



## Commercial Actuator Selection Chart – Non-Spring Return

Actuator Model	24 VAC Power Input	Control Signal								Position Feedback		Torque					Aux. Switches	
		On/Off	Tri-State Floating	0 to 10 VDC 0 to 20 mA*	4 to 20 mA	0 to 20 V Phasecut	0 to 135 Ohm	Pulse Width Modulation (PWM)	Starting Point & Span Adjust. (zero & span)	0 to 10 VDC	Resistive 0-1000 Ohm	44 in-lb	88 in-lb	132 in-lb	177 in-lb	221 in-lb	310 in-lb	Built-in Auxiliary Switches, (-S) only
EN44B2(-S)	●			●		5	5	5		●		●						●
EN44B2-ZS(-S)	●			●	6				●	●		●						●
EN44C2-NP	●	2	●									●						
EN44C2(-S)(-P)	●	2	●								3	●						●
EN88B2(-S)	●			●		5	5	5		●			●					●
EN88B2-ZS(-S)	●			●	6				●	●			●					●
EN88C2(-S)(-P)	●	2	●								3		●					●
EN132B2	●			●		5	5	5		●				●				
EN132B2-ZS-S	●			●	6				●	●				●				●
EN132C2(-S)(-P)	●	●	●								3			●				●
EN221B2(-S)	●			●		5	5	5		●					●			●
EN221B2-ZS(-S)	●			●					●	●					●			●
EN221C2(-S)	●	●	●												●			●
EN177D2(-S)	●				●										●			●
EN310B2(-S)	●			●		5	5	5		●							●	●
EN310B2-ZS(-S)	●			●					●	●							●	●
EN310C2(-S)	●	●	●								3						●	●

Notes:

- \* Requires 500 ohm resistor.
- 2 Can be wired for two-position control using a Form C relay.
- 3 (-P) option includes potentiometer feedback
- 5 Peripheral options are available for specialty signals such as PWM, 0-135 ohm and 0-20 V phase cut.
- 6 "-ZS" version can be calibrated to 2 to 10 V. With the addition of a 500 ohm (1 %, 1/4 W) resistor, it is compatible with 4 to 20 mA.
- Most assemblies are available with an optional weathershield, or NEMA 4/4X type enclosure.
- (-S) indicates built-in auxiliary switch.



## Commercial Actuator Selection Chart – Spring Return

Actuator Model	Power Input		Nominal Spring Return Time (Sec) - Maximum	Control Signal								Position Feedback		Torque		Built-in Auxiliary Switches (-S) only
	24 VAC	120 VAC		On/Off	Tri-State Floating	0 to 10 VDC 0 to 20 mA*	4 to 20 mA	0 to 20 V Phasecut	0 to 135 Ohm	Pulse Width Modulation (PWM)	Starting Point & Span Adjust.	0 to 10 VDC	Resistive (-P) 0-1000 Ohm	62 in-lb	142 in-lb	
ES62A2(-S)	2		30	●										●		●
ES62A1(-S)		●	30	●										●		●
ES62B2(-S)	2		30			●		5	5	5		●		●		●
ES62B2-ZS(-S)	2		30			●	6				●	●		●		●
ES62C2(-S)(-P)	2		30		●							3		●		●
ES142A2(-S)	●		30	●											●	●
ES142A1(-S)		●	30	●											●	●
ES142A3(-S)	230 VAC		30	●											●	●
ES142B2(-S)	●		30			●		5	5	5		●		●		●
ES142B2-ZS(-S)	●		30			●					●	●		●		●
ES142C2(-S)(-P)	●		30		●							3		●		●

Notes:

- \* Requires a 500 ohm (1 %, 1/4 W) resistor.
- 3 (-P) option includes potentiometer feedback
- 2 Can be powered with 24 VDC ± 15%
- 5 Peripheral options are available for specialty signals such as PWM, 0-135 ohm and 0-20 V phase cut
- 6 "-ZS" version can be calibrated to 2 to 10 V. With the addition of a 500 ohm (1 %, 1/4 W) resistor it is compatible with 4 to 20 mA.
- Most commercial assemblies are available with an optional weathershield, or NEMA 4/4X type enclosure.
- (-S) indicates built-in auxiliary switch.
- 230 VAC available for ES142A3(-S) actuator only.



## Non-Spring Return Electronic Actuators 24 VAC Two-Position or Tri-State (Floating) Control (44 & 88 in-lb) EN44C2(-S, -P), EN44C2-NP & EN88C2(-S, -P)



### Description

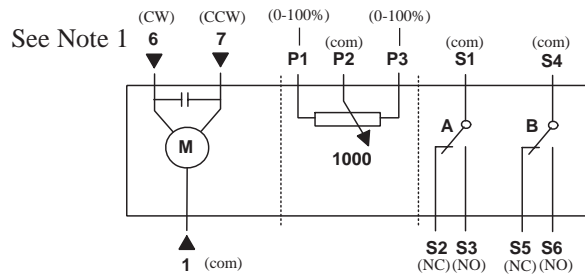
The EN44C2 (-S, -P) & EN88C2 (-S, -P) direct coupled 24 VAC non-spring return rotary electronic actuators are designed for tri-state (floating) control or two-position control (with external relay) of dampers and valves.

### Features

- Compact, lightweight design
- Manual override
- Non-plenum and plenum models available (plenum is standard for all 24 V models)
- UL, CSA approved; plenum versions also CE rated
- Independently adjustable dual auxiliary switches available (-S option)
- Feedback potentiometer models available (-P option)

### Application

These actuators are used in constant or variable air volume installations for control of HVAC dampers or valves requiring up to 44 in-lb (5 N-m) or 88 in-lb (10 N-m) of torque.



Actuator Part Number Table					
Torque	Input Signal	Cabling	24 VAC Operating Voltage		
			Standard	With Potentiometer	Dual Auxiliary Switches Only
44 in-lb (5 N-m)	Tri-state or Two-Position*	Plenum	EN44C2	EN44C2-P	EN44C2-S
44 in-lb (5 N-m)	Tri-state or Two-Position*	Non-Plenum	EN44C2-NP	—	—
88 in-lb (10 N-m)	Tri-state or Two-Position*	Plenum	EN88C2	EN88C2-P	EN88C2-S

Notes:

\* For two-position use Form C relay.

1 Do not ground switched legs (6 & 7)



**Non-Spring Return Electronic Actuators 24 VAC  
Two-Position or Tri-State (Floating) Control (44 & 88 in-lb)  
EN44C2(-S, -P), EN44C2-NP & EN88C2(-S, -P)**

Technical Data	EN44C2-NP, EN44C2(-S, -P)	EN88C2(-S, -P)
Power supply	24 VAC +20%, -15% 50/60 Hz	
Transformer sizing	2.3 VA (class 2 power source req. for UL)	
Electrical connection	(-NP) Non-Plenum cable Standard: 3 ft plenum rated cable; conduit connector optional	
Angle of rotation	0-95°, adj. stops	
Torque at rated voltage	44 in-lb min. (5 N-m)	88 in-lb min. (10 N-m)
Direction of rotation	reversible with wiring	
Position indication	clip on indicator	
Shaft size	3/8" to 5/8" (8 mm to 16 mm) round 1/4" to 1/2" (6 mm to 12.7 mm) square 9/16" (15 mm) hex	
Minimum shaft length	3/4" (20 mm)	
Auxiliary features		
– Feedback potentiometer (-P option)	0 to 1000 Ω, <10 mA	
– Auxiliary switches (-S option)	plenum: 4 A resistive, 24 VAC plenum: 2 A inductive, 24 VAC	
Switch range (-S option)*		
– Switch A	0° to 90° with 5° intervals	
– Recommended range usage	0° to 45°	
– Factory setting	5°	
– Switching hysteresis	2°	
Switch range (-S option)*		
– Switch B	0° to 90° with 5° intervals	
– Recommended range usage	45° to 90°	
– Factory setting	85°	
– Switching hysteresis	2°	
Running time	90 secs at 60 Hz (108 secs at 50 Hz)	125 secs at 60 Hz (155 secs at 50 Hz)
Humidity	95% RH noncondensing	
Housing type**	NEMA type 2/IP54 according to EN60529	
Housing material	Durable plastic	
Ambient temperature	-22°F to 130°F (-30°C to 55°C)	
Storage temperature	-22°F to 140°F (-30°C to 60°C)	
Noise level	<35 dBA	
Servicing	maintenance free	
Agency ratings	UL 873 listed, CE-UL certified to CSA C22.2 No. 24-93	
CE conformity***	Electromagnetic Compatibility (EMC): 89/336/EEC Emissions standards: EN50081-1 Immunity standards: EN50082-2	
Quality standard	ISO 9002	
Weight	1.06 lbs (0.48 kg)	

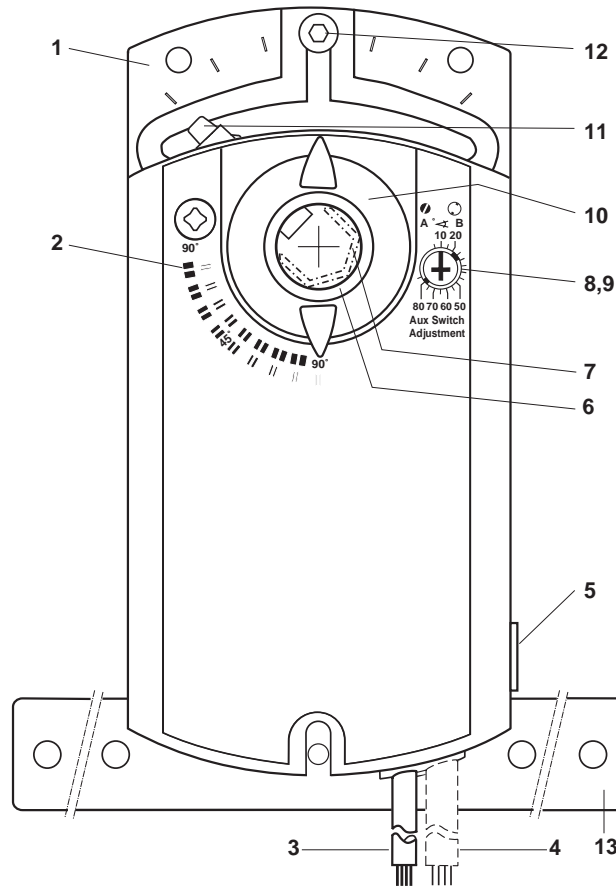
**Notes:**

- ! \* SWITCH WARNING: Apply only main voltage or only safety extra-low voltage (SELV) to switching outputs of auxiliary switches A and B. Mixed operation is not permissible.
- \*\* DEI has optional NEMA 4/4X type housings for these actuators. Call DEI for information.
- ! \*\*\* CE WARNING: All wiring of these actuators must be safety extra-low voltage (SELV/PELV) in accordance with EN60730.



## Non-Spring Return Electronic Actuators 24 VAC Two-Position or Tri-State (Floating) Control (44 & 88 in-lb) EN44C2(-S, -P), EN44C2-NP & EN88C2(-S, -P)

### Actuator Components



### Legend

1. Base plate
2. Positioning scale for angle of rotation
3. Connection cables
4. Connection cables ("S" and "P" options)
5. Manual override
6. Coupling bushing
7. Centering element for EN44 & EN88 (shaft diam. 8 mm to 10 mm)
8. Auxiliary switch A ("S" option)
9. Auxiliary switch B ("S" option)
10. Position indicator
11. Adjustment lever with locking screw
12. Adjusting screw for mechanical range stop
13. Mounting bracket

### Operation

A floating control signal controls the actuator. The actuator's angle of rotation is proportional to the length of time the signal is applied. A 24 VAC control signal to wire 6 (Y1) causes the actuator coupling to rotate clockwise. A 24 VAC control signal to wire 7 (Y2) causes the actuator coupling to rotate counterclockwise.

To reverse the direction of rotation, the wires 6 and 7 (Y1 and Y2) may be interchanged.

**In the event of a power failure, or with no control voltage, the actuator holds its current position.**

### Life Expectancy

An improperly-tuned control loop will cause excessive repositioning that will shorten the life of the actuator.

### Note:

- For wiring, switch and zero/span adjustments, refer to Type A - EN44, EN88 Installation Instructions.



## Non-Spring Return Electronic Actuators 24 VAC Modulating Control (44 & 88 in-lb) EN44B2(-S), EN44B2-ZS(-S), EN88B2(-S) & EN88B2-ZS(-S)



### Description

The EN44B2(-S), EN44B2-ZS(-S), EN88B2(-S) and EN88B2-ZS(-S) direct coupled 24 VAC non-spring return rotary electronic actuators are designed for modulating control of dampers or valves.

