SERVOACTUATORS
MG SERIES

Rev. A, February 2024

LINEAR ELECTRO-MECHANICAL SERVOACTUATORS

WHEN PERFORMANCE REALLY MATTERS

MOOG

Whenever the highest level of motion control performance and design flexibility are required, you'll find Moog expertise at work. Through collaboration, creativity and worldclass technological solutions, we help you overcome your toughest engineering obstacles. Enhance your machine's performance. And help take your thinking further than you ever thought possible.

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MAKING THE IMPOSSIBLE POSSIBLE IN MOTION CONTROL

Moog Industrial is your partner of choice when performance really matters. We combine world class technologies with expert advisory support to solve our customers' most difficult challenges in motion control.

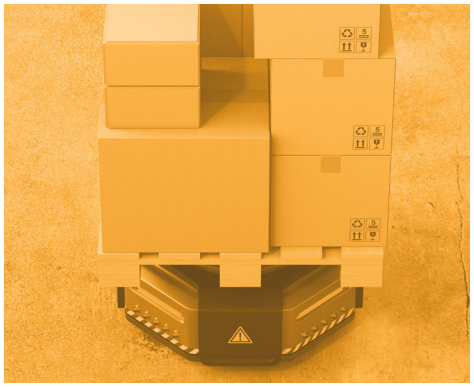
Our Experience

Moog Industrial excels in a wide range of applications, including industrial automation, machine building, robotics and medical motion control - just to name a few.

Get exceptional customer support from our well-trained experts, backed by Moog's longstanding track record of high performance and trusted experience. All related technology is owned by Moog.

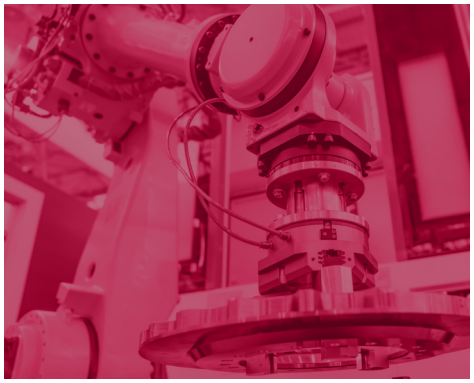
Will Make You Triumph

Moog's typical hands-on mentality and our ambition to make the impossible possible in motion control can provide you with a competitive advantage, which will most likely last for years.



Our formula:

- Superior and reliable machine design, based on technology-neutral approach
- Customize to your very specific requirements, including the utmost compactness and quietness
- Improved profitability through economically effective project design
- A trustful partnership, driven by empathy and passion



STRUCTURE OF THE AC LINEAR SERVOACTUATORS MG SERIES

Advantages

More than twice the force, same dimensions

The MG Series servoactuators deliver smooth and accurate movement and long operational life even with high payloads and peak forces up to 170 kN (38,217.52 lbf). By redesigning the MG Series actuator's mechanics, Moog is delivering higher maximum overload forces while keeping the same compact dimensions. At party of size, the new MG Series delivers up to a 120-percent increase in force compared to peak values of previous series.

Quick replacement of pneumatic and hydraulic cylinders

The form factor of the new MG Series actuators is based on conventional pneumatic and hydraulic cylinders, so customers can easily retrofit existing systems. This, coupled with a wide range of effective stroke lengths, up to 550 mm (21.65 in), means customers can find the right fit for virtually any application. The enhanced flexibility allowed by an electromechanical control makes it easy to perform feats that would be challenging for hydraulic solutions or even unachievable with pneumatic ones.

Energy savings

Customers can obtain much better results using an EMA with a typical efficiency-to-cost ratio estimated between 70 to 90 percent, compared to the 30 to 50 percent of a pneumatic equivalent and 50 to 70 percent in the case of hydraulics.

Technical Characteristics

Working conditions and other technical data

- Ambient temperature 5 to 40 °C (41 to 104 °F)
- Relative humidity 5 to 95 %
- Altitude above sea level up to 1,000 m (3,2800 ft) a.s.l. (pressure 90 kPa [13 psi])
- Thermal insulation class „F“, maximum temperature of the winding ϑ = 145 °C (293 °F)
- IC410 (i.e. closed, with natural cooling of the servoactuator surface. All data indicated here are for operation with an additional A-Flange cooling area.)
- Servoactuators are produced for several DC intermediate circuit voltages (standard 120,330,560 and 700 VDC. Lower voltage variants are available upon request.)
- Standard insulation system allows: du/dt = 5 kV/µs, Upp = 1.5 kV
- Optional reinforced insulation system allows: du/dt = 6.6 kV/µs, Upp = 1.5 kV

Features

- Peak forces up to 170 kN (38,217.52 lbf)
- Large effective stroke range up to 550 mm (21.65 in)
- Traverse speed up to 500 mm/s (19.69 in/sec)
- Various mounting options
- Lower operating costs than pneumatic or hydraulic
- cylinders
- Flexible linear positioning possible with position controlled servo drive
- Low noise emission
- Long service life
- DC link voltage up to 700 VDC

Standard version

- 560 VDC design
- Resolver
- Thermal monitoring with thermal switch, 135 °C (275 °F)
- Electrical connection via plug (M23)
- ISO flange suitable for standard pneumatic cylinders replacement

Options

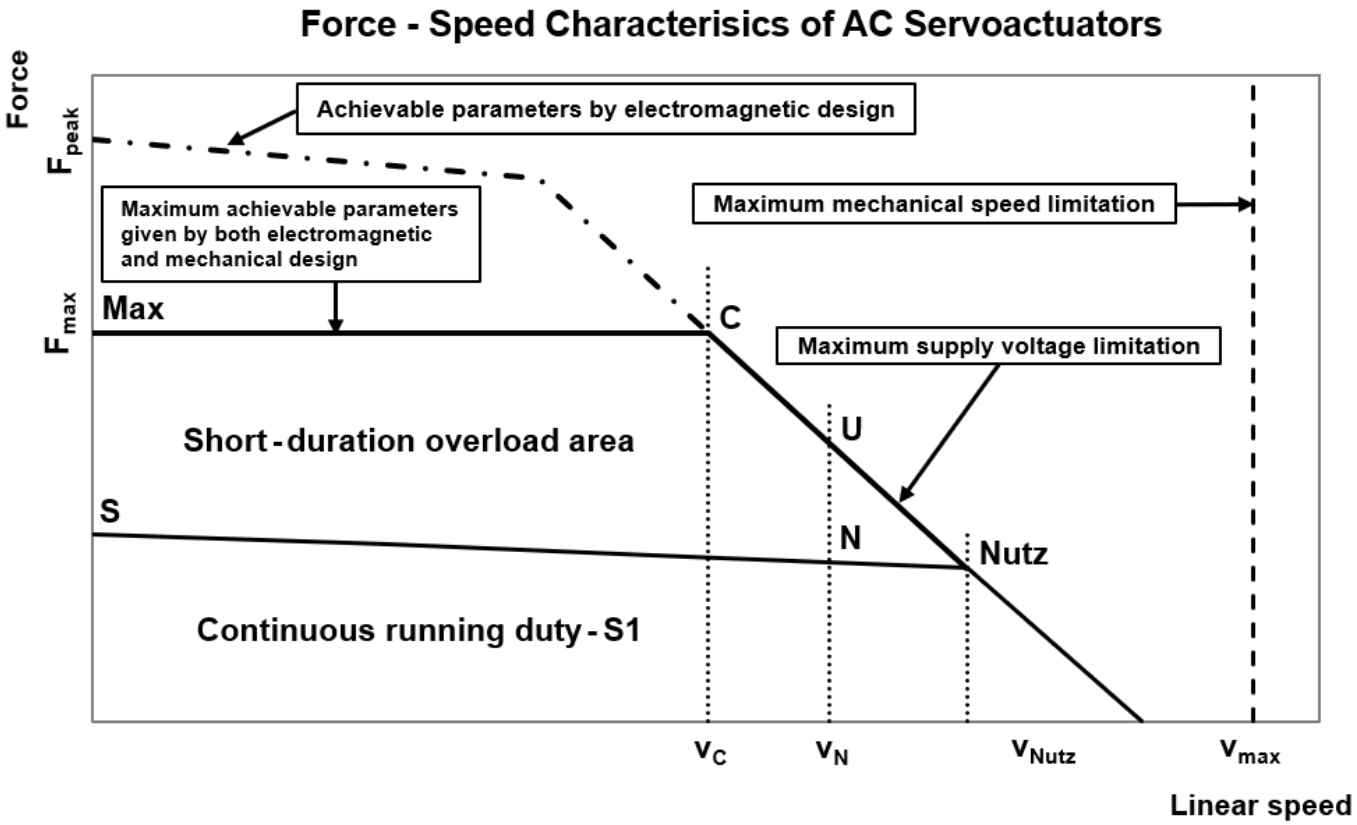
- Safety brake 24 VDC
- Internal ball screw support
- Various ball screw leads
- Feedback system: Single or Multiturn
- Protocol: Endat, Hiperface, Drive Cliq, Biss, SSI
- Application-specific optimised designs
- Liquid or fan cooled variant available upon request

Note

For any special requirements, such as different working conditions, overall design modifications, specific feedback sensor requests ,etc., please contact Moog engineering services.

TECHNICAL SPECIFICATION

Values given for S, N, and Nutz operation points and continuous running duty (S1) curves are determined in regard to the maximal thermal load of the servoactuator with a resolver. Please note that the rated working point, limit point and Nutz point as well as the no-load state do not respect the maximum achievable rotational and linear speed given by inertia and available stroke.
Maximum forces delivered by certain servoactuators may be limited by their mechanical design. Check with Moog for possible mechanical modifications if higher forces are required to be delivered by a certain servoactuator.
Average service life of a servoactuator depends on the typical servoactuator load and work cycle. The servoactuator is not designed for forces close to maximum value to be applied for a long period of time as it can decrease service life of the servoactuator significantly. Refer to the average service life graph of the respective servoactuator size for details.
For additional information, please contact Moog.



Term Definitions:

Stall torque M_0 – Torque produced by the motor at zero speed for continuous running duty S1. It is defined for winding temperature rise of 105 K (189 °F) and ambient temperature of 40 °C (104 °F). Please note that running the servoactuator close to zero speeds represents a risk of asymmetrical thermal phase load caused by uneven current phase load.

Uneven current phase load – The RMS phase current values differ across the phases which may lead to a single-phase overheating. For additional information, please contact Moog.

Stall force F_0 – Force produced by the servoactuator at zero speed for continuous running duty S1. It is defined for winding temperature rise of 105 K (189 °F) and ambient temperature of 40 °C (104 °F). It is given by the stall torque value and ball screw lead and efficiency. Please note that running the servoactuator close to zero speeds represents a risk of asymmetrical thermal phase load caused by uneven current phase load.

Stall current I_0 – Terminal RMS current while the servoactuator is producing stall torque and stall force. It is defined for winding temperature rise of 105 K (189 °F) and ambient temperature of 40 °C (104 °F).

Torque constant k_M – Ratio between torque and terminal RMS current. It is defined for the servoactuator temperature of 20 °C (68 °F) and torque close to zero.[1]

Force constant k_F – Ratio between force and terminal RMS current. It is defined for the servoactuator temperature of 20 °C (68 °F) and force close to zero.[2]

Rated working point – Working point achieving winding temperature rise of 105 K (189 °F) at ambient temperature of 40 °C (104 °F) at specified speed for continuous running duty (S1).

Rated voltage U_N – Terminal AC voltage at rated working point.

Rated torque M_N – Torque produced by the servoactuator at rated working point.

Rated force F_N – Force produced by the servoactuator at rated working point. It is given by the rated torque value and ball screw lead and efficiency.

Rated current I_N – Terminal RMS current at rated working point.

Rated rotational speed n_N – Rotational speed of the servoactuator at rated working point.

Rated linear speed v_N - Linear speed of the servoactuator at rated working point.

Rated power output P_N – Power output at rated working point.

Voltage constant K_E – Phase-to-phase RMS induced voltage per 1000 RPM. It is defined for the servoactuator temperature of 20 °C (68 °F).

Voltage constant k_e – Phase-to-phase RMS induced voltage per 1 rad/s. It is defined for the servoactuator temperature of 20 °C (68 °F).

Maximum force overload at rated speed F_U – Maximum short-duration permitted force at rated speed (maximum supply voltage applied).

Maximum overload ratio at rated speed F_U/F_N – Ratio between the maximum short-duration permitted force and rated force at rated speed.

Achievable peak stall force F_{peak} – Maximum achievable force at zero speed given by the electromagnetic design. Please note that this value may exceed the maximum stall force (mechanically permissible force). For additional information or customization options, please contact Moog.

Maximum stall force F_{max} – Maximum permitted short-duration force to be produced by the servoactuator at zero speed.

Maximum stall current I_{max} – Terminal RMS current when the servoactuator produces maximum stall force. It is defined for winding temperature rise of 105 K (189 °F) and ambient temperature of 40 °C (104 °F).

Maximum rotational speed n_{max} – The rotational speed mechanical limit.

Maximum linear speed v_{max} – The linear speed mechanical limit.

Limit point – Achievable short-duration working point given simultaneously by the electromagnetic and mechanical design limits and the maximum supply voltage limit. It is defined for winding temperature rise of 105 K (189 °F) and ambient temperature of 40 °C (104 °F).[3]

Limit point current I_C – Terminal RMS current at limit point.

Breakdown force FC – Force produced at limit point.

Limit point linear speed v_C – Linear speed at limit point.

