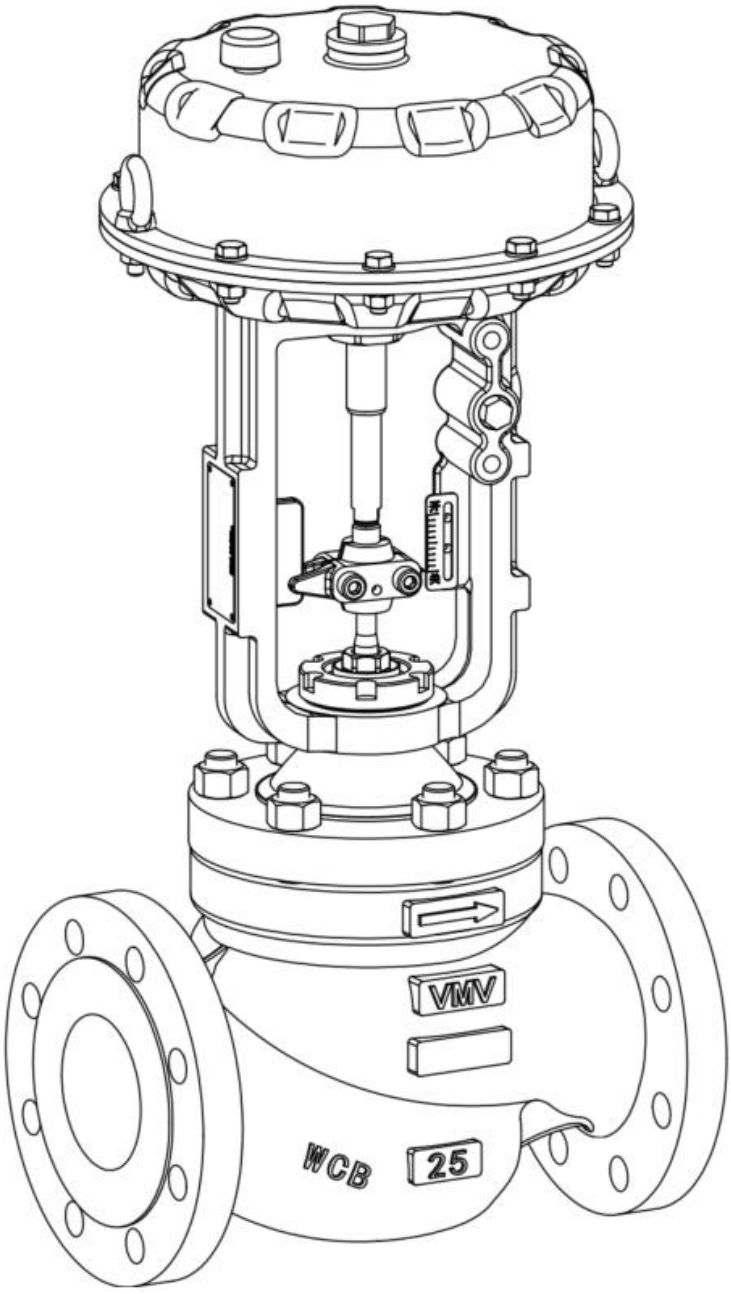
V8000 Series Pneumatic Control Valve

OPERATION INSTRUCTIONS



Zhejiang Newton Fluid Control CO.,LTD

Catalogue

1.Safety precautions

1.1 General note

In addition to the rules described below, plant management must strictly comply with mandatory safety and health regulations.
The personnel operating the valve must be trained and qualified personnel.
VMV shall not be liable for personal injury or equipment damage arising from:

- Incorrect operation
- Use non-VMV original spare parts
- Unauthorized personnel to perform maintenance

The transportation process from the factory to the site must use the original packaging。

VMV shall not be liable for personal injury or damage to the goods caused by unauthorized alteration of the original packaging.

1.2 Use and maintenance

Be careful with valve stem and actuator push rod connector and feedback rod.
Do not reach the valve stem and feedback lever, even if the valve is not in action, unless the air source is disconnected or the spring pressure is completely released.

1.3 Disassembly

Danger warning ⚠
In order to avoid personal injury and damage to the equipment system, pressure isolation and pressure relief of the valve should be performed before disassembly, including partial disassembly.

