

Watts Safety Mixing Valves



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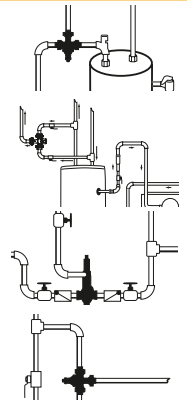
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The Dangers of Hot Water

Every year, thousands of people in the U.S.A. suffer serious thermal shock or scalding injuries in their bathtubs, sinks and showers. Additional untold numbers become ill due to water-borne bacteria, such as Legionella.

Problem: Thermal Shock

Often, injuries in the shower are caused by slips and falls in reaction to a sudden increase or decrease in water temperature. Ideally, if the supply of cold or hot water is lost, the water flow should be shut down immediately. Termination of flow would eliminate the instinctive but dangerous reaction to move quickly away from a too hot or too cold water stream.

Solution:

Watts Thermostatic Mixing Valves maintain and limit mixed hot water to a desired, selectable temperature, helping to minimize thermal shock.

Problem: Scalding



More than 90% of scalding incidents occur in the home. The tender skin of very young children and the slow reaction time of the elderly and the handicapped make them most vulnerable to serious hot water burns. Scalding injuries are tremendously painful, and the effects can last for years. Scalding occurs for a variety of reasons. In some cases, water heater thermostats are faulty, or set too high. In others, temperature regulating valves at the domestic hot water source are either malfunctioning or

missing altogether. Water heaters are normally set to temperatures above 131°F (55°C) to prevent development of harmful bacteria, such as Legionella, in the water supply. Water at temperatures above 106°F (41°C) are painful. At a temperature of 131°F (55°C), a child can be scalded in less than 4 seconds.

Solution:

Watts Thermostatic Mixing Valves maintain and limit the mixed hot water to a desirable selectable temperature, helping to prevent scalding injury.

Problem: Legionella Bacteria

Legionella is the bacteria responsible for Legionnaire's Disease, an acute bacterial infection of the lower respiratory tract. This bacterium was first identified in 1977 by the Centers for Disease Control as the cause of an outbreak of pneumonia that caused 34 deaths at a 1976 American Legion Convention in Philadelphia. Pontiac Fever is a less severe, non-pneumonia, flu-like disease that is associated with and likely caused by Legionella bacteria.

Legionella is a fairly common water bacteria and has been found to exist widely in many surface water sources such as; lakes, rivers, streams and ponds. It can also be found in ground water sources and some soils. At the levels found in these naturally occurring sources it typically does not pose a threat to public health. When the bacterium enters a domestic water system it can find an ideal host environment of warm water temperatures (105-115°F), stagnant water areas (storage tanks and dead-end piping legs) and ample food sources (sediment, scale, deposits and biofilm). Under these conditions Legionella can rapidly colonize, forming higher concentrations that can pose the public health threat of Legionnaire's Disease.

There are many methods of controlling colonization of Legionella bacteria. However, a widely accepted and preferred method is to maintain the hot water system storage temperature continually at or above 140°F. Unfortunately, the elevated temperature necessary to minimize the growth of and kill Legionella bacteria has the potential to cause serious thermal shock and scalding injuries.

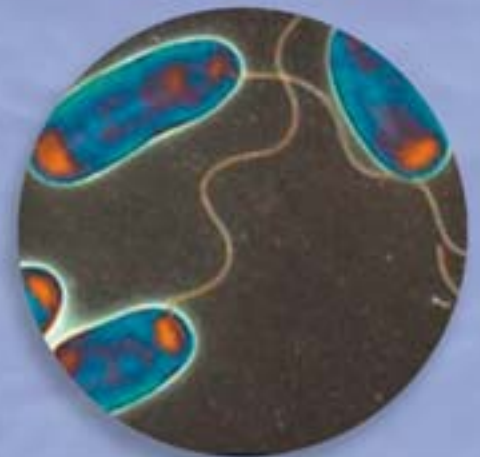
Solution:

Watts Thermostatic Mixing Valves maintain and limit the mixed hot water to a desirable, selectable temperature allowing for the storage of domestic hot water at the higher temperatures necessary to reduce the risk of Legionella growth in the system.



131°

The temperature in degrees °F that is required to kill Legionella bacteria in a water heater





3,000 – 4,000

The approximate number
of scald cases in the
U.S. each year



The Limitations of Pressure Balanced Mixing Valves

Many shower and combination tub/shower mixing valves in today's homes use a pressure balanced design. Unfortunately, pressure balanced type valves do not automatically control outlet temperatures, nor do they automatically limit outlet temperatures should the supply temperatures dramatically increase or decrease. Such limitations are potentially dangerous. Further, to prevent users from adjusting the valve beyond a safe operating temperature, pressure balanced valves require setting of the limit stop by the installer. In addition, to accommodate future changes in the hot or cold water temperature, the limit stop would need to be re-set.

By contrast, Watts Thermostatic Mixing Valves offer precise control of the outlet temperatures, no matter how the supply temperatures or pressures vary over time.

Watts Makes It Safe...

Since 1874 Watts Regulator Company has set the standard for the latest valve technology. Whether it is our pressure reducing valves to regulate steam or water, relief valves to ensure safe operation of water heaters or boilers or backflow prevention devices to help prevent cross-contamination of water supplies, Watts has earned a reputation for safety, reliability and innovation.

With widespread industry attention over the safe storage and distribution of domestic hot water due to concerns of tap water scalding, thermal shock and Legionella, Watts has again taken a leadership role by providing a complete line of thermostatic mixing valves, which provide safe, accurate control of hot water from its source through to its final use.

Please take a few moments to look over the information on the following pages. If you have any questions or would like additional information on how to protect against the dangers of scalding, thermal shock and Legionella growth, click on the "Danger – Scalding Lurks" link on the Watts Regulator web site at: www.wattsreg.com, or contact your local authorized Watts Representative.

A Word about American Society of Sanitary Engineering (ASSE) Standards 1016, 1017 and 1070

ASSE 1016, ASSE 1017 and ASSE 1070 are standards that are cited often in this brochure.

ASSE 1016 covers the delivery of water at the individual fixtures that are adjusted and controlled by the user. Therefore, it addresses very precise and immediate temperature regulation requirements. This standard covers three types of valves: Pressure Balancing, Thermostatic and Combined Pressure Balancing/Thermostatic. Watts ASSE 1016 listed valves meet the thermostatic requirements of this standard.

ASSE 1070 is a recently approved standard and the newest of the three standards. It covers control of maximum temperature to a fixture or group of fixtures; such as sinks, lavatories or bathtubs. The device may either be the final temperature regulation or have water further tempered downstream with the addition of cold water.

ASSE 1017, on the other hand, does not address final temperature control at fixtures and appliances. It is concerned with valves used at the source of hot water for distribution to the supply system, and therefore allows wider variation of the outlet temperature at higher flow rates.

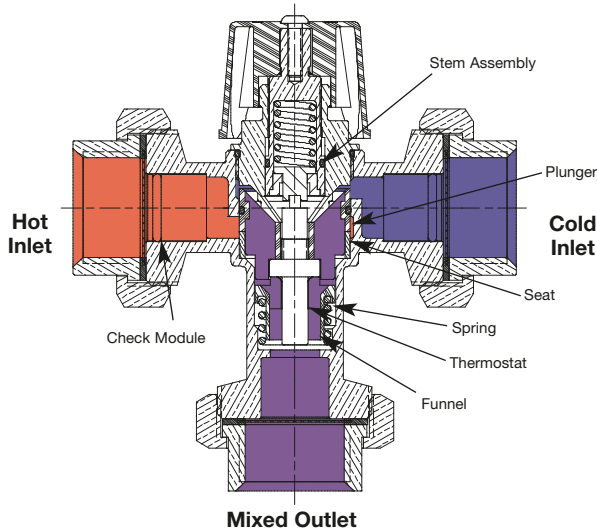
ASSE 1017 listed devices should never be used to deliver water directly to the user. These valves should be used in combination with an ASSE 1016 and/or ASSE 1070 listed devices.

For more information, please check the ASSE website at: www.ASSE-plumbing.org.



How They Work

Upon use of tempered water, a thermostat in the mixing chamber of the valve senses the outlet temperature. The thermostat automatically positions a seat assembly which controls the flow of hot and cold water supplied to the mixing chamber. If the mixed outlet temperature increases, the thermostat will expand moving the seat assembly to allow the cold water inlet port to open more fully and at the same time restricting the hot water inlet port. Conversely, if the mixed outlet temperature decreases, the thermostat will contract moving the seat assembly to allow the hot water inlet port to open more fully and at the same time restricting the cold water inlet port. In both cases the mixed outlet water temperature is automatically and continually maintained at the preset temperature within the tolerances of the valve. In the event of a cold or hot water supply failure, the seat assembly moves to an extreme position shutting off the hot or cold inlet water port. A mechanical adjustment permits selection of the desired outlet water temperature within range of the valve.



106°

The average water temperature in degrees °F that causes pain

Why They Are Used

Supply Systems

Mixing valves provide the following benefits:

1. The water temperature that is discharged directly from a water heater can vary $\pm 10^{\circ}\text{F}$ or more. This can be due to tolerance of control devices, inlet water temperature changes and stacking (higher water temperatures at the top of the water heater). Use of a thermostatic mixing valve assures constant outlet water temperature even with variations in hot or cold water supply temperature.**
2. If a water heater is operated at lower temperatures, high flow demand situations can result in a reduction of hot water supply temperatures if the recovery time of the water heater is not sufficient for the flow demand. Using a hot water extender or mixing valve allows the water heater to be operated at higher temperatures, extending the effective system flow rate and preventing the growth of Legionella.
3. To be able to supply peak demands for domestic hot water it is often necessary to provide high capacity water heaters with high recovery rates. Use of a hot water extender can reduce the size/BTU requirements needed to provide capacity for peak system demands.

At the Fixture

Heat loss in the system piping can result in varying temperatures of the hot and cold water supplied to fixtures. The use of thermostatic mixing valves assures constant safe hot water temperature at the point of delivery to the fixture.

** Please refer to specification for the selected model to determine the allowable inlet temperature range to maintain a desired outlet temperature.





Design Considerations

Heat Traps

- All mixing valves used at the source of supply should be trapped. Trapping the valve helps reduce mineral deposits and premature component wear.
- Heat traps help reduce convection loss also known as thermosiphoning, increasing system efficiency.

Stop Valves

- All mixing valves should be installed with a means to isolate the valve for service and repair.

Check Valves

- Check valves assure flow of water in one direction. They prevent thermal siphoning of hot water to the cold water supply.
- The addition of check valves should be considered whenever the potential exists for extreme differential pressures between the hot and cold water supply.
- Check valves are a requirement for compliance with ASSE Standard 1017 applications. Watts Series USG, MMV and 1170 come standard with integral check valves.

Strainers

- Water supply systems should be thoroughly flushed prior to placing mixing valves in service.
- Installation of additional strainers in the supply piping is recommended in systems where water can contain particles that could impede the proper operation of the mixing valve. Watts Series MMV and 1170 include inlet filters to provide protection against supply line debris.

Maximum Pressure

This is the maximum pressure that the valve could be subjected to during normal operation. Normal residential water system pressures should be limited to 80psi (552 kPa) as required by national codes.

Maximum Temperature

This is the maximum temperature that the valve could be subjected to during normal operation. Exceeding the maximum temperature could cause failure of internal components.

Minimum Flow

A minimum flow of water through the valve is required to provide accurate temperature control. Water flow below the listed minimum could result in increased outlet deviations.

Minimum Inlet Differential

This is the minimum difference between the hot and cold temperature that is required to produce the desired outlet temperature.

Cautions

At the Fixture

Delivery of water to fixtures intended for use in bathing or washing should always be controlled by valves listed to ASSE Standard 1016 Type T or ASSE Standard 1070 such as Watts Series MMV, L111 and USG mixing valves.

