

# Baumann™ 24003 3-Way Bronze or Stainless Steel Control Valve

## 3-Way Rugged Industrial Control Valve For Mixing and Diverting Applications

The Baumann 24003 3-way control valve (figures 1 and 2) is ideally suited for control of flow and temperature where mixing or diverting service is required. This 3-way valve uses a rugged cast bronze or CF8M stainless steel body with S31600 austenitic stainless steel trim for extended service life.

### Features

- Compact and light weight design reduces installed piping costs.
- Optional ENVIRO-SEAL™ packing system to meet critical emission control requirements; suitable for use in light duty chemical service (not for use in corrosive service). This option is available in the stainless steel version only.
- High quality S31600 austenitic stainless steel trim materials.
- Dual plug and stem guiding provides increased stability during plug travel.
- Multiple trim capacity reductions available to meet changing process requirements.
- Epoxy powder-coated actuator with stainless steel fasteners for corrosion resistance.
- Multi-spring, field-reversible actuator with reduced deadband, permits direct operation from remote signal devices.
- Actuator and yoke can be removed from the valve assembly while maintaining packing integrity.
- Fisher® FIELDVUE™ digital valve controllers available for remote calibration and diagnostics in facilities utilizing the PlantWeb™ architecture.



Figure 1. Stainless Steel 3-Way Valve with Baumann 32 Actuator



Figure 2. Bronze 3-Way Valve with Baumann 54 Actuator and FIELDVUE DVC2000 Digital Valve Controller



# 24003 Valve

Table 1. Flow Direction<sup>(1)</sup>

Service	Inlet	Outlet
Diverting	C	U and L
Mixing	U and L	C

1. C = Common port, U = Upper port, L = Lower port

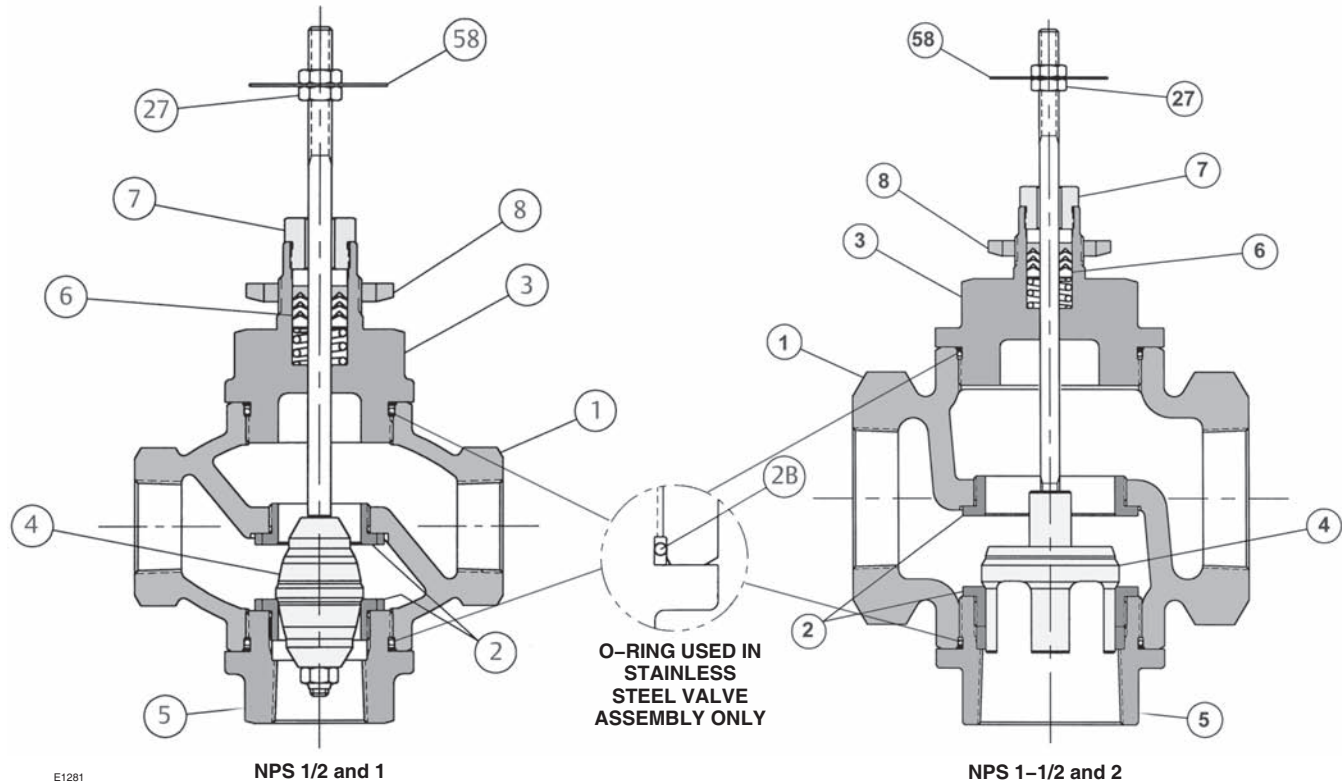
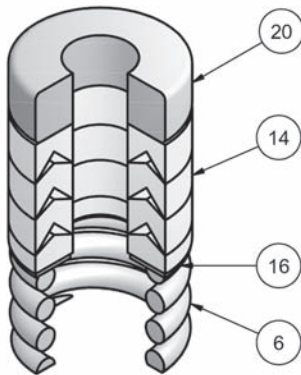


