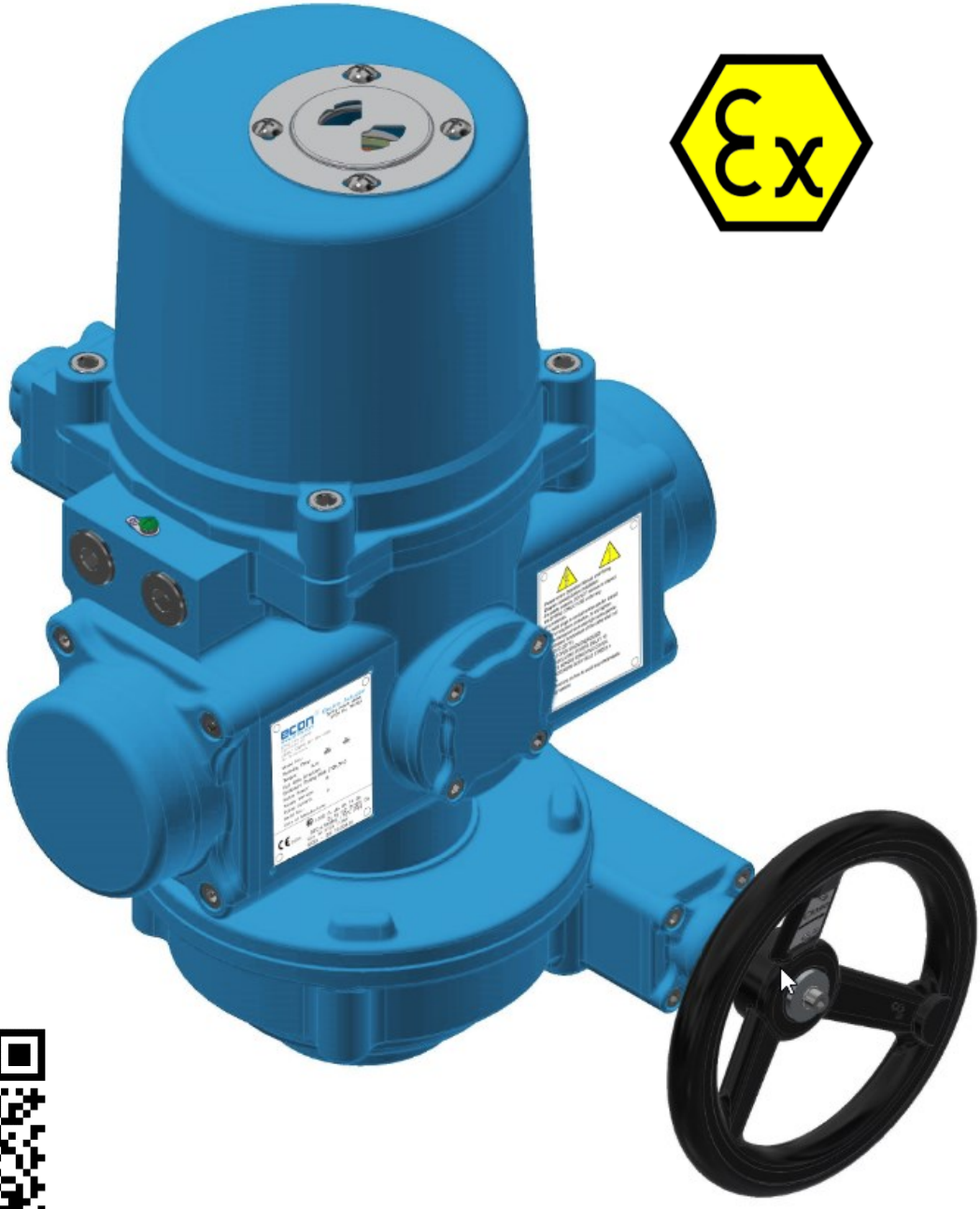
ECON SPRING RETURN ELECTRIC ACTUATOR

Fig. 7917EX, type ELSA50 - 260



Installation and Operation Manual for actuator type: ELSA50, 130, 200 & 260

Content

1. General Information

⚠ **Failure to follow safety instructions may cause serious injury, equipment damage, or voided warranty.**

1.1 Safety Instructions

- Installation, maintenance and repair works must be performed by trained personnel and the safety and warning instruction contained in this manual must be followed.
- The user should read and follow instructions contained in this operation manual included with the product. Failure to do this may result in damages and void warranty. ERIKS will not be liable for damages caused by operator negligence or misuse.
- Local health and safety legislation shall be complied with.
- In a few cases, the surface temperature may exceed 60°C (140°F). Please check the surface temperature before operation, using an appropriate thermometer and wearing protective gloves before operation.

1.2 Installation Notices

⚠ **Operating by handwheel: Do not use any tools to increase force on the handwheel for operating, as this can damage the actuator or valve.**

⚠ **Do not apply power before the actuator is in the full spring return position (spring unloaded).**

1.2.1 General

- The spring return actuator is shipped in spring return position (spring unloaded). Standard actuators will be supplied with a clockwise spring return action for closing the valve in case power outage occurs. However actuators can optionally be supplied with a counter-clockwise spring return action for opening the valve.
- **DO NOT** install in ambient temperatures that exceed 70°C (158 °F).
- **DO NOT**, under any circumstances, remove the cover of the actuator while in a hazardous location when the power is still live inside the actuator. This could cause ignition of a hazardous atmosphere.
- **DO NOT**, under any circumstances, use an explosion-proof electric actuator in a hazardous location that does not meet the specification which the actuator was designed for.
- Mount, test, and calibrate actuators in a non-hazardous location.
- When removing the actuator, care must be taken not to scratch, scar or deform the flame path of the cover or base of the actuator. This will negate the protection rating

of the enclosure in a hazardous location.

- The explosion proof electric actuator is shipped with mating surfaces of the cover and base. When assembling them, pay attention to the mating number (QA code) in order to assure the protection rating in a hazardous location.
- Please read the operation manual and wiring diagram carefully before installation.
- Verify that the supply voltage is in accordance with the data on the nameplate to prevent short circuit or damage to the electrical/electronic parts caused by incorrect power input.
- Turn power off before wiring or maintenance.
- There are grounding devices both inside and outside of the actuator. The ground wires should be connected properly.
- The metal plugs in the conduit entries are for transport only. For long term protection appropriate flameproof cable glands and power cables must be fitted. These must withstand a minimum temperature of 105°C (221°F). Please refer to section 1.2.3
- To avoid functional failure caused by a static load, do not touch any components on the PCB with metal tools or bare hands.
- Use proper cable glands in order to seal the conduit entries correctly. Don't mount the actuator with conduit entries in upright position in order to prevent water ingress.
- After manual operation, the actuator shall be returned to its unloaded position by handwheel before electrical operation of the actuator.
- The actuator should be installed in an upright or horizontal position. Do not mount upside down or below the horizontal position.
- Periodically inspect the actuator enclosure to prevent dust from accumulating.
- Perform below inspections prior to installation. The actuator may not be used if any of the below items is unqualified.
    - ✓ Check the actuator markings and certificate number in order to check if it does comply with the intended application.
    - ✓ All parts of the housing must be assembled and fastened in the right manner.

      ⚠ **USE FASTENERS WITH YIELD STRESS ≥ 700MPa.**
    - ✓ All the explosion-proof parts may not show cracks or functional defects.

1.2.2 Cable Glands

⚠ **Please select matching explosion-proof cable connectors/glands according to the product specifications.**

ATEX / IECEx

The actuator is delivered with two conduit entries plugged by metal plugs. Use cable glands with ATEX / IECEx certification and in accordance with the technical standards required by Ex db h IIB Gb, Ex tb h IIIC Db. The electrical supply cable must be suitable for the applicable power rating and a minimal temperature of 105°C (221°F).

1.3 Working Conditions

ATEX / IECEx:

- ✓ Atmospheric pressure: 80 - 110 kPa.
- ✓ Ambient temperature: - 30°C to + 70°C (- 22°F to + 158°F).
- ✓ Relative humidity: Not more than 95% (+ 25°C / 77°F).
- ✓ The actuator can operate normally within tolerated variation of ± 10% of rated supply. voltage or ± 1% of rated frequency.

1.4 Standards

- **ATEX European Hazardous Area:**
  EN 60079-0, EN 60079-1, EN 60079-31, EN ISO 80079-36 and EN ISO 80079-37.

Directive	Group	Ambient Temperature
Ex II 2 GD	Ex db h IIB T4 Gb	- 30°C to + 70°C (- 22°F to + 158°F)
Ex II 2 GD	Ex tb h IIIC T130°C Db	- 30°C to + 70°C (- 22°F to + 158°F)

- **IECEx International Hazardous Area:**
  IEC 60079-0, IEC 60079-1, IEC 60079-31, ISO 80079-36 and ISO 80079-37.

