

# TankMixer™ water heater tank mixing valve

## 520 series



Replaces 01267/23 .1 NA



ASSE 1017  
NSF/ANSI/CAN 372



### Function

The Caleffi TankMixer™ 520\_AX series kit combines a three-way thermostatic mixing valve with a cold water cross and flexible pipe for easy installation directly on a typical gas-fired water heater and other water heaters that now comply with the National Appliance Energy Conservation Act (NAECA). The TankMixer 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 hot inlet port closes tight to prevent temperature creep in recirculation applications. Also available as body only, for a wide variety of separately-sourced 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.

The valve has been specifically certified to ASSE 1017 and Low Lead Plumbing Law by ICC-ES. It complies with codes IPC, IRC, NPC and UPC for use in accordance with the US and Canadian plumbing codes, and standard NSF/ANSI/CAN 372, low lead.

### Product range

52050_AX series	Kit containing adjustable three-way thermostatic mixing valve, angle body with cold water cross with check valve and flexible connector pipe .....connections 3/4" NPT female to water heater; 3/4" sweat, press, and NPT male union mix outlet/cold water inlet
52051_AX series	Kit containing adjustable three-way thermostatic mixing valve with mixed outlet temperature gauge, angle body with cold water cross with check valve and flexible connector pipe .....connections 3/4" NPT female to water heater; 3/4" sweat, press, and NPT male union mix outlet/cold water inlet
520051A	Adjustable three-way thermostatic mixing valve, angle style body only for field installed connection fittings, source separately .....connections 1" male union

### Technical specifications

#### Materials

- Valve body:	DZR low-lead* brass
- Cold water cross body:	DZR low-lead* brass
- Shutter, seats and slide guides:	PSU
- Springs:	stainless steel
- Seals:	peroxide-cured EPDM
- Adjustment knob	ABS
- Large ID flexible pipe:	stainless steel
- Recirculation port plug:	low-lead* brass

\* 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)  
 Minimum flow rate for stable operation with balanced supply pressure conditions: 0.5 gpm (2 l/min)

Outlet temperature gauge (optional): 2" diameter  
 Dual-scale 30 °F - 210 °F (0 °C -100 °C)

