

# MIXCAL™ Adjustable three-way thermostatic mixing valve

## series 521



01050/10 NA

Replaces 01050/03 NA



**LOW LEAD**



### 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 the incoming hot and cold water.

The valve has been specifically certified to ASSE 1017 and IAPMO R&T.



ASSE 1017



Lead Plumbing Law Certified by IAPMO R&T

### Product range

- 521\_\_A Adjustable three-way thermostatic mixing valve, threaded and sweat connections \_\_\_\_\_ sizes 1/2", 3/4", 1"
- 521\_\_AC Adjustable three-way thermostatic mixing valve, threaded and sweat connections, inlet port check valves \_\_\_\_\_ sizes 1/2", 3/4", 1"
- 521519A,(AC) Adjustable three-way thermostatic mixing valve, sweat connections, outlet temperature gage (check valves) \_\_\_\_\_ size 3/4"
- 521619A,(AC) Adjustable three-way thermostatic mixing valve, sweat connections, outlet temperature gage (check valves) \_\_\_\_\_ size 1"

### Technical specification

- 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)

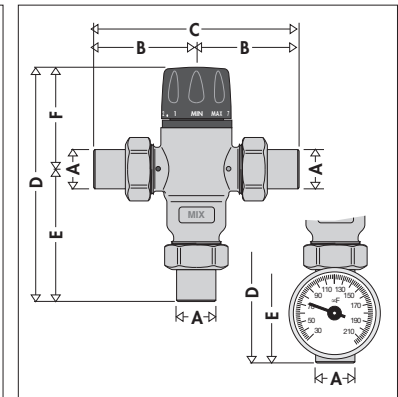
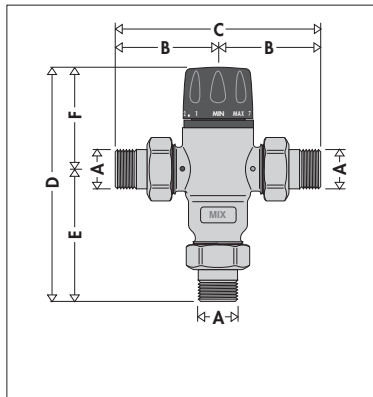
Max working pressure (static): 200 psi (14 bar)  
Max working pressure (dynamic): 70 psi (5 bar)  
Max hot water inlet temperature: 200°F (93°C)  
Maximum inlet pressure ratio (H/C or C/H): 2:1  
Minimum temperature difference between hot water inlet and mixed water outlet for optimum performance: 27°F (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

Connections: 1/2"–1" NPT male with union  
1/2"–1" sweat with union

### Dimensions



Code	A	B	C	D	E	F
521400A	1/2"	2 5/8"	5 1/4"	5 15/16"	3 3/8"	2 9/16"
521400AC	1/2"	2 5/8"	5 1/4"	5 15/16"	3 3/8"	2 9/16"
521500A	3/4"	2 5/8"	5 1/4"	5 15/16"	3 3/8"	2 9/16"
521500AC	3/4"	3"	6"	5 15/16"	3 3/8"	2 9/16"
521600A	1"	2 7/8"	5 3/4"	6 1/4"	3 11/16"	2 9/16"
521600AC	1"	3 1/16"	6 1/8"	6 1/4"	3 11/16"	2 9/16"

Code	A	B	C	D	E	F
521409A	1/2"	2 1/4"	4 1/2"	5 5/8"	3 1/16"	2 9/16"
521409AC	1/2"	2 7/8"	5 3/4"	5 5/8"	3 1/16"	2 9/16"
521509A	3/4"	2 1/2"	5"	5 13/16"	3 1/4"	2 9/16"
521519A	3/4"	2 1/2"	5"	7 3/16"	4 5/8"	2 9/16"
521509AC	3/4"	3 1/16"	6 1/8"	5 13/16"	3 1/4"	2 9/16"
521519AC	3/4"	3 1/16"	6 1/8"	7 3/16"	4 5/8"	2 9/16"
521609A	1"	3 1/16"	6 1/8"	6 7/16"	3 7/8"	2 9/16"
521619A	1"	3 1/16"	6 1/8"	7 13/16"	5 1/4"	2 9/16"
521609AC	1"	3 1/4"	6 1/2"	6 7/16"	3 7/8"	2 9/16"
521619AC	1"	3 1/4"	6 1/2"	7 13/16"	5 1/4"	2 9/16"

