

SERIES EL-940 SPRING RETURN ELECTRIC ACTUATORS

Actuator Specifications	EL-940 Series		
Torque lb/Nm	1750"lbs / 200Nm		
Supply Voltage	24VAC/DC	120VAC	230VAC
Max Inrush Current	19.0A	11.0A	5.6A
Running Current	9.0A	3.8A	2.1A
Runtime (90°@60/50Hz)	11.0 sec	11.0 sec / 13.0 sec	
Runtime (90° Spring)	3.0 sec	12.0 sec	
Weight	297lbs / 135kg		
Mechanical Connections	ISO5211 F12 8pt 27mm		
Electrical Entry	(2) 3/4" NPT		
Electrical Terminations	12 - 16 Ga.		
Environmental Rating	4, 4X		
Manual Override	15.8" HandWheel		
Control	On/Off/Jog/Proportional		
Case material	Aluminum Alloy, Powder Coated		
Motor Protection	Split Phase Capacitor		
120vac or 230vac Operation	275°F/135°C Thermal F Class		
Motor Protection	Brush type DC Motor		
24vac or 24vdc Operation	275°F/135°C Thermal F Class		
Ambient Temperature	-22°F to +150°F		
Operating Range	-30°C to +65°C		

A SPRING RETURN electric actuator designed for load requirements up to 1750"lbs. The actuator comes standard with two auxiliary switches (Form C), an internal low power heater, a NEMA 4X environmental rating, and in 120/230VAC or 24VAC/DC supply voltages. The EL Series mechanical connections utilize an ISO5211 mounting system, size F12 with an 8 point 27mm female drive. The EL Series is offered in three different control modes....On/Off (2 position control), Jog (floating control) and Proportional (modulating control). Application requirements will dictate whether to utilize a CW (clockwise spring return) or CCW (counter-clockwise spring return) model.

