MAXIMUM DYNAMIC BRUSHLESS SERVO MOTORS
MD SERIES

OFFERING HIGHER DYNAMICS, WIDE RANGE OF SIZES AND FLEXIBLE DESIGN OPTIONS FOR HIGH PERFORMANCE APPLICATIONS

WHAT MOVES YOUR WORLD

MOOG

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.

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PRODUCT OVERVIEW

Highest Dynamics, Power Density and Reliability

For over two decades, the name Moog has been associated with Brushless Servo Motors and drives offering the highest dynamics, power density and reliability. Moog offers a broad range of standard servo motors as well as custom solutions to meet your unique application requirements. Moog Brushless Servo Motors are needed for a variety of applications; especially where dynamics, compact size and reliability are important.

Maximum Dynamic Brushless Servo Motors

Moog's Maximum Dynamic Brushless Servo Motors (MD Series) address the evolving need for greater dynamics and higher performance in industrial applications. The electronically commutated synchronous AC motors with permanent magnet field excitation are designed for highly dynamic servo applications. The MD Series Servo Motors offer very high angular acceleration which is unique and exceptional. Designed and manufactured in accordance with strict CE standards, the MD Series Servo Motors use ruggedized components with proven reliability in harsh thermal and shock load environments.

The MD Series Servo Motors range covers 5 frame sizes, 7 magnetic designs, with natural/liquid cooling options and highly customizable modular construction. The wide range of these servo motors, combined with the ability to seamlessly integrate with existing infrastructure, reduces the need for redesign, limits cost and improves space utilization. The MD Series Servo Motors are available with the following options:

- Cooling options: Natural, fan or liquid cooling
- Integral holding brakes
- Resolver or encoder based feedback
- Various connector options
- Plain or slot and key type shafts
- Teflon shaft seal (IP67 sealing)

Exceptional Overload Capacity

- The electromagnetic design with exceptional overload capacity results in an increase in the effective torque available to accelerate and decelerate the load, enabling higher dynamics and improved cycle times.

- MD Series Servo Motors use a fully laminated, weight and inertia optimized rotor to provide 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, and an efficient thermal construction.

Modular Design and Long Life

- The modular design of the MD Series Servo Motors facilitates a high degree of customization to meet diverse application requirements across several industry segments. The modular design is supported by a variety of options with Moog's application staff capable of supplying fully customized solutions tailored to meet exact customer specifications.

- All Moog Servo Motors are manufactured using tight machining tolerances, precision balancing and undergo thorough production testing. The use of high reliability feedback devices, sealed lifetime lubricated bearings and IP65 compliant construction combine to extend service life and offer years of reliable, low maintenance operation.

- The MD Series Servo Motors is the ideal choice for machine builders looking for 'best-in-class' servo motors with low inertia and high dynamics. Moog servo drives can further optimize machine performance and ensure smooth integration.

