

7-102, 7-200, 7-400, 7-500, 7-700, 7-900, 7-1000

## TempControl 7 Series Operation & Maintenance Manual



### Coordinating Model Numbers

- HTA-100** *High temp audio/visual alarm system*
- T-425-( )** *3" bimetal dial thermometer*
- BV-( )** *Volume control shut off valves*
- SV-( )** *Solenoid valve*
- TF-( )** *Tee fittings*
- WHA-1** *Water hammer arrestor*

#### Note:

Insert proper model number in parenthesis.

### Configurations *(Components Certified Separately)*

- A** *Valve and piping assembly*
- B** *Valve and piping in cabinet*
- BW** *Valve and piping in cabinet with cold water bypass*

#### Note:

Append appropriate suffix to model number.

### Specification

TempControl thermostatic mixing valve made from lead free\*\* metal components. Models 102-700 feature serviceable integral check stops. Models 900 & 1000 feature removable check stops with union ells (see table 1 for flow rates).

#### Temperature control range:

70°F - 150°F (21.1°C - 65.6°C)

#### Approach temperature: 5°F (2.8°C)

\*\*According to US Senate bill S.3874, the term "lead free" is defined as follows: "not more than a weighted average of 0.25 percent lead when used with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures"

### Compliance

ASME A112.18.1/CSA B125.1

ASME A112.18.3/CSA B125.3

ASSE 1017

CA 116875 (AB 1953)

NSF 372

US S.3874



### Warranty

**5 Years** - for commercial installations.

Refer to [www.symmons.com/warranty](http://www.symmons.com/warranty) for complete warranty information.

Table 1: Flow Rate - gpm (L/min)

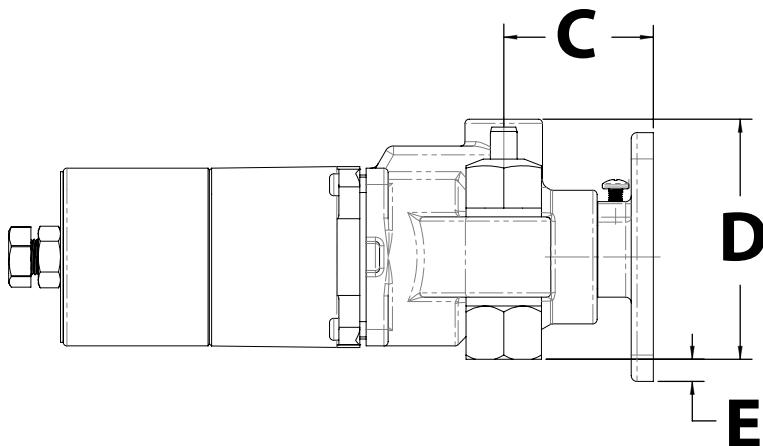
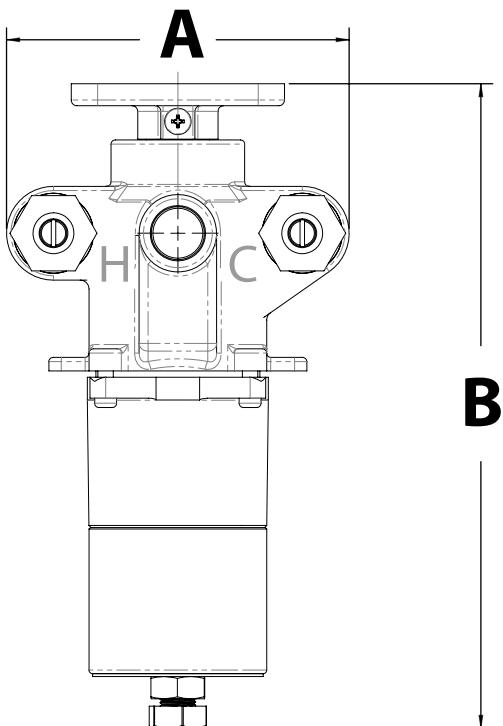
Valve Model	Min. Flow Rate*	Min. Flow Rate	Pressure Differential - psi (kPa)					
			5 psi (34 kPa)	10 psi (69 kPa)	20 psi (138 kPa)	25 psi (172 kPa)	30 psi (207 kPa)	45 psi (310 kPa)
7-102	0.5 gpm (1.9 L/min)	0.5 gpm (1.9 L/min)	1 gpm (4 L/min)	3 gpm (11 L/min)	6 gpm (23 L/min)	7 gpm (27 L/min)	8 gpm (30 L/min)	11 gpm (42 L/min)
7-200	0.5 gpm (1.9 L/min)	5 gpm (19 L/min)	7 gpm (27 L/min)	12 gpm (46 L/min)	18 gpm (68 L/min)	21 gpm (80 L/min)	23 gpm (87 L/min)	27 gpm (102 L/min)
7-400	0.5 gpm (1.9 L/min)	9 gpm (34 L/min)	18 gpm (68 L/min)	27 gpm (102 L/min)	37 gpm (140 L/min)	41 gpm (155 L/min)	44 gpm (167 L/min)	53 gpm (201 L/min)
7-500	0.5 gpm (1.9 L/min)	13 gpm (49 L/min)	22 gpm (83 L/min)	38 gpm (144 L/min)	50 gpm (190 L/min)	55 gpm (209 L/min)	59 gpm (224 L/min)	70 gpm (265 L/min)
7-700	0.5 gpm (1.9 L/min)	13 gpm (49 L/min)	25 gpm (95 L/min)	43 gpm (163 L/min)	57 gpm (216 L/min)	62 gpm (235 L/min)	66 gpm (250 L/min)	77 gpm (292 L/min)
7-900	0.5 gpm (1.9 L/min)	13 gpm (49 L/min)	30 gpm (114 L/min)	55 gpm (209 L/min)	76 gpm (288 L/min)	84 gpm (318 L/min)	89 gpm (337 L/min)	104 gpm (394 L/min)
7-1000	0.5 gpm (1.9 L/min)	13 gpm (49 L/min)	38 gpm (144 L/min)	67 gpm (254 L/min)	100 gpm (379 L/min)	111 gpm (421 L/min)	120 gpm (455 L/min)	140 gpm (531 L/min)

