# CESIM – 保护财产和设备安全

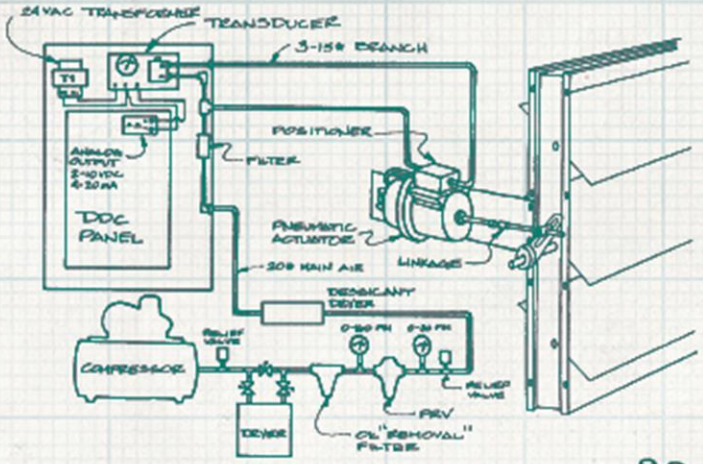
## 安全重于泰山.
## Small Devices.
## Big Impact.

# 安全

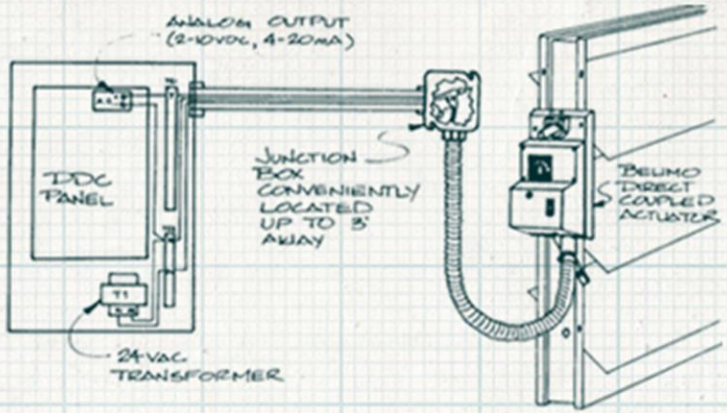
**安全. 坚固. 快速. 可靠.**

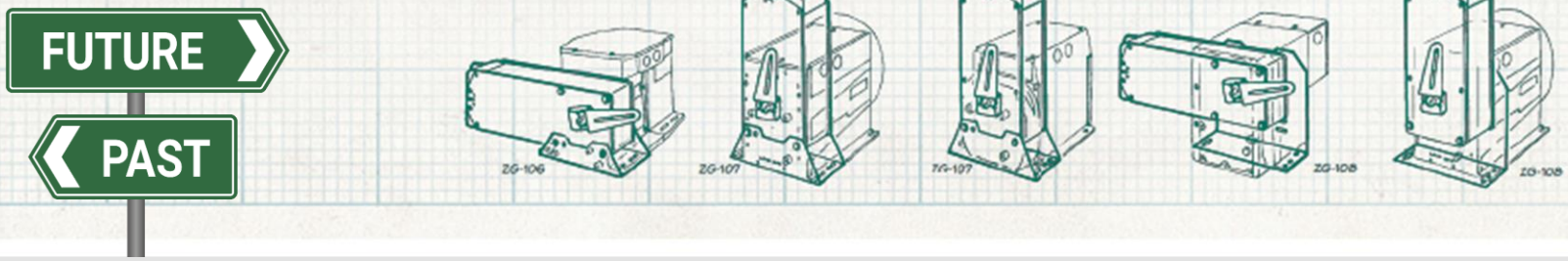
# 开创性的理念

## 通过连接件安装风阀执行器




## 直接耦合安装风阀执行器



# 开创性的理念

- 1975，值得铭记的年份

- **直接耦合安装的**创造者
- **力求共赢**

# 1992年 自复位功能的风门执行器—弹簧复位

INTEROFFICE MEMORANDUM FROM WERNER BUCK
MAY 16, 1997

Despite the fact that we have now replaced the FM24-SR with the newer, successful AF24-SR, it is important for you to have information on our findings regarding failures which occurred with the former FM24-SR actuators and also what we intend to do for any customers who may encounter a problem to ensure any continuing problems are resolved to the customers' satisfaction.