Danger warning ⚠
Before disassemble the actuator, verify that the pneumatic connection is not pressurized.In order to avoid personal injury and damage to the equipment system, the actuator must be isolated from any pressure. Before removing the connection block, the actuator must be depressurized.
When disassembling the actuator, even if it is partially disassembled, it should be carried out in accordance with the instruction manual.

1.4 Noise

For some special applications, the valve may produce very high noise, in this case, it must be equipped with an early warning sign in accordance with the procedure.

1.5 Temperature

For high temperature media, the operator must pay attention to parts that are not insulated.

1.6 Packing

Danger warning ⚠

When the pressure inside the valve is maintained, it is not allowed to disassemble and replace the stuffing box.

2、Installation, Use, and Maintenance Instructions

2.1 Working principle of valves

It mainly consists of valve body, bonnet, stem,seat, valve core, pressure cage, guide cage (or sleeve), actuator and other components (check Figure 1). When the valve receives a 4-20mA control signal, the valve actuator drives the valve stem to move vertically upwards or downwards corresponding to the control signal value. The valve stem moves upwards to open the valve, and moves downwards to close the valve.

The movement of the valve stem drives the movement of the valve core, while the movement of the valve core changes the throttling area between the valve core and the valve seat, thereby achieving the function of regulating the medium flow rate (or pressure, temperature).

2.2 Structure of valves

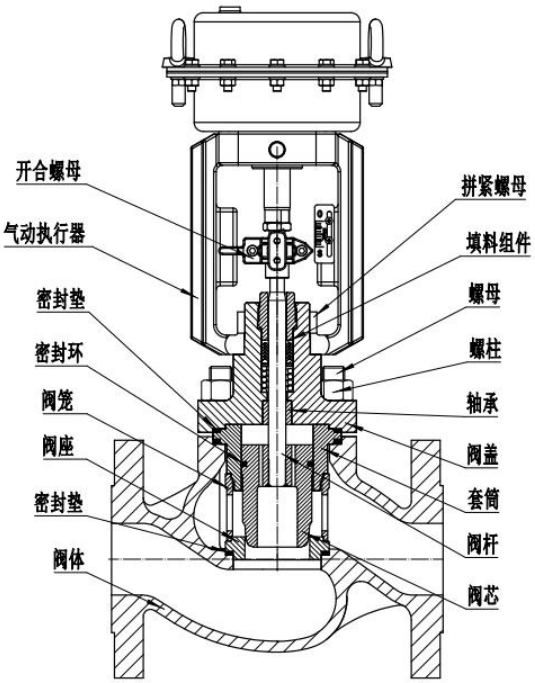


Figure 1 Balanced Single Seat Control Valve

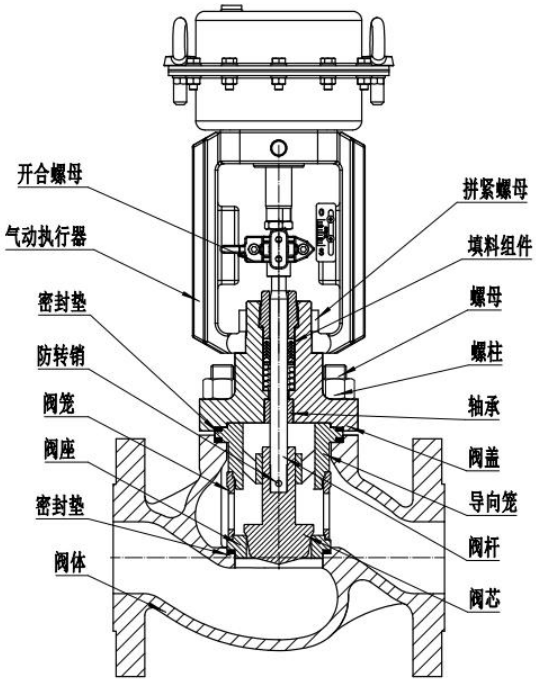
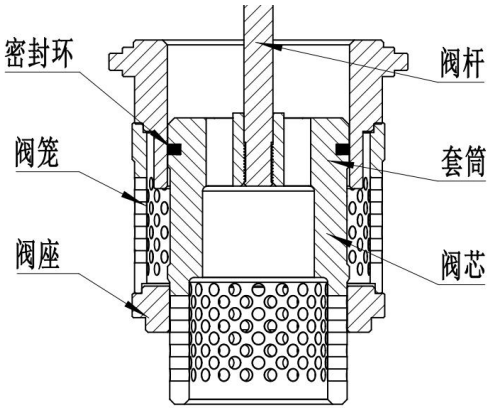


