操作说明书

Operating Instructions for

PD/PE 型气动执行机构

Pneumatic actuators of type PD/PE

BA 25.1.02/1115

目录

安装和安全说明 4
- 总论 4
- 防爆区域的特别说明 5

产品描述 6
- 调整 7
- 安装和维护 7

技术数据 8

操作方法 11
- 双气动 11
- 单气动(弹簧复位) 12

执行器尺寸 13

机械接口 18

调整停止位置 22

保养 24
- 密封和滑动部件交换 24
- 低温下的密封件 26
- 组装执行器 28
- 插入复位弹簧 31

保证 32

Table of contents

Mounting and safety instructions 4
- General remarks 4
- Special instructions for Ex-zones 5

Product description 6
- Adjustment 7
- Mounting and maintenance 7

Technical data 8

Method of operation 11
- double-acting 11
- single-acting (spring return) 12

Dimensioning the actuator 13

Mechanical interfaces 18

Adjustment of stop positions 22

Maintenance 24
- Exchange of sealings and gliding parts 24
- Inserting the sealings for low of high temperatures 26
- Assembling the actuator 28
- Inserting spring returns 31

Warranty 32

安装和安全说明

总论

- 安装，气动连接和初始操作必须由经过认证的专业人员根据此安装和操作手册进行.
- 气动执行器可以产生很大的扭矩。为避免事故，请参考并遵守国家和国际安全说明.
- 执行器连接到压缩空气系统时，请勿对其进行任何维护或操作。在执行机构的维护工作或其他处理过程中，将其从压缩空气系统中断开，并将其锁定在安全的压缩空气供应系统中。
- 将执行器安装在阀门上之前，确保执行器的转向方向设置正确，以免损坏阀门.
- 在调整停止位置时，请注意不要将阀门转过阀门环垫圈，以免损坏.
- 在安装和初始操作之前，检查技术参数，即压力，扭矩，转向和环境温度
- 观察执行器的认可温度，以免损坏内部和外部部件和人员.
- 不要超过最大控制压力，以避免功能故障，爆炸和人身伤害.

Mounting and safety instructions

General remarks

- Mounting, pneumatic connection and initial operation must be conducted by a certified professional according to this mounting and operating manual.
- Pneumatic actuators can produce heavy torques. To avoid accidents please refer to and observe the national and international safety instructions.
- Do not perform any maintenance or manipulation to the actuator while it is connected to a compressed air system. During maintenance work or other handling at the actuator disconnect it from the compressed air system and lock it from unintended compressed air supply.
- Before mounting the actuator on the valve make sure the actuator´s turning direction is set correct to avoid damage to the valve.
- On adjustment of the stop positions pay attention to not turning the valve over the valve´s ring gaskets to avoid damage.
- Before mounting and initial operation check the technical parameters, i.e. pressure, torque, turning direction and ambient temperature.
- Observe the approved temperatures of the actuator to avoid damage to the interior and exterior parts and persons.
- Do not exceed the maximum control pressure to avoid function failure, explosion and damage to persons.

防爆区域的特殊操作说明

- 建立执行机构与阀门之间的均衡
- 如果需要，防止执行机构的表面由于日照或其他能源过热，应建立热隔离.
- 在执行器或其他附件的安装或其他操作过程中，避免在使用工具时产生火花
- 使用执行机构仅附带经过认可的附件.
- 执行机构附近避免大量积尘。.

Special instructions for operation in Ex-zones

- Establish potential equalization between the actuator and the valve.
- Prevent the actuator´s surfaces from overheating by sun or other energy sources, if necessary establish a thermal isolation.
- During mounting or other handling on the actuator or other attached parts avoid spark formation while using tools.
- Attach only Ex-approved accessories to the actuator.
- Avoid major dust accumulation near the actuator.

产品描述

执行器被开发用于从 1 到 10 巴的压缩空气操作,执行机构也可完全用于液压油，水或惰性气体。
有两种型号：单作用（弹簧复位）和双作用。

通过插入或移除适当量的弹簧可以轻松实现执行器类型的更改。

执行器的标记特性是由以下部件组成的标准设备:

- 在 0°和 90°位置的两端方位调整
- 三维位置指示器
- 没有金属部件的预应力弹簧（事故预防）
- 由不锈钢制成的小齿轮（型号 P20）或镀镍碳钢（P25 以上）
- 壳体的所有内表面都已完成
- 阳极氧化的壳体
- 通过环氧树脂粉末涂层对外壳盖和活塞进行防腐蚀
- 回转范围 90° - 120° - 135° - 150° - 180° (根据要求可选)
- 通过母螺纹或螺栓螺纹固定阀门（公制或 UNC 螺纹）
- 空气入口为"GAS"或"¼""NPT"的 NAMUR 孔

Product description

The actuator was developed for operation with compressed air from 1 to 10 bar. The actuator is also fully functional with hydraulic fluid, water or inert gasses.

Two models are available: Single-acting (spring return) and double-acting.

Changing the actuator typology is easily realized by inserting or removing the appropriate amount of springs.

A marking characteristic of the actuator is the standard euipment consisting of the following parts:

- Both way adjustment of the end positions for the 0° and 90° position
- Three dimensional position indicator
- Pre-stressed springs without metal parts (accident preventional)
- Pinion gear made of stainless steel (up to model P20) or nickel-plated carbon steel (P25 and larger)
- All inner surfaces of the body are finished
- Anodized body
- Corrosion protection of housing covers and piston by epoxy resin powder coating
- Turning range of 90° - 120° - 135° - 150° - 180° (more on request)
- Valve fixing by female or bolt thread (metric or UNC thread)
- NAMUR holes for air inlet of ¼'' GAS or ¼'' NPT

调整

通过用于打开和关闭位置的外部可调节位置限位器，可以平衡组装公差，并且可以将终端位置精细调整+/- 10%

安装和维护

- 单作用，易于维护的预应力安全弹簧，无风险拆除。致动器可以根据所需的空气压力轻松调节到操作规格。
- 通过简单地添加或去除必要的弹簧，可以轻松地从双重变为单作用
- 通过运行序列号对配件进行精确回溯 ISO 9001.

Adjustment

By external adjustable position stoppers for the OPEN and CLOSE position the assembly tolerance can be balanced and a fine adjustment of the end positions by +/-10% is possible.

