

## VSxF-2/-3/-4 SMALL LINEAR VALVES PN16 FOR MODULATING AND ON/OFF-CONTROL

### PRODUCT DATA



VSxF-2

VSxF-3

VSxF-4

### GENERAL

These small linear valves are used in combination with small electric linear valve actuators and thermoelectric actuators for the control of hot and/or chilled water for fan coil units and small reheaters/recoolers in electric/electronic temperature control systems.

### FEATURES

- Small size allows installation where space is limited
- Long stroke results in a high quality characteristic
- Soft seat provides low leakage rate and high rangeability
- High close-off pressure
- Wide standardized range of  $k_{VS}$  values
- Reduced  $k_{VS}$  values in the bypass to facilitate hydronic balancing
- Dezincification-resistant yellow brass
- Range of fittings available for different connections (soldered, threaded)
- Models with integrated snap-on linkage for MT-series thermal actuators
- Standardized opening direction across the complete VS portfolio (valve stem down to open A-B / A-AB)
- Valve diverting usage capability (depending on model)

### SPECIFICATIONS

Models	Two-way VSxF-2 Three-way VSxF-3 Three-way with bypass VSxF-4
Operation	Two-way; three-way stem up to close, port A to B / AB
Nominal pressure rating	PN16
Capacity index ( $k_{VS}$ )	see tables on pages 2, 3, and 4
Close-off pressures	see tables on pages 2, 3, and 4
Leakage rate	$\leq 0.02\%$ of $k_{VS}$
Port connection	flat sealing connections in standard sizes

#### Valve body

Material	Brass
Size	DN15 (1/2"), DN20 (3/4"), DN25 (1-1/4")

#### Trim

Stem	Stainless steel
Plug	Brass
Suitable medium	Water, with max. 50% glycol
Controlled water temp.	2...120 °C

#### Modulating valves

VSMF-xxx	
Stroke	6.5 mm
Dimensions	see Fig. 5, Fig. 6, and Fig. 7 on page 6 and Fig. 8, Fig. 9, and Fig. 10 on page 7
Characteristic	2-way: modified equal % 3-way: A-AB modified equal %; B-AB linear

#### ON/OFF valves

VSOFF-xxx	
Stroke	2.5 mm
Dimensions	see Fig. 5, Fig. 6, and Fig. 7 on page 6 and Fig. 8, Fig. 9, and Fig. 10 on page 7

## FLOW CAPACITIES AND CLOSE-OFF PRESSURE RATINGS

### VSxF-2 Two-Way Valves with Flat Sealing

DN	k <sub>vs</sub> A-B	type	snap-on feature*	stroke	order no.	close-off pressure with actuator		
						M6410C,L; M7410C,E (180 N)	MT8; M5410C1,L1 (90 N)	MT4;M7410A (90 N)
15	0.16	MOD	--	6.5	VSMF-215-0.16	600 kPa	600 kPa	--
15	0.25	MOD	--	6.5	VSMF-215-0.25	600 kPa	600 kPa	--
15	0.40	MOD	--	6.5	VSMF-215-0.4	600 kPa	600 kPa	--
15	0.63	MOD	--	6.5	VSMF-215-0.63	600 kPa	600 kPa	--
15	1.0	MOD	--	6.5	VSMF-215-1.0	600 kPa	600 kPa	--
15	1.6	MOD	--	6.5	VSMF-215-1.6	300 kPa	300 kPa	--
15	2.5	MOD	--	6.5	VSMF-215-2.5	100 kPa	100 kPa	--
20	2.5	MOD	--	6.5	VSMF-220-2.5	150 kPa	150 kPa	--
20	2.5	MOD	--	6.5	VSMF-220-2.5E	250 kPa	--	--
20	4.0	MOD	--	6.5	VSMF-220-4.0	50 kPa	50 kPa	--
20	4.0	MOD	--	6.5	VSMF-220-4.0E	250 kPa	--	--
25	6.3	MOD	--	6.5	VSMF-225-6.3P	250 kPa	250 kPa	--
25	8.0	MOD	--	6.5	VSMF-225-8.0P	250 kPa	250 kPa	--
15	1.0	ON-OFF	--	2.5	VSOE-215-1.0	600 kPa	600 kPa	600 kPa
15	1.0	ON-OFF	•	2.5	VSOE-215-1.0S	600 kPa	600 kPa	600 kPa
15	1.6	ON-OFF	--	2.5	VSOE-215-1.6	300 kPa	300 kPa	300 kPa
15	1.6	ON-OFF	•	2.5	VSOE-215-1.6S	300 kPa	300 kPa	300 kPa
15	2.5	ON-OFF	--	2.5	VSOE-215-2.5	150 kPa	150 kPa	150 kPa
15	2.5	ON-OFF	•	2.5	VSOE-215-2.5S	150 kPa	150 kPa	150 kPa
20	2.5	ON-OFF	--	2.5	VSOE-220-2.5	200 kPa	200 kPa	200 kPa
20	2.5	ON-OFF	•	2.5	VSOE-220-2.5S	200 kPa	200 kPa	200 kPa
20	4.0	ON-OFF	--	2.5	VSOE-220-4.0	100 kPa	100 kPa	100 kPa
20	4.0	ON-OFF	•	2.5	VSOE-220-4.0S	100 kPa	100 kPa	100 kPa
25	4.0	ON-OFF	--	2.5	VSOE-225-4.0P	200 kPa	200 kPa	200 kPa
25	5.5	ON-OFF	--	2.5	VSOE-225-5.5P	200 kPa	200 kPa	200 kPa

