

Hot Water Recirculation Guide

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**Featuring Grundfos
Stainless Steel Circulators**

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GRUNDFOS



Leaders in Pump Technology

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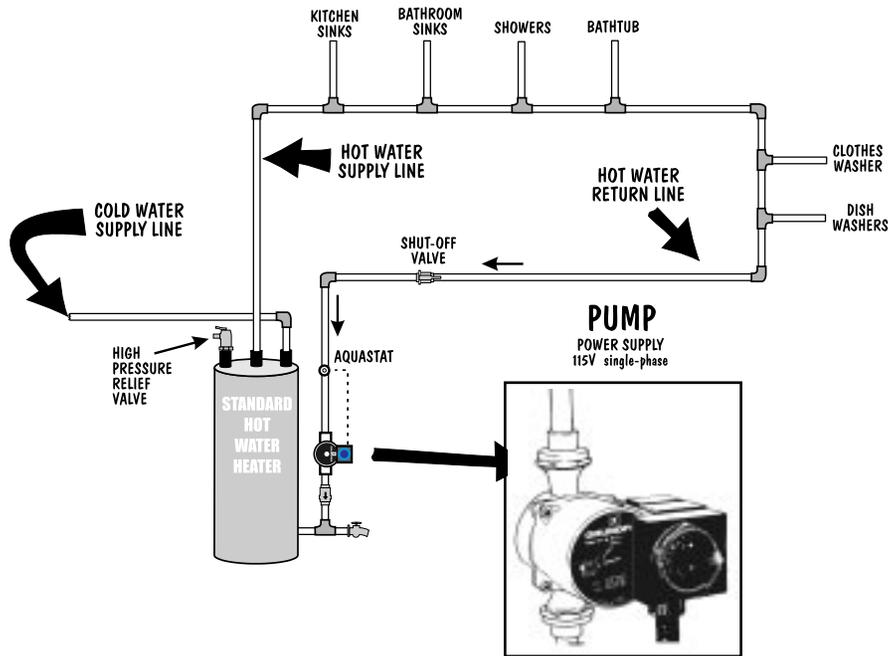
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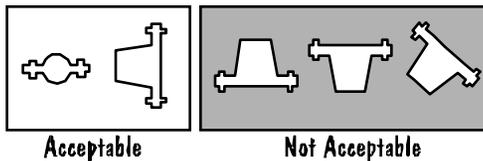
Introduction

This manual is designed to help insure proper installation of residential hot water recirculation systems. The following instructions and diagrams are primarily for plumbing contractors and home builders who are familiar with the plumbing trade.



Installation Notes

1. Insulate both supply and return lines with a minimum of 1/2" fiberglass insulation to minimize pipe heat loss.
2. Maintain a minimum of 2" clearance between hot and cold water supply lines.
3. Branches off the main hot water supply lines should be kept as short as possible. Extending branch lengths will increase the time required for hot water to reach fixtures.
4. Check valve should be placed in each hot water return line to prevent entry of cold water or reversal flow, particularly during periods of high hot water demand.
5. Local codes may require the installation of an expansion tank for secondary pressure relief on cold water supply lines with check valves.
6. Install Grundfos circulators with motor shaft positioned horizontally, as shown below.
7. Air removal is accomplished by removing the back plug from the circulator when the system is charged with water and the circulator is not operating. The circulator's slotted shaft is then rotated until the air no longer escapes. The circulator is ready to operate once the back plug is reinstalled.
8. Grundfos wet rotor circulator power heads can be replaced without removing the pump housing.



Selecting Equipment

Hot water heaters are commonly sized based on their first hour rating (FHR). This is the amount of hot water that can be supplied in one hour of operation (DOE 1990). The procedure for determining the first hour rating specifies that the tank initially be full of heated water (DOE 1993). The table below details minimum capacities of hot water heaters for one and two family living units.