Montage und Wartung

- Single-acting, easy to maintain by prestressed safety springs and riskless to dismantle. The actuator can easily be adjusted to the operation specification with the required air pressure.
- Easy modification from double to single-acting by simply adding or removing the necessary springs.
- Exact backtracking for accessories by running serial numbers acc. ISO 9001.

技术数据

双作用和单作用（弹簧复位）型气动双活塞部分回转执行器。

额定选择范围: 90°, 120°, 135°, 150° und 180° （更多型号可根据要求）。可调终端位置为-10°至+ 10°（P15 ... P65 两侧，P70 / 75 一侧）。.

扭矩: 5 - 5.000 Nm（参见扭矩表或数据表）.

材质: 主体：铝，阳极氧化. W 更多类型的表面保护（硬质阳极氧化和 PTFE 涂层，环氧树脂粉末涂层或不锈钢体）.

外壳：铝，环氧树脂粉末涂层

活塞：铝，环氧树脂浸涂

轴承：低摩擦合成材料

垫圈：NBR（其他材料要求）

螺栓和螺母：不锈钢

温度范围: 标准选择 -20°C - +80°C
可提供高低温型号

Technical data

Pneumatically operated double-piston part-turn actuator as double and single-acting (spring return) model.

Nominal turning range: 90°, 120°, 135°, 150° and 180° (more models on request). Adjustable end positions from -10° to +10° (P15...P65 two sides, P70/75 one side).

Torque: 5 to 5.000 Nm (refer to torque table or data sheets).

Material: Body: Aluminum, anodized. More types of surface protection (hard anodized and PTFE coated, epoxy resin powder-coating or stainless steel body).

Housing covers: Aluminum, epoxy resin powder-coated

Pistons: Aluminum, epoxy resin dip-coated

Bearings: Low-friction synthetic material

Gaskets: NBR (other materials on request)

Bolts and nuts: Stainless steel

Temperature range: Standard version -20°C to +80°C
High and low temperature models available

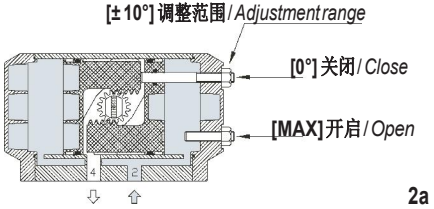
安装位置:	任意
控制介质:	过滤空气 PNEUROP / ISO Class 4，其他空气
控制压力:	2 - 10 bar (双作用), 3 -8 bar (单作用)
机械接口:	执行器 - 阀门: ISO 5211 执行器 - 控制阀: NAMUR 和 VDI/VDE 3845 执行器 - 信号单元: VDI/VDE 3845 (NAMUR)
润滑:	执行器在常规条件下以足够的工作寿命 润滑油：ROL OIL STAUFFER / 2 或类似物
应用范围:	执行器可以在室内以及在开放的场合操作.

Fitting position:	Any
Control medium:	Filtered air acc. PNEUROP/ISO Class 4, other media on request
Control pressure:	2 to 10 bar (double-acting), 3 to 8 bar (single-acting)
Mechanical interfaces:	Actuator - Valve: ISO 5211 Actuator - Control valve: NAMUR and VDI/VDE 3845 Actuator - Signal units: VDI/VDE 3845 (NAMUR)
Lubrication:	The actuators are delivered with a lubrication sufficient for a lifetime under regular conditions. Lubricant: ROL OIL STAUFFER/2 or similar.
Application range:	The actuator can be operated indoor as well as in open field.

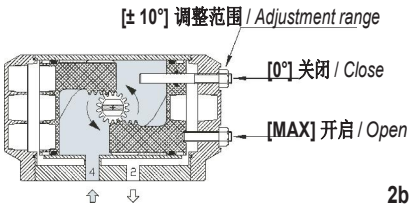
关闭阶段 Closing phase

开启阶段 Opening phase

双作用 (逆时针)
double-acting (CCW)

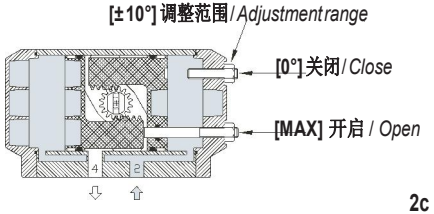


2a

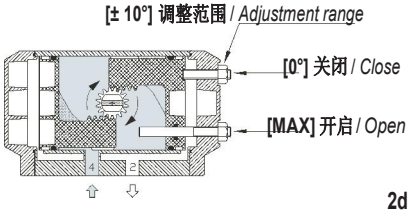


2b

双作用 (顺时针)
double-acting (CW)

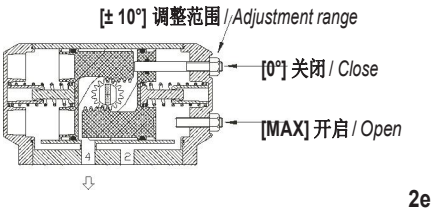


2c

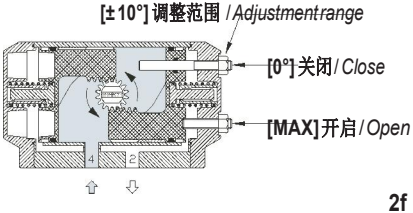


2d

单作用
(弹簧复位)
single-acting
(spring return)



2e



2f

操作方法

双作用

执行器的转动/运动受到空气供给的压缩空气的影响. 如图所示，空气源 4 连接到两个活塞之间的内腔，而空气源 2 连接到外腔.

如图 2a 所示，活塞和壳体盖之间的空腔通过供气 2 填充空气，导致活塞压在一起（CLOSE-位置）。空气将通过通道 4 离开执行器 - 活塞移动分开（OPEN-位置）标准型将逆时针移动（从上看）,如果右壳体中的止动杆接触另一个活塞，则活塞行程因此小齿轮的转动受到限制

如果空气供应被倒置，如图 2b 所示，活塞移动并影响小齿轮的转动，因此影响致动器的 OPEN 位置。活塞行程可以通过位于右侧外壳盖上的调整螺栓进行调节.

