AngleMix™ DL
Angle-style thermostatic mixing valve, dual listed

520 series

01420/24 NA

AHR EXPO INNOVATION AWARDS 2021 WINNER

ASSE 1017
ASSE 1070
NSF/ANSI/CAN 372

ICC ES PMG LOW LEAD

Function

The Caleffi AngleMix™ DL 520 series thermostatic mixing valve is used in systems producing domestic hot water and easily mounts to the top of water heaters. In addition to point of distribution applications, the DL model is factory set for point of use applications, limiting the maximum mixed outlet temperature to prevent scalding water temperatures. The mixed temperature outlet is inline with the hot water inlet, facilitating trouble-free connection and reducing space required for installation. The AngleMix DL maintains 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 its inlet ports tight, eliminating temperature creep in recirculation loops. 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.

The AngleMix DL complies with both ASSE 1070/ASME A112.1070/CSA B125.70 and ASSE 1017 and CSA B125.3. The DL model is factory configured with an adjustment knob limiting mixed outlet temperature to 120 °F maximum. The device can be converted to ASSE 1017 function by removing the rotation limiting screw. In addition, it is certified for compliance with NSF/ANSI/CAN 372, low lead/lead free laws and use according to U.S. and Canadian plumbing codes. AngleMix DL listed and certified by ICC-ES, listing certificates detailed below.

Product range

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

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

In ASSE 1017 mode

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)

In ASSE 1070 mode

Recommended minimum temperature difference between hot water inlet and mixed water outlet for optimal performance: 27 °F (15 °C)

Required minimum temperature difference between hot water inlet and mixed water outlet for thermal shut-off function: 27 °F (15 °C)

Flow coefficient:	Cv=2.0 (Kv=1.7)
Minimum flow rate for stable operation with balanced supply pressure condictions:	0.5 gpm (2 l/min)
Maximum flow rate for temperature stability:	9 gpm (34 l/min)
Mixed outlet temperature gauge:	2" diameter Dual-scale 32 °F - 210 °F and 0 °C –100 °C Accuracy: 1% full-scale

