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BOLLEY(TIANJIN) CONTROL SYSTEM MANUFACTURING CO., LTD.

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L8A SERIES ELECTRO PNEUMATIC  
VALVE POSITIONER

L8A 系列电气阀门定位器

# COMPANY PROFILE

## 公司简介



博雷（天津）控制系统制造有限公司是一家集工程、阀门生产于一体的企业，引进美国先进阀门制造技术，为客户提供专业的过程自动化及控制设备等解决方案。一直以来稳步发展，经过多年的积累，博雷控制已经迈入了国际化公司的行列。

公司主导产品有闸阀、截止阀、蝶阀、球阀、止回阀、调节阀、减压阀、隔膜阀、旋塞阀、柱塞阀、疏水阀、电站阀、美标阀、水力控制阀等80多种品种、300多个系列、几千种规格。产品采用GB、JB、HG、API、ANSI、DIN、JIS、BS等国内外先进标准设计制造。通径从1/4"至96"（DN6-2400mm）、压力从150LB至2500LB（2MPa-42MPa）、工作温度为-196℃至800℃。主要材料有灰铸铁、球墨铸铁、铜、碳素钢、不锈钢、合金钢、低温钢、铬钼钢、沉淀硬化钢及其他特殊钢材。

我们以卓越的品质和服务取得了全球数以万计的用户的信赖及支持，所涉及的行业包括化工、石化、电力、环境、生物科技、燃气、染料、制药、供热、造纸、建筑食品、有色金属、钢铁以及其他工业领域。

我们重视客户提出的每一个要求，并按照客户提出的要求量身定做，力求为客户提供最好的解决方案，同时也能优化产品性能，客户感到满意与他们保持紧密的合作关系。我们坚持这样做并取得了成功，这是我们发展的动力。自从博雷控制诞生的那一刻起，我们力求每一个环节都做到精益求精，所以我们的质保系统渗透到每一个工序，确保每个员工用到的是最好的零配件，这是我们发展的根本。

为了确保产品质量和满足顾客的要求，我们坚持不断深化内部管理，努力提升全员质量意识，扩大全球营销团队，为国内外客户提供更方便快捷的服务。

**我们力求每一个环节都做到精益求精，  
争做控制系统行业之美好明天的领航者！**

Bolley (Tianjin) Control System Manufacturing Co., Ltd. is a collection of engineering control system, valve production in a body's enterprise, introducing the advanced valve manufacturing technology, providing customers with professional solutions for process automation and control equipment, etc. Has been a steady development, after many years of accumulation, Bolley Control has entered the international company.

Company main products are gate valve, globe valve, butterfly valve, ball valve, check valve, regulating valve, relief valve, diaphragm valve, plug valve, plunger valve, steam trap, power station valve, american standard valve, hydraulic control valves, and more than 80 varieties, more than 300 series, thousands of specifications. Product by GB, JB, HG, API, ANSI, DIN, JIS, BS, and domestic and foreign advanced standards. Size from 1/4" to 96" (DN6-2400mm), pressure from 150LB to 2500LB (2MPa - 42MPa), the working temperature to -196°C to 800°C. The main materials are gray cast iron, nodular cast iron, copper, carbon steel, stainless steel, alloy steel, low temperature steel, chrome molybdenum steel, precipitation hardened steel and other special steel.

With our excellent quality and service has made the world tens of thousands of users trust and support, involved in industries including chemical, petrochemical, electric power, environmental, biological technology, gas, dyestuff, pharmaceutical, heating, papermaking, food, non-ferrous metals, steel and other industrial fields.

We attach importance to the customer request of each, and customized according to customer demand, makes every effort to provide customers with the best solution, but also can optimize product performance, customer satisfaction and their close relations of cooperation. We insist on doing this and has been a success, this is our development power. Since the birth of Bolley control that moment, we strive to do every link strives for perfection, so our quality assurance system to infiltrate every working procedure, to ensure that each employee use is one of the best parts, it is fundamental to our development.

In order to ensure product quality and meet the requirements of customers, we continuously deepen the internal management, efforts to enhance the quality consciousness, expand the global marketing team, to provide more convenient service to customers from home and abroad.

**We Strive To Achieve Excellence In Every Aspect,  
To Control System Of Industry Leader A Better Tomorrow!**

# L8A 系列

## 电气阀门定位器

L8A SERIES ELECTRO PNEUMATIC VALVE POSITIONER



## L8A SERIES ELECTRO PNEUMATIC VALVE POSITIONER L8A 系列电气阀门定位器



01/02

### ◆ 产品简介 Product Introduction

L8A 系列电气阀门定位器是一种从控制信号接收4~20mA直流电流信号，通过气动执行器来精确调整阀门开度的装置。

L8A Series of electric valve positioner is a kind of device which receives direct current signal of 4~20mA from the control signal and precisely adjusts the valve opening with the pneumatic actuators.

### ◆ 注意事项 Precautions

#### 注意 Notes

为了安装人员、产品、系列安全，安装或调试本产品时请遵守本说明书中的安全事项  
For the safety of the installation personnel, products and systems, please comply with the safety matters in this manual during the installation or debugging.

不正确改造或维修本产品，可能造成损害。如需维修或改造本产品，请与本厂联系。  
Incorrect modification or repair of this product may cause damages. If you need repair or modify this product, please contact with our factory.

本产品为控制阀附件，操作时请同时遵守相应控制阀的使用注意事项。  
Since this product is a control valve accessory, please abide by the precaution of use of the corresponding control valves during the operation.

- 在运输、安装、使用过程中，请注意小心轻放。过大的震动和冲击可能会损坏产品。
- 不要超过产品技术参数规定范围使用。
- 储存产品时不要长时间置于高温、高湿度环境下。使用时要盖好外壳，以免雨水进入产品内部。
- In the process of transportation, installation and use, please pay attention to handling the product with care. Excessive vibration and impact might damage the product.
- Don't use the product beyond the specified range of the product technical parameters.
- During the storage, don't put product in the environment of high temperature and high humidity for a long time. During the use, cover the shell to prevent rainwater from entering the inside of the product.

### ◆ 质保期限 Warranty

产品质保期限以采购单注明期限为准。  
The product warranty period will be subject to the indicated date on the purchase order.

