

PLUMBING SYSTEMS

D'MAND[®] HOT WATER DELIVERY SYSTEMS

INSTALLATION GUIDE



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D'MAND[®] Hot Water Delivery Systems for Structured Plumbing[®] Applications Installation Guide

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This installation guide is published for building officials and plumbing professionals interested in the D'MAND[®] Hot Water Delivery System. This guide describes the recommendations for installing D'MAND in Uponor plumbing systems. Local codes should be followed.

The Uponor plumbing system features Wirsbo AQUAPEX® tubing and Wirsbo AQUAPEX plus tubing. Wirsbo AQUAPEX carries the NSF-pw seal for use in hot and cold potable water plumbing systems.

Uponor has used reasonable efforts in collecting, preparing and providing quality information and material in this document. However, system enhancements may result in modification of features or specifications without notice. For the most current technical information, go to the Uponor website at www.uponor-usa.com.

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Please direct any questions regarding the suitability of an application or a specific design to your local Uponor representative. For the name of your representative, call toll free (800) 321-4739.

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Section 1 Overview

Uponor offers the D'MAND[®] Hot Water Delivery System to provide fast hot water delivery, resulting in energy and water savings for today's new homes.

With the D'MAND system, hot water is delivered within seconds after turning on the faucet. The system uses a pump, which is activated by a motion sensor or pushing a button. Once the pump is activated, hot water reaches the faucet in just seconds. That means very little water is wasted down the drain while the homeowner waits for the water to warm up.

The D'MAND system uses a Structured Plumbing[®] layout for quick and easy installation during new home construction. See **page 19** for more information about Structured Plumbing.

System Components

The D'MAND system consists of a pump and an activation device.





Installation Considerations

Prior to installing the D'MAND Hot Water Delivery System, consider the following.

- The D'MAND system requires a minimum ¾" Wirsbo AQUAPEX® tubing dedicated return line. The return line is connected only through those manifolds supplying fixtures supported by the D'MAND system and then routed back to the water heater. This return line allows the cool water in the supply line and manifolds to be quickly replaced by hot water from the water heater.
- The most effective hot water delivery system should employ Structured Plumbing. That is, the layout design of the plumbing system should effectively take advantage of the benefits of recirculation. See Structured Plumbing on **page 19** for more information.

- In Uponor plumbing systems, the D'MAND pump is located on the return line near its terminus where it intersects the cold water supply line to the water heater. A tee fitting on the cold water supply line into the water heater connects the return line from the D'MAND system.
- Mount the D'MAND pump on the wall at a stud, or securely affix to another supporting structure near the water heater.
- The D'MAND pump has an integral temperature sensor that senses a rise in the recirculating line's water temperature. Once the temperature sensor reaches a preset temperature rise, it will deactivate the pump.
- The D'MAND pump incorporates an integral check valve, thus eliminating the need for a separate valve.
- The D'MAND system uses activation devices that are connected to the pump with low-voltage wiring.



Important:

Install the wiring before the wall cavities are closed.

- Low-voltage wire, required to connect the pump to the activation device, is not provided with the D'MAND system. The installer must provide the wiring.
- Choose the type of activation device (button or motion sensor) that is best suited for the requirements for hot water in the location where the activation device will be installed. See Activation Devices on page 11 for more information.
- The D'MAND pump requires an electrical connection. The pump is equipped with a 6-foot grounded plug (110 volt). Thus, a grounded receptacle is needed within 6 feet of the pump.



Warning:

A properly sized expansion tank is required when installing the D'MAND pump in an Uponor plumbing system that uses a pressure-reducing valve with backflow prevention.

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Section 2 Model Sizing and Selection

Prior to installation, select the proper pump model. Uponor offers two pumps in the D'MAND Hot Water Delivery System: Model 100 (Q6700070) and Model 200 (Q6700002).

The Model 100 Pump is more appropriate for systems in which the total tubing distance from the hot water supply to the farthest fixture is less than 100 feet. The Model 200 Pump is more appropriate for systems in which the total tubing distance from the hot water supply to the farthest fixture is more than 100 feet. However, it can be used for distances less than 100 feet, if desired.

The D'MAND system works by purging ambient-temperature water from the hot water loop so that it may be filled by hot water from your water heater.

