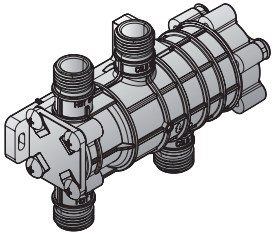


Navi circ™

Installation and Operation Manual

Certified to NSF / ANSI 372

COMPONENT UPC ®

Note This device is designed and optimized for use with Navien NPE-A/A2/S2 and NPN Series water heaters and NCB-H/NFC-H Series combi boilers.

⚠ WARNING

All installations should be done only by a qualified expert and in accordance with the provided instructions by the manufacturer. Before starting the installation, please review these installation and operating instructions carefully. The installation must comply with national, state, and local plumbing codes and regulations.

When Installing the NaviCirc:

- Read these instructions carefully. Failure to comply could damage the NaviCirc and also cause potential injury and/or property damage.
- Check the ratings provided in the instructions and on the product to make sure the product is suitable for the application.
- Installers must be trained, experienced, and licensed service technicians.
- Follow local codes for installation and application requirements.

After the installation is complete, verify proper operation of the NaviCirc by following the instructions provided in this manual.

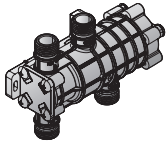
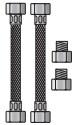
Contents

1. About the NaviCirc

NaviCirc is a circulation device for standard domestic hot water lines without a recirculation system. It allows domestic hot water lines and domestic cold water lines to connect to the NaviCirc and pre-heat hot water lines by circulating hot and cold water through the NaviCirc. This prevents hot water loss and heating time loss.

To prevent too much hot water from flowing into the cold water line, the NaviCirc includes a feature that automatically blocks circulation when reaching a temperature of approximately 95°F (35°C).

1.1 Included Items

	
NaviCirc (Recirculation Valve)	**Installation and Operation Manual**
	
Anchors and Screws	**Flexible Hoses (with kit only)**

1.2 Specifications

Refer to the following table for product specifications.

Items	Specifications
Product Name	NaviCirc
Part Number	PFFW-SXX-001
Water Flow Rate Range	0.53 - 1.06 GPM (2.0 - 4.0 LPM)
Crossover Shutoff Temperature	95°F (35°C)
Water Temperature Range	41°F to 180°F (5°C to 82°C)
Ambient Temperature Range	32 - 122°F (0 - 50°C) (Indoor use only)
Storage Temperature Range	14 - 122°F (-10 - 50°C)
Max Water Pressure	150 psi
Installation Operation	Horizontal
Dimensions (in)	5.62 x 3.93 x 2.19
Weight (lb)	1.10 lb (0.5 kg)

⚠ WARNING

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

1.3 Compatible Products & Pump Requirements

The NaviCirc is compatible with Navien NPE-A/A2/S2 and NPN Series water heaters and NCB-H/NFC-H Series combi boilers.

NPE-A and NPE-A2 models may utilize the built-in pump along with the appropriate piping to create a hot water recirculation loop. If the NaviCirc is used on a non-Navien appliance, consult the manufacturer for compatibility and size the pump with the following head requirements:

Pump MAX head approx. 15 ft (4.6 m) – 23 ft (7 m)

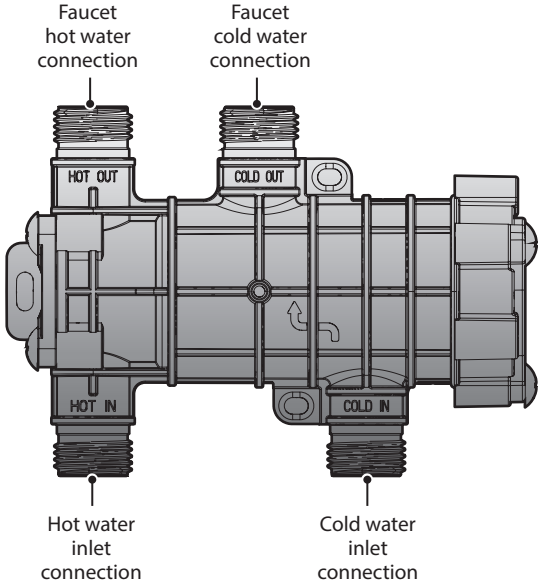
Note Navien does not guarantee the performance of the NaviCirc when used on a non-Navien appliance.

NOTICE

If the selected external pump does not meet the recommended specifications provided in this manual, the NaviCirc may not operate properly.

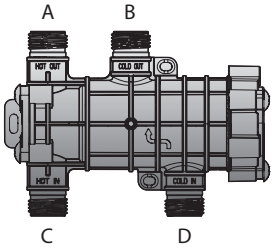
1.4 Configuration

Refer to the following diagram for the NaviCirc layout.

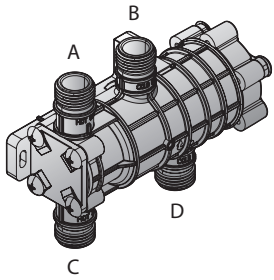


1.5 Supply Connections

Refer to the following table for the NaviCirc supply connection specifications.



Front view



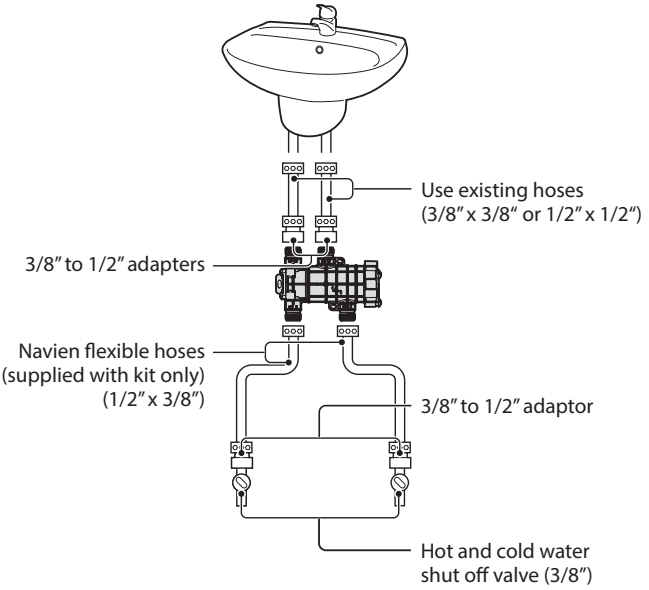
Side view

	List	Connection
A	Hot Water Outlet	PF ½"
B	Cold Water Outlet	PF ½"
C	Hot Water Outlet	PF ½"
D	Cold Water Outlet	PF ½"
Dimension (in)		5.62 x 3.93 x 2.19

Supply Connections

1.6 Installing the NaviCirc

Follow the instructions to install the NaviCirc to desired faucet location.



1.6.1 Installing the NaviCirc

1. Make sure that the install location is near the faucet furthest from the water heater.
2. Close the hot and cold water inlet shutoff valves.
3. Open both the hot and cold water faucets.
4. Disconnect the 3/8" (or 1/2") hose that was originally connected to faucet.
5. Secure the NaviCirc below the faucet in the desired location.
6. Connect the 3/8" to 1/2" adaptor to the NaviCirc **HOT OUT** and **COLD OUT** (or the hot and cold shutoff valves depending on the shutoff valve hose size) connections.
7. Connect the end of the existing 3/8" (or ½") hot and cold water hoses connected to the faucet to the **HOT OUT** and **COLD OUT** connections.

   Note Do not use Teflon tape or adhesives on the NaviCirc 1/2" male orifices. Make sure to use hoses with rubber gaskets.
8. Connect Navien supplied 1/2" to 3/8" flex line or other flexible hose to 3/8" hot and cold shutoff valves with or without the adaptor depending on the existing shutoff valve hose size.
9. Connect the remaining 1/2" hot and cold water flex lines to the NaviCirc **HOT IN** and **COLD IN** connections.
10. Open the hot and cold water shutoff valves before using the NaviCirc.

⚠ WARNING

Ensure that the hot and cold water shutoff valves are open before using the NaviCirc. Operating the device without opening the valves will build hot water pressure and may result in injury or death.

1.6.2 Leak Check & Air Purge

1. Close hot water and cold water faucets.
2. Open hot water and cold water shutoff valves.
3. Open hot water and cold water faucets.
4. Check if there are leaks after connecting the hoses to the NaviCirc.

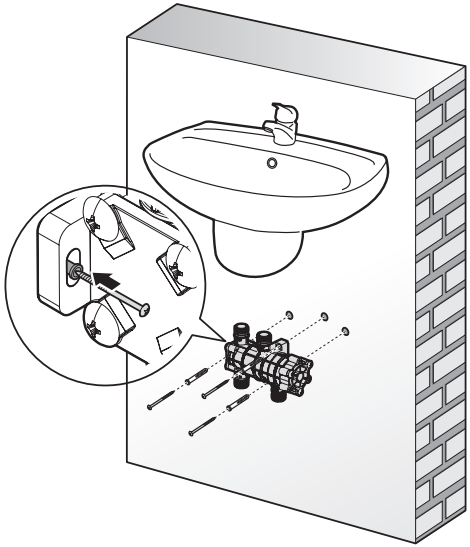
   Note In case of leaks, close the shutoff valves and repair any leaks.

5. Purge the air from the system by opening the hot water and cold water faucet.

   Note Perform an air purge so that all residual air can properly leave the system pipes. If the air purge is not performed long enough, the recirculation valve may not operate properly. Also, residual air can damage the recirculation pump.

1.7 Securing the NaviCirc to the Wall

Follow the instructions to install the NaviCirc to desired faucet location.



Secure the NaviCirc with the three anchor bolts included with the installation kit.

Note Do not forcefully secure the NaviCirc to the wall with anchor bolts, as this can damage the system. Make sure to place it horizontally in a fixed position as shown above.

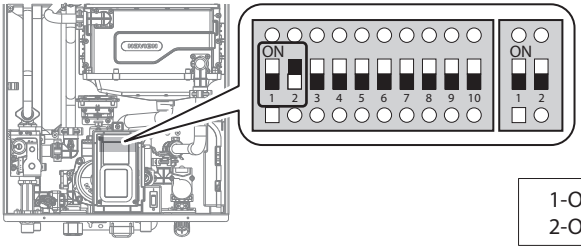
2. Application System

2.1 NPE-A System

2.1.1 Application Guidelines

See the installation guidelines below for additional instructions.

1. Locate the 10-switch set of dipswitches on the front panel and verify that **DIP SW2** is **ON** for **EXTERNAL** recirculation.



1-OFF
2-ON

2. On the front panel, press the Power button to turn off the water heater.
3. Enter the R&D information menu by pressing the Up [+] button three times, the Down [-] button three times, and then the Up [+] button four more times.

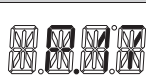
Note Maximum recirculation pipe lengths:

- 100 feet (approx 30 m) equivalent length of ½" copper pipe
- 400 feet (approx 120 m) equivalent length of ¾" copper pipe

4. In the R&D information menu, use the Up [+] or Down [-] button to move to 2.PAR (Parameter information mode), and then press the Information button.

