

Technical Bulletin 158 - I-Series Boiler with DHW Recirculation

PURPOSE: To announce the I-Series Condensing Combi Boiler offers DHW recirculation and to explain how DHW recirculation works, the different recirculation modes, and how to configure the boiler for DHW recirculation.

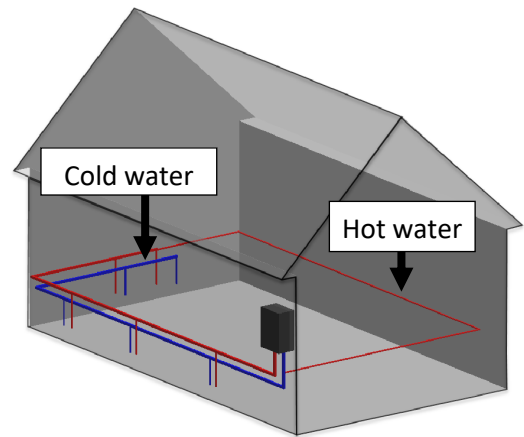
I-Series Condensing Combi Boiler Models: i060C, i090C, and i120C

DHW Recirculation Facts:

- Recirculation circulates hot water through the plumbing system, so hot water is always available in whatever part of the house that the consumer may need it.
- Recirculation requires an external recirculation pump. For pump sizing, reference the “DHW Pressure Drop and Flow Curve” in the Boiler Installation and Operation Manual.
- An optional 24V timer can be used to set the time intervals and duration of recirculation (an example timer is the Intermatic® MIL72ASTUZ-24).
- Two recirculation modes are available: Dedicated and Crossover:

Dedicated Mode:

- The plumbing system includes a dedicated hot water return line.
- Recirculation technology in the boiler decides if the pump will turn on based on time intervals and DHW setpoint temperature.
- How the recirculation pump works:
 - The pump turns ON and runs until the DHW return water temperature is within 6°F of the setpoint temperature, or for 20 minutes, whichever occurs first.
 - The pump stays OFF based on the DHW setpoint temperature (as outlined in the table below).