ASSE 1016 listed valves provide the user with both scald protection and thermal shock protection. ASSE 1070 listed valves provide the user with scald protection only.

These valves should never be set to exceed a maximum temperature of 120°F (49°C). (Watts recommends the maximum temperature of 110°F (43°C) for shower and bathing fixtures.)

Supply Systems

The control of water temperature for the source of supply should be controlled by mixing valves such as ASSE 1017 listed Watts Series 1170, L1170 and MMV.

These valves can also be used for re-circulation systems to maintain domestic hot water supply temperatures at levels (temperatures above 131°F (55°C)) that prevent the growth of harmful bacteria such as Legionella.

Radiant Heat Systems

Either a Watts 1170 or an L1170 mixing valve can be used for radiant heat systems. However, it is important that a boiler's high temperature limits do not exceed the maximum temperature rating of the system components. This will protect against component temperature failure should dirt, sediment or other mechanical failure cause a mixing valve to become inoperable.

Periodic Inspection

Regular inspection of mixing valves is recommended to assure maximum valve life and a properly functioning system. Corrosive water conditions, unauthorized adjustments or repairs can be detected during inspection and service of the valve. The frequency of cleaning depends upon local water conditions.



2-3 Seconds

The number of seconds it takes for a child or elderly person to receive 3rd degree burns from water at 140°F (60°C)

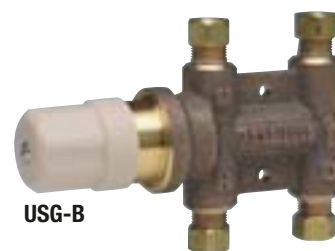


Series USG

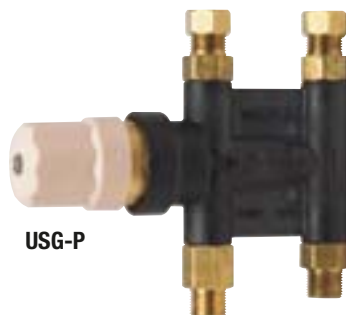
Under Sink Guardian® Thermostatic Mixing Valves

Size: 3/8" (10mm)

Series USG Under Sink Guardian® Thermostatic Mixing Valves are designed to maintain and limit hot water to lavatory and kitchen sinks to desired selectable temperature in commercial, institutional and residential applications. Series USG is listed to ASSE Standard 1016 for single fixture applications. These valves feature a double throttling design to control both the hot and cold water supply to the mixed outlet. The superior flow characteristics of these valves provide accurate temperature control ($\pm 3^{\circ}\text{F}$) with low pressure drop. Additionally, the Series USG incorporates dual check valves to protect against cross-flow.



USG-B



USG-P

U.S. Pat. #6,315,209

Models

- USG-B** - Bronze body
- USG-B-SC** - Bronze body w/satin chrome finish
- USG-P** - Thermoplastic body

Features

- Maintains mixed water temperature to $\pm 3^{\circ}\text{F}$ up to 120°F (49°C).
- Installs easily between the stop valves and faucet
- 3/8" (10mm) compression fittings
- Includes tamper resistant locking cap to prevent accidental mis-adjustment.
- Built-in check valves prevent migration of hot water to cold and cold water to hot water piping.
- Provided with cap for three port application.

Materials

- Body: Bronze (USG-B), Thermoplastic (USG-P)
- Metal Disc: Stainless steel
- Spring: Stainless steel
- Ball: Stainless steel
- Thermostat: Copper
- Rubber Disc: Buna-N
- O-rings: Buna-N
- Piston: UDEL-P1700
- Gasket: Garlock 3000

Pressure – Temperature

Minimum supply pressure: 30psi (207 kPa)

Hot inlet temperature: 120°F - 180°F (49°C - 82°C)

Cold inlet temperature: 40°F - 85°F (4°C - 29°C)

Minimum inlet temperature differential: 15°F (9°C)

Temperature out: 80°F - 120°F (27°C - 49°C)

Maximum pressure: 150psi (10.34 bar)

Pressure differential between hot and cold inlet supplies must be less than 20% between them.

Approvals



(USG-P only)

Approval: CSA B-125 certified

NSF 61 Certified (USG-P only)

Listing: ASSE Standard 1016

Specifications

A Thermostatic Mixing Valve shall be installed on the hot water supply to the fixture. The valve shall be ASSE Standard 1016 listed and control the temperature of the hot water. It shall have a bronze (USG-B) or thermoplastic (USG-P) body and shall include integral check valves and an adjustment cap with locking feature. The valve shall be provided with 3/8" (10mm) male compression fittings. The valve shall be Watts Regulator Company Series USG-B or USG-P.

Options

For optional strainer specify USG Strainer – 3/8" male compression x 3/8" female thread, 20x20 mesh stainless steel screen.

For satin chrome finish specify – SC (for USG-B only)

Typical Installation



The Watts Under Sink Guardian®, USG, installs easily onto most faucets.

- Shut off supply valves and remove existing piping to faucet
- Connect the USG to the supply valves and the faucet, using tubing of your choice with $\frac{3}{8}$ " (10mm) compression fittings
- Turn on supply valves and check for leaks.
- Set temperature

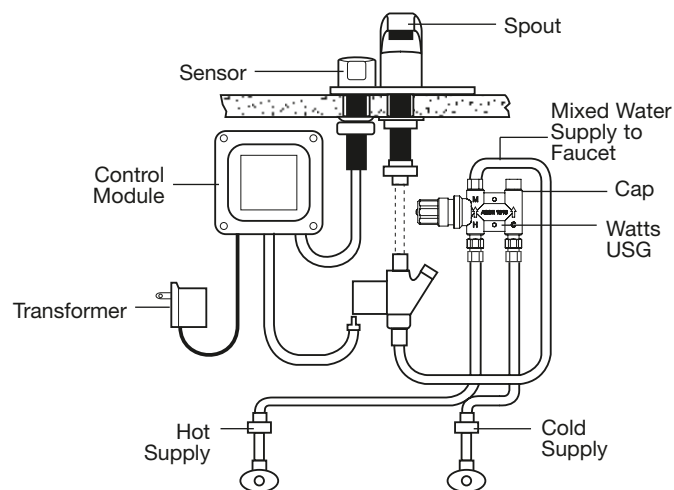
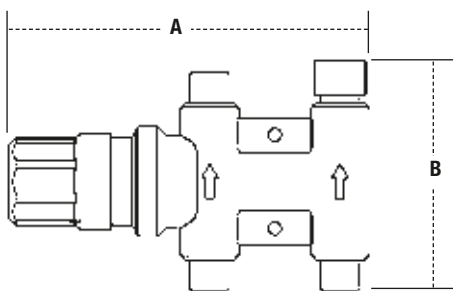
Temperature Adjustment



You can easily adjust the Under Sink Guardian® to the desired safe maximum temperature using the unique safety cap.

- Loosen the cap screw with the hex wrench provided.
- Pull the cap from the valve body and turn to obtain the desired mixed water temperature at the outlet. As a safety feature, the cap must be partially lifted from the valve to adjust the temperature.
- Push the cap onto the valve body and tighten the hex screw to protect against inadvertent or unauthorized adjustment of the outlet temperature.
- Lower handle and tighten screw.
- Check outlet temperature.

Dimensions — Weights



Typical Sensor Faucet Application

MODEL	BODY	CONNECTION SIZE (DN)	DIMENSIONS (APPROX.)				WEIGHT	
			A		B		lbs.	kg.
USG-B	Bronze	$\frac{3}{8}$ " (10mm) Compression	in.	mm	in.	mm		
USG-B-SC	Bronze with Satin Chrome Finish	$\frac{3}{8}$ " (10mm) Compression	$5\frac{3}{16}$	132	$3\frac{1}{8}$	79	1.5	0.68
USG-P	Plastic	$\frac{3}{4}$ " (10mm) Compression	$5\frac{3}{16}$	132	$3\frac{1}{8}$	79	1.5	0.68

Series MMV-M1

Thermostatic Mixing Valves

Sizes: 1/2" - 1" (15 – 25mm)

Series MMV-M1 Thermostatic Mixing Valves are designed to maintain and limit hot water to sinks, baths, showers or lavatories to desired selectable temperature in commercial, institutional and residential applications. Series MMV-M1 is listed to ASSE Standard 1016 for single fixture applications, ASSE 1070 for single or multiple fixture applications and ASSE 1017 for hot water source applications. These valves feature a double throttling design to control both the hot and cold water supply to the mixed outlet. The superior flow characteristics of these valves provide accurate temperature control ($\pm 3^{\circ}\text{F}$) with low pressure drop. Additionally, the Series MMV-M1 incorporates integral inlet filter washers and check valves to protect against cross-flow



Models

- MMV-UT-M1** - Union threaded end connections
- MMV-US-M1** - Union solder end connections
- MMV-PEX-M1** - Union PEX end connections
- MMV-CPVC-M1** - Union CPVC end connections

Features

- Bronze body construction
- Solid wax hydraulic principle thermostat assures dependable mixing of hot and cold water
- Thermostat controls both hot and cold water
- Solder, threaded, PEX or CPVC end connection models available
- Adjustment cap with locking feature
- ASSE 1016, 1017 and 1070 listed
- Integral filter washers and check valves

Materials

- Body: Bronze
- Thermostat Assembly: Copper
- O-rings: Buna-N; EPDM
- Pistons: Udel-P1700
- Springs: Stainless Steel

Pressure — Temperature

Minimum Supply Pressure Static: 30psi (207 kPa)

Inlet Temperatures: hot inlet, 120°F – 180°F (49°C – 82°C), cold inlet, 39°F – 85°F (4°C – 29°C)

Hot Water Inlet to Outlet Differential Temperature: 10°F (5.6°C)

Temperature Out: Field range: 80°F – 120°F (27°C – 49°C), adjustable. Accurate within $\pm 3^{\circ}\text{F}$ (1.7°C)

Maximum Temperature: 200°F (93°C)

Maximum Pressure: 150psi (10.55 bar)

Minimum Flow: 0.5 gpm (1.9 lpm) @ 0.8psi (0.55 kPa)†

Maximum Flow: 20 gpm (76 lpm) @ 125psi (862 kPa)†

Approvals



Approval: CSA B125 Certified

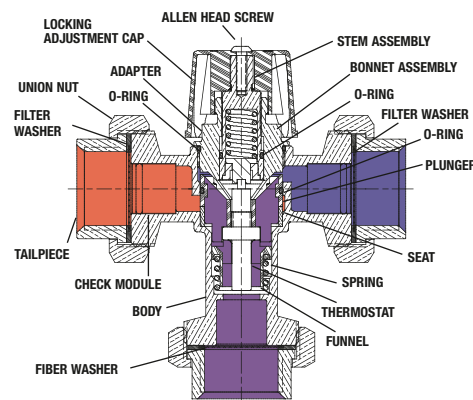
Listing: ASSE 1016, ASSE 1017 & ASSE 1070

† When tested in accordance with ASSE 1016, ASSE 1017 & ASSE 1070.

