



TECHNICAL INSTRUCTIONS—REPAIR KITS
Hydroguard Series 420
Thermostatic Valve
All Models (1–9)

DESCRIPTION

Thank you for purchasing a Powers kit. The Powers kit you have purchased is intended to service or to upgrade your valve. This technical instruction form contains the following information:

- 1. **Parts Drawing**pp. 2–3
- 2. **Disassembling the valve, Installing parts, Reassembling and Testing the valve**.....pp. 4–5
- 3. **Preventive Maintenance and Safety Guidelines**.....p. 6

NOTES ON SPECIFIC KITS

The Powers High Capacity Conversion Kit allows a high valve capacity of 30 L/min (8 gpm) at a pressure drop of 310 kPa (45 psi) for Model 9 valves.

The Powers Low Capacity Conversion Kit allows a low flow performance of 13.2 L/min (3.5 gpm) at a pressure drop of 310 kPa (45 psi) for Model 9 valves.

The Powers Internal Rebuild Kit is the equivalent of upgrading to the 420 Hydroguard Model 9. It is also a complete integral replacement kit for Model 9 users. For more information on how to upgrade to a Model 9 valve, see Series 420 Technical Instructions.

The Powers Low Temperature Hot Water Conversion Kit: The use of this kit permits the discharge temperature to be as close as 1.1°C [2°F] to the hot water supply temperature.

For example, a 42°C [108°F] discharge temperature can be obtained with a 43°C [110°F] hot water supply temperature. Capacity will be as follows with a 310 kPa [45 psi] pressure differential, 43°C [110°F] hot water temperature and 4°C [40°F] cold water temperature:

| Discharge Temperature | Discharge Capacity |
|------------------------------|---------------------------|
| 32°C [90°F] | 22.7 L/min [6 gpm] |
| 42°C [108°F] | 20.8 L/min [5.5 gpm] |