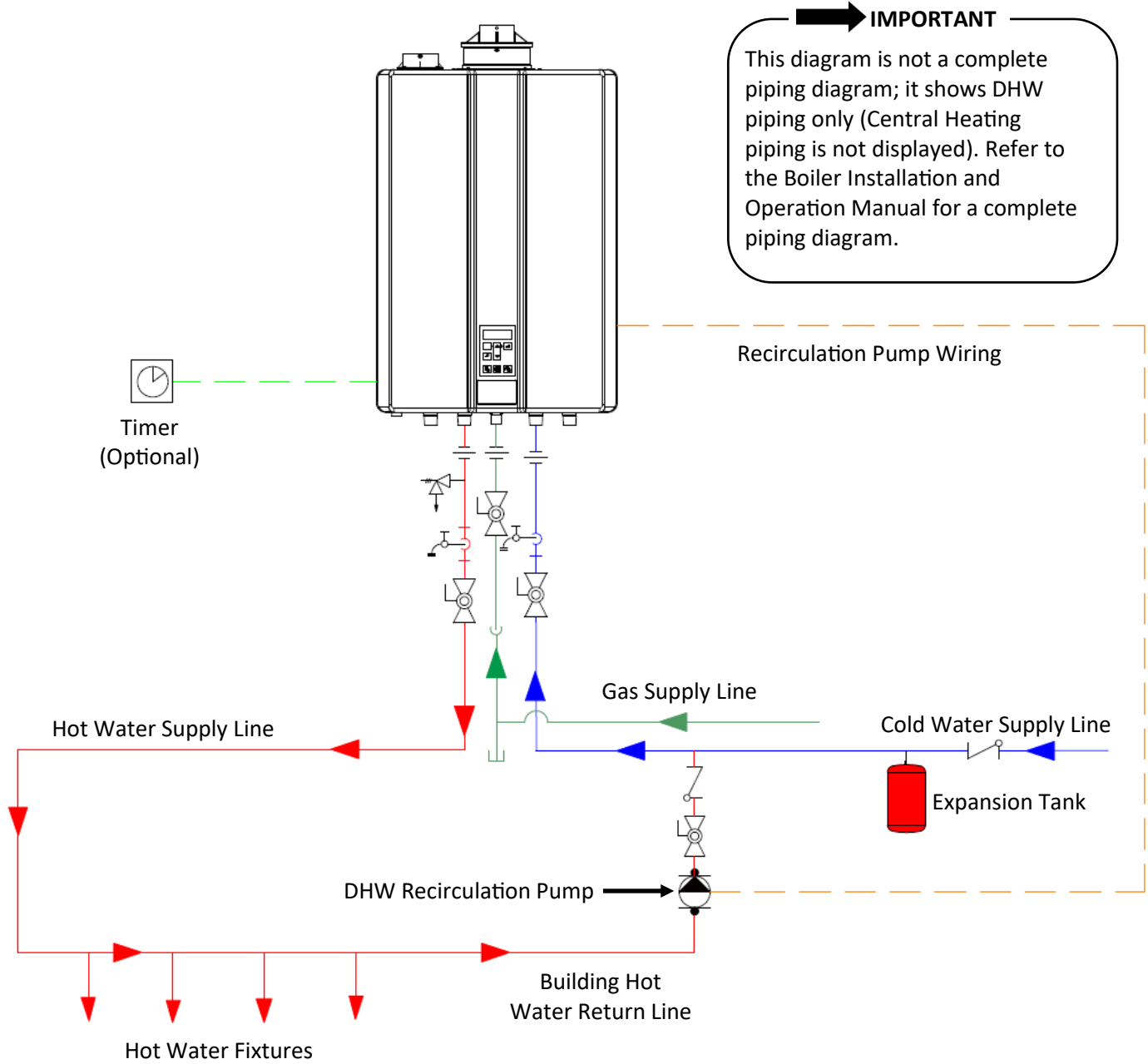


Home includes dedicated hot water and cold water lines.

DHW Setpoint Temperature (°F)	140°	135°	130°	125°	120°	115°	110°	108°	106°	104°	102°	100°	98°
Typical Pump OFF Intervals (Minutes)	9	10	11	12	14	16	19	20	22	24	26	28	31

Note: Rinnai strongly recommends installing insulation to the hot water and dedicated return lines to decrease the amount of heat loss.

