E-350=05

KITZ

B Series Pneumatic Actuators for Ball and Butterfly Valves

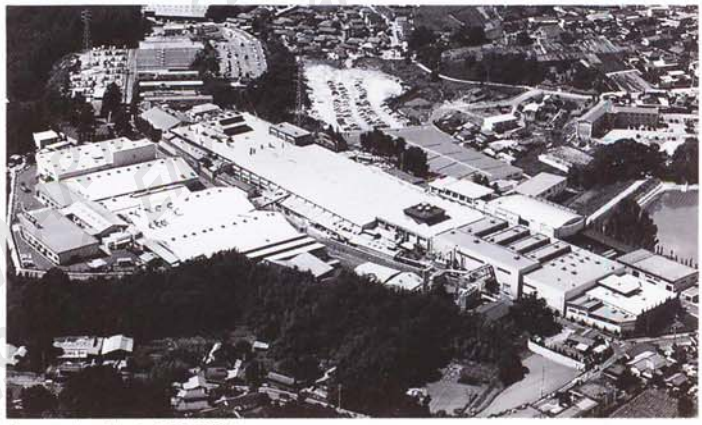
International Edition

KITZ CORPORATION

KITZ

KITZ CORPORATION

Contents



Nagasaka Plant (ISO 9001)

Ina Plant (ISO 9001)

Suwa Plant (ISO 9001)

This catalog uses **MPa** and **N·m**, SI units, for indication of pressure and torque values. However, for readers' convenience, **psi** and **kgf/cm²** are added for pressure indication, and **inch·lbs** and **kgf·cm** are added for torque indication.

The products introduced in this catalog are all covered by the ISO 9001 certification awarded KITZ Corporation in 1989, the earliest in the valve industry.

Foreword

Pneumatic actuators are generally recommended because they simplify piping arrangements and minimize environmental pollution problems. These are advantageous features when compared with hydraulically operated actuators. Also, unlike electric actuators, care required for inflammable or explosive servicing environments is much less when pneumatic actuators are installed.

Application of pneumatic actuators has grown dramatically in recent days for their cost and energy saving advantages. KITZ proudly introduces B Series pneumatic actuators which are readily mountable on all KITZ ball and butterfly valves. Ball or butterfly valves constructed similarly to KITZ valves may also be satisfactorily operated with KITZ pneumatic actuators.

Type B actuator mounted on a KITZ ball valve

Type BS actuator mounted on a KITZ ball valve

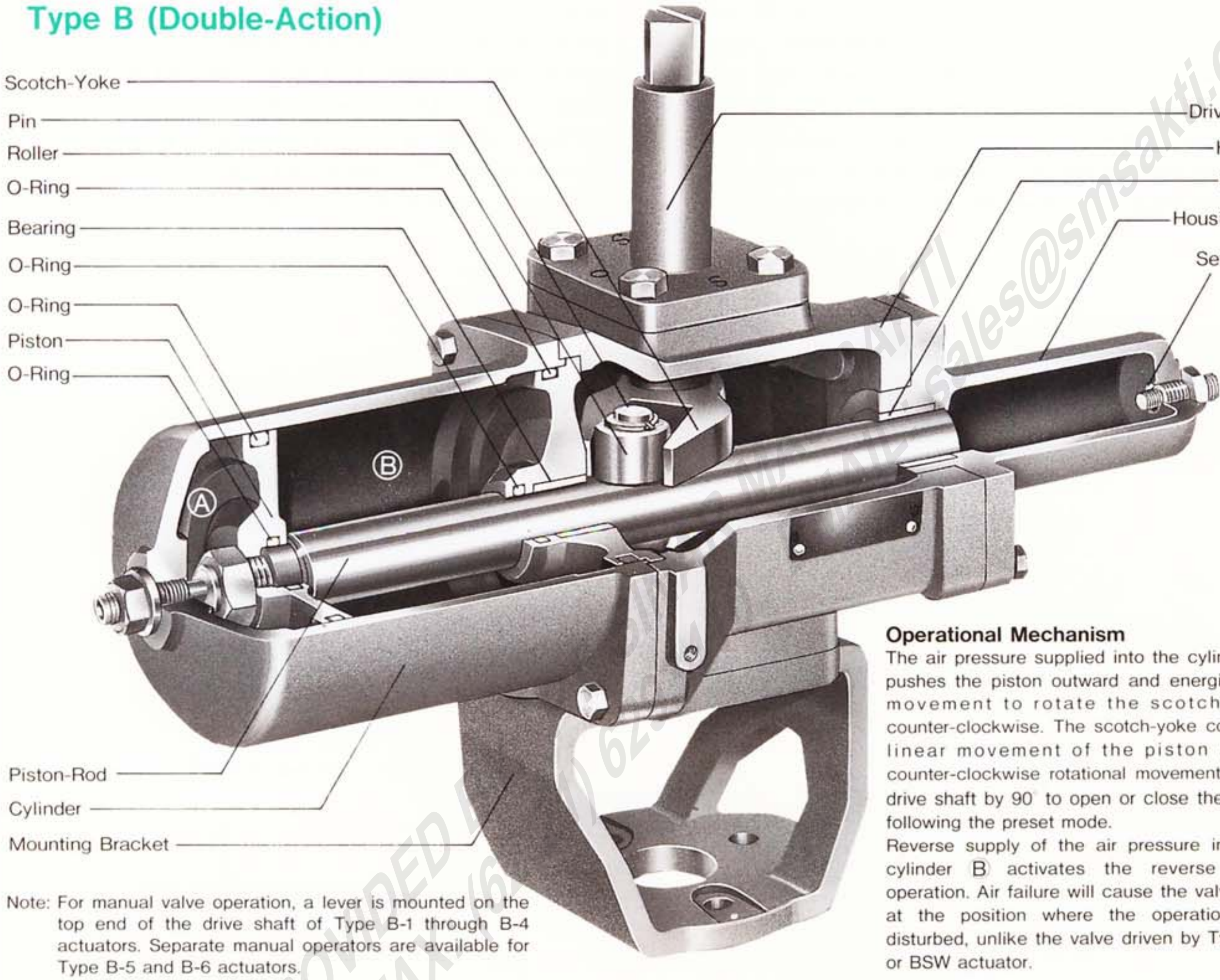
Type BSW actuator mounted on a KITZ ball valve

Type B actuator mounted on a KITZ butterfly valve

Features of KITZ B Series Pneumatic Actuators

Internationally patented

Type B (Double-Action)



Note: For manual valve operation, a lever is 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 counter-clockwise. The scotch-yoke converts linear movement of the piston rod to counter-clockwise 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 stay at the position where the operation was disturbed, unlike the valve driven by Type BS or BSW 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 periodic 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

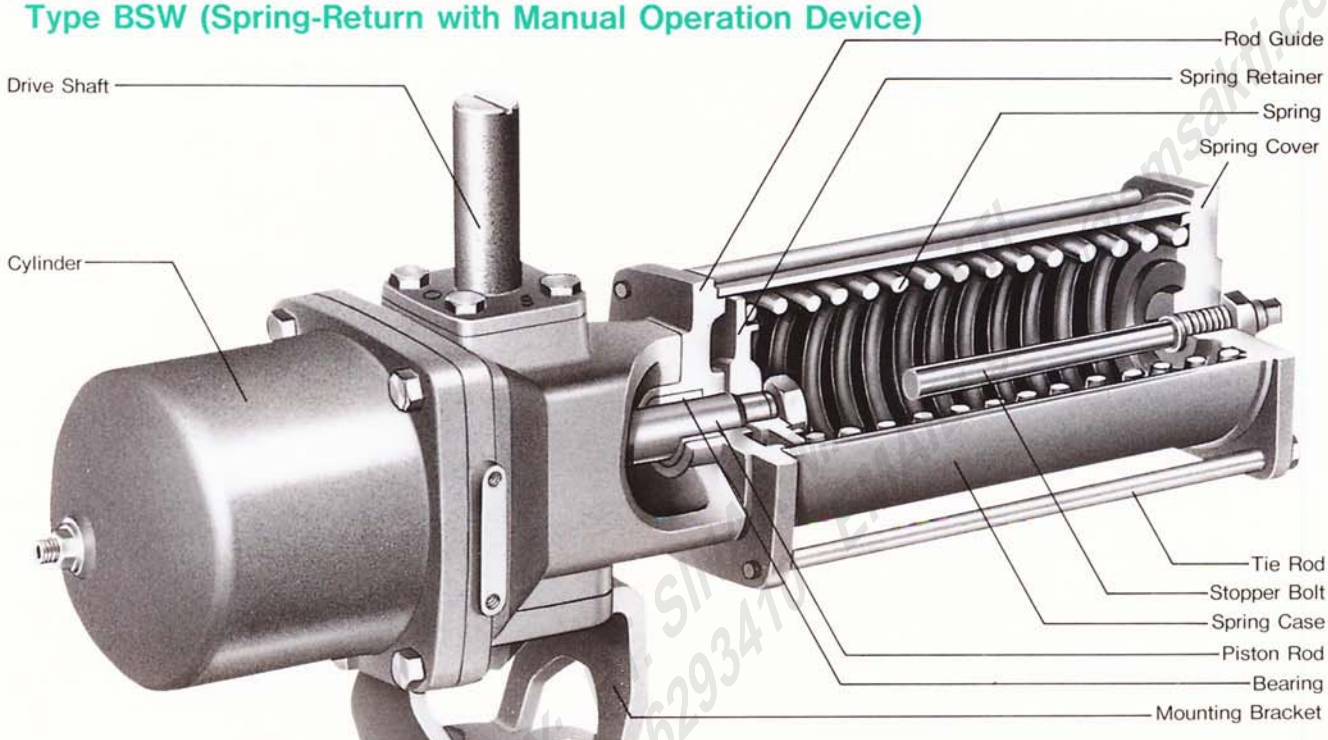
Unlike conventional cylinder actuators deploying linear drive characteristics, use of a scotch-yoke mechanism provides a U-shape curve which maximizes the force obtained at the start and end areas of each stroke. This performance curve is similar to the torque characteristics of ball and butterfly valves in general, making KITZ B Series actuators suitable for such quarter-turn valves (see Page 3).

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 on its side.

