Grundfos Hot Water Recirculation

PRODUCT AND APPLICATION GUIDE

GRUNDFOS

Hot Water Recirculation

► Instant Hot Water – Comfort and Convenience!

Enjoy hot water instantly with the Grundfos Hot Water Recirculation System. This system eliminates waiting at the faucet for hot water.

Hot water recirculation systems are routinely installed in hotels and commercial buildings. Guests, as well as building occupants, love the comfort and convenience of instant hot water. In fact, they have come to expect it.

Now residential customers can enjoy the same comfort and convenience of instant hot water, as long as the correct system design and quality components are used.

Home builders and plumbing contractors are making this an optional feature that not only adds value to the home, but delivers the comfort and convenience of instant hot water that should be expected. Imagine turning on a shower and getting hot water immediately. Why wait while cold water is going down the drain?

► Water Conservation

The majority of the general population waits one to two minutes for hot water every time they turn on the faucet. It is inconvenient and frustrating (not to mention wasteful). With the proper plumbing system design and a Grundfos Hot Water Recirculation System, your customers will enjoy many years of the comfort, convenience and savings of instant hot water.

Millions of gallons of water go down the drain every year because homeowners routinely waste fresh water waiting for hot water at their faucets or showers. The table below illustrates how much water is wasted based on pipe diameter size. Hot water recirculation means instant hot water without the waste.

Fresh water is a precious natural resource that is slowly being depleted. Compared with the rest of the world, water in the United States is not costly today, but as this resource is depleted, costs will rise. Hot water recirculation is a cost-effective method of controlling any additional waste of water.

Pipe Type	Hot Water Supply Length (ft.)	Pipe Volume (gallons)	# of Times Water is Used Daily	Daily Water Volume Wasted (gallons)	Annual Water Volume Wasted (gallons)
1/2" Copper, Type “L”	100	2.7	10	27.0	9,855.0
1/2" Copper, Type “L”	150	3.4	10	34.0	12,410.0
1/2" Copper, Type “L”	200	4.5	10	45.3	16,534.5
1/2" Copper, Type “L”	250	5.7	10	56.6	20,659.0
1/2" Copper, Type “L”	300	6.8	10	67.9	24,783.5
3/4" Copper, Type “L”	100	5.0	10	50.3	18,359.5
3/4" Copper, Type “L”	150	7.5	10	75.4	27,521.0
3/4" Copper, Type “L”	200	10.5	10	105.0	38,325.0
3/4" Copper, Type “L”	250	12.6	10	126.0	45,990.0
3/4" Copper, Type “L”	300	15.1	10	151.0	55,115.0

► How Hot Water Recirculation Works

The plumbing design requires the hot water side of each fixture (faucet, shower or other appliance) be placed in a continuous loop by connecting a hot water return line from the last fixture to the water heater. This creates one continuous hot water loop (see Figure A). A Grundfos Hot Water Recirculation pump is placed on this return line with a check valve. Some circulator pumps come with a built-in timer and line cord (see Figure B). The built-in timer allows the user to pre-program the usage times. Once the system is installed, the circulator pump will only operate at the programmed times moving water through the system loop. In essence, the hot water piping becomes an extension of the water heater. Since this system only operates when the timer requires, no additional energy or water is wasted.