\*Minimum flow rate when valve is installed at or near the hot water source with recirculated tempered water and continuously operating circulating pump.

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**Dimensions (7-102)**



TempControl Valve Sizes		
Model No.	Inlet	Outlet
7-102	1/2"	1/2"
Measurements		
Dimension	7-102	
A	4 13/16", 122 mm	
B	9 1/4", 235 mm	
C	2 1/8", 53 mm	
D	3 3/8", 86 mm	
E	5/16", 8 mm	

**Note:**

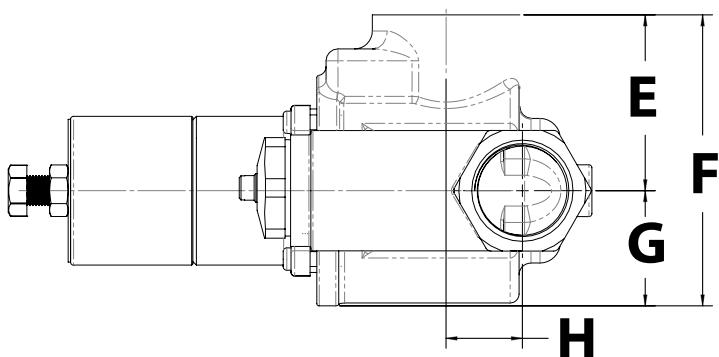
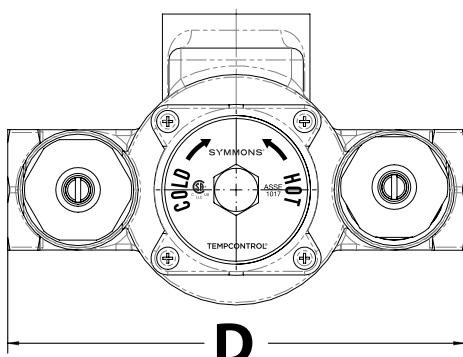
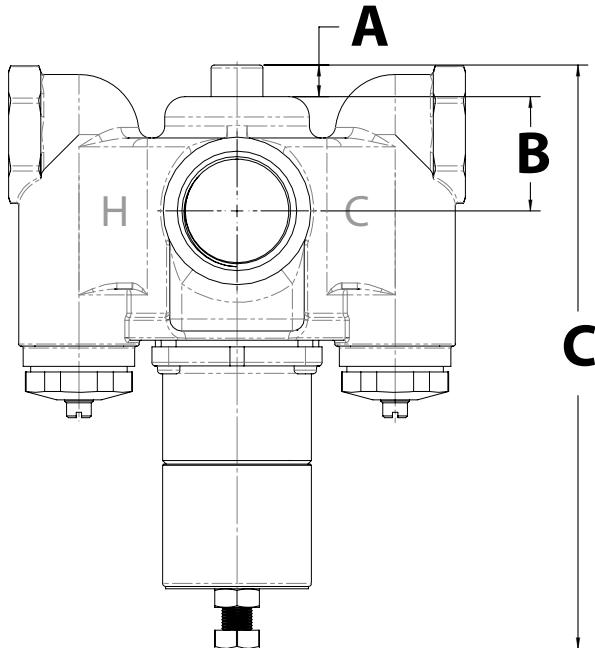
- 1) Dimensions are subject to change without notice.

