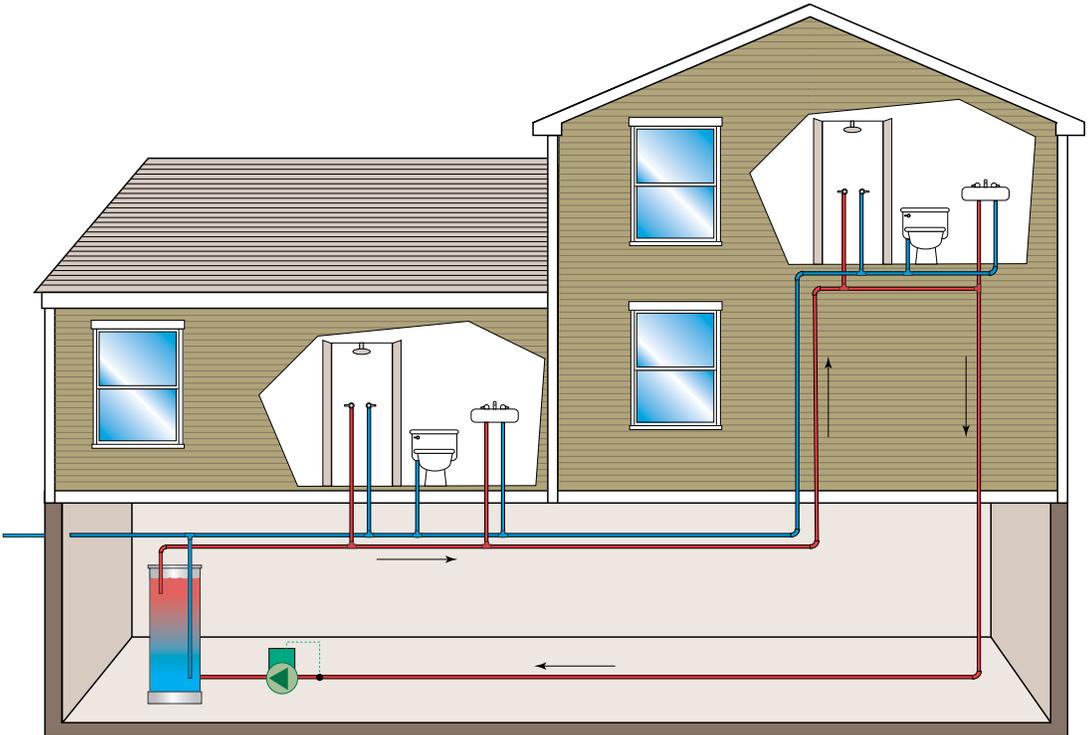


# Domestic Hot Water Recirculation Systems Application, Selection & Installation Guide



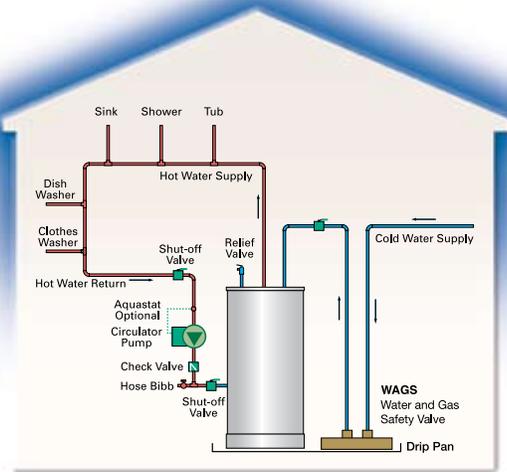
HYDRONIC COMPONENTS & SYSTEMS



# Domestic Hot Water Recirculation

## The Problem: Waiting for Hot Water

It's a common problem: turn on the faucet or shower for hot water, then wait for it to arrive. In fact, the wait can be up to two minutes in larger homes with multiple bathrooms and long runs of pipe between the plumbing fixtures and the water heater! With a Taco Domestic Hot Water Recirculation System in place, there's no more wait. Instant hot water!



