Miniature Type Pneumatic Regulating Valve

Operating Manual

The vibration of valve has stridulation.	The regulating valve vibrates while approaching full close.	1. The regulating valve is too large and often used while small openness. 2. The flow direction of medium is opposite the close directing of valve.
	The regulating valve vibrates while approaching all the openness.	1. The support is not stable. 2. There is vibration nearby. 3. The valve core and the lining abrade.
The action of valve is dull.	The reciprocating travelling action of valve rod is dull.	1. There are muddy mediums or mediums with high viscosity in the valve body, which have blocking or coking phenomenon. 2. Teflon packing hardens and goes bad.
	The single-direction action of valve rod is dull.	1. The diaphragm in the air chamber is damaged. 2. There is air leakage in the air chamber.
The leakage rate of valve is large.	The leakage rate when the valve full closed is large.	1. The valve core and the valve seat are corroded and abraded. 2. The thread of valve seat is corroded.
	The valve can not reach full-close position.	1. The medium pressure is larger than the permissible pressure difference of valve. 2. There is foreign body in the valve body.
There is leakage in the packing and connecting position.	The seal packing leaks.	1. The gland of packing is not compress tightly. 2. The packing goes bad. 3. The valve rod is damaged.
	The connecting position between valve body and upper valve cover leaks.	1. The clamp hexnut loosens. 2. The sealing gasket is damaged.

7. Ordering instruction

1. Name, model
2. Nominal aperture (DN)
3. Rated flow coefficient (Kv)
4. The on-off mode of valve
5. Inherent flow characteristics
6. Materials and working temperature of valve body and the parts inside the valve
7. Teflon (notes can be omitted) or graphite packing
8. Accessories

You can purchase a more satisfactory product if providing more specific technical data and self-control information.

Table 11 PN40/PN64 flange size (Fig. 6)

Nominal aperture DN	Flange										Thread	
	D	D_1	D_2	D_3	D_4	Dm	b	f	f_1=f_2	d	Quantity n	Thread
20	105/125	75/90	55/68	51	50	44/52	16/20	2	4	14/18	4	M12/M16
25	115/135	85/100	65/78	58	57	49/61	16/22					
32	135/150	100/110	78/82	66	65	62/68	18/24	3		18/23	4	M16/M20
40	145/165	110/125	85/95	76	75	70/80	18/24					
50	160/175	125/135	100/105	88	87	80/90	20/26					
65	180/200	145/160	120/130	110	109	101/111	22/28				8	M16/M20
80	195/210	160/170	135/140	121	120	116/128	22/30					
100	230/250	190/200	160/168	150	149	140/152	24/32		4.5	12/25	8	M20/M22
125	270/295	220/240	188/202	176	175	169/181	28/36			25/30	8	M22/M27
150	300/340	250/280	218/240	204	203	198/210	30/38			25/34	8	M22/M30
200	375/405	320/345	282/300	260	259	256/268	38/44			30/34	12	M27/M30
250	445/470	385/40	345/352	313	312	314/326	42/48			31/41	12	M30/M36
300	540/530	450/460	408/412	364	363	368/384	46/54	6			16	M30/M36

Note: The data in the front is the size of PN40 in the same lattice, the back ones is the size of PN64.

6. Common failures and removal

Pleas see table 12 for the common failures and their reasons.

Table 12

Common failures		Main reasons
Valve doesn't work	The positioner has gas source but not output.	1. The throttling hole of amplifier in the positioner blocks. 2. There is moisture in the compressed air, which is accumulated at the ball valve position of amplifier.
	Have signal but not act.	1. The valve core and the lining or the valve seat stuck. 2. The valve core falls off (the pin breaks.) 3. The valve rod bends or breaks off. 4. The actuator breaks down.
The action of valve is not stable.	Have certain gas source and signal pressure, but the action of regulating valve isn't stable.	1. The positioner breaks down. 2. The output pipeline leaks. 3. The rigidity of actuator is too small to resist the changing of liquid pressure. 4. The valve friction is large.

Miniature Type Pneumatic Regulating Valve

1. Overview

Pneumatic miniature type regulating valve is small in size, light in weight, accurate and efficient. It is a new-generation regulating valve developed on the basis of domestic and oversea sophisticated designing technology, abundant manufacturing experience and advanced structure, which accord with IEC standard.