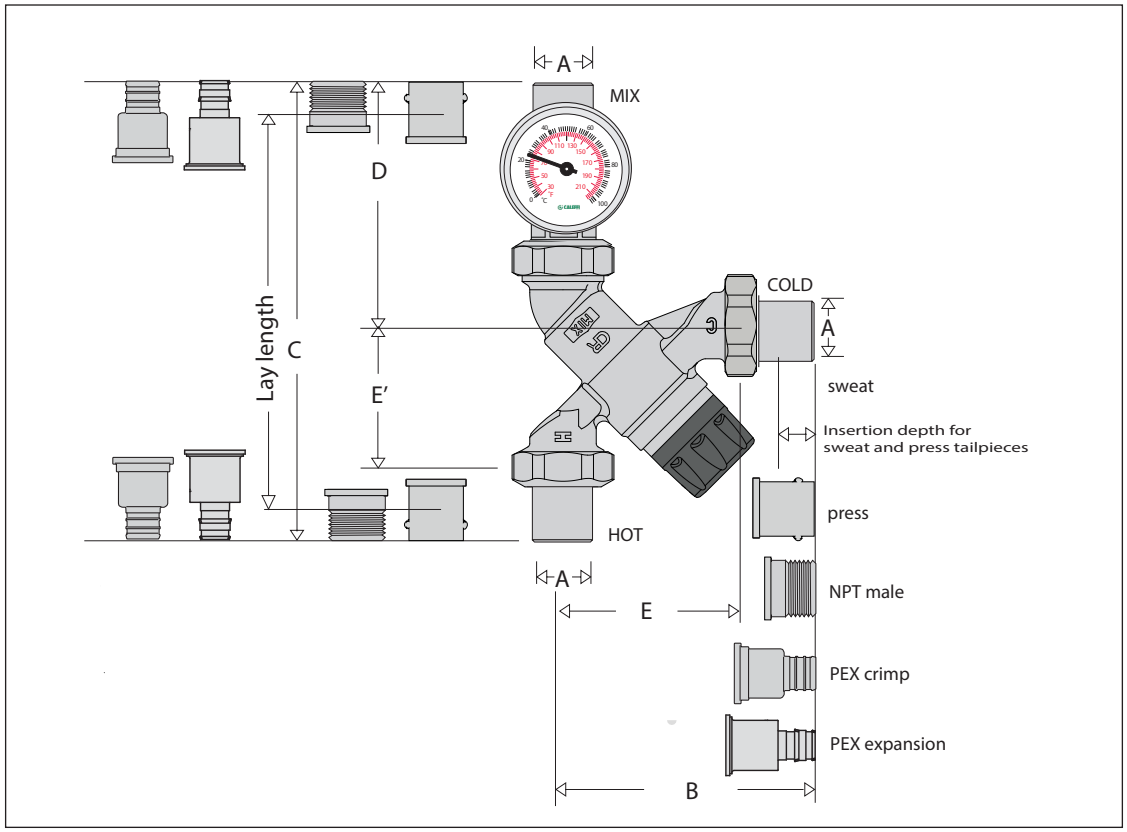
Certifications

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. ASSE 1070/ASME A112.1070/CSA B125.70 and CSA B125.3. Certified and listed by ICC-ES,
3. NSF/ANSI /CAN 372, Drinking Water System Components-Lead Content Reduction of Lead in Drinking Water Act, California Health and Safety Code 116875 S.3874, Reduction of Lead in Drinking Water Act, certified by ICC-ES, file PMG-1360.
4. PEX crimp fittings certified to ASTM F 1807.
5. PEX expansion fittings certified to ASTM F 1960.

Connections

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

Dimensions

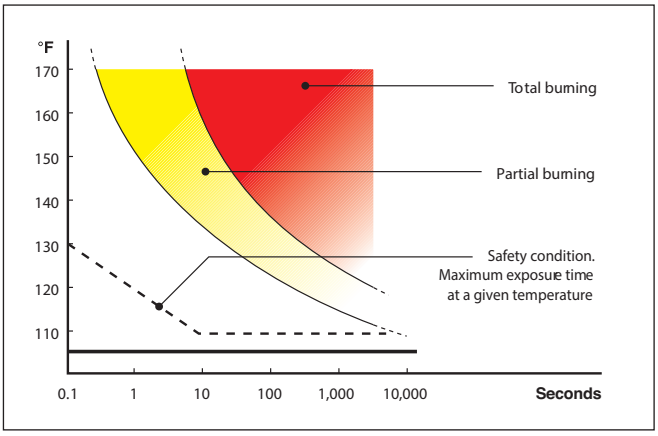


Code	A	B	C	D	E	E'	LL*	Inser-tion depth	Wt. (lb.)	Cv (Kv)
520410AC	½" NPT male	4¼"	8¼"	4⅝"	2 11/16"	2 1/16"			1.8	2.0 (1.7)
520414AC	½" PEX crimp	4⅜"	8 9/16"	4 13/16"					1.7	
520415AC	½" PEX exp	4⅜"	8⅝"	4⅞"					1.7	
520416AC	½" press	4⅝"	4¼"	4 3/16"			6½"	⅞"	1.9	
520419AC	½" sweat	4⅛"	6¾"	3 3/16"			5 11/16"	½"	1.8	
520510AC	¾" NPT male	4 3/16"	7 13/16"	4 3/16"					2.1	
520514AC	¾" PEX crimp	4⅜"	8 9/16"	4 13/16"					1.9	
520515AC	¾" PEX exp	4⅝"	9 1/16"	5 1/16"					1.9	
520516AC	¾" press	4 11/16"	8 11/16"	4½"			6¾"	15/16"	2.1	
520519AC	¾" sweat	4¼"	6 15/16"	3 5/16"			5⅝"	⅝"	2.1	

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

AngleMix DL models with Inlet port check valves included as standard.

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.

