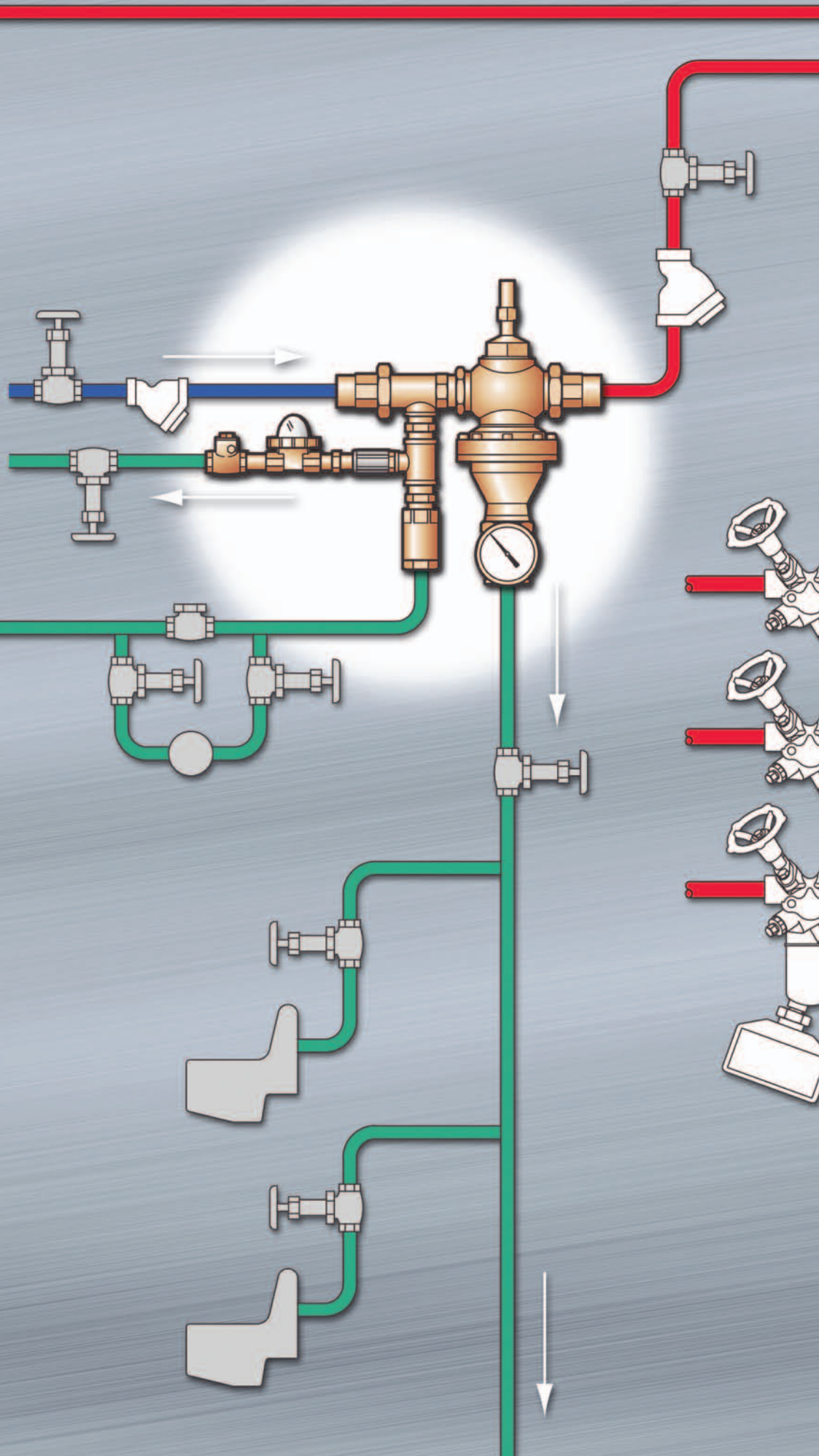


rada[™]
Mixing Valves



Armstrong



Armstrong[®]

Intelligent System Solutions[™]

STEAM • AIR • HOT WATER

Hot & Cold Water Mixing Valves ID Chart



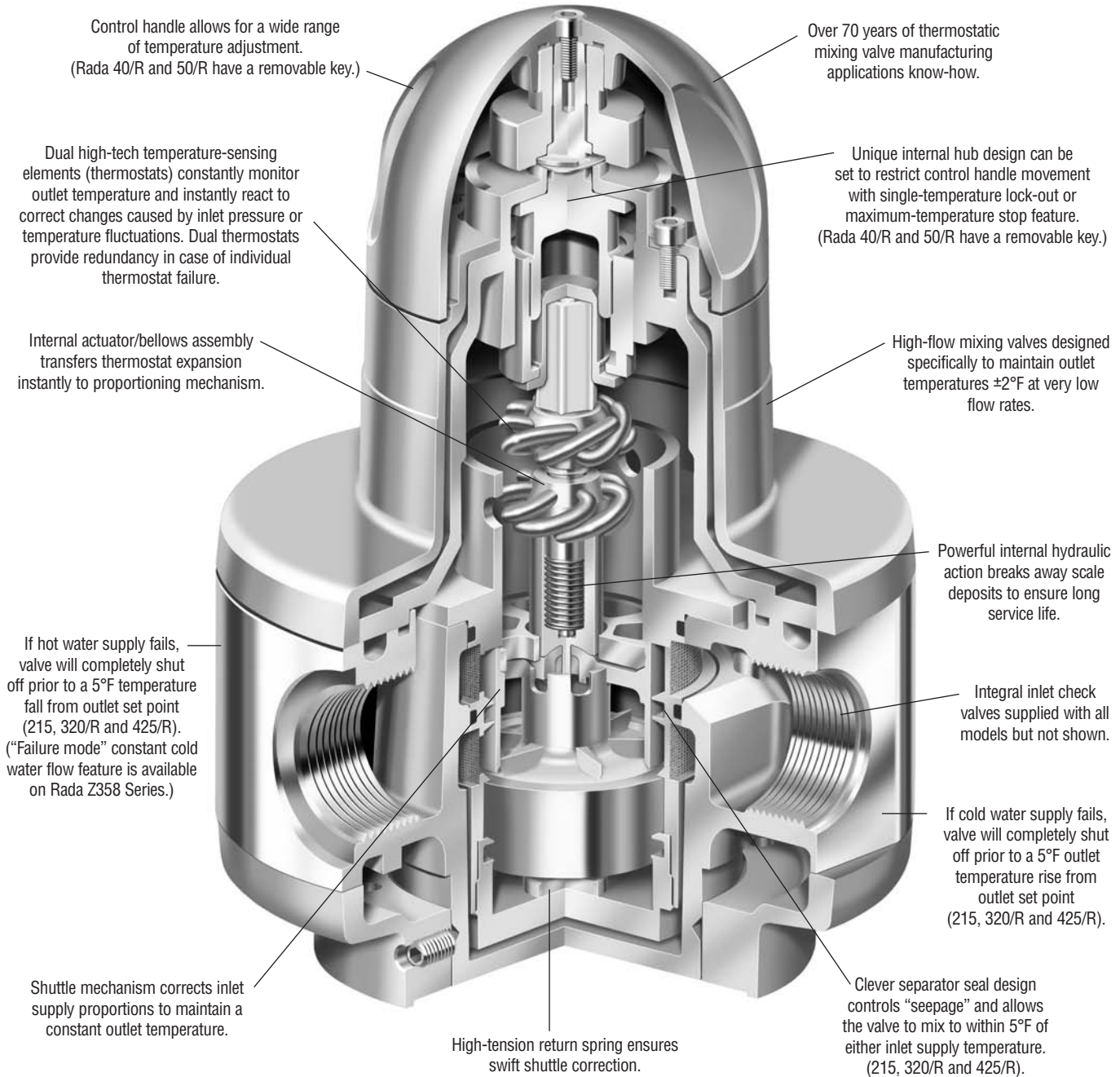
Illustration	Type	Connections NPT	Body Material	Model	Max. Flow Rate gpm	Min. Flow Rate gpm	Check Valves	Thermometer	ANSI Z358.1 - 1998	ASSE 1017 CSA B125	Shutdown Feature	Recirc. System	Located on Page	
Rada® Single Point & Zoned/Group Control Systems														
Individual Mixing Units														
	Hot & Cold Water Mixing Valves	3/8"	Bronze	110	2.4	.5	●			1016	●		7	
		1/2"	Brass CP	215	11†	.5	●					●		8
		1"		320	23†	1	●			●	●			9
		1-1/4"		425	46†	2	●			●	●			12
		1-1/2"	Bronze	40	72††	2	●	●		●	●			15
		2"		50	98††	2	●	●		●	●			16
Rada® Solutions for Central Recirculation System Control—Thermostatic														
Individual Mixing Units														
	Hot & Cold Water Mixing Valves	3/4"	Brass CP	320R	15††	—	●	●		●	●	●	18	
		1"		425R	31††	—	●	●		●	●	●	19	
		1-1/2"	Bronze	40R	72††	—	●	●		●	●	●	20	
		2"		50R	98††	—	●	●		●	●	●	21	
Flexi-Flo™ Package Systems														
	Hot & Cold Water Mixing Valves	3"	Bronze (Copper Piping)	50R-50R	193††	—	●	●		●	●	●	22	
		4"		50R-50R-50R	288††	—	●	●		●	●	●	23	
Rada® Solutions for Central Recirculation System Control—Electronic														
Package Systems														
	Electronic Mixing Center	1-1/2"	Bronze (Copper Piping)	EMC 1	75	—	●	●	●	●	●	●	27	
		3"		EMC 2	150	—	●	●	●	●	●	●	27	
Rada® Solutions for Emergency Fixture Control														
	Hot & Cold Water Mixing Valves	1"	Brass CP	Z358-20	24†	1	●	●	●		●		30	
		1-1/4"		Z358-40	48†	2	●	●	●		●		33	
Sample Specifications														
Rada Single Point and Zoned/Group Control Systems													36	
Rada Solutions for Central Recirculation System Control													39	
Rada Solutions for Emergency Fixture Control													45	

† 45 psi pressure drop
 †† 20 psi pressure drop

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.



For Point of Use or Zoned/Group Control, for Central Recirculation Systems or Emergency Equipment, Armstrong Presents...



What do these technical benefits mean in field application terms?

How about a full range of Thermostatic Mixing Valves that can also be manifolded to produce a series of Flexi-Flo™ preplumbed assemblies that will allow you to:

- be less concerned about high mineral content water because of the powerful internal action and the use of high-tech polymers and coatings
- specify or use fewer valves per building, because even our large valves have remarkable minimum flow requirements
- use combinations of large valves for high flow demand buildings without the need to tie in a small mixing valve to handle the low circulating pump-only flow rate
- specify or use group controllers and point-of-use valves as secondary mixers even when the central mixing valve is delivering low temperature (120°F/49°C or below as legislated) recirculated hot water (most mixing valves require a significant differential between hot and blend)
- rest assured that many of our field representatives are either "degreed" engineers or engineered product specialists
- deliver ANSI recommended "tepid" water with "failure mode" constant cold water flow to emergency fixtures
- specify and install mixing valves that meet ASSE 1016, ASSE 1017 and CSA B125 where applicable

When it comes to mixed water temperature control, there's a word for the ultimate in safety and accuracy—Rada. Hot and cold water mixing valves have a simple but critically important function in life—to provide a consistent means of regulating water temperature at or before a point of use. Sounds simple enough, right? But mixing valves that depend on wax or spirit-filled capsules or old-fashioned bimetal coils as their thermostats have been anything but simple. Usually they leave you to choose between two necessary benefits:

- 1) a powerful force to resist mineral deposition and control the proportioning device or
- 2) a fast reaction time.

Rada thinks you deserve both. And we deliver both with the Rada principle.

Why the World Needs Rada Mixing Valves

The *thermostatic mixing valve* has long been regarded as an essential means of ensuring that premixed hot water for general hygiene use is maintained at a safe, comfortable temperature. In addition, the multitude of process applications, along with an ever-present requirement for industrial safety, have increased the demand for accurately controlled hot water at specific temperatures.

Clearly, the perfect thermostatic mixing valve would combine maximum sensitivity with the ability to generate a force powerful enough to resist mineral deposit and transmit the reaction quickly. In other words, the ideal mixing valve would deliver *sensitivity* and *accuracy* plus a *forceful* and *superfast* reaction time.

Enter the Rada Principle

The Rada unit contains a corrosion-resistant flexible metal bellows connected to a coiled copper tube, providing a large surface area in contact with the blended water. The tube is filled with a polyeutectic compound highly sensitive to temperature change, which almost immediately extends or contracts the bellows when a temperature change occurs.

The powerful axial force drives a proportioning mechanism to control hot and cold water mixing more precisely than ever before, thus maintaining a virtually constant outlet temperature.

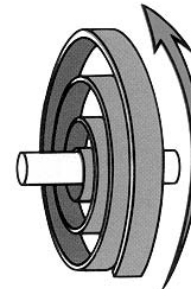
The Rada method of mixed water temperature control ends forever the argument over which principle—bimetal or filled capsule—is superior. Now it's clear: Both are outdated by Rada mixing valves from Armstrong.

The Next Frontier

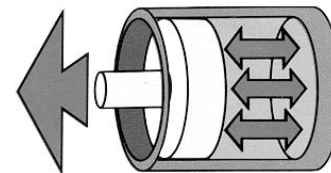
Thermostatic water-mixing technology in various forms has been around since the early 1900s, with Rada firmly planted on the developmental leading edge. We believe that water mixing is ready for an evolutionary quantum leap and that the next frontier must feature advanced, low-voltage electronics.

The first in a family of Electronic Mixing Centers (EMC) is featured on pages 24 through 27. Through electronic mixing we have been able to achieve pinpoint control and accuracy at a level that is, in reality, impossible with a thermostatic mixing valve.

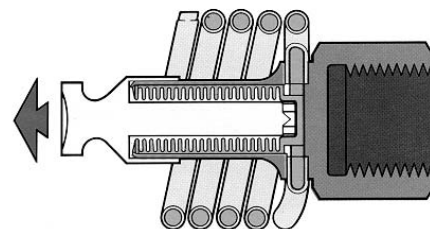
With PC and building management system interface capability, and programming, data logging, alarm, and self-diagnostic features, Rada EMCs offer design options and system solutions unavailable from any other resource.



**Bimetal principle
has very little power**



**Wax/spirit-filled capsule principle
has a slow reaction time**



Rada principle



Rada® Single Point & Zoned/Group Control Systems

Thermostatic Mixing Valves

Rada Single Point and Zoned/Group Control Systems feature a series of 6 individual **Thermostatic Mixing Valves** designed specifically for use in non-return “dead leg” applications.

The complete range has been designed to offer accurate temperature control in installations where there are diverse flow requirements between .5 and 295 gpm (1.9 and 1,078 lpm).

Sizing

To size a mixing valve for single open outlet applications, simply match the required flow rate with the available maintained inlet water pressure. Correlate with required minimum flow rate and make a selection.

When sizing for zoned or group control applications, ensure that there is sufficient residual pressure (20 psi minimum is suggested) after the mixing valve to satisfactorily operate the outlet fixtures at realistic maximum simultaneous demand.

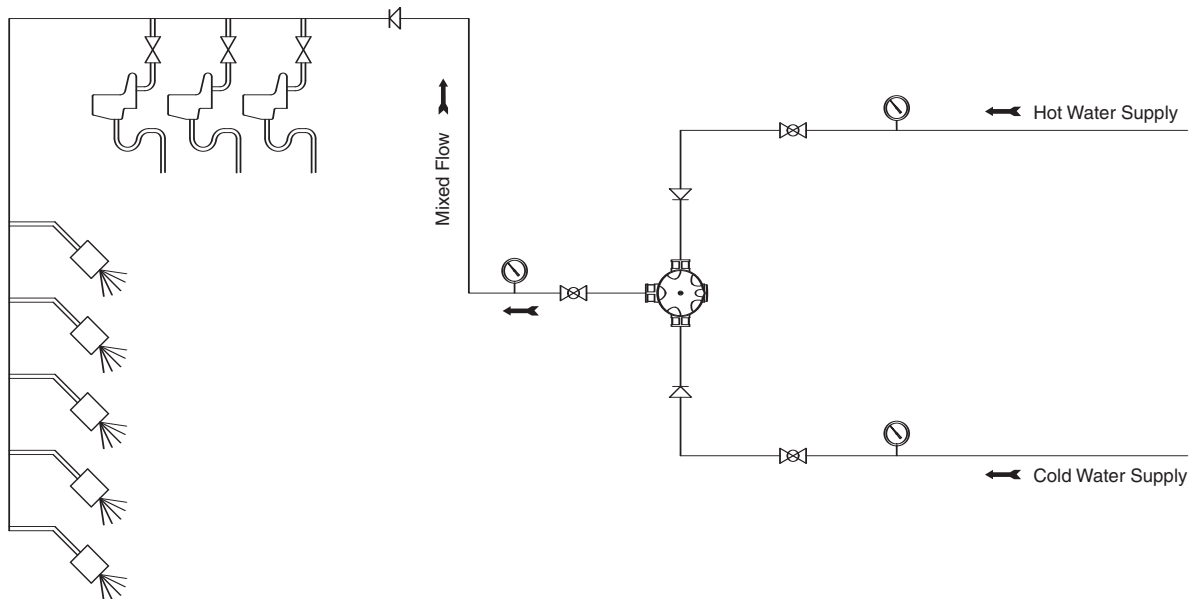
Rada Thermostatic Mixing Valves (gpm)

Model	Pressure Drop (psi)										Min. Flow	C _v
	5	10	15	20	25	30	35	40	45	50		
110	—	.75	—	1.25	—	1.75	—	2.25	—	2.5	.5	.25
215	4	5	7	8	9	9	10	11	11	12	.5	1.7
320	8	11	13	15	17	19	20	22	23	24	1	3.4
425	15	22	27	31	35	38	41	44	46	49	2	6.9
40	36	51	62	72	—	—	—	—	—	—	2	16.0
50	49	70	85	98	—	—	—	—	—	—	2	22.0

Rada Thermostatic Mixing Valves Installed in Parallel (gpm)

Model	Pressure Drop (psi)				Min. Flow	C _v
	5	10	15	20		
40/40	72	101	124	143	4	32
50/50	98	139	170	197	4	44
50/50/50	148	209	256	295	6	66

Data on the individual Rada Mixing Valves for Single Point and Zoned/Group Control Systems can be found on pages 7 through 16. Certified drawings, specifications, installation and maintenance guides, and plumbing schematics available upon request by calling Hot Water Group at (269) 279-3602.



All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Single Point & Zoned/Group Control Systems

Model 110

ASSE 1016 certified “point of use” Thermostatic Mixing Valve. Designed and applied specifically to meet ASSE Standard 1016 requirements for under-lavatory sanitary applications.

Capable of close temperature control at diverse flow rates as low as .5 gpm, Model 110 has been “value engineered” so that retrofit installations to bring existing sites up to ASSE standards can be accomplished without prohibitive expenditure.

Model 110 is recommended for use for single lavatory control. Rada 215 (page 8) is recommended if group control of lavatories meets the installation and budgetary requirements of the site.

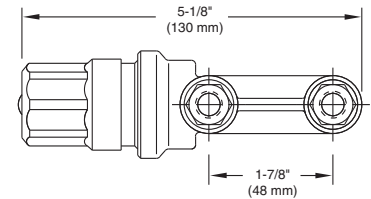


Model 110 Offers:

Safety. Maintains outlet temperature +/-3°F. Integral dual check valves prevent cross connection. Temperature limiting feature and automatic thermal shutdown in the event of an inlet supply failure. Tamper-resistant locking cap.

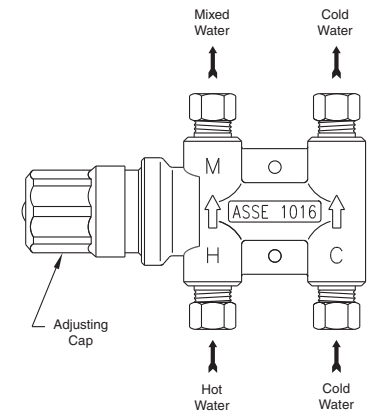
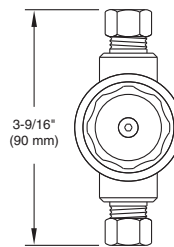
Economy. Value engineered to accommodate multiple unit applications.

Comfort. Maintains a steady outlet temperature by constant internal monitoring and correcting of inlet supply temperature and pressure applications.



Technical Specifications

- 3/8" (10 mm) compression
- Operating pressures
 - Maximum: 150 psi (10 bar)
 - Minimum: 30 psi (2.1 bar)
- ASSE 1016 certified
- Flow coefficient (C_v) .25
- Integral check valves and strainers
- Inlet hot supply 120° to 180°F
- Inlet cold supply 40° to 85°F
- Minimum inlet/outlet temperature differential 15°F
- Maximum outlet temperature 120°F
- Shipping weight 3 lbs (1.3 kg)



For a fully detailed certified drawing, refer to CDLW 1113.

Model	Pressure Drop (psi)										Min. Flow	C _v
	5	10	15	20	25	30	35	40	45	50		
110	—	.75	—	1.25	—	1.75	—	2.25	—	2.5	.5	.25
215	4	5	7	8	9	9	10	11	11	12	.5	1.7
320	8	11	13	15	17	19	20	22	23	24	1	3.4
425	15	22	27	31	35	38	41	44	46	49	2	6.9
40	36	51	62	72	—	—	—	—	—	—	2	16.0
50	49	70	85	98	—	—	—	—	—	—	2	22.0

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.



Armstrong® Rada® Single Point & Zoned/Group Control Systems

Rada 215

Rada Thermostatic Mixing Valve of “sealed for life” replaceable cartridge construction. Compact design is ideally suited to recessed enclosure, plumbing chase and mechanical room installations or as console, deck or wall mount unit for tub fill and shower applications. Complete operating mechanism of valve is enclosed in a durable disposable polymer cartridge for ease of maintenance. Powerful internal movement of the hot and cold water proportioning assembly ensures resistance to high mineral content water. Capable of close temperature control at full (12 gpm/45 lpm) and reduced (.5 gpm/1.9 lpm) flow rates. Unit is designed for surface mount installation and is supplied as standard with a tamperproof single temperature “locking” shroud **and** variable temperature control trim set.*

* Use of the trim set allows for full temperature control to within 5°F (2°C) of either inlet supply along with an integral maximum temperature limit stop and single temperature locking option.



