

Control Valve Actuator User Technical Specification

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Section 1 Actuator Systems

1. Seller shall be responsible for correctly sizing the actuator based on the process operating conditions and characteristics of the control valve. Sizing shall ensure that a 25% safety factor for torque or thrust is provided.
2. The actuator will be a single-phase AC powered electric actuator, capable of delivering sufficient thrust or torque to operate at the required speed for the applicable process. Alternatively, when requested on the data sheets the actuator may need to accept a 24 VDC supply.
3. The safety margin of motor power available for seating and unseating the valve shall be sufficient to ensure torque/thrust limit trip at maximum valve torque with the supply voltage 10% below nominal.
4. Actuator must be capable of continuous modulation – Class D as per BS EN ISO 22153 or S9-Continuous duty as per IEC 60034

Section 2 Materials or Construction

1. The actuator body will be constructed of cast aluminum.
2. The enclosure will be IP68 with a separately sealed terminal compartment. Removal of the terminal cover for field wiring and installation shall not expose the internal electronics to the environment.

Section 3 Performance

1. Valve travel position accuracy – 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%.
2. Performance parameters must all be as follows:

<u>Linearity</u>	+/- 0.5%	
<u>Deadband</u>	+/- 0.0% to 10.0%	Adjustable
<u>Repeatability</u>	+/- 0.1%	
<u>Hysteresis</u>	+/- 0.1%	
<u>Resolution</u>	0.1%	

3. Stability – In modulation, no more than one over-shoot greater than +/- 0.5% shall be observed during shop performance and field testing.

Section 4 Stroke Speed Requirements

1. Speed of the actuator shall be non-intrusively adjustable from 40% up to 100% of its maximum speed in increments of 1% as required by the process.
2. The “fail to position” on loss of power speed shall be adjustable independent of the normal operating speed.

Section 5 Actuator/valve Yoke

1. Yoke assemblies are to be supplied, when requested, with the actuator and shall provide rigid support, not only static support for the actuator, but to preclude any flexing during rapid operation.

Section 6 Manual over-ride

1. Where specified and shown on the plan drawings, a hand wheel or knob for manual operation of the actuator shall be provided such that the maximum operating torque shall not exceed 30 lbf.ft.

Section 7 HMI and Set up

1. Non-intrusive setting of actuator and option configurations must be provided.
2. A data logger must be provided.
3. An option to allow force or torque seating of the valve must be selectable on the HMI. Settings, such as max torque, dead band etc, shall be configured using a PDA or PC. Software will be provided by the actuator manufacturer.
4. In addition a HART communication tool should be capable of performing the HMI program functions when a HART card is fitted to the actuator.
5. The Actuator must be capable of auto set up & calibration. This auto set up may be initiated using the HMI. Security is important so the actuator must preclude the casual initiation of the set up sequence.
6. For data logger & diagnostics features the actuator will need to monitor the following:

1	Net valve torque/thrust demand of the valve throughout the stroke
2	Valve position
3	Number of movements in any position (cycle counter)
4	Input signal & dwell time
6	Failsafe energy estimate
7	Local commands (via PDA/PC)
8	Actuator memory, processor & sensors
9	System efficiency parameters

This information will be used to provide derived diagnostic information including the following:

1	Valve signature plot
2	Dynamic response tests
3	Step change response tests
4	Dwell time plot

The diagnostic information needs to be presented in a user friendly format. Diagnostic information must be downloadable over the PDA or available 2 wire communications link.

7. A temperature sensor must be located in the actuator to monitor internal temperature.
8. After actuator set up and configuration, a configuration report must be generated to reflect all the user selectable parameters chosen. This report must be available for printing or electronic storage.

Section 8 Position and availability Indication

1. Continuous remote position indication in the form of a 4-20mA output shall be provided as standard.
2. A non-contact encoder device shall be used to determine the actuator's position.
3. A programmable relay shall be used to provide actuator availability status.
4. The actuator must be capable of positioning using a 4-20mA control signal either full range or split range configuration. The response of the actuator must be adjustable to characterize the position of the valve in response to the input signal, default characteristic will be linear.
5. Where specified and shown on the plan drawings, digital fieldbus communications cards will be supplied to facilitate control & indication as well as other communications needs. Compatible optional cards will include HART, Profibus, Foundation Fieldbus, Modbus and Pakscan.

Section 9 Auxiliary input/output options.