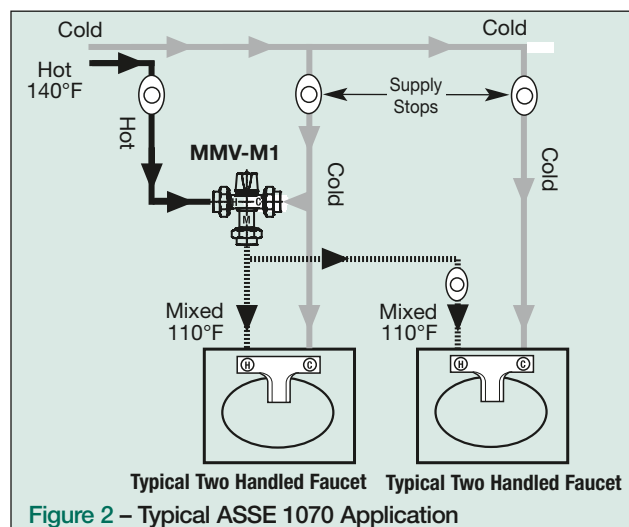
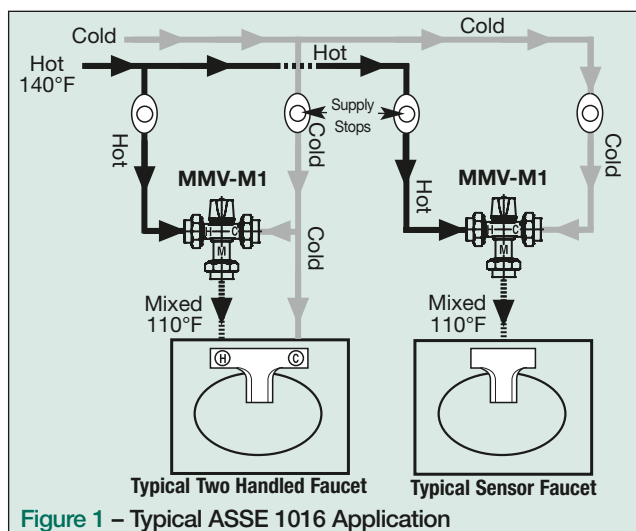
Specifications

A Thermostatic Mixing Valve shall be installed on the hot water supply to fixture. The valve shall be ASSE Standard 1016, ASSE 1017 and ASSE 1070 listed and control the temperature of the hot water. It shall have a bronze body and shall include integral filter washers and check valves and an adjustment cap with locking feature. The valve shall be provided with solder (-US), threaded (-UT), CPVC or PEX union connections. The valve shall be a Watts Regulator Company Series MMV-M1.

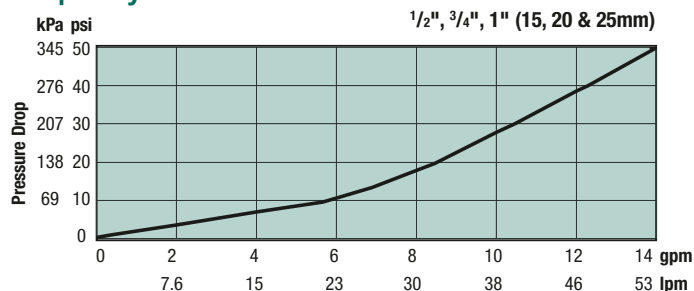
Basic Construction



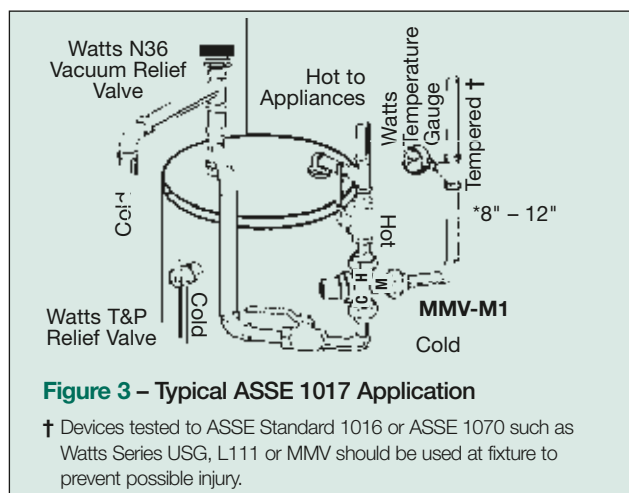
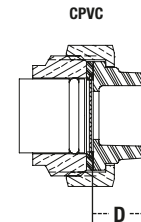
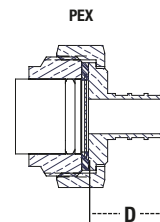
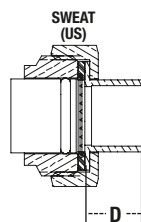
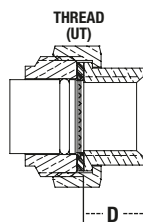
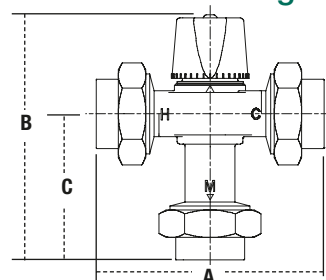
Typical MMV-M1 Applications



Capacity



Dimensions – Weights



MODEL	SIZE (DN)		DIMENSIONS (APPROX.)								WEIGHT	
	in.	mm	A		B		C		D		lbs.	kg.
MMV-UT-M1	1/2	15	47/8	124	57/16	137	33/16	80	1/2	13	1.5	.68
	3/4	20	47/8	124	57/16	137	33/16	80	9/16	14	1.6	.73
	1	32	55/16	135	55/8	143	33/8	86	11/16	17	1.6	.73
MMV-US-M1	1/2	15	413/16	123	53/8	137	31/8	80	1/2	13	1.5	.68
	3/4	20	55/16	135	55/8	143	33/8	86	3/4	19	1.6	.73
	1	32	513/16	148	57/8	149	35/8	92	15/16	23	1.6	.73
MMV-PEX-M1	1/2	15	51/4	133	59/16	142	35/16	85	5/8	1	1.5	.68
	3/4	20	51/2	140	511/16	145	37/16	88	3/4	19	1.6	.73
	1	32	57/8	149	57/8	150	35/8	93	13/16	2	1.6	.73
MMV-CPVC-M1	1/2	15	43/4	121	55/16	136	31/16	79	1/2	13	1.5	.68
	3/4	20	51/4	133	55/16	142	35/16	85	3/4	19	1.6	.73
	1	32	511/16	144	513/16	147	39/16	90	15/16	23	1.6	.73

UT = Union Thread US = Union Sweat

Model L111

Thermostatic Mixing Valve

Size: 1/2" (15mm)

Model L111 Thermostatic Mixing Valve is ideal for supplying sinks, showers or lavatories with tempered water in residential, commercial and institutional environments. It can be used anywhere preset water temperature is required for point-of-use, under sink installations such as in homes, schools, restaurants, hospitals and public restrooms. The L111's tamper-resistant polypropylene cover makes it especially useful for any exposed or "under-the-sink" installations. The cover is secured by a hexagonal screw, which limits access to the temperature adjusting mechanism to protect from unauthorized tampering. Model L111 is listed to ASSE Standard 1016 for single fixture applications.



L111

Features

- High flow rate capable of supplying single fixture with up to 10 gpm (38 lpm) of pre-set, tempered water
- Can be either direct wall mounted or cabinet mounted
- Installs easily into existing water supply lines
- Rugged construction of forged brass body and replaceable, advanced polymer temperature-regulating element assures long life

Materials

- Body: Forged brass construction
- O-ring: EPDM
- Temperature Regulating Cartridge: Polyetherimide
- Cover: Polypropylene

Pressure — Temperature

Minimum Supply Pressure (static): 15psi (103 kPa)

Recommended Inlet Temperatures:

Hot inlet: 120°F – 180°F (49°C – 82°C)

Cold inlet: 41°F – 70°F (5°C – 21°C)

Minimum Inlet Differential Temperature: 10°F (5.6°C)

Temperature Out: Field range: 80°F – 120°F (27°C – 49°C), adjustable
Accurate within ±3°F (±1.5°C)

Maximum Temperature: 200°F (93°C)

Maximum Pressure: 125psi (8.8 bar)

Minimum Flow Requirement: 0.5 gpm (1.9 lpm)

Approvals



Listing: ASSE 1016

Specifications

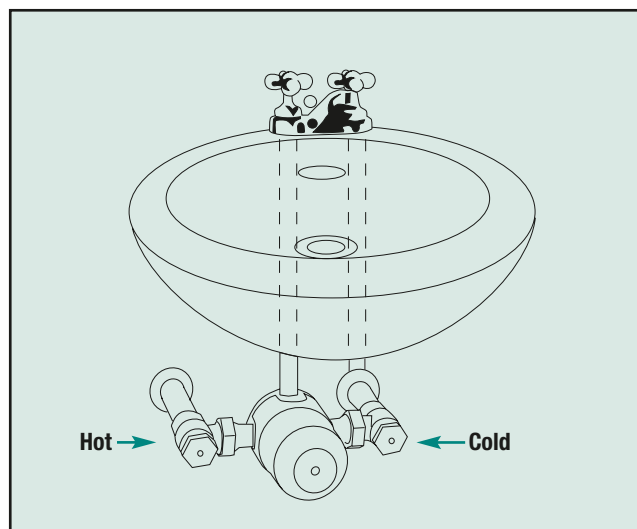
A Thermostatic Mixing Valve shall be installed on the hot and cold water supply to the fixture as shown in the diagram. The valve shall be ASSE Standard 1016 listed and control the temperature of the hot water to the fixture. The valve shall have 1/2" (15mm) female NPT inlet and outlet connections. The valve shall have a brass body with integral mounting holes to enable the valve to be secured to a wall or suitable enclosure. The valve shall include a tamper resistant thermoplastic enclosure to protect against unauthorized adjustment of the outlet temperature or removal of mounting fasteners. The valve shall be of a single replaceable cartridge design to allow service or repair of the valve without removal of the valve from the piping system or disassembly of internal valve components. The valve shall be a Watts Regulator Company Model L111.

Application Note

Installation of stop valves and check valves is recommended to allow periodic inspection and to prevent cross flow in extreme pressure differential situations.

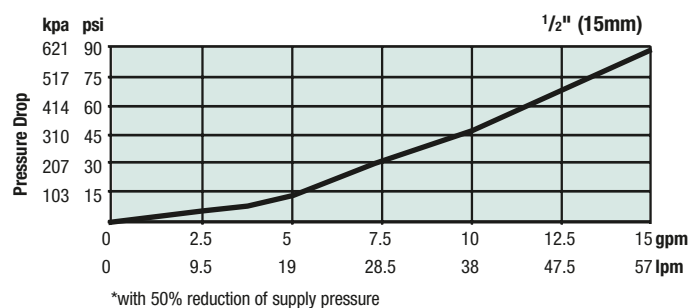
NOTE: Do not use this valve to recirculate water at elevated temperatures. Systems that recirculate water at elevated temperatures to reduce risk of bacterial growth in the piping require ASSE Standard 1017 devices. This valve can be used in conjunction with recirculation systems to reduce the hot water supply to a safe temperature at the individual fixtures.

Typical Applications

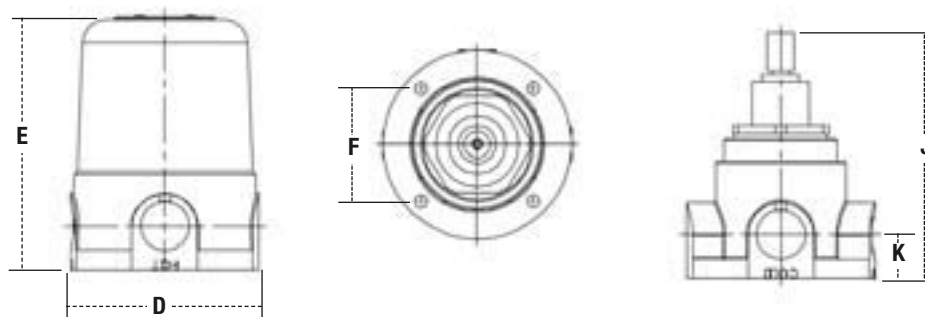


Watts Model L111 shown with Series CS
Check Stops (optional) installed

Capacity



Dimensions — Weights



MODEL	INLET/OUTLET SIZE		DIMENSIONS (APPROX.)								WEIGHT			
	(DN)		D		E		F		J		K			
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg
L111	1/2	15	2 ¹⁵ / ₁₆	74	3 ¹⁵ / ₁₆	101	1 ³ / ₄	45	3 ⁷ / ₈	98	1 ¹ / ₁₆	17	3.3	1.5

Series 1170-M2, L1170-M2

Hot Water Temperature Control Valves

Sizes: ½" – 1" (15 – 25mm)

Series 1170-M2, L1170-M2 Hot Water Temperature Control Valves are designed for mixing hot and cold water on hot water supply systems. They can be used for a variety of applications to reduce the temperature of the hot water from the system, and are ideal for radiant heat applications. These valves feature a double throttling design to control both the hot and cold water supply to the mixed outlet. Additionally, the Series 1170-M2, L1170-M2 incorporates integral inlet filter washers and check valves to protect against cross-flow. Series 1170-M2, L1170-M2 is listed to ASSE Standard 1017 for hot water source applications.



