How to Select the Commercial Electronic Actuator Part Number

Powe E	e r Type Electric		E	N 3	510	C	2	-S	Options		
								D D	Auxiliary	dbook (10) 00.0hm)
		lo						P D2	Potentiometer fee	dback (1)	35 Ohm)
N	Non-Spri	ng Retur	n					75	Zero span	adjustme	nt
S	Spring	Return						DP	Differential pres	sure tran	smitter
5	Bpring	Return						N	No c	over	Sillitter
								NP	Non-r	olenum	
	Tor	que		l							
Ty	pe A	Ту	pe B							Vol	tage
Non-	Spring	Non-	Spring							1	120 V
44	44 in-lb	53	53 in-lb							2	24 V
88	88 in-lb	70	70 in-lb	ľ						3	230 V
132	132 in-lb	140	140 in-lb		-						
221	221 in-lb	210	210 in-lb					1	Control Signal		
310	310 in-lb	280	280 in-lb				А		On/Off		
Sp	oring	Sp	oring				B	Type A 0-10 V, 0-20 mA with dropping res		g resistor	
62	62 in-lb	70	70 in-lb				Б	Type B	0-10 V, 2-10V, 0-2 jumper so	0 mA or 4 electable	-10 mA
142	142 in-lb	177	177 in-lb				С		Tri-state		
							D		4-20 mA		
							Е	Propo	ortional resistance (1 (Adjustable Ra	00-10,000 .nge)	Ohm)

Μ

Note:

- See Actuator Selection Chart to confirm combinations.

2-10 V, 4-20 mA with dropping resistor



Commercial Actuator Selection Chart – Non-Spring Return

		Control Signal			Position Feedback			Torque				Aux. Switches					
Actuator Model	24 VAC Power Input	On/Off	Tri-State Floating	0-10 VDC, 2-10 VDC 0-20 mA, 4-20 mA	Resistive: 100-10,000 Ohm	Pulse Width Modulation (PWM)	Starting Point & Span Adjust. (zero & span)	0-10 VDC, 2-10 VDC	Resistive (-P) 0-1000 Ohm	Resistive (-P2) 0-135 Ohm	35 in-lb	53 in-lb	70 in-lb	140 in-lb	210 in-lb	280 in-lb	Built-in Auxiliary Switches, (-S) only
EN53A2(-S)	•	•	•									2					•
EN53B2(-S)	•			•		1		٠				•					•
EN53C2(-S)	•		•									•					•
EN70B2(-S)	•			•		1		٠					•				•
EN70B2-ZS(-S)	•			•			•	•					•				•
EN70C2(-S)	•	•	•										•				•
EN70C2(-P)/(-P2)	•	•	•						•	•			•				
EN70E2(-S)	•				•			٠					•				•
EN140B2(-S)	•			•		1		٠						•			•
EN140B2-ZS(-S)	•			•			•	٠						•			•
EN140C2(-S)	•	•	•											•			•
EN140C2(-P)/(-P2)	•	•	•						•	•				•			
EN140E2(-S)	•				•			٠						•			•
EN210B2(-S)	•			•		1		٠							•		•
EN210B2-ZS(-S)	•			•			•	٠							•		•
EN210C2(-S)	•	•	•												•		•
EN210C2(-P)(-P2)	•	•	•						•	٠					•		
EN210E2(-S)	•				•			٠							•		•
EN280B2(-S)	•			•		1		•								•	•
EN280B2-ZS(-S)	•			•			•	•								•	•
EN280C2(-S)	•	•	•													•	•
EN280C2(-P)(-P2)	•	•	•						•	•						•	
EN280E2(-S)	•				•			•								•	•

Notes:

1 Peripheral options are available for specialty signals such as PWM, 0-135 Ohm and 0-20 V phasecut. Call DEI.

2 For 1, 1.8 and 2 minute settings only. See page AC-B-6.
 Most commercial assemblies are available with an optional

Most commercial assemblies are available with an optional NEMA 4/4X type housing. See applicable data sheet for details.

(-S) optional switch; (-P) optional resistive feedback; (-P2) optional resistive feedback; (-ZS) zero span version.

Commercial Actuator Selection Chart – Spring Return

	Power	r Input	u u		Control S			1		Position Feedback		Torque			Aux. Switches			
Actuator Model	24 VAC	120 VAC	Nominal Spring Retur Time (Sec) - Maximun	On/Off	Tri-State (Floating)	0-10 VDC, 2-10 VDC 0-20 mA, 4-20 mA*	0-20 V Phasecut or 0-135 Ohm	Pulse Width Modulation (PWM)	Starting Point & Span Adjust.	0-10 VDC, 2-10 VDC	Resistive (-P) (135 Ohm)	Resistive (-P2) (1,000 Ohm)	53 in-lb	70 in-lb	140 in-lb	177 in-lb	Built-in Auxiliary Switch (-S) only	Self-Adaptive
ES53C2(-S) *	•		<15	•	•								•					
ES70A1(-S)		•	<15	•										•				
ES70A2(-S)	•		<15	•										•				
ES70B2(-S)	•		<15			•	1	1		•				•				•
ES70B2-ZS(-S)	•		<15			•	1	1	•	•				•				
ES70C2(-S)	•		<15	•	•						•	•		•				
ES140A1		•	<15	•											•			
ES140C2(-S)(-P)(-P2)	•		<15	•	•						•	•			•		•	
ES177A1(-S)		•	<15	•												•	•	
ES177A2(-S)	•		<15	•												•	•	
ES177B2(-S)	•		<15			•	1	1		•						•	•	•
ES177B2-ZS(-S)	•		<15			•	1	1	•	•						•	•	
ES177C2(-S)	•		<15	•	•						•	•				•	•	

Notes:

* Requires 500 ohm (1%, 1/4 W) resistor.

1 Peripheral options are available for specialty signals such as PWM, 0-135 Ohm and 0-20 V phase cut. Call DEI.

2 2-10 V, 6-9 V or 4-20 mA only

- Most commercial assemblies are available with an optional NEMA 4/4X type housing. See applicable data sheet for details.

- (-S) means the switch is optional.



Non-Spring Return, 24 VAC Electronic Actuators, Tri-State (Floating)/Two-Position EN53A2(-S), EN53C2(-S); EN70C2, EN140C2, EN210C2 & EN280C2(-S), (-P), (-P2)



EN53 Series Actuator



The EN "A" or "C" Series is a direct-mount line of actuators that operates on 24 VAC (or 24 VDC power for the EN70, 140, 210, and 280) and is available for use with floating controllers. The EN53 actuators are easily installed on a Variable Air Volume (VAV) box, a round damper shaft up to 1/2 inch (13 mm) diameter, and a 3/8 inch (10 mm) square shaft. The EN70, 140, 210 and 280 bidirectional actuators do not require a damper linkage and are easily installed on a 7/4 inch (20 mm) diameter or a square shaft up to 5/8 inch (16 mm).

