



MODEL 935 ROTARY SERVO ACTUATOR



The Model 935 is one of the highest performance rotary servo actuators available on the market. We offer this actuator with a digital and analog communications interface. Also, we can customize the actuator to provide up to ± 90 degree angular excursion in a slightly longer package. These options allow our customers flexibility based upon the architecture in the system to have a drop-in servo actuator.

TYPICAL APPLICATIONS

- Unmanned air vehicles — tactical, medium long endurance and MALE / HALE vehicles
 - Control surfaces requiring servo actuation
- Target drones — control surfaces, speed brakes
- 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

- Integrated position servo loop control with either analog or digital communications
- Non-jamming mechanical stops
- 4 stage spur gear train assembly
- Stainless steel output shaft, 0.5 inch SAE spline
- Brushless permanent magnet motor design
- High temperature capability
- Electronic stops limit input command
- NTC thermistor in motor for temp sensing of motor windings
- Outputs for current, velocity and temperature telemetry
- Signal interface is digital RS-485 electrical protocol
- Thermal management options available for high altitude application

BENEFITS

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

DESIGN AND CONSTRUCTION

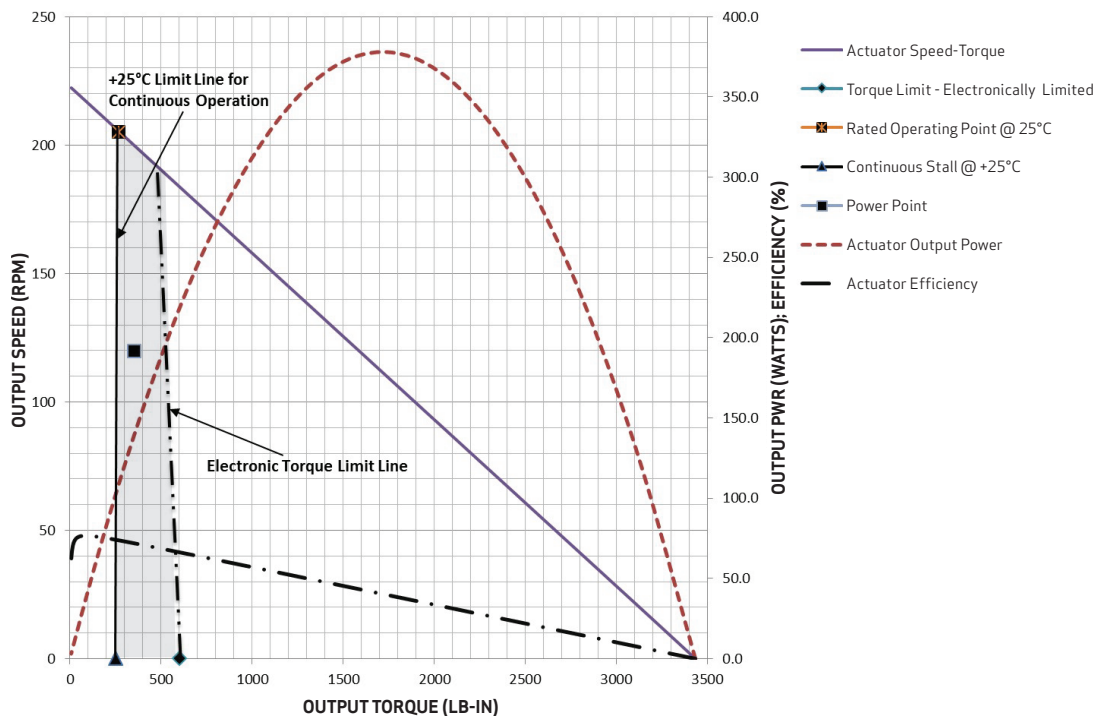
- IPC-6012, Class 3
- J-STD-001B, Class 3
- IPC-A-610, Class 3