Models

1170 Temperature Range:

90°F – 160°F (32°C – 71°C)

- | | |
|---------------------|----------------------------------|
| 1170-UT-M2 | - Union threaded end connections |
| 1170-US-M2 | - Union solder end connections |
| 1170-PEX-M2 | - Union PEX end connections |
| 1170-CPVC-M2 | - Union CPVC end connections |

L1170 Temperature Range:

60°F – 120°F (16°C – 49°C)

- | | |
|----------------------|----------------------------------|
| L1170-UT-M2 | - Union threaded end connections |
| L1170-US-M2 | - Union solder end connections |
| L1170-PEX-M2 | - Union PEX end connections |
| L1170-CPVC-M2 | - Union CPVC end connections |

Features

- Bronze body construction
- Solid wax hydraulic principle thermostat assures dependable mixing of hot and cold water
- Thermostat controls both hot and cold water
- Models available with solder, thread, PEX or CPVC end connections
- Integral filter washers and check valves
- Adjustment cap with locking feature
- ASSE 1017 listed

Materials

- Body: Bronze
- Springs: Stainless steel
- Thermostat Assembly: Copper
- O-Rings: EPDM
- Pistons: Udel-P1700

Pressure — Temperature

Minimum Supply Pressure (Static): 30psi (207 kPa)

Inlet Temperatures: hot inlet, 120°F – 200°F (49°C – 93°C), cold inlet, 40°F – 85°F (4°C – 29°C)

Hot Water Inlet to Outlet Temperature Differential: 10°F (5.6°C)

1170-M2 Temperature Out: Field range: 90°F – 160°F (32°C – 71°C), adjustable: Accurate within ±3°F (1.7°C)

L1170-M2 Temperature Out: Field range: 60°F – 120°F (16°C – 49°C), adjustable: Accurate within ±3°F (1.7°C)

Maximum Temperature: 200°F (93°C)

Maximum Pressure: 150psi (10 bar)

Approvals



Approval: CSA B125 Certified
Listing: ASSE 1017

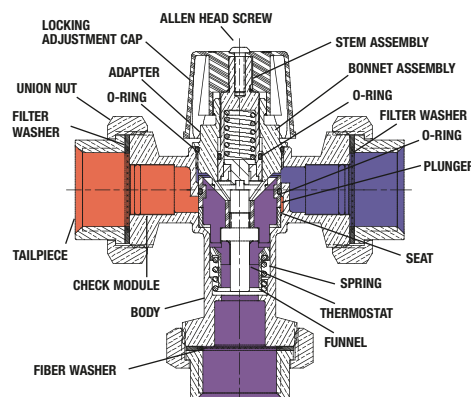
Specifications

A Hot Water Temperature Control Valve shall be installed on water heating equipment to provide tempered water to supply piping. Valve shall have a bronze body, include integral check valves and operate so the thermostat controls the cold and hot water ports. The valve shall be provided with solder (-US), threaded (-UT), PEX or CPVC connections. Valve shall be ASSE Standard 1017 Listed. Valve shall be a Watts Regulator Company Series 1170-M2 or L1170-M2.

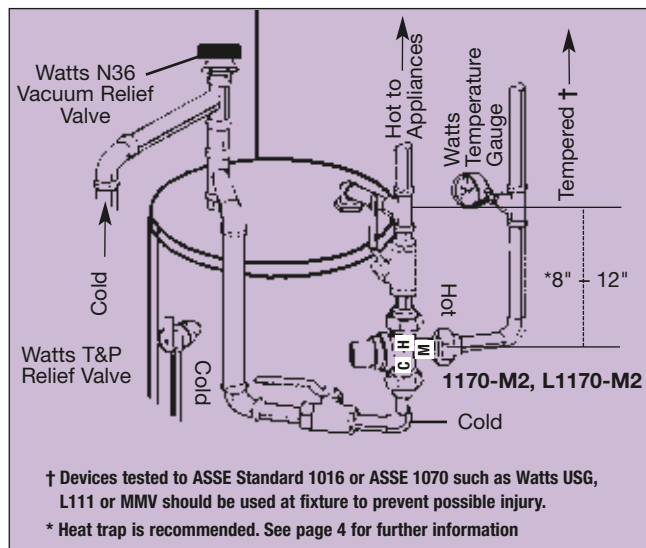
Application Note

Watts Hot Water Temperature Control Valve Series 1170 are designed to be installed at or near the boiler or water heater. They cannot be used by themselves for tempering water temperatures at fixtures where ASSE Standard 1016 or ASSE Standard 1070 listed devices are required. To comply with ASSE Standard 1016 or ASSE Standard 1070, listed devices such as Watts Series L111, USG or MMV should be used at fixtures to prevent possible injury.

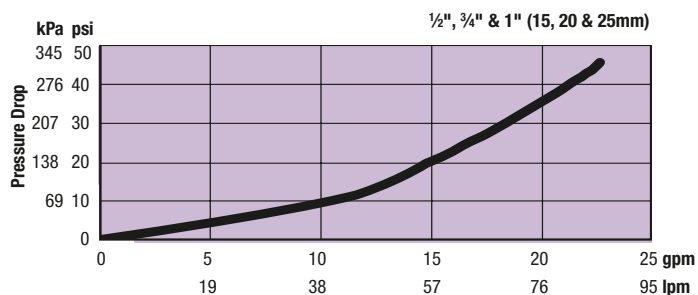
Basic Construction



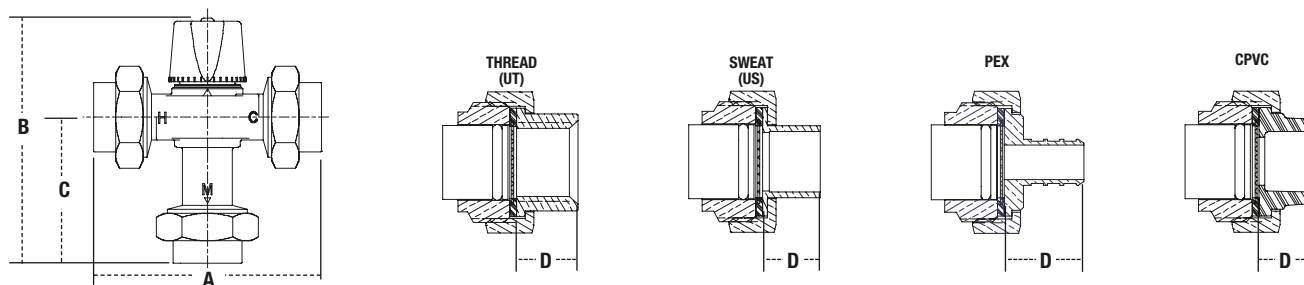
Typical 1170-M2 Applications



Capacity



Dimensions — Weights



MODEL	SIZE (DN)		DIMENSIONS (APPROX.)								WEIGHT	
	in.	mm.	A		B		C		D		lbs.	kg.
1170-UT-M2	1/2	15	4 7/8	124	5 7/16	137	3 3/16	80	1 1/2	13	1.5	.68
	3/4	20	4 7/8	124	5 7/16	137	3 3/16	80	9/16	14	1.6	.73
	1	32	5 5/16	135	5 5/8	143	3 3/8	86	11/16	17	1.6	.73
1170-US-M2	1/2	15	4 13/16	123	5 3/8	137	3 1/8	80	1 1/2	14	1.5	.68
	3/4	20	5 5/16	135	5 5/8	143	3 3/8	86	3/4	19	1.6	.73
	1	32	5 13/16	148	5 7/8	149	3 5/8	92	15/16	24	1.6	.73
1170-PEX-M2	1/2	15	5 1/4	133	5 9/16	142	3 5/16	85	5/8	16	1.5	.68
	3/4	20	5 1/2	140	5 11/16	145	3 7/16	88	5/8	16	1.6	.73
	1	32	5 7/8	149	5 7/8	150	3 5/8	93	13/16	21	1.6	.73
1170-CPVC-M2	1/2	15	4 3/4	121	5 5/16	136	3 1/16	79	1 1/2	13	1.5	.68
	3/4	20	5 1/4	133	5 9/16	142	3 5/16	85	3/4	19	1.6	.73
	1	32	5 11/16	144	5 13/16	147	3 9/16	90	15/16	24	1.6	.73

UT = Union Thread US = Union Sweat

Series 70A, L70A

Hot Water Extender Tempering Valves

Sizes: 1/2" - 3/4" (15 – 20mm)

Watts Series 70A, L70A Hot Water Extender Tempering Valves are designed for small domestic water supply systems, especially tankless heater, water heater and solar installations and are available with sweat or threaded connections. They feature a hydraulically-operated thermostat which opens a spring-loaded check in the cold water inlet, allowing cold water to mix with the hot. Valve bodies are constructed of brass to resist corrosive domestic hot water conditions.

For their size, these valves have an unusually high capacity. For example, the 3/4" (20mm) 70A-T used for smaller domestic and residential requirements passes more than 10gpm (38 lpm), with a 10psi (70 bar) pressure drop. Maintenance is simple too; the thermostat is easily removed and replaceable as a unit.



70A

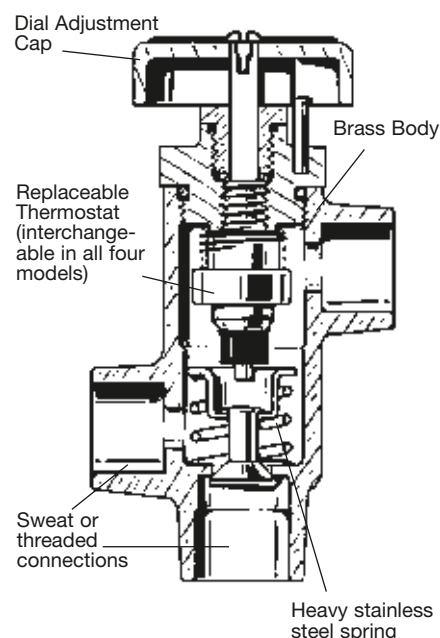
Models

- 70A-F** – Furnished in 1/2" (15mm) size with sweat connections
- 70A-T** – Furnished in 1/2" and 3/4" (15 and 20mm) threaded connections
- L70A-F** – Identical to 70A-F except furnished for low temperature range applications between 100°F and 130°F (38°C and 54° C)
- L70A-T** – Identical to 70A-T except furnished for low temperature range applications between 100°F and 130°F (38°C and 54° C)

Pressure — Temperature

Temperature range: 120°F – 160°F (49°C – 71°C)
Maximum Temperature: 210°F (99°C)
Maximum Pressure: 150psi (10.55 bar)
Minimum Flow Requirement: 2 gpm (8 lpm)

