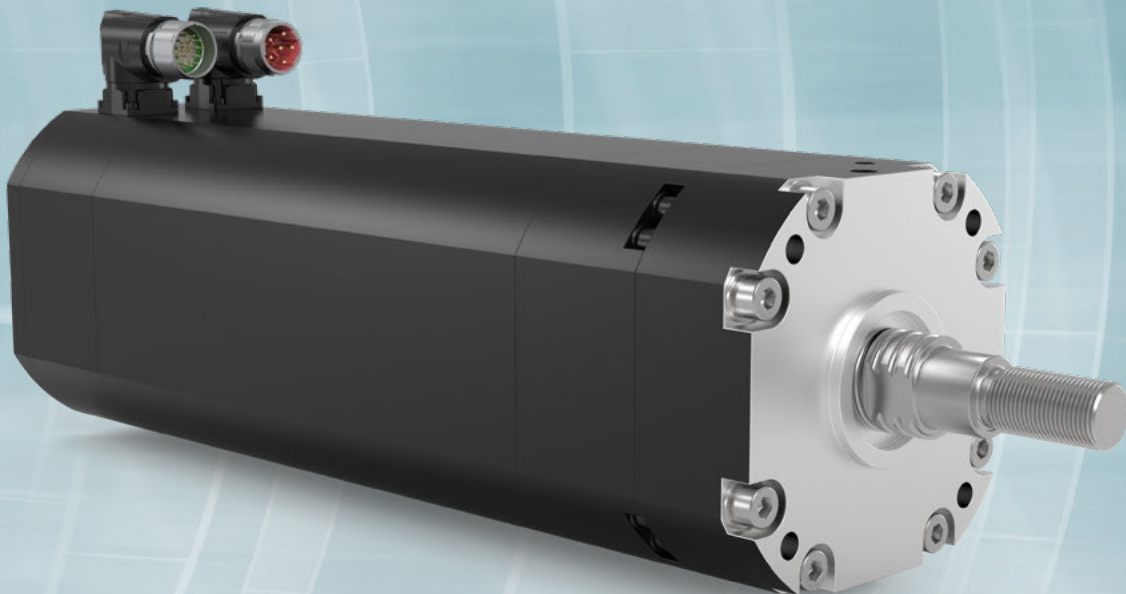


high power density
compact
modification

cyber[®] force actuator MG linear actuators





**Catalogs, CAD data and operating manuals can
be found in our download center at**

<https://cyber-motor.wittenstein.de/en-en/download/>



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GROUP



alpha

WITTENSTEIN alpha GmbH
High-precision servo drives and
linear systems



WITTENSTEIN alpha develops, produces and sells mechanical and mechatronic servo drive systems for sectors that require maximum precision. Our products continue to set new standards around the world.

We have divided our product portfolio into four segments in order to meet varying, application-specific requirements: While the Premium and Advanced segments focus on technology and performance, the Value and Basic segments place more emphasis on price and satisfying basic customer requirements.



cyber motor

WITTENSTEIN cyber motor GmbH
Highly dynamic servo motors and
drive electronics



WITTENSTEIN cyber motor develops, produces and sells technologically advanced servo motors with sophisticated drive electronics as well as complete mechatronic drive systems with maximum power density. Our particular expertise lies in specialized motors for ultra-high vacuums, radioactive environments and high temperatures.

We collaborate closely with our customers on individual projects. During the development process, we share knowledge, learn from one another and develop new ideas together. The resulting solutions help differentiate our customers from their competitors.



galaxie

WITTENSTEIN galaxie GmbH
Superior gearboxes and drive systems



WITTENSTEIN galaxie develops, produces and sells radically innovative gearboxes and drive systems, whose functional superiority is based on an entirely new operating principle. Our unique expertise makes us the global leader in rotary mechatronic drive technologies.

Our innovations enable our customers to implement their machines and systems with previously unattainable performance parameters. Moreover, our solutions allow products to be manufactured in an efficient way that conserves resources.



WITTENSTEIN motion control GmbH
Drive systems for the most extreme
environmental requirements



WITTENSTEIN motion control develops, produces and sells customized systems for critical environmental conditions using servo motors, gearboxes, electronics and software. Our development expertise and the high level of vertical integration of the components ensure that our technologies meet our customers' requirements.

We focus our innovative solutions on fields that rely on maximum performance, robustness and reliability: Real-time security software completes our product portfolio.



attocube systems
Nanoprecision drive and measurement
technology solutions



attocube develops, produces and sells drive and measurement technology for highly demanding nanotech applications. Its product range includes everything from nano drives and complete microscope systems to innovative sensor solutions, which far exceed current measurement technology in their precision, speed and compactness and can also be used under extreme conditions.

Years of experience and expertise in both the scientific and industrial market segments have yielded an inspiring product catalog boasting maximum precision and user-friendliness. This superior technology revolutionizes existing applications and guarantees lasting competitive advantages for our customers.



baramundi software GmbH
Secure management of the
IT infrastructure in offices and
production



baramundi provides companies and organizations worldwide with efficient, secure and cross-platform management of networked endpoints in IT and manufacturing. The Management Suite provides our customers with integrated, future-orientated unified endpoint management.

baramundi leads the way in regard to unified endpoint management in networked production environments. We develop this solution in close cooperation with the WITTENSTEIN Digitalization Center.

Structure of the AC linear servoactuators cyber[®] force actuator MG

Advantages

More than twice the force, same dimensions

The cyber[®] force actuator MG 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, WITTENSTEIN s.r.o. is delivering higher maximum overload forces while keeping the same compact dimensions. At party of size, the cyber[®] force actuator MG 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 cyber[®] force actuator MG 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 (32,800 ft) a.s.l. (pressure 90 kPa [13 psi])
- Thermal insulation class „F“, maximum temperature of the winding $\vartheta = 145$ °C (293 °F)
- IC410 (i.e. closed, with natural cooling of the servo-actuator 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 V_{DC}. Lower voltage variants are available upon request.)
- Standard insulation system allows:
du/dt = 5 kV/μs, U_{pp} = 1.5 kV
- Optional reinforced insulation system allows:
du/dt = 6.6 kV/μs, U_{pp} = 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 V_{DC}

Standard version

- 560 V_{DC} 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 V_{DC}
- 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

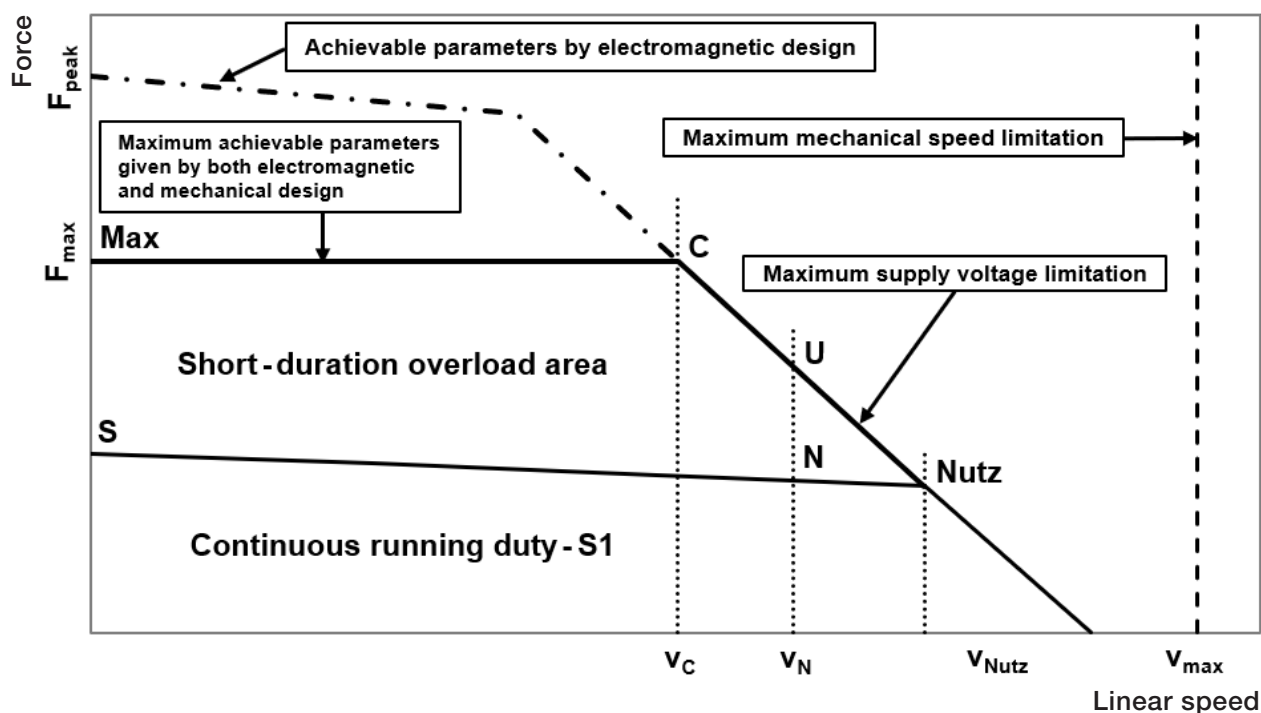
For any special requirements, such as different working conditions, overall design modifications, specific feedback sensor requests, etc., please contact WITTENSTEIN s.r.o. engineering services.

