Three-Position Control Valves (3B Series)

Features

(1) Adjustment of opening position is mechanically controlled, which enables fine adjustment and makes adjustment work and maintenance easier.
*Initial opening position adjustment range
The intermediate position of the 3B series can be adjusted at any given degree within 0° to 30°.
Double-action type ... Special wrench supplied with the product Spring-return type ... Wrenches available on the market

(2) The open/close response is so quick that it can be used for emergency shutoff.

(3) Reliable control is provided which prevents overshoot at the opening.

(4) Excellent shock resistance and cost reduction is archived by eliminating the need for positioners.

(5) The design reduces air consumption and enables the actuator to be compact.

(6) A mechanism is provided to prevent a shock action (jumping) at the start of the opening operation.

(7) The open/close action pattern (opening position/time) is selectable.

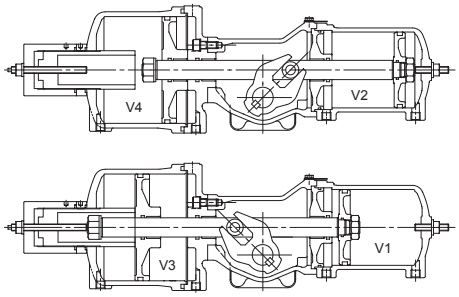
(8) The unit complies easily with explosion proof specifications.

Specifications

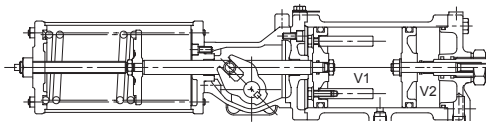
Actuator

Specifications \ Operation Type / Type		Double-action				Spring return/Spring return type with manual operation device (lower row)			
		3B-1	3B-2	3B-3	3B-4	3BS-1 3BSW-1	3BS-2 3BSW-2	3BS-3 3BSW-3	3BS-4 3BSW-4
Operating media		Compressed instrument air							
Standard operating pressure		0.4 MPa							
Operating pressure range		0.4–0.7 MPa or less							
Housing test pressure		0.97 MPa							
Operation torque (ending)	N·m	36	94	235	598	27	71	176	449
Cylinder volume	V1(1)	0.17	0.43	1.04	2.75	0.39	0.80	2.29	5.73
	V2(1)	0.17	0.43	1.09	2.69	0.18	0.48	1.39	3.93
	V3(1)	0.19	0.52	1.30	2.76	—	—	—	—
	V4(1)	0.33	0.82	2.23	5.39	—	—	—	—
Air supply port		Rc1/4							Rc1/2
Drive shaft rotation		90° (± 5° at each end)							
Intermediate opening adjustment range		0–30°							
Ambient temperature		–20°C to + 60°C (supplied air should not frozen)							
Standard coating		Acrylic modified alkyd resin heat resistant paint/Paint color: silver							

Double-action



Spring-return



Accessories

Standard accessories	Specifications
1 Filter regulator **1 piece**	Standard specifications: SMC product AW series, CKD product 7019 series • Manufacturer standard type (relieving type)

Model \ Spec.	Air inlet (Rc)	Flow rate* Nℓ/min (approx.)	Pressure setting range (MPa)	Ambient temperature (℃)	Actuator size common with 3B/3BS/3BSW
B7019-2C-GB	1/4	600	0.04–0.83	5–65	3B-1
AW30-02BG-R		1,500	0.05–85	–5–60	3B-2–3B-4

*Flow rate: values at inlet pressure 0.69 MPa and output pressure of 0.39 MPa.
・Bowl material: Polycarbonate
・Nominal filtration rating: 5 µm

Standard accessories	Specifications
2 Solenoid valve **2 pieces**	Standard specifications: Konan Electric CO., Ltd. product 454 series • Pilot operated four-way solenoid valve: Single solenoid

Model \ Spec.	Constr-uction	Air inlet (Rc)	Cv Value	Pressure setting range (MPa)	Ambient temperature (℃)	Power source
454S202C-E01-H1	Explosion proof	1/4	1.19	0.15–0.8	–5–+60	AC100/110V
454S202C-E01-H3						AC200/220V
454S202C-E01-H5						DC24V

*A manifold solenoid valve assembled with two single solenoids
Suffix "-00-G30887" is added to the above model number.

