MAXFORCE
PRE-ENGINEERED ELECTRIC LINEAR ACTUATION SOLUTION
SIZE 4

THE ELECTRO-MECHANICAL SOLUTION FOR HIGH PERFORMANCE ACTUATION

WHAT MOVES YOUR WORLD
Moog MaxForce Pre-Engineered Electric Actuation Solutions provide an electro-mechanical alternative to traditional hydraulic actuation. Combining an electro-mechanical servoactuator, a servodrive and integrated software, this high performance solution delivers world-class motion control to a wide array of linear applications, ensuring high speed and high force in today’s most demanding industrial environments.

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This catalog is for users with technical knowledge. To ensure that all necessary characteristics for function and safety of the system are given, the user has to check the suitability of the products described herein. The products described herein are subject to change without notice. In case of doubt, please contact Moog.

For the most current information, visit www.moog.com/servomotorsanddrives

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An Integrated System Designed To Achieve Maximum Machine Performance

PERFORMANCE
- Long lasting performance and reliability with integrated design and reduced part count
- Pre-engineered system - servoactuator, servodrive, software - allows for easy set-up and installation

PRECISION
- Ensures more accurate precision motion control
- Low inertia servomotors for higher acceleration
- Lower audible noise compared to hydraulic installation

EFFICIENCY
- Reduces maintenance and operating costs
- Match unique machine designs with a full range of options, sizes and configurations
- Reduces energy consumption
- Eliminates oil leaks

COMMISSIONING SOFTWARE
- 

Components optimized to work together

The MaxForce Pre-Engineered Electric Linear Actuation Solution is an actuation package that employs Moog’s innovative brushless servomotor and ball-screw technology, a state-of-the-art servodrive and user-friendly commissioning software. All of the components are optimized to work together to provide the highest level of performance and accuracy.

Engineered in advance

Moog’s depth of motion control expertise provides you with a flexible solution unique to your machine needs. Moog has engineered the majority of the work in advance so that with minimal effort the system can be easily implemented into your application.

World-class components for high performance

The MaxForce Pre-Engineered Electric Linear Actuation Solution features genuine Moog components so you can rest assured that you’re getting the world-class performance today’s design engineers have come to trust.

User-friendly software

Moog’s intuitive commissioning software helps the user reduce system setup time.

The commissioning software saves time at system start up by automatically uploading preset system tuning parameters from the absolute encoder. The software also ensures error-free start up by implementing preset safety limits for speed, force and stroke length.

The Servodrive is programmed in user-friendly engineering units eliminating the need for the conversion from RPM to rod speed, from servomotor current to force and from encoder counts to position. This information is preprogrammed into the servoactuator encoder for automatic upload.

There is also a Control Panel function and Fault History which allows ease of setup and troubleshooting. Various levels of intelligence and communication options are available.
## SERVOMOTOR PERFORMANCE 300 VOLT

<table>
<thead>
<tr>
<th>Servomotor Stack Number</th>
<th>Rotor Inertia kg(\text{cm}^2) (lb(\text{ft}^2))</th>
<th>Brake Inertia kg(\text{cm}^2) (lb(\text{ft}^2))</th>
<th>Continuous Stall Torque Nm (in-lb)</th>
<th>Peak Stall Torque Nm (in-lb)</th>
<th>RPM</th>
<th>Nominal Speed</th>
<th>Brake Holding Torque Nm (in-lb)</th>
<th>Continuous Current Arms</th>
<th>Peak Current Arms</th>
</tr>
</thead>
<tbody>
<tr>
<td>-8</td>
<td>4.70 (0.00416)</td>
<td>1.00 (0.00089)</td>
<td>8.20 (72.6)</td>
<td>22.00 (194.7)</td>
<td>3500.0</td>
<td>18.00 (159.3)</td>
<td>9.2</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>-9</td>
<td>6.80 (0.00602)</td>
<td>1.00 (0.00089)</td>
<td>12.50 (110.6)</td>
<td>35.00 (309.8)</td>
<td>2800.0</td>
<td>18.00 (159.3)</td>
<td>9.6</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

## SERVOACTUATOR PERFORMANCE

### Nominal Backlash mm (in)
-2800 (0.000787)

### Maximum Backlash mm (in)
-0.02 (0.000787)

### Lead Accuracy mm/300mm (in/ft)
0.023 (0.000906)

### Resolution mm (in)
0.00001 (0.0000039)

### Maximum Static Load kN (lb)
41 (9217.63)

### Screw Diameter mm (in)
32 (1.25)

### Environmental Rating

<table>
<thead>
<tr>
<th>Stroke range mm (in)</th>
<th>75-2000 (3.9-59)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Strokes mm (in)</td>
<td>100, 200, 300, 400, 500, 750, 1000, 1500, 2000</td>
</tr>
</tbody>
</table>

### Servoactuator Mass adder/Unit stroke kg/mm (lb/in)
0.0191 (0.00170)

## DEFINITIONS

### Continuous Stall Force:
Force produced by the servoactuator at the continuous servomotor torque and at zero speed. Continuous force declines as servomotor speed increases. Consult performance curves for force rating at higher speeds. Continuous servomotor torque is limited by temperature and thus, the continuous force will be reduced with ambient temperatures above 25°C.

