POWERS
A WATTS INDUSTRIES CO.

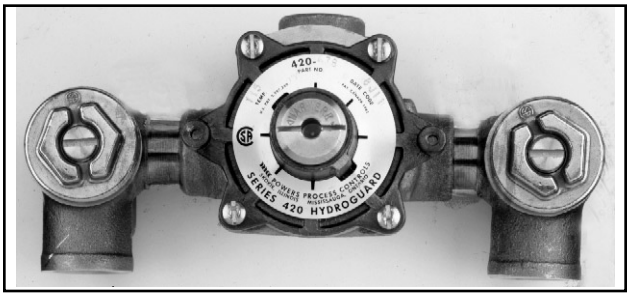
TECHNICAL INSTRUCTIONS
Hydroguard Series 420
Under-the-Counter Thermostatic Tempering Valve

DESCRIPTION

Hydroguard Series 420 Under-the-Counter thermostatic tempering valves are designed for all applications where the temperature of generated hot water must be controlled for safe, economic use. A powerful liquid-filled motor quickly senses and compensates for temperature fluctuations induced by water temperature and pressure changes in the supply line.

Rugged construction features cast brass body and corrosion-resistant internal components for years of dependable, trouble-free service. Screwdriver stem makes temperature adjustment quick and easy.

For restricted access control, the Series 420 valve can be housed in a stainless-steel or white baked enamel steel cabinet and can be packaged with solenoid valve(s) (for ESP electronic faucets), checkstops (highly recommended) or other accessories common to Powers' cabinet supply offering.



Shown above: Model 420-RB-E-S-S-0-0

SPECIFICATIONS

Valve Construction:
Under-the-Counter thermostatic mixing valve, with heavy cast bronze body and brass stem with screwdriver adjustment.

Capacity.....**Standard** .....6 gpm [22.7 L/min]* (±0.5 gpm [1.9 L/min])
High .....8 gpm [30.3 L/min]* (±0.5 gpm [1.9 L/min])
Low .....3.5 gpm [13.2 L/min]* (±0.5 gpm [1.9 L/min])

Maximum Hot Water Supply Temperature .....190°F [88°C]
Minimum Hot Water Supply Temperature (not applicable to low temperature hot water valve) **....**25°F [14°C] above set point
Maximum Operating Pressure .....125 psig [862 kPa]
Temperature Ranges .....**Standard**.....65–115°F [18–46°C]
High .....120–175°F [49–79°C]
Low .....40–90°F [4–32°C]
Maximum Static Pressure.....125 psig [862 kPa]

Minimum Flow and Pressure Differential:	**Minimum Flow**	**Minimum Pressure Differential**
Standard Capacity	2.5 gpm [9.5 L/min]	10 psi [69 kPa]
High Capacity	4.5 gpm [17 L/min]	15 psi [103 kPa]
Low Capacity	1.0 gpm [3.8 L/min]	5 psi [34 kPa]

Shipping Weight .....5 lbs. [2.3 kg]

The Hydroguard Series 420 Under-the-Counter standard and high capacity valves meet the above operating conditions as stated in ASSE 1017 (45 psi pressure differential, hot water supply between 140°–180°F [60–82°C], cold water supply less than 70°F [21°C]).

If your operating conditions vary from those stated in the standard, performance may vary as well. Consult your local sales representative or a Powers factory engineer to discuss your specific application. All Powers Under-the-Counter thermostatic mixing valves perform to the requirements of standards ASSE 1017 and CSA B125.

* At 45 psi differential [310 kPa], with hot water supply between 140°–180°F [60–82°C].

OPERATION

Hot and cold water supplies enter the 420 Hydroguard through their respective inlet ports. Both supplies mix in the chamber containing the valve assembly. The resulting mixture flows across the thermostatic motor, and the motor positions the valve assembly to maintain the desired delivery water temperature.

