

# Honeywell

# Smart Direct Coupled Actuators

**ENGINEERING GUIDE SPEC****23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC****23 09 13 INSTRUMENTATION AND CONTROL DEVICES FOR HVAC****23 09 13.13 ACTUATORS AND OPERATORS**

## **PART 1 GENERAL**

### **1.1 SUMMARY**

- A. This Section includes general requirements for Direct Coupled Actuators (DCA) used within heating, ventilating, and air conditioning (HVAC) systems, for driving quarter-turn final control elements of: volume control dampers, rotary valves, and with linkages, to provide linear stroke of globe or cage valves.
- B. All automatically controlled devices, unless specified otherwise elsewhere, shall be provided with actuators sized to operate their appropriate loads with sufficient reserve power to provide smooth modulating action or two-position action and tight close-off. The actuator shall provide: two-position, floating, or analog signal control, or Sylk® bus control, as required to match the controller output. Actuators shall be power failure return type where valves or dampers are required to fail to a safe position and where specified.

### **1.2 RELATED SECTIONS**

- A. SECTION 23 09 13.33 – Control Valves
- B. SECTION 23 09 13.43 – Control Dampers
- C. SECTION 23 09 23 – Direct-Digital Control Systems for HVAC
- D. SECTION 23 09 33 – Electric and Electronic Control Systems for HVAC
- E. SECTION 23 09 93 – Sequence of Operations for HVAC Controls

### **1.3 AGENCY AND CODE APPROVALS**

- A. The publications listed below form a part of this specification to the extent referenced. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified. Verification that the approvals exist for all submitted products shall be provided with the submittal package. Products not currently offering the following approvals are not acceptable.
  - (1) UL Approved: UL 873 Plenum Rated
  - (2) Canadian UL Approved: cUL C22.2 No. 24-93
  - (3) CE Compliant
  - (4) IEC: 60730-1 and Part 2 - 14
  - (5) C-Tick: N314

### **1.4 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Maintain multiple authorized product distributors capable of providing product and support.
- B. Source Limitation: Obtain all actuators of every type shall be through one source from a single manufacturer.

### **1.5 SUBMITTALS**

- A. See SECTION 01 30 00 – Administrative Requirements, for submittal procedures.
- B. Provide manufacturer's technical data on features, performance, electrical ratings, and characteristics on specified products.



## PART 2 PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURES

- A. Specified Manufacturer: Honeywell
- B. Acceptable Manufacturers: Alternate manufactures will be considered in accordance “or equal” provision specified in SECTION 01 62 00 – Product Options.

### 2.2 SPRING-RETURN DIRECT COUPLED ACTUATOR

#### A. General Requirements:

- (1) The actuator shall provide a brushless DC ball bearing sub-motor, microprocessor controlled by monitoring: speed, torque, and position for stall protection, and positional accuracy.
- (2) The actuator shall be direct coupled, capable of mounting to a round or square jackshaft, using a removable output hub with self-centering shaft adapter that provides concentric mounting with a single bolt for tightening, for a 95 degree stroke and an integral adjustable range-stop mechanism.
- (3) The actuator rating shall be based on minimum design life torque of: 27lb-in. (3 Nm), 44 lb-in. (5 Nm), 88 lb-in. (10 Nm), or 175 lb-in. (20 Nm).
- (4) The actuator shall provide screw terminal wiring connections located within an integral access cover, with conduit opening for either standard conduit fittings or water-tight cable strain-relief fittings, NEMA 2 rated or IP54.
- (5) The actuator housing shall provide for a flippable installation to reverse the spring return direction, providing either clockwise or counterclockwise fail-safe operation.
- (6) The actuator shall provide a continuously engaged mechanical spring, which must return to a fail-safe position in less than 25 seconds.
- (7) The actuator shall provide immediate positioning upon power-up. Actuators that require time for spring to wind or a capacitor to charge up before actuation are **NOT acceptable**.
- (8) The actuator timing shall be constant and independent of load and supply voltage, over the entire temperature and voltage ranges specified in technical requirements.
- (9) The actuator minimum design life shall be: 60,000 full stroke cycles, 60,000 spring-return cycles, and 1,500,000 repositions at rated torque and temperature.
  - (a) The actuator shall be manufactured under ISO 9001 International Quality Control Standards and be warranted for five years.

#### B. Communicating Actuator:

- (1) The actuator shall provide Sylk® Bus communication, a two wire, polarity insensitive bus that provides communications between a Sylk®-enabled actuator device and a Sylk®-enabled controller:
  - (a) The actuator shall accept Sylk® Bus communicated control commands:
    - 1. ActualPosOfActu: nci Sylk Actuator Command
    - 2. SylkActTtravelTim: nci Actuator Travel Time
  - (b) The actuator shall provide Sylk® Bus communicated operational feedback:
    - 1. ActualPosOfActu: nvo Actual Position
    - 2. CycleCount: nvo Cycle count
    - 3. Status: nvo Status
    - 4. Overridden: nvo Overridden
    - 5. Power Report: nvo Power Report
- (2) The actuator microprocessor control shall provide redundant position feedback methods, feedback potentiometer and counting motor commutations, for accurate position tracking.

