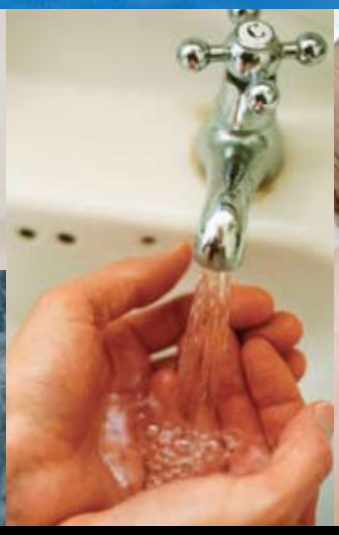

Safety Thermostatic Tempering Valves

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WATTS®

Table of Contents

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 Tempering 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 Tempering 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.

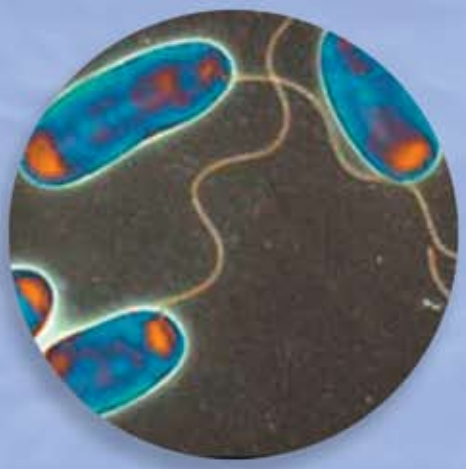
There are many methods of controlling colonization of Legionella bacteria. However, a widely accepted and preferred method is to maintain the hot water system storage temperature continually at or above 140°F. Unfortunately, the elevated temperature necessary to minimize the growth of and kill Legionella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

Solution:

Watts Thermostatic Tempering 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



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 Tempering 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 Tempering Valves, which provide safe, accurate control of hot water from its source through to its final use.

3,000 – 4,000

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

A Word about American Society of Sanitary Engineering (ASSE) Standards 1016, 1017, 1069 and 1070

ASSE 1016, ASSE 1017, ASSE 1069 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 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.

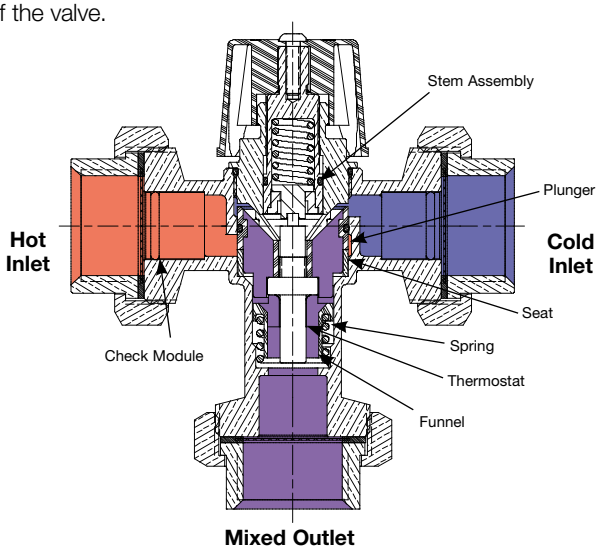
ASSE 1069 was developed for applications that include but are not limited to gang showers, sitz baths, by supplying water at a preset temperature through a single pipe supply. Mixing water downstream of an ASSE 1069 device in not allowed.

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.

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 ±10°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 tempering 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 tempering 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.

ASSE Standards

A Comparison of ASSE 1069, 1070 and 1071 with revised 1016 and 1017 standards.

Standard	ASSE 1016 - 1996*	ASSE 1016 - 2005*	ASSE 1017 - 2003
Status	Model Code Adopted	Current	Current
Title	Individual Thermostatic, Pressure Balancing, and Combination Pressure Balancing, Thermostatic control valves for individual fixtures	Automatic Compensating valves for individual showers and tub-shower combinations	Temperature Activated Mixing Valves for hot water distribution systems
Category	Point-of use, bather interface	Point-of use, bather or bather attendant interface	Tempered water distribution
Application	Bath & shower	Shower or tub/shower combination only	Hot water source/boiler
Types	Type P - Pressure Balancing Type T - Thermostatic Type T/P - Combination	Type P - Pressure Balancing, Type T - Thermostatic, Type T/P - Combination	Thermostatic only
Valve Temp Range - Outlet	Full cold to 105˚F minimum	Full cold to 105˚F minimum, 120˚F maximum	Minimum adjustable range 105˚F - 120˚F
Temperature Tolerance	±3˚F	T/P and P = ±3.6˚F T = +5.4˚F, -9.0˚F	±3˚F to ±7˚F (depending on valve size/capacity)
Pressure Change Test (Hot & Cold)	P = 50% up/down T = 20% up/down T/P = 50% up/down	P = 50% up/down T = 20% up/down T/P = 50% up/down	No pressure change test
Temperature Change Test (Hot)	P = Does not test for temperature change T = 25˚F hot water increase T/P = 25˚F hot water increase	P = Does not test for temperature change T = 25˚F hot water increase T/P = 25˚F hot water increase	25˚F hot water increase
Flow Test	Not applicable	Minimum 2.25 gpm	Not applicable
Minimum Tested Flow to Provide Control	2.5 gpm	2.5 gpm	50% of flow @ 10psid
Cold Water Failure Allowance	P, T, T/P < 0.5 gpm within 5 seconds before 120˚F	P, T, T/P < 0.5 gpm within 5 seconds before 120˚F	Not applicable
Life Cycle	P = 100,000 cycles T = 20K control dial/80K sensor T/P = 20K control dial/80K sensor	100,000 cycles – all	Not applicable
Watts Applicable Products †*Undergoing listing process*	L111, MMV, USG-B, USG-P		1170, L1170, MMV

ASSE 1062 - 2006	ASSE 1069 - 2005	ASSE 1070 - 2004	ASSE 1071
Current	Current	Current	Current
Temperature Actuated, Flow Reduction valves for individual fixture fittings (TAFR)	Automatic Temperature Control Mixing Valves	Water Temperature Limiting Devices	Temperature Activated Mixing valves for plumbed emergency equipment
In-line high temperature limit devices	Point-of-use distribution Adjustment by installer	Point-of-use or distribution	Point-of-use or distribution
Faucets, shower heads, tub spouts dramatically reduce flow when temperature exceeds actuation point	Gang showers, sitz baths, spas, gang lavatories	Sinks, lavatories, baths	Eye washers, eye/face washes, drench showers and combination units
Thermostatic only	Thermostatic only	Thermostatic only	Thermostatic only
Not applicable	100˚F - 115˚F	105˚F - 110˚F	65˚F - 95˚F
Maximum actuation temperature 120˚F or less	+ 5˚F lasting more than 1.5 seconds within first 5 seconds - 9˚F lasting more than 1 second within first five seconds	±7˚F	Varies depending on capacity. Also, hot water control has a tighter tolerance than cold water control.
Not applicable	20% up and down for cold & hot supply	20% up and down for cold & hot supply	Not applicable
Not applicable	25˚F hot water increase	25˚F hot water increase	25˚F hot water increase
0.25 gpm within five seconds when temp. exceeds 120˚F and one second once actuation temperature exceeds 129˚F	Must be 90% of manufacturer's published flow	Must be 90% of manufacturer's published flow	HW Failure, CW flow = manufacturer's rated by-pass flow @ 30 psid
Not applicable	2.5 gpm or less	Manufacturer's minimum stated flow	3.0 gpm or manufacturer's stated minimum
Not applicable	0.5 gpm for ½" and ¾" devices 1.0 gpm for 1" devices and larger	0.2 gpm or 20% of minimum flow, whichever is greater before 120˚F	CW failure, HW flow gpm not to exceed 0.5
125,000 cycles	100,000 cycles	100,000 cycles	Not applicable
WHT-115	MMV L111	MMV, L111, USG-B, USG-P†	

** Shaded sections of chart denote changes from ASSE 1016 - 1996 to ASSE 1016 - 2005.*

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-B tempering 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)

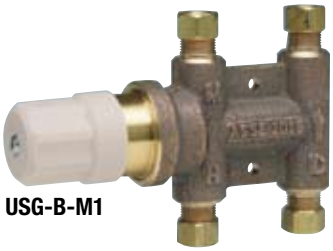
Series USG

Under Sink Guardian® Thermostatic Tempering Valves

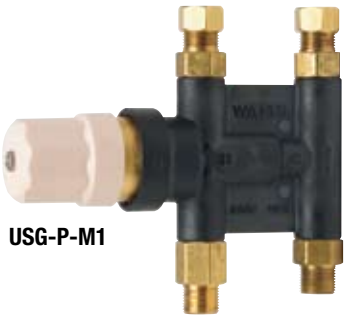
Dual Listed!
ASSE 1016 & ASSE 1070*

Size: ⅜" (10mm)

Series USG Under Sink Guardian® Thermostatic Tempering 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 1016-96 and ASSE 1070* 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 (±3°F) with low pressure drop. Additionally, the Series USG incorporates dual check valves to protect against cross-flow and integral screens to filter out debris.



USG-B-M1



USG-P-M1

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

Models

USG-B-M1 - Bronze body

USG-B-SC-M1 - Bronze body w/satin chrome finish

USG-P-M1 - Thermoplastic body

Features

- Maintains mixed water temperature to ±3°F up to 120°F (49°C).
- Installs easily between the stop valves and faucet
- ⅜" (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.
- Integral strainer with 40 mesh stainless steel screens to filter out debris.

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: 39°F-80°F (3.8°C-27°C)

Minimum inlet temperature differential: 5°F (2.8°C)

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

Maximum pressure: 150psi (10.3 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 1016-96 and ASSE 1070*

*USG-B only

Specifications

A Thermostatic Tempering Valve shall be installed on the hot water supply to the fixture. The valve shall be ASSE Standard 1016-96 and ASSE1070 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, integral screens and an adjustment cap with locking feature. The valve shall be provided with ⅜" (10mm) male compression fittings. The valve shall be Watts Regulator Company Series USG-B or USG-P.