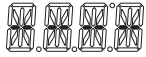
No.	Mode	Display
1	Technical information	
2	Parameter information	

5. Use the Up [+] and Down [-] buttons to enter Parameter #17 (P.17 – Enable Thermal Bypass Valve).

Item	Name	Description	Display
P17	Enable thermal bypass valve	Set thermal bypass valve operation	

(Required Adjustments to the Available Parameters)

6. Use the Up [+] or Down [-] button to move to adjust the parameter option to 2. ON.

Range	Description	Display
1.OFF	Thermal bypass valve is disabled.	
2. ON	Thermal bypass valve is enabled.	
Null	Setting for S-type models, Panel DIP3 ON, Cascade ON, or AHU is enabled.	

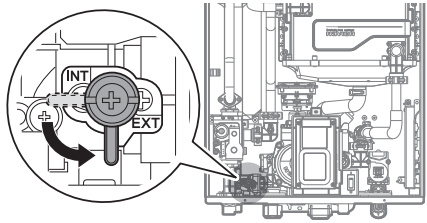
Note

- Additional parameters are available to adjust unit operation for various plumbing systems. Refer to the NPE Installation & Operation Manual for more information on these parameters.

Items	Description
Pump Cycle Interval Time (P.12)	Sets the maximum time that the internal circulator will operate once a recirculation cycle has been initiated. • Setting range: 1 to 120 (in 1-minute increments) • Default: 20 min **Note** When the optional HotButton accessory is installed, the maximum setting value is limited to 5 minutes.

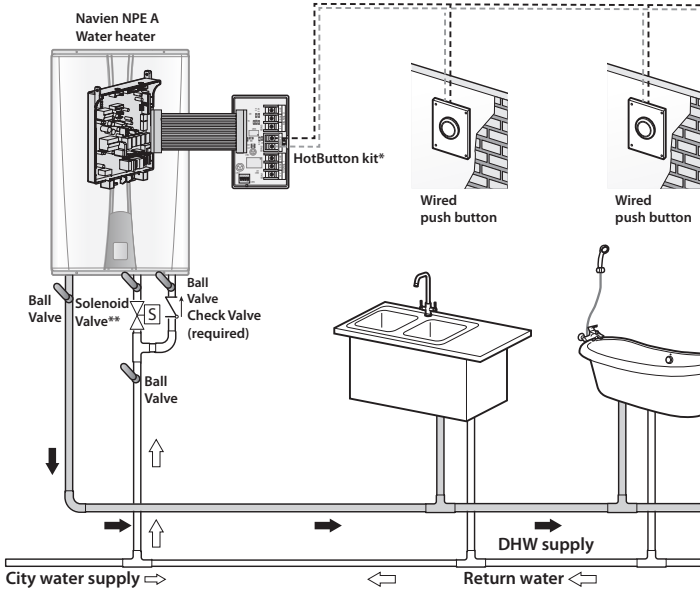
Items	Description
Return Line Sampling Time (P.14)	Sets the length of time that the circulator will operate periodically in order to check the temperature of the recirculation return line and see if it needs to be re-heated. • Setting range: 1 to 120 (in 1-minute increments) • Default: 30 min

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



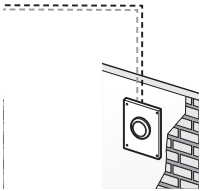
2.1.2 NPE-A System Diagram

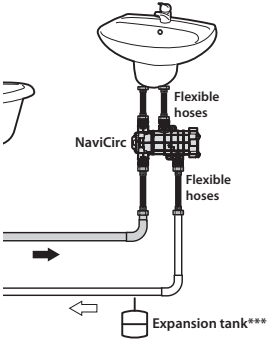
Follow the instructions to install the NaviCirc to the wall.



Install the recirculation valve to the faucet furthest from the water heater.

If installed in close proximity to the water heater, faucets further away from the water heater will take longer to receive hot water.





Note

A branch from the cold water line must be connected to the RECIRCULATION RETURN water connection located on the water heater. Additionally, the end user might experience lukewarm water when first opening the cold water tap.

Maximum recirculation pipe lengths:

- 100 feet (approx 30 m) equivalent length of ½" copper pipe
- 400 feet (approx 120 m) equivalent length of ¾" copper pipe

* The HotButton kit is sold separately.

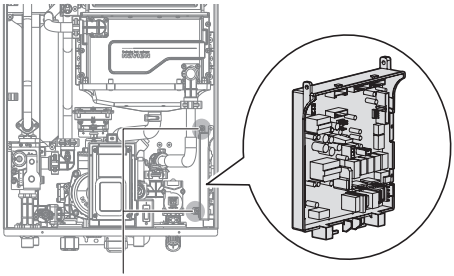
** Solenoid valve not required under most conditions. Temperature fluctuations may occur during high system flow rates.

*** Expansion tank only required if a check valve is installed on the cold water supply line or if required by local codes.

2.1.2.1 Installing the Solenoid Valve (Optional)

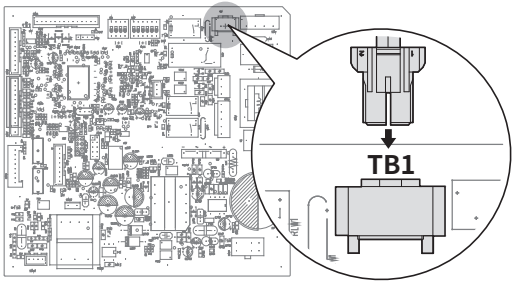
A Navien external pump wire (#GXXX001319) is needed to complete the solenoid valve installation. See the installation guidelines below.

1. Make sure that the system power is off before proceeding with the installation of the wiring.
2. Remove the front cover from the unit and remove the PCB by removing the 2 attaching screws from the housing.
3. Use a 120 VAC (max 1.5 A) normally closed solenoid valve for this application (a slow closing solenoid is recommended to prevent water hammer).
4. Connect the external pump wire to the proper wires from the solenoid valve.
5. Remove the 2 screws holding the PCB box in place and remove the PCB box from the system.

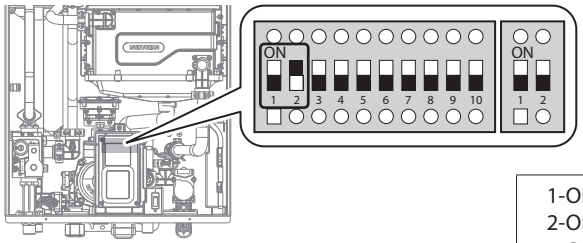


Remove Screws here.

6. Locate the TB1 connection on the PCB and attach the external pump wire and solenoid valve assembly to this connector.



7. Locate the 10-switch set of dipswitches on the front panel and verify that **DIP SW2** is **ON** for **EXTERNAL** recirculation.



1-OFF
2-ON
3-OFF

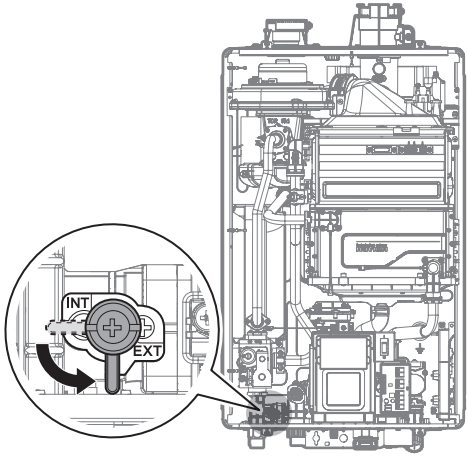
2.2 NPE-A2/S2 System

For more information about external recirculation mode and DIP switch settings, refer to the NPE A2/S2 Installation Manual.

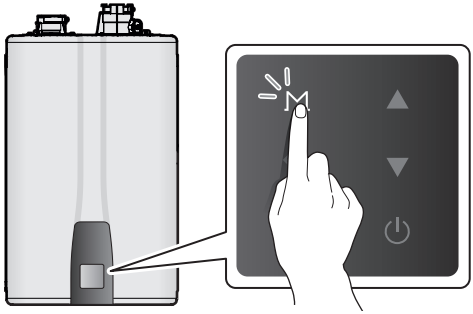
2.2.1 Setting External Recirculation Mode

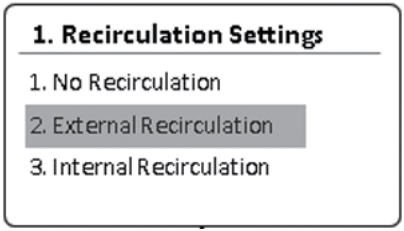
To use the external recirculation mode:

1. Connect the water supply to support recirculation.
2. Set the 2-way valve inside the water heater to "EXT."



3. Press the Menu button (M) to access the Main menu and select **1. Recirculation Setting** > **2. External Recirculation** by pressing the OK button (OK).

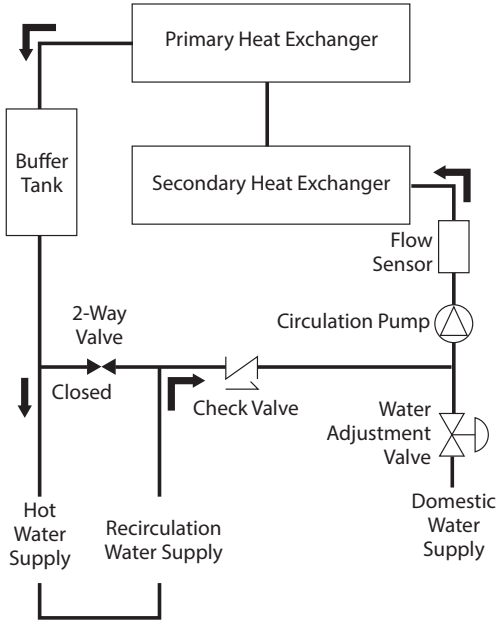




Note If the A2-type model requires an external pump, follow the instructions in "2.2.2 External Pump Wire Connection" on page 26 first and select **YES** on the screen asking whether the external pump is connected to the PCB.

Model	Step 1	Step 2	Step 3
A2-type	Ext.Recirc	Use Ext.Pump Yes/No	Always On
			Intelligent
			Weekly
			HotButton
S2-type	Ext.Recirc	Always On	N/A
		Intelligent	N/A
		Weekly	Schedule Set
		HotButton	N/A

The following diagram shows the external recirculation flow for pre-heating:



[External Recirculation Mode using the Recirculation Inlet]

2.2.2 External Pump Wire Connection

An external pump may be connected to the water heater for recirculation applications. When selecting a circulator, it shall be sized to maintain a flow of 2-4 GPM at 15 ft (4.6 m) – 23 ft (7 m) of head through the water heater. Follow the instructions below when connecting the pump wire accessory to the PCB.

⚠ WARNING

Electric shock hazard

To prevent death or serious injury or property damage:

- DO NOT remove the front cover unless the power to the water heater is turned off or disconnected.
- ALWAYS check the water heater is turned off before connecting the wire to the PCB.