### ◆ 订货代码 Ordering Code

L8A-100 1 2 3-4 5

<b>1</b> 动作形式 Action form	L 直行程 Straight stroke R 角行程 Angular stroke	<b>4</b> 附带功能 Incidental function
<b>2</b> 输出 Output	S 单作用 Single Action D 双作用 Double Action	L 带LCD显示 With LCD display pL 带LCD显示、带4~20mA信号反馈 With LCD display, with signal feedback of 4~20mA
<b>3</b> 结构 Structure	i 本安 Intrinsically safety m 隔爆 Flameproof n 不隔爆 Non-flameproof	<b>5</b> 选项 Option T 附带气路板 With gas flow board

◆ 技术参数 Product Introduction

项目 Item	L8A-100L		L8A-100R	
	单作用 Single Action	双作用 Double Action	单作用 Single Action	双作用 Double Action
输入信号 Input signal	4~20mA DC (不带显示、不带反馈型号) 4~20mA DC (Type without display or feedback)			
阻抗 Resistance	250±15Ω(不带显示、不带反馈型号) 250±15Ω(Type without display or feedback)			
供给压力 Supply Pressure	1.4~7.0kgf/cm <sup>2</sup> (20~100psi)			
行程 Stroke	10~150mm		0~90°	
气源接口尺寸 Air Connection Size	PT(NPT)1/4			
压力表接口尺寸 Pressure Gauge Connection Size	PT(NPT)1/8			
电源接口尺寸 Power Interface Size	PT1/2(G1/2)			
防爆等级 Explosive-proof Grade	NEPSI:ExialICT6 Ex dII BT6			
防护等级 Protection Grade	IP 66			
环境温度 Ambient Temperature	工作温度 Operating Temperature	标准型: -20~70°C 低温型: -40~70°C (-20°C以下无显示)	Standard Type:-20~70°C Low temperature type:-40~70°C(No display when the temperature is below -20°C)	
	防爆温度 Temperature Flameproof	-20~60°C		
线性 Linearity	±1.0%F.S			
滞后度 Hysteresis	1.0%F.S			
灵敏度 Sensitivity	±0.2%F.S	±0.5%F.S	±0.2%F.S	±0.5%F.S
重复性 Repeatability	±0.5%F.S			
空气消耗量 Air Consumption	3LPM(Sup=1.4kgf/cm <sup>2</sup> , 20Psi)			
流量 Flow	80LPM(Sup=1.4kgf/cm <sup>2</sup> , 20Psi)			
材质 Material	压铸铝 Die-casting aluminum			
重量 Weight	2.1kg		2.1kg	
带显示功能/带反馈功能型号 Type with display/feedback				
输入信号 Input Signal	4~20 mA DC (二线制) 4~20mA DC (Two-wire System)			
输入负载电压 Input Load Voltage	MAX 15V			
反馈信号 Feedback signal	4~20 mA DC (二线制) 4~20mA DC (Two-wire System)			
反馈信号电源 Feedback Signal Power	DC 24V±15%			

◆ 安装 Installation

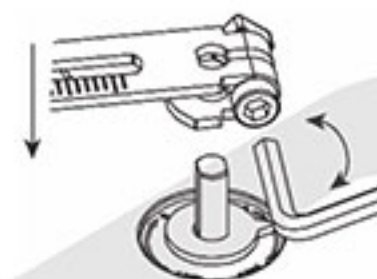
1.1机械连接 Mechanical Connection

1.11 注意事项 Precautions

注意 Notes	安装前需切断阀门、执行器和其它附件的输入信号及气源 Before the installation, you should cut off the input signal and the air supply of the valves, actuators and other accessories.
	如果调节阀已安装在管路中, 需采取措施将此调节阀从管路中隔离。 If the regulator is installed in the pipeline, measures should be taken to isolate the regulator from the pipeline.

1.12 安装反馈杆 Feedback Rod Installation

将定位器本体与反馈杆进行组装。  
Assemble the positioner ontology and the feedback rod.



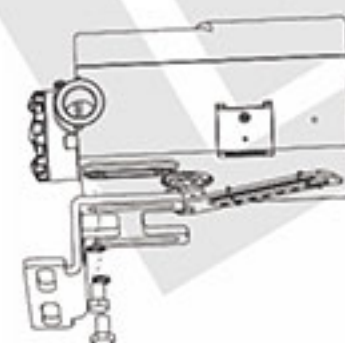
1. 将反馈杆套在定位器底部轴上。注意轴的方向。
2. 用5mm内六角扳手拧紧锁紧螺丝。

1. Put the feedback rod around the bottom shaft of the positioner. Pay attention to the direction of the shaft.
2. Screw and fasten the screw with a hex wrench of 5mm.

1.13 安装到直行程执行器上

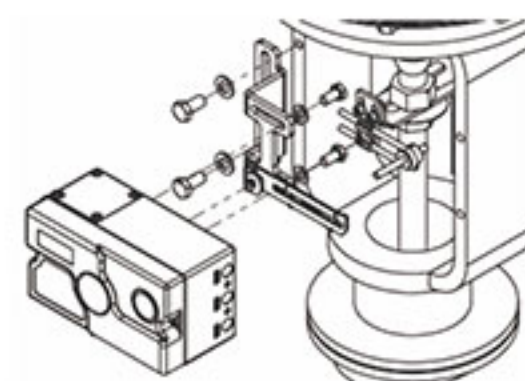
Install on Linear Motion Actuators

把直行程安装板安装到定位器本体上。  
Install the linear motion mounting plate onto the positioner ontology.



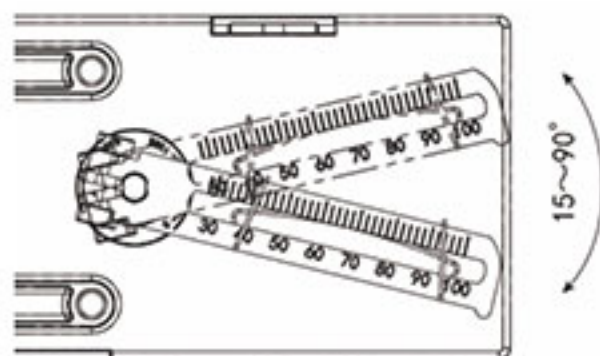
1. 用两颗M8螺丝将安装板安装到本体上, 暂时不要拧紧螺丝。
1. Install the mounting plate onto the ontology with two M8 screws. Don't tighten the screws temporarily.