All actuators can also be mounted to valves (ball, globe, and butterfly) using one of the many valve linkage kits available through Dodge Engineering & Controls.

The EN models deliver up to 280 in-lb (32 N-m) of torque in a single mount configuration, and up to 560 in-lb (64 N-m) of torque in a tandem mount configuration. The angle of rotation is mechanically adjustable from 0° to 90° in 5° increments. Integral auxiliary switches are available to indicate end-stop position or to perform switching functions at any angle within the selected rotation range. Position feedback is available through switches or a potentiometer signal.

Torque Minimum: EN53A2 or EN53C2: 53 in-lb; EN70C2: 70 in-lb; EN140C2: 140 in-lb; EN210C2: 210 in-lb; EN280C2: 280 in-lb

Application: EN Series actuators are designed to position air dampers and valves in HVAC systems. Applications include: positioning return air or exhaust dampers; controlling face and bypass dampers; positioning blades for variable volume fans; positioning ball, butterfly or globe valves. Refer to the manufacturer's information to size properly the damper, valve and/or actuator. Spring return actuators, such as Dodge Engineering's ES Series, are recommended for use with outdoor air dampers in cold climates.

Operation (EN53): The EN53 Series provides a 53 in-lb (6 N-m) running torque for floating control of dampers, VAV box dampers or control valves. The EN53 Series mounts directly on the duct surface, round damper or small rectangular damper with an anti-rotation bracket and two sheet metal screws (included). Additional linkages or couplers are not required. A controller provides a control signal to the actuator depending upon the desired movement of the damper blade. This signal causes the motor to rotate in the proper direction and moves the damper blade open or closed.

Note: To avoid excessive wear or drive time on the motor, use a controller and/or software that provides a time-out function to remove the signal at the end of rotation (stall).

EN70, 140, 210, 280 Series Actuator

The EN53C2(-S) actuator rotates at a nominal rate of 1.5° per second (90° in 60 seconds)

at 60 Hz input (72 seconds @ 50 Hz) with a load independent rotation time. The actuator rotation is field adjustable from 30° to 90° . Actual rotation time for actuators using less than 90° rotation should be determined and that value used with the controller software. For example, 40 seconds would be used for 60° rotation. The EN53A2(-S) models offer adjustable rotation times of 1, 1.5, 2, 5.5 and 11 minutes. The 1, 1.5 and 2 minute settings provide 53 in-lb of torque and are ideal for two-position and floating applications. The 5.5 and 11 minute settings provide 35 in-lb of torque.

Operation (EN70, 140, 210 and 280): EN Series actuators operate on 24 VAC at 50/60 Hz or 24 VDC. These compact actuators use a DC motor with stall detection circuitry that operates throughout the entire stroke. The proportional actuators employ noise filtering techniques on the control signal to eliminate response to spurious noise. Rotation is mechanically limited to 93° by integral end-stops. The position of the actuator is visually indicated from 0° to 90° on the cover. An anti-rotation bracket prevents lateral movement of the actuator. For hand positioning the coupler, pressing the spring-loaded gear release on the actuator cover can manually disengage the gear train.



Non-Spring Return, 24 VAC Electronic Actuators, Tri-State (Floating)/Two-Position EN53C2(-S); EN70C2, EN140C2, EN210C2 & EN280C2(-S), (-P), (-P2)

Technical Data	EN53C2(-S), EN53A2(-S)	EN70C2 (-S)(-P)(-P2)	EN140C2 (-S)(-P)(-P2)	EN210C2 (-S)(-P)(-P2)	EN280C2 (-S)(-P)(-P2)			
Power supply	20 to 30 VAC @ 50/60 Hz	20 to 30 VAC, 24 VDC +/- 10%, 50/60 Hz						
Transformer sizing	C2(-S) ¹ : 2.5 VA A2(-S) ² : 2.8 VA (class 2 power source req. for UL)	6.5 VA (class 2 power source req. for UL) 7.5 VA (class 2 power source req. for UL)						
Electrical connection	1/4" spade terminals **	screw termi	nals for 22 to 14 AWG	(max. of two 18-22 AWC	G/terminals)			
Control signal	C2(-S): floating A2(-S): two-position or floating 20-30 VAC @ 50/60 Hz	floatii	60 Hz)	24 VAC @ 50/60 Hz or 24 VDC				
Factory setting	Direct (CW) of	or reverse (CCW) with s	signal increase (jumper	selectable)				
Feedback signal (-P) or (-P2) option	_		1000 Ω (-P) c	or 135 Ω (-P2)				
Input impedance	$\begin{array}{c} C2(-S)^{1}: 200 \ \Omega \\ A2(-S)^{2}: 160 \ \Omega \end{array} \tag{400 } \Omega \end{array}$							
Switch contact rating (-S) option	Two SPDT rated @ 24 VAC, 1.5 A inductive, 3 A resistive, 35 VA maxper switch, class 2							
Mechanical connection (shaft size)	3/8" to 1/2" (10-12.7 mm) diameter round shaft 3/8" to 3/4" (10-20 mm) diameter round shaft 3/8" (10 mm) square shaft 3/8" to 5/8" (10-16 mm) square shaft							
Angle of rotation	Adjustable from 30-90°	0-90° in 5° increments, mechanical limitation 93°						
Torque	1, 1.5, and 2 minute settings: 53 in-lb (6 N-m) 5.5 and 11 minute settings: 35 in-lb (4 N-m)	70 in-lb (8 N-m)	140 in-lb (16 N-m)	210 in-lb (24 N-m)	280 in-lb (32 N-m)			
Direction of rotation	CW or CCW	CW or CCW with proper wiring						
Position indication	bolt indicator		clip-on i	ndicator				
Running time	C2(-S) ¹ : 60 secs @ 60 Hz, 72 secs @ 50 Hz A2(-S) ² : 60 secs factory set, adjustable with switch: 60, 90, 120, 330, or 660 secs @ 60 Hz; 72, 108, 144, 396, or 792 secs @ 50 Hz	25-50 secs for 0-70 in-lb (0-8 N-m)	70-115 secs for 0-140 in-lb (0-16 N-m)	115-175 secs for 0-210 in -lb (0-24 N-m)	115-185 secs for 0-280 (0-32 N-m)			
Humidity	0 to 90% RH non-condensing		0 to 95% RH n	on-condensing				
Operating temperature	-4°F to 125°F (-20°C to 52°C)		-4°F to 122°F	(-20°C to 50°C)				
Storage temperature	C2(-S) ¹ : -40°F to 176°F (-40°C to 80°C) $A_2(S)^2$: 40°E to 186°E (-40°C to 86°C)	-40°F to 186°F (-40°C to 86°C)						
Housing type*	NFMA 2 IP32		NFMA	2 IP42				
Agency listings	11LA111 L, 11 JL	UL 873 listed: CSA C	22.2. CE 89/336/EFC					
Noise level	<35 dBA @ 1 m	ellers instea, esir el	<45 dB/	A @ 1 m				
Servicing		maintena	nce free					
Quality standard		ISO 9	002					
Weight	2.4 lbs (1.08 kg)		2.9 lbs	(1.3 kg)				

Notes:

* Most commercial assemblies are available with an optional NEMA 4/4X type housing. See applicable data sheet for details.