## Waiting Means Wasting

Waiting for hot water sends millions of gallons of cooled water down the drain each year. In fact, an average family of 4 wastes up to 14,000 gallons of water each year waiting for hot water.\* Water conservation is so important that many US states and municipalities routinely impose watering bans and offer rebate incentives to help conserve this natural resource. \*Source: Dept. of Energy study.

## Estimated Annual Water Savings

Pipe Type	Hot Water Supply Length (ft.)	Pipe Water Volume (gallons)	Daily Water Volume Wasted (gallons)*	Annual Water Volume Saved (gallons)
1/2" Copper Type "L"	100	1.2 per 100'	12	4,400
	150		18	6,600
	200		24	8,800
	250		30	11,000
	300		36	13,200
3/4" Copper Type "L"	100	2.5 per 100'	25	9,200
	150		37	13,700
	200		50	18,300
	250		62	23,000
	300		75	27,500

\* Assume average of 10 cycles per day.

## Energy Down The Drain

Of course, all that "waiting water" contains some heat energy (BTU's), even if it's only room temperature. Wasting those

BTU's and starting over with fresh, cold water to heat up requires even more heat energy. So in addition to wasting water, millions of BTU's and energy dollars are wasted, too.

## The Solution: Install a Domestic Hot Water Recirculation System.

The Taco Plumb n' Plug® Recirculation System is specifically designed for:

- Instant hot water comfort
- Water savings
- Energy savings

## How a Domestic Hot Water Recirculation System Works

A standard DHW system requires a dedicated return line from the furthest fixture back to the water heater. The return line is connected to a tee at the tank drain valve or to the tank's cold water supply line. A Taco Plumb n' Plug® recirculation pump with an optional Integral Flow Check (IFC) is installed on the return line and controlled by a timer or temperature aquastat. The spring-loaded IFC prevents gravity circulation during off-cycles. The timer turns on the pump at preset intervals, usually during peak use periods in the early morning and late afternoon. An optional Aquastat operates the pump to keep hot water in the line within a set range (95°F-115°F). All supply and return lines should be insulated for maximum energy savings.

## Required Components

- Taco Plumb n' Plug® Circulator with optional IFC
- Isolation valves - to isolate the pump for future service
- Flow check valve - to prevent gravity flow
- Purge Valve - to remove air from system piping
- Timer control - 24-hour analog or 7-day digital timer
- Aquastat - to control temp between 95°F-115°F (opt.)
- Pipe insulation - to maximize energy savings

## Features & Benefits:

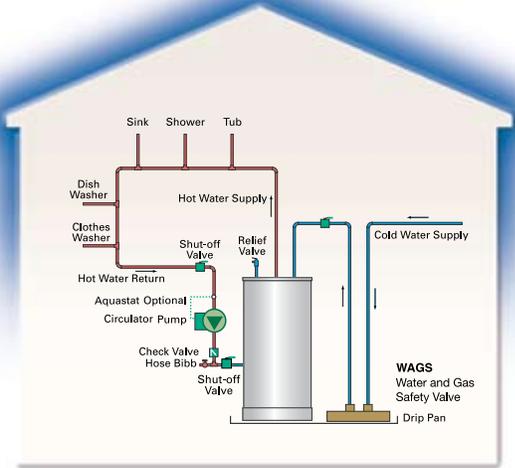
### Plumb n' Plug Circulators

- Removable stainless steel cartridge - contains all moving parts
- Patented, removable Integral Flow Check (IFC) option
- Bronze construction
- 1/2" & 3/4" sweat, 3/4" npt, union or flanged connections
- Pre-wired power cord
- Pre-wired 24-hour analog or 7-day programmable timer
- Durable Noryl® impeller
- Ceramic shaft, carbon bearings
- Quiet running, low power consumption
- Low maintenance, unmatched reliability
- UL Listed

