EXPLOSION PROOF DYNAMIC BRUSHLESS SERVO MOTORS

ExD SERIES

Rev. C, October 2013

OFFERING HIGH PERFORMANCE SERVO MOTORS
FOR USE IN POTENTIALLY EXPLOSIVE ATMOSPHERES
IN ACCORDANCE WITH ATEX AND IECEx

Whenever the highest levels of motion control performance and design flexibility are required, you'll find Moog expertise at work. Through collaboration, creativity and world-class 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.

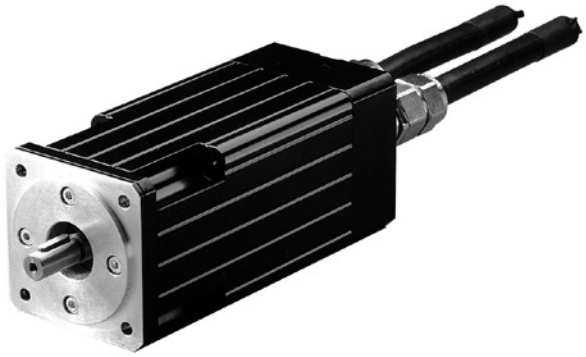
TABLE OF CONTENTS

INTRODUCTION 2
- Product Overview 3
- Features and Benefits 5
- Technical Features 6
- Servo Motor Versions 8

TECHNICAL DATA 9
- Size 3 9
- Size 5 18
- Size 6 27
- Wiring Diagram 40
- Bearing Load Diagrams 41

BACKGROUND 42
- Defining the Hazardous Location and Servo Motor Sizing 42
- About Moog 43

ORDERING INFORMATION 45
- Options 45
- Ordering Code 46



PRODUCT OVERVIEW

Moog Brushless Technology

For over two decades, the name Moog has been associated with brushless servo motors and servo drives offering the highest dynamics, power density and reliability. The products are designed as a system to deliver superior servo performance. Moog offers a broad range of standard models as well as custom solutions to meet your unique application requirements. Moog brushless servo motors and drives are found on a variety of applications; especially where dynamics, compact size and reliability are important.

ExD Series Servo Motors

Moog's Explosion Proof Dynamic Brushless Servo Motors (ExD Series) are electronically commutated synchronous AC motors with permanent magnet field excitation. The ExD Series Servo Motors are designed for highly dynamic applications where positioning times of 30 ms or less are often the norm. The ExD Series Servo Motors offers one of the industry's widest power ranges.

The modular design is supported by a variety of options with Moog's application engineers capable of helping you tailor the product to meet the exact specifications of your machine application. All Moog Servo Motors are manufactured in-house and the use of tight machining tolerances, precision balancing and thorough production testing guarantee a long service life.

The ExD Series Motors are designed and tested for operation in conditions where vapors or gases form flammable or explosive environments.The flameproof housing has been tested and proven capable to withstand internal explosions without bursting or allowing ignition to reach outside the motor frame. These servo motors are certified for use in potentially explosive atmosphere in accordance with ATEX 94/9/CE directive „D" type protection and IECEx for II C gases, with dust protection against III C.

Please refer to the Programmable Multi-Axis Servo Drive System catalog for details of our Servo Drive offering.

Standards

These motors are certified to be in compliance with ATEX and IECEx standards:

- EN/IEC 60079-0 Explosive atmospheres - Part 0: Equipment - General requirements
- EN/IEC 60079-1 Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures „d"
- EN/IEC 60079-31 Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure „t"

Type of Protection

- Flameproof „d"
- Dust „tb"

Marking

- Ex II 2 G Ex d IIC T3-T6 Gb
- Ex II 2 D Ex tb IIIC T200 °C-T85 °C Db IP 65/67

Reference links

- ATEX Certificate
- IECEx Certificate

PRODUCT OVERVIEW

Servo Motor type[1)]	Stall torque	Maximum torque	Rated speed	Rotor inertia	Square flange
	Nm (lbf in)	Nm (lbf in)	r/min	kg cm^2 (10^{-4} lbf in s^2)	mm (in)
G-3LM2 (L05)	0.52 (4.6)	1.60 (14.2)	7,800	0.16 (1.4)	70 (2.8)
G-3LM4 (L15)	1.39 (12.3)	4.9 (43.4)	6,300	0.39 (3.5)	70 (2.8)
G-3LM6 (L25)	2.16 (19.1)	8.2 (72.6)	4,600	0.62 (5.5)	70 (2.8)
G-3LM8 (L40)	3.26 (28.9)	13.2 (117)	3,800	0.97 (8.6)	70 (2.8)
G-3LV2 (L05)	0.52 (4.6)	1.6 (14.2)	7,800	0.16 (1.4)	70 (2.8)
G-3LV4 (L15)	1.39 (12.3)	4.9 (43.4)	6,300	0.39 (3.5)	70 (2.8)
G-3LV6 (L25)	2.16 (19.1)	8.2 (72.6)	4,600	0.62 (5.5)	70 (2.8)
G-3LV8 (L40)	3.26 (28.9)	13.2 (117)	3,800	0.97 (8.6)	70 (2.8)
G-5LM2 (L10)	5.79 (51.2)	12.2 (108)	4,800	4.6 (40.7)	140 (5.5)
G-5LM4 (L20)	10.83 (95.9)	25.8 (228)	3,500	8.00 (70.8)	140 (5.5)
G-5LM6 (L30)	15.7 (139)	38.2 (338)	2,700	11.50 (102)	140 (5.5)
G-5LM8 (L50)	25.4 (225)	61.2 (542)	2,000	18.40 (163)	140 (5.5)
G-5LV2 (L10)	5.79 (51.2)	12.20 (108)	4,800	4.60 (40.7)	140 (5.5)
G-5LV4 (L20)	10.83 (95.9)	25.80 (228)	3,500	8.00 (70.8)	140 (5.5)
G-5LV6 (L30)	15.70 (139)	38.20 (338)	2,700	11.50 (102)	140 (5.5)
G-5LV8 (L50)	25.40 (225)	61.20 (542)	2,000	18.40 (163)	140 (5.5)
G-6LM2 (L15)	12.91 (114)	40.13 (355)	4,000	27.25 (241)	190 (7.5)
G-6LM4 (L30)	25.57 (226)	79.79 (706)	3,000	52.08 (461)	190 (7.5)
G-6LM6 (L45)	36.26 (321)	119.65 (1,059)	2,500	76.91 (681)	190 (7.5)
G-6LM8 (L60)	47.35 (419)	159.55 (1,412)	2,200	102.07 (903)	190 (7.5)
G-6LM9 (L90)	66.72 (591)	239.34 (2,118)	2,000	151.08 (1,337)	190 (7.5)
G-6LV2 (L15)	12.85 (114)	40.15 (355)	4,000	27.25 (241)	190 (7.5)
G-6LV4 (L30)	24.95 (221)	79.77 (706)	3,000	52.08 (461)	190 (7.5)
G-6LV6 (L45)	36.24 (321)	119.64 (1,059)	2,500	76.91 (681)	190 (7.5)
G-6LV8 (L60)	47.30 (419)	159.52 (1,412)	2,200	102.07 (903)	190 (7.5)
G-6LV9 (L90)	66.68 (590)	239.31 (2,118)	2,000	151.08 (1,337)	190 (7.5)

1) Motor type code [eg. G-3LM2 (L05), see back page for ordering reference]
G = Explosion proof Series Servo motor
3 = Flange size
M = Winding voltage (M = Low voltage, 325 V_{DC} with primary PTC thermal sensor)
V = Winding voltage (V = High voltage, 565 V_{DC} with primary PTC thermal sensor)
2 (L05) = Stack length

Notes:

1. Nominal speed can be easily adjusted by changing the stator windings. Please contact your local Moog application engineer for information.
2. All the above technical data is for explosion proof motor assuming T4 temperature class at +40 °C (+104 °F).

FEATURES AND BENEFITS

Features	Benefits
Certified for use in potentially hazardous environments	Offer greater safety and risk protection
Feature superior motor dynamics	Improves machine cycle time
Compact, lightweight construction and broad range of torque ratings offered	Simplifies machine design and streamlines supply chain
Proprietary, low cogging design	Delivers smooth low speed operation for machines
Ruggedized, maintenance free design with bearing greased for life	Boosts overall system availability
Flexible design options that can be tailored to exact specifications	Eases integration
Design that can be tailored to meet unique machine and application requirements	Enables a more flexible machine design
Built in PTC thermal sensor to protect motor from overheating and IP 65/67 protection class	Provides greater safety and reduces downtime

Superior Motor Dynamics Improves Cycle Time

The ExD Series Servo Motor combines a low inertia rotor with an electromagnetic design having exceptional overload capacity. The result is an increase in the effective torque available to accelerate and decelerate the load, enabling higher dynamics and improved cycle times.
ExD Series Servo Motors use a fully laminated, weight optimized, rotor to provide a significant inertia reduction over conventional solid rotor designs. It is able to achieve a high overload capacity through the use of high-energy rare earth magnets, a high pole count electrical design, and an efficient thermal construction.

Compact and Lightweight Construction Simplifies Machine Design

The ExD Series Servo Motor provides high torque in a compact and lightweight package to achieve both high power density and a high torque-to-weight ratio. The compact and lightweight package provides greater flexibility and often enables new cost-saving approaches to machine construction. In applications where the motor is mounted on a moving axis, the high torque-to-weight ratio allows greater payloads and/or increased acceleration.
ExD Series Servo Motors leverage an all-aluminum motor housing to achieve a significant weight reduction over low cost steel housings. A robust thermal design allows more power to be designed into a small, compact package.

Proprietary, Low-Cogging Design Delivers Smooth Low Speed Operation

The ExD Series Servo Motor includes several design enhancements to deliver smooth slow speed performance. The enhancements include the selection of a high pole count (8 to 12 poles) electromagnetic design, a stator with non-symmetric slot count and other proprietary features to minimize cogging.

Ruggedized, Maintenance-Free Design to Boost Overall System Availability

The ExD Series Servo Motor is designed and manufactured in accordance with strict standards, using ruggedized components with proven reliability in harsh thermal and shock load environments. These features combine to offer years of reliable, maintenance-free, operations and boost overall system availability. The use of high-reliability feedback devices, sealed lifetime lubricated bearings, precision balanced rotors (Class G6.3) of ISO 1940 and IP65 construction combine to extend service life.

Flexible Design Option Eases Integration

The ExD Series Servo Motor is available with thefollowing options:

- Integral holding brakes
- Resolver or encoder-based feedback
- Plain or slot and key type shafts
- Cable gland with cable

Fully Customized Designs Support Unique Application Requirements

The Moog ExD Series Servo Motors can be customized to meet your unique needs.

The following are some common requests supported by Moog's application staff:

- Custom motor windings
- Custom shafts and flanges
- Custom feedback devices

TECHNICAL FEATURES

Sizing the Servo Motor for a System

With experience in a variety of industrial machinery applications, Moog's engineers understand the critical role that application sizing process plays in overall machine design. With global competition forcing machine designers to do more with less, there is an expanding need to avoid unnecessary margin and "size" the motors exactly to your application needs. It is for these reasons that Moog specifies motor performance characteristics in a practical manner ideal for designing your system. Motor characteristics are specified under the same environmental conditions in which they will be used, with notes clearly articulating the operating conditions.

Elements of Motor Performance

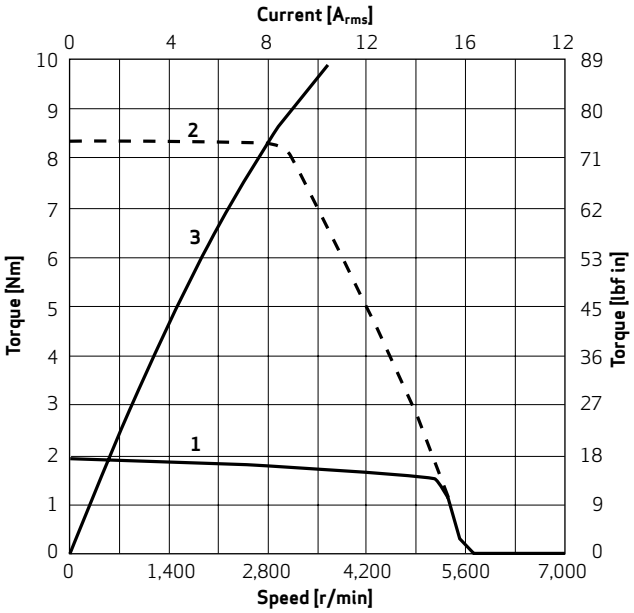
The motor performance characteristics contain three elements.

1. The continuous torque curve.
This curve illustrates the motor torque available at 100 % duty cycle under the following conditions:

   - Operation in still air with ambient temperatures based on T code
   - Motor front flange attached to a steel mounting plate measuring 300 x 300 x 12 mm (11.81 x 11.81 x 0.47 in)

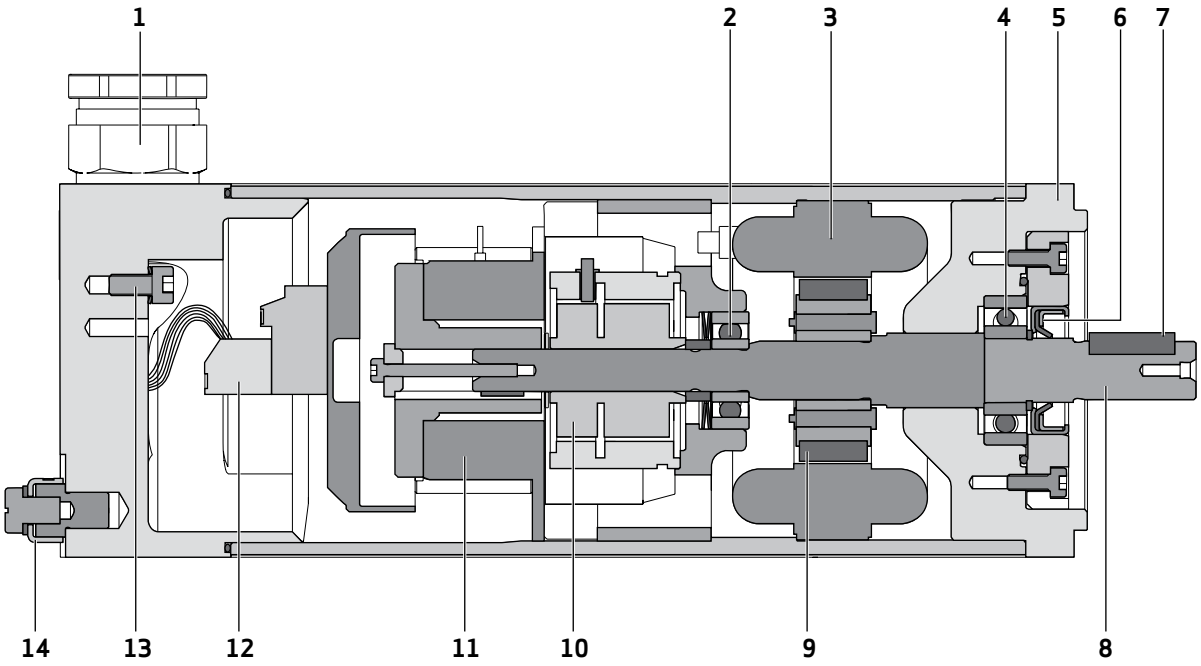
2. The peak torque curve.
This curve reflects the motor torque available with a 10 % duty cycle (1 out of 10 seconds). It is based on years of practical industry experience and is useful for typical servo applications.

3. The motor kT characteristic.
The motor kT characteristic depicts stator saturation at various operating points and can be used to optimize sizing in low duty cycle applications. ExD Series Servo Motors can deliver a low duty cycle "impulse torque" which is typically 20 to 30 % more than rated peak torque. While motors can be operated reliably at this operating point, it is recommended that a member of Moog's application team reviews the application to ensure thermal restrictions are not violated.



1 Continuous torque
2 Maximum torque
3 Torque constant k_T

TECHNICAL FEATURES



1 Cable outlet
2 Shaft bearing B (floating bearing)
3 Stator winding
4 Shaft bearing A (fixed bearing)
5 Flange
6 Radial shaft seal
7 Keyway (optional)
8 Shaft
9 Permanent magnets, rotor
10 Feedback device
11 Permanent magnet holding brake (optional)
12 Connection strip
13 Internal ground terminal
14 External ground terminal

SERVO MOTOR VERSIONS

General Information

1. Motors designed to EN 60034 (VDE 530)
2. Certified to ATEX and IECEx
3. Rotors balanced to Class G6.3 per ISO 1940
4. Sealing to IP65
5. Operating ambient temperature refer to box car
6. Class F winding insulation
7. Motor flange dimensions per IEC 34, NEMA MG7, IN 42948, ISO 286
8. Motor shaft dimensions per DIN 748
9. Motor shaft keyway per DIN 6885, IEC 72-1
10. Feedback Sensors

    a) Resolver

    b) Encoder

    - Incremental
    - Absolute single-turn
    - Absolute multi-turn
11. G-3L, G-5L and G-6L servomotors are available in two versions:

    G-xLM: Designed for the use of 325 V_{DC} link

    G-xLV: Designed for the use of 565 V_{DC} link
12. Winding temperature sensors (standard version): PTC as per temperature class and NTC
13. Sealed life-time lubricated bearing
14. Cable gland optional

Notes

1. Continuous ratings based upon:
    - Operation in still air with ambient temperatures as indicated in the specification table.
    - Motor front flange attached to a steel mounting plate measuring 300 x 300 x 12 mm (11.81 x 11.81 x 0.47 in).
2. Peak ratings based on: Duty cycle of 10 % (1 out of 10 seconds).
3. k_T-line show non-linearity between current and torque at high end.
4. Nominal speed and power values at maximum continuous output power with conditions per note 1
5. Resistance and inductance measurement based on “cold” values (i.e. measured at +25 °C (+77 °F)).
6. Current ratings are A_{rms} per phase.
7. Motor performance as measured with Moog drives at 325 V_{DC} link for the G-xLM motor and 565 V_{DC} link for G-xLV motor. For other drives and voltage levels, please talk to you Moog local application engineers.
8. Specification tolerances are ±10 %.
9. The maximum speed, n_{max}, is the maximum allowable operating speed. This speed is either limited by the voltage limiting Back E.M.F. characteristic or mechanically by centrifugal forces and/or bearing-stressing, whichever value is lower.