Internationally patented

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



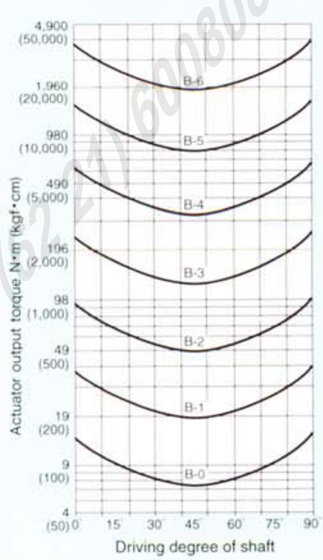
Operational Mechanism

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

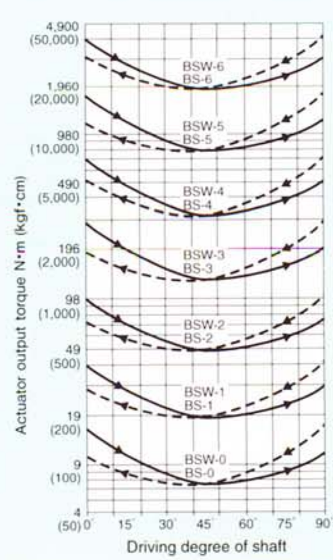
At the moment the air is discharged to the atmosphere through the solenoid valve, the spring force pushes the piston to the reverse direction, and the scotch-yoke activates clockwise rotation of the shaft to reversely operate the valve. Air failure will cause the valve return to the original open or 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



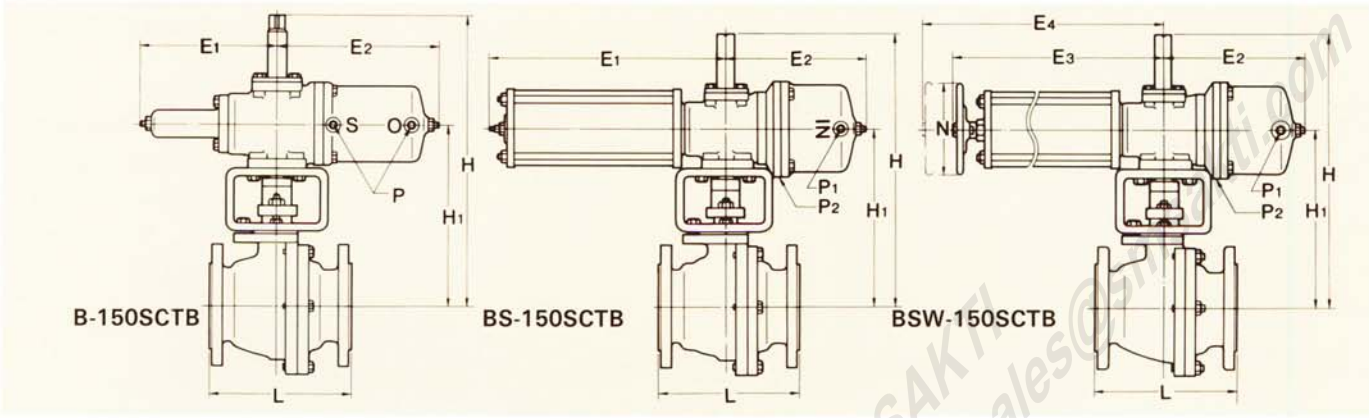
— Output torque when air pressure is supplied.

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

Operating pressure: 0.39MPa (4kgf/cm² or 60psi)

Pneumatically-Operated

Class 150 Carbon Steel Ball Valves, Full Bore Design*



Type B (Double-Action) Actuator Mounted

mm

Fig.	Valve Size		Bore Diam.	H	H1	L	Type B Actuator			
	in	mm					E1	E2	P	Type
B-150SCTB FULL BORE	1/2	15	15	207	137	108	89	108	Rc1/8	B-0
	3/4	20	20	210	140	117				
	1	25	25	217	147	127				
	1 1/2	40	40	313	178	165	128	154	Rc1/4	B-1
	2	50	50	360	212	178	177	205	Rc1/4	B-2
	2 1/2	65	65	385	237	190				
	3	80	80	459	284	203	235	272	Rc1/4	B-3
	4	100	100	482	307	229				
	6	150	150	620	395	394	284	328	Rc1/4	B-4
	8	200	200	707	487	457	367	423	Rc1/2	B-5
	10	250	250	751	548	533	527	631	Rc1/2	B-6

Actuators selected here are recommended only for light load service.

See Page 12 for heavy load service and other information for selection of actuators.

See Page 10 for general specifications of actuators.

See Page 13 for valve pressure-temperature ratings.

Type BS/BSW (Spring-Return) Actuator Mounted

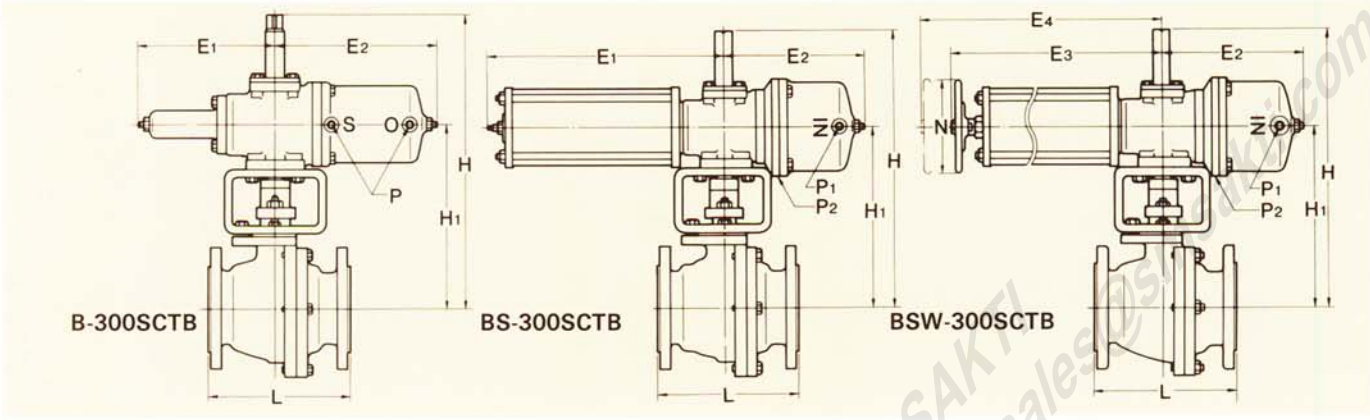
mm

Fig.	Valve Size		Bore Diam.	H	H1	L	Type BS/BSW Actuator							
	in	mm					E1	E2	E3	E4	N	P1	P2	Type
BS/BSW-150SCTB FULL BORE	1/2	15	15	207	137	108	163	124	185	218	90	Rc1/8	Rc1/8	BS-0 BSW-0
	3/4	20	20	210	140	117								
	1	25	25	217	147	127								
	1 1/2	40	40	313	178	165	239	161	259	315	100	Rc1/4	Rc1/8	BS-1 BSW-1
	2	50	50	360	212	178	335	210	362	438	140	Rc1/4	Rc1/8	BS-2 BSW-2
	2 1/2	65	65	385	237	190								
	3	80	80	459	284	203	451	276	482	582	200	Rc1/4	Rc1/4	BS-3 BSW-3
	4	100	100	482	307	229								
	6	150	150	620	395	394	575	351	609	734	250	Rc1/2	Rc1/4	BS-4 BSW-4
	8	200	200	707	487	457	745	446	795	956	300	Rc1/2	Rc1/4	BS-5 BSW-5
	10	250	250	751	548	533	931	638	1006	1250	450	Rc1/2	Rc1/2	BS-6 BSW-6

* Refer to KITZ Cat. E-205 for valve design details.

Pneumatically-Operated

Class 300 Carbon Steel Ball Valves, Full Bore Design*



Type B (Double-Action) Actuator Mounted

mm

Fig.	Valve Size		Bore Diam.	H	H1	L	Type B Actuator			
	in	mm					E1	E2	P	Type
B-300SCTB FULL BORE	1/2	15	15	207	137	140	89	108	Rc1/8	B-0
	3/4	20	20	210	140	152				
	1	25	25	217	147	165				
	1 1/2	40	40	313	178	190	128	154	Rc1/4	B-1
	2	50	50	360	212	216	177	205	Rc1/4	B-2
	2 1/2	65	65	385	237	241				
	3	80	80	459	284	283	235	272	Rc1/4	B-3
	4	100	100	482	307	305				
	6	150	150	620	395	403	284	328	Rc1/4	B-4
	8	200	200	707	487	502	367	423	Rc1/2	B-5

Actuators selected here are recommended only for light load service.

See Page 12 for heavy load service and other information for selection of actuators.

See Page 10 for general specifications of actuators.

See Page 13 for valve pressure-temperature ratings.

Type BS/BSW (Spring-Return) Actuator Mounted

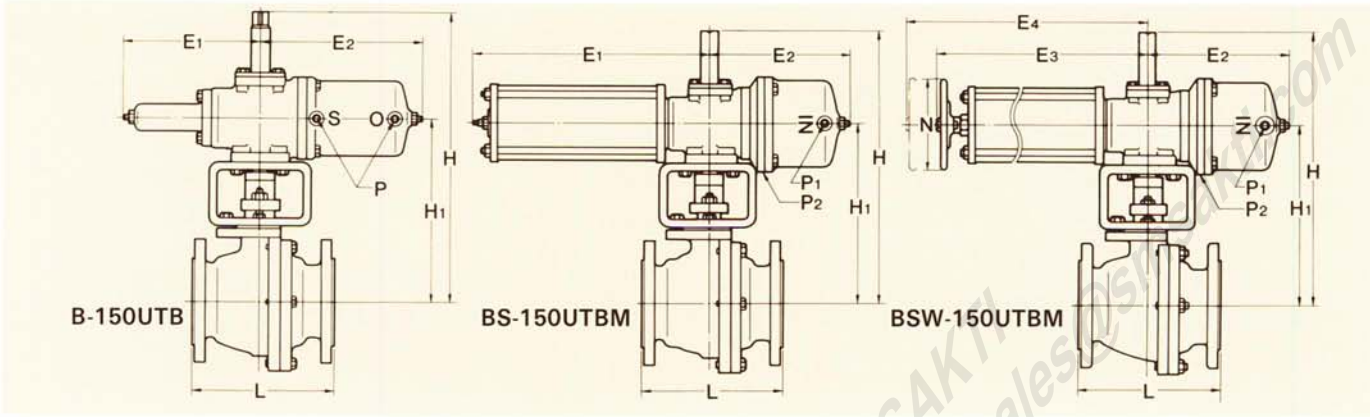
mm

Fig.	Valve Size		Bore Diam.	H	H1	L	Type BS/BSW Actuator							
	in	mm					E1	E2	E3	E4	N	P1	P2	Type
BS/BSW-300SCTB FULL BORE	1/2	15	15	207	137	140	163	124	185	218	90	Rc1/8	Rc1/8	BS-0 BSW-0
	3/4	20	20	210	140	152								
	1	25	25	217	147	165								
	1 1/2	40	40	313	178	190	239	161	259	315	100	Rc1/4	Rc1/8	BS-1 BSW-1
	2	50	50	360	212	216	335	210	362	438	140	Rc1/4	Rc1/8	BS-2 BSW-2
	2 1/2	65	65	385	237	241								
	3	80	80	459	284	283	451	276	482	582	200	Rc1/4	Rc1/4	BS-3 BSW-3
	4	100	100	482	307	305								
	6	150	150	620	395	403	575	351	609	734	250	Rc1/2	Rc1/4	BS-4 BSW-4
	8	200	200	707	487	502	745	446	795	956	300	Rc1/2	Rc1/4	BS-5 BSW-5

* Refer to KITZ Cat. E-205 for valve design details.