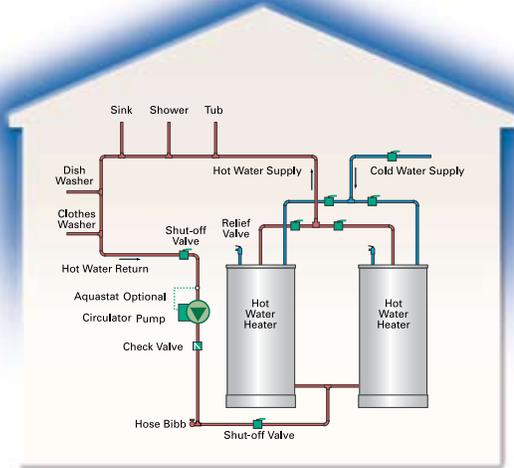
Noryl® is a registered trademark of General Electric Company.

# Typical Installation & Piping

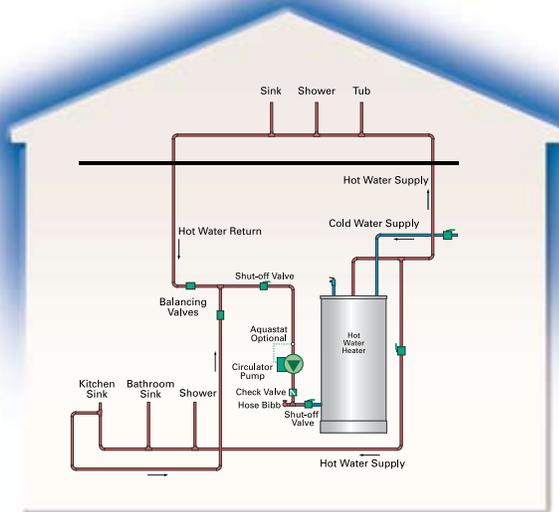
## One-Story with 1 Water Heater



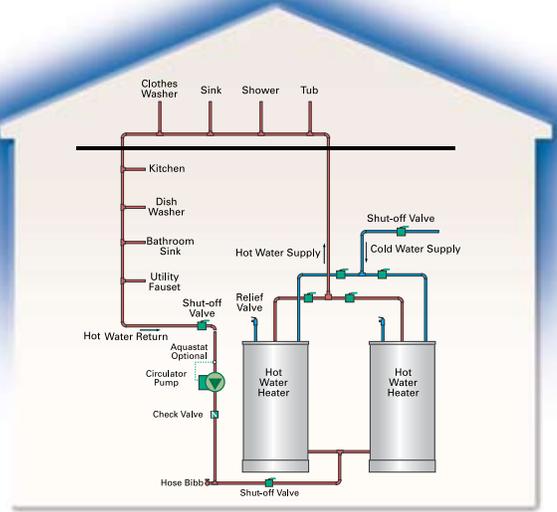
## One-Story with 2 Water Heaters



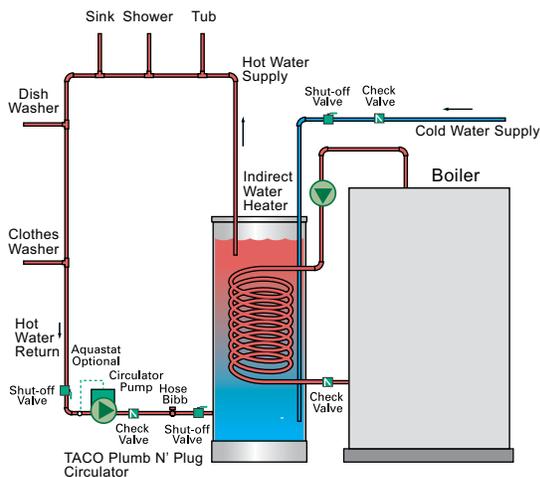
## Multi-Story with 1 Water Heater



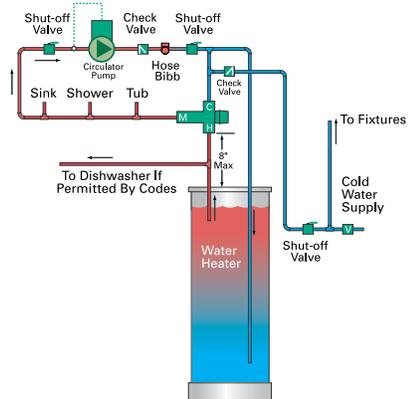
## Multi-Story with 2 Water Heaters



## Recirculation Piping with Indirect Water Heater



## Recirculation Piping with Storage Water Heater & Mixing Valve



# Submittal Data Information

## Standard Models

Standard Model #	System Connection	Plumb n' Plug® (PNP) Pre-Wired Models			HP	Voltage	Amps
		24 Hr Analog Timer	7 Day Digital Timer	Line Cord Only			
003-BC4	1/2" Sweat	003-BC4-PNP	003-BC4-8PNP	003-BC4-4PNP	1/40	115/60/1	0.43
003-B4	3/4" Sweat	003-B4-PNP	003-B4-2PNP	003-B4-1PNP	1/40	115/60/1	0.43
003-BT4	3/4" NPT	003-BT4-PNP	003-BT4-2PNP	003-BT4-1PNP	1/40	115/60/1	0.43
003-BC4-I	Union	003-BC4-1PNP	003-BC4-9PNP	003-BC4-5PNP	1/40	115/60/1	0.43
006-BC4	1/2" Sweat	006-BC4-PNP	006-BC4-4PNP	006-BC4-2PNP	1/40	115/60/1	0.52
006-B4	3/4" Sweat	006-B4-PNP	006-B4-2PNP	006-B4-1PNP	1/40	115/60/1	0.52
006-BT4	3/4" NPT	006-BT4-PNP	006-BT4-2PNP	006-BT4-3PNP	1/40	115/60/1	0.52
