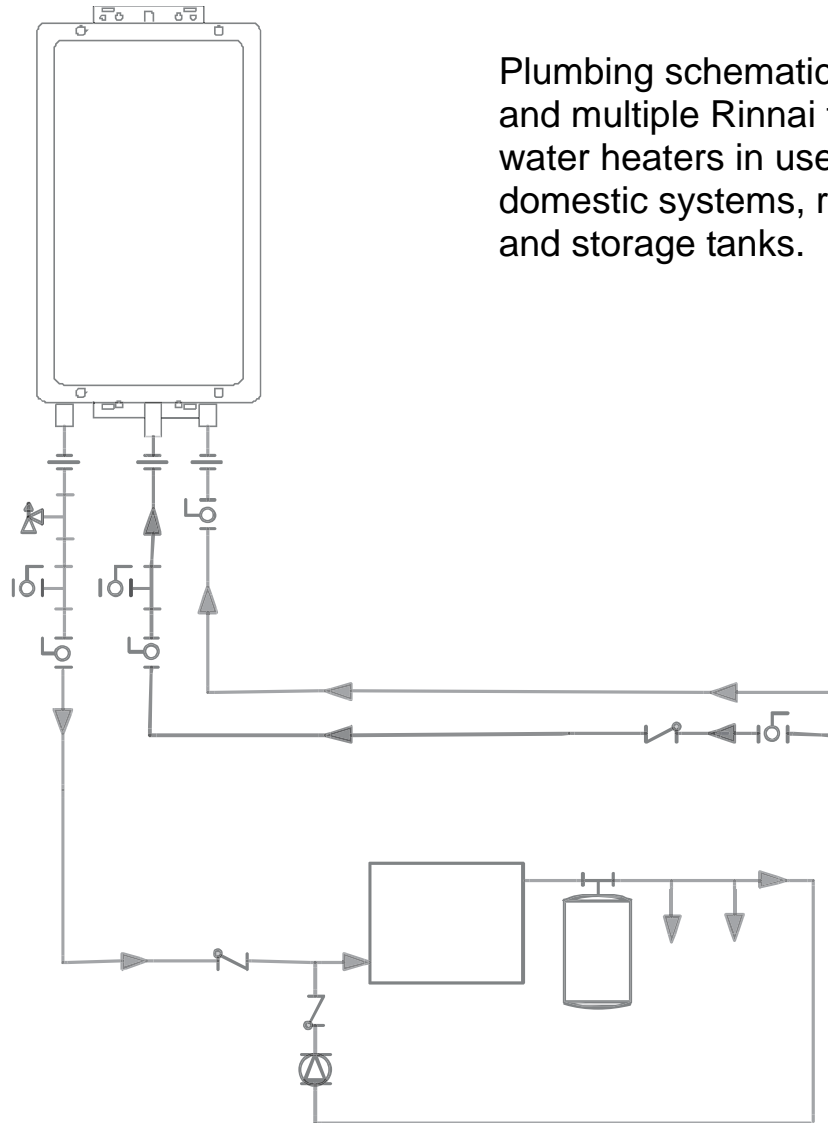




Hot Water System Design Manual

Plumbing schematics for single and multiple Rinnai tankless water heaters in use with domestic systems, recirculation, and storage tanks.



This document, R-TRWH-E-02 Rev B (2/27/2008), supersedes and replaces the previous Hot Water System Design Manual, R-TRWH-E-02 Rev A (6/14/2007).

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Certifications

Indoor Water Heaters

Trade Name	CSA Listing
R50LSi	REU-VA2019FFUD-US-(N, P) *
R75LSi	REU-VA2528FFUD-US-(N, P) *
R75LSi	REU-VA2528FFUD(A)-US-(N, P) *
R94LSi	REU-VA2535FFUD-US-(N, P) *
R98LSi	REU-VA3237FFU-US-(N, P) *
R98LSiASME	REU-VA3237FFU-ASME-(N, P) *
R53i	REU-V2520FFU-US-(N, P)
C53i	REU-V2520FFUC-US-(N, P) *
R53i	REU-V2520FFUD-US-(N, P)
C53i	REU-V2520FFUCD-US-(N, P) *
R85i	REU-V2532FFU-US-(N, P)
C85i	REU-V2532FFUC-US-(N, P) *
R85iPLUS	REU-V2532FFUD-US-(N, P)
C85iPLUS	REU-V2532FFUCD-US-(N, P) *
R98i	REU-V3237FFU-US-(N, P)
C98i	REU-V3237FFUC-US-(N, P) *
R98iASME	REU-V3237FFU-ASME-(N, P)
C98iASME	REU-V3237FFUC-ASME-(N, P) *

Outdoor Water Heaters

Trade Name	CSA Listing
V53e	REU-VAM1620W
R63LSe	REU-VA2024WD *
R75LSe	REU-VA2528WD-US-(N, P) *
R75LSe	REU-VA2528WD(A)-US-(N, P) *
R94LSe	REU-VA2535WD-US-(N, P) *
R98LSe	REU-VA3237W-US-(N, P) *
R98LSeASME	REU-VA3237W-ASME-(N, P) *
R42e	REU-V1616W-(N, P)
C42e	REU-V1616WC-(N, P) *
R53e	REU-V2020W-(N, P)
C53e	REU-V2020WC-(N, P) *
R70e	REU-V2526W-US-(N, P)
R85e	REU-V2532W-US-(N, P)
C85e	REU-V2532WC-US-(N, P) *
R85ePLUS	REU-V2532WD-US-(N, P)
C85ePLUS	REU-V2532WCD-US-(N, P) *
R98e	REU-V3237W-US-(N, P)
C98e	REU-V3237WC-US-(N, P) *
R98eASME	REU-V3237W-ASME-(N, P)
C98eASME	REU-V3237WC-ASME-(N, P) *

* authorized for commercial use

The models listed above have received the following certifications except where noted:



Certified to applicable U.S. standards for appliances using gas or other petroleum fuel.



Energy efficiency certified by Gas Appliance Manufacturers Association (GAMA), www.gamanet.org



Certified to applicable Canadian standards for appliances using gas or other petroleum fuel.

Met the California Energy Commission (CEC) standards



Certified by the Uniform Plumbing Code (UPC)

Approved by the Commonwealth of Massachusetts



Certified by National Sanitation Foundation (NSF), www.nsf.org

Received New York City's Material and Equipment Acceptance (MEA)

(indoor models must use the NSF approved top guard)

REU-VAM1620W is not NSF approved

Certifications



R98LSiASME
R98LSeASME

R98iASME
C98iASME

R98eASME
C98eASME

These models are built in accordance with the requirements of the ASME Boiler and Pressure Vessel Code and received the Certificate of Authorization from the National Board. The heat exchanger has the NB and the HLW stamps.

Rinnai Accessories

Multiple Unit Connections (refer to model applicability)

MSA Controller: The MSA controllers (Pack A) and cables (Pack B) are optional accessories that electronically connect 2 to 5 water heaters and allows them to function as one hot water source. Two water heaters require one MSA Pack A. Each additional water heater beyond two requires one MSA Pack B.

EZConnect: The EZConnect cable is an optional accessory that electronically connects 2 water heaters and allows them to function as one hot water source.

PVA Valves: Pressure activated valves that allow each water heater (max 5) to turn on as necessary to meet the demand for hot water

- Guidelines for multiple unit connections:
- Do not install both the EZConnect and the MSA packs because they are not designed to operate together.
 - Water heaters connected with the EZConnect Cable or the MSA packs cannot be used for the bathfill function.
 - Temperature settings can only be changed on the controller for the primary unit.
 - Do not use the EZConnect or MSA packs with storage tank applications.

Rinnai Installation Kits - available with threaded (F) or sweated (C) connections

WRIK-F, WRIK-C, SRIK-F, SRIK-C: For models rated below 200,000 BTU/hr, provides isolation valves, pressure relief valve, and full port drains with easy union installation

WRIK-32F, WRIK-32C: For models rated above 200,000 BTU/hr, provides isolation valves, pressure relief valve, and full port drains with easy union installation

Remote Controllers: MC-91-1US - Controller included with the unit except for the VAM1620W
MCC-91-1US - For commercial and hydronic applications allowing temperatures above 140° F. Refer to model applicability
MC-100V-1US - Deluxe controller
BC-100V-1US - Bathroom controller
MC-502RC-1US-MS - Wireless controller with transceiver
MC-502RC-1US-S - Wireless controller
MC-502RC-1US-M - Transceiver

Recess Boxes: Recesses unit into the wall, protecting and hiding the unit from view

Pipe Covers: For security, weather protection, and finished look

Rinnai is continually updating and introducing new products and accessories. For the latest information, contact Rinnai at 1-800-621-9419, FAX: 1-888-474-6624, or www.rinnai.us.

Model Applicability (Accessories)

Outdoor

Model	Recess Boxes	Pipe Covers	Electronic Connection	Remote Controllers
R42e, C42e R53e, C53e	RGB-20-U	PC-20-W (white)	MSA-2	[1]
V53e			[6]	
R63LSe		PCD01-SM2 (silver)		[2]
R70e, R85e, C85e	RGB-25-U or RGB-25U-MSAL (with moisture seal flange)	PC-25-W (white) PC-25-G (gray)	MSA-2	[1]
R85ePLUS, C85ePLUS		PCD03-SM (silver) PCD03-MG (white)		
R75LSe, R94LSe		PCD03-SM2 (silver)	EZ Connect [5], MSA-2	[2]
R98e, C98e, R98eASME, C98eASME,	RGB-32	PC-32-W (white) PC-32-G (gray)		[1]
R98LSe, R98LSeASME				[2]

Indoor

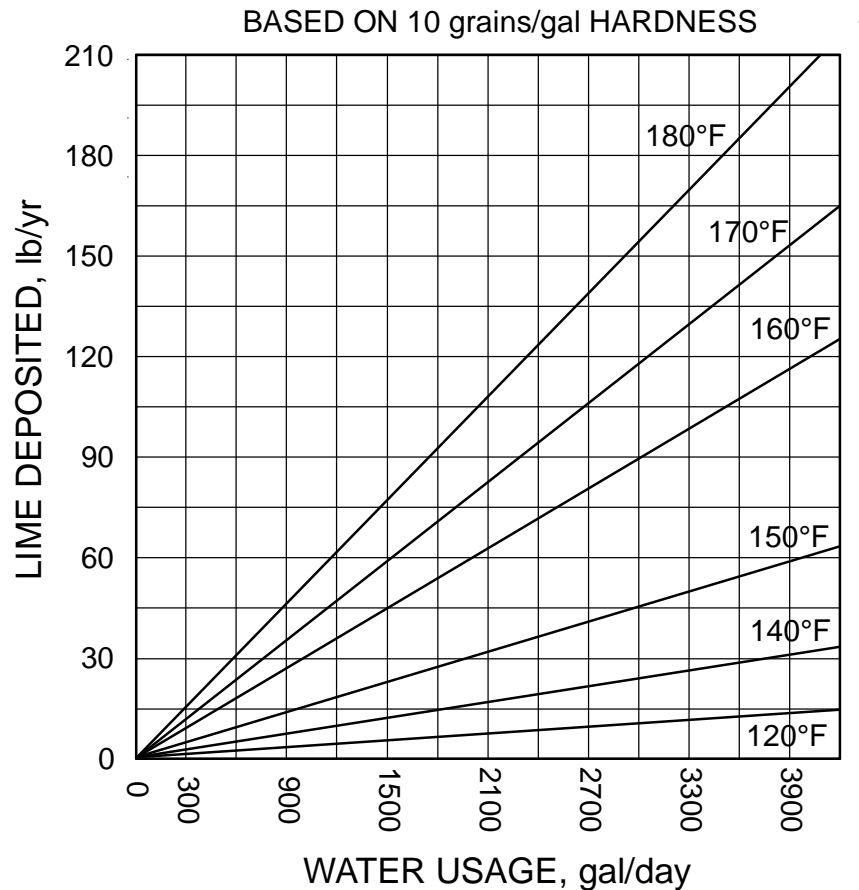
Model	Venting Type	Integrated Condensate Collector	Electronic Connection	Remote Controllers
<i>R53i, C53i, R53iPLUS, C53iPLUS</i> <i>R85i, C85i, R85iPLUS, C85iPLUS</i>	Concentric 3" / 5" [4]	NO [3]	MSA-2	[1]
<i>R50LSi</i> <i>R75LSi</i> <i>R94LSi</i>		YES	EZ Connect [5], MSA-2	[2]
<i>R98i, C98i, R98iASME, C98iASME</i>	4" for intake and 4" for exhaust [4]	NO [3]		[1]
<i>R98LSi, R98LSiASME</i>				[2]

Notes

- [1] MC-91, MC-100, BC-100, MC-502
- [2] MC-91, MC-100, BC-100, MC-502, MCC-91
- [3] The Condensate Collector vent piece and the Condensate Trap (224050) for trapping and draining condensate may be required depending on your installation. Refer to the Operation and Installation Manual.
- [4] Refer to the Operation and Installation Manual
- [5] The EZ Connect will connect a maximum of 2 water heaters.
- [6] Electronic connection is not available for these models. Connection can be made using pressure activating Rinnai PVA valves.

Water Quality and Scale

A complete water analysis and an understanding of system requirements are needed to protect the Rinnai tankless water heaters and water heating systems from scale. Water analysis shows whether water is hard or soft. Hard water, unless treated, will cause scaling or liming of the Rinnai heat exchanger. The rate of scaling increases with temperature and usage because calcium carbonate and other scaling compounds lose solubility (fall out of solution) at higher temperatures. For example, for every 20°F over 140°F, the rate of scale increases by a factor of 2 (See figure below). Reference target water quality levels found in the operation / installation manual and consider water treatment if these levels are exceeded. *



*Source 2003 ASHRAE Handbook HVAC Applications

Pump Sizing for Circulation

1. Use the chart below or one appropriate for your conditions to determine the heat loss in the length of the hot water supply and return piping. For example, 100 ft of 1-1/2 in bare copper tubing results in a heat loss of 5300 Btu/h.

Approximate Heat Loss from Piping at 140 °F Inlet, 70 °F Ambient *

Nominal Size, in.	Bare Copper Tubing, Btu/h-ft	1/2 in. Glass Fiber Insulated Copper Tubing, Btu/h-ft
3/4	30	17.7
1	38	20.3
1-1/4	45	23.4
1-1/2	53	25.4
2	66	29.6
2-1/2	80	33.8
3	94	39.5
4	120	48.4

* Source: 2003 ASHRAE Handbook HVAC Applications

2. Determine the acceptable temperature drop at the last fixture in the loop. For example, if the supply temperature from the water heater is 120 °F (49 °C) and an acceptable temperature at the last fixture is 100 °F (38 °C) then the acceptable temperature drop is 20 °F (7 °C).
3. Calculate the required pump flow rate using the following formula:

$$\text{FLOW RATE (gpm)} = \frac{\text{HEAT LOSS (BTU / h)}}{500 \times \text{ACCEPTABLE TEMPERATURE DROP (°F)}}$$

4. Based on the above calculations select a pump for the type of circulation system you will be utilizing:
 - A). Preferred Method (reference drawing WH-1-RGE) - Reference pump manufacturers flow vs. pressure specifications to select a pump that can provide the flow rate calculated above while overcoming the pressure loss through:
 - Tank water heater (reference manufacturer's information)
 - All building supply and return plumbing in the circulation loop (reference local plumbing codes, standards, or practices)
 - B). Optional Method (WH-1-R) - Reference pump manufacturers flow vs. pressure specifications to select a pump that can provide 3 gpm of flow or the flow rate calculated above, whichever is greater, while overcoming the pressure loss through:
 - Rinnai tankless water heater (reference flow vs. pressure curve of the Rinnai model being used)
 - Optional storage tank (reference manufacturer's information)
 - All building supply and return plumbing in the circulation loop (reference local plumbing codes, standards, or practices)

NOTE: Only use pumps of brass or stainless steel construction. Do not use pumps of iron construction as they will oxidize and clog the inlet filter on the appliance.

Tank Water Heaters in a Circulation Loop

The following applies when using a tank water heater (gas or electric) to provide heat for a circulation loop. Drawing WH-1-RGE is an example.

The heat **output** of the tank must be equal to or greater than the calculated circulation loop heat loss.

(Reference page 6, Step 1 on calculating heat loss).

