User Manual

R100

Low-temperature Ball Valve

Chongqing Chuanyi Control Valve Co., Ltd.

Foreword

This Manual is applicable to the low-temperature ball valve composed of AT and AW pneumatic actuators and low-temperature ball valve body components. The models include R100-200, R100-201, R100-210, R100-211, R100-300 and R100-301.

Users (customers) are supposed to read the Manual carefully and fully understand it before use. In addition, the equipment operators and maintenance personnel should keep the Manual properly for reference when necessary after the equipment is normally started.

The main contents of the Manual include structure, operation principle, main technical parameters and performance, acceptance, handling and storage, unpacking, installation, start-up preparation and start-up, daily inspection and regular inspection, fault/abnormality identification methods and measures, disassembly and assembly.

With continuous research on and improvement of the control valve, the contents of the Manual may be inconsistent with the products purchased. Please get in touch with the following department at any time for any doubt about the products purchased or the Manual.

Sales Department: Tel.: 023-67032525, 67032526 and 67032527
Fax: 023-67032523

Safety Precautions

To ensure acceptance, handling, storage, installation, start-up preparation, start-up, and maintenance of the control valves in a safe manner, correct operation and periodic maintenance are required. Please read the safety precautions in the Manual carefully and understand the safety precautions completely before operation.

This Manual and safety precautions mainly introduce how to use R100 low-temperature ball valve to adjust the pressure, temperature and level of fluid and control the on-off of fluid. If the operation is not performed according to the operation method described in the Manual, the user should be responsible for the safety.

The safety precautions that must be followed in the Manual are indicated as follows, including warnings, caution titles, and descriptions.

Warning

Casualty accidents may occur if there is non-conformance with precautions.

Caution

Damage and fault of control valve and other equipment may occur in case of non-conformance to precautions.

1. Structure and Action Principle

1-1. AT actuator

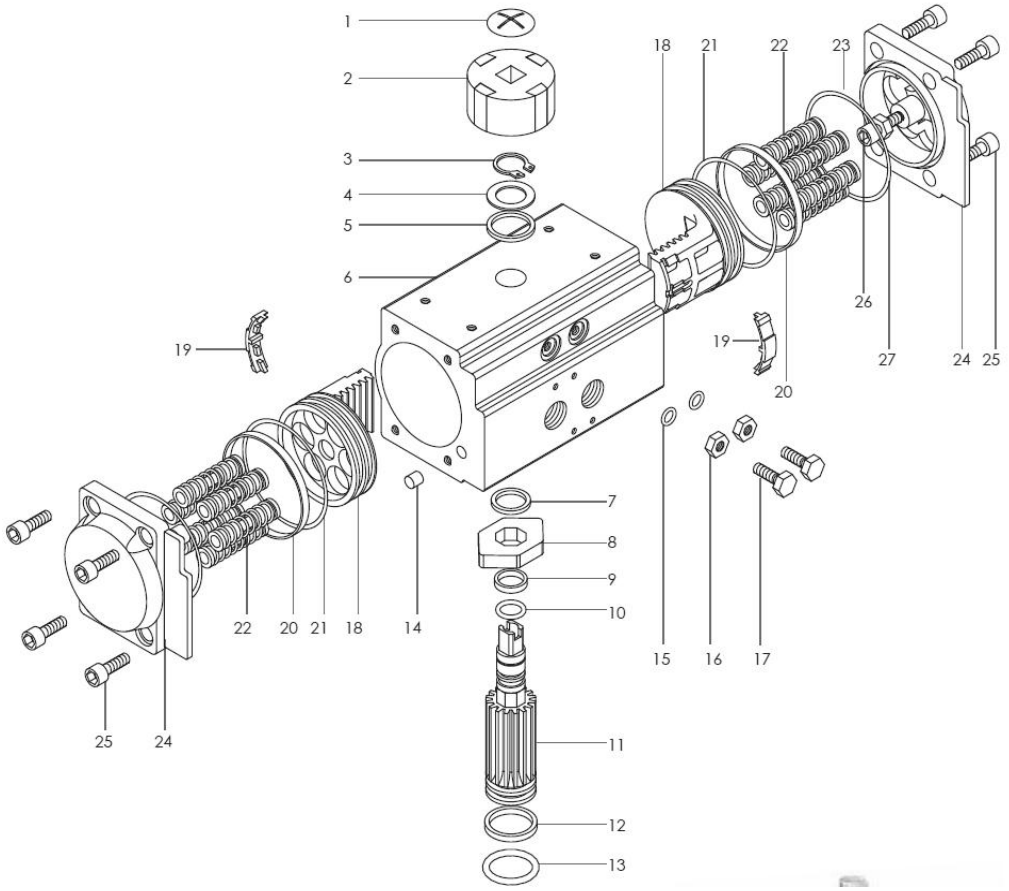
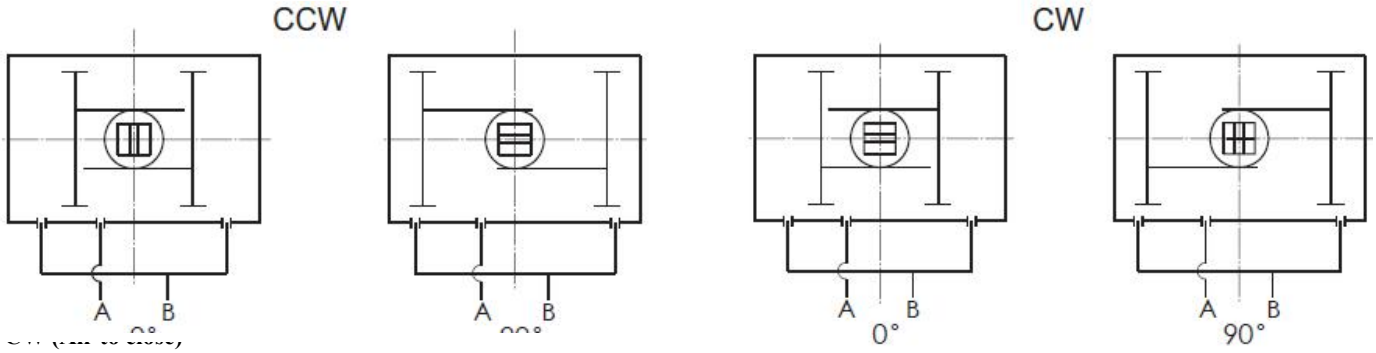


Fig. 1 Structure of AT Actuator

No.	Description	No.	Description
1	Indicator screw	15	Adjusting screw O-ring
2	Indicator	16	Adjusting screws and nuts
3	Circlip	17	Adjusting screw bolt
4	Washer	18	Piston
5	Outer gasket	19	Piston guide
6	Cylinder body	20	Piston bearing
7	Inner gasket	21	Piston O-ring
8	Cam	22	Spring
9	Upper shaft bearing	23	End cover O-ring
10	Upper shaft O-ring	24	End cover
11	Gear shaft	25	End cover screw bolt
12	Lower shaft bearing	26	Limit screw bolt
13	Lower shaft O-ring	27	Limit screw bolt
14	Plug		

Working principle

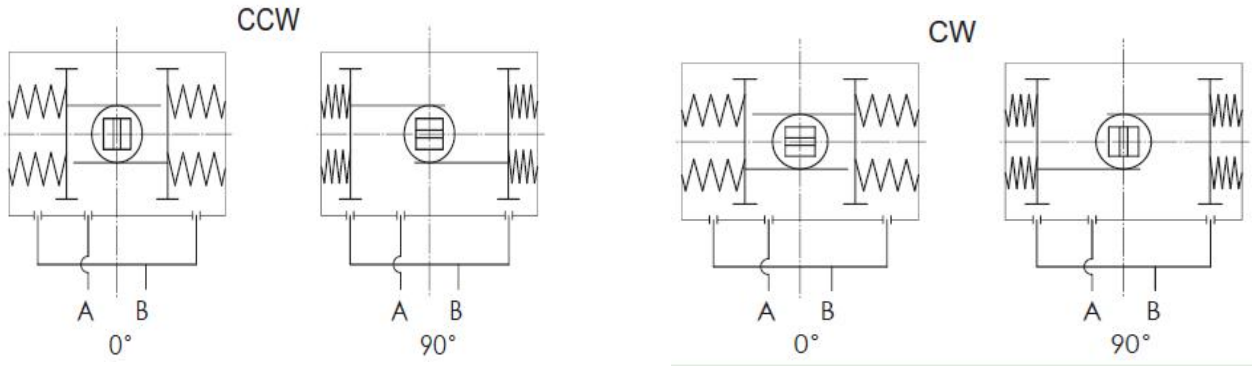
Double-acting actuator



When air enters from port A, the compressed air pushes the piston to move outwards, the output shaft of the actuator rotates clockwise (0°→90°), and air exits from port B.

When air enters from port B, the compressed air pushes the piston to move inward, the output shaft of the actuator rotates counterclockwise (90°→0°), and air exits from port A.

Single-acting actuator



CCW (air to open)

When air enters from port A, compressed air overcomes the spring force and pushes the piston to move outward, the output shaft of the actuator rotates counterclockwise (0°→90°), and air exits from port B;

When the actuator loses air, the piston moves inward under the action of spring force, the output shaft of the actuator rotates clockwise (90°→0°), and port A exhausts.

CW (Air to close)

When air enters from port B, the compressed air overcomes the spring force and pushes the piston to move outward, the output shaft of the actuator rotates clockwise (0°→90°), and port B exhausts;

When the actuator loses air, the piston moves inward under the action of spring force, the output shaft of the actuator rotates counterclockwise (90°→0°), and port A exhausts.

1-2. AW actuator

(1) AW double-acting actuator

Structure: It is mainly composed of box body, piston, shifting fork, shaft, cylinder, long double-headed screw, sealing ring, slider and other parts. See Fig. 2 for the structure.

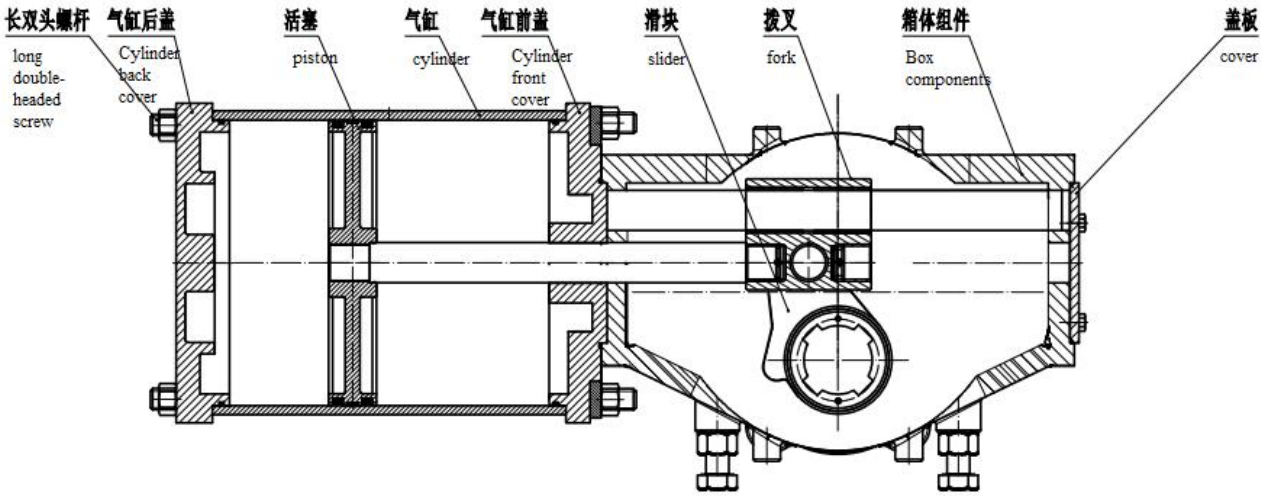


Fig. 2 Structure Diagram of AW Series Double-acting Actuator

Working principle: When the air source is connected to the (two) right (left) air inlets of the actuator cylinder, the air source enters the right (left) cylinder and pushes the piston to move leftward (rightward). The piston drives the piston rod to move together, and the piston rod pulls the fork to rotate counterclockwise (clockwise), thus driving the main shaft to rotate counterclockwise (clockwise) and output torque. The main shaft remains in place after a loss of pressure. If you want to reset the spindle, just ventilate from the left (right) air inlet.