HUD-FHA Minimum Water Heater Capacities for One and Two Family Living Units

Number of Baths Number of Bedrooms	2 to 2.5			3 to 3.5			
	3	4	5	3	4	5	6
GAS Heater							
Storage, gal	40	40	50	40	50	50	50
1000 Btu/h input	36	38	47	38	38	47	50
1-h draw, gal	70	72	90	72	82	90	92
Recovery, gph	30	32	40	32	32	40	42
ELECTRIC Heater							
Storage, gal	50	50	66	50	66	66	80
k-W input	5.5	5.5	5.5	5.5	5.5	5.5	5.5
1-h draw, gal	72	72	88	72	88	88	102
Recovery, gph	22	22	22	22	22	22	22
Recommended Grundfos Circulator	A			B			
Connection size, in	UP15-18			UP15-42			
Return Line, in	3/4	3/4	3/4	3/4	3/4	3/4	3/4
	<i>See UNION and FLANGE connection options below</i>						

- A = UP 15-18SU, 1/25 Hp, 115 V
 UP 15-18SF, 1/25 Hp, 115 V
- B = UP 15-42SU, 1/25 Hp, 115 V
 UP 15-42SF, 1/25 Hp, 115 V

Note: 1/2" and 3/4" connections are available. Refer to the chart on page 13.

Additional Selection Data

Typical Residential Usage of Hot Water per Task

Use	High Flow	Low Flow (Water Savers Used)
Food Preparation	5 gal.	3 gal.
Hand dish washing	4	4
Automatic dishwasher	15	15
Clothes washer	32	21
Shower or bath	20	15
Face and hand washing	4	2

Calculating the Circulator Requirements

A simple method for sizing the circulators for residential hot water recirculation applications is shown below. The hot water return line is typically a 1/2" to 3/4" in diameter.

1. 1 gpm for every 20 fixture units in the system
2. .5 gpm for each 3/4 or 1-in. riser
 1 gpm for each 1-1/4 or 1-1/2-in. riser
 2 gpm for each riser 2 in. or larger

Diagram 1 — Single Story Installation

Diagram Notes:

The circulator in this system is controlled by a pipe mounted aquastat and system timer. When an aquastat is used a circulator will typically switch on at 95°F and off at 120°F return water temperature. Refer to the Grundfos installation and operating instructions for the timer and thermostatic control accessories.