Electric Tank Water Heater

Since the input and output are the same for an electric tank water heater, this can be expressed as:

$$\text{Electric Tank Input (Kw)} \geq \frac{\text{Circulation loop heat loss (Btu/h)}}{3413}$$

(1 Kilowatt = 3,413 BTU)

Gas Tank Water Heater

When using a gas style water heater, the efficiency of the tank must be taken into account.

$$\text{Available Btu output} = (\text{Btu input of tank}) \times (\text{efficiency}) \geq \text{Circulation loop heat loss (Btu/h)}$$

Example:

30,000 Btu input gas tank
0.62 Efficiency

$$30,000 \times .62 = 18,600 \text{ available Btu output}$$

Additional Guidelines

Rinnai water heaters not recovering a storage tank: In applications involving a commercial dishwasher, a hot water circulation loop feeding the dishwasher is required.

Rinnai water heater recovering a storage tank: In applications involving a commercial dishwasher, a hot water circulation loop feeding the dishwasher may be required depending on the distance between the dishwasher and the storage tank. Refer to local codes when determining the need for circulation loops to dishwashers.

Pump Sizing for Storage Tank Application

The following applies when using Rinnai tankless water heaters to recover a storage tank. Drawing WH-1-B is an example.

Rinnai Tankless water heaters have a pressure loss which must be considered in the system design. Reference the pressure loss curve for the Rinnai model being used to determine the pump size for the desired recovery rate.

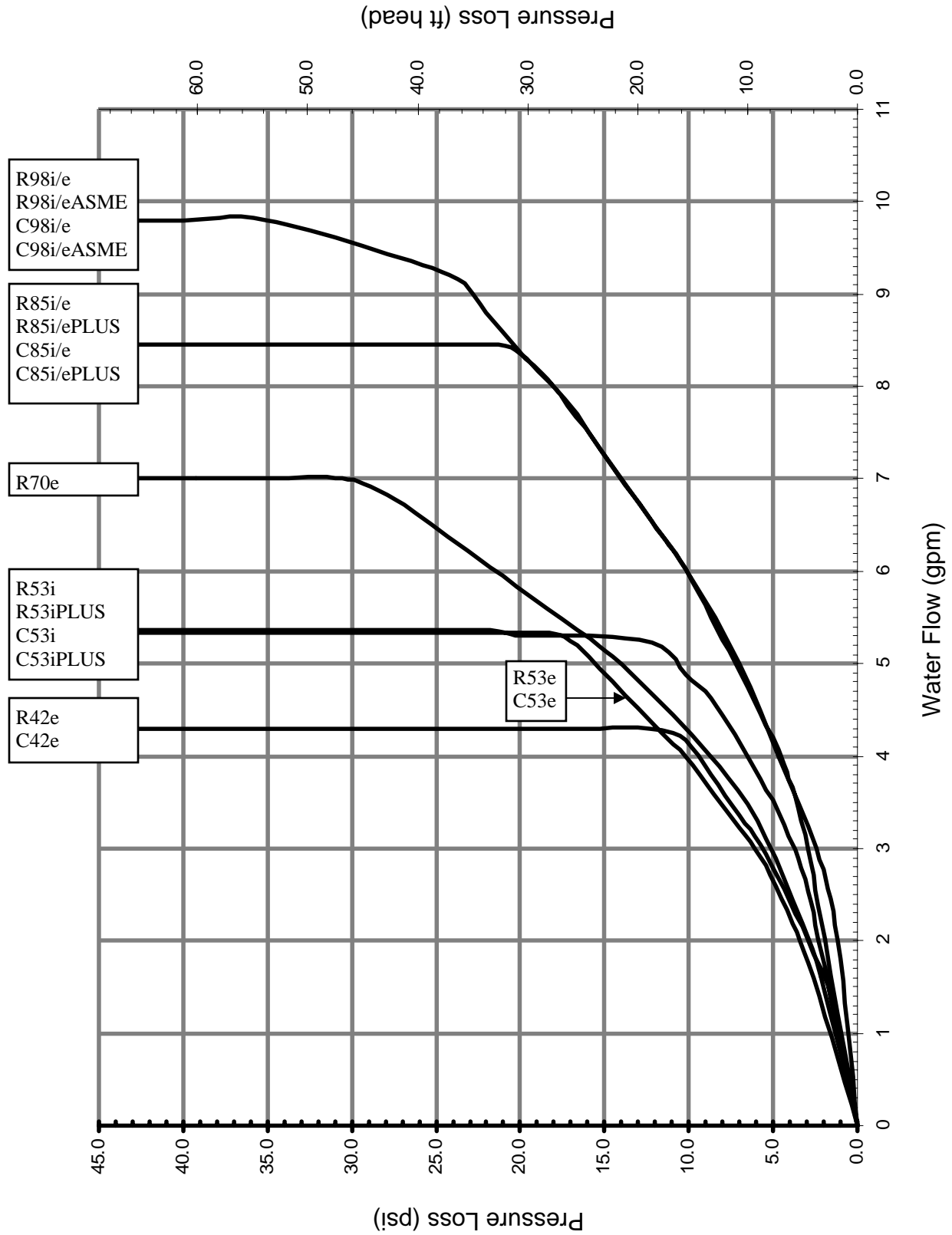
For recommended pump sizes use the table below. Additional pressure losses in plumbing between the Rinnai(s) and the storage tank must also be taken into consideration.

The specified pump size is to provide maximum recovery of the storage tank. A smaller pump size may be used, but could result in longer recovery time of the tank. Please contact the engineering department with any questions on pump sizing.

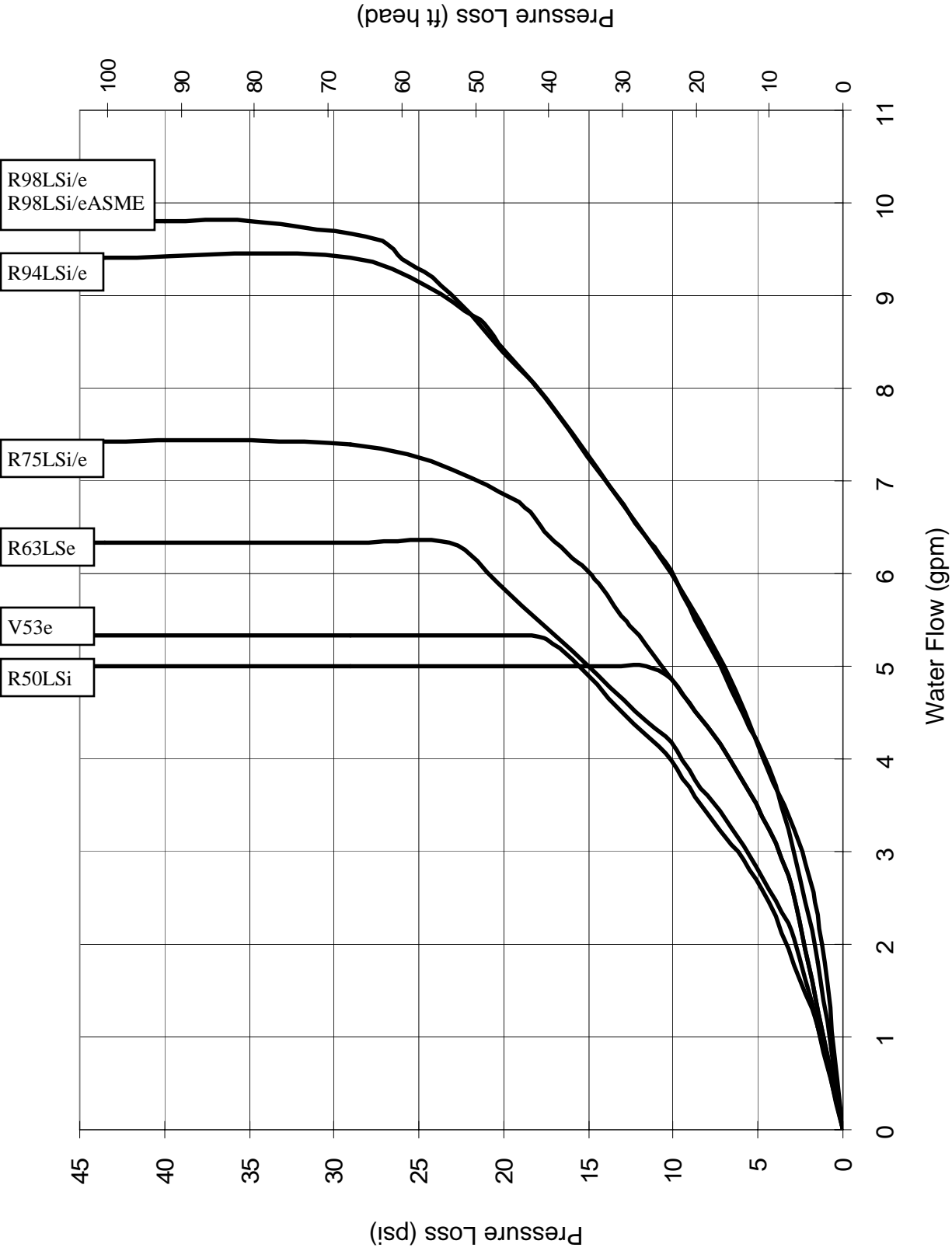
NOTE: Only use pumps of brass or stainless steel construction. Do not use pumps of iron construction as they will oxidize and clog the inlet filter on the appliance.

Pump Flow Requirements			
Number of Rinnai Water Heaters	R/C85i/e(PLUS) R94LSi/e R/C98i/e(ASME) R98LSi/e(ASME)	R/C53i(PLUS) R70e R75LSi/e	R42e, C42e V53e R50LSi R53e, C53e R63LSe
1	6 gpm @ 30' head	5 gpm @ 25' head	4 gpm @ 25' head
2	12 gpm @ 30' head	10 gpm @ 25' head	8 gpm @ 25' head
3	18 gpm @ 30' head	15 gpm @ 25' head	12 gpm @ 25' head
4	24 gpm @ 30' head	20 gpm @ 25' head	16 gpm @ 25' head
5	30 gpm @ 30' head	25 gpm @ 25' head	20 gpm @ 25' head
6	36 gpm @ 30' head	30 gpm @ 25' head	24 gpm @ 25' head
7	42 gpm @ 30' head	35 gpm @ 25' head	28 gpm @ 25' head
8	48 gpm @ 30' head	40 gpm @ 25' head	32 gpm @ 25' head
9	54 gpm @ 30' head	45 gpm @ 25' head	36 gpm @ 25' head
10	60 gpm @ 30' head	50 gpm @ 25' head	40 gpm @ 25' head
11	66 gpm @ 30' head	55 gpm @ 25' head	44 gpm @ 25' head
12	72 gpm @ 30' head	60 gpm @ 25' head	48 gpm @ 25' head
13	78 gpm @ 30' head	65 gpm @ 25' head	52 gpm @ 25' head
14	84 gpm @ 30' head	70 gpm @ 25' head	56 gpm @ 25' head
15	90 gpm @ 30' head	75 gpm @ 25' head	60 gpm @ 25' head

Pressure Loss Curves - V Series



Pressure Loss Curves - VA Series





<u>Rinnai</u> <u>Equipment List</u>	<u>QTY</u>
Rinnai Water Heaters	1

Drawing Number:
WH-1

Drawing Date:
June 11, 2007

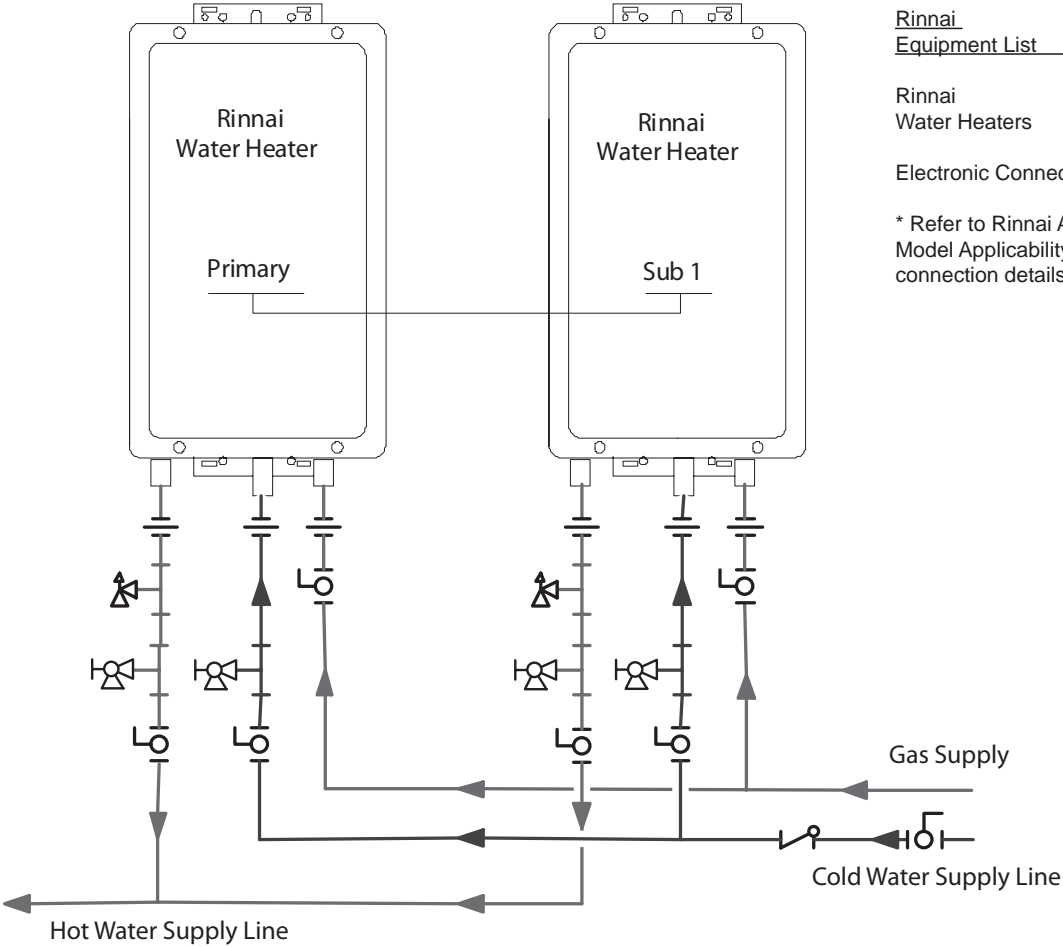
Rinnai
103 International Drive
Peachtree City, GA 30269

Domestic Hot Water - Standard Installation 1 Rinnai Water Heater Preferred Piping Installation

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.

Key

	3/4" Ball Valve		Pressure Regulator
	3/4" Union		Circulating Pump
	Check Valve		Boiler Drain Valve
	Pressure Relief Valve		Solenoid Valve



Rinnai Equipment List	QTY
--------------------------	-----

Rinnai
Water Heaters 2

Electronic Connection *

* Refer to Rinnai Accessories and
Model Applicability for electronic
connection details.