Rada 215 Offers:

Safety. Integral check valves to prevent cross connection. A maximum temperature limiting feature and automatic shutdown in the event of an inlet supply failure.

Economy. New technology and state-of-the-art materials reduce cost. Single “no spare parts” replaceable cartridge design reduces field maintenance and parts stocking requirements.

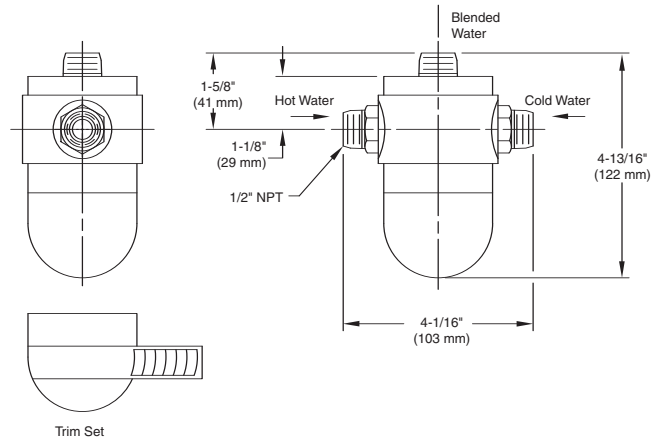
Comfort. Maintains a steady outlet temperature by constant internal monitoring and correcting of inlet supply temperature and pressure fluctuations.

Technical Specifications

- 1/2" (15 mm) NPT inlets and 1/2" (15 mm) NPT outlet
- DZR brass/stainless alloy/polymer construction
- Operating pressures
 - Maximum: 150 psi (10 bar)
 - Minimum: 10 psi (.7 bar)
- Maximum pressure loss ratio: 10 to 1**
- Flow coefficient (C_v) 1.74
- Integral inlet check valves and strainers
- Shipping weight 4 lbs (1.8 kg)

**Ratio of inlet pressures accounting for restrictions on valve outlet (minus back pressure)

For a fully detailed certified drawing, refer to CDLW #1057.



Rada Thermostatic Mixing Valves (gpm)												
Model	Pressure Drop (psi)										Min. Flow	C _v
	5	10	15	20	25	30	35	40	45	50		
110	—	.75	—	1.25	—	1.75	—	2.25	—	2.5	.5	.25
215	4	5	7	8	9	9	10	11	11	12	.5	1.7
320	8	11	13	15	17	19	20	22	23	24	1	3.4
425	15	22	27	31	35	38	41	44	46	49	2	6.9
40	36	51	62	72	—	—	—	—	—	—	2	16.0
50	49	70	85	98	—	—	—	—	—	—	2	22.0

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Rada® Single Point & Zoned/Group Control Systems

Rada 320

Rada Thermostatic Mixing Valve of “sealed for life” disposable cartridge construction. Compact design and top and/or bottom blended water outlet make Rada 320 ideal for recessed enclosure, plumbing chase and mechanical room installations. Rada 320 is the mixing valve of choice for console, deck or “in wall” installation (Rada 320B) when installed for therapy/whirlpool bathing unit applications.

Complete operating mechanism of valve is enclosed in durable polymer cartridge for easy field maintenance. Powerful internal proportioning mechanism resists mineral deposits and buildup.

Capable of close temperature control at full (24 gpm/91 lpm) and reduced (1 gpm/3.8 lpm) flow rates. Able to blend to within 5°F (2°C) of either inlet supply due to “low seepage” across internal proportioning mechanism.

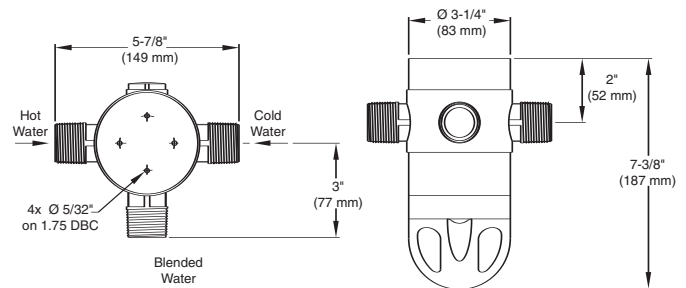
Rada 320 Offers:

Safety. Dual thermostats provide redundancy in case of individual thermostat failure. Integral check valves prevent cross connection. Maximum temperature limiting and single temperature locking rise feature. Instant automatic shutdown prior to a 5°F (2°C) temperature rise/fall in the event of an inlet supply failure.

Economy. New technology and state-of-the-art materials reduce cost. Single “no spare parts” replaceable cartridge design reduces field maintenance and parts stocking requirements.

Comfort. Maintains a steady outlet temperature by constant internal monitoring and correcting of inlet supply temperature and pressure fluctuations.

Rada 320 supersedes Rada 222, 17 and 20.



Technical Specifications

- 1" (25 mm) NPT inlets and 1" (25 mm) NPT outlet
- Chrome-plated DZR brass/polymer construction
- Operating pressures
 - Maximum: 150 psi (10 bar)
 - Minimum: 10 psi (.7 bar)
- Maximum flow rate at 9 ft/sec (2.7 m/sec): 16 gpm (61 lpm)
- Maximum pressure loss ratio: 10 to 1*
- ASSE 1017 and CSA B125 certified
- Flow coefficient (C_v) 3.4
- Integral check valves and strainers
- Dual thermostatic elements
- Shipping weight 10 lbs (4.5 kg)

*Ratio of inlet pressures accounting for restrictions on valve outlet (minus back pressure)

For fully detailed certified drawing, refer to CDLW #1061.

Rada Thermostatic Mixing Valves (gpm)												
Model	Pressure Drop (psi)										Min. Flow	C _v
	5	10	15	20	25	30	35	40	45	50		
110	—	.75	—	1.25	—	1.75	—	2.25	—	2.5	.5	.25
215	4	5	7	8	9	9	10	11	11	12	.5	1.7
320	8	11	13	15	17	19	20	22	23	24	1	3.4
425	15	22	27	31	35	38	41	44	46	49	2	6.9
40	36	51	62	72	—	—	—	—	—	—	2	16.0
50	49	70	85	98	—	—	—	—	—	—	2	22.0

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.



Rada® Single Point & Zoned/Group Control Systems

Rada 320D

A derivative of the standard Rada 320 Thermostatic Mixing Valve, this assembly is ideal for surface mount, recessed enclosure, plumbing chase and mechanical room installations.

Factory supplied pre-plumbed and pressure-tested Rada 320D is supplied as standard combination inlet check stop/union/strainers, thermometer and outlet stop valve.*

* Rada 320D is supplied with top outlet and can be site reconfigured for bottom outlet applications.

Rada 320D is supplied as a polished chrome Thermostatic Mixing Valve with self-finish brass/bronze fittings and connections.

Rada 320DC is supplied as a polished chrome Thermostatic Mixing Valve with nickel-plated fittings and connections.

Rada 320 Offers:

Safety. Dual thermostats provide redundancy in case of individual thermostat failure. Integral check valves prevent cross connection. Maximum temperature limiting and single temperature locking feature. Instant automatic shutdown prior to a 5°F (2°C) temperature rise/fall in the event of an inlet supply failure.

Economy. New technology and state-of-the-art materials reduce cost. Single “no spare parts” replaceable cartridge design reduces field maintenance and parts stocking requirements.

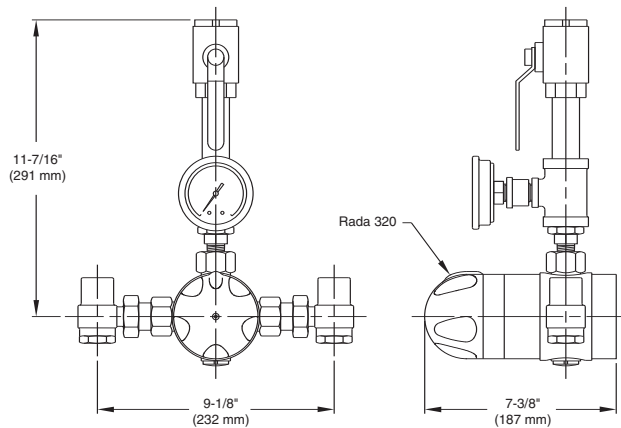
Comfort. Maintains a steady outlet temperature by constant internal monitoring and correcting of inlet supply temperature and pressure fluctuations.

Rada 320 supersedes Rada 222, 17 and 20.

Technical Specifications

- 3/4" (20 mm) NPT inlets and 3/4" NPT outlet
- Chrome-plated DZR brass/polymer construction with self-finish brass and bronze components (320D) or with nickel-plated components (320DC)
- Operating pressures
 - Maximum: 150 psi (10 bar)
 - Minimum: 10 psi (.7 bar)
- Maximum flow rate at 9 ft/sec (2.7 m/sec): 16 gpm (61 lpm)
- Maximum pressure loss ratio: 10 to 1**
- ASSE 1017 and CSA B125 certified
- Flow coefficient (C_v) 3.4
- Integral combination inlet check stop/union/strainers
- Fitted with thermometer and outlet stop valve
- Dual thermostatic elements
- Shipping weight 17 lbs (6.4 kg)

**Ratio of inlet pressures accounting for restrictions on valve outlet (minus back pressure)



For a fully detailed certified drawing, refer to CDLW #1102.

Rada Thermostatic Mixing Valves (gpm)												
Model	Pressure Drop (psi)										Min. Flow	C _v
	5	10	15	20	25	30	35	40	45	50		
110	—	.75	—	1.25	—	1.75	—	2.25	—	2.5	.5	.25
215	4	5	7	8	9	9	10	11	11	12	.5	1.7
320	8	11	13	15	17	19	20	22	23	24	1	3.4
425	15	22	27	31	35	38	41	44	46	49	2	6.9
40	36	51	62	72	—	—	—	—	—	—	2	16.0
50	49	70	85	98	—	—	—	—	—	—	2	22.0

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Rada® Single Point & Zoned/Group Control Systems

Rada 320-FMC

Rada Thermostatic Mixing Valve for remote/secure cabinet mount “dead leg” group fixture control. Rada 320 is ideal for this application due to its low service, single “sealed for life” disposable cartridge construction, low inlet to outlet temperature differential requirement and low flow single fixture control capability.

Rada 320 is supplied fully assembled and pressure tested in an 18" x 24" x 8" stainless steel recessed cabinet with a 2" flange. Cabinet has a polished stainless steel piano-hinged door with a keyed cylinder lock.

Rada 320-FMC is supplied as standard with combination inlet check stop/union/strainers, thermometer and outlet stop valve.

Rada 320-FMC is supplied as standard under this model number for top inlet hot and cold water supplies and a top outlet with a left hand hinged door as indicated in adjacent drawing.

Rada 320-FMC can be specified/ordered with the following piping configurations under the following model numbers:

Top inlets/bottom outlet	320-FMC-TB
Bottom inlets/bottom outlet	320-FMC-BB*
Bottom inlets/top outlet	320-FMC-BT*

*320-FMC-BB/BT are supplied with a right-hand hinged door.

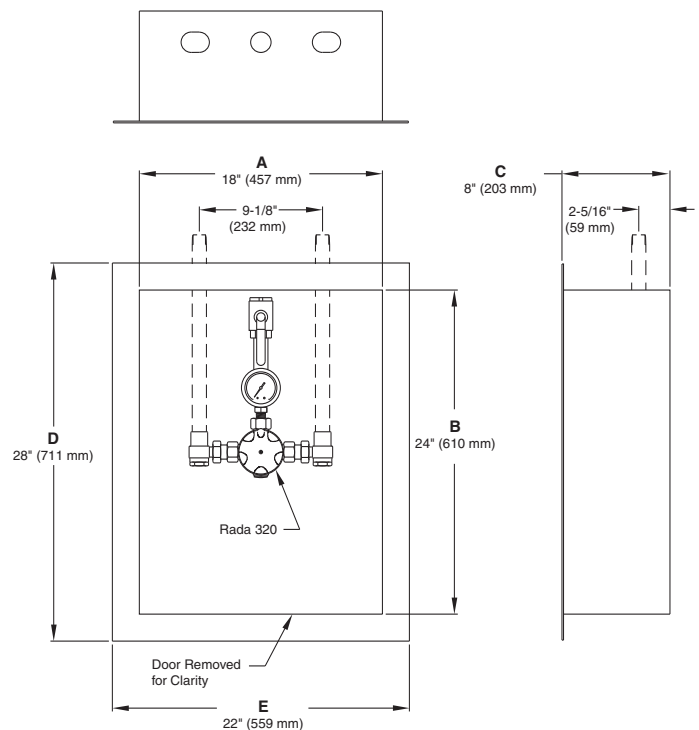


Technical Specifications

- 3/4" NPT (20 mm) inlets and 3/4" NPT (20 mm) outlet
- Cabinet construction: 14 gauge #4 finish stainless steel
- Cabinet outer flange 2"
- Integral thermometer
- Integral check stop/strainer/unions
- Refer to Rada 320, page 9, for mixing valve technical detail.
- Outlet stop valve
- Shipping weight 58 lbs (22 kg)

NOTE: Available as above in a Surface Mounted Cabinet of the same size and specification, less recess flange, under model number 320-SMC. Use dimensions A, B and C only.

For a fully detailed certified drawing, refer to CDLW #1070.



All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.



Armstrong® Rada® Single Point & Zoned/Group Control Systems

Rada 425

Rada Thermostatic Mixing Valve is suitable for safe, accurate water temperature control in single open outlet or “dead leg” multiple-point-of-use applications. Compact design and top or bottom blended water outlet make Rada 425 ideal for surface mount, recessed enclosure or plumbing chase installations. Rada 425 is capable of very close temperature control at full (49 gpm/185 lpm) and reduced (2 gpm/7.5 lpm) flow rates, which makes it an excellent selection for larger “group” fixture control.

Rada 425 is able to blend to within 5°F (2°C) of either inlet supply temperature because of “low seepage” across the internal proportioning mechanism, while still maintaining thermal correction/shutdown capability. This feature makes Rada 425 a superb selection for secondary or “zoned” fixture/building water temperature control.

Rada 425 Offers:

Safety. Dual thermostats provide redundancy in case of individual thermostat failure. Integral inlet check valves prevent cross connection. Maximum temperature limiting and single temperature locking features legislate control. Instant automatic shutdown will occur prior to a 5°F (2°C) temperature rise/fall in the event of an inlet supply failure.

Economy. New technology and state-of-the-art materials reduce cost. Design and functional simplicity reduce field maintenance and parts stocking requirements.

Comfort. Maintains a steady outlet temperature by constant internal monitoring and correcting of inlet supply temperature and pressure fluctuations.

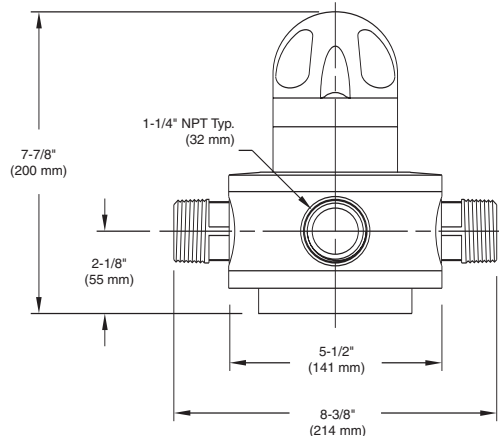
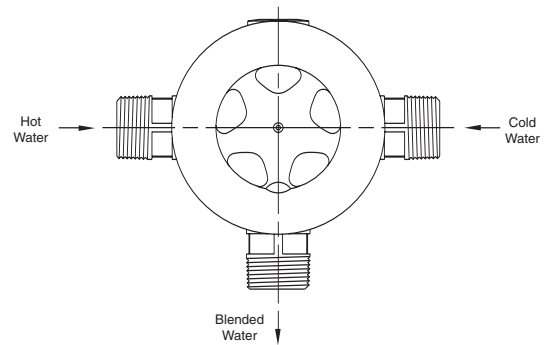
Rada 425 supersedes Rada 25.

Technical Specifications

- 1-1/4" NPT (32 mm) inlets and 1-1/4" outlet
- Chrome-plated DZR brass/polymer construction
- Operating pressures
 - Maximum: 150 psi (10 bar)
 - Minimum: 10 psi (.7 bar)
- Maximum flow rate at 9 ft/sec (2.7 m/sec): 26 gpm (98 lpm)
- Minimum flow rate 2 gpm (7.5 lpm)
- ASSE 1017 and CSA B125 certified
- Maximum pressure loss ratio: 10 to 1*
- Flow coefficient (C_v) 6.9
- Integral inlet check valves and strainers
- Dual thermostatic elements
- Shipping weight 18 lbs (8.1 kg)

* Ratio of inlet pressures accounting for restrictions on valve outlet (minus back pressure)

For a fully detailed certified drawing, refer to CDLW #1065.



Rada Thermostatic Mixing Valves (gpm)												
Model	Pressure Drop (psi)										Min. Flow	C _v
	5	10	15	20	25	30	35	40	45	50		
110	—	.75	—	1.25	—	1.75	—	2.25	—	2.5	.5	.25
215	4	5	7	8	9	9	10	11	11	12	.5	1.7
320	8	11	13	15	17	19	20	22	23	24	1	3.4
425	15	22	27	31	35	38	41	44	46	49	2	6.9
40	36	51	62	72	—	—	—	—	—	—	2	16.0
50	49	70	85	98	—	—	—	—	—	—	2	22.0

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Rada® Single Point & Zoned/Group Control Systems

Rada 425D

A derivative of the standard Rada 425 Thermostatic Mixing Valve, the Rada 425D is suitable for safe and accurate water temperature control in single open outlet or “dead leg” multiple-point-of-use applications. This assembly is ideal for surface mount, recessed enclosure, plumbing chase and mechanical room installations.

Factory supplied pre-plumbed and pressure-tested, Rada 425D has standard combination inlet check stop/union/strainers, thermometer and outlet stop valve.*

*Rada 425D is supplied with top outlet and can be site reconfigured for bottom outlet application.

Rada 425D is supplied as a polished chrome Thermostatic Mixing Valve with self-finish brass/bronze fittings and connections.

Rada 425DC is supplied as a polished chrome Thermostatic Mixing Valve with nickel-plated fittings and connections.

Rada 425 Offers:

Safety. Dual thermostats provide redundancy in case of individual thermostat failure. Integral inlet check valves prevent cross connection. Maximum temperature limiting and single temperature locking features legislate control. Instant automatic shutdown will occur prior to a 5°F (2°C) temperature rise/fall in the event of an inlet supply failure.

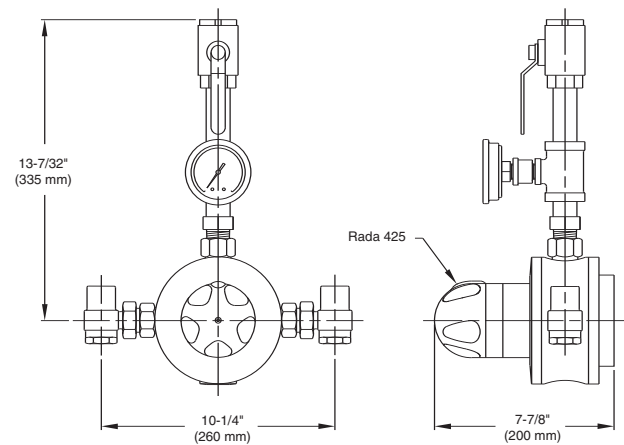
Economy. New technology and state-of-the-art materials reduce cost. Design and functional simplicity reduce field maintenance and parts stocking requirements.

Comfort. Maintains a steady outlet temperature by constant internal monitoring and correcting of inlet supply temperature and pressure fluctuations.

Rada 425 supersedes Rada 25.

Technical Specifications

- 1" (25 mm) NPT inlets and 1" NPT outlet
- Chrome-plated DZR brass/polymer construction with self-finish brass and bronze components (425D) or with nickel-plated components (425DC)
- Operating pressures
 - Maximum: 150 psi (10 bar)
 - Minimum: 10 psi (.7 bar)
- Maximum flow rate at 9 ft/sec (2.7 m/sec): 26 gpm (98 lpm)
- Maximum pressure loss ratio: 10 to 1**
- ASSE 1017 and CSA B125 certified
- Flow coefficient (C_v) 6.9
- Integral combination inlet check stop/union/strainers
- Fitted with thermometer and outlet stop valve
- Dual thermostatic elements
- Shipping weight 26 lbs (10 kg)



For a fully detailed certified drawing, refer to CDLW #1103.

Rada Thermostatic Mixing Valves (gpm)												
Model	Pressure Drop (psi)										Min. Flow	C _v
	5	10	15	20	25	30	35	40	45	50		
110	—	.75	—	1.25	—	1.75	—	2.25	—	2.5	.5	.25
215	4	5	7	8	9	9	10	11	11	12	.5	1.7
320	8	11	13	15	17	19	20	22	23	24	1	3.4
425	15	22	27	31	35	38	41	44	46	49	2	6.9
40	36	51	62	72	—	—	—	—	—	—	2	16.0
50	49	70	85	98	—	—	—	—	—	—	2	22.0

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.



Rada® Single Point & Zoned/Group Control Systems

Rada 425-FMC

Rada Thermostatic Mixing Valve (TMV) for remote/secure cabinet mount “dead leg” group fixture control. Rada 425 is ideal for this application due to its low service, low inlet to outlet temperature differential requirement and low flow single fixture control capability.

Rada 425 is supplied fully assembled and pressure tested in an 18" x 24" x 8" stainless steel recessed cabinet with a 2" flange. Cabinet has a polished stainless steel piano-hinged door with a keyed cylinder lock.

Rada 425-FMC is supplied as standard with combination inlet check stop/union/strainers, thermometer and outlet stop valve.

