Rada® 50 Thermostatic Mixing Valve
Installation and Maintenance

Water Temperature Controls
Recirculation Systems
Thermostatic

This Rada 50 Valve has been supplied for this application based upon information provided to Armstrong at the time the order was placed.

This Rada 50 Valve is configured for use in a “dead leg” piping configuration as indicated in the drawing on page 4.

This Rada 50 Valve is not configured for use as the primary controller in a central pumped re-circulation system.

This Rada 50 Valve is not designed to deliver tepid water to Emergency Fixtures.

For further information, please call our technical department Toll Free at 1-888-HOT-HOSE.

Important Note: Rada 50 is not designed to be the final water temperature controller in an institutional hygiene application.

Model No. Rada 50
Serial No. __________________________
Ship Date __________________________
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 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.

Warning: Rada 50 is not designed to be the final water temperature controller in an institutional hygiene application.

Technical Specifications
• 2” NPT inlets and 2” 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 inlet check valves
• Integral thermometer
• ASSE 1017 and CSA B125 certified
• Shipping weight 30 lbs (13.5 kg)

For a submittal drawing, refer to CDLW #1042.

<table>
<thead>
<tr>
<th>Rada Thermostatic Mixing Valves (gpm)</th>
<th>Pressure Drop (psi)</th>
<th>Min. Flow</th>
<th>Cv</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
<td><strong>5</strong></td>
<td><strong>10</strong></td>
<td><strong>15</strong></td>
</tr>
<tr>
<td>320</td>
<td>8</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>425</td>
<td>15</td>
<td>22</td>
<td>27</td>
</tr>
<tr>
<td>40</td>
<td>36</td>
<td>51</td>
<td>62</td>
</tr>
<tr>
<td>50</td>
<td>49</td>
<td>70</td>
<td>85</td>
</tr>
</tbody>
</table>
Rada 50 Components

Rada 50 is supplied with the following components:

<table>
<thead>
<tr>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
</table>
| 1 each Rada 50 Thermostatic Mixing Valve with integral inlet check valves and thermometer. | D35313
| | D35314
| | D35315

The Rada 50 supplied with this I&M includes the following (checked) Thermostatic Element.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Temperature Range</th>
<th>Stamp Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>D14796</td>
<td>Low 90 - 115°F (32 - 46°C)</td>
<td>2195</td>
</tr>
<tr>
<td>D14797</td>
<td>Standard 115 - 135°F (46 - 57°C)</td>
<td>8883</td>
</tr>
<tr>
<td>D14798</td>
<td>High Above 135°F (57°C)</td>
<td>8887</td>
</tr>
</tbody>
</table>

Safety Warnings

The function of a Thermostatic Mixing Valve is to deliver water consistently at a pre-designated temperature.

Rada Thermostatic Mixing Valves are precision engineered to give continued superior and safe performance provided:

1. They are installed, commissioned, operated and maintained in accordance with the recommendations provided and accepted plumbing practices.

2. Periodic attention is given, as necessary, to maintain the product, the accessory fittings and the plumbing system in good functional order.

In keeping with every other mechanical product, Rada Mixing Valves should not be considered as functionally infallible and, as such, will never totally replace the vigilance and attention of facility nursing/bathing or other institutional supervisory or industrial safety staff.

Provided that they are installed, commissioned, operated and maintained, the risk of product failure and its associated consequences, if not eliminated, are reduced to the minimum achievable.

Rada 50 Operating Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Hot Water Supply Temperature</td>
<td>185°F (85°C) *</td>
</tr>
<tr>
<td>Minimum Cold Water Supply Temperature</td>
<td>33°F (1°C)</td>
</tr>
<tr>
<td>Optimum Minimum Inlet to Outlet Temperature Differential</td>
<td>18°F (10°C)</td>
</tr>
<tr>
<td>Optimum Thermostatic Control Range</td>
<td>86°F (30°C) - 122°F (50°C) **</td>
</tr>
<tr>
<td>Maximum Flow Rate</td>
<td>58 gpm (219 lpm) ***</td>
</tr>
<tr>
<td>Minimum Flow Rate</td>
<td>2 gpm (7.5 lpm)</td>
</tr>
<tr>
<td>Maximum Inlet Supply Pressure</td>
<td>150 psi (10 bar)</td>
</tr>
<tr>
<td>Minimum Inlet Supply Pressure</td>
<td>10 psi (0.7 bar)</td>
</tr>
<tr>
<td>Maximum Inlet to Outlet Pressure Differential (pressure drop)</td>
<td>20 psi (1.4 bar)</td>
</tr>
</tbody>
</table>

Inlet supply pressure must be nominally equal.