Nutz point – Working point for continuous running duty (S1) at highest possible speed limited by maximum supply voltage or maximum mechanical speed, when the winding temperature rise reaches 105 K (189 °F) at ambient temperature of 40 °C (104 °F).[4]

Max. utilizable linear speed v_{nutz} – Linear speed at Nutz point.

Max. utilizable force F_{nutz} – Force produced at Nutz point.

Max. utilizable power output P_{nutz} – Power output at Nutz point.

No-load max. rotational speed n_0 – Rotational speed at no-load at maximum supply voltage.

No-load max. linear speed v_0 - Linear speed at no-load at maximum supply voltage.

Number of poles 2p – Number of poles of the servoactuator.

Winding resistance R_{U-V} – Winding phase-to-phase resistance at 20 °C (68 °F).

Winding inductance L_{U-V} – Winding phase-to-phase inductance.

Moment of inertia J – Moment of inertia of the rotor (excluding the ball screw).

Mass m – Total servoactuator mass excluding the ball screw and the brake.

Ball screw lead s – Linear distance travelled per one screw revolution.

Stroke h – The available stroke given by the servoactuator design.

Static friction torque M_r – The rotor static friction torque.

Damping constant k_D – The rate at which the friction torque increases with increasing rotor speed.

Mechanical time constant T_m – The motor mechanical time constant.

Thermal resistance (winding to ambient) $R_{th(RU)}$ – Thermal resistance between the winding and ambient.

Thermal resistance (frame to ambient) $R_{th(GU)}$ - Thermal resistance between the servoactuator frame and ambient.

Thermal time constant T_{th} – The servoactuator thermal time constant.

1) Torque constant declines with increasing load torque and temperature.

2) Force constant declines with increasing load force and temperature.

3) At lower speed, the maximum torque and force are limited by either the electromagnetic design or the mechanical design. The maximum torque and force may slowly decline with increasing speed. At limit point, supply voltage becomes the limiting factor and therefore the maximum torque and force start declining more rapidly with increasing speed.

4) In most cases, Nutz point is a working point with highest power output for continuous running duty (S1). For more information, please contact Moog.

MG Series Servoactuators Overview

Parameters

Series	**Stall force** [N] (lbf)	**Maximum force** [N] (lbf)	**Max speed** [mm/s] (in/sec)	**Standard stroke** [mm] (in)
MG40	1,370 - 3,620 (308 - 814)	5,990 - 14,500 (1,347 - 3,260)	333 (13.11)	Up to 140 (5.51)
MG50	6,290 - 12,400 (1,414 - 2,788)	28,560 - 34,000 (6,421 - 7,644)	213 (8.39)	Up to 220 (8.66)
MG63	8,480 - 26,200 (1,906 - 5,890)	37,700 - 50,000 (8,475 - 11,240)	250 (9.84)	Up to 220 (8.66)
MG90	21,090 - 39,750 (4,741 - 8,936)	59,320 - 83,900 (13,335 - 18,861)	333 (13.11)	Up to 425 (16.73)
MG100	17,910 - 45,710 (4,026 - 10,276)	71,630 - 170,000 (16,102 - 38,216)	254 (10)	Up to 385 (15.16)

MG40 Series

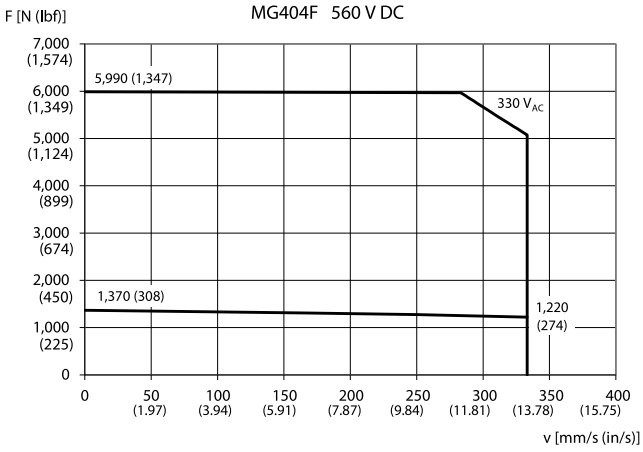
Parameters

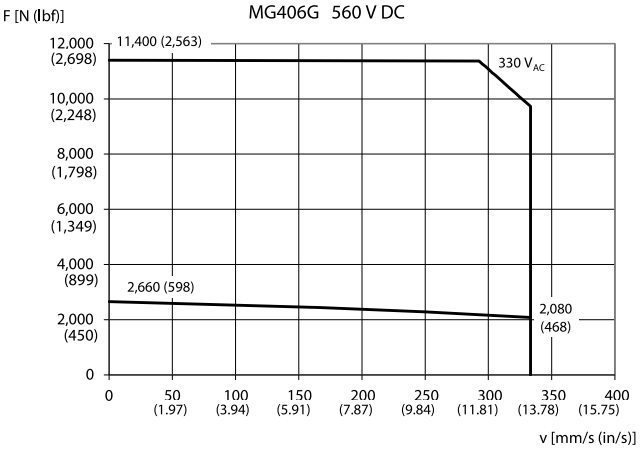
SERVOACTUATOR TYPE				MG404F	MG406G	MG408H
	DC BUS VOLTAGE	**U_{DC}**	**V**	**560**	**560**	**560**
S	**STALL VALUES**					
	Stalll torque	M_0	Nm (lbf in)	1.21 (10.71)	2.35 (20.80)	3.20 (28.32)
	Stall force	F_0	N (lbf)	1,370 (308)	2,660 (598)	3,620 (814)
	Stall current	I_0	A	1.84	3.06	3.66
	Torque constant	k_M	Nm/A	0.744	0.827	0.992
	Force constant	k_F	N/A	872	935	1,130
N	**RATED VALUES**					
	Rated voltage	U_N	V	157	165	182
	Rated torque	M_N	Nm (lbf in)	1.13 (10.00)	2.02 (17.88)	2.55 (22.57)
	Rated force	F_N	N (lbf)	1,280 (288)	2,280 (513)	2,880 (647)
	Rated current	I_N	A	1.75	2.69	2.99
	Rated rotational speed	n_N	min^{-1}	3,000	3,000	3,000
	Rated linear speed	v_N	mm/s (in/s)	250 (9.84)	250 (9.84)	250 (9.84)
	Rated power output	P_N	W	320	570	720
	Voltage constant	K_E	Vmin/1000	45	50	60
	Voltage constant	k_e	Vs/rad	0.430	0.480	0.573
U	**OVERLOADING CAPACITY AT RATED SPEED**					
	Maximum force overload at rated speed	F_U	N (lbf)	5,970 (1,342)	11,380 (2,558)	14,500 (3,260)
	Maximum overload ratio at rated speed	F_U/F_N	-	4.66	4.99	5.03
Max	**MAXIMUM VALUES**					
	Maximum stall force	F_{max}	N (lbf)	5,990 (1,347)	11,400 (2,563)	14,500 (3,260)
	Maximum current	I_{max}	A	8.45	14.1	15.9
	Maximum rotational speed	n_{mech}	min^{-1}	4,000	4,000	4,000
	Maximum linear speed	v_{mech}	mm/s (in/s)	333 (13.11)	333 (13.11)	333 (13.11)
C	**LIMIT POINT**					
	Limit point current	I_C	A	8.45	14.1	15.9
	Breakdown force	F_C	N (lbf)	5,970 (1,342)	11,370 (2,556)	14,500 (3,260)
	Limit point linear speed	v_C	mm/s (in/s)	283 (11.14)	293 (11.54)	278 (10.94)
Nutz	**MAX. UTILIZABLE PARAMETERS FOR S1**					
	Max. utilizable linear speed	v_{nutz}	mm/s (in/s)	333 (13.11)	333 (13.11)	333 (13.11)
	Max. utilizable force	F_{nutz}	N (lbf)	1,220 (274)	2,080 (468)	2,540 (571)
	Max. utilizable power output	P_{nutz}	W	407	693	847
0	**NO-LOAD (I and F = 0)**					
	No-load max. rotational speed	n_0	min^{-1}	7,080	6,200	5,490
	No-load max. linear speed	v_0	mm/s (in/s)	590 (23.23)	517 (20.35)	458 (18.03)
	TECHNICAL FEATURES					
	Number of poles	2p	-	6	6	6
	Winding resistance	R_{U-V}	Ω	12.4	5.38	4.31
	Winding inductance	L_{U-V}	mH	21.0	13.0	12.0
	Moment of inertia	J	$kgm^2/1000$	0.466	0.513	0.548
	Mass	m	kg (lb)	3.46 (7.63)	4.33 (9.55)	5.02 (11.07)
	Ball screw lead	s	mm (in)	5 (0.20)	5 (0.20)	5 (0.20)
	Stroke	h	mm (in)	80 (3.15)	115 (4.53)	140 (5.51)
	MECHANICAL VALUES					
	Static friction torque	M_r	Nm (lbf in)	0.074 (0.655)	0.088 (0.779)	0.098 (0.867)
	Damping constant	k_D	$Nm.min.10^{-5}$	0.63	1.3	1.7
	Mechanical time constant	T_m	ms	15	5.3	3.6
	THERMAL VALUES					
	Thermal resistance (winding to ambient)	$R_{th(RU)}$	K/W	1.16	0.97	0.84
	Thermal resistance (frame to ambient)	$R_{th(GU)}$	K/W	0.83	0.69	0.60
	Thermal time constant	T_{th}	min	24.7	25.3	25.2

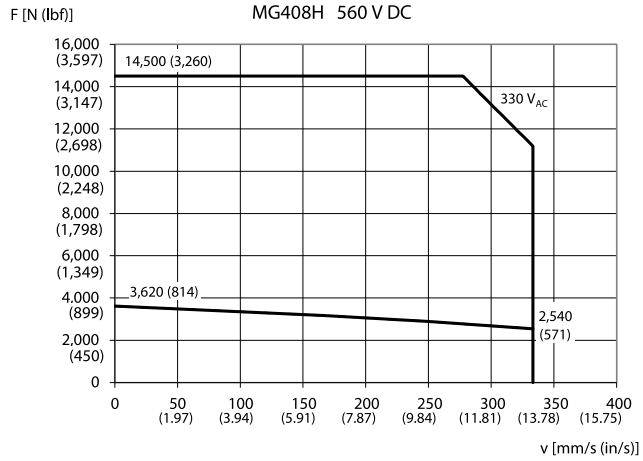
The above parameters apply if the servoactuator is connected to a flange 185 x 185 x 10 mm (7.28 x 7.28 x 0.39 in) which acts as an additional cooling area.

MG40 Series

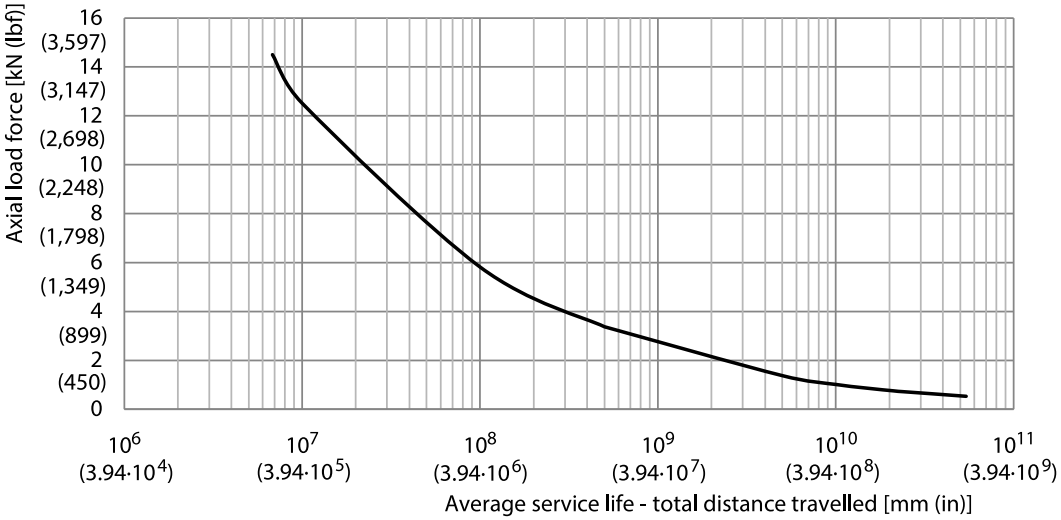
Technical specifications







MG40 Average Service Life

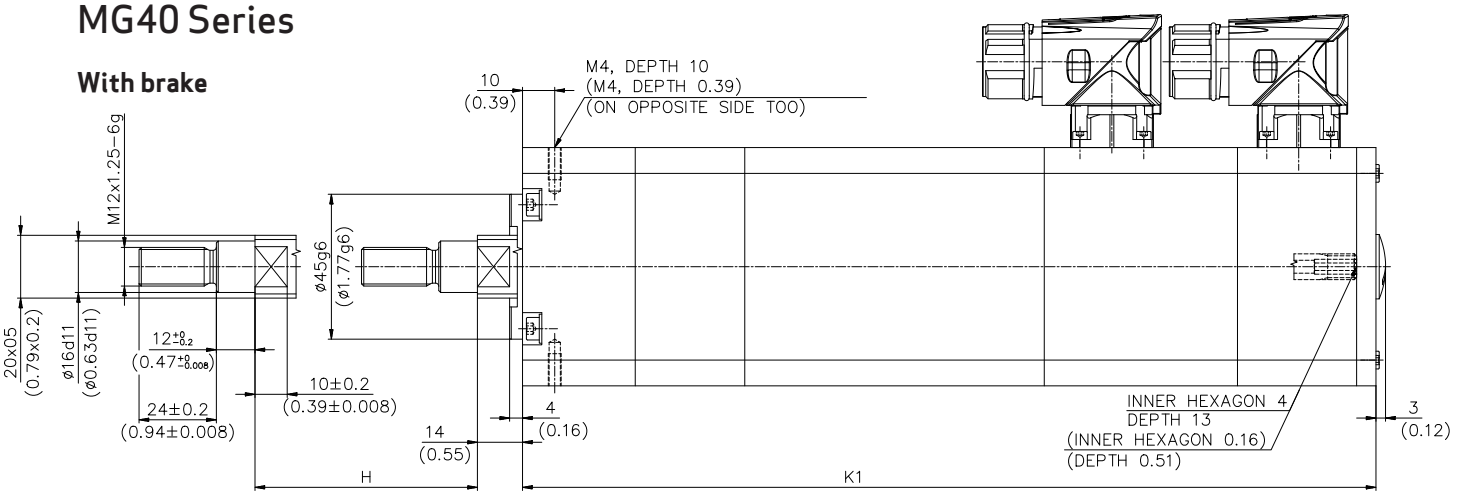


Please note that the above average service life graph only applies when the following conditions are met:

- Maximum load force of 14.5 kN (3,259.73 lbf) at zero speed is not exceeded.
- No ball screw radial load occurs.
- Force is applied evenly among the whole stroke.
- Prescribed grease quantity and quality requirements are met during the whole service life.
- The servoactuator is not used in a high frequency application.
- The servoactuator is not shock loaded.

