

## 1 Scope

This manual provides explanation on the installation, operation, and maintenance of the Series SRX Explosion Proof Electric Actuator and SRX(M) Modulating Explosion Proof Electric Actuator. Not all information for the SRXM will be covered in this manual. Please refer to the TMC4 Installation and Operation Manual for more information on the modulating control card used in the SRX(M).

## 2 Introduction

### 2.1 Safety Notices



**WARNING:** Identifies a potentially hazardous situation or practice that may lead to personal injury or death.



**SHOCK HAZARD:** Indicates dangerous voltage may be present.



**CAUTION:** Indicates general precaution that could lead to personal injury or damage to equipment.

### 2.2 Safety Instructions

- This device was shipped from the factory in a proper condition to be safely installed and operated in a hazard-free manner. The notes and warnings in this document and on the actuator should be maintained and followed to ensure safe operation of the device.
- Take all necessary precautions to prevent damage to the actuator due to rough handling, impact, or improper storage.
- Do not use abrasive compounds to clean the actuator, or scrape metal surfaces with any objects.
- The system controlling the actuator must have proper safeguards to prevent damage to equipment, or injury to personnel should failure of system components occur.
- A qualified person in terms of this document is one who is familiar with the installation, commissioning and operation of the electric actuator and who has appropriate qualifications, which may include:

- Is trained in the operation and maintenance of electric equipment and system in accordance with established safety practices.
  - Is trained or authorized to energize, de-energize, ground, tag and lock electric circuits and equipment in accordance with established safety practices.
  - In cases where the actuator is installed in a potentially explosive (hazardous) location, is trained in the installation, commissioning, operation, and maintenance of equipment in hazardous locations.
- The actuator must be installed, commissioned, operated, and repaired by qualified personnel.
  - All installation, commissioning, operation, and maintenance must be performed under strict observation of all applicable codes, standards and safety regulations.
  - Reference is specifically made here to observe all applicable safety regulations for actuators installed in potentially explosive (hazardous) locations.

### 2.3 Specific Condition of Use

- Repair of flamepath is not intended.
- Use Fasteners with
  1. M8 x 1.25 6g, 30 mm long 304 stainless steel with tolerance strength of  $\geq 700$  MPa bolts for flange joints
  2. M10 x 1.5 6g, 65 mm long 304 stainless steel with tolerance strength of  $\geq 700$  MPa for outer stop bolts
  3. External thread: M16 x 2.0 6g, and Internal thread: M10 x 1.5 6h, 45mm long 304 stainless steel with tolerance strength of  $\geq 700$  MPa for inner stop bolts"

### 2.4 Ex Instructions and Flamepaths

- Use supply wire suitable for at least 194°F (90°C)
- A seal shall be installed within 2 in. (50 mm) of the enclosure.
- Open circuit before removing cover.
- Loaded spring inside, do not disassemble spring pack.



**CAUTION:**

### 2.5 Storage

- Actuators must be stored in a clean, cool and dry environment.
- Actuators should be store with Body-Cap installed and cable entries sealed.

### 2.8 Standard Specifications

Standard Specifications	
Power Supply:	24 VDC (SRX-0600 only), 120/220 VAC 1PH, 50/60 Hz
<b>Motor:</b>	
24VDC:	24V 100W 5A (SRX-0600 model only)
110VAC:	110V 50/60 Hz 30W 0.5A
220VAC:	220V 50/60 Hz 30W 0.33A
<b>Limit Switches:</b>	
24VDC:	15A 1/2HP @125/250VAC (SRX-0600 model only)
110VAC:	11A 1/3HP @125/250/277VAC 1/2A 125VDC,1 1/4A 250VDC
220VAC:	11A 1/3HP @125/250/277VAC 1/2A 125VDC,1 1/4A 250VDC
Stall Protection:	Built in thermal protection, Open at 130±5°C, Close at 85±15°C
Travel Angle:	0 to 90° ± 10°
Indicator:	Continuous position indicator
Space Heater	10W Anti-Condensation
Cable Conduit:	Two 3/4" NPT (SRX-0300 has One 3/4" NPT)
Lubrication:	Grease Synthetic
Terminal Block:	Spring loaded lever push type

- When actuators are stored outdoors, they must be off the ground and high enough to prevent being immersed in water or buried in snow.

