



H₂Air

Installation Manual

Add-on Controller Installation Kit

NPE-A all models

NPE-A2/S2 all models

NPN/NHW700 all models

This device is designed to work with NPE-A, NPE-A2/S2, and NPN/NHW700 water heaters only.



WARNING

All installations should be done only by a qualified expert and in accordance with the appropriate Navien manual. Installing an electric appliance with improper methods or materials may result in serious injury or death due to fire.

ELECTRICAL SHOCK HAZARD. Disconnect power before installing or servicing. Otherwise, severe personal injury, death, or substantial property damage may result.

All wiring must be installed in accordance with local regulations of the installation site.

When Installing this Product:

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure the product is suitable for the application.
3. Installers must be trained, experienced, and licensed service technicians.
4. Follow local codes for installation and application.

After installation is complete, check the product's operation by following the instructions provided in this manual.

Note

All wiring must be installed in accordance with local regulations of the installation site.

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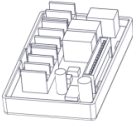

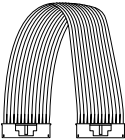

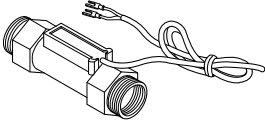
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1. About the H₂Air

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

1.1 Included Items

The product is supplied with an installation kit. Make sure that the installation kit contains the following items before installing the product.

	
<p>Navien H₂Air Add-on Controller</p>	<p>Installation Manual</p>
	
<p>Main Control Connector (13-pin cable for connection to water heaters)</p>	<p>Outdoor Temperature Sensor (with cable)</p>
	
<p>Flow Switch (with cable)</p>	

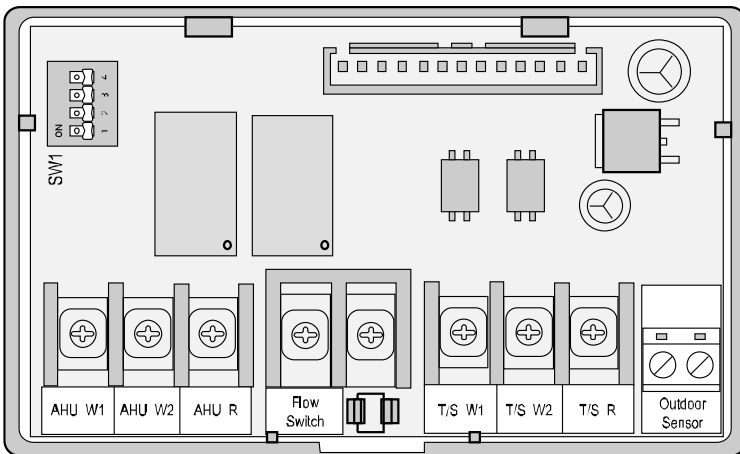
1.2 Specifications

Refer to the following table for product specifications.

Items	Specifications
Model name	KDO-A100
Device type	Add-on controller for Navien water heaters
Installation type	Snap-on (onto the water heater PCB tray)
Connections	<p>Main connector socket to water heater Main control connector (13-pin cable)</p> <p>Thermostat input terminals Contacts for one thermostat (1 or 2-stage)</p> <p>Outdoor sensor connection terminal Contacts for one outdoor sensor</p> <p>Output terminal to the air handler unit Contacts for one AHU (1 or 2-stage)</p>

1.3 Device Layout

Refer to the following diagram for the product layout.



1.3.1 Wiring Connection Table

Terminal	Wiring Connection
AHU W1	Connect to AHU W1
AHU W2	Connect to AHU W2
AHU R	Connect to AHU R
Flow switch	Flow switch input terminal
T/S W1	Connect to thermostat W1
T/S W2	Connect to thermostat W2
T/S R	Connect to thermostat R
Outdoor Sensor	Outdoor sensor input

1.3.2 Dip Switch Function Table

SW (DIP 1–4)	ON	OFF	Default
DIP 1	Outdoor reset not in use	Outdoor reset in use	OFF
DIP 2	Simultaneous DHW and heating*	DHW priority	OFF
DIP 3	2-stage thermostat using	1-stage thermostat using	OFF
DIP 4	Reserved		OFF

* Depending on the DHW flow rate (demand), simultaneous DHW and heating may not be available. When the DHW demand is high, DHW supply takes priority and the heating may be temporarily turned off until the DHW demand decreases, even when this function is activated.

2. Installing the Device

This section provides information required to install the H₂Air add-on controller in water heaters.

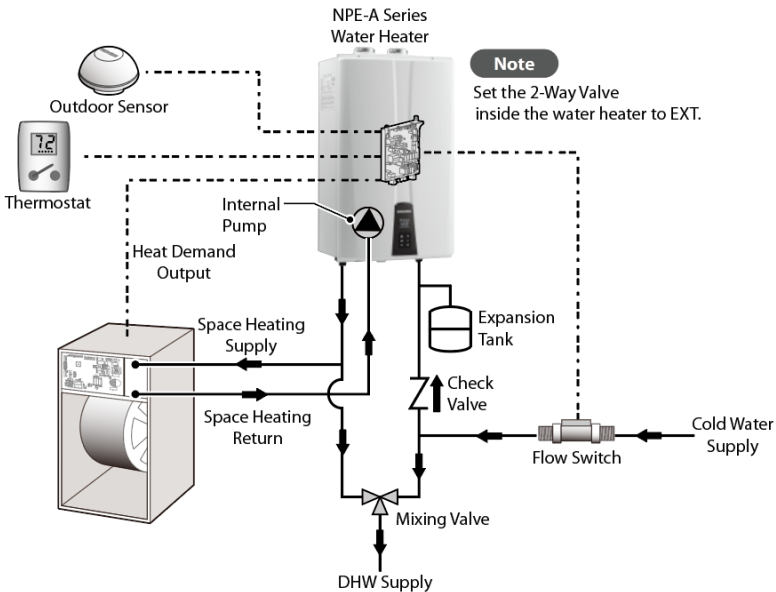
WARNING

Ensure that you have turned off the power to the water heater before installing the device.

