Adjustable, anti-scale thermostatic mixing valve

series 521

cert. n° 0003 ISO 9001

01050/02 GB

replaces 01050/01 GB

Function

The thermostatic mixing valve is used in systems producing domestic hot water.
Its function is to maintain the temperature of the mixed water sent to the user constant at the set value when there are variations in the temperature and supply pressure of the hot water and incoming cold water or in the flow rate.

These devices are also available with connections complete with filters and check valves on the hot and cold water inlets.

WRAS APPROVED PRODUCT

Product range

Code 521400/500	Thermostatic mixing valve	Sizes 1/2", 3/4"
Code 521503	Thermostatic mixing valve with check valves on the inlets	Size 3/4"
Code 521115/122	Thermostatic mixing valve with filters and check valves on the inlets	Sizes Ø 15 mm and Ø 22 mm for copper pipe

Technical specification

- Materials: - Body: DZR brass CR EN 12165 CW602N, chrome plated
- Shutter: PPO
- Springs: stainless steel
- Seals: EPDM

Temperature setting range: 30÷65°C
Temperature stability: ±2°C

Max working pressure (static): 14 bar
Max working pressure (dynamic): 5 bar
Max inlet temperature: 85°C

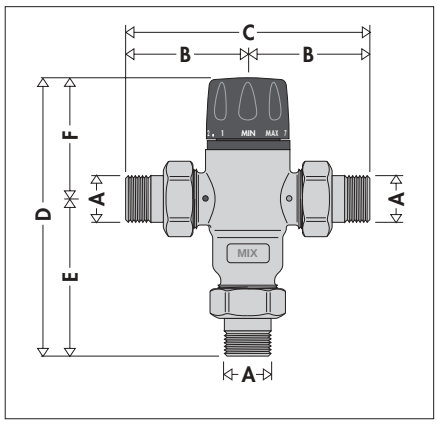
Max inlet pressure ratio (H/C or C/H): 2:1

Min temperature difference between hot water inlet and mixed water outlet for optimum performance: 15°C

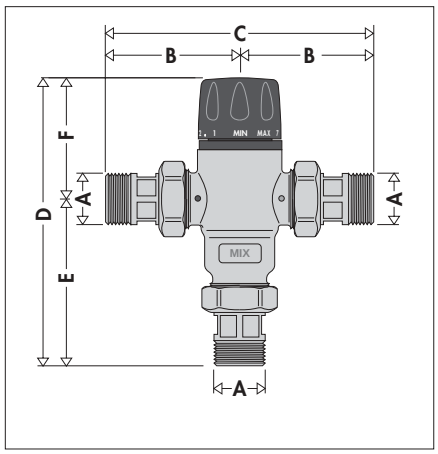
Complying with EN 1287.

Connections: - 1/2" and 3/4" M with union tailpiece
- Ø 15 mm and Ø 22 mm compression

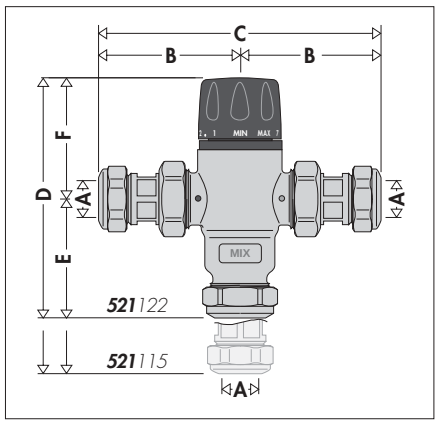
Dimensions



Code	A	B	C	D	E	F
521400	1/2"	67	134	152	86,5	65,5
521500	3/4"	67	134	152	86,5	65,5



Code	A	B	C	D	E	F
521503	3/4"	71,5	143	156,5	91	65,5



Code	A	B	C	D	E	F
521115	Ø 15	79	158	163,5	98	65,5
521122	Ø 22	80,5	161	132	66,5	65,5

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 60°C. 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 50°C can cause burning very quickly. For example, at 55°C partial burning will occurr in approximately 30 seconds, while at 60°C partial burning will occurr 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 50°C;
- maintain the temperature constant when the incoming pressure and temperature conditions vary.

