

# S05, S10, S20 Series Spring Return Direct Coupled Actuators

CS4105, CS4110, CS4120, CS7505, CS7510, CS7520, CS8105,  
CS8110, CS8120

## PRODUCT DATA



## FEATURES

- Brushless DC submotor with electronic stall protection for floating/modulating models.
- Brush DC submotor with electronic stall protection for 2-position models.
- Self-centering shaft adapter (shaft coupling) for wide range of shaft sizes.
- Models available with three torque ratings: 44 lb-in. (5 N•m), 88 lb-in. (10 N•m), and 175 lb-in. (20 N•m).
- Models available for use with two-position, single pole single throw (spst), line-voltage or low-voltage controls.
- Models available for use with floating or switched single-pole, double-throw (spdt) controls.
- Models available for use with proportional current or voltage controls.
- Models available with combined floating/modulating control in a single device.
- Models available with adjustable zero and span.
- Models available with line-voltage internal and switches.
- Access cover to facilitate connectivity.
- Metal housing with built-in mechanical end limits.
- Spring return direction field-selectable.
- Shaft position indicator and scale.
- Manual winding capability with locking function.
- UL (cUL) listed and CE compliant.
- All Models are plenum-rated per UL873.

## APPLICATION

CS41XX, CS75XX, CS81XX Spring Return Direct Coupled Actuators (DCA) are used within heating, ventilating, and air-conditioning (HVAC) systems. They can drive a variety of quarter-turn, final control elements requiring spring return fail-safe operation.

Applications include:

- Volume control dampers, mounted directly to the drive shaft or remotely (with the use of accessory hardware).
- Quarter-turn rotary valves, such as ball or butterfly valves mounted directly to the drive shaft.
- Linear stroke globe or cage valves mounted with linkages to provide linear actuation.



## SPECIFICATIONS

**Models:** See Tables 2, 3 and 4.

**Dimensions:** See Fig. 1.

**Device Weight:** 7 lb (3.2 kg).

**Temperature Ratings:**

Ambient: -40°F to 140°F (-40°C to 60°C).

Shipping and Storage: -40°F to 158°F (-40°C to 70°C).

**Humidity Ratings:** 5% to 95% RH noncondensing.

**Electrical Connections:**

Field wiring 14 to 22 AWG (2.0 to 0.344 mm sq) to screw terminals, located under the removable access cover.

**Electrical Ratings:** See Table 1.

**End Switches (Two SPDT):**

Settings (fixed): 7° nominal stroke, 85° nominal stroke.

Ratings (maximum load):

Low-Voltage Models: 250 VAC, 5A resistive, 3A inductive.

Line-Voltage Models: 250 VAC, 5A resistive.

**Mounting:** Self-centering shaft adapter (shaft coupling).

Round Damper Shafts: 0.375 to 1.06 in. (10 to 27 mm).

Square Damper Shafts: 1/2 to 3/4 in. (13 to 19 mm).

Actuator can be mounted with shaft in any position.

**NOTE:** For 175 lb-in. (20 N•m) models: 3/4 in. or greater shaft diameter recommended.

**Minimum Damper Shaft Length:** 1 in. (25 mm); 3 in. (76 mm) recommended.

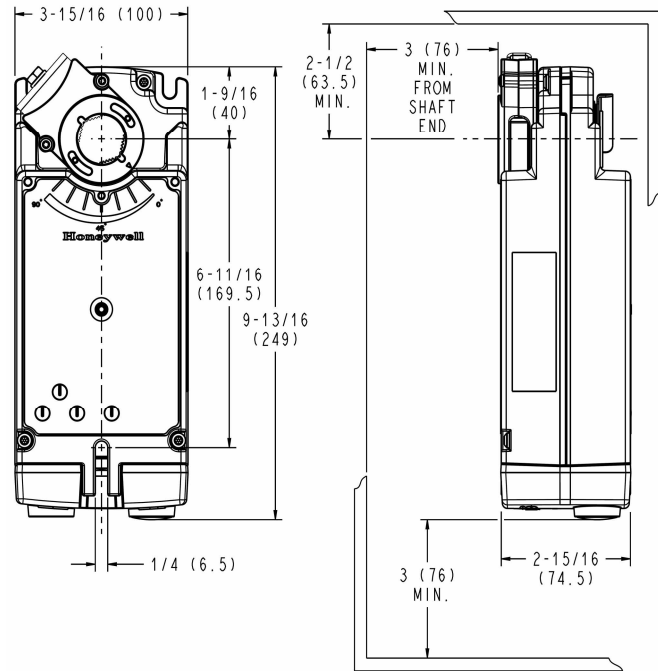
**Timing (At Rated Torque and Voltage):**

Drive Open (typical):

Floating, Modulating Models: 90 seconds.

Two-Position Models: 45 seconds ±5 seconds.