Standard accessories	Specifications
3 Speed controller **1 piece**	Standard specifications: SMC product AS series

Model \ Spec.	Connec-tion (Rc)	Max flow rate*: Nl / min controlled/ free flow	Operating pressure range (MPa)	Ambient temp. (°C)	Actuator size common with 3B/3BS/3BSW
AS2000-02	1/4	250/340	0.05–1.0	–5–60	3B-1
AS3000-02-X581		810/810			3B-2–3B-4

Note: The installation position of one speed controller is between the full open position and the intermediate position on the closing side.
*The max flow rate is the value under the conditions that the inlet pressure is 0.5 MPa, the outlet is released to atmosphere, the temperature is 20°C, and the orifice of the speed controller is fully opened.
・Low temperature application (-30 to 60°C) and high temperature application (-10 to 80°C) are not indicated in the model number. Therefore, specify in the specification sheet.

Standard accessories	Specifications
4 Silencer **3 pieces**	Standard specifications: Koganei product KM series • Compact type

Model \ Spec.	Connec-tion (Rc)	Effective area (mm^2)	Recom-mended flow *Nl/min	Noise reduction (dB)	Ambient temp. (°C)	Actuator size common with 3B/3BS/3BSW
KM-22	1/4	21	1,000	18 or more	5–60	3B-1–3B-4

Standard accessories	Specifications
5 Mounting screws, brackets, air pipes 1 Set	・Mounting screw: SUS304 ・Bracket: FCD450 ・Connector: SCS13A ・Air pipe/fitting: steel pipes/brass joints (stainless steel is optionally available)

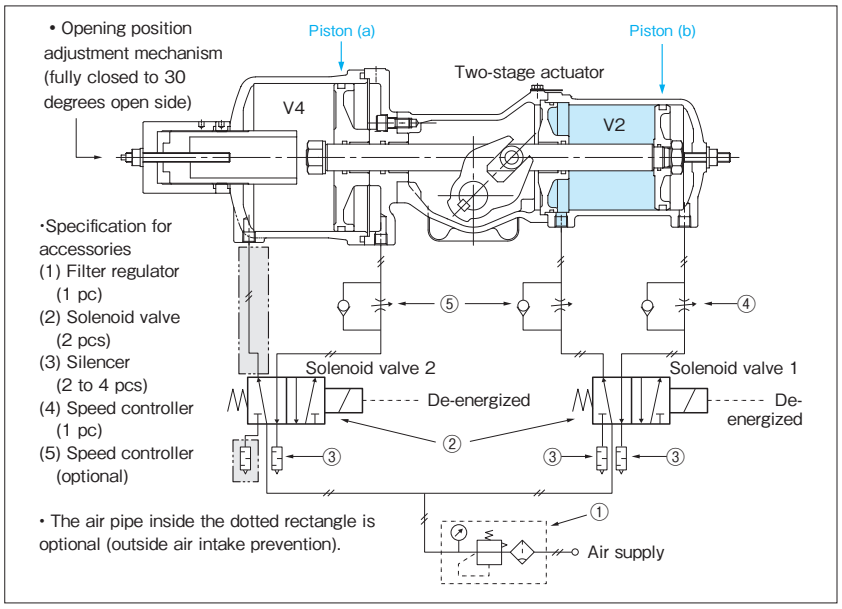
*Other accessories (such as a pressure equalizing valve) are optionally available.

Operational Mechanism <Double Action>

The Fully Closed position

(1) The fully closed position

When both the solenoid valves 1 and 2 are de-energized, the air pressure passes through solenoid valve 1 and enters the cylinder chamber V2. The air pressure in the cylinder chamber V2 moves the small piston on the right to the right end, and the actuator output shaft rotates clockwise when viewing from above. At this point, the disc reaches the fully closed position.