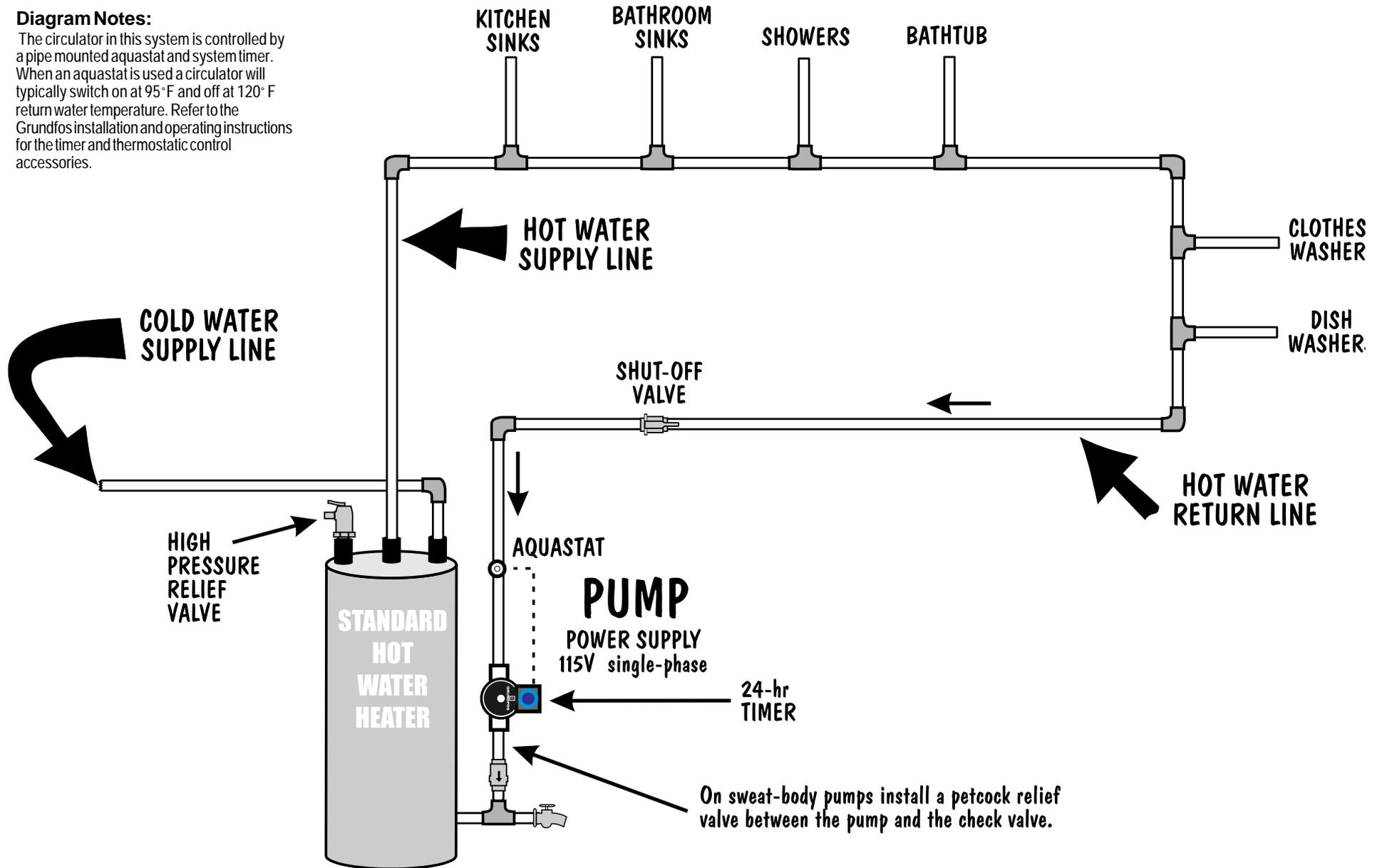


Diagram 2 — Single Story with Two Hot Water Heaters and One Zone

Diagram Notes:

When two or more hot water heaters supply a single zone, a common header should be used for both the hot water supply and return lines. This will ensure an adequate supply of hot water and proper system balancing. Installation of isolation valves on the hot water supply and return lines for each hot water heater is **OPTIONAL**. However, installation of isolation valves will provide both a professional appearance and aid in routine maintenance.

