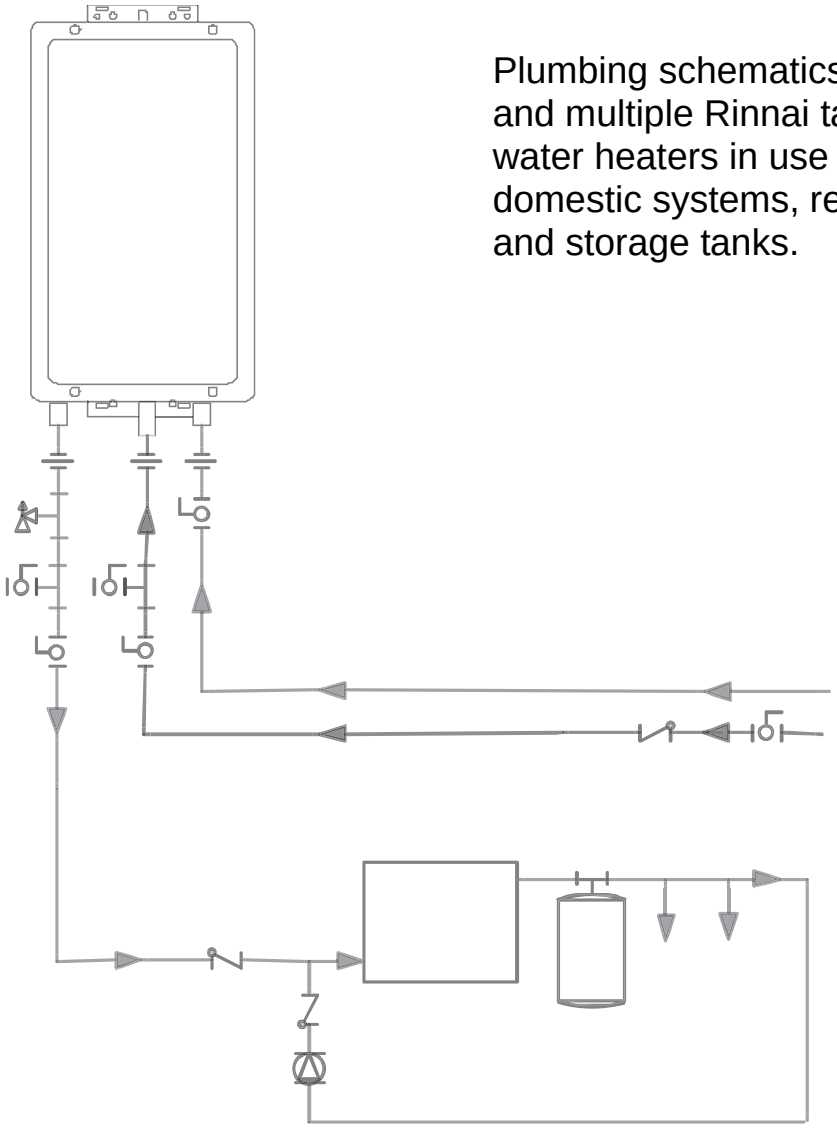
Rinnai®

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 A (6/14/2007), supersedes and replaces the previous Hot Water System Design Manuals, R-TRWH-E-02 (6/6/2007) and ENG.2002.9.

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Certifications

REU-V1616W	*REU-V2532W*	*REU-V3237-W*
REU-V1616WC	*REU-V2532WC*	*REU-V3237-WC*
REU-V2020W	*REU-V2532WD*	*REU-V3237-W-ASME*
REU-V2020WC	*REU-V2532WCD*	*REU-V3237-WC-ASME*
REU-V2526W		
REU-V2520FFU	*REU-V2532FFU*	*REU-V3237-FFU*
REU-V2520FFUC	*REU-V2532FFUC*	*REU-V3237-FFUC*
REU-V2520FFUD	*REU-V2532FFUD*	*REU-V3237-FFU-ASME*
REU-V2520FFUCD	*REU-V2532FFUCD*	*REU-V3237-FFUC-ASME*

These models have received the following certifications:

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

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

Certified by the Uniform Plumbing Code (UPC)

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

Certified by National Sanitation Foundation (NSF), www.nsf.org
(indoor models must use the NSF approved top guard)

Met the California Energy Commission (CEC) standards

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

Approved by the Commonwealth of Massachusetts

REU-V3237-W-ASME	*REU-V3237-FFU-ASME*
REU-V3237-WC-ASME	*REU-V3237-FFUC-ASME*

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

MSA Controller: The MSA-2M and MSA-2S packs are optional accessories that electronically connects 2 to 5 water heaters and allows them to function as one hot water source.

EZConnect: The EZConnect cable is an optional accessory that electronically connects 2 *REU-V3237* water heaters and allows them to function as one hot water source.

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-2M and MSA-2S 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 pack 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 (*REU-V3237*), provides isolation valves, pressure relief valve, and full port drains with easy union installation.

Remote Controllers: MC-91-1US (included)
Deluxe controller: MC-100V-1US (optional)
Bathroom controller: BC-100V-1US (optional)
Wireless controller (with transceiver): MC-502RC-1US-MS (optional)

Indoor

Ubbink Rolux Venting: 3”/5” dia. concentric plastic or metal vent components; (not applicable to V3237 models)

ProTech Venting: 4” dia. stainless steel components for exhaust vent and concentric terminations (for V3237 models only)

Condensate Trap (224050) for trapping and draining condensate

Battery Backup: 750VA; supplies power for a short period in case there is a loss of electricity.

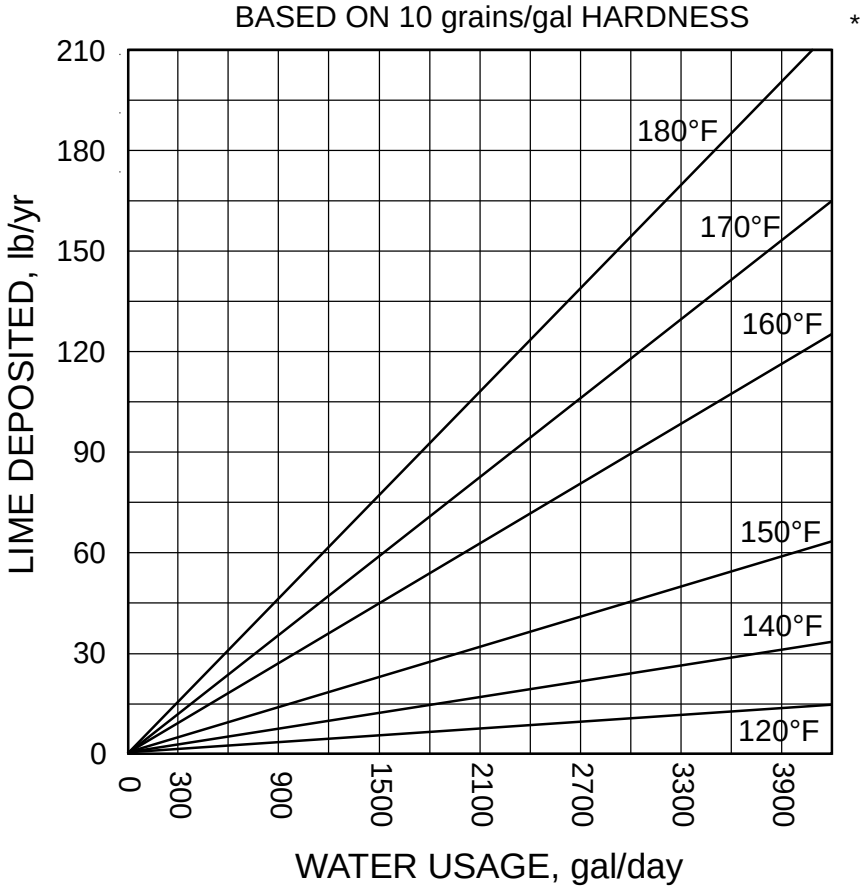
Outdoor

Model	**Recess Boxes** protects and hides the unit from view	**Pipe Covers** for security, weather protection, and finished look
REU-V1616W(C), REU-V2020W(C)	RGB-20-W	PC-20-W *(white)*
REU-V2526W, REU-V2532W(C)	RGB-25-W RGB-25-MS *(moisture seal - riveted construction)* RGB-25-MSW *(moisture seal - welded construction)*	PC-25-W *(white)* PC-25-G *(gray)*
REU-V2532W(C)D	RGB-25-D	PCD03-SM *(silver-gray)* PCD03-MG *(white)*
REU-V3237-W(C), REU-V3237-W(C)-ASME	RGB-32	PC-32-W *(white)* PC-32-G *(gray)*

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.

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 ºF Inlet, 70 ºF 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 ºF (49 ºC) and an acceptable temperature at the last fixture is 100 ºF (38 ºC) then the acceptable temperature drop is 20 ºF (7 ºC).

3. Calculate the required pump flow rate using the following formula:

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

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.

Available Btu output = (Btu input of tank) x (efficiency) $\geq$ Circulation loop heat loss (Btu/h)

Example:

30,000 Btu input gas tank
0.62 Efficiency

30,000 x .62 = 18,600 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.

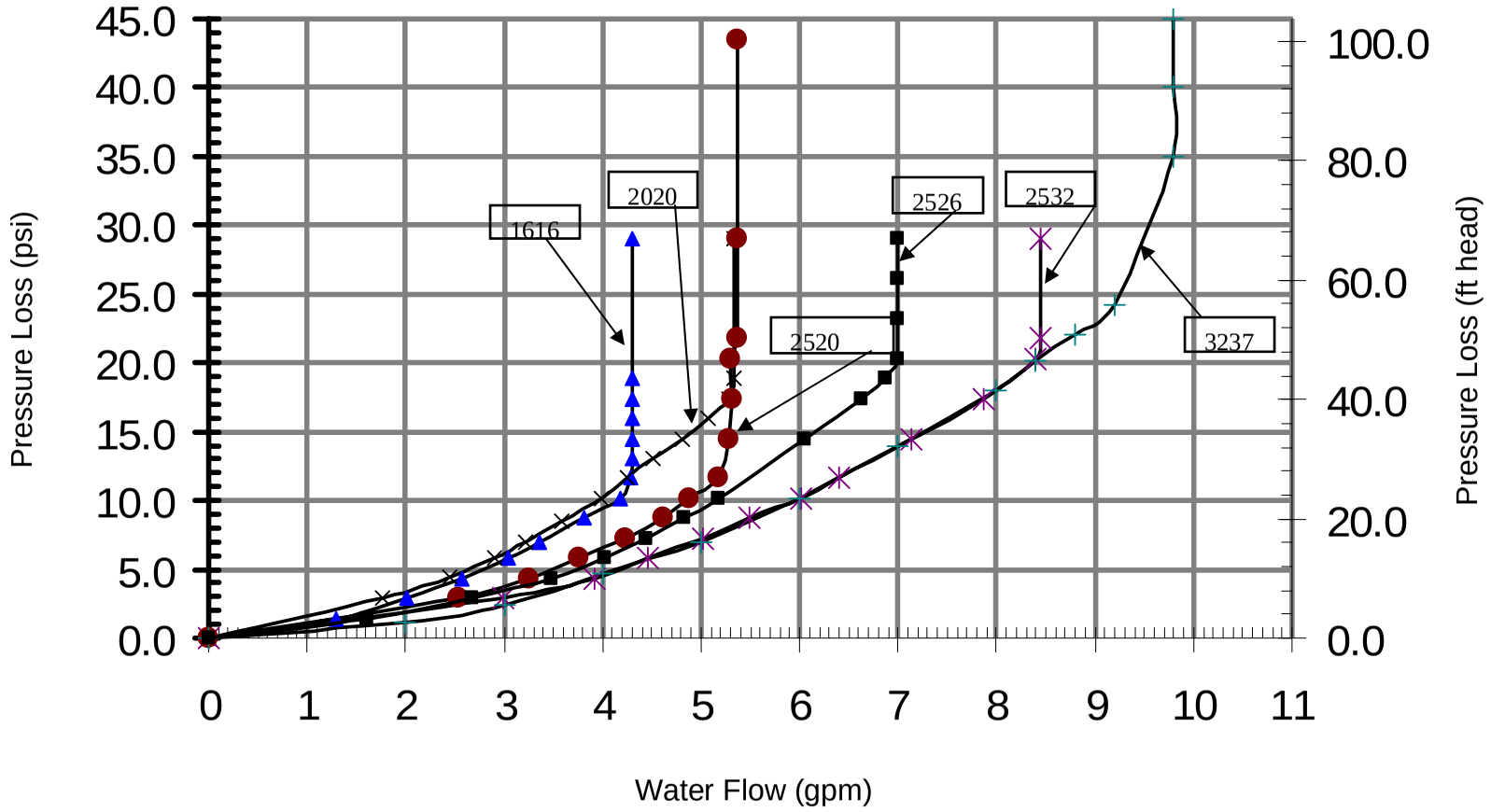
For recommended pump sizes use the table below. Additional pressure losses in plumbing between the Rinnai(s) and the storage tank must also be taken into consideration.

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.

