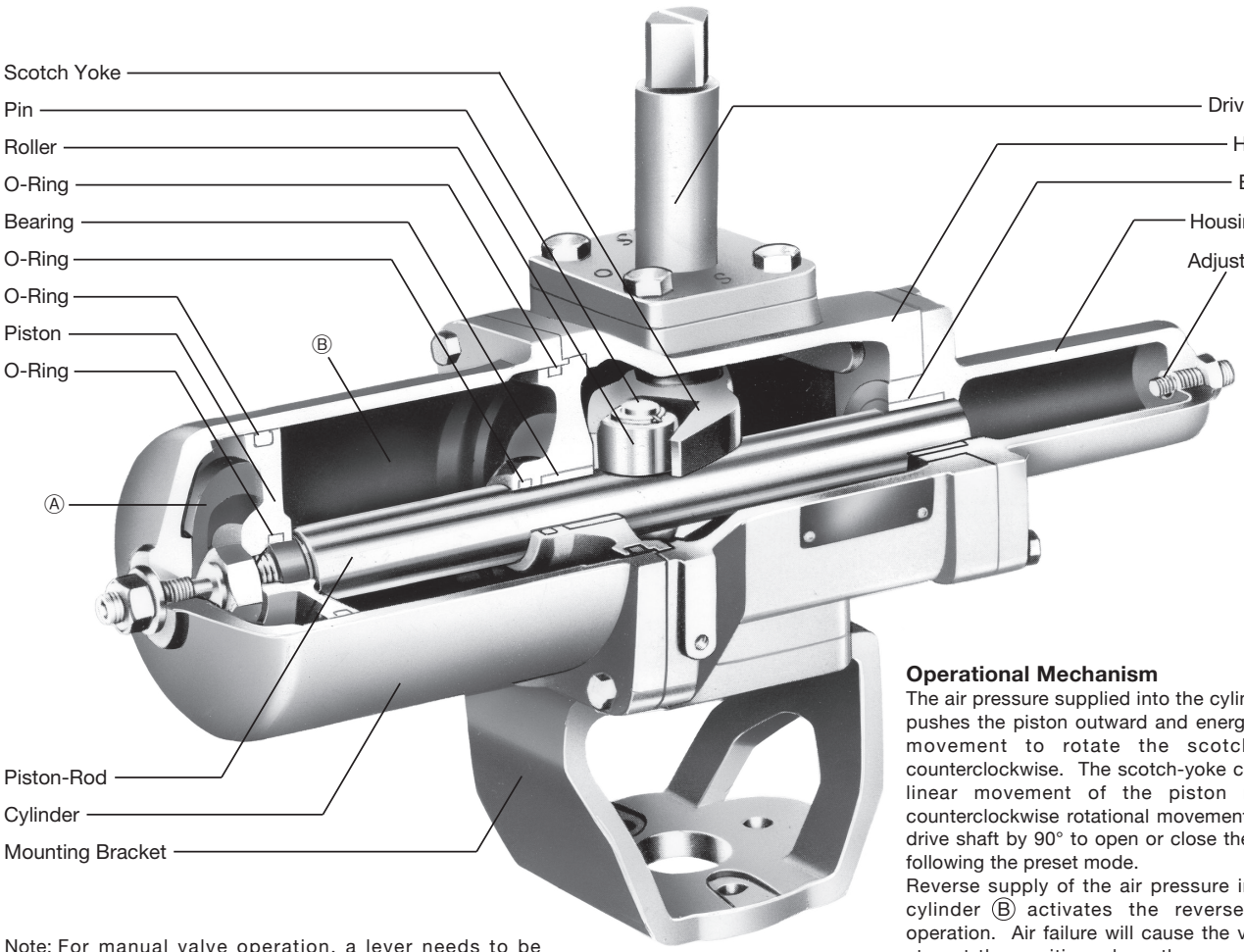
Features of KITZ B Series Pneumatic Actuators

Internationally patented

Type B (Double-Action)



Note: For manual valve operation, a lever needs to be mounted on the top end of the drive shaft of Type B-1 through B-4 actuators. Separate manual operators are available for Type B-5 and B-6 actuators.

Operational Mechanism
The air pressure supplied into the cylinder Ⓐ pushes the piston outward and energizes its movement to rotate the scotch-yoke counterclockwise. The scotch-yoke converts linear movement of the piston rod to counterclockwise rotational movement of the drive shaft by 90° to open or close the valve, following the preset mode.
Reverse supply of the air pressure into the cylinder Ⓑ activates the reverse valve operation. Air failure will cause the valve to stay at the position where the operation is disturbed, unlike the valve driven by Type BS or BWS actuator.

Smooth operation with minimum friction
Extensive use of fluorocarbon resin to coat inside parts of the actuator reduces friction to a minimum for smooth operation. This includes the inside of the cylinder, resulting in smooth sliding of the piston and O-rings, as well as the surfaces of driving shaft, piston rod, and all bearings. As a result, the actuator features long-term stable operation.

Simple, trouble-free construction
The number of parts has been minimized to reduce mechanical problems and simplify periodical check, maintenance, disassembly, or reassembly.

Separated turning mechanism and cylinder
Unlike conventional designs, in which the cylinder drive transmission mechanism is incorporated in the cylinder itself, the transmission mechanism of KITZ B Series actuators is designed with a scotch yoke installed separately from the cylinder.

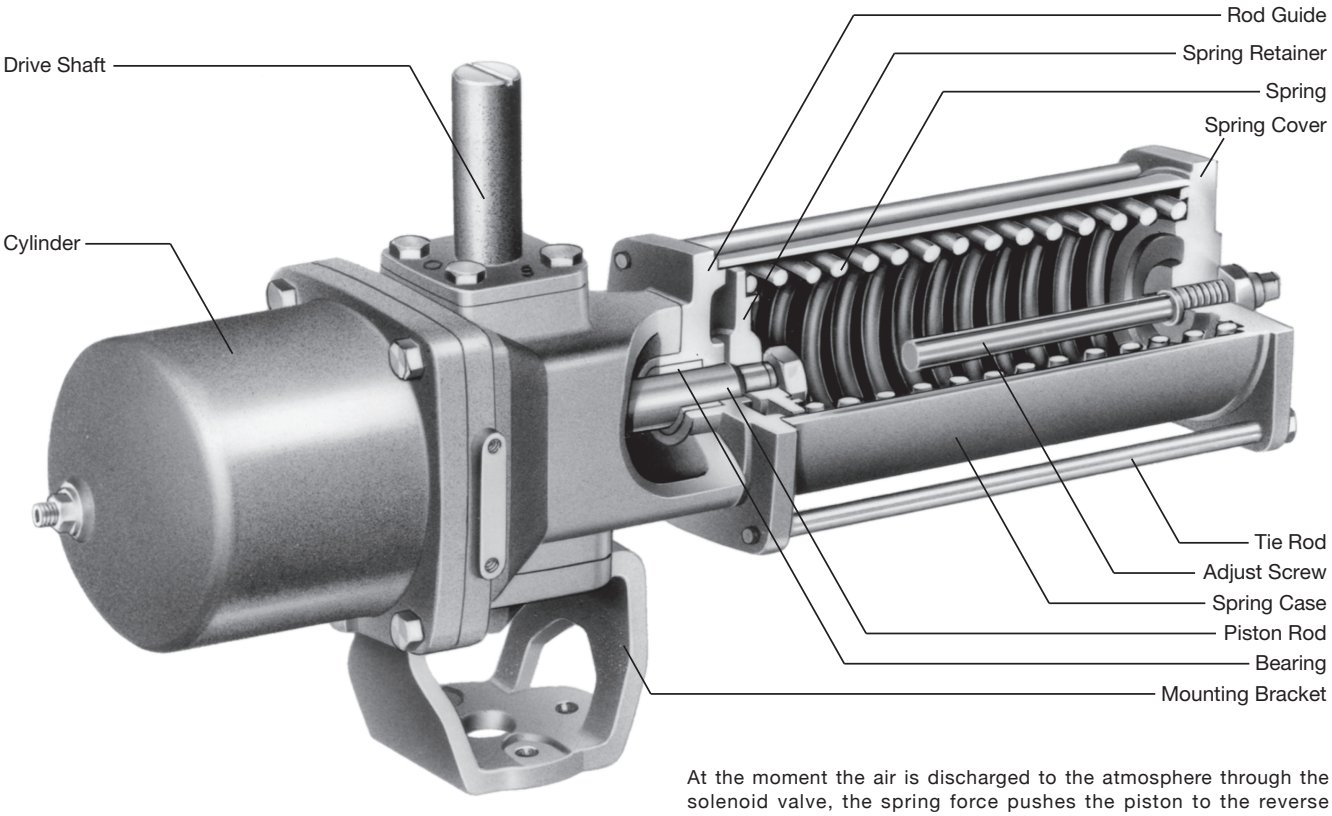
This construction prevents air leakage even when the shaft clearance has increased during service.