Pneumatic miniature type regulating valve is one of the most widely-used and most important products in production process control systems. In this series products, ZMZP type pneumatic miniature type single-seat regulating valve, ZMZM type pneumatic miniature type sleeve regulating valve and ZMZN type pneumatic miniature type double-seat regulating valve are one of the universal products for user to select. It applies to the process control system of general fluid mediums and technical conditions.

Except the common advantages of pneumatic instruments, pneumatic miniature type regulating valve also has reliable action characteristics, accurate flow characteristics, broad adjustable range, stable operability and tiny leakage rate. Therefore, above mentioned unique advantages will get high-quality control effects in the wide application of diversity working conditions.

2. Working principle and structure

ZMZP type pneumatic miniature type single-seat regulating valve is composed of ZHA (B) type pneumatic multi-spring film actuator and VJP low flow resistance straight single-seat valve. See Fig 1 (a).

ZMZM type pneumatic miniature type sleeve regulating valve is composed of ZHA (B) type pneumatic multi-spring film actuator and VJM low flow resistance sleeve valve. See Fig 1 (b).

ZMZN type pneumatic miniature type double-seat regulating valve is composed of ZHA (B) type pneumatic multi-spring film actuator and VJN double-seat valve. See Fig a (c).

After the exogenous pneumatic signal pressure inputting into film room, when this pressure acts on the diaphragm, it will generate thrust and compress the spring group to make the push rod move and drive the valve rod to make the valve core open and close until the counter-force of compressed thrust and spring group balanced and stabilized at some stroke. According to the above mentioned principle, the stroke size of valve core has a certain proportional relation with the size of input signal.

According to the modes of action, pneumatic multi-spring film actuator can be divided into positive-action mode and negative-action mode. When the signal pressure increasing, the actuator with push rod moving at the direction of stretching out film room is called positive-action mode and the model is ZHA type. When the signal pressure increasing, the actuator with push rod moving at the direction of returning to film room is called negative-action mode and the model is ZHB type. They are shown as the actuators in Fig. 1 (a) and Fig. 1 (b).

According to the on-off modes, pneumatic miniature type regulating valve can be divided into air-to-close type and air-to-open type. Air-to-close type valve is composed of positive-action actuator and valve body. When input signal pressure is changed from lower limit value into upper limit value, the valve is from full open to full close. Air-to-open type valve is composed of negative-action actuator and valve body. When input signal pressure is changed from lower limit value into upper limit value, the valve is from full close to full open. They are respectively shown as Fig. 1 (a), 1 (b) and 1 (c).

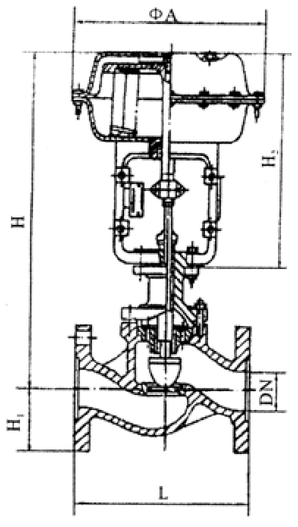

Fig. 1 (a)

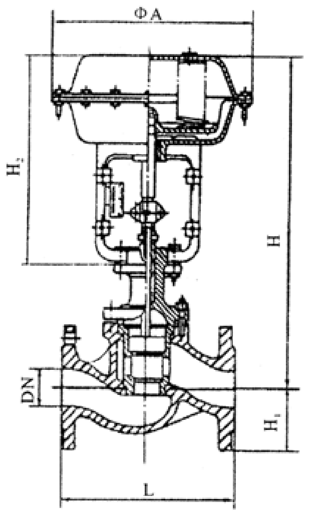

Fig. 1 (b)

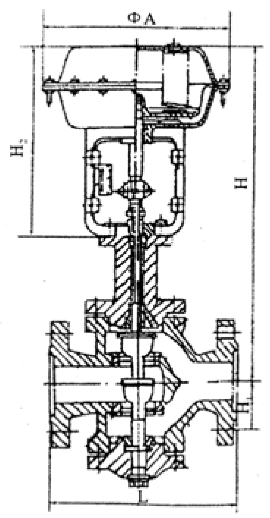

Fig. 1 (c)

Pneumatic multi-spring film actuator is low in height, light in weight and easy to install and calibrate. It is composed of diaphragm, compression spring, tray, push rod, support, shaft sleeve and diaphragm cover and so on. The diaphragm is in a comparatively deep basin shape and the changing of effective area is small. It adopts high-quality rubber, which can be used from -40℃ to +85℃ with normal operation. The compression spring uses multi-spring combination mode so as to decrease the height. The oriented surface of push rod is subtly processed to enhance hardness and reduce roughness, which can achieve the reducing of return difference and the increasing of tightness. Negative-action type actuator adopts O-shape seal ring form, matched with push rod and shaft sleeve, which is simple in structure and reliable in tightness. Through correct design and precise processing, this actuator leaves out the regulating structure of compression spring, which can be installed in one time without calibration. See Fig.2.

