SP5000型自力式低压泄压阀（以下简称泄压阀）

SP5000 Self-Operated Low-Pressure Relief Valve(hereafter called as relief valve)

注意 Caution

安装，操作，维护由非专业人员进行可能会对设备，人员造成损坏，所以必须由专业人员进行调压阀的安装，调试及维护。

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.

产品概述 Product Overview

SP5000型低压泄压阀是一种直接作用阀前压力调节阀，可广泛应用于各类低压放散系统，特别适用于储罐及反应釜的低压排放系统。最低控制压力0.5KPa,最高控制压力15KPa,最低使用温度-48℃,最高使用温度120℃。

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 contro pressure is 15KPa. The minimal operation temperature is -48℃. The maximum operationtemperature is 120℃.

产品特点 Product Feature

- 调压方便---螺杆式调节机构使调压更轻松，方便，迅速。

  Easy Pressure Regulation---The screw regulation device can realize easy, convenient and quick pressure regulation.

- 安全过载---在任何情况下安全永远是最重要的，自力式调节阀因其介质会直接进入执行器，当系统超压时，往往会严重损坏阀门。SP5000型泄压阀的过载保护机构会安全承载高于调压范围上限值几倍甚至几十倍的过载压力。

  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.

- 无填料---在低压控制时任何摩擦阻力都会影响泄压阀的控制精度，SP5000型泄压阀无填料结构使整个调节机构有很好的灵敏度，同时又减少了外泄漏点。

  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.

- 软密封---阀芯为软密封结构，在阀芯关闭时能轻松切断流体。

  Soft Sealing---The valve plug designed as soft sealing structure and can easily shut off the flow.

- 不锈钢执行器---执行器作为泄压阀的重要部件，采用不锈钢板成形，有很高的耐压强度和使用寿命。

  Stainless Actuator---As an important part of the reguator, the actuator is made of stainless plate to ensure its high pressure-strength and long service life.

- 维护方便---SP5000型泄压阀每一结构的确定原则是在保证性能指标的前提下达到最方便的安装维护。顶置压入式安装不需拆下阀体就可以进行内部的检查维护，且不需任何专用工具。

采用阀盖中心定位原则，省去所有不必要的重复配合，内件留有足够的间隙，使内件能轻松取出或放入。

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 easity taken out or put in.

● 系列通用**---SP5000**型泄压阀与本公司所产的整个自力式系列产品有极高的零部件通用性，可减少项目备件数量。

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

规格系列，性能参数 Specification Series and Performance Indicator

● 阀体尺寸（阀体为法兰式连接）

Body Size(Flanged connection)

DN15(1/2"),DN20(3/4"),DN25(1"),DN40(11/2"),DN50(2")

DN65(21/2"),DN80(3"),DN100(4"),DN150(6"),DN200(8")

● 压力等级 **Pressure Rating**

PN16,40,64 ANSI 150LB,300LB,600LB

也可以定制 **Can also be customized**

● 流量系数 **Flow Factor**

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

注：**DN15**最大**KV**为**4.5**,**DN20**最大**KV**为**6.5**,其余口径不限。
Remak: maximum 4.5 KV is allow for DN15, maximum 6.5 KV is for DN20.

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

注：以上为标准口径，阀门也可按缩径尺寸加工。

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

● 取压方式 **Pressure Measuring Method**

阀内取压

Measured at inside of the valve

● 流量特性 **Flow Characteristics** **L**

● 使用温度**Operation Temperature**

对于软密封阀门来讲，温度主要取决于密封件及膜片材质。

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

NBR **-29-82℃**

FKM **-8-120℃**

SR **-48-85℃**

EPDM **-38-115℃**

PTFE **-40-150℃**

● 泄漏等级 **Leakage Class** **VI**级

● 关闭等级

<10%的调压范围上限值

<10% of upper limit of reguation range.