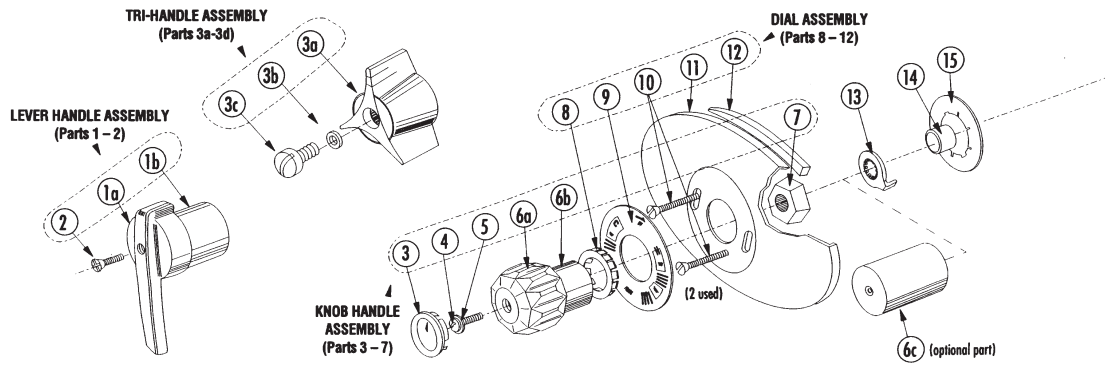
SPECIFICATIONS

| | | |
|--|---------------------------------|--|
| Capacity..... | Standard | 22.7 L/min [6 gpm] (1.9 L/min [0.5 gpm]) |
| | High..... | 30.3 L/min [8 gpm] (1.9 L/min [0.5 gpm]) |
| | Low..... | 13.2 L/min [3.5 gpm] (1.9 L/min [0.5 gpm]) |
| | Low Hot Water Temperature | 20.8 l/min [5.5 gpm] (1.9 L/min [0.5 gpm]) |
| Maximum Hot Water Supply Temperature | | 88°C [190°F] |
| Minimum Hot Water Supply Temperature (not applicable to low temperature hot water valve) | | 14°C [25°F] above set point |
| Maximum Operating Pressure | | .862 kPa [125 psig] |
| Temperature Ranges | Standard | 18–46°C [65–115°F] |
| | High..... | 49–79°C [120–175°F] |
| | Low..... | 4–32°C (40–90°F) |
| Temperature Limit Stop..... | | Adjustable (factory set at 46°C [115°F]) |
| Maximum Static Pressure | | .862 kPa (125 psig) |
| Minimum Flow and Pressure Differential: | Minimum Flow | Min.Press. Differential |
| | Standard Capacity | 9.5 L/min (2.5 gpm) 69kPa (10psi) |
| | High Capacity | 17 L/min (4.5 gpm) 103 kPa (15 psi) |
| | Low Capacity | 3.8 L/min (1.0 gpm) 34 kPa (5 psi) |
| | Low Hot Water Temp. | 2.5 L/min (9.5 gpm) 69 kPa (10 psi) |
| Wall Seal Gasket | | Furnished with Dial |
| Dial Plate..... | | Color-Coded Temperature Scale |
| Shipping Weight | | 2.3 kg [5 lbs] |

* At 310 kPa differential [45 psi], with hot water supply between 60–82°C [140–180°].
 ** At 310 kPa differential [45 psi], with hot water supply of 43°C [110°F] and a set point of 42°C [108°F].
 ▲ For inlet and outlet dimensions and agency certification information, refer to complete Series 420 Technical Instructions.

Note: After any servicing to the 420 valve, the maximum temperature setting (limit stop) must be reset. Refer to page 5 for limit stop instructions. For additional information and individual part numbers for servicing the 420 valve, refer to complete Series 420 technical instructions.

PARTS IN DRAWING BELOW REPRESENT MODELS 8-9 ONLY. For Models 1-7, packing components (items 17 and 18) will differ. See complete Series 420 Technical Instructions for details on Models 4-7 part numbers.