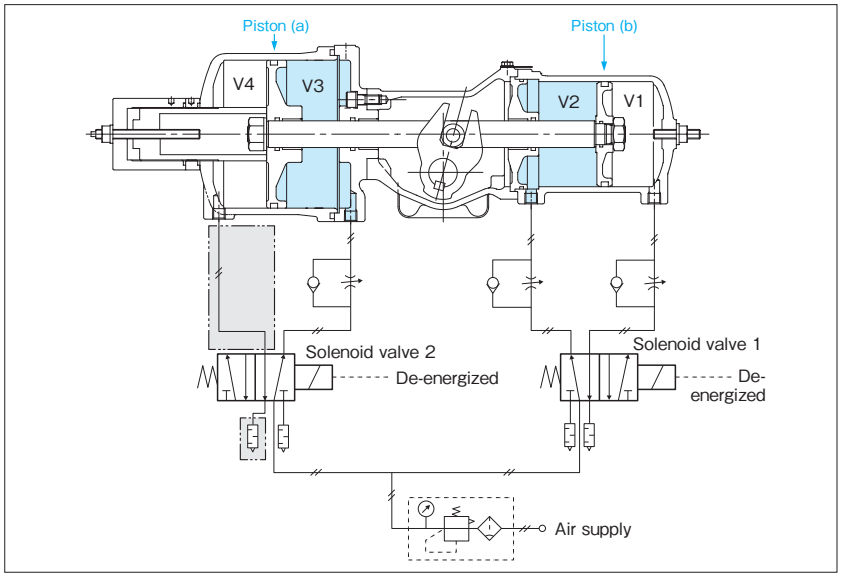


The Intermediate Position

(2) Open at the first stage (the intermediate position: within 30 degrees)

When the solenoid valve 2 is energized, the air pressure passes through solenoid valve 2 and enters the cylinder chamber V3. The air pressure in the cylinder chamber V3 moves the large piston on the left up to the stopper of the first stage, and the actuator output shaft rotates counter-clockwise (within the range of 0 to 30 degrees) when viewing from above.

At this point, the disc moves to the intermediate position and stops there.



The Fully Open Position

(3) Open at the second stage opening (fully open)

When solenoid valve 1 is energized, the air pressure passes through solenoid valve 1 and enters the cylinder chamber V1, and at the same time, air pressure in the cylinder chamber V2 is exhausted from the exhaust port of solenoid valve 1.

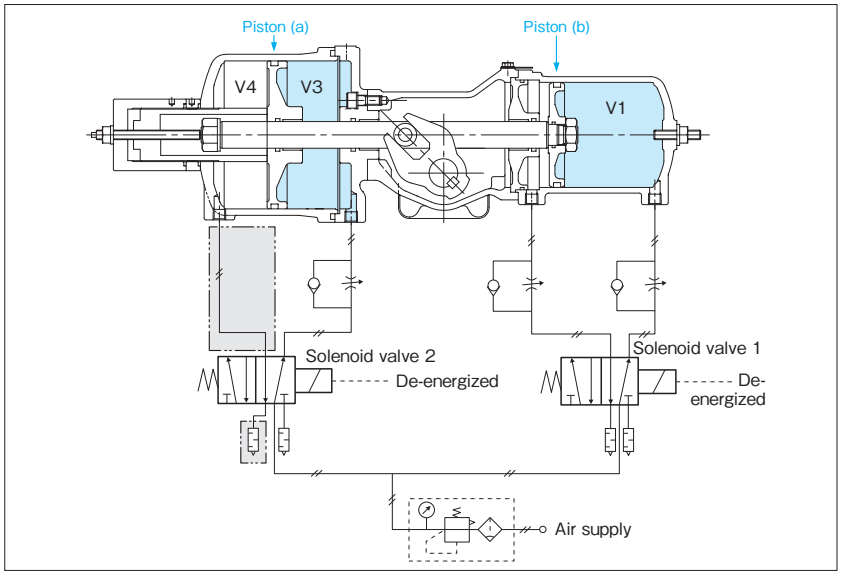
The air pressure in the cylinder chamber V1 moves the small piston on the right to the left end, and the actuator output shaft rotates counter-clockwise when viewing from above. At this point, the disc reaches the fully open position.

(4) Closed at the first stage (the intermediate position: within 30 degrees)

While the actuator action is same as (2), it is able to adjust operating speed by the speed controller (4).

(5) Closed at the second stage (fully closed)

The actuator action is the same as (1).