### 2.6 Terminology

Standard actuator direction and position are as follows:  
Close = Clockwise (CW)

Open = Counter-Clockwise (CCW)

NOTE: For the sake of this document, these terms may be used interchangeably

### 2.7 Information and Features

Triac Series SRX Actuator are for us on quarter-turn valves and damper that require between 300 to 1800 in-lbs of torque to operate and need to spring clockwise or counter-clockwise if power failure condition occurs. SRX Actuators are designed to be used in non-explosive and explosive conditions with requirements of Class I, Division I, Group C & D, T4, and environmental conditions with requirements of IP 66 & 67, NEMA Type 4, 4x & 6.

Materials:	Carbon Steel, Alloy Steel, Spring Steel, Stainless Steel, Aluminum Alloy, NBR, ABS and Polycarbonate Plastic
Ambient Temperature:	-40°C (-40°F) to 60°C (140°F)
External Coating:	Powder Coating

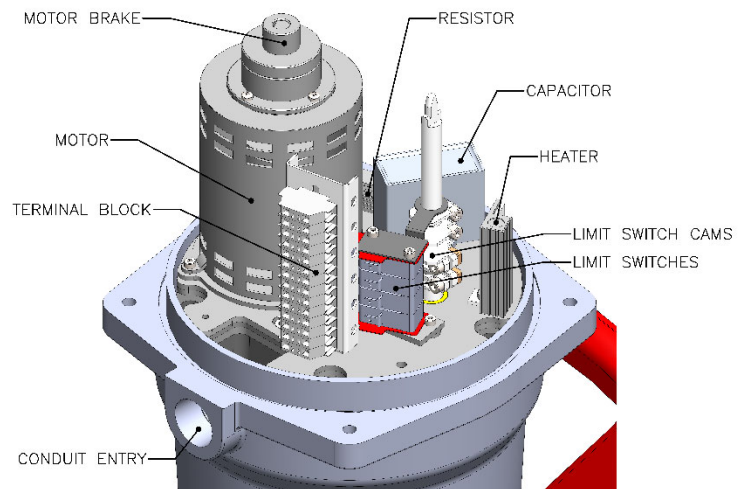
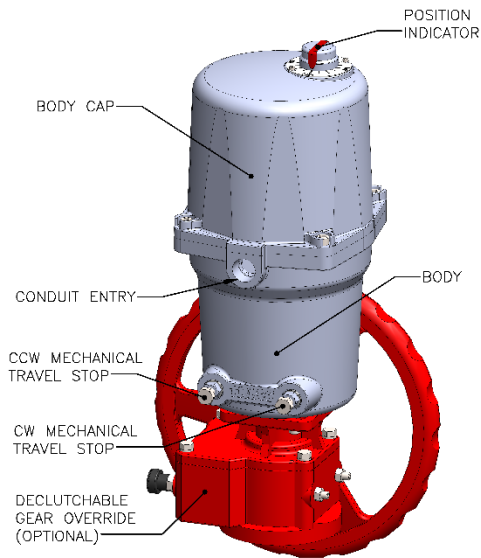
### 2.9 Standard Performance Technical Data

Spring End	90° Cycle Time	Spring Fail Time <sup>1</sup>	Motor Size	Full Load Amps			Duty Cycle	Weight	
				DC	AC			Standard	w/ Override
in-lbs	seconds	seconds	Watts	24V	110V	220V	%	Lbs.	Lbs.
300	6-10	2-6	30	N/A	1.20	0.55	50	32	72
600	30	2	30	4.00	0.70	0.35	50	62	102
1200	30	7	30	N/A	0.85	0.45	50	80	120
1800	30	7	30	N/A	1.10	0.55	50	120	160

