

INSTALLATION AND OPERATION MANUAL

Rinnai Circ-Logic

With Grundfos GTK15 Kit

For SENSEI™ and non-SENSEI™ Tankless Water Heaters



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READ AND SAVE THESE INSTRUCTIONS

1 About

Thank you for purchasing a Grundfos GTK15 Kit. Before installing and operating this pump, be sure to read these instructions completely and carefully to familiarize yourself with the pump's features and functionality.

Rinnai's recirculation technology is called Circ-Logic. Circ-Logic allows consumers to set recirculation patterns that coincide with their hot water usage patterns. Hot water is available when needed, without circulating it during times of inactivity. The GTK15 kit, manufactured by Grundfos, allows the user to enjoy Circ-Logic with VC, KB, and SENSEI™ series tankless water heaters on a dedicated return line with the use of an external pump.

For all models, Circ-Logic operates in either **Comfort** or **Economy** Mode (the modes are selected by dip switches/parameter settings inside the water heater):

- **Comfort mode** — Cycles the pump more frequently, ensuring the loop temperature remains higher (but also uses more energy).
- **Economy mode** — Cycles the pump less often, using less energy to maintain the circulation loop temperature.

1.1 How This Manual is Organized

This manual contains the following sections and appendix:

- Section 1 describes the contents of the GTK15 Kit and pump installation guidelines for all tankless water heater models.
- Section 2 contains installation instructions for SENSEI™ tankless water heaters. If you are installing a GTK15 Kit on one of the following tankless water heater models, follow the instructions in Section 2.
 - RU199i/e
 - RU180i/e
 - RU160i/e
 - RU130i/e
 - CU199i/e
 - CU160i/e
- Section 3 contains installation instructions for non-SENSEI™ tankless water heaters. If you are installing a GTK15 Kit on one of the following tankless water heater models, follow the instructions in Section 3.
 - RLX94i
 - RL75i/e (VC)
 - RL94i/e (VC)
 - RU98i/RUC98i and RU98e (KB)
 - RU80i/RUC80i and RU80e (KB)
- Section 4 provides information on operating the GTK15 pump timer settings, applications, and troubleshooting for all models.
- Section 5 is an appendix containing system drawings for recirculation with a GTK15 Kit pump.

1.2 Disclaimers

- The pump must be installed in accordance with these installation instructions when Circ-Logic is used.
- This document is intended to be used as a guide only and not as a replacement for a professionally engineered project. The contractor/engineer must determine the necessary components for and configuration of the particular system being installed. This guide does not imply compliance with local or national building codes. It is the engineer's or contractor's responsibility to ensure the installation is in accordance with all local building codes. The water heater and the plumbing system should be installed in accordance with local codes and with the Rinnai Tankless Water Heater Installation and Operation Manual.

1.3 Kit Contents

The GTK15 Kit contains the following:

- Grundfos 15-55 pump with timer and internal check valve
- 6 ft. (2 m) electrical cord
- 6 ft. (2 m) BX conduit pre-wired to pump (In-line 4 amp glass Fuse included)
- (5) wire nuts
- Flange kit
- Rinnai Circ-Logic Manual



IMPORTANT

If installing with a SENSEI™ tankless water heater, the controller cable necessary to wire the pump to the water heater is not included in this kit. Make sure you have purchased this accessory cable separately before continuing installation.

1.4 Pipe Length

Equivalent Pipe Length * using Grundfos GTK15 @ 120 °F	Up to 200 ft (61 m)
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* The Equivalent Pipe Length includes supply piping, return piping, and fittings. The Installer/Contractor/Engineer must calculate the total equivalent pipe length of the piping system.

1.5 Installation Guidelines for All Models

A licensed professional must install the GTK15 Kit.

The installer should have the following skills:

- Connect gas lines, water lines, valves, and electricity.
- Knowledge of applicable national, state, and local codes.

If you lack these skills, contact a licensed professional.

The pump supplied with your GTK15 Kit is meant for **indoor installations only**. It is designed to circulate water from 36 °F to 150 °F up to a maximum pressure of 145 PSI.

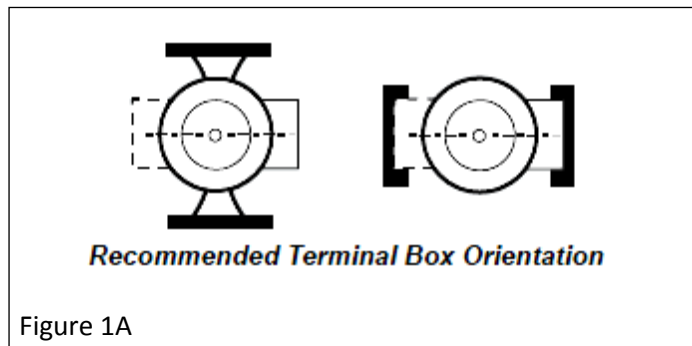
The proper operating voltage and other electrical information can be found on the nameplate attached to the top of the motor.