*Rada 50 can accept temporary excursions above 185°F (85°C) and maintain control without sustaining internal damage. (ASSE 1017 certification requires exposure to 200°F (93°C) for a period of 30 minutes). Prolonged operation of the mixing valve at such elevated temperatures is not recommended.

**Rada 50 can be supplied with a high temperature thermostat for applications where the outlet temperature required is greater than 130°F (54°C).

***Maximum flow rate determined at 9 ft/sec pipeline velocity.
**Rada 50 Installation**

The Rada 50 Thermostatic Mixing Valve must be installed as per the piping schematic provided below. Failure to follow this directive will compromise valve/system performance, void all warranties and may create a user comfort issue and safety concern.

Armstrong has Rada technical support personnel available from 8:00 a.m. to 5:00 p.m. EST. Call Toll Free 1-888-HOT HOSE.

**Notes:**

1. Rada 50 may be installed in a vertical or horizontal position.

2. Rada 50 must be installed in a standard **HOT-LEFT/COLD-RIGHT** inlet supply configuration. There are red (hot) and blue (cold) markings on each valve. The inlet supplies must always match the corresponding inlet ports on the valve.

3. Be sure to thoroughly flush the pipework before fitting the Rada 50. A good quality “Y” type strainer (40 mesh minimum) should be installed on hot and cold water inlets to mixing valve.

4. Be sure to “make up” all “sweat” or “soldered” fittings ahead of time. Do not expose Rada 50 or any of its fittings to extreme temperatures (such as an acetylene or propane torch).

5. Rada 50 is pre-set at the factory to a fixed outlet temperature. It is highly unlikely that the installation site conditions will match the test conditions. As such:

   **RADA 50 MUST BE PRE-SET ON SITE BY QUALIFIED PERSONNEL.**
   
   Rada 50 set up (commissioning) protocol is included on page 5.

6. Rada 50 requires service access beneath the bonnet assembly. A minimum access clearance of 18” is suggested.

**Rada 50 Piping Schematic**

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![Rada 50 Piping Schematic](image-url)
Commissioning the Rada 50

Commissioning must be carried out in accordance with these instructions, and must be conducted by designated, qualified and competent personnel.

Ensure that the hot and cold supplies are at their designated pressures and temperatures. Open mixed water outlet and wait until the hot and cold inlet temperatures are stable. Note the mixed water temperature.

If the mixed water temperature requires adjustment, turn the adjusting key clockwise (Photo 5-1) to reduce the temperature or counterclockwise to increase the temperature. Turn the key only 1/2 turn at a time and allow a few seconds for the temperature to stabilize.

Fixed Temperature Setting

Remove and store the key.
Rada 50 is supplied with a removable temperature adjustment key. The temperature adjustment spindle is protected by a lock shield mechanism to discourage unauthorized adjustment.

Rada 50 Servicing and Maintenance

Rada 50 Thermostatic Mixing Valves should be inspected annually, or more frequently where acknowledged site conditions such as high mineral content water dictate.

To service the Rada 50 proceed as follows:

Isolate/by-pass the valve by turning off each inlet supply.
Isolate the outlet.

Step 1.
Turn the adjustment screw, using the Temperature Adjustment key (Part No. D18462) provided, counter clockwise until it comes to a stop. To make resetting easier after service, count the number of turns to full stop and note them in the box provided. Refer to Photo 5-2.

Step 2.
Remove the Bonnet Assembly (Part No. D33741) with a large wrench by turning counterclockwise. Refer to Photo 5-3.
A. Turn the Adjustment Screw fully clockwise and remove it from the Bonnet Assembly. Refer to Photo 6-1.

B. Remove the Adjustment O-Seals (3) and Cover O-Seal (Service/O-Seal Kit Part No. D33467).

C. Clean and inspect the Cold Valve Face along with all the other machined surfaces using a scouring cloth or a domestic pot cleaner.

