Product Manual

H100

Cryogenic regulating Valve

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Preface

This manual is used to the service instruction of H100 cryogenic regulating valve which is assembled by HA series multi-spring diaphragm actuator. If the valve equipped with electric actuator, various types of electric actuator structure, working principle, usage, installation, debugging instructions please refer to electric actuator, valve components and the instructions are exactly the same to this manual, other types of valves don't use this manual.

User (customer) should read this manual carefully and fully understand this manual before use. In addition, this manual must be kept well by equipment operator and maintenance person for reference and reading as necessary after equipment items have been normally operated.

The main content of this manual includes structure and function principle, main technique parameters, replaceable service parts, acceptance, handling and storage, installation, operation preparation and operation, daily inspection and regular inspection, malfunction, and its' identification method and measures, disassembly, assembly of control valve and so on

Due to continuous improvement of control valve, it is possible that the content of the manual does not comply with specific condition of purchased product. If there is any question about the purchased product or this manual, please contact with our sales department:

Sales department：TEL：023- 67032525、67032526、67032527、67032521
FAX：023-67032513

Safety Precautions

In order to ensure safe operation of acceptance, handling and transportation, storage, installation, operation preparation and maintenance, the valve must be used correctly and maintained regularly. Please read safety attention items carefully and understand entirely before operation.

The safety precautions in this manual introduces how to use H100 cryogenic regulating valve in order to adjust fluid flow, pressure, temperature, liquid level as well as fluid on-off. User will bear related safety liability if operation does not comply with the instructions or the operation method explained in this manual.

The safety precautions must be followed in the text as follows:

⚠ Warning

It may cause casualties if these precautions are not obeyed.

⚠ Notice

The valves or other equipment items would be in damage or failure if these precautions are not obeyed。

1．Structure and action principle

1-1．HA1~4 Multi-spring diaphragm actuator

It falls into the direct action type（HA1~4D）and the reverse action type（HA1~4R）according to the mode of action, refer to 1-1 a)、1-1 b).

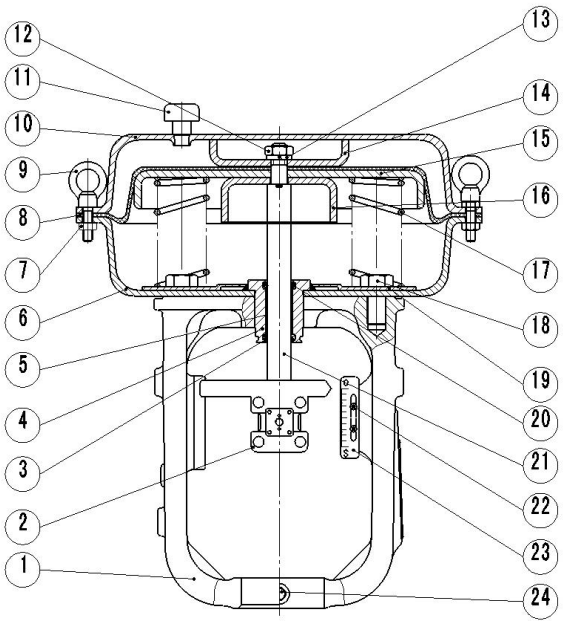


Fig 1-1 a) Direct action Type（HA1~4D）

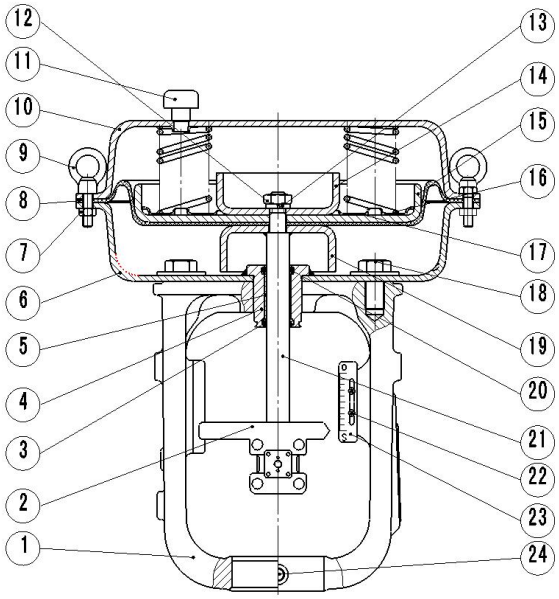


Fig.1-1 b) Reverse action Type（HA1~4R）

Key	Description	Key	Description	Key	Description
1	Yoke	2	Slit nut	3	Dust ring
4	Axis guide	5	Circle bushing	6	Diaphragm cover(Bottom)
7	Hex nut	8	Diaphragm	9	Eyebolt
10	Diaphragm cover (Top)	11	Rain hat	12	Hex nut
13	Spring washer	14	Starting stopper	15	Pallet
16	End stopper	17	Compression Spring	18	Hexagon headed bolt
19	Spring seat	20	Seal ring	21	Actuator stem
22	Cross recess pan head screw	23	Travel brand	24	Hexagon headed bolt

Structure：It is basically consists of diaphragm cover (top and bottom), diaphragm, actuator stem, compression spring, axile guide, yoke etc.

How it works：With a signal pressure input into the diaphragm pneumatic room, a thrust will be generated on the surface of the diaphragm to make the push pole moved. When the counterforce produced from the compression spring is equal to the thrust in a position, the displacement distance of the push pole is the stroke of the pneumatic diaphragm actuator.

Direct Action：When the signal pressure in the air chamber is zero, the actuator stem is located above. With the signal pressure input into the air chamber, the actuator stem moves downwards.

Reverse action: When the signal pressure in the air chamber is zero, the actuator stem is located below. With the signal

pressure input into the air chamber, the actuator stem moves upwards.

1-2 Manual operating mechanism

The manual operating mechanism is designed to operate the control valve without air supply.

1-2-1． Manual manipulation device（ THM ）is equipped on the top of the actuator, see Fig.1-2 a).