### Peak Stall Force:
Force produced by the servoactuator at the peak servomotor torque and at zero speed. Peak force declines as servomotor speed increases. Consult performance curves for force rating at higher speeds. Peak force can be held only for short durations (typically less than 1 minute) after which a cool down period at less than the continuous rating is required.

### Brake Holding Force:
Maximum force that the optional brake will hold stationary. Brake should not be used to stop a moving servoactuator as damage to the brake will result.

### Maximum Static Load:
Mechanical load limit of the servoactuator components. This is a limit of the structural components of the servoactuator.

### Dynamic Load Rating:
The load at which the estimated life of a ball screw or bearing will be 1 million revolutions

### Maximum Speed:
The maximum linear speed for the servoactuator. The available force at maximum speed is significantly less than the Stall Forces. Consult the Performance curves for Speed-Speed relationship.

### Accuracy:
The ability of a positioning system to move exactly to a commanded position.

### Repeatability:
The ability of a positioning system to return to the same point from the same direction with the same load.

### Resolution:
The smallest positioning increment possible.

### Lead Accuracy:
The maximum deviation from nominal lead over specified interval.

### Maximum Linear Inertia:
This is the maximum load mass that can be connected to the servoactuator. This mass results in 10:1 inertia match to servomotor with 1000 mm stroke. Increasing stroke length will reduce this value while reducing stroke will increase this value. For exact inertia matching, refer to MaxForce sizing software.

### Servoactuator Base Mass:
This is the mass of the servoactuator with 0" stroke. To get total servoactuator mass multiply stroke \(X\) servoactuator mass adder and add to servoactuator base mass.
1:1 GEAR RATIO 300 VOLT

**Servomotor Stack Number -8**

![Graph 1](image1)

**Servomotor Stack Number -9**

![Graph 2](image2)

**Servomotor Stack Number -8**

![Graph 3](image3)

**Servomotor Stack Number -9**

![Graph 4](image4)
PERFORMANCE CURVES: 300 VOLT

SIZE 4

1:1.4 GEAR RATIO 300 VOLT

Servomotor Stack Number -8

Servomotor Stack Number -9

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1:1.67 GEAR RATIO 300 VOLT

**Servomotor Stack Number -8**

884-891-xxxxGxxxA
1:1.67 gear ratio, 325 VDC 5mm lead

**Servomotor Stack Number -9**

884-991-xxxxGxxxA
1:1.67 gear ratio, 325 VDC 5mm lead

**Servomotor Stack Number -8**

884-891-xxxxGxxxB
1:1.67 gear ratio, 325 VDC 10mm lead

**Servomotor Stack Number -9**

884-991-xxxxGxxxB
1:1.67 gear ratio, 325 VDC 10mm lead

**Servomotor Stack Number -8**

884-891-xxxxGxxxD
1:1.67 gear ratio, 325 VDC 20mm lead

**Servomotor Stack Number -9**

884-991-xxxxGxxxD
1:1.67 gear ratio, 325 VDC 20mm lead

**Continuous Force**

**Peak Force**
### SERVOMOTOR PERFORMANCE 600 VOLT

<table>
<thead>
<tr>
<th>Servo-motor Stack Number</th>
<th>Rotor Inertia kg·cm² (lb·in²)</th>
<th>Brake Inertia kg·cm² (lb·in²)</th>
<th>Continuous Stall Torque (in-lb)</th>
<th>Peak Stall Torque (in-lb)</th>
<th>Nominal Speed RPM</th>
<th>Peak Holding Torque (in-lb)</th>
<th>Continuous Current Arms</th>
<th>Peak Current Arms</th>
</tr>
</thead>
<tbody>
<tr>
<td>-8</td>
<td>4.70 (0.00416)</td>
<td>1.00 (0.00089)</td>
<td>8.20 (72.6)</td>
<td>26.50 (234.6)</td>
<td>3300.0</td>
<td>18.00 (159.3)</td>
<td>5.8</td>
<td>18.5</td>
</tr>
<tr>
<td>-9</td>
<td>6.80 (0.00602)</td>
<td>1.00 (0.00089)</td>
<td>11.20 (99.1)</td>
<td>39.80 (352.3)</td>
<td>3000.0</td>
<td>18.00 (159.3)</td>
<td>5.6</td>
<td>20</td>
</tr>
</tbody>
</table>