Options

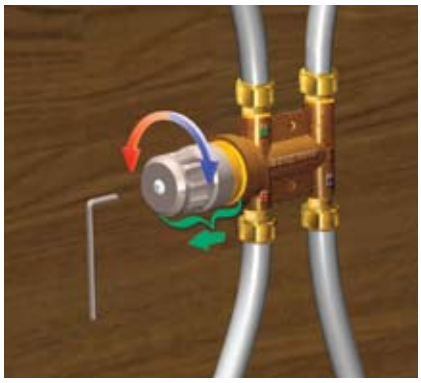
For satin chrome finish specify – SC (for USG-B only)

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 ⅜" (10mm) compression fittings
- Turn on supply valves and check for leaks.
- Set temperature

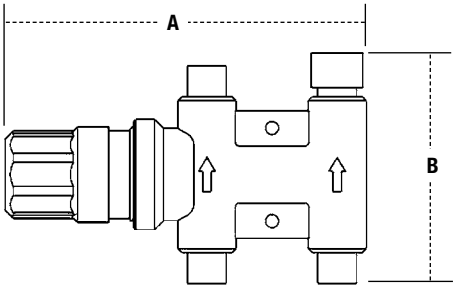
Temperature Adjustment

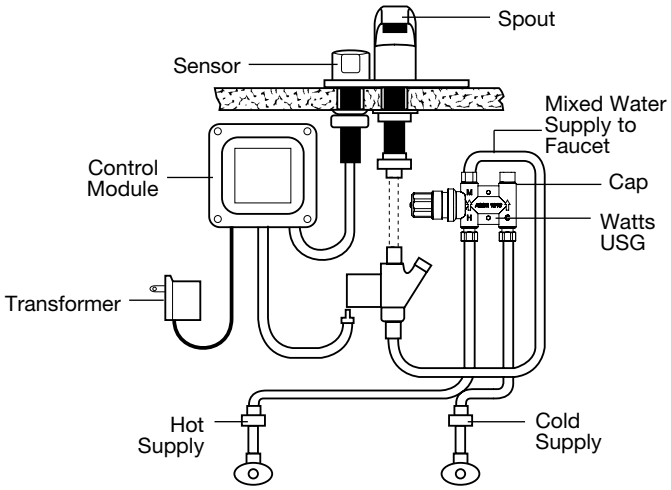


You can easily adjust the Under Sink Guardian® to the desired safe maximum temperature using the unique safety cap.

- 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.
- Check outlet temperature.

Dimensions — Weights





Typical Sensor Faucet Application

MODEL	BODY	CONNECTION SIZE (DN)	DIMENSIONS (APPROX.)				WEIGHT	
			A		B			
			in.	*mm*	*in.*	*mm*	*lbs.*	*kg.*
USG-B-M1	Bronze	⅜" (10mm) Compression	5 3/16	132	3⅛	79	1.5	0.68
USG-B-SC-M1	Bronze with Satin Chrome Finish	⅜" (10mm) Compression	5 3/16	132	3⅛	79	1.5	0.68
USG-P-M1	Thermoplastic	⅜" (10mm) Compression	5 3/16	132	3⅛	79	1.5	0.68

Series MMV

Thermostatic Tempering Valves

Sizes: ½" - 1" (15 – 25mm)

Quadruple Listed!
ASSE 1016, ASSE 1017, ASSE 1069 & ASSE 1070

Series MMV Thermostatic Tempering 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. The MMV-M1 is listed to ASSE Standard 1016 for single fixture applications, ASSE 1070 for single or multiple fixture applications ASSE 1069 for single-pipe, tempered water application 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 (±3°F) with low pressure drop. Additionally, the MMV-M1 incorporates integral inlet filter washers and check valves to protect against cross-flow.

MMV-M1

MMV-QC-M1

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

MMV-QC-M1 - Quick-Connect 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, Quick-Connect 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: 5°F (3°C) above the set point

Temperature Out: Field range: 80°F – 120°F (27°C – 49°C), adjustable. Accurate within ±3°F (1.7°C)

Maximum Temperature: 200°F (93°C)

Maximum Pressure: 150psi (10.3 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

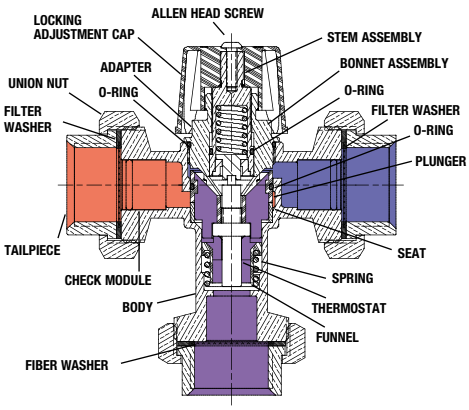
Listing: ASSE 1016, ASSE 1017, ASSE 1069 & ASSE 1070

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

Specifications

A Thermostatic Tempering Valve shall be installed on the hot water supply to fixture. The valve shall be ASSE Standard 1016, ASSE 1017, ASSE 1069 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, (-QC) Quick-Connect or PEX union connections. The valve shall be a Watts Regulator Company Series MMV.

Basic Construction



Typical MMV-M1 Applications

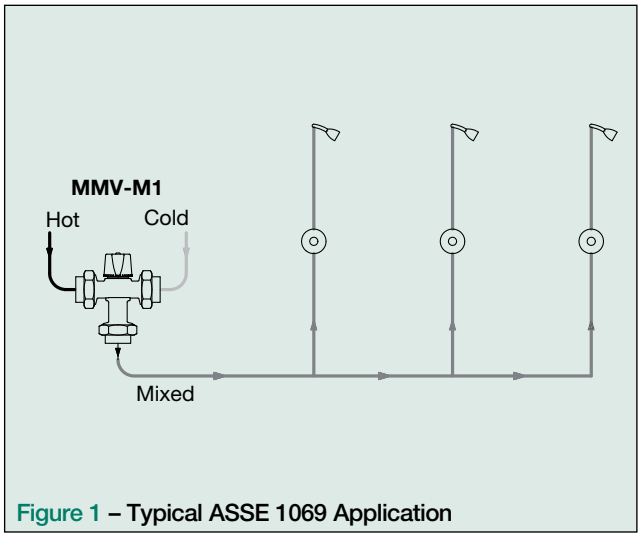


Figure 1 – Typical ASSE 1069 Application

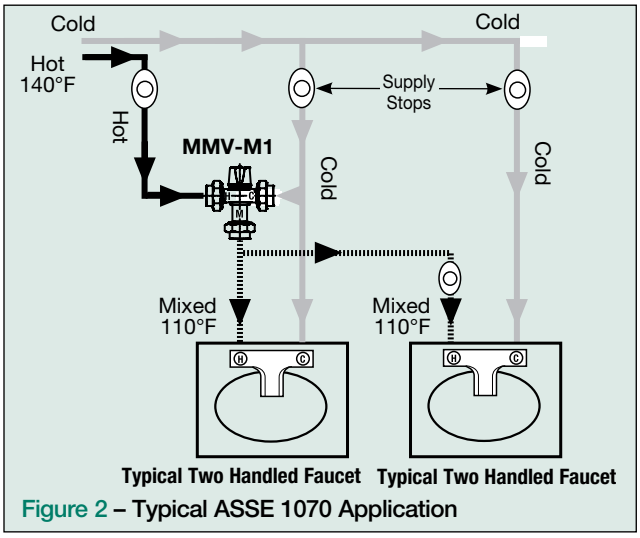
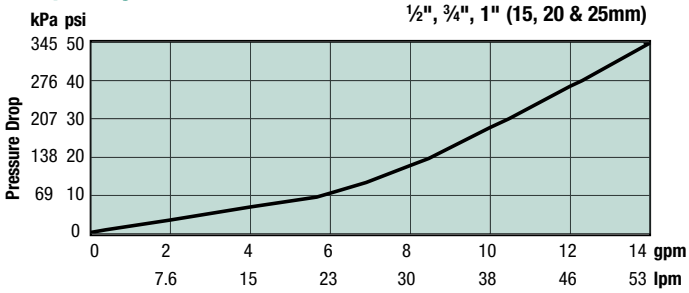


Figure 2 – Typical ASSE 1070 Application

Capacity



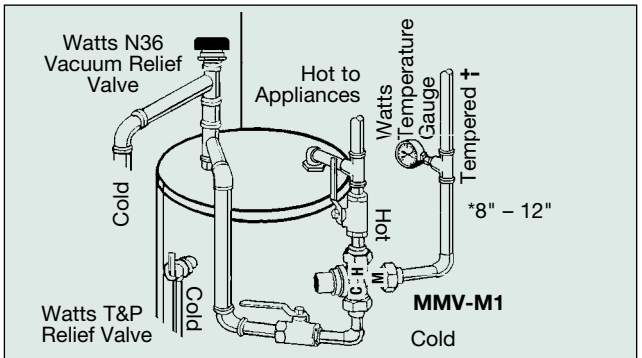
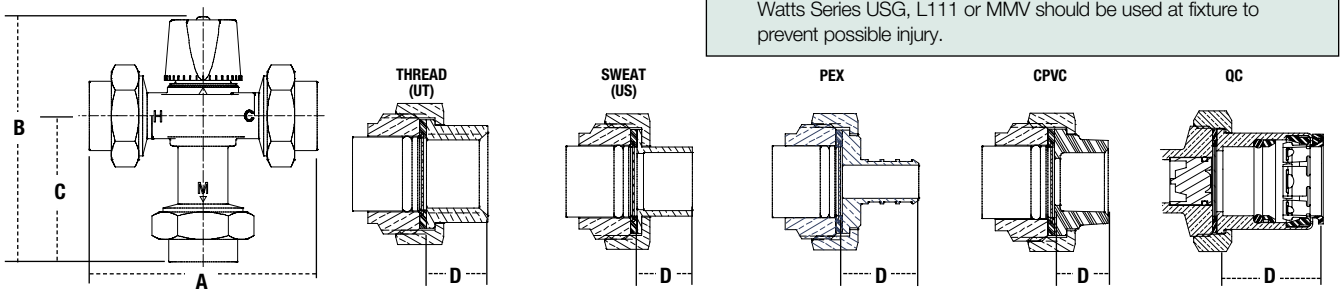


Figure 3 – Typical ASSE 1017 Application

† Devices tested to ASSE Standard 1016 or ASSE 1070 such as Watts Series USG, L111 or MMV should be used at fixture to prevent possible injury.