Drive characteristics suited to quarter-turn valves
Unlike conventional cylinder actuators deploying linear drive characteristics, use of a scotch yoke mechanism provides a U-shape curve which maximizes the force obtained at the start and end areas of each stroke. This performance curve is similar to the torque characteristics of ball and butterfly valves in general, making KITZ B Series actuators suitable for such quarter-turn valves.

Installation of accessories
The actuator housing is provided with an arrangement for mounting limit switches and valve positioners, etc. on its top, and solenoid valves, air filters, and regulators, etc. on its side.

Internationally patented

Type BS (Spring-Return)
Type BSW (Spring-Return with Manual Operation Device)

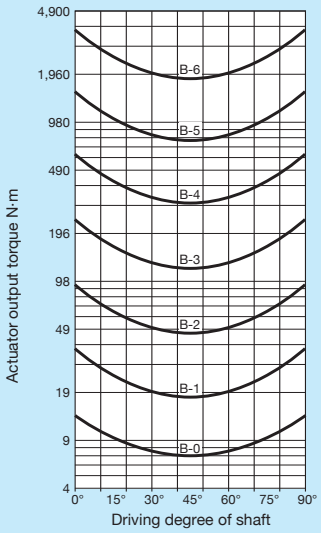


Operational Mechanism

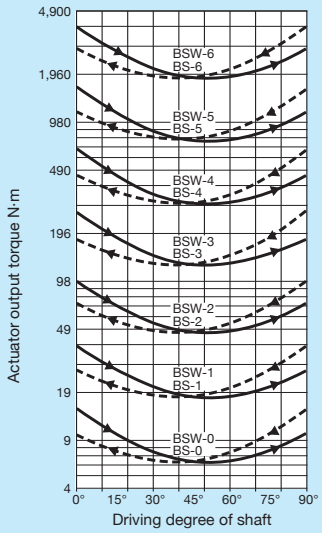
The air pressure supplied into the cylinder pushes the piston outward and energizes its movement to rotate the scotch-yoke counterclockwise, compressing the spring. The scotch-yoke converts linear movement of the piston rod to counterclockwise rotational movement of the drive shaft by 90°, to open or close the valve, following the preset mode.

At the moment the air is discharged to the atmosphere through the solenoid valve, the spring force pushes the piston to the reverse direction, and the scotch-yoke activates clockwise rotation of the shaft to reversely operate the valve. Air failure will cause the valve to return to the original open or closed position automatically, following the preset mode, unlike the valve driven by Type B actuator.
The BSW actuator is driven with the same mechanism as Type BS, but provided with a handwheel for manual operation. Please bear it in mind that the handwheel must be **factory mounted**.

Type B Actuator Output Torque



Type BS/BSW Actuator Output Torque



— Output torque when air pressure is supplied.
--- Output torque caused by spring force when air pressure is exhausted.

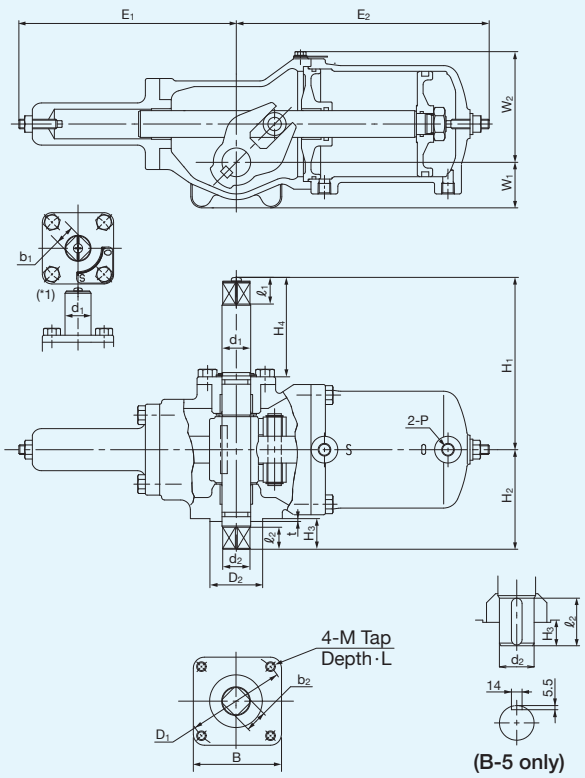
Operating pressure:
0.4 MPa

Specifications and Dimensions

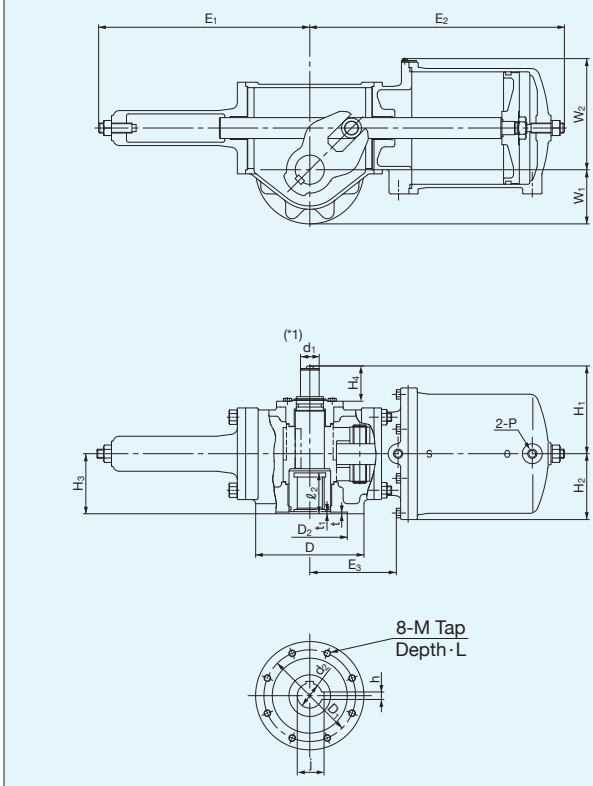
Operating media	:	Compressed instrument air
Standard operating pressure	:	0.4 MPa: factory preset pressure
Pressure supply range	:	0.3 MPa to 0.7 MPa
Output torque	:	Refer to Page 2
Standard durability	:	100,000 cycles under moderate service conditions
Housing test pressure	:	0.97 MPa
Drive shaft rotation	:	100° (when the stopper is fully relaxed)
Rotation adjustment range	:	5° at each end
Service temperature range	:	–20°C to +60°C (Supplied air should not be frozen.)
Safety Integrity Level (SIL)	:	IEC 61508-2010 SIL 2 or 3 capable

Type B (Double-Action)

Type B-0 to B-5



Type B-6



*1. The operating lever cannot be mounted on the drive shaft of Type B-5 and B-6 actuators.