(2) AW single-acting pneumatic actuator

Structure: It is mainly composed of spring cylinder cover, outer spring, inner spring, spring cylinder, piston, shifting fork, piston rod, cylinder block, manual parts and other components, as shown in Fig. 3 and Fig. 4.

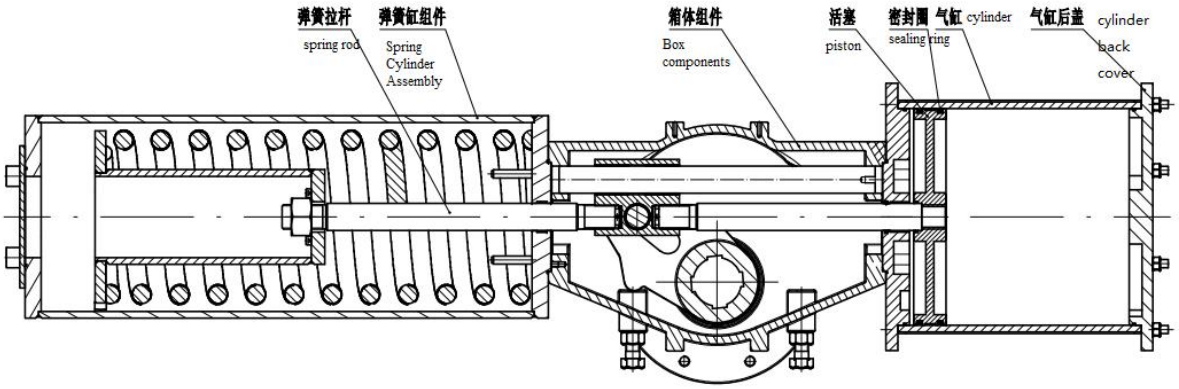


Fig. 3 Structure Diagram of AW Series Single-acting Actuator

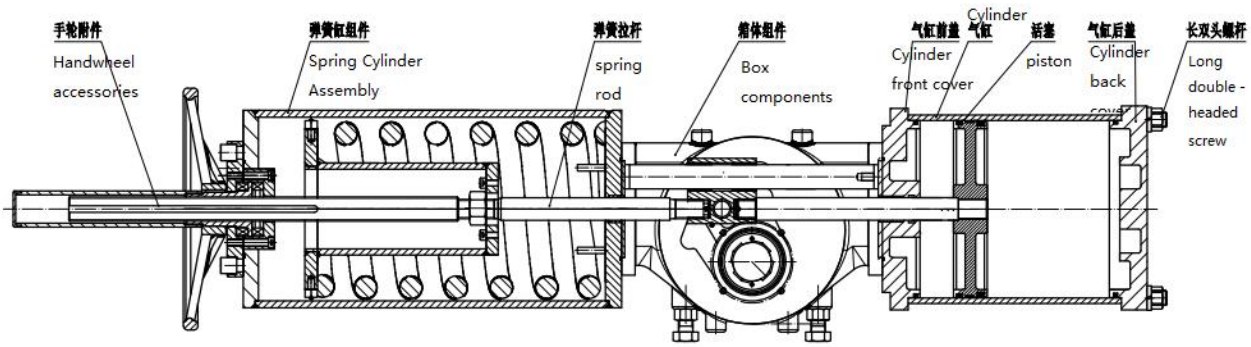


Fig. 4Structure Diagram of AW Series Single-acting Actuator with Handwheel

Working principle: When the air source is connected to the (two) right air inlets of the actuator, the air source enters the right (left) cylinder block and pushes the piston to move leftward (rightward). The piston drives the piston rod to move together, and the piston rod pulls the fork

to rotate counterclockwise (clockwise), thus driving the main shaft to rotate counterclockwise and output torque. At this time, the left (right) spring is compressed. When the right (left) cylinder loses pressure, the spring returns to its original position and the spindle also returns clockwise (counterclockwise).

1-3. R100 valve body assembly

R100 low-temperature ball valve is a cut-off ball valve specially developed by our company for low-temperature and ultra-low temperature working conditions such as LNG terminal, LNG storage tank and transportation, air separation unit, petrochemical tail gas separation equipment, rectisol, liquid oxygen, liquid nitrogen and other cryogenic storage tanks and tankers.

The structure of valve components is shown in the following figure:

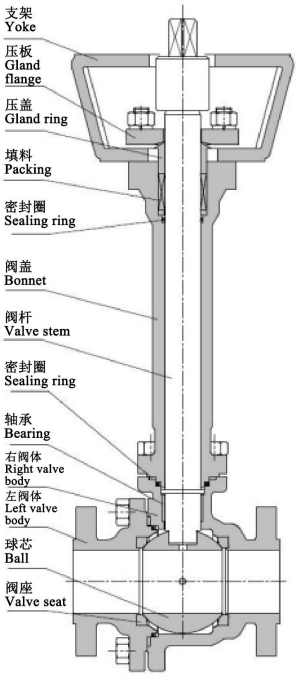


Fig. 5-1 Floating Low-temperature Ball Valve

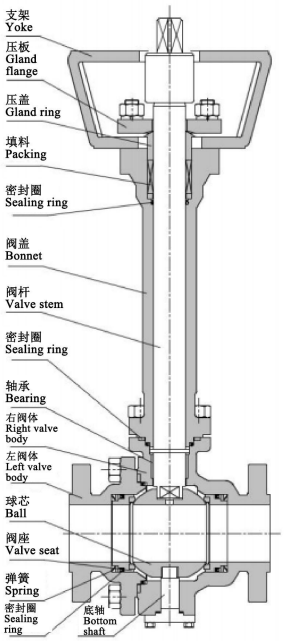


Fig. 5-2 Fixed Low-temperature Ball Valve

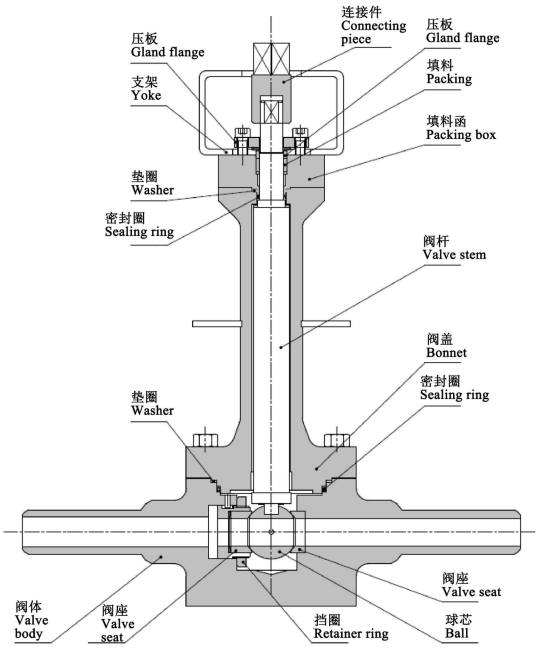


Fig. 5-3 Top-entry Floating Low-temperature Ball Valve

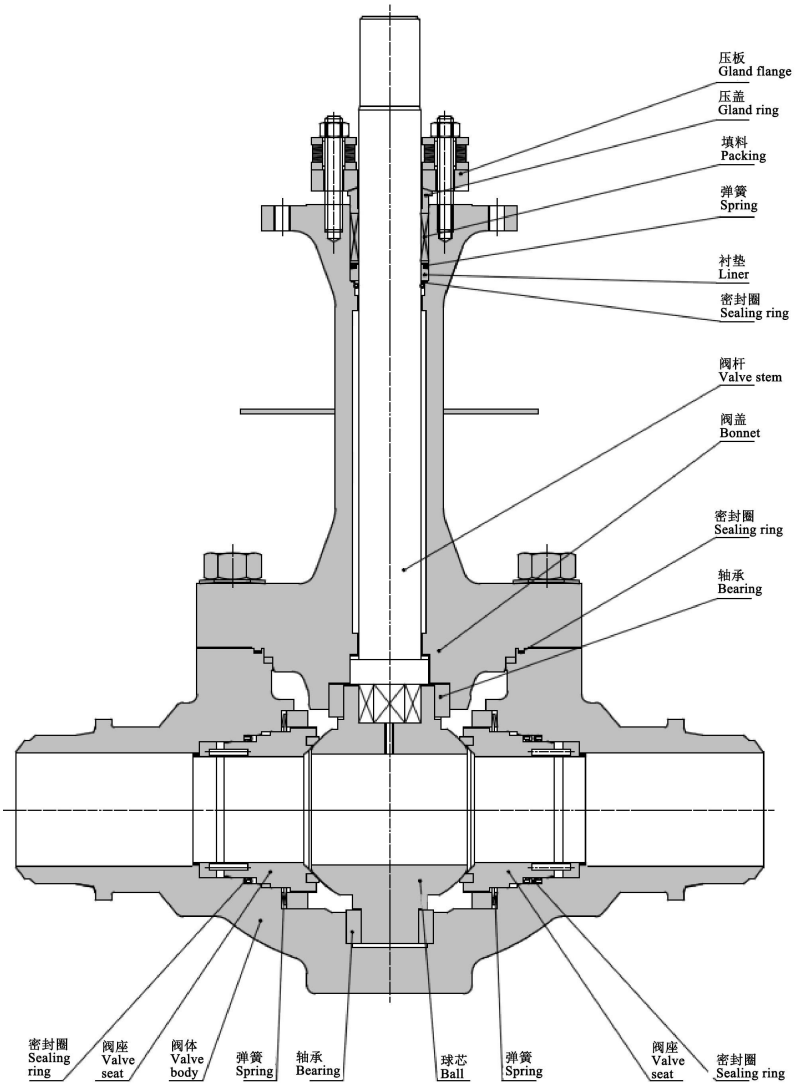


Fig. 5-4 Top-entry Fixed Ball Low-temperature Ball Valve

Note: The main air source pipeline provided on site shall not be less than G1/2" to ensure the normal use of the valve.

R100 LNG low-temperature ball valve is composed of pneumatic piston actuator and ball valve body components through yoke and connecting sleeve. The valve body components of ball valves are mainly composed of left and right valve bodies, balls, valve seats, valve stems and other parts. If equipped with explosion-proof solenoid valve, explosion-proof travel switch and other accessories, it can be used in explosion-proof occasions. After being equipped with pneumatic accessories or spring return mechanism, the ball valve can be automatically in a fully open or closed position when the air source fails, thus ensuring the safe operation of the system.

2. Main Technical Parameters

●Valve body

Form	Straight through cast globe valve
Nominal diameter	1/2″(15)、3/4″(20)、1″(25)、1¼″(32)、1½″(40)、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)

Nominal pressure	PN 16, 20, 25, 40, 50, 63, 100, 110, 150, 160, 260Class 150, 300, 600, 900, 1500
Connection type	Flange type: FF, RF, MFM, RJ, BW Flange standard: ASMEB16.5; JIS B2201; HG/T 20592; HG/T 20615; JB/T 79.1; JB/T79.2; GB/T9112
Material	Refer to Table 1
Packing	Graphite packing

●Components in valve

Type of plug	Ball valve core
Flow characteristics	Quick-opening
Material	Refer to Table 1

●Actuator

Model No. / Specification	Pneumatic actuator	
	AT	AW
Air supply pressure	400～700kPa	
Air source interface	NPT1/8″、NPT 1/4″、NPT 3/8″、NPT 1/2″、NPT 3/4″	
Travel angle	90° 90°	
Ambient temperature	Standard type -20～+80°C High temperature type -15～+120°C Low-temperature type -40～+80°C	
Accessories	Solenoid valve, air filter pressure reducer, lock-up valve, travel switch, valve position transmitter, handwheel mechanism, etc.	