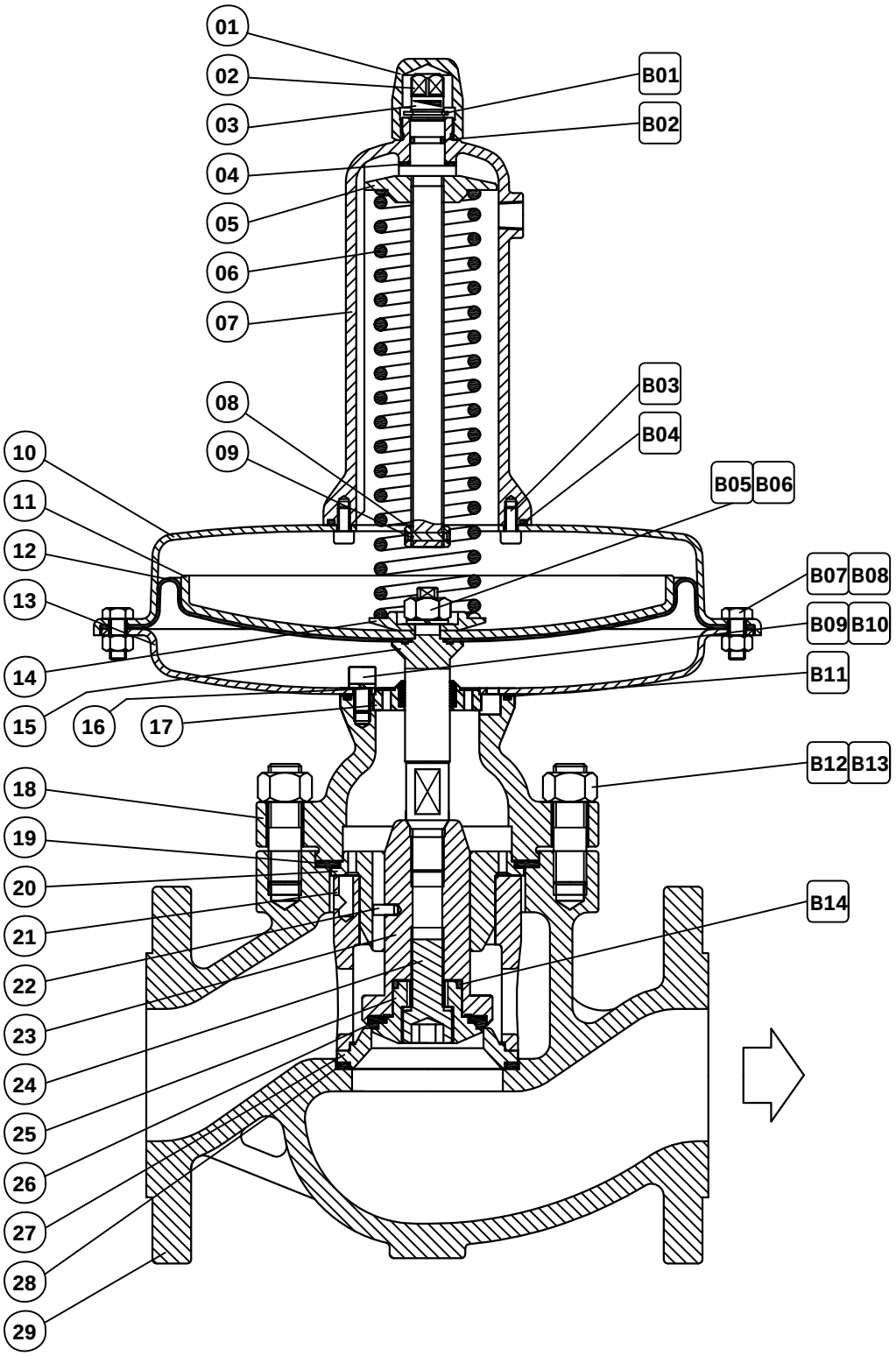
调压范围、执行器组配、压差、精度
Spring Range、The Actuator Configuration、Difference Pressure and Precision