Theory of Operation

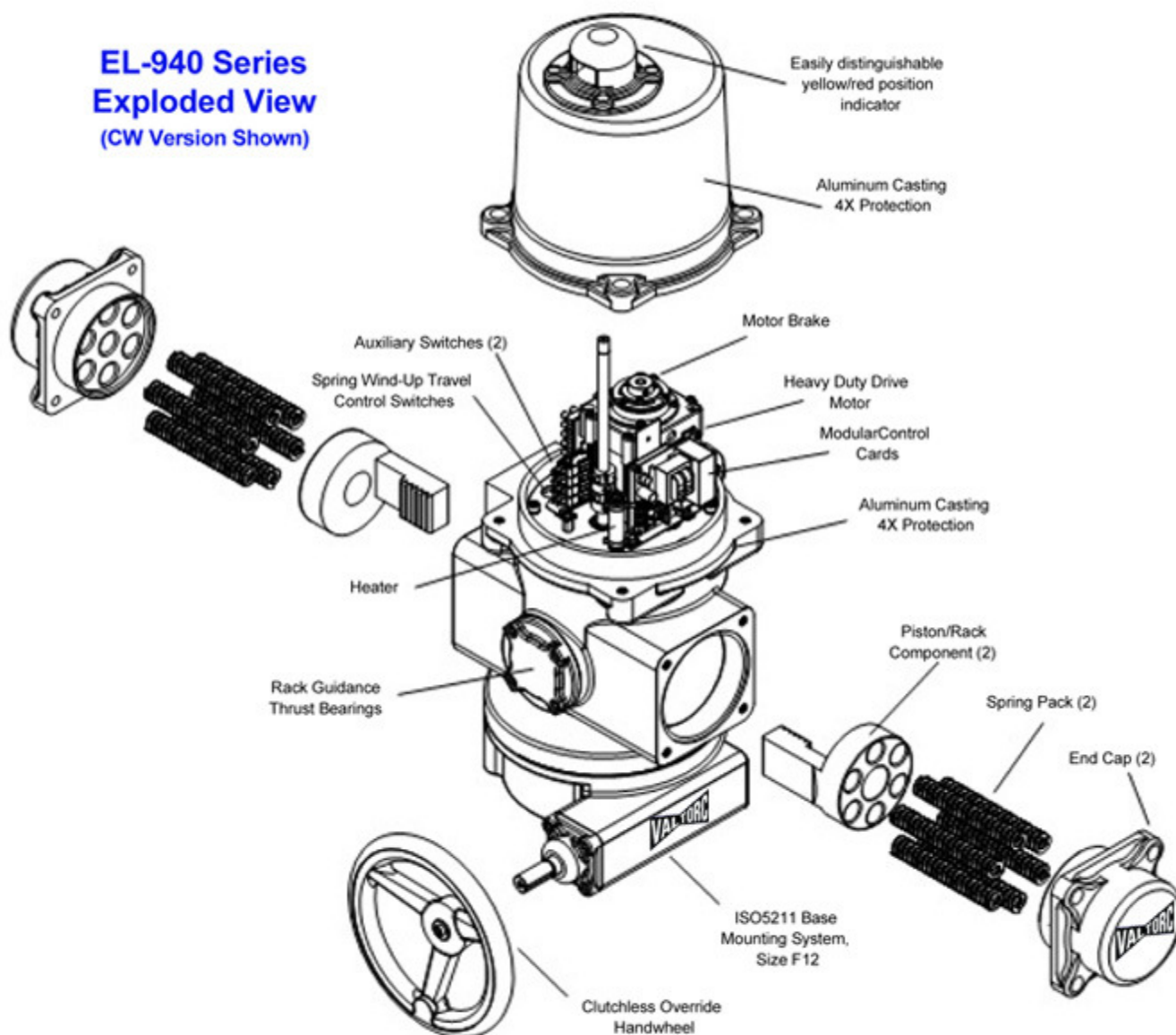
While power is present, the actuator will respond to drive control signals depending on the model chosen. A 2 position unit will drive until it reaches the full end of travel setting opposite the spring return direction. A Jog unit will drive OPEN, CLOSED or HOLD position until it receives a command to move otherwise. A Proportional control unit will follow an analog control signal for positioning and will HOLD until a modified control signal is received. In each of these models a motor brake unit is utilized to HOLD the actuator in position until commanded to move OR a loss of supply voltage. If power is lost or removed at any time, the brake is released and the mechanical spring mechanism returns the actuator to its normal (unloaded) position. Once the spring mechanism has been released, the actuator will not drive under power again until a) the unit has reached its fail stop (unloaded) position and b) power has been restored to the actuator. While the actuator is in its fail stop position, the MANUAL HANDLE may be employed to position the actuator anywhere between the UNLOADED and LOADED position and the actuator will HOLD in that position indefinitely, regardless of whether power is present. The MANUAL HANDLE must return the actuator to its fully UNLOADED position BEFORE electrical operation of the actuator will be possible. **THIS IS A SAFETY FEATURE.** Additionally, if the actuator has been driven electrically to its fully LOADED position, the MANUAL HANDLE cannot be used to drive the actuator back to its fully UNLOADED position. **THIS IS ALSO A SAFETY FEATURE.** This prevents unexpected release of stored spring energy. Remote indication of actuator status is possible by utilizing built-in auxiliary switches. These dry contacts can show when an actuator has been overridden after power has been restored, indicating the actuator will NOT operate under control again until it has been manually returned to the full Fail-Safe position (explained above).



Application Notes:

1. These actuators are designed to be used in either a horizontal or upright position.
Do NOT mount the actuator with the top below a horizontal position.
2. When installing conduit, use proper techniques for entry into the actuator. Use drip loops to prevent conduit condensate from entering the actuator.
3. Both NPT conduit ports MUST use proper equipment to protect the NEMA 4x integrity of the housing.
4. The internal heater is to be used in ALL applications.
5. Do NOT install the actuator outdoors or in humid environments unless it is powered up and the heater is functioning.
6. Use proper wire size to prevent actuator failure (see chart below for proper wire sizing).
7. The mechanical travel stop is factory calibrated for end-of-spring travel. The setting of this stop should be changed ONLY if absolutely necessary and ONLY after consulting with Valtorc Engineering. This stop is ONLY for the spring return end of travel and has a MAXIMUM of +/- 2 degrees adjustment. The power drive direction stop is adjusted by end-of-travel cams and again should only be performed after reviewing the Field Manual and consulting with the factory.

