AngleMix™ and AngleMix+™
Angle-style thermostatic mixing valve

520 series

01266/25 NA
Replaces 01266/24 NA

AHR EXPO INNOVATION AWARDS 2021 WINNER

ASSE 1017
NSF/ANSI/CAN 372

ICC ES PMG LOW LEAD

Function

The Caleffi AngleMix™ and AngleMix+™ 520 series thermostatic mixing valves are used in systems producing domestic hot water and easily mount to the top of water heaters. The mixed temperature outlet is inline with the hot water inlet, facilitating trouble-free connection and reducing space required for installation. These thermostatic mixing valves maintain the desired output temperature of the mixed water supplied at a constant set value compensating for both temperature and pressure fluctuations of the incoming hot and cold water. The mixing valve closes both inlet ports tight, eliminating temperature creep in recirculation loops. The AngleMix and AngleMix+ can also be used for temperature control in hydronic heating system applications. Also available as body only, for a wide variety of separately-ordered end connections, the angle style body design offers improved fluid dynamics for better performance and reduces installation labor and materials, eliminating a piping elbow in typical installations.

AngleMix versions features sizes ½", ¾" and 1" with 2.0 Cv, and AngleMix+ features a larger flow capacity 1" size, with 3.5 Cv.

The AngleMix and AngleMix+ comply with NSF/ANSI/CAN 372, low lead, as certified by ICC-ES, and complies with ASSE 1017, CSA B125.3, UPC, IPC, Low Lead Laws and listed by ICC-ES for use in accordance with the U.S. and Canadian plumbing codes.

Caleffi code 290030 and 290031 full-port ball valve is designed for isolating the AngleMix 520 series, ½", ¾" and 1" sizes, that have 1" metric "G" thread union connections. The isolation valve installs in between the valve body and the tailpiece fitting assembly. Male x Female configuration and bi-directional full ball valve flow capacity provides flexibility for using one, two or three isolation valves for the primary functioning valve. Code 290031 has an extended stem for those projects that require pipe insulation. The Caleffi code NA10826 full-port ball valve can be used for isolating the size 1" AngleMix+ using the NPT male end connections.

Product range, AngleMix

520___A series	Adjustable three-way thermostatic mixing valve with mixed outlet temperature gauge and angle body
	.....union connections ½" and ¾" press, NPT male, sweat union, PEX crimp and expansion
520___AC series	Adjustable three-way thermostatic mixing valve with mixed outlet temperature gauge, angle body with inlet port check valves
	.....union connections ½" and ¾" press, NPT male, sweat union, PEX crimp and expansion
5206___A 001 series	Adjustable three-way thermostatic mixing valve with mixed outlet temperature gauge and angle body
	.....union connections 1" press, NPT male, sweat union, PEX crimp and expansion
5206___AC 001 series	Adjustable three-way thermostatic mixing valve with mixed outlet temperature gauge, angle body with inlet port check valves
	.....union connections 1" press, NPT male, sweat union, PEX crimp and expansion

Product range, AngleMix+

5206___A series	Adjustable three-way thermostatic mixing valve with mixed outlet temperature gauge and angle body
	.....union connections 1" press, NPT male, sweat union, PEX crimp and expansion
5206___AC series	Adjustable three-way thermostatic mixing valve with mixed outlet temperature gauge, angle body with inlet port check valves
	.....union connections 1" press, NPT male, sweat union, PEX crimp and expansion

Technical specifications

Materials

Valve body:	DZR low-lead* brass
Shutter, seats and slide guides:	PSU
Springs:	stainless steel
Seals:	peroxide-cured EPDM
Adjustment knob	ABS

* Meets the "lead free" requirement of Section 1417 of the Safe Drinking Water Act (SDWA). This product has a weighted average lead content of less than 0.25% for its wetted surfaces contacted with consumable water.

Performance

Suitable fluids:	water
Setting range:	95–150 °F (35–65 °C)
Tolerance:	±3 °F (±2 °C)
Max. working pressure (static):	150 psi (10 bar)
Max. working pressure (dynamic):	75 psi (5 bar)
Max. hot water inlet temperature:	195 °F (90 °C)
Max. inlet pressure ratio (H/C or C/H) for optimal performance:	2:1

Minimum temperature difference between hot water inlet and mixed water outlet for stable operation with balanced supply pressure conditions: 9 °F (5 °C)

Recommended minimum temperature difference between hot water inlet and mixed water outlet for optimal performance: 18 °F (10 °C)

Required minimum temperature difference between hot water inlet and mixed water outlet for thermal shut-off function: 18 °F (10 °C)

Flow coefficient:	AngleMix:	Cv=2.0 (Kv=1.7)
	AngleMix+:	Cv=3.5 (Kv=3.0)

Minimum flow rate for stable operation with balanced supply pressure condictions:

AngleMix ½", ¾", 1" sizes: 0.5 gpm (2 l/min)
AngleMix+ 1" size: 1.0 gpm (4 l/min)

Maximum flow rate for temperature stability:

AngleMix ½", ¾", 1" sizes: 9 gpm (34 l/min)
AngleMix+ 1" size: 16 gpm (60 l/min)

Mixed outlet temperature gauge: 2" diameter
Dual-scale 32 °F - 210 °F and 0 °C –100 °C
Accuracy: 1% full-scale