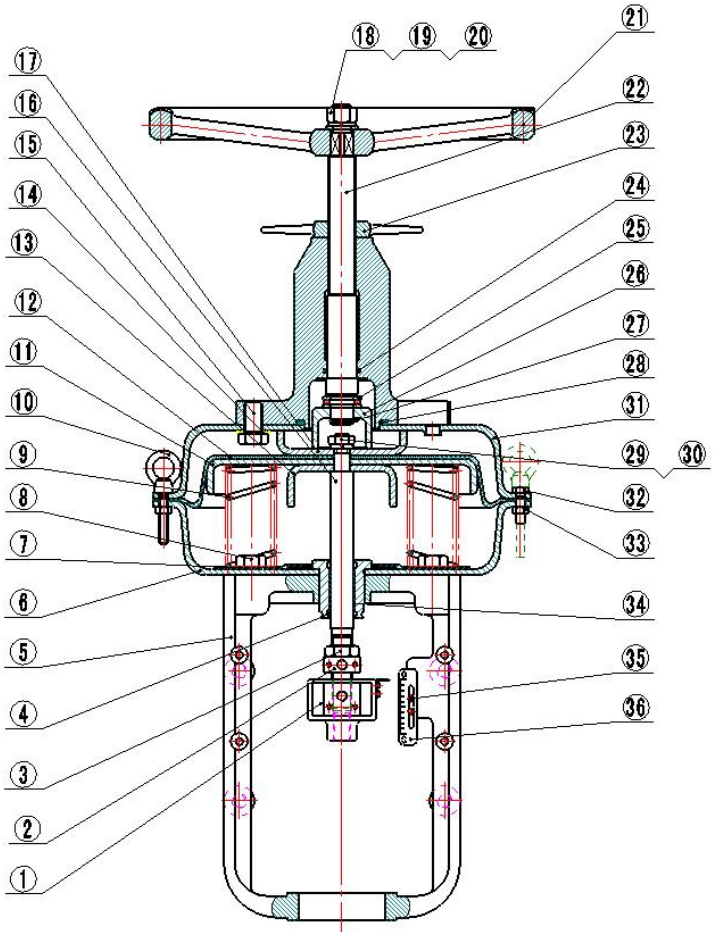


Fig 1-2 a) Direct Action Actuator with Top Hand wheel

Key	Description	Key	Description	Key	Description
1	Slit nut	2	Link block	3	Flat nut
4	Dust ring	5	Yoke	6	Diaphragm cover(Bottom)
7	Spring seat	8、18、29、33	Hex nut	9	Spring
10	Eyebolt	11	Pallet	12	Diaphragm
13	End stopper	14	Sealing washer	15、32	Hexagon headed bolt
16	Actuator stem	17	Starting stopper	19、30	Spring washer
20	plain washer	21	Handwheel	22	Threaded rod
23	Lock nyt	24、28	O-ring	25	Thrust ball bearing
26	Bearing seat	27	External circlips	31	Diaphragm cover (Top)
34	Bushing	35	Cross recess pan head screw	36	Travel brand

1-2-2．The side-mounted handwheel for the actuator (SHM), see Fig 1-2 b)。

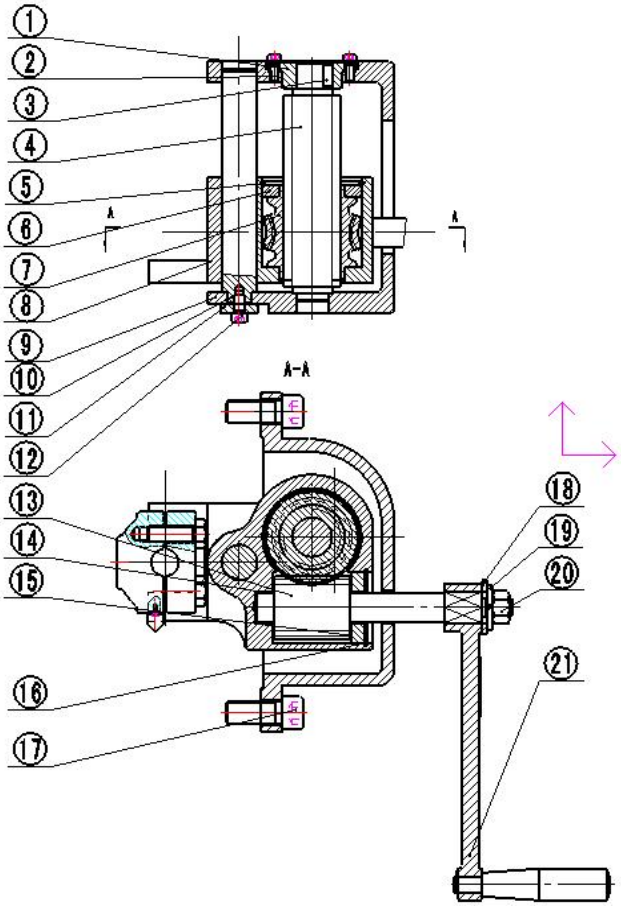


Fig.1-2 b) Side-mounted manual operating mechanism Installed on the actuator

Key	Description	Key	Description	Key	Description
1	Hexagon socket head cap screws	2	Axis guide	3	Ordinary flat key
4	Threaded rod	5	Circlip For hole	6	Worm gear ring
7	Worm gear	8	Worm gear case	9	Case
10	Strut knighthead	11	Pressing sleeve	12	Hexagon socket head cap screws
13	Worm	14	Flanger bearing	15	Worm gear ring
16	Circlip For hole	17	Hexagon socket head cap screws	18	Flat washer
19	Spring washer	20	Hexagon nut	21	Manual parts

1-3　The structure and operating principle of VP（ZSC）double-acting pneumatic piston type actuator

1、Structure：The structure of the double-acting cylinder piston type actuator is composed of cylinders (top and bottom), worm gear, worm-gear case, cylinder body, piston, actuator stem and worm, etc, see Fig1-3 and the table.

2、How it works：With the air supply input into the cylinder chamber, a thrust will be generated on the piston to make the actuator stem moved and the distance moved by the actuator stem is the travel of the actuator. During manual operating, cut off air supply to the air cylinder firstly, open the shutoff valve, turn the hand wheel CW, and then insert the link pin

into the hole after the actuator stem is faced with the threaded rod. Turn the handwheel CW for FO type valve while CCW for FC type valve. When automatic operation, pull out the link pin firstly, then turn the handwheel CCW to make the threaded rod stay in extreme higher position (the handwheel can't be rotated any more), cut off the shutoff valve, connect to the gas supply to proceed automatic operation