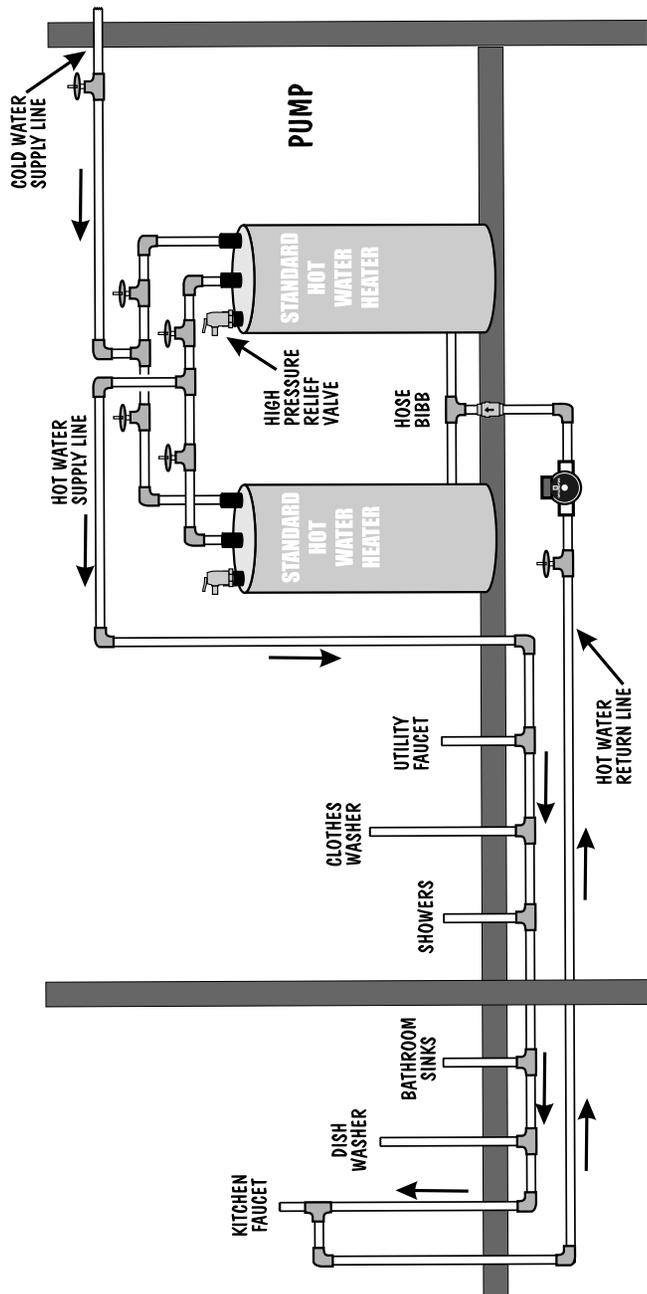


Diagram 3 — Two Story with One Hot Water Heater and Two Zones

Diagram Notes:

The proper location of the hot water return line on multiple zone systems is always from the last fixture in the loop. A balancing valve should be installed on the return line of each lopp to insure that each fixture in each zone is provided with both an adequate supply of hot water and at the proper temperature. Access to these balancing valves should be provided for periodic maintenance and system balancing. Installation of an air vent at the highest point in the system will ensure proper venting of air and reduce oxygen related corrosion problems.