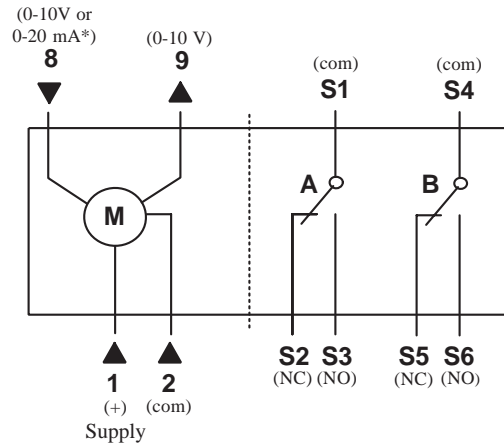
### Features

- Compact, lightweight design
- Self-adapting capability for maximum flexibility in damper positioning
- Manual override
- Offset and slope adjustment models available ("-ZS" option)
- Independently adjustable dual auxiliary switches available ("-S" option)
- UL, CSA approved; CE rated

### Application

These actuators are used in constant or variable air volume installations for control of HVAC dampers or valves requiring up to 44 in-lb (5 N-m) or 88 in-lb (10 N-m) of torque.

### Wiring



Actuator Part Number Table						
Torque	Input Signal	Cabling	24 VAC Operating Voltage			
			Standard	Span/Offset Adjustable	Dual Aux. Switches and Slope/Offset Adjustable	Dual Auxiliary Switches Only
44 in-lb (5 N-m)	0-10 VDC 0-20 mA*	Plenum Cable	EN44B2	EN44B2-ZS	EN44B2-ZS-S	EN44B2-S
88 in-lb (10 N-m)	0-10 VDC 0-20 mA*	Plenum Cable	EN88B2	EN88B2-ZS	EN88B2-ZS-S	EN88B2-S

**Notes:**

- \* 0-20 mA requires 500 Ω (1 %, 1/4 W) resistor across pins 2 and 8
- "-ZS" versions can be calibrated to 4-20 mA.



**Non-Spring Return Electronic Actuators  
24 VAC Modulating Control (44 & 88 in-lb)  
EN44B2(-S), EN44B2-ZS(-S), EN88B2(-S) & EN88B2-ZS(-S)**

Technical Data	EN44B2(-S), EN44B2-ZS(-S)	EN88B2(-S), EN88B2-ZS(-S)
Power supply	24 VAC +20%, -15%, 50/60 Hz	
Transformer sizing	3.3 VA (class 2 power source req. for UL; class III per EN60730)	
Electrical connection	3 ft 18 AWG plenum cable	
Control signal "Y"	0-10 VDC, 0-20 mA†	
Input resistance	100 Kohm VDC	
Operating range	0-10 VDC, 0-20 mA†	
Feedback signal "U"	0-10 VDC, 1 mA Max	
Angle of rotation	0° to 95°, adj. stops	
Torque at rated voltage	44 in-lb (5 N-m)	88 in-lb (10 N-m)
Direction of rotation	reversible w/dip switch factory setting is clockwise, with direct acting feedback signal	
Position indication	clip on indicator	
Shaft size	3/8" to 5/8" (8 mm to 16 mm) round 1/4" to 1/2" (6 mm to 12.7 mm) square 9/16" (15 mm) hex	
Minimum shaft length	3/4" (20 mm)	
Auxiliary features		
- Control signal adjustment (-ZS option):		
- Offset (start point)	0 to 5 VDC	
- Slope	2 to 30 VDC	
- Auxiliary switches	plenum: 4 A resistive, 24 VAC	
(-S option)	plenum: 2 A inductive, 24 VAC	
Switch range (-S option)*		
- Switch A	0° to 90° with 5° intervals	
- Recommended range usage	0° to 45°	
- Factory setting	5°	
- Switching hysteresis	2°	
Switch range (-S option)*		
- Switch B	0° to 90° with 5° intervals	
- Recommended range usage	45° to 90°	
- Factory setting	85°	
- Switching hysteresis	2°	
Running time	90 secs at 60 Hz (108 secs at 50 Hz)	125 secs at 60 Hz (150 secs at 50 Hz)
Humidity	95% RH noncondensing	
Housing type**	NEMA type 2/IP54 according to EN60529	
Housing material	Durable plastic	
Ambient temperature	-22°F to 130°F (-30°C to 55°C)	
Storage temperature	-22°F to 140°F (-30°C to 60°C)	
Noise level	<35 dBA	
Servicing	maintenance free	
Agency ratings	UL 873 listed, CE-UL certified to CSA C22.2 No. 24-93	
CE conformity***	Electromagnetic Compatibility (EMC): 89/336/EEC Emissions standards: EN50081-1 Immunity standards: EN50082-2	
Quality standard	ISO 9002	
Weight	1.06 lbs (0.48 kg)	

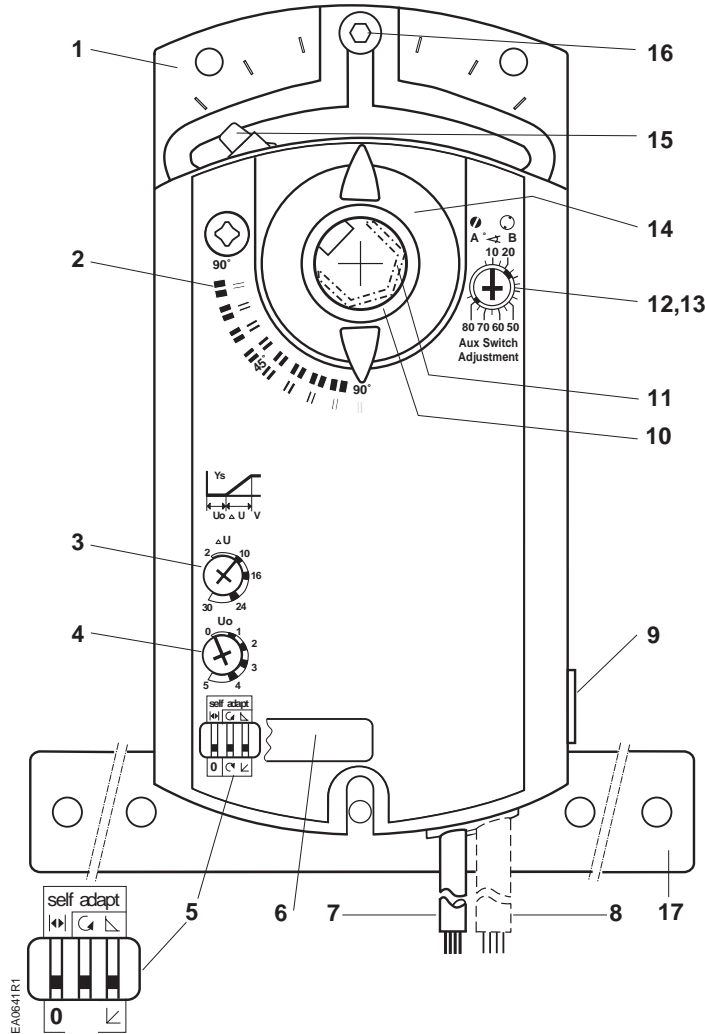
**Notes:**

- † Add 500 Ω (1 %, 1/4 W) resistor across pins 2 & 8 for 0-20 mA signal.
- ! \* SWITCH WARNING: Apply only main voltage or only safety extra-low voltage (SELV) to switching outputs of auxiliary switches A and B. Mixed operation is not permissible.
- \*\* DEI has optional NEMA 4/4X type housings for these actuators. Call DEI for information.
- ! \*\*\* CE WARNING: All wiring of these actuators must be safety extra-low voltage (SELV/PELV) in accordance with EN60730.



## Non-Spring Return Electronic Actuators 24 VAC Modulating Control (44 & 88 in-lb) EN44B2(-S), EN44B2-ZS(-S), EN88B2(-S) & EN88B2-ZS(-S)

### Actuator Components



### Legend

1. Base plate
2. Positioning scale for angle of rotation
3. Slope adjustment ("-ZS" version)
4. Offset (start point) adjustment ("-ZS" version)
5. DIP switches
6. Cover for DIP switches
7. Connection cables
8. Connection cables ("-S" option)
9. Manual override
10. Coupling bushing
11. Centering element for EN44 and (EN88 shaft diam. 8 mm to 10 mm)
12. Auxiliary switch A ("-S" option)
13. Auxiliary switch B ("-S" option)
14. Position indicator
15. Adjustment lever with locking screw
16. Adjusting screw for mechanical range stop
17. Mounting bracket

### Operation

A continuous 0 to 10 VDC signal from a controller to wire 8 (Y) operates the actuator. The angle of rotation is proportional to the control signal. A 0 to 10 VDC position feedback output signal is available between wires 9 (U) and wire 2 (com) to monitor the position of the motor.

In the event of a power failure the actuator holds its position. In the event only the control signal is lost, the actuator returns to the "0" position.

#### Note:

- For wiring, switch and zero/span adjustments, refer to Type A - EN44, EN88 Installation Instructions.





## Non-Spring Return Electronic Actuators

### 24 VAC Two-Position or Tri-State (Floating) Control (132, 221 & 310 in-lb) EN132C2(-S), EN221C2(-S) & EN310C2(-S)



#### Description

The EN132C2(-S), EN221C2(-S) and EN310C2(-S) direct coupled 24 VAC non-spring return (NSR) rotary electronic actuators are designed for tri-state (floating) or two-position control of building HVAC dampers and valves.

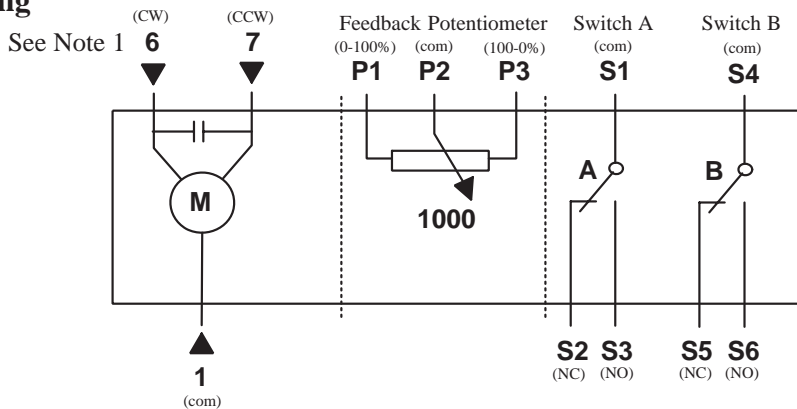
#### Features

- Unique self-centering shaft coupling
- All metal housing
- Manual override
- Independently adjustable dual auxiliary switches available
- UL, cUL listed; CE certified

#### Application

These actuators are used in constant or variable air volume installations for the control of return air, mixed air, exhaust, and face and bypass dampers or control valves requiring up to 132 in-lb (15 N-m), 221 in-lb (25 N-m) or 310 in-lb (35 N-m) of torque.

#### Wiring



#### Tri-State Control:

If the damper or valve turns counterclockwise (CCW) to open, reverse the 6 and 7 wires at the controller.

#### Two Position Control: EN132C2 Only

Connect wire 1 to common, connect wire 6 to common in order to drive clockwise. To drive counterclockwise, add wire 7 to wire 6 on the common.

Actuator Part Number Table					
Torque	Input Signal	Cabling	24 VAC Operating Voltage		
			Standard	With Dual Auxiliary Switches	Potentiometer Feedback
132 in-lb (15 N-m)	Tri-state or Two-Position	Standard or Plenum Cable	EN132C2	EN132C2-S	EN132C2-P
221 in-lb (25 N-m)	Tri-state or Two-Position*	Plenum Cable	EN221C2	EN221C2-S	—
310 in-lb (35 N-m)	Tri-state or Two-Position*	Plenum Cable	EN310C2	EN310C2-S	—

Note:

1 Do not ground switched legs (6 & 7)

\* Form C Relay required.