虽然执行器通常正在逆时针方向打开并顺时针关闭（安装 A），但可以更改此模式. 图 2c 和 2D 显示了相同单作用的执行器，但是活塞被反转以改变执行器模式

Method of operation

double-acting

The turning/movement of the actuator is effected by the compressed air applied by the air supplies. As shown, the air supply 4 is connected to the inner cavity between the two pistons, while air supply 2 is connected to the outer cavities.

As shown in figure 2a, the cavity between the pistons and the housing covers fill with air by air supply 2 resulting in the pistons pressed together (CLOSE-Position). The air will leave the actuator by air supply 4 - the pistons move apart (OPEN-Position).
The standard type will move counter-clockwise (seen from above).
If the stop bar in the right housing cover touches the opponent piston, the piston stroke and therefore the turn of the pinion is limited.

If the air supplies are inverted, as shown in figure 2b, the pistons move apart and affect the turn of the pinion and therefore the OPEN-Position of the actuator. The piston stroke can be adjusted by the adjustment bolts located on the right housing cover.

Though the actuator usually is working counter-clockwise for opening and clockwise for closing (mounting A) it is possible to change this mode. Figures 2c and 2d show the same single-acting actuator, but the pistons have been inverted to convert the actuators turning mode (i.e. open=CW, close=CCW).

操作方法

单作用（弹簧复位）

在这种类型下，关闭阶段由位于活塞和壳体盖之间的弹簧实现。

在空气断开的情况下，如果泄漏，弹簧将被推开，执行器将关闭。 内部空气将由供气 4 离开（见图 2e）。

如果通过空气供应 4 施加空气，则将活塞压紧并且弹簧被压缩。 内部空气将由供气 2 离开，执行器移动到其 OPEN 位置。标准型将逆时针移动（见上图;见图 2f）.

Method of operation

single-acting (spring return)

At this type the closing phase is realized by the springs located between the pistons and the housing covers.

In case of air disconnection oder leaks the springs will be pushed apart and the actuator will close. The internal air will leave by air supply 4 (see figure 2e).

If the air is applied by air supply 4 the pistons are pressed apart and the springs are compressed. The internal air will leave by air supply 2 and the actuator moves to its OPEN-position.
The standard type will move counter-clockwise (seen from above; see figure 2f).

执行机构尺寸

在确定执行器尺寸之前，必须提供以下数据

- 阀门类型，
- 阀门开启扭矩,
- 阀门关闭扭矩,
- 操作执行器的控制压力水平.

双作用和单作用执行器之间有区别.双作用致动器具有恒定的扭矩，而单作用由于弹簧的应力而具有减小的气动扭矩.必须确定所施加的空气压力的水平，使得最小气动力矩至少等于阀的打开/关闭扭矩。.

如果施加的空气水平低于尺寸水平，则可能发生致动器的故障（阀的打开或关闭不正确）.

请参考扭矩表和数据手册。

Dimensioning the actuator

Before dimensioning the actuator the following data must be available:

- Type of valve,
- Opening torque of valve,
- Closing torque of valve,
- Level of control pressure which operates the actuator.

There is a difference between the double- and the single-acting actuator. The double-acting actuator has a constant torque, while the single-acting has a decreasing pneumatical torque because of the stressing of the springs. The level of the applied air pressure must be determined that the minimum pneumatical torque is at least equal to the opening-/closing torque of the valve.

If the applied air level under-runs the dimensioned level a malfunction of the actuator may occur (incorrect opening or closing of the valve).

For dimensioning the actuator please refer to the torque table and the data sheets.

双作用执行机构的尺寸

双作用致动器的扭矩在 90°冲程期间显示恒定水平。 请参考图 5a 和 5b，并进行如下操作:

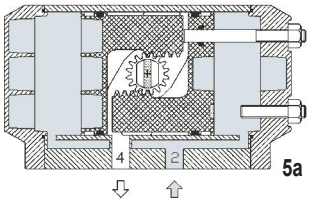
1. 指定用于操作阀门的必要扭矩，并通过所需的安全余量（取决于阀门的类型和操作条件）增加额定扭矩特性.
2. 参见扭矩表，并选择该列中显示适当气压的扭矩。 选择等于或高于阀门所需耦合力矩的扭矩.
3. 您是否找到了最适用的扭矩，左侧列显示了相应的执行器类型.

Dimensioning the double-acting actuator

The torque of the double-acting actuator shows a constant level during the 90° stroke. Please refer to figures 5a and 5b and proceed as follows:

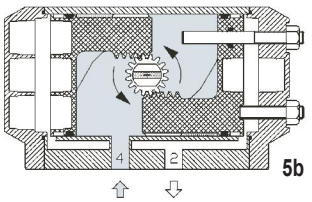
1. Specify the necessary torque for operating the valve and increase the nominal torque characteristic by the desired safety margin (depending on the type of valve and operating conditions).
2. Refer to the torque table and select the torque in that column which shows the appropriate air pressure. Choose the torque which is equal or higher than the required coupling moment of the valve.
3. Have you found the most applicable torque, the left column shows you the appropriate type of actuator.

位置 „关闭“
Position „closed“



5a

位置 „开启“
Position „open“



5b

单作用执行机构规格

在单作用执行器的情况下，如下所述:

单作用致动器的扭矩在行程期间不变，但是会减小.由于弹簧的压缩，致动器处于开启阶段时，扭矩减小。在关闭阶段，弹簧逐渐释放这种能量.

- 开启阶段　　开始/Pos. 2
- 开启阶段　　结束/Pos. 2
- 关闭阶段　　开始/Pos. 1
- 关闭阶段　　结束/Pos. 1

要选择适当的执行机构，请执行以下步骤:

1. 指定必要的扭矩，并通过所需的安全余量（取决于阀门的类型和操作条件）增加额定扭矩特性。
2. 请参见"单作用 90°"表，并从"End / Pos。1"等于或大于必要扭矩的转矩.
3. 按照所需的压力，请在列/位置中查看。2 表示所述扭矩等于或高于所需扭矩.

Dimensioning the single-acting actuator

In case of a single-acting actuator consider as follows:

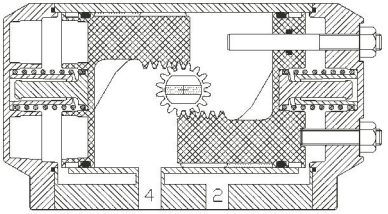
The torque of a single-acting actuator is inconstant during stroke, but decreasing. The torque reduces while the actuator is in opening phase because of the compression of the springs. During the closing phase the springs release this energy decreasingly.

