

## MODEL 965 ROTARY SERVO ACTUATOR



The Model 965 is one of the highest torque rotary servo electromechanical actuators available that integrates position loop servo control electronics with a digital communications interface. This actuator provides an angular excursion up to  $\pm 90^\circ$  in its current configuration. The customer can program the positional state of the actuator if loss of communications occurs. This is one of many options that allow the customer to

easily implement this actuator into their system.

### 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



# MODEL 965 ROTARY SERVO ACTUATOR

## FEATURES

- Integrated position servo loop control with digital communications
- Non-jamming mechanical stops
- Brushless permanent magnet motor design with integrated holding brake
- High temperature capability
- Electronic stops limit input command
- Four wire RS-485 full duplex signal interface

## BENEFITS

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

## ELECTRONICS DESIGN AND CONSTRUCTION

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

### INPUT VOLTAGE / POWER DATA SPECIFICATIONS

| Specification                     | Model 96500000-03                              |
|-----------------------------------|------------------------------------------------|
| Operating Voltage                 | 21 to 32 VDC                                   |
| Operating Temperature Range       | -40° to +71° C                                 |
| Operating Altitude Range          | 11,500 to 38,000 ft                            |
| Weight                            | 11.5 lb                                        |
| Mechanical Stroke                 | ±105 ±2° non jamming stops                     |
| Electrical Stroke                 | ±90 ±1°- electronically limited                |
| No Load Speed @ 28 VDC            | 70° / sec                                      |
| Static Current @ 28 VDC           | < 400 mA                                       |
| Peak Stall Torque                 | 2,500 lb-in nom - electronically limited       |
| Line Current AT Peak Stall Torque | 23 amps                                        |
| Unpowered Backdrive Torque        | 15 lb-in max                                   |
| Power Point                       | 2,200 lb-in @ 45° / sec                        |
| Backlash                          | < 1.0 degrees with ±125 lb-in reversing torque |
| Small Signal Frequency Response   | 5.0 Hz no load with 4° DEGP-P command          |
| Electrical Command interface      | 4 wire RS-485 full duplex                      |
| Communications Protocol           | Refer to M1 / M2 protocol <sup>1</sup>         |
| Command and Position Resolution   | 12 bit                                         |
| Addressing                        | Connector pin strapping-up to 16 addresses     |
| Loss of Communication             | User definable                                 |

Notes:

<sup>1</sup>Contact Moog sales to receive detailed protocol information.

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## CONNECTOR PIN ASSIGNMENT

| Pin Number | RS-485 Half Duplex Model |
|------------|--------------------------|
| A          | Power Return             |
| B          | Power Return             |
| C          | +28 VDC Power            |
| D          | Chassis Ground           |
| E          | Return Unit ID           |
| F          | Unit ID 'B'              |
| G          | Unit ID 'A'              |
| H          | RS-485 Transmit High     |
| J          | RS-485 Transmit Low      |
| K          | RS-485 Receive High      |
| L          | RS-485 Receive Low       |
| M          | Spare                    |
| N          | Spare                    |
| P          | +28 VDC Power            |
| R          | +28 VDC Power            |
| S          | Unit ID 'D'              |
| T          | Unit ID 'C'              |
| U          | RS-485 Return            |
| V          | Power Return             |