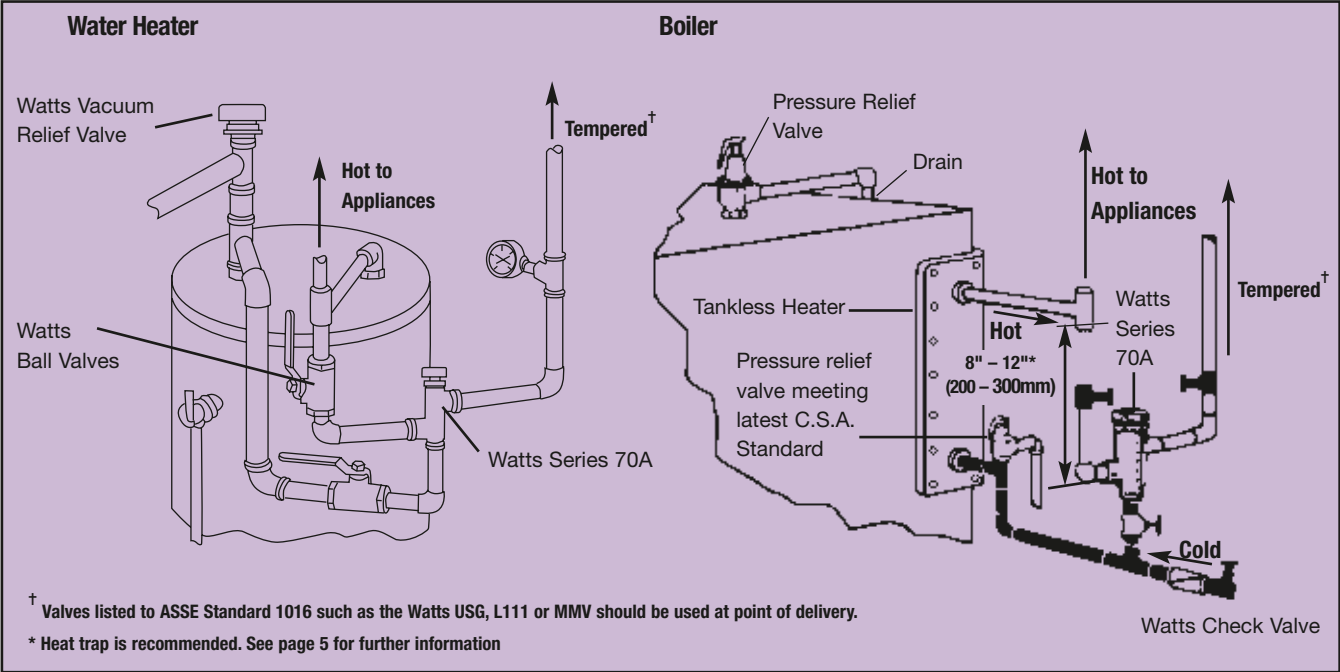
Basic Construction



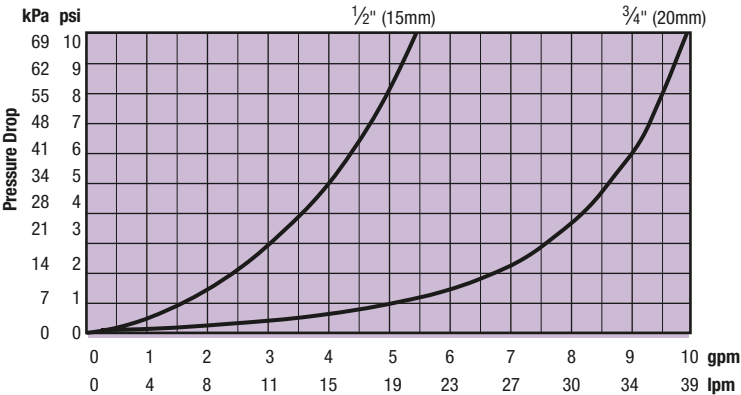
Features

- Brass valve bodies
- Simple maintenance thermostat assembly is easily removed and replaceable as a unit
- “Finger Tip” Dial adjustment cap
- Sweat or threaded connections
- Stainless steel springs

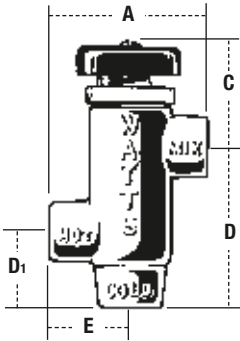
Typical 70A Applications



Capacity



Dimensions — Weights



MODEL	SIZE (DN)		DIMENSIONS (APPROX.)										WEIGHT	
	in.	mm	A		C		D		D1		E		lbs.	kg.
70A-F	1/2	15	2	50	2 3/4	70	1	25	1 3/8	41	1 3/16	21	0.68	.30
70A-T	1/2	15	2 3/4	70	2 3/4	70	1 5/8	41	1 3/8	41	1 3/16	21	1.30	.59
70A	3/4	20	2 3/4	70	2 3/4	70	1 3/8	41	1 3/8	41	1 3/16	21	0.96	.44
70A-T	3/4	20	2 3/4	70	2 3/4	70	1 3/8	41	1 3/8	41	1 3/16	21	1.20	.54
L70A-F	1/2	15	2	50	2 3/4	70	1	25	1 3/8	41	1 3/16	21	0.60	.29
L70A-T	1/2	15	2 3/4	70	2 3/4	70	1 5/8	41	1 3/8	41	1 3/16	21	1.30	.59
L70A	3/4	20	2 3/4	70	2 3/4	70	1 3/8	41	1 3/8	41	1 3/16	21	0.96	.44
L70A-T	3/4	20	2 3/4	70	2 3/4	70	1 3/8	41	1 3/8	41	1 3/16	21	1.20	.54

Series N170-M2, N170L-M2

Hot Water Extender Tempering Valves

Sizes: 3/4" - 2" (20 - 50mm)

Series N170-M2, N170L-M2 hot water extender tempering valves are designed for mixing hot and cold water to extend the hot water supply in large hot water supply systems. The unique "double thermostat design" combines two thermostats to respond quickly to changes in water temperature passing through the mixing chamber. And because the travel load is divided evenly between the two sensing elements, the operating life of the element is vastly improved.

This new concept in thermostat design provides a powerful force on opening and closing of fixtures to ensure the proper mix. The combination of a sensitive thermostatic element with a free-moving, high-temperature-resisting rubber disc ensures longer valve life and more satisfactory system performance. Plus, this dual-action thermostat is interchangeable in all sizes from 3/4" - 2" (20 - 50mm).



N170-M2

Models

- **N170-M2** – Stainless Steel disc. For temperatures between 130°F – 180°F (55°C – 82°C)
- **N170L-M2** – Stainless Steel disc. For temperatures between 100°F – 130°F (38°C – 55°C)
- **N170-M2-HT** – Teflon® disc. For temperatures between 130°F – 180°F (55°C – 82°C)
- **N170L-M2-HT** – Teflon® disc. For temperatures between 100°F – 130°F (38°C – 55°C)

Materials

- Body: Bronze
- Disc: Stainless Steel (Teflon® for models N170-M2-HT and N170L-M2-HT)
- Thermostat Assembly: Copper

Pressure — Temperature

Maximum Pressure: 150psi (10.55 bar)

Series N170-M2 and N170-M2-HT adjustable temperature range: 130°F – 180°F (55°C – 82°C)

Series N170L-M2 and N170L-M2-HT adjustable temperature range: 100°F – 130°F (38°C – 55°C)

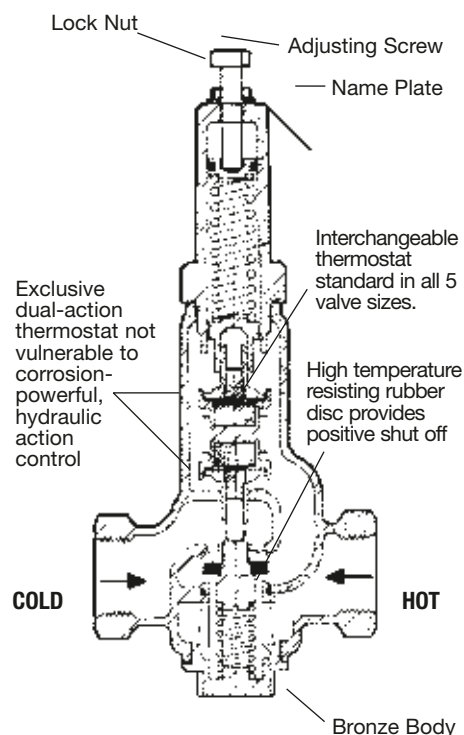
Maximum Temperature: 210°F (99°C)

Minimum Flow Requirement: 8 - 9 gpm (30 - 34 lpm)

Specifications

A Hot Water Extender Tempering Valve shall be installed on heating equipment to provide tempered water. Valve shall have bronze body and operate so that the thermostat controls both the hot and the cold water ports. Valve shall be a Watts Regulator Company Series N170-M2, N170L-M2.

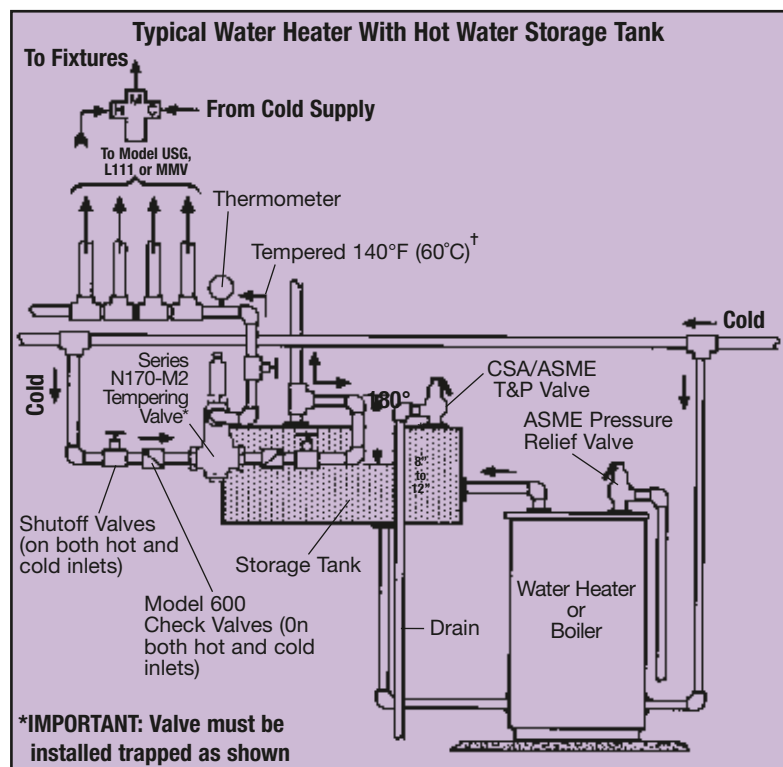
Basic Construction



Features

- All bronze body construction with stainless steel disc
- Solid wall hydraulic principle thermostat assures dependable mixing of hot and cold water
- Thermostat controls both hot and cold water
- New static adjustment screw seal

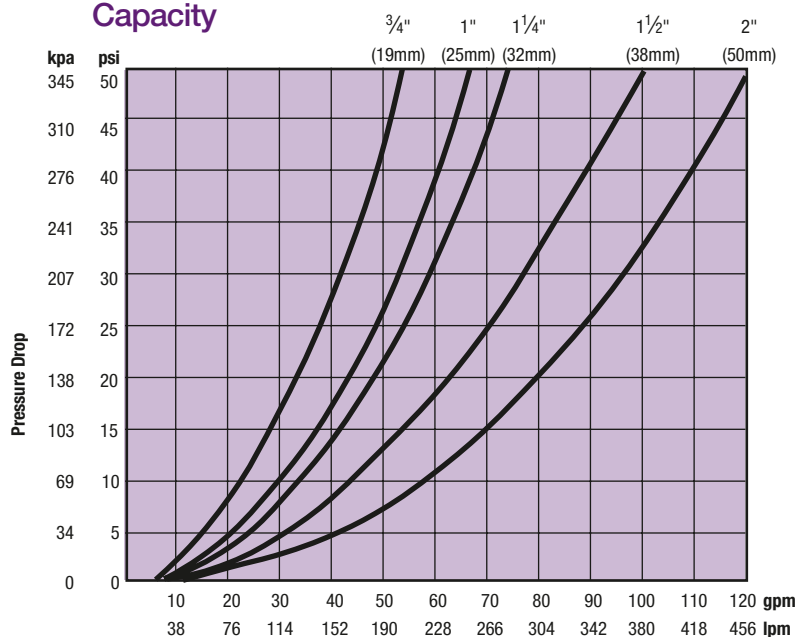
Typical N170-M2 Applications



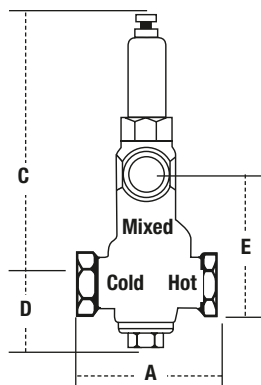
[†] Valves listed to ASSE 1016 or ASSE 1070 such as the Watts USG, L111 or MMV should be used at point of delivery.

