Electric Failsafe Control Valve Actuators

1. SUMMARY

Provide electric actuators for the following valves. All electric valve actuators shall be of one manufacturer for single source responsibility.

3" VJ Valtec Isolation Globe Valve
- Max Stroke 2 inches
- Full stroke Time 20 seconds
- Maximum Thrust 1500 lbf
- Rotork CVL-FCS-1500 per WD C20-00-AD-FCS

3" VJ Valtec Flow Control Globe Valve
- Max Stroke 2 inches
- Full stroke Time 20 seconds
- Maximum Thrust 1500 lbf
- Rotork CVL-FCS-1500 per WD C20-00-AD-FCS

3" VJ Valtek Isolation Globe Valve
- Max Stroke 2 inches
- Full stroke Time 20 seconds
- Maximum Thrust 1500 lbf
- Rotork CVL-FCS-1500 per WD C20-00-AD-FCS

1 PHPK Flow Control Globe Valve
- Max Stroke 7/8 inches
- Full stroke Time 20 seconds
- Maximum Thrust 165 lbf
- Rotork CVL-FCS-1500 per WD C20-00-AD-FCS

3" VJ PHPK Isolation Globe Valve
- Max Stroke 2 inches
- Full stroke Time 20 seconds
- Maximum Thrust 1378 lbf
- Rotork CVL-FCS-1500 per WD C20-00-AD-FCS

4" Annin Vent Valve (3 ea)
- Quarter Turn
- Rotork IQTM2000-FCS Per WD AD6111-100

2. SUBMITTALS

A. Drawings to include:
1. Dimensioned mechanical outline drawing of actuators with valve tag information
2. Actuator electrical drawings with valve tag information.
3. Actuator descriptive literature.
4. Actuator Installation Manual
5. Actuator Maintenance Manual
6. Sample performance and test data. A final submittal is required for all actuators supplied.
   a) Each actuator shall be performance tested

b) The test equipment should simulate typical valve load
c) The following parameters should be recorded on the test certificate
   (1) Current at maximum torque or thrust setting
   (2) Torque at maximum torque or thrust setting
   (3) Flash Test Voltage
   (4) Actuator Output Speed or Operating Time
   (5) Failsafe function wiring diagram number
d) Individual test certificates shall be supplied free of charge with each actuator.

3. REQUIREMENTS

A. The actuator shall be suitable for use on a nominal 120 volt, single phase power supply and incorporate motor, integral reversing starter and terminals for remote control connections.

B. Performance

1. The total maximum inaccuracy of the valve travel position due to any limitation, i.e. repeatability, deadband, resolution, hysteresis, etc. shall be less 0.2%.
   a) Linearity shall be 0.50% or better.
   b) Repeatability shall be 0.10% or better.
   c) Hysteresis shall be 0.10% or better.
2. In modulation, no more than one over-shoot greater than 0.5% shall be observed during shop performance and field testing.

C. Power Failure Mode

1. Actuator must have a means of running to a pre-selected position or remaining at the last position should the main power be lost.
2. This pre-selected position must be easily programmable without opening the actuator.
3. No physical change to the build or construction of the actuator shall be needed to achieve the change in fail position.
4. An adjustable dwell time must be incorporated to avoid nuisance trips.
5. No battery of any type shall be allowed.

D. Actuator Sizing:

1. The actuator shall be sized to 125% safety factor to guarantee valve closure at the specified differential pressure and flow conditions with the supply voltage 10% below nominal
2. All globe valves shall have a min linear speed of 0.25 in/sec
3. The actuator shall be capable of functioning in an ambient temperature ranging from minus -22°F (- 30°C) to +140°F (+ 60°C) in a NEMA 7 for Zones 1 and 2 (Divisions 1 and 2) Group C and D gases.

E. Motor:

1. Shall be a brushless DC type.
2. Shall be rated for continuous modulating duty.
3. A suitable self-resetting protection device shall be incorporated in the motor or motor starter circuits.

F. Gearing:

1. Mounting restriction shall not be permitted.

2. The combined gear ratio shall ensure "self locking" characteristics at all times and shall be sufficient high ratio as to inhibit "backdriving" the actuator to 200% of rated output.

G. Hand Operation:
1. A handwheel shall be provided for emergency operation.
2. Maximum rimpull shall be 50 ft-lb.
3. The handwheel shall be engaged when the motor is isolated from the control signal.
4. The local/off/auto selector should be pad lockable in any position.

H. Integral Control and Protection Facilities
1. Integral Starter
   a) The reversing starter, control transformer, and local controls shall be integral to the valve actuator
   b) The reversing starter, control transformer, and local controls shall be suitably housed to prevent breathing and condensation buildup.
   c) Shall be a solid-state type.
2. Integral Transformer:
   a) Shall have the necessary tappings and be adequately rated to provide power for the following functions:
      (1) Energization of the motor
      (2) Supply all internal control circuits
3. Integral Selector
   a) Shall be a local/remote selector switch padlockable in any one of the following three positions:
      (1) Local Control only
      (2) Off (No Electrical Operation)
      (3) Remote Control Only
   b) No dynamic penetration of the electrical enclosure by the local controls shall be permitted.
4. To control hydraulic shock the operate time shall be continuously variable from 0 to maximum operate speed.
5. The electric circuit diagram of the actuator should not vary with valve type remaining identical regardless of whether the valve is to open or close on torque/thrust or position limit.