Drawing Number:
WH-2

Drawing Date:
February 27, 2008

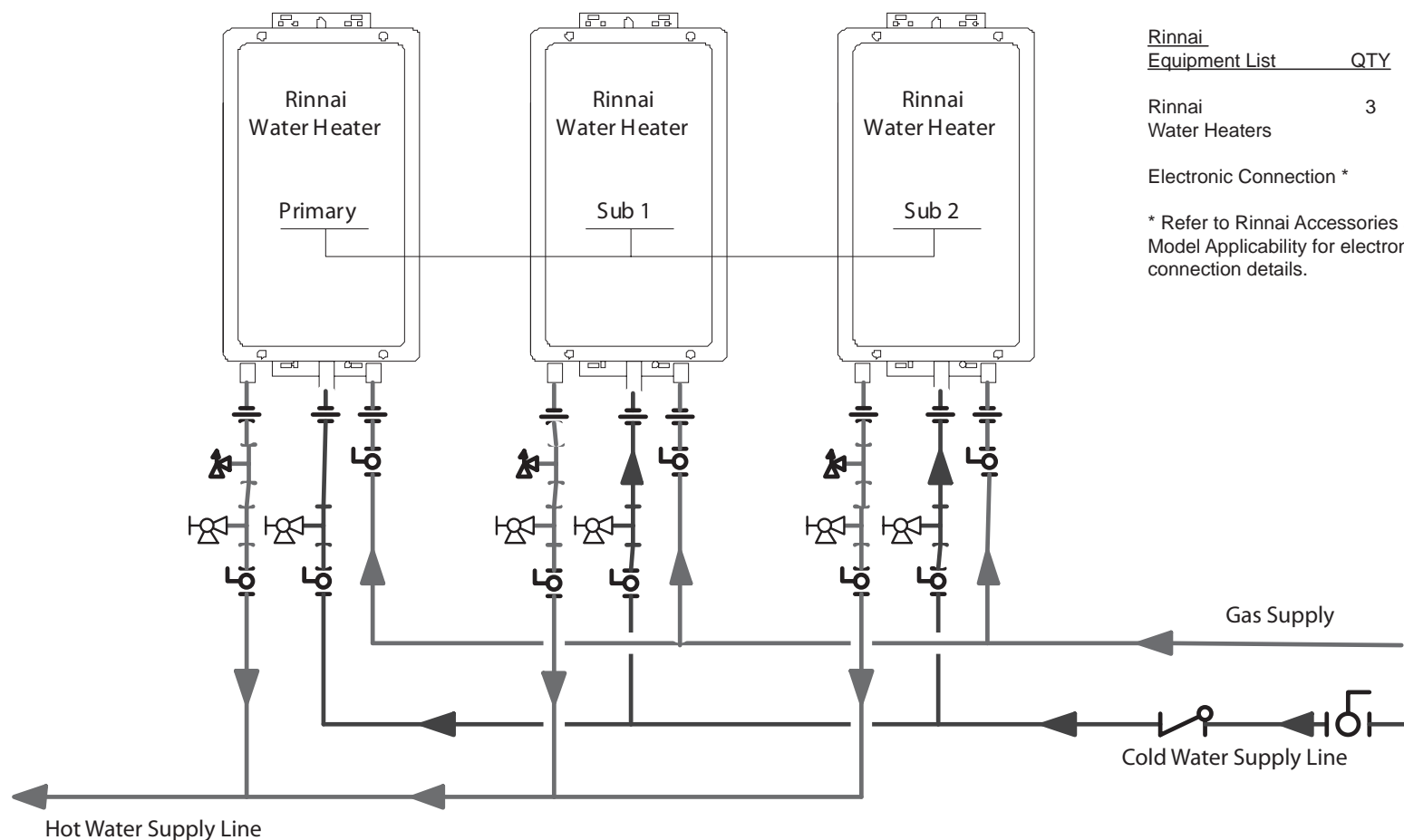
Rinnai[®]
103 International Drive
Peachtree City, GA 30269

Domestic Hot Water - Standard Installation
2 Rinnai Water Heaters
Preferred Piping Installation

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Key

	3/4" Ball Valve		Pressure Regulator
	3/4" Union		Circulating Pump
	Check Valve		Boiler Drain Valve
	Pressure Relief Valve		Solenoid Valve



Rinnai
Equipment List QTY

Rinnai Water Heaters 3

Electronic Connection *

* Refer to Rinnai Accessories and Model Applicability for electronic connection details.

Drawing Number:
WH-3

Drawing Date:
February 27, 2008

Rinnai

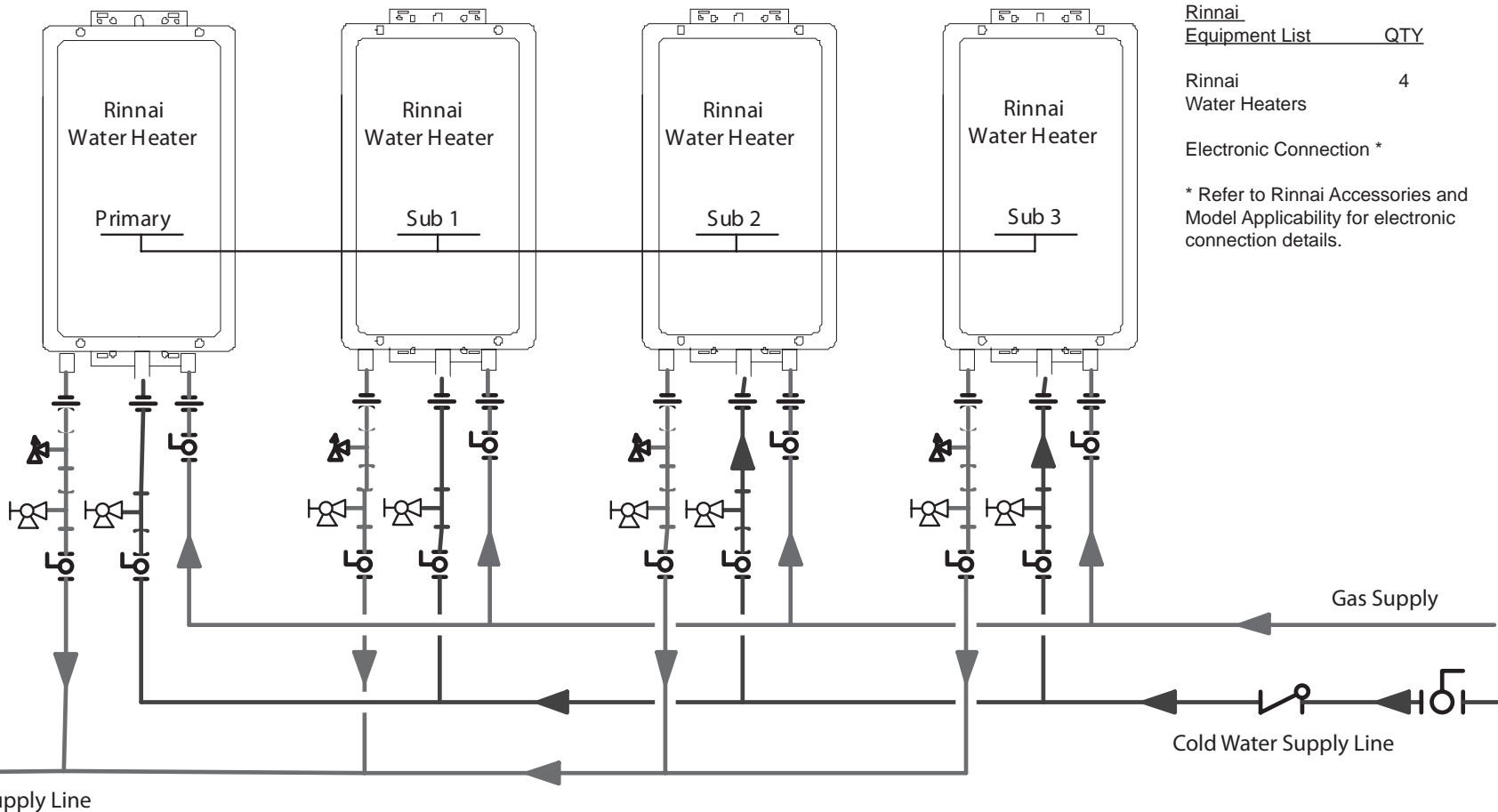
103 International Drive
Peachtree City, GA 30269

Domestic Hot Water - Standard Installation 3 Rinnai Water Heaters Preferred Piping Installation

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Key

	3/4" Ball Valve		Pressure Regulator
	3/4" Union		Circulating Pump
	Check Valve		Boiler Drain Valve
	Pressure Relief Valve		Solenoid Valve



Rinnai Equipment List

Rinnai Water Heaters 4

Electronic Connection *

* Refer to Rinnai Accessories and Model Applicability for electronic connection details.

Drawing Number:
WH-4

Drawing Date:
February 27, 2008

Rinnai

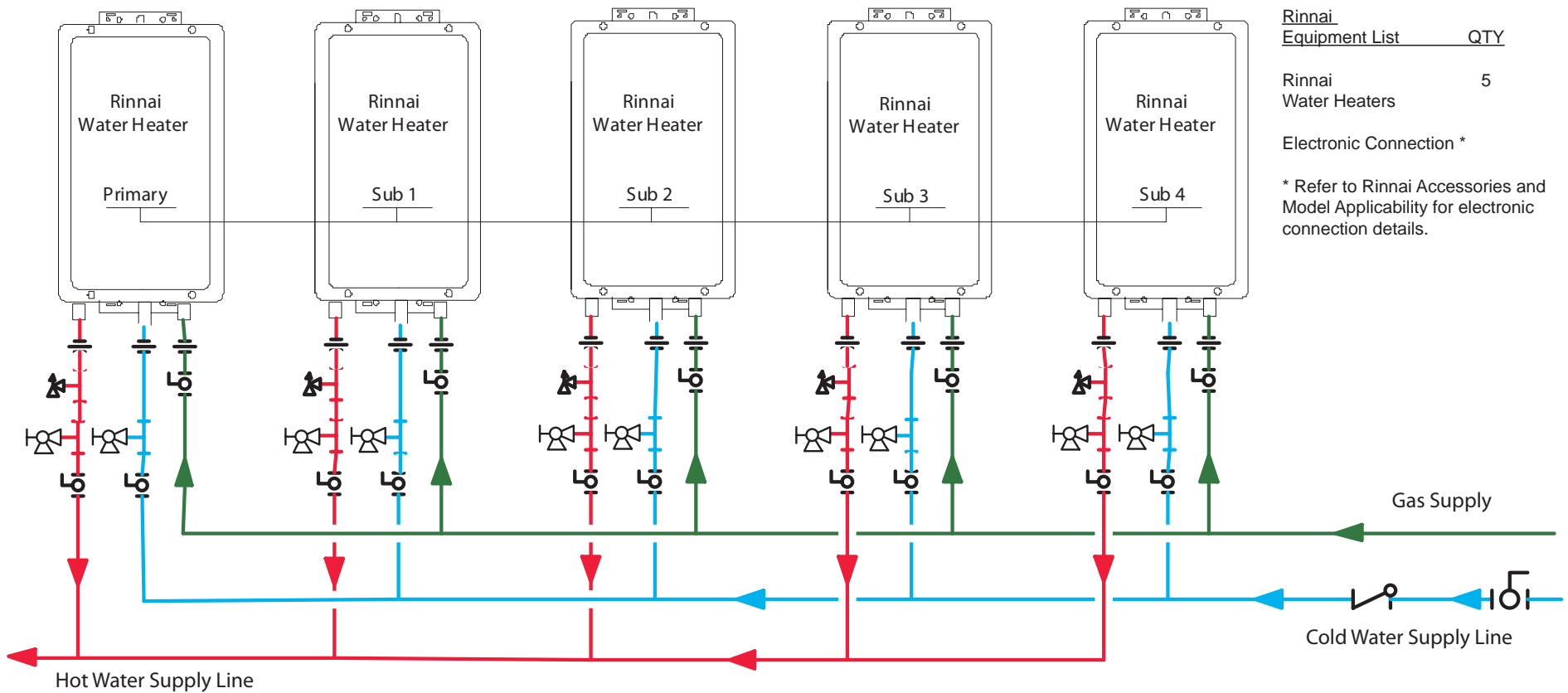
103 International Drive
Peachtree City, GA 30269

Domestic Hot Water - Standard Installation 4 Rinnai Water Heaters Preferred Piping Installation

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Key

	3/4" Ball Valve		Pressure Regulator
	3/4" Union		Circulating Pump
	Check Valve		Boiler Drain Valve
	Pressure Relief Valve		Solenoid Valve



Drawing Number:
WH-5

Drawing Date:
February 27, 2008

Rinnai

103 International Drive
Peachtree City, GA 30269

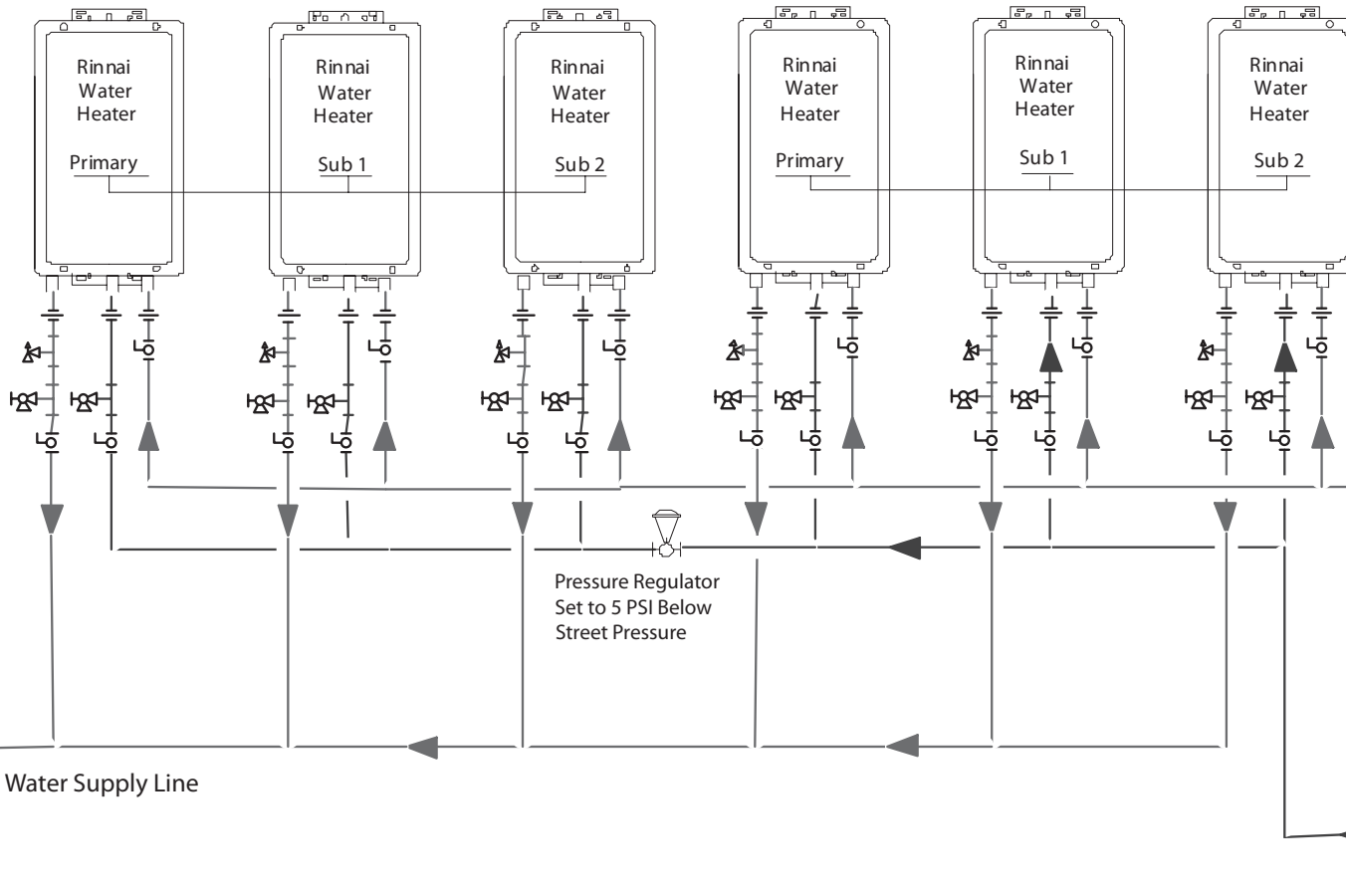
Domestic Hot Water - Standard Installation
5 Rinnai Water Heaters
Preferred Piping Installation

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.

Key









3/4" Ball Valve
3/4" Union
Check Valve
Pressure Relief Valve

Pressure Regulator
Circulating Pump
Boiler Drain Valve
Solenoid Valve



Rinnai Equipment List		QTY
Rinnai Water Heaters		6
Electronic Connection *		
* Refer to Rinnai Accessories and Model Applicability for electronic connection details.		

17

Drawing Number: WH-6	Domestic Hot Water - Standard Installation 6 Rinnai Water Heaters Preferred Piping Installation	
Drawing Date: February 27, 2008		
<div>Rinnai®</div> <div>103 International Drive Peachtree City, GA 30269</div>	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.	Key
		<div><div><div><div></div><div>3/4" Ball Valve</div></div><div><div></div><div>3/4" Union</div></div><div><div></div><div>Check Valve</div></div><div><div></div><div>Pressure Relief Valve</div></div></div><div><div><div><div></div><div>Pressure Regulator</div></div><div><div></div><div>Circulating Pump</div></div><div><div></div><div>Boiler Drain Valve</div></div><div><div></div><div>Solenoid Valve</div></div></div></div></div>

IMPORTANT!

