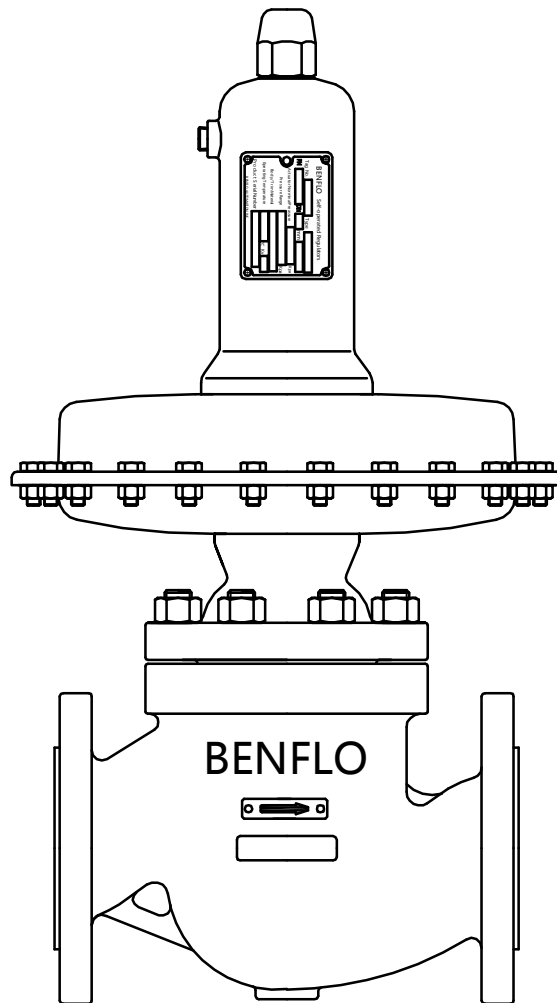


# Micro-pressure Blanketing Gas Relief Regulating Valve

## Type SP5000



**Ben***FLO*  
Automation

BENFLO AUTOMATION INC.

(Partner Of SaiLing Automation Equipment Co.,Ltd.)

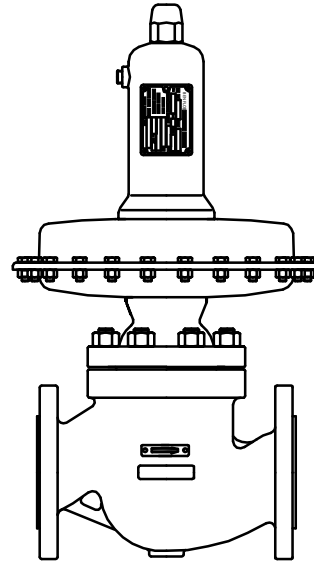
## SP5000 Micro-pressure Blanketing Gas Relief Regulating Valve (hereafter called as relief valve)

## Caution

Due to the installation, operation or maintenance performed by non-professional persons may cause equipment damages or injuries. The work must be performed by professional persons.

## Product Overview

SP5000 relief valve is direct-operated upstream pressure regulating valve. It can use for sundry relief system. Especially apply to the low-pressure relief system of the tank and reaction kettle. The minimal control pressure is 0.5KPa. The maximum control pressure is 15KPa. The minimal operation temperature is -48°C. The maximum operation temperature is 120°C.



## Product Feature

- Easy Pressure Regulation---The screw regulation device can realize easy, convenient and quick pressure regulation.
- Overload Safety---The safety shall be ensured under any circumstances. The self-operated regulator allows medium to enter the actuator, so the overload of the system usually badly damaged the regulator. The overload protection structure of SP5000 regulator can safely bear the overload pressure one or few dozens times higher than the upper limit pressure of the regulation range.
- No Packing---Any friction resistance will affect the control precision of the relief valve at the low-pressure control. SP5000 pressure relief valve without packing makes the regulating mechanism have highly sensitive and reduces leakage point.
- Soft Sealing---The valve plug designed as soft sealing structure and can easily shut off the flow.
- Stainless Actuator---As an important part of the regulator, the actuator is made of stainless plate to ensure its high pressure-strength and long service life.

