

# Spence Type K3 Control Valve



*Figure 1. Type K3 Control Valve*

## Introduction

Type K3 control valve is designed for economical control of steam, water, gas and process applications in typical institutional, commercial and industrial

processes. Type K3 is a three-way valve available with either a direct or reverse acting actuator that meets most mixing or diverting application requirements.

# Type K3

## Specifications

This section lists the specifications for the Type K3. Factory specification are stamped on the nameplate fastened on the control valve at the factory.

### Control Valve Type

**Type K3:** Three-way valve with union ends and pneumatic actuator

### Control Valve Sizes

NPS 1/2, 3/4, 1, 1-1/4, 1-1/2 and 2 /  
DN 15, 20, 25, 32, 40 and 50

### Pressure and Temperature Chart<sup>(1)</sup>

See Figure 2

### Control Pressure Capabilities<sup>(1)</sup>

3 to 15 psi / 0.21 to 1.03 bar

### End Connection Style

NPT Union

### Maximum Rated Flow Coefficient, $C_v$

**NPS 1/2 / DN 15:** 5.6

**NPS 3/4 / DN 20:** 7.1

**NPS 1 / DN 25:** 9.2

**NPS 1-1/4 / DN 32:** 22

**NPS 1-1/2 / DN 40:** 28

**NPS 2 / DN 50:** 35

### Construction Materials

**Body:** Bronze

**Seat:** Stainless steel

**Plug, Stem and Stem Assembly:** Stainless steel

**Stem Guide:** Stainless steel, Monel or Brass

**Actuator Casing:** Steel

**Actuator Spring:** Steel Wire

**Diaphragm:** Nitrile (NBR)

**Yoke:** Ductile iron

### Options

36 or 60 sq. in. / 0.02 or 0.04 sqm actuators

Electric Actuator

### Applicable Codes

Meets or exceeds ANSI B16.15 Class 250

ANSI/FCI 70-2 Class IV Seat Leakage

Article 3, Section 3 of the

Pressure Equipment Directive.

1. The pressure/temperature limits in this Bulletin and any applicable standard or code limitation should not be exceeded.

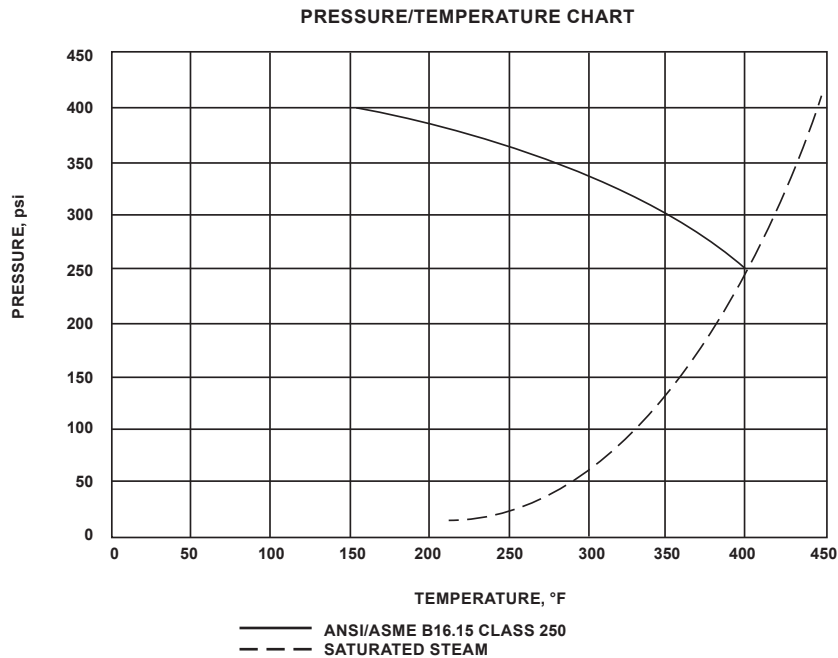
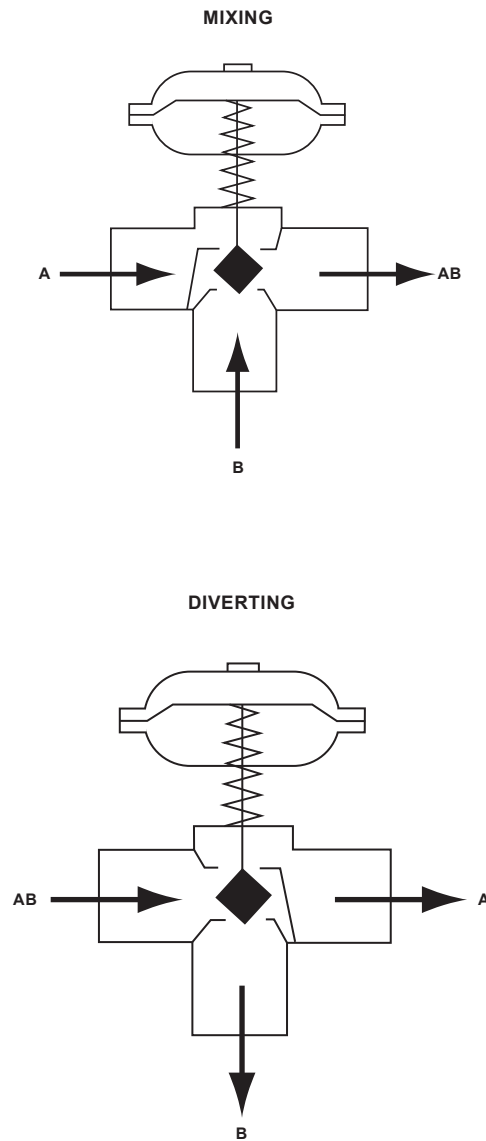


