CALEFFI

www.caleffi.com

38476.05

Adjustable Three-Way Thermostatic Mixing Valve

521 Series

Installation, commissioning and servicing instructions

ASSE 1017

Function

The thermostatic mixer is used in systems producing domestic hot water or in radiant panels heating systems. Its function is to maintain the temperature of the mixed water supplied to the user constant at the set value when there are variations in the supply conditions of the incoming hot and cold water.
The valve has been specifically certified to ASSE 1017.

Product range

521A Series Three-way thermostatic mixing valve:
"C" models include inlet check valves "519, 619" models include outlet adapter. Union thread NPT Male, sizes 1/2", 3/4",1"; Union Sweat, size 1/2", 3/4", 1".

Technical Characteristics

· Materials:	- Body:	low-lead brass (<0.25% Lead content)
	- Shutter:	PPO
	- Springs:	Stainless steel
	- Seals:	EPDM
· Setting range:		85–150°F (30–65°C)
· Tolerance:		±3°F (±2°C)
· Max working pressure (static):		200 psi (14 bar)
· Max working pressure (dynamic):		70 psi (5 bar)
· Max hot water inlet temperature:		200°F (93°C)
· Maximum inlet pressure ratio (H/C or C/H):		2:1
· Minimum temperature difference between hot water inlet and mixed water outlet for optimum performance:		27°F (15°C)
· Certified to:		ASSE 1017
· Lead Plumbing Law Compliance:		(0.25% Max. weighted average lead content)
· Lead Plumbing Law Certified by IAPMO R&T		

SAFETY INSTRUCTION

This safety alert symbol will be used in this manual to draw attention to safety related instructions. When used, the safety alert symbol means **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED! FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN A SAFETY HAZARD.**

CAUTION: All work must be performed by qualified personnel trained in the proper application, installation, and maintenance of systems in accordance with all applicable codes and ordinances.

CAUTION: If the thermostatic mixer is not installed, commissioned and maintained properly, according to the instructions contained in this manual, it may not operate correctly and may endanger the user.

CAUTION: Make sure that all the connecting pipework is water tight.

CAUTION: When making the water connections, make sure that the mixer connecting pipework is not mechanically over-stressed. Over time this could cause breakages, with consequent water losses which, in turn, could cause harm to property and/or people.

CAUTION: Water temperatures higher than 100°F can be dangerous. During the installation, commissioning and maintenance of the thermostatic mixer, take the necessary precautions to ensure that such temperatures do not endanger people.

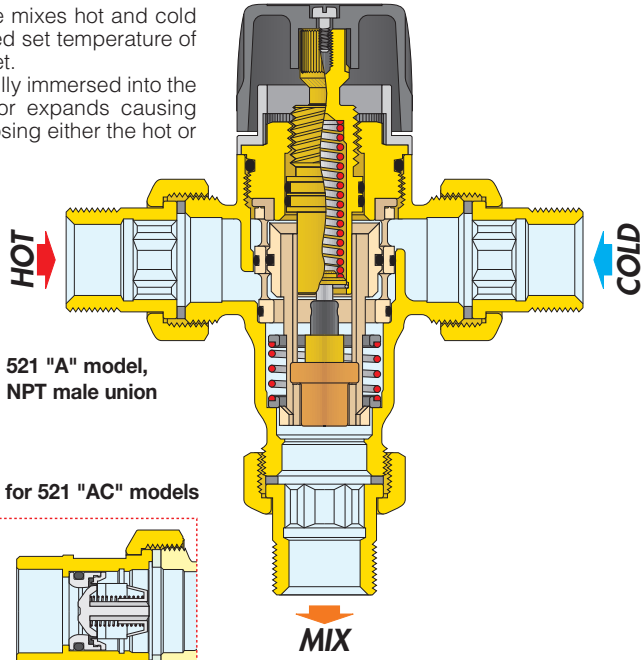
CAUTION: In the case of highly aggressive water, arrangements must be made to treat the water before it enters the thermostatic mixer, in accordance with current legislation. Otherwise the mixer may be damaged and will not operate correctly.