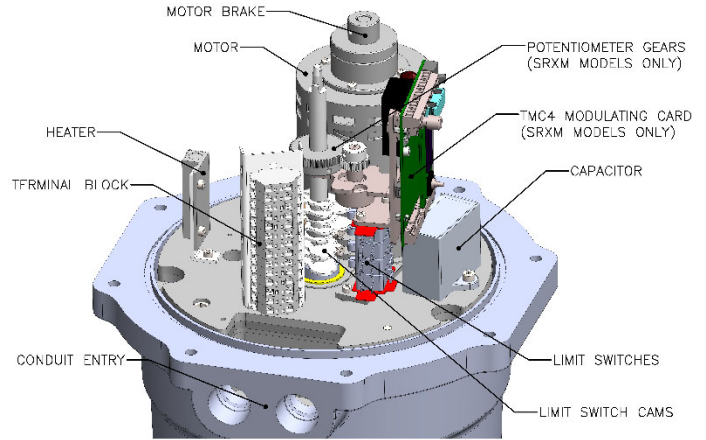
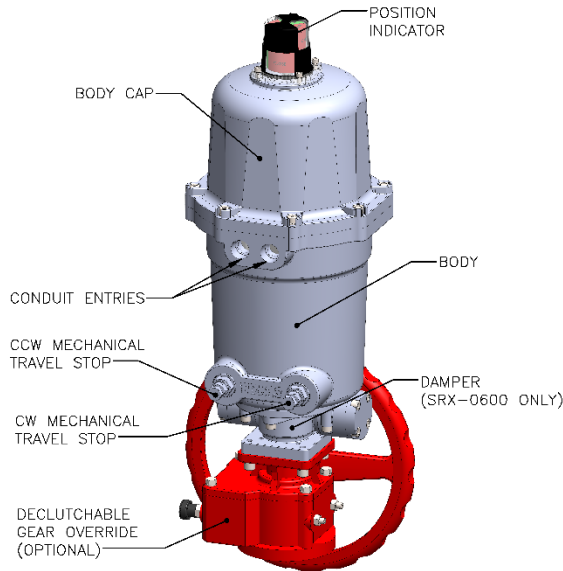
<sup>1</sup> Cycle and Spring Fail Times are under no load conditions.

### 2.10 Standard Model Parts

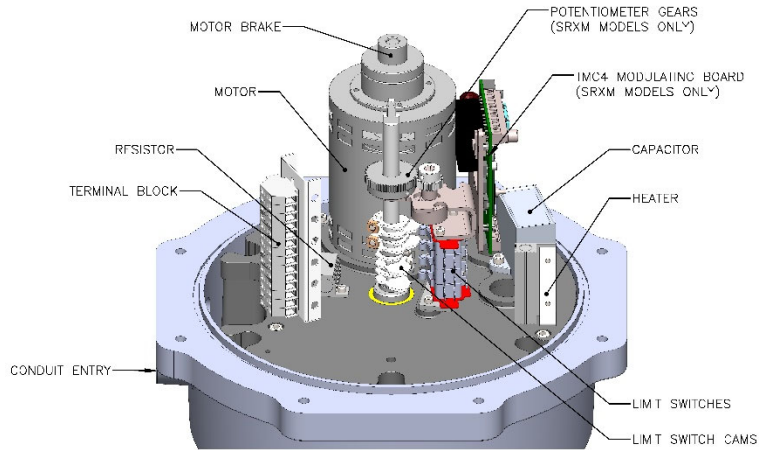
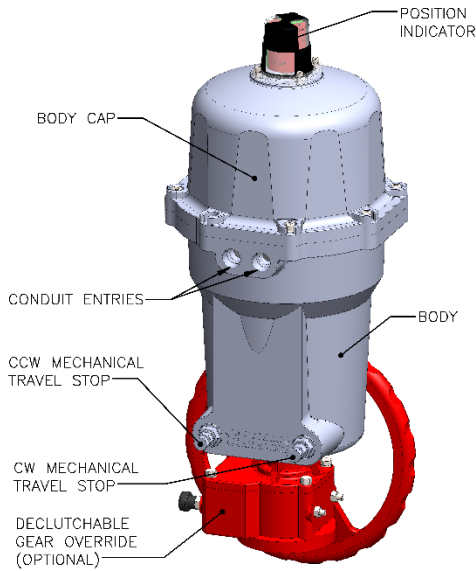
#### 2.10.1 SRX-0300



2.10.2 SRX-0600



2.10.3 SRX-1200/SRX-1800



2.11 Space Heater

Condensation may form in the actuator due to change in ambient temperature. Powering the internal space heater will help prevent condensation. Heating element is PTS resistor with temperature limiting to prevent heating above 158°F (70°C).