Energy saving

Energy saving is regulated by D.P.R. n° 412/93 (Italy) which makes the use of mixers obligatory on domestic hot water distribution units with storage which are not otherwise regulated, to restrict to 48°C, with a tolerance of +5°C, the temperature of the water flowing into the distribution system.
The purpose of this temperature limitation is to reduce as much as possible passive losses through the distribution system, and to avoid delivery of water which is hotter than required.

Operating principle

The controlling element of the thermostatic mixing valve is a temperature 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 mixer automatically regulates the water flow to obtain the required temperature.

Construction details

Anti-scale materials

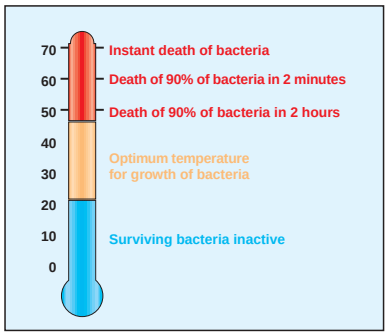
The material used in the construction of the mixer eliminate the problem of jamming caused by lime deposits. All the working parts such as shutter, seats and slide guides are made of a special anti-scale material, with a low friction coefficient, guaranteeing that the performance will be maintained over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

Temperature setting and locking

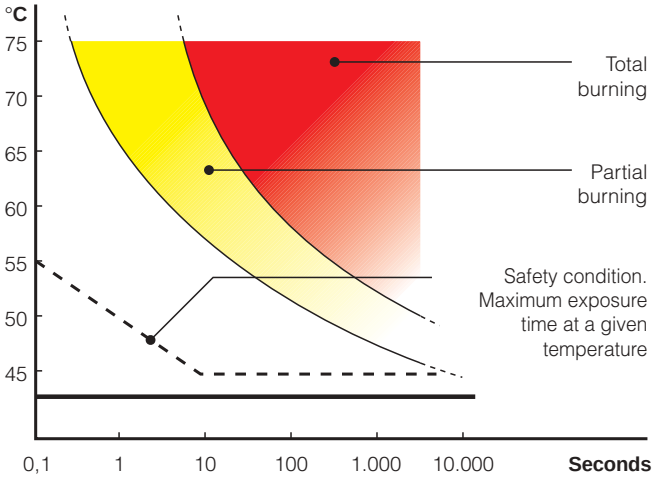
The control knob permits temperature setting between minimum and maximum in one turn (360°). It also has a tamper-proof system to lock the temperature at the set value.

Thermal disinfection

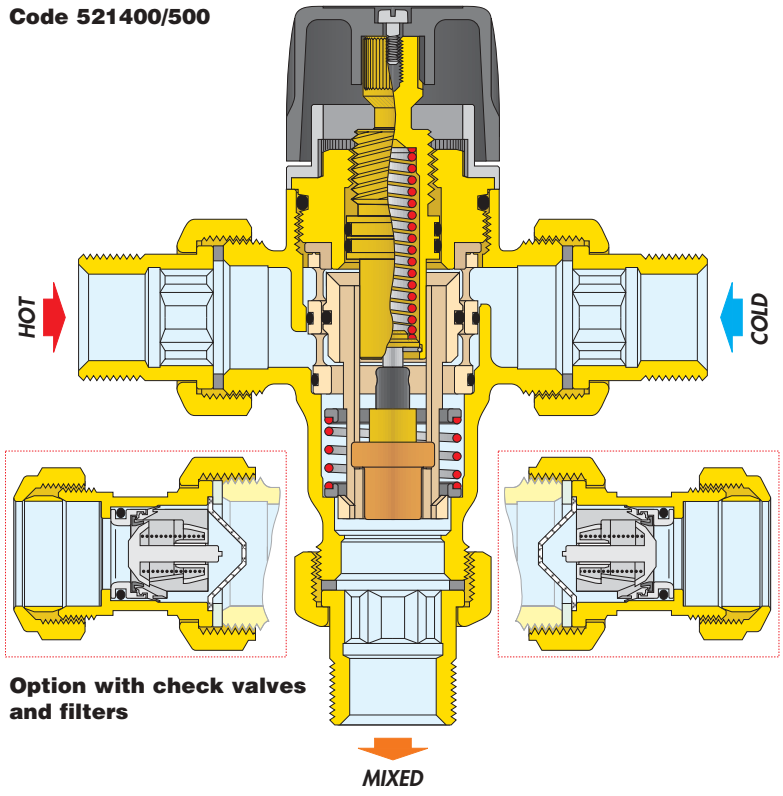
The diagram opposite shows the behaviour of the bacteria *Legionella Pneumophila* when the temperature conditions of the water in which it is contained vary.
In order to ensure proper thermal "disinfection", the values must not be below 60°C.