## Legionella-scalding risk

In systems producing domestic hot water with storage, in order to avoid the dangerous infection known as *Legionella*, the hot water must be stored at a temperature of at least 140°F. At this temperature it is certain that the growth of the bacteria causing this infection will be totally eliminated. At this temperature, however, the water cannot be used directly. As shown on the diagram opposite, temperatures of more than 120°F can cause burning very quickly. For example, at 130°F partial burning will occur in approximately 30 seconds, while at 140°F partial burning will occur in approximately 5 seconds. The time may be reduced by 50 percent or more for children and elderly people.

In view of the above, it is necessary to install a thermostatic mixing valve which can:

- reduce the temperature at the point of use to a value lower than that of storage and suitable for sanitary users. For safety reasons, it is advisable to limit the mixed water temperature to 120°F;
- maintain the temperature constant when the incoming pressure and temperature conditions vary.

## 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.

## Construction details

### Anti-scale materials

The material used in the construction of the thermostatic mixing valve eliminates the problem of jamming caused by lime deposits. All the working parts such as shutter, seats and slide guides are made of a special anti-scale material, with a low friction coefficient, guaranteeing that the performance will be maintained over the long term.

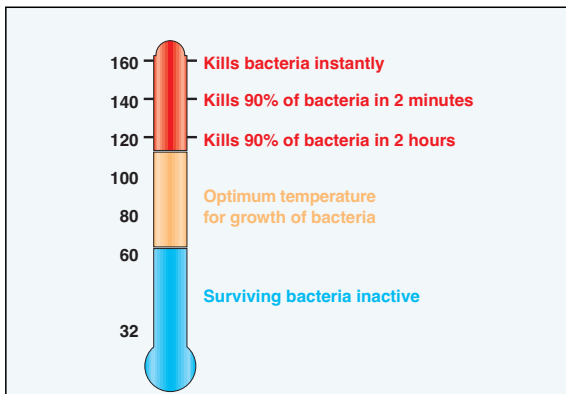
### Temperature setting and locking

The control knob permits temperature setting between minimum and maximum in one turn (360°). It also has a tamper-proof system to lock the temperature at the set value.

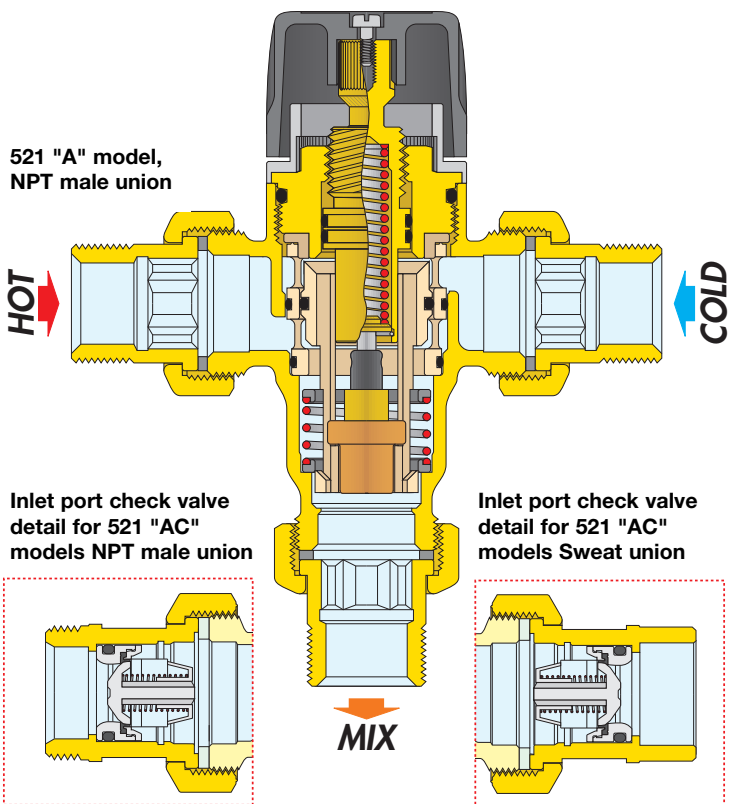
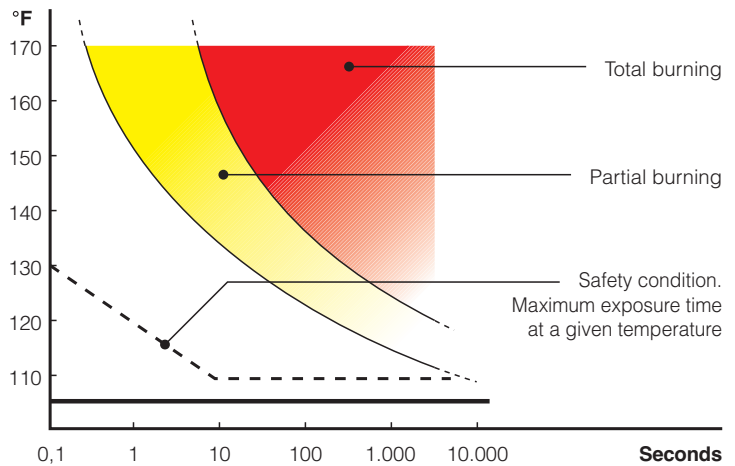
## Thermal disinfection