Actuator Voltage	Heater
24 VDC	10W, 5.7A
110/220 VAC	10W, 2.5A

### 3 Installation

#### 3.1 Pre-Installation

Check actuator nameplate to ensure correct model, torque output, operating speed, voltage and enclosure type before installation or use. It is important to verify the torque output of the actuator is appropriate for the torque requirements of the valve and that the duty cycle of the actuator is appropriate for the intended application.

**WARNING:**

- The actuator generates a large mechanical force during normal operation.
- Installation, commissioning, maintenance and repairs must only be performed by qualified personnel with extensive knowledge on working with electrical equipment according to enclosure ratings.
- Any modification to actuators is prohibited as it may change enclosure and Ex. ratings.



#### 3.2 Tools

- Body Cover Bolts: 6 mm hex head key (Allen)
- Wire Termination: Flat head screwdriver or other device to push in spring terminals to insert wires.
- Limit Switch Cams: 3 mm hex head key
- Stop bolt and stop bolt nut: 2 17mm wrenches
- (Both bolt and nut are 17mm. A 17 mm socket on the bolt and 17 mm wrench on the nut will work.)
- Wire Strippers
- Multimeter

#### 3.3 Actuator Mounting

**CAUTION:**

Prior to mounting, the actuator must be checked for any damage. Damaged parts must be replaced by original spare parts only.



- Mounting actuator is easiest with valve shaft pointing vertically upwards, but mounting is possible in other positions.
- Actuator should be mounted to ensure sufficient

room to easily remove housing cover and access internal components for wiring and repair.

- Standard ISO 5211 bolt patterns are provided on mounting base. Actuator must be firmly secured to a sturdy mounting bracket or directly to the valve's ISO mounting pad. High tensile bolts or studs with spring locking washers must be used. To avoid backlash, there should be no flexibility in the mounting.
- Valve output shaft must be in line with actuator output drive to avoid side-loading the shaft.
- Ensure both valve and actuator are in the same open or closed position before mounting.

#### 3.4 Body-Cap

**WARNING:**

Flamepath surfaces on SRX Actuators must not be damaged in any way. **DO NOT FORCE** cover onto actuator body.



##### 3.4.1 Body-Cap Bolts

All SRX Models use M8 size bolts to fasten the body cover to the actuator body. These bolts can be removed with a 6 mm hex head key.

**WARNING:**

Damaged Body-Cap bolts must be replaced with bolt equivalent to model specific bolts listed in table 3.4.1



Actuator Model	Hex Head Bolt (A2-70 304 SS)	Bolt Qty.	Bolt Torque (ft-lbs)	Bolt Hex Size
SRX-0300	M8x1.25-6g 30 mm Length	4	16	6 mm
SRX-0600	M8x1.25-6g 35 mm Length	8	16	6 mm
SRX-1200	M8x1.25-6g 40 mm Length	8	16	6 mm
SRX-1800	M8x1.25-6g 40 mm Length	8	16	6 mm

