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# Segment ball valve



## ○ Segment ball valve

Segment ball valve is one type of ball valves. Its closure is a half ball with V type port which has sharp edges. During operating the valve, friction action will be occurred between its closures that producing a strong shearing force to the medium, and a fan-shaped area will be formed between V type port of the ball and the port of seat ring, so the section area of flow port can be changed, and the medium can be precisely regulated. It is a kind of regulating valve with angle rotation, having same sealing performance as common ball valves, so it simultaneously has both functions of regulating and on-off. Incorporating with pneumatic or electric actuators, it can be widely used in the automatic control systems in different industries.

## ○ Product features:

**Integral structure of Body :** Both wafer type and flanged type V-type ball valves are with integral, side-entry structure which has strong rigidity, making it hard to be deformation and leakage.

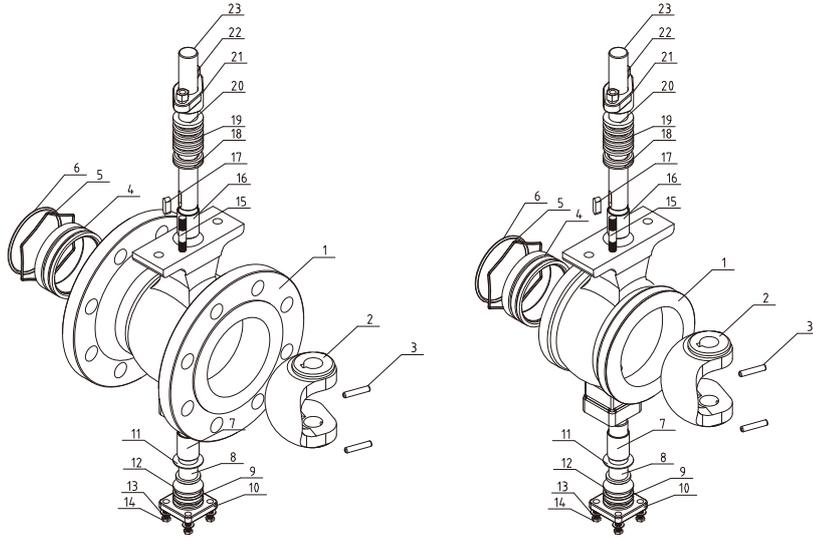
**With lower and upper self-lubricated bearings:** Lower and upper self-lubricated bearings are installed inside the body. So the contact surface with stem is bigger which have a high carrying capacity and low friction coefficient, that operating torque of valve is reduced.

**Seat rings can be metal seats or PTFE soft seats** depending on different working medium. Sealing face of metal seats will be overlaid with hard alloy, while ball surface is hardened with hard chromium plated or spraying overlay, plasma nitriding, etc, so as to increase working life of sealing faces and improve temperature resistance. PTFE or RPTFE seats have excellent sealing performance, high corrosion resistance and wide applications.

**Economical practicality:** Light body weight, small stem torque, so it can be installed with smaller pneumatic or electric actuators, high cost-effective compared to same size/class of other kinds of regulating valves.

**Wide applications:** With the shearing action between V port and seat ring, also with smooth body internal surface, so making the medium is not easy to be kept in the body. So it is not only suitable for liquid medium, but also better for using in control system of mediums contained fibers and solid particles.

**Precise control of small flow:** Through special machining on the V port for small sizes, which can achieve a precise control of low CV value.



## Parts List

No.	Part name	Quantity	Material		
1	Body	1	WCB	CF8	CF8M
2	valve core	1	CF8+hard chromium	CF8+hard chromium	CF8M+hard chromium
3	parallel pin	2	304	304	316
4	Seat	1	304+hard alloy overlaid	304+hard alloy overlaid	316
5	Spring	1	316	316	316
6	O-ring	1	Viton	Viton	Viton
7	Self-lubricated bearing		304+PTFE	304+PTFE	316+PTFE
8	Lower stem	1	20Cr13	304	316
9	O-ring	1	Viton	Viton	Viton
10	Lower cover	1	WCB	CF8	CF8M
11	Washer	1	PTFE	PTFE	PTFE
12	Adjusted gasket	1	PTFE	PTFE	PTFE
13	Flat gasket	4	Q235	304	304
14	Screw	4	25	304	304
15	Bolt	2	25	304	304
16	Self-lubricated bearing	1	304+PTFE	304+PTFE	316+PTFE
17	Key	1	20Cr13	304	316
18	Lower stem packing	1	PTFE	PTFE	PTFE
19	Middle stem packing	1 suit	PTFE	PTFE	PTFE
20	Upper stem packing	1	PTFE	PTFE	PTFE
21	Packing gland	1	WCB	CF8	CF8M
22	Nut	2	35	304	304
23	Upper stem	1	20Cr13	304	316

## Product model

DN25–DN250 ( 1" –10" ) wafer type, flanged type

DN300–DN500 ( 12" –20" ) flanged type

Pressure rating:

DIN PN10、PN16、PN25

ANSI 150

## Design standard

1. End flanges ; GB/T 9113.1–2010 、 JB/T 79.1–1994、 HG 20592–2009  
ASME B 16.5 EN 1092–1; 2001
2. Pressure/temperature rating: GB/T 12224–2007 ASME B16.34–2003 ISO 7005–1
3. Face to face  
Wafer type:Manufacturer standard  
Flanged type:ISA S75.04–1995, IEC/DIN 534–3–2
4. working temperature :  
Normal temperature  
Middle temperature  
High temperature
5. Pressure test standard  
Shell and seat test ; GB/T 4213–2007

Metal seat leakage rate: The below table will be used if customer doesn't have any special requirements. If the customer has special requirement, then leakage rate will be in accordance with spec GB/T 4213–2007 V class V.

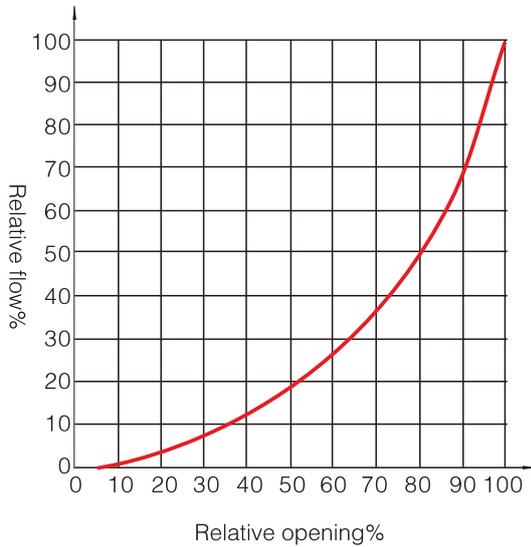
Shell test pressure shall be 1.5 times of PN, the pressure rating determined for material at 38 °C listed in ASTM B16.34. Stem packing and seat test pressure shall be 1.1 times the pressure rating determined for material at 38 °C listed in ASTM B16.34. Seat test shall be done under max. differential pressure. When max. differential pressure is not specified, then it will be tested under pressure at 1.0 MPa(hydrostatic pressure). When defined max. differential pressure is less than 0.6MPa, then it will be tested under pressure at 0.6 MPa. Test Fluid shall be fresh water containing a corrosion inhibitor.

## Max. allowable leakage rate of seat test

Size	Max. allowable leakage rate of metal seat	Max. allowable leakage rate of soft seat
DN25 ( 1" )	1.50ml/min	0.15ml/min
DN32 ( 1 1/4" )	1.80ml/min	0.18ml/min
DN40 ( 1 1/2" )	2.40ml/min	0.24ml/min
DN50 ( 2" )	3.00ml/min	0.30ml/min
DN65 ( 2 1/2" )	3.90ml/min	0.39ml/min
DN80 ( 3" )	4.80ml/min	0.48ml/min
DN100 ( 4" )	6.00ml/min	0.60ml/min
DN125 ( 5" )	7.50ml/min	0.75ml/min
DN150 ( 6" )	9.00ml/min	0.90ml/min
DN200 ( 8" )	12.00ml/min	1.20ml/min
DN250 ( 10" )	15.00ml/min	1.50ml/min
DN300 ( 12" )	18.00ml/min	1.80ml/min
DN350 ( 14" )	21.00ml/min	2.10ml/min
DN400 ( 16" )	24.00ml/min	2.40ml/min
DN450 ( 18" )	26.00ml/min	2.60ml/min
DN500 ( 20" )	30.00ml/min	3.00ml/min

### Flow characteristics

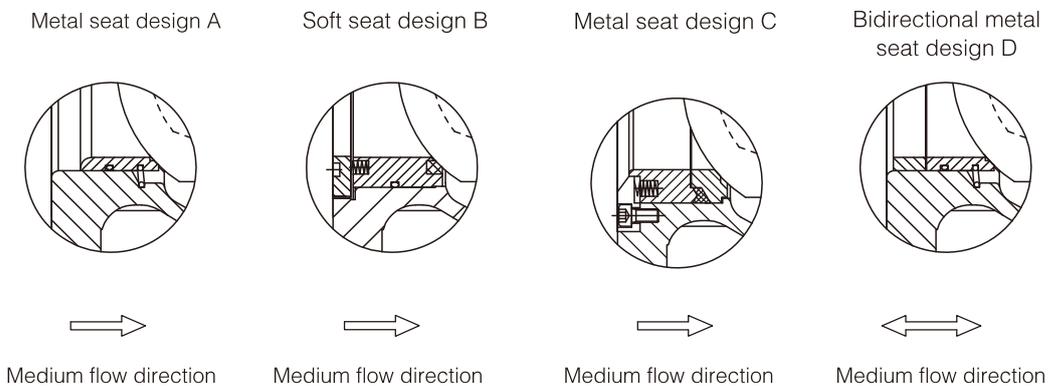
The intrinsic flow characteristic of V type regulating ball valve approximates the characteristic of equal percentum , see Fig.1.



