

PKR Actuator Retrofit Solution for Chiller with Automated Refrigeration Ball Valve

# Electronic Fail-Safe Actuators with SuperCap Technology

# Super capacitor for critical applications



Super capacitors (SuperCaps) are electrochemical condensers that are faster in response and more reliable than conventional rechargeable batteries. This modern energy storage technology is now enhancing energy efficiency and the functionality of complex safety solutions around the globe. Belimo has intensively tested and improved the SuperCap technology in order to equip damper and valve actuators with an innovative electronic fail-safe control function.

## Patented Algorithm for Maximum Reliability

Since 2007, Belimo tested SuperCap technology under harsh conditions: temperatures of 122...-22°F [50...-30°C] and long-term charging and discharging. Testing focused on reliability of the electronic fail-safe function with continuous loads. In order to combine SuperCap technology with fail-safe control actuators, Belimo developed and patented a SuperCap energy management algorithm included in the actuator microprocessor controller. The algorithm will:

- Safely charge and discharge the SuperCap energy
- Deliver reliable long service life (estimate of 15 years or >100,000 full charges)

## Applied Wherever Safety and Energy Efficiency are Required

SuperCaps absorb energy very quickly and discharge immediately as required. They have a longer service life and greater cycle-resistant than rechargeable batteries. These properties are desirable in high-tech applications:

- Defibrillators
- Aviation emergency exits
- Automotive air bags
- Wind turbines and smart grids

## Critical System Power through SuperCaps

### Medical Electronics



- Life-saving: Energy storage in defibrillators

### Aviation



- Evacuation: Emergency opening of the exit doors and deployment of emergency slides

### Automotive



- Crash protection: Airbag deployment

### Renewable Energy



- Wind turbines: Control of blade pitch and emergency shutdown routine
- Photovoltaic systems: Voltage stabilization to the grid

# System protection with increased HVAC versatility and efficiency



During an electrical power supply interruption, dampers and valves are automatically returned to their fail-safe position with electronic fail-safe control function. Water coils are protected from freezing, steam heat exchangers are closed for safety, and fume hoods are opened to ensure ventilation. Electronic fail-safe actuators with SuperCap technology are distinguished by efficiency, reliability, and versatility.

## Versatile Performance with Low Energy Consumption

Through comprehensive testing and development efforts, Belimo created an electronic fail-safe actuator using SuperCap technology with outstanding performance offering:

- Wide range of torque models
- Fast acting 4...7 seconds actuation (NKQ series)
- Constant delivered torque across the entire travel range, even in the fail-safe end position
- Increased torque in piggyback applications (coupling of several actuators to a single shaft or linkage)
- Low power consumption in holding mode

## Controlled Power-Off for Comfort and Efficiency

Environmental and climate conditions often result in short power interruptions which can cause damper and valve actuators to begin fail-safe operation and temporarily destabilize the room or building temperature control. This can result in unnecessary actuator movements and additional energy usage. Electronic fail-safe actuators with the control power-off function provide solutions to these climate conditions.

- Short power failures from 0...10 seconds can be ignored without an interruption in the operation of the system and without any loss of comfort in the building
- Time and cost to return the system to normal operation are avoided in many cases

## Advantages of Electronic Fail-Safe Actuators with SuperCap Technology



## Selectable fail-safe position and direction of rotation

- Adjustable fail-safe position over 0...100% of the actuator travel
- Direction of rotation switch for actuator motor response
- Power fail delay on MFT models (0...10 sec) for brown out conditions to prevent immediate fail-safe action

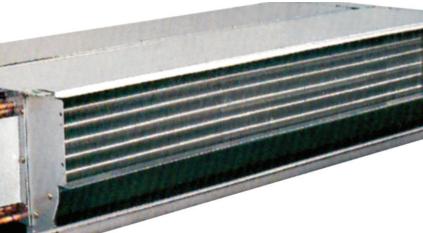
## Consistent user interface with any control signal

- On/Off, Floating Point Control
- Multi-Function Technology (MFT) adjustable analog 2...10 V (default)
- Complete compatibility with all damper and valve actuators

## Simple, space-saving installation

- Compact external dimensions and low weight compared to mechanical spring return actuators
- Piggyback actuator assemblies deliver up to 720 in-lb to a single drive shaft or linkage (GK series)

# Electronic Fail-Safe Actuators for HVAC Applications

Typical Fields of Application	Safety Function	Electronic Fail-Safe Actuators
<b>Air Handling Equipment</b> 	Freeze protection for air handling unit coils exposed to cold outdoor air in the event of power failure: <ul style="list-style-type: none"><li>• Ventilation dampers up to 90 ft<sup>2</sup> [8 m<sup>2</sup>]</li><li>• Indoor or outdoor mounting</li></ul>	 Damper actuators to 360 in-lb [40 Nm] IP66/NEMA 4 housing option
<b>Fume Hoods</b> 	Life safety and system protection in the event of the sudden escape of hazardous gases in science laboratories: <ul style="list-style-type: none"><li>• Powered runtime 4 seconds over 95°</li><li>• Fail-safe runtime 4 seconds over 95°</li></ul>	 Fast running actuator 54 in-lb [6 Nm]
<b>Fan Coils and Unit Ventilators</b> 	Freeze protection for fan coil units and fin tube elements in the event of power failure: <ul style="list-style-type: none"><li>• 2-way and 3-way porting</li><li>• Flow capacity to 20 GPM</li><li>• 2-wire On/Off control wiring</li></ul>	 Valve actuator for 1/2"- 3/4" zone valves
<b>Hydronic Control</b> 	Fail-safe flow in the event of power failure: <ul style="list-style-type: none"><li>• 2-way and 3-way porting</li><li>• Globe valve flow rate to 700 GPM</li><li>• Characterized Control Valve flow rate to 800 GPM</li><li>• Butterfly valve flow rate to 4000 GPM</li><li>• V ball inlet steam pressure to 200 psi</li></ul>	 Valve actuator up to 12" valve body size IP66/NEMA 4 housing option (Globe valve) IP67/NEMA 4X (Butterfly valve)