\*integrated snap-on linkage for MT-series actuators

## VSxF-3 Three-Way Valves with Flat Sealing

DN	K <sub>vs</sub>		type	snap-on feature*	stroke	applic.	order no.	close-off pressure with actuator		
	A-AB	B-AB						M6410C,L; M7410C,E (180 N)	MT8; M5410C1,L1 (90 N)	MT4;M7410A (90 N)
15	0.25	0.16	MOD	--	6.5	MIX	VSMF-315-0.25	600 kPa	600 kPa	--
15	0.40	0.25	MOD	--	6.5	MIX	VSMF-315-0.4	600 kPa	600 kPa	--
15	0.63	0.40	MOD	--	6.5	MIX	VSMF-315-0.63	600 kPa	600 kPa	--
15	1.0	0.63	MOD	--	6.5	MIX	VSMF-315-1.0	600 kPa	600 kPa	--
15	1.6	1.0	MOD	--	6.5	MIX	VSMF-315-1.6	300 kPa	300 kPa	--
15	2.5	1.6	MOD	--	6.5	MIX	VSMF-315-2.5	100 kPa	100 kPa	--
20	2.5	1.6	MOD	--	6.5	MIX	VSMF-320-2.5	150 kPa	150 kPa	--
20	2.5	1.6	MOD	--	6.5	MIX	VSMF-320-2.5E	250 kPa	--	--
20	4.0	2.5	MOD	--	6.5	MIX	VSMF-320-4.0	50 kPa	50 kPa	--
20	4.0	2.5	MOD	--	6.5	MIX	VSMF-320-4.0E <sup>†</sup>	250 kPa	--	--
25	6.3	4.0	MOD	--	6.5	MIX	VSMF-325-6.3P	250 kPa	250 kPa	--
25	8.0	5.5	MOD	--	6.5	MIX	VSMF-325-8.0P	250 kPa	250 kPa	--
15	1.0	0.63	ON-OFF	--	2.5	MIX/DIV	VSOE-315-1.0	600 / 200 kPa	600 / 200 kPa	600 / 200 kPa
15	1.0	0.63	ON-OFF	•	2.5	MIX/DIV	VSOE-315-1.0S	600 / 200 kPa	600 / 200 kPa	600 / 200 kPa
15	1.6	1.0	ON-OFF	--	2.5	MIX/DIV	VSOE-315-1.6	300 / 200 kPa	300 / 200 kPa	300 / 200 kPa
15	1.6	1.0	ON-OFF	•	2.5	MIX/DIV	VSOE-315-1.6S	300 / 200 kPa	300 / 200 kPa	300 / 200 kPa
15	2.5	1.6	ON-OFF	--	2.5	MIX	VSOE-315-2.5	150 kPa	150 kPa	150 kPa
15	2.5	1.6	ON-OFF	•	2.5	MIX	VSOE-315-2.5S	150 kPa	150 kPa	150 kPa
20	2.5	1.6	ON-OFF	--	2.5	MIX	VSOE-320-2.5	200 kPa	200 kPa	200 kPa
20	2.5	1.6	ON-OFF	•	2.5	MIX	VSOE-320-2.5S	200 kPa	200 kPa	200 kPa
20	4.0	2.5	ON-OFF	--	2.5	MIX	VSOE-320-4.0	100 kPa	100 kPa	100 kPa
20	4.0	2.5	ON-OFF	•	2.5	MIX	VSOE-320-4.0S	100 kPa	100 kPa	100 kPa
25	4.0	2.5	ON-OFF	--	6.5	MIX	VSOE-325-4.0P	200 kPa	200 kPa	200 kPa
25	5.5	3.5	ON-OFF	--	6.5	MIX	VSOE-325-5.5P	200 kPa	200 kPa	200 kPa