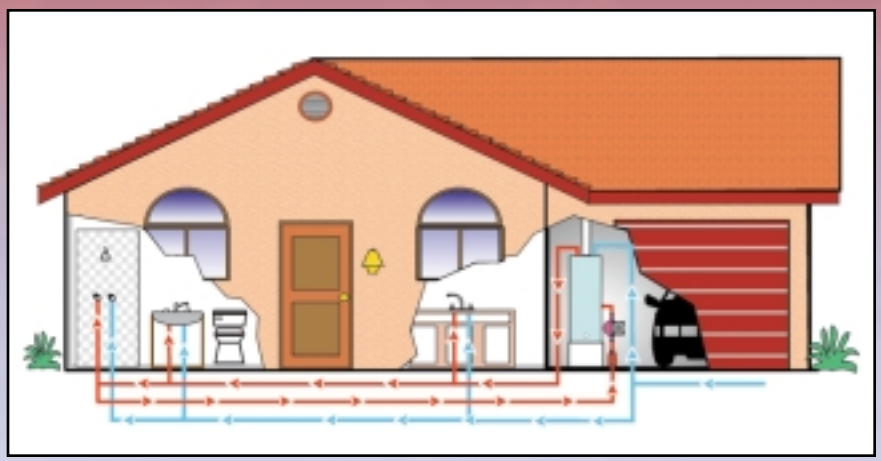


Figure A

Figure B

In addition to the system described above, an optional aquastat can be added to give your customers even more savings (see Figure C). This aquastat senses the water temperature. When the water cools down, the pump will operate, circulating hot water through the entire hot water loop. When the temperature is at the desired level, the pump remains off.

Figure C

► Savings

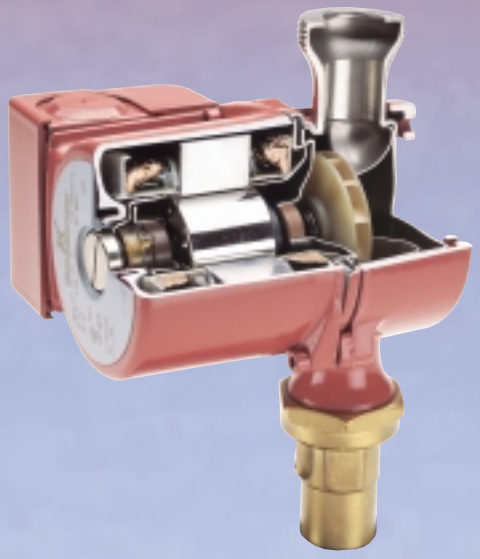
When cold water is drained from the hot water pipe, new cold water enters the water heater and is heated to the set temperature. Your customers not only pay for the new water going into the water heater, but they pay to heat it too! Also, when this hot water is moved into the pipes then left to cool, your customers have paid to heat water they haven't even used! Hot water recirculation means instant hot water without unnecessary waste.

► Payback

Many customers will want hot water recirculation simply for comfort and convenience.

Depending on a specific system design, payback will result from the reduction of water usage, water waste and water heater energy consumption.

Grundfos Pump-Powered Hot Water Recirculation Systems



► Grundfos Wet Rotor Circulator Pumps

A wet rotor circulator pump is designed to be smaller and more efficient than standard pumps. Standard pumps use a mechanical seal to connect the motor to the "water moving side." A wet rotor circulator pump does not have this type of connection (coupling) since all the rotating parts are totally immersed in water by means of a stainless steel barrier (canister) that isolates these rotating parts from the motor.

The water keeps the circulator lubricated and running cool. Since there is no mechanical seal, there are fewer moving parts that might fail and cause the pump to leak.

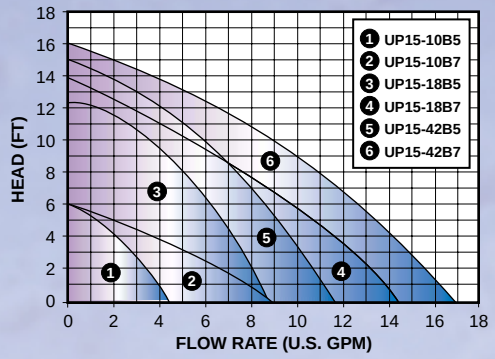
Grundfos Pumps has developed several wet rotor circulator pump models to meet the needs of domestic hot water recirculation systems.

