



## MODEL 820 ROTARY SERVO ACTUATOR



The Model 820 is a high performance rotary servo electromechanical actuator designed for extreme conditions and utilizes a brushless DC motor as its prime mover within the product. This actuator is used for surface positioning, throttle control and other utility functions on UAV and aerospace platforms. The actuator has been chosen to support new and existing programs.

The Model 820 is one of our most versatile actuators, offering integral servo electronics and multiple communication interfaces.

### TYPICAL APPLICATIONS

- Unmanned air vehicles — tactical, medium altitude, long endurance (MALE), and high altitude long endurance (HALE) vehicles
  - Flight control surface actuation
- Optionally piloted air vehicles (OPV)
- Utility actuation — throttle control, doors, spoilers
- Electric aircraft, eVTOL, eSTOL, air taxis and urban air mobility vehicles — tilting mechanism, flight control, landing gear



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## FEATURES

- Small size and weight
- Power compatibility – 28 VDC buss
- Power point – up to 230° / sec at 60 in-lbs
- Torque output – up to 150 in-lbs
- Brushless permanent magnet motor design
- Positioning and torque limiting
- High accuracy film transducer
- Position output signal / feedback
- Operates with various command inputs
- Low backlash design
- Stroke or displacement up to ± 45 degrees, Moog will evaluate higher angular performance requirements as needed
- High efficiency steel gearing

## BENEFITS

- Robust structural design
- Mechanical stops
- Low weight to power performance
- Customizable

## ENVIRONMENTAL SPECIFICATIONS

### Environmental Data

Description	Details
Operating Temperature	-40° to +71° C
Storage Temperature	-65° to +85° C
Altitude	Up to 50,000 ft
Shock	10 G's at 11 milliseconds
Vibration	1.5 G's RMS (15 to 2,000 Hz)
Acceleration	10 G's

### RTCA / DO-160E Test Data

Description	Details
Temperature and Altitude	Section 4, 4.5.1 and 4.5.3, Category D2
Temperature Variation	Section 5, Category B
Humidity	Section 6, Category B
Operational Shock	Section 7, Category B
Vibration	Section 8, Category R
Explosion Proofness	Section 9, Category H Env. II
Waterproofness	Section 10, Category Y
Dust	Section 12, Category S
Fungus	Section 13, Category F
Salt Spray	Section 14, Category X 1 cycle only
Emissions of Radio Frequency Energy	Section 21, Category M conducted only

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## PERFORMANCE DATA SPECIFICATIONS

Specification	Model 82000000-12	Model 82000000-14
Supply Voltage	21 to 32 VDC	22 to 32 VDC
Weight	1.2 lb max	1.2 lb max
Command Input	4 wire RS-485 full duplex <sup>2</sup>	R/C PWM (Refer to Figure 1)
Position Telemetry	12 bit resolution, position of RS-485 <sup>2</sup>	±10 VDC (Refer to Figure 1)
Output Position Scaling	±0.11	±0.11
Static current @ 28 VDC	< 120 mA	< 120 mA
No Load Speed @ 28 VDC	180° / sec	180° / sec
Power Point	158 @ 105 in-lbs	105 in-lbf @ 140° / second
Peak Stall Torque <sup>1,3</sup>	150 in-lbs	150 in-lbs
Line Current at Peak Stall Torque <sup>1</sup>	1.5 amps	1.5 amps
Unpowered Backdrive Torque	65 in-oz max	65 in-oz max
Backlash <sup>4</sup>	< = 1.0°	< = 1.0°
Positional Accuracy	0.5°	0.5°
Small Signal Bandwidth	6 Hz min at no load	6 Hz min at no load
Electrical Limit	±45°	±45°
Mechanical Limit	±51.5°	±51.5°

Notes:

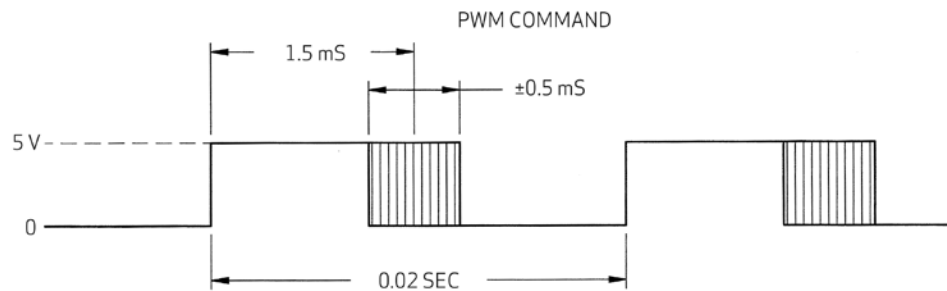
<sup>1</sup>At stall torque point using a torque bar fixture.

<sup>2</sup>Please contact Moog to obtain documentation detailing the communication protocol.