SIZE 3

Low Voltage 325 V_{DC}, Type G-3LM

General Characteristics

Characteristics		Units	G-3LM2 (L05)	G-3LM4 (L15)	G-3LM6 (L25)	G-3LM8 (L40)
Maximum torque	M_{max}	Nm (lbf in)	1.60 (14.2)	4.9 (43.4)	8.2 (72.6)	13.2 (117)
Maximum current	I_{max}	A_{rms}	4.6	10.7	12.3	16.3
Maximum speed	n_{max}	r/min	10,100	8,000	5,500	4,500
Torque constant	k_T	Nm/A_{rms} ($lbf\ in/A_{rms}$)	0.39 (3.5)	0.52 (4.6)	0.76 (6.7)	0.92 (8.1)
Voltage constant	k_e	$V_{rms}/k_{r/min}$	25.0	31.6	45.7	55.3
Thermal time constant	t_{th}	s	350	760	970	1,350
Winding resistance at 25 °C (77 °F) (phase to phase)	R_{tt}	Ohm	16.67	4.97	5.24	4.24
Winding inductance (phase to phase)	L_{tt}	mH	19.4	8.5	10.1	8.9
Rotor inertia with resolver	J	$kg\ cm^2$ (10^{-4} lbf in s^2)	0.16 (1.4)	0.39 (3.5)	0.62 (5.5)	0.97 (8.6)
Rotor inertia with encoder	J	$kg\ cm^2$ (10^{-4} lbf in s^2)	0.14 (1.2)	0.37 (3.3)	0.60 (5.3)	0.95 (8.4)
Weight (without brake)	m	kg (lb)	2.1 (4.6)	2.7 (6)	3.3 (7.3)	4.2 (9.3)

SIZE 3

Low Voltage 325 V_{DC}, Type G-3LM

Characteristics Based on Temperature Class T3 and T4

Characteristics		Units	G-3LM2 (L05)	G-3LM4 (L15)	G-3LM6 (L25)	G-3LM8 (L40)
Continuous stall torque at 40 °C (104 °F)	M_0	Nm (lbf in)	0.52 (4.6)	1.39 (12.3)	2.16 (19.1)	3.26 (28.9)
Continuous stall current at 40 °C (104 °F)	I_0	A_{rms}	1.31	2.67	2.84	3.52
Rated torque at 40 °C (104 °F)	M_N	Nm (lbf in)	0.44 (3.9)	1.09 (9.6)	1.81 (16)	2.82 (25)
Rated speed at 40 °C (104 °F)	n_N	r/min	7,800	6,300	4,600	3,800
Output power, continuous duty, rated speed at 40 °C (104 °F)	P_N	kW (hp)	0.359 (0.5)	0.719 (1)	0.871 (1.2)	1.122 (1.5)
Continuous stall torque at 50 °C (122 °F)	M_0	Nm (lbf in)	0.50 (4.4)	1.33 (11.8)	2.07 (18.3)	3.13 (27.7)
Rated torque at 50 °C (122 °F)	M_N	Nm (lbf in)	0.42 (3.7)	1.02 (9)	1.72 (15.2)	2.66 (23.5)
Rated speed at 50 °C (122 °F)	n_N	r/min	7,800	6,300	4,600	3,800
Output power, continuous duty, rated speed at 50 °C (122 °F)	P_N	kW (hp)	0.343 (0.5)	0.673 (0.9)	0.828 (1.1)	1.58 (1.4)
Continuous stall torque at 60 °C (140 °F)	M_0	Nm (lbf in)	0.46 (4.1)	1.22 (10.8)	1.91 (16.9)	2.88 (25.5)
Rated torque at 60 °C (140 °F)	M_N	Nm (lbf in)	0.37 (3.3)	0.88 (7.8)	1.52 (13.5)	2.37 (21)
Rated speed at 60 °C (140 °F)	n_N	r/min	7,800	6,300	4,600	3,800
Output power, continuous duty, rated speed at 60 °C (140 °F)	P_N	kW (hp)	0.302 (0.4)	0.580 (0.8)	0.732 (1)	0.943 (1.3)
Continuous stall torque at 70 °C (158 °F)	M_0	Nm (lbf in)	0.41 (3.6)	1.09 (9.6)	1.70 (15)	2.56 (22.7)
Rated torque at 70 °C (158 °F)	M_N	Nm (lbf in)	0.31 (2.7)	0.69 (6.1)	1.25 (11.1)	1.97 (17.4)
Rated speed at 70 °C (158 °F)	n_N	r/min	7,800	6,300	4,600	3,800
Output power, continuous duty, rated speed at 70 °C (158 °F)	P_N	kW (hp)	0.253 (0.3)	0.455 (0.6)	0.602 (0.8)	0.783 (1)
Continuous stall torque at 80 °C (176 °F)	M_0	Nm (lbf in)	0.34 (3)	0.91 (8.1)	1.41 (12.5)	2.14 (18.9)
Rated torque at 80 °C (176 °F)	M_N	Nm (lbf in)	0.22 (1.9)	0.35 (3.1)	0.83 (7.3)	1.38 (12.2)
Rated speed at 80 °C (176 °F)	n_N	r/min	7,800	6,300	4,600	3,800
Output power, continuous duty, rated speed at 80 °C (176 °F)	P_N	kW (hp)	0.180 (0.2)	0.231 (0.3)	0.400 (0.5)	0.549 (0.7)

SIZE 3

Low Voltage 325 V_{DC}, Type G-3LM

Characteristics Based on Temperature Class T5

Characteristics		Units	G-3LM2 (L05)	G-3LM4 (L15)	G-3LM6 (L25)	G-3LM8 (L40)
Continuous stall torque at 40 °C (104 °F)	M_0	Nm (lbf in)	0.43 (3.8)	1.17 (10.4)	1.81 (16)	2.74 (24.3)
Rated torque at 40 °C (104 °F)	M_N	Nm (lbf in)	0.33 (2.9)	0.75 (6.6)	1.35 (11.9)	2.12 (18.8)
Rated speed at 40 °C (104 °F)	n_N	r/min	7,800	6,300	4,600	3,800
Output power, continuous duty, rated speed at 40 °C (104 °F)	P_N	kW (hp)	0.269 (0.4)	0.495 (0.7)	0.650 (0.9)	0.843 (1.1)

Characteristics Based on Temperature Class T6

Characteristics		Units	G-3LM2 (L05)	G-3LM4 (L15)	G-3LM6 (L25)	G-3LM8 (L40)
Continuous stall torque at 40 °C (104 °F)	M_0	Nm (lbf in)	0.32 (2.8)	0.85 (7.5)	1.32 (11.7)	1.99 (17.6)
Rated torque at 40 °C (104 °F)	M_N	Nm (lbf in)	0.14 (1.2)	0.59 (5.2)	0.45 (4)	0.91 (8.1)
Rated speed at 40 °C (104 °F)	n_N	r/min	7,800	4,000	4,600	3,800
Output power, continuous duty, rated speed at 40 °C (104 °F)	P_N	kW (hp)	0.114 (0.2)	0.247 (0.3)	0.217 (0.3)	0.362 (0.5)

SIZE 3
High Voltage 565 V_{DC}, Type G-3LV

General Characteristics

Characteristics		Units	G-3LV2 (L05)	G-3LV4 (L15)	G-3LV6 (L25)	G-3LV8 (L40)
Maximum torque	M_{max}	Nm (lbf in)	1.6 (14.2)	4.9 (43.4)	8.2 (72.6)	13.2 (117)
Maximum current	I_{max}	A_{rms}	3.8	7.9	8	12
Maximum speed	n_{max}	r/min	14,400	10,100	6,100	5,700
Torque constant	k_T	Nm/A_{rms} (lbf in/A_{rms})	0.47 (4.2)	0.71 (6.3)	1.18 (10.4)	1.27 (11.2)
Voltage constant	k_e	$V_{rms}/k_{r/min}$	30.0	43.3	71.0	75.9
Thermal time constant	t_{th}	s	350	760	970	1,350
Winding resistance at 25 °C (77 °F) (phase to phase)	R_{tt}	Ohm	24.56	9.53	13	8.09
Winding inductance (phase to phase)	L_{tt}	mH	29.3	15.9	24.7	16.8
Rotor inertia with resolver	J	kg cm^2 (10^{-4} lbf in s^2)	0.16 (1.4)	0.39 (3.5)	0.62 (5.5)	0.97 (8.6)
Rotor inertia with encoder	J	kg cm^2 (10^{-4} lbf in s^2)	0.14 (1.2)	0.37 (3.3)	0.60 (5.3)	0.95 (8.4)
Weight (without brake)	m	kg (lb)	2.1 (4.6)	2.7 (6)	3.3 (7.3)	4.2 (9.3)

SIZE 3
High Voltage 565 V_{DC}, Type G-3LV

Characteristics Based on Temperature Class T3 and T4

Characteristics		Units	G-3LV2 (L05)	G-3LV4 (L15)	G-3LV6 (L25)	G-3LV8 (L40)
Continuous stall torque at 40 °C (104 °F)	M_0	Nm (lbf in)	0.52 (4.6)	1.39 (12.3)	2.16 (19.1)	3.26 (28.9)
Continuous stall current at 40 °C (104 °F)	I_0	A_{rms}	1.08	1.94	1.81	2.56
Rated torque at 40 °C (104 °F)	M_N	Nm (lbf in)	0.44 (3.9)	1.09 (9.6)	1.81 (16)	2.82 (25)
Rated speed at 40 °C (104 °F)	n_N	r/min	7,800	6,300	4,600	3,800
Output power, continuous duty, rated speed at 40 °C (104 °F)	P_N	kW (hp)	0.359 (0.5)	0.719 (1)	0.871 (1.2)	1.122 (1.5)
Continuous stall torque at 50 °C (122 °F)	M_0	Nm (lbf in)	0.50 (4.4)	1.33 (11.8)	2.07 (18.3)	3.13 (27.7)
Rated torque at 50 °C (122 °F)	M_N	Nm (lbf in)	0.42 (3.7)	1.02 (9)	1.72 (15.2)	2.66 (23.5)
Rated speed at 50 °C (122 °F)	n_N	r/min	7,800	6,300	4,600	3,800
Output power, continuous duty, rated speed at 50 °C (122 °F)	P_N	kW (hp)	0.343 (0.5)	0.673 (0.9)	0.828 (1.1)	1.58 (1.4)
Continuous stall torque at 60 °C (140 °F)	M_0	Nm (lbf in)	0.46 (4.1)	1.22 (10.8)	1.91 (16.9)	2.88 (25.5)
Rated torque at 60 °C (140 °F)	M_N	Nm (lbf in)	0.37 (3.3)	0.88 (7.8)	1.52 (13.5)	2.37 (21)
Rated speed at 60 °C (140 °F)	n_N	r/min	7,800	6,300	4,600	3,800
Output power, continuous duty, rated speed at 60 °C (140 °F)	P_N	kW (hp)	0.302 (0.4)	0.580 (0.8)	0.732 (1)	0.943 (1.3)
Continuous stall torque at 70 °C (158 °F)	M_0	Nm (lbf in)	0.41 (3.6)	1.09 (9.6)	1.70 (15)	2.56 (22.7)
Rated torque at 70 °C (158 °F)	M_N	Nm (lbf in)	0.31 (2.7)	0.69 (6.1)	1.25 (11.1)	1.97 (17.4)
Rated speed at 70 °C (158 °F)	n_N	r/min	7,800	6,300	4,600	3,800
Output power, continuous duty, rated speed at 70 °C (158 °F)	P_N	kW (hp)	0.253 (0.3)	0.455 (0.6)	0.602 (0.8)	0.783 (1)
Continuous stall torque at 80 °C (176 °F)	M_0	Nm (lbf in)	0.34 (3)	0.91 (8.1)	1.41 (12.5)	2.14 (18.9)
Rated torque at 80 °C (176 °F)	M_N	Nm (lbf in)	0.22 (1.9)	0.35 (3.1)	0.83 (7.3)	1.38 (12.2)
Rated speed at 80 °C (176 °F)	n_N	r/min	7,800	6,300	4,600	3,800
Output power, continuous duty, rated speed at 80 °C (176 °F)	P_N	kW (hp)	0.180 (0.2)	0.231 (0.3)	0.400 (0.5)	0.549 (0.7)

SIZE 3
High Voltage 565 V_{DC}, Type G-3LV

Characteristics Based on Temperature Class T5

Characteristics		Units	G-3LV2 (L05)	G-3LV4 (L15)	G-3LV6 (L25)	G-3LV8 (L40)
Continuous stall torque at 40 °C (104 °F)	M_0	Nm (lbf in)	0.43 (3.8)	1.17 (10.4)	1.81 (16)	2.74 (24.3)
Rated torque at 40 °C (104 °F)	M_N	Nm (lbf in)	0.33 (2.9)	0.75 (6.6)	1.35 (11.9)	2.12 (18.8)
Rated speed at 40 °C (104 °F)	n_N	r/min	7,800	6,300	4,600	3,800
Output power, continuous duty, rated speed at 40 °C (104 °F)	P_N	kW (hp)	0.269 (0.4)	0.495 (0.7)	0.650 (0.9)	0.843 (1.1)

Characteristics Based on Temperature Class T6

Characteristics		Units	G-3LV2 (L05)	G-3LV4 (L15)	G-3LV6 (L25)	G-3LV8 (L40)
Continuous stall torque at 40 °C (104 °F)	M_0	Nm (lbf in)	0.32 (2.8)	0.85 (7.5)	1.32 (11.7)	1.99 (17.6)
Rated torque at 40 °C (104 °F)	M_N	Nm (lbf in)	0.14 (1.2)	0.59 (5.2)	0.45 (4)	0.91 (8.1)
Rated speed at 40 °C (104 °F)	n_N	r/min	7,800	4,000	4,600	3,800
Output power, continuous duty, rated speed at 40 °C (104 °F)	P_N	kW (hp)	0.114 (0.2)	0.247 (0.3)	0.217 (0.3)	0.362 (0.5)

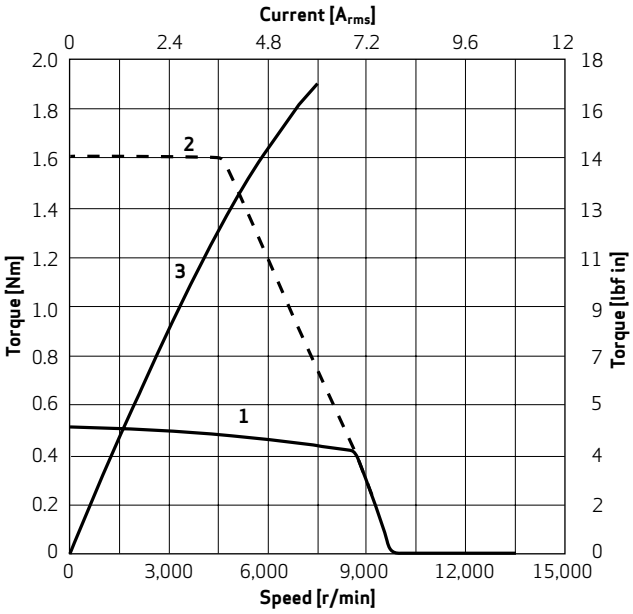
SIZE 3

Motor Characteristics Type G-3L

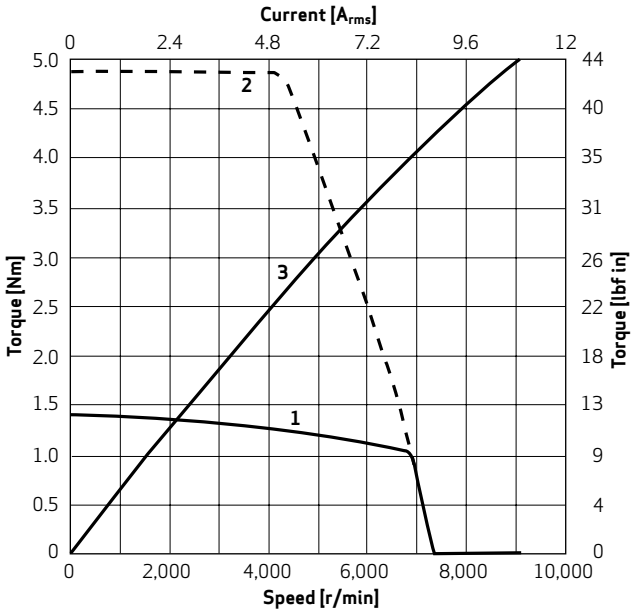
Temperature Class T4

Ambient Temperature 40 °C (104 °F)

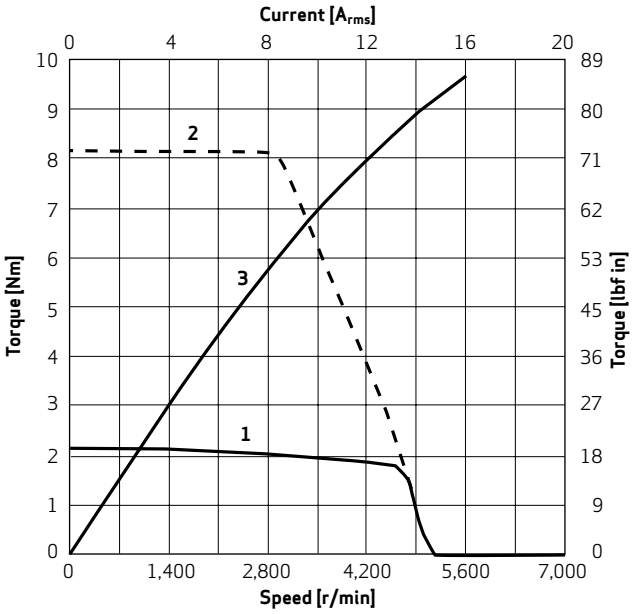
G-3LM2 (L05)