### CV values of standard products

Size	CV values
DN25 ( 1" )	36
DN32 ( 1 1/4" )	56
DN40 ( 1 1/2" )	94
DN50 ( 2" )	152
DN65 ( 2 1/2" )	262
DN80 ( 3" )	358
DN100 ( 4" )	540
DN125 ( 5" )	906
DN150 ( 6" )	1424
DN200 ( 8" )	2176
DN250 ( 10" )	3532
DN300 ( 12" )	5732
DN350 ( 14" )	8245
DN400 ( 16" )	10651
DN450 ( 18" )	12878
DN500 ( 20" )	16343

### Structural sketch of different seat design



### Application of different seat structure

Metal seat design A	
Seat	304/316+Stellite
Spring	17-7PH/316
O-ring	Viton
Stem packing	PTFE
Ball+hardened treatment	Hard chromium plated /Nitriding/WC coating/STL coating
Suitable temperature range	-29°C-150°C
Suitable medium	Water/Oil/Solid particles/Suspensions

Metal seat design A	
Seat	304/316+Stellite
Spring	17-7PH/316
O-ring	High temp. resistance Viton
Stem packing	Graphite
Ball+hardened treatment	Hard chromium plated /Nitriding/WC coating/STL coating
Suitable temperature range	-29°C-150°C
Suitable medium	Water/Oil/Solid particles/Suspensions

Soft seat design B	
Seat	304+PTFE/316+PTFE
Spring	17-7PH or Inconel
O-ring	Viton
Stem packing	PTFE
Ball+hardened treatment	Hard chromium plated/Nitriding
Suitable temperature range	-29°C-150°C
Suitable medium	Water/Oil/Steam/Gas

Metal seat design C	
Seat	304/316+Stellite
Spring	17-7PH/316/Inconel
O-ring	Graphite
Ball+hardened treatment	Nitriding/WC coating/STL coating
Stem packing	Graphite
Suitable temperature range	-29°C-150°C
Suitable medium	Steam/Solid particles

Bidirectional metal seat design D	
Seat	304/316+Stellite
Spring	17-7PH/316
O-ring	Viton
Stem packing	PTFE
Ball+hardened treatment	Hard chromium plated/ Nitriding/WC coating /STL coating
Suitable temperature range	-29°C-150°C
Suitable medium	Water/Oil/Solid particles/Suspensions

## Actuator Selection

Selection table of actuator for V type ball valve												
DN	Pneumatic actuator				Equipped with GT Small fine series of actuators			Electric operation	Gearbox operation	Air tube	Air supply pressure (Mpa)	
	mm	ZS	Manual operation	ZDS	Manual operation	DA	SR					Manual operation
25	ZS36-63	26:1	ZDS45-100	38:1	63	26:1	75	28:1	05	1	Φ6 × 1(G1/4)	0.5-0.7
32	ZS36-63	26:1	ZDS45-100	38:1	63	26:1	75	28:1	05	1		
40	ZS36-80	28:1	ZDS45-100	38:1	83	28:1	92	38:1	10	1		
50	ZS45-80	28:1	ZDS45-100	38:1	92	28:1	105	38:1	10	1		
65	ZS45-80	28:1	ZDS55-125	38:1	92	28:1	105	38:1	20	2	Φ8 × 1.5(G1/4)	
80	ZS45-100	38:1	ZDS55-125	38:1	105	38:1	125	38:1	20	2		
100	ZS45-100	38:1	ZDS55-125	54:1	105	38:1	125	54:1	40	2		
125	ZS55-100	54:1	ZDS55-125	54:1	125	54:1	140	54:1	40	3		
150	ZS55-125	54:1	ZDS63-160	80:1	140	54:1	160	80:1	40	3	Φ10 × 2(G3/8)	
200	ZS63-160	54:1	ZDS63-200	80:1	160	54:1	210	80:1	60	4		
250	ZS80-200	80:1	ZDS80-250	78:1	190	80:1	210	78:1	100	5		
300	ZS80-250	80:1	ZDS100-300	78:1	240	80:1	270	78:1	150	5	Φ12 × 2(G1/2)	
350	ZS100-300	78:1	ZDS125-300	98:1	270	78:1	300	98:1	200	5		
400	ZS100-300	78:1	ZDS125-350	98:1	300	78:1	350	98:1		6		
450	ZS125-350	320:1	ZDS125-400	320:1	350	320:1	400	320:1		6		
500	ZS125-350	320:1	ZDS125-400	320:1	350	320:1	400	320:1		6D		

Note: ZS series actuators are developed and manufactured by Hiton itself. See the catalog of ZS actuators for more information. All the above actuators are recommended for valves with Nominal pressure at 1.6MPa while air supply pressure at 0.5MPa. If the Nominal pressure of valve is more than 1.6MPa, or the medium is high temperature such as steam, then it is recommended to use higher models.

### Selection of accessories

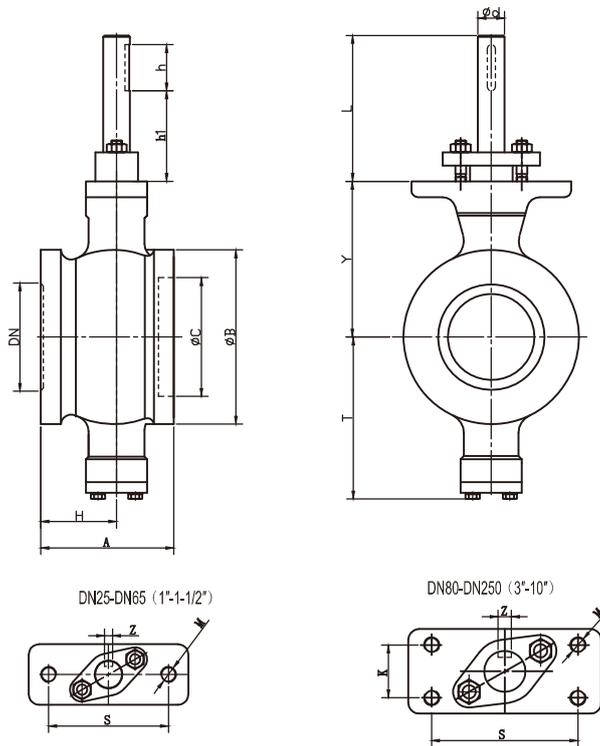
Regulating Segment ball valve;

1. Pneumatic regulating type: Body+ Yoke+ Pneumatic actuator + Electric valve positioned + Air filter
2. Electric regulating type: Body+ Yoke+ Regulating type electric actuator

On/off V type ball valve;

1. Pneumatic on/off type: Body+ Yoke+ Pneumatic actuator+ Solenoid valve+ Limit switch+ Air filter
2. Electric on/off type: Body+ Yoke+ On/off type electric actuator

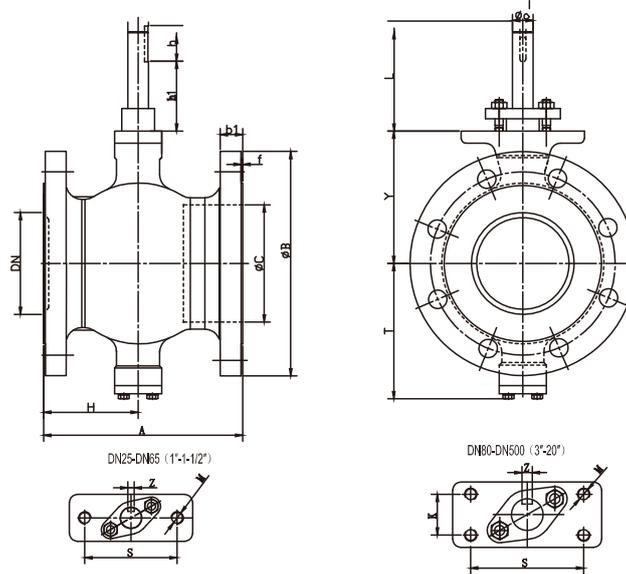
### overall dimension table of Wafer Segment ball valve