\*integrated snap-on linkage for MT-series actuators

<sup>†</sup>leakage rate B-AB port ≤ 0.5%

## VSxF-4 Four-Way Valves with Flat Sealing

DN	k <sub>vs</sub>		type	snap-on feature*	stroke	applic.	order no.	close-off pressure with actuator		
	A-AB	B-AB						M6410C,L; M7410C,E (180 N)	MT8; M5410C1,L1 (90 N)	MT4;M7410A (90 N)
15	0.25	0.16	MOD	--	6.5	MIX	VSMF-415-0.25	600 kPa	600 kPa	--
15	0.40	0.25	MOD	--	6.5	MIX	VSMF-415-0.4	600 kPa	600 kPa	--
15	0.63	0.40	MOD	--	6.5	MIX	VSMF-415-0.63	600 kPa	600 kPa	--
15	1.0	0.63	MOD	--	6.5	MIX	VSMF-415-1.0	600 kPa	600 kPa	--
15	1.6	1.0	MOD	--	6.5	MIX	VSMF-415-1.6	300 kPa	300 kPa	--
15	2.5	1.6	MOD	--	6.5	MIX	VSMF-415-2.5	100 kPa	100 kPa	--
20	2.5	1.6	MOD	--	6.5	MIX	VSMF-420-2.5	150 kPa	150 kPa	--
20	2.5	1.6	MOD	--	6.5	MIX	VSMF-420-2.5E	250 kPa	--	--
20	4.0	2.5	MOD	--	6.5	MIX	VSMF-420-4.0	50 kPa	50 kPa	--
20	4.0	2.5	MOD	--	6.5	MIX	VSMF-420-4.0E†	250 kPa	--	--
25	6.3	4.0	MOD	--	6.5	MIX	VSMF-425-6.3P	250 kPa	250 kPa	--
25	8.0	5.5	MOD	--	6.5	MIX	VSMF-425-8.0P	250 kPa	250 kPa	--
15	1.0	0.63	ON-OFF	--	2.5	MIX/DIV	VSOFF-415-1.0	600 / 200 kPa	600 / 200 kPa	600 / 200 kPa
15	1.0	0.63	ON-OFF	•	2.5	MIX/DIV	VSOFF-415-1.0S	600 / 200 kPa	600 / 200 kPa	600 / 200 kPa
15	1.6	1.0	ON-OFF	--	2.5	MIX/DIV	VSOFF-415-1.6	300 / 200 kPa	300 / 200 kPa	300 / 200 kPa
15	1.6	1.0	ON-OFF	•	2.5	MIX/DIV	VSOFF-415-1.6S	300 / 200 kPa	300 / 200 kPa	300 / 200 kPa
15	2.5	1.6	ON-OFF	--	2.5	MIX	VSOFF-415-2.5	150 kPa	150 kPa	150 kPa
15	2.5	1.6	ON-OFF	•	2.5	MIX	VSOFF-415-2.5S	150 kPa	150 kPa	150 kPa
20	2.5	1.6	ON-OFF	--	2.5	MIX	VSOFF-420-2.5	200 kPa	200 kPa	200 kPa
20	2.5	1.6	ON-OFF	•	2.5	MIX	VSOFF-420-2.5S	200 kPa	200 kPa	200 kPa
20	4.0	2.5	ON-OFF	--	2.5	MIX	VSOFF-420-4.0	100 kPa	100 kPa	100 kPa
20	4.0	2.5	ON-OFF	•	2.5	MIX	VSOFF-420-4.0S	100 kPa	100 kPa	100 kPa
25	4.0	2.5	ON-OFF	--	6.5	MIX	VSOFF-425-4.0P	200 kPa	200 kPa	200 kPa
25	5.5	3.5	ON-OFF	--	6.5	MIX	VSOFF-425-5.5P	200 kPa	200 kPa	200 kPa