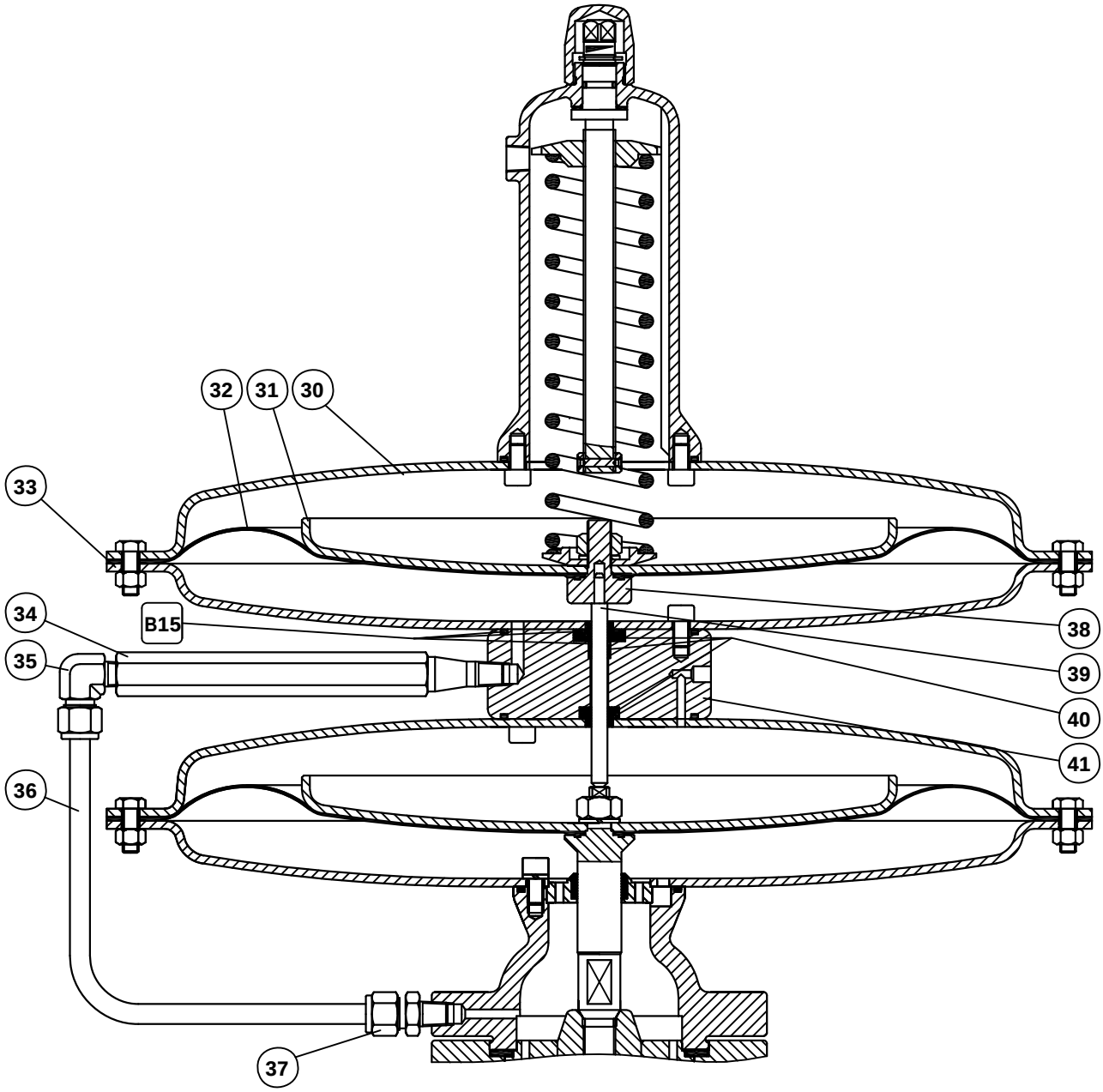
执行器号 Actuator number	弹簧号 Spring number	调压范围 Spring range KPa	理论精度 Theorectical Precision 阀门口径 Valve Size										执行器耐压 Max actuator pressure KPa
			15	20	25	40	50	65	80	100	150	200	
02.04.00	HS011	0.5-1.3	2%	3%	3%								200
	HS012	1-3	2%	3%	3%								
	HS013	1.5-4.5	2%	3%	3%								
	HS014	2.4-7.2	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%	

注： 精度是指在恒压差下阀门在**10-50%**开度时的压力理论偏差值，在实际应用中还会受压差变化，流量等影响，实际偏偏差值根据工艺参数计算为准。

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 deviayion is computed by the process parameter.