Operational Mechanism <Spring Return>

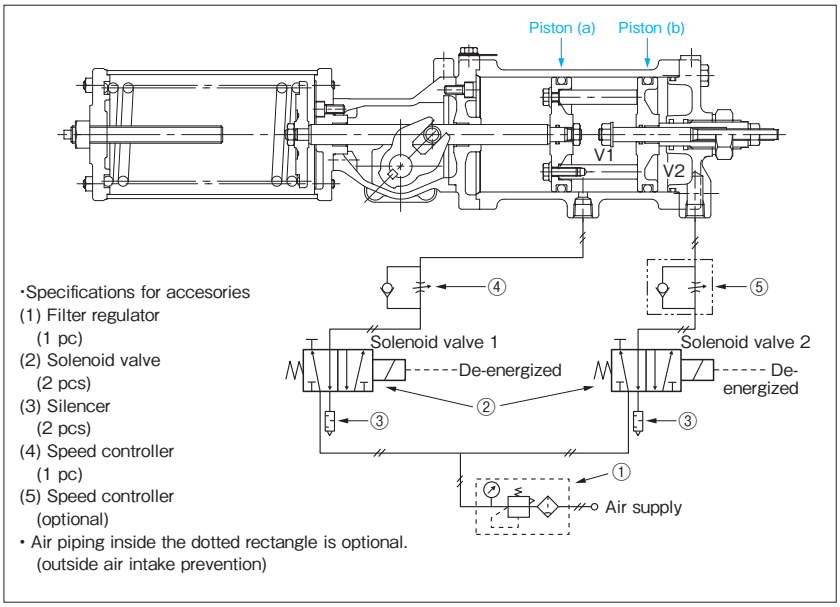
●Spring Return Actuator <Type 3BS/3BSW>

(The figures show type 3BS actuator)

■ The Fully Closed Position

(1) The fully closed position

When both solenoid valves 1 and 2 are de-energized, air pressure in the cylinder chambers V1 and V2 is exhausted from the exhaust ports of solenoid valves 1 and 2, and then the disc moves to the fully closed position.

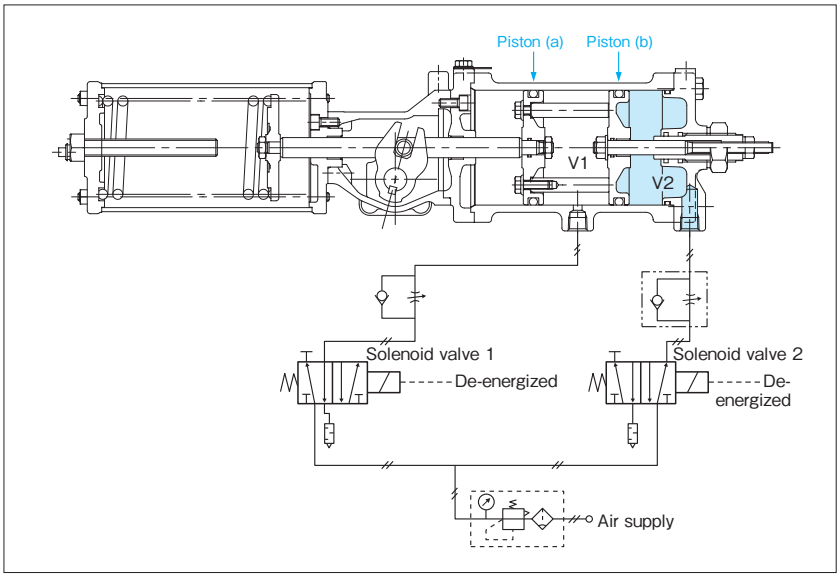


・Specifications for accesories
(1) Filter regulator
(1 pc)
(2) Solenoid valve
(2 pcs)
(3) Silencer
(2 pcs)
(4) Speed controller
(1 pc)
(5) Speed controller
(optional)
・Air piping inside the dotted rectangle is optional.
(outside air intake prevention)

■ The Intermediate Position

(2) Open at the first stage (The intermediate position: within 30 degrees)

When solenoid valve 1 is de-energized and solenoid valve 2 is energized, the air pressure enters the cylinder chamber V2, and the piston (b) moves to the stopper at the first stage. The actuator output shaft rotates counter-clockwise (within the range from 0 and 30 degrees) when viewing from above, and the disc moves to the intermediate position and stops there.