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 WITTENSTEIN s.r.o. 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 WITTENSTEIN s.r.o.

Force – Speed Characteristics of AC Servoactuators



cyber[®] force actuator MG Overview

Parameters

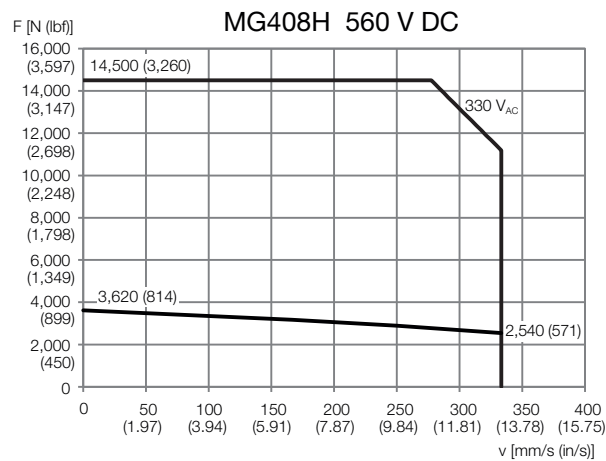
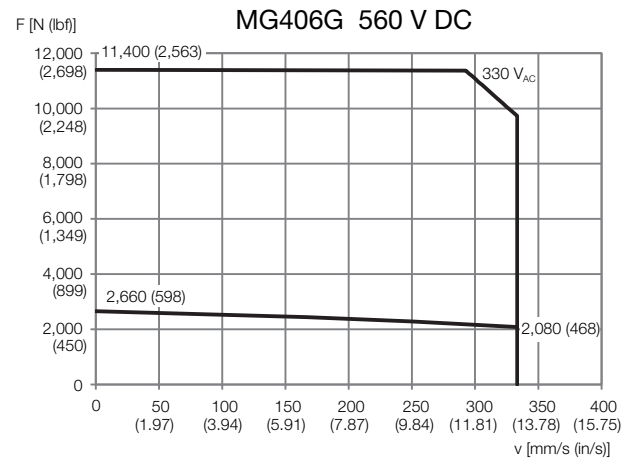
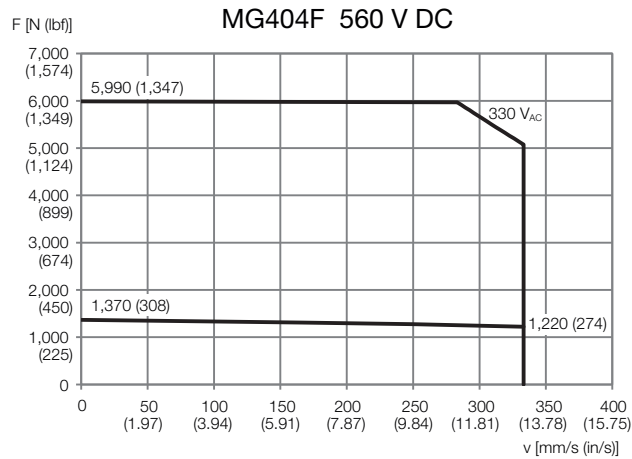
Series	Stall force [N] (lbf)	Maximum force [N] (lbf)	Max speed [mm/s] (in/sec)	Standard stroke [mm] (in)
cyber [®] force actuator MG 40	1,370 – 3,620 (308 – 814)	5,990 – 14,500 (1,347 – 3,260)	333 (13.11)	Up to 140 (5.51)
cyber [®] force actuator MG 50	6,290 – 12,400 (1,414 – 2,788)	28,560 – 34,000 (6,421 – 7,644)	213 (8.39)	Up to 220 (8.66)
cyber [®] force actuator MG 63	8,480 – 26,200 (1,906 – 5,890)	37,700 – 50,000 (8,475 – 11,240)	250 (9.84)	Up to 220 (8.66)
cyber [®] force actuator MG 90	21,090 – 39,750 (4,741 – 8,936)	59,320 – 83,900 (13,335 – 18,861)	333 (13.11)	Up to 425 (16.73)
cyber [®] force actuator MG 100	17,910 – 45,710 (4,026 – 10,276)	71,630 – 170,000 (16,102 – 38,216)	254 (10)	Up to 385 (15.16)

cyber[®] force actuator

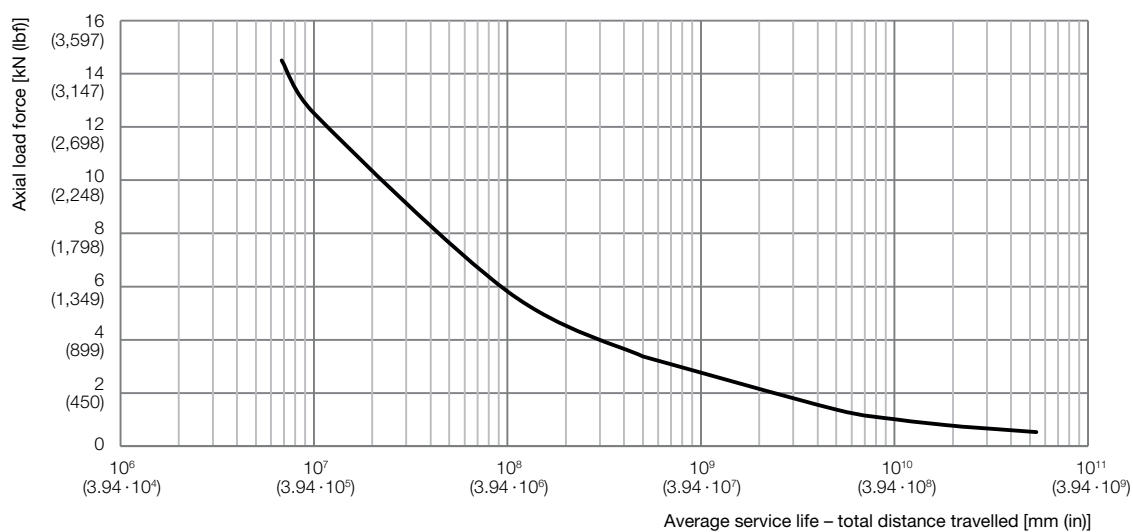
MG 40

Servoactuator type				MG404F	MG406G	MG408H
	DC Bus Voltage	U_{DC}	V	560	560	560
S	Stall values					
	Stall 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	$V_{min}/1000$	45	50	60
	Voltage constant	k_e	V_s/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
O	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_f	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.