ENVIRONMENTAL SPECIFICATIONS

MIL-STD-461F Test

Description	Details
Temperature/ Altitude	-40° to +60° C 0 to 65,000 feet
Explosive Atmosphere	Sea level - ambient H2 4% to 75% volume
Random Vibration	Table 5.3
Static Load	600 in-lb to each stop
25% Life Cycle	125 hours
Conducted Susceptibility	Method CS-114 Curve 5
Radiated Susceptibility	Method RS-103 200 V / m

CALCULATED PERFORMANCE CURVES @ 28 VDC AND @ 25°C



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PERFORMANCE DATA SPECIFICATIONS

Features	Model 93500000-34	Model 93500000-36
Operating Voltage	21 to 32 VDC	21 to 32 VDC
Operating Temperature Range	-40° to +71° C	-40° to +71° C
Operating Altitude Range	-1,500 to +65,000 ft	-1,500 to +65,000 ft
Weight	3.9 lbm max	3.7 lbm max
Mechanical Stroke	±50°	±50°
Electrical Stroke	±45° - electronically limited	±45° - electronically limited
No Load Speed @ 28 VDC	180° / sec nominal - electronically limited	90° / sec nominal - electronically limited
Static Current @ 28 VDC	200 mA nominal	< 150 mA
Peak Stall Torque	600 in-lbf nominal - electronically limited	600 in-lbf nominal - electronically limited
Continuous Stall Torque	150 in-lbf	150 in-lbf
Line Current At Peak Stall Torque	6 amps nominal - electronically limited	< 6.4 amps
Unpowered Backdrive Torque	15 in-lbf max	15 in-lbf max
Power Point	350 in-lbf @ 120° / sec	280 in-lbf @ 60° / sec
Electromechanical Stiffness	100 in-lbf / degree, nominal	485 in-lbf / degree, nominal
Maximum Shaft Inertia	81 lb-in ²	520 lb-in ²
Backlash	< = 36 arc min ¹	< = 36 arc min ¹
Small Signal Frequency Response	5.0 Hz - at no load	5.0 Hz - at no load
Electrical Command Interface	4 wire RS-485 – full duplex ²	R/C PWM ³
Communication Protocol	See note 2	N/A
Command and Position Resolution	12 bits ²	N/A
Addressing	Connector pin strapping – up to 16 addresses ²	N/A
Loss of Communication	Float after 500 milliseconds	Return to null after 500 milliseconds

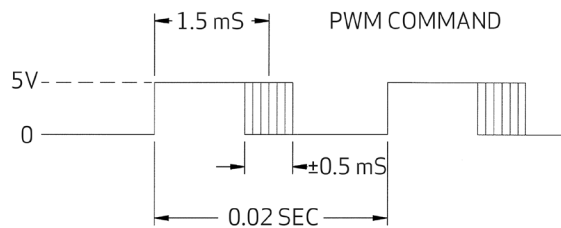
Notes:

¹With ±10 in-lbf reversing load applied to shaft.

²Contact Moog sales to receive detailed protocol information.

³Refer to Figure 1 for the PWM Command for Model 93500000-36.

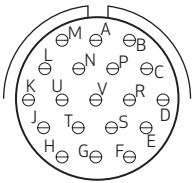
FIGURE 1



AS VIEWED FROM SHAFT
 INPUT COMMAND:
 • 2.0 mSEC = 45°CCW
 • 1.5 mSEC = 0°
 • 1.0 mSEC = 45°CW
 POSITION TELEMETRY:
 • -10 VDC = 45° CCW
 • +10 VDC = 45°CW

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CONNECTOR PIN ASSIGNMENT

Pin	RS-485 Version Model 93500000-34	R / C PWM Version Model 93500000-36	*Pin Diagram
A	Power Gnd	Power Gnd	
B	Power Gnd	Power Gnd	
C	+ 28 VDC	+ 28 VDC	
D	+ 28 VDC	+ 28 VDC	
E	Current telemetry	Current telemetry	
F	Velocity telemetry	Velocity telemetry	
G	Signal RTN	Signal RTN	
H	Transmit high	Position telemetry	
J	Transmit low	Reserved	
K	Receive high	RC PWM In	
L	Receive low	RC PWM Rtn	
M	Temperature telemetry	Temperature telemetry	
N	Unit ID "A"	Reserved	
P	Unit ID "B"	Reserved	
R	Temp return	Temp return	
S	Chassis Gnd	Chassis Gnd	
T	Unit ID "C"	Reserved	
U	Unit ID "D"	Reserved	
V	Unit ID Rtn	Reserved	

*For reference only, Amphenol® catalog pin arrangement.