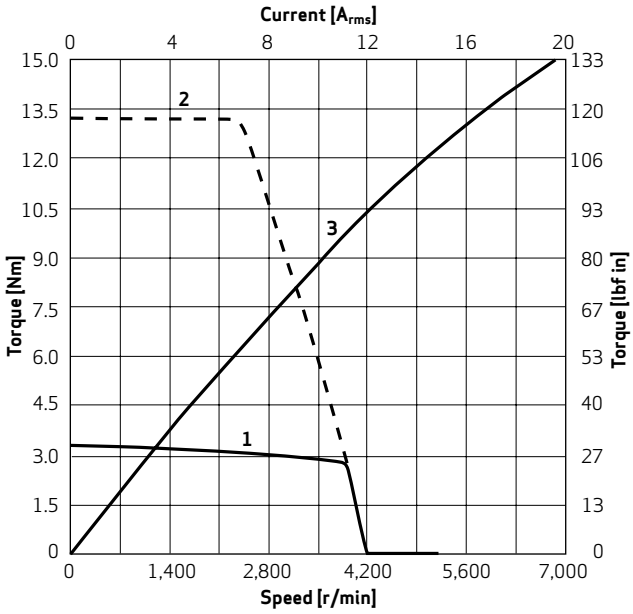
G-3LM4 (L15)



G-3LM6 (L25)



G-3LM8 (L40)



1 Continuous torque
2 Maximum torque
3 Torque constant k_T

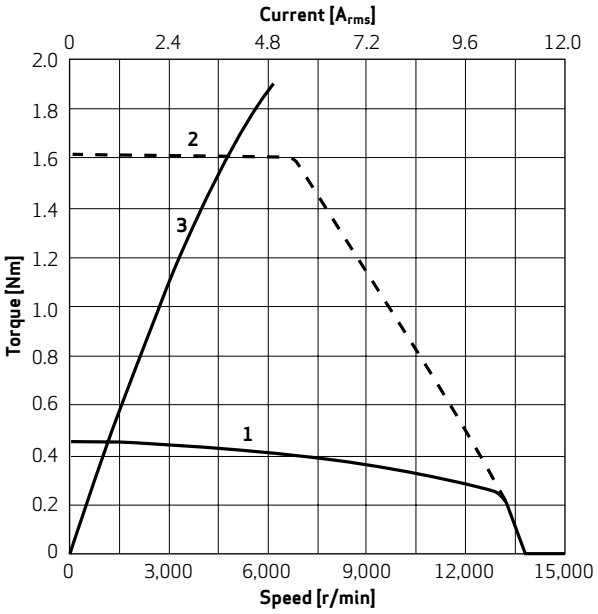
SIZE 3

Motor Characteristics Type G-3L

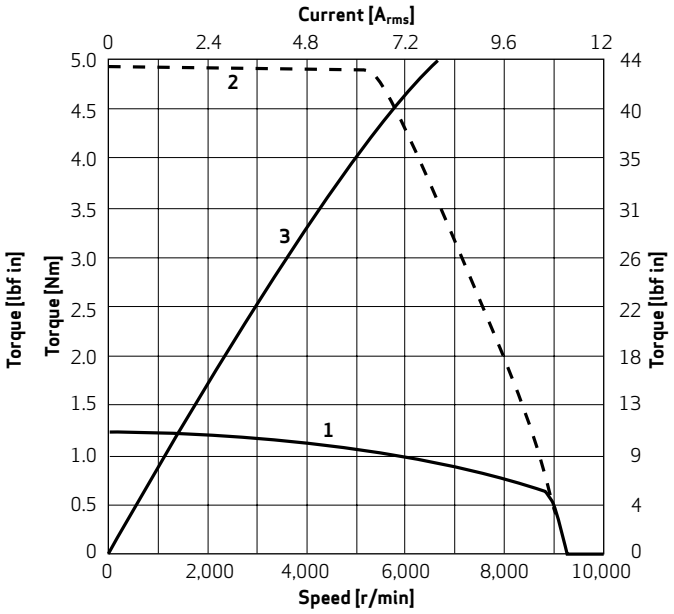
Temperature Class T4

Ambient Temperature 40 °C (104 °F)

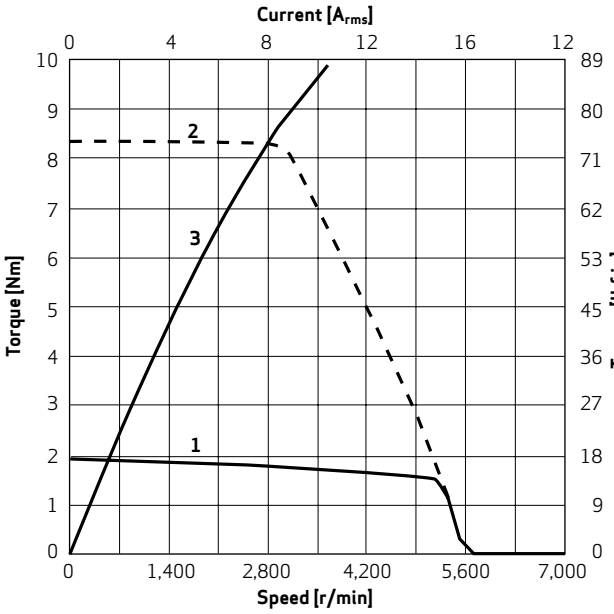
G-3LV2 (L05)



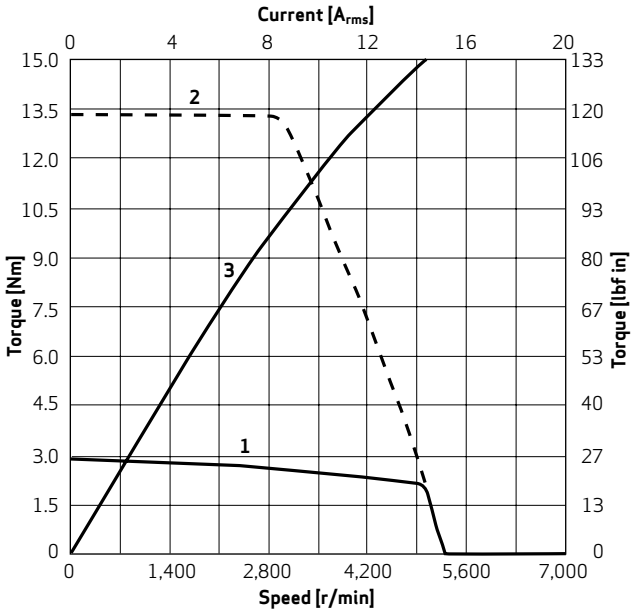
G-3LV4 (L15)



G-3LV6 (L25)



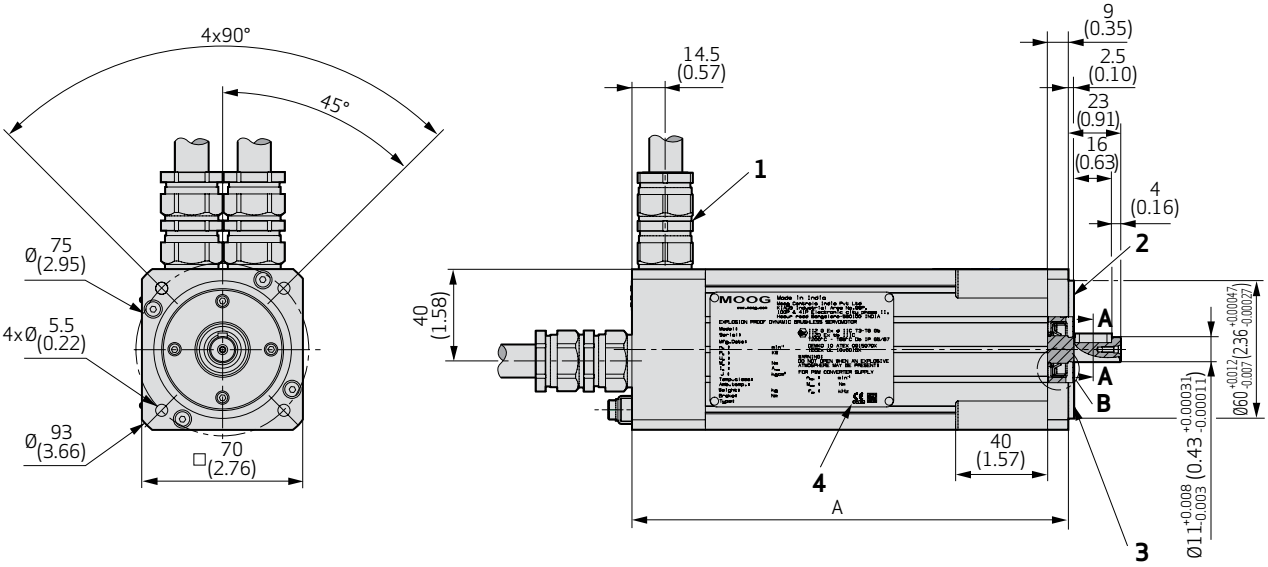
G-3LV8 (L40)



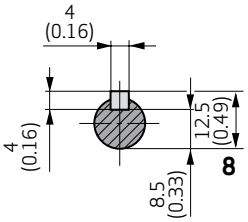
1 Continuous torque
2 Maximum torque
3 Torque constant k_T

SIZE 3

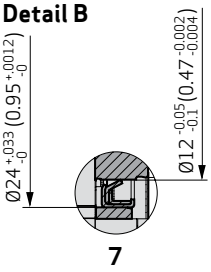
Type G-3L, Dimensions



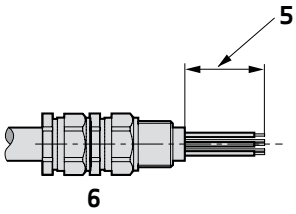
Section A-A



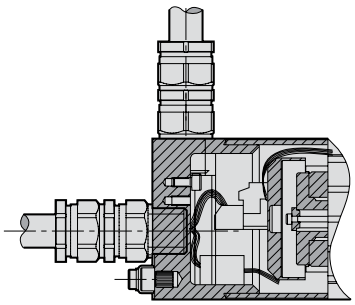
Detail B



Cable Gland



Sectional view for connection cable



Stack length	Dimension „A“ Resolver with Brake	Dimension „A“ Encoder without Brake	Dimension „A“ Resolver without Brake
	mm (in)	mm (in)	mm (in)
L05	190 (7.5)	190 (7.5)	164 (6.5)
L15	216 (8.5)	216 (8.5)	190 (7.5)
L25	241 (9.5)	241 (9.5)	215 (8.5)
L40	279 (11)	279 (11)	253 (10)

1 Alternative cable outlet
2 Run out class as per IEC/DIN Normal class
3 Flange
4 Name plate
5 Stripping length to be determined
6 Cable gland entry M20x1.5
7 Shaft seal
8 Optional shaft key

Notes:
NEMA/IEC metric mounting

SIZE 5

Low Voltage 325 V_{DC}, Type G-5LM

General Characteristics

Characteristics		Units	G-5LM2 (L10)	G-5LM4 (L20)	G-5LM6 (L30)	G-5LM8 (L50)
Maximum torque	M_{max}	Nm (lbf in)	12.2 (108)	25.8 (228)	38.2 (338)	61.2 (542)
Maximum current	I_{max}	A_{rms}	24.2	33.0	38.1	43.3
Maximum speed	n_{max}	r/min	6,600	4,100	3,300	2,400
Torque constant	k_T	Nm/A_{rms} (lbf in/A_{rms})	0.62 (5.5)	1.00 (8.9)	1.28 (11.3)	1.74 (15.4)
Voltage constant	k_e	$V_{rms}/k_{r/min}$	38.3	60.5	76.5	104
Thermal time constant	t_{th}	s	1,590	2,200	2,540	3,300
Winding resistance at 25 °C (77 °F) (phase to phase)	R_{tt}	Ohm	0.876	0.760	0.659	0.576
Winding inductance (phase to phase)	L_{tt}	mH	4.0	4.4	4.5	5.0
Rotor inertia with resolver	J	kg cm^2 (10^{-4} lbf in s^2)	4.6 (40.7)	8.00 (70.8)	11.50 (102)	18.40 (163)
Rotor inertia with encoder	J	kg cm^2 (10^{-4} lbf in s^2)	4.4 (38.9)	7.80 (69)	11.30 (100)	18.20 (161)
Weight (without brake)	m	kg (lb)	12.1 (26.7)	14.3 (31.5)	16.5 (36.4)	21.0 (46.3)

SIZE 5

Low Voltage 325 V_{DC}, Type G-5LM

Characteristics Based on Temperature Class T3 and T4

Characteristics		Units	G-5LM2 (L10)	G-5LM4 (L20)	G-5LM6 (L30)	G-5LM8 (L50)
Continuous stall torque at 40 °C (104 °F)	M_0	Nm (lbf in)	5.79 (51.2)	10.83 (95.9)	15.7 (139)	25.4 (225)
Continuous stall current at 40 °C (104 °F)	I_0	A_{rms}	9.40	10.76	12.27	14.52
Rated torque at 40 °C (104 °F)	M_N	Nm (lbf in)	4.32 (38.2)	8.15 (72.1)	12.40 (110)	20.95 (185)
Rated speed at 40 °C (104 °F)	n_N	r/min	4,800	3,500	2,700	2,000
Output power, continuous duty, rated speed at 40 °C (104 °F)	P_N	kW (hp)	2.170 (2.9)	2.985 (4)	3.504 (4.7)	4.385 (5.9)
Continuous stall torque at 50 °C (122 °F)	M_0	Nm (lbf in)	5.47 (48.4)	10.24 (90.6)	14.85 (131)	24.00 (212)
Rated torque at 50 °C (122 °F)	M_N	Nm (lbf in)	3.92 (34.7)	7.39 (65.4)	11.34 (100)	19.32 (171)
Rated speed at 50 °C (122 °F)	n_N	r/min	4,800	3,500	2,700	2,000
Output power, continuous duty, rated speed at 50 °C (122 °F)	P_N	kW (hp)	1.969 (2.6)	2.707 (3.6)	3.204 (4.3)	4.44 (5.4)
Continuous stall torque at 60 °C (140 °F)	M_0	Nm (lbf in)	5.15 (45.6)	9.64 (85.3)	13.98 (124)	22.60 (200)
Rated torque at 60 °C (140 °F)	M_N	Nm (lbf in)	3.47 (30.7)	6.56 (58.1)	10.21 (90.4)	17.58 (156)
Rated speed at 60 °C (140 °F)	n_N	r/min	4,800	3,500	2,700	2,000
Output power, continuous duty, rated speed at 60 °C (140 °F)	P_N	kW (hp)	1.743 (2.3)	2.403 (3.2)	2.885 (3.9)	3.680 (4.9)
Continuous stall torque at 70 °C (158 °F)	M_0	Nm (lbf in)	4.81 (42.6)	9.00 (79.7)	13.07 (116)	21.14 (187)
Rated torque at 70 °C (158 °F)	M_N	Nm (lbf in)	2.96 (26.2)	5.58 (49.4)	8.92 (78.9)	15.67 (139)
Rated speed at 70 °C (158 °F)	n_N	r/min	4,800	3,500	2,700	2,000
Output power, continuous duty, rated speed at 70 °C (158 °F)	P_N	kW (hp)	1.487 (2)	2.44 (2.7)	2.521 (3.4)	3.280 (4.4)
Continuous stall torque at 80 °C (176 °F)	M_0	Nm (lbf in)	4.30 (38.1)	8.05 (71.2)	11.67 (103)	18.87 (167)
Rated torque at 80 °C (176 °F)	M_N	Nm (lbf in)	2.06 (18.2)	3.88 (34.3)	6.73 (59.6)	12.43 (110)
Rated speed at 80 °C (176 °F)	n_N	r/min	4,800	3,500	2,700	2,000
Output power, continuous duty, rated speed at 80 °C (176 °F)	P_N	kW (hp)	1.035 (1.4)	1.421 (1.9)	1.902 (2.5)	2.602 (3.5)

SIZE 5

Low Voltage 325 V_{DC}, Type G-5LM

Characteristics Based on Temperature Class T5

Characteristics		Units	G-5LM2 (L10)	G-5LM4 (L20)	G-5LM6 (L30)	G-5LM8 (L50)
Continuous stall torque at 40 °C (104 °F)	M_0	Nm (lbf in)	5.09 (45.1)	9.53 (84.3)	13.82 (122)	22.35 (198)
Rated torque at 40 °C (104 °F)	M_N	Nm (lbf in)	3.15 (27.9)	5.92 (52.4)	9.47 (83.8)	16.60 (147)
Rated speed at 40 °C (104 °F)	n_N	r/min	4,800	3,500	2,700	2,000
Output power, continuous duty, rated speed at 40 °C (104 °F)	P_N	kW (hp)	1.582 (2.1)	2.169 (2.9)	2.676 (3.6)	3.475 (4.7)

Characteristics Based on Temperature Class T6

Characteristics		Units	G-5LM2 (L10)	G-5LM4 (L20)	G-5LM6 (L30)	G-5LM8 (L50)
Continuous stall torque at 40 °C (104 °F)	M_0	Nm (lbf in)	4.03 (35.7)	9.53 (84.3)	10.93 (96.7)	17.68 (156)
Rated torque at 40 °C (104 °F)	M_N	Nm (lbf in)	1.47 (13)	5.92 (52.4)	4.42 (39.1)	7.83 (69.3)
Rated speed at 40 °C (104 °F)	n_N	r/min	4,200	3,500	2,500	2,000
Output power, continuous duty, rated speed at 40 °C (104 °F)	P_N	kW (hp)	0.646 (0.9)	2.169 (2.9)	1.156 (1.5)	1.639 (2.2)