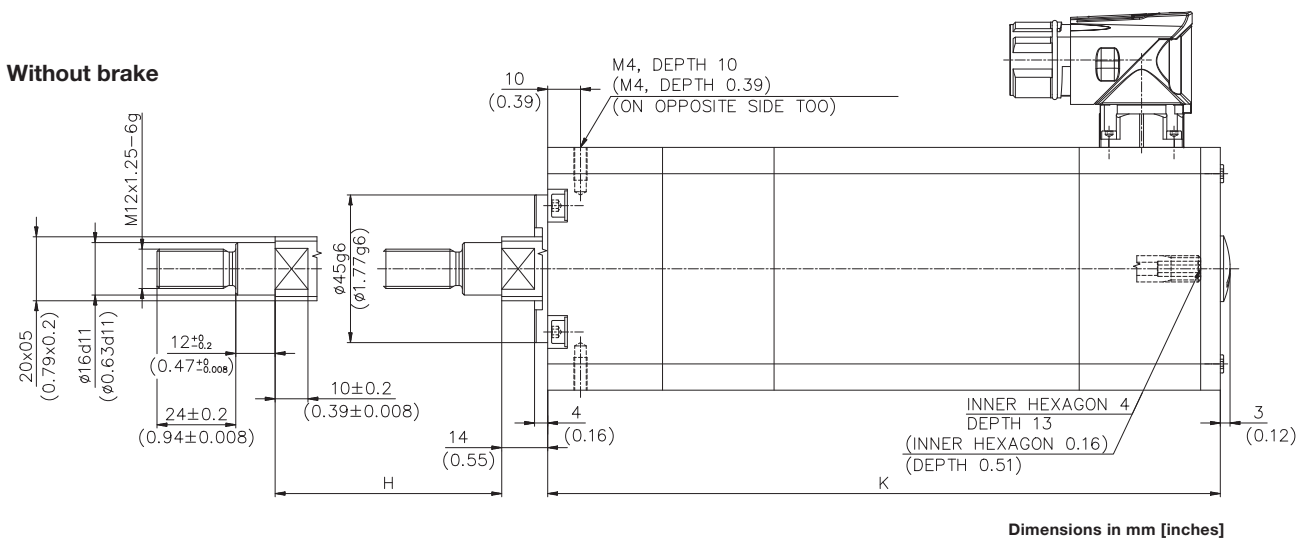
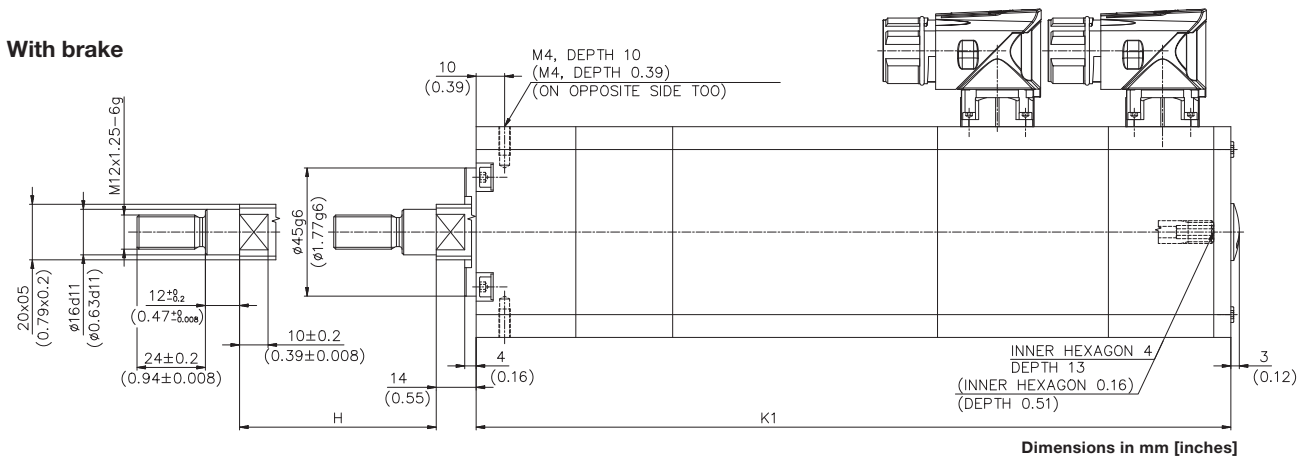
MG 40 Average Service Life



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.

cyber[®] force actuator
MG 40



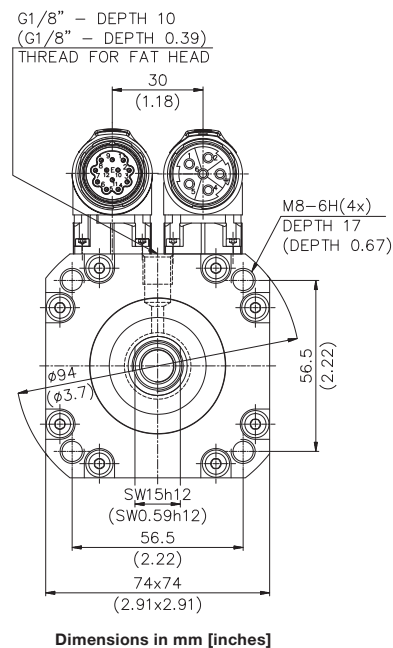
Dimensions

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)

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 WITTENSTEIN s.r.o.



Notes



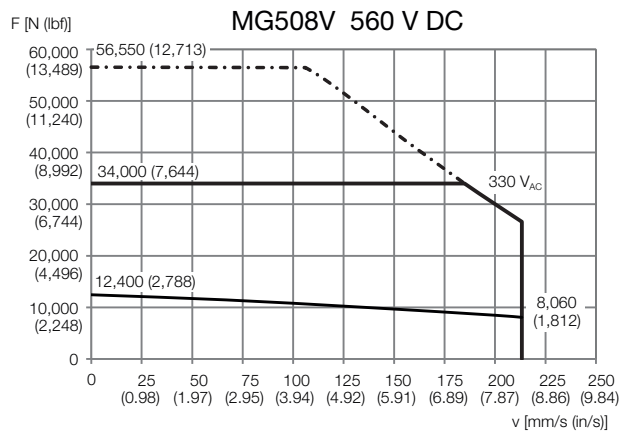
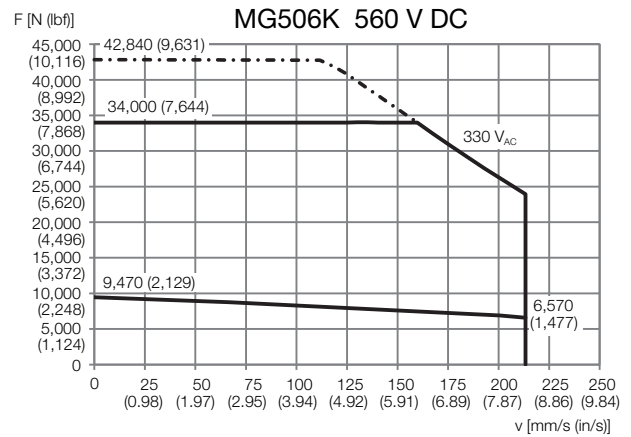
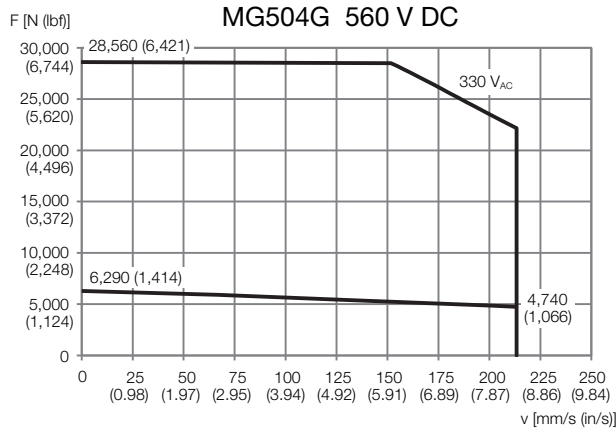
cyber motor