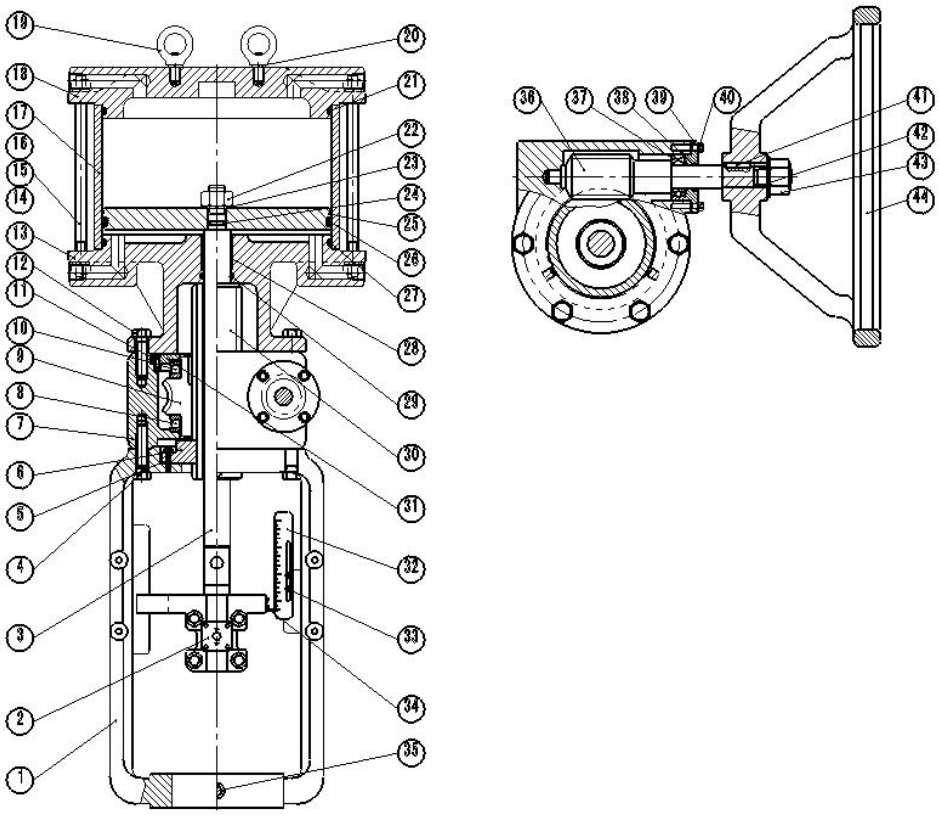


Fig.1-3 VP（ZSC）Double-action pneumatic piston type actuator

Key	Description	Key	Description	Key	Description
1	Yoke	2	Slit nut	3	Actuator stem
4	Hexagon headed bolt	5	Hexagon headed bolt	6	Anti rotating parts
7	worm-gear case	8	Thrust ball bearing	9	Worm-gear
10	Thrust ball bearing	11	Cross recessed pan head screw	12	Hexagon headed bolt
13	Cylinder cover(bottom)	14	Actuator body	15	Double end studs
16	Spring washer	17	Hex nut	18	Cylinder cover(top)
19	Eyebolt nut	20	Spring washer	21	O-ring
22	Hex nut	23	Spring washer	24	O-ring
25	Piston	26	O-ring	27	O-ring
28	Oil-free lubrication bearing	29	O-ring	30	Threaded rod
31	Guiding element	32	Travel brand	33	Cross recessed pan head screw
34	Needle	35	Hexagon headed bolt	36	Worm
37	Angular contact ball bearing	38	O-ring	39	Orifice plate
40	Hex socket head bolt	41	Flat key	42	Flat gasket
43	Hex nut	44	Handwheel		

1-4 The structure and operating principle of VA（ZSP） single –action pneumatic piston type actuator

Structure：Pneumatic piston type actuator is primarily composed of top/ bottom cylinder cover, piston, stopper, spring and yoke, etc. The structure sees Fig 1-4.

How it works：With the air supply input into the cylinder chamber, a thrust will be generated against the piston to make the actuator stem moved and the distance moved by the actuator stem is the travel of the actuator. Direct action: While hand operating, first cut off the air supply and turn the handwheel CW, the threaded rod moves down to drive the actuator stem for hand operation. When automatic operation, turn the handwheel CCW to make the threaded rod stay in extreme higher position (the hand wheel can't be rotated any more), connect to the gas supply to proceed automatic operation. Reverse action: While hand operating, first cut off the air supply and turn the handwheel CCW, the s threaded rod moves up to drive the actuator stem for hand operation. When automatic operation, turn the handwheel CW to make the threaded rod stay in extreme lower position (the hand wheel can't be rotated any more), connect to the gas supply to proceed automatic operation.

Pneumatic single-action piston type actuator is divided into direct action type and reverse action type. When the air pressure is input into cylinder chamber, the actuator stem moves downwards is the direct action type, on the contrary, the actuator is the reverse action type.

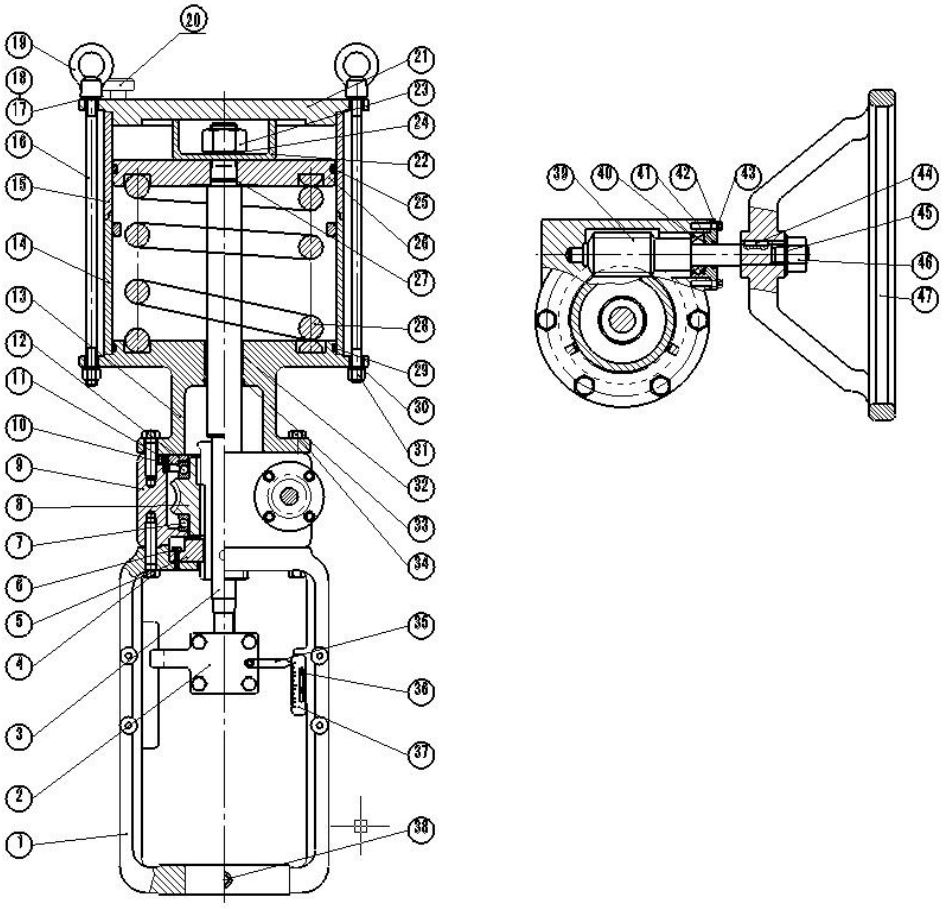


Fig 1-4　VA（ZSP）Single-action pneumatic piston type actuator

Key	Description	Key	Description	Key	Description
1	Yoke	2	Slit nut	3	Actuator stem
4	Hexagon headed bolt	5	Anti rotating parts	6	Hexagon headed bolt
7	Thrust ball bearing	8	Worm gear	9	worm-gear case
10	Cross recessed pan head screw	11	Thrust ball bearing	12	Guiding element
13	Cylinder cover(bottom)	14	Actuator body(bottom)	15	Actuator body(top)
16	Double end studs	17	Spring washer	18	Hex nut
19	Eyebolt nut	20	Rain hat	21	Cylinder cover(top)
22	Stopper	23	Hex nut	24	Spring washer
25	O-ring	26	Piston	27	O-ring
28	Compression spring	29	O-ring	30	Spring washer
31	Hex nut	32	O-ring	33	O-ring
34	Hexagon headed bolt	35	Threaded rod	36	Needle
37	Cross recessed pan head screw	38	Travel brand	39	Hexagon headed bolt
40	Worm	41	Angular contact ball bearing	42	O-ring
43	Damper baffle	44	Hexagon headed bolt	45	Flat key
46	Flat gasket	47	Hex nut	48	Handwheel

1-5. H100 cryogenic regulating valve

H100 cryogenic regulating valve is one which is applied to low temperature and cryogenic cases. It adopts long neck valve cover for temperature insulation; valve seat's leaking quantity conforms to ANSI standard. The adjusting valve is equipped with the executor with multi-spring type film, and has the advantages of compact structure and greater output force. The valve body adopts precision forging and welding corner type structure with aluminium alloy material, and possesses better low temperature-proof performance; the double sealing of bellows and filler ensures the adjusting valve not leaking in case of low temperature and effectively protects the external valve from frosting.