SIZE 5
High Voltage 565 V_{DC}, Type G-5LV

General Characteristics

Characteristics		Units	G-5LV2 (L10)	G-5LV4 (L20)	G-5LV6 (L30)	G-5LV8 (L50)
Maximum torque	M_{max}	Nm (lbf in)	12.20 (108)	25.80 (228)	38.20 (338)	61.20 (542)
Maximum current	I_{max}	A_{rms}	13.6	22.9	35.5	44.0
Maximum speed	n_{max}	r/min	6,300	4,900	5,200	4,200
Torque constant	k_T	Nm/A_{rms} (lbf in/A_{rms})	1.11 (9.8)	1.45 (12.8)	1.38 (12.2)	1.74 (15.4)
Voltage constant	k_e	$V_{rms}/k_{r/min}$	69.4	88.4	83.5	104
Thermal time constant	t_{th}	s	1,590	2,200	2,540	3,300
Winding resistance at 25 °C (77 °F) (phase to phase)	R_{tt}	Ohm	2.850	1.595	0.757	0.576
Winding inductance (phase to phase)	L_{tt}	mH	13.0	9.3	5.4	5.0
Rotor inertia with resolver	J	kg cm^2 (10^{-4} lbf in s^2)	4.60 (40.7)	7.80 (69)	11.50 (102)	18.20 (161)
Rotor inertia with encoder	J	kg cm^2 (10^{-4} lbf in s^2)	4.40 (38.9)	7.80 (69)	11.30 (100)	18.20 (161)
Weight (without brake)	m	kg (lb)	12.1 (26.7)	14.3 (31.5)	16.5 (36.4)	21.0 (46.3)

SIZE 5
High Voltage 565 V_{DC}, Type G-5LV

Characteristics Based on Temperature Class T3 and T4

Characteristics		Units	G-5LV2 (L10)	G-5LV4 (L20)	G-5LV6 (L30)	G-5LV8 (L50)
Continuous stall torque at 40 °C (104 °F)	M_0	Nm (lbf in)	5.79 (51.2)	10.83 (95.9)	15.70 (139)	25.40 (225)
Continuous stall current at 40 °C (104 °F)	I_0	A_{rms}	5.16	7.40	11.35	14.52
Rated torque at 40 °C (104 °F)	M_N	Nm (lbf in)	4.32 (38.2)	8.15 (72.1)	12.40 (110)	20.95 (185)
Rated speed at 40 °C (104 °F)	n_N	r/min	4,800	3,500	2,700	2,000
Output power, continuous duty, rated speed at 40 °C (104 °F)	P_N	kW (hp)	2.170 (2.9)	2.985 (4)	3.54 (4.1)	4.385 (5.9)
Continuous stall torque at 50 °C (122 °F)	M_0	Nm (lbf in)	5.47 (48.4)	10.24 (90.6)	14.85 (131)	24.00 (212)
Rated torque at 50 °C (122 °F)	M_N	Nm (lbf in)	3.92 (34.7)	7.39 (65.4)	11.34 (100)	19.32 (171)
Rated speed at 50 °C (122 °F)	n_N	r/min	4,800	3,500	2,700	2,000
Output power, continuous duty, rated speed at 50 °C (122 °F)	P_N	kW (hp)	1.969 (2.6)	2.707 (3.6)	3.204 (4.3)	4.44 (5.4)
Continuous stall torque at 60 °C (140 °F)	M_0	Nm (lbf in)	5.15 (45.6)	9.64 (85.3)	13.98 (124)	22.60 (200)
Rated torque at 60 °C (140 °F)	M_N	Nm (lbf in)	3.47 (30.7)	6.56 (58.1)	10.21 (90.4)	17.58 (156)
Rated speed at 60 °C (140 °F)	n_N	r/min	4,800	3,500	2,700	2,000
Output power, continuous duty, rated speed at 60 °C (140 °F)	P_N	kW (hp)	1.743 (2.3)	2.403 (3.2)	2.885 (3.9)	3.680 (4.9)
Continuous stall torque at 70 °C (158 °F)	M_0	Nm (lbf in)	4.81 (42.6)	9.00 (79.7)	13.07 (116)	21.14 (187)
Rated torque at 70 °C (158 °F)	M_N	Nm (lbf in)	2.96 (26.2)	5.58 (49.4)	8.92 (78.9)	15.67 (139)
Rated speed at 70 °C (158 °F)	n_N	r/min	4,800	3,500	2,700	2,000
Output power, continuous duty, rated speed at 70 °C (158 °F)	P_N	kW (hp)	1.487 (2)	2.44 (2.7)	2.521 (3.4)	3.280 (4.4)
Continuous stall torque at 80 °C (176 °F)	M_0	Nm (lbf in)	4.30 (38.1)	8.05 (71.2)	11.67 (103)	18.87 (167)
Rated torque at 80 °C (176 °F)	M_N	Nm (lbf in)	2.06 (18.2)	3.88 (34.3)	6.73 (59.6)	12.43 (110)
Rated speed at 80 °C (176 °F)	n_N	r/min	4,800	3,500	2,700	2,000
Output power, continuous duty, rated speed at 80 °C (176 °F)	P_N	kW (hp)	1.035 (1.4)	1.421 (1.9)	1.902 (2.5)	2.602 (3.5)

SIZE 5

High Voltage 565 V_{DC}, Type G-5LV

Characteristics Based on Temperature Class T5

Characteristics		Units	G-5LV2 (L10)	G-5LV4 (L20)	G-5LV6 (L30)	G-5LV8 (L50)
Continuous stall torque at 40 °C (104 °F)	M_0	Nm (lbf in)	5.09 (45.1)	9.53 (84.3)	13.82 (122)	22.35 (198)
Rated torque at 40 °C (104 °F)	M_N	Nm (lbf in)	3.15 (27.9)	5.92 (52.4)	9.47 (83.8)	16.60 (147)
Rated speed at 40 °C (104 °F)	n_N	r/min	4,800	3,500	2,700	2,000
Output power, continuous duty, rated speed at 40 °C (104 °F)	P_N	kW (hp)	1.582 (2.1)	2.169 (2.9)	2.676 (3.6)	3.475 (4.7)

Characteristics Based on Temperature Class T6

Characteristics		Units	G-5LV2 (L10)	G-5LV4 (L20)	G-5LV6 (L30)	G-5LV8 (L50)
Continuous stall torque at 40 °C (104 °F)	M_0	Nm (lbf in)	4.03 (35.7)	7.54 (66.7)	10.93 (96.7)	17.68 (156)
Rated torque at 40 °C (104 °F)	M_N	Nm (lbf in)	1.47 (13)	2.51 (22.2)	4.42 (39.1)	7.83 (69.3)
Rated speed at 40 °C (104 °F)	n_N	r/min	4,200	3,100	2,500	2,000
Output power, continuous duty, rated speed at 40 °C (104 °F)	P_N	kW (hp)	0.646 (0.9)	0.814 (1.1)	1.156 (1.5)	1.639 (2.2)

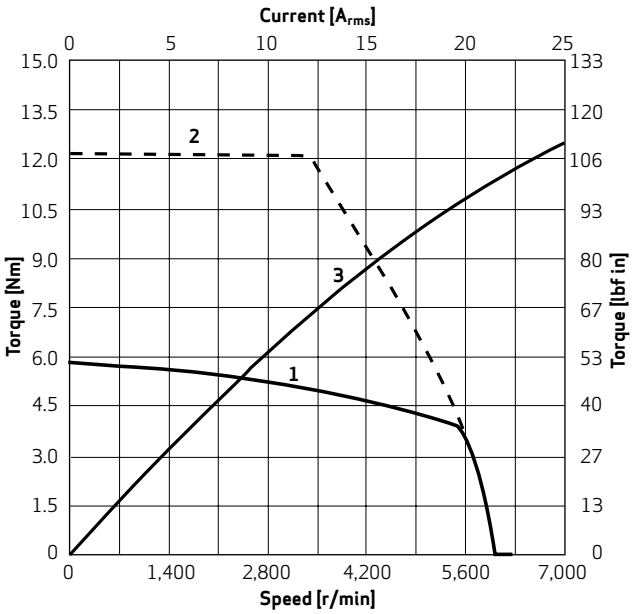
SIZE 5

Motor Characteristics Type G-5L

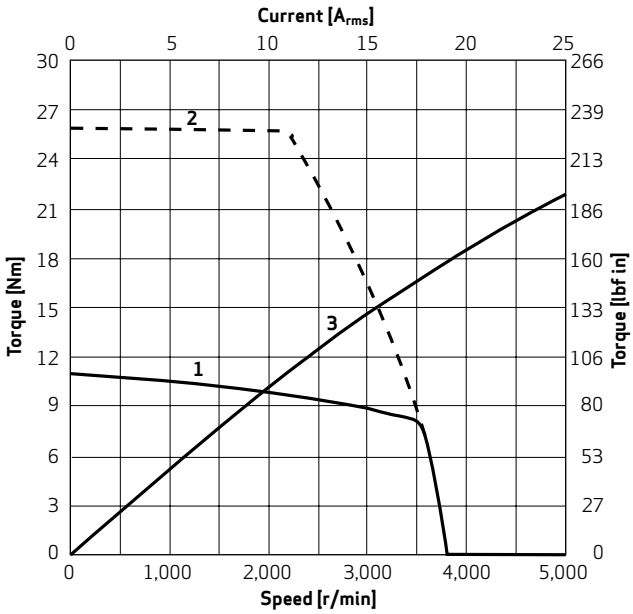
Temperature Class T4

Ambient Temperature 40 °C (104 °F)

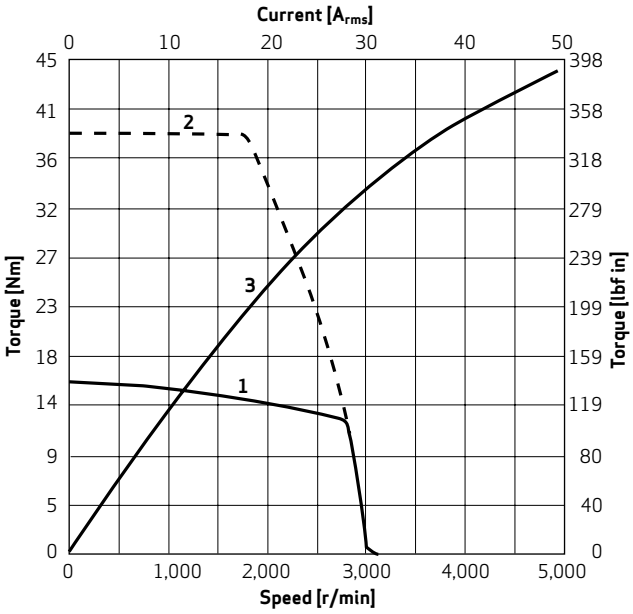
G-5LM2 (L10)



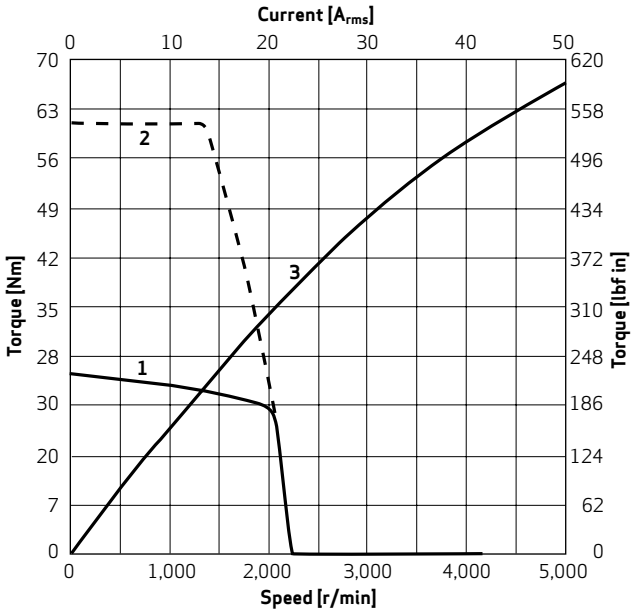
G-5LM4 (L20)



G-5LM6 (L30)



G-5LM8 (L50)



1 Continuous torque
2 Maximum torque
3 Torque constant k_T

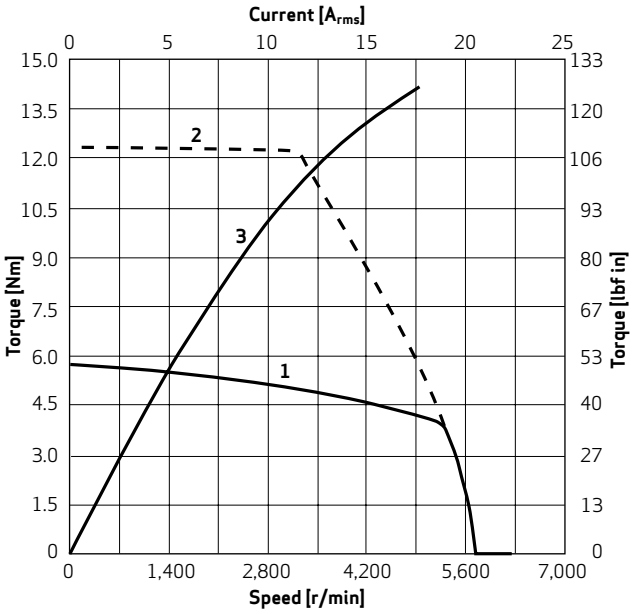
SIZE 5

Motor Characteristics Type G-5L

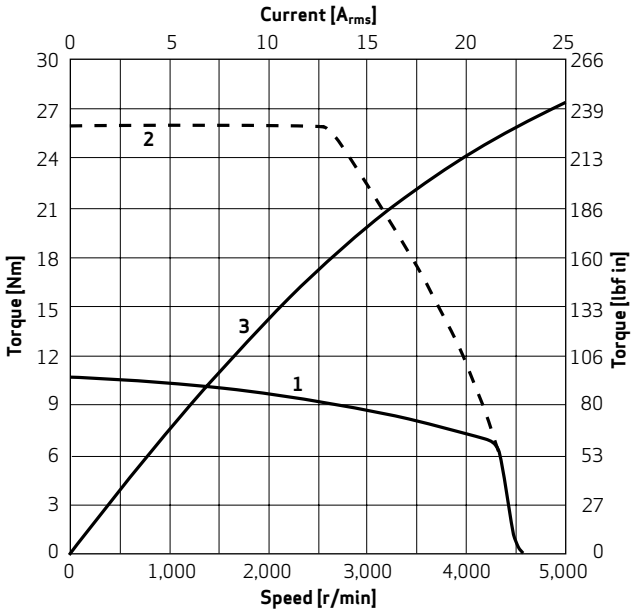
Temperature Class T4

Ambient Temperature 40 °C (104 °F)

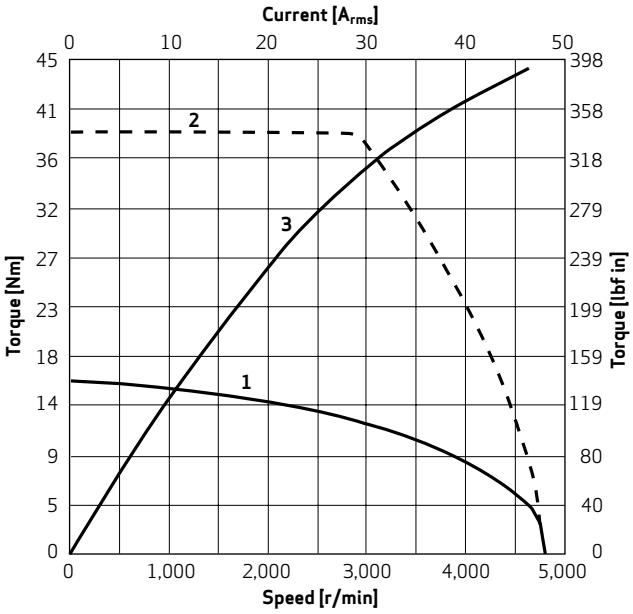
G-5LV2 (L10)



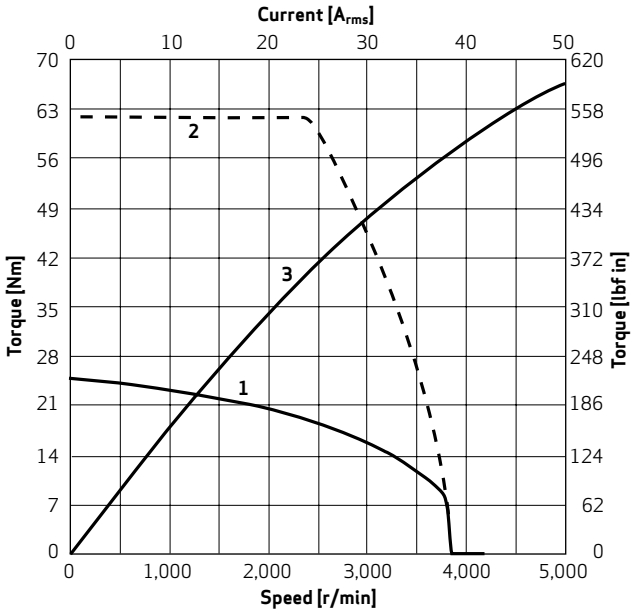
G-5LV4 (L20)



G-5LV6 (L30)