** Optional pluggable terminal blocks.

1 Tri-State only

2 Two-Position or Tri-State



Non-Spring Return, 24 VAC Electronic Actuators, Tri-State (Floating)/Two-Position EN53A2(-S), EN53C2(-S); EN70C2, EN140C2, EN210C2 & EN280C2(-S), (-P), (-P2)

Wiring Diagrams

EN53C2(-S) & EN53A2(-S)



EN70C2, EN140C2, EN210C2 & EN280C2(-S),(-P),(-P2)



Non-Spring Return, 24 VAC/VDC Electronic Actuators, Modulating EN53B2(-S), EN70B2(-S)(-ZS), EN140B2(-S)(-ZS), EN210B2(-S)(-ZS) & EN280B2(-S)



EN53 Series Actuator



Torque Minimum: EN53B2: 53 in-lb; EN70B2: 70 in-lb; EN140B2: 140 in-lb; EN210B2: 210 in-lb; EN280B2: 280 in-lb

Application: EN Series actuators are designed to position air dampers and valves in HVAC systems. Applications include: positioning return air or exhaust dampers; controlling face and bypass dampers; positioning blades for variable volume fans; positioning ball, butterfly or globe valves. Refer to the manufacturer's information to size properly the damper, valve and/or actuator. Spring return actuators, such as Dodge Engineering's ES Series, are recommended for use with outdoor air dampers in cold climates.

Operation (EN53): The EN53 Series provides a 53 in-lb (6 N-m) running torque for proportional control of dampers, VAV box dampers or control valves. The EN53 Series mounts directly on the duct surface, round damper or small rectangular damper with an anti-rotation bracket and two sheet metal screws (included). Additional linkages or couplers are not required. A controller provides a control signal to the actuator depending upon the desired movement of the damper blade. This signal causes the motor to rotate in the proper direction and moves the damper blade open or closed.

EN70, 140, 210, 280 Series Actuator

Note: To avoid excessive wear or drive time on the motor, use a controller and/or software that provides a time-out function to remove the signal at the end of rotation (stall).

The actuator rotates at a nominal rate of 1.5° per second (90° in 60 seconds) at 60 Hz input. The actuator rotation is field adjustable from 30° to 90°. Actual rotation time for actuators using less than 90° rotation should be determined and that value used with the controller software. For example, 40 seconds would be used for 60° rotation.

Operation (EN70, 140, 210, 280): EN Series actuators operate on 24 VAC at 50/60 Hz or 24 VDC. These compact actuators use a DC motor with stall detection circuitry that operates throughout the entire stroke. The proportional actuators employ noise filtering techniques on the control signal to eliminate response to spurious noise. Rotation is mechanically limited to 93° by integral end-stops. The position of the actuator is visually indicated from 0° to 90° on the cover. An anti-rotation bracket prevents lateral movement of the actuator. For hand positioning the coupler, pressing the spring-loaded gear release on the actuator cover can manually disengage the gear train.



Non-Spring Return, 24 VAC/VDC Electronic Actuators, Modulating EN53B2(-S), EN70B2(-S)(-ZS), EN140B2(-S)(-ZS), EN210B2(-S)(-ZS) & EN280B2(-S)

Technical Data	EN53B2(-S)	EN70B2(-S)(-ZS)	EN140B2(-S)(-ZS)	EN210B2(-S)(-ZS)	EN280B2(-S)		
Power supply	20 to 30 VAC @ 50/60 Hz		20 to 30 VAC, 24 V	DC ±10%, 50/60 Hz			
Transformer sizing	3.2 VA class 2 power source req. for UL		7.5 VA class 2 powe	er source req. for UL			
Electrical connection	1/4" spade terminals**	screw terr	minals for 22 to 14 AWG	(max. of two 18-22 AWG/	terminals)		
Control signal	0	(2) to 10 VDC, 0(2) to 20	VDC, or 0(4) to 20 mA (ju	imper selectable)			
Control signal		zero;	0-6 VDC, 0-12 VDC, or 0-	12 mA			
(-ZS option)	_	span; 2-10 VDC, 4-20 VDC, or 4-20 mA					
Factory setting	0-10 VDC direct CW rotation with signal increase	0	-10 VDC, 0-20 mA, CW ro	tation with signal increas	se		
Feedback signal	0-10 VDC or 2-1	0 VDC for 90° (1 mA @ 1	0 VDC) (corresponds to i	nput and signal span sel	ection)		
Input impedance	voltage: 150 kΩ, current: 500 Ω	vo	voltage: 205 kΩ for 0(2) to 10 V, 410 kΩ for 0(4) to 20 V, current: 500 Ω				
Switch contact rating (-S option)	two SP	two SPDT rated at 24 VAC, 1.5 A inductive, 3 A resistive 35 VA max per switch					
Mechanical connection (shaft size)	3/8" to 1/2" (10 mm to 12.7 mm) diameter round shaft 3/8" (10 mm) square shaft	3/8" to 3/4" (10 mm to 20 mm) diameter round shaft 3/8" to 5/8" (10 mm to 16 mm) square shaft					
Angle of rotation	adjustable from 30°-90°	0°-90° in 5° increments, mechanical limitation 93°					
Torque	53 in-lb (6 N-m)	70 in-lb (8 N-m) constant	140 in-lb (16 N-m)	210 in-lb (24 N-m)	280 in-lb (32 N-m)		
Direction of rotation	CW or CCW		jumper s	electable			
Position indication			clip-on indicator				
Running time	60 secs @ 60 Hz,	25-50 secs for	70-115 secs for	115-175 secs for	115-185 secs for		
	72 secs @ 50 Hz	0-70 in-lb (0-8 N-m)	0-140 in-lb (0-16 N-m)	0-210 in-lb (0-24 N-m)	0-280 in-lb (0-32 N-m)		
Humidity	0 to 90% RH non-condensing		0 to 95% RH n	on-condensing			
Ambient temperature	-4°F to 125°F (-20°C to 52°C)		-4°F to 122°F	(-20°C to 50°C)			
Storage temperature	-40°F to 176°F (-40°C to 80°C)		-40°F to 186°F	(-40°C to 86°C)			
Housing type*	NEMA 2, IP32		NEMA	2, IP42			
Agency listing		UL873 listed, CSA C22.2, CE 89/336/EEC					
Noise level	\leq 35 dBA @ 1 m		\leq 45 dB.	A @ 1 m			
Servicing			maintenance free				
Quality standard		ISO 9002					
Weight	2.4 lbs (1.08 kg)		2.9 lbs	(1.3 kg)			

Notes:

* Most commercial assemblies are available with an optional NEMA 4/4X type housing. See applicable data sheet for details.