The model numbers listed below include indoor, outdoor, ASME versions, and Designer Plus series models.

Pump Flow Requirements			
Number of Rinnai Water Heaters	**REU-V2532** **REU-V3237**	**REU-V2520** **REU-V2526**	**REU-V1616** **REU-V2020**
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



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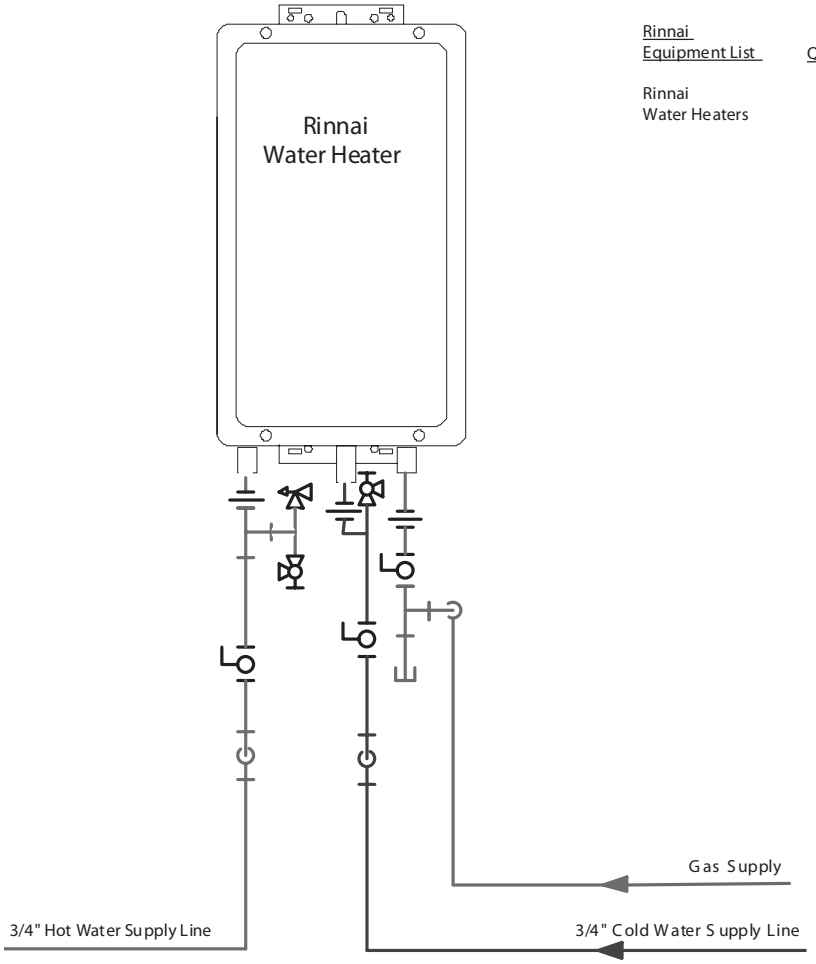


Rinnai Equipment List	QTY
Rinnai Water Heaters	1

Drawing Number:
WH-1

Drawing Date:
June 11, 2007

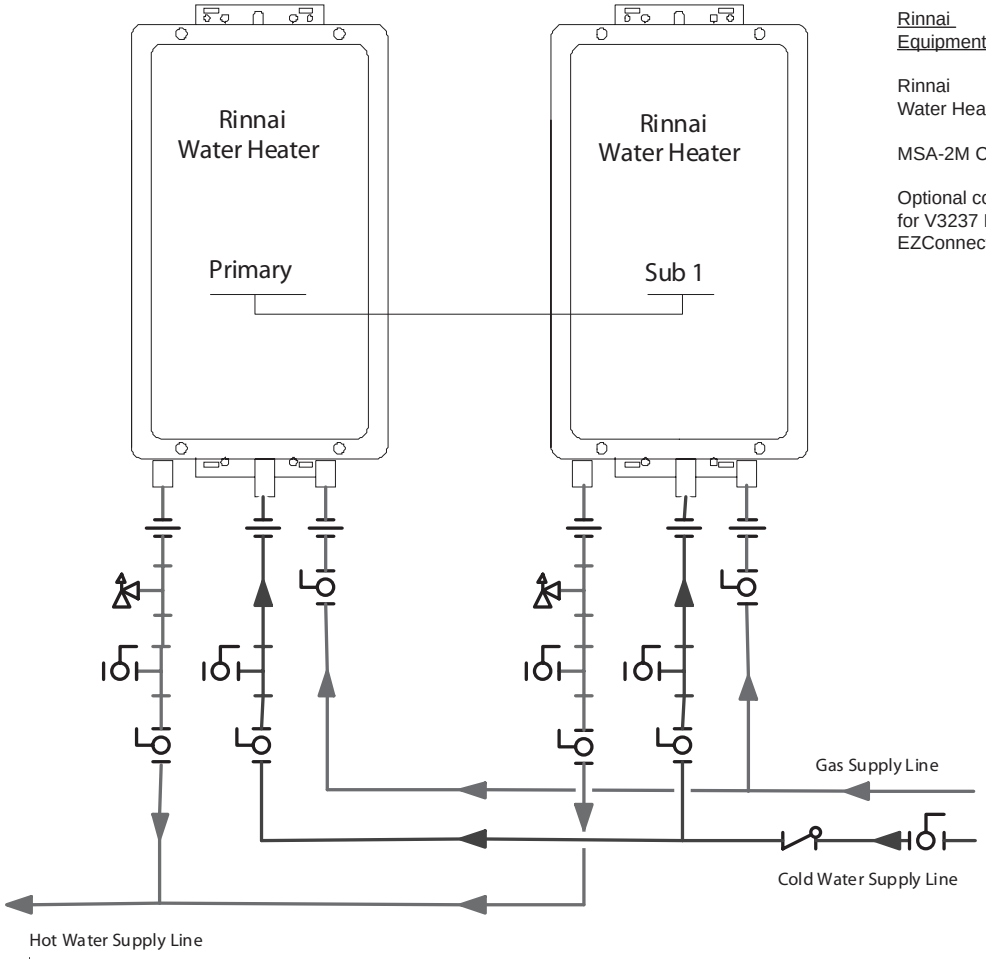
Rinnai®
103 International Drive
Peachtree City, GA 30269

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



Rinnai Equipment List	QTY
Rinnai Water Heaters	2
MSA-2M Controls	1
Optional connection for V3237 Models: EZConnect Cable	1

Drawing Number:
WH-2

Drawing Date:
June 11, 2007

Rinnai®
103 International Drive
Peachtree City, GA 30269

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

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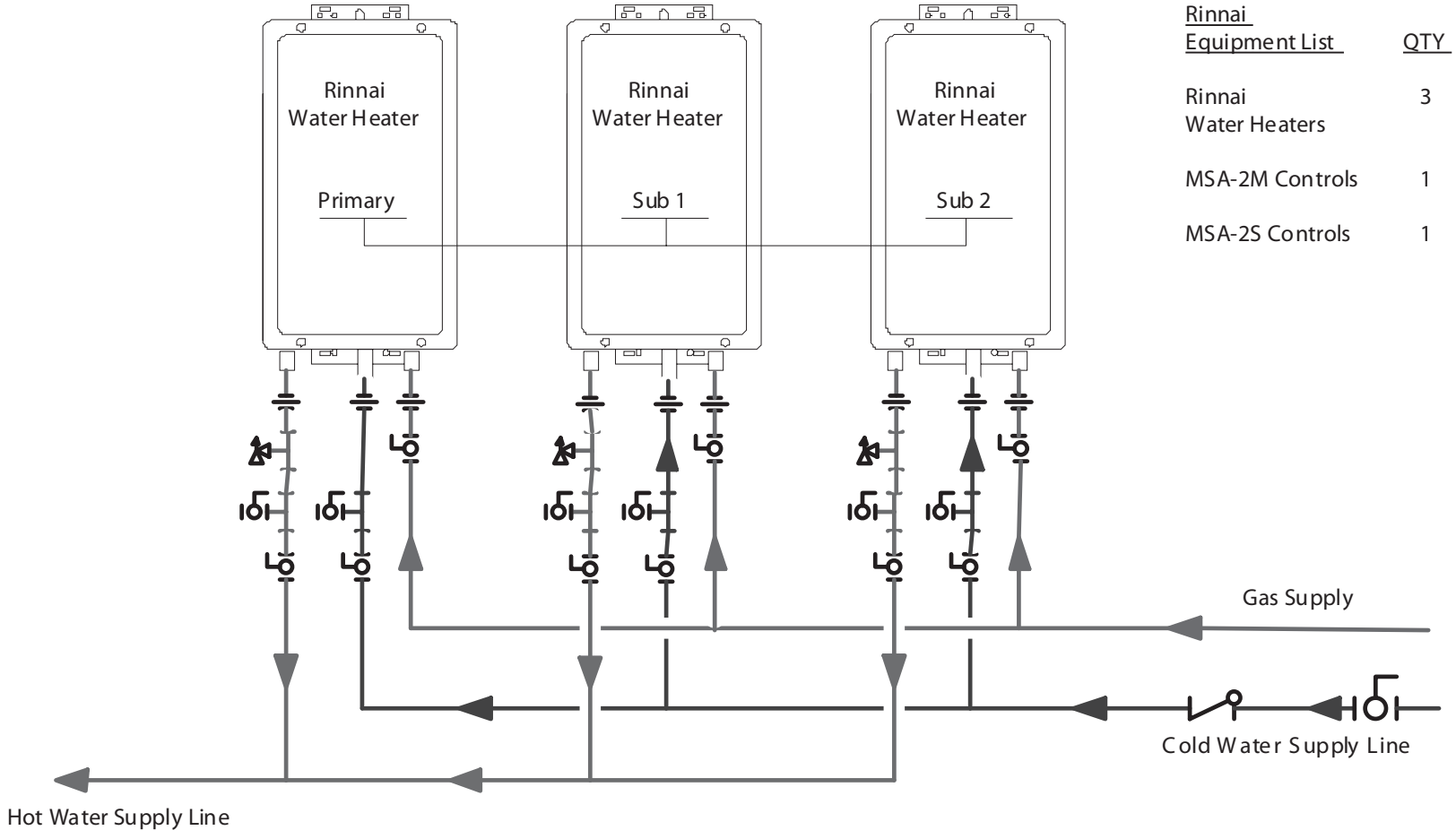

Rinnai Equipment List	QTY
Rinnai Water Heaters	3
MSA-2M Controls	1
MSA-2S Controls	1

Drawing Number:
WH-3

Drawing Date:
June 11, 2007

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103 International Drive
Peachtree City, GA 30269

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

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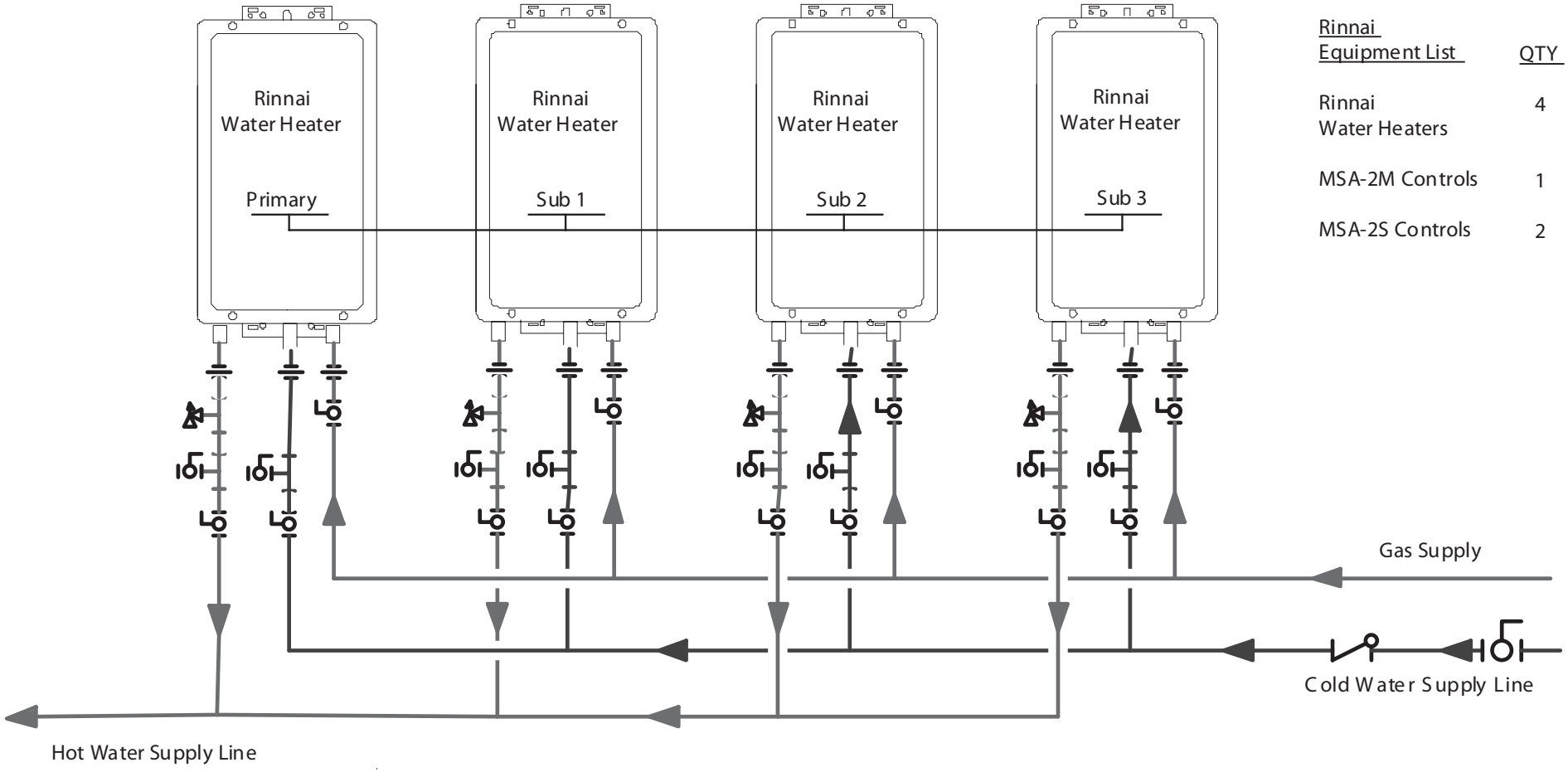