The diagram shows the behaviour of the bacteria *Legionella Pneumophila* when the temperature conditions of the water in which it is contained vary.

In order to ensure proper thermal "disinfection", the values must not be below 140°F.



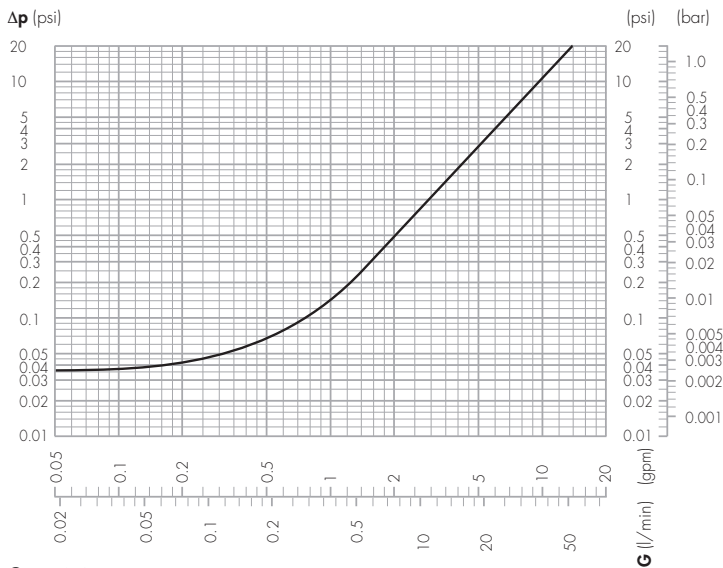
## Temperature - Exposure time



Item Description	Item Qty. per Valve	1/2 inch		3/4 inch		1 inch	
		NPT	Sweat	NPT	Sweat	NPT	Sweat
Union Washer	3	521400A, AC	521409A, AC	521500A, AC	521509A, AC 521519A, AC	521600A, AC	521609A, AC 521619A, AC
Union Nut 1"	3	R50055					
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)

## Flow curve



$C_v = 3.0$   
 $K_v = 2.6$

## Use

Caleffi MIXCAL series 521 thermostatic mixing valves are designed to be installed at the hot water heater. The Caleffi 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 chill protection 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 valves 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