Figure 3. Baumann 24000F Valve Body with Standard Bonnet and NPS 1 Integral Seat

Table 2. Materials of Construction

KEY NO.	DESCRIPTION	MATERIAL	
		Bronze	Stainless Steel
1	Valve Body	Bronze ASTM B62	ASTM A351 CF8M
2	Seat Rings	ASTM A276 S31600 Condition A	ASTM A276 S31600 Condition A
2B	O-Ring	N/A	TFE/P (tetrafluoroethylene/propylene)
3	Bonnet	Bronze ASTM B62	ASTM A351 CF8M
4	Plug & Stem Assembly	ASTM A276 S31600 Condition A	ASTM A276 S31600 Condition A
5	Bottom Port	Bronze ASTM B62	ASTM A351 CF8M
6	Packing	Standard	PTFE (Polytetrafluoroethylene) / PTFE, 25% carbon filled
		Optional	Molded Graphite Ribbon (Grafoil) ENVIRO-SEAL (Stainless Steel ONLY)
7	Packing Follower	ASTM A276 S31600 Condition A Stainless Steel	
8	Drive Nut (Yoke)	ASTM A194 S30400 Gr. 8	
27	Locknuts	Stainless Steel (18-8 SST)	
58	Travel Indicator	ASTM A240 S30400	

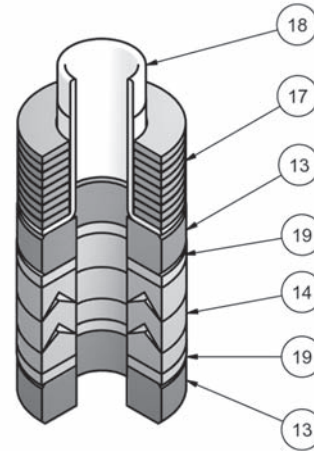


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Figure 4. Standard Spring-Loaded PTFE V-Ring Packing Kit

Table 3. Standard Spring-Loaded PTFE V-Ring Packing Kit

Key Number	Description	Material
6	Spring	ASTM A313 S30200
14	Packing Set	PTFE (Polytetrafluoroethylene) / PTFE, 25% carbon filled
16	Washer	ASTM A240 S31600
20	Spacer	J-2000 (filled-Polytetrafluoroethylene)

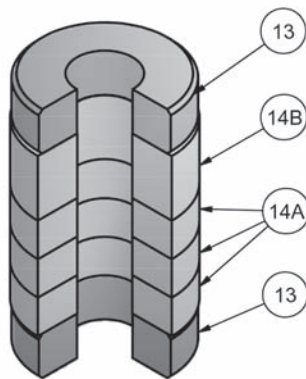


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Figure 6. ENVIRO-SEAL Packing Kit (Optional for Stainless Steel Only)

Table 5. ENVIRO-SEAL Packing Kit (Optional for Stainless Steel Only)

Key Number	Description	Material
13	Bushing	Carbon-Graphite
14	Packing Set	PTFE (Polytetrafluoroethylene) / PTFE, 25% carbon filled
17	Belleville Spring	N06600 Nickel Alloy (ASTM B637 N07718, 40 HRC max)
18	Bushing	PEEK (polyetheretherketone)
19	Washer	Modified PTFE



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Figure 5. Molded Graphite (Flexible Graphite) Packing Kit (Optional)

Table 4. Molded Graphite (Flexible Graphite) Packing Kit (Optional)

Key Number	Description	Material
13	Bushings	Carbon-Graphite
14A	Packing Rings	Graphite
14B	Packing Ring	Graphite

### Special ENVIRO-SEAL Packing Note

The ENVIRO-SEAL PTFE packing system is suitable for 100 ppm environmental applications on services up to 51.7 barg (750 psig) and process temperatures ranging from -46 to 232°C (-50 to 450°F).