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Dimensions (7-200, 7-400, 7-500, 7-700)



TempControl Valve Sizes		
Model No.	Inlet	Outlet
7-200	3/4"	3/4"
7-400	3/4"	1"
7-500	1"	1 1/4"
7-700	1 1/4"	1 1/2"
Measurements		
Dimension	7-200	7-400
A	1/2", 13 mm	1/2", 13 mm
B	1 7/8", 46 mm	1 1/2", 39 mm
C	8 15/16", 226 mm	9 3/4", 251 mm
D	5 15/16", 150 mm	6 1/2", 165 mm
E	2", 51 mm	2 5/8", 67 mm
F	3 5/16", 84 mm	4 1/8", 105 mm
G	1 5/16", 33 mm	1 1/2", 38 mm
H	11/16", 17 mm	3/4", 19 mm
Dimension	7-500	7-700
A	1/2", 13 mm	1/2", 13 mm
B	1 15/16", 49 mm	1 15/16", 49 mm
C	9 5/8", 248 mm	9 13/16", 243 mm
D	7 11/16", 195 mm	7 11/16", 195 mm
E	2 15/16", 75 mm	2 15/16", 75 mm
F	4 7/8", 124 mm	4 7/8", 124 mm
G	1 15/16", 49 mm	1 15/16", 49 mm
H	1 5/16", 33 mm	1 5/16", 33 mm

**Note:**

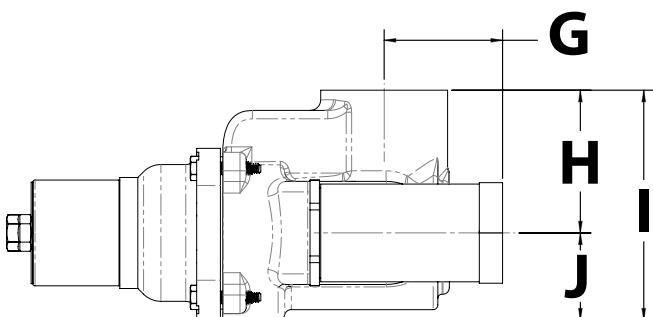
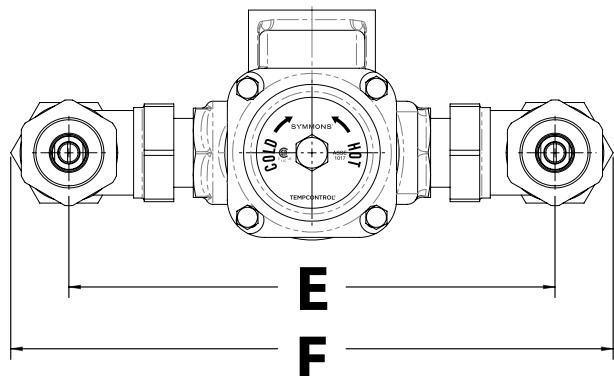
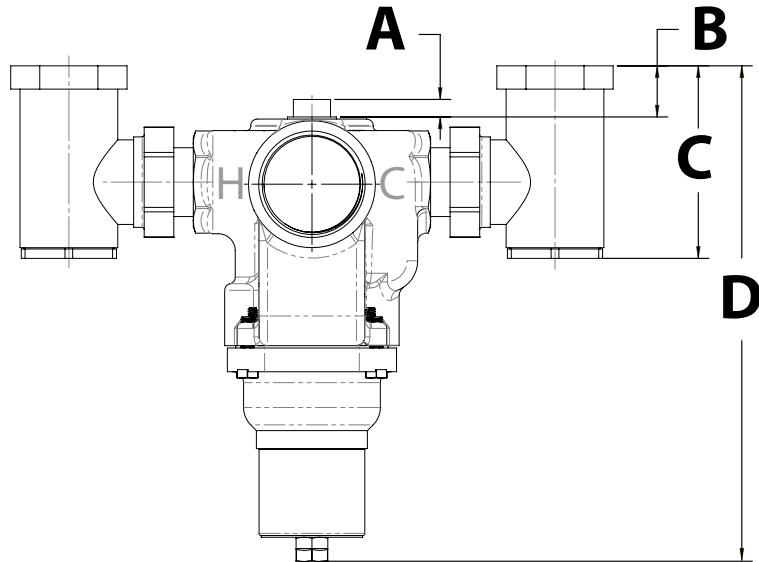
- 1) Dimensions are subject to change without notice.