006-BC4-I	Union	006-BC4-1PNP	006-BC4-5PNP	006-BC4-3PNP	1/40	115/60/1	0.52
008-BC6	3/4" Sweat	---	---	---	1/25	115/60/1	0.84
008-BF6	Flanged	---	---	---	1/25	115/60/1	0.84



## Integral Flow Check (IFC) Models

Standard Model #	System Connection	Plumb n' Plug® (PNP) Pre-Wired Models			HP	Voltage	Amps
		24 Hr Analog Timer	7 Day Digital Timer	Line Cord Only			
003-BC4-IIFC	1/2" Sweat	003-BC4-3PNP	003-BC4-11PNP	003-BC4-7PNP	1/40	115/60/1	0.43
003-BC4-IFC	3/4" Sweat	003-B4-2PNP	003-BC4-10PNP	003-BC4-6PNP	1/40	115/60/1	0.43
003-B4-2IFC	Union	003-B4-3PNP	003-B4-4PNP	---	1/40	115/60/1	0.43
006-BC7-IIFC	1/2" Sweat	006-BC7-1PNP	006-BC7-5PNP	006-BC7-3PNP	1/40	115/60/1	0.52
006-BC7-IFC	3/4" Sweat	006-BC7-PNP	006-BC7-4PNP	006-BC7-2PNP	1/40	115/60/1	0.52
006-B7-IFC	Union	006-B7-PNP	006-B7-1PNP	---	1/40	115/60/1	0.52
008-BC6-IFC	3/4" Sweat	---	---	---	1/25	115/60/1	0.84
008-BF6-IFC	Flanged	---	---	---	1/25	115/60/1	0.84



## Domestic Hot Water Circulator Accessories

Freedom Flange	System Connection	Sweat	NPT
Shut-Off	1/2"	242-2	242-1
	3/4"	243-2	243-1
Bronze	1/2"	110-522BSF	---
	3/4"	110-523BSF	110-251BF

Unions	System Connection	Sweat	NPT
Half Unions	1/2"	110-558	110-556
	3/4"	110-559	110-557
Shut-Off Unions	1/2"	258-3	258-1
	3/4"	258-4	258-2

Plumb n' Plug Accessories	Model #
Analog Timer Kit	265-1
Digital Timer Kit	265-3
Aquastat	563-2