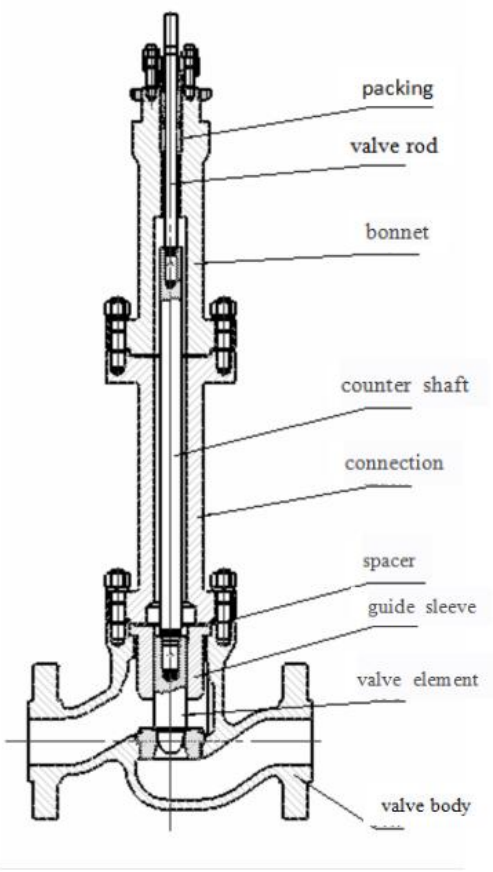


Fig.1-5 H100 Cryogenic regulating valve

1-6. H100 cryogenic regulating valve

Structure: The valve consists of pneumatic actuator and H100 cryogenic regulating valve. The yoke of the actuator is linked to the bonnet tightly by the pinch nut. The actuator stem and valve plug component are connected and locked tightly by the pinch nut.。

H100 cryogenic regulating valve is divided into FO and FC type.

FC type：When the diaphragm gas cell is input into the maximum signal pressure, valve plug stays in full open position, while the signal pressure is none, valve plug stays in full cut-off position.

FO type：When the diaphragm gas cell is input into the maximum signal pressure, valve plug stays in full cut-off position; while the signal pressure is none, valve plug stays in full open position.

How it works: The action of H100 cryogenic regulating valve is the move of the valve plug pushed by actuator stem according to the magnitude of the pressure in diaphragm gas cell (pneumatic actuator combination) or signal from electric actuator (electric actuator combination). This is the travel of the control valve. The change of the travel changes the flow area to regulate or control the technological parameters including the pressure, temperature, flow and fluid level.

2. Main Technical Parameter

Valve body

Type：Straight-through, single seated casting globe valve

Valve dimension：25、32、40、50、65、80、100、150、200mm

Nominal pressure：Class 150/300/600/900

Connecting type：FM (MFM)、BW

Upper valve cover: billows sealing type

Extension type Ⅲ：-196 ~ -100℃

Packing ：graphite packing

Gland type：screw type**.**

Actuator

HA Multi spring diaphragm actuator, VA Single acting cylinder piston actuator, VP（ZSC）Double acting cylinder piston actuator

Diaphragm material：Acetic-propyl rubber with nylon, Butyl rubber with nylon

Spring range: 20 ~ 100kPa, 80 ~ 240kPa (HA), 190 ~ 350kPa (VA)

Air supply:140 ~ 400kPa (HA), 400 ~ 600kPa (VA), 400 ~ 700kPa (VP)

Gas connection: Rc1/4″ (HA), Rc1/4″ , Rc3/8” , Rc1/2″ (VP)

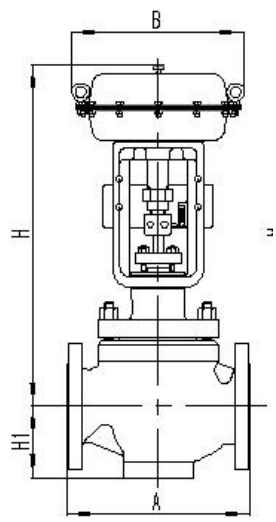
Accessory：Positioner, air filter regulator, air lock, position limit switch, valve position transmitter and handle, etc.

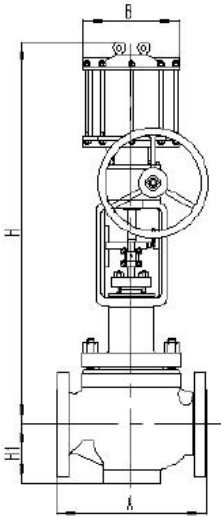
Note： Choose different accessory according to the need of scene working condition. The structure, using and function refer to the instruction.

Ambient temperature:

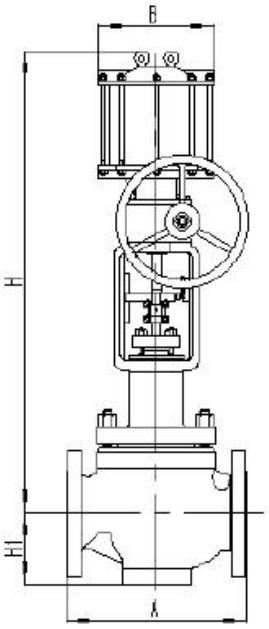
HA actuator	VA, VP actuator
Standard type: -30 ~ ＋70℃	Standard type: -20 ~ +70℃
High temperature type: -20 ~ +100℃	High temperature type: -20 ~ +100℃
Low temperature type: -40 ~ +70℃	Low temperature type: -40 ~ +70℃

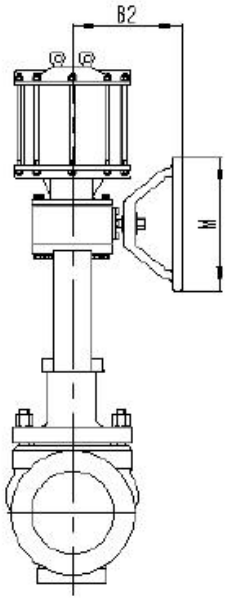
3. Size and Weight





don't deserve the hand wheel





deserve the hand wheel

Fig2. outline dimensional drawing

3-1 flange distance

Table 2. flange distance mm

公称通径 Nominal size	A							
	Class 125 FF Class 150 RF JIS 10K FF RF PN1.6 RF	JIS 16K RF	Class 300 RF JIS 20、30K RF JIS 30K RF PN4.0 MFM	Class 600 RF JIS 40K RF PN6.4 MFM	JIS 16K TG	JIS 20K TG	JIS 30K TG	JIS 40K TG
25	184	190	194	206	—	198	212	206
32	222	231	235	251	—	—	—	—
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	—	425	457	—	425	—	457
150	451	465	473	508	475	473	486	508
200	543	560	568	610	570	568	580	610

