太航德克森
TAIHANG DIRKSEN

DZL 型

自力式调节阀使用说明书

DZL Series Self-acting Type Control Valve Mannual

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1 产品概述

DZL 型自力式单座压力调节阀（简称调压阀）是不需要任何外加能源，利用被调介质自身能量而实现自动调节的执行器产品。该产品最大特点是，能在无电、无气的场所工作，同时又节约了能源，压力设定值在运行中可随意调整。采用快开流量特性，动作灵敏，密封性能好。因而它广泛应用于石油、化工、电力、冶金、食品、轻纺、机械制造与居民建筑楼群等各种工业设备中用气体、液体及蒸汽介质减压、稳压（用于阀后调节）或泄压、稳压（用于阀前调节）的自动控制。

1 Introduction

The DZL type self-acting type single seat pressure control valve (referred to as the pressure control valve) is an actuator product that does not require any external energy and utilizes the energy of the regulated medium to achieve automatic regulation. The biggest feature of this product is that it can work in places without electricity or gas, while saving energy. The pressure setting value can be adjusted freely during operation. Adopting fast opening flow characteristics, the action is sensitive and the sealing performance is good. Therefore, it is widely used in petroleum, chemical industry, electric power, metallurgy, food, textile, machinery manufacturing, residential buildings and other industrial equipment to reduce and stabilize the pressure of gas, liquid and steam media (used for post valve regulation) or automatic control of

pressure relief and stabilization (used for valve front regulation).

2、产品规格

2、Product specifications

2.1 产品结构和工作原理

调压阀主要有检测执行机构、调节阀、冷凝器与阀后（或阀前）接管等四部分组成，其结构见图 1。

图 1 a）用于控制阀后压力的调压阀，阀的作用方式为压闭型。其原理如下：介质由箭头方向流入阀体、经阀芯、阀座节流后输出。另一路经冷凝器（介质为蒸汽时使用）冷却后，被引入执行机构作用于膜片上，使阀芯随之发生相应的位移，达到减压、稳压之目的。如阀后压力增加，作用于膜片上的力增加，压缩弹簧，带动阀芯，使阀门开启度减少，直到阀后压力下降到设定值为止。同理，如阀后压力降低，作用在膜片上的力减小，由于弹簧的反作用力，带动阀芯，使阀门开启度增大，直到阀后压力上升到设定值为止。

图 1 b）用于控制阀前压力的调节阀，阀的作用方式为压开型。其原理如下：介质由箭头方向流入阀体，另一路经冷凝器（介质为蒸汽时使用）冷却后，被引入执行机构作用于膜片上，使阀芯随之发生相应的位移，达到泄压、稳压之目的。如阀前压力增加，作用于膜片上的力增加，压缩弹簧，带动调芯，使阀门开启度增大，直至阀前压力下降到设定值为止。同理，如阀前压力降低，作用于膜片上的力减小，由于弹簧的反作用力，带

