Spring Return Fail-safe Electric Valve Actuator

2020.09
SY02-B001D-EN

CAUTION !

- **Please ensure that the O-ring seal is in good condition prior to cover installation.**
- **Installation, maintenance and repair works must be performed by trained personnel.**
- **Do not use any tools to increase force on handwheel for operating as this can damage the actuator or valve.**

Installation Notices

a. The standard spring return actuator rotates counter-clockwise with power (spring compressed) and rotates clockwise with spring released (fully-closed or fully-open) when power outage.
b. Please read operation manual and wiring diagram carefully before installation.
c. Verify that supply voltage is in accordance with the data on nameplate to prevent short circuit or electrical/electronic parts damage caused by incorrect power input.
d. Turn power off before wiring or maintenance.
e. Connect the ground wire to PE point inside the electric actuator.
f. To avoid functional failure caused by static, do not touch any components on the PCB with metal tools or bare hands.
g. Do not parallel wire multiple actuators together without using an extra relay.
h. Use proper techniques when installing conduit and properly seal the connection. Do not mount the actuator with conduit entries in upright position to prevent condensation from entering the unit.
i. After manual operation, the actuator shall be returned to its spring released position by handwheel before electrical operation of the actuator.
j. Actuator should be installed in an upright or horizontal position. Do not mount upside down or below a horizontal position.
k. These units are not designed to operate in vacuum spaces or where an explosive
l. Periodically inspect actuator enclosure to prevent dust from accumulating.

Manual Device Installation

a . Slide fixing screw through washers and handwheel and secure them to override shaft as shown in the figure below (figure 1).
⚠ **Turn off power when installing handwheel.**
b . Assembly completed as shown in the figure below (figure 2).

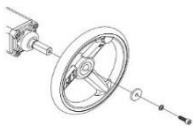


Figure 1

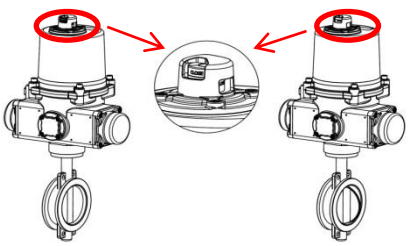
Figure 2

Valve Mounting Instructions

⚠ **For safety reasons, do not remove or inspect the SPRING STRUCTURE. Proper tools must be used, or serious injury will occur.**

a. The actuator shall be sized to ensure that its torque output meets the load requirements of valve. (As a MINIMUM, a 30% safety factor is suggested for the calculation of torque requirement).

● If the maximum torque of 5" valve is 80 N·m
→ 80 × 1.3 (safety factor) = 104 N·m
104 N·m < 130 N·m (S-1300) →OK!
104 N·m > 50 N·m (S-500) →Not OK!



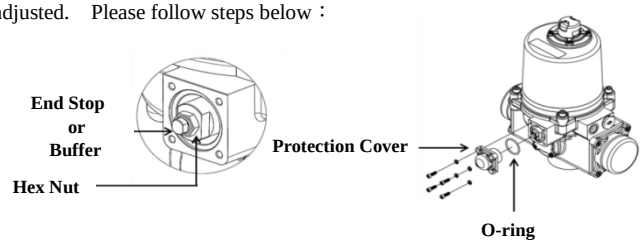
b. The spring return actuator is shipped in spring return position (spring released) with the configuration of spring clockwise and fully-closed when power outage unless specified.
c. The valve or damper must be rotated to fully-closed position before mounting with actuator if FAIL POSTION is fully-closed and vice versa.
d. Remove all of valve handle parts, for example, the handle or open/close mechanical stops so as to not interfere with the actuator.
⚠ **Do not remove packing gland or other parts necessary for operation from valve.**
e. Check again that the valve and actuator are in the same position (fully-open or fully-closed).
f. Once mounted together, either directly or with a mounting kit, ensure that they are properly secured together and all fasteners are tightened.
g. Remove the conduit entry plug to relieve the pressure inside the actuator for the ease of the top cover removal and gently remove the cover.
⚠ **The power must be off before removing the cover.**
h. Refer to operation manual section 4.3 for wiring notices and connect the wires according to the wiring diagram labeled inside the cover of actuator.
i. Supply power to actuator.
⚠ **Care must be taken at all times as there are live circuits present that may cause electrical shock.**
j. Re-calibration may be required for the end positions, refer to Actuator Set-up section for further instructions.
k. Assemble the cover and secure cover screws firmly after setting.
⚠ **Please ensure that the O-ring seal is in good condition prior to cover installation.**

Actuator Set-up

⚠ **If the actuator is equipped with a manual override, rotate the handwheel to return the actuator to its spring released position before the power is supplied.**
⚠ **Use proper cable glands with IP rating when installing and securely tighten the conduit fittings to ensure the enclosure protection rating.**

The spring return actuator provides fail-safe positioning and the end stop position of spring return is determined by either buffer or end stop (On/Off by the buffer, floating or modulating limited by end stop). When the actuator is motorized, the end position is determined by limit switches.