公称通径 Nominal size	A						
	Class 150 RJ	Class 300 RJ	Class 600 RJ	Class 300 LG	Class 600 LG	Class 150 SW、BW	Class 300、600 SW、BW
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

公称通径 Nominal size	A	
	Class 900	
	RF（SW，BW）	RJ
25	245	245
40	333	333
50	375	378
80	440	443

Table 3-1. outline dimensions

Nominal size	Actuator	H	B	H1
32	HA2D、R	1095	281	70
	HA3D、R	1245	363	
	EIL04	1310	172	
40	HA2D、R	1095	281	70
	HA3D、R	1245	363	
	EIL04	1310	172	
50	HA2D、R	1100	281	80
	HA3D、R	1250	363	
	EIL04	1315	172	
65	HA3D、R	1290	363	88
	HA4D、R	1550	520	
	EIL08	1475	229	
	M8610+L8210	1530	—	
80	HA3D、R	1295	363	98
	HA4D、R	1560	520	
	EIL08	1485	229	
	M8610+L8210	1535	—	
100	HA3D、R	1315	363	113
	HA4D、R	1575	520	
	VA6R	2115	475	
	VP5	1825	382	
	EIL08	1515	229	
	M8610+L8210	1555	—	
125	HA3D、R	1450	363	146
	HA4D、R	1630	520	
	VA6R	2175	480	
	VP5	1880	382	
	VP6	1995	480	
	VP7	1995	580	
	EIL08	1670	229	
	M8610+L8220	1795	—	
150	HA3D、R	1450	363	170
	HA4D、R	1630	520	
	VA6R	2175	480	
	VP5	1880	382	
	VP6	1995	480	
	VP7	1995	580	
	EIL08	1660	229	
	M8610+L8210	1795	—	
200	HA4D、R	1780	520	220
	VP5	2050	382	
	VP6	2165	480	
	VP7	2165	580	
	M8620+L8220	2205	—	

Table 3-2. Hand wheel size

Nominal size	Actuator	H		B2	M
		side-mounted handwheel	top-mounted handwheel		
32	HA2D、R	1095	1355	273.5	175
	HA3D、R	1245	1535	278.5	175
40	HA2D、R	1095	1355	273.5	175
	HA3D、R	1245	1535	278.5	175
50	HA2D、R	1100	1355	273.5	175
	HA3D、R	1250	1535	278.5	175
65	HA3D、R	1290	1580	278.5	175
	HA4D、R	1550	1950	303	320
80	HA3D、R	1295	1585	278.5	175
	HA4D、R	1560	1960	303	320
100	HA3D、R	1315	1605	278.5	175
	HA4D、R	1575	1975	303	320
	VA6R	2240	—	384	380
	VP5	1935	—	324	380
125	HA3D、R	1450	1740	278.5	175
	HA4D、R	1630	2030	303	320
	VA6R	2300	—	384	380
	VP5	1990	—	324	380
	VP6	2120	—	384	380
	VP7	2120	—	384	380
150	HA3D、R	1450	1740	278.5	175
	HA4D、R	1630	2030	303	320
	VA6R	2300	—	384	380
	VP5	1990	—	324	380
	VP6	2120	—	384	380
	VP7	2120	—	384	380
200	HA4D、R	1780	2180	303	320
	VP5	2160	—	324	380
	VP6	2290	—	384	380
	VP7	2290	—	384	380

Note: size H in table 3-2 is the valve height deserving the hand wheel.

4. Packing maintenance and replacement

Valve parts are subject to normal wear and must be inspected and replaced as necessary. Inspection and maintenance frequency depends on the severity of service conditions. Packing maintenance and replacement operations can be performed with the valve in the line.

> **⚠ WARNING**
>
> Avoid personal injury or property damage from sudden release of process pressure or bursting of parts.
>
> - Always wear protective gloves, clothing, and eyewear when performing any maintenance operations to avoid personal injury.
> - Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.
> - Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure from both sides of the valve. Drain the process media from both sides of the valve.
> - Vent pneumatic actuator loading pressure and release any actuator spring compression force.
> - Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.
> - The valve packing box may contain process fluids that are pressurized, even when the valve has been removed from the pipeline. Process fluids may spray out under pressure when removing the packing hardware or packing rings.

4-1. Packing maintenance

If there is undesirable packing leakage with other than spring-loaded packing, first try to limit the leakage and establish a stem seal by tightening the packing flange nuts.

If the packing is relatively new and tight on the stem, and if tightening the packing flange nuts does not stop the leakage, the valve stem may be worn or nicked so that a seal cannot be made. The surface finish of a new valve stem is critical for making a good packing seal. If the leakage comes from the outside diameter of the packing, the leakage may be caused by nicks or scratches around the packing box wall.

4-2. Packing replacement

（1）Isolate the control valve from the line pressure, release pressure from both sides of the valve, and drain the process media from both sides of the valve. Use lock-up procedures to be sure that the above measures stay in effect while you work on the equipment.

（2）Remove the actuator from the valve by unscrewing the yoke locknut.

（3）Loosen the packing flange nuts so that the packing is not tight on the valve stem. Remove any travel indicator parts and slit nuts from the valve stem threads.

Warning

To avoid personal injury or property damage caused by uncontrolled movement of the bonnet, loosen the bonnet by following the instructions in the next step. Do not remove a stuck bonnet by pulling on it with equipment that can stretch or store energy in any other manner. The sudden release of stored energy can cause uncontrolled movement of the bonnet.

Notice

Avoid damaging the seat surface caused by the valve plug and stem assembly dropping from the bonnet after being lifted part way out.

（4）Hex nuts attach the bonnet to the valve body. Loosen these nuts approximately 3 mm, then loosen the body-to bonnet gasket joint by either rocking the bonnet or prying between the bonnet and valve. Work the prying tool around the bonnet until the bonnet loosens. If no fluid leaks from the joint, remove the nuts and six hexagon head screws completely and carefully lift the bonnet off the valve.

（5）Remove the locknut and separate the valve plug and stem from the bonnet. Set the parts on a protective material surface to prevent damage to gasket or seating surface.

（6）Remove the bonnet gasket and cover the opening in the valve to protect the gasket surface and prevent foreign material from getting into the valve body cavity.

（7）Remove the packing flange nuts, gland flange and packing follower. Carefully push out all the remaining packing parts from the valve side of the bonnet using a rounded rod or other tools that will not scratch the packing box wall. Clean the packing box and metal packing parts.

（8）Inspect the stem threads and packing box surface for any sharp edges which might cut the packing. Scratches or burrs could cause packing box leakage or damage to the new packing. Replace the damage parts if the surface condition can’t be improved by light sanding.

（9）Remove the covering protecting the valve body cavity and install a new bonnet serrated washer. Make sure the gasket seating surfaces are clean and smooth. Then slide the bonnet over the stem and onto the stud bolts.

⚠ Notice

Proper performance of the bolting procedures compresses the serrated washer enough to seal the body-to-bonnet joint.

The proper bolting procedures include-but are not limited to-ensure that bolting threads are clean, and evenly tightening the cap screws, or nuts onto the bolts, in a crisscross pattern. Tightening one cap screw or nut may loosen an adjacent cap screw or nut. Repeat the crisscross tightening pattern several times until each cap screw or nut is tight and body-to bonnet seal is made. When the operating temperature has been reached, perform this torquing procedure once again.