Delivery water temperature can be varied by turning the adjustment stem. Turning the stem counterclockwise raises the temperature, and turning the stem clockwise lowers the temperature. WARNING: A valve without checkstops, left in the open position, even *with* a downstream shutoff valve used, does not prevent crossflow.

(**Operation** continued on page 3)

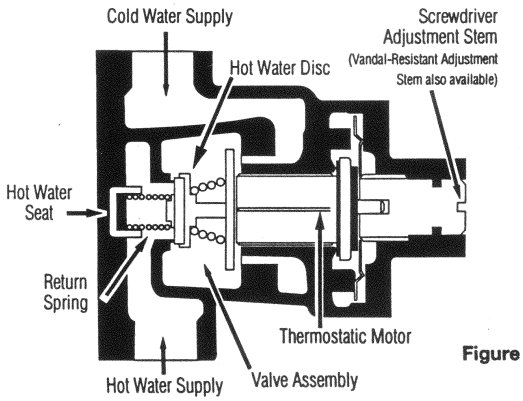


Figure 1.

SAFETY & PERFORMANCE GUIDELINES

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

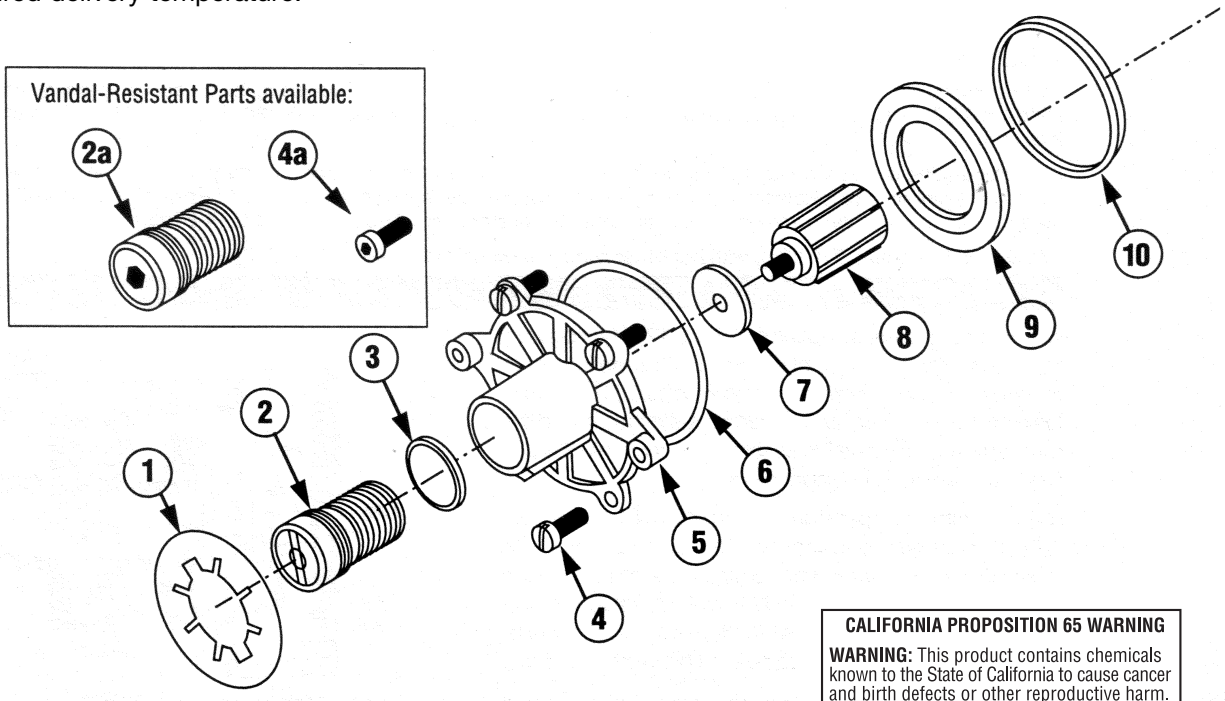
1. Thermostatic water mixing valves are control devices which must be cleaned and maintained on a regular basis. Powers specifies periodic maintenance at least once a year or immediately after any changes are made to the plumbing system. Although annual cleaning is recommended, frequency of cleaning depends on quality of local water conditions. Refer to Preventive Maintenance on page 4 for recommended cleaning procedure.
2. Quick closing valves may cause damage to the mixing valve by creating shock waves. When the 420 Hydroguard supplies tempered water to self-closing and/or solenoid valves, Powers recommends use of a shock absorber (Powers Part No. 460-353) on the discharge line. This protects the 420 Hydroguard thermostatic motor from damage.
3. Locate the 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 to supply an entire building.
4. Correct valve sizing affects valve and system performance; under- or over-sizing of the mixing valve(s) can cause poor operation and possibly injury. Refer to Sizing Information on page 6.