cyber[®] force actuator

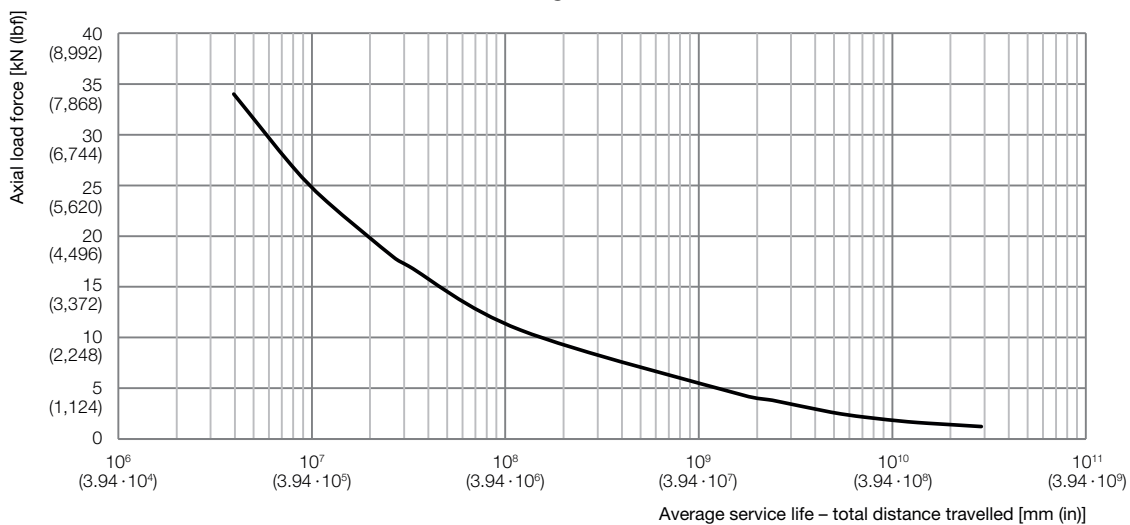
MG 50

Servoactuator type				MG504G	MG506K	MG508V
	DC Bus Voltage	U_{DC}	V	560	560	560
S	Stall values					
	Stall 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	$V_{min}/1000$	50	70	80
	Voltage constant	k_e	V_s/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
O	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_f	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.



MG 50 Average Service Life

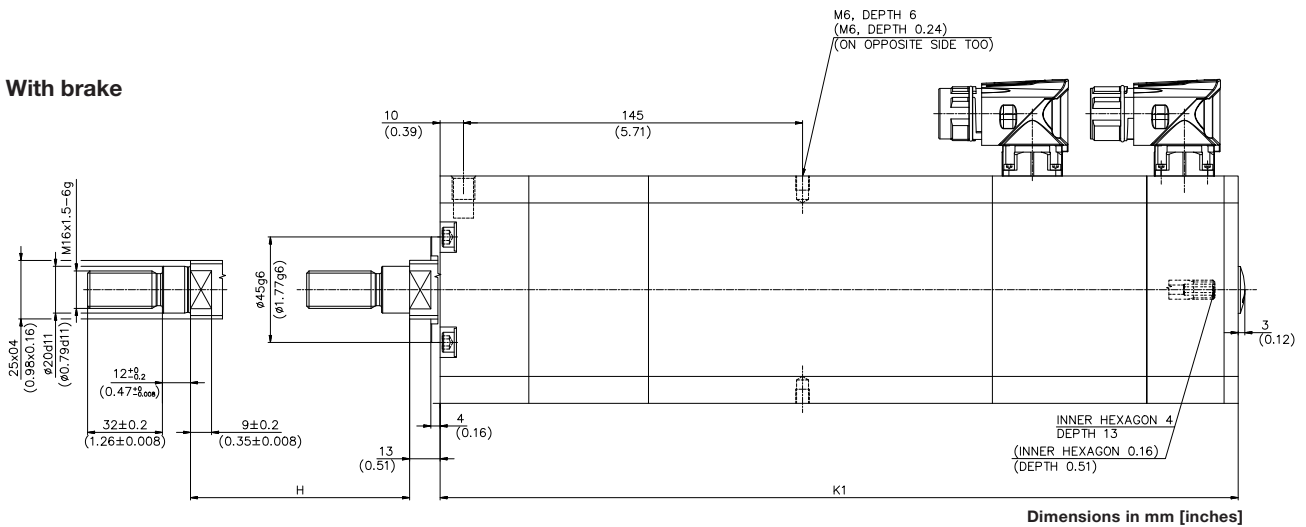


Please note that the above average service life graph only applies when the following conditions are met:

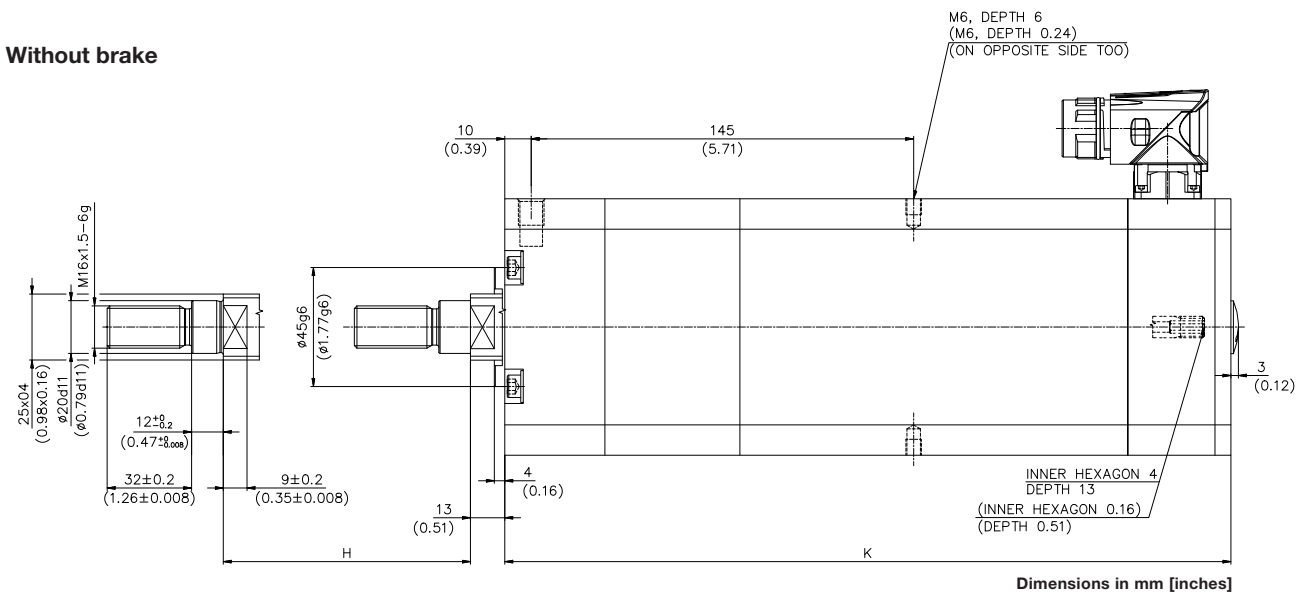
- Maximum load force of 34 kN (7,643.50 lbf) at zero speed is not exceeded.
- No ball screw radial load occurs.
- Force is applied evenly among the whole stroke.
- Prescribed grease quantity and quality requirements are met during the whole service life.
- The servoactuator is not used in a high frequency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

cyber[®] force actuator MG 50

With brake



Without brake



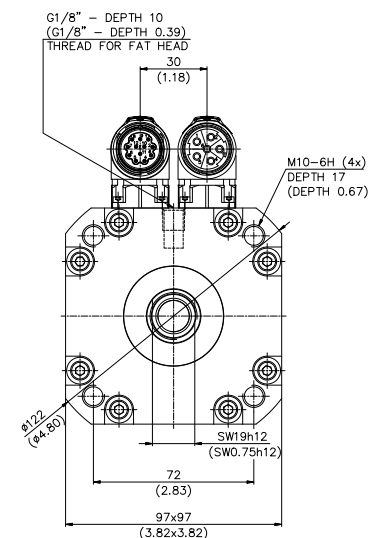
Dimensions

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 WITTENSTEIN s.r.o.