（10）Install the bolts, and install new packing and the metal packing box parts according to the approximate arrangement in Fig 3. For PTFE packing, place a smooth-edged pipe over the valve stem and gently tap each soft packing part into the packing box. Slide packing follower and gland flange into position. Install packing flange nuts. For type V graphite packing, first place it into packing box, then install packing follower, gland flange, packing bolts and nuts. Compress the packing by tightening the packing nuts.

5. Checking and acceptance, transportation and Storage

5-1. Checking and acceptance, transportation

⚠ Warning

Since the control valve is heavy, the following attentions must be paid, in order to avoid incorrect operation and causing significant injury to the operator .

- When the control valve is connected with the process pipeline, please use suitable hoisting equipment which conforms to the local labor safety and health law. It is forbidden for people to stand or operate directly under lifting equipment
- The packaging shall be attached importance to, because the corrugated cases where small-size products are stored are always wet out, which will cause the strength reduction.

5-2. Storage

（1）The valve must be properly packed and stored before installing to the pipeline.

（2）It is forbidden to store the valve in the following locations:

(a) Location exposed to rainwater

(b) Location with temperature exceeds 60℃

（c）Dusty location

（d）Location with high humidity

（3）Repack the package after checking its performance before installation.

（4）The plug and cover of the connecting air piping and electric wiring interface shall not be opened before the installation of air piping and electric wiring starts.

（5）Generally the packing will vulcanize or age if it stored more than one year. On this condition, the package shall be opened, loosen the hex nuts of fastening packing by 2 turns and keep this state. . Apply air or water pressure equal to fluid pressure into the piping and flange joint after tightening the hex nut before using, Check whether there is leakage in the packing section. If there is any leakage, please replace the packing. The replacement follows the instructions of the disassembly and assembly.

（6）Proper treatment shall be taken if the control valve has been used in operation and dissembled for storage from piping system:

（a） Drying shall be carried out after the valve interior has been carefully cleaned with water.

（b） Do not damage the flange surface of control valve as shown in Figure 5-1.

（c） For the potential rusty position, the anti-rust treatment shall be carried out.

（d） For the air piping connection and electric wiring connection, the waterproof treatment shall be carried out.

6. Unboxing

Warning

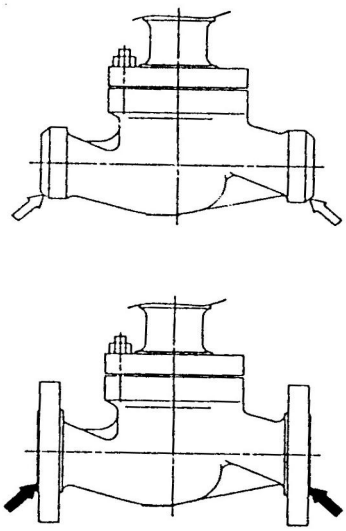
- When the valve is lifted out from the packing case and is hoisted, please use the standard belt which is suitable to the valve's weight to avoid damaging the valve. In this case, use the eyebolts at the two sides of the actuator(the eyebolts are a pair of ringed bolts compressing the diaphragm cover), and make load even， see Fig..3-2. However, when the weight marked on the box exceeds the following restricted weight range， or the valve diameter is DN200 above, please don't use the eyebolts of the diaphragm cover, the valve must be lifted as shown in Fig.3-3 or personal injury may be caused by unsafe lifting.

Actuator Type	Maximum Load（kg）	Actuator individual weight (kg)
HA1	160	8
HA2	160	16
HA3	160	32
HA4	220	68
HA5	500	123

⚠ Notice

After removing the package, in order to prevent damage to the control valve, we must pay attention to the following matters.

- Please don't damage the pipe connecting flange sealing surfaces or welding-groove as shown in figure 3-1, to avoid the leakage of sealing surface.
- Do not make the actuator touch the ground to prevent the positioner, accelerator, solenoid valve and handwheel which installed on the actuator from being crushed by the control valve.



Please don't damage the surface indicated by arrowhead

Fig.3-1

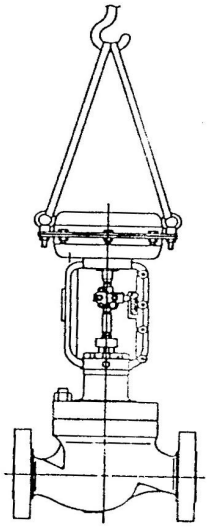


Fig.3-2

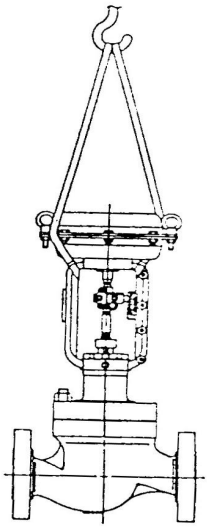


Fig.3-3

7. Installation

7-1 Matters needing attention

⚠ Warning

Since the control valve is heavy, the following attentions must be paid, in order to avoid incorrect operation to cause significant damage to the body.

- When the control valve is connected with the process pipeline, please use a suitable hoisting equipment which conforms to the local labor safety and health law. It is forbidden for people to stand or operate directly under lifting equipment

Notice

To maintain the valve's performance, please pay attention to the following items.

- Please don't damage the pipe connecting flange sealing surfaces or welding-groove as shown in figure 5-1 to avoid leakage.
- When the valve is lifted out from the packing box, the warning• notice items shall be complied with and the standard belt suitable for the valve weight shall be used in order to avoid the damage to the valve .
- Clean up the inside of the pipeline fully and install the valve after removing sundries, welding sediment and watermark. The leakage will be caused between the plug and seat ring if there are remnants. In addition, when the remnants enter into the guiding parts, it will cause the action insensitivity.
- Before the project of the air piping and electric wiring starts, the plug and cover of air piping and electric wiring connection etc. shall not be opened after the control valve and the pipe are installed.
- When the control valve is installed to the process piping, do not make it violent shocks such as knocks or drops, or it will cause breakdown and must be readjusted.
- Make sure that there are enough spaces for the valve maintenance and disassembly.
- Make sure the safe space, easy to operate in the situation of the actuator with manually operating mechanism.
- Do not install the valve in the situation of severe shaking or excessive load.
- For ease of maintenance, the actuator shall not be reverse installed.
- The valve installation direction must conform to the flow direction indicated by the arrow on the valve body.

Note：For the temperature range, the factors such as radiation and sunlight haven't been taken into consideration, so it is advised to use e suitable sunshade board or heat insulation, etc.

7-2．Maintenance space and equipment

The space enough for changing actuator and checking trim above the valve, which is larger than the following size, shall be guaranteed. In addition, if you need to remove the control valve for maintenance, in the case of artificial useless, please install chain hoist equipment above the control valve, the actual size is the following size plus chain hoist equipment size.