EL-940 Series Exploded View (CW Version Shown)



A modular cast aluminum housing incorporates the mechanical drive train, the spring pack, rack assemblies, output drive shaft, motor and control section and the manual override handwheel unit. **The spring pack is NOT field servicable and spring failure direction mode must be selected at time of order.**

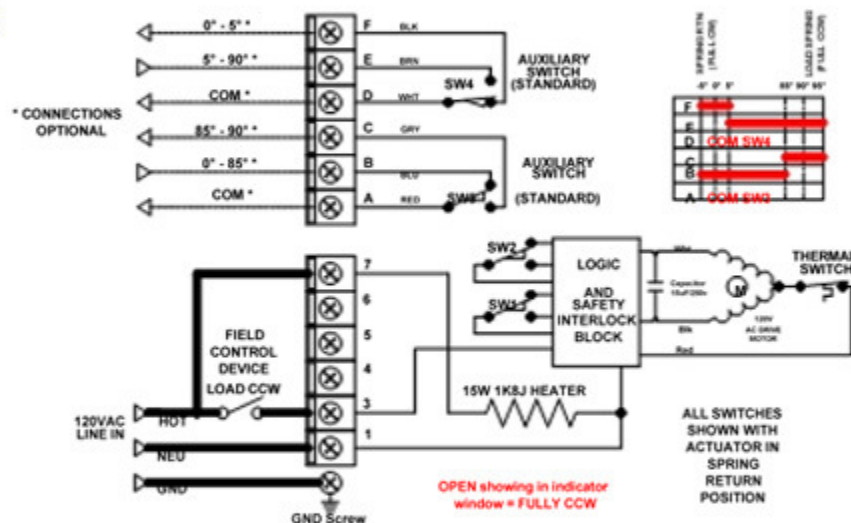
CAUTION!.....spring packs are under **EXTREME** tension and must **NOT** be altered or modified under any circumstances. Do **NOT** remove any bolts or screws from the actuator housing other than the (4) TOP COVER SCREWS. Failure to comply with this warning could cause severe bodily injury.

Wiring Diagrams for EL-940 Series

Field Control Device may be relay contact, Switch or Valtorc type. Pilot device 10A MAX. Auxiliary switches are rated 10A @ 250vac MAX. Terminals A-F are dry type Form C. Terminals accept 12-18ga solid/stranded wire.

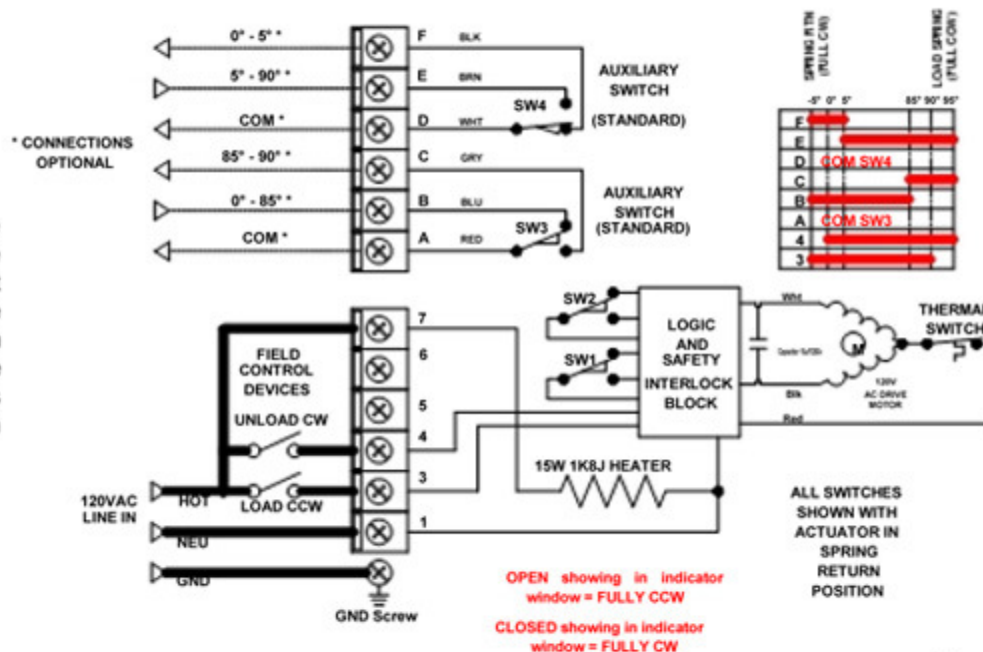
On/Off/2 Position Control

On/Off or 2 Position control is used for damper or valve applications where the requirement is for either fully open or fully closed positioning. This actuator must drive to it's end of travel opposite the spring fail position. Loss of control signal or power before reaching it's end of travel will cause the unit to spring return.