Spring Close: 20 seconds typical.



**Fig. 1. Dimensional drawing of actuator in in. (mm).**

**Table 1. Electrical Ratings.**

Model(s)	Power Input		Power Consumption (VA)					
	Voltage	Frequency	44 lb-in. (5 N•m)		88 lb-in. (10 N•m)		175 lb-in. (20 N•m)	
			Driving	Holding	Driving	Holding	Driving	Holding
Floating, Modulating	24 VAC±20% (Class 2), 24 VDC	50/60 Hz.	13	5	14	5	16	5
Two-Position, Low-voltage	24 VAC±20% (Class 2), 24 VDC	50/60 Hz.	25	8	30	8	40	8
Two-Position, Line-voltage	100-250 VAC	50/60 Hz.	45	13	45	13	60	13

## ORDERING INFORMATION

If you have additional questions, need further information, or would like to comment on our products or services, please write or phone:

1. Your local Honeywell Automation and Control Products Sales Office (check white pages of your phone directory).
2. Honeywell ECC Customer Care  
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International Sales and Service Offices in all principal cities of the world. Manufacturing in Australia, Finland, France, Germany, Japan, Mexico, Netherlands, Spain, Taiwan, United Kingdom, P.R.C.

**Table 2. O.S. Number Selection (see Table 3 also).**

C	Motorized Actuator						
S	Fail Safe Function (Spring Return)						
	41	100-250 VAC Two-Position Control; Reversible Mount					
	75	24 VAC/VDC Modulating and Floating Control; Reversible Mount					
	81	24 VAC/VDC Two-Position Control; Reversible Mount					
		05	44 lb-in. (5 N•m)				
		10	88 lb-in. (10 N•m)				
		20	175 lb-in. (20 N•m)				
			A <sup>a</sup>	Standard U.S. Model			
			B <sup>b</sup>	Standard European Model			
			E <sup>b</sup>	Selectable control signal; Adjustable zero and span; Includes service and auto-adapt modes			
			H <sup>a</sup>				
				1	No Feedback		
				2	Voltage Feedback Signal		
					0	No End Switches	
					2	Two End Switches	
					X X	System Controlled Numbers	
C	S	75	20	A	2	0	X X

<sup>a</sup> Model manufactured for sale in the United States.

<sup>b</sup> Model manufactured for sale in Europe.

**Table 3. Actuator Catalog Numbering (see Table 2 also).**

S	Spring Return Fail Safe Mode						
N	Non-Spring Return Fail Safe Mode						
	05	44 lb-in. (5 N•m); Spring Return Only					
	10	88 lb-in. (10 N•m); Spring Return Only					
	20	175 lb-in. (20 N•m)					
	34	300 lb-in. (34 N•m); Non-Spring Return Only					
		24	24 VAC/VDC Floating Control				
		24-2POS	24 VAC/VDC Two-Position Control				
		120-2POS	120 VAC Two-Position Control				
		230-2POS	230 VAC Two-Position Control				
		010	24 VAC/VDC Modulating and Floating Control				
			Fixed Zero/Span, No End Switches				
			-SW2	Internal End Switches			
			-SER <sup>a</sup>	Enhanced Modulating; Adjustable Zero/Span			
S	10	24-2POS	-SW2				

<sup>a</sup> Enhanced models include two internal end switches.

**Table 4. Available Model**

Model	Description
CS4105A1002	100-250 VAC Two-Position Control; Reversible Mount; 5N•m; Standard U.S Model; No Feedback; No End Switches;
CS4110A1002	100-250 VAC Two-Position Control; Reversible Mount; 10N•m; Standard U.S Model; No Feedback; No End Switches;
CS4110A1200	100-250 VAC Two-Position Control; Reversible Mount; 10N•m; Standard U.S Model; No Feedback; Two End Switches;
CS4120A1001	100-250 VAC Two-Position Control; Reversible Mount; 20N•m; Standard U.S Model; No Feedback; No End Switches;
CS4120A1209	100-250 VAC Two-Position Control; Reversible Mount; 20N•m; Standard U.S Model; No Feedback; Two End Switches;
CS7505A2008	24 VAC/VDC Modulating and Floating Control; Reversible Mount; 5N•m; Standard U.S Model; Voltage Feedback Signal; No End Switches;
CS7510A2008	24 VAC/VDC Modulating and Floating Control; Reversible Mount; 10N•m; Standard U.S Model; Voltage Feedback Signal; No End Switches;
CS7510A2206	24 VAC/VDC Modulating and Floating Control; Reversible Mount; 10N•m; Standard U.S Model; Voltage Feedback Signal; Two End Switches;
CS7510H2209	24 VAC/VDC Modulating and Floating Control; Reversible Mount; 10N•m; Selectable control signal; Adjustable zero and span; Includes service and atuo-adapt modes; Voltage Feedback Signal; Two End Switches;
CS7520A2007	24 VAC/VDC Modulating and Floating Control; Reversible Mount; 20N•m; Standard U.S Model; Voltage Feedback Signal; No End Switches;
CS7520A2205	24 VAC/VDC Modulating and Floating Control; Reversible Mount; 20N•m; Standard U.S Model; Voltage Feedback Signal; Two End Switches;
CS7520H2208	24 VAC/VDC Modulating and Floating Control; Reversible Mount; 20N•m; Selectable control signal; Adjustable zero and span; Includes service and atuo-adapt modes; Voltage Feedback Signal; Two End Switches;
CS8105A1008	24 VAC/VDC Two-Position Control; Reversible Mount; 5N•m; Standard U.S Model; No Feedback; No End Switches;
CS8110A1008	24 VAC/VDC Two-Position Control; Reversible Mount; 10N•m; Standard U.S Model; No Feedback; No End Switches;
CS8110A1206	24 VAC/VDC Two-Position Control; Reversible Mount; 10N•m; Standard U.S Model; No Feedback; Two End Switches;
CS8120A1007	24 VAC/VDC Two-Position Control; Reversible Mount; 20N•m; Standard U.S Model; No Feedback; No End Switches;
CS8120A1205	24 VAC/VDC Two-Position Control; Reversible Mount; 20N•m; Standard U.S Model; No Feedback; Two End Switches;