PARTS LIST

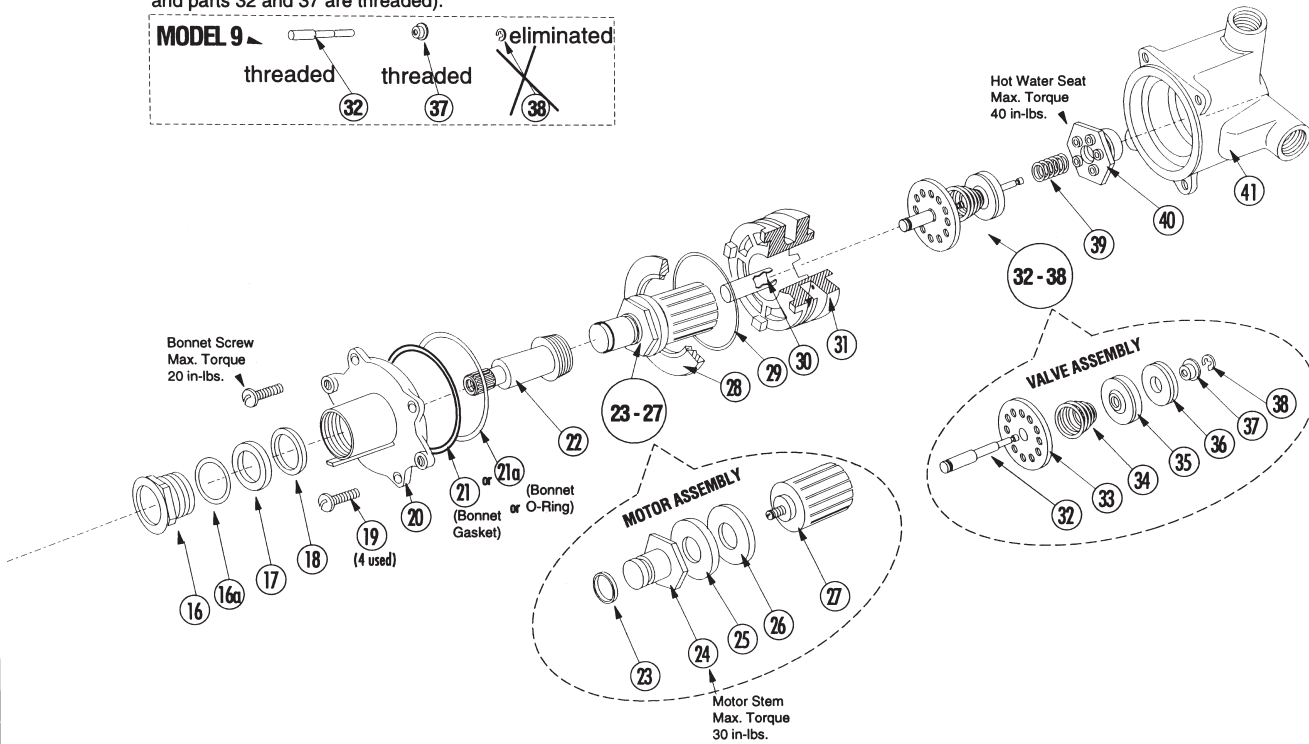
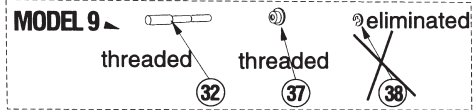
| Item | Description | Part No. | Kit No. | Item | Description | Part No. | Kit No. |
|---------|---|-------------|----------------|-------|--|----------|----------------|
| 1-2 | Lever Handle Assembly | | 420-336 | 21 | Bonnet Gasket | | 227-280 |
| 1a | Lever Handle | — | 420-336 | ◆ | | | |
| 1b | Sleeve | — | 420-336 | 21A | Bonnet O-Ring (for Models 7-9) | 047-128 | ◆ |
| 2 | Lever Handle Screw | | 410-365 | 22 | Adjustment Stem (for Models 7-9) | 420-122 | ◆ |
| 3a-3d | Tri-Handle Assembly | | 410-565 | 23-27 | Motor Assy. [65-115°F (Std.)] | | 227-339 |
| 3a | Tri-Handle | 410-191 | 410-565 | | Motor Assy. [125-175°F (Hi)] | | 227-342 |
| 3b | Washer | 046-008K | 410-565 | | Motor Assy. [40-90°F (Lo)] | | 227-343 |
| 3c | Screw | 030-070 | 410-565 | 23 | Motor Quad Ring | 047-013 | ◆ |
| 3d | Plug Button (NS) | 410-195 | 410-565 | 24 | Motor Stem | 227-049 | ◆ |
| 3-7 | Acrylic Handle Assembly | | 420-337 | 25 | Shut-off Disc Retainer | 227-050 | ◆ |
| 3 | Plug Button and Insert | 420-314 | 420-337 | 26 | Shut-off Disc | 227-206 | ◆ |
| 4 | Handle Screw 8-32 x 3/4" | 034-515K | 420-337 | 27 | Thermostatic Motor | — | ◆ |
| 5 | Washer | 227-197 | 420-337 | 28 | Retaining Ring | | 227-233 |
| 6a | Acrylic Handle Knob | — | 420-337 | ◆ | | | |
| 6b | Sleeve | 227-196 | 420-337 | 29 | Combination Seat Ring | 047-029 | ◆ |
| 6c | Vandal-Proof Cap (optional part)* | 227-344 | — | 30 | Motor Override Stem Sleeve | 420-256 | ◆ |
| 7 | Knob Insert | 420-213 | 420-337 | 31 | Combination Seat: | | |
| 8-12 | Dial Assembly | | 420-335 | | Standard (Model 8) | 227-038A | ◆ |
| 8 | Retaining Ring | | 227-166 | | Standard (Model 9) | 420-518A | ◆ |
| 420-335 | | | | | Low Capacity (for Models 5-9) | 227-388 | ◆ |
| 9 | Dial Graphic Insert (F) | 420-308 | 420-335 | | High Capacity (for Models 5-9) | 420-518A | ◆ |
| 10 | Dial Plate Screws: (Concealed) 8-32 x 1-1/2" | (2) 080-013 | 420-335 | | Low Hot Water Temp (for Models 1-9) | | 420-470 |
| 11 | Dial Plate (Oval) | 420-166 | 420-335 | ◆ | | | |
| 12 | Dial Gasket | 410-284 | 420-335 | 32-38 | Valve Assembly | | |
| 13 | Temp. Stop (for Models 7-9) | — | 420-212 | | Standard Capacity (for Models 5-8) | | 420-193 |
| 14 | Temp. Stop Spacer | — | 420-223 | ◆ | | | |
| 15 | Nameplate | — | — | | Standard Capacity (for Model 9) | 420-552 | ◆ |
| 16 | Packing Gland | | 420-578 | | Low Capacity (for Models 5-9) | 227-388 | ◆ |
| ◆ | | | | | High Capacity (for Models 5-9) | 420-552 | ◆ |
| 16a | O-Ring (5/8 x 3/4 x 1/16) | 084-014 | ◆ | | Low Hot Water Temp (for Models 1-9) | | 420-470 |
| 17 | Huva Cup | — | ◆ | ◆ | | | |
| 18 | Packing Stop Ring | 420-508 | ◆ | 32 | Override Stem (unthreaded Mod 1-8; threaded Mod 9) | — | ◆ |
| 19 | Bonnet Screws 10x24 x 9/16" (4) | 030-887 | ◆ | 33 | Cold Water Shut-Off Plate | — | ◆ |
| 20 | Bonnet | 420-200A | ◆ | 34 | Override Spring | — | ◆ |
| | | | | 35 | Hot Water Disk Retainer | — | ◆ |
| | | | | 36 | Hot Water Shut-Off Disc | — | ◆ |
| | | | | 37 | Override Spring Retainer (unthreaded Mod 1-8; threaded Mod 9) | — | ◆ |