DN	A	H	B	C	T	Y	L	L	φ d	h	S	K	M	Z	Actuator
25	50	30	68	38	81	73	102	75	16	35	75	/	2-M10	5	32
32	60	35	76	45	86	78	100	75	16	35	75	/	2-M10	5	40
40	60	35	84	50	90	80	102	75	16	35	75	/	2-M10	5	76
50	75	43	100	62	93	90	104	75	16	35	75	/	2-M10	5	90
65	100	50	118	73	108	105	102	75	16	35	75	/	2-M10	5	100
80	100	57	132	93	123	118	110	75	20	35	90	28	4-M10	6	140
100	115	65	158	115	138	130	108	75	20	35	90	28	4-M10	6	150
125	129	78	184	134	148	145	110	80	25	40	90	28	4-M10	8	200
150	160	95	216	164	170	170	124	94	30	50	110	40	4-M12	8	300
200	200	120	268	206	200	201	124	94	30	50	110	40	4-M12	8	500
250	240	148	326	260	240	237	140	98	40	60	135	40	4-M16	12	800

Note: Stem projection length L has 2 options, one is long type which is suitable for ZS pneumatic actuator as stem can be inserted into the actuator, short type will be used if stem adapter is available.

Overall dimension table of Flanged V type ball valve



PN16

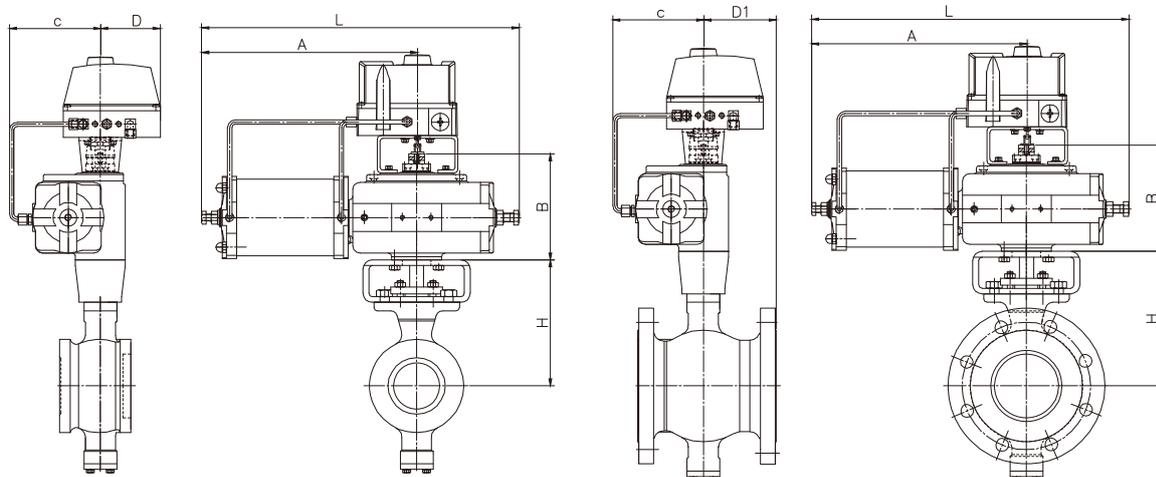
DN	A	H	B	b1	f	C	T	Y	L	L	∅d	h	S	K	M	Z	Actuator
25	102	51	115	16	2	38	81	73	102	75	16	35	75	/	2-M10	5	32
32	102	51	140	18	2	45	86	78	100	75	16	35	75	/	2-M10	5	40
40	114	57	150	18	2	50	90	80	102	75	16	35	75	/	2-M10	5	76
50	124	60	165	20	2	62	93	90	104	75	16	35	75	/	2-M10	5	90
65	145	70	185	20	2	73	108	105	102	75	16	35	75	/	2-M10	5	100
80	165	75	200	20	2	93	123	118	110	75	20	35	90	28	4-M10	6	140
100	194	92	220	22	2	115	138	130	108	75	20	35	90	28	4-M10	6	150
125	194	97	250	22	2	134	148	145	110	80	25	40	90	28	4-M10	8	200
150	229	110	285	24	2	164	170	170	124	94	30	50	110	40	4-M12	8	300
200	243	120	340	24	2	206	200	201	124	94	30	50	110	40	4-M12	8	500
250	297	148	405	26	2	260	240	237	140	98	40	60	135	40	4-M16	12	800
300	338	190	460	28	2	316	286	282	140	98	40	60	135	40	4-M16	12	1400
350	400	221	520	30	2	372	330	337	170	125	50	60	140	64	4-M16	14	2000
400	400	220	580	32	2	420	367	372	212	172	60	80	170	80	4-M20	18	2900
450	520	290	640	40	2	470	422	432	240	172	70	90	190	90	4-M24	20	3400
500	600	320	715	44	2	516	490	498	250	180	80	100	190	90	4-M24	22	5000

150Lb

inch	A	H	B	b1	f	C	T	Y	L	L	∅d	h	S	K	M	Z	Actuator
1	102	51	108	14.5	2	38	81	73	102	75	16	35	75	/	2-M10	5	40
1 1/4	102	51	115	14.5	2	45	86	78	100	75	16	35	75	/	2-M10	5	46
1 1/2	114	57	127	14.5	2	50	90	80	102	75	16	35	75	/	2-M10	5	90
2	124	60	152	16.3	2	62	93	90	104	75	16	35	75	/	2-M10	5	115
2 1/2	145	70	180	18	2	73	108	105	102	75	16	35	75	/	2-M10	5	120
3	165	75	191	19.5	2	93	123	118	110	75	20	35	90	28	4-M10	6	180
4	194	92	230	24	2	115	138	130	108	75	20	35	90	28	4-M10	6	200
5	194	97	255	24.3	2	134	148	145	110	80	25	40	90	28	4-M10	8	220
6	229	110	280	26	2	164	170	170	124	94	30	50	110	40	4-M12	8	350
8	243	120	340	29	2	206	200	201	124	94	30	50	110	40	4-M12	8	600
10	297	148	405	30.6	2	260	240	237	140	98	40	60	135	40	4-M16	12	900
12	338	190	485	32.2	2	316	286	282	140	98	40	60	135	40	4-M16	12	1600
14	400	221	535	35.4	2	372	330	337	170	125	50	60	140	64	4-M16	14	2400
16	400	220	595	37	2	420	367	372	212	172	60	80	170	80	4-M20	18	3500

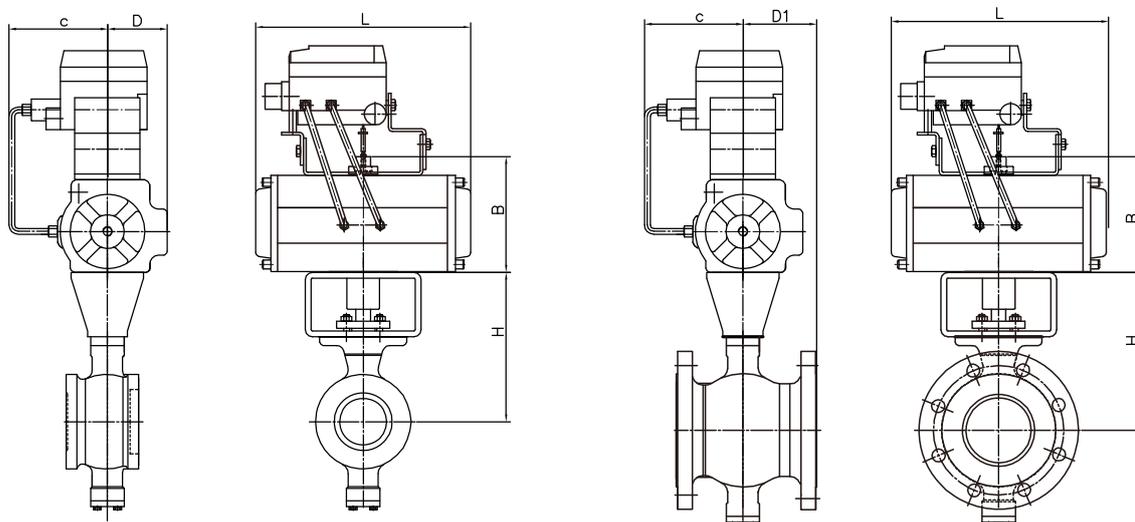
Note: Stem projection length L has 2 options, one is long type which is suitable for ZS pneumatic actuator as stem can be inserted into the actuator, short type will be used if stem adapter is available.