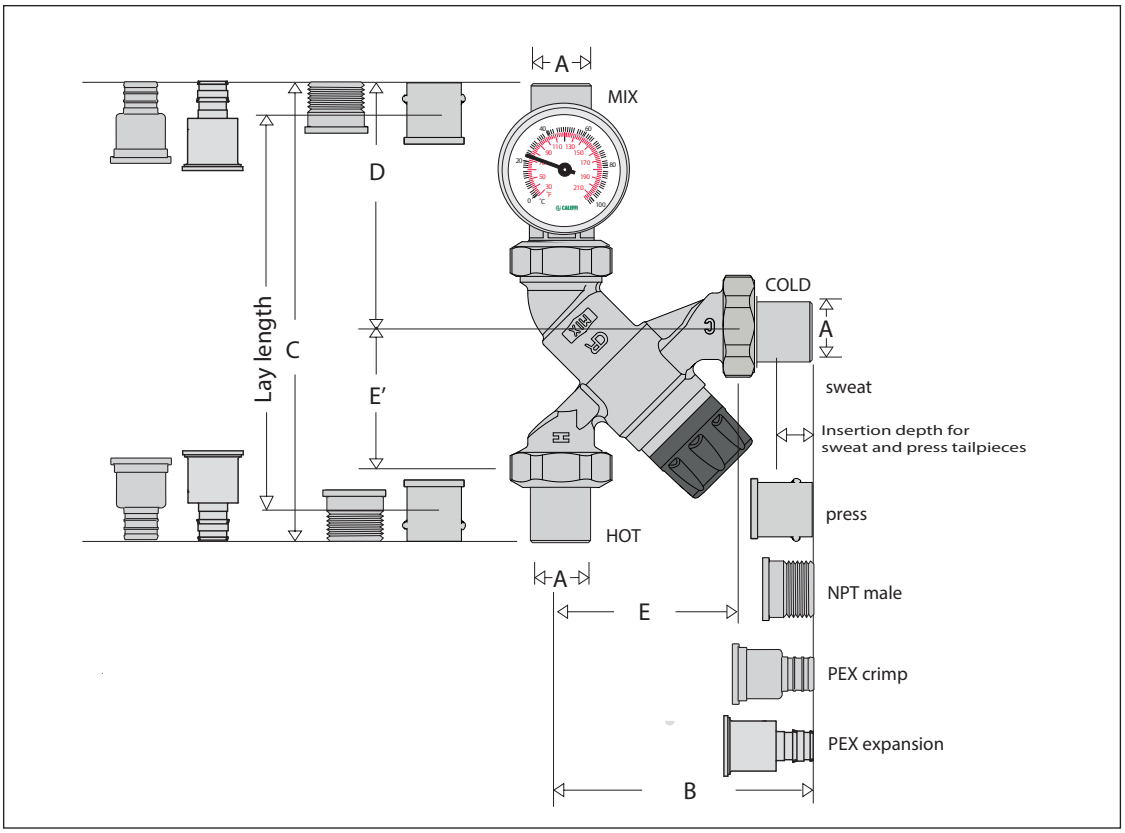
Certifications

1. ASSE 1017, CSA B125.3, UPC, IPC, IRC and NPC for use in accordance with U.S. and Canadian plumbing codes. Certified and listed by ICC-ES, File PMG 1357.
2. NSF/ANSI/CAN 372, US and Canadian Low-Lead and Lead-Free materials contents laws for drinking water system components. Certified by ICC-ES, PMG File 1360.
3. PEX crimp fittings certified to ASTM F 1807.
4. PEX expansion fittings certified to ASTM F 1960.

Connections

- sweat union:	½", ¾", 1"
- press union:	½", ¾", 1"
- NPT male union:	½", ¾", 1"
- PEX crimp union:	½", ¾", 1"
- PEX expansion union	½", ¾", 1"

Dimensions


A
MIX
D
Lay length
C
E'
COLD
A
sweat
Insertion depth for
sweat and press tailpieces
press
HOT
A
E
NPT male
PEX crimp
PEX expansion
B