Servo Drives

Servo Motors
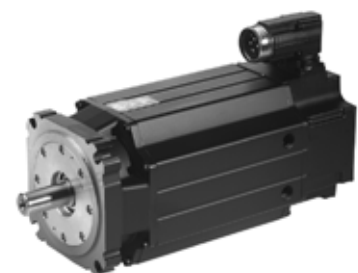
PRODUCT OVERVIEW

Overview of MD Series Servo Motors

Type code	Maximum torque	Continuous stall torque - Natural cooling	Continuous stall torque - Liquid cooling	Rotor inertia	Nominal speed [1]	Square flange Natural/ Water cooling
	Nm (lbf in)	Nm (lbf in)	Nm (lbf in)	kg cm^2 (10^{-4} lbf in s^2)	r/min	mm (in)
JSC3	10 to 38 (89 to 333)	2.2 to 7.4 (20 to 66)	-	0.78 to 2 (6.9 to 18)	5,400 to 2,400	70 (2.8)
JSC4	19 to 58 (167 to 513)	4.9 to 12 (43 to 104)	-	2.2 to 5.7 (20 to 50)	5,100 to 2,700	100 (3.9)
JHx5	64 to 128 (568 to 1,136)	22 to 39 (190 to 349)	46 to 91 (408 to 801)	11 to 20 (96 to 179)	2,500 to 2,000	140.5/145 (5.5/5.7)
JSx5	136 to 273 (1,204 to 2,416)	28 to 56 (250 to 474)	59 to 117 (525 to 1,039)	27 to 49 (238 to 434)	3,000 to 1,300	140.5/145 (5.5/5.7)
JHx6	276 to 547 (2,443 to 4,841)	71 to 136 (627 to 1,207)	114 to 225 (1,009 to 1,991)	81 to 155 (715 to 1,374)	1,900 to 1,400	190/190 (7.5/7.5)
JSx6	612 to 1,226 (5,417 to 10,851)	84 to 160 (743 to 1,416)	134 to 261 (1,186 to 2,310)	257 to 486 (2,274 to 4,301)	2,200 to 1,000	190/190 (7.5/7.5)
JSx7	1,002 to 2,012 (8,868 to 17,808)	314 to 629 (2,779 to 5,567)	516 to 1,034 (4,567 to 9,152)	1,021 to 1,985 (9,036 to 17,567)	900 to 575	275/275 (11/11)

1) Nominal speed can be easily adjusted by changing the stator windings. Please refer to your local Moog application engineer for information.

Note: Refer to second last page for servo motor type definition.

FEATURES AND BENEFITS

Features	Benefits
Dynamics • Higher angular acceleration • Electromagnetic design with exceptional overload capacity	• Faster operation and higher performance • Increased productivity • Improved product quality through accurate control
Range • Maximum torque from 10 to 2,012 Nm (89 to 17,807 lbf in) and power from 1 to 60 kW (1 to 80 hp) • 5 frame sizes, 7 magnetic designs, natural/liquid cooling options	• Over 35,000 variants for machine builders to choose from • Rapid machine design process • Improved cycle times
Flexibility through modular construction • Ability to match exact customer requirements • Customization of flange sizes, connector types and versions for use in special environments	• Seamless integration into existing infrastructure • Reduced need for system redesign

TECHNICAL FEATURES

1. Moog Motor Performance Characteristics

Having collaborated with a several industrial machine designers, Moog engineers understand the critical role that application sizing process plays in overall machine design. The MD Series Servo Motors have been developed keeping this in consideration.

The typical torque characteristics of the MD Series Servo Motor are as shown below.
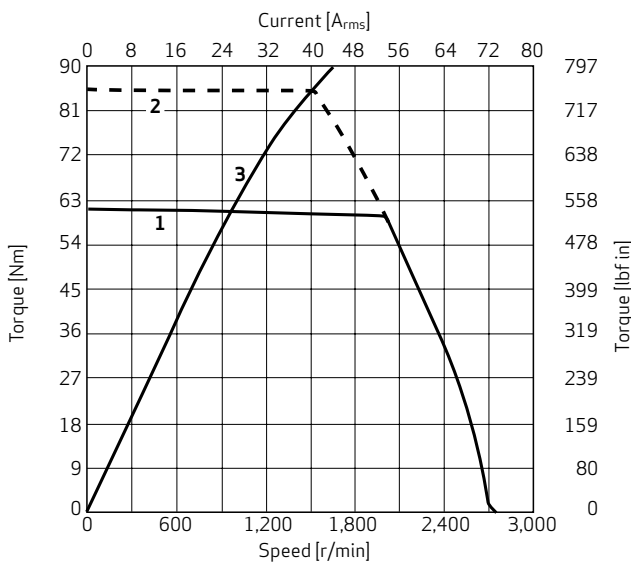
1. Continuous torque
2. Maximum torque
3. Torque constant k_T

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 up to 40 °C (104 °F)
- Winding temperature mesure up to 110 °C (230 °F) over ambient for resolver feedback motors
- Motor front flange attached to a steel mounting plate measuring minimum 300 x 300 x 25 mm (11.81 x 11.81 x 1.00 in)

Maximum Torque Curve

This curve reflects the motor torque available with a 5 % duty cycle (1 out of 20 s). It is based on years of practical industry experience and is useful for typical servo applications.

kT Characteristic

The motor k_T characteristic depicts stator saturation at various operating points and can be used to optimize sizing in low duty cycle applications.