Rada 425-FMC is supplied as standard under this model number for top inlet hot and cold water supplies and a top outlet with a left hand hinged as indicated in adjacent drawing.

Rada 425-FMC can be specified/ordered with the following piping configurations under the following model numbers:

Top inlets/bottom outlet	425-FMC-TB
Bottom inlets/bottom outlet	425-FMC-BB*
Bottom inlets/top outlet	425-FMC-BT*

* 425-FMC-BB/BT are supplied with a right-hand hinged door.

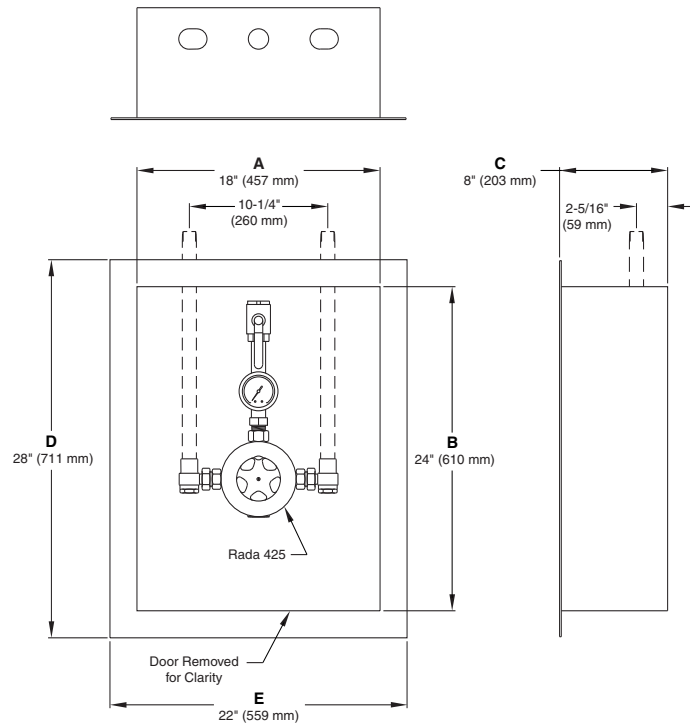


Technical Specifications

- 1" NPT (25 mm) inlets and 1" NPT (25 mm) outlet
- Cabinet construction: 14 gauge #4 finish stainless steel
- Cabinet outer flange 2"
- Outlet stop valve
- Integral thermometer
- Integral check stop/strainer/unions
- Refer to Rada 425, page 12, for Mixing Valve technical detail.
- Shipping weight 70 lbs (27 kg)

NOTE: Available as above in a Surface Mounted Cabinet of the same size and specification, less recess flange, under model number 425-SMC. Use dimensions A, B and C only.

For a fully detailed certified drawing, refer to CDLW #1071.



All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Rada® Single Point & Zoned/Group Control Systems

Rada 40

Rada Thermostatic Mixing Valve is suitable for accurate water temperature control in single open outlet or “dead leg” multiple-point-of-use industrial process applications. Rada 40 is also applicable for institutional group fixture or zoned temperature control when ASSE 1016 certified individual fixture controls are installed at each point of use. Capable of close outlet water temperature control at flow rates between 2 and 72 gpm (7.5 and 272 lpm).

Rada 40 may be installed in parallel to increase outlet flow rates. Refer to page 6.

Rada 40 Offers:

Safety. Dual thermostats provide redundancy in case of individual thermostat failure. Integral check valves prevent cross connection. Has a maximum temperature locking feature with key and shutdown mode feature in the event of a cold water supply failure.*

Economy. Design and functional simplicity along with easy-access internal components reduce maintenance time. PTFE coated internal parts resist mineral deposition for prolonged service life.

Comfort. Fast acting thermostat maintains a constant outlet water temperature by adjusting the inlet supply proportions to compensate for water temperature changes and system pressure fluctuations.

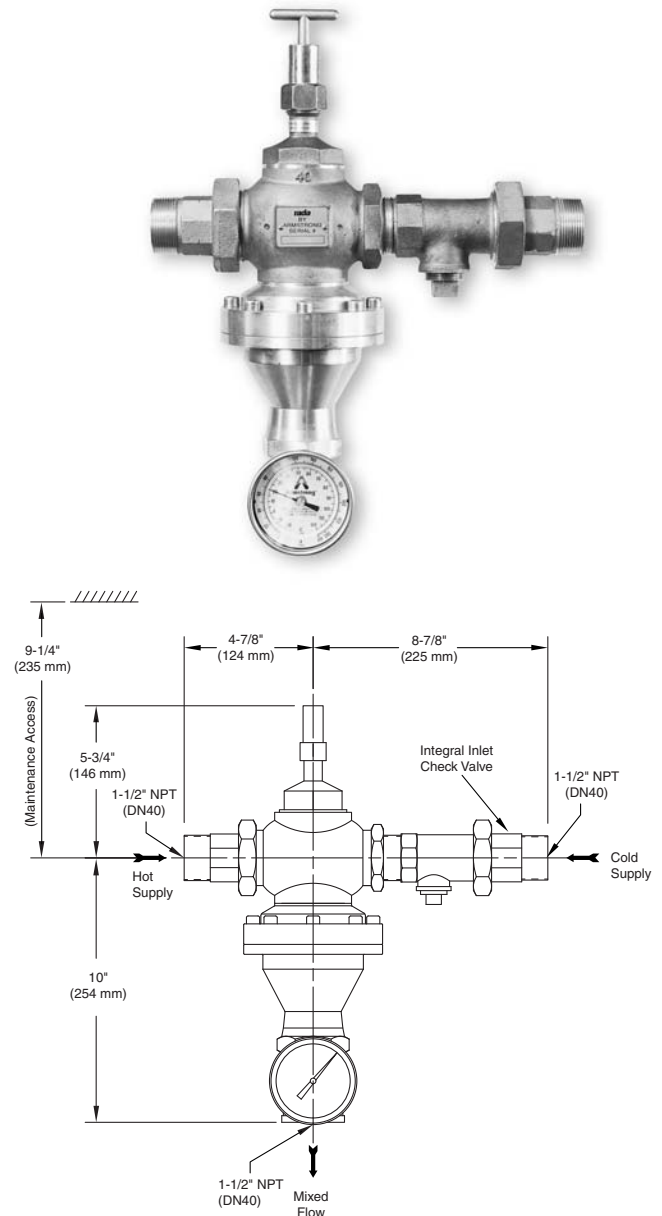
* Shutdown mode is defined as a thermally driven bias toward the hot seat within the valve. This action may or may not reduce the outlet flow rate relative to inlet supply and outlet set point temperatures. Large capacity thermostatic mixing valves (1-1/2" and 2"/40 mm and 50 mm) cannot be guaranteed to fully shut off in the event of a cold water supply failure.

IMPORTANT NOTE: If Rada 40 is to be used for group fixture or zoned temperature control in institutional showering, bathing or handwashing, then ASSE 1016 certified individual fixture controls must be installed at each point of use.

If the design/specification does not call for ASSE 1016 certified individual fixture fittings, then the largest group or zoned mixer suggested is Rada 425. If higher flows are required, create more groups/zones.

Technical Specifications

- 1-1/2" (40 mm) NPT inlets and 1-1/2" (40 mm) NPT outlet
- DZR brass/stainless steel construction
- Operating pressures
 - Maximum: 150 psi (10 bar)
 - Minimum: 10 psi (.7 bar)
- Maximum pressure drop 20 psi (1.4 bar)
- Maximum flow rate at 9 ft/sec (2.7 m/sec): 58 gpm (219 lpm)
- Minimum flow rate 2 gpm (7.5 lpm)



- ASSE 1017 and CSA B125 certified
- Flow coefficient (C_v) 16
- Integral inlet check valves
- Integral thermometer
- Dual thermostatic elements
- Shipping weight 30 lbs (13.5 kg)

For fully detailed certified drawing, refer to CDLW #1040.

Rada Thermostatic Mixing Valves (gpm)												
Model	Pressure Drop (psi)										Min. Flow	C _v
	5	10	15	20	25	30	35	40	45	50		
110	—	.75	—	1.25	—	1.75	—	2.25	—	2.5	.5	.25
215	4	5	7	8	9	9	10	11	11	12	.5	1.7
320	8	11	13	15	17	19	20	22	23	24	1	3.4
425	15	22	27	31	35	38	41	44	46	49	2	6.9
40	36	51	62	72	—	—	—	—	—	—	2	16.0
50	49	70	85	98	—	—	—	—	—	—	2	22.0

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.



Armstrong® Rada® Single Point & Zoned/Group Control Systems

Rada 50

Rada Thermostatic Mixing Valve is suitable for accurate water temperature control in single open outlet or “dead leg” multiple-point-of-use industrial process applications. Rada 50 is also applicable for institutional group fixture or zoned temperature control when ASSE 1016 certified individual fixture controls are installed at each point of use. Capable of close outlet water temperature control at flow rates between 2 and 98 gpm (7.5 and 371 lpm).

Rada 50 may be installed in parallel to increase outlet flow rates. Refer to page 6.

Rada 50 Offers:

Safety. Dual thermostats provide redundancy in case of individual thermostat failure. Integral check valves prevent cross connection. Has a maximum temperature locking feature with key and shutdown mode feature in the event of a cold water supply failure.*

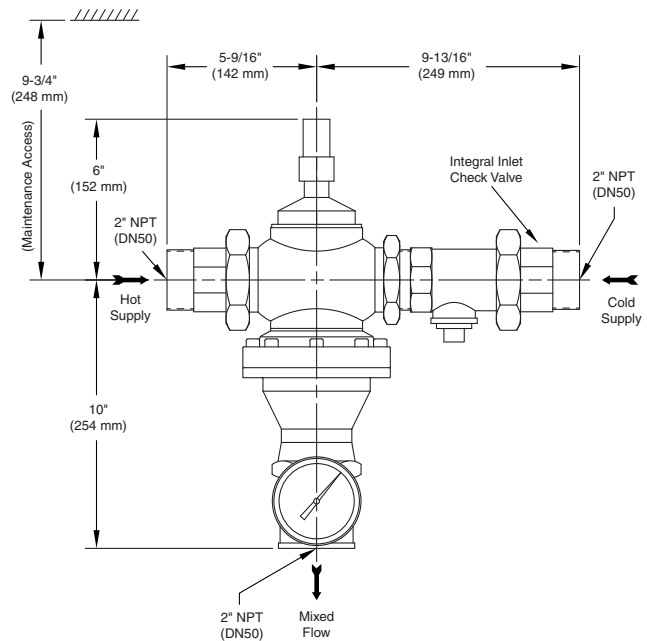
Economy. Design and functional simplicity along with easy-access internal components reduce maintenance time. PTFE coated internal parts resist mineral deposition for prolonged service life.

Comfort. Fast acting thermostat maintains a constant outlet water temperature by adjusting the inlet supply proportions to compensate for water temperature changes and system pressure fluctuations.

* Shutdown mode is defined as a thermally driven bias toward the hot seat within the valve. This action may or may not reduce the outlet flow rate relative to inlet supply and outlet set point temperatures. Large capacity Thermostatic Mixing Valves (1-1/2" and 2"/40 and 50 mm) cannot be guaranteed to fully shut off in the event of a cold water supply failure.

IMPORTANT NOTE: If Rada 50 is to be used for group fixture or zoned temperature control in institutional showering, bathing or handwashing, then ASSE 1016 certified individual fixture controls must be installed at each point of use.

If the design/specification does not call for ASSE 1016 certified individual fixture fittings, then the largest group or zoned mixer suggested is Rada 425. If higher flows are required, create more groups/zones.



Technical Specifications

- 2" NPT (50 mm) inlets and 2" (50 mm) NPT outlet
- DZR brass/stainless steel construction
- Operating pressures
 - Maximum: 150 psi (10 bar)
 - Minimum: 10 psi (.7 bar)
- Maximum pressure drop 20 psi (1.3 bar)
- Maximum flow rate at 9 ft/sec (2.7 m/sec): 98 gpm (371 lpm)
- Minimum flow rate 2 gpm (7.5 lpm)

- ASSE 1017 and CSA B125 certified
- Flow coefficient (C_v) 22
- Integral inlet check valves
- Integral thermometer
- Dual thermostatic elements
- Shipping weight 34 lbs (15.4 kg)

For fully detailed certified drawing, refer to CDLW #1042.

Rada Thermostatic Mixing Valves (gpm)

Model	Pressure Drop (psi)										Min. Flow	C _v
	5	10	15	20	25	30	35	40	45	50		
110	—	.75	—	1.25	—	1.75	—	2.25	—	2.5	.5	.25
215	4	5	7	8	9	9	10	11	11	12	.5	1.7
320	8	11	13	15	17	19	20	22	23	24	1	3.4
425	15	22	27	31	35	38	41	44	46	49	2	6.9
40	36	51	62	72	—	—	—	—	—	—	2	16.0
50	49	70	85	98	—	—	—	—	—	—	2	22.0

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Thermostatic

Rada Solutions for Central Recirculation System Control feature four individual **Thermostatic Mixing Valve** assemblies and two **Flexi-Flo™ Packages** designed for use in pumped recirculating hot water systems.

The complete range has been designed to offer accurate temperature control in applications where there are diverse flow requirements up to 288 gpm (1,090 lpm).*

All valves and valve packages designed for recirculation system control are identified with the suffix R.

Sizing

To size a mixing valve or Flexi-Flo™ package, simply match the required flow rate on the charts below with the pressure drop that the existing system can accommodate or the new system design specifies. Armstrong refers to the Modified Hunter Curve, where applicable, when determining system flow requirements.

NOTE: Maximum flow rates determined at 9 ft/sec (2.7 m/sec) pipeline velocity.

* Consult factory for customized Flexi-Flo packages for flow requirements in excess of 288 gpm (1,090 lpm).

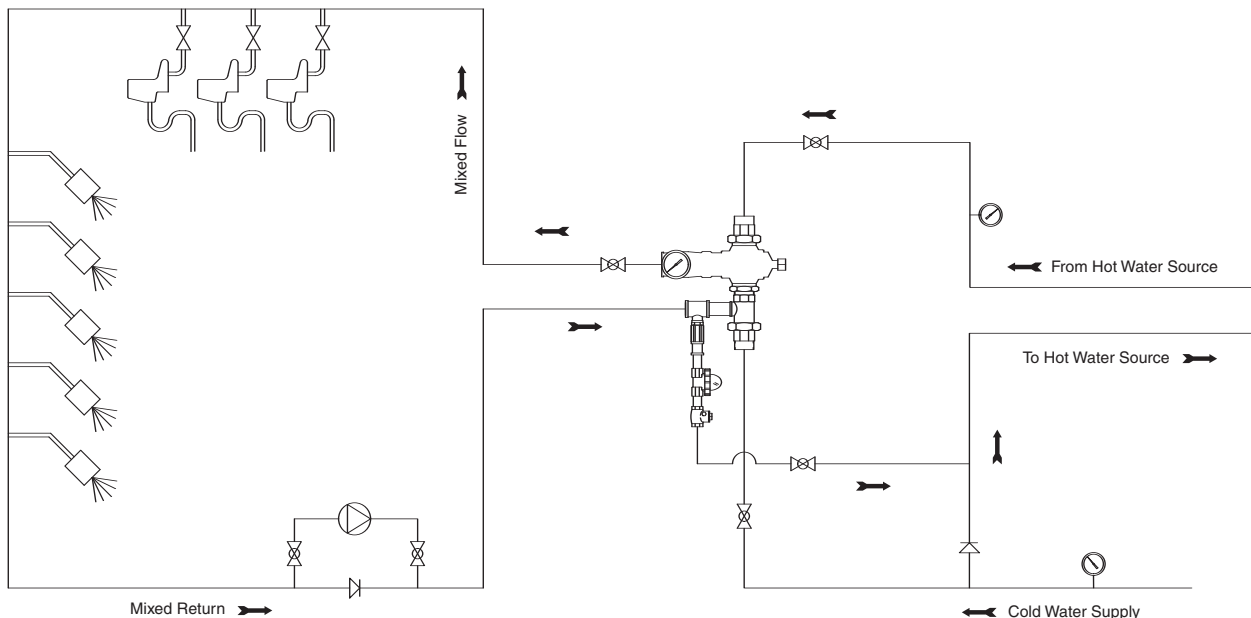
Rada Thermostatic Mixing Valves (gpm)

Model	Pressure Drop (psi)				Min. System Draw-off	Max. Flow	C _v
	5	10	15	20			
320R	8	11	13	15	0	16	3.4
425R	15	22	27	31	0	26	6.9
40R	36	51	62	72	0	58	16.0
50R	49	70	85	98	0	98	22.0

Flexi-Flo Packages (gpm)

Model	Pressure Drop (psi)				Min. System Draw-off	Max. Flow	C _v
	5	10	15	20			
50R-50R	97	137	168	193	0	193	42.4
50R-50R-50R	144	204	250	288	0	288	63.6

Data on Rada Solutions for Central Recirculation System Control can be found on pages 18 through 23. Certified drawings, specifications, installation and maintenance guides, and plumbing schematics are available upon request by calling Hot Water Group at (269) 279-3602.



All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.



Thermostatic

Rada 320R

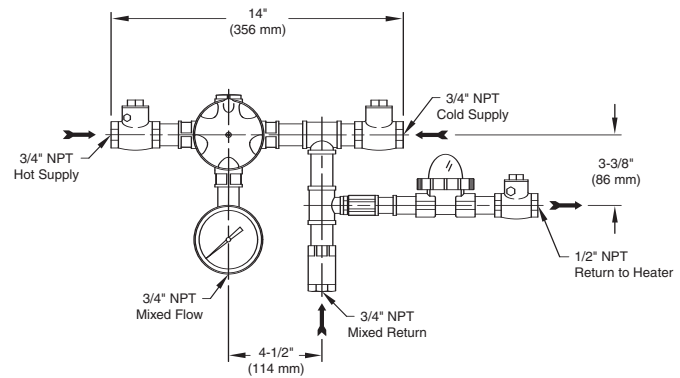
Rada Thermostatic Mixing Valve is designed specifically to be installed as the primary control valve within a pumped recirculation system. Capable of maintaining safe, accurate water temperatures during both peak and zero-demand “idling” periods. With a Rada 320R installed as the primary temperature controller within a pumped recirculation system, there will be a **zero** minimum blended water flow rate/draw-off requirement. The Rada 320R features a unique integral thermostatic return limiter that maintains recirculating water temperatures within the circuit. Thermostatic return limiters eliminate the requirement for a fitted aquastat and reduce cycling wear and tear on the circulating pump.

Rada 320R Offers:

Safety. Dual thermostats provide redundancy in case of individual thermostat failure. Integral check valves prevent cross connection. Maximum temperature limiting and single temperature locking feature. Instant automatic shutdown prior to a 5°F (2°C) temperature rise/fall in the event of an inlet supply failure and an integral thermostatic return limiter to prevent “temperature creep” during zero-demand periods.

Economy. New technology and state-of-the-art materials reduce cost. Single “no spare parts” replaceable cartridge design reduces field maintenance and parts stocking requirements.

Comfort. Maintains a steady outlet temperature by constant internal monitoring and adjustment of recirculating hot water temperature.



Technical Specifications

- 3/4" (20 mm) NPT inlets and 3/4" (20 mm) NPT outlets
- Chrome-plated DZR brass/polymer construction
- Operating pressures
 - Maximum: 150 psi (10 bar)
 - Minimum: 10 psi (.7 bar)
- ASSE 1017 and CSA B125 certified
- Flow coefficient (C_v) 3.4
- Integral thermometer
- Integral check valves and strainers
- Integral sight flow indicator
- Maximum flow rate at 9 ft/sec (2.7 m/sec): 16 gpm (61 lpm)
- Integral thermostatic return limiter
- Dual thermostatic elements
- Shipping weight 25 lbs (11 kg)

For a fully detailed certified drawing, refer to CDLW #1050.

Rada Thermostatic Mixing Valves (gpm)

Model	Pressure Drop (psi)				Min. System Draw-off	Max. Flow	C _v
	5	10	15	20			
320R	8	11	13	15	0	16	3.4
425R	15	22	27	31	0	26	6.9
40R	36	51	62	72	0	58	16.0
50R	49	70	85	98	0	98	22.0

NOTE: Maximum flow rates determined at 9 ft/sec pipeline velocity.

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Thermostatic

Rada 425R

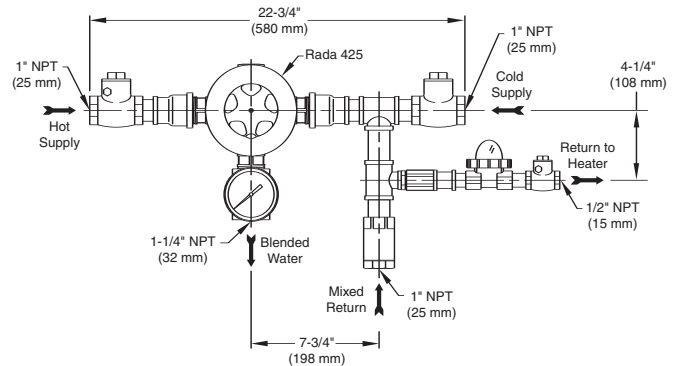
Rada Thermostatic Mixing Valve is designed specifically to be installed as the primary control valve within a pumped recirculation system. Capable of maintaining safe, accurate water temperatures during both peak and zero-demand “idling” periods. With a Rada 425R installed as the primary temperature controller within a pumped recirculation system, there will be a **zero** minimum blended water flow rate/draw-off requirement. The Rada 425R features a unique integral thermostatic return limiter that maintains recirculating water temperatures within the circuit. Thermostatic return limiters eliminate the requirement for a fitted aquastat and reduce cycling wear and tear on the circulating pump.

Rada 425R Offers:

Safety. Dual thermostats provide redundancy in case of individual thermostat failure. Maximum temperature limiting and single temperature locking feature. Instant automatic shutdown prior to a 5°F (2°C) temperature rise/fall in the event of an inlet supply failure and an integral thermostatic return limiter to prevent “temperature creep” during zero-demand periods.

Economy. New technology and state-of-the-art materials reduce cost. Accurate across a wide diversity of flow rates, Rada 425R allows single valve installation where previously “high-low” multiple valve assemblies were required.