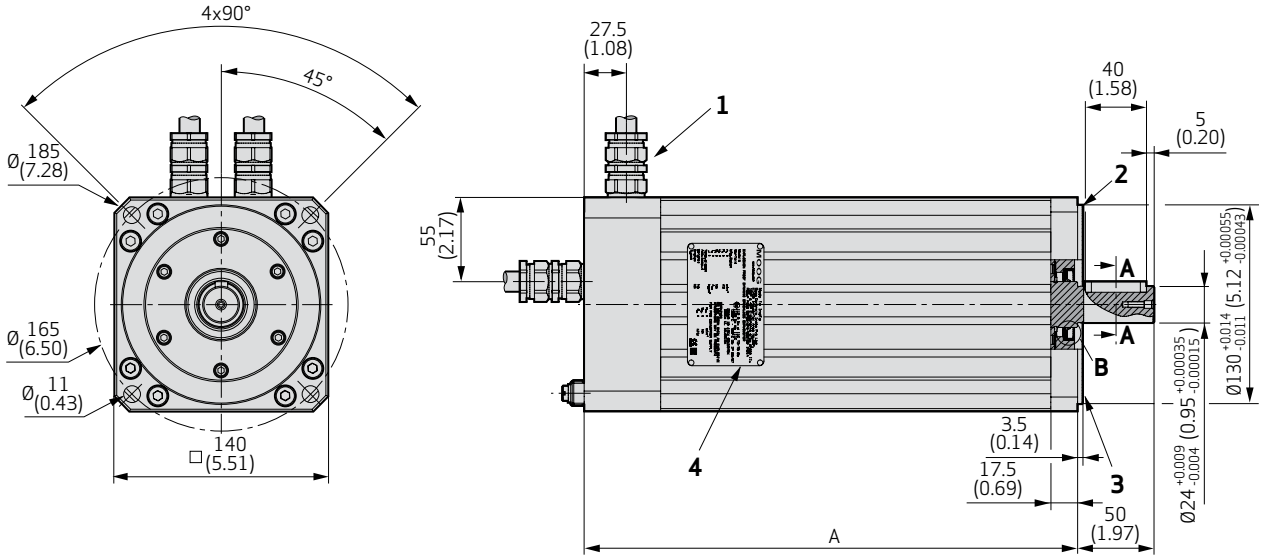
G-5LV8 (L50)



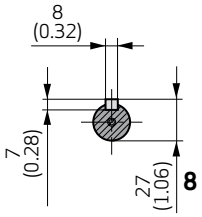
1 Continuous torque
2 Maximum torque
3 Torque constant k_T

SIZE 5

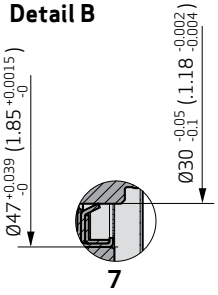
Type G-5L, Dimensions



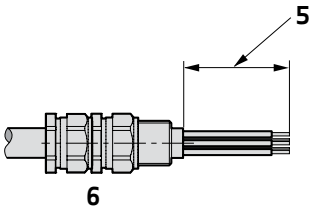
SECTION A-A



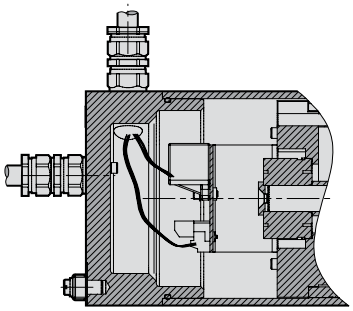
Detail B



Cable Gland



Sectional view for connection cable



Stack length	Dimension „A“ Resolver without brake Encoder without brake	Dimension „A“ Resolver with brake Encoder with brake
	mm (in)	mm (in)
L10	265 (10.4)	323 (12.7)
L20	290 (11.4)	348 (13.7)
L30	315 (12.4)	373 (14.7)
L50	366 (14.4)	424 (16.7)

Notes:
NEMA/IEC metric mounting

1 Alternative cable outlet
2 Run out class as per IEC/DIN Normal class
3 Flange
4 Name plate
5 Stripping length to be determine
6 Cable gland entry M20x1.5, optional M25x1.5
7 Shaft seal
8 Optional shaft key

SIZE 6

Low Voltage 325 V_{DC}, Type G-6LM

General Characteristics

Characteristics		Units	G-6LM2 (L15)	G-6LM4 (L30)	G-6LM6 (L45)	G-6LM8 (L60)	G-6LM9 (L90)
Maximum torque	M_{max}	Nm (lbf in)	40.13 (355)	79.79 (706)	119.65 (1,059)	159.55 (1,412)	239.34 (2,118)
Maximum current	I_{max}	A_{rms}	72.0	107.0	133.7	154.4	178.3
Maximum speed	n_{max}	r/min	6,130	4,660	3,900	3,370	2,620
Torque constant	k_T	Nm/A_{rms} (lbf in/A_{rms})	0.65 (5.8)	0.87 (7.7)	1.05 (9.3)	1.21 (10.7)	1.57 (13.9)
Voltage constant	k_e	$V_{rms}/k_{r/min}$	41.3	54.4	65.0	75.1	96.9
Thermal time constant	t_{th}	s	2,698	3,186	3,775	3,850	4,100
Winding resistance at 25 °C (77 °F) (phase to phase)	R_{tt}	Ohm	0.234	0.140	0.115	0.105	0.105
Winding inductance (phase to phase)	L_{tt}	mH	2.0	1.6	1.5	1.4	1.6
Rotor inertia with resolver	J	kg cm^2 (10^{-4} lbf in s^2)	27.25 (241)	52.08 (461)	76.91 (681)	102.07 (903)	151.08 (1,337)
Rotor inertia with encoder	J	kg cm^2 (10^{-4} lbf in s^2)	27.25 (241)	52.08 (461)	76.91 (681)	102.07 (903)	151.08 (1,337)
Weight (without brake)	m	kg (lb)	15.1 (33.3)	21.1 (46.5)	27.1 (59.8)	33.1 (73)	44.9 (99)

SIZE 6

Low Voltage 325 V_{DC}, Type G-6LM

Characteristics Based on Temperature Class T3

Characteristics		Units	G-6LM2 (L15)	G-6LM4 (L30)	G-6LM6 (L45)	G-6LM8 (L60)	G-6LM9 (L90)
Continuous stall torque at 40 °C (104 °F)	M_0	Nm (lbf in)	12.91 (114)	25.57 (226)	36.26 (321)	47.35 (419)	66.72 (591)
Continuous stall current at 40 °C (104 °F)	I_0	A_{rms}	19.75	29.35	34.63	39.15	42.40
Rated torque at 40 °C (104 °F)	M_N	Nm (lbf in)	7.96 (70.5)	16.50 (146)	23.18 (205)	31.20 (276)	39.91 (353)
Rated speed at 40 °C (104 °F)	n_N	r/min	4,000	3,000	2,500	2,200	2,000
Output power, continuous duty, rated speed at 40 °C (104 °F)	P_N	kW (hp)	3.335 (4.5)	5.183 (6.9)	6.70 (8.1)	7.188 (9.6)	8.360 (11.2)
Continuous stall torque at 50 °C (122 °F)	M_0	Nm (lbf in)	12.38 (110)	23.77 (210)	34.36 (304)	44.87 (397)	65.71 (582)
Rated torque at 50 °C (122 °F)	M_N	Nm (lbf in)	7.26 (64.3)	13.56 (120)	20.39 (180)	27.66 (245)	39.73 (352)
Rated speed at 50 °C (122 °F)	n_N	r/min	4,000	3,000	2,500	2,200	2,000
Output power, continuous duty, rated speed at 50 °C (122 °F)	P_N	kW (hp)	3.41 (4.1)	4.261 (5.7)	5.340 (7.2)	6.372 (8.5)	8.322 (11.2)
Continuous stall torque at 60 °C (140 °F)	M_0	Nm (lbf in)	11.75 (104)	22.94 (203)	32.92 (291)	43.31 (383)	63.43 (561)
Rated torque at 60 °C (140 °F)	M_N	Nm (lbf in)	6.26 (55.4)	12.49 (111)	18.36 (162)	25.73 (228)	36.87 (326)
Rated speed at 60 °C (140 °F)	n_N	r/min	4,000	3,000	2,500	2,200	2,000
Output power, continuous duty, rated speed at 60 °C (140 °F)	P_N	kW (hp)	2.624 (3.5)	3.923 (5.3)	4.808 (6.4)	5.928 (7.9)	7.722 (10.4)
Continuous stall torque at 70 °C (158 °F)	M_0	Nm (lbf in)	10.85 (96)	20.82 (184)	29.92 (265)	39.32 (348)	57.58 (510)
Rated torque at 70 °C (158 °F)	M_N	Nm (lbf in)	6.87 (60.8)	12.76 (113)	18.57 (164)	24.83 (220)	33.98 (301)
Rated speed at 70 °C (158 °F)	n_N	r/min	3,200	2,400	2,000	1,800	1,700
Output power, continuous duty, rated speed at 70 °C (158 °F)	P_N	kW (hp)	2.304 (3.1)	3.208 (4.3)	3.890 (5.2)	4.681 (6.3)	6.49 (8.1)
Continuous stall torque at 80 °C (176 °F)	M_0	Nm (lbf in)	9.96 (88.2)	19.12 (169)	27.64 (245)	36.10 (320)	52.87 (468)
Rated torque at 80 °C (176 °F)	M_N	Nm (lbf in)	6.44 (57)	11.90 (105)	17.00 (150)	22.56 (200)	31.03 (275)
Rated speed at 80 °C (176 °F)	n_N	r/min	2,800	2,100	1,800	1,600	1,500
Output power, continuous duty, rated speed at 80 °C (176 °F)	P_N	kW (hp)	1.889 (2.5)	2.616 (3.5)	3.204 (4.3)	3.781 (5.1)	4.875 (6.5)
Continuous stall torque at 90 °C (194 °F)	M_0	Nm (lbf in)	8.91 (78.9)	16.60 (147)	24.00 (212)	31.35 (277)	49.95 (442)
Rated torque at 90 °C (194 °F)	M_N	Nm (lbf in)	5.98 (52.9)	10.85 (96)	15.11 (134)	19.07 (169)	26.22 (232)
Rated speed at 90 °C (194 °F)	n_N	r/min	2,300	1,600	1,400	1,300	1,500
Output power, continuous duty, rated speed at 90 °C (194 °F)	P_N	kW (hp)	1.441 (1.9)	1.817 (2.4)	2.216 (3)	2.596 (3.5)	4.119 (5.5)
Continuous stall torque at 100 °C (212 °F)	M_0	Nm (lbf in)	7.29 (64.5)	14.43 (128)	20.72 (183)	27.26 (241)	44.68 (395)
Rated torque at 100 °C (212 °F)	M_N	Nm (lbf in)	4.00 (35.4)	8.60 (76.1)	13.03 (115)	17.10 (151)	23.63 (209)
Rated speed at 100 °C (212 °F)	n_N	r/min	2,000	1,400	1,100	1,000	1,250
Output power, continuous duty, rated speed at 100 °C (212 °F)	P_N	kW (hp)	0.838 (1.1)	1.261 (1.7)	1.501 (2)	1.791 (2.4)	3.93 (4.1)

SIZE 6

Low Voltage 325 V_{DC}, Type G-6LM

Characteristics Based on Temperature Class T4

Characteristics		**Units**	**G-6LM2 (L15)**	**G-6LM4 (L30)**	**G-6LM6 (L45)**	**G-6LM8 (L60)**	**G-6LM9 (L90)**
Continuous stall torque at 40 °C (104 °F)	M_0	Nm (lbf in)	12.91 (114)	25.57 (226)	36.26 (321)	47.35 (419)	66.72 (591)
Continuous stall current at 40 °C (104 °F)	I_0	A_{rms}	19.75	29.35	34.63	39.15	42.4
Rated torque at 40 °C (104 °F)	M_N	Nm (lbf in)	7.96 (70.5)	16.50 (146)	23.18 (205)	31.20 (276)	39.91 (353)
Rated speed at 40 °C (104 °F)	n_N	r/min	4,000	3,000	2,500	2,200	2,000
Output power, continuous duty, rated speed at 40 °C (104 °F)	P_N	kW (hp)	3.335 (4.5)	5.183 (6.9)	6.70 (8.1)	7.188 (9.6)	8.36 (11.2)
Continuous stall torque at 50 °C (122 °F)	M_0	Nm (lbf in)	12.38 (110)	23.77 (210)	34.36 (304)	44.87 (397)	65.71 (582)
Rated torque at 50 °C (122 °F)	M_N	Nm (lbf in)	7.26 (64.3)	13.56 (120)	20.39 (180)	27.66 (245)	39.73 (352)
Rated speed at 50 °C (122 °F)	n_N	r/min	4,000	3,000	2,500	2,200	2,000
Output power, continuous duty, rated speed at 50 °C (122 °F)	P_N	kW (hp)	3.41 (4.1)	4.261 (5.7)	5.340 (7.2)	6.372 (8.5)	8.322 (11.2)
Continuous stall torque at 60 °C (140 °F)	M_0	Nm (lbf in)	11.63 (103)	22.44 (199)	32.43 (287)	42.36 (375)	62.03 (549)
Rated torque at 60 °C (140 °F)	M_N	Nm (lbf in)	5.99 (53)	11.29 (100)	17.24 (153)	23.72 (210)	38.82 (344)
Rated speed at 60 °C (140 °F)	n_N	r/min	4,000	3,000	2,500	2,200	1,800
Output power, continuous duty, rated speed at 60 °C (140 °F)	P_N	kW (hp)	2.509 (3.4)	3.546 (4.8)	4.514 (6.1)	5.466 (7.3)	7.319 (9.8)
Continuous stall torque at 70 °C (158 °F)	M_0	Nm (lbf in)	10.85 (96)	20.82 (184)	29.92 (265)	39.32 (348)	57.58 (510)
Rated torque at 70 °C (158 °F)	M_N	Nm (lbf in)	6.87 (60.8)	12.76 (113)	18.57 (164)	24.83 (220)	33.98 (301)
Rated speed at 70 °C (158 °F)	n_N	r/min	3,200	2,400	2,000	1,800	1,700
Output power, continuous duty, rated speed at 70 °C (158 °F)	P_N	kW (hp)	2.304 (3.1)	3.208 (4.3)	3.890 (5.2)	4.681 (6.3)	6.49 (8.1)
Continuous stall torque at 80 °C (176 °F)	M_0	Nm (lbf in)	9.96 (88.2)	19.12 (169)	27.64 (245)	36.10 (320)	52.87 (468)
Rated torque at 80 °C (176 °F)	M_N	Nm (lbf in)	6.44 (57)	11.90 (105)	17.00 (150)	22.56 (200)	31.03 (275)
Rated speed at 80 °C (176 °F)	n_N	r/min	2,800	2,100	1,800	1,600	1,500
Output power, continuous duty, rated speed at 80 °C (176 °F)	P_N	kW (hp)	1.889 (2.5)	2.616 (3.5)	3.204 (4.3)	3.781 (5.1)	4.875 (6.5)

SIZE 6

Low Voltage 325 V_{DC}, Type G-6LM

Characteristics Based on Temperature Class T5

Characteristics		Units	G-6LM2 (L15)	G-6LM4 (L30)	G-6LM6 (L45)	G-6LM8 (L60)	G-6LM9 (L90)
Continuous stall torque at 40 °C (104 °F)	M_0	Nm (lbf in)	10.32 (91.3)	19.81 (175)	28.64 (253)	37.41 (331)	54.79 (485)
Rated torque at 40 °C (104 °F)	M_N	Nm (lbf in)	6.47 (57.3)	12.05 (107)	17.34 (153)	23.19 (205)	34.76 (308)
Rated speed at 40 °C (104 °F)	n_N	r/min	2,700	2,000	1,700	1,500	1,300
Output power, continuous duty, rated speed at 40 °C (104 °F)	P_N	kW (hp)	1.831 (2.5)	2.523 (3.4)	3.87 (4.1)	3.644 (4.9)	4.733 (6.3)

Characteristics Based on Temperature Class T6

Characteristics		Units	G-6LM2 (L15)	G-6LM4 (L30)	G-6LM6 (L45)	G-6LM8 (L60)	G-6LM9 (L90)
Continuous stall torque at 40 °C (104 °F)	M_0	Nm (lbf in)	8.96 (79.3)	17.20 (152)	24.87 (220)	32.29 (286)	47.30 (419)
Rated torque at 40 °C (104 °F)	M_N	Nm (lbf in)	5.71 (50.5)	10.87 (96.2)	13.86 (123)	18.86 (167)	26.29 (233)
Rated speed at 40 °C (104 °F)	n_N	r/min	2,100	1,500	1,400	1,200	1,100
Output power, continuous duty, rated speed at 40 °C (104 °F)	P_N	kW (hp)	1.256 (1.7)	1.708 (2.3)	2.32 (2.7)	2.371 (3.2)	3.29 (4.1)

SIZE 6
High Voltage 565 V_{DC}, Type G-6LV

General Characteristics

Characteristics		Units	G-6LV2 (L15)	G-6LV4 (L30)	G-6LV6 (L45)	G-6LV8 (L60)	G-6LV9 (L90)
Maximum torque	M_{max}	Nm (lbf in)	40.15 (355)	79.77 (706)	119.64 (1,059)	159.52 (1,412)	239.31 (2,118)
Maximum current	I_{max}	A_{rms}	48	77.2	88.2	88.2	123.5
Maximum speed	n_{max}	r/min	7,100	5,850	4,470	3,350	3,150
Torque constant	k_T	Nm/A_{rms} (lbf in/A_{rms})	0.98 (8.7)	1.21 (10.7)	1.59 (14.1)	2.12 (18.8)	2.27 (20.1)
Voltage constant	k_e	$V_{rms}/k_{r/min}$	62.1	75.4	98.5	132	140
Thermal time constant	t_{th}	s	2,698	3,186	3,775	3,850	4,100
Winding resistance at 25 °C (77 °F) (phase to phase)	R_{tt}	Ohm	0.533	0.283	0.265	0.321	0.219
Winding inductance (phase to phase)	L_{tt}	mH	4.5	3.1	3.4	4.4	3.3
Rotor inertia with resolver	J	kg cm^2 (10^{-4} lbf in s^2)	27.25 (241)	52.08 (461)	76.91 (681)	102.07 (903)	151.08 (1,337)
Rotor inertia with encoder	J	kg cm^2 (10^{-4} lbf in s^2)	27.25 (241)	52.08 (461)	76.91 (681)	102.07 (903)	151.08 (1,337)
Weight (without brake)	m	kg (lb)	15.1 (33.3)	21.1 (46.5)	27.1 (59.8)	33.1 (73)	44.9 (99)