OPERATION (continued from p. 1)

If the temperature of the mixture is higher than the temperature setting, the thermostatic motor actuates the valve assembly toward the hot water seat. Hot water flow decreases and cold water flow increases. Thus the mixture temperature is brought down to the desired temperature. The reverse occurs when the mixture temperature is lower than the temperature setting.

A change in water temperature or pressure of either hot or cold water supply will cause the thermostatic motor to reposition the valve assembly to maintain the desired delivery temperature.

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



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

PARTS LIST

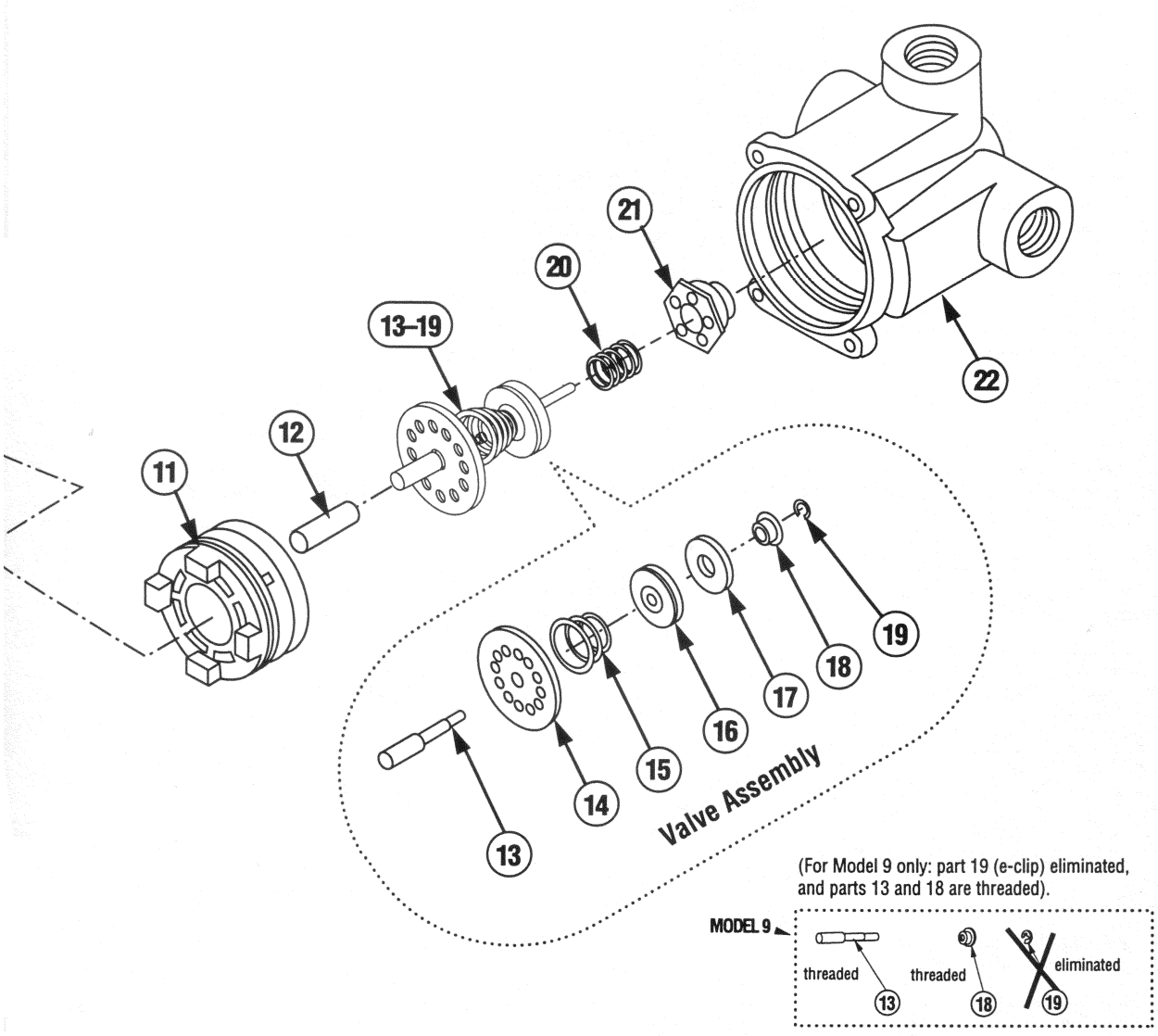
Item #	Product #	Description	Material
1	N/A	Nameplate	Aluminum
2	420-184A	Adjustment Stem	Brass
2a	420-184H	Vandal-Resistant Adj. Stem	Brass
3	047-114	Stem O-Ring	Buna-N
4	420-214	Screws (12 per kit)	Stainless Steel
4a	080-050	Vandal-Resistant Screws (12)	Stainless Steel
5	420-201	Bonnet	Brass
6	†	Bonnet O-Ring	Buna-N
7	046-171	Washer	Brass
8	†	Thermostatic Motor	—
9	227-233	Retaining Ring	Delrin
10	†	Combination Seat O-Ring	Buna-N
11	†	Combination Seat	Delrin
12	†	Motor Sleeve	Brass