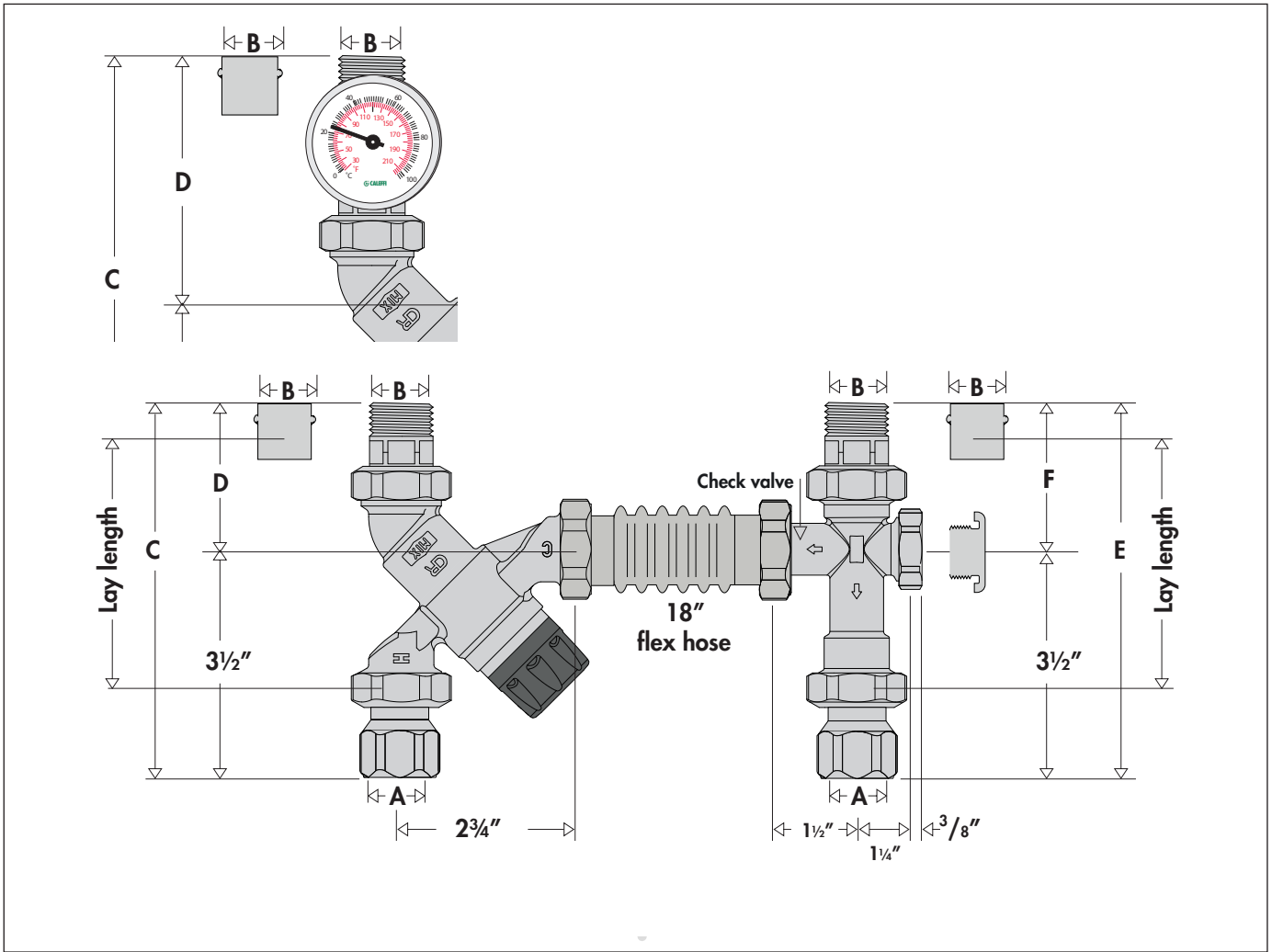
#### Certifications

- 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.
- 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.

#### Connections

to water heater:	
- NPT female union:	3/4"
to mix temperature outlet and cold water inlet:	
- sweat union:	3/4"
- press union:	3/4"
- NPT male union:	3/4"

**Dimensions**



No temperature gauge.

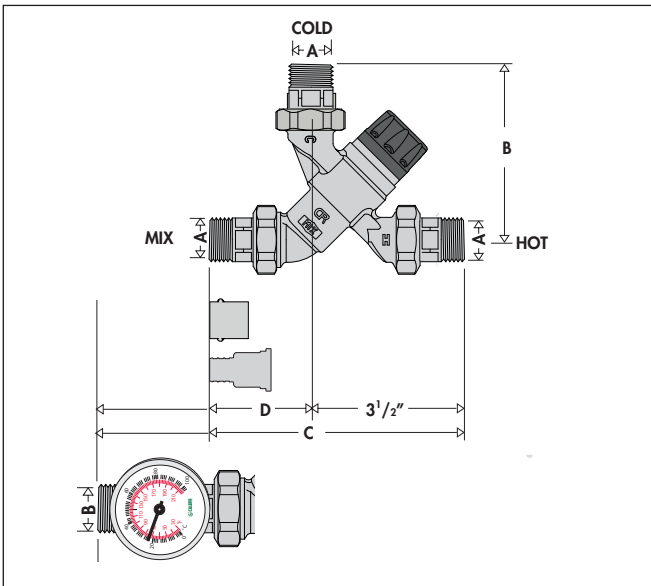
Code	A	B	C	D	E	F	Wt. (lb.)
520500AX	3/4" nptf	3/4" nptm	5 9/16"	2 1/4"	5 5/8"	2 1/4"	2.4
520506AX	3/4" nptf	3/4" press	5 13/16"	2 9/16"	5 7/8"	2 9/16"	2.4
520509AX	3/4" nptf	3/4" swt	5 1/2"	2 9/16"	5 1/2"	2 9/16"	2.4

Lay length (hot inlet to mix outlet) for press: 3 3/8"; for sweat: 3 3/8".