Group	Ambient Temperature
Ex db h IIB T4 Gb	- 30°C to + 70°C (- 22°F to + 158°F)
Ex tb h IIIC T130 °C Db	- 30°C to + 70°C (- 22°F to + 158°F)

1.5 Inspection, Storage, Transport

1.5.1 Receiving / Inspection

- Carefully inspect the package for any damages resulting from shipping and report all damages to the freight carrier and supplier.
- After unpacking the product, please keep the cartons and any packing materials in case of product return or replacement. Verify that the items listed on the packing slip or bill of lading are the same as what was ordered. If there is any discrepancy, please contact your supplier.
- Verify that the technical data on the nameplate is in accordance with your purchase order.

1.5.2 Storage

- The actuator should be stored in a dry area with a relative humidity of less than 90% (20 ± 5°C) and at a temperature between - 20°C to + 40°C (- 4°F to + 104°F)
- The product shall be stored with suitable protection from corrosive substances, which could damage the metal and insulating parts.
- The metal plugs for temporary protection should not be removed until the actuator is ready to be cabled. Use suitable flameproof cable glands to ensure IP rated protection when installing. Please refer to section 1.2.2.

1.5.3 Transport

- Attach ropes or hooks for the purpose of lifting or hoisting only to the housing and not to the handwheel.
- Actuators packaged in cartons can stand up to land, sea, or air transportation.
- Packaged actuators shall be safeguarded from violent impact and strong vibrations and be protected from rain or snow.

1.5.4 Lubrication

- The gear train has been sufficiently lubricated at the factory. No additional lubrication is required.

2. Product Overview

ECON Fig. 7917EX ELSA series explosion-proof spring return fail-safe actuators are designed and manufactured as flame-proof and combustible dust-proof products.
ECON ELSA series spring return fail-safe electric actuators offer torque ranges from 50 Nm up to 260 Nm (445 in-lb to 2300 in-lb) and are designed for fail-safe positioning of quarter-turn valves or dampers upon loss of supply voltage, which include On/Off control, floating control and modulating control. A rack and pinion spring mechanism is used to position the controlled device to either fully OPEN or fully CLOSED position without any external power source. For On/Off types, a mechanical BUFFER is used at the end of the spring stroke to reduce the “water hammer” effects in pipes. A clutch-less manual override is provided for manual positioning of the controlled device. Actuators without a manual override can be ordered as an option.

ATEX / IECEx Explosion-proof instructions

II 2 G Ex db h IIB T4 Gb

II 2 D Ex tb h IIIC T130°C Db

Fig. 7917EX ELSA series Explosion-Proof Spring Return Fail-safe Electric Valve Actuator (referred as "actuator"). It is a control device for valves and can be used in the places, where is classified as Zone 1 or Zone 2, contained Group II A and Group II B gases, Zone 21 or Zone 22, contained the combustible dust atmosphere or the mixture circumstance with the explosive gas atmospheres and the combustible dust atmospheres. Temperature group T1 - T4.

➢ **Certificate Numbers:**

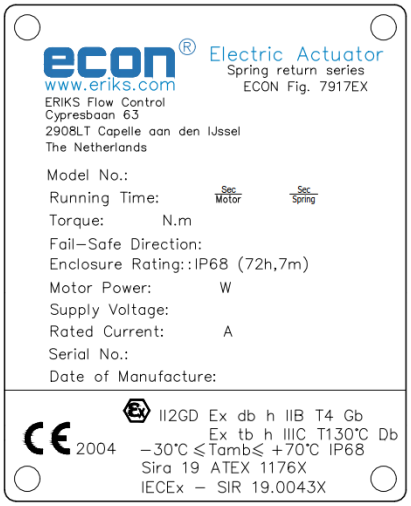
- Sira 19 ATEX 1176 X
- IECEx SIR19.0043X

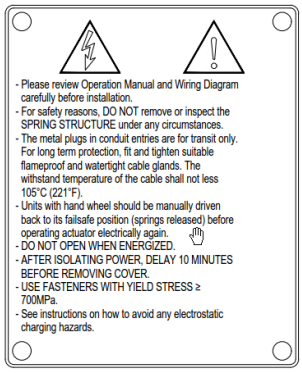
2.1 Features

- IP68 enclosure (7m/72 hours).
- Controls: On/Off, floating (optional), modulating (optional).
- Clutch-less manual override.
- ISO 5211 mounting flange.
- Domed visual position indicator.
- Built-in motor thermal protection

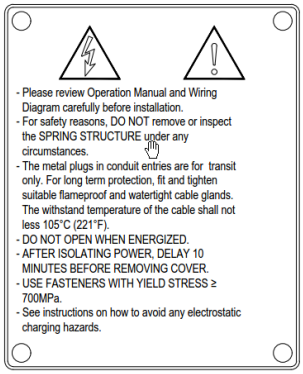
2.2 Actuator markings

- ECON logo (trade mark)
- Model number
- Running time
- Torque (output)
- Fail-safe direction
- Enclosure rating
- Motor power
- Supply voltage
- Rated current
- Serial Number
- Date of manufacture
- ATEX and IECEx markings
- ATEX and IECEx certificate No.





Actuator with manual override

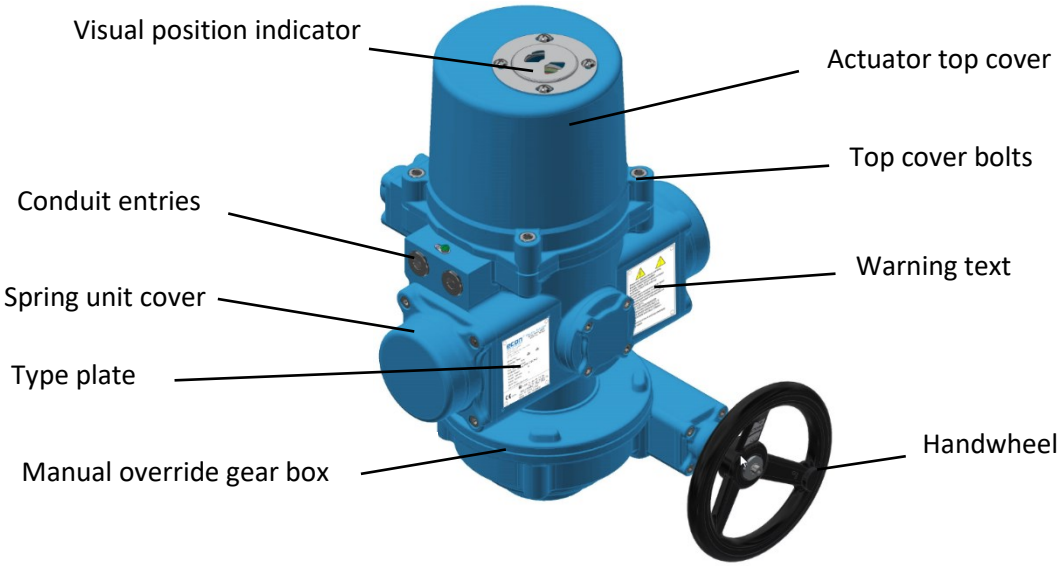


Actuator without manual override

⚠ **Please make sure the explosion-proof specification for the product is in consistence with nameplate and instruction.**

3. Product Mechanical Data

3.1 Parts Identification

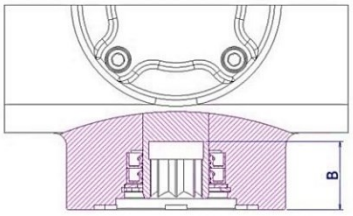


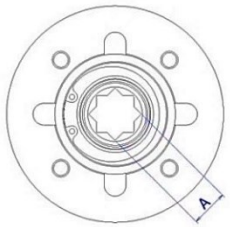
3.2 Technical Information

Model	Torque		Motor Power	Weight			
	Nm	In-lb	Watt	Without manual override		With manual override	
				kg	lb	kg	lb
ELSA50	50	445	50	28	62	38	84
ELSA130	130	1,150	130	59	130	76	168
ELSA200	200	1,770	130	97	214	137	302
ELSA260	260	2,300	130	97	214	137	302

3.3 Mounting Base Details

Model	Mounting Flange	Shaft (A)		Depth of Shaft (B)	
	ISO 5211	mm	inch	mm	inch
ELSA50	F07	17	0.669	30	1.181
ELSA130	F10	22	0.866	41	1.614
ELSA200	F12	27	1.063	45	1.772
ELSA260	F12	27	1.063	45	1.772





3.4 Actuator Selection

Fig. 7917EX ELSA-❶-❷-❸-❹-❺

❶ Type	❷ Voltage	❸ Direction of Rotation	❹ Control Mode	❺ Manual Override
ELSA50 ELSA130 ELSA200 ELSA260	24: 24VAC D24: 24VDC 110: 110VAC 1PH 120: 120VAC 1PH 220: 220VAC 1PH/3PH 240: 240VAC 1PH/3PH 380: 380VAC 3PH 440: 440V AC 3PH	CW: Fail Clockwise Spring Return. CCW: Fail Counter-Clockwise Spring Return.	T: On/Off. F: Floating. M: Modulating.	Y: With Manual Override. N: Without Manual Override.