Pneumatically-Operated

Class 150 Stainless Steel Ball Valves, Full Bore Design*



Type B (Double-Action) Actuator Mounted

mm

Fig.	Valve Size		Bore Diam.	H	H1	L	Type B Actuator			
	in	mm					E1	E2	P	Type
B-150UTB(M) FULL BORE	1/2	15	15	207	137	108	89	108	Rc1/8	B-0
	3/4	20	20	210	140	117				
	1	25	25	217	147	127				
	1 1/2	40	40	313	178	165	128	154	Rc1/4	B-1
	2	50	50	360	212	178	177	205	Rc1/4	B-2
	2 1/2	65	65	385	237	190				
	3	80	80	459	284	203	235	272	Rc1/4	B-3
	4	100	100	482	307	229				
	5	125	125	595	370	356	284	328	Rc1/4	B-4
	6	150	150	620	395	394				
	8	200	200	707	487	457	367	423	Rc1/2	B-5
	10	250	250	751	548	533	527	631	Rc1/2	B-6

Actuators selected here are recommended only for light load service.

See Page 12 for heavy load service and other information for selection of actuators.

See Page 10 for general specifications of actuators.

See Page 13 for valve pressure-temperature ratings.

Type BS/BSW (Spring-Return) Actuator Mounted

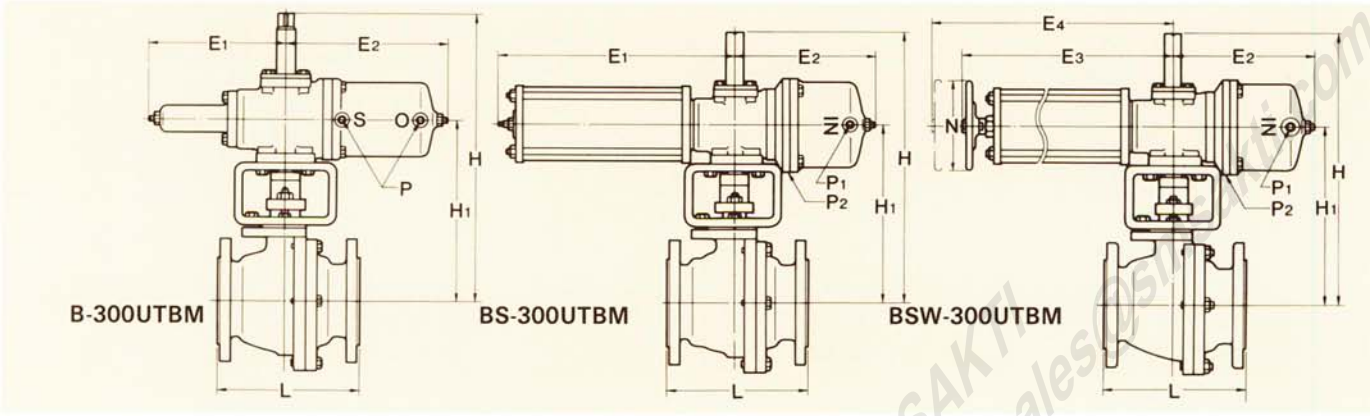
mm

Fig.	Valve Size		Bore Diam.	H	H1	L	Type BS/BSW Actuator							
	in	mm					E1	E2	E3	E4	N	P1	P2	Type
BS/BSW-150UTB(M) FULL BORE	1/2	15	15	207	137	108	163	124	185	218	90	Rc1/8	Rc1/8	BS-0 BSW-0
	3/4	20	20	210	140	117								
	1	25	25	217	147	127								
	1 1/2	40	40	313	178	165	239	161	259	315	100	Rc1/4	Rc1/8	BS-1 BSW-1
	2	50	50	360	212	178	335	210	362	438	140	Rc1/4	Rc1/8	BS-2 BSW-2
	2 1/2	65	65	385	237	190								
	3	80	80	459	284	203	451	276	482	582	200	Rc1/4	Rc1/4	BS-3 BSW-3
	4	100	100	482	307	229								
	5	125	125	595	370	356	575	351	609	734	250	Rc1/2	Rc1/4	BS-4 BSW-4
	6	150	150	620	395	394								
	8	200	200	707	487	457	745	446	795	956	300	Rc1/2	Rc1/4	BS-5 BSW-5
	10	250	250	751	548	533	931	638	1006	1250	450	Rc1/2	Rc1/2	BS-6 BSW-6

*Refer to KITZ Cat. E-205 for valve design details.

Pneumatically-Operated

Class 300 Stainless Steel Ball Valves, Full Bore Design*



Type B (Double-Action) Actuator Mounted

mm

Fig.	Valve Size		Bore Diam.	H	H1	L	Type B Actuator			
	in	mm					E1	E2	P	Type
B-300UTB(M) FULL BORE	1/2	15	15	207	137	140	89	108	Rc1/8	B-0
	3/4	20	20	210	140	152				
	1	25	25	217	147	165				
	1 1/2	40	40	313	178	190	128	154	Rc1/4	B-1
	2	50	50	360	212	216	177	205	Rc1/4	B-2
	3	80	80	459	284	283	235	272	Rc1/4	B-3
	4	100	100	482	307	305				
	6	150	150	620	395	403	284	328	Rc1/4	B-4
	8	200	200	707	487	502	367	423	Rc1/2	B-5

Actuators selected here are recommended only for light load service.

See Page 12 for heavy load service and other information for selection of actuators.

See Page 10 for general specifications of actuators.

See Page 13 for valve pressure-temperature ratings.

Type BS/BSW (Spring-Return) Actuator Mounted

mm

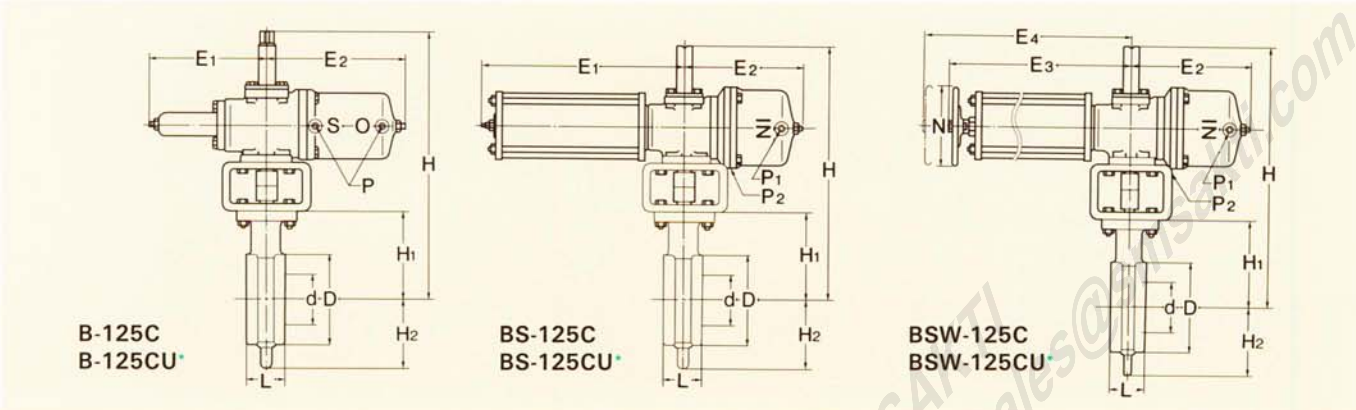
Fig.	Valve Size		Bore Diam.	H	H1	L	Type BS/BSW Actuator							
	in	mm					E1	E2	E3	E4	N	P1	P2	Type
BS/BSW-300UTB(M) FULL BORE	1/2	15	15	207	137	140	163	124	185	218	90	Rc1/8	Rc1/8	BS-0 BSW-0
	3/4	20	20	210	140	152								
	1	25	25	217	147	165								
	1 1/2	40	40	313	178	190	239	161	259	315	100	Rc1/4	Rc1/8	BS-1 BSW-1
	2	50	50	360	212	216	335	210	362	438	140	Rc1/4	Rc1/8	BS-2 BSW-2
	3	80	80	459	284	283	451	276	482	582	200	Rc1/4	Rc1/4	BS-3 BSW-3
	4	100	100	482	307	305								
	6	150	150	620	395	403	575	351	609	734	250	Rc1/2	Rc1/4	BS-4 BSW-4
	8	200	200	707	487	502	745	446	795	956	300	Rc1/2	Rc1/4	BS-5 BSW-5

* Refer to KITZ Cat. E-205 for valve design details.

Pneumatically-Operated

Class 125 C-Type Butterfly Valves*

Provided with center drive disc and rubber liners.



Speed controller valves are provided on all actuators.