D. Reinstall O-Seals into Bonnet Assembly after first applying a silicone-based lubricant such as Dow 111 and re-install adjustment screw.

Step 3. Fit the Cartridge Removal Tool (Part No. D18463) into the two tappings on the face of the Cartridge Assembly (Part No. D33431 / D33432 / D33433). Refer to Photo 6-2.

Step 4. Gently withdraw the Cartridge Assembly, the Return Spring and Spring Support Washer. Refer to Photo 6-3.

Step 5. Remove Slide Valve Seal (the slide valve seal consists of a white teflon® and black EPDM seal) from the Valve Body; clean seal groove, replace Slide Valve Seal after first applying a silicone based lubricant such as Dow 111. Refer to Drawing 1 Page 8.

Step 6. Using two wrenches, grip the hex at each end of the Cartridge Assembly and carefully unscrew and remove whichever end piece comes loose first. Refer to Drawing 2 Page 8.

Step 7. Remove the Thermostatic Element (Part No. D14796 / D14797 / D14798). Refer to Photo 6-4.
Rada 50 Servicing and Maintenance

Step 8.
Using a screwdriver placed through the cartridge body to “hold back” carefully unscrew the remaining end cap on the Cartridge Assembly. Refer to Photo 7-1.

Step 9.
Clean the Slide Valve using a scouring cloth or a domestic pot cleaner but do not attempt to remove the slide valve from the spool. Refer to Drawing 2 Page 8.

Do not use the scouring cloth on the spool, you will scratch the specially coated surface. Use a soft cloth and water.

Step 10.
Ensure that the inner surfaces of the Element Guide, Spool and Spool End cap are clean.

Step 11.
Replace Push Rod Seal (Service/O-Sea Kit Part No. D33467) on Push Rod within Element Guide and reassemble. Refer to Drawing 2 Page 8.

Step 12.
Reinstall Element Guide into Cartridge Body being careful to locate the Element Guide at the end of the cartridge, which houses the slide valve. Do not over torque. Refer to Drawing 2 Page 8.

Step 13.
Replace Thermostatic Element after first applying a silicone-based lubricant such as Dow 111 to the pistons at either end. The Thermostatic Element comprises two thermostats joined by a spring. Insert the complete assembly so that the thermostat with the flange (baffle plate) locates first. Refer to Photo 7-2.

Step 14.
Replace the Spool Endcap using care not to over torque. Refer to Drawing 2 Page 8.

Step 15.
Replace slide valve seal (slide valve consists of a white Teflon® and black EPDM seal). 
Note: Always use new seals (Service/O-Sea Kit Part No. D33467).

Step 16.
Reinstall the Spring Support Washer and Return Spring. Refer to Drawing 1 Page 8.

Step 17.
Reinstall the Cartridge Assembly into the Valve Body.

Step 18.
Replace Bonnet Assembly with the adjustment screw turned fully counter-clockwise.

Step 19.
Refer to your reminder on Page 5, Step 1, and return adjustment screw to its original set point. Pressure test and re-commission the Valve following the directions on Page 5.
**Adjusting Screw**

**Valve Cover**

**Cover Seal**

**Cartridge Removal Tool** (Part No. D18463)

**Cartridge**

*See Page 12*

**Spring Support Washer**

**Return Spring**

**Hot Inlet**

**Slide Valve Seal**

**Hot Valve Face**

**Cold Inlet**

**Cold Valve Face**

**Spool Support Ring**

**Screwdriver**

*Indicates sealing surfaces which must be clean, smooth and undamaged.*
### Rada 50 Parts List

<table>
<thead>
<tr>
<th>Ref. No.</th>
<th>Part Name</th>
<th>Assembly Name</th>
<th>Part No.</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Adjusting Screw</td>
<td></td>
<td>D33741</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Lockshield Nut</td>
<td></td>
<td>D33431</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>*Adjustment Seal (3)</td>
<td></td>
<td>D33432</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Valve Cover</td>
<td></td>
<td>D33433</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>*Cover Seal</td>
<td></td>
<td>D33435</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Return Spring</td>
<td></td>
<td>D33462</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Valve Body</td>
<td></td>
<td>D33485</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>*Coupling Seal</td>
<td>Service/</td>
<td>D33467</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Slide-Valve Seal</td>
<td>Screw Pack</td>
<td>D33435</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Flange Bolt (8)</td>
<td>Service/</td>
<td>D33467</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Flange Seal</td>
<td>O-Seal Pack</td>
<td>D33467</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>*Flange Seal</td>
<td>Service/</td>
<td>D33435</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Keeper Plate</td>
<td></td>
<td>D33486</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>By-Pass Valve (6)</td>
<td></td>
<td>D33464</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>By-Pass Plate</td>
<td></td>
<td>D33487</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>*Spool Support Ring</td>
<td>Service/</td>
<td>D33467</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Outlet Body</td>
<td></td>
<td>D33488</td>
<td></td>
</tr>
</tbody>
</table>