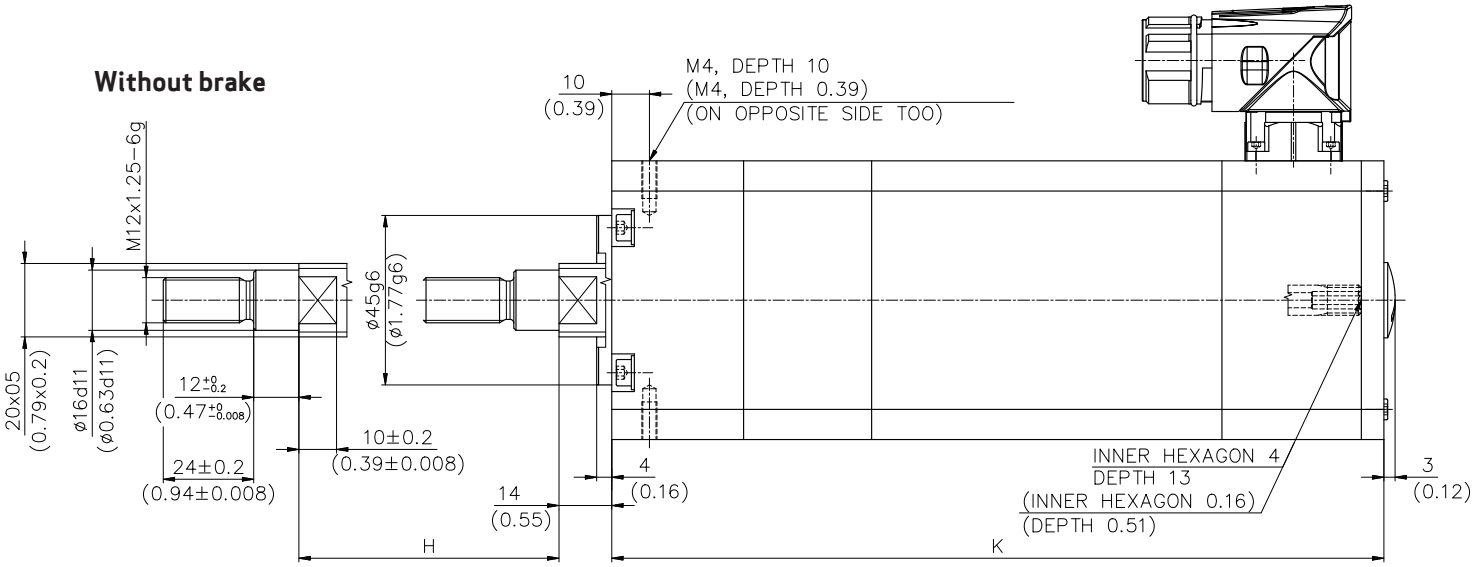
MG40 Series

With brake



Dimensions in mm [inches]

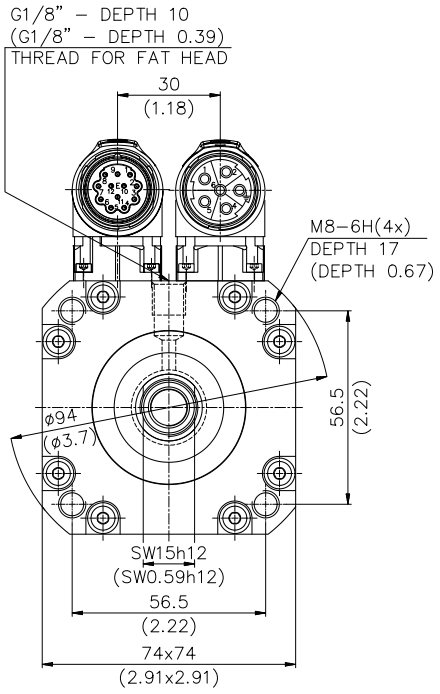
Without brake



Dimensions in mm [inches]

Dimensions

TYPE	H mm (in)	K mm (in)	K1 mm (in)
	hub	without brake	with brake
MG404	80 (3.15)	205 (8.07)	261 (10.28)
MG406	115 (4.53)	241 (9.49)	297 (11.69)
MG408	140 (5.51)	268 (10.55)	324 (12.76)



Dimensions in mm [inches]

Safety brake

MB	t1 max.	t2 max.	U1 DC	nmax.	J	m
Nm (lbf in)	ms	ms	V	min-1	$kg.m^2.10^{-3}$	kg (lb)
2 (17.70)	50	30	24	9,000	0.0245	0.62 (1.37)

Note: The brake can withstand forces up to 2.26 kN (508.07 lbf), if higher forces are needed, please contact Moog.

NOTES

MG50 Series

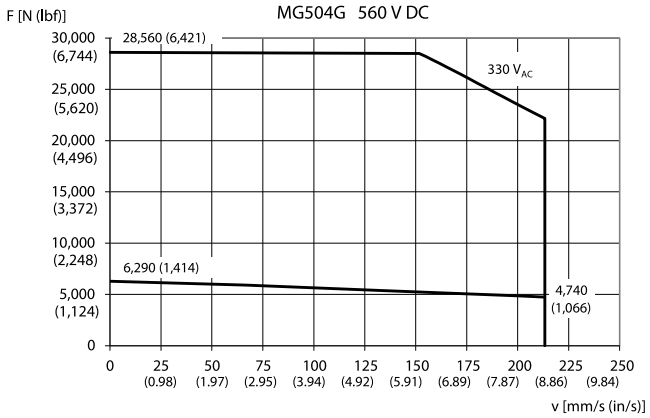
Parameters

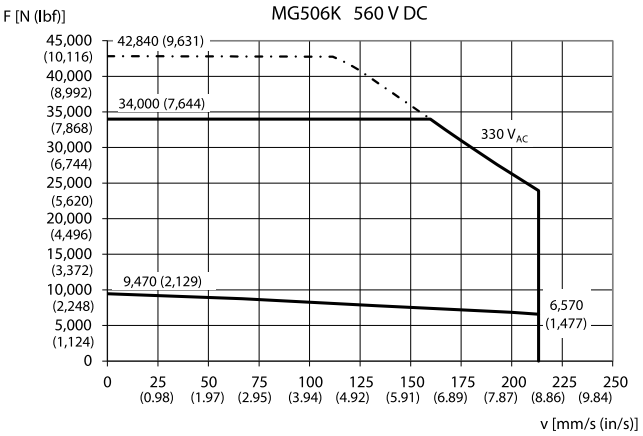
SERVOACTUATOR TYPE				MG504G	MG506K	MG508V
	DC BUS VOLTAGE	**U_{DC}**	**V**	**560**	**560**	**560**
S	**STALL VALUES**					
	Stalll torque	M_0	Nm (lbf in)	4.45 (39.39)	6.70 (59.30)	8.80 (77.89)
	Stall force	F_0	N (lbf)	6,290 (1,414)	9,470 (2,129)	12,400 (2,788)
	Stall current	I_0	A	6.12	6.57	7.56
	Torque constant	k_M	Nm/A	0.827	1.16	1.32
	Force constant	k_F	N/A	1,180	1,650	1,870
N	**RATED VALUES**					
	Rated voltage	U_N	V	156	212	236
	Rated torque	M_N	Nm (lbf in)	3.45 (30.54)	4.85 (42.93)	6.00 (53.10)
	Rated force	F_N	N (lbf)	4,880 (1,097)	6,860 (1,542)	8,480 (1,906)
	Rated current	I_N	A	4.87	4.88	5.31
	Rated rotational speed	n_N	min^{-1}	3,000	3,000	3,000
	Rated linear speed	v_N	mm/s (in/s)	200 (7.87)	200 (7.87)	200 (7.87)
	Rated power output	P_N	W	976	1,370	1,700
	Voltage constant	K_E	Vmin/1000	50	70	80
	Voltage constant	k_e	Vs/rad	0.477	0.670	0.762
U	**OVERLOADING CAPACITY AT RATED SPEED**					
	Maximum force overload at rated speed	F_U	N (lbf)	24,190 (5,438)	26,290 (5,910)	30,000 (6,744)
	Maximum overload ratio at rated speed	F_U/F_N	-	4.96	3.83	3.54
Max	**MAXIMUM VALUES**					
	Maximum stall force	F_{max}	N (lbf)	28,560 (6,421)	34,000 (7,644)	34,000 (7,644)
	Maximum current	I_{max}	A	34.0	26.0	21.5
	Maximum rotational speed	n_{mech}	min^{-1}	3,200	3,200	3,200
	Maximum linear speed	v_{mech}	mm/s (in/s)	213 (8.39)	213 (8.39)	213 (8.39)
C	**LIMIT POINT**					
	Limit point current	I_C	A	34.0	26.0	21.5
	Breakdown force	F_C	N (lbf)	28,490 (6,405)	34,000 (7,644)	34,000 (7,644)
	Limit point linear speed	v_C	mm/s (in/s)	158 (6.22)	160 (6.30)	185 (7.28)
Nutz	**MAX. UTILIZABLE PARAMETERS FOR S1**					
	Max. utilizable linear speed	v_{nutz}	mm/s (in/s)	213 (8.39)	213 (8.39)	213 (8.39)
	Max. utilizable force	F_{nutz}	N (lbf)	4,740 (1,066)	6,570 (1,477)	8,060 (1,812)
	Max. utilizable power output	P_{nutz}	W	1,011	1,402	1,719
0	**NO-LOAD (I and F = 0)**					
	No-load max. rotational speed	n_0	min^{-1}	6,510	4,680	4,130
	No-load max. linear speed	v_0	mm/s (in/s)	434 (17.09)	312 (12.28)	275 (10.83)
	TECHNICAL FEATURES					
	Number of poles	2p	-	6	6	6
	Winding resistance	R_{U-V}	Ω	1.64	1.76	1.46
	Winding inductance	L_{U-V}	mH	11	13	12
	Moment of inertia	J	$kgm^2/1000$	1.210	1.330	1.460
	Mass	m	kg (lb)	8.9 (19.6)	10.9 (24.0)	12.7 (28.0)
	Ball screw lead	s	mm (in)	4 (0.16)	4 (0.16)	4 (0.16)
	Stroke	h	mm (in)	130 (5.12)	175 (6.89)	220 (8.66)
	MECHANICAL VALUES					
	Static friction torque	M_r	Nm (lbf in)	0.19 (1.68)	0.21 (1.86)	0.24 (2.12)
	Damping constant	k_D	$Nm.min.10^{-5}$	2.00	3.10	4.30
	Mechanical time constant	T_m	ms	4.4	2.6	1.8
	THERMAL VALUES					
	Thermal resistance (winding to ambient)	$R_{th(RU)}$	K/W	0.79	0.64	0.58
	Thermal resistance (frame to ambient)	$R_{th(GU)}$	K/W	0.56	0.46	0.42
	Thermal time constant	T_{th}	min	36.2	36.2	39.0

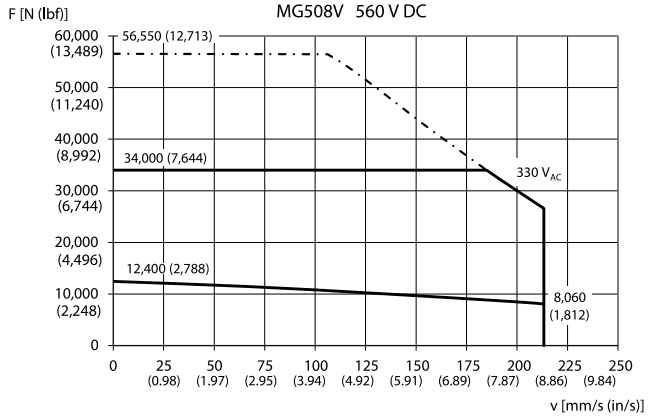
The above parameters apply if the servoactuator is connected to a flange 242 x 242 x 12 mm (9.53 x 9.53 x 0.47 in) which acts as an additional cooling area.