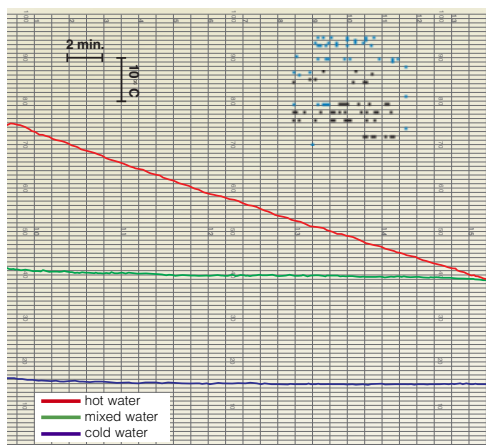
Caleffi MIXCAL Series 521 thermostatic mixing valves should not be used in conjunction with boilers giving instantaneous production of domestic hot water. Their addition would compromise the correct operation of the boiler itself.

## Radiant panel heating systems

Caleffi MIXCAL Series 521 thermostatic mixing valves can also be used for regulating the flow temperature in hydronic and radiant heating systems, to which it assures a constant and accurate control with ease of installation.

## Temperature stability

The diagram shows the stability of the temperature of the mixed water on variation of the temperature of the stored water.



## Installation

Before installing a Caleffi MIXCAL Series 521 three-way thermostatic mixing valve, the system must be inspected to ensure that its operating conditions are within the range of the mixing valve, checking, for example, the supply temperature, supply pressure, etc.

Systems where the Caleffi Series 521 thermostatic mixing valve is to be fitted must be drained and cleaned out to remove any dirt or debris which may have accumulated during installation.

The installation of filters of appropriate capacity at the inlet of the water from the mains supply is always advisable.

Caleffi Series 521 thermostatic mixing valves must be installed by qualified personnel in accordance with the diagrams in this brochure, taking into account all current applicable standards.

Caleffi Series 521 thermostatic mixing valves can be installed in any position, either vertical or horizontal, or upside down.

The following are shown on the thermostatic mixing valve body:

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

## Check valves

In order to prevent undesirable backsiphonage, check valves should be installed in systems with thermostatic mixing valves. As a convenience for easier installations, the Caleffi 521 "AC" series thermostatic mixing valves include integral check valves in the hot and cold inlet ports.

## Commissioning

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 521519A and 521619A with integral outlet port temperature gages 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.

## Temperature adjustment

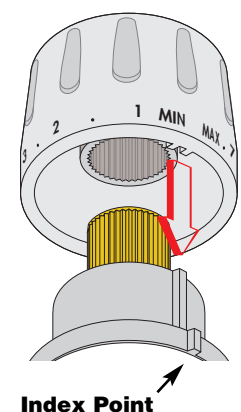
The temperature is set to the required value by means of the knob with the graduated scale, on the top of the valve.