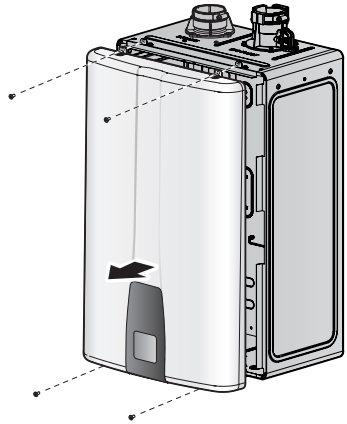
Note Configure the desired mode according to the instructions in the NPE A2/S2 Installation Manual.

<Specifications>

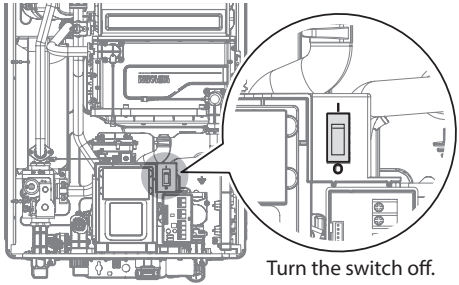
- External Pump Wire (#GXXX001319)
- Maximum Power Consumption: 150 W, 1.5 A
- Length: 6 ft (183 cm)

Note When using a pump with larger power requirements than the listed specification above, a relay should be used to ensure proper operation.

1. Remove the water heater front cover by loosening the 4 Phillips head screws securing it to the case.

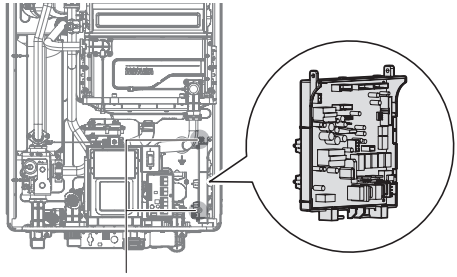


2. Locate the power switch on the right side of the front panel and switch the system off.



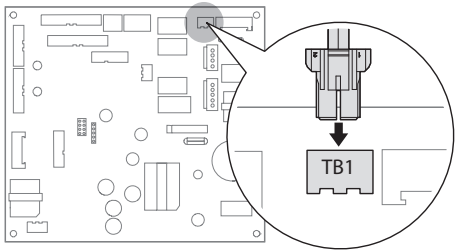
Turn the switch off.

3. Remove the 2 screws holding the PCB box in place and remove the PCB box from the system.



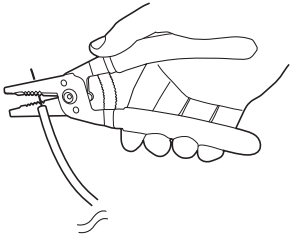
Remove Screws here.

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



5. Put the PCB box back in its original place and secure it using the 2 mounting screws.

6. Remove the plastic insulation from the external pump wire with a wire stripper before connecting it to the pump.



7. Connect the external pump wire to the proper wires from the pump junction box.

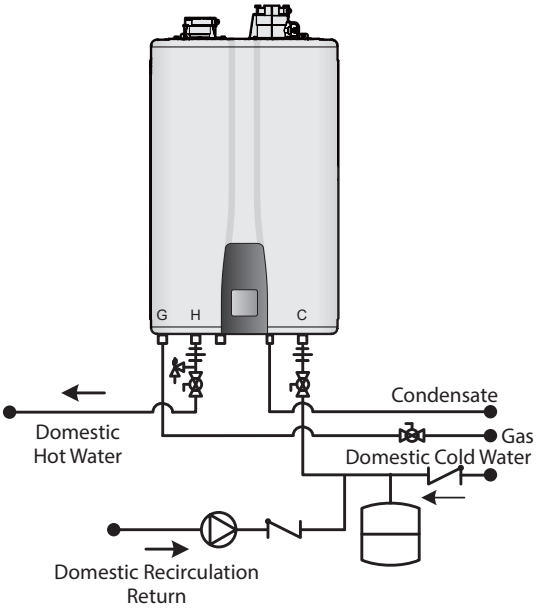
⚠ WARNING

ONLY turn on the water heater after connecting the wire to the external pump to prevent serious injury or death from electric shock.

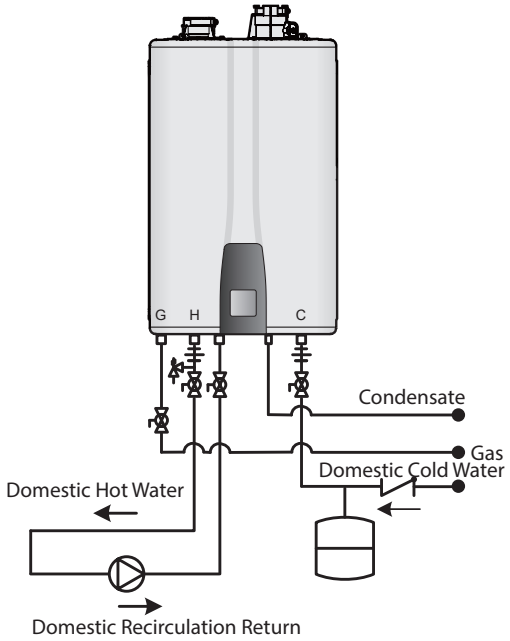
8. Turn on the switch beside the front panel.

9. Put the water heater cover back on and secure it with the 4 screws.

   You can configure it as either Type 1 or Type 2 if you install an external recirculation line.

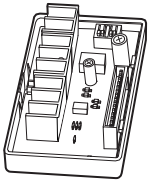


[Type 1. Recirculation using External Pump - Return line ties into Cold Water Inlet (NPE-S2 Models)]



[Type 2. Recirculation Using a Second Pump (NPE-A2 Models, Navien Internal Pump & External Pump)]

2.2.3 Navien HotButton Kit (Optional)

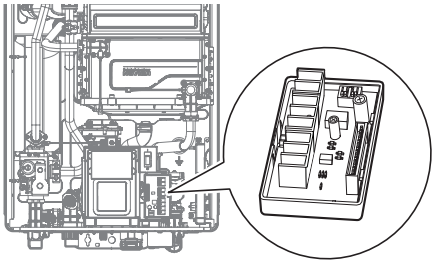


The NPE-A2/S2 series water heaters have a built-in Navien HotButton controller (the push button, wall plate, and temperature sensor have to be purchased separately). It adds signal input functions to the NPE-A2/S2 series water heaters for more efficient DHW hot water recirculation functionality.

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

The HotButton kit can receive signals from multiple push buttons installed in various areas and performs optimal DHW recirculation only when there is a demand for hot water. For more information about the parameter settings, refer to the NPE A2/S2 Installation Manual.

Included Item

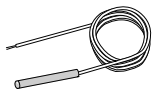


HotButton Controller

Items Not Included

Push Button Switch
(#GXXX001426)

Wall Plate
(#GXXX001427)

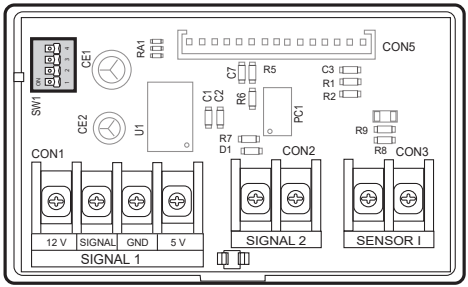


Temperature Sensor
(#GXXX001640)

Note In addition to activating the HotButton using push buttons, recirculation can also be started through the NaviLink app if the optional NaviLink WiFi control system has been installed.

Device Layout

Refer to the following diagram for the product layout.



* SIGNAL1 contacts are for optional wireless push buttons or motion sensor accessories.

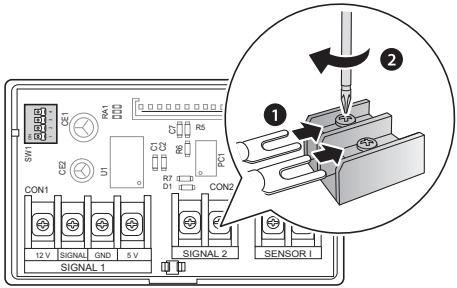
** SENSOR I contacts are connected with a piece of metal plate by default. Remove the metal plate before connecting a temperature sensor to the circuit board.

Wiring Connection Table

Terminal		Wiring Connection
Signal1	**12 V**	Contacts for wireless push button or motion sensor connection
	Signal	
	GND	
	5 V	
Signal2 (Not polarity sensitive)		Push Button Switch Contact #1
		Push Button Switch Contact #2
Sensor I		Contacts for temperature sensor connection

Connecting Wired Switches

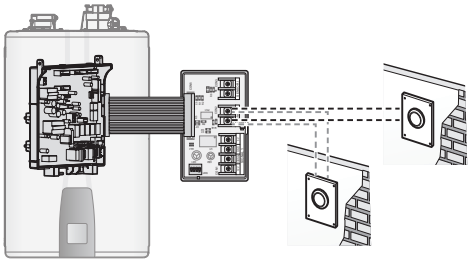
Refer to the following diagrams to connect a wired switch, or multiple wired switches to the HotButton controller.



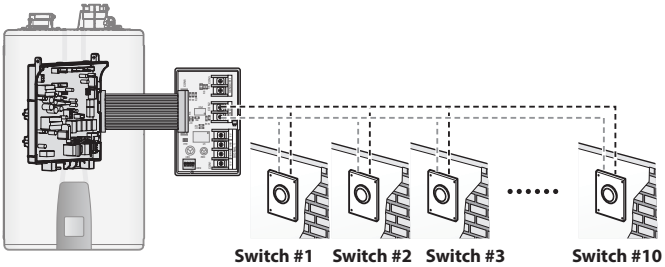
Note

- Multiple wired switches may be connected to the same terminal contacts.
- Use spade connectors at the end of the cables to securely install the cables to the terminal contacts.

When you connect the push button switches to the controller, you can run cables from each switch directly to the controller and connect them to the same terminal. Or, you can run a common branch circuit that runs from the controller and connect each switch to the branch.



[Multiple switches connected directly to the same terminals at the controller]

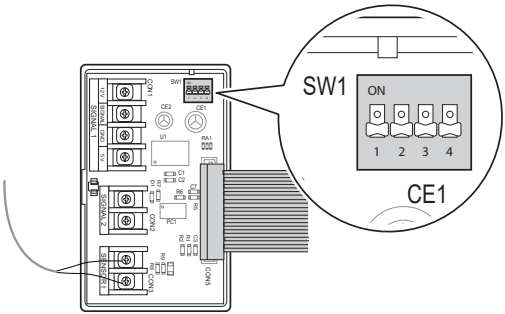


[Multiple switches connected to a common branch circuit]

Note

- You can connect up to 10 push button switches to one HotButton controller.
- Use UTP cables or cables with a diameter greater than AWG 24.
- Make sure that the total cable length does not exceed 328 feet (100 meters).
- Additional push button switches (#GXXX001426) and wall plates (#GXXX001427) can be purchased through Navien.