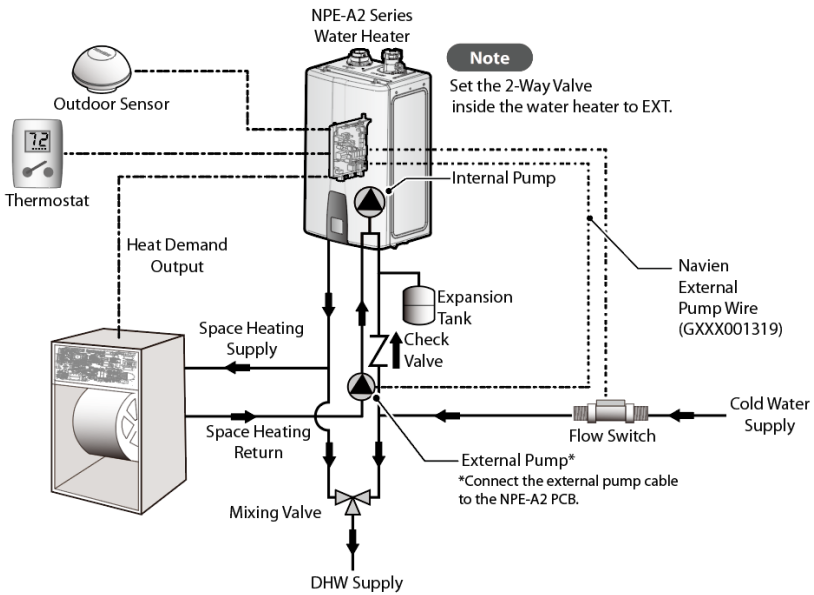
2.1 Basic Principles

The following diagram shows the basic operation of water heaters with the H₂Air add-on controller.