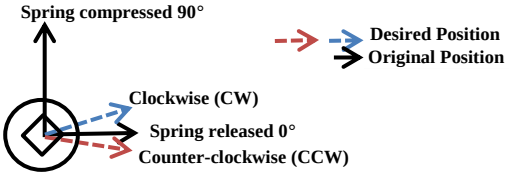
The actuator has been set and calibrated at the factory. Most of products will not require recalibration of these settings. However these are general settings. After valve and actuator are bolted together, apply power to drive the actuator to its fully-open (spring compressed). Then remove power to let the rack and pinion spring mechanism drive back to its fully-closed position. If the OPEN or CLOSE stop point are not aligned with valve or damper correctly, its end positions must be adjusted. Please follow steps below：



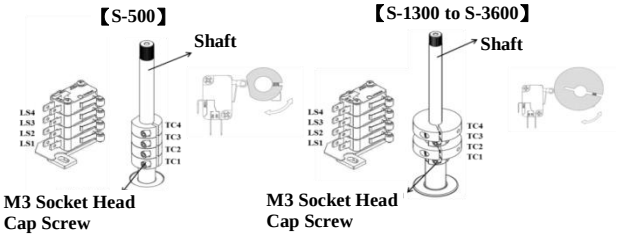
⚠ **For modulating unit, ensure to loosen the sector gear of potentiometer first before adjusting the following settings.**

Adjustment procedure for spring-return actuator in the fail-closed position upon loss of supply voltage.

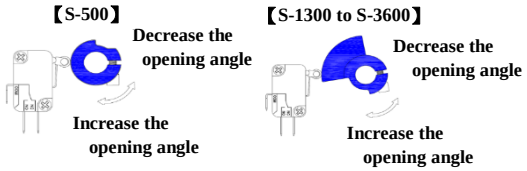
- **Adjust FULLY-CLOSED (spring released) stop point as steps below:**
  a. Turn power off and loosen the protection cover using a 5 mm hex key.
  b. Loosen the hex nut of the buffer or end stop using a 17 mm hex wrench. Hold the hex nut and turn the buffer or end stop using a 10 mm hex wrench to adjust end position.
  c. Turn the buffer or end stop to adjust the fully-closed stop point.



  ➢ S-500: One turn = 2.3 degrees.
  ➢ S-1300 to S-3600: One turn = 1.4 degrees.
  d. Once completed, tighten the hex nut, replace the protection cover and tighten all screws.
  ⚠ **If the buffer or end stop is adjusted, TC2 must be reset in accordance with the buffer or the end stop.**
  e. Loosen the M3 cap screw of cam TC2 with a 2.5 mm hex key.
  f. Rotate the cam TC2 counter-clockwise until a light click is heard, and then slowly rotate the cam TC2 clockwise until a light click is heard.
  g. Tighten the cap screw of cam TC2.



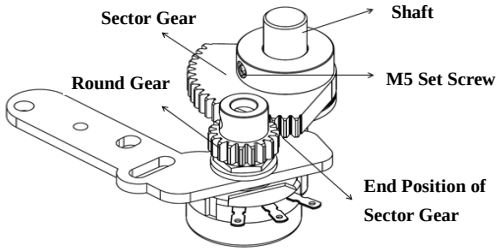
- **Adjust FULLY-OPEN (spring compressed) stop point as steps below:**
  a. Apply power to drive the actuator to its fully-open (spring compressed) position. If the open stop point is not aligned with the valve or damper properly, then it must be adjusted.
  b. Remove power to let spring system to drive back to its fully-closed (spring released) position.
  c. If it is required to adjust, loosen the cap screw of cam TC1 with a 2.5 mm hex key.
  - To increase the opening angle, turn the cam clockwise.
  - To decrease the opening angle, turn the cam counter-clockwise.



  d. After adjusting the cam, apply power to drive the actuator to the fully-open position.
  e. Verify that it is in the correct fully-open position.
  - ✓ If it is in correct position, remove power and lock the cap screw of cam TC1.
  - ✓ If it is not in correct position, repeat step C until the correct position is reached.

  f. If auxiliary switches will be used for feedback, cams TC3 and TC4 need to be calibrated.
  - ✓ Adjust cam TC3 so it trips just before cam TC1 does.
  - ✓ Adjust cam TC4 so it trips just before cam TC2 does.