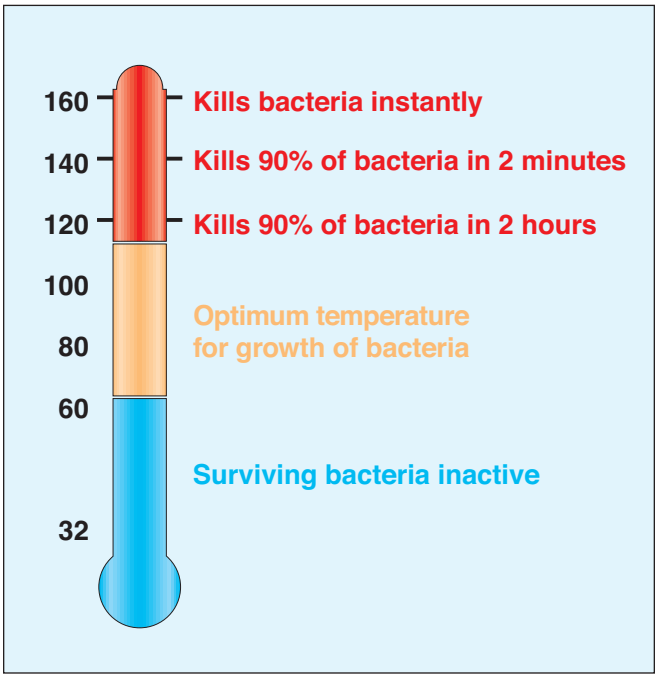
In view of the above, it is necessary to install a thermostatic mixing valve which can:

- 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 DL 520_AC 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. The AngleMix DL 520_AC series point of use mixing valve with inlet check valves and stop limited 120 °F maximum temperature setting easily mounts under sinks or tubs. It can also be used as a point of distribution valve, in ASSE 1017 mode, by removing the stop limit screw, allowing adjustment up to 150 °F. 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

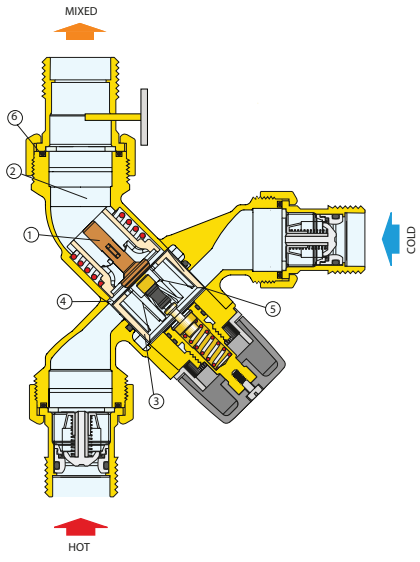
The control knob permits temperature setting between minimum and maximum in one turn (360 °). It also has a tamper-proof system to lock the temperature at the set value.

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 (operating in ASSE 1017 mode), or 27 °F (operating in ASSE 1070 mode). Additionally, the tight closing hot inlet port prevents temperature creep in recirculation applications.

Check valve

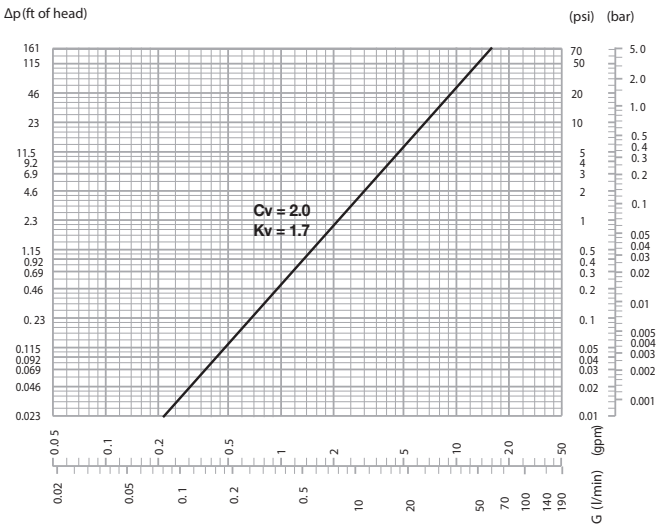
In systems with thermostatic mixing valves, check valves must be installed to prevent undesired backflow. As a convenience for easier installations, the AngleMix 5206__AC series (1" size) mixing valves are supplied complete with a check valve in the hot and cold inlet ports.



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



Flow should never exceed standards for pipe size and materials.

Use

Caleffi AngleMix DL 520_AC series thermostatic mixing valves are engineered for installation at either the point of distribution to regulate the temperature of the domestic hot water distributed within the downstream network, or at point of use for scald protection. The AngleMix DL 520_AC series mixing valve includes inlet tailpieces which have check valves, to meet the requirements of ASSE 1070. 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.