Type B (Double-Action) Actuator Mounted

mm

Fig.	Valve Size in	Valve Size mm	d	H	H_1	H_2	L	D	Bolt* Circle Diam.	Type B Actuator E_1	E_2	P	Type
B-125C(U)*	2	50	52	370	128	66	43	90	120.5	128	154	Rc1/4	B-1
	2½	65	67	380	138	79	46	115	139.5				
	3	80	80	416	143	99	46	126	152.5	177	205	Rc1/4	B-2
	4	100	102	428	155	120	52	146	190.5				
	5	125	127	454	177	134	56	181	216.0				
	6	150	152	526	197	151	56	211	241.5	235	272	Rc1/4	B-3
	8	200	200	554	225	190	71	257	298.5				
	10	250	254	724	286	221	76	322	362.0	284	328	Rc1/4	B-4
	12	300	297	750	312	260	83	367	432.0				
	14	350	335	789	351	301	92	410	476.5				
	16	400	390	840	377	333	102	470	539.5	367	423	Rc1/2	B-5
	18	450	440	866	403	357	114	530	578				
	20	500	485	907	424	390	127	580	635	527	631	Rc1/2	B-6
	24	600	585	964	481	450	154	688	749.5				

Valve working temperature:
−10°C～+80°C
(4°F～176°F)

Valve working pressure:
0.98MPa
(10kgf/cm² or 150psi)

Actuator specifications:
See Page 10

*(U): Suffix code for stainless steel disc

*According to ASME B16.1.

Type BS/BSW (Spring-Return) Actuator Mounted

mm

Fig.	Valve Size in	Valve Size mm	d	H	H_1	H_2	L	D	Bolt* Circle Diam.	Type BS/BSW Actuator E_1	E_2	E_3	E_4	N	P_1	P_2	Type
BS·BSW-125(U)*	2	50	52	370	128	66	43	90	120.5	239	161	259	315	100	Rc1/4	Rc1/8	BS-1 BSW-1
	2½	65	67	380	138	79	46	115	139.5								
	3	80	80	416	143	99	46	126	152.5	335	210	362	438	140	Rc1/4	Rc1/8	BS-2 BSW-2
	4	100	102	428	155	120	52	146	190.5								
	5	125	127	454	177	134	56	181	216.0								
	6	150	152	526	197	151	56	211	241.5	451	276	482	582	200	Rc1/4	Rc1/4	BS-3 BSW-3
	8	200	200	554	225	190	71	257	298.5								
	10	250	254	724	286	221	76	322	362.0	575	351	609	734	250	Rc1/2	Rc1/4	BS-4 BSW-4
	12	300	297	750	312	260	83	367	432.0								
	14	350	335	814	351	301	92	410	476.5								
	16	400	390	840	377	333	102	470	539.5	745	446	795	956	300	Rc1/2	Rc1/4	BS-5 BSW-5
	18	450	440	866	403	357	114	530	578								
	20	500	485	907	424	390	127	580	635	931	638	1006	1250	450	Rc1/2	Rc1/2	BS-6 BSW-6
	24	600	585	964	481	450	154	688	749.5								

* Refer to KITZ Cat. E-230 for valve design details.

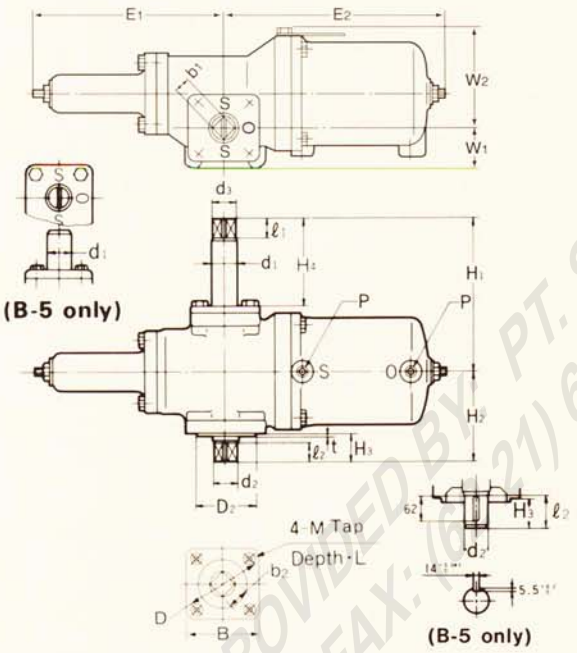
MEMO

Specifications and Dimensions

Operating media	:	Compressed instrumentation air
Standard operating pressure	:	0.39MPa (4kgf/cm² or 60 psi) ; factory preset pressure
Pressure supply range	:	0.29MPa (3kgf/cm² or 60 psi) to 0.69MPa (7kgf/cm² or 100 psi)
Output torque	:	Refer to Page 3
Standard durability	:	100,000 cycles under moderate service conditions
Housing test pressure	:	0.97MPa (9.9kgf/cm² or 140 psi)
Drive shaft rotation	:	100° (when the stopper is fully relaxed)
Rotation adjustment range	:	5° at each end
Service temperature range	:	standard: −20°C to +60°C (−4°F to +140°F) option: −40°C to +60°C (−40°F to +140°F)

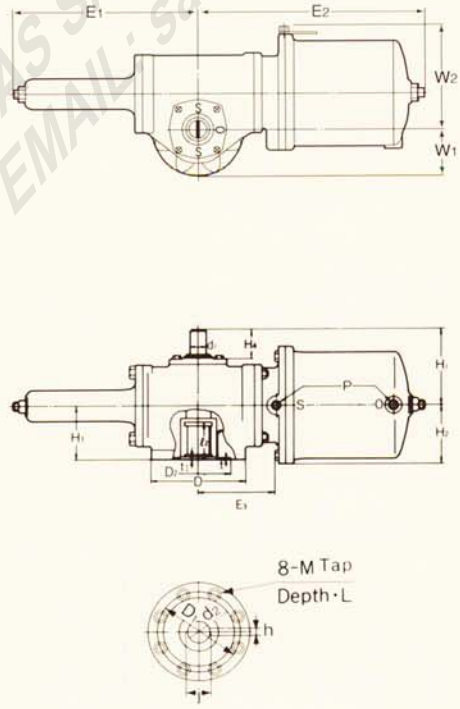
Type B (Double-Action)

Types B-0 to B-5



1. The operating lever cannot be mounted on the drive shaft of Type B-5 and B-6 actuators.
2. Type B-0 actuator is not provided with the cast-out O-S indication on the cylinder.

Types B-6



Type B Actuator Dimensions

mm

Type	E1	E2	E3	W1	W2	H1	H2	H3	H4	D	D1	D2	d1	d2	d3	b1	b2	B	ℓ1	ℓ2	t	t1	P	L	M	h	J
B-0	89	108	–	25	54	70	53	18	35	–	50	35	12	15	12	10	12	50	10	12	2	–	Rc1/8	9	M6	–	–
B-1	128	154	–	25	81	135	60	18	89	–	50	35	16	15	15	12	12	50	12	12	2	–	Rc1/4	9	M6	–	–
B-2	177	205	–	35	89	148	77	23	94	–	70	55	22	21	21	17	17	70	17	17	2	–	Rc1/4	12	M8	–	–
B-3	235	272	–	48	116	175	104	32	99	–	102	70	30	28.5	28.5	23	23	95	23	23	3	–	Rc1/4	15	M10	–	–
B-4	284	328	–	57	149	225	138	43	122	–	125	85	45	41	41	32	32	114	32	32	3	–	Rc1/4	19	M12	–	–
B-5	367	423	–	81	203	220	167	34	86	–	165	130	45	46	–	–	–	162	63	63	3	–	Rc1/2	32	M20	–	–
B-6	527	631	212	130	267	203	158	144	77	260	220	180	45	60	–	–	–	–	–	99	4	5	Rc1/2	26	M16	18	64.4

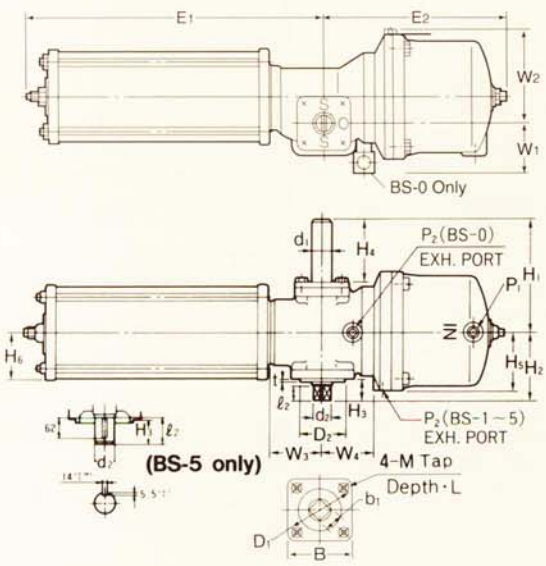
Type BS Actuator Dimensions

mm

Type	E1	E2	E3	E5	W1	W2	W3	W4	H1	H2	H3	H4	H5	H6	D	D1	D2	d1	d2	b	B	ℓ	t	t1	M	L	h	j	P1	P2
BS-0	163	124	–	–	40	62	–	38	70	53	18	35	41	33	–	50	35	12	15	12	50	12	2	–	M6	9	–	–	Rc1/8	Rc1/8
BS-1	239	161	–	–	30	81	47	38	135	60	18	89	52	46	–	50	35	16	15	12	50	12	2	–	M6	9	–	–	Rc1/4	Rc1/8
BS-2	335	210	–	–	38	106	62	56	148	77	23	94	68	54	–	70	55	22	21	17	70	17	2	–	M8	12	–	–	Rc1/4	Rc1/8
BS-3	451	276	–	–	52	140	80	78	175	104	32	99	92	73	–	102	70	30	28.5	23	95	23	3	–	M10	15	–	–	Rc1/4	Rc1/4
BS-4	575	351	–	–	81	188	100	91	225	138	43	122	130	99	–	125	85	45	41	32	114	32	3	–	M12	19	–	–	Rc1/2	Rc1/4
BS-5	745	446	–	–	117	256	128	114	220	167	34	86	182	139	–	165	130	45	46	–	162	63	3	–	M20	32	–	–	Rc1/2	Rc1/4
BS-6	931	638	180	169	130	326	–	–	203	217	144	77	184	–	260	220	180	45	60	–	–	99	4	5	M16	26	18	64.4	Rc1/2	Rc1/2