## SPLINE DATA

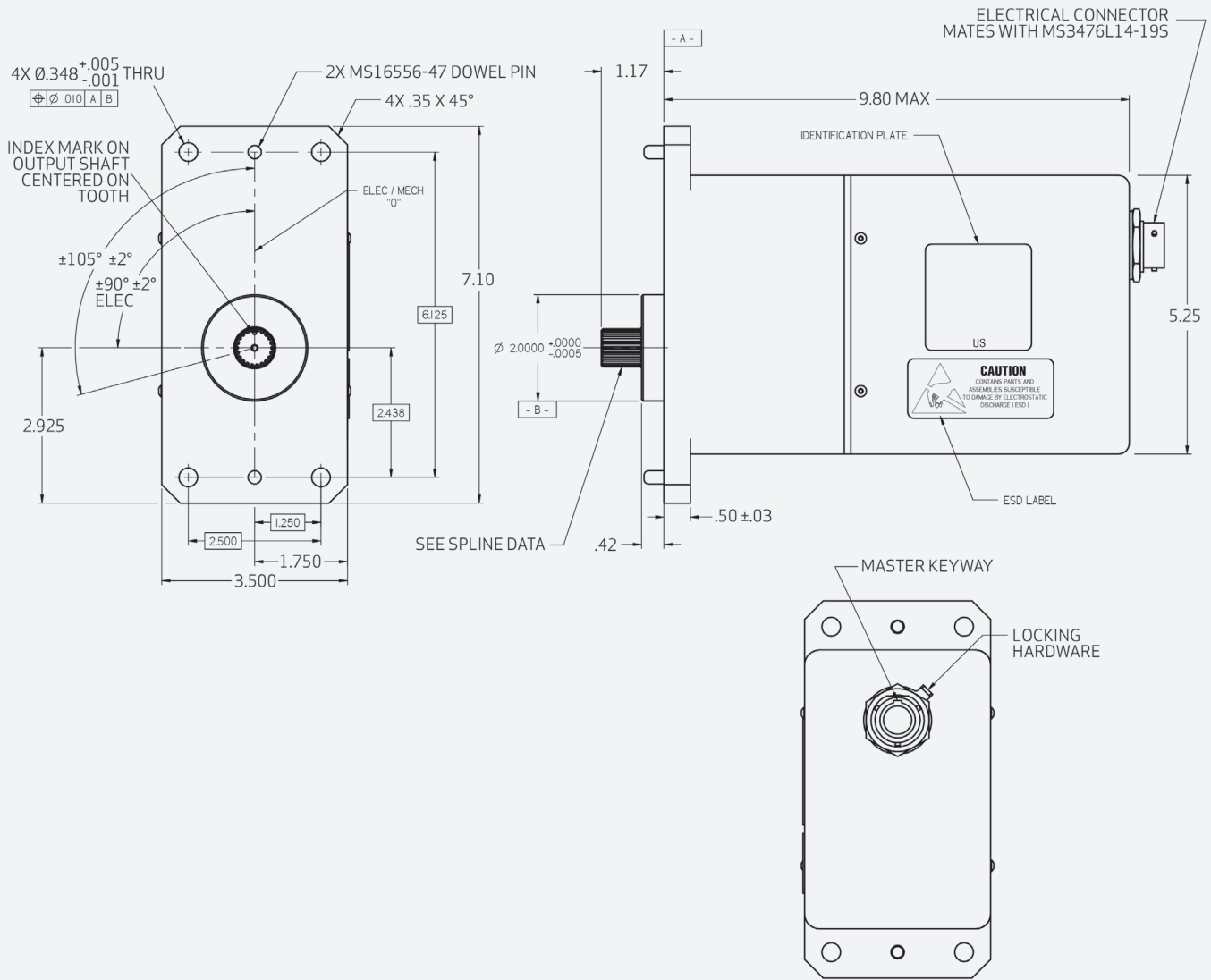
External Involute - Class 5 Fit  
Fillet Root Side Fit Per ANSI B92.1a-1976

| Features                                   | Model 96500000-03                                               |
|--------------------------------------------|-----------------------------------------------------------------|
| Number of Teeth                            | 22                                                              |
| Pitch                                      | 32 / 64                                                         |
| Pitch Diameter Reference                   | 0.68750                                                         |
| Pressure Angle                             | 30°                                                             |
| Base Diameter                              | 0.5954                                                          |
| Major Diameter                             | 0.7188                                                          |
| Minor Diameter                             | 0.613                                                           |
| True Involute Form Diameter                | 0.652                                                           |
| Effective Circular Tooth Thickness Maximum | 0.0491                                                          |
| Actual Circular Tooth Thickness Minimum    | 0.0465                                                          |
| Fillet Radius                              | 0.011                                                           |
| Measurement Over 0.0600 Diameter Pins      | 0.7763 $\begin{smallmatrix} +.0018 \\ -.0000 \end{smallmatrix}$ |

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## MECHANICAL DIMENSIONS (INCHES)

Note: 96500000-03 series shown



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