\*integrated snap-on linkage for MT-series actuators

†leakage rate B-AB port ≤ 0.5%

## OPERATION

In the case of the two-way valve, the three-way valve, and the three-way valve with bypass, the built-in spring produces a closing force on the A-B / A-AB ports.

The valves are supplied with a screwed-on adjustment cap for manual operation and for protection of the stem. At modulating valves with 6.5mm stroke the adjustment cap allows A-B / A-AB to be fully closed and A-B / A-AB to be opened by ~50% (B-port closed by 50%). This allows the stem to be set up for filling or initial heating/cooling during the building construction phase without the use of a controller or actuator.

The small electric valve actuators as well as the thermo-electric actuators provide automatic control over the opening and closing movement of the valve stem.

### Typical Operation

All types of valves should be mounted in the return flow. If the  $\Delta p$ -values exceed 300 kPa, attention should be paid to the development of noise.

### Two-Way Valves

Direction of flow always from port A to port B

Port B: Outlet

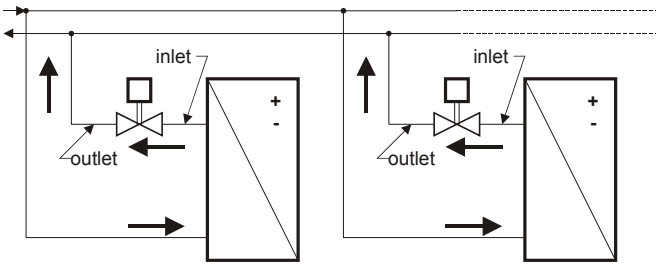


Fig. 1. Two-way valve operation

### Three-Way Valves

These valves are preferably used as mixing valves, this means:

- Port AB: Total flow outlet
- Port A: Controlled flow inlet
- Port B: Bypass inlet

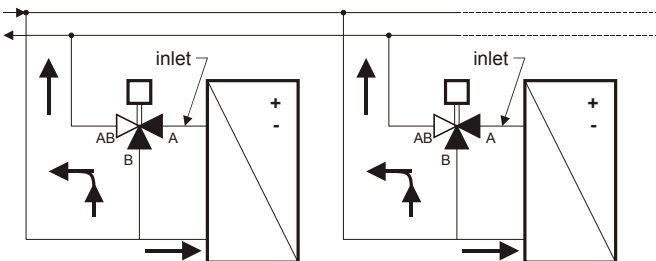


Fig. 2. Three-way valve operation

### Three-Way Valves with Bypass

These valves simplify the installation, which is depending on the layout of the pipework, as the bypass pipe is part of the

valve. The information for the normal three-way valves is also valid for this type.

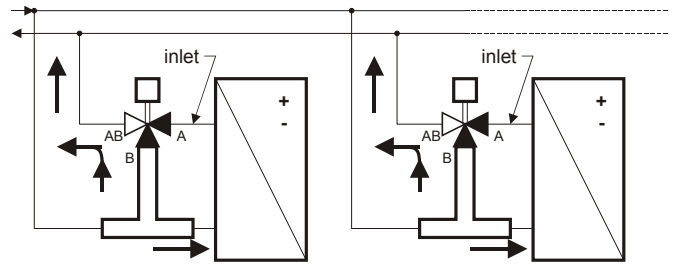


Fig. 3. Three-way valve with bypass

## MOUNTING

When installing the valve care must be taken that the flow direction is correct (see section "Typical Operation"). The valve must not be mounted with the stem pointing downward.

The adjustment cap must be removed from the valve only when the actuator is fitted. The valve should be installed as stress-free as possible with a tightening torque of 25 to 30 Nm.