Dimensions — Weights



MODEL	SIZE (DN)		DIMENSIONS (APPROX.)								WEIGHT	
			A		B		C		D			
	in.	mm	in.	mm	in.	mm.	in.	mm	in.	mm	lbs.	kg.
	½	15	4⅞	124	5⁷⁄₁₆	137	3⅜	80	½	13	1.5	.68
MMV-UT-M1	¾	20	4⅞	124	5⁷⁄₁₆	137	3⅜	80	⁹⁄₁₆	14	1.6	.73
	1	25	5⁵⁄₁₆	135	5⅝	143	3⅜	86	¹¹⁄₁₆	17	1.6	.73
	½	15	4¹³⁄₁₆	123	5⅜	137	3⅛	80	½	13	1.5	.68
MMV-US-M1	¾	20	5⁵⁄₁₆	135	5⅝	143	3⅜	86	¾	19	1.6	.73
	1	25	5¹³⁄₁₆	148	5⅞	149	3⅝	92	¹⁵⁄₁₆	23	1.6	.73
	½	15	5¼	133	5⁹⁄₁₆	142	3⁵⁄₁₆	85	⅝	1	1.5	.68
MMV-PEX-M1	¾	20	5½	140	5¹¹⁄₁₆	145	3⁷⁄₁₆	88	¾	19	1.6	.73
	1	25	5⅞	149	5⅞	150	3⅝	93	¹³⁄₁₆	2	1.6	.73
	½	15	4¾	121	5⁵⁄₁₆	136	3¹⁄₁₆	79	½	13	1.5	.68
MMV-CPVC-M1	¾	20	5¼	133	5⁹⁄₁₆	142	3⁵⁄₁₆	85	¾	19	1.6	.73
	1	25	5¹¹⁄₁₆	144	5¹³⁄₁₆	147	3⁹⁄₁₆	90	¹⁵⁄₁₆	23	1.6	.73
	½	15	6⅝	168	6¼	159	4	102	1½	38	2.17	.98
MMV-QC-M1	¾	20	6¹⁵⁄₁₆	177	6⁷⁄₁₆	163	4³⁄₁₆	106	1¹¹⁄₁₆	42	2.88	1.31
	1	25	7⅛	181	6½	165	4¼	108	1¾	44	3.65	1.66

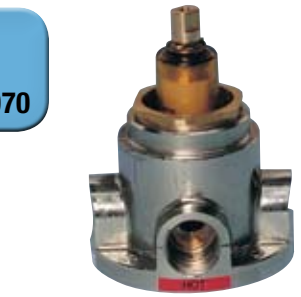
UT = Union Thread US = Union Sweat QC = Quick-Connect

Model L111

Thermostatic Tempering Valve

Size: ½" (15mm)

Triple Listed!
ASSE 1016,
ASSE 1069 & ASSE 1070



L111

Model L111 Thermostatic Tempering 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, ASSE 1069 for single-pipe, tempered water applications and ASSE 1070 for lavatory and whirlpool tempering applications.

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

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
ASSE 1069
ASSE 1070

Specifications

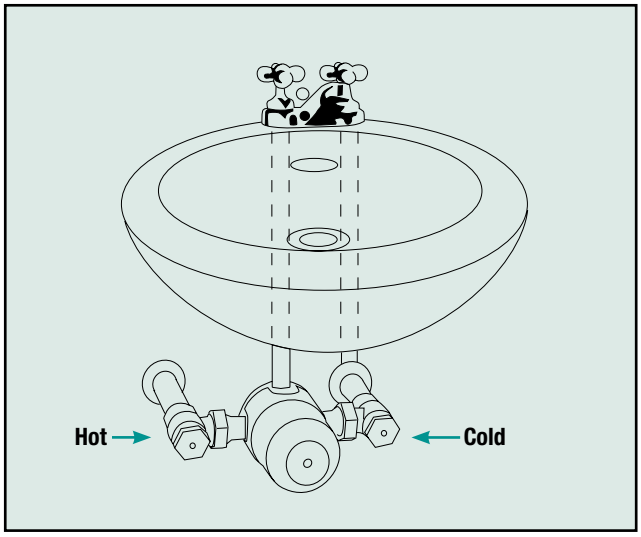
A Thermostatic Tempering Valve shall be installed on the hot and cold water supply to the fixture as shown in the diagram. The valve shall be ASSE Standard 1016, 1069 , and 1070 listed and control the temperature of the hot water to the fixture. The valve shall have ½" (15mm) female NPT inlet and outlet 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.

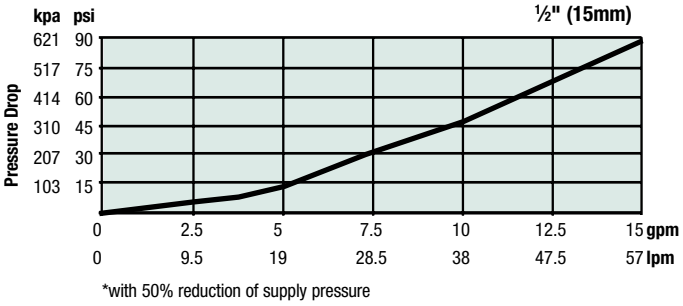
NOTE: Do not use this valve to recirculate water at elevated temperatures. Systems that recirculate water at elevated temperatures to reduce risk of bacterial growth in the piping require ASSE Standard 1017 devices. This valve can be used in conjunction with recirculation systems to reduce the hot water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

Typical Applications



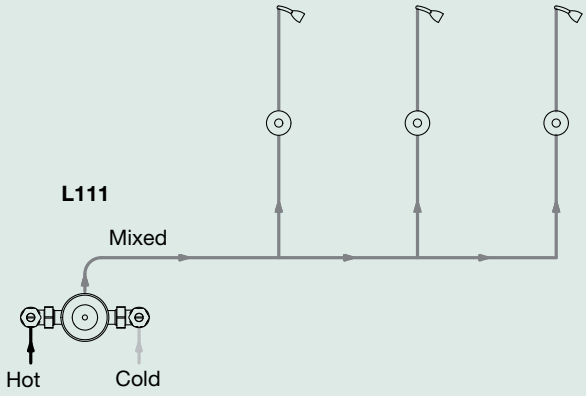
Watts Model L111 shown with Series CS Check Stops (optional) installed

Capacity

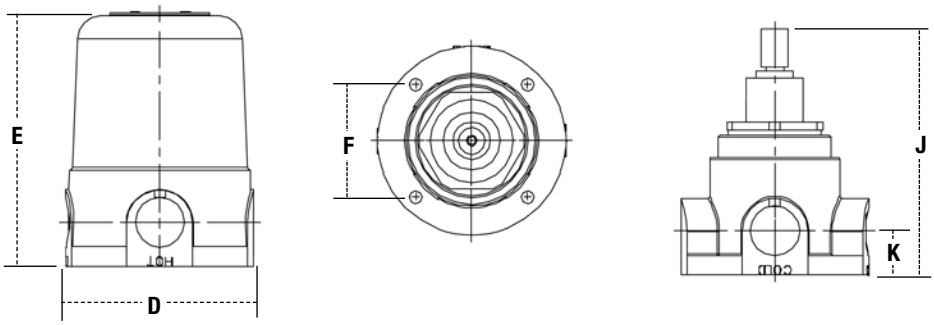


*with 50% reduction of supply pressure

Typical ASSE 1069 Application



Dimensions — Weights



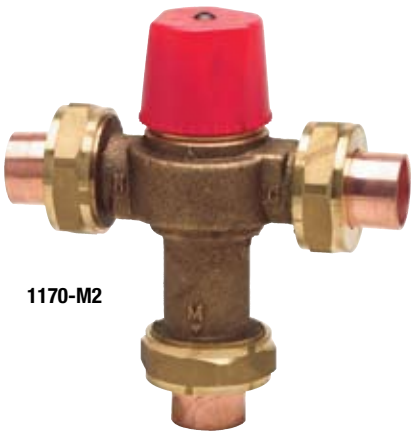
MODEL	INLET/OUTLET SIZE		DIMENSIONS (APPROX.)										WEIGHT	
	(DN)		D		E		F		J		K			
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg
L111	½	15	2 15/16	74	3 15/16	101	1¾	45	3⅞	98	11/16	17	3.3	1.5

Series 1170, L1170

Hot Water Temperature Control Valves

Sizes: ½" – 1" (15 – 25mm)

Series 1170, L1170 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, L1170 incorporates integral inlet filter washers and check valves to protect against cross-flow. Series 1170, L1170 is listed to ASSE Standard 1017 for hot water source applications.



1170-M2

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
1170-QC-M2	- Quick-Connect 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
1170-QC-M2	- Quick-Connect 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, Quick-Connect 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: 5°F (3°C) above set point

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 (1.6°C)

Maximum Temperature: 200°F (93°C)

Maximum Pressure: 150psi (10.3 bar)

Approvals

Approval: CSA B125 Certified
Listing: ASSE 1017

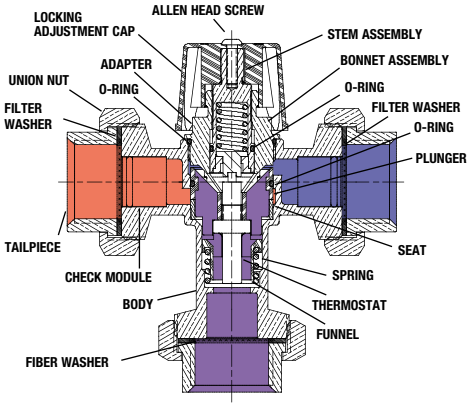
Specifications

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, (-QC), Quick-Connect or CPVC connections. Valve shall be ASSE Standard 1017 Listed. Valve shall be a Watts Regulator Company Series 1170 or L1170.

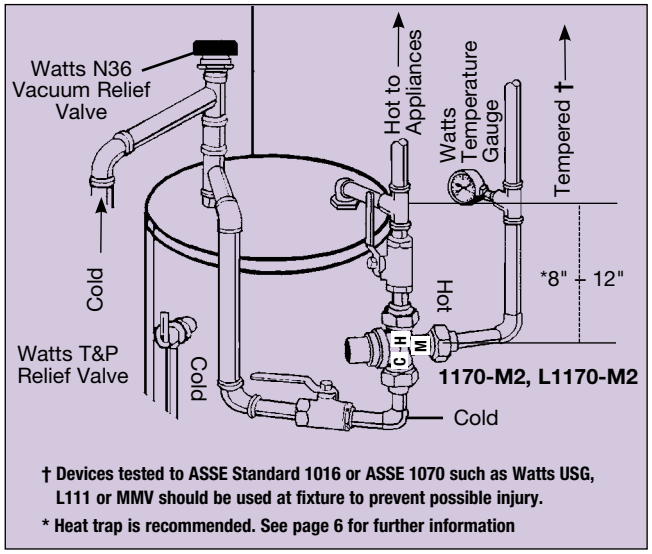
Application Note

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



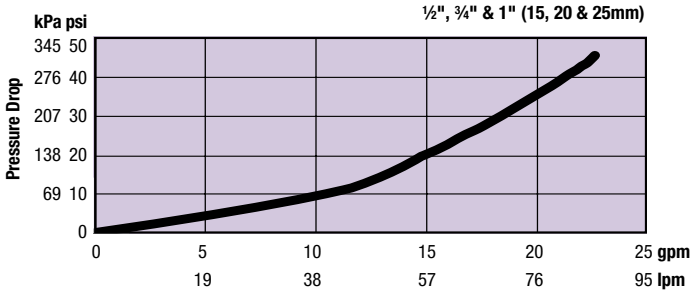
Typical 1170-M2 Applications



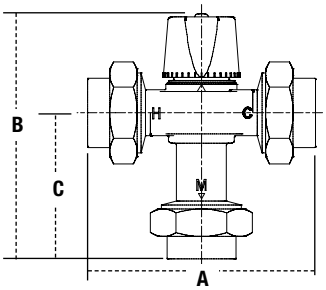
† Devices tested to ASSE Standard 1016 or ASSE 1070 such as Watts USG, L111 or MMV should be used at fixture to prevent possible injury.