●Material combination of valve body and trim parts

Table 1A Floating Ball Type (R100-200, R100-210, R100-300)

·HT: heat treatment ·HF: surface hardening

Valve body material		A351-CF8，A351-CF8M，A351-CF3M，A182-F304，A182-F316
Ball	Material	304/316/316L
	Handling	HF
Valve stem	Material	S20910
	Handling	HT
Valve seat	Material	PCTFE/304/316/316L
	Handling	/HF
	Stainless steel filter regulator body	-196℃~+150℃
Allowable leakage of valve seat		Refer to provisions of BS6364
Valve sealing direction		One-way seal

Table 1B Fixed Ball Type (R100-201, R100-211, R100-301)

Valve body material		A351-CF8，A351-CF8M，A351-CF3M，A182-F304，A182-F316
Ball	Material	304/316/316L
	Handling	HF
Valve stem	Material	S20910
	Handling	HT
Valve seat	Material	PCTFE/304/316/316L
	Handling	/HF
	Stainless steel filter regulator body	-196℃~+150℃
Allowable leakage of valve seat		Refer to provisions of BS6364
Valve sealing direction		Two-way sealing

●**Dimensions and weight**

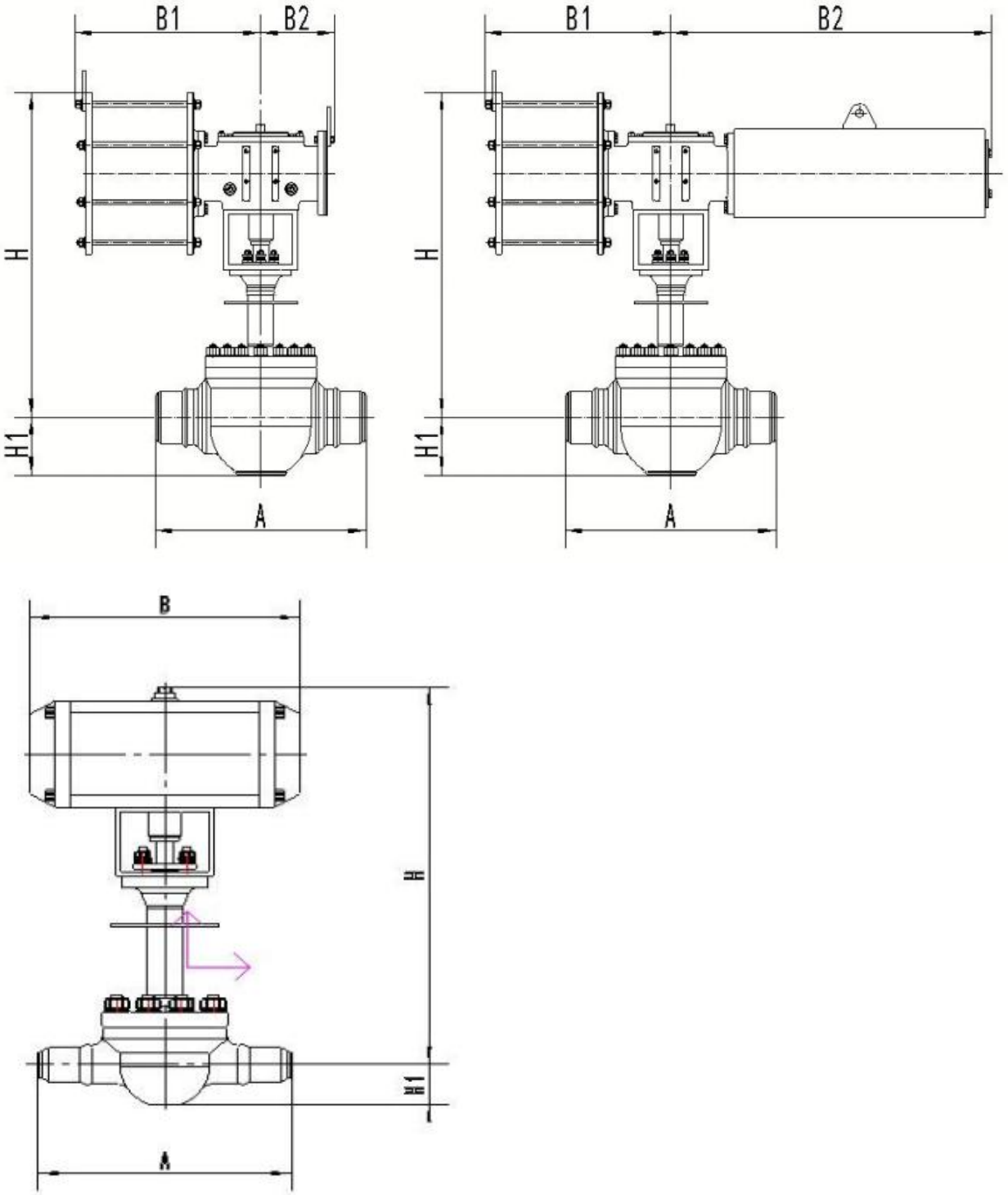


Fig. 6-1 Overall Dimensions of R100 Top-entry Fixed Ball Valve with AW and AT Pneumatic Actuators (R100-300, R100-301)

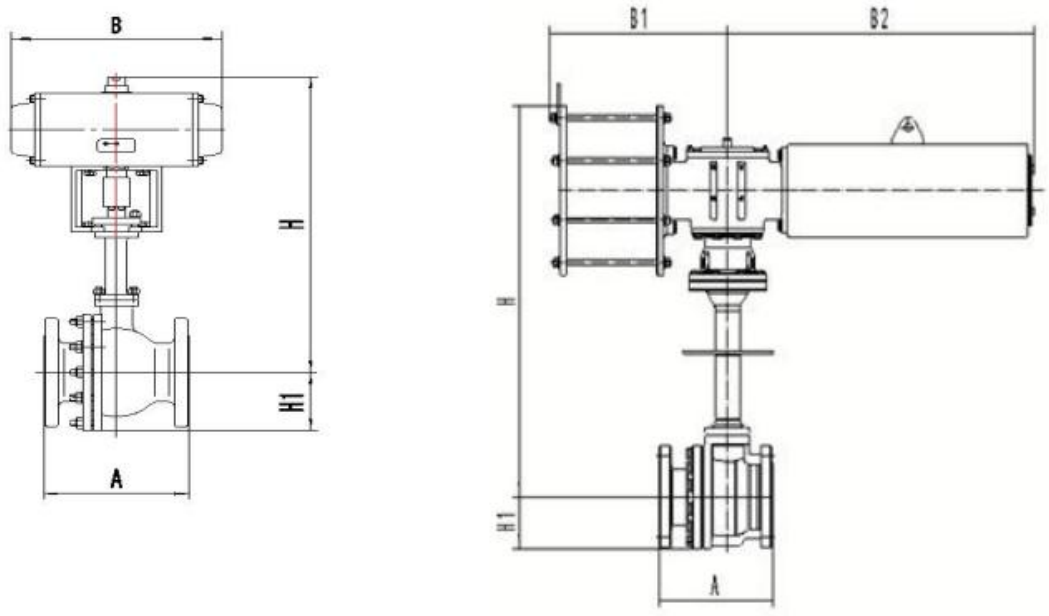


Fig. 6-2 R100 Standard Floating Ball Valve with AW and AT Pneumatic Actuators (R100-200, R100-210)

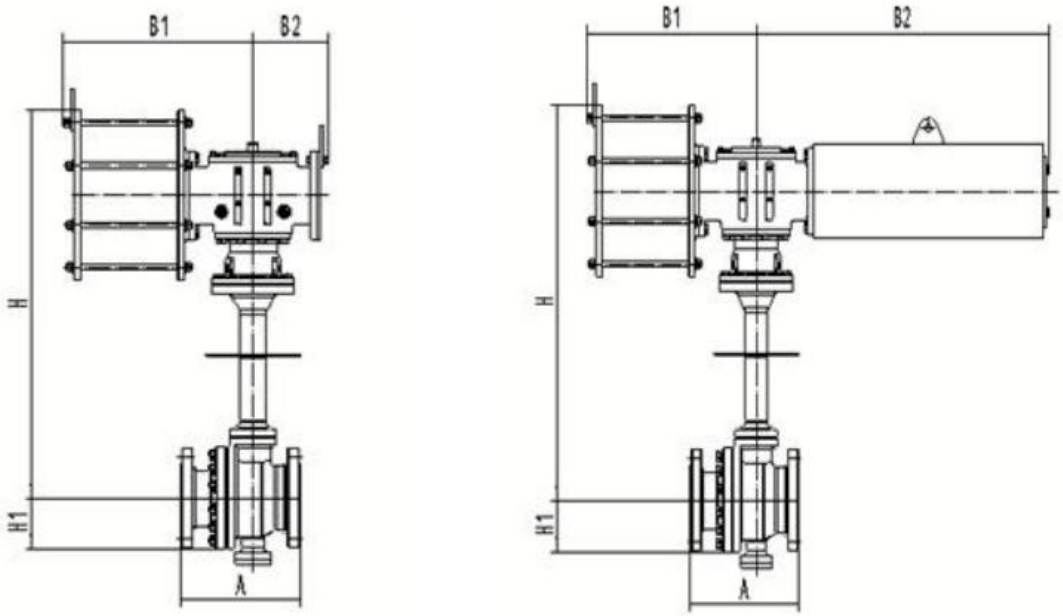


Fig. 6-3 R100 Standard Trunnion Ball Valve with AW and AT Pneumatic Actuators (R100—201, R100—211)

Overall dimensions and weight (Note: In case of any inconsistency between the data in the following table and that in the overall dimension drawing provided by the Technology Department, the latter shall prevail)

Table 3-1 Overall Dimensions and Weight of PN16/Class150 Standard Low-temperature Ball Valve with Pneumatic Actuator

(R100—200, R100—210, R100—201, R100—211**) mm**

Nominal diameter Inch (mm)	Actuator	H	B	B1	B2	A	H1	Weight kg	Nominal diameter Inch (mm)	Actuator	H	B	B1	B2	A	H1	Weight kg
1/2" (15)	AT125SR5 AT125SD5	537	350			127	55		4" (100)	AT240SR5 AT240SD5	869	620			229	136	
	AT83DRO AT83DDO	450	235							AT190DRO AT190DDO	810	540					
										AW27SR52 AW27SD52	924		650	950			
										AW22D001	864		520	200			
3/4" (20)	AT125SR5 AT125SD5	537	350						5" (125)	AT270SR5 AT270SD5	958	740			356	157	
	AT83DRO AT83DDO	450	235							AT210DRO AT210DDO	885	560					
										AW32SR53 AW32SD53	974		700	1160			
										AW27D002	974		650	250			
1" (25)	AT125SR5 AT125SD5	537	350						6" (150)	AT240DRO AT240DDO	994	620			394	196	
	AT83DRO AT83DDO	450	235							AW32SR53 AW32SD53	1049		700	1160			
										AW40SR53 AW40SD53	1145		700	1160			
										AW27D002	1049		650	250			
1¼" (32)	AT140SR5 AT140SD5	592	405			140	65		8" (200)	AT270DRO AT270DDO	1208	740			457	250	
	AT105DRO AT105DDO	553	285							AW45SR53 AW45SD53	1417		780	1300			
										AW40SR53 AW40SD53	1320		700	1160			
										AW30D003	1223		700	270			
1½" (40)	AT140SR5 AT140SD5	601	405			165	70		10"(250)	AW45SR53 AW45SD53	1472		780	1300	533	325	
	AT125DRO AT125DDO	585	350							AW35D004	1470		800	320			
										AW30D003	1373		700	270			
2" (50)	AT160SR5 AT160SD5	647	470			178	84		12"(300)	AW35D004	1570		800	320	610	380	
	AT125DRO AT125DDO	605	350							AW55SR55 AW55SD55	1795		950	1500			
	AW22SR51 AW22SD51	724		520	910												
2½" (65)	AT190SR5 AT190SD5	710	540			190	99		14"(350)	AW35D004	1810		800	320	686	438	
	AT140DRO AT140DDO	642	405							AW55D005 AW55D005	1805		850	370			
	AW22SR51 AW22SD51	744		520	910					AW65SR55 AW65SD55	2018		950	1600			
3" (80)	AT210SR5 AT210SD5	815	560			203	116		16"(400)	AW55D005 AW55D005	2072		950	370	762	440	
	AT160DRO AT160DDO	747	470							AW60D005 AW60D005	2070		950	370			
	AW27SR52 AW27SD52	904		650	950					AW65SR55 AW65SD55	2118		950	1600			

Note: 1. The overall dimensions in this table do not include accessories.