With electrical power supplied to a Rinnai water heater, it will not freeze in environments as cold as -30°F, when protected from direct wind exposure.

In the event of a power failure at temperatures below freezing, the water heater should be drained of all water to prevent freezing damage.

The unit may be drained manually or through the installation of the Optional solenoid valves as shown.

The electrical connections for the two solenoid valves should be tied to the 120 V power terminals provided on the PC Board of the water heater.

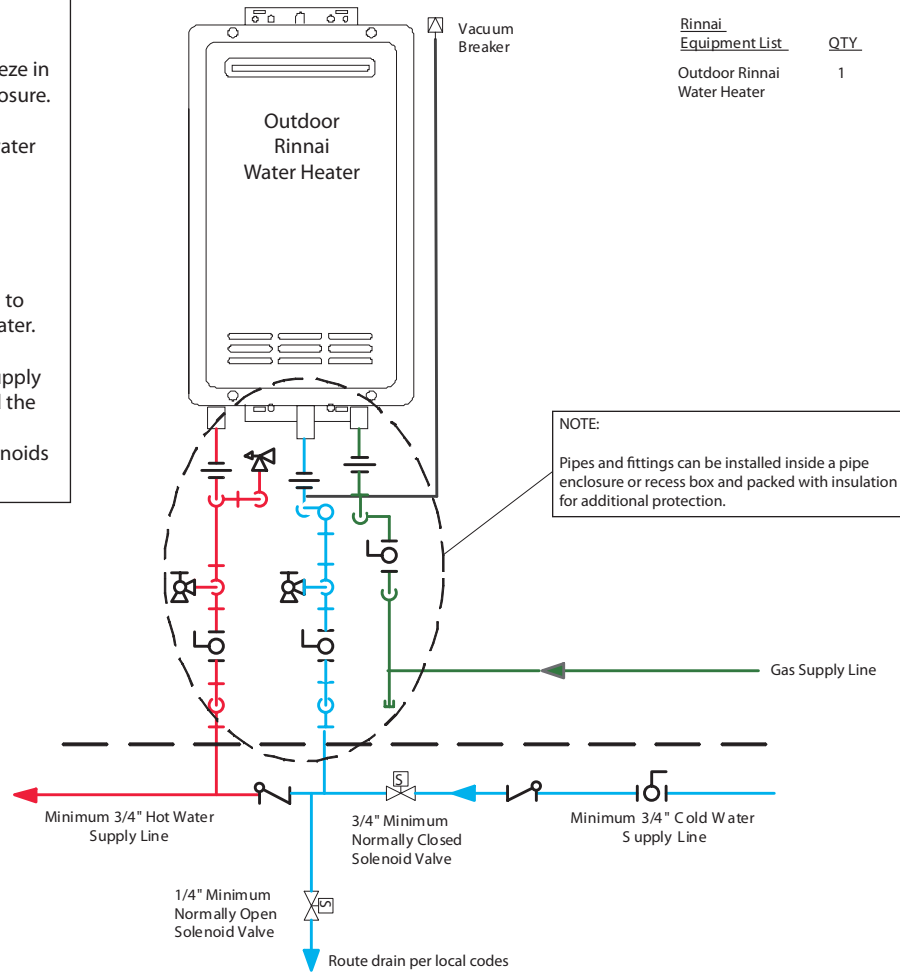
When the electrical power to the water heater fails, the cold water supply solenoid valve closes, stopping the flow of water into the heater, and the drain down solenoid valve opens, allowing the water heater and associated piping to drain. Ensure that you run the drain for the solenoids per local codes.

NOTE:

Freeze protect all water pipes and fittings located outside building structure. These are indicated by being above the dashed line.

All pipes and fittings shown below the dashed line should be located inside the building structure.

The vacuum breaker line should be located inside the building structure.



Rinnai Equipment List	QTY
Outdoor Rinnai Water Heater	1

NOTE:

Pipes and fittings can be installed inside a pipe enclosure or recess box and packed with insulation for additional protection.

Drawing Number:
WH-1-D

Drawing Date:
June 11, 2007

Rinnai
103 International Drive
Peachtree City, GA 30269

Domestic Hot Water - Optional Freeze Protection
1 Outdoor Rinnai Water Heater
Preferred Piping Installation

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Key

	3/4" Ball Valve		Pressure Regulator
	3/4" Union		Circulating Pump
	Check Valve		Boiler Drain Valve
	Pressure Relief Valve		Solenoid Valve

IMPORTANT!

With electrical power supplied to a Rinnai water heater, it will not freeze in environments as cold as -30°F, when protected from direct wind exposure.

In the event of a power failure at temperatures below freezing, the water heater should be drained of all water to prevent freezing damage.

The unit may be drained manually or through the installation of the Optional solenoid valves as shown.

The electrical connections for the two solenoid valves should be tied to the 120 V power terminals provided on the PC Board of the water heater.

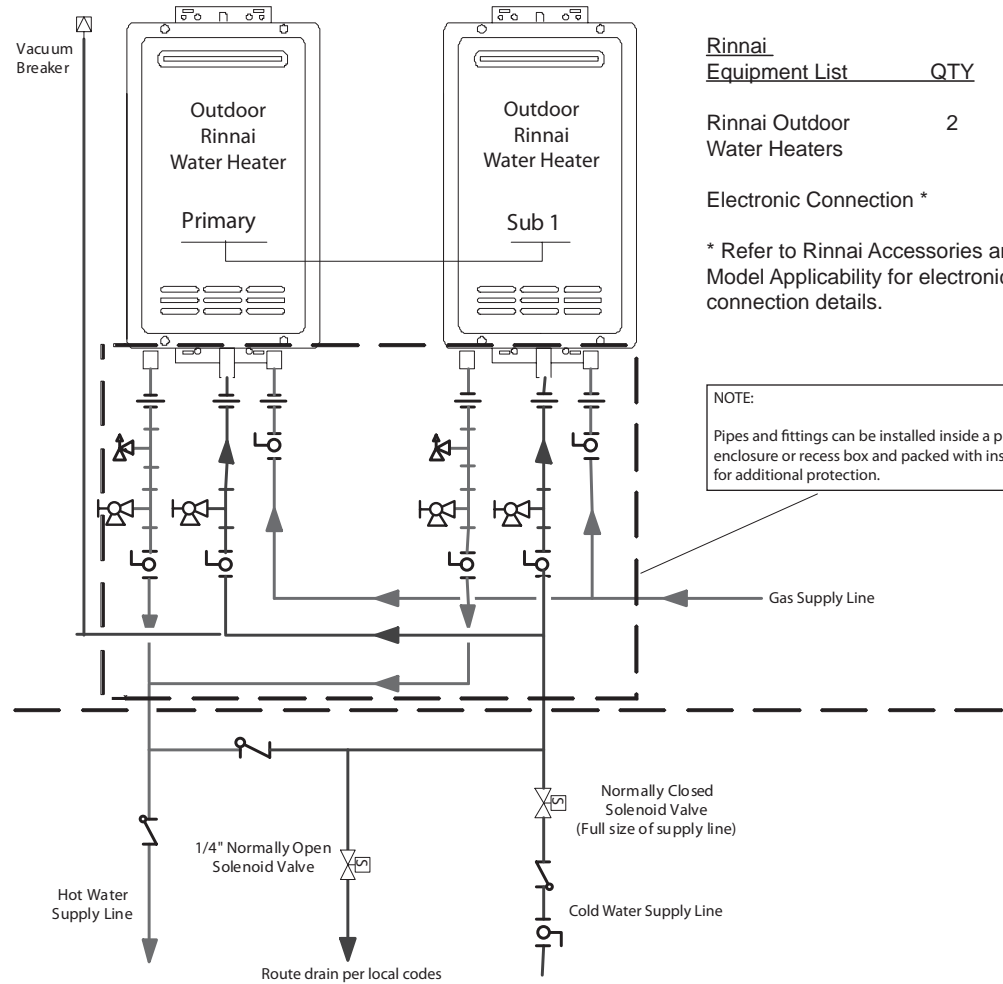
When the electrical power to the water heater fails, the cold water supply solenoid valve closes, stopping the flow of water into the heater, and the drain down solenoid valve opens, allowing the water heater and associated piping to drain. Ensure that you run the drain for the solenoids per local codes.

NOTE:

Freeze protect all water pipes and fittings located outside building structure. These are indicated by being above the dashed line.

All pipes and fittings shown below the dashed line should be located inside the building structure.

The vacuum breaker line should be located inside the building structure.



**Rinnai
Equipment List** **QTY**

Rinnai Outdoor Water Heaters 2

Electronic Connection *

* Refer to Rinnai Accessories and Model Applicability for electronic connection details.

NOTE:

Pipes and fittings can be installed inside a pipe enclosure or recess box and packed with insulation for additional protection.

Drawing Number:
WH-2-D

Drawing Date:
February 27, 2008

Rinnai®

103 International Drive
Peachtree City, GA 30269

**Domestic Hot Water - Optional Freeze Protection
2 Outdoor Rinnai Water Heaters
Preferred Piping Installation**

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Key

	3/4" Ball Valve		Pressure Regulator
	3/4" Union		Circulating Pump
	Check Valve		Boiler Drain Valve
	Pressure Relief Valve		Solenoid Valve

IMPORTANT!

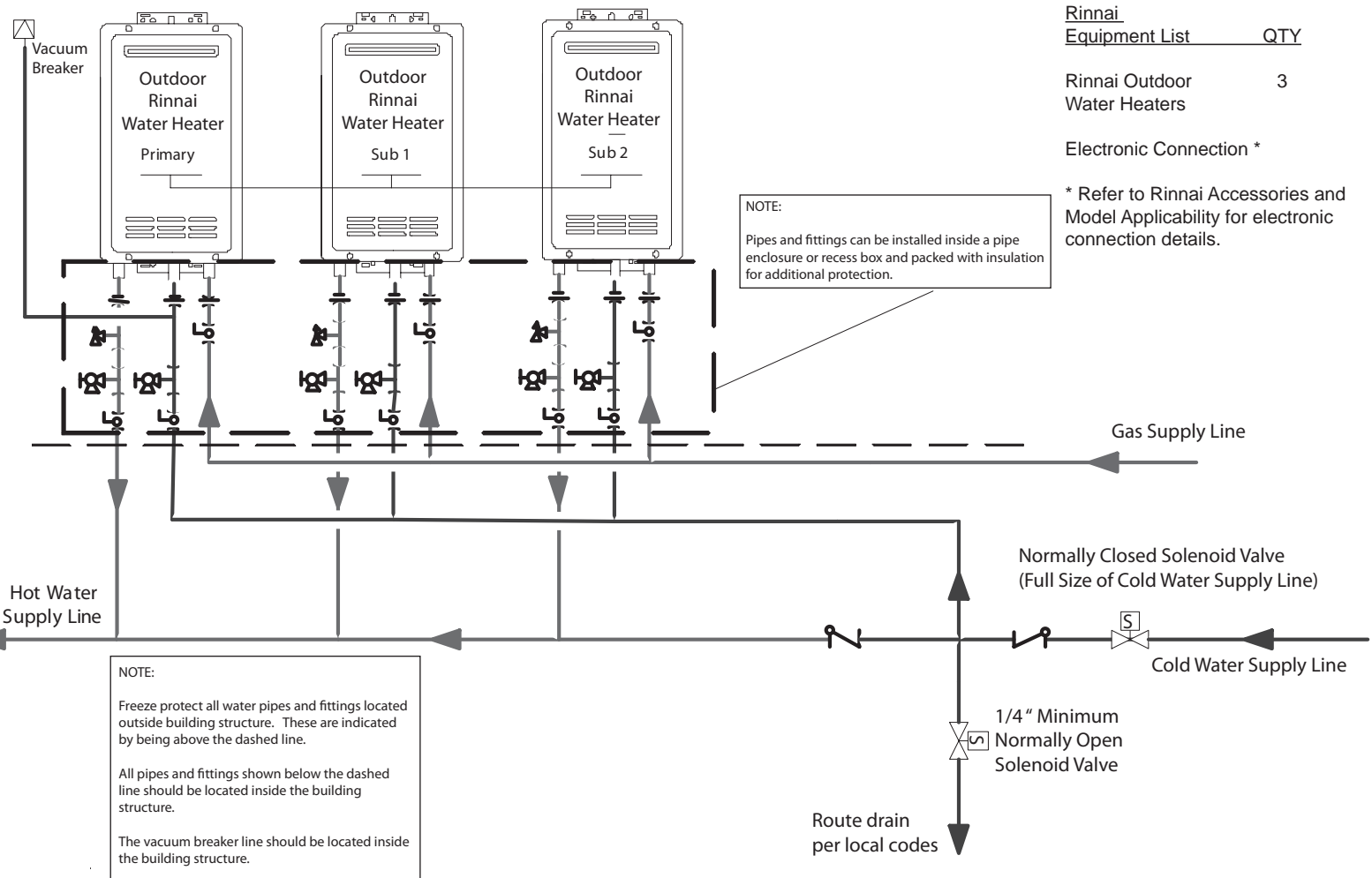
With electrical power supplied to a Rinnai water heater, it will not freeze in environments as cold as -30°F, when protected from direct wind exposure.

In the event of a power failure at temperatures below freezing, the water heater should be drained of all water to prevent freezing damage.

The unit may be drained manually or through the installation of the Optional solenoid valves as shown.

The electrical connections for the two solenoid valves should be tied to the 120 V power terminals provided on the PC Board of the water heater.

When the electrical power to the water heater fails, the cold water supply solenoid valve closes, stopping the flow of water into the heater, and the drain down solenoid valve opens, allowing the water heater and associated piping to drain. Ensure that you run the drain for the solenoids per local codes.



Drawing Number:
WH-3-D

Drawing Date:
February 27, 2008

Rinnai

103 International Drive
Peachtree City, GA 30269

**Domestic Hot Water - Optional Freeze Protection
3 Outdoor Rinnai Water Heaters
Preferred Piping Installation**

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Key

	3/4" Ball Valve		Pressure Regulator
	3/4" Union		Circulating Pump
	Check Valve		Boiler Drain Valve
	Pressure Relief Valve		Solenoid Valve

IMPORTANT!