With temperature gauge.

Code	A	B	C	D	E	F	Wt. (lb.)
520510AX	3/4" nptf	3/4" nptm	7 7/8"	4 1/4"	5 5/8"	2 1/4"	2.9
520516AX	3/4" nptf	3/4" press	8"	4 9/16"	5 7/8"	2 9/16"	2.9
520519AX	3/4" nptf	3/4" swt	7 3/4"	4 9/16"	5 1/2"	2 9/16"	2.9

Lay length (hot inlet to mix outlet) for press: 5 5/16"; for sweat: 5 5/16".



Code	Fitting code	A	B	C	D	Wt. (lb.)
520051A*	NA20650**	3/4" nptm	4"	5 1/4"	2 1/4"	2.8
	NA20653**	3/4" nptf	4 1/4"	5 3/4"	2 1/4"	2.8
	NA20656**	3/4" press	4"	5 3/4"	2 9/16"	2.8
	NA20657**	3/4" PEX barb	4 1/4"	6 1/2"	2 3/4"	2.8
	NA20659**	3/4" sweat	4"	5 1/4"	2 9/16"	2.8

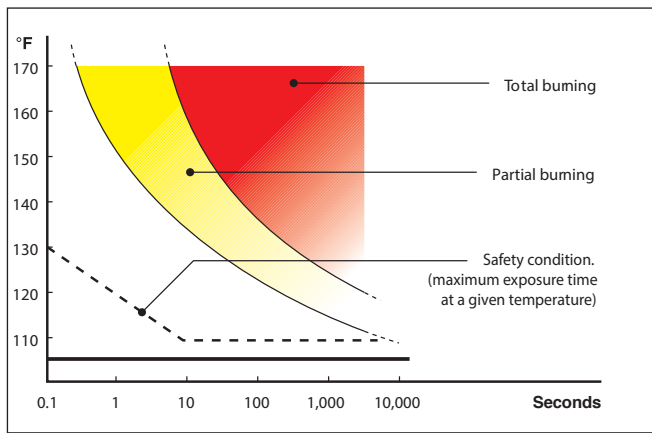
Add 2 1/4 inch to dimension D and C for temperature gauge adapter on mix outlet, code NA10358 (1" union thread with gauge).

\*1" male union connection.

\*\*3 required for all ports, weight includes fittings.

Lay length from Hot Inlet to Mix Outlet for 3/4" press and sweat connections: 3 3/4"