● Easy Maintenance---The selection criteria of the every structure of the SP5000 regulator is to make sure the most convenient installation and maintenance while ensuring the performance requirements are met.

The top-mounted push-down installation method allows you to inspect and maintain the internal parts without any special tools before disassembling the regulator.

The bonnet central alignment method is adopted to avoid all unnecessary repeat matching operation. The internal part has sufficient clearance to make sure itself can be easily taken out or put in.

● Universal Parts---SP5000 regulator has extremely high parts universality with the whole self-operated products series manufactured by our company, it helps to reduce the inventory of spare parts.

**Specification Series and Performance Indicator**

● Body Size(Flanged connection)  
DN15(1/2"),DN20(3/4"),DN25(1"),DN40(1 1/2"),DN50(2")  
DN65(2 1/2"),DN80(3"),DN100(4"),DN150(6"),DN200(8")

● Pressure Rating  
PN16,40,64 ANSI 150LB,300LB,600LB  
Can also be customized

● Flow Factor

Valve Size	DN15, DN20, DN25
KV	1.6, 2.5, 4.5, 6.5, 10

Remak: maximum 4.5 KV is allow for DN15, maximum 6.5 KV is for DN20.

Valve Size	40	50	65	80	100	150	200
KV	25	40	65	100	160	260	380

Note:Diameters listed in above table are standard diameters, the valves can also be made with reduced diameters.

● Pressure Measuring Method

Measured at inside of the valve

● Flow Characteristics L

● Operation Temperature

For the soft sealing valve, the temperature depends on the material of the sealing part and diaphragm.

NBR	-29-82°C
FKM	-8-120°C
SR	-48-85°C
EPDM	-38-115°C
PTFE	-40-150°C

● Leakage Class VI级

● Closing Class

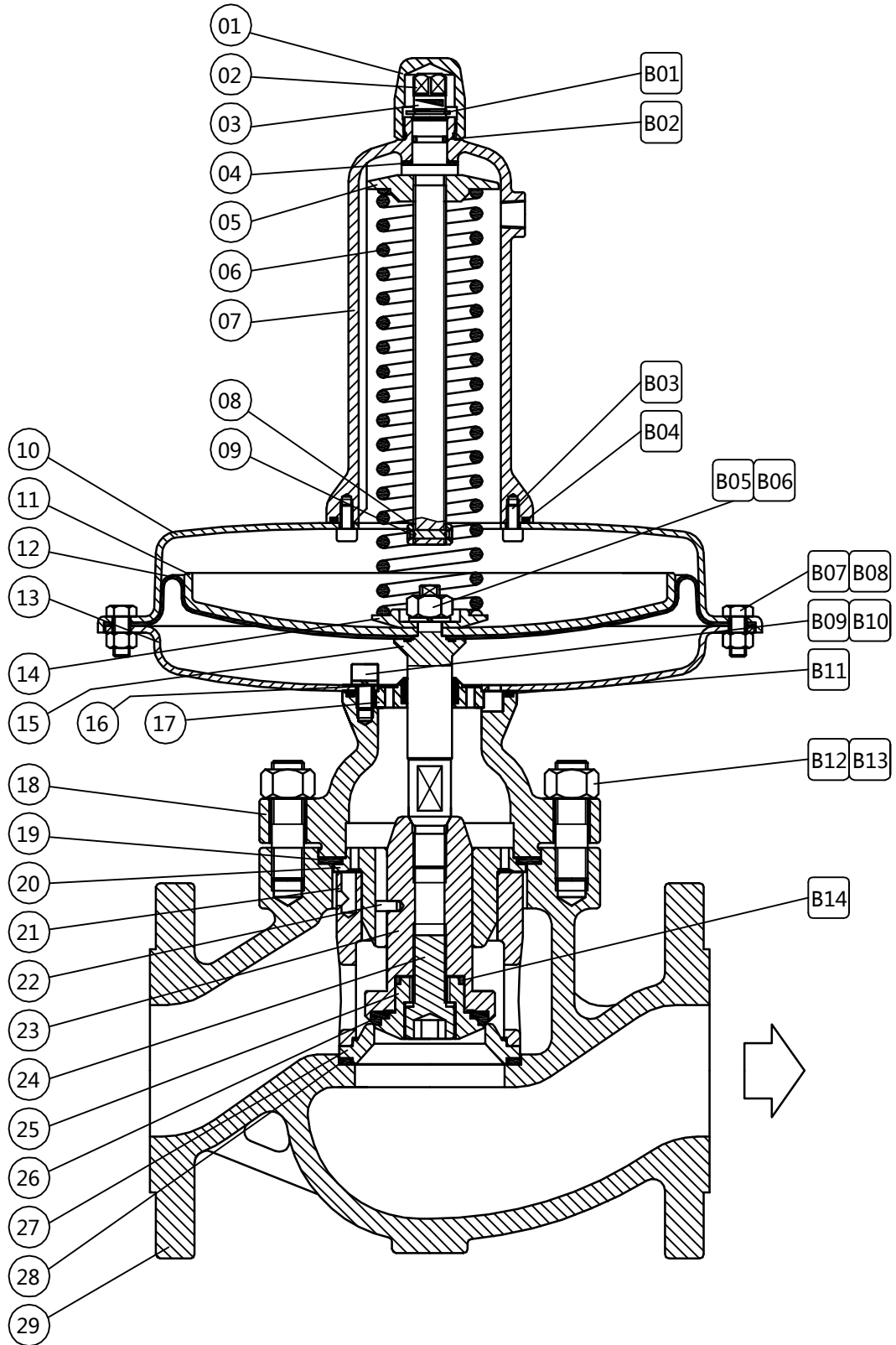
<10% of upper limit of regulation range.