SIZE 6
High Voltage 565 V_{DC}, Type G-6LV

Characteristics Based on Temperature Class T3

Characteristics		Units	G-6LV2 (L15)	G-6LV4 (L30)	G-6LV6 (L45)	G-6LV8 (L60)	G-6LV9 (L90)
Continuous stall torque at 40 °C (104 °F)	M_0	Nm (lbf in)	12.85 (114)	24.95 (221)	36.24 (321)	47.30 (419)	66.68 (590)
Continuous stall current at 40 °C (104 °F)	I_0	A_{rms}	13.10	20.65	22.84	22.35	29.36
Rated torque at 40 °C (104 °F)	M_N	Nm (lbf in)	7.93 (70.2)	16.09 (142)	23.17 (205)	31.16 (276)	39.89 (353)
Rated speed at 40 °C (104 °F)	n_N	r/min	4,000	3,000	2,500	2,200	2,000
Output power, continuous duty, rated speed at 40 °C (104 °F)	P_N	kW (hp)	3.320 (4.5)	5.55 (6.8)	6.66 (8.1)	7.181 (9.6)	8.355 (11.2)
Continuous stall torque at 50 °C (122 °F)	M_0	Nm (lbf in)	12.33 (109)	23.19 (205)	34.34 (304)	44.82 (397)	65.68 (581)
Rated torque at 50 °C (122 °F)	M_N	Nm (lbf in)	7.23 (64)	13.23 (117)	20.38 (180)	27.63 (245)	39.71 (351)
Rated speed at 50 °C (122 °F)	n_N	r/min	4,000	3,000	2,500	2,200	2,000
Output power, continuous duty, rated speed at 50 °C (122 °F)	P_N	kW (hp)	3.27 (4.1)	4.156 (5.6)	5.336 (7.2)	6.366 (8.5)	8.318 (11.2)
Continuous stall torque at 60 °C (140 °F)	M_0	Nm (lbf in)	11.70 (104)	22.38 (198)	32.90 (291)	43.26 (383)	63.39 (561)
Rated torque at 60 °C (140 °F)	M_N	Nm (lbf in)	6.24 (55.2)	12.18 (108)	18.35 (162)	25.70 (227)	36.84 (326)
Rated speed at 60 °C (140 °F)	n_N	r/min	4,000	3,000	2,500	2,200	2,000
Output power, continuous duty, rated speed at 60 °C (140 °F)	P_N	kW (hp)	2.612 (3.5)	3.826 (5.1)	4.806 (6.4)	5.922 (7.9)	7.718 (10.3)
Continuous stall torque at 70 °C (158 °F)	M_0	Nm (lbf in)	10.80 (95.6)	20.31 (180)	29.90 (265)	39.27 (348)	57.55 (509)
Rated torque at 70 °C (158 °F)	M_N	Nm (lbf in)	6.84 (60.5)	12.45 (110)	18.56 (164)	24.80 (219)	33.96 (301)
Rated speed at 70 °C (158 °F)	n_N	r/min	3,200	2,400	2,000	1,800	1,700
Output power, continuous duty, rated speed at 70 °C (158 °F)	P_N	kW (hp)	2.293 (3.1)	3.129 (4.2)	3.887 (5.2)	4.676 (6.3)	6.46 (8.1)
Continuous stall torque at 80 °C (176 °F)	M_0	Nm (lbf in)	9.92 (87.8)	18.65 (165)	27.62 (244)	36.06 (319)	52.84 (468)
Rated torque at 80 °C (176 °F)	M_N	Nm (lbf in)	6.41 (56.7)	11.59 (103)	16.98 (150)	22.54 (199)	31.01 (274)
Rated speed at 80 °C (176 °F)	n_N	r/min	2,800	2,100	1,800	1,600	1,500
Output power, continuous duty, rated speed at 80 °C (176 °F)	P_N	kW (hp)	1.881 (2.5)	2.550 (3.4)	3.202 (4.3)	3.777 (5.1)	4.872 (6.5)
Continuous stall torque at 90 °C (194 °F)	M_0	Nm (lbf in)	8.87 (78.5)	16.20 (143)	23.99 (212)	31.32 (277)	49.92 (442)
Rated torque at 90 °C (194 °F)	M_N	Nm (lbf in)	5.95 (52.7)	10.57 (93.6)	15.10 (134)	19.05 (169)	26.21 (232)
Rated speed at 90 °C (194 °F)	n_N	r/min	2,300	1,600	1,400	1,300	1,500
Output power, continuous duty, rated speed at 90 °C (194 °F)	P_N	kW (hp)	1.434 (1.9)	1.771 (2.4)	2.215 (3)	2.594 (3.5)	4.117 (5.5)
Continuous stall torque at 100 °C (212 °F)	M_0	Nm (lbf in)	7.26 (64.3)	14.08 (125)	20.71 (183)	27.24 (241)	40.00 (354)
Rated torque at 100 °C (212 °F)	M_N	Nm (lbf in)	3.98 (35.2)	8.38 (74.2)	13.02 (115)	17.08 (151)	23.61 (209)
Rated speed at 100 °C (212 °F)	n_N	r/min	2,000	1,400	1,100	1,000	1,250
Output power, continuous duty, rated speed at 100 °C (212 °F)	P_N	kW (hp)	0.834 (1.1)	1.229 (1.6)	1.500 (2)	1.789 (2.4)	3.91 (4.1)

SIZE 6

High Voltage 565 V_{DC}, Type G-6LV

Characteristics Based on Temperature Class T4

Characteristics		Units	G-6LV2 (L15)	G-6LV4 (L30)	G-6LV6 (L45)	G-6LV8 (L60)	G-6LV9 (L90)
Continuous stall torque at 40 °C (104 °F)	M_0	Nm (lbf in)	12.85 (114)	24.95 (221)	36.24 (321)	47.30 (419)	66.68 (590)
Continuous stall current at 40 °C (104 °F)	I_0	A_{rms}	13.10	20.65	22.84	22.35	29.36
Rated torque at 40 °C (104 °F)	M_N	Nm (lbf in)	7.93 (70.2)	16.09 (142)	23.17 (205)	31.16 (276)	39.89 (353)
Rated speed at 40 °C (104 °F)	n_N	r/min	4,000	3,000	2,500	2,200	2,000
Output power, continuous duty, rated speed at 40 °C (104 °F)	P_N	kW (hp)	3.320 (4.5)	5.55 (6.8)	6.66 (8.1)	7.181 (9.6)	8.355 (11.2)
Continuous stall torque at 50 °C (122 °F)	M_0	Nm (lbf in)	12.33 (109)	23.19 (205)	34.34 (304)	44.82 (397)	65.68 (581)
Rated torque at 50 °C (122 °F)	M_N	Nm (lbf in)	7.23 (64)	13.23 (117)	20.38 (180)	27.63 (245)	39.71 (351)
Rated speed at 50 °C (122 °F)	n_N	r/min	4,000	3,000	2,500	2,200	2,000
Output power, continuous duty, rated speed at 50 °C (122 °F)	P_N	kW (hp)	3.27 (4.1)	4.156 (5.6)	5.336 (7.2)	6.366 (8.5)	8.318 (11.2)
Continuous stall torque at 60 °C (140 °F)	M_0	Nm (lbf in)	11.58 (102)	21.89 (194)	32.41 (287)	42.31 (374)	62.00 (549)
Rated torque at 60 °C (140 °F)	M_N	Nm (lbf in)	5.96 (52.8)	11.00 (97.4)	17.23 (152)	23.70 (210)	38.80 (343)
Rated speed at 60 °C (140 °F)	n_N	r/min	4,000	3,000	2,500	2,200	1,800
Output power, continuous duty, rated speed at 60 °C (140 °F)	P_N	kW (hp)	2.497 (3.3)	3.455 (4.6)	4.511 (6)	5.460 (7.3)	7.315 (9.8)
Continuous stall torque at 70 °C (158 °F)	M_0	Nm (lbf in)	10.80 (95.6)	20.31 (180)	29.90 (265)	39.27 (348)	57.55 (509)
Rated torque at 70 °C (158 °F)	M_N	Nm (lbf in)	6.84 (60.5)	12.45 (110)	18.56 (164)	24.80 (219)	33.96 (301)
Rated speed at 70 °C (158 °F)	n_N	r/min	3,200	2,400	2,000	1,800	1,700
Output power, continuous duty, rated speed at 70 °C (158 °F)	P_N	kW (hp)	2.293 (3.1)	3.129 (4.2)	3.887 (5.2)	4.676 (6.3)	6.46 (8.1)
Continuous stall torque at 80 °C (176 °F)	M_0	Nm (lbf in)	9.92 (87.8)	18.65 (165)	27.62 (244)	36.06 (319)	52.84 (468)
Rated torque at 80 °C (176 °F)	M_N	Nm (lbf in)	6.41 (56.7)	11.59 (103)	16.98 (150)	22.54 (199)	31.01 (274)
Rated speed at 80 °C (176 °F)	n_N	r/min	2,800	2,100	1,800	1,600	1,500
Output power, continuous duty, rated speed at 80 °C (176 °F)	P_N	kW (hp)	1.881 (2.5)	2.550 (3.4)	3.202 (4.3)	3.777 (5.1)	4.872 (6.5)

SIZE 6
High Voltage 565 V_{DC}, Type G-6LV

Characteristics Based on Temperature Class T5

Characteristics		Units	G-6LV2 (L15)	G-6LV4 (L30)	G-6LV6 (L45)	G-6LV8 (L60)	G-6LV9 (L90)
Continuous stall torque at 40 °C (104 °F)	M_0	Nm (lbf in)	10.28 (91)	19.33 (171)	28.63 (253)	37.37 (331)	54.76 (485)
Rated torque at 40 °C (104 °F)	M_N	Nm (lbf in)	6.45 (57.1)	11.74 (104)	17.33 (153)	23.17 (205)	34.74 (307)
Rated speed at 40 °C (104 °F)	n_N	r/min	2,700	2,000	1,700	1,500	1,300
Output power, continuous duty, rated speed at 40 °C (104 °F)	P_N	kW (hp)	1.823 (2.4)	2.459 (3.3)	3.85 (4.1)	3.640 (4.9)	4.730 (6.3)

Characteristics Based on Temperature Class T6

Characteristics		Units	G-6LV2 (L15)	G-6LV4 (L30)	G-6LV6 (L45)	G-6LV8 (L60)	G-6LV9 (L90)
Continuous stall torque at 40 °C (104 °F)	M_0	Nm (lbf in)	8.92 (78.9)	16.78 (149)	24.86 (220)	32.25 (285)	47.27 (418)
Rated torque at 40 °C (104 °F)	M_N	Nm (lbf in)	5.68 (50.3)	10.60 (93.8)	13.85 (123)	18.84 (167)	26.27 (233)
Rated speed at 40 °C (104 °F)	n_N	r/min	2,100	1,500	1,400	1,200	1,100
Output power, continuous duty, rated speed at 40 °C (104 °F)	P_N	kW (hp)	1.250 (1.7)	1.665 (2.2)	2.31 (2.7)	2.368 (3.2)	3.27 (4.1)

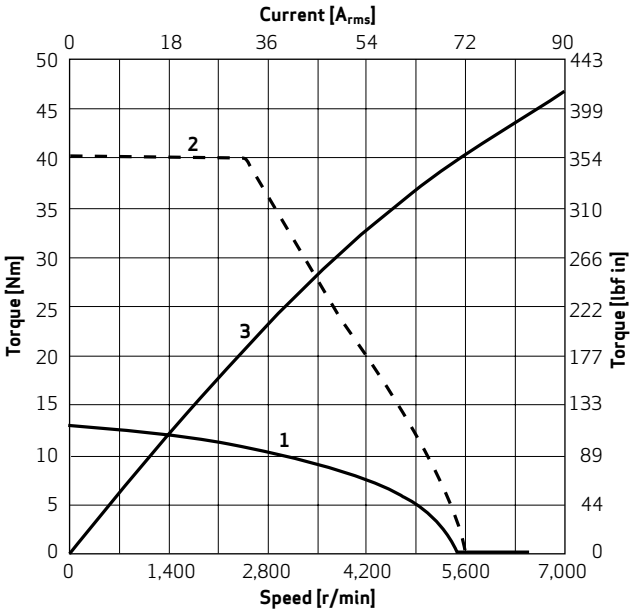
SIZE 6

Motor Characteristics Type G-6L

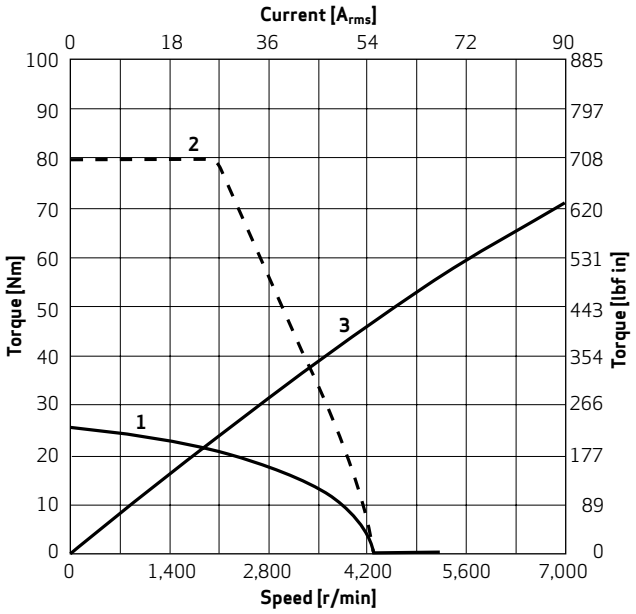
Temperature Class T4

Ambient Temperature 40 °C (104 °F)

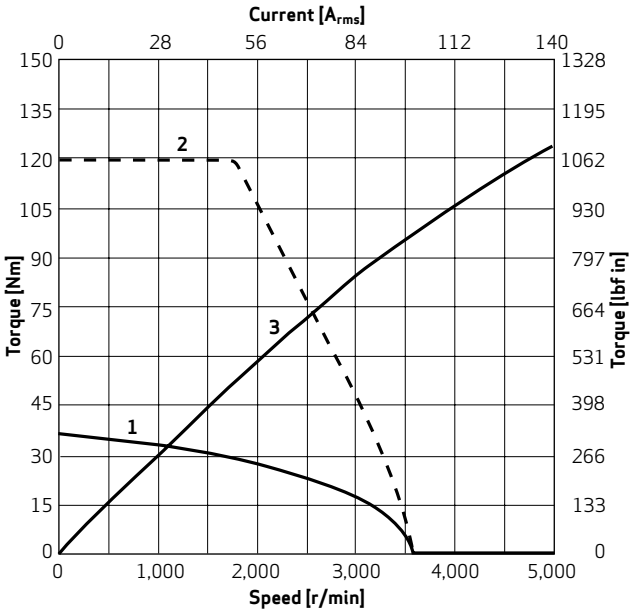
G-6LM2 (L15)



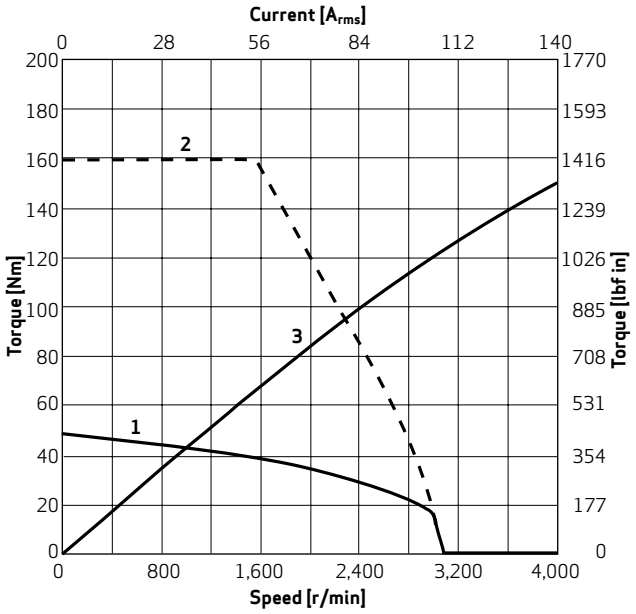
G-6LM4 (L30)



G-6LM6 (L45)



G-6LM8 (L60)



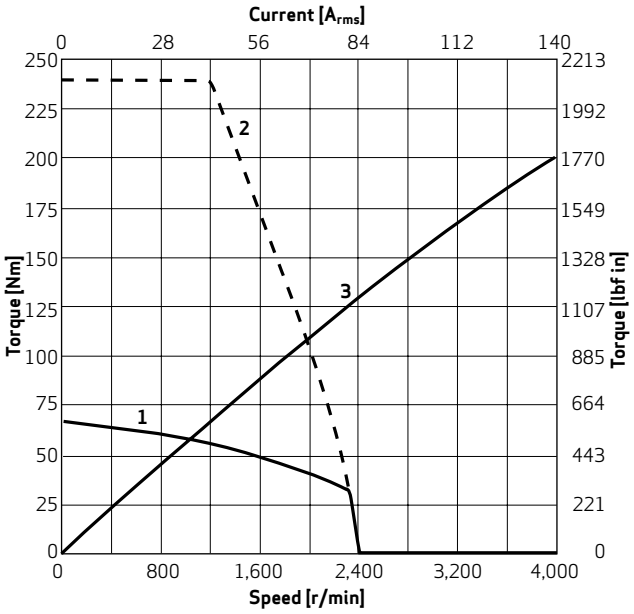
1 Continuous torque
2 Maximum torque
3 Torque constant k_T