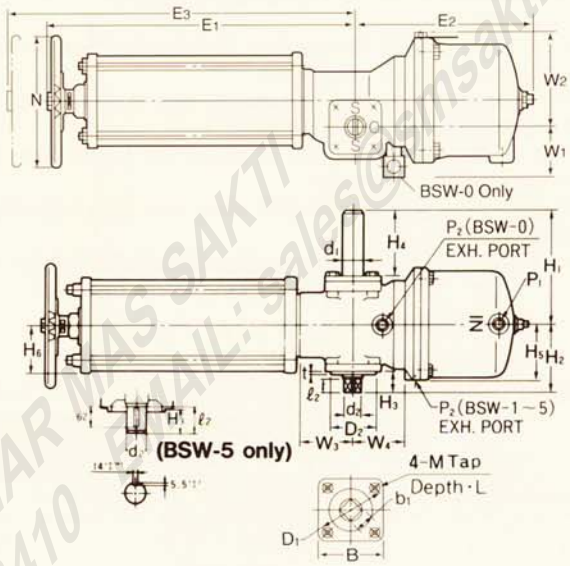
Type BS (Spring-Return)

Type BS-0 to BS-5

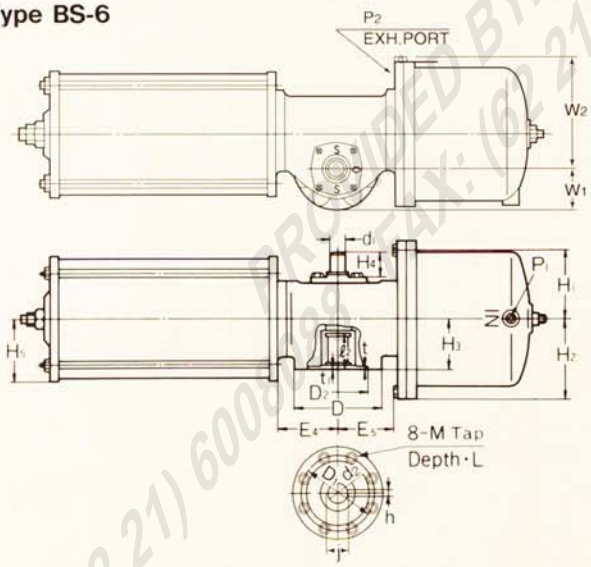


Type BSW
(Spring-Return with Manual Operation Device)

Type BSW-0 to BSW-5

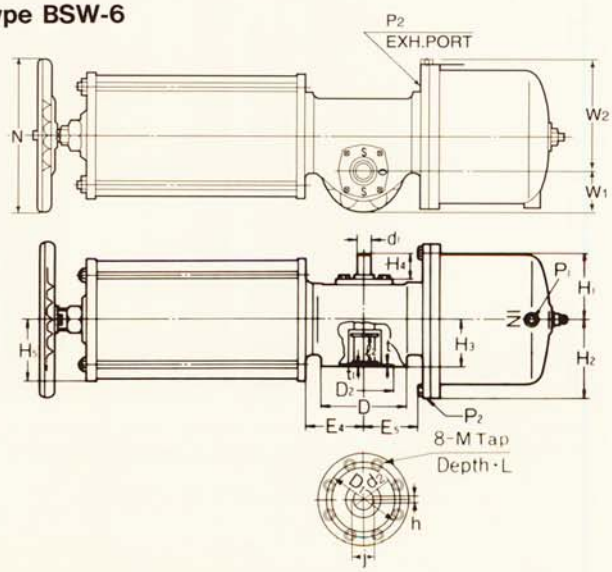


Type BS-6



● Type BS-0 actuator is not provided with the cast-out O-S indication on the cylinder.

Type BSW-6



● Type BSW-0 actuator is not provided with the cast-out O-S indication on the cylinder.

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	124	218	–	–	40	62	–	38	70	53	18	35	41	33	–	50	35	12	15	12	50	12	2	–	M6	9	–	–	90	Rc⅛	Rc⅛
BSW-1	259	161	315	–	–	30	81	47	38	135	60	18	89	52	46	–	50	35	16	15	12	50	12	2	–	M6	9	–	–	100	Rc¼	Rc⅛
BSW-2	362	210	438	–	–	38	106	62	56	148	77	23	94	68	54	–	70	55	22	21	17	70	17	2	–	M8	12	–	–	140	Rc¼	Rc⅛
BSW-3	482	276	582	–	–	52	140	80	78	175	104	32	99	92	73	–	102	70	30	28.5	23	95	23	3	–	M10	15	–	–	200	Rc¼	Rc¼
BSW-4	609	351	734	–	–	81	188	100	91	225	138	43	122	130	99	–	125	85	45	41	32	114	32	3	–	M12	19	–	–	250	Rc½	Rc¼
BSW-5	795	446	956	–	–	117	256	128	114	220	167	34	86	182	139	–	165	130	45	46	–	162	63	3	–	M20	32	–	–	300	Rc½	Rc¼
BSW-6	1006	638	1250	180	169	130	326	–	–	203	217	144	77	184	–	260	220	180	45	60	–	–	99	4	5	M16	26	18	64.4	450	Rc½	Rc½

Actuator Selection for KITZ Ball and Butterfly Valves

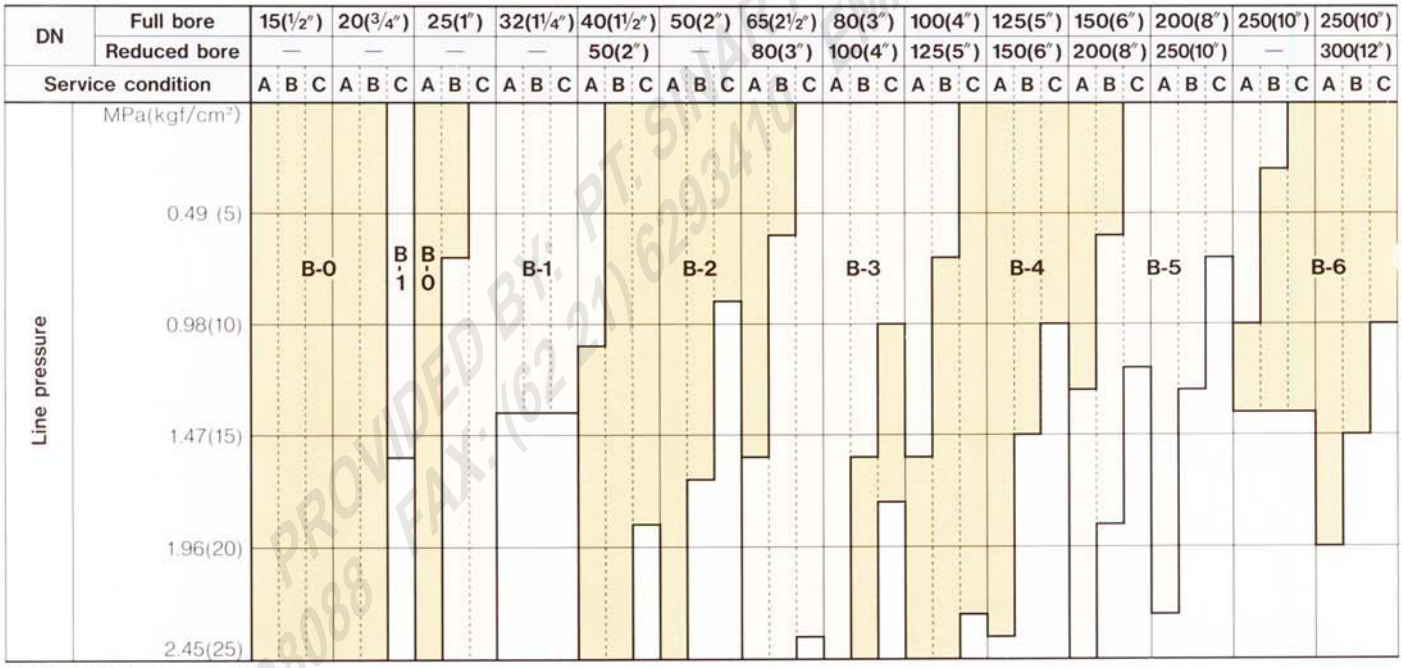
Selection of KITZ B Series Pneumatic Actuators

1. Determine the actuator load category A, B or C from the table below, depending on your planned service conditions, and make a selection of your actuator, following the selection quides given on Page 4 to 8.
2. Note that fail-safe operation of KITZ B Series actuators is quaranteed in the ambient temperature range of −20 C(−4 F) to 60 C (140 F).
3. Please contact KITZ Corporation for technical advice for the following service conditions:
   (a) For extremely high flow rate and/or high fluid velocity.
   (b) For extremely high fluid viscosity.
   (c) For valves being left open or closed for longer than 3 months without operation.
   (d) In case of supply air pressure being less than 0.39MPa (4kgf/cm²).
   (e) In case of line pressure exceeding 2.45MPa (25kgf/cm²).

Actuator Load Category against Service Temperature

Service conditions	Valve trim	≤300 C	300 C to 350 C	300 C to 450 C
Water lubricant(≤10000cp) Heavy oil(≤10000cp)	3H/6H	A	B	C
Air and gas steam	3H/6H	A	B	C
Kerosine, naphtha, alcohol and other solvents. Oil-free medium	3H/6H	A	B	C
Viscous semifluid (10000cp to 50000cp)	3H/6H	A	B	C
Slurries and powdered semifluid	3H	Not recommended		
	6H	See notes		

Selection Guide of KITZ B Series Actuators per Valve Sizes



★Restrictive service conditions

- Contact KITZ Corporation for technical advice where the above colume is left blank in white, or the valve size is other than listed.
- Confirm the size availability of each pressure class of KITZ valves, refering to the list provided on Page 4 to 8.

