User Manual

H100-021

Balanced Sleeve Low-temperature Control Valve

Chongqing Chuanyi Control Valve Co., Ltd.

Foreword

This Manual is applicable to the balanced sleeve low-temperature control valve composed of HA, HV actuators, electric actuators and H100-021 balanced sleeve low-temperature control valves. If an electric actuator is equipped, the structure, working principle, use, installation and commissioning instructions of various electric actuators are detailed in the instruction manual of electric actuator. The valve body components are exactly the same as this Manual. This Manual shall not be used for valves of other models.

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, dimensions and weight, maintenance and replacement of packing, 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 Operation Manual and safety precautions mainly introduce how to use the H100-021 balanced sleeve low-temperature control valve to adjust the flow, pressure, temperature and level of fluid and control the connection and disconnection 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. HA1~4 multi-spring modular actuator

According to the mode of action, it can be divided into direct action type (HA11~41D8) and reverse action type (HA11~41R8), as shown in Fig. 1- 1 (a) and Fig. 1- 1 (b).

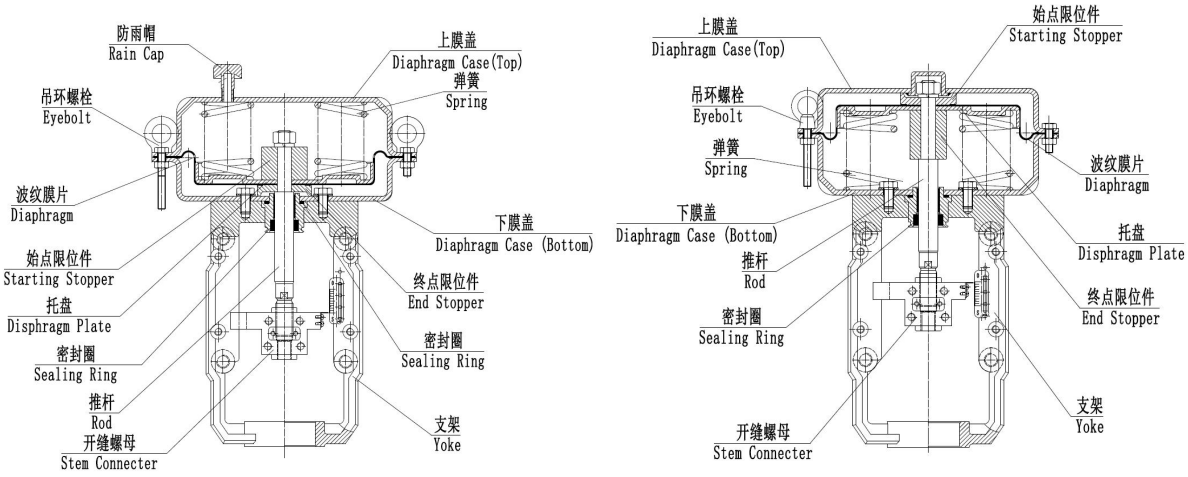


Fig. 1- 1 (a) Reverse Action (HA11~41R) Fig. 1-1(b) Direct Action (HA11~41D)

Structure: It is mainly composed of top and bottom diaphragm cases, diaphragms, rods, springs, end stoppers, starting stoppers, yokes and other parts.

Principle: When the signal pressure is input into the film air chamber, a thrust is generated on the film to move the rod component. When the reaction force generated by the compression spring being compressed and the thrust generated by the signal pressure on the film are balanced at a certain position, the distance that the rod moves is the stroke of the pneumatic film actuator.

Direct action: When the signal pressure of air chamber is zero, the rod component is located at the upper part; when the signal pressure is input in the air chamber, the rod component moves downward.

Reverse action: When the signal of the air chamber is zero, the rod part is located below; when the air chamber inputs the signal pressure, the rod part moves upwards.

1-2. Manual operating mechanism

A manual operating mechanism is provided to operate the control valve when there is no air supply.

1-2-1 Roof-mounted manual operating mechanism (THM) mounted on actuator (see Fig. 1- 2)

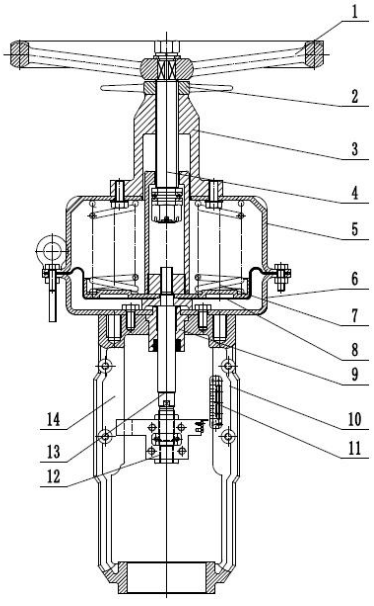


Fig. 1-2 Direct Action Actuator with Top-mounted Manual Operating Mechanism

No.	Name of parts	No.	Name of parts	No.	Name of parts
1	Handwheel disc	2	Lock nut	3	Handwheel body
4	Screw stem component	5	Diaphragm case (top)	6	Diaphragm case (bottom)
7	Spring	8	Diaphragm	9	Guide sleeve
10	Bracket	11	Travel board	12	Slotted nut
13	Rod	14	Bracket	15	

1-2-2 Side-mounted manual operating mechanism (SHM) mounted on HA3-4 actuators (see Fig. 1-3).

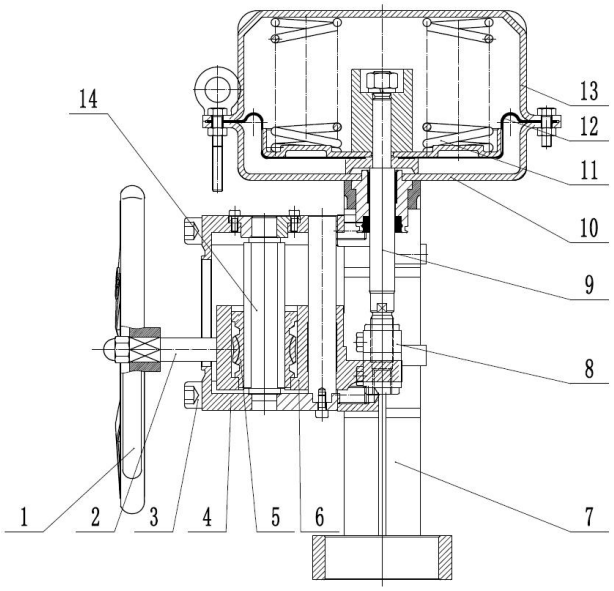


Fig. 1-3 Side-mounted Manual Operating Mechanism Mounted on Actuator

No.	Name of parts	No.	Name of parts	No.	Name of parts
1	Handwheel disc	2	Worm	3	Support rod
4	Chassis	5	Worm gear	6	Circle drive
7	Bracket	8	Slotted nut component	9	Rod
10	Diaphragm case (bottom)	11	Spring	12	Diaphragm
13	Diaphragm case (top)	14	Screw rod	15	