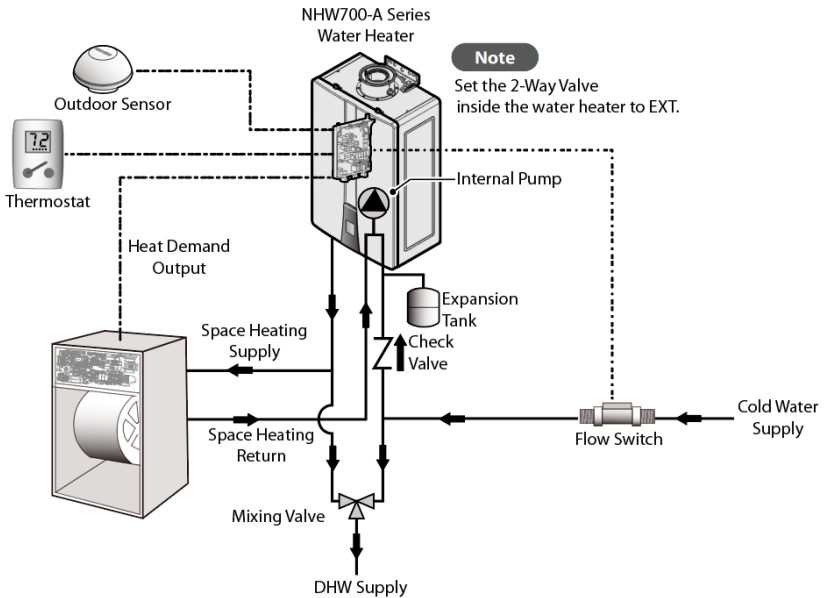
System Diagram for NPE-A



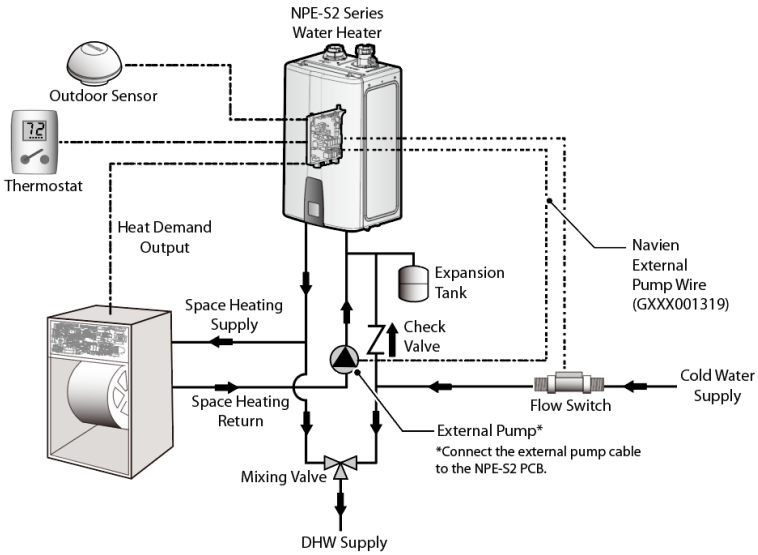
System Diagram for NPE-A2



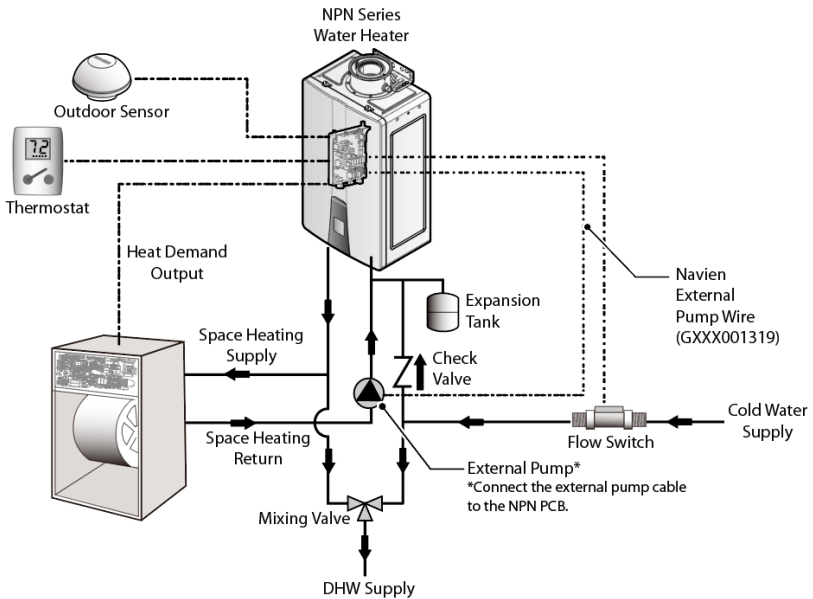
System Diagram for NHW700-A



System Diagram for NPE-S2



System Diagram for NPN





WARNING

A mixing valve must be installed in the system in order to limit the DHW output temperature and prevent scalding. Setting the mixing valve to 115–120°F is recommended.

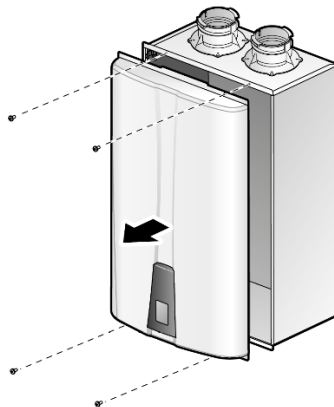
Note

- Install a spring check valve for vertical pipe runs. Do not use a swing check valve with vertical piping.
- Install either a spring check valve or a swing check valve in a horizontal pipe run.
- An outdoor sensor and a flow switch are supplied with the product.
- Use 18 AWG cables for thermostat wiring.
- When using an external pump, connect the pump to the water heater PCB directly using a Navien External Pump Cable (GXXX001319).

2.2 Installing the Device in Water Heaters

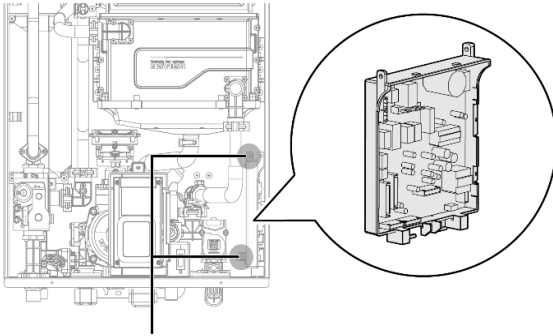
Follow the instructions to install the Navien H₂Air in water heaters.

1. Turn off the power supply to the water heater.
2. Remove the water heater's front cover by loosening the four screws securing it to the case.



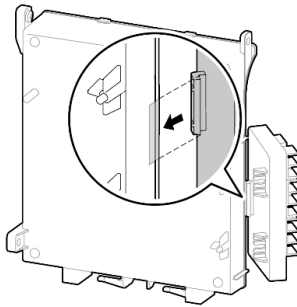
3. **For NPE-A:**

Remove the two screws holding the PCB tray in place and pull out the PCB tray from the unit.

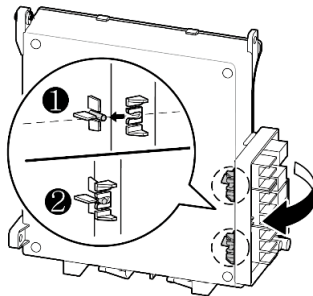


Remove screws here.

4. Install the H₂Air onto the water heater's PCB tray. Align the latch at the back of the case with the front lip of the PCB tray.



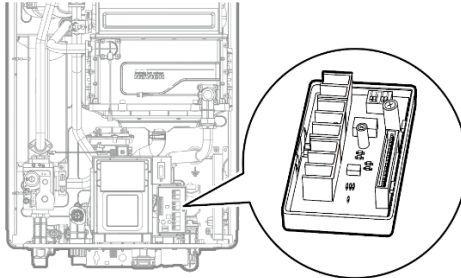
5. Align the two latches at the back of the H₂Air with the two catch bars at the back of the water heater's PCB tray. Then pivot the H₂Air onto the PCB tray until the latches snap-on to the catch bars.



Replace the PCB tray back into the water heater and secure it with the two screws.

For NPE-A2/S2:

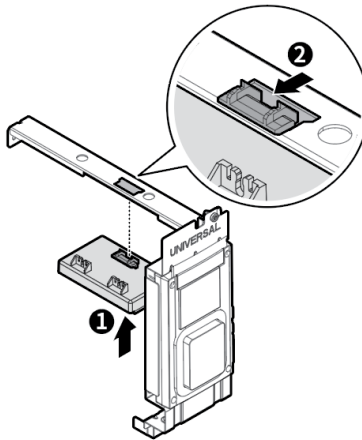
Remove the existing HotButton controller from its mounted location and replace it with the H₂Air controller using the provided tabs on the component housing.



