SECTION 230923.12 - CONTROL DAMPERS

PART 1 - PRODUCTS

1.2 ELECTRIC AND ELECTRONIC ACTUATORS

A. Manufactured, brand labeled or distributed by Belimo.

B. Agency Listings: ISO 9001, UL 873 or UL 60730, 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] [230 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 and temperatures.

F. Two-Position Actuators: Single direction, spring return or reversing type.
1. Low voltage actuators [24 V] or wide range line voltage [120-230 V] or Universal voltage [24-230 V]

G. Modulating Actuators:

1. Capable of stopping at numerous points across full movement range, and starting in either direction from any point in range.
2. Control Input Signal:
   a. Three Point, Tristate, or Floating Point: One input drives actuator towards open position, and other input drives actuator towards closed position. No signal to either input actuator remains in 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]** VDC **[and] [4- to 20-mA]** signals.
   c. Pulse Width Modulation (PWM): Actuator drives to a commanded position according to a pulse duration (length) of signal from a dry-contact closure, triac sink or source controller.
   d. Programmable:
      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, the ratio of the number of hours in motion and the number of hours powered.

e. Digital control:
1) Damper actuators with built-in digital control for BACnet [MS/TP] or Modbus [RTU].
2) Damper actuators with built-in digital control for BACnet [IP] or Modbus [TCP].

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 analog position feedback through [**voltage**] signal for remote monitoring.
3. [Equip] [Where indicated, equip] digitally controlled [BACnet MS/TP] or [Modbus RTU] actuators with position feedback data point.
4. 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 directly couple 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. Single 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))**].
2. Humidity: Suitable for humidity range encountered by application; minimum operating range shall be from 5 to 95 percent relative humidity, non-condensing.

M. Enclosure:

1. Suitable for ambient conditions encountered by application.
2. NEMA Type 1 for indoor installation in an equipment enclosure.
3. NEMA Type 2 for indoor and protected applications.
4. NEMA Type 4 or Type 4X for outdoor and unprotected applications.
5. 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.

O. **Optional Addressable Actuator**

1. **Controlled via BACnet MS/TP or Modbus RTU.**
   a. Internal converter for one (optional) sensor (active sensor or switching contact) for transmission of the sensor signal to a higher-level system.
2. **Controlled via the Cloud, BACnet IP or Modbus TCP.**
   a. Internal converter for two (optional) sensors (passive sensor, active sensor or switching contact) for transmission of the sensor signal to a higher-level system.