

MixCal™ adjustable three-way thermostatic mixing valve

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521 Series

Installation, commissioning and servicing instructions



Function

The Caleffi MixCal™ three-way thermostatic mixing valve is used in systems producing domestic hot water or in hydronic and radiant heating systems. It maintains the desired output temperature of the mixed water supplied to the user at a constant set value compensating for both temperature and pressure fluctuations of incoming hot and cold water. The MixCal is fail cold: for any failure of cold or hot inlets or valve function, the hot water port closes.

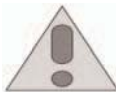
Product range

521A Series Three-way thermostatic mixing valve:

“C” models include inlet check valves “519, 619” models include outlet gauge 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, seats and sliding guides:	PPO
	-Springs:	Stainless steel
	-Seals:	EPDM
Suitable fluids:		water, 30% max glycol solution
-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)
-Minimum flow rate to ensure optimal performance:		1.3 GPM (5 L/min)
-Certified to:		ASSE 1017
-Lead Plumbing Law Compliance:		0.25% Max. weighted average lead content)
-Lead Plumbing Law Certified by IAPMO R&T		

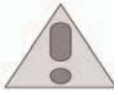


SAFETY INSTRUCTION

This safety alert symbol will be used in this manual to draw attention to safety related instructions. When used, the safety 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.



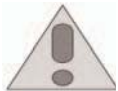
CAUTION: If the thermostatic mixing valve is not installed, commissioned and maintained properly, according to the instructions contained in this manual, it may not operate correctly and may endanger the user.



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



CAUTION: When making the water connections, make sure that the pipework connecting the MixCal thermostatic mixing valve is not mechanically overstressed. 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 (38°C) can be dangerous. During the installation, commissioning and maintenance of the MixCal thermostatic mixing valve, 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 mixing valve, in accordance with current legislation. Otherwise the thermostatic mixing valve may be damaged and will not operate correctly.

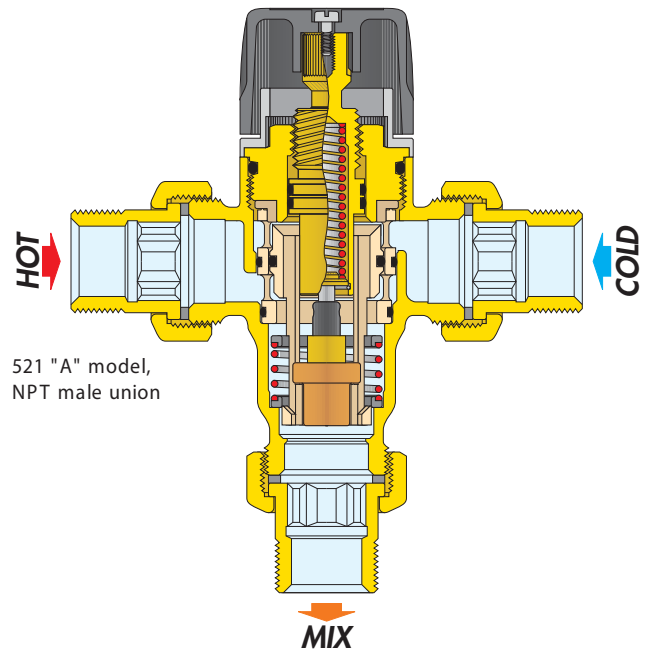


CAUTION: If installed in an ASSE 1017 application, check valves shall be used.

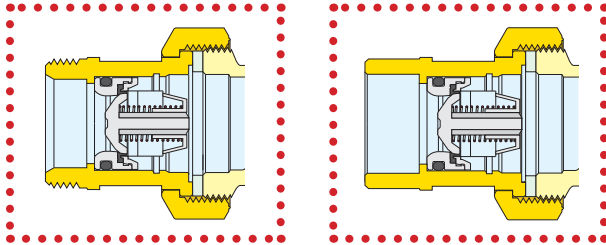
Leave this manual for the user.

Operating principle

The controlling element of the three-way thermostatic mixing valve is a thermostatic sensor fully immersed in the mixed water outlet tube which, as it expands or contracts, continuously establishes the correct proportion of hot and cold water entering the valve. The regulation of these flows is by means of a piston sliding in a cylinder between the hot and cold water passages. Even when there are pressure drops due to the drawing off of hot or cold water for other uses, or variations in the incoming temperature, the thermostatic mixing valve automatically regulates the water flow to obtain the required temperature.