Temperature - Exposure time

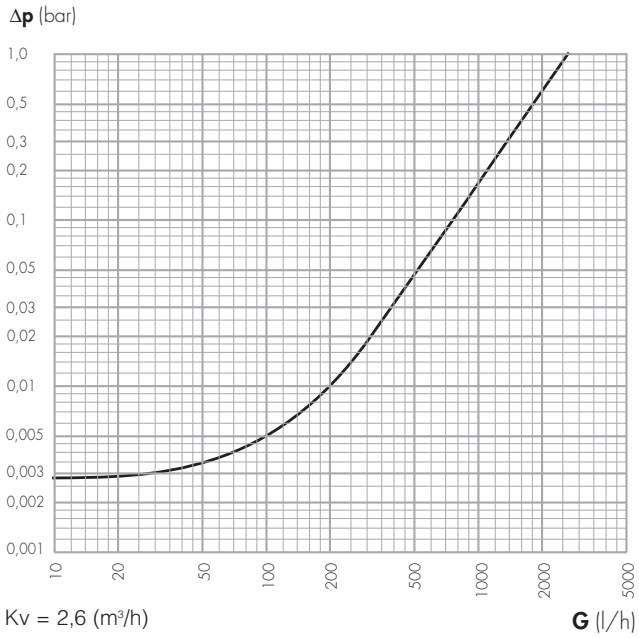


Code 521400/500



Option with check valves and filters

Hydraulic characteristics

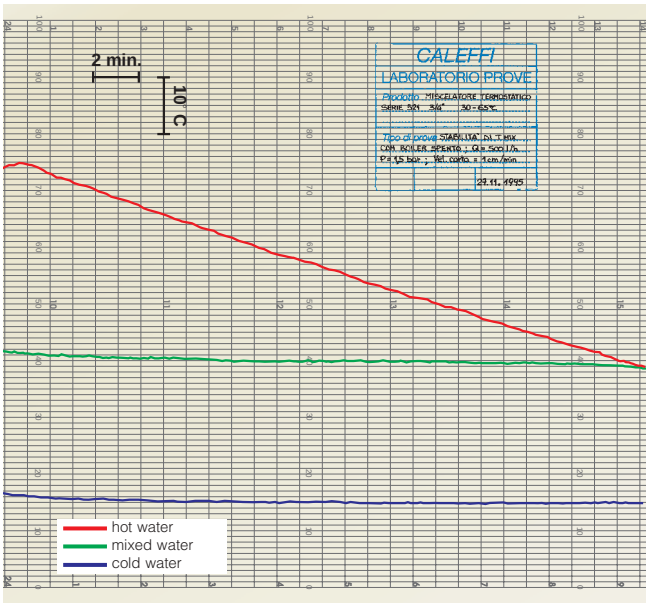


Use

The Caleffi series 521 thermostatic mixing valves, given their flow characteristics, can be installed to control temperature either for individual uses (e.g. washbasin, bidet, shower) or for multiple uses.
Warning: wherever an antiscald feature is required, Caleffi series 5212 high performance thermostatic mixing valves need to be installed.
In order to guarantee the delivery of water mixed at the set temperature, the thermostatic mixing valves must have a minimum flow rate of 5 l/min.