These models are available in various configurations, including bronze housings with 1/2" and 3/4" sweat (B5 and B7) and stainless steel housings with union threaded connections (SU). Also, Grundfos has developed the first circulators that include an integrated check valve inside a union fitting on a sweat pump housing (BUC5 and BUC7).

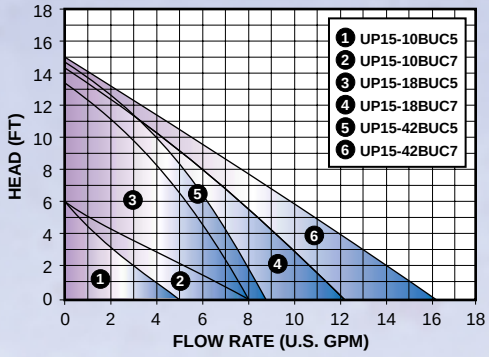
These models have been fitted with the options of a built-in 6', 115 volt ac line cord with a NEMA 3-prong male plug (LC) or line cord and 24-hour programmable timer (TLC).

Simply install the right model circulator for the application and enjoy the hot water!

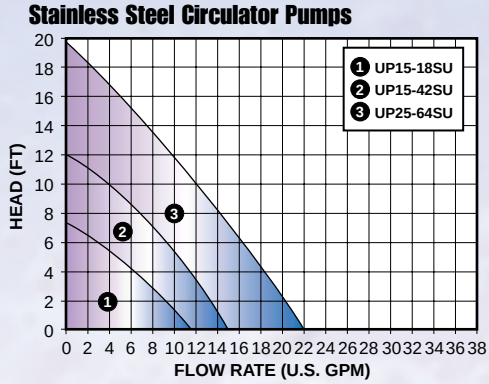
Bronze Circulator Pumps



Bronze Circulator Pumps with Integral Check Valve



Stainless Steel Circulator Pumps



► Optional Features

- ► Bronze or stainless steel models are available to resist the corrosive effects of fresh water.
- ► Timer models help conserve water and energy since they can control pump operation for desired operating times during the day.
- ► Line cord models provide convenience to the installer because no pre-wire of the pump is required.
- ► Most recirculation systems require check valves to protect against gravity circulation. They also ensure proper flow direction. Models are provided with built-in check valves.
- ► Aquastats can be incorporated into the circulator for additional savings. The circulator will operate only when the temperature of the water is below the set point.

Available Models

All models are 115 volt operated. They are available in bronze (1/2" & 3/4" sweat), bronze with integral check valve (1/2 & 3/4" sweat) and stainless steel threaded models.

Standard Models

Model	Part Number	Description	Watts	Typical Operating Point	
				Head (ft.)	Flow (gpm)
UP15-10B5	59896213	1/25th HP, 1 Sp., Bronze 1/2" Sweat Housing	55	3.000	2.250
UP15-18B5	59896114	1/25th HP, 1 Sp., Bronze 1/2" Sweat Housing	85	7.000	4.625
UP15-42B5	59896145	1/25th HP, 1 Sp., Bronze 1/2" Sweat Housing	85	7.625	5.875
UP15-10B7	59896226	1/25th HP, 1 Sp., Bronze 3/4" Sweat Housing	55	3.000	4.500
UP15-18B7	59896121	1/25th HP, 1 Sp., Bronze 3/4" Sweat Housing	85	7.000	7.250
UP15-42B7	59896146	1/25th HP, 1 Sp., Bronze 3/4" Sweat Housing	85	8.000	8.500
UP15-10BUC5	59896225	1/25th HP, 1 Sp., Bronze 1/2" Sweat Housing*	55	3.000	2.250
UP15-18BUC5	59896123	1/25th HP, 1 Sp., Bronze 1/2" Sweat Housing*	85	7.000	4.625
UP15-42BUC5	59896150	1/25th HP, 1 Sp., Bronze 1/2" Sweat Housing*	85	7.625	5.875
UP15-10BUC7	59896241	1/25th HP, 1 Sp., Bronze 3/4" Sweat Housing*	55	3.000	4.125
UP15-18BUC7	59896124	1/25th HP, 1 Sp., Bronze 3/4" Sweat Housing*	85	7.250	6.125
UP15-42BUC7	59896151	1/25th HP, 1 Sp., Bronze 3/4" Sweat Housing*	85	7.500	8.125
UP15-18SU	59896127	1/25th HP, 1 Sp., Stainless Steel Union Housing	85	3.750	5.750
UP15-42SU	59896174	1/25th HP, 1 Sp., Stainless Steel Union Housing	85	6.000	7.500
UP25-64SU	52722324	1/12th HP, 1 Sp., Stainless Steel Union Housing	180	10.000	10.500