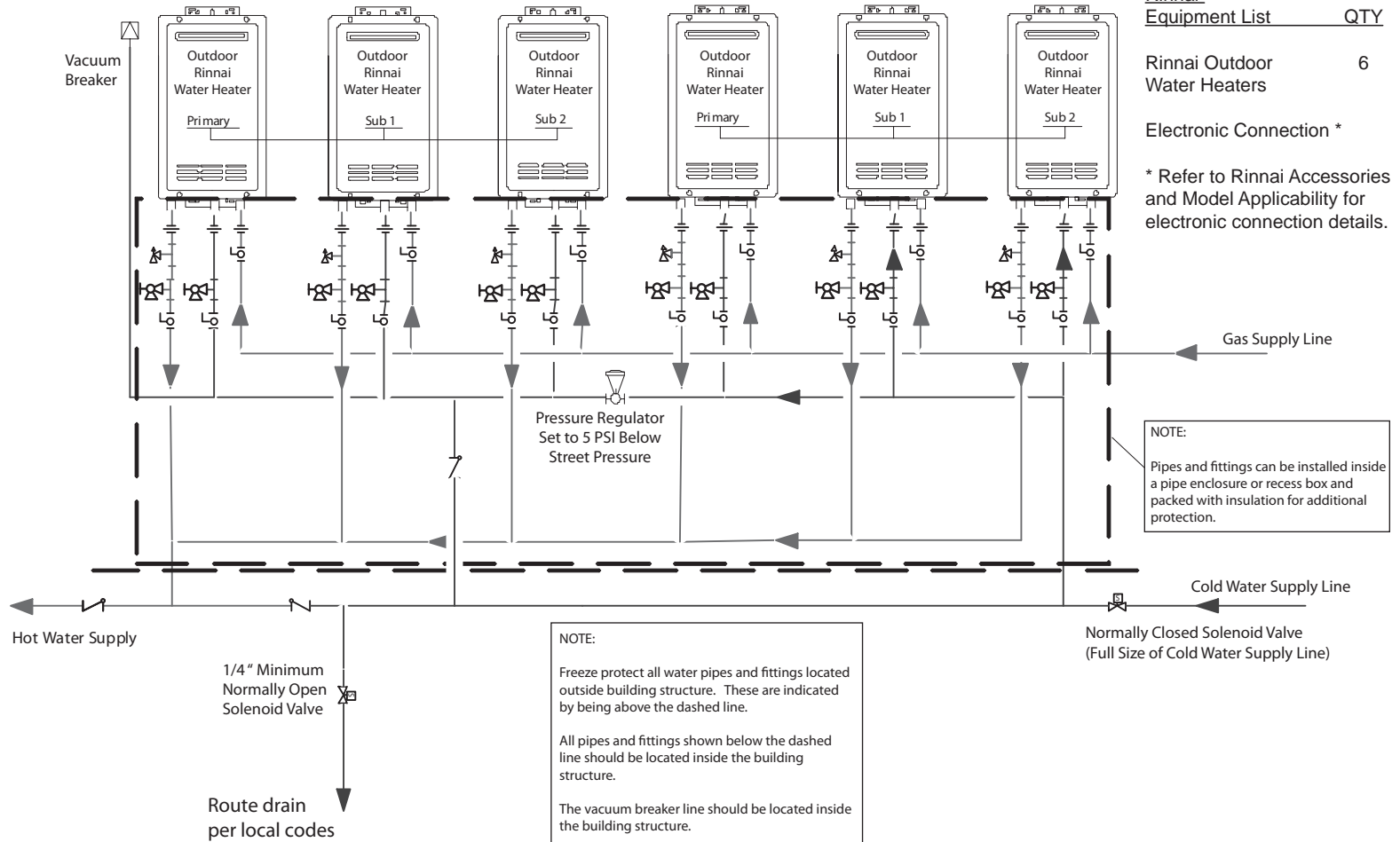
With electrical power supplied to a Rinnai water heater, it will not freeze in environments as cold as -30°F, when protected from direct wind exposure.

In the event of a power failure at temperatures below freezing, the water heater should be drained of all water to prevent freezing damage.

The unit may be drained manually or through the installation of the Optional solenoid valves as shown.

The electrical connections for the two solenoid valves should be tied to the 120 V power terminals provided on the PC Board of the water heater.

When the electrical power to the water heater fails, the cold water supply solenoid valve closes, stopping the flow of water into the heater, and the drain down solenoid valve opens, allowing the water heater and associated piping to drain. Ensure that you run the drain for the solenoids per local codes.



Drawing Number:
WH-6-D

Drawing Date:
February 27, 2008

Rinnai

103 International Drive
Peachtree City, GA 30269

Domestic Hot Water - Optional Freeze Protection 6 Outdoor Rinnai Water Heaters Preferred Piping Installation

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Key

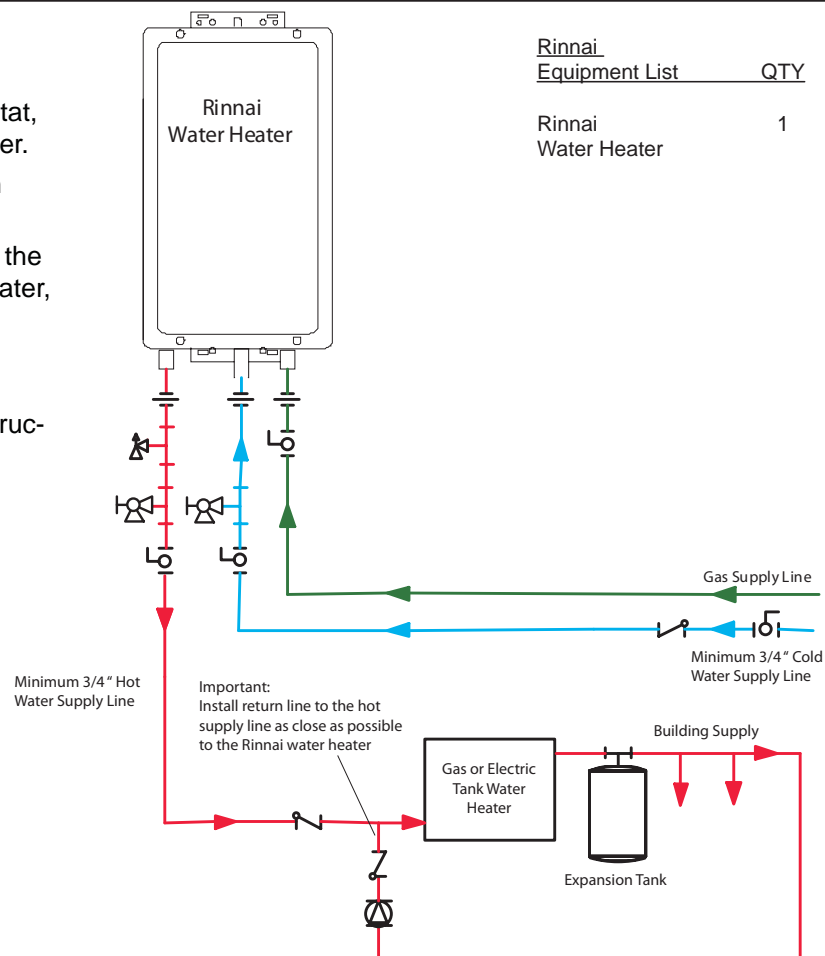
	3/4" Ball Valve		Pressure Regulator
	3/4" Union		Circulating Pump
	Check Valve		Boiler Drain Valve
	Pressure Relief Valve		Solenoid Valve

Pump should be controlled by an Aquastat, Timer or Combination Aquastat and Timer.

Pump to be sized to maintain circulation loop temperature.

The pump should be sized to overcome the pressure loss through the tank water heater, and supply and return plumbing in the circulation loop. Reference the section *Pump Sizing for Circulation*.

Pump to be of bronze or stainless construction.



Drawing Number:

WH-1-RGE

Drawing Date:

February 27, 2008

Rinnai®





103 International Drive
Peachtree City, GA 30269





Domestic Hot Water - Circulation Systems

1 Rinnai Water Heater with Gas or Electric Tank Preferred Piping Installation

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Key

	3/4" Ball Valve
	3/4" Union
	Check Valve
	Pressure Relief Valve

	Pressure Regulator
	Circulating Pump
	Boiler Drain Valve
	Solenoid Valve

For this application:

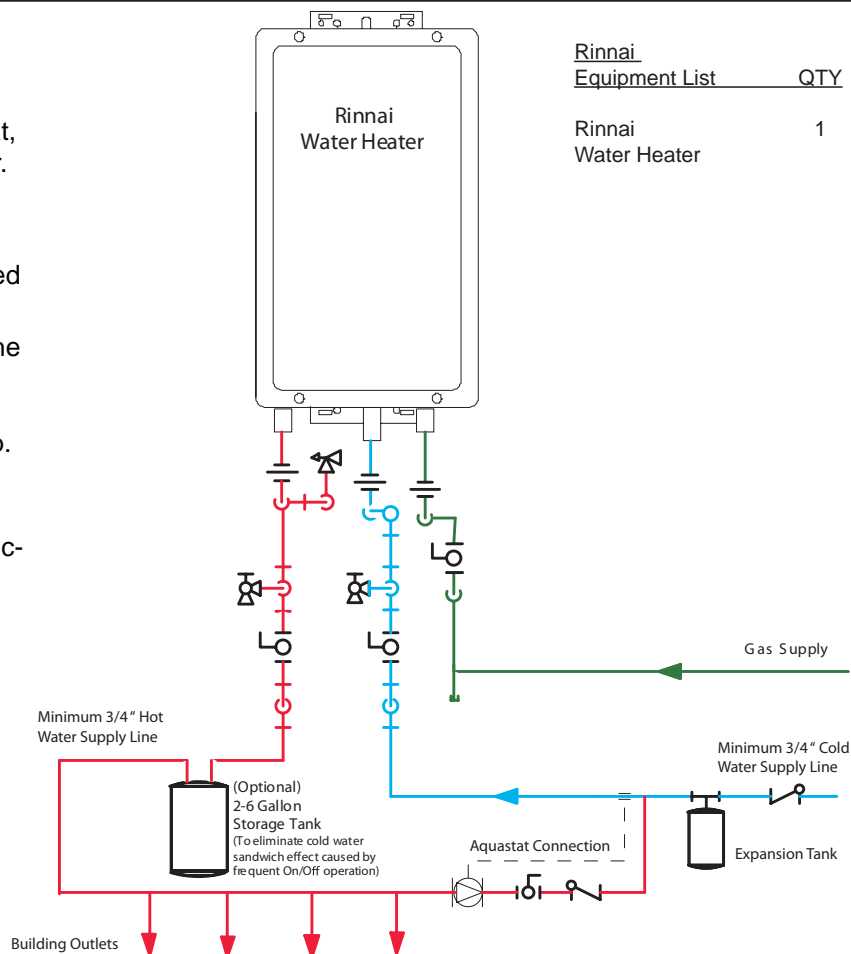
Pump should be controlled by an Aquastat, Timer or Combination Aquastat and Timer.

Pump to be sized to maintain circulation loop temperature.

A minimum of 3 GPM flow is recommended for the circulation system.

The pump should be sized to overcome the pressure loss through the Rinnai water heater, optional storage tank, and supply and return plumbing in the circulation loop. Reference the section *Pump Sizing for Circulation*.

Pump to be of bronze or stainless construction.



Drawing Number:
WH-1-R

Drawing Date:
June 11, 2007

Rinnai®

103 International Drive
Peachtree City, GA 30269

Domestic Hot Water - Circulation Systems 1 Rinnai Water Heater Optional Piping Installation

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Key

- 3/4" Ball Valve
- 3/4" Union
- Check Valve
- Pressure Relief Valve

- Pressure Regulator
- Circulating Pump
- Boiler Drain Valve
- Solenoid Valve

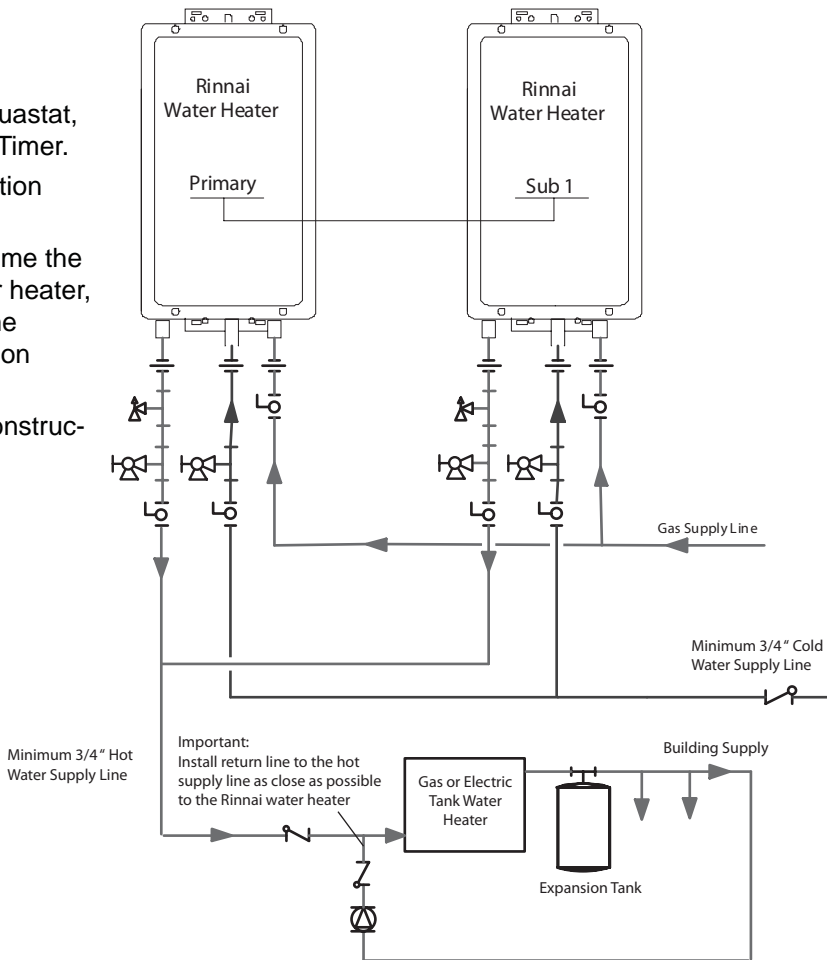
For this application:

Pump should be controlled by an Aquastat, Timer or Combination Aquastat and Timer.

Pump to be sized to maintain circulation loop temperature.

The pump should be sized to overcome the pressure loss through the tank water heater, and supply and return plumbing in the circulation loop. Reference the section *Pump Sizing for Circulation*.

Pump to be of bronze or stainless construction.



Rinnai
Equipment List QTY

Rinnai 2
Water Heaters

Electronic Connection *

* Refer to Rinnai Accessories and Model Applicability for electronic connection details.

Drawing Number:

WH-2-RGE

Drawing Date:

February 27, 2008









Rinnai[®]

103 International Drive
Peachtree City, GA 30269

Domestic Hot Water - Circulation Systems
2 Rinnai Water Heaters with Gas or Electric Tank
Preferred Piping Installation

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Key

	3/4" Ball Valve		Pressure Regulator
	3/4" Union		Circulating Pump
	Check Valve		Boiler Drain Valve
	Pressure Relief Valve		Solenoid Valve

For this application:

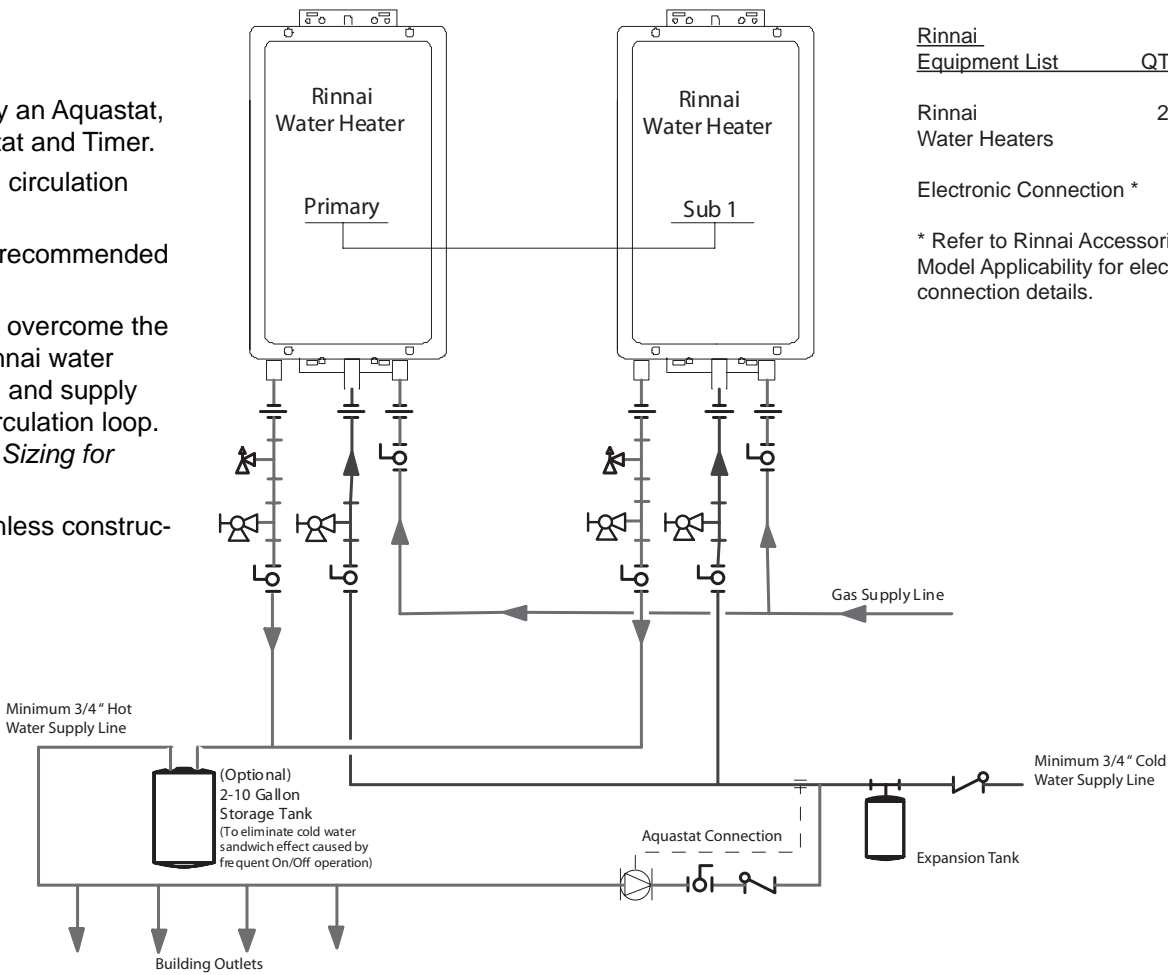
Pump should be controlled by an Aquastat, Timer or Combination Aquastat and Timer.