安装在直行程执行器上。  
Install on Linear Motion Actuators.



2. 根据执行器上面安装孔大小选择合适的螺丝将定位器安装到执行器上面, 拧紧安装螺丝。
2. Choose the appropriate screw according to the mounting hole size on the actuator and install the positioner to the actuator.

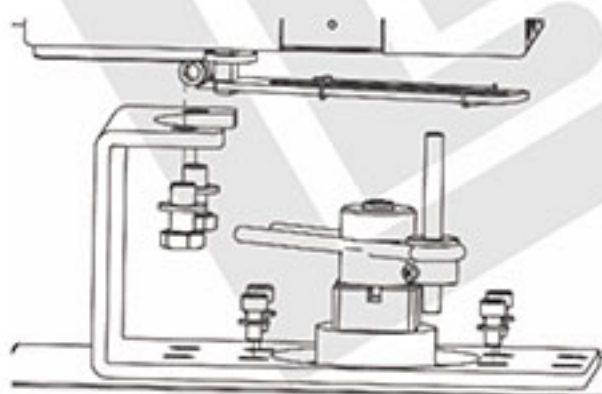
1.14 确定定位器在执行器上的最佳安装位置  
Identify the Optimum Installation Position of the Positioner on the Actuator



1. 在执行器上另接一个减压器，手动调整减压器输出压力，观察反馈杆摆幅，使反馈杆摆幅在15~90度范围内。
2. 调整减压器输出压力，使执行器开到约50%位置，调整安装板垂直方向位置，使反馈杆在约水平位置。
3. 拧紧固定螺丝将安装板牢固的安装在执行器上。
4. 水平方向移动定位器，使反馈杆档杆对齐反馈上的刻度。
5. 拧紧固定螺丝完成安装。

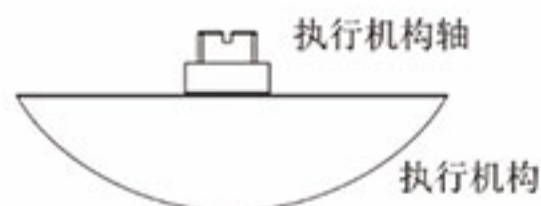
1. Install another pressure reducer on the actuator. Manually adjust the output pressure of the pressure reducer and observe the swing of the feedback rod to make sure that the swing is in the range of 15~90°.
2. Adjust the output pressure of the pressure reducer to make the actuator open to about 50%. Adjust vertical position of the mounting plate to make the feedback rod in the horizontal position.
3. Tighten retaining screws to firmly install the mounting plate onto the actuator.
4. Horizontally move the positioner to align the gag lever post of the feedback rod to the scale on the feedback.
5. Tighten retaining screws to finish installation.

1.15 安装在角行程执行器上  
Install on Rotary Motion Actuators



1. 用4颗M5螺丝将角行程安装板固定在执行器上，拧紧螺丝。
2. 将角行程档杆固定在执行器上，调整档杆到合适高度。
3. 用两颗M8螺丝将装好反馈杆的定位器固定在角行程安装板上，同时将反馈杆档杆插在反馈杆中间槽内。
4. 仔细观察档杆，使档杆能既能在反馈杆槽内滑动，又不碰到定位器底部或阀门附件上。
5. 拧紧所有安装螺丝。

1. Fix the angular motion mounting plate onto the actuator with four M5 screws and tighten the screws.
2. Fix the angular motion gag lever post onto the actuator and adjust the gag lever post to the right height.
3. Fix the positioner on which the feedback rod was installed onto the angular motion mounting plate with two M8 screws, and meanwhile insert the gag lever post of the feedback rod into the middle groove of the feedback rod.
4. Carefully observe the gag lever post to make it reliably slide in the feedback rod groove without touching the bottom of the positioner or the valve accessories.
5. Tighten all the mounting screws.



1. 执行机构轴凸起高度过高或过低有可能使档杆接触不到反馈杆。
  2. 这种情况下请自行修正或订货时附加说明定制。
1. The condition that the actuator shaft raises too high or too low may cause the results that the gag lever post cannot touch the feedback rod.
  2. In this case, please amend it yourself or add custom when you order it.

1.2 电气连接 Electrical Connection

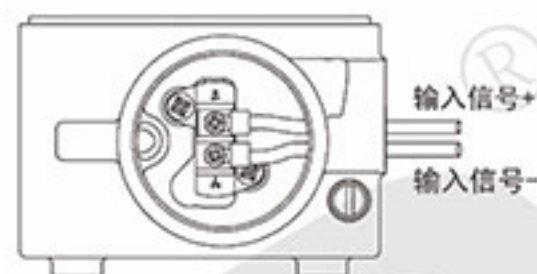
1.2.1 注意事项 Precautions

注意  
Notes

定位器额定工作电压为24V，最大工作电压为26V。长时间在超过额定电压情况下工作可能会引起不可预料的情况。  
The rated working voltage of the positioner is 24V, with the maximum working voltage of 26 V. Working under the voltage above the rated voltage for a long time may cause unpredictable results.

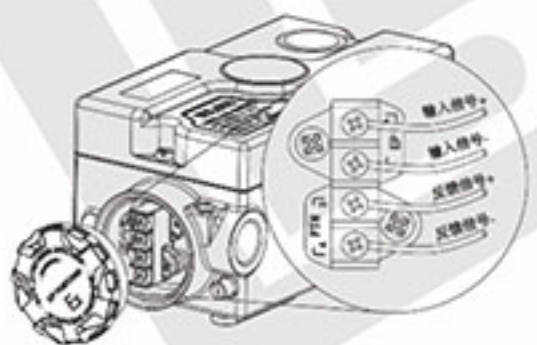
反馈信号在定位器无信号时所处状态不确定。请勿将反馈信号作为关键连锁信号。  
When the positioner has no signals, the state of the feedback is uncertain. Do not use the feedback signal as a key chain one.