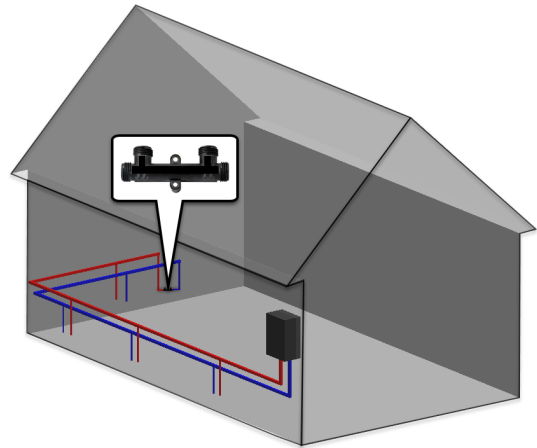
Dedicated Mode Plumbing Diagram



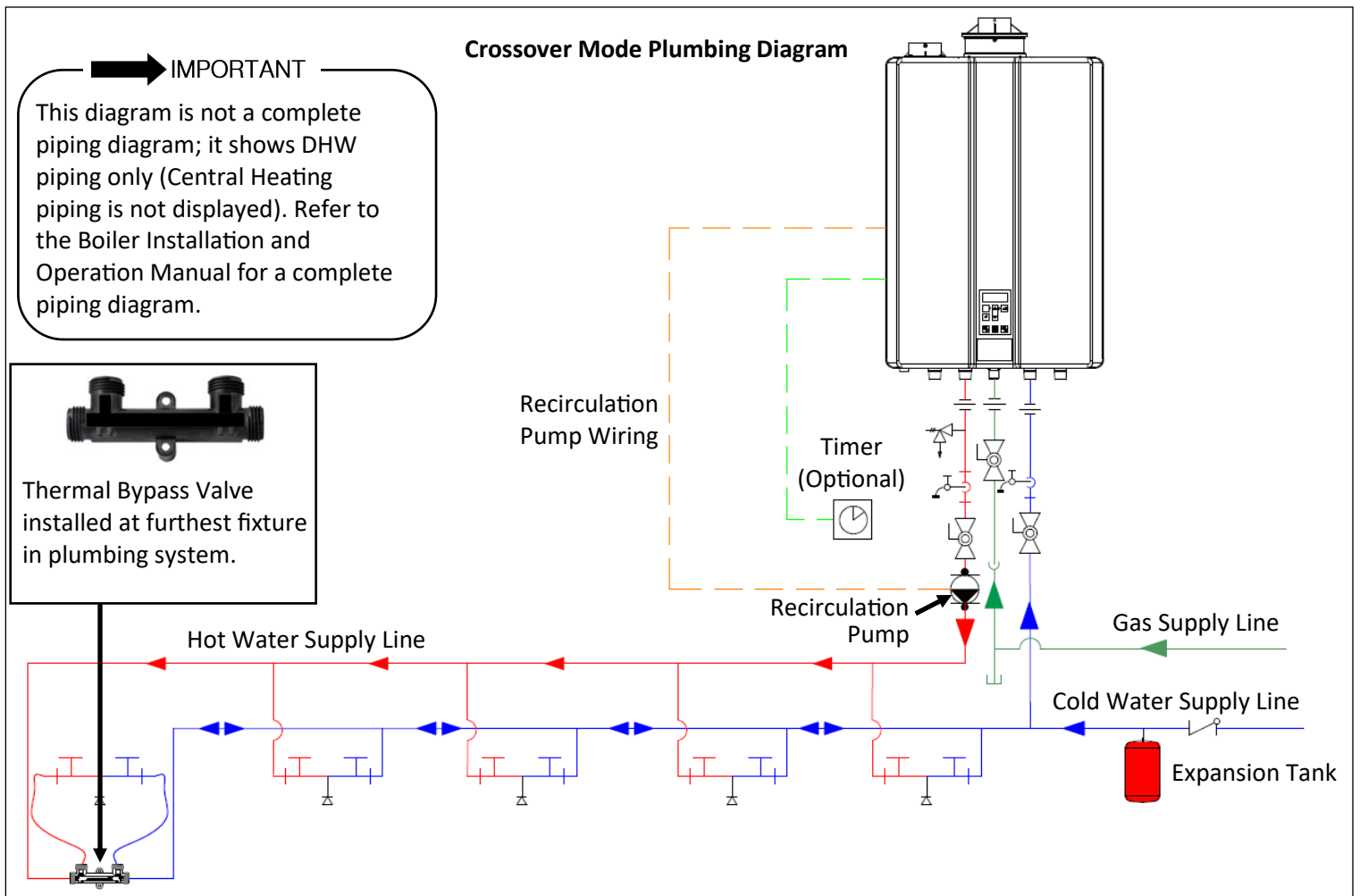
Crossover Mode (Factory Default):

- The plumbing system does not have a dedicated circulation return line. Crossover mode requires installation of a **thermal bypass valve** at the furthest fixture in the plumbing system. When installed, the boiler uses the cold water line for hot water recirculation. A thermal bypass valve can be purchased through Rinnai (PN: 107000143) or plumbing supply stores.
- How the recirculation pump works:
 - The pump turns ON and runs until the thermal bypass valve closes (with a DHW flow less than approximately 0.26 GPM), or for 20 minutes, whichever occurs first.
 - The pump stays OFF for 10 minutes.

Note: The thermal bypass valve should only be used for Crossover Mode recirculation systems. Do not install more than one thermal bypass valve in the plumbing system.