Analysis of problems with the FM24-SR actuator has shown that the most frequent cause is a premature breakdown of a composite, metal/nylon, gear assembly, caused in 2 ways:

1) The FM24-SR actuator is designed with 2 DC motor drive sections. The first is used to windup and control the spring return mechanism. The second controls the modulation of the actuator position. The spring section is not designed to have power removed from it to drive the actuator to its fail-safe position as a normal control function. If the power to the actuator is constantly turned off and on to control the position, the spring, or associated gears will fail, causing the actuator to be non-operative. The spring return section is designed to only be used in the presence of a power failure. The published number of cycles for the FM, in fail-safe mode. Is 1000 safety functions. The actual operational life can be as long as 2000 fail-safes.

2) Another cause for this failure, and harder to determine, is if in a particular location, there are frequent, momentary, power interruptions. During a momentary power interruption, the spring return mechanism will be activated, driving the actuator towards its fail-safe position. If power is reapplied to the actuator before the actuator reaches its fail-safe position, the DC motor will suddenly put force on the mechanism in the opposite direction. These forces, spring and DC motor, working at the same time, produce a load on the mechanism several times the force during normal operation which causes the nylon teeth on the composite drive gear to wear out.

# 设计寿命

## Guaranteed Actuator Design Life

For over 35 years Belimo has been the worldwide leader in HVAC actuation. Belimo verifies the design endurance of all actuators with high-tech test equipment. Belimo designs this test equipment for the specific purpose of performing both life cycle and partial cycle testing.

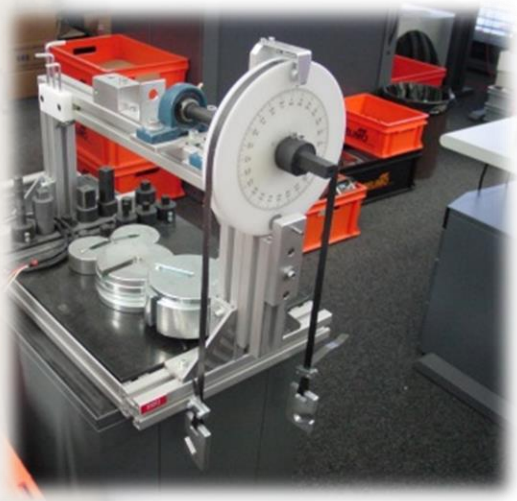
Belimo provides the design life and partial cycle data as guidelines to estimate useful product life. The actual life of a Belimo actuator depends on the installed application.

**Design Life FULL Cycle Testing**

Prior to launching a new product series Belimo tests several batches of actuators (e.g. AFB/X, LF, LMB) to benchmark the actual performance to the design target in order to estimate the installed life expectancy. The actuator sampling is taken from the 0-series or pilot production which utilizes production tooling from all vendors and Belimo. During the actuator series life-cycle Belimo also randomly samples 5 to 10 actuators at random intervals to verify reliability from production lots.

The life cycle test results are intended to provide an approximate actuator life expectancy. Belimo guarantees the actuator life only when the actuator is installed and used according to the product specification.

- *Guaranteed Actuator Design Life Cycles – Spring Return*: Belimo guarantees that all actuators will operate for 60,000 full cycles when the labeled torque load is applied. For example, an AFBUP is rated for 180 in-lb.
- *Guaranteed Actuator Design Life Cycles – Electronic Failsafe*: Belimo guarantees that all actuators will operate for 100,000 full cycles when the labeled torque load is applied (motor 95° rotation) over the [illegible] and voltage range. (Does not include 'Q' types)
- [illegible] Belimo guarantees that all actuators will [illegible] an NMB24-3 is



# BELIMO技术规范!

SECTION 230923.12 - CONTROL DAMPERS

PART 1 - PRODUCTS

1.1 GENERAL CONTROL-DAMPER ACTUATORS RE

A. Actuators shall operate related damper(s) with suffi modulating action or two-position action and proper s conditions to which the damper is subjected.

B. Actuators shall produce sufficient power and torque t pressures encountered. Actuators shall be sized to cl pressure as a minimum requirement.

C. The total damper area operated by an actuator s manufacturer's maximum area rating.

D. Provide one actuator for each damper assembly wher drive a single damper assembly shall operate in unisc

E. Avoid the use of excessively oversized actuators w failure when the damper blade has reached either its

F. Use jackshafts and shaft couplings in lieu of blad aligned damper sections.

mounting hardware and linkages for connect position in the event

I. Fail-Safe:
1. Where indicated, provide actuator to fail to an end position.
2. Mechanical spring return mechanism to drive controlled device to an end position (open or close) on loss of power.
3. Electronic fail-safe shall incorporate an active balancing circuit to maintain equal charging rates among the Super Capacitors. The power fail position shall be proportionally adjustable between 0 to 100% in 10 degree increments with a 2 second **[Insert timing between 0-10 seconds]** operational delay.