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## Dimensions (7-900, 7-1000)



TempControl Valve Sizes		
Model No.	Inlet	Outlet
7-900	1 1/2"	1 1/2"
7-1000	1 1/2"	2"
Measurements		
Dimension	7-900	7-1000
A	7/16", 11 mm	7/16", 11 mm
B	1 3/16", 31 mm	1 3/16", 31 mm
C	4 9/16", 116 mm	4 9/16", 116 mm
D	11 1/6", 280 mm	11 3/8", 289 mm
E	11 1/2", 296 mm	11 1/2", 296 mm
F	14 1/4", 365 mm	14 1/4", 365 mm
G	2 13/16", 71 mm	2 13/16", 71 mm
H	3 3/8", 86 mm	3 3/8", 86 mm
I	5 7/16", 138 mm	5 7/16", 138 mm
J	2 1/16", 52 mm	2 1/16", 52 mm

**Note:**

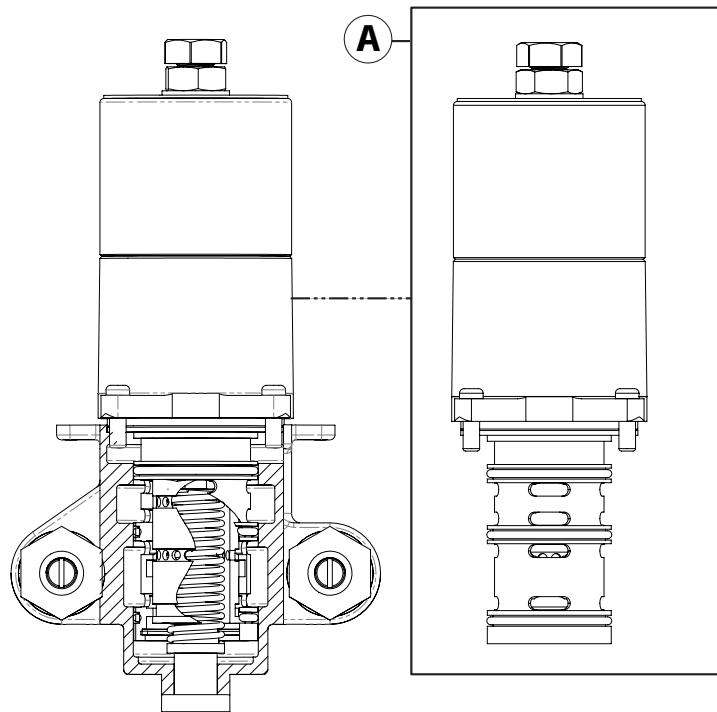
- 1) Dimensions are subject to change without notice.

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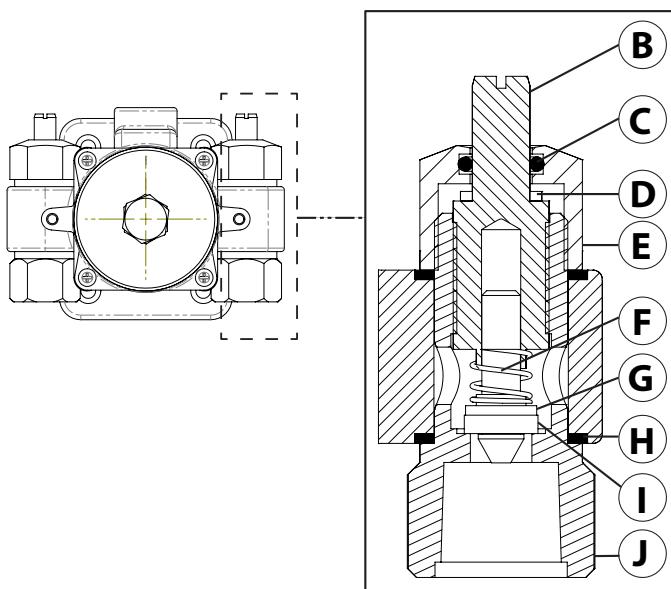
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### Parts Breakdown (7-102)



Replacement Parts for Model 102

Item	Description	Part No.
A	Valve replacement cartridge	7-102NW
B	Check stop spindle	CSE-35
C	O-ring	CE-29
D	Washer	CSE-31
E	Check stop cap	CSE-26
F	Check spring	CSE-34
G	Check assembly	CSE-33
H	Gasket (x2)	CE-30
I	Check stop washer	CSE-32
J	Check stop body with stop seat	CSE-25