Dimensions

AngleMix

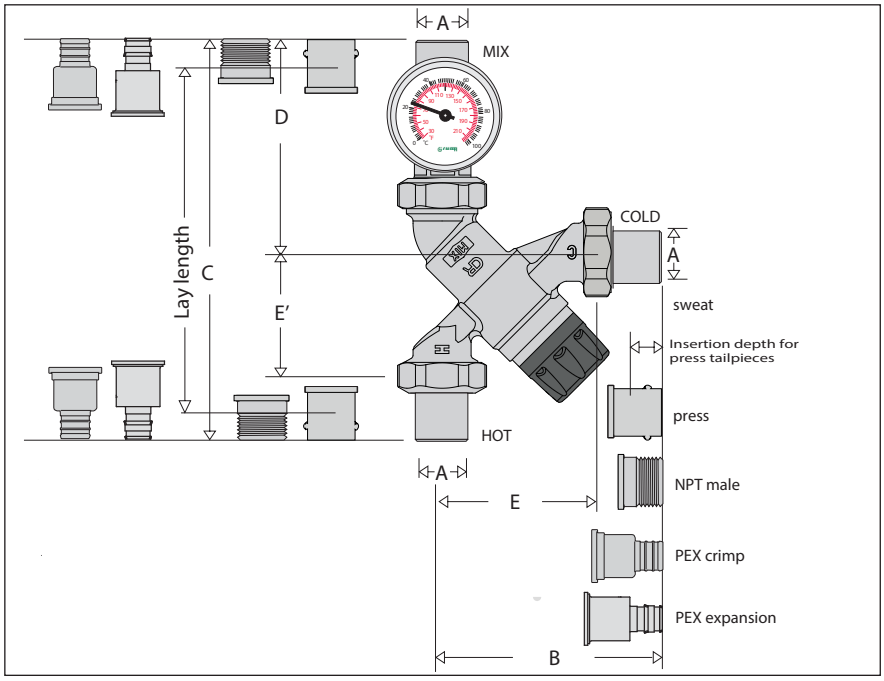
Code	A	B	C	D	E	E'	LL*	Insert. depth	Wt. (lb.)	Cv (Kv)
520410A	½" NPT male	4¼"	8¼"	4⅝"	2 11/16"	2 1/16"			1.7	2.0 (1.7)
520410AC**	½" NPT male	4¼"	8¼"	4⅝"					2.2	
520414A	½" PEX crimp	4⅜"	8 9/16"	4 13/16"					1.6	
520414AC**	½" PEX crimp	4⅜"	8 9/16"	4 13/16"					2.1	
520415A	½" PEX exp	4⅜"	8⅝"	4⅞"					1.6	
520415AC**	½" PEX exp	4⅜"	8⅝"	4⅞"					2.1	
520416A	½" press	3¾"	7⅜"	4 3/16"			5⅝"	⅞"	1.8	
520416AC**	½" press	4¾"	9⅜"	5 3/16"			7⅝"	⅞"	2.3	
520419A	½" sweat	3 7/16"	6 1/16"	3 3/16"					1.7	
520419AC**	½" sweat	4 1/16"	7 5/16"	3 13/16"					2.2	
520510A	¾" NPT male	3¾"	7⅜"	4 3/16"					2.0	
520510AC**	¾" NPT male	4⅛"	8 1/16"	4 9/16"					2.5	
520514A	¾" PEX crimp	4⅜"	8 9/16"	4 13/16"					1.8	
520514AC**	¾" PEX crimp	4⅜"	8 9/16"	4 13/16"					2.3	
520515A	¾" PEX exp	4⅝*	9 1/16"	5 1/16"					1.8	
520515AC**	¾" PEX exp	5⅛"	10 1/16"	5 9/16"					2.3	
520516A	¾" press	4⅛"	8 1/16"	4 9/16"			6 3/16"	15/16"	2.0	
520516AC**	¾" press	5½"	10 13/16"	5 15/16"			8 15/16*	15/16"	2.5	
520519A	¾" sweat	3 11/16"	6⅜"	3 9/16"					2.0	
520519AC**	¾" sweat	4¼"	7½"	4⅛"					2.5	
520610A 001	1" NPT male	4"	7⅞"	4 7/16"					3.9	
520610AC 001**	1" NPT male	4 3/16"	8¼"	4⅝"					4.0	
520614A 001	1" PEX crimp	4⅜"	8 9/16"	4 13/16"					3.5	
520614AC 001**	1" PEX crimp	4⅜"	8 9/16"	4 13/16"					3.7	
520615A 001	1" PEX exp	5"	9 13/16"	5 7/16"					3.5	
520615AC 001**	1" PEX exp	5½"	10 13/16"	5 15/16"					3.7	
520616A 001	1" press	4¼"	8⅜"	4 11/16"			7 13/16"	1 1/16"	3.7	
520616AC 001**	1" press	5⅝"	11 1/16"	6 1/16"			10½"	1 1/16"	3.9	
520619A 001	1" sweat	4¼"	7½"	4⅛"					3.7	
520619AC 001**	1" sweat	4 7/16"	7⅞"	4 5/16"					3.8	

**Lay length for press tailpieces (hot inlet to mix oulet).*

***Inlet port check valves included.*

Dimensions

AngleMix+

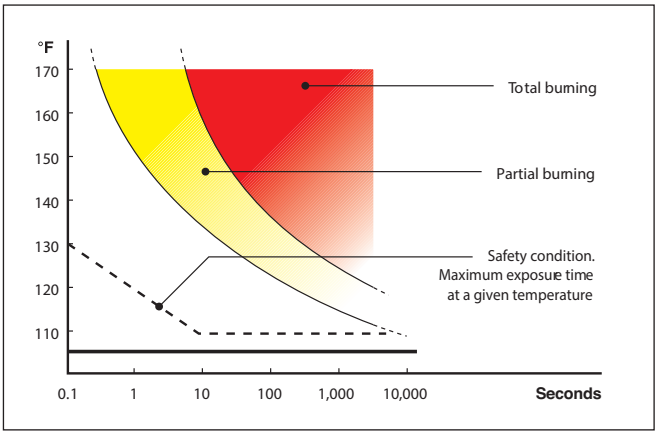


Code	A	B	C	D	E	E'	LL*	Insert. depth	Wt. (lb.)	Cv (Kv)
520610A	1" NPT male	5 13/16"	10 15/16"	5 7/8"	3 5/8"	2 7/8"			3.9	3.5 (3.0)
520610AC**	1" NPT male	5 13/16"	10 15/16"	5 7/8"					4.0	
520614A	1" PEX crimp	5 3/8"	10 1/16"	5 1/2"					3.5	
520614AC**	1" PEX crimp	7 13/16"	12 1/2"	5 1/2"					3.7	
520615A	1" PEX exp	4 7/8"	9 1/16"	5"					3.5	
520615AC**	1" PEX exp	7 5/16"	11 1/2"	5"					3.7	
520616A	1" press	5 3/8"	10"	5 1/2"			7 13/16"	1 1/16"	3.7	
520616AC**	1" press	7 3/4"	12 7/16"	5 1/2"			10 1/4"	1 1/16"	3.9	
520619A	1" sweat	4 11/16"	8 11/16"	4 3/4"					3.7	
520619AC**	1" sweat	7 1/8"	11 1/8"	4 3/4"					3.8	

**Lay length for press tailpieces (hot inlet to mix oulet).*

***Inlet port check valves included.*

Temperature — exposure time



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 occurr in approximately 30 seconds, while at 140 °F partial burning will occurr in approximately 5 seconds. The time may be reduced by 50 percent or more for children and elderly people.