HotButton Controller

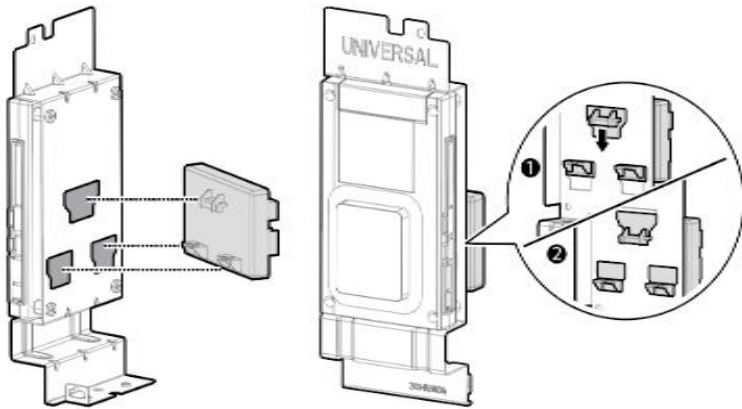
For NHW700-A:

Align the latch on the back of the H₂Air controller case with the mounting location on the front panel support bracket. Then, insert the latch into the mounting hole and slide the H₂Air controller to secure it.



For NPN:

Remove the screws holding the front panel to the bracket to pull out the part. Align the three latches on the back of the H₂Air controller with the mounting location on the back of the panel bracket. Then, slide the H₂Air controller downward to secure it.



6. Connect all cables and wiring to the H₂Air. For more details, refer to “3.2 Cable Connections”, on page 18.
7. Set the proper DIP switches for the desired installation setup. For more details, refer to “1.3.2 Dip Switch Function Table”, on page 7.
8. Make sure to replace the PCB or front panel back into the water heater and secure it with the two screws.
9. Close the front cover and secure it with the 4 screws.

⚠ CAUTION

Before disconnecting cables inside the unit, label all cables. Wiring errors can cause improper operation and dangerous situations. Verify wiring connections and unit operation after servicing.

3. Wiring the Device

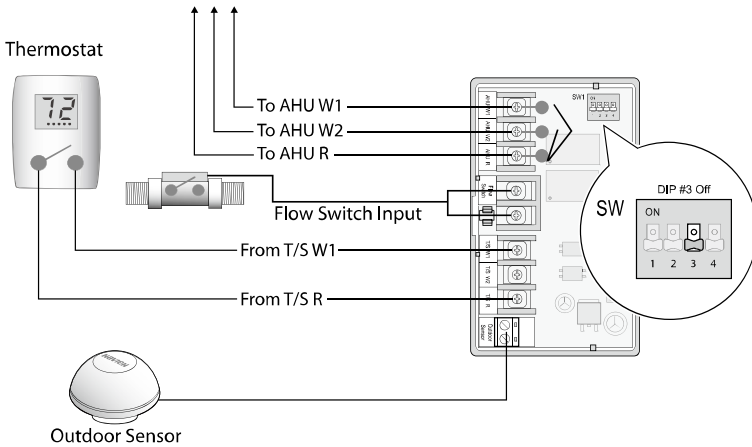
This section provides information required to plan and install the system wiring.

3.1 System Wiring Examples

Refer to the following wiring diagrams to properly install wiring for various setups you may need in your system. Set DIP switch (SW) #3 as specified for each configuration.

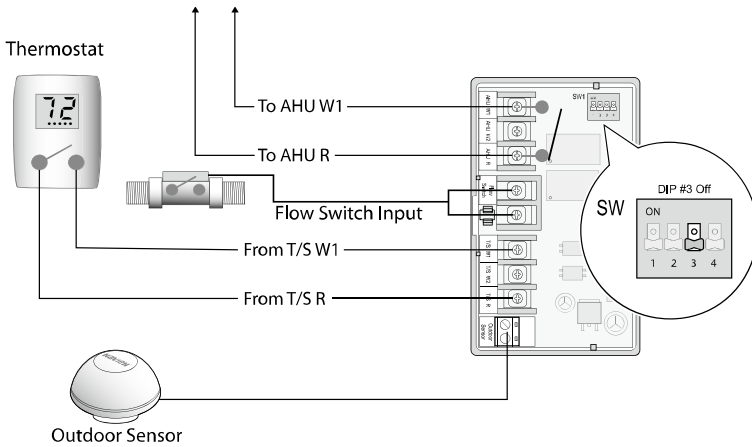
3.1.1 1-Stage Thermostat / 2-Stage Control Heating System

Set DIP switch (SW) #3 to 'Off' to configure the system to use a 1-stage thermostat/ 2-stage control.



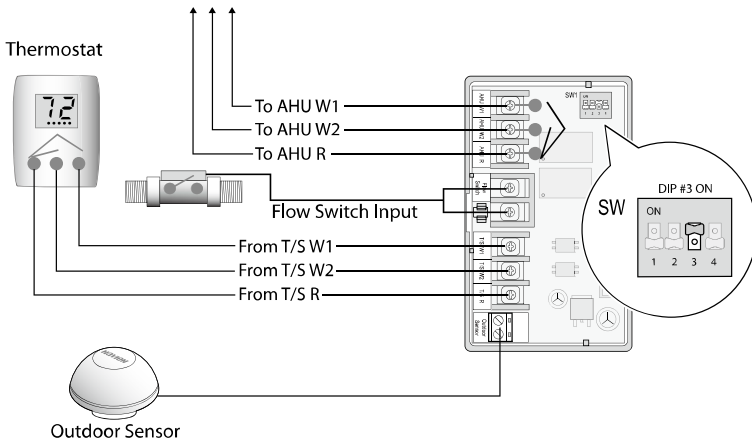
3.1.2 1-Stage Thermostat / 1-Stage Control Heating System

Set DIP switch (SW) #3 to 'Off' to configure the system to use a 1-stage thermostat / 1-stage control.