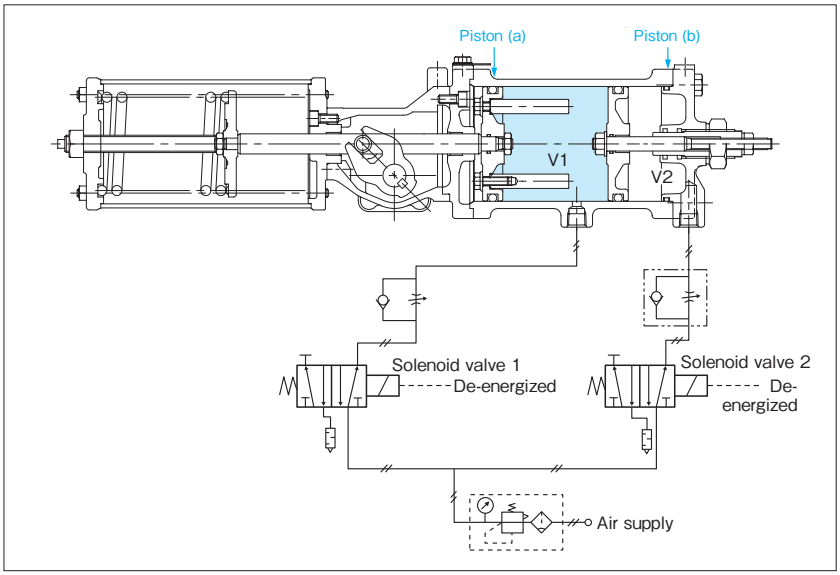


■ The Fully Open Position

(3) Open at the second stage (fully open)
When solenoid valve 1 is energized, the air pressure passes through solenoid valve 1 and enters the cylinder chamber V1, and the piston (a) moves to the left. The actuator output shaft rotates counter-clockwise when viewing from above, and the disc reaches the fully open position.

(4) Closed at the first stage (the intermediate position: within 30 degrees)
When the actuator action is the same as (2), it is able to adjust operating speed by the speed controller (4).

(5) Closed at the second stage (fully closed)
The actuator action is the same as (1).



Operation Type (Time Chart)

By switching two solenoid valves, the following types of actuator actions are possible.

1) Open/closed at two stages: Fully closed (1)→ Intermediate (2)→ Fully open (3)→ Intermediate (4)→ Fully closed (5)

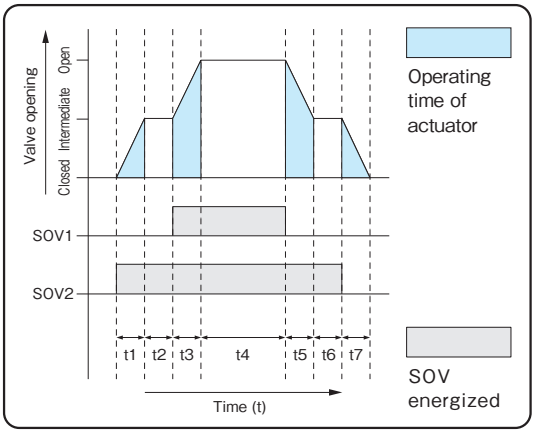
[Action pattern]

	SOV1	SOV2	Valve pos.	Time
①	De-energized	De-energized	Fully closed	—
②	De-energized	Energized	Intermediate	t1–t2
③	Energized	Energized	Fully open	t3–t4
④	De-energized	Energized	Intermediate	t5–t6
⑤	De-energized	De-energized	Fully closed	t7

Note: SOV is an abbreviation for solenoid valve.

[Operating time of the actuator]

- The time "t5" can be adjusted by the speed controller.
- The times "t2", "t4" and "t6" are specified by the user.



2) Open at one stage/closed at two stages: Fully closed (1)→ Fully open (2)→ Intermediate (3)→ Fully closed (4)

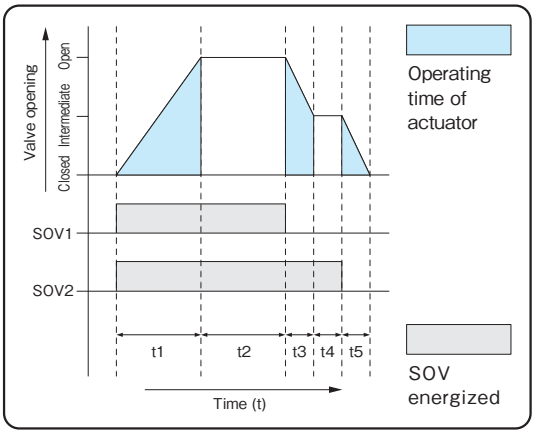
[Action pattern]

	SOV1	SOV2	Valve pos.	Time
①	De-energized	De-energized	Fully closed	—
②	Energized	Energized	Fully open	t1–t2
③	De-energized	Energized	Intermediate	t3–t4
④	De-energized	De-energized	Fully closed	t5

Note: SOV is an abbreviation for solenoid valve.