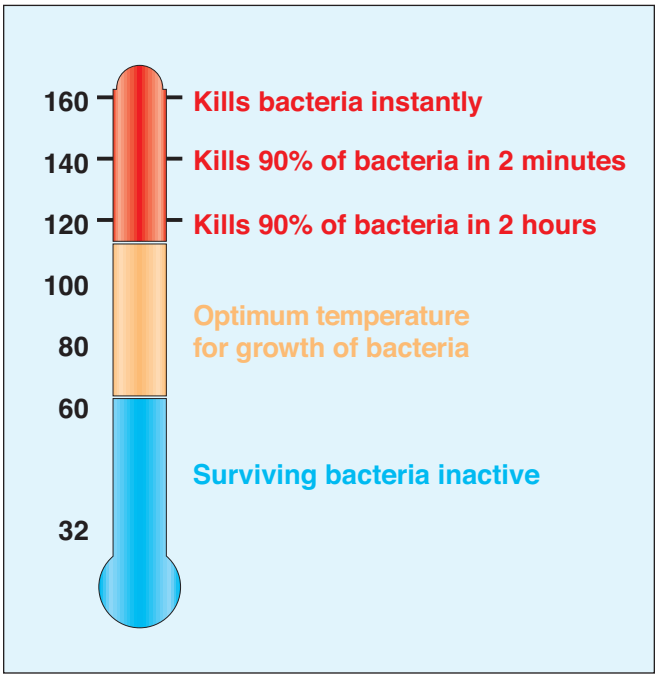
In view of the above, it is necessary to install a thermostatic mixing valve which can:

- 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 120 °F when point-of-use anti-scalding thermostatic mixing valves are not present at all fixtures.
- maintain the temperature constant when the incoming pressure and temperature conditions vary.

Thermal disinfection

The diagram shows the behavior 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.



Operating principle

The thermostatic mixing valve mixes the hot and cold water at the inlets to maintain constant mixed water at the desired set temperature. A thermostatic sensor (1) is fully immersed in the mixed water outlet passage (2) 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 (3) sliding in a cylinder between the hot and cold water passages. This controls the passage of hot (4) or cold (5) water at the inlet. If the inlet temperature or pressure changes, the internal element automatically reacts to restore the set temperature at the outlet. The AngleMix 520 series point of distribution mixing valve is an angled configuration for easy installation to most water heaters for direct mounting to the top pipe connections. Posi-Stop™ union seals (6) on all three union tailpiece connections.

Construction details

Anti-scale materials

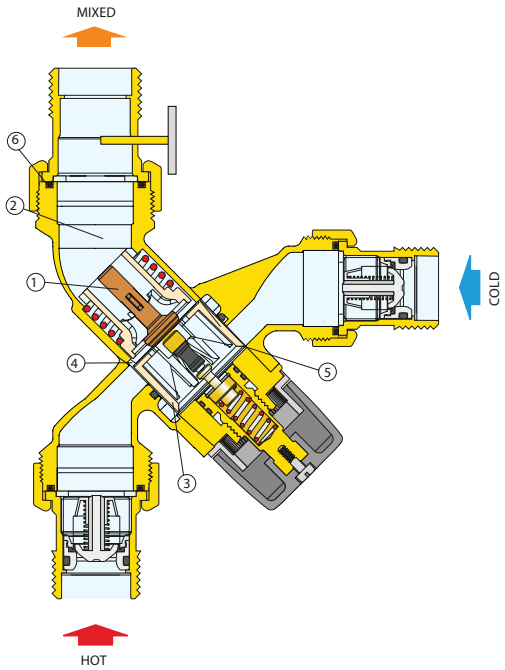
The material used in the construction of the Caleffi AngleMix 520 series thermostatic mixing valve reduces jamming caused by lime deposits. All the working parts such as shutter, seats and slide guides are made of a special anti-scale polymer material, with a low friction coefficient, assuring long term performance.

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 shut-off

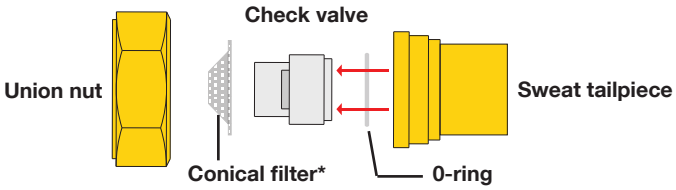
In the event of accidental cold water supply failure, the shutter seals off the hot water passage, thus preventing the delivery of mixed temperature water. This is only guaranteed when there is a minimum temperature difference between the inlet hot water and the mixed temperature water delivery of 18 °F. Additionally, the tight closing hot inlet port prevents temperature creep in recirculation applications.



Check valve

In systems with thermostatic mixing valves, check valves must be installed to prevent undesired backflow. As a convenience for easier installations, the AngleMix 520__AC and AngleMix+ 5206__AC 001 series mixing valves are supplied complete with a check valve in the hot and cold inlet ports.