1.2.2 输入信号连接 Input Signal Connection



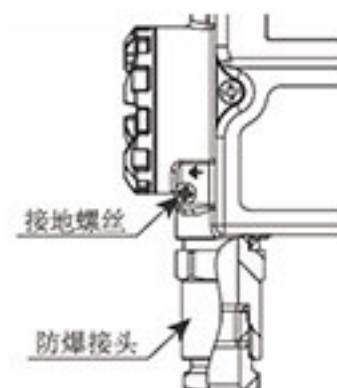
1. "1+" 端子连接PLC (DCS) 4~20mA输出信号正极，"2-" 端子连接输出信号负极。
  2. 适合使用0.5~1.5mm<sup>2</sup>电缆。
1. Connect terminal "1+" to the output signal positive of PLC (DCS) 4~20mA and connect terminal "2-" to the output signal negative.
  2. The use of cables of 0.5~1.5mm<sup>2</sup> is suitable.

1.2.3 反馈信号连接 Feedback Signal Connection



1. "1+" 端子连接PLC (DCS) 4~20mA输出信号正极，"2-" 端子连接输出信号负极。
  2. "3" 端子连接反馈信号回路正极，"4" 端子连接反馈信号回路负极。
  3. 适合使用0.5~1.5mm<sup>2</sup>电缆。
1. Connect terminal "1+" to the output signal positive of PLC (DCS) 4~20mA and connect terminal "2-" to the output signal negative.
  2. Connect terminal "3" to the circuit positive of the feedback signal and connect terminal "4" to the circuit negative of the feedback signal.
  3. The use of cables of 0.5~1.5mm<sup>2</sup> is suitable.

1.2.4 隔爆型定位器电气连接  
Electrical Connection of Flameproof Positioner



1. 防爆型号的电气阀门定位器输入信号需在外部连接安全栅。
  2. 信号电缆需使用防爆接头引入。
  3. 通过接地螺丝可靠的接地。
1. Electric valve positioner input signals of flameproof type should connect to the security gate externally.
  2. Signal cables should be introduced with flameproof joint.
  3. It should be reliably grounding through the grounding screw.

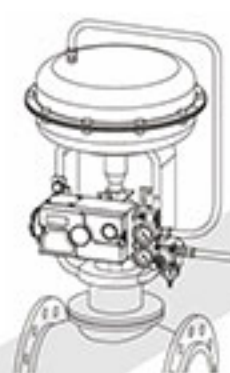
### 1.3 配管 Piping

#### 1.31 注意事项 Precautions

注意  
Notes

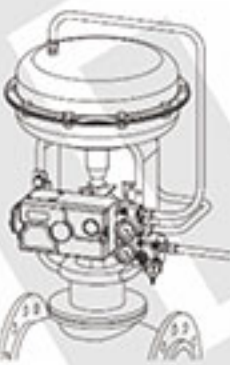
- 确保连接好管路以后再打开压缩空气源，防止出现意外情况。  
Ensure good connection of pipelines before turning on the compressed air supply in order to avoid accidents.
- 打开压缩空气源后调节阀可能会动作，确保现场及管路安全后再打开气源。  
The regulator may act after the compressed air supply is turned on. Ensure the security of the site and pipe lines before you turn on the air supply.
- 需使用干燥、除油、除尘后的压缩空气源。  
You need to use the compressed air supply after drying, degreasing and dust removal.

#### 1.32 直行程执行器配管连接 Linear Motion Actuator Piping Connection



1. 安装在单作用执行器上时，使用“OUT1”口连接执行器，“OUT2”用堵头堵住。
2. “SUP”口连接气源输入。工厂气源需通过空气过滤减压后再连接到定位器。
3. 调节减压器输出压力至执行器标称压力+0.05MPa。

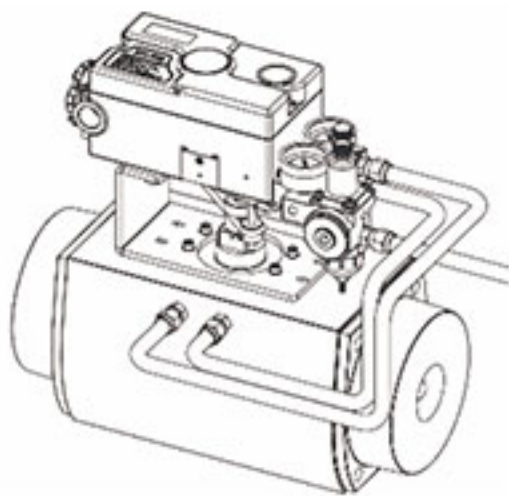
1. When installing on the single-action actuator, you should use "OUT1" joint to connect the actuator, while "OUT2" should be plugged by a plug.
2. Use "SUP" joint to connect the air input. The factory air supply needs to be filtered in the air pressure reducer before it is connected to the positioner.
3. Adjust the input pressure of the pressure reducer to nominal pressure of the actuator, + 0.05 MPa.



1. 安装在双作用执行器上时，分别使用“OUT1”、“OUT2”口连接执行器的两个输入口。
2. “SUP”口连接气源输入。工厂气源需通过空气过滤减压后再连接到定位器。
3. 调节减压器输出压力至执行器标称压力。

1. When installing on the double-action actuators, you should use "OUT1" and "OUT2" joint to connect the two input ports of the actuators respectively.
2. Use "SUP" joint to connect the air input. The factory air supply needs to be filtered in the air pressure reducer before it is connected to the positioner.
3. Adjust the input pressure of the pressure reducer to nominal pressure of the actuator.