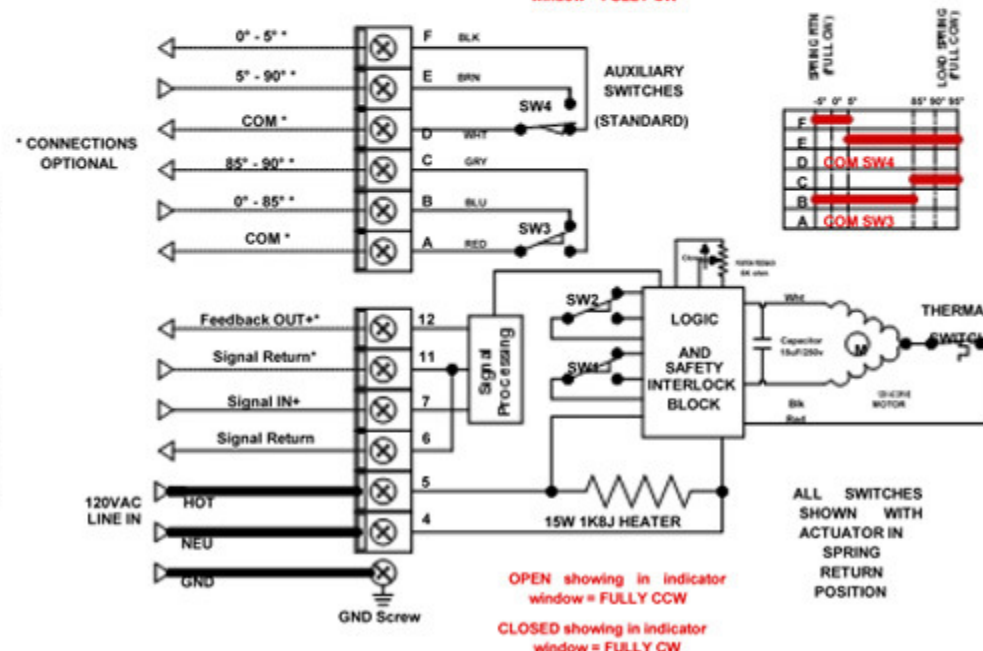
Jog/Floating Control

Jog/Floating control is used for damper or valve applications where the requirement is for the device to be controlled with a standard floating controller that can drive one direction, stop in mid stroke, then drive in the opposite direction or any combination thereof. In this scheme, the motor brake will engage any time the drive motor is NOT moving under power. Only a loss of supply POWER will cause the spring mechanism to fail-position the actuator.



Proportional Control

Proportional control is used for damper or valve applications where the requirement is for the device to follow an analog control signal to provide modulating control of the device. The unit will accept various control signal inputs (4-20mA, 2-10vdc or 1-5vdc) and also will provide an analog feedback signal for external signal referencing. In this scheme, the motor brake will engage any time the drive motor is NOT moving under power. Only a loss of supply POWER will cause the spring mechanism to fail-position the actuator. However, a loss of control SIGNAL can be programmed to drive the actuator to either fully open, fully closed or to fail-in-position.