HotButton DIP Switch Information



DIP SW	OFF	ON
1	Enable the HotButton.	Disable the HotButton.
2	Enable the energy saver function.	Disable the energy saver function.
3	Reserved	Reserved
4	Reserved	Reserved

Note

- HotButton DIP SW1
  - Enable or disable the HotButton function.
  - Default: Enabled (OFF)
- HotButton DIP SW2
  - Enable or disable the energy saver function.
  - Default: Enabled (OFF)
  - The energy saver function limits the operation time of the recirculation system to reduce energy usage. This function may be required to remain enabled to meet local building code regulations.

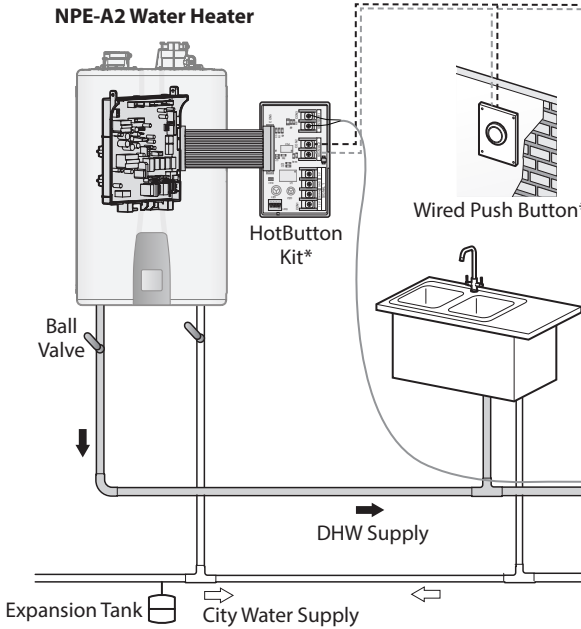
2.2.4 System Application – External Recirculation

The following diagram shows the recirculation system's basic operation of an NPE-A2/S2 series water heater system with the Navien NaviCirc and Navien HotButton kit with or without a dedicated return line.

Note

- The NPE-A2/S2 series water heaters have a built-in Navien HotButton controller (the push button, wall plate, and temperature sensor must be purchased separately).
- Install the NaviCirc to the faucet farthest from the water heater. If installed in close proximity to the water heater, faucet pipes far away may not be properly heated.
- The Navien HotButton can be used ONLY with a water heater system configured for DHW recirculation.
- All other recirculation functions will be disabled.

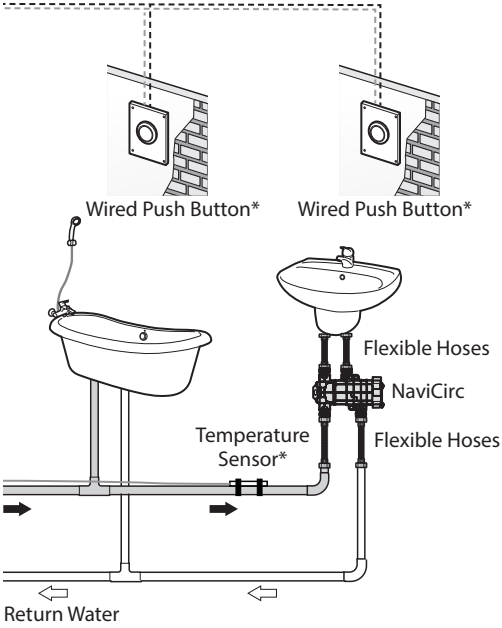
External Recirculation with HotButton (Optional) and NaviCirc



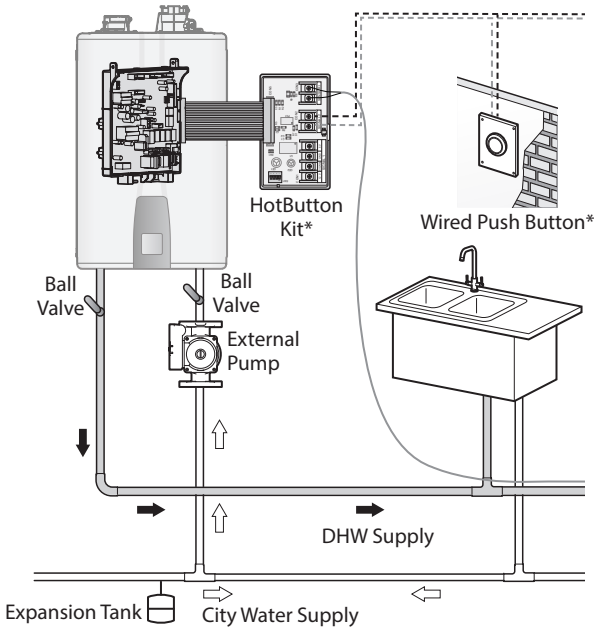
[NPE-180A2/210A2/240A2]

Note

- Set the 2-way valve inside the water heater to the "Ext" position when using the NaviCirc recirculation valve.
- It is not necessary to install bypass piping from the cold line to the recirculation inlet fitting for NPE-A2 models.

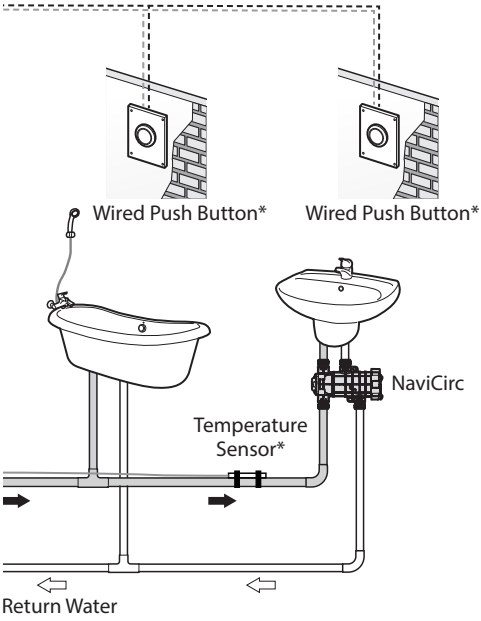

Wired Push Button*
Wired Push Button*
Flexible Hoses
NaviCirc
Temperature
Sensor*
Flexible Hoses
Return Water

NPE-S2 Water Heater



[NPE-150S2/180S2/210S2/240S2]

* The HotButton kit, push buttons, and the temperature sensor are not included with the water heater but are available for purchase.


Wired Push Button*
Wired Push Button*
NaviCirc
Temperature
Sensor*
Return Water

2.3 NPN System

For more information about external recirculation mode and DIP switch settings, refer to the NPN Installation Manual.

2.3.1 External Pump Wire Connection

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

⚠ WARNING

Electric shock hazard

To prevent death or serious injury or property damage:

- DO NOT remove the front cover unless the power to the water heater is turned off or disconnected.
- ALWAYS check the water heater is turned off before connecting the wire to the PCB.

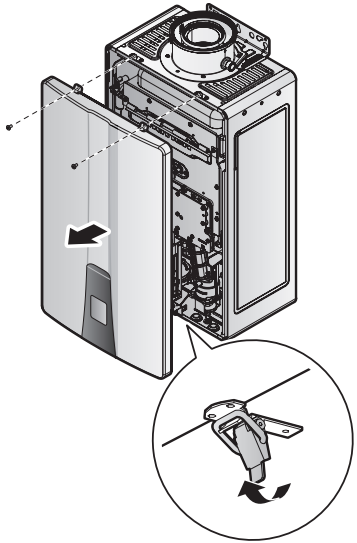
Note Configure the desired mode according to the instructions in the NPN Installation Manual.

<External Pump Wire (GXXX001319) Specifications>

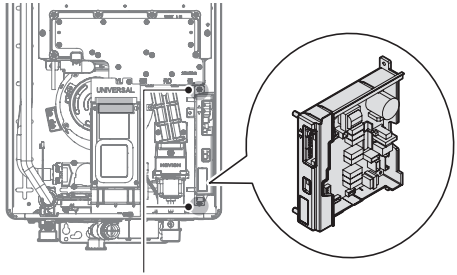
- Maximum Power Consumption: 150W, 1.5A
- Length: 6 ft (183 cm)

Note When using a pump with larger power requirements than the listed specification above, a relay should be used to ensure proper operation.

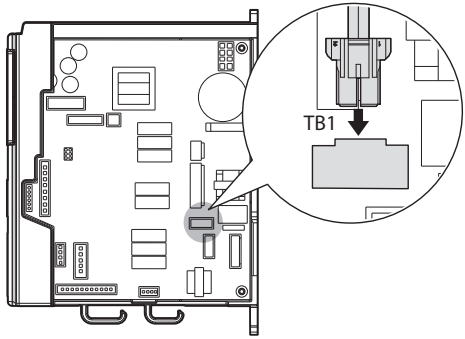
1. Disconnect the power supply to the water heater.
2. Remove the two upper screws from the front cover assembly using a Phillips head screwdriver. Then, release the toggle latch from the bottom of the front cover assembly to gain access to the internal components.



3. Remove the 2 screws holding the PCB box in place and remove the PCB box from the system.

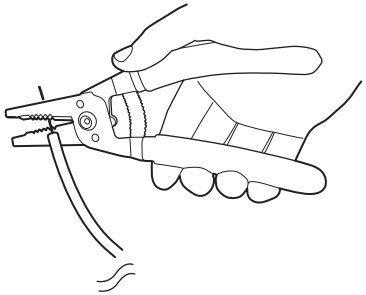


4. Connect the external pump wiring connector to the connector socket on the PCB (TB1).



5. Put the PCB box back in its original place and secure it using the 2 mounting screws.

6. Remove the plastic insulation from the external pump wire with a wire stripper before connecting it to the pump.

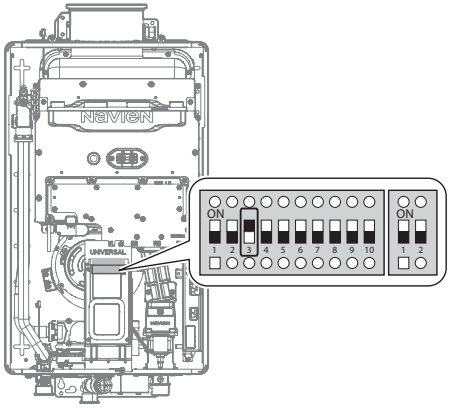


7. Connect the External Pump Wire to the proper wires from the pump junction box.

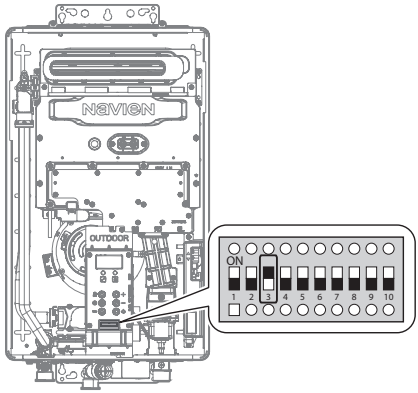
⚠ WARNING

ONLY turn on the water heater after connecting the wire to the external pump to prevent serious injury or death from electric shock.