### Bonnet Assembly
- Part No. D33741

### Cartridge Assembly
- Part No. D33431
  - D33432
  - D33433

*Available in Service/O-Seal Pack D33467

† Also included with Thermostat Assembly Part No. D14796
D14797
D14798
## Rada 50/50R Common Spare Parts

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>System Temp. Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>D18462</td>
<td>Temperature Adjustment Key</td>
<td>—</td>
</tr>
<tr>
<td>D18463</td>
<td>Cartridge Removal Tool</td>
<td>—</td>
</tr>
<tr>
<td>D33467</td>
<td>Service/O-Seal Kit</td>
<td>—</td>
</tr>
<tr>
<td>D14796</td>
<td>Thermostatic Element Low Temp.</td>
<td>90 - 114°F</td>
</tr>
<tr>
<td>D14797</td>
<td>Thermostatic Element Standard</td>
<td>115 - 135°F</td>
</tr>
<tr>
<td>D14798</td>
<td>Thermostatic Element High Temp.</td>
<td>Above 136°F</td>
</tr>
<tr>
<td>D33468</td>
<td>Cartridge Assembly Low Temp.</td>
<td>90 - 125°F</td>
</tr>
<tr>
<td>D33469</td>
<td>Cartridge Assembly Standard</td>
<td>113 - 143°F</td>
</tr>
<tr>
<td>D33470</td>
<td>Cartridge Assembly High Temp.</td>
<td>above 136°F</td>
</tr>
<tr>
<td>D33741</td>
<td>Model 50 Bonnet Assembly</td>
<td>—</td>
</tr>
<tr>
<td>D33435</td>
<td>Screw Pack Model 40 and 50 (6) Item 11</td>
<td>—</td>
</tr>
<tr>
<td>D33472</td>
<td>Inlet Check Valve Kit (2 each)</td>
<td>—</td>
</tr>
<tr>
<td>D8931</td>
<td>Outlet Thermometer</td>
<td>—</td>
</tr>
</tbody>
</table>

![Diagram of Rada 50/50R Common Spare Parts](image)
## Fault Diagnosis

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause / Action</th>
</tr>
</thead>
</table>
| 1. Mixed Water Temperature too high when mixed water is being used.    | a. Temperature setting too high. Temperature has been set when hot supply temperature is too low. Re-adjust temperature setting. See Servicing and Maintenance beginning on Page 5.  
  b. Hot water has migrated into cold water supply. Close all mixed water outlets and check that cold supply pipework remains cold.  
| 2. Only hot or cold water from outlet.                                 | a. Inlet supplies reversed (i.e. hot supply to cold inlet). Check - Rectify.  
  c. Check strainers and inlet fittings for blockage.  
  d. Refer to symptom 6 below.  
  e. Installation conditions continuously outside operating parameters:                                                                 |
| 3. Fluctuating or reduced flow rate                                    | Normal function of mixing valve when operating conditions are unsatisfactory.  
  a. Check strainers and inlet/outlet fittings for flow restriction.  
  b. Ensure that minimum flow rate is sufficient for supply conditions.  
  c. Ensure that dynamic inlet pressures are nominally balanced.  
  d. Ensure that inlet temperature differentials are sufficient.  
  e. (Subject to rectification of supply conditions) Check thermostatic performance; renew cartridge assembly if necessary. |
| 4. No flow from mixing valve outlet                                    | Check inlet isolators are fully open.  
  a. Check strainers and inlet/outlet fittings for blockage.  
  b. Hot or cold supply failure; thermostat holding correct shutdown function. Rectify.                                                                 |
| 5. Blend temperature drift                                             | Indicated operating conditions changed.  
  a. Refer to problem 3 above.  
  b. Hot supply temperature fluctuation (rectify and refer to Commissioning Page 5).  
  c. Supply pressure fluctuation. Check - Rectify.                                                                 |
| 6. Hot water in cold supply or cold water in hot supply                | Indicates check valves require maintenance.                                                                                                                                                                    |
| 7. Water leaking from valve body                                       | Seal(s) worn or damaged.  
  a. Obtain Service Pack, and replace all seals.                                                                                                                                                             |
| 8. Mixed water temperature varies, and does not respond to adjustment. | a. The “Cartridge” has seized in the Thermostatic Mixing Valve. Carry out a full service. See Servicing and Maintenance beginning on Page 5.  
| 9. Mixed water flow rate is reduced.                                  | a. Partly blocked strainers. Check - Clean/Replace  
  b. Supply pressure has fallen. Check system at incoming main and other accessible point downstream.  
  c. Extra demand has been added to the system. Check maximum flow-rate for the “Mixing Valve” against maximum expected flow-rate. See Page 3. |
| 10. Mixed water temperature suddenly runs cold.                       | a. Maximum allowable flow-rate has been exceeded. See Page 3. Fit auxiliary mixing valve in parallel or reduce the system demand.                                                                           |
Limited Warranty and Remedy