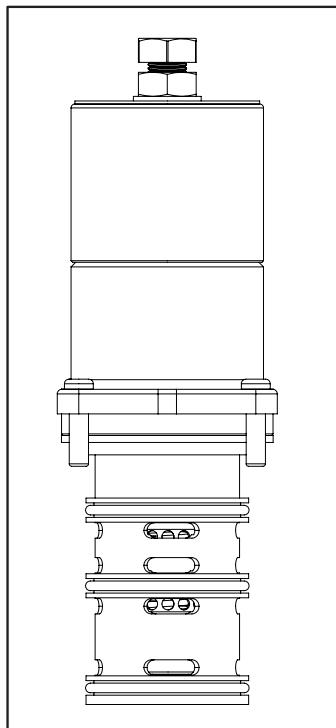


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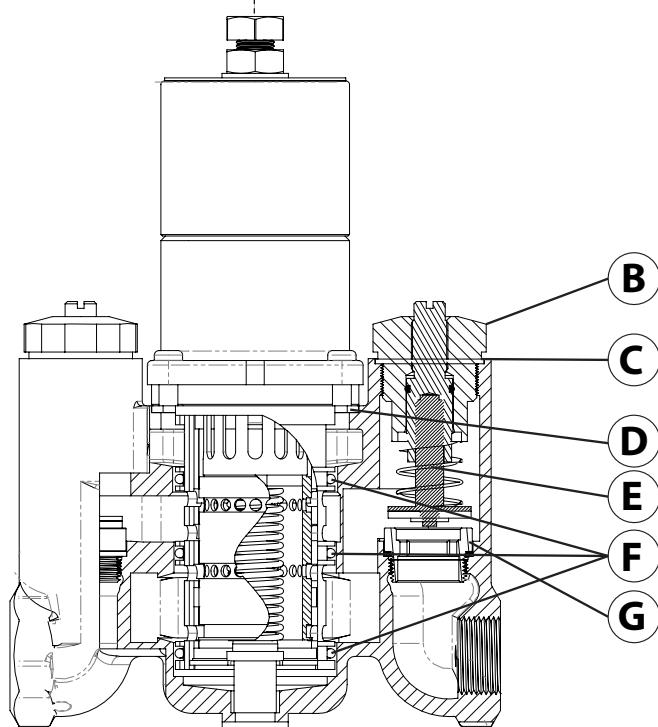
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### Parts Breakdown (7-200, 7-400, 7-500, 7-700)



**A**



#### Replacement Parts for Models 200-700

Item	Description	Part No.
A	Valve replacement cartridge	7-( )NW
B	Complete replacement stop assembly	TT-50AN-( )
C	Cap gasket	TT-21-( )
D	Casing gasket	TT-11-( )
E	Check spindle and spring	TT-181-( )
F	Sleeve o-rings (x3)	TT-15-( )
G	Check seat	TT-26-( )

#### Notes:

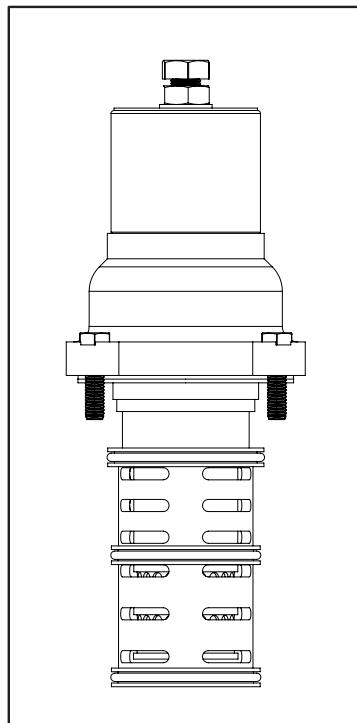
- 1) Insert proper model number in parenthesis.
- 2) Item B contains cap gasket, check spring, bonnet assembly and check assembly.

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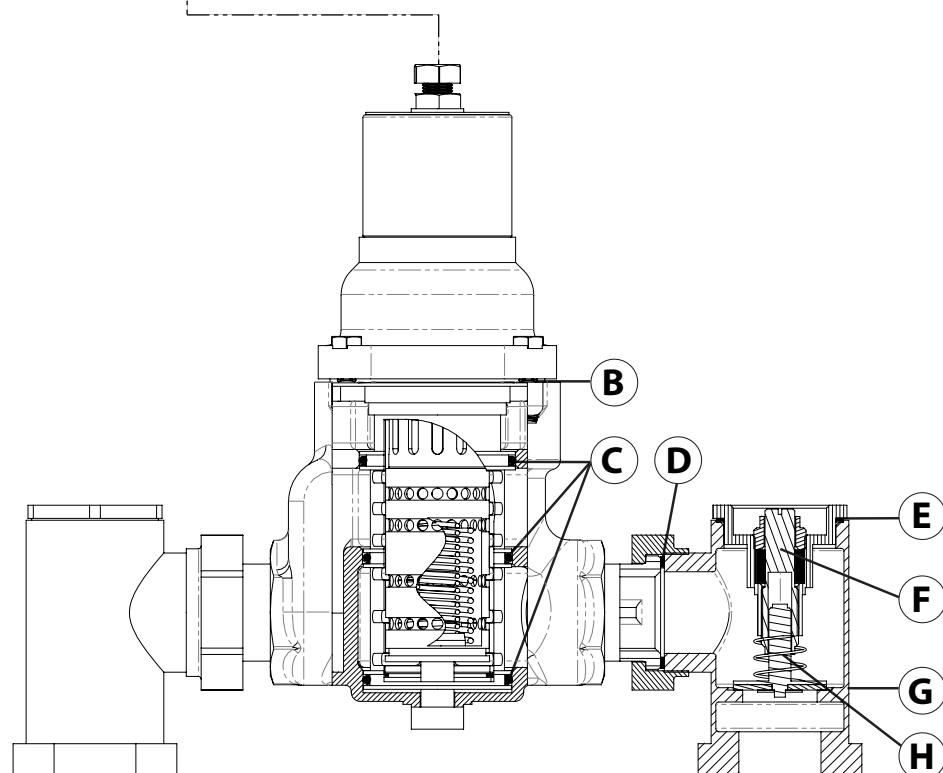
### Parts Breakdown (7-900, 7-1000)