1-2-3 Structure of HA51 actuator, as shown in Fig. 1-4

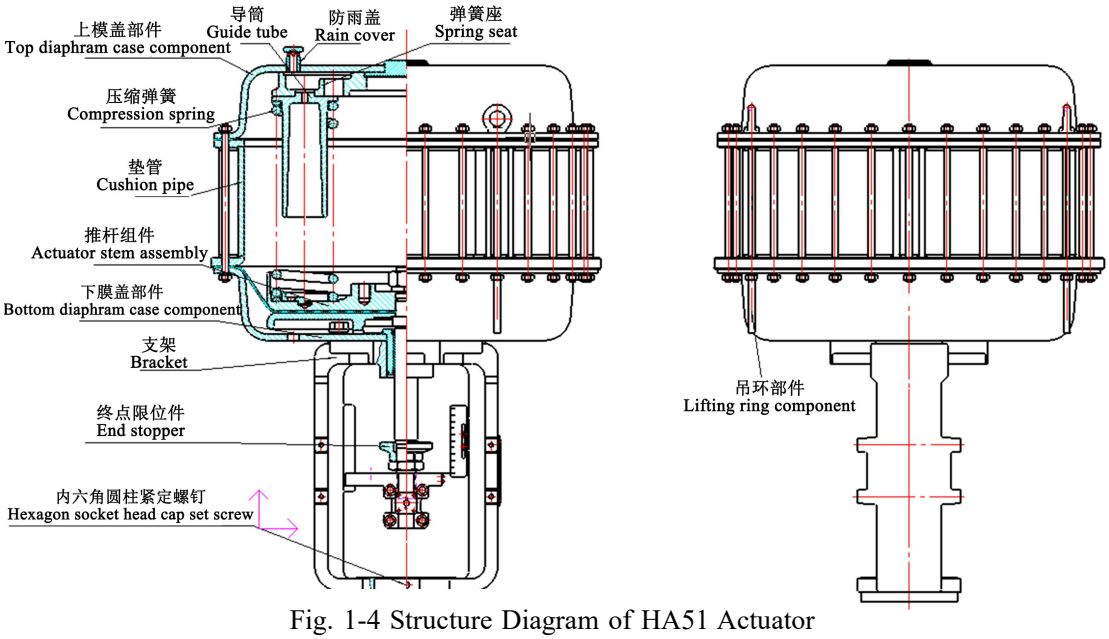


Fig. 1-4 Structure Diagram of HA51 Actuator

1-3 Structure and working principle of HV actuator

1. Structure and Working Principle of HV Single-acting Pneumatic Piston Actuator

Structure: The pneumatic piston actuator is mainly composed of upper cylinder head, lower cylinder head, cylinder block, piston, rod, spring, spring seat, yoke, slotted nut and other parts. See Fig. 2-1 and Fig. 2-2 for the structure.

Working principle: For the pneumatic single-acting piston actuator, after the air source pressure from the air supply system is input into the cylinder chamber, thrust will be generated on the piston to overcome the reaction force of the compression spring and move the rod for a certain distance, which is the stroke of the actuator.

Pneumatic single-acting piston actuator is divided into direct action and reverse action. When the air source pressure is input to the cylinder chamber, it makes the rod move downwards as a direct action, and it makes the rod move upwards as a reverse action type.

Manual operation:

(1) With side-mounted handwheel

① In case of direct action, disconnect the air supply to the cylinder first, move the handwheel clockwise, and the screw stem moves downwards to drive the stopper and rod to move downwards as a whole for manual operation. When switching to automatic operation, move the handwheel counterclockwise so that the screw stem is at the uppermost end (until the handwheel cannot be moved), and connect the air source for automatic operation, as shown in Fig. 2-1.

② During reverse action, first disconnect the air supply to the cylinder, move the handwheel clockwise to make the screw stem move downwards. When the through-hole on the rod is aligned with that on the screw stem, insert the link pin into the hole; then move the handwheel counterclockwise to make the screw stem and rod move upwards for manual operation. When switching to automatic operation, the link pin must be pulled out first, and then the handwheel shall be moved counterclockwise so that the screw stem is at the highest position (until the handwheel cannot be moved), and the air source shall be connected for automatic operation, as shown in Fig. 2-2.

③ In case of double acting, disconnect the air supply to the cylinder first, move the handwheel clockwise to make the screw stem move downwards, and insert the link pin into the hole when the through-hole on the rod is aligned with that on the screw stem; in case of an air-to-open valve, move the handwheel counterclockwise to make the screw stem and rod move upwards to open the valve; in case of an air-to-close valve, move the handwheel clockwise to make the screw stem and rod move downwards to close the valve. When switching to automatic operation, the link pin must be pulled out first, and then the handwheel shall be moved counterclockwise so that the screw stem is at the highest position (until the handwheel cannot be moved), and the air source shall be connected for automatic operation, as shown in Fig. 1-2-1.

(2) With top-mounted handwheel

① In case of direct action, disconnect the air supply to the cylinder first, loosen the lock nut, and then move the handwheel clockwise to

make the screw stem move downward for manual operation. When switching to automatic operation, move the handwheel counterclockwise so that the screw stem is at the top end (until the handwheel cannot be moved), tighten the lock nut, connect the air source and carry out automatic operation, as shown in Fig. 2-3.

② In case of reverse action, first disconnect the air supply to the cylinder, loosen the lock nut, and then move the handwheel counterclockwise to make the screw stem move upwards for manual operation. When switching to automatic operation, move the handwheel clockwise, and the screw stem moves downwards so that both the handwheel and lock nut are flush with the handwheel body. Then tighten the lock nut, connect the air source, and carry out automatic operation, as shown in Fig. 2-3

(3) With hydraulic handwheel

First disconnect the air supply to the cylinder, inject anti-wear hydraulic oil with specified label and meeting ISO cleanliness below Grade 10, then jack the pressure relief switch clockwise, press it up and down with an extension rod, so as to carry out manual operation and realize valve opening and closing. When switching to automatic operation, fully open the pressure relief switch counterclockwise. When the pointer of the pressure gauge is 0, connect the air source for automatic operation, as shown in Fig. 2-4.

Precautions:

a. When manually operating the extension rod for pressurization, pay attention to whether there is any change in the pressure gauge and whether there is oil leakage at the high-pressure pipe joint to prevent natural aging of rubber seals.

b. During manual-automatic operation, it must be ensured that the handwheel is completely depressurized. Automatic operation can only be carried out when the pressure gauge indicates 0 (factory default is automatic).

c. If the handwheel has not been used for a long time, please drain the hydraulic oil in time to prevent the deteriorated hydraulic oil from affecting the performance of the handwheel.