◎ Overall dimensions of body and double acting actuator



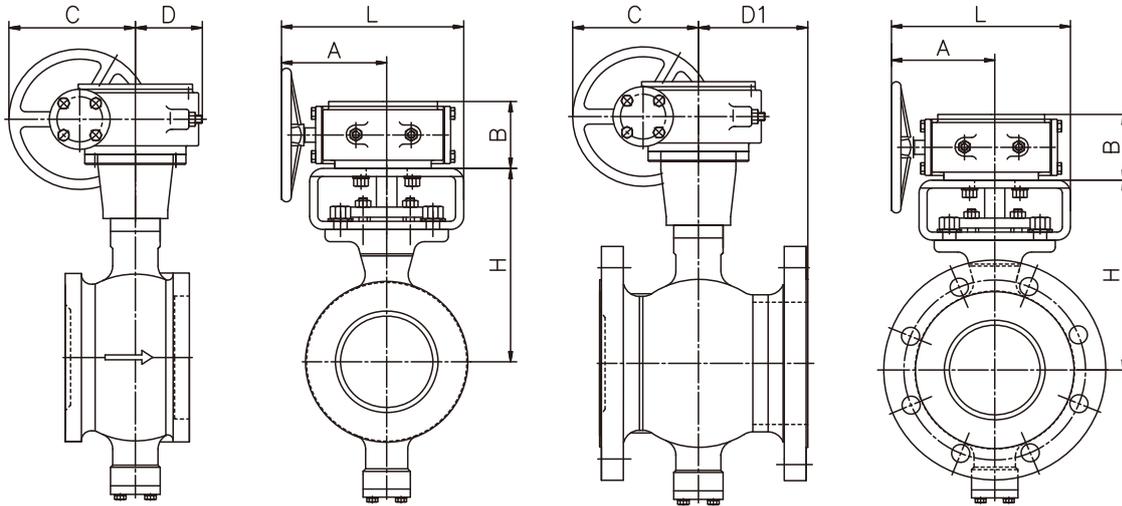
DN	A	L	B	H	C	D	D1
25	270	390	140	133	105	85	85
32	270	390	140	138	105	85	85
40	275	395	140	140	115	85	85
50	275	395	140	150	115	85	85
65	296	440	150	165	125	85	85
80	300	445	150	178	135	85	90
100	300	445	150	190	135	85	102
125	343	507	155	205	155	85	97
150	343	507	155	235	170	85	129
200	418	617	190	265	200	85	123
250	502	742	224	317	260	92	149
300	520	760	224	362	280		148
350	605	900	277	437	330		179
400	620	900	277	492	330		180
450	770	1200	330	570	400		230
500	770	1200	330	640	400		280

- Overall dimensions of body and small type pneumatic actuator



DN	L	B	H	C	D	D1
25	168	108	163	120	36	85
32	168	108	168	120	36	85
40	204	129	170	130	46	85
50	262	137	180	130	50	85
65	262	137	195	130	50	85
80	268	153	210	145	56	90
100	268	153	220	145	56	102
125	300	175	235	160	68	97
150	390	192	270	160	75	129
200	460	217	300	175	87	123
250	525	260	375	195	103	149
300	600	319	420	220		148
350	720	356	500	250		179
400	740	378	550	260		180
450	740	378	650	260		230
500	860	432	720	260		280

○ Overall dimensions of body and gearbox



DN	A	L	B	H	C	D	D1
25	145	200	70	133	170	60	60
32	145	200	70	138	170	60	60
40	145	200	70	140	170	60	60
50	145	200	70	150	170	60	64
65	145	200	70	165	170	60	75
80	145	200	70	178	170	60	90
100	145	200	70	190	170	60	100
125	170	235	74	205	190	75	97
150	170	235	74	235	190	75	120
200	190	265	90	265	220	83	125
250	215	325	100	317	270	106	150
300	215	325	100	362	270		150
350	260	370	125	437	300		180
400	260	370	125	492	300		180
450	260	370	125	570	300		230
500	270	415	130	640	340		280

# **Double acting actuator**



## ◉ Double acting actuator

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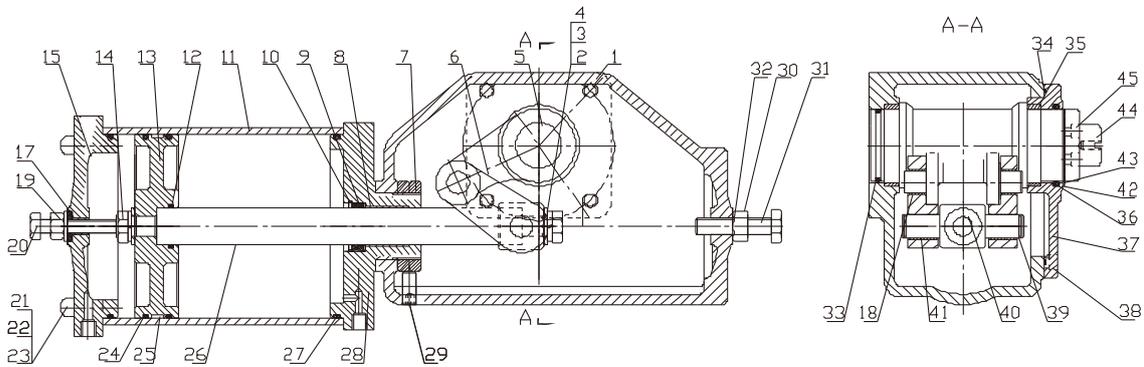
The pneumatic actuator developed and manufactured by Hiton, is a kind of crank arm piston type, compressed air forces piston to move linearly through the cylinder, and linear movement can be transformed into quarter turn rotation through the crank arm. The actuator has a high precision of rotation, small return difference and dead zone and high sensitivity. The actuators are mainly used for quarter turn regulating valves, also because of large range of output torques and complete models which are used in control system of quarter turn on/off valves. It is a multi-functional actuator, which is suitable for almost all range of quarter turn valves.

## ◉ Features

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1. High precision of rotation: All rotation area are equipped with high precision bearings.
2. Long service life: For small size actuators, its cylinder material is aluminum alloy, inside surface with special anti-abrasion treatment, piston rod with hard chromium coated and mirror finish grinding, piston with guided ring and dual sealing design.
3. Strong impact resistance: Crank arm is in integral casting construction which has high strength, good stability and strong impact resistance.
4. Easy to adjust, and large adjustment range: Through the 2 adjusting screws located on 2 sides of the actuator, it is very easy to adjust the stroke of the actuator, in a range between plus 10 degree to minus 10 degree.
5. Excellent safety performance: For single acting pneumatic actuator, it is with spring anti-blowout design; enable the use of actuator becomes safer.
6. Selection can be more flexible, economical and practical: Body and cylinder assembly can be incorporated according to torque requirement, which provide small level difference of output torque while more torque levels. So the selection is more flexible.
7. Achieve quick open/close: Incorporated with pneumatic accessories, it can achieve a quick open or close.
8. With changeable torque output feature, it is closer to the real requirement that valve had been used in service: The output torque at open starting point is the highest, which exceeds the nominal rated output torque, so safety factor is higher.

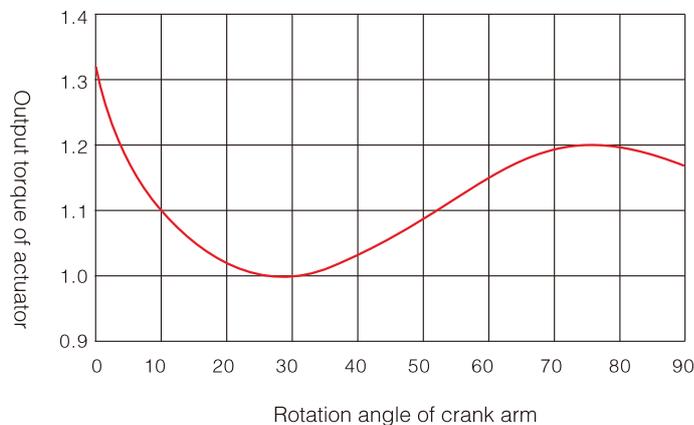
Bill of material for double acting actuator



No.	Part name	Qty	Material	No.	Part name	Qty	Material
23	Bolt	4	45+Zn				
22	Washer	4	Q235	45	Screw	2	Stainless steel
21	Nut	4	35	44	End cover	1	WCB
20	Bolt	1	35	43	Open dial indicator	1	Plastic
19	Nut	1	15	42	Open dial panel	1	Stainless steel
18	Lubricated bearing	2		41	Lubricated bearing	2	
17	Washer	1	Q235	40	Universal axis	1	45
16	Sealing gasket	1	PTFE	39	Spring backup ring	2	65Mn
15	Upper cover	1	WCB/Q235	38	Screw	4	35
14	Bolt	1	25	37	Case cap	1	WCB
13	Piston	1	WCB/Q235	36	O-ring	1	NBR
12	O-ring	1	NBR	35	Lubricated bearing	2	
11	Cylinder	1	AL alloy(250aboveQ235)	34	Waterproof gasket	1	NBR
10	Backup ring	1	Spring steel wire	33	O-ring	1	NBR
9	Y-ring	1	PU	32	Flat gasket	1	Q235
8	Lubricated bearing	1	Compound material	31	Bolt	1	35
7	Round nut	2	15	30	Nut	1	15
6	Tie rod	2	WCB	29	Screw	1	35
5	Crank arm	1	ZG25	28	Lower cover	1	WCB/Q235
4	Washer	2	Q235	27	O-ring	2	NBR
3	Bolt	1	35	26	Piston rod	1	45+Cr
2	Washer	2	25Mn	25	O-ring	2	NBR
1	Case	1	WCB	24	Guide ring	1	PTFE