Figure 2 Ordinary Single Seat Control Valve

开合螺母half nut，气动执行器pneumatic actuators，密封垫gaskets，密封环 sealing rings，阀笼 cage，阀座seat，阀体body，拼紧螺母assembly nut，填料组件packing components，螺母nut，螺柱studs，轴承bearing，阀盖bonnet，套筒sleeve，阀杆 stem，阀芯valve core



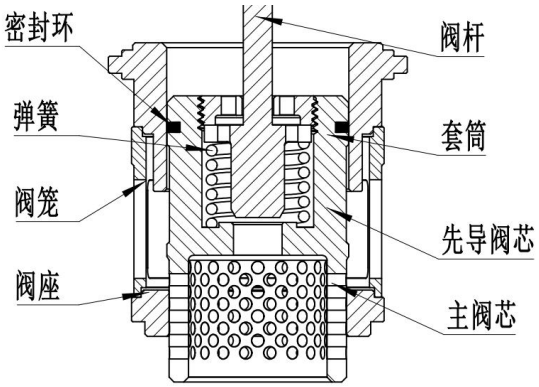
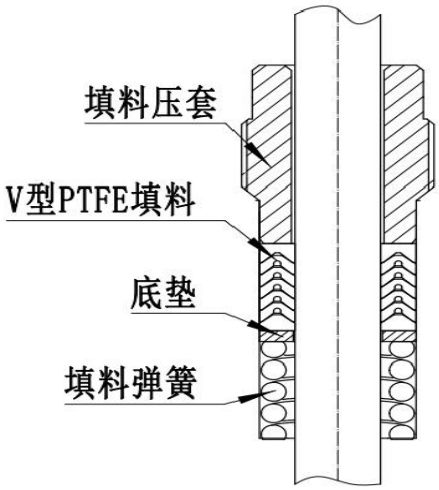


Figure 3 Low noise/multi-stage pressure reducing valve internals
Figure 4 Pilot operated valve trim
密封环 sealing rings，阀笼 cage，阀座seat,阀杆 stem，套筒sleeve，阀芯valve core
弹簧：spring 先导阀芯Pilot valve core，主阀芯：main valve core



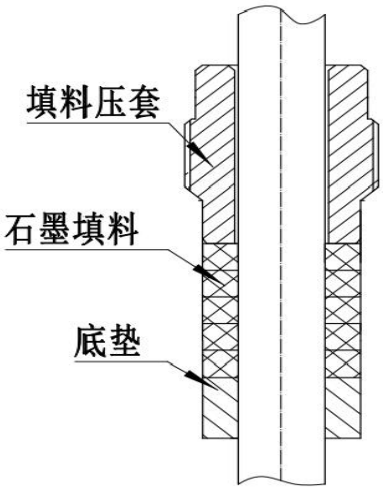
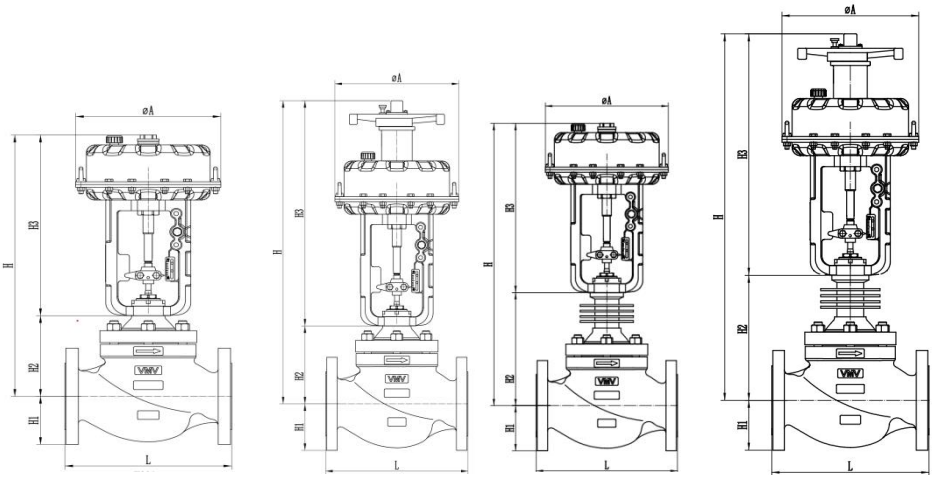