- For modulating actuators, after completing the calibration, turn the actuator to fully-closed (spring released) position and follow the procedure below:
  a. Loosen M5 set screw.
  b. Rotate sector gear clockwise to the position shown in figure below.
  ⚠ **Ensure that round gear and sector gear are engaged properly.**
  c. Tighten M5 set screw.



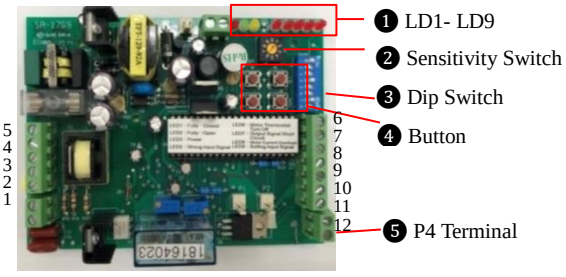
TC2 is utilized for sensing fully-closed stop point. Once the spring mechanism has been released when power outage, the actuator will not drive under power again until it has reached its fail stop position and TC2 trips.

TC1 "OPEN
Clockwise: increase opening degree.
Counter-clockwise: decrease opening degree.

Note:
- **LS2 shall trip while TC2 reaches the end stop point.**
- **TC3 & TC4 are optional, refer to (f.) for calibration.**

Modulating Control Board Adjustment

▲The layout is based on 110/220V voltage.



Dip-Switch Setting (Original Factory Setting：1, 4, 8 ON)

* S1, S2：Input Signal Setting * S3, S4 & S5：Output Signal Setting

Input Signal	S1	S2
4 - 20 mA	ON	OFF
1 - 5 V	OFF	OFF
2 - 10 V	OFF	ON

Output Signal	S3	S4	S5
4 - 20 mA	OFF	ON	OFF
2 - 10 V	ON	OFF	ON

* S6, S7 & S8：Setting of fail position when input signal fails.

⚠ **The input signal type is set by switches 1 and 2. And switch 6 is used to set the corresponding relationship between value of input signal and operation direction of actuator.**

Symbol	S6	S7	S8	Signal Failed Position
90° Signal	ON	OFF	ON	Fully-Open (90°)
		ON	OFF	Fully-Closed (0°)
		ON	ON	The Last Position
90° Signal	OFF	ON	OFF	Fully- Open (90°)
		OFF	ON	Fully- Closed (0°)
		ON	ON	The Last Position

P4 Terminal

- P4 is a contact for alarm conduction. If the microprocessor detects that the actuator has not reached the preset end of travel stop within 15 seconds, then the microprocessor conducts P4. It can connect with an alarm or similar devices for warning.

Sensitivity Switch Setting (SW2)

a. When switched to " 1 ": The Highest Sensitivity.
When switched to " 0 ": The Lowest Sensitivity.
b. Original factory setting
- S-500 to S-2600: 3.

Signal Setting for Open and Close position

⚠ **These settings are set and calibrated at the factory. Mostly, they do not need to be recalibrated. Please follow steps below to set when required.**
⚠ **Use a multimeter to measure the output signal in accordance with the selected signal type.**

LD1	Fully-closed	LD6	Motor thermal protector activated
LD2	Fully-open	LD7	Output signal short circuit
LD3	Power	LD8	Overcurrent in motor
LD5	Wrong input signal	LD9	Local setting mode

Press and hold "SET" switch for 2 seconds until LD 9 lights to enter local setting mode.

Signal setting for Fully-OPEN position

a. Press and hold "UP" switch to operate the actuator to open until it has reached the fully-open position and LD2 lights and then input a signal 5 V or 10 V or 20 mA.
b. Press "MODE" switch for 2 seconds to complete the setting of fully-open position.

Signal setting for Fully-CLOSED position

a. Press and hold "DOWN" switch to operate the actuator to close until it has reached fully-closed position and LD1 lights, and then input a signal 1V or 2V or 4 mA.
b. Press "MODE" switch for 2 seconds to complete the setting of fully-closed position.

After completing the above settings, press "SET" switch to quit local setting.