动阀芯，使阀门开启度减小，直到阀前压力上升到设定值为止。

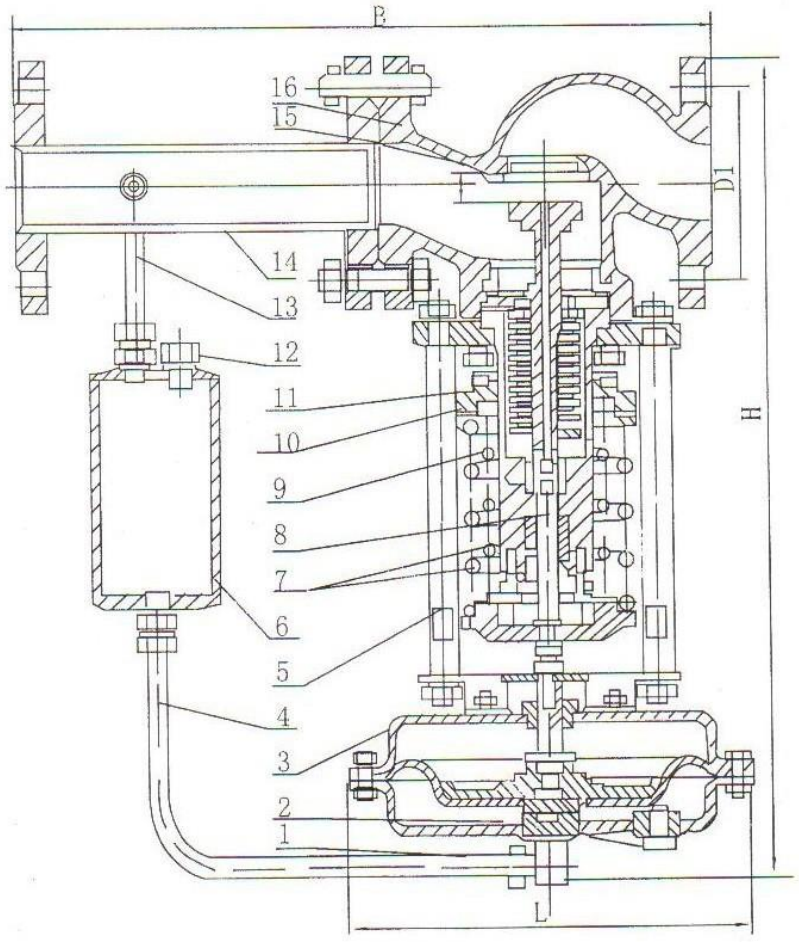
2.1 Structure and principle

The pressure control valve mainly consists of four parts: the detection actuator, the control valve, the condenser, and the connecting pipe behind the valve (or in front of the valve). Its structure is shown in Fig. 1.

Fig. 1 a） A pressure control valve used to control the pressure behind the valve, which operates in a pressure closed type. The principle is as follows: the medium flows into the valve body in the direction of the arrow, passes through the valve core, and is throttled by the valve seat before being output. The other way is cooled by the condenser (used when the medium is steam) and then introduced into the actuator to act on the diaphragm, causing the valve core to move accordingly, achieving the purpose of reducing pressure and stabilizing pressure. If the pressure behind the valve increases, the force acting on the diaphragm increases, compressing the spring and driving the valve core, reducing the valve opening until the pressure behind the valve drops to the set value. Similarly, if the pressure behind the valve decreases, the force acting on the diaphragm decreases. Due to the reaction force of the spring, it drives the valve core and increases the opening degree of the valve until the pressure behind the valve rises to the set value.

Fig. 1 b） is a control valve used to control the pressure in front of the valve, which operates in a pressure open type. The principle is as follows: the medium flows into the valve body in the direction of the arrow, and the other

path is cooled by the condenser (used when the medium is steam). It is introduced into the actuator to act on the diaphragm, causing the valve core to move accordingly, achieving the purpose of pressure relief and stabilization. If the pressure in front of the valve increases, the force acting on the diaphragm increases, compressing the spring, driving the core adjustment, and increasing the valve opening until the pressure in front of the valve drops to the set value. Similarly, if the pressure in front of the valve decreases, the force acting on the diaphragm decreases. Due to the reaction force of the spring, it drives the valve core, causing the valve opening to decrease until the pressure in front of the valve rises to the set value.



图一 a）DZL-16B 型调压阀

1、进液接头　2、排气塞　3、检测执行机构　4、进液管　5、阀盖螺钉　6、冷凝器　7、弹簧　8、阀杆　9、阀芯　10、波纹管 11、压力调节盘　12、注液口螺钉　13、取压管 14、阀后接管　15、阀座　16、阀体

Fig. 1 a) DZL-16B Pressure Control valve

1. Inlet connector 2, exhaust plug 3, detection actuator 4, inlet pipe 5. Valve cover screw 6, condenser 7, spring 8, valve stem 9. Valve core 10, corrugated pipe 11, pressure regulating plate 12, injection port screw 13. Pressure pipe 14, valve connecting pipe 15, valve seat 16, valve body