Replacement Parts for Model 900 & 1000		
Item	Description	Part No.
A	Valve replacement cartridge	7-( )NW
B	Casing gasket	TT-11-( )
C	Sleeve o-rings (x3)	TT-15-( )
D	Gasket between stops	TT-32A
E	Cap gasket	TT-21-( )
F	Stop spindle	TT-22-( )
G	Complete replacement stop body assembly	TT-27-( )
H	Check spindle and spring	TT-200-( )

#### Notes:

- 1) Insert proper model number in parenthesis.
- 2) Item G contains check body, cap, check spring and check assembly.



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### Installation



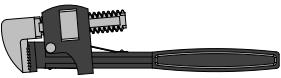
#### CAUTION



When these installation, operation and service instructions are not followed, TempControl functionality and service life will be greatly impaired.

All TempControl installations must have a thermometer and shut off valve in the tempered water outlet (as shown in diagrams) for proper troubleshooting service.

#### Tools Required for Installation

Adjustable wrench	
Flat head screwdriver	
Phillips head screwdriver	
Pipe wrench	
Safety goggles	

### Technical Assistance and Sizing

For assistance and technical support in sizing and selection of the proper TempControl valve or system, consult the Symmons TempSize™ computer sizing software, your local representative or Symmons Customer Service Department at 1-800-SYMMONS.

### TempControl Location

An underlying premise of thermostatic water controller installations is an acknowledgement that thermostatic mixing valves will not operate properly when the hot and cold supplies serving such valves are subjected to pressure disturbances when flowing less than full capacity. In a correctly designed mechanical room, the supply pressures are stable and not subject to pressure disturbances. As a result, when a TempControl valve is indicated as being located in the mechanical room, a Hi-Low system will not be recommended.

When the valve's location is indicated as being outside of the mechanical room, it is assumed that there is a potential for pressure fluctuations in the hot and cold supply lines servicing a TempControl valve and a Hi-Low system will automatically be recommended.

**Note:** If the system is designed so that the TempControl valve is not subjected to high-low flow demand, even though it is located outside the mechanical room, a single TempControl valve will operate properly.

### Installation Tips

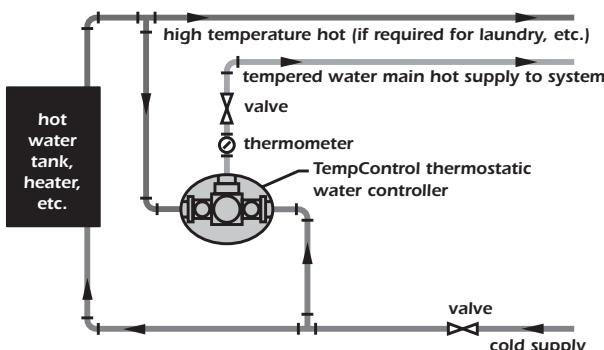
All piping should be thoroughly flushed before TempControl is installed. The TempControl can be installed in any position as long as Hot Water is connected to "H" port and Cold Water is connected to "C" port. Close service stops on TempControl, remove cartridge, (see page 11 for Cartridge Removal and Replacement section), turn on water supply and open stops wide to thoroughly flush piping before putting valve in service. TempControl is set at factory to deliver approximately 100° F.

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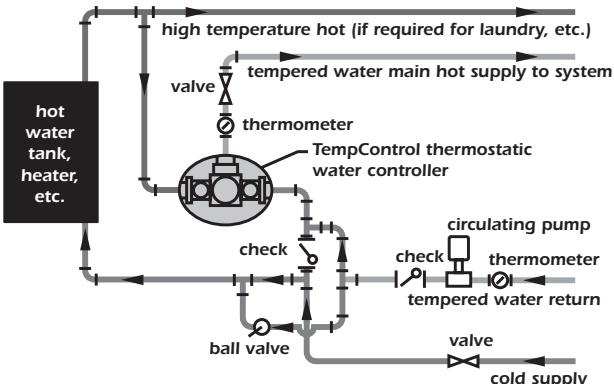
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### Installation