**Stroke: 95° ±3°, mechanically limited.**

**Design Life (at Rated Voltage):**

Two-position models: 50,000 full stroke cycles;  
50,000 full stroke spring returns.  
Floating and Modulating models: 60,000 full stroke cycles;  
1,500,000 repositions; 60,000 full stroke spring returns.

**Controller Type:**

S05, S10, S20: See Table 3.  
S05, S10, S20: Modulating or Floating; controlled by selector switch.  
Input Impedance: 95K ohms minimum.  
Feedback Signal: 0-10 VDC or 2-10 VDC;  
Driving current is 3 mA minimum.

**Torque Ratings:**

Typical Holding, Driving, Spring Return:  
S05: 44 lb-in. (5 N•m).  
S10: 88 lb-in. (10 N•m).  
S20: 175 lb-in. (20 N•m).  
Stall Maximum (fully open at 24°C):  
S05: 100 lb-in. (11.3 N•m).  
S10: 200 lb-in. (22.6 N•m).  
S20: 350 lb-in. (39.6 N•m).

**Noise Rating at 1m (Maximum):**

Holding: 20 dBA (no audible noise).  
Two-position models:  
Driving: 50 dBA.  
Spring Return: 65 dBA.  
Floating and Modulating models:  
Driving: 40 dBA.  
Spring Return: 50 dBA.

**Environmental Protection Ratings:**

NEMA2 (US Models) or IP54 (European Models) when mounted on a horizontal shaft with access cover below the shaft.

**Approvals: See Table 5.**

**Table 5. Approvals.**

UL/cUL	✓
UL873 Plenum Rating, File No. E4436; Guide No. XAPX.	✓
CE	✓
C-TICK	✓

**Accessories:**

32004254-002 Self-Centering Shaft Adapter (supplied with actuator).  
50030966-001 Anti-Rotation Bracket (supplied with actuator).  
6174215 Extension Screw (supplied with actuator).  
27518 Balljoint (5/16 in.).  
103598 Balljoint (1/4 in.).  
205860 Electronic Minimum Position Potentiometer.  
27520A-E,G,H-L,Q Pushrod (5/16 in. diameter).  
5450074 Water-tight Cable Gland/Strain-relief Fitting (supplied with actuator).  
32003036-001 Weather Enclosure.  
50001194-001 Foot Mount Kit.  
50005859-001 NEMA4/4X Enclosure.  
SW2-US Auxiliary Switch Package.  
See also Form 63-2620.

**Sizing**

**Required Torque**

In lieu of data from a Specification Engineer or Manufacturer, required torque for a given damper load can be determined using the following method:

$$T_R = T_D \times A_D$$

Where:

- $T_R$  = Required torque for the damper load.
- $T_D$  = Damper torque rating from the manufacturer, expressed in either (lb-in.)/(sq ft) or (N•m)/(sq m), the damper load.
- $A_D$  = Damper area expressed in either sq ft or sq m.

**Actuators Required**

In lieu of data from a Specification Engineer or Manufacturer, the number of required actuators for a given damper load can be determined using the following method:

$$N = \frac{T_R}{T_A \times SF}$$

Where:

- N = Number of actuators.
- $T_R$  = Required torque for the damper load. (See above.)
- $T_A$  = Actuator torque rating.
- SF = Safety factor.

**NOTE:** The safety factor accounts for variables such as mis-alignments, aging of the damper, etc. 0.8 is a typical safety factor.



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