Comfort. Maintains a steady outlet temperature by constant internal monitoring and adjustment of recirculating hot water temperature.



Technical Specifications

- 1" NPT (25 mm) inlets and 1" (25 mm) outlet(s)
- Chrome-plated DZR brass/polymer construction
- Operating pressures
 - Maximum: 150 psi (10 bar)
 - Minimum: 10 psi (.7 bar)
- Flow coefficient (C_v) 6.9
- ASSE 1017 and CSA B125 certified
- Maximum flow rate at 9 ft/sec (2.7 m/sec): 26 gpm (98 lpm)
- Integral inlet check valves and strainers
- Integral thermometer
- Integral sight flow indicator
- Integral thermostatic return limiter
- Dual thermostatic elements
- Shipping weight 29 lbs (13 kg)

For a fully detailed certified drawing, refer to CDLW #1066.

Rada Thermostatic Mixing Valves (gpm)							
Model	Pressure Drop (psi)				Min. System Draw-off	Max. Flow	C _v
	5	10	15	20			
320R	8	11	13	15	0	16	3.4
425R	15	22	27	31	0	26	6.9
40R	36	51	62	72	0	58	16.0
50R	49	70	85	98	0	98	22.0

NOTE: Maximum flow rates determined at 9 ft/sec pipeline velocity.

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Thermostatic

Rada 40R

Rada Thermostatic Mixing Valve is designed specifically to be installed as the primary control valve within a pumped recirculation system. Capable of maintaining safe, accurate water temperatures during both peak and zero-demand “idling” periods. With a Rada 40R installed as the primary temperature controller within a pumped recirculation system, there will be a **zero** minimum blended water flow rate/draw-off requirement. The Rada 40R features a unique integral thermostatic return limiter that maintains recirculating water temperatures within the circuit. Thermostatic return limiters eliminate the requirement for a fitted aquastat and reduce cycling wear and tear on the circulating pump.

Rada 40R Offers:

Safety. Dual thermostats provide redundancy in case of individual thermostat failure. Integral inlet check valves prevent cross connection. A maximum temperature locking feature with key and an integral thermostatic return limiter prevent “temperature creep” during zero-demand periods.

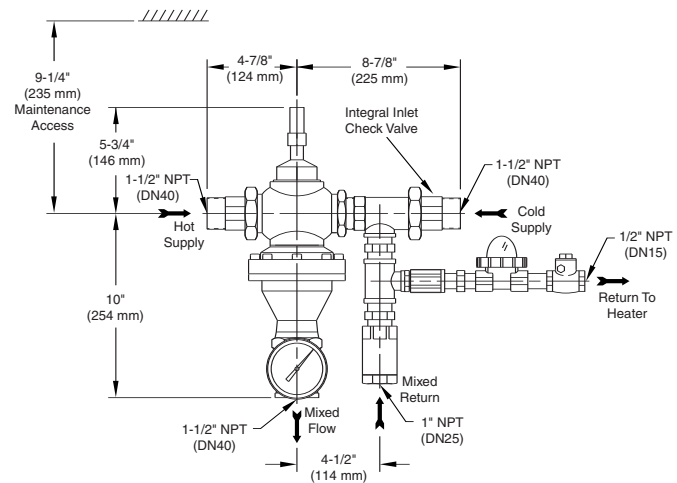
Economy. Design and functional simplicity along with easy-access internal components reduce maintenance time. PTFE coated internal parts resist mineral deposition for prolonged service life. Accurate across a wide diversity of flow rates, Rada 40R allows single valve installation where previously “high-low” multiple valve assemblies were required.

Comfort. Maintains a steady outlet temperature by constant internal monitoring and adjustment of recirculating hot water temperature.

Technical Specifications

- 1-1/2" NPT (40 mm) inlets and 1-1/2" (40 mm) NPT outlet
- DZR brass/stainless steel construction
- Operating pressures
 - Maximum: 150 psi (10 bar)
 - Minimum: 10 psi (.7 bar)
- Maximum pressure drop 20 psi (1.4 bar)
- Maximum flow rate at 9 ft/sec (2.7 m/sec): 58 gpm (219 lpm)
- ASSE 1017 and CSA B125 certified
- Flow coefficient (C_v) 16
- Integral inlet check valves
- Integral thermometer
- Integral sight flow indicator
- Integral thermostatic return limiter
- Dual thermostatic elements
- Shipping weight 45 lbs (20 kg)

For a fully detailed certified drawing, refer to CDLW #1041.



Rada Thermostatic Mixing Valves (gpm)

Model	Pressure Drop (psi)				Min. System Draw-off	Max. Flow	C _v
	5	10	15	20			
320R	8	11	13	15	0	16	3.4
425R	15	22	27	31	0	26	6.9
40R	36	51	62	72	0	58	16.0
50R	49	70	85	98	0	98	22.0

NOTE: Maximum flow rates determined at 9 ft/sec pipeline velocity.

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Thermostatic

Rada 50R

Rada Thermostatic Mixing Valve is designed specifically to be installed as the primary control valve within a pumped recirculation system. Capable of maintaining safe, accurate water temperatures during both peak and zero-demand “idling” periods. With a Rada 50R installed as the primary temperature controller within a pumped recirculation system, there will be a **zero** minimum blended water flow rate/draw-off requirement. The Rada 50R features a unique integral thermostatic return limiter that maintains recirculating water temperatures within the circuit. Thermostatic return limiters eliminate the requirement for a fitted aquastat and reduce cycling wear and tear on the circulating pump.

Rada 50R Offers:

Safety. Dual thermostats provide redundancy in case of individual thermostat failure. Integral inlet check valves prevent cross connection. A maximum temperature locking feature with key and an integral thermostatic return limiter prevent “temperature creep” during zero-demand periods.

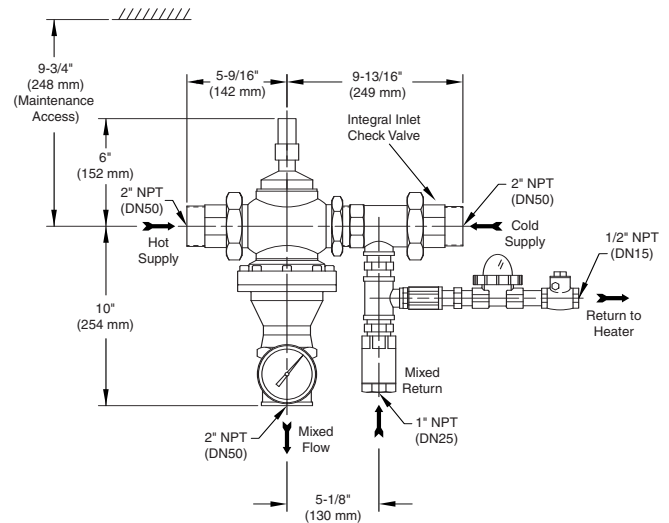
Economy. Design and functional simplicity along with easy-access internal components reduce maintenance time. PTFE coated internal parts resist mineral deposition for prolonged service life. Accurate across a wide diversity of flow rates, Rada 50R allows single valve installation where previously “high-low” multiple valve assemblies were required.

Comfort. Maintains a steady outlet temperature by constant internal monitoring and adjustment of recirculating hot water temperature.

Technical Specifications

- 2" NPT (50 mm) inlets and 2" (50 mm) NPT outlets
- DZR brass/stainless steel construction
- Operating pressures
 - Maximum: 150 psi (10 bar)
 - Minimum: 10 psi (.7 bar)
- Maximum pressure drop 20 psi (1.4 bar)
- Maximum flow rate at 9 ft/sec (2.7 m/sec): 98 gpm (371 lpm)
- ASSE 1017 and CSA B125 certified
- Flow coefficient (C_v) 22
- Integral inlet check valves
- Integral thermometer
- Integral sight flow indicator
- Integral thermostatic return limiter
- Dual thermostatic elements
- Shipping weight 45 lbs (20 kg)

For a fully detailed certified drawing, refer to CDLW #1043.



Rada Thermostatic Mixing Valves (gpm)

Model	Pressure Drop (psi)				Min. System Draw-off	Max. Flow	C_v
	5	10	15	20			
320R	8	11	13	15	0	16	3.4
425R	15	22	27	31	0	26	6.9
40R	36	51	62	72	0	58	16.0
50R	49	70	85	98	0	98	22.0

NOTE: Maximum flow rates determined at 9 ft/sec pipeline velocity.

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.



Thermostatic

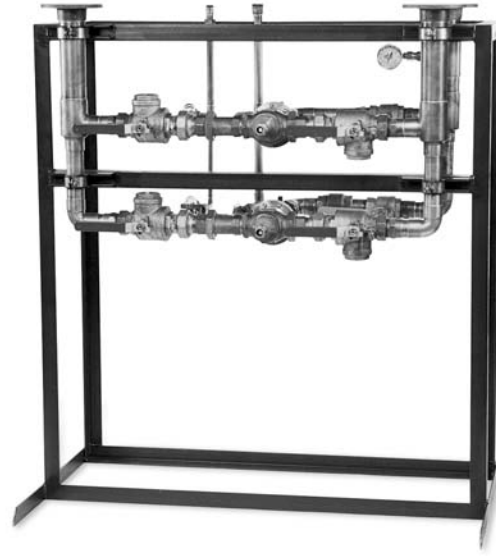
Flexi-Flo™ 50R-50R

Thermostatic Central Recirculation System Controller is designed specifically to be installed as the primary control assembly within a pumped recirculating hot water system.

Capable of maintaining safe, accurate water temperatures during both peak and zero-demand “idling” periods, the Flexi-Flo 50R-50R features two Rada 50R thermostatic mixing valves (page 21) piped in parallel. By combining the high flow capacity of two valves, Flexi-Flo 50R-50R has a flow capacity of 193 gpm (731 lpm) at a 20 psi (1.4 bar) pressure drop.

Flexi-Flo 50R-50R features two unique integral thermostatic return limiters that monitor recirculation return water temperatures to prevent “temperature creep” within the circuit. Thermostatic return limiters eliminate the requirement for a fitted aquastat and reduce cycling wear and tear on the circulating pump.

Flexi-Flo 50R-50R features a specially designed surplus valve that effectively “stages out” one Rada 50R during periods when the system demand can be managed by a single valve. With a Flexi-Flo 50R-50R installed as the primary temperature controller within a pumped recirculation system, there will be a **zero** minimum blended water flow rate/draw-off requirement.



Flexi-Flo Systems Offer:

Safety. Integral check valves prevent cross connection. A maximum temperature locking feature is included. Integral thermostatic return limiters prevent “temperature creep” during zero-demand periods.

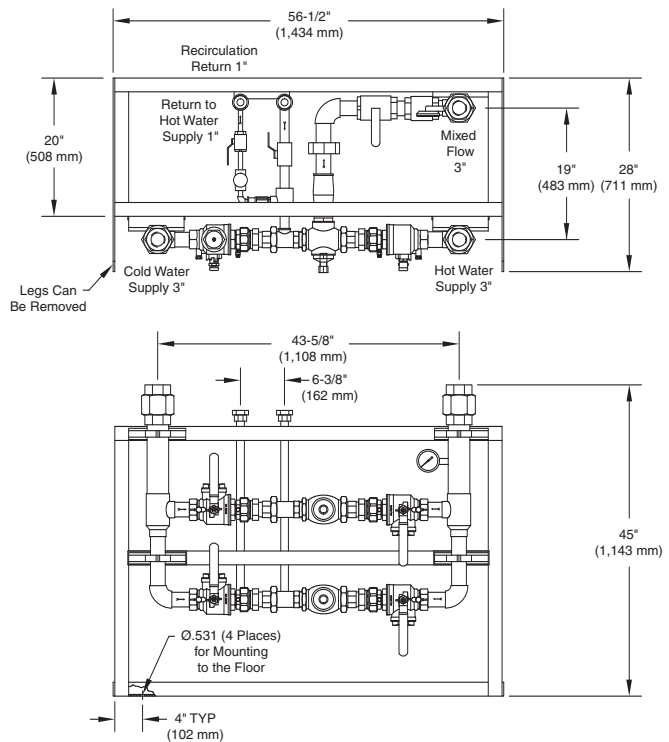
Economy. Fully engineered, frame mounted, pre-piped and pressure-tested assembly reduces installation time. Design and functional simplicity, combination ball valve/strainers and easy-access internal parts reduce maintenance time.

Comfort. Maintains a steady outlet temperature by constant monitoring and adjustment of recirculating hot water temperature.

Technical Specifications

- 3" (80 mm) inlets/outlet
- Pre-piped, pressure-tested, frame-mounted assembly
- Operating pressures
 - Maximum: 150 psi (10 bar)
 - Minimum: 10 psi (.7 bar)
- Maximum pressure drop 20 psi (1.4 bar)
- Maximum flow rate @ 9 ft/sec (2.7 m/sec): 193 gpm (731 lpm)
- ASSE 1017 and CSA B125 certified (Rada 50R)
- Flow coefficient (C_v) 42.4
- Integral check valves and strainers
- Integral thermometer
- Dual thermostatic elements
- Shipping weight 477 lbs (216 kg)

For a fully detailed certified drawing, refer to CDLW #1049.



Flexi-Flo Packages (gpm)—Standard							
Model	Pressure Drop (psi)				Min. System Draw-off	Max. Flow	C _v
	5	10	15	20			
50R-50R	97	137	168	193	0	193	42.4
50R-50R-50R	144	204	250	288	0	288	63.6

NOTE: Maximum flow rates determined at 9 ft/sec pipeline velocity.

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Thermostatic

Flexi-Flo™ 50R-50R-50R

Thermostatic Central Recirculation System Controller is designed specifically to be installed as the primary control assembly within a pumped recirculating hot water system.

Capable of maintaining safe, accurate water temperatures during both peak and zero-demand “idling” periods, the Flexi-Flo 50R-50R-50R features three Rada 50R thermostatic mixing valves (page 21) piped in parallel. By combining the high flow capacity of three valves, Flexi-Flo 50R-50R-50R has a flow capacity of 288 gpm (1,090 lpm) at a 20 psi (1.4 bar) pressure drop.

Flexi-Flo 50R-50R-50R features three unique integral thermostatic return limiters that monitor recirculation return water temperatures to prevent “temperature creep” within the circuit. Thermostatic return limiters eliminate the requirement for a fitted aquastat and reduce cycling wear and tear on the circulating pump.

Flexi-Flo 50R-50R-50R features two specially designed surplus valves that effectively “stage out” the second and third Rada 50R during periods when system demand can be managed by a single valve. With a Flexi-Flo 50R-50R-50R installed as the primary temperature controller within a pumped recirculation system, there will be a **zero** minimum blended water flow rate/draw-off requirement.

Flexi-Flo Systems Offer:

Safety. Integral check valves prevent cross connection. A maximum temperature locking feature is included. Integral thermostatic return limiters prevent “temperature creep” during zero-demand periods.

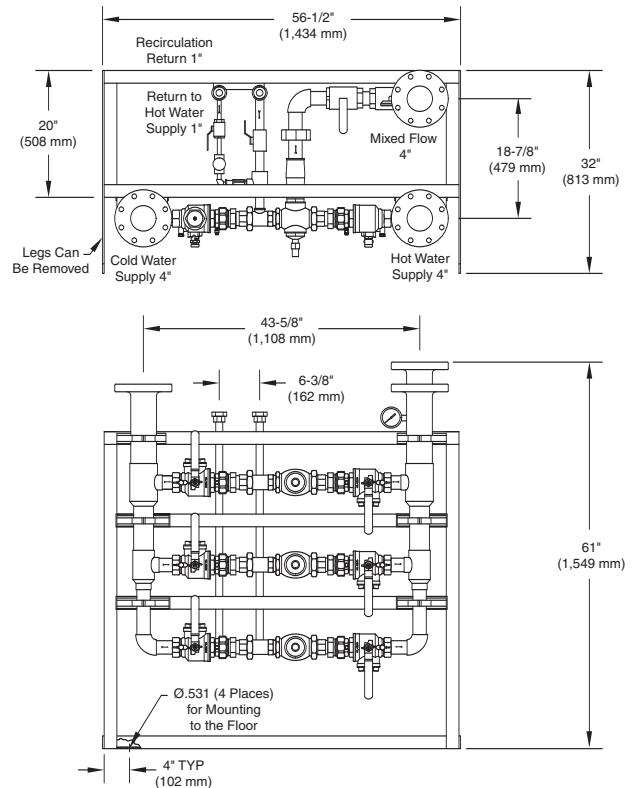
Economy. Fully engineered, frame mounted, pre-piped and pressure-tested assembly reduces installation time. Design and functional simplicity, combination ball valve/strainers and easy-access internal parts reduce maintenance time.

Comfort. Maintains a steady outlet temperature by constant monitoring and adjustment of recirculating hot water temperature.

Technical Specifications

- 4" (100 mm) inlets/outlet
- Pre-piped, pressure-tested, frame-mounted assembly
- Operating pressures
 - Maximum: 150 psi (10 bar)
 - Minimum: 10 psi (.7 bar)
- Maximum pressure drop 20 psi (1.4 bar)
- Maximum flow rate @ 9 ft/sec (2.7 m/sec): 288 gpm (1,090 lpm)
- ASSE 1017 and CSA B125 certified (Rada 50R)
- Flow coefficient (C_v) 63.6
- Integral check valves and strainers
- Integral thermometer
- Dual thermostatic elements
- Shipping weight 550 lbs (249 kg)

For a fully detailed certified drawing, refer to CDLW #1051.



Flexi-Flo Packages (gpm)—Standard

Model	Pressure Drop (psi)				Min. System Draw-off	Max. Flow	C _v
	5	10	15	20			
50R-50R	97	137	168	193	0	193	42.4
50R-50R-50R	144	204	250	288	0	288	63.6

NOTE: Maximum flow rates determined at 9 ft/sec pipeline velocity.

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Electronic

Rada Solutions for Central Recirculation System Control—Electronic feature a series of eight Electronic Mixing Centers (EMC) designed for use in pumped recirculating hot water systems.

The complete range has been designed to offer an unparalleled level of system temperature control through the use of precision-engineered hydraulics with integrated electronic circuit technology.

Sizing

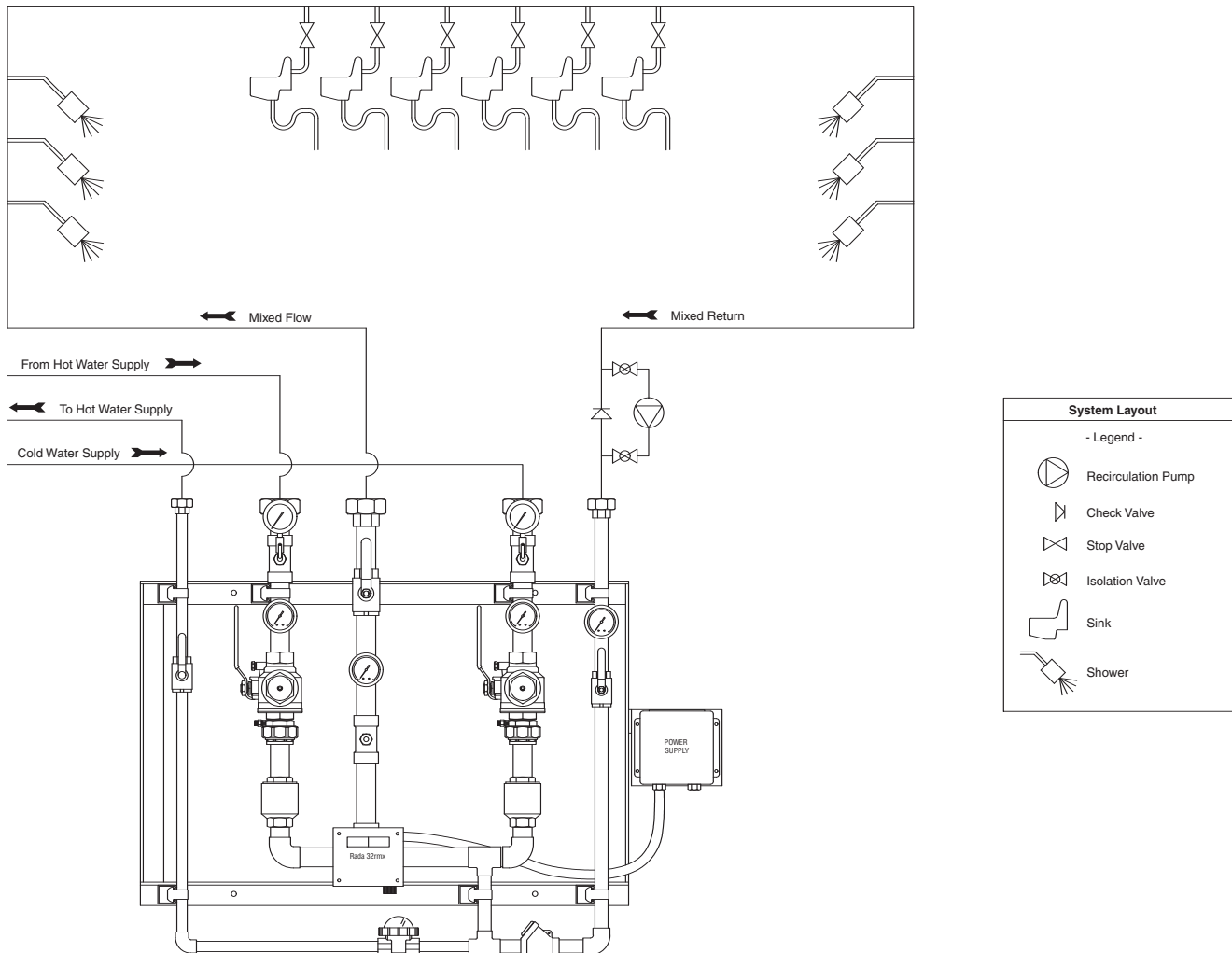
Rada EMC is available in two flow capacities. To select, simply match the required flow rate on the chart below with a pressure drop acceptable to the system design. Armstrong uses the Modified Hunter Curve, where applicable, when determining system flow requirements.