## Non-Spring Return Electronic Actuators

### 24 VAC Two-Position or Tri-State (Floating) Control (132, 221 & 310 in-lb) EN132C2(-S), EN221C2(-S) & EN310C2(-S)

Technical Data	EN132C2(-S)(-P)	EN221C2(-S)	EN310C2(-S)
Power supply	24 VAC $\pm$ 20%, 50/60 Hz		
Power consumption	running: 3 VA / 3 W; holding: 1 VA	running: 7 VA	running: 7 VA
Transformer sizing	class 2, in accordance with UL/CSA		
Electrical connection	3 ft, 18 GA	3 ft, 18 AWG plenum cable	
Overload protection	electronic throughout 0° to 95° rotation		
Potentiometer (-P)	0-1000 $\Omega$ (<10 mA)	-	
Angle of rotation	mechanically limited to 95°		
Minimum torque	132 in-lb (15 N-m), <360 in-lb (40 N-m) max.	221 in-lb (25 N-m)	310 in-lb (35 N-m)
Direction of rotation	reversible with dip switch		
Position indication	visual indicator, -5° to 90° (-5° is spring return position)		
Manual override	push down button		
Shaft size	1/4" to 3/4" (6.4 mm to 20.5 mm) min. diameter 1/4" to 1/2" (6.4 mm to 13 mm) square	standard: 3/8" to 1" (8 mm to 25.6 mm) diameter 1/4" to 5/8" (6.4 mm to 18 mm) square oversize: 1.05" (26.6 mm) max. special adapter	
Minimum shaft length	3/4" (20 mm)		
Auxiliary switches (-S option)	AC: 24 VAC to 250 VAC 6A resistive 2A general purpose use DC: 12 VDC to 30 VDC 2A	AC: 24 VAC 4A resistive 2A general purpose use DC: 12 VDC to 30 VDC 2A	
Switch range (-S option)* - Switch A	0° to 90° with 5° intervals		
- Recommended range usage	0° to 45°		
- Factory setting	5°		
- Switching hysteresis	2°		
Switch range (-S option)* - Switch B	0° to 90° with 5° intervals		
- Recommended range usage	45° to 90°		
- Factory setting	85°		
- Switching hysteresis	2°		
Running time for 90°	125 secs 60 Hz, 150 secs 50 Hz		
Humidity	95% RH noncondensing		
Ambient temperature	-25°F to 130°F (-32°C to 55°C)		
Storage temperature	-40°F to 158°F (-40°C to 70°C)		
Housing type**	NEMA type 1/IP40 according to EN60529		
Housing material	Die cast aluminum alloy		
Gear lubrication	Silicone free		
Agency ratings	UL 873 or UL 60730 listed, CE-UL certified to CSA C22.2 No. 24-93		
CE conformity***	Electromagnetic Compatibility (EMC): 89/336/EEC Emissions standards: EN50081-1 Low voltage directive 73/231 EEC		
	Immunity standards: EN61000-6-2 except EN132C2-NP (EN50082-1)	Immunity standards: EN50082-2	
Noise level	max 40 dBA	max 45 dBA	
Servicing	maintenance free		
Quality standard	ISO 9002		
Weight	2.2 lbs (1.0 kg)	4.4 lbs (2.0 kg)	

**Notes:**

! \* SWITCH WARNING: Apply only main voltage or only safety extra-low voltage (SELV) to switching outputs of auxiliary switches A and B. Mixed operation is not permissible.

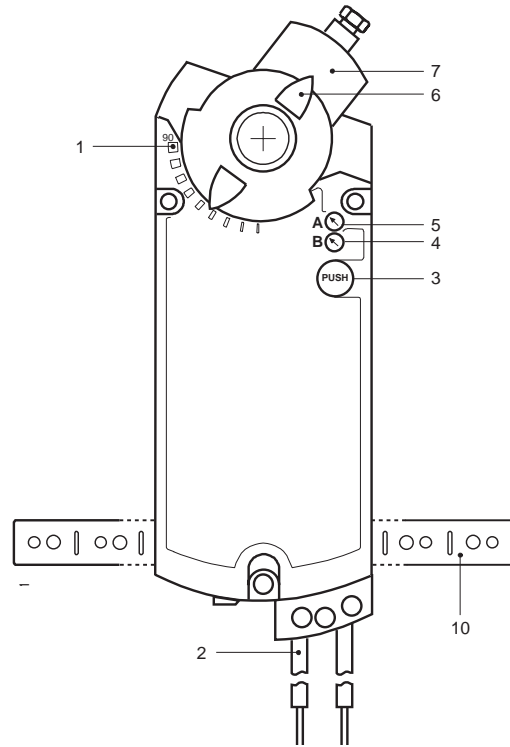
\*\* DEI has optional NEMA 4/4X type housings for these actuators. Call DEI for information.

! \*\*\* CE WARNING: All wiring of these actuators must be safety extra-low voltage (SELV/PELV) in accordance with EN60730.



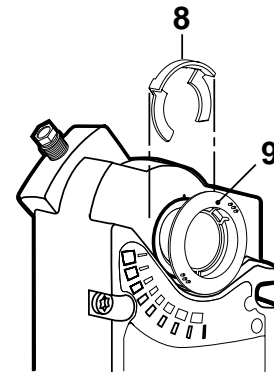
**Non-Spring Return Electronic Actuators  
 24 VAC Two-Position or Tri-State (Floating) Control (132, 221 & 310 in-lb)  
 EN132C2(-S), EN221C2(-S) & EN310C2(-S)**

**Actuator Components**



**Legend**

1. Positioning scale for angle of rotation
2. Connection cables
3. Manual override
4. Auxiliary switch B
5. Auxiliary switch A
6. Position indicator
7. Standard or self-centering shaft adapter\*
8. Shaft adapter locking clip
9. Position indicator adapter
10. Mounting bracket



**Operation**

A floating control signal controls the actuator. The actuator's angle of rotation is proportional to the length of time the signal is applied. A 24 VAC control signal to wires 1 and 6 (G-Y1) causes the actuator coupling to rotate clockwise. A 24 VAC control signal to wires 1 and 7 (G-Y2) causes the actuator coupling to rotate counterclockwise.

If you want to reverse the direction of rotation, the wires 6 and 7 (Y1 and Y2) may be interchanged. Reverse the position indicator so that the counterclockwise 0 to 90 scale is visible. For complete wiring info, refer to technical bulletin.

In the event of a power failure, or with no control voltage, the actuator holds its current position.

In the event of a blockage in the damper or valve, the actuator is overload protected over the full range to prevent damage to the actuator.

**Life expectancy**

An improperly tuned control loop will cause excessive repositioning that will shorten the life of the actuator.

**⚠ WARNING:** Apply only line voltage or only Class 2 voltage to the switching outputs of both auxiliary switches A and B. Mixed operation is not permissible. See *Wiring* for details.

*Note:*

\* Self-centering shaft adapter shown.



**Non-Spring Return Electronic Actuators  
 24 VAC Modulating Control (132, 221 & 310 in-lb)  
 EN132B2, EN132B2-ZS-S, EN221B2(-S), EN221B2-ZS(-S),  
 EN310B2(-S) & EN310B2-ZS(-S)**



**Description**

The EN132B2, EN132B2-ZS-S, EN221B2(-S), EN221B2-ZS(-S), EN310B2(-S) and EN310B2-ZS(-S) direct coupled 24 VAC non-spring return (NSR) rotary electronic actuators are designed for modulating control of building HVAC dampers or valves.

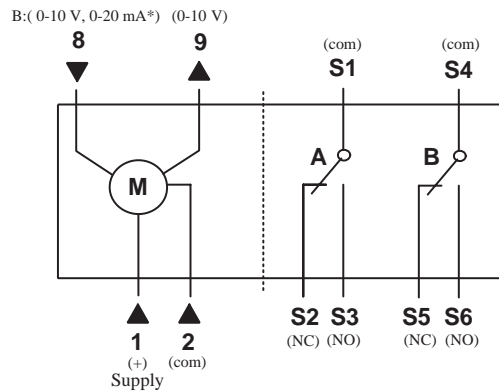
**Features**

- Built-in feedback
- Unique self-centering shaft coupling
- All metal housing
- Manual override
- Offset and span adjustment models available
- Independently adjustable dual auxiliary switches available
- UL, cUL and CE listed

**Application**

These actuators are used in constant or variable air volume installations for the control of return air, mixed air, exhaust, and face and bypass dampers and valves requiring up to 132 in-lb (15 N-m), 221 in-lb (25 N-m), or 310 in-lb (35 N-m) torque.

**Wiring**



Actuator Part Number Table						
Torque	Input Signal	Cabling	24 VAC Operating Voltage			
			Standard	Span/Offset Adjustable	Dual Auxiliary Switches and Span/Offset Adjustable	Dual Auxiliary Switches Only
132 in-lb (15 N-m)	0 to 10 VDC 0 to 20 mA*	Standard or Plenum Cable	EN132B2	–	EN132B2-ZS-S	–
221 in-lb (25 N-m)	0 to 10 VDC 0 to 20 mA*	Plenum Cable	EN221B2	EN221B2-ZS	EN221B2-ZS-S	EN221B2-S
310 in-lb (35 N-m)	0 to 10 VDC 0 to 20 mA*	Standard Cable	–	–	EN310B2-ZS-S	–
		Plenum Cable	EN310B2	EN310B2-ZS	–	EN310B2-S

*Note:*

\* 0-20 mA: Requires 500 Ω (1 %, 1/4 W) resistor across pins 2 and 8. "-ZS" version can be calibrated to 4-20 mA.



**Non-Spring Return Electronic Actuators  
24 VAC Modulating Control (132, 221 & 310 in-lb)  
EN132B2, EN132B2-ZS-S, EN221B2(-S), EN221B2-ZS(-S),  
EN310B2(-S) & EN310B2-ZS(-S)**

Technical Data	EN 132B2, EN 132B2-ZS-S	EN 221B2(-S), EN 221B2-ZS(-S)	EN 310B2(-S), EN 310B2-ZS(-S)
Power supply	24 VAC ±20%, 50/60 Hz		
Transformer sizing	5 VA running 1 VA holding (class 2 power source req. for UL)	8 VA running 1.1 VA holding (class 2 power source req. for UL)	
Electrical connection	3 ft, 18 AWG		3 ft, 18 AWG plenum cable
Overload protection	Electronic throughout 0° to 95° rotation		
Control signal	0-10 VDC, 0-20 mA†		
Input resistance	> 100 Kohm	> 100 Kohm	
Operating range	0 to 10 VDC, 0 to 20 mA†		
Feedback output "U"	0 to 10 VDC (1 mA max.)		
Angle of rotation	90°, 95° max.		
Minimum torque	132 in-lb (15 N-m)	221 in-lb (25 N-m)	310 in-lb (35 N-m)
Direction of rotation	control: selectable by dip switch		
Position indication	visual indicator, 0° to 95°		
Manual override	push down button		
Shaft size	1/4" to 3/4" (6.4 mm to 20.5 mm) diameter	Standard: 3/8" to 1" (8 mm to 25.6 mm) diameter	
	1/4" to 1/2" (6.4 mm to 13 mm) square	1/4" to 5/8" (6.4 mm to 18 mm) square	
Minimum shaft length	3/4" (20 mm)		
Auxiliary switches (-S option)	AC: 24 VAC to 250 VAC 6A resistive 2A general purpose use DC: 12 VDC to 30 VDC, 2A	AC: 24 VAC to 250 VAC plenum: 4 A resistive, 24 VAC plenum: 2 A general purpose use, 24 VAC DC: 12 VDC to 30 VDC, 2A	
Switch range (-S option)*	0° to 90° with 5° intervals		
- Switch A	0° to 45°		
- Recommended range usage	5°		
- Factory setting	2°		
- Switching hysteresis			
Switch range (-S option)*	0° to 90° with 5° intervals		
- Switch B	45° to 90°		
- Recommended range usage	85°		
- Factory setting	2°		
- Switching hysteresis			
Zero Span Control Signal Adjustment (-ZS model)			
- Offset (startpoint)	0-5 VDC		
- Factory Setting	0 VDC		
- Span	2-30 VDC		
Running time (90°) (nominal)	125 secs (60 Hz) 150 secs (50 Hz)		
Humidity	95% RH noncondensing		
Ambient temperature	-25°F to 130°F (-32°C to 55°C)		
Storage temperature	-40°F to 158°F (-40°C to 70°C)		
Housing type**	NEMA type 1/IP40 according to EN 60529		
Housing material	Die cast aluminum alloy		
Gear lubrication	Silicone free		
Agency ratings	UL 60730 or UL 873 listed, CE-UL certified to CSA C22.2 No. 24-93		
CE conformity***	Electromagnetic Compatibility (EMC): 89/336/EEC Emissions standards: EN 50081-1 Immunity standards: EN 50082-2 Low-voltage directive		
Noise level	<45 dBA		
Servicing	maintenance free		
Quality standard	ISO 9002		
Weight	2.2 lbs (1.0 kg)	4.4 lbs (2.0 kg)	

**Notes:**

† Add 500 Ω (1 %, 1/4 W) resistor across pins 2 & 8 for 0-20 mA signal.

! \* SWITCH WARNING: Apply only main voltage or only safety extra-low voltage (SELV) to switching outputs of auxiliary switches A and B. Mixed operation is not permissible.