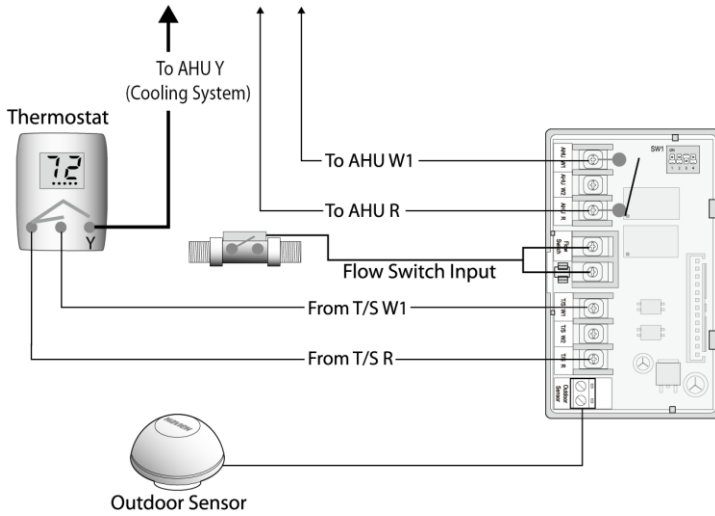
3.1.3 2-Stage Thermostat / 2-Stage Control Heating System

Set DIP switch (SW) #3 to 'On' to configure the system to use a 2-stage thermostat / 2-stage control.



3.1.4 Configuring the Cooling System (for a Heating / Cooling Combo System)

To configure the cooling system, connect the thermostat **Y** terminal to the AHU cooling input terminal **Y**, and connect the thermostat **R** terminal to the **AHU R** output.

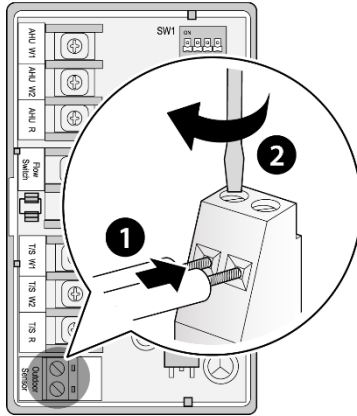


3.2 Cable Connections

Follow the instructions below to connect the cables to the H₂Air.

3.2.1 Connecting the Outdoor Temperature Sensor Cable

An outdoor temperature sensor is supplied with the Navien H₂Air installation kit. Insert the exposed wire into the terminal. Then tighten the terminal screw with a screwdriver.

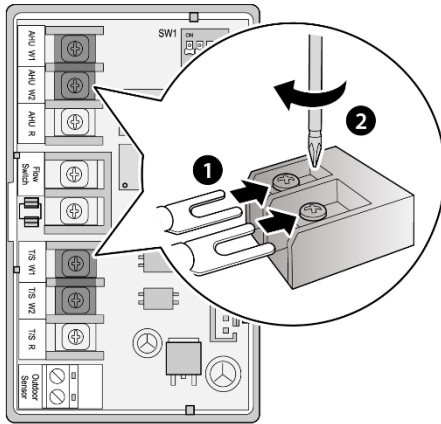


Note

- Use thermostat wire (18 gauge wire) for the outdoor temperature sensor connection.
- When installing the outdoor temperature sensor, avoid installing it in direct sunlight.

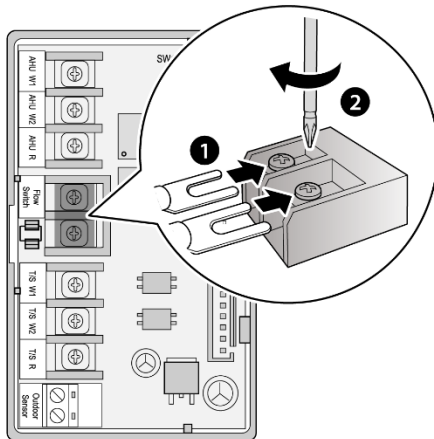
3.2.2 Connecting the Thermostat Cables

The H₂Air receives input signals from thermostats to control the AHU. Insert the wiring or connector into the contact. Then tighten the terminal screw with a screwdriver.



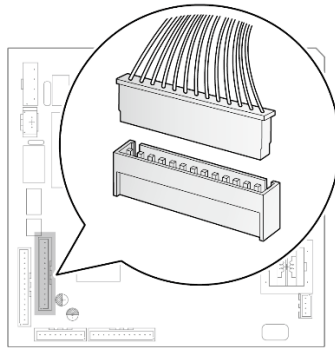
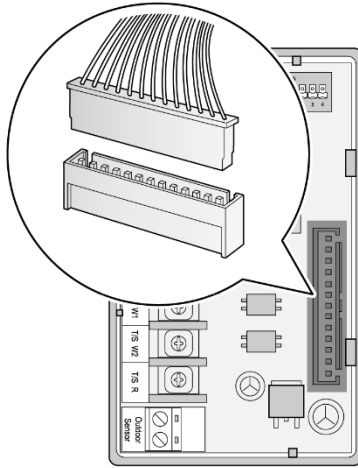
3.2.3 Connecting the Flow Switch Cables

Insert the fork connectors into the contact. Then tighten the terminal screw with a screwdriver.



3.2.4 Connecting the Main Control Connector

To connect the H₂Air to the Navien water heaters, use the 13-pin main control connector supplied with the Navien H₂Air. Connect one end of the cable to the connector socket on the H₂Air PCB. Then, connect the other end to the connector socket on the water heater PCB.



Note

For NPN/NHW700 only - Make sure to use the included extended 13-pin cable for sufficient length from the PCB.

4. Configuring the Device

This section provides the information required to set the desired options for the Navien water heater system with the H₂Air add-on controller.

4.1 System Air Removal

Make sure to remove all excess air from the combination system piping. To assist with this process, the NPE, NPE-A2/S2 and NHW700-A Series water heater models have an available TEST MODE feature (see below).

For NPE and NPE-A2/S2 - Enter the Special Operations menu to access the TEST MODE feature by pressing the [Diagnostic] and [Back] buttons.