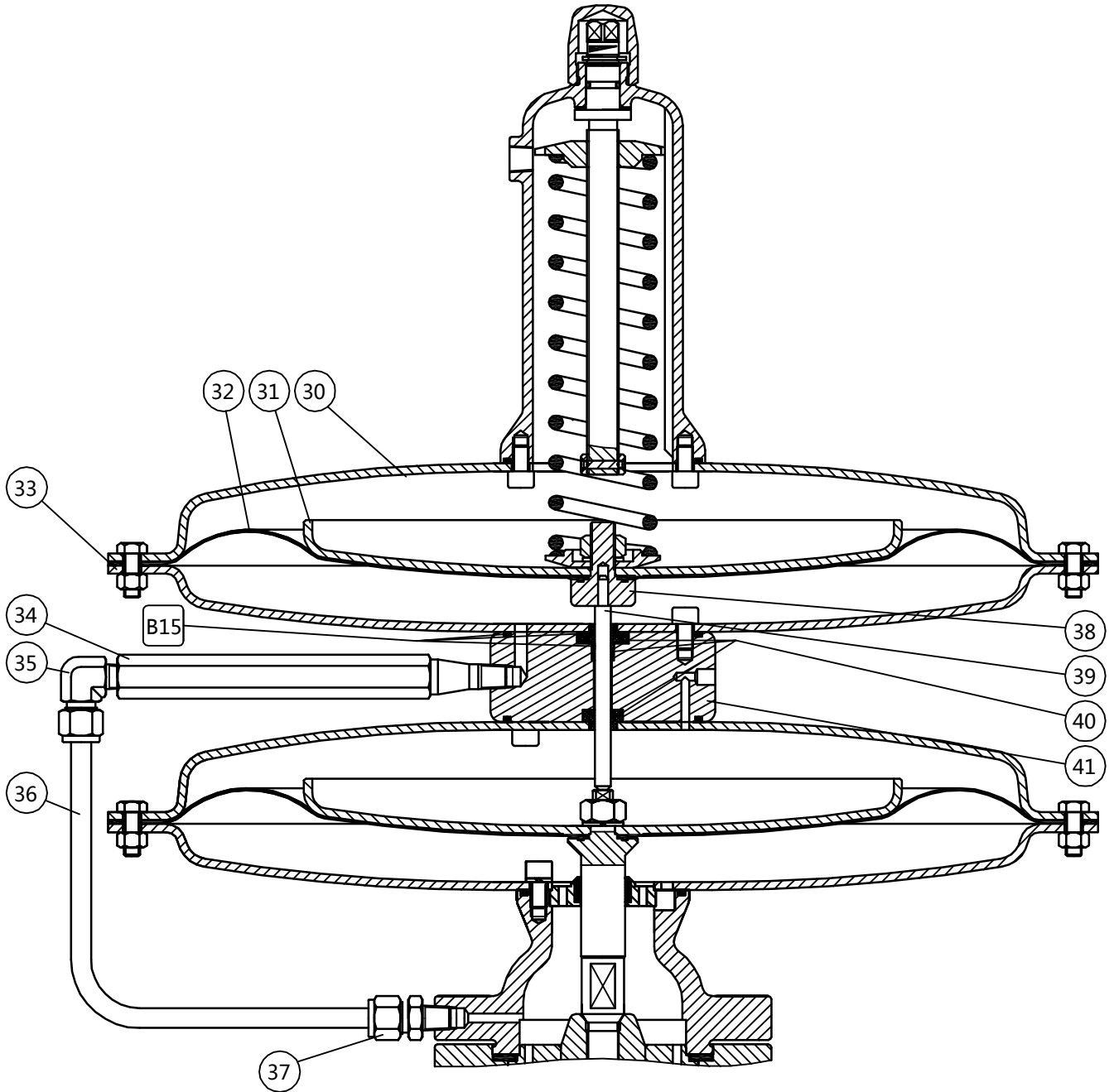
Spring Range, The Actuator Configuration, Difference Pressure and Precision