### Technical data of double acting actuator

Code of actuator	Cylinder diameter(mm)	Cylinder volume(ml)	Max. bore diameter(mm)	Max. input air pressure(MPa)	Working temperature
ZS36-63	63	267	20	0.8	80°C
ZS36-80	80	503	20	0.8	80°C
ZS45-80	80	534	25	0.8	80°C
ZS45-100	100	855	25	0.8	80°C
ZS55-100	100	1052	30	0.8	80°C
ZS55-125	125	1645	30	0.8	80°C
ZS63-160	160	3010	40	0.8	80°C
ZS63-200	200	4710	40	0.6	80°C
ZS80-200	200	5960	60	0.8	80°C
ZS80-250	250	9320	60	0.6	80°C
ZS100-250	250	11775	70	0.8	80°C
ZS100-300	300	16700	70	0.8	80°C
ZS125-300	300	21550	100	0.8	80°C
ZS125-350	350	29330	100	0.8	80°C



### Selection of double acting actuator

This series of actuators are suitable for quarter turn valves, follow the below steps to choose the actuator:

1. Confirm the valve type is belonged to quarter turn valve.
2. Confirm the required valve stem torque.
3. To select a suitable actuator, generally the rated output torque of selected actuator shall be 1.1 to 1.3 times that of valve's stem torque, which also depends on the importance of the valve. If it is required with high reliability for the valve operation, then an actuator with more safety factors shall be selected.
4. Pay special attention to the air supply pressure at jobsite, it is important to select a correct actuator based on the real air supply pressure.

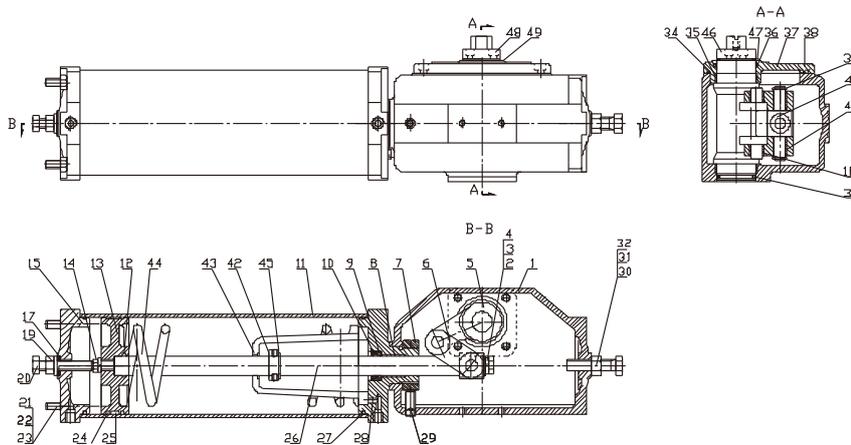
## ○ Output torque data of double acting actuator

Code of actuator	Air supply pressure 3Bar	Air supply pressure 4Bar	Air supply pressure 5Bar	Air supply pressure 6Bar	Air supply pressure 7Bar
ZS36-63	28	38	48	58	68
ZS36-80	45	60	76	91	106
ZS45-80	58	76	96	115	134
ZS45-100	90	120	150	180	210
ZS55-100	108	144	180	216	
ZS55-125	168	224	280	336	392
ZS63-160	292	390	488	585	683
ZS63-200	502	670	838	□	□
ZS80-200	638	850	1064	1276	1489
ZS80-250	996	1328	1660	□	□
ZS100-250	1245	1660	2075	2490	2905
ZS100-300	1797	2396	2995	3594	4193
ZS125-300	2244	2992	3740	4488	5236
ZS125-350	3054	4072	5090	6108	7126

# Single acting actuator

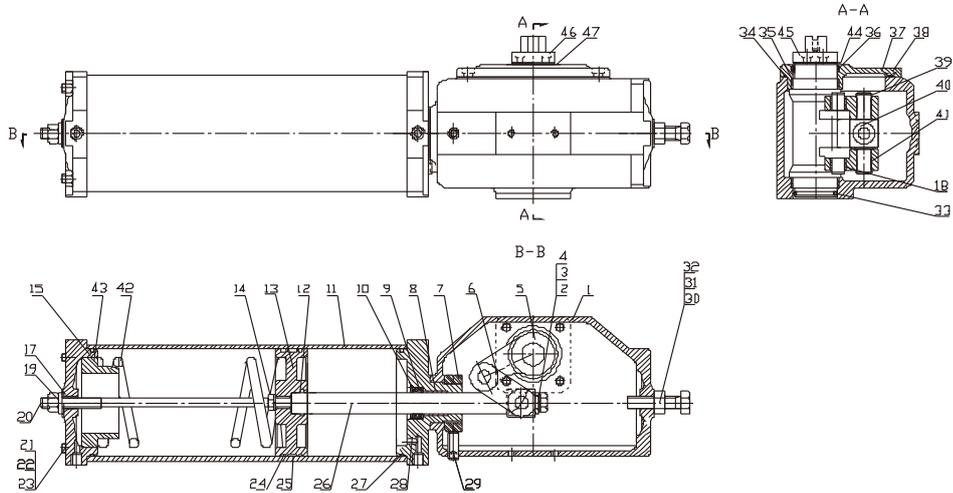
Design of single acting spring return actuator is based on the design structure of double acting actuator. There are 2 different designs : Air Close–Spring Open type and Air Open–Spring Close type. Air Close type is suitable for the services requiring the valve to be opened when air supply is failed or electricity is failed. Air Open type is suitable for the services requiring the valve to be closed when air supply is failed or electricity is failed.

① Single acting with air supplied to open



No.	Part name	Qty	Material	No.	Part name	Qty	Material
25	O-ring	2	NBR				
24	Guide ring	1	PTFE	49	Open dial indicator	1	Stainless steel
23	Bolt	4	45+Zn	48	Screw	2	Stainless steel
22	Washer	4	Q235	47	Open indicator hand	1	Plastic
21	Nut	4	35	46	Crank arm cap	1	WCB
20	Bolt	1	35	45	Spring	1	60Si2MnA
19	Nut	1	15	44	Spring seat	1	45
18	Self lubricated bearing	2		43	Spring cover	1	45
17	Washer	1	Q235	42	Snap ring	1	65Mn
16	Gasket	1	PTFE	41	Self lubricated bearing	2	
15	Upper cap	1	WCB/Q235	40	Universal axis	1	45
14	Bolt	1	25	39	Backup ring	2	65Mn
13	Piston	1	WCB/Q235	38	Screw	4	35
12	O-ring	1	NBR	37	Cover	1	WCB
11	Cylinder	1	ALalloy(250aboveQ235)	36	O-ring	1	NBR
10	Steel wire backup ring	1	Stainless spring steel wire	35	Self lubricated bearing	2	
9	Y-ring	1	PU	34	Waterproof gasket	1	NBR
8	Self lubricated bearing	1	Compound material	33	O-ring	1	NBR
7	Round nut	2	15	32	Washer	1	Q235
6	Connecting rod	2	WCB	31	Bolt	1	35
5	Crank arm	1	ZG25	30	Nut	1	15
4	Washer	2	Q235	29	Screw	1	35
3	Bolt	1	35	28	Lower cap	1	WCB/Q235
2	Washer	2	25Mn	27	O-ring	2	NBR
1	Body	1	WCB	26	Piston rod	1	45+Cr

