SECTION 25 35 13

ACTUATORS AND OPERATORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes electric and pneumatic actuator and operator requirements for control valves and dampers.

Note: Pneumatic actuation is acceptable for use in Stanford Facilities, and may be required, particularly in renovation projects where pneumatic controls already exist.

B. Related Sections
   1. 25 05 53 Identification
   2. 25 14 23 Field Equipment Panels
   3. 25 35 19 Control Valves
   4. 25 35 26 Compressed Air Supply
   5. 25 05 53 Identification
   6. Division 15 or 23 for Dampers

1.2 REFERENCES

A. Refer to 25 00 00 Integrated Automation

1.3 DEFINITIONS

A. Refer to 25 06 11 Integrated Automation Definitions

1.4 SYSTEM DESCRIPTION

A. Actuators, operators and positioners for control valves, control dampers, controlled by the DDC or Delta V system.

1.5 SUBMITTALS

A. Product data sheets shall include construction materials and assembly methods, maximum design parameters (temperature, pressure, velocity, etc.), and performance data for full range of actuator stroke.

B. Refer to section 25 35 19 for valve schedule and division 15 or 23 for damper schedule requirements.

1.6 QUALITY ASSURANCE

A. Each controlled valve or damper shall be connected to a control output. A single output to control multiple valves or dampers is prohibited, except where multiple damper sections are combined to provide required flow area. Pneumatic damper actuators may be combined to operate multiple dampers in sequence.

B. Obtain adequate system information necessary for configuration (normally open or normally closed) and sizing selection. Valve and damper operating speeds shall be selected or adjusted so that actuators will remain in step with controllers without hunting, regardless of load variations. 0% and 100% control signals shall ensure valve or damper is fully closed or fully open as sequence requires.

C. Reversing relays are not permitted.
D. All actuators must be accessible for routine scheduled service without shut down of system. Mount actuators outside of exhaust air-stream.

E. Avoid installations where actuator may be exposed to excessive moisture, corrosive fumes, vibration, high ambient temperatures, elements, or high traffic areas with potential for mechanical damage. Provide appropriate enclosure rated for installed environment.

F. Install in accordance with the manufacturer’s recommendation.

G. Label actuators and operators per section 25 05 53.

PART 2 - PRODUCTS

2.1 PILOT POSITIONERS FOR PNEUMATIC DAMPER AND VALVE ACTUATORS

A. Input range 3-15 psig.

B. Input ranges and gain factors shall be fully field adjustable, typical input spring range is 10psig (4-14 psig).

2.2 DAMPER ACTUATORS (PNEUMATIC)

A. The actuator assembly shall include the necessary hardware and proper mounting and connection directly to damper shaft or damper blade.

B. All actuators having more than a 100 lb-in torque output shall accept a 1 inch diameter shaft directly, without the need for auxiliary adapters.

C. Pneumatic Diaphragm with Spring Return
   1. Actuators shall be selected to match, stroke, shut-off pressure, temperature, torque, etc., required for intended service.
   2. Provide spring return feature for fail open or closed positions, as required by control sequence.

2.3 DAMPER ACTUATORS (ANALOG ELECTRIC)

A. The actuator assembly shall include the necessary hardware and proper mounting and connection directly to damper shaft or damper blade.

B. All actuators having more than a 100 lb-in torque output shall accept a 1 inch diameter shaft directly, without the need for auxiliary adapters.

C. Modulating actuator input signals shall be either 4-20ma or 2-10VDC proportional only. Floating or pulsing signals are not allowed.

D. Provide spring return feature for fail open or closed positions, as required by control sequence.

E. Actuators shall be Brushless DC Motor Technology with stall protection.

2.4 VALVE ACTUATORS (PNEUMATIC)

A. Actuators shall have fail safe spring return. Valves shall fail to the closed position except where specified differently.

B. For 2-way valves, actuator shall close against 125 percent of the maximum differential to which they are subjected.

C. For 3-way valves actuators shall close-off against double the maximum pressure differential to which they are subjected.

D. Pneumatic Diaphragm with Spring Return
1. Actuators shall be by selected to match, stroke, shut-off pressure, temperature, torque, etc., required for intended service.

2. Provide spring return feature for fail open or closed positions, as required by control sequence.

### 2.5 VALVE ACTUATORS (ANALOG ELECTRIC)

A. Actuators shall have selectable fail safe spring return. Valves shall typically fail to the closed position.

B. For 2-way valves, actuator shall close against 125 percent of the maximum differential to which they are subjected.

C. For 3-way valves actuators shall close-off against double the maximum pressure differential to which they are subjected.

D. Modulating actuator input signals shall be either 4-20ma or 2-10VDC proportional only. Floating or pulsing signals are not allowed.

E. Actuators shall be Brushless DC Motor Technology with stall protection.

F. Provide spring return feature for fail open or closed positions or fail in place, as required by control sequence, for critical applications such as heating and cooling coils on major air handling units, humidifiers, heat exchangers, flow control for major equipment items such as chillers, cooling towers, boilers, etc.

---

**PART 3 - EXECUTION**

### 3.1 PILOT POSITIONERS

A. Must be provided on modulating pneumatic actuated valves 2” and larger.

B. Must be provided on all modulating pneumatic actuated dampers. For each mechanically connected damper section, one pilot positioner can drive multiple actuators if needed.

### 3.2 DAMPER ACTUATORS (PNEUMATIC)

A. Provide actuator for each automatic damper with sufficient capacity and spring strength to operate damper under all conditions. Provide additional actuators as necessary for smooth operation.

B. Provide proper linkage and brackets for mounting and attaching actuators to devices. Design mounting and/or support to provide no more than 5% hysteresis in either direction (actual movement of damper shaft versus ideal movement) due to deflection of actuator mounting or linkage.

### 3.3 DAMPER ACTUATORS (ANALOG ELECTRONIC)

A. Provide actuator for each automatic damper with sufficient capacity to operate damper under all conditions. Provide additional actuators as necessary for smooth operation.

B. Provide proper linkage and brackets for mounting and attaching actuators to devices. Design mounting and/or support to provide no more than 5% hysteresis in either direction (actual movement of damper shaft versus ideal movement) due to deflection of actuator mounting.

### 3.4 VALVE ACTUATORS (PNEUMATIC)

A. Provide actuator for each automatic valve with sufficient capacity to operate damper under all conditions.

B. Provide proper brackets for mounting and attaching actuators to devices. Design mounting and/or support to provide no more than 5% hysteresis in either direction (actual movement of valve stem or damper shaft versus ideal movement) due to deflection of actuator mounting.
3.5 VALVE ACTUATORS (ANALOG ELECTRONIC)

A. Provide actuator for each automatic valve with sufficient capacity to operate damper under all conditions

B. Provide proper brackets for mounting and attaching actuators to devices. Design mounting and/or support to provide no more than 5% hysteresis in either direction (actual movement of valve stem or damper shaft versus ideal movement) due to deflection of actuator mounting.

END OF SECTION