Actuator number	Spring number	Spring range KPa	Theoretical Precision										Max actuator pressure KPa
			Valve Size										
			15	20	25	40	50	65	80	100	150	200	
02.04.00	HS011	0.5-1.3	2%	3%	3%	-----	-----	-----	-----	-----	-----	-----	200
	HS012	1-3	2%	3%	3%	-----	-----	-----	-----	-----	-----	-----	
	HS013	1.5-4.5	2%	3%	3%	-----	-----	-----	-----	-----	-----	-----	
	HS014	2.4-7.2	2%	3%	4%	-----	-----	-----	-----	-----	-----	-----	
	HS015	4.5-14	3%	4%	4%	-----	-----	-----	-----	-----	-----	-----	
02.12.00	HS022	0.5-1.5	-----	-----	-----	3%	4%	-----	-----	-----	-----	-----	200
	HS023	0.9-2.7	-----	-----	-----	3%	4%	-----	-----	-----	-----	-----	
	HS024	1.5-4.5	-----	-----	-----	3%	4%	-----	-----	-----	-----	-----	
	HS025	2.3-6.9	-----	-----	-----	4%	5%	-----	-----	-----	-----	-----	
	HS026	5-15	-----	-----	-----	5%	6%	-----	-----	-----	-----	-----	
02.16.00	HS023	0.5-1.3	-----	-----	-----	3%	4%	5%	6%	7%	-----	-----	100
	HS024	0.7-2	-----	-----	-----	3%	4%	5%	6%	7%	-----	-----	
	HS025	1-3	-----	-----	-----	4%	5%	6%	7%	8%	-----	-----	
	HS026	2.4-7.2	-----	-----	-----	5%	6%	7%	8%	9%	-----	-----	
	HS027	4-12	-----	-----	-----	5%	6%	7%	8%	9%	-----	-----	
02.18.00	HS024	0.5-1	-----	-----	-----	-----	-----	5%	6%	7%	10%	14%	100
	HS025	0.5-1.5	-----	-----	-----	-----	-----	6%	7%	8%	11%	15%	
	HS026	1.2-3.6	-----	-----	-----	-----	-----	7%	8%	9%	12%	16%	
	HS027	2-6	-----	-----	-----	-----	-----	7%	8%	9%	12%	16%	

Remark: The theoretical precision indicates the theoretical pressure deviation of the valve under 10-50% travel and constant pressure difference. It will be affected by the pressure difference change and flow in actual application. The actual theoretical deviation is computed by the process parameter.