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

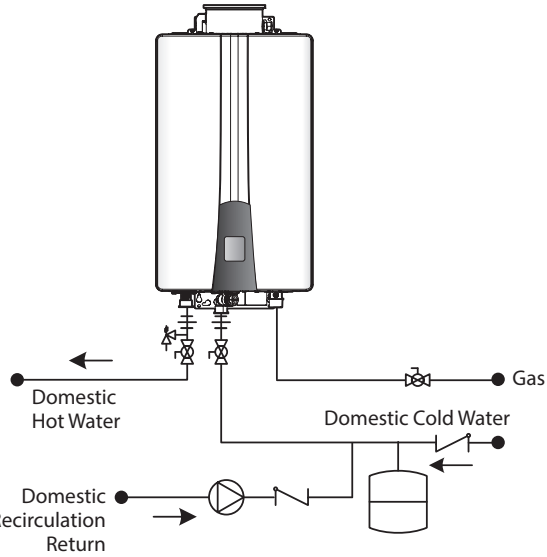


[NPN-160U/180U/199U]



[NPN-120E/160E/180E/199E]

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



[Recirculation Using External Pump Only]

2.3.2 Adjusting the Recirculation Parameters

Entering the R&D Information Menu

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

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

No.	Mode	Display
1	Technical Information	
2	Parameter Information	

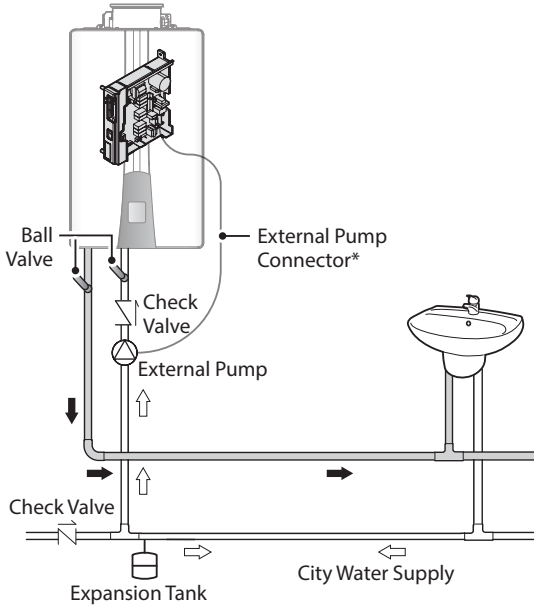
4. To return to the previous menu (R&D information menu), press the [Reset] button once.

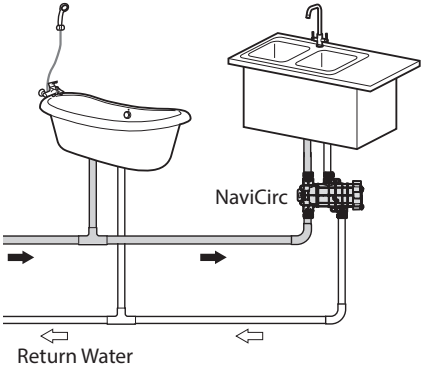
Items	Name	Description	Display
12. P12	Pump Cycle Interval	Set the maximum time for pump operation or on-demand operation.	
14. P14	Pump Sampling Time	Set the pump cycle ON interval.	
15. P15	Differential OFF Temp	Set the offset temperature to turn off the preheating operation (function disabled with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

2.3.3 External Recirculation with NaviCirc

The following diagram shows the basic operation of an NPN Series water heater recirculation system with the NaviCirc.

Note Install the NaviCirc to the faucet farthest from the water heater. If installed in close proximity to the water heater, faucet pipes far away may not be properly heated.

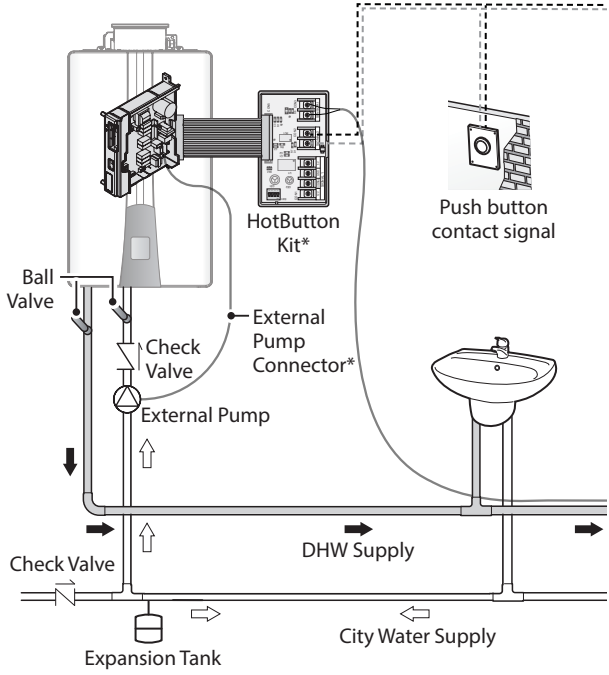


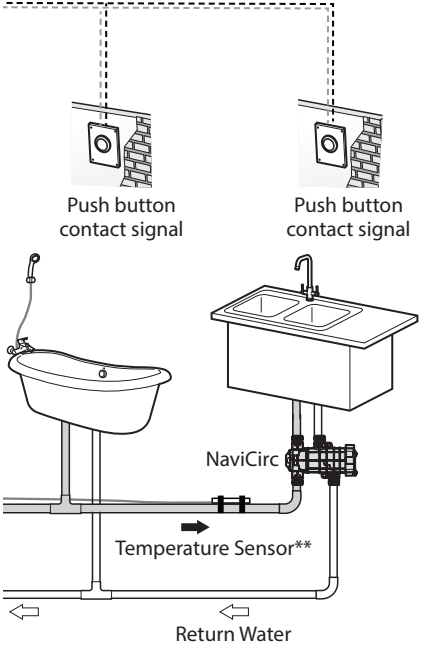


* The external pump connector is not included with the water heater but it is available for purchase. For more information about connecting the external pump to the water heater, refer to "2.5.1 External Pump Wire Connection" on page 42.

2.3.4 External Recirculation with HotButton (Optional) and NaviCirc

The following diagram shows the basic operation of an NPN Series water heater recirculation system with the NaviCirc and HotButton.





* The Hotbutton kit and external pump connector are not included with the water heater but they are available for purchase. For more information about connecting the external pump to the water heater, refer to "2.5.1 External Pump Wire Connection" on page 42.

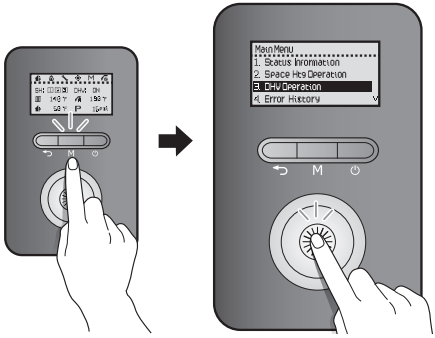
** When the optional temperature sensor is installed, it must be insulated. The sensor wire may be extended by up to 100 ft (30 m) using 22AWG wire.

2.4 NCB-H System

For more information about external recirculation mode and DIP switch settings, refer to the NCB-H Installation & Operation Manual.

2.4.1 Setting the DHW Operation

To set the boiler's DHW operation, press the Menu button (M), and then select "3. DHW Operation".



Rotate the Command dial (◎) to switch between the list items or to increase/decrease setting values. Press the Command dial (◎) to select an item or to confirm after making changes.

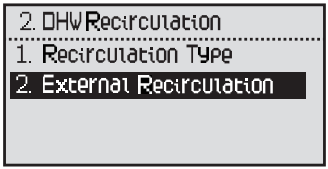
Press the Back button (↩) to return to the previous screen or menu.

Item	Description
1. DHW Set Temp	Set the hot water temperature (°F). • Setting range: 86 - 140°F (30 - 60°C) • Default: 122°F (50°C)

Item	Description
2. DHW Recirculation	When only one NCB-H boiler is connected: Set the Recirculation type and Schedule settings. • Recirculation type - No Recirculation - Combi Pre-Heat - External **Note** External recirculation cannot be used for cascade systems. Recirculation type settings (Combi Pre-heat/ External) • Set to Combi Pre-heat (Default: Always On) - Always On - Intelligent - Weekly **Note** Intelligent mode cannot be used for cascade systems. • Set to External (Default: Always On) - Always On - Intelligent - Weekly - Aquastat - Manual

2.4.2 Setting External Recirculation

When using the External Recirculation feature, you can choose commands in the menu to preheat according to the set DHW temperature.



Item	Description
1. Always On	Set to repeat DHW Recirculation.
2. Intelligent*	Set to detect DHW use for a week and repeat the detected cycle.
3. Weekly*	The user can choose commands for DHW Recirculation on a weekly basis. 1. 1 Day: schedule a command for the week. 2. 3 Day: schedule commands for Weekdays, Saturdays, and Sundays. 3. 7 Day: schedule commands for each day of the week.
4. Aquastat	Set to use an aquastat for DHW Recirculation.
5. HotButton (Manual)	Set to use HotButton Push Buttons to activate Recirculation.

* To choose this option you must set up the Time settings in the Configuration menu.

Note If there is a space heating demand signal during external recirculation, pre-heating will take priority, and space heating will start afterwards.

2.4.3 Examples of Electrical Connections

⚠ 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 electrical components.
- 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.

Note The installation must comply with National Electrical Code and any other national, state, provincial or local codes or regulations. In Canada, CSA C22.1 Canadian Electrical Code Part 1, and any local codes.
Wiring must be N.E.C. Class 1. If original wiring as supplied with boiler must be replaced, use only type 105 °C wire or equivalent.
Boiler must be electrically grounded as required by National Electrical Code ANSI/NFPA 70 – latest edition.

2.4.3.1 Accessing the NCB-H Terminal Strips

⚠ DANGER

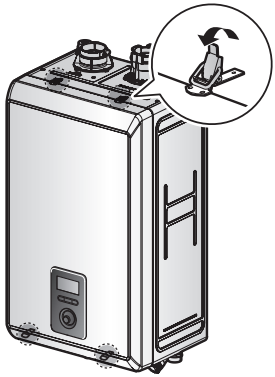
Electric Shock Hazard

To prevent serious injury or death:

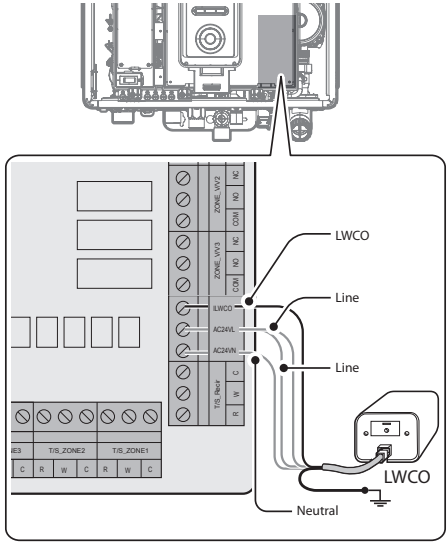
You must ensure that the boiler is disconnected from the electrical supply before carrying out any servicing inside the boiler and, particularly, on the electric terminal strips.