Actuator Selection Guide for KITZ Butterfly Valves

Class	size in / mm / Valve Code	2 / 50	2½ / 65	3 / 80	4 / 100	5 / 125	6 / 150	8 / 200	10 / 250	12 / 300	14 / 350	16 / 400	18 / 450	20 / 500	24 / 600
125	B-125C B-125CU	B-1		B-2			B-3		B-4			B-5		B-6	

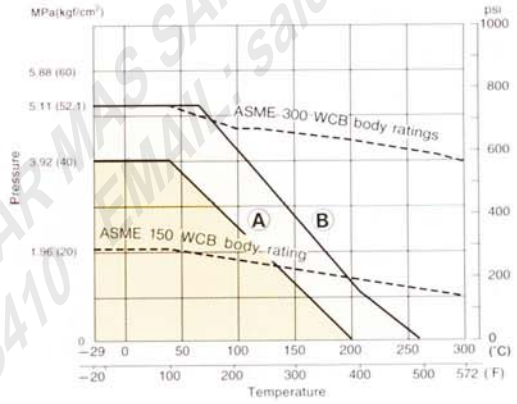
Seat Rating of KITZ Ball Valves, Full Bore Design

Seat materials (A) : PTFE
(B) : HYPATITE® ※ PTFE or Carbon-filled PTFE

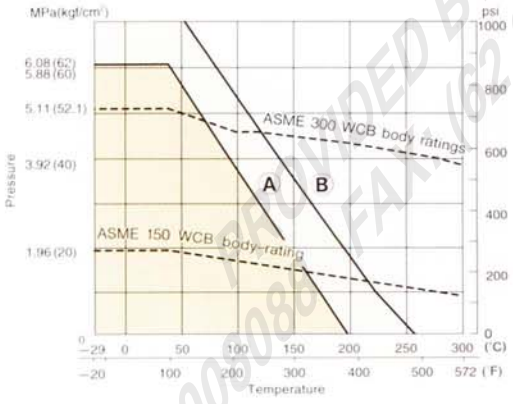
※HYPATITE® is the standard seat material for KITZ ball valves. Specify PTFE or Carbon-filled PTFE when required.

Body ratings shown here are for ASTM A216 Gr. WCB. For ratings of other valve shell materials, refer to the latest edition of ASME B16.34.

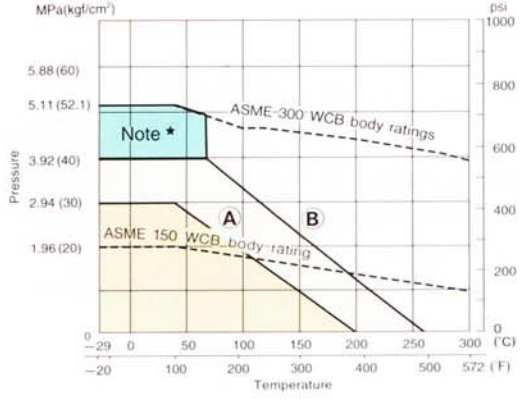
Size : 3″ & 4″



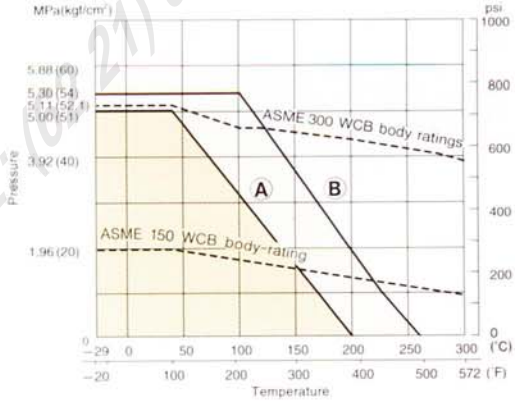
Size : ½″ & ¾″



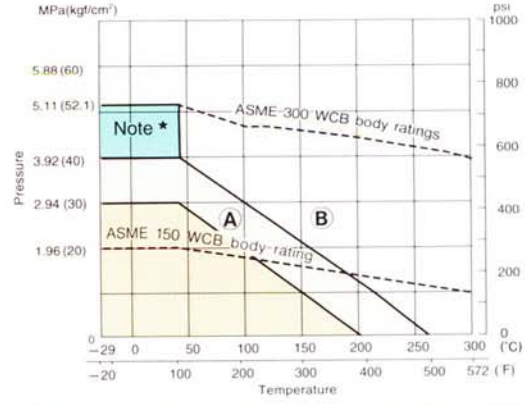
Size : 5″ & 6″



Size : 1″ to 2½″



Size : 8″ & 10″



Note★ Continuous pressurization is not recommended in this P-T range.

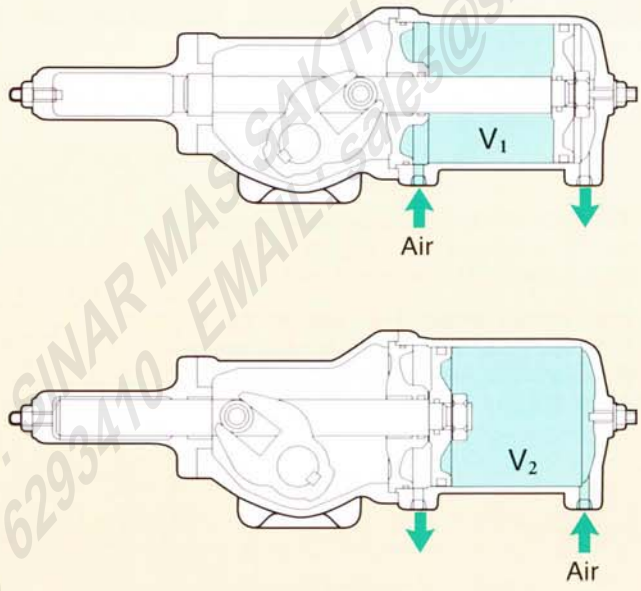
Cylinder Volume and Air Supply Requirements

On installation of piping 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

Actuator size	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

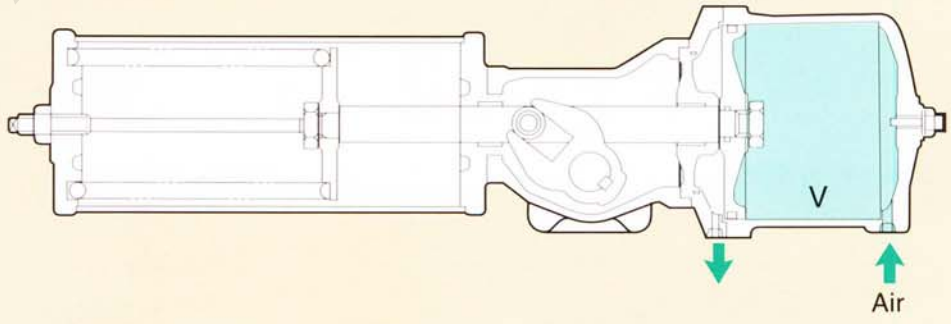
(liters)



Cylinder volume for Type BS/BSW actuators

Actuator size	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

(liters)



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 or 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 an actuator operating "n" cycles (two 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

1. 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.
2. After manual operation, the lever handle should be removed. Operating actuators with handles attached is extremely dangerous.
3. Long bolts securing the spring case should not be loosened or unthreaded, 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.
4. KITZ Operation Manual E-631 or 901-E is available for safe and efficient operation of KITZ B Series actuators.

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

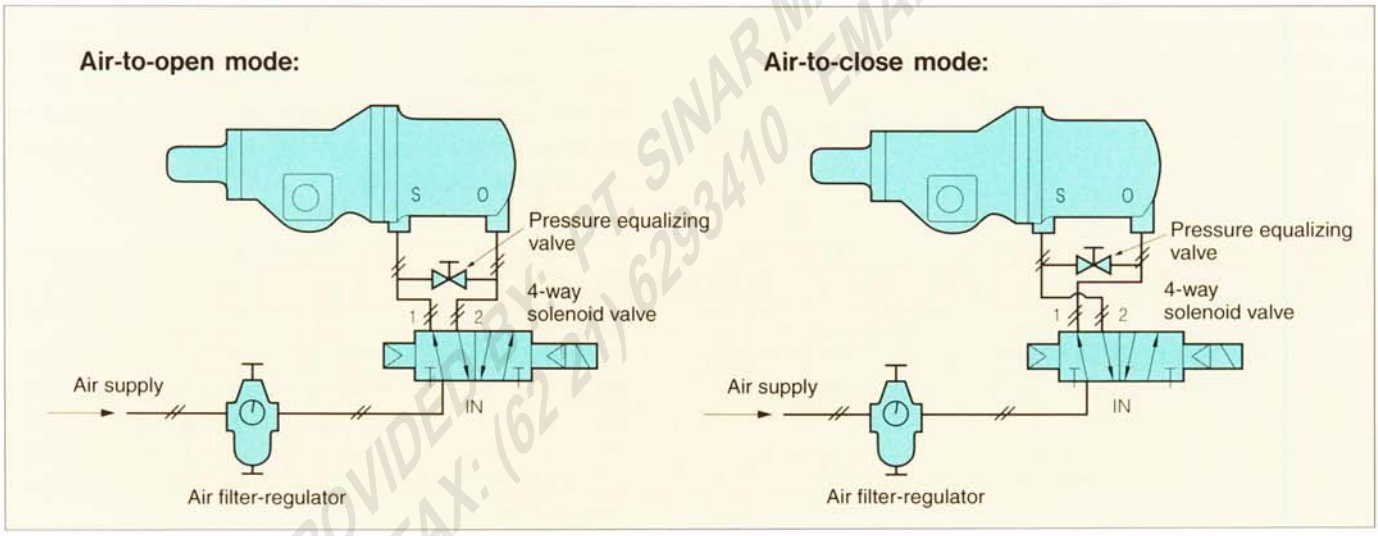
When installing pipes (either copper pipes or covered copper pipes) for air supply to actuators :

1. Select pipes of suitable diameter and wall thickness, according to the table given below.
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.