Figure 5 PTFE packing assembly

Figure 6 Graphite Filler Assembly

2.3 External dimensions of valves



Nominal Diameter	Actuator model	L						H1	H2		H3		ϕA
		PN 16	PN 25	PN 40	Class150	Class300	PN63 PN100 Class600		Standard bonnet	Heat sink type bonnet	without hand wheel	with handwheel	
DN15	MT1	160	160	160	160	194	206	75	130	285	300	450	180
DN20	MT1	160	160	160	160	194	206	75	130	285	300	450	180
DN25	MT1	160	160	160	160	197	210	75	130	285	300	450	180
DN32	MT1	180	180	180	180	222	251	90	140	290	300	450	180
DN40	MT1	200	200	200	200	235	251	90	140	290	300	450	180
DN50	MT1	230	230	230	230	267	286	105	180	330	300	450	180
DN65	MT2	290	290	290	290	292	311	115	196	346	398	651	270
DN80	MT2	310	310	310	310	318	337	120	196	346	398	651	270
DN100	MT2	350	350	350	350	368	394	145	221	371	398	651	270
DN125	MT3	400	400	400	400	425	457	189	260	460	681	890	400
DN150	MT3	480	480	480	480	473	508	189	260	460	681	890	400
DN200	MT3	600	600	600	600	568	610	239	292	492	681	890	400
DN250	MT4	673	708	708	673	708	752	305	357	607	1100	1700	590
DN300	MT4	737	775	775	737	775	819	335	394	644	1100	1700	590

2.4 Design and Manufacturing, Inspection and Testing Standards for Valves

1. GB/T 4213-2008 Pneumatic Control Valves
2. NB/T 47044-2014 Power Plant Valves

2.5 Main performance and parameters of valves

Nominal diameter: DN15 (NPS1/2) to DN500

Pressure rating: PN16~PN420, Class150~Class2500

Gas source pressure: 0.4-0.6MPa

Working temperature: -45~588 ℃

Valve cover type: Standard type (-17 ℃~300 ℃)

Heat sink type (-45 ℃ to -17 ℃,>300 ℃)

Filler: V-shaped composite filler (≤ 200 ℃)

Graphite composite filler (>200 ℃)

Flow characteristics: equal percentage, linear, fast opening

Adjustable ratio: 50:1

Leakage level: Class IV (metal hard seal)

Class V (metal hard seal)

Class VI (Soft Seal)

Return difference: ＜ 1%

Dead zone: ＜ 0.6

2.6 Use notice

◆ It must be confirmed that the maximum working pressure is not higher than the allowable pressure of the valve body at design temperature.

◆ It must be confirmed that the maximum operating pressure and temperature are within the limits of the pressure-temperature rating of the body and below the maximum allowable value shown on the nameplate.

◆ It must be confirmed that the valve position number matches the installation location of the pipeline.

◆ It must be confirmed that the flow direction of the valve meets the requirements of pipeline installation.

◆ It must be confirmed that the air source pressure meets the requirements of the pneumatic actuator.。

◆ It is necessary to clean all debris in the pipeline that affects the performance and life of the valve, such as welding slag, debris, grease, cloth, cardboard, mud and sand.

◆ Valves must not be purged without removing valve internals.

◆ The temperature rise process must be controlled at the standard temperature rise rate of 100℃/ hour.