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





02.18.00 执行器
02.18.00 Actuator

序号 SN	零件名称 Name of Part	材质 Material	序号 SN	零件名称 Name of Part	材质 Material
01	保护罩 Protective Cover	304SS	20	导套 Guide Bush	304SS，316L
02	螺杆 Screw	304SS	21	套筒 Cage	CF8,CF3M,304SS,316L
03	箭头 Arrow	304SS	22	销 Pin	304SS，316L
04	垫圈 Washer	PTFE	23	阀芯 Valve Plug	304SS，316L
05	螺母 Nut	Hpb59-1	24	螺钉 Screw	304SS，316L
06	设定弹簧 Setting Spring	304SS	25	压板 Press Plate	304SS，316L
07	弹簧罩 Spring Cover	CF8	26	阀垫 Valve Cushion	NBR;FKM;SR;PTFE
08	挡圈 Block Ring	304SS	27	阀座 Valve Seat	304SS，316L
09	销 Pin	304SS	28	阀座垫圈	316SS+Graphite
10	膜盖 Diaphragm Case	304SS，316L		Sealing Rng of Valva Seat	316L+Graphite
11	盘 Diaphragm Plate	LY12			316L+PTFE
12	膜片 Diaphragm	NBR,FKM,SR	29	阀体 Body	WCB,CF8,CF3M
13	膜盖 Diaphragm Case	304SS，316L	30	膜盖 Diaphragm Case	304SS，316L
14	弹簧座 Spring Seat	304SS	31	盘 Diaphragm Plate	LY12
15	阀杆 Valve Stem	304SS，316L	32	膜片 Diaphragm	NBR,FKM,SR
16	导套 Guide Bush	PTFE	33	膜盖 Diaphragm Case	304SS，316L
17	垫块 Cushion Block	304SS，316L	34	接管 Connecting Pipe	304SS，316L
18	阀盖 Bonnet	WCB,CF8,CF3M	35	接头 Joint	304SS，316L
19	阀盖垫圈	316SS+Graphite	36	导压管 Pressure Pipe	304SS，316L
	Sealing Ring of Bonnet	316L+Graphite	37	接头 Joint	304SS，316L
		316L+PTFE			

B01	弹性挡圈 Circlip	304SS	B09	内六角螺钉 Socket Head Screw	304SS，316L
B02	O型圈 O-Ring	NBR	B10	弹簧挡圈 Spring Washer	304SS，316L
B03	内六角螺钉 Socket Head Screw	304SS，316L	B11	O型圈 O-Ring	NBR,FKM,SR
B04	O型圈 O-Ring	NBR	B12	双头螺柱 Stud	45#;304SS
B05	六角螺母 Hex Nut	304SS	B13	六角螺母 Hex nut	45#;304SS
B06	弹簧挡圈 Spring Washer	304SS	B14	O型圈	NBR,FKM,SR
B07	六角螺栓 Hex Bolts	304SS	B15	O型圈	NBR,FKM,SR
B08	六角螺母 Hex Nut	304SS			

操作原理 Operational Principle

泄压阀为阀前压力控制阀，阀芯正装，在执行器没有受压时，阀芯关闭，阀前介质压力经内部导压孔引入执行器膜室产生推力，此推力与给定弹簧的预压缩力比较，当推力大于弹簧力时，阀芯就会被开启，阀前被泄压，直至阀前压力，执行器推力，弹簧力达到平衡，阀芯就会稳定在与阀前泄压流量对应的开度上，当阀前流量或阀后背压变化引起阀前压力变化时，原有的平衡就被打破，阀芯会相应位移进行补偿，即压力升高阀芯开大，压力降低阀芯关小，使压力得以恢复。总之，不管工艺参数如何变化，阀前压力始终被控制在一定范围内，当阀前压力不断减小，低于原有设定值，阀芯会逐渐关闭保压。

设定压力的大小取决于弹簧与执行器的配比，执行器有效面积是不变的，改变弹簧推力就可以改变设定压力的大小，所以只要旋动调节螺钉就可以进行工艺压力的调整。

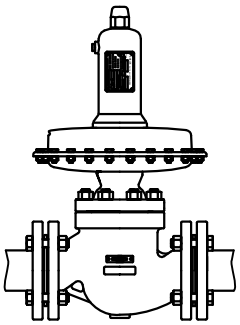
The pressure relief valve is divided into upstream-prssure control and has a normal-installed plug. The plug close when the actuator can't bearany pressure, the upstream media pressure introduced into the actuayor's diaphreagm case to generate a pusing force. This pusing force will be compared with preset compression force of diaphreagm case to generate a pusing force. This pusing force will be compared with preset compression force of a setting spring. When the pusing force is large than the preset compression force, the plug will be opened, the upsteam pressure will be released until the balance among upstream pressure, actuator pusing force and spring compression force is reached, than the plug will be kept at the opennees 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 orginal 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 reguator, 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.