Figure 2. Type K3 Pressure and Temperature Chart



**Figure 3.** Fluid Flow Direction for Mixing and Diverting Service

## Principle of Operation

Type K3 valve is a three-way, universal construction, globe style, pneumatic diaphragm control valve. The pneumatic actuator can be arranged as direct or reverse acting.

When selecting a direct acting actuator, upper port is failed closed on air loss. When selecting a reverse

acting actuator, the lower port is failed closed on air loss. When used for mixing, the forces developed by the two inlet flows oppose each other and create a balanced environment. Thus, the actuator can control the flow efficiently without power lost to overcome dynamic unbalance. When using the valve for diverting service, simply reverse the valve installation.

# Type K3

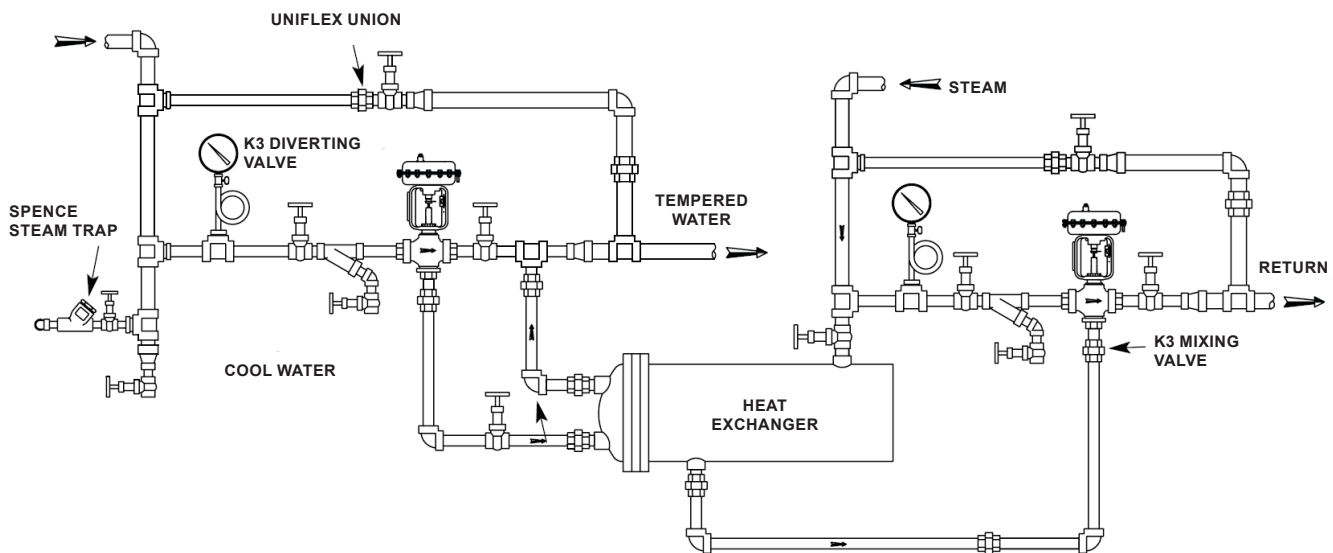


Figure 4. Type K3 Control Valve Recommended Installation for Steam Application

## Installation



### WARNING

Always wear protective gloves, clothing and eyewear when performing any maintenance operations to avoid personal injury.

Personal injury or equipment damage caused by sudden release of pressure might result if the valve assembly is installed where service conditions could exceed the limits. To avoid such injury or damage, provide a relief valve for overpressure protection as required by government or accepted industry codes and good engineering practices.

Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

- Locate the valve in a straight run of horizontal pipe as shown in Figure 4. Mount the valve with the actuator in the upright position. Allow room for removal of the actuator.
- Prevent pipeline hammering in compressible fluid service by providing proper drainage before and after the valve.
- Avoid damaging effects of scale and dirt in pipelines by using a strainer.
- A three-valve by-pass to facilitate inspection and maintenance without interrupting service is recommended.
- To eliminate excessive noise with steam and other compressible fluids, enlarge the delivery pipe size to allow a reasonable flow velocity at the reduced pressure. A concentric transition is recommended.
- If possible, avoid sharp turns close to the valve.
- Install upstream and downstream pressure gauges to indicate performance.
- If the rating of the delivery system or connected equipment is less than the initial pressure, provide a safety relief valve.

**Table 1. Type K3 Shutoff Value**

SIZE		ACTUATOR SIZE	BENCH RANGE <sup>(1)</sup> , psi	ACTUATOR	REVERSE SHUTOFF <sup>(1)</sup> , psid	BENCH RANGE <sup>(2)</sup> , psi	ACTUATOR CODE	DIRECT SHUTOFF <sup>(2)</sup> , psid
NPS	DN				3 to 15 psi / 0.21 to 1.03 bar			3 to 15 psi / 0.21 to 1.03 bar
1/2	15	36 sq. in. / 0.02 sqm	5.5 to 12.5	RA	125	4.5 to 13.5	DM	85
			6.5 to 11.5	RB	175	6 to 12	DA	175
			8 to 11	RC	250	----	----	----
3/4	20	36 sq. in. / 0.02 sqm	5.5 to 12.5	RA	125	4.5 to 13.5	DM	85
			6.5 to 11.5	RB	175	6 to 12	DA	175
			8 to 11	RC	250	----	----	----
1	25	36 sq. in. / 0.02 sqm	5.5 to 12.5	RA	75	4.5 to 13.5	DM	60
			6.5 to 11.5	RB	125	6 to 12	DA	125
			8 to 11	RC	200	----	----	----
1-1/4	32	36 sq. in. / 0.02 sqm	5.5 to 12.5	RC	60	6 to 12	DC	80
			7.5 to 10.5	RE	110	7 to 11	DD	100
		60 sq. in. / 0.04 sqm	7.5 to 12	RG	200	7 to 11	DG	175
			8 to 11	RH	225	----	----	----
1-1/2	40	36 sq. in. / 0.02 sqm	5.5 to 12.5	RC	50	6 to 12	DC	60
			7.5 to 10.5	RE	85	7 to 11	DD	75
		60 sq. in. / 0.04 sqm	7.5 to 12	RG	125	7 to 11	DG	135
			8 to 11	RH	175	----	----	----
2	50	36 sq. in. / 0.02 sqm	5.5 to 12.5	RC	35	6 to 12	DC	45
			7.5 to 10.5	RE	70	7 to 11	DD	60
		60 sq. in. / 0.04 sqm	7.5 to 12	RG	75	7 to 11	DG	100
			8 to 11	RH	125	----	----	----

1. Lower Part (B) - Fail Closed  
2. Upper Part (A) - Fail Closed.

**Table 2. Type K3 C<sub>v</sub>**

PERCENT OF TRAVEL				Port	0	10	20	30	40	50	60	70	80	90	100
Valve Size		Travel			C <sub>v</sub>										
NPS	DN	In.	mm												
1/2	15	7/32	5.56	Lower	0	0.9	1.9	2.7	3.6	4.3	4.8	5.2	5.3	5.35	5.4
				Upper	5.6	5.55	5.5	5.3	4.9	4.5	3.9	3.1	2.2	1.2	0
3/4	20	7/32	5.56	Lower	0	0.9	2	3	4	4.9	5.5	6	6.2	6.3	6.4
				Upper	7.1	7	6.9	6.5	5.9	5.2	4.4	3.4	2.3	1.2	0
1	25	7/32	5.56	Lower	0	0.8	1.7	2.9	4	5.3	6.2	7.2	7.8	8.4	8.7
				Upper	9.2	8.5	7.9	7.1	6.2	5.3	4.2	3.2	2.1	1.1	0
1-1/4	32	1/2	12.7	Lower	0	2.7	6.2	10.2	15	18.8	20	20.8	21.2	21.6	22
				Upper	19.5	19	18.5	17.5	15.5	13.5	11	8	5	2.5	0
1-1/2	40	1/2	12.7	Lower	0	2	6	11	16	20	22.5	24.5	26	27	28
				Upper	24	23	22	20	18	15	12	9	6	2.7	0
2	50	1/2	12.7	Lower	0	2.2	5.7	10.9	16	21	24	27.4	30	32	34
				Upper	35	32.4	30	27	23.5	20	16	12	8	4	0