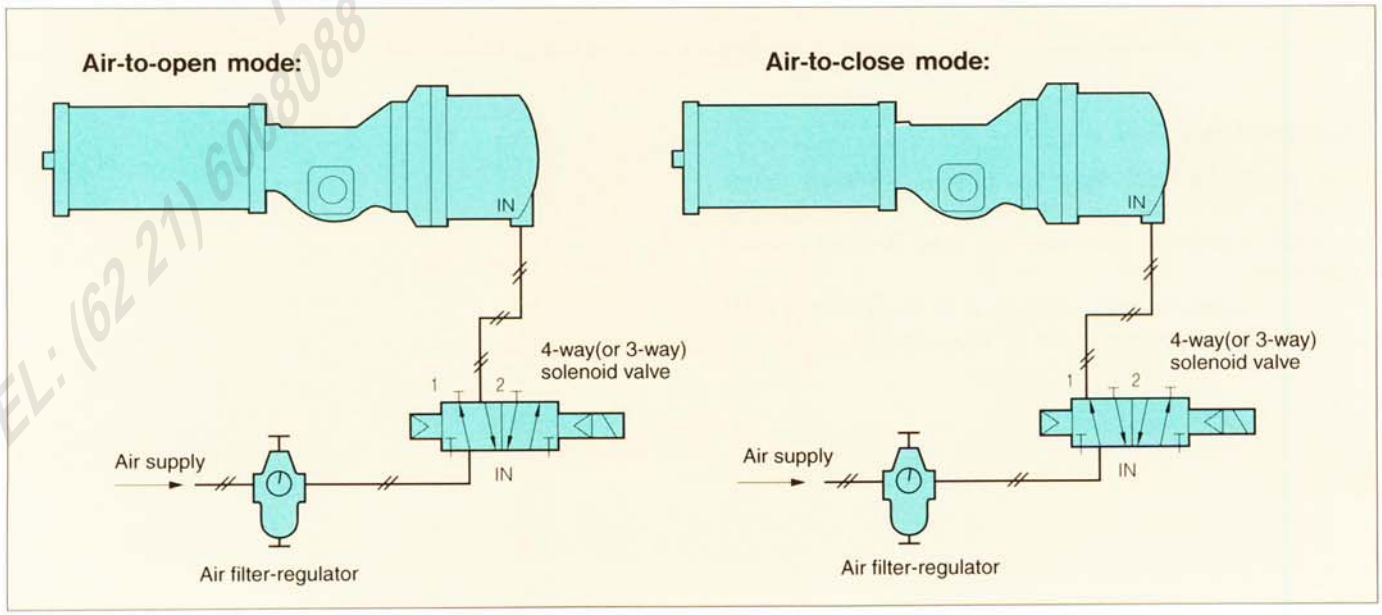
Diameter of piping threads (Rc)

Size	−0	−1	−2	−3	−4	−5	−6
Type B	1/8	1/4	1/4	1/4	1/4	1/2	1/2
Type BS/BSW	1/8	1/4	1/4	1/4	1/2	1/2	1/2

Type B Actuators (Double-Action)



Type BS/BSW Actuators (Spring-return)



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

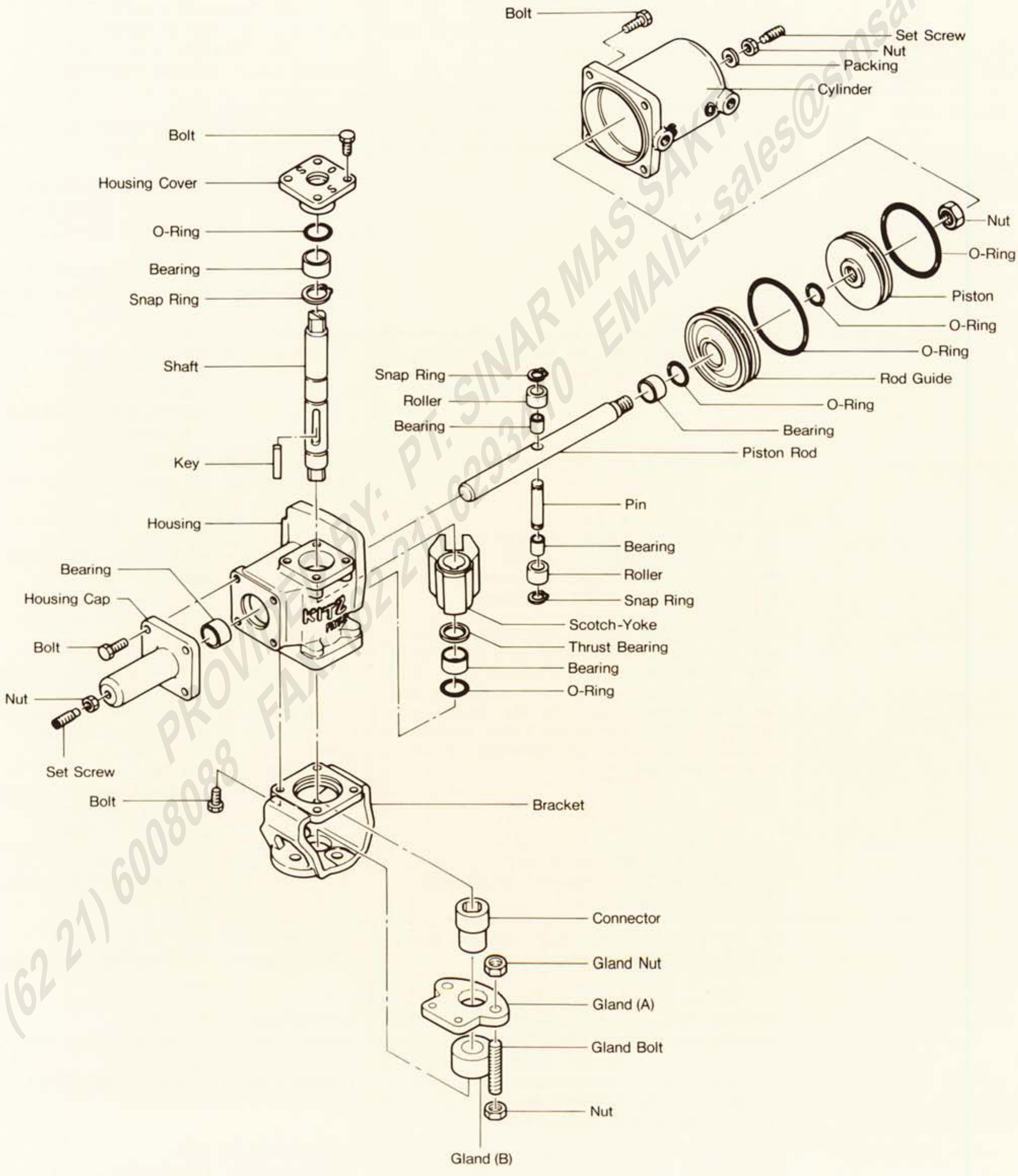
KITZ Optional Actuator Accessories

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 indication.	LS AC: 10A/125V 10A/250V 10A/480V DC: 0.8A/115V 0.4A/230V LS-F AC: 5A/125V 5A/250V DC: 0.8A/125V 0.4A/250V 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: Rc¼ Working pressure: 0~0.97MPa(0~9.9kgf/cm² or 0~140psi) Orfice diam: 6mm Electric current: 100V/50Hz 100V/60Hz 110V/60Hz 200V/50Hz 200V/60Hz 220V/60Hz Supply source connection Weather-proof: DIN terminals or terminal boxes Explosion-proof: Electric wire pipe threading
Air Filter-Regulator F + R (Complete 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: Rc¼, Rc½ Working pressure: Max. inlet pressure; 0.97MPa(9.9kgf/cm² or 140psi) Max.outlet pressure; 0.04~0.83MPa (0.5~8.5kgf/cm² or 8~120psi)
Speed Controller SP	For reducing actuator operating speeds.	Connected pipe: Rc⅛, Rc¼, Rc½ Operation pressure: 0.97MPa(9.9kgf/cm² or 140psi) max.
Quick Exhaust Valve QE	For increasing actuator operation speeds:With spring-return actuators, speed increase is possible only in spring-return direction. (Usable only for actuators without positioners)	Connected pipe: Rc¼, Rc½ Working pressure: 0.97MPa(9.9kgf/cm² or 140psi) max.
Valve Positioner P (Complete with pressure gauge)	For operating actuators at any desired position, with the flow rate controlled by a valve: Valve positioners may be mounted on both double-action and spring-return actuators. With use of valve positioners, flow rate may be stably controlled. Both air-to-open and air-to-close actuation modes can be obtained by simply reversing cam direction.	Connected pipe: Rc¼ (pressure gauge:Rc ⅛) Supply pressure: 0.29~0.69MPa(3~7kgf/cm² or 43~100psi) Signal pressure: 0.02~0.1MPa(0.2~1.0kgf/cm² or 3~15psi) or specified Lineality: ±2% max. Hysteresis: 1% max. Air consumption: 20Nℓ/min. max. (at supply pressure 0.49MPa (5kgf/cm² or 70psi)
Silencer K	For reducing air exhaust noise generated by a solenoid valve: To be installed in the exhaust port of a solenoid valve.	Connected pipe: Rc⅛, Rc¼, Rc½ Working pressure: 0.9MPa(9.2kgf/cm² or 130psi) max.
Air Filter F	For removing moisture, water and other foreign objects from operating air.	Connected pipe: Rc¼, Rc½ Working pressure: 0.97MPa(9.9kgf/cm² or 140psi) max.
Lubricator L	Although KITZ B Series actuators and their standard solenoid valves are basically designed for no need of lubrication, when other solenoid valves are used, or when actuators are subjected to high operating frequency for long periods of time, lubrication is recommended.	Connected pipe: Rc¼, Rc½ Working pressure: 0.97MPa(9.9kgf/cm² or 140psi) max. Recommended oil: Turbine oil #90~#140
Pressure Equalizing Valve C	For equalizing the internal air pressure with the atmospheric level for manual operation of actuators.	Connected pipe: Rc¼ Working pressure: 1.37MPa(14kgf/cm² or 200psi) max.