2. MD Series Servo Motor capabilities

- The below illustration provides an overview of the MD Series Servo Motor capabilities.
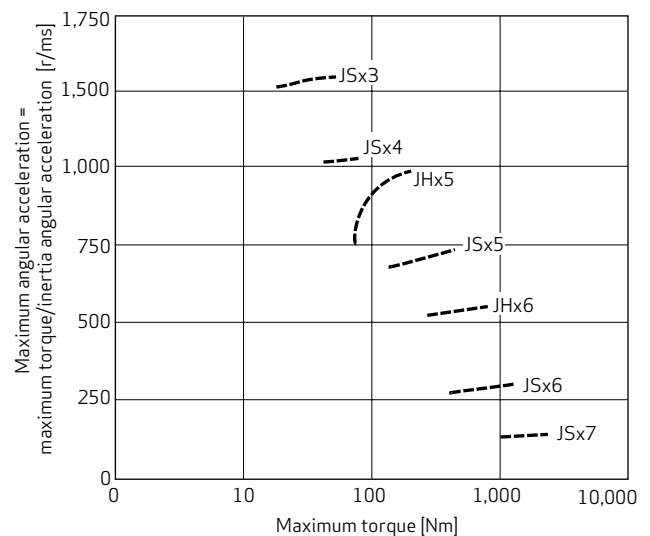
3. Conformity to standards

MD Series Servo Motors meet the requirements of the EC directives such as low voltage directive and EMC directives (together with Moog drive).These motors are also UL approved and conform to UL standards.

TECHNICAL FEATURES

4. Ruggedized Design

The MD Series Servo Motors are designed and manufactured in accordance with strict CE standards, using ruggedized components with proven reliability in harsh thermal and shock load environments. These factors combine to offer years of reliable, low maintenance operation and boost overall system availability.

The MD Series Servo Motors are available with the following options:

- Cooling options: Natural, fan or liquid cooling
- Integral holding brakes
- Resolver or encoder based feedback
- Various connector options
- Plain or slot and key type shafts
- Teflon® shaft seal (IP67 sealing)

5. Fully Customized Designs Support Unique Application Requirements

Moog can tailor motors to the exact specifications or requirements of a machine including custom specifications for the following:

- Motor winding
- Shaft and flange
- Frameless design
- Connector configuration (including pigtail)
- Feedback device
- Design for unique environments including high temperature, high shock levels, oil and water immersion
- Different painting color (Standard is RAL 9005 MATT (black) painted)

Motor Natural Cooling Cutaway Drawing

Motor Liquid Cooling Cutaway Drawing
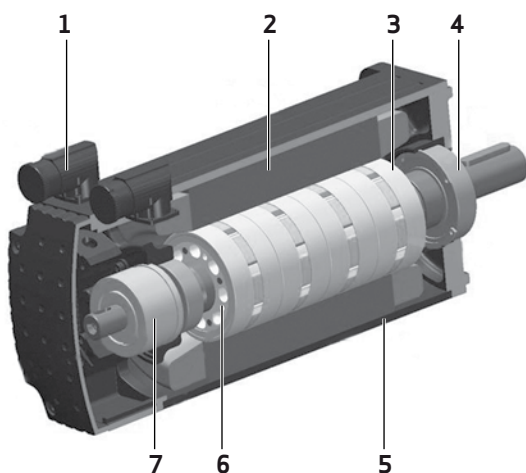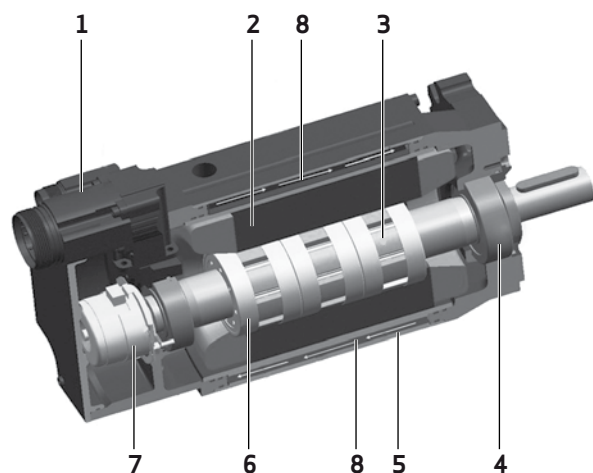
1	Metal CE/UL compliant connectors	5	Lightweight extruded aluminum housing
2	Proprietary stator design	6	Fully laminated low-inertia rotor
3	Rare earth magnets	7	Feedback device
4	Sealed life-time lubricated bearings	8	Liquid flow path