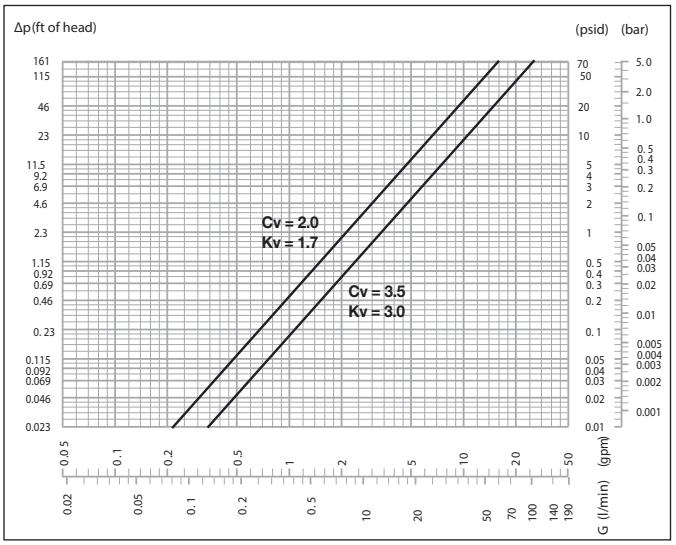
NOTE TO INSTALLER: DO NOT TEST FIT OR INSTALL CHECK VALVES BEFORE SOLDERING. IF INSTALLED, REMOVAL WILL REQUIRE DAMAGING THE CHECK VALVE AND IT WILL NO LONGER BE USABLE. (*Conical filters are not included in AngleMix+)



Body shape

The angle body configuration has improved fluid dynamics for better performance, and reduces installation labor and materials because the hot inlet port is in line with the mixed outlet port, eliminating a piping elbow as required for standard mixing valves. The cold inlet comes in the side.

Hydraulic Characteristics



Size 1/2" and 3/4": Cv=2.0, Kv=1.7
Size 1": Cv=3.5, Kv=3.0
Flow should never exceed standards for pipe size and materials.

Use

Caleffi AngleMix and AngleMix+ thermostatic mixing valves are engineered for installation at the point of distribution to regulate the temperature of the domestic hot water distributed within the downstream network. The AngleMix and AngleMix+ are not suitable for tempering water temperature at individual fixtures as a point-of-use valve. The AngleMix and AngleMix+ thermostatic mixing valves are not designed to offer protection against scalding. Where scald protection is necessary an ASSE 1070/ASME A112.1070/CSA B125.70 and CSA B125.3 certifed valve should be used. The Caleffi 5212 or 5213 series scald protection mixing valves meet this requirement. As a safety precaution, it is advisable to limit the maximum mixed water temperature at 120 °F when scald protection devices are not implemented at each fixture.

Caleffi AngleMix and AngleMix+ thermostatic mxing valves (520_AC series) with hot and cold inlet check valves are not recommended for use in hydronic systems.

Installation

Before installing a Caleffi AngleMix and AngleMix+ 520 series three-way thermostatic mixing valves, 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 520 series thermostatic mixing valve will be installed must be drained and cleaned out to remove any dirt or debris which may have accumulated during installation.

The installation of appropriately sized filters at the inlet from the main water supply is always advisable.

Caleffi AngleMix and AngleMix+ 520 series 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 AngleMix and AngleMix+ 520 series 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, marked “H”.
- Cold water inlet, marked “C”.
- Mixed water outlet, marked “MIX”.

Commissioning

The Caleffi AngleMix and AngleMix+ 520 series thermostatic mixing valve must be commissioned in accordance with current standards by qualified personnel using temperature measuring equipment. Caleffi AngleMix and AngleMix+ 520 series come standard with an integral outlet port temperature gauge which provides a time-saving temperature setting process to get close to the desired temperature. Use of a digital thermometer is recommended for confirming the final setting of the mixed water temperature. After installation, the valve must be tested and commisioned in accordance with instructions given below, taking into account current applicable standards.

Temperature adjustment

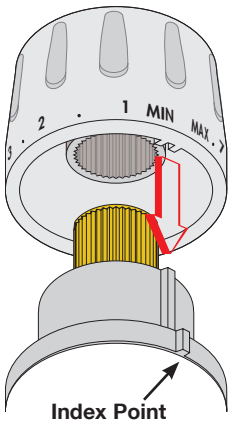
The control knob permits temperature setting between minimum and maximum in one turn (360°). It also has a tamper-proof system to lock the temperature at the set value. The temperature is set to the required value by means of the knob with the graduated scale, on the top of the valve.

Pos.	Min.	1	2	3	4	5	6	7	Max.
T (°F)	95	105	115	120	125	132	140	145	150
T (°C)	35	40	45	48	52	56	60	63	65