Note: The return line between the last fixture and the D'MAND inlet must be ³/₄" or larger Wirsbo AQUAPEX[®] tubing. Using a smaller return line may increase the time necessary for hot water to reach the desired fixture.

D'MAND System Model 100 Pump

The Model 100 Pump is equipped with ½-inch NPT male threads for connection purposes. Although the Uponor Model 100 pump is very reliable and should not require maintenance, the installer may install isolation flanges or valves on either side of the pump. This allows easy removal of the pump in the event it needs servicing in the future.

D'MAND System Model 200 Pump

The Uponor Model 200 Pump is equipped with standard connection flanges with ¾-inch female NPT threaded connectors on the removable half of each flange. For isolation purposes, the threaded connectors feature integral ball valves, which may rotate (i.e., open and close) with either an Allen wrench, a wide-blade screwdriver or the handle on the isolation ball valve.

Note: During normal operation, ensure the ball valves are in the full-open configuration.

Thread ProPEX[®] Male Adapters ($\frac{3}{4}$ -inch male NPT by $\frac{3}{4}$ -inch ProPEX) into the female inlets on the flanges so that Wirsbo AQUAPEX tubing may be connected to the adapters.

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Section 3 Installing the D'MAND Pump

The D'MAND pump operates at 110 volts and is supplied with a 6-foot power cord terminated with a grounded three-prong plug. It is necessary to locate a grounded 110-volt, 60 Hz AC electrical outlet less than 6 feet from the pump. See **Figure 3-1**.

Securely mount the pump to a wood stud or other sturdy supporting structure. Screw holes are pre-machined into the mounting bracket to facilitate mounting. See **Figure 3-2**.

For best configuration of the plumbing system, mount the pump above the water heater.



Figure 3-2: Secure with screws.



Figure 3-1: Grounded 110-volt, 60 Hz AC Electrical Outlet

Note the arrow cast into the side of the pump housing as shown in **Figure 3-3**. Water must flow through the pump in the direction as the arrow indicates. Therefore, the return line coming from the last plumbing fixture should connect at the top (inlet) of the pump, and the line from the pump to the water heater should connect to the bottom (outlet) of the pump.

Always mount the pump so that the cartridge housing is horizontal. Do not mount the pump so that the cartridge housing is vertical. Additionally, do not mount the control box below the cartridge housing. See **Figure 3-4**.

For a convenient and professional installation, mount a wiring box within 12 to 24 inches of the pump to use as a junction box. See **Figure 3-4**.



Figure 3-4

During installation when running the low-voltage wires for the activation devices, leave sufficient wire at the junction box so the connections can be made outside the junction box. Connect the pump control wires and the activation devices wires at the junction box. See **Figure 3-5**. Coil the completed connections into the junction box and attach a solid cover plate over the junction box.

Using appropriate fittings, connect the return line from the system to the inlet side of the pump. See **Figure 3-6**.



Figure 3-6

From the outlet side of the pump (the bottom in this example), extend the return line back to the cold water inlet to the water heater. Tee the return line into the cold water supply line. See **Figure 3-7**.

Note: In all cases, consult the water heater installation instructions to determine if the hot water heater manufacturer has any special instructions regarding the attachment of return lines.



Figure 3-7

The D'MAND pump features an internal check valve that prevents reverse flow through the pump; therefore, no additional check valves are required.

To maximize the efficiency of the system, insulate the hot water supply line (from the hot water heater to the point where the last fixture on the loop is supplied). See **Figure 3-8**.



Figure 3-8

Section 4 Activation Devices

An activation device turns on the D'MAND pump. There are two types of activation devices available with the D'MAND system.

- Activation Button (See Figure 4-1.)
- Motion Sensor (See Figure 4-2.)

Any D'MAND system can use either device or a combination of both devices based on the customer's requirements.

Choosing an Activation Device

Prior to wiring the activation devices, determine which activation device to use at each faucet where rapid delivery of hot water is desired. Some considerations are outlined below.

- Activation buttons are best located near faucets where the majority of users are aware that the D'MAND system is installed. That's because they will know that they will need to push the button to receive hot water quickly.
- An activation button is also a good choice when a user may not necessarily want hot water each time the faucet is used (e.g., a kitchen sink).