To the Installer

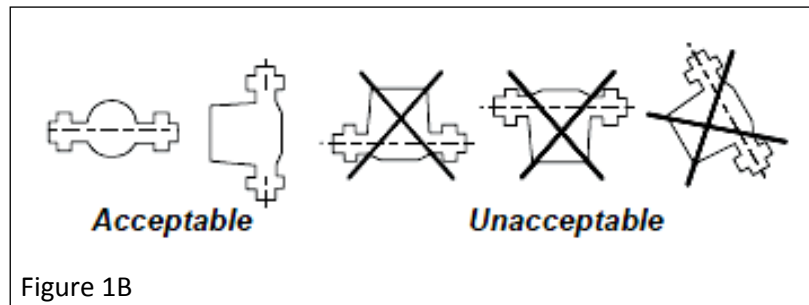
- Thoroughly clean and flush the system prior to pump installation.
- Do not install the pump at the lowest point of the system where dirt and sediment naturally collect.
- Install an air vent at the high point(s) of the system to remove accumulated air.
- Ensure that water does not enter the terminal box during the installation process.
- Install the pump as shown on the system drawings; the suction side of the pump should be flooded with water.
- **DO NOT START THE PUMP UNTIL THE SYSTEM HAS BEEN FILLED AND CHECKED FOR LEAKS OR OTHER POSSIBLE COMPONENT FAILURES.**

Position of Terminal Box

Proper installation of the pump will have the terminal box located to one side of the pump or the other, with the conduit entry down (Figure 1A).



The arrows on the side or bottom of the pump housing indicate direction of flow through the pump. GRUNDFOS circulators can be installed in both vertical and horizontal lines. The pump must be installed with the motor shaft positioned horizontally. Under no circumstances should the pump be installed with the shaft vertical or where the shaft falls below the horizontal plane (Figure 1B).



It is recommended that isolation valves be installed on each side of the pump. If possible, do not install elbows, branch tees, and similar fittings just before or after the pump. Provide support to the pump or adjacent plumbing to reduce thermal and mechanical stress on the pump.

2

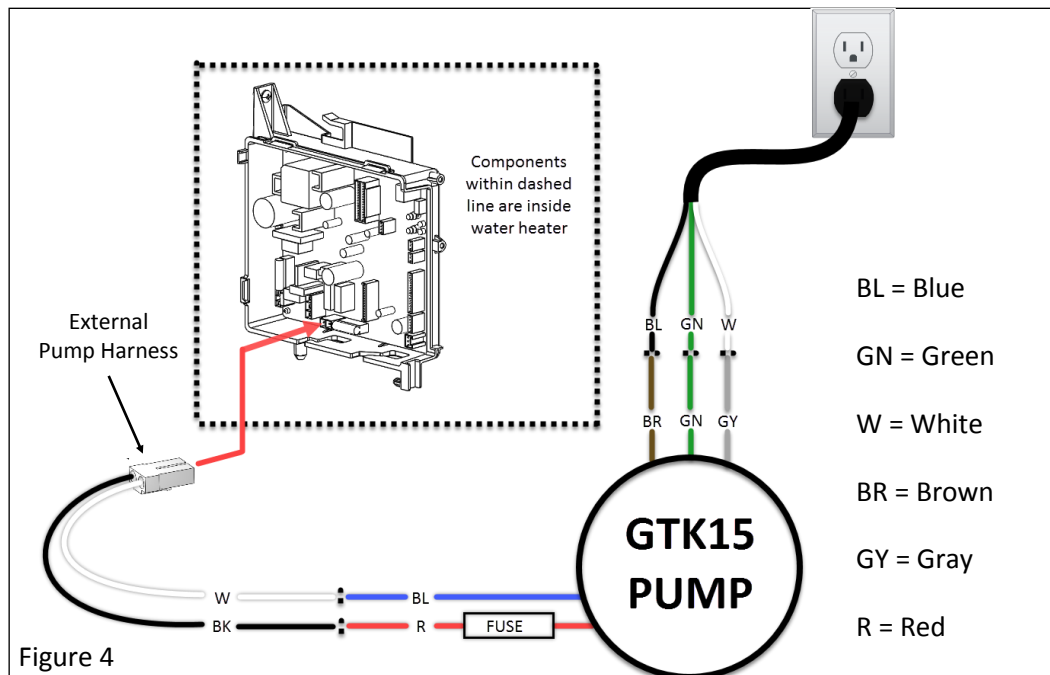
SENSEI™ Installation

2.1 Wiring the Pump to the Water Heater

⚠ WARNING Install the Rinnai water heater according to the Rinnai Installation and Operation Manual. The water heater must be electrically grounded in accordance with local codes and ordinances or, in the absence of local codes, in accordance with the National Electrical Code, ANSI/NFPA No. 70. Indoor water heaters are equipped with a three-prong (grounding) plug for your protection against shock hazard and should be plugged directly into a properly grounded three-prong receptacle. Do not cut or remove the grounding terminal from this plug. To protect yourself from harm, before installation:

- Turn off the electrical power supply by unplugging the power cord or by turning off the electricity at the circuit breaker. (The temperature controller does not control the electrical power.)
- Turn off the gas at the manual gas valve, usually located immediately below the water heater.
- Turn off the incoming water supply. This can be done by turning off the water supply to the building.