[Operating time of the actuator]

- The time "t3" can be adjusted by the speed controller.
- The times "t2" and "t4" are specified by the user.



3) Open at two stages/closed at one stage: Fully closed (1)→ Intermediate (2)→ Fully open (3)→ Fully closed (4)

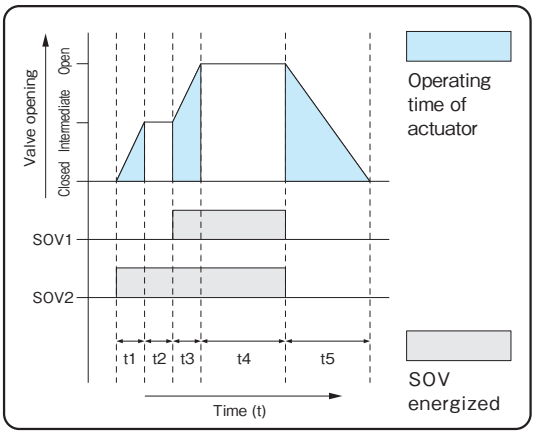
[Action pattern]

	SOV1	SOV2	Valve pos.	Time
①	De-energized	De-energized	Fully closed	—
②	De-energized	Energized	Intermediate	t1–t2
③	Energized	Energized	Fully open	t3–t4
④	De-energized	De-energized	Fully closed	t5

Note: SOV is an abbreviation for solenoid valve.

[Operating time of the actuator]

- The time "t5" can be adjusted by the speed controller.
- The times "t2" and "t4" are specified by the user.



4) Open/closed at one stage: Fully closed (1)→ Fully open (2)→ Fully closed (3)

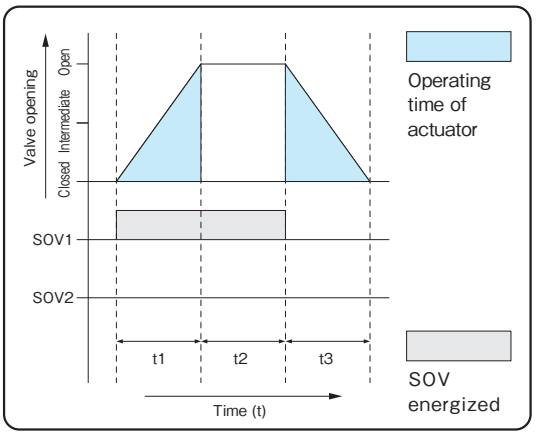
[Action pattern]

	SOV1	SOV2	Valve pos.	Time
①	De-energized	De-energized	Fully closed	—
②	Energized	De-energized	Fully open	t1–t2
③	De-energized	De-energized	Fully closed	t3

Note: SOV is an abbreviation for solenoid valve.

[Operating time of the actuator]

- The time "t3" can be adjusted by the speed controller.
- The times "t2" is specified by the user.