Freedom Flange

Shut-off Freedom Flange



265-1  
Analog  
Timer



265-3  
Digital  
Timer



Half  
Unions



Shut-off  
Unions

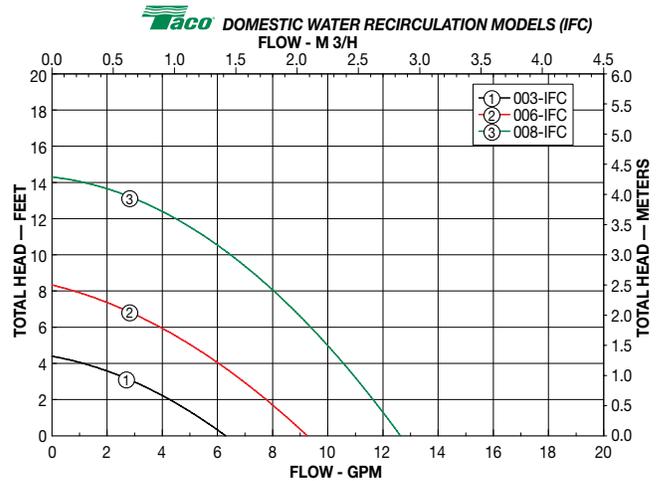
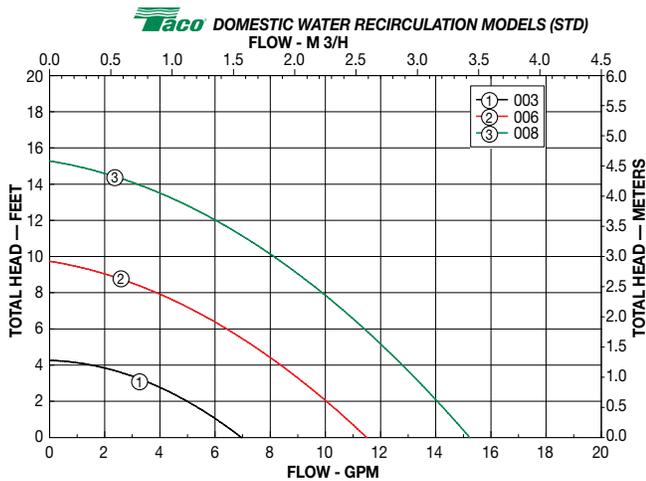


563-2  
Aquastat



# Choosing the Correct Circulator for the Job

## Performance Field Information - 60 Hz



### Pump Selection Charts

This information is provided as a guide only. Larger models are available. For larger systems, consult your local Taco representative. Find the table below that best describes the design you plan to use. Select the pump model based on the supply and return pipe length, size and pump options. Do not oversize the pump or high velocity noise and erosion corrosion of system piping may result.

#### 1/2" Supply & 1/2" Return Lines

Model #	Supply Pipe Maximum Length (ft.)	Total Maximum Pipe Length (ft.)
003	50	100
006	150	300
008	275	550
003-IFC*	50	100
006-IFC*	125	250
008-IFC*	250	500

\*With Integral Flow Check

#### 3/4" Supply & 3/4" Return Lines

Model #	Supply Pipe Maximum Length (ft.)	Total Maximum Pipe Length (ft.)
003	350	700
006	900	1,800
008	1,450	2,900
003-IFC*	350	700
006-IFC*	750	1,500
008-IFC*	1,350	2,700

\*With Integral Flow Check

#### 3/4" Supply & 1/2" Return Lines

Model #	Supply Pipe Maximum Length (ft.)	Total Maximum Pipe Length (ft.)
003	100	200
006	275	550
008	450	900
003-IFC*	100	200
006-IFC*	275	550
008-IFC*	425	850

\*With Integral Flow Check

#### 1" Supply & 1/2" Return Lines

Model #	Supply Pipe Maximum Length (ft.)	Total Maximum Pipe Length (ft.)
003	125	250
006	325	650
008	525	1,050
003-IFC*	130	260
006-IFC*	275	550
008-IFC*	500	1,000

\*With Integral Flow Check

#### 1" Supply & 3/4" Return Lines

Model #	Supply Pipe Maximum Length (ft.)	Total Maximum Pipe Length (ft.)
003	600	1,200
006	1,500	3,000
003-IFC*	1,200	1,200
006-IFC*	2,500	2,500

\*With Integral Flow Check

### Assumptions:

Flow = 1 GPM

Max. Velocity = 3 ft./sec.