Temperature stability

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



Instant production of hot water

The Caleffi series 521 thermostatic mixing valves **cannot be used** in conjunction with boilers with instant production of domestic hot water. Their addition would compromise the correct operation of the boiler itself.

Installation

Before installing the mixer, the pipework must be flushed to ensure that no circulating impurities can harm its operation.
It is always advisable to install filters of suitable capacity where the water enters the water system.
Mixers codes 521115/22 have filters on the hot and cold water inlets.
Series 521 thermostatic mixing valves must be installed in accordance with the installation diagrams given in the instruction sheet or in this leaflet.
Series 521 thermostatic mixing valves can be installed in any position, either vertical or horizontal.
The following are shown on the body of the mixer:
· hot water inlet, colour red, marked “HOT”
· cold water inlet, colour blue, 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.
Thermostatic mixing valves 521503 and 521115/22 have built-in check valves on the hot and cold water inlets.

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. Use of a digital thermometer is recommended for measurement 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.

Temperature setting table

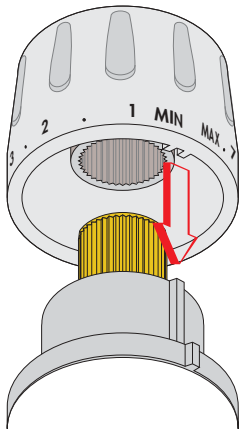
Position	Min	1	2	3	4	5	6	7	Max
T (°C)	27	32	38	44	49	53	58	63	67

Reference conditions: T_{hot} = 68°C
T_{cold} = 13°C
Hot and cold inlet pressure = 3 bar

Locking the adjustment

After adjustment, the temperature can be locked at the set value by means of the knob.

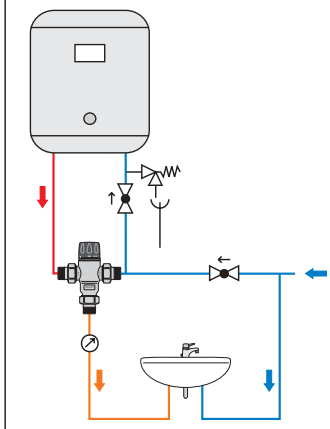
To do this, unscrew the lock nut on the top of the knob, remove the knob itself and put it back in such a way that the internal reference slide locates onto the projection on the shaft below.



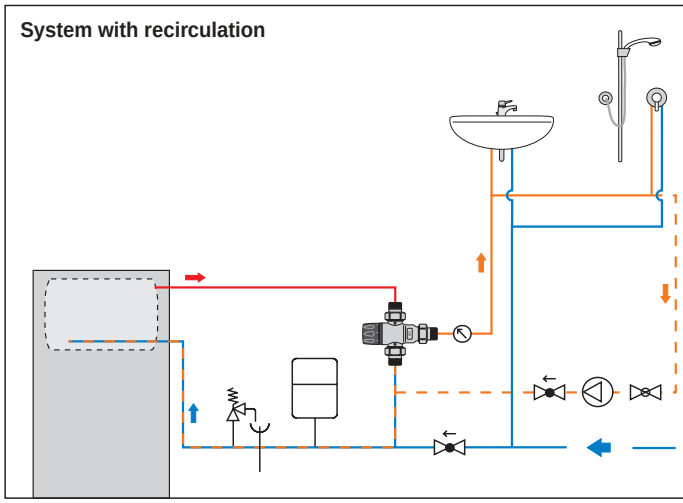
Application diagrams

- Ball valve
- Ball valve with check valve
- Thermometer
- Backflow preventer
- Zone valve
- Pump
- Expansion vessel
- Thermostat
- Safety valve