J. Integral Overload Protection:

1. Provide electronic overload protection throughout the entire operating range in both directions.

K. Damper Attachment:

1. Unless otherwise required for damper interface, provide actuator designed to be directly coupled to damper shaft without need for connecting linkages.
2. Attach actuator to damper drive shaft in a way that ensures maximum transfer of power and torque without slippage.
3. Bolt and set screw method of attachment is acceptable only if provided with at least two points of attachment.

and Humidity:

ating temperature range encountered by application with [minus 22 to plus 122 deg F ((minus 30 to minus operating

# 自复位功能的执行器系列- 弹簧复位

## 产品系列

SF...系列产品

- 防护等级最高IP66
- 非运行环境温度最低-40ºC

| 机械式（弹簧）复位<br>风门执行器 | TF.. | LF.. | NF..A | SF..A | EF..A |
|---|---|---|---|---|---|
| 扭矩 | 2.5 Nm | 4 Nm | 10 Nm | 20 Nm | 30 Nm |
| 可控风门尺寸 | 0.5 $m^2$ | 0.8 $m^2$ | 2.0 $m^2$ | 4.0 $m^2$ | 6.0 $m^2$ |
| 运行时间 | 75s / 90˚<br>(SR: 150s / 90º) | 40...75s / 90˚<br>(SR: 150s / 90º) | 75s / 90˚<br>(SR: 150s / 90º) | 75s / 90˚<br>(SR: 150s / 90º) | 75s / 90˚<br>(SR: 150s / 90º) |
| 弹簧复位时间 | <25s / 90˚ | 20s / 90˚ | <20s / 90˚ | <20s / 90˚ | <20s / 90˚ |

# 自复位功能的执行器系列- 弹簧复位

## 主要参数

| 机械式自复位风门执行器 | 10Nm NFA.. | 20Nm SFA.. | 30Nm EF.. |
|---|---|---|---|
| 开关型<br>AC/DC 24V 50/60Hz | | | |
| 内置辅助反馈开关 2 SPDT | | | EF24A-S2 |
| AC 230V 50/60Hz<br>AC 100...240V 50/60Hz | | | |
| 内置辅助反馈开关 2 SPDT | | | EF230A-S2 |
| AC 24...240V / DC 24...125V | NFA | SFA | |
| 内置辅助反馈开关 2 SPDT | NFA-S2 | SFA-S2 | |
| 调节型 | | | |
| 控制信号 DC (0)2...10V, 反馈信号 DC 2...10V<br>AC/DC 24V 50/60Hz | NF24A-SR | SF24A-SR | EF24A-SR |
| 运行时间 -电机 | 开关型 75s，调节型 150s | | 开关型 75s ，调节型 150s |
| -弹簧复位 | 20s @ -20...+50°C/<br>最大60s@ -30°C | | 20s @ -20...+50°C/<br>最大60s@ -30°C |
| 轴径 | 10...25.4mm<br>14...25.4mm | | 12...26.7mm<br>12...25.2mm |
| 噪音等级 -电机 | 开关型最大45dB(A)<br>调节型最大40dB(A) | | 开关型最大55dB(A)<br>调节型最大45dB(A) |
| -弹簧复位 | 最大62dB(A) | | 最大71dB(A) |
| 接线方式 | 电缆 1m | | |
| 旋转方向 | L/R安装选择 | | |
| 旋转角度 | 最大95°，可通过机械限位装置调节 | | |
| 位置指示 | 机械指示器 | | |
| 电气防护等级 | IP54 | | |

# 自复位功能的执行器系列- 电子复位

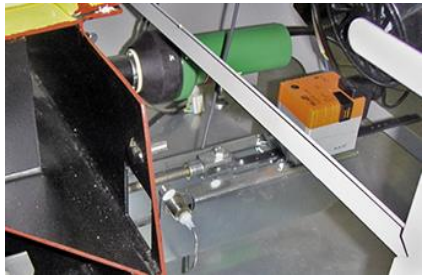
## 产品系列

- 可延迟复位时间（0~10秒）
- 可设置复位位置 (0...100%范围内，CM24K除外)

| 电子式复位<br>风门执行器 | SKM230..+CM24K.. | GK..A | NKQ..A | PK..A |
|---|---|---|---|---|
| 扭矩 | 2 Nm | 40 Nm | 6 Nm | 160 Nm |
| 可控风门尺寸 | 0.4 $m^2$ | 8.0 $m^2$ | 1.2 $m^2$ | ** 可替代多个组合的执行器** |
| 运行时间 | 75s / 90˚ | 150s / 90˚ | 4s / 90˚ | 30 sec …120 sec / 90˚ |
| 电复位时间 | 15s / 90˚ | 35s / 90˚ | 4s / 90˚ | 30 sec / 90˚ |