Figure 4-1: Button



Figure 4-2: Motion Sensor

- Use motion sensors in locations where many of the users may not know that the D'MAND system is installed, such as a quest bathroom or a powder room.
- Using motion sensors in high-traffic areas, like the kitchen, is not an ideal location, because the motion sensor will detect movement, and hot water may not always be required. A button is more appropriate for the kitchen.
- A motion sensor is a good choice when hot water is usually required each time someone approaches the faucet (e.g., master bathroom).

(continued on page 12)

- Mount the motion sensor so that it does not detect movement outside the area where the faucet is located.
- **Note:** The D'MAND system has an internal temperature sensor and control logic to ensure the pump cannot be activated repeatedly or when hot water is already in the system.

Wiring the Activation Device

The activation button requires a two-wire thermostat wire (18-gauge) in order to connect to the junction box at the pump location. The Motion Sensor requires a three-wire thermostat wire (18-gauge) in order to connect to the junction box at the pump location.

Note: It is common practice to increase the number of low-voltage wires within the bundle to provide redundancy should one of the wires break or short out. Should a failure take place, simply identify the broken wire and change the connections to the spare wire in the bundle. If two-wire, low-voltage wiring is required for the operation, consider installing three-wire instead. Three-wire, low-voltage operations will usually employ five-wire.

From the control box on the D'MAND pump, there are two lowvoltage wire bundles. See **Figure 4-3**. The two-wire bundle is used to connect to the activation button. The three-wire bundle is used to connect to the motion sensor. Both bundles are labeled respectively. These bundles are connected with their corresponding activation device and wired in the junction box at the pump location.

It is possible to install more than one activation button or motion





sensor in a system. If so, wire the devices in parallel, not in series. The schematics on **page 13** show direct parallel wiring for the two different devices. (See **Figures 4-4** and **4-5**.)

At the junction box near the pump location, wire all the activation buttons into the two-wire lead from the pump control box and all the motion sensors into the three-wire lead from the pump control box.

Install the low-voltage wiring for the activation devices after the rough in, but before the wall cavities are closed with drywall. Leave some excess wire where the activation device will be installed so that insufficient wire length does not limit where the device is positioned and mounted.



Figure 4-4



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Installing the Motion Sensor

Mount a wiring box in the wall cavity where the motion sensor will be mounted. Run low-voltage wire (three conductor) from the junction box (see **Figure 4-6**) to the sensor wiring box. Cut the low-voltage wire so that there is about 10 inches of excess. Coil the excess wire in the box to protect it while drywall is installed.

Install drywall (or other wall material), and make a cut out to expose the box and low-voltage wiring. See **Figure 4-6**.

On the back of the motion sensor, affix two pieces of hook-and-loop tape (with pressure-sensitive adhesive backing). Position the pieces so that the pigtail protrudes from the space between the pieces approximately at midpoint of the sensor. Leave the backing on the exposed side of the tape. See **Figure 4-7**.

Slide a wall plate with a standard %-inch circular opening over the pigtail. The finished side of the plate should face the back of the motion sensor. See **Figure 4-8**.

Using wire nuts or other suitable connectors, attach the pigtails from the sensor to the low-voltage wire that was terminated at the electrical box. Maintain proper polarity by connecting like-colored conductors to one another. See **Figure 4-9**.



Figure 4-6



Figure 4-7



Figure 4-8



Figure 4-9

Push the connected section of the wires into the box and attach the wall plate. Remove the backing from the hook-and-loop tape. Push the remaining wire through the wall plate opening into the box. See **Figure 4-10**.

Affix the motion sensor to the wall plate by pressing the exposed adhesive on the hook-and-loop tape onto the plate. Position the sensor so that it is centered on the plate.



Figure 4-10

Note: If the motion sensor is

mounted above head-height (as recommended), affix the motion sensor to the wall plate so that the lens is on the bottom. See **Figure 4-11**.



Figure 4-11

Installing the Activation Button in a Cabinet Rail

In most installations, the activation button is installed in a cabinet rail just below the countertop overhang. See **Figure 4-12**.

For this type of installation, install a sufficient length of two-conductor, low-voltage wiring to allow the end of the wire to extend several inches beyond the front of the cabinet.

Drill a [%]-inch hole in the rail where the button will be mounted. Pull the excess wire through the drilled hole and attach the wires to the screw terminals on the back of the button. See **Figure 4-13**.

Push the wire back through the drill hole, and press the button into place. See **Figure 4-14**. If necessary, the tension tabs on the outside edge of the button may be to assure that the button mounts securely in the drilled hole.