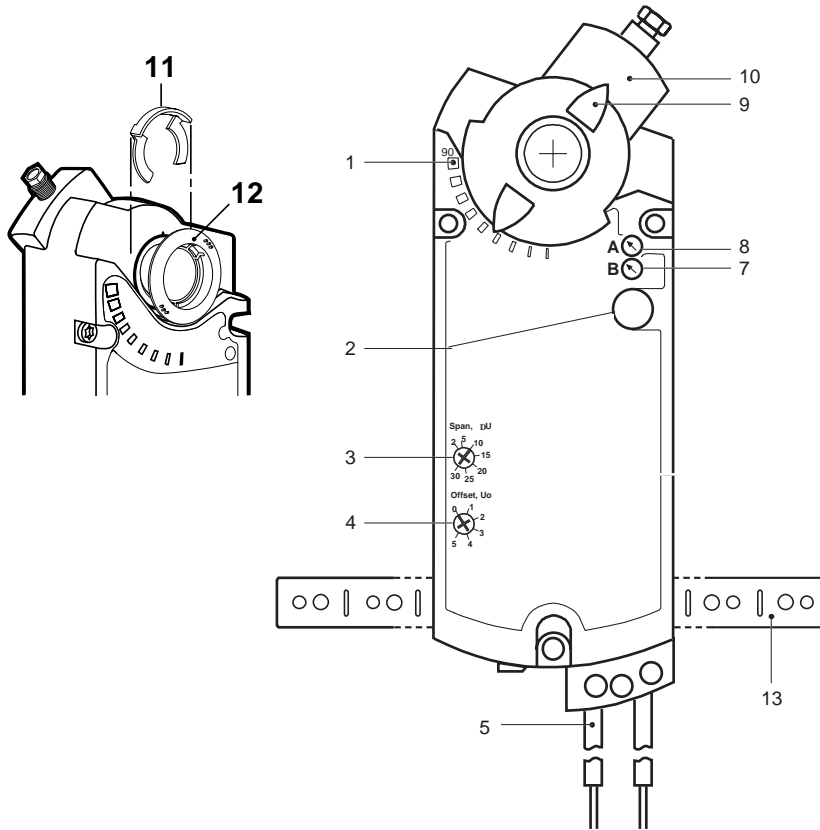
\*\* DEI has optional NEMA 4/4X type housings for these actuators. Call DEI for information.

! \*\*\*CE WARNING: All wiring of these actuators must be safety extra-low voltage (SELV/PELV) in accordance with EN60730.



**Non-Spring Return Electronic Actuators  
24 VAC Modulating Control (132, 221 & 310 in-lb)  
EN132B2, EN132B2-ZS-S, EN221B2(-S), EN221B2-ZS(-S),  
EN310B2(-S) & EN310B2-ZS(-S)**

**Actuator Components**



**Legend**

1. Positioning scale for angle of rotation
2. Manual override (push)
3. Span adjustment (-ZS version)
4. Offset (start point) adjustment (-ZS version)
5. Connection cables
7. Auxiliary switch B (-S option)
8. Auxiliary switch A (-S option)
9. Position indicator
10. Standard or self-centering shaft adapter\*
11. Shaft adapter locking clip
12. Position indicator adapter
13. Mounting bracket

**Operation**

A continuous DC 4 to 20 mA signal or a 0 to 10 VDC (0-20 mA\*\*) signal from a controller to wire Y operates the actuator. The angle of rotation is proportional to the control signal. A 0 to 10 VDC position feedback output signal is available between wires U and com (system neutral) to monitor the position of the motor.

In the event of a power failure, the actuator holds its current position. If only the control signal is lost, the actuator returns to the “0” position.

**Life expectancy**

An improperly tuned control loop will cause excessive repositioning that will shorten the life of the actuator.

**⚠ WARNING:** Apply only AC-line voltage from the same phase or only UL-Class 2 voltage (SELV for CE conformance) to the switching outputs of both auxiliary switches A and B. Mixed operation is not permissible.

\* Self-centering shaft adapter shown.

\*\* Add 500 Ω (1 %, 1/4 W) resistor across pins 2 & 8 for 0-20 mA signal.



## Spring Return Rotary Electronic Actuator Two-Position Control ES62A(-S) & ES142A(-S)



### Description

The ES142 (24 VAC or 120 VAC) and the ES62A (24 VAC/VDC or 120 VAC) direct coupled two-position spring return electronic actuators are for control of building HVAC dampers or valves.

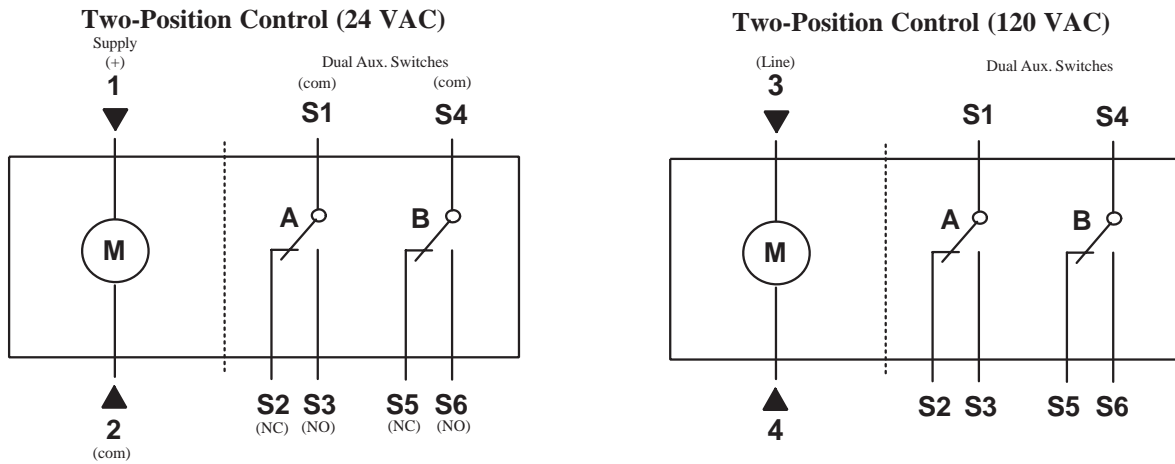
### Features

- Brushless DC motor technology with stall protection
- Bidirectional fail-safe spring return
- Unique self-centering shaft coupling
- Access to all functions from either side of the actuator
- All metal housing
- Manual override
- 5° pre-load as shipped from factory
- Models with independently adjustable dual auxiliary switches available
- UL, CSA approved; CE rating for ES62

### Application

This actuator is used for the control of valves or dampers requiring up to 62 in-lb (7 N-m) or 142 in-lb (16 N-m) of torque. It is designed for applications that require the valve or damper to return to its fail-safe position when there is a power failure.

### Wiring Diagrams



Actuator Part Number Table						
Torque	Input Signal	Cabling	Operating Voltage			
			24 VAC		115 VAC	
			Standard	Dual Auxiliary Switches	Standard	Dual Auxiliary Switches
62 in-lb (7 N-m)	Two-Position	Standard or Plenum Cable	ES62A2	ES62A2-S	ES62A1	ES62A1-S
142 in-lb (16 N-m)	Two-Position	Standard or Plenum Cable	ES142A2	ES142A2-S	ES142A1	ES142A1-S



## Spring Return Rotary Electronic Actuator 24 VAC/VDC or 115 VAC Two-Position Control ES62A(-S)

Technical Data	ES62A2(-S)	ES62A1(-S)
Power supply	24 VAC ± 20%, 24 VDC ± 15% 50/60 Hz	120 VAC ± 10% 50/60 Hz
Power consumption	running: 5 VA, 3.5 WDC holding: 4 VA, 3 WDC	7 VA, 5W
Transformer sizing	class 2 power source req. for UL, CSA	class 2 power source req. for UL, CSA
Electrical connection / attached cable	3 ft, 18 AWG cable, BX connector	
	plenum cable <sup>1</sup>	standard cable
Overload protection	Electronic throughout 0 to 95° rotation	
Angle of rotation (max.)	95°	
Minimum torque	62 in-lb (7 N-m)	
Direction of rotation	spring return: selectable when ordering valves, selectable in field for damper	
Position indication	visual indicator, -5° to 90° (-5° is spring return position)	
Manual override	3 mm hex crank (shipped with actuator)	
Shaft size	1/4" to 3/4" (6.4 mm to 20.5 mm) diameter 1/4" to 1/2" (6.4 mm to 13 mm) square	
Minimum shaft length	3/4" (20 mm)	
Auxiliary switches (-S option)	AC: 24 VAC to 250 VAC 6A resistive 2A general purpose use DC: 12 VDC to 30 VDC 2A	
Switch range (-S option)* – Switch A	0° to 90° with 5° intervals	
– Recommended range usage	0° to 45°	
– Factory setting	5°	
– Switching hysteresis	2°	
Switch range (-S option)* – Switch B	0° to 90° with 5° intervals	
– Recommended range usage	45° to 90°	
– Factory setting	85°	
– Switching hysteresis	2°	
Running time (nominal)	90 secs running spring return: 15 secs typical (<60 secs max at -25°F)	
Humidity	5 to 95% RH, noncondensing	
Ambient temperature	-25°F to 130°F (-32°C to 55°C)	
Storage temperature	-25°F to 158°F (-32°C to 70°C)	
Housing type**	NEMA type 1/IP40 according to EN60529	
Housing material	Die cast aluminum alloy	
Agency ratings	UL 60730 listed (replacing UL 873), C-UL CSA C22.2 No. 24-93	
CE conformity***	Electromagnetic Compatibility (EMC): 89/336/EEC Emissions standards: EN50081-1 Immunity Standards: EN50082-2	
Noise level	40 dBA (running)	
Servicing	maintenance free	
Quality standard	ISO 9002	
Weight	2.86 lbs (1.3 kg)	

*Notes:*

- ! \* SWITCH WARNING: Apply only line voltage or only Class 2 voltage to the switching outputs of both auxiliary switches A and B. Mixed operation is not permissible.
- \*\* DEI has optional NEMA 4/4X type housings for these actuators. Call DEI for information.
- ! \*\*\*CE WARNING: All wiring of these actuators must be safety extra-low voltage (SELV/PELV) in accordance with EN60730.
- 1 "-NP" version has non-plenum cable





## Spring Return Rotary Electronic Actuator 24 VAC or 115 VAC Two-Position Control ES142A(-S)

Technical Data	ES142A2(-S)	ES142A1(-S)
Power supply	24 VAC +20% , -15% 50/60 Hz	115 VAC ±15% 50/60 Hz
Power consumption	running: 8 VA holding: 3 VA	running: 9 VA holding: 9 VA
Transformer sizing	class 2 power source req. for UL	
Electrical connection	3 ft, 18 AWG plenum cable	3 ft, 18 AWG cable
	plenum cable	standard cable
Overload protection	Electronic throughout 0° to 95° rotation	
Angle of rotation (max.)	95°	
Minimum torque	142 in-lb (16 N-m)	
Direction of rotation	spring return: selectable when ordering valves, selectable in field for damper motor: selectable by dip switch	
Position indication	visual indicator, -5° to 90° (-5° is spring return position)	
Manual override	3 mm hex crank (shipped with actuator)	
Shaft size	Standard: 3/8" to 1" (8 mm to 25.6 mm) diameter 1/4" to 3/4" (6.4 mm to 20.5 mm) square Oversize: 1.05" (special adapter)	
Minimum shaft length	3/4" (20.5 mm)	
Auxiliary switches (-S option)	plenum: 4 A resistive, 24 VAC plenum: 2 A inductive, 24 VAC	standard: 6 A resistive, 24 VAC to 250 VAC standard: 2 A inductive, 24 VAC to 250 VAC
Switch range (-S option)* – Switch A – Recommended range usage – Factory setting – Switching hysteresis	0° to 90° with 5° intervals	
	0° to 45°	
	5°	
	2°	
Switch range (-S option)* – Switch B – Recommended range usage – Factory setting – Switching hysteresis	0° to 90° with 5° intervals	
	45° to 90°	
	85°	
	2°	
Running time (nominal)	90 secs constant, independent of load, spring return: 15 secs typical (30 secs max.)	
Humidity	5 to 95% RH, noncondensing	
Ambient temperature	-25°F to 130°F (-32°C to 55°C)	
Storage temperature	-25°F to 158°F (-32°C to 70°C)	
Housing type**	NEMA type 1/IP40 according to EN60529	
Housing material	Die cast aluminum alloy	
Agency ratings	UL 873 listed, CE-UL certified to CSA C22.2 No. 24-93	
CE conformity***	Electromagnetic Compatibility (EMC): 89/336/EEC Emissions standards: EN50081-1 Immunity Standards: EN50082-2	
Noise level	<45 dBA max	
Servicing	maintenance free	
Quality standard	ISO 9002	
Weight	4.85 lbs (2.2 kg)	

**Notes:**

! \* SWITCH WARNING: Apply only main voltage or only safety extra-low voltage (SELV) to switching outputs of auxiliary switches A and B. Mixed operation is not permissible.