Table 3-2 Overall Dimensions and Weight of PN40/Class 300 Standard Low-temperature Ball Valve with Pneumatic Actuator

(R100—200, R100—210, R100—201, R100—211**) mm**

Nominal diameter Inch (mm)	Actuator	H	B	B1	B2	A	H1	Weight kg	Nominal diameter Inch (mm)	Actuator	H	B	B1	B2	A	H1	Weight kg
1/2" (15)	AT125SR5 AT125SD5	495	350			1165	58		4" (100)	AT270SR5 AT270SD5	908	740			305	136	
	AT92DRO AT92DDO	456	275							AT210DRO AT210DDO	835	560					
										AW22D001	864		520	200			
										AW27SR52 AW27SD52	924		650	950			
3/4" (20)	AT125SR5 AT125SD5	495	350						5" (125)	AT240DRO AT240DDO	919	620			381	157	
	AT92DRO AT92DDO	456	275							AW27D002	974		650	250			
										AW32SR53 AW32SD53	974		700	1160			
1" (25)	AT125SR5 AT125SD5	495	350						6" (150)	AW30D003	1048		700	270	403	196	
	AT92DRO AT92DDO	456	275							AT270DRO AT270DDO	1033	740					
										AW40SR53 AW40SD53	1145		700	1160			
1¼" (32)	AT140SR5 AT140SD5	592	405			178	65		8" (200)	AW30D003	1224		700	270	502	250	
	AT105DRO AT105DDO	553	285							AW35D004	1320		800	320			
										AW45SR53 AW45SD53	1322		780	1300			
1½" (40)	AT160SR5 AT160SD5	617	470			190	70		10"(250)	AW55SR55 AW55SD55	1606		950	1500	568	3325	
	AT140DRO AT140DDO	592	405							AW35D004	1470		800	320			
2" (50)	AT190SR5 AT190SD5	670	540			216	85		12"(300)	AW55D005 AW55D005	1705		950	370	648	380	
	AT140DRO AT140DDO	601	405							AW65SR55 AW65SD55	1868		950	1600			
	AW22SR51 AW22SD51	724		520	910												
2½" (65)	AT210SR5 AT210SD5	735	560			241	105		14"(350)	AW60D005	1993		950	370	762	438	
	AT160DRO AT160DDO	667	470							AW65SR55 AW65SD55	2018		950	1600			
	AW22SR51 AW22SD51	764		520	910												
3" (80)	AT190DRO AT190DDO	770	540			\283	116		16"(400)	AW60D005	2093		950	370	838	440	
	AT210SR5 AT210SD5	795	560							AW65SR55 AW65SD55	2118		950	1600			
	AT240SR5 AT240SD5	829	620														
	AW27SR52 AW27SD52	884		650	950												

Note: 1. The overall dimensions in this table do not include accessories.

Table 3-3 Overall Dimensions and Weight of PN63 Standard Low-temperature Ball Valve with Pneumatic Actuator (R100—200, R100—210, R100—201, R100—211**) mm**

Nominal diameter Inch (mm)	Actuator	H	B	B1	B2	A	H1	Weight kg	Nominal diameter Inch (mm)	Actuator	H	B	B1	B2	A	H1	Weight kg
1/2" (15)	AT140SR5 AT140SD5	542	405			165	60		4" (100)	AT270SR5 AT270SD5	1099	740			406	181	
	AT92DRO AT92DDO	486	275							AT210DRO AT210DDO	1026	560					
										AW27D002	1115		650	250			
										AW32SR53 AW32SD53	1115		700	1160			
3/4" (20)	AT140SR5 AT140SD5	542	405			190	60		5" (125)	AT240DRO AT240DDO	1169	620			457	245	
	AT92DRO AT92DDO	486	275							AW27D002	1224		650	250			
										AW40SR53 AW40SD53	1320		700	1160			
1" (25)	AT140SR5 AT140SD5	582	405			216	70		6" (150)	AW30D003	1289		700	270	495	254	
	AT92DRO AT92DDO	526	275							AW45SR53 AW45SD53	1388		780	1300			
1¼" (32)	AT160SR5 AT160SD5	669	470			229	87		8" (200)	AW35D004	1450		800	320	597	305	
	AT105DRO AT105DDO	605	285							AW55SR55 AW55SD55	1675		950	1500			
1½" (40)	AT160SR5 AT160SD5	705	470			241	106		10"(250)	AW35D004	1612		800	320	673	3336	
	AT125DRO AT125DDO	663	350							AW65SR55 AW65SD55	1910		950	1600			
2" (50)	AT190SR5 AT190SD5	768	540			292	106		12"(300)	AW55D005	1932		950	370	762	427	
	AT140DRO AT140DDO	700	405							AW65SR55 AW65SD55	1978		950	1600			
	AW22SR51 AW22SD51	822		520	910												
2½" (65)	AT210SR5 AT210SD5	875	560			330	134		14"(350)	AW60D005	2143		950	370	826	463	
	AT160DRO AT160DDO	807	470							AW65SR55 AW65SD55	2168		950	1600			
	AW27SR52 AW27SD52	964		650	950												
3" (80)	AT190DRO AT190DDO	941	540			\356	144		16"(400)	AW60D005	2346		950	370	902	541	
	AT240SR5 AT240SD5	1000	620							AW65SR55 AW65SD55	2371		950	1600			
	AW27SR52 AW27SD52	1032		650	950												

Note: 1. The overall dimensions in this table do not include accessories.

Table 3-4 Overall Dimensions and Weight of PN100/Class600 Standard Low-temperature Ball Valve with Pneumatic Actuator

(R100—200, R100—210, R100—201, R100—211**) mm**

Nominal diameter Inch (mm)	Actuator	H	B	B1	B2	A	H1	Weight kg	Nominal diameter Inch (mm)	Actuator	H	B	B1	B2	A	H1	Weight kg
1/2" (15)	AT140SR5 AT140SD5	542	405			165	60		4" (100)	AT270SR5 T270SD5	1099	740			432	181	
	AT92DRO AT92DDO	486	275							AT210DRO AT210DDO	1026	560					
										AW27D002	1115		650	250			
										AW32SR53 AW32SD53	1115		700	1160			
3/4" (20)	AT140SR5 AT140SD5	542	405			190	60		5" (125)	AT240DRO AT240DDO	1169	620			508	245	
	AT92DRO AT92DDO	486	275							AW27D002	1224		650	250			
										AW40SR53 AW40SD53	1320		700	1160			
1" (25)	AT140SR5 AT140SD5	582	405			216	70		6" (150)	AW30D003	1289		700	270	559	254	
	AT92DRO AT92DDO	526	275							AW45SR53 AW45SD53	1388		780	1300			
1¼" (32)	AT160SR5 AT160SD5	669	470			229	87		8" (200)	AW35D004	1450		800	320	660	305	
	AT105DRO AT105DDO	605	285							AW55SR55 AW55SD55	1675		950	1500			
1½" (40)	AT160SR5 AT160SD5	705	470			241	106		10"(250)	AW35D004	1612		800	320	787	3336	
	AT125DRO AT125DDO	663	350							AW65SR55 AW65SD55	1910		950	1600			
2" (50)	AT190SR5 AT190SD5	768	540			292	106		12"(300)	AW55D005	1932		950	370	838	427	
	AT140DRO AT140DDO	700	405							AW65SR55 AW65SD55	1978		950	1600			
	AW22SR51 AW22SD51	822		520	910												
2½" (65)	AT210SR5 AT210SD5	875	560			330	134		14"(350)	AW60D005	2143		950	370	889	463	
	AT160DRO AT160DDO	807	470							AW65SR55 AW65SD55	2168		950	1600			
	AW27SR52 AW27SD52	964		650	950												
3" (80)	AT190DRO AT190DDO	941	540			\356	144		16"(400)	AW60D005	2346		950	370	991	541	
	AT240SR5 AT240SD5	1000	620							AW65SR55 AW65SD55	2371		950	1600			
	AW27SR52 AW27SD52	1032		650	950												

Note: 1. The overall dimensions in this table do not include accessories.

Table 3-5 Overall Dimensions and Weight of PN150/Class900 Standard Low-temperature Ball Valve with Pneumatic Actuator

(R100—200, R100—210, R100—201, R100—211**) mm**

Nominal diameter Inch (mm)	Actuator	H	B	B1	B2	A	H1	Weight kg	Nominal diameter Inch (mm)	Actuator	H	B	B1	B2	A	H1	Weight kg
1/2" (15)	AT140SR5 AT140SD5	572	405			254	65		4" (100)	AT240DRO AT240DDO	1199	620			457	183	
	AT105DRO AT105DDO	533	285							AT270SR5 AT270SD5	1238	740					
										AW32SR53 AW32SD53	1253		700	1160			
										AW27D002	1254		650	250			
3/4" (20)	AT140SR5 AT140SD5	572	405			254	65		5" (125)	AT240DRO AT240DDO	1349	620			559	250	
	AT105DRO AT105DDO	533	285							AW27D002	1324		650	250			
										AW40SR53 AW40SD53	1420		700	1160			
1" (25)	AT140SR5 AT140SD5	622	405			254	75		6" (150)	AW30D003	1343		700	270	610	260	
	AT105DRO AT105DDO	566	285							AW45SR53 AW45SD53	1442		780	1300			
1¼" (32)	AT160SR5 AT160SD5	727	470			279	90		8" (200)	AW35D004	1470		800	320	737	310	
	AT125DRO AT125DDO	685	285							AW55SR55 AW55SD55	1695		950	1500			
1½" (40)	AT190SR5 AT190SD5	810	540			305	110		10"(250)	AW55D005	1845		950	370	838	3380	
	AT140DRO AT140DDO	742	405							AW65SR55 AW65SD55	1918		950	1600			
2" (50)	AT210SR5 AT210SD5	915	560			368	140		12"(300)	AW60D005	1963		950	370	965	420	
	AT160DRO AT160DDO	847	470							AW65SR55 AW65SD55	1988		950	1600			
2½" (65)	AT240SR5 AT240SD5	1009	620			419	150		14"(350)	AW60D005	2196		950	370	1029	460	
	AT190DRO AT190DDO	950	540							AW65SR55 AW65SD55	2221		950	1600			
3" (80)	AT210DRO AT210DDO	1115	560			\381	160		16"(400)	AW60D005	2346		950	370	1130	460	
	AW27SR52 AW27SD52	1204		650	950					AW65SR55 AW65SD55	2371		950	1600			
	AT270SR5 AT270SD5	1188	740														

Note: 1. The overall dimensions in this table do not include accessories.