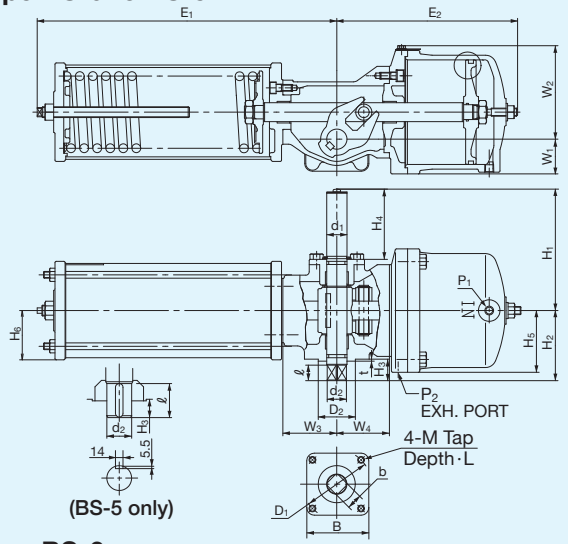
Type B Actuator Dimensions

mm

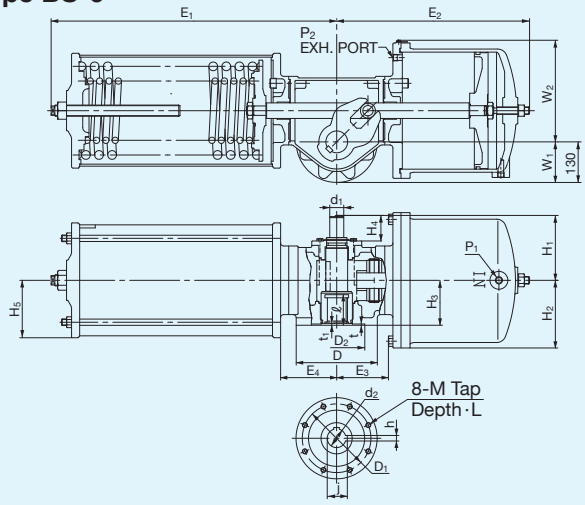
Type	E_1	E_2	E_3	W_1	W_2	H_1	H_2	H_3	H_4	D	D_1	D_2	d_1	d_2	b_1	b_2	B	ℓ_1	ℓ_2	t	t_1	P	L	M	h	j
B-0	92	111	—	25	54	75	53	18	40	—	50	35	12	15	10	12	50	10	12	2	—	BSPT1/8	9	M6	—	—
B-1	128	154	—	25	81	140	60	18	94	—	50	35	16	15	12	12	50	12	12	2	—	BSPT1/4	9	M6	—	—
B-2	177	205	—	35	89	153	77	23	99	—	70	55	22	21	17	17	70	17	17	2	—	BSPT1/4	12	M8	—	—
B-3	235	272	—	48	116	180	104	32	104	—	102	70	30	28.5	23	23	95	23	23	3	—	BSPT1/4	15	M10	—	—
B-4	289	333	—	57	149	230	138	43	127	—	125	85	45	41	32	32	114	32	32	3	—	BSPT1/4	19	M12	—	—
B-5	372	428	—	81	203	225	167	34	91	—	165	130	45	46	—	—	162	63	63	3	—	BSPT1/2	32	M20	—	—
B-6	532	636	212	130	267	208	158	144	82	260	220	180	45	60	—	—	—	—	99	4	5	BSPT1/2	26	M16	18	64.4

Type BS (Spring-Return)

Type BS-0 to BS-5

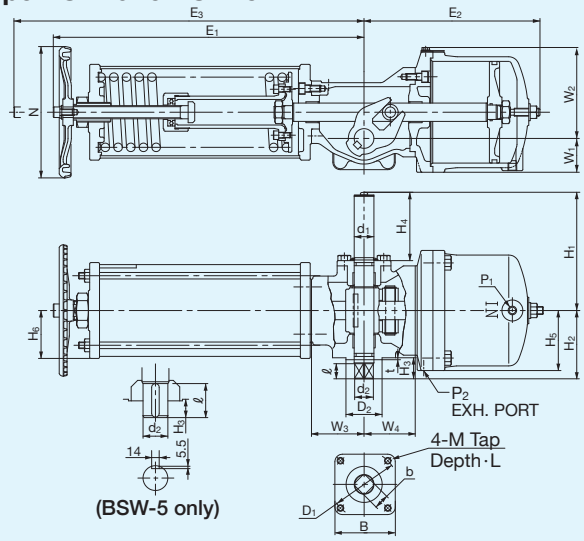


Type BS-6

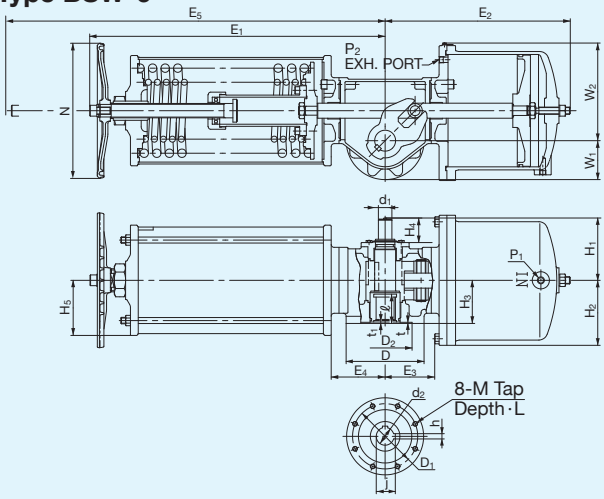


Type BSW (Spring-Return with Manual Operation Device)

Type BSW-0 to BSW-5



Type BSW-6



Type BS Actuator Dimensions

mm

Type	E_1	E_2	E_3	E_4	W_1	W_2	W_3	W_4	H_1	H_2	H_3	H_4	H_5	H_6	D	D_1	D_2	d_1	d_2	b	B	ℓ	t	t_1	M	L	h	j	P_1	P_2
BS-0	163	127	—	—	40	62	—	38	75	53	18	40	41	—	—	50	35	12	15	12	50	12	2	—	M6	9	—	—	BSPT1/8	BSPT1/8
BS-1	239	166	—	—	30	83	47	38	140	60	18	94	52	46	—	50	35	16	15	12	50	12	2	—	M6	9	—	—	BSPT1/4	BSPT1/8
BS-2	335	215	—	—	38	106	62	56	153	77	23	99	68	54	—	70	55	22	21	17	70	17	2	—	M8	12	—	—	BSPT1/4	BSPT1/8
BS-3	451	286	—	—	52	140	80	78	180	104	32	104	92	73	—	102	70	30	28.5	23	95	23	3	—	M10	15	—	—	BSPT1/4	BSPT1/4
BS-4	575	361	—	—	81	188	100	91	230	138	43	127	130	99	—	125	85	45	41	32	114	32	3	—	M12	19	—	—	BSPT1/2	BSPT1/4
BS-5	745	461	—	—	117	256	128	114	225	167	34	91	182	139	—	165	130	45	46	—	162	63	3	—	M20	32	—	—	BSPT1/2	BSPT1/4
BS-6	931	638	169	180	130	326	—	—	208	217	144	82	184	—	260	220	180	45	60	—	—	99	4	5	M16	26	18	64.4	BSPT1/2	BSPT1/2

Type BSW Actuator Dimensions

mm

Type	E_1	E_2	E_3	E_4	E_5	W_1	W_2	W_3	W_4	H_1	H_2	H_3	H_4	H_5	H_6	D	D_1	D_2	d_1	d_2	b	B	ℓ	t	t_1	M	L	h	j	N	P_1	P_2
BSW-0	185	127	218	—	—	40	62	—	38	75	53	18	40	41	—	—	50	35	12	15	12	50	12	2	—	M6	9	—	—	90	BSPT1/8	BSPT1/8
BSW-1	259	166	315	—	—	30	83	47	38	140	60	18	94	52	46	—	50	35	16	15	12	50	12	2	—	M6	9	—	—	100	BSPT1/4	BSPT1/8
BSW-2	362	215	438	—	—	38	106	62	56	153	77	23	99	68	54	—	70	55	22	21	17	70	17	2	—	M8	12	—	—	140	BSPT1/4	BSPT1/8
BSW-3	482	286	582	—	—	52	140	80	78	180	104	32	104	92	73	—	102	70	30	28.5	23	95	23	3	—	M10	15	—	—	200	BSPT1/4	BSPT1/4
BSW-4	609	361	734	—	—	81	188	100	91	230	138	43	127	130	99	—	125	85	45	41	32	114	32	3	—	M12	19	—	—	250	BSPT1/2	BSPT1/4
BSW-5	795	461	956	—	—	117	256	128	114	225	167	34	91	182	139	—	165	130	45	46	—	162	63	3	—	M20	32	—	—	300	BSPT1/2	BSPT1/4
BSW-6	1006	638	169	180	1250	130	326	—	—	208	217	144	82	184	—	260	220	180	45	60	—	—	99	4	5	M16	26	18	64.4	450	BSPT1/2	BSPT1/2