Item #	Product #	Description	Material
13–19		**Valve Assembly**	
13		Override Stem	Brass
14		Cold Water Shut Off Plate	Rubber
15		Override Spring	Stainless Steel
16		Hot Water Disc Retainer	Brass
17		Hot Water Shut Off Disc	Bronze
18		Override Spring Retainer	Brass
19		Retaining Spring E-Clip	Copper
20	227-109	Return Spring	Stainless Steel
21	227-389	Hot Water Seat—Low Capacity	Noryl
	420-155	Hot Water Seat—High Capacity	Noryl
	420-250A	Hot Water Seat—Std. Capacity	Noryl
22	N/A	Body	Bronze

† **NOTE:** Item available in more than one repair kit. See repair kits on p. 4.

NA = item not available as an individual commercial part.

ALL MODELS



NOTE: For Model 9 only, the valve assembly must be replaced as a unit. In order to protect the valve assembly from damage, do not attempt to take it apart.

PREVENTIVE MAINTENANCE

Every Six Months: Check and adjust the maximum temperature setting (see instructions below).

Every Twelve Months:

1. Shut off water supply.
2. Open up checkstops (if any).
3. Clean strainers (if any) and check for free movement of checkstop poppet.
4. Remove the bonnet and check for freedom of movement of internal components.
5. Test the thermostatic motor as described in Thermostatic Motor Testing Section (page 5).
6. Replace seals if cracked, cut, or worn.
7. Reassemble.
8. Adjust screwdriver stem to desired temperature.

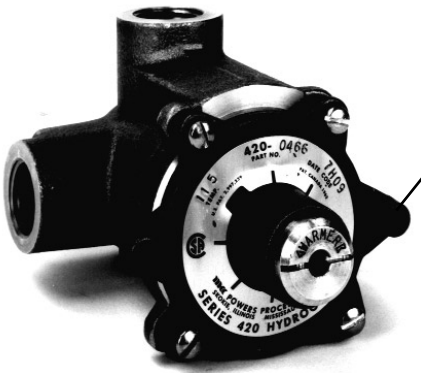


Figure 2.