Actuator	H
HA1，HA2	More than 500mm
HA3	More than 600mm
HA4	More than 750mm
HA5	More than 1150mm

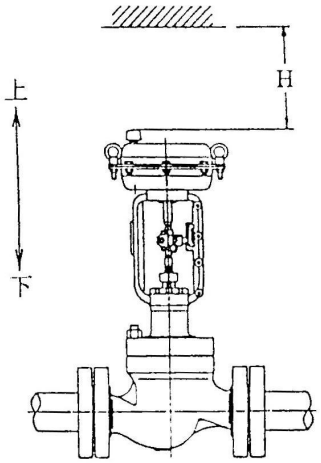


Fig.4

7-3． Installation site

- It is vertically installed as Fig. 6 shows in principle, but if the valve is forced to do so, it is allowed to be installed within the range as shown in Fig.7. The escape holes of the actuator and accessory shall not be laid heavenward. The valve may be dangerous and vibration from outside forces, please use the attached yoke or piping support.
- The safe and well operated installation position on the case of manual operating device.

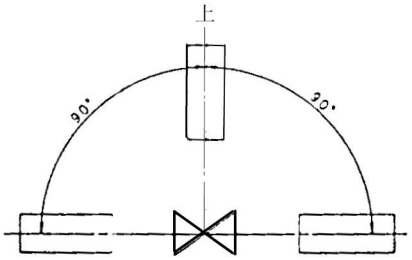


Fig. 5

7-4. Piping · Wiring project

Notice

To keep the performance of the control valve, the following items shall be paid attention to.

- For the gas piping of the positioner and accelerator, please choose sufficient piping diameter to be ensure the air supply pressure. Gas quality must meet the requirements of the accessory specification sheets in order to avoid accessory internal gas blockage.
- All the positioners, accelerators, solenoid valves etc., which are installed in compliance with the customer requirements, are assembled with the actuator before they leave factory and try not to make them damaged.
- In the case of inputting the signal directly, please connect the piping as Fig 1-1 shows.
- The piping and wiring of accessories shall accord with the relevant instructions when the control valve is equipped with the accessories
- Sealing tape can't be used for accessory piping joints to avoid clogging resulting in action insensitivity.
- Wiring project can't be carried out on rainy days or in rainfall environments to avoid leakage and instrument damage.
- Choose the suitable wire specification to keep the accessory's performance.
- Make sure the exterior wire connection sealed and waterproof while wiring.

8. Operation preparation and operation

8-1. Operation preparation

Notice

- The operation preparation can't be performed in the rain if the actuator is mounted with accessories or it will result in electric leakage or performance degradation.
- Confirm the supply voltage of the accessories conforms to the voltage on the nameplate before connected to the power source.
- The air source of the actuator shall be from the dry and clean air, and the air pressure can't exceed the range marked in the instruction. If any changes are needed, please consult with Chuanyi Control Valve Co., Ltd.
- Make sure that there is no air leakage in the air piping connection and diaphragm tightening part (actuator periphery), and if it happens, please seal up the leakage according to 12-3 Actuator Disassembly.

8-1-1． All the control valves produced by our company have been debugged before leaving, but if the disassembly inspection has been made, it is necessary to adjust the travel of rod when assembling the actuator and valve body parts (to get the rated travel). Then the following orders shall be complied with:

（1） Fix the actuator on the valve body by tightening the lock nut(The chiseled peen hammer can be used for hitting and tightening)

（2） The air pipe is fitted to the actuator so that the pressure can be freely changed by the pressure reducing valve. (The air pipe of positive action type is connected to the top diaphragm cover, and that of the reaction-type is connected to the bottom diaphragm cover)

（3） Depress the valve stem to make the plug contact the sleeve valve line.

Positive action actuator

（4） Confirm the spring range indicated on the nameplate and apply the upper limit value of the air pressure to the actuator.

（5） Reincrease the air pressure to reach the supply pressure as required, and the actuator stem of the actuator can move about 1~2mm. (This is the travel allowance of actuator stem)

（6） Reduce the pressure, and once again increase to the upper limit of the spring range.

（7） In this state, when the threaded portion of the slit nut coincides with that of the actuator stem and valve stem, tighten with the hex bolt. (See Fig. 6)

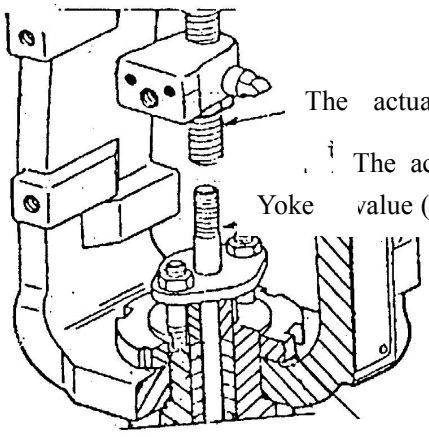
Reverse action actuator

（4） Affirm the spring range indicated on the nameplate and apply lower limit value of the air pressure to the actuator. Here, the actuator stem of the actuator can move about 1~2mm.

（5） Increase the pressure, and once again reduce to the lower limit of the spring range.

（6）Perform a procedure identically according to Item7 of the positive action actuator.

Notice: During the transportation and installation process, it is hard to avoid the situations such as bumping and dropping. If the valve hasn't disassembled, the positive and revere action actuator only need to be adjusted according to (4)~(7) or （4）~（6）items.



8-1-2． Adjustment of accessory

The accessory shall make adjustment in compliance with instructions of the accessories. In addition, the positioner debugging for the detection of control valve travel, the dial indicator, micrometer gauge or travel inspecting, instrument which has comparative travel shall be used.

8-2．Operation

Notice

● Cover the wiring box tightly during operation to prevent the rainwater or surrounding liquid which may cause electrical leakage or electric shock..

（1） Manual manipulation

The valve on-off can be manually operated（used in the valve with manual operating device）without the gas supply.

Notice

● Don’t continuously turn the handlewheel when the manual device has reached its close position, or it will damage the whole manual operating mechanism. The force of rotating the hand wheel shouldn’t exceed the following value.
HA2：19kg ，HA3：26kg，HA4：41kg (The force is the circumference of the hand wheel).

（1-1）Operating instructions of top-loading manual operating mechanism

- For manual operation of the actuator, first loosen the pinch nut of the fixed hand wheel, and then rotate the hand wheel in the direction of arrow. If the rotation is clockwise, the valve stem is moving downward regardless of the actuator positive or reverse action type. When the hand wheel rotates clockwise, the valve is closed, and the valve is opened in a counter clockwise direction.
- For automatic operation of the actuator, rotate the hand wheel up to the peak if it is the positive action actuator or rotate it down to the utmost if it is the reaction-type, and then tighten the pinch nut and fix it.

（1-2）Operating instructions of side-loading manual operating mechanism

- With the handwheel shipped with automatic operating, please don’t turn the handwheel. When the user needs the manual operation, rotates the handwheel to carry on the manual operation directly.
- When the actuator is a positive action, turn the handwheel CW to open the valve to the required position and get it back CCW when finished.
- When the actuator is a reverse action, turn the handwheel CW to close the valve to the required position and get it back CCW when finished.

9. Daily and Regular Inspection

9-1 Daily Inspection

Daily inspection shall be performed on those important control valves installed on main or important piping system

- Make sure there is no leakage on the air supply source to prevent malfunction.
- Make sure there is no leakage on packing and washer. If fluid leakage occurs， check the valve stem to find out if there is any damage or blocking occurs If everything is normal, please tighten the packing while confirming the status of the action.
- Make sure whether there is any an abnormal sound or piping vibration.

