

Battery Spring Return or Capacitor vs Mechanical Spring Return

In the field of electric valve actuators there are 2 globally recognised systems in use that provide the failsafe functionality:

- 1) Stored electrical energy either in a battery back-up system or an internal capacitor which simply provides an alternate power supply to drive the motor in the event of external power failure
- 2) Stored mechanical energy in an internal spring system whereby the motor tensions the spring and holds the tensioned springs when external power is available. Should external power fail the spring energy is released and used to mechanically send the valve to a failsafe position.

Advantages of battery back-up / capacitor systems

- 1) The motor is the same size for a failsafe actuator as for an on-off actuator as the battery back-up or capacitor system simply provides an alternate power source.
- 2) The cost of the actuator with battery back-up or capacitor is significantly more competitive than mechanical spring failsafe electric actuators
- 3) Because of their comparative low cost, they can be available from stock

Disadvantages of battery back-up systems

- 1) Working time under battery power is the same as when under electrical power, so fast failsafe closing times are not generally available - can be an issue in ESD (Emergency Shut Down) applications.
- 2) Over-use when under battery power resulting in over-draining of battery charge and corresponding battery damage and loss of performance
- 3) Re-charge periods not respected resulting in over-draining of battery charge and corresponding battery damage and loss of performance

Advantages of mechanical spring systems

- 1) Eliminates potential risk of insufficient battery power being available at time of need as the failsafe function is mechanical, not electrical
- 2) Can design springs to produce fast closing time allowing this system to be used as ESD

Disadvantages of mechanical spring systems

- 1) The failsafe actuator becomes significantly heavier than an equivalent on-off actuator because the motor must overcome both valve and spring torque and is therefore heavier, plus the weight of the springs and housing capable of holding the springs in tension. Typically, the weight will be 5-10 times heavier than an equivalent on-off actuator. An example would be a 50Nm battery back-up failsafe actuator typically weigh 4kgs, an equivalent mechanical spring return electric actuator would be 40-50kgs.
- 2) The cost is enormous compared to an equivalent on-off actuator due to the complexity of compressing and releasing a powerful spring.
- 3) Due to the cost they are generally not available from stock

J+J's BSR (Battery 'Spring Return') System.

- In service for over 15 years in around 70 countries, the BSR system is proven globally in hundreds of different applications.
- The battery, when used in accordance with the instructions, never drops below 50% capacity, and constantly trickle charging ensuring its longevity and reliability in service.
- Designed to have external power connected at all times
- Initial charging and subsequent observing of minimum charge times are critical to this longevity, life and performance are dramatically reduced if incorrect use allows batteries to fully drain.
- The battery is oversized by a factor of 5 to cover degradation.



- The manufacturer recommends that the battery be replaced for new as routine maintenance every 5 years, although the UK arm of the manufacturer have never sold a replacement battery, and do not carry spares for that reason.
- Whilst not designed to, can be operated as a solenoid using a 2 wire energise open, battery close actuator, however the minimum re-charge times MUST be observed or irreparable damage will be caused to the battery.
- When correctly installed and operated, proof of function is demonstrated by removing external power when the actuator is not in its pre-determined failsafe position.