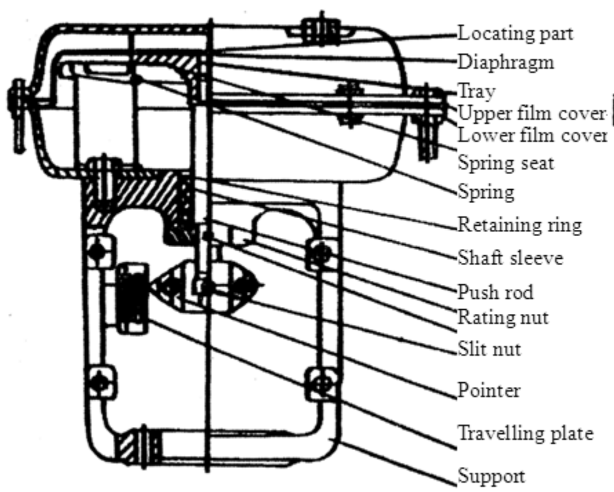

Fig. 2 (a) Positive action (ZHA type)

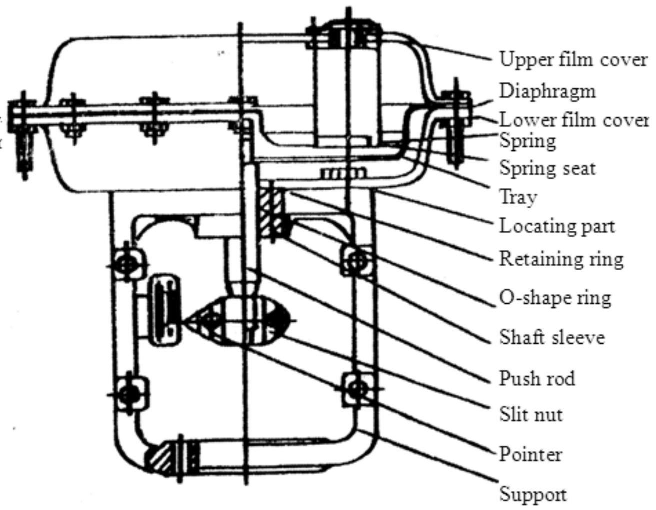

Fig. 2 (b) Negative action (ZHB type)

not more than 90%. There should not be objectionable constituents in the air which will corrode the regulating vlave.

Table 10 Size of PN16 flange (Fig. 5)

Nominal aperture DN	Flange							Seal surface			Thread	
	D	D_1	D_2	Dm	b	f	d	t	t_1	Submultiple	Quantity n	Thread
20	105	75	55	42	16	2	14	4		2	4	M12
25	115	85	65	49								
32	135	100	78	60	18		18	5	1	3	4	M16
40	145	110	85	68		3						
50	160	125	100	80	20							
65	180	145	120	97								
80	195	160	135	114	22						8	M16
100	215	180	155	136	24							
125	245	210	185	165	26							
150	280	240	210	192	28		23				8	M20
200	335	295	265	246	30						12	M20
250	405	355	320	298	32		25				12	M22
300	460	410	375	352	34	4		6	1.5			