# Type K3

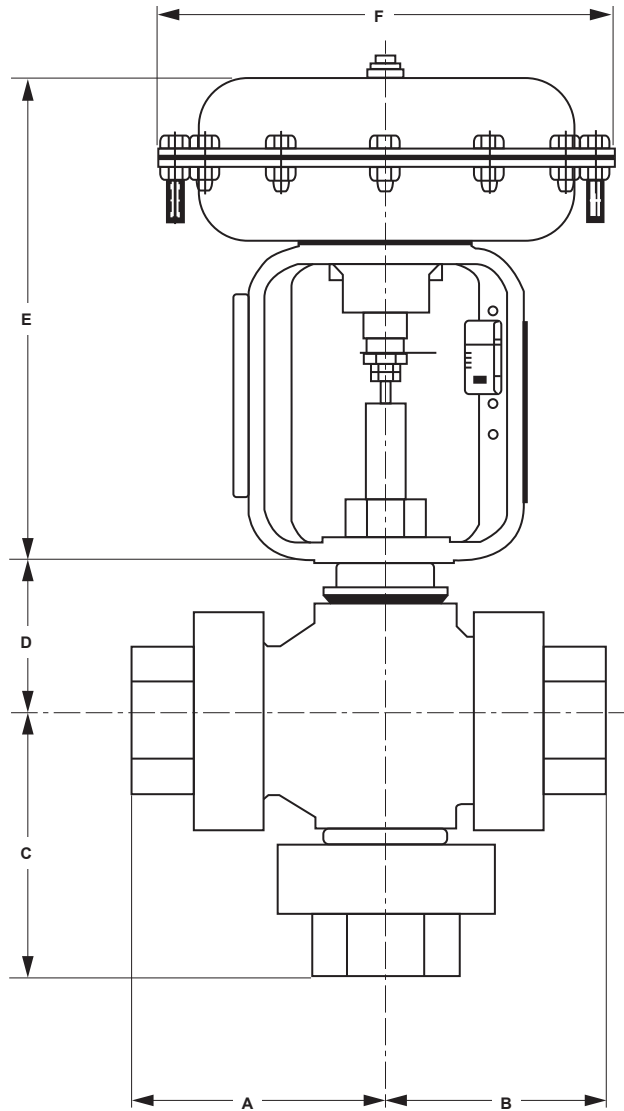


Figure 5. Type K3 Dimension

Table 3. Type K3 Dimension

VALVE SIZE		A		B		C		D		E				F				WEIGHT			
										36 sq. in. / 0.02 sqm		60 sq. in. / 0.04 sqm		36 sq. in. / 0.02 sqm		60 sq. in. / 0.04 sqm		36 sq. in. / 0.02 sqm		60 sq. in. / 0.04 sqm	
NPS	DN	In.	mm	In.	mm	In.	mm	In.	mm	In.	mm	In.	mm	In.	mm	In.	mm	lbs	kg	lbs	kg
1/2 to 3/4	15 to 20	3-5/8	92	3-5/16	84	4-1/8	105	2-7/8	73	9-7/8	251	----	----	9-1/4	235	----	----	28	12.7	41	18.6
1	25	3-5/8	92	3-5/16	84	4-1/8	105	2-7/8	73	9-7/8	251	----	----	9-1/4	235	----	----	27	12.3	40	18.2
1 1/4	32	4-11/16	119	4-1/8	105	4-22/32	119	3-3/32	79	9-7/8	251	11-3/4	298	9-1/4	235	11-1/4	286	35	15.9	48	21.8
1 1/2	40	4-11/16	119	4-1/8	105	4-22/32	119	3-3/32	79	9-7/8	251	11-3/4	298	9-1/4	235	11-1/4	286	37	16.8	50	22.7
2	50	4-7/8	124	4-3/16	106	4-29/32	125	3-3/32	79	9-7/8	251	11-3/4	298	9-1/4	235	11-1/4	286	42	19.1	55	25

## Ordering Information

When ordering, complete the ordering guide on this page. Refer to the Specifications section on page 2.

Review the description to the right of each specification and the information in each referenced table or figure. Specify your choice whenever a selection is offered.

## Ordering Guide

### Body Size (Select One)


- NPS 1/2 / DN 15
- NPS 3/4 / DN 20
- NPS 1 / DN 25
- NPS 1-1/4 / DN 32
- NPS 1-1/2 / DN 40
- NPS 2 / DN 50


### Options

- 36 sq. in. / 0.02 sqm actuators
- 60 sq. in. / 0.04 sqm actuators
- Electric Actuator

# Type K3

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