#### 1.33 角行程执行器配管连接 Rotary Motion Actuator Piping Connection



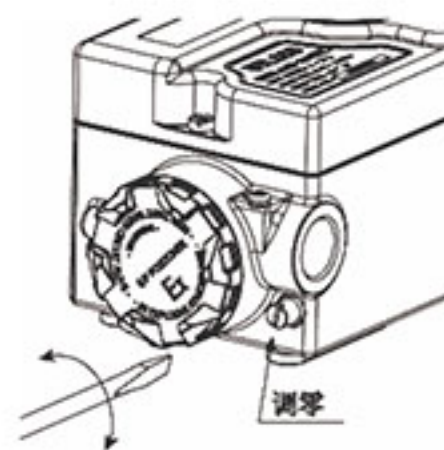
1. 安装在单作用执行器上时，使用“OUT1”口连接执行器，“OUT2”用堵头堵住。
2. 安装在双作用执行器上时，“OUT1”、“OUT2”分别连接执行器两个输入口。
3. “SUP”口连接气源输入。工厂气源需通过空气过滤减压后再连接到定位器。
4. 调节减压器输出压力至执行器标称压力。(单作用执行器：标称压力+0.05MPa)

1. When installing on the single-action actuator, you should use "OUT1" joint to connect the actuator, while "OUT2" should be plugged by a plug.
2. When installing on the double-action actuators, you should use "OUT1" and "OUT2" joint to connect the two input ports of the actuators respectively.
3. Use "SUP" joint to connect the air input. The factory air supply needs to be filtered in the air pressure reducer before it is connected to the positioner.
4. Adjust the input pressure of the pressure reducer to nominal pressure of the actuator. (For the single-action actuator, the nominal pressure is +0.05MPa)

## L8A SERIES ELECTRO PNEUMATIC VALVE POSITIONER L8A 系列电气阀门定位器

### ◆ 调试 Debugging

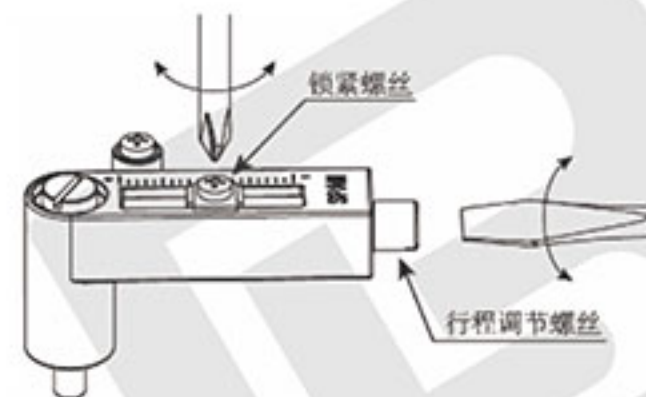
#### 2.1 零位调整 Zero Setting



1. 使用一字螺丝刀轻轻旋转调零螺丝调整零位。
2. 配合行程调整，以完成定位器的调试。

1. Lightly rotate the zero screw to perform zero setting with a straight screwdriver.
2. Cooperate with stroke adjustment in order to finish the debugging of the positioner.

#### 2.2 行程调整 Stroke Adjustment



1. 用十字螺丝刀松开“锁紧螺丝”，然后用一字螺丝刀旋转“行程调节螺丝”改变定位器行程。
2. 调整好后拧紧“锁紧螺丝”。
3. 给定信号0%(100%)观察阀门是否达到指定行程。
4. 反复调整行程和零位，完成定位器的校准。

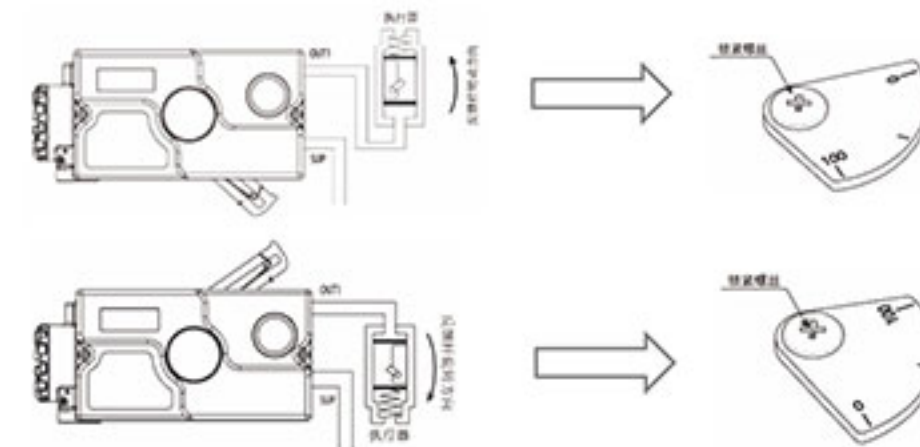
1. Loosen the lock screw with a phillips screwdriver. Then rotate the stroke adjustment screw with a straight screwdriver to change the stroke of the positioner.
2. Fasten the lock screw after the adjustment.
3. In the case of a given signal of 0% (100%), observe whether the valve reaches specified stroke.
4. Adjust the stroke and the zero position repeatedly to finish positioner calibration.

#### 2.3 按照执行器作用方式确定凸轮面

##### Identify the CAM Surface According To the Actuator Action Way

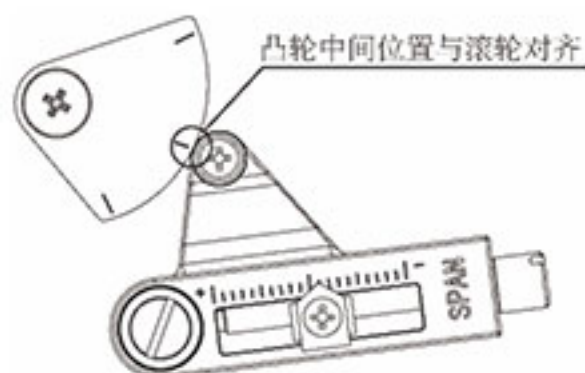
定位器安装在执行器上后，当定位器输出口“OUT1”输出时，可根据定位器反馈杆旋转方向，确定使用凸轮“TR-A”面或“TR-B”面。如果是双作用执行器，同样也可根据“OUT1”输出时定位器反馈杆的转动方向来确定凸轮面。

After the positioner is installed onto the actuator, in the case of outputting through the positioner output port "OUT1", you can determine to use CAM "TR" or "TR-B" surface according to the rotation direction of the positioner feedback rod. In the case of double-action actuators, you can also identify the cam surface according to the rotation direction of the positioner feedback rod when the positioner output through "OUT1".