** Optional pluggable terminal blocks.



Non-Spring Return, 24 VAC/VDC Electronic Actuators, Modulating EN53B2(-S), EN70B2(-S)(-ZS), EN140B2(-S)(-ZS), EN210B2(-S)(-ZS) & EN280B2(-S)

Wiring Diagrams

EN53B2(-S)*



EN70B2(-S)(-ZS), EN140B2(-S)(-ZS), , EN210B2(-S)(-ZS), & EN280B2(-S)





⁽Shown Factory Set) Models: B2-S, B2-ZS-S

Note:

* If actuator is being powered continuously it requires (-S) option, as well as a Form C relay.



Non-Spring Return 24 VAC/VDC Electronic Actuators, Resistive EN70E2(-S), EN140E2(-S) & EN210E2(-S)



The EN "E" Series is a direct-mount line of actuators that operates on 24 VAC or VDC power and is available for use with resistive controllers. These bidirectional actuators do not require a damper linkage and are easily installed on a round shaft up to a 3/4" (20 mm) diameter or a square shaft up to 5/8" (16 mm). They can also be mounted to valves (ball, globe, and butterfly) using one of the many valve linkage kits available through Dodge Engineering & Controls.

The EN models deliver up to 210 in-lb (24 N-m) of torque. The angle of rotation is mechanically adjustable from 0° to 90° in 5° increments. Integral auxiliary switches are available to indicate end-stop position or to perform switching functions at any angle within the selected rotation range. Position feedback is available through switches or a 0 (2) to 10 VDC signal.

Torque Minimum: EN70E2: 70 in-lb; EN140E2: 140 in-lb; EN210E2: 210 in-lb.

Application: EN Series actuators are designed to position air dampers and valves in HVAC systems. Applications include: positioning return air or exhaust dampers; controlling face and bypass dampers; positioning blades for variable volume fans; positioning ball, butterfly or globe valves. Refer to the manufacturer's information to size properly the damper, valve and/or actuator. Spring return actuators, such as Dodge Engineering's ES Series, are recommended for use with outdoor air dampers in cold climates.

Operation: EN Series actuators operate on 24 VAC at 50/60 Hz or 24 VDC. These compact actuators use a DC motor with stall detection circuitry that operates throughout the entire stroke. The resistive actuators employ noise filtering techniques on the control signal to eliminate response to spurious noise.

Rotation is mechanically limited to 93° by integral end-stops. The position of the actuator is visually indicated from 0° to 90° on the cover. An anti-rotation bracket prevents lateral movement of the actuator. For hand positioning the coupler, pressing the spring-loaded gear release on the actuator cover can manually disengage the gear train.



Non-Spring Return 24 VAC/VDC Electronic Actuators, Resistive EN70E2(-S), EN140E2(-S) & EN210E2(-S)

Technical Data	EN70E2(-S)	EN140E2(-S)	EN210E2(-S)				
Power supply	20 t	o 30 VAC, 24 VDC ±10%, 50/6	0 Hz				
Transformer sizing	7.5	VA class 2 power soure req. for	r UL				
Electrical connection	screw terminals for	screw terminals for 22 to 14 AWG (max. of two 18-22 AWG/terminals)					
Control signal		100 to 10,000 Ω					
Factory setting	Ċ	lirect (CW) with signal increas	e				
Feedback signal	0 to	0 10 VDC for 90° (1 mA at 10 VI	DC)				
Input impedance		1.8 MΩ					
Switch contact rating (-S option)	two SPDT rated @ 24 VAC, 1.5 A inductive, 3 A resistive (3.5 VA max. per switch)						
Mechanical connection	3/8" to $3/4$ " (10 mm to 20 mm) diameter round shaft						
(shaft size)	3/8" to 5/8" (10 mm to 16 mm) square shaft						
Angle of rotation	0° to 90° in 5° increments, mechanical limitation 93°						
Torque	70 in-lb (8 N-m) constant	140 in-lb (16 N-m)	210 in-lb (24 N-m)				
Direction of rotation	jumper selectable						
Position indication		clip-on indicator					
Running time	25-50 secs for	70-115 secs For	115-175 secs For				
	0-70 in-lb (0-8 N-m)	0-140 in-lb (0-16 N-m)	0-210 in-lb (0-24 N-m)				
Humidity		0 to 95% RH non-condensing					
Ambient temperature		-40°F to 122°F (-20°C to 50°C)					
Storage temperature		-40°F to 186°F (-40°C to 86°C)					
Housing type*		NEMA 2, IP42					
Agency listings	UL 8'	73 listed; CSA C22.2, CE 89/330	5/EEC				
Noise level		<45 dBA @ 1 m					
Servicing		maintenance free					
Quality standard		ISO 9002					
Weight		2.9 lbs (1.3 kg)					

Note:

* Most commercial assemblies are available with an optional NEMA 4/4X type housing. See applicable data sheet for details.

Wiring Diagrams



Note:

Terminals 3 and 4 function as CCW and CW references when the Resistive models are in the DA mode, but as CW and CCW references when these models are in the RA mode.





Spring Return 24 VAC/VDC Electronic Actuators, **Tri-State (Floating) or Two-Position** ES70C2(-S)



The ES70 Series Electric Spring Return Actuators provide control of dampers in Heating, Ventilating, and Air Conditioning (HVAC) systems. All actuators in this series provide 70 lb·in (8 N·m) rated torque. A mechanical spring return system provides rated torque with and without power applied to the actuator. The series includes the following control options: On/Off and Floating Point, 24 V power

These actuators are configured for direct mounting and do not require a damper linkage. Actuators can be mounted directly to a damper shaft from 5/16 to 5/8 in. (8 to 16 mm) diameter with a universal clamp. A Shaft Coupler Kit is available for shafts up to 3/4 in. (19 mm) diameter. An accessory crankarm and remote mounting kit are available for applications where the actuator cannot be direct-coupled to the damper shaft. Optional line voltage auxiliary switches indicate an end-stop position or perform switching functions within the selected rotation range.