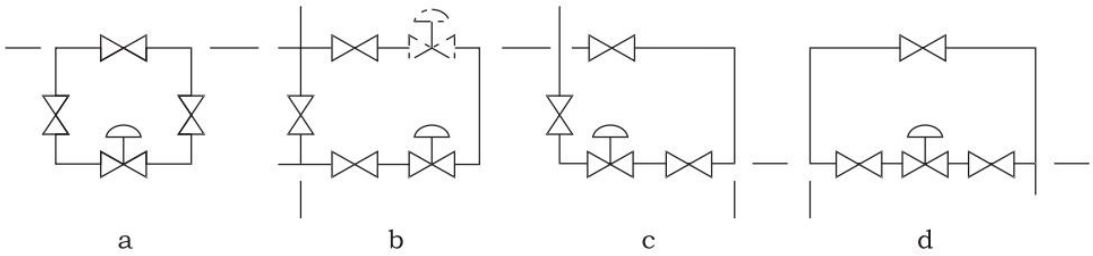
◆ Disassembling valves at cooling temperatures above 100 ° C must be prohibited.

2.7 Installation:

◆ Valves with nominal diameters smaller than pipe diameters shall be equipped with concentric size head transitions.

◆ In general, the bypass valve of the cut-off valve is installed in the piping of the process and the control valve is matched into a valve group to meet the needs of continuous operation of the equipment. Maintenance control valves are isolated by cut-off valves and adjusted by bypass valves.

- Four control valve group arrangements are recommended in the figure below.



- There should be sufficient space for manual operation by the operator (including bypass operation), as well as the possibility of on-site removal and repair of the control valve and accessories.
- The control valve should be installed on the horizontal pipe, and the valve stem is perpendicular to the ground; Generally, it should be supported under the valve to ensure stable and reliable. For special occasions, when the control valve needs to be installed horizontally on a vertical pipe, the control valve should also be supported (except for DN50 small diameter control valves). When installing, avoid bringing additional force to the control valve.
- When it is installed on the horizontal pipeline, due to the restrictions of environmental conditions, the installation Angle must be selected in sequence 45 or 135, 270, 225 or 315 degrees, as far as possible to avoid 180 degrees horizontal installation, and at the same time to install the rod fixed actuator.
- When the valve is connected by flanges, the size, coaxiality and parallelism of the pipe connection arrangement must be checked to avoid tensile and bending stress during installation.
- There should be a straight pipe section before and after the control valve, and the length of the straight pipe section before and after the valve is not less than 10 times the diameter of the pipe, so as to avoid the straight pipe section of the valve being too short and affecting the flow characteristics.
- The control valve should be thoroughly removed from the pipe before installation, such as dirt, welding slag, etc. After installation, use normal temperature water for trial operation. During trial operation, the valve should be fully opened, or the bypass valve should be opened. During trial operation, attention should be paid to the tightness of the valve body and the connection of the pipeline.
- When the valve is butt welded, it must avoid the effect of overheating of the valve body when welding with the pipeline.
- The spool is embedded with a plastic soft seal ring valve, and it is best to lift the spool when welding, so that it does not contact the seat.

- The temperature of the valve body must be controlled during welding if overheating of the valve body is expected and the valve internals have a plastic soft seal ring. The outer surface temperature of the valve body 70-80mm from the welding area shall not exceed 100°C.
- When the valve is threaded, it must be connected with a loose joint to facilitate removal from the line.

2.8 Disassembly and replacement

2.8.1 Disassembly principle

◆ Clean the site, equipment and special tools.

◆ Check the spreader and rope.

◆ Prepare cartons, cardboard or cloth pads.

◆ When tapping or vibrating the workpiece: one should be light, two should be symmetrical, three should use copper rod or wood hammer, it is strictly prohibited to knock the sealing surface.

◆ When lifting: one to vertical, two to slow, three to observe, it is strictly prohibited to pull hard.

◆ Place the workpiece by classification to prevent bumping and protect the sealing surface or seals.

◆ The workpiece with assembly, positioning and direction should be marked.

◆ Not clear the internal structure of the workpiece is not forced to dismantle.

◆ Damaged packing, seals and other wearing parts are strictly prohibited.

◆ Do a good job of dust prevention, rust prevention and loss prevention.