The valve is supplied complete with mounting instructions. The water quality must meet VDI 2035 requirements.

### Snap-On Linkage for MT-Series Actuators

The ON-OFF models can also be ordered with a special integrated snap-on linkage for MT-series Smart-T actuators to facilitate assembly. These models are indicated by an "S" at the end of the order numbers, e.g.

- Standard valve with thread connection VSOF-415-1.6
- Valve with integrated snap-on linkage VSOF-415-1.6S

Modulating valves with this special integrated snap-on linkage are available, upon request.

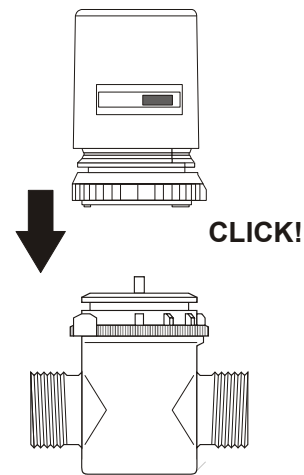
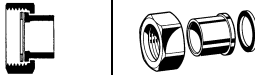
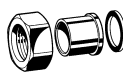

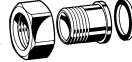
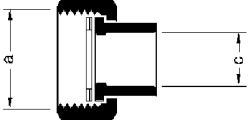
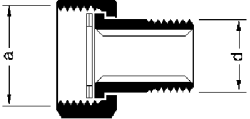


Fig. 4. Integrated snap-on linkage

## ACCESSORIES

Valves VSxF-2 need two connection sets, valves VSxF-3 need three connection sets, and valves VSxF-4 need four connection sets.

connection	pipe size	DN	order number	connection set		description
Soldering	12 mm 15 mm	15 20	AC-15FS AC-20FS			Consisting of 1 union nut, 1 solder bush, and 1 gasket
External Thread	R3/8" R1/2" R1"	15 20 25	AC-15FT AC-20FT ACS-25T			Consisting of 1 union nut, 1 tailpiece, and 1 gasket

dimensions of connection sets				order number
	a	c	d	
	G1/2"	12 mm		AC-15FS
	G3/4"	15 mm		AC-20FS
	G1/2"		R3/8"	AC-15FT
	G3/4"		R1/2"	AC-20FT
	G1-1/4"		R1"	ACS-25T

## DIMENSIONS

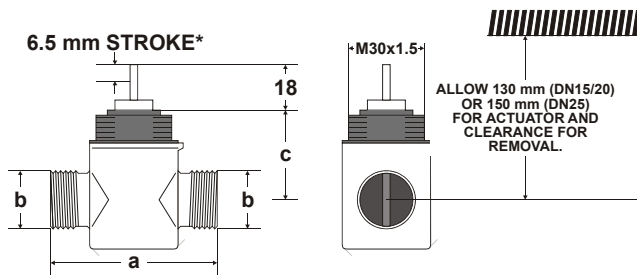


Fig. 5. Two-way valves, dimensions

**\*NOTE:** In the case of modulating valves, the stroke amounts to 6.5 mm, and the closure distance to 18 mm. In the case of ON/OFF valves, the stroke amounts to 2.5 mm, and the closure distance to 14 mm.

Table 1. Two-way valves, dimensions (mm)

	a	b	c
DN15	56	G 1/2 A	32
DN20	66	G 3/4 A	34
DN25	76	G1-1/4"	48

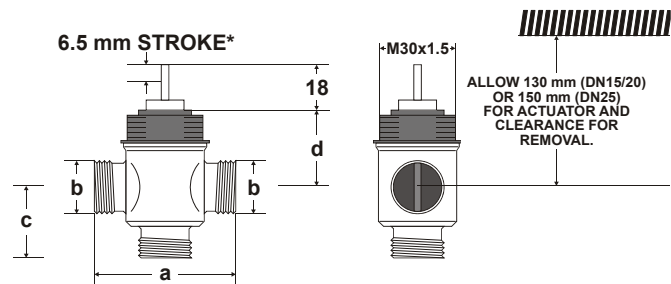


Fig. 6. Three-way valves, dimensions (mm)

**\*NOTE:** In the case of modulating valves, the stroke amounts to 6.5 mm, and the closure distance to 18 mm. In the case of ON/OFF valves, the stroke amounts to 2.5 mm, and the closure distance to 14 mm.