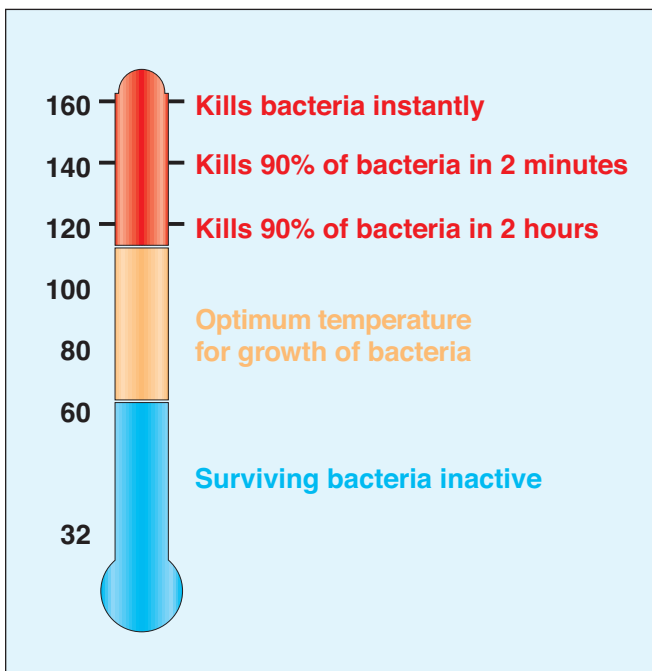
## Temperature — exposure time



## 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. The TankMixer 520 series point of distribution mixing valve is an angled configuration combined with a flexible hose and cold water cross for easy installation to most water heaters for direct mounting to the universal ¾” male NPT threaded top pipe connections with a variety of outlet connection styles. This provides increased usable hot water capacity on existing or new high efficiency water heaters by allowing water to be stored at a higher temperature and safely delivered at lower adjustable temperatures to all fixtures. In addition, it can be used to reduce legionella growth by allowing the water heater thermostat to be set at 140 °F. The flexible hose length allows mounting to all water heater tank sizes. The TankMixer 520\_AX series comes standard with a recirculation port that can be plugged or used for connecting to a hot water recirculation loop.

## 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 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.

## Construction details

### Anti-scale materials

The material used in the construction of the Caleffi TankMixer 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

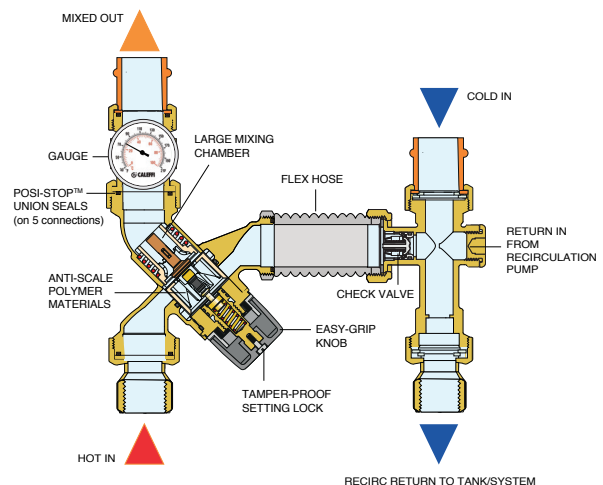
The control knob permits temperature setting between minimum and maximum in one turn (360°). It also has a tamper-proof system to lock the temperature at the set value.

### 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

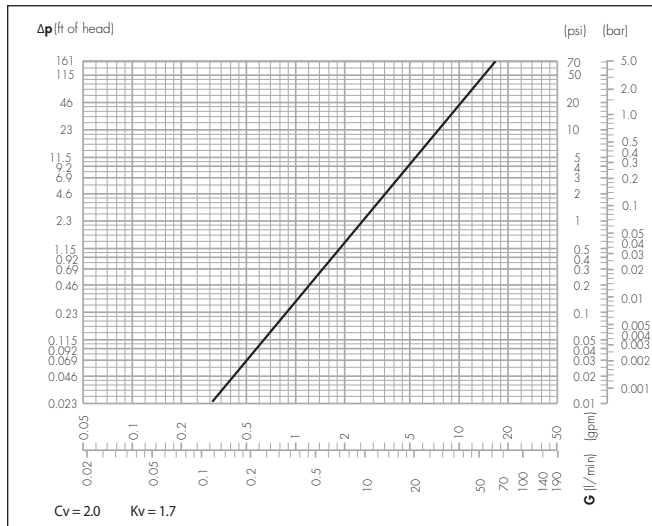
In systems with thermostatic mixing valves, check valves must be installed to prevent undesired backflow. The TankMixer 520\_AX series mixing valves are supplied complete with a check valve on the cold water cross outlet port to the mixing valve. As a convenience for easier installations, the TankMixer 520051A body only can be field-installed with separately purchased union tailpieces for ½”, ¾” or 1” npt female or male, press, PEX barb or sweat with or without check valves (for 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 from the side.

