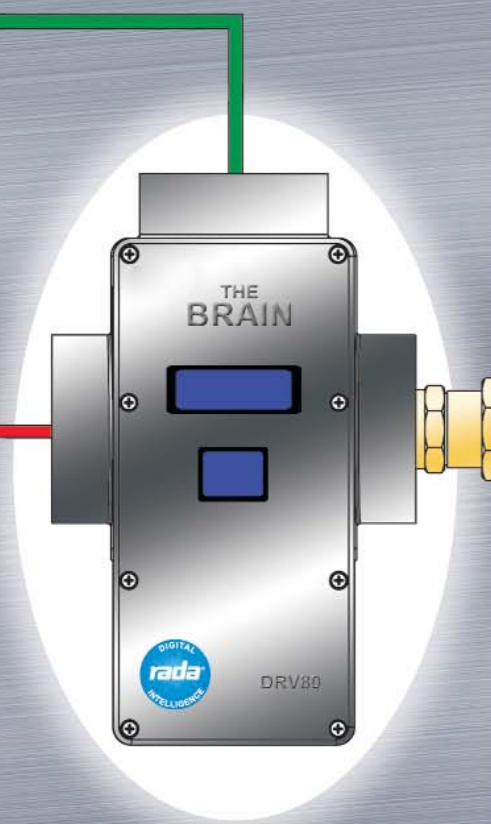


## Thermostatic, Electronic and Digital Water Temperature Control Solutions



# Armstrong



**Armstrong**



Armstrong offers both a complete system and a modular component solution to mixed water temperature control across the entire Institutional and Industrial hot water distribution network.

From mechanical room based digital recirculation system control with integral BAS interface to traditional thermostatic control at distribution points within the system to revolutionary digital point of use control solutions, Armstrong products place user safety and legionella risk reduction at the forefront of hot water system design operation and maintenance.

Armstrong defines its range of mixed water temperature controls within the following classifications:

- **Water Temperature Control-Single Point of Use-Thermostatic**
- **Water Temperature Control-Single Point of Use-Digital**
- **Water Temperature Control-Groups of Fixtures-Thermostatic**
- **Water Temperature Control-Recirculation Systems-Thermostatic**
- **Water Temperature Control-Recirculation Systems-Electronic**
- **Water Temperature Control-Recirculation Systems-Digital**
- **Water Temperature Control-Emergency Fixtures-Thermostatic**

Individual product data sheets, written specifications, certified submittal drawings, IOM guides, online installation site tours and other product and system support information and documentation can be located at Armstrong's web site. Please visit [www.armstronginternational.com](http://www.armstronginternational.com).

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## Armstrong® Water Temperature Control - Single Point of Use

### Thermostatic



- Thermal Shutdown Mode
- +/- 2°F Temperature Stability to fixture (Rada 215)
- Maximum Temperature Limit Stop
- Maximum Temperature Locking Feature
- Single “sealed for life” Replacement Cartridge (Rada 215)



# Water Temperature Control - Single Point of Use

## Thermostatic

Water Temperature Control - Single Point of Use - Thermostatic, features thermostatic mixing valves which are designed specifically for installation at or near the final point of use.

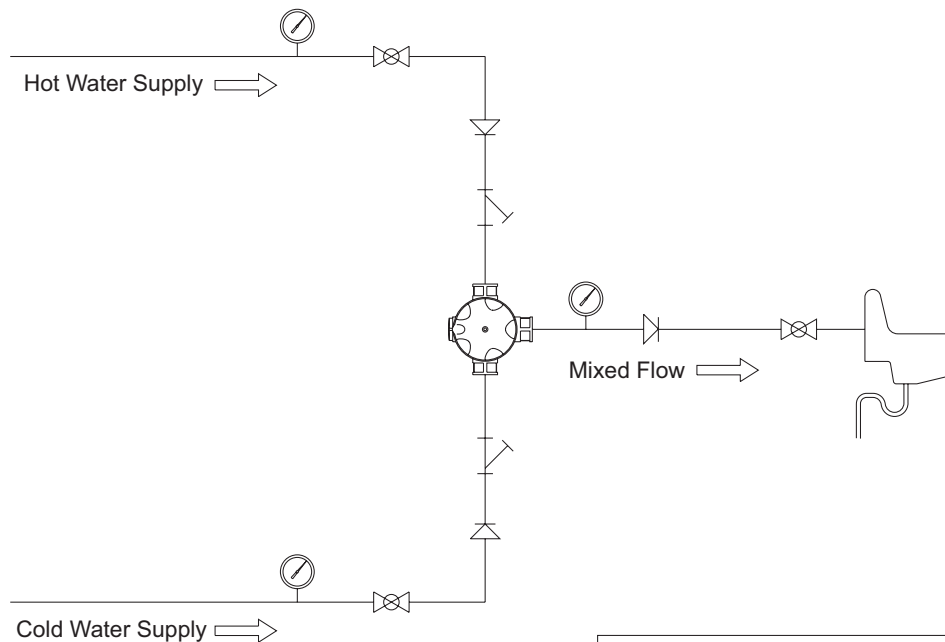
The range has been designed to offer accurate temperature control in installations where there are diverse flow requirements between .5 and 11 gpm (1.9 and 41.6 lpm).

## 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.

Technical data sheets on the individual Rada Thermostatic Mixing Valves for Single Point of Use applications can be found on pages 6-7.

Rada Thermostatic Mixing Valves (gpm)												
Model	Pressure Drop (psi)										Min. Flow	C <sub>v</sub>
	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



System Layout	
	Thermometer
	Isolation Valve
	Sink
	Check Valve
	Strainer



# Water Temperature Control - Single Point of Use

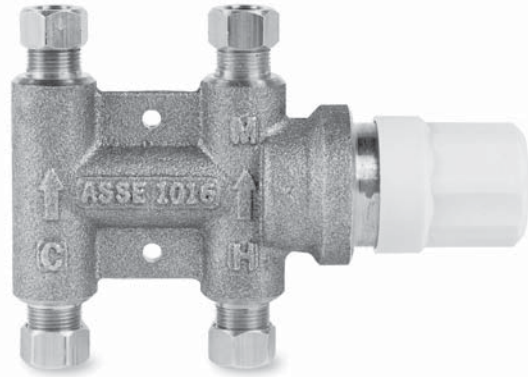
## Thermostatic

### Rada 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, Rada 110 has been "value engineered" so that retrofit installations to bring existing sites up to ASSE standards can be accomplished without prohibitive expenditure.

Rada 110 is recommended for single lavatory control. Rada 215 (page 7) can also be used if group control of lavatories meets the installation and budgetary requirements of the site.



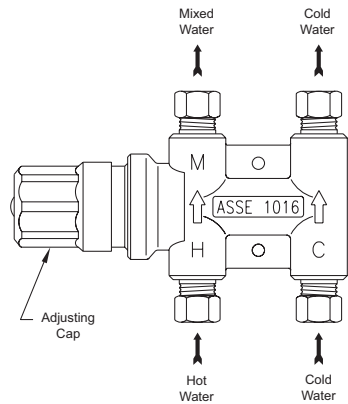
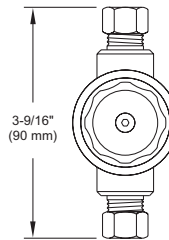
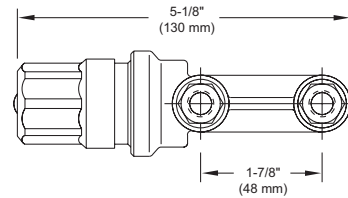
### Operational Specifications

- Typical outlet temperature control +/- 3°F
- Adjustable maximum temperature lock
- Tamper resistant locking cap

### Technical Specifications

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

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



Rada Thermostatic Mixing Valves (gpm)												
Model	Pressure Drop (psi)										Min. Flow	C <sub>v</sub>
	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

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



# Water Temperature Control - Single Point of Use

## Thermostatic

### Rada 215

Rada Thermostatic Mixing Valve of "sealed for life" replaceable cartridge construction. Compact design is ideally suited for use at or near the final point of use to deliver a pre designated mixed water temperature to either a single or a small "group" of lavatories.

Rada 215 is also ideal for 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 diverse flow rates between 1 gpm (3.8 lpm) and 12 gpm (45 lpm). 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.



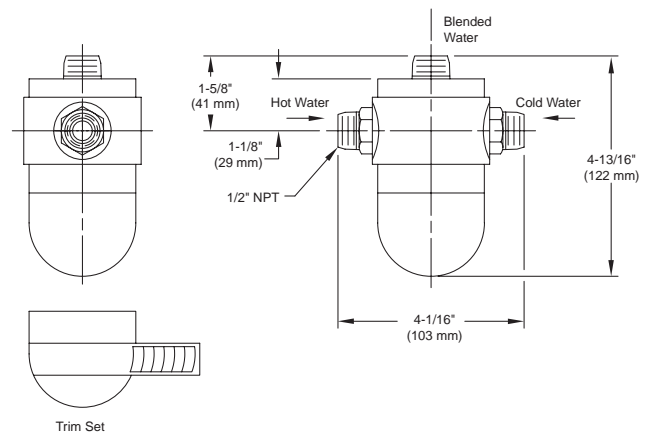
### Operational Specifications

- Typical outlet temperature control +/-2°F
- Adjustable maximum temperature limit stop
- Adjustable single temperature lockout
- Thermal shutdown mode upon inlet supply failure

### Technical Specifications

- 1/2" (15 mm) NPT inlets and 1/2" (15 mm) NPT outlet
- Chrome plated DZR brass/stainless alloy/polymer construction
- Operating pressures
  - Maximum: 150 psi (10 bar)
  - Minimum: 10 psi (.7 bar)
- Integral inlet check valves and strainers
- ASSE 1016 submitted
- Shipping weight 10 lbs (4.5 kg)

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



Rada Thermostatic Mixing Valves (gpm)												
Model	Pressure Drop (psi)										Min. Flow	C <sub>v</sub>
	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

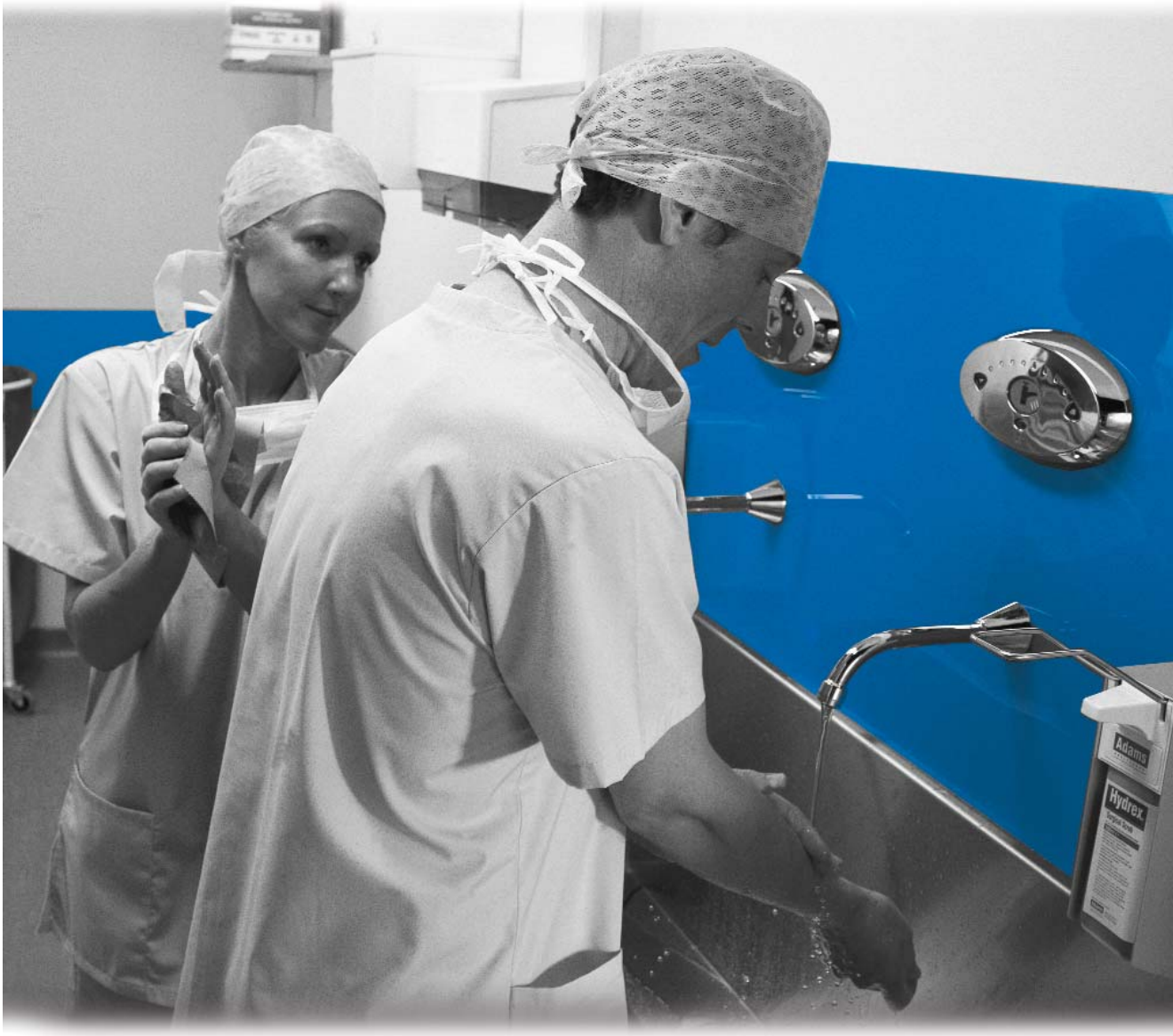
All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.



# Armstrong® Water Temperature Control - Single Point of Use



## Digital



### Digital Mixing Valve

- Precision Digital Water Temperature Control
- Remotely Located
- Plug-in design simplifies installation
- Automatically adjusts if supply pressures change
- Automatically adjusts if supply temperatures change
- Intelligent Fault Diagnosis System
- 5-Year Warranty
- ASSE 1016 approved

### Digital Control Panel

- No Touch On/Off
- Programmable "On" Temperature Set Point
- Programmable Timed Flow
- No Touch Temperature Adjustment
- Programmable User Adjustment Range
- LED Display Feedback
- User Activity Data Logging/Reporting
- Service Information, Logging/Reporting
- Service Flush Program
- Thermal Disinfection Program
- Promotes compliance with OSHA, CDC and NYDOH Legionella Guidelines





# Water Temperature Control - Single Point of Use

## Digital

Water Temperature Control - Single Point of Use - Digital features BrainWave™. BrainWave™ is a series of 4 individual point of use digital mixing valves designed for installation at the point of use to allow user control of water temperature and flow.

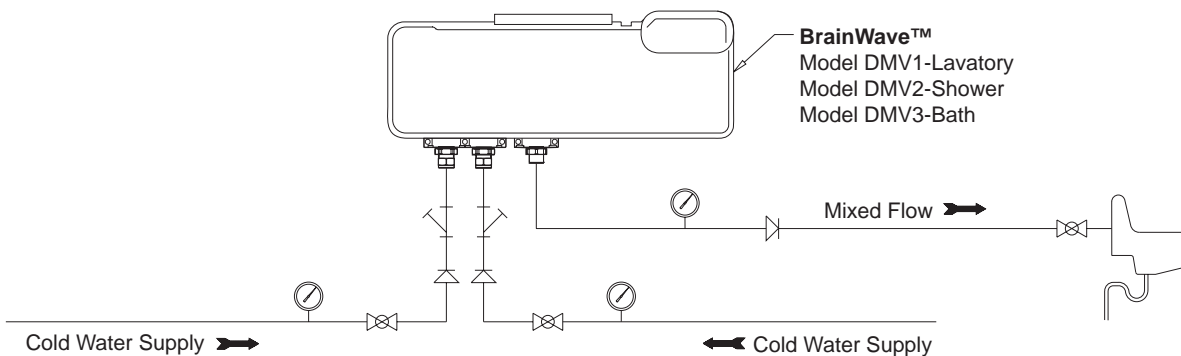
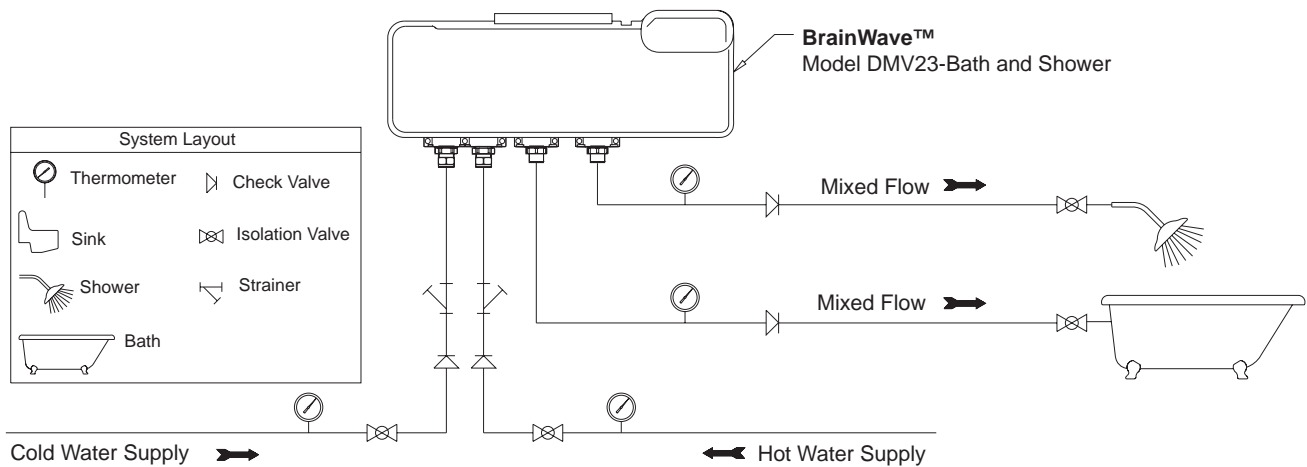
The range has been designed to offer individual lavatory, individual shower, individual bath fill and individual bath/shower combination digital flow and temperature control primarily in healthcare installations where user safety and legionella risk reduction is paramount.

## Sizing

Each BrainWave™ is designed for an individual single point of use and has a suitable maximum and minimum flow capacity.

Technical data sheets on the individual BrainWave™ Digital Mixing Valves can be found on Pages 10-17.

Model	Pressure Drop (psi)										Min. Flow	Max.* Flow	C <sub>v</sub>
	5	10	15	20	25	30	35	40	45	50			
DMV1	3	4	5	6	6	7	7	8	9	9	1	7*	1.2
DMV2													
DMV3	6	8	10	11	12	14	15	16	17	18	1.6	16*	2.5
DMV23													





# Water Temperature Control - Single Point of Use



## Digital

### BrainWave™ Model DMV1

Concealed electronic mixing valve with surface mount control panel for lavatory flow and +/-2°F (+/-1°C) temperature control.

### Operational Specifications

- Programmable timed flow
- No touch on/off flow control
- No touch temperature adjustment
- Programmable minimum/maximum temperature access limits
- Programmable service flush
- Programmable thermal disinfection mode
- Data logging capabilities



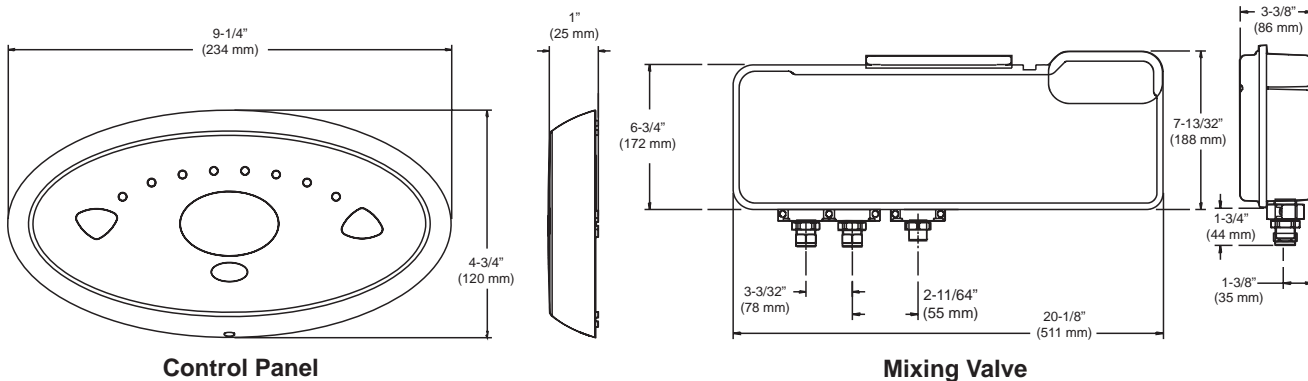
### BrainWave™ Model DMV1

Concealed electronic mixing valve for lavatories offering programmable maximum, minimum and default temperatures, service flush and thermal disinfection with data logging capabilities.

Supplied complete with programmable software via PDA, power supply, check valves and strainers. Wall mounted control panel offering infra-red no-touch controls for flow and temperature adjustment and programmable timed flow control.



For a fully detailed certified drawing, refer to CDLW #1147.



BrainWave™ Digital Mixing Valves													
Model	Pressure Drop (psi)										Min. Flow	Max.* Flow	C <sub>v</sub>
	5	10	15	20	25	30	35	40	45	50			
DMV1	3	4	5	6	6	7	7	8	9	9	1	7*	1.2
DMV2													
DMV3	6	8	10	11	12	14	15	16	17	18	1.6	16*	2.5
DMV23													

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



# Water Temperature Control - Single Point of Use

## Digital

### BrainWave™ Model DMV1-Lavatory

#### Technical Specifications

##### Connections

- Inlet and outlet connections: 1/2" NPT

##### Materials

- Control panel cover: Chrome ABS or optional stainless steel
- Mixing unit enclosure: PC/ABS
- Integral components: DZR brass stainless steel and engineering plastic

##### Temperatures

- Factory pre-set:
  - Min 86°F (30°C), Max 106°F (41°C)
  - Default 100°F (38°C)
- Programmable range:
  - Min 86°F - 117°F (30°C - 47°C),
  - Max 91°F - 122°F (33°C - 50°C),
  - Default 86°F - 122°F (30°C - 50°C)
  - Full cold can also be selected
- Minimum blend temperature differential from hot supply: 5°F (2°C)
- Optimum thermostatic control range: 86°F - 122°F (30°C - 50°C)
- Inlet Cold water range (recommended): 34°F - 68°F (1°C - 20°C)
- Inlet Hot water range (recommended): 122°F - 149°F (50°C - 65°C )  
185°F (85°C) during disinfection

##### Performance

- Thermal shutdown upon inlet supply failure
- +/- 2°F (+/- 1°C) delivery temperature stability
- Minimum flow rate at recommended supply conditions:
  - 1 GPM (4 LPM) at <72 psi maintained pressure
  - 1.6 GPM (6 LPM) at >72 psi maintained pressure.

##### Thermal Disinfection

- Factory Settings
  - Min. Temperature: 140°F (60°C)
  - Min. Time: 5 minutes
- Programmable Range
  - Min. Temperature: 140 - 185°F (60 - 85°C)
  - Min. Time: 0 - 50 minutes

Reduced water flow during disinfection can be selected.

##### Environment

- Ambient temperature: 34°F - 104°F (1°C - 40°C)
- Maximum relative humidity: 95% non-condensing

##### Pressures

- Maximum static pressure: 145 psi (10 bar)
- Maximum inlet supply pressure differential: 3:1 (equal inlet pressure recommended)

##### IP Rating

- Control panel: IP45
- Overall valve enclosure: IP24
- Electronics compartment: IP45
- PSU: IP45

##### Electrical

- Supply Voltage: 120V 50-60Hz
- Maximum load: 20W at 12V DC
- Control panel cable length: 10 ft. (3m) supplied
- Maximum distance 20 ft. (6m)

##### Times - Factory settings

- Flow time: 15 seconds
- Service flush cycle: 2 minutes
- Service flush waiting period: 12 hours

##### Programmable range

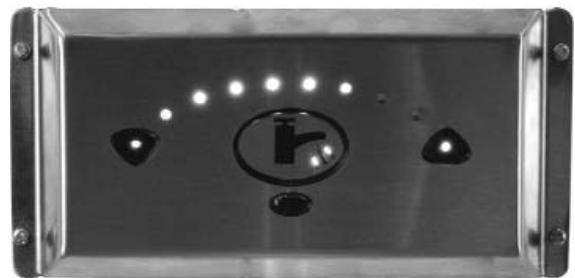
- Flow time: 5 seconds - 60 minutes
- Service flush cycle: 1 minute - 59 minutes
- Service flush waiting period: 1 hour - 983 hours

##### Operation

- Temperature selector: Full no-touch temperature control
- Flow control: No-touch on/off - timed flow

##### Approvals

- ASSE 1016, CSA, UL



Optional Stainless Steel Control Panel



# Water Temperature Control - Single Point of Use



## Digital

### BrainWave™ Model DMV2

Concealed electronic mixing valve with surface mount control panel for **individual shower** flow and +/-2°F (+/-1°C) temperature control.

### Operational Specifications

- Programmable timed flow
- No touch on/off flow control
- No touch temperature adjustment
- Programmable minimum/maximum temperature access limits
- Programmable service flush
- Programmable thermal disinfection mode
- Data logging capabilities



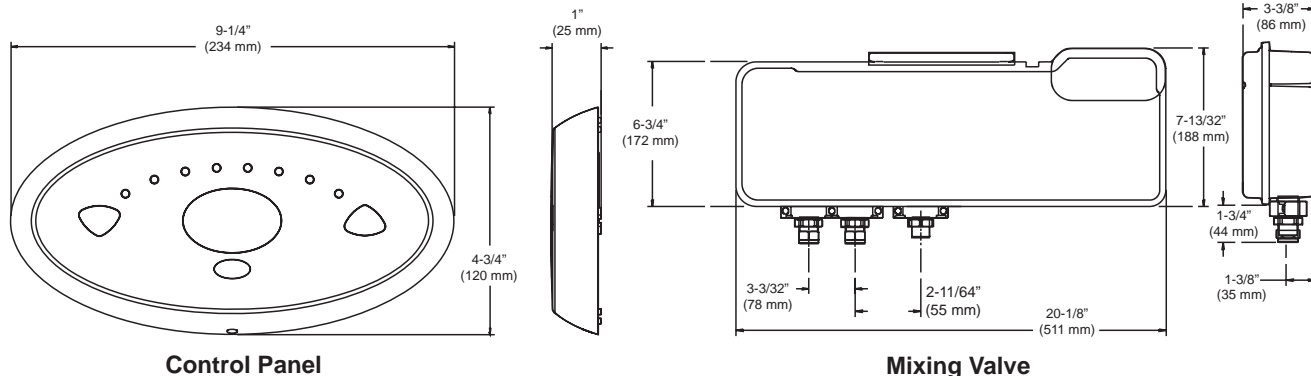
### BrainWave™ Model DMV2-Individual Shower

Concealed electronic mixing valve for showers offering programmable maximum, minimum and default temperatures, service flush and thermal disinfection with data logging capabilities.

Supplied complete with programmable software via PDA, power supply, check valves and strainers. Wall mounted control panel offering infra-red no-touch controls for flow and temperature adjustment and programmable timed flow control.



For a fully detailed certified drawing, refer to CDLW #1148.



BrainWave™ Digital Mixing Valves													
Model	Pressure Drop (psi)										Min. Flow	Max.* Flow	C <sub>v</sub>
	5	10	15	20	25	30	35	40	45	50			
DMV1	3	4	5	6	6	7	7	8	9	9	1	7*	1.2
DMV2	6	8	10	11	12	14	15	16	17	18	1.6	16*	2.5
DMV3													
DMV23													

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



# Water Temperature Control - Single Point of Use

## Digital

### BrainWave™ Model DMV2-Individual Shower

#### Technical Specifications

##### Connections

- Inlet and outlet connections: 1/2" NPT

##### Materials

- Control panel cover: Chrome ABS or optional stainless steel
- Mixing unit enclosure: PC/ABS
- Integral components: DZR brass stainless steel and engineering plastic

##### Temperatures

- Factory pre-set:
  - Min 86°F (30°C), Max 106°F (41°C),
  - Default 100°F (38°C)
- Programmable range:
  - Min 86°F - 117°F (30°C - 47°C),
  - Max 91°F - 122°F (33°C - 50°C),
  - Default 86°F - 122°F (30°C - 50°C)
  - Full cold can also be selected
- Minimum blend temperature differential from hot supply: 5°F (2°C)
- Optimum thermostatic control range: 86°F - 122°F (30°C - 50°C)
- Inlet Cold water range (recommended): 34°F - 68°F (1°C - 20°C)
- Inlet Hot water range (recommended): 122°F - 149°F (50°C - 65°C )  
185°F (85°C) during disinfection

##### Performance

- Thermal shutdown upon inlet supply failure
- +/- 2°F (+/- 1°C) delivery temperature stability
- Minimum flow rate at recommended supply conditions:
  - 1 GPM (4 LPM) at <72 psi maintained pressure
  - 1.6 GPM (6 LPM) at >72 psi maintained pressure.

##### Thermal Disinfection

- Factory Settings
  - Min. Temperature: 140°F (60°C)
  - Min. Time: 5 minutes
- Programmable Range
  - Min. Temperature: 140 - 185°F (60 - 85°C)
  - Min. Time: 0 - 50 minutes
  - Reduced water flow during disinfection can be selected.

##### Environment

- Ambient temperature: 34°F - 104°F (1°C - 40°C)
- Maximum relative humidity: 95% non-condensing

##### Pressures

- Maximum static pressure: 145 psi (10 bar)
- Maximum inlet supply pressure differential: 3:1 (equal inlet pressure recommended)

##### IP Rating

- Control panel: IP45
- Overall valve enclosure: IP24
- Electronics compartment: IP45
- PSU: IP45

##### Electrical

- Supply Voltage: 120V 50-60Hz
- Maximum load: 20W at 12V DC
- Control panel cable length: 10 ft. (3m) supplied
- Maximum distance 20 ft. (6m)

##### Times - Factory settings

- Flow time: 15 seconds
- Service flush cycle: 2 minutes
- Service flush waiting period: 12 hours

##### Programmable range

- Flow time: 5 seconds - 60 minutes
- Service flush cycle: 1 minute - 59 minutes
- Service flush waiting period: 1 hour - 983 hours

##### Operation

- Temperature selector: Full no-touch temperature control
- Flow control: No-touch on/off - timed flow

##### Approvals

- ASSE 1016, CSA, UL



Optional Stainless Steel Control Panel

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



# Water Temperature Control - Single Point of Use



## Digital

### BrainWave™ Model DMV3-Individual Bath

Concealed electronic mixing valve with surface mount control panel for **individual bath** fill and +/-2°F (+/-1°C) temperature control.