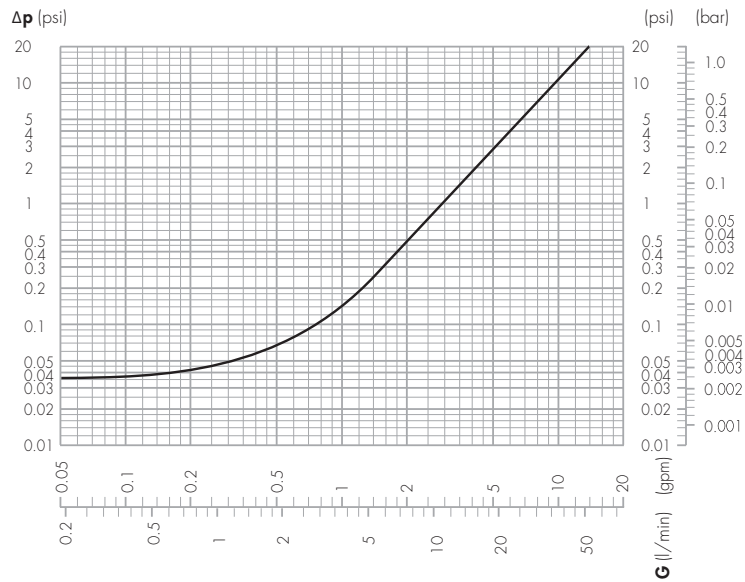


Inlet port check valve detail for 521 "AC" models



Flow curves

$C_v = 3.0$
 $K_v = 2.6$



Use



Caleffi MixCal series 521 thermostatic mixing valves are designed to be installed at the hot water heater. The Caleffi Mix Cal 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 a scald protection feature is required, Caleffi series 5213 high performance mixing valve needs 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 MixCal series 521 thermostatic mixing valves 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

NOTE TO INSTALLER: The Caleffi MixCal series 521 thermostatic mixing valve should be installed by qualified personnel, in accordance with local codes and ordinances. It is the responsibility of the installer to properly select, install and adjust this thermostatic mixing valve as specified in these instructions.

Before installing a Caleffi MixCal series 521 thermostatic mixing valve, the system must be inspected to ensure that it's operating conditions are within the range of the thermostatic mixing valve checking, for example, the supply temperature, supply pressure, etc.



Systems where the Caleffi MixCal series 521 thermostatic mixing valve is to be installed 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 area which are subject to highly aggressive water, arrangements must be made to treat the water before it enters the valve.

Internal controlling components shall be accessible for repair without disturbing the pipe connections.

Caleffi MixCal series 521 thermostatic mixing valves must be installed in accordance with the diagrams in this manual, taking into account all current applicable standards.

Caleffi Mix Cal series 521 thermostatic mixing valves can be installed in any position, either vertical or horizontal.

The following are shown on the mixer body:

- Hot water inlet, color red and marker "HOT".
- Cold water inlet, color blue and marker "COLD".
- Mixed water outlet, marker "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.

Check valves

In order to prevent undesirable backsiphonage, separate check valves should be installed in systems with code "521 A" model thermostatic mixing valves (these models do not contain integral check valves in the hot and cold inlet ports). As a convenience for easier installations, the Caleffi code "521 AC" model series thermostatic mixing valves include integral check valves in the hot and cold inlet ports.

NOTE TO INSTALLER: If the check valve is already installed in the tailpiece, remove the check valve and o-ring from the brass tailpiece before soldering the tailpiece into place. Attach the o-ring to the check valve and install into tailpiece, pushing in until it bottoms out inside the tailpiece.

Commissioning

As In view of the special purpose of the thermostatic mixing valve, it must be commissioned in accordance with current standards by qualified personnel using temperature measuring equipment, Caleffi codes 521519A and 521619A with integral outlet port temperature gauges provide a time-saving temperature setting process to get close to the desired temperature. Use of a digital thermometer is recommended for determining the final setting of the mixed water temperature.

NOTE: Gauge adapters with 2" diameter, 20-210°F scale, code NA10056 (3/4" sweat) or NA10058 (1" sweat) can be separately purchased and field installed to the Caleffi MixCal series 521 models sold without the integral gauge adapters.

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

- 1) Ensure that the system is clean and free from 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.

Temperature adjustment

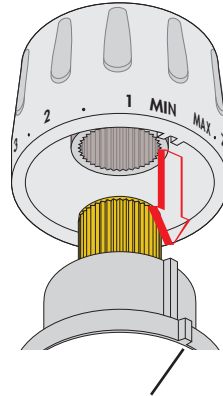
The temperature is set to the required value by means of the knob with a graduated scale, on the top of the valve.

Pos.	Min.	1	2	3	4	5	6	7	Max
T (°F)	81	90	100	111	120	127	138	145	152
T (°C)	27	32	38	44	49	53	58	63	67

with: $T_{Hot} = 155^{\circ}F (68^{\circ}C)$. $T_{Cold} = 55^{\circ}F (13^{\circ}C)$. $P = 43 \text{ psi (3 bar)}$

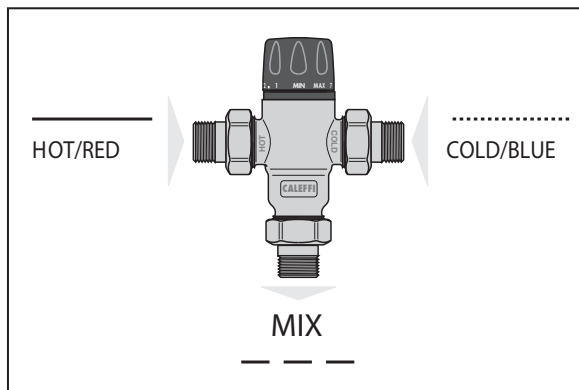
Locking the setting

Position the handle to the number required with respect to the index point. 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.