Pump to be sized to maintain circulation loop temperature.









A minimum of 3 GPM flow is recommended for the circulation system.

The pump should be sized to overcome the pressure loss through the Rinnai water heater, optional storage tank, and supply and return plumbing in the circulation loop. Reference the section *Pump Sizing for Circulation*.

Pump to be of bronze or stainless construction.



Rinnai Equipment List		QTY
Rinnai Water Heaters		2
Electronic Connection *		
* Refer to Rinnai Accessories and Model Applicability for electronic connection details.		

Drawing Number: WH-2-R	Domestic Hot Water - Circulation Systems 2 Rinnai Water Heaters Optional Piping Installation	
Drawing Date: February 27, 2008	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.	Key
<div>Rinnai®</div> <div>103 International Drive Peachtree City, GA 30269</div>		<div><div> 3/4" Ball Valve</div><div> 3/4" Union</div><div> Check Valve</div><div> Pressure Relief Valve</div><div> Pressure Regulator</div><div> Circulating Pump</div><div> Boiler Drain Valve</div><div> Solenoid Valve</div></div>

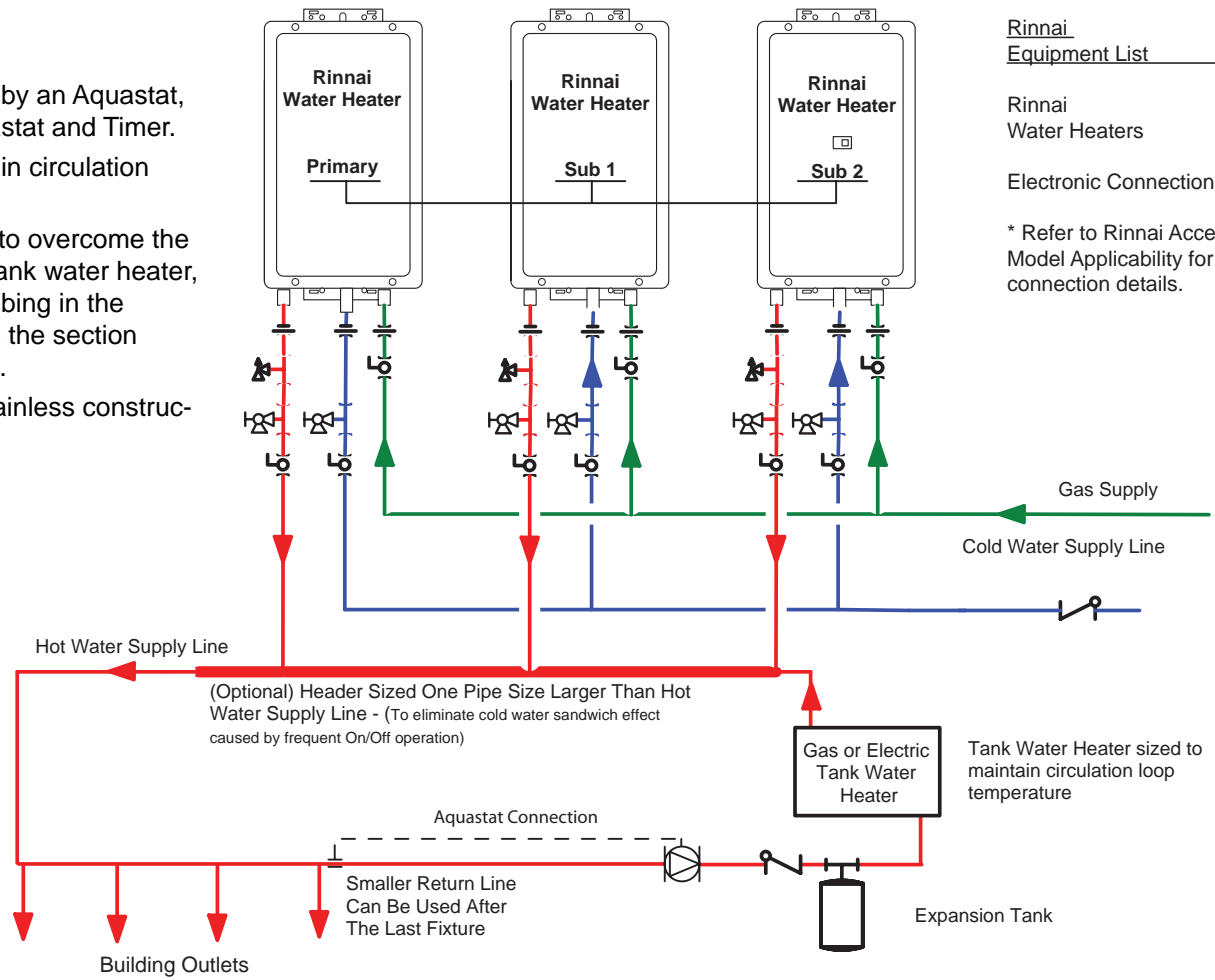
For this application:

Pump should be controlled by an Aquastat, Timer or Combination Aquastat and Timer.

Pump to be sized to maintain circulation loop temperature.

The pump should be sized to overcome the pressure loss through the tank water heater, and supply and return plumbing in the circulation loop. Reference the section *Pump Sizing for Circulation*.

Pump to be of bronze or stainless construction.



Rinnai
Equipment List QTY

Rinnai 3
Water Heaters

Electronic Connection *

* Refer to Rinnai Accessories and Model Applicability for electronic connection details.

Tank Water Heater sized to maintain circulation loop temperature

Expansion Tank

Drawing Number:
WH-3-RGE

Drawing Date:
February 27, 2008

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Peachtree City, GA 30269

Domestic Hot Water - Circulation Systems
3 Rinnai Water Heaters with Gas or Electric Tank
Preferred Piping Installation

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Key

- | | | | |
|--|-----------------------|--|--------------------|
| | 3/4" Ball Valve | | Pressure Regulator |
| | 3/4" Union | | Circulating Pump |
| | Check Valve | | Boiler Drain Valve |
| | Pressure Relief Valve | | Solenoid Valve |

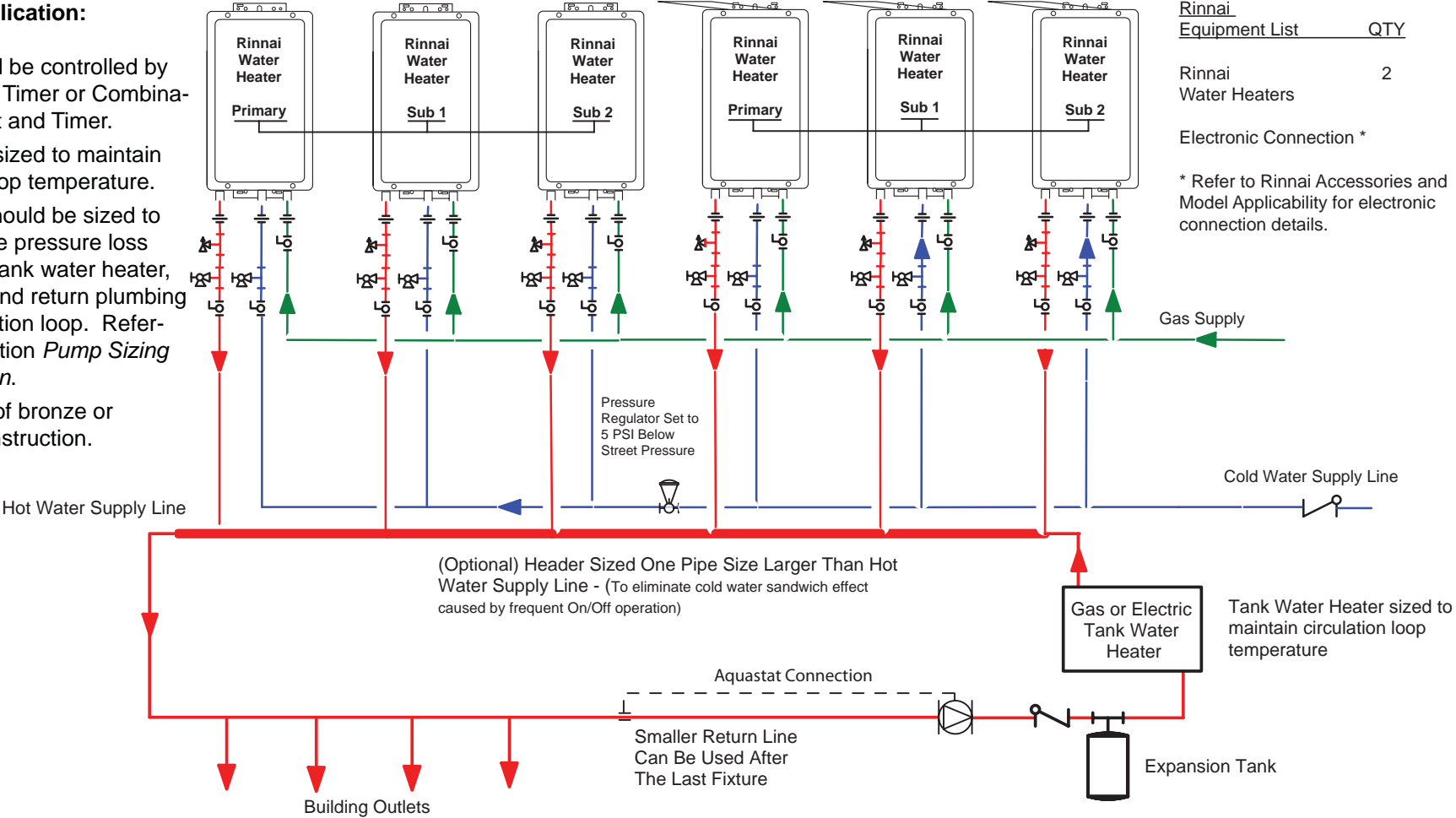
For this application:

Pump should be controlled by an Aquastat, Timer or Combination Aquastat and Timer.

Pump to be sized to maintain circulation loop temperature.

The pump should be sized to overcome the pressure loss through the tank water heater, and supply and return plumbing in the circulation loop. Reference the section *Pump Sizing for Circulation*.

Pump to be of bronze or stainless construction.



Rinnai Equipment List QTY

Rinnai Water Heaters 2

Electronic Connection *

* Refer to Rinnai Accessories and Model Applicability for electronic connection details.

Tank Water Heater sized to maintain circulation loop temperature

Drawing Number:
WH-6-RGE

Drawing Date:
February 27, 2008

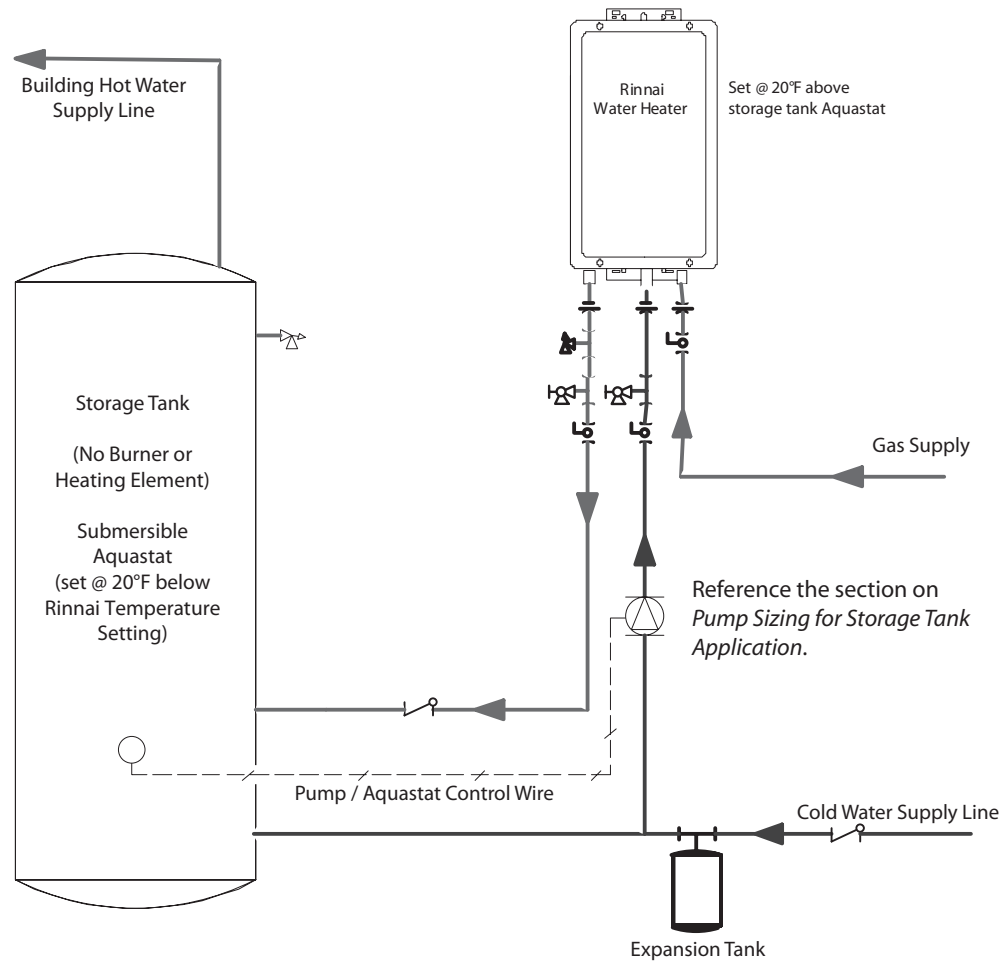
Rinnai
103 International Drive
Peachtree City, GA 30269

Domestic Hot Water - Circulation Systems
6 Rinnai Water Heaters with Gas or Electric Tank
Preferred Piping Installation

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Key

- | | | | |
|--|-----------------------|--|--------------------|
| | 3/4" Ball Valve | | Pressure Regulator |
| | 3/4" Union | | Circulating Pump |
| | Check Valve | | Boiler Drain Valve |
| | Pressure Relief Valve | | Solenoid Valve |