3.5 Sizing

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

The actuator shall be sized to ensure that its torque output meets the operating torque of the valve and its ability to overcome the required duty cycle of the application (A safety factor of minimal 30% on top of the required valve torque is recommended).

If the maximum torque of a valve is 80 Nm → 80 x 1.3 = 104 Nm
104 Nm < 130 Nm (ELSA130) → OK!
104 Nm > 50 Nm (ELSA50) → NOT OK!

3.6 Duty Cycle – IEC

- The duty cycle is the relationship between the running time and resting time. It is calculated as below:

$$\text{Duty Cycle} = \frac{\text{Running Time (s)}}{\text{Running Time (s) + Rest Time (s)}} \times 100\ \%$$

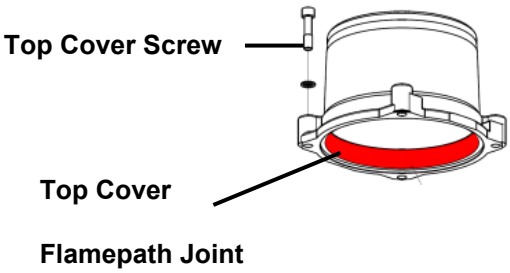
$$\text{Rest Time (s)} = \frac{\text{Running Time (s)} \times (1 - \text{Duty Cycle})}{\text{Duty Cycle}}$$

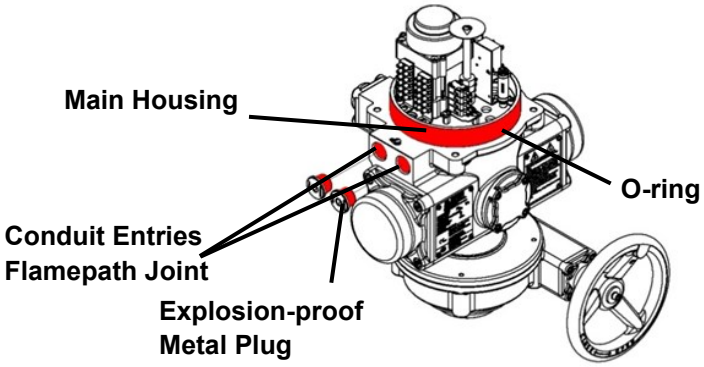
- **If the motor running time is 10 s, the spring return time is 5 s and the duty cycle is 50%, the rest (off) time shall be calculated as below:**
  - ✓ Running time: [10 s × (1 - 50 %)] / 50 % = 10, rest time is 10 s
  - ✓ Reset time : [5 s. × (1 - 50 %)] / 50 % = 5, rest time is 5 s
  - ⚠ **One cycle is equal to: open-rest-close-rest**
  - ⚠ **A rest time is required after spring return action because the gear train and motor are driven during spring release.**

3.7 Flame path Joint - Cover removal

⚠ **During cover removal and conduit entry removal, ensure that flame path surfaces are free from scratches or scrapes.**

⚠ **Actuator installation and maintenance must be performed by trained personnel.**





Cover Removal

Please gently remove the cover, but first remove the conduit entry metal plugs to relieve the pressure inside the actuator and in order to avoid a vacuum by lifting the cover. It will ease the top cover removal. DO NOT attempt to remove the top cover with a screwdriver as it will damage the closing surfaces.

Cover Installation

⚠ **Please ensure that the O-ring seal is in good condition prior to cover installation. Slowly re-install the cover while being careful not to pinch the O-ring seal.**

⚠ **The explosion-proof enclosures are marked with a QA-code on both of the connection flanges. Please verify that QA-code inside the cover is identical to the one on the connection flanges-during installation. Covers of these actuators are not interchangeable!**

Please follow below table to tighten the top cover screws:

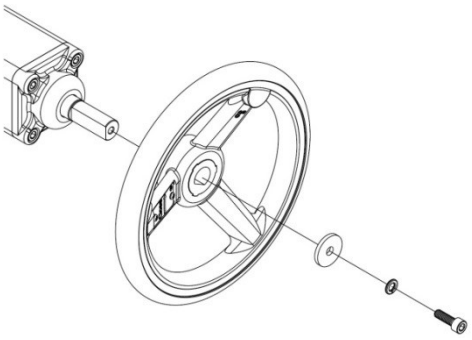
Model	Screw	Allen Key	Torque
		mm	N·m
ELSA50	M10	8	43
ELSA130	M14	12	120
ELSA200 to ELSA260	M16	14	185

4. Mounting And Setup

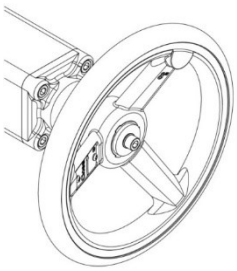
4.1 Handwheel Installation

a. Slide the fixing screw through the washers and handwheel and secure them to the override shaft as shown in the figure below.

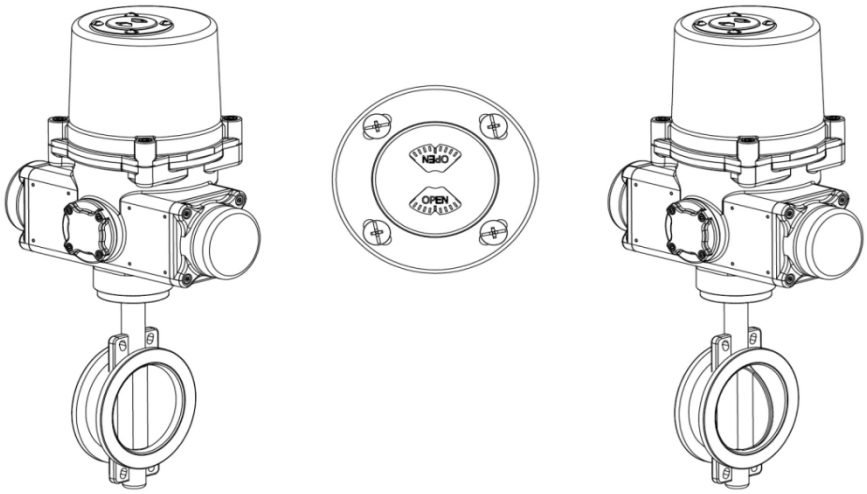
⚠ **Turn off power when installing the handwheel.**



b. Assembly completed as shown in the figure below.



4.2 Valve Mounting Instructions



a. The spring return actuator is shipped in spring return position (spring unloaded). Standard actuators will be supplied with a clockwise spring return action for closing the valve in case power outage occurs. However actuators can optionally be supplied with a counter-clockwise spring return action for opening the valve.
b. Make sure the valve is in the correct FAIL POSIITION before mounting the actuator to it. Refer to illustration above.
c. Remove all of the valve manual operation parts, such as the mechanical open/close stoppers in order to prevent interference with the electric operation.

⚠ **Do not remove the packing gland or other parts necessary for safe operation of the valve.**

d. Check again if the valve and actuator are in the same position (fully-open or fully-closed).
e. Once mounted together, either directly or with a mounting kit, ensure that they are properly secured together by fastening all fasteners by using corrects tools.
f. 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 supply must be switched off before removing the cover. Wait 10 minutes before removing the cover.**

g. A label with the wiring diagram is inside the cover of the actuator.
h. Supply power to the actuator.

⚠ **Care must be taken at all times as there are live circuits present which may cause an electrical shock.**

i. Re-calibration may be required for the end positions, refer to section 4.4 for further instructions.
j. Assemble the cover and secure the cover bolts firmly after setting.

⚠ **Refer to 3.7 for installation and check if the flame path joint between the cover and base is clean and without obstacles.**

⚠ **Please ensure that the O-ring seal is in good condition prior to cover installation.**

⚠ **The explosion proof enclosures are marked with a QA-code on both of the connection flanges. Please verify that QA-code inside the cover is identical to the one on the connection flanges-during installation. Covers of these actuators are not interchangeable!**

4.3 Wiring Instructions

⚠ **Turn off the power before making electrical connections!**

- There are grounding devices both inside and outside of the actuator (green screws). The grounding wires should be connected properly.
- Both conduit entries are plugged with metal plugs according to the specification as mentioned below.
  ELSA50 to ELSA260: 1/2" NPT, 3/4" NPT, M20 x 1.5 or M25 x 1.5.