CAUTION: If installing in an ASSE 1017 application, check valves shall be used.

Leave this manual for the user.

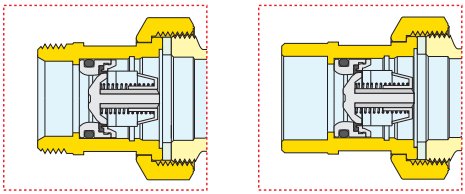
Operating Principle

A thermostatic mixing valve mixes hot and cold water to maintain the desired set temperature of the mixed water at the outlet.
A thermostatic element is fully immersed into the mixed water. It contracts or expands causing movement of the piston, closing either the hot or cold inlets, regulating the flow rates entering the valve.
If there are variations of temperature or pressure at the inlets, the internal element automatically reacts attempting to restore the original temperature setting.



521 "A" model, NPT male union

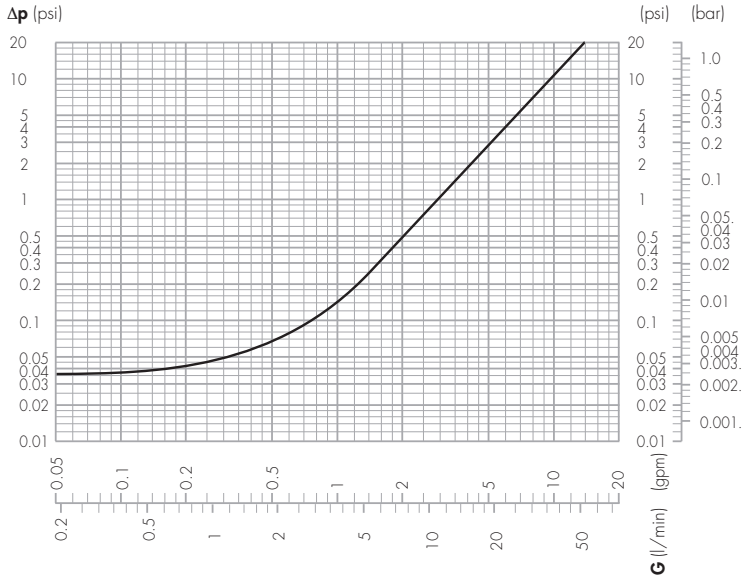
Inlet port check valve detail for 521 "AC" models



Flow curves

Cv = 3.0

Kv = 2.6



Use

Caleffi series 521 thermostatic mixing valves are designed to be installed at the hot water heater. The Caleffi series 521 valve cannot be used for tempering water temperature at fixtures as a point-of-use valve. They are not designed to provide scald protection or anti-chill service. They should not be used where ASSE 1070 devices are required. Wherever an scald protection feature is required, Caleffi series 5213 high performance mixing valve need to be installed. For safety reasons, it is advisable to limit the maximum mixed water temperature to 120°F.

Instantaneous production of hot water

Caleffi Series 521 thermostatic mixers should not be used in conjunction with boilers giving instantaneous production of domestic hot water. Their addition would compromise the correct operation of the boiler itself.

Installation

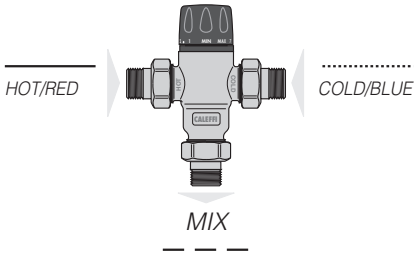
Before installing a Caleffi Series 521 mixer, the system must be inspected to ensure that its operating conditions are within the range of the mixer, checking, for example, the supply temperature, supply pressure, etc.