Rinnai Equipment List	QTY
Rinnai Water Heaters	4
MSA-2M Controls	1
MSA-2S Controls	2

Drawing Number:
WH-4

Drawing Date:
June 11, 2007

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Peachtree City, GA 30269

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

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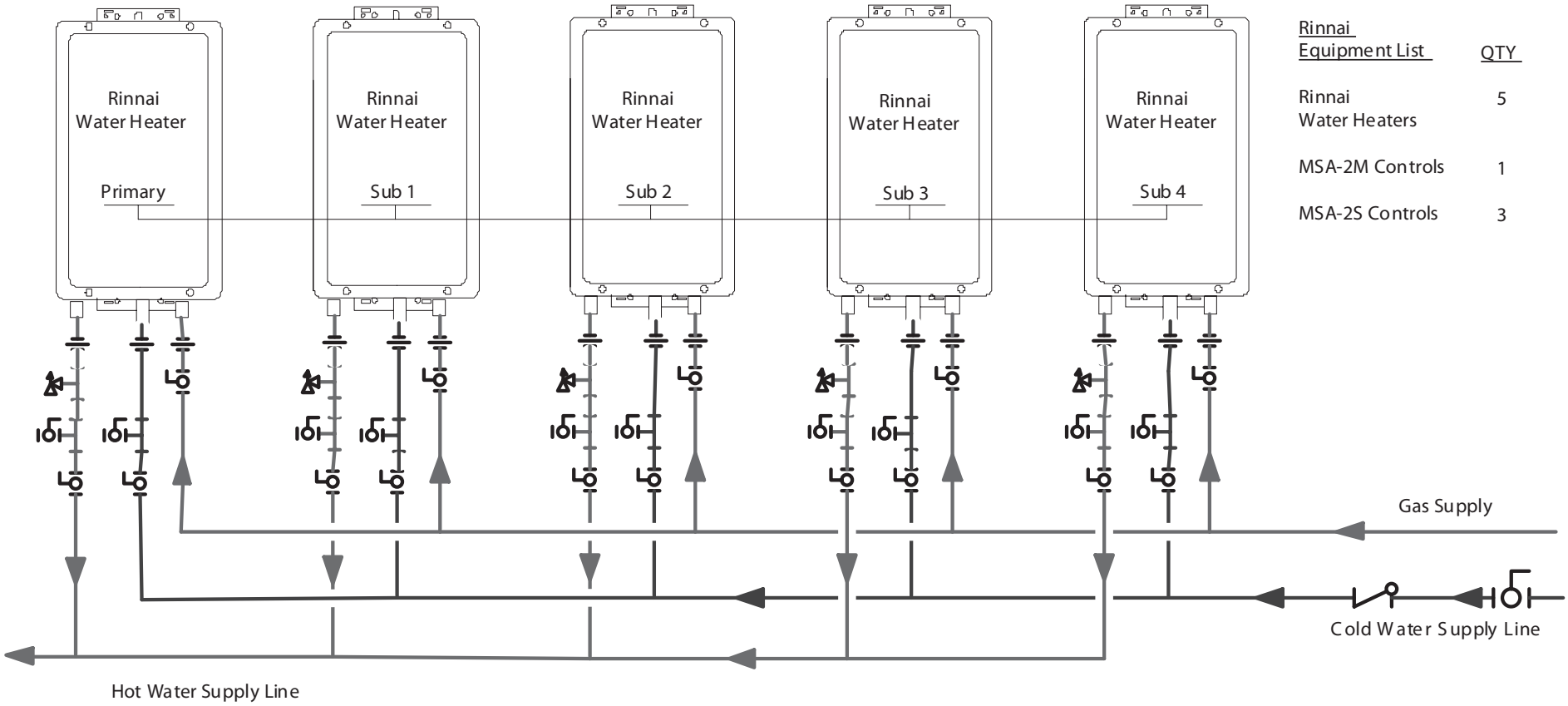
- Boiler Drain Valve
- Solenoid Valve



Rinnai Equipment List	QTY
Rinnai Water Heaters	5
MSA-2M Controls	1
MSA-2S Controls	3

Drawing Number:
WH-5

Drawing Date:
June 11, 2007

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Peachtree City, GA 30269

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

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Key

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- Circulating Pump
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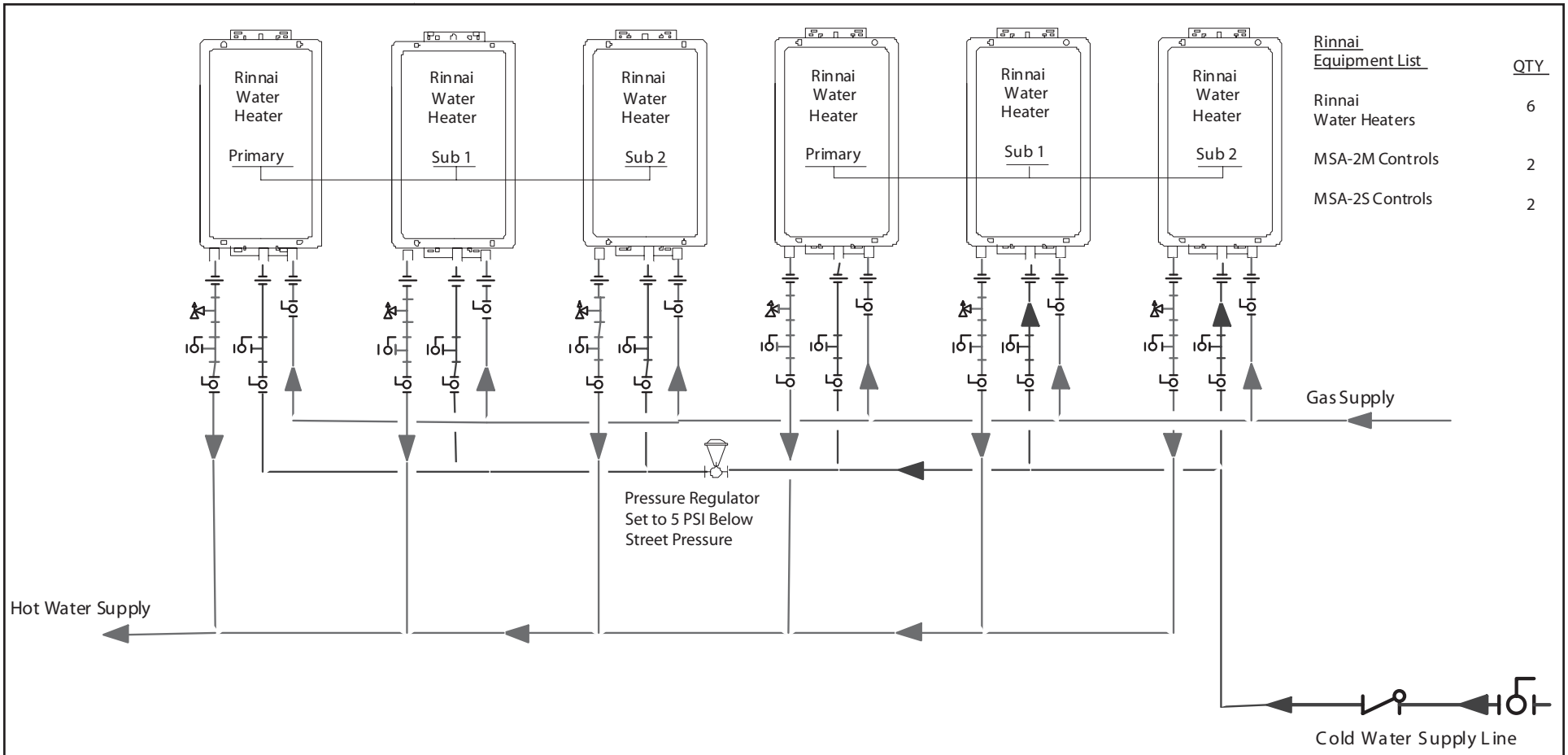
- Solenoid Valve



Drawing Number:
WH-6

Drawing Date:
June 11, 2007

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Peachtree City, GA 30269

Domestic Hot Water - Standard Installation
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

IMPORTANT!

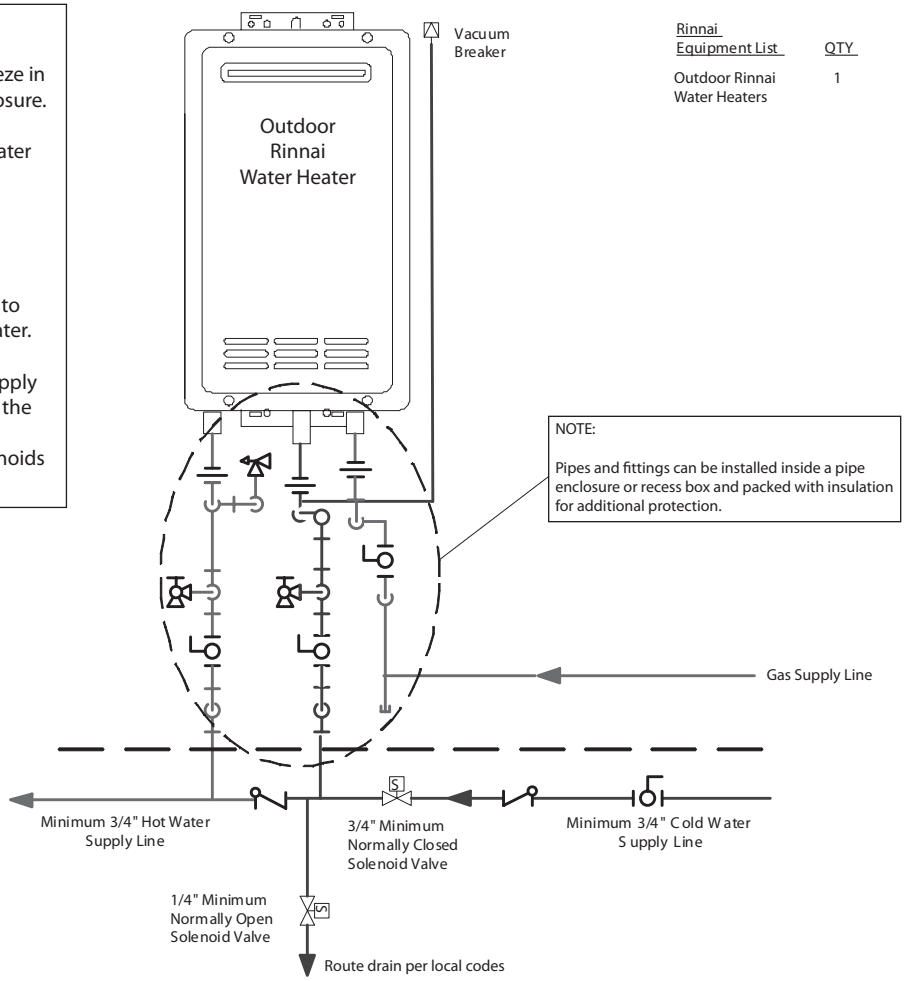
With electrical power supplied to a Rinnai water heater, it will not freeze in enviornments as cold as -30ºF, when protected from direct wind exposure.

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.



Rinnai Equipment List	QTY
Outdoor Rinnai Water Heaters	1

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.

Drawing Number:

WH-1-D

Drawing Date:

June 11, 2007

Rinnai®

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

IMPORTANT!