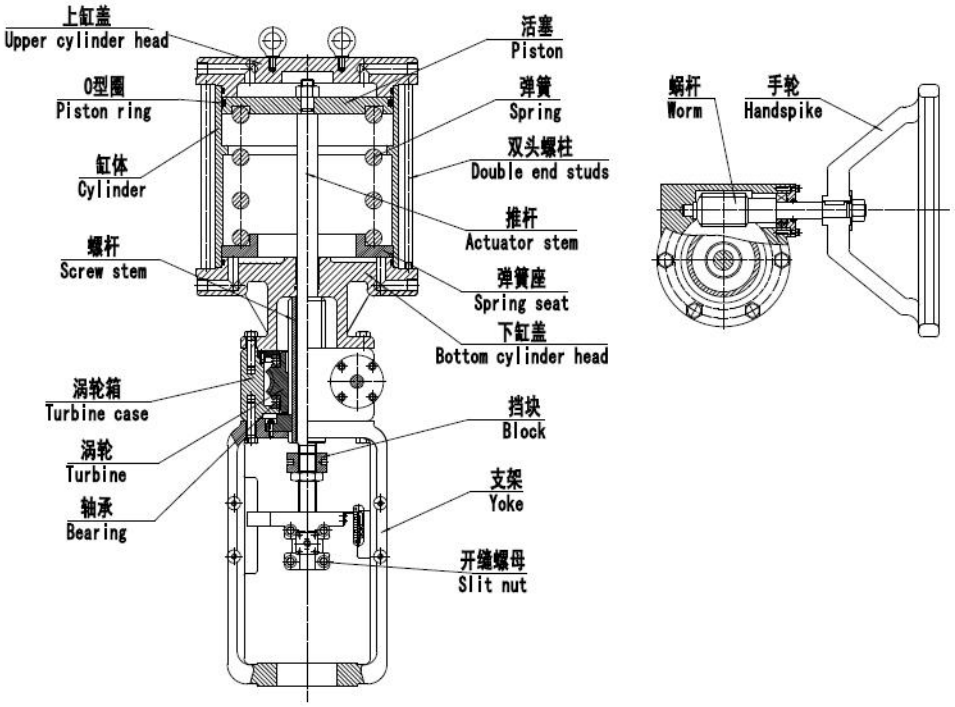


Fig. 2-1 HV Direct Action with Side-mounted Handwheel

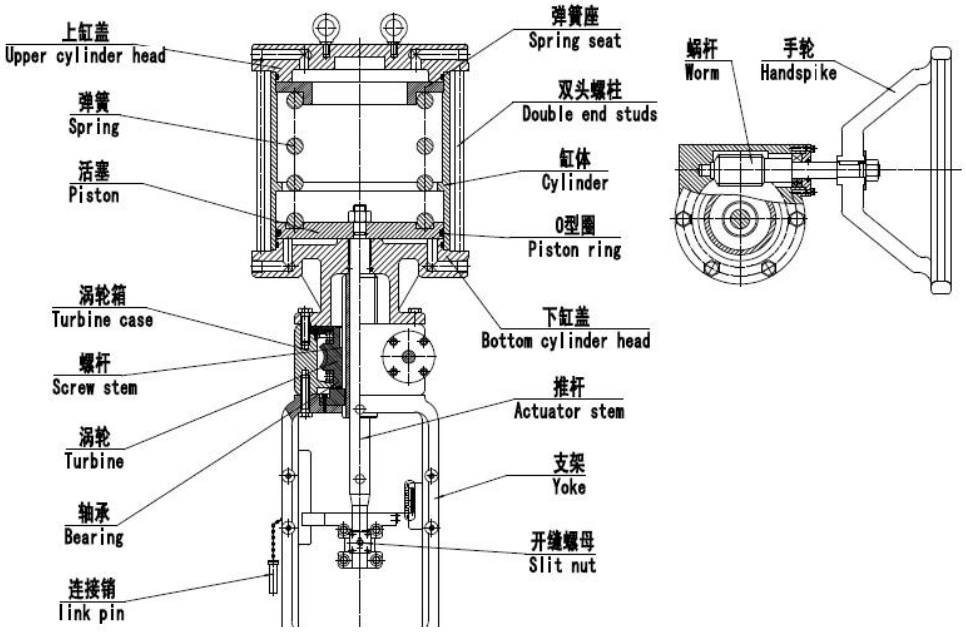


Fig. 2-2 HV Reverse Action with Side-mounted Handwheel

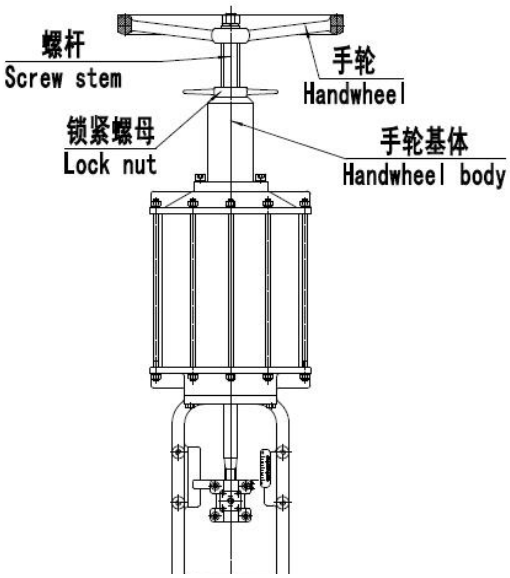


Fig. 2-3 HV Single-acting with Top-mounted Handwheel

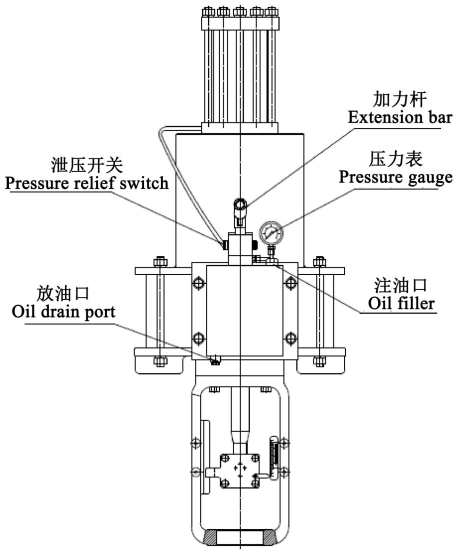


Fig. 2-4 HV Single-acting with Hydraulic Handwheel

2. Structure and Working Principle of HV Double-acting Pneumatic Piston Actuator

Structure: The double-acting cylinder piston actuator is mainly composed of upper cylinder head, lower cylinder head, cylinder block, piston, rod, stud bolt, slotted nut and other parts, as shown in Fig. 3-1.

Working principle: For the pneumatic double-acting piston actuator, after the air source pressure from the air supply system is input into the cylinder chamber, thrust will be generated on the piston to move the rod for a certain distance, which is the stroke of the actuator.

Manual operation:

(1) With side-mounted handwheel

First disconnect the air supply to the cylinder, open the globe valve, move the handwheel **clockwise** to make the screw stem move downwards, and insert the link pin into the hole when the through-hole on the rod is aligned with that on the screw stem. In case of an

air-to-close valve, move the handwheel clockwise; in case of an air-to-open valve, move the handwheel counterclockwise for manual operation. When switching to automatic operation, the link pin must be pulled out first, and then the handwheel shall be moved counterclockwise so that the screw stem is at the highest position (until the handwheel cannot be moved), the globe valve shall be closed, and the air source shall be connected for automatic operation, as shown in Fig. 3-1.

(2) With top-mounted handwheel

First disconnect the air supply to the cylinder, open the globe valve and loosen the lock nut. In case of an air-to-close valve, move the handwheel clockwise; in case of an air-to-open valve, move the handwheel counterclockwise for manual operation. When switching to automatic operation, measure the length of the screw stem between the handwheel and the handwheel body with a handwheel position scale to ensure that they are roughly equal. Then tighten the lock nut, close the globe valve, connect the air source, and carry out automatic operation. See Fig. 3-2