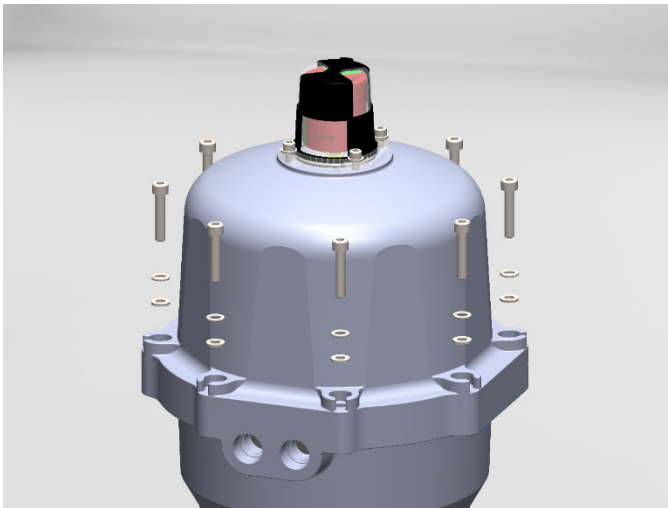
##### 3.4.2 Body-Cap Removal

**WARNING:**

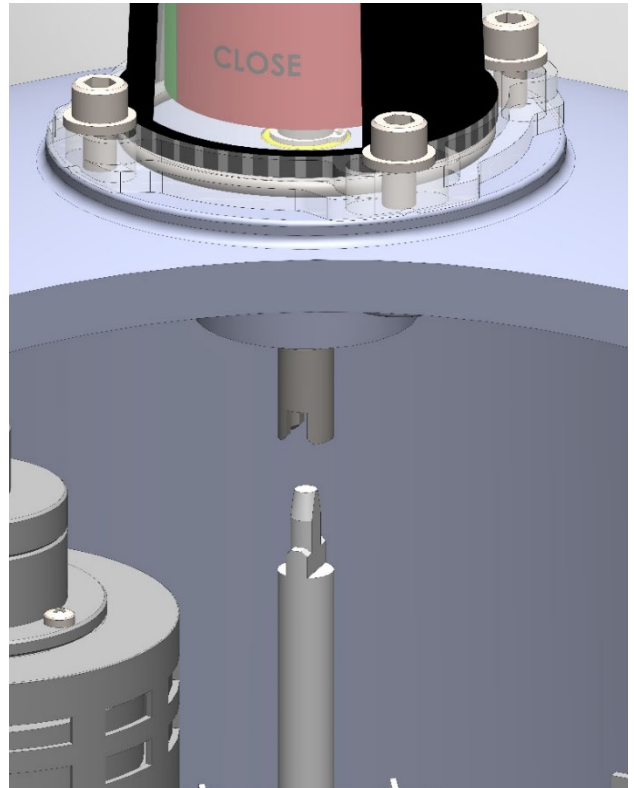
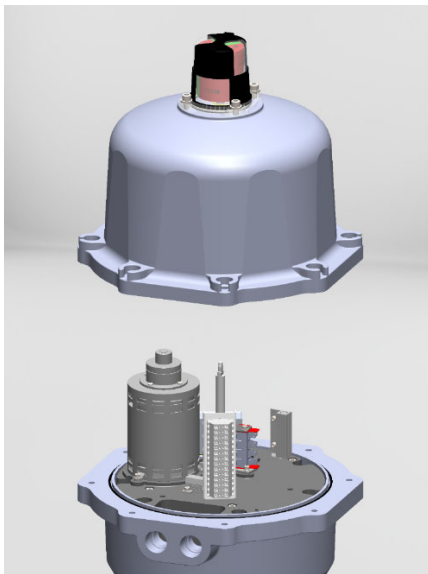
Excessive damage to the Body-Cap to Body flamepath can impact performance, safety, and explosion rating. Take care to properly store Body-Cap.



- 1) Remove specified number of Body-Cap bolts found in section 3.4.1



- 2) Pull body cover away from the body. If cap is difficult to remove, it may be rotated in a clockwise or counterclockwise direction to free up any binding.

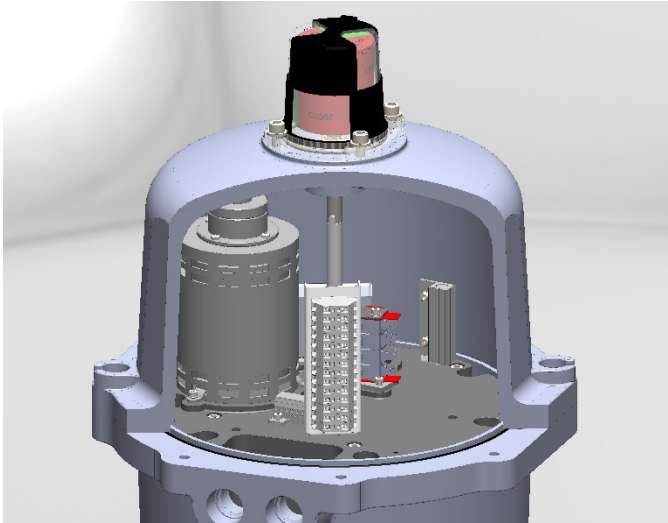


- 2) Lower the body cover onto the body until the contact surfaces are mated together. Make sure that bolt holes and indicator are aligned properly.