### Operational Specifications

- Programmable timed flow
- No touch on/off flow control
- No touch temperature adjustment
- Programmable minimum/maximum temperature access limits
- Programmable service flush
- Programmable thermal disinfection mode
- Data logging capabilities



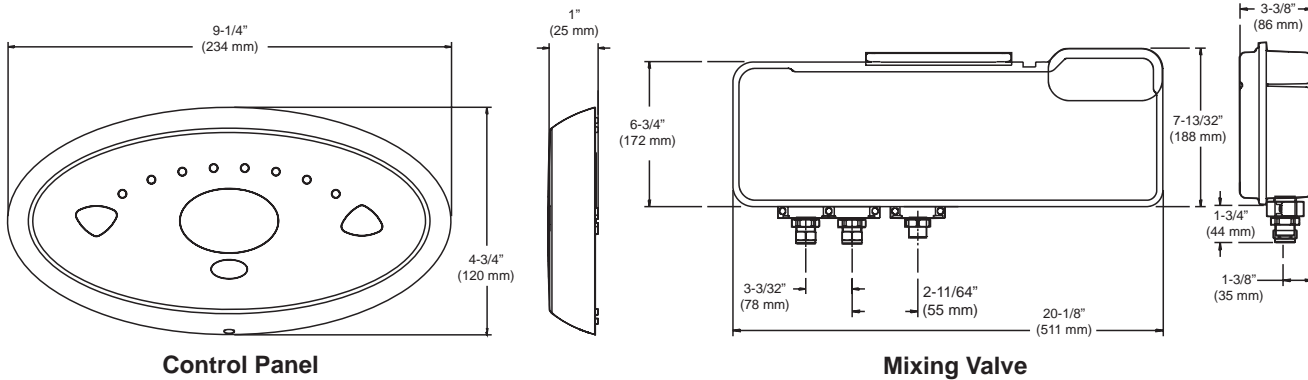
### BrainWave™ Model DMV3

Concealed electronic mixing valve for higher flow bath/tub filling applications offering programmable maximum, minimum and default temperatures, service flush and thermal disinfection with data logging capabilities.

Supplied complete with programmable software via PDA, power supply, check valves and strainers. Wall mounted control panel offering infra-red no-touch controls for flow and temperature adjustment and programmable timed flow control.



For a fully detailed certified drawing, refer to CDLW #1149.



BrainWave™ Digital Mixing Valves													
Model	Pressure Drop (psi)										Min. Flow	Max.* Flow	C <sub>v</sub>
	5	10	15	20	25	30	35	40	45	50			
DMV1	3	4	5	6	6	7	7	8	9	9	1	7*	1.2
DMV2	3	4	5	6	6	7	7	8	9	9	1	7*	1.2
DMV3	6	8	10	11	12	14	15	16	17	18	1.6	16*	2.5
DMV23	6	8	10	11	12	14	15	16	17	18	1.6	16*	2.5

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



# Water Temperature Control - Single Point of Use

## Digital

### BrainWave Model DMV3-Individual Bath

#### Technical Specifications

##### Connections

- Inlet and outlet connections: 3/4" NPT

##### Materials

- Control panel cover: Chrome ABS or optional stainless steel
- Mixing unit enclosure: PC/ABS
- Integral components: DZR brass stainless steel and engineering plastic

##### Temperatures

- Factory pre-set:  
Min 86°F (30°C), Max 106°F (41°C),  
Default 104°F (40°C)
- Programmable range:  
Min 86°F - 117°F (30°C - 47°C),  
Max 91°F - 122°F (33°C - 50°C),  
Default 86°F - 122°F (30°C - 50°C)  
Full cold can also be selected
- Minimum blend temperature differential from hot supply:  
5°F (2°C)
- Optimum thermostatic control range:  
86°F - 122°F (30°C - 50°C)
- Inlet Cold water range (recommended):  
34°F - 68°F (1°C - 20°C)
- Inlet Hot water range (recommended):  
122°F - 149°F (50°C - 65°C )  
185°F (85°C) during disinfection

##### Performance

- Thermal shutdown upon inlet supply failure
- +/- 2°F (+/- 1°C) delivery temperature stability
- Minimum flow rate at recommended supply conditions:  
1.6 GPM (6 LPM) at <72 psi maintained pressure  
2 GPM (8 LPM) at >72 psi maintained pressure.

##### Thermal Disinfection

- Factory Settings  
Min. Temperature: 140°F (60°C)  
Min. Time: 5 minutes
- Programmable Range  
Min. Temperature: 140 - 185°F (60 - 85°C)  
Min. Time: 0 - 50 minutes  
Reduced water flow during disinfection can be selected.

##### Environment

- Ambient temperature: 34°F - 104°F (1°C - 40°C)
- Maximum relative humidity: 95% non-condensing

##### Pressures

- Maximum static pressure: 145 psi (10 bar)
- Maximum inlet supply pressure differential: 3:1

##### IP Rating

- Control panel: IP45
- Overall valve enclosure: IP24
- Electronics compartment: IP45
- PSU: IP45

##### Electrical

- Supply Voltage: 120V 50-60Hz
- Maximum load: 20W at 12V DC
- Control panel cable length: 10 ft. (3m) supplied
- Maximum distance 20 ft. (6m)

##### Times - Factory settings

- Flow time: 300 seconds
- Service flush cycle: 2 minutes
- Service flush waiting period: 12 hours

##### Programmable range

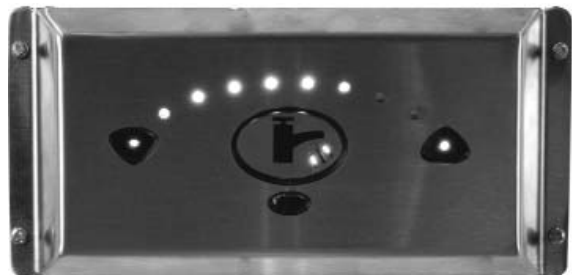
- Flow time: 5 seconds - 60 minutes
- Service flush cycle: 1 minute - 59 minutes
- Service flush waiting period: 1 hour - 983 hours

##### Operation

- Temperature selector: Full no-touch temperature control
- Flow control: No-touch on/off - timed flow

##### Approvals

- ASSE 1016, CSA, UL



Optional Stainless Steel Control Panel

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



# Water Temperature Control - Single Point of Use



## Digital

### BrainWave™ Model DMV23-Bath and Shower

Concealed electronic mixing valve with surface mount control panel for combination **bath and shower** flow and +/-2°F (+/-1°C) temperature control.

#### Operational Specifications

- Programmable timed flow
- No touch on/off flow control
- No touch temperature adjustment
- Programmable minimum/maximum temperature access limits
- Programmable service flush
- Programmable thermal disinfection mode
- Data logging capabilities



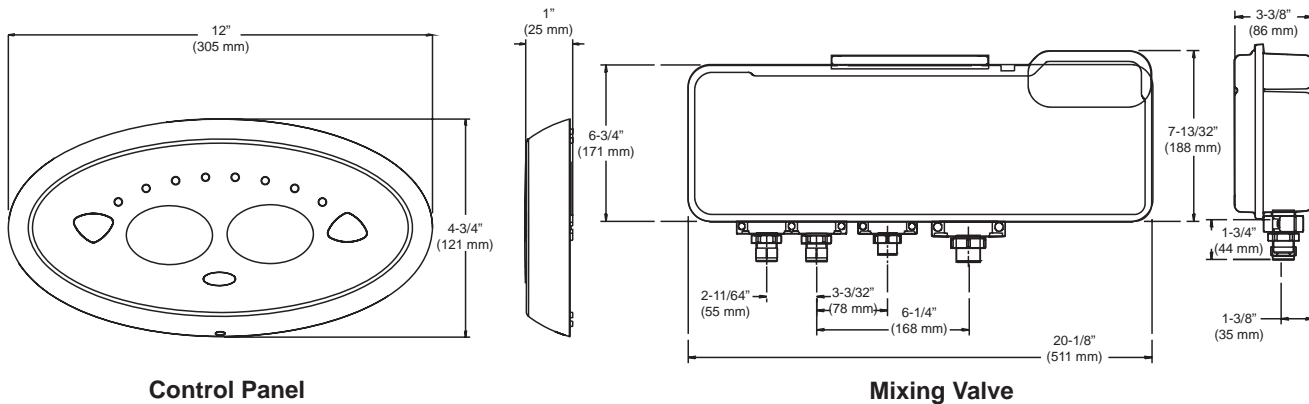
### BrainWave™ Model DMV23

Concealed electronic mixing valve for combination bathing and showering systems offering programmable maximum, minimum and default temperatures, service flush and thermal disinfection with data logging capabilities.

Supplied complete with programmable software via PDA, power supply, check valves and strainers. Wall mounted control panel offering infra-red no-touch controls for flow and temperature adjustment and programmable timed flow control.



For a fully detailed certified drawing, refer to CDLW #1150.



BrainWave™ Digital Mixing Valves													
Model	Pressure Drop (psi)										Min. Flow	Max.* Flow	C <sub>v</sub>
	5	10	15	20	25	30	35	40	45	50			
DMV1	3	4	5	6	6	7	7	8	9	9	1	7*	1.2
DMV2													
DMV3	6	8	10	11	12	14	15	16	17	18	1.6	16*	2.5
DMV23													

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





# Water Temperature Control - Single Point of Use

## Digital

### BrainWave™ Model DMV23-Bath and Shower

#### Technical Specifications

##### Connections

- Inlet connections: 3/4" NPT
- Outlet connection: Bath 3/4" NPT, Shower 1/2" NPT

##### Materials

- Control panel cover: Chrome ABS
- Mixing unit enclosure: PC/ABS
- Integral components: DZR brass stainless steel and engineering plastic

##### Temperatures

- Factory pre-set:
  - Shower:** Min 86°F (30°C), Max 106°F (41°C), Default 100°F (38°C)
  - Bath:** Min 86°F (30°C), Max 111°F (44°C), Default 104°F (40°C)
- Programmable range:
  - Min 86°F - 117°F (30°C - 47°C),
  - Max 91°F - 122°F (33°C - 50°C),
  - Default 86°F - 122°F (30°C - 50°C)
  - Full cold can also be selected
- Minimum blend temperature differential from hot supply: 5°F (2°C)
- Optimum thermostatic control range: 86°F - 122°F (30°C - 50°C)
- Inlet Cold water range (recommended): 34°F - 68°F (1°C - 20°C)
- Inlet Hot water range (recommended): 122°F - 149°F (50°C - 65°C )  
185°F (85°C) during disinfection

##### Performance

- Thermal shutdown upon inlet supply failure
- +/- 2°F (+/- 1°C) delivery temperature stability
- Minimum flow rate at recommended supply conditions: 1.6 GPM (6 LPM) at <72 psi maintained pressure  
2 GPM (8 LPM) at >72 psi maintained pressure.

##### Thermal Disinfection

- Factory Settings
  - Min. Temperature: 140°F (60°C)
  - Min. Time: 5 minutes
- Programmable Range
  - Min. Temperature: 140 - 185°F (60 - 85°C)
  - Min. Time: 0 - 50 minutes

Reduced water flow during disinfection can be selected.

##### Environment

- Ambient temperature: 34°F - 104°F (1°C - 40°C)
- Maximum relative humidity: 95% non-condensing

##### Pressures

- Maximum static pressure: 145 psi (10 bar)
- Maximum inlet supply pressure differential: 3:1 (equal inlet pressure recommended)

##### IP Rating

- Control panel: IP45
- Overall valve enclosure: IP24
- Electronics compartment: IP45
- PSU: IP45

##### Electrical

- Supply Voltage: 120V 50-60Hz
- Maximum load: 20W at 12V DC
- Control panel cable length: 10 ft. (3m) supplied
- Maximum distance 20 ft. (6m)

##### Times - Factory settings

- Flow time shower: 30 seconds
- Flow time bath: 300 seconds
- Service flush cycle: 2 minutes
- Service flush waiting period: 12 hours

##### Programmable range

- Flow time shower : 5 seconds - 60 minutes
- Flow time bath : 5 seconds - 60 minutes
- Duty flush cycle: 1 minute - 59 minutes
- Duty flush waiting period: 1 hour - 983 hours

##### Operation

- Temperature selector: Full no-touch temperature control
- Flow control: No-touch on/off - timed flow
- Independent bath and shower control

##### Approvals

- ASSE 1016, CSA, UL

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



## **Armstrong** Water Temperature Control - Groups of Fixtures

### Thermostatic



- Thermal Shutdown Mode
- Typical +/- 2°F Temperature Stability to fixture
- Accuracy at Low Flow Rates
- Maximum Temperature Locking Feature
- Single “sealed for life” Replacement Cartridge (Rada 320 and 425)



# Water Temperature Control - Groups of Fixtures

## Thermostatic

Water Temperature Control - Groups of Fixtures - Thermostatic features a series of 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.

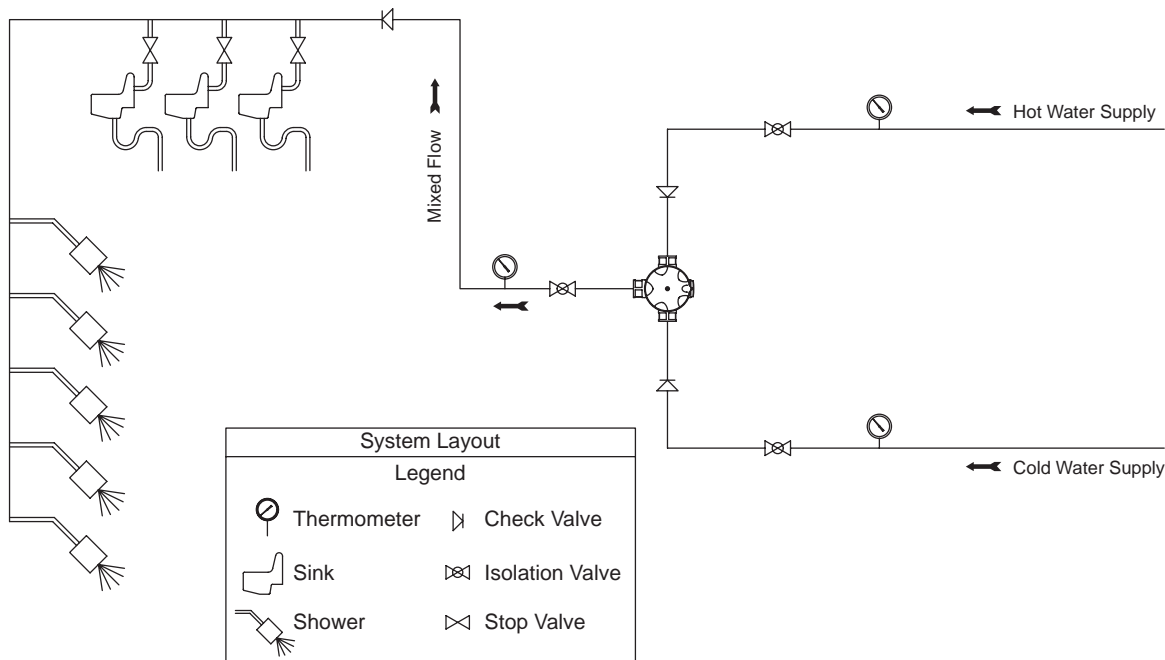
## Sizing

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.

Technical data sheets on the individual Rada mixing valves for group fixture control can be found on Pages 20-29.

Rada Thermostatic Mixing Valves (gpm)												
Model	Pressure Drop (psi)										Min. Flow	C <sub>v</sub>
	5	10	15	20	25	30	35	40	45	50		
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 <sub>v</sub>
	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





# Armstrong® Water Temperature Control - Groups of Fixtures

## Thermostatic

### 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 utility/mechanical room installation.

Complete operating mechanism of valve is enclosed in a durable polymer cartridge for ease of field maintenance. Powerful internal mechanism and non metallic wetted parts resist mineral deposition.

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

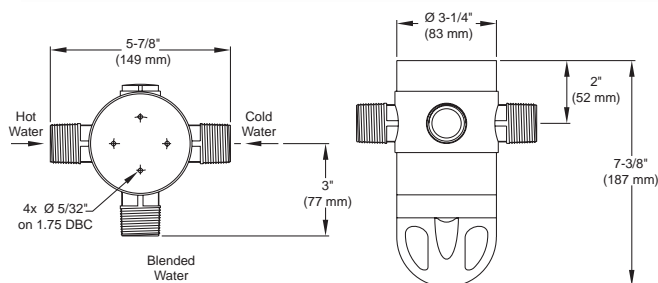


### Operational Specifications

- Dual thermostatic elements provide redundancy in the event of individual thermostat failure
- Typical outlet temperature control +/-2°F
- Adjustable maximum temperature limit stop
- Adjustable single temperature lockout
- Thermal shutdown mode upon inlet supply failure

### 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)
- Integral inlet check valves and strainers
- ASSE 1017 and CSA B125 certified
- Shipping weight 10 lbs (4.5 kg)



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

Rada Thermostatic Mixing Valves (gpm)												
Model	Pressure Drop (psi)										Min. Flow	C <sub>v</sub>
	5	10	15	20	25	30	35	40	45	50		
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.



# Water Temperature Control - Groups of Fixtures

## Thermostatic

### Rada 320D

A derivative assembly of the standard 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 utility/mechanical room installation.

Complete operating mechanism of valve is enclosed in durable polymer cartridge for ease of field maintenance. Powerful internal mechanism and non metallic wetted parts resist mineral deposition.

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

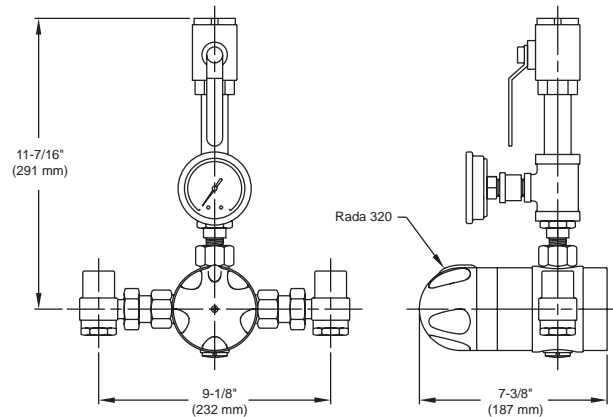
### Operational Specifications

- Dual thermostatic elements provide redundancy in the event of individual thermostat failure
- Typical outlet temperature control +/-2°F
- Adjustable maximum temperature limit stop
- Adjustable single temperature lockout
- Thermal shutdown mode upon inlet supply failure

### Technical Specifications

- 3/4" (20 mm) NPT inlets and 3/4" (20 mm) 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)
- Integral combination inlet check stop/union/strainers
- Outlet thermometer and outlet flow control valve
- ASSE 1017 and CSA B125 certified
- Shipping weight 10 lbs (4.5 kg)

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



Rada Thermostatic Mixing Valves (gpm)												
Model					Pressure Drop (psi)						Min. Flow	C <sub>v</sub>
	5	10	15	20	25	30	35	40	45	50		
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® Water Temperature Control - Groups of Fixtures

## Thermostatic

### 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-FMC is supplied as standard\* fully assembled and pressure tested in an 26" x 30" x 10" 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 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

\*Note cabinet options under technical specifications.



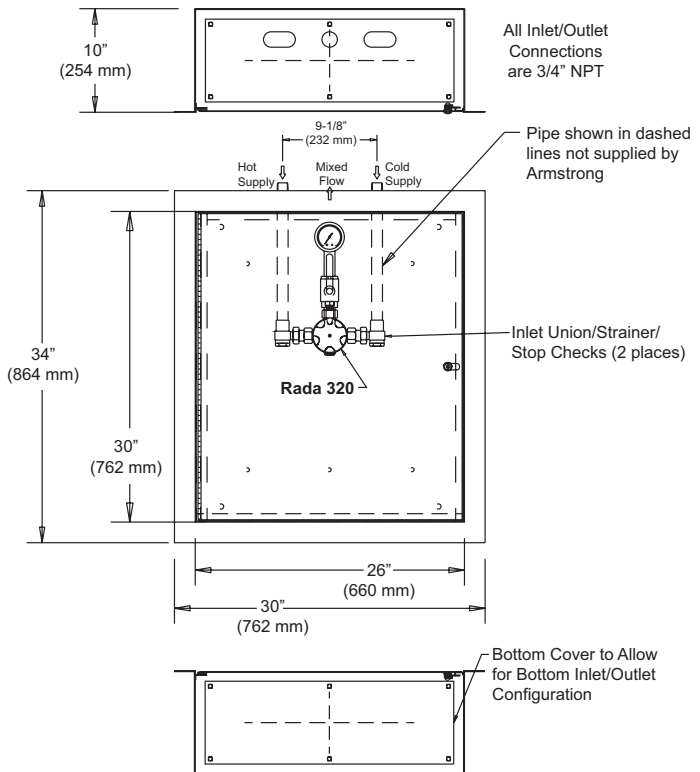
## Technical Specifications

- 3/4" NPT (20 mm) inlets and 3/4" NPT (20 mm) outlet
- Cabinet construction: 18 gauge #4 finish stainless steel
- Cabinet options:
  - Premium: Stainless steel 14 gauge #4 finish
  - Baked Enamel: White enameled steel 18 gauge
- Cabinet outer flange 2"
- Integral thermometer
- Integral check stop/strainer/unions
- Refer to Rada 320, page 9, for mixing valve operational and technical specifications.
- 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.



White enameled steel 18 gauge available upon request.



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.



# Water Temperature Control - Groups of Fixtures

## Thermostatic

### Rada 425

Rada 425 Thermostatic Mixing Valve for institutional group fixture water temperature control. Compact design and top and/or bottom blended water outlet make Rada 425 ideal for recessed enclosure, plumbing chase and utility/mechanical room installation.

Powerful internal mechanism and stainless steel operating mechanism resist mineral deposition.

Capable of close temperature control at diverse flow rates between 2 gpm (7.5 lpm) and 49 gpm (185 lpm). Able to blend to within 5°F (2°C) of either inlet supply due to "low seepage" across internal proportioning mechanism.

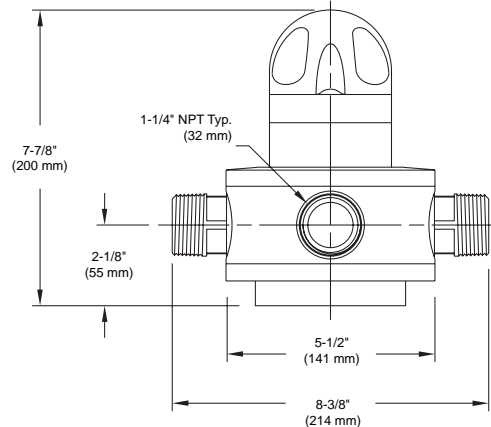
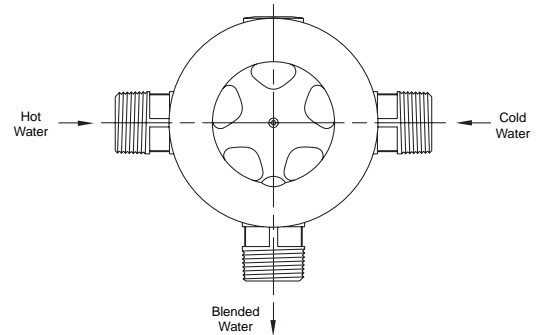
### Operational Specifications

- Dual thermostatic elements provide redundancy in the event of individual thermostat failure.
- Typical outlet temperature control +/-2°F
- Adjustable maximum temperature limit stop
- Adjustable single temperature lockout
- Thermal shutdown mode upon inlet supply failure

### Technical Specifications

- 1-1/4" NPT (32 mm) inlets and 1-1/4" (32 mm) outlet
- Chrome plated DZR brass/stainless steel
- Operating pressures
  - Maximum: 150 psi (10 bar)
  - Minimum: 10 psi (.7 bar)
- Integral inlet check valves and strainers
- ASSE 1017 and CSA B125 certified
- Shipping weight 18 lbs (8.1 kg)

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



Rada Thermostatic Mixing Valves (gpm)

Model	Pressure Drop (psi)										Min. Flow	C <sub>v</sub>
	5	10	15	20	25	30	35	40	45	50		
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.



# Water Temperature Control - Groups of Fixtures

## Thermostatic

### Rada 425D

A derivative of the standard Rada 425 Thermostatic Mixing Valve for institutional group fixture control. Compact design and top and/or bottom blended water outlet make Rada 425 ideal for recessed enclosure, plumbing chase and utility/mechanical room installation.

Powerful internal mechanism and stainless steel operating mechanism resist mineral deposition.

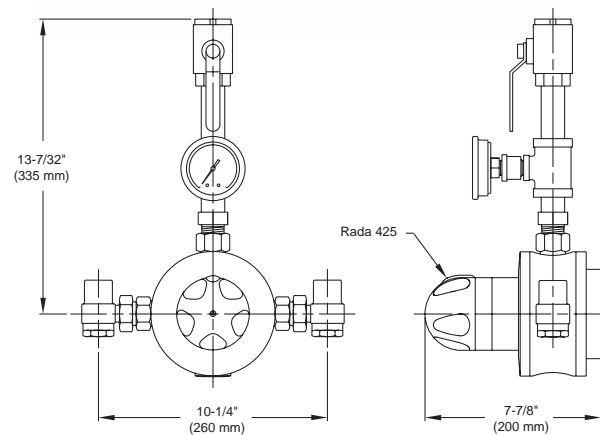
Capable of close temperature control at diverse flow rates between 2 gpm (7.5 lpm) and 49 gpm (185 lpm). Able to blend to within 5°F (2°C) of either inlet supply due to "low seepage" across internal proportioning mechanism.

### Operational Specifications

- Dual thermostatic elements provide redundancy in the event of individual thermostat failure
- Typical outlet temperature control +/-2°F
- Adjustable maximum temperature limit stop
- Adjustable single temperature lockout
- Thermal shutdown mode upon inlet supply failure

### Technical Specifications

- 1" (25 mm) NPT inlets and 1" (25 mm) NPT outlet
- Chrome plated DZR brass/stainless steel 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)
- Integral combination inlet check stop/union/strainers
- Outlet thermometer and outlet flow control
- ASSE 1017 and CSA B125 certified
- 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 <sub>v</sub>
	5	10	15	20	25	30	35	40	45	50		
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.





# Water Temperature Control - Groups of Fixtures

## Thermostatic

### 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-FMC is supplied as standard\* fully assembled and pressure tested in an 26" x 30" x 10" 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 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 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

\* Note cabinet options under technical specifications.

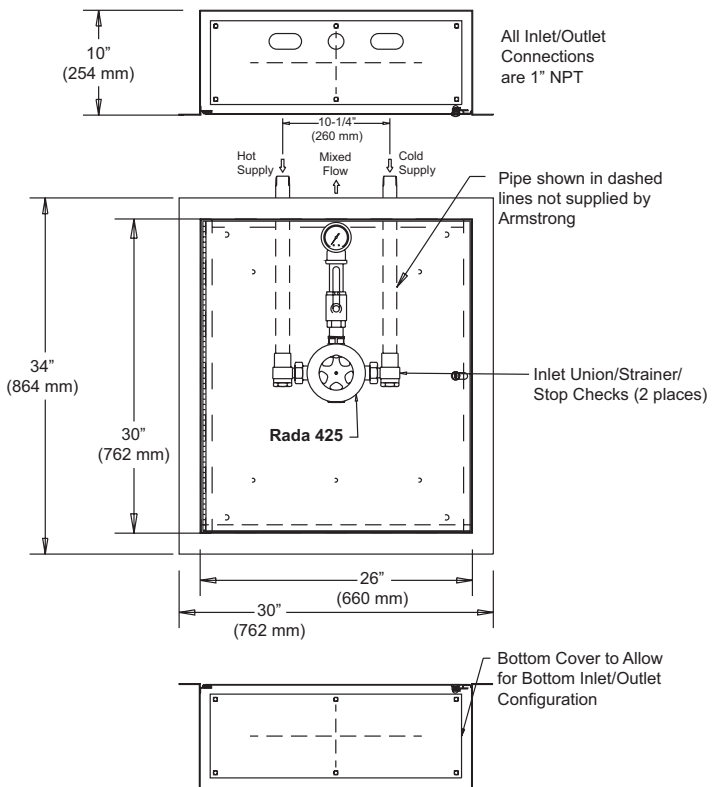
### Technical Specifications

- 1" NPT (25 mm) inlets and 1" NPT (25 mm) outlet
- Cabinet construction: 18 gauge #4 finish stainless steel
- Cabinet options:
  - Premium: Stainless steel 14 gauge #4 finish
  - Baked Enamel: White enameled steel 18 gauge
- Cabinet outer flange 2"
- Outlet stop valve
- Integral thermometer
- Integral check stop/strainer/unions
- Refer to Rada 425, page 23, for Mixing Valve operating and technical specifications
- 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.



White enameled steel 18 gauge available upon request.



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.



# Armstrong® Water Temperature Control - Groups of Fixtures

## Thermostatic

### Rada 40

Rada 40 Thermostatic Mixing Valve for institutional group fixture water temperature control when ASSE 1016 certified individual fixture controls are installed at each point of use

Rada 40 is also applicable for accurate water temperature control in single open outlet or "dead leg" multiple-point-of-use industrial process applications.

Capable of close outlet water temperature control at flow rates between 2 and 72 gpm (7.5 and 272 lpm) .

### Operating Specifications

- Dual thermostatic elements provide redundancy in the event of individual thermostat failure
- Typical outlet temperature control +/-2°F
- Adjustable Single Temperature lockout (removable key)
- Thermal shutdown mode upon inlet supply failure

\* 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.