Notes



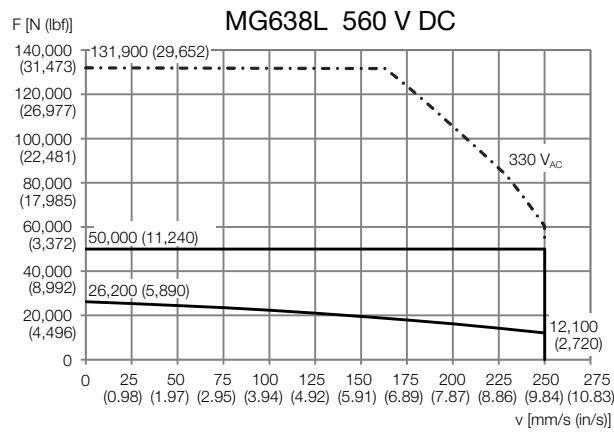
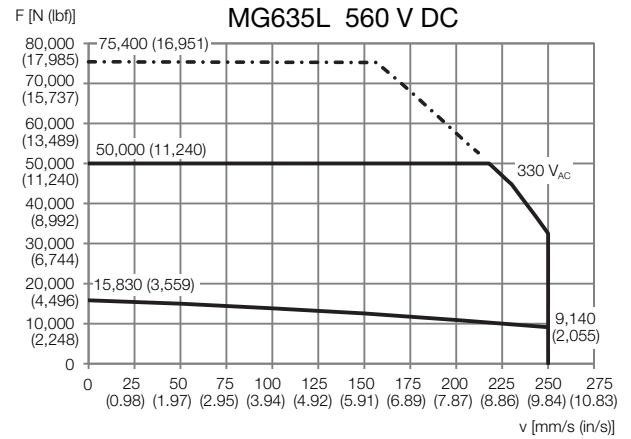
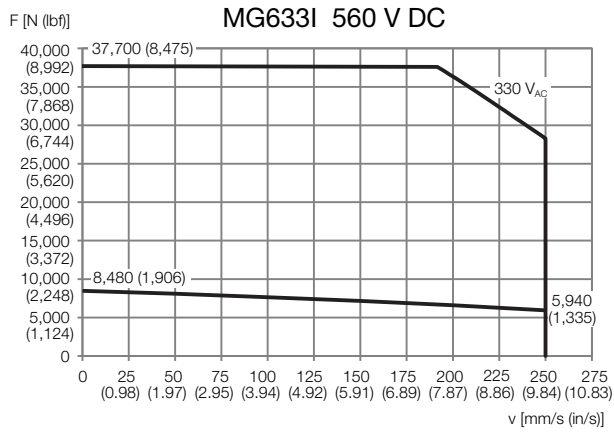
cyber motor

cyber[®] force actuator

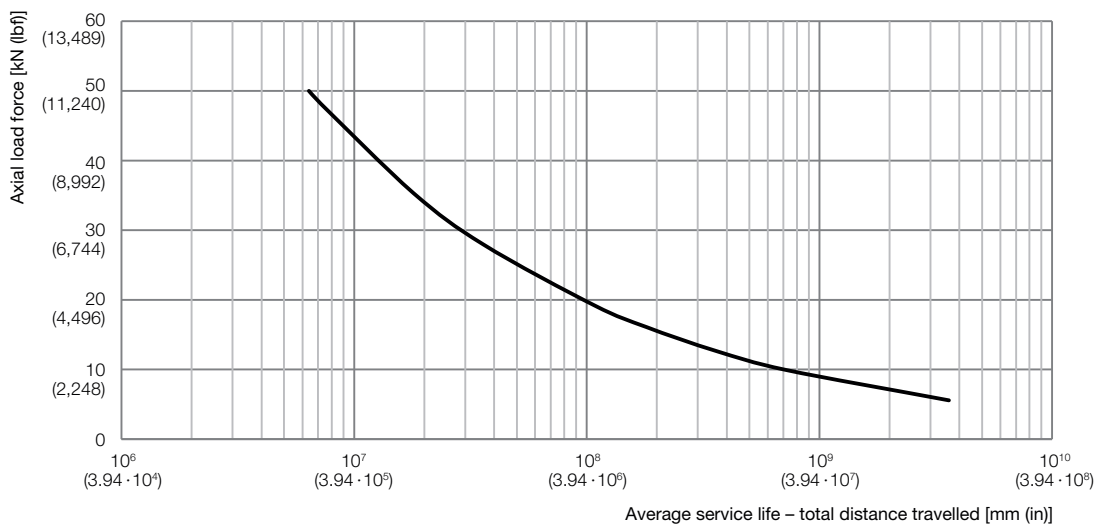
MG 63

Servoactuator type				MG633I	MG635L	MG638L
	DC Bus Voltage	U_{DC}	V	560	560	560
S	Stall values					
	Stall 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	$V_{min}/1000$	90	120	120
	Voltage constant	k_e	V_s/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
O	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_f	Nm (lbf 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 300x300x12 mm (11.81x11.81x0.47 in) which acts as an additional cooling area.



MG 63 Average Service Life

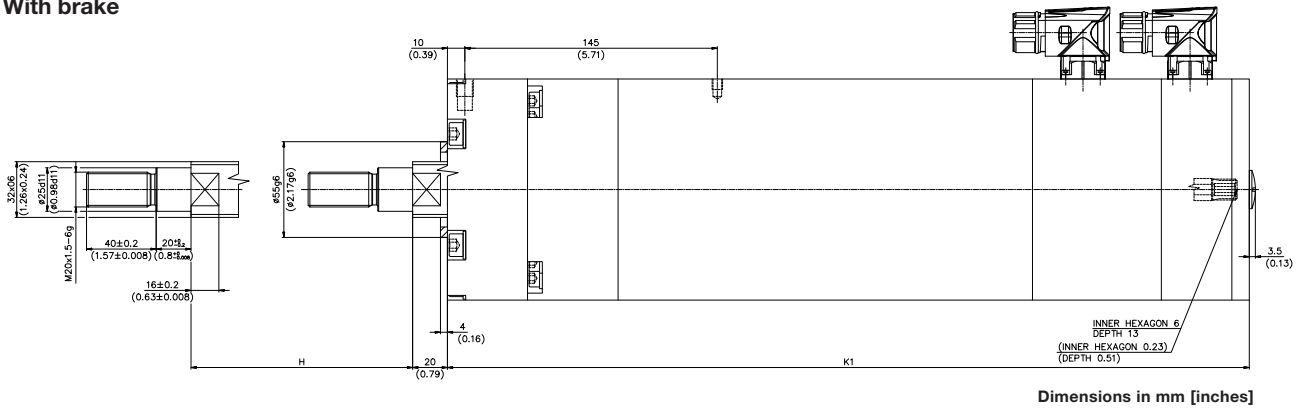


Please note that the above average service life graph only applies when the following conditions are met:

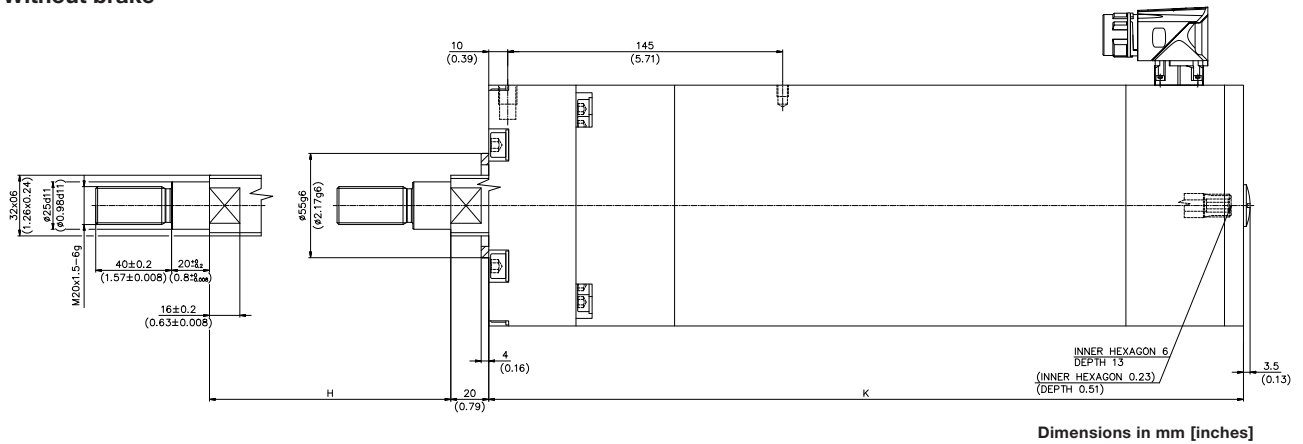
- Maximum load force of 50 kN (11,240.45 lbf) at zero speed is not exceeded.
- No ball screw radial load occurs.
- Force is applied evenly among the whole stroke.
- Prescribed grease quantity and quality requirements are met during the whole service life.
- The servoactuator is not used in a high frequency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

cyber[®] force actuator MG 63

With brake



Without brake



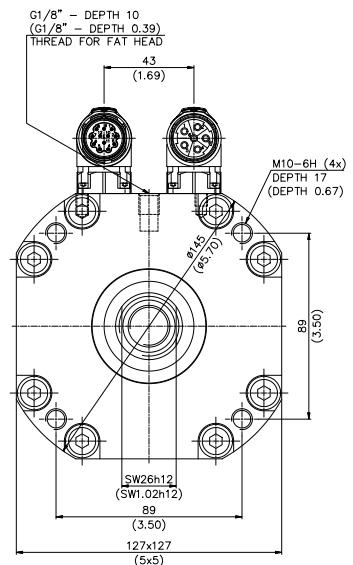
Dimensions

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	7,500	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 WITTENSTEIN s.r.o.



Notes



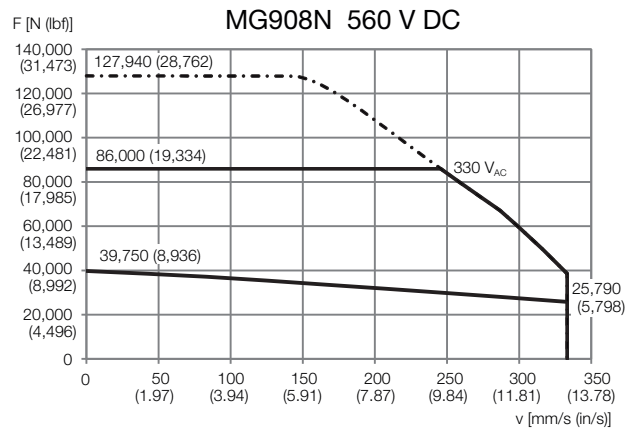
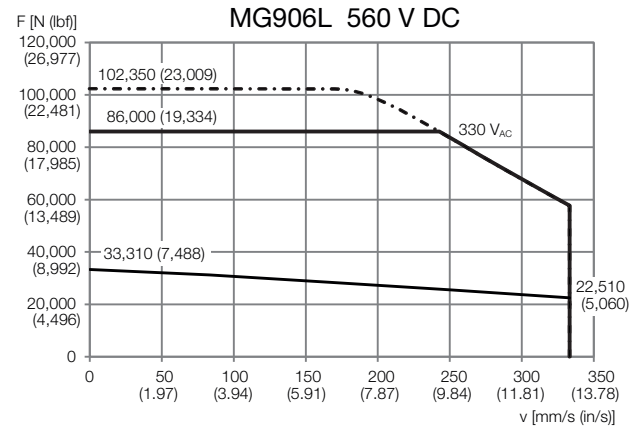
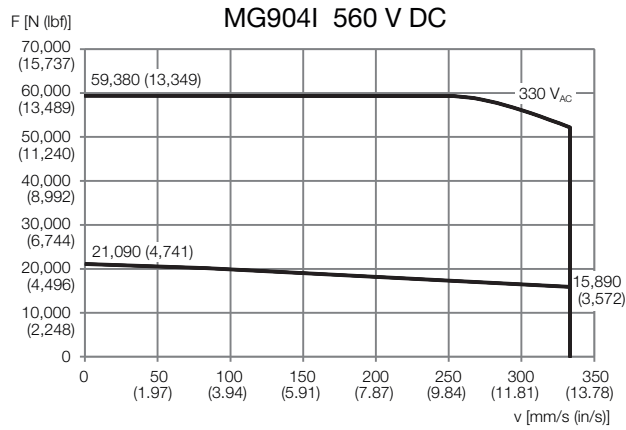
cyber motor

cyber[®] force actuator

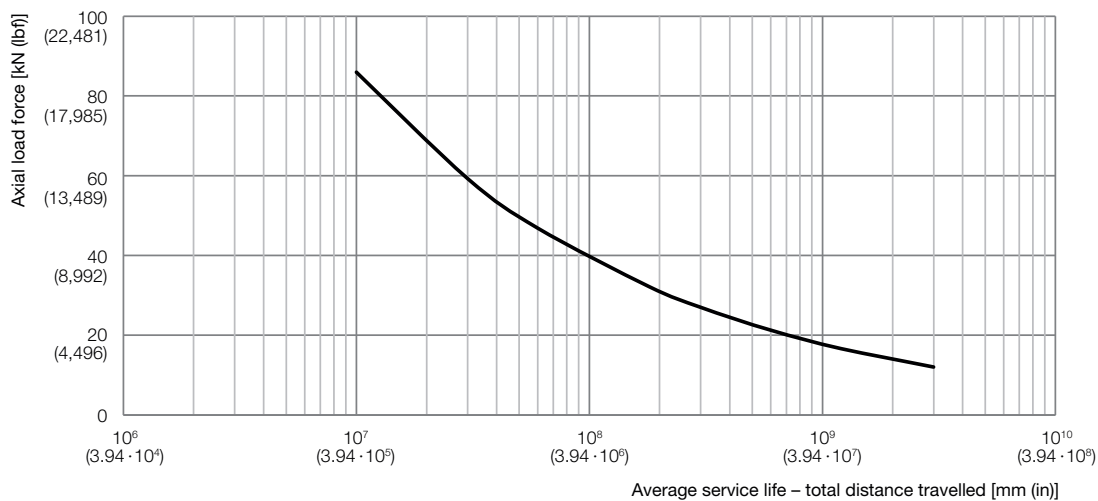
MG 90

Servoactuator type				MG904I	MG906L	MG908N
	DC Bus Voltage	U_{DC}	V	560	560	560
S	Stall values					
	Stall 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	$V_{min}/1000$	90	120	150
	Voltage constant	k_e	V_s/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
O	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_f	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 475x475x20 mm (18.70x18.70x0.79 in) which acts as an additional cooling area.