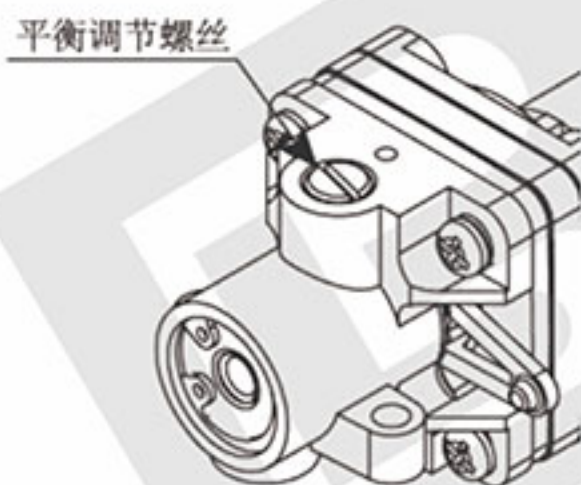


如果需要将凸轮翻转,只需要拧掉“锁紧螺丝”,将凸轮反过来安装到轴上,再拧上“锁紧螺丝”即可。重新安装凸轮后,当执行器开度在50%左右时,凸轮中间刻度线应与滚轮对齐。

If you need to turn over the CAM, you only need to loosen the lock screw, turn over the CAM, install it to the shaft, and then tighten the lock screw. After the reinstallation of the CAM, when the opening of the actuator is around 50%, the middle scale line of the CAM should be aligned with the roller.



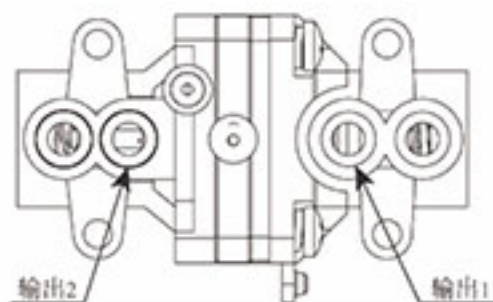
## 2.4 平衡调整 Balancing Adjustment



1. “平衡调节螺丝”可以调节两个输出口输出气压之间的平衡关系,优化执行器动作。
2. 出厂时已调整至最佳位置,请勿随便更改。

1. Balancing adjustment screws can adjust the balancing relations between the output pressures of the two output ports and optimize the actuator movements.
2. It has been adjusted to the optimum position during the delivery. Please don't literally change it.

## 2.5 节流孔调整 Orifice Adjustment



节流片规格: 0.5mm, 1mm  
Piece: 0.5mm, 1mm

1. 在气动放大器底部输出孔加装节流片,可以避免定位器在小容积执行器上的振荡现象。
2. 可以在订货时说明是否需要加装节流片,默认不加。

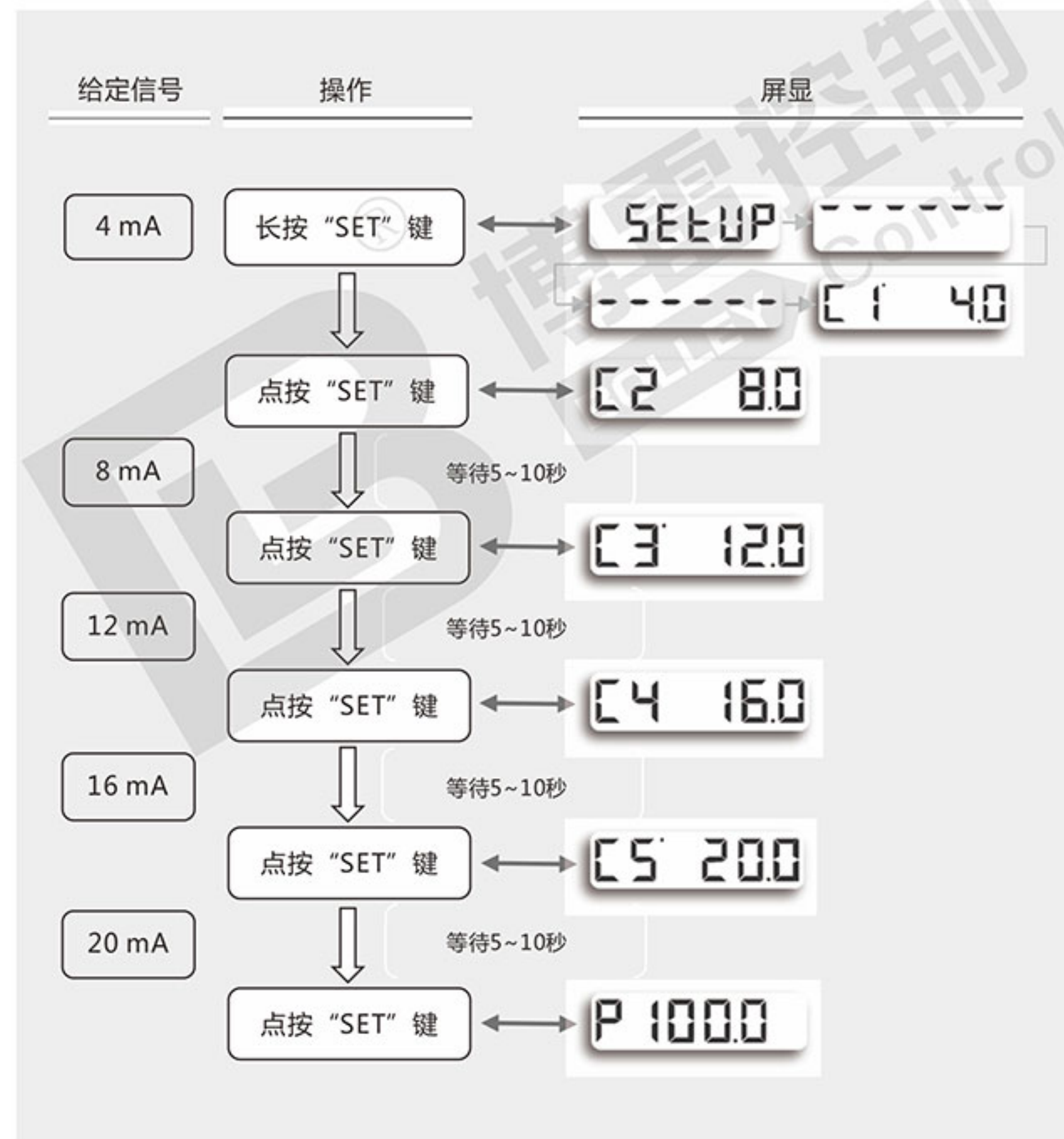
1. Additionally install flow regulator pieces in the bottom output port of the pneumatic amplifier, which can avoid the oscillation phenomenon of the positioner on the actuators of small volume.
2. You can tell us whether the flow regulator pieces specification of flow regulator are additionally needed. There is none by default.