#### C. Proportional Actuator:

- (1) The actuator shall provide proportional or floating control:
  - (a) Proportional control refers to direct acceptance of 2-10 Vdc or a 4-20 mA input signal from a controller.
  - (b) Floating control refers to direct acceptance of 24 Vac pulse-width modulated open and close commands from a tri-state (SP3T) controller.
- (2) The actuator shall have a rotation direction control switch accessible on the cover to change between proportional or floating control. Actuators that require to be electronically programmed by use of a handheld programming device or external computer software are **NOT acceptable**.
- (3) The actuator shall provide a high input impedance (95 K $\Omega$  minimum) to allow a common control signal to drive multiple actuators.
- (4) The actuator shall provide input signal filtering exceeding standard requirements for protection against Radio Frequency Interference (RFI) and Electro-Magnetic Interference (EMI).
- (5) The actuator microprocessor control shall monitor the duration of the floating control input signal and driving, in response to the duration of the signal, for accurate positioning.
- (6) The actuator microprocessor control shall provide redundant position feedback methods, feedback potentiometer and counting motor commutations, for accurate position tracking.

- D. Two-Position Actuator:
- (1) The actuator shall provide two-position control:
    - (a) Two-position control refers to direct acceptance of 24 VAC /dc or 100-250 Vac power controlled by SPST switch.
    - (b) Shipping and Storage: -40° to 158° F (-40° to 70° C)
  - (2) The actuator shall provide double-insulated line-voltage circuits, no ground required.
- E. Technical Requirements:
- (1) Temperature Ratings:
    - (a) Ambient: -40° to 140° F (-40° to 60° C)
    - (b) Shipping and Storage: -40° to 158° F (-40° to 70° C)
  - (2) Humidity Rating:
    - (a) Ambient: 5% to 95% RH, non-condensing.
    - (b) Shipping and Storage: 5% to 95% RH, non-condensing.
  - (3) Electrical Ratings:
    - (a) Proportional: 24 Vac  $\pm$ 20 (Class 2) 50/60 Hz, 24 Vdc
    - (b) Two-Position, Low-Voltage: 24 Vac  $\pm$ 20 (Class 2) 50/60 Hz, 24 Vdc
    - (c) Two-Position, Line-Voltage: 100-250 Vac 50/60 Hz
  - (4) Power Consumption (VA):
    - (a) Communicating, Proportional :
      1. 27 lb-in. (3 Nm): 6 VA Driving
      2. 44 lb-in. (5 Nm): 6 VA Driving
      3. 88 lb-in. (10 Nm): 14 VA Driving, 5 VA Holding
      4. 175 lb-in. (20 Nm): 16 VA Driving, 5 VA Holding
    - (b) Two-Position, Low-Voltage:
      1. 27 lb-in. (3 Nm): 6 VA Driving
      2. 44 lb-in. (5 Nm): 6 VA Driving
      3. 88 lb-in. (10 Nm): 30 VA Driving, 8 VA Holding
      4. 175 lb-in. (20 Nm): 40 VA Driving, 8 VA Holding
    - (c) Two-Position, Line-Voltage:
      1. 27 lb-in. (3 Nm): 6 VA Driving
      2. 44 lb-in. (5 Nm): 6 VA Driving
      3. 88 lb-in. (10 Nm): 45 VA Driving, 13 VA Holding
      4. 175 lb-in. (20 Nm): 60 VA Driving, 13 VA Holding
  - (5) End Switches, Dry Contact rated to minimum of 250 Vac, 5 A resistive
  - (6) Mounting:
    - (a) Self-Centering Shaft Adapter (Shaft Coupling):
      1. Round or Square Damper Shaft
      2. Damper Shaft Length: 1 in. (25 mm) minimum, 3 in. (76 mm) recommended.
    - (b) Actuator can be mounted with shaft in any position.
  - (7) Stroke: 95°  $\pm$ 3°, mechanically limited.
  - (8) Feedback signal: 0/2-10 Vdc, 3 mA minimum driving current.
  - (9) Torque Ratings:
    - (a) Low-Torque Actuator:
      1. Driving, Holding, Spring Return: 27 lb-in. (3Nm)
      2. Stall Maximum: 71 lb-in. (8 Nm)
    - (b) Medium-Torque Actuator:
      1. Driving, Holding, Spring Return: 44 lb-in. (5 Nm)
      2. Stall Maximum: 106 lb-in. (12 Nm)
      3. Driving, Holding, Spring Return: 88 lb-in. (10 Nm)
      4. Stall Maximum: 175 lb-in. (20 Nm)
    - (c) High-Torque Actuator:
      1. Driving, Holding, Spring Return: 175 lb-in. (20 Nm)
      2. Stall Maximum: 350 lb-in. (39.6 Nm)
  - (10) Noise Rating (Maximum) at 1 meter:
    - (a) Holding: 20 dBA
    - (b) Proportional Actuator:
      1. Driving: 40 dBA
      2. Spring Return: 50 dBA
    - (c) Two-Position Actuator:
      1. Driving: 50 dBA
      2. Spring Return: 65 dBA

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- A. Install materials in accordance with manufacturer's instructions, and as detailed on the project drawing set.

### **3.2 WIRING**

- A. Line and low voltage electrical connections shall be furnished and installed by this contractor in accordance with these specifications.
- B. Conduit installation requirements are specified in SECTION 25 05 33.13 Conduit for Electrical Systems. Drawings indicate general arrangement of conduit, fittings, and specialties.
- C. All wiring shall be in accordance with the National Electrical Code and any applicable local codes.

### **3.3 WARRANTY**

- A. Actuators shall be warranted for a period of five (5) years from the date of installation when installed in accordance with manufacturer's instructions.

## **END OF SECTION 23 09 13.13**

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### **Automation and Control Solutions**

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