INVOLUTE SPLINE DATA

External Involute - Class 5 Fit
Fillet Root, Side Fit Per ANSI B92.1a-1976

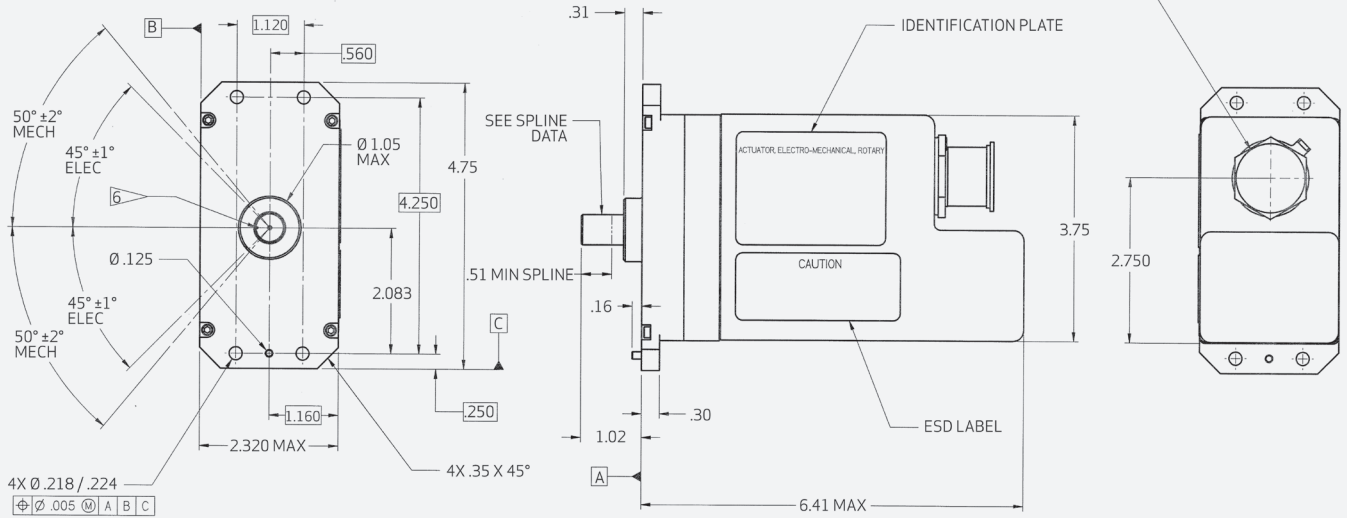
Features	Model Model 93500000-34	Model Model 93500000-36
Number of Teeth	23	23
Pitch	48 / 96	48 / 96
Pitch Diameter	0.4792	0.4792
Pressure Angle	45	45
Base Diameter	0.3388 ref	0.3388 ref
Major Diameter	0.499 +0 -.002	0.499 +0 -.002
Minor Diameter	0.451 min	0.451 min
True Involute Form Diameter	0.465	0.465
Effective Circular Tooth Thickness Maximum	0.0369	0.0369
Actual Circular Tooth Thickness Minimum	0.0343	0.0343
Fillet Radius	0	0.0043
Measurement Over 0.0400 Diameter Pins	0.5428 min ref	0.5428 min ref

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MECHANICAL DIMENSIONS (INCHES)

*Model Model 93500000-34 Shown Below

CONNECTOR MATES WITH MS3476L14-19S



*Model 93500000-36 is similar to Model 93500000-34 in dimensions.



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