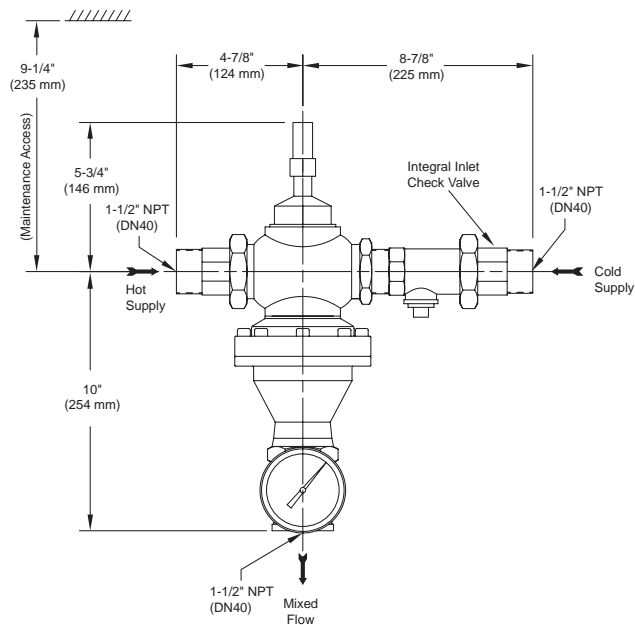
**IMPORTANT NOTE:** If Rada 40 is to be used for group fixture or zoned temperature control in institutional showering, bathing or hand washing, then ASSE 1016 certified individual fixture controls must be installed at each point of use.

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)
- Integral combination inlet check valves
- Integral thermometer
- ASSE 1017 and CSA B125 certified
- 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 <sub>v</sub>
	5	10	15	20	25	30	35	40	45	50		
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.



# Water Temperature Control - Groups of Fixtures

## Thermostatic

### Rada 40-FMC

Rada 40-FMC is supplied as standard\* fully assembled and pressure tested in an 26" x 30" x 10" stainless steel recessed cabinet with a 2" flange. Cabinet has a polished stainless steel piano-hinged door with a keyed cylinder lock.

Rada 40-FMC is supplied as standard under this model number for top inlet hot and cold water supplies and a bottom outlet with a left hand hinged door as indicated in adjacent drawing. Rada 40-FMC can be specified/ordered with the following piping configurations under the following model number:

Bottom inlets/top outlet 40-FMC-BT

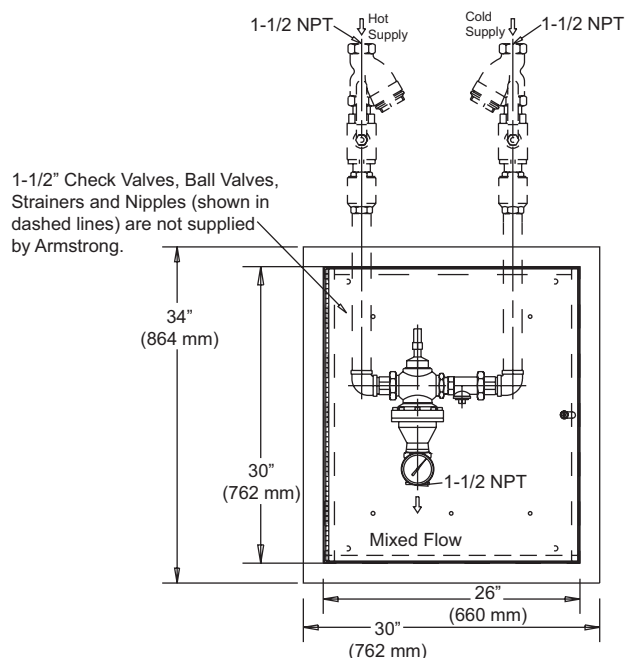
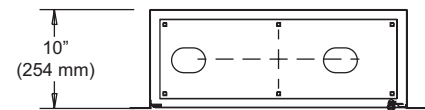
\* Note cabinet options under technical specifications.

### Technical Specifications

- 1-1/2" (40 mm) NPT inlets and 1-1/2" (40 mm) NPT outlet
- Cabinet construction: 18 gauge #4 finish stainless steel
- Cabinet options:
  - Premium: Stainless steel 14 gauge #4 finish
  - Baked Enamel: White enameled steel 18 gauge
- Cabinet outer flange 2"
- Integral thermometer
- Integral inlet check valves
- Refer to Rada 40, page 26, for mixing valve operational and technical specifications
- 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 40-SMC.

For a fully detailed certified drawing, refer to CDLW #1151.



White enameled steel 18 gauge available upon request.

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



# Water Temperature Control - Groups of Fixtures

## Thermostatic

### Rada 50

Rada 50 Thermostatic Mixing Valve for institutional group fixture water temperature control when ASSE 1016 certified individual fixture controls are installed at each point of use

Rada 50 is also applicable for accurate water temperature control in single open outlet or "dead leg" multiple-point-of-use industrial process applications. 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 19.

### Rada 50 Offers:

- Dual thermostatic elements provide redundancy in the event of individual thermostat failure
- Typical outlet temperature control +/-2°F
- Adjustable single temperature lockout (removable key)
- Thermal shutdown mode upon inlet supply failure

\* 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.

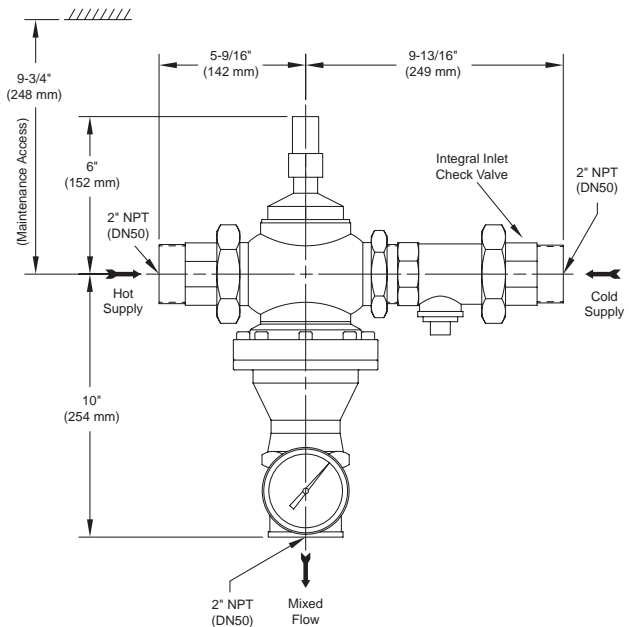
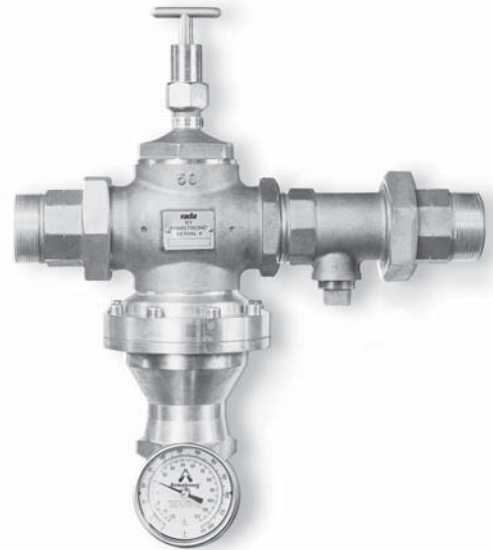
**IMPORTANT NOTE:** If Rada 50 is to be used for group fixture or zoned temperature control in institutional showering, bathing or hand washing, then ASSE 1016 certified individual fixture controls must be installed at each point of use.

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)
- Integral combination inlet check valves
- Integral thermometer
- ASSE 1017 and CSA B125 certified
- Shipping weight 30 lbs (13.5 kg)

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



Rada Thermostatic Mixing Valves (gpm)

Model	Pressure Drop (psi)										Min. Flow	C <sub>v</sub>
	5	10	15	20	25	30	35	40	45	50		
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.



# Water Temperature Control - Groups of Fixtures

## Thermostatic

### Rada 50-FMC

Rada 50-FMC is supplied as standard\* fully assembled and pressure tested in an 26" x 30" x 10" stainless steel recessed cabinet with a 2" flange. Cabinet has a polished stainless steel piano-hinged door with a keyed cylinder lock.

Rada 50-FMC is supplied as standard under this model number for top inlet hot and cold water supplies and a bottom outlet with a left hand hinged door as indicated in adjacent drawing. Rada 50-FMC can be specified/ordered with the following piping configurations under the following model numbers:

Bottom inlets/top outlet 50-FMC-BT

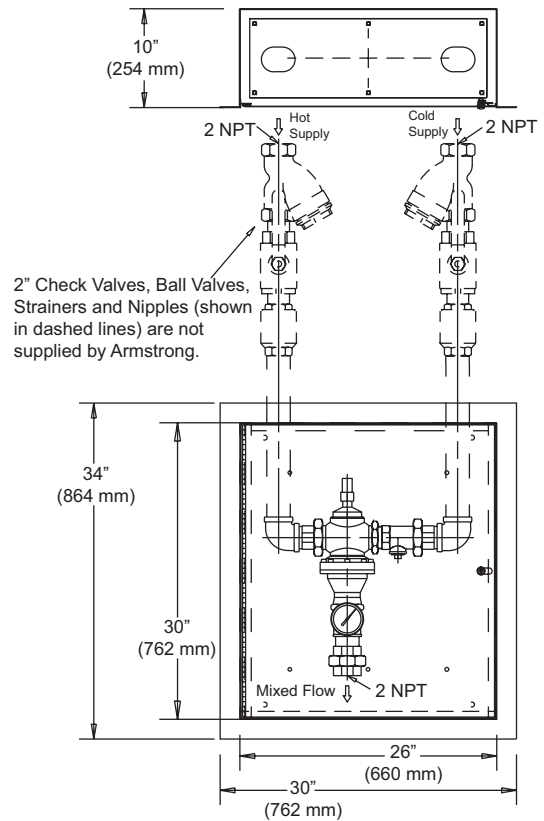
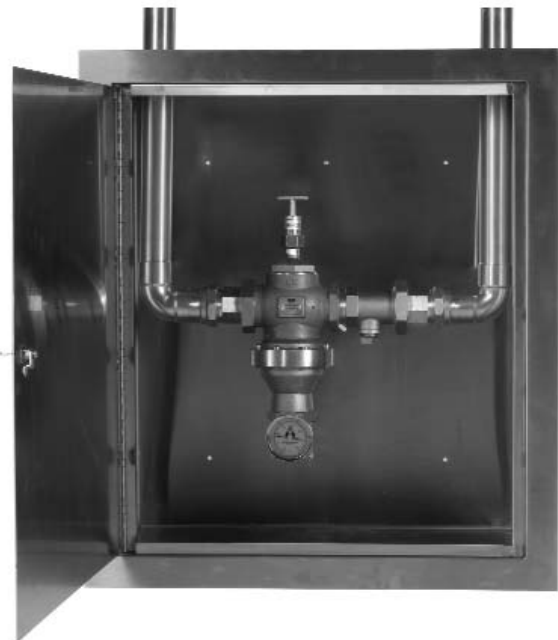
\* Note cabinet options under technical specifications.

### Technical Specifications

- 2" (50 mm) NPT inlets and 2" (50 mm) NPT outlet
- Cabinet construction: 18 gauge #4 finish stainless steel
- Cabinet options:
  - Premium: Stainless steel 14 gauge #4 finish
  - Baked Enamel: White enameled steel 18 gauge
- Cabinet outer flange 2"
- Integral thermometer
- Integral inlet check valves
- Refer to Rada 50, page 28, for mixing valve operational and technical specifications
- 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 50-SMC.

For a fully detailed certified drawing, refer to CDLW #1152.



White enameled steel 18 gauge available upon request.

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



## Armstrong® Water Temperature Control - Recirculation Systems

### Thermostatic



- +/- 5°F Temperature Stability to fixture (Return Limiter)
- Accuracy at Low Flow Rates
- Maximum Temperature Locking Feature
- Single Replacement Cartridge



# Water Temperature Control - Recirculation Systems

## Thermostatic

Water Temperature Control - Recirculation Systems - Thermostatic features four individual Thermostatic Mixing Valve assemblies and two packaged systems 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, 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.

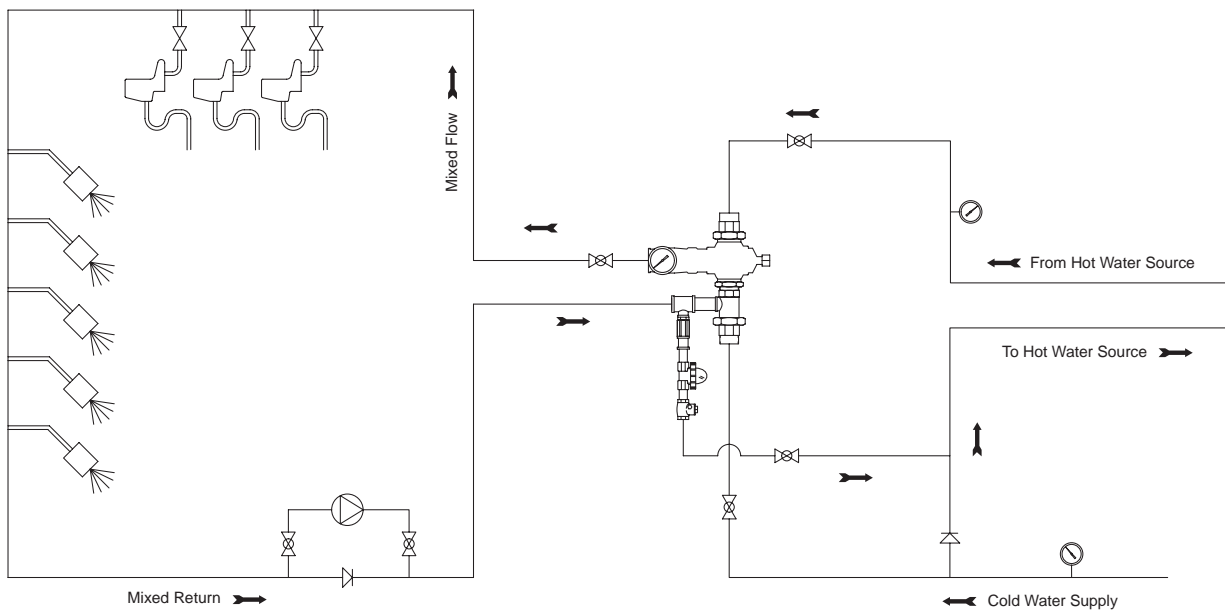
\* Consult factory for customized Rada packages for flow requirements in excess of 288 gpm (1,090 lpm).

**Rada Thermostatic Mixing Valves (gpm)**

Model	Pressure Drop (psi)				Min. System Draw-off	Maximum Flow @9'/sec.	C <sub>v</sub>
	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

**Rada Packages (gpm)**

Model	Pressure Drop (psi)				Min. System Draw-off	Maximum Flow @9'/sec.	C <sub>v</sub>
	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



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



# Water Temperature Control - Recirculation Systems

## 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.

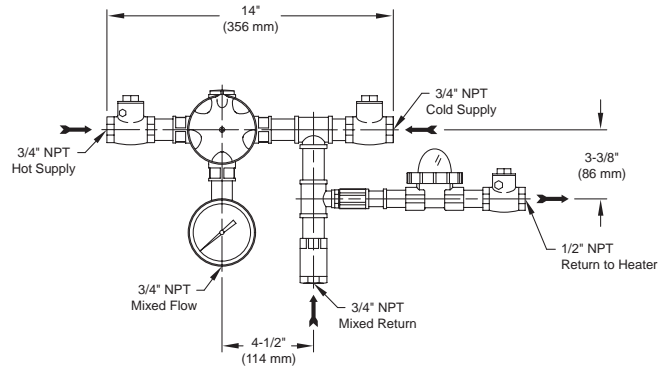


### Operational Specifications

- Dual thermostatic elements provide redundancy in the event of individual thermostat failure
- Typical system temperature control +/-5°F
- Adjustable maximum temperature limit stop
- Adjustable single temperature lockout

### 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)
- 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
- ASSE 1017 and CSA B125 certified
- 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 <sub>v</sub>
	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.





# Water Temperature Control - Recirculation Systems

## Thermostatic

### Rada 320R-FMC

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-FMC is supplied as standard\* fully assembled and pressure tested in an 26" x 30" x 10" stainless steel recessed cabinet with a 2" flange. Cabinet has a polished stainless steel piano-hinged door with a keyed cylinder lock.

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

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

\* Note cabinet options under technical specifications.

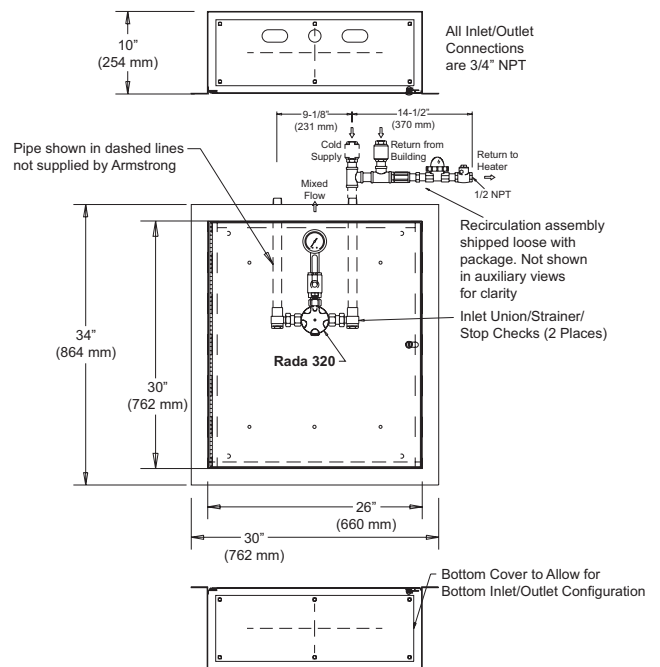
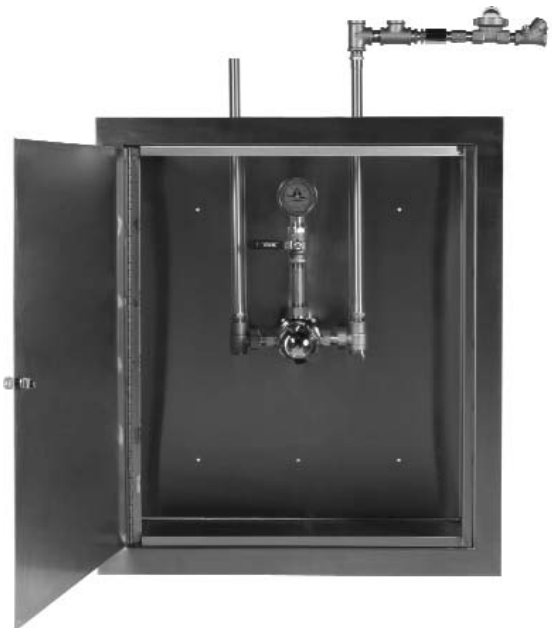
### Technical Specifications

- 3/4" NPT (20 mm) inlets and 3/4" NPT (20 mm) outlet
- Cabinet construction: 18 gauge #4 finish stainless steel
- Cabinet options:
  - Premium: Stainless steel 14 gauge #4 finish
  - Baked Enamel: White enameled steel 18 gauge
- Cabinet outer flange 2"
- Integral thermometer
- Integral check stop/strainer/unions
- Refer to Rada 320R, page 32, for mixing valve operational and technical specifications
- 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.



White enameled steel 18 gauge available upon request.



For a fully detailed certified drawing, refer to ODLW #1137.

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



# Water Temperature Control - Recirculation Systems

## 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.

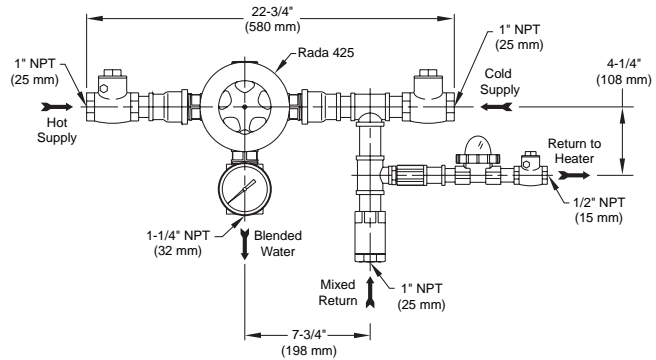


### Operational Specifications

- Dual thermostatic elements provide redundancy in the event of individual thermostat failure
- Typical system temperature control +/-5°F
- Adjustable maximum temperature limit stop
- Adjustable single temperature lockout

### Technical Specifications

- 1" NPT (25 mm) inlets and 1" (25 mm) outlet(s)
- Chrome-plated DZR brass/stainless steel construction
- Operating pressures
  - Maximum: 150 psi (10 bar)
  - Minimum: 10 psi (.7 bar)
- 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
- 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 <sub>v</sub>
	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.



## Water Temperature Control - Recirculation Systems

### Thermostatic

#### Rada 425R-FMC

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-FMC is supplied as standard\* fully assembled and pressure tested in an 26" x 30" x 10" stainless steel recessed cabinet with a 2" flange. Cabinet has a polished stainless steel piano-hinged door with a keyed cylinder lock.

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

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

\* Note cabinet options under technical specifications.

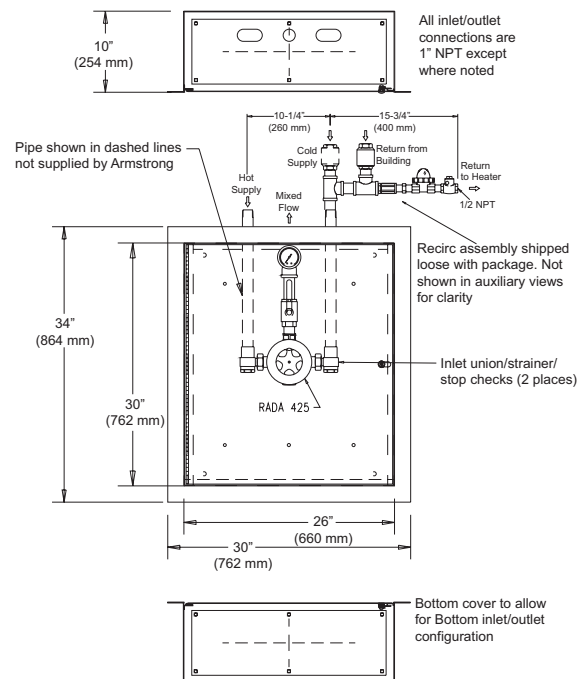
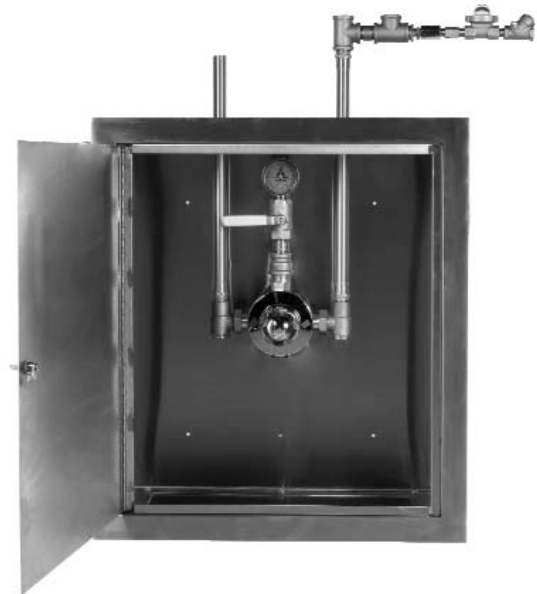
#### Technical Specifications

- 3/4" NPT (20 mm) inlets and 3/4" NPT (20 mm) outlet
- Cabinet construction: 18 gauge #4 finish stainless steel
- Cabinet options:
  - Premium: Stainless steel 14 gauge #4 finish
  - Baked Enamel: White enameled steel 18 gauge
- Cabinet outer flange 2"
- Integral thermometer
- Integral check stop/strainer/unions
- Refer to Rada 425R, page 34, for mixing valve operational and technical specifications
- 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 425R-SMC.



White enameled steel 18 gauge available upon request.



For a fully detailed certified drawing, refer to CDLW #1141.

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



# Water Temperature Control - Recirculation Systems

## Thermostatic

### Rada 40R

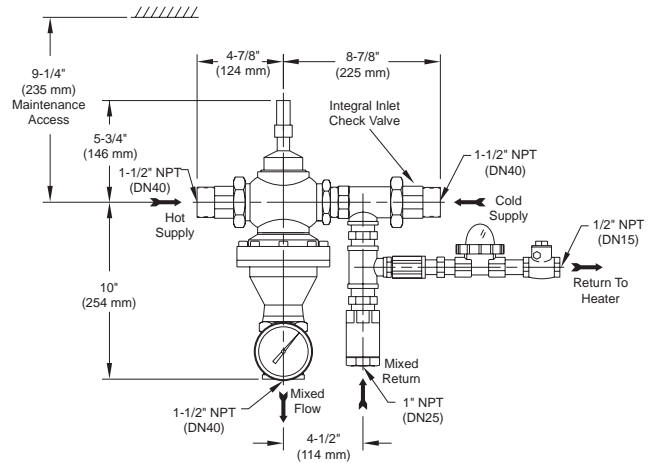
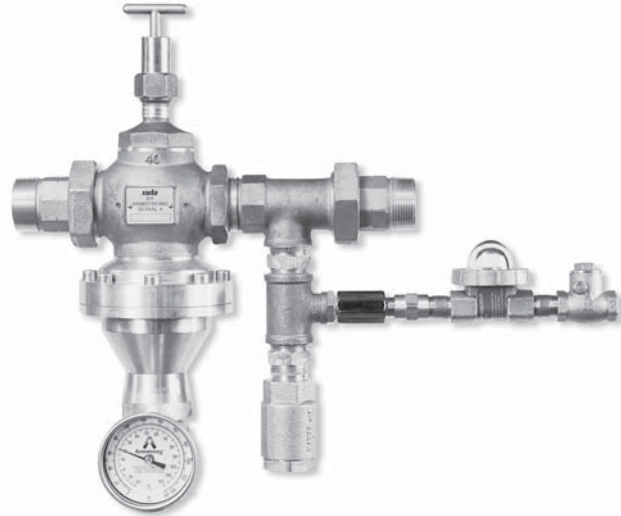
Rada Thermostatic Mixing Valve is designed specifically to be installed as the primary control valve within a pumped recirculation system. Capable of maintaining safe, accurate water temperatures during both peak and zero-demand "idling" periods. With a Rada 40R installed as the primary temperature controller 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.

### Operational Specifications

- Dual thermostatic elements provide redundancy in the event of individual thermostat failure
- Typical system temperature control +/-5°F
- Adjustable single temperature lockout (removable key)

### 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)
- Integral inlet check valves
- Integral thermometer
- Integral sight flow indicator
- Integral thermostatic return limiter
- ASSE 1017 and CSA B125 certified
- 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 <sub>v</sub>
	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.



# Water Temperature Control - Recirculation Systems

## Thermostatic

### Rada 40R-FMC

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.

Rada 40R-FMC is supplied as standard\* fully assembled and pressure tested in an 26" x 30" x 10" stainless steel recessed cabinet with a 2" flange. Cabinet has a polished stainless steel piano-hinged door with a keyed cylinder lock.

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

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

Bottom inlets/top outlet 40R-FMC-BT

\* Note cabinet options under technical specifications.

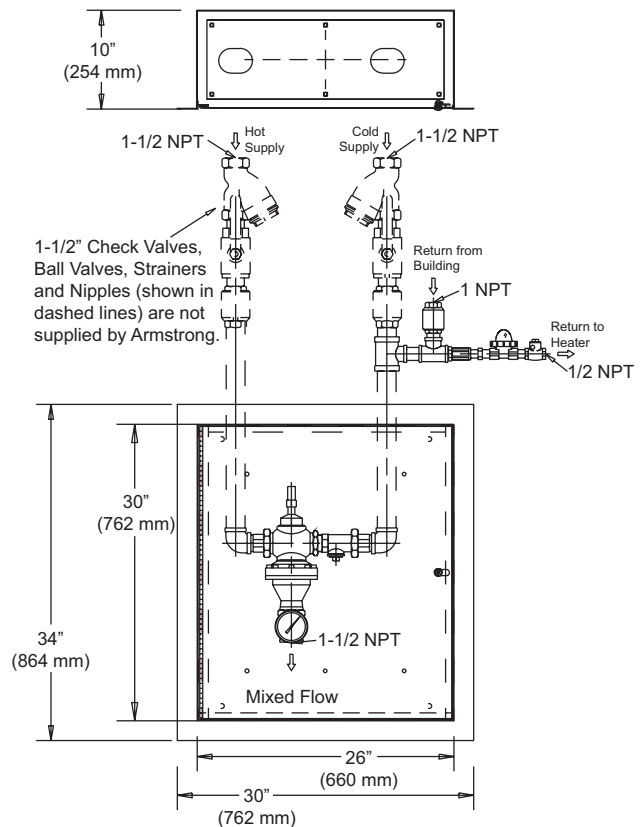
### Technical Specifications

- 1" NPT (40 mm) inlets and 1" NPT (40 mm) outlet
- Cabinet construction: 14 gauge #4 finish stainless steel
- Cabinet options:
  - Premium: Stainless steel 14 gauge #4 finish
  - Baked Enamel: White enameled steel 18 gauge
- Cabinet outer flange 2"
- Integral thermometer
- Integral check stop/strainer/unions
- Refer to Rada 40R, page 36, for mixing valve operational and technical specifications
- 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 40R-SMC.



White enameled steel 18 gauge available upon request.



For a fully detailed certified drawing, refer to CDLW #1153.