◆ Item available in more than one repair kit. See kit list for kit information.

— Item not available as an individual commercial part **OR** item not available as a commercial kit.

* Vandal-proof cap (part #227-344) prevents any adjustment of the temperature setting. When this cap is installed, 420 valve will remain always open. If part #227-344 is used, another shutoff device must be in place in order to stop water flow. See page 5 for information on installing the vandal-proof cap.

(For Model 9 only: part 38 (e-clip) eliminated, and parts 32 and 37 are threaded).



AVAILABLE REPAIR KITS (continued on following page)

| | | |
|---------|---|------------------|
| 420-481 | Acrylic Handle Kit* | Models 4-6 |
| 420-337 | Acrylic Handle Kit | Models 7-9 |
| | ITEMS: 3, 4, 5, 6 (or 6a & 6b),7 | |
| 227-377 | Bonnet Replacement Kit | Models 4-6 |
| 420-161 | Bonnet Replacement/Conversion Kit** | Models 7-9 |
| | ITEMS: 2, 4, 10, 13, 14, 16, 16a,17, 18, 19, 20,21a, 22, 28 | |
| 227-341 | Combination Seat Kit (Standard Capacity) | Models 1-8 |
| 420-558 | Combination Seat Kit (Standard Capacity) | Model 9 |
| 420-558 | Combination Seat Kit (High Capacity) | Models 5-9 |
| | ITEMS: 21, 21a, 28, 29, 31 ★ | |
| 420-182 | Dial Assembly F Concealed Valves | Models 4-7 |
| 420-335 | Dial Assembly F Concealed Valves | Models 8-9 |
| | ITEMS: 8, 9, 10, 11,12 | |
| 227-338 | Gasket and Disc Replacement Kit*** | All Models (1-9) |
| | ITEMS: 16a, 17, 21, 21a, 23, 26, 29, 37★ | |
| 420-272 | Hardware Kit/Trim Package | All Models (1-9) |
| | ITEMS: 2, 8, 10, 11, 12, and rough-in guide | |

* For Models 4-6, knob insert (Part #227-161) should also be ordered.