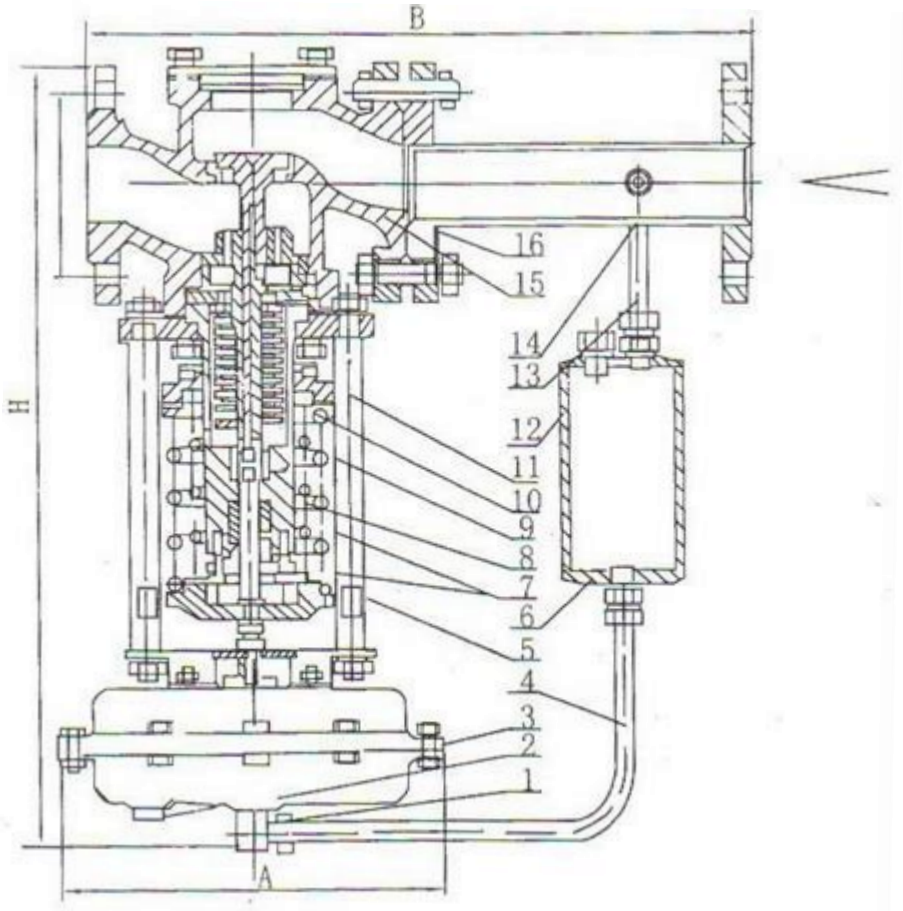


图 1 b) DZL-16K 型调压阀

1、进液接口　2、排气塞　3、检测执行机构　4、进液管　5、压盖螺钉　6、冷凝器　7、弹簧　8、阀杆　9、阀芯　10、波纹管 11、压力调节盘　12、注液口螺钉　13、取压管　14、阀前接管　15、阀座　16、阀体

Fig. 1 b) DZL-16K Pressure Control valve

1.Liquid inlet interface 2, exhaust plug 3. Detection actuator 4, inlet pipe 5. Gland screw 6. Condenser. 7 Spring 8. Valve stem 9. Valve core 10. Bellows

11. Pressure regulating plate 12. Injection port screw 13. Pressure pipe 14, valve front connecting pipe 15, valve seat 16, valve body

2.2 性能指标

2.2 Performance indicators, and materials

公称通径 DN（mm）	20	25	32	40	50	65	80	100	125	150	200	250	300
额定流量系数（Kv）	7	11	20	30	48	75	120	190	300	480	760	1100	1750
额定行程（mm） Travel	8	8	10	10	14	20	20	25	40	40	50	60	70
公称压力 PN（MPa）	1.6 4.0 6.4												
压力分段范围（kPa）	15～50、40～80、60～100、80～140、120～180、160～220、200～260、240～300、280～350、330～400、380～450、430～500、480～560、540～620、600～700、680～800、780～900、880～1000												
流量特性 Flow characteristic	快开 Quick opening												
调节精度（%） Accuracy	±5												
使用温度（℃） Temperature	≦350												
允许泄漏量（1/h） Leakage	10^{-4}×阀额定容量 10^{-4}×rated capacity												