9-2 Regular Inspection

All control valves are required to carry out all the above items of daily inspection every half a year.

For those abnormal conditions that cannot be solved with the above steps, please disassemble the valve for maintenance and contact the sales office of Chuanyi Control valve Co., Ltd. during major shut-down.

10. Symptom、Cause and Remedy

Symptom	Cause	Remedy
No action or action is slow	1） Low air pressure. 2） Air piping blockage or leakage 3） Actuator failure, such as diaphragm rupture and leakage 4） Accessories abnormalities: positioner, solenoid valve, etc.	1） Provide the required air pressure 2） Cleaning and reinforcement of the connection part, then pipe-fitting. 3） Change diaphragm. 4） In case of no attachment， provide a specified air pressure into the air interface of the actuator. If there is no exception, the positioner is then made adjustment or inspection and replacement of other accessories.
Action is unstable	1） Actuator stiffness is too small，the lack of thrust caused by the change of medium pressure 2） Positioner signal changes. 3） Air supply fluctuation. 4） Pressure relief valve failure	1） Change a bigger rigidity actuator. 2） Adjust the settings for the positioner and check the signal system. 3） To confirm or change the gas supply pipe diameter. 4) Repair and replacement of the pressure relief valve

Seat leakage is large	1）Sealing face of plug and cage are corroded or damaged. 2）Medium pressure is too large, and the actuator output power is not enough 3）Foreign matter in valve body. 4）The whole travel is not enough.	1）Check or change parts 2）Add positioner or replace the actuator. 3）Removal of foreign matter 4）Adjust the whole travel.
Packing	1）Packing follower is not tightened. 2）PTFE packing aging deterioration or sprain 3）Seal face of the stem wears out.	1）Tighten the packing 2）Change the packing 3）Change the valve stem
Connection leakage	1）Nuts loose 2）Seal washer is damaged. 3）Seal face of other parts contacting with washer is corroded or damaged	1）Tighten nuts 2）Change the washer 3）Repair or replace the relevant parts

11．Disassembly·Assembly

11-1 The disassembly of the valve body and the actuator

⚠ Warning

For the control valve is heavy，the following items must be paid attention to. If not, it would cause the significant bodily injury.

- Use the suitable lifting machine for hoisting according to labor safety sanitary law and the valve body components shall be fixed according to following items
  （1） Use the yoke to fix valve body tightly on the flat ground, and the cushion shall also be used to prevent the yoke from contacting the sealing face of the flange directly.
  （2） In order to prevent damaging the sealing face of the flange, the minor-caliber control valve adopts the aluminum plate and copper plate etc. as the gasket, and then fix the valve body on the table-vice after it has been padded with the gasket.
- It is necessary to wear protecting glasses while the parts are disassembled and cleaned. In addition, operators shouldn't make their hands contact with the cleaning solution directly and they should wear rubber glove.
- Before disassembling the control valve on the spot, it is necessary to cut off the piping medium first and then remove all the pressure inside the valve.

（1） Input a certain air pressure to the actuator to make the needle pointer pointed to 10%~20% of full close

position.

（2） Loosen hex bolt on the slit nut which connects the valve stem and actuator stem, remove the slit nut to detach the actuator stem from the valve stem.

（3） Loosen the locknut of steadier and off-load

（4） Uplift the actuator to separate from valve body.

11-2 Disassembly and Assembly of HA actuator

⚠ Warning

- Start the disassembly work after the air pressure in diaphragm room has fallen to atmospheric pressure. If there is air pressure in diaphragm room, it could cause personal accident. This is what attention should be paid to.
- If the order of disassembly is wrong, it could cause the spring ejecting to hurt people， so the disassembly order must be conformed to.

⚠ Notice

- Don’t damage the diaphragm and the surface of the actuator stem in the disassembling process.
- Don’t disassemble parts if diaphragm and actuator stem was not abnormal in the following visual inspection. Inspection site：Pros and cons surface of diaphragm and surface of the actuator stem.
- Do the disassembly and assembly in the upright position.
- Mark “Fit” on the diaphragm cover before disassembling in order to find the air piping position easily.
- Lay the disassembled parts on the clean place.

- Disassembly Procedure

Direct action type actuator

（1） Remove the air piping and accessories.

（2） Remove slit nut, needle pointer and tight nut.

（3） Remove hex bolt and nut on the diaphragm cover.

（4） Loosen two nuts of the eyebolts evenly and alternately.

（5） Remove the diaphragm cover. Pull out actuator stem and diaphragm parts together.

（6） Take out springs and the scraper sealing.

Reverse action type actuator

（1） Remove the air piping and accessories.

（2） Remove slit nut, needle pointer and tight nut.

（3） Remove hex bolt and nut on the diaphragm cover.

（4） Loosen two nuts of the eyebolts evenly and alternately.

（5） Remove the diaphragm cover. Pull out the springs.

（6） Pull out the actuator stem and diaphragm parts together.

（7） Take out the gasket and the scraper seal.

- Assembly Procedure

Check the parts to make sure they have no damage, distortion and paint obscission before assembly, and then assemble the actuator as the following procedures.

Direct action type actuator

（1） Fit the scraper seal into the diaphragm cover.

（2） Install the spring into the spring base.

（3） Insert the actuator stem of the actuator (with diaphragm) into the bush. Notice should be given that the thread of actuator stem doesn't damage the inner side and scraper seal (It is much better to wrap a PVC rubber belt on the thread)

Reverse action type actuator

（1） Fit the gasket and scraper seal into the diaphragm cover.

（2） Insert the actuator stem of the actuator (with diaphragm) into the bush. Notice should be given that the thread of actuator stem doesn't damage the inner side and scraper seal (It is much better to wrap a PVC rubber belt on the thread). Rotate the actuator stem to make the limit parts on the pallet parallel to the head face of the steadier.

（3） Install the compression spring on the spring base.

Direct and reverse action type actuator

（4） Cover the top diaphragm cover, and tighten the eyebolt.

Note: Tighten the eyebolts evenly; the pretightening force emerges once it is screwed down.

（5） Tighten other hex bolts and hex nuts, and fix the diaphragm cover.

（6） Install the pinch nut.

（7） Revolve the needle pointer and fix it with the pinch nut and then install the slit nut, with the air piping installed on the interface of the top diaphragm cover(positive action type)or bottom diaphragm cover(back action type）. The positive action type actuator revolves the flashing cap into the gas vent.

（8） After the assembly is completed, make a check as follows:：

1） Impose 0.5Mpa air pressure from the air piping connection (top diaphragm cover), and check whether the diaphragm periphery has leakage or not with soapsuds.

2） Check whether the actuator can run normally or not for its total excursion.(when the actuator hasn't been connected with the valve).

12. Ordering notice

Give a clear indication in ordering:

1、Product model　2、Inside nominal diameter　3、Nominal pressure and flange connection

4、Body material and inside component material　5、Bonnet type　6、 Flow characteristics

7、Actuator model, air supply pressure　8、Valve action type

9、Accessories (actuator, handwheel, reducing valve)

10、Special request: Forbid oil and copper　11、Fluid name, temperature, specific gravity

12、Dielectric viscosity whether contains suspended liquid or not　13、spare parts and components

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