<u>Rinnai</u>	<u>Equipment List</u>	<u>QTY</u>
Rinnai Commercial	Water Heater	1

Drawing Number:
WH-1-B

Drawing Date:
February 27, 2008

Rinnai

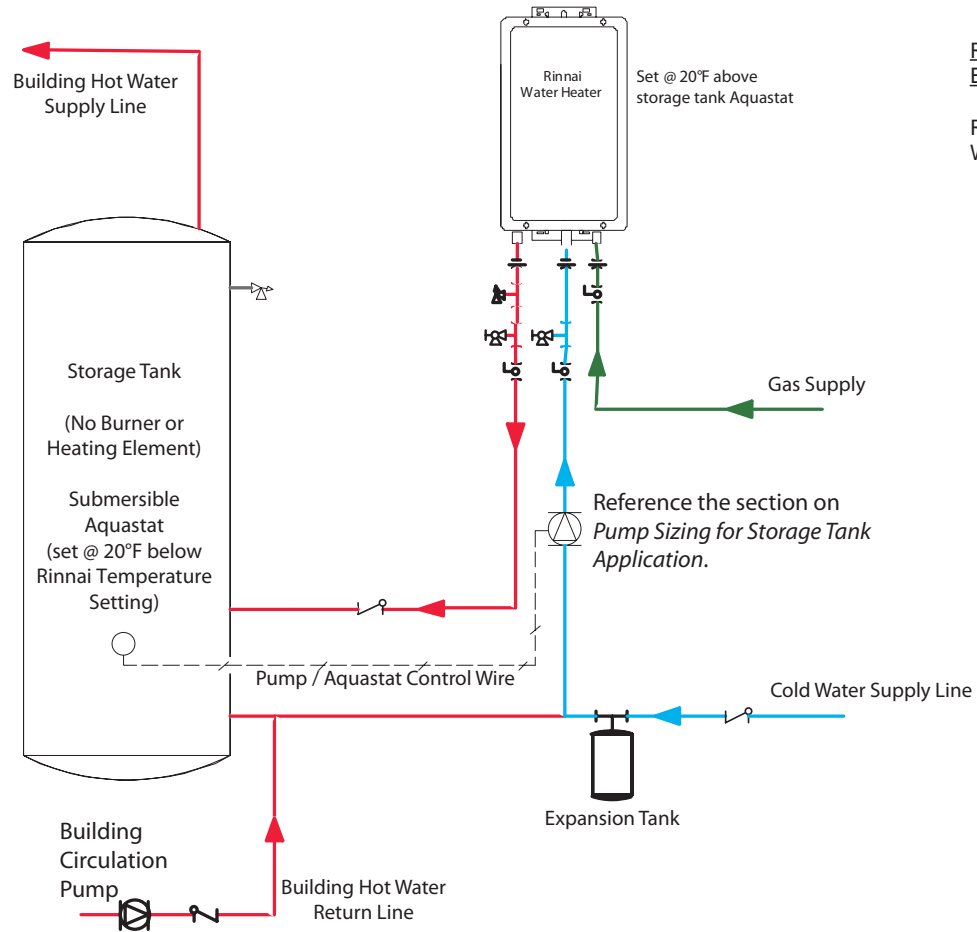
103 International Drive
Peachtree City, GA 30269

Domestic Hot Water - Backup Storage 1 Rinnai Water Heater Preferred Piping Installation

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Key

	3/4" Ball Valve		Pressure Regulator
	3/4" Union		Circulating Pump
	Check Valve		Boiler Drain Valve
	Pressure Relief Valve		Solenoid Valve



Rinnai Equipment List		QTY
Rinnai Commercial Water Heater		1

Drawing Number:
WH-1-B-R

Drawing Date:
February 27, 2008

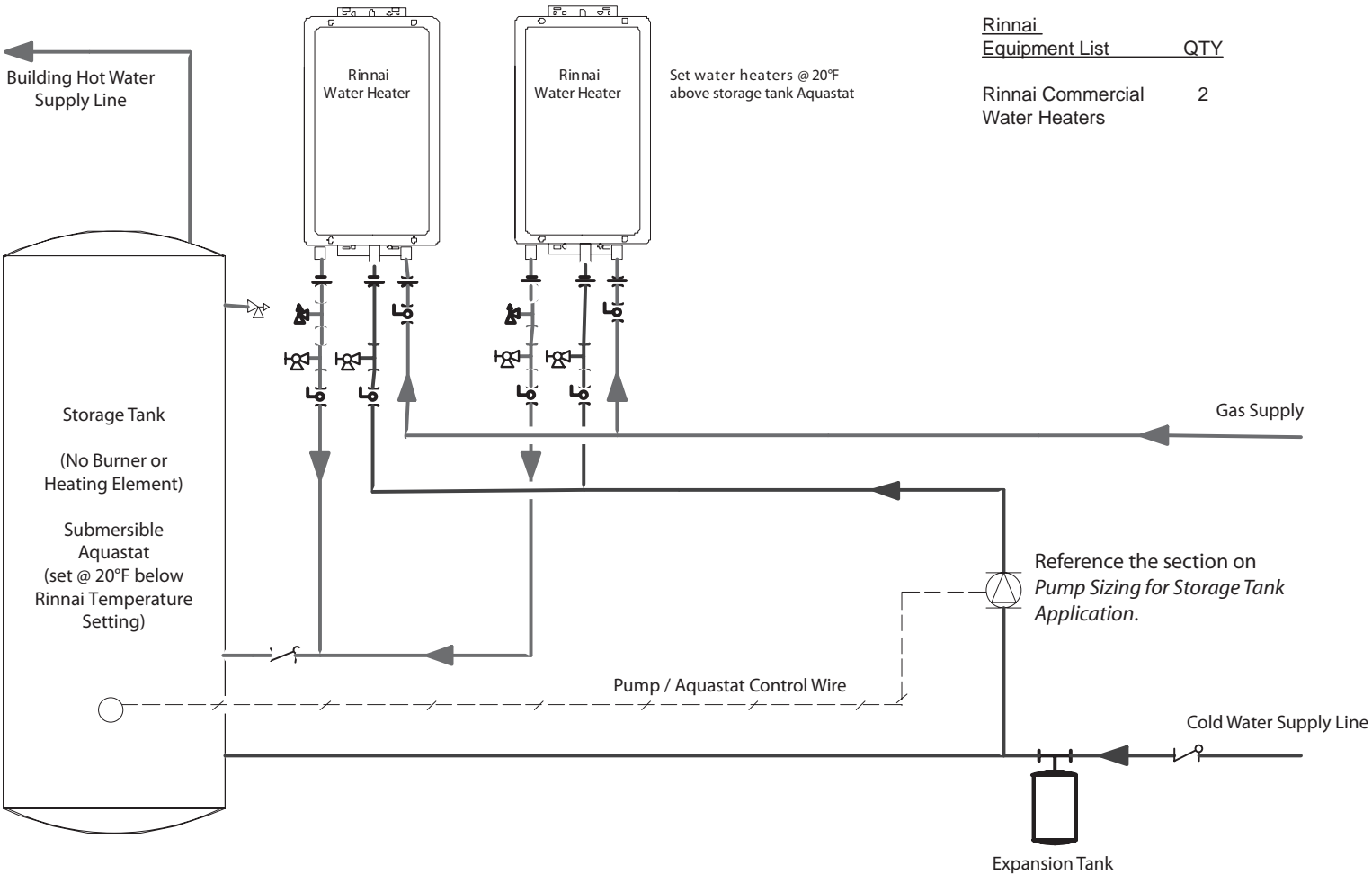
Rinnai
103 International Drive
Peachtree City, GA 30269

Domestic Hot Water - Backup Storage / Circulation 1 Rinnai Water Heater Preferred Piping Installation

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Key

	3/4" Ball Valve		Pressure Regulator
	3/4" Union		Circulating Pump
	Check Valve		Boiler Drain Valve
	Pressure Relief Valve		Solenoid Valve



Rinnai	
Equipment List	QTY
Rinnai Commercial Water Heaters	2

Drawing Number:
WH-2-B

Drawing Date:
February 27, 2008

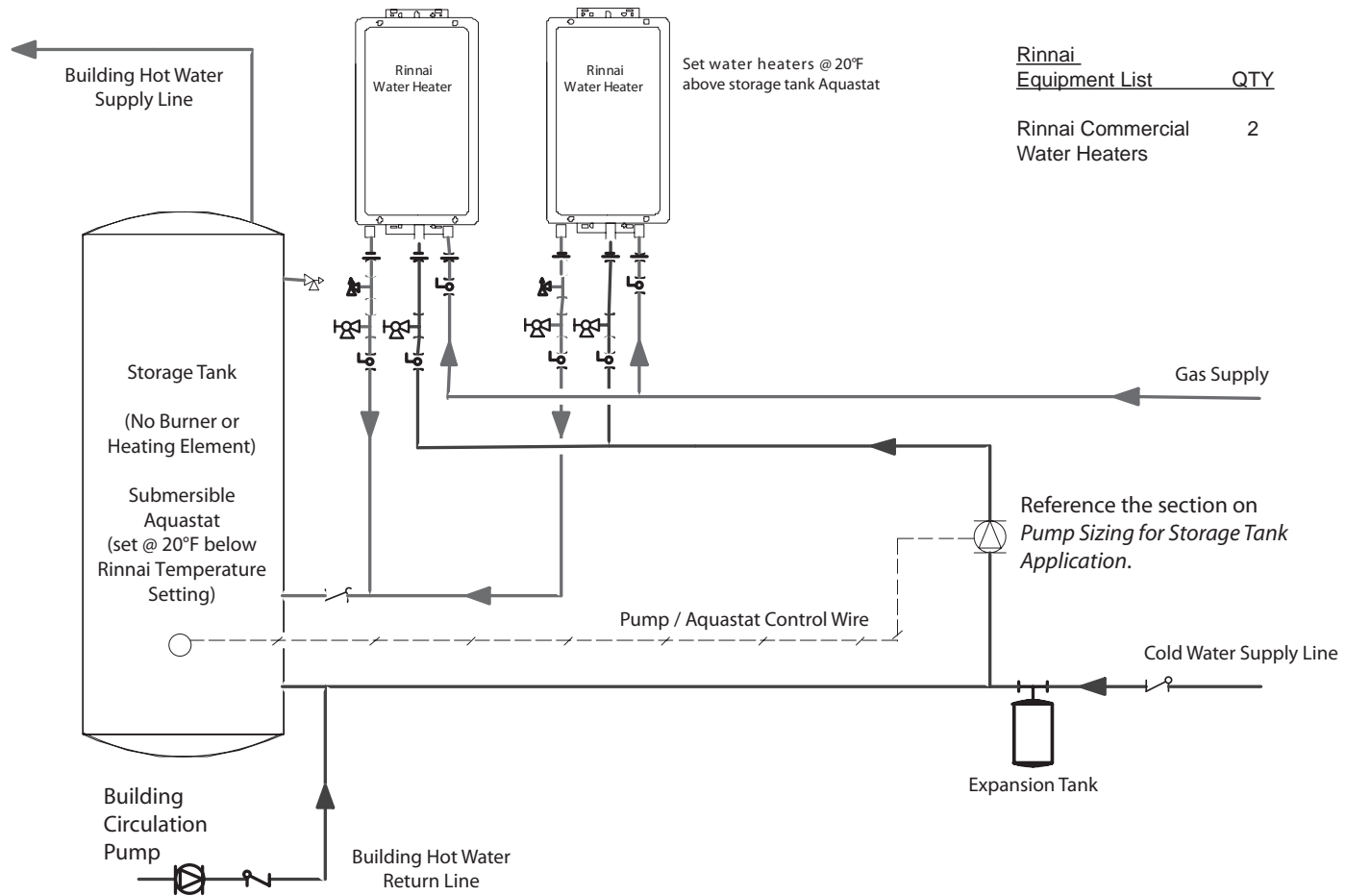
Rinnai
103 International Drive
Peachtree City, GA 30269

Domestic Hot Water - Backup Storage
2 Rinnai Water Heaters
Preferred Piping Installation

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Key

	3/4" Ball Valve		Pressure Regulator
	3/4" Union		Circulating Pump
	Check Valve		Boiler Drain Valve
	Pressure Relief Valve		Solenoid Valve



Rinnai Equipment List	QTY
Rinnai Commercial Water Heaters	2

Drawing Number:
WH-2-B-R

Drawing Date:
February 27, 2008

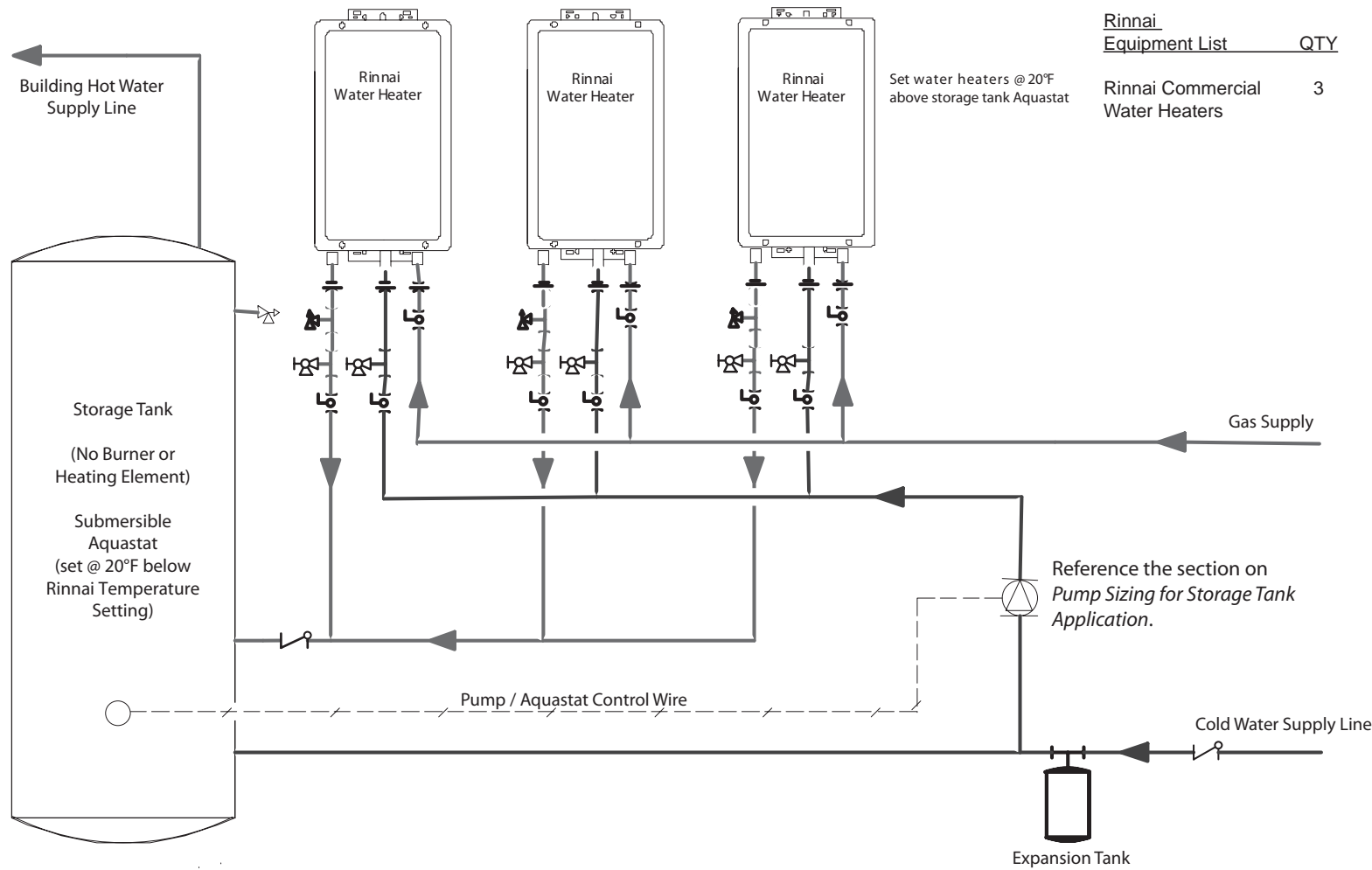
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103 International Drive
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Domestic Hot Water - Backup Storage / Circulation 2 Rinnai Water Heaters Preferred Piping Installation

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Key

	3/4" Ball Valve		Pressure Regulator
	3/4" Union		Circulating Pump
	Check Valve		Boiler Drain Valve
	Pressure Relief Valve		Solenoid Valve