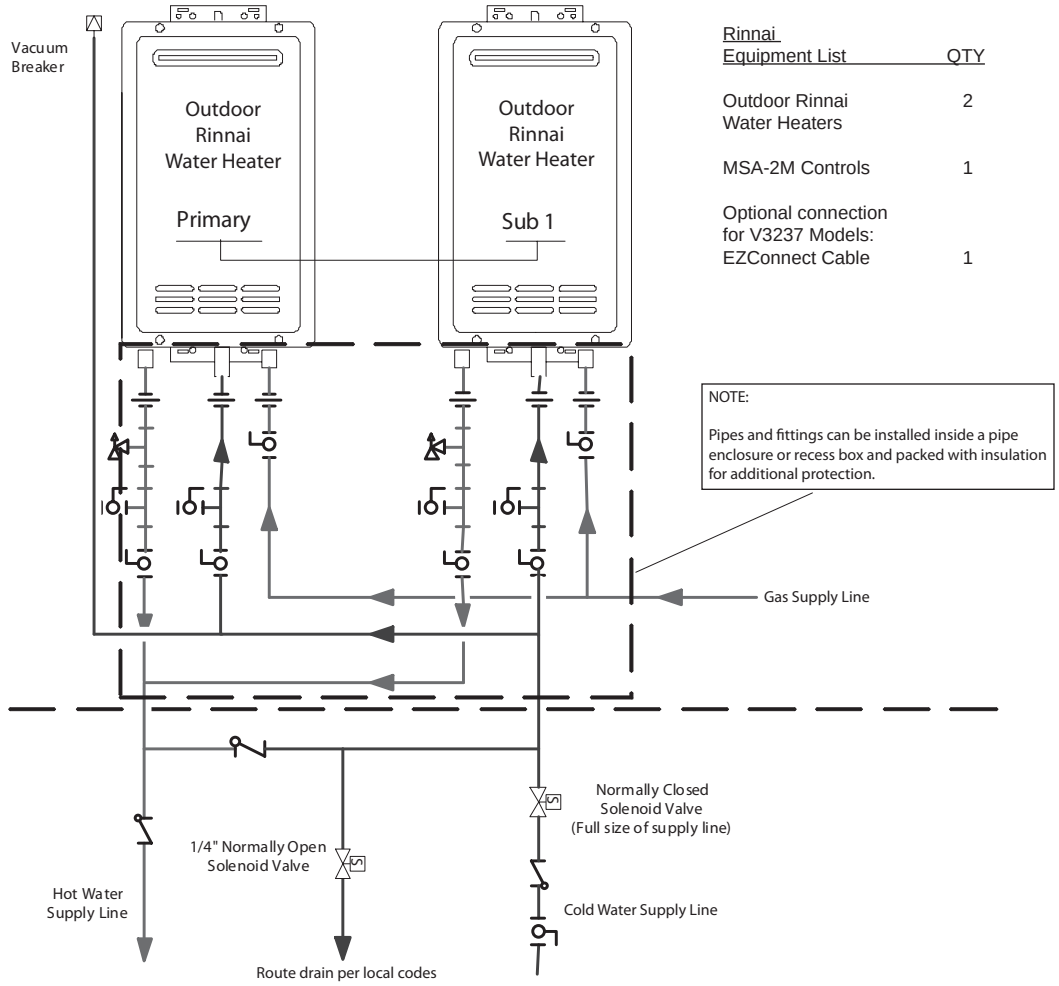
With electrical power supplied to a Rinnai water heater, it will not freeze in enviornments as cold as -30ºF, when protected from direct wind exposure.

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.



Rinnai Equipment List	QTY
Outdoor Rinnai Water Heaters	2
MSA-2M Controls	1
Optional connection for V3237 Models: EZConnect Cable	1

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.

Drawing Number:

WH-2-D

Drawing Date:

June 11, 2007

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103 International Drive
Peachtree City, GA 30269

Domestic Hot Water - Optional Freeze Protection
2 Outdoor 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

IMPORTANT!

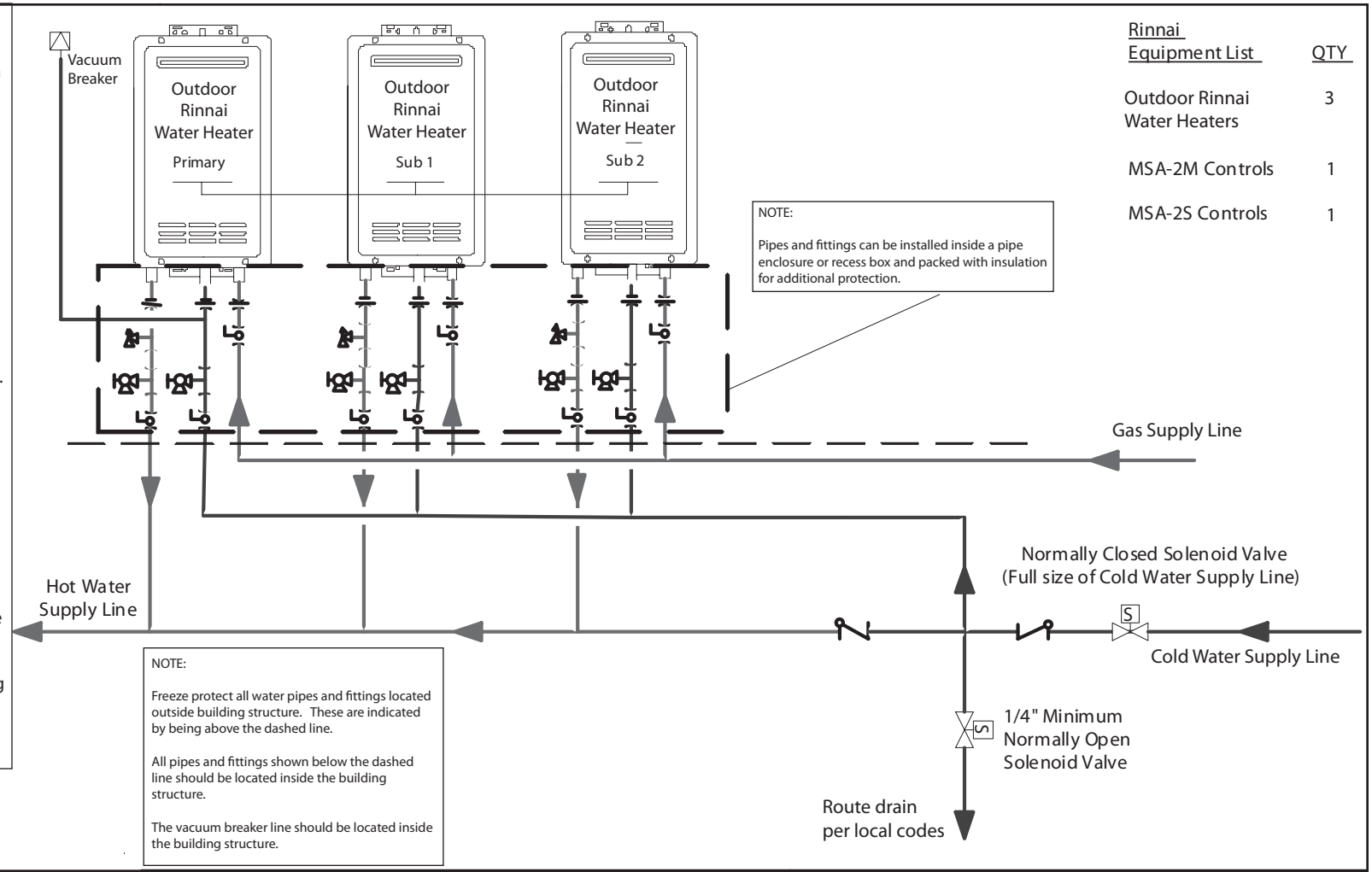
With electrical power supplied to a Rinnai water heater, it will not freeze in enviornments as cold as -30ºF, when protected from direct wind exposure.

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.



Rinnai Equipment List	QTY
Outdoor Rinnai Water Heaters	3
MSA-2M Controls	1
MSA-2S Controls	1

Drawing Number:
WH-3-D

Drawing Date:
June 11, 2007

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

IMPORTANT!

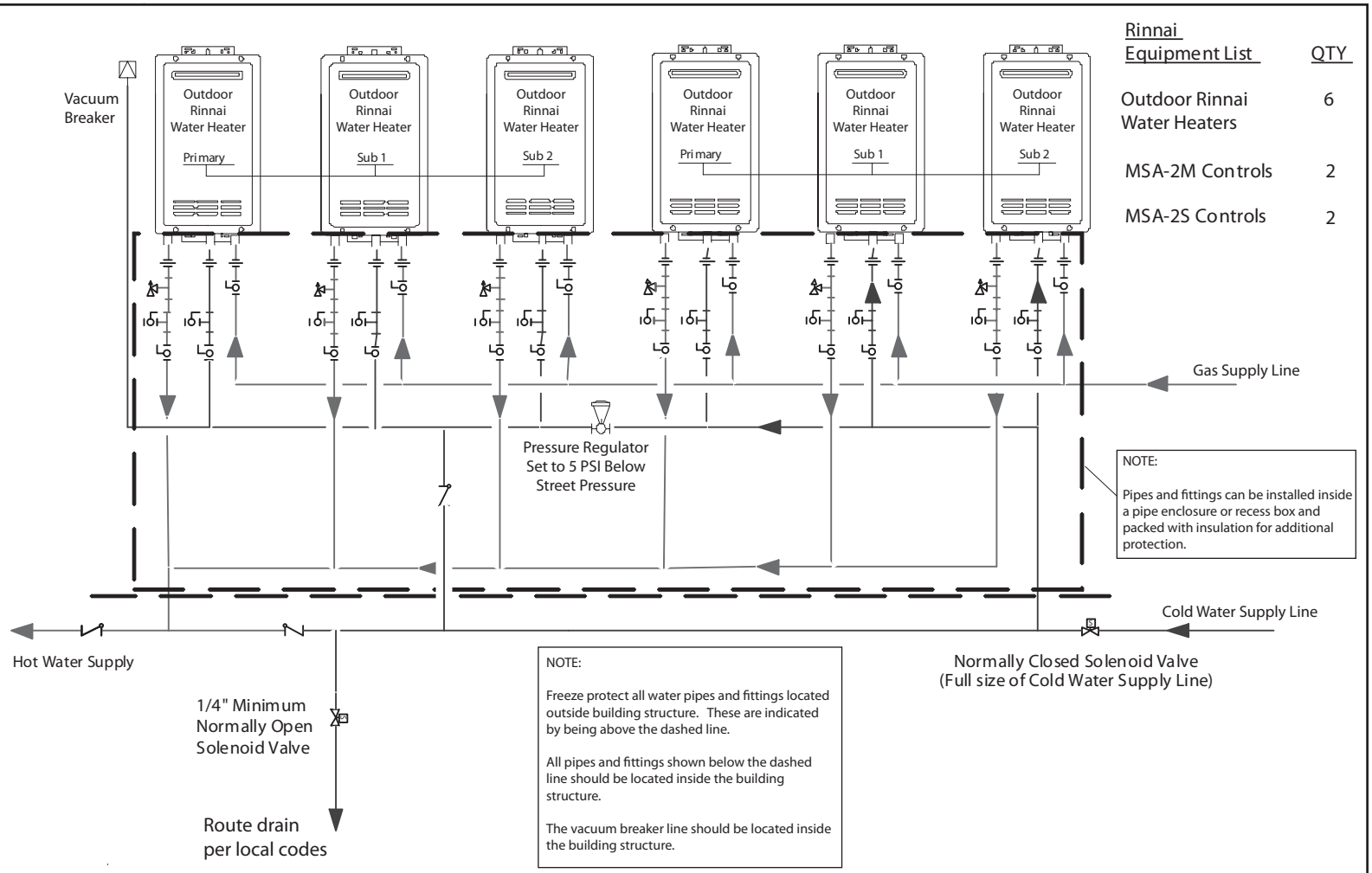
With electrical power supplied to a Rinnai water heater, it will not freeze in enviornments as cold as -30ºF, when protected from direct wind exposure.

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.