- Opening phase Start/Pos. 2
- Opening phase End/Pos. 2
- Closing phase Start/Pos. 1
- Closing phase End/Pos. 1

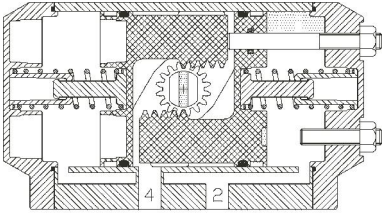
To select the appropriate actuator proceed as follows:

1. Specify the necessary torque and increase the nominal torque characteristic by the desired safety margin (depending on the type of valve and operating conditions).
2. Refer to the table „Single-acting 90°" and choose from column „End/Pos. 1" the torque which is equal to or higher than the necessary torque.
3. In accordance with the required pressure please check in column End/Pos. 2 that the stated torque is equal to or higher than the required torque.

位置 „关闭“
Position „closed“

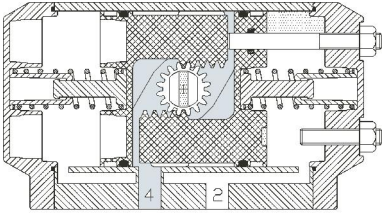


Start/Pos. 1 **5c**

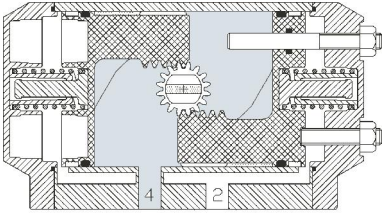


End/Pos. 1 **5d**

开放阶段
Opening phase



Start/Pos. 2 **5e**



End/Pos. 1 **5f**

25 Nm 扭矩球阀

系数: *安全系数50%*
所需扭矩: *37,5 Nm (25-50%)*
空气压力: *5,5 bar*

从下表中选择一个接近扭矩（Pos.1 END）高于 37.5 Nm。您将发现，根据 P30-S4 型，说明了扭矩为 42.2 Nm，开启扭矩（Pos.2 END）为 56.1 Nm。因此，这是适当的执行器类型。n.

Ball valve with 25 Nm torque

Coefficient: Safety factor 50%
Required torque: 37.5 Nm (25-50%)
Air pressure: 5.5 bar

From the table below choose a close torque (Pos.1 END) above 37.5 Nm. You will find that in accordance with type P30-S4 a torque of 42.2 Nm and an open torque (Pos.2 END) of 56.1 Nm is stated. Therefore this is the appropriate actuator type.

		关闭扭矩 *Close torque* **(Pos. 1)**		开启扭矩 *Open torque* **(Pos. 2)**	
				5,5 bar	
型号 *Type*	**弹簧** *Springs*	**START**	**END**	**START**	**END**
	2+2	**28,3**	**21,1**	**91,6**	**84,4**
	3+3	**42,4**	**31,6**	**81,1**	**70,3**
P30	**4+4**	**56,6**	**42,2**	**70,5**	**56,1**
	5+5	**70,7**	**52,7**	**60,0**	**42,0**

机械接口

下压力

为了实现对阀的简单安装，已经开发了特殊的法兰. 它集成到执行机构的外壳中，并带有 ISO 适配器（表 A），允许舌槽和槽与舌连接到阀门。小齿轮的联接件设置有双星形方形，以实现高安装灵活性。可根据要求提供更多的用于紧固的阴接头或钻孔。

小齿轮的下压力由一个双方形组成，允许安装方形阀或延长轴在 45°或 90°没有差异。小齿轮的方形扳手也可作为双道单/双槽版本

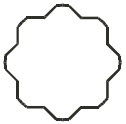
Mechanical interfaces

Downforce

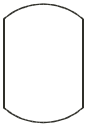
To achieve a simple mounting to the valve a special flange has been developed. It is integrated into the actuator's housing and carries an ISO adaptor (Table A) allowing a tongue and groove as well as a groove and tongue connection to the valve. The female coupling of the pinion is provided with a double star-shaped square to achieve a high mounting flexibility. More female couplings or drillings for fastening are available on request.

The downforce of the pinion consists of a double square allowing the installation of a square valve or extension shaft with no difference at 45° or 90°. The square wrench of the pinion is also available as double D oder single-/double-notch version.

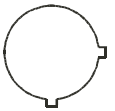
双矩形 *Double square*



双 D *Double D*



槽口 *Notches*



型号 *Type*	ISO-钻头法兰 *ISO-drills flange*		扳手尺寸 *Wrench size*
P05	F03 + F05	F04	11
P10	F03	F04	
P13	F04	F05	14
P15	F04 + F07	F05 + F07	
P18	F04 + F07	F05 + F07	
P20	-	F05 + F07	17
P25	-	F05 + F07	
P30	-	F05 + F07	
P35	-	F07 + F10	22
P40	-	F07 + F10	
P45	-	F07 + F10	
P50	-	F10 + F12	27
P55	-	F10 + F12	
P60	F10 + F12	F10 + F14	36
P65	F10 + F12	F10 + F14	
P70	F14	F16	46
P75	-	F16	

= 标准

表格 A
Table A

Mechanische Schnittstellen

Signalgeräte

在执行器的顶部，NAMUR 接口位于允许安装限位转发器，位置控制器和其他附件

空气供应设计用于 NAMUR 标准的¼“气体，允许简单直接安装控制阀

机械接口

信号装置

On the actuator´s top the NAMUR-interface is located allowing the installation of limit repeaters, position controllers and other accessories.

The air supplies are designed for NAMUR-standards for ¼“ gas allowing a simple and direct mounting of the control valves.

NAMUR-界面:
安装位置限位开关或定位器

NAMUR interface:
Mounting position für limit switch or positioner

3b

将执行器安装到阀门上

1. 检查执行机构的下压力是否与阀门兼容.
2. 确保阀处于关闭位置，执行器处于正常位置（图 3b）.
3. 将安装支架安装到阀门上，并确保正确安装和调整构件后，手动固定螺栓.