1. An optional auxiliary card shall be available to allow the following:-
 - a. Four programmable inputs to facilitate:-
 - i. Open and close digital inputs for remote control.
 - ii. Maintain/Stop input to accommodate either maintained or "push to run" digital signals and provide stop functionality.
 - iii. Initiation of a self test program which uses a small step change routine to monitor friction and response times of the actuator and valve assembly.
 - iv. A separately terminated ESD signal (independent from "loss of power" or "loss of signal" fail to position).
 - b. Four programmable output relays to facilitate indication of :-

Function	Description
Availability	Active when actuator is available for remote operation, selector set to RUN mode and no faults present that would inhibit operation (all critical faults)
Fault	Active when actuator is in a fault state
Closed Position Limit	Active when the actuator is at Fully Closed position
Open Position Limit	Active when the actuator is at the Fully Open position
Open Torque/Thrust Overload	Active when the opening thrust / torque (at any position) reaches the configured value
Close Torque/Thrust Overload	Active when the closing thrust / torque (at any position) reaches the configured value
Torque/Thrust Overload	Active when the thrust / torque (in either direction) reaches the configured value
Supercap Power	Healthy reserve power pack status
Failsafe Action	Active when failsafe action is being performed
Intermediate position	Active if the actuator passes an intermediate position (open or close direction)
Actuator Closing	Active when moving closed
Actuator Opening	Active when moving open

Actuator Moving	Active when moving (in either direction)
Motor Running	Active when motor is in motion
Motor Stalled	Active when the motor fails to move after a valid command has been sent (in either direction)
Hand Operation	Active when movement is detected by hand
Blinker	Pulses on and off during actuator movement
Local Stop Selected	Active when STOP mode is selected
ESD Active	Active when ESD signal is present
Relay Parity	Fault indication function ensuring even number of relays are active at any time
Monitor	Active when actuator has no faults (including non-critical faults)
Mains Failure	Active when mains power supply fails
RUN Selected	Active when RUN mode is selected
Test Selected	Active when TEST mode is selected
Test Failed	Active when the test sequence fails
Supercap Failure	Active when a failure has occurred with the reserve power pack

- c. Relays to have a rating of 5 Amps, and switching power of 60W inductive and 150W resistive.
- d. The contact form for all auxiliary inputs and outputs shall be configurable to suit normally open or normally closed system philosophy.

Section10 Environment and enclosure

1. Actuator shall be capable of functioning in a normal ambient temperature of -22□ F (- 30° C) to +158° F (+ 70° C). Provision for a low temperature option shall also be made for ambient temperature of -40□ F (- 40° C) to +140° F (+ 60° C).
2. Actuators shall be 'O' ring sealed, watertight to IP68, NEMA 4/6, and shall at the same time have an inner watertight and dustproof 'O' ring seal between the terminal compartment and the internal electrical elements of the actuator fully protecting the motor and all other internal electrical elements of the actuator from ingress of moisture and dust when the terminal cover is removed on site for cabling.
3. Enclosure must allow for temporary site storage without the need for electrical supply connection.
4. All external fasteners shall be stainless steel.
5. Where specified, actuators shall be certified for explosion/hazardous applications by the appropriate certifying body.

Section 11 Power or signal failure mode

1. When specified and shown on plan drawings, the 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. Should the control signal be lost, the actuator must have a means of running to a pre-selected position or remaining at the last position.
3. This pre-selected position must be easily programmable using any of the communications methods indicated in section 8. 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 spurious trips.

Section 12 Start-Up Kit

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

Section 13 Performance Test Certificate

1. Each actuator must be performance tested prior to leaving the manufacturing factory. Individual test certificates shall be created and supplied free-of-charge. The test equipment should simulate a typical valve load and the following parameters should be recorded:
 - Current at maximum torque/thrust setting
 - Torque or thrust at maximum setting
 - Speed and travel
 - Input command calibration at 0% and 100%
 - Output position calibration at 0% and 100%
 - Flash Test Voltage
2. In addition, the test certificate should record details of specification, such as options for fail safe, manual drive, power supply voltage, model number and wiring diagram code number.

Section 14 Warranty

1. Each actuator shall be warranted for a minimum of 12 months of operation from date of shipment. This warranty shall be held in effect regardless of pre-commissioning conditions in a typical indoor or outdoor environment as long as the actuator is not abused or disassembled. This warranty shall not require the use of special storage procedures (such as the use of indoor storage, plastic bags, desiccants, and the connection of heaters) in order to be maintained.
2. The warranty shall be extended to 24 months from the date of start-up if the actuator is set up and started up by a factory-trained Field Service Technician employed by the actuator manufacturer.