Single acting with air failed to close



No.	Part name	Qty	Material	No.	Part name	Qty	Material
25	O-ring	2	NBR				
24	Guide ring	1	PTFE				
23	Bolt	4	45+Zn				
22	Washer	4	Q235	47	Open dial indicator	1	Stainless steel
21	Nut	4	35	46	Screw	2	Stainless steel
20	Bolt	1	35	45	Open indicator hand	1	Plastic
19	Nut	1	15	44	Crank arm cover	1	WCB
18	Self lubricated bearing	2		43	Spring	1	60Si2MnA
17	Washer	1	Q235	42	Spring seat	1	45
16	Gasket	1	PTFE	41	Self lubricated bearing	2	
15	Upper cap	1	WCB/Q235	40	Universal axis	1	45
14	Bolt	1	25	39	Backup ring	2	65Mn
13	Piston	1	WCB/Q235	38	Screw	4	35
12	O-ring	1	NBR	37	Cover	1	WCB
11	Cylinder	1	AL alloy(250 above Q235)	36	O-ring	1	NBR
10	Backup ring	1	Stainless spring steel wire	35	Self lubricated bearing	2	NBR
9	Y-ring	1	PU	34	Waterproof gasket	1	NBR
8	Self lubricated bearing	1	Compound material	33	O-ring	1	Q235
7	Round nut	2	15	32	Washer	1	35
6	Connecting rod	2		31	Bolt	1	15
5	Crank arm	1	ZG25	30	Nut	1	35
4	Washer	2		29	Screw	1	WCB/Q235
3	Bolt	1	35	28	Lower cap	1	NBR
2	Washer	2	25Mn	27	O-ring	2	45+Cr
1	Body	1	WCB	26	Piston rod	1	

Technical data of single acting actuator

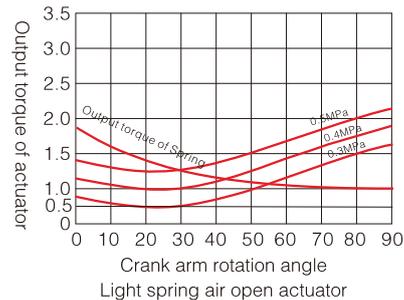
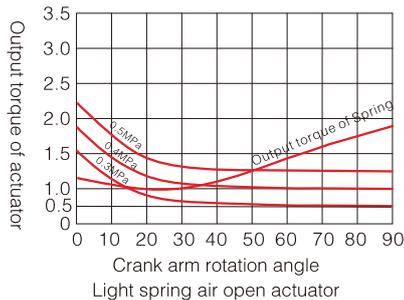
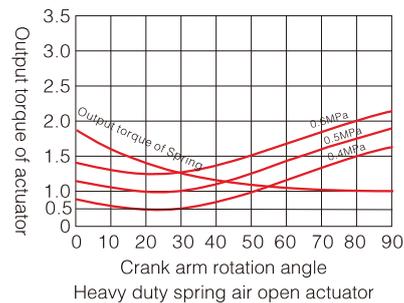
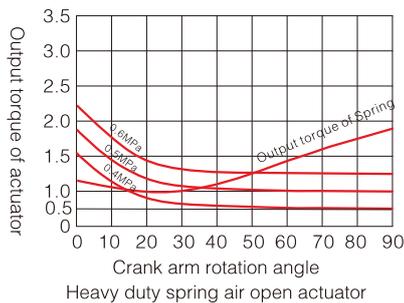
Code of actuator	Cylinder diameter(mm)	Cylinder volume(ml)	Max. bore diameter(mm)	Max. output air pressure(MPa)	Working temperature
ZDS45/ZDSK45-100	100	2120	25	0.8	80°C
ZDL45/ZDLK45-100	100	2276	25	0.8	80°C
ZDS55/ZDSK55-125	125	3925	30	0.8	80°C
ZDL55/ZDLK55-125	125	3740	30	0.8	80°C
ZDS63/ZDSK63-160	160	7235	40	0.8	80°C
ZDL63/ZDLK63-160	160	8440	40	0.8	80°C
ZDS63/ZDSK63-200	200	12870	40	0.8	80°C
ZDL63/ZDLK63-200	200	13500	40	0.8	80°C
ZDS80/ZDSK80-250	250	23300	60	0.8	80°C
ZDL80/ZDLK80-250	250	24770	60	0.8	80°C
ZDS80/ZDSK80-300	300	35325	60	0.8	80°C
ZDL80/ZDLK80-300	300	38150	60	0.8	80°C
ZDS100/ZDSK100-300	300	38150	70	0.6	80°C
ZDL100/ZDLK100-300	300	40978	70	0.8	80°C
ZDS125/ZLSK125-300	300	49455	100	0.8	80°C
ZDL125/ZDLK125-300	300	52980	100	0.8	80°C
ZDS125/ZDSK125-350	350	67315	100	0.8	80°C
ZDL125/ZDLK125-350	350	72120	100	0.8	80°C

Note: ZDS series actuator presents heavy duty Spring Air Close single acting actuators, suitable for those systems where require air supply pressure  $\geq 0.5$ MPa.

ZDL series actuator presents light duty Air Close single acting actuators, suitable for those systems where require air supply pressure  $\geq 0.4$ MPa.

ZDSK series actuator presents heavy duty Spring Air Open single acting actuators, suitable for those systems where require air supply pressure  $\geq 0.4$ MPa.

ZDL series actuator presents light duty Spring Air Open single acting actuators, suitable for those systems where require air supply pressure  $\geq 0.4$ MPa.



## ◎ Selection of actuator

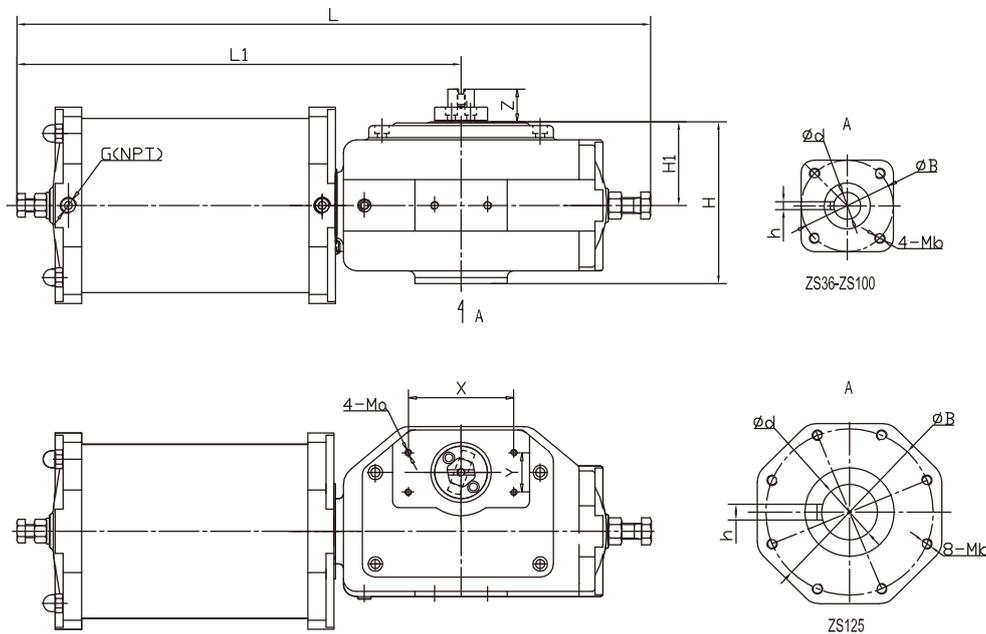
This series of actuators are suitable for quarter turn valves with spring return system, follow the below steps to select an actuator:

1. Ensure the valve is subjected to quarter turn type;
2. If valve is required to be closed when air supply is failed, then should select Air Open actuator; if valve is required to be opened when air is failed, then should select Air Close actuator.
3. Confirm operating torque of the valve;
4. Referring to the table of rated output torque of springs to select a suitable actuator, generally the rated output torque of selected actuator shall be 1.1 to 1.3 times that of valve's stem torque, which also depends on the importance of the valve. If it is required with high reliability for the valve operation, then an actuator with more safety factors shall be selected.
5. Pay special attention to the air supply pressure at jobsite when choosing actuators, it is important to select a correct one based on the real air supply pressure.

## ◎ Output torque table of actuator

Code of actuator	Output torque of spring	Air supply pressure 3Bar	Air supply pressure 4Bar	Air supply pressure 5Bar	Air supply pressure 6Bar	Air supply pressure 7Bar
ZDL45/ZDLK45-100	45	24	54	84	90	120
ZDS45/ZDLS45-100	60		30	60		
ZDL55/ZDLK55-125	86	46	102	158	170	228
ZDS55/ZDSK55-125	115		57	115		
ZDL63/ZDLK63-160	160	86	194	300	245	430
ZDS63/ZSSK63-160	214		107	214		
ZDL63/ZDLK63-200	250	134	302	470	503	670
ZDS63/ZDSK63-200	335		168	335		
ZDL80/ZDLK80-250	500	266	600	932	1000	1330
ZDS80/ZDSK80-250	665		332	665		
ZDL80/ZDLK80-300	720	383	863	1342	1438	1917
ZDS80/ZDSK80-300	960		480	958		
ZDL100/ZDLK100-300	900	480	1080	1680	1800	2400
ZDS100/ZDSK100-300	1200		600	1200		
ZDL125/ZLSK125-300	1125	600	1350	2100	2250	3000
ZDS125/ZDSK125-300	1500		750	1500		
ZDL125/ZDLK125-350	1530	820	1835	2850	3060	4080
ZDS125/ZDSK125-350	2040		1020	2040		

