

# Thermostatic mixing valves with replaceable cartridge for centralized systems

## 5230, 5231 series



01080/13 NA

Replaces 01080/11 NA



### Function

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

The 5230 and 5231 series thermostatic mixing valves are ASSE 1017 approved for point of distribution and are designed specifically for systems requiring high flow rates and precise, stable temperature control.



ASSE 1017

### Product Range

Code 5230\_0A Adjustable thermostatic mixing valve with replaceable cartridge ..... connections 1", 1-1/4", 1-1/2", 2" NPT male union  
Code 5230\_6A Adjustable thermostatic mixing valve with replaceable cartridge ..... connections 1" sweat  
Code 5230\_8A Adjustable thermostatic mixing valve with replaceable cartridge ..... connections 3/4", 1", 1-1/4" sweat union  
Code 523178A Adjustable thermostatic mixing valve with replaceable cartridge and outlet temperature gauge..... connection 1-1/4" sweat union

### Technical specification

Materials: - Body: Brass  
- Shutter: Brass, chemical nickel plated  
- Springs: Stainless steel  
- Seals: EPDM

Medium: Water  
Maximum percentage of glycol: 30% glycol solution

Setting range:

See table on page 3

Temperature stability:  $\pm 5^\circ\text{F}$  ( $\pm 3^\circ\text{C}$ )

Max working pressure (static): 200 psi (14 bar)

Max working pressure (dynamic): 70 psi (5 bar)

Hot water inlet temperature range: 120 – 185°F (49 – 85°C)

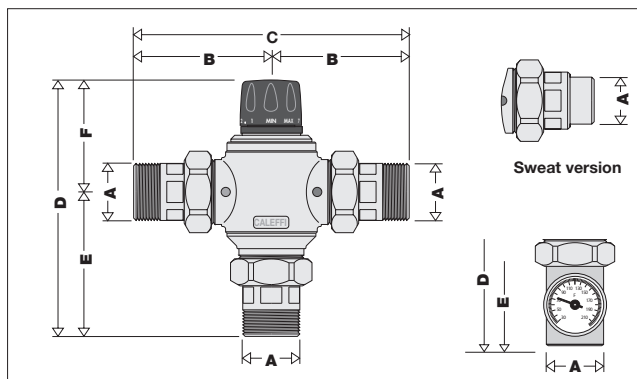
Cold water inlet temperature range: 40 – 80°F (4.4 – 26.6°C)

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

Minimum temperature difference between hot water inlet and mixed water outlet for optimum performance: 20°F (11°C)

Maximum water hardness: 10 grains

Approved for ASSE 1017



	Code	A	B	C	D	E	F	Weight (lb)
ASSE 1017	523058A	3/4" SW	2 3/4"	5 1/2"	6 1/8"	3 1/4"	2 15/16"	5
	523066A	1" SW	2 15/16"	5 7/8"	6 5/16"	3 7/16"	2 15/16"	5
	523060A	1" NPT	4 7/16"	8 7/8"	8 1/16"	4 5/8"	3 7/16"	7
	523068A	1" SW	3 9/16"	7 1/8"	7 3/16"	3 3/4"	3 7/16"	7
	523070A	1 1/4" NPT	4 5/8"	9 5/16"	8 1/4"	4 13/16"	3 7/16"	7.1
	523078A	1 1/4" SW	3 11/16"	7 5/16"	7 5/16"	3 13/16"	3 7/16"	7.1
	523178A	1 1/4" SW	3 11/16"	7 5/16"	7 15/16"	4 7/16"	3 7/16"	8.5
	523080A	1 1/2" NPT	5 3/16"	10 5/16"	9 3/4"	5 1/2"	4 1/4"	17
	523090A	2" NPT	5 3/16"	10 3/8"	9 3/4"	5 1/2"	4 1/4"	18