MG50 Series

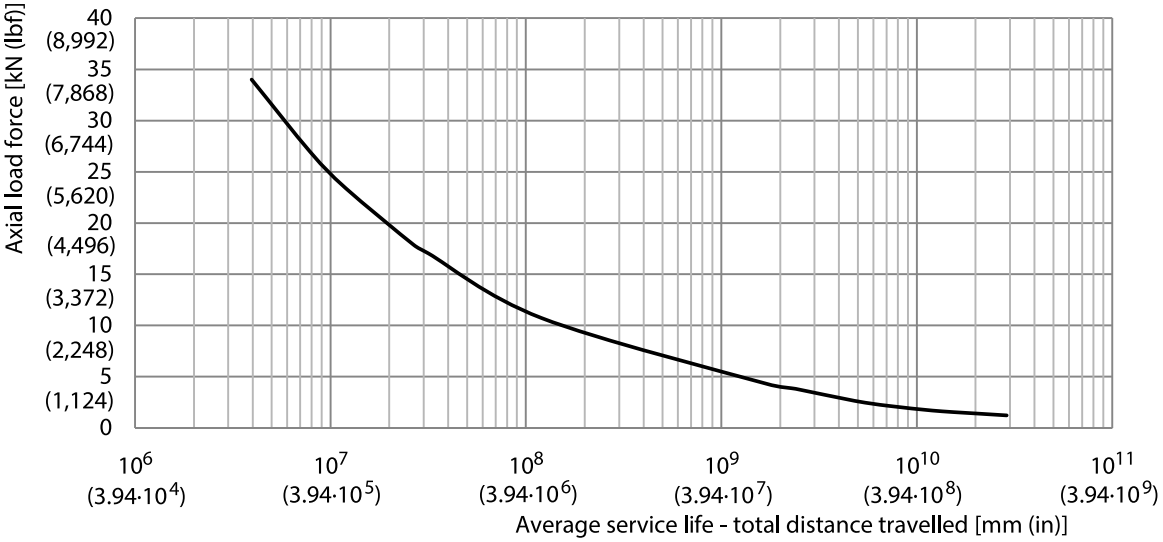
Technical specifications







MG50 Average Service Life

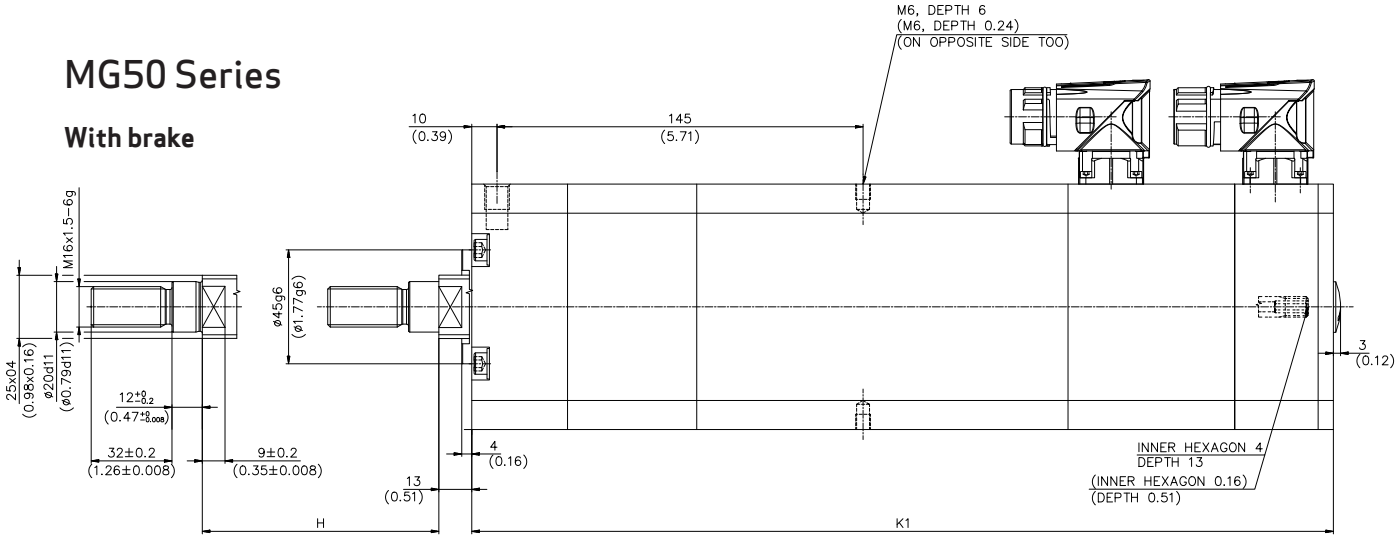


Please note that the above average service life graph only applies when the following conditions are met:

- Maximum load force of 34 kN (7,643.50 lbf) at zero speed is not exceeded.
- No ball screw radial load occurs.
- Force is applied evenly among the whole stroke.
- Prescribed grease quantity and quality requirements are met during the whole service life.
- The servoactuator is not used in a high frequency application.
- The servoactuator is not shock loaded.

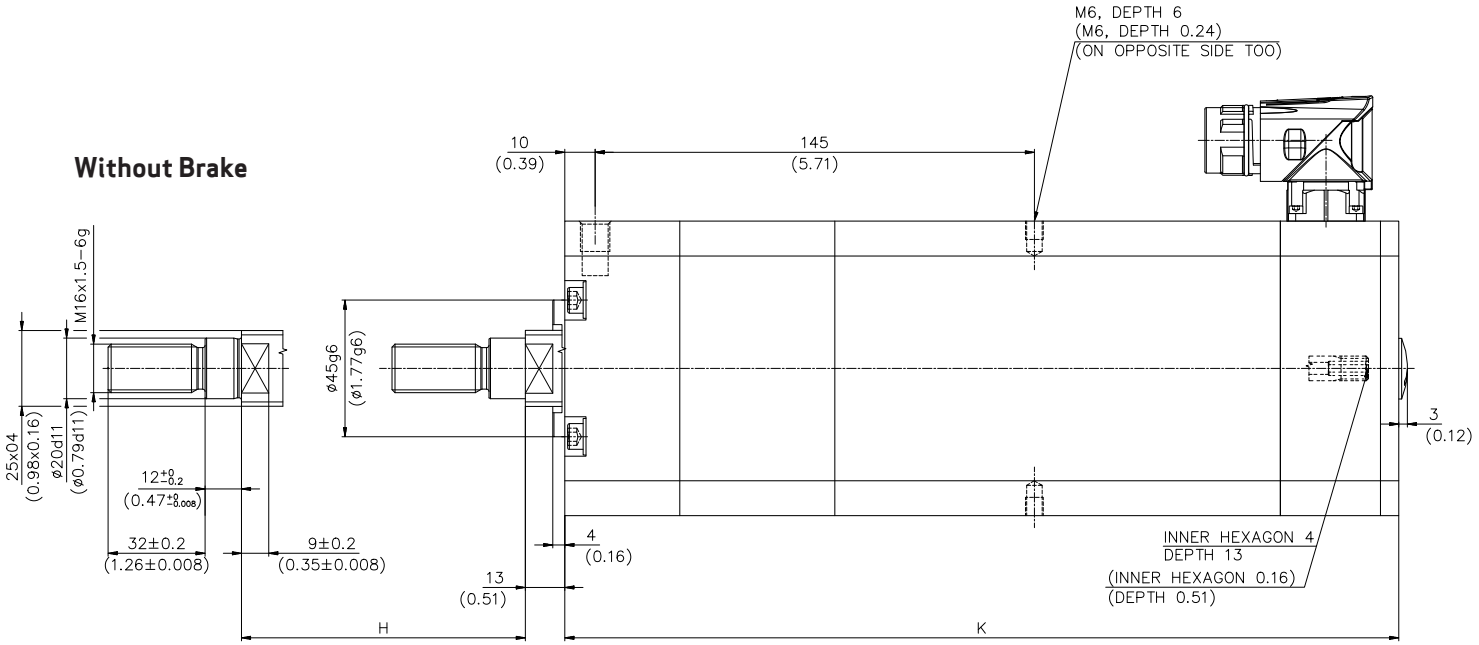
MG50 Series

With brake



Dimensions in mm [inches]

Without Brake



Dimensions in mm [inches]

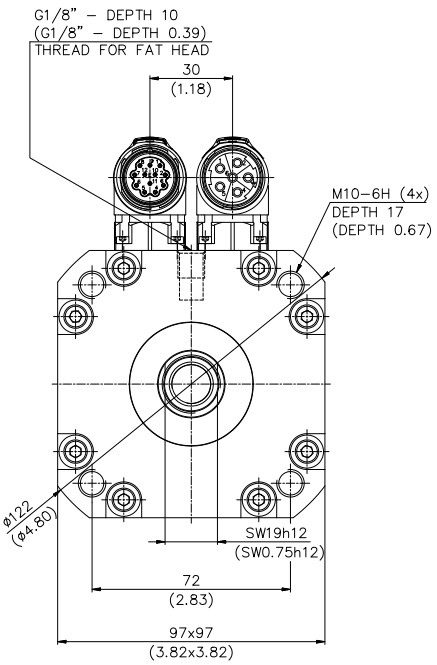
Dimensions

TYPE	H mm (in)	K mm (in)	K1 mm (in)
	Hub	without brake	with brake
MG504	130 (5.12)	275 (10.83)	338 (13.31)
MG506	175 (6.89)	320 (12.60)	383 (15.08)
MG508	220 (8.66)	365 (14.37)	428 (16.85)

Safety brake

MB	t1 max.	t2 max.	U1 DC	nmax.	J	m
Nm (lbf in)	ms	ms	V	min-1	$kg.m^2.10^{-3}$	kg (lb)
6 (53.10)	65	60	24	7,500	0.1038	1.12 (2.47)

Note: The brake can withstand forces up to 8.45 kN (1,899.64 lbf), if higher forces are needed, please contact Moog.



Dimensions in mm [inches]

NOTES

MG63 Series

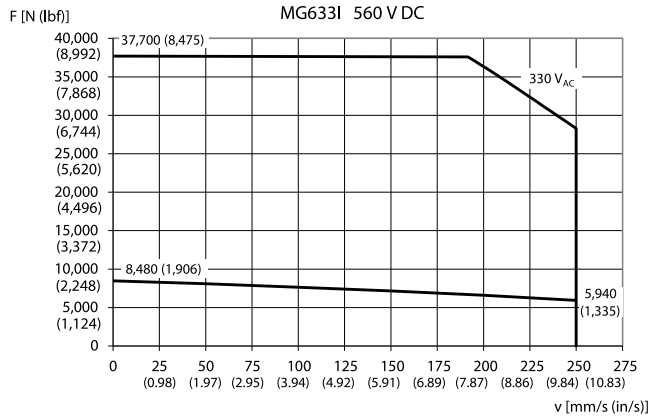
Parameters

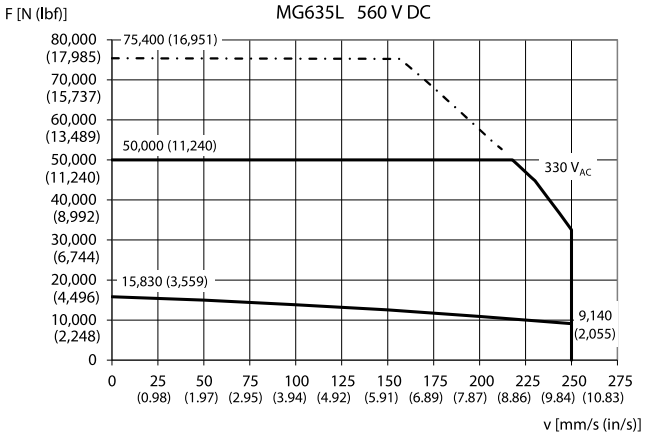
SERVOACTUATOR TYPE				MG633I	MG635L	MG638L
	DC BUS VOLTAGE	U_{DC}	V	560	560	560
S	STALL VALUES					
	Stalll torque	M_0	Nm (lbf in)	9.00 (79.7)	16.8 (148.7)	27.8 (246.1)
	Stall force	F_0	N (lbf)	8,480 (1,906)	15,830 (3,559)	26,200 (5,890)
	Stall current	I_0	A	6.78	9.87	16.3
	Torque constant	k_M	Nm/A	1.49	1.98	1.98
	Force constant	k_F	N/A	1,420	1,800	1,800
N	RATED VALUES					
	Rated voltage	U_N	V	181	223	219
	Rated torque	M_N	Nm (lbf in)	7.00 (62.0)	11.6 (102.7)	17.2 (152.2)
	Rated force	F_N	N (lbf)	6,600 (1,484)	10,930 (2,457)	16,210 (3,644)
	Rated current	I_N	A	5.38	6.98	10.4
	Rated rotational speed	n_N	min^{-1}	2,000	2,000	2,000
	Rated linear speed	v_N	mm/s (in/s)	200 (7.87)	200 (7.87)	200 (7.87)
	Rated power output	P_N	W	1,320	2,190	3,240
	Voltage constant	K_E	Vmin/1000	90	120	120
	Voltage constant	k_e	Vs/rad	0.860	1.14	1.14
U	OVERLOADING CAPACITY AT RATED SPEED					
	Maximum force overload at rated speed	F_U	N (lbf)	36,350 (8,171)	50,000(11,240)	50,000(11,240)
	Maximum overload ratio at rated speed	F_U/F_N	-	7.14	4.57	3.08
Max	MAXIMUM VALUES					
	Maximum stall force	F_{max}	N (lbf)	37,700 (8,475)	50,000 (11,240)	50,000 (11,240)
	Maximum current	I_{max}	A	35.6	32.7	31.5
	Maximum rotational speed	n_{mech}	min^{-1}	2,500	2,500	2,500
	Maximum linear speed	v_{mech}	mm/s (in/s)	250 (9.84)	250 (9.84)	250 (9.84)
C	LIMIT POINT					
	Limit point current	I_C	A	35.6	32.7	31.5
	Breakdown force	F_C	N (lbf)	37,590 (8,450)	50,000 (11,240)	50,000 (11,240)
	Limit point linear speed	v_C	mm/s (in/s)	192 (7.56)	218 (8.58)	250 (9.84)
Nutz	MAX. UTILIZABLE PARAMETERS FOR S1					
	Max. utilizable linear speed	v_{nutz}	mm/s (in/s)	250 (9.84)	250 (9.84)	250 (9.84)
	Max. utilizable force	F_{nutz}	N (lbf)	5,940 (1,335)	9,140 (2,055)	12,100 (2,720)
	Max. utilizable power output	P_{nutz}	W	1,490	2,290	3,020
0	NO-LOAD (I and F = 0)					
	No-load max. rotational speed	n_0	min^{-1}	3,630	2,850	2,850
	No-load max. linear speed	v_0	mm/s (in/s)	363 (14.29)	285 (11.22)	285 (11.22)
	TECHNICAL FEATURES					
	Number of poles	2p	-	12	12	12
	Winding resistance	R_{U-V}	Ω	1.76	1.05	0.501
	Winding inductance	L_{U-V}	mH	5.4	4.2	2.3
	Moment of inertia	J	$kgm^2/1000$	4.26	5.22	6.68
	Mass	m	kg (lb)	18.8 (41.4)	22.8 (50.3)	28.8 (63.5)
	Ball screw lead	s	mm (in)	6 (0.24)	6 (0.24)	6 (0.24)
	Stroke	h	mm (in)	95 (3.74)	145 (5.71)	220 (8.66)
	MECHANICAL VALUES					
	Static friction torque	M_r	Nm (inf in)	0.22 (1.95)	0.30 (2.66)	0.42 (3.72)
	Damping constant	k_D	$Nm.min.10^{-5}$	5.8	12	20
	Mechanical time constant	T_m	ms	5.1	2.1	1.3
	THERMAL VALUES					
	Thermal resistance (winding to ambient)	$R_{th(RU)}$	K/W	0.6	0.48	0.37
	Thermal resistance (frame to ambient)	$R_{th(GU)}$	K/W	0.43	0.34	0.26
	Thermal time constant	T_{th}	min	54.0	58.0	64.0