Allowances have been added for pressure drop of other typical system components

Type L Copper Tubing

Supply & Return Piping are equal in length.

# Domestic Hot Water Recirculation

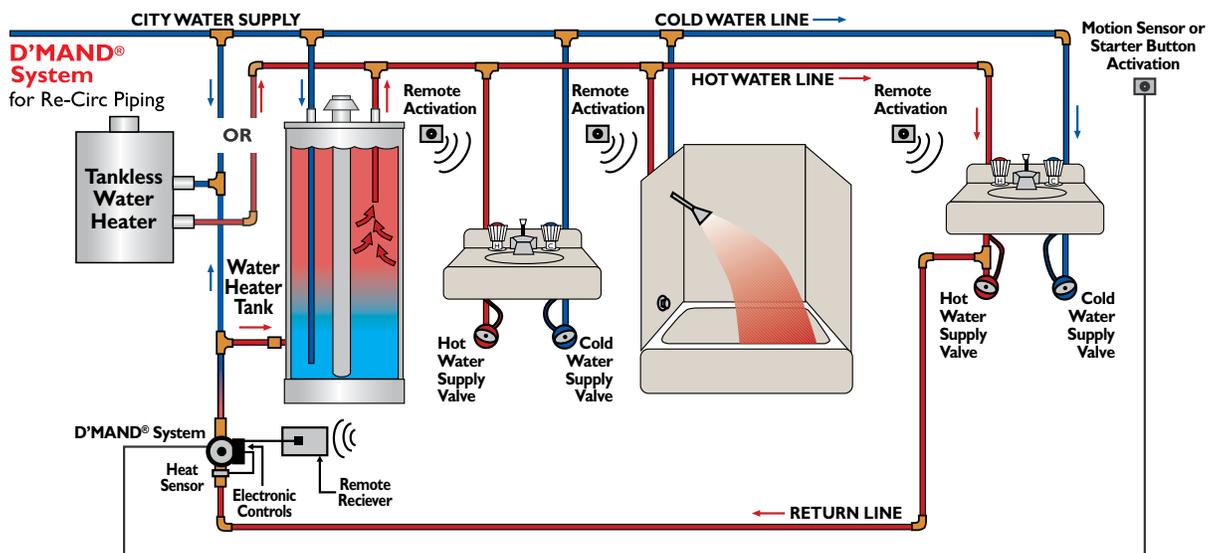
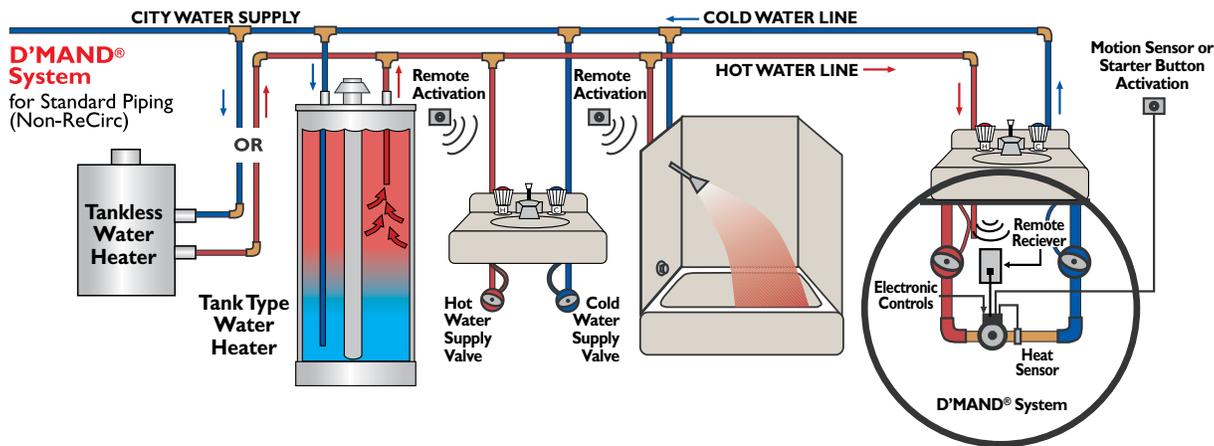