  ⚠ **Use correct glands with threaded ends that match the inside threads of the actuator in order to prevent dame to these threads.**
- Verify the supply power is in accordance with the data on the nameplate to prevent a short circuit and an electrical shock.

  ⚠ **Do not apply power to the actuator before wiring, otherwise it can cause an electrical shock or damage the components of the actuator.**
- After wiring, please tighten the conduit entries with suitable cable glands and cover properly. Unused conduit entries have to be sealed with metal plugs to reach the explosion-proof function. Please refer to section 1.2.2.

4.4 Actuator Set-up

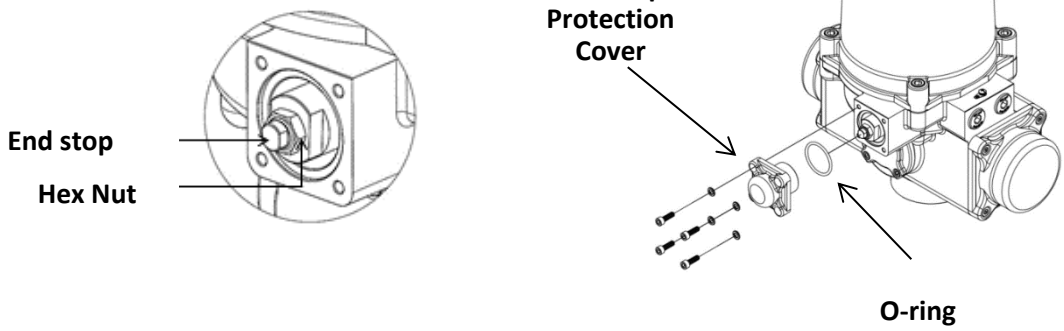
⚠ **If the actuator is equipped with a manual override, rotate the handwheel to return the actuator to its fully unloaded spring position before the power is supplied.**

⚠ **Securely tighten the conduit fittings to ensure the enclosure protection rating.**

⚠ **DO NOT APPLY POWER BEFORE the actuator is back in the full spring return position (spring onloaded).**

The spring return actuator provides fail-safe positioning and the end stop position of the spring return action is determined by either a buffer or mechanical stop (On/Off by the buffer, floating or modulating limited by mechanical 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 products will not require recalibration of these settings. However these are general settings. After the valve and actuator are bolted together, apply power to drive the actuator to its fully-open (spring compressed for a spring to close actuator). 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 the valve or damper position correctly, the end positions must be adjusted. Please follow steps below:

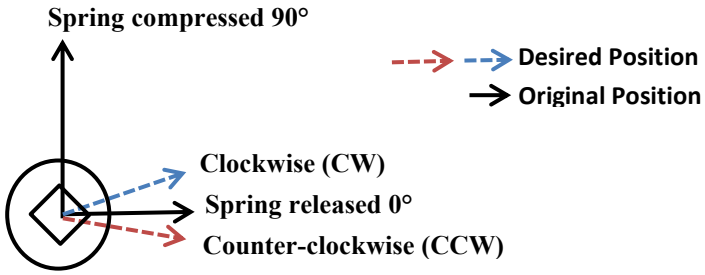


⚠ **For modulating unit, ensure to loosen the sector gear of potentiometer first before adjusting the following settings.**

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

Adjust FULLY-CLOSED (spring released) stop point. Follow the steps below:

a. Turn the power off and loosen the end stop protection cover using a 5mm hex key.
b. Loosen the hex locknut of the End Stop using a 17mm hex wrench. Hold the locknut and turn the End Stop using a 10mm hex wrench to adjust the end position
c. Turn the buffer or End Stop in order to adjust the fully-closed stop point.



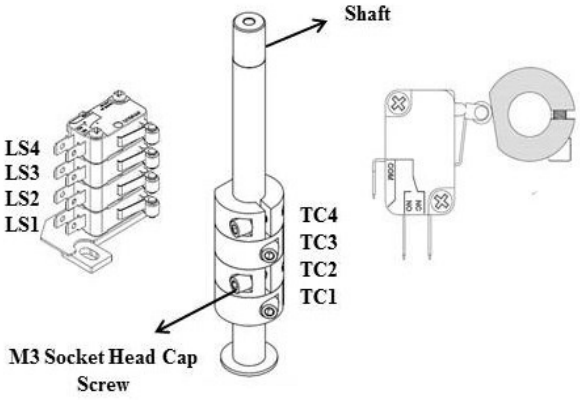
- ELSA50 : One turn = 2,3 degrees
- ELSA130 to ELSA260 : One turn = 1,4 degrees

d. Once completed, tighten the hex nut, replace the cover and tighten the bolts.

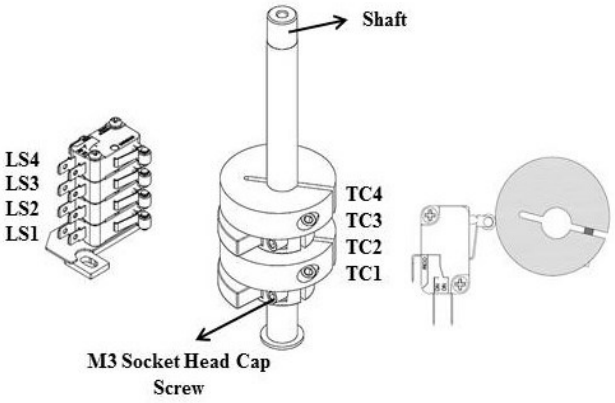
⚠ **If the buffer or End Stop is adjusted, TC2 must be reset in accordance with the buffer or the End Stop**

e. Loosen the M3 cap bolt of the cam TC2 with a 2.5mm 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 bolt of cam TC2.

ELSA50



ELSA130, ELSA200 and ELSA260



TC2 is utilized for sensing the fully-closed stop point. Once the spring mechanism has been released due to power outage, the actuator will not drive (under power) again until it has reached its fail stop position and TC2 is not triggering LS2.

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 auxiliary, refer to section** Fout! Verwijzingsbron niet gevonden. **(f.) and** Fout! Verwijzingsbron niet gevonden. **(f.) for calibration.**

Dry contact sequence diagram

Symbol	Contact	Position 100% 0%
LS4 (Dry Contact)	D - F	
	D - E	
LS3 (Dry Contact)	A - C	
	A - B	

- Solid line (—) : Dry contact in conductive state.
- Dotted line (---) : Dry contact in non-conductive state.

Adjust FULLY-OPEN (spring compressed) stop point. Follow the steps below:

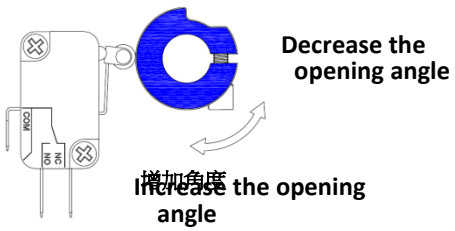
⚠ **Do not remove the cover to supply power in case the actuator is located in a hazardous environment. If so, please operate the unit manually.**

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.

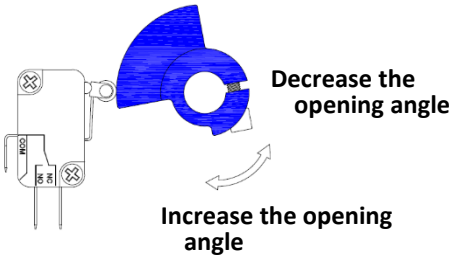
b. Turn the power off and let the spring unit drive the actuator back to its fully-closed (spring released) position.

c. If it is required to adjust, loosen the cap screw of cam TC1 with a 2.5m hex key.
   - ➢ To increase the opening angle, turn the cam clockwise.
   - ➢ To decrease the opening angle, turn the cam counter-clockwise.

【ELSA50】



【ELSA130 up to ELSA260】



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, turn the power supply off and lock the cap bolt of cam TC1
   - ✓ If it is not in the 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.

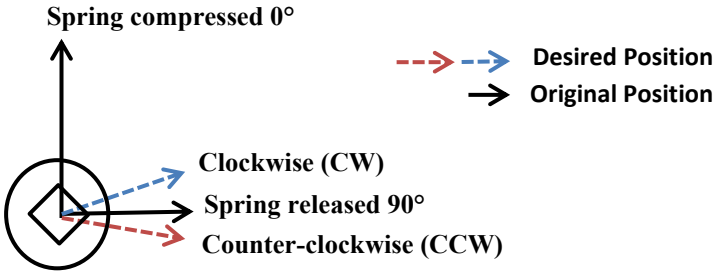
4.4.2 Adjustment procedure for spring-return actuator in the fail-open position upon loss of supply voltage

Adjust FULLY-OPEN (spring released) stop point. Follow the steps below:

a. Turn the power off and loosen the end stop protection cover using a 5mm hex key.

b. Loosen the hex locknut of the End Stop using a 17mm hex wrench. Hold the locknut and turn the End Stop using a 10mm hex wrench to adjust the end position.

c. Turn the buffer or End Stop to adjust the fully-open stop point.