装配带安装支架

将轴适配器（如果使用）定位到阀轴，将执行器安装到安装支架上。调整阀门和执行器以避免系统张力; 紧固所有螺栓（使用螺丝锁定！）.

直接组装

将执行器定位到阀门上，并确保阀杆插入执行器的下压力。从下面插入适当的螺栓到阀门的法兰上，紧固零件而没有系统张力。调整法兰并将螺丝拧紧（使用螺丝锁定！）。

Mounting the actuator to the valve

1. Check whether the downforce of the actuator is compatible to the valve.
2. Make sure that the valve is in closed position and the actuator is in normal position (Figure 3b).
3. Assemble the mounting bracket to the valve and fasten the bolts manually after making sure that the build is installed and adjusted correctly.

Assembly with mounting bracket

Position the shaft adapter (if used) to the valve shaft and the actuator to the mounting bracket. Adjust the valve and the actuator to avoid system tension; fasten all bolts (use screw locking!).

Direct assembly

Position the actuator to the valve and make sure that the valve shaft is inserted to the actuator´s downforce. From below insert appropriate bolts to the valve´s flange, fasten the parts without system tension. Adjust the flange and fasten screws crosswise (use screw locking!).

4. 开始运行执行机构数次，以确保组件运行正常。如果设备运行不正确，请重复步骤1至4.如果问题仍然存在，请联系 ARIS Antriebe und Steuerungen GmbHme
5. 完成安装后，必须调整执行器的行程以确保正确的操作。对于两个停止位置（0°和 90°），执行器的调整范围为+/- 10°.

调整停止位置

- 将执行器放在工作台上.
- 松开调节螺丝的安全螺母（右端盖 0°/ 90°）
- 转动调节螺栓（内六角），直到小齿轮到达其最终位置.
- 将控制空气施加到执行器并检查停止位置.
- 重复步骤 3 和 4，直到调整正确。拧紧调整螺栓的锁紧螺母.

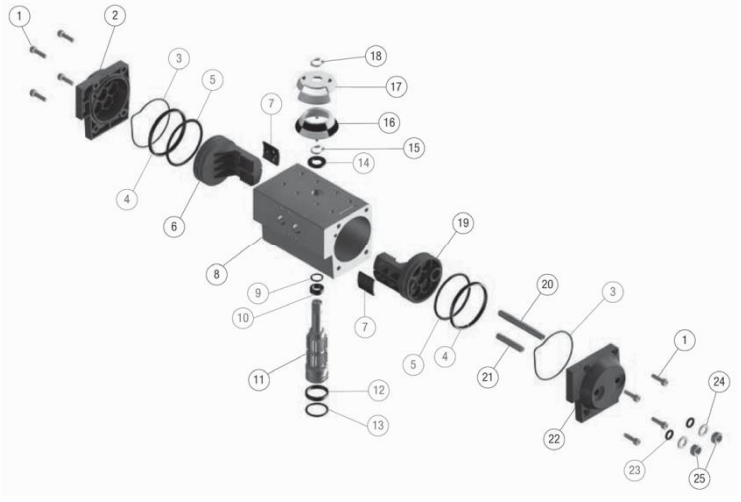
4. Start running the actuator several times to make sure the assembly is operating correctly. In case the unit is not operating correctly repeat steps 1 to 4. If the problems persist please contact ARIS Antriebe und Steuerungen GmbH.
5. After having finished the mounting, the actuator´s stroke has to be adjusted to ensure a proper operation. The actuators have an adjustment range of +/- 10° for both stop positions (0° and 90°).

Adjustment of the stop positions

- Place the actuator on a bench.
- Release the safety nut of the regulation screw (right end cap 0°/90°).
- Turn the regulation bolt (female hexagon) until the pinion has reached its end position.
- Apply the control air to the actuator and check the stop positions.
- Repeat steps 3 and 4 until the adjustment is correct. Tighten the lock nuts of the adjustment bolts.

Bauteile des Stellantriebes

Pos.	部件 / *Part*	材料 / *Material*
1	端盖螺栓 / *End cap bolt*	不锈钢/ *Stainless steel*
2	左端盖 / *Left end cap*	压铸铝 / *Die cast aluminum*
3	端盖 O 型圈) / End cap O-Ring	NBR
4	活塞轴承 / *Piston wear bearing*	Technopolymer
5	活塞 O 型圈 / *Piston O-Ring*	NBR
6	左活塞 / *Left piston*	压铸铝 / *Die cast aluminum*
7	活塞导轨 / *Piston skate*	Technopolymer



Actuator parts

Pos.	部件 / *Part*	材料 / *Material*
8	壳体 / *Actuator body*	铝/ *Aluminum*
9	上小齿轮环 / *Upper pinion ring*	NBR
10	上小齿轮轴承 / *Upper pinion bearing*	Technopolymer
11	小齿轮 I / *Pinion*	不锈钢 / *Stainless steel*
12	下小齿轮轴承 / *Lower pinion bearing*	Technopolymer
13	小齿轮 O 形圈 / *Lower pinion O-Ring*	NBR
14	上小齿轮垫圈 / Upper pinion *washer*	Technopolymer
15	小齿轮卡环 / *Pinion snap ring*	不锈钢 I/ *Stainless steel*
16	指标（修正） / *Indicator (fix)*	Technopolymer
17	指标（旋转） / *Indicator (rotating)*	Technopolymer
18	指示器卡环 / *Indicator snap ring*	不锈钢 / *Stainless steel*
19	右活塞 / *Right piston*	压铸铝 / *Die cast aluminum*
20	闭路行程 / *Closed travel stop*	不锈钢 / *Stainless steel*
21	开启行程 / *Open travel stop*	不锈钢 / *Stainless steel*
22	右端盖 I/ *Right end cap*	压铸铝 / *Die cast aluminum*
23	O 型圈 / *O-Ring*	NBR
24	垫圈 / *Washer*	不锈钢 / *Stainless steel*
25	停止螺栓螺母 / *Stop bolt nut*	不锈钢 / *Stainless steel*

保养

密封件和滑动部件的交换

在执行机构进行任何维护工作之前，请断开供气和拆除所有配件。单作用（弹簧复位）执行机构确保弹簧处于松弛位置。

1. 断开执行器的空气和电力供应.
2. 将执行器从安装支架上卸下并将其保持在干净的位置.
3. E 松开 4 个端盖螺丝（No.），拆下端盖（2 号和 22 号）。
4. 拆卸端盖 O 型圈（3 号），并检查其状态和润滑
5. 拆下安装在右活塞头上的止动螺栓和调节螺丝
6. 通过使用插入小齿轮（No.22）顶部适当槽口的扳手逆时针转动小齿轮，直到空转.
7. 使用钳子通过影响弹簧座来移除活塞（6 号和 19 号），但确保不会损坏活塞的表面
   注意：如果本机已顺时针安装（安装 B），则活塞必须相反转动。

Maintenance

Exchange of sealings and gliding parts

Before doing any maintenance work on the actuator disconnect the air supply and dismantle all accessories. At single-acting (spring return) actuators make sure that the springs are in their relaxed position.