TROUBLESHOOTING

1. The flow of water is less than desired…
   - valves upstream from supply not fully open
   - low supply pressures
   - accumulation of lime deposits in hot water pipes, restricting the flow of hot water
   - checkstops not fully open
   - clogged strainer screens in the checkstops
   - clogged hot water seat
2. Flow of water is completely shut off…
   - valves upstream from supply completely closed
   - failure of cold water supply pressure (the 420 Hydroguard is designed to shut off on a cold water supply failure)
   - checkstops completely closed
3. Flow is untempered hot or cold water…
   - accumulation of lime deposits in hot water pipes, restricting the flow of hot water
   - thermostatic motor failure; replace with new thermostatic motor
   - hot and cold water supplies are connected to the wrong ports
4. Maximum temperature specified for the 420 Hydroguard cannot be obtained…
   - accumulation of lime deposits in hot water pipes, restricting the flow of hot water
   - hot water supply temperature is too low
5. Variable discharge temperature occurs…
   - extreme pressure variations in supply lines
   - valve operating below minimum capacity requirements

REPAIR KIT PART NUMBERS

Problem	Recommended Kit Type	Repair Kit No.	Used for Model(s)	Includes Items
• Variable or untempered discharge temperature	Motor Replacement	420-519V (High temp) 420-519 (Std. temp) 420-519W (Low temp)	1–9 1–9 1–9	Thermal Motor, Bonnet O-Ring, Motor Sleeve (6, 8, 12)
• Water leaks at valve shut off, shut-off disk and/or hot water seat have been replaced	Combination Seat Replacement	420-559 (High capacity) 420-521 (Std. capacity) 420-559 (Std. capacity) 420-522 (Low capacity)	1–9 1–8 9 1–9	Combination Seat, Combination Seat O-Ring, Retaining Ring, Bonnet O-Ring (6, 9, 10, 11)
• Low flow, desired temperature cannot be reached	Low Temperature Hot Water Conversion Kit	420-203 420-557	1-8 9	Bonnet O-Ring,Combination Seat O-Ring (Mdls. 1-8 kit only), Combination Seat (Mdl. 9 kit only), Valve Assembly (Mdl. 9 kit only)
• Water leaks at bonnet/body	O-Ring Kit	420-524	1–9	Stem O-Ring, Bonnet O-Ring, Combination Seat O-Ring (3, 6, 10)
• Variable or untempered discharge temperature continues after motor replacement	Valve Replacement	420-563 (High capacity) 420-525 (Std. capacity) 420-560 (Std. capacity) 420-560 (Low capacity)	1–9 1–8 9 1–9	Bonnet O-Ring, Valve Assembly (6, 13–19)
• Worn hot water seat	Valve and Hot Water Seat	227-340 (Std. capacity) 420-561 (Std. capacity)	5-8 9	Bonnet O-Ring, Combination Seat O-Ring, Valve Assembly, Return Spring, Hot Water Seat (6, 10, 13-19, 20, 21)

SERVICING

(Before assembling valve, make certain both water supplies to the valve are shut off.)

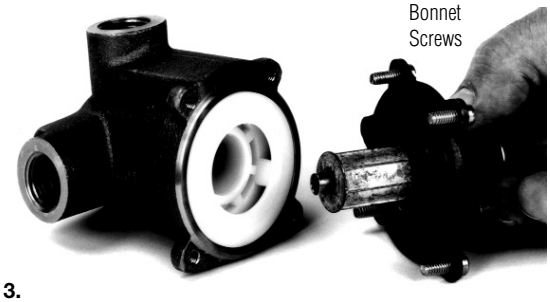


Figure 3.

Remove four bonnet screws and pull out bonnet assembly. The motor and motor sleeve should come out with the bonnet. If not, they can be easily pulled out. When reassembling, the open end portion of the motor sleeve should be projecting out of the motor.