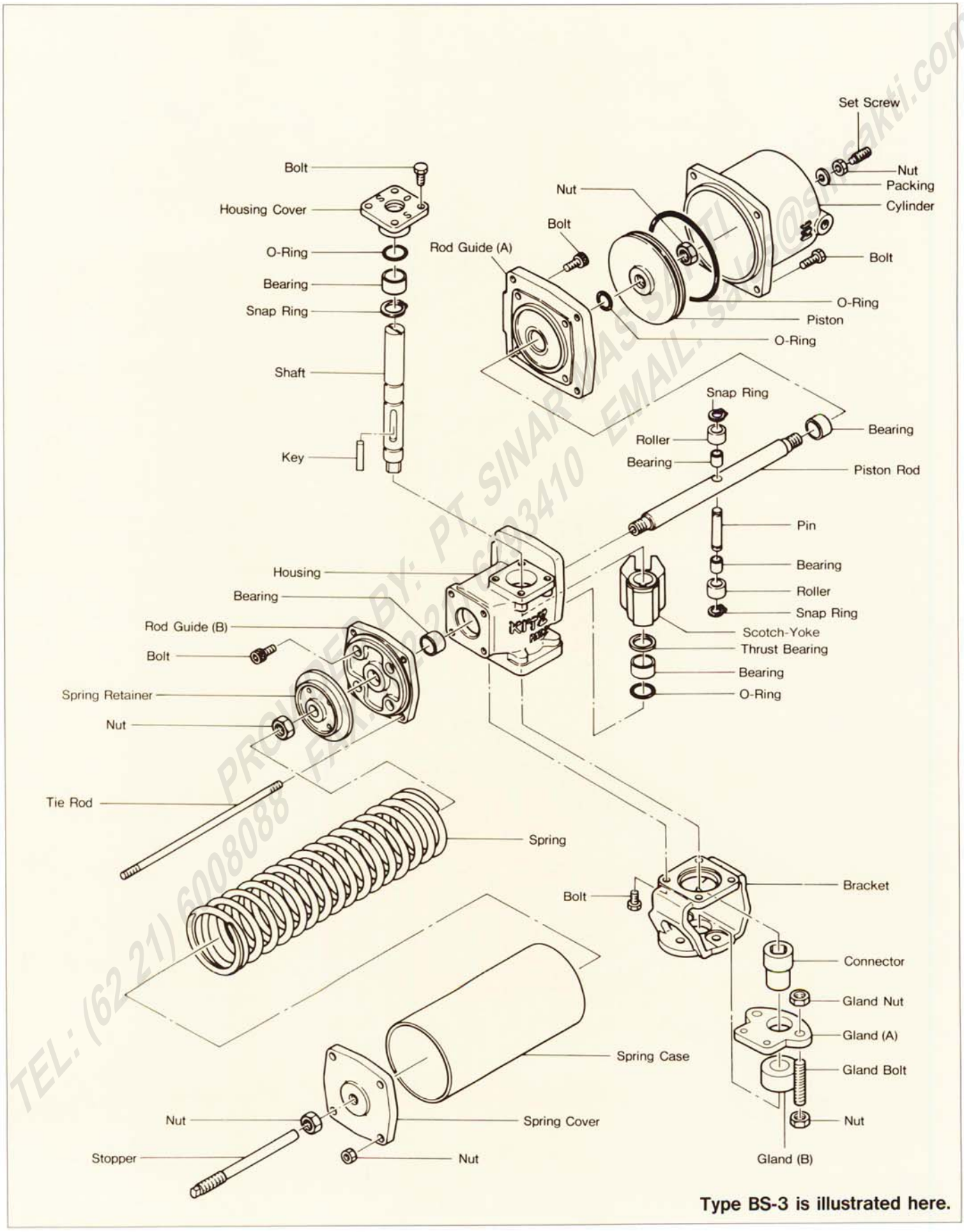
Above specifications are KITZ standards. Different specifications are optionally available.

Construction Details of Type B Actuators



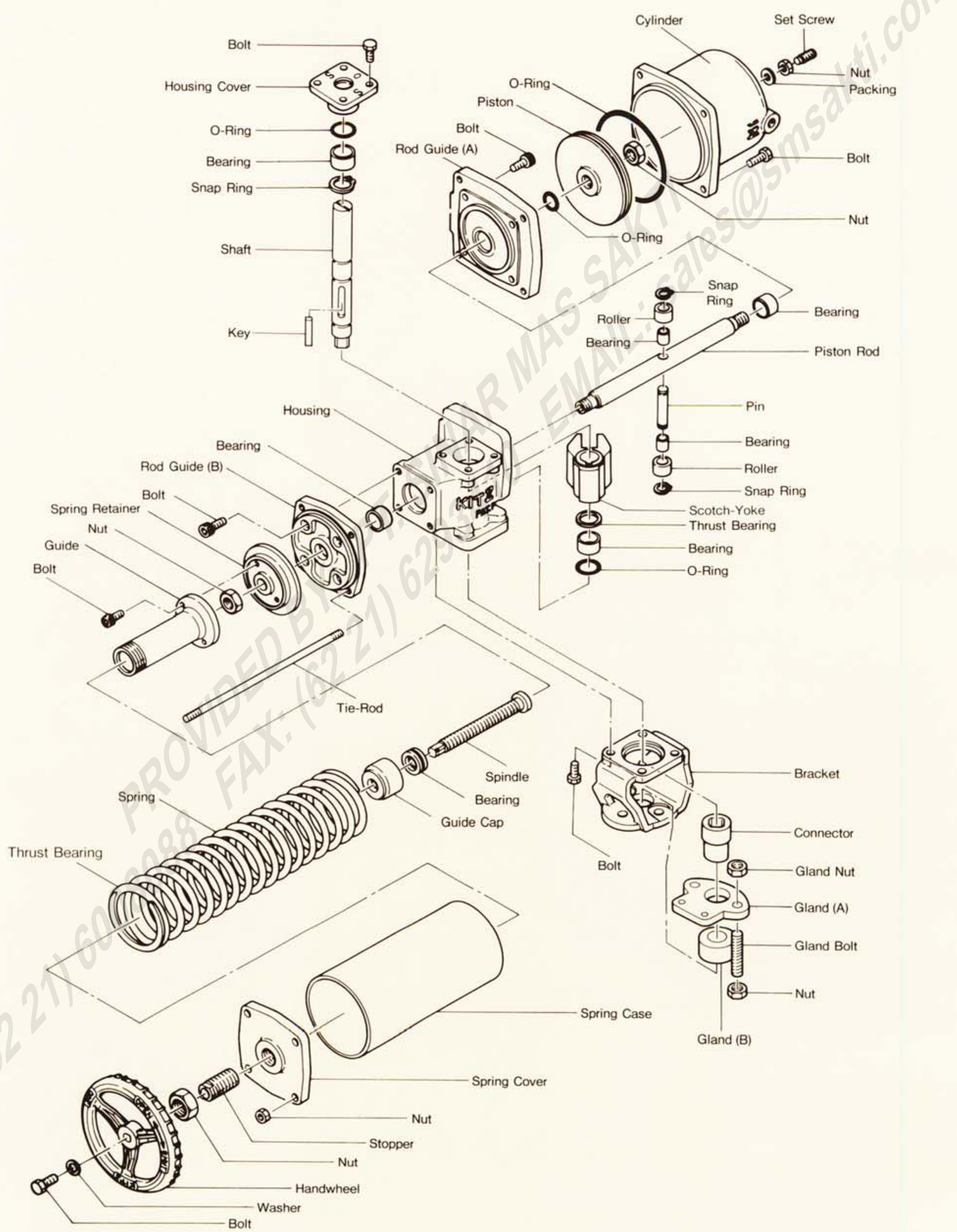
Type B-3 is illustrated here.

Construction Details of Type BS Actuators



Type BS-3 is illustrated here.

Construction Details of Type BSW Actuators



Type BSW-3 is illustrated here.

Valve and Actuator Handling Instructions

1. Before mounting valves on pipelines, remove welding chips, scales and other foreign objects from the ports; flush the insides thoroughly.
2. Both pneumatically operated ball and butterfly valves can be mounted horizontally or vertically. Fluid can be discharged from either port. However, air filters and lubricators attached to actuators should be correctly positioned in consideration of the weight of actuators which may cause an extra stress on the pipeline.
3. For convenience of maintenance service, provide an adequate room around valves, such as 300 mm above, 500 mm below, and 300 mm wide from the sides.
4. Ambient temperatures allowable for actuators ranges between −20°C and +60°C. Valves should be adequately protected if the ambient temperature exceeds this range.
5. If a pipeline vibrates, take appropriate prevention measures.
6. In corrosive atmospheres such as SO_2 or Cl_2, corrosive gas should not be intruded into the air supply.
7. Use air compressors and air reservoirs with a capacity of 130% of the piping capacity and air consumption.
   The maximum supply air pressure for KITZ B Series actuators is 0.69MPa(7kgf/cm² or 100psi).
8. During the initial operation, or after suspension of operation exceeding 3 month, operating torque may exceed the specified level. In these cases, actuators should be manually operated several times before starting pneumatic activation.

How To Order KITZ Valves Assembled with B Series Actuators

The product coding below shows you how to order standard KITZ pneumatically operated valves.

1	2	3	4	5	
B	150	U	TB	M	..... Ball Valves
Type of Actuator	Valve Class	Shell Material	Valve Type	Shell Material Suffix	

1	2	4	
B	125	C	..... Butterfly valves
Type of Actuator	Valve Class	Valve Type	

1. Type of Actuator

B	Double-action
BS	Spring-return
BSW	Spring-return with manual operation device

2. Valve Class

125	ASME Class 125
150	ASME Class 150
300	ASME Class 300

3. Shell Material

SC	Carbon Steel
U	Stainless Steel
FC	Cast Iron

4. Valve Type

TB	Ball Valve, Full Bore
TC	Ball Valve, Trunnion Mounted
C	C Series Butterfly Valve
CU	C Series Butterfly Valve with 304 disc
CM	C Series Butterfly Valve with 316 disc

5. Trim Material for Carbon Steel Valves

M	Type 316 S.S.
(blank)	Type 304 S.S.

⚠ CAUTION

Technical data published in this catalog have been developed from our design calculation, in-house testing, field reports provided by our customers and/or published official standards or specifications. They are good only to cover typical applications as a general guideline to users of KITZ products introduced in this catalog.

For any specific application, users are kindly requested to contact KITZ Corporation for technical advice, or to carry out their own study and evaluation for proving suitability of these products to such an application. Failure to follow this request could result in property damage and/or personal injury, for which we shall not be liable.

While this catalog has been compiled with the utmost care, we assume no responsibility for errors, impropriety or inadequacy. Any information provided in this catalog is subject to from-time-to-time change without notice for error rectification, product discontinuation, design modification, new product introduction or any other cause that KITZ Corpration considers necessary. This edition cancels all previous issues.

ISO 9001 certified since 1989

KITZ

KITZ CORPORATION
1-10-1, Nakase, Mihama-ku, Chiba 261-8577, Japan
International Sales Dept. Phone: 81-43-299-1730, 1732 and 1733
Fax: 81-43-299-0121

Distributed by

Printed in Japan