

Specification for 3 phase multi-turn electric actuators

1. General

The actuators shall be suitable for use on a nominal volt 3 phase Hz power supply and are to incorporate motor, integral reversing contactor, local control facilities and terminals for remote control and indication connections housed within a self contained, sealed enclosure.

The actuator shall include a device to ensure that the motor runs with the correct rotation for the required direction of valve travel irrespective of the connection sequence of the power supply. In order to maintain the integrity of the enclosure, setting of the torque levels, position limits and configuration of the indication contacts etc shall be carried out without the removal of any actuator covers.

2. Environmental

Actuators shall be suitable for indoor and outdoor use. The actuators shall be capable of functioning in an ambient temperature ranging from -30 degrees Celsius to + 70 degrees Celsius.

3. Enclosure

Actuators shall be o-ring sealed, watertight to IP68 standards 7m submersible for 72 hours, and shall at the same time have a watertight and dustproof o-ring seal between the terminal compartment and the internal electrical elements of the actuator. The motor and all the other internal electrical elements of the actuator shall be protected from ingress of moisture and dust when the terminal cover is removed for site cabling.

Enclosure must allow for temporary site storage without the need for electrical supply connection.

4. Motor

The electrical motor shall be squirrel-cage, low inertia high torque design, F Class insulated with temperature rise limited to class B, 15 minutes time rating.

Electrical and mechanical disconnection of the motor should be possible without draining the lubricant from the actuator gearcase.

5. Motor protection

Protection shall be provided for the motor as follows:

a) Intelligent motor protection during valve jams – 2 modes shall be provided:

- (i) A general stop mode facilitating the stop of the motor and the immediate triggering of a valve alarm when the valve experiences a jam.
- (ii) An intelligent jam protection mode facilitating the "backing off" of the actuator in the opposite direction (for a preset percentage of travel and times) when a valve obstruction is met, and the automatic reversal of direction of travel in an attempt to overcome the valve jam. After a pre set number of operations, if the obstruction is not overcome, the actuator will stop and display relevant alarm signals.

b) Motor temperature shall be sensed by a thermostat de energising the motor in case of overheating

c) Lost phase protection

d) Automatic phase rotation correction

e) Provision shall be made for reversing actuator travel direction without going through a "STOP" operation in either "LOCAL" or "REMOTE" mode, a timing circle shall be provided to delay energization of travel reversing for the consideration of reducing motor current surges.

6. Gearing

The actuator gearing shall be totally enclosed in an oil filled gearcase suitable for operation at any angle. All drive gearing and components must be of metal construction and incorporate a lost-motion hammer blow feature. For rising spindle valves the output shaft shall be hollow to accept a rising stem, and incorporate thrust bearings of the ball or roller type at the base of the actuator.

7. Hand operation

A handwheel shall be provided for emergency operation, engaged when the motor is declutched by a lever or similar means, the drive being restored to power automatically by starting the motor. The handwheel or selection lever shall not move on restoration of the motor drive. Provision shall be made for the hand/auto selection lever to be locked in both hand and auto positions. It should be possible to select hand operation while the actuator is running or start the actuator motor while the hand / auto selection lever is locked in hand without damage to the drive train.

The handwheel drive must be mechanically independent of the motor drive and any handwheel gearing should be such as to permit emergency manual operation in a reasonable time.

8. Remote valve position / actuator status indication

Four contacts shall be provided which can be selected to indicate any position of the valve. Provision shall be made for the selection of a normally closed or open contact form. Contacts shall maintain and update position indication during handwheel operation when all external power to the actuator is isolated.

The contacts shall be rated at 5A, 250V AC, 30V DC. As an alternative to providing valve position any of the four contacts shall be selectable to signal one of the following:

- a) Valve opening, closing or moving
- b) Thermostat tripped, lost phase
- c) Motor tripped on torque in mid travel, motor stalled
- d) Remote selected
- e) Actuator being operated by hand wheel

Apart from the four sets of indication contacts, the actuator also has a pair of monitoring contact which can indicate the effectiveness of actuator electrical devices. (Nominal capacity is 8A 250V AC, 30V DC). The monitoring contacts shall be triggered at any of the following conditions.

- a) Losing phase power
- b) Control power failure
- c) Selecting local control and selecting local stop

Provision shall be made in the design for an additional 4 contacts having the same functionality.

9. Local position indication

The actuator shall include a digital position indicator with a display from fully open to fully closed in 1% increments. The digital display shall be maintained and updated during handwheel operation when all external power to the actuator is isolated. Red, green and yellow lights corresponding to open close and intermediate valve position shall be supplied on actuator display.

For on/off actuator, shall provide a Current Position Transmitter to give a 4-20 milliamp analogue signal feedback corresponding to valve travel for remote indication.

For modulating actuator, shall provide Current Position Transmitter and folomatic to give a 4-20 milliamp analogue signal feedback and control corresponding to valve travel.

The display shall be capable to oriented increments of 90 as required.

10. Integral local control and control mode selector

The actuator shall incorporate local controls for Open, Close and Stop and Local/Stop/Remote mode selector switch lockable in any one of the following three positions: local control only, stop (no electrical and remote operation), remote control only. It shall be possible to select self-maintained or step (inching) control.

The local controls shall be arranged so that the direction of valve travel can be reversed without the necessity of stopping the actuator.

11. Remote control

Remote control fed from an internal 24V DC supply and/or from an external supply between 20v and 120v AC or 20v and 60v DC, suitable for control methods as following:

- Open and Close maintained or “step” (inching) control.
- Overriding Emergency Shut-down to close (or open) valve from a normally closed or open contact.
- Two-wire control, energise to close (or open), de-energise to open (or close).

Actuator has full compatibility to connect with Fieldbus-Mastering control systems and communication protocol. Actuator can add Fieldbus module such as Modbus, Profibus and Foundation.

12. Wiring and terminals

The terminal compartment shall be separated from the inner electrical components of the actuator by means of a watertight seal and shall be provided with a minimum of three cable entries.

All wiring supplied as part of the actuator to be contained within the main enclosure for physical and environmental protection.

13. Start-up kit

Each actuator shall be supplied with a start-up kit comprising of installation instruction manual, electrical wiring diagram and cover seals to make good any site losses during the commissioning period. In addition, sufficient actuator commissioning tools shall be supplied to enable actuator set up and adjustment during valve / actuator testing and site installation commissioning.