Home includes a thermal bypass valve installed at the furthest fixture

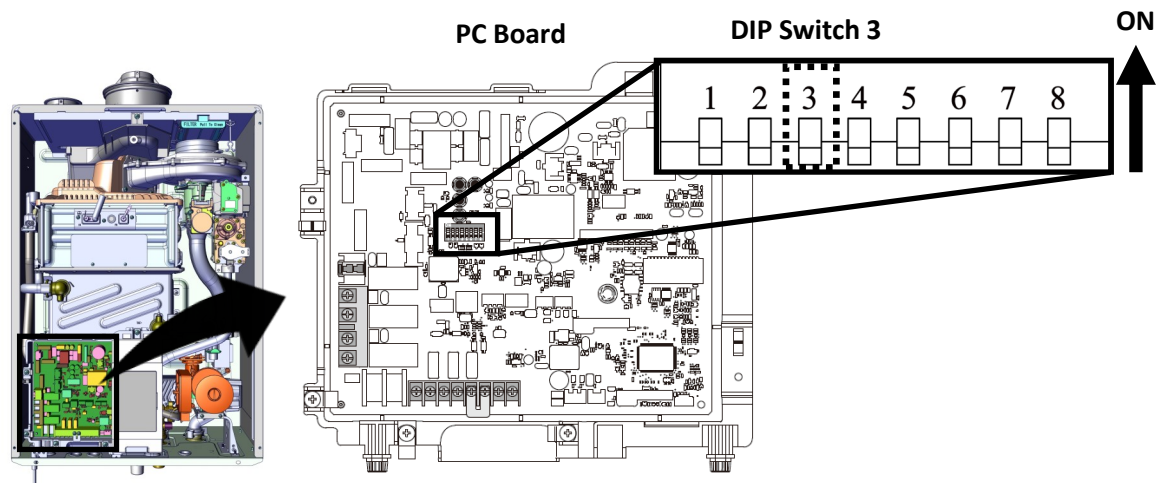


Configure the Boiler for DHW Recirculation:

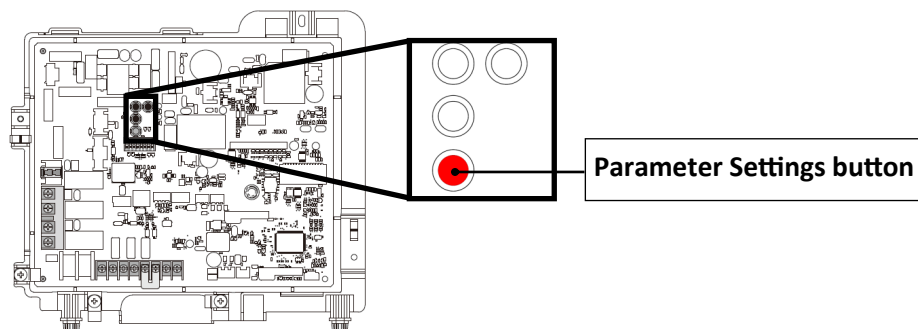
Step 1: Set DIP Switches and Parameter Settings

Note: Refer to the Boiler Installation and Operation Manual for complete DIP Switch and Parameter Setting instructions.

1. Remove the boiler's front panel.
2. Locate the PC Board (lower left side of unit).
3. Locate the DIP switches on the PC Board (see below). Adjust **DIP switch 3** to the **ON** position.