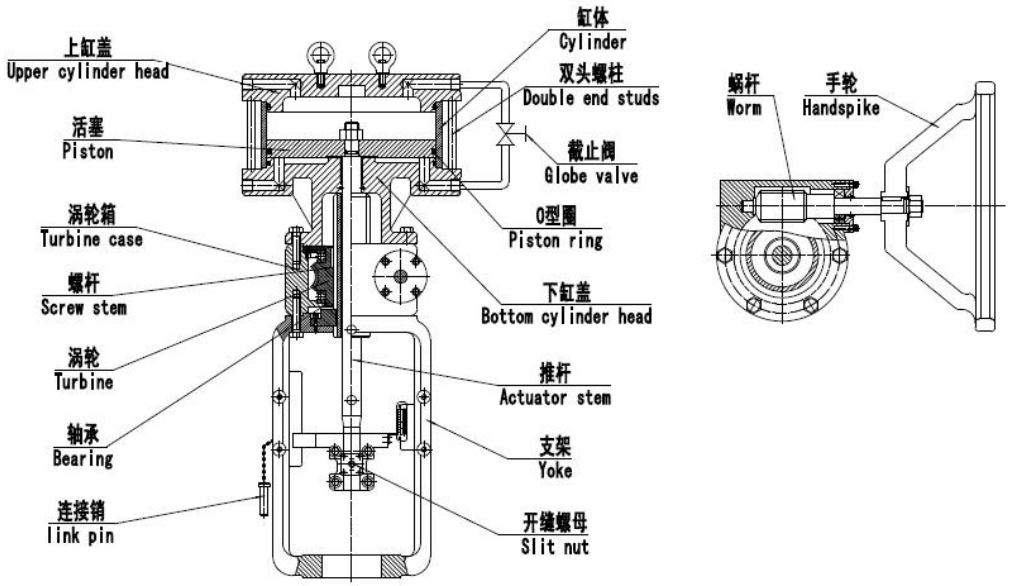


Fig. 3-1 HV Double-acting with Side-mounted Handwheel

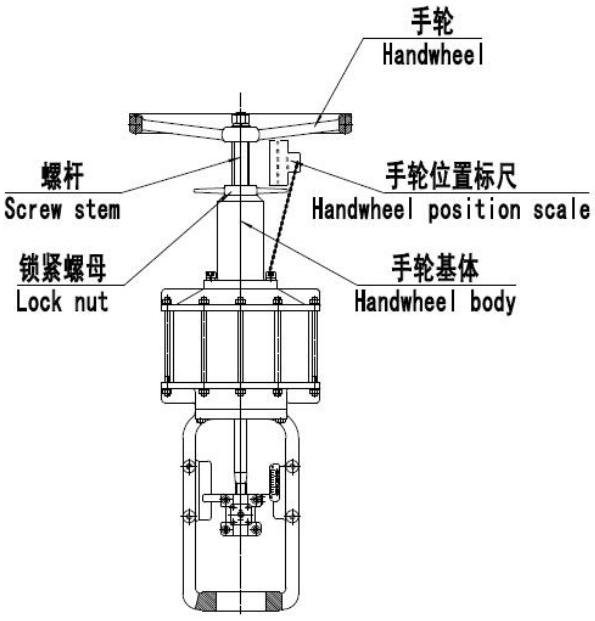


Fig. 3-2 HV Double-acting with Top-mounted Handwheel

1-4 H100-021 Valve Body Assembly

Structure: It is mainly composed of upper valve cover, valve body, valve seat, valve core components, packing, pressing plate, guide ring and other parts. The valve core component consists of a valve core and a valve stem, fixed with a cylindrical pin. The bonnet has a packing

chamber with PTFE V-shaped packing or graphite packing inside, as shown in Fig. 4.

Principle: The control valve is in direct contact with the regulated medium. As the upward and downward movement of the valve element changes the flow area between the valve element and the valve seat, thus changing the resistance coefficient of the valve and achieving the regulation effect on the medium flow.

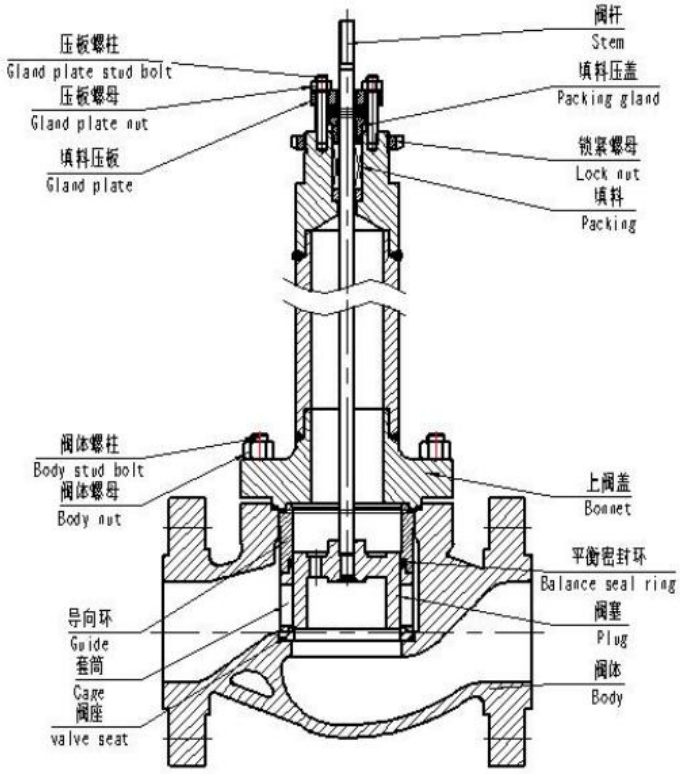


Fig. 4 Structure of H100-021 Valve Body Assembly

2. Main Technical Parameters

●Valve body

Form	**Straight-through Balanced Sleeve Cast Ball Valve**
Nominal diameter	32、40、50、65、80、100、125、150、200、250、300、350、400、450、500、600mm
Nominal pressure	Class 150, 300, 600, 900, 1500:
Connection type	Flange type: FF, RF, RJ, TG, MFM welded versions: SW(40~50mm): BW (65~250mm), flange standard: JIS B2201, JB/T79.1-94(PN1.6MPa), JB/T79.2-94(PN4.0, 6.4MPa), ANSI B16.5-2009, HG20592-2009, and HG20615-2009
Dimensions	Please refer to Table 5
Material of valve body and bonnet	CF3、CF3M、CF8、CF8M
Bonnet type	Elongation III (EIII): -196~+200°C
Gland type	Bolt compression type
Filler	V-shaped PTFE packing, graphite packing. Please refer to Fig. 2

Gasket	Zigzag (316, 316L)
Surface coating	Dark gray (epoxy). However, when the valve body is made of stainless steel, no coating will be applied to the valve body.

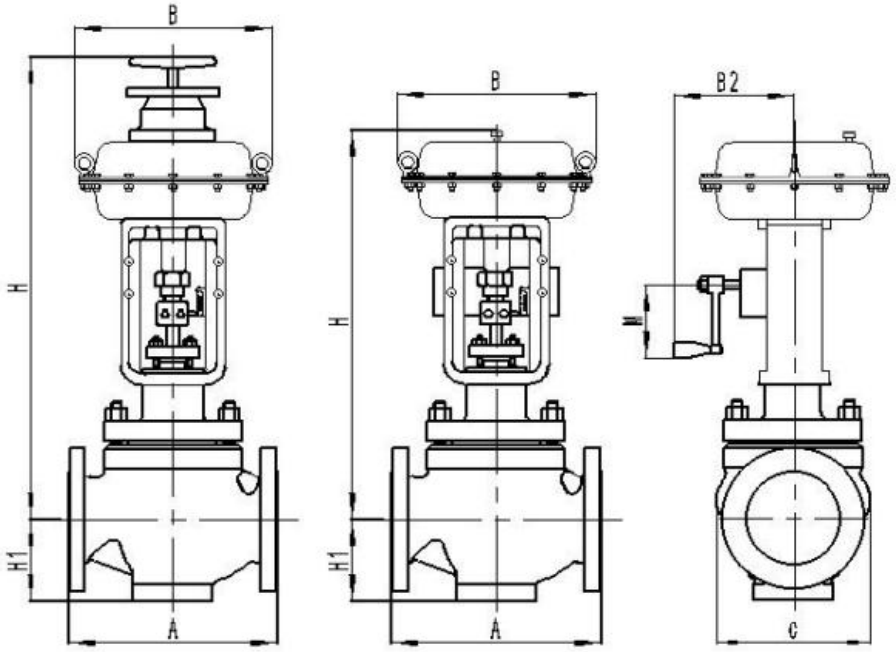
● Trim

Type of plug	Single-seat plunger type
Flow characteristics	High volume flow characteristics Equal percentage characteristics（%F）and linear characteristics（LF） High-precision flow characteristics Equal percentage characteristics (%) and linear characteristics (L)