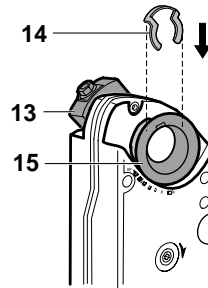
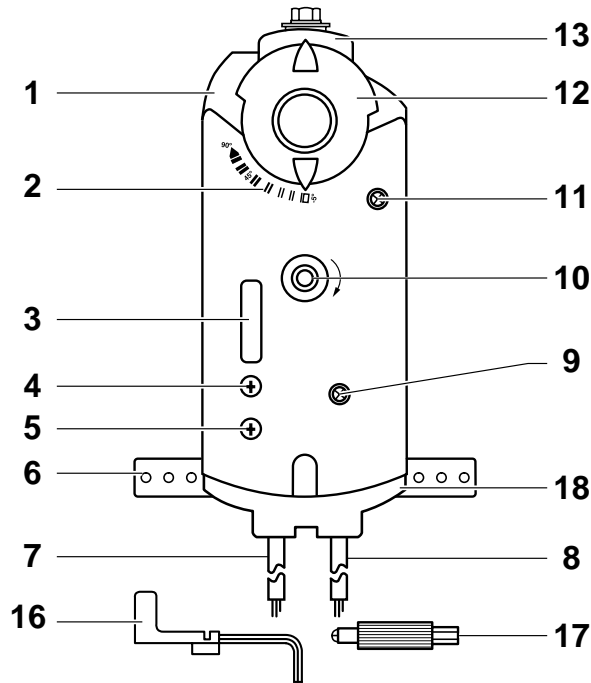
\*\* DEI has optional NEMA 4/4X type housings for these actuators. Call DEI for information.

! \*\*\*CE WARNING: All wiring of these actuators must be safety extra-low voltage (SELV/PELV) in accordance with EN60730.



## Spring Return Rotary Electronic Actuator 24 VAC/VDC or 115 VAC Two-Position Control ES62A(-S)

### Actuator Components



### Legend

1. Actuator housing
2. Positioning scale for angle of rotation
3. DIP switches and cover
4. Span adjustment
5. Offset (start point) adjustment
6. Mounting bracket
7. Connection cables for power and positioning signal
8. Connection cables for auxiliary switches or feedback potentiometer
9. Gear train lock pin
10. Manual override wrench opening and direction of rotation arrow
11. Locking shaft for auxiliary switches A and B
12. Position indicator
13. Self-centering shaft adapter
14. Shaft adapter locking clip
15. Position indicator adapter
16. Key for manual adjustment
17. Adjustment tool for: auxiliary switches (11), potentiometers (4 and 5), and locking shaft (9)

### Operation

When power is applied, the actuator coupling moves toward the “90°” position. In the event of a power failure, or when operating voltage is turned off, the actuator returns to the “0°” position.

### Life expectancy

An improperly-tuned control loop will cause excessive repositioning that will shorten the life of the actuator.

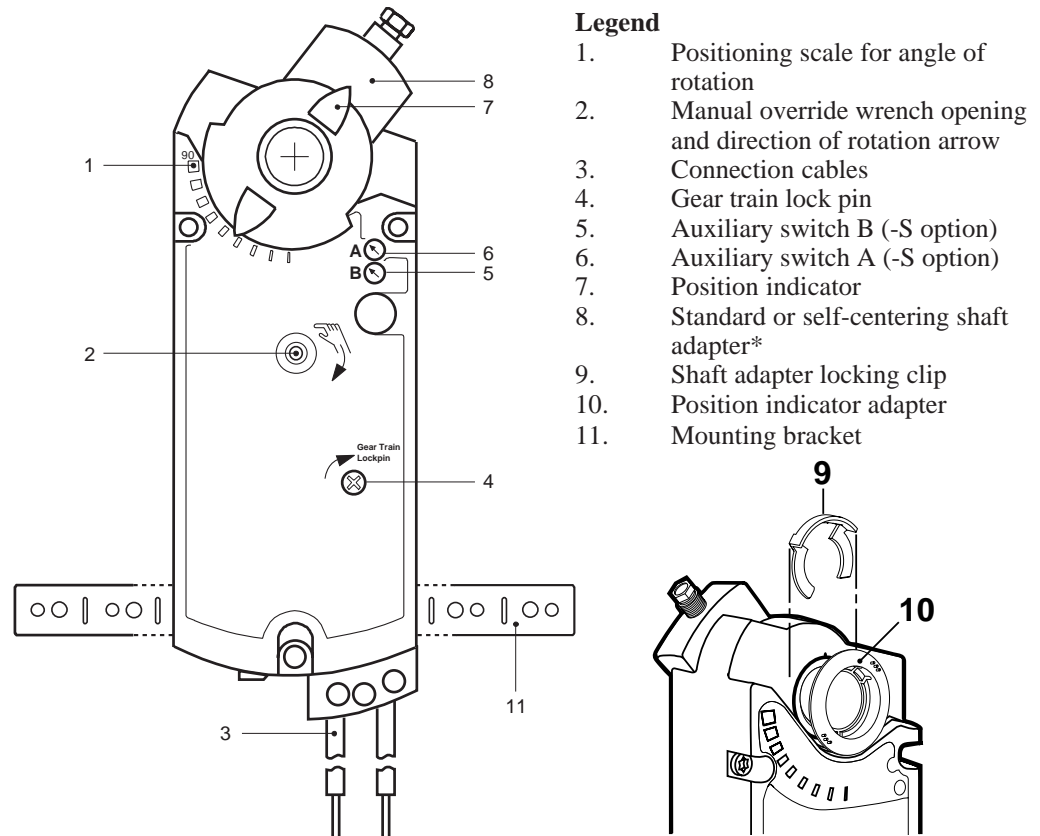
### Notes:

- For installation, option (-S) and accessory information, see Engineering, Application and Installation guide.
- \* Self-centering shaft adapter shown.



## Spring Return Rotary Electronic Actuator 24 VAC or 115 VAC Two-Position Control ES142A(-S)

### Actuator Components



### Operation

When power is applied, the actuator coupling moves toward the “90°” position. In the event of a power failure, or when operating voltage is turned off, the actuator returns to the “0” position.

### Life expectancy

An improperly-tuned control loop will cause excessive repositioning that will shorten the life of the actuator.

#### Notes:

- For installation, option (-S) and accessory information, see Engineering, Application and Installation guide.
- \* Self-centering shaft adapter shown.



## Spring Return Electronic Actuator Tri-State (Floating) Control ES62C2(-S) & ES142C2(-S)



### Description

The ES62C2(-S) (24 VAC/VDC) and ES142C2(-S) direct coupled 24 VAC spring return electronic actuators are designed for tri-state (floating) control of building HVAC dampers and valves.

### Features

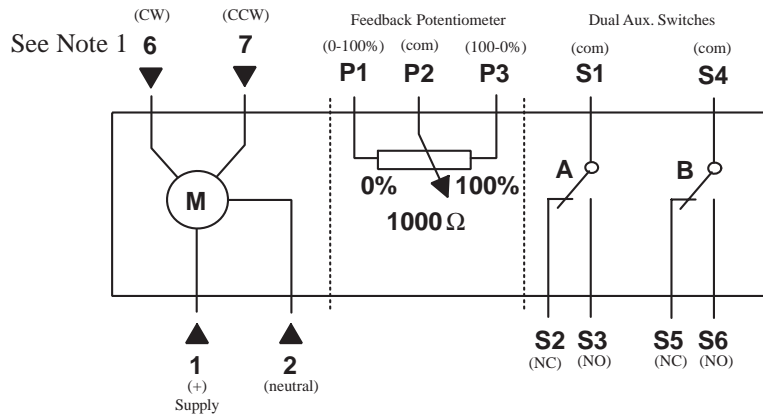
- Brushless DC motor technology with stall protection
- Bidirectional fail-safe spring return
- Unique self-centering shaft coupling
- Access to all functions from either side of the actuator
- All metal housing
- Manual override
- 5° pre-load as shipped from factory
- Models with independently adjustable auxiliary switches available (-S option), includes potentiometer feedback
- UL, CSA approved, pending CE approval

### Application

This actuator is used in constant or variable air volume installations for the control of return air, mixed air, exhaust, face and bypass valves, and dampers requiring up to 62 in-lb (7 N-m) or 142 in-lb (16 N-m) torque. It is designed for applications that require the valve or damper to return to a fail-safe position when there is a power failure.

### Wiring

#### Three-position Control (24 V)



Actuator Part Number Table					
Torque	Input Signal	Cabling	24 VAC Operating Voltage		
			Standard	Dual Auxiliary Switches	Feedback Potentiometer
62 in-lb (7 N-m)	Tri-state (floating)	Standard Cable	ES62C2	ES62C2-S	ES62C2-P
142 in-lb (16 N-m)	Tri-state (floating)	Plenum Cable	ES142C2	ES142C2-S	ES142C2-P

Note:

- 1 Do not ground switched legs (6 & 7)



**Spring Return Electronic Actuator  
Tri-State (Floating) Control  
ES62C2(-S) & ES142C2(-S)**

Technical Data	ES62C2(-S)	ES142C2(-S)
Power supply	24 VAC ± 20%, 24 VDC ± 15%, 50/60 Hz	24 VAC +20%, -15%, 50/60 Hz
Power consumption	running: 5 VA (3.5 WDC) holding: 4 VA (3 WDC)	running: 8 VA holding: 5 VA
Transformer sizing	class 2 power source req. for UL, CSA	
Electrical connection	3 ft, 18 GA appliance cable	3 ft, 18 AWG plenum cable
Overload protection	electronic throughout 0° to 95° rotation	
Potentiometer	0-1000 8 (max. 1 mA)	
Angle of rotation	mechanically limited to 95°	
Minimum torque	62 in-lb (7 N-m)	142 in-lb (16 N-m)
Direction of rotation	spring: option when ordering valves; reversible with mounting for dampers motor: reversible with dip switch	
Position indication	visual indicator, -5° to 90° (-5° is spring return position)	
Manual override	3 mm hex crank (shipped with actuator)	
Shaft size	1/4" to 3/4" (6.4 mm to 20.5 mm) diameter 1/4" to 1/2" (6.5 mm to 13 mm) square	3/8" to 1" (8 mm to 25.6 mm) diameter 1/4" to 3/4" (6 mm to 18 mm) square
Minimum shaft length	3/4" (20 mm)	
Auxiliary switches (-S option)	AC: 24 VAC to 250 VAC 6 A resistive 2 A general purpose use DC: 12 VDC to 30 VDC 2 A	plenum: 4 A resistive, 24 VAC plenum: 2 A inductive, 24 VAC
Switch range (-S option)* – Switch A	0° to 90° with 5° intervals	
– Recommended range usage	0° to 45°	
– Factory setting	5°	
– Switching hysteresis	2°	
Switch range (-S option)* – Switch B	0° to 90° with 5° intervals	
– Recommended range usage	45° to 90°	
– Factory setting	85°	
– Switching hysteresis	2°	
Running time for 90°	Motor: 90 secs Spring: 15 secs typical (60 secs max. @ 25°F)	Motor: 90 secs constant, independent of load Spring: 15 secs typical (30 secs max.)
Humidity	95% RH noncondensing	
Ambient temperature	-25°F to 130°F (-32°C to 55°C)	
Storage temperature	-25°F to 158°F (-32°C to 70°C)	
Housing type**	NEMA type 1/IP40 according to EN60529	
Housing material	Die cast aluminum alloy	
Agency ratings	UL 60730 or UL 873 listed, C-UL certified to CSA C22.2 No. 24-93, pending CE approval for plenum models	
CE conformity***	Electromagnetic Compatibility (EMC): 89/336/EEC Emissions standards: EN50081-1 Immunity standards: EN50082-2	-
Noise level	20 dBA (running)	max. 45 dBA
Servicing	maintenance free	
Quality standard	ISO 9002	
Weight	2.86 lbs (1.3 kg)	6.0 lbs (2.7 kg)

*Notes:*

! \* SWITCH WARNING: Apply only line voltage or or only Class 2 voltage to the switching outputs of both auxiliary switches A and B. Mixed operation is not permissible.