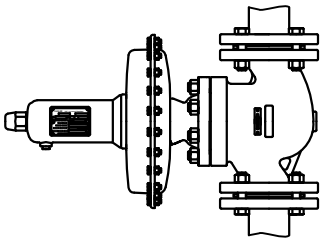
安装 Install

● 泄压阀安装时流向一定要与阀体上的箭头一致。应尽可能垂直安装，尽量避免水平安装。

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.



正确 **Right**



不推荐安装，会增加磨损。**DN>50**不得采用。

Not recommended for installation, will installation, will increase the wear.

DN>50 Shall Not Allowed

● 泄压阀前后应安装截止阀，以便检修和维护，在重要的场合应安装旁路阀，以便应急使用。

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.

● 泄压阀前应装上压力表或其他检测仪表，以便进行压力调整。

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

● 泄压阀为内部导压，直接安装于管道即可。

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

● 泄压阀安装前管道应已进行清洗或吹扫，不应留有颗粒，焊渣等杂物。

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

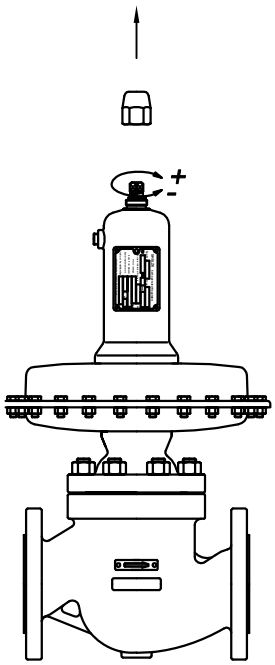
运行使用 Operation

● 投入运行前应先检查各部安装是否正确。

To make sure the components of the relief valve are correctly installed before the relief valve is put into operation.

● 全开阀后截止阀，保持下游完全开通，缓慢开启阀前截止阀，并观察压力表示值，如无异常现象可全开阀前截止阀，泄压阀即进入运行状态。如需改变其设定压力，只要打开执行器上的保护罩，旋动调节螺杆即可，顺时针压力升高，逆时针压力减小。

To fully open the upstream globe valve and keep the downstream unobstructed. Slowy 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 rotare the adjusting screw. To rotate clockwise, the pressure will increase. On the contray, the pressure will reduce.



检修要点 Repair Points

● 在任何情况下要进行泄压阀的拆卸，必须将其内部压力释放和与运行系统完全隔离的状态下进行。

The internal pressure of the relief valver must be completely released and separated with operation system whenever the valve will be disassemble.

● 在任何情况下对执行器拆卸时首先应逆时针旋动调节螺杆，将给定弹簧完全放松后才可进行解体。

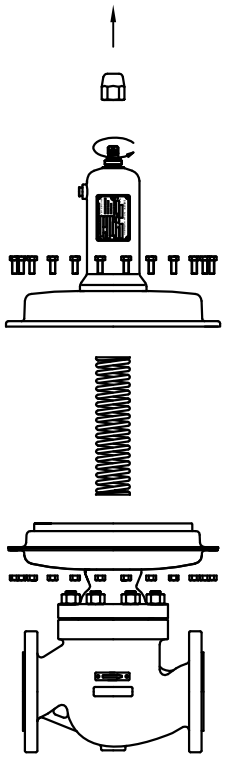
In any case, before the actuator is disassembled, you should first rotate the adjusting screw in anti-clock direction, fully loosen the spring and disassemble it.