** For Models 1-6, handle kit and a trim kit should also be ordered. Trim kit is #420-272.

*** Kit contains packing for various models. Replace old packing with like materials/components and discard extra parts. For model 9 only, shut-off disc not removable. Valve assembly must be replaced as a unit. Do not attempt to removed Model 9 shut-off disc.

★ Lubricating gel included in this kit is for application to the O-rings.

AVAILABLE REPAIR KITS (Additional kits on previous page)

| | | |
|---------|---|------------------|
| 420-562 | Internal Rebuild Kit*** | Models 5-9 |
| 420-555 | Low Capacity Conversion Kit*** | Models 5-9 |
| 420-556 | High Capacity Conversion Kit*** | Models 5-9 |
| | ITEMS: 21, 21a, 28, 29, 31, 32-38, 39,40 ♦ | |
| 420-243 | Lever Handle Kit | Model 7 |
| 420-336 | Lever Handle Kit | Models 8-9 |
| | ITEMS: 1 (or 1a & 1b), 2 | |
| 420-203 | Low Temperature Hot Water Conversion Kit*** | Models 1-8 |
| | ITEMS: 21,21a, 29,31, | |
| 420-557 | Low Temperature Hot Water Conversion Kit | |
| | ITEMS: 21a, 31, 32-37 | Model 9 |
| 227-339 | Motor Replacement Kit—Std. Temp. (65-115°F)*** | All Models (1-9) |
| 227-342 | Motor Replacement Kit—High Temp. (120°F-175°F)*** | All Models (1-9) |
| 227-343 | Motor Replacement Kit—Low Temp. (40-90°F)*** | All Models (1-9) |
| | ITEMS: 21, 21a, 23, 24, 25, 27, 30 | |
| 420-223 | Spacer Kit | Models 4-9 |
| | ITEMS: 14 | |
| 420-222 | Temperature Stop Kit | Models 4-6 |
| 420-212 | Temperature Stop Kit | Models 7-9 |
| | ITEMS: 13 | |
| 410-565 | Tri-Handle Kit | Models 7-9 |
| | ITEMS: 3a-3c | |
| 227-290 | Valve and Hot Water Seat Kit (Standard Capacity)*** | Models 1-4 |
| 227-340 | Valve and Hot Water Seat Kit (Standard Capacity)*** | Models 5-8 |
| 420.561 | Valve and Hot Water Seat Kit (Standard Capacity)*** | Model 9 |
| | ITEMS: 21a, 29, 32-38,39, 40 | |

* For Models 4-6, knob insert (Part #227-161) should also be ordered.

** For Models 1-6, handle kit and a trim kit should also be ordered. Trim kit is #420-272.

***Kit contains packing for various models. Replace old packing with like materials/components and discard extra parts. For model 9 only, shut-off disc not removable. Valve assembly must be replaced as a unit. Do not attempt to removed Model 9 shut-off disc.

★ Lubricating gel included in this kit is for application to the O-rings.

GENERAL INSTRUCTIONS

DISASSEMBLE THE VALVE

1. Turn off supply water, and position valve handle at its full clockwise (OFF) position.
2. Remove plug button, handlescrew, handle, retaining ring and dial insert (Items 1-9 as appropriate).
3. Remove 2 dial plate screws and dial plate (Items 10-11). **Confirm the valve model:** The model number is the first digit of the date code stamped on the valve nameplate. The other three digits of the date code represent the date it was manufactured.
4. If your kit contains items 16 or beyond, continue with disassembly. Remove 4 bonnet screws (Item19). **Do not apply a torque of more than 2 in-lbs. (maximum) to the bonnet screws. When installing new bonnet screws, tighten to a max. torque of 20 in-lbs.**
5. Pull out bonnet assembly and attached motor (Items 20-27). Replace parts as necessary for kit ordered. **NOTE: When installing a new motor assembly, tighten motor stem to a max. torque of 30 in-lbs.**
6. Remove white retaining ring (Item 28).
7. Pullout old combination seat using two pairs of pliers pulling on opposite lugs (Item 31).