结构、零件清单、零件材质 Structure, Parts List and Material





02.18.00 Actuator

SN	Name of Part	Material	SN	Name of Part	Material
01	Protective Cover	304SS	20	Guide Bush	304SS , 316L
02	Screw	304SS	21	Cage	CF8,CF3M,304SS,316L
03	Arrow	304SS	22	Pin	304SS , 316L
04	Washer	PTFE	23	Valve Plug	304SS , 316L
05	Nut	Hpb59-1	24	Screw	304SS , 316L
06	Setting Spring	304SS	25	Press Plate	304SS , 316L
07	Spring Cover	CF8	26	Valve Cushion	NBR;FKM;SR;PTFE
08	Block Ring	304SS	27	Valve Seat	304SS , 316L
09	Pin	304SS	28	Sealing Rng of Valva Seat	316SS+Graphite 316L+Graphite
10	Diaphragm Case	304SS , 316L			316L+PTFE
11	Diaphragm Plate	LY12			
12	Diaphragm	NBR,FKM,SR	29	Body	WCB,CF8,CF3M
13	Diaphragm Case	304SS , 316L	30	Diaphragm Case	304SS , 316L
14	Spring Seat	304SS	31	Diaphragm Plate	LY12
15	Valve Stem	304SS , 316L	32	Diaphragm	NBR,FKM,SR
16	Guide Bush	PTFE	33	Diaphragm Case	304SS , 316L
17	Cushion Block	304SS , 316L	34	Connecting Pipe	304SS , 316L
18	Bonnet	WCB,CF8,CF3M	35	Joint	304SS , 316L
19	Sealing Ring of Bonnet	316SS+Graphite 316L+Graphite 316L+PTFE	36	Pressure Pipe	304SS , 316L
			37	Joint	304SS , 316L
B01	Circlip	304SS	B09	Socket Head Screw	304SS , 316L
B02	O-Ring	NBR	B10	Spring Washer	304SS , 316L
B03	Socket Head Screw	304SS , 316L	B11	O-Ring	NBR,FKM,SR
B04	O-Ring	NBR	B12	Stud	45#;304SS
B05	Hex Nut	304SS	B13	Hex nut	45#;304SS
B06	Spring Washer	304SS	B14	O-Ring	NBR,FKM,SR
B07	Hex Bolts	304SS	B15	O-Ring	NBR,FKM,SR
B08	Hex Nut	304SS			

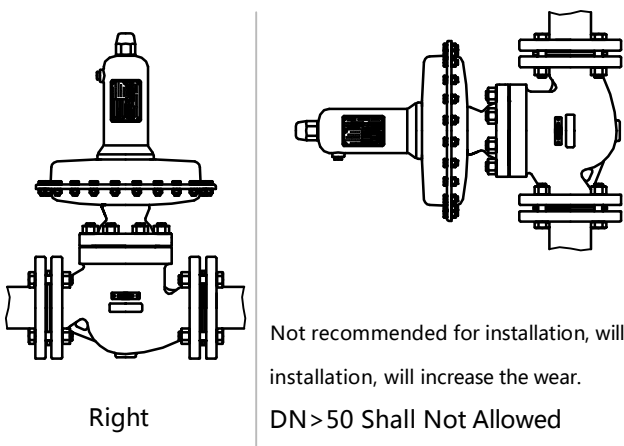
Operational Principle

The pressure relief valve is divided into upstream-pressure control and has a normal-installed plug. The plug close when the actuator can't bear any pressure, the upstream media pressure introduced into the actuator's diaphragm case to generate a pushing force. This pushing force will be compared with preset compression force of diaphragm case to generate a pushing force. This pushing force will be compared with preset compression force of a setting spring. When the pushing force is large than the preset compression force, the plug will be opened, the upstream pressure will be released until the balance among upstream pressure, actuator pushing force and spring compression force is reached, than the plug will be kept at the openees corresponding to upstream release flow. When the upstream pressure changed to the fluctuation of upstream flow or downstream back pressure, the previous balance will be broke, the plug will move to compensate the change, the plug will open more when the pressure reduce to restore the pressure. In a few words, the upstream pressure will be control to a certain range no matter whatever the process parameters changes. The plug will close to maintain the pressure when the upstream pressure continuously decreases to a pressure that is lower than a original set point.