### SERVOACTUATOR PERFORMANCE

<table>
<thead>
<tr>
<th>Nominal Backlash mm (in)</th>
<th>0.002 (0.0000787)</th>
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</thead>
<tbody>
<tr>
<td>Maximum Backlash mm (in)</td>
<td>0.02 (0.000787)</td>
</tr>
<tr>
<td>Lead Accuracy mm/300mm (in/ft)</td>
<td>0.023 (0.000906)</td>
</tr>
<tr>
<td>Resolution mm (in)</td>
<td>0.00001 (0.00000039)</td>
</tr>
<tr>
<td>Maximum Static Load kN (lb)</td>
<td>41 (9217.63)</td>
</tr>
<tr>
<td>Screw Diameter mm (in)</td>
<td>32 (1.25)</td>
</tr>
<tr>
<td>Environmental Rating</td>
<td>IP65</td>
</tr>
<tr>
<td>Stroke range mm (in)</td>
<td>75-2000 (3.9-59)</td>
</tr>
<tr>
<td>Standard Strokes mm</td>
<td>100, 200, 300, 400, 500, 750, 1000, 1500, 2000</td>
</tr>
<tr>
<td>Servoactuator Mass adder/unit stroke kg/mm (lb/in)</td>
<td>0.191 (1.070)</td>
</tr>
</tbody>
</table>

### DEFINITIONS

**Continuous Stall Force:**
Force produced by the servoactuator at the continuous servomotor torque and at zero speed. Continuous force declines as servomotor speed increases. Consult performance curves for force rating at higher speeds. Continuous servomotor torque is limited by temperature and thus, the continuous force will be reduced with ambient temperatures above 25°C.

**Peak Stall Force:**
Force produced by the servoactuator at the peak servomotor torque and at zero speed. Peak force declines as servomotor speed increases. Consult performance curves for force rating at higher speeds. Peak force can be held only for short durations (typically less than 1 minute) after which a cool down period at less than the continuous rating is required.

**Brake Holding Force:**
Maximum force that the optional brake will hold stationary. Brake should not be used to stop a moving servoactuator as damage to the brake will result.

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The load at which the estimated life of a ball screw or bearing will be 1 million revolutions

**Maximum Speed:**
The maximum linear speed for the servoactuator. The available force at maximum speed is significantly less than the Stall Forces. Consult the Performance curves for Force/Speed relationship.

**Accuracy:**
The ability of a positioning system to move exactly to a commanded position.

**Repeatability:**
The ability of a positioning system to return to the same point from the same direction with the same load.

**Resolution:**
The smallest positioning increment possible.

**Maximum Linear Inertia:**
The maximum load mass that can be connected to the servoactuator. This mass results in 10:1 inertia match to servomotor with 1000 mm stroke. Increasing stroke length will reduce this value while reducing stroke will increase this value. For exact inertia matching, refer to MaxForce sizing software.

**Servoactuator Base Mass:**
This is the mass of the servoactuator with 0° stroke. To get total servoactuator mass multiply stroke X servoactuator mass adder and add to servoactuator base mass.
1:1 GEAR RATIO 600 VOLT

**Servomotor Stack Number -8**

- 884-813-xxxxGxxxA
- 884-853-xxxxGxxxA

1:1.0 gear ratio, 525 VDC 5mm lead
Linear Speed [in/sec]:
- 0 2 4 6 8 10 12
- 0 500 1000 1500 2000 2500

**Servomotor Stack Number -9**

- 884-913-xxxxGxxxA
- 884-953-xxxxGxxxA

1:1.0 gear ratio, 525 VDC 5mm lead
Linear Speed [in/sec]:
- 0 2 4 6 8 10
- 0 2500 5000 7500 10000 12500

**Servomotor Stack Number -8**

- 884-813-xxxxGxxxB
- 884-853-xxxxGxxxB

1:1.0 gear ratio, 525 VDC 10mm lead
Linear Speed [in/sec]:
- 0 5 10 15 20
- 0 1000 2000 3000 4000 5000

**Servomotor Stack Number -9**

- 884-913-xxxxGxxxB
- 884-953-xxxxGxxxB

1:1.0 gear ratio, 525 VDC 10mm lead
Linear Speed [in/sec]:
- 0 5 10 15 20
- 0 1000 2000 3000 4000

**Servomotor Stack Number -8**

- 884-813-xxxxGxxxD
- 884-853-xxxxGxxxD

1:1.0 gear ratio, 525 VDC 20mm lead
Linear Speed [in/sec]:
- 0 2 4 6 8 10
- 0 500 1000 1500 2000

**Servomotor Stack Number -9**

- 884-913-xxxxGxxxD
- 884-953-xxxxGxxxD

1:1.0 gear ratio, 525 VDC 20mm lead
Linear Speed [in/sec]:
- 0 2 4 6 8 10
- 0 500 1000 1500 2000