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



# Water Temperature Control - Recirculation Systems

## 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.

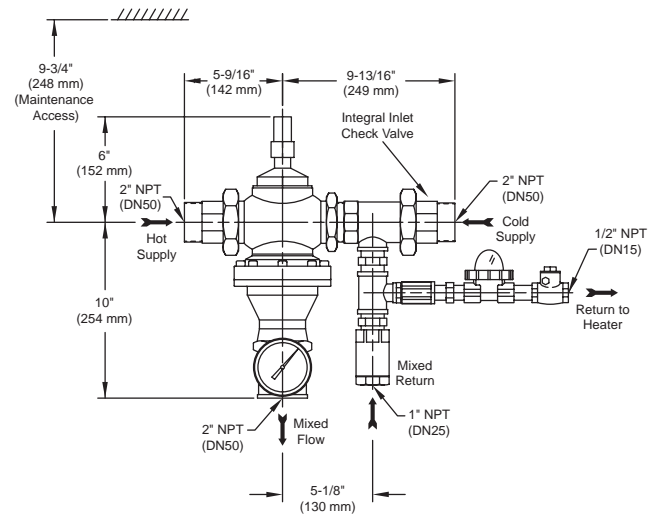
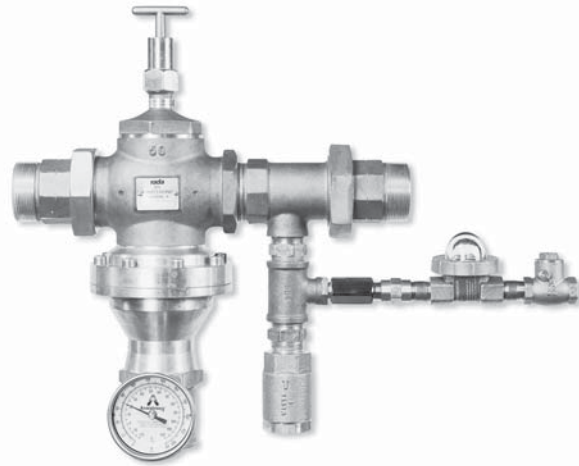
### Operational Specifications

- Dual thermostatic elements provide redundancy in the event of individual thermostat failure
- Typical system temperature control +/-5°F
- Adjustable single temperature lockout (removable key)

### 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)
- Integral inlet check valves
- Integral thermometer
- Integral sight flow indicator
- Integral thermostatic return limiter
- ASSE 1017 and CSA B125 certified
- 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 <sub>v</sub>
	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.



# Water Temperature Control - Recirculation Systems

## Thermostatic

### Rada 50R-FMC

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.

Rada 50R-FMC is supplied as standard\* fully assembled and pressure tested in an 26" x 30" x 10" stainless steel recessed cabinet with a 2" flange. Cabinet has a polished stainless steel piano-hinged door with a keyed cylinder lock.

Rada 50R-FMC is supplied as standard with combination inlet check stop/union/strainers, thermometer and outlet stop valve.

Rada 50R-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 50R-FMC can be specified/ordered with the following piping configurations under the following model numbers:

Bottom inlets/top outlet 50R-FMC-BT

\* Note cabinet options under technical specifications.

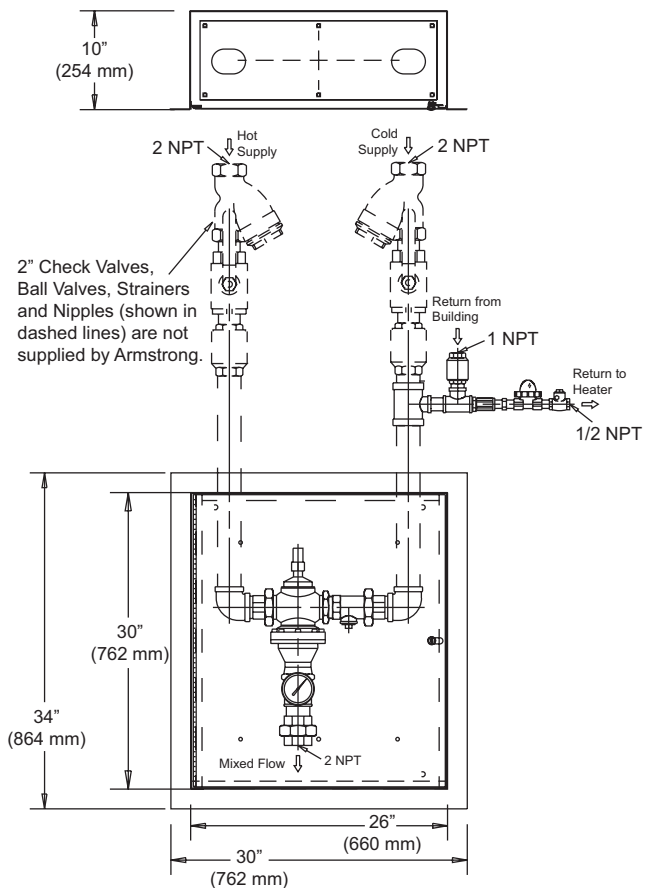
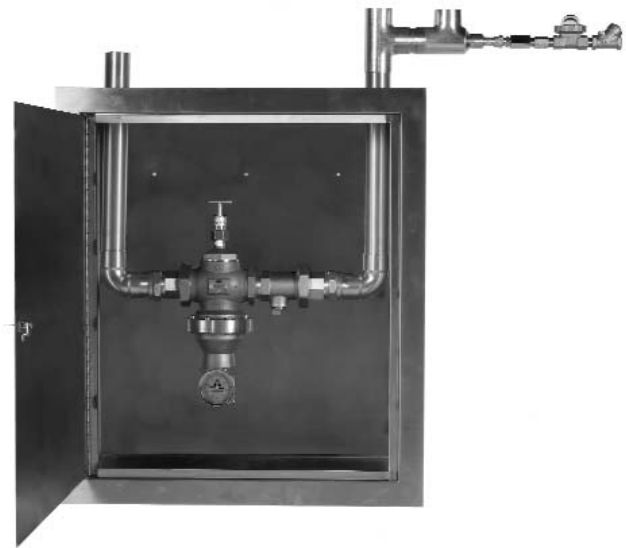
### Technical Specifications

- 2" NPT (50 mm) inlets and 2" NPT (50 mm) outlet
- Cabinet construction: 18 gauge #4 finish stainless steel
- Cabinet outer flange 2"
- Cabinet options:
  - Premium: Stainless steel 14 gauge #4 finish
  - Baked Enamel: White enameled steel 18 gauge
- Integral thermometer
- Integral inlet check valves
- Refer to Rada 50R, page 38, for mixing valve operational and technical specifications
- 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 50R-SMC.



White enameled steel 18 gauge available upon request.



For a fully detailed certified drawing, refer to CDLW #1154.

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



# Water Temperature Control - Recirculation Systems

## Thermostatic

### Rada 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 Rada 50R-50R features two Rada 50R thermostatic mixing valves (page 38) piped in parallel. By combining the high flow capacity of two valves, Rada 50R-50R has a flow capacity of 193 gpm (731 lpm) at a 20 psi (1.4 bar) pressure drop.

Rada 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.

Rada 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

Rada 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.



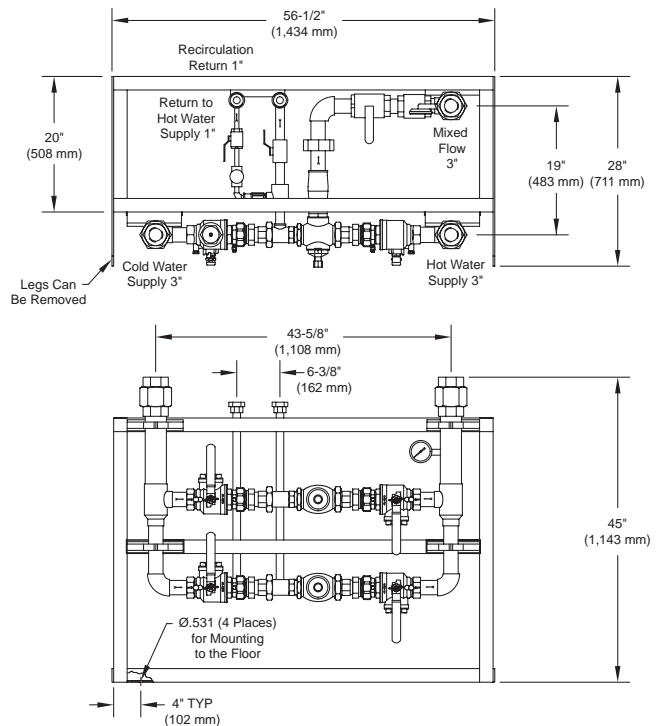
### Operational Specifications

- Dual thermostatic elements provide redundancy in the event of individual thermostat failure (50R)
- Typical system temperature control +/-5°F
- Adjustable single temperature lockout (50R removable key)

### 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)
- Integral check valves and strainers
- Integral thermometer
- ASSE 1017 and CSA B125 certified (Rada 50R)
- Shipping weight 477 lbs (216 kg)

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



50R-50R Packages (gpm)—Standard							
Model	Pressure Drop (psi)				Min. System Draw-off	Max. Flow	C <sub>v</sub>
	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.*





# Water Temperature Control - Recirculation Systems

## Thermostatic

### Rada 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 Rada 50R-50R-50R features three Rada 50R thermostatic mixing valves piped in parallel. By combining the high flow capacity of three valves, Rada 50R-50R-50R has a flow capacity of 288 gpm (1,090 lpm) at a 20 psi (1.4 bar) pressure drop.

Rada 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.

Rada 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 Rada 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.



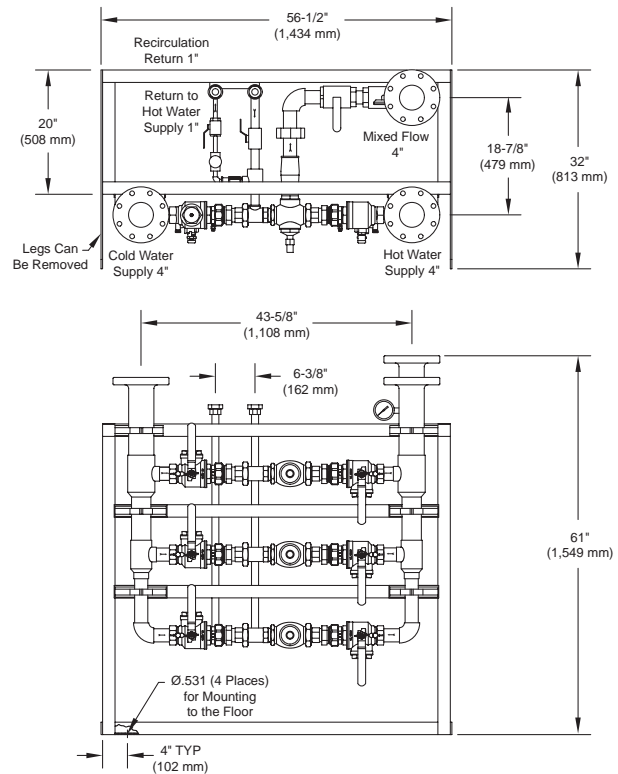
## Operational Specifications

- Dual thermostatic elements provide redundancy in the event of individual thermostat failure (50R)
- Typical system temperature control +/-5°F
- Adjustable single temperature lockout (50R removable key)

## 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)
- Integral check valves and strainers
- Integral thermometer
- ASSE 1017 and CSA B125 certified (Rada 50R)
- Shipping weight 550 lbs (249 kg)

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



50R-50R-50R Packages (gpm)—Standard							
Model	Pressure Drop (psi)				Min. System Draw-off	Max. Flow	C <sub>v</sub>
	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

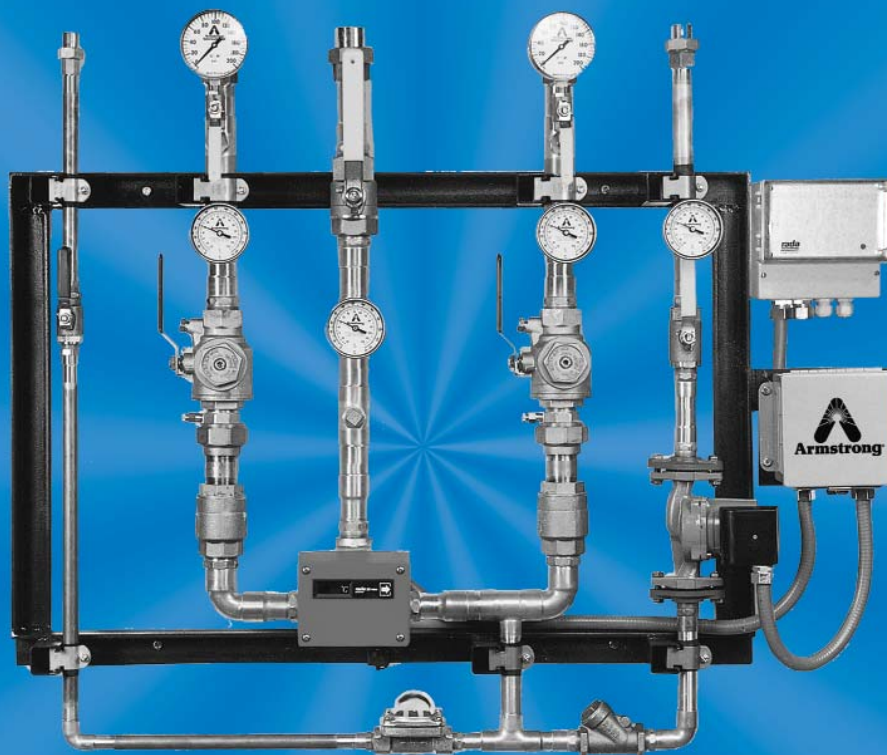
NOTE: Maximum flow rates determined at 9 ft/sec pipeline velocity.

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



# Armstrong® Water Temperature Control - Recirculation Systems

## Electronic



- **Packaged Solution**
- **Designed for Recirculation**
- **Typical System Control +/-2°F**
- **“Out of Temperature Range” Mode**
- **Remote Set Point Adjustment**
- **BAS Interface Capability**
- **New Advanced BAS Features**
- **Promotes compliance with OSHA, CDC and NYDOH Legionella Guidelines**



# Water Temperature Control - Recirculation Systems

## Electronic

Water Temperature Control - Recirculation Systems - Electronic features The Brain®. The Brain® is a series of eight Electronic Mixing Centers (EMC) designed specifically for use as the primary water temperature controller in a pumped recirculating hot water system

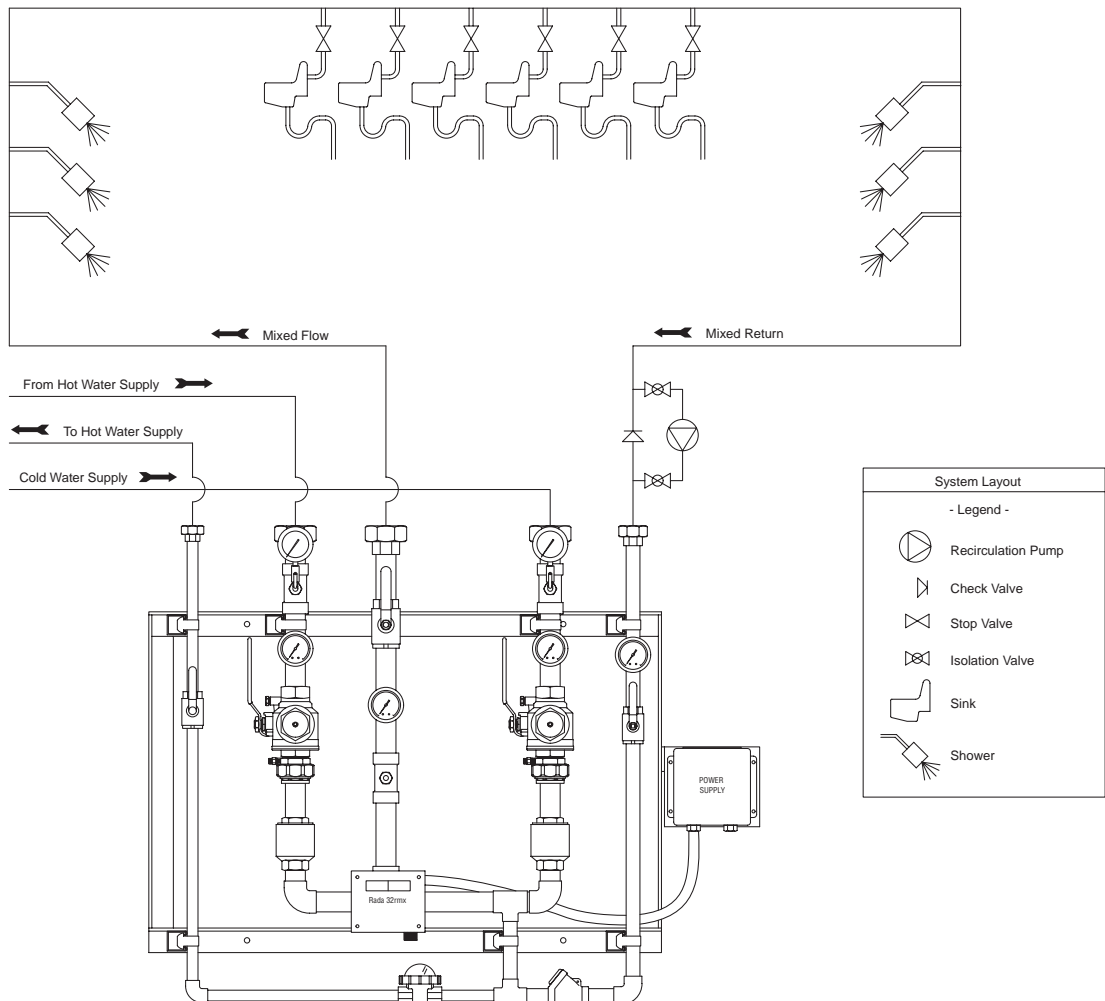
The complete range has been designed to offer an unparalleled level of system temperature control through the use of precision-engineered hydraulics with integrated electronic circuit technology.

## Sizing

The Brain® Electronic Mixing Centers are 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 Brain® Electronic Mixing Centers Recirculation Systems can be found on pages 44 through 47. Certified drawings, specifications, installation and maintenance guides, and plumbing schematics are available by calling Armstrong at (269) 279-3602.

The Brain® Electronic Mixing Centers (gpm)							
Model	Pressure Drop (psi)				Min. System Draw-off	Maximum Flow @9'/sec	C <sub>v</sub>
	5	10	15	20			
EMC 1	36	51	62	72	0	58	16
EMC 2	72	102	124	144	0	100	32





# Water Temperature Control - Recirculation Systems

## Electronic - The Brain™ The Central Recirculation System

The Brain Electronic Mixing Centers 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.

The Brain Electronic Mixing Centers are supplied as pre-plumbed packages, each of which differs slightly from this schematic.

### Adding the Options

The Brain Electronic Mixing Centers offer both the basic mixing center and mixing centers with a series of options and features.

Additionally each Electronic Mixing Center includes a data interface port which can be connected via an optionally supplied Control Module (model number suffix "3"). This Control Module

serves as the gateway onto a third party building automation system (BAS) or PC network.

When engaged with a resident BAS, The Brain offers two way communication capability via a 4-20mA signal.

### Remote "Set Point" Adjustment

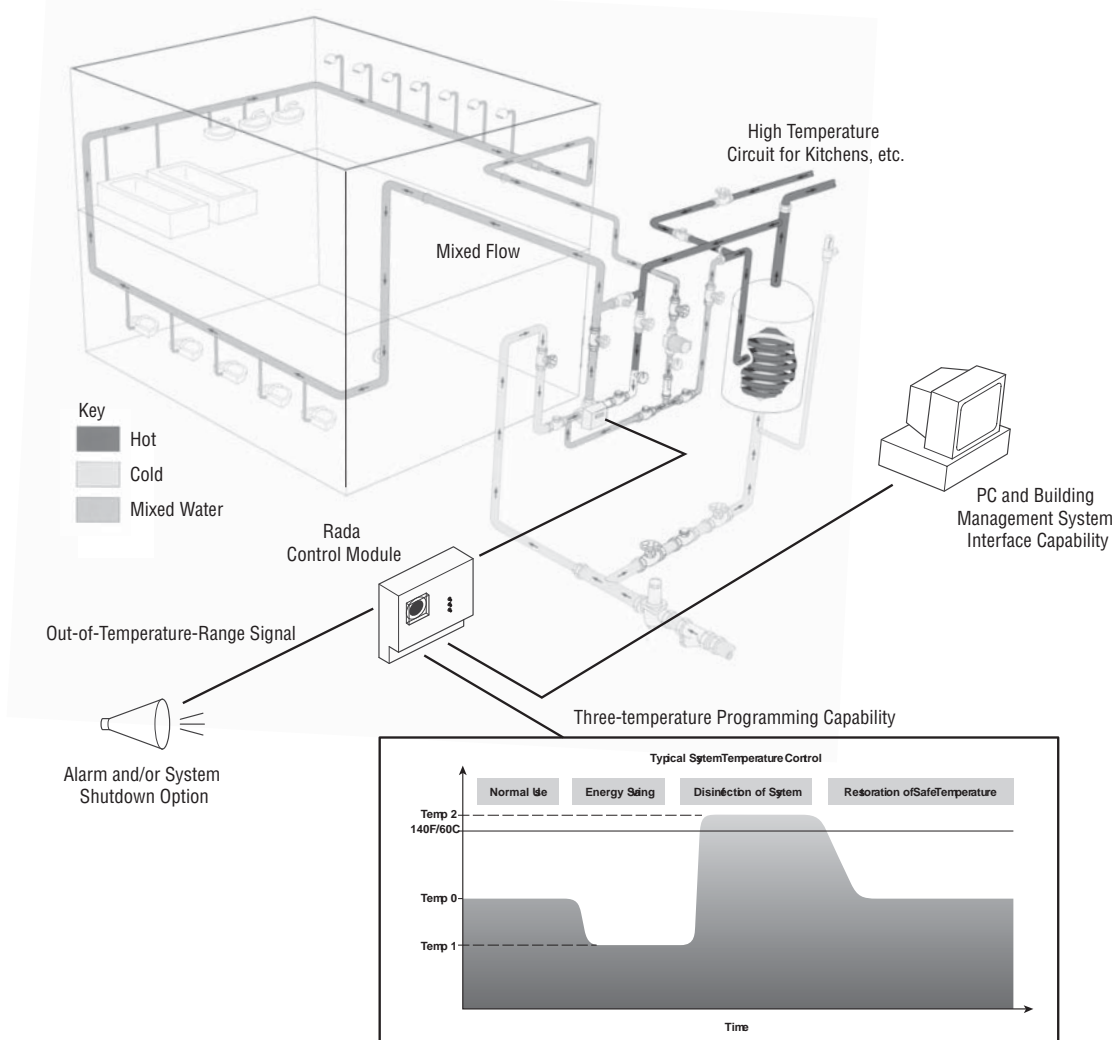
When engaged with a third party BAS, The Brain seeks a supervisory signal and offers a remote set point adjustment capability via the BAS and is "locked out" and can no longer be temperature set point adjustable at the mixing unit.

### Remote "Actual" Temperature Access

When engaged with a third party BAS, The Brain seeks a supervisory signal and offers remote temperature access by reporting the "actual" water temperature to the BAS.

### Building Automation System Interface Solutions (BASIS)

In installations where additional system data points (inlet HW, CW temps & pressures etc) are desirable, Armstrong offers BASIS. A full description of the BASIS options is provided on Page 47.





# Water Temperature Control - Recirculation Systems

## Electronic

### Electronic Mixing Centers

The Brain Electronic Mixing centers feature the Rada 32rmx electronic temperature controller.

The Brain Model 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 Brain Model EMC 12 incorporates a circulating pump, while the The Brain Model EMC 13 adds the Rada Control Module and the integral capability for BAS interface.

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

The Brain Model 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.

Additionally, The Brain Model EMC 2 series is piped so that it offers a "system redundancy" capability where desirable.

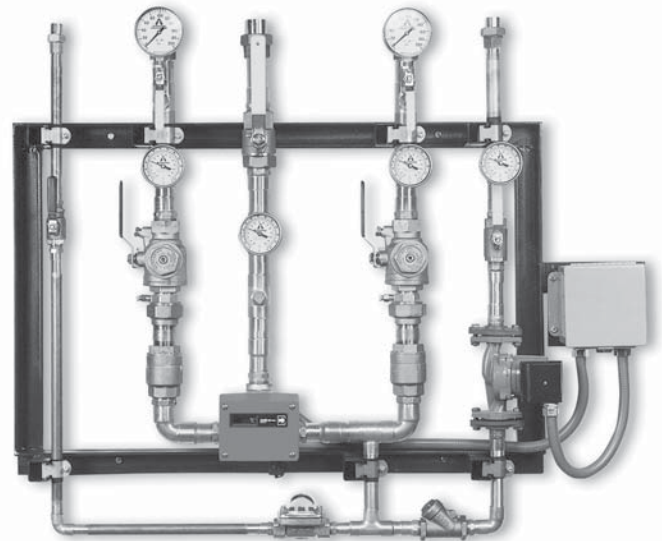
With integrated circuit technology combined with precision hydraulics, the 32rmx allows The Brain to deliver blended water economically at a safe, accurate temperature for sanitary use in recirculated hot water systems.

The Brain 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 Brain will maintain the temperature of the continuously flowing, pumped recirculating circuit.

### Operational Specifications

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
- Remote set point adjustment via PC network or BAS.
- System monitoring via PC network or BAS
- 32rmx valve automatically shuts off the hot water flow upon cold water inlet supply failure
- 32rmx valve automatically shuts off the cold water flow upon hot water inlet supply failure 32rmx valve automatically flows cold water only in the event of a power failure



### Application

The Brain 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 AC 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



# Water Temperature Control - Recirculation Systems

## 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 1/25 HP circulating pump rated at 8 gpm (30 lpm) at 8 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" 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 15 gpm (57 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.

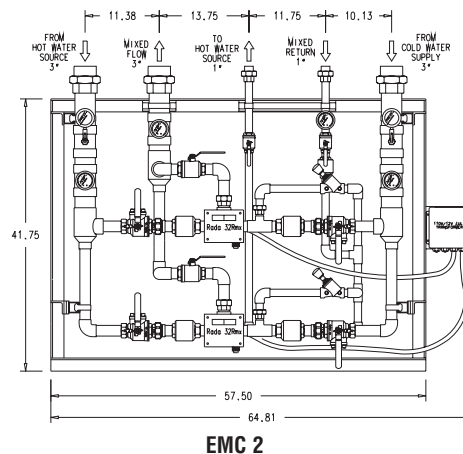
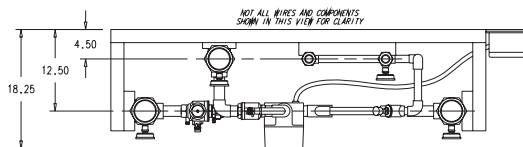
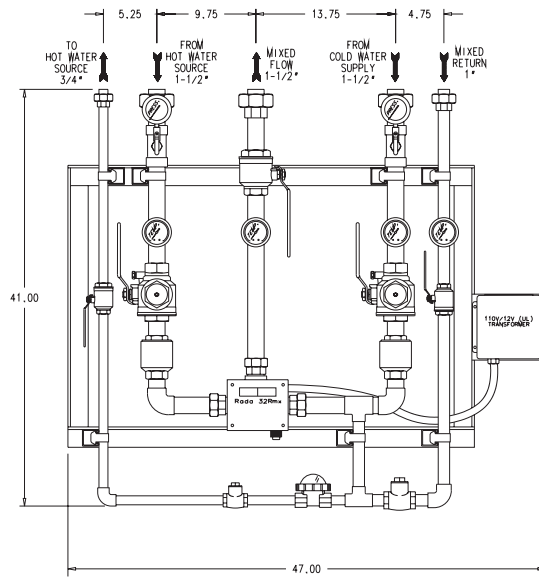
EMC 1	CDLW #1105
EMC 2	CDLW #1109
EMC 12	CDLW #1106
EMC 22	CDLW #1110
EMC 13	CDLW #1107
EMC 23	CDLW #1111
EMC 123	CDLW #1108
EMC 223	CDLW #1112

**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 Brain® EMC installation and maintenance guide.



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



# Water Temperature Control - Recirculation Systems

## Building Automation System Interface Solutions (BASIS)

### BASIS 1

Provided as a standard feature of EMC models with suffix "3" where BAS interface option is selected

Includes Model 840 control module with the following:

- Integral 4-20ma output connection for mixing unit temperature transmission to existing BAS.
- Integral 4-20ma input connection for mixing unit remote set point adjustment via existing BAS.
- Model 840 control module to mixing unit interface cable provided.
- Model 840 control module to BAS wiring not included.
- Temperature transmitter\* for downstream mixed water temperature transmission to existing BAS.
- Image file containing EMC system graphic template.

\*Supplied as hardware only. Temperature transmitter installation and wiring to BAS not included

### BASIS 2

Provided as BASIS 1 with the following:

- Three (3) additional temperature transmitters with interface junction panel. Temperature transmitters supplied installed and pre-wired to EMC except for downstream mixed water transmitter.
- Downstream mixed water transmitter supplied as hardware only. Temperature transmitter installation and wiring to BAS not included.
- Interface junction panel wiring to BAS not included.
- Image file containing EMC system graphic template.

### BASIS 3

Provided as BASIS 2 with the following:

- Hot supply in, cold supply in and mixed water out pressure transmitters
- Pressure transmitters supplied installed and pre-wired to interface junction panel.
- Interface junction panel wiring to BAS not included.

### BASIS 4

Provided as BASIS 3 with the following:

- Mixed water outlet flow meter
- Recirculation return flow meter

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

EMC 13 BASIS 2 CDLW #1156

EMC 13 BASIS 3 CDLW #1157

EMC 23 BASIS 2 CDLW #1160

EMC 23 BASIS 3 CDLW #1161

EMC 123 BASIS 2 CDLW #1158

EMC 123 BASIS 3 CDLW #1159

EMC 223 BASIS 2 CDLW #1162

EMC 223 BASIS 3 CDLW #1163



# Armstrong® Water Temperature Control - Recirculation Systems

## Digital



### Digital Intelligence

- Thinks for itself and talks to the building
- PDA programmable
- Engineered exclusively for Recirculating Hot Water Systems

### Digital Safety & Hygiene

- Programmable system safety alerts
- Shuts off upon inlet supply failure
- Shuts off Hot Water upon power failure & “out of temperature range” mode.
- Promotes compliance with OSHA & CDC Legionella Guidelines.