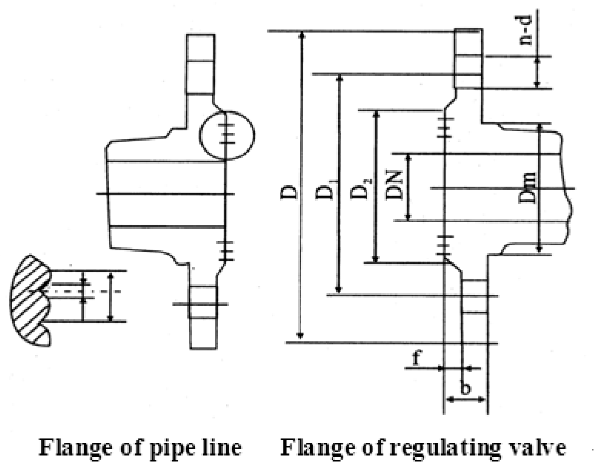

Fig. 5 PN16 raised face flange

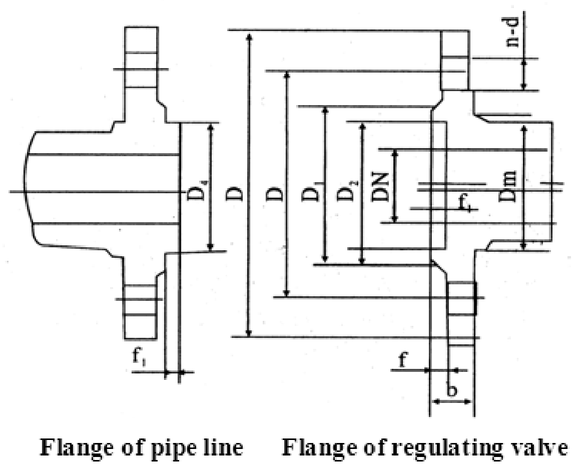

Fig. 6 PN40, PN64concave-convex type seal flange

valve.

d) The regulating valve must be installed according to the arrow of flow direction on the valve body.

2) Maintenance

If the regulating valve can not meet the operating requirements while using or has operated for a long time, regular examination should be conducted to prevent from accidents. Note to repair carefully.

(1) The repairing often contains the following respects:

a) The cleaning of valve

Examine and repair the valve dismantled from the technical pipeline. Clean the parts which are dipped in the technical mediums to prevent from the damages to the personnel and equipment caused by the corrosive or harmful fluids. The rusting on the surface of parts should also be removed.

b) The dismantling of valve

In order to examine all the parts of valve to decide the repairing and replacing range, firstly should dismantle the actuator and valve completely. While dismantling, should protect the precisely processed parts, such as valve core, valve seat, valve rod, push rod and shaft sleeve and so on, and the precisely finished surface so as to prevent from breakdown to reduce the repairing expense. Special tools should be used to dismantle the valve seat.

c) The examination and repairing of main parts

If there are small rusts and abrades on the throttling surface of valve core and the seal surface between valve core and valve seat, generally can use machining or grinding methods to conduct repairing. If the damage is severe, should replace new parts. While repairing, should ensure the axiality of valve core and valve seat.

If the seal surface of valve rod is damaged, should use new parts to replace.

If the orientation of push rod and the seal surface are damaged, for the negative-action actuator, should replace the new parts; while for the positive-action actuator, can do some proper repairing.

While examining and repairing compression spring, if find defects (such as flaws) which will affect the strength, it should be replaced by a new one.

d) The replacement of vulnerable parts

The vulnerable parts of this regulating valve mainly are parts like packing, O-shape seal ring, gasket and diaphragm.

The dismantled packing, O-shape ring and gasket should be replaced by new ones while examining and repairing. After dismantling the diaphragm, should check if there are any flaws, ageing and wearing traces which indicate fracture possibility. Then decide whether to replace. Generally speaking, it should be replaced no more than 2~3 years.

e) Assembling and debugging

While assembling, appropriate lubricating grease should be applied on the locating position, orienting position and thread-connecting position of parts to make the next examination and repairing easier. Furthermore, should pay special attention to the axiality of push rod, valve core parts and valve seat in the whole machine.

After the assembling and debugging, it should be installed and used after passing the delivery testing items of product specified in the standard.

3) Safekeeping

The regulating valve should be kept in a room, with air temperature 5～40℃ and relative humidity

Low flow resistance can straightly pass single-seat valve, sleeve valve and double-seat valve, which is compact and simple in structure and has quite large flow coefficient. Single-seat valve and sleeve valve adopts valve form of straight-to-single-seat without bottom cap oriented structure, which is small in volume, light in weight, smooth in flow channel and has characteristics of high efficiency. The connecting form of valve body and piping adopts plane, convex and concave flanges so as to adapt to different nominal apertures. The valve cover can be divided into general type and mesothermal type so as to be used for different temperatures. The valve core type of single-seat valve is up-oriented plunger type. The valve core of sleeve is cylindrical and opens orifices with certain characteristics through the inner circle orient and the precise processing of sleeve. The valve core form of double-seat valve is up and lower oriented plunger shape. They all have accurate flow characteristics and accord with the IEC standard and the gradient and deviation requirements specified by the state. Standard type packing is Teflon molding packing, while special packing such as soft graphite can also be selected according to the field using requirements.