To access the PCB, carefully follow the steps below:

1. Turn off the power supply to the boiler.
2. Unfasten the 4 latches (2 at the top and 2 at the bottom) to remove the front cover and gain access to the internal components.

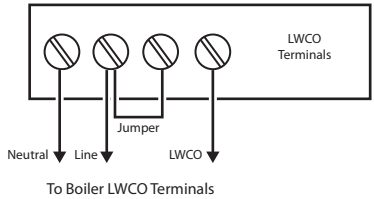


2.4.3.2 Wiring Diagram - External LWCO



Note The boiler supplies 24 VAC at the LWCO power terminals (CNC3).

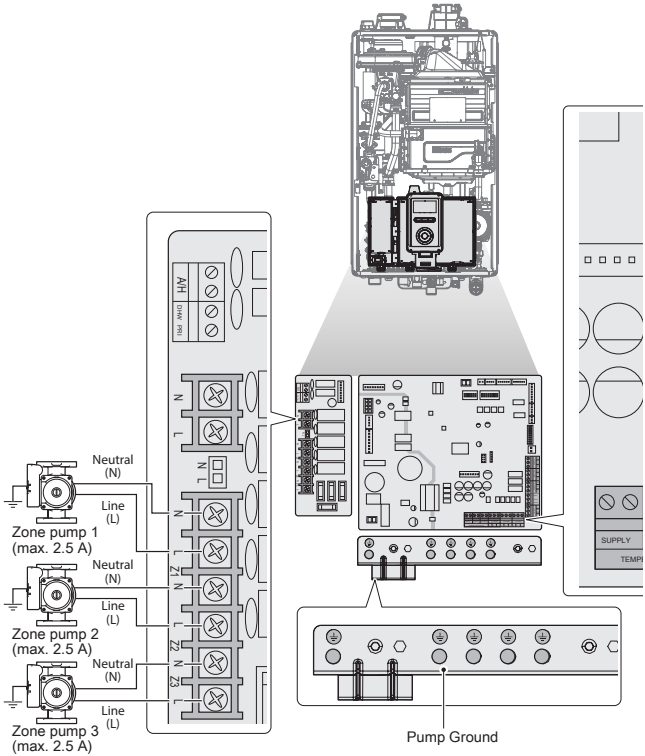
For terminal type LWCO appliances, a typical wiring method is shown below (same voltage for control and burner circuit):

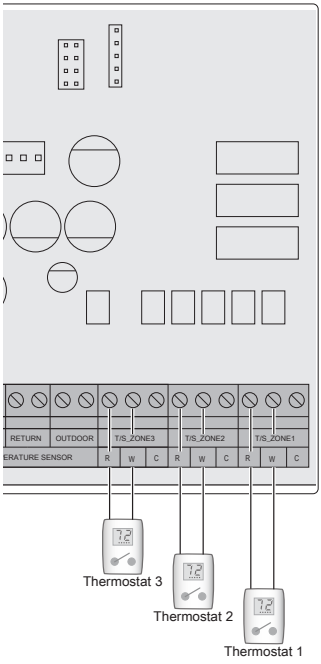


2.4.3.3 Wiring Diagram - Zone Pump System

NCB-H boilers can operate a heating system with up to 3 zones. The following is the wiring diagram for a zone pump system with 3 zones.

Zone Pump Dry Contact Connections (no 24VAC power) and Thermostats without 24VAC power





Note

- If you have a 24 V thermostat, connect it to the R & C terminals on the boiler's PCB.
- The C terminals are for optional connections with 24 V thermostats that have a COMMON wire.

2.4.4 External Recirculation with NaviCirc

The following pump models are recommended for use with the NCB-H boiler and DHW recirculation systems.

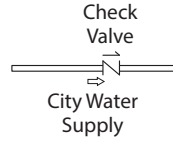
When using the indicated pump models, observe the following maximum recirculation pipe lengths:

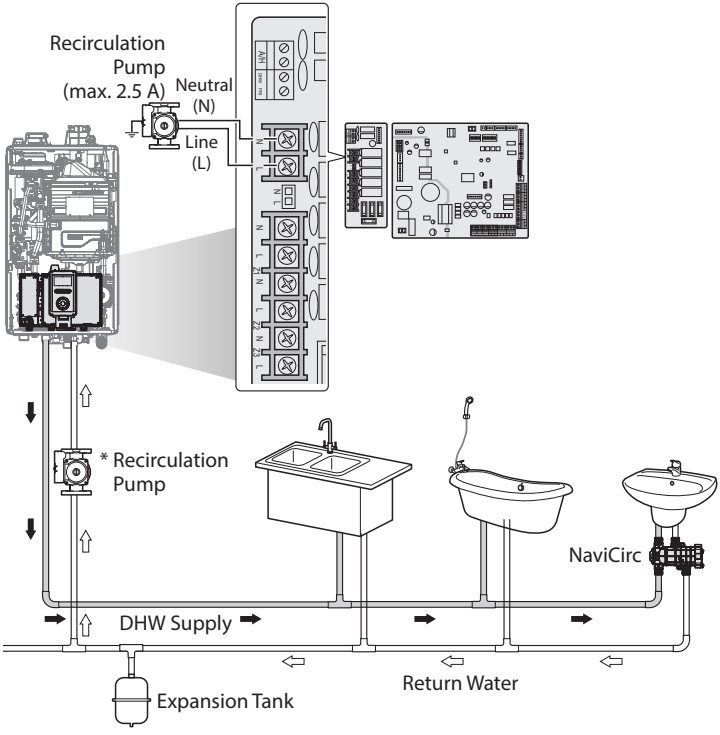
- 100 feet (30 m) equivalent length of $^{1}/_{2}$" copper pipe
- 400 feet (120 m) equivalent length of $^{3}/_{4}$" copper pipe

External Recirculation Mode

For best performance, select the Intelligent or Weekly option in the External recirculation DHW recirculation menu. To use the aquastat mode, install an aquastat to the DHW pipe line and connect to the CNC6 terminal on the PCB. (Refer to "3.7.4 Wiring Diagram - Zone Pump System with DHW Recirculation" in the NCB-H Installation & Operation Manual.)

Note Combi pre-heat is the default mode for DHW recirculation. To select external recirculation, refer to the combi pre-heat and external recirculation sections in "2.3.1 Setting the DHW Operation" on page 54 for details.




Recirculation
Pump
(max. 2.5 A)
Neutral
(N)
Line
(L)
* Recirculation
Pump
NaviCirc
DHW Supply
Return Water
Expansion Tank

* A Taco 008-BC6 or Grundfos 15-42 BUC7 (or equivalent) circulation pump is recommended for use with the NCB-H boiler and DHW recirculation systems.
* When using the external recirculation mode, observe the following maximum recirculation pipe lengths including fittings ($^3/_4$" pipe is recommended). Lengths in excess of these limits will require a larger recirculation pump.

Maximum Pipe Lengths		
Pipe Diameter	$^1/_2$"	$^3/_4$"
Maximum Pipe Length	100 ft (30 m)	400 ft (120 m)

Note

- Install the NaviCirc recirculation valve on the faucet furthest from the NCB-H boiler.
- If installed in close proximity to the boiler, faucets further down the supply line will take longer to receive hot water.

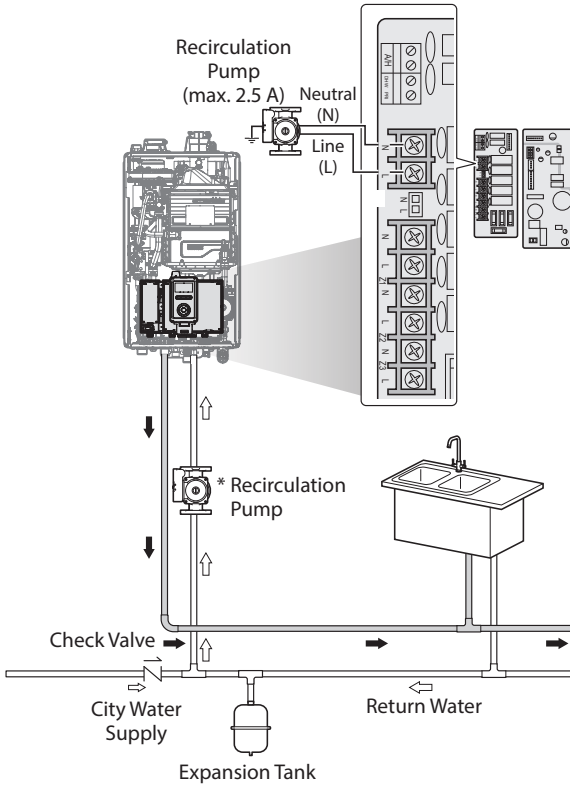
2.4.5 External Recirculation with HotButton (Optional) and NaviCirc

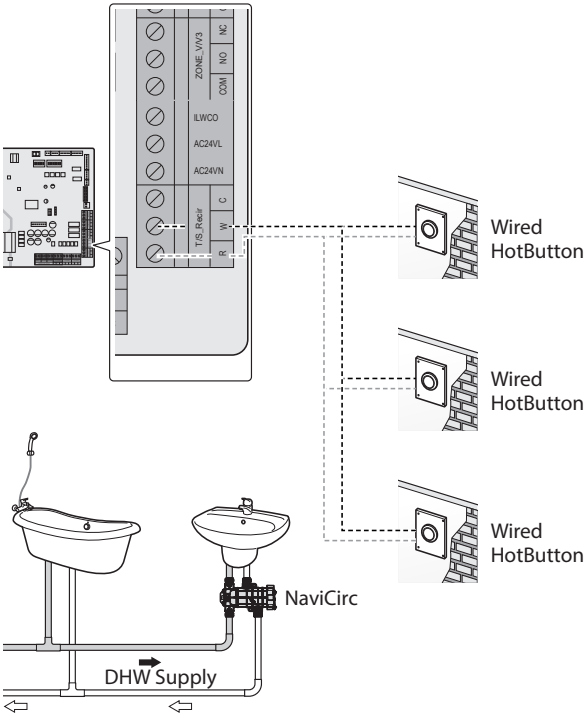
External Recirculation Mode

For best performance, select the manual option in the External recirculation DHW recirculation mode.

Note

- Combi pre-heat is the default mode for DHW recirculation. To select external recirculation, refer to the combi pre-heat and external recirculation sections in "2.3.1 Setting the DHW Operation" on page 54 for details.
- For more information on the LWCO connections, refer to "2.3.3.2 Wiring Diagram - External LWCO" on page 59.