*with Integrated Check Valve

Bronze Sweat

Bronze Sweat with Integrated Check Valve

Stainless Steel Union

Line Cord Models

Model	Part Number	Description	Watts	Typical Operating Point	
				Head (ft.)	Flow (gpm)
UP15-10B5/LC	59896214	1/25th HP, 1 Sp., Bronze 1/2" Sweat Housing	55	3.000	2.250
UP15-18B5/LC	59896211	1/25th HP, 1 Sp., Bronze 1/2" Sweat Housing	85	7.000	4.625
UP15-42B5/LC	59896233	1/25th HP, 1 Sp., Bronze 1/2" Sweat Housing	85	7.625	5.875
UP15-10B7/LC	59896209	1/25th HP, 1 Sp., Bronze 3/4" Sweat Housing	55	3.000	4.500
UP15-18B7/LC	59896229	1/25th HP, 1 Sp., Bronze 3/4" Sweat Housing	85	7.000	7.250
UP15-42B7/LC	59896235	1/25th HP, 1 Sp., Bronze 3/4" Sweat Housing	85	8.000	8.500
UP15-10BUC5/LC	59896237	1/25th HP, 1 Sp., Bronze 1/2" Sweat Housing*	55	3.000	2.250
UP15-10BUC7/LC	59896239	1/25th HP, 1 Sp., Bronze 3/4" Sweat Housing*	55	3.000	4.125
UP15-18SU/LC	59896231	1/25th HP, 1 Sp., Stainless Steel Union Housing	85	3.750	5.750

*with Integrated Check Valve

Bronze Sweat with Line Cord

Bronze Sweat with Integrated Check Valve and Line Cord

Stainless Steel Union with Line Cord

Timer and Line Cord Models

Model	Part Number	Description	Watts	Typical Operating Point	
				Head (ft.)	Flow (gpm)
UP15-10B5/TLC	59896215	1/25th HP, 1 Sp., Bronze 1/2" Sweat Housing	55	3.000	2.250
UP15-18B5/TLC	59896212	1/25th HP, 1 Sp., Bronze 1/2" Sweat Housing	85	7.000	4.625
UP15-42B5/TLC	59896234	1/25th HP, 1 Sp., Bronze 1/2" Sweat Housing	88	7.625	5.875
UP15-10B7/TLC	59896210	1/25th HP, 1 Sp., Bronze 3/4" Sweat Housing	55	3.000	4.500
UP15-18B7/TLC	59896230	1/25th HP, 1 Sp., Bronze 3/4" Sweat Housing	85	7.000	7.250
UP15-42B7/TLC	59896236	1/25th HP, 1 Sp., Bronze 3/4" Sweat Housing	85	8.000	8.500
UP15-10BUC5/TLC	59896238	1/25th HP, 1 Sp., Bronze 1/2" Sweat Housing*	55	3.000	2.250
UP15-10BUC7/TLC	59896240	1/25th HP, 1 Sp., Bronze 3/4" Sweat Housing*	55	3.000	4.125
UP15-18SU/TLC	59896232	1/25th HP, 1 Sp., Stainless Steel Union Housing	85	3.750	5.750