1. Disconnect the air and electricity supply of the actuator.
2. Unmount the actuator from the mounting bracket and keep it at a clean place.
3. Dismantle the end caps (No. 2 and 22) by loosening the 4 end cap screws (No. 1).
4. Dismantle the end cap O-Rings (No. 3) and check their condition and lubrication.
5. Remove the stop bolt and the regulation screw placed on the right piston head.
6. By using a wrench inserted into the appropriate notch on top of the pinion (No. 22) turn the pinion counter-clockwise until it idles.
7. Use pliers to remove the pistons (No. 6 and 19) by affecting the spring seats but make sure not to damage the surface of the pistons.
   Notice: If the unit has been mounted operating clockwise (mounting B) then the piston must be turned contrarily.

8. 从左右活塞上拆下 O 形圈和推力块（No.4,5 和 7）。
9. 仅具有更换法兰的执行器：松开位于法兰底部的螺钉；发出执行机构，并将小齿轮的上部分在木制表面上，从下方抽出执行器壳体的法兰 - 小齿轮块。
10. 将小齿轮（11 号）拉出法兰.
11. 拆下垫圈（14 号）.
12. 拆下位于上下小齿轮和下小齿轮轴承（10 号和 12 号）上的 O 形圈（9 号和 13 号）.
13. 如果需要，请查看并更换磨损部件。

8. Remove the O-Rings and the thrust blocks (No. 4, 5 and 7) from the right and left piston.
9. Actuators with change flanges only: Release the screws located on the bottom side of the flange; pounce the actuator and tap the upper part of the pinion upon a wooden surface to extract the flange-pinion-block of the actuator housing from below.
10. Pull the pinion (No. 11) out of the flange.
11. Remove the washer (No. 14).
12. Remove the O-Rings (No. 9 and 13) located on the upper and lower pinion and the lower and upper pinion bearing (No. 10 and 12).
13. Inspect and replace the worn-out parts if necessary.

备件套件包含以下部件		*The spare-part kit contains the following parts*	
3	**O 型圈（外壳）**	*3*	*O-Ring (Housing)*
4	**活塞轴承**	*4*	*Piston wear bearing*
5	**O 型圈（活塞）**	*5*	*O-Ring (Piston)*
7	**活塞导轨**	*7*	*Piston skate*
9	**O 型圈（小齿轮）**	*9*	*O-Ring (Pinion top)*
10	**上小齿轮轴承**	*10*	*Upper pinion bearing*
12	**下小齿轮轴承**	*12*	*Lower pinion bearing*
13	**O 型圈（小齿轮底部）**	*13*	*O-Ring (Pinion bottom)*
23	**O 型圈**	*23*	*O-Ring*

保养

低温或高温下插入密封

1. 如上所述拆下执行机构。

2. 使用以下执行器部件的螺丝刀拆下密封:

   - 从活塞(Nr. 5),
   - 从端盖 (Nr. 3),
   - 从小齿轮的上端开始，(Nr. 20),
   - 从小齿轮的下端开始， (Nr. 23).

3. 使用酒精或其他温和的溶解器去除所有执行器部件的润滑。（注意：在插入新的密封套件之前，请先清洁所有表面。）

4. 分开密封并注意其安装位置。以下注意事项:
   活塞 O 型圈：最大厚度 (Nr. 5).
   端盖 O 形圈：最大直径 (Nr. 3).
   小齿轮 O 形圈：残留的密封件将最小直径的 O 形圈插入下小齿轮座（23 号）和直径较小的上齿轮座（20 号）.
   O 型圈用于调节螺丝 (Nr. 13).

Maintenance

Inserting the sealings for low or high temperatures

1. Dismantle the actuator as described above.

2. Remove the sealings by using a screwdriver from the following actuator parts:

   - From the pistons (No. 5),
   - from the end caps (No. 3),
   - from the upper end of the pinion (No. 20),
   - from the lower end of the pinion (No. 23).

3. Use alcohol or other gentle dissolver to remove lubriaction from all actuator parts. (Note: Clean all surfaces accurately before inserting a new seal kit.)

4. Seperate the sealings and note their installation position. Following sealings are on hand:
   Piston O-Ring: Largest thickness (No. 5)
   End cap O-Ring: Largest diameter (No. 3)
   Pinion O-Ring: Among the residual sealings insert the O-Rings with the largest diameter to the lower pinion seat (No. 23) and those with less diameter to the upper pinion seat (No. 20).
   O-Ring for the refulation screw (No. 13).

5. 为低/高温安装密封套件. 如果过程太困难，则可以对密封进行拉伸和润滑以简化插入。（注意：使用充分润滑）安装端盖 O 型圈检查它们是否恰好在座椅上; 如果没有，安装端盖（1 号和 16 号）时密封件可能会损坏！

6. 润滑以下内部执行器部件:

   · 执行器的内部钻孔,
   · 活塞表面（推力块，O 型圈）暴露于磨损,
   · 活塞的齿（齿条）
   · 轮架活塞.

7. 按照本手册的说明组装执行机构部件 rie-

5. Install the seal kit for low/high temperatures. In case the procedure is excessively difficult the sealings can be stretched and lubricated to simplify the insertion. (Note: Use an adequate lubrication). When installing the end cap O-Rings check that they fit exactly in their seats; if not, the sealings could get damaged when mounting the end caps (No. 1 and 16)!

