

Delta Control Products, Inc. 2031 West Rose Garden Lane Phoenix, AZ 85027 623-780-2408

# DCS-62 Series Spring Return Electronic Actuator Product Bulletin

# **Description** The Delta DCS-62 direct-coupled spring return electronic actuator is designed for modulating, two-position, and three-position control of building HVAC dampers.

- **Features** Brushless DC motor technology with stall protection
  - · Bi-directional fail-safe spring return
  - Models available with dual, independently adjustable auxiliary switches
  - Unique self-centering shaft coupling
  - Manual override
  - · Available in 62 lb-in torque
  - 5° preload as shipped from factory
  - · Mechanical range adjustment capabilities
  - · UL and cUL listed, CE certified
  - 24 Vac/dc compatible
- **Application** Used in constant or variable air volume installations for the control of return air, mixed air, exhaust, and face and bypass dampers requiring up to 62 lb-in (7 Nm) torque.

Designed for applications that require the damper to return to a fail-safe position when there is a power failure.

#### **Model Number Descriptions**

	Operating		Control			Cables	Bui Opti	Built-in Options	
Model Number	24 VAC ±20% 24 VDC ±15%	120 VAC ±10%	Modulating 0 -10 VDC	3-Position	2-Position	Standard	Dual Auxiliary Switches	Offset 0 to 5 VDC Span 2 to 30 VDC	
DCS24-62	•								
DCS24-62-A	•				$\bullet$				
DCS24-62-T	•			$\bullet$					
DCS24-62-TA	•			•					
DCS120-62									
DCS120-62-A									
DCMS24-62	•								
DCMS24-62-A									
DCMS24-62-Z	•		٠						
DCMS24-62-ZA									

Consult Delta for more options which are available for this actuator series.



# **Specifications**

Power Supply	Operating voltage	24 Vac ±20%; 24 Vdc ±15%		
Power Supply	Frequency	50/60 Hz		
	Power consumption			
24 Vac/24 Vdc	running	5 VA/3.5W		
	holding	4 VA/3W		
	Equipment rating	Class 2, in accordance with UL/CSA Class III per EN 60730		
Power Supply	Operating voltage	120 Vac ±10%		
120 Vac	Frequency	50/60 Hz		
	Power consumption			
	running and holding	7 VA/5W		
Control Signal	Input signal (wires 8–2)			
0	voltage input signal	0 to 10 Vdc (max. 35 Vdc)		
	input resistance	>100K ohms		
Feedback Signal	Position output signal (wires 9–2)			
-	voltage output signal 0	0 to 10 Vdc		
	maximum output current	+1 mA, -0.5 mA		
Function	Running/spring return torque	62 lb-in (7 Nm)		
	Maximum torque	186 lb-in (21 Nm)		
	Runtime for 90°			
	operating with motor	90 seconds		
	closing (on power loss) with spring return	15 seconds typical		
		(60 seconds max. at -25°F (-32°C))		
Mounting	Nominal angle of rotation	90°		
wounting	Maximum angular rotation	95°		
	Shaft size	1/4 to 3/4-inch (6.4 to 20.5 mm) dia.		
		1/4 to 1/2-inch (6.4 to 13 mm) square		
	Minimum shaft length	3/4-inch (20 mm)		
Heusing	Enclosure	NEMA 1		
nousing		IP54 according to EN 60 529 (limited positions, see Installation Instructions 129-307)		
	Material	Die cast aluminum alloy		
	Gear lubrication	Silicone free		
Ambient Conditions	Ambient temperature			
	operation	-25°F to 130°F (-32°C to 55°C)		
	storage and transport	-40°F to 158°F (-40°C to 70°C)		
	Ambient humidity (non-condensing)	95% rh		
Agency Certification		UL listed to UL60730 (to replace UL873)		
		cUL certified to Canadian Standard C22.2 No. 24-93		
	Low voltage directive (LVD)	73/23/EEC		
		EN 60 730-2-14		
		(Type 1)		
Auxiliary Features	Dual auxiliary awitches			
	AC rating (standard cable)	24 to 250 Vac		
	AC fating (standard cable)			
	AC rating (Plenum cable)	24 Vac		
	AC fating (Fiendin cable)	AC 1A resistive		
	DC rating (Standard/Plonum cable)	12 to 30 V/dc		
		DC 2A		
	Switch Range			
	Switch A	0 to 90° with 5° intervals		
	Recommended range usage	0 to 45°		
	Factory setting	5°		
	Switch B	0 to 90° with 5° intervals		
	Recommended range usage	45 to 90°		
	Factory setting	85°		
	Switching hysteresis	2°		

# Specifications

#### continued

Pre-cabled connectior	۱
Cable length	
Noise level	
Life cycle	
Dimensione	
DIMENSIONS	

Weight

#### **Actuator Components**





Figure 1. Components of the DCS-62 Spring Return Actuator. 18 AWG (0.75mm<sup>2</sup>)

3 feet (0.9 m) length

40 dBA

Designed for over 50,000 full stroke cycles at rated torque and temperature

8-3/8-in. H × 3-1/4-in. W × 2-2/3-in. D (212 mm H × 83 mm W × 68 mm D)

2.9 lbs. (1.3 kg)

#### 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 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
- Adjustment tool for: auxiliary switches (11), offset/span (4 and 5), and lock pin (9)
- 18. 1/2-inch NSPT conduit connections

# Operation

# DCMS24-62 Modulating Units

Apply a continuous  $\overline{0}$  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 0 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.