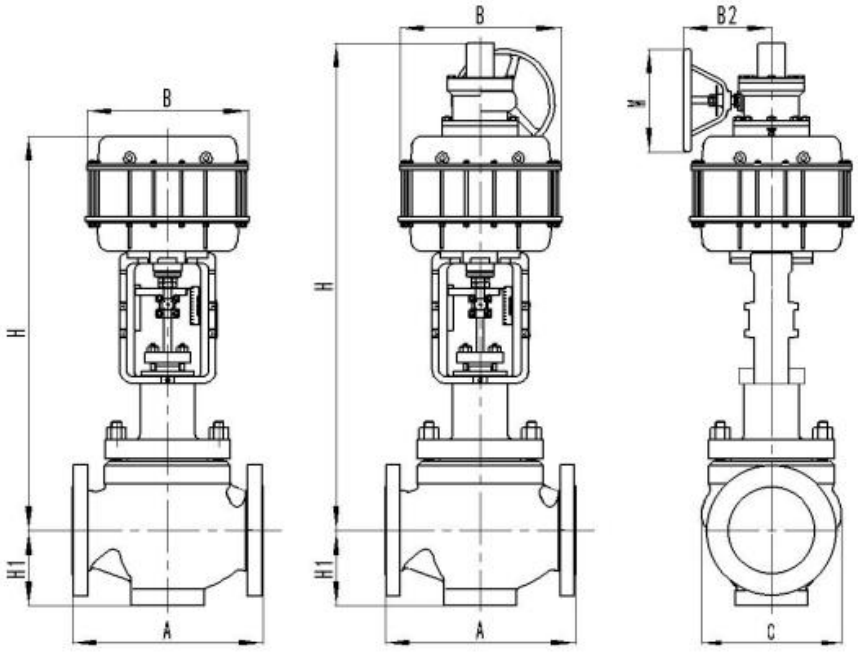
● Actuator

Model / **No.** / **Size**	**Pneumatic diaphragm type**	**Cylinder piston type**		**Electronic**	**Intelligent type**
	HA	HV		EIL	M8 series
	Multiple spring type	Single action	Double action		
Application	Adjustment	Adjustment		Adjustment	
Air supply pressure or voltage	Air supply pressure (spring range) 400（80～240）kPa	Air supply pressure 400～700kPa		Voltage: 220 /380V 50HZ Input signal: 4~20mA DC	Voltage: 220 /380V 50HZ Input signal: 4~20mA DC
Interface	Air piping: NPT 1/4(HA1~HA4); NPT 1/2(HA5Y)	Air piping: NPT 3/8(VA/VP4~6); NPT 1/2（VA/VP7~8）		Wiring: 2-PF3/4	Wiring: PG13.5
Direct action	Air pressure increase valve closed	Air pressure increase valve closed		Input signal valve closed	Input signal valve closed
Reverse action	Air pressure increase valve ON	Air pressure increase valve ON		Input signal valve open	Input signal valve open
Ambient temperature	Standard type -30～+70°C High temperature type 0~+100°C Low-temperature type -40～+40°C	Standard type: -20°C to +60°C High temperature type 0~+100°C Low-temperature type -50～+60°C		－20～＋70℃	－25～＋70℃
Paint color	Water blue (color code RAL5021)	Water blue (color code RAL5021)			
Annex	Positioner, air filtering and pressure reducing valve, lock-up valve, valve transmitter, handwheel mechanism, etc.	Positioner, air filtering and pressure reducing valve, lock-up valve, valve transmitter, handwheel mechanism, etc.		EIL actuator handwheel	M8 actuator handwheel