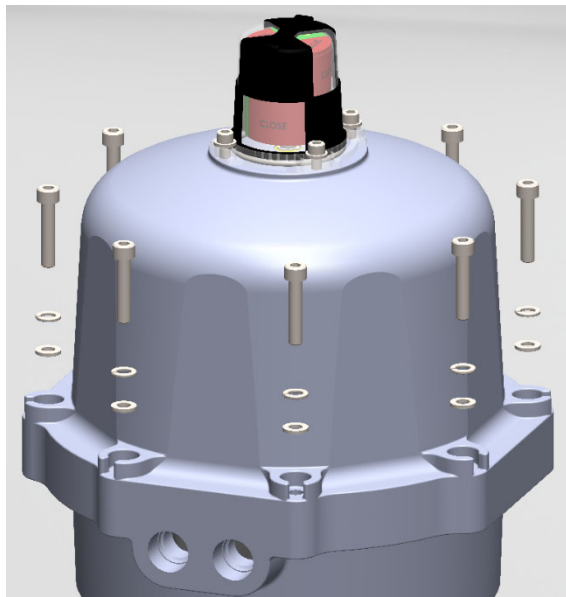
NOTE: Make sure the indicator shaft on the body cap and body are aligned. The body cover may have to rotated clockwise or counterclockwise to get the indicator shafts to mate together.

### 3.4.3 To install Body-Cap.

- 1) Using the stem found on the inside of the body cover, make sure the position indicator is oriented in the same direction as the indicator shaft that is attached to the body.



3) Replace M8 body cover bolts and torque to specified ft-lbs found in section 3.4.1.



### 3.5 Electrical Wiring

#### 3.5.1 Wire Schematics

Actuator Model	Voltage	On/Off Schematic #	Modulating Schematic #
SRX-0300	120/220 VAC	SE01668	SE01719
SRX-0600	24 VDC	SE01669	SE01722
	120/220 VAC	SE01679	SE01721
SRX-1200	120/220 VAC	SE01668	SE01719
SRX-1800	120/220 VAC	SE01668	SE01719

#### 3.5.2 Conduit Entry



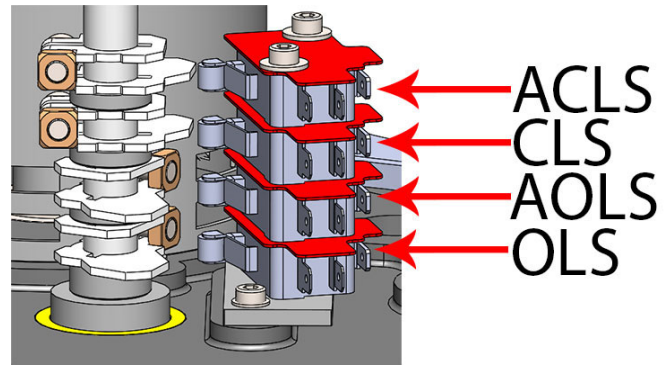
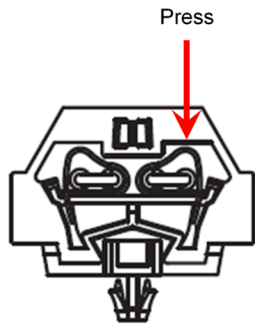
Suitably certified conduit cable to be used for 3/4" NPT entries

#### 3.5.3 Wire Termination

- Use supply wire suitable for at least 194°F (90°C)
- A seal shall be installed within 2 in. (50 mm) of the enclosure.
- Ensure power supply voltage matches the nameplate or label, and that power supply can provide the stated full load current.
- Two conduit entries are provided on each actuator: one for power and the other for control signal.
- A minimum of 18AWG wiring is recommended for all field wiring.
- The actuator shall be wired and grounded in accordance with local and national electrical codes.
- Conduit shall be sealed at the actuator housing to prevent water or moisture from entering the actuator through the conduit openings.
- The compartment heater should be continuously energized to reduce accumulation of moisture within actuator housing.
- Unused conduit entries must be closed off with plug fitting approved for use per actuator enclosure ratings.