减压比（阀前压力/阀后压力） Pressure reducing ratio	最大 10、最小 1.25 Max. 10、Min. 1.25

2.3 主要零件材料

2.3 Main component materials

零件名称 Name	材 料 Materials
阀 体 Body	ZG230-450、ZG1Cr18Ni9Ti、ZGCr18Ni12Mo2Ti
阀 芯 Valve core	1Cr18Ni9Ti、Cr18Ni12Mo2Ti
阀 座 Seat	1Cr18Ni9Ti、Cr18Ni12Mo2Ti
阀 杆 Stem	1Cr18Ni9Ti、Cr18Ni12Mo2Ti
橡胶膜片 Rubber diaphragm	丁晴、乙炳、氟、耐油橡胶 Nitrile、fluorine、oil resistant rubber
膜 盖 Bonnet	A3、A3 钢涂四氟乙烯 A3、A3 coated with tetrafluoroethylene
填 料 Packing	聚四氟乙烯、柔性石墨 PTFE、flexible graphite

3 安装与使用

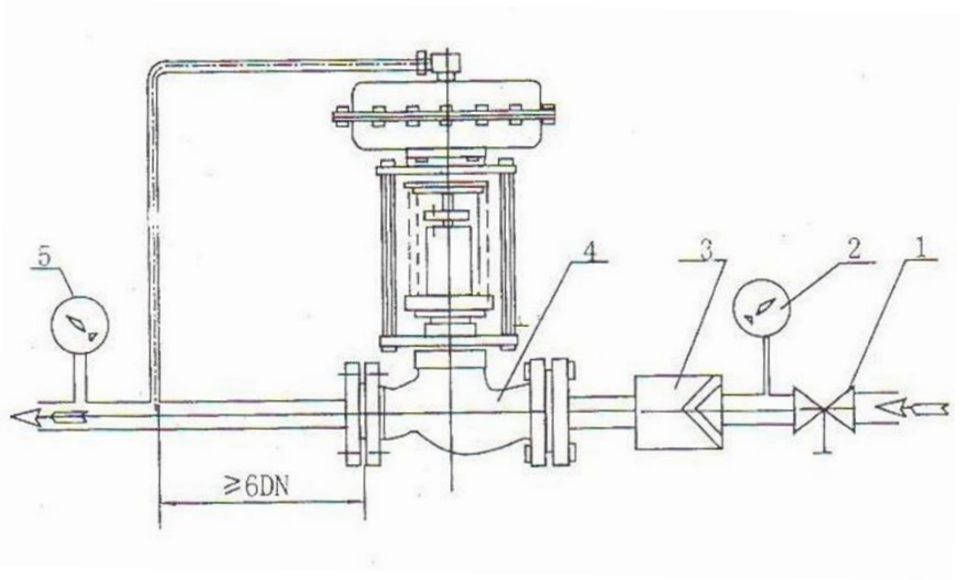
3 Installation and use

3.1 安装

阀在常温下（≦70℃）气体或低粘度液体介质中使用时，此时与通常的气动薄膜调节阀相同为直立安装在水平管道上，如图 2 所示。

3.1 Installation

When the valve is used in gas or low viscosity liquid media at room temperature (≤ 70 ℃), it is installed upright on a horizontal pipeline, as shown in Fig. 2, just like a typical pneumatic thin film control valve.