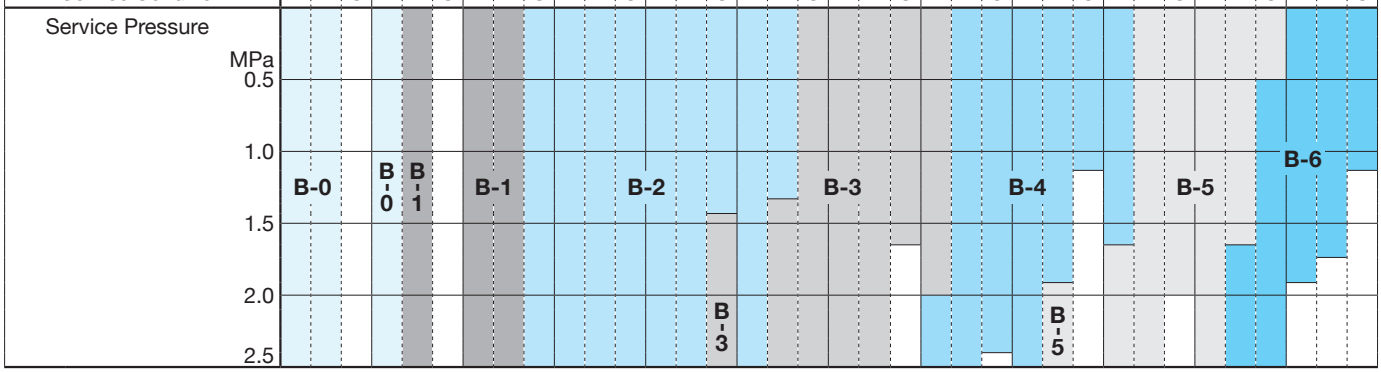
Actuator Sizing (For Ball valves)

The operating torque of a valve varies according to fluid conditions such as pressure, temperature, velocity, viscosity and density. The following actuator sizes are recommended for typical light or heavy load service with the fluid conditions specified below. Selection of Type B listed here can be also applied to selection of Type BS and Type BSW.

IMPORTANT
Selection of actuators is very critical when:
- ■Fluid pressure is higher than that listed below.
- ■Fluid velocity is extremely high.
- ■Operational interval exceeds three months.
- ■Operating pressure is lower than 0.4 MPa (60 psi)

For TDZ Series (Full Bore Design)

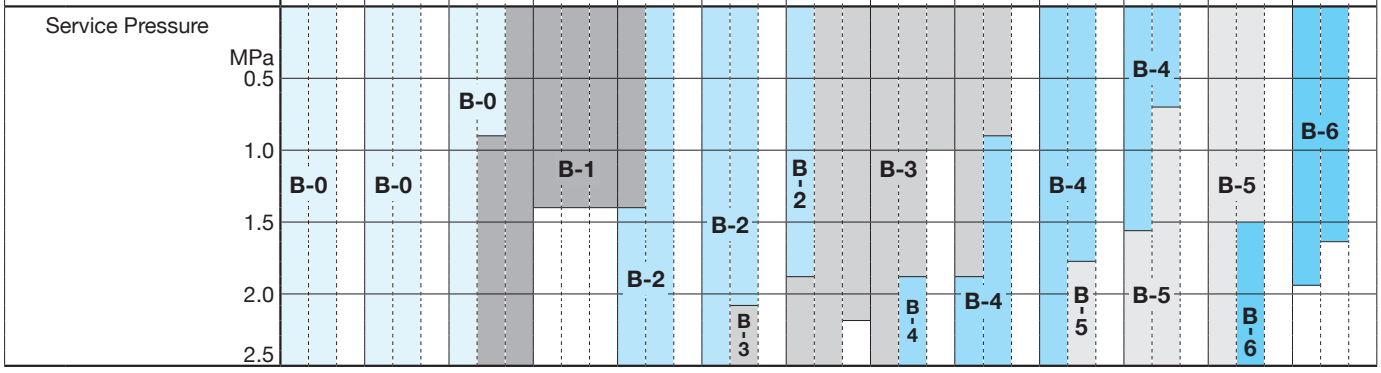
Size	in	1/2[B]	3/4[B]	1[B]	11/2[B]	2[B]	21/2[B]	3[B]	4[B]	5[B]	6[B]	8[B]	10[B]
	mm	15[A]	20[A]	25[A]	40[A]	50[A]	65[A]	80[A]	100[A]	125[A]	150[A]	200[A]	250[A]
Service Condition		A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C



*Consult KITZ distributors for availability of appropriate actuators.

For TB Series

Size	Full Bore Type in(mm)	1/2[B](15[A])	3/4 (20)	1 (25)	11/4 (32)	11/2 (40)	2 (50)	21/2 (65)	3 (80)	4 (100)	5 (125)	6 (150)	8 (200)	10 (250)
	Reduced Bore Type in(mm)	3/4[B] (20[A])	1 (25)	11/4 (32)	11/2 (40)	2 (50)	—	3 (80)	4 (100)	5 (125)	6 (150)	8 (200)	10 (250)	12 (300)
Service Condition		A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C



*Consult KITZ distributors for availability of appropriate actuators.