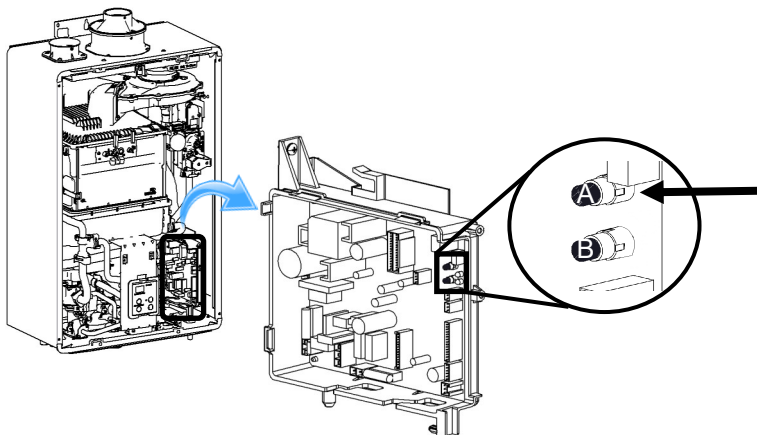
1. Turn off the electrical power supply by unplugging the power cord or by turning off the electricity at the circuit breaker.
2. Install the GTK15 pump according to the “Installation Guidelines for All Models” and system drawing in the Appendix.
3. Being careful not to damage existing wires, use a knockout or step drill bit to make a new hole to the left of the existing hole on the bottom of the water heater that is 3/4 in. (19 mm) in diameter.
4. Remove the lock nut from the end of the flexible conduit to route the line through the new hole. After the flexible conduit is installed through the bottom of the water heater, refasten the lock nut to secure the line.
5. Connect the wires labelled “Wire to Tankless” to the external pump harness cable (not included). Connect the blue to white wires and red to black wires, using one wire nut for each connection.
6. After the wires are securely fastened, connect the pump harness cable to the PC Board as illustrated below.
7. Take the wires labelled “Wire to Cord” and connect them to the black power cord wires. Connect the brown to black, green to green, and gray to white wires, using a wire nut to secure each connection.
8. Route the end of the black power cord out of the water heater through the rubber grommet opening at the base of the water heater. Connect the power cord to a nearby outlet or power source.



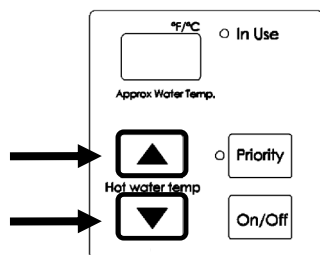
9. Adjust the parameter settings in the water heater for recirculation by following the information below.

2.2 Parameter Settings

a. Press the “A” button for 1 second.



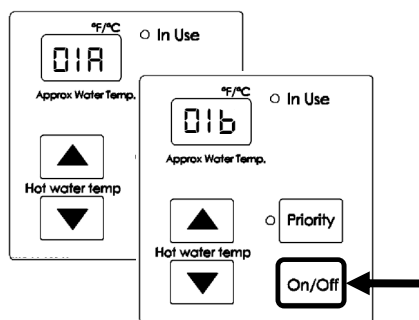
b. Use the ▲ (Up) and ▼ (Down) buttons on the controller to select a setting number following the table below. Refer to the Rinnai Tankless Water Heater Installation and Operation Manual for the full Parameter Settings table.



Setting #	Setting Description	Selection	
		A	B
04	Recirculation Settings	No Recirculation	Recirculation (Dedicated)
05	Recirculation Mode ¹	Economy	Comfort

¹ Setting 05 is available only if setting 04 B is selected.

c. After the desired setting number is selected, use the “On/Off” button on the controller to change the selection for the setting number. Example: Display will change from 01A to 01b for Maximum Temperature setting (as shown below).



d. To exit the parameters, press the “A” button on the PC board for 1 second.

10. Set the timer switch to the actual time by turning the programming ring in the direction of the arrow until the timing arrow points to the actual time on the ring.

11. Set the manual switch to “ON”.

12. Press the “On/Off” button on the controller. The pump and water heater will turn on to raise the recirculation loop temperature.

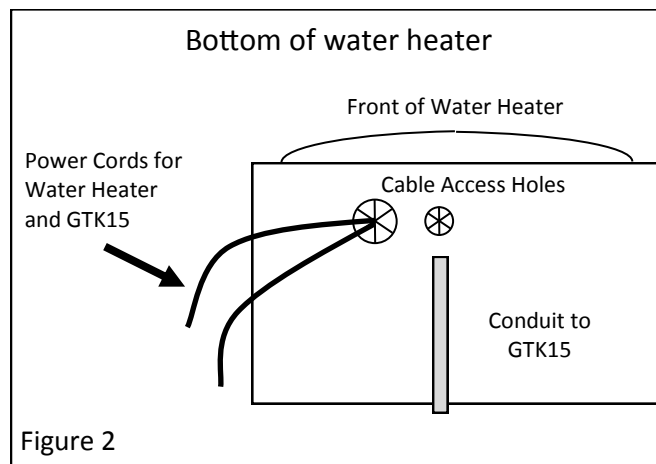
3 Non-SENSE™ Installation

3.1 Wiring the Pump to the Water Heater

⚠ WARNING Install the Rinnai water heater according to the Rinnai Installation and Operation Manual. The water heater must be electrically grounded in accordance with local codes and ordinances or, in the absence of local codes, in accordance with the National Electrical Code, ANSI/NFPA No. 70. Indoor water heaters are equipped with a three-prong (grounding) plug for your protection against shock hazard and should be plugged directly into a properly grounded three-prong receptacle. Do not cut or remove the grounding terminal from this plug. To protect yourself from harm, before installation:

- Turn off the electrical power supply by unplugging the power cord or by turning off the electricity at the circuit breaker. (The temperature controller does not control the electrical power.)
- Turn off the gas at the manual gas valve, usually located immediately below the water heater.
- Turn off the incoming water supply. This can be done by turning off the water supply to the building.

1. Turn off the electrical power supply by unplugging the power cord or by turning off the electricity at the circuit breaker.
2. Install the GTK15 pump according to the “Installation Guidelines for All Models” and system drawing in the Appendix. Re-route the water heater power cord or wiring from the smaller access hole to the larger access hole (Figure 2).