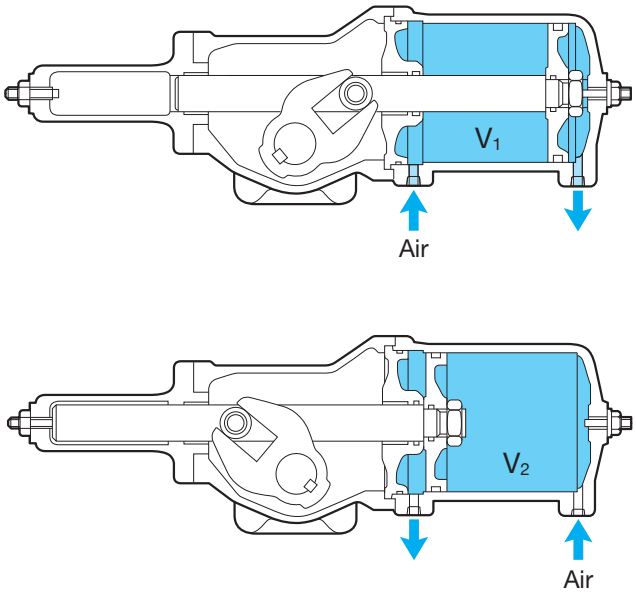
Cylinder Volume and Air Supply Requirements

On installation of control system for actuators, air requirements of actuators should be carefully studied to ensure that a sufficient pressure is provided. Actuators should be activated by clean air which is made free from moisture by air driers. For frequent operation, occasional lubrication is recommended for higher efficiency and longer service life.

Cylinder volume for Type B actuators

Type \ Cylinder	V_1	V_2
B-0	0.05	0.07
B-1	0.17	0.17
B-2	0.43	0.43
B-3	1.04	1.09
B-4	2.69	2.75
B-5	6.53	6.80
B-6	15.90	14.20

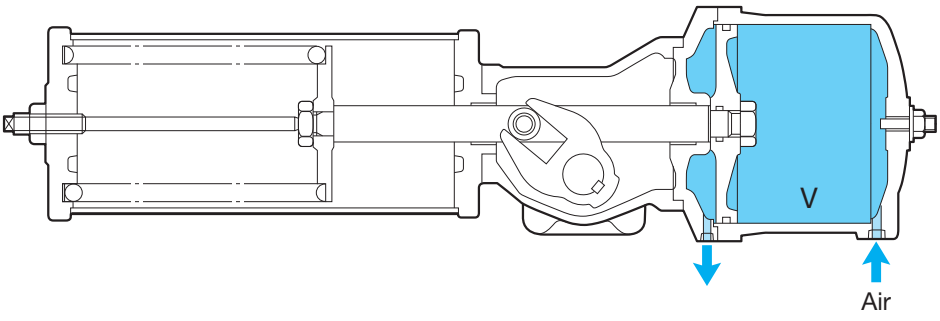
(unit: ℓ)



Cylinder volume for Type BS/BSW actuators

Type \ Cylinder	V
BS-0/BSW-0	0.17
BS-1/BSW-1	0.33
BS-2/BSW-2	0.82
BS-3/BSW-3	2.23
BS-4/BSW-4	5.39
BS-5/BSW-5	13.70
BS-6/BSW-6	30.20

(unit: ℓ)



Air Supply Requirement (Flow Rate)

Actuators should be supplied with the air, sufficient to operate the valve through a full stroke from the open to closed position and vice versa in "t" seconds, as converted into flow rate per minute. The required air volume "Q" is calculated as follows.

$$Q = V\left(\frac{P+0.1013}{0.1013}\right) \times \frac{60}{t} (N\ell/min.)$$

Q = Air supply requirement per minute (Nℓ/min.)
V = Cylinder volume (liters)
V_1 or V_2, whichever larger, for Type B actuators
P = Supply pressure (MPaG)
t = Time required per stroke (seconds)

All accessories to be mounted on the actuator such as solenoid valves, air filters, regulators, and air supply pipes, should have sufficient capacity to accommodate air flow rate (Q) calculated here.

Air Consumption

Air consumption means the volume of air discharged into the atmosphere from actuator operation "n" cycles (double strokes) per hour as converted into volumes per minute. The value is calculated as follows.

Type B actuator:

$$Q = (V_1+V_2)\left(\frac{P+0.1013}{0.1013}\right) n \times \frac{1}{60} (N\ell/min.)$$

Type BS or BSW actuator:

$$Q = V\left(\frac{P+0.1013}{0.1013}\right) n \times \frac{1}{60} (N\ell/min.)$$

For selecting compressors and air reservoirs for these actuators, determine the capacities based on the air consumption values obtained from the above calculations, adding an extra 30% as allowance for possible loss of air caused by solenoid valves, accessories, piping, etc.

⚠CAUTION

- For manual operation, ensure in advance to (a) shut off the supply of air and (b) discharge of the air left in the housing to the atmosphere.
  For double-action actuators, the pressure equalizing valve should be opened in advance.
- After manual operation, the lever handle should be removed. Operating actuators with handles attached is extremely dangerous.
- Long bolts securing the spring case should not be loosened or unscrewed, unless required for maintenance, particularly in case of manual operation of spring-return actuators. A compressed spring may suddenly break out, causing an extreme danger.
- KITZ Operation Manual is available for safe and efficient operation of KITZ B Series actuators, on request.

Manual Operation

For double-action type actuators, manual lever handles for Type B-1 through B-4, and manual operation devices for Type B-5 and B-6 are readily available.
For spring-return type actuators, specify Type BSW on your order for provision of manual operation.

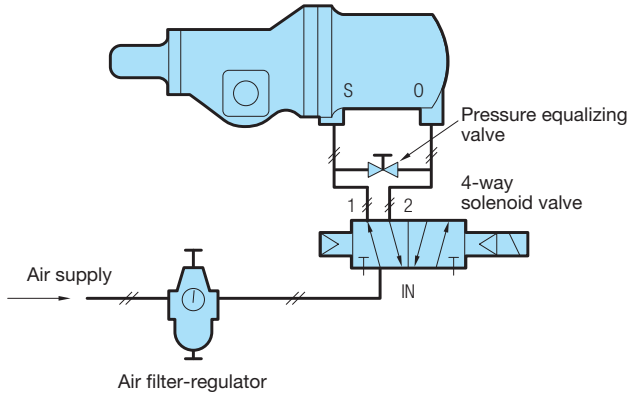
Air Piping for Actuators

When assembling air supply pipes (either copper pipes or covered copper pipes) to actuators:

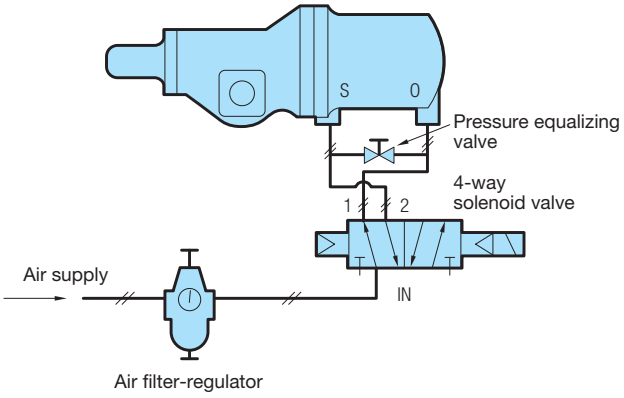
1. Select pipes of suitable diameter and wall thickness.
2. Seal all pipe joints securely to avoid leakage since accessories are mounted along the pipes between air supply source and actuator. Use PTFE tapes for sealing, making sure that loose tape ends do not extend into the pipe: they may block ports and air supply may be adversely effected.