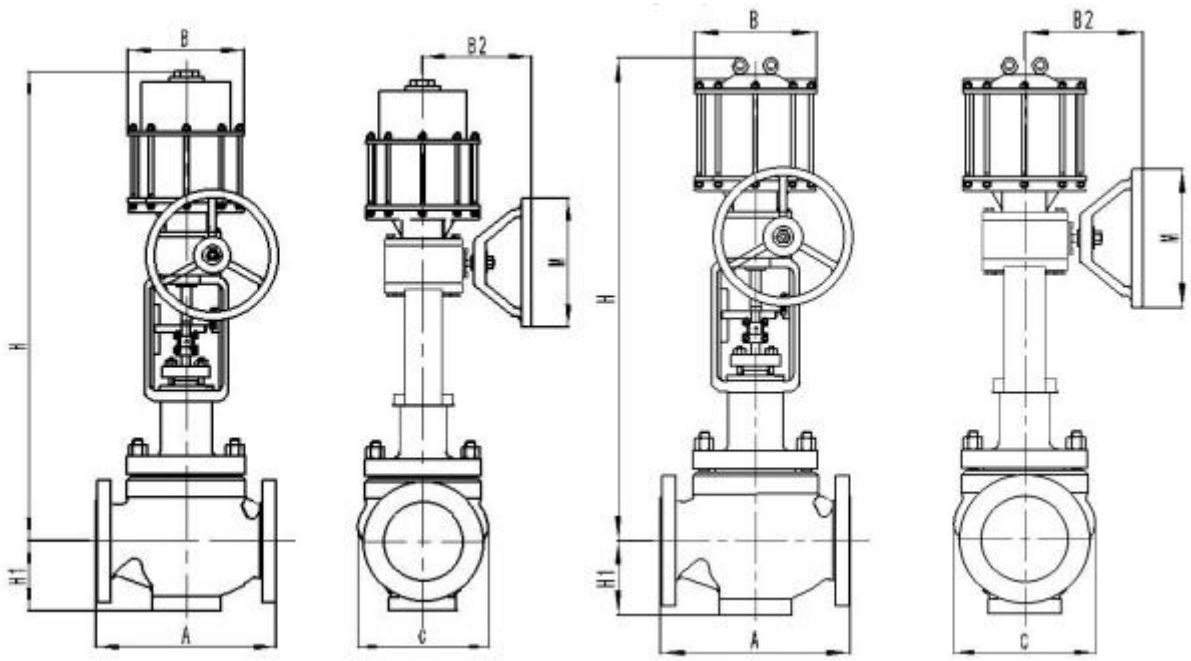
●Dimensions and weight



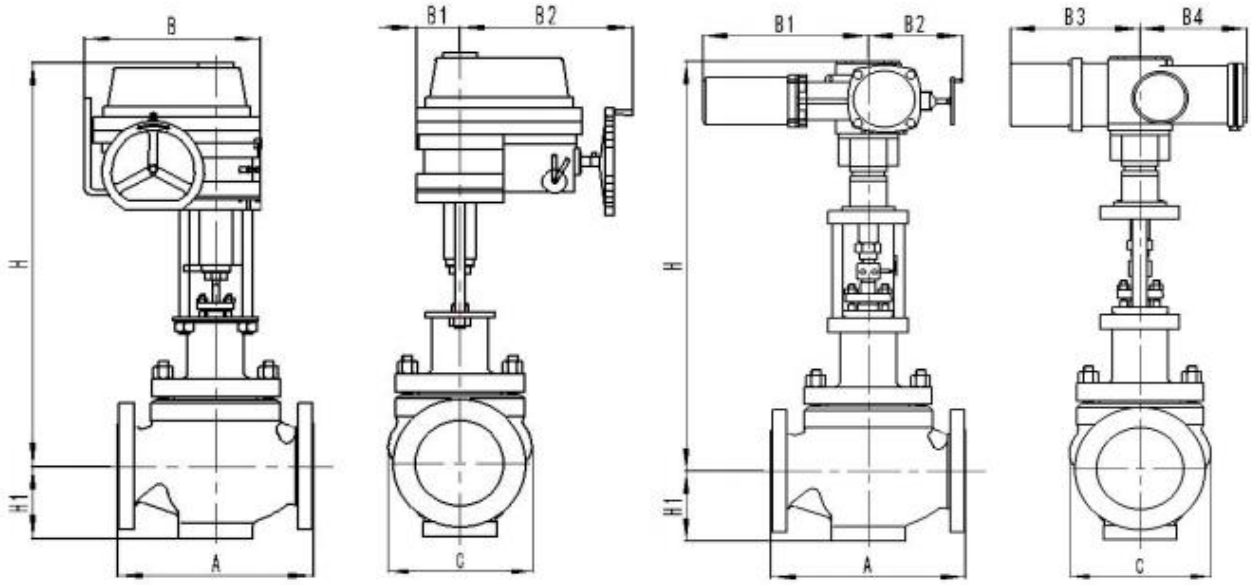
With HA11~HA41 actuator



With HA51 actuator



With HV single/double-acting actuator



With EIL/M8 actuator

Fig. 5 Overall Dimensions

Table 1-1 Flange Distance Dimensions mm

Nominal diameter	A							
	Class 150 RF PN16 RF	JIS 16K RF	Class 300 RF PN40MFM	Class 600 RF PN63MFM	JIS 16K TG	JIS 20K TG	JIS30K TG	JIS 40K TG
32	190	I	205	210	I	I	I	I
40	222	231	235	251	235	236	248	251
50	254	263	267	286	265	267	276	286
65	276	288	292	311	290	292	303	311
80	298	313	317	337	310	317	326	337
100	352	364	368	394	360	368	379	394
125	403	I	425	457	I	425	I	457
150	451	465	473	508	475	473	486	508
200	543	560	568	610	570	568	580	610
250	673	I	708	752	I	I	I	I
300	737	I	775	819	I	I	I	I

Nominal diameter	A						
	Class 150 RJ	Class 300 RJ	Class 600 RJ	Class 300 TG	Class 600 TG	Class 150SW, BW	Class 150, 600SW, BW
32	235	248	251	244	248	251	251
40	235	248	251	244	248	251	251
50	267	283	289	276	283	286	286
65	289	308	314	302	308	311	311
80	311	333	340	327	333	337	337
100	365	384	397	378	391	394	394
150	464	489	511	483	505	473	508
200	556	584	613	578	606	568	610

Nominal diameter	A						
	JIS63K	Class 900		Class 1500		Class 2500	
	RF	RF (SW, BW)	RJ	RF (SW, BW)	RJ	RF (Sw, BW)	RJ
40	323	333	333	333	333	358	361
50	354	375	378	375	378	400	403
80	431	440	443	460	463	498	504
100	496	510	513	530	533	575	585
150	699	715	718	770	776	820	833
200	895	915	918	972	982	1020	1036
250	—	1137	1140	1327	1336	I	I
300	I	1311	1314	1400	1416	I	I

Note: Flange distance conforms to IEC60534-3 standard.

Table 1-2 Maximum Dimensions of Side Surface mm

Nominal diameter	C					
	PN16	PN40	PN64	Class150	Class300	Class600
32	147	149	152	147	149	152
40	150	150	170	150	150	170
50	177	180	184	177	180	184
65	198	202	206	198	202	206
80	209	214	218	209	214	218
100	249	256	262	249	256	275
125	301	306	316	301	312	330
150	351	358	370	351	358	370
200	434	450	458	434	450	468
250	560	568	574	560	568	580
300	575	583	589	575	583	597

Nominal diameter	C		
	Class900	Class1500	Class2500
40	180	180	205
50	215	215	235
80	240	265	305
100	290	310	355
150	380	395	485
200	470	498	550

Table 2-1 Overall Dimensions mm

Nominal diameter	Actuator	H (Elongation III EIII)	B	B1	B2	B3	B4	M	H1
40	HA21	1095	281		273.5			175	70
	HA31	1245	363	I	278.5		I	175	
	EIL04	1310	172		258			I	
50	HA21	1100	281		273.5			175	80
	HA31	1250	363	I	278.5			175	
	EIL04	1315	172		258			I	
65	HA31	1290	363		278.5			175	88
	HA41	1550	520	I	303		I	320	
	EIL08	1475	229		338			I	
	M8610+L8210	1530	I	285	346	253	350	I	
80	HA31	1295	363		278.5			175	98
	HA41	1560	520	II	303			320	
	EIL08	1485	229		338			I	
	M8610+L8210	1535	I	285	346	253	350	I	
100	HA31	1315	363		278.5			175	113
	HA41	1575	520		303			320	
	HV61SR5	2115	475		384			380	
	HV51D00	1825	382		324			380	
	EIL08	1515	229		338			I	
	M8610+L8210	1555	I	285	346	253	350	I	
125	HA31	1450	363	I	278.5			175	146
	HA41	1630	520		303			320	
	HV61SR5	2175	480		384			380	
	HV51D00	1880	382		324	—		380	
	HV61D00	1995	480		384	—		380	
	HV71D00	1995	580		384			380	
	EIL08	1670	229		338			I	
	M8610+L8210	1795	II	313	350	253	350	I	

150	HA31	1450	363		278.5			175	170
	HA41	1630	520		303		II	320	
	HV61SR5	2175	480		384		—	380	
	HV51D00	1880	382		324			380	
	HV61D00	1995	480		384		II	380	
	HV71D00	1995	580		384		II	380	
	EIL08	1660	229		338			I	
	M8610+L8210	1795	I	313	350	253	350	I	
200	HA41	1780	520	—	303	—	—	320	220
	HV51D00	2050	382		324			380	
	HV61D00	2165	480		384	—	—	380	
	HV71D00	2165	580	—	384			380	
	M8620+L8220	2205	—	313	350	253	350	—	
250	HA51	II	605		380	—		325	305
	HV61D00	I	480		384			380	
	HV71D00	II	580		384			380	
	EIL25	II	258		356			I	
	M8620+L8230	I	—	313	350	253	350	I	

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.

●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 matter left will cause leakage between valve core and valve seat. In addition, if the foreign matter enters the guide section of valve core,

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. 6 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.

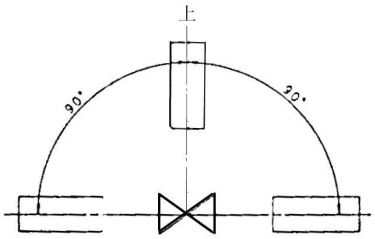


Fig. 6

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 tray, 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