INSTALL THE KIT

8. If your kit contains a valve assembly (Items 32-38) and a hot water seat (Item 40), remove the hot water seat using a 7/8" deep well socket ground flat. **NOTE: When installing a new hot water seat, tighten to a max torque of 40 in-lbs.**
9. Lubricate any new combination seat O-rings (Item 29) with the supplied silicone gel.
10. Press the new combination seat fully in the valve.
11. Install new retaining ring (Item 28), with the word TOP facing outward.
12. Install one of the two bonnet sealing gaskets. **Use the flat gasket on valve Models 1-4. Use the O-ring on valve Models 5-9.**

REASSEMBLE THE VALVE

13. Reinsert the motor and attached bonnet assembly. **NOTE: when securing the 4 bonnet screws, maximum torque is 20 in-lbs.**
14. Reattach the faceplate, dial insert, and retaining ring. Attach the valve handle, but do not secure it with the screw.

INSTRUCTIONS FOR INSTALLATION OF OPTIONAL VANDAL-PROOF CAP

- Loosen handlescrew. Set desired temperature on valve. Rotate temperature stop [13] clockwise until it rests against the bonnet stop [20].

This will prevent rotation of the adjustment stem [22] when tightening the handle screw.

- Replace handle with the vandal-proof cap and attach with handle screw.

Note: Any time vandal-proof cap is removed, setpoint and temperature stop [13] must be reset. (See part list description for other information.)

TESTING THE SYSTEM—SETTING THE LIMIT STOP—FINAL ASSEMBLY

Test the System

Before final assembly, test the system and check the maximum temperature setting.

- Verify that the valve is in the OFF position (fully clockwise position).
- Turn on water supply, and then rotate the valve handle counterclockwise. Water should come through the spout/showerhead.

Test the valve to specifications according to your valve type (see specifications on page 1). Measure flow using a calibrated flow meter on the outlet. If a flow meter is unavailable, use a graduated container and a stopwatch.

- Now turn handle **fully** counterclockwise and **measure the temperature** of the outlet water. Wait until the temperature stabilizes for an accurate reading. **If temperature limit stop is out of adjustment, read the following section on how to set.**
- Turn off valve (fully clockwise) and check all connections (showerhead/outlet, pipe connections, valve bonnet) for leaks.

Maximum Temperature Setting: Handle Rotation Stop

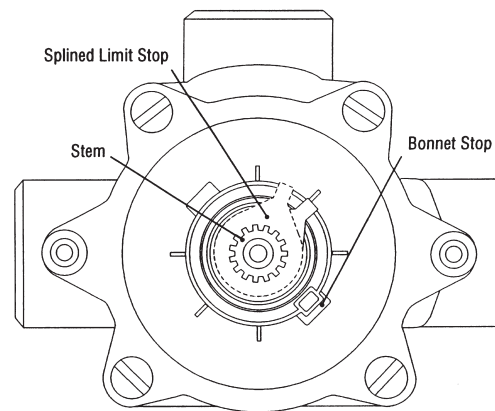
The handle rotation setting *must be adjusted to limit the distance the user can rotate the handle towards the full hot water position.*

Note: The Standard 420 Hydroguard valve was factory set to deliver 46°C (115°F) tempered water, with a hot supply temperature of 60°C (140°F), cold supply temperature of 18°C (65°F), and pressure differential of 310 kPa (45 psi).

The maximum temperature setting must be checked and/or adjusted by the installer if the water conditions differ from this setting.

CAUTION: Any repair or modification of the valve may affect the high temperature setting. The maximum temperature setting must be checked by the installer before use.

**After Rough-In and Testing of System:
Maximum Temperature Setting (Handle Rotation Stop)**



When the user rotates the handle fully counter-clockwise, the limit stop will rest against the bonnet stop (refer to figure).