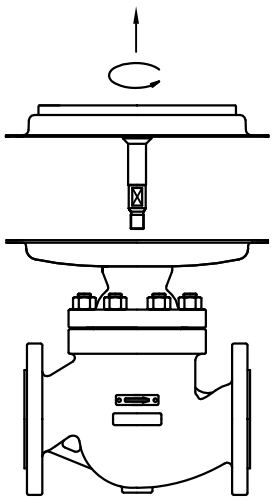
● 泄压阀为一体式结构，如要对调压阀进行解体检修，应从上至下按次序进行。

The relief valve is an integral structure. If you want to repair the valve, must be from top to bottom in order.

松开保护罩，逆时针旋转调节螺杆使弹簧完全放松，松开膜盖螺栓，取出弹簧。

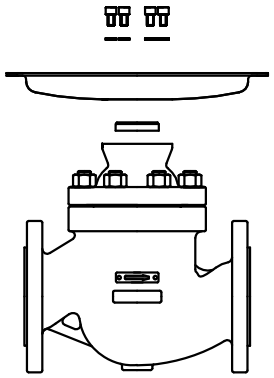
Loosen the protective cover, anticlockwise rotate the adjusting screw to the spring fully release. Loosen the diaphragm screw and remove the spring.





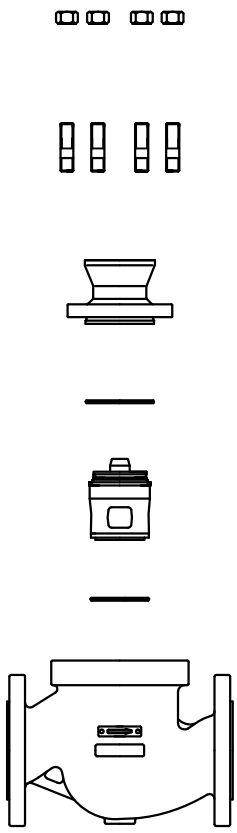
逆时针旋转退出膜片组件。

Anticlockwise rotate the diaphragm assembly to exting out.



松开螺钉，取下导套及膜盖。

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



拆掉阀盖螺母，取下阀盖，就可以取出阀内件。

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

型号编制 Mode Establishment

SP 5000 — □ — □

- **DN:** 15-DN15(1/2") 20-DN20(3/4") 25-DN25(1") 40-DN40(11/2") 50-DN50(2") 65-DN65(21/2") 80-DN80(3") 100-DN100(4") 150-DN150(6") 200-DN200(8")
- **PN:** 16-PN16 40-PN40 64-PN64 150-150LB 300-300LB 600-600LB
- 低压阀泄压阀 **Low-Pressure Relief Valve**