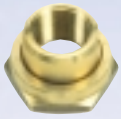
*with Integrated Check Valve

Bronze Sweat with Timer and Line Cord

Bronze Sweat with Integrated Check Valve, Timer and Line Cord

Stainless Steel Union with Timer and Line Cord

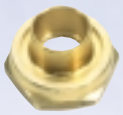
Pump Accessories



3/4" Bronze Half Union (threaded)

3/4" Bronze Union Isolation Valve (compression)

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



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

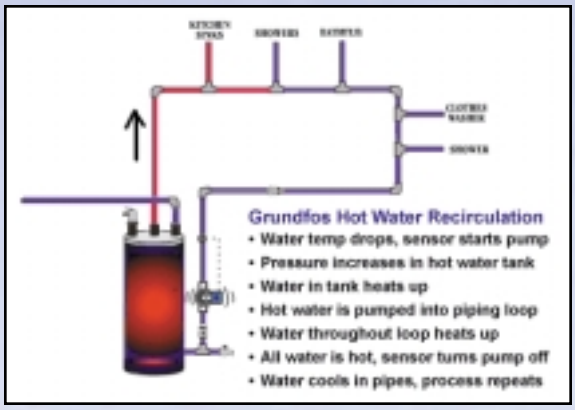
24 Hour Clock/Timer Control

1/2" & 3/4" Aquastat Thermostatic Control

Features and Benefits

Features	Benefits
► Bronze and stainless steel construction	► *Eliminates and prevents corrosive effects of fresh water*
► Wet rotor design	► *Maintenance-free, low energy consumption, easy to install, quiet running*
► Composite impeller	► *Improved performance and efficiency*
► Available with built-in timer	► *Pre-program usage times to save power*
► Available with line cord	► *No additional wiring required*
► Optional aquastat	► *Adds to savings by operating pump by sensing the water temperature*
All models are:	
► UL, CSA and cUL rated	► *Assurance of agency testing and conformance*
► Available with built-in check valve	► *No need for additional labor of installing another plumbing component*
► Designed specifically for domestic hot water applications	► *Ensures peak performance and minimizes water waste for the specific application*

System Components



Aside from the piping, a hot water recirculation system requires the following components:

- **Grundfos UP Circulator Pump** – required to move the water through the piping system loop. A fractional horsepower stainless steel or bronze model should be used to ensure proper circulation with minimal energy consumption. These models are available with several optional features (see available models for more details).
- **Check Valve** – used to ensure the proper flow direction of water through the system. Note: Some models are available with a built-in check valve to reduce the installation of another piping component.
- **Shut-off Valves** – it is recommended to place this valve before the pump, after the last faucet in the plumbing series loop, in order to isolate the pump.
- **Piping Insulation** – used to fit over the pipe to minimize heat loss.
- **System Timer** – allows the pump to operate only at the pre-programmed times. This eliminates any energy loss due to non-usage. Circulator pumps are equipped with a system timer.
- **Aquastat** – used to control the operation of the pump based on the water temperature. This adds to energy savings.

How to Choose the Proper Circulator Pump Model

Find the table below that best describes the design you plan to use.
Select the pump model based on the supply pipe length, size and pump options.

Circulator Pump Models used on 1/2" Supply & 1/2" Return Pipes

UP Bronze Model Circulators

Model #	1/2" Supply Pipe, Max. Length (ft.)	Total Max. Pipe Length (ft.)	Supply Line Volume (gallons)
UP15-10B5	100	200	2.4

UP Bronze Model Circulators with Built-In Check Valve

Model #	1/2" Supply Pipe, Max. Length (ft.)	Total Max. Pipe Length (ft.)	Supply Line Volume (gallons)
UP15-10BUC5	85	170	2.0