1. 截止阀　2. 压力表　3. 过滤器　4. 调节阀　5、压力表

1. Globe valve 2. Pressure gauge 3. Filter 4. Control valve 5. Pressure gauge

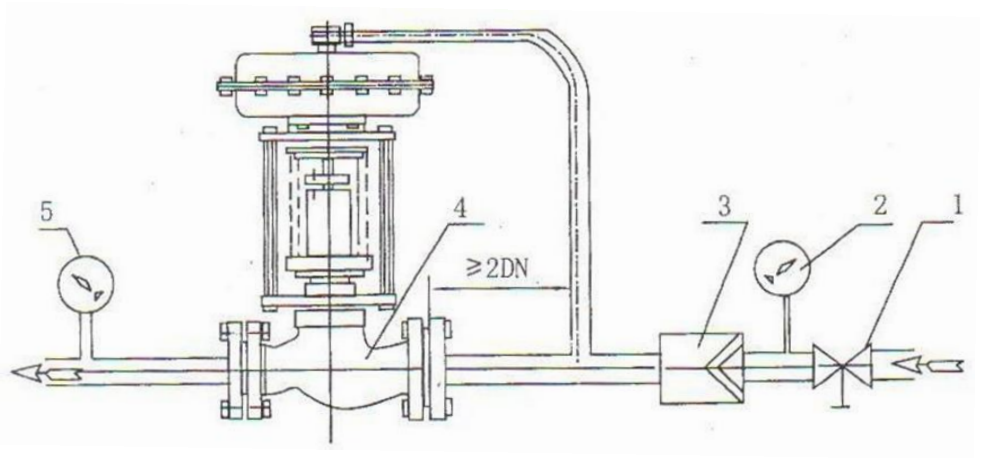


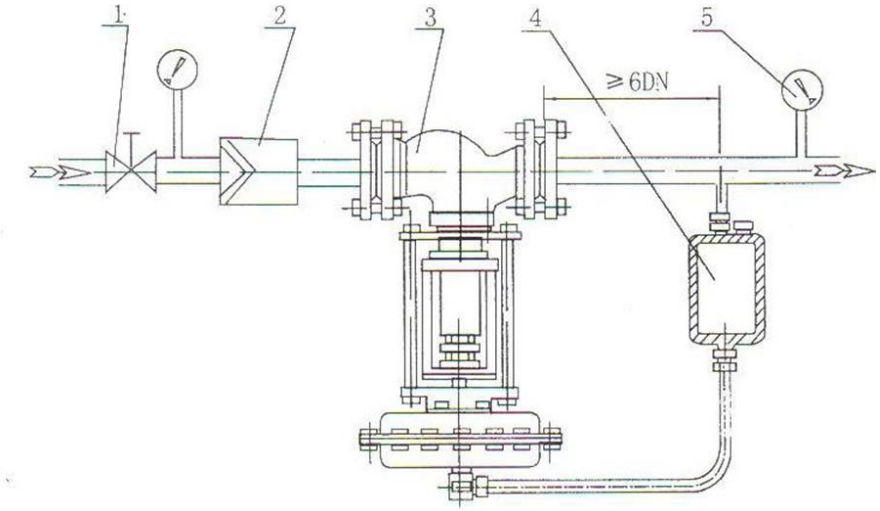
图 2　介质为气体或低粘度液体时的安装

Fig. 2 Installation when the medium is gas or low viscosity liquid

如果调压阀作用的介质为蒸汽，调压阀需倒立安装在水平管道上，如

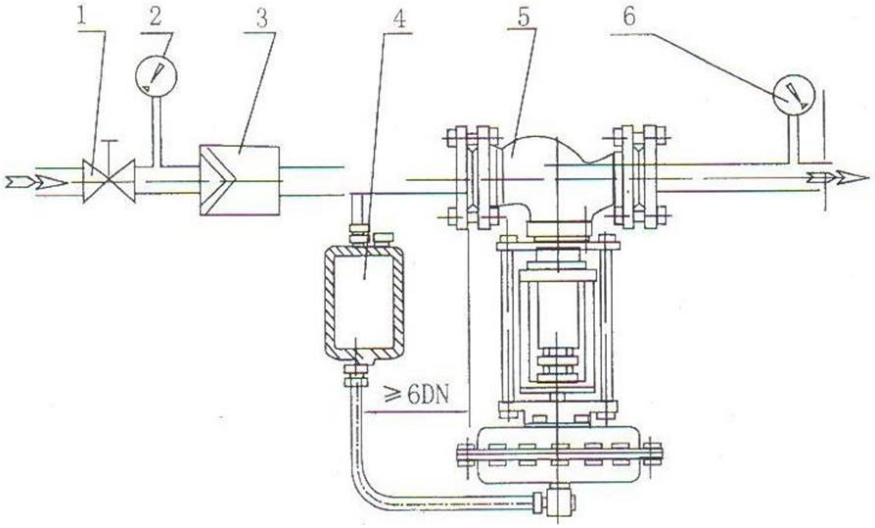
图 3 所示。

If the medium acting on the pressure control valve is steam, the pressure control valve needs to be installed upside down on a horizontal pipeline, as shown in Fig. 3.