The value of setting pressure depends on the configuration between the spring and actuator, the effective area of an actuator is fixed for an assembled regulator, the valve of the setting pressure will be changed with the changing of pushing force of the spring. Therefore, the process pressure can be adjusted with the turning of adjusting screw.

Install

- The flow direction of the relief valve must be the same with the direction arrow sign on the body of the relief valve when it is installed. The relief valver must be vertically installed to avoid horizontal installation whenever is possible.



- Shut-off valves should be installed either at the upstream and downstream of the relief valver for inpection and maintenance, the by-pass valve should be installed for emergency in important applications.

- The pressure gauge or other pressure detection instrument should be installed before the relief valve for pressure adjustment.

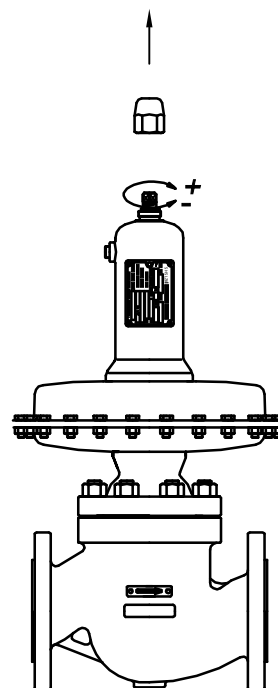
- The relief valve with pressure measured from the inside can be directly installed on the piping.

- The piping should be flushed or purged before the instillation of the relef valve to remove any particulates or welding slag.



Operation

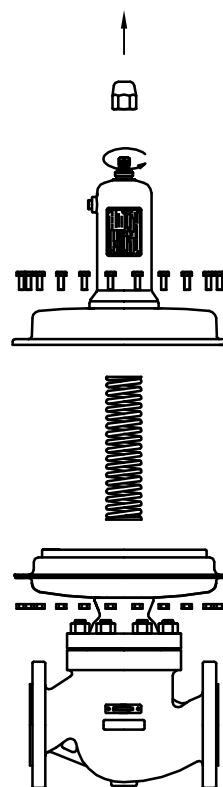
- To make sure the components of the relief valve are correctly installed before the relief valve is put into operation.
  
- To fully open the upstream globe valve and keep the downstream unobstructed. Slowly open the upstream globe valve and watch the pressure gauge. If no exception you can fully open the upstream globe valve, the relief valve enters operation state. To change the setting pressing, you should open the protection cover on the actuator and rotate the adjusting screw. To rotate clockwise, the pressure will increase. On the contrary, the pressure will reduce.

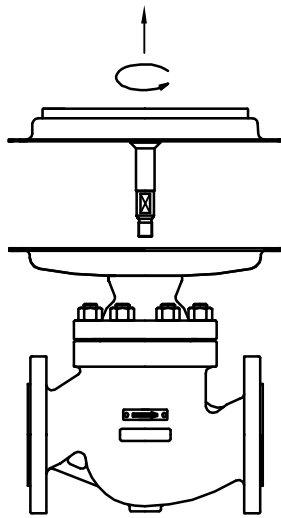


Repair Points

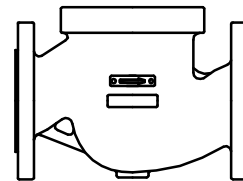
- The internal pressure of the relief valver must be completely released and separated with operation system whenever the valve will be disassemble.
  
- In any case, before the actuator is disassembled, you should first rotate the adjusting screw in anti-clock direction, fully loosen the spring and disassemble it.
  
- The relief valve is an integral structure. If you want to repair the valve, must be from top to bottom in order.