The single-seat valve is mainly composed of valve body, valve cover, valve core, valve seat, valve rod, packing and clamp and so on; sleeve valve is mainly composed of valve plug, valve rod, packing and clamp etc.; double-seat valve is mainly composed of valve body, valve cover, valve core, valve seat, valve rod, packing, clamp and lining etc. There is a packing room in the upper valve cover, which is filled with Teflon packing (or high-temperature packing). See Fig. 3.

The valve body, valve seat, sleeve, valve plug and valve rod are all made of 1Cr18Ni9Ti. In order to prolong the service life, according the needs of users, can bead weld hard alloy, such as Co, Cr and W etc. on the seal surface between valve core and valve seat, sleeve and valve plug. If adopting Teflon or rubber flexible sealing form, a comparatively nice sealing can be achieved. To meet diversity requirements on anti-corrosion, Hastelloy alloy B, Hastelloy alloy C, Monel metal, 316L stainless steel and Ti material can also be used.

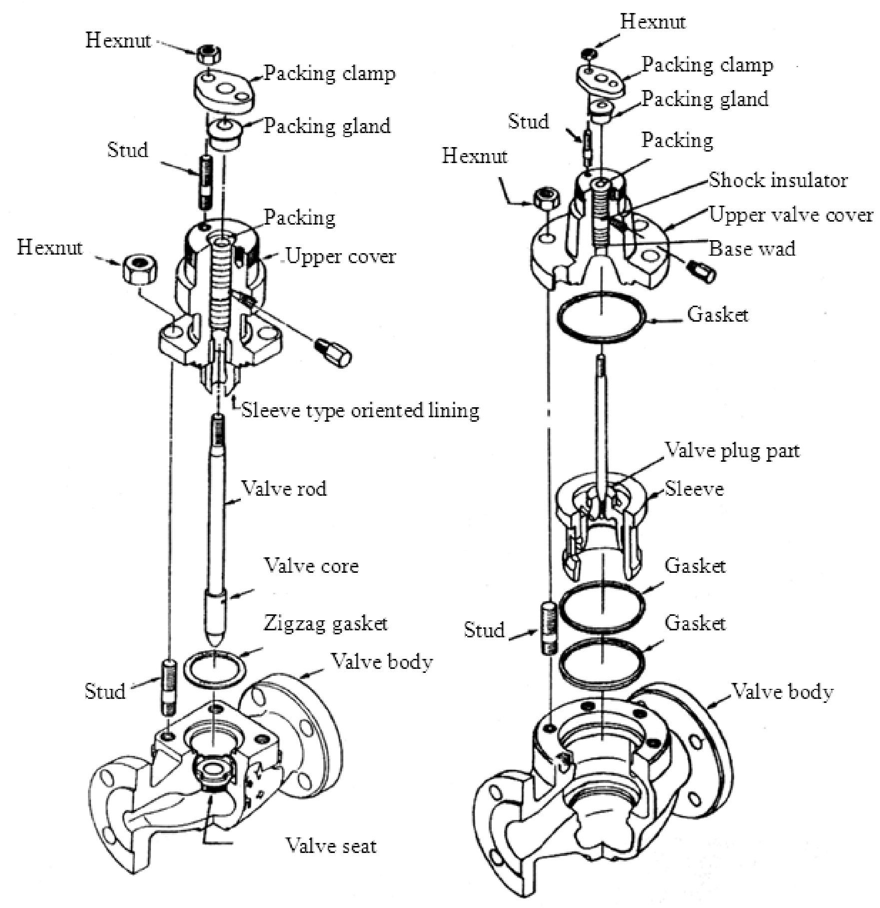

Fig. 3 (a) VJP type single-seat valve **Fig. 3 (b) VJM type sleeve valve**

3. Main technical parameters and outline dimensions

Main parameters of ZMZP type, ZMZM type and ZMZN type pneumatic miniature type regulating valves Table 1