#### Piping Diagrams

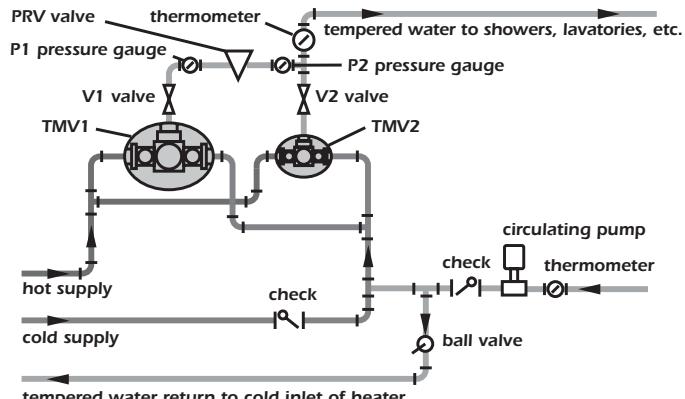
**Diagram 1**
**Single Valve Installation at or near Hot Water Source**


**Diagram 1 INSTALLATION AT OR NEAR THE HOT WATER SOURCE:** TempControl must be positioned below the hot water tank or heater, well below the high temperature water line. This procedure creates a heat trap and protects against hot water migrating through the controller.

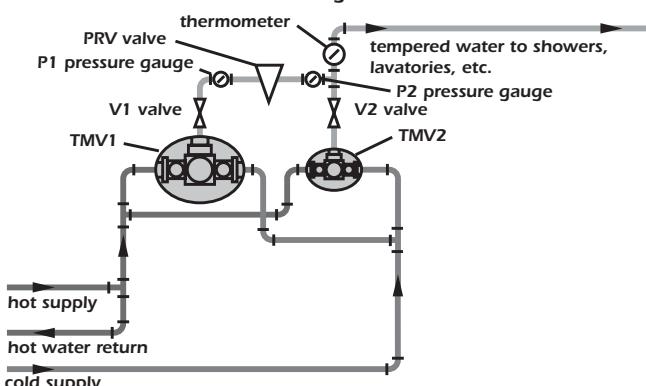
**Diagram 2**
**Single Valve Installation with Recirculating Tempered Water at Hot Water Source**


**Diagram 2 INSTALLATION WITH RECIRCULATING TEMPERED WATER AT HOT WATER SOURCE:** TempControl must have the return line connected exactly as shown. This procedure allows the controller to maintain the set temperature during periods of no draw by (a) allowing the major volume of return water to supply the cold inlet of the TempControl and (b) the minor volume of return water to be reheated and supply the hot inlet of the TempControl. When there is no water draw on the

plumbing system, no water can be added to the system; therefore, the "cold" and "hot" supplies to the TempControl must come from within the system as described below using the ball valve for fine tuning the operation as outlined in (a) and (b).

**Diagram 3**
**Remote HI-LOW System Installation with Recirculating Tempered Water**


**Diagram 3 REMOTE HI-LOW INSTALLATION WITH RECIRCULATING TEMPERED WATER OR HOT WATER RETURN:** TempControl Hi-Low system must have the return line connected exactly as shown (See Diagram 2 notes).

**Diagram 4**
**Remote HI-LOW System Installation with Recirculating Hot Water**


**Diagram 4 REMOTE HI-LOW INSTALLATION WITH RECIRCULATING HOT WATER SUPPLY ONLY:** TempControl Hi-Low system must be piped as shown.

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### Operation & Adjustment

Cycle valve to full hot then cold 3 full times allowing valve to reach full temperature. With approximately 80% of the design intent flowing water, turn adjustment bolt to obtain desired setting and lock nut in place. Thermostatic water controllers should be sized according to the flow capacity required from the valve, NOT the pipe size supplied to the valve. For assistance and technical support in sizing and selection of the proper TEMPCONTROL Thermostatic Water Controller, consult the Symmons TEMPSIZE™ computer sizing software, your local representative or Symmons Customer Service Department at 1-800-SYMMONS.

 **CAUTION:** Turning adjustment bolt fully counter-clockwise will remove bolt from TempControl. If this occurs simply replace bolt.

#### For systems piped to **Diagram 2:**

1. With ball valve closed, set TempControl to desired temperature with water flowing from tempered water line.
2. After obtaining desired temperature, stop the water flow.
3. Crack the ball valve open so that a small amount of water is returned to the hot water source. This allows the TempControl to maintain the set temperature during periods of no draw on the system.
4. During no draw, observe the thermometer on the discharge of the TempControl. If the temperature increases above the setting in Step 1, close the ball valve slightly or if temperature decreases, open it slightly.