3. Route the line cord (power cord) for the GTK15 through this larger access hole.
4. On VC series models, use a knockout or step drill bit to enlarge the smaller hole to 3/4 in. (19 mm) diameter. On KB series models, the hole is already the correct size. Attach the conduit from the GTK15 to the smaller access hole using the connector supplied.

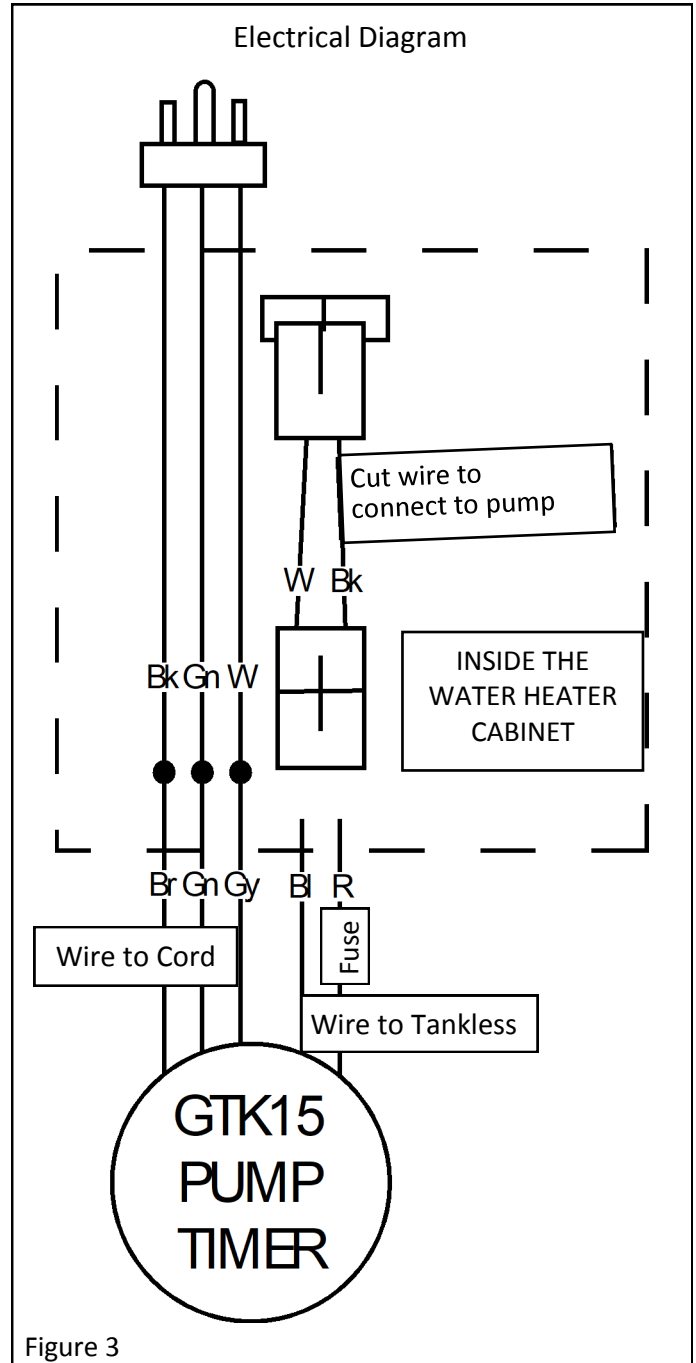
- Splice the brown, gray, and green wires from the Grundfos unit to the line cord (black, white, green) according to the wiring table. These splices should be located inside the water heater cabinet (Figure 3).
- The wire harness for the recirculation pump is bundled with the wire harness from the PC board (the pump wiring is labeled to show where to connect to the tankless water heater or cord as appropriate). The connector has a black and white wire with the label "Cut wire to connect to pump". To connect to the pump, cut the connector and splice the wires according to the wiring table and Figure 3. Follow Electrical Code and pump manufacturer's recommendations.

⚠ WARNING

RISK OF ELECTRIC SHOCK

The Grundfos GTK15 Pump has two power sources. Disconnect all supply connections before servicing. One is directly from the electrical outlet for the timer and the other is through the water heater for the pump.

Wiring Table		
Description	GTK15 (Timer)	Supplied Line Cord
+115VAC	Brown (Br)	Black (Bk)
Neutral	Gray (Gy)	White (W)
Ground	Green (Gn)	Green (Gn)
	GTK15 (Pump)	Rinnai Circ-Logic
+115VAC (Circ-Logic)	Red (R)	Black (Bk)
Neutral (Circ-Logic)	Blue (Bl)	White (W)



- Adjust the dip switch in the water heater by moving the 4th switch in the white set of switches (SW2) to ON. For Economy Mode, set the 8th switch in the white set of switches (SW2) to OFF (default). For Comfort Mode, set the 8th switch in the white set of switches (SW2) to ON.

Settings for SW2 (Bank Of White Switches)		
	Switch 4	Switch 8
Economy Mode	ON	OFF
Comfort Mode	ON	ON

- Connect power to the water heater and the GTK15 line cord.
- Set the timer switch to the actual time by turning the programming ring in the direction of the arrow until the timing arrow points to the actual time on the ring.
- Set the manual switch to "ON".
- Press the "On/Off" button on the controller. The pump and water heater will turn on to raise the recirculation loop temperature.
- Refer to section **4.4 Timer Operation** for additional information on programming the timers.