Nominal aperture	DN	20				25	40		50	65	80	100	150		200	250	300
	DN	10	12	15	20		32	40					125	150			
Rated flow coefficient Kv	Straight line	1.8	2.8	4.4	6.9	11	17.6	27.5	44	69	110	176	275	440	690	1110	1600
	Equal percent	1.6	2.5	4.0	6.3	10	16	25	40	63	100	160	250	400	630	1000	1440
Rated travel mm		16					25			40			60			100	
Active area of film cm^2		310								550			950			1300	
Inherent flow characteristics		Straight line, equal percent, quick open															
Inherent rangeability		50:1															
Nominal pressure 10^5Pa		16; 40; 64															
Working temperature ℃		-20～+200; -40～+250; -40～+450; -60～+450															
Environmental temperature ℃		-40～+85															
Standard signal pressure KPa		20～100															
Pressure of air source MPa		0.14; 0.25; 0.4															
Spring range KPa		200～100; 40～200; 80～240; 20～60; 60～200															
Adapter size		Female thread M10×1															

Note: the Kv of ZMZN pneumatic miniature type double-seat regulating valve see column "Equal percent".

Technical parameters of ZHA (B) pneumatic multi-spring film actuator Table 2

Model	ZHA (B) -22	ZHA (B) -23	ZHA (B) -34	ZHA (B) -45	ZHA (B)-56	Spring range KPa
Active area of film cm^2	310	310	550	950	1300	20～100 (Standard spring range)
Rated travel mm	16	25	40	60	100	40～200; 80～240; 20～60; 60～100

Temperature table for applied mediums Table 3

Materials of valve body and valve cover	Medium temperature ℃		
	The upper valve cover of general type		The upper valve cover of cooling fin type
	Teflon packing	Graphite packing	
Cast iron (HT200)	-40～+200	—	—
Cast steel (ZG230-450)	-40～+250	-40～+450	
Cast stainless steel (ZG1Cr18Ni9Ti)		-60～+450	

Note: graphite packing is a new-type high-temperature packing, which can directly work in high/low-temperature mediums from -80～+600℃. Under high-temperature conditions, select normal upper valve cover adding graphite packing and cancel cooling fin. It has smaller size, excellent tightness and long service life, but it has large return difference. So it is suggested to match using with positioner. Please make it clear when ordering this product.

Permissible leakage rate Table 4

Valve type	ZMZP type	ZMZM type	ZMZN type
Permissible leakage rate	10^{-4}×Rated capacity of valve	5×10^{-3}×Rated capacity of valve	5×10^{-3}×Rated capacity of valve

5. Installation, maintenance and safekeeping

1) Installation

(1) While installing regulating valve, the following respects should be considered:

a) Safety: The safety of personnel and equipments in the installing process;

b) Control performance: The pressure of piping system should accord with the pressure loss considered while calibrating the dimension of regulating valve so as to ensure the needed flow characteristics. The inlet port and outlet port should have enough straight pipeline;

c) Installation position: There should be enough space for the operator to operate (including bypass operation) and to ensure the possibility of dismantling and repairing regulating valve and its accessories on spot;

d) Group of regulating valves: In the technical process piping, a bypass valve with a stop valve is often installed to work with regulating valve and constitute a valve group so as to adapt to the continuous operation of equipments. When repairing regulating valve, stop valve isolates and bypass valve regulates. There are four recommended arranging forms of regulating valve group in the following Fig. 4.

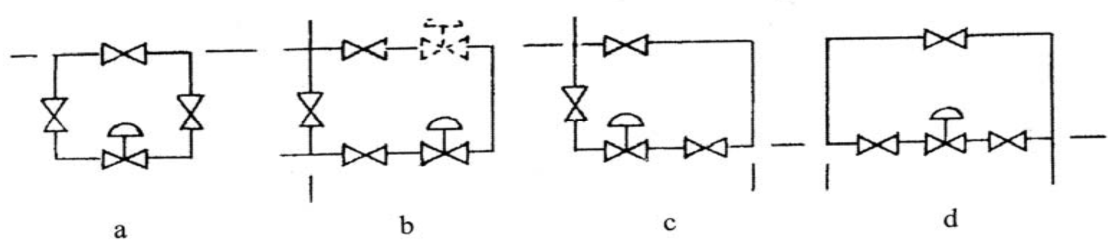

Fig.4 b-mode regulating valve can also be installed in the dotted line position

(2) The installing flow direction of regulating valve is recommended to be installed according to table 9:

Table 9

Form of regulating valve	Installation of flow direction
Single-seat valve	Flow open (open the direction flow towards the valve, low inflow high outflow)
Sleeve valve	Flow close (close the direction flow towards the valve, high inflow low outflow)
Double-seat valve	Inflow in the middle, up and down outflow

(3) The installation personnel should firstly realize that regulating valve is a kind of precise instruments, which can not be collided or tumbled to avoid breakdown. Pay attention to the following points:

a) The valve should be installed vertically on the pipeline. If the weight of valve is comparatively heavy or there is vibration in the field, a support should be added.

b) Should avoid that the valve body suffers too large stress because of the severe uncoaxiality of the front or back pipeline or the flanges of equipments.

c) Before the first working and after the examination and repairing after stop working, should firstly wash the piping system and then install the regulating valve or install a filter screen in front of the

Explanation: (1) P – Valve positioner; R – Pressure

(2) This table takes actuator of standard specification as calculation standard. If the max. working pressure exceeding the range listed in the table, can put forward to manufacturer to take proper solutions.

(3) For this table takes valve closing position as calculation standard, larger error is permitted for other positions.

Table 8 Permissible pressure difference of ZMZM type and ZMZN type pneumatic miniature type regulating valve (MPa)

On-off mode	Model of actuator	Spring range (KPa)	Pressure of gas source MPa	Needed accessories	Nominal aperture (Diameter of valve seat) mm							
					25	40	50	65	80	100	150	200
Air-to-close	ZHA -22	20-100	0.14	-	3.0							
		20-100	0.25	P	6.4							
		40-200	0.4	P.R	6.4							
	ZHA -23	20-100	0.14	-		2.25	1.95					
		20-100	0.25	P		6.4	6.4					
		40-200	0.4	P.R		6.4	6.4					
	ZHA -34	20-100	0.14	-				2.36	2.04	1.67		
		20-100	0.25	P				6.4	6.4	6.4		
		40-200	0.4	P.R				6.4	6.4	6.4		
	ZHA -45	20-100	0.14	-							1.41	1.14
		20-100	0.25	P							6.4	6.4
		40-200	0.4	P.R							6.4	6.4
Air-to-open	ZHA -22	20-100	0.14	-	1.50							
		40-200	0.25	P.R	4.50							
		80-240	0.4	P	6.4							
	ZHA -23	20-100	0.14	-		1.13	0.98					
		40-200	0.25	P.R		3.38	2.93					
		80-240	0.4	P		6.4	6.4					
	ZHA -34	20-100	0.14	-				1.18	1.02	0.84		
		40-200	0.25	P.R				3.54	3.06	2.51		
		80-240	0.4	P				6.4	6.4	5.58		
	ZHA -45	20-100	0.14	-							0.71	0.57
		40-200	0.25	P.R							2.12	1.71
		80-240	0.4	P							4.94	4.00

Explanation: (1) P – Valve positioner; R – Pressure

(2) This table takes actuator of standard specification as calculation standard. If the max. working pressure exceeding the range listed in the table, can put forward to manufacturer to take proper solutions.

Outline dimensions and qualities of ZMZP type, ZMZM type, ZMZN type pneumatic miniature type regulating valve Table 5

DN	L single-seat sleeve			Hmm		H_1mm			Quality kg		L double-seat			Hmm		H_1mm	Quality kg		Actuator			
mm	PN16	PN40	PN64	General	Mesotherm	PN16	PN40	PN64	PN16	PN40, 64	PN16	PN40	PN64	General	Mesotherm		PN16	PN40, 64	Model	ΦA	H2	Quality kg
20	181	194	206	459.5	589.5	52.5		62.5	20	21									ZH (B) -22	267	334	15
25	184	197	210	476.5	606.5	57.5		67.5	23	24	185	190	200	631	761	117	25	26				
32											200	210	210	637	763	120	28	30				
40	222	235	251	517.5	647.5	72.5		82.5	31	44	220	230	235	676	786	139	36	52	ZH (B) -23	267	362	16
50	254	267	286	524.5	654.5	80		87.5	37	47	250	255	265	686	816	144	40	58				
65	276	292	311	627	792	90		100	55	77	275	285	295	853	996	188	60	86	ZH (B) -34	350	406	31
80	298	317	337	637	802	97.5		105	65	97	300	310	320	883	1012	208	71	109				
100	352	368	394	645	810	107.5	115	125	75	125	350	355	370	907	1020	220	90	140				
125											410	425	440	1006	1155	268	156	181	ZH (B) -45	470	550	68
150	451	473	508	880	1080	140	150	170	188	268	450	460	475	1026	1171	278	195	291				
200	600	600	650	893.5	1093.5	167.5	187.5	202.5	268	438	550	560	570	1254	1391	320	288	478				