* Heat trap is recommended. See page 4 for further information

Capacity



Dimensions — Weights



TEMPERATURE RANGE		SIZE (DN)		DIMENSIONS (APPROX.)						WEIGHT			
130° – 180°F (55° – 82°C)	100° – 130°F (38° – 55°C)			A		B		D		E			
<i>Model</i>	<i>Model</i>	<i>in.</i>	<i>mm</i>	<i>in.</i>	<i>mm</i>	<i>in.</i>	<i>mm</i>	<i>in.</i>	<i>mm</i>	<i>in.</i>	<i>mm.</i>	<i>lbs.</i>	<i>kg.</i>
N170-M2	N170L-M2	3/4	20	4 1/8	105	5 3/8	143	2	50	3 1/2	90	4.13	1.9
N170-M2	N170L-M2	1	25	4 1/2	114	5 3/8	143	2	50	3 1/2	90	4.38	2.0
N170-M2	N170L-M2	1 1/4	32	6	152	6	152	2	50	3 7/16	88	8	3.6
N170-M2	N170L-M2	1 1/2	40	6	152	6	152	2 1/8	54	3 7/16	88	8	3.6
N170-M2	N170L-M2	2x1 1/2	50x4	6 3/8	162	6	152	2 1/8	54	3 7/16	88	8.75	4.0

Series CS

Check Stop Valves

Sizes: 1/2", 3/4", 1" (15, 20, 25mm)

Watts Series CS check stop valves perform triple duty — as isolation valves, as check valves, and as strainers. The union connections facilitate service and maintenance of both the valve and the strainer. The Series CS valves protect against cross flow of hot and cold water in the system, provide isolation of the mixing or tempering valve during servicing, and allow for maintenance of the valve. The CS Series' integral fine mesh strainer protects the valve from damaging dirt or debris.



CS U-T



CS U-T

Models

- CS U-T** – Union threaded
- CS U-S** – Union solder
- CSC U-T** – Union threaded, chrome plated
- CSC U-S** – Union solder, chrome plated

Features

- Performs triple duty: check valve, shut-off valve, strainer
- Check valve function protects against hot and cold water supply cross flow
- Shutoff function facilitates mixing valve service
- Strainer protects mixing valves from dirt and other debris
- Universal design eliminates left-hand/right-hand confusion

Materials

- Body – Bronze body construction
- O-rings – EPDM
- Strainer Screen – Stainless steel
- Spring – Stainless steel
- Disc – EPDM
- Adjustment Screw – Slotted

Pressure — Temperature

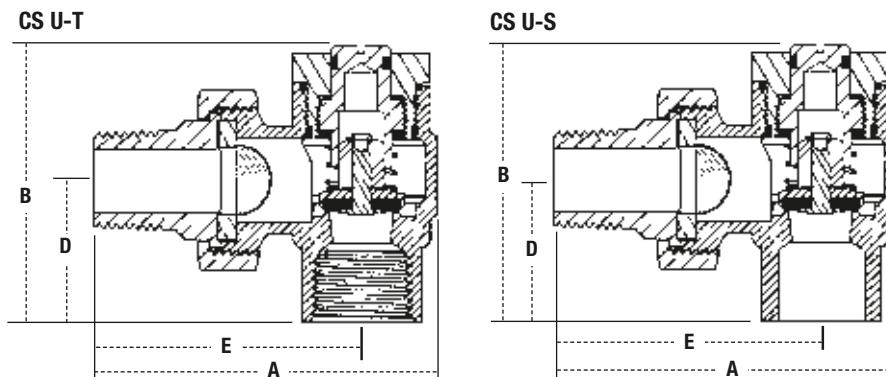
Maximum Pressure: 150psi (10.3 bar)

Maximum Temperature: 200°F (93°C)

Specifications

A CS combination check/stop/strainer valve shall be used at the hot and cold water inlets to the Watts L111 mixing valves. This manual valve shall be a Watts model CS U-T (union/threaded), CS U-S (union/solder), CSC U-T /S (chrome plated union, thread/solder) as indicated on the installation plans. This valve will be of bronze construction, incorporating materials suitable for its intended use. The check/stop valve shall be fitted with a strainer to prevent large particulate matter from entering the valve. The check/stop valve shall be fitted with a union connection to facilitate the removal of the mixing valve and the servicing of the strainer. Valve shall be a Watts Regulator Company Series CS.

Dimensions — Weights



MODEL	SIZE (DN)				DIMENSIONS (APPROX.)								WEIGHT	
	Inlet		Outlet		A		B		D		E		oz. gr.	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm.		
CS U-S	1/2	15	1/2	15	27/8	73	15/16	59	13/16	30	21/4	57	12	340
CS U-S	3/4	20	3/4	20	3	76	211/16	68	13/8	35	25/16	59	17	482
CS U-T	1/2	15	1/2	15	27/8	73	15/16	59	13/16	30	21/4	57	12	340
CS U-T	3/4	20	3/4	20	31/4	83	211/16	68	13/8	35	25/16	65	17	482
CS U-T	1	25	1	25	4	102	31/8	79	111/16	43	31/8	79	27	765
*CSC U-S	1/2	15	1/2	15	27/8	73	15/16	59	13/16	30	21/4	57	12	340
*CSC U-S	3/4	20	3/4	20	3	76	211/16	68	13/8	35	25/16	59	17	482
*CSC U-T	1/2	15	1/2	15	27/8	73	15/16	59	13/16	30	21/4	57	12	340
*CSC U-T	3/4	20	3/4	20	31/4	83	211/16	68	13/8	35	29/16	65	17	482
CSC U-T	1	25	1	25	4	102	31/8	79	111/16	43	31/8	79	27	765

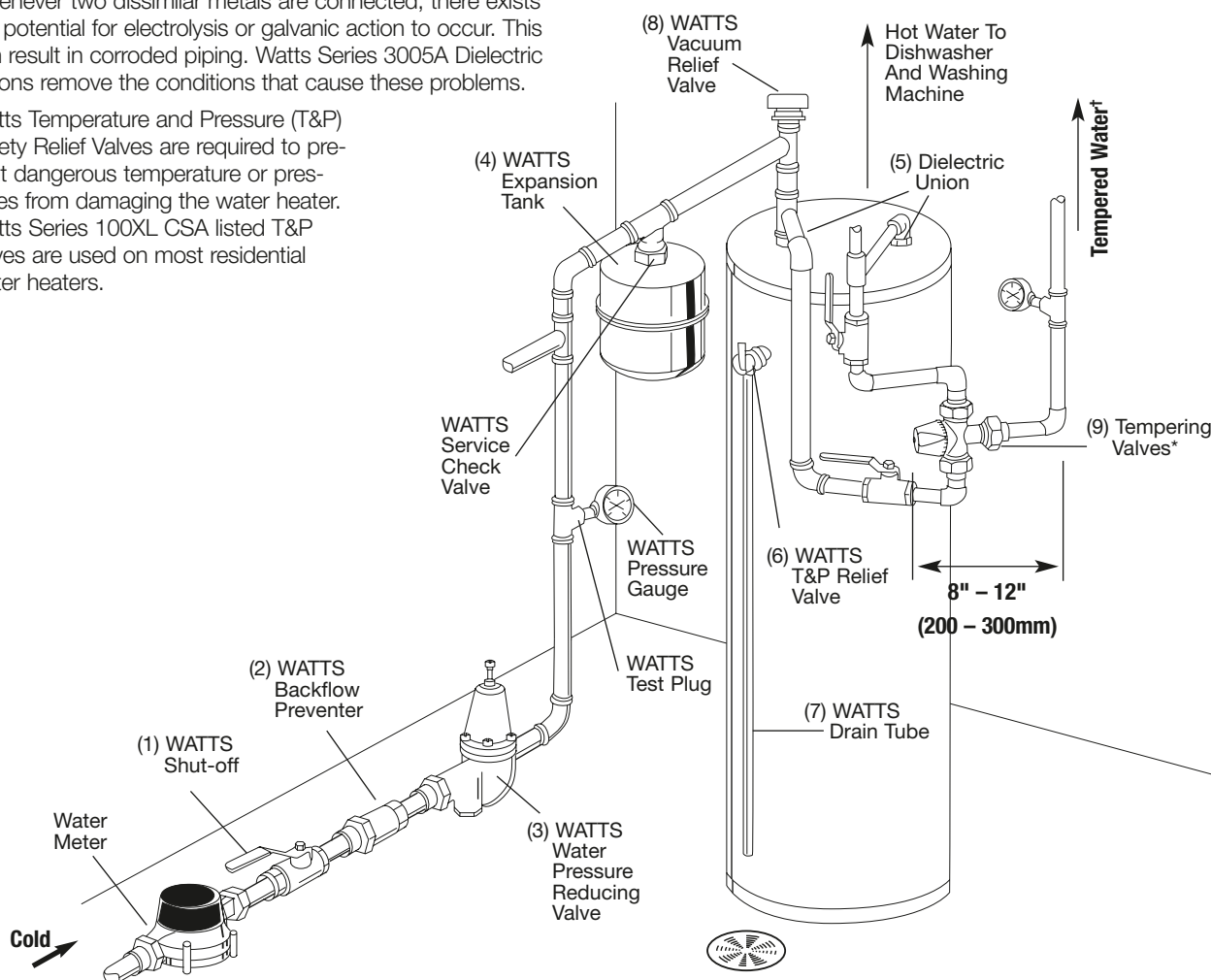
*Chrome plated

Typical Water Heater Installation

Using Watts Mixing Valves and other related flow control products.

The numbers in parenthesis are keyed to the application descriptions below and to the drawings.