## Dimensions

### “Legionella” - Scalding risk

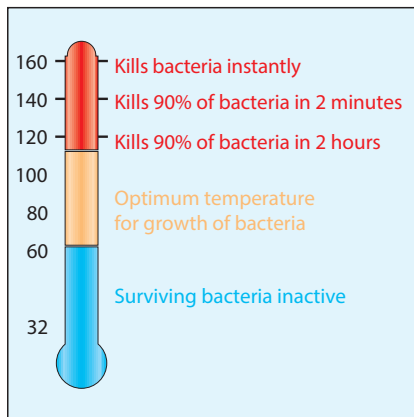
In systems producing domestic hot water with storage, in order to avoid the dangerous infection known as “Legionella”, the hot water must be stored at a temperature of at least 140°F. At this temperature it is certain that the growth of the bacteria causing this infection will be totally eliminated. However, at this temperature the water cannot be used directly, as it may cause scalding. For example, at 130°F, partial burning takes place in 30 seconds and at 140°F total burning takes place in 5 seconds. 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;
- maintain this value when the incoming pressure and temperature conditions vary.

### Thermal disinfection

The diagram below shows the behavior of the bacteria “Legionella Pneumophila” when the temperature conditions of the water in which it is contained vary, in laboratory sample population.

In order to ensure proper thermal “disinfection”, the value must not be below 140°F.



### Reference documents

With regard to the prevention and control of Legionella, see the National Regulations and applicable Code of Practice.

## Principle of Operation

A thermostatic mixing valve mixes hot and cold water in such a way as to maintain a constant set temperature of the mixed water at the outlet.

A thermostatic element is fully immersed into the mixed water. It then 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.

### Thermal shutoff

In the event of a failure of either the hot or cold supply, the piston will shut off, stopping water discharging from the mixed water outlet.

The Caleffi valve requires a minimum temperature differential from hot inlet to mixed water outlet of 20°F (11°C) to ensure the correct operation of the thermal shutoff feature.

### Constructional details

#### Double seat

The mixing valve has a special actuator which acts on a double water passage seat. This guarantees a high flow rate with a reduced resistance, at the same time maintaining accurate temperature regulation.

#### Replaceable cartridge

The internal cartridge containing all the regulating components is pre-assembled in a single unit and can easily be inspected for cleaning or replacement if necessary, without the need to remove the valve body from the pipework.

#### Anti-wear surfaces

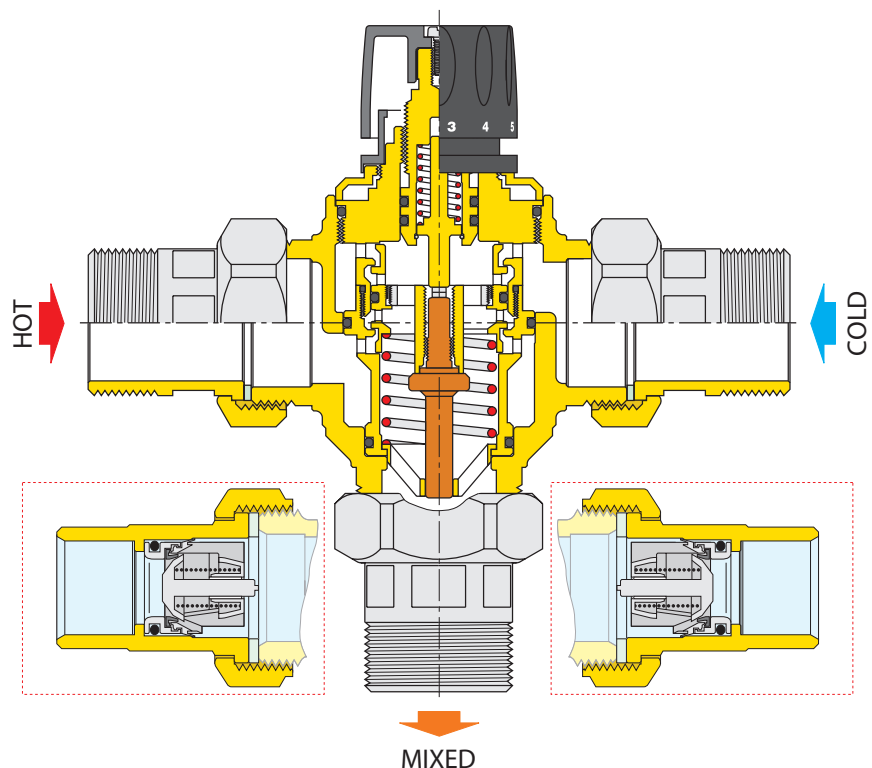
All the working parts such as shutter, seats and slide guide are chemical nickel plated. This treatment reduces the wearing and scaling to a minimum and guarantees the maintenance of performance over time.