6. Lubricate the following internal actuator parts:

   · The internal drilling of the actuator,
   · surfaces of the piston (thrust block, O-Ring) exposed to abrasions,
   · toothing (rack) of the piston and
   · the rackwheel of the piston.

7. Assemble the actuator parts as described in this manual.

保养

组装执行器

I

在组装执行器之前，请确保:

- 所有表面均没有不均匀或粗糙的区域.
- 密封件，其座椅，内部钻孔和暴露于磨损的表面是充分润滑的.

1. 将 O 形圈（20 号和 23 号）和小齿轮轴承（编号 21 和 24）放在活塞上（22 号）。
2. 将螺母（26 号）和垫圈（25 号）插入法兰座（27 号）。这避免了过度的摩擦和磨损。
3. 将小齿轮插入法兰.
4. 将小齿轮法兰单元按压到执行机构（19 号）上，直到法兰完全固定在车身上.
5. 拧紧位于法兰上的螺丝（28 号）.
6. 检查正确安装的临时测试：使用扳手手动转动小齿轮，确保小齿轮自由旋转.
7. 将密封（5 号）和适当的推力块（6 号和 8 号）插入左右活塞（7 号和 12 号）。

Maintenance

Assembling the actuator

I

Before assembling the actuator make sure that

- All surfaces are free of uneven or rough areas and
- the sealings, their seats, the internal drilling and the surfaces exposed to abrasion are sufficient lubricated.

1. Place the O-Rings (No. 20 and 23) and the pinion bearings (No. 21 and 24) on the piston (No. 22).
2. Insert the nuts (No. 26) and the washers (No. 25) into the flange seats (No. 27). This avoids excessive friction and resulting abrasion.
3. Insert the pinion into the flange.
4. Apply the pinion flange unit to the actuator body (No. 19) by pressing it until the flange is completely set to the body.
5. Fasten the screws (No. 28) located on the flange.
6. Interim test for checking the correct mounting: Turn the pinion manually by using a wrench and make sure that the pinion is rotating freely.
7. Insert the sealings (No. 5) and the appropriate thrust blocks (No. 6 and 8) into the right and left piston (No. 7 and 12).

8. 插入活塞:
根据所需的执行器的转动（逆时针安装 A 或顺时针安装 B），可以通过两种不同的方式布置此过程。. 左右活塞的定义如下：在朝向执行器空气供应的正视图中，位于小齿轮右侧的活塞是右活塞，位于小齿轮左侧的活塞是左活塞。
安装 A 的步骤如下：

插入左活塞
将执行器放置在左侧的垂直位置，以使法兰面向操作者，并且供气位于右侧.
对于CCW转动，齿条必须插入小齿轮的左侧。用手按住左活塞，直到完全固定在身体内部
插入右活塞
将执行器放置在左侧的垂直位置，以使法兰面向操作者，并且供气位于右侧.
对于 CCW 转动，齿条必须插入小齿轮的左侧。 用手按住右活塞，直到完全固定在内部.

9. 安装端盖
将 O 形圈（3 号）置于气缸盖中，将其放置在座椅上。 用手指踩踏，确保密封完全固定在座位上。.

8. Inserting the piston:
This procedure can be arranged by two different ways, depending on the desired actuator´s turning (counter-clockwise MOUNTING A or clockwise MOUNTING B). Left and right pistons are defined as follows: At front view towards the air supplies of the actuator the piston located right of the pinion is the RIGHT PISTON and the piston located left of the pinion is the LEFT PISTON. For MOUNTING A proceed as follows:

Inserting the LEFT PISTON
Place the actuator in a vertical position on its left side so that the flange is facing the operator and the air supply is on the right side.
For a CCW turning the toothed rack must be inserted on the left side of the pinion.
Insert the left piston by pressing it with your hands until it is completely set to the body inside.
Inserting the RIGHT PISTON
Place the actuator in a vertical position on its left side so that the flange is facing the operator and the air supply is on the right side.
For a CCW turning the toothed rack must be inserted on the left side of the pinion.
Insert the right piston by pressing it with your hands until it is completely set to the body inside.

9. Mounting the end caps
Insert the O-Rings (No. 3) into the cylinder head by positioning them in their seats. Follow the tread with your finger to make sure the sealings are set completely in their seats.

从右侧气缸盖（16 号）外侧将止动螺栓（15 号）和调节螺钉（14 号）顺时针拧紧，直至到达气缸盖内.
首先将止动螺栓和调节螺钉的 O 形圈（13 号），然后将止动螺栓（No.18）插入气缸盖的外侧. 插入用于安装气缸盖的 4 个内六角螺丝（1 号），并以表 B 中列出的最大扭矩拧紧。

10. 调整
通过供气将压缩空气施加到执行机构 2.用扳手调整调节螺丝（标记为"0°"），直到小齿轮的上槽到达垂直位置（0°位置）。考虑表 B 中的锁定扭矩来固定止动螺栓螺母。.通过供气 4 将压缩空气施加到执行机构以实现打开。小齿轮的上槽必须调整到驱动轴的 90°; 如果需要，调整调节螺丝（标记为"MAX"），直到上切口达到正确的位置，并考虑到表 B 中的锁定扭矩固定止动螺栓螺母.

Mount the stop bolt (No. 15) and the regulation screw (No. 14) from outside on the right cylinder head (No. 16) by tightening them clockwise until they reach the cylinder head inside.
First insert the O-Rings (No. 13) of the stop bolt and the regulation screw and then the stop bolt nuts (No. 18) to the outside of the cylinder head.
Insert the 4 female hex-screws (No. 1) for mounting the cylinder head and tighten them with the maximum torque stated in Table B.

10. Adjustments
Apply compressed air to the actuator by air supply 2. Adjust the regulation screw (marked „0°“) with a wrench until the upper notch of the pinion reaches the vertical position (0°-position). Fasten the stop bolt nuts considering the locking torque in table B.
Apply compressed air to the actuator by air supply 4 to effect the opening phase. The upper notch of the pinion must be adjusted 90° to the drive axis; if needed, adjust the regulation screw (marked „MAX“) until the upper notch reaches the correct position and fasten the stop bolt nuts considering the locking torque in table B.