Data on the EMC series for Rada Solutions for Central Recirculation System Control can be found on pages 24 through 27. Certified drawings, specifications, installation and maintenance guides, and plumbing schematics are available by calling Armstrong at (269) 279-3602.

Model	Pressure Drop (psi)				Min. System Draw-off*	Max. Flow**	C _v
	5	10	15	20			
EMC 1	36	51	62	72	0	58	16
EMC 2	72	102	124	144	0	100	32

* EMC 1 requires the circulating pump to operate continuously at a minimum flow rate of 2 gpm. EMC 2 requires the circulating pump to operate continuously at a minimum flow rate of 4 gpm. **There is no minimum system draw-off flow requirement with this equipment.**

** Maximum flow rate determined at 9 ft/sec pipeline velocity.



All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Electronic

The Central Recirculation System

Rada EMCs feature the 32rmx Electronic Mixing Valve. The 32rmx is designed to be the primary controller for a recirculating hot water circuit, as indicated by the schematic drawing below.

This schematic is provided for concept and explanation purposes only. Actual plumbing systems will differ slightly, based upon variables such as the system designer's preferences, the type of water heater selected and the specific site construction feasibility.

Rada EMCs are supplied as pre-plumbed packages, each of which differs slightly from this schematic.

Adding the Options

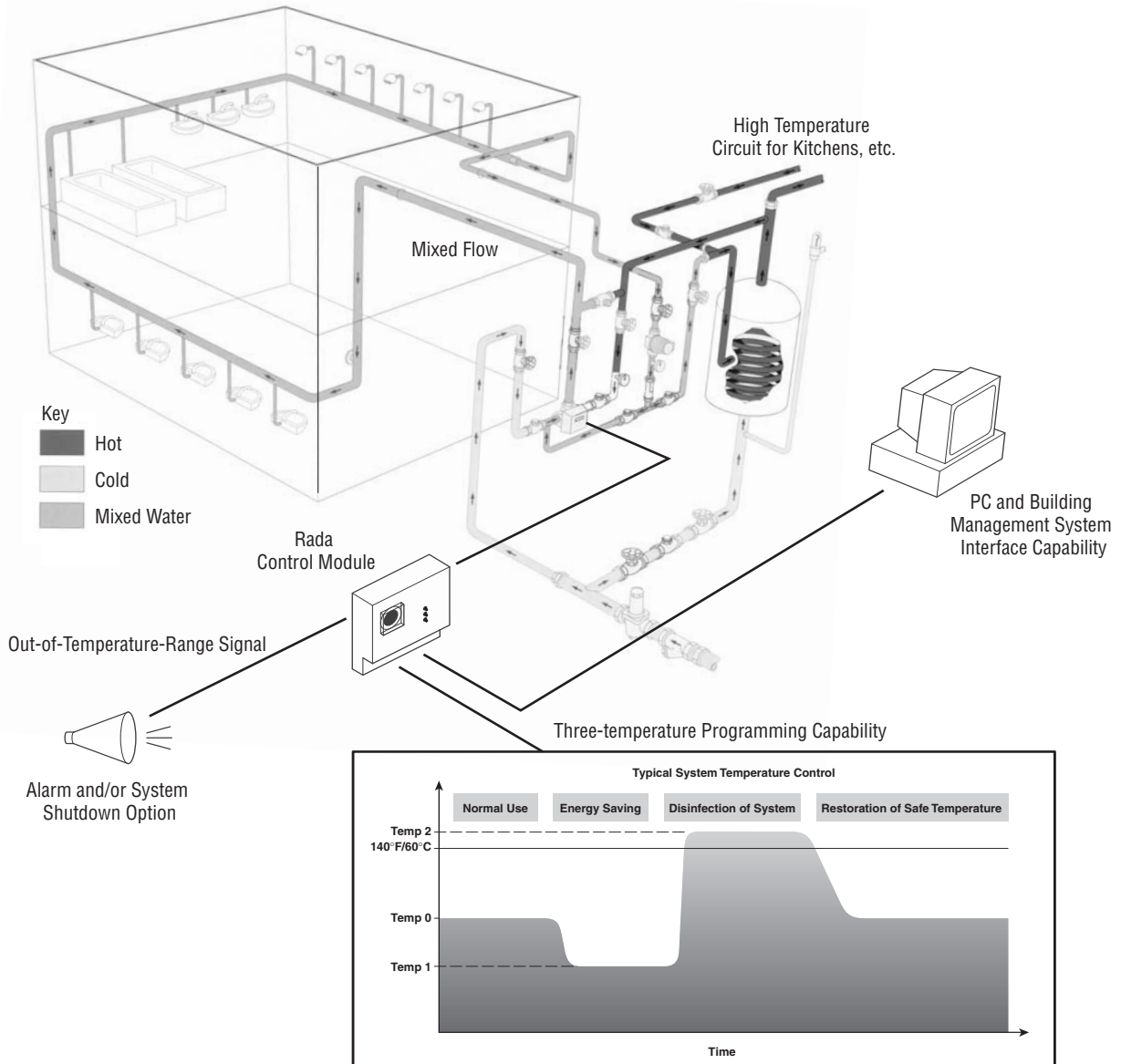
Rada EMCs from Armstrong offer both the basic mixing center and mixing centers with a series of options and features. Additionally, each EMC includes a data interface port that allows the system to be equipped with an alarm. The system can be programmed, monitored and controlled from a remote location and can be

engaged with Armstrong's energy optimization system (EOS) or a third-party building management system (BMS).

A primary feature of the EMC models 13, 123, 23 and 223 is the three-temperature programming capability. Using a Rada Control Module, the EMC can be site-programmed to deliver to a normal operating temperature for sanitary use; T1, an energy-saving temperature for periods when the normal operating temperature is not required; and T2, an elevated system disinfection temperature.

Energy Optimization System (EOS)

To support the Rada EMC in applications where building/system automation is desired but where there is no opportunity to engage with an existing third-party BMS, Armstrong offers EOS. EOS requires a minimal investment in site-based hardware and the purchase of our fee-based access to EOS on a protected Web site. EOS offers user graphics, data output and storage capability, mobile text messaging and site-audible output advisories, and remote system control, along with many other application/site-customized options.



All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Electronic

Electronic Mixing Centers

The EMCs feature the Rada 32rmx electronic temperature controller.

The EMC 1 will deliver up to 72 gpm (273 lpm) and comprises all required installation components supplied pre-plumbed and pressure-tested, mounted to an enameled steel frame. Installing contractor is required to make up to five standard union connections for hot and cold supply in, blended water to the system, and system and water heater return lines.

The EMC 12 incorporates a circulating pump, while the EMC 13 adds the option of system thermal disinfection and energy efficiency via a Rada Control Module.

The “complete” EMC 123 brings together both of the above options.

The EMC 2 series are as above with two 32rmx temperature controllers installed in parallel for systems where flow rates up to 150 gpm (568 lpm) are required.

The modern integrated circuit technology with precision hydraulics of the 32rmx allows the EMC to deliver blended water economically at a safe, accurate temperature for sanitary use in recirculated hot water systems.

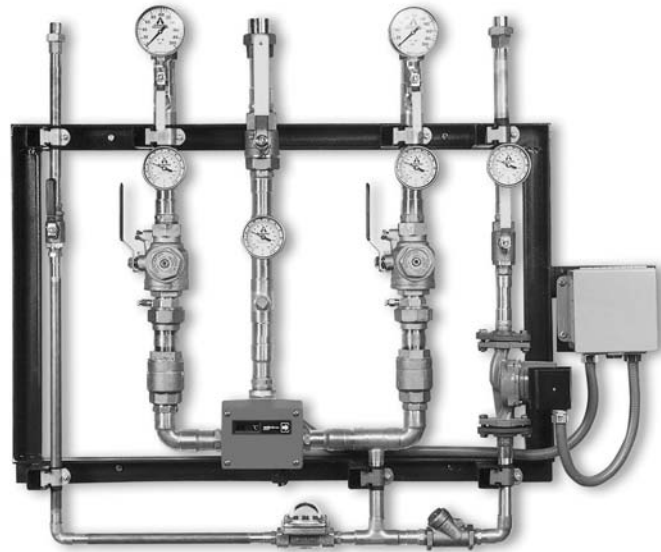
The EMC supplies blended hot and cold water at a safe, predetermined temperature when any fixture in the building is in use.

During periods of no system draw-off, the EMC will maintain the temperature of the continuously flowing, pumped recirculating circuit.

Performance

The improved accuracy possible with 32rmx control technology, combined with its data input/output communication capability, means:

- Recirculated water control within 2°F (1°C) with minimal recirculation of 2 gpm (7.6 lpm)*
- Accurate control of blended water drawn from the system at a point of use within 2°F (1°C)*
- Minimal, 2°F (1°C) recirculation system temperature loss required for effective loop control
- Elimination of dangerous overnight or non-demand-period “temperature creep”
- Dual operation “set” and “actual” temperature display for effective commissioning, adjustment and system monitoring
- Visual signal by display to show “error” mode or “out of range” system failure, coupled with output for audible alarm and/or downstream solenoid valve relay
- Programming via a PC
- System monitoring and control from a remote location
- Engagement with a building management system
- 32rmx valve automatically shuts off the hot water flow upon cold water inlet supply failure
- 32rmx valve automatically shuts off the hot water flow in the event of a power failure



Application

EMC provides premixed water for multiple showering, hand washing and bathing point-of-use fixtures where hot water is supplied from either a storage-type or instantaneous/semi-instantaneous water heater.

Suitable for installation in hotels, schools, correctional facilities, hospitals, nursing/assisted living homes, dormitories and other multiple-occupant commercial, institutional, and industrial buildings that are required to operate a continuously recirculating pumped hot water system.

Technical Specifications

32rmx Temperature Controller

- Plated gunmetal body, enameled aluminum housing/cover, stainless steel primary internal components
- Electronics: 12V DC Solid State plug-in micro-electronic circuitry
- Flow rates
 - Maximum: 72 gpm at 20 psi pressure drop (272 lpm at 1.38 bar)
 - Minimum: 32rmx: 2 gpm (7.6 lpm)
 - System: There is no minimum draw-off requirement from the system.
- Operating pressures
 - Maximum: 150 psi (10 bar)
 - Minimum: 10 psi (.7 bar)
- LED digital readout
- “Self-check” integral “out of range” visual/audible alarm
- Approvals/certifications: ASSE 1017, CSA B125

* Claim does not account for natural system temperature loss at distant points within the system relative to pumped water velocity and ambient temperature.

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Electronic

Electronic Mixing Centers up to 72 gpm (273 lpm)

EMC 1 is supplied as a mixing center that includes:

- 32rmx electronic temperature controller
- 1-1/2" Inlet/Outlet and 1" recirculation return piping
- Inlet/return check valves
- Inlet combination ball valve strainers
- Pressure gauges
- Inlet, system blend and return line thermometers
- Isolation valves
- 110V/12V UL-listed transformer enclosed in a NEMA 4X enclosure
- Low voltage control wiring with protective conduit

EMC 12 is supplied as EMC 1 with a pre-wired 1/12 HP circulating pump rated at 10 gpm (38 lpm) at 15 ft of head.

EMC 13 is supplied as EMC 1 with a Rada Control Module for programming energy efficiency and thermal disinfection modes.

EMC 123 is supplied as EMC 12 with a Rada Control Module for programming energy efficiency and thermal disinfection modes.

Electronic Mixing Centers up to 144 gpm (545 lpm)

EMC 2 is supplied as mixing center that includes:

- Two 32rmx electronic temperature controllers
- 3" Inlet/Outlet and 1-1/2" recirculation return piping
- Inlet/return check valves
- Inlet combination ball valve strainers
- Pressure gauges
- Inlet, system blend and return line thermometers
- Isolation valve
- System balancing valves
- 110V/12V UL-listed transformer enclosed in a NEMA 4X enclosure
- Low voltage control wiring with protective conduit

EMC 22 is supplied as EMC 2 with a pre-wired 1/6 HP circulating pump rated at 10 gpm (38 lpm) at 30 ft of head.

EMC 23 is supplied as EMC 2 with a Rada Control Module for programming energy efficiency and thermal disinfection modes.

EMC 223 is supplied as EMC 22 with a Rada Control Module for programming energy efficiency and thermal disinfection modes.

For fully detailed certified drawings, please refer to the list below and consult your local representative, Armstrong directly or our Web site.

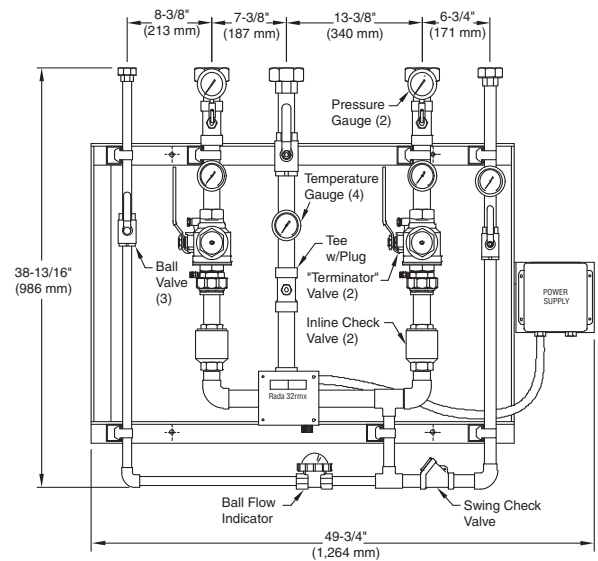
EMC 1	CDLW #1105
EMC 2	CDLW #1109
EMC 12	CDLW #1106
EMC 22	CDLW #1110
EMC 13	CDLW #1107
EMC 23	CDLW #1111
EMC 123	CDLW #1108
EMC 223	CDLW #1112

TECHNICAL NOTES: A fully licensed electrician will be required to connect a GFI-protected 110V power supply to the power supply enclosure provided on the EMC. All subsequent low voltage control wiring is supplied factory completed and tested, housed in a protective conduit.

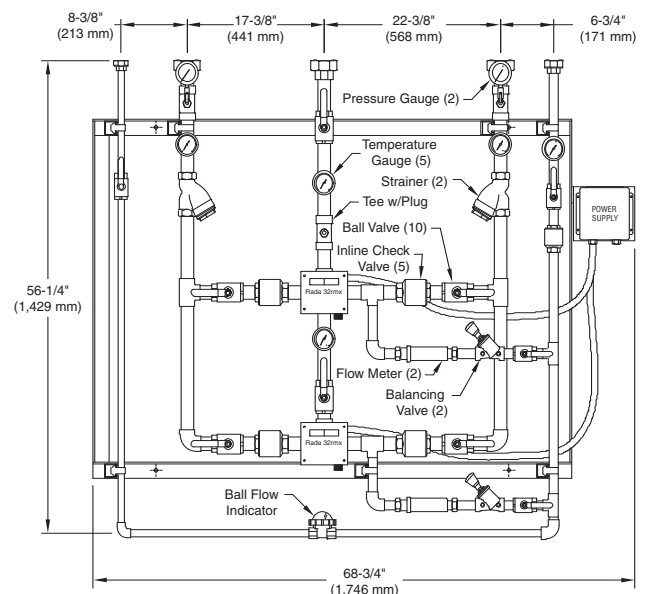
EMC models that include a circulating pump will require a fully licensed electrician to connect a GFI-protected 110V power supply directly to the pump connection point provided.

The 110V power supply for the power supply enclosure and the pump must be on the same circuit, protected by the same circuit breaker.

Further wiring detail is provided in the Rada EMC installation and maintenance guide.



EMC 1



EMC 2

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.



Rada Z358 series has been designed specifically to provide tepid water to emergency fixtures as detailed in ANSI Z358.1-1998.

ANSI Z358.1-1998 Related Excerpts

Sections 4.6.6, 5.4.6, 7.4.6, 9.4.5: “Delivered flushing fluid temperature shall be tepid.”

Definition **Tepid:** Moderately warm; lukewarm.

Section 4.1: “Emergency showerheads shall be capable of delivering a minimum of 75.5 liters per minute (20 gpm).”

Section 5.1.5: “Eyewash equipment shall be capable of delivering flushing fluid to the eyes not less than 1.5 lpm (0.4 gpm).”

Section 7.1.4: “Plumbed eye/facewash equipment shall be capable of delivering flushing fluid to the eyes not less than 11.4 liters per minute (3.0 gpm).”

Section 8.1: “Drench hoses shall deliver a minimum of 11.4 liters per minute of flushing fluid (3.0 gpm).”

Point of Use

Rada Z358-20 and Z358-40 Thermostatic Mixing Valves are suitable for installation at or near a point of use for direct tepid water supply to an emergency fixture or grouping of fixtures. Groups of fixtures must meet the valve’s flow capacity requirements if there is a potential for simultaneous operation.

Central Recirculation System Control

Recirculated, tepid loops serving emergency fixtures are fundamentally different in application from standard institutional hot water recirculating systems. The limited system draw-off requirement of the emergency fixture circuit portends limited system audit capability and a subsequent underlying system management concern.

In other words, institutional loops with frequent draw-offs at diverse flow rates for hand washing, showering and bathing communicate with building management on a regular basis (the lavatory is too hot, the shower is too cold, etc.). The capacity exists to make adjustments and corrections.

Closed loops for emergency fixtures, on the other hand, require infrequent but often a large and sudden volume of water that must be in the correct temperature range every time. Without some level of manual or automated system monitoring and correction, along with an aggressive system maintenance protocol, tepid loops present a challenge.

Therefore, Rada Thermostatic Mixing Valves are **not** recommended for installation as central controllers for recirculated tepid water loops. Consult factory for details.

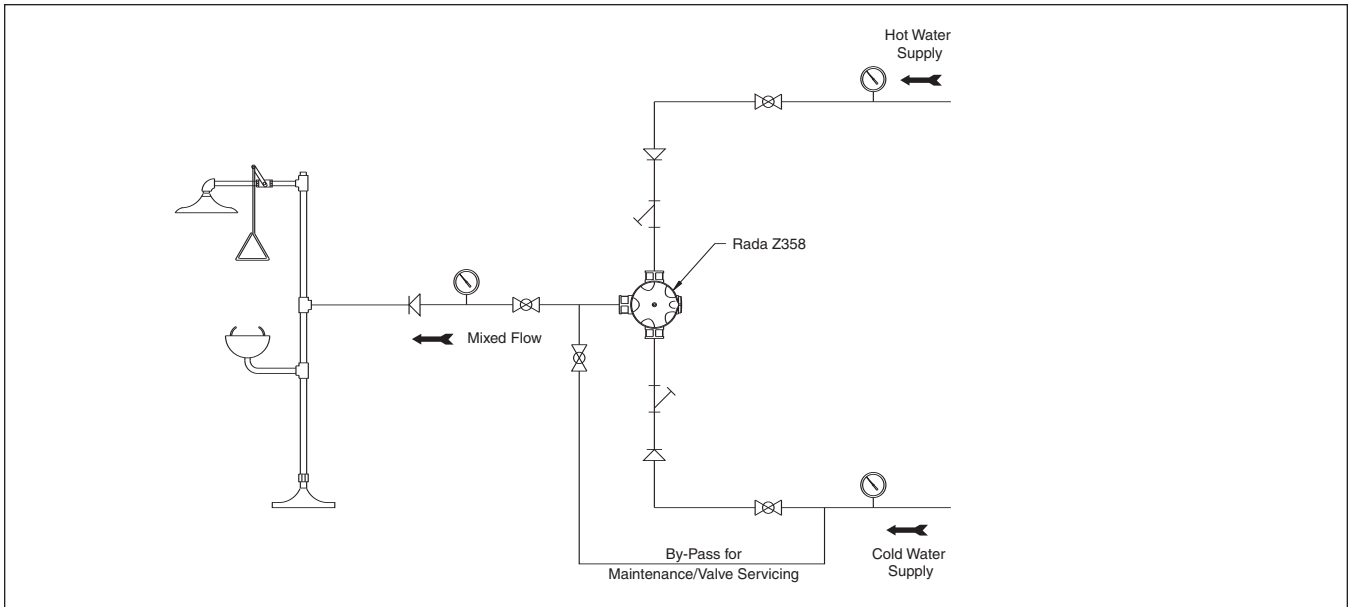
The Solution

Rada Electronic Mixing Centers (EMC) offer a packaged solution with an unparalleled level of accuracy, control and reliability. The EMC is available with site-programmable elements such as an off-hour high temperature flush and/or a system dump to control bacteria. In addition, the “out of range” visual and audible alert feature gives the system operator a vitally important audit capability.