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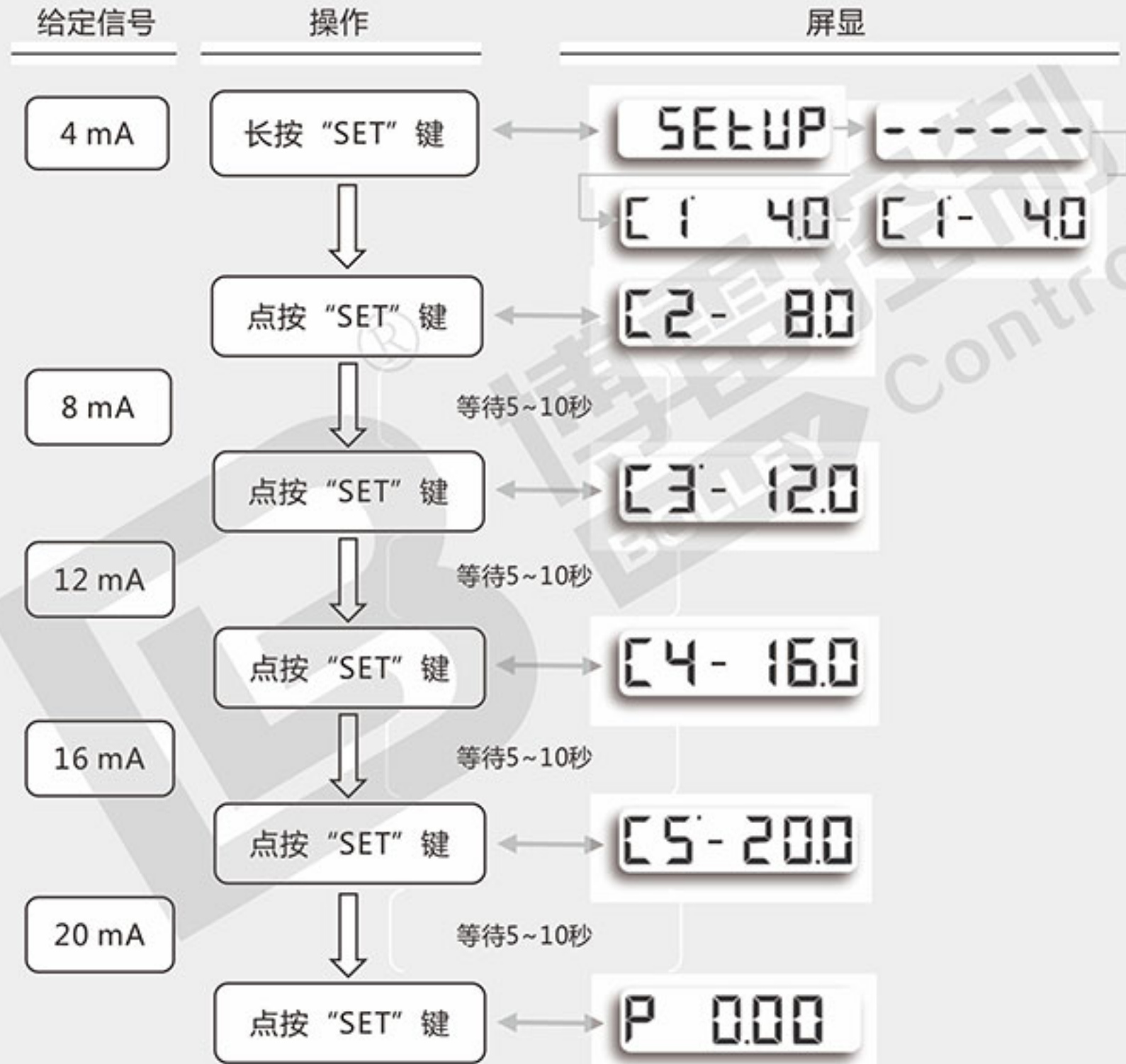
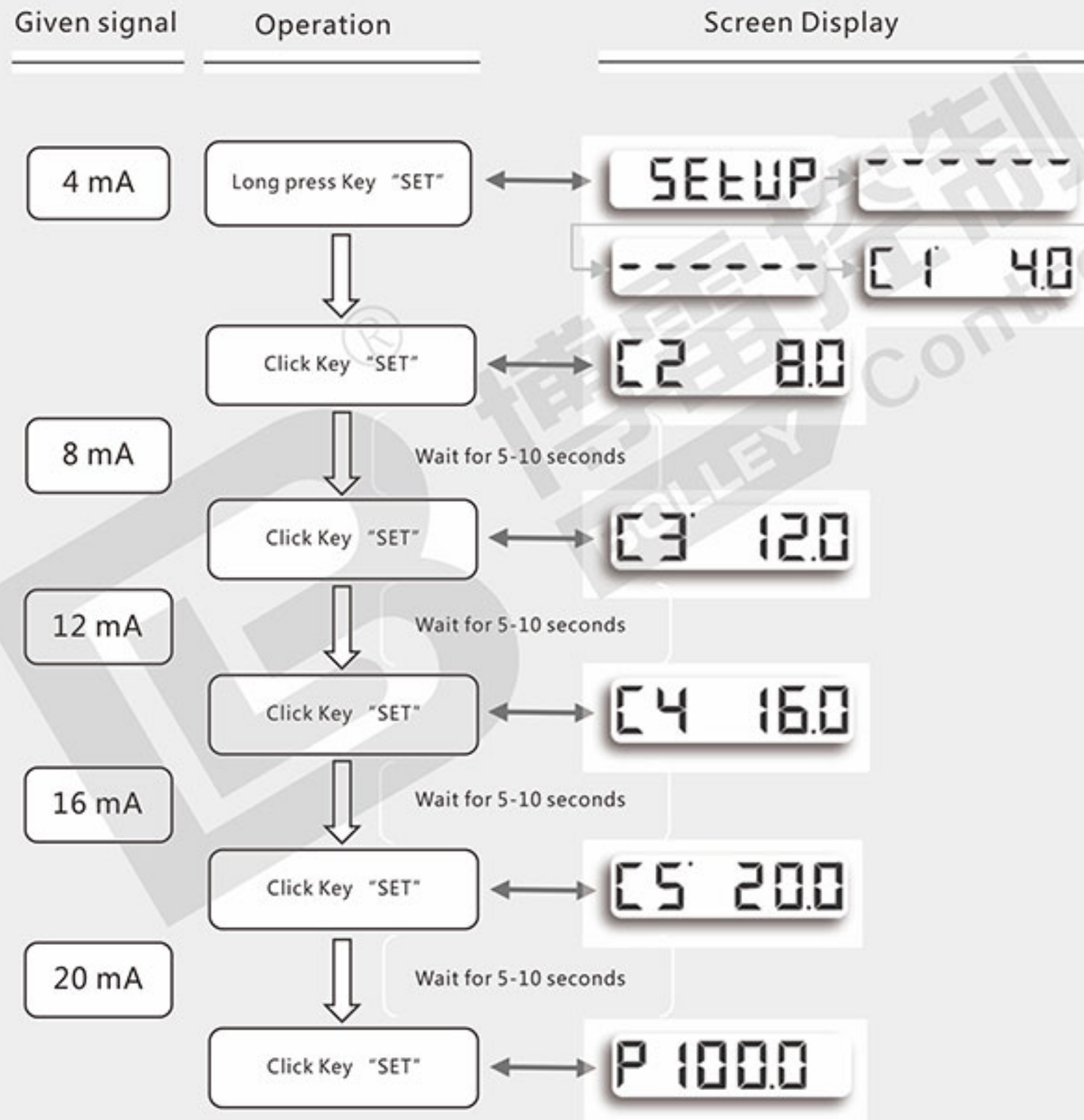
### 2.6 反馈信号调整 Feedback Signal Adjustment