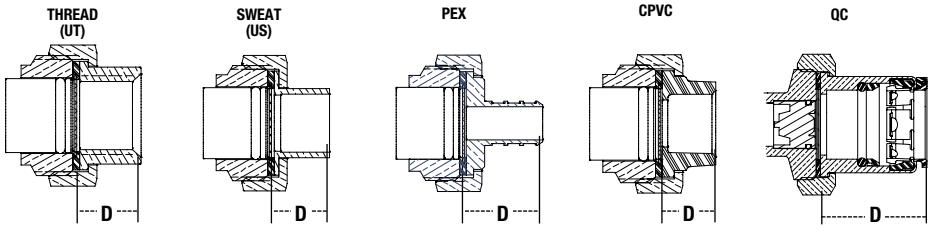
* Heat trap is recommended. See page 6 for further information

Capacity



Dimensions — Weights





MODEL	SIZE (DN)		DIMENSIONS (APPROX.)								WEIGHT	
			A		B		C		D			
	in.	mm.	in.	mm.	in.	mm.	in.	mm.	in.	mm.	lbs.	kg.
	½	15	4⅞	124	5⅞16	137	3⅜16	80	½	13	1.5	.68
1170-UT-M2	¾	20	4⅞	124	5⅞16	137	3⅜16	80	9⁄16	14	1.6	.73
	1	25	5⅝16	135	5⅝	143	3⅜	86	1⅛16	17	1.6	.73
	½	15	4⅜16	123	5⅜	137	3⅛	80	½	14	1.5	.68
1170-US-M2	¾	20	5⅝16	135	5⅝	143	3⅜	86	¾	19	1.6	.73
	1	25	5⅜16	148	5⅞	149	3⅝	92	15⁄16	24	1.6	.73
	½	15	5¼	133	5⅜16	142	3⅝16	85	⅝	16	1.5	.68
1170-PEX-M2	¾	20	5½	140	5⅛16	145	3⅞16	88	⅝	16	1.6	.73
	1	25	5⅞	149	5⅞	150	3⅝	93	1⅜16	21	1.6	.73
	½	15	4¾	121	5⅝16	136	3⅛16	79	½	13	1.5	.68
1170-CPVC-M2	¾	20	5¼	133	5⅜16	142	3⅝16	85	¾	19	1.6	.73
	1	25	5⅛16	144	5⅜16	147	3⅜16	90	15⁄16	24	1.6	.73
	½	15	6⅝	168	6¼	159	4	102	1½	38	2.17	.98
1170-QC-M1	¾	20	6⅝16	177	6⅞16	163	4⅜16	106	1⅛16	42	2.88	1.31
	1	25	7⅛	181	6½	165	4¼	108	1¾	44	3.65	1.66

UT = Union Thread US = Union Sweat QC = Quick-Connect

Series 70A, L70A

Hot Water Extender Tempering Valves

Sizes: ½" – ¾" (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 ¾" (20mm) 70A-T used for smaller domestic and residential requirements passes more than 10gpm (38 lpm), with a 10psi (69 kPa) pressure drop. Maintenance is simple too; the thermostat is easily removed and replaceable as a unit.

70A

Models

70A-F – Furnished in ½" (15mm) size with sweat connections

70A-T – Furnished in ½" and ¾" (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)

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

Pressure — Temperature

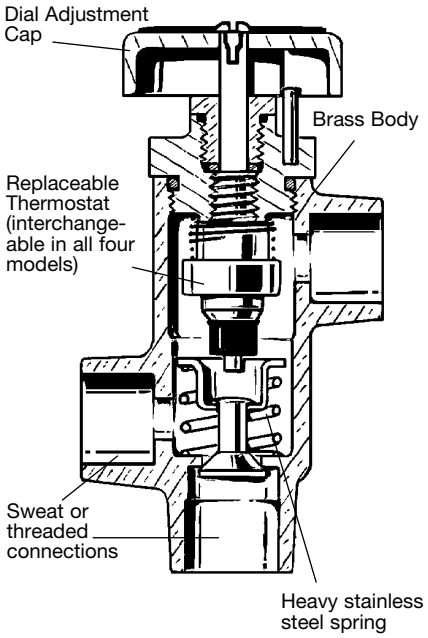
Temperature range: 120°F – 160°F (49°C – 71°C)

Maximum Temperature: 210°F (99°C)

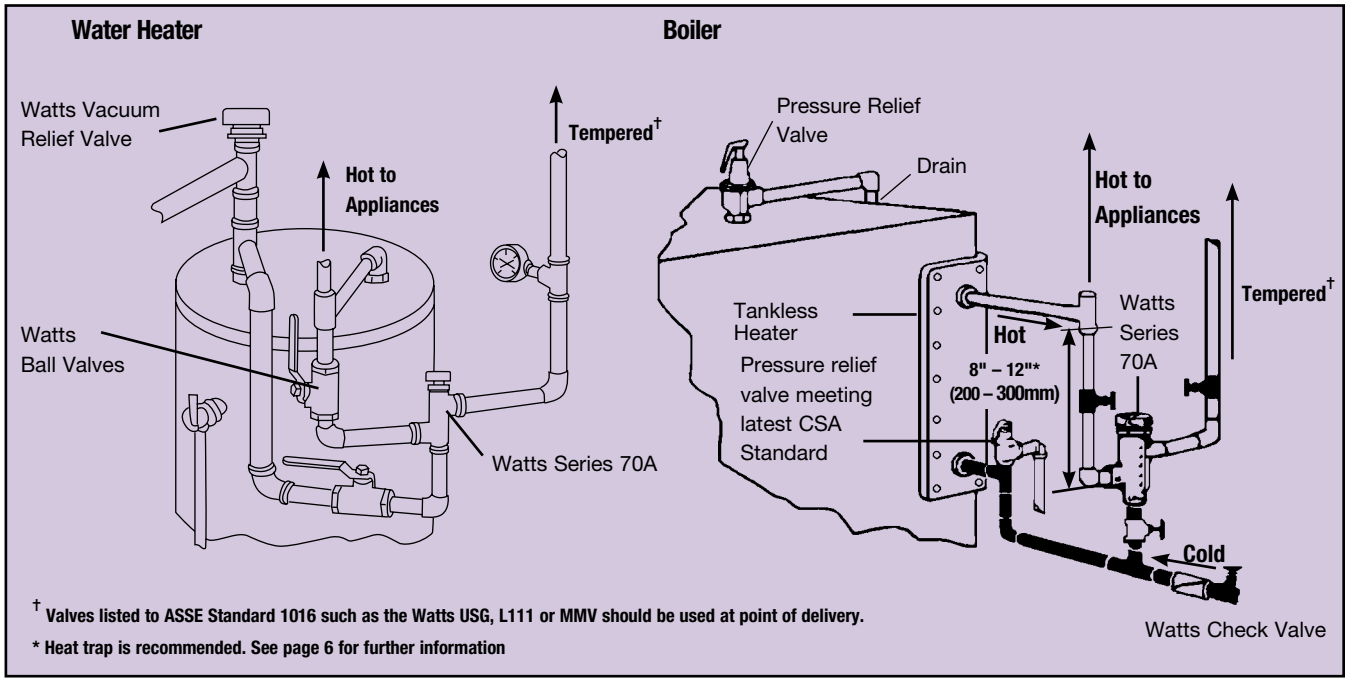
Maximum Pressure: 150psi (10.3 bar)

Minimum Flow Requirement: 2 gpm (8 lpm)

Basic Construction



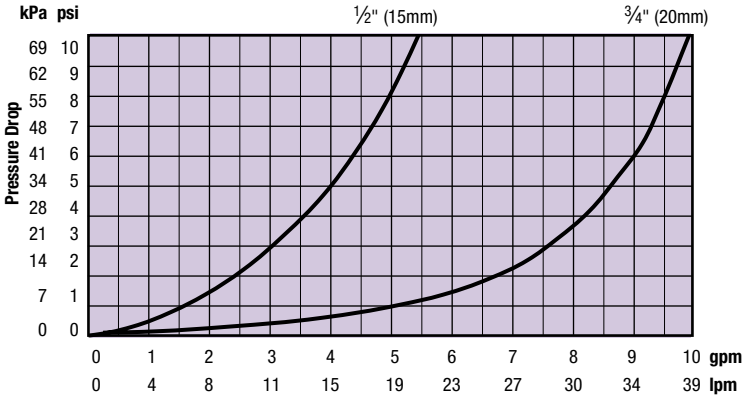
Typical 70A Applications



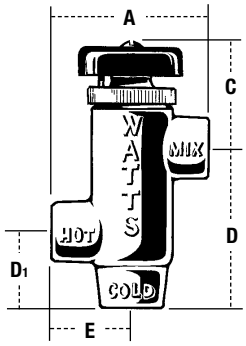
† Valves listed to ASSE Standard 1016 such as the Watts USG, L111 or MMV should be used at point of delivery.

* Heat trap is recommended. See page 6 for further information

Capacity



Dimensions — Weights



MODEL	SIZE (DN)		DIMENSIONS (APPROX.)										WEIGHT	
			A		C		D		D1		E			
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm.	lbs.	kg.
70A-F	½	15	2	50	2¾	70	1	25	1⅜	41	1 3/16	21	0.68	.30
70A-T	½	15	2¾	70	2¾	70	1⅝	41	1⅜	41	1 3/16	21	1.30	.59
70A	¾	20	2¾	70	2¾	70	1⅜	41	1⅜	41	1 3/16	21	0.96	.44
70A-T	¾	20	2¾	70	2¾	70	1⅜	41	1⅜	41	1 3/16	21	1.20	.54
L70A-F	½	15	2	50	2¾	70	1	25	1⅜	41	1 3/16	21	0.60	.29
L70A-T	½	15	2¾	70	2¾	70	1⅝	41	1⅜	41	1 3/16	21	1.30	.59
L70A	¾	20	2¾	70	2¾	70	1⅜	41	1⅜	41	1 3/16	21	0.96	.44
L70A-T	¾	20	2¾	70	2¾	70	1⅜	41	1⅜	41	1 3/16	21	1.20	.54

Series N170

Hot Water Master Tempering Valves

Sizes: ¾" - 2" (20 – 50mm)

Watts Series N170 hot water master tempering valves are especially designed for use on larger hot water supply systems for mixing hot and cold water for a variety of applications to extend the hot water supply. This series uses paraffin-based thermostat to sense and adjust outlet temperature.