Type B Actuators (Double-Action)

Solenoid energized open:

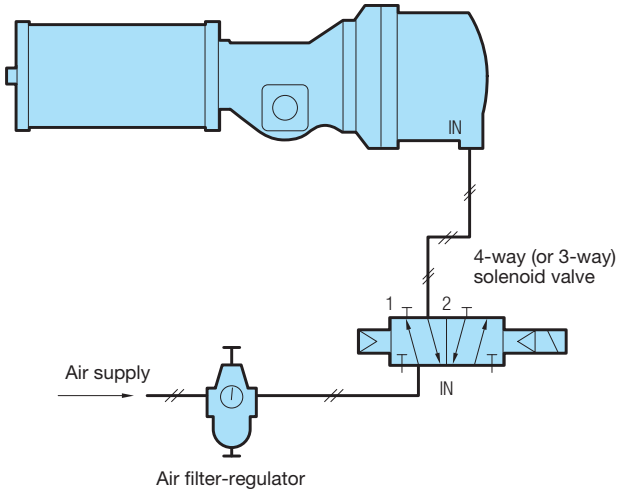


Solenoid energized close:

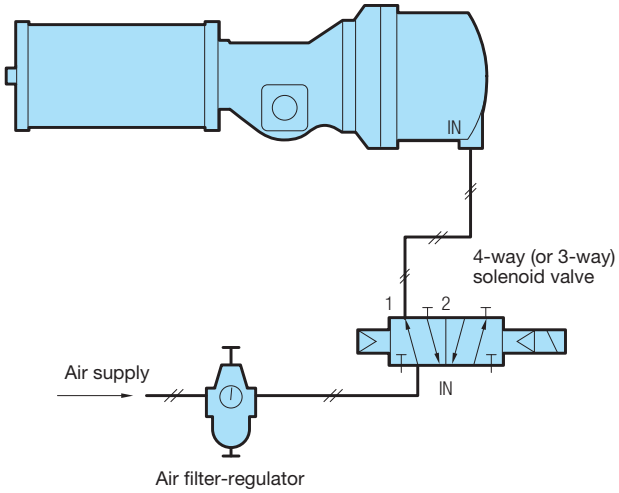


Type BS/BSW Actuators (Spring-return)

Solenoid energized open:

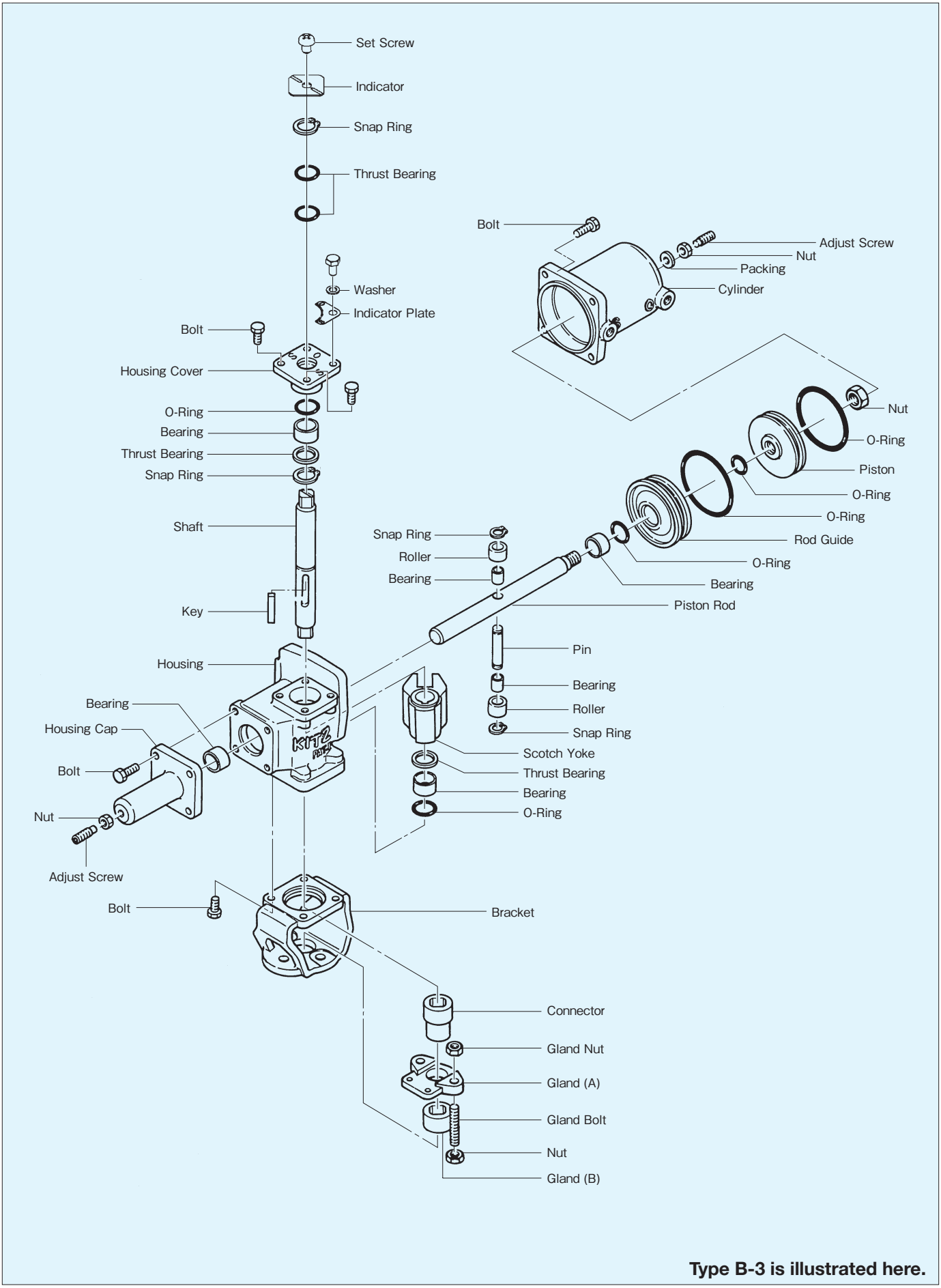


Solenoid energized close:



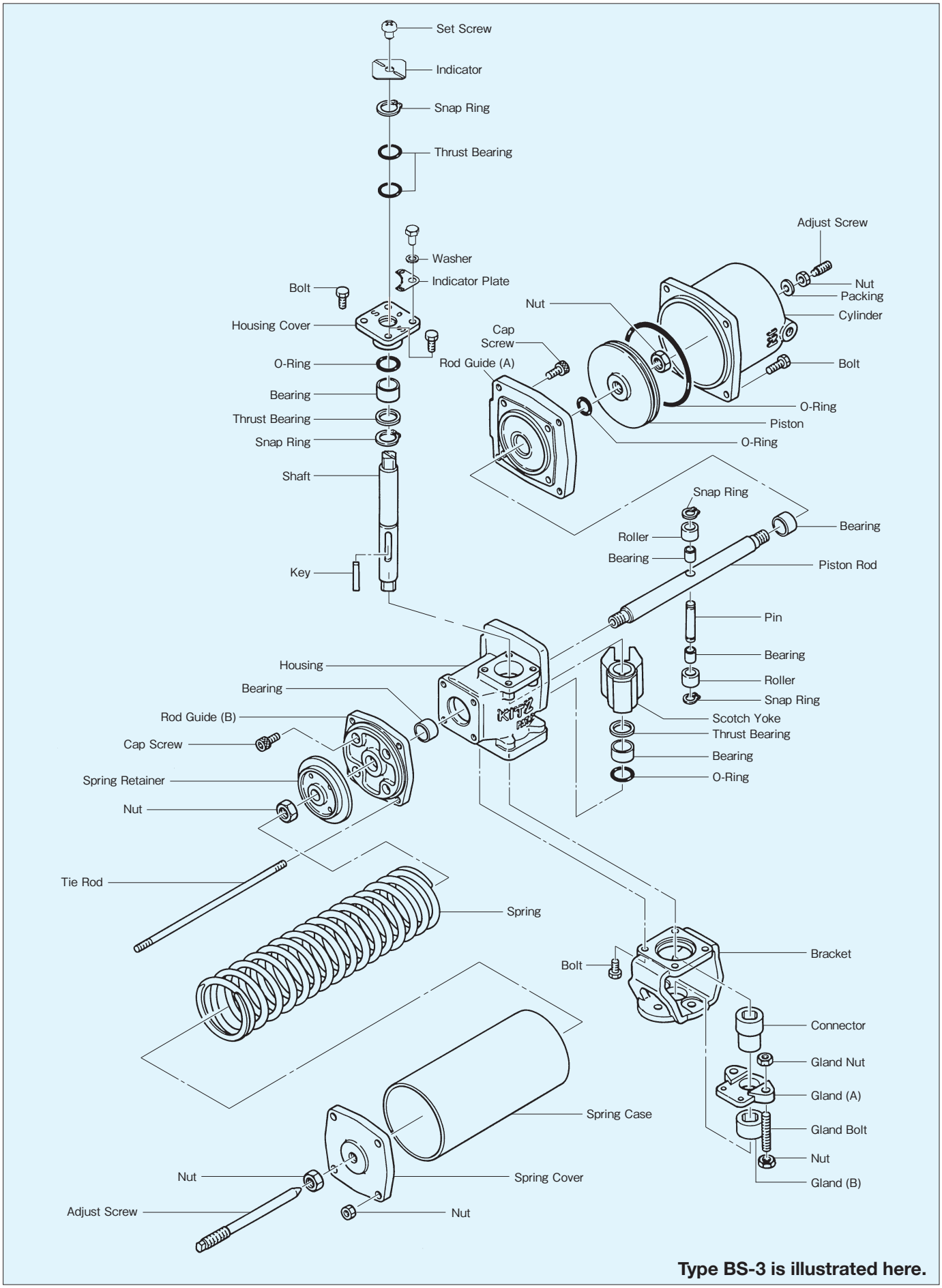
Circuit diagrams of solenoid valves indicate that they are NOT energized.