#### Low inertia thermostat

The temperature-sensitive element, the “motor” of the thermostatic mixing valve, is characterised by a low heat inertia; this means that it reacts rapidly to variations in the incoming temperature and pressure conditions, reducing the valve response times.

#### Temperature setting and locking

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



## Point of Distribution ASSE 1017 Approved

Code	Description	Flow
523058A	3/4" Union Sweat	4.8 Cv
523066A	1" Union Sweat	4.8 Cv

### 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)	77	84	91	102	109	118	126	136	149
T (°C)	25	29	33	39	43	48	52	58	65

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

### Replacement Cartridge code 523005

Code	Description	Flow
523060A	1" Union Thread NPT male	8 Cv
523068A	1" Union Sweat	8 Cv
523070A	1-1/4" Union Thread NPT male	10 Cv
523078A	1-1/4" Union Sweat	10 Cv
523178A	1-1/4" Union Sweat with gauge	10 Cv

Pos.	Min	1	2	3	4	5	6	7	Max
T (°F)	81	90	100	111	120	127	136	145	153
T (°C)	27	32	38	44	49	53	58	63	67

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

### Replacement Cartridge code 523006

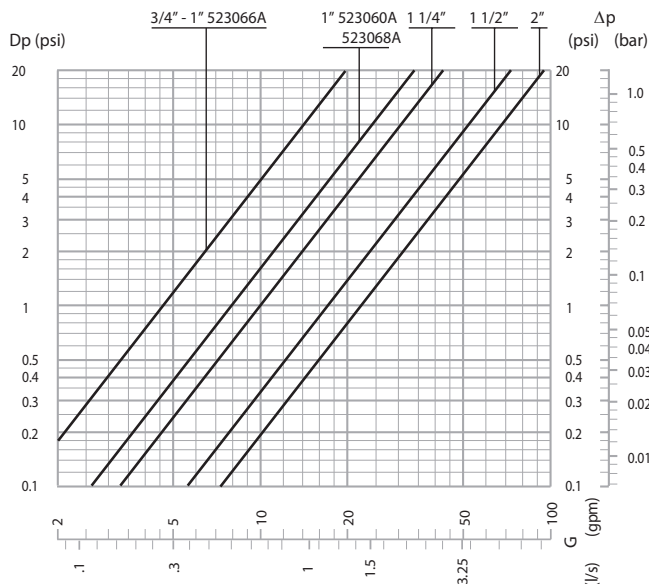
Code	Description	Flow
523080A	1-1/2" Union Thread NPT male	17 Cv
523090A	2" Union Thread NPT male	22 Cv

Pos.	Min	1	2	3	4	5	6	7	Max
T (°F)	97	102	108	113	118	126	129	135	140
T (°C)	36	39	42	45	48	52	54	57	60

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

### Replacement Cartridge code 523008

### Flow curve



### Recommended flow rates for temperature stability:

	Min. (gpm)	Max. (gpm)
3/4" - 1" (523066A)	2	24
1" 523060A - 523068A - 1 1/4"	4.5	40
1 1/2" - 2"	13	83

### Use

Caleffi 5230 series thermostatic mixing valves are designed to be installed at the hot water heater and 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 and should not be used where ASSE 1070 devices are required. Wherever a scald protection feature is required, ASSE 1070 model 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 5230 series 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 Series 5230 thermostatic mixing valves can also be used for regulating the flow temperature in radiant panel heating systems, to which it assures a constant and accurate control with ease of installation.