Models

- **N170-M3** – For temperatures between 90°F – 180°F (32°C – 82°C)
- **N170-M3 CSUT** – with checkstops. For temperatures between 90°F – 180°F (32°C – 82°C)

Features

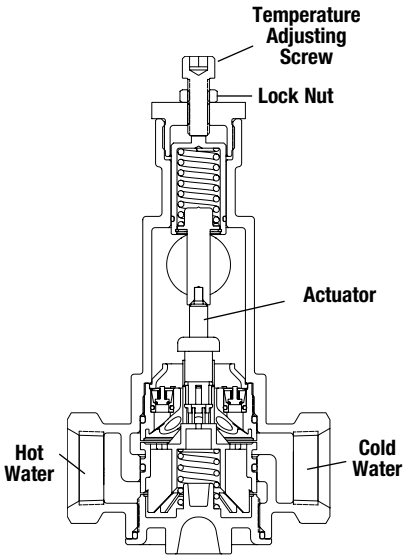
- ASSE 1017 and IAPMO cUPC Listed
- N170-M3 uses paraffin-based thermostat to sense and adjust outlet temperature
- Dirt and lime resistant poppet and seat design
- Virtual shutoff if supply pressure fails
- Vandal-resistant locking mechanism to secure temperature setting
- Factory tested

Specification

Master mixing valve shall feature paraffin-based, thermal actuation technology for precise temperature control. Valve shall be listed to ASSE 1017 and cUPC and shall be approved to ASSE 1017 & CSA B125.3 standards. Master mixing valve shall have an approach temperature of 5°F (3°C). Valve shall have an outlet temperature range from 90 - 180°F (32 to 82°C) with a lockable temperature-setting feature. Valve shall be manufactured of corrosion resistant materials and feature a single-seat design for positive shutoff. Minimum flows to ASSE 1017 shall be ¾ N170-M3 (3.0 gpm, 11 lpm), 1 N170-M3 (4.0 gm, 15 lpm), 1-¼ N170-M3 (4.0 gpm, 15 lpm), 1-½ N170-M3 (5.0 gpm, 19 lpm), 2 N170-M3 (7.0 gpm, 26 lpm).

Master mixing valves shall be of Watts Series N170-M3. Any alternate must have a written approval prior to bidding.

Basic Construction



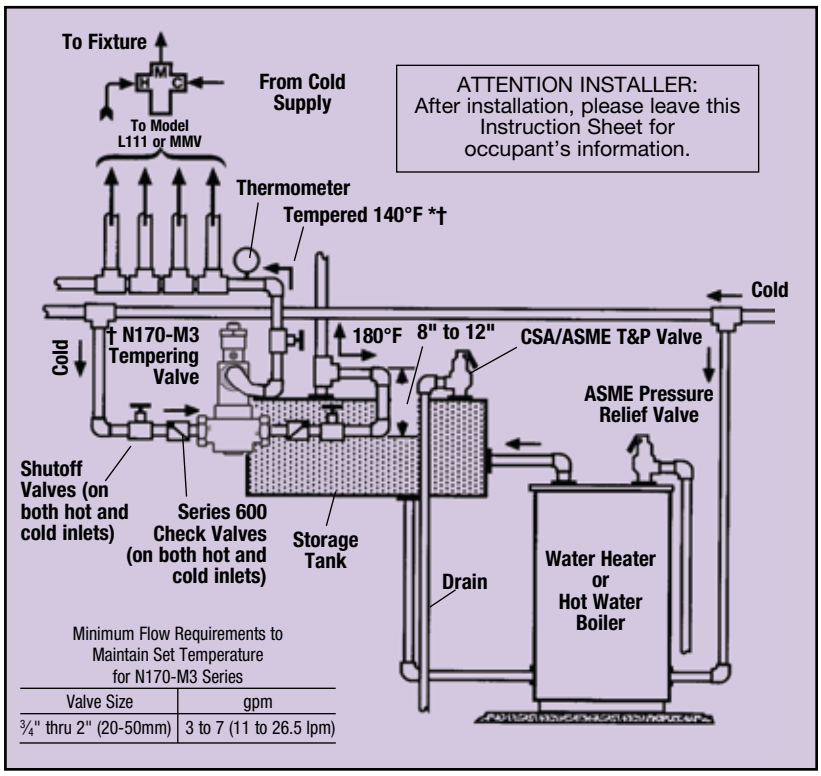
Pressure-Temperature

Maximum Operating Pressure	125psig (861 kPa)
Maximum Hot Water Temperature	200°F (93°C)
Minimum Hot Water Supply Temperature	5°F (3°C) Above Set Point*
Temperature Adjustment Range**	90 - 180°F (32 - 82°C)
Hot Water Inlet Temperature Range	120 - 180°F (42 - 82°C)
Cold Water Inlet Temperature Range	40 - 80°F (4 - 27°C)
Listing	ASSE 1017, IAPMO cUPC
Approval Standards	ASSE 1017, CSA B125.3

*With Equal Pressure

**Low Limit cannot be less than the cold water temperature. For best operation, hot water should be at least 5°F (3°C) above desired set point.

Basic Installation



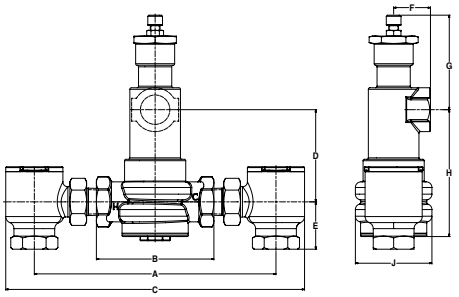
Minimum Flow Requirements to Maintain Set Temperature for N170-M3 Series

Valve Size	gpm
¾" thru 2" (20-50mm)	3 to 7 (11 to 26.5 lpm)

† Valves listed to ASSE 1016, ASSE 1069 or ASSE 1070 such as the Watts USG, L111 or MMV should be used at point of delivery.

* Heat trap is recommended. See page 6 for further information

Dimensions



Capacity

Flow Capacity at 50-50 mixed Less Checkstops									
				Pressure Drop Across Valve					
Model	Inlet / Outlet (NPT)	Min. Flow to ASSE 1017	C_v	5psi (34 kPa)	10psi (69 kPa)	20psi (138 kPa)	30psi (207 kPa)	45psi (310 kPa)	60psi (414 kPa)
¾" N170-M3	¾ x ¾"	3 gpm 11 lpm	6.70	15 gpm 57 lpm	21 gpm 79 lpm	30 gpm 114 lpm	37 gpm 140 lpm	45 gpm 170 lpm	52 gpm 197 lpm
1" N170-M3	1 x 1"	4 gpm 15 lpm	10.13	23 gpm 87 lpm	32 gpm 121 lpm	45 gpm 170 lpm	56 gpm 212 lpm	68 gpm 257 lpm	79 gpm 299 lpm
1 ¼" N170-M3	1-¼ x 1-¼"	4 gpm 15 lpm	14.16	32 gpm 121 lpm	45 gpm 170 lpm	63 gpm 238 lpm	76 gpm 288 lpm	95 gpm 360 lpm	110 gpm 416 lpm
1 ½" N170-M3	1-½ x 1-½"	5 gpm 19 lpm	15.65	35 gpm 134 lpm	49 gpm 185 lpm	70 gpm 265 lpm	86 gpm 326 lpm	105 gpm 397 lpm	121 gpm 458 lpm
2" N170-M3	2 x 1-½ x 2"	7 gpm 26 lpm	18.63	42 gpm 159 lpm	59 gpm 223 lpm	83 gpm 314 lpm	102 gpm 386 lpm	125 gpm 473 lpm	144 gpm 545 lpm

MODEL	BODY INLETS NPT	CHECK STOP INLETS NPT	BODY OUTLET NPT	DIMENSIONS A in.	A mm	B in.	B mm	C in	C mm	D in.	D mm	E in.	E mm	F in.	F mm	G in.	G mm	H in.	H mm	J in.	J mm	WEIGHT lbs.	WEIGHT kgs.
¾ N170-M3	¾	N/A	¾	N/A		4½	114	N/A		3½	89	N/A		1 7/16	36	3 5/8	92	4 7/8	124	2 15/16	75	4.8	2.2
¾ N170-M3 CSUT	N/A	¾	¾	9¼	235	4½	114	11 7/16	291	3½	89	1 13/16	46	1 7/16	36	3 5/8	92	4 7/8	124	2 15/16	75	9.8	4.5
1 N170-M3	1	N/A	1	N/A		4 9/16	116	N/A		3½	89	N/A		1 7/16	36	3 5/8	92	4 7/8	124	2 15/16	75	4.8	2.2
1 N170-M3 CSUT	N/A	¾	1	10 1/8	264	4 9/16	116	12 9/16	319	3½	89	1 13/16	46	1 7/16	36	3 5/8	92	4 7/8	124	2 15/16	75	10.3	4.9
1¼ N170-M3	1¼	N/A	1¼	N/A		6 1/16	154	N/A		3 7/16	87	N/A		1¾	44	31 1/16	94	5¼	133	4½	114	9.4	4.3
1¼ N170-M3 CSUT	N/A	1¼	1¼	12 1/16	306	6 1/16	154	15 1/16	383	3 7/16	87	2½	64	1	44	31 1/16	94	5¼	133	4½	114	19.3	8.8
1½ N170-M3	1½	N/A	1½	N/A		6 1/16	154	N/A		3 7/16	87	N/A		1¾	44	31 1/16	94	5¼	133	4½	114	9.1	4.1
1½ N170-M3 CSUT	N/A	1¼	1½	13¼	337	6 1/16	154	16¼	413	3 7/16	87	2½	64	1¾	44	31 1/16	94	5¼	133	4½	114	19.8	9.0
2 N170-M3	2 (Hot) 1½ (Cold)	N/A	2	N/A		6 7/16	164	N/A		3 3/16	81	N/A		2 1/16	52	3⅞	98	5⅜	137	4½	114	10.4	4.7
2 N170-M3 CSUT	N/A	1¼	2	13¾	349	6 7/16	164	16¾	425	3 3/16	81	2½	64	2 1/16	52	3⅞	98	5⅜	137	4½	114	21.3	9.7

Series CS

Check Stop Valves

Sizes: ½", ¾", 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)