4

Operating the Pump

4.1 How It Works

Before operating the pump, the Rinnai water heater should be turned on and the DIP switches (SW2 - white switches, #4, #8)/parameters set correctly for recirculation and Comfort or Economy Mode.

Pump recirculation begins when the water heater is turned on. The Rinnai inlet and outlet thermistors measure the water temperature. If the inlet thermistor detects abnormal temperature, then diagnostic code 51 is generated and the pump will turn off.

When the return water temperature reaches approximately 15°F (8.3°C) below the temperature setting, the water heater and pump will turn off.

The cycle will start at the approximate time interval in the table based on the recirculation mode setting. The cycle stops based on the temperature thermistor readings.

4.2 Timer Technical Data

Timer Control

- Supply Voltage: 115-120 VAC, 60 hertz
- Ambient Temperature: -4 °F to 175 °F
- Shortest Switching Interval: 15 minute increment
- Switch Modes: “Timer”, “ON” Override, “OFF” Override
- Protection: Clear plastic cover for dust and moisture protection of the clock face.
- Timer Speed: Default is High and should be remain at High for Circ-Logic.

4.3 Timer Technical Application

The timer control is designed to turn the circulator on and off at preset times, allowing the user to select operation of the circulator during high use periods of the day.

The pump will only circulate water when both the timer and the Circ-Logic output are activated.

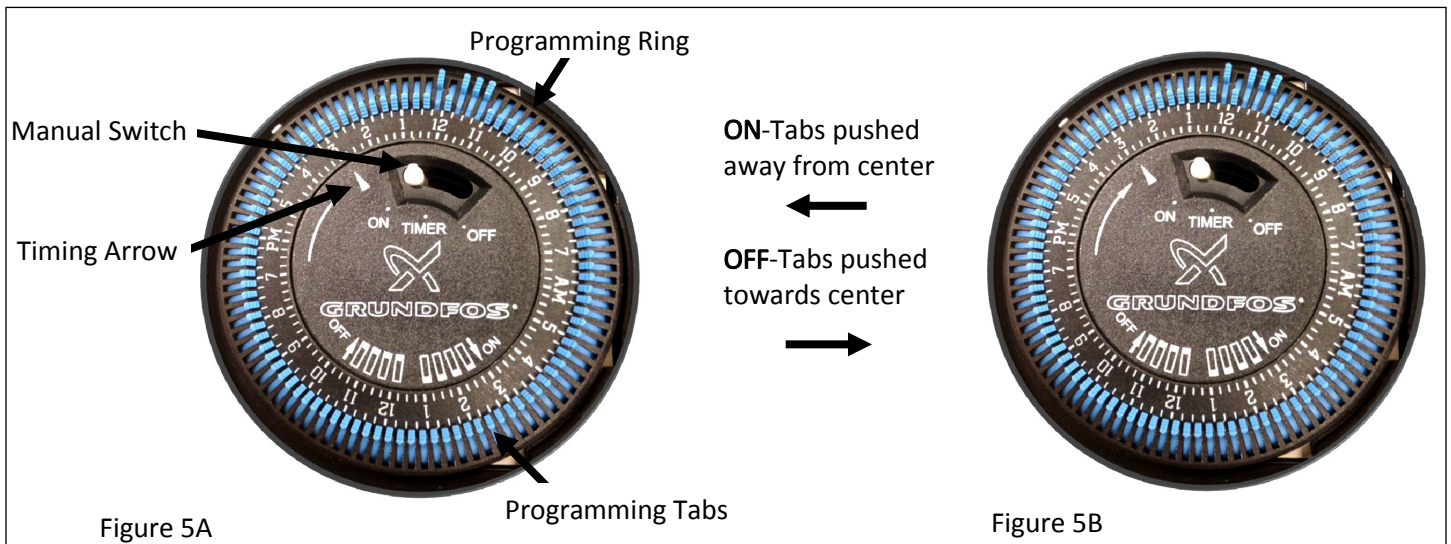
Rinnai Temperature Setting °F	Typical Pump ON Intervals* (minutes)	
	Economy Mode	Comfort Mode
140	31	15
135	31	15
130	31	15
125	31	15
120	31	15
115	35	18
110	42	21
108	45	22
106	49	24
104	54	27
102	60	30
100	68	34
98	79	39

* The pump will cycle on at these calculated intervals which are based on the temperature setting, insulation, and estimated heat loss in the system. The values for your installation may vary.

4.4 Timer Operation

NOTE: Before the circulator is started, the system must be filled with liquid and vented.

1. Set the timer switch to the actual time by turning the programming ring in the direction of the arrow until the timing arrow points to the actual time on the ring (Figure 5A).
2. Set the required "ON"/"OFF" times on the programming ring by pushing the programming tabs either away from or toward the center of the ring. Tabs pushed away from the center indicate the circulator is switched "ON," while tabs pushed toward the center indicate the circulator is switched "OFF" (Figure 5B).
3. Set the manual switch to the "TIMER" position. The circulator will now start/stop according to the settings of the programming tabs.
4. For continuous operation, set the manual switch to the "ON" position. To switch the circulator off, set the manual switch to the "OFF" position. The "ON"/"OFF" modes may be used without affecting the function of either the programming ring or the timer switch. Note that the circulator is controlled by both the Timer and the Circ-Logic output. Please see section 4.6 Sequence of Operation for more details.
5. In case of power outage, the timer will not keep time. After power has been restored, the correct time of day must be reset by rotating the programming ring in the direction of the arrow until the timing arrow points to the actual time on the ring.