# 自复位功能的执行器系列- 电子复位

## 产品系列



- 可延迟复位时间（0~10秒）
- 可设置复位位置 (0...100%范围内)

| 直行程电子复位<br>风门执行器 | LHK..A | SHK..A |
|---|---|---|
| 推力 | 150 N | 450 N |
| 可控风门尺寸 | 1.0 $m^2$ | 3.0 $m^2$ |
| 运行时间 | 120s / 100 mm | |
| 电复位时间 | 35s / 100 mm˚ | |

# 自复位功能的执行器系列- 电子复位

**特点与**优势

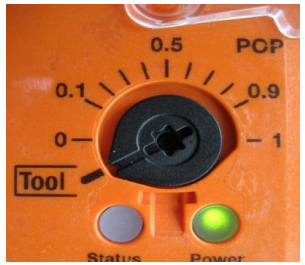
预**充**电时间：

- **供**电**中断**48**小**时**后**，电**容**标**准充**电时间为7s

**失**电**位置** Power Off Position (POP)：

- 执**行器失**电**后复位的位置设定**，调节**范**围**以**10%为单**位**，

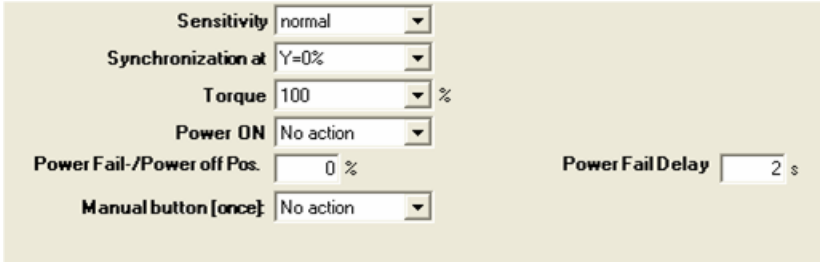
0～100%调节。



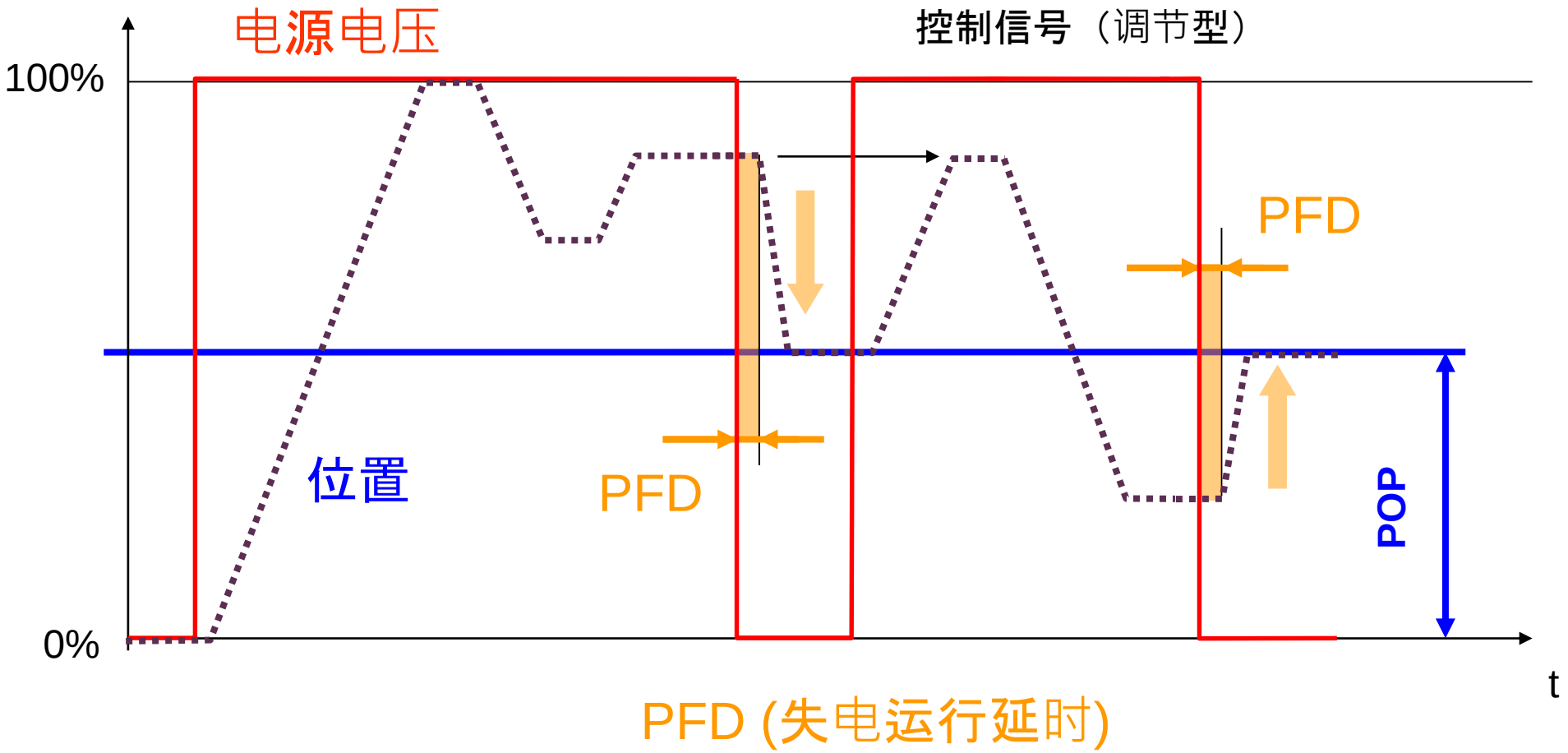

**失**电**延**时 Power Fail Delay Time (PFD)

- **如果**发**生短暂的供**电**中断** (**几秒**钟) , 执**行器将不会运行**POP功能，