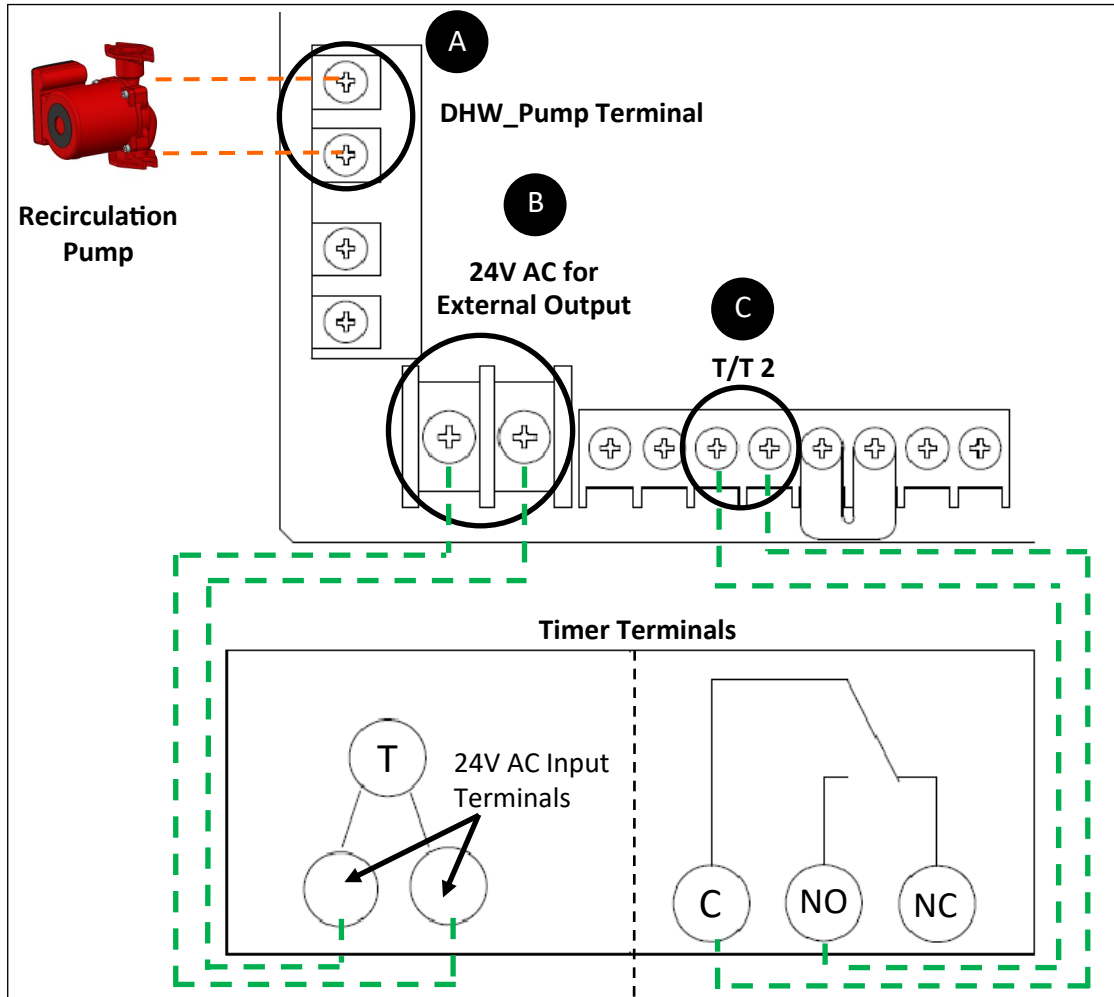
4. Locate the Parameter Settings button on the PC Board (red button). Press and hold the red button for five seconds to enter into Parameter Settings mode.
5. Adjust Parameters 12 and 13 to the desired settings shown in the table below.



Parameter Number	Function/Description	Selection	
		A (Default)	b
12	<ul style="list-style-type: none"> • Select option A for Crossover Mode • Select option b for Dedicated Mode 	Crossover Mode	Dedicated Mode
13	<ul style="list-style-type: none"> • Select option A if a timer is used to control DHW recirculation • Select option b if a timer is not used to control DHW recirculation 	Yes (Timer)	No (No Timer)

Step 2: Connect Wiring to PC Board

6. Wire the external DHW recirculation pump to the **DHW_Pump Terminal** connection on the PC Board (see **A** below).
7. If using a timer:
 - Wire the 24V AC timer circuit to the **24V AC for External Output** connection (see **B**).
 - Wire the timer **C** and **NO** contacts to the **T/T 2** connection (see **C**).



- Timer receives power from the PC Board.
- The 24V AC timer circuit must be electrically isolated from the **C** and **NO** contacts that connect to the **T/T 2** terminal.

- Electrically isolated contacts **C** and **NO** close the **T/T 2** circuit on the boiler to activate recirculation.
- Do not connect the **NC** terminal to the PC Board (if the timer includes an **NC** terminal).
- Connections **C**, **NO** and **NC** should not be connected to timer 24V AC input terminals.

Note: Do not connect the timer to any of the 120V terminals on the PC Board or to any other 120V components.

8. Replace the boiler's front panel.