2.8.2 Disassembly of control valve (see FIG. 1-Fig. 4)

1. Disassemble and remove the opening and closing nut connected with the valve and the actuator;

2. Unscrew the fastening nut of the bracket cover;

3. Disassemble the actuator;

4, screw off the packing press sleeve;

7. Screw off the valve cover nut;

8. Lift the valve cover vertically and slowly until it disconnects from the valve stem, and pay attention to avoid bending the valve stem and damaging the head thread of the valve stem;

9. Take out the valve cover sealing gasket;

10. Hold the valve stem vertically and slowly pull out the spool and valve stem, and use the spool assembly of large caliber with a sling;

11, knock the sleeve (or guide cage) outer circle or upper end, loose and then pull out, large diameter sleeve (or guide cage) with a sling;

12. Tap the end face of the valve seat and take it out after it is loose. Be careful not to damage the sealing surface of the valve seat when tapping;

13. Take out the seat sealing gasket.

2.8.3 Disassembly and replacement of packing

1. Hook out packing and packing pad with special hook (packing damage should not be used again).

2. When replacing the valve cover, the valve stem is inserted into the valve body, and the packing is inserted into the valve stem and pressed into the packing hole with the packing gland.

3, when the packing is PTFE, the assembly order is: lower packing, middle packing and upper packing.

4, when the filler is flexible graphite, the assembly order is: packing pad, flexible graphite.

2.9 Valve assembly

2.9.1 Assembly principle

◆ Clean the site, equipment and special tools.

◆ Check the spreader and rope.

◆ Prepare cartons, cardboard or cloth pads.

◆ Clean parts, air dry after assembly.

◆ Place the workpiece by classification to prevent bumping and protect the sealing surface or seals.

◆ Every other day to be installed to prevent dust, rust and loss.

◆ When tapping or vibrating the workpiece: one should be light, two should be symmetrical, three should use copper rod or wood hammer, it is strictly prohibited to knock the sealing surface.

◆ When hoisting: one should be vertical, the second should be slow, the third should be observed, and it is strictly prohibited to pull hard.

2.9.2 Assembly order and requirements of control valves (see Figure 1-Figure 4)

1. Place the valve body horizontally on the floor.

2. The seat gasket is centered in the seat hole.

3. Rotate the valve seat alternately left and right several times.

4. Spool assembly, slowly plug the spool assembly into the seat, and then lift up and down, repeat several times.

5. Sleeve (or guide cage), put the sleeve (or guide cage) into the spool.

6. The valve cover gasket is placed in the center.

7. Middle flange stud, head height should be consistent.

8. Valve cover, check whether the installation direction is correct, check whether the valve cover is correct, check whether the clearance around the bolt hole is uniform, to avoid damage to the valve stem and thread.

9. Middle flange nut, symmetrical light twist.

10. Packing assembly requirements are the same as 8.3.

11. Packing press sleeve, light twist can be, to be tightened when the pressure test.

12. Tighten the nut of the middle flange symmetrically until required (see Table 1 for tightening torque). Check whether the gap between the flange surface of the valve cover and the plane of the valve body is uniform, and whether the gap size is consistent with the drawing.

13. Connect the actuator and check if the valve stem is flexible, if there is any jamming phenomenon, and if the valve opening stroke meets the requirements of the nameplate. Repeat the full open and full close cycle three to four times.

14. Pressure test: Pneumatic control valves shall be tested in accordance with the GB/T 4213-2008 standard and meet the standard requirements. The valve shall be tested in the fully open position. When conducting strength tests on valves with large diameters and high pressure, it is necessary to remove the linkage with the valve stem and allow the actuator to open upwards to the highest position to prevent the valve stem from pressing against the actuator push rod and damaging the actuator.

15. Sealing test: Pneumatic control valves shall be tested in accordance with the GB/T 4213-2008 standard and meet the standard requirements. The valve must be equipped with an actuator for sealing test, and other instruments cannot be used to replace the actuator to close the valve.