Armstrong Hot Water Group, Inc. (“Armstrong”) warrants to the original user of those products supplied by it and used in the service and in the manner for which they are intended, that such products shall be free from defects in material and workmanship for a period of one (1) year from the date of installation, but not longer than 15 months from the date of shipment from the factory [unless a Special Warranty Period applies, as listed below]. This warranty does not extend to any product that has been subject to misuse, neglect, or alteration after shipment from the Armstrong factory. Except as may be expressly provided in a written agreement between Armstrong and the user, which is signed by both parties, Armstrong DOES NOT MAKE ANY OTHER REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

The sole and exclusive remedy with respect to the above limited warranty or with respect to any other claim relating to the products or to defects or any condition or use of the products supplied by Armstrong, however caused, and whether such claim is based upon warranty, contract, negligence, strict liability, or any other basis or theory, is limited to Armstrong’s repair or replacement of the part or product, excluding any labor or any other cost to remove or install said part or product, or, at Armstrong’s option, to repayment of the purchase price. As a condition of enforcing any rights or remedies relating to Armstrong products, notice of any warranty or other claim relating to the products must be given in writing to Armstrong: (i) within 30 days of last day of the applicable warranty period, or (ii) within 30 days of the date of the manifestation of the condition or occurrence giving rise to the claim, whichever is earlier. IN NO EVENT SHALL ARMSTRONG BE LIABLE FOR SPECIAL, DIRECT, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, LOSS OF USE OR PROFITS OR INTERRUPTION OF BUSINESS. The Limited Warranty and Remedy terms herein apply notwithstanding any contrary terms in any purchase order or form submitted or issued by any user, purchaser, or third party and all such contrary terms shall be deemed rejected by Armstrong.

Special Warranty Periods are as follows:

Flo-Direct Gas Fired Water Heater
The stainless steel structure and stainless steel internals (flame, tube, pall rings, supports, etc.) shall have a ten (10) year non-prorated guarantee against burn out or any structural failure caused by materials and workmanship. Provided only clean potable water is heated. The other components on the Flo-Direct, such as valves, combustion equipment, electrical controls, and the burner shall have a two (2) year non-prorated guarantee against failure caused by materials and workmanship.

Flo-Rite-Temp Instantaneous Water Heater
The tube bundle shall have a 10-year guarantee against failure caused by materials or workmanship provided by Armstrong but not against gasket failure or damage caused by corrosion, water hammer or lack of proper cleaning.

Flo-Rite-Temp Packaged Instantaneous Water Heater
Two (2) years from the date of installation, but not longer than 27 months from the date of shipment. See above for tube bundle guarantee.

Flo-Eco High Efficiency Gas Water Heater
The heat exchanger and supplied integral components such as the burner, the electrical controls and valving shall have a two (2) year warranty from the date of installation but no longer than 27 months from the date of shipment. The tank and replaceable tank liner shall have a 5 year warranty from the date of shipment.

The Brain – Model DRV80 and derivative assemblies shall have a 5-year all component parts warranty.