DZL-16B 型调压阀

DZL-16B Pressure Control valve



DZL-16K 型调压阀

DZL-16K Pressure Control valve

图 3　介质为蒸汽时的安装

Fig. 3 Installation when the medium is steam

1、截止阀 2、6、压力表　3、过滤器　4、冷凝器　5、调压阀

1. Globe valves 2 and 6, pressure gauge 3, filter 4, condenser 5, pressure control valve

安装时，注意一下几点：

（1）冷凝器必须高于调压阀的执行机构而低于阀后（阀后调压阀）或阀前（阀前调压阀）接管，以保证冷凝器内充满冷凝液。

（2）取压点应取在离调压阀适当的位置，阀前调压阀应大于 2 倍管道直径，阀后调压阀应大于 6 倍管道直径。

（3）为便于现场维修及操作，调压阀四周应留有适当空间，阀前后应设置截止阀与旁路手动阀，如图 4 所示。

（4）调压阀通径过大（DN≧100 时），应有固定支架。

（5）介质流动方向要与阀体上箭头指向一致，前后管道中心应对准调压阀两法兰中心，避免阀体受过大的应力。

（6）阀前应设置过滤器以防止介质中杂质堵塞。

（7）调压阀应安装在环境温度不超过-25℃--55℃的场合。

When installing, pay attention to the following points:

（1）The condenser must be higher than the actuator of the pressure control valve and lower than the valve behind (pressure control valve behind the valve) or in front of the valve (valve top note valve) to ensure that the condenser is full of condensate.

（2）The pressure tapping point shall be at a proper position away from the pressure control valve, and the pressure control valve in front of the valve shall be more than twice as straight as the pipeline diameter, and the base note valve shall be greater than 6 times the pipe diameter.

（3）For the convenience of on-site maintenance and operation, there should be appropriate space around the pressure control valve, and a shut-off valve and a bypass manual valve should be installed before and after the valve, as shown in Fig. 4.

（4）When the diameter of the pressure control valve is too large (DN ≥ 100), a fixed bracket should be provided.

（5）The direction of medium flow should be consistent with the arrow on the valve body, and the center of the front and rear pipelines should be aligned with the pressure control valve two flange centers to avoid excessive stress on the valve body.

（6）A filter should be installed in front of the valve to prevent impurities from blocking the medium.

（7）Pressure control valves should be installed in environments where the ambient temperature does not exceed -25 ℃ to 55 ℃.

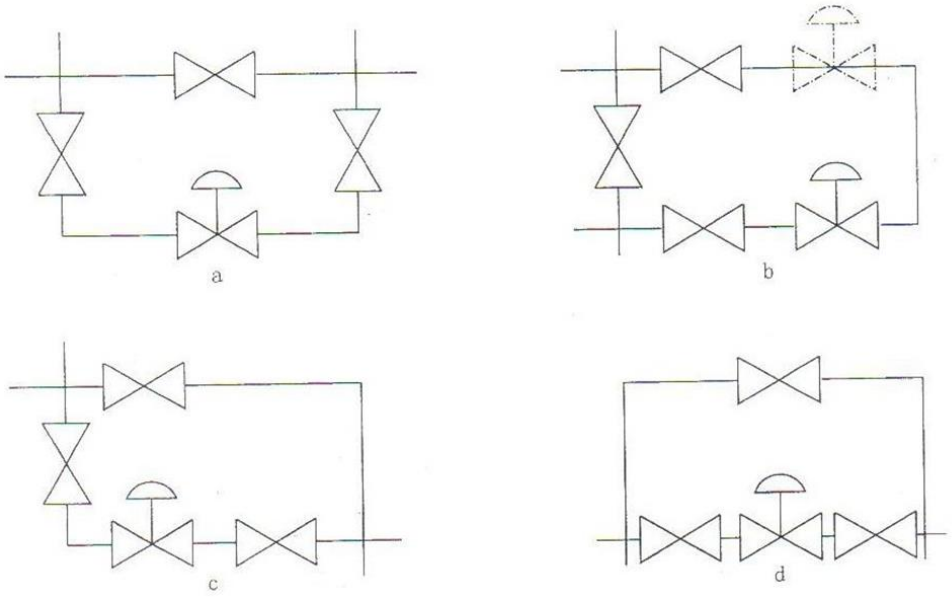


图 4 调压阀阀组安装方案

Fig. 4 Installation Plan for Pressure Control valve Group

注： 图中虚线表示管道出入口的另一种允许方向

Note: The dashed line in the figure represents another allowed direction for pipeline entrances and exits.