Figure 4-12



Figure 4-13

adjusted



Figure 4-14

Installing the Activation Button in Other Locations

If installing the activation button where it is not convenient to mount in a cabinet rail (e.g., a pedestal sink), Uponor recommends mounting the button in a wall plate. See **Figure 4-15**. The plate should have a %-inch hole that is attached to a wiring box (previously mounted in the wall cavity).

Note: The activation button has a springtension ring around its outside edge that holds the button in place after it is pushed into the ⁵/₂-inch hole.

Lace the low-voltage wire through the hole in the plate. See **Figure 4-16**. Next attach the wires to the screw terminals on the button. Then push the button into the hole. Coil the excess wire in the wiring box, and attach the plate to the wiring box.



Figure 4-15



Figure 4-16

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Section 5 Structured Plumbing

Structured Plumbing is essentially the system layout. When employing D'MAND hot water delivery, a Structured Plumbing layout incorporates a loop of tubing that starts at the hot water supply line (i.e., the line that moves hot water away from the heater), and returns to the heater where it tees into the main line, supplying cold water to the heater. Within practical considerations, that loop should supply all the hot water fixtures in the building.

For an effective system, make sure the individual lengths of tubing or drops that branch off the main loop to supply hot water to the individual fixtures are as short as possible. To accomplish this, route the main supply line, or loop, as close as possible to each fixture or fixture group. Routing the loop close to the fixtures minimizes water waste as well as the waiting time for hot water. Ideally, the length of an individual drop should not exceed 6 feet. However, in some layouts, especially where fixtures in a group are supplied with drops attached to a common manifold, some drops may need to be longer than others. In those instances where drops of varying length originate from a common manifold, situate the manifold so that the shortest drop is designated for that fixture with the highest flow rate (e.g., shower). This also minimizes wasted water while waiting for the water to heat up. See **Figure 5-1**.



Figure 5-1: Structured Plumbing — Remote Manifolds with D'MAND or Timed Recirculation

Two-loop System

Depending on the layout of a building, it may be more practical and cost effective to supply fixtures with more than one loop. In such a case, install a D'MAND pump in each loop. Each pump must have its own segregated activation devices. However, the tubing attached to the outlets of the individual pumps may merge into a single return line before it is teed into the cold water supply line. See **Figure 5-2**, which illustrates a hot-water system.



Figure 5-2: Remote manifolds feature a significant reduction in the number of individual connections.

Section 6 System Start-up, Testing and Troubleshooting

Start-up and Testing

Once the system is fully installed, turn the water supply on and plug in the system.

Note: The pump will automatically turn on when it is initially plugged in without activating the D'MAND button.

The D'MAND system will continue to operate until the sensor signals that hot water has arrived. Then it will automatically shut off.

To test the system again, wait until the return line cools down (approximately 20 minutes). You can test the system by pushing the button or moving in front of a motion sensor.

To test the temperature sensor independently, place a hot towel over the sensor located on the pump housing. The unit should shut off immediately. When the hot towel is removed, the system can be operated by one of the activation devices.



D'MAND Button



D'MAND Motion Sensor

Troubleshooting the D'MAND System

To diagnose common problems, refer to **Table 6-1**.

Problem	Possible Cause	Remedy
The pump does not run when the activation button is pressed.	 A. No power at electrical outlet B. The controller is plugged into an electrical outlet controlled by a wall switch (such as the outlet under many kitchen sinks that controls the gar- bage disposal). 	A. and B. Plug the controller into a hot outlet.
	C. The power cord is not secured to the pump and valve.	C. and D. Shut off power, and then make sure wires have good contact.
	D. The wire to the activation button is not connected well.	
	E. The temperature setting is already sensing hot water, so the pump is not activating.	E. Call Uponor at (800) 321- 4739 to reset sensitivity setting.
The water is not hot enough.	A. Pump or valve was installed with water flow going in the wrong direction.	A. Check the arrows on the housing of the valve and pump to make sure they point in the correct direction.
	B. Something is blocking the flow of water in the tubing.	B. Check the piping for obstruction.
Water is not hot enough when pump shuts down.	A. The temperature sensitivity setting now in place is too low, and the pump is turning itself off too soon.	A. Call Uponor at (800) 321-4739.

Table 6-1: Troubleshooting the D'MAND System

Notes



Notes

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