#### 3.5.4 Terminal Block Operation

- 1) Using flat head screwdriver press in the spring clamp and hold open.
- 2) Insert wire into the end opening of the desire terminal.
- 3) Remove screwdriver and allow spring clamp to grab onto wire.



### 3.5.5 Grounding

Internal Earth Ground is located next to terminal block and is marked with ground symbol.



### 3.6 Limit Switches



**WARNING:**

Hazardous voltage. Turn off all power and lock out service panel before installing or modifying any electrical wiring. Use caution when energizing inputs.



**CAUTION:**

Setting limit switches incorrectly may result in actuator stopping by the mechanical stops. This may overheat the motor and force it into thermal overload. Electrical operation will not be possible until overload resets. The motor may eventually fail if repeatedly overheated.

Switch Order from the top to bottom of the stack:

- ACLS = Auxiliary Close (clockwise)
- CLS = Close (Clockwise) motor control
- AOLS = Auxiliary open (counterclockwise)
- OLS = Open (counterclockwise) motor control

### 3.7 Setting Limit Switches

Setting Open & Close Limit Switches must be performed with the actuator mounted on the valve to properly align open and closed positions.

#### 3.7.1 Open Limit Switch

- 1) Move the actuator to the desired open position and use motor brake to hold position.
- 2) Rotate the OLS cam CCW until the cam is tripping the Open Limit Switch.

NOTE: A multimeter or listening for an audible click from the limit switch will indicate when the limit switch has been tripped.

#### 3.7.2 Setting the Closed Limit Switches

- 1) Move the actuator to the desired closed position and use motor brake to hold position.
- 2) Rotate the CLS cam CW until the cam is tripping the Closed Limit Switch.

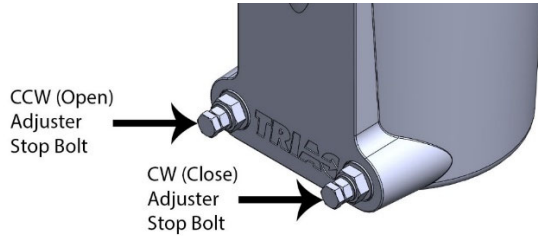
NOTE: A multimeter or listening for an audible click from the limit switch will indicate when the limit switch has been tripped.

#### 3.7.3 Accessory Limit Switches

The ACLS and AOLS can be set in same manner as the CLS and OLS but can be set to trip before the CLS and OLS.



### 3.8 Mechanical Travel Stop Adjustment



Setting the open and closed stop bolts must be performed with the actuator mounted on the valve.

Before setting the Mechanical Travel Stops the OLS and CLS must be set to desired positions.

#### 3.8.1 Stop Bolt Nut Torques:

#### 3.8.2 To set the CW Stop Bolt:

- 1) Operate the actuator to the CW position.
- 2) Loosen the Stop bolt adjuster nut.
- 3) Hand tighten the CW Stop Bolt until contact is made with the limiting adjuster stop plate.
- 4) Reverse (loosen) the CW stop bolt 1 turn.
- 5) Maintain the CW stop bolt position and tighten the CW Stop Bolt Nut to specified torque 32 ft-lbs.

For SRX-\_\_\_\_-FC configurations, make sure that valve is in CW position when power is removed from actuator.

NOTE: The amount of degree a valve can be consider closed will change between valves. Number of turns in step 3.6.2.4 may need adjusted according.