Features

- 70 lb·in. (8 N·m) rated torque
- · direct-coupled design
- reversible mounting
- · electronic stall detection
- · double-insulated construction
- · locking manual override with auto release and crank storage
- integral cables with colored and numbered conductors
- integral connectors for 3/8 in. (10 mm) Flexible Metal Conduit (FMC)
- optional integrated auxiliary switches
- UL, CE, and C-Tick compliance
- manufactured under International Standards Organization (ISO) 9001 quality control standards

Wiring Diagrams: ES70C2(-S)





Floating Control, Multiple Actuators with One Transforme RA RA DAY DA DAY YDA BLK RED BLK RED 2 C 24 VAC 1 24 VDC







Spring Return 24 VAC/VDC Electronic Actuators, Tri-State (Floating) or Two-Position ES70C2(-S)

Technical Data	ES70C2(-S)			
Power supply	24 VAC @ 50/60 Hz or 24 VDC, Class 2			
Power Requirements	 24 VAC: (19.2V-28.8V) 7.9 VA Running, 5.5 VA Holding Position; 24 VDC: (21.6V-28.8V) 3.5 W Running, 1.9 W Holding Position 			
Transformer sizing	7 VA per Actuator			
Electrical connection	48" UL 758 Type AWM Halogen-Free Cable w/ 18 AWG Conductors and .25 in. Ferrule Ends			
Control signal	Tri-State or 2-Position			
Switch contact rating (-S option)	two SPDT, double insulated switches with gold over silver contacts; rated @ 24 VAC, 50 VA pilot duty 120 VAC, 5.8 Resistive, 1/4 hp, 275 VA Pilot Duty 240 VAC, 5.0 A Resistive, 1/4 hp, 275 VA Pilot Duty			
Conduit Connections	Integral Connectors for 3/8 in. (10 mm) Flexible Metal Conduit			
Mechanical connection (shaft size) 5/16" to 5/8" (8 to 16 mm) diameter round shaft, or 1/4" and 1/2" (6 to square shafts.				
Angle of rotation	Maximum Full Stroke: 95°, Adjustable Stop: 35° to 95°, Maximum Position			
Torque	70 in-lbs (8 N-m)			
Direction of rotation	Direction is Selectable with Mounting Position of Actuator			
Position indication	clip-on indicator			
Manual override	Locking manual override with auto release and crank storage			
Running time Power On (Running)	150 Seconds Constant for 0 - 70 in-lbs (8 N-m) Load, at all Operating Conditions			
Running time Power Off (Spring Returning)	17 to 25 Seconds for 0-70 in-lb (0 to 8 N-m) at room temp.; 94 Seconds Max. for 0 to 70 in-lb (0-8 N-m) at -4°F (-20°C); 22 Seconds Nominal at Full Rated Load			
	Operating : -4 to 140°F (-20 to 60°C); 90% RH Maximum, Noncondensing			
Ambient Conditions	Storage: -40 to 185°F (-40 to 85°C); 90% RH Maximum, Noncondensing			
Housing type*	NEMA 2/IP54			
Agency listings U.S.	UL Listed, CCN XAPX, File E27734; to UL 60730-1A: 2003-08, Ed. 3.1, Automatic Electrical Controls for Household and Similar Use; and UL 60730-2-14: 2002- 02, Ed. 1, Part 2, Particular Requirements for Electric Actuators. (All Models)			
Agency listings Canada	UL Listed, CCN XAPX7, File E27734; to UL 60730-1-1:02-CAN/CSA: July 2002, 3rd Ed., Automatic Electrical Controls for Household and Similar Use and CSA C22.2 No. 24-93 Temperature Indicating and Regulating Equipment. (All Models)			
	Power On (running): <35 dBA at 70 in-lbs (8 N-m) Load, at a Distance of 39- 13/32 in. (1 m)			
Audible Noice Rating	Power On (Holding): <20 dBA at a Distance of 39-13/32 in. (1 m)			
	Power Off (Spring Returning): <52 dBA at 70 in-lbs (8 N-m) Load, at a Distance of 39-13/32 in. (1 m)			
Servicing	maintenance free			
Dimensions	6.33 x 3.90 x 2.26 in. (160.7 x 99 x 57.5 mm)			
Weight	3.43 Lbs.; 3.8 lbs with switches			

Notes:

* Most commercial assemblies are available with an optional NEMA 4/4X type housing. See applicable data sheet for details.

Spring Return 24 VAC/VDC Electronic Actuators, Two-Position ES70A2(-S) & ES70A1(-S)



The ES70 Series Electric Spring Return Actuators provide control of dampers in Heating, Ventilating, and Air Conditioning (HVAC) systems. All actuators in this series provide 70 lb·in (8 N·m) rated torque. A mechanical spring return system provides rated torque with and without power applied to the actuator. The series includes the following control options: On/Off, 24 V and 120 VAC power

These actuators are configured for direct mounting and do not require a damper linkage. Actuators can be mounted directly to a damper shaft from 5/16 to 5/8 in. (8 to 16 mm) diameter with a universal clamp. A Shaft Coupler Kit is available for shafts up to 3/4 in. (19 mm) diameter. An accessory crankarm and remote mounting kit are available for applications where the actuator cannot be direct-coupled to the damper shaft. Optional line voltage auxiliary switches indicate an end-stop position or perform switching functions within the selected rotation range.

Features

- 70 lb·in. (8 N·m) rated torque
- direct-coupled design
- reversible mounting
- electronic stall detection
- double-insulated construction
- · locking manual override with auto release and crank storage
- integral cables with colored and numbered conductors
- integral connectors for 3/8 in. (10 mm) Flexible Metal Conduit (FMC)
- · optional integrated auxiliary switches
- UL, CE, and C-Tick compliance
- manufactured under International Standards Organization (ISO) 9001 quality control standards

Wiring Diagrams: ES70A2(-S) and ES70A1(-S)





Auxiliary Switches



Auxiliary Switch Models: ES70A2-S and ES70A1-S

Spring Return 24 VAC/VDC Electronic Actuators, Two-Position ES70A2(-S) & ES70A1(-S)