### Digital Stability and Control

- Typical System Temperature Control +/-2F
- Controls system “temperature creep”
- 0-150 GPM “Out of the Box” Solution

### Digital Connectivity

- BAS & LAN interface capability
- Integral Serial Data Ports
- BacNet, Lonworks compatible (BrainScan™)
- Web-Enabled (BrainScan™)





# Water Temperature Control - Recirculation Systems

## Digital

Water Temperature Control - Digital features a Digital Recirculating Valve (DRV) and Digital Mixing Centers specifically designed for use in a pumped recirculating hot water system.

### "Out of the Box" Solution

Model DRV 80 is a single installer/operator programmable "out of the box" solution for systems which experience diverse user draw-off between 0 to 150 GPM.

### "Plug and Play" Solution

Model DRV 80R is a single installer/operator programmable "Plug and Play" solution for systems which experience diverse user draw-off between 0 to 150 GPM. Model DRV 80R includes a recirculation system return manifold assembly.

### "Packaged" Solutions

Model DRV 80 based Digital Mixing Center (DMC). Model DMC 1 features a single DRV 80 pre-piped and pressure tested complete with isolation valves, strainers, mixed return flow indicator, check valves, thermometers and an optionally selected system circulating pump for systems which experience diverse user draw-off from 0 to 150 GPM.

Model DMC 2 features two DRV 80s plumbed in parallel, pre-piped, pressure tested with system accessory items as above for systems which experience diverse user draw-off from 0 to 300 GPM.

## Remote Control, System Monitoring, System Interrogation and Data Logging



Model DRV 80 and Armstrong Packaged Assemblies which feature Model DRV 80 (DRV 80R, DMC1, DMC2 etc) are provided as standard with an integral Mixed Outlet Water sensor and Remote Set Point Adjustment capability for "plug and play" system communication via PC, LAN or resident Building Automation System.

Model DRV 80 offers an integral relay point for connection to a selected accessory component such as a pump on/off switch, to activate/deactivate a solenoid or to enable an audible alarm etc. systems which experience diverse user draw-off for 0 to 150 GPM.

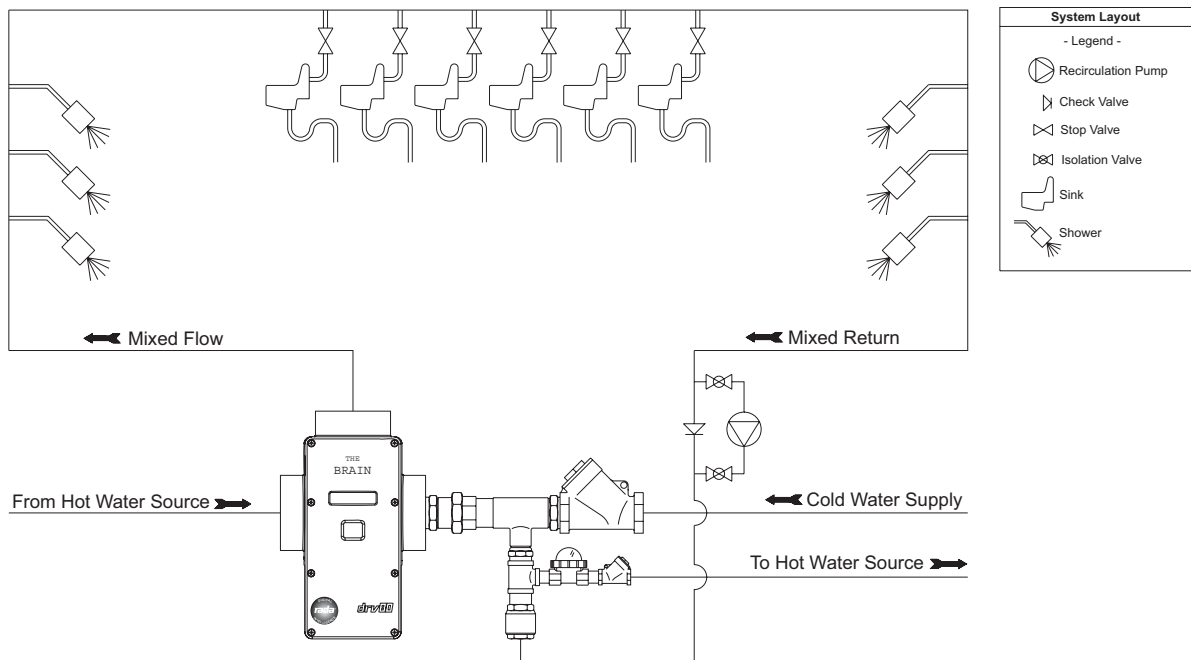
Model DRV 80 is supplied as standard with integral Hot Water & Cold Water/System Return Water sensors and a serial connection data port which enables communication to third party system hardware via an accessory component called BrainScan™.

### BrainScan™

BrainScan™ is an optionally selected external network adapter console from Armstrong complete with custom tailored software. BrainScan connects to the integral serial connection data port on DRV 80 and enables a direct onward connection to Building Automation Systems which utilize LONWORKS & BACNET protocols, a communication capability with other Building Automation Systems which connect via an RS485 port, an Ethernet port for web access OR an RS422 port for connection to an optionally available Wi-Fi/modem module.

Recirculation Systems - Digital

Model	Pressure Drop (psi)				Minimum System Draw-Off	Maximum Flow @9'/sec.	C <sub>v</sub>
	5	10	15	20			
DRV80/R	78	111	136	157	0	193	35
DMC1	78	111	136	157	0	193	35
DMC2	156	222	272	314	0	386	70





# Water Temperature Control - Recirculation Systems

## Digital

### The Brain™ DRV80

DRV 80 is a fully digital recirculation valve (DRV) for "point of source" or mechanical room based installation. DRV 80 is designed specifically to be the primary water temperature controller in a continuously pumped recirculating hot water system.

Model DRV 80 is a single installer/operator programmable "out of the box" solution for systems which experience diverse user draw-off between 0 to 150 GPM.

### Operational Specifications

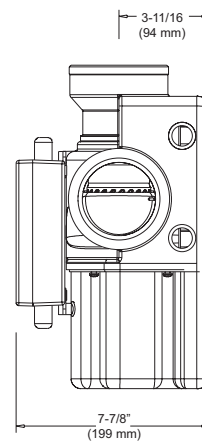
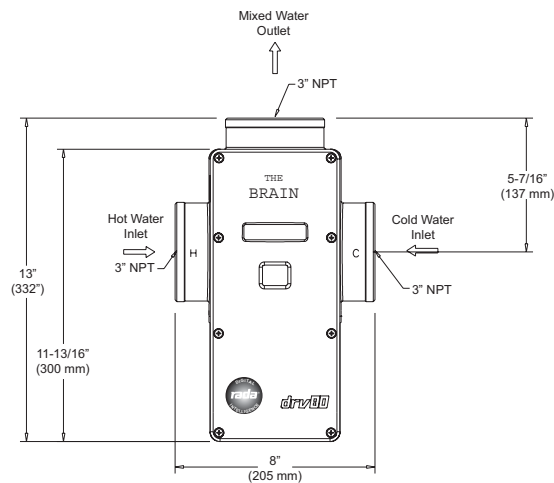
The enhanced accuracy possible with DRV80 digital technology, combined with its data input/output communication capability equals:

- Accurate control of blended water drawn from the system at a point of use typically within +/-2°F at draw off points a minimum of 5m downstream of mixing valve during consistent system demand periods
- Operational water pressure of 10 -150 psig
- Minimum valve inlet to outlet temperature requirement (system recirculation temperature loss) of 2°F
- 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
- Maintain a consistent system "idling" temperature and control *temperature creep* without the use of a manual throttling device or balance valve.
- System shall not require a temperature activated pump shut-off device (aquastat).
- Programmable set point range of 100-160°F (37-71°C) plus full hot/full cold
- Ability to thermally disinfect at recommended temperatures
- Programmable 1<sup>st</sup> level high/low temp alarm display
- Programmable temperature error level for safety shutdown

### Technical Specifications

- 100-240 V Power supply (12 VAC output)
- 2 x 4-20 mA current loop interfaces:  
Input: Setpoint Selection  
Output: Measured Blend Temperature
- Relay output: 24V DC/240 V AC SPCO  
Error Relay: Activated in alarm or error mode
- Serial Connection Data Port\*
- Optional External Network Adapter\*
- Stainless Steel Construction
- 3" NPT Connections (optional 2" adapter)
- ASSE 1017 and CSA B125 Certified

For a fully detailed certified drawing, refer to CD# D6774.



Recirculation Systems - Digital							
Model	Pressure Drop (psi)				Minimum System Draw-Off	Maximum Flow @9'/sec.	C <sub>v</sub>
	5	10	15	20			
DRV80/R	78	111	136	157	0	193	35
DMC1	78	111	136	157	0	193	35
DMC2	156	222	272	314	0	386	70

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



# Water Temperature Control - Recirculation Systems

## Digital

### DRV80R

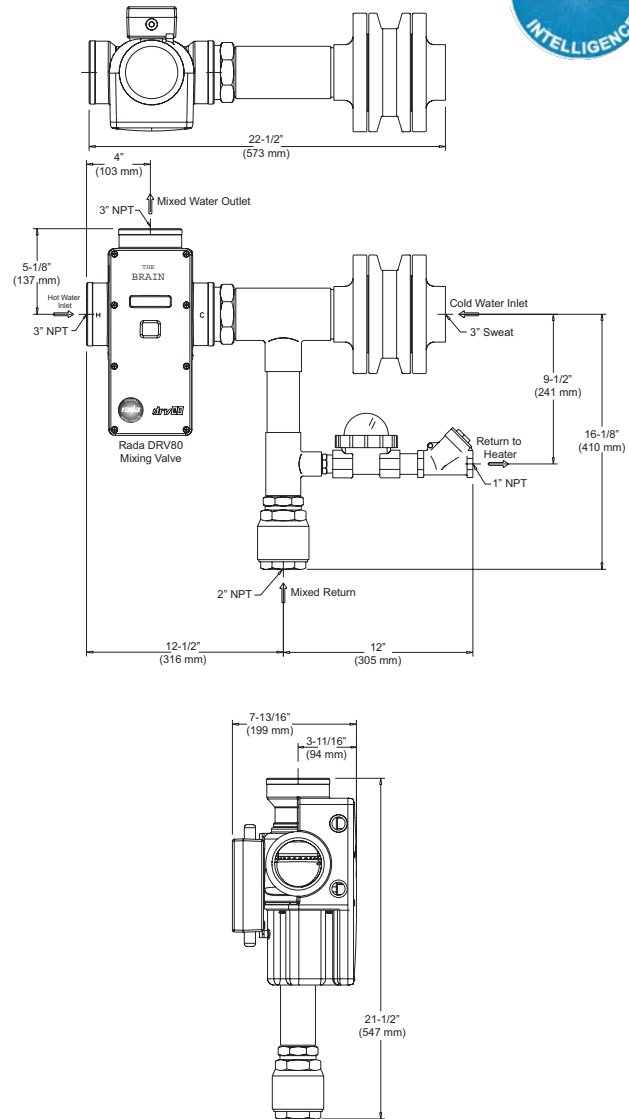
DRV 80R is a fully digital recirculation valve (DRV) for "point of source" or mechanical room based installation. DRV 80 is designed specifically to be the primary water temperature controller in a continuously pumped recirculating hot water system

Model DRV 80R is a single installer/operator programmable "Plug and Play" solution for systems which experience diverse user draw-off between 0 to 150 GPM and includes a recirculation system return manifold assembly.

### Operational Specifications

The enhanced accuracy possible with DRV80 digital technology, combined with its data input/output communication capability equals:

- Accurate control of blended water drawn from the system at a point of use typically within +/-2°F at draw off points a minimum of 5m downstream of mixing valve during consistent system demand periods
- Operational water pressure of 10 -150 psig
- Minimum valve inlet to outlet temperature requirement (system recirculation temperature loss) of 2°F
- 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
- Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
- System shall not require a temperature activated pump shut-off device (aquastat).
- Programmable set point range of 100-160°F (37-71°C) plus full hot/full cold
- Ability to thermally disinfect at recommended temperatures
- Programmable 1<sup>st</sup> level hi/lo temp alarm display
- Programmable temperature error level for safety shutdown



For a fully detailed certified drawing, refer to CD# D6775.

### Technical Specifications

- 100-240 V Power supply (12 V AC output)
- 2 x 4-20 mA current loop interfaces:  
Input: Setpoint Selection  
Output: Measured Blend Temperature
- Relay output: 24V DC/240 V AC SPCO  
Error Relay: Activated in error mode
- Serial Connection Data Port\*
- Optional External Network Adapter\*
- Stainless Steel Construction
- 3" NPT Connections (optional 2" adapter)
- Recirculation system return manifold assembly.  
2" System Return Check Valve  
1" Return to Heater Line Check  
2" Return to Heater Line Ball Flow Indicator  
3" CW inlet Check Valve
- ASSE 1017 and CSA B125 Certified

### Recirculation Systems - Digital

Model	Pressure Drop (psi)				Minimum System Draw-Off	Maximum Flow @9'/sec.	C <sub>v</sub>
	5	10	15	20			
DRV80/R	78	111	136	157	0	193	35
DMC1	78	111	136	157	0	193	35
DMC2	156	222	272	314	0	386	70

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



# Water Temperature Control - Recirculation Systems

## Digital

### DMC1

Model DMC 1 features a single DRV 80 pre-piped and pressure tested complete with isolation valves, strainers, mixed return flow indicator, check valves, thermometers and an optionally selected system circulating pump for systems which experience diverse user draw-off from 0 to 150 GPM.

DRV 80 "The Big Brain" is a fully digital recirculating valve (DRV) for "point of source" or mechanical room based installation. DRV 80 is designed specifically to be the primary water temperature controller in a continuously pumped recirculating hot water system.

Model DMC 1 is a single installer/operator programmable "packaged solution" for systems which experience diverse user draw-off between 0 to 150 GPM.

### Operational Specifications

The enhanced accuracy possible with DRV80 digital technology, combined with its data input/output communication capability equals:

- Accurate control of blended water drawn from the system at a point of use typically within  $\pm 2^{\circ}\text{F}$  at draw off points a minimum of 5m downstream of mixing valve during consistent system demand periods
- Operational water pressure of 10 -150 psig
- Minimum valve inlet to outlet temperature requirement (system recirculation temperature loss) of  $2^{\circ}\text{F}$
- 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
- Maintain a consistent system "idling" temperature and control *Temperature Creep* without the use of a manual throttling device or balance valve.
- System shall not require a temperature activated pump shut-off device (aquastat).
- Programmable set point range of 100-160 $^{\circ}\text{F}$  (37-71 $^{\circ}\text{C}$ ) plus full hot/full cold
- Ability to thermally disinfect at recommended temperatures
- Programmable 1<sup>st</sup> level hi/lo temp alarm display
- Programmable temperature error level for safety shutdown

### Technical Specifications

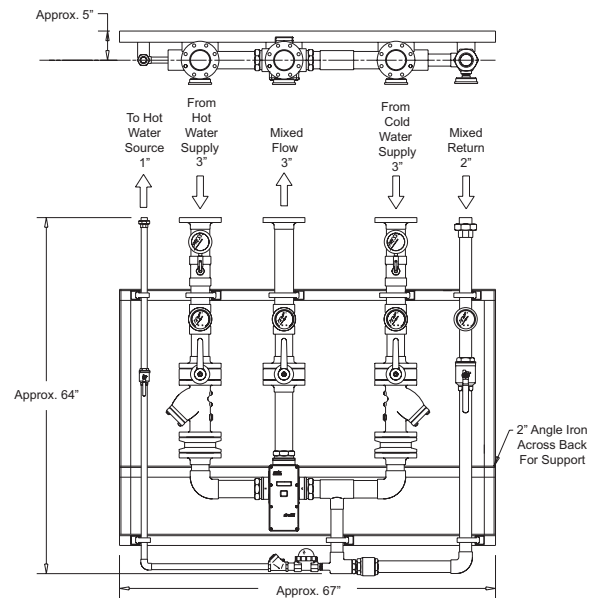
- 100-240 V Power supply (12 V AC output)
- 2 x 4-20 mA current loop interfaces:  
Input: Setpoint Selection  
Output: Measured Blend Temperature
- Relay output: 24V DC/240 V AC SPCO  
Error Relay: Activated in alarm or error mode
- Serial Connection Data Port\*
- Optional External Network Adapter\*
- Stainless Steel Construction



### DMC 1

Supplied as a pre-plumbed, pressure-tested and mounted to an enameled steel frame comprising:

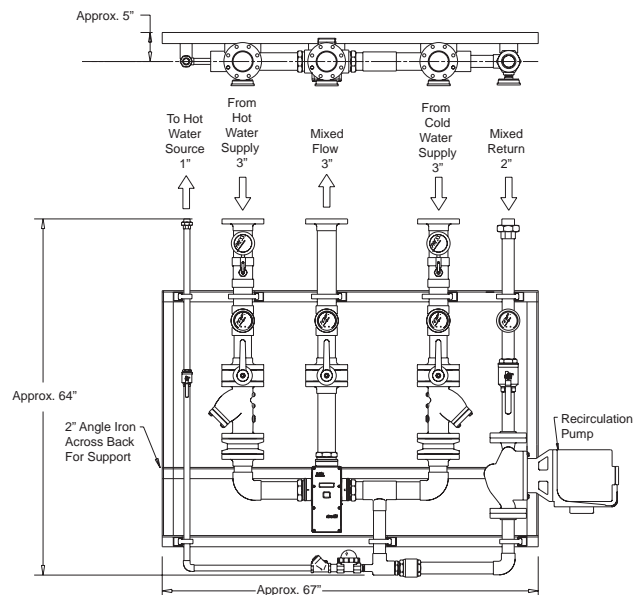
- 1 ea: DRV 80 Digital Recirculation System Controller
- 3" inlet/outlet piping with flanged connections
- System isolation valves,
- Inlet strainers
- Mixed return flow indicator
- Check valves
- Thermometers



For a fully detailed certified drawing, refer to CD# D6776.

### DMC 12

As above with 1/6 hp system circulating pump.



For a fully detailed certified drawing, refer to CD# D6777.

# Water Temperature Control - Recirculation Systems



## Digital

### DMC2

Model DMC 2 features two "parallel" DRV 80 pre-piped and pressure tested complete with isolation valves, strainers, mixed return flow indicator, check valves, thermometers and an optionally selected system circulating pump for systems which experience diverse user draw-off from 0 to 300 GPM.

Each DRV 80 "The Big Brain" is a fully digital recirculating valve (DRV) for "point of source" or mechanical room based installation. DRV 80 is designed specifically to be the primary water temperature controller in a continuously pumped recirculating hot water system.

Model DMC 1 is a single installer/operator programmable "packaged solution" for systems which experience diverse user draw-off between 0 to 150 GPM.

### Operational Specifications

The enhanced accuracy possible with DRV80 digital technology, combined with its data input/output communication capability equals:

- Accurate control of blended water drawn from the system at a point of use typically within  $\pm 2^{\circ}\text{F}$  at draw off points a minimum of 5m downstream of mixing valve during consistent system demand periods
- Operational water pressure of 10 -150 psig
- Minimum valve inlet to outlet temperature requirement (system recirculation temperature loss) of  $2^{\circ}\text{F}$
- 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
- Maintain a consistent system "idling" temperature and control *Temperature Creep* without the use of a manual throttling device or balance valve.
- System shall not require a temperature activated pump shut-off device (aquastat).
- Programmable set point range of 100-160°F (37-71°C) plus full hot/full cold
- Ability to thermally disinfect at recommended temperatures
- Programmable 1<sup>st</sup> level hi/lo temp alarm display
- Programmable temperature error level for safety shutdown

### Technical Specifications

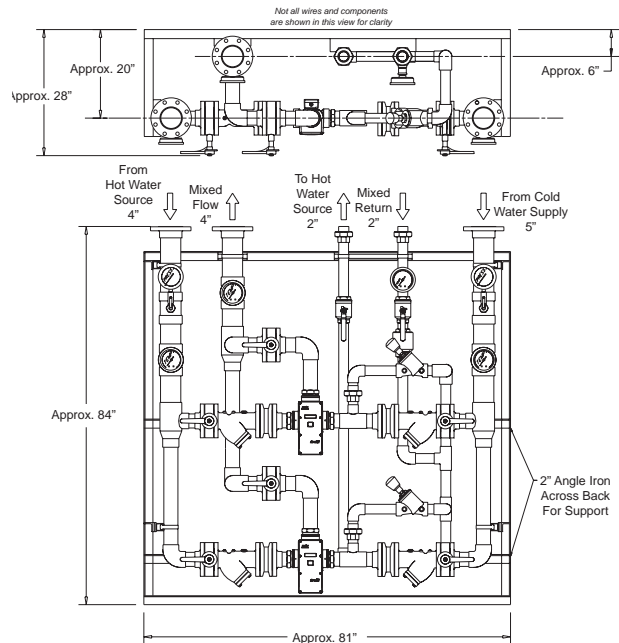
- 100-240 V Power supply (12 V AC output)
- 2 x 4-20 mA current loop interfaces:  
Input: Setpoint Selection  
Output: Measured Blend Temperature
- Relay output: 24V DC/240 V AC SPCO  
Error Relay: Activated in alarm or error mode
- Serial Connection Data Port\*
- Optional External Network Adapter\*
- Stainless Steel Construction



### DMC 2

Supplied as a pre-plumbed, pressure-tested and mounted to an enameled steel frame comprising:

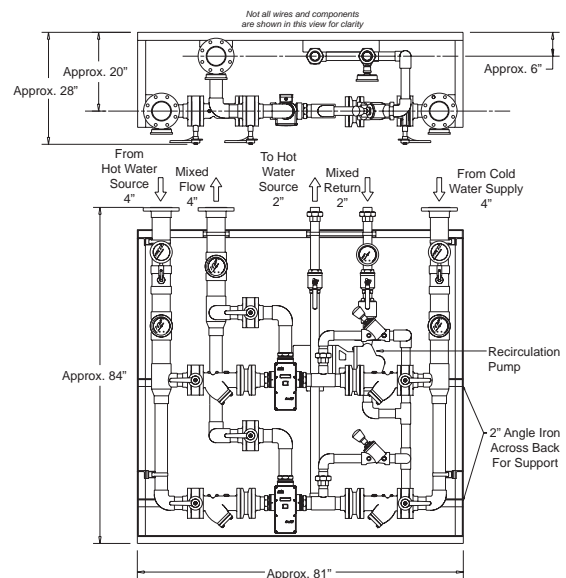
- 2 ea: DRV 80 Digital Recirculation System Controllers
- 4" inlet/outlet piping with flanged connections
- System isolation valves
- Inlet strainers
- Mixed return flow indicator
- Check valves
- Thermometers



For a fully detailed certified drawing, refer to CD# D6784.

### DMC 22

As above with 3/4 hp system circulating pump.



For a fully detailed certified drawing, refer to CD# D6785.



## Armstrong® Water Temperature Control - Recirculation Systems



### BrainScan™ - Hot Water System Monitoring

BrainScan™ is a Digital Hot Water Management System console optionally supplied with DRV80 Digital Recirculating Valves and DRV80 based Digital Mixing Centers.

BrainScan™ is factory configured to engage with either a Local Area Network (LAN), a third party Building Automation System (BAS) or an Internet Service Provider (ISP) to enable the DRV80's integral monitoring features.

Standard BrainScan™ configurations include hardware and software options which include on screen system graphics which are compatible with most standard Building Automation System open protocols.

All of the standard alarm conditions and error messages available through the DRV80 are also available through BrainScan™. BrainScan™ is available in three (3) different configuration packages as described below:

#### BrainScan™ 1

Includes remote hot water supply, cold/recirculation water supply and blended water outlet temperature readings. Also gives the ability to remotely change blended water outlet temperature setpoint. Included with all BrainScan™ options is the valve/system graphic.

#### BrainScan™ 2

Provided as BrainScan™ 1 with hot water supply, cold water supply and blended water outlet pressure transmitters.

#### BrainScan™ 3

Provided as BrainScan™ 2 with blended water outlet and recirculation return flow meters. These can be used to calculate water usage.

#### Technical Specifications

- BrainScan™ utilizes the SoM-5282 System Module as the processing engine and uClinux as the operating system
- BrainScan™ accommodates a socket for a protocol translator module that is capable of communicating with BacNet, Lonworks FFT as well as a modem and wi-fi module
- Standard ethernet port available to bring system on to the internet via a secured HTTP network server
- System displays "real time" values as well as stored data to be downloaded by the facility into their preferred program
- Data storage and exporting is done via XML formatted files, written every 15 minutes
- Editor accessible via telnet allowing user maintenance and assignment of user privileges which consist of "Read Only" or "Read and Configure"



## Water Temperature Control - Recirculation Systems

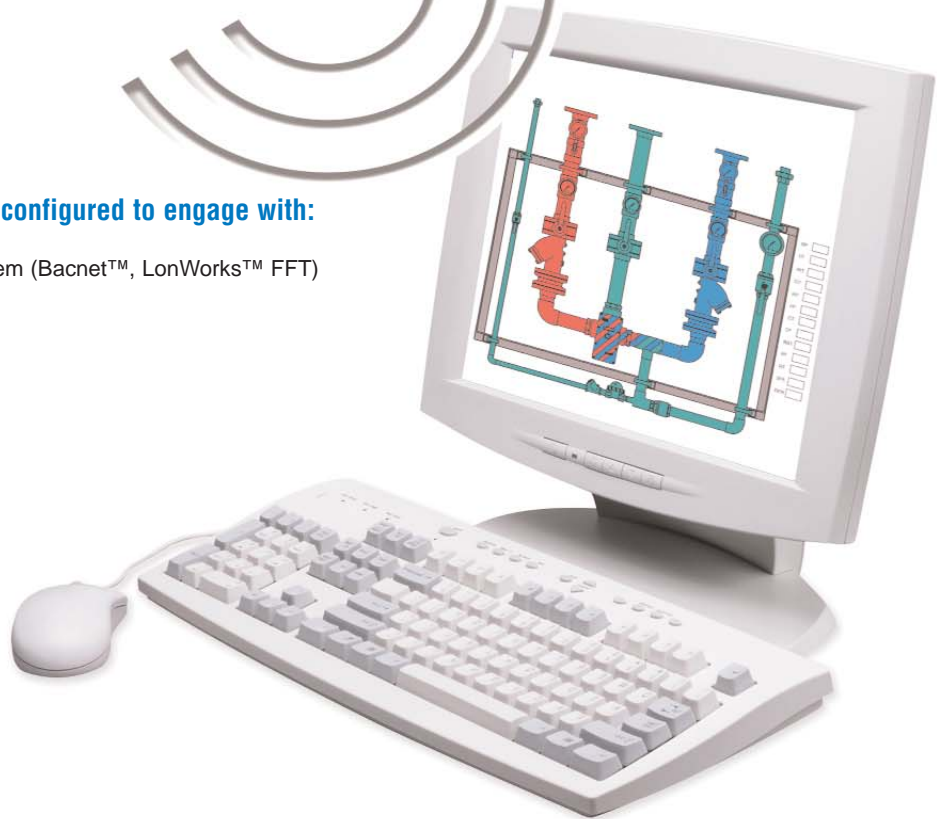
### BrainScan™ - Hot Water System Monitoring



BrainScan™ is a Digital Hot Water Management System console optionally supplied with DRV80 Digital Recirculating Valves and DRV80 based Digital Mixing Centers.

#### BrainScan™ is factory configured to engage with:

- Building Automation System (Bacnet™, LonWorks™ FFT)
- Local Area Network
- Internet Service Provider

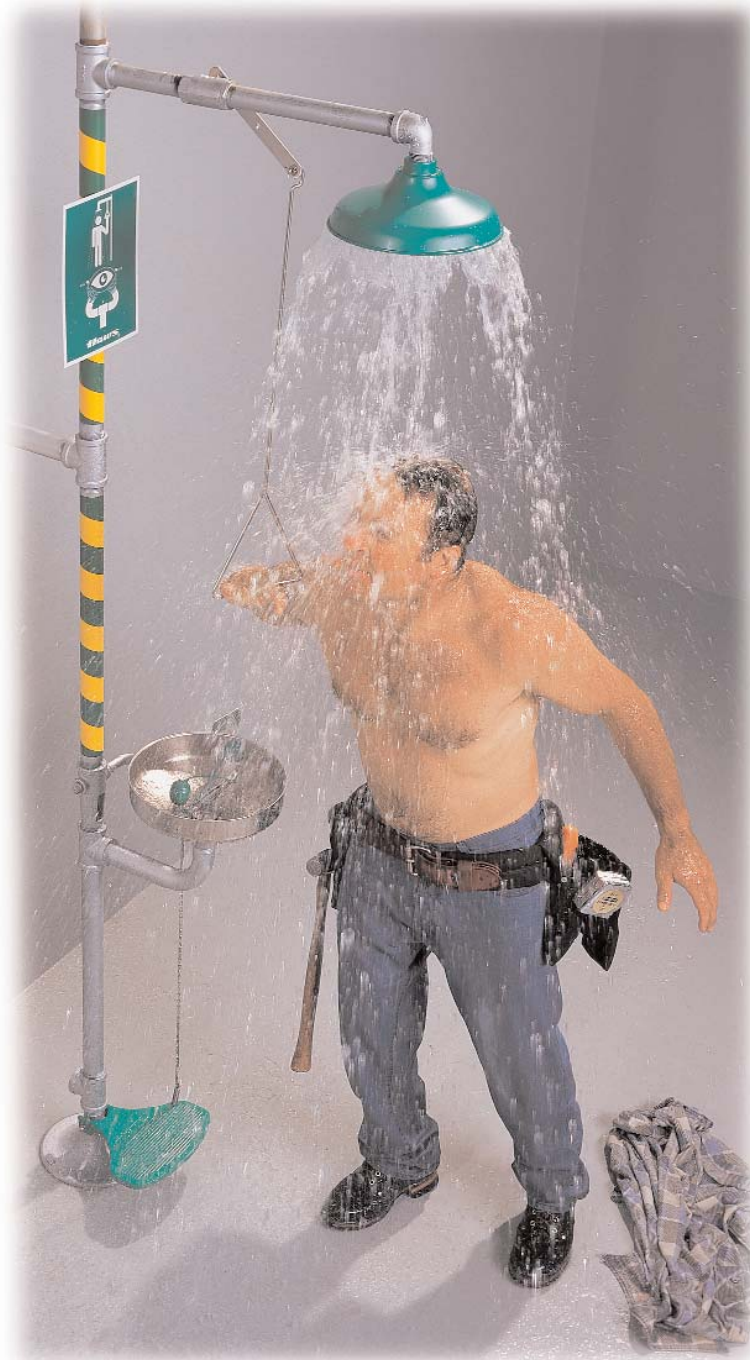




## Armstrong® Water Temperature Control - Emergency Fixtures

### Thermostatic

- Thermostatic water temperature control
- Dual thermostats provide redundancy
- Maximum temperature locking feature
- Continuous cold water flow to fixture upon hot water supply failure



- Thermal shutdown mode to protect user upon cold water supply failure
- Promotes compliance with ANSI Z358.1-2004

Above image courtesy of the Haws Corporation, Sparks, Nevada (775) 359-4712





# Water Temperature Control - Emergency Fixtures

## Thermostatic

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.