4.5 Troubleshooting

When the pump is first started, the shaft may rotate slowly until water has fully penetrated the bearings. If the pump does not run, the shaft can be rotated manually. To accomplish this, switch the electrical supply off, and close the isolation valves on each side of the pump. Remove the large screw in the middle of the nameplate. Insert a small flat blade screwdriver into the end of the shaft and gently turn until the shaft moves freely (Figure 6). Replace and tighten the plug. Open the isolation valves and wait 2 to 3 minutes for the system pressure to equalize before starting the pump (Figure 6).



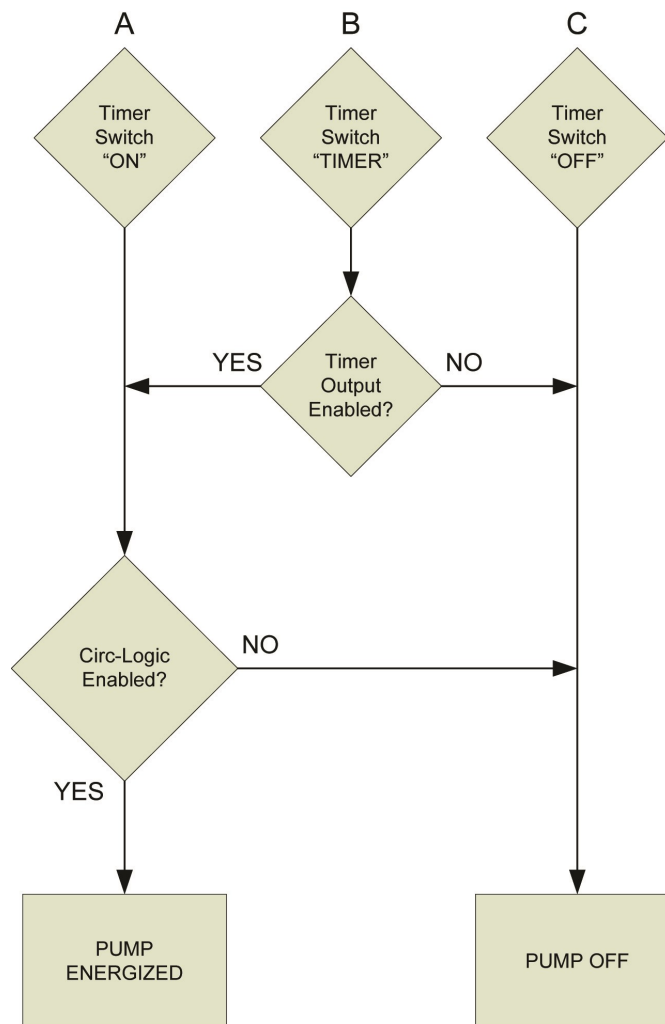
NOTE

The isolation valves are to be field supplied. This image is just for illustration purposes only.

4.6 Sequence of Operation

- A. When the manual switch of the Grundfos timer is in the “ON” position, the Circ-Logic will control the pump.
- B. When the manual switch is in the “TIMER” position:
- if the timer output relay is *activated* the Circ-Logic will control the pump.
 - if the timer output relay is *deactivated* the pump will remain off.
- C. When the manual switch is in the “OFF” position the pump will not run.