Figure 1　Reference table for tightening torque of bolts

Screw	Wrench	Tightening torque（Nm）		Screw	Wrench	Tightening torque（Nm）	
		Minimum	Maximum			Minimum	Maximum
M12	19	20	30	M30	46	250	530
M14	22	45	50	M33	50	340	720
M16	24	30	80	M36x3	55	470	980
M18	27	100	110	M39x3	60	480	1270
M20	30	130	150	M42x3	65	850	1600
M24	36	170	260	M45x3	70	680	2000
M27	41	250	390				

2.10 The causes and inspection & maintenance methods of general faults of control valves

Table2 Pneumatic Valve

Item	Faults	Causes	Inspection & Maintenance Methods
1	Valve no action	1. Air source failure, severe air leakage in the supply pipeline 2. Input signal disappears 3. Positioner and converter malfunction 4. Diaphragm rupture and spring fracture 5. Valve stem, valve core stuck, etc	Repair external air source equipment, pipelines, and joints Troubleshooting signal output - converter - positioner Repair or replace the locator and converter Replace the film and spring Disassemble the valve body, remove debris, or repair valve internals
2	Valve slow action	1. Low air source pressure 2. Diaphragm and piston ring leakage 3. The packing is too tight and the valve stem is deformed 4. There is mud or viscous medium inside the valve that causes blockage or coking	Check the air source pressure and locator performance Replace the diaphragm and piston ring sealing ring Adjust the tightening force of the nut, repair or replace the valve stem Disassemble the valve body, inspect, clean and eliminate any issues
3	Valve cannot fully closed	1. There is a problem with the input signal 2. Insufficient membrane chamber air pressure 3. The operating pressure difference is greater than the design pressure difference 4. There are debris between the valve seat and valve core	Readjust input signal Check the pressure setting of the pressure reducing valve Replace actuator specifications Disassemble the valve body, inspect, clean and eliminate any issues
4	Excessive leakage when valve closed	1. Damage to valve core and valve seat sealing surface 2. Loose valve seat and damaged sealing gasket 3. There are debris between the valve seat and valve core	Grinding repair or replacement Disassemble, reassemble and replace the sealing gasket Disassemble the valve body, inspect, clean and eliminate any issues
5	Valve vibration	1. Poor adjustment of the locator 2. Unstable support 3. The valve opening is too small or the flow direction is incorrect 4. The packing is too tight 5. The gap between the valve core and the guide sleeve is too large	Readjust the locator Reinforcement support Replace the small Cv valve trim or change the flow direction Adjusting the tightening force of the nut Replace the valve core or guide

		6. There is a vibration source nearby	component Take measures to reduce pressure and vibration to eliminate it
6	Packing leakage	1. The packing material is not tightly compressed 2. Mismatch between packing material and medium 3. The valve stem is deformed and rough 4. Deformation of packing gland	Compression packing Replacing packing Repair or replace the valve stem Replacing the packing gland
7	Valve body gaskets leakage	1. Insufficient tightening torque 2. Damaged sealing gasket 3. The sealing surfaces on the top and bottom of the sealing gasket are damaged	Increase the pre tightening force and tighten again Replace the sealing gasket Repair sealing surface

2.11 Valve vulnerable parts

◆Sealing gaskets, packing, and sealing rings can be randomly equipped as needed

◆When repairing and replacing parts such as valve core, valve seat, valve stem, bearings, guide cage, sleeve, etc., they need to be purchased from the factory

2.12 Transportation and Storage

◆Before transportation, check whether the packaging box is neat, firm, and undamaged, and whether all markings are complete, correct, and clear.

◆During loading and unloading, the goods should be loaded and unloaded with care, properly bundled, and throwing, sliding, and hitting are strictly prohibited to ensure the safe transportation of goods without damage.

◆During transportation, rain and theft prevention measures should be taken for the goods, and the condition of the ropes should be regularly checked for completeness.

◆Storage environment requirements: temperature of 5-40 ℃, relative humidity not exceeding 90%, and no corrosive substances in the air.

◆Place according to the arrow markings on the packaging box, and do not tilt or invert

◆Do a good job in preventing rain, moisture, rust, dust, and theft.

◆The product packaging has a protection validity period of one year from the date of shipment.

2.13 Opening case & Inspection

◆Smooth lifting and careful handling

◆Open the case for acceptance according to the contract terms

◆Manage random documents such as packing lists, drawings, quality certificates, etc

◆Take good care of spare parts, specialized tools, and other random items

◆Carefully read and strictly follow the 《Installation, Use, and Maintenance Manual》 for operation

◆Contact the manufacturer promptly if you have any questions

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