Installation

Before installing a Caleffi AngleMix DL 520 series 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 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 DL 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 DL 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, color red and marked “HOT”.
- Cold water inlet, color blue and marked “COLD”.
- Mixed water outlet, marked “MIX”.

Commissioning

The Caleffi AngleMix DL 520 series thermostatic mixing valve must be commissioned in accordance with current standards by qualified personnel using temperature measuring equipment. Caleffi AngleMix DL 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.

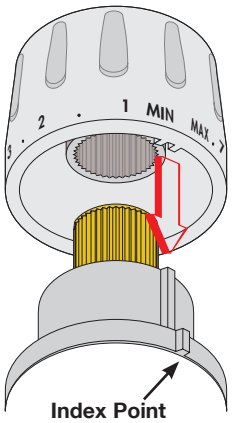
Pos.	Min.	1	2	3	4	5	6	7	Max.
T (°F)	95	105	115	120	125	132	140	145	150
T (°C)	35	40	45	48	52	56	60	63	65

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

Gray shading indicates temperature value positions for the AngleMix DL models, limited to 120 °F per ASSE 1070, with setting locking screw in place.

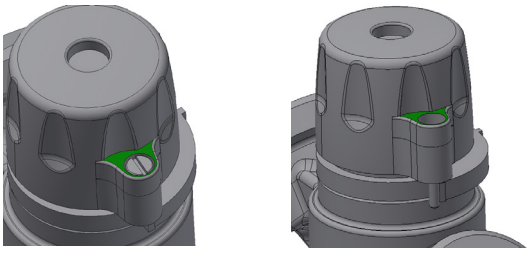
Locking the setting for AngleMix DL 520_AC, dual ASSE 1017 and ASSE 1070 models

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.



Converting the AngleMix DL (ASSE 1070) to AngleMix (ASSE 1017)

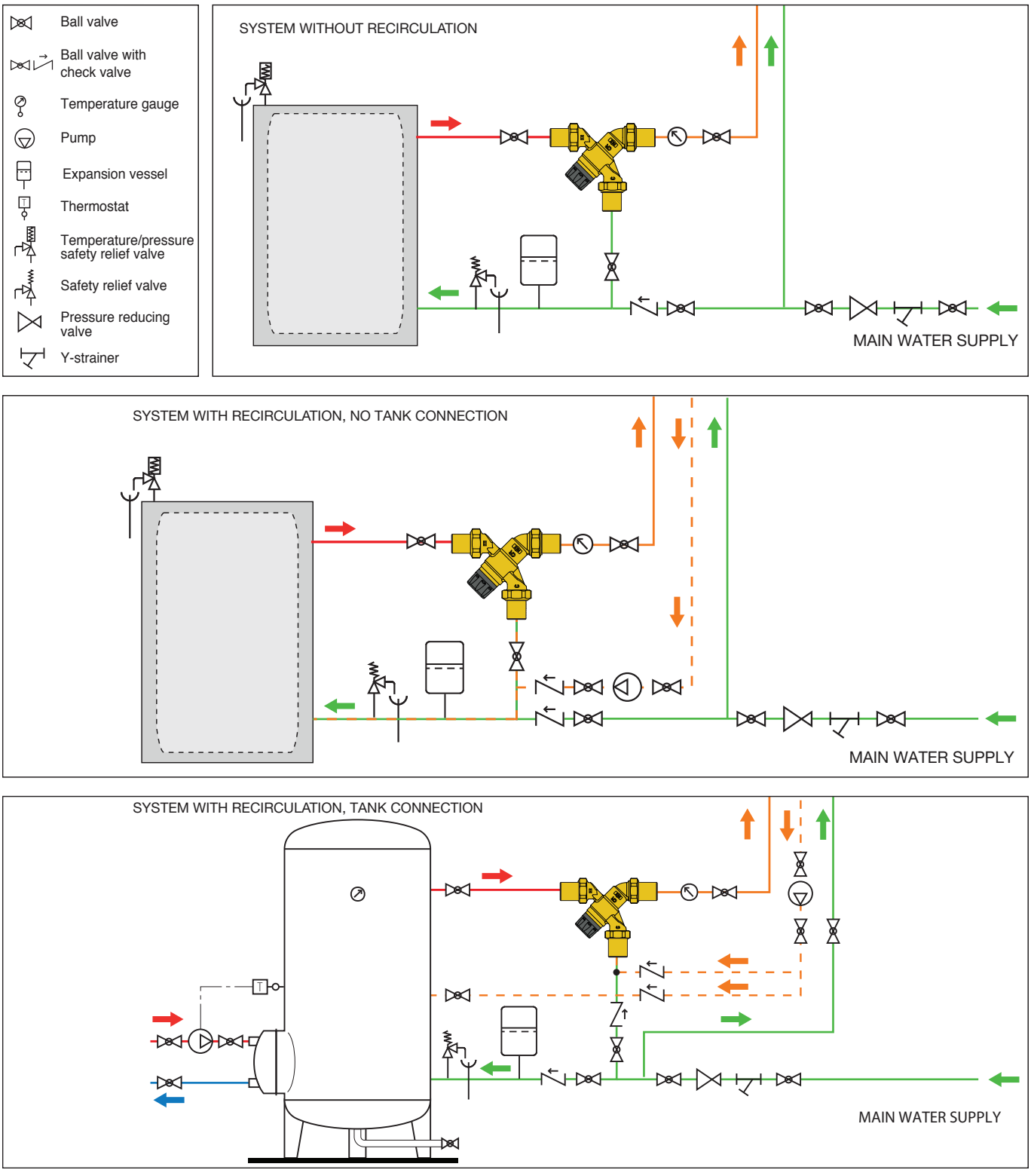
AngleMix DL 520_AC models are factory-configured with an adjustment limiting set screw, restricting the set temperature to 120 °F meeting ASSE 1070 requirements for scald protection. However, users have the flexibility to convert the valve to an ASSE 1017 style by backing out the limiting set screw, thereby enabling unrestricted adjustment up to 150 °F.