For NHW700-A - Enter the Special Operations menu to access the TEST MODE feature by pressing the [Diagnostic] button for 5 seconds.

Choose TEST MODE, then PUMP to allow the unit to cycle the internal pump. This process will assist in removing the remaining air from the system piping by either using the provided air vent on the internal pump or optional air removal accessories installed on the system piping.

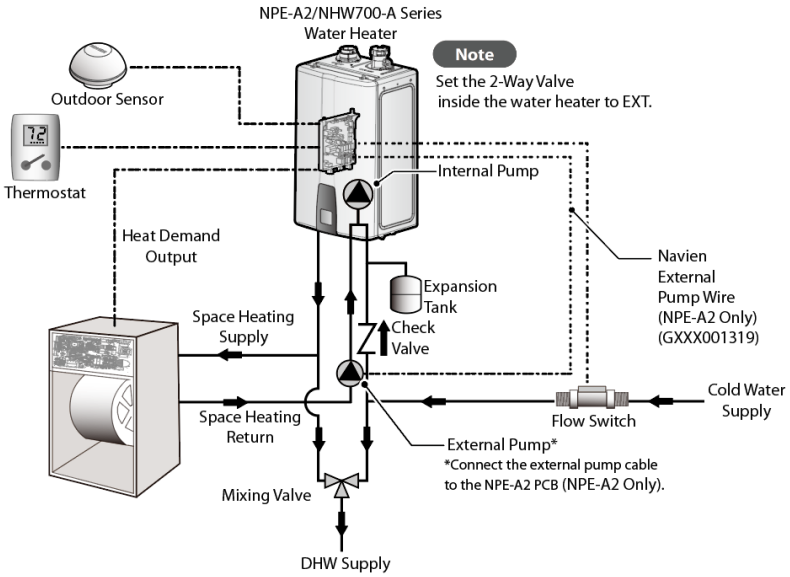
4.2 Pump Control Options

CAUTION

The drawings in this instruction are intended only as a guide and are not replacements for professional engineering drawings. This drawing represents a concept system and does not imply compliance with local building codes. Actual installation requirements may vary depending on installation locations and parameters. All installation work must be carried out in accordance with all local building codes. Verify with local building officials before commencing system installation.

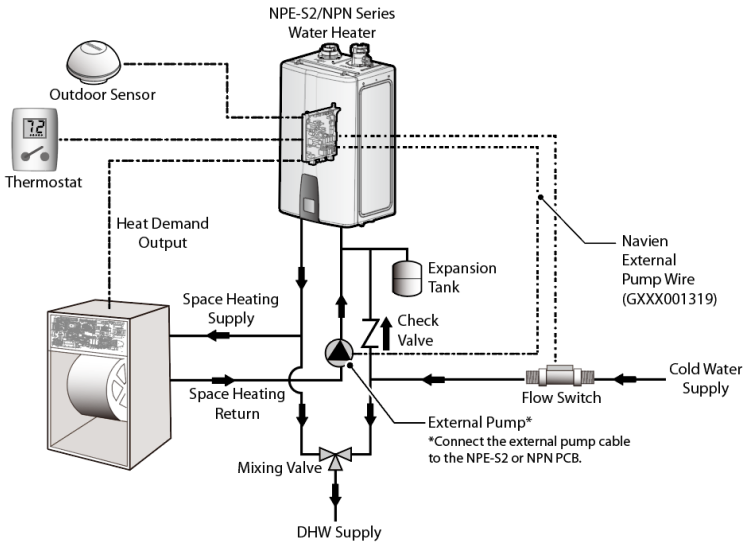
The following example demonstrates the application of pump control configuration options.

NPE-A2/NHW700-A System with the Internal or Optional External Pump



Set the 2-way valve inside the water heater to 'EXT'.

NPE-S2/NPN System with an External Pump



For use with an External Pump, see general guidelines below:

- 2 to 4 GPM circulation is recommended.
- 150W, 1.5A and lower pumps can be wired to the water heater PCB using the Navien External Pump Wire (GXXX001319).
- Check the Installation Manual for the specific water heater model for additional pump wiring guidelines.



WARNING

An anti-scalding device must be installed in the system in order to limit the DHW output temperature and prevent scalding. Set the temperature to 115-120°F.

Note

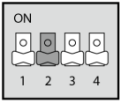
- Install a spring check valve for vertical pipe runs. Do not use a swing check valve with vertical piping.
- Install either a spring check valve or a swing check valve for a horizontal run.
- An outdoor sensor and a flow switch are supplied with the product.
- Use 18 AWG wires for thermostat installation.
- Install certified mixing valves and expansion tanks ONLY.
- When using an external pump, connect the pump to the water heater PCB directly using a Navien External Pump Cable (GXXX001319).

4.3 DHW Priority Options

Refer to the following options to configure the system's DHW supply modes.

4.3.1 DHW Priority Mode

When the system is configured for the DHW priority mode, space heating does not operate if there is DHW demand (the flow switch is 'closed').

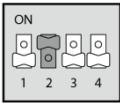


Set the DIP switch (SW) #2 to 'Off' to configure the system to operate in the DHW priority mode.

4.3.2 Simultaneous DHW and Space Heating Mode

When the system is configured for simultaneous DHW and Space heating mode, both DHW and space heating will be supplied at the same time. However, when DHW demand becomes high, the system automatically turns off the space heating. The system will continue in this mode until it determines that DHW demand has been reduced.* Please see appendix for water heater performance specifications.

*The system determines that DHW demand is high and stops supplying the space heating when the water heater is running at or above 85% of its maximum capacity. The space heating operation will restart once the DHW demand has been satisfied.












Set the DIP switch (SW) #2 to 'On' to configure the system to operate DHW and space heating mode simultaneously.