Construction Details of Type B Actuators



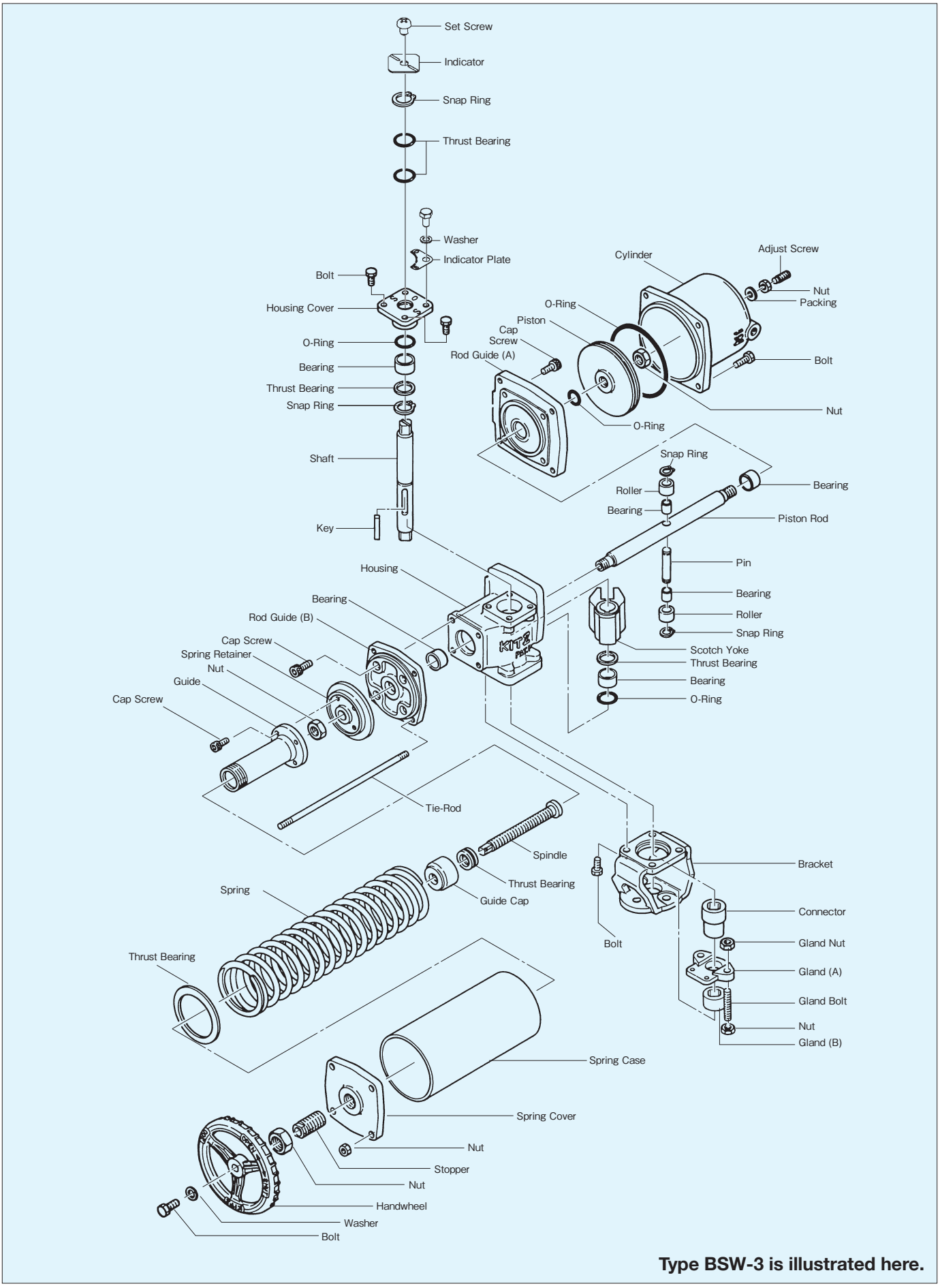
Type B-3 is illustrated here.

Construction Details of Type BS Actuators



Type BS-3 is illustrated here.

Construction Details of Type BSW Actuators



Type BSW-3 is illustrated here.

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.

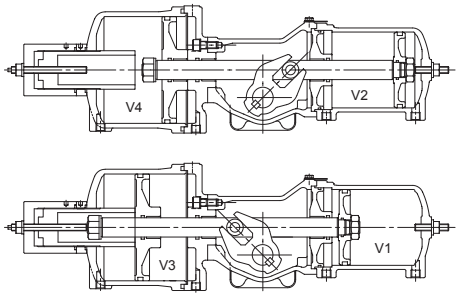
(8) The unit complies easily with explosion proof specifications.

Specifications

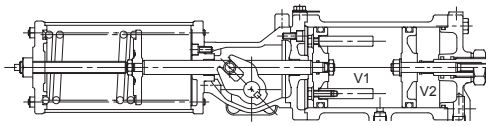
Actuator

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)

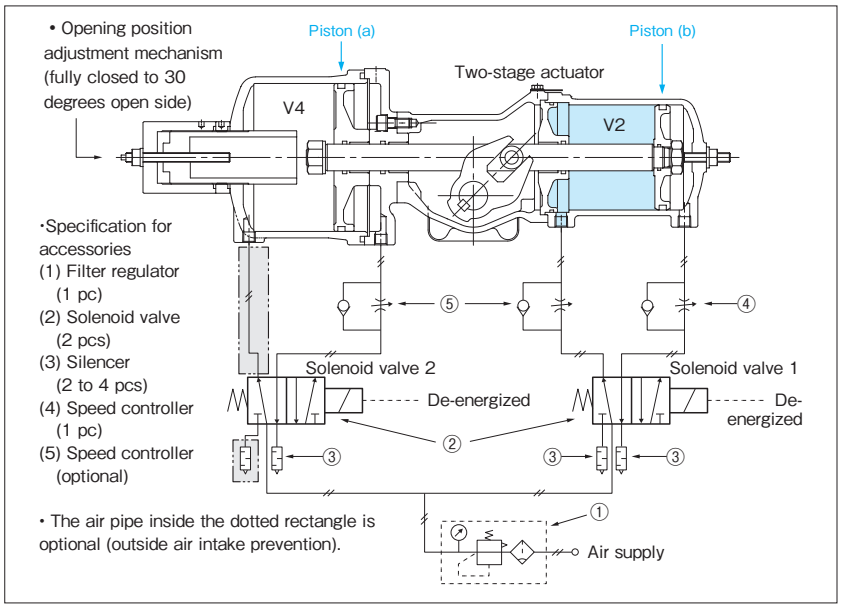
*Other accessories (such as a pressure equalizing valve) are optionally available.