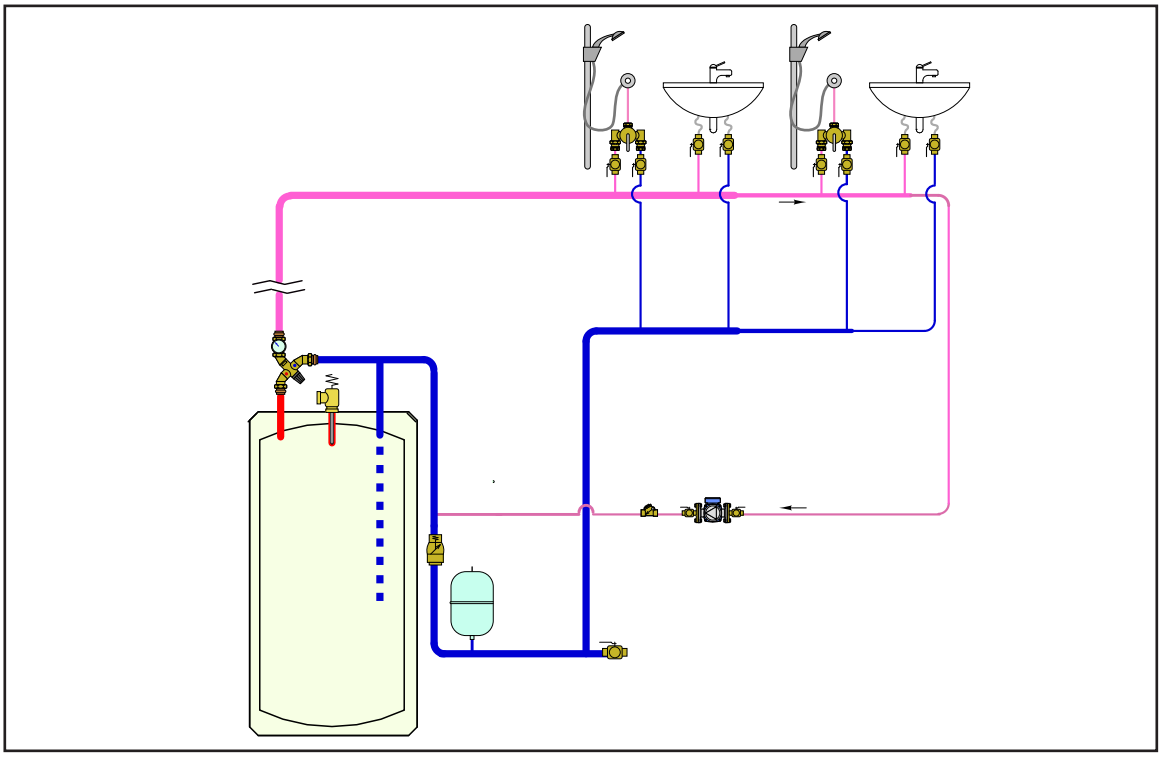
ASSE 1017
(screw up)