#### 3.8.3 To set the CCW Stop Bolt:

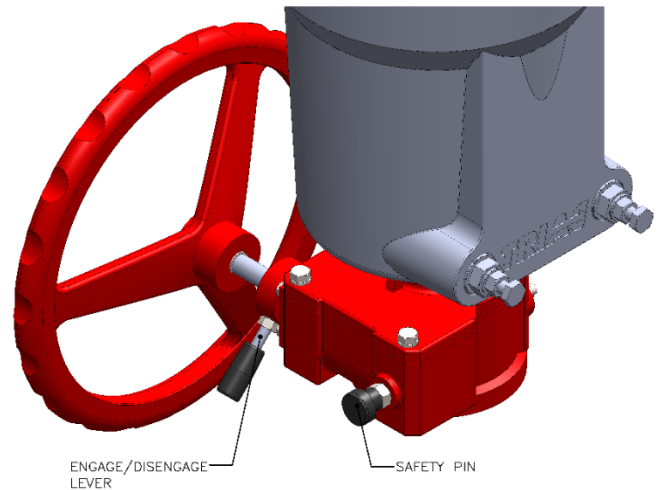
- 1) Operate the actuator to the CCW position.
- 2) Loosen the Stop bolt adjuster nut.
- 3) Hand tighten the CCW Stop Bolt until contact is made with the limiting adjuster stop plate.
- 4) Reverse (loosen) the CCW stop bolt 1 turn.
- 5) Maintain the CCW stop bolt position and tighten the CW Stop Bolt Nut to specified torque 32 ft-lbs.

For SRX-\_\_\_\_-FO configurations, make sure that valve is in CCW position when power is removed from actuator.

NOTE: Amount of rotation that can occur before a valve starts to see flow needs consider when setting stop bolts in the fail direction. Number of turns a stop bolt is backed off after contact with plate may need decreased to make sure valve is in closed position during fail condition.

## 4 Operation

### 4.1 Manual Gear Override (Optional)



#### CAUTION:



The manual gear override must never be operated while power is supplied to the actuator. Failure to disconnect power from the actuator or not verifying proper position before disengagement can cause the actuator to jam on the worm gear and cause damage to components.

#### 4.1.1 To engage:

- 1) Pull and hold the safety pin out
- 2) Rotate the engage/disengage lever counterclockwise.

A slight rotation of the handwheel may be required to engage the worm gear.

- 3) Movement

- Rotate the handwheel counter-clockwise to operate the actuator/valve in the counter-clockwise direction.
- Rotate the handwheel clockwise to operate the actuator/valve in the clockwise direction.

#### 4.1.2 To disengage

- 1) Rotate the valve/actuator to the actuator fail position.
  - For fail closed models (FC) the actuator must be operated to the clockwise (closed) position with the manual gear override ensuring the closed motor limit switch is tripped.
  - For fail open models (FO) the actuator must be operated to the counterclockwise (open) position with the manual gear override ensuring the open motor limit switch is tripped.
- 2) Pull and hold the safety pin out
- 3) Rotate engage/disengage lever clockwise.

The handwheel should rotate freely when the gear override is disengaged.

## 5.2 Testing Fail Operation and Fail Position

- Operate the actuator to the corresponding non-fail position
- Counterclockwise for fail closed (FC) models
- Clockwise for fail open (FO) models.
- Remove power from the actuator and verify that the actuator returns the valve to the fail position.

Note: During normal operation, the actuator is held in the set open or closed position by the motor brake. When power loss occurs the corresponding stop-bolt is what impedes movement in fail direction. Due to the minute difference in the set open and closed position and the fail position, the desired valve position will need to be verified and adjusted if needed.

## 5 Testing

Testing should be done with the actuator mounted to the valve to ensure that the correct fail position is achieved when power is lost to the actuator.

### 5.1 Testing Regular Operation

- Counterclockwise operation shall be tested by powering the actuator to the counterclockwise position. See appropriate wiring schematic.
- Verify that the valve is in the desired counterclockwise position and adjust if needed.
- Clockwise operation shall be tested by powering the actuator to the clockwise position. See appropriate wiring schematic.
- Verify that the valve is in the desired counterclockwise position and adjust if needed.