I. Actuator Torque Protection
1. Each actuator shall be provided with both open and close torque/thrust protection
2. For security purposes, all adjustments to torque/thrust settings shall be limited to a removable setting tool.
3. Torque/Thrust sensing
   (1) Must be affected purely electrically or electronically.
   (2) Protection range shall be 40 to 100 percent of the rated.

J. Actuator Valve Position Control and Indication:
1. For security purposes, all adjustments to position controller settings shall be limited to a removable setting tool.
2. To ensure reliable operation all position transmitters shall be contactless.
3. The actuator must be capable of positioning using a 4-20mA control signal either full range or split range configuration.

a) Resolution shall be 0.1% minimum
b) Deadband shall be adjustable from 0% to 10.0% in 0.1% increments.
c) Must be measured purely electrically or electronically.
d) Shall move to a pre-selected position or remaining at the last position on loss of control signal.
e) The response of the actuator must be adjustable to characterize the position of the valve in response to the signal, default characteristic will be linear.

4. A transmitter to provide a 4-20mA analog output signal corresponding to valve position shall be provided.
5. A fault relay will be used to provide actuator availability status.

K. Monitoring & Diagnostics Facilities:

1. Each actuator shall include a diagnostic module
   a) Shall store historical actuator data
   b) Permit analysis of changes in actuator or valve performance
   c) The actuator supplier to allow reconfiguration and diagnostic information to be reviewed and analyze shall provide a software tool.
      (1) Software shall be compatible with Windows software for uploading and downloading all variables for the actuator
      (2) Software shall be compatible with Windows software for performing detailed analysis of diagnostic data.
2. Diagnostic data shall be available without requiring the opening of any actuator covers.
3. A bi-directional non-intrusive communications link must be possible between the actuator and owner's laptop to facilitate downloading actuator setup
   a) Shall not require any covers on the actuator enclosure to be opened
   b) Shall provide;
      (1) Displaying of the actuator current settings on a computer
      (2) Storing of the actuator settings on a computer
      (3) Modification of the existing actuator settings

L. Enclosure:

1. Actuators shall be 'O' ring sealed, watertight to NEMA 6
2. The enclosure shall have an inner watertight and dustproof 'O' ring seal between the terminal compartment and the internal electrical elements of the actuator.
3. The inner seal shall fully protect the motor and all other internal electrical elements of the actuator from ingress of moisture and dust when the terminal cover is removed.
4. Actuators for explosion/hazardous applications shall also be certified flameproof (explosion proof) to NEMA 7 for Zones 1 and 2 (Divisions 1 and 2) Group C and D gases or NFPA Class 1 Division 2 Group B.
5. Enclosure must allow for site storage without the need for electrical supply connection.
6. All actuator external fasteners shall be made of stainless steel.

M. Startup:

1. Each actuator shall be supplied with a startup kit comprising installation instruction, electrical wiring diagram, and sufficient spare cover screws and seals to make good any site losses during the commissioning period.

2. The actuator supplier shall provide within 30 days of plant acceptance the following data on actuator operation.
   a) Software shall be provided free of charge to view the data.

      Actuator configuration information including but not limited to
      (i) Open Torque Setting
      (ii) Close Torque Setting
      (iii) Fail safe Direction
      (iv) Solid State Position Controller Configuration
      (v) Low set point, ma vs. position
      (vi) High set point, ma vs. position
      (vii) Deadband in percent

N. Warranty:
   1. Each actuator shall be warranted for a minimum of 24 months of operation or up to a maximum of 36 months from shipment.
   2. Warranty
      a) Shall be held in effect regardless of precommissioning conditions in a typical indoor or outdoor environment as long as the actuators are not left disassembled or are not physically abused.
1. Shall not require the use of special storage procedures (such as the use of indoor storage, plastic bags, desiccants, and the connection of heater(s) in order to be maintained.

O. Summary:
Power Supply 120 VAC-1PH-60Hz
Enclosure NEMA 7 for Zones 1 and 2 (Divisions 1 and 2) Group C and D gases or NFPA Class 1 Division 2 Group B
Standard Intelligent features
Dual Sensor Technology with 0.1% Output Resolution
Bluetooth User Interface
Fail to position Reserve Super Capacitor Powerpack on loss of mains power
DC Brushless Motor
Double Sealed Terminal Compartment
With Manual override
Analog Control 4-20ma in/out

P. Retrofit Existing Valves with new actuators:

Valve actuator manufacturer shall be responsible for obtaining proper physical torque/thrust calculations, proper measurements, valve data, stem measurements and all appropriate valve adaptation data. Retrofit shall be performed by local valve actuator manufacturer with directly employed actuator manufacturer service technicians. Retrofit shall included removing existing operators and reinstalling new actuator (wiring by others). Retrofit adaptation shall include new valve yokes and mounting pads and all hardware and components necessary for proper actuator/valve operation.