2. The structure length A in the table is for RF flange connection. If RJ flange connection is selected, please consult the Technical Department for structural length A.

Table 3-6 Overall Dimensions and Weight of PN260/Class 1500 Standard Low-temperature Ball Valve with Pneumatic Actuator

(R100—200, R100—210, R100—201, R100—211**) mm**

Nominal diameter Inch (mm)	Actuator	H	B	B1	B2	Flange type A	H1	Weight kg
2" (50)	AT240SR5 AT240SD5	1015	620			371	190	
	AT190DRO AT190DDO	947	540					
2½" (65)	AT270SR5 AT270SD5	1109	740			422	200	
	AT210DRO AT210DDO	1050	560					
3" (80)	AT270DRO AT270DDO	1215	740			473	210	
	AW32SR52 AW32SD52	1323		680	1160			
4" (100)	AW32SR52 AW32SD52	1353		680	1160	549	233	
	AT270DRO AT270DDO	1336	740					
	AW45SR53 AW45SD53	1450		780	1300			
6" (150)	AW55SR55 AW55SD55	1595		950	1500	711	310	
	AW35D004	1540		800	320			
8" (200)	AW65SR55 AW65SD55	1574		950	1600	841	360	
	AW55D005	1795		950	370			
10"(250)	AW65SR55 AW65SD55	1811		950	1600	1000	430	
	AW55D005	2071		950	370			
12"(300)	AW65SR55 AW65SD55	2007		950	1600	1146	471	
	AW60D005	2077		950	370			

Note: 1. The overall dimensions in this table do not include accessories.

2. The structure length A in the table is RJ flange connection form.

Table 3-7 Overall Dimensions and Weight of PN16/Class150 Top-entry Low-temperature Ball Valve with Pneumatic Actuator (R100—300, R100—301**) mm**

Nominal diameter Inch (mm)	Actuator	H	B	B1	B2	Butt welding A	H1	Weight kg	Nominal diameter Inch (mm)	Actuator	H	B	B1	B2	Butt welding A	H1	Weight kg
1/2" (15)	AT125SR5 AT125SD5	537	350			327	55		4" (100)	AT240SR5 AT240SD5	869	620			429	143	
	AT83DRO AT83DDO	450	235							AT190DRO AT190DDO	810	540					
										AW27SR52 AW27SD52	924		650	950			
										AW22D001	864		520	200			
3/4" (20)	AT125SR5 AT125SD5	537	350						5" (125)	AT270SR5 AT270SD5	958	740			556	157	
	AT83DRO AT83DDO	450	235							AT210DRO AT210DDO	885	560					
										AW32SR53 AW32SD53	974		700	1160			
										AW27D002	974		650	250			
1" (25)	AT125SR5 AT125SD5	537	350						6" (150)	AT240DRO AT240DDO	994	620			594	217	
	AT83DRO AT83DDO	450	235							AW27D002	1049		650	250			
										AW32SR53 AW32SD53	1049		700	1160			
										AW40SR53 AW40SD53	1145		700	1160			
1¼" (32)	AT140SR5 AT140SD5	592	405			340	65		8" (200)	AT270DRO AT270DDO	1208	740			657	265	
	AT105DRO AT105DDO	553	285							AW30D003	1223		700	270			
										AW40SR53 AW40SD53	1320		700	1160			
										AW45SR53 AW45SD53	1322		780	1300			
1½" (40)	AT140SR5 AT140SD5	601	405			365	70		10"(250)	AW30D003	1373		700	270	733	313	
	AT125DRO AT125DDO	585	350							AW35D004	1470		800	320			
										AW45SR53 AW45SD53	1567		780	1300			
2" (50)	AT160SR5 AT160SD5	647	470			378	83		12"(300)	AW35D004	1570		800	320	810	400	
	AT125DRO AT125DDO	605	350							AW35D004	1570		800	320			
	AW22SR51 AW22SD51	724		520	910					AW55SR55 AW55SD55	1795		950	1500			
2½" (65)	AT190SR5 AT190SD5	710	540			390	83		14"(350)	AW35D004	1810		800	320	886	430	
	AT140DRO AT140DDO	642	405							AW55D005	1805		850	370			
	AW22SR51 AW22SD51	744		520	910					AW65SR55 AW65SD55	2018		950	1600			
3" (80)	AT210SR5 AT210SD5	815	560			403	110		16"(400)	AW55D005	2072		950	370	962	452	
	AT160DRO AT160DDO	747	470							AW60D005	2070		950	370			
	AW27SR52 AW27SD52	904		650	950					AW65SR55 AW65SD55	2118		950	1600			

Note: The structure length A already includes the sleeve size.

Table 3-8 Overall Dimensions and Weight of PN40/Class300 Top-entry Low-temperature Ball Valve with Pneumatic Actuator (R100—300, R100—301**) mm**

Nominal diameter Inch (mm)	Actuator	H	B	B1	B2	Butt welding A	H1	Weight kg	Nominal diameter Inch (mm)	Actuator	H	B	B1	B2	Butt welding A	H1	Weight kg
1/2" (15)	AT125SR5 AT125SD5	495	350			3365	58		4" (100)	AT270SR5 AT270SD5	908	740			505	143	
	AT92DRO AT92DDO	456	275							AT210DROA T210DDO	835	560					
										AW22D001	864		520	200			
										AW27SR52 AW27SD52	924		650	950			
3/4" (20)	AT125SR5 AT125SD5	495	350						5" (125)	AT240DROA T240DDO	919	620			581	157	
	AT92DRO AT92DDO	456	275							AW27D002	974		650	250			
										AW32SR53 AW32SD53	974		700	1160			
1" (25)	AT125SR5 AT125SD5	495	350						6" (150)	AW30D003	1048		700	270	603	217	
	AT92DRO AT92DDO	456	275							AT270DROA T270DDO	1033	740					
										AW40SR53 AW40SD53	1145		700	1160			
1¼" (32)	AT140SR5 AT140SD5	592	405			378	65		8" (200)	AW30D003	1224		700	270	702	265	
	AT105DRO AT105DDO	553	285							AW35D004	1320		800	320			
										AW45SR53A W45SD53	1322		780	1300			
1½" (40)	AT160SR5 AT160SD5	617	470			390	70		10"(250)	AW55SR55A W55SD55	1606		950	1500	768	313	
	AT140DRO AT140DDO	592	405							AW35D004	1470		800	320			
2" (50)	AT190SR5 AT190SD5	670	540			416	83		12"(300)	AW55D005	1705		950	370	848	400	
	AT140DRO AT140DDO	601	405							AW65SR55A W65SD55	1868		950	1600			
	AW22SR51 AW22SD51	724		520	910												
2½" (65)	AT210SR5 AT210SD5	735	560			441	83		14"(350)	AW60D005	1993		950	370	962	430	
	AT160DRO AT160DDO	667	470							AW65SR55A W65SD55	2018		950	1600			
	AW22SR51 AW22SD51	764		520	910												
3" (80)	AT190DRO AT190DDO	770	540			\483	110		16"(400)	AW60D005	2093		950	370	1038	452	
	AT210SR5 AT210SD5	795	560							AW65SR55A W65SD55	2118		950	1600			

	AT240SR5 AT240SD5	829	620														
	AW27SR52 AW27SD52	884		650	950												

Note: The structure length A already includes the sleeve size.

Table 3-9 Overall Dimensions and Weight of Top-entry Low-temperature Ball Valve PN63 with Pneumatic Actuator (R100—300, R100—301**) mm**

Nominal diameter Inch (mm)	Actuator	H	B	B1	B2	Butt welding A	H1	Weight kg	Nominal diameter Inch (mm)	Actuator	H	B	B1	B2	Butt welding A	H1	Weight kg
1/2" (15)	AT140SR5 AT140SD5	542	405			365	60		4" (100)	AT270SR5 AT270SD5	1099	740			606	181	
	AT92DRO AT92DDO	486	275							AT210DROA T210DDO	1026	560					
										AW27D002	1115		650	250			
										AW32SR53 AW32SD53	1115		700	1160			
3/4" (20)	AT140SR5 AT140SD5	542	405			390	60		5" (125)	AT240DROA T240DDO	1169	620			657	245	
	AT92DRO AT92DDO	486	275							AW27D002	1224		650	250			
										AW40SR53 AW40SD53	1320		700	1160			
1" (25)	AT140SR5 AT140SD5	582	405			416	70		6" (150)	AW30D003	1289		700	270	695	254	
	AT92DRO AT92DDO	526	275							AW45SR53A W45SD53	1388		780	1300			
1¼" (32)	AT160SR5 AT160SD5	669	470			429	87		8" (200)	AW35D004	1450		800	320	797	305	
	AT105DRO AT105DDO	605	285							AW55SR55A W55SD55	1675		950	1500			
1½" (40)	AT160SR5 AT160SD5	705	470			441	106		10"(250)	AW35D004	1612		800	320	873	336	
	AT125DRO AT125DDO	663	350							AW65SR55A W65SD55	1910		950	1600			
2" (50)	AT190SR5 AT190SD5	768	540			492	106		12"(300)	AW55D005	1932		950	370	962	427	
	AT140DRO AT140DDO	700	405							AW65SR55A W65SD55	1978		950	1600			
	AW22SR51 AW22SD51	822		520	910												
2½" (65)	AT210SR5 AT210SD5	875	560			530	134		14"(350)	AW60D005	2143		950	370	1026	463	
	AT160DRO AT160DDO	807	470							AW65SR55A W65SD55	2168		950	1600			
	AW27SR52 AW27SD52	964		650	950												
3" (80)	AT190DRO AT190DDO	941	540			\556	144		16"(400)	AW60D005	2346		950	370	1102	541	

	AT240SR5 AT240SD5	1000	620							AW65SR55A W65SD55	2371		950	1600			
	AW27SR52 AW27SD52	1032		650	950												

Note: The structure length A already includes the sleeve size.

Table 3-10 Overall Dimensions and Weight of PN100/Class600 Top-entry Low-temperature Ball Valve with Pneumatic Actuator (R100—300, R100—301**) mm**

Nominal diameter Inch (mm)	Actuator	H	B	B1	B2	Butt welding A	H1	Weight kg	Nominal diameter Inch (mm)	Actuator	H	B	B1	B2	Butt welding A	H1	Weight kg
1/2" (15)	AT140SR5 AT140SD5	542	405			365	60		4" (100)	AT270SR5 AT270SD5	1099	740			632	181	
	AT92DRO AT92DDO	486	275							AT210DROA T210DDO	1026	560					
										AW27D002	1115		650	250			
										AW32SR53 AW32SD53	1115		700	1160			
3/4" (20)	AT140SR5 AT140SD5	542	405			390	60		5" (125)	AT240DROA T240DDO	1169	620			708	245	
	AT92DRO AT92DDO	486	275							AW27D002	1224		650	250			
										AW40SR53 AW40SD53	1320		700	1160			
1" (25)	AT140SR5 AT140SD5	582	405			416	70		6" (150)	AW30D003	1289		700	270	759	254	
	AT92DRO AT92DDO	526	275							AW45SR53A W45SD53	1388		780	1300			
1¼" (32)	AT160SR5 AT160SD5	669	470			429	87		8" (200)	AW35D004	1450		800	320	860	305	
	AT105DRO AT105DDO	605	285							AW55SR55A W55SD55	1675		950	1500			
1½" (40)	AT160SR5 AT160SD5	705	470			441	106		10"(250)	AW35D004	1612		800	320	987	336	
	AT125DRO AT125DDO	663	350							AW65SR55A W65SD55	1910		950	1600			
2" (50)	AT190SR5 AT190SD5	768	540			492	106		12"(300)	AW55D005	1932		950	370	1038	427	
	AT140DRO AT140DDO	700	405							AW65SR55A W65SD55	1978		950	1600			
	AW22SR51 AW22SD51	822		520	910												
2½" (65)	AT210SR5 AT210SD5	875	560			530	134		14"(350)	AW60D005	2143		950	370	1089	463	
	AT160DRO AT160DDO	807	470							AW65SR55A W65SD55	2168		950	1600			
	AW27SR52 AW27SD52	964		650	950												
3" (80)	AT190DRO AT190DDO	941	540			\556	144		16"(400)	AW60D005	2346		950	370	1191	541	
	AT240SR5 AT240SD5	1000	620							AW65SR55A W65SD55	2371		950	1600			
	AW27SR52 AW27SD52	1032		650	950												

Note: The structure length A already includes the sleeve size.