Recirculation
Pump
(max. 2.5 A)
Neutral
(N)
Line
(L)
* Recirculation
Pump
Check Valve
City Water
Supply
Return Water
Expansion Tank


ZONE_V/V3
NC
NO
COM
ILWCO
AC24VL
AC24VN
T/S_Recir
C
W
R
Wired
HotButton
Wired
HotButton
Wired
HotButton
NaviCirc
DHW Supply

* A Taco 008-BC6 or Grundfos 15-42 BUC7 (or equivalent) circulation pump is recommended for use with the NCB-H boiler and DHW recirculation systems.
* When using the external recirculation mode, observe the following maximum recirculation pipe lengths including fittings ($^3/_4$" pipe is recommended). Lengths in excess of these limits will require a larger recirculation pump.

Maximum Pipe Lengths		
Pipe Diameter	$^1/_2$"	$^3/_4$"
Maximum Pipe Length	100 ft (30 m)	400 ft (120 m)

Note

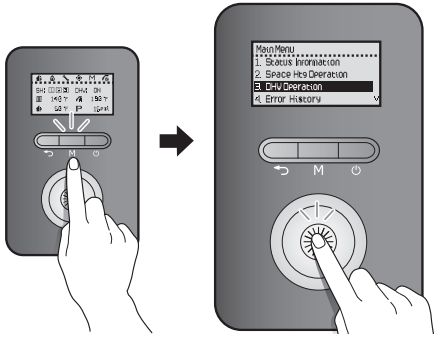
- To use HotButton mode, install a HotButton and recirculation pump.
- Install the NaviCirc recirculation valve to the faucet furthest from the NCB-H boiler.
- If installed in close proximity to the boiler, faucets further down the supply line will take longer to receive hot water.

2.5 NFC-H System

For more information about external recirculation mode and DIP switch settings, refer to the NFC-H Installation & Operation Manual.

2.5.1 Setting the DHW Operation

To set the boiler's DHW operation, press the Menu button (M), and then select "3. DHW Operation".



Rotate the Command dial (◎) to switch between the list items or to increase/decrease setting values. Press the Command dial (◎) to select an item or to confirm after making changes.

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

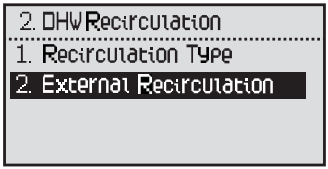
Item	Description
1. DHW Set Temp	Set the hot water temperature (°F). • Setting range: 86 - 140°F (30 - 60°C) • Default: 122°F (50°C)

Item	Description
2. DHW Recirculation	When only one NFC-H boiler is connected: Set the Recirculation type and Schedule settings. • Recirculation type - No Recirculation - Combi Pre-Heat - External **Note** External recirculation cannot be used for cascade systems. Recirculation type settings (Combi Pre-heat/ External) • Set to Combi Pre-heat (Default: Always On) - Always On - Intelligent - Weekly **Note** Intelligent mode cannot be used for cascade systems. • Set to External (Default: Always On) - Always On - Intelligent - Weekly - Aquastat - Manual

2.5.2 Setting External Recirculation

External Recirculation

When using the External Recirculation feature, you can choose commands in the menu to preheat according to the set DHW temperature.



Item	Description
1. Always On	Set to repeat DHW Recirculation.
2. Intelligent*	Set to detect DHW use for a week and repeat the detected cycle.
3. Weekly*	The user can choose commands for DHW Recirculation on a weekly basis. 1. 1 Day: schedule a command for the week. 2. 3 Day: schedule commands for Weekdays, Saturdays, and Sundays. 3. 7 Day: schedule commands for each day of the week.
4. Aquastat	Set to use an aquastat for DHW Recirculation.
5. HotButton (Manual)	Set to use HotButton Push Buttons to activate Recirculation.

* To choose this option you must set up the Time settings in the Configuration menu.

Note If there is a space heating demand signal during external recirculation, pre-heating will take priority, and space heating will start afterwards.

2.5.3 Examples of Electrical Connections

⚠ 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 electrical components.
- 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.

Note The installation must comply with National Electrical Code and any other national, state, provincial or local codes or regulations. In Canada, CSA C22.1 Canadian Electrical Code Part 1, and any local codes.
Wiring must be N.E.C. Class 1. If original wiring as supplied with boiler must be replaced, use only type 105 °C wire or equivalent.
Boiler must be electrically grounded as required by National Electrical Code ANSI/NFPA 70 – latest edition.

2.5.3.1 Accessing the NFC-H Terminal Strips

⚠ DANGER

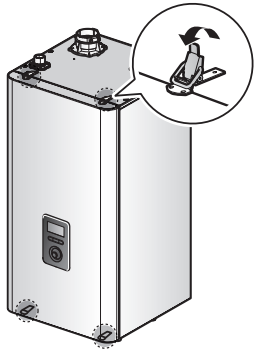
Electric Shock Hazard

To prevent serious injury or death:

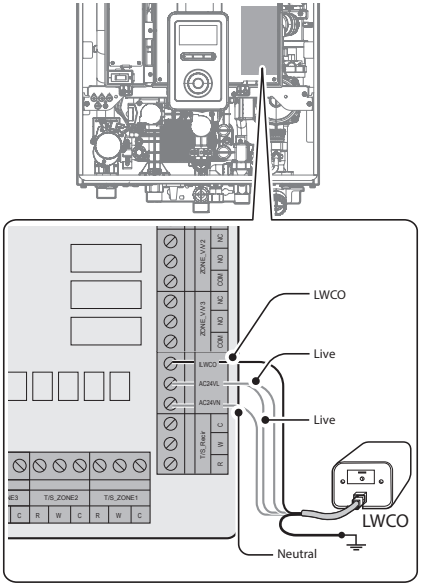
You must ensure that the boiler is disconnected from the electrical supply before carrying out any servicing inside the boiler and, particularly, on the electric terminal strips.

To access the PCB, carefully follow the steps below:

1. Turn off the power supply to the boiler.
2. Unfasten the 4 latches (2 at the top and 2 at the bottom) to remove the front cover and gain access to the internal components.

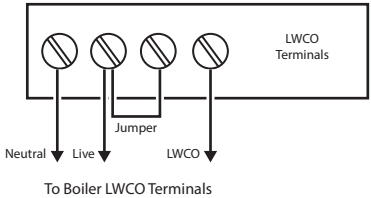


2.5.3.2 Wiring Diagram - External LWCO



Note The boiler supplies 24 VAC at the LWCO power terminals (CNC3).

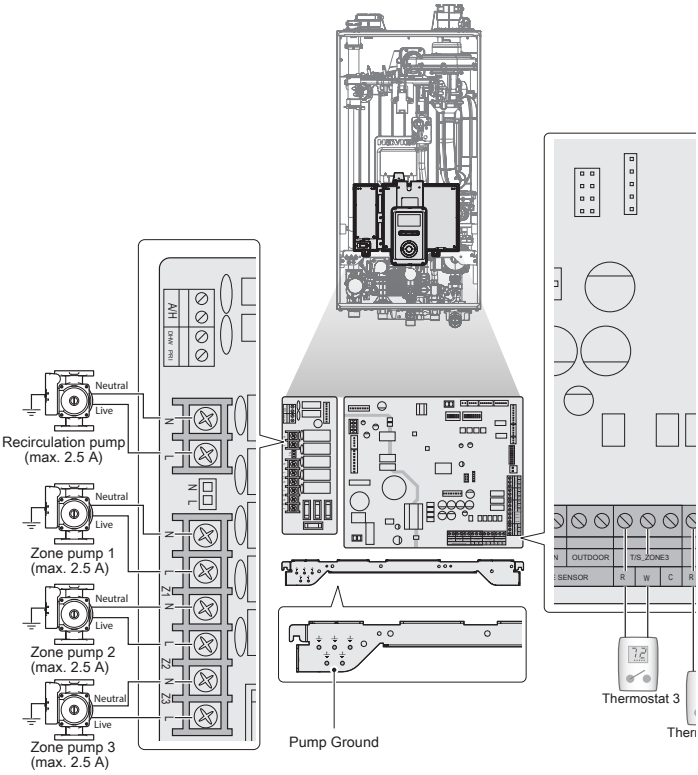
For terminal type LWCO appliances, a typical wiring method is shown below (same voltage for control and burner circuit):

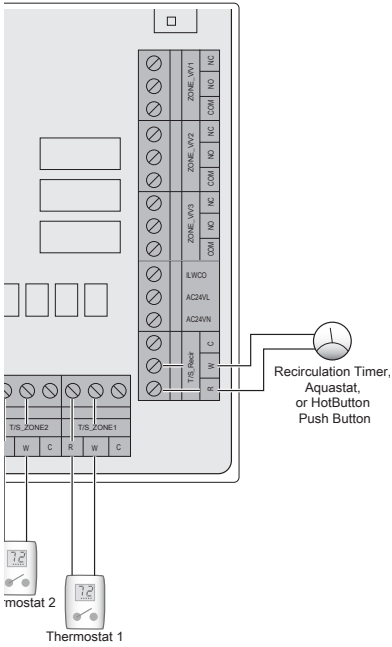


2.5.3.3 Wiring Diagram - Zone Pump System with Recirculation

NFC-H boilers can use both the 3 zone heating system and the DHW recirculation feature. The following wiring diagram shows the 3 zone system and the DHW external recirculation feature.

Without 24VAC Connections



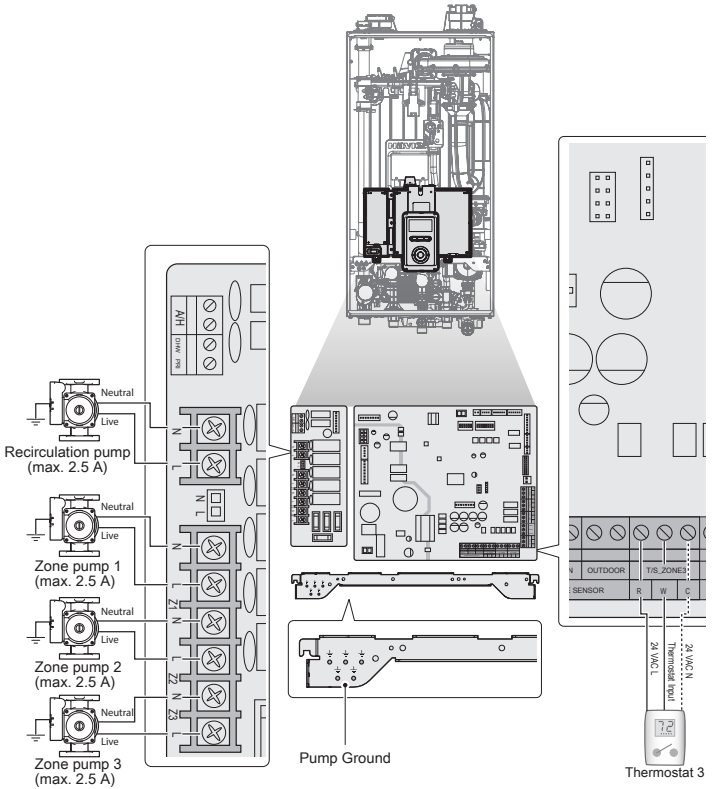


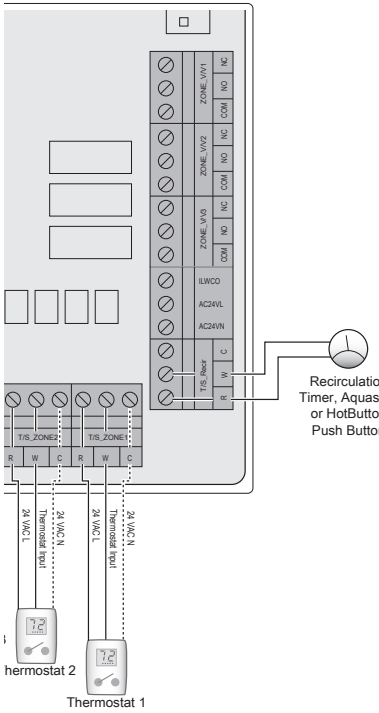
* If the DHW recirculation menu is set to the Always On, Intelligent, or Weekly option, no aquastat or additional HotButton is required.