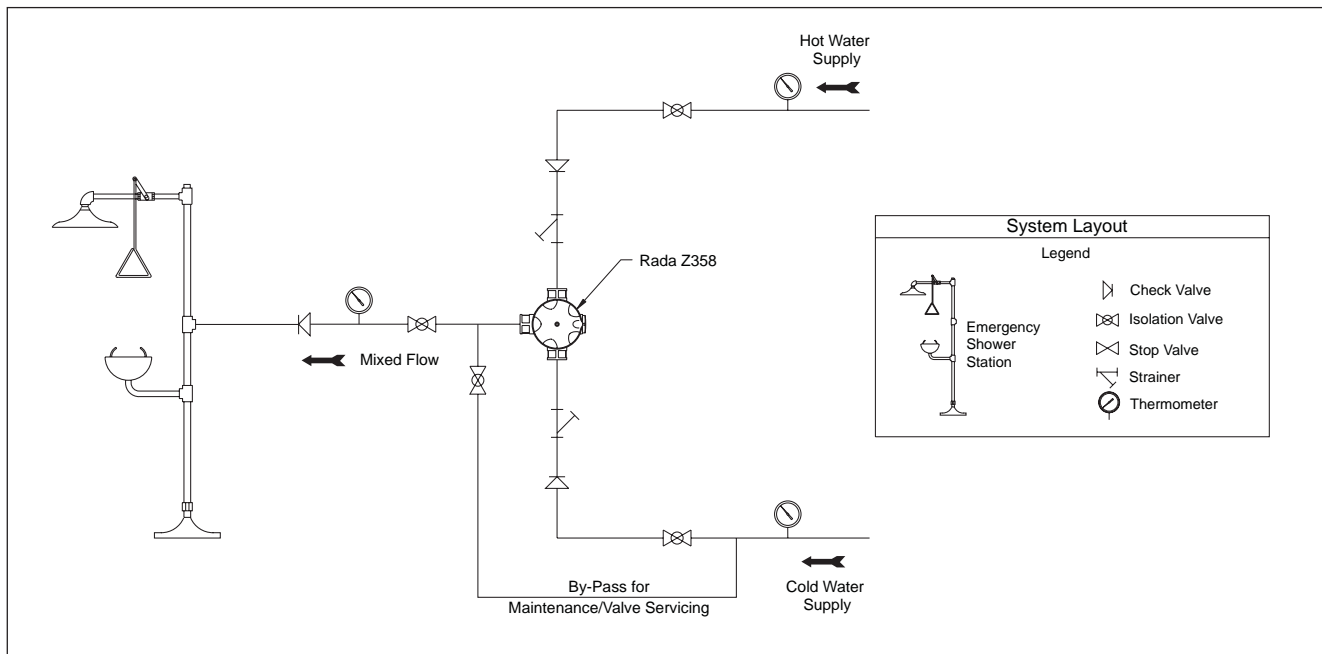
## Central Recirculation System Control

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.





# Armstrong® Water Temperature Control - Emergency Fixtures

## Thermostatic

### 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.

### Operational Specifications

- 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.

### 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 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 Z358-20 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

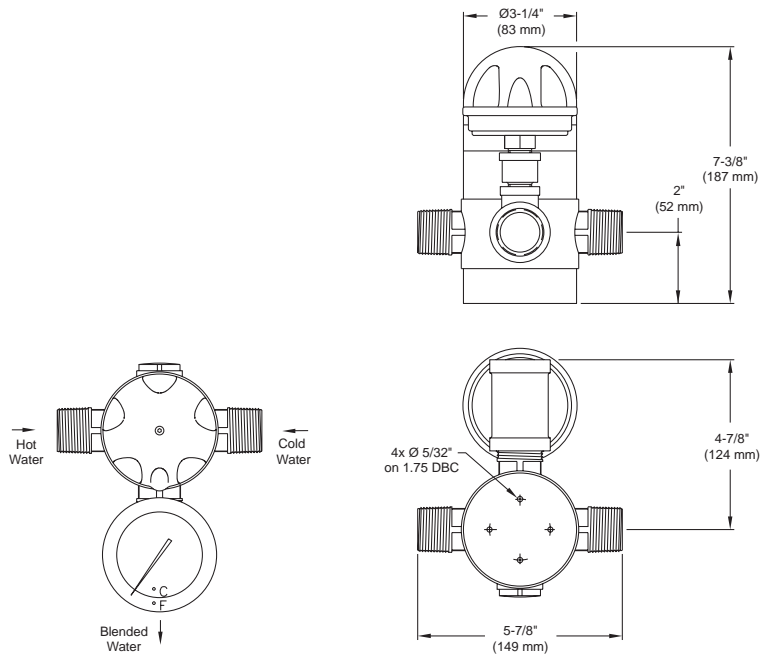
NOTE: Shaded area represents Armstrong’s interpretation of “tepid” water.

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.*



# Water Temperature Control - Emergency Fixtures



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.



# Armstrong® Water Temperature Control - Emergency Fixtures

## Thermostatic

### 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.

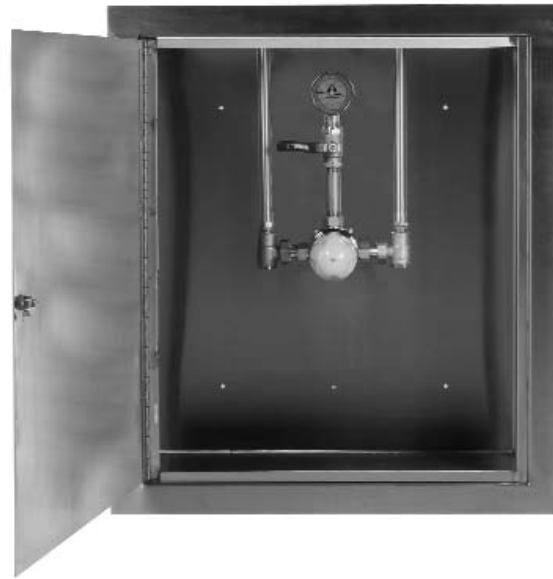
Rada Z358-20-FMC is supplied as standard\* fully assembled and pressure- tested, in an 26" x 30" x 10" stainless steel recessed cabinet with a 2" flange. Cabinet has a polished stainless steel piano-hinged door with a keyed cylinder lock.

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

\*Note cabinet options under technical specifications.



## Technical Specifications

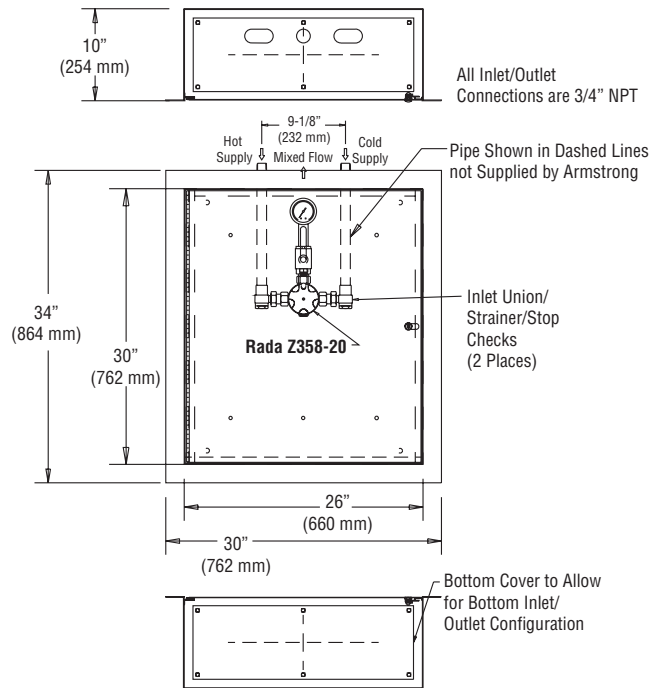
- 3/4" (20 mm) NPT inlets and 3/4" NPT outlet
- Cabinet construction: 18 gauge #4 finish stainless steel
- Cabinet outer flange: 2"
- Cabinet options:
  - Premium: Stainless steel 14 gauge #4 finish
  - Baked Enamel: White enameled steel 18 gauge
- Integral thermometer
- Outlet flow control
- Integral check stop/strainer/unions
- Refer to Rada Z358-20, page 58, for mixing valve operational and technical specifications

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

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



White enameled steel 18 gauge available upon request.



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



# Water Temperature Control - Emergency Fixtures

## Thermostatic

### 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.

### Operational Specifications

- 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.

### 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/colest 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

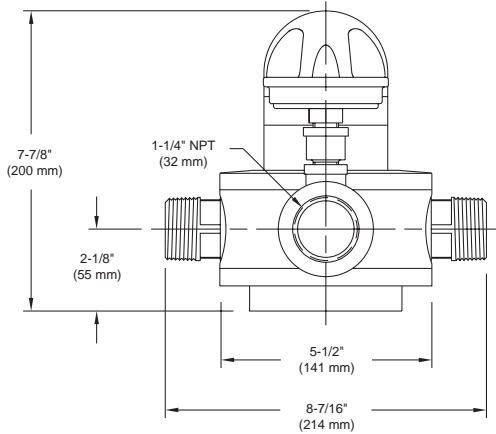
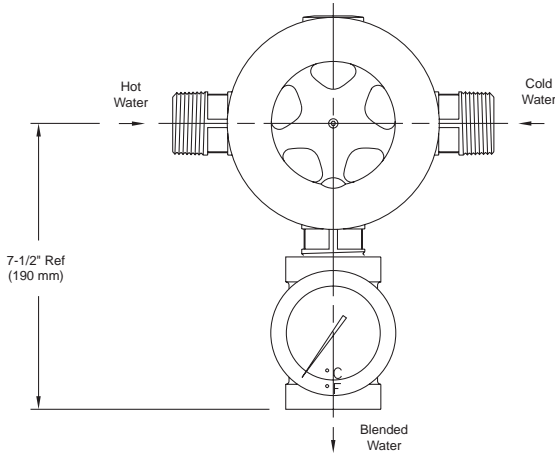
NOTE: Shaded area represents Armstrong's interpretation of "tepid" water.

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.**



# Water Temperature Control - Emergency Fixtures



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.*



# Water Temperature Control - Emergency Fixtures

## Thermostatic

### 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.

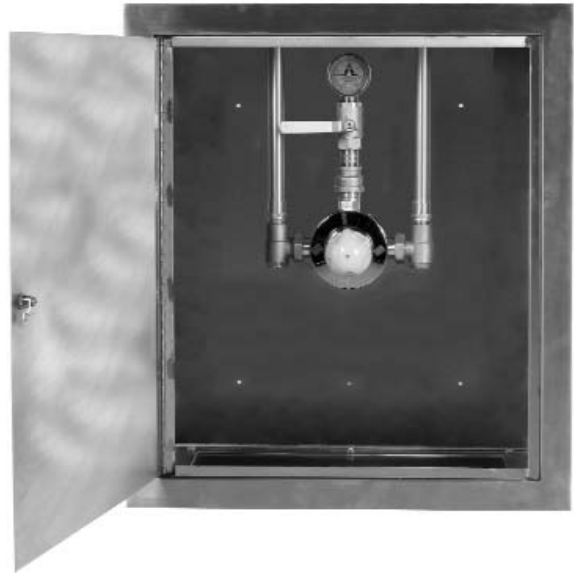
Rada Z358-40-FMC is supplied as standard\* fully assembled and pressure-tested, in an 26" x 30" x 10" stainless steel recessed cabinet with a 2" flange. Cabinet has a polished stainless steel piano-hinged door with a keyed cylinder lock.

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

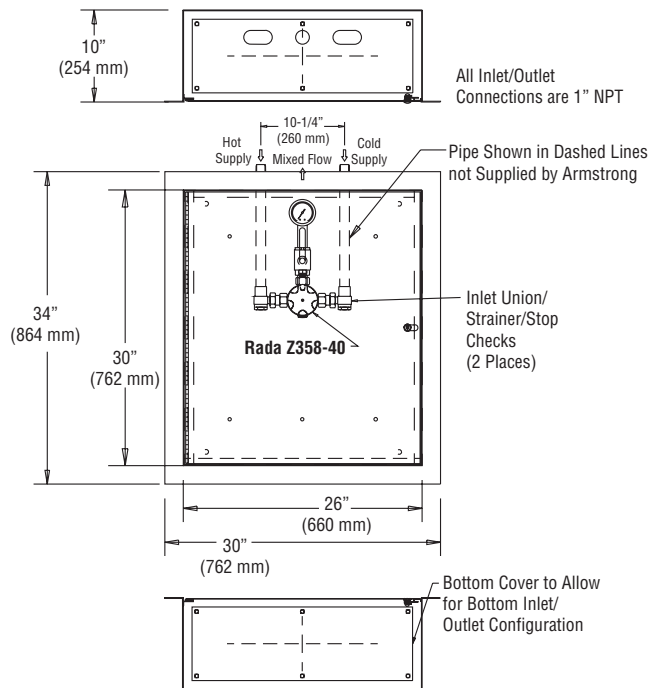
\*Note cabinet options under technical specifications.



## Technical Specifications

- 1"(25 mm) NPT inlets and 1" NPT outlet
  - Cabinet construction: 18 gauge #4 finish stainless steel
  - Cabinet outer flange: 2"
  - Cabinet options:
    - Premium: Stainless steel 14 gauge #4 finish
    - Baked Enamel: White enameled steel 18 gauge
  - Integral thermometer
  - Outlet flow control
  - Integral check stop/strainer/unions
- Refer to Rada Z358-40, page 61, for mixing valve operational and technical specifications.

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



White enameled steel 18 gauge available upon request.

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.



## Armstrong® Sample Specifications

### Water Temperature Control - Single Point of Use Thermostatic

#### Rada 110

**General:** The Thermostatic Mixing Valve (TMV) shall be of DZR brass/stainless steel construction. TMV shall have dual compression fitting inlets and outlet with integral inlet spring loaded check valves and strainers. TMV shall be equipped with a maximum temperature limiting and single temperature locking feature.

Materials of construction and items included shall be:

- DZR brass/stainless steel
- Dual 3/8" compression fitting inlets and outlet
- Integral inlet check valves and strainers
- Tamper-resistant locking cap

**Performance:** TMV shall be capable of controlling mixed water temperatures +/-3°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 for under-lavatory sanitary applications and shall be so certified and identified.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Maintains mixed water temperatures +/-3°F at flow rates between .5 and 5 gpm
- Delivers mixed water temperature within 5°F of either inlet supply temperature
- Operational pressure of 30 - 150 psig

#### Rada 215

**General:** The Thermostatic Mixing Valve (TMV) shall be of DZR brass/stainless steel/polymer construction. TMV shall have NPT inlets and outlet with integral inlet spring loaded check valves and strainers. TMV shall be equipped with a maximum temperature limiting and single temperature locking feature.

Materials of construction and items included shall be:

- DZR brass/stainless steel/polymer
- 1/2" NPT inlets and outlet
- Integral inlet check valves and strainers
- Temperature control trim set
- Tamperproof locking shroud

**Performance:** 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 +/-2°F at flow rates between .5 and 11. TMV shall be capable of delivering a mixed water temperature that is within 5°F of either inlet supply temperature.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Maintains mixed water temperatures +/-2°F at flow rates between .5 and 11 gpm
- Delivers mixed water temperature within 5°F of either inlet supply temperature
- Operational pressure of 10 - 150 psig
- Thermal shutdown mode upon inlet supply failure

### Water Temperature Control - Single Point of Use Digital

#### BrainWave DMV1

**General:** The Digital Mixing Valve (DMV) shall be of DZR brass/stainless steel/polymer with chrome surface mount control panel. DMV shall have NPT inlets and outlet with integral inlet spring loaded check valves and strainers. DMV shall be supplied with programmable software via PDA, power supply, and wall mounted control panel. Control panel shall be infra-red no-touch controls for flow and temperature adjustment and shall be capable of programmable timed flow and temperature control.

Materials of construction and items included shall be:

- DZR brass/stainless steel/polymer
- Chrome control panel cover
- 1/2" NPT inlets and outlet
- Integral inlet check valves and strainers
- Programmable software and 120V 50-60Hz power supply
- Infra-red no-touch surface mount control panel with 10ft cable

**Performance:** Concealed DMV for lavatories shall be capable of controlling mixed water temperatures +/-2°F at flow rates between 1 and 7 gpm, and shall have a programmable flow time 5 seconds - 60 minutes. DMV shall be capable of delivering a mixed water temperature that is within 5°F of either inlet supply temperature. DMV shall have a minimum programmable temperature range 86 °F - 117°F and a maximum range 91°F - 122°F. DMV shall be capable of delivering cold water directly from the cold water supply to the fixture in the event of a failure of the inlet hot supply. DMV shall have service flush with programmable thermal disinfection temperature range 140°F - 185°F for 0 - 50 minutes with data logging capabilities. DMV shall be compliant with ASSE Standard 1016, CSA B125, and UL and shall be so certified and identified.

The Digital Mixing Valve shall include all of the following capabilities:

- Maintains mixed water temperatures +/-2°F at flow rates between 1 and 7 gpm
- Delivers mixed water temperature within 2°F of either inlet supply temperature
- Instant automatic outlet shutdown upon either inlet supply failure
- Programmable temperature setpoint range 86°F - 117°F (min) and 91°F - 122°F (max)
- Programmable Thermal Disinfection option 140°F - 185°F for 0 - 50 minutes
- Operational water pressure of 10 - 145 psig





## Sample Specifications

### Water Temperature Control - Single Point of Use Digital

#### BrainWave DMV2

**General:** The Digital Mixing Valve (DMV) shall be of DZR brass/stainless steel/polymer with chrome surface mount control panel. DMV shall have NPT inlets and outlet with integral inlet spring loaded check valves and strainers. DMV shall be supplied with programmable software via PDA, power supply, and wall mounted control panel. Control panel shall be infra-red no-touch controls for flow and temperature adjustment and shall be capable of programmable timed flow and temperature control.

Materials of construction and items included shall be:

- DZR brass/stainless/polymer
- Chrome control panel cover
- 1/2" NPT inlets and outlet
- Integral inlet check valves and strainers
- Programmable software and 120V 50-60Hz power supply
- Infra-red no-touch surface mount control panel with 10ft cable

**Performance:** Concealed DMV for individual showers shall be capable of controlling mixed water temperatures +/-2°F at flow rates between 1 and 7 gpm, and shall have a programmable flow time 5 seconds - 60 minutes. DMV shall be capable of delivering a mixed water temperature that is within 5°F of either inlet supply temperature. DMV shall have a minimum programmable temperature range 86 °F - 117°F and a maximum range 91°F - 122°F. DMV shall be capable of delivering cold water directly from the cold water supply to the fixture in the event of a failure of the inlet hot supply. DMV shall have service flush with programmable thermal disinfection temperature range 140°F - 185°F for 0 - 50 minutes with data logging capabilities. DMV shall be compliant with ASSE Standard 1016, CSA B125, and UL and shall be so certified and identified.

The Digital Mixing Valve shall include all of the following capabilities:

- Maintains mixed water temperatures +/-2°F at flow rates between 1 and 7 gpm
- Delivers mixed water temperature within 2°F of either inlet supply temperature
- Instant automatic outlet shutdown upon either inlet supply failure
- Programmable temperature setpoint range 86°F - 117°F (min) and 91°F - 122°F (max)
- Programmable Thermal Disinfection option 140°F - 185°F for 0 - 50 minutes
- Operational water pressure of 10 - 145 psig

### Water Temperature Control - Single Point of Use Digital

#### BrainWave DMV3

**General:** The Digital Mixing Valve (DMV) shall be of DZR brass/stainless steel/polymer with chrome surface mount control panel. DMV shall have NPT inlets and outlet with integral inlet spring loaded check valves and strainers. DMV shall be supplied with programmable software via PDA, power supply, and wall mounted control panel. Control panel shall be infra-red no-touch controls for flow and temperature adjustment and shall be capable of programmable timed flow and temperature control.

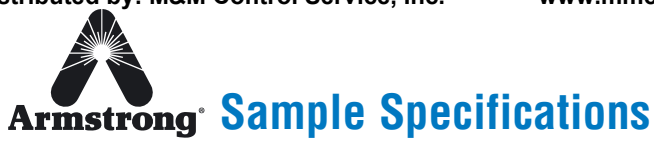
Materials of construction and items included shall be:

- DZR brass/stainless steel/polymer
- Chrome control panel cover
- 3/4" NPT inlets and outlet
- Integral inlet check valves and strainers
- Programmable software and 120V 50-60Hz power supply
- Infra-red no-touch surface mount control panel with 10ft cable

**Performance:** Concealed DMV for individual bath/tub filling applications shall be capable of controlling mixed water temperatures +/-2°F at flow rates between 1.6 and 16 gpm, and shall have a programmable flow time 5 seconds - 60 minutes. DMV shall be capable of delivering a mixed water temperature that is within 5°F of either inlet supply temperature. DMV shall have a minimum programmable temperature range 86 °F - 117°F and a maximum range 91°F - 122°F. DMV shall be capable of delivering cold water directly from the cold water supply to the fixture in the event of a failure of the inlet hot supply. DMV shall have service flush with programmable thermal disinfection temperature range 140°F - 185°F for 0 - 50 minutes with data logging capabilities. DMV shall be compliant with ASSE Standard 1016, CSA B125, and UL and shall be so certified and identified.

The Digital Mixing Valve shall include all of the following capabilities:

- Maintains mixed water temperatures +/-2°F at flow rates between 1.6 and 16 gpm
- Delivers mixed water temperature within 2°F of either inlet supply temperature
- Instant automatic outlet shutdown upon either inlet supply failure
- Programmable temperature setpoint range 86°F - 117°F (min) and 91°F - 122°F (max)
- Programmable Thermal Disinfection option 140°F - 185°F for 0 - 50 minutes
- Operational water pressure of 10 - 145 psig



## Water Temperature Control - Single Point of Use Digital

### BrainWave DMV23

**General:** The Digital Mixing Valve (DMV) shall be of DZR brass/stainless steel/polymer with chrome surface mount control panel. DMV shall have NPT inlets and outlet with integral inlet spring loaded check valves and strainers. DMV shall be supplied with programmable software via PDA, power supply, and wall mounted control panel. Control panel shall be infra-red no-touch controls for flow and temperature adjustment and shall be capable of programmable timed flow and temperature control.

Materials of construction and items included shall be:

- DZR brass stainless steel/polymer
- Chrome control panel cover
- 3/4" NPT inlets with integral check valves and strainers
- 3/4" NPT outlet for bath, 1/2" NPT outlet for shower
- Programmable software and 120V 50-60Hz power supply
- Infra-red no-touch surface mount control panel with 10ft cable

**Performance:** Concealed DMV for combination bathing and showering systems shall be capable of controlling mixed water temperatures +/-2°F at flow rates between 1.6 and 16 gpm, and shall have a programmable flow time 5 seconds - 60 minutes. DMV shall be capable of delivering a mixed water temperature that is within 5°F of either inlet supply temperature. DMV shall have a minimum programmable temperature range 86 °F - 117°F and a maximum range 91°F - 122°F. DMV shall be capable of delivering cold water directly from the cold water supply to the fixture in the event of a failure of the inlet hot supply. DMV shall have service flush with programmable thermal disinfection temperature range 140°F - 185°F for 0 - 50 minutes with data logging capabilities. DMV shall be compliant with ASSE Standard 1016, CSA B125, and UL and shall be so certified and identified.

The Digital Mixing Valve shall include all of the following capabilities:

- Maintains mixed water temperatures +/-2°F at flow rates between 1.6 and 16 gpm
- Delivers mixed water temperature within 2°F of either inlet supply temperature
- Instant automatic outlet shutdown upon either inlet supply failure
- Programmable temperature setpoint range 86°F - 117°F (min) and 91°F - 122°F (max)
- Programmable Thermal Disinfection option 140°F - 185°F for 0 - 50 minutes
- Operational water pressure of 10 - 145 psig

## Water Temperature Control - Groups of Fixtures Thermostatic

### Rada 320

**General:** The Thermostatic Mixing Valve (TMV) shall be of chrome-plated DZR brass/polymer construction. TMV shall have NPT inlets and outlet with integral inlet 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 have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

Materials of construction and items included shall be:

- Chrome-plated DZR brass/polymer
- 1" NPT inlets and outlet
- Optional top or bottom mixed water outlet
- Integral inlet check valves and strainers
- Dual Thermostats

**Performance:** 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 +/-2°F at flow rates between 1 and 24 gpm. 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.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Maintains mixed water temperatures +/-2°F at flow rates between 1 and 24 gpm
- Delivers mixed water temperature within 5°F of either inlet supply temperature
- Operational pressure of 10 - 150 psig
- Thermal shutdown mode upon inlet supply failure



## Sample Specifications

### Water Temperature Control - Groups of Fixtures Thermostatic

#### Rada 320D

**General:** The Thermostatic Mixing Valve (TMV) shall be of chrome-plated DZR brass/polymer construction. All required installation components shall be supplied pre-plumbed and pressure tested. TMV shall have NPT inlets and outlet with integral combination inlet check stop/union/strainers, and outlet stop valve and thermometer. TMV shall be equipped with a maximum temperature limiting and single temperature locking feature. TMV shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

Materials of construction and items included shall be:

- Chrome-plated DZR brass/polymer
- 3/4" NPT inlets and outlet
- Integral combination inlet check stop/union/strainers
- Outlet stop valve and thermometer
- Dual thermostats

**Performance:** 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 +/-2°F at flow rates between 1 and 24 gpm. 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.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Maintains mixed water temperatures +/-2°F at flow rates between 1 and 24 gpm
- Delivers mixed water temperature within 5°F of either inlet supply temperature
- Operational pressure of 10 - 150 psig
- Thermal shutdown mode upon inlet supply failure

### Water Temperature Control - Groups of Fixtures Thermostatic

#### Rada 320-FMC

**General:** The Thermostatic Mixing Valve (TMV) shall be of chrome-plated DZR brass/polymer construction. TMV shall be supplied as standard pre-plumbed and pressure-tested, enclosed in a 26" x 30" x 10" stainless steel recessed cabinet with a 2" flange. Cabinet shall have a polished stainless steel piano-hinged door with keyed cylinder lock. TMV shall have optional top or bottom NPT inlets and outlet with integral combination inlet check stop/union/strainers, and outlet stop valve and thermometer. TMV shall be equipped with a maximum temperature limiting and single temperature locking feature. TMV shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

Materials of construction and items included shall be:

- Chrome-plated DZR brass/polymer
- Cabinet options:
  - Premium: 14 gauge #4 finish stainless steel
  - Standard: 18 gauge #4 finish stainless steel
  - Baked Enamel: 18 gauge white enameled steel
- Optional top or bottom 3/4" NPT inlets and outlet
- Integral combination inlet check stop/union/strainers
- Outlet stop valve and thermometer
- Dual thermostats

**Performance:** 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 +/-2°F at flow rates between 1 and 24 gpm. 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.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Maintains mixed water temperatures +/-2°F at flow rates between 1 and 24 gpm
- Delivers mixed water temperature within 5°F of either inlet supply temperature
- Operational pressure of 10 - 150 psig
- Thermal shutdown mode upon inlet supply failure



## Water Temperature Control - Groups of Fixtures Thermostatic

### Rada 425

**General:** The Thermostatic Mixing Valve (TMV) shall be of chrome-plated DZR brass/polymer construction. TMV shall have NPT inlets and outlet with integral inlet 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 have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

Materials of construction and items included shall be:

- Chrome-plated DZR brass/polymer
- 1-1/4" NPT inlets and outlet
- Optional top or bottom mixed water outlet
- Integral inlet check valves and strainers
- Dual Thermostats

**Performance:** 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 +/-2°F at flow rates between 2 and 48 gpm. 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.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Maintains mixed water temperatures +/-2°F at flow rates between 2 and 48 gpm
- Delivers mixed water temperature within 5°F of either inlet supply temperature
- Operational pressure of 10 - 150 psig
- Thermal shutdown mode upon inlet supply failure

## Water Temperature Control - Groups of Fixtures Thermostatic

### Rada 425D

**General:** The Thermostatic Mixing Valve (TMV) shall be of chrome-plated DZR brass/polymer construction. All required installation components shall be supplied pre-plumbed and pressure tested. TMV shall have NPT inlets and outlet with integral combination inlet check stop/union/strainers, and outlet stop valve and thermometer. TMV shall be equipped with a maximum temperature limiting and single temperature locking feature. TMV shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

Materials of construction and items included shall be:

- Chrome-plated DZR brass/polymer
- 1" NPT inlets and outlet
- Integral combination inlet check stop/union/strainers
- Outlet stop valve and thermometer
- Dual thermostats

**Performance:** TMV shall be capable of controlling mixed water temperatures +/-2°F at flow rates between 2 and 48 gpm. 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.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Maintains mixed water temperatures +/-2°F at flow rates between 2 and 48 gpm
- Delivers mixed water temperature within 5°F of either inlet supply temperature
- Operational pressure of 10 - 150 psig
- Thermal shutdown mode upon inlet supply failure



## Sample Specifications

### Water Temperature Control - Groups of Fixtures Thermostatic

#### Rada 425-FMC

**General:** The Thermostatic Mixing Valve (TMV) shall be of chrome-plated DZR brass/polymer construction. TMV shall be supplied as standard pre-plumbed and pressure-tested, enclosed in a 26" x 30" x 10" stainless steel recessed cabinet with a 2" flange. Cabinet shall have a polished stainless steel piano-hinged door with keyed cylinder lock. TMV shall have optional top or bottom NPT inlets and outlet with integral combination inlet check stop/union/strainers, and outlet stop valve and thermometer. TMV shall be equipped with a maximum temperature limiting and single temperature locking feature. TMV shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

Materials of construction and items included shall be:

- Chrome-plated DZR brass/polymer
- Cabinet options:
  - Premium: 14 gauge #4 finish stainless steel
  - Standard: 18 gauge #4 finish stainless steel
  - Baked Enamel: 18 gauge white enameled steel
- Optional top or bottom 1" NPT inlets and outlet
- Integral combination inlet check stop/union/strainers
- Outlet stop valve and thermometer
- Dual thermostats

**Performance:** TMV shall be capable of controlling mixed water temperatures +/-2°F at flow rates between 2 and 48 gpm. 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.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Maintains mixed water temperatures +/-2°F at flow rates between 2 and 48 gpm
- Delivers mixed water temperature within 5°F of either inlet supply temperature
- Operational pressure of 10 - 150 psig
- Thermal shutdown mode upon inlet supply failure

### Water Temperature Control - Groups of Fixtures Thermostatic

#### Rada 40

**General:** The Thermostatic Mixing Valve (TMV) shall be of DZR brass construction with stainless steel internal operating mechanism. All required installation components shall be supplied pre-plumbed and pressure tested. TMV shall have NPT inlets and outlet with integral inlet spring loaded check valves. 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.