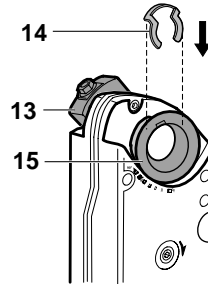
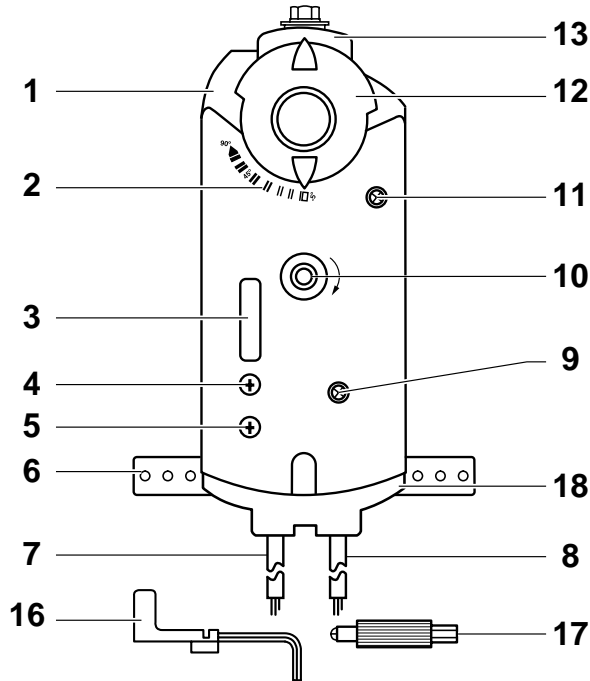
\*\* DEI has optional NEMA 4/4X type housings for these actuators. Call DEI for information.

! \*\*\*CE WARNING: All wiring of these actuators must be safety extra-low voltage (SELV/PELV) in accordance with EN60730.



## Spring Return Electronic Actuator 24 VAC/VDC Tri-State (Floating) Control ES62C2(-S)

### Actuator Components



### Legend

1. Actuator housing
2. Positioning scale for angle of rotation
3. DIP switches and cover
4. Span adjustment
5. Offset (start point) adjustment
6. Mounting bracket
7. Connection cables for power and positioning signal
8. Connection cables for auxiliary switches or feedback potentiometer
9. Gear train lock pin
10. Manual override wrench opening and direction of rotation arrow
11. Locking shaft for auxiliary switches A and B
12. Position indicator
13. Self-centering shaft adapter
14. Shaft adapter locking clip
15. Position indicator adapter
16. Key for manual adjustment
17. Adjustment tool for: auxiliary switches (11), potentiometers (4 and 5), and locking shaft (9)

### Operation

A tri-state (floating) control signal controls the valve or damper actuator. The actuator's angle of rotation is proportional to the length of time the signal is applied. A 24 VAC control signal to Y1 causes the actuator coupling to rotate clockwise. A 24 VAC control signal to Y2 causes the actuator coupling to rotate counterclockwise.

With no control voltage, the actuator holds its current position.

In the event of a power failure, the actuator spring returns to the "0" position.

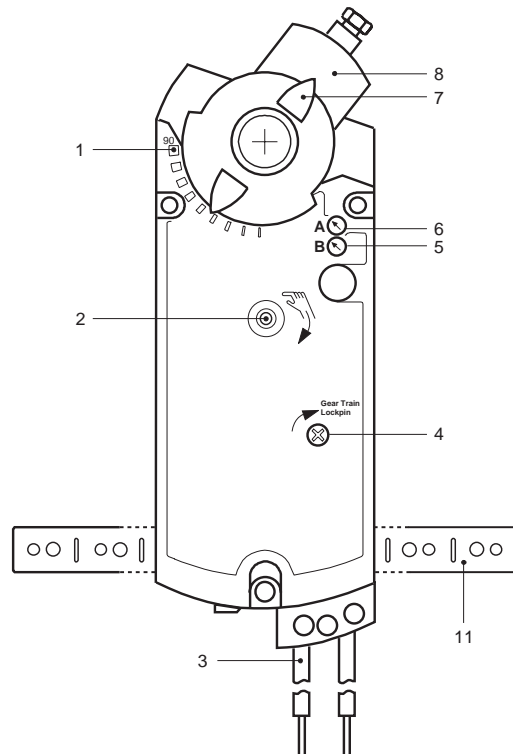
### Life expectancy

An improperly tuned control loop will cause excessive repositioning that will shorten the life of the actuator.



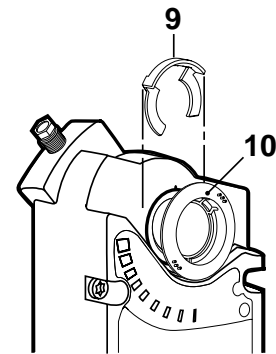
## Spring Return Electronic Actuator 24 VAC Tri-State (Floating) Control ES142C2(-S)

### Actuator Components



### Legend

1. Positioning scale for angle of rotation
2. Manual override wrench opening and direction of rotation arrow
3. Connection cables
4. Gear train lock pin
5. Auxiliary switch B (-S option)
6. Auxiliary switch A (-S option)
7. Position indicator
8. Standard or self-centering shaft adapter\*
9. Shaft adapter locking clip
10. Position indicator adapter
11. Mounting bracket



### Operation

A tri-state (floating) control signal controls the valve or damper actuator. The actuator's angle of rotation is proportional to the length of time the signal is applied. A 24 VAC control signal to Y1 causes the actuator coupling to rotate clockwise. A 24 VAC control signal to Y2 causes the actuator coupling to rotate counterclockwise.

With no control voltage, the actuator holds its current position.

In the event of a power failure, the actuator spring returns to the "0" position.

### Life expectancy

An improperly tuned control loop will cause excessive repositioning that will shorten the life of the actuator.

Note:

\* Self-centering shaft adapter shown.



## Spring Return Electronic Actuators 24 VAC Modulating Control ES62B2(-S), ES62B2-ZS(-S), ES142B2(-S) & ES142B2-ZS(-S)



### Description

The ES62B2(-S), ES62B2-ZS(-S), ES142B2(-S) & ES142B2-ZS(-S) direct coupled 24 VAC spring return electronic actuators are designed for modulating control of building HVAC dampers and valves.

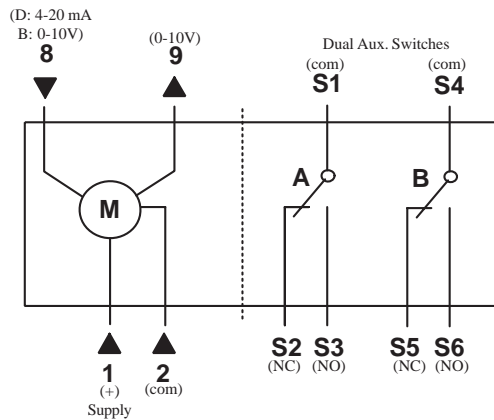
### Features

- Brushless DC motor technology with stall protection
- Bidirectional fail-safe spring return
- Unique self-centering shaft coupling
- All metal housing
- Access to all functions from either side of the actuator
- Manual override
- 5° pre-load as shipped from factory
- Offset and span adjustment models available (-ZS option)
- Models with independently adjustable dual auxiliary switches available (-S option)
- UL, CSA approved; plenum versions pending CE rating

### Application

This actuator is used in constant or variable air volume installations for the control of return air, mixed air, exhaust, and face and bypass valves or dampers requiring up to 62 in-lb (7 N-m) or 142 in-lb (16 Nm) torque. It is designed for applications that require the valve or damper to return to a fail-safe position when there is a power failure.

### Wiring



Actuator Part Number Table						
Torque	Input Signal	Cabling	24 VAC Operating Voltage			
			Standard	Span/Offset Adjustable	Dual Auxiliary Switches and Span/Offset Adjustable	Dual Auxiliary Switches Only
62 in-lb (7 N-m)	0 to 10 VDC 0 to 20 mA*	Plenum Cable	ES62B2	ES62B2-ZS	ES62B2-ZS-S	ES62B2-S
142 in-lb (16 N-m)	0 to 10 VDC 0 to 20 mA*	Plenum Cable	ES142B2	ES142B2-ZS	ES142B2-ZS-S	ES142B2-S

#### Notes:

- \* 0-20 mA requires 500 Ω (1 %, 1/4 W) resistor across pins 2 and 8
- "-ZS" versions can be calibrated to 4 to 20 mA.





## Spring Return Electronic Actuators 24 VAC Modulating Control ES62B2(-S), ES62B2-ZS(-S), ES142B2(-S) & ES142B2-ZS(-S)

Technical Data	ES62B2(-S) ES62B2-ZS(-S)	ES142B2(-S) ES142B2-ZS(-S)
Power supply	24 VAC ± 20% 50/60 Hz, 24 VDC ± 15%	24 VAC +20% , -15% , 50/60 Hz
Transformer sizing	running: 5 VA (3.5 WDC) holding: 4 VA (3 WDC) (class 2 power source req. for UL)	running: 9 VA holding: 5 VA (class 2 power source req. for UL)
Electrical connection	3 ft, 18 AWG plenum cable	
Overload protection	Electronic throughout 0° to 95° rotation	
Control signal	0 to 10 VDC (max. 35 VDC), 0 to 20 mA†	0 to 10 VDC, 0 to 20 mA†
Input impedance	>100 Kohm	100 Kohm (0.1 mA)
Operating range	0 to 10 VDC (max. 35 VDC), 0 to 20 mA†	0 to 10 VDC, 0 to 20 mA†
Feedback output "U"	0 to 10 VDC ( ±1 mA max.) for 95°	
Angle of rotation	95°	
Minimum torque	62 in-lb (7 N-m)	142 in-lb (16 N-m)
Direction of rotation	spring return: selectable when ordering valve, selectable for damper control direction with dip switch control: selectable by dip switch (on some models)	
Position indication	visual indicator, 0° to 95° (0° is spring return position)	
Manual override	3 mm hex crank (shipped with actuator)	
Shaft size	1/4" to 3/4" (6.4 mm to 20.5 mm) diameter 1/4" to 1/2" (6.4 mm to 13 mm) square	Standard: 3/8" to 1" (8 mm to 25.6 mm) diameter 1/4" to 5/8" (6.4 mm to 18 mm) square Oversize: 1.05" (26.6 mm) special adapter
Minimum shaft length	3/4" (20 mm)	
Auxiliary switches (-S option)	AC: 24 VAC to 250 VAC 6A resistive 2A general purpose use DC: 12 VDC to 30 VDC 2A	plenum: 4 A resistive, 24 VAC plenum: 2 A inductive, 24 VAC
Switch range (-S option)*	0° to 90° with 5° intervals	
- Switch A	0° to 45°	
- Recommended range usage	5°	
- Factory setting	2°	
- Switching hysteresis	2°	
Switch range (-S option)*	0° to 90° with 5° intervals	
- Switch B	45° to 90°	
- Recommended range usage	85°	
- Factory setting	2°	
- Switching hysteresis	2°	
Control signal adjustment (-ZS option)	2-30 VDC	
- Offset (startpoint)	0-5 VDC	
- Factory setting (offset)	0 VDC	
- Factory setting (span)	30 V	
- Span	2-30 VDC	
Running time (90°) (nominal)	90 secs constant spring return: 15 secs typical (60 secs max. @ -25°F)	90 secs constant spring return: 15 secs typical (30 secs max.)
Humidity	95% RH, noncondensing	
Ambient temperature	-25°F to 130°F (-32°C to 55°C)	
Storage temperature	-25°F to 158°F (-32°C to 70°C)	
Housing type**	NEMA type 1/IP40 according to EN60529	
Housing material	Die cast aluminum alloy	
Agency ratings	UL 60730 or UL 873 listed, C-UL certified to CSA C22.2 No. 24-93, pending CE approval for plenum models	
CE conformity***	Electromagnetic Compatibility (EMC): 89/336/EEC Emissions standards: EN50081-1 Immunity standards: EN50082-2	-
Noise level	20 dBA	<45 dBA (running)
Servicing	maintenance free	
Quality standard	ISO 9002	
Weight	2.86 lbs (1.3 kg)	4.85 lbs (2.2 kg)

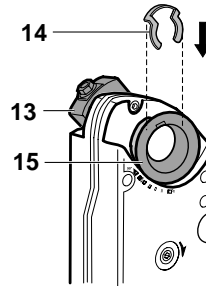
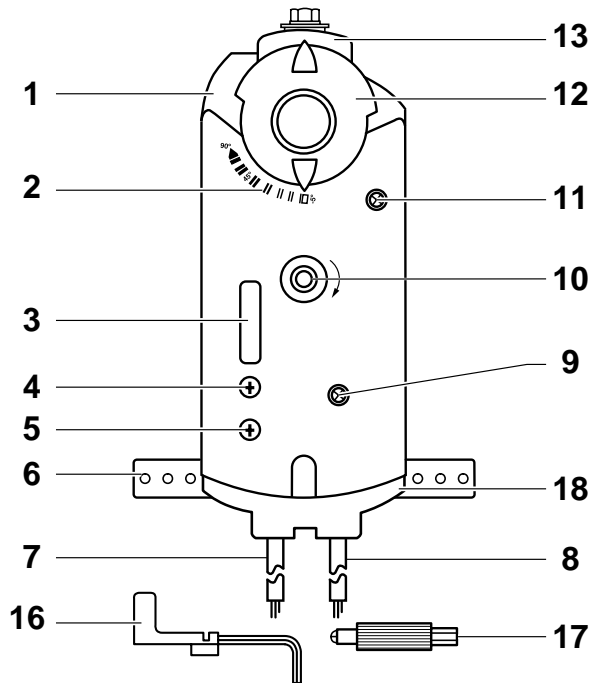
**Notes:**

- † Add 500 Ω (1 %, 1/4 W) resistor across pins 2 & 8 for 0-20 mA signal.
- ! \* SWITCH WARNING: Apply only line voltage or only Class 2 voltage to the switching outputs of both auxiliary switches A and B. Mixed operation is not permissible.
- \*\* DEI has optional NEMA 4/4X type housings for these actuators. Call DEI for information.
- ! \*\*\*CE WARNING: All wiring of these actuators must be safety extra-low voltage (SELV/PELV) in accordance with EN60730.