Technical Data	ES70A2(-S)	ES70A1(-S)					
Power supply	24 VAC @ 50/60 Hz or 24 VDC, Class 2	120 VAC @ 60 Hz					
Power Requirements	 24 VAC: 6.1 VA Running, 1.2 VA Holding Position; 24 VDC: 3.5 W Running, 0.5 W Holding Position 	120 VAC: 0.05 A Running, 0.03 A Holding Position					
Transformer sizing	7 VA per Actuator	-					
Electrical connection	48" UL 758 Type AWM Halogen-Fr	ree Cable w/ 18 AWG Conductors					
Control signal	2-Posi	ition					
Switch contact rating (-S option)	two SPDT, double insulated switches with gold over silver contacts; rated @ 24 VAC, 50 VA pilot duty	two SPDT, double insulated switches with gold over silver contacts; rated @ 120 VAC, 5.8 resistive, 1/4 hp, 275 VA pilot duty					
Conduit Connections	Integral Connectors for 3/8 in. (10 mm) Flexible Metal Conduit						
Mechanical connection (shaft size)	5/16" to $5/8$ " (8 to 16 mm) diameter round shaft, or $1/4$ " and $1/2$ " (6 to 12mm) square shafts.						
Angle of rotation	Maximum Full Stroke: 95°, Adjustable	Stop: 35° to 95°, Maximum Position					
Torque	70 in-lbs	(8 N-m)					
Direction of rotation	Direction is Selectable with Mo	ounting Position of Actuator					
Position indication	clip-on in	dicator					
Manual override	Locking manual override with a	uto release and crank storage					
Running time Power on (Running)	Non-spring return: 55 to 71 secs for 0 conditions; 60 sec. Nor	to 70 in-lb (0-8 N-m) at all operating minal at full rated load					
Running time Power off (Spring Returning)	Spring return: 13 to 26 secs for 0-70 in-lb for 0 to 70 in-lb (0-8 N-m) at -4°F (-20°C); at -40°F	(0 to 8 N-m) at room temp.; 39 secs max. 108 secs max. for 0 to 53 in-lb (0-6 N-m) (-40°C)					
Ambient Conditions	Operating : -4 to 140°F (-20 to 60°C);	90% RH Maximum, Noncondensing					
Ambient Conditions	Storage: -40 to 185°F (-40 to 85°C); 90% RH Maximum, Noncondensing						
Housing type*	NEMA 2	2/IP54					
Agency listings U.S.	UL Listed, CCN XAPX, File E27734; to U Electrical Controls for Household and Si Ed. 1, Part 2, Particular Requirements	L 60730-1A: 2003-08, Ed. 3.1, Automatic milar Use; and UL 60730-2-14: 2002-02, for Electric Actuators. (All Models)					
Agency listings Canada	UL Listed, CCN XAPX7, File E27734; to UL 60730-1-1:02-CAN/CSA: July 2002, 3rd Ed., Automatic Electrical Controls for Household and Similar Use and CSA C22.2 No. 24-93 Temperature Indicating and Regulating Equipment. (All Models)						
Noise level	<47 dBA @ 70 in-lb. (8 N-m) Load,	<47 dBA @ 70 in-lb. (8 N-m) Load, at a distance of 39-13/32 in. (1 m)					
Servicing	maintenance free						
Dimensions	6.33 x 3.90 x 2.26 in. (160.7 x 99 x 57.5 mm)						
Weight	3.75 lbs (1.7 kg)	4.15 lbs (1.9 kg)					

Note:

* Most commercial assemblies are available with an optional NEMA 4/4X type housing. See applicable data sheet for details.

Spring Return 24 VAC/VDC Electronic Actuators, Modulating ES70B2(-S)

The ES70B2 Series Electric Spring Return Actuators provide control of dampers in Heating, Ventilating, and Air Conditioning (HVAC) systems. All actuators in this series provide 70 lb·in (8 N·m) rated torque. A mechanical spring return system provides rated torque with and without power applied to the actuator. This series is a proportional, 24 V power actua-

These actuators are configured for direct mounting and do not require a

damper linkage. Actuators can be mounted directly to a damper shaft from

5/16 to 5/8 in. (8 to 16 mm) diameter with a universal clamp. An accessory crankarm and remote mounting kit are available for applications where the actuator cannot be direct-coupled to the damper shaft. Optional line voltage auxiliary switches indicate an end-stop position or perform switch-

tor offering 0(2) to 10 VDC or 0(4) to 20 mA Control Signals.

ing functions within the selected rotation range.



Features

- 70 lb·in. (8 N·m) rated torque
- direct-coupled design
- reversible mounting
- electronic stall detection
- double-insulated construction
- microprocessor-controlled brushless DC motor
- external mode selection switch
- · locking manual override with auto release and crank storage
- integral cables with colored and numbered conductors
- integral connectors for 3/8 in. (10 mm) Flexible Metal Conduit (FMC)
- optional integrated auxiliary switches
- UL, CE, and C-Tick compliance
- manufactured under International Standards Organization (ISO) 9001 quality control standards

Wiring Diagrams: ES70B2(-S)





Auxiliary Switches



Auxiliary Switch Model: ES70B2-S

Spring Return 24 VAC/VDC Electronic Actuators, Modulating ES70B2(-S)

Technical Data	ES70B2(-S)		
Power supply	24 VAC (19.2 to 28.8 VAC) @ 50/60 Hz) or 24 VDC (21.6 V to 28.8 V)		
Power Requirements	 24 VAC: 7.9 VA Running, 5.5 VA Holding Position, 24 VDC: Class 2, 3.5 W Running, 1.9 W Holding Position 		
Transformer sizing	8 VA Minimum per actuator Class 2		
Electrical connection	 48" UL 758 Type AWM Halogen-Free Cable w/ 18 AWG Wire leads with Integral Connectors for 3/8" (10 mm) flexible metal conduit and .25 in. Ferrule Ends 		
Control signal	gnal Selectable DC 0(2) to 10V or 0(4) to 20 mA with field furnished 500 ohm, 0.25 W minimum resistor; Swtich selectable Direct or Reverse Action with Signal Increa		
Factory setting	0-10 VDC, CW rotation with increase in signal		
Feedback signal	0 (2) to 10 VDC for desired rotation range up to 95° Corresponds to rotation limits, 0.5 mA at 10V Maximum		
Input impedance	voltage: 100,000 Ω , current: 500 Ω w/ field furnished resistor		
Switch contact rating (-S option)	two SPDT double insulated 24 VAC, 50 VA pilot duty 120 VAC, 5.8 A resistive, 1/4 hp, 275 VA pilot duty 240 VAC, 5.0 A resistive, 1/4 hp, 275 VA pilot duty		
Mechanical connection (shaft size)	5/16" to 5/8" or (8 mm to 16 mm) diameter, round shaft 1/4" tp 1/2" or (6 to 12 mm) square shaft		
Angle of rotation	mechanically limited to 95°		
Torque	70 in-lbs (8 N-m)		
Direction of rotation	Switch Selectable Direct or Reverse Action with Signal Increase		
Position indication	clip-on indicator		
Running time	150 secs for 0-70 in-lb (8 N-m) Load at all operating conditions, Spring Return: 17 to 25 secs for 0 to 70 in-lb Load, at room temperature		
Humidity	0 to 95% RH, non-condensing		
Ambient temp./Humidity	-40°F to 140°F (-40°C to 60°C); 0 to 95% RH, max. non-condensing		
Storage temp./Humidity	-40°F to 185°F (-40°C to 85°C); 0 to 90% RH, max non-condensing		
Housing type*	NEMA 2, IP54 for All Mounting Directions		
Agency listing U.S.	UL Listed, CCN XAPX, File E27734; to UL 60730-1A: 2003-08, Ed. 3.1, Automatic Electrical Controls for Household and Similar Use; and UL 60730-2-14: 2002-02, Ed. 1, Part 2, Particular Requirements for Electric Actuators. (All Models)		
Agency listing Canada	UL Listed, CCN XAPX7, File E27734; to UL 60730-1-1:02-CAN/CSA: July 2002, 3rd Ed., Automatic Electrical Controls for Household and Similar Use; and CSA C22.2 No. 24-93 Temperature Indicating and Regulating Equipment (All Models)		
Noise level	<52 dBA @ 70 in-lb. (8 N-m) Load, at a distance of 39-13/32 in. (1 m)		
Servicing	maintenance free		
Dimensions	6.33 x 3.90 x 2.26 in. (160.7 x 99 x 57.5 mm)		
Weight	3.43 lbs (1.6 kg) (-S models): 3.8 lbs. (1.7 kg)		