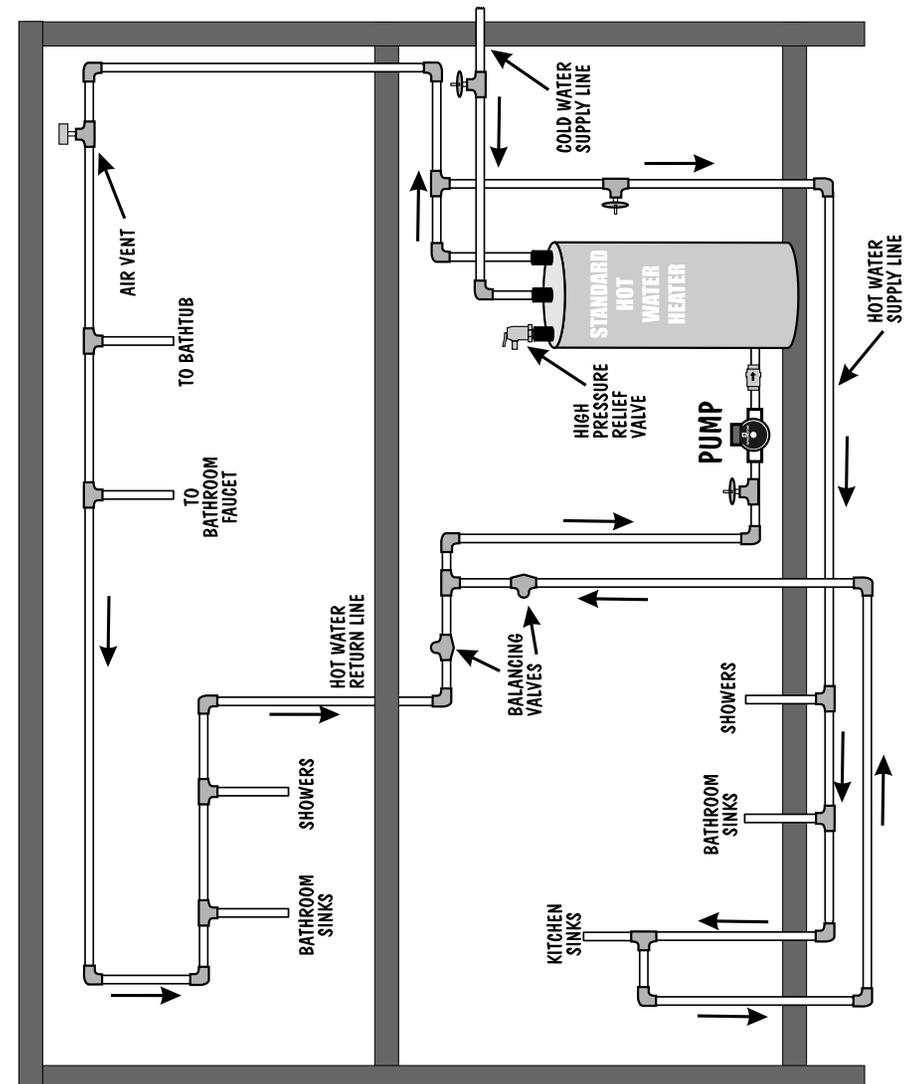


Diagram 4 — Two Story with A Zone On Each Floor

Diagram Notes:

Proper sizing of the hot water heater and circulator for each zone is critical to ensure an adequate supply of hot water (refer to diagram 1).

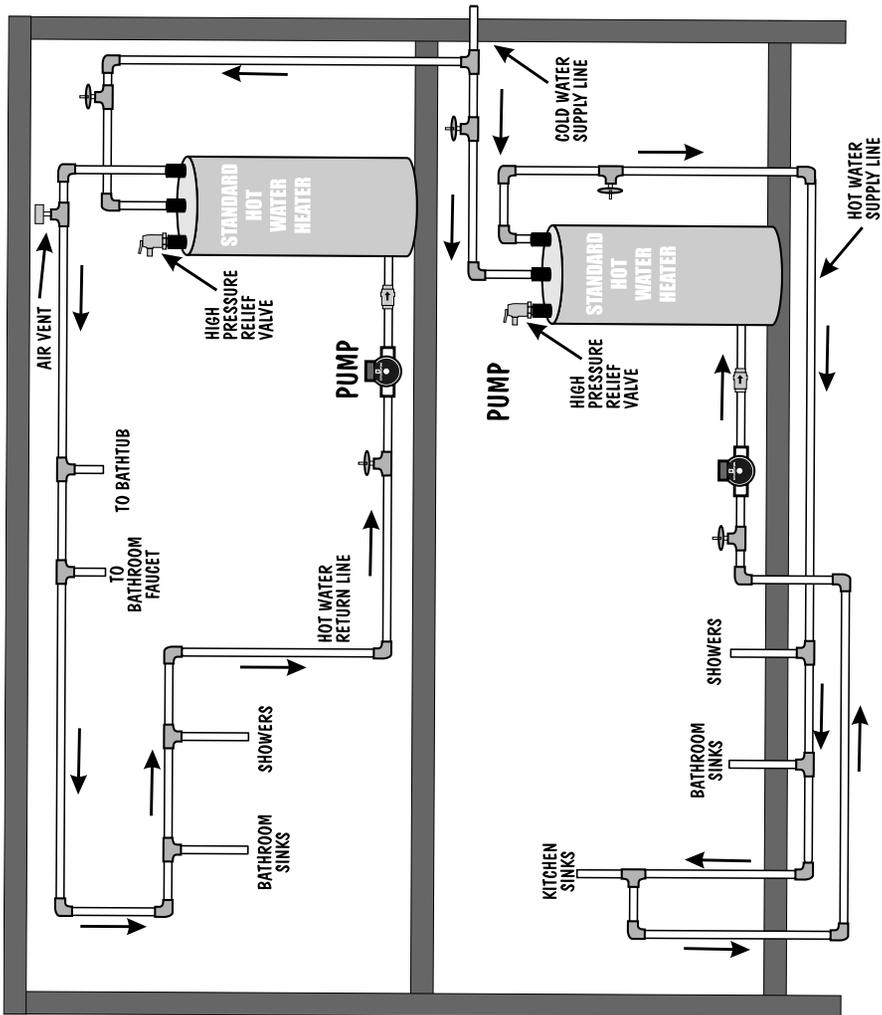
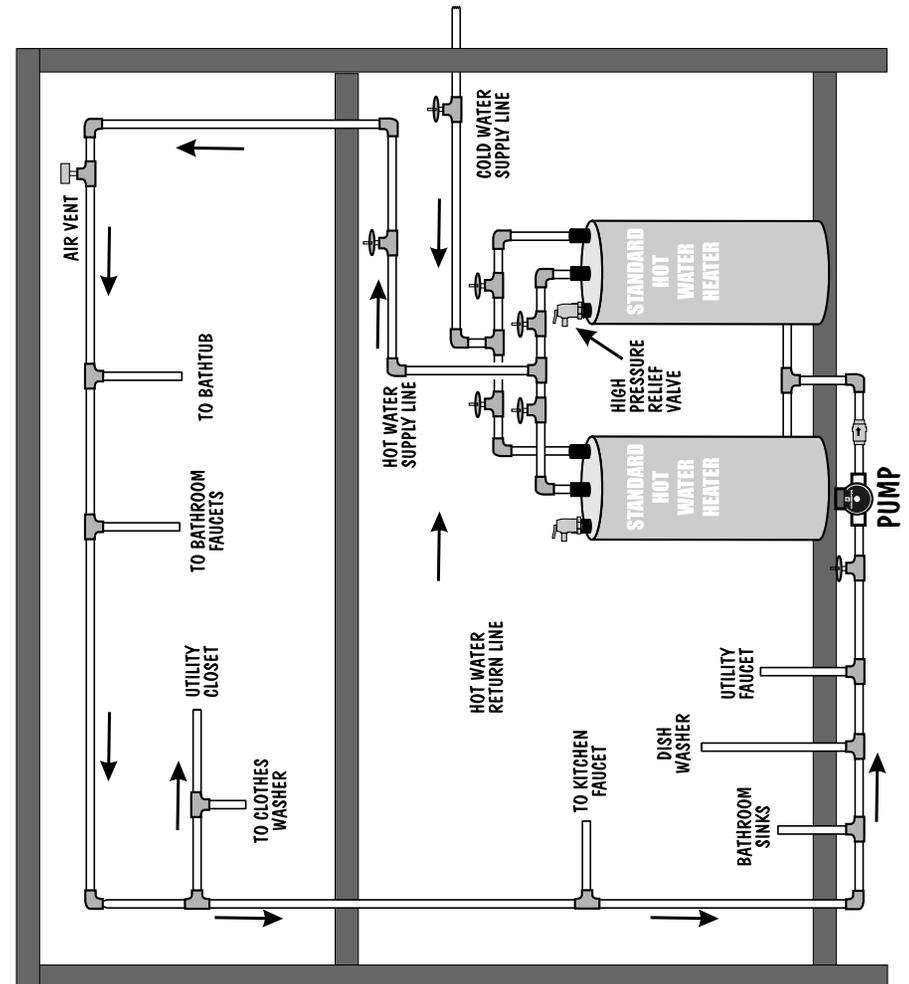