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

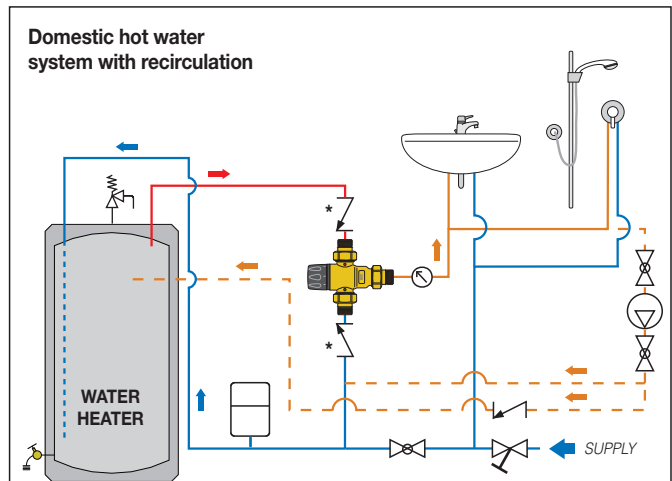
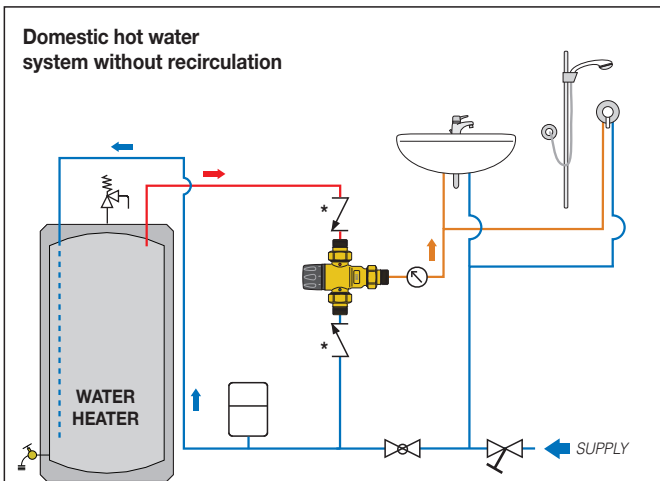
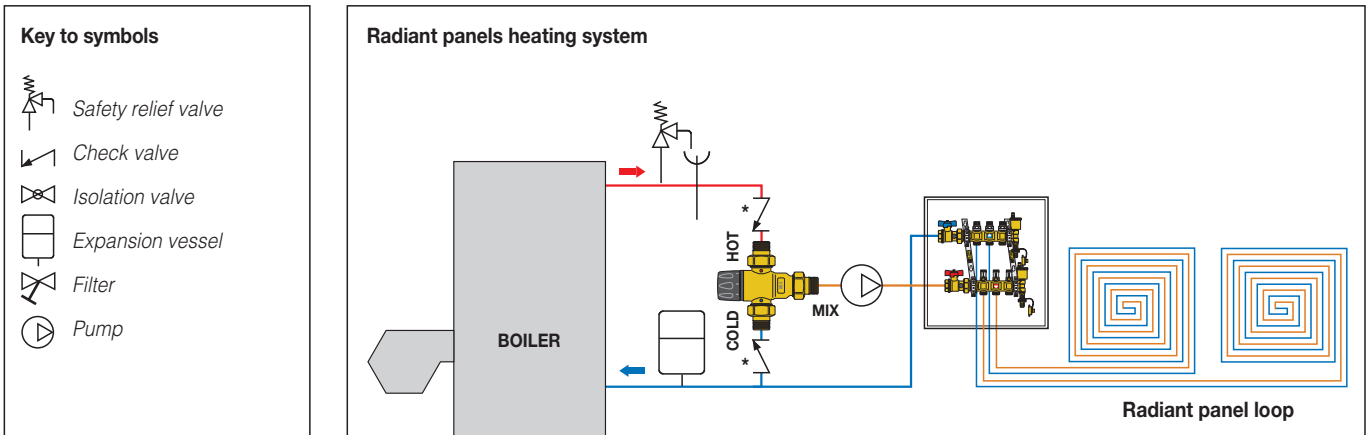
with:  $T_{HOT} = 155^{\circ}F (68^{\circ}C)$  ·  $T_{COLD} = 55^{\circ}F (13^{\circ}C)$  ·  $P = 43 \text{ psi (3 bar)}$

## 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.



**Application diagrams**



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

**SPECIFICATION SUMMARIES**

**Series 521**

Adjustable thermostatic mixing valve to ASSE 1017. Threaded connections 1/2" (3/4" or 1") NPT M with union tailpieces. Low-lead brass body (<0.25% Lead content) certified by IAPMO R&T. Shutter, regulating seats and sliding surfaces in anti-scale plastic. Seals EPDM. Stainless steel spring. Maximum working temperature 200°F. Setting range 85°F to 150°F. Maximum working pressure 200 psi. Tolerance ±3°F. Provided with tamper-proof setting lock.

**Series 521**

Adjustable thermostatic mixing valve to ASSE 1017. Sweat connections 1/2" (3/4" or 1") with union tailpieces. Low-lead brass body (<0.25% Lead content) certified by IAPMO R&T. Shutter, regulating seats and sliding surfaces in anti-scale plastic. Seals EPDM. Stainless steel spring. Maximum working temperature 200°F. Setting range 85°F to 150°F. Maximum working pressure 200 psi. Tolerance ±3°F. Provided with tamper-proof setting lock.

*We reserve the right to change our products and their relevant technical data, contained in this publication, at any time and without prior notice.*