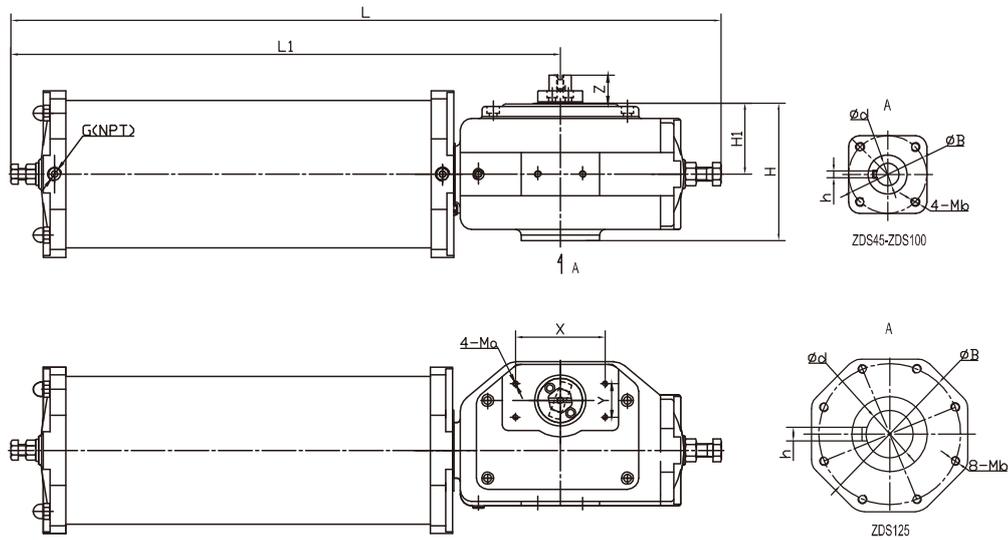
◉ Outline of double acting actuator



◉ Dimension table of double acting actuator

Code of actuator	L	L1	H	H1	Z	X	Y	Ma	φ B	Mb	φ d	h	G (NPT)
ZS36-63	390	270	115	59	26	80	30	M6	70	4-M8	φ 16	5	1/4
ZS36-80	395	275	115	59	26	80	30	M6	70	4-M8	φ 20	6	
ZS45-80	440	296	124	64	26	80	30	M6	70	4-M8	φ 16	5	
ZS45-100	445	300	124	64	26	80	30	M6	70	4-M8	φ 20	6	
ZS55-125	507	343	129	67	26	80	30	M6	102	4-M10	φ 20 φ 30	6	
ZS63-160	617	418	164	83	26	130	30	M6	125	4-M12	φ 30 φ 35 φ 40	8 10 12	
ZS63-200	625	426	164	83	26	130	30	M6	125	4-M12			
ZS80-200	742	502	198	100	26	130	30	M6	140	4-M16	φ 40 φ 45 φ 50 φ 55 φ 60	12 14 14 16 18	3/8
ZS80-250	750	510	198	100	26	130	30	M6	140	4-M16			
ZS100-250	900	605	251	125	26	130	30	M6	165	4-M20	φ 50 φ 55 φ 60	14 16 18	3/8
ZS100-300	900	605	251	125	26	130	30	M6	165	4-M20	φ 60 φ 65 φ 70	18 18 20	
ZS125-300	1150	758	300	147	26	130	30	M6	254	8-M16	φ 60 φ 70 φ 80	18 20 22	3/8
ZS125-350	1155	763	300	147	26	130	30	M6	254	8-M16	φ 80 φ 90 φ 100	22 25 28	

○ Outline of single acting actuator



○ Dimension table of single acting actuator

Code of actuator	L	L1	H	H1	Z	X	Y	Ma	φ B	Mb	φ d	h	G(NPT)
ZDL45/ZDLK45-100	620	465	124	64	26	80	30	M6	70	4-M8	φ 16	5	1/4
ZDS45/ZDLS45-100	600	445	124	64	26	80	30	M6	70	4-M8	φ 20	6	1/4
ZDL55/ZDLK55-125	750	586	129	67	26	80	30	M6	102	4-M10	φ 20	6	1/4
ZDS55/ZDSK55-125	694	530	129	67	26	80	30	M6	102	4-M10	φ 25	8	1/4
ZDL63/ZDLK63-160	910	710	164	83	26	130	30	M6	125	4-M12	φ 30	8	3/8
ZDS63/ZSSK63-160	855	655	164	83	26	130	30	M6	125	4-M12	φ 35	10	3/8
ZDL63/ZDLK63-200	930	730	164	83	26	130	30	M6	125	4-M12	φ 40	12	3/8
ZDS63/ZDSK63-200	865	665	164	83	26	130	30	M6	125	4-M12	φ 40	12	3/8
ZDL80/ZDLK80-250	1120	883	198	100	26	130	30	M6	140	4-M16	φ 40	12	3/8
ZDS80/ZDSK80-250	1070	833	198	100	26	130	30	M6	140	4-M16	φ 45	14	3/8
ZDL80/ZDLK80-300	1180	940	198	100	26	130	30	M6	140	4-M16	φ 50	14	3/8
ZDS80/ZDSK80-300	1100	860	198	100	26	130	30	M6	140	4-M16	φ 55	16	3/8
ZDL80/ZDLK80-300	1100	860	198	100	26	130	30	M6	140	4-M16	φ 60	14	3/8
ZDL100/ZDLK100-300	1360	1065	251	125	26	130	30	M6	165	4-M20	φ 40	12	3/8
ZDS100/ZDSK100-300	1260	965	251	125	26	130	30	M6	165	4-M20	φ 50	18	3/8
ZDL125/ZLSK125-300	1750	1360	300	147	26	130	30	M6	254	8-M16	φ 60	18	3/8
ZDS125/ZDSK125-300	1600	1210	300	147	26	130	30	M6	254	8-M16	φ 70	20	3/8
ZDL125/ZDLK125-350	1770	1380	300	147	26	130	30	M6	254	8-M16	φ 80	22	1/2
ZDS125/ZDSK125-350	1620	1230	300	147	26	130	30	M6	254	8-M16	φ 90	25	1/2
ZDS125/ZDSK125-350	1620	1230	300	147	26	130	30	M6	254	8-M16	φ 100	28	1/2

## Selection of Regulating valve

### ◉ Procedure of selection of Regulating valve

#### 1. Selection of Regulating valve

There are many categories of regulating valves. Normal categories include one way one seat type, one way two seats, angle type, diaphragm type, small flow type, 3 way type, V-ball type, butterfly type, Sleeve type, ball type, etc. The following aspects shall be considered when specifically selected.

(1) Construction of valve core

Mainly considering according to the selected flow characteristics and imbalanced force and other factors.

(2)Wear resistance

When fluid medium is suspension with high concentration abrasiveness, the internal materials of valve have to be hard.

(3) Corrosion resistance

Because medium is with corrosiveness, so try to select a valve with simple construction.

(4) Temperature and pressure of medium

When the temperature and pressure of medium is high and greatly variable, the material of core and seats of valve shall be selected with good temperature resistance and good pressure resistance.

(5) Prevention of cavitation and flash

Cavitation and flash effect only occur on liquid medium. During the actual production, flash and cavitation will create vibration and noises, the service life of valves will be reduced, so flash and cavitation should be avoid when selecting a valve.

#### Selection of actuator for regulating valve

In order to ensure a normal operation for regulating valve, the assembled actuator shall be able to have an enough output torque to operate the valve and ensure high level seal.

Normally, it is without spring return for double acting pneumatic, hydraulic and electric actuators. The magnitude of force has nothing to do with its moving direction, so, the key point to select an actuator is to know its max. output torque and revolution moment. As for single acting pneumatic actuator, its output torque is related to the opening degree of valve, also some forces produced by regulating valve will affect its moving characteristic. So it is required to establish force balance on opening range of the regulating valve.

#### Confirmation of actuator type

After the output torque of actuator is confirmed, selecting relevant actuator according to the demand of craft environment, if explosion proof is required in the field, it is recommended to select pneumatic actuator. Considering the aspect of energy saving, it is recommended to select electric actuator. If high precision of regulation is required, it is recommended to select hydraulic actuator, such as speed regulation of transparent machine in power generation plant, temperature regulation and control of catalytic device reactor in refinery, etc.