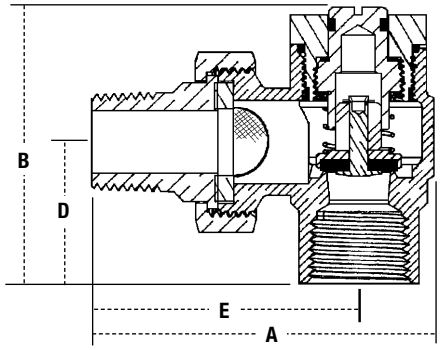
Maximum Temperature: 200°F (93°C)

Specifications

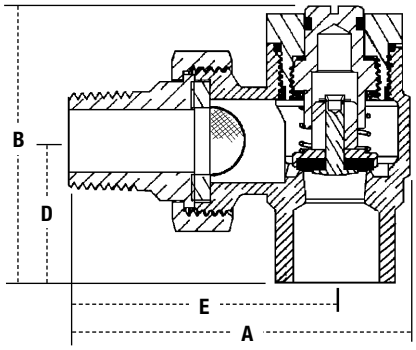
A CS combination check/stop/strainer valve shall be used at the hot and cold water inlets to the Watts L111 mixing valves. This manual valve shall be a Watts model CS U-T (union/threaded), CS U-S (union/solder), CSC U-T /S (chrome plated union, thread/solder) as indicated on the installation plans. This 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

CS U-T



CS U-S



MODEL	SIZE (DN)				DIMENSIONS (APPROX.)								WEIGHT	
	Inlet		Outlet		A		B		D		E			
	in.	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm.*	*oz.*	*gr.*
CS U-S	½	15	½	15	2⅞	73	1 5⁄16	59	1 3⁄16	30	2¼	57	12	340
CS U-S	¾	20	¾	20	3	76	2 11⁄16	68	1⅜	35	2 5⁄16	59	17	482
CS U-T	½	15	½	15	2⅞	73	1 5⁄16	59	1 3⁄16	30	2¼	57	12	340
CS U-T	¾	20	¾	20	3¼	83	2 11⁄16	68	1⅜	35	2 5⁄16	65	17	482
CS U-T	1	25	1	25	4	102	3⅛	79	1 11⁄16	43	3⅛	79	27	765
*CSC U-S	½	15	½	15	2⅞	73	1 5⁄16	59	1 3⁄16	30	2¼	57	12	340
*CSC U-S	¾	20	¾	20	3	76	2 11⁄16	68	1⅜	35	2 5⁄16	59	17	482
*CSC U-T	½	15	½	15	2⅞	73	1 5⁄16	59	1 3⁄16	30	2¼	57	12	340
*CSC U-T	¾	20	¾	20	3¼	83	2 11⁄16	68	1⅜	35	2 9⁄16	65	17	482
CSC U-T	1	25	1	25	4	102	3⅛	79	1 11⁄16	43	3⅛	79	27	765

*Chrome plated

Typical Water Heater Installation

Using Watts Thermostatic Tempering 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 shutoff.

(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.

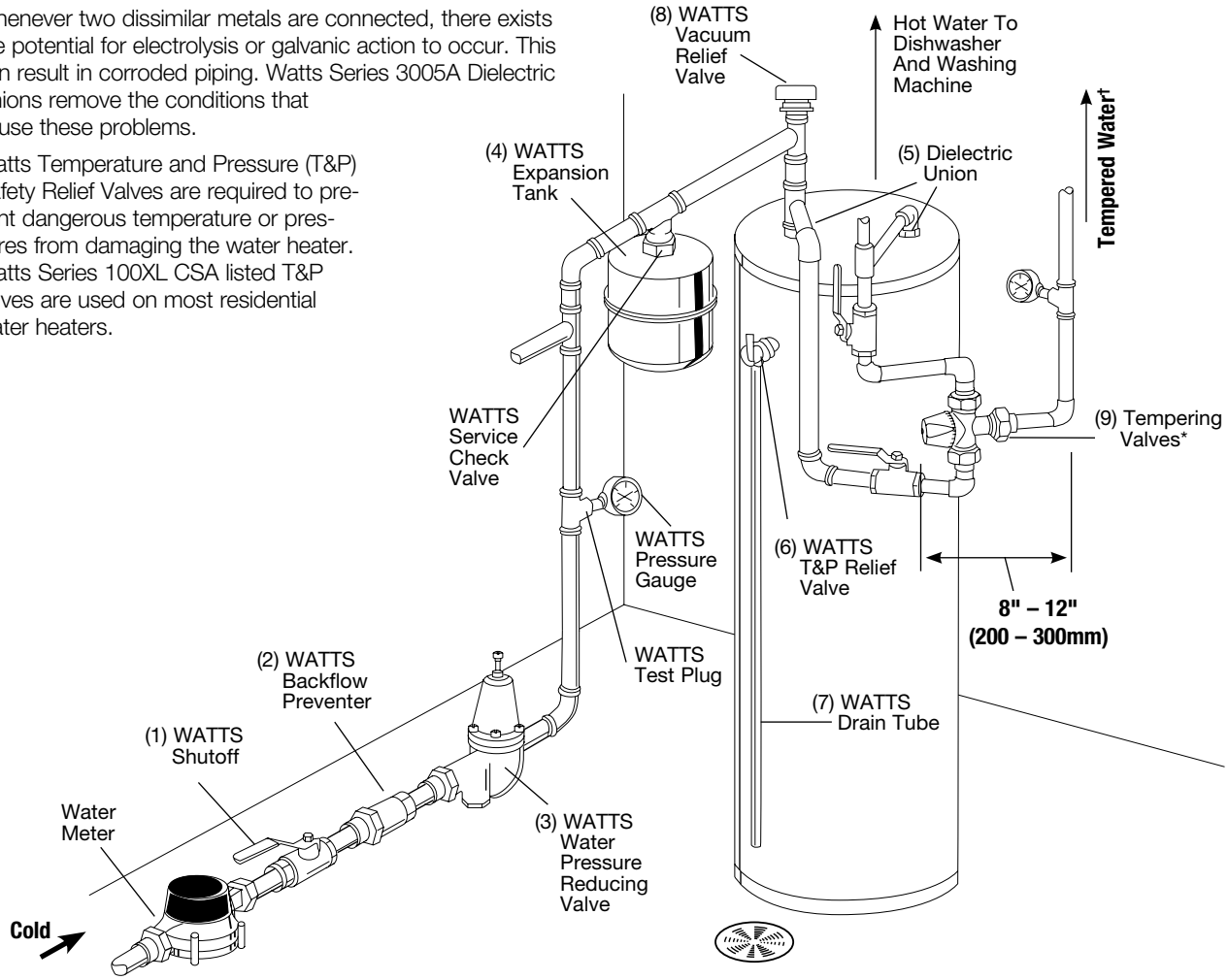
(5) Whenever two dissimilar metals are connected, there exists the potential for electrolysis or galvanic action to occur. This can result in corroded piping. Watts Series 3005A Dielectric Unions remove the conditions that cause these problems.

(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.

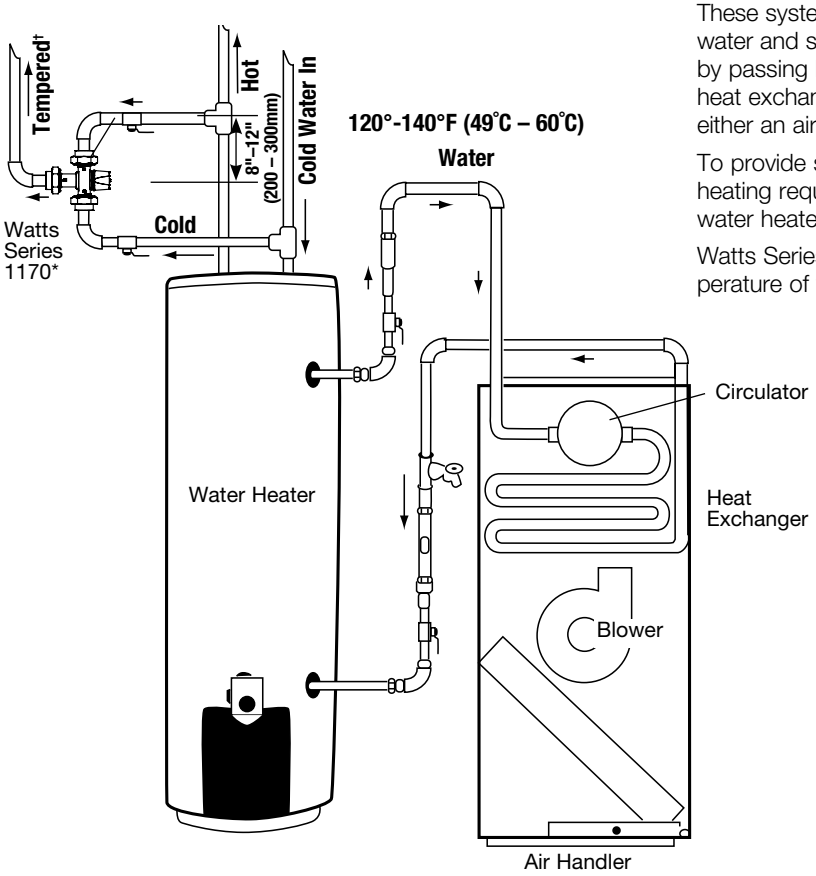
(8) To prevent the water heater tank from collapsing when a water heater or a system is drained and to prevent the siphoning of all of the hot water from the water heater, a vacuum relief valve is required. Use Watts Model N36 CSA Listed Relief Valves.

(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, L1170.



† 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 6 for further information.