4. Other applied data

(1) The relationships between working pressure and temperature

When selecting the nominal pressure of regulating valve according to the max. working pressure of technical medium, the working temperature condition of medium should be contrasted. Because the nominal pressure is decided according to the strength condition under a certain reference temperature. Once the working temperature exceeding reference temperature, the permissible max. working pressure is bound to lower than nominal pressure. This point should be noted sufficiently. Please see table 6 for their specific relationships.

(2) Permissible pressure difference

While selecting regulating valve, besides considering other conditions, the problem that if the action of regulating valve is normal or not should also be noted from the thrust angle. If expressed by characteristic data, it is that if the permissible pressure difference is larger than the max. working pressure difference.

In order to promote the degree of standardization, universalization and seriation, the parts of actuator and valve have a standard combination. The permissible pressure difference specified by this combination generally applies to the working pressure difference conditions of normal technical processes. For detailed data, see table 7 and table 8.

Table 6 The working temperature and max. permissible pressure table of regulating valve

Material	Nominal pressure PN (10^5Pa)	Medium working temperature (℃)						
		200	250	300	350	400	425	450
		Max. working pressure (MPa)						
Cast iron	16	1.5						
Carbon steel	40	4.0	3.7	3.3	3.0	2.8	2.3	1.8
	64	6.4	5.9	5.2	4.7	4.1	3.7	2.9
Stainless steel	40	4.0	4.0	3.8	3.6	3.4	3.2	3.0
	64	6.4	6.4	6.0	5.6	5.3	5.0	4.8
Molybdenum steel and Chromium-molybdenum steel	40	4.0	4.0	4.0	4.0	3.6	3.4	3.2
	64	6.4	6.4	6.4	6.4	5.8	5.5	5.2

Note: 1. When the working temperature is the median of temperature grades in the table, can adopt intepolation method to decide max. working temperature.

2. When the mechanical property and temperature limit of the materials used by the main parts of valve are lower than the information listed in the table, this table can not be used.

Table 7 The permissible pressure difference of ZMZP type pneumatic miniature type single-seat regulating valve (MPa)

On-off mode	Model of actuator	Model of spring range	Pressure of gas source MPa	Needed accessories	Nominal aperture (Diameter of valve seat) mm													
					20				25	40		50	65	80	100	150		200
					(10)	(12)	(15)	(20)		(32)	(40)					(125)	(150)	
Air-to-close	ZHA-22	20-100	0.14	-	6.4	6.19	3.96	2.23	1.43									
		20-100	0.25	P	6 .4	6.4	6.4	6.4	6.4									
		40-200	0.4	P.R	6.4	6.4	6.4	6.4	6.4									
	ZHA-23	20-100	0.14	-						0.87	0.56	0.35						
		20-100	0.25	P						5.68	3.64	2.30						
		40-200	0.4	P.R						6.4	5.04	3.18						
	ZHA-34	20-100	0.14	-									0.34	0.22	0.14			
		20-100	0.25	P									2.21	1.43	0.91			
		40-200	0.4	P.R									3.06	1.98	1.26			
	ZHA-45	20-100	0.14	-												0.15	0.10	0.06
		20-100	0.25	P												0.95	0.66	0.37
		40-200	0.4	P.R												1.32	0.92	0.52
Air-to-open	ZHA-22	20-100	0.14	-	4.46	3.09	1.98	1.11	0.71									
		40-200	0.25	P.R	6.4	6.4	5.94	3.34	2.14									
		80-240	0.4	P	6.4	6.4	6.4	6.4	4.99									
	ZHA-23	20-100	0.14	-						0.44	0.28	0.18						
		40-200	0.25	P.R						1.31	0.84	0.53						
		80-240	0.4	P						3.05	1.95	1.25						
	ZHA-34	20-100	0.14	-									0.17	0.11	0.07			
		40-200	0.25	P.R									0.51	0.33	0.21			
		80-240	0.4	P									1.18	0.78	0.5			
	ZHA-45	20-100	0.14	-												0.07	0.05	0.03
		10-200	0.25	P.R												0.22	0.15	0.09
		80-240	0.4	P												0.51	0.36	0.21