#### Selection of working type of regulating valve

Working types of regulating valve is only available when it is assembled with pneumatic actuator. Its working types are formed through the positive and negative effects of both actuator and valve. There are 4 types: positive-positive (Air close type), positive-negative (Air open type), negative-positive (Air open type), negative-negative (Air close type). Through these 4 types, the working types of regulating valves can be formed into 2 types(Air open and Air close). The following 3 aspects have to be considered to select a working type of regulating valve:

a) Safety of process production

b) Medium characteristic

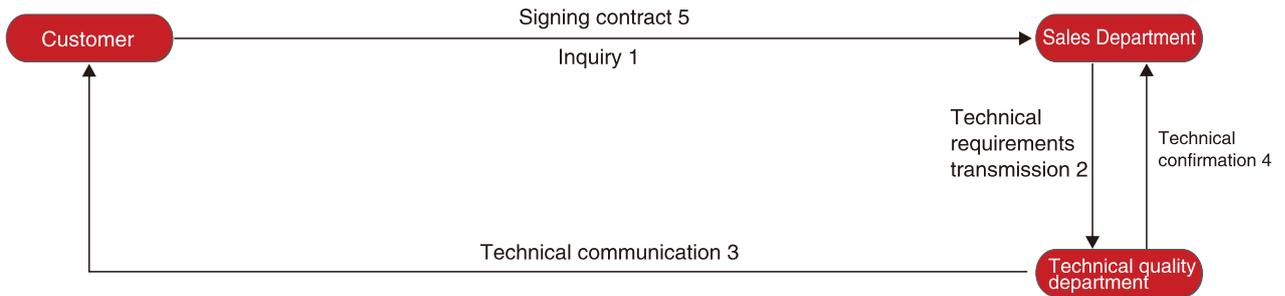
c) ensure quality of product to minimize loss of economy.

#### 2.Detailed technical data to select regulating valve

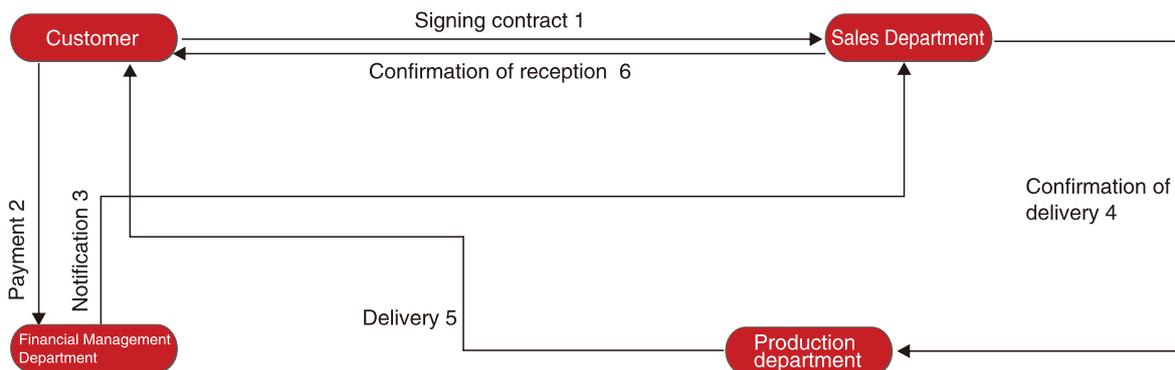
1. Fluid category
2. Fluid temperature
3. Fluid viscosity
4. Fluid gravity
5. Flow capacity required(max. and min.)
6. Valve inlet pressure(max. and min.)
7. Valve outlet pressure(max. and min.)
8. Pressure drop at normal flow condition
9. Pressure drop at closing condition
10. Max. allowable noise level
11. Pipe size and wall thickness of inlet and outlet
12. Body material
13. Instrument signal (4-20mA 0-10V, etc)
14. Valve caliber (m)
15. Body construction
16. Required actuator size (The output torque of actuator is 1.2 to 1.5 times that of of that valve, which is the optimum incorporation.)
17. Drive energy: Electric, pneumatic, electro-hydraulic
18. Other required process condition(For example: Anti-explosion, etc.)

# Service flow chart

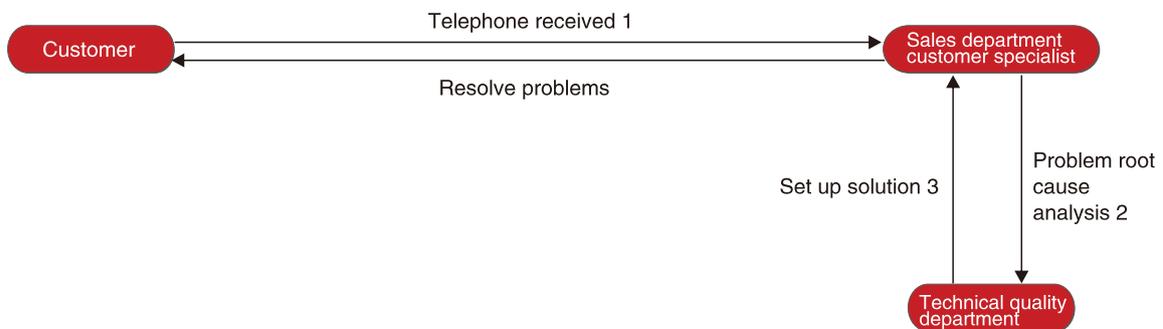
## inquiry, ordering and technical communication flow chart



## Delivery flow procedure



## After service flow chart



## Product Code:

Note: Product code is formed by 7 units, the 1st unit "Valve type" is separated with latter unit "Detailed valve annotation".

Valve type → Actuator type Control type Nominal pressure Valve size Seal type Body material Related product

### 1<sup>st</sup> unit Valve type

VF: V type flanged ball valve  
 VD: V type wafer ball valve  
 OF: O type floating ball valve  
 OG: O type trunnion mounted ball valve  
 DC: Common knife gate valve  
 DT: Through conduit knife gate valve  
 DF: Square port knife gate valve

ZHLS: Small size single seat regulating valve  
 ZHTS: Upper guided single seat regulating valve  
 ZHCB: Sleeve 2 seats regulating valve  
 ZHSG: Sleeve single seat regulating valve  
 ZHCN: Low noise single sleeve guided single seat regulating valve  
 WD: Wafer butterfly valve  
 WF: Flanged butterfly valve

### 2<sup>nd</sup> unit Actuator type

1. Actuators related to V type ball valve, O type ball valve, butterfly valves: ZS Piston type double acting; ZDS Piston type heavy duty spring return single acting(Air close); ZDSK Piston heavy duty spring return single acting(Air open); ZDL Piston light duty spring return single acting(Air close), ZDLK Piston light duty spring return single acting(Air open).  
 H: Worm gearbox type, AL: Electric type J: Fine small type double acting pneumatic actuator JD: Fine small type single acting pneumatic actuator  
 2. Actuators related to knife gate valve, through conduit knife gate valve and square port knife gate valve:  
 A: Inside screw stem with manual operation  
 Q: pneumatic piston type  
 QD: Pneumatic piston single acting type  
 FD: Electric operation  
 S: Bevel gearbox operation  
 3. Actuators related to regulating valves.  
 ZHAD: Pneumatic diaphragm air close type actuator  
 ZHAR: Pneumatic diaphragm air open type actuator  
 HG: Piston type double acting actuator  
 PSL: Electronic actuator

### 3<sup>rd</sup> unit Control type

1.E: 2-way on/off type  
 2.T: Proportion regulating type

### 4<sup>th</sup> unit Nominal pressure

Nominal pressure rating of Chinese standard and DIN standard is 10 times of rated pressure rating in MPa, pressure rating of API standard will be 150lbs, 300lbs, etc.

### 5<sup>th</sup> unit Valve size

1Valve size:Standard size will be used for Chinese standard and DIN standard, unit will be mm.  
 Unit of Imperial standard is inch.

### 6<sup>th</sup> unit Seal type

F: Teflon soft seal Y: Hard seal E: EPDM rubber seal Q: NBR rubber seal

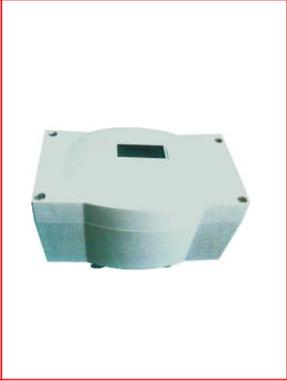
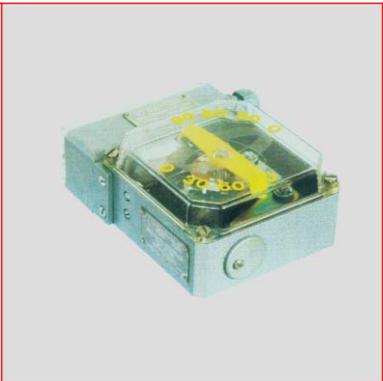
### 7<sup>th</sup> unit Body material

1. B C: WCB 2. P: CF8 3. M: CF8M 4. L: CF3M

### 8<sup>th</sup> unit Related product

G: High temperature products D: Low temperature products W: Bellow seal products

◦ Accessories

Positioner			
			
Metso NE900 Series	Metso NE700 Series	Positioner	ABB Positioner
			
YAMATAKE	SOMAS	YTC positioner	
			
Fine small pneumatic actuator	Fine small electric actuator	Worm gearbox	

**Solenoid valve**