#### For systems piped to **Diagram 3:**

1. Turn off recirculating pump and close ball valve
2. Shut off (V1).
3. Open 5 showers or equivalent to the full hot position.
4. Set small TempControl valve (TMV2) to the full cold position and note the temperature on thermometer.
5. Shut off valve (V2) and open valve (V1). Set large TempControl valve (TMV1) to desired system

temperature (make sure adjustment screw on PRV valve is in the full clockwise position).

6. Shut off 2 showers or equivalent (leaving 3 still on) and open valve (V2).
7. Turn PRV adjustment screw counter-clockwise until temperature (T) equals that obtained in step #4.
8. Adjust TempControl valve (TMV2) to desired system temperature and system will be in operational mode.
9. Stop the water flow, after obtaining desired temperature and turn on the recirculating pump.
10. Crack the ball valve open so that a small amount of water is returned to the hot water source. This allows the TempControl to maintain the set temperature during periods of no draw on the system.
11. During no draw, observe the thermometer on the discharge on the TempControl. If the temperature increases above the setting in step #8, Close the ball valve slightly or open it if the temperature decreases.

#### For systems piped to **Diagram 4:**

Follow steps 2 through 9 for systems piped to **Diagram 3**. Ignore reference to recirculating pump in step 9 (not applicable to this installation).

### Maintenance

The cartridge unit contains the entire valve control mechanism. For non-interrupted service, keep a spare cartridge on hand.

TempControl valve control mechanism must be kept clean and free from deposits and any foreign matter build-up that will be present in many water systems. Inspect within 30 days of initial installation or operation. If inspection determines that your water system causes deposits and foreign matter build-up monthly, then valve should be cleaned monthly as follows: Remove cartridge (see page 11 for Cartridge Removal and Replacement section) and soak in any acceptable de-liming agent (or regular household vinegar). Wash off deposits, be sure piston is moving freely in its sleeve, and replace cartridge. Clean more frequently if your system so demands (do not completely remove piston from cartridge).

The Check Valves in the TempControl are highly important

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factors in its proper operation. If chips, dirt or other foreign materials lodge on the seats and prevent the checks from fully seating, there may be a bypass of water into the opposing line, and the TempControl will not operate to its set delivery temperature. A bypass may be detected by feeling the supply line while the TempControl is not operating. If, for example, the cold line feels hot, the cold water check is not seating properly. It should be removed and the check and its seat cleaned.

### Cartridge Removal & Replacement

Before removing a used cartridge for cleaning, have new casing gasket and sleeve o-rings on hand.

Shut off supplies at stop checks by turning clockwise.

Remove 4 bolts on cartridge bolt flange.

With 2 large bladed screwdrivers, pry evenly on two opposite sides of bolt flange until cartridge is free to be removed by hand. Pull out cartridge with a twisting and turning action, always keeping cartridge on center line.

Leave compensating spring in position at bottom center of valve body.

Clean cartridge as described in maintenance instructions.

Replace sleeve O-rings and grease same.

With a twisting and pushing action, replace cartridge in valve body until bolt flange is firmly against housing gasket.

While holding cartridge in place, replace bolts and tighten. Do not attempt to pull cartridge into position with bolts—it will damage the valve control mechanism.

Open stops and adjust temperature.

### Seasonal Use

When a TempControl is used seasonally (schools, campgrounds, golf clubs, etc.) the cartridge must be removed and thoroughly drained of all water to prevent freeze damage. The check stops should also be removed to drain all water from the supply lines and valve body (see “cartridge removal and replacement”). This will prohibit damage caused by freezing water.

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**Trouble Shooting Chart**

**For Tempered Water Recirculated Systems**

Problem	Cause	Solution
Thermometer in TempControl outlet rises to temperature of the heater at start of no draw (i.e. sink or showers not running, etc.).	No circulation of tempered water because return line is piped to the hot water source only.	Repipe system to diagram 2 or 3 which allows the discharge of the pump (tempered water return) to go back to the hot water source and the cold inlet of the TempControl.
Hot water temperature at sink or shower is below set point of TempControl.	Sufficient circulation of tempered water is not reaching the hot water source.	Repipe system to diagram 2 or 3 which allows the discharge of the pump (tempered water return) to go back to the hot water source and the cold inlet of the TempControl.
Temperature rises.	Not piped to Diagrams 2 or 3. Ball valve too far open.	Check valve must be installed on cold supply to controller or adjust ball valve (see diagram 2 or 3 on page 9).
Cannot elevate or decrease tempered water by turning adjustment bolt.	Piston stuck with foreign matter.	Remove cartridge and soak in household vinegar for an hour. If piston does not free after soaking replace cartridge.
Temperature drops during draw (sink, shower running, etc.).	Valve was set in no draw mode.	Run showers and sinks and then set valve.

**For Tempered Water Non-Recirculated Systems**

Problem	Cause	Solution
Bypass, cold to hot or hot to cold.	Checks not properly seating.	Clean fouled checks, or if damaged, replace damaged parts.