Rinnai Equipment List	QTY
Rinnai Commercial Water Heaters	3

Drawing Number:
WH-3-B

Drawing Date:
February 27, 2008

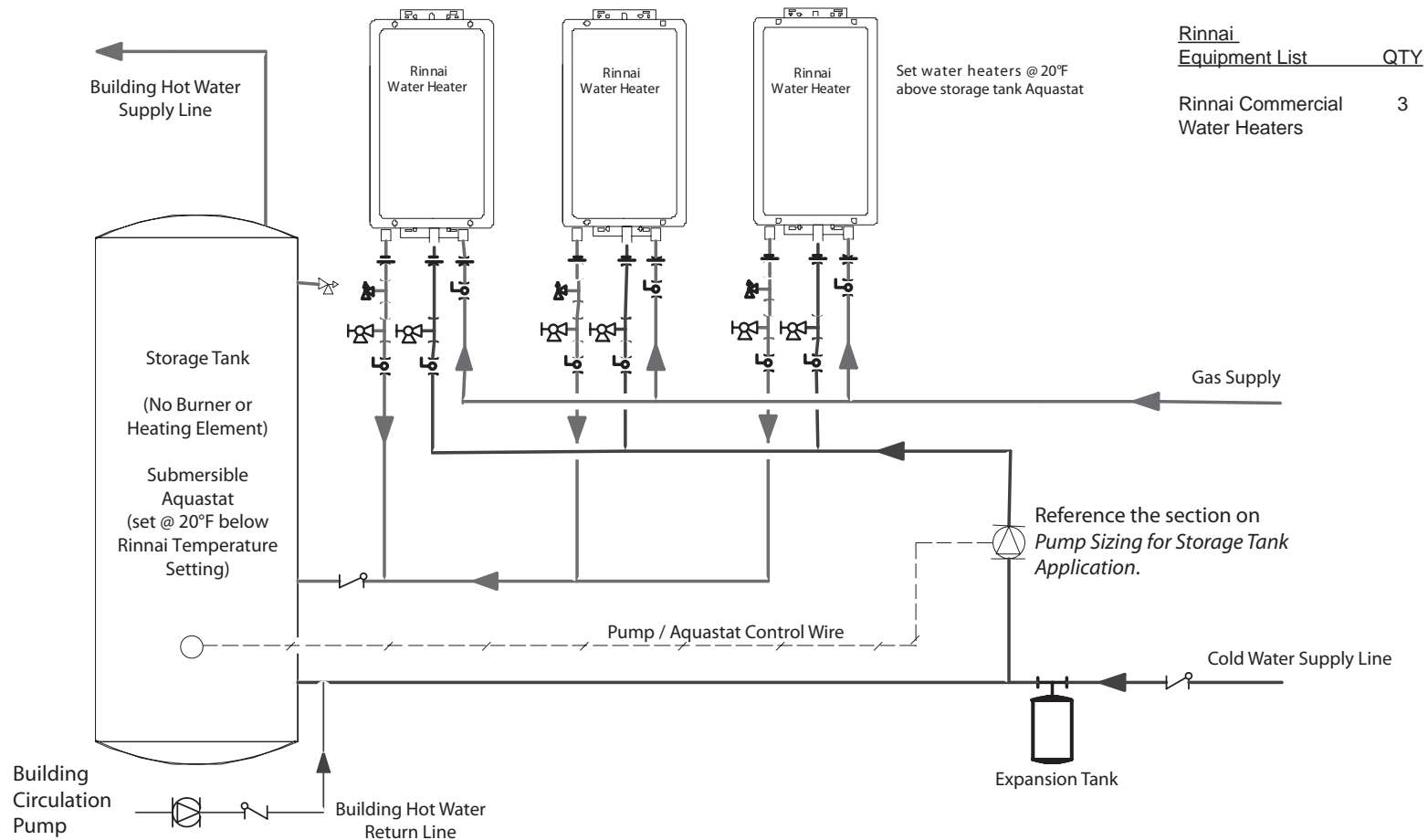
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103 International Drive
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Domestic Hot Water - Backup Storage 3 Rinnai Water Heaters Preferred Piping Installation

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Key

	3/4" Ball Valve		Pressure Regulator
	3/4" Union		Circulating Pump
	Check Valve		Boiler Drain Valve
	Pressure Relief Valve		Solenoid Valve



Drawing Number:

WH-3-B-R

Drawing Date:

February 27, 2008

Rinnai

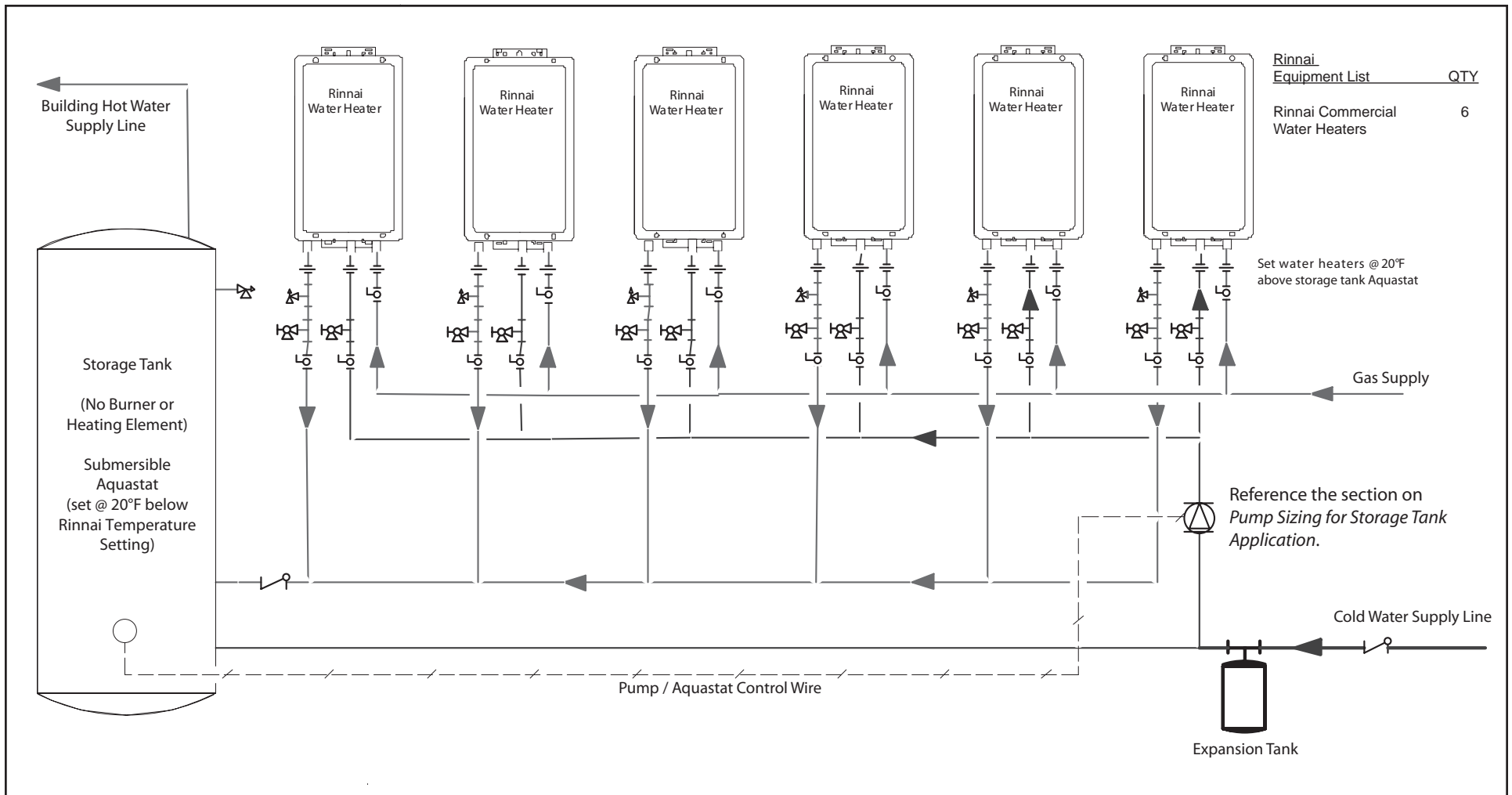
103 International Drive
Peachtree City, GA 30269

Domestic Hot Water - Backup Storage / Circulation 3 Rinnai Water Heaters Preferred Piping Installation

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Key

	3/4" Ball Valve		Pressure Regulator
	3/4" Union		Circulating Pump
	Check Valve		Boiler Drain Valve
	Pressure Relief Valve		Solenoid Valve



Drawing Number:
WH-6-B

Drawing Date:
February 27, 2008

Rinnai

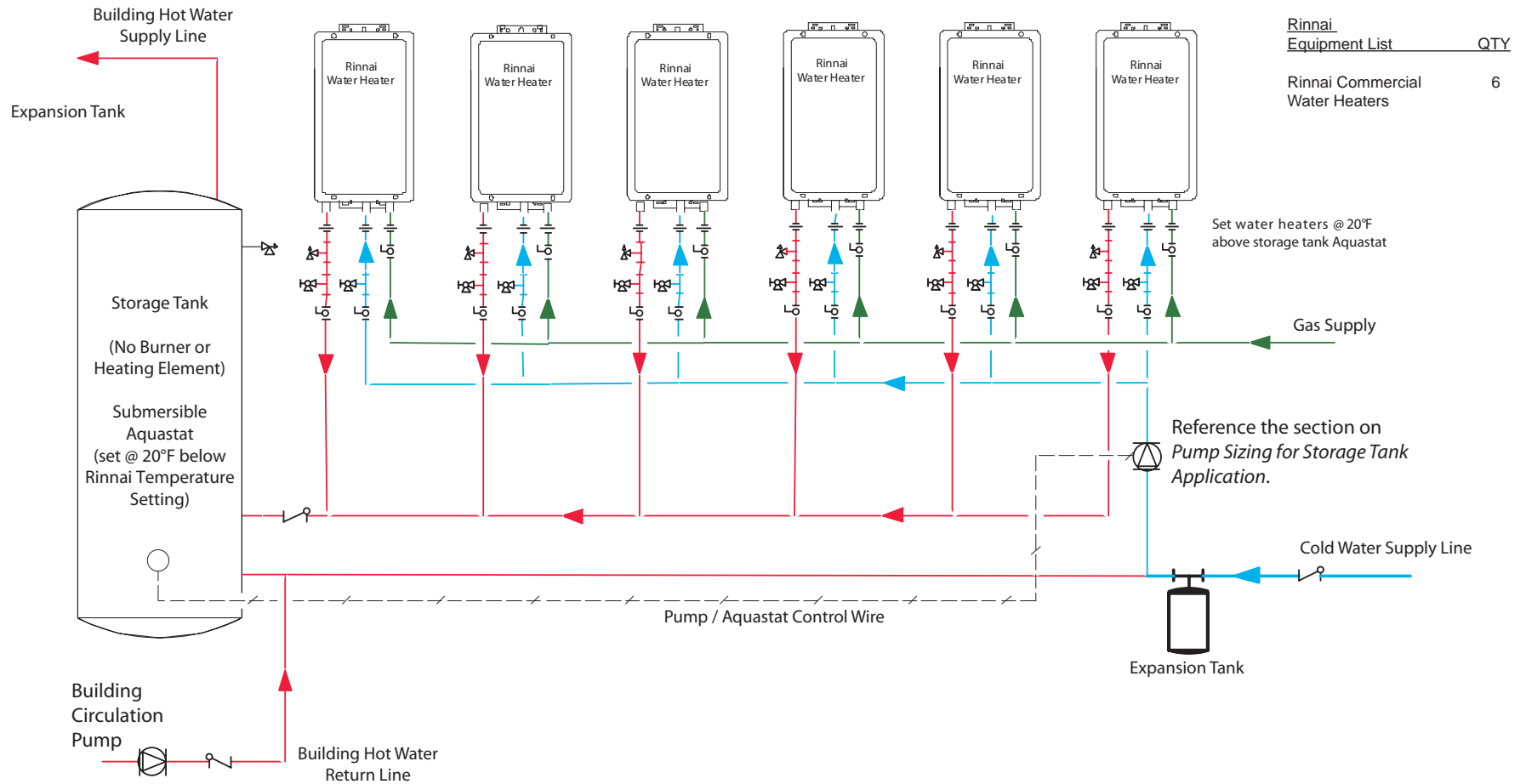
103 International Drive
Peachtree City, GA 30269

Domestic Hot Water - Backup Storage 6 Rinnai Water Heaters Preferred Piping Installation

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Key

	3/4" Ball Valve		Pressure Regulator
	3/4" Union		Circulating Pump
	Check Valve		Boiler Drain Valve
	Pressure Relief Valve		Solenoid Valve



Drawing Number:

WH-6-B-R

Drawing Date:

February 27, 2008

Rinnai®

 103 International Drive
 Peachtree City, GA 30269

Domestic Hot Water - Backup Storage / Circulation 6 Rinnai Water Heaters Preferred Piping Installation

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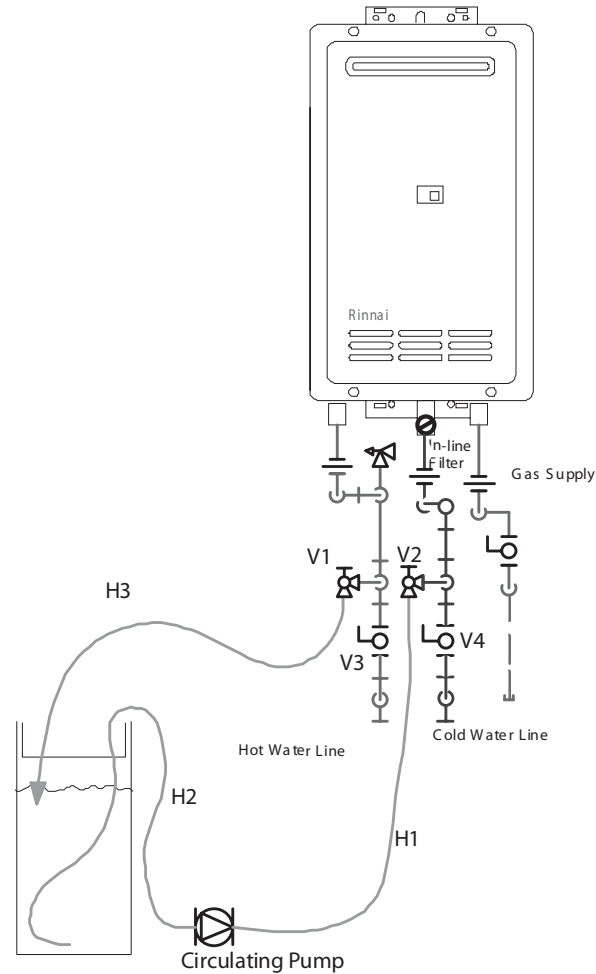
Key









- 3/4" Ball Valve
- 3/4" Union
- Check Valve
- Pressure Relief Valve

- Pressure Regulator
- Circulating Pump
- Boiler Drain Valve
- Solenoid Valve

Flush Procedure

1. Disconnect electrical power to the water heater.
2. Close the shutoff valves on both the hot water and cold water lines (V3 and V4).
3. Connect pump outlet hose (H1) to the cold water line at service valve V2.
4. Connect drain hose (H3) to service valve V1.
5. Pour approximately 4 gallons of virgin, food grade, white vinegar or citric acid into pail.
6. Place the drain hose (H3) and the hose (H2) to the pump inlet into the cleaning solution.
7. Open both service valves (V1 and V2) on the hot water and cold water lines.
8. Operate the pump and allow the cleaning solution to circulate through the water heater for at least 45 minutes.
9. Turn off the pump.
10. Rinse the cleaning solution from the water heater by:
 - a. remove the free end of the drain hose (H3) from the pail
 - b. close service valve, V2, and open shutoff valve, V4. Do not open shutoff valve, V3.
 - c. allow water to flow through the water heater for 5 minutes
 - d. close service valve, V1, and open shutoff valve, V3.
11. Disconnect all hoses.
12. Remove the in-line filter at the cold water inlet and clean out any residue. Place filter back into unit.
13. Restore electrical power to the water heater.



Drawing Number: M-1-F	Maintenance - Scale Flush Procedure 1 Rinnai Water Heater	
Drawing Date: June 11, 2007	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.	Key
<div>Rinnai® 103 International Drive Peachtree City, GA 30269</div>		<div><div> 3/4" Ball Valve</div><div> 3/4" Union</div><div> Check Valve</div><div> Pressure Relief Valve</div></div> <div><div> Pressure Regulator</div><div> Circulating Pump</div><div> Boiler Drain Valve</div><div> Solenoid Valve</div></div>

Notes

Notes

Notes

Ask about **Rinnai**®

Rinnai's other fine products

Rinnai America Corporation
103 International Drive
Peachtree City, GA 30269
TOLL FREE: 1-800-621-9419
FAX: 678-829-1666
www.rinnai.us



Tankless Water Heaters

- Residential and Commercial Applications
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- Up to 9.8 GPM
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- Propane or Natural Gas
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- Cool-to-the-touch Cabinet
- Blower Included
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- Gas Conversion Kit Included



Direct-Vent Fireplace, RHFE-750ETR

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- Zero-Clearance Installation
- Available in Four Options of Fronts
- Remotes and Fan Included
- Gas Conversion Kit Available



Hydronic Air Handler

- Designed for Use with Rinnai Systems
- Domestic Hot Water Priority
- Optional Programmable Thermostat
- Zero Clearance to Combustibles
- Accommodates Standard Cased-Coils