## Hydraulic Characteristics



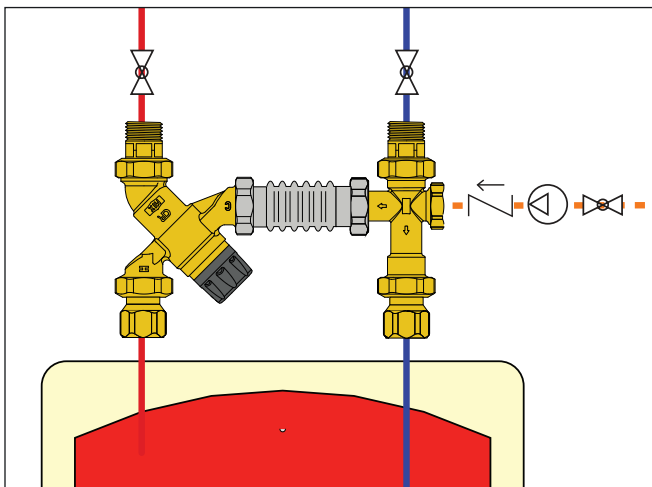
## Use

Caleffi TankMixer 520 series thermostatic mixing valves are designed to be installed at the hot water heater. The 520 series 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 5213 series high performance mixing valves need to be installed. For safety reasons, it is advisable to limit the maximum mixed water temperature to 120 °F when anti-scald devices are not used at each fixture.

## Water heater

As a result of the NAECA, many water heaters now have more insulation making them physically larger, for the same water capacity, than the older models. So units with less capacity are installed requiring higher temperature settings to provide the capacity users were previously accustomed, requiring mixing valves to temper the water to safe levels.

Caleffi TankMixer 520\_AX series thermostatic mixing valves with cold water cross with check valve assembly and large ID flexible connector will conveniently fit a typical gas-fired water heater and a wide variety of other water heaters. A recirculation return can be connected at the side port of the cold water cross.



## Installation

Before installing a Caleffi TankMixer 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.

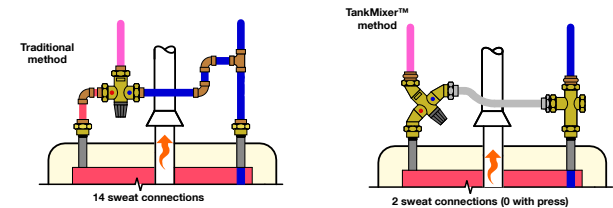
Caleffi TankMixer 520 series thermostatic mixing valves must be installed by qualified personnel in accordance with the diagrams in this brochure, taking into account all current applicable standards.

Caleffi TankMixer 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".

The TankMixer 520\_AX series comes packaged in a kit with everything needed for fast installation including union fittings and press connections.



## Commissioning

The Caleffi TankMixer 520 series thermostatic mixing valve must be commissioned in accordance with current standards by qualified personnel using temperature measuring equipment. Caleffi 520510AX, 520516AX and 5210519AX with integral outlet port temperature gauge provide 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. Note: For models purchased without the outlet temperature gauge, the temperature gauge adapter with temperature gauge can be separately purchased and field installed, code NA10056 for 3/4" models.

## Temperature adjustment

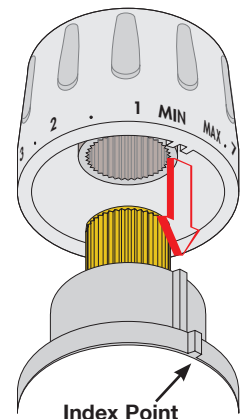
The temperature is set to the required value by means of the knob with the graduated scale, on the top of the valve.

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

with:  $T_{HOT} = 158 \text{ }^{\circ}\text{F} (70 \text{ }^{\circ}\text{C})$ , with:  $T_{COLD} = 59 \text{ }^{\circ}\text{F} (15 \text{ }^{\circ}\text{C})$ ,  $P = 43 \text{ psi} (3 \text{ bar})$

## 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.



## Replacement parts



Replacement body.  
Meets requirements of NSF/ANSI 372-2011. Certified to: ASSE 1017/CSA B125.3, Low lead, by ICC-ES file PMG-1360.  
End connection flexibility: 1/2", 3/4" 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.