---

**Continuous Force**  
**Peak Force**
1:1.4 GEAR RATIO 600 VOLT

**Performance Curves:**

**Servomotor Stack Number -8**

884-873-xxxxGxxxA
1:1.4 gear ratio, 525 VDC 5mm lead

884-873-xxxxGxxxB
1:1.4 gear ratio, 525 VDC 10mm lead

884-873-xxxxGxxxD
1:1.4 gear ratio, 525 VDC 20mm lead

**Servomotor Stack Number -9**

884-973-xxxxGxxxA
1:1.4 gear ratio, 525 VDC 5mm lead

884-973-xxxxGxxxB
1:1.4 gear ratio, 525 VDC 10mm lead

884-973-xxxxGxxxD
1:1.4 gear ratio, 525 VDC 20mm lead

---

**Continuous Force**

**Peak Force**
1:1.67 GEAR RATIO 600 VOLT

Servomotor Stack Number -8

Servomotor Stack Number -9

Continuous Force

Peak Force
ENCODER HOUSING GROUNDING IS ELECTRICALLY CONNECTED TO THE MOTOR HOUSING VIA THE STATOR COUPLING. THE GND (0 V) CONNECTED TO SUPPLY VOLTAGE HAS NO CONNECTION TO THE ENCODER HOUSING.

ELECTRICAL SCHEMATIC WITH ENCODER

(CODE: 1 OR 3)

ENCODER: CA65132-001-XXX
POWER:
300V: C22294-001-XXX
600V: CA15987-001-XXX

CABLES (XXX = LENGTH IN METERS)

ENERGIZE BRAKE TO RUN

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ROD END KITS

ROD END KIT, MALE END OPTION
(CODE: 0)

ROD END KIT, CLEVIS END OPTION
(CODE: 3)

ROD END KIT, SPHERICAL BEARING OPTION
(USED WITH INTERNAL ANTI-ROTATION)
(CODE: 6)

ROD EYE KIT, SPADE END OPTION
(CODE: 4)
## Fieldbus

High-speed interfaces provide a fully digital link for receiving motion commands, providing feedback of status and initializing controller parameters.

**Supported Fieldbuses include:**
- DeviceNet
- Ethernet IP
- 16 bit Analog with Encoder Repeat.

**Servomotor Feedback Supported:**
- Stegmann Absolute Encoders, Encoder Simulated Output

## Technical Data

<table>
<thead>
<tr>
<th>Fieldbus Ordering Codes</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Fieldbus</td>
<td>G362-010-00-A-902A</td>
</tr>
<tr>
<td>DeviceNet</td>
<td>G362-010-40-A-902A</td>
</tr>
<tr>
<td>Ethernet IP</td>
<td>G362-010-90-A-902A</td>
</tr>
<tr>
<td>16 Bit analog with encoder +/- 10v, 0-20mA</td>
<td>G362-010-70-A-902A</td>
</tr>
</tbody>
</table>

### Electrical Characteristics

- Power supply: 3-phase, 65 Vac to 510 Vac, 1 phase, 103 to 243 VAC
- Auxiliary power supply: 24 Vdc, 2A
- PWM Frequency: 10 kHz
- Position control loop frequency: 8 kHz
- Speed control loop frequency: 8 kHz
- Continuous / peak output current: 10A/42A with 3-phase supply

### Certifications include
- UL, CE, ODVA

### Environmental Data

- Operating ambient temperature: 0 to 40°C
- Storage Temperature: -25 to +55°C
- Thermal Protection: 70°C to de-rating the servodrive
- Ingress Protection: IP20

### Protection

- Servomotor and servodrive over temperature
- Out of tolerance power supply detection
- Encoder/Resolver missing signal detection
- Output Open/Short circuit detection
- FT limiting
- Thermal foldback

### Fieldbus Ordering Codes

<table>
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<tr>
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<tr>
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<td>G362-010-40-A-902A</td>
</tr>
<tr>
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</tr>
<tr>
<td>16 Bit analog with encoder +/- 10v, 0-20mA</td>
<td>G362-010-70-A-902A</td>
</tr>
</tbody>
</table>

### Digital I/O

- Hardware enable input for process control
- Servomotor Brake Control Output
- Servodrive Ready Output
- Additional 7 programmable inputs and 3 programmable outputs allowing for custom servodrive functionality and monitoring
TAKE A CLOSER LOOK

Solutions for MaxForce pre-engineered electro-mechanical actuation for high performance applications are readily available by calling +1 716 652 2000 or emailing us at info.usa@moog.com

For more information, visit our Web site or locate the distributor nearest you at www.moog.com/industrial/distributorlocator.