MG 90 Average Service Life

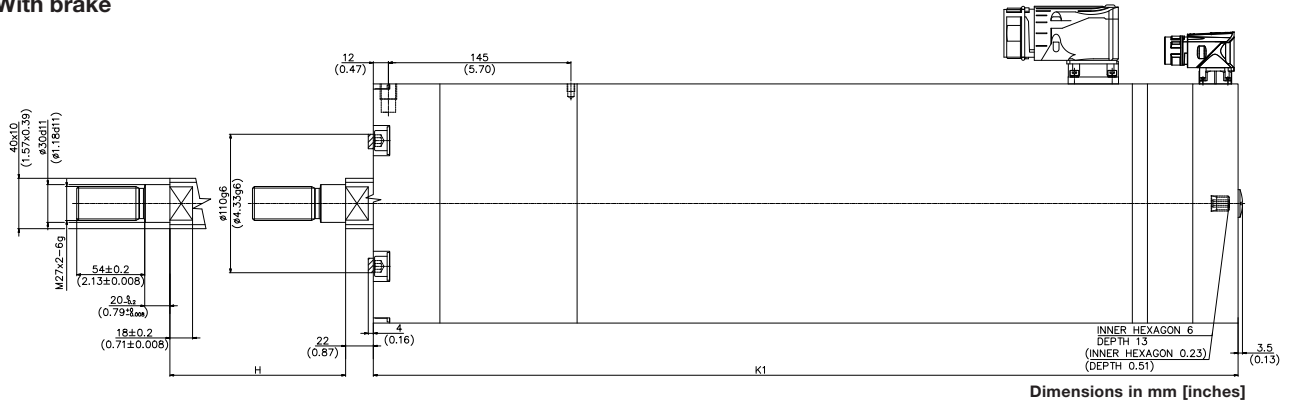


Please note that the above average service life graph only applies when the following conditions are met:

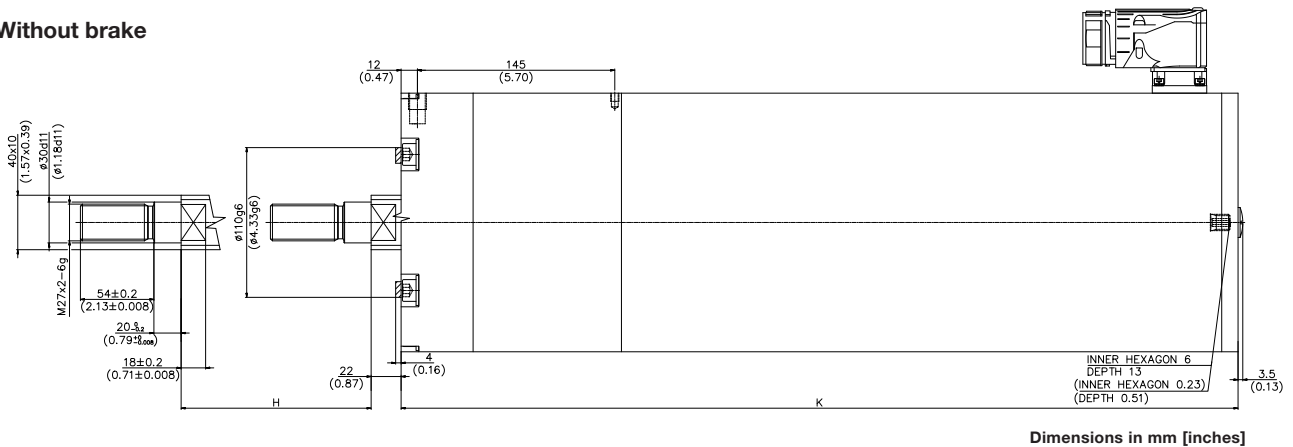
- Maximum load force of 86 kN (19,333.57 lbf) at zero speed is not exceeded.
- No ball screw radial load occurs.
- Force is applied evenly among the whole stroke.
- Prescribed grease quantity and quality requirements are met during the whole service life.
- The servoactuator is not used in a high frequency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

cyber[®] force actuator MG 90

With brake



Without brake



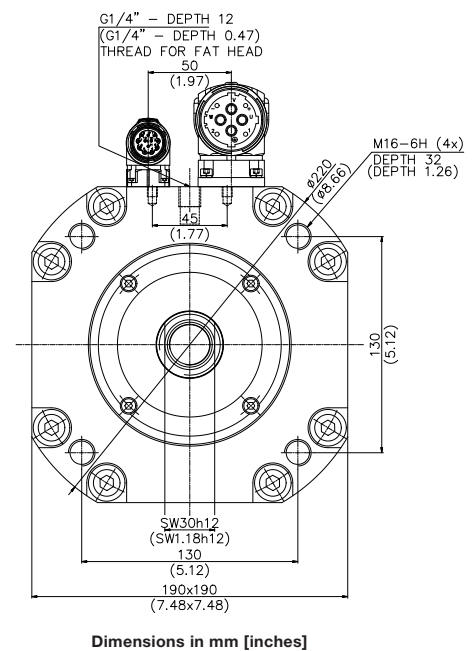
Dimensions

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	6,500	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 WITTENSTEIN s.r.o.



Notes



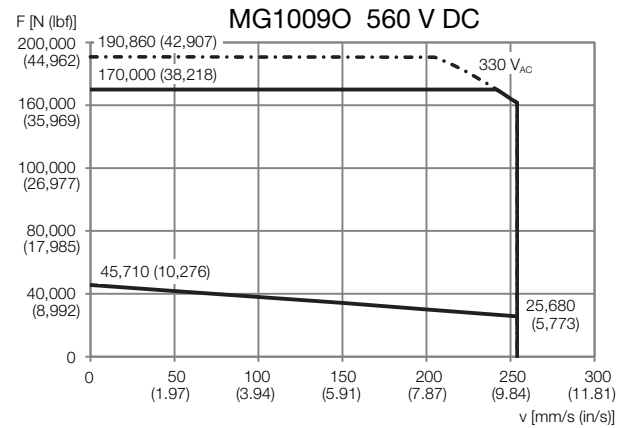
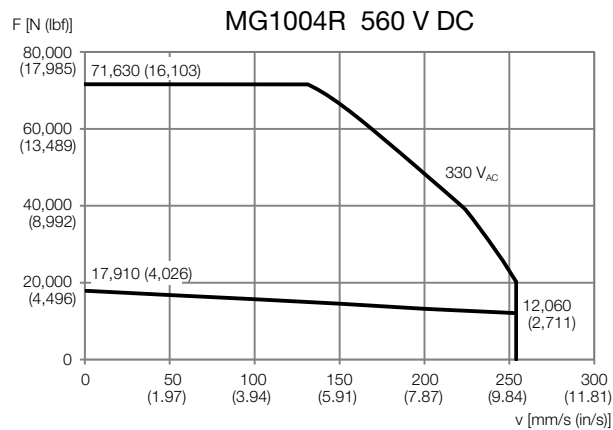
cyber motor

cyber[®] force actuator

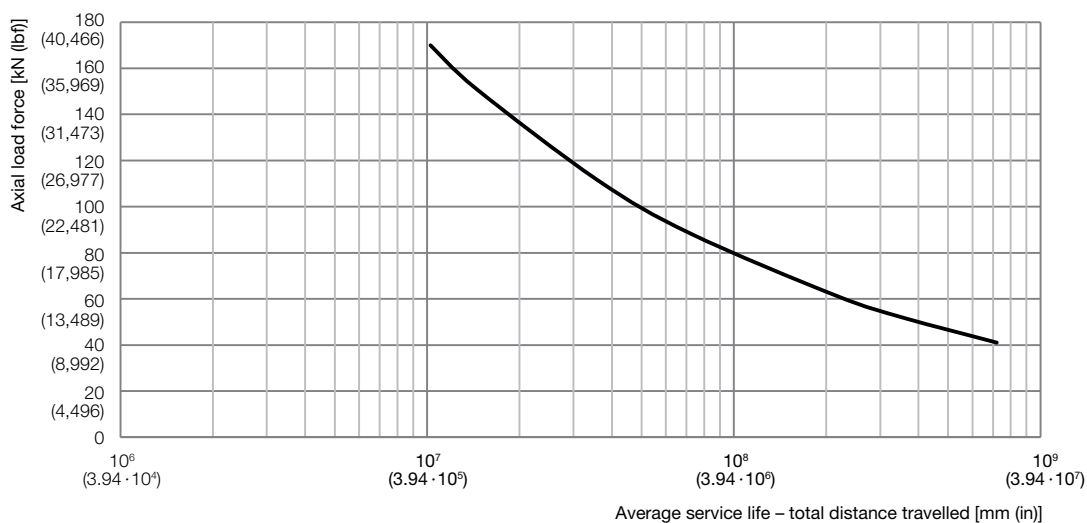
MG 100

Servoactuator type				MG1004R	MG1009O
	DC Bus Voltage	U_{DC}	V	560	560
S	Stall values				
	Stall 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	$V_{min}/1000$	250	180
	Voltage constant	k_e	V_s/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
O	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_f	Nm (lbf 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 475x475x20 mm (18.70x18.70x0.79 in) which acts as an additional cooling area.