For non-environmental applications, this packing system offers excellent performance at the same temperature range up to the maximum valve working pressure.

Temperature limits apply to packing arrangements only. Complete valve assembly temperature limits may differ, refer to appropriate pressure/temperature ratings.

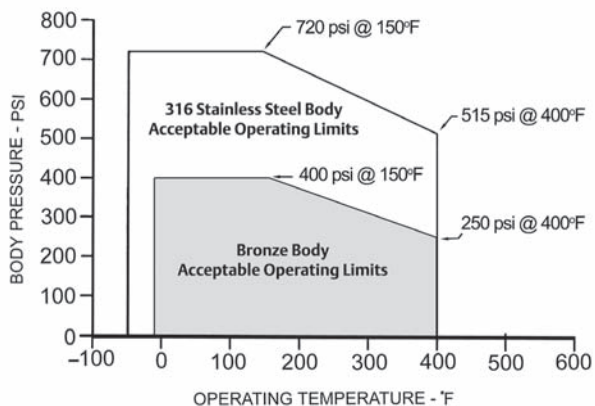
(Reference Fisher Packing Selection Guidelines for Sliding-Stem Valves, Bulletin 59.1:062, D101986X012).

Table 6. Technical Specifications

NOMINAL PIPE SIZE	NPS 1/2, 1, 1-1/2, and 2	
END CONNECTIONS	Screwed NPT	
SEAT PLUG SEALING	Metal-to-Metal	
CHARACTERISTIC	Linear	
SEAT LEAKAGE	Class III	
VALVE BODY MATERIAL	Bronze	Stainless Steel
PRESSURE RATING	400 psi @ 150°F / 250 psi @ 400°F	720 psi @ 150°F / 515 psi @ 400°F
TEMPERATURE LIMITS	-20 to 400°F	

Table 7. Maximum Cv Values at 100% Plug Opening  
( $K_v = 0.86 \times C_v$ )

VALVE SIZE	ORIFICE DIAMETER	PLUG TRAVEL	RATED VALUES
NPS	inches	inches	$C_v$
1/2	0.626	0.56	1, 2
	0.876	0.56	4
1	0.876	0.56	4
	1.126	0.56	10
1-1/2	1.676	0.75	20
2	2.126	0.75	40



E1282

Figure 7. Valve Body and Temperature Limits

Table 8. Maximum Cv Values

Valve Series	$C_v$ Rating	$F_L$	$F_d$	$X_T$	$K_C$
688	1	0.9	0.46	0.68	0.73
	2				
	4				
	10				
	20				
	40				

Table 9. Actuator Specifications

TYPE <sup>(1)</sup>	32, 54, 70 Multi-Spring Diaphragm (Single Acting)
DIAPHRAGM AREA	210, 350, 450 cm <sup>2</sup> / 32, 54, 70 in <sup>2</sup>
AIR FAILURE	32 and 54 Fails Open or Closed (Field Reversible) / 70 Fails Closed ONLY
TRAVEL <sup>(2)</sup>	14.2 or 19.1 mm / 0.56 or 0.75 inches
AMBIENT TEMPERATURE RANGE	-29°C to 71°C / -20°F to 160°F
MAXIMUM AIR PRESSURE	2.41 barg / 35 psig
DIAPHRAGM MATERIAL <sup>(3)</sup>	NBR (Nitrile) / TPES (Polyester Thermoplastic)
SPRING CASES	Steel, Powder Epoxy-Coated with Stainless Steel Fasteners
YOKE	Ductile Iron, Powder Epoxy-Coated

1. Electric actuators available. Refer to bulletins 52.1:ECV (D103347X012) and 52.1:NVACTION (D103326X012).

2. Dual travel stops are available on Baumann 32 and 54 actuators. These are not field reversible.

3. Optional reinforced VMQ (Silicone) diaphragm with FKM (Fluorocarbon) O-ring actuator stem seal for high temperature conditions (-29°C to 121°C / -20°F to 250°F) is available with Baumann 32 and 54 actuators ONLY.