5. Parameter Table

5.1 NPE-A, NPN and NHW700 Parameter Table

The following table lists the parameters used to configure the water heater system functions. For more information about the parameter settings, refer to the NPE-A or NPN/NHW700 Installation Manual.

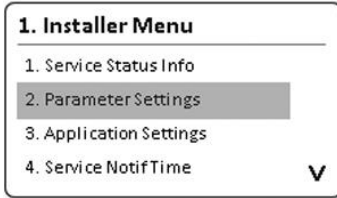
No.	Mode	Display
4	Pump Exercise Operation Time	
5	Burn Delay Time	
6	Pump Post Purge Time	
7	Outdoor Low Temperature Set-point	
8	Outdoor High Temperature Set-point	
9	CH MIN Set-point	
10	CH MAX Set-point	
11	2-Stage T/S Output Heat-Capacity	
13	Pump Exercise Operation Interval	

5.2 NPE-A2/S2 Parameter Table

The following table lists the parameters used to configure the water heater system function. For more information about the parameter settings, refer to the NPE-A2/S2 Installation Manual.

5.2.1 Parameter Settings

1. From the Installer Menu, select **2. Parameter Settings**.

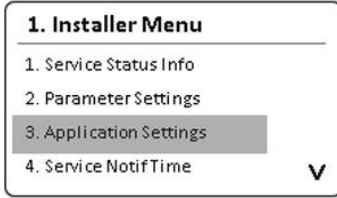


2. After entering the parameter setting screen, press the Up button (▲) or the Down button (▼) to switch between the parameters or to increase or decrease setting values. Press the OK Button (OK) to select a parameter or to confirm after making changes.

Item	Default value
1. Pump Exercise OP Time	30 Sec
2. Pump Exercise Interval	24 Hr

5.2.2 Application Settings

- From the Installer Menu, select **3. Application Settings**.



- After entering the application setting screen, select **3. Air handler Unit**, and then 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 parameter or to confirm after making changes.

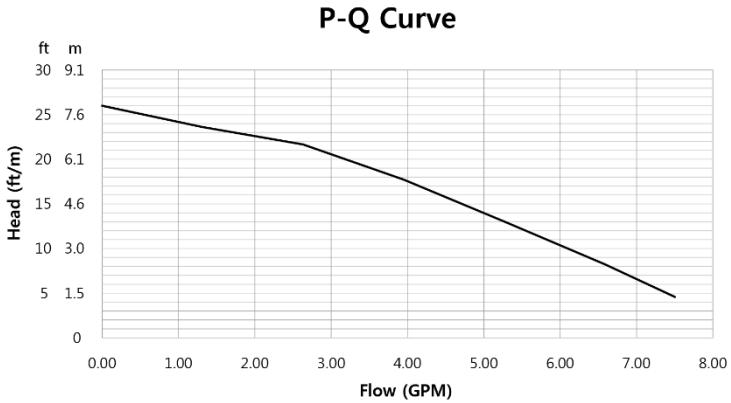
Item	Default value
1. AHU Burn Delay Time	30 Sec
2. AHU Pump Post Purge Time	30 Sec
3. AHU Outdoor Low Temp	14°F
4. AHU Outdoor High Temp	70°F
5. AHU SH MIN Set-Point	100°F
6. AHU SH MAX Set-Point	100°F
7. AHU 2Stage T/S Output	25.00%

6. Maintenance

The Navien water heaters that are used in the DHW/heating systems should be properly maintained and flushed on an annual basis. Please see the Navien Water Heater Installation Manual for more details regarding annual servicing and maintenance.

7. Appendix

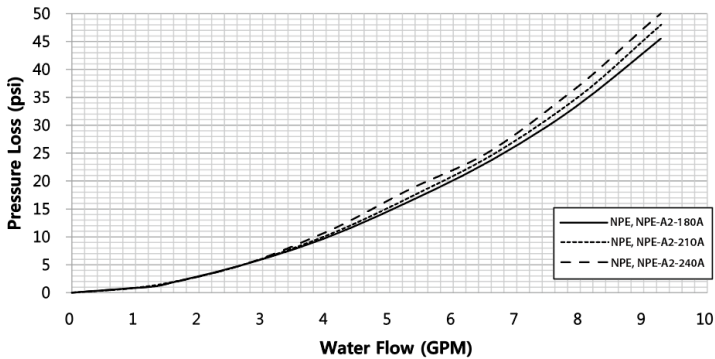
Pump P-Q Curve



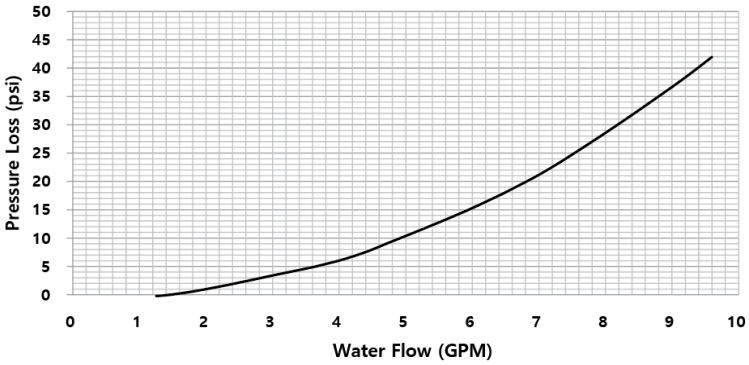
Note

When the system uses the internal circulation pump with the NPE-A, NPE-A2 and NHW700-A water heaters, the flow rate may vary depending on the type and capacity of the AHU in use.