SIZE 6
Motor Characteristics Type G-6L

Temperature Class T4

Ambient Temperature 40 °C (104 °F)

G-6LM9 (L90)



1 Continuous torque
2 Maximum torque
3 Torque constant k_T

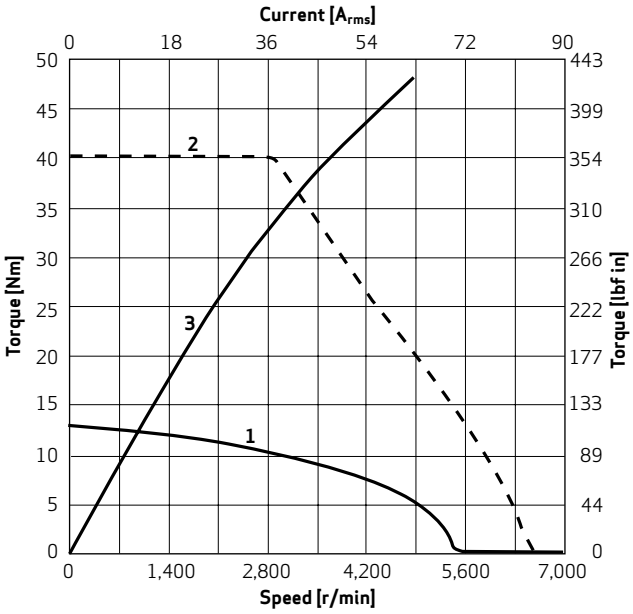
SIZE 6

Motor Characteristics Type G-6L

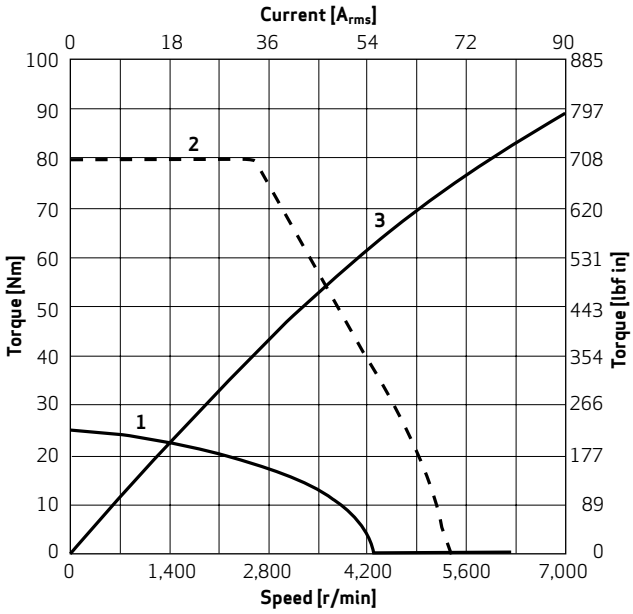
Temperature Class T4

Ambient Temperature 40 °C (104 °F)

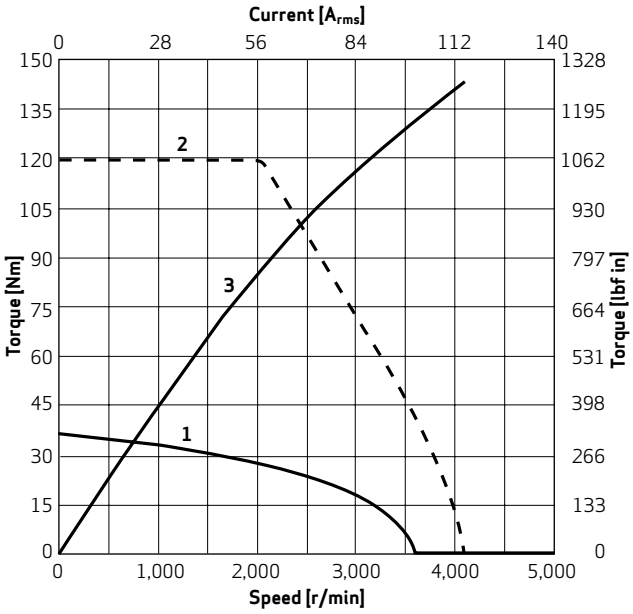
G-6LV2 (L15)



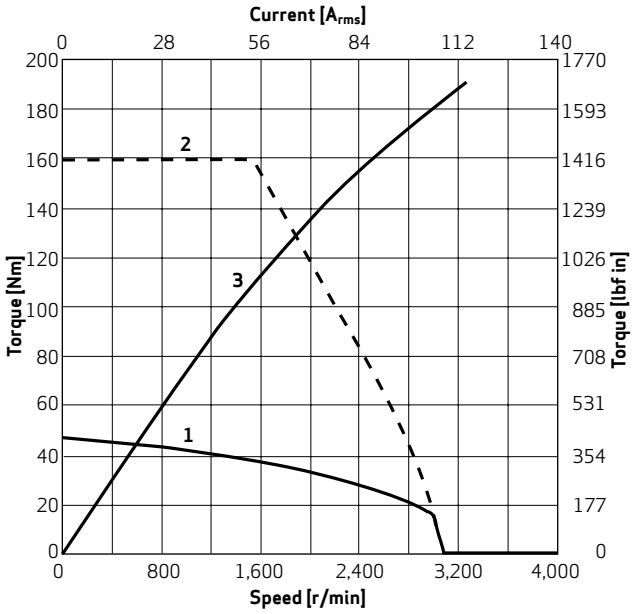
G-6LV4 (L30)



G-6LV6 (L45)



G-6LV8 (L60)



1 Continuous torque
2 Maximum torque
3 Torque constant k_T

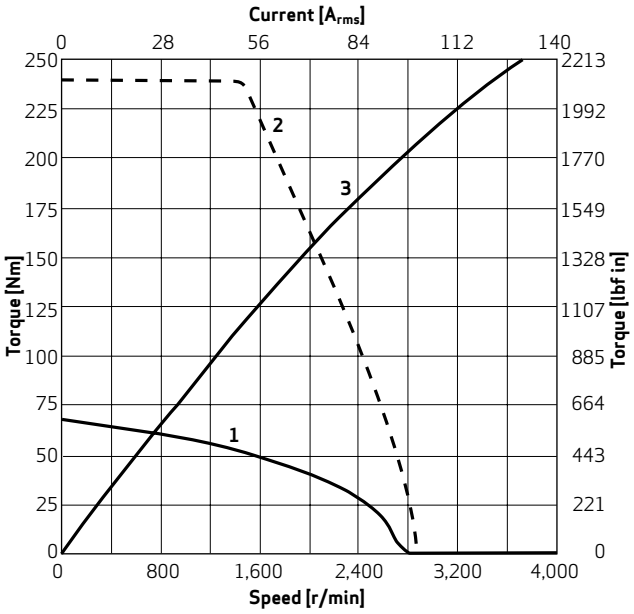
SIZE 6

Motor Characteristics Type G-6L

Temperature Class T4

Ambient Temperature 40 °C (104 °F)

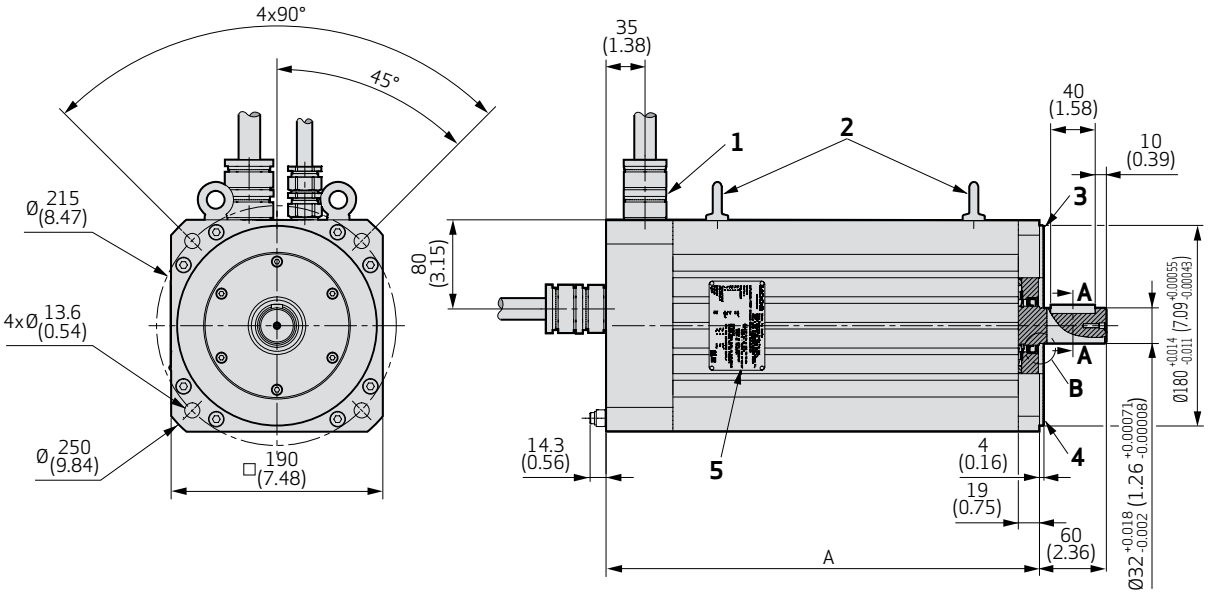
G-6LV9 (L90)



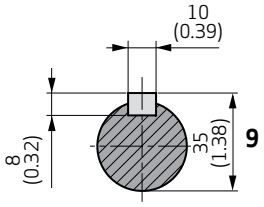
1 Continuous torque
2 Maximum torque
3 Torque constant k_T

SIZE 6

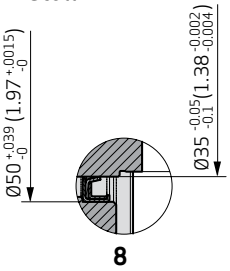
Type G-6L, Dimensions



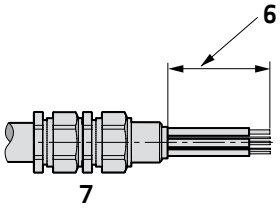
Section A-A



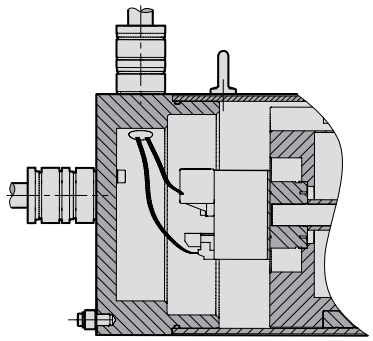
Detail B



Cable Gland



Sectional view for connection cable

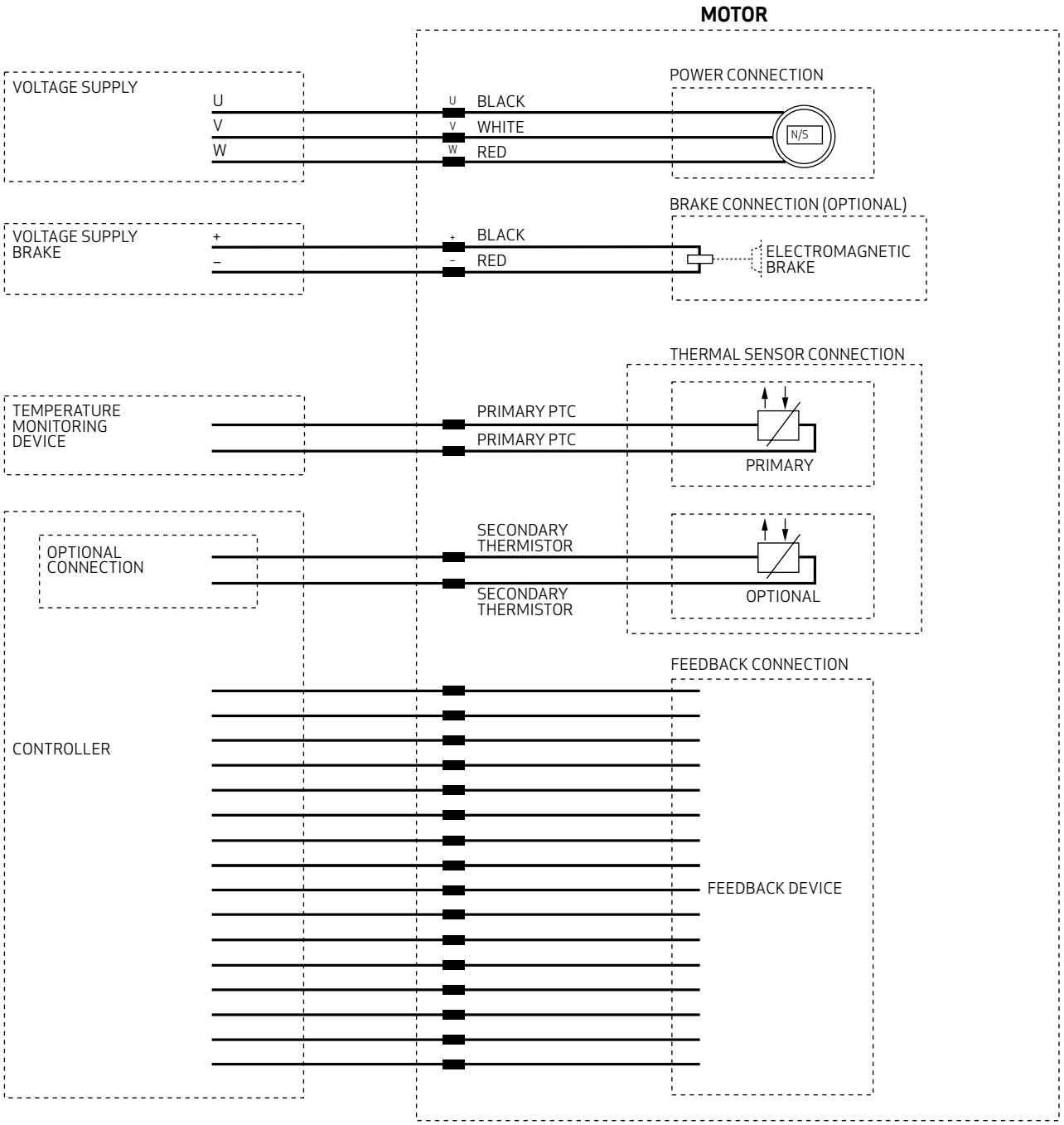


Stack length	Dimension „A“ Resolver without brake Encoder without brake	Dimension „A“ Resolver with brake Encoder with brake
	mm (in)	mm (in)
L15	331 (13)	389 (15.3)
L30	369 (14.5)	427 (16.8)
L45	407 (16)	465 (18.3)
L60	446 (17.6)	504 (19.8)
L90	522 (20.6)	580 (22.8)

Notes:
NEMA/IEC metric mounting

1 Alternative cable outlet
2 Lifting eye bolts
3 Run out class as per IEC/DIN Normal class
4 Flange
5 Name plate
6 Stripping length to be determine
7 Cable gland entry M20x1.5 and M25x1.5, optional M32x1.5
8 Shaft seal
9 Optional shaft key

WIRING DIAGRAM



BEARING LOAD DIAGRAMS

Maximum Permissible Shaft Load

The maximum permissible radial load depends on desired service life.

The bearing load curves display servo motor configurations (motor speed: radial loads) that support an operational life of 20,0 hours (L10h).

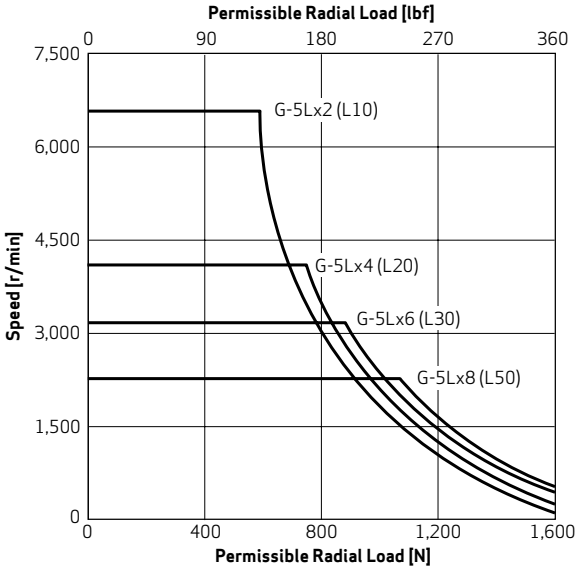
For maximum axial loads values for individual servo motor models, see the table below. Consult Moog for extended service life requirements or alternate load conditions.

Note:

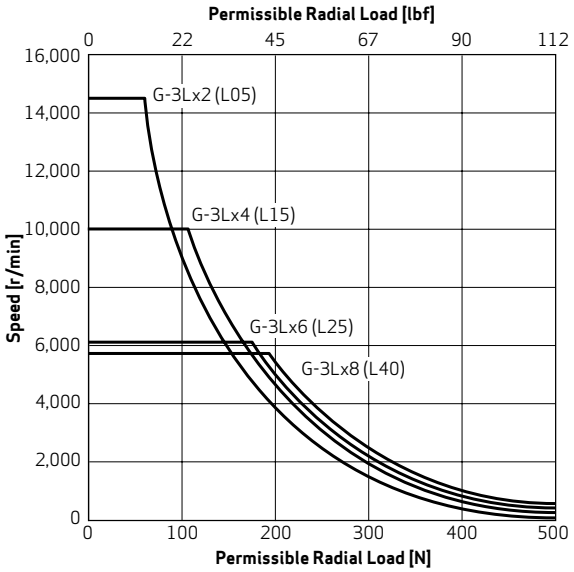
Load capacity referenced to middle of output shaft.