Rinnai Equipment List	QTY
Outdoor Rinnai Water Heaters	6
MSA-2M Controls	2
MSA-2S Controls	2

Drawing Number:
WH-6-D

Drawing Date:
June 11, 2007

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

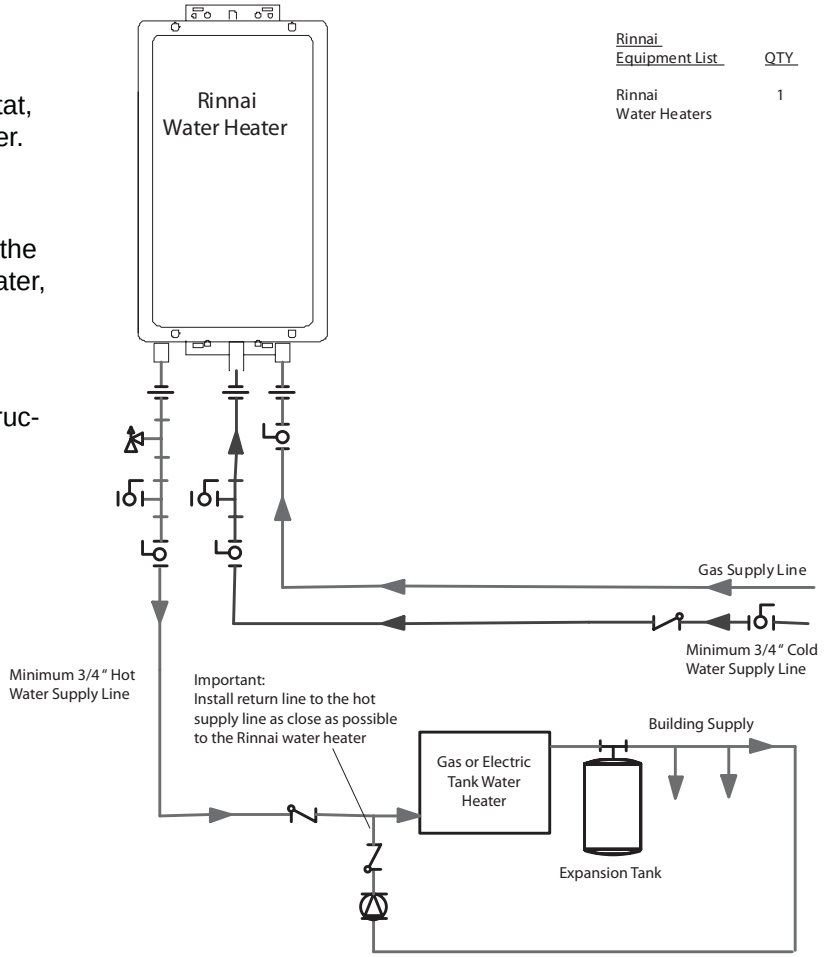
For this application:

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 Water Heaters	1

Drawing Number:
WH-1-RGE

Drawing Date:
June 11, 2007

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:

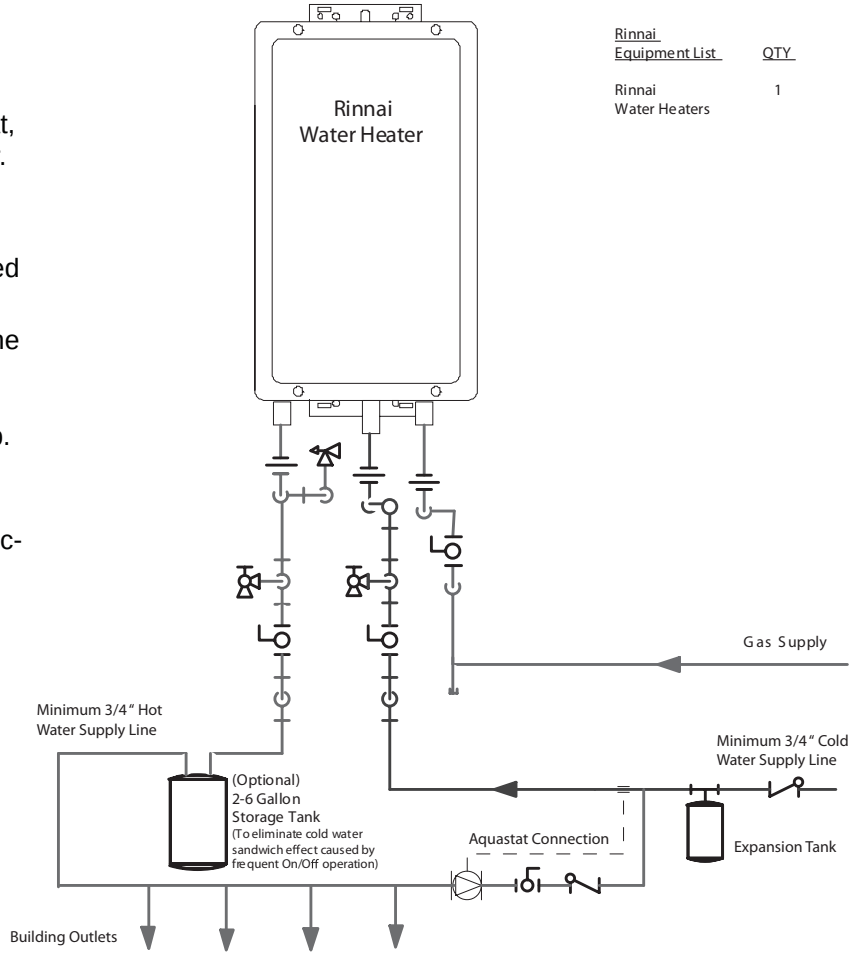
Pump should be controlled by an Aquastat, Timer or Combination Aquastat and Timer.

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

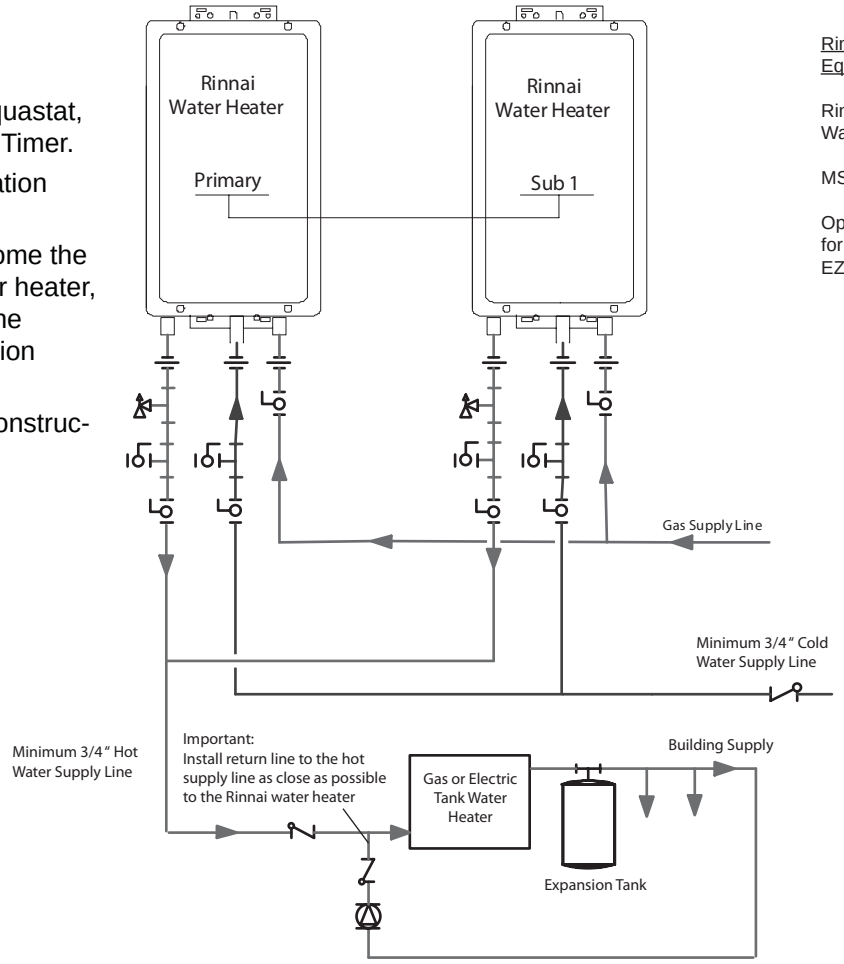
For this application:

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 Water Heaters	2
MSA-2M Controls	1
Optional connection for V3237 Models: EZConnect Cable	1

Drawing Number:
WH-2-RGE

Drawing Date:
June 11, 2007

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

For this application:

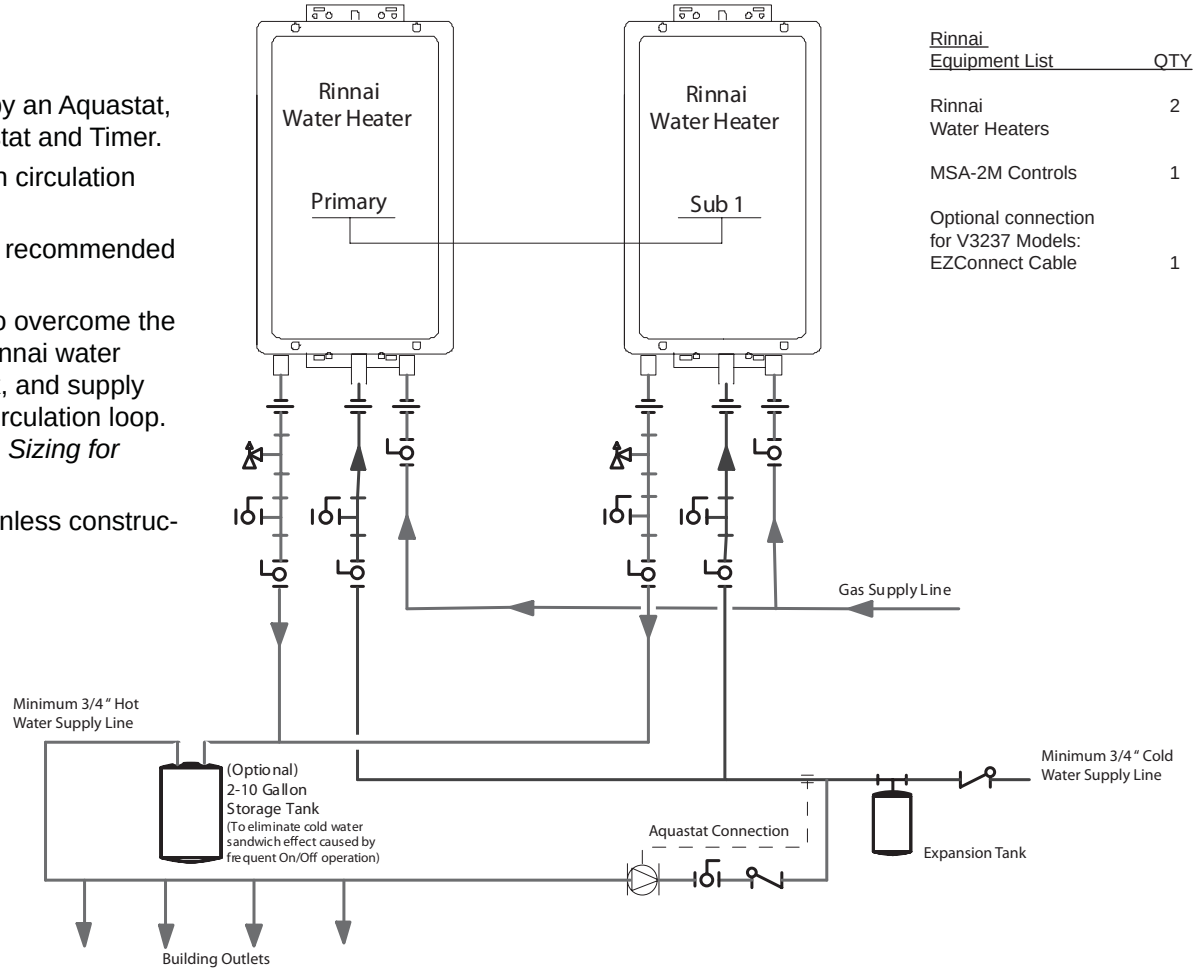
Pump should be controlled by an Aquastat, Timer or Combination Aquastat and Timer.

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.



Rinnai Equipment List	QTY
Rinnai Water Heaters	2
MSA-2M Controls	1
Optional connection for V3237 Models: EZConnect Cable	1

Drawing Number: WH-2-R

Drawing Date: June 11, 2007

Rinnai®

103 International Drive
Peachtree City, GA 30269

Domestic Hot Water - Circulation Systems
2 Rinnai Water Heaters
Optional Piping Installation

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Key

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- Boiler Drain Valve
- Solenoid Valve