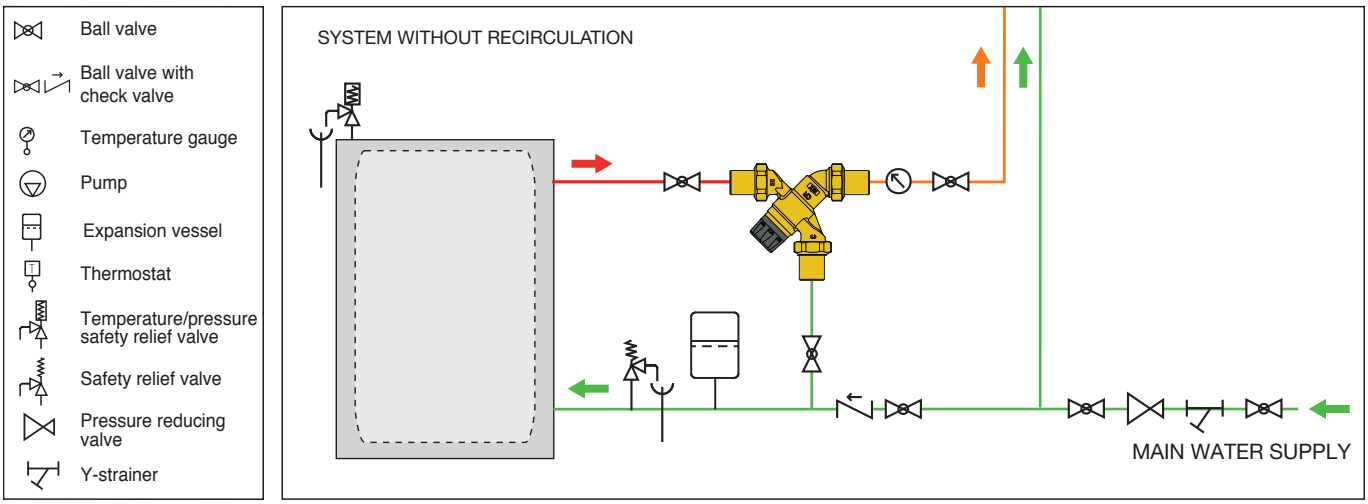
with: T_{HOT} = 158 °F (70 °C), with: T_{cold} = 59 °F (15 °C), P = 43 psi (3 bar)

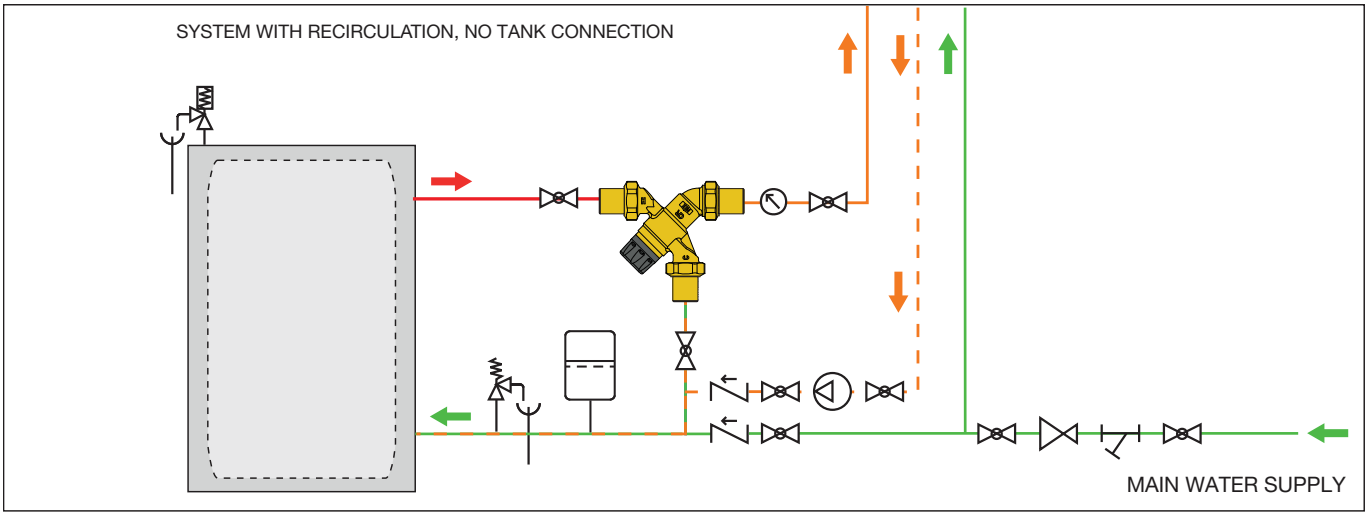
Locking the setting

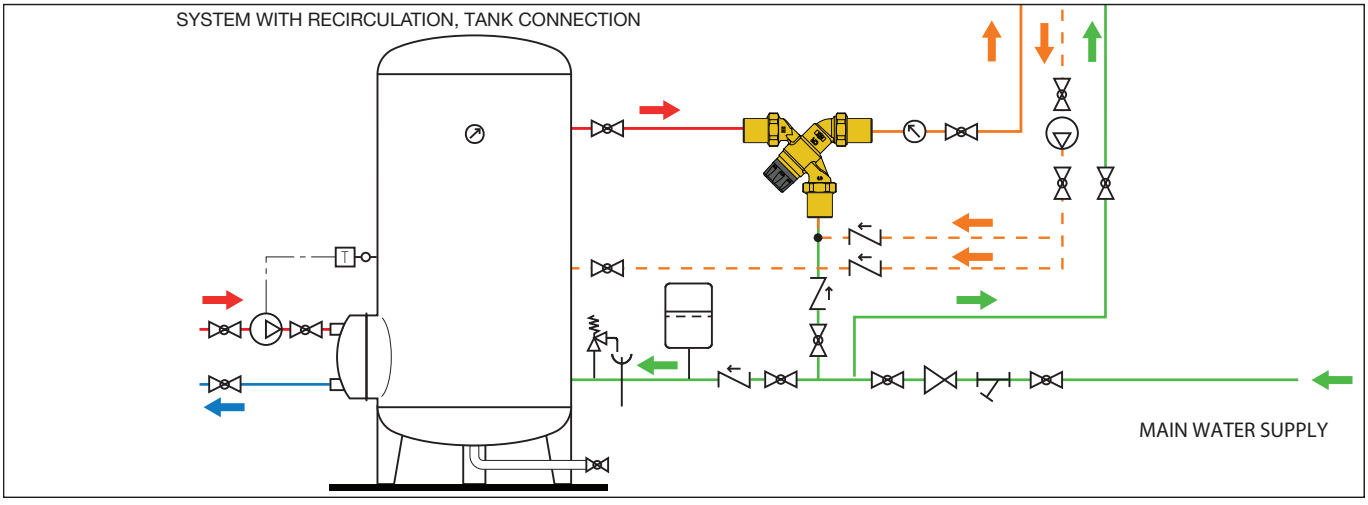
1. Align the index point to the desired temperature setting by rotating the control knob.
2. Unscrew the head screw and remove the control knob.
3. Position the knob so that the boss, indicated by red arrow in figure, fits into the internal slot of the control knob.
4. Tighten the head screw and the control knob will no longer be able to rotate to adjust the mixing setting.