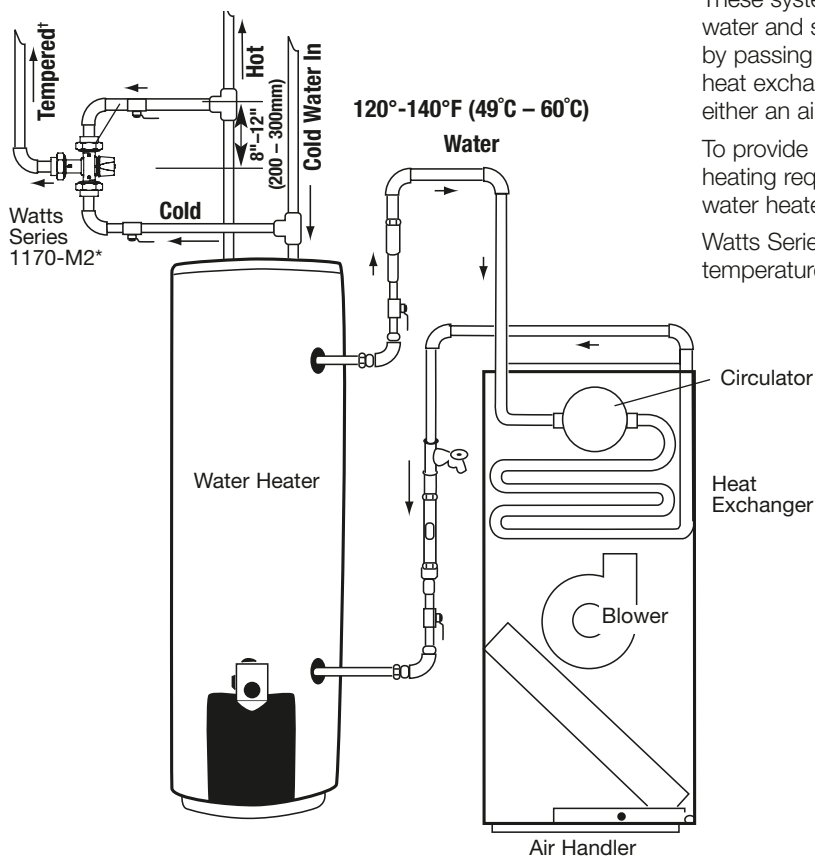
- (1) Proper installation requires a shutoff valve at the entrance of the domestic water supply to the building. Use Watts Series B6000 ball valves for long life, easy, no leak shut off.
- (2) Many municipalities require backflow prevention devices at the supply to the building in order to assure clean, safe potable water to all customers in the water distribution system. Watts Series 7 and Watts Series 009 backflow preventers can be used.
- (3) Pressure reducing valves save water and prevent high water supply pressure problems which can damage appliances and valves. Use Watts Series 25AUB-Z3.
- (4) In closed systems or where high water pressure exists, a method to control thermal expansion is required. Watts Series DET Potable Water Thermal Expansion tanks are the most environmentally friendly way of controlling thermal expansion.
- (5) Whenever two dissimilar metals are connected, there exists the potential for electrolysis or galvanic action to occur. This can result in corroded piping. Watts Series 3005A Dielectric Unions remove the conditions that cause these problems.
- (6) Watts Temperature and Pressure (T&P) Safety Relief Valves are required to prevent dangerous temperature or pressures from damaging the water heater. Watts Series 100XL CSA listed T&P valves are used on most residential water heaters.
- (7) Drain tubes are required to channel hot water discharge from the temperature and pressure safety relief valve to a safe area of disposal. Use Watts Series 100DT.
- (8) To prevent the water heater tank from collapsing when a water heater or a system is drained and to prevent the siphoning of all of the hot water from the water heater, a vacuum relief valve is required. Use Watts Model N36 CSA Listed Relief Valves.
- (9) To operate the water heater at elevated temperatures and extend the effective system flow rate and/or provide a two temperature system, a tempering valve is required. Use a Watts Series 1170-M2, L1170-M2.



† Valves listed to ASSE 1016 or ASSE 1070 such as the Watts USG, L111 or MMV should be used at point of delivery.

* Heat trap is recommended. See page 4 for further information.

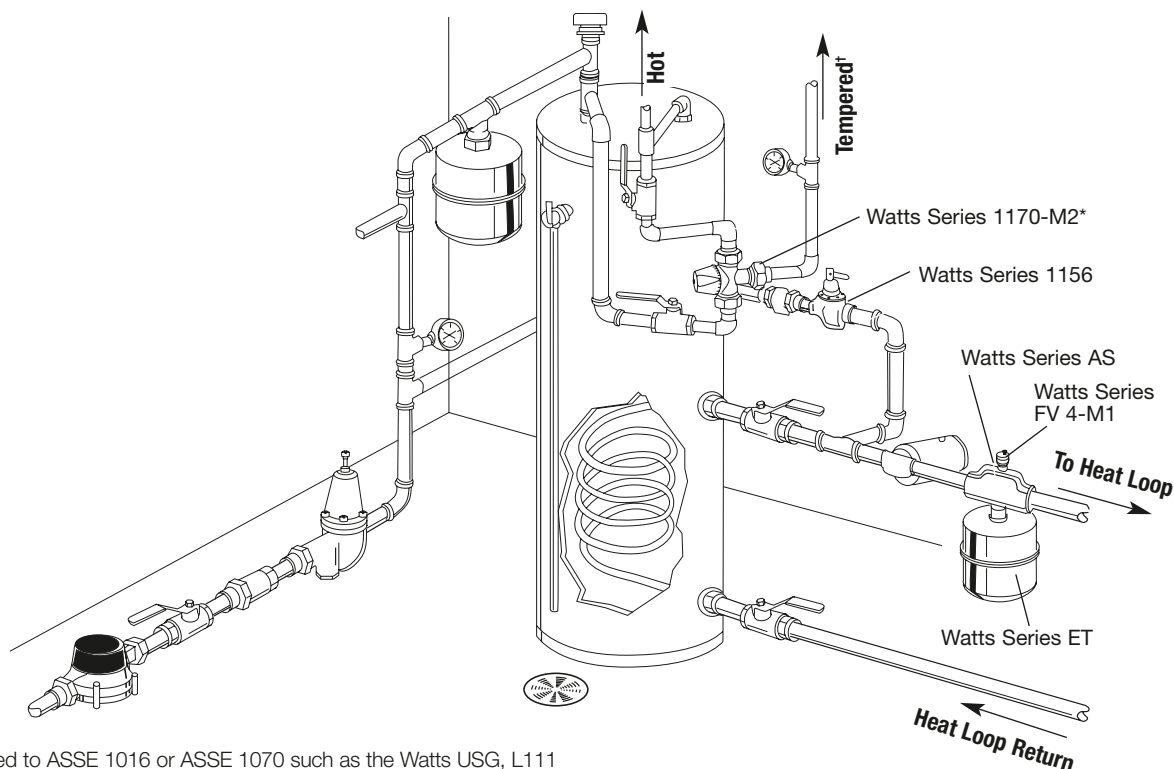
Combination Systems



These systems use a water heater to supply both domestic hot water and space heating. Space heating may be accomplished by passing hot water from the water heater tank through a heat exchanger located within the water heater tank through either an air handler unit or radiant heat tubing loop.

To provide sufficient BTU's and recovery for system space heating requirements, it is often necessary to operate the water heater at elevated temperatures.

Watts Series 1170-M2 mixing valves are used to reduce the temperature of water supplied for domestic use.



† Valves listed to ASSE 1016 or ASSE 1070 such as the Watts USG, L111 or MMV should be used at point of delivery.

* Heat trap is recommended. See page 4 for further information.

Recirculation Systems

The purpose of a recirculation system on domestic hot water piping is to maintain a minimum temperature in the piping, thus making tempered water immediately available to the user and preventing growth of bacteria such as Legionella. Water in the piping is not allowed to cool in periods of no demand.

Components of a domestic hot water recirculation system: (Refer to Recirculation System 1)

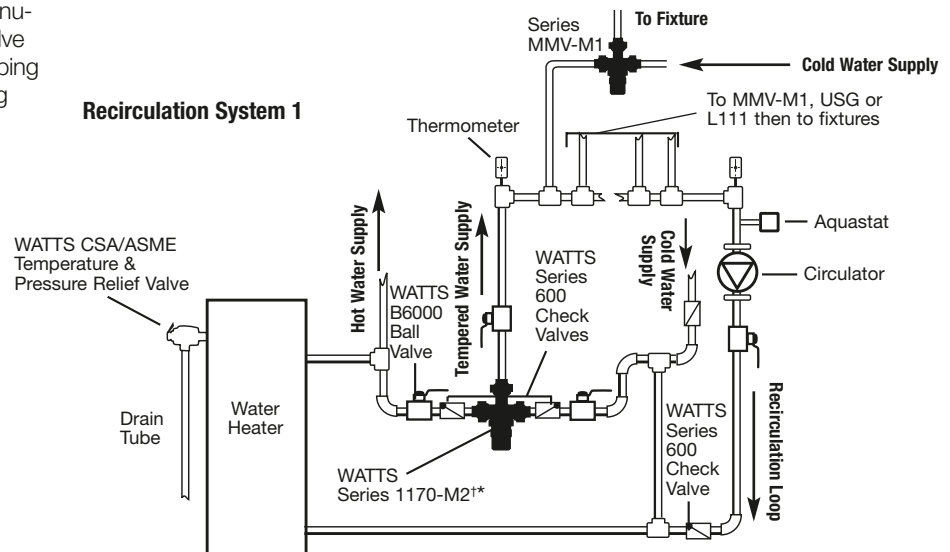
Circulator - Very little flow is required to maintain a minimum temperature in the piping, especially with current insulation specifications. The size of the circulator depends upon the minimum flow requirements of the tempering valve. For a Watts Series N170-M1, this is 8 to 9gpm (30 – 40 lpm). The minimum flow requirements of the tempering valve must be maintained.

Aquastat - An Aquastat must be used to control the on/off operation of the circulator. The Aquastat is set 5°F to 10°F lower than the mixed water outlet temperature of the tempering valve. The circulator cannot be allowed to run continuously because bypass through the mixing valve will eventually allow the temperature in the piping to climb to that of the hot water heater during no draw periods.

Check Valves - Check valves assure flow of water in one direction. Their purposes in a recirculation system are as follows:

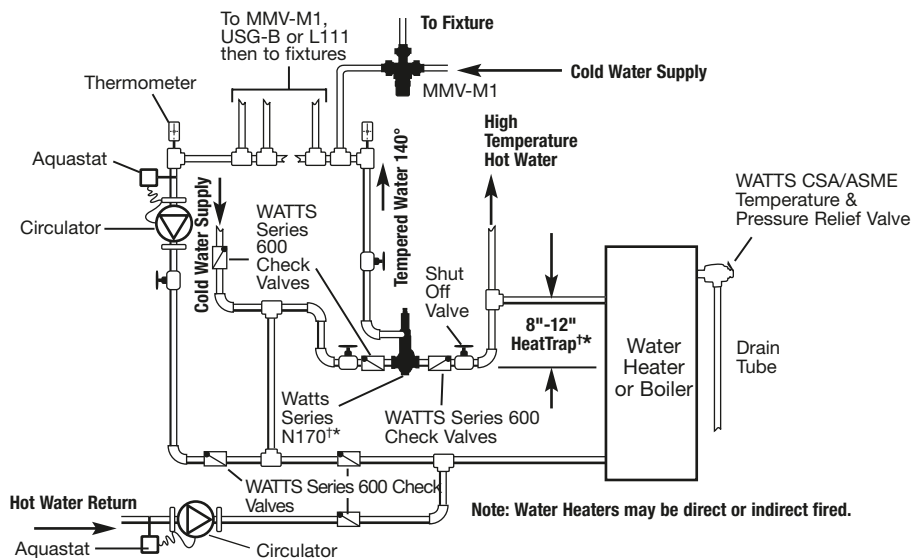
- Prevents cross connection (bypass) in the event of pressure drop
- Prevents thermal siphoning of hot water to the cold water supply
- Prevents flow of cold water to the tempered water supply. A draw of tempered water will not result in flow of cold water into the return loop
- Prevents thermal siphoning of hot water to the cold water inlet of the mixing valve

If both high temperature hot water and tempered hot water recirculation is required, a second circulator must be used and piped as shown in Recirculation System 2.



Recirculation System 2

Typical Two Temperature System with High Temperature Hot Water Recirculation Line



† Valves listed to ASSE 1016 or ASSE 1070 such as the Watts L111, USG or MMV should be used at point of delivery.