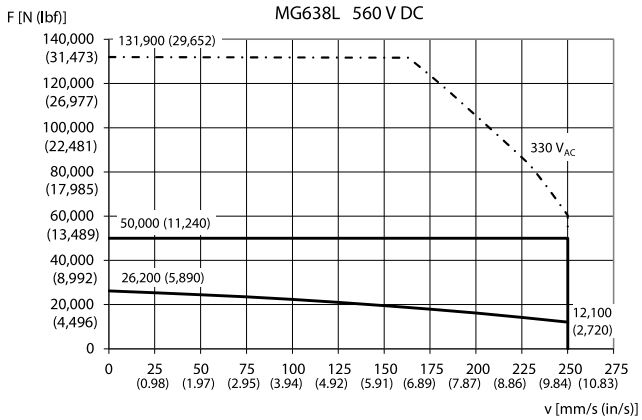
The above parameters apply if the servoactuator is connected to a flange 300 x 300 x 12 mm (11.81 x 11.81 x 0.47 in) which acts as an additional cooling area.

MG63 Series

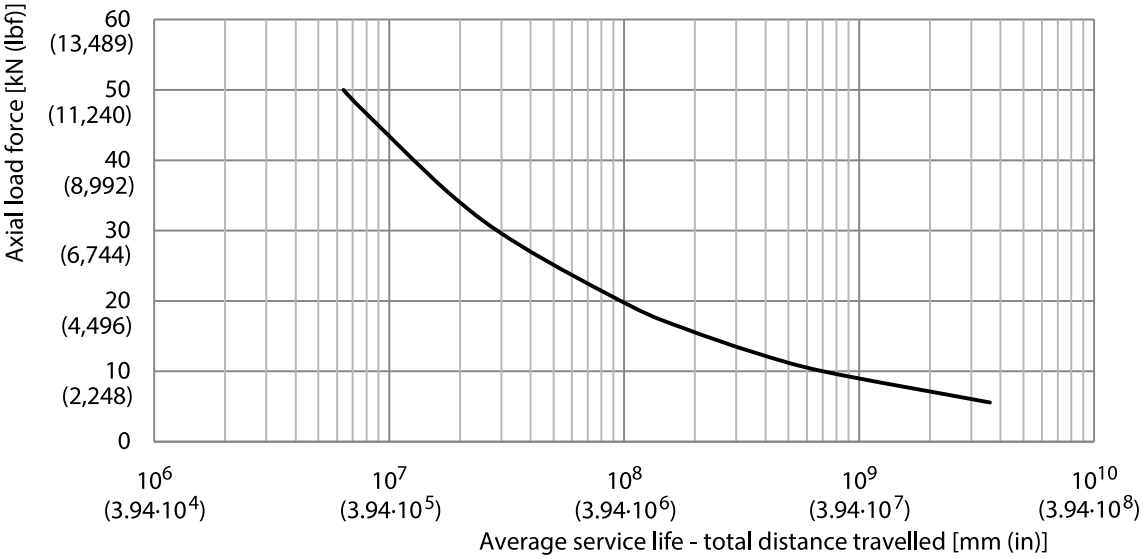
Technical specifications







MG63 Average Service Life

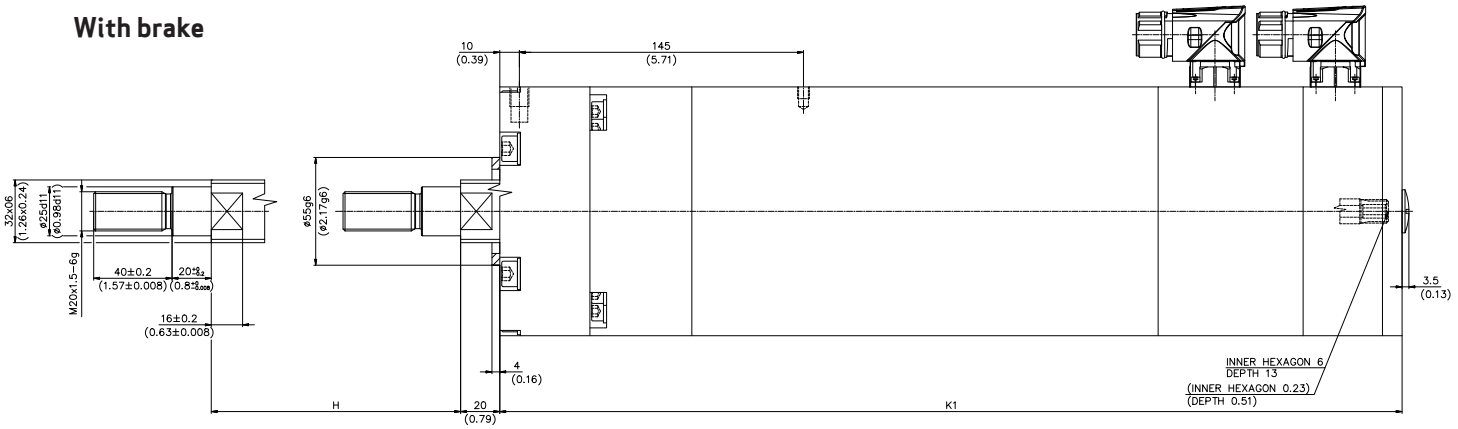


Please note that the above average service life graph only applies when the following conditions are met:

- Maximum load force of 50 kN (11,240.45 lbf) at zero speed is not exceeded.
- No ball screw radial load occurs.
- Force is applied evenly among the whole stroke.
- Prescribed grease quantity and quality requirements are met during the whole service life.
- The servoactuator is not used in a high frequency application.
- The servoactuator is not shock loaded.

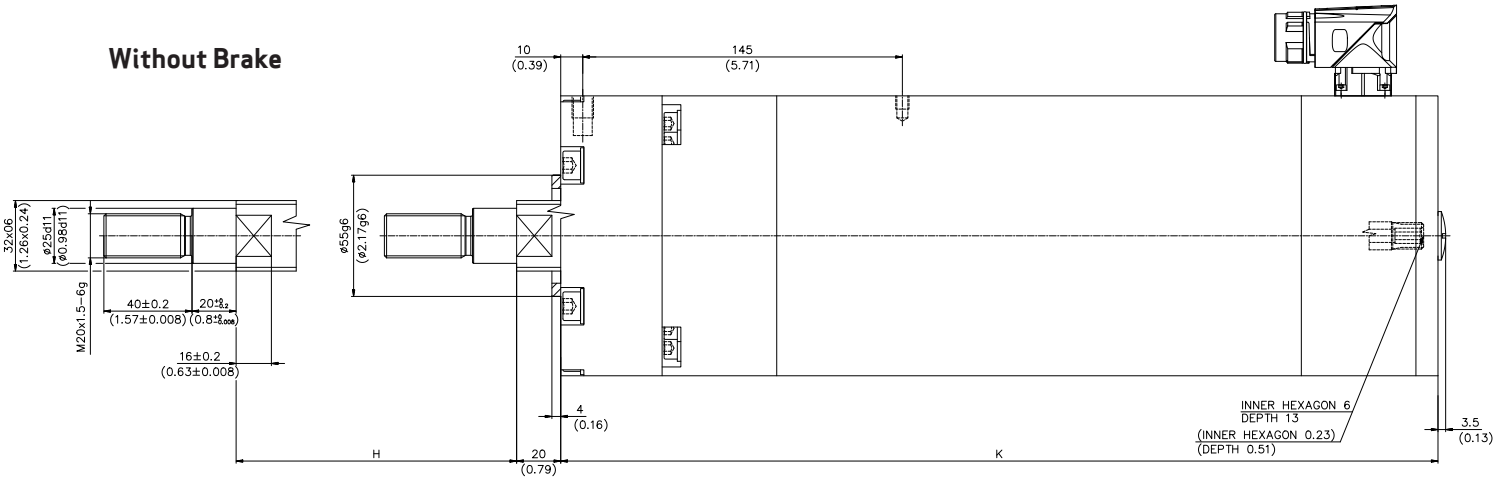
MG63 Series

With brake



Dimensions in mm [inches]

Without Brake



Dimensions in mm [inches]

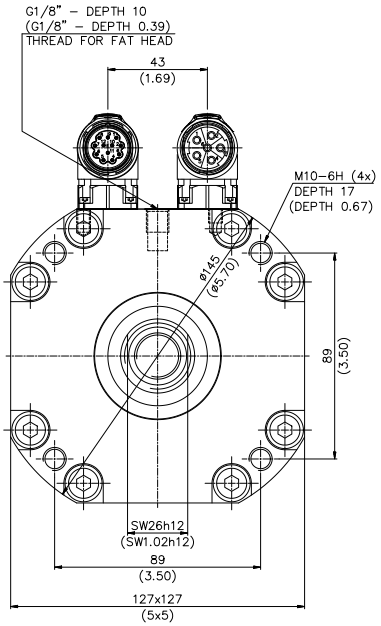
Dimensions

TYPE	H mm (in)	K mm (in)	K1 mm (in)
	hub	without brake	with brake
MG633	95 (3.74)	273 (10.75)	336 (13.23)
MG635	145 (5.71)	323 (12.72)	386 (15.20)
MG638	220 (8.66)	398 (15.67)	461 (18.15)

Safety brake

MB	t1 max.	t2 max.	U1 DC	nmax.	J	m
Nm (lbf in)	ms	ms	V	min-1	$kg.m^2.10^{-3}$	kg (lb)
6 (53.10)	65	60	24	7500	0.1038	1,12 (2.47)

Note: The brake can withstand forces up to 5.65 kN (1,270.17 lbf), if higher forces are needed, please contact Moog.