- ELSA50: One turn = 2,3 degrees
- ELSA130 to ELSA260: One turn = 1,4 degrees

d. Once completed, tighten the hex nut, replace cover and tighten the bolts.

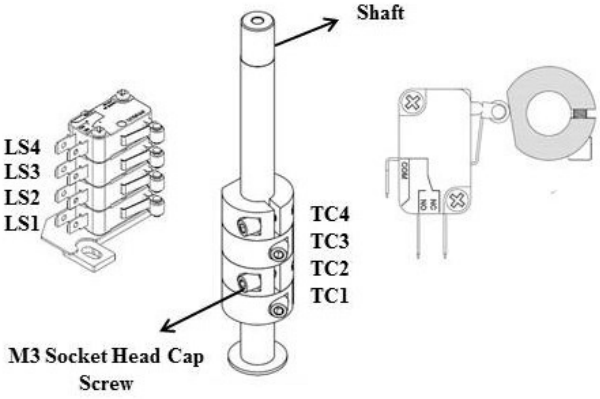
⚠ **If the buffer or End Stop is adjusted, TC2 must be reset in accordance with the buffer or the End Stop**

e. Loosen the M3 cap screw of cam TC2 with a 2.5mm hex key.

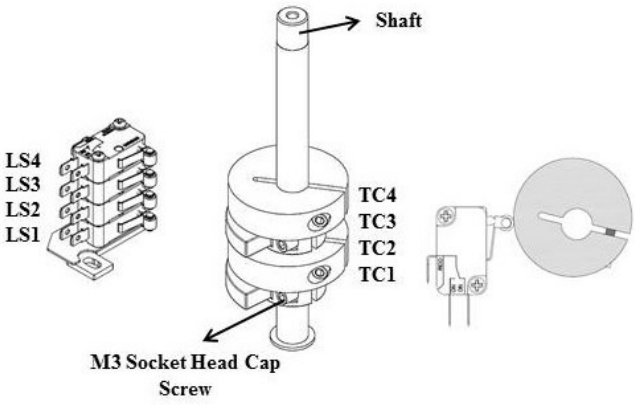
f. Rotate the cam TC2 counter-clockwise until a light click is heard, and then slowly rotate the cam TC2 clockwise until a light click is heard.

g. Tighten the cap bolt of cam TC2.

ELSA50



ELSA130, ELSA200 and ELSA260



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** is not trigger LS2.

TC1 "OPEN " **Clockwise:** decrease closing degree

Counter-clockwise: increase closing degree

Note:

- **LS2 shall trip while TC2 reaches the end stop point.**
- **TC3 & TC4 are optional, refer to section** Fout! Verwijzingsbron niet gevonden. **(f.)**

Dry contact sequence diagram

Symbol	Contact	Position 100% — 0%
LS4 (Dry Contact)	D - F	----------
	D - E	----------
LS3 (Dry Contact)	A - C	----------
	A - B	----------

- Solid line (——) : Dry contact in conductive state.
- Dotted line (----) : Dry contact in non-conductive state.

Adjust FULLY-CLOSED (spring compressed) stop point. Follow the steps below:

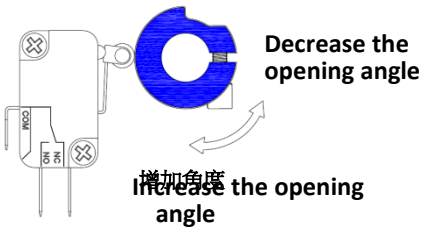
⚠ **Do not remove the cover to supply power in case the actuator is located in a hazardous environment. If so, please operate the unit manually.**

a. Apply power to drive the actuator to its fully-closed (spring compressed) position. If the close stop point is not aligned with the valve or damper properly, then it must be adjusted.

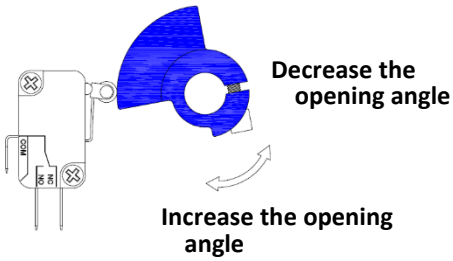
b. Turn the power off and let the spring unit drive the actuator back to its fully-open (spring released) position.

c. If it is required to adjust, loosen the cap bolt of cam TC1 with a 2.5m hex key.
   - To increase the opening angle, turn the cam clockwise.
   - To decrease the opening angle, turn the cam counter-clockwise.

【ELSA50】



ELSA130 up to ELSA260】



d. After adjusting the cam, apply power to drive the actuator to the fully-closed position.

e. Verify that it is in the correct fully-closed position.
   - ✓ If it is in correct position, turn the power supply off and lock the cap bolt of cam TC1.
   - ✓ If it is not in the 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.

4.4.3 Modulating Control Actuators Potentiometer Setting

For modulating actuators, after completing the calibration, turn the actuator to the fully-closed or fully-open position (spring released) and follow the procedure below:

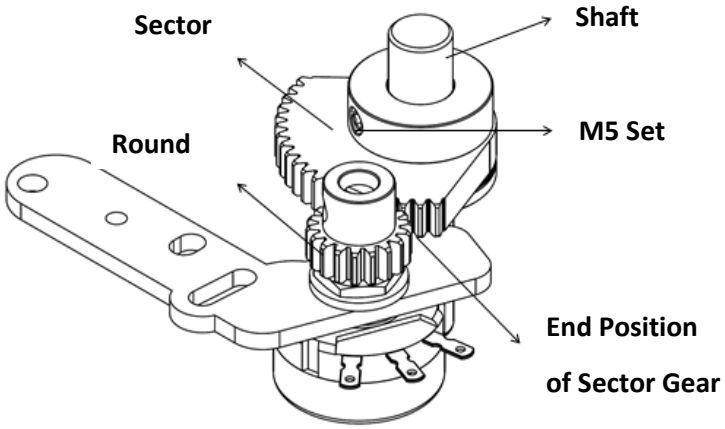
Fail clockwise (CW) rotation

a. Loosen M5 set screw.

b. Rotate the sector gear clockwise to the position shown in the image on the right.

⚠ **Ensure that the round gear and sector gear are engaged properly.**

c. Tighten M5 set screw.



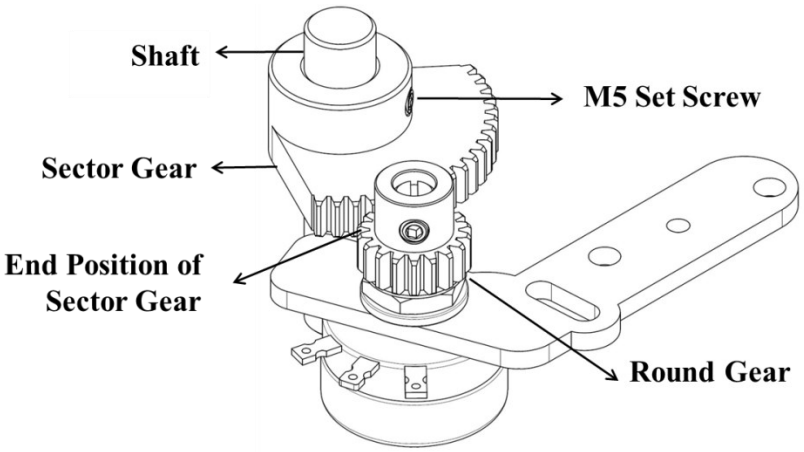
Fail counter-clockwise (CCW) rotation

a. Loosen M5 set screw.

b. Rotate the sector gear counter-clockwise to the position shown in the figure on the right.