Circulator Pump Models used on 3/4" Supply & 1/2" Return Pipes

UP Bronze Model Circulators

Model #	3/4" Supply Pipe, Max. Length (ft.)	Total Max. Pipe Length (ft.)	Supply Line Volume (gallons)
UP15-10B5	200	400	10.0
UP15-10B7	215	430	10.8
UP15-18B5	460	920	23.1
UP15-18B7	500	1000	25.1

UP Stainless Steel Model Circulators

Model #	3/4" Supply Pipe, Max. Length (ft.)	Total Max. Pipe Length (ft.)	Supply Line Volume (gallons)
UP15-18SU	255	510	12.8
UP15-42SU	425	850	21.4
UP25-64SU	700	1400	35.2

UP Bronze Model Circulators with Built-In Check Valve

Model #	3/4" Supply Pipe, Max. Length (ft.)	Total Max. Pipe Length (ft.)	Supply Line Volume (gallons)
UP15-10BUC5	170	340	8.5
UP15-10BUC7	195	390	9.8
UP15-18BUC5	460	920	23.1
UP15-18BUC7	500	1000	25.1

Circulator Pump Models used on 3/4" Supply & 3/4" Return Pipes

UP Bronze Model Circulators

Model #	3/4" Supply Pipe, Max. Length (ft.)	Total Max. Pipe Length (ft.)	Supply Line Volume (gallons)
UP15-10B7	500	1000	25.1
UP15-18B7	1600	3200	80.4
UP15-42B7	1800	3600	90.5

UP Stainless Steel Model Circulators

Model #	3/4" Supply Pipe, Max. Length (ft.)	Total Max. Pipe Length (ft.)	Supply Line Volume (gallons)
UP15-18SU	1275	2550	64.1
UP15-42SU	1350	2700	67.8
UP25-64SU	2200	4400	110.7

UP Bronze Model Circulators with Built-In Check Valve

Model #	3/4" Supply Pipe, Max. Length (ft.)	Total Max. Pipe Length (ft.)	Supply Line Volume (gallons)
UP15-10BUC7	620	1240	31.2
UP15-18BUC7	1575	3150	79.2
UP15-42BUC7	1700	3400	85.4

NOTE: Calculations are based on 110°F water at 1 gpm for type "L" copper pipe with 20 elbows and 10 tees for the hot water supply. Also, allows use of type "L" copper pipe of equal length as the supply with 20 elbows and 1 check valve for the return pipe. Check valve is removed from calculations for models with built-in check valves. For other selections, call your local Grundfos Sales Representative.

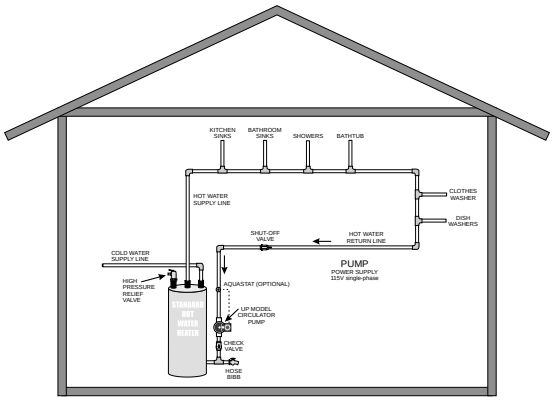
For Additional Piping Components

Pipe Component	Equiv. Pipe Length of 1/2" Component (ft.)	Equiv. Pipe Length of 3/4" Component (ft.)
90° Elbow	1.55	2.06
45° Elbow	0.83	1.10
Tee (Straight Port)	1.00	1.40
Tee (Side Port)	3.10	4.10
Flow Check	5.10	6.86

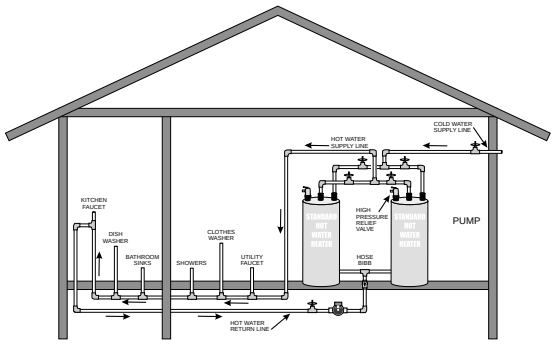
NOTE: For each additional pipe component on the system, its equivalent length must be subtracted to the supply pipe max. length on the pump slection charts to get the revised max. supply pipe length.