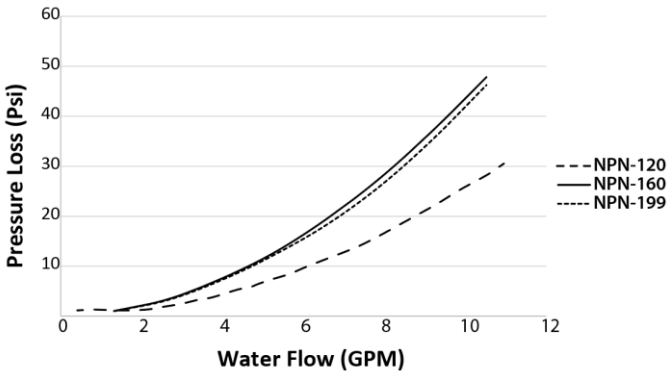
NPE-A and NPE-A2 Pressure Loss



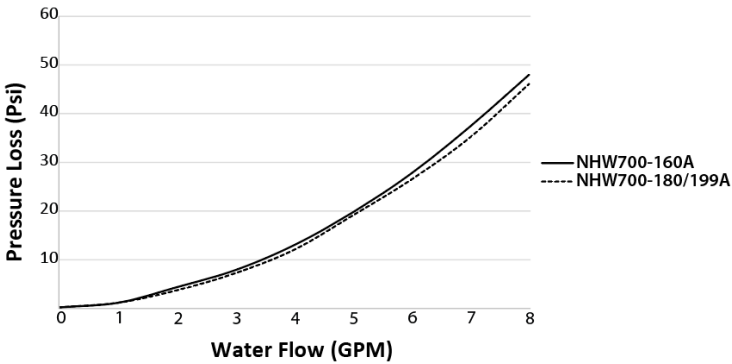
NPE-150S2 Pressure Loss



NPN Pressure Loss



NHW700-A Pressure Loss



LIMITED WARRANTY NAVIEN, INC.

Warranty Period

Navien products come with a limited warranty covering parts. The following warranty periods begin to run from the date of original installation. The date of original installation must be provided to Navien, and upon request, proof of the original installation date must also be provided to Navien. When the product is installed in a new construction, the commencement date shall be dated upon which the end-user takes title to the property.

APPLICABLE WARRANTY PERIOD

Period of Coverage	
All other parts and components	3 years

Warranty Claim Procedures

To obtain warranty repair service, the end user or homeowner must contact the original installer of your Navien product. If the original installer cannot be identified, the end user or home owner may contact Navien's Customer Care Department at (800) 519-8794. Proof of purchase is required to obtain warranty service.

Warranty Service

At its option, Navien will replace the defective component (part), in accordance with the terms of this Limited Warranty, if it fails in normal use and service during the applicable warranty period identified above. The replacement component must be Navien original factory component. Navien, at its sole discretion, may replace the product with a new or refurbished product of comparable quality and design. The replacement component or product will be warranted only for the unexpired portion of the original component's applicable warranty period. Payment for labor in completing the warranty service is subject to Navien's prior written approval and shall be subject to Navien's schedule of approved labor allowances.

Warranty Exclusions

Navien's Limited Warranty shall be void in the event of an occurrence of any of the following:

- Improper installation, failure to install in strict compliance with the Installation Manual procedures, installed by a non-licensed installer, and installation in violation of applicable rules, laws or building codes.
- Product purchased through the internet, other e-commerce channels, or any installer that obtained the product from a supplier or distributor not authorized by Navien.
- Failure to perform annual maintenance, misuse, operation at settings other than those recommended or specified, noncompliance with instructions or guidelines set forth in the User's Information Manual.
- Modification or alteration of the product in any manner, including but not limited to, removal of any component or part, addition of any non-approved components, relocating or moving the product from its original installation site, or any accidental or intentional damage to the Product.
- Installer's failure to fully comply with the warranty service and return policy procedures previously provided to installer and as is available on Navien's website. Such policies include but are not limited to the installer's failure to first contact Navien Technical Support while in front of the product for purposes of trouble shooting the identified problem or issue.
- Any damage, malfunction or failure caused by abuse, negligence, alteration, accident, fire, flood, freezing, wind, lightning and other acts of God.
- Operating, using or storing the zone pump controller in a corrosive or contaminated atmosphere or environment.
- Installation at any location outside the United States and Canada.

Other Terms: This Limited Warranty is subject further to the terms and conditions set forth herein and as may be further specified in the terms and conditions page located on Navien's website at www.navieninc.com. WITH THE EXCEPTION OF THIS LIMITED WARRANTY, NAVIEN DISCLAIMS ANY OBLIGATION OR LIABILITY WITH RESPECT TO THE PRODUCTS OR THEIR SALE AND USE, AND NAVIEN NEITHER ASSUMES NOR AUTHORIZES THE ASSUMPTION OF, ANY OBLIGATION OR LIABILITY IN CONNECTION WITH THE PRODUCTS. THIS DISCLAIMER INCLUDES ANY OTHER WARRANTIES, EXPRESS, IMPLIED OR STATUTORY RESPECTING THE PRODUCTS OR ANY PARTS OR COMPONENTS THERE OF, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANT ABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Navien's total liability for any claim arising hereunder shall not exceed the purchase price which you paid for the product. NAVIEN SHALL NOT IN ANY EVENT BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL OR LIQUIDATED DAMAGES OR PENALTIES, INCLUDING CLAIMS FOR LOST REVENUE, PROFITS OR BUSINESS OPPORTUNITIES, EVEN IF NAVIEN HAD OR SHOULD HAVE HAD ANY KNOWLEDGE, ACTUAL OR CONSTRUCTIVE, OF THE POSSIBILITY OF SUCH DAMAGES.



H₂Air

Installation Manual

Getting Service

If your product requires service:

- All repairs require preauthorization by Technical Support. For warranty service, always contact Technical Support first.
- A short list of independent service providers in your area can be found on the website: www.navieninc.com/installers.
- Contact a licensed professional for the affected system (for example, a plumber, gas fitter, or electrician).

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