⚠ **Ensure that the round gear and sector gear are engaged properly.**

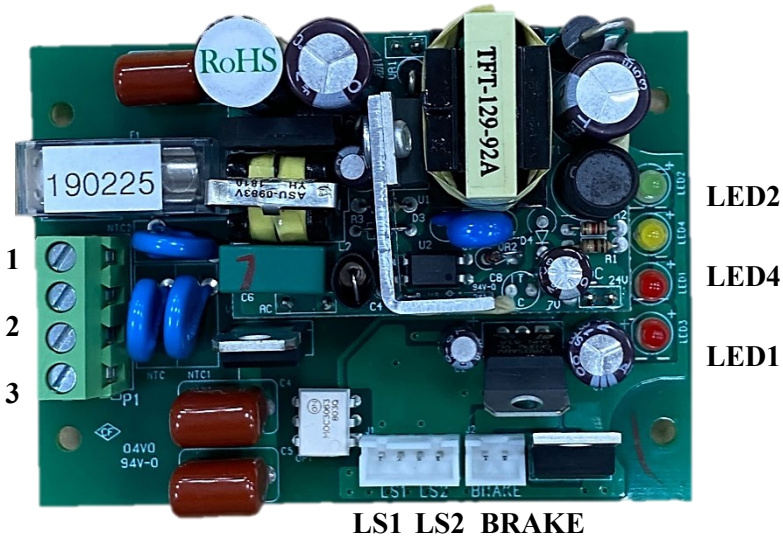
c. Tighten M5 set screw.



5. On-off Control and Floating Control Board Adjustment

5.1 On-off Control Board Surface

The layout is based on 115 / 230V voltage.



- **Indicator Lamp**

Lamp No.	Status
LED1	Power
LED2	Operating
LED3	Motor Brake
LED4	Alerting Signal

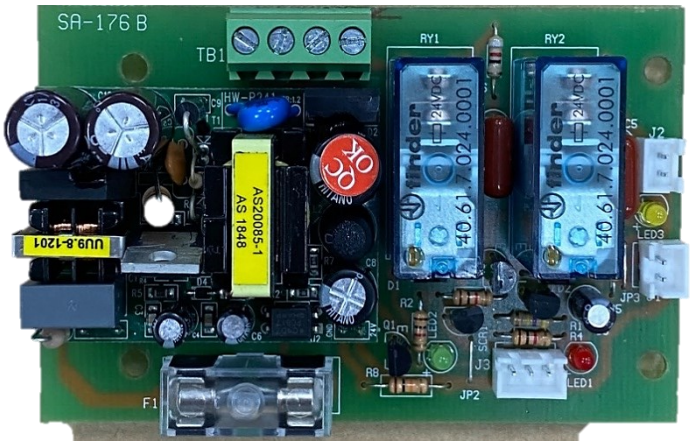
5.2 Troubleshooting of On-off Controler.

⚠ **In case LED1 to LED3 does not light or LED4 lights when the actuators are motorized, please refer to steps below for basic troubleshooting.**

Status of LEDs	Possible problems	Solution
LED4 goes on	a. LS1and LS2 terminals loose or poor contact. b. Incorrect connection of the terminal LS1 or LS2. c. The input power failure time is more than 150ms. d. Abnormal setting of limit switches and cams. e. Supply the power again during spring release. f. LS1and LS2 failed. g. Actuator overload cause it can not returned to spring released position and restart. h. Abnormal setting of cam TC and cause the contact of LS2 can not be released.	a. When the terminals loosen, please refer to the wiring diagram for wiring. If it is damaged, please replace new terminals. b. Verify the actuator is wire properly as per wiring diagram. c. Please provide an independent power supply to actuator to avoid unstable power supply and cause the actuator enter to self-protection. d. Please refer to section 4.4 Actuator set-up. e. Power off until the actuator return to spring released position and then supply power again. f. Replace new limit switches. g. Please refer to Section 3.5 Sizing. h. Please refer to section 4.4 Actuator set-up.
LED1 does not go on	a. Wrong supply voltage. b. Blown fuse. c. PCB failed.	a. Check the power supply is according to the actuator rated voltage. b. Replace a new fuse. c. Replace a new PCB.
LED2 does not go on	a. Abnormal Setting for LS1 and LS2. b. PCB failed. ◦	a. Check the LED 4, if the LED4 lights please refer to the troubleshooting for LED4. b. Replace a new PCB.
LED3 does not go on	a. PCB failed.	a. Replace a new PCB.

5.3 Floating Control Board Surface

The layout is based on 115 / 230V voltage.



- **Indicator Lamp**

Lamp No.	Status
LED1	Spring Released
LED2	Spring Compressed
LED3	Power

5.4 Troubleshooting of Floating Controler

⚠ **In case LED1 to LED3 does not light when the actuator is motorized, please refer to steps below for basic troubleshooting.**

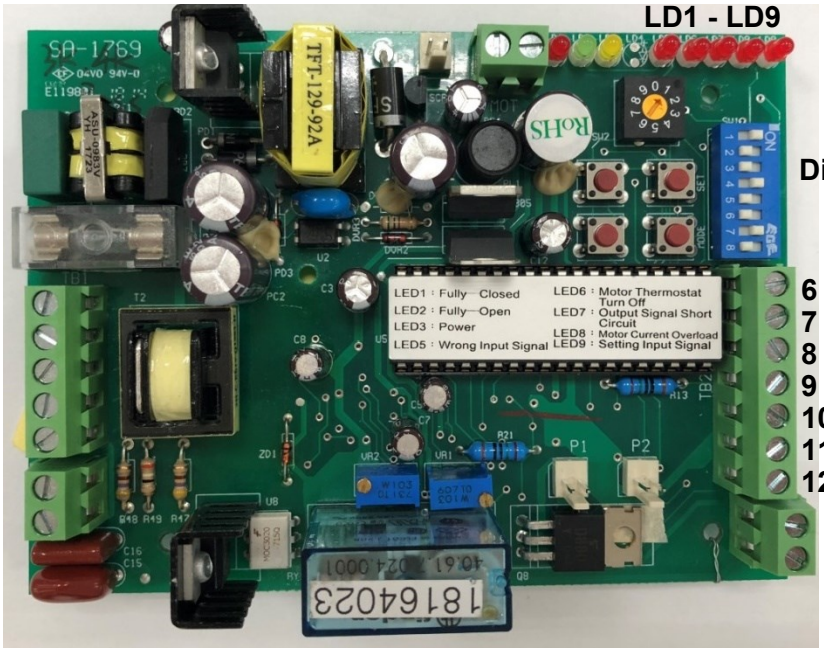
Status of LEDs	Possible problems	Solution
LED1 does not go on	a. Abnormal control signal. b. PCB failed. c. Abnormal power supplied. d. The terminals loose or poor contact.	a. Check if the terminal #4 and #6 is conducted. b. Replace a new PCB。 c. Check the power supply is according to the actuator rated voltage. d. When the terminals loosen, please refer to the wiring diagram for wiring. If it is damaged, please replace new wirings.
LED2 does not go on	a. Abnormal control signal. b. PCB failed. c. Abnormal power supplied. d. The cam active the limit switch. e. Incorrect setting of the LS1 and TC1. f. Incorrect connection of LS1. g. The terminals loose or poor contact.	a. Check if the terminal #4 and #5 is conducted. b. Replace a new PCB。 c. Check the power supply is according to the actuator rated voltage d. It's normal condition, please refer to 4.4 Actuator set-up. e. Check if the LS1 is conducted when the actuator return to spring released position, if not please refer to 4.4 Actuator set-up. f. Verify the actuator is wire properly as per wiring diagram. g. When the terminals loosen, please refer to the wiring diagram for wiring. If it is damaged, please replace new terminals.

Status of LEDs	Possible problems	Solution
LED3 does not go on	a. Abnormal power supply. b. Blown fuse (F1). c. PCB failed. d. Incorrect setting of the LS2 and TC2. e. Actuator overload. f. Actuator is abnormal and can not return to spring released positon. g. Incorrect connection of LS1. h. The terminals loose or poor contact.	a. Check the power supply is according to the actuator rated voltage. b. Blown fuse. c. Replace a new PCB. d. Check if the LS2 is conducted when the actuator return to spring released positon, if not please refer to 4.4. Actuator set-up. e. Check if the torque of valve larger than actuator rated torque. f. Contact with factory to replace new actuator. g. Verify the actuator is wire properly as per wiring diagram h. When the terminals loosen, please refer to the wiring diagram for wiring. If it is damaged, please replace new terminals.

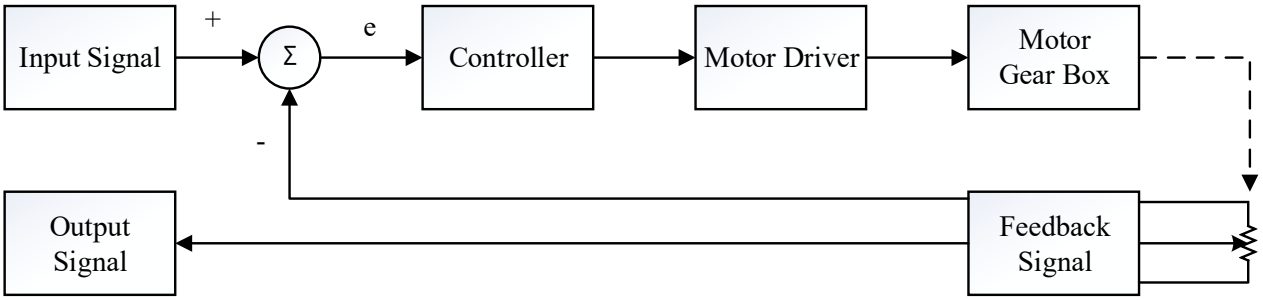
6. Modulating Control Board Adjustment

6.1 Modulating Control Board Surface

The layout is based on 110 / 220 V voltage.