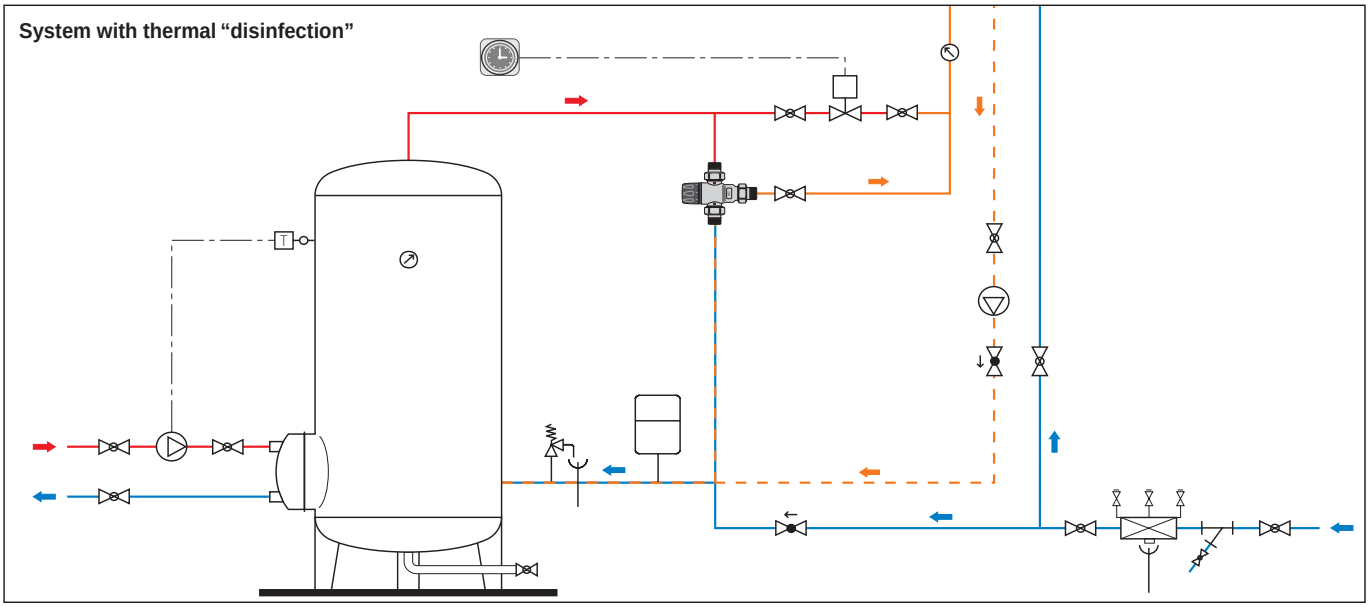
System without recirculation



System with recirculation



System with thermal “disinfection”



SPECIFICATION SUMMARIES

Series 521

Adjustable thermostatic mixing valve to EN 1287. Connections 1/2” (or 3/4”) M with union tailpieces. DZR alloy body. Chrome plated. Shutter, regulating seats and sliding surfaces in anti-scale plastic. Seals EPDM. Stainless steel spring. Maximum working temperature 85°C. Setting range 30°C to 65°C. Maximum working pressure 14 bar. Tolerance ±2°C. Provided with tamper-proof setting lock.

Series 521

Adjustable thermostatic mixing valve to EN 1287. Connections 3/4” M with union tailpieces. DZR alloy body. Chrome plated. Shutter, regulating seats and sliding surfaces in anti-scale plastic. Seals EPDM. Stainless steel spring. Maximum working temperature 85°C. Setting range 30°C to 65°C. Maximum working pressure 14 bar. Tolerance ±2°C. Check valve on hot and cold water inlets. Provided with tamper-proof setting lock.

Series 521

Adjustable thermostatic mixing valve to EN 1287. Connections for copper pipe Ø 15 mm (or Ø 22 mm). DZR alloy body. Chrome plated. Shutter, regulating seats and sliding surfaces in anti-scale plastic. Seals EPDM. Stainless steel spring. Maximum working temperature 85°C. Setting range 30°C to 65°C. Maximum working pressure 14 bar. Tolerance ±2°C. Check valve on hot and cold water inlets. Provided with tamper-proof setting lock.