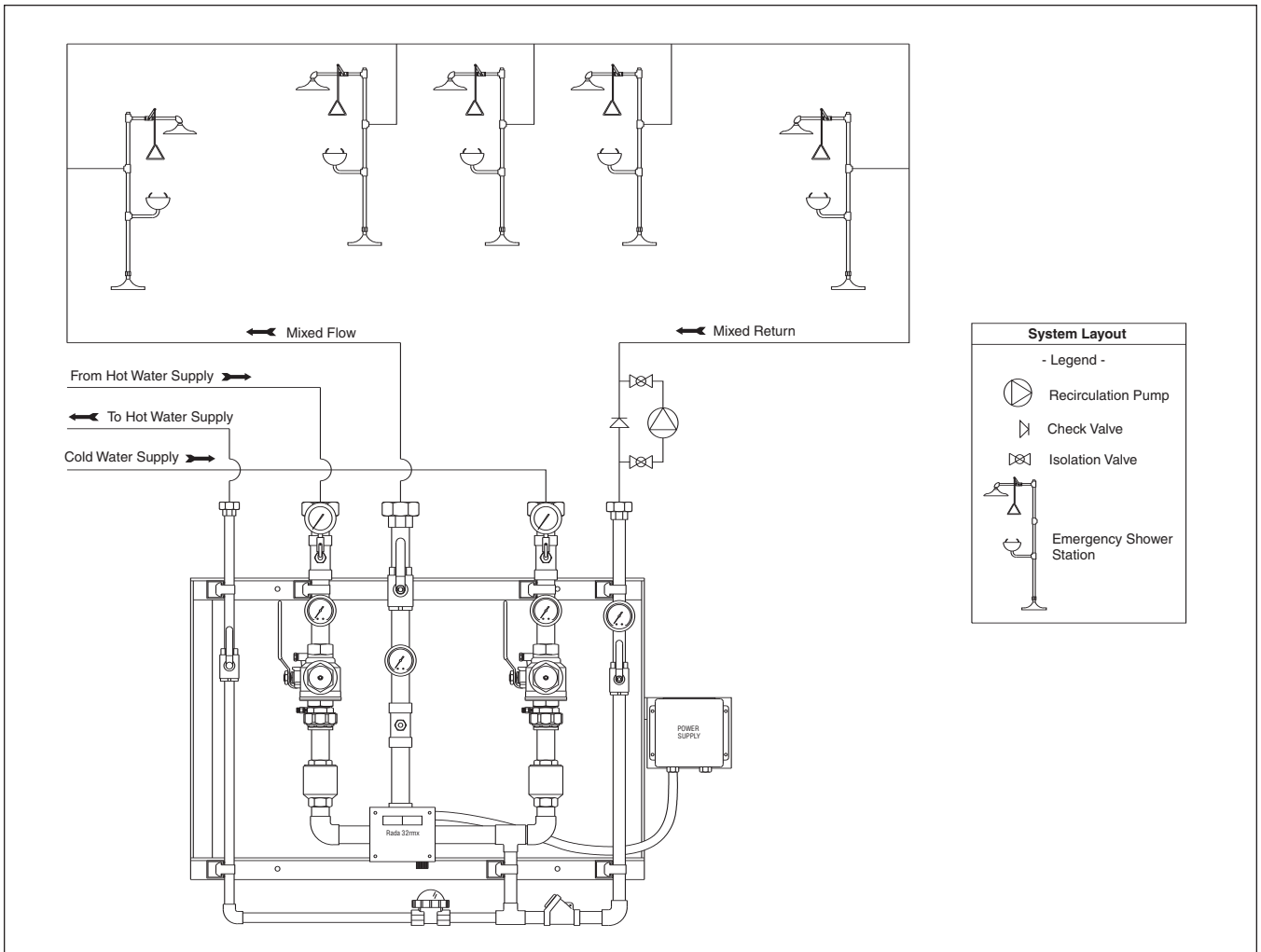
The superior technology available with the EMC allows Armstrong, the system designer, the installer and the facility owner/operator to manufacture, specify, install and operate a system that can clearly be termed state-of-the-art.

For details on the EMC, including the products’ EOS and third-party BMS interface capability, refer to previous pages 24 through 27, Rada Solutions for Central Recirculation System Control—Electronic.

Point of Use



Central Recirculation System Control



All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.



Rada Z358-20

Rada Z358-20 has been designed specifically to provide tepid water to emergency fixtures as detailed in ANSI Z358.1-1998 specifications.

Z358-20 is a Thermostatic Mixing Valve of “sealed for life” disposable cartridge construction. Compact design and top or bottom blended water outlet make Z358-20 ideal for OEM, new construction and upgrade/retrofit installations.

For Emergency Drench Showers. Rada Z358-20 will pass ANSI specified minimum of 20 gpm/76 lpm (actual 23 gpm/87 lpm) and will flow a minimum of 10 gpm (38 lpm) from direct cold water supply in hot failure mode at 40 psi (2.7 bar) maintained equal inlet supply pressure.

For Emergency Eye Wash Stations. For single or multiple fixture installation, Rada Z358-20 will control accurately at flow rates from 20 gpm (76 lpm) to below 1 gpm (3.8 lpm).

In flow applications between 20 gpm (76 lpm) and 10 gpm (38 lpm), Z358-20 will pass approximately 50% of original flow setting in hot failure mode.

In flow applications between 10 gpm (38 lpm) and 5 gpm (19 lpm), Z358-20 will pass approximately 80% of original flow setting in hot failure mode.

In flow applications below 5 gpm (19 lpm), Z358-20 will pass approximately 95% of original flow setting in hot failure mode.

Rada Z358-20 Offers:

User Safety

- Site Adjustable—Mechanical maximum-temperature limit stop and single-temperature locking features as a function of the temperature control handle design.
- Thermal shutdown feature is designed to protect user from unsafe water temperatures or hot water/chemical reaction should cold supply be interrupted during use.
- Unique constant cold water flow design ensures that in the event of a hot supply failure the Rada Z358-20 will allow cold water to flow to fixture.
- Unique constant cold water flow feature allows the inlet hot water supply to be set within a prescribed range, thus limiting the potential outlet temperature to a safe maximum in the event of misadjustment, unauthorized tampering or thermostat failure. **This feature presumes that the correct initial commissioning was performed and that the cold water supply has not been interrupted.**

Refer to **Table 1: Safe Maximum Inlet Hot Water Supply Temperature.**

Economy. New technology and state-of-the-art polymer internal components reduce cost and resist mineral deposition. Single corrosion-resistant “no spare parts” replaceable cartridge design reduces field maintenance time.

Comfort. Maintains a constant outlet temperature, which can be preset to meet ANSI Z358.1-1998 requirements. Controlled blended water at emergency fixtures will allow a user in distress to access flushing water at temperatures where required exposure can be sustained.

IMPORTANT NOTE: The replaceable cartridge design and functional simplicity of the Rada Z358-20 make the regular preventive maintenance (PM) program, which this type of application mandates, easier to effect.

Technical Specifications

- 1" (25 mm) NPT inlets and 3/4" (20 mm) NPT outlet(s)
- Chrome-plated DZR brass/polymer construction with bright “Safety Yellow” control handle.
- Operating pressures must be nominally equal
 - Maximum: 100 psi (6.9 bar)*
 - Minimum: 40 psi (2.7 bar) drench showers
 - 20 psi (1.4 bar) eye wash
- Integral thermometer
- Integral replaceable cartridge-type inlet check valves
- Dual thermostatic elements
- Integral replaceable inlet strainers
- 10 gpm (38 lpm) constant cold water flow in hot failure mode to open outlet at 40 psi (2.7 bar) pressure drop
- Shipping weight 10 lb (4.5 kg)

*High water pressures may deliver a volume and spray force that are injurious to the user. Check with fixture manufacturer or regulate water pressures within acceptable range.

Table 1. Safe Maximum Inlet Hot Water Supply Temperature

Refer to this table to correlate inlet hot water supply temperature with anticipated seasonal ground water temperatures (use best case/warmest scenario). For details, reference **Safety Bulletin #4** at left.

Inlet Hot Water Temp. °F	Cold Water Temperature °F				
	33	40	50	60	70
120	80	84	88	93	97
130	86	89	94	98	103
140	91	95	99	104	108
150	96	100	105	109	114
160	102	106	110	115	119
175	110	114	118	123	127
185	116	119	124	128	133

NOTE: Shaded area indicates potential user risk.

Table 2. Minimum Inlet Hot Water Supply Temperature

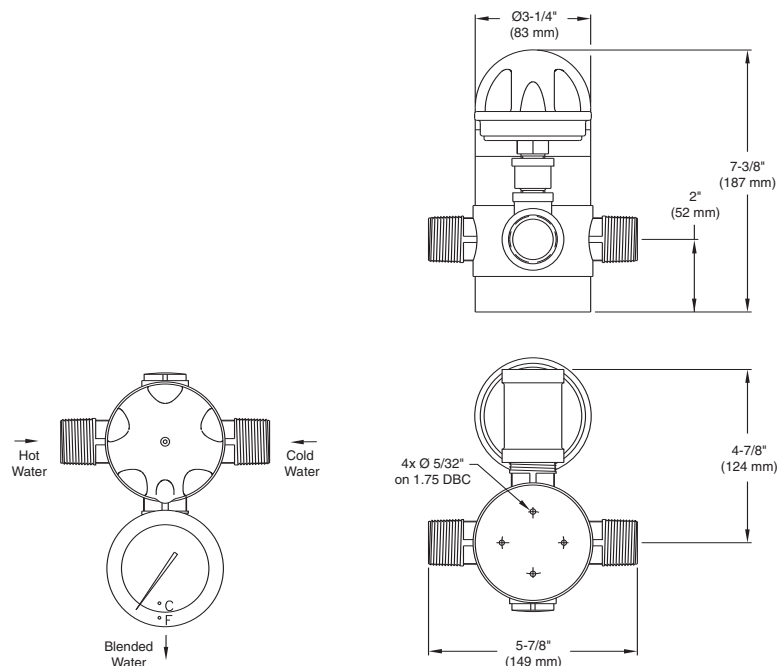
Rada Z358-20 will require a minimum inlet hot water supply temperature, which must be correlated with the anticipated seasonal inlet cold water supply temperature (use worst case/coldest scenario) as per Table 2 below.

Blend Temp. °F	Cold Water Temperature °F				
	33	40	50	60	70
80	120	113	105	97	88
85	129	122	114	106	97
90	138	132	123	115	107
95	147	141	132	124	116

NOTE: Shaded area represents Armstrong’s interpretation of “tepid” water.

For expanded versions of Tables 1 and 2, consult factory or product installation and maintenance manual.

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.



For a fully detailed certified drawing, refer to CDLW #1063.

Thermostatic Mixing Valves (gpm)											
Model	Pressure Drop (psi)										Min. Flow
	5	10	15	20	25	30	35	40	45	50	
Z358-20	8	11	13	15	17	19	20	22	23	24	1
Z358-40	15	22	27	31	35	38	41	44	46	49	2

Operating Specifications	
Maximum Recommended Hot Water Supply Temperature	130°F (54°C)
Minimum Cold Water Supply Temperature	33°F (1°C)
Optimum Inlet to Outlet Temperature Differential	Refer to Table 2
Minimum Flow Rate	1 gpm (3.8 lpm)
Maximum Inlet Supply Pressure (supplies must be nominally equal)	100 psi (6.9 bar)*
Minimum Inlet Supply Pressure	40 psi (2.7 bar) Drench Shower 20 psi (1.4 bar) Eye Wash

* High water pressures may deliver a volume and spray force that are injurious to the user. Check with fixture manufacturer or regulate water pressures within acceptable range.

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Rada Z358-20-FMC

Rada Z358-20-FMC is a Thermostatic Mixing Valve for remote/secure cabinet mount. This product has been designed specifically to provide tepid water to emergency fixtures as detailed in ANSI Z358.1-1998 specifications.

Rada Z358-20-FMC is supplied fully assembled and pressure-tested, in an 18" x 24" x 8" stainless steel recessed cabinet with a 2" flange. Cabinet has a polished stainless steel piano-hinged door with a keyed cylinder lock.

Rada Z358-20-FMC is supplied as standard under this model number for top inlet hot and cold water supplies and a top outlet with a left-hand hinged door as indicated in the picture and drawing.

Rada Z358-20-FMC can be specified/ordered with the following piping configurations under the following model numbers.

Top inlets/bottom outlet	Z358-20-FMC-TB
Bottom inlets/bottom outlet	Z358-20-FMC-BB*
Bottom inlets/top outlet	Z358-20-FMC-BT*

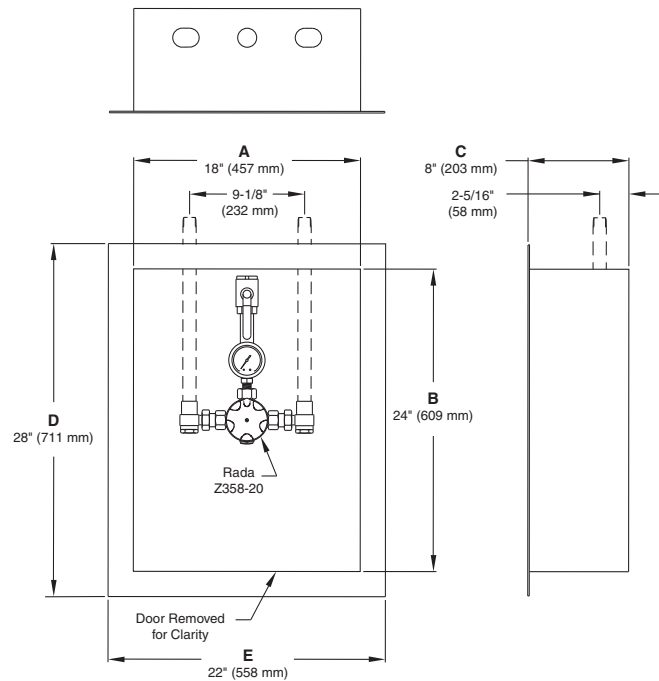
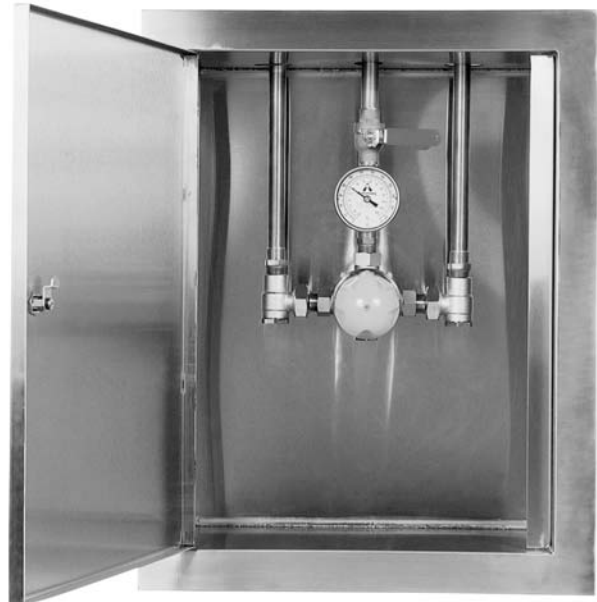
*Z358-20-FMC-BB/BT are supplied with a right-hand hinged door.

Technical Specifications

- 3/4" (20 mm) NPT inlets and 3/4" NPT outlet
- Cabinet construction: 14 gauge #4 finish stainless steel
- Cabinet outer flange: 2"
- Integral thermometer
- Outlet flow control
- Integral check stop/strainer/unions
- Refer to Rada Z358-20, page 30, for mixing valve technical detail

NOTE: Available as above in a Surface Mounted Cabinet of the same size and specification, less recess flange, under model number Z358-20-SMC. Use dimensions A, B and C only.

For a fully detailed certified drawing, refer to CDLW #1082.



All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Rada Z358-40

Rada Z358-40 has been designed specifically to provide tepid water to emergency fixtures as detailed in ANSI Z358.1-1998 specifications.

Z358-40 is a Thermostatic Mixing Valve designed specifically to deliver tepid water to emergency fixtures. Compact design and top or bottom blended water outlet makes Z358-40 ideal for OEM, new construction and upgrade/retrofit installations.

For Emergency Drench Showers. Rada Z358-40 will pass ANSI specified minimum of 20 gpm (75.7 lpm)—actual 46 gpm (147 lpm)—and will flow a minimum of 15 gpm (57 lpm) from direct cold water supply in hot failure mode at 45 psi (3 bar) pressure drop.

For Emergency Eye Wash Stations. For single or multiple fixture installation, Rada Z358-40 will control accurately at flow rates from 40 gpm (151 lpm) to below 2 gpm (7 lpm)—actual 46 gpm @ 45 psi pressure drop.

In 40 gpm (151 lpm) flow applications, Z358-40 will pass approximately 40% of original flow setting in hot failure mode.

In 30 gpm (114 lpm) flow applications, Z358-40 will pass approximately 50% of original flow setting in hot failure mode.

In 15 gpm (57 lpm) flow applications, Z358-40 will pass approximately 75% of original flow setting in hot failure mode.

Rada Z358-40 Offers

Safety.

- Site Adjustable—Mechanical maximum temperature limit stop and single temperature locking features as functions of the temperature control handle design.
- Thermal shutdown feature is designed to protect user from unsafe water temperatures or hot water/chemical reaction should cold supply be interrupted during use.
- Unique constant cold water flow design ensures that in the event of a hot supply failure the Rada Z358-40 will allow cold water to flow to fixture.
- Unique constant cold water flow feature allows the inlet hot water supply to be set within a prescribed range, thus limiting the potential outlet temperature to a safe maximum in the event of misadjustment, unauthorized tampering or thermostat failure. **This feature presumes that the correct initial commissioning was performed and that the cold water supply has not been interrupted.**

Refer to **Table 1. Safe Maximum Inlet Hot Water Supply Temperature**, at right.

Economy. New technology and state-of-the-art materials reduce cost. Design and functional simplicity reduce field maintenance and parts stocking requirements.

Comfort. Maintains a constant outlet temperature, which can be preset to meet ANSI Z358.1-1998 requirements. Controlled blended water at emergency fixtures will allow a user in distress to access flushing water at temperatures where required exposure can be sustained.

IMPORTANT NOTE: The replaceable cartridge design and functional simplicity of the Rada Z358-40 make the regular preventative maintenance (PM) program, which this type of application mandates, easier to effect.

Technical Specifications

- 1-1/4" (32 mm) NPT inlets and 1-1/4" (32 mm) NPT outlet(s)
- Chrome-plated DZR brass/polymer construction with bright "Safety Yellow" control handle.
- Operating pressures must be nominally equal
 - Maximum: 100 psi (6.9 bar)*
 - Minimum: 40 psi (2.7 bar) drench showers
 - 20 psi (1.4 bar) eye wash
- Maximum recommended pressure drop 75 psi (5 bar)
- Maximum recommended outlet flow 53 gpm (200 lpm)
- Integral thermometer
- Integral replaceable cartridge-type inlet check valves
- Integral replaceable inlet strainers
- Dual thermostatic elements
- 15 gpm (57 lpm) constant cold water flow in hot failure mode to open outlet at 45 psi (3 bar) pressure drop
- Shipping weight 18 lb (8 kg)

*High water pressures may deliver a volume and spray force that are injurious to the user. Check with fixture manufacturer or regulate water pressures within acceptable range.

Table 1.
Safe Maximum Inlet Hot Water Supply Temperature
Refer to Table 1 below to correlate inlet hot water supply temperature with anticipated seasonal ground water temperatures (use best case/warmest scenario). For details, reference **Safety** benefit Bullet #4 at left.

Inlet Hot Water Temp. °F	Cold Water Temperature °F				
	33	40	50	60	70
120	80	84	88	93	97
130	86	89	94	98	103
140	91	95	99	104	108
150	96	100	105	109	114
160	102	106	110	115	119
175	110	114	118	123	127
185	116	119	124	128	133

NOTE: Shaded area indicates potential user risk.

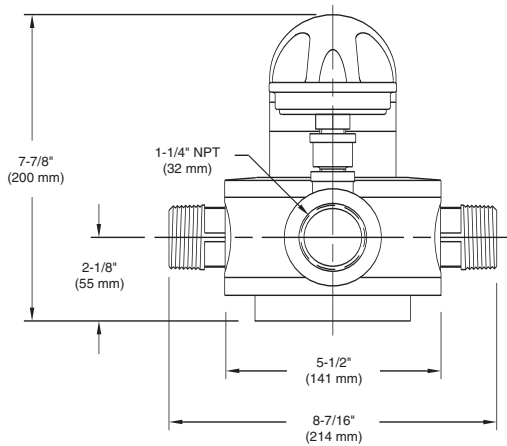
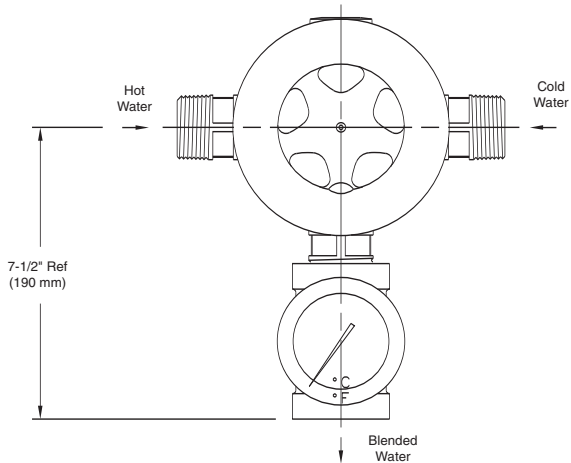
Table 2.
Minimum Inlet Hot Water Supply Temperature
Rada Z358-40 will require a minimum inlet hot water supply temperature, which must be correlated with the anticipated seasonal inlet cold water supply temperature (use worst case/coldest scenario) as per Table 2 below.

Blend Temp. °F	Cold Water Temperature °F				
	33	40	50	60	70
80	120	113	105	97	88
85	129	122	114	106	97
90	138	132	123	115	107
95	147	141	132	124	116

NOTE: Shaded area represents Armstrong's interpretation of "tepid" water.

For expanded versions of Tables 1 and 2, consult factory or product installation and maintenance manual.

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.



For a fully detailed certified drawing, refer to CDLW #1073.

Thermostatic Mixing Valves (gpm)

Model	Pressure Drop (psi)										Min. Flow
	5	10	15	20	25	30	35	40	45	50	
Z358-20	8	11	13	15	17	19	20	22	23	24	1
Z358-40	15	22	27	31	35	38	41	44	46	49	2

Operating Specifications

Maximum Recommended Hot Water Supply Temperature	130°F (54°C)
Minimum Cold Water Supply Temperature	33°F (1°C)
Optimum Inlet to Outlet Temperature Differential	Refer to Table 2
Minimum Flow Rate	2 gpm (7.6 lpm)
Maximum Inlet Supply Pressure (supplies must be nominally equal)	100 psi (6.9 bar)*
Minimum Inlet Supply Pressure	40 psi (2.7 bar) Drench Shower 20 psi (1.4 bar) Eye Wash

* High water pressures may deliver a volume and spray force that are injurious to the user. Check with fixture manufacturer or regulate water pressures within acceptable range.

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Rada Z358-40-FMC

Rada Z358-40-FMC is a Thermostatic Mixing Valve for remote/secure cabinet mount. This product has been designed specifically to provide tepid water to emergency fixtures as detailed in ANSI Z358.1-1998 specifications.

Rada Z358-40-FMC is supplied fully assembled and pressure-tested, in an 18" x 24" x 8" stainless steel recessed cabinet with a 2" flange. Cabinet has a polished stainless steel piano-hinged door with a keyed cylinder lock.

Rada Z358-40-FMC is supplied as standard under this model number for top inlet hot and cold water supplies and a top outlet with a left-hand hinged door as indicated in the picture and drawing.