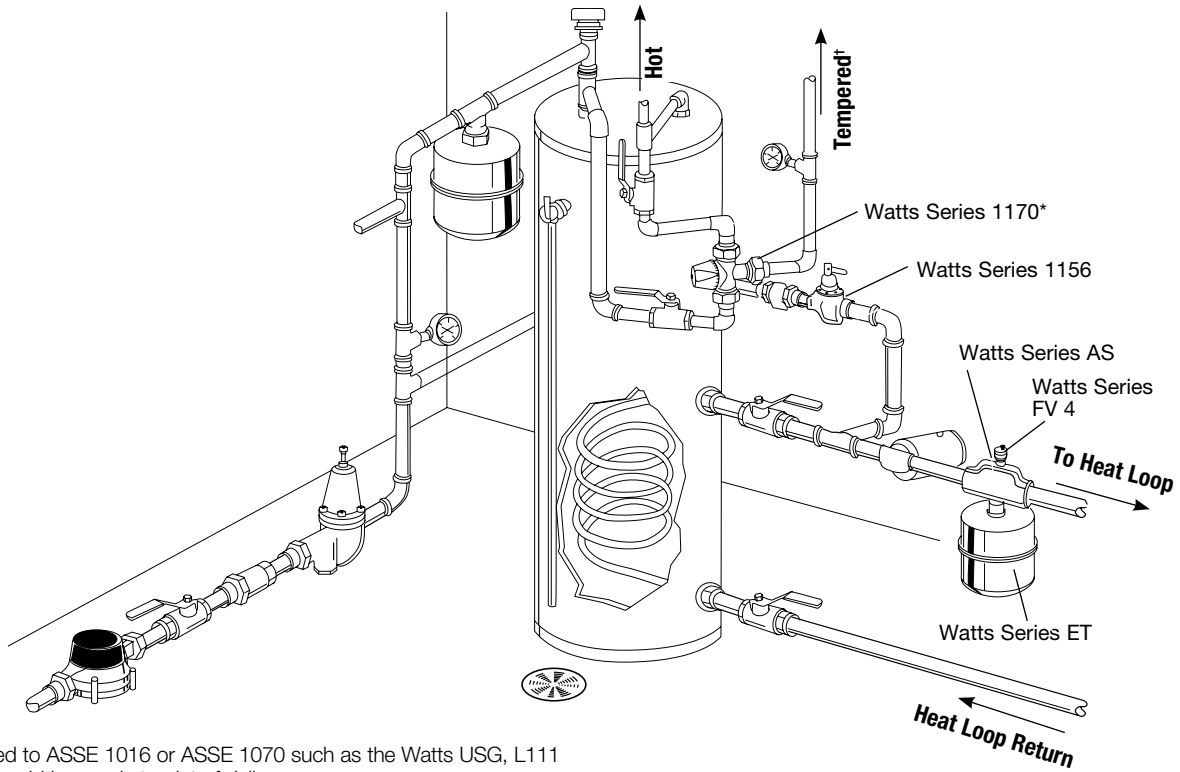
Combination Systems



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 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 6 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, this is 8 to 9gpm (30 – 40 lpm). The minimum flow requirements of the tempering valve must be maintained.

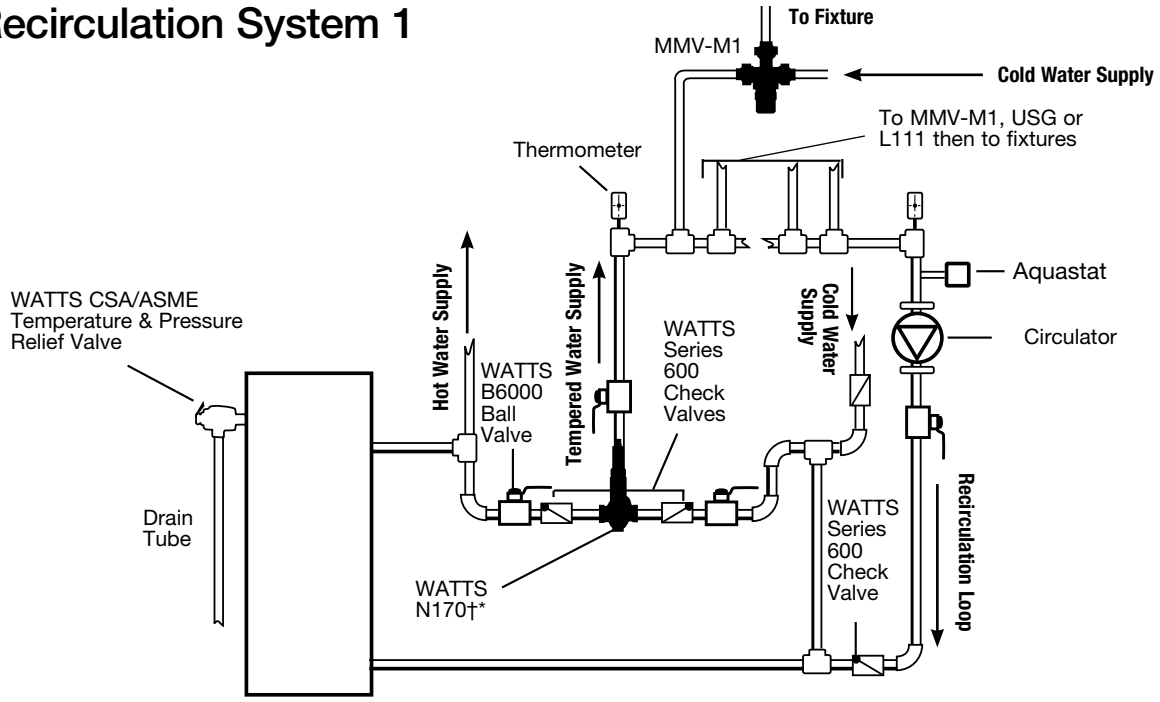
Aquastat - An Aquastat must be used to control the on/off operation of the circulator. The Aquastat is set 5°F to 10°F lower than the mixed water outlet temperature of the tempering valve. The circulator cannot be allowed to run continuously because bypass through the mixing valve will eventually allow 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

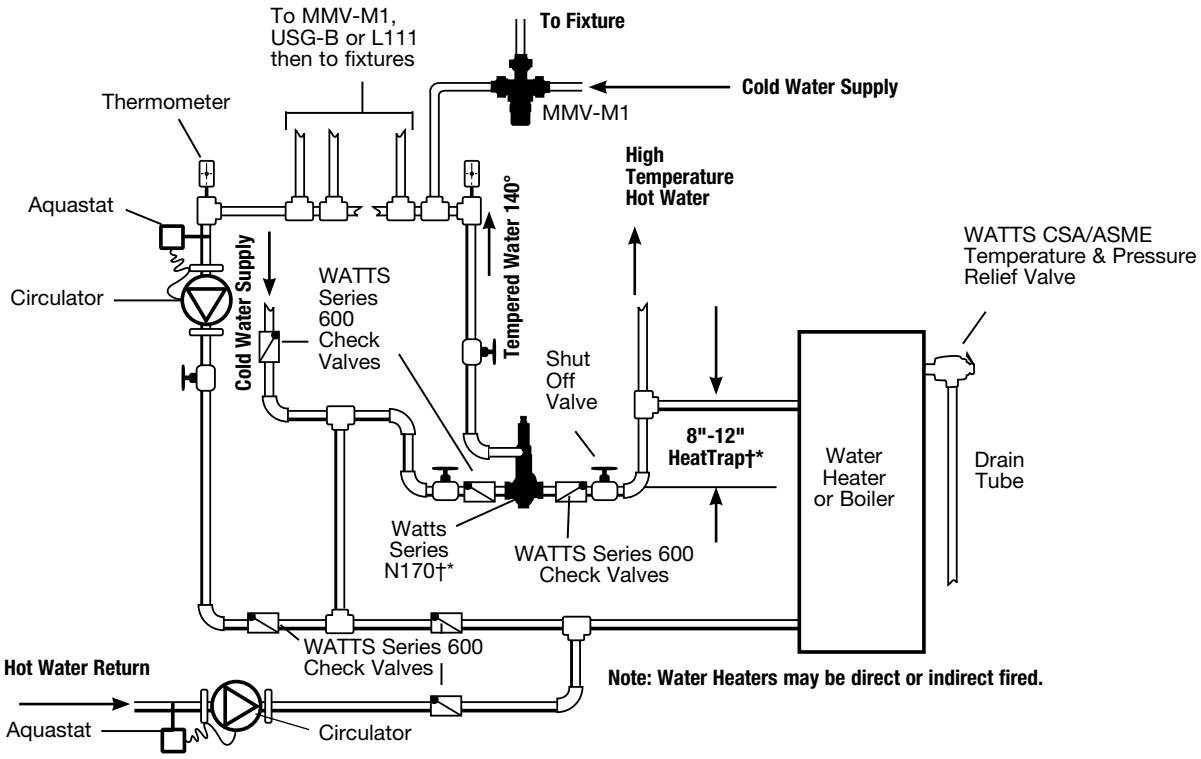
If both high temperature hot water and tempered hot water recirculation is required, a second circulator must be used and piped as shown in Recirculation System 2.

Recirculation System 1



Recirculation System 2

Typical Two Temperature System with High Temperature Hot Water Recirculation Line



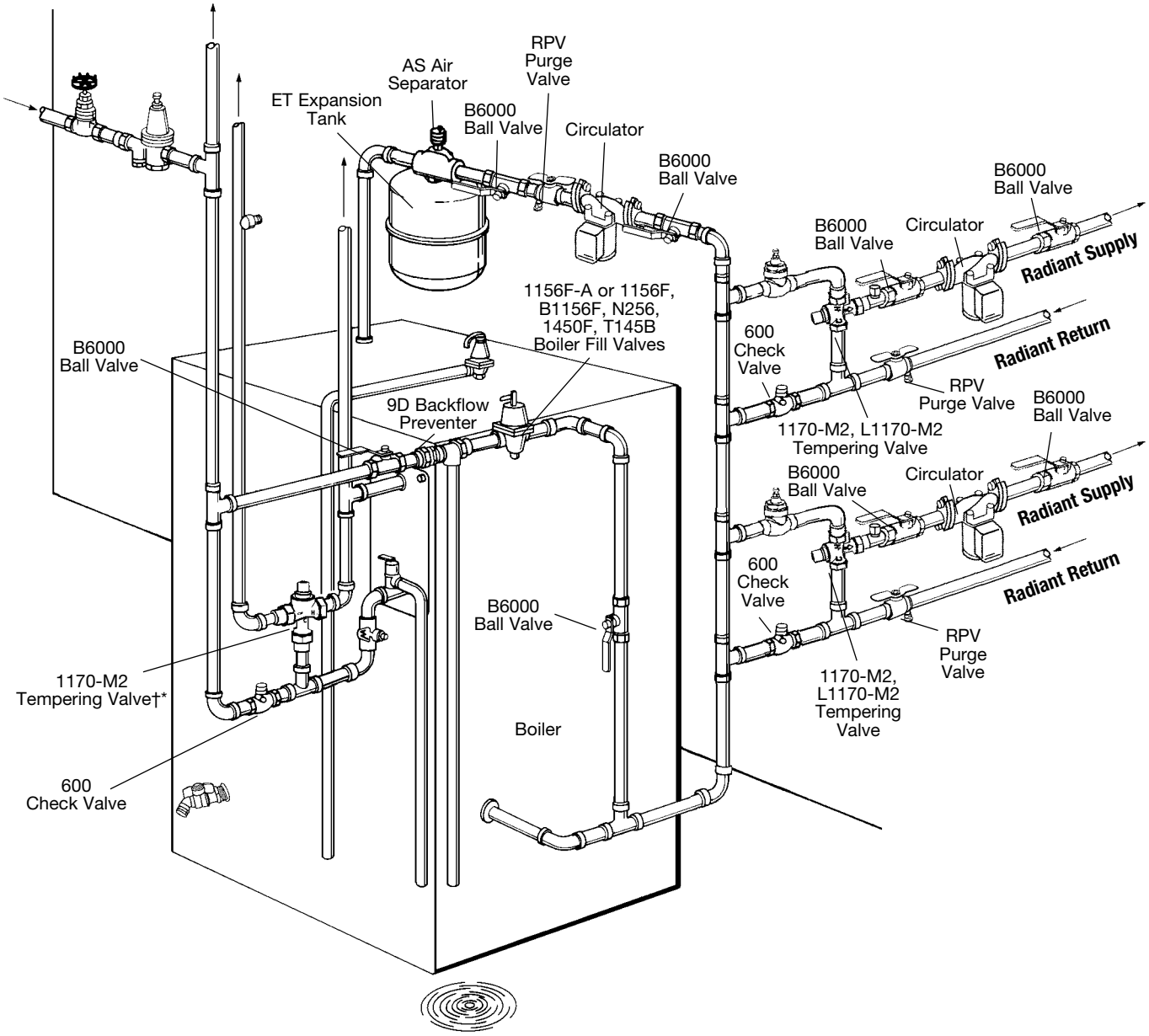
† Valves listed to ASSE 1016 or ASSE 1070 such as the Watts L111, USG or MMV should be used at point of delivery.
* Heat trap is recommended. See page 6 for further information.