Diagram 5 — Two Story with One Zone Using Two Hot Water Heaters and a Circulator

Diagram Notes:

This configuration is similar to Figure 2 and requires a common header for both the hot water return and supply lines and installation of an air vent at the highest point in the system piping.



Hot Water Recirc Cross Reference

The Quality Advantages of a Stainless Circulator

- Highest Quality Components for Maximum Durability
- Flanged or Threaded Connections — No Sweat for Easy Installations
- Lighter Than Bronze, Less Stress on Pipes
- No Lead

Featuring Stainless Grundfos Circulators

TACO B & G ARMSTRONG GRUNDFOS

Model	Dim (Length)	Model	Dim (Length)	Model	Dim (Length)	Grundfos Model	Dim (Length)
006B	4 or 5	SLC25B	6 ³ / ₈	ST10B	6 ¹ / ₂	UM15-10B5	5
						UM15-10B7	6 ³ / ₈
						UP15-18B5	5
						UP15-18B7	5
Stainless Steel							
						UP15-18SU	6
						UP15-18SF	6 ¹ / ₂
005BF 007BF	6 ¹¹ / ₃₂	NBF12/22 LR15-B SLC25B Ser. 100-B	6 ³ / ₈	ST10B	6 ¹ / ₂	UP15-42SU	6
						UP15-42SF	6 ¹ / ₂
						UP15-42B5	5

Sizing for Apartments and Motels

The sizing information shown below is a guide only — Grundfos makes no promises regarding its accuracy in every situation. See the notes at the bottom of the page for additional factors to consider when selecting a Grundfos circulator for your application.