Dimensions in mm [inches]

NOTES

MG90 Series

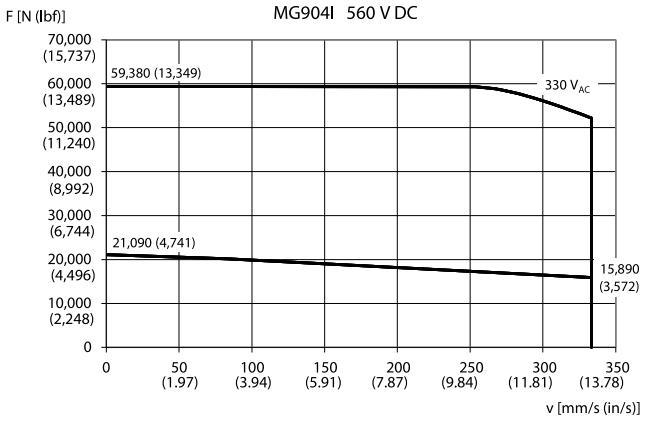
Parameters

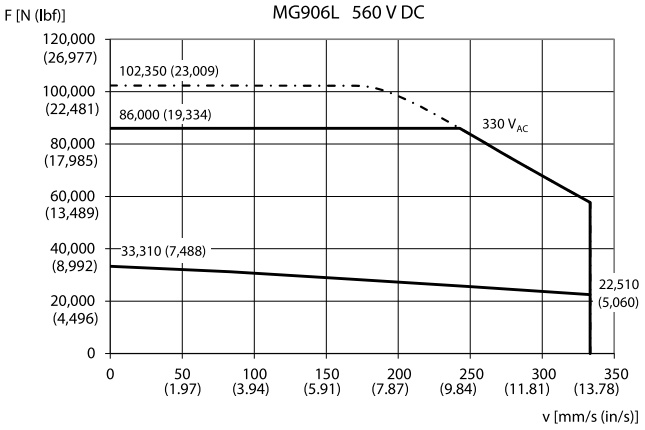
SERVOACTUATOR TYPE				MG904I	MG906L	MG908N
	DC BUS VOLTAGE	U_{DC}	V	560	560	560
S	STALL VALUES					
	Stalll torque	M_0	Nm (lbf in)	37.3 (330.1)	58.9 (521.3)	70.3 (622.2)
	Stall force	F_0	N (lbf)	21,090 (4,741)	33,310 (7,488)	39,750 (8,936)
	Stall current	I_0	A	29.1	32.8	32.2
	Torque constant	k_M	Nm/A	1.49	1.98	2.48
	Force constant	k_F	N/A	829	1,150	1,400
N	RATED VALUES					
	Rated voltage	U_N	V	141	189	226
	Rated torque	M_N	Nm (lbf in)	30.6 (270.8)	45.2 (400.1)	52.6 (465.5)
	Rated force	F_N	N (lbf)	17,300 (3,889)	25,560 (5,746)	29,740 (6,686)
	Rated current	I_N	A	23.9	25.2	24.1
	Rated rotational speed	n_N	min^{-1}	1,500	1,500	1,500
	Rated linear speed	v_N	mm/s (in/s)	250 (9.84)	250 (9.84)	250 (9.84)
	Rated power output	P_N	W	4,330	6,390	7,440
	Voltage constant	K_E	Vmin/1000	90	120	150
	Voltage constant	k_e	Vs/rad	0.860	1.14	1.43
U	OVERLOADING CAPACITY AT RATED SPEED					
	Maximum force overload at rated speed	F_U	N (lbf)	59,320 (13,335)	83,730 (18,823)	83,900 (18,861)
	Maximum overload ratio at rated speed	F_U/F_N	-	3.43	3.28	2.82
Max	MAXIMUM VALUES					
	Maximum stall force	F_{max}	N (lbf)	59,380 (13,349)	86,000 (19,334)	86,000 (19,334)
	Maximum current	I_{max}	A	120	96.4	74.1
	Maximum rotational speed	n_{mech}	min^{-1}	2,000	2,000	2,000
	Maximum linear speed	v_{mech}	mm/s (in/s)	333 (13.11)	333 (13.11)	333 (13.11)
C	LIMIT POINT					
	Limit point current	I_C	A	120	96.4	74.1
	Breakdown force	F_C	N (lbf)	59,320 (13,335)	86,000 (19,334)	86,000 (19,334)
	Limit point linear speed	v_C	mm/s (in/s)	249 (9.80)	243 (9.57)	246 (9.69)
Nutz	MAX. UTILIZABLE PARAMETERS FOR S1					
	Max. utilizable linear speed	v_{nutz}	mm/s (in/s)	333 (13.11)	333 (13.11)	333 (13.11)
	Max. utilizable force	F_{nutz}	N (lbf)	15,890 (3,572)	22,510 (5,060)	25,790 (5,798)
	Max. utilizable power output	P_{nutz}	W	5,300	7,500	8,600
0	NO-LOAD (I and F = 0)					
	No-load max. rotational speed	n_0	min^{-1}	3,720	2,680	2,210
	No-load max. linear speed	v_0	mm/s (in/s)	620 (24.41)	447 (17.60)	368 (14.49)
	TECHNICAL FEATURES					
	Number of poles	2p	-	6	6	6
	Winding resistance	R_{U-V}	Ω	0.232	0.216	0.241
	Winding inductance	L_{U-V}	mH	5.2	6.1	7.1
	Moment of inertia	J	$kgm^2/1000$	18.8	22.2	24.4
	Mass	m	kg (lb)	69 (152.12)	83 (182.98)	92 (202.83)
	Ball screw lead	s	mm (in)	10 (0.39)	10 (0.39)	10 (0.39)
	Stroke	h	mm (in)	300 (11.81)	375 (14.76)	425 (16.73)
	MECHANICAL VALUES					
	Static friction torque	M_r	Nm (lbf in)	0.79 (6.99)	0.91 (8.05)	0.99 (8.76)
	Damping constant	k_D	$Nm.min.10^{-5}$	7.10	11.0	14.0
	Mechanical time constant	T_m	ms	3.9	2.3	1.8
	THERMAL VALUES					
	Thermal resistance (winding to ambient)	$R_{th(RU)}$	K/W	0.25	0.21	0.19
	Thermal resistance (frame to ambient)	$R_{th(GU)}$	K/W	0.18	0.15	0.14
	Thermal time constant	T_{th}	min	85.0	76.0	79.0

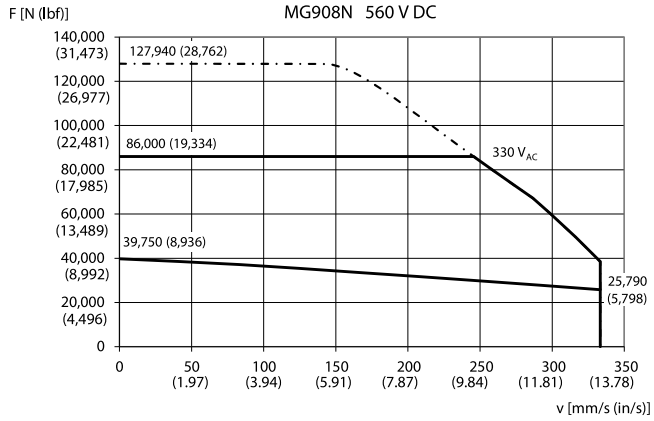
The above parameters apply if the servoactuator is connected to a flange 475 x 475 x 20 mm (18.70 x 18.70 x 0.79 in) which acts as an additional cooling area.

MG90 Series

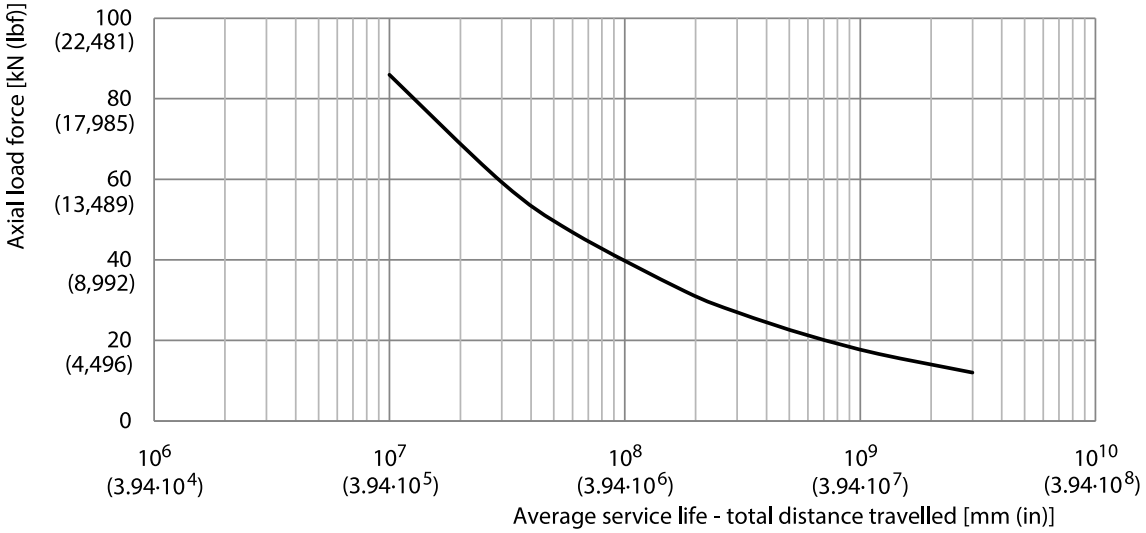
Technical specifications







MG90 Average Service Life

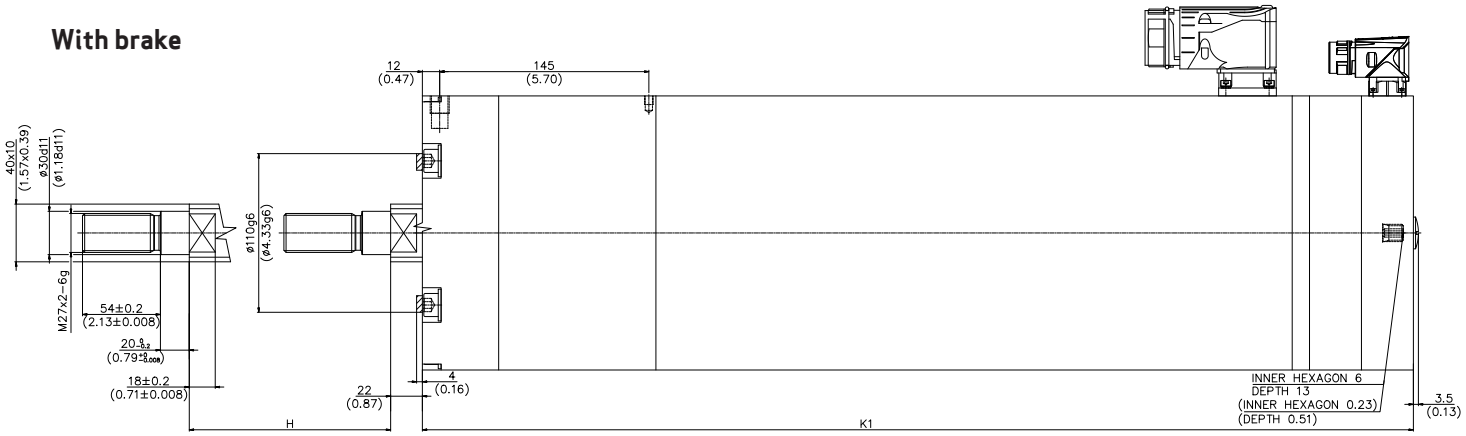


Please note that the above average service life graph only applies when the following conditions are met:

- Maximum load force of 86 kN (19,333.57 lbf) at zero speed is not exceeded.
- No ball screw radial load occurs.
- Force is applied evenly among the whole stroke.
- Prescribed grease quantity and quality requirements are met during the whole service life.
- The servoactuator is not used in a high frequency application.
- The servoactuator is not shock loaded.

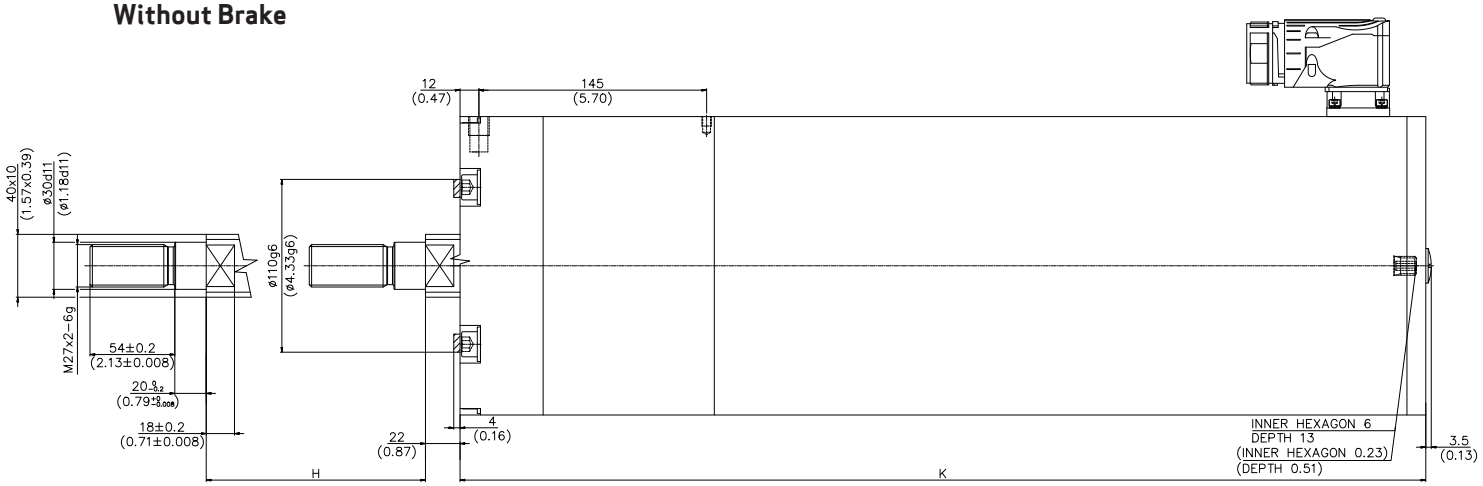
MG90 Series

With brake



Dimensions in mm [inches]

Without Brake



Dimensions in mm [inches]

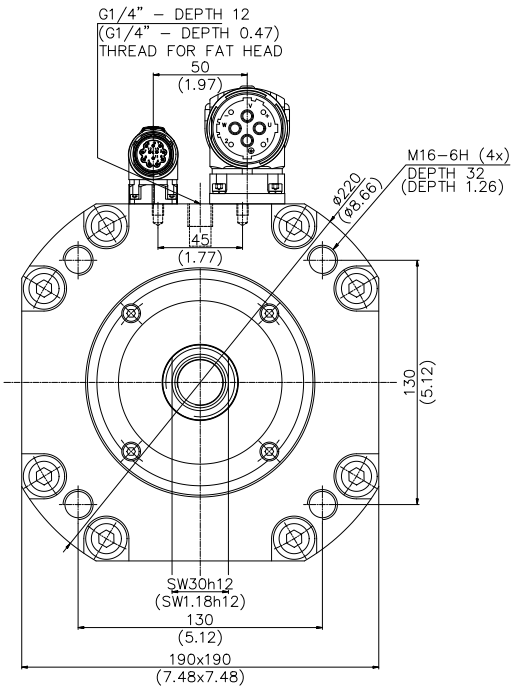
Dimensions

TYPE	H mm (in)	K mm (in)	K1 mm (in)
	hub	without brake	with brake
MG904	300 (11.81)	490 (19.29)	562 (22.13)
MG906	375 (14.76)	565 (22.24)	637 (25.08)
MG908	425 (16.73)	615 (24.21)	687 (27.05)

Safety brake

MB	t1 max.	t2 max.	U1 DC	nmax.	J	m
Nm (lbf in)	ms	ms	V	min-1	$kg.m^2.10^{-3}$	kg (lb)
20 (177.01)	80	80	24	6500	0,4838	2.74 (6.04)

Note: The brake can withstand forces up to 11.3 kN (2,540.34 lbf), if higher forces are needed, please contact Moog.