1. 首先连接好反馈信号回路,将定位器调整好。注意电位器齿轮上的记号在定位器开度50%左右时应该对齐。
2. 然后按以下步骤调整反馈信号。

1. First connect the feedback signal circuit, and adjust the positioner. Pay attention that the marks on the potentiometer gear should be aligned when the opening of the positioner is about 50%.
2. Then adjust feedback signals according to the steps below.



3. 如需输入信号与反馈信号相反时，按下列表格设定。  
When the input signal is opposite of the feedback one, follow the below chart for setting.





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### ◆ 产品维护和检查 Product Maintenance and Inspection

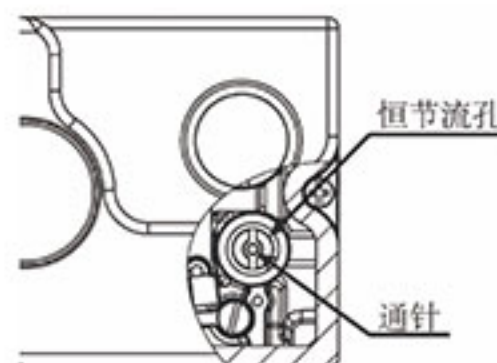
1. 定期检查阀门定位器前空气过滤减压器的输出压力，不要随意加大或减小减压器输出压力。
2. 定期给空气过滤减压器放水，防止减压器内水气浸入定位器造成定位器故障。
3. 在正常使用中，请盖好定位器的外壳以防水汽、灰尘等杂质进入定位器内部造成故障。

1. Regularly check the output pressure of the air filtration pressure reducer in front of the valve positioner. Don't increase or decrease output pressure of the pressure reducer casually.
2. Drain the air filtration pressure reducer regularly to prevent moisture in the pressure reducer entering the positioner, which may lead to positioner faults.
3. During normal use, please cover the positioner shell to prevent moisture, dust and other impurities entering the positioner internal part, which may cause faults.

### 常见故障排除 Trouble Shooting

给定信号不动作 Given signals don't act	1. 检查气源 2. 检查信号连接	1. Check the air supply 2. Check the signal connection
有动作，但无法全开（全关） Have action, but not fully open (closed)	检查气源压力	Check the air pressure
只能处在全开或全关位置 Can only be in position of fully open or closed	疏通恒节流孔	Dredge constant orifice
定位器振荡 Positioner oscillation	1. 检查连接附件是否松动 2. 检查输出口有无泄露 3. 执行器容积过小	1. Check whether the connection accessories are loose 2. Check whether there is any leakage on the output port 3. The actuator capacity is too small
无反馈信号 No feedback signals	1. 检查反馈信号连接 2. 检查反馈信号回路24V电源	1. Check the feedback signal connection 2. Check the feedback signal circuit of 24V power supply
液晶显示屏显示 Error LCD screen displays Error	1. 检查反馈杆有无松脱 2. 检查电位器齿轮有无松脱 3. 电位器及齿轮未对齐或损坏	1. Check whether there is any loose phenomenon on feedback rod 2. Check whether there is any loose phenomenon on the potentiometer gear 3. Potentiometer and the gear are not aligned or damaged
无法线性调节 Unable to perform linear adjustment	凸轮装反或输出口接反(双作用)	CAM is installed backwards or output ports are connected backwards (Double-action)

### 疏通恒节流孔 Dredge constant orifice



1. 用螺丝刀将“通针”往下压几次，便可疏通“恒节流孔”。
2. 必要时可将“恒节流孔”组件逆时针方向拧出，彻底清除堵塞物后再装回。装回时注意不要遗失密封O型圈。

1. Press the nozzle cleaner down several times with a screwdriver, which can dredge the constant orifice.
2. When necessary, screw out the "constant orifice" component counterclockwise and screw it back after the obstruction is fully cleaned. Pay attention that seal O-rings aren't lost when screwing back.