3.2 使用

在常温下使用气体或低粘度液体场合的操作程序：（参见图 2）

（1） 缓慢开启阀前后截止阀。

（2） 拧松排气塞，直至气体或液体从执行机构溢出为止。

（3） 然后重新拧紧排气塞，调压阀却可工作。所需压力值的大小可通过压力调节盘的调整而得到，调整时，注意观察压力表示值，动作应缓慢，不得使阀杆跟着转动。

使用蒸汽场合时的操作程序：（参见图 3）

（1） 从冷凝器上拧下注液口螺钉。

（2） 拧松执行机构排气塞。

（3） 使用漏斗通过注液口加水直至排气孔流出为止。

（4） 拧紧排气塞，继续注水直至溢出注液口。

（5） 拧紧注液口螺钉。

（6） 缓慢开启调压阀前后截止阀。

（7） 调整压力调节盘，并观察压力表示值达到要求为止。

3.2 Using

Operating procedures for using gases or low viscosity liquids at room temperature: (see Fig. 2)

(1) Slowly open the front and rear shut-off valves.

(2) Loosen the exhaust plug until gas or liquid overflows from the actuator.

(3) Then tighten the exhaust plug again, but the pressure control valve can work. The required pressure value can be obtained by adjusting the pressure adjustment plate. When adjusting, pay attention to observing the pressure indication value, and the action should be slow, not allowing the valve stem to rotate along with it.

Operating procedures when using steam: (see Figure 3)

(1) Unscrew the liquid inlet screw from the condenser.

(2) Loosen the exhaust plug of the actuator.

(3) Use a funnel to add water through the injection port until the exhaust hole flows out.

(4) Tighten the exhaust plug and continue to inject water until it overflows the injection port.

(5) Tighten the liquid injection port screw.

(6) Slowly open the front and rear shut-off valves of the pressure control valve.

(7) Adjust the pressure adjustment plate and observe the pressure indication value until it meets the requirements.

4 维修

调压阀投入运行后，一般维护工作量小，平常只要观察阀前、阀后压力示值是否符合工艺所需值要求即可。另外，观察填料函与执行机构是否渗漏，若渗漏应拧紧或更换填料及膜片。调压阀常见故障排除方法（见下表）。

4 Repair

After the pressure control valve is put into operation, the maintenance workload is generally small. Usually, it is only necessary to observe whether the pressure readings in front and behind the valve meet the requirements of the process. In addition, observe whether there is leakage between the packing box and the actuator. If there is leakage, tighten or replace the packing and diaphragm. Common troubleshooting methods for pressure control valves (see the table below).

故 障 现 象 Fault phenomenon	产 生 原 因 Cause of occurrence	排 除 方 法 Exclusion method
阀后压力不稳定随着阀前压力变动而变动 The unstable pressure behind the valve changes with the pressure before the valve	1、 阀芯被异物卡住 2、 阀杆、推杆卡住 3、液管道堵塞 1. The valve core is stuck by foreign objects 2. Valve stem and push rod stuck 3. Liquid pipeline blockage	1、重新拆装排除异物 2、重新调整 3、疏通 1. Reassemble and remove foreign objects 2. Readjust 3. Unclogging