Dimensions in mm [inches]

NOTES

MG100 Series

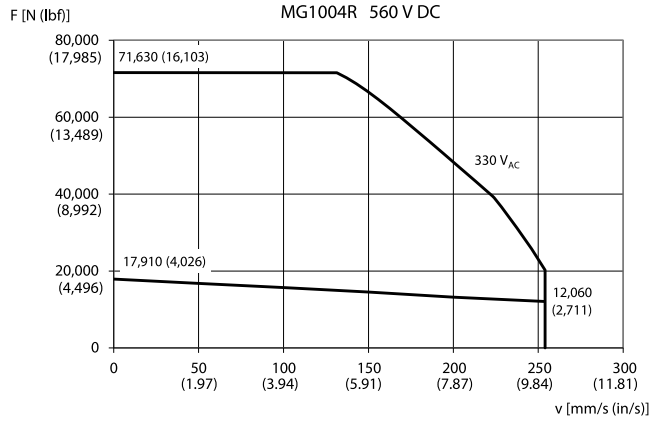
Parameters

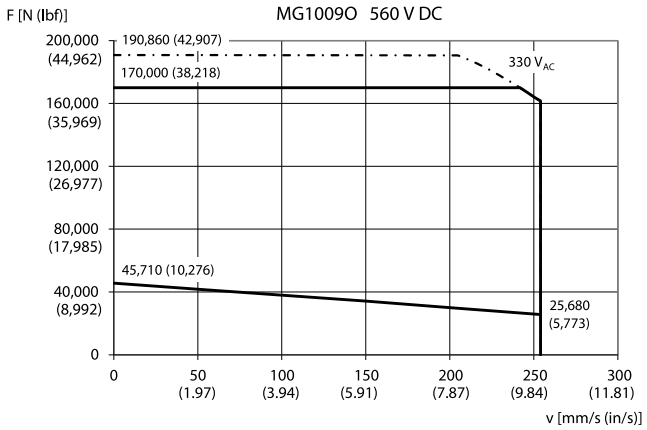
SERVOACTUATOR TYPE				MG1004R	MG1009O
	DC BUS VOLTAGE	**U_{DC}**	**V**	**560**	**560**
S	**STALL VALUES**				
	Stalll torque	M_0	Nm (lbf in)	38.0 (336.3)	97.0 (858.5)
	Stall force	F_0	N (lbf)	17,910 (4,026)	45,710 (10,276)
	Stall current	I_0	A	11.2	38.5
	Torque constant	k_M	Nm/A	4.13	2.98
	Force constant	k_F	N/A	1,870	1,390
N	**RATED VALUES**				
	Rated voltage	U_N	V	235	166
	Rated torque	M_N	Nm (lbf in)	28.0 (247.8)	63.9 (565.6)
	Rated force	F_N	N (lbf)	13,190 (2,965)	30,110 (6,769)
	Rated current	I_N	A	8.40	25.7
	Rated rotational speed	n_N	min^{-1}	1,000	1,000
	Rated linear speed	v_N	mm/s (in/s)	200 (7.87)	200 (7.87)
	Rated power output	P_N	W	2,640	6,020
	Voltage constant	K_E	Vmin/1000	250	180
	Voltage constant	k_e	Vs/rad	2.38	1.72
U	**OVERLOADING CAPACITY AT RATED SPEED**				
	Maximum force overload at rated speed	F_U	N (lbf)	48,330 (10,865)	170,000 (38,218)
	Maximum overload ratio at rated speed	F_U/F_N	-	3.66	5.65
Max	**MAXIMUM VALUES**				
	Maximum stall force	F_{max}	N (lbf)	71,630 (16,102)	170,000 (38,216)
	Maximum current	I_{max}	A	57.5	167
	Maximum rotational speed	n_{mech}	min^{-1}	1,270	1,270
	Maximum linear speed	v_{mech}	mm/s (in/s)	254 (10.00)	254 (10.00)
C	**LIMIT POINT**				
	Limit point current	I_C	A	57.5	167
	Breakdown force	F_C	N (lbf)	71,570 (16,089)	170,000 (38,218)
	Limit point linear speed	v_C	mm/s (in/s)	131 (5.16)	242 (9.53)
Nutz	**MAX. UTILIZABLE PARAMETERS FOR S1**				
	Max. utilizable linear speed	v_{nutz}	mm/s (in/s)	254 (10.00)	254 (10.00)
	Max. utilizable force	F_{nutz}	N (lbf)	12,060 (2,711)	25,680 (5,773)
	Max. utilizable power output	P_{nutz}	W	3,060	6,520
0	**NO-LOAD (I and F = 0)**				
	No-load max. rotational speed	n_0	min^{-1}	1,370	1,840
	No-load max. linear speed	v_0	mm/s (in/s)	274 (10.79)	368 (14.49)
TECHNICAL FEATURES					
	Number of poles	2p	-	12	12
	Winding resistance	R_{U-V}	Ω	1.30	0.192
	Winding inductance	L_{U-V}	mH	9.6	1.9
	Moment of inertia	J	$kgm^2/1000$	132	152
	Mass	m	kg (lb)	124 (273.37)	150 (330.69)
	Ball screw lead	s	mm (in)	12 (0.47)	12 (0.47)
	Stroke	h	mm (in)	260 (10.24)	385 (15.16)
	MECHANICAL VALUES				
	Static friction torque	M_r	Nm (ibf in)	1.60 (14.16)	2.00 (17.70)
	Damping constant	k_D	$Nm.min.10^{-5}$	18	50
	Mechanical time constant	T_m	ms	15.0	4.9
	THERMAL VALUES				
	Thermal resistance (winding to ambient)	$R_{th(RU)}$	K/W	0.28	0.16
	Thermal resistance (frame to ambient)	$R_{th(GU)}$	K/W	0.20	0.12
	Thermal time constant	T_{th}	min	72.0	72.0

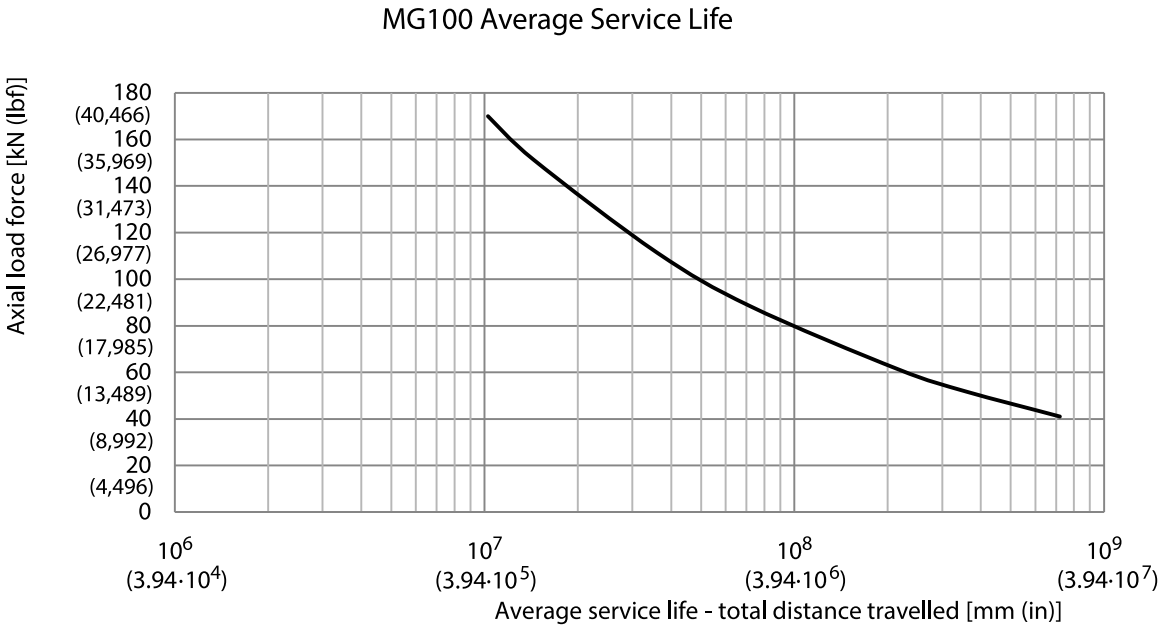
The above parameters apply if the servoactuator is connected to a flange 475 x 475 x 20 mm (18.70 x 18.70 x 0.79 in) which acts as an additional cooling area.

MG100 Series

Technical specifications





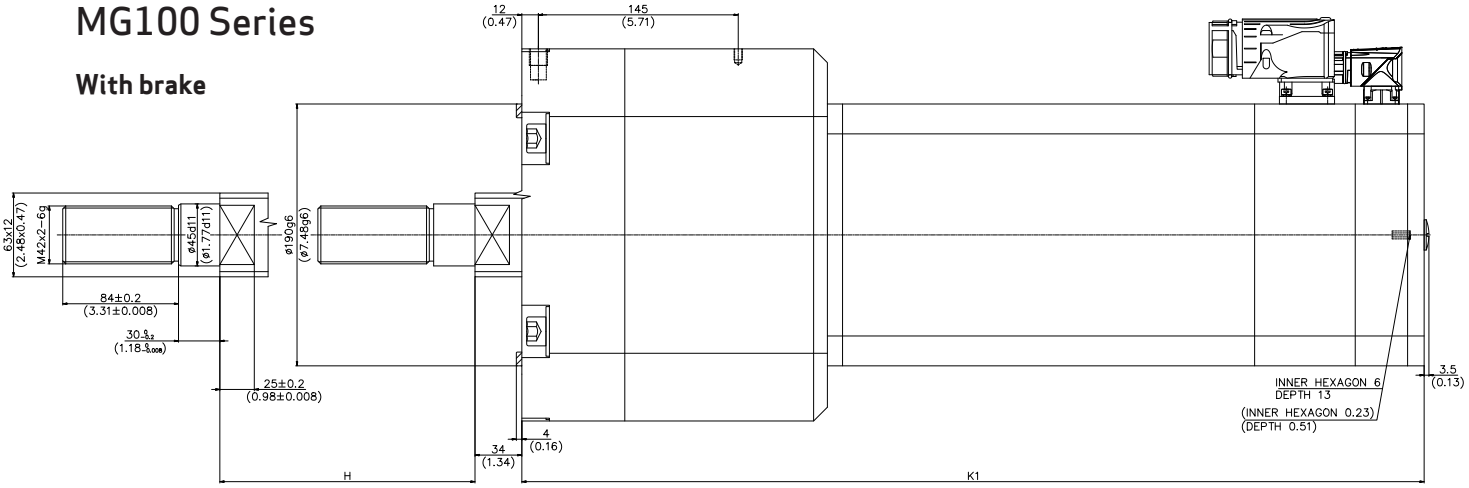


Please note that the above average service life graph only applies when the following conditions are met:

- Maximum load force of 170 kN (38,217.52 lbf) at zero speed is not exceeded.
- No ball screw radial load occurs.
- Force is applied evenly among the whole stroke.
- Prescribed grease quantity and quality requirements are met during the whole service life.
- The servoactuator is not used in a high frequency application.
- The servoactuator is not shock loaded.