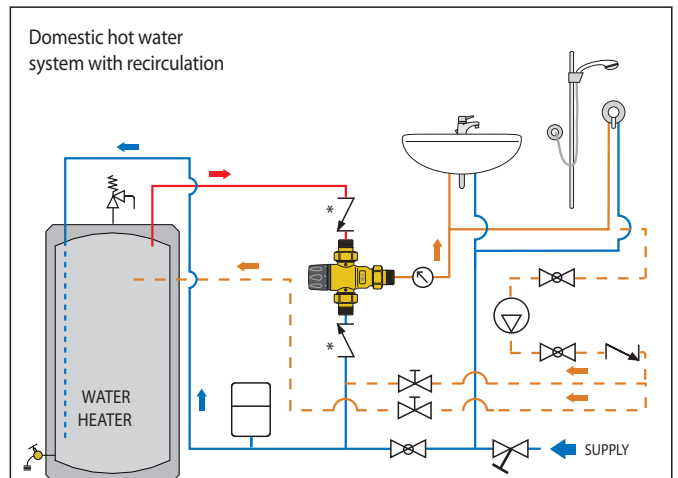
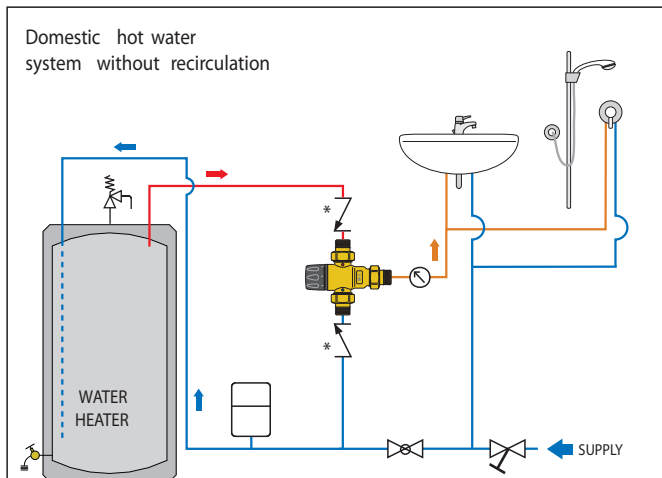
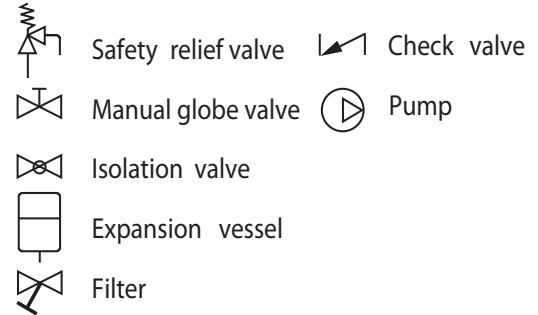


Index Point

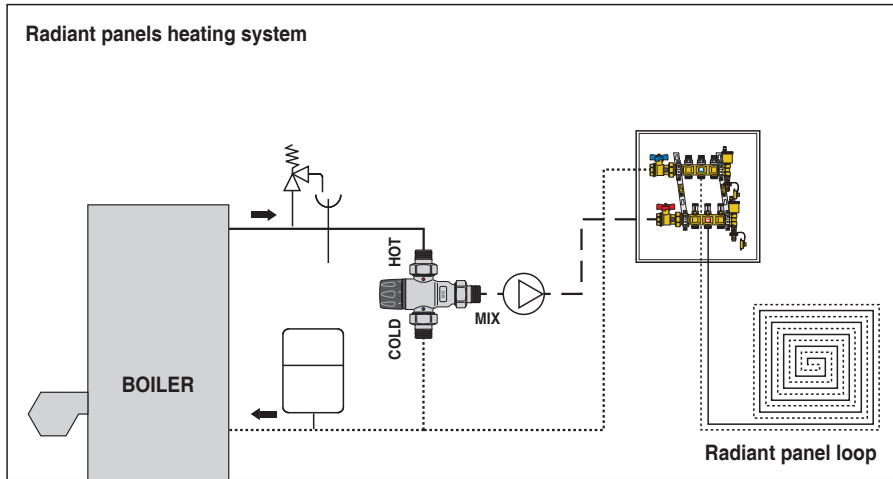
Application Diagrams



Key to symbols



*MixCal series 521 thermostatic mixing valves with inlet check valves, "AC" models, can be used instead of separately installed check valves.



Item Description	Item Qty per Valve	1/2 inch		3/4 inch		1 inch	
		NPT 521400A, AC	Sweat 521409A, AC	NPT 521500A, AC	Sweat 521509A, AC 521519A, AC	NPT 521600A, AC	Sweat 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 gauge	1	----	NA10056	----	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 thermostatic mixing valve will provide a very high level of performance. However, in some circumstances, where our maintenance plan is not followed 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.	· Stabilize 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.



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