6.2 Programming



6.3 Dip Switch Setting (SW1)

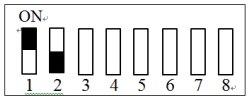
The Dip Switch SW1 is a combination of 8 switches and equally divided in two rows. It is utilized to select signal type of input as well as output and fail positioning when the signal input fails. The sliders can be placed at either ON (upper) or OFF (lower) state position. Factory settings are switches 1, 4, 8 at ON state and switches 2, 3, 5, 6, 7 at OFF state.

Please follow steps below if an adjustment of these settings are required.

ⓘ **Please restart the actuator after adjusting.**

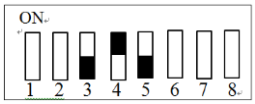
	1	2	3	4	5	6	7	8
Factory setting	ON	OFF	OFF	ON	OFF	OFF	OFF	ON
4 - 20 mA input	ON	OFF						
1 - 5 V input	OFF	OFF						
2 - 10 V input	OFF	ON						
4 - 20 mA output			OFF	ON	OFF			
2 - 10 V output			ON	OFF	ON			
Input 20 mA / 5V / 10V to operate valve to fully-open position						OFF		
Input 20 mA / 5V / 10V to operate valve to fully-closed position						ON		
When signal input failed, driving valve to fully-open (when S6 sets at " ON").							OFF	ON
When signal input failed, driving valve to fully-closed (when S6 sets at " ON").							ON	OFF
When signal input failed, driving valve to fully-closed (when S6 sets at " OFF").							OFF	ON
When signal input failed, driving valve to fully-open (when S6 sets at " OFF").							ON	OFF
When signal input failed, valve stays at the last position.							ON	ON

a. Input Signal Setting (switches 1 - 2)



Input Signal	State of Switches
4 - 20 mA	1 at ON, 2 at OFF.
1 - 5 V	1 at OFF, 2 at OFF.
2 - 10 V	1 at OFF, 2 at ON.

b. Output Signal Setting (switches 3 - 5)

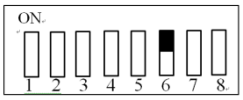


Output Signal	State of Switches
4 - 20 mA	3 at OFF, 4 at ON, 5 at OFF.
2 - 10 V	3 at ON, 4 at OFF, 5 at ON.

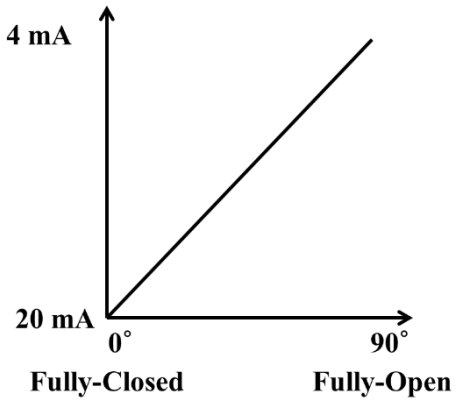
c. Setting of fail position when input signal failed (Switches 6 - 8).

⚠ **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.**

When S6 is set to ON :



- The program defines 20 mA or 5 V or 10 V as a command for fully-closed positioning. The line graph below shows the signal level and the corresponding position of actuator.



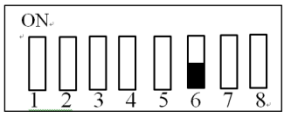
- When a low signal value is received, the actuator operates toward fully-open position and when a high signal value is received, the actuator operates toward fully-closed position.

Input Signal	Fully-Open (90°)	Fully-Closed (0°)
4 - 20 mA	4 mA	20 mA
1 - 5 V	1 V	5 V
2 - 10 V	2 V	10 V

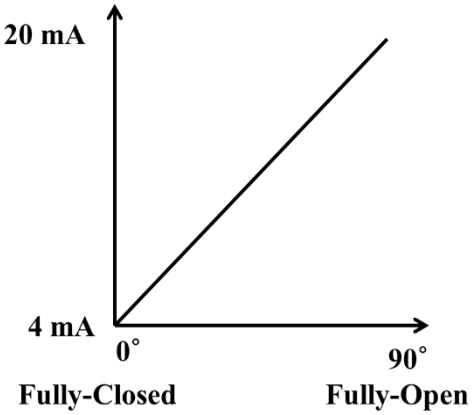
- The selection of the fail position while the input signal failed, please follow table below:

Signal Failed Position	State of Switch
Fully-Open (90°)	7 at OFF, 8 at ON
Fully-Closed (0°)	7 at ON, 8 at OFF
The Last Position	7 at ON, 8 at ON

When S6 is set to OFF:



- The program defines 20 mA / 5 V /10 V as a command for fully-open positioning. The line graph below shows the signal level and the corresponding position of the actuator.



- When a high signal value received, the actuator operates toward fully-open position and when a low signal value received, the actuator operates toward fully-closed position.

Input Signal	Fully-Open (90°)	Fully-Closed (0°)
4 - 20mA	20 mA	4 mA
1 - 5 V	5 V	1 V
2 - 10 V	10 V	2 V

- The selection of the fail position while the input signal failed, please follow table below:

Signal Failed Position	State of Switch
Fully-Open (90°)	7 at ON, 8 at OFF
Fully-Closed (0°)	7 at OFF, 8 at ON.
The Last Position	7 at ON, 8 at ON.

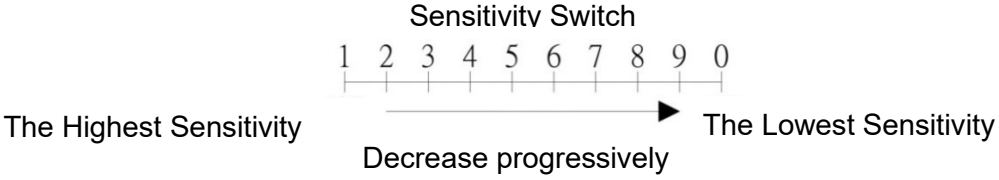
6.4 P4 Terminal

- 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.

6.5 Sensitivity Switch Setting (SW2)

When the sensitivity setting is higher, the resolution of the input signal will be higher, and relatively the dead band will be smaller. Excessive high sensitivity setting may cause the actuator to keep hunting and could not run to the desired position which will lead to the thermostat inside the motor to trip because of overheating, and finally the actuator will shut down. If this situation happens, it is suggested to turn down the sensitivity setting.

6.5.1 Setting



- When switched to ” 1 ”: The Highest Sensitivity.
  When switched to ” 0 ”: The Lowest Sensitivity.

6.5.2 Original factory setting

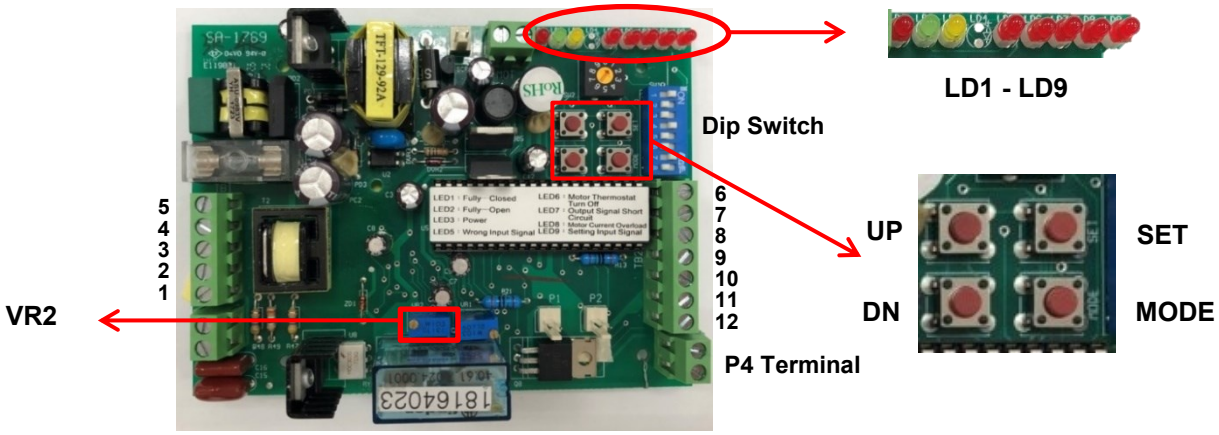
- ELSA50 up to ELSA260：3.