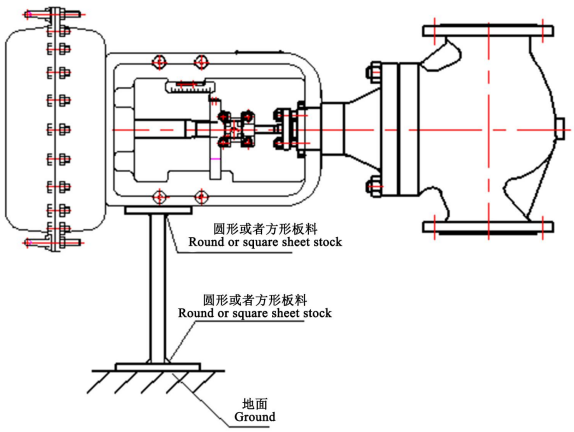
(3) AT series: any installation

(4) AW series: any installation

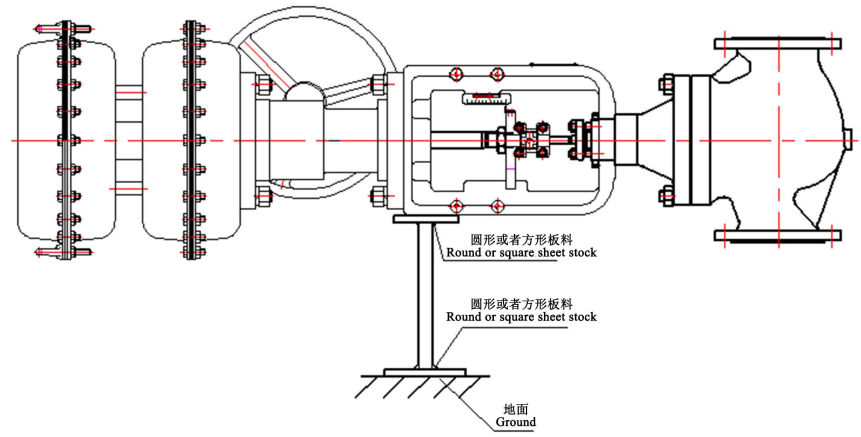
(5) VR series: The actuator shall be installed vertically, and horizontal installation is prohibited.

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.

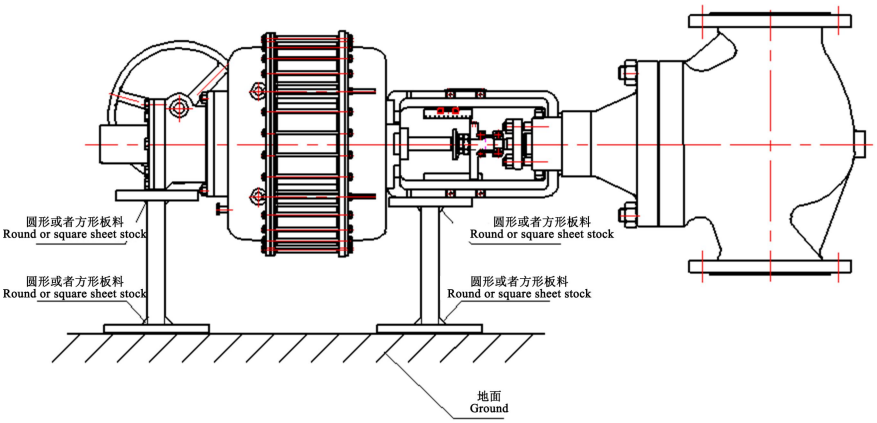
●When the actuator is installed horizontally, it is necessary to support the schematic diagram with supports:

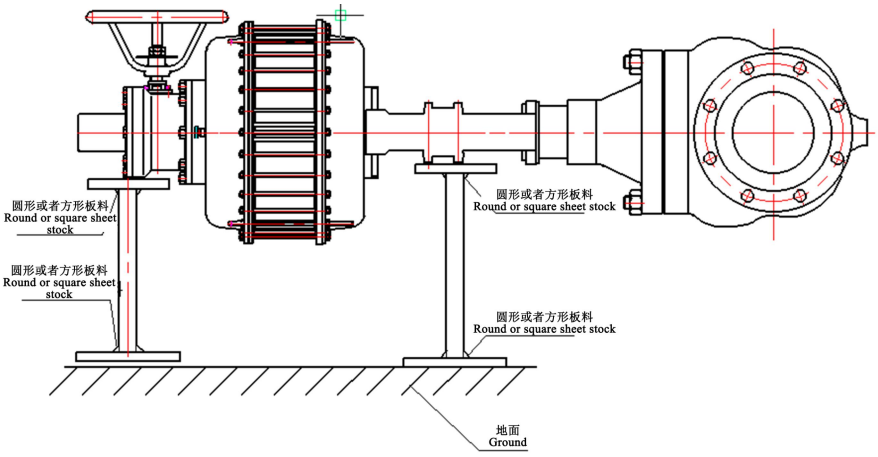


Schematic Diagram of Horizontal Installation Support of HA1~4



Schematic Diagram of HA4X2 Horizontal Installation Support





Schematic Diagram of HA5 Horizontal Installation Support

Fig. 7 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.

3-5 Stroke adjustment

All control valves produced by our factory have been debugged before leaving the factory. However, if they have been disassembled for inspection, when assembling the actuator and valve body components, it is necessary to adjust the rod stroke (to obtain the rated stroke). At this time, please follow the following sequence (stroke adjustment is only limited to the actuator HA produced by Chuanyi Control Valve, and refer to the corresponding manufacturer's actuator instructions for stroke adjustment of actuators of other manufacturers):

（1） Install the actuator on the valve body component and tighten the lock nut (which can be knocked and tightened with a chipping hammer).

（2） Install the air pipe on the actuator so that the pressure can be changed freely through the pressure reducing valve (install it on the top diaphragm case for direct action type and install it on the bottom diaphragm case for reverse action type).

（3） Press down the valve stem to make the valve element contact with the valve seat.

Direct action actuator

（4） Verify the spring range as indicated on the nameplate and apply source pressure to the actuator at its upper limit value.

（5） When the air source pressure is increased to reach the required supply air pressure, the actuator rod can move 1~2mm (this is the rod travel allowance)

（6） Decrease the air pressure and increase it again up to the upper spring range

(7) In this state, when the threads of the slotted nut match those on the rod and valve stem of the actuator, tighten them with hexagon bolts. See Fig. 10

Reverse action actuator

(8) Confirm the spring range marked on the nameplate, and apply air pressure of its lower limit to the actuator. The actuator rod can now

move 1 to 2 mm.

(9) Increase the air pressure and then decrease it to the lower limit of spring range.

(10) Proceed in the order of item 7 for the direct action actuator.

Note: Due to unfavorable conditions such as impact and falling inevitably occur during transportation and installation, if not disassembled, the direct and reverse action actuators only need to be adjusted according to (4)~(7) or (4)~(6) above after installation.

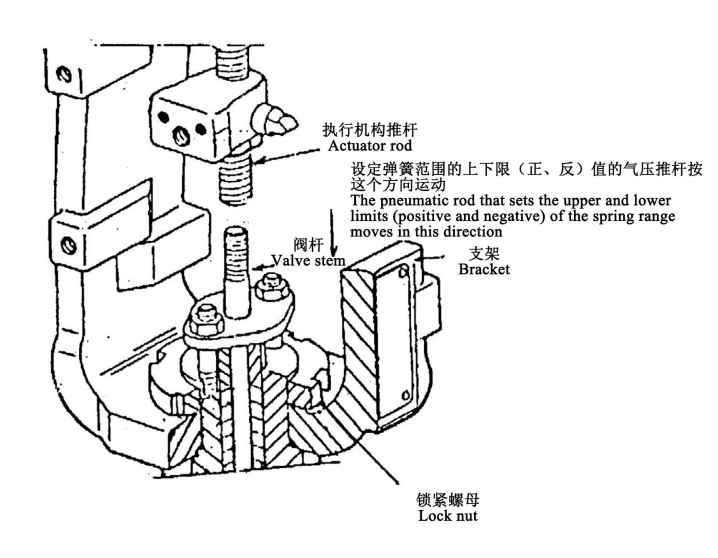


Fig. 8

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.