Table 3-11 Overall Dimensions and Weight of PN150/Class900 Top-entry Low-temperature Ball Valve with Pneumatic Actuator (R100—300, R100—301) mm

Nominal diameter Inch (mm)	Actuator	H	B	B1	B2	Butt welding A	H1	Weight kg	Nominal diameter Inch (mm)	Actuator	H	B	B1	B2	Butt welding A	H1	Weight kg
1/2" (15)	AT140SR5 AT140SD5	572	405			454	65		4" (100)	AT240DROA T240DDO	1199	620			657	183	
	AT105DRO AT105DDO	533	285							AT270SR5 AT270SD5	1238	740					
										AW32SR53 AW32SD53	1253		700	1160			
										AW27D002	1254		650	250			
3/4" (20)	AT140SR5 AT140SD5	572	405			454	65		5" (125)	AT240DROA T240DDO	1349	620			759	250	
	AT105DRO AT105DDO	533	285							AW27D002	1324		650	250			
										AW40SR53 AW40SD53	1420		700	1160			
1" (25)	AT140SR5 AT140SD5	622	405			454	75		6" (150)	AW30D003	1343		700	270	810	260	
	AT105DRO AT105DDO	566	285							AW45SR53 AW45SD53	1442		780	1300			
1¼" (32)	AT160SR5 AT160SD5	727	470			479	90		8" (200)	AW35D004	1470		800	320	937	310	
	AT125DRO AT125DDO	685	285							AW55SR55 AW55SD55	1695		950	1500			
1½" (40)	AT190SR5 AT190SD5	810	540			505	110		10"(250)	AW55D005	1845		950	370	1038	3380	
	AT140DRO AT140DDO	742	405							AW65SR55 AW65SD55	1918		950	1600			
2" (50)	AT210SR5 AT210SD5	915	560			568	140		12"(300)	AW60D005	1963		950	370	1165	420	
	AT160DRO AT160DDO	847	470							AW65SR55 AW65SD55	1988		950	1600			
2½" (65)	AT240SR5 AT240SD5	1009	620			619	150		14"(350)	AW60D005	2196		950	370	1229	460	
	AT190DRO AT190DDO	950	540							AW65SR55 AW65SD55	2221		950	1600			
3" (80)	AT210DRO AT210DDO	1115	560			\581	160		16"(400)	AW60D005	2346		950	370	1330	460	
	AT270SR5 AT270SD5	1188	740							AW65SR55 AW65SD55	2371		950	1600			
	AW27SR52 AW27SD52	1204		650	950												

Note: The structure length A already includes the sleeve size.

Table 3-12 Overall Dimensions and Weight of PN260/Class1500 Top-entry Low-temperature Ball Valve with Pneumatic Actuator (R100—300, R100—301**) mm**

Nominal diameter Inch (mm)	Actuator	H	B	B1	B2	Butt welding A	H1	Weight kg
2" (50)	AT240SR5 AT240SD5	1015	620			571	190	
	AT190DRO AT190DDO	947	540					
2½" (65)	AT270SR5 AT270SD5	1109	740			622	200	
	AT210DRO AT210DDO	1050	560					
3" (80)	AT270DRO AT270DDO	1215	740			673	210	
	AW40SR53 AW40SD53	1323		700	1160			
4" (100)	AW40SR53 AW40SD53	1353		700	1160	749	233	
	AT270DRO AT270DDO	1336	740					
	AW45SR53 AW45SD53	1450		780	1300			
6" (150)	AW55SR55 AW55SD55	1595		950	1500	911	310	
	AW35D004	1540		800	320			
8" (200)	AW65SR55 AW65SD55	1574		950	1600	1041	360	
	AW55D005	1795		950	370			
10"(250)	AW65SR55 AW65SD55	1811		950	1600	1200	430	
	AW55D005	2071		950	370			
12"(300)	AW65SR55 AW65SD55	2007		950	1600	1346	471	
	AW60D005	2077		950	370			

Note: The structure length A already includes the sleeve size.

3. Installation

3-1 Valve installation

Warning

As the control valve is heavy, the following should be noted to avoid major personal injury due to improper operation.

●When the control valve is connected with the process pipeline, please use appropriate hoisting machinery that meets the provisions of the Labor Safety and Health Law for lifting. At this time, it is absolutely not allowed to stand or operate the hoisting machinery under the lifted objects.

●If the whole machine needs to be lifted during on-site installation, the lifting lugs of the actuator cannot be used, and the lifting holes on the valve body must be used.

●Personnel carrying out any adjustments to the installation of valves shall use equipment and clothing normally used for valve installation.

●Lines must be depressurized, drained and vented before valves are installed.

●Handling and installation of all valves and actuators must be carried out by personnel trained in all aspects of erection and manual/mechanical handling techniques.

●Personnel injury may result from packing leakage. Valve packing is tightened from the factory; however, it may be necessary to re-adjust the packing to meet specific application conditions.

●Please clean the inside of piping thoroughly to remove sundries, welding slag and rust before installing this control valve. Any foreign

Precautions for installation: We have adjusted the stop screw on the actuator in place before its leaving from the factory. Please do not adjust the stop screw during use. If you need to do so, please consult the technical personnel of Chongqing Chuanyi Control Valve Co., Ltd.

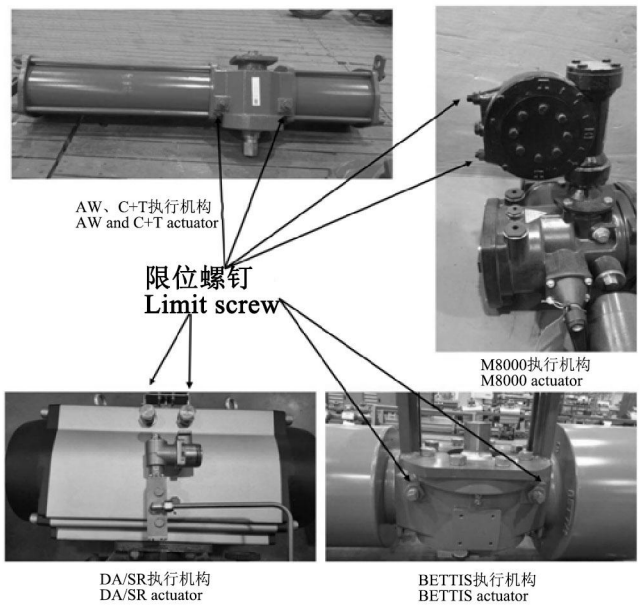


Fig. 7 Schematic Diagram of Stop Screw Positions of Various Actuators

3-2 Installation position

The standard mounting arrangement for a control valve assembly is to mount the actuator vertically above the valve. Other positions may cause uneven wear of the valve trim, affecting the performance of the valve. It is allowed to install within the range shown in Fig. 8 as a last resort. If the control valve may be subject to vibration and external force, the yoke attached to the control valve or the piping bracket should be used.

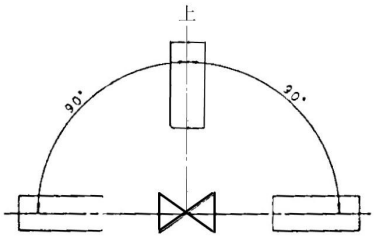


Fig. 8

3-3 Installation direction and support requirements of actuator on pipeline

The control valve assembly is normally mounted with the actuator vertically above the valve. Other locations may result in uneven wear of the valve trim affecting the performance of the valve. For some valves, when the actuator is not vertical, it may also need to be supported by bracing.

Suggestions for pipeline installation direction of various actuators:

(1) HA series: vertical installation is recommended. According to the field use data, there is no problem in some HA2~4 horizontal installation and use. However, according to theoretical analysis, the probability of problems in horizontal installation of HA4X2 or HA5Y actuators is relatively large.

●When HA4X2 or HA5Y actuator is placed horizontally, the membrane type diaphragm assembly has no support in the inner cavity and is entirely supported at the guide sleeve of rod. This position is mainly used for guiding. If it bears support, the gravity of the diaphragm assembly (including disphragn plate, etc.) will be completely pressed on the edge of the rod guide, resulting in large friction. In addition, the material of rod 304 is not wear-resistant, which may easily cause scratches to the rod and abnormal sound. Seizing and scratching of seals leading to air leakage. ;

●The HA actuator is of a multi-spring structure, and the spring has only 1 side guide, which is very short and weak in strength. When placed horizontally, it is easy to cause the spring to topple over, which may lead to failure of the whole machine.

(2) HV series: any installation

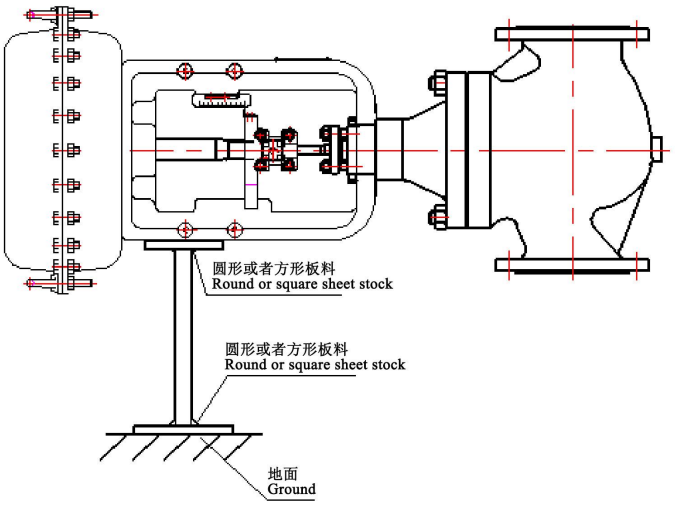
(3) AT series: any installation

(4) AW series: any installation

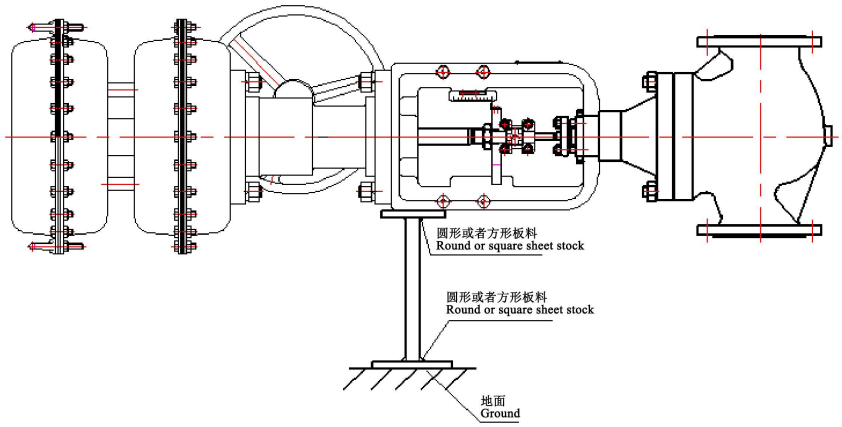
(5) VR series: The actuator shall be installed vertically, and horizontal installation is prohibited.

The reason is similar to that of the above HA diaphragm actuator. Due to the straight stroke and corner stroke, there is a large rotational eccentricity, which easily leads to friction and jamming inside the cylinder.