ASSE 1070
(screw down)

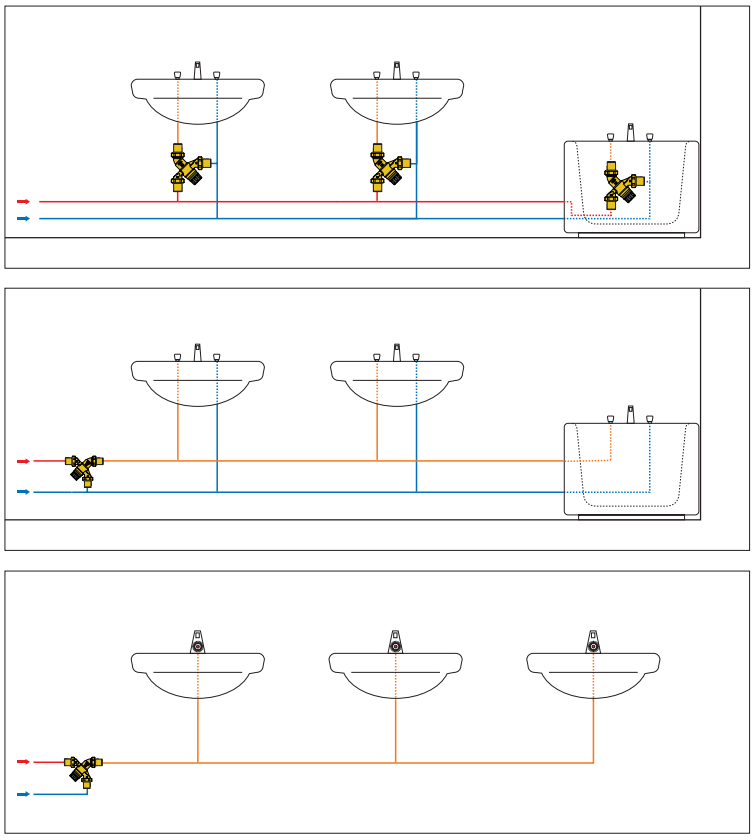
Application diagrams, point of distribution



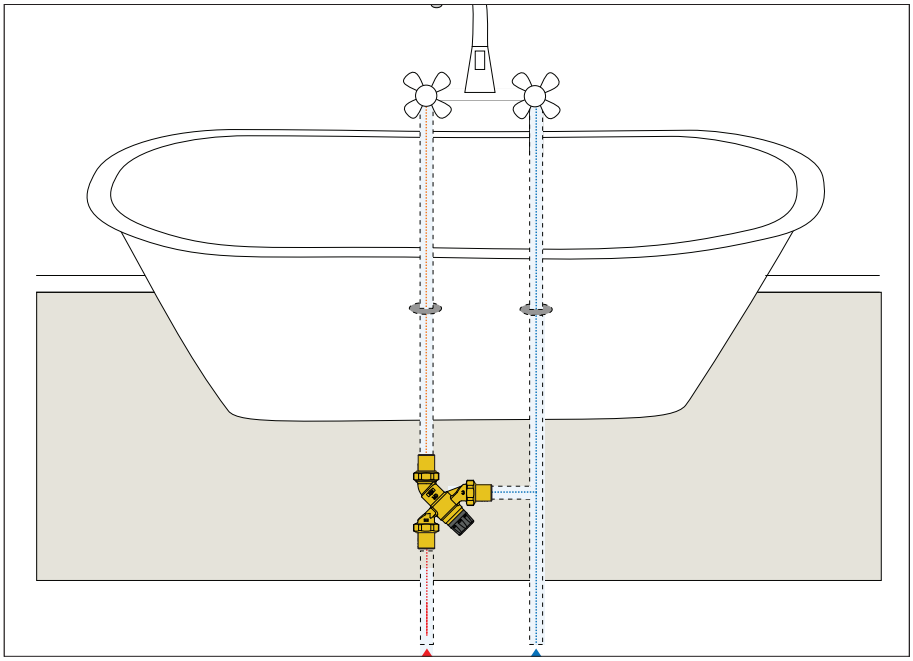
Application diagrams, point of distribution



Application diagrams, Point of Use



Application diagrams, Point of Use



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.