# Product Bulletin

52.1:243WY

March 2010

# 24003 Valve

Table 10. Allowable Pressure Drops (psi) – Mixing (Combining) Service

ORIFIC DIAMETER (inch)	NOMINAL PLUG TRAVEL (inch) <sup>(1)</sup>	ACTUATOR TYPE	BENCH RANGE (psi)	ALLOWABLE PRESSURE DROP PORT L FAILS CLOSED (PSI)		BENCH RANGE (psi)	ALLOWABLE PRESSURE DROP PORT L FAILS OPEN (PSI)	
				3–15 psi Signal to Actuator	With Positioner 20 psig Air Supply		3–15 psi Signal to Actuator	With Positioner 20 psig Air Supply
0.626	0.56	32	5–13	112	225	3–11	281	563
			7–15	225	337	5–13	112	394
		54	7–14	375	563	3–10	469	720
			9–15	563	720	3–13	187	656
0.876	0.56	32	5–13	60	121	3–11	151	303
			7–15	121	259	5–13	60	212
		54	7–14	202	303	3–10	252	505
			9–16	303	404	3–13	101	353
1.126	0.56	32	5–13	37	75	3–11	94	189
			7–15	75	113	5–13	37	132
		54	7–14	126	189	3–10	157	315
			9–16	189	252	3–13	63	220
		70	8–15	220	309	---	---	---
			---	---	---	---	---	---
1.676	0.75	54	5–15	29	58	3–10	73	147
			7–13	58	88	3–13	29	102
		70	7–15	82	123	---	---	---
2.126	0.75	54	3–10	---	---	3–10	46	93
			7–13	37	55	3–13	18	65
		70	7–15	52	78	---	---	---
			10–15	91	117	---	---	---

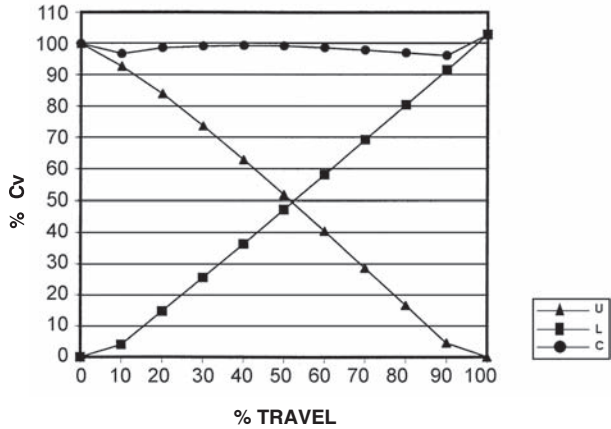
1. Use Baumann 54 or larger actuator with molded graphite ribbon or ENVIRO-SEAL packing systems.

Table 11. Allowable Pressure Drops (psi) – Diverting (Diverging) Service

ORIFIC DIAMETER (inch)	NOMINAL PLUG TRAVEL (inch) <sup>(1)</sup>	ACTUATOR TYPE	BENCH RANGE (psi)	ALLOWABLE PRESSURE DROP PORT L FAILS CLOSED (PSI)		BENCH RANGE (psi)	ALLOWABLE PRESSURE DROP PORT L FAILS OPEN (PSI)	
				3–15 psi Signal to Actuator	With Positioner 20 psig Air Supply		3–15 psi Signal to Actuator	With Positioner 20 psig Air Supply
0.626	0.56	32	5–13	80	160	3–11	201	402
			7–15	160	241	5–13	80	281
		54	7–14	268	402	3–10	335	670
			9–15	402	670	3–13	134	469
0.876	0.56	32	5–13	43	86	3–11	108	216
			7–15	86	185	5–13	43	151
		54	7–14	144	216	3–10	180	360
			9–16	216	288	3–13	72	252
1.126	0.56	32	5–13	27	54	3–11	67	135
			7–15	54	81	5–13	27	94
		54	7–14	90	135	3–10	112	225
			9–16	135	180	3–13	45	157
		70	8–15	157	220	---	---	---
1.676	0.75	54	5–15	21	42	3–10	52	105
			7–13	42	63	3–13	21	73
		70	7–15	59	88	---	---	---
2.126	0.75	54	3–10	---	---	3–10	33	66
			7–13	26	39	3–13	13	46
		70	7–15	37	55	---	---	---
			10–15	65	83	---	---	---