Systems where the Caleffi Series 521 mixer is to be fitted must be drained and cleaned out to remove any dirt or debris which may have accumulated during installation.
Failure to remove dirt or debris may affect performance and the manufacturer's product guarantee.
The installation of filters of appropriate capacity at the inlet of the water from the mains supply is always advisable.
In areas which are subject to highly aggressive water, arrangements must be made to treat the water before it enters the valve.

Caleffi Series 521 mixers must be installed in accordance with the diagrams in this manual, taking into account all current applicable standards.
Caleffi Series 521 mixers can be installed in any position, either vertical or horizontal.
The following are shown on the mixer body:
- Hot water inlet, colour red and marked “HOT”.
- Cold water inlet, colour blue and marked “COLD”.
- Mixed water outlet, marked “MIX”.

It is essential that access to the valve is totally unobstructed for any maintenance which may be required to the valve or connections. The pipework from/to the valve must not be used to support the weight of the valve itself.

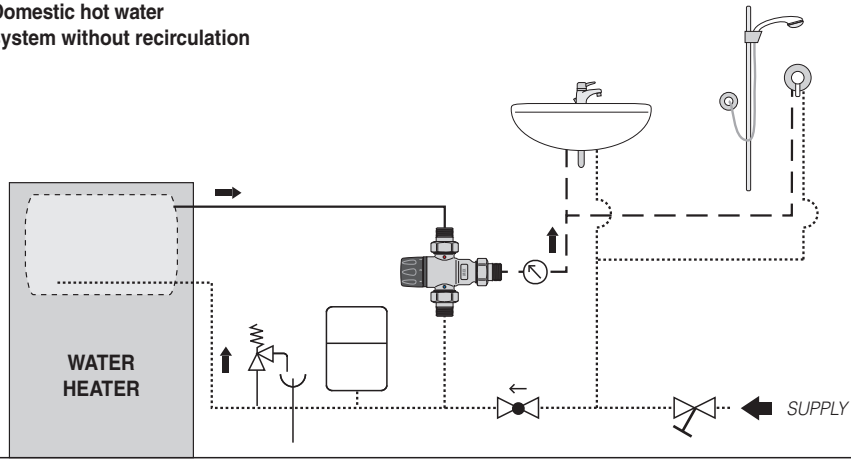
Application Diagrams



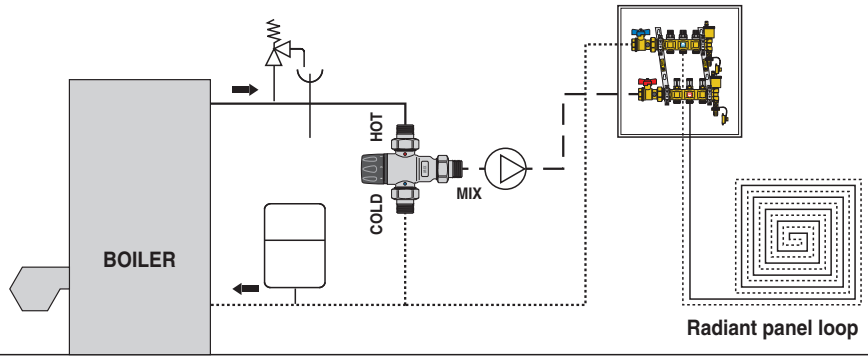
Key to symbols

- *Safety relief valve*
- *Isolation and check valve*
- *Isolation valve*
- *Expansion vessel*
- *Filter*

Domestic hot water system without recirculation



Radiant panels heating system



Commissioning

After installation, the valve must be tested and commissioned in accordance with the instructions given below, taking into account current applicable standards.