### Installation

Before installing a Caleffi 5230 series 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 5230 series 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.

Failure to remove dirt or debris may affect performance and the manufacturer's product guarantee. Softened water use is highly recommended as the warranty is voided if used on water with hardness greater than 10 grains.

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 5230 series thermostatic mixing valves must be installed in accordance with the diagrams in this manual, taking into account all current applicable standards.

Caleffi 5230 series thermostatic mixing valves can be installed in any position, either vertical or horizontal.

The following are shown on the thermostatic mixing valves body:

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

In systems with thermostatic mixing valves, check valves must be installed to prevent undesirable fluid backflow. The 5230- 1017 models do not contain integral check valves, so those must be sourced separately. 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.

## Commissioning

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

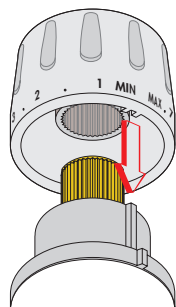
- 1) Ensure that the system is clean and free from any dirt or debris before commissioning the thermostatic mixing valves. Be sure water hardness is less than 10 grains.
- 2) It is recommended that the temperature is set using a suitable calibrated digital thermometer. The valve must be commissioned by measuring the temperature of the mixed water at the outlet.
- 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 setting

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

## Locking the setting

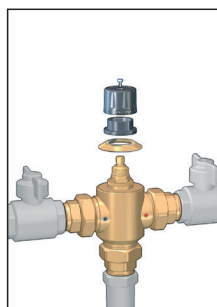
Position the knob at the required value, unscrew the top screw, slide off the knob and put it back in such a way that the handle fits into the internal slot of the knob. Tighten the head screw.



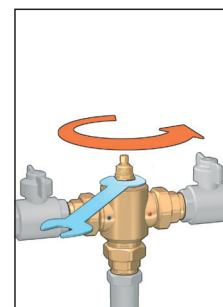
## Replacing the cartridge

The internal cartridge, containing all the regulating components, can be inspected and, if necessary, replaced, without the need to dismantle the valve body from the pipework.

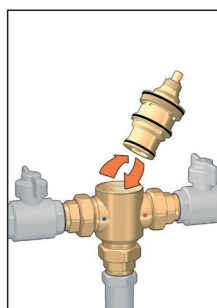
- 1) Close the shut-off valves on the hot and cold inlets. Set the knob to the maximum value.
- 2) Remove the temperature regulating knob after unscrewing the lock screw at the top.  
Dismantle the plastic knob frame. Unscrew the brass plated protective cover by means of the hexagon (1" - 1 1/4").
- 3) Remove the internal cartridge for inspection or replacement, using a suitably sized spanner.
- 4) Refit the protective brass plated cover. Refit the plastic frame in such a way that the position indicator is visible.
- 5) The spare cartridge is supplied pre-set to the maximum value. Position the regulating knob in such a way that the letters MAX align with the position indicator. By rotating the knob clockwise, it should be possible to adjust the value from maximum to minimum. Fix the knob with the top lock screw.
- 6) Reopen the shut-off valves and adjust the thermostatic mixing valves to the required temperature value.