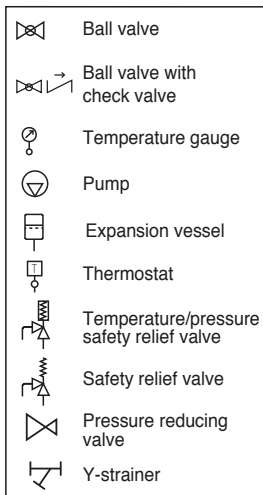
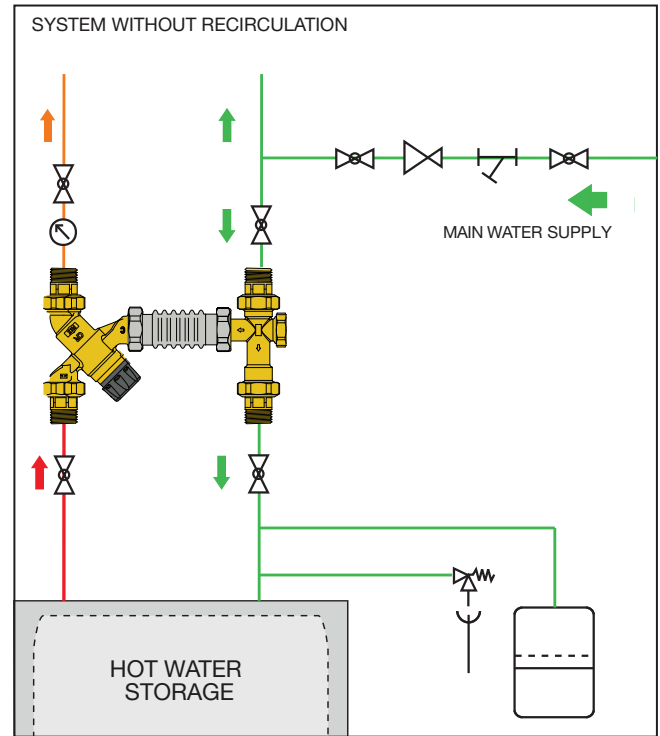
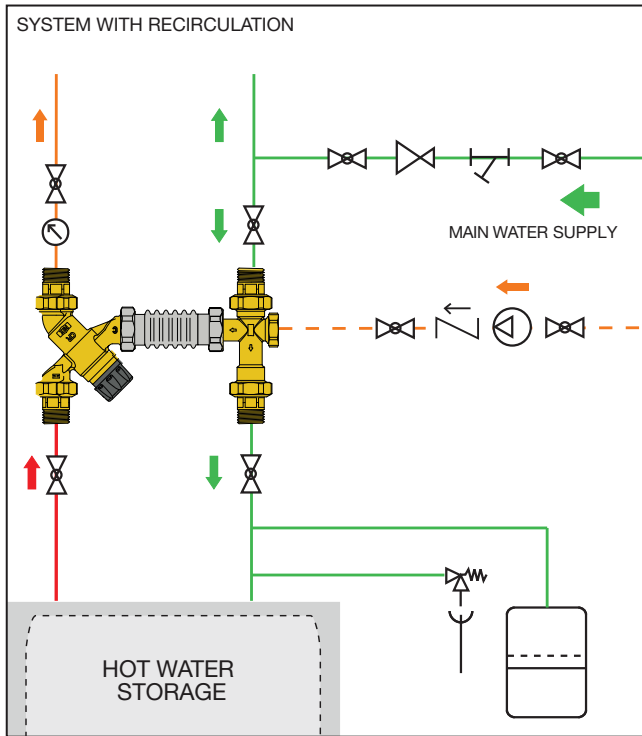
520015A.....1" male union thread, Cv=2.0 (Kv=1.7)