Typical Radiant Heat Installation

Thermostatic Tempering 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.

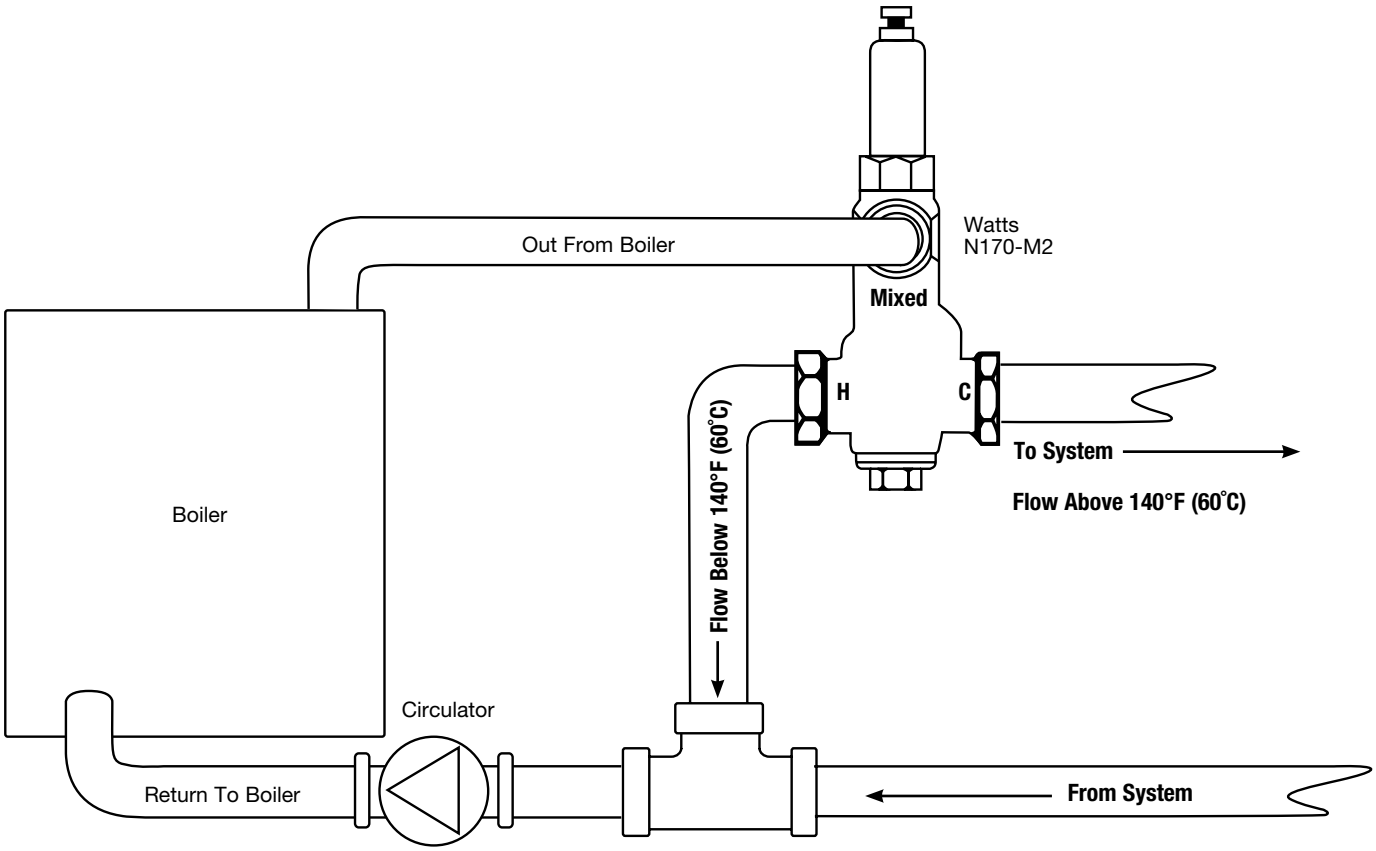
Until the zone/loop circulator is activated there is no flow through the temperature control valve. Upon activation of the circulator, hot boiler water supplied through the recirculation loop enters the hot water inlet of the temperature control valve. Mixed water from the valve at the desired temperature 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 6 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 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.	277 Royal Ave., Hawthorne, NJ 07506	973 427-2898	973 427-4246
	Edwards, Platt & Deely, Inc.	368 Wyandanch Ave., North Babylon, NY 11703	631 253-0600	631 253-0303
	Vernon Bitzer Associates, Inc.	980 Thomas Drive, Warminster, PA 18974	215 443-7500	215 443-7573
	W. P. Haney Co., Inc.	51 Norfolk Ave., South Easton, MA 02375	508 238-2030	508 238-8353
Mid Atlantic	Disney McLane & Associates	428 McGregor Ave., Cincinnati, OH 45206	800 542-1682	877 476-1682
	J. B. O'Connor Company, Inc.	P.O. Box 12927, Pittsburgh, PA 15241	724 745-5300	724 745-7420
	RMI	Glenfield Bus. Ctr., 2535 Mechanicsville Tpk., Richmond, VA 23223	804 643-7355	804 643-7380
	The Joyce Agency, Inc.	8442 Alban Rd., Springfield, VA 22150	703 866-3111	703 866-2332
	WMS Sales, Inc. (Main office)	9580 County Rd., Clarence Center, NY 14032	716 741-9575	716 741-4810
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	Billingsley & Associates, Inc.	478 Cheyenne Lane, Madison, MS 39110	601 856-7565	601 856-8390
	Francisco J. Ortiz & Co., Inc.	Charlyn Industrial Pk., Road 190 KM1.9 - Lot #8, Carolina, Puerto Rico 00983	787 769-0085	787 750-5120
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	Mid-America Marketing, Inc.	1364 Foster Avenue, Nashville, TN 37210	615 259-9944	615 259-5111
	Mid-America Marketing, Inc.	5466 Old Hwy. 78, Memphis, TN 38118	800 365 6154	901 795-0394
	Smith & Stevenson Co., Inc.	4935 Chastain Ave., Charlotte, NC 28217	704 525-3388	704 525-6749
	Harry Warren, Inc.	1400 North Orange Blossom Trail, Orlando, FL 32804	407 841-9237	407 841-9246
	Watts Georgia	2861-B Bankers Industrial Drive, Atlanta, GA 30360	770 209-3310	770 447-4583
North Central	Dave Watson Associates	1325 West Beecher, Adrian, MI 49221	517 263-8988	517 263-2328
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	Soderholm & Associates, Inc.	7150 143rd Ave. N.W., Anoka, MN 55303	763 427-9635	763 427-5665
	Stickler & Associates	333 North 121 St., Milwaukee, WI 53226	414 771-0400	414 771-3607
South Central	Hugh M. Cunningham, Inc.	13755 Benchmark, Dallas, TX 75234	972 888-3808	972 888-3838
	HMC Sandia Group	13755 Benchmark, Dallas, TX 75234	505 222-3134	972 888-3838
	Mack McClain & Associates, Inc.	4407 Meramec Bottom, Suite G, St. Louis, MO 63129	314 894-8188	314 894-8388
	Mack McClain & Associates, Inc.	1450 NE 69th Place, Ste. 56 Ankeny, IA 50021	515 288-0184	515 288-5049
	Mack McClain & Associates, Inc.	15090 West 116th St., Olathe, KS 66062	913 339-6677	913 339-9518
	OK! Sales, Inc.	214 NE 12th. St., Ste A Moore, OK 73160	405 794-5200	405 794-5250
Western	Delco Sales, Inc.	1930 Raymer Ave., Fullerton, CA 92833	714 888-2444	714 888-2448
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	Fanning & Associates, Inc.	6765 Franklin St., Denver, CO 80229-7111	303 289-4191	303 286-9069
	Hollabaugh Brothers & Associates	6915 South 194th St., Kent, WA 98032	253 867-5040	253 867-5055
	Hollabaugh Brothers & Associates	3028 S.E. 17th Ave., Portland, OR 97202	503 238-0313	503 235-2824
	P I R Sales, Inc.	3050 North San Marcos Place, Chandler, AZ 85225	480 892-6000	480 892-6096
	Preferred Sales	30852 Huntwood Ave., Hayward, CA 94544	510 487-9755	510 476-1595
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Canada	Watts Industries (Canada) Inc. (Watts Regulator Co. Division)	5435 North Service Road, Burlington, Ontario L7L 5H7	905 332-4090	905 332-7068
	Con-Cur West Marketing, Inc.	71B Clipper Street, Coquitlam, British Columbia V3K 6X2	604 540-5088	604 540-5084
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	J.D.S. Sales Ltd.	4 Lancaster Street, St. John's, Newfoundland A1A 5P7	709 579-5771	709 579-1558
	Les Ent. Roland Lajoie	6221 Marivaux, St-Leonard, QC H1P 3H6	514 328-6645	514 328-6131
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	RAM Mechanical Marketing Inc.	905 Winnipeg Street, Regina, Saskatchewan S4R 1J1	306 525-1986	306 525-0809
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	Walmar Mechanical Sales	24 Gurdwara Rd., Nepean, Ontario K2E 8B5	613 225-9774	613 225-0673
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USA: 815 Chestnut St., No. Andover, MA 01845-6098; www.watts.com
Canada: 5435 North Service Rd., Burlington, ONT. L7L 5H7; www.wattscanada.ca