

SECTION 230923.12 - CONTROL DAMPERS

PART 1 - PRODUCTS

1.1 GENERAL CONTROL-DAMPER ACTUATORS REQUIREMENTS

- A. Actuators shall operate related damper(s) with sufficient reserve power to provide smooth modulating action or two-position action and proper speed of response at velocity and pressure conditions to which the damper is subjected.
- B. Actuators shall produce sufficient power and torque to close off against the maximum system pressures encountered. Actuators shall be sized to close off against the designed fan shutoff pressure as a minimum requirement.
- C. The total damper area operated by an actuator shall not exceed 80 percent of damper manufacturer's maximum area rating.
- D. Provide one actuator for each damper assembly where possible. Multiple actuators required to drive a single damper assembly shall operate in unison.
- E. Avoid the use of excessively oversized actuators which could overdrive and cause linkage failure when the damper blade has reached either its full open or closed position.
- F. Use jackshafts and shaft couplings in lieu of blade-to-blade linkages when driving axially aligned damper sections.
- G. Provide mounting hardware and linkages for connecting actuator to damper.
- H. Select actuators to fail in desired position in the event of a power failure.
- I. Actuator Fail Positions:[**See Drawings.**][**As indicated below:**]
 - 1. Exhaust Air: [Close] [Last position] [Open].
 - 2. Outdoor Air: [Close] [Last position] [Open].
 - 3. Supply Air: [Close] [Last position] [Open].
 - 4. Return Air: [Close] [Last position] [Open].
 - 5. <Insert system and fail position>.

1.2 ELECTRIC AND ELECTRONIC ACTUATORS

- A. Manufactured, brand labeled or distributed by Belimo.
- B. Agency Listngs: ISO 9001, cULus, CE, and CSA.
- C. The manufacturer shall warrant all components for a period of 5 years from the date of production with the first two years unconditional.
- D. Type: Motor operated, with gears, electric and electronic.

- E. Voltage:
1. [See Drawings] [Voltage selection is delegated to professional designing control system] [24 V] [120 V] <Insert requirement>.
 2. Actuator shall deliver torque required for continuous uniform movement of controlled device from limit to limit when operated at rated voltage.
- F. Two-Position Actuators: Single direction, spring return or reversing type.
- G. Modulating Actuators:
1. Capable of stopping at all points across full range, and starting in either direction from any point in range.
 2. Control Input Signal:
 - a. Three Point, Tristate, or Floating Point: Clockwise and counter-clockwise inputs. One input drives actuator to open position, and other input drives actuator to close position. No signal of either input, the actuator remains in the last position.
 - b. Proportional: Actuator drives proportional to input signal and modulates throughout its angle of rotation. Suitable for [~~zero- to 10-~~] [or] [~~2- to 10-~~]V dc [~~and~~] [~~4- to 20-mA~~] signals.
 - c. Pulse Width Modulation (PWM): Actuator drives to a specified position according to a pulse duration (length) of signal from a dry-contact closure, triac sink or source controller.
 - d. Programmable Multi-Function:
 - 1) Control Input, Position Feedback, Mechanical Travel, and Running Time: Factory or field software programmable without the use of actuator mounted switches.
 - 2) Adaptation: Upon adjustment of operating parameters. Adaptation shall be available to initiate adaption of the input, feedback and run time, to the actual mechanical angle of rotation or travel.
 - 3) Diagnostic: Feedback of hunting or oscillation, mechanical overload, mechanical travel, and mechanical load limit.
 - 4) Service Data: Include, at a minimum, number of hours powered and number of hours in motion.
- H. Position Feedback:
1. [Equip] [Where indicated, equip] two-position actuators with auxiliary switches or other positive means of a position indication signal for remote monitoring of [open] [~~and~~] [close] position.
 2. [Equip] [Where indicated, equip] modulating actuators with a position feedback through [current] [or] [voltage] signal for remote monitoring.
 3. Provide a position indicator and graduated scale on each actuator indicating open and closed travel limits.
- 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.

L. Temperature and Humidity:

1. Temperature: Suitable for operating temperature range encountered by application with minimum operating temperature range of **[minus 22 to plus 122 deg F ((minus 30 to plus 50 deg C))]** **<Insert temperature range>**.
2. Humidity: Suitable for humidity range encountered by application; minimum operating range shall be from **[5 to 95]** **<Insert numbers>** percent relative humidity, non-condensing.

M. Enclosure:

1. Suitable for ambient conditions encountered by application.
2. NEMA Type 2 for indoor and protected applications.
3. NEMA Type 4 or Type 4X for outdoor and unprotected applications.
4. Provide actuator enclosure with a heater and controller where required by application.

N. Stroke Time:

1. Operate damper from fully closed to fully open within **[15] [60] [75] [90] [150]** **<Insert number>** seconds.
2. Operate damper from fully open to fully closed within **[15] [60] [75] [90] [150]** **<Insert number>** seconds.
3. Move damper to fail-safe position within **[5] [15] [30]** **<Insert number>** seconds.
4. Select operating speed to be compatible with equipment and system operation.
5. Actuators operating in smoke control systems comply with governing code and NFPA requirements.