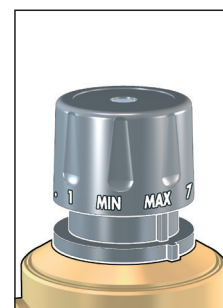
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3a

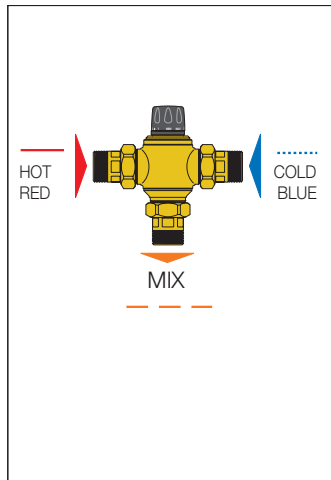


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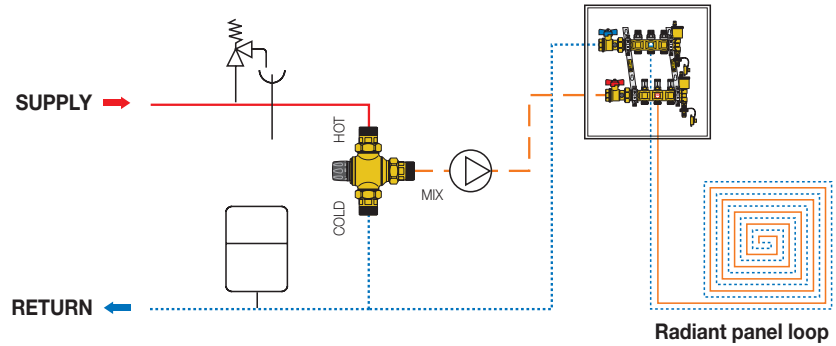


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## Applications diagrams



**Radiant panels heating system ASSE 1017 model application**



### Recirculation with point-of-distribution thermostatic mixing valves

For domestic recirculating water systems that include a single ASSE 1017 point-of-distribution thermostatic mixing valve, such as the Caleffi 5230 and 5231 series thermostatic mixing valves, the piping installation below is recommended.

In any recirculating hot water distribution system there will be times when the circulator is operating, but no hot water is being drawn at the fixtures. Under this condition, heat continually dissipates from the piping forming the recirculation loop. If the loop is relatively short, and well insulated, the rate of heat loss should be very small. If the loop is long, and uninsulated, the rate of heat loss could be substantially greater.

To maintain the recirculating water at the desired delivery temperature the heat lost from the loop must be replaced. This requires some water flow between the loop and the hot water source. Ideally, this flow is adjusted so that the rate of heat transfer from the hot water source to the loop exactly balances the rate of heat loss from the loop's piping.

The figure (above right) shows a "bypass valve" (1), and "return valve" (2), which regulate how much warm water from the return side of the recirculating loop flows back to the storage tank. When there is no demand for hot water at the fixtures, the flow of return water to the tank will equal the rate of hot water flow from the tank to the inlet port of the mixing valve. Ideally, this flow should be adjusted so that the rate of heat transfer from the tank to the recirculating loop exactly balances the rate of heat loss from the

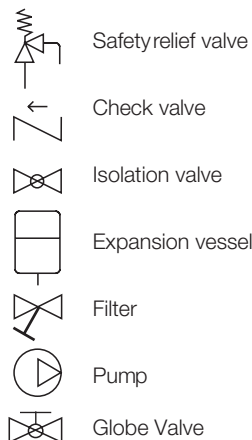
recirculating loop. This allows the water temperature leaving the mixing valve to remain stable.

The bypass valve (1) and possibly the return valve (2) must be adjusted when there is no domestic water draw on the recirculating loop (when all the fixtures are off). Begin with the bypass valve (1) fully closed, and the return valve (2) fully open. Turn on the recirculating circulator and let it run for several minutes. The supply water temperature leaving the mixing valve will likely be lower than the setting of the valve, since there is no return flow to the tank.