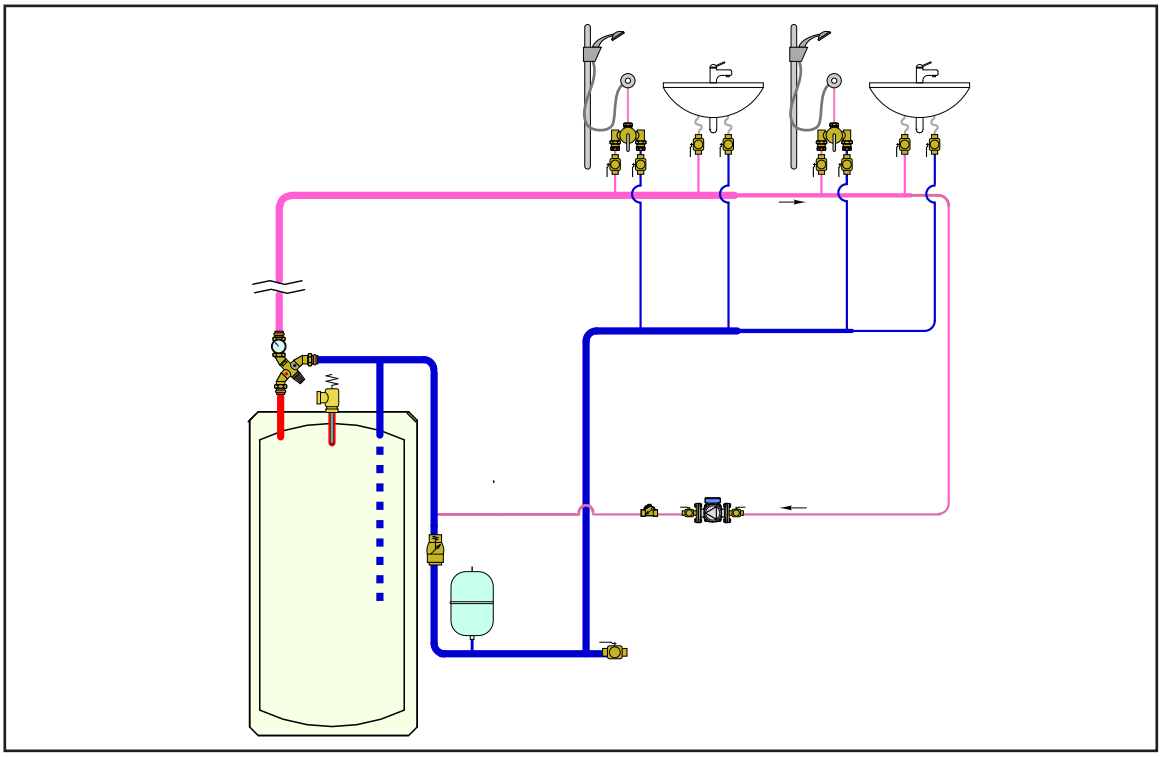
Application diagrams







Application diagrams



Accessories and Replacement parts

Replacement body.
Meets requirements of NSF/ANSI/CAN 372. Certified to: ASSE 1017, CSA B125.3, Low lead, by ICC-ES file PMG-1360.
End connection flexibility: ½", ¾" or 1" NPT female or male, press, PEX barb or sweat with or without check valves, separately sourced for field installation. See Caleffi List Price catalog for fitting selection.

520051A.....1" male union thread, ½" & ¾" vavles. Cv=2.0 (Kv=1.7)
520061A.....1¼" male union thread, 1" valve. Cv=3.5 (Kv=3.0)

Point of distribution mixed temperature gauge adaptor fits 1" male union thread mixing valves. Removable gauge fits into temperature well. Gauge dial is 2" diameter and dual-scale from 30—210 °F (0—100 °C). Low-lead brass body. Meets requirements of NSF/ANSI/CAN 372. Certified to: ASSE 1017, CSA B125.3, Low lead, by ICC-ES file PMG-1360.

NA10056.....¾" sweat with gauge
NA10358 .....1" union thread with gauge
688003A.....Replacement gauge

Isolation ball valve.
Low lead Male x Female union fits 1" valves between body and tailpiece. See below.