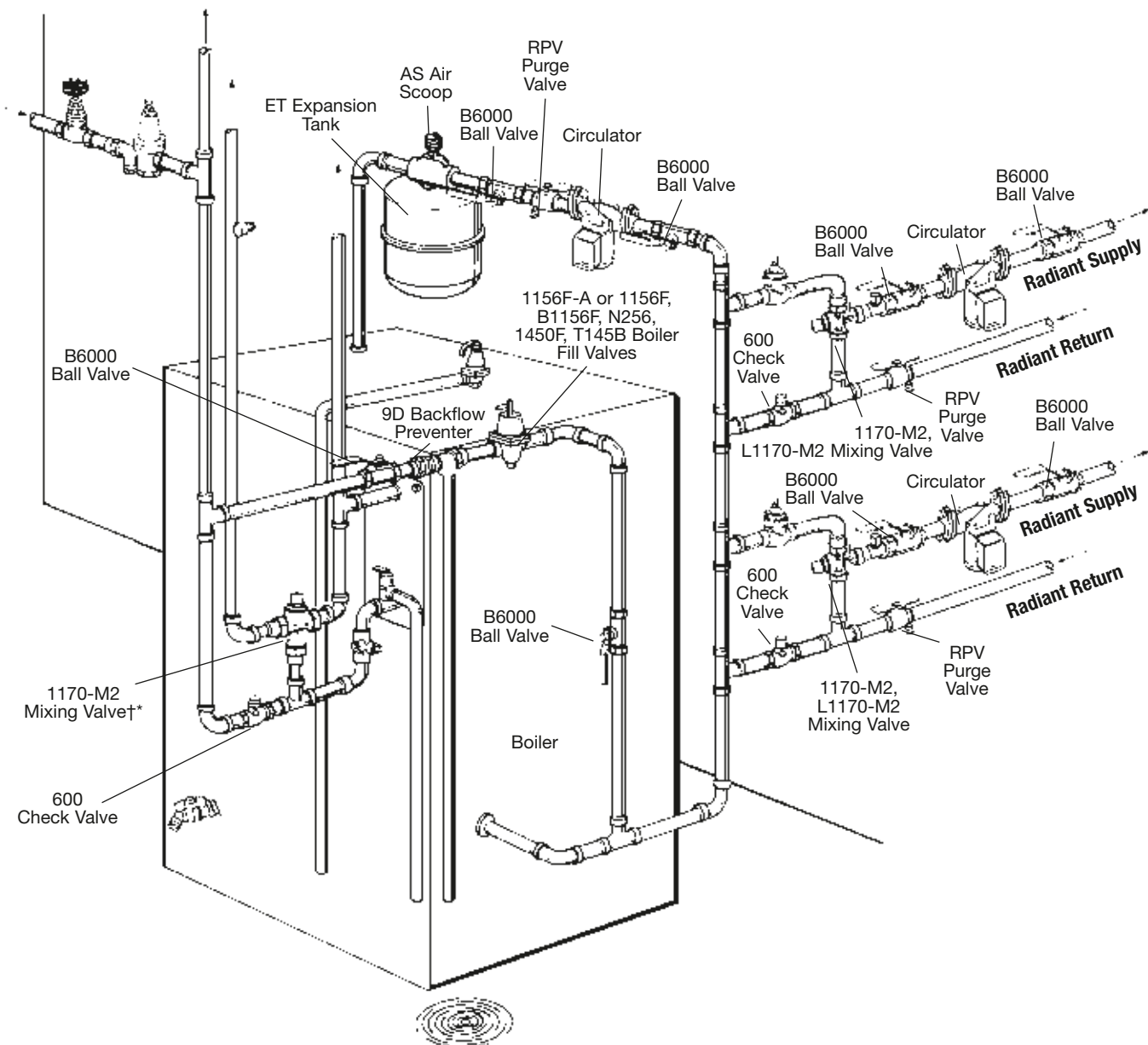
* Heat trap is recommended. See page 4 for further information.

Typical Radiant Heat Installation

Thermostatic mixing valves used in radiant heat applications provide the installer with the ability to accurately control temperature to individual loops or zones. Recommended piping includes a recirculation loop that will provide a continuous flow of hot water to any individual loop or zone.

The boiler water supplied to the individual loop or zone enters the hot water inlet of the temperature control valve and is mixed with cool return water from that zone/loop.

Until the zone/loop circulator is activated there is no flow through the temperature control valve. Upon activation of the circulator, hot boiler water supplied through the recirculation loop enters the hot water inlet of the temperature control valve. Mixed water from the valve at the desired temperature is supplied to the zone/loop, the desired heat transfer occurs and the return water is directed to either the recirculation loop or it enters the cold inlet to be mixed with the hot boiler water. The amount of hot water entering the zone/loop is always equal to the water returned to the recirculation loop.



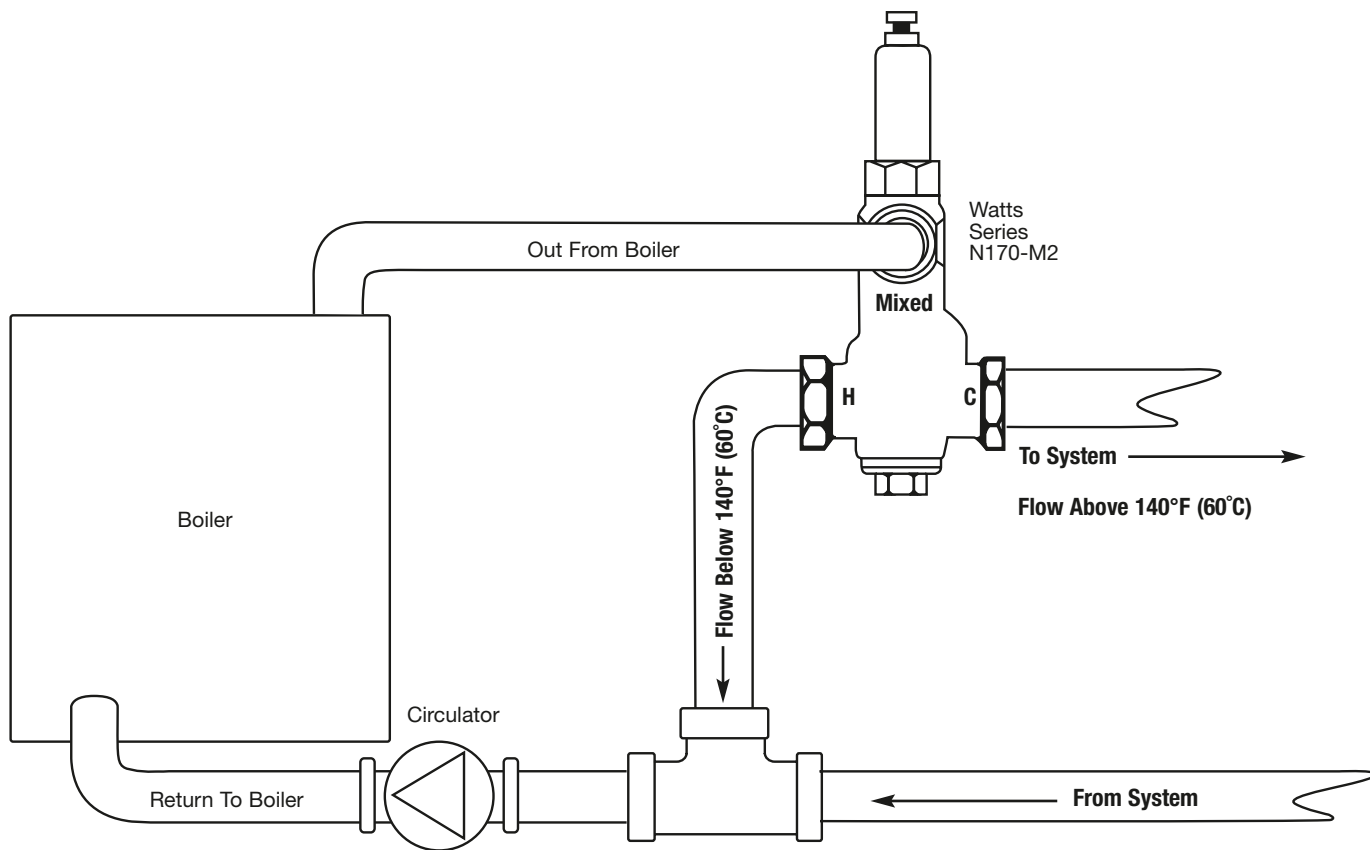
† Valves listed to ASSE Standard 1016 such as the Watts USG, L111 or MMV should be used at point of delivery.

* Heat trap is recommended. See page 4 for further information.

Bypass Lines

To prevent condensation in high efficiency cast iron boilers, you can use a bypass line which recirculates boiler water to the system return. In this system, boiler water below 140°F (60°C) circulates back to the boiler return without system flow. As the temperature increases above 140°F (60°C) a mixture

of system water would also be returned to the boiler. When the distribution system temperature exceeds 140°F (60°C), then full flow would be obtained in the system with no flow through the bypass loop. Watts Series N170-M2 valves are often used for bypass service.



For Technical Assistance Call Your Authorized Watts Agent.

			Telephone #	Fax #
	HEADQUARTERS: Watts Regulator Company	815 Chestnut St., North Andover, MA 01845-6098 U.S.A.	978 688-1811	978 794-1848
North East	Edwards, Platt & Deely, Inc. Edwards, Platt & Deely, Inc. W. P. Haney Co., Inc.	271 Royal Ave., Hawthorne, NJ 07506 368 Wyandanch Ave., North Babylon, NY 11703 51 Norfolk Ave., South Easton, MA 02375	973 427-2898 631 253-0600 508 238-2030	973 427-4246 631 253-0303 508 238-8353
Mid Atlantic	J. B. O'Connor Company, Inc. RMI The Joyce Agency, Inc. Vernon Bitzer Associates, Inc. WMS Sales, Inc. (Main office)	P.O. Box 12927, Pittsburgh, PA 15241 Glenfield Bus. Ctr., 2535 Mechanicsville Tpk., Richmond, VA 23223 8442 Alban Rd., Springfield, VA 22150 980 Thomas Drive, Warminster, PA 18974 9580 County Rd., Clarence Center, NY 14032	724 745-5300 804 643-7355 703 866-3111 215 443-7500 716 741-9575	724 745-7420 804 643-7380 703 866-2332 215 443-7573 716 741-4810
South East	Billingsley & Associates, Inc. Billingsley & Associates, Inc. Francisco J. Ortiz & Co., Inc. Mid-America Marketing, Inc. Mid-America Marketing, Inc. Smith & Stevenson Co., Inc. Harry Warren, Inc. Watts Georgia	2728 Crestview Ave., Kenner, LA 70062-4829 478 Cheyenne Lane, Madison, MS 39110 Charlyn Industrial Pk., Road 190 KM1.9 - Lot #8, Carolina, Puerto Rico 00983 203 Industrial Drive, Birmingham, AL 35211 1364 Foster Avenue, Nashville, TN 37210 5466 Old Hwy. 78, Memphis, TN 38118 4935 Chastain Ave., Charlotte, NC 28217 1400 North Orange Blossom Trail, Orlando, FL 32804 2861-B Bankers Industrial Drive, Atlanta, GA 30360	504 602-8100 601 856-7565 787 769-0085 205 879-3469 615 259-9944 901 795-0045 704 525-3388 407 841-9237 770 209-3310	504 602-8106 601 856-8390 787 750-5120 205 870-5027 615 259-5111 901 795-0394 704 525-6749 407 841-9246 770 447-4583
North Central	Aspinall Associates, Inc. Dave Watson Associates Disney McLane & Associates BWA Company Mid-Continent Marketing Services Ltd. Soderholm & Associates, Inc. Stickler & Associates	6840 Hillsdale Court, Indianapolis, IN 46250 1325 West Beecher, Adrian, MI 49221 428 McGregor Ave., Cincinnati, OH 45206 17610 S. Waterloo Rd., Cleveland, OH 44119 1724 Armitage Ct., Addison, IL 60101 7150 143rd Ave. N.W., Anoka, MN 55303 333 North 121 St., Milwaukee, WI 53226	317 849-5757 517 263-8988 800 542-1682 216 486-1010 630 953-1211 763 427-9635 414 771-0400	317 845-7967 517 263-2328 877 476-1682 216 486-2860 630 953-1067 763 427-5665 414 771-3607
South Central	Hugh M. Cunningham, Inc. Mack McClain & Associates Mack McClain & Associates, Inc. Mack McClain & Associates, Inc. OK! Sales, Inc.	13755 Benchmark, Dallas, TX 75234 4407 Meramec Bottom, Suite G, St. Louis, MO 63129 1450 NE 69th Place, Ste. 56 Ankeny, IA 50021 15090 West 116th St., Olathe, KS 66062 214-A NE 12th., Moore, OK 73160	972 888-3808 314 894-8188 515 288-0184 913 339-6677 405 794-5200	972 888-3838 314 894-8388 515 288-5049 913 339-9518 405 794-5250
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