Materials of construction and items included shall be:

- DZR brass/stainless steel
- 1-1/2" NPT inlets and outlet
- Integral inlet check valves
- Dual Thermostats

**Performance:** TMV shall be capable of controlling mixed water temperatures +/-2°F at flow rates between 2 and 72 gpm. TMV shall be capable of delivering a mixed water temperature that is within 10°F of either inlet supply temperature. TMV shall be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Maintains mixed water temperatures +/-2°F at flow rates between 2 and 72 gpm
- Delivers mixed water temperature within 10°F of either inlet supply temperature
- Operational water pressure of 10 - 150 psig
- Thermal shutdown mode upon inlet supply failure



## Water Temperature Control - Groups of Fixtures Thermostatic

### Rada 40-FMC

**General:** The Thermostatic Mixing Valve (TMV) shall be of DZR brass construction with stainless steel internal operating mechanism. All required installation components shall be supplied pre-plumbed and pressure tested, enclosed in a 26" x 30" x 10" stainless steel recessed cabinet with a 2" flange. Cabinet shall have a polished stainless steel piano-hinged door with keyed cylinder lock. TMV shall have NPT inlets and outlet with integral inlet spring loaded check valves. 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.

Materials of construction and items included shall be:

- DZR brass/stainless steel
- Cabinet options:
  - Premium: 14 gauge #4 finish stainless steel
  - Standard: 18 gauge #4 finish stainless steel
  - Baked Enamel: 18 gauge white enameled steel
- 1-1/2" NPT inlets and outlet
- Integral inlet check valves
- Dual Thermostats

**Performance:** TMV shall be capable of controlling mixed water temperatures +/-2°F at flow rates between 2 and 72 gpm. TMV shall be capable of delivering a mixed water temperature that is within 10°F of either inlet supply temperature. TMV shall be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Maintains mixed water temperatures +/-2°F at flow rates between 2 and 72 gpm
- Delivers mixed water temperature within 10°F of either inlet supply temperature
- Operational water pressure of 10 - 150 psig
- Thermal shutdown mode upon inlet supply failure

## Water Temperature Control - Groups of Fixtures Thermostatic

### Rada 50

**General:** The Thermostatic Mixing Valve (TMV) shall be of DZR brass construction with stainless steel internal operating mechanism. All required installation components shall be supplied pre-plumbed and pressure tested. TMV shall have NPT inlets and outlet with integral inlet spring loaded check valves. 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.

Materials of construction and items included shall be:

- DZR brass/stainless steel
- 2" NPT inlets and outlet
- Integral inlet check valves
- Dual Thermostats

**Performance:** TMV shall be capable of controlling mixed water temperatures +/-2°F at flow rates between 2 and 98 gpm. TMV shall be capable of delivering a mixed water temperature that is within 10°F of either inlet supply temperature. TMV shall be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Maintains mixed water temperatures +/-2°F at flow rates between 2 and 98 gpm
- Delivers mixed water temperature within 10°F of either inlet supply temperature
- Operational water pressure of 10 - 150 psig
- Thermal shutdown mode upon inlet supply failure



## Sample Specifications

### Water Temperature Control - Groups of Fixtures Thermostatic

#### Rada 50-FMC

**General:** The Thermostatic Mixing Valve (TMV) shall be of DZR brass construction with stainless steel internal operating mechanism. All required installation components shall be supplied pre-plumbed and pressure tested, enclosed in a 26" x 30" x 10" stainless steel recessed cabinet with a 2" flange. Cabinet shall have a polished stainless steel piano-hinged door with keyed cylinder lock. TMV shall have NPT inlets and outlet with integral inlet spring loaded check valves. 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.

Materials of construction and items included shall be:

- DZR brass/stainless steel
- Cabinet options:
  - Premium: 14 gauge #4 finish stainless steel
  - Standard: 18 gauge #4 finish stainless steel
  - Baked Enamel: 18 gauge white enameled steel
- 2" NPT inlets and outlet
- Integral inlet check valves
- Dual Thermostats

**Performance:** TMV shall be capable of controlling mixed water temperatures +/-2°F at flow rates between 2 and 98 gpm. TMV shall be capable of delivering a mixed water temperature that is within 10°F of either inlet supply temperature. TMV shall be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Maintains mixed water temperatures +/-2°F at flow rates between 2 and 98 gpm
- Delivers mixed water temperature within 10°F of either inlet supply temperature
- Operational water pressure of 10 - 150 psig
- Thermal shutdown mode upon inlet supply failure

### Water Temperature Control - Recirculation Systems Thermostatic

#### Rada 320R

**General:** The Thermostatic Mixing Valve Assembly (TMVA) shall be of chrome-plated DZR brass/polymer construction. All required installation components shall be supplied pre-plumbed and pressure tested. TMVA shall be supplied with hot inlet, cold inlet, mixed water outlet and mixed return inlet with thermostatic return limiter to maintain circuit temperature during no-demand periods. 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. TMVA shall be equipped with a maximum temperature limiting and single temperature locking feature. TMVA shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

Materials of construction and items included shall be:

- Chrome-plated DZR brass/polymer
- 3/4" NPT inlets and outlet
- Integral inlet check valves and strainers
- Integral slight flow indicator
- Integral thermometer
- Thermostatic return limiter
- Dual Thermostats

**Performance:** TMVA shall be capable of passing 15 gpm in a recirculating hot water system at peak demand at a 20 psi 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 be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Delivers 15 gpm at 20 psi pressure drop
- Operational water pressure of 10 - 150 psig
- Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
- Delivery water temperature shall be within 5F of set point at a location measured 15' downstream of TMVA during consistent system demand periods.
- System shall not require a temperature activated pump shut-off device (aquastat).



# Armstrong® Sample Specifications

## Water Temperature Control - Recirculation Systems Thermostatic

### Rada 320R-FMC

**General:** The Thermostatic Mixing Valve Assembly (TMVA) shall be of chrome-plated DZR brass/polymer construction. All required installation components shall be supplied pre-plumbed and pressure tested, enclosed in a 26" x 30" x 10" stainless steel recessed cabinet with a 2" flange. Cabinet shall have a polished stainless steel piano-hinged door with keyed cylinder lock. TMVA shall be supplied with hot inlet, cold inlet, mixed water outlet and mixed return inlet with thermostatic return limiter to maintain circuit temperature during no-demand periods. 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. TMVA shall be equipped with a maximum temperature limiting and single temperature locking feature. TMVA shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

Materials of construction and items included shall be:

- Chrome-plated DZR brass/polymer
- Cabinet options:
  - Premium: 14 gauge #4 finish stainless steel
  - Standard: 18 gauge #4 finish stainless steel
  - Baked Enamel: 18 gauge white enameled steel
- 3/4" NPT inlets and outlet
- Integral inlet check valves and strainers
- Integral slight flow indicator
- Integral thermometer
- Thermostatic return limiter
- Dual Thermostats

**Performance:** TMVA shall be capable of passing 15 gpm in a recirculating hot water system at peak demand at a 20 psi 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 be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Delivers 15 gpm at 20 psi pressure drop
- Operational water pressure of 10 - 150 psig
- Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
- Delivery water temperature shall be within 5F of set point at a location measured 15' downstream of TMVA during consistent system demand periods.
- System shall not require a temperature activated pump shut-off device (aquastat).

## Water Temperature Control - Recirculation Systems Thermostatic

### Rada 425R

**General:** The Thermostatic Mixing Valve Assembly (TMVA) shall be of chrome-plated DZR brass/polymer construction. All required installation components shall be supplied pre-plumbed and pressure tested. TMVA shall be supplied with hot inlet, cold inlet, mixed water outlet and mixed return inlet with thermostatic return limiter to maintain circuit temperature during no-demand periods. 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. TMVA shall be equipped with a maximum temperature limiting and single temperature locking feature. TMVA shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

Materials of construction and items included shall be:

- Chrome-plated DZR brass/polymer
- 1" NPT inlets and outlets
- Integral inlet check valves and strainers
- Integral slight flow indicator
- Integral thermometer
- Thermostatic return limiter
- Dual Thermostats

**Performance:** TMVA shall be capable of passing 31 gpm in a recirculating hot water system at peak demand at a 20 psi 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 be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Delivers 31 gpm at 20 psi pressure drop
- Operational water pressure of 10 - 150 psig
- Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
- Delivery water temperature shall be within 5F of set point at a location measured 15' downstream of TMVA during consistent system demand periods.
- System shall not require a temperature activated pump shut-off device (aquastat).





## Sample Specifications

### Water Temperature Control - Recirculation Systems Thermostatic

#### Rada 425R-FMC

**General:** The Thermostatic Mixing Valve Assembly (TMVA) shall be of chrome-plated DZR brass/polymer construction. All required installation components shall be supplied pre-plumbed and pressure tested, enclosed in a 26" x 30" x 10" stainless steel recessed cabinet with a 2" flange. Cabinet shall have a polished stainless steel piano-hinged door with keyed cylinder lock. TMVA shall be supplied with hot inlet, cold inlet, mixed water outlet and mixed return inlet with thermostatic return limiter to maintain circuit temperature during no-demand periods. 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. TMVA shall be equipped with a maximum temperature limiting and single temperature locking feature. TMVA shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

Materials of construction and items included shall be:

- Chrome-plated DZR brass/polymer
- Cabinet options:
  - Premium: 14 gauge #4 finish stainless steel
  - Standard: 18 gauge #4 finish stainless steel
  - Baked Enamel: 18 gauge white enameled steel
- 1" NPT inlets and outlets
- Integral inlet check valves and strainers
- Integral slight flow indicator
- Integral thermometer
- Thermostatic return limiter
- Dual Thermostats

**Performance:** TMVA shall be capable of passing 31 gpm in a recirculating hot water system at peak demand at a 20 psi 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 be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Delivers 31 gpm at 20 psi pressure drop
- Operational water pressure of 10 - 150 psig
- Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
- Delivery water temperature shall be within 5F of set point at a location measured 15' downstream of TMVA during consistent system demand periods.
- System shall not require a temperature activated pump shut-off device (aquastat).

### Water Temperature Control - Recirculation Systems Thermostatic

#### Rada 40R

**General:** The Thermostatic Mixing Valve Assembly (TMVA) shall be of DZR brass construction with stainless steel internal operating mechanism. All required installation components shall be supplied pre-plumbed and pressure tested. TMVA shall be supplied pre-piped with hot inlet, cold inlet, mixed water outlet and mixed return inlet with thermostatic return limiter to maintain circuit temperature during no-demand periods. 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 be equipped with removable temperature adjustment key with lockshield for single temperature lock out capability. TMVA shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

Materials of construction and items included shall be:

- DZR brass/stainless steel
- 1-1/2" NPT inlets and outlets
- Integral inlet check valves
- Integral slight flow indicator
- Integral thermometer
- Thermostatic return limiter
- Dual Thermostats

**Performance:** TMVA shall be capable of passing 72 gpm in a recirculating hot water system at peak demand at a 20 psi 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 be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Delivers 72 gpm at 20 psi pressure drop
- Operational water pressure of 10 - 150 psig
- Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
- Delivery water temperature shall be within 5F of set point at a location measured 15' downstream of TMVA during consistent system demand periods.
- System shall not require a temperature activated pump shut-off device (aquastat).



# Armstrong® Sample Specifications

## Water Temperature Control - Recirculation Systems Thermostatic

### Rada 40R-FMC

**General:** The Thermostatic Mixing Valve Assembly (TMVA) shall be of DZR brass construction with stainless steel internal operating mechanism. All required installation components shall be supplied pre-plumbed and pressure tested, enclosed in a 26" x 30" x 10" stainless steel recessed cabinet with a 2" flange. Cabinet shall have a polished stainless steel piano-hinged door with keyed cylinder lock. TMVA shall be supplied pre-piped with hot inlet, cold inlet, mixed water outlet and mixed return inlet with thermostatic return limiter to maintain circuit temperature during no-demand periods. 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 be equipped with removable temperature adjustment key with lockshield for single temperature lock out capability. TMVA shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

Materials of construction and items included shall be:

- DZR brass/stainless steel
- Cabinet options:
  - Premium: 14 gauge #4 finish stainless steel
  - Standard: 18 gauge #4 finish stainless steel
  - Baked Enamel: 18 gauge white enameled steel
- 1-1/2" NPT inlets and outlets
- Integral inlet check valves
- Integral slight flow indicator
- Integral thermometer
- Thermostatic return limiter
- Dual Thermostats

**Performance:** TMVA shall be capable of passing 72 gpm in a recirculating hot water system at peak demand at a 20 psi 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 be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Delivers 72 gpm at 20 psi pressure drop
- Operational water pressure of 10 - 150 psig
- Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
- Delivery water temperature shall be within 5F of set point at a location measured 15' downstream of TMVA during consistent system demand periods.
- System shall not require a temperature activated pump shut-off device (aquastat).

## Water Temperature Control - Recirculation Systems Thermostatic

### Rada 50R

**General:** The Thermostatic Mixing Valve Assembly (TMVA) shall be of DZR brass construction with stainless steel internal operating mechanism. All required installation components shall be supplied pre-plumbed and pressure tested. TMVA shall be supplied pre-piped with hot inlet, cold inlet, mixed water outlet and mixed return inlet with thermostatic return limiter to maintain circuit temperature during no-demand periods. 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 be equipped with removable temperature adjustment key with lockshield for single temperature lock out capability. TMVA shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

Materials of construction and items included shall be:

- DZR brass/stainless steel
- 2" NPT inlets and outlets
- Integral inlet check valves
- Integral slight flow indicator
- Integral thermometer
- Thermostatic return limiter
- Dual Thermostats

**Performance:** TMVA shall be capable of passing 98 gpm in a recirculating hot water system at peak demand at a 20 psi 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 be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Delivers 98 gpm at 20 psi pressure drop
- Operational water pressure of 10 - 150 psig
- Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
- Delivery water temperature shall be within 5F of set point at a location measured 15' downstream of TMVA during consistent system demand periods.
- System shall not require a temperature activated pump shut-off device (aquastat).



## Sample Specifications

### Water Temperature Control - Recirculation Systems Thermostatic

#### Rada 50R-FMC

**General:** The Thermostatic Mixing Valve Assembly (TMVA) shall be of DZR brass construction with stainless steel internal operating mechanism. All required installation components shall be supplied pre-plumbed and pressure tested, enclosed in a 26" x 30" x 10" stainless steel recessed cabinet with a 2" flange. Cabinet shall have a polished stainless steel piano-hinged door with keyed cylinder lock. TMVA shall be supplied pre-piped with hot inlet, cold inlet, mixed water outlet and mixed return inlet with thermostatic return limiter to maintain circuit temperature during no-demand periods. 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 be equipped with removable temperature adjustment key with lockshield for single temperature lock out capability. TMVA shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

Materials of construction and items included shall be:

- DZR brass/stainless steel
- Cabinet options:
  - Premium: 14 gauge #4 finish stainless steel
  - Standard: 18 gauge #4 finish stainless steel
  - Baked Enamel: 18 gauge white enameled steel
- 2" NPT inlets and outlets
- Integral inlet check valves
- Integral slight flow indicator
- Integral thermometer
- Thermostatic return limiter
- Dual Thermostats

**Performance:** TMVA shall be capable of passing 98 gpm in a recirculating hot water system at peak demand at a 20 psi 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 be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Delivers 98 gpm at 20 psi pressure drop
- Operational water pressure of 10 - 150 psig
- Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
- Delivery water temperature shall be within 5F of set point at a location measured 15' downstream of TMVA during consistent system demand periods.
- System shall not require a temperature activated pump shut-off device (aquastat).

### Water Temperature Control - Recirculation Systems Thermostatic

#### Rada 50R-50R

**General:** The Thermostatic Mixing Valve Assembly (TMVA) shall be supplied pre-plumbed and pressure tested, and mounted on a heavy duty freestanding 2" angle iron frame. TMVA shall include two Rada 50R Thermostatic Mixing Valves piped in parallel. TMVA shall be supplied with hot inlet, cold inlet, mixed water outlet and mixed return inlet with thermostatic return limiter to maintain circuit temperature during no-demand periods. 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. Each TMV shall be equipped with removable temperature adjustment key with lockshield for single temperature lock out capability. TMVA shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

Materials of construction and items included shall be:

- Heavy duty 2" angle iron frame
- 3" inlets and outlet
- Integral inlet check valves and strainers
- Integral slight flow indicators
- Integral thermometers
- Thermostatic return limiters
- Dual Thermostats (2 per valve)

**Performance:** TMVA shall be capable of passing 193 gpm in a recirculating hot water system at peak demand at a 20 psi 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. Each TMVA shall be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Delivers 193 gpm at 20 psi pressure drop
- Operational water pressure of 10 - 150 psig
- Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
- Delivery water temperature shall be within 5F of set point at a location measured 15' downstream of TMVA during consistent system demand periods.
- System shall not require a temperature activated pump shut-off device (aquastat).



## Water Temperature Control - Recirculation Systems Thermostatic

### Rada 50R-50R-50R

**General:** The Thermostatic Mixing Valve Assembly (TMVA) shall be supplied pre-plumbed and pressure tested, and mounted on a heavy duty freestanding 2" angle iron frame. TMVA shall include three Rada 50R Thermostatic Mixing Valves piped in parallel. TMVA shall be supplied with hot inlet, cold inlet, mixed water outlet and mixed return inlet with thermostatic return limiter to maintain circuit temperature during no-demand periods. 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. Each TMV shall be equipped with removable temperature adjustment key with lockshield for single temperature lock out capability. TMVA shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

Materials of construction and items included shall be:

- Heavy duty 2" angle iron frame
- 4" inlets and outlet
- Integral inlet check valves and strainers
- Integral slight flow indicators
- Integral thermometers
- Thermostatic return limiters
- Dual Thermostats (2 per valve)

**Performance:** TMVA shall be capable of passing 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. Each TMVA shall be compliant with ASSE Standard 1017 and CSA B125 and shall be so certified and identified.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Delivers 288 gpm at 20 psi pressure drop
- Operational water pressure of 10 - 150 psig
- Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
- Delivery water temperature shall be within 5F of set point at a location measured 15' downstream of TMVA during consistent system demand periods.
- System shall not require a temperature activated pump shut-off device (aquastat).

## Water Temperature Control - Recirculation Systems Electronic

### The Brain Model EMC 1

**General:** 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. Temperature controllers shall feature integrated circuit board technology designed to deliver blended water economically at a safe, accurate temperature for sanitary use in re-circulated hot water systems. Electronic control box shall be supplied pre-wired, terminating at a knockout for Romex or BX cable connector.

Materials of construction and items included shall be:

- Frame of 2" carbon steel angle
- One 12V AC electronic temperature controller
- One 110V AC UL Listed transformer enclosed in a NEMA 4X enclosure
- Low voltage control wiring with protective conduit
- All required valve fittings and isolation valves, pressure gauges, inlet combination ball valve strainers, inlet/return check valves, inlet, system blend and return line thermometers

**Performance:** The Electronic Mixing Center (EMC) shall deliver up to 72 gpm with no minimum system draw-off requirement. The EMC shall have a visual operation "set" and "actual" temperature display for effective commissioning, adjustment and system monitoring and 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. The temperature controller shall be compliant with ASSE Standard 1017 and CSA B125 and so certified and identified.

The Electronic Mixing Center shall include all of the following capabilities:

- Accurate control of blended water drawn from the system at a point of use within +/-2°F at draw off points a minimum of 5m downstream of mixing valve during consistent system demand periods
- Operational water pressure of 10 -150 psig
- Minimum valve inlet to outlet temperature requirement (system recirculation temperature loss) of 2°F
- 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
- Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
- System shall not require a temperature activated pump shut-off device (aquastat).



## Sample Specifications

### Water Temperature Control - Recirculation Systems Electronic

#### The Brain Model EMC 12

**General:** 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. Temperature controllers shall feature integrated circuit board technology designed to deliver blended water economically at a safe, accurate temperature for sanitary use in re-circulated hot water systems. Electronic control box shall be supplied pre-wired, terminating at a knockout for Romex or BX cable connector.

Materials of construction and items included shall be:

- Frame of 2" carbon steel angle
- One 12V AC electronic temperature controller
- One 110V AC UL Listed transformer enclosed in a NEMA 4X enclosure
- Low voltage control wiring with protective conduit
- All required valve fittings and isolation valves, pressure gauges, inlet combination ball valve strainers, inlet/return check valves, inlet, system blend and return line thermometers
- 1/25 HP circulating pump rated at 8 gpm at 8 ft of head

**Performance:** The Electronic Mixing Center (EMC) shall deliver up to 72 gpm with no minimum system draw-off requirement. The EMC shall have a visual operation "set" and "actual" temperature display for effective commissioning, adjustment and system monitoring and 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. The temperature controller shall be compliant with ASSE Standard 1017 and CSA B125 and so certified and identified.

The Electronic Mixing Center shall include all of the following capabilities:

- Accurate control of blended water drawn from the system at a point of use within +/-2°F at draw off points a minimum of 5m downstream of mixing valve during consistent system demand periods
- Operational water pressure of 10 -150 psig
- Minimum valve inlet to outlet temperature requirement (system recirculation temperature loss) of 2°F
- 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
- Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
- System shall not require a temperature activated pump shut-off device (aquastat).

### Water Temperature Control - Recirculation Systems Electronic

#### The Brain Model EMC 13

**General:** 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. Temperature controllers shall feature integrated circuit board technology designed to deliver blended water economically at a safe, accurate temperature for sanitary use in re-circulated hot water systems. Electronic control box shall be supplied pre-wired, terminating at a knockout for Romex or BX cable connector.

Materials of construction and items included shall be:

- Frame of 2" carbon steel angle
- One 12V AC electronic temperature controller
- One 110V AC UL Listed transformer enclosed in a NEMA 4X enclosure
- One electronic temperature controller to building automation interface module with interface cables and integral 4-20 mA input and output connections
- One dual-mode temperature RTD providing a 4-20 mA signal for installation in the mixed downstream pipe work
- Low voltage control wiring with protective conduit
- All required valve fittings and isolation valves, pressure gauges, inlet combination ball valve strainers, inlet/return check valves, inlet, system blend and return line thermometers

**Performance:** The Electronic Mixing Center (EMC) shall deliver up to 72 gpm with no minimum system draw-off requirement. The EMC shall have a visual operation "set" and "actual" temperature display for effective commissioning, adjustment and system monitoring and 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. The EMC shall have an integral two-way data port for PC and BMS interface. The temperature controller shall be compliant with ASSE Standard 1017 and CSA B125 and so certified and identified.

The Electronic Mixing Center shall include all of the following capabilities:

- Accurate control of blended water drawn from the system at a point of use within +/-2°F at draw off points a minimum of 5m downstream of mixing valve during consistent system demand periods
- Operational water pressure of 10 -150 psig
- Minimum valve inlet to outlet temperature requirement (system recirculation temperature loss) of 2°F
- 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
- Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
- System shall not require a temperature activated pump shut-off device (aquastat).
- Remote Set Point adjustment capability
- Capability to disable manual temperature adjustment capability for system security



## Water Temperature Control - Recirculation Systems Electronic

### The Brain Model EMC 123

**General:** 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. 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 re-circulated hot water systems. Electronic control box shall be supplied pre-wired, terminating at a knockout for Romex or BX cable connector.

Materials of construction and items included shall be:

- Frame of 2" carbon steel angle
- One 12V AC electronic temperature controller
- One 110V AC UL Listed transformer enclosed in a NEMA 4X enclosure
- One electronic temperature controller to building automation interface module with interface cables and integral 4-20 mA input and output connections
- One dual-mode temperature RTD providing a 4-20 mA signal for installation in the mixed downstream pipe work
- Low voltage control wiring with protective conduit
- All required valve fittings and isolation valves, pressure gauges, inlet combination ball valve strainers, inlet/return check valves, inlet, system blend and return line thermometers
- 1/25 HP circulating pump rated at 8 gpm at 8 ft of head

**Performance:** The Electronic Mixing Center (EMC) shall deliver up to 72 gpm with no minimum system draw-off requirement. The EMC shall have a visual operation "set" and "actual" temperature display for effective commissioning, adjustment and system monitoring and 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. The EMC shall have an integral two-way data port for PC and BMS interface. The temperature controller shall be compliant with ASSE Standard 1017 and CSA B125 and so certified and identified.

The Electronic Mixing Center shall include all of the following capabilities:

- Accurate control of blended water drawn from the system at a point of use within +/-2°F at draw off points a minimum of 5m downstream of mixing valve during consistent system demand periods
- Operational water pressure of 10 -150 psig
- Minimum valve inlet to outlet temperature requirement (system recirculation temperature loss) of 2°F
- 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
- Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
- System shall not require a temperature activated pump shut-off device (aquastat).
- Remote Set Point adjustment capability
- Capability to disable manual temperature adjustment capability for system security

## Water Temperature Control - Recirculation Systems Electronic

### The Brain Model EMC 2

**General:** 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. Temperature controllers feature integrated circuit board technology designed to deliver blended water economically at a safe, accurate temperature for sanitary use in re-circulated hot water systems. Electronic control box shall be supplied pre-wired, terminating at a knockout for Romex or BX cable connector.

Materials of construction and items included shall be:

- Frame of 2" carbon steel angle
- Two 12V AC electronic temperature controllers
- Two 110V AC UL Listed transformers enclosed in a NEMA 4X enclosure
- Low voltage control wiring with protective conduit
- All required valve fittings and isolation valves, pressure gauges, inlet combination ball valve strainers, inlet/return check valves, inlet, system blend and return line thermometers

**Performance:** The Electronic Mixing Center (EMC) shall deliver up to 144 gpm with no minimum system draw-off requirement. The EMC shall have a visual operation "set" and "actual" temperature display for effective commissioning, adjustment and system monitoring and 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. The temperature controller shall be compliant with ASSE Standard 1017 and CSA B125 and so certified and identified.

The Electronic Mixing Center shall include all of the following capabilities:

- Accurate control of blended water drawn from the system at a point of use within +/-2°F at draw off points a minimum of 5m downstream of mixing valve during consistent system demand periods
- Operational water pressure of 10 -150 psig
- Minimum valve inlet to outlet temperature requirement (system recirculation temperature loss) of 2°F
- 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
- Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
- System shall not require a temperature activated pump shut-off device (aquastat).



## Sample Specifications

### Water Temperature Control - Recirculation Systems Electronic

#### The Brain Model EMC 22

**General:** 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. Temperature controllers feature integrated circuit board technology designed to deliver blended water economically at a safe, accurate temperature for sanitary use in re-circulated hot water systems. Electronic control box shall be supplied pre-wired, terminating at a knockout for Romex or BX cable connector.

Materials of construction and items included shall be:

- Frame of 2" carbon steel angle
- Two 12V AC electronic temperature controllers
- Two 110V AC UL Listed transformers enclosed in a NEMA 4X enclosure
- Low voltage control wiring with protective conduit
- All required valve fittings and isolation valves, pressure gauges, inlet combination ball valve strainers, inlet/return check valves, inlet, system blend and return line thermometers
- 1/6 HP circulating pump rated at 15 gpm at 30 ft of head

**Performance:** The Electronic Mixing Center (EMC) shall deliver up to 144 gpm with no minimum system draw-off requirement. The EMC shall have a visual operation "set" and "actual" temperature display for effective commissioning, adjustment and system monitoring and 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. The temperature controller shall be compliant with ASSE Standard 1017 and CSA B125 and so certified and identified.

The Electronic Mixing Center shall include all of the following capabilities:

- Accurate control of blended water drawn from the system at a point of use within +/-2°F at draw off points a minimum of 5m downstream of mixing valve during consistent system demand periods
- Operational water pressure of 10 -150 psig
- Minimum valve inlet to outlet temperature requirement (system recirculation temperature loss) of 2°F
- 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
- Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
- System shall not require a temperature activated pump shut-off device (aquastat).

### Water Temperature Control - Recirculation Systems Electronic

#### The Brain Model EMC 23

**General:** 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. Temperature controllers shall feature integrated circuit board technology designed to deliver blended water economically at a safe, accurate temperature for sanitary use in re-circulated hot water systems. Electronic control box shall be supplied pre-wired, terminating at a knockout for Romex or BX cable connector.