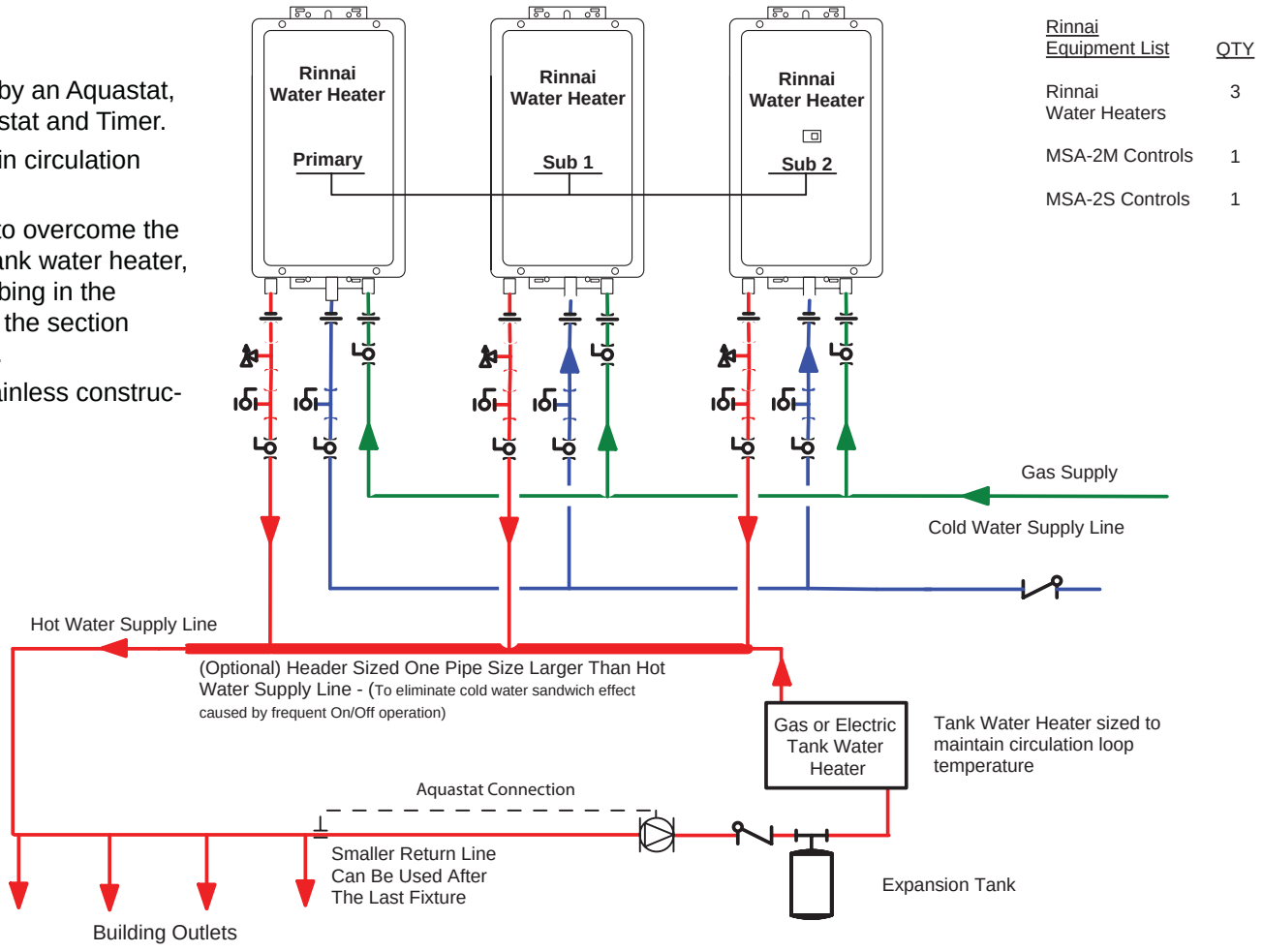
For this application:

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 Water Heaters	3
MSA-2M Controls	1
MSA-2S Controls	1

Drawing Number:
WH-3-RGE

Drawing Date:
June 11, 2007

Rinnai®
103 International Drive
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

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- Circulating Pump
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For this application:

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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*.

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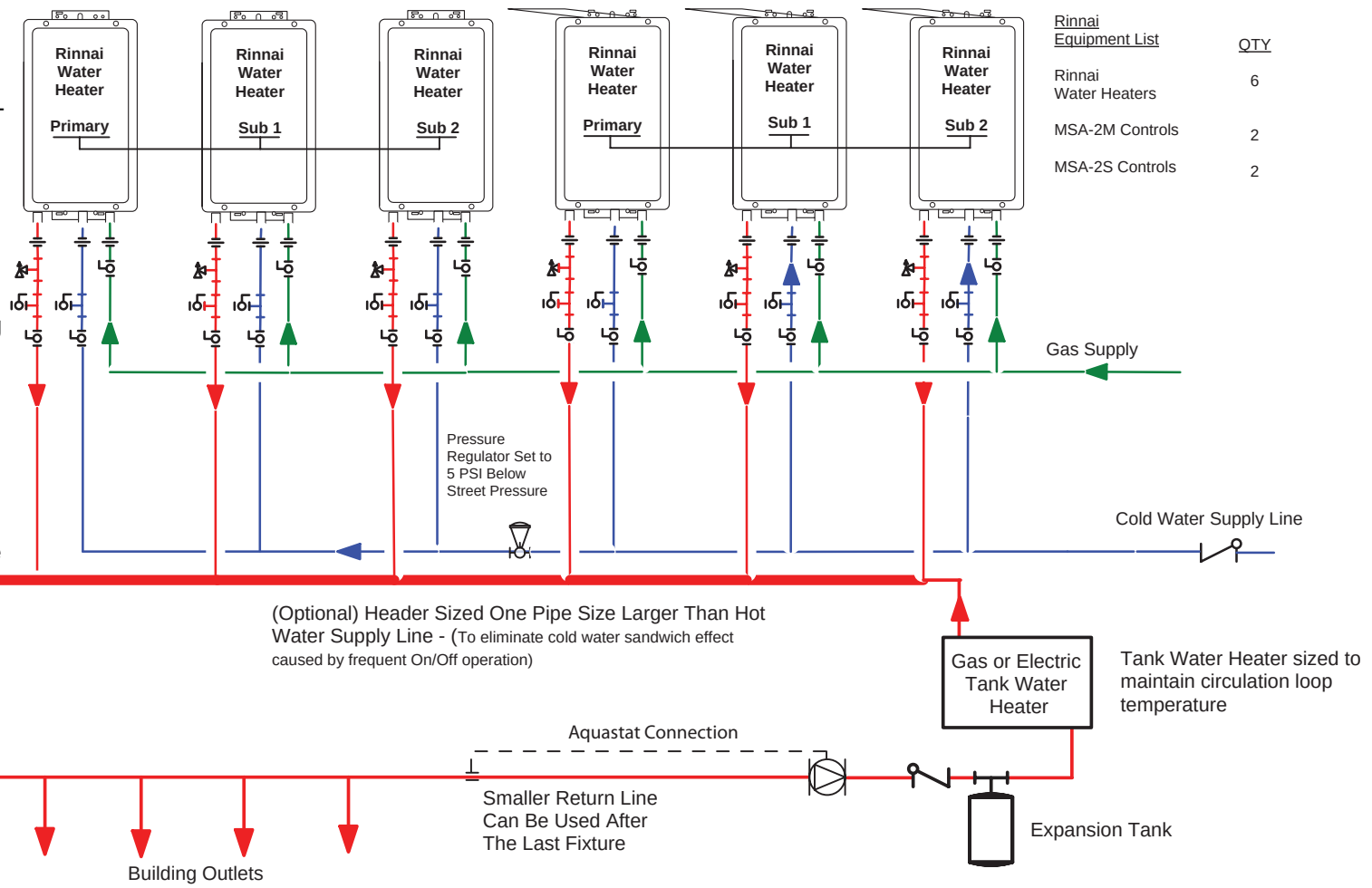

Drawing Number:

WH-6-RGE

Drawing Date:

June 11, 2007

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

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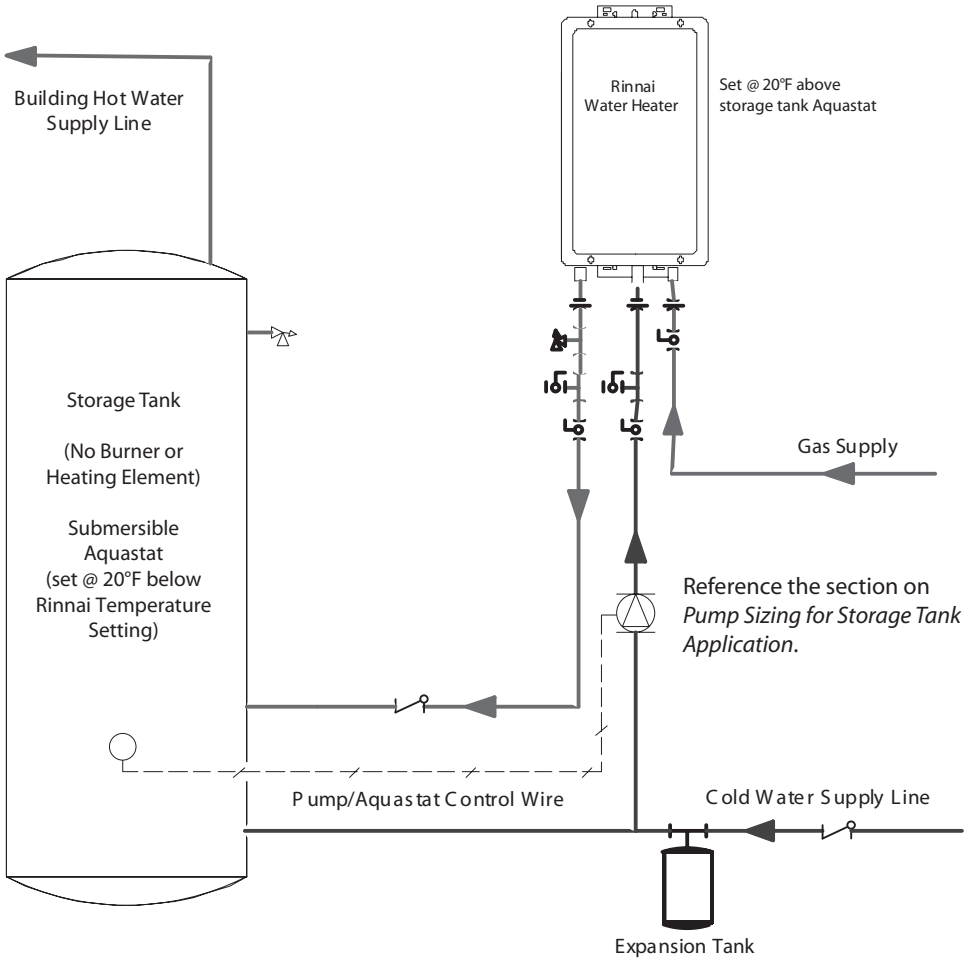
- Solenoid Valve



Rinnai Equipment List	QTY
Rinnai Commercial Water Heaters	1

Drawing Number:
WH-1-B

Drawing Date:
June 11, 2007

Rinnai®
103 International Drive
Peachtree City, GA 30269

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

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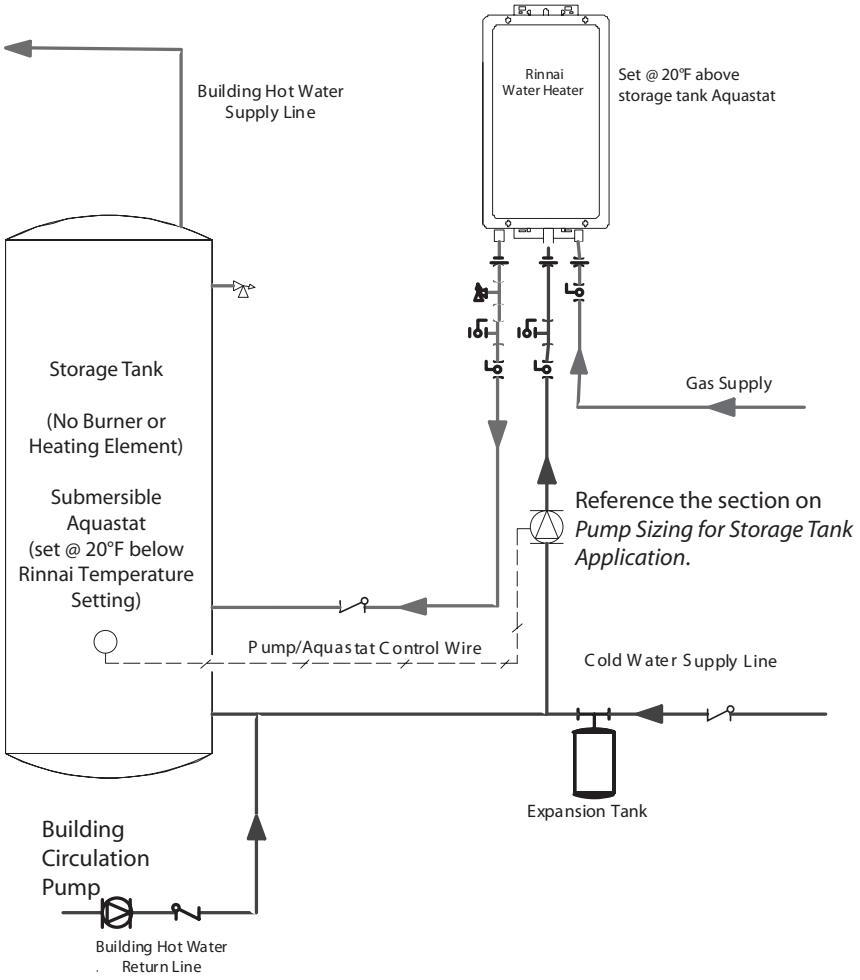

Rinnai Equipment List	QTY
Rinnai Commercial Water Heaters	1

Drawing Number:

WH-1-B-R

Drawing Date:

June 11, 2007

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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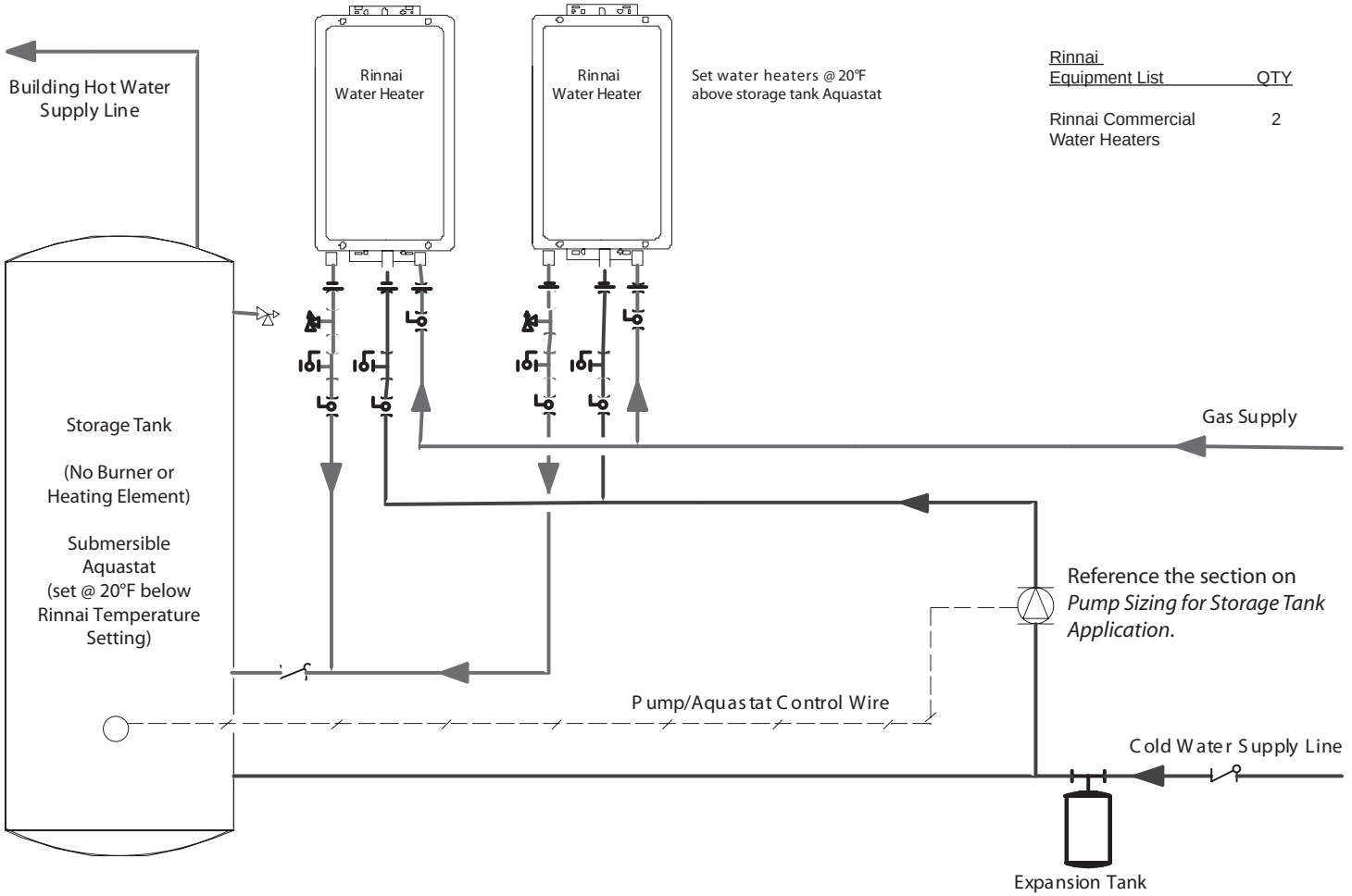

Drawing Number:
WH-2-B

Drawing Date:
June 11, 2007

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

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- Circulating Pump
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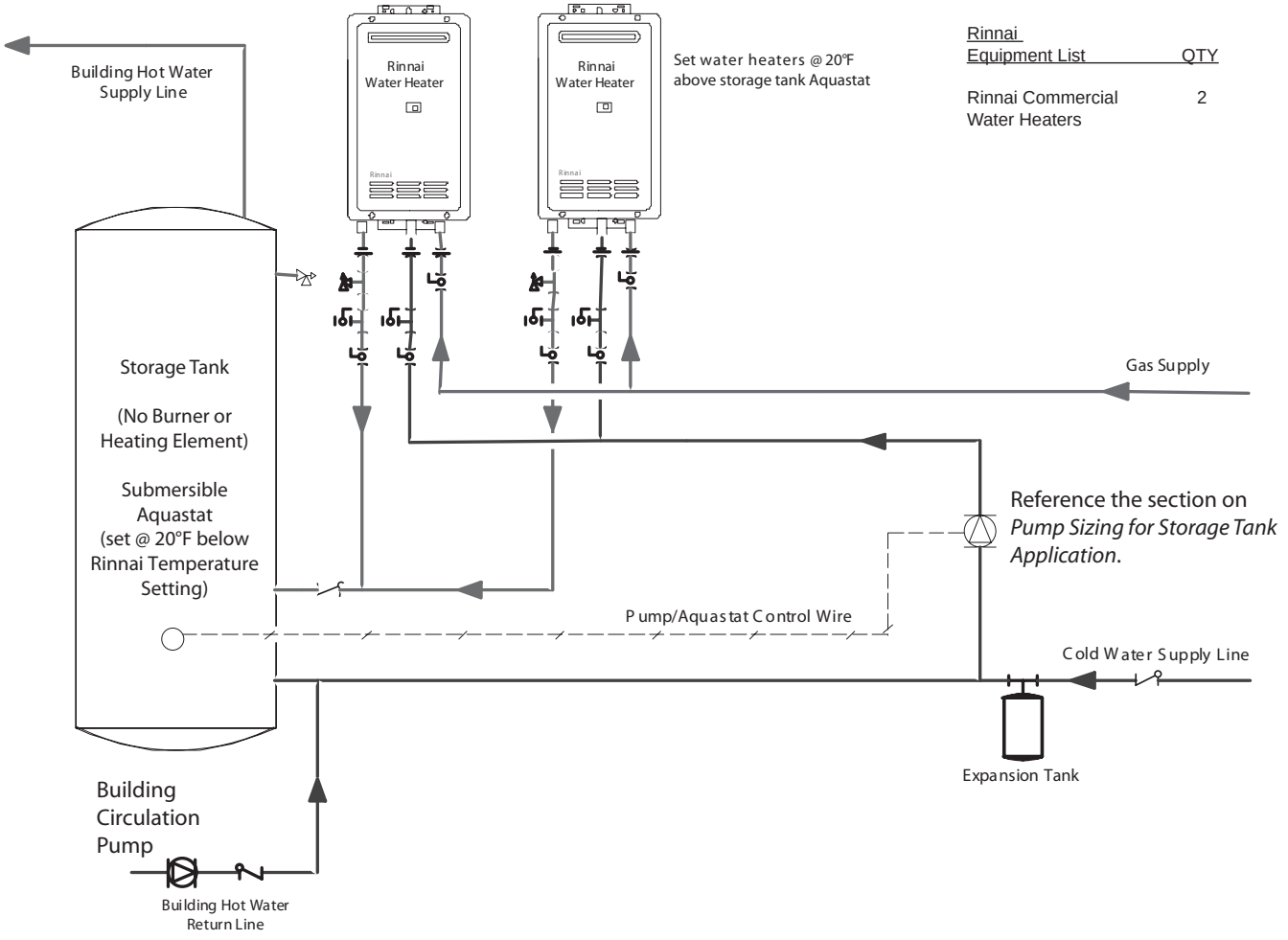

Drawing Number:

WH-2-B-R

Drawing Date:

June 11, 2007

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103 International Drive
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2 Rinnai Water Heaters
Preferred Piping Installation

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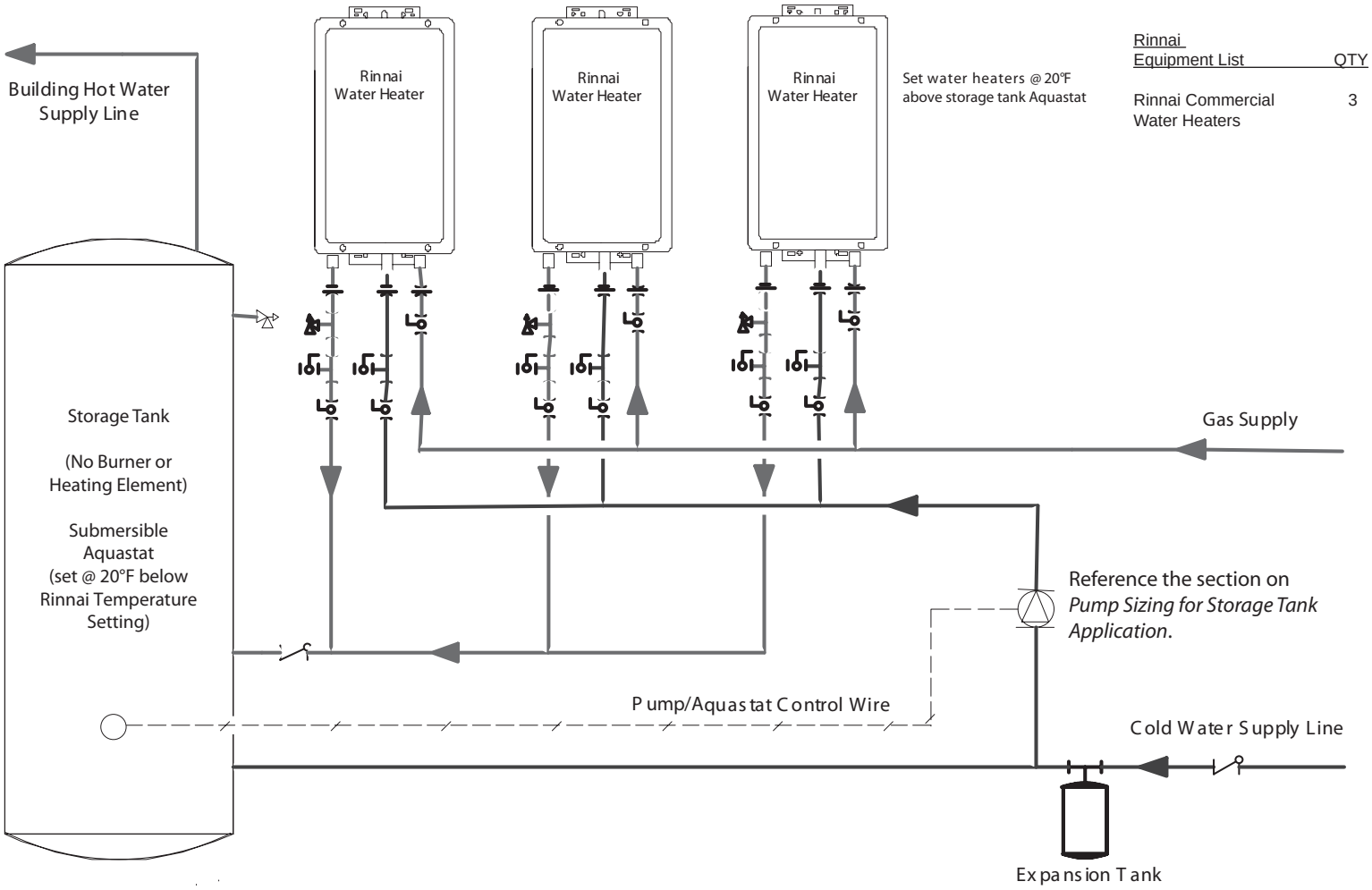

Drawing Number:
WH-3-B

Drawing Date:
June 11, 2007

Rinnai®
103 International Drive
Peachtree City, GA 30269

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

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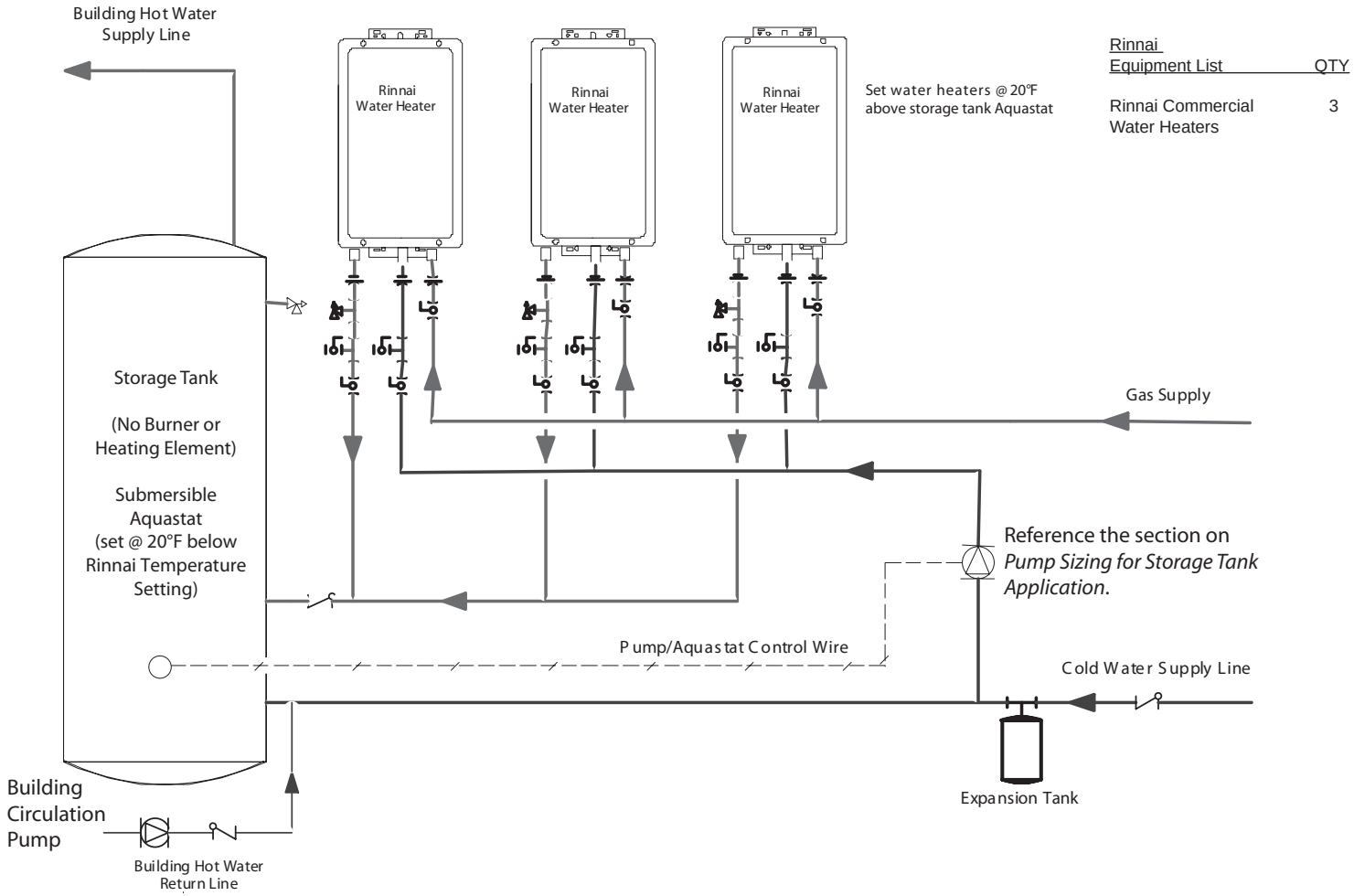