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.

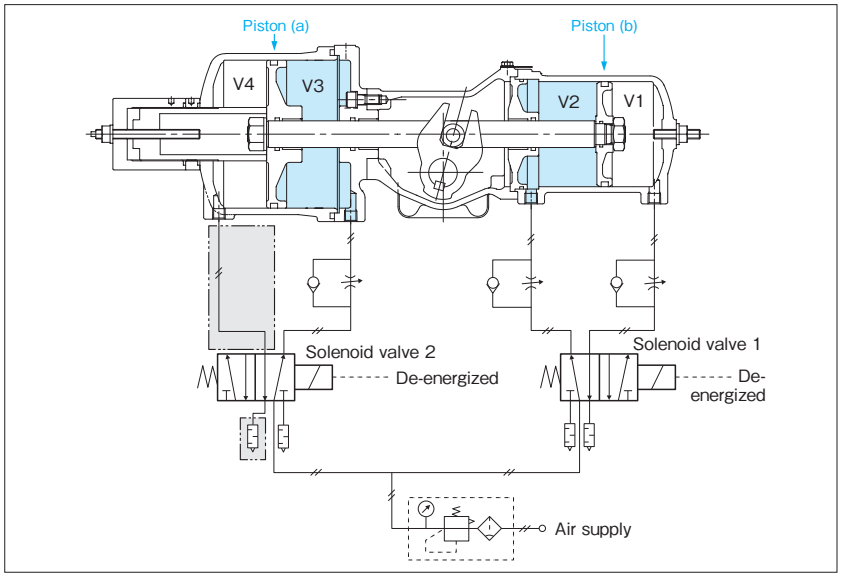


The Intermediate Position

(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.

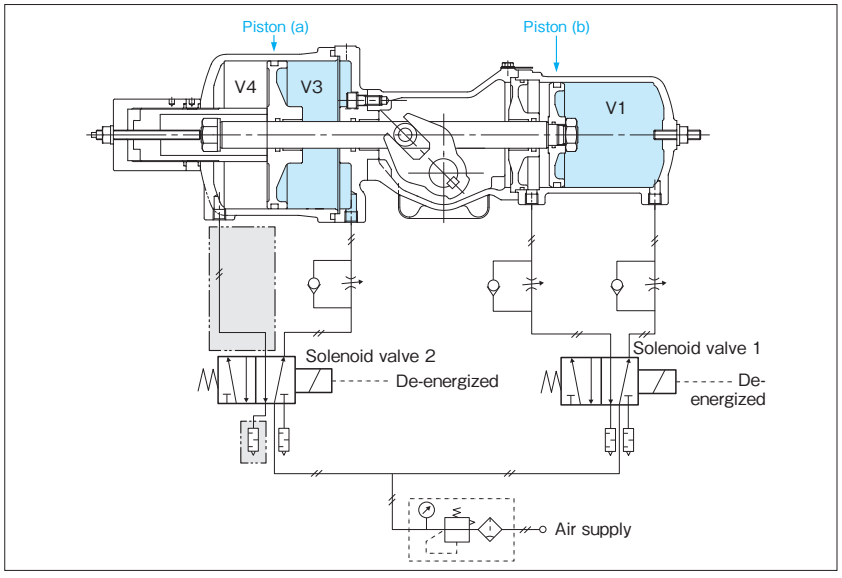
The air pressure in the cylinder chamber V1 moves the small piston on the right to the left end, and the actuator output shaft rotates counter-clockwise when viewing from above. At this point, the disc reaches the fully open position.

(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>

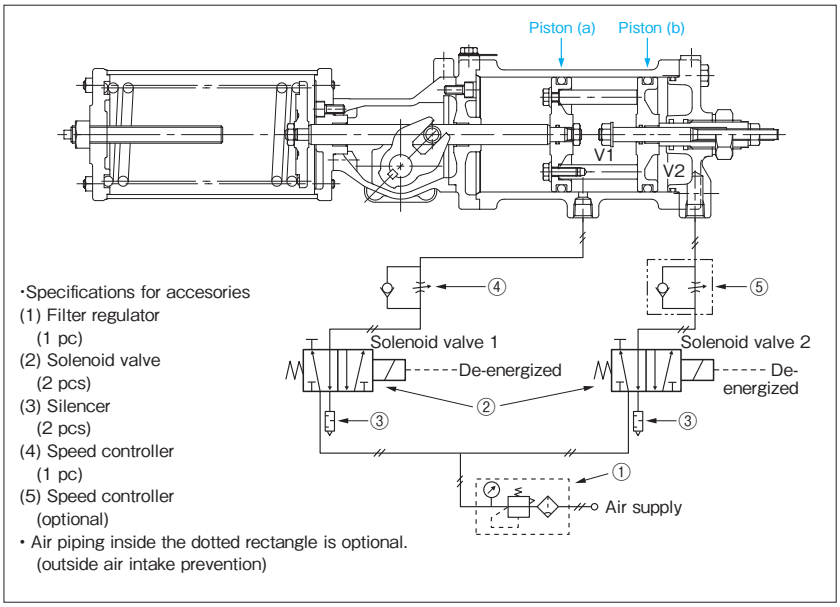
●Spring Return Actuator <Type 3BS/3BSW>

(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.

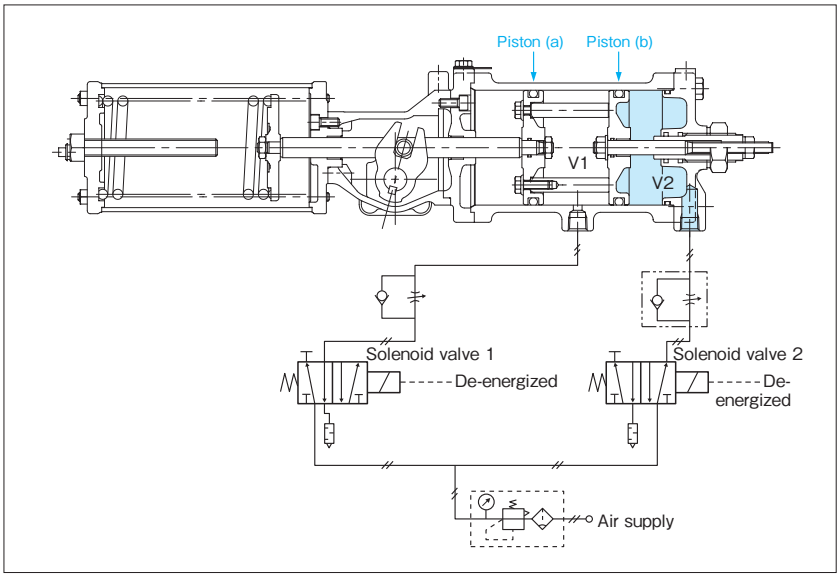


・Specifications for accesories
(1) Filter regulator
(1 pc)
(2) Solenoid valve
(2 pcs)
(3) Silencer
(2 pcs)
(4) Speed controller
(1 pc)
(5) Speed controller
(optional)
・Air piping inside the dotted rectangle is optional.
(outside air intake prevention)

■ 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.