#### DCS24-62 2-Position Units

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

## **Operation** continued

#### DCS24-62-T, 3-Position Units

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

With no control voltage, the damper actuator holds its position. In the event of a power failure, the actuator spring returns to the "0" position.

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

# **Life Expectancy** An improperly tuned loop will cause excessive repositioning that will shorten the life of the actuator.

The type of actuator required depends on several factors:

Sizing

- 1. Obtain damper torque ratings (lb-in/ft<sup>2</sup> or Nm/m<sup>2</sup>) from the damper manufacturer.
- 2. Determine the area of the damper.
- 3. Calculate the total torque required to move the damper:

Total Torque = Torque Rating × Damper Area SF<sup>1</sup>

4. Select a spring return actuator from Page 1.

<sup>1</sup>Safety Factor: When calculating the total torque required, a safety factor should be included for unaccountable variables such as slight misalignments, aging of the damper, etc. A suggested safety factor is 0.80.

**Manual Override** 



Figure 2. Manual Override.

NOTE: Always turn the key in the direction of the arrow.



#### CAUTION:

When engaging the gear train lock pin, carefully turn only about 5 degrees until you meet slight resistance. Turning too far will strip the lock pin.

To Release Manual Override

Do one of the following:

- Restore power and send a control signal.
- When power is absent, do the following:
  - 1. Insert the 3 mm hex key in the override opening.
  - 2. Turn the key in the direction of the arrow.
  - 3. Remove the key.

#### Mechanical Range Adjustment

The angular rotation is adjustable between 0 and 90° at 5-degree intervals.

To limit the range of shaft movement:

- 1. Remove the locking clip and self-adjusting shaft adapter.
- 2. Rotate the damper blade shaft to its failed position.
- 3. Rotate the shaft coupling to the desired position.
- 4. Insert the shaft adapter into the actuator and fasten it with the locking clip. See Figure 3.





Figure 3. Mechanical Range Adjustment.

#### Control Signal Adjustment (Offset and Span "-Z")

The offset (start point) and span of the control signal can be adjusted. The offset, Uo, can be adjusted between 0 to 5 Vdc. The span,  $\Delta U$ , can be adjusted between 2 to 30 Vdc.







Factory Setting of 30V Span 0 Offset

 $\Delta$ U Span 1. Uo = 0V,  $\Delta$ U = 2V The minimum working range for Ys = 100% 2. Uo = 5V,  $\Delta$ U = 30V The maximum working range for Ys = 100%

Ys Mechanical positioning range (100% = angle of rotation 90°)



#### Example:

Yu Control signal Uo Offset (start point)

Open the actuator from 0 to 50% (45°) using a control signal of: Umin = 2V to Umax = 10V

Calculating the value of  $\Delta U$ :

3. Uo = 0V,  $\Delta U \approx 30V$  Factory setting



# **Wire Designations**

Applicable	Standard	Function	Terminal	Color
Actuator	Symbol	Function	Designations	
24 Vac/dc	1	Supply (SP)	G	Red
	2	Neutral (SN)	G0	Black
	6	Control signal clockwise	Y1	Violet
	7	Control signal counterclockwise	Y2	Orange
	8	Input signal: 0 to 10 Vdc	Y	Gray
	9	Position output: 0 to 10 Vdc	U	Pink
120 Vac -	3	Line	L	Black
	4	Neutral	N	White
Auxiliary Switches	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
Position Feedback	P1	Feedback Potentiometer 0 to 100% P1 - P2	а	White/red
	P2	Feedback Potentiometer Common	b	White/blue
	P3	Feedback Potentiometer 100 to 0% P3 – P2	С	White/pink

# **Wiring Diagrams**

DCS24-62 (-A) Optional Switches 24 Vac/dc 2-Position Control



DCS120-62 (-A) Optional Switches 120 Vac 2-Position Control



DCS24-62-T (*-A) Optional Switches* 24 Vac/dc 3-Position Control



Figure 7.

DCMS24-62 (-A ) Optional Switches DCMS24-62-Z (-A ) Optional Switches

24 Vac/dc Modulating control



#### **Dual Auxiliary Switch**

DCS24-62-A DCS120-62-A DCS24-62-TA DCMS24-62-A DCMS24-62-ZA

NOTE: Use the long arm of the "†" to point to the position of switch A. Use the narrower tab on the red ring to point to the position of switch B



To change the settings of A and B:

- Make sure the actuator is in the "0", fail safe position. The scale is valid only in the "0" position.
- Use the adjustment tool provided with the actuator to turn the switch adjustment dials to the desired setting at which a signal is to be given.

Factory setting Switch  $A = 5^{\circ}$ Switch  $B = 85^{\circ}$  Actuator rotary range with the shaft adapter mounted at position "0".

Setting range for switches A and B Setting interval: 5° Switching hysteresis: 2°

> Aux Switch Adjustment

Figure 6. Adjustable Switching Values for the Dual Auxiliary Switches.

#### **Dimensions**