Apartment Buildings

UNITS	GPM	FEET OF HEAD	RETURN PIPE	GRUNDFOS PUMP
0-4	1.0	4	1/2" & 3/4"	UP15-18SF or SU
5-20	3.0	10	3/4"	UP15-42SF
21-30	4.7	14	3/4"	UP25-64SF
		10	1"	UP25-64SF
31-40	6.9	19	1	UP26-96BF
		14	1 1/4"	UP25-64SF
41-50	9.3	23	1 1/4"	UP26-96BF
		19	1 1/2"	UP43-75BF
51-60	12.0	29	1 1/4"	UMT/UPT or UMC/UPC 50-160BZ
61-70	15.0	23	1 1/2"	UMT/UPT or UMC/UPC 50-80BZ
		34	1 1/2"	UMT/UPT or UMC/UPC 50-160BZ
		27	2	UMT/UPT or UMC/UPC 50-160BZ
71-80	18.0	38	1 1/2"	UMT/UPT or UMC/UPC 50-160BZ
		30	2	UMT/UPT or UMC/UPC 50-160BZ
81-90	22.0	43	2	UMT/UPT or UMC/UPC 50-160BZ
91-100	26	48	2	UMT/UPT or UMC/UPC 50-160BZ

Motels

UNITS	GPM	FEET OF HEAD	RETURN PIPE	GRUNDFOS PUMP
0-20	1.3	10	3/4"	UP15-42SF
21-30	2.2	14	3/4"	UP25-64SF
		10	1"	UP15-42SF
31-40	3.2	19	3/4"	UP26-96BF
		14	1"	UP25-64SF
41-50	4.3	24	3/4"	UP26-96BF
		15	1"	UP25-64SF

NOTES:

- Mineral deposits in older piping can cause a sizeable increase in pumping head requirements.
- Undersized return piping will cause an increase in pumping head requirements.

Hot Water Recirc Accessory Guide

Timer and Controls

TIMER CONTROL
for use with Single Speed, Series UP 115 volt circulators
Part# 50.5474



THERMOSTATIC CONTROL
for use with Single Speed, Series UP 115 volt circulators

1/2" clip-on mount for 5/8" O.D. system piping
(1/2" I.D. copper tubing or 3/8" steel pipe)
95°F-120°F
Part# 50.565Z

3/4" clip-on mount for 7/8" O.D. system piping
(3/4" I.D. copper tubing or 1/2" steel pipe)
95°F-120°F
Part# 50.5653

Flange Options

**For Stainless Steel Body,
Union Mount Pumps**

UP15-18SU
UP15-42SU
UP25-64SU



Bronze Union
Isolation Valve
(Compression)
3/4"



Bronze
Half Union
(Sweat)
1/2" & 3/4"



Bronze
Half Union
(Threaded)
3/4"



Bronze
Half Union
Isolation Valve
(Threaded)
1/2" & 3/4"

**For Cast Iron Body,
Flange Mount Pumps**

Brute II (UP15-42F)
UPS15-42F
UP26-64F
UP26-96F
UP26-99F
UP43-75F

AND

**For Stainless Steel or
Bronze Body,
Flange Mount Pumps**

UM15-10B5/B7
UP15-18SF
UP15-18B5/B7
UP15-42SF
UP15-42B5/B7
UP25-64SF
UP26-96BF
UP26-99BF
UP43-75BF



Cast Iron Flange
(Threaded) 3/4", 1", 1 1/4", & 1 1/2"
(Special 1 1/2" for UP43-75F)
3/4"



Bronze Flange
Isolation Valve
(Threaded) 3/4", 1", & 1 1/4"
(Special 1 1/2" for
UP43-75F)



Bronze Flange
(Threaded)
3/4" & 1"
(Special 1 1/2" for
UP43-75BF)