Model	Figure
ELSA50 to ELSA 260	

6.6 Signal Settings 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.**



Lamp	Status	Lamp	Status
LD1	Fully-closed **(Spring released)**	LD6	Motor thermal protector activated
LD2	Fully-open **(Spring compressed)**	LD7	Output signal short circuit
LD3	Power	LD8	Overcurrent in motor
LD5	Wrong input signal	LD9	Local setting mode

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

- **Signal setting for Fully-OPEN position (Spring compressed)**
  a. Press and hold “UP” button to operate the actuator to open until it has reached the fully-open position and LD2 lights. Input the signal according the setting value of dip switch and check if output signal is correct, if not, correct output signal, adjust VR2 until you achieve the correct output signal.

VR2 ↻ Clockwise: increasing signal value.
↺ Counter-clockwise: decreasing signal value.

  b. Press ”MODE” button for 2 seconds to complete the setting of fully-open position.
- **Signal setting for Fully-CLOSED position (Spring released)**
  a. Press and hold “DN” button to operate the actuator to close until it has reached fully-closed position and LD1 lights. Input the signal according the setting value of dip switch and check if output signal is correct, if not, correct output signal, adjust VR2 until you achieve the correct output signal.

VR2 ↻ Clockwise: increasing signal value.
↺ Counter-clockwise: decreasing signal value.

  b. Press “MODE” button for 2 seconds to complete the setting of fully-closed position.

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

6.7 Troubleshooting of modulating controller

⚠ **In case LD3 does not light or any of LD5 to LD9 lights when the actuator is motorized, please refer to steps below for basic troubleshooting.**

⚠ **Please do the troubleshooting when LD4 to LD8 lights, and then restart the power to turn the lights off.**

Status of LEDs	Possible problems	Solution
LD3 does not go on	a. No power supplied. b. Incorrect connection of the lines #8, #9 of the potentiometer c. Modulating controller failed.	a. Check the power supply as well as wires connected to terminals #4 & #5, please refer to section 6. b. Verify the actuator is wired properly as per wiring diagram. c. Send back to the factory for inspection.
LD5 goes on	a. An incorrect signal type inputted. For example, preset with 2-10 V input but input 4 - 20 mA. b. Input a voltage exceeding the rated. For example, preset with 2-10 V input but input 13.5 V. c. An incorrect signal type inputted. For example, preset with 4 - 20 mA input but input 2 - 10V. In this case, the actuator still works in 2 - 7V. When the signal is over 7.2 V, the LD5 lights.	Verify if the switch 1 is set in accordance with the type of input signal. Please refer to section 6.3.
LD 6 goes on	Motor thermal protector started.	a. The duty cycle exceeded the rated, please refer to section 3.6. b. The contact of motor thermal protector (MOT) disconnected.
LD7 goes on	a. Signal output short circuit. b. The input signal type 2 - 10 V with reversed polarity.	a. Verify if the signal output with reversed polarity. The negative pole should be connected to terminal #11 and the positive pole should be connected to terminal#12. b. Verify if the signal input with reversed polarity when applying 2 - 10 V, the negative pole should be connected to terminal #6 and the positive pole should be connected to terminal #7.
LD8 goes on	Motor over-current.	a. Duty cycle exceeded the rated. Please refer to section 3.6 and reduce the duty rating. b. Check the load. c. Check if the motor rotor is locked (For example: Valve is stuck by foreign objects).
LD9 goes on	Local setting mode - Setting position for open & close.	After completing setting, press “SET” button to quit.

7. Troubleshooting

⚠ **ACTUATORS WITH A HANDWHEEL: Always turn back the actuator to the fully closed or fully open position (spring in unloaded condition), before connecting the actuator to the power source.**

Floating Controller

Motor does not operate and overheats.

Possible problems	Solution
a. The seating torque of valve increased caused by oxidized seals and has resulted in a torque overload on actuator. b. Jammed pipe or valve seat stuck. c. Motor drive stem bearing damaged. d. The limit switch for fully-closed does not trip (with manual override). e. The limit switch for fully-closed does not trip (without manual override).	a. Manually operate or replace the valve. b. Check for any blockage or obstacle in pipe. c. Replace the actuator. d. Operate the actuator manually to fully-closed position and confirm if the limit switch trips. e. Check if a torque overload is caused by the valve.

The actuator functions normally but motor is hot.

Possible problems	Solution
a. Actuator operates too frequently and exceeded duty cycle rating. b. A torque overload is caused by the valve. c. Wrong power supply. d. Parallel connection of two ore more actuators.	a. Adjust the system bandwidth or reduce the frequency of operation. b. This problem happened frequently after valve operating for a long time. It is suggested to replace the valve. c. Check the power supply. d. Check operation current values and install a relay. (Every actuator needs its own power source)

The valve does not operate no matter under either electrical operation or manual operation.

Possible problems	Solution
a. The actuator is not properly installed onto the valve. b. The torque of valve is larger than the torque of the actuator. c. The set screw of the cam is loosened. d. The OPEN and CLOSE end stop points of actuator are not aligned with the valve.	a. Please refer to the installation steps is section 4.2. b. Replace with a new valve or a larger size actuator. c. Readjust the mechanical stops and limit switches, please refer to section 4.4. d. Separate the actuator from the valve and reinstall to ensure the OPEN and CLOSE stop points are aligned properly.

The capacitor is failed.

Possible problems	Solution
a. The environmental temperature did exceed the withstandable temperature range.	a. Please use the capacitor at a temperature between -30°C to +70°C (-22°F to +158°F)

Modulating Controller

The LED (LD5 - LD9) is flashing.

Solution
Refer to section 6.6

The actuator is running fully open/close but is not modulating.

Possible problems	Solution
The signal input with a reversed polarity, it means a signal failure.	Verify if the negative pole of signal input connected to terminal #6 and the positive pole connected to terminal #7.

Modulating controller is out of function.

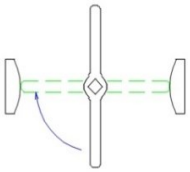
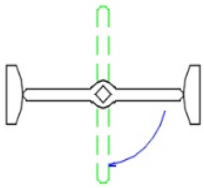
Possible problems	Solution
a. Potentiometer failed. Actuator is out of control or receiving abnormal feedback. b. The sector gear of potentiometer is loosened. c. Input by wrong signal type. d. Modulating board failed and actuator does not work or can only be operated in a single direction.	a. Replace with a new potentiometer. b. Check if the input signal is correct, please refer to section 6.3. c. Replace with new modulating board. d. Send back to factory for inspection.

8. Actuator Options

Fail clockwise (CW) rotation
When energized, the driven valve rotates CCW (viewed from the top of the actuator). Meanwhile, the springs are compressed. On loss of power, the spring returns (unloaded) and the driven valve rotates CW.

Fail counter-clockwise (CCW) rotation

When energized, the driven valve rotates CW (viewed from the top of the actuator). Meanwhile, the springs are compressed. On loss of power, the spring returns (unloaded) and the driven valve rotates CCW.

Valve's operating direction	The position required for the valve when power fails	Actuator type	Handwheel direction
	Valve fully-closed	CW	Direct mount per original factory setting. 
	Valve fully-open	CCW	Adjust the tag and position indicator. 
	Valve fully-closed	CCW	Direct mount per original factory setting. 
	Valve fully-open	CW	

⚠ **ACTUATORS WITH A HANDWHEEL: Always turn back the actuator to the fully closed or fully open position (spring in unloaded condition), before connecting the actuator to the power source.**

Instructions for adjusting the open/close indicator beacon:

1. Loosen the lock screws of top cover (Figure 1).
2. After loosening the lock screws of the position indicator, remove the indicator from the top of the shaft. Rotate the indicator 90 degrees and lock the screws, then re-install the indicator scale (Figure 2).

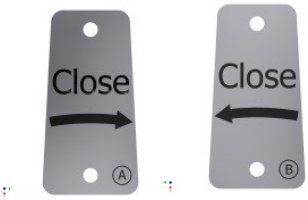
The handwheel is marked with an arrow pointing towards the CLOSED direction. Please make adjustments to the handwheel marking in case the configuration changes – Figure 4.

1. Loosen the screws of the tag and adjust the tag to reflect the correct CLOSE direction (Figure 3).
2. Adjust the tag to side B (counter-clockwise in the closing direction) and tighten the screws (Figure 4).

【Figure 1】

【Figure 2】

【Figure 3】



【Figure 4】

If you have questions about this product,
Please contact the nearest ECON distributor.
You can find them on **www.eriks.com**

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