<sup>3</sup>Electronically limited.

<sup>4</sup>With a 7 in-lb reversing torque applied to the output shaft.

FIGURE 1



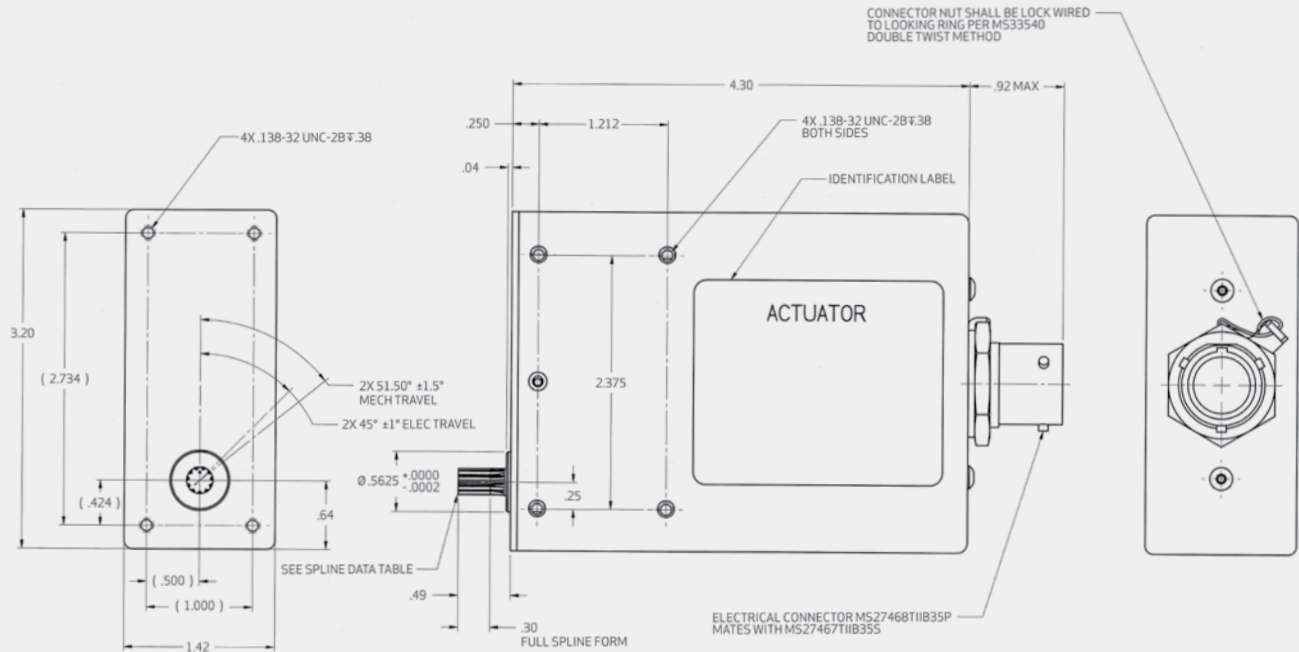
AS VIEWED FROM SHAFT:

- 2.0 mSEC = 45° CW
  - 1.0 mSEC = 45° CCW
- POS TELEMETRY:
- 45° CW = +10.0 VDC
  - 45° CCW = -10.0 VDC

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## MECHANICAL DIMENSIONS (INCHES)

\*Note: 82000000-14 series shown



\*Model 82000000-12 is similar to Model 82000000-14 in dimensions.

### INVOLUTE SPLINE DATA

External Involute - Class 5 Fit  
Fillet Root, Side Fit Per ANSI B92.1

Features Model 82000000-12 and -14

Number of Teeth	11
Pitch	48 / 96
Pitch Diameter	0.2292
Pressure Angle	45
Base Diameter	0.1620
Major Diameter	.249 +0 -.001
Minor Diameter	0.2010
True Involute Form Diameter	0.2120
Effective Circular Tooth Thickness Maximum	0.0369
Actual Circular Tooth Thickness Minimum	0.0345
Fillet Radius	0
Measurement Over 0.0400 Diameter Pins	0.2911 min ref

### CONNECTOR PIN ASSIGNMENT

Pin Number	82000000-12 4 Wire RS-485 Full Duplex	82000000-14 R/C - PWM	Pin Diagram
1	RS-485 Transmit A	R/C PWM Command Input	
2	RS-485 Transmit B	R/C PWM RTN	
3	RS-485 Receive A	POS Telemetry	
4	RS-485 Receive B	Spare	
5	Chassis Ground	Chassis Ground	
6	+28 VDC Input Power	+28 VDC Input Power	
7	+28 VDC Power Return	+28 VDC Power Return	
8	RS-485 Return	Spare	
9	Unit ID Return	Telemetry Return	
10	Unit ID A	Spare	
11	Unit ID B	Spare	
12	Unit ID C	Spare	
13	Unit ID D	Spare	

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