Type	Axial load during operation [N (lbf)]	Axial load during installation [N (lbf)]
G-3L	75 (17)	150 (34)
G-5L	200 (45)	400 (90)
G-6L	250 (56)	500 (112)

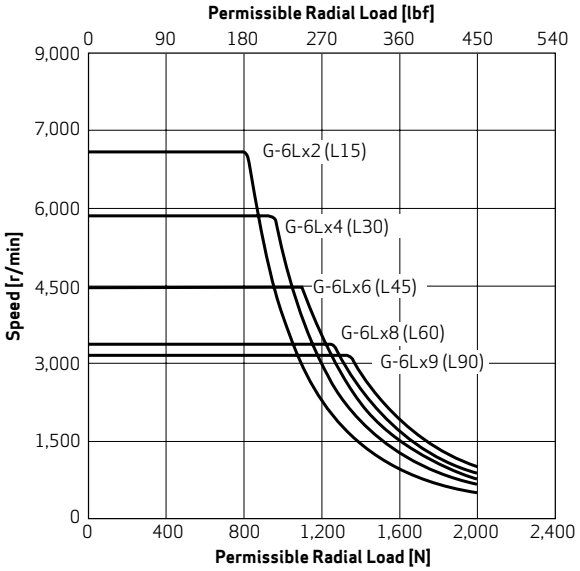
G-5L



G-3L



G-6L



DEFINING THE HAZARDOUS LOCATION AND SERVO MOTOR SIZING

This application note aims to provide the user with some tools and guidelines for the correct motor sizing for a new application. When a fully optimized system is required, please contact your local Moog application engineers.

Its important to define the hazardous location before the selection of the motor. IEC 60079-11 defines the methodology for classifying hazardous location. The classification could be in terms of the following points.

- Zone of operation
- Type of gas present
- Type of dust present
- Temperature rating of the motor
- Type of connection required (cable gland with cable length required)
- Type of ingress protection required.
- Based on the hazardous location classification, certification of motor is defined. The Moog ExD Servo Motor Series have been certified by UL for ATEX and IECEx certification wherein the certification code defines the application to be II C for gasses and III C for dust protection, with permissible maximum surface temperature range from +85 to +200 °C (+185 to +392 °F) based on ignition temperature class.

In addition safety options provided to comply with hazardous environment certifications, explosion proof motors are equipped with a primary set of thermistor which is always a PTC thermal sensor. This PTC thermal sensor must be connected to a temperature monitoring device which in turn should trip the motor when a motor cross the maximum allowable temperature. For selection of temperature monitoring device contact our local application engineer.

Once the hazardous location and the certification requirement of the motor have been defined, the sizing of the motor can be done.

Validation may be necessary to ensure the correct thermal and electric sizing of the motor. Contact our local application engineer for additional information and support.

ABOUT MOOG

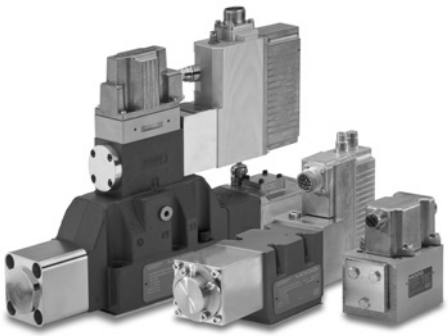
Moog Inc. is a worldwide designer, manufacturer and integrator of precision control components and systems. Moog's Industrial Group designs and manufactures high performance motion control solutions combining electric, hydraulic, and hybrid technologies with expert consultative support in a range of applications including energy production and generation machinery, industrial production machinery and simulation and test equipment. We help performance-driven companies design and develop their next-generation machines. Moog Industrial Group, with fiscal year 2012 sales of USD 634 million and locations in 26 countries, is part of Moog Inc. (NYSE:MOG.A and MOG.B) which has sales of USD 2.47 billion.

This vast scope ensures that our engineers remain close to the needs of machine builders and provide flexible design solutions and technical expertise tailored to our customers' toughest challenges.

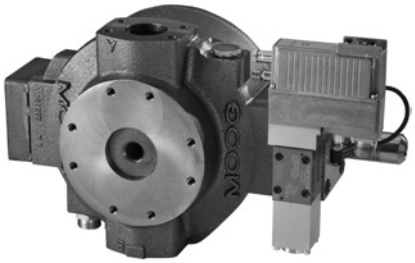
Moog experts work in close collaboration with machine builders and application engineers to design motion control systems for greater productivity, higher reliability, superior connectivity, less costly maintenance and more effective operations. Our regional presence, industry knowledge and design flexibility ensures Moog motion control solutions are tailored to their environment — from meeting operating regulations and performance standards, to taking machine performance to a higher level.

Servo Drives

Servo Motors



Servo Valves



Radial Piston Pumps

Products

At the heart of every Moog solution is an array of products engineered for precision, high performance and reliability. For more than six decades, Moog products have been specified for critical machine applications.

Some are developed specifically for unique operating environments. Others are standard equipment on machines across many industries. All are continuously improved to take advantage of the latest technology breakthroughs and advancements.

Moog products include:

- Servo Valves and Proportional Valves
- Servo Motors and Servo Drives
- Servo Controllers and Software
- Radial Piston Pumps
- Actuators
- Integrated Hydraulic Manifold Systems and Cartridge Valves
- Slip Rings
- Motion Bases

ABOUT MOOG

Solutions

Hydraulic solutions

Since Bill Moog invented the first commercially viable servo valve in 1951, Moog has set the standard for world-class hydraulic technology. Today, Moog products are used in a variety of applications - providing high power, enhanced productivity and ever better performance for some of the worlds most demanding applications.

Electric solutions

Clean operation, low noise generation, less maintenance and reduced power consumption make Moog electric solutions ideal for applications worldwide. Moog is the ideal partner for applications where transitioning technologies requires special expertise.

Hybrid solutions

By incorporating the advantages of existing hydraulic and electric technologies - including modular flexibility, increased efficiency and cleanliness - into innovative hybrid solutions, Moog offers new performance potential in specialized applications.

Flight Simulation

Formula One Simulation Table

Moog Global Support

Moog Global Support is our promise to offer world-class Repair and Maintenance Services delivered expertly by our trained technicians. With the reliability only available from a leading manufacturer with facilities around the world, Moog offers you service and expertise you can count on to keep your equipment operating as it should.

This promise offers many benefits to our customers including:

- Reduce your downtime by keeping critical machines running in peak performance
- Protect your investment by ensuring reliability, versatility and long-life of products
- Better plan your maintenance activities and make systematic upgrades
- Leverage our flexible programs to meet the unique service requirements of your facility

Look to Moog for global support including:

- Repair services using OEM parts are performed by trained technicians to the latest specifications
- Stock management of spare parts and products to prevent unplanned downtime
- Flexible programs, tailored to your needs such as upgrades, preventative maintenance and annual/multi-year contracts
- On-site services bring the expertise to you, providing quicker commissioning, set-up and diagnostics
- Access to reliable services that are guaranteed to offer consistent quality anywhere in the world
- For more information on Moog Global Support visit **www.moog.com/industrial/service**.

MOOG GLOBAL SUPPORT®

OPTIONS

Flexible Design Options

Moog's ExD Series Servo Motors are available with a variety of standard and custom options to address the unique requirements of your application. Moog's motor design and application teams are continually introducing new options to address the changing needs of the market place. As a result, if you need something that's not presently listed, contact your local sales office.

Standard Options

Integral Holding Brake

Holding brakes are available for all standard ExD Series Servo Motors. The brake is a permanent magnet style that is designed to hold the axis in position even with power removed. This is especially useful in applications where the motor is on an axis controlling a weightinduced load (e.g., vertical axis on a gantry robot).

The integral holding brake requires a regulated 24 V_{DC} supply (see Accessories) for proper operation. Refer to motor technical data for brake current requirements.

Please note that the brake is a holding brake and is not designed to stop dynamic loads. The Servo Drive is required to decelerate the axis and hold position before the brake is engaged.

Shaft Options

Standard ExD Series Servo Motors are available with plain or slot and key metric shafts. For custom motor shafts such as spline or English dimension shafts, see Custom Options.

Motor Windings

Moog's standard ExD Series Servo Motors are designed to address the needs of most dynamic motion control applications. However, Moog recognizes that OEMs have unique needs which cannot always be addressed by catalog products. This is why Moog offers custom motor windings. Custom motor windings may be used to optimize motor performance in applications with non-standard bus voltages or deliver customized performance characteristics for applications with unique speed or current requirements. However our custom winding will be adhered to only when it meet the Ex standard requirement.

Shafts and Flanges

To support legacy products or meet unique application needs, Moog's modular ExD Series Servo Motor design is capable of supporting custom shafts (length, diameter or spline fittings) and custom flanges.

Feedback Options

Feedback device listed in the ordering code are considered as standard. Requirement of any other types of special feedback devices, please consult your local sales office.

Cable Gland with Cable

Moog provides customized cable with suitable cable gland to provide the desired connection to the servo drive, temperature monitoring device and power supply.

Accessories

To speed-up your design cycle, Moog offers a variety of accessories which have been specified and tested for compatibility with our motors and drives. These accessories will also minimize assembly activities, allowing you to reduce production time.

- Programmable Multi-Axis Servo Drive System: See Servo Drive catalog.
- To obtain pre-assembled motor cables, crimp tools, power supplies, please contact your local Moog office.

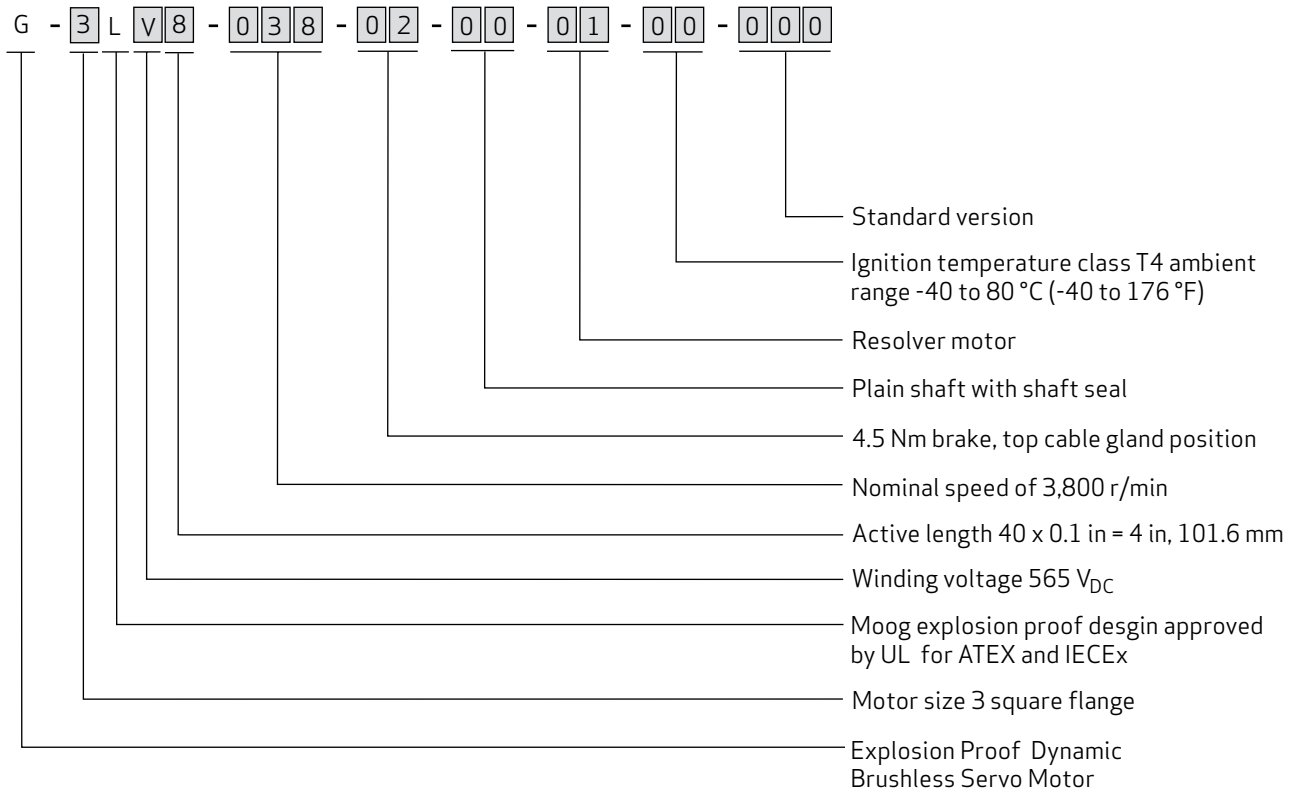
ORDERING CODE

Example

To order a motor, choose the various type options by filling in the ordering code on the inside back page of the catalog.

Contact your local Moog office to provide the corresponding model number for your order.

Both model number and ordering code (Model and Type respectively) will be present on the motor nameplate.



Information before orderings - refer to ordering code on the inside back page of the catalog:

1. Thermal sensor: First set of themistor is PTC only (no option). Second set of thermistor is NTC as standard. Option second set of thermistor can be PTC or KTY.
2. Any non standard stack length between L05 to L40 for size 3, between L10 to L50 for size 5 and between L15 to L90 for size 6.
3. Standard motor delivered without cable gland or cable.
4. Size 3 encoder motors are always without brake.
5. T3 ignition temperature class for size 3 and 5 up to +80 °C (+176 °F) only.

ORDERING CODE

G - □ L □□ - □□□ - □□ - □□ - □□ - □□ - □□□

Motor size

	Square flange
3	70 mm (2.76 in)
5	140 mm (5.51 in)
6	190 mm (7.48 in)

L	Moog Ex design UL

Winding voltage [1]

M	Low voltage
V	High voltage

Stack length

	Motorsize		
Code	3	5	6
0	Special [2]		
2	L05	L10	L15
4	L15	L20	L30
6	L25	L30	L45
8	L40	L50	L60
9			L90

Active length in 0.1 inch

Nominal speed

xxx	r/100 min

Example: r/min = 3500/100 = 035

Electrical option

	Brake options		Cable gland position [3]	
	1	2	Top	Back
00			■	
01	■		■	
02		■	■	
03				■
04	■			■
05		■		■
99	Special for brake only			

Brake options [4]

Motor size		3	5	6
Low-T	1	2 Nm	14 Nm	22 Nm
		18 lbf in	124 lbf in	195 lbf in
High-T	2	4.5 Nm	22 Nm	72 Nm
		40 lbf in	195 lbf in	637 lbf in
	Code			

Mechanical option

	Keyway	Shaft exit seal
00		■
01	■	■
99	Special	

Feedback option

	Motor size			Encoder type resolver/	
	3	5	6		
00	Not allowed				
01	2 poles resolver				
02				Incremental	Stegmann
03	SKS36		SRS50	Absolute single turn	Stegmann
04	SKM36		SRM50	Absolute multi turn	Stegmann
05	ERN1185		ERN1387	Incremental	Heidenhain
06	-		ECN1313	Absolute single turn	Heidenhain
07	-		EQN1325	Absolute multi turn	Heidenhain
99	Special				

Special version

000	Standard version

Ignition temp class/ambient [5]

	-20 to 40°C -4 to +104°F	-20 to 50°C -4 to +122°F	-20 to 60°C -4 to +140°F	-20 to 70°C -4 to +158°F	-20 to 80°C -4 to +176°F	-20 to 90°C -4 to +194°F	-20 to 100°C -4 to +212°F	-40 to 40°C -40 to +104°F	-40 to 50°C -40 to +122°F	-40 to 60°C -40 to +140°F	-40 to 70°C -40 to +158°F	-40 to 80°C -40 to+176°F	-40 to 90°C -40 to +194°F	-40 to 100°C -40 to +212°F
00												T4		
01		T4												
02			T4											
03	T4													
04				T4										
05					T4									
06								T4						
07									T4					
08										T4				
09											T4			
10	T5													
11								T5						
12	T6													
13								T6						
14	T3													
15		T3												
16			T3											
17				T3										
18					T3									
19						T3								
20							T3							
21								T3						
22									T3					
23										T3				
24											T3			
25												T3		
26													T3	
27														T3

TAKE A CLOSER LOOK.

Moog designs a range of motion control products that complement the performance of those featured in this catalog. Visit our website for more information and contact the Moog facility nearest you.

Argentina
+54 11 4326 5916
info.argentina@moog.com

Australia
+61 3 9561 6044
info.australia@moog.com

Brazil
+55 11 3572 400
info.brazil@moog.com

Canada
+1 716 652 2000
info.canada@moog.com

China
+86 21 2893 1600
info.china@moog.com

Finland
+358 10 422 1840
info.finland@moog.com

France
+33 1 4560 7000
info.france@moog.com

Germany
+49 7031 622 0
info.germany@moog.com

Hong Kong
+852 2 635 3200
info.hongkong@moog.com

India
+91 80 4057 6666
info.india@moog.com

Ireland
+353 21 451 9000
info.ireland@moog.com

Italy
+39 332 421 111
info.italy@moog.com

Japan
+81 46 355 3767
info.japan@moog.com

Korea
+82 31 764 6711
info.korea@moog.com

Luxembourg
+352 40 46 401
info.luxembourg@moog.com

The Netherlands
+31 252 462 0
info.thenetherlands@moog.com

Norway
+47 6494 1948
info.norway@moog.com

Russia
+7 8 31 713 1811
info.russia@moog.com

Singapore
+65 677 36238
info.singapore@moog.com

South Africa
+27 12 653 6768
info.southafrica@moog.com

Spain
+34 902 133 240
info.spain@moog.com

Sweden
+46 31 680 60
info.sweden@moog.com

Switzerland
+41 71 394 5010
info.switzerland@moog.com

Turkey
+90 216 663 6020
info.turkey@moog.com

United Kingdom
+44 168 429 6600
info.uk@moog.com

USA
+1 716 652 2000
info.usa@moog.com

www.moog.com/industrial

Explosion Proof Dynamic Brushless Servo Motors
PIM, Rev. C, October 2013, Id. CDL32776-en