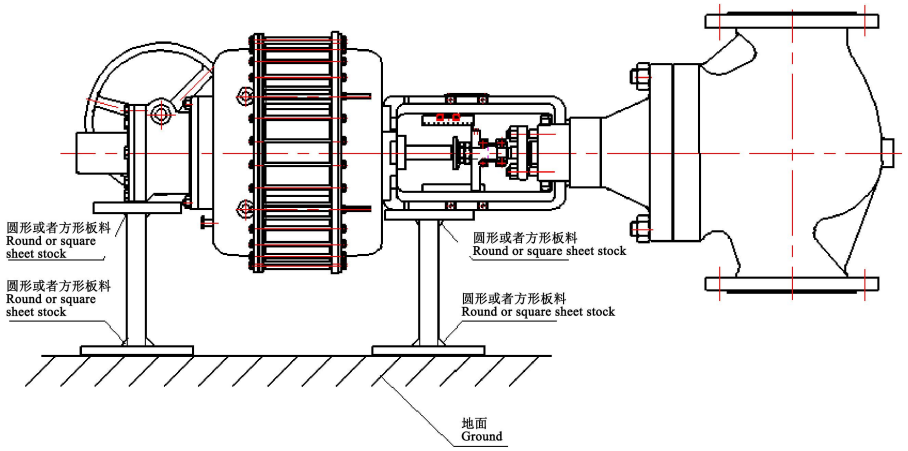
●When the actuator is installed horizontally, it is necessary to support the schematic diagram with supports:

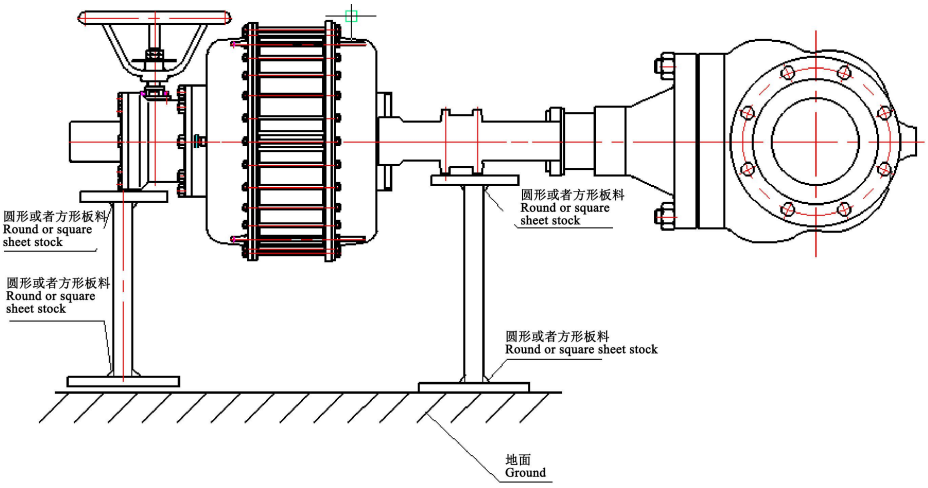


Schematic Diagram of Horizontal Installation Support of HA1~4



Schematic Diagram of HA4X2 Horizontal Installation Support





Schematic Diagram of HA5 Horizontal Installation Support

Fig. 9 Schematic Diagram of Horizontal Installation Support for HA Series Actuator

3-4 Precautions for connecting actuator with valve

3-4-1 Connection with pneumatic actuator

(1) For HA reverse action actuator

Introduce an air source pressure of 40 kPa into the diaphragm chamber, place a transition block between the rod and the valve stem, remove the input air source to make the valve core contact with the valve seat; at this time, adjust the precision pressure reducing valve, introduce an air source pressure of 20 kPa into the diaphragm chamber of the actuator, remove the transition block and connect the slotted nut.

(2) For HA direct action actuator

Place a transition block between the rod and the valve stem, introduce a certain air source pressure into the diaphragm chamber of the actuator to make the valve core contact with the valve seat, adjust the input value of the air source pressure to 20 kPa, remove the transition block, and connect the slotted nut.

(3) For HA pneumatic diaphragm actuator and HV single-acting cylinder piston actuator

Check the spring range according to the nameplate. According to the starting position, adjust the precision pressure reducing valve, introduce the maximum air source pressure within the spring range into the diaphragm chamber of the actuator, and observe whether the product can go through the full stroke.

(4) For double-acting actuator

Input an air source pressure of 500kPa from the upper end, adjust the pressure pressure reducing valve when the rod reaches the lower end, input a certain air source pressure from the lower end to move the rod upward by 2mm, and connect the slotted nut (or other connecting pieces). According to the starting position, install and fix the travel board, input an air source pressure of 500Kpa from the lower end, and observe whether the product can go through the full stroke.

3-4-2 Connection with electric actuator

(1) Connect the actuator and valve body components, remove the actuator housing, and loosen the mechanical limit mechanism and limit switch.

(2) Turn the handwheel to make the rod contact with the valve stem, then turn the handwheel for 2 turns in the opposite direction, connect the rod and the valve stem, install the travel board, and fix the lower end limit switch and mechanical limit mechanism. Connect the power and control wires according to the actuator instructions. Give the control signal, make the valve travel to the full stroke, and fix the upper end limit switch and mechanical limit mechanism. Note that the limit switch at the starting point and ending point of the actuator shall act before the mechanical limit mechanism. Check whether the action mode of electric opening or closing is correct.

(3) Cut off the power supply and signal, remove the connecting wire and install the housing.

4. Maintenance

Valve parts are subject to normal wear and must be inspected and replaced as required. The frequency of inspection and maintenance depends on the severity of process conditions. Packing maintenance and replacement operations can be carried out while the valve is still installed in the pipeline. The contents of regular observation and maintenance are as follows:

1. Check the actuator for air leakage;
2. Check whether the control accessories work normally;
3. Whether the packing part leaks;
4. Whether the valve operates smoothly;
5. Whether the system flow is normal.

Warning

Avoid personal injury or property damage caused by sudden release of process pressure or bursting of parts. Before carrying out any maintenance operation:

●Always wear protective gloves, clothes and goggles during any maintenance operation to avoid personal injury.

●Disconnect all operating lines that supply air pressure, power or control signals to the actuator. Make sure that the actuator does not suddenly open or close the valve.

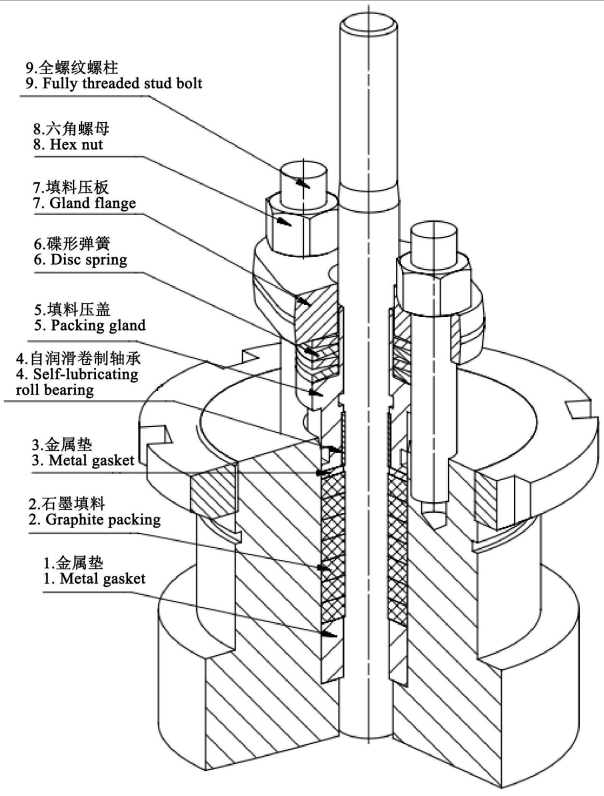
●Isolate the process pressure from the valve by bypassing or completely shutting down the process. Completely relieve the process pressure on both sides of the valve. Drain the process medium on both sides of the valve.

●Vent the pneumatic actuator loading pressure and release any actuator spring pre-compression force.

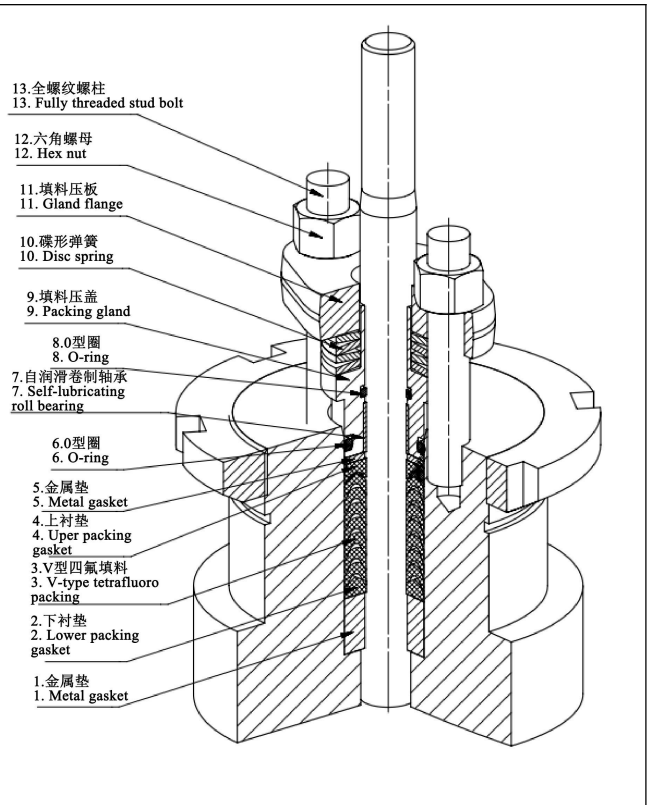
●Use a lockout to ensure that the above measures remain effective when you work on the equipment.

●Even though the valve has been removed from the line, the packing box of the valve may contain process fluid under pressure and therefore may spray out under pressure when the packing hardware or packing rings are removed.

4-1 Maintenance of packing



Graphite packing system



PTFE packing system

If non-spring-loaded packing leaks unexpectedly, an attempt should first be made to limit the leakage by adding a little PTFE or graphite packing and then strengthening the stem seal by tightening the packing flange nuts.

If the packing is relatively new and seats snugly on the stem, and if tightening of the packing flange nuts does not stop leakage, the stem may be worn or scored so that a seal cannot be formed, and the surface finish of the new stem is critical to forming an excellent packing seal. If the leakage is from the outside diameter of the packing, it may be caused by nicks or scratches in the stuffing box wall.

When the control valve is used for high-temperature medium (such as steam) and other working conditions, it is recommended to fill lubricating oil into graphite packing every six months. Filling method: fully open the valve body, slightly loosen the nut of the control valve gland flange, drop non-iced lubricating oil into the gap between the valve stem and the packing, and let the valve stem reciprocate several times to achieve the purpose of lubrication.

4-2 Replacement of packing

(1) Isolate the control valve from line pressure, relieve pressure on both sides of the body and discharge process media from both sides of the valve, using a lock to ensure that these measures remain effective when you are working on the equipment.

(2) Input a certain air pressure to the actuator so that the pointer points at 80%~90% of the fully closed position.

(3) Loosen the hexagon bolt on the slotted nut that connects the valve stem and rod, and remove the slotted nut to separate the actuator rod from the valve stem.

(4) Loosen the yoke lock nut and lift it down.

(5) Lift the actuator to separate it from the valve body.

(6) Loosen the gland flange nut so that the packing does not stick to the valve stem, and remove all travel indicator parts and slotted nuts from the valve stem threads.

⚠Warning

To avoid personal injury or property damage caused by uncontrolled movement of the bonnet, loosen the bonnet according to instructions given in next step. Do not forcibly pull or remove the tightly attached bonnet with tools that can expand and contract or store energy in any way. Sudden release of stored energy will cause uncontrolled movement of the bonnet.