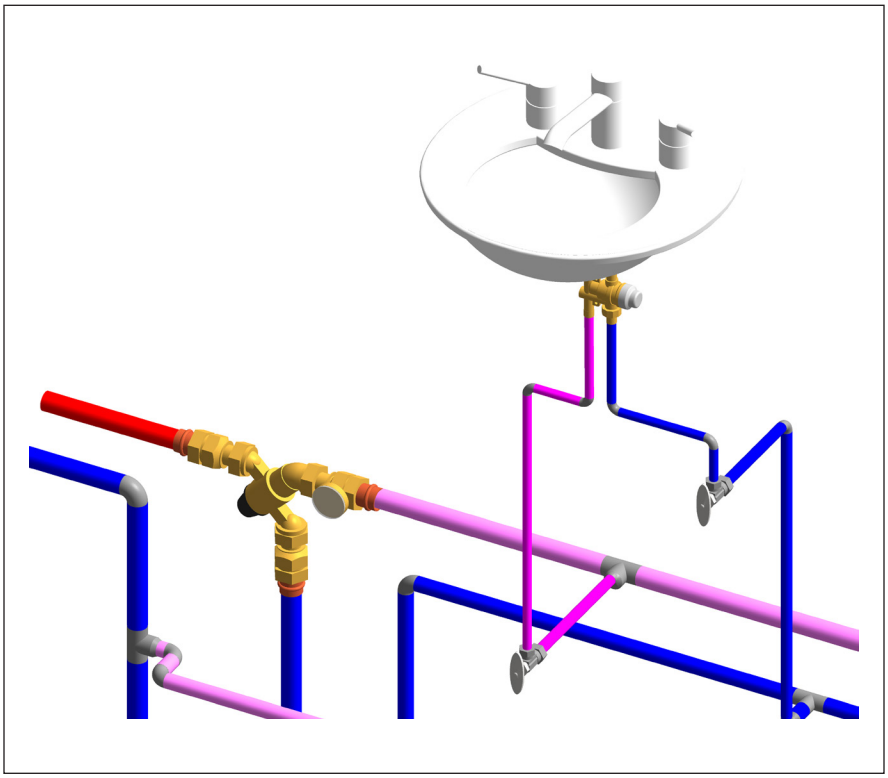
Code	Description	Lbs
290030	Isolation ball valve 1" M x 1" F union	1.0
290031	Isolation ball valve. ext stem 1" M x 1" F union	1.0

Isolation ball valve with extended handle.
High strength forged low lead brass.

Code	Description	Lbs
NA10826	1" FNPT ball valve	1.0

Code 290030 isolation ball valves installed on AngleMix inlets

For more information, consult Technical Brochure 1397-24 NA at www.caleffi.com



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SPECIFICATION SUMMARIES

AngleMix™ 520__A(C) series - angle style thermostatic mixing valve

Adjustable thermostatic and pressure balanced angle style mixing valve approved for point of distribution domestic water systems, complies with ASSE 1017, CSA B125.3, UPC, IPC Low Lead Laws and listed by ICC-ES for use in accordance with the U.S. and Canadian plumbing codes. Connections ½", ¾" and 1" NPT male, press, sweat, PEX crimp and PEX expansion union. DZR low-lead brass valve body (<0.25% Lead content) certified by ICC-ES file 1360. Meets requirements of NSF/ANSI/CAN 372. Shutter, regulating seats and sliding surfaces in anti-scale plastic, PSU. Seals peroxide-cured EPDM. Stainless steel spring. Maximum working temperature 195 degrees F (90 degrees C). Setting range 95 degrees F to 150 degrees F (35 degrees C to 65 degrees C). Maximum working pressure 150 psi (10 bar). Maximum operating differential pressure 75 psi (5 bar). Tolerance ±3 degrees F (±2 degrees C). Flow rating: Size ½", ¾" and 1" AngleMix Cv 2.0 (Kv 1.7), Size 1" AngleMix+ Cv=3.5 (Kv 3.0). Provided with tamper-proof setting lock and mixed outlet dual-scale temperature gauge, 32 to 210 degrees F scale and 0 to 100 degree C scale, 2 inch diameter. Provide with inlet port check valves, AC models. Provide with optional inlet and outlet isolation ball valves, code 290030 or 290031 or NA10826, separately sourced, field installed.

AngleMix™ 5200X1A - angle style thermostatic mixing valve body

Adjustable thermostatic and pressure balanced angle style mixing valve approved for point of distribution domestic water systems, complies with ASSE 1017, CSA B125.3, UPC, IPC Low Lead Laws and listed by ICC-ES for use in accordance with the U.S. and Canadian plumbing codes. Connections 1" male union (code 520051A) and 1¼" male union (code 520061A). DZR low-lead brass valve body (<0.25% Lead content) certified by ICC-ES file 1360. Meets requirements of NSF/ANSI/CAN 372. Shutter, regulating seats and sliding surfaces in anti-scale plastic, PSU. Seals peroxide-cured EPDM. Stainless steel spring. Maximum working temperature 195 degrees F (90 degrees C). Setting range 95 degrees F to 150 degrees F (35 degrees C to 65 degrees C). Maximum working pressure 150 psi (10 bar). Maximum operating differential pressure 75 psi (5 bar). Tolerance ±3 degrees F (±2 degrees C). Flow rating: Cv 2.0 (Kv 1.7), code 520051A; Cv 3.5 (Kv 3.0), code 520061A. Provided with tamper-proof setting lock. Provide with separately supplied mixed outlet dual-scale temperature gauge, 32 to 210 degrees F scale and 0 to 100 degree C scale, 2 inch diameter. Provide with separately supplied end connection fittings, with or without check valves, for ½", ¾", or 1" NPT male, NPT female, press, sweat, PEX crimp or expansion with 1" union nut and washer. Provide with optional inlet and outlet isolation ball valves, code 290030 or 290031 or NA10826, separately sourced, field installed.

Caleffi North America, Inc.
3883 W. Milwaukee Road, Milwaukee, WI 53208
Tel: 414-238-2360 · Fax: 414-238-2366
Technical Support: 414-338-6338 / techsupport.us@caleffi.com
sales@caleffi.com · www.caleffi.com