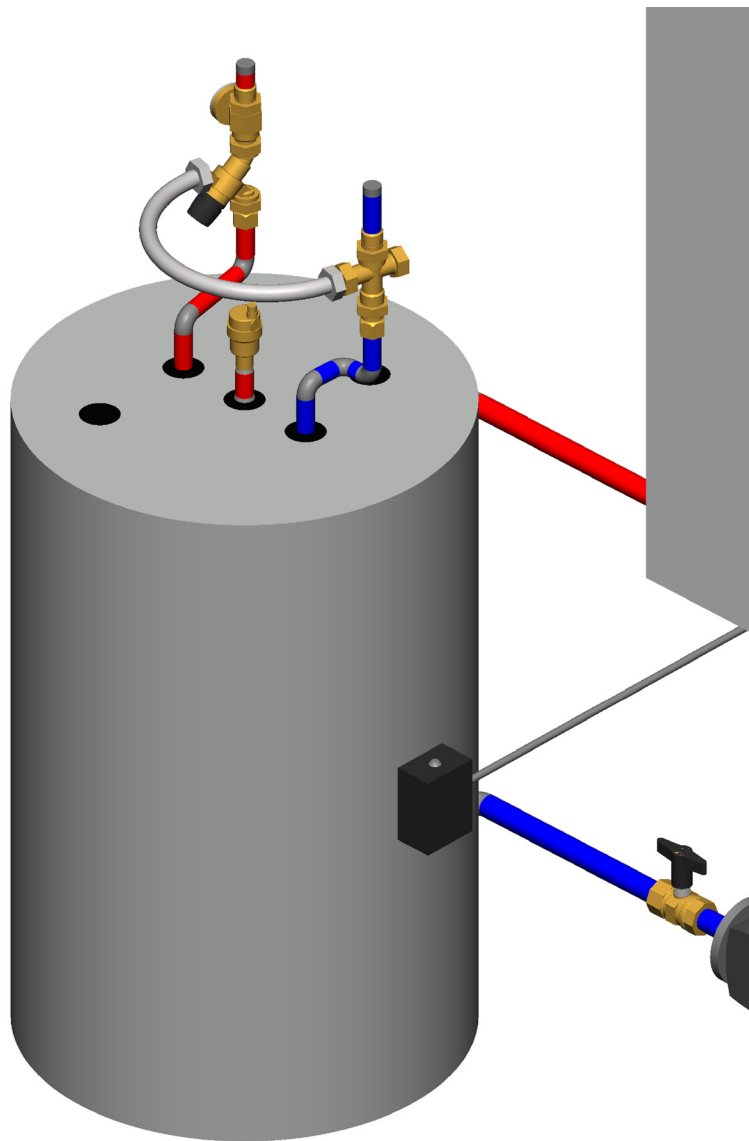


Point of distribution mixed temperature gauge adaptor fits TankMixer™ 520 series mixing valves. Threaded union mounting replaces existing mixed outlet with 3/4" or 1" sweat pipe connection. Removable gauge fits into temperature well. Gauge dial is 2" diameter and dual-scale 30—210° F (0—100° F) .  
Low-lead brass body.

NA10056.....3/4" sweat with gauge  
NA10358.....1" union thread with gauge  
688003A.....Replacement gauge

## Application diagrams





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## SPECIFICATION SUMMARIES

### TankMixer™ 5205 AX series - thermostatic mixing valve with flexible pipe and cold water cross

Adjustable thermostatic and pressure balanced mixing valve, certified by ICC-ES to ASSE 1017 and CSA B125.3, approved for point of distribution domestic water systems. Connections 3/4" NPT male, 3/4" sweat or 3/4" press with union tailpieces. DZR low-lead brass valve body and cold water cross (<0.25% Lead content) certified by ICC-ES file 1360. Meets requirements of NSF/ANSI/CAN 372-2011. Shutter, regulating seats and sliding surfaces in anti-scale plastic, PSU. Seals peroxide-cured EPDM. Stainless steel spring. Large ID stainless steel flexible pipe, 18" length. 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). Provided with tamper-proof setting lock. Provided with cold water port check valve in cold water cross outlet. Provide with optional mixed outlet temperature gauge, 30 to 210 degrees F scale, 2 inch diameter. Provided with recirculation return port, 1/2" NPT female, low-lead brass plug included.

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