Figure 5.

Pull out the combination seat with a pair of pliers, pulling on the two opposing lugs. One plier can be used by alternately pulling on the two opposite lugs until the seat can be removed by hand. Pull out the valve assembly and return spring as shown in Figure 5.

Figure 4.

A new thermostatic motor can be substituted. Use pliers to separate motor from stem. Locate the pliers near washer. To avoid damage, be certain not to squeeze thermostatic motor too firmly. (See figure 4.)

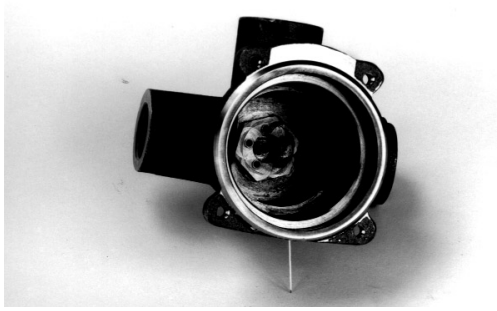


Figure 6.

The hot water seat can be removed with a 7/8" (22mm) socket wrench. (Max. 40 in–lbs. torque.)

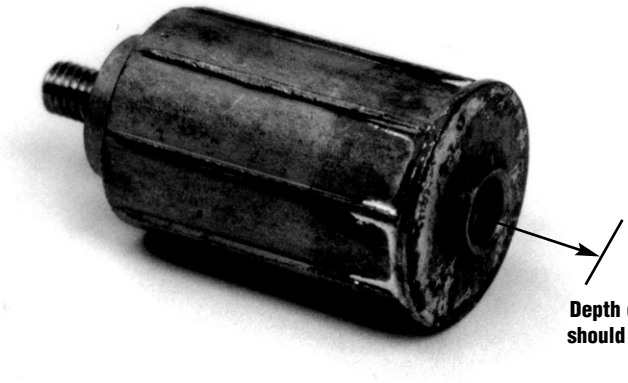
NOTE: After completing any maintenance/repairs, check maximum discharge temperature 115° (46°C). Reset if necessary.

NOTE: When replacing hot water seat, do not over tighten!

THERMOSTATIC MOTOR TESTING

1. Remove the thermostatic motor. Make the following test to determine whether the thermostatic motor is in operating condition.
2. Thermostatic motor bellows should offer firm, not spongy resistance to a rigid blunt object inserted inside the bellows. If it does not offer firm resistance, the thermostatic motor is not fully charged and should be replaced.
3. Place the thermostatic motor sleeve in the motor as shown in Figure 7. Immerse the thermostatic motor into 75°F (24°C) water for a few minutes. The thermostatic motor should cause an approximate 1/32″ (0.8mm) travel with the 25° (13°C) temperature difference. In other words, the top of the sleeve should be approximately 1/32″ (0.8mm) higher at 100°F (38°C) than it was at 75°F (24°C). If this distance is much less, the thermostatic motor has lost part of its charge and should be replaced.

Figure 7.

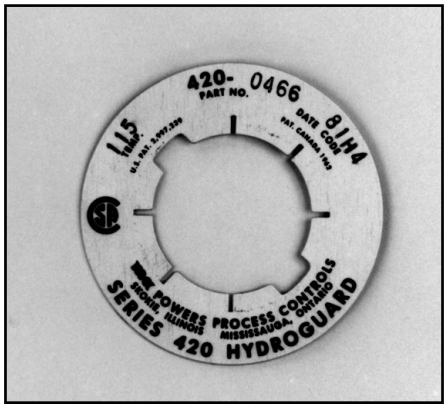


MODEL IDENTIFICATION

To be sure you are installing appropriate parts into your valve, determine the model number. The easiest way to do that is to look at the date code (found on the nameplate of the valve). The date code (not to be confused with the product or part number) is a four-digit code. Its purpose is to record the model/version number of the product itself and the date of manufacture. (See circle "B" in the figure below for location of date code.)