Materials of construction and items included shall be:

- Frame of 2" carbon steel angle
- Two 12V AC electronic temperature controllers
- Two 110V AC UL Listed transformers enclosed in a NEMA 4X enclosure
- Two electronic temperature controller to building automation interface modules with interface cables and integral 4-20 mA input and output connections
- One dual-mode temperature RTD providing a 4-20 mA signal for installation in the mixed downstream pipe work
- Low voltage control wiring with protective conduit
- All required valve fittings and isolation valves, pressure gauges, inlet combination ball valve strainers, inlet/return check valves, inlet, system blend and return line thermometers

**Performance:** The Electronic Mixing Center (EMC) shall deliver up to 144 gpm with no minimum system draw-off requirement. The EMC shall have a visual operation "set" and "actual" temperature display for effective commissioning, adjustment and system monitoring and 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. The EMC shall have an integral two-way data port for PC and BMS interface. The temperature controller shall be compliant with ASSE Standard 1017 and CSA B125 and so certified and identified.

The Electronic Mixing Center shall include all of the following capabilities:

- Accurate control of blended water drawn from the system at a point of use within +/-2°F at draw off points a minimum of 5m downstream of mixing valve during consistent system demand periods
- Operational water pressure of 10 -150 psig
- Minimum valve inlet to outlet temperature requirement (system recirculation temperature loss) of 2°F
- 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
- Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
- System shall not require a temperature activated pump shut-off device (aquastat).
- Remote Set Point adjustment capability
- Capability to disable manual temperature adjustment for system security



## Armstrong® Sample Specifications

### Water Temperature Control - Recirculation Systems Electronic

#### The Brain Model EMC 223

**General:** 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. Temperature controllers shall feature integrated circuit board technology designed to deliver blended water economically at a safe, accurate temperature for sanitary use in re-circulated hot water systems. Electronic control box shall be supplied pre-wired, terminating at a knockout for Romex or BX cable connector.

Materials of construction and items included shall be:

- Frame of 2" carbon steel angle
- Two 12V AC electronic temperature controllers
- Two 110V AC UL Listed transformers enclosed in a NEMA 4X enclosure
- Two electronic temperature controller to building automation interface modules with interface cables and integral 4-20 mA input and output connections
- One dual-mode temperature RTD providing a 4-20 mA signal for installation in the mixed downstream pipe work
- Low voltage control wiring with protective conduit
- All required valve fittings and isolation valves, pressure gauges, inlet combination ball valve strainers, inlet/return check valves, inlet,
- 1/6 HP circulating pump rated at 15 gpm at 30 ft of head

**Performance:** The Electronic Mixing Center (EMC) shall deliver up to 144 gpm with no minimum system draw-off requirement. The EMC shall have a visual operation "set" and "actual" temperature display for effective commissioning, adjustment and system monitoring and 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. The EMC shall have an integral two-way data port for PC and BMS interface. The temperature controller shall be compliant with ASSE Standard 1017 and CSA B125 and so certified and identified.

The Electronic Mixing Center shall include all of the following capabilities:

- Accurate control of blended water drawn from the system at a point of use within +/-2°F at draw off points a minimum of 5m downstream of mixing valve during consistent system demand periods
- Operational water pressure of 10 -150 psig
- Minimum valve inlet to outlet temperature requirement (system recirculation temperature loss) of 2°F
- 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
- Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
- System shall not require a temperature activated pump shut-off device (aquastat).
- Remote Set Point adjustment capability
- Capability to disable manual temperature adjustment for system security

### The Brain™ with Building Automation System Interface Solution (BASIS)

#### Brain Packages w/ BASIS 2 Option Selected

**General:** Everything supplied as standard Brain Package w/ suffix 3 plus the additional items:

- Three temperature transmitters installed in hot and cold water inlet and re-circulation return piping and pre-wired to interface junction panel

#### Brain Packages w/ BASIS 3 Option Selected

**General:** Everything supplied as standard Brain Package w/ suffix 3 plus the additional items:

- Three temperature transmitters installed in hot and cold water inlet and re-circulation return piping and pre-wired to interface junction panel
- Three pressure transmitters installed in hot and cold water inlet and mixed outlet piping and pre-wired to interface junction panel

#### Brain Packages w/ BASIS 4 Option Selected

**General:** Everything supplied as standard Brain Package w/ suffix 3 plus the additional items:

- Three temperature transmitters installed in hot and cold water inlet and re-circulation return piping and pre-wired to interface junction panel
- Three pressure transmitters installed in hot and cold water inlet and mixed outlet piping and pre-wired to interface junction panel
- Two flow meters installed in mixed outlet and re-circulation piping system security





## Sample Specifications

### Water Temperature Control - Recirculation Systems Digital

#### The Brain Digital Recirculating Valve (DRV80)

**General:** Temperature controller shall be controlled digitally via integrated circuit board technology designed to deliver blended water economically at a safe, accurate temperature for sanitary use in re-circulated hot water systems.

Materials of construction and items included shall be:

- Digital Recirculating Valve
- 100-240 V Power supply (12 V AC output)
- 2 x 4-20 mA current loop interfaces:
  - Input: Setpoint Selection
  - Output: Measured Blend Temperature
- Relay output: 24V
  - Error Relay: Activated in error mode
- Serial Connection Port
- Optional External Network Adapter
- All Stainless Steel Construction
- 2" or 3" NPT Connections

**Performance:** The Digital Recirculating Valve (DRV80) shall deliver up to 150 gpm with no minimum system draw-off requirement. The DRV shall have a 2 line, 16 character display of delivered temperature with the option of °F or °C. Display also shows the error codes and alarm conditions. Setpoint configuration, unit selection, and alarm conditions available via the IrDA programming port used with the programming software or via the Building Automation System. The DRV shall have an integral data port for the 4-20 mA interfaces. The DRV shall also include an integral serial data (RS485) connection port for a multitude of Building Automation Interface as well as internet connectivity. The temperature controller shall be compliant with ASSE Standard 1017 and CSA B125 and so certified and identified.

The Digital Recirculating Valve shall include all of the following capabilities:

- Accurate control of blended water drawn from the system at a point of use within +/-2°F at draw off points a minimum of 5m downstream of mixing valve during consistent system demand periods
- Operational water pressure of 10 -150 psig
- Minimum valve inlet to outlet temperature requirement (system recirculation temperature loss) of 2°F
- 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
- Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
- System shall not require a temperature activated pump shut-off device (aquastat).
- Programmable set point range of 100-160°F (37-71°C) plus full hot/full cold
- Programmable thermal disinfection
- Programmable 1<sup>st</sup> level hi/lo temp alarm display
- Programmable 2<sup>nd</sup> level hi/lo temp alarm display/full cold

### Water Temperature Control - Recirculation Systems Digital

#### The Brain Digital Recirculating Valve (DRV80R)

**General:** Temperature controller shall be controlled digitally via integrated circuit board technology designed to deliver blended water economically at a safe, accurate temperature for sanitary use in re-circulated hot water systems.

Materials of construction and items included shall be:

- Digital Recirculating Valve
- 100-240 V Power supply (12 V AC output)
- 2 x 4-20 mA current loop interfaces:
  - Input: Setpoint Selection
  - Output: Measured Blend Temperature
- Relay output: 24V
  - Error Relay: Activated in error mode
- Serial Connection Port
- Optional External Network Adapter
- All Stainless Steel Construction
- 2" or 3" NPT Connections

**Performance:** The Digital Recirculating Valve (DRV80) shall deliver up to 150 gpm with no minimum system draw-off requirement. The DRV shall have a 2 line, 16 character display of delivered temperature with the option of °F or °C. Display also shows the error codes and alarm conditions. Setpoint configuration, unit selection, and alarm conditions available via the IrDA programming port used with the programming software or via the Building Automation System. The DRV shall have an integral data port for the 4-20 mA interfaces. The DRV shall also include an integral serial data (RS485) connection port for a multitude of Building Automation Interface as well as internet connectivity. The temperature controller shall be compliant with ASSE Standard 1017 and CSA B125 and so certified and identified.

The Digital Recirculating Valve shall include all of the following capabilities:

- Accurate control of blended water drawn from the system at a point of use within +/-2°F at draw off points a minimum of 5m downstream of mixing valve during consistent system demand periods
- Operational water pressure of 10 -150 psig
- Minimum valve inlet to outlet temperature requirement (system recirculation temperature loss) of 2°F
- 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
- Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
- System shall not require a temperature activated pump shut-off device (aquastat).
- Programmable set point range of 100-160°F (37-71°C) plus full hot/full cold
- Recirculation system manifold comprising of the following:
  - System return check valve
  - Return to heater check valve
  - Return to heater ball flow indicator
  - Cold water check valve
- Programmable 1<sup>st</sup> level hi/lo temp alarm display
- Programmable 2<sup>nd</sup> level hi/lo temp alarm display/full cold



## Armstrong® Sample Specifications

### Water Temperature Control - Recirculation Systems Digital

#### The Brain Model DMC 1

**General:** All required installation components shall be supplied pre-plumbed and pressure-tested, mounted to an enameled steel frame terminating in three ANSI flanged connections for hot and cold supply in, blended water to the system, and two standard union connections for system and water heater return lines. Temperature controller shall be controlled digitally via integrated circuit board technology designed to deliver blended water economically at a safe, accurate temperature for sanitary use in re-circulated hot water systems.

Materials of construction and items included shall be:

- Frame of 2" carbon steel angle
- One 12V Digital Recirculating Valve (DRV80)
- One UL Listed Power supply's rated at 100-240V (12V AC output)
- 2 x 4-20 mA current loop interfaces:
  - Input: Setpoint Selection
  - Output: Measured Blend Temperature
- Relay output: 24V
  - Error Relay: Activated in error mode
- RS 485 Serial Data Connection Port
- Optional External Network Adapter
- All required valve fittings and isolation valves, pressure gauges, inlet combination ball valve strainers, inlet/return check valves, inlet, system blend and return line thermometers
- All Stainless Steel Construction

**Performance:** The Digital Mixing Center (DMC) shall deliver up to 150 gpm with no minimum system draw-off requirement. The DMC shall have a 2 line, 16 character display of delivered temperature with the option of °F or °C. Display also shows the error codes and alarm conditions. Setpoint configuration, unit selection, and alarm conditions available via the IrDA programming port used with the programming software or via the Building Automation System. The DRV80 shall have an integral data port for the 4-20 mA interfaces. The DRV80 shall also include an integral serial data (RS485) connection port for a multitude of Building Automation Interface as well as Internet connectivity. The temperature controller shall be compliant with ASSE Standard 1017 and CSA B125 and so certified and identified.

The Digital Recirculating Valve shall include all of the following capabilities:

- Accurate control of blended water drawn from the system at a point of use within +/-2°F at draw off points a minimum of 5m downstream of mixing valve during consistent system demand periods
- Operational water pressure of 10 -150 psig
- Minimum valve inlet to outlet temperature requirement (system recirculation temperature loss) of 2°F
- 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
- Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
- System shall not require a temperature activated pump shut-off device (aquastat).
- Programmable set point range of 100-160°F (37-71°C) plus full hot/full cold
- Programmable 1<sup>st</sup> level hi/lo temp alarm display
- Programmable 2<sup>nd</sup> level hi/lo temp alarm display/full cold

### Water Temperature Control - Recirculation Systems Digital

#### The Brain Model DMC 12

**General:** All required installation components shall be supplied pre-plumbed and pressure-tested, mounted to an enameled steel frame terminating in three ANSI flanged connections for hot and cold supply in, blended water to the system, and two standard union connections for system and water heater return lines. Temperature controller shall be controlled digitally via integrated circuit board technology designed to deliver blended water economically at a safe, accurate temperature for sanitary use in re-circulated hot water systems.

Materials of construction and items included shall be:

- Frame of 2" carbon steel angle
- One 12V Digital Recirculating Valve (DRV80)
- One UL Listed Power supply's rated at 100-240V (12V AC output)
- 2 x 4-20 mA current loop interfaces:
  - Input: Setpoint Selection
  - Output: Measured Blend Temperature
- Relay output: 24V
  - Error Relay: Activated in error mode
- RS 485 Serial Data Connection Port
- Optional External Network Adapter
- All required valve fittings and isolation valves, pressure gauges, inlet combination ball valve strainers, inlet/return check valves, inlet, system blend and return line thermometers
- All Stainless Steel Construction
- 3/4 Hp circulating pump rated at 30 gpm at 45 ft of head

**Performance:** The Digital Mixing Center (DMC) shall deliver up to 150 gpm with no minimum system draw-off requirement. The DMC shall have a 2 line, 16 character display of delivered temperature with the option of °F or °C. Display also shows the error codes and alarm conditions. Setpoint configuration, unit selection, and alarm conditions available via the IrDA programming port used with the programming software or via the Building Automation System. The DRV80 shall have an integral data port for the 4-20 mA interfaces. The DRV80 shall also include an integral serial data (RS485) connection port for a multitude of Building Automation Interface as well as Internet connectivity. The temperature controller shall be compliant with ASSE Standard 1017 and CSA B125 and so certified and identified.

The Digital Recirculating Valve shall include all of the following capabilities:

- Accurate control of blended water drawn from the system at a point of use within +/-2°F at draw off points a minimum of 5m downstream of mixing valve during consistent system demand periods
- Operational water pressure of 10 -150 psig
- Minimum valve inlet to outlet temperature requirement (system recirculation temperature loss) of 2°F
- 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
- Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
- System shall not require a temperature activated pump shut-off device (aquastat).
- Programmable set point range of 100-160°F (37-71°C) plus full hot/full cold
- Programmable 1<sup>st</sup> level hi/lo temp alarm display
- Programmable 2<sup>nd</sup> level hi/lo temp alarm display/full cold



## Sample Specifications

### Water Temperature Control - Recirculation Systems Digital

#### The Brain Model DMC 2

**General:** All required installation components shall be supplied pre-plumbed and pressure-tested, mounted to an enameled steel frame terminating in three ANSI flanged connections for hot and cold supply in, blended water to the system, and two standard union connections for system and water heater return lines. Temperature controllers shall be controlled digitally via integrated circuit board technology designed to deliver blended water economically at a safe, accurate temperature for sanitary use in re-circulated hot water systems.

Materials of construction and items included shall be:

- Frame of 2" carbon steel angle
- Two 12V Digital Recirculating Valves (DRV80)
- Two UL Listed Power supply's rated at 100-240V (12V AC output)
- 2 x 4-20 mA current loop interfaces:
  - Input: Setpoint Selection
  - Output: Measured Blend Temperature
- Relay output: 24V
  - Error Relay: Activated in error mode
- RS 485 Serial Data Connection Port
- Optional External Network Adapter
- All required valve fittings and isolation valves, pressure gauges, inlet combination ball valve strainers, inlet/return check valves, inlet, system blend and return line thermometers
- All Stainless Steel Construction

**Performance:** The Digital Mixing Center (DMC) shall deliver up to 300 gpm with no minimum system draw-off requirement. The DMC shall have a 2 line, 16 character display of delivered temperature with the option of °F or °C. Display also shows the error codes and alarm conditions. Setpoint configuration, unit selection, and alarm conditions available via the IrDA programming port used with the programming software or via the Building Automation System. The DRV80 shall have an integral data port for the 4-20 mA interfaces. The DRV80 shall also include an integral serial data (RS485) connection port for a multitude of Building Automation Interface as well as Internet connectivity. The temperature controller shall be compliant with ASSE Standard 1017 and CSA B125 and so certified and identified.

The Digital Recirculating Valve shall include all of the following capabilities:

- Accurate control of blended water drawn from the system at a point of use within +/-2°F at draw off points a minimum of 5m downstream of mixing valve during consistent system demand periods
- Operational water pressure of 10 -150 psig
- Minimum valve inlet to outlet temperature requirement (system recirculation temperature loss) of 2°F
- 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
- Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
- System shall not require a temperature activated pump shut-off device (aquastat).
- Programmable set point range of 100-160°F (37-71°C) plus full hot/full cold
- Programmable 1<sup>st</sup> level hi/lo temp alarm display
- Programmable 2<sup>nd</sup> level hi/lo temp alarm display/full cold

### Water Temperature Control - Recirculation Systems Digital

#### The Brain Model DMC 22

**General:** All required installation components shall be supplied pre-plumbed and pressure-tested, mounted to an enameled steel frame terminating in three ANSI flanged connections for hot and cold supply in, blended water to the system, and two standard union connections for system and water heater return lines. Temperature controllers shall be controlled digitally via integrated circuit board technology designed to deliver blended water economically at a safe, accurate temperature for sanitary use in re-circulated hot water systems.

Materials of construction and items included shall be:

- Frame of 2" carbon steel angle
- Two 12V Digital Recirculating Valves (DRV80)
- Two UL Listed Power supply's rated at 100-240V (12V AC output)
- 2 x 4-20 mA current loop interfaces:
  - Input: Setpoint Selection
  - Output: Measured Blend Temperature
- Relay output: 24V
  - Error Relay: Activated in error mode
- RS 485 Serial Data Connection Port
- Optional External Network Adapter
- All required valve fittings and isolation valves, pressure gauges, inlet combination ball valve strainers, inlet/return check valves, inlet, system blend and return line thermometers
- All Stainless Steel Construction
- 3/4 Hp circulating pump rated at 30 gpm at 45 ft of head

**Performance:** The Digital Mixing Center (DMC) shall deliver up to 300 gpm with no minimum system draw-off requirement. The DMC shall have a 2 line, 16 character display of delivered temperature with the option of °F or °C. Display also shows the error codes and alarm conditions. Setpoint configuration, unit selection, and alarm conditions available via the IrDA programming port used with the programming software or via the Building Automation System. The DRV80 shall have an integral data port for the 4-20 mA interfaces. The DRV80 shall also include an integral serial data (RS485) connection port for a multitude of Building Automation Interface as well as Internet connectivity. The temperature controller shall be compliant with ASSE Standard 1017 and CSA B125 and so certified and identified.

The Digital Recirculating Valve shall include all of the following capabilities:

- Accurate control of blended water drawn from the system at a point of use within +/-2°F at draw off points a minimum of 5m downstream of mixing valve during consistent system demand periods
- Operational water pressure of 10 -150 psig
- Minimum valve inlet to outlet temperature requirement (system recirculation temperature loss) of 2°F
- 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
- Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a manual throttling device or balance valve.
- System shall not require a temperature activated pump shut-off device (aquastat).
- Programmable set point range of 100-160°F (37-71°C) plus full hot/full cold
- Programmable 1<sup>st</sup> level hi/lo temp alarm display
- Programmable 2<sup>nd</sup> level hi/lo temp alarm display/full cold



## BrainScan™ Hot Water Monitoring Device

**General:** Hot Water System Monitoring shall include a Digital Hot Water Management System Console and shall be supplied integral to DRV80 Digital Recirculating Valves and/or DRV80 based Digital Mixing Centers (specifier select).

Hot Water Management System Console shall be factory configured to engage with either a Local Area Network, a third party Building Automation System, or an Internet Provider to enable the mixing units (DRV 80) integral monitoring features.

Hot Water Management System Console configurations shall include hardware and software options which include on screen system graphics which are compatible with most standard Building Automation System open protocols.

Hot Water Management System Console shall interface directly with DRV 80 via an integral serial port so that all standard alarm conditions and error messages available through the DRV80 are received and further transmitted.

All as BrainScan™ by Armstrong Hot Water Inc.,

### BrainScan Options (Specifier select)

- BrainScan 1 - Comprises remote hot water supply, cold/recirculation water supply, and blended water outlet temperature readings. Also gives the ability to remotely change blended water outlet temperature setpoint. Included with all BrainScan options is the valve/system graphic.
- BrainScan 2 - Provided as BrainScan 1 with hot water supply, cold water supply, and blended water outlet pressure transmitters.
- BrainScan 3 - Provided as BrainScan 2 with blended water outlet and recirculation return flow meters to monitor, measure and calculate water usage.

**Technical:** Hot Water Management System Console shall include the following options:

- Shall utilize the SoM-5282 System on Module as the processing engine and uClinux as the operating system
- Shall accommodate a socket for a protocol translator module that is capable of communicating with BacNet MSTP, Lonworks FTT, as well as a modem and wi-fi module
- Shall include standard Ethernet port available to bring system on to the Internet via a secured HTTP network server
- System shall display "real-time" values as well as store data to be downloaded by the facility into their preferred program
- Shall include integral data storage with XML formatted files export capability written at 15 minute intervals
- Shall include an editor accessible via telnet allowing user maintenance and will assign user privileges, which consist of Read Only or Read and Configure

## Water Temperature Control - Emergency Fixtures Thermostatic

### Rada Z358-20

**General:** The Thermostatic Mixing Valve (TMV) shall be of chrome-plated DZR brass/polymer construction with bright "Safety Yellow" control handle. All required installation components shall be supplied pre-plumbed and pressure tested. TMV shall have NPT inlets and outlet with integral inlet spring loaded check valves and strainers, and an outlet with thermometer and tee. TMV shall be equipped with a maximum temperature limiting and single temperature locking feature. TMV shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

Materials of construction and items included shall be:

- Chrome-plated DZR brass/polymer
- 1" NPT inlets with check valves and strainers
- 3/4" NPT outlet with thermometer and tee
- Integral inlet check valves and strainers
- Integral thermometer
- Dual thermostats

**Performance:** 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 at flow rates between .4 and 24 gpm. TMV shall be capable of delivering up to 10 gpm of cold water directly from the cold water supply to the fixture in the event of a failure of the inlet hot supply. TMV shall be 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.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Maintains mixed water temperatures at flow rates between .4 and 24 gpm
- Cold water bypass allows cold water to flow upon hot water supply
- Operational water pressure of 20 - 100 psig for eye wash
- Operational water pressure of 40 - 100 psig for drench showers



## Sample Specifications

### Water Temperature Control - Emergency Fixtures Thermostatic

#### Rada Z358-20-FMC

**General:** The Thermostatic Mixing Valve (TMV) shall be of chrome-plated DZR brass/polymer construction with bright "Safety Yellow" control handle. TMV shall be supplied as standard pre-plumbed and pressure-tested, enclosed in a 26" x 30" x 10" stainless steel recessed cabinet with a 2" flange. Cabinet shall have a polished stainless steel piano-hinged door with keyed cylinder lock. TMV shall have optional top or bottom NPT inlets and outlet with integral combination inlet check stop/union/strainers, and outlet stop valve and thermometer. TMV shall be equipped with a maximum temperature limiting and single temperature locking feature. TMV shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

Materials of construction and items included shall be:

- Chrome-plated DZR brass/polymer
- Cabinet options:
  - Premium: 14 gauge #4 finish stainless steel
  - Standard: 18 gauge #4 finish stainless steel
  - Baked Enamel: 18 gauge white enameled steel
- Optional top or bottom 3/4" NPT inlets and outlet
- Integral combination inlet check stop/union/strainers
- Outlet stop valve and thermometer
- Dual thermostats

**Performance:** 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 at flow rates between .4 and 24 gpm. TMV shall be capable of delivering up to 10 gpm of cold water directly from the cold water supply to the fixture in the event of a failure of the inlet hot supply. TMV shall be 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.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Maintains mixed water temperatures at flow rates between .4 and 24 gpm
- Cold water bypass allows cold water to flow upon hot water supply failure
- Delivers up to 10 gpm of cold water in hot failure mode
- Operational water pressure of 20 - 100 psig for eye wash
- Operational water pressure of 40 - 100 psig for drench showers failure
- Delivers up to 10 gpm of cold water in hot failure mode
- Operational water pressure of 20 - 100 psig for eye wash
- Operational water pressure of 40 - 100 psig for drench showers

### Water Temperature Control - Emergency Fixtures Thermostatic

#### Rada Z358-40

**General:** The Thermostatic Mixing Valve (TMV) shall be of chrome-plated DZR brass/polymer construction with bright "Safety Yellow" control handle. All required installation components shall be supplied pre-plumbed and pressure tested. TMV shall have NPT inlets and outlet with integral inlet spring loaded check valves and strainers, and an outlet with thermometer and tee. TMV shall be equipped with a maximum temperature limiting and single temperature locking feature. TMV shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

Materials of construction and items included shall be:

- Chrome-plated DZR brass/polymer
- 1-1/4" NPT inlets with check valves and strainers
- 1" NPT outlet with thermometer and tee
- Integral inlet check valves and strainers
- Integral thermometer
- Dual thermostats

**Performance:** TMV shall be capable of controlling mixed water temperatures at flow rates between 2 and 48 gpm. TMV shall be capable of delivering up to 20 gpm of cold water directly from the cold water supply to the fixture in the event of a failure of the inlet hot supply. TMV shall be 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.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Maintains mixed water temperatures at flow rates between 2 and 48 gpm
- Cold water bypass allows cold water to flow upon hot water supply failure
- Delivers up to 20 gpm of cold water in hot failure mode
- Operational water pressure of 20 - 100 psig for eye wash
- Operational water pressure of 40 - 100 psig for drench showers



## Water Temperature Control - Emergency Fixtures Thermostatic

### Rada Z358-40-FMC

**General:** The Thermostatic Mixing Valve (TMV) shall be of chrome-plated DZR brass/polymer construction with bright "Safety Yellow" control handle. TMV shall be supplied as standard pre-plumbed and pressure-tested, enclosed in a 26" x 30" x 10" stainless steel recessed cabinet with a 2" flange. Cabinet shall have a polished stainless steel piano-hinged door with keyed cylinder lock. TMV shall have optional top or bottom NPT inlets and outlet with integral combination inlet check stop/union/strainers, and outlet stop valve and thermometer. TMV shall be equipped with a maximum temperature limiting and single temperature locking feature. TMV shall have dual thermostats for increased accuracy and to provide redundancy in case of individual thermostat failure.

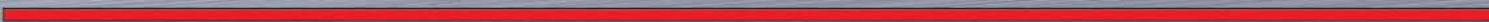
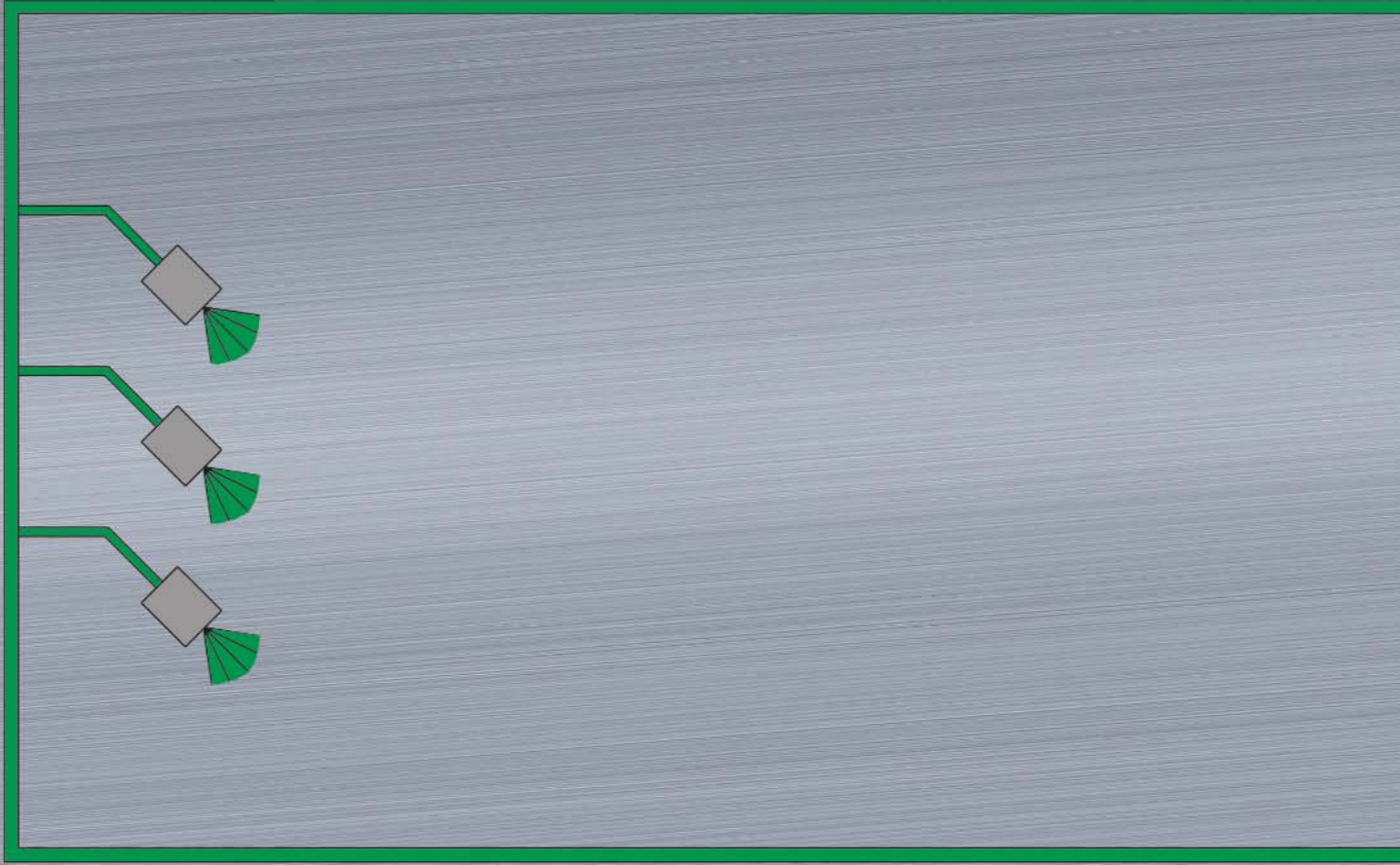
Materials of construction and items included shall be:

- Chrome-plated DZR brass/polymer
- Cabinet options:
  - Premium: 14 gauge #4 finish stainless steel
  - Standard: 18 gauge #4 finish stainless steel
  - Baked Enamel: 18 gauge white enameled steel
- Optional top or bottom 1" NPT inlets and outlet
- Integral combination inlet check stop/union/strainers
- Outlet stop valve and thermometer
- Dual thermostats

**Performance:** TMV shall be capable of controlling mixed water temperatures at flow rates between 2 and 48 gpm. TMV shall be capable of delivering up to 20 gpm of cold water directly from the cold water supply to the fixture in the event of a failure of the inlet hot supply. TMV shall be 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.

The Thermostatic Mixing Valve shall include all of the following capabilities:

- Maintains mixed water temperatures at flow rates between 2 and 48 gpm
- Cold water bypass allows cold water to flow upon hot water supply failure
- Delivers up to 20 gpm of cold water in hot failure mode
- Operational water pressure of 20 - 100 psig for eye wash
- Operational water pressure of 40 - 100 psig for drench showers



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