Note

- The C terminals are for optional connections with 24 V thermostat COMMON.
- When using combi pre-heat, using a recirculation pump is not necessary. Select combi pre-heat on the DHW recirculation menu of the parameter setting part.
- When using external recirculation, install a recirculation pump and select external recirculation in the DHW recirculation menu.

With 24VAC Connections





* If the DHW recirculation menu is set to the Always On, Intelligent, or Weekly option, no aquastat or additional HotButton is required.

Note

- When using combi pre-heat, using a recirculation pump is not necessary. Select combi pre-heat on the DHW recirculation menu.
- When using external recirculation, install a recirculation pump and select external recirculation in the DHW recirculation menu.

2.5.4 External Recirculation with NaviCirc

The following pump models are recommended for use with the NFC-H boiler and DHW recirculation systems.

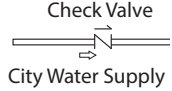
When using the indicated pump models, observe the following maximum recirculation pipe lengths:

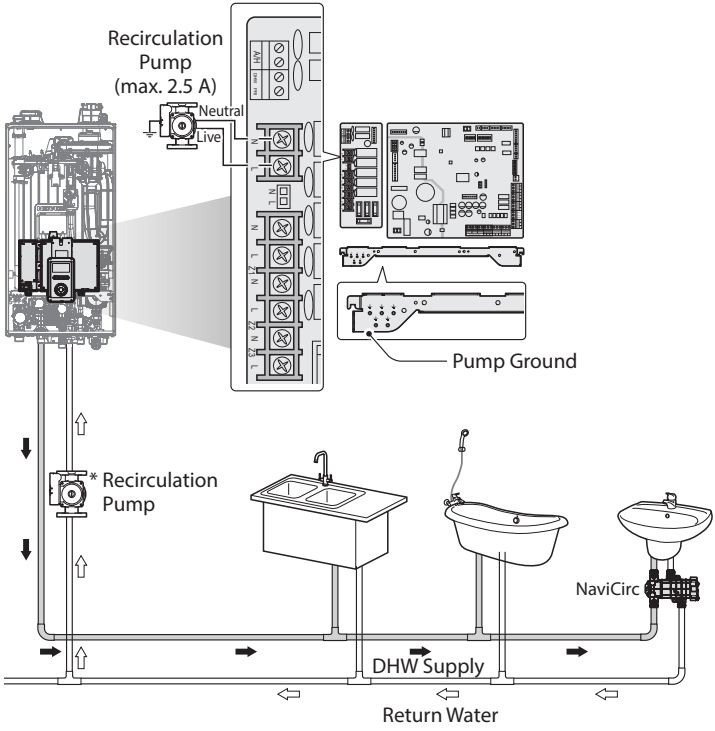
- 100 feet (30 m) equivalent length of $^{1}/_{2}$" copper pipe
- 400 feet (120 m) equivalent length of $^{3}/_{4}$" copper pipe

External Recirculation Mode

For best performance, select the Intelligent or Weekly option in the External recirculation DHW recirculation menu. To use the aquastat mode, install an aquastat to the DHW pipe line and connect to the CNC6 terminal on the PCB. (Refer to "2.4.3.3 Wiring Diagram - Zone Pump System with Recirculation" on page 75 for details.)

Note Combi pre-heat is the default mode for DHW recirculation. To select external recirculation, refer to the combi pre-heat and external recirculation sections in "2.4.1 Setting the DHW Operation" on page 69 for details.




Recirculation
Pump
(max. 2.5 A)
Neutral
Live
Pump Ground
* Recirculation
Pump
NaviCirc
DHW Supply
Return Water

* A Taco 008-BC6 or Grundfos 15-42 BUC7 (or equivalent) circulation pump is recommended for use with the NFC-H boiler and DHW recirculation systems.
* When using the external recirculation mode, observe the following maximum recirculation pipe lengths including fittings ($^3/_4$" pipe is recommended). Lengths in excess of these limits will require a larger recirculation pump.

Maximum Pipe Lengths		
Pipe Diameter	$^1/_2$"	$^3/_4$"
Maximum Pipe Length	100 ft (30 m)	400 ft (120 m)

Note

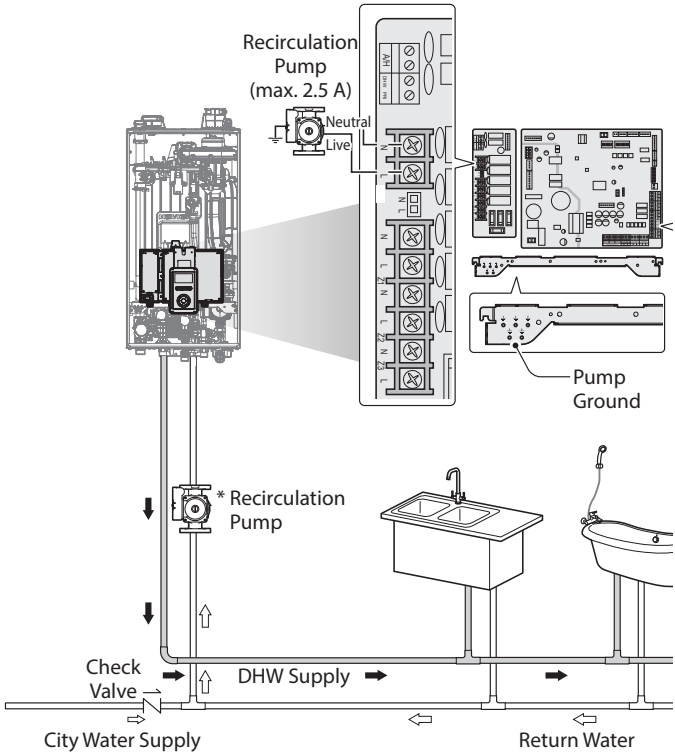
- Install the NaviCirc recirculation valve on the faucet furthest from the NFC-H boiler.
- If installed in close proximity to the boiler, faucets further down the supply line will take longer to receive hot water.

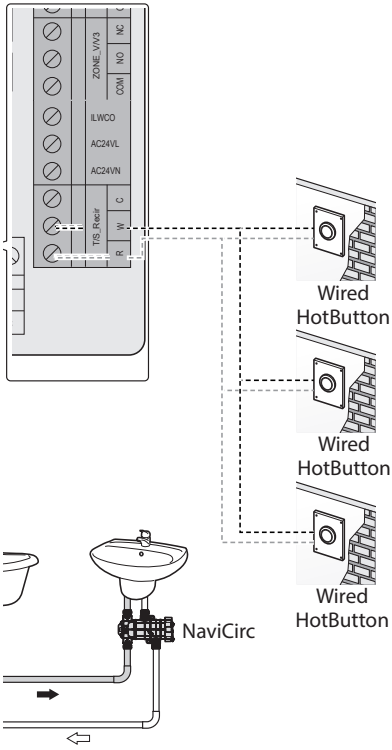
2.5.5 External Recirculation with HotButton (Optional) and NaviCirc

External Recirculation Mode

For best performance, select the manual option in the External recirculation DHW recirculation mode.

Note Combi pre-heat is the default mode for DHW recirculation. To select external recirculation, refer to the combi pre-heat and external recirculation sections in "2.4.1 Setting the DHW Operation" on page 69 for details.


Recirculation
Pump
(max. 2.5 A)
Neutral
Live
Pump
Ground
* Recirculation
Pump
Check
Valve
DHW Supply
City Water Supply
Return Water



* A Taco 008-BC6 or Grundfos 15-42 BUC7 (or equivalent) circulation pump is recommended for use with the NFC-H boiler and DHW recirculation systems.
* When using the external recirculation mode, observe the following maximum recirculation pipe lengths including fittings ($^3/_4$" pipe is recommended). Lengths in excess of these limits will require a larger recirculation pump.

Maximum Pipe Lengths		
Pipe Diameter	$^1/_2$"	$^3/_4$"
Maximum Pipe Length	100 ft (30 m)	400 ft (120 m)

Note

- To use HotButton mode, install a HotButton and recirculation pump.
- Install the NaviCirc recirculation valve to the faucet furthest from the NFC-H boiler.
- If installed in close proximity to the boiler, faucets further down the supply line will take longer to receive hot water.

3. Troubleshooting

If you experience a problem with the NaviCirc, refer to the following table for possible remedies.

Problem	Possible cause(s)
The water from the hot water tap is not hot enough.	• Full temperature water has not reached the fixture. • The hot water temperature of the water heater is set too low. • The pump is not operating properly. • The pump is working, but hot water does not reach the NaviCirc. • NaviCirc is not installed properly.
The water from the hot water tap is not hot enough even when the water heater is set at a high temperature.	• NaviCirc malfunction.
The water from the hot water tap is too hot.	• The water heater temperature is set too high.
Hot water comes out while cold water is being used.	• NaviCirc is operating properly. • NaviCirc malfunction.
Noises after installation.	• Recirculation temperature cut-off function.

What to do
• Keep the fixture open to allow the hot water line to purge. • Set the water heater temperature to a higher temperature. • Check whether the pump is stuck. • If NaviCirc is used on a non-Navien appliance, check that the pump is properly sized and installed per the manufacturer's instructions. • Clean out the water heater filter and the NaviCirc inlet. • Contact Navien Technical Support.
• Contact Navien Technical Support.
• Adjust the water heater temperature.
• It is normal for some hot water to bleed over to the cold line during recirculation. • If the hot water discharge continues to come from the cold water faucet after installation, the NaviCirc may require service. • In this case contact Navien Support.
• The NaviCirc will stop recirculation if it reaches the set temperature during recirculation. This is the NaviCirc temperature cut-off function and small noises may occur. This means the NaviCirc is operating normally. • If other noises occur, contact Navien Technical Support.

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.

Note Navien does not guarantee the performance of the NaviCirc when used on a non-Navien appliance.

Applicable Warranty Period

Period of Coverage	
All other part 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 Technical Administration 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.

MEMO

MEMO

Navi irc™

Installation and Operation Manual

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