1. Use Baumann 54 or larger actuator with molded graphite ribbon or ENVIRO-SEAL packing systems.

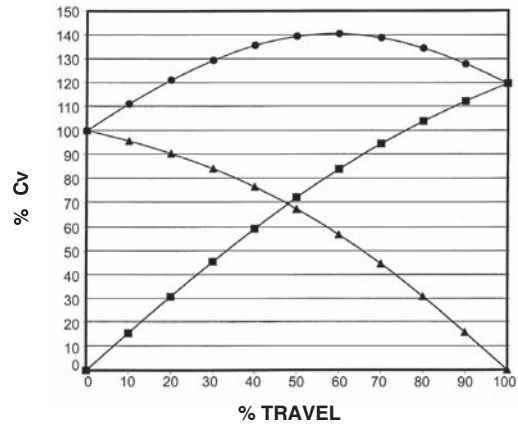
FLOW INTO PORTS U AND L  
PERCENTAGE OF MAXIMUM RATED Cv



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Figure 8. Mixing Service Flow Characteristics

FLOW INTO PORT C  
PERCENTAGE OF MAXIMUM RATED Cv



E1284

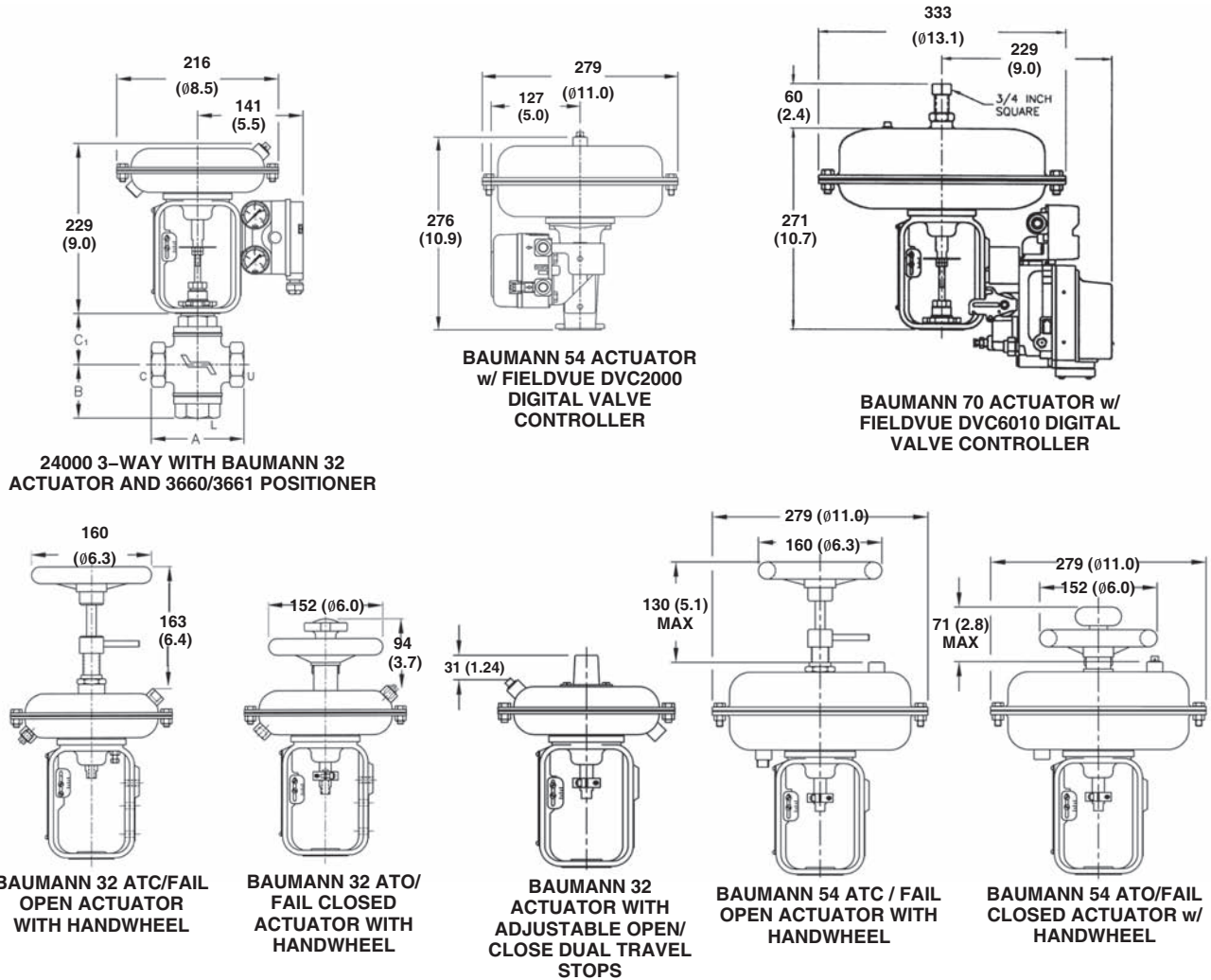
Figure 9. Diverting Service Flow Characteristics