- Remove the valve handle and splined stop.
- If the outlet temperature measured in Step 3 exceeds the desired maximum outlet temperature, move the limit stop **one spline counter-clockwise**. This will **decrease** the handle rotation and the maximum adjustable temperature.
- If the outlet temperature measured in Step 3 is below the desired maximum outlet temperature, move the limit stop **one spline clockwise**. This will **increase** the handle rotation and the maximum adjustable temperature. Once adjusted, the handle holds the splined stop in position.
- Replace handle. Repeat steps 2 through 7 until desired maximum outlet temperature is reached. Then proceed to step 9.

Final Assembly

- Remove handle before final assembly.

After the handle rotation limit stop has been properly set, reattach the faceplate, dial insert, handle, and (if included) plug button.

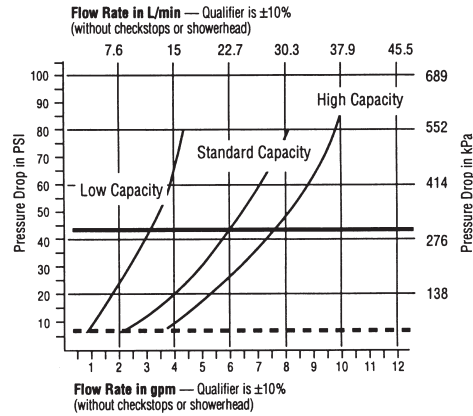
Note: All Powers products are subject to the Terms and Conditions of Sale and Warranty Information, found in the current Powers Commercial Price List.

SAFETY GUIDELINES—ALL MODELS

Adherence to these guidelines and recommendations promotes safe product usage and ensures proper valve performance.

1. Thermostatic water mixing valves are control devices that must be cleaned and maintained on a regular basis. Powers specifies periodic maintenance at least once a year or immediately after any changes are made to the plumbing system. Annual cleaning is recommended, however, frequency of cleaning depends on quality of local water conditions. Refer to the Preventive Maintenance section for recommended cleaning procedure.
2. **Warning:** To prevent injury to the user, **it is important to periodically check the maximum temperature adjustment on the valve for (1) any sign of motor wear or (2) motor failure (refer to the Motor Testing Section of the Series 420 Technical Instructions).** The above conditions in the thermostatic motor can cause the valve to pass full hot water.
3. **Note:** The handle rotation setting must be adjusted to limit the distance the user can rotate the handle towards the full hot water position.
4. Quick closing valves may cause damage to the mixing valve by creating shock waves. When the Hydroguard supplies tempered water to self-closing and/or solenoid valves. Powers recommends installing a shock absorber (Powers Part #460-353) on the discharge line, which will protect the Hydroguard thermostatic motor from damage.

5. Position the 420 valve as close as possible to outlet fixture to avoid waste of energy and water (except in applications where the valve is used as a primary mixing valve).
6. Correct valve sizing affects valve and system performance; refer to the Sizing curves below.



PREVENTIVE MAINTENANCE

NOTE: Before servicing checkstops or piping, always turn off the upstream water supply.

EVERY 12 MONTHS

- Open up the checkstops and check for free movement of the poppet. To access the checkstops, remove the valve handle assembly and dial plate (Items 1–11 as appropriate).
- Before servicing the valve, turn off the water supply upstream or close the optional checkstops. To close the checkstops, turn the adjustment screw fully clockwise on each checkstop.
- Remove the bonnet (Item 201) and check the internal components for freedom of movement. The valve assembly (Items 32–38) should travel 0.050" between the hot water seat and the combination seat (Item 31). Rinse all

grit and impurities from the internal components before reinstallation.

- Test the thermostatic motor as described in the Series 420 Technical Instructions. Check the combination seat and hot water seat holes for blockage, as described in the Servicing section of the Series 420 Technical Instructions. Replace seals if cracked, cut or worn.
- Winterize valves that are used outdoors. Remove and store the internal components and drain all water from the valve.

EVERY THREE MONTHS

- Every three months, check the maximum temperature setting (handle rotation setting). Refer to page 5.

CALIFORNIA PROPOSITION 65 WARNING

WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. (Installer: California law requires that this warning be given to the consumer.)

For more information: www.wattsind.com/prop65

POWERS

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