Note: * Most commercial assemblies are available with an optional NEMA 4/4X type housing. See applicable data sheet for details.

- for 0(4) to 20 mA a field supplied 500 ohm resistor required .



Spring Return Rotary Electronic Actuator, Two-Position ES177A(-S)



The ES177A Two-position Actuators are direct mount, spring return electric actuators that operate on 24 VAC or VDC, or 120 VAC power. These bidirectional actuators do not require a damper linkage, and are easily installed on dampers with 1/2 to 3/4 in. or 12 to 19 mm round shafts, or 3/8 and 1/2 in. or 10, 12, and 14 mm square shafts using the standard shaft clamp included with the actuator. An optional Jackshaft Coupler Kit is available for 3/4 to 1-1/16 in. or 19 to 27 mm round shafts, or 5/8 and 3/4 in. or 16, 18, and 19 mm square shafts.

The ES177A Series Electric Spring Return Actuators provide running and spring return torques of 177 in-lb (20 N-m). Integral line voltage auxiliary switches are available on the –S models to indicate end-stop position, or to perform switching functions within the selected rotation range.

The ES177A On/Off Electric Spring Return Actuator provides reliable, integrated damper or valve control. An AC 24 V at 50/60 Hz or DC 24 V input signal (ES177A2 model) between the black and red wires, or an AC 120 V input signal at 60 Hz (ES177A1 model) between the black and white wires, causes the output hub to rotate from -5 to 90° (unless an external mechanical limit is reached).

When power is applied, the actuator rotates and the output hub rotates against the spring from -5 to 90°. The actuator is electronically overload protected should the actuator stall before reaching 90°. It holds position at the end of the stroke until power is removed. When power is removed, the actuator spring returns to its -5° position (unless an external mechanical limit is reached). A stall condition while driving between -5 to 90° causes the output hub to stop motion and hold its position until power is removed. Rotation is mechanically limited to the -5 and 90° positions by integral end-stops. Optional end-stops are available to limit the output hub travel. An anti-rotation bracket prevents rotational movement of the actuator body.

Actuator Part Number Table										
Torque	Input Signal		Operating Voltage							
		Cabling	24 VA	C/VDC	120	0 VAC				
Tolque		Cabling	Standard	Dual Auxiliary Switches	Standard	Dual Auxiliary Switches				
177 in-lb (20 N-m)	Two-Position	Standard or Plenum Cable	ES177A2	ES177A2-S	ES177A1	ES177A1-S				

Spring Return Rotary Electronic Actuator, Two-Position ES177A(-S)

Technical Data	ES177A2(-S)	ES177A1(-S)			
Power supply	24 VAC @ 50/60 Hz or 24 VDC, Class 2	120 VAC @ 60 Hz			
Power Requirements	 24 VAC: 24.6 VA Running, 7.7 VA Holding Position, 24 VDC: 17.6 W Running, 2.8 W Holding Position 	120 VAC: 0.25 VA Running, 0.13 VA Holding Position			
Transformer sizing	25 VA Class 2 power source	min. e req. for UL, CSA			
Electrical connection	48"18 AWG Halogen-fr	ee Cable Wire Leads			
Control signal	2-Posi	tion			
Overload protection	Electronic throughout 0 to 95° rotation				
Switch contact rating (-S option)	two SPD, double insulated switches with gold flash contacts; rated @ 24 VAC, 50 VA pilot duty	two SPD, double insulated switches with gold flash contacts; rated @ 120 VAC, 5.8 resisteive, 1/4 hp, 275 VA pilot duty			
Conduit Connections	Integral Connectors for 3/8 in. (10 mm) Flexible Metal Conduit				
Mechanical connection (shaft size)	nd shaft, or 3/8" and 1/2" (10, 12 and re shafts. its are available for larger shafts.				
Angle of rotation	mechanically limited to 90°,	adjustable from 30° to 90°			
Torque	177 in-lbs (2 354 in-lb (40 N-m) for two m	0 N-m); or odels mounted in tandem			
Direction of rotation	selectable when ordering valves, selectable in field for damp				
Position indication	clip-on indicator				
Manual override	3 mm hex crank (shipped with actuator)				
Spring Return	Direction is selectable with Mo Side A, Actuator face away from Side B, Actuator face away from	ounting Positionof Actuator: damper for CCW spring retum; damper for CW spring retum			
Running Time	24 to 57 seconds for 0 to 177 in-lbs (0 to 35 seconds nominal Spring Return: 11 to 15 secs for 0 t tempera 35 secs maximum for 0 to 1 130 secs for 0 to 177 in	 20 N-m) at all operating conditions; at full rated load. 177 in-lb (0 to 20 N-m) at room ture; 77 in-lb (0 to 20 N-m) at -22° (-30°C); n-lb (0 to 20 N-m) at -40° (-40°C); 			
Humidity	90% RH maximum,	non-condensing			
Ambient temperature	-40°F to 131°F (-40°C to 55°C)			
Ambient Conditions	Operating : -40 to 131°F (-40 to 55°C); Storage : -85 to 185°F (-65 to 85°C); 9	90% RH Maximum, Noncondensing 5% RH Maximum. Noncondensing			
Cycles	60,000 full stroke cycles:	1,500,000 repositions			
Storage temperature	-85°F to 185°F (-65°C to 85°C)			
Housing type*	NEMA 2	/ IP54			
Housing material	Die cast alum	inum alloy			
Agency listings U.S.	UL Listed, CCN XAPX, File E1916 Electrical Controls for Household an Part 2, Particular Requirements for	97; to UL 60730-1A: Automatic d Similar Use; and UL 60730-2-14: Electric Actuators. (All Models)			
Agency listings Canada	UL Listed, CCN XAPX7, File E191697; Electrical Controls for Household	to CAN/CSA-E60730-1: Automatic l and Similar Use. (All Models)			
Noise level	<66 dBA @ 1 m				
Servicing	maintenar	nce free			

Notes:

* Most commercial assemblies are available with an optional NEMA 4/4X type housing. See applicable data sheet for details.