Rada Z358-40-FMC can be specified/ordered with the following piping configurations under the following model numbers.

Top inlets/bottom outlet	Z358-40-FMC-TB
Bottom inlets/bottom outlet	Z358-40-FMC-BB*
Bottom inlets/top outlet	Z358-40-FMC-BT*

*Z358-40-FMC-BB/BT are supplied with a right-hand hinged door.

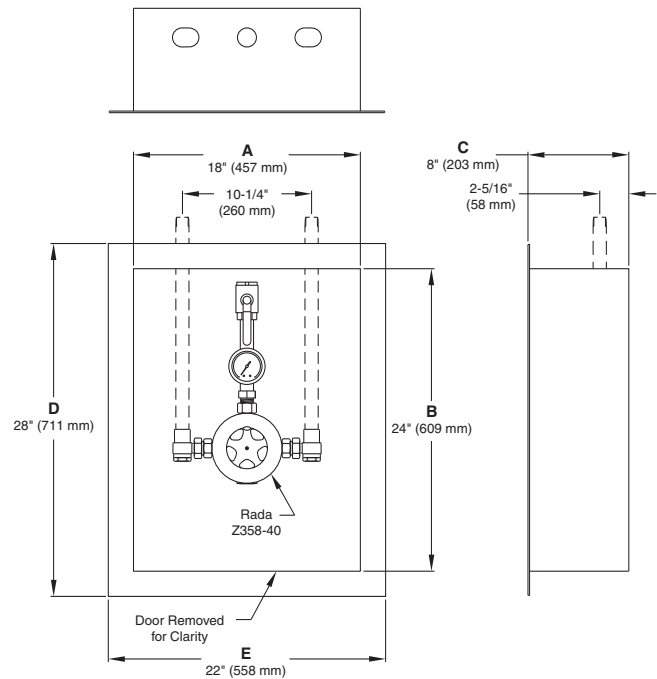


Technical Specifications

- 1" (25 mm) NPT inlets and 1" NPT outlet
- Cabinet construction: 14 gauge #4 finish stainless steel
- Cabinet outer flange: 2"
- Integral thermometer
- Outlet flow control
- Integral check stop/strainer/unions
- Refer to Rada Z358-40, page 33, for mixing valve technical detail

NOTE: Available as above in a Surface Mounted Cabinet of the same size and specification, less recess flange, under model number Z358-40-SMC. Use dimensions A, B and C only.

For a fully detailed certified drawing, refer to CDLW #1085.



All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Rada® Single Point and Zoned/Group Control Systems

Rada 110

Thermostatic Mixing Valve (TMV) of DZR brass/stainless steel. TMV shall have dual 3/8" NPT male compression fitting inlets with integral spring loaded check valves and dual 3/8" male compression fitting outlets. TMV shall be equipped with maximum temperature limiting and single temperature locking feature.

TMV shall be capable of controlling mixed water temperatures $\pm 3^{\circ}\text{F}$ at flow rates between .5 and 5 gpm and shall have the capability to completely shut off outlet flow prior to a 5°F temperature rise/fall in the event of a failure of either inlet supply. TMV shall be capable of delivering a mixed water temperature that is within 5°F of either inlet supply temperature.

TMV shall be compliant with ASSE Standard 1016 and shall be so certified and identified.

All as Rada 110 supplied by Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

Rada 215

Thermostatic Mixing Valve (TMV) of DZR brass/stainless steel/polymer construction. TMV shall have 1/2" NPT male inlets with integral spring loaded check valves and strainers and a rear facing mixed water outlet. TMV shall be equipped with maximum temperature limiting and single temperature locking feature and shall be supplied with both a temperature control trim set and a tamperproof locking shroud.

TMV shall be so designed that all of the internal operating components are enclosed in a one-piece, "sealed for life" replaceable cartridge for ease of service. TMV shall be capable of controlling mixed water temperatures $\pm 2^{\circ}\text{F}$ at flow rates between .5 and 11 gpm and shall have the capability to completely shut off outlet flow prior to a 5°F temperature rise/fall in the event of a failure of either inlet supply. TMV shall be capable of delivering a mixed water temperature that is within 5°F of either inlet supply temperature.

All as Rada 215 supplied by Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

Rada 320

Thermostatic Mixing Valve (TMV) of chrome-plated DZR brass construction. TMV shall have 1" NPT male inlets with integral spring loaded check valves and strainers and an optional top or bottom mixed water outlet. TMV shall be equipped with a maximum temperature limiting and single temperature locking feature.

TMV shall be so designed that all of the internal operating components are enclosed in a one-piece, "sealed for life" replaceable cartridge for ease of service. TMV shall be capable of controlling mixed water temperatures $\pm 2^{\circ}\text{F}$ at flow rates between 1 and 24 gpm and shall have the capability to completely shut off outlet flow prior to a 5°F temperature rise/fall in the event of a failure of either inlet supply. TMV shall be capable of delivering a mixed water temperature that is within 5°F of either inlet supply temperature.

TMV shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

TMV shall be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

All as Rada 320 supplied by Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

Rada 320D

Thermostatic Mixing Valve (TMV) of chrome-plated DZR brass construction. TMV shall have 3/4" NPT inlets with fitted combination union/check stop/strainers and outlet stop valve and thermometer. TMV shall be equipped with a maximum temperature limiting and single temperature locking feature.

TMV shall be so designed that all of the internal operating components are enclosed in a one-piece, "sealed for life" replaceable cartridge for ease of service. TMV shall be capable of controlling mixed water temperatures $\pm 2^{\circ}\text{F}$ at flow rates between 1 and 24 gpm and shall have the capability to completely shut off outlet flow prior to a 5°F temperature rise/fall in the event of a failure of either inlet supply. TMV shall be capable of delivering a mixed water temperature that is within 5°F of either inlet supply temperature.

TMV shall be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

All as Rada 320D supplied by Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

Rada 320DC

Thermostatic Mixing Valve (TMV) of chrome-plated DZR brass construction. TMV shall have 3/4" NPT inlets with fitted combination union/check stop/strainers and outlet stop valve and thermometer. TMV shall be equipped with a maximum temperature limiting and single temperature locking feature.

TMV shall be so designed that all of the internal operating components are enclosed in a one-piece, "sealed for life" replaceable cartridge for ease of service. TMV shall be capable of controlling mixed water temperatures $\pm 2^{\circ}\text{F}$ at flow rates between 1 and 24 gpm and shall have the capability to completely shut off outlet flow prior to a 5°F temperature rise/fall in the event of a failure of either inlet supply. TMV shall be capable of delivering a mixed water temperature that is within 5°F of either inlet supply temperature.

Assembly components and associated fittings shall have a heavy duty nickel-plated finish.

TMV shall be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

All as Rada 320DC supplied by Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Rada® Single Point and Zoned/Group Control Systems

Rada 320-FMC

Thermostatic Mixing Valve (TMV) shall be of chrome-plated DZR brass construction and shall be so designed that all of the internal operating components are enclosed in a one-piece, “sealed for life” replaceable cartridge for ease of service.

TMV shall have integral combination inlet check stop/union/strainers and shall be equipped with a maximum temperature limiting and single temperature locking feature.

TMV shall be capable of controlling mixed water temperatures +/-2°F at flow rates between 1 and 24 gpm and shall have the capability to completely shut off outlet flow prior to a 5°F temperature rise/fall in the event of a failure of either inlet supply. TMV shall be capable of delivering a mixed water temperature that is within 5°F of either inlet supply temperature.

TMV shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

TMV shall be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

TMV shall be supplied fully assembled and pressure-tested, with outlet stop valve enclosed in an 18" x 24" x 8" stainless steel recessed cabinet with a 2" flange. Cabinet shall have a polished stainless steel piano-hinged door with keyed cylinder lock.

Please select option.

- Cabinet shall be supplied with 3/4" NPT top inlets and a 3/4" NPT top outlet (standard).
- Cabinet shall be supplied with 3/4" NPT top inlets and a 3/4" NPT bottom outlet (TB).
- Cabinet shall be supplied with 3/4" NPT bottom inlets and a 3/4" NPT bottom outlet (BB).
- Cabinet shall be supplied with 3/4" NPT bottom inlets and a 3/4" NPT top outlet (BT).

Please use suffix SMC where appropriate to call out Surface Mounted Cabinet.

As all Rada 320-FMC supplied by Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

Rada 425

Thermostatic Mixing Valve (TMV) of chrome-plated DZR brass construction with stainless steel internal operating mechanism. TMV shall have 1-1/4" NPT male inlets with integral spring loaded check valves and strainers and an optional top or bottom mixed water outlet. TMV shall be equipped with a maximum temperature limiting and single temperature locking feature.

TMV shall be capable of controlling mixed water temperatures +/-2°F at flow rates between 2 and 48 gpm and shall have the capability to completely shut off outlet flow prior to a 5°F temperature rise/fall in the event of a failure of either inlet supply. TMV shall be capable of delivering a mixed water temperature that is within 5°F of either inlet supply temperature.

TMV shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

TMV shall be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

All as Rada 425 supplied by Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

Rada 425D

Thermostatic Mixing Valve (TMV) of chrome-plated DZR brass construction with stainless steel internal operating mechanism. TMV shall have 1" NPT inlets with fitted combination union/check stop/strainers, and outlet stop valve and thermometer. TMV shall be equipped with a maximum temperature limiting and single temperature locking feature.

TMV shall be capable of controlling mixed water temperatures +/-2°F at flow rates between 2 and 48 gpm and shall have the capability to completely shut off outlet flow prior to a 5°F temperature rise/fall in the event of a failure of either inlet supply. TMV shall be capable of delivering a mixed water temperature that is within 5°F of either inlet supply temperature.

TMV shall be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

All as Rada 425D supplied by Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

Rada® Single Point and Zoned/Group Control Systems

Rada 425DC

Thermostatic Mixing Valve (TMV) of chrome-plated DZR brass construction with stainless steel internal operating mechanism. TMV shall have 1" NPT inlets with fitted combination union/check stop/strainers, and outlet stop valve and thermometer. TMV shall be equipped with a maximum temperature limiting and single temperature locking feature.

TMV shall be capable of controlling mixed water temperatures +/-2°F at flow rates between 2 and 48 gpm and shall have the capability to completely shut off outlet flow prior to a 5°F temperature rise/fall in the event of a failure of either inlet supply. TMV shall be capable of delivering a mixed water temperature that is within 5°F of either inlet supply temperature.

TMV shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

Assembly components and associated fittings shall have a heavy duty nickel-plated finish.

TMV shall be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

All as Rada 425DC supplied by Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

Rada 425-FMC

Thermostatic Mixing Valve (TMV) of chrome-plated DZR brass construction with stainless steel internal operating mechanism. TMV shall have integral combination inlet check stop/union/strainers and shall be equipped with a maximum temperature limiting and single temperature locking feature.

TMV shall be capable of controlling mixed water temperatures +/-2°F at flow rates between 2 and 48 gpm and shall have the capability to completely shut off outlet flow prior to a 5°F temperature rise/fall in the event of a failure of either inlet supply. TMV shall be capable of delivering a mixed water temperature that is within 5°F of either inlet supply temperature.

TMV shall be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

TMV shall be supplied fully assembled and pressure-tested, with outlet stop valve enclosed in an 18" x 24" x 8" stainless steel recessed cabinet with a 2" flange. Cabinet shall have a polished stainless steel piano-hinged door with keyed cylinder lock.

Please select option.

- Cabinet shall be supplied with 1" NPT top inlets and a 1" NPT top outlet (standard).
- Cabinet shall be supplied with 1" NPT top inlets and a 1" NPT bottom outlet (TB).
- Cabinet shall be supplied with 1" NPT bottom inlets and a 1" NPT bottom outlet (BB).
- Cabinet shall be supplied with 1" NPT bottom inlets and a 1" NPT top outlet (BT).

Please use suffix SMC where appropriate to call out Surface Mounted Cabinet.

As all Rada 425-FMC supplied by Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Rada 40

Thermostatic Mixing Valve (TMV) shall be of brass construction with stainless steel internal operating mechanism. TMV shall have 1-1/2" NPT inlets with integral spring loaded check valves and rear facing mixed water outlet. TMV shall be equipped with removable temperature adjustment key with lockshield for single temperature lock out capability.

TMV shall be capable of controlling mixed water temperatures +/-2°F at flow rates between 2 and 72 gpm and shall have the capability to reduce outlet flow to seepage prior to a 5°F temperature rise/fall in the event of a failure of either inlet supply. TMV shall be capable of delivering a mixed water temperature that is within 18°F of either inlet supply temperature.

TMV shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

TMV shall be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

All as Rada 40 supplied by Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

Rada 50

Thermostatic Mixing Valve (TMV) shall be of brass construction with stainless steel internal operating mechanism. TMV shall have 2" NPT inlets with integral spring loaded check valves and rear facing mixed water outlet. TMV shall be equipped with removable temperature adjustment key with lockshield for single temperature lock out capability.

TMV shall be capable of controlling mixed water temperatures +/-2°F at flow rates between 2 and 98 gpm and shall have the capability to reduce outlet flow to seepage prior to a 5°F temperature rise/fall in the event of a failure of either inlet supply. TMV shall be capable of delivering a mixed water temperature that is within 18°F of either inlet supply temperature.

TMV shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

TMV shall be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

All as Rada 50 supplied by Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

Rada® Solutions for Central Recirculation System Control

Rada 320R

Thermostatic Mixing Valve Assembly (TMVA) shall have 3/4" inlets/outlet and shall pass a minimum 15 gpm in a recirculating hot water system at peak demand at a 20 psi maximum pressure drop. TMVA shall be fitted with an integral thermostatic return limiter to maintain circuit temperature during no-demand periods.

TMVA shall be capable of maintaining system temperature without exceeding set point with no required minimum flow rate through the TMVA or minimum draw-off from the system.

TMVA shall be equipped with a maximum temperature limiting and single temperature locking feature.

TMVA shall be supplied pre-piped with hot inlet, cold inlet, mixed water outlet and mixed return inlet with said thermostatic return limiter. TMVA shall also include as standard, integral inlet strainers, mixed return sight flow indicator, outlet thermometer and inlet supply, mixed return and return to heat source check valves.

TMV shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

TMV shall be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

All as Rada 320R supplied by Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

Rada 40R

Thermostatic Mixing Valve Assembly (TMVA) shall have 1-1/2" inlets/outlet and shall pass a minimum 72 gpm in a recirculating hot water system at peak demand at a 20 psi maximum pressure drop. TMVA shall be fitted with an integral thermostatic return limiter to maintain circuit temperature during no-demand periods.

TMV shall be equipped with removable temperature adjustment key with lockshield for single temperature lock out capability.

TMVA shall be capable of maintaining system temperature without exceeding set point with no required minimum flow rate through the TMVA or minimum draw-off from the system.

TMVA shall be supplied pre-piped with hot inlet, cold inlet, mixed water outlet and mixed return inlet with said thermostatic return limiter. TMVA shall also include as standard, mixed return sight flow indicator, outlet thermometer and inlet supply, mixed return and return to heat source check valves.

TMV shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

TMV shall be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

All as Rada 40R supplied by Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

Rada 425R

Thermostatic Mixing Valve Assembly (TMVA) shall have 1" inlets/outlet and shall pass a minimum 31 gpm in a recirculating hot water system at peak demand at a 20 psi maximum pressure drop. TMVA shall be fitted with an integral thermostatic return limiter to maintain circuit temperature during no-demand periods.

TMVA shall be capable of maintaining system temperature without exceeding set point with no required minimum flow rate through the TMVA or minimum draw-off from the system.

TMVA shall be equipped with a maximum temperature limiting and single temperature locking feature.

TMVA shall be supplied pre-piped with hot inlet, cold inlet, mixed water outlet and mixed return inlet with said thermostatic return limiter. TMVA shall also include as standard, integral inlet strainers, mixed return sight flow indicator, outlet thermometer and inlet supply, mixed return and return to heat source check valves.

TMV shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

TMV shall be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

All as Rada 425R supplied by Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

Rada 50R

Thermostatic Mixing Valve Assembly (TMVA) shall have 2" inlets/outlet and shall pass a minimum 98 gpm in a recirculating hot water system at peak demand at a 20 psi maximum pressure drop. TMVA shall be fitted with an integral thermostatic return limiter to maintain circuit temperature during no-demand periods.

TMVA shall be capable of maintaining system temperature without exceeding set point with no required minimum flow rate through the TMVA or minimum draw-off from the system.

TMV shall be equipped with removable temperature adjustment key with lockshield for single temperature lock out capability.

TMVA shall be supplied pre-piped with hot inlet, cold inlet, mixed water outlet and mixed return inlet with said thermostatic return limiter. TMVA shall also include as standard, mixed return sight flow indicator, outlet thermometer and inlet supply, mixed return and return to heat source check valves.

TMV shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

TMV shall be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

All as Rada 50R supplied by Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Rada® Solutions for Central Recirculation System Control

Flexi-Flo™ 50R-50R

Thermostatic Mixing Valve Assembly (TMVA) shall have 3" inlets and a 3" outlet and shall pass a minimum 193 gpm in a recirculating hot water system at peak demand at a 20 psi maximum pressure drop. TMVA shall be capable of maintaining system temperature without exceeding set point with no required minimum flow rate through the TMVA or minimum draw-off from the system.

TMVA shall include two Rada 50R Thermostatic Mixing Valves piped in parallel with integral thermostatic return limiters which maintain circuit temperature during no-demand periods.

Each TMV shall be equipped with removable temperature adjustment key with lockshield for single temperature lock out capability.

TMV shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

TMV shall be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

TMVA shall be supplied pre-piped and pressure-tested, with hot inlet, cold inlet, mixed water outlet and mixed return inlet with said thermostatic return limiters. All connection points shall have fitted unions. TMVA shall also include as standard, integral inlet combination ball valve/strainers, mixed return sight flow indicators, outlet thermometer and inlet supply, mixed return and return to heat source check valves.

Complete assembly shall be supplied mounted on a heavy duty, freestanding angle iron frame.

All as Flexi-Flo 50R-50R supplied by Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

Flexi-Flo™ 50R-50R-50R

Thermostatic Mixing Valve Assembly (TMVA) shall have 4" flanged inlets and a 4" flanged outlet and shall pass a minimum of 288 gpm in a recirculating hot water system at peak demand at a 20 psi maximum pressure drop. TMVA shall be capable of maintaining system temperature without exceeding set point with no required minimum flow rate through the TMVA or minimum draw-off from the system.

TMVA shall include three Rada 50R Thermostatic Mixing Valves piped in parallel with integral thermostatic return limiters which maintain circuit temperature during no-demand periods.

Each TMV shall be equipped with removable temperature adjustment key with lockshield for single temperature lock out capability.

TMV shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

Individual TMV shall be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

TMVA shall be supplied pre-piped and pressure-tested, with hot inlet, cold inlet, mixed water outlet and mixed return inlet with said thermostatic return limiters. Mixed return connection points shall have fitted unions. TMVA shall also include as standard, integral inlet combination ball valve/strainers, mixed return sight flow indicators, outlet thermometer and inlet supply, mixed return and return to heat source check valves.

Complete assembly shall be supplied mounted on a heavy duty, freestanding angle iron frame.

All as Flexi-Flo 50R-50R-50R supplied by Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

Rada® Solutions for Central Recirculation System Control

Rada EMC 1

Electronic Mixing Center (EMC) shall deliver up to 75 gpm with no minimum system draw-off requirement and shall comprise:

- 12V DC electronic temperature controller
- Inlet/return check valves
- Inlet combination ball valve strainers
- Pressure gauges
- Inlet, system blend and return line thermometers
- Isolation valves
- 110V UL-listed transformer enclosed in a NEMA 4X enclosure
- Low voltage control wiring with protective conduit

All required installation components shall be supplied pre-plumbed and pressure-tested, mounted to an enameled steel frame terminating in five standard union connections for hot and cold supply in, blended water to the system, and system and water heater return lines.

Electronic control box shall be supplied pre-wired, terminating at a knockout for Romex or BX cable connector.

Temperature controller shall be non-thermostatic and shall feature integrated circuit board technology designed to deliver blended water economically at a safe, accurate temperature for sanitary use in recirculated hot water systems.

Electronic Mixing Center will include all of the following capabilities:

- Recirculated water control within $\pm 2^{\circ}\text{F}$ with minimal recirculation of 2 gpm
- Accurate control of blended water drawn from the system at a point of use within $\pm 2^{\circ}\text{F}$
- A minimum of 2°F recirculation system temperature loss required for effective loop control
- A visual operation “set” and “actual” temperature display for effective commissioning, adjustment and system monitoring
- A visual signal by display to show “error” mode or “out of range” system failure, coupled with output for audible alarm and/or downstream solenoid valve relay
- Integral two-way data port for PC and BMS interface
- Automatic shutoff of hot water flow upon cold water inlet supply failure
- Automatic shutoff of hot water flow in the event of a power failure
- Temperature controller compliant with ASSE Standard 1017 and CSA B125 and so certified and identified

All as Rada EMC 1 from Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

Rada EMC 12

Electronic Mixing Center (EMC) shall deliver up to 75 gpm with no minimum system draw-off requirement and shall comprise:

- 12V DC electronic temperature controller
- Inlet/return check valves
- Inlet combination ball valve strainers
- Pressure gauges
- Inlet, system blend and return line thermometers
- Isolation valves
- 110V UL-listed transformer enclosed in a NEMA 4X enclosure
- Low voltage control wiring with protective conduit
- 1/12 HP circulating pump rated at 10 gpm at 15 ft of head

All required installation components shall be supplied pre-plumbed and pressure-tested, mounted to an enameled steel frame terminating in five standard union connections for hot and cold supply in, blended water to the system, and system and water heater return lines.

Electronic control box shall be supplied pre-wired, terminating at a knockout for Romex or BX cable connector.

Temperature controller shall be non-thermostatic and shall feature integrated circuit board technology designed to deliver blended water economically at a safe, accurate temperature for sanitary use in recirculated hot water systems.