Tabelle B

型号 / Actuator type	锁定扭矩 / Locking torque [Nm]
P15	8
P20 - P25	12
P30 - P45	15
P50 - P 65	22

插入复位弹簧

通过简单地改变位于气缸盖上的弹簧的结构，致动器可以通过双作用改变为单作用。右端盖最多可容纳 5 个弹簧，左端帽最多可容纳 7 个弹簧; 建议安装至少 2 + 2 个弹簧，用于将负载均匀地分配到活塞。弹簧的数量正在影响执行器在运行过程中产生的转矩; 请参阅数据表以确定执行器的尺寸并选择正确数量的弹簧

要按照以下步骤安装弹簧:

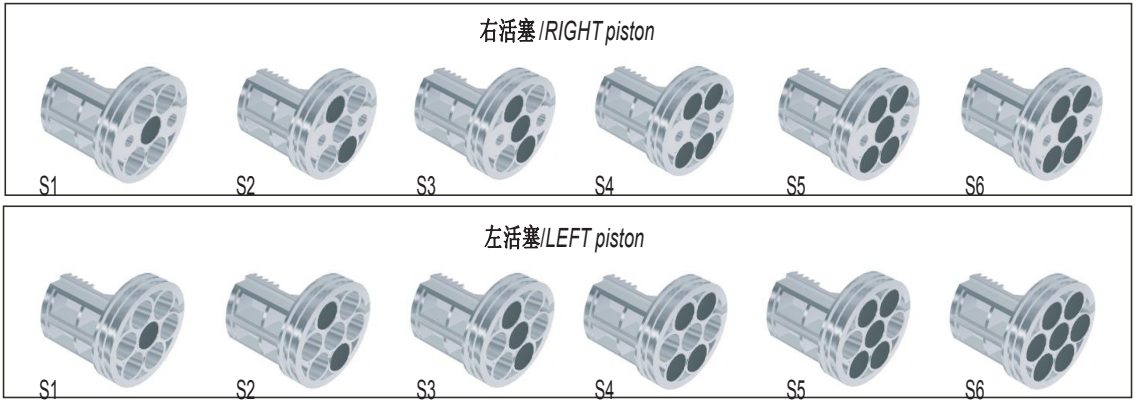
1. 从气缸盖（1 号）上松开 4 个内六角螺母 (Nr. 1).
2. 拆下端盖 (Nr. 2 und 16).
   请参阅第 32 页，并将正确数量的弹簧插入两个端盖（即 P15 -S4 = 4 + 4 弹簧）。建议将保持深钻孔的刀片的塑料部件应用于气缸盖.
3. 按照本手册的说明再次安装执行器。

Insertion of spring returns

The actuators can be modified from double-acting to single-acting by simply changing the configuration of the springs located on the cylinder heads. The right end cap can hold up to 5 springs, the left end cap up to 7 springs; it is recommended to mount at least 2 + 2 springs to distribute the load evenly to the pistons. The amount of the springs is effecting the torque that the actuator produces during operation; refer to the data sheets to dimension the actuator and choose the correct amount of springs.

To mount the springs proceed as follows:

1. Release the 4 female hex-nut screws from the cylinder heads (No. 1).
2. Remove the end caps (No. 2 and 16).
3. Refer to page 32 and insert the correct amount of springs into both end caps (i.e. P15 -S4 = 4+4 springs). It is recommended to apply the plastic part of the insert which holds the deep drilling to the cylinder head.
4. Mount the actuator again as described in this manual.



保证

如果产品用于其开发和实现的目的和应用，则保修仅涵盖材料和/或制造缺陷 。ARIS Antriebe und Steuerungen GmbH 不包括不属于“材料和/或制造缺陷”类别的腐蚀或其他损害的保证。
保修期从交付开始，并在法定期限内运行.
有关本保修的任何声明必须提交，并且必须在保修期满之前收到 ARIS。 ARIS 收到索赔后，保留在现场或 ARIS 分支机构检查相关产品的权利.

Warranty

The warranty covers only material and/or fabrication defects if the products are used for purposes and applications they were developed and realized for. ARIS Antriebe und Steuerungen GmbH excludes warranty for corrosion or other damages not belonging to the categories „material and/or fabrication defects“.
The warranty period begins with the delivery and runs for the statutory duration.
Any claim concerning this warranty has to be filed written and must receive ARIS before the warranty expiration date. After receiving a claim ARIS reserves the right to inspect the concerning product on-site or at an ARIS branch.

如果 ARIS 声称产品在本保修范围内，则根据 ARIS 所做出的决定，更换，修理或信用记录是 ARIS 唯一的责任和客户的唯一权利。因此，ARIS 不对以前未经批准的维修，作品，材料和/或其他费用负责。本保修不包括与发生的故障直接或间接相关的损害赔偿索赔。

在以下情况下保修期满:

- 如果产品被拆除，则在 ARIS 站点外更改或更改
- 由于安装不正确导致的故障
- 如果一个产品在应用程序中使用，那么它们没有被开发和实现.

此外，此保修仅对 ARIS 生产的产品有效。对于由 ARIS 销售但由第三方生产的任何产品，相关制造商的保修条款适用.

注意：参考产品范围的不断改进和扩展 ARIS Antriebe und Steuerungen GmbH 保留更改或修改技术设计和施工特性的权利，恕不另行通知。ARIS 没有义务将这些更改应用于在修改点之前或之后销售的产品.

If ARIS asserts that the product is covered by this warranty the replacement, repair or a credit entry is the only liability of ARIS and the only right of the customer, depending on the decision ARIS makes. Therefore ARIS can not be held responsible for repairs, works, materials and/or other expenses which have not been approved before. This warranty excludes claims for damages related directly or indirectly with the occurred failure.

The warranty expires in the following cases:

- If a product is dismantled, modified oder changed outside an ARIS site or
- at failures resulting from incorrect installation or
- if a product is used in an application they were not developed and realized for.

Furthermore, this warranty is only effective for products manufactured by ARIS. For any product sold by ARIS but manufactured by a third party the warranty of the concerning manufacturer applies.

NOTICE: Refering to a continious improvement and extension of the product range ARIS Antriebe und Steuerungen GmbH reserves the right to change or modify the technical design and construction characteristics without prior notice. ARIS has no obligation to apply these changes to products sold before or after the modification point.