Table 12. Valve Body Dimensions and Weights: NPT Valve Bodies Only

VALVE SIZE NPS	VALVE BODY MATERIAL						TRAVEL Inches	WEIGHT lbs
	BRONZE, NPT			STAINLESS STEEL, NPT (A)				
	A	B	C1	A	B	C1		
1/2	4.88	2.75	2.75	5.0	2.75	2.75	0.56	8
1	4.88	2.75	2.75	5.0	2.75	2.75	0.56	8
1-1/2	5.75	3.81	3.31	6.1	3.38	3.31	0.75	15
2	6.50	4.0	3.6	6.50	3.75	3.6	0.75	20

Table 13. Actuator Weights

BAUMANN 32 ACTUATOR		BAUMANN 54 ACTUATOR		BAUMANN 70 ACTUATOR	
kg	lbs	kg	lbs	kg	lbs
4.5	10	11.3	25	15.4	34



mm  
(inch)

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**NOTE: ACTUATOR REMOVAL REQUIRES 115 mm (4.5 INCHES) VERTICAL CLEARANCE.**

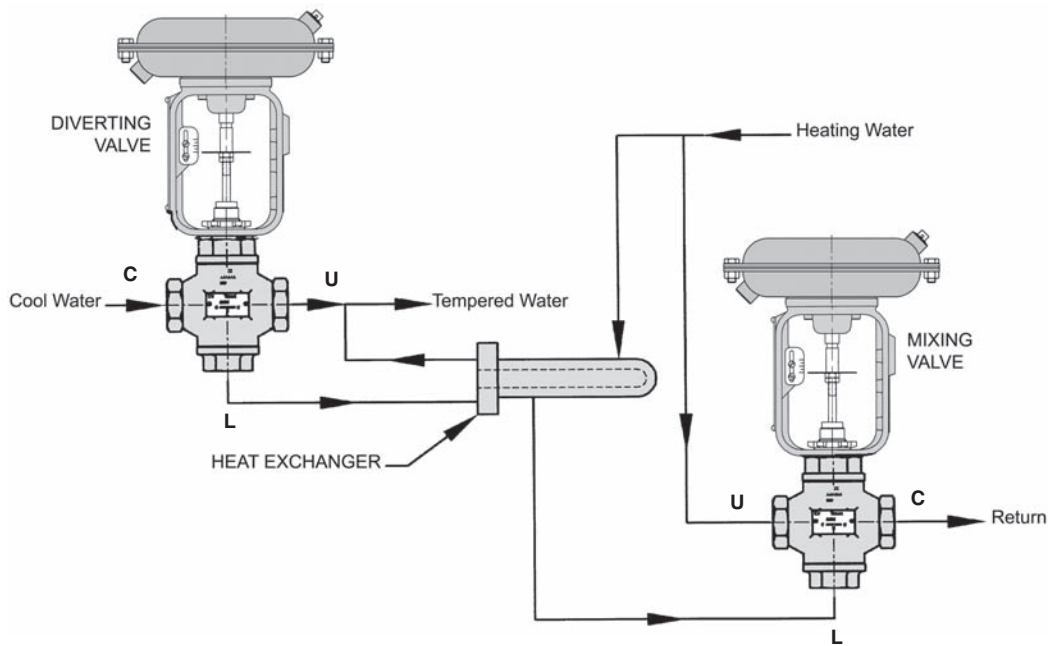
*Figure 10. Dimensional Drawings*

*Table 14. Application Port<sup>(1)</sup>*

Service	Inlet	Outlet
Diverting	C	U and L
Mixing	U and L	C

1. C = Common port, U = Upper port, L = Lower port





E1286

Figure 11. Mixing and Diverting Applications

Table 15. Model Numbering System

	24			3				
Actuator Type	Valve Body Series	Service		Port "L" Fails		3-Way Valve Body	Material	
32	24	D	Diverting	1	Closed	3	---	Bronze
54		M	Mixing	2	Open		S	Stainless Steel
70								

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