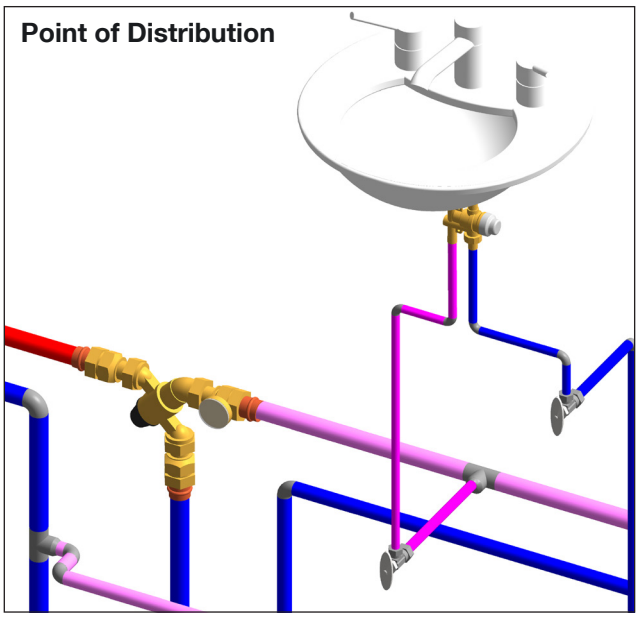
NA10056.....¾" sweat with gauge
NA10358 .....1" union thread with gauge
688003A.....Replacement gauge

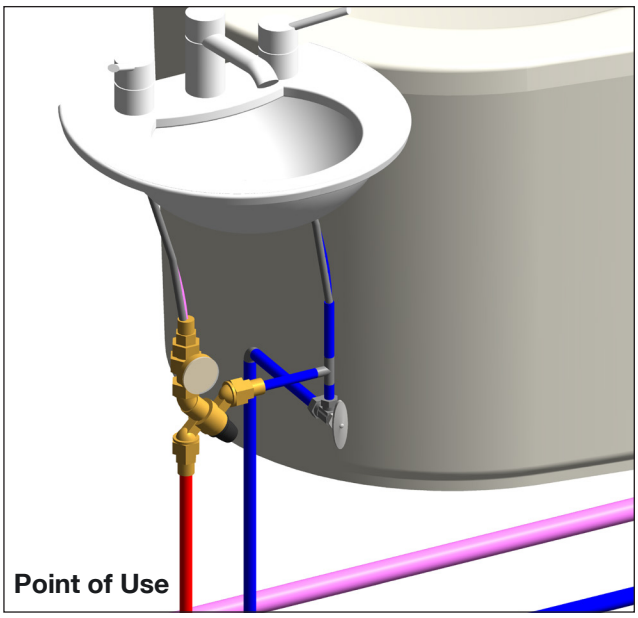
Isolation ball valve.
Low lead Male x Female union fits 1" valves between body and tailpiece. See below.

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

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

Code 290030 isolation ball valves installed on AngleMix inlets





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SPECIFICATION SUMMARIES

AngleMix™ 520__AC series - angle style thermostatic mixing valve, dual listed

Adjustable thermostatic and pressure balanced angle style mixing valve, certified by ICC-ES to ASSE 1017 and CSA B125.3, approved for point of distribution domestic water systems; ASSE 1070/ASME A112.1070/CSA B125.70 approved for point of use domestic water systems. Connections ½" and ¾" 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). Factory setting: limited to 120 degrees F (50 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" and ¾"- Cv 2.0 (Kv 1.7). 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. Provided with inlet port check valves, standard construction. Provide with optional inlet and outlet isolation ball valves, code 290030 or 290031, separately sourced, field installed.

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