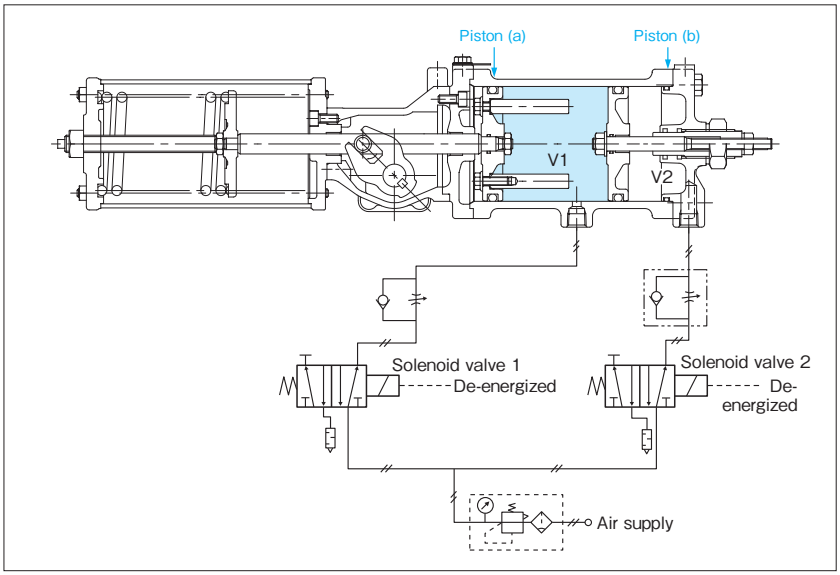


■ The Fully Open Position

(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)

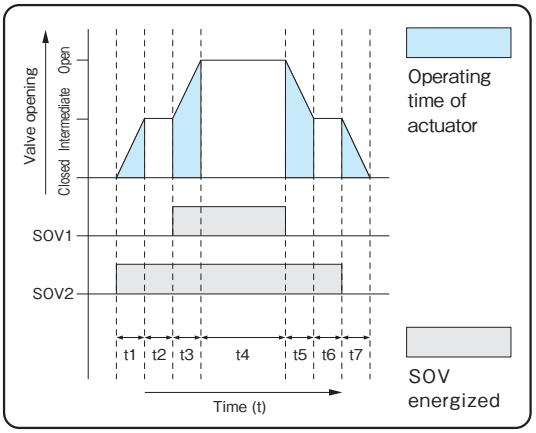
[Action pattern]

	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)

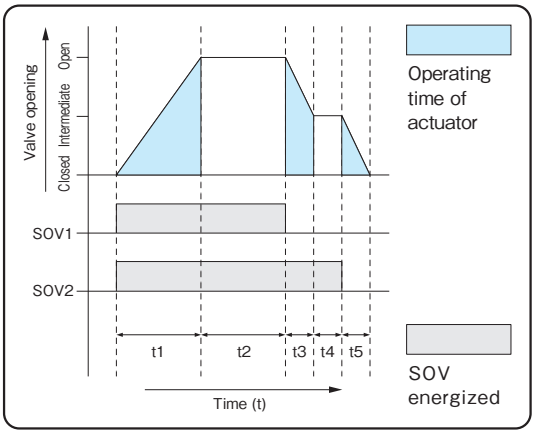
[Action pattern]

	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)

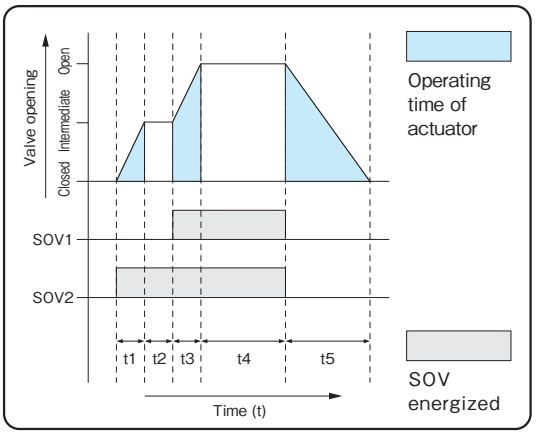
[Action pattern]

	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)

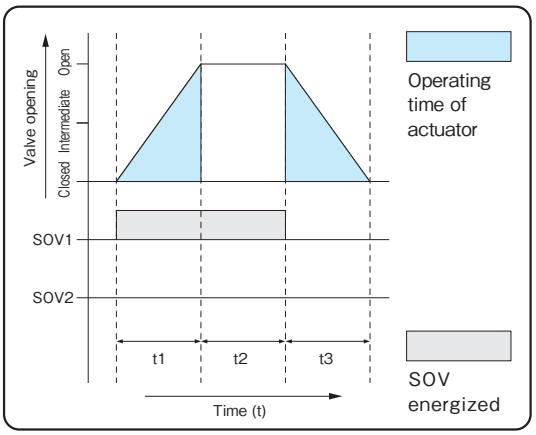
[Action pattern]

	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.



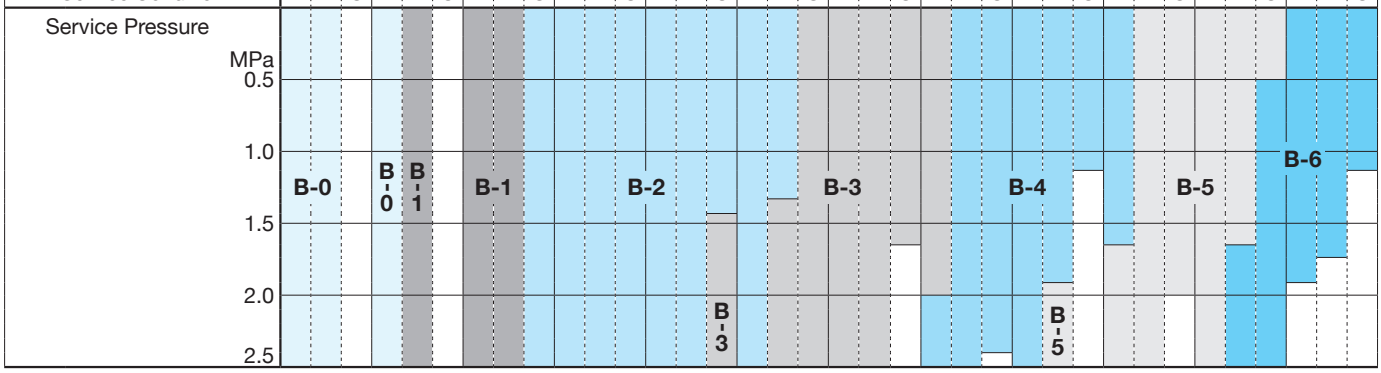
Actuator Sizing (For Ball valves)

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)

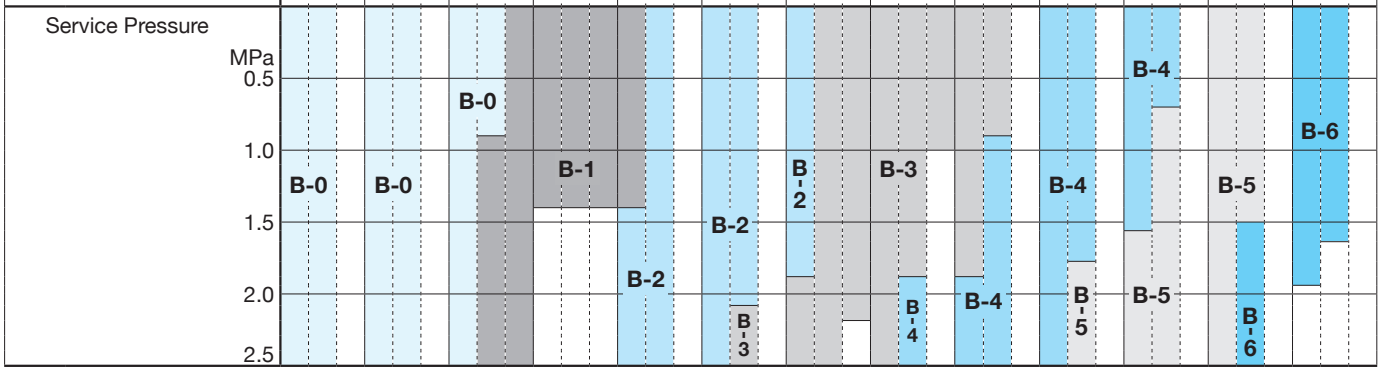
Size	in	1/2[B]	3/4[B]	1[B]	11/2[B]	2[B]	21/2[B]	3[B]	4[B]	5[B]	6[B]	8[B]	10[B]
	mm	15[A]	20[A]	25[A]	40[A]	50[A]	65[A]	80[A]	100[A]	125[A]	150[A]	200[A]	250[A]
Service Condition		A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C



*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.