Table 2. Three-way valves, dimensions (mm)

	a	b	c	d
DN15	56	G 1/2 A	25.5	32
DN20	66	G 3/4 A	33	34
DN25	76	G1-1/4"	38	48

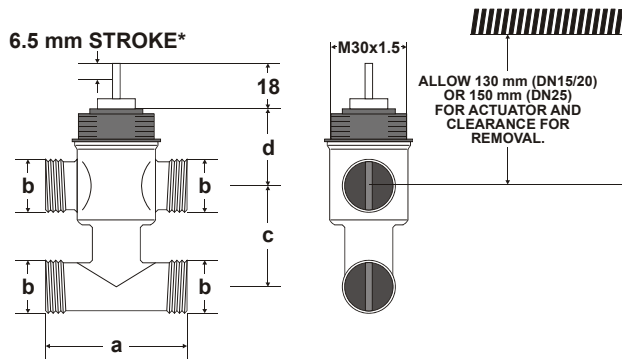


Fig. 7. Three-way valves with bypass, dimensions

**\*NOTE:** In the case of modulating valves, the stroke amounts to 6.5 mm, and the closure distance to 18 mm. In the case of ON/OFF valves, the stroke amounts to 2.5 mm, and the closure distance to 14 mm.

Table 3. Three-way valves with bypass, dimensions (mm)

	a	b	c	d
DN15	56	G ½A	40	32
DN20	66	G¾A	40	34
DN25	76	G1-1/4"	62.5	48

## DIMENSIONS WITH SNAP-ON

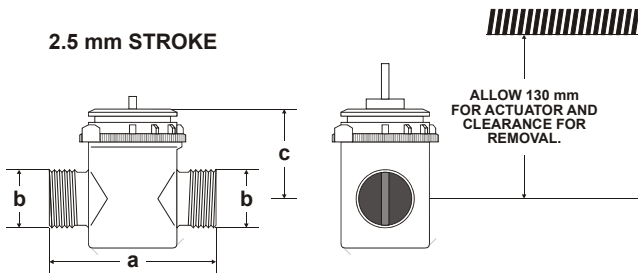


Fig. 8. Two-way valves with snap-on, dimensions

Table 4. Two-way valves, dimensions (mm)

	a	b	c
DN15	56	G ½ A	34.5
DN20	66	G¾ A	36.6

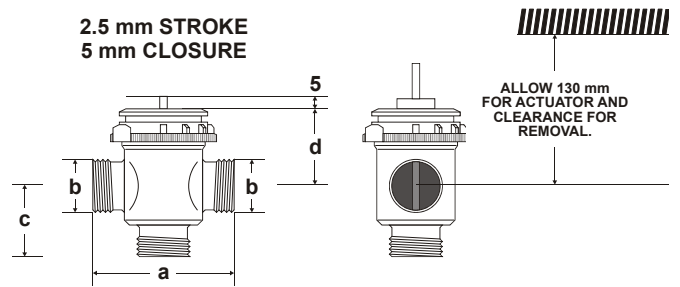


Fig. 9. Three-way valves with snap-on, dimensions (mm)

Table 5. Three-way valves, dimensions (mm)

	a	b	c	d
DN15	56	G ½ A	25.5	34.5
DN20	66	G¾ A	33	36.6

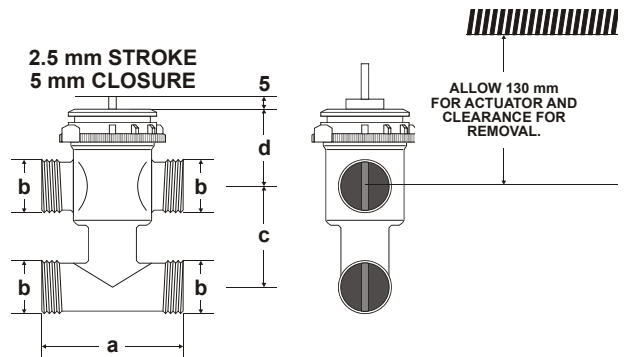


Fig. 10. Three-way valves with bypass with snap-on, dimensions

Table 6. Three-way valves with bypass, dimensions (mm)