Loosen the protective cover, anticlockwise rotate the adjusting screw to the spring fully release. Loosen the diaphragm screw and remove the spring.





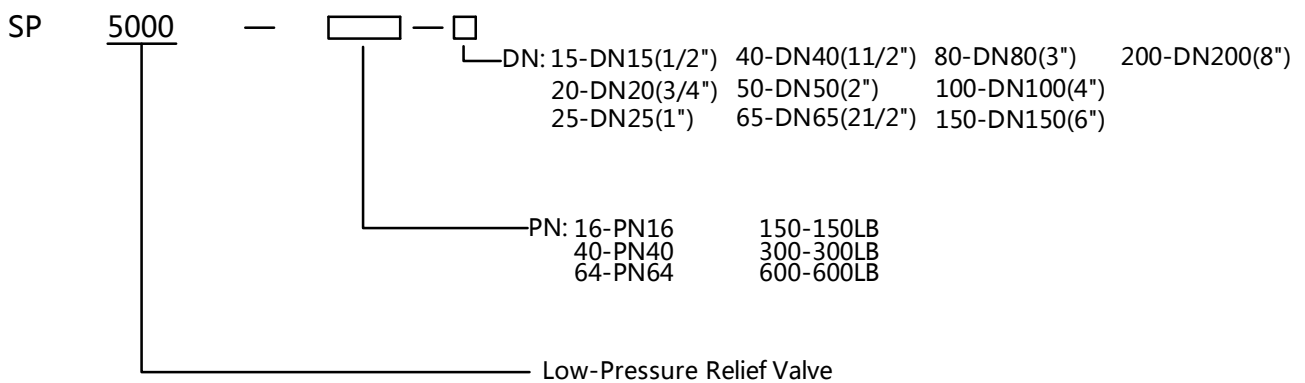
Anticlockwise rotate the diaphragm assembly to exiting out.



Loosen the screw, take down the diaphragm case and bush.

Loosen the nut, take down the bonnet and internal parts.