Sequence of Operations Flowchart



5 Appendix

5.1 SENSEI™ and Non-SENSEI™ System Drawing: Recirculation Using One Rinnai Water Heater

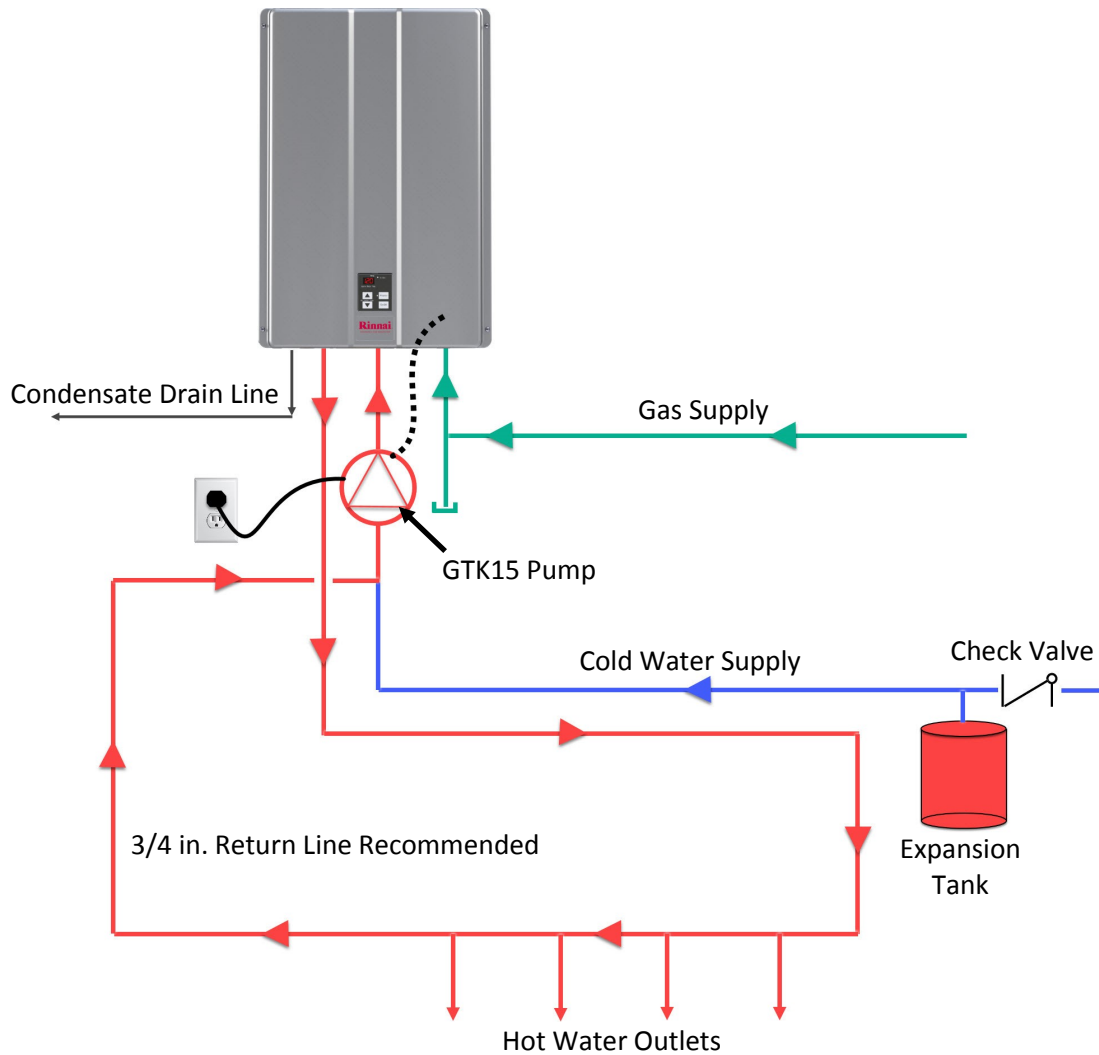


Figure 7

5.2 SENSEI™ System Drawing: Recirculation Using Two Rinnai Water Heaters

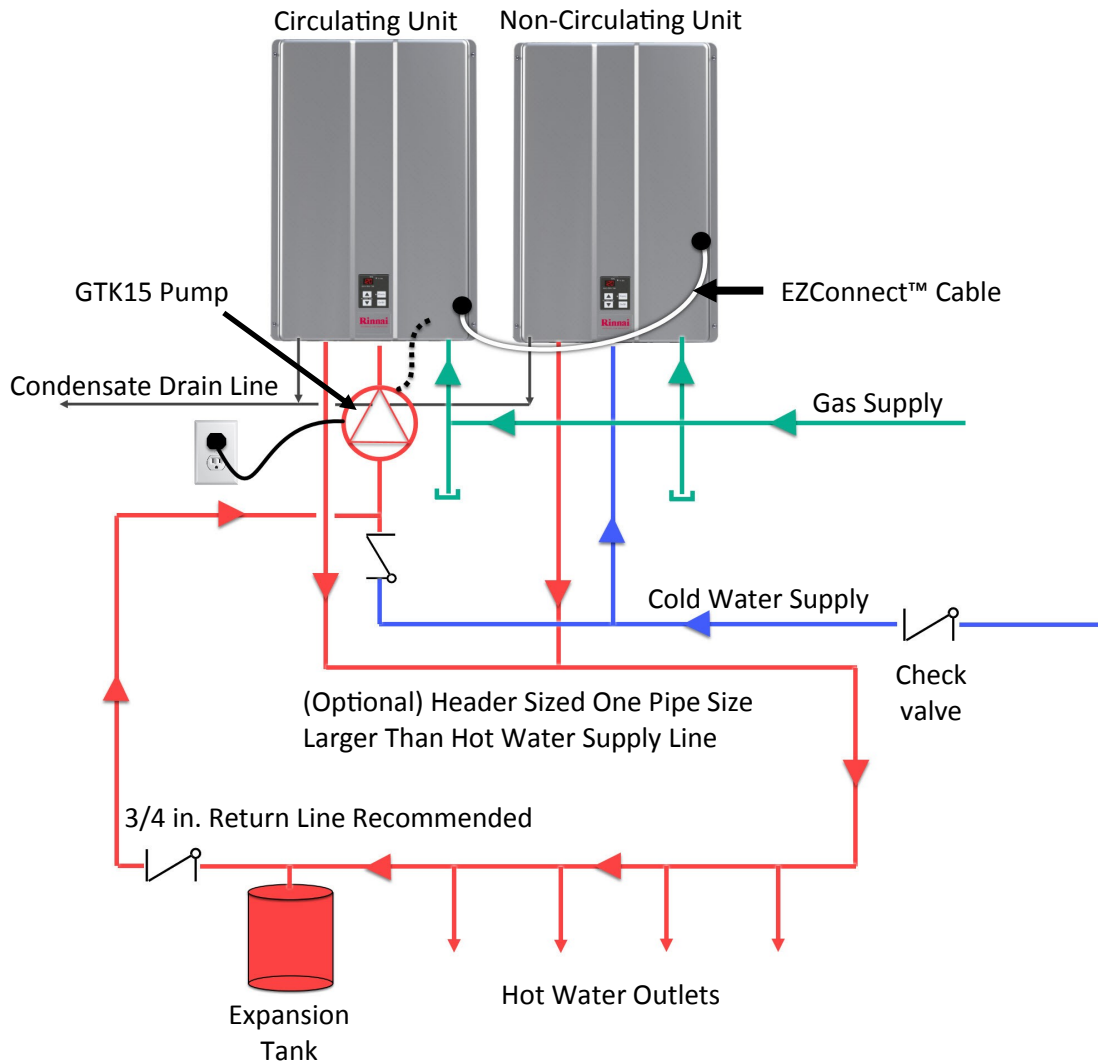


Figure 8

This is not an engineering drawing; it is intended only as a guide and not as a replacement for professional engineering project drawings. This drawing is not intended to describe a complete system. It is up to the contractor or engineer to determine the necessary components and configuration of the particular system to be installed. The drawing does not imply compliance with local building code requirements. It is the responsibility of the engineer or contractor to ensure that the installation is in accordance with all local building codes. Confer with local building officials before installation.