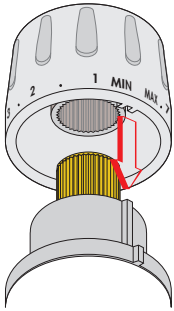
1) Ensure that the system is clean and free from any dirt or debris before commissioning the thermostatic mixer.
2) It is recommended that the temperature is set using a suitable calibrated digital thermometer. The valve must be commissioned by measuring the temperature of the mixed water emerging at the point of use.
3) The maximum outlet temperature from the valve must be set taking account of the fluctuations due to simultaneous use. It is essential for these conditions to be stabilised before commissioning.
4) Adjust the temperature using the adjusting knob on the valve. For safety reasons, it is advisable to limit the maximum mixed water temperature to 120°F in domestic hot water systems.

Setting the temperature

The temperature is set to the required value by means of the adjusting knob with the graduated scale on the top of the valve.

Pos.	Min	1	2	3	4	5	6	7	Max
T (°F)	81	90	100	111	120	127	136	145	152
T (°C)	27	32	38	44	49	53	58	63	67

with: T_{HOT} = 155°F (68°C) · T_{COLD} = 55°F (13°C) · P = 43 psi (3 bar)



Preset locking

Position the handle to the number required. Unscrew the head screw, pull off the handle and reposition it so that the handle fits into the internal slot of the knob. Tighten the head screw.

Maintenance

In service tests should be carried out regularly to monitor the mixer performance, as deterioration of performance could indicate that the valve and/or the system require maintenance. If, during these tests, the temperature of the mixed water has changed significantly in comparison with the previous test, the details given in the installation and commissioning sections should be checked and maintenance carried out.
The following aspects should be checked regularly to ensure that the optimum performance levels of the valve are maintained. Every 12 months at least, or more often if necessary.

1) Check and clean the system filters.
2) Check that any non-return valves positioned upstream of the Caleffi valve are operating correctly, without problems caused by impurities.
3) The Caleffi valve should not be dismantled. Limescale can be removed from internal components by immersion in a suitable de-scaling fluid.
4) When the components which can be maintained have been checked, commissioning should be carried out again.

Item Description	Item Qty per Valve	1/2 inch		3/4 inch		1 inch	
		NPT	Sweat	NPT	Sweat	NPT	Sweat
		521400A, AC	521409A, AC	521500A,AC	521509A,AC 521519A,AC	521600A,AC	521609A,AC 521619A,AC
Union Washer	3	R50055					
Union Nut 1"	3	R61008					
Male Tailpieces	3	R31981	NA10002	31901A	NA10003 (2 only-'519')	59817A*	59834A* (2 only-'619')
Inlet Male Tailpiece with Check Valve- "AC" Models only	2	59893A	59904A	59840A	59905A	59894A	59906A
Outlet Tailpiece- "AC" Models only	1	R31981	NA10002	31901A	NA10003	59817A*	59834A*
Outlet Adapter with temperature gage	1	----	----	----	NA10056	----	NA10058

**Tailpiece fitting with integral union nut. 1" NPT and Sweat models require only 2 separate 1" union nuts (R61008)*

Troubleshooting

Under normal operating conditions the Caleffi 521 series thermostatic mixing valve will provide a very high level of performance. However, in some circumstances, where our maintenance plan is not followed, the following problems may arise.

Symptom	Cause	Corrective action
Hot water at the cold taps	a) Operation of check valve is hindered; check valve is not sealing correctly. b) Check valves not fitted.	• Replace faulty check valves
Fluctuating mixed water temperature	a) Erratic supply temperatures at the inlets of the valve. b) Starvation of the water supplies at the inlets of the valve. c) Incorrect commissioning of the valve.	• Restore inlet conditions within the limits of the valve.
Erratic flow of water from the valve	a) Insufficient water supplies. b) Fluctuations in supply pressures/temperatures. c) Adverse effect created by other draw off points on the system.	• Stabilise inlet supply conditions.
No flow of water from the valve	a) In-line filters blocked. b) Insufficient supply pressures. c) Debris obstructing valve operation.	• Clean filters. • Restore inlet supplies. • Clean debris or scale from valve.

Caleffi North America, Inc.
3883 West Milwaukee Road
Milwaukee, WI 53208
T: 414.238.2360 F: 414.238.2366