MG 100 Average Service Life

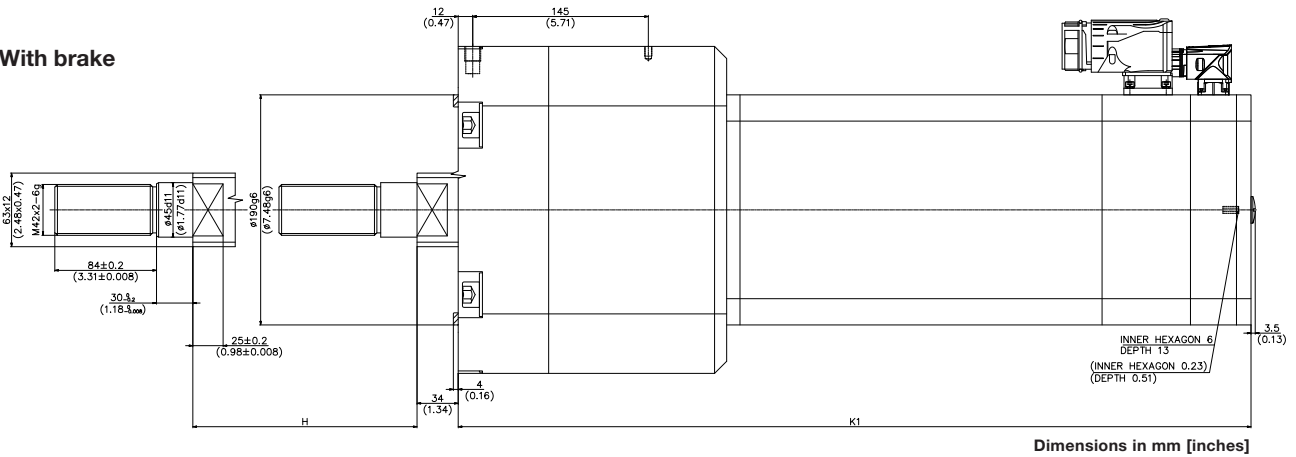


Please note that the above average service life graph only applies when the following conditions are met:

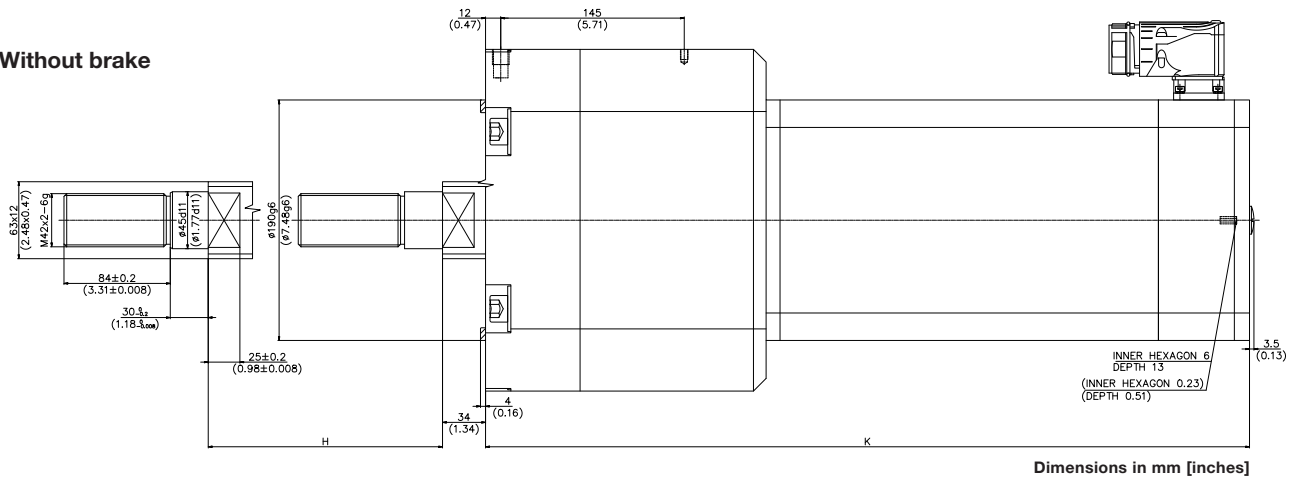
- Maximum load force of 170 kN (38,217.52 lbf) at zero speed is not exceeded.
- No ball screw radial load occurs.
- Force is applied evenly among the whole stroke.
- Prescribed grease quantity and quality requirements are met during the whole service life.
- The servoactuator is not used in a high frequency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

cyber[®] force actuator MG 100

With brake



Without brake



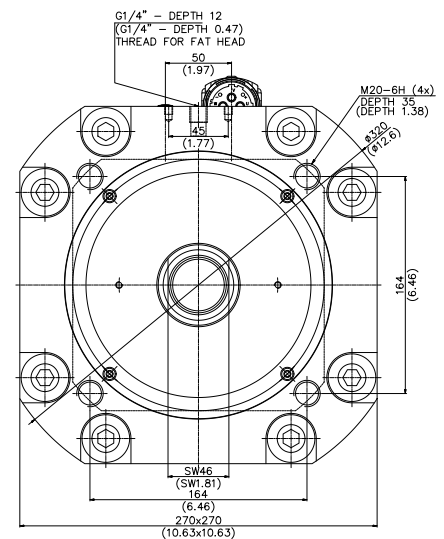
Dimensions

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	6,500	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 WITTENSTEIN s.r.o.



Notes



cyber motor

Information

Glossary

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 WITTENSTEIN s.r.o.

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 WITTENSTEIN s.r.o.

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

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 WITTENSTEIN s.r.o.

Limit point current I_c

Terminal RMS current at limit point.

Breakdown force F_c

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) $R_{th(RU)}$

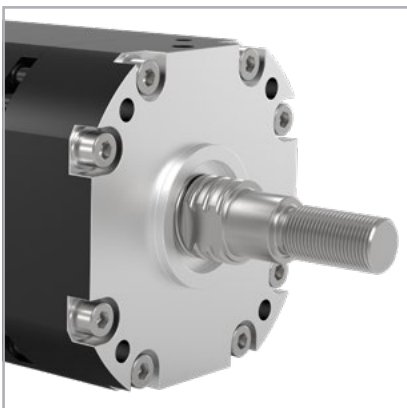
Thermal resistance between the winding and ambient.

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.





cyber motor

WITTENSTEIN cyber motor GmbH · Walter-Wittenstein-Straße 1 · 97999 Igersheim · Germany
Tel. +49 7931 493-15800 · info@wittenstein-cyber-motor.de

WITTENSTEIN s.r.o. · Trnkova 3129/119a · 628 00 Brno · Czech republic
Tel. +420 517 078 300 · info@wittenstein.cz

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