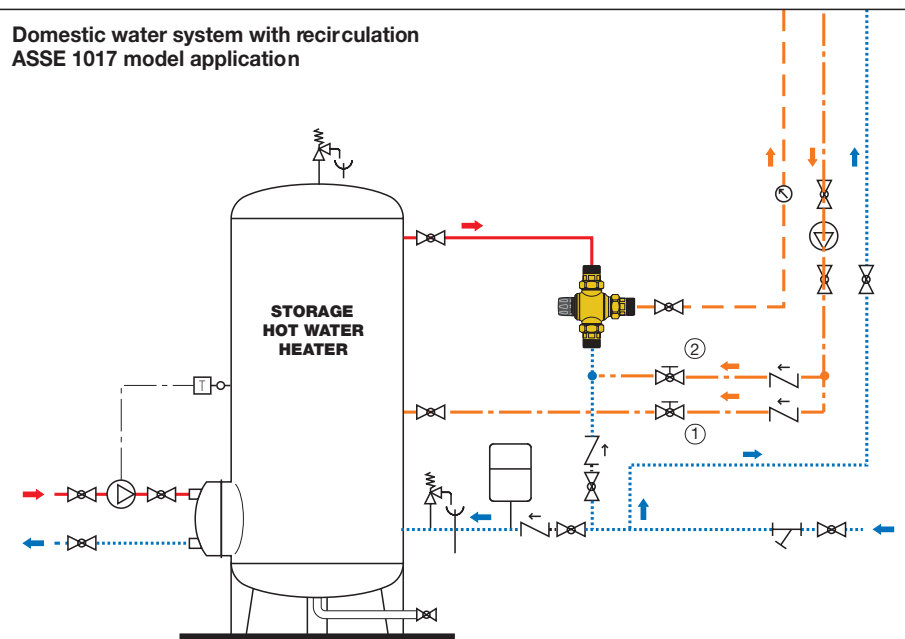
Slowly open the bypass valve (1) and monitor the temperature leaving the mixing valve. It will likely begin rising as some water returns to the tank, and an equal flow of hot water moves from the tank to the hot port of the mixing valve. When the temperature leaving the mixing valve remains stable, and is at or very close to the temperature set on the mixing valve, the bypass valve is correctly set.

The return valve (2) can remain fully open unless a situation occurs where the bypass valve (1) is fully open, but the temperature leaving the mixing valve is still too low. If this occurs, partially close the return valve (2) to add flow resistance. This forces more flow through the bypass valve (1). Repeat the previously described procedure of slowly opening the bypass valve (1) until the water temperature leaving the mixing valve is stable.

#### Key to symbols



**Domestic water system with recirculation ASSE 1017 model application**



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## SPECIFICATION SUMMARIES

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### Code 5230\_0A

Adjustable thermostatic mixing valve with replaceable cartridge. Certified to ASSE 1017. Threaded connections from 1" to 2" NPT male with unions. Brass body. Brass cartridge chemical nickel plated. Stainless steel springs. Seals in EPDM. Max. operating temperature 185°F (85°C). Setting range 77 to 153°F (25 to 67°C). Maximum water hardness: 10 grains. Max. working pressure (static) 200 psi. Max. working pressure (dynamic) 70 psi. Tolerance  $\pm 5^\circ\text{F}$ . Provided with tamper-proof temperature locking.

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### Code 5230\_6A, 5230\_8A

Adjustable thermostatic mixing valve with replaceable cartridge. Certified to ASSE 1017. Sweat connections 3/4", 1" and 1 1/4" with unions. Brass body. Brass cartridge chemical nickel plated. Stainless steel springs. Seals in EPDM. Max. operating temperature 185°F (85°C). Setting range 77 to 153°F (25 to 67°C). Maximum water hardness: 10 grains. Max. working pressure (static) 200 psi. Max. working pressure (dynamic) 70 psi. Tolerance  $\pm 5^\circ\text{F}$ . Provided with tamper-proof temperature locking. For 1-1/4" size, provide with optional mixed outlet temperature gauge, 86 to 210°F scale, 2" diameter.

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

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Caleffi North America, Inc.  
3883 W. Milwaukee Road  
Milwaukee, WI 53208  
Tel: 414-238-2360 · Fax: 414-238-2366  
sales@caleffi.com · www.caleffi.us  
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