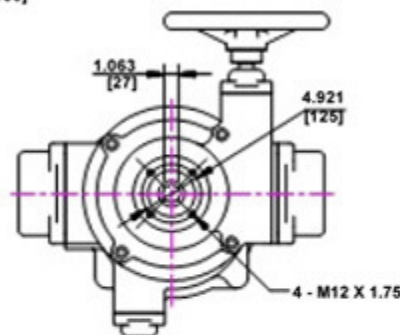
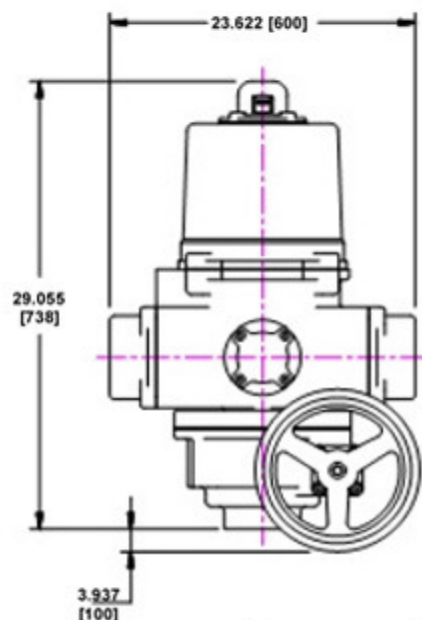
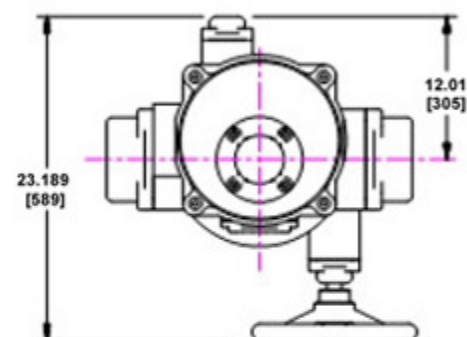
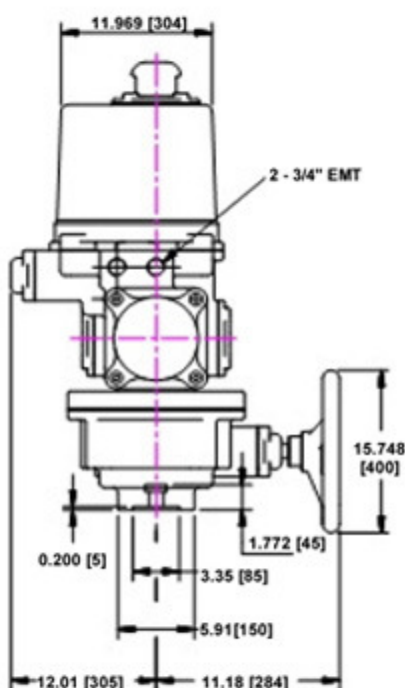
Wire Sizing Data

MAX distance between Actuator and Supply (feet)

Wire Gage	EL-CW-24 19.0A	EL-CW-120 11.0A	EL-CW-230 5.6A
18	-	-	-
16	-	-	444
14	-	191	718
12	34	292	1098
10	57	496	1867
8	86	740	2786

Wire sizing data is provided in the table above to assist in the selection of the proper wire size for Valtorc EL series actuators using various wire sizes over distance. Please make sure to reference the correct voltage and do not exceed the indicated length of the wire run for each model.

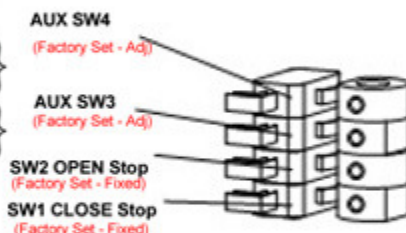
EL-940 Series Dimensional Data (CW Version Shown)



Switch Logic Map and Switch/Cam Arrangement

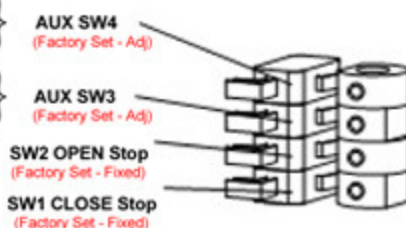
Switch sequencing data is provided in the tables below to show the change-of-state points during the rotation of the actuator from CW to CCW and back again. The LOWER 2 cams are set at the factory and MUST NOT be changed. The INCLUDED auxiliary switches SW3 & SW4 are for terminals A thru F and those set points may be modified if need be.

	(CW)		(CCW)	
	-5°	0°	5°	85° 90° 95°
D:F	—	—		
D:E			—	—
A:C				—
A:B	—	—		
3	—	—		
4	—	—		



Switch/Cam arrangement for Jog & Proportional control (CW Version shown)

	(CW)		(CCW)	
	-5°	0°	5°	85° 90° 95°
D:F	—	—		
D:E			—	—
A:C				—
A:B	—	—		
3	—	—		



Switch/Cam arrangement for On/Off control (CW Version shown)