	a	b	c	d
DN15	56	G ½A	40	34.5
DN20	66	G¾A	40	36.6

## VALVE ACTION WITH MT-SERIES SMART-T THERMAL ACTUATORS

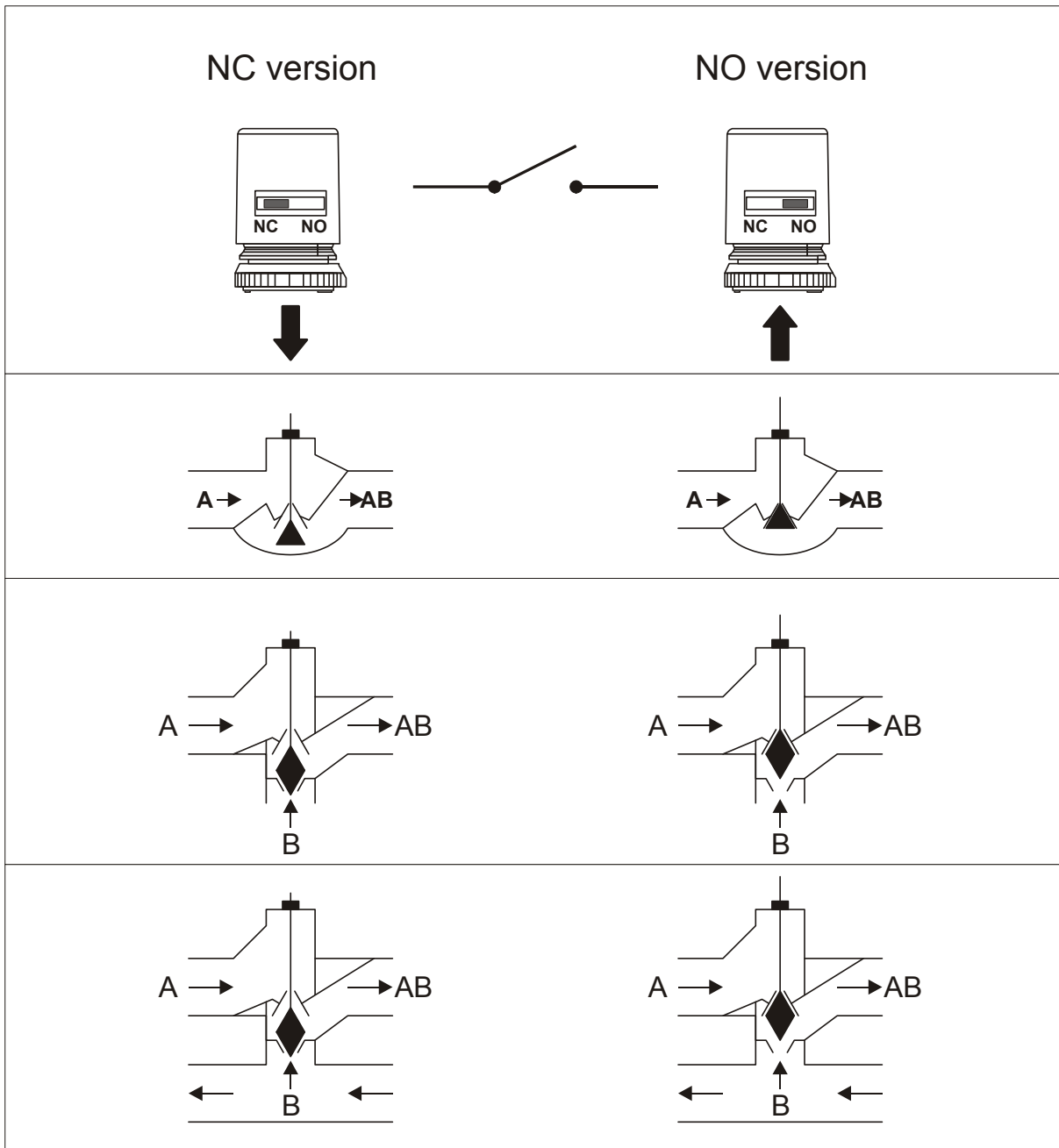


Fig. 11. Valve action with MT-series Smart-T Thermal Actuators

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