执**行器将始**终维**持在**PFD**的位置**，**延**时时间**最**长10s ，**默**认2s。



# 电子式自复位执行器
## 运行图



# 失效安全保护的应用场合:
# 超级电容用于何处?

**可再生能源**
风力发电机：控制叶片位置和触发紧急停机

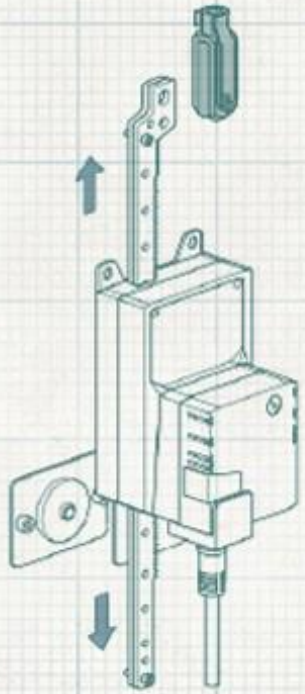
**医疗电子器械**
保护生命：除颤器节能

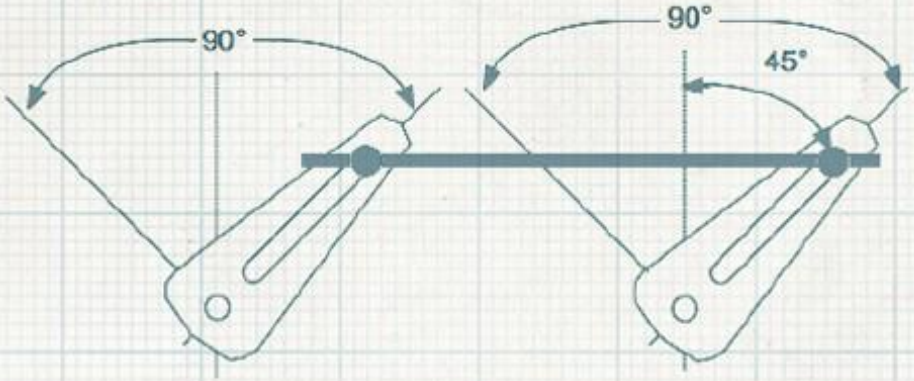
**航空飞机**
紧急疏散：打开应急门和触发紧急滑梯

**交通工具**
车辆：触发安全气囊

**汽车工业**
动能回收（KERS）

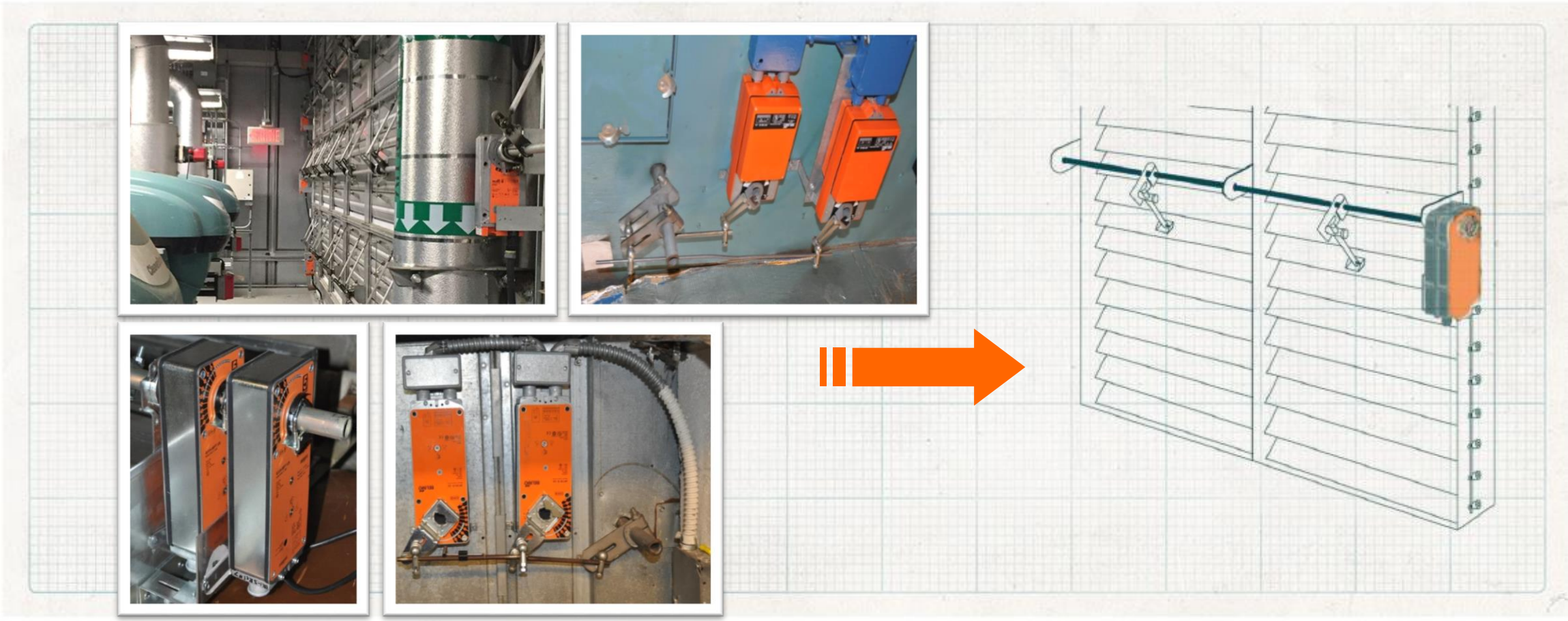