⚠Caution

Avoid damage to the seating surfaces caused by the valve core and stem assembly falling off the bonnet after partially lifting it.

(7) The bonnet is fixed to the valve body by hex nuts. Loosen these nuts by about 3 mm and then shake the bonnet or pry it apart between the bonnet and valve to loosen the body-to-bonnet gasket joint surface. Pry up the bonnet with a pry bar along its periphery until it is loosened. If no fluid is leaking from the joint surfaces, remove nuts or hexagon head screws completely and carefully lift bonnet off body.

(8) Remove the lock nut, separate the valve core and valve stem from the bonnet, and place the parts on the surface of protective materials to prevent damage to the sealing ring or seating surface.

(9) Remove the bonnet gasket and cover the opening of the valve to protect the surface of the sealing ring and prevent foreign matters from entering the inner cavity of the valve body.

(10) Remove the packing flange nut, gland flange and packing gland. Use a round bar or other tools that will not scratch the packing box wall to carefully push out all remaining packing parts from the valve side of the bonnet to clean the packing box and metal packing parts.

(11) Check the surface of valve stem thread and stuffing box for sharp edges, which may cut packing. Scratches or burrs will cause leakage of stuffing box or damage new packing. If the surface condition cannot be improved by gentle sanding with abrasive paper, replace damaged parts.

(12) Remove the cover protecting the inner cavity of the valve body and install a new bonnet serrated washer to ensure that the washer seating surface is clean and smooth, then slide the bonnet along the stem and onto the stud bolt.

⚠Caution

The correct method of tightening the screw bolts compresses the serrated washer, thereby adequately sealing the body-to-bonnet joint.

Proper screw bolt tightening methods include, but are not limited to, ensuring that the threads of the screw bolts are clean and evenly tightening the nuts on hex-head screws or stud bolts in a crisscross pattern. Tightening one hex head screw or nut may

(13) Install screw bolts and install new packing or metal packing box parts according to the corresponding structure. When the packing is PTFE, place a smooth-edged pipe on the valve stem and gently knock each soft packing part into the stuffing box. Slide the packing gland and gland flange properly and install the nut of the gland flange. When the packing is V-shaped graphite packing, put it into the stuffing box first, and then install the packing gland, gland flange, packing screw bolt and nut. Compress the packing by tightening the packing nut.

4-3 Maintenance and removal of valve trim

4-3-1 Rust prevention

For the R100 low-temperature ball valve produced by our company, under non-oil prohibition conditions, our company has applied antirust oil to the non-coating surface of carbon steel products to prevent product rust. The application area includes but is not limited to valve body flow channel and flange sealing surface.

Note: Anti-rust oil is an anti-rust product with mineral oil as the base oil. If cleaning is required, organic solvent or high temperature steam can be used for cleaning. After cleaning, the product will have no anti-rust ability.

4-3-2 Lapping-in of valve core and seat

For metal valve seat construction, the seating surfaces of the plug, valve seat ring or liner can be lapped to improve shut-off performance. (Deep cuts should be removed by machining rather than grinding).

> ⚠Caution
>
> To avoid damage to the bellows seal bonnet assembly, do not attempt to lapp metal seating surfaces. Any forced lapping rotation will damage the internal elements of the bonnet on the bellows seal.

Grinding method:

(1) Wipe the valve core and seat clean.

(2) Apply a layer of high-quality abrasive sand with particle size of 280 to 600 evenly and appropriately at the valve core valve line;

(3) Install the valve cover and fix it with the valve body;

(4) Install a slotted nut or other clamping device to clamp the valve stem, and then rotate the valve core and the valve seat for running-in;

(5) During grinding, attention shall be paid to slight force, stability and uniformity;

(6) After grinding for a period of time, remove the slotted nut, other clamping devices and bonnet, and check whether the contact area between the two valve lines of the valve core and valve seat is more than 90%; if so, carry out assembly; otherwise, repeat steps 1) ~ 6).

5. Acceptance, Handling and Storage

5-1. Acceptance and handling

> ⚠Warning
>
> As the control valve is heavy, the following should be noted during handling. Otherwise, serious personal injury may be caused.
>
> ●Hoisting machinery conforming to the labor safety and health law shall be used for loading, unloading and handling. It is absolutely forbidden to stand or operate hoisting machinery under hoisted objects.
>
> ●For small-size products packed in corrugated boxes, the strength of the packing box is often reduced due to wetting by water.

5-2. Storage

(1) Before being installed on the pipeline, it must be kept in a packaged state.

(2) It is not allowed to keep it in the following places:

(a) Where there is rain.

(b) Where temperature exceeds 60°C.

(c) Dusty places.

(d) Where humidity exceeds the permitted level

(3) If the package is disassembled for performance inspection during acceptance, it must be repackaged until installation begins.

(4) Do not open the plugs and covers of air piping interfaces and electrical wiring interfaces before the commencement of air piping works and electrical wiring works.

(5) If the storage period is more than one year, the packing will often be hardened and aged. Therefore, please open the package, loosen the hex nut for fastening the packing by 2 turns, and store it in this state. When in use, please tighten the hex nut and apply air or water pressure equivalent to the fluid pressure from the connecting flange of the piping to check for leakage in the packing part. If there is any leakage, the packing should be replaced with a new one. Please follow the instructions of disassembly and assembly for replacement essentials.

(6) In case of storage after use, please handle according to the following items:

(a) Please carefully clean the inside of the control valve with water and dry it.

(b) Do not damage the sealing surface of the piping connecting flange shown in Fig. 13-1.

(c) Please carry out rust-proof treatment for the position prone to rusting.

Please carry out waterproof treatment on the air piping interface and electrical wiring interface.

6. Unpacking

Warning

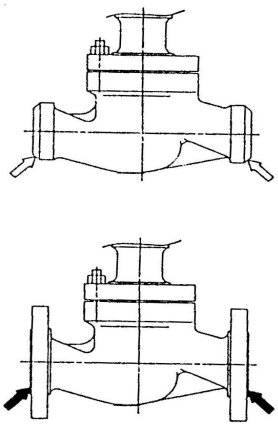
- When taking out the control valve from the packing box and lifting it, please use a standardized sling suitable for the weight of the control valve to avoid damaging the control valve. At this time, please use the eyebolts on both sides of the actuator (the eyebolts are also a pair of screw bolts with ring heads for pressing the diaphragm cover), and make the load even. Please refer to Fig. 13-2. However, if the weight marked on the surface of the packing box exceeds the following limited weight range, please do not use the eyebolt installed on the membrane cover, and it must be carried out as shown in Fig. 13-3. Otherwise, personal injury or death may be caused due to unsafe hoisting.

Actuator model	Maximum load (kg)	Single actuator weight (kg)
HA1	160	8
HA2	160	16
HA3	160	32
HA4	220	68
HA5	500	123

Caution

After unpacking, the following should be noted to prevent damage of control valve.

- Please do not damage the sealing surface or welding groove of piping connecting flange as shown in Fig. 10-1, so as to avoid leakage on the sealing surface.
- When accessories such as positioner, accelerator and solenoid valve and manual operating mechanism are installed on the actuator of control valve, they shall not touch the ground to avoid being squeezed by the control valve.



Avoid damage

Surface indicated by the arrow

Fig. 10-1

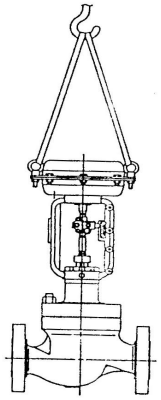


Fig. 10-2

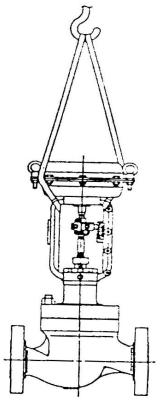


Fig. 10-3

7. Routine Inspection and Regular Inspection

7-1 Daily inspection

For the control valve that plays an important role in production, the routine inspection should be performed as follows.

- In order to prevent malfunction, please confirm whether there is air leakage at the air source interface.
- Please confirm whether there is leakage at the packing and gasket. In case of fluid leakage, please check the valve stem for damage or seizure. If no abnormality is found, please tighten the packing while confirming the action state.
- Please confirm whether there is abnormal sound and whether the control valve and piping vibrate during action.

7-2 Regular Inspection

All items subject to the above routine inspection shall be inspected for all control valves once every six months.

In case of any abnormality found in routine inspection and regular inspection that cannot be handled, disassembly and maintenance can be carried out during shutdown or contact the Sales Department of Chongqing Chuanyi Control Valve Co., Ltd.

8. Fault Symptoms, Causes and Measures

Table 4

Faults	Cause	Solution
The valve stem does not rotate well	1. The packing is pressed too tightly. 2. The valve stem and its mating part are damaged or have gathered dirt 3. Too many times of opening and closing 4. The packing gland tilts outward and the valve stem is blocked. 5. The valve stem is bent. 6. The pre-tightening specific pressure of valve seat and ball is too large.	1. Re-adjust the loose screw bolts 2. Disassemble, repair and remove dirt 3. Disassemble and clean it to remove dirt 4. Enlarge the inner hole of packing gland or make corrections. 5. Replace the valve stem 6. Clean or replace the valve seat.
Internal leakage of valve	1. Insufficient pre-tightening force 2. The sealing surface is damaged or dirty 3. The sealing ring is damaged	1. Increase the pre-tightening force 2. Trim or grind the sealing surface and remove dirt. 3. Replace the sealing ring.
Leakage at the stem packing	1. Insufficient packing pressing force 2. The packing is used too old and fails.	1. Tighten the gland screw bolts 2. Replace the packing

Leakage of gasket between valve body and support sleeve	1. Insufficient tightening torque 2. The gasket is damaged.	1. Increase the torque. 2. Replace the gasket

9. Suggestions on Disposal of Abandoned Valve

⚠Caution

●The following so-called discarded valves refer to the valves of fixed assets that are scrapped according to relevant regulations and whose production is stopped.

●After the product is scrapped, the parts polluted by the medium shall be disposed of by a qualified professional organization.

1. After the abandoned valve is shut down as planned, it should be identified and evaluated for safety and environmental factors, corresponding countermeasures should be formulated, and thorough process treatment should be carried out. After passing the sampling analysis, there will be no residual materials in it to achieve a state of safe shutdown and pollution control.

2. During the process of treatment of discarded valves, the emptying, pressure relief, replacement, and purging operations shall be carried out in strict accordance with the emptying and replacement scheme. The discharged "three wastes" materials shall be disposed of in accordance with relevant regulations to ensure that the wastewater and exhaust gas meet the discharge standards, and any kinds of wastewater and wastes are not allowed to be discharged into open ditches or rainwater drainage systems. Waste residue shall be sent to the place designated by the environmental protection department for disposal. Sound elimination and insulation facilities shall be provided during purging, and the noise generated shall not disturb residents (or cause pollution to the surrounding environment).

3. During the cleaning operation of abandoned valves, a detailed cleaning scheme shall be formulated to clarify the types, toxicity, hazards and control means of substances discharged during the cleaning process. Cleaning wastewater must be treated to meet the discharge requirements through analysis before it can be discharged or treated.

4. Valves that have been applied for asset scrapping shall be sealed or dismantled, or disposed of as waste materials. They shall not continue to be put into production, nor shall they be leased or transferred.

10. Ordering Notice

Please specify the following items during ordering:

1. Product model 2. Nominal diameter × valve seat diameter 3. Nominal pressure and flange connection type

4. Materials of valve body and internal components 5. Bonnet form 6. Flow characteristics

7. Actuator model and air supply pressure 8. Valve action type

9. Accessories (positioner, handwheel mechanism and pressure reducing valve) 10. Special requirements such as no oil or no copper

11. Medium name, temperature and specific gravity 12. Whether the medium viscosity contains suspension 13. Spare parts

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