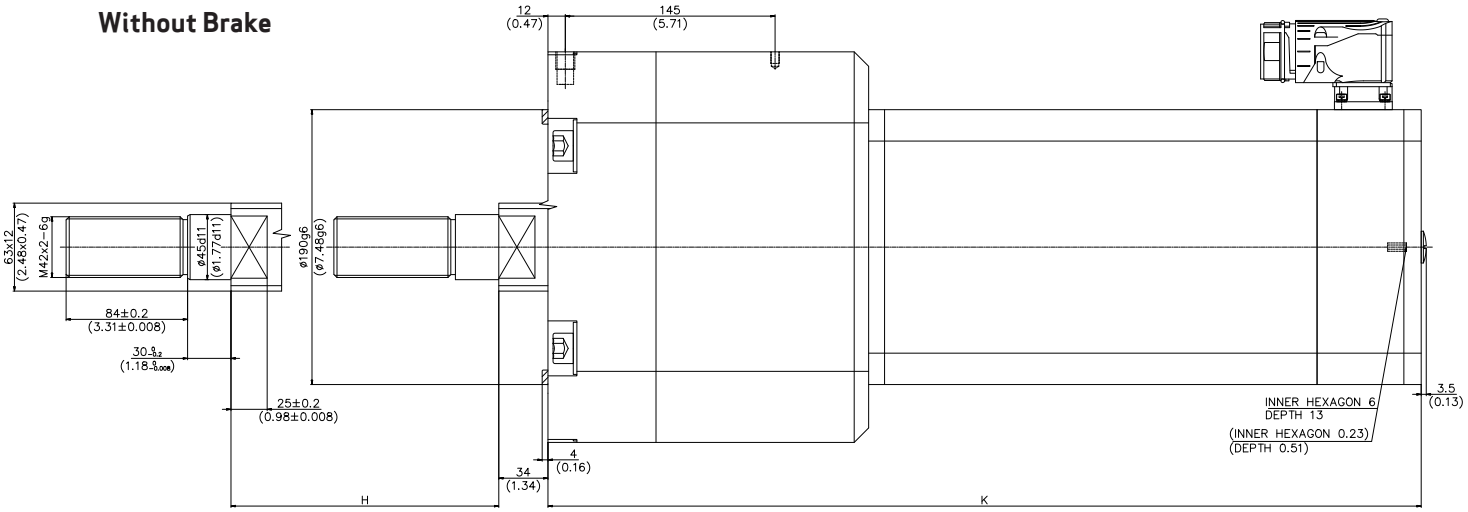
MG100 Series

With brake



Dimensions in mm [inches]

Without Brake



Dimensions in mm [inches]

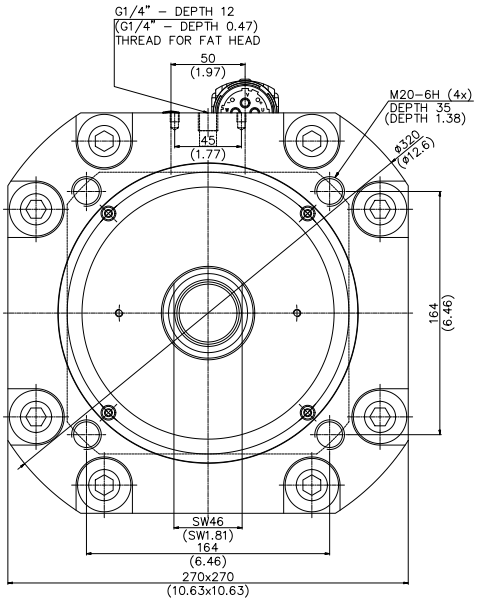
Dimensions

TYPE	H mm (in)	K mm (in)	K1 mm (in)
	hub	without brake	with brake
MG1004	260 (10.24)	480 (18.90)	530 (20.87)
MG1009	385 (15.16)	605 (23.82)	655 (25.79)

Safety brake

MB	t1 max.	t2 max.	U1 DC	nmax.	J	m
Nm (lbf in)	ms	ms	V	min-1	$kg.m^2.10^{-3}$	kg (lb)
20 (177.01)	80	80	24	6500	0,4838	2.74 (6.04)

Note: The brake can withstand forces up to 9.4 kN (2,113.20 lbf), if higher forces are needed, please contact Moog.



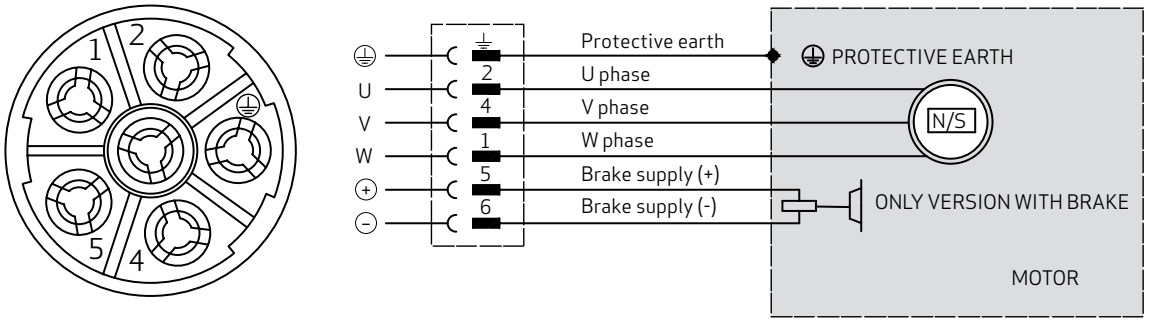
Dimensions in mm [inches]

NOTES

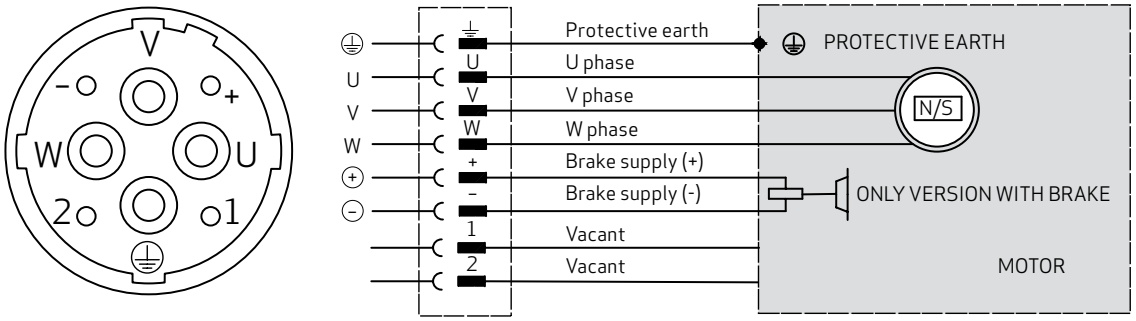
WIRING DIAGRAMS

Power Connector

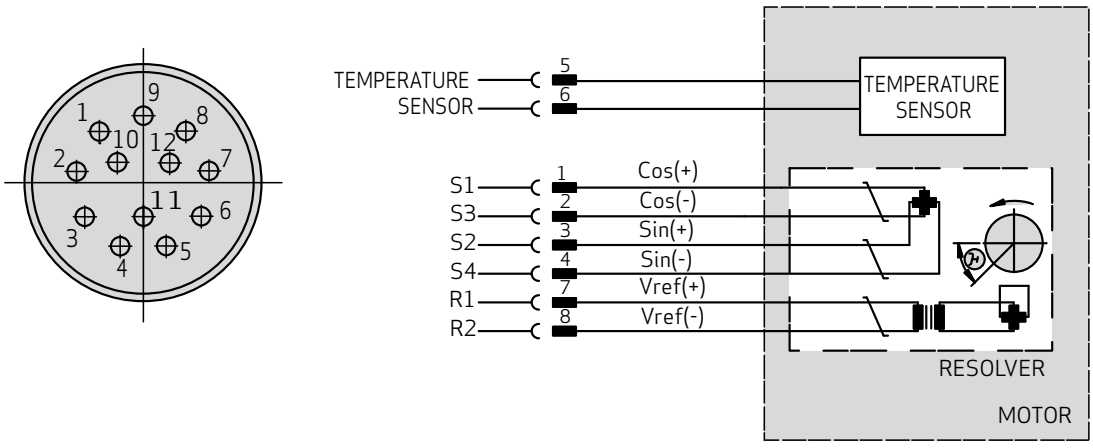
Power Connector Size 1



Power Connector Size 1.5



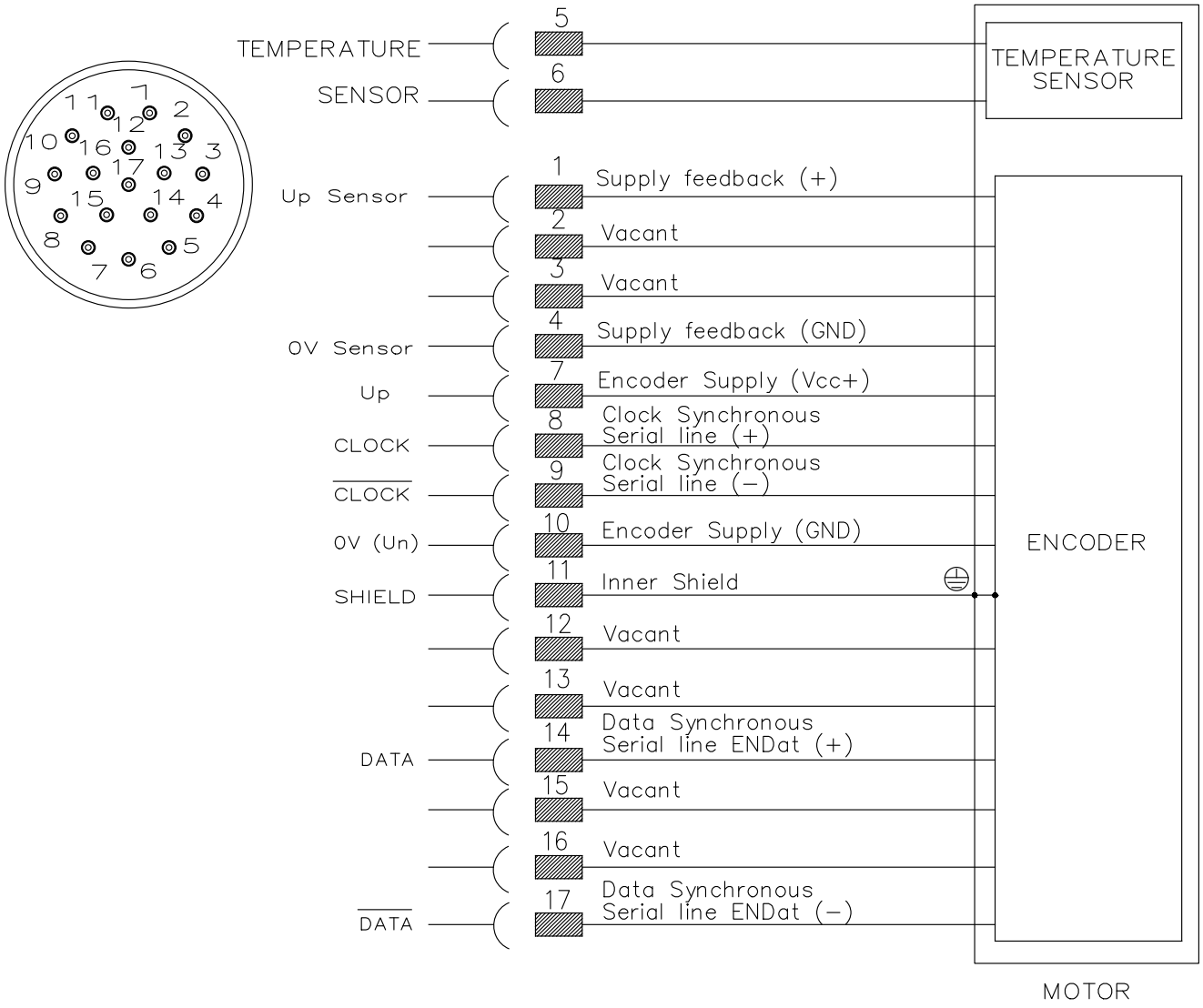
Signal Resolver Connector



WIRING DIAGRAMS

Encoder Connectors

Heidenhain Absolute Single turn/Multi turn



OTHER MOOG PRODUCT OFFERING

SERVO DRIVES AND ELECTRONICS

Moog servo drives and electronic products can deliver the highest level of control accuracy, dynamic performance and reliability in both centralized and decentralized configurations. Machine designers are allowed complete freedom to achieve their goals, with space savings and optimized layouts perfectly fitting both traditional cabinets and distributed control architectures.

CENTRALIZED SOLUTIONS

Moog drive portfolio for cabinet installation include both single axis and multi axis configurations.

Single-Axis Drives DS2020 Series - Ultra Compact Single-Axis Servo Drive

Standalone servo drive with integrated power supply, specifically designed with extremely compact dimensions for space saving.

Multi-Axis Drives DM2020 Series - Digital Multi-Axis Servo Drive

Modular design drive platform, single and double axis modules, with shared power supply. About 50% more compact than a comparable standalone configuration.

DECENTRALIZED SOLUTIONS

Out-of-cabinet products for flexible machine architecture.

DR2020 - Machine-Mounted Servo Drive

On-board servo control, for installation on machine surfaces and easy daisy-chain and o
ut of the cabinet connections.

SmartMotor™

Highly programmable, integrated servo motor systems with an encoder, an amplifier, a controller, RS-232/RS-485 communication, and IOs. Ideal for fast, high precision applications.

OTHER LINEAR MOTION PRODUCTS

Moog linear motion technology provides a vast array of electromechanical solutions for any kind of application, in a wide variety of sizes and torques. Our products can generate rotary-to-linear or direct linear motion, to better adapt to all customer needs.

Linear Motors

Moog's linear motors come in various configurations and offer dynamic, precise linear motion positioning for all kinds of industrial applications, from factory automation to testing, robotics, packaging and many others. Options include ironless motors, motors with air and liquid cooling, available in a large power range to fit all needs.

Screws

Thanks to over 30 years of experience in the manufacturing of ball, roller and inverted roller screws, Moog can provide products capable of delivering high torques and high precision movements while minimizing wear and tear and maintenance downtimes.

Sliding System Drives

Moog's highly compact and top-performing Sliding System Drives are the perfect fit for demanding applications. They deliver accurate position detection, smooth operation and easily programmable parameters for fine control, in an extremely small space.

NOTES

NOTES

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Moog covers an extensive range of motion control solutions and also provides service and support. Moog has offices around the world. For more information or the office nearest you, visit **www.moog.com/contact-us/moog-facilities**

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WHEN PERFORMANCE REALLY MATTERS

MOOG