Fluid Condition

Fluids \ Service Condition	Light Load Service	Heavy Load Service
Water	up to 1.0 MPa: A	1.0~2.5 MPa: B
Air, steam and gases	up to 0.7 MPa: A	0.7~1.8 MPa: B
Highly viscous fluid		up to 1.0 MPa: B
Kerosene, naphtha, alcohol, and other solvents		up to 1.0 MPa: B
Oil-free service		up to 1.0 MPa: B
Slurry and other liquids containing foreign objects		up to 1.0 MPa: C*
Service temperature: Fluids temperature	See valve seat rating of “Ball Valves Catalog” (E-201)	

Contact us for fluids other than the above.

*Contact us for extremely heavy load service (powder, slurry, dehydrated cake, etc.) or fluids easy to solidify or polymerize.

Optional Accessories

The following optional accessories are recommended for KITZ B Series actuators.
For supply of other accessories, contact your local KITZ distributors.

Product code	Purpose	Specifications
Limit Switch **LS** Weather-proof **LS-F** Explosion-proof	For initiating electric signals to check open or close position of the valve: A separate limit switch is recommended for each of open and close indications.	**LS** AC: 10 A/125 V 10 A/250 V 10 A/480 V DC: 0.8 A/115 V 0.4 A/230 V **LS-F** AC: 5 A/125 V 5 A/250 V DC: 0.8 A/125 V 0.4 A/250 V Contact circuit: 2-Circuit double break
Solenoid Valve **SOV** Weather-proof **SOV-F** Explosion-proof	Flow switching over air flow by electric signal; 4-way solenoid valves for double-action actuators, 4-way solenoid valves for spring-return actuators, with one OUT port plugged, or 3-way solenoid valves used.	Connected pipe: BSPT1/4 Working pressure: 0~0.97 MPa Orifice diam: 6 mm Electric current: 100 V/50 Hz 100 V/60 Hz 110 V/60 Hz 200 V/50 Hz 200 V/60 Hz 220 V/60 Hz Supply source connection Weather-proof: DIN terminals or terminal boxes Explosion-proof: Electric wire pipe threading
Air Filter-Regulator **F + R** (With pressure gauge)	For removing moisture, water and other foreign objects from operating air and for regulating air pressure at a desire level.	Connected pipe: BSPT1/4, BSPT1/2 Working pressure: Max. inlet pressure; 0.97 MPa Setting pressure range: Max. outlet pressure; 0.04~0.83 MPa
Speed Controller **SP**	For reducing actuator operating speeds.	Connected pipe: BSPT1/8, BSPT1/4, BSPT1/2 Operation pressure: 0.97 MPa max.
Quick Exhaust Valve **QE**	For increasing actuator operation speed. This device can increase operation speed only when the actuator is operated by the spring. Positioners cannot be used together with a quick exhaust valves.	Connected pipe: BSPT1/4, BSPT1/2 Working pressure: 0.97 MPa max.
Valve Positioner **P** (Complete with pressure gauge)	For controlling the flow rate. A positioner can be mounted on either double-action or spring-return actuators. Operation mode, air-to-open or air-to-close, can be changed simply by reversing cam direction.	Connected pipe: BSPT1/4 (pressure gauge: BSPT1/8) Supply pressure: 0.3~0.7 MPa Signal pressure: 0.02~0.1 MPa or specified Signal Current: E/P: (input signal) 4~20 mA Air consumption: 20 Nℓ/min. max. (at supply pressure 0.5 MPa)
Silencer **K**	For reducing the air exhaust noise of solenoid valves. The device is installed at the exhaust port of a solenoid valve.	Connected pipe: BSPT1/8, BSPT1/4, BSPT1/2 Working pressure: 0.9 MPa max.
Air Filter **F**	For removing moisture, water and other foreign objects from operating air.	Connected pipe: BSPT1/4, BSPT1/2 Working pressure: 0.97 MPa max.
Pressure Equalizing Valve **C**	For equalizing the internal air pressure to the atmospheric level for manual operation of actuators.	Connected pipe: BSPT1/4 Working pressure: 1.37 MPa max.

Above specifications are KITZ standards. Different specifications are optionally available.