## Spring Return Electronic Actuators 24 VAC Modulating Control ES62B2(-S), ES62B2-ZS(-S)

### Actuator Components



### Legend

1. Actuator housing
2. Positioning scale for angle of rotation
3. DIP switches and cover
4. Span adjustment
5. Offset (start point) adjustment
6. Mounting bracket
7. Connection cables for power and positioning signal
8. Connection cables for auxiliary switches or feedback potentiometer
9. Gear train lock pin
10. Manual override wrench opening and direction of rotation arrow
11. Locking shaft for auxiliary switches A and B
12. Position indicator
13. Self-centering shaft adapter
14. Shaft adapter locking clip
15. Position indicator adapter
16. Key for manual adjustment
17. Adjustment tool for: auxiliary switches (11), potentiometers (4 and 5), and locking shaft (9)

### Operation

A continuous 4 to 20 mA signal or a 0 to 10 VDC (0-20 mA\*\*) signal from a controller to wire Y operates the actuator. The angle of rotation is proportional to the control signal. A 0 to 10 VDC position feedback output signal is available between wires U and Comm (system neutral) to monitor the position of the motor.

In the event of a power failure, or when the operating voltage is shut off, the actuator returns to the "0" position.

### Life Expectancy

An improperly-tuned control loop will cause excessive repositioning that will shorten the life of the actuator.

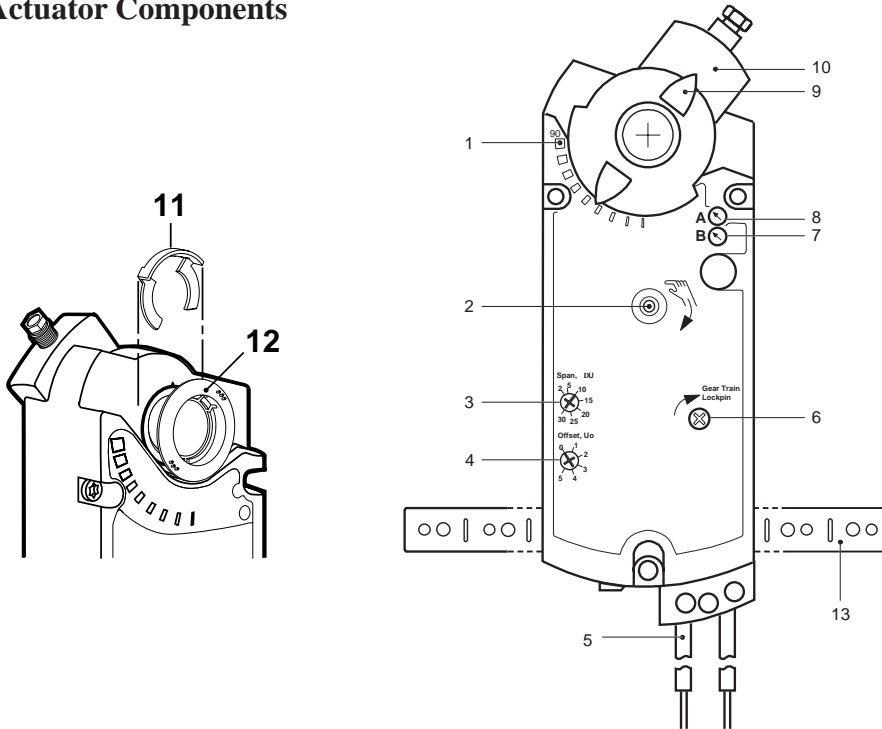
### Notes:

- For installation, option (-ZS, -S) and accessory information, see installation guide.
- \* Self-centering shaft adapter shown.
- \*\* 0-20 mA with addition of 500Ω (1 %, 1/4 W) resistor.



## Spring Return Electronic Actuators 24 VAC Modulating Control ES142B2(-S) & ES142B2-ZS(-S)

### Actuator Components



### Legend

1. Positioning scale for angle of rotation
2. Manual override wrench opening and direction of rotation arrow
3. Span adjustment (-ZS version)
4. Offset (start point) adjustment (-ZS version)
5. Connection cables
6. Gear train lock pin
7. Auxiliary switch B
8. Auxiliary switch A
9. Position indicator
10. Standard or self-centering shaft adapter\*
11. Shaft adapter locking clip
12. Position indicator adapter
13. Mounting bracket

### Operation

A continuous 4 to 20 mA signal or a 0 to 10 VDC (0-20 mA\*\*) signal from a controller to wire Y operates the actuator. The angle of rotation is proportional to the control signal. A 0 to 10 VDC position feedback output signal is available between wires U and Comm (system neutral) to monitor the position of the motor.

In the event of a power failure, or when the operating voltage is shut off, the actuator returns to the "0" position.

### Life Expectancy

An improperly-tuned control loop will cause excessive repositioning that will shorten the life of the actuator.

### Notes:

- For installation, option (-ZS, -S) and accessory information, see installation instructions.
- \* Self-centering shaft adapter shown.
- \*\* 0-20 mA with addition of 500  $\Omega$  (1 %, 1/4 W) resistor across pins 2 & 8.



## Spring Return Electronic Actuators 24 VAC Modulating Control ES62M2(-S) & ES142M2(-S)

### Description

The ES62M2(-S) & ES142M2(-S) direct coupled 24 VAC spring return electronic actuators are designed for modulating control of building HVAC dampers and valves.

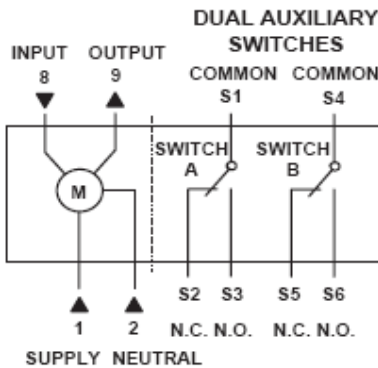
### Features



- Brushless DC motor technology with stall protection
- Bidirectional fail-safe spring return
- Unique self-centering shaft coupling
- All metal housing
- Manual override
- 5° pre-load as shipped from factory
- Input signal inversion option (direct or inverse acting)
- Feedback signal inversion option
- Models with independently adjustable dual auxiliary switches available (-S option)
- UL and cUL listed

### Application

This actuator is used in constant or variable air volume installations for the control of return air, mixed air, exhaust, and face and bypass dampers or valves requiring up to 62 in-lb (7 N-m) or 142 in-lb (16 Nm) torque. It is designed for applications that require the valve or damper to return to a fail-safe position when there is a power failure.



Standard Symbol	Function	Terminal Designations	Color
1	Supply (SP)	G	Red
2	Neutral (SN)	G0	Black
8	Input signal	Y	Gray
9	Position output	U	Pink
S1	Switch A – Common	Q11	Gray/red
S2	Switch A – N.C.	Q12	Gray/blue
S3	Switch A – N.O.	Q14	Gray/pink
S4	Switch B – Common	Q21	Black/red
S5	Switch B – N.C.	Q22	Black/blue
S6	Switch B – N.O.	Q24	Black/pink

Actuator Part Number Table				
Torque	Input Signal	Cabling	Standard	Dual Auxiliary Switches
62 in-lb (7 N-m)	2 to 10 VDC 4 to 20 mA*	Plenum Cable	ES62M2	ES62M2-S
142 in-lb (16 N-m)	0(2) to 10 VDC 0(4) to 20 mA*	Plenum Cable	ES142M2	ES142M2-S

**Notes:**

\* 0(4)-20 mA requires a 500 Ω (1%, 1/4W) resistor across pins 2 & 8



## Spring Return Electronic Actuators 24 VAC Modulating Control ES62M2(-S) & ES142M2(-S)

Technical Data	ES62M2(-S)	ES142M2(-S)
Power supply	24 VAC ± 20%; 24 VDC ± 15%, 50/60 Hz	24 VAC +20%; 24 VDC ± 10%, 50/60 Hz
Transformer sizing	running: 5 VA (3.5 W) holding: 4 VA (3 W) (class 2 power source req. for UL/CSA)	running: 9 VA (7 W) holding: 5 VA (4 W) (class 2 power source req. for UL/CSA)
Electrical connection	3 ft, 18 AWG plenum cable	
Overload protection	0° to 95° rotation, with stall protection	
Control signal	2-10 VDC (max. 35 VDC)	0-10 VDC or 2-10 VDC (max. 35 VDC)
Input impedance	>100 Kohm	>100 Kohm
Feedback output "U"	2-10 VDC (+1 mA, -5 mA max.)	0-10 VDC or 2-10 VDC (+1 mA, -5 mA max.)
Angle of rotation	95°	
Minimum torque	62 in-lb (7 N-m)	142 in-lb (16 N-m)
Direction of rotation	spring return: selectable when ordering valve, selectable for damper control direction with dip switch control: selectable by dip switch	
Position indication	visual indicator, 0° to 95° (0° is spring return position)	
Manual override	3 mm hex crank (shipped with actuator)	
Shaft size	1/4" to 3/4" (6.4 mm to 20.5 mm) diameter 1/4" to 1/2" (6.4 mm to 13 mm) square	3/8" to 1" (8 mm to 25.6 mm) diameter 1/4" to 5/8" (6.4 mm to 18 mm) square
Minimum shaft length	3/4" (20 mm)	
Auxiliary switches (-S option)	AC: 24 VAC to 250 VAC 4A resistive 2A general purpose DC: 12 VDC to 30 VDC 2A	AC: 24 VAC 4A resistive 2A, FLA, 12 LRA DC: 12 VDC to 30 VDC 2A
Switch range (-S option)*		
– Switch A	0° to 90° with 5° intervals	
– Recommended range usage	0° to 45°	
– Factory setting	5°	
– Switching hysteresis	2°	
Switch range (-S option)*		
– Switch B	0° to 90° with 5° intervals	
– Recommended range usage	45° to 90°	
– Factory setting	85°	
– Switching hysteresis	2°	
Running time (90°) (nominal)	90 secs spring return: 15 secs typical (60 secs max. @ -25°F (-32°C))	90 secs spring return: 15 secs typical (30 secs max.)
Humidity	95% RH, noncondensing	
Ambient temperature	-25°F to 130°F (-32°C to 55°C)	
Storage temperature	-40°F to 158°F (-40°C to 70°C)	
Housing type**	NEMA 1/IP54 according to EN60 529	NEMA 2 in vertical to horizontal 90°
Housing material	Die cast aluminum alloy, Gear Lubrication - silicone free	
Agency ratings	UL Listed to 60730 (to replace UL 873 listed, cUL certified to CSA C22.2 No. 24-93)	
CE conformity***	Australian Electromagnetic Compatibility (EMC): 89/336/EEC per AS/NZS 4251.1/2:1999 (C-tick)	–
Noise level	40 dBA	<45 dBA (running)
Servicing	maintenance free	
Weight	2.9 lbs (1.3 kg)	4.85 lbs (2.2 kg)

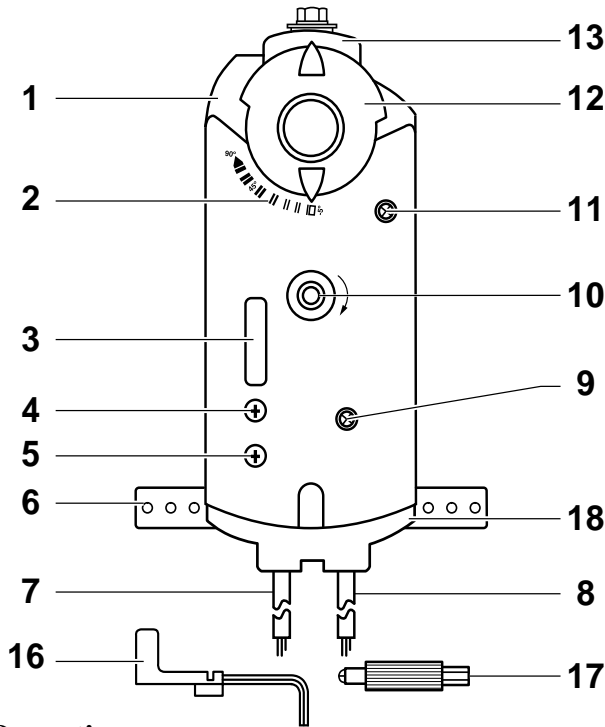
**Notes:**

- † Add 500 Ω (1 %, 1/4 W) resistor across pins 2 & 8 for mA signal.
- ! \* SWITCH WARNING: Apply only line voltage from the same phase or only UL Class 2 voltage to the switching outputs of both auxiliary switches A and B. Mixed operation is not permissible.
- \*\* DEI has optional NEMA 4/4X type housings for these actuators. Call DEI for information.
- ! \*\*\* CE WARNING: When wiring these actuators, only UL-Class 2 voltage (SELV/PELV for CE) is permitted.