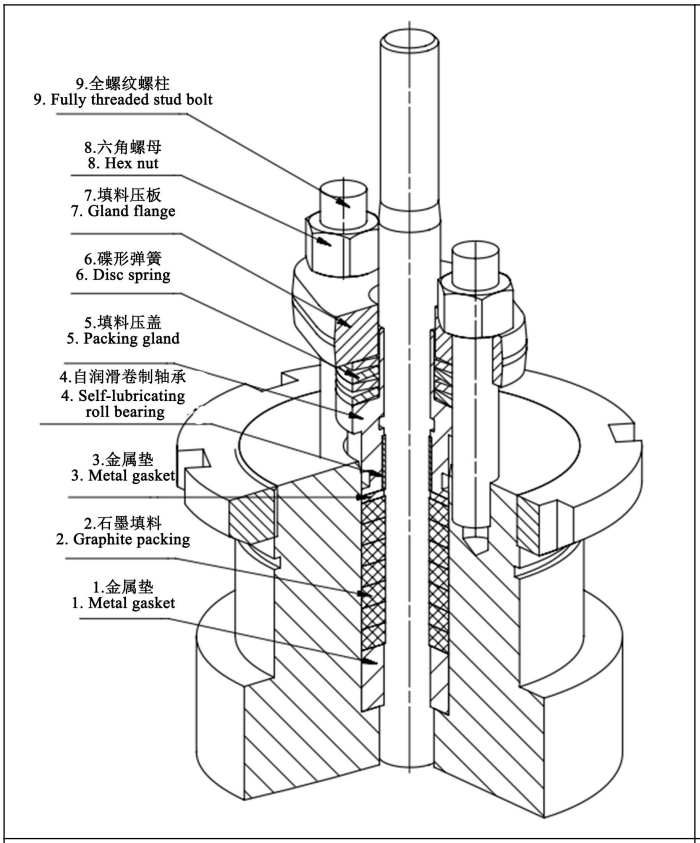
●Isolate the process pressure from the valve by bypassing or completely shutting down the process. Completely relieve the process pressure on both sides of the valve. Drain the process medium on both sides of the valve.

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

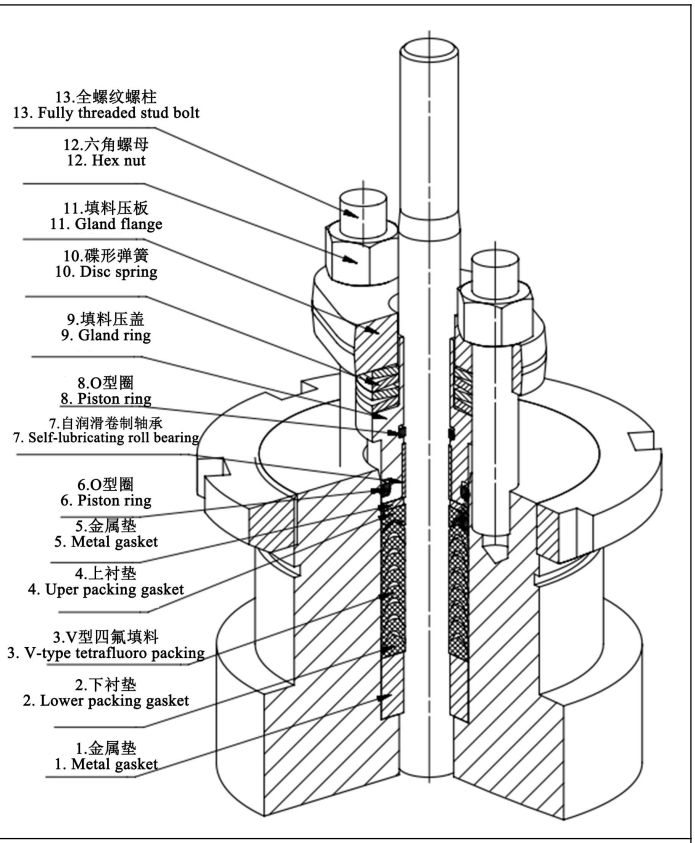
●Use a lockout to ensure that the above measures remain effective when you work on the equipment.

●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

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 seal ring or seating surface.

(9) Remove the bonnet gasket and cover the opening of the valve to protect the surface of the seal 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 H100-021 balanced sleeve low-temperature control 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. 9-1.

(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

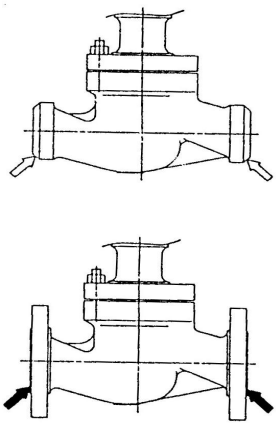
- When taking out the control valve from the packing box and lifting it, please use a standardized sling suitable for the weight of the control valve to avoid damaging the control valve. At this time, please use the eyebolts on both sides of the actuator (the eyebolts are also a pair of bolts with ring heads for pressing the diaphragm cover), and make the load even. Please refer to Fig. 12-2. 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. 12-3. 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 the piping connecting flange as shown in Fig. 9-1 to avoid leakage on the sealing surface.
- When accessories such as positioner, accelerator and solenoid valve and manual operating mechanism are installed on the



Avoid damage

Surface indicated by the arrow

Fig. 9-1

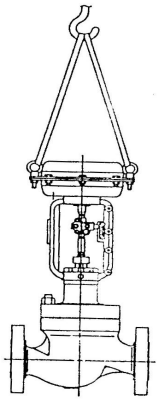


Fig. 9-2

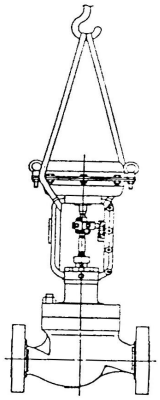


Fig. 9-3

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

Fault Status	Main causes	Troubleshooting
The valve does not act or acts slowly	1) Low air supply pressure 2) Blockage or leakage of air piping 3) Actuator fault, such as diaphragm rupture and air leakage 4) There are attachments on the guide part of the valve element, and the valve stem is bent or broken 5) Abnormal accessories: positioner, solenoid valve, etc.	1) Supply specified air pressure 2) Clean and reinforce the connecting parts before piping 3) Replace the diaphragm 4) Clean and replace parts 5) Apply the specified air pressure to the actuator air connection without connecting accessories. If there is no abnormality, adjust the positioner again or check and replace other accessories.
Unstable action	1) The rigidity of the actuator is too small, and the change in medium pressure causes insufficient thrust. 2) Positioner signal variation 3) Variation in supply pressure 4) Failure of pressure reducing valve	1) Actuators with high rigidity are used instead. 2) Adjust various settings of the positioner and check the signal system. 3) Confirm or replace the diameter of air supply piping 4) Repair and replace the pressure reducing valve.
The leakage of the valve is large	1) Corrosion and damage of sealing surfaces between valve element and valve seat, and between valve seat and valve body. 2) The medium pressure difference is too large, and the output force of the actuator is insufficient 3) Foreign matters invade the valve body 4) Insufficient full stroke	1) Repair or replace parts and components 2) Install a positioner or replace the actuator 3) Remove foreign matters 4) Adjust the full stroke
Packing	1) The packing gland is not pressed tightly 2) Aging, deterioration or sprain of PTFE packing 3) Wear of sealing surface of valve stem	1) Tight packing 2) Replace the packing 3) Replace the valve stem
Leakage at connections	1) Loose nut 2) The sealing gasket is damaged. 3) Corrosion or damage of sealing surfaces of other parts in contact with the gasket	1) Tighten the nut 2) Replace the gasket 3) Repair or replace relevant parts

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

Mailing address: No. 879, Caihe Road, Caijiagang Town, Beibei District, Chongqing

Chongqing Chuanyi Control Valve Co., Ltd.

Business contact: Sales Department

Tel.: 023-67032525/27/26

Fax: 023-67032523

Email: sales11@cqcy.com

Website: www.siccv.com

Postal code: 400707

Version No.: CY11-2025B-01