# 自复位执行器的应用



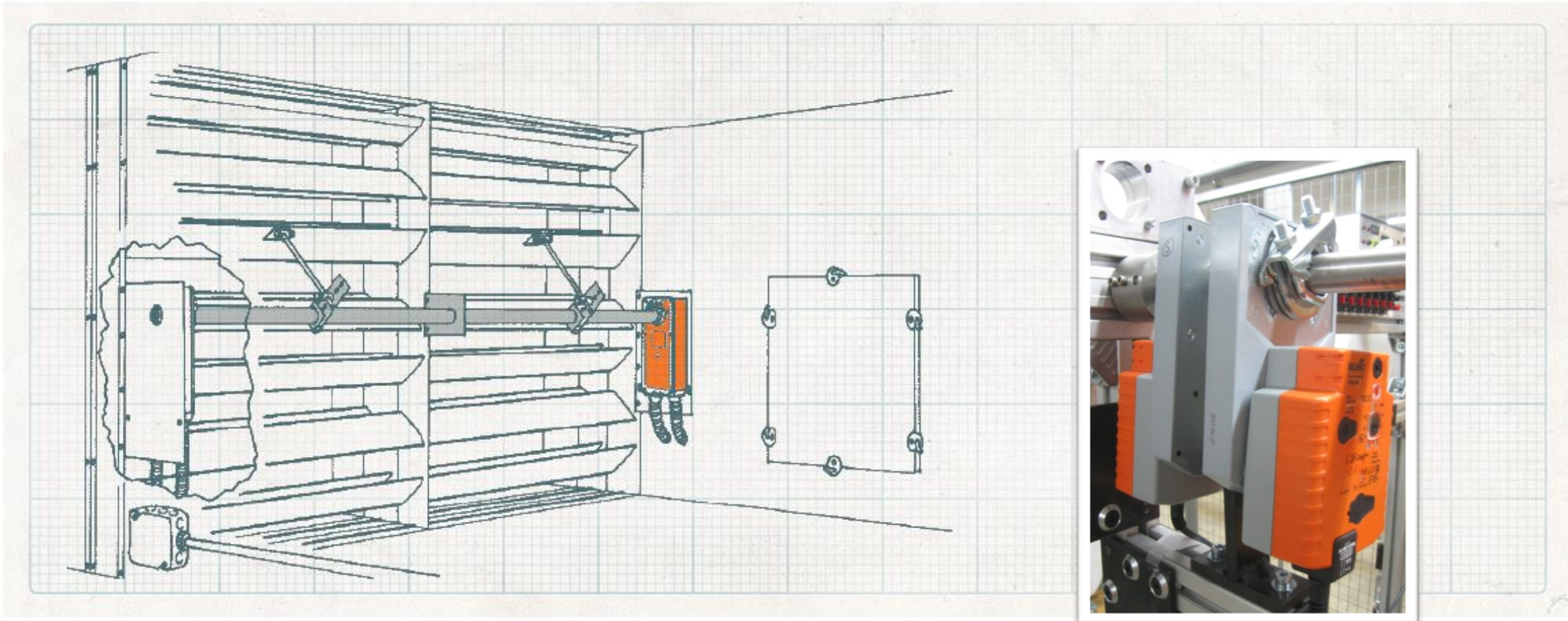



直行程自复位执行器的有效传递

# 自复位执行器的应用



# 自复位执行器的应用

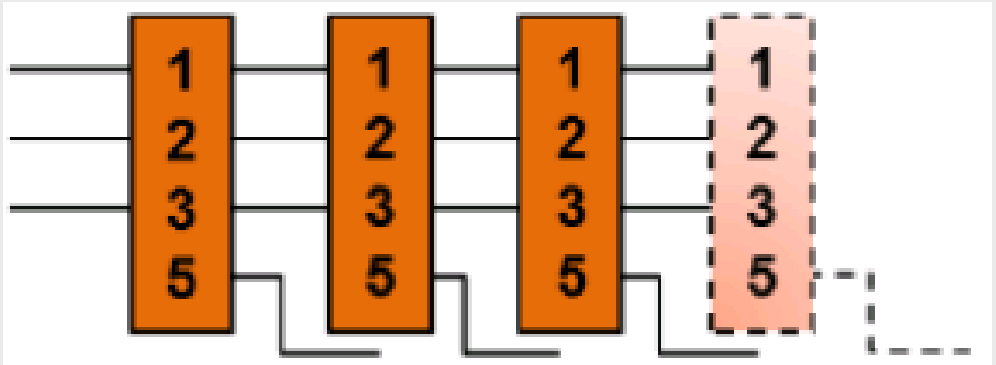


# 自复位执行器的应用

## Piggy back 解决方案

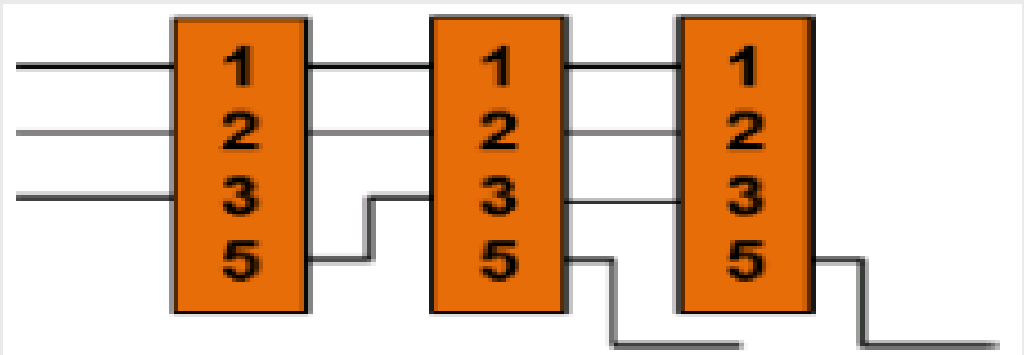
并联

- 可用于开关型和-SR调节型




主从

- 可用于-MF型（带PGB Ⅱ）

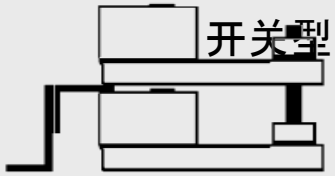
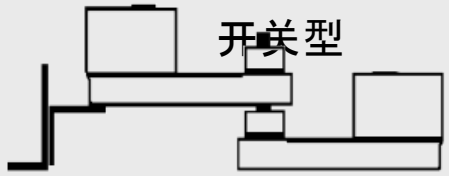