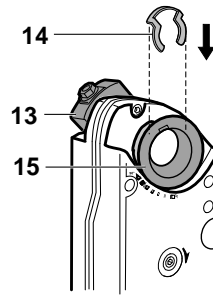
**Spring Return Electronic Actuators  
 24 VAC Modulating Control  
 ES62M2(-S)**

**Actuator Components**



**Legend**

1. Actuator housing
2. Positioning scale for angle of rotation
3. DIP switches and cover
4. N/A
5. N/A
6. Mounting bracket
7. Connection cable for power and control signals
8. Connection cable for auxiliary switches or feedback potentiometer
9. Gear train lock pin
10. Manual override wrench opening and direction of rotation arrow
11. Auxiliary switches A and B
12. Position indicator
13. Self-centering shaft adapter
14. Shaft adapter locking clip
15. Position indicator adapter
16. Key for manual adjustment
17. Adjustment tool for: auxiliary switches (11) and lock pin (9)
18. 1/2-inch NPT conduit connections



**Operation**

Apply a continuous 2 to 10 VDC\* control signal between wire 8 (Y) and wire 2 (G0) to operate the damper actuator.

The angle of rotation is proportional to the control signal.

A 2 to 10 VDC position feedback output signal is available between wire 9 (U) and wire 2 (G0) to monitor the position of the damper motor.

In the event of a power failure or when the operating voltage is shut off, the actuator returns to the "0" position.

**Life Expectancy**

An improperly-tuned control loop will cause excessive repositioning that will shorten the life of the actuator.

**Dip Switch Functionality**

Input signal inversion allows inverting the control input signal. The arrow direction indicates opening or closing (closing or opening) when operating an actuator with a given control signal.

Feedback signal inversion allows inverting the position feedback output signal.

Description	Label		Description	Function
Inverse Acting			Direct-Acting	Input Signal Inversion
Inverse-Acting Feedback			Direct-Acting Feedback	Feedback Signal inversion
				<b>Not In Use</b>

**Notes:**

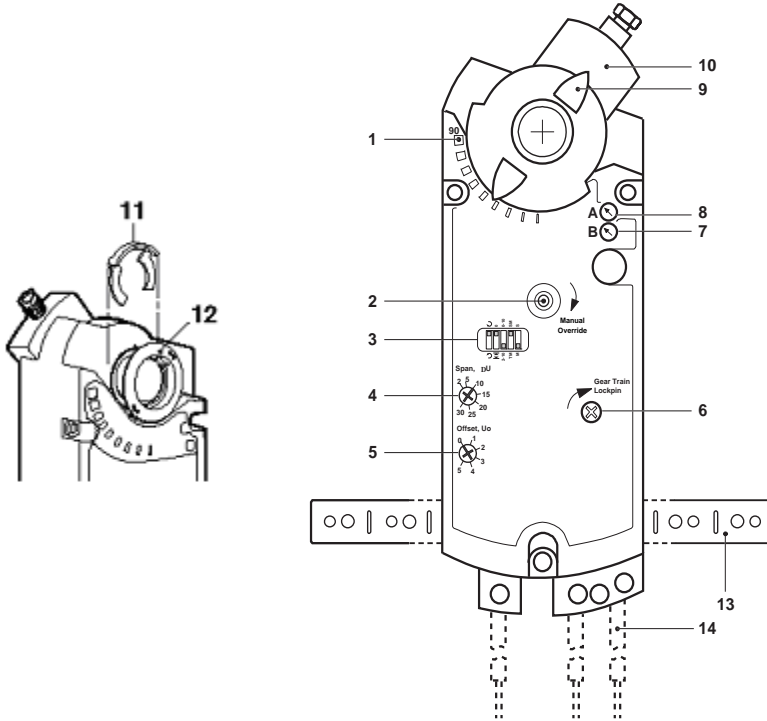
- For installation, option (-S) and accessory information, see installation guide.

\* 4-20 mA with addition of 500Ω (1 %, 1/4 W) resistor.



## Spring Return Electronic Actuators 24 VAC Modulating Control ES142M2(-S)

### Actuator Components



### Legend

1. Positioning scale for angle of rotation
2. Manual override wrench opening and direction of rotation arrow
3. DIP switches
4. N/A
5. N/A
6. Gear train lock pin
7. Auxiliary switch B
8. Auxiliary switch A
9. Position indicator
10. Self-centering shaft adapter
11. Shaft adapter locking clip
12. Position indicator adapter
13. Mounting bracket
14. Connection cables

### Operation

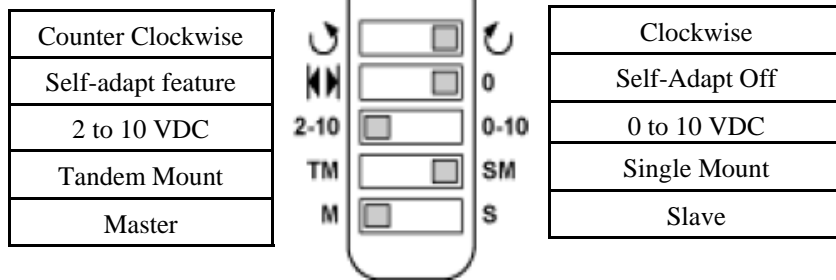
A continuous 0 to 10 VDC or 2 to 10 VDC\* signal from a controller to wire Y operates the damper actuator. The angle of rotation is proportional (or inverse proportional) to the control signal. A 0 to 10 VDC position feedback output signal is available between wires U and G0 (system neutral) to monitor the position of the damper actuator.

In the event of a power failure or when the operating voltage is shut off, all actuator models will return to the 0 position. In the event of a blockage in a damper, actuators are overload protected over the full range to prevent damage to the actuators.

### Life Expectancy

An improperly-tuned control loop will cause excessive repositioning that will shorten the life of the actuator.

### Implementation of DIP Switch Features



### Notes:

- For installation, option (-S) and accessory information, see installation instructions.
- \* 0-20 mA/4-20 mA with addition of 500 Ω (1 %, 1/4 W) resistor across pins 2 & 8.



## Electronic Commercial Actuators Type A

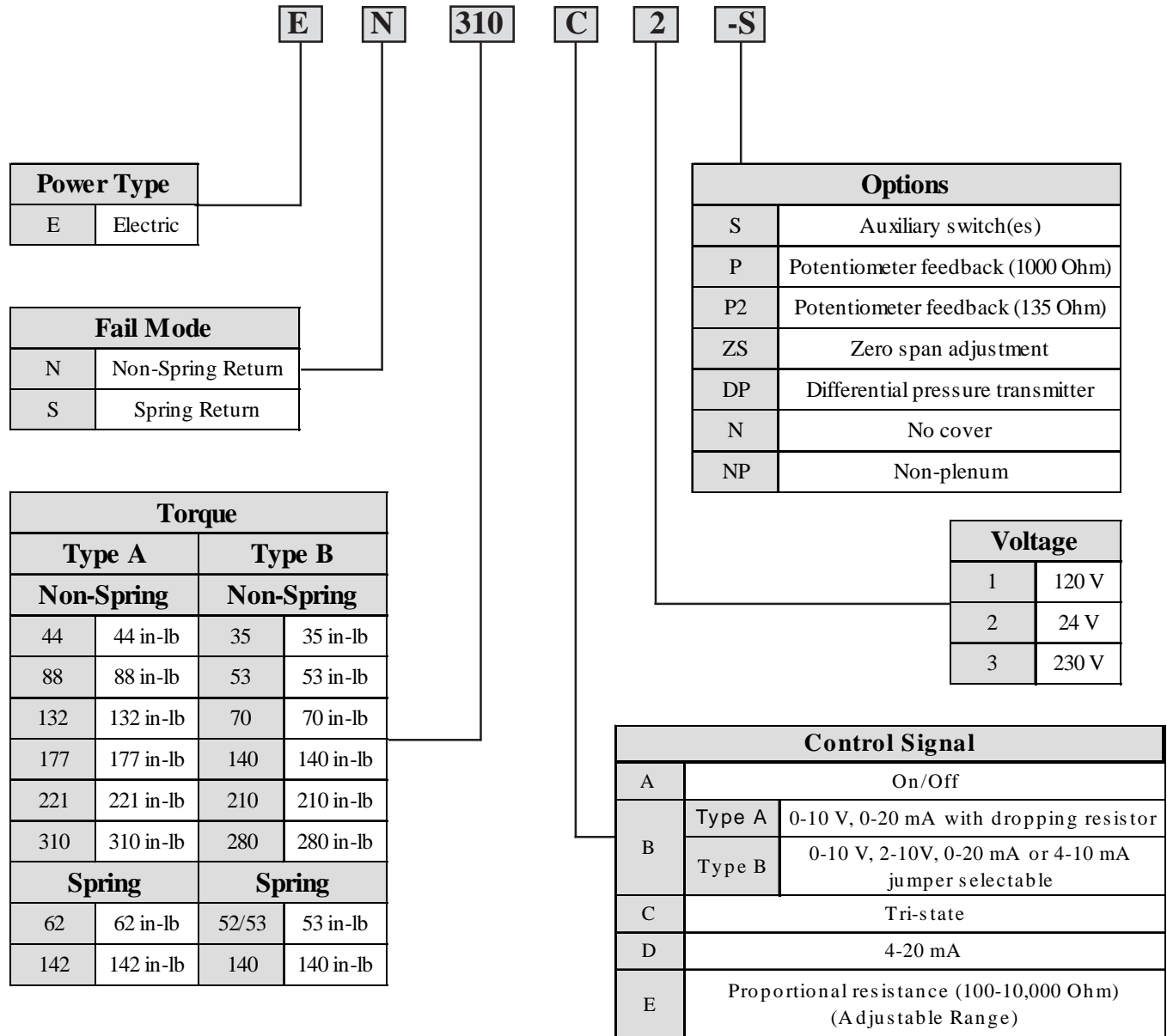
### Commercial Actuator Selection Chart

– Non-Spring Return .....	AC-A-1	
– Spring Return .....	AC-A-2	
Non-Spring Return, 24 VAC, Two-Position or Tri-State (Floating); EN44C2(-S, -P), EN44C2-NP & EN88C2(-S, -P) ...		AC-A-3-5
Non-Spring Return, 24 VAC, Modulating; EN44B2(-S), EN44B2-ZS(-S), EN88B2(-S) & EN88B2-ZS(-S) .....		AC-A-6-8
Non-Spring Return, 24 VAC, Two-Position or Tri-State (Floating); EN132C2(-S), EN221C2(-S) & EN310C2(-S) .....		AC-A-9-11
Non-Spring Return, 24 VAC, Modulating; EN132B2, EN132B2-ZS(-S), EN221B2(-S), EN221B2-ZS(-S), EN177D2(-S), EN310B2(-S) & EN310B2-ZS(-S) .....		AC-A-12-14
Spring Return, Two-Position; ES62A(-S) & ES142A(-S) .....		AC-A-15-19
Spring Return, Tri-State (Floating); ES62C2(-S)(P) & ES142C2(-S)(P) .....		AC-A-20-23
Spring Return, 24 VAC, Modulating; ES62B2(-S), ES62B2-ZS(-S), ES142B2(-S), ES142B2-ZS(-S), ES62M2(-S) & ES142M2(-S) .....		AC-A-24-31





## How to Select the Commercial Electronic Actuator Part Number



*Note:*

- See Actuator Selection Chart to confirm combinations.