5.3 Non-SENSEI™ System Drawing: Recirculation Using Two Rinnai Water Heaters

For this application:

- Reference Rinnai Circ-Logic Guide for Rinnai Circ-Logic Description, sizing and installation instructions.
- Pump should be of bronze or stainless steel construction.
- PVA to remain at factory default setting. Circulation unit should not be connected electronically to MSB Controller or EZConnect™ Cable.

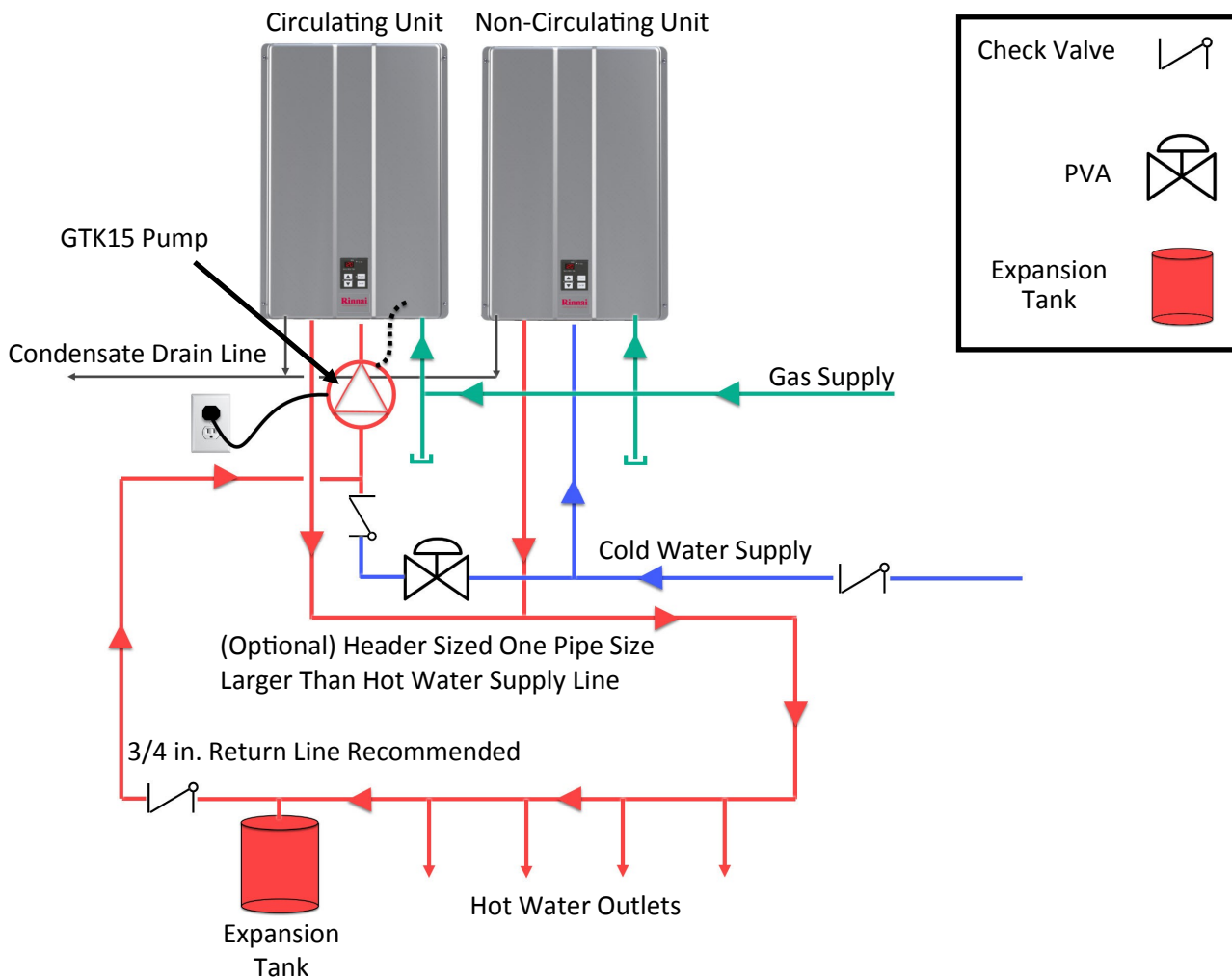


Figure 9

This is not an engineering drawing; it is intended only as a guide and not as a replacement for professional engineering project drawings. This drawing is not intended to describe a complete system. It is up to the contractor or engineer to determine the necessary components and configuration of the particular system to be installed. The drawing does not imply compliance with local building code requirements. It is the responsibility of the engineer or contractor to ensure that the installation is in accordance with all local building codes. Confer with local building officials before installation.



Learn more about Rinnai high-performance Tankless Water Heaters, Hybrid Water Heating Systems, Boilers, Vent-Free Fan Convectors and EnergySaver® Direct Vent Wall Furnaces at:

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Local, state, provincial, federal and national fuel gas codes must be adhered to prior to and upon installation.

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