Applications

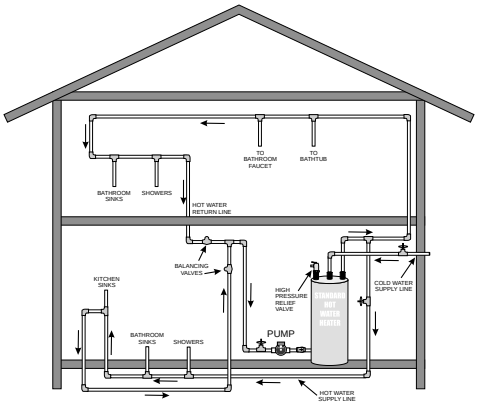
These diagrams illustrate commonly used system layout configurations.



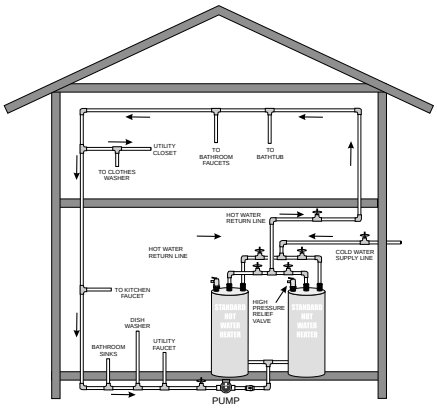
Single Level with 1 Water Heater



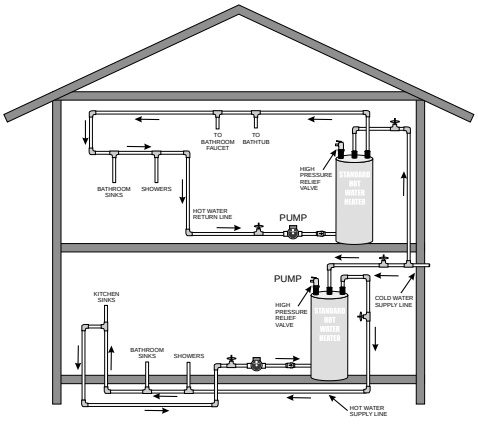
Single Level with 2 Water Heaters



Multi Level with 1 Water Heater



Multi Level with 2 Water Heaters



Multi Level with Water Heaters for Each Level

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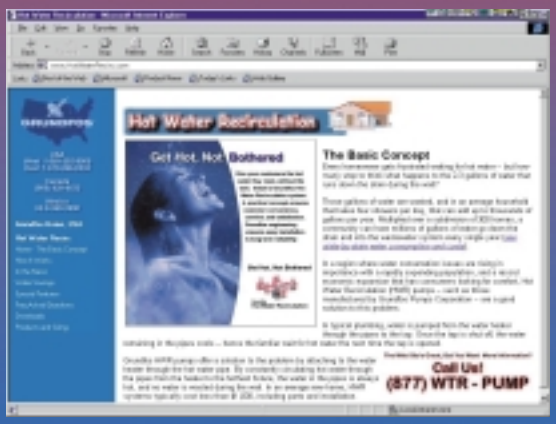

Visit our website to see:
► Frequently Asked Questions ► Animation showing how water flows through a Hot Water Recirculation system
► Listing of Grundfos Dealers and Distributors in your area

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Performance curves and technical information listed as a range only and subject to change without notice. Consult a Grundfos product submittal data sheet for exact pump specifications.

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