Spring Return Rotary Electronic Actuator 24 VAC or 120 VAC Two-Position ES177A(-S)

Wiring Diagrams

Two-Position Control (24 VAC)





Auxiliary Switches



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.
- !- 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, Modulating ES177B2(-ZS)(-S)



Applications

The ES177B2(-ZS)(-S) Proportional Electric Actuators are directmount, spring return electric actuators that operate on AC/DC 24V power. These bidirectional actuators do not require a damper linkage, and are easily installed on dampers with 1/2 to 3/4 in. or 12 to 19 mm round shafts, or 3/8 and 1/2 in. or 10, 12, and 14 mm square shafts using the standard shaft clamp included with the actuator. An optional Jackshaft Coupler Kit is available for 3/4 to 1-1/16 in. or 19 to 27 mm round shafts, or 5/8 and 3/4 in. or 16, 18, and 19 mm square shafts.

Torque Minimum: a single ES177B2(-ZS)(-S): 177 in-lb; two ES177B2(-ZS)(-S): 354 in-lb.

Integral line voltage auxiliary switches are available on the (-S) models to indicate end-stop position or to perform switching functions within the selected rotation range.

Wiring Diagrams:



Notes:

- For 0(4) to 20 mA, a field supplied 500 ohm resistor required .

- ES177B2 models are not designed for 4-20mA tandem mount.



Spring Return Rotary Electronic Actuator 24 VAC/VDC, Modulating ES177B2(-ZS)(-S)

Technical Data	ES177B2(-ZS)(-S)					
Power supply	24 VAC (19.2 to 30 VAC @ 50/60 Hz) or 24 VDC (21.6 V to 26.4 V)					
	24 VAC: 15.5 VA Running,					
Power Requirements	7.7 VA Holding Position,					
rower requirements	24 VDC: Class 2, 6.7 W Running,					
	2.9 W Holding Position					
Transformer sizing	20 VA Minimum per actuator					
	48" UL 758 Type AWM Halogen-Free Cable w/ 18 AWG					
Electrical connection	Wire leads with Integral Connectors for $\frac{2}{9}$ (10 mm) flavible metal conduit					
	Selectable DC $0(2)$ to 10V or $0(4)$ to 20 mA with heid turnished 500 ohm, 0.25 w minimum resistor; Swtich selectable direct or reverse action with signal increase					
Control signal	(-ZS) model: Selectable DC 0 to 10V or 0 to 20 mA with field furnished 500 ohm, 0.25 W $$					
Control signal	minimum resistor;					
	Start point programmable DC 0 to 10V;					
	Span programmable DC 2 to 10V;					
Factoria a ttina	0.10 VDC CW setsetise with insures in signal increase					
Factory setting	0-10 vDC, Cw rotation with increase in signal					
	0 (2) to 10 VDC for desired rotation range up to 90°					
Foodbooksignal	Corresponds to rotation limits, I mA maximum					
reeuback signal	(-7S) model: 0 to 10 VDC for desired rotation range up to 90°					
	Corresponds to rotation limits, 1 mA maximum					
Input impedance voltage: 200,000Ω, current input: 500 ohms w/ field furnished 500 ohm res						
Switch contact rating (-S option)	two SPDT double insulated with gold flash contacts:					
	24 VAC, 50 VA pilot duty					
	120 VAC, 5.8 A resistive, 1/4 hp, 275 VA pilot duty					
	240 VAC, 5.0 A resistive, 1/4 hp, 2/5 VA pilot duty					
Mechanical connection	1/2" to 3/4" or (12 mm to 19 mm) diameter, round shaft or					
(shaft size)	3/8" to 1/2" or (10, 12 and 14 mm) square shaft					
	mechanically limited to 90°, adjustable from 30 to 90° CW or CCW					
Angle of rotation	with optional adjustable stop kit.					
Τ	177 in-lbs (20 N-m) for single actuator					
lorque	354 in-lbs (40 N-m) for two actuators, mounted in tandem					
	Direction is selectable with Mounting Position of Actuator:					
Spring Return	Side A, Actuator face away from damper for CCW spring return;					
	Side B, A ctuator face away from damper for CW spring return					
Running time	150 secs for 0-177 in-lb (20 N-m) at all operating conditions; independent of load, Spring Return: 20 secs for 0 to 177 in-lb (0 to 20 N-m) at room temperature					
Tandem Mount	Available for 0(2)-10 VDC, Unavailable for (0)4-20 mA					
Ambient						
temperature/Humidity	-40°F to 131°F (-40°C to 55°C); 90% RH Maximum, Noncondensing					
Storage	950E to 1050E (550C to 950C), 050/ DTI Maximum Name					
temperature/Humidity	-65'F 10 165'F (-05'C 10 65'C); 95% KH Maximum, Noncondensing					
Cycles	60,000 full stroke cycles; 1,500,000 repositions					
Aluminum Enclosure	NEMA 2, IP54 for All Mounting Directions					
	UL Listed, CCN XAPX, File E27734; to UL 60730-1A: 2003-08, Ed. 3.1, Automatic					
Agency listing U.S.	Electrical Controls for Household and Similar Use; and UL 60730-2-14: 2002-02, Ed. 1,					
-	Part 2, Particular Requirements for Electric Actuators. (All Models)					
	UL Listed, CCN XAPX7, File E27734; to UL 60730-1-1:02-CAN/CSA: July 2002, 3rd Ed.,					
Agency listing Canada	Automatic Electrical Controls for Household and Similar Use; and CSA C22.2 No. 24-93					
	remperature indicating and Regulating Equipment (All Models).					
	Power on (running): <66 dBA at 39-13/32 in. (1 m):					
Audible Noise Rating	Power on (holding): <18 dBA at 39-13/32 in. (1 m);					
Ū.	Power off (spring returning): <66 dBA @ 39-13/32 in. (1 m)					
Servicing	maintenance free					

Notes:

* Most commercial assemblies are available with an optional NEMA 4/4X type housing. See applicable data sheet for details.