Drawing Number:

WH-3-B-R

Drawing Date:

June 11, 2007

Rinnai®

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

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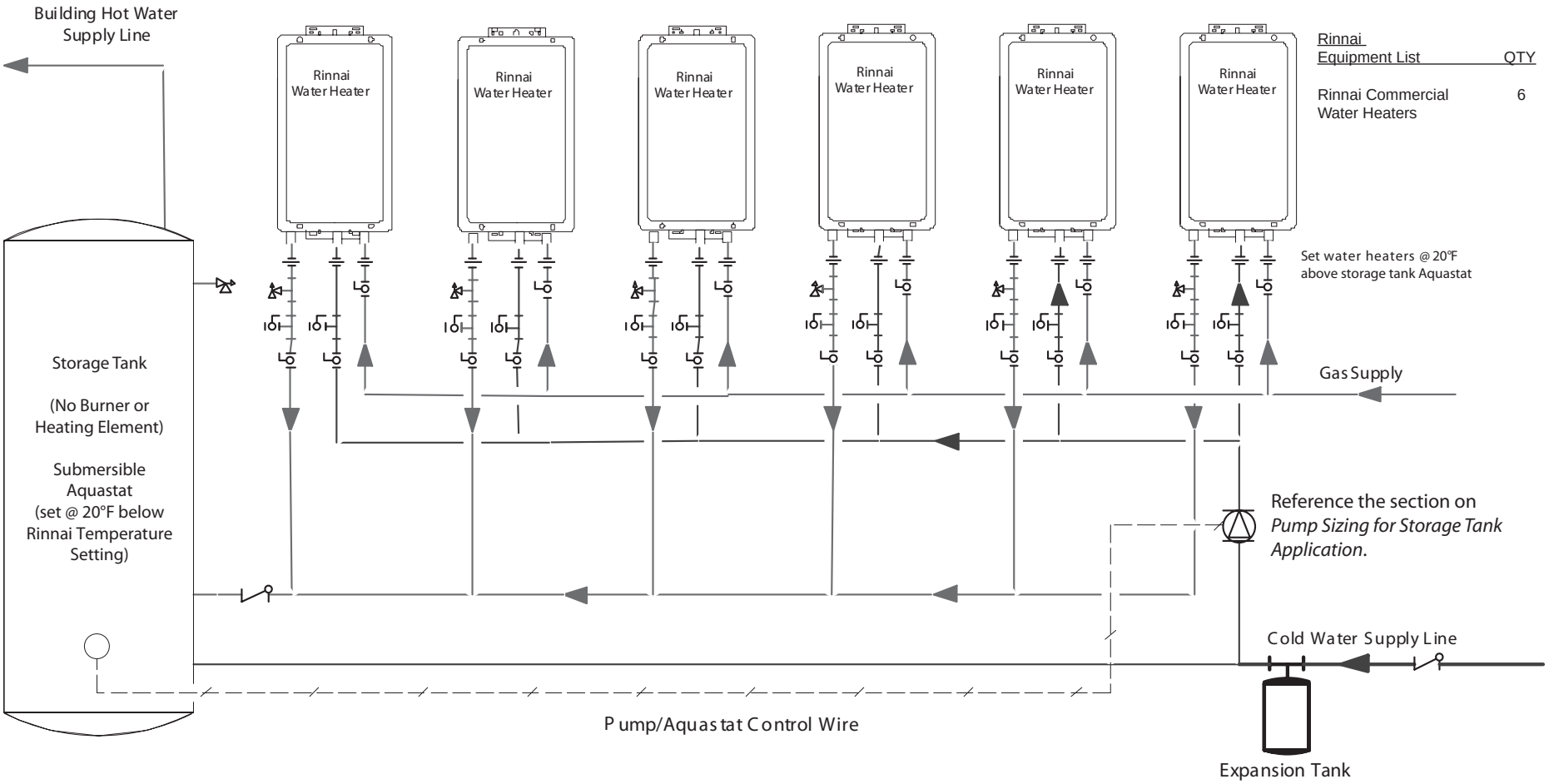

Drawing Number:

WH-6-B

Drawing Date:

June 11, 2007

Rinnai®

103 International Drive
Peachtree City, GA 30269

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

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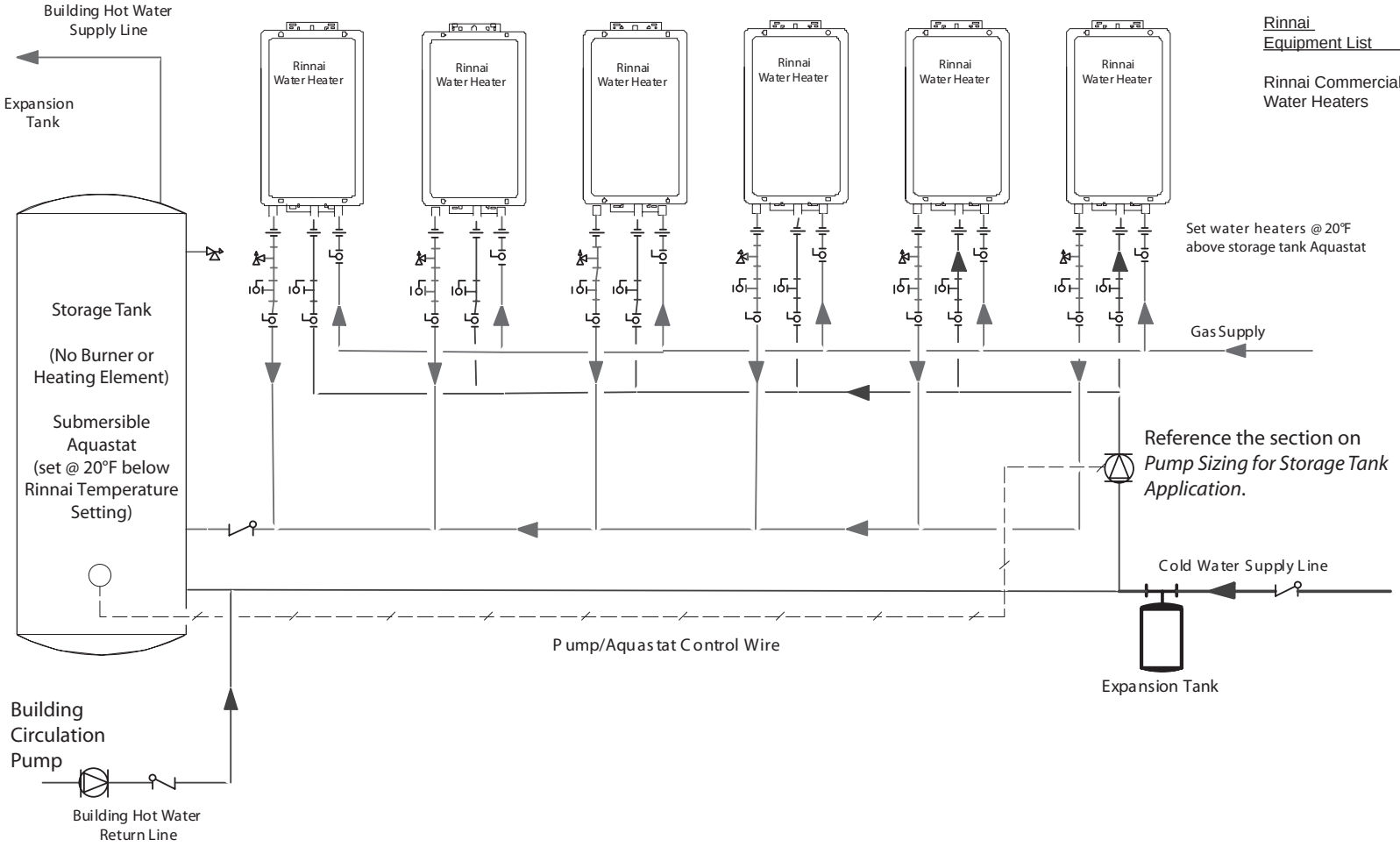

Rinnai Equipment List	QTY
Rinnai Commercial Water Heaters	6

Drawing Number:

WH-6-B-R

Drawing Date:

June 11, 2007

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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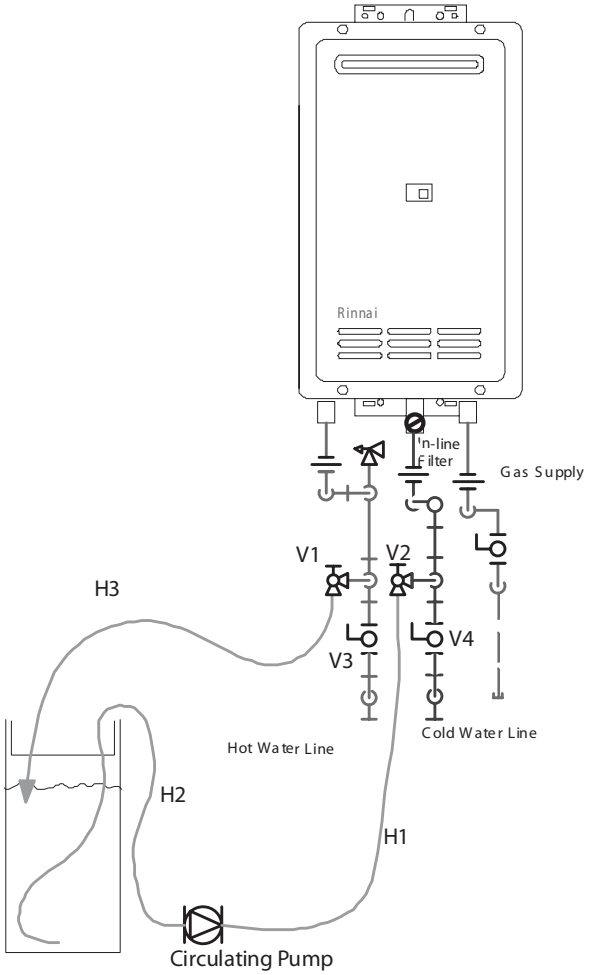
Key

- 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

Drawing Date:
June 11, 2007

Rinnai®
103 International Drive
Peachtree City, GA 30269

Maintenance - Scale Flush Procedure
1 Rinnai Water Heater

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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

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

Direct Vent Heaters

- "Cool-to-the-Touch" cabinet
- Easily Installed and Safe for Any Room
- Up to 84% Efficient
- Electronic Ignition - No Pilot Light
- Propane or Natural Gas
- Whisper Quiet Blower
- Primary Heat Source

Vent-Free Zone Heaters

- Programmable Thermostat
- Energy Efficient, Vent-free
- No Visible Flame
- Oxygen Depletion Sensor
- Secondary Heat Source
- "Cool-to-the-Touch" Cabinet

Direct-Vent Fireplace, RHFE-750ETR

- Energy Efficient Source of Zone Heating
- Accurate Temperature Control
- Bottom Air Discharge
- Full-function Remote
- Unique Interchangeable Fronts
- Digital Dual Timer Function

Infrared Heaters

- Wall-mountable or Free-standing
- Works in Power Outages
- Energy Efficient
- Natural or Propane Gas
- ODS Safety Sensor
- Ideal for Emergency Heating

R-TRWH-E-02 Rev A
6/2007