In the example below, the Date Code is labeled by circle "B". The first digit, 8, indicates the model number. The nameplate also indicates the temperature range of the valve. In the figure below, circle "A" shows the location of the temperature range: "115" (a standard valve).

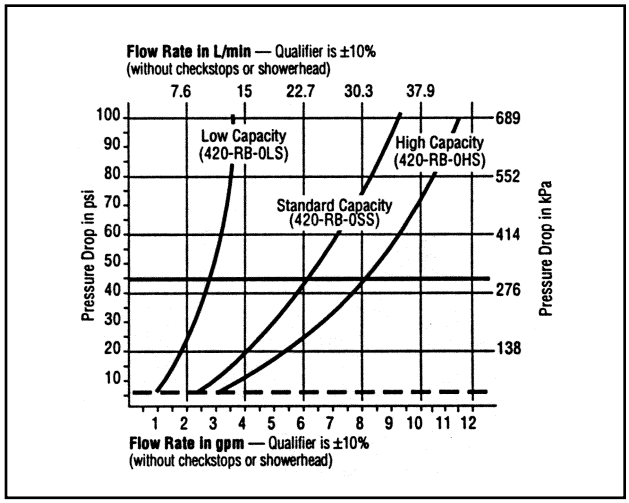
Figure 8. Nameplate



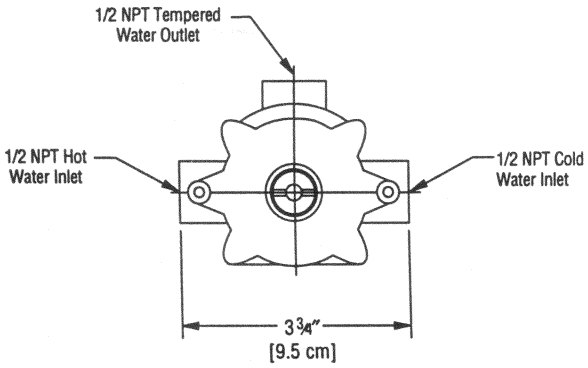
SIZING

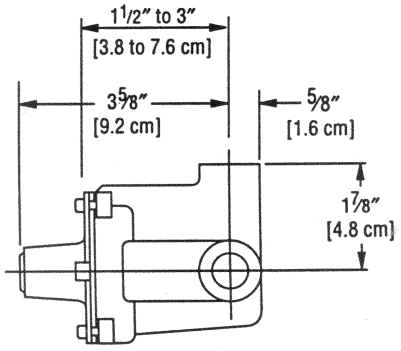
The flow chart below indicates the Hydroguard Series 420 discharge capacity in gpm for various pressure differentials (the difference between the lowest inlet pressure and the discharge pressure at the valve). Valve sizing affects the performance and reliability of the valve. Under- or over-sizing of the mixing valve(s) can cause poor operation and possibly injury.

Warning: This is a water tempering device and is not intended or designed for point-of-use shower applications. ***There is no limit stop.*** It is strongly recommended that checkstops be installed with this valve even when a downstream shutoff is used.

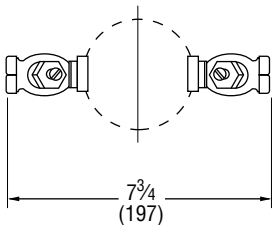


DIMENSIONAL DATA AND CHECKSTOPS

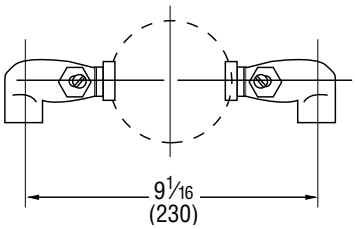




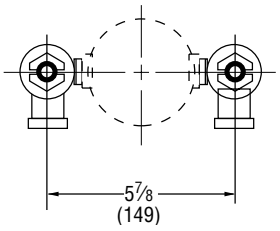
Type A, C



Type D



Type E



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