Electronic Mixing Center will include all of the following capabilities:

- Recirculated water control within $\pm 2^{\circ}\text{F}$ with minimal recirculation of 2 gpm
- Accurate control of blended water drawn from the system at a point of use within $\pm 2^{\circ}\text{F}$
- A minimum of 2°F recirculation system temperature loss required for effective loop control
- A visual operation “set” and “actual” temperature display for effective commissioning, adjustment and system monitoring
- A visual signal by display to show “error” mode or “out of range” system failure, coupled with output for audible alarm and/or downstream solenoid valve relay
- Integral two-way data port for PC and BMS interface
- Automatic shutoff of hot water flow upon cold water inlet supply failure
- Automatic shutoff of hot water flow in the event of a power failure
- Temperature controller compliant with ASSE Standard 1017 and CSA B125 and so certified and identified

All as Rada EMC 12 from Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Rada® Solutions for Central Recirculation System Control

Rada EMC 13

Electronic Mixing Center (EMC) shall deliver up to 75 gpm with no minimum system draw-off requirement and shall comprise:

- 12V DC electronic temperature controller
- Inlet/return check valves
- Inlet combination ball valve strainers
- Pressure gauges
- Inlet, system blend and return line thermometers
- Isolation valves
- 110V UL-listed transformer enclosed in a NEMA 4X enclosure
- Low voltage control wiring with protective conduit
- System control module

All required installation components shall be supplied pre-plumbed and pressure-tested, mounted to an enameled steel frame terminating in five standard union connections for hot and cold supply in, blended water to the system, and system and water heater return lines.

Electronic control box shall be supplied pre-wired, terminating at a knockout for Romex or BX cable connector.

Temperature controller shall be non-thermostatic and shall feature integrated circuit board technology designed to deliver blended water economically at a safe, accurate temperature for sanitary use in recirculated hot water systems.

System control module shall feature integral timer and shall have programming capability for timed automatic system temperature adjustment.

Electronic Mixing Center will include all of the following capabilities:

- Recirculated water control within +/-2°F with minimal recirculation of 2 gpm
- Accurate control of blended water drawn from the system at a point of use within +/-2°F
- A minimum of 2°F recirculation system temperature loss required for effective loop control
- A visual operation “set” and “actual” temperature display for effective commissioning, adjustment and system monitoring
- A visual signal by display to show “error” mode or “out of range” system failure, coupled with output for audible alarm and/or downstream solenoid valve relay
- Integral two-way data port for PC and BMS interface
- Automatic shutoff of hot water flow upon cold water inlet supply failure
- Automatic shutoff of hot water flow in the event of a power failure
- Temperature controller compliant with ASSE Standard 1017 and CSA B125 and so certified and identified

All as Rada EMC 13 from Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

Rada EMC 123

Electronic Mixing Center (EMC) shall deliver up to 75 gpm with no minimum system draw-off requirement and shall comprise:

- 12V DC electronic temperature controllers
- Inlet/return check valves
- Inlet combination ball valve strainers
- Pressure gauges
- Inlet, system blend and return line thermometers
- Isolation valves
- 110V UL-listed transformer enclosed in a NEMA 4X enclosure
- Low voltage control wiring with protective conduit
- 1/12 HP circulating pump rated at 10 gpm at 15 ft of head
- System control module

All required installation components shall be supplied pre-plumbed and pressure-tested, mounted to an enameled steel frame terminating in five standard union connections for hot and cold supply in, blended water to the system, and system and water heater return lines.

Electronic control box shall be supplied pre-wired, terminating at a knockout for Romex or BX cable connector.

Temperature controller shall be non-thermostatic and shall feature integrated circuit board technology designed to deliver blended water economically at a safe, accurate temperature for sanitary use in recirculated hot water systems.

System control module shall feature integral timer and shall have programming capability for timed automatic system temperature adjustment.

Electronic Mixing Center will include all of the following capabilities:

- Recirculated water control within +/-2°F with minimal recirculation of 2 gpm
- Accurate control of blended water drawn from the system at a point of use within +/-2°F
- A minimum of 2°F recirculation system temperature loss required for effective loop control
- A visual operation “set” and “actual” temperature display for effective commissioning, adjustment and system monitoring
- A visual signal by display to show “error” mode or “out of range” system failure, coupled with output for audible alarm and/or downstream solenoid valve relay
- Integral two-way data port for PC and BMS interface
- Automatic shutoff of hot water flow upon cold water inlet supply failure
- Automatic shutoff of hot water flow in the event of a power failure
- Temperature controller compliant with ASSE Standard 1017 and CSA B125 and so certified and identified

All as Rada EMC 123 from Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Rada® Solutions for Central Recirculation System Control

Rada EMC 2

Electronic Mixing Center (EMC) shall deliver up to 150 gpm with no minimum system draw-off requirement and shall comprise:

- Two 12V DC electronic temperature controllers
- Inlet/return check valves
- Inlet combination ball valve strainers
- Pressure gauges
- Inlet, system blend and return line thermometers
- Isolation valve
- System balancing valves
- 110V UL-listed transformer enclosed in a NEMA 4X enclosure
- Low voltage control wiring with protective conduit

All required installation components shall be supplied pre-plumbed and pressure-tested, mounted to an enameled steel frame terminating in five standard union connections for hot and cold supply in, blended water to the system, and system and water heater return lines.

Electronic control box shall be supplied pre-wired, terminating at a knockout for Romex or BX cable connector.

Temperature controllers shall be non-thermostatic and shall feature integrated circuit board technology designed to deliver blended water economically at a safe, accurate temperature for sanitary use in recirculated hot water systems.

Electronic Mixing Center will include all of the following capabilities:

- Recirculated water control within +/-2°F with minimal recirculation of 4 gpm
- Accurate control of blended water drawn from the system at a point of use within +/-2°F
- A minimum of 2°F recirculation system temperature loss required for effective loop control
- A visual operation “set” and “actual” temperature display for effective commissioning, adjustment and system monitoring
- A visual signal by display to show “error” mode or “out of range” system failure, coupled with output for audible alarm and/or downstream solenoid valve relay
- Integral two-way data port for PC and BMS interface
- Automatic shutoff of hot water flow upon cold water inlet supply failure
- Automatic shutoff of hot water flow in the event of a power failure
- Temperature controllers compliant with ASSE Standard 1017 and CSA B125 and so certified and identified

All as Rada EMC 2 from Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

Rada EMC 22

Electronic Mixing Center (EMC) shall deliver up to 150 gpm with no minimum system draw-off requirement and shall comprise:

- Two 12V DC electronic temperature controllers
- Inlet/return check valves
- Inlet combination ball valve strainers
- Pressure gauges
- Inlet, system blend and return line thermometers
- Isolation valves
- System balancing valves
- 110V UL-listed transformer enclosed in a NEMA 4X enclosure
- Low voltage control wiring with protective conduit
- 1/6 HP circulating pump rated at 10 gpm at 30 ft of head

All required installation components shall be supplied pre-plumbed and pressure-tested, mounted to an enameled steel frame terminating in five standard union connections for hot and cold supply in, blended water to the system, and system and water heater return lines.

Electronic control box shall be supplied pre-wired, terminating at a knockout for Romex or BX cable connector.

Temperature controllers shall be non-thermostatic and shall feature integrated circuit board technology designed to deliver blended water economically at a safe, accurate temperature for sanitary use in recirculated hot water systems.

Electronic Mixing Center will include all of the following capabilities:

- Recirculated water control within +/-2°F with minimal recirculation of 4 gpm
- Accurate control of blended water drawn from the system at a point of use within +/-2°F
- A minimum of 2°F recirculation system temperature loss required for effective loop control
- A visual operation “set” and “actual” temperature display for effective commissioning, adjustment and system monitoring
- A visual signal by display to show “error” mode or “out of range” system failure, coupled with output for audible alarm and/or downstream solenoid valve relay
- Integral two-way data port for PC and BMS interface
- Automatic shutoff of hot water flow upon cold water inlet supply failure
- Automatic shutoff of hot water flow in the event of a power failure
- Temperature controllers compliant with ASSE Standard 1017 and CSA B125 and so certified and identified

All as Rada EMC 22 from Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Rada® Solutions for Central Recirculation System Control

Rada EMC 23

Electronic Mixing Center (EMC) shall deliver up to 150 gpm with no minimum system draw-off requirement and shall comprise:

- Two 12V DC electronic temperature controllers
- Inlet/return check valves
- Inlet combination ball valve strainers
- Pressure gauges
- Inlet, system blend and return line thermometers
- Isolation valves
- System balancing valves
- 110V UL-listed transformer enclosed in a NEMA 4X enclosure
- Low voltage control wiring with protective conduit
- System control module

All required installation components shall be supplied pre-plumbed and pressure-tested, mounted to an enameled steel frame terminating in five standard union connections for hot and cold supply in, blended water to the system, and system and water heater return lines.

Electronic control box shall be supplied pre-wired, terminating at a knockout for Romex or BX cable connector.

Temperature controllers shall be non-thermostatic and shall feature integrated circuit board technology designed to deliver blended water economically at a safe, accurate temperature for sanitary use in recirculated hot water systems.

System control modules shall feature integral timer and shall have programming capability for timed automatic system temperature adjustment.

Electronic Mixing Center will include all of the following capabilities:

- Recirculated water control within +/-2°F with minimal recirculation of 4 gpm
- Accurate control of blended water drawn from the system at a point of use within +/-2°F
- A minimum of 2°F recirculation system temperature loss required for effective loop control
- A visual operation “set” and “actual” temperature display for effective commissioning, adjustment and system monitoring
- A visual signal by display to show “error” mode or “out of range” system failure, coupled with output for audible alarm and/or downstream solenoid valve relay
- Integral two-way data port for PC and BMS interface
- Automatic shutoff of hot water flow upon cold water inlet supply failure
- Automatic shutoff of hot water flow in the event of a power failure
- Temperature controllers compliant with ASSE Standard 1017 and CSA B125 and so certified and identified

All as Rada EMC 23 from Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

Rada EMC 223

Electronic Mixing Center (EMC) shall deliver up to 150 gpm with no minimum system draw-off requirement and shall comprise:

- Two 12V DC electronic temperature controllers
- Inlet/return check valves
- Inlet combination ball valve strainers
- Pressure gauges
- Inlet, system blend and return line thermometers
- Isolation valves
- 110V UL-listed transformer enclosed in a NEMA 4X enclosure
- Low voltage control wiring with protective conduit
- 1/6 HP circulating pump rated at 10 gpm at 30 ft of head
- System control module

All required installation components shall be supplied pre-plumbed and pressure-tested, mounted to an enameled steel frame terminating in five standard union connections for hot and cold supply in, blended water to the system, and system and water heater return lines.

Electronic control box shall be supplied pre-wired, terminating at a knockout for Romex or BX cable connector.

Temperature controllers shall be non-thermostatic and shall feature integrated circuit board technology designed to deliver blended water economically at a safe, accurate temperature for sanitary use in recirculated hot water systems.

System control modules shall feature integral timer and shall have programming capability for timed automatic system temperature adjustment.

Electronic Mixing Center will include all of the following capabilities:

- Recirculated water control within +/-2°F with minimal recirculation of 4 gpm
- Accurate control of blended water drawn from the system at a point of use within +/-2°F
- A minimum of 2°F recirculation system temperature loss required for effective loop control
- A visual operation “set” and “actual” temperature display for effective commissioning, adjustment and system monitoring
- A visual signal by display to show “error” mode or “out of range” system failure, coupled with output for audible alarm and/or downstream solenoid valve relay
- Integral two-way data port for PC and BMS interface
- Automatic shutoff of hot water flow upon cold water inlet supply failure
- Automatic shutoff of hot water flow in the event of a power failure
- Temperature controllers compliant with ASSE Standard 1017 and CSA B125 and so certified and identified

All as Rada EMC 223 from Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Rada® Solutions for Emergency Fixture Control

Rada Z358-20

Thermostatic Mixing Valve (TMV) of chrome-plated DZR brass construction with stainless steel internal operating mechanism and “Safety Yellow” control handle. TMV shall have 1" NPT male inlets with integral spring loaded check valves and strainers, a 3/4" outlet with thermometer and tee.

TMV shall be so designed that all of the internal operating components are enclosed in a one-piece, “sealed for life” replaceable cartridge for ease of service.

TMV shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

TMV shall be supplied with all of the following capabilities:

- Maximum temperature limiting and single temperature locking
- Control of mixed water temperatures +/-2°F at flow rates between .4 and 24 gpm
- Complete shutoff of outlet flow prior to a 5°F temperature rise in the event of a failure of the inlet cold water supply
- Constant cold water flow design capable of delivering up to 10 gpm directly from the cold water supply to the fixture in the event of a failure of the inlet hot supply
- Designed so that with a 130°F inlet hot supply temperature and 60°F cold water supply, the maximum mixed water temperature available from the TMV in misadjustment, product failure or product tampering mode is 98°F

TMV shall be capable of meeting the requirements of ANSI Standard Z358.1-1998 sections 4.1, 4.6.6, 5.1.5, 5.4.6, 7.1.4, 7.4.6, 8.1, 8.4.4 and 9.4.5.

All as Rada Z358-20 supplied by Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

Rada Z358-40

Thermostatic Mixing Valve (TMV) of chrome-plated DZR brass construction with stainless steel internal operating mechanism and “Safety Yellow” control handle. TMV shall have 1-1/4" NPT male inlets with integral spring loaded check valves and strainers, a 1" outlet with thermometer and tee.

TMV shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

TMV shall be supplied with all of the following capabilities:

- Maximum temperature limiting and single temperature locking
- Control of mixed water temperatures +/-2°F at flow rates between 2 and 48 gpm
- Complete shutoff of outlet flow prior to a 5°F temperature rise in the event of a failure of the inlet cold water supply
- Constant cold water flow design capable of delivering up to 20 gpm directly from the cold water supply to the fixture in the event of a failure of the inlet hot supply
- Designed so that with a 130°F inlet hot supply temperature and 60°F cold water supply, the maximum mixed water temperature available from the TMV in misadjustment, product failure or product tampering mode is 98°F

TMV shall be capable of meeting the requirements of ANSI Standard Z358.1-1998 sections 4.1, 4.6.6, 5.4.6, 7.1.4, 7.4.6, 8.1, 8.4.4 and 9.4.5.

All as Rada Z358-40 supplied by Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.



Rada® Solutions for Emergency Fixture Control

Rada Z358-20-FMC

Thermostatic Mixing Valve (TMV) of chrome-plated DZR brass construction with stainless steel internal operating mechanism and “Safety Yellow” control handle. TMV shall have 3/4" NPT inlets with fitted combination union/check stop/strainers and outlet stop valve and thermometer.

TMV shall be so designed that all of the internal operating components are enclosed in a one-piece, “sealed for life” replaceable cartridge for ease of service.

TMV shall be supplied with all of the following capabilities:

- Maximum temperature limiting and single temperature locking
- Control of mixed water temperatures +/-2°F at flow rates between .4 and 24 gpm
- Complete shutoff of outlet flow prior to a 5°F temperature rise in the event of a failure of the inlet cold water supply
- Constant cold water flow design capable of delivering up to 10 gpm directly from the cold water supply to the fixture in the event of a failure of the inlet hot supply
- Designed so that with a 130°F inlet hot supply temperature and 60°F cold water supply, the maximum mixed water temperature available from the TMV in misadjustment, product failure or product tampering mode is 98°F

TMV shall be capable of meeting the requirements of ANSI Standard Z358.1-1998 sections 4.1, 4.6.6, 5.1.5, 5.4.6, 7.1.4, 7.4.6, 8.1, 8.4.4 and 9.4.5.

TMV shall be supplied fully assembled and pressure-tested, with outlet stop valve enclosed in an 18" x 24" x 8" stainless steel recessed cabinet with a 2" flange. Cabinet shall have a polished stainless steel piano-hinged door with keyed cylinder lock.

Please select option.

- Cabinet shall be supplied with 3/4" NPT top inlets and a 3/4" NPT top outlet (standard).
- Cabinet shall be supplied with 3/4" NPT top inlets and a 3/4" NPT bottom outlet (TB).
- Cabinet shall be supplied with 3/4" NPT bottom inlets and a 3/4" NPT bottom outlet (BB).
- Cabinet shall be supplied with 3/4" NPT bottom inlets and a 3/4" NPT top outlet (BT).

Please use suffix SMC where appropriate to call out Surface Mounted Cabinet.

As all Rada Z358-20-FMC supplied by Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

Rada Z358-40-FMC

Thermostatic Mixing Valve (TMV) of chrome-plated DZR brass construction with stainless steel internal operating mechanism and “Safety Yellow” control handle. TMV shall have 1" NPT inlets with fitted combination union/check stop/strainers and outlet stop valve and thermometer.

TMV shall be supplied with all of the following capabilities:

- Maximum temperature limiting and single temperature locking
- Control of mixed water temperatures +/-2°F at flow rates between 2 and 48 gpm
- Complete shutoff of outlet flow prior to a 5°F temperature rise in the event of a failure of the inlet cold water supply
- Constant cold water flow design capable of delivering up to 20 gpm directly from the cold water supply to the fixture in the event of a failure of the inlet hot supply
- Designed so that with a 130°F inlet hot supply temperature and 60°F cold water supply, the maximum mixed water temperature available from the TMV in misadjustment, product failure or product tampering mode is 98°F

TMV shall be capable of meeting the requirements of ANSI Standard Z358.1-1998 sections 4.1, 4.6.6, 5.4.6, 7.1.4, 7.4.6, 8.1, 8.4.4 and 9.4.5.

TMV shall be supplied fully assembled and pressure-tested, with outlet stop valve enclosed in an 18" x 24" x 8" stainless steel recessed cabinet with a 2" flange. Cabinet shall have a polished stainless steel piano-hinged door with keyed cylinder lock.

Please select option.

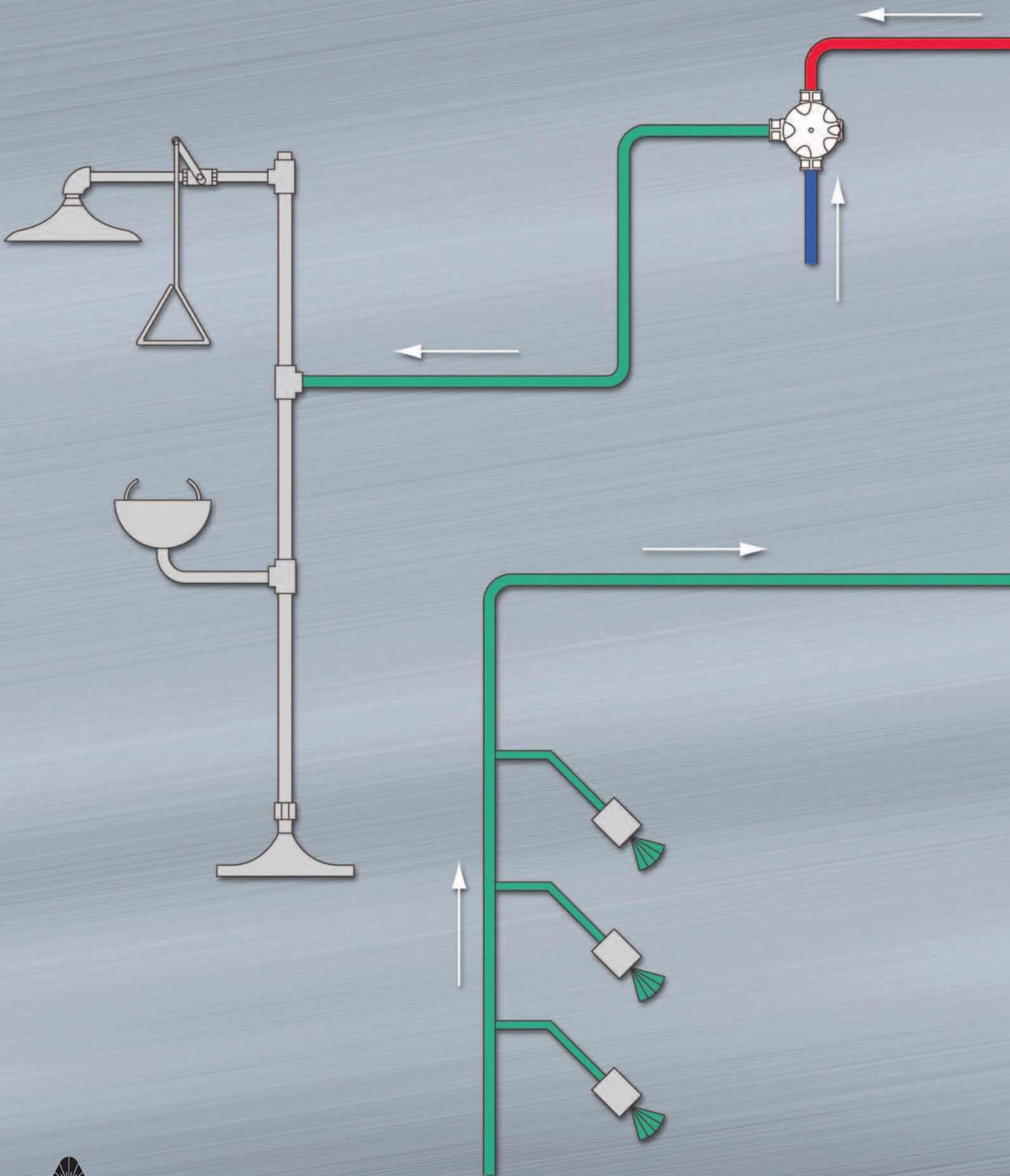
- Cabinet shall be supplied with 1" NPT top inlets and a 3/4" NPT top outlet (standard).
- Cabinet shall be supplied with 1" NPT top inlets and a 3/4" NPT bottom outlet (TB).
- Cabinet shall be supplied with 1" NPT bottom inlets and a 3/4" NPT bottom outlet (BB).
- Cabinet shall be supplied with 1" NPT bottom inlets and a 3/4" NPT top outlet (BT).

Please use suffix SMC where appropriate to call out Surface Mounted Cabinet.

All as Rada Z358-40-FMC supplied by Armstrong International Inc., Three Rivers, MI, or otherwise approved equal.

Inside Back Cover

Blank



Hot Water Group

221 Armstrong Blvd., P.O. Box 408, Three Rivers, MI 49093 – USA Phone: (269) 279-3602 Fax: (269) 279-3130