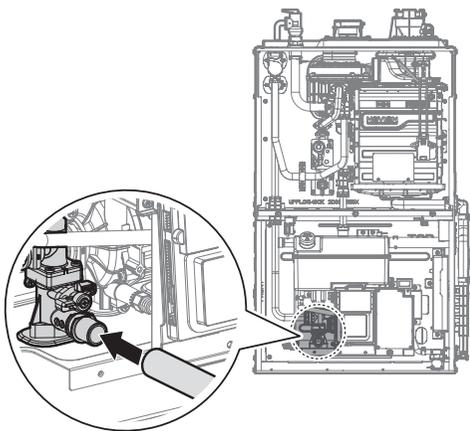
Damage due to freezing will not be covered under the Navien Limited Warranty.

If the furnace will not be used for a long period of time, drain the expansion tank to prevent freezing.

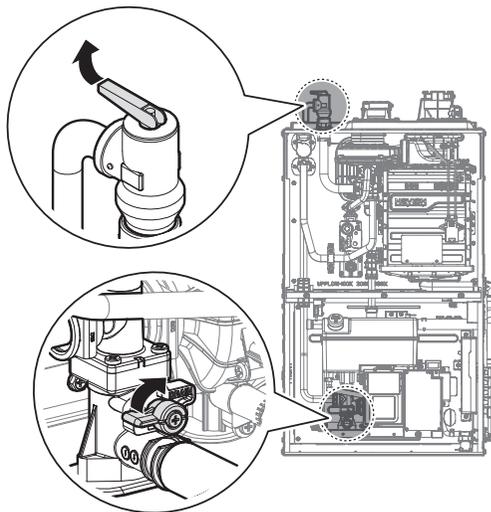
1. Loosen the 3 screws (in the middle of the front covers), and then remove the front covers from the furnace.



2. Connect the $\frac{3}{4}$ " condensate hose (included in the installation parts kit) to the drain adapter.



3. Rotate the drain valve on the drain adapter 90 degrees in a clockwise direction, and then lift up the lever on the pressure relief valve to open it.



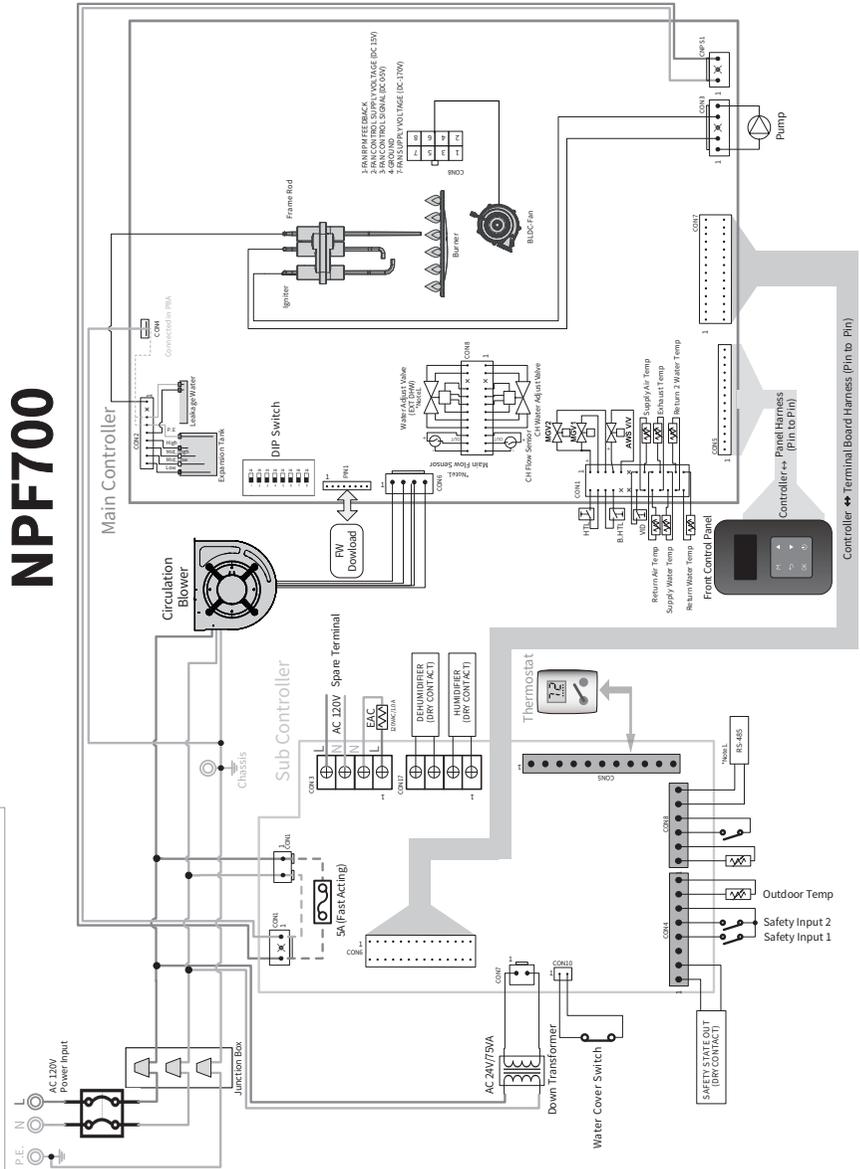
4. Drain the expansion tank for more than 5 minutes and then close the drain valve and pressure relief valve.

6.5 Wiring Diagram

6.5.1 Main Board

NOTICE
Do not remove the front cover unless the power to the furnace is turned off or disconnected.

WARNING
Electrical Shock Hazard
For your safety, turn off electrical power supply before making any electrical connections to avoid possible electric hazard. Failure to do so can cause severe personal injury or death.



6.6 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 and Operation Manual

NPF Condensing Hydro-furnace

Getting Service

All repairs require pre-authorization by Technical Support.

- Request for your installer or any licensed professional to contact Technical Support at 1-800-519-8794 Option 2 once at the installation site.
- A short list of independent service providers in your area can be found on the website: www.navieninc.com/installers.

When seeking service, have the following information at hand:

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

Version: 1.0 (October, 2023)



800.519.8794 | www.navieninc.com

20 Goodyear Irvine, CA 92618

THE LEADER IN CONDENSING TECHNOLOGY