# 自复位执行器的应用

## Piggy back 解决方案

### 并联

- 可用于开关型和-SR调节型

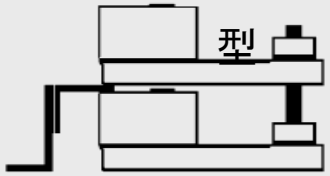
| | SF..A | EF.. |
|---|---|---|
| 产品系列 |  开关型 |  开关型 |
| 线 | 联 | 联 |
| 接 方式 | 2*并60Nm | 2*并60Nm |
| 扭矩 | | |
| 使用寿命 | 30000次 | 30000次 |
| 安装要求 | 使用 型支架 | 使用 型支架 |

# 自复位执行器的应用

## Piggy back 解决方案

### 主从

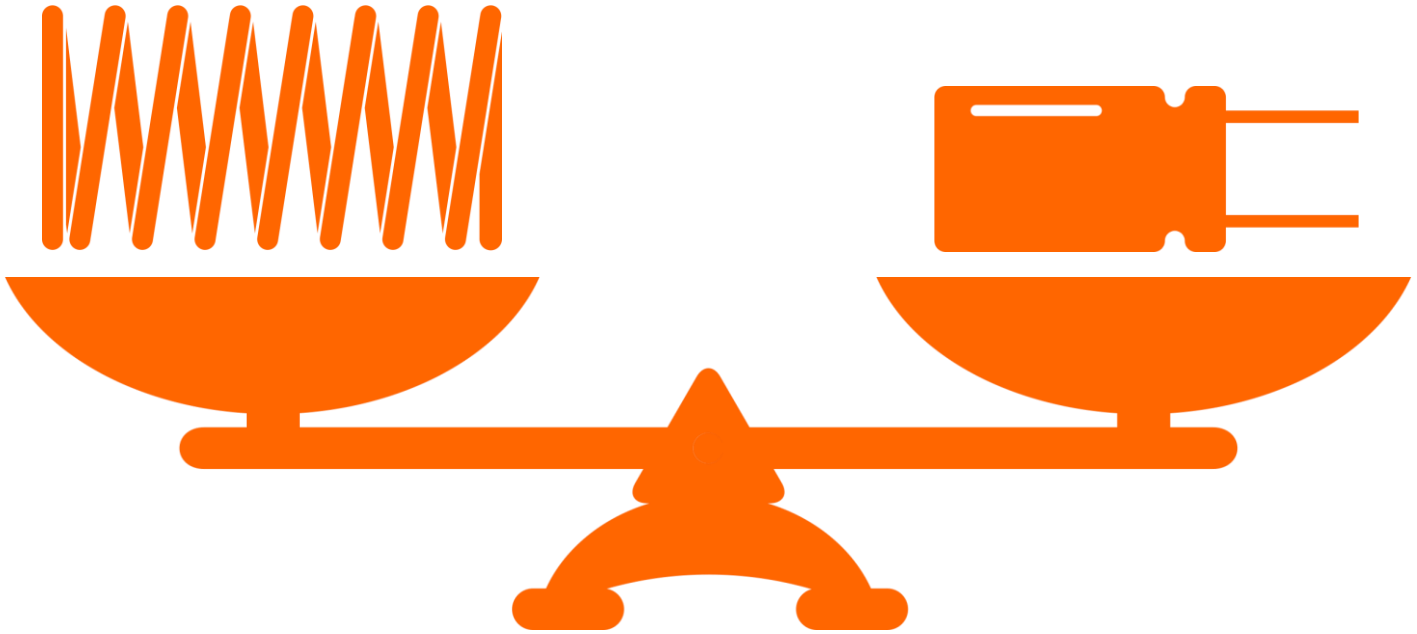
- 可用于MF调节型（带PGB Ⅱ）

| 产品系列 | SF..A.. -MF | EF.... -MF | GK..-MF |
|---|---|---|---|
| |  |  | |
| 线 | | | |
| 接 方式 | PGB Ⅱ 主从 | PGB Ⅱ 主从 | PGB Ⅱ 主从 |
| 新程序 | 2*=40Nm | 2*=60Nm | 2*=80Nm |
| 扭矩 | 30000 | 30000 | 50000 |
| 使用寿命 | L 次 | L 次 | L 次 |
| 安装要求 | 使用 型支架 | 使用 型支架 | 使用 型支架 |

# Belimo 失效安全保护!
# 您可以信赖的安全系统!

- 全系列的自复位功能的执行器，保护生命、财产安全。


# 小组活动– Failsafe Actuation




BELIMO®