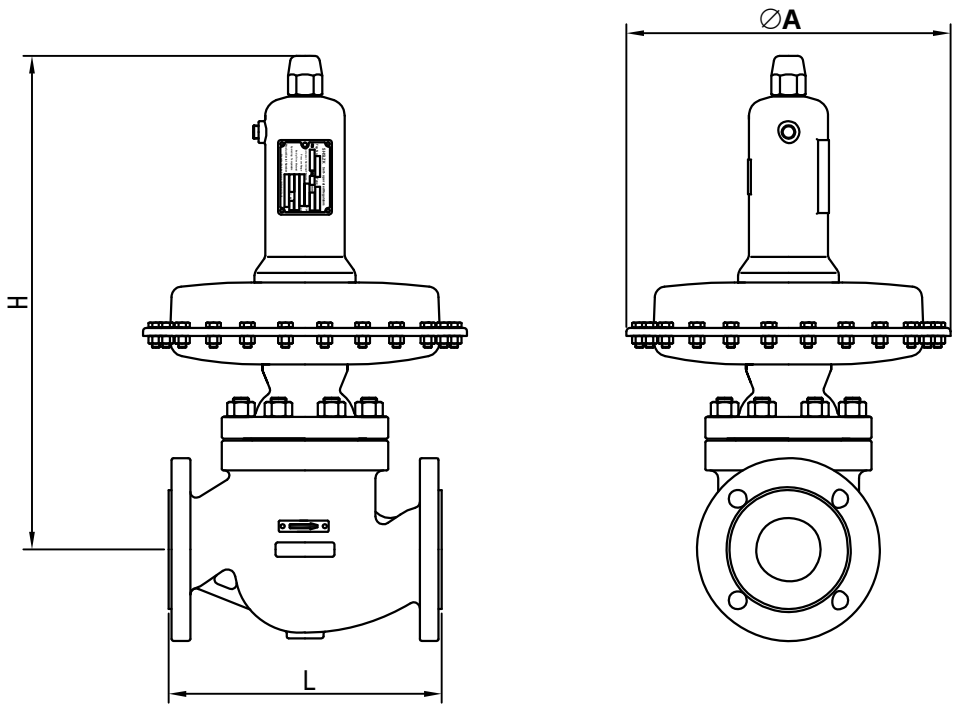
铭牌内容 Description on The Nameplate

- 产品型号 Type
- 公称通径 Nominal Diameter
- 公称压力 Nominal Pressure
- 阀体/内件材质 Material of Body/Internal Parts
- 膜片材质 Material of Diaphragm
- 调压范围 Regulation Range
- 执行器最高耐压 Maximun Pressure of Actuator
- KV值 Kv Value
- 使用温度 Operating Temperature
- 法兰标准 Flange Standard
- 生产编号 Serial Number

选型条件 Selection Criteria

- 管线尺寸 Pipeline Dimensions
- 介质种类 Medium
- 介质温度、环境温度
  Medium Temperature、Ambient Temperature
- 介质密度 Medium Density
- 阀前压力、阀后压力
  Upstream Pressure、Downstream Pressure
- 流量 Flowrate
- 设定压力 Setting Point
- 法兰标准 Flange Standard
- 本体及内件材质要求
  Requirements on Material of The Body and Internal parts
- 其他特殊要求 Other Special Requirements

外型尺寸 Dimension



阀门直径 Valve Size			15	20	25	40	50	65	80	100	150	200
PN16(150LB)			181	181	184	222	254	276	298	352	451	600
PN40(300LB)		L	181	194	197	235	267	292	317	368	473	600
PN64(600LB)			206	206	210	251	286	311	337	394	508	650
执行器 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)		重量	11	11	13	20	28	52	68	75	118	172
PN40(300LB)		Weight	11	11	13	20	30	55	72	83	138	195
PN64(600LB)		Kg	13	13	16	25	36	63	81	92	165	236

注：重量由于配置不同会有所不同，这里的重量为较平均的重量。

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

经验分享 Experience Sharing

- 阀前安全装置

必须认识到泄压阀不是安全阀，阀前控制调压阀不能承担安全阀的责任，应对阀前系统进行评估，如泄压阀故障时阀前系统存在安全隐患，必须另外安装安全阀或其他安全装置。

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.

- 流量系数的计算及KV值的选择

流量系数的计算与普通调节阀一样，这里不再详述，KV值选择时注意阀门的开度不应超过**70%**，比较理想的开度范围为**10-60%**。

The Calculation of The Flow Coefficient and Selection KV Value.

The detailed calculation of the flow cofficient 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%.

- 调压范围的选择

所选的调压范围必须涵盖所需的工艺设定值。同一设定值会有多个调压范围适用，但应使设定值尽量处于调压范围的中间或中间偏上的位置，因为对于每一对弹簧和执行器的配置其理论偏差是固定的，设定值越靠近调压范围上限值相对偏差就越小。一般设定值处于调压范围**40-85%**的范围是比较合适的。

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 uper middle of the range. It is because that the theorretical 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 valve is in the 40-85% of the regulation range.

● 执行器的选择

必须认识到泄压阀不同于普通调节阀，介质会进入执行器，介质会直接接触膜片，所以我们首先应考虑介质是否会腐蚀膜片，介质温度是否超过膜片允许温度，从而选择合适的膜片材质。

Selection of Actuator

It must be noticed that the relief valver is different with conventional valve. The medium will enter the actuator and make direct contact with the diaphragm. Therefore, we should conside that whether there is any corroison to the diapgragm 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.

警告 **Waring**

泄压阀到了现场，如要对泄压阀进行试压，必须认识到泄压阀不同于普通阀门，不能以阀体公称压力为标准，且执行器与阀组件也无法拆开进行单独试压，所以只能整体进行整机试压，且压力不得超过执行器最高耐压，只允许用气体试验。

After the relief valve is delivered to the site, its pressure should tested. The relief valve is different from the common valve and norminal 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.