Mode Establishment



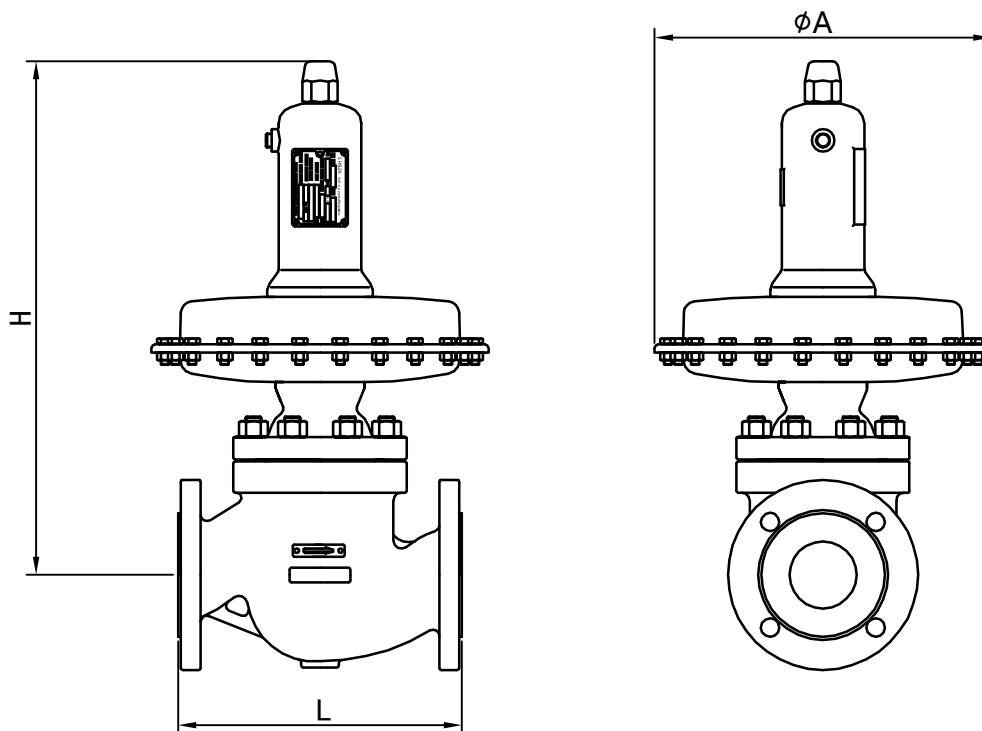
Description on The Nameplate

- Type
- Nominal Diameter
- Nominal Pressure
- Material of Body/Internal Parts
- Material of Diaphragm
- Regulation Range
- Maximum Pressure of Actuator
- Kv Value
- Operating Temperature
- Flange Standard
- Serial Number

Selection Criteria

- Pipeline Dimensions
- Medium
- Medium Temperature、 Ambient Temperature
- Medium Density
- Upstream Pressure、 Downstream Pressure
- Flowrate
- Setting Point
- Flange Standard
- Requirements on Material of The Body and Internal parts
- Other Special Requirements

Dimension



Valve Size			15	20	25	40	50	65	80	100	150	200
PN16(150LB)		L	181	181	184	222	254	276	298	352	451	600
PN40(300LB)			181	194	197	235	267	292	317	368	473	600
PN64(600LB)			206	206	210	251	286	311	337	394	508	650
Actuator	02.04.00	H	347	347	357	_____	_____	_____	_____	_____	_____	_____
		A	327	327	327	_____	_____	_____	_____	_____	_____	_____
	02.12.00	H	_____	_____	_____	440	450	_____	_____	_____	_____	_____
		A	_____	_____	_____	327	327	_____	_____	_____	_____	_____
	02.16.00	H	_____	_____	_____	440	450	500	500	505	_____	_____
		A	_____	_____	_____	494	494	494	494	494	_____	_____
	02.18.00	H	_____	_____	_____	_____	_____	630	630	635	730	800
		A	_____	_____	_____	_____	_____	494	494	494	494	494
	PN16(150LB)	Weight	11	11	13	20	28	52	68	75	118	172
	PN40(300LB)		11	11	13	20	30	55	72	83	138	195
PN64(600LB)	Kg		13	13	16	25	36	63	81	92	165	236

Remark: The weight will be different due to different configurations, the weight indicates average weight

Experience Sharing

● Upstream Safety Device

It should be cleared that the relief valve is not a safety valve. The responsibility of safety valve can not be satisfied with upstream control regulator. The safety of the upstream system should be evaluated. If there is any potential safety risk when the relief valve failed, other safety valve or safety device must be installed.

● The Calculation of The Flow Coefficient and Selection KV Value.

The detailed calculation of the flow coefficient will not be described here because the method is the same with normal valve, it should be noticed that the maximum openness of the valve should be not higher than 70%, When the KV value is selected, the suitable range of the openness should be 10-60%.

● Selection of Regulation Range

The regulation range selected must cover the process setting required. There will be a number of regulation ranges can be used for the same setting value. The ranges should be selected to make the setting value is at the middle or upper middle of the range. It is because that the theoretical deviation of every combination of spring and actuator is fixed, the deviation will be smaller when the setting value is closer to the upper limit of the regulation range. Generally, it is suitable to make the setting value is in the 40-85% of the regulation range.

● Selection of Actuator

It must be noticed that the relief valve is different with conventional valve. The medium will enter the actuator and make direct contact with the diaphragm. Therefore, we should consider that whether there is any corrosion to the diaphragm will be caused by the medium or whether the temperature of the medium is higher than the allowed temperature of the diaphragm when we select the suitable material of the diaphragm.

**Warning**

After the relief valve is delivered to the site, its pressure should be tested. The relief valve is different from the common valve and nominal pressure of the valve can not be referred to. But the actuator and valve assembly can not separate pressure test. It only do integral pressure test. The gas pressure test is allowed, but it can not exceed the maximum pressure of the actuator.

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### Micro-pressure Blanketing Gas Relief Regulating Valve

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