## "On-Demand" Systems for New or Retrofit Installations

Using the existing cold water line as the return line, the D'MAND® System is ideal for both new and retrofit installations. Typically installed at the furthest fixture from the water heater, D'MAND® fits out of the way, under any bathroom vanity. Connections are made from the hot and cold lines to the suction and discharge side of the pump using adapter tees and stainless flex lines provided. When hot water is needed, the pump is activated by pressing a starter button, runs only long enough to supply hot water to the fixture and then automatically stops. This prevents hot water from entering the cold line. A spring-loaded Integral Flow-Check valve (IFC) prevents cold water from entering the hot line. Optional wireless RF or motion sensor starters are also available.

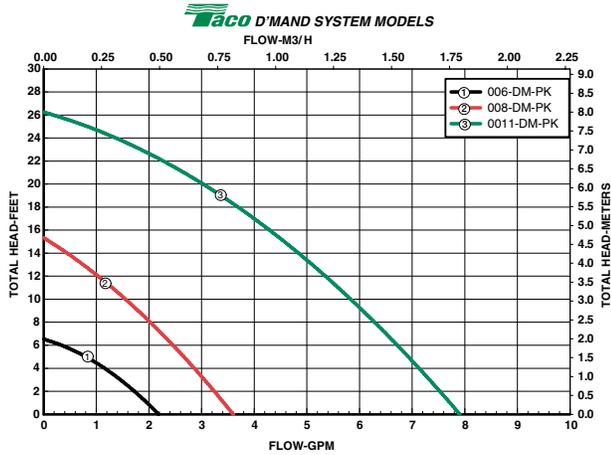
## Ideal for Tankless Water Heaters Features and Benefits of the Taco D'MAND® System

- Instant Hot Water Comfort
- Maximum Water & Energy Savings
- 24 Hour "On-Demand" operation
- Maintenance free circulator - unmatched reliability
- Removable stainless steel cartridge - contains all moving parts
- UL, IAPMO listed
- Patented D'MAND® electronics control board
- Integral Flow-Check (IFC) to prevent thermo-siphoning or gravity flow
- Pre-wired power cord and integral temperature sensor
- Adapter tees & stainless steel flex lines included
- RF wireless remote or motion sensor starter-optional



# Sizing Your D'MAND® System

## Performance Field Information - 60 Hz



### Standard Piping: Tank Type Water Heater

Size of Home	Total length of Pipe (ft)	Model
Small	50	006-DM-PK
Medium	100	008-DM-PK
Large/Commerical	Over 100	0011-DM-PK

### Tankless Water Heater

Size of Home	Total length of Pipe (ft)	Model
Small / Medium	<60	008-DM-PK
Large/Commerical	60+	0011-DM-PK

### Recirculation Piping: Tank Type Water Heater

Size of Home	Total Length of Pipe (ft.)	Model
Small	100	006-DM
Medium	200	008-DM
Large/Commerical	200 +	0011-DM

### Tankless Water Heater

Size of Home	Sq. Ft.	Model
Small / Medium	<2500	008-DM
Large/Commerical	2500+	0011-DM



### D'MAND® System Accessories

Model	Description
554-1	RF Remote Transmitter/Receiver Kit
554-2	RF Individual Remote Transmitter Button
554-3	Hardwired Individual Starter Button Round
554-4	Motion Sensor Kit



RF Wireless Starter Kit



Motion Sensor

**HYDRONIC COMPONENTS & SYSTEMS**

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Do it right.®  **Taco**®

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[www.taco-hvac.com](http://www.taco-hvac.com)