阀前后压力降不下来，始终在需求值上方变动 The pressure before and after the valve cannot decrease and always fluctuates above the demand value	1、设定弹簧刚度太大 2、发口径过大 3、阀前压力过高，减压比过大 1. Setting the spring stiffness too high 2. Excessive caliber 3. The pressure in front of the valve is too high, and the pressure reduction ratio is too high	1、更换弹簧 2、更换较小口径 3阀前压阀后压超过 10， 应 2 级降压 1. Replace the spring 2. Replace with smaller caliber 3. If the pressure before and after the valve exceeds 10, it should be level 2 voltage reduction
阀后压力升不上去，始终在需求值下方变动 The pressure behind the valve cannot rise and always fluctuates below the demand value	1、 设定弹簧刚度太小 2、 阀口径过小 3、 减压比过小 1. Setting the spring stiffness too small 2. The valve diameter is too small 3. The pressure reduction ratio is too small	1、更换弹簧 2、更换较大口径 3、阀前压阀后压低于 1.25，应提高阀前压 1. Replace the spring 2. Replace with larger caliber 3. If the pressure before and after the valve is lower than 1.25, the pressure before and after the valve should be increased
阀前压力升不上去，始终在需求值下方动作 The pressure in front of the valve cannot rise and always acts below the required value	1、 设定弹簧刚度太小 2、 阀芯被异物卡住 3、 阀杆、推杆卡住 4、阀芯、阀座损坏，泄漏量过大 5、 阀口径太大 1. Setting the spring stiffness too small 2. The valve core is stuck by foreign objects 3. Valve stem and push rod stuck 4. Damaged valve core and valve seat, with excessive leakage 5. The valve diameter is too large	1、 更换弹簧 2、 重新拆装 3、 重新调整 4、 重新研磨，或更换 5、 更换较小口径 1. Replace the spring 2. Dismantling and reassembling 3. Readjust 4. Re grind or replace 5. Replace with smaller caliber
阀前压力降不下去，始终在需求值上方动作 The pressure in front of the valve cannot decrease and always acts above	1、 设定弹簧刚度太大 2、 阀口径太小 3、阀芯、阀杆、推杆等卡死 1. Setting the spring stiffness too high . The valve diameter is too small	1、 更换弹簧 2、 更换较大口径 3、 排除卡死原因，重新调整 1. Replace the spring 2. Replace with larger caliber 3. Eliminate the cause of jamming and

the required value	3. Valve core, valve stem, push rod, etc. are stuck	readjust
阀后压或阀前压波动过于频繁 Excessive fluctuation in valve back pressure or valve front pressure Yu frequently	1、 阀口径过大 2、 执行机构膜室容量太小 1. Valve diameter too large 2. The capacity of the actuator membrane chamber is too small	1、 选择恰当的阀口径 2、 在进液管道内增设阻尼器 1. Choose the appropriate valve diameter 2. Add dampers in the inlet pipeline

5、订货须知

5、Ordering Instructions

阀门型号 Model		阀门名称 Name	
公称通径 DN(mm)	√	公称压力 PN(MPa)	√
压力调节范围(Mpa) Pressure adjustment range		控制阀前还是阀后 Control valve front pressure or valve rear pressure	√
压力设定值(Mpa) Pressure setting value	√	介质名称 Medium	√
执行机构型式 Actuator type		介质工作温度 Medium temperature	√
额定流量系数 Kv		介质状态 Medium status	√
阀前最大压力 Input pressure Max. 阀前最小压力 Input pressure Min. 阀前正常压力（Mpa） Input pressure		阀后最大压力 Output pressure Max. 阀后最小压力 Output pressure Min. 阀后正常压力（MPa）	

Norm.		Output pressure Norm.	
最大流量 Flow rate Max. 最小流量 Flow rate Min. 正常流量 Flow rate Norm.		液体粘度 Dynamic Viscosity 液体密度 Liquid Density 气体密度 Air Density	
材质 Material： 阀体 Body 阀内件 Trim		泄漏量等级要求 Leakage level （GB/T4213-92）	
工艺管道尺寸 Line size	√	耐蚀要求 Corrosion resistance requirements	
法兰面距(mm) L Distance between flange end faces		法兰执行标准 Flange standard	
所配附件 Accessories	冷凝器、接管、配法兰、紧固件、调压棒、取压管、取压接头 Condenser, connecting pipe, flange, fastener, pressure regulating rod, pressure tapping pipe, pressure tapping joint		

其中带√的必须填

The ones marked with √ must be filled in

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