SIZE 3
Natural Cooling, Standard Dynamic, Type JSC3

Characteristics and Nominal Values with Sinusoidal Drive

Characteristics		JSC3-020	JSC3-040	JSC3-050	JSC3-060	JSC3-075	Units
Continuous stall torque	M_0	2.2 (19.5)	4.2 (37.2)	5.1 (45.1)	6.0 (53.1)	7.4 (65.5)	Nm (lbf in)
Nominal torque	M_N	1.51 (13.4)	2.71 (24)	3.93 (34.8)	5 (44.3)	6.58 (58.2)	Nm (lbf in)
Maximum torque	M_{max}	10.0 (88.5)	20.0 (177)	25.0 (221)	30.0 (266)	37.6 (333)	Nm (lbf in)
Nominal speed	n_N	5,400	4,700	3,700	3,100	2,400	r/min
Maximum speed	n_{max}	11,140	5,570	4,450	3,710	2,970	r/min
Continuous stall current	I_0	3.41	3.18	3.12	3.07	3.02	A_{rms}
Nominal power	P_N	0.85 (1.1)	1.34 (1.8)	1.52 (2)	1.62 (2.2)	1.65 (2.2)	kW (hp)
Torque constant	k_T	0.66 (5.8)	1.31 (11.6)	1.64 (14.5)	1.97 (17.4)	2.46 (21.8)	Nm/A_{rms} $(lbf\ in/A_{rms})$
Voltage constant	k_e	39.5	78.9	98.7	118.4	148	$V_{rms}/k_{r/min}$
Thermal time constant	t_{th}	878	1,345	1,614	1,856	2,042	s
Winding resistance at 25 °C (77 °F) (phase to phase)	R_{tt}	4.9	7.98	9.52	11.06	13.371	Ohm
Winding inductance (phase to phase)	L_{tt}	9.8	14.6	17	19.4	23	mH
Rotor inertia with resolver	J	0.78 (6.9)	1.24 (11)	1.47 (13)	1.7 (15)	2.04 (18.1)	kg cm^2 (10^{-4} lbf in s^2)
Rotor inertia with encoder	J	0.78 (6.9)	1.24 (11)	1.47 (13)	1.7 (15)	2.04 (18.1)	kg cm^2 (10^{-4} lbf in s^2)
Weight (without brake)	m	2.4 (5.3)	3.8 (8.4)	4.5 (9.9)	4.8 (10.6)	6.2 (13.7)	kg (lb)

Optional holding brake	Option 1	Option 2	Units
Holding torque	N/A	4.5 (39.8)	Nm (lbf in)
Extra weight	N/A	0.32 (0.7)	kg (lb)
Extra inertia with resolver	N/A	0.18 (1.6)	kg cm^2 (10^{-4} lbf in s^2)
Extra inertia with encoder	N/A	0.18 (1.6)	kg cm^2 (10^{-4} lbf in s^2)
Power requirement	N/A	12	W
Voltage requirement (+6 % -10 %)	N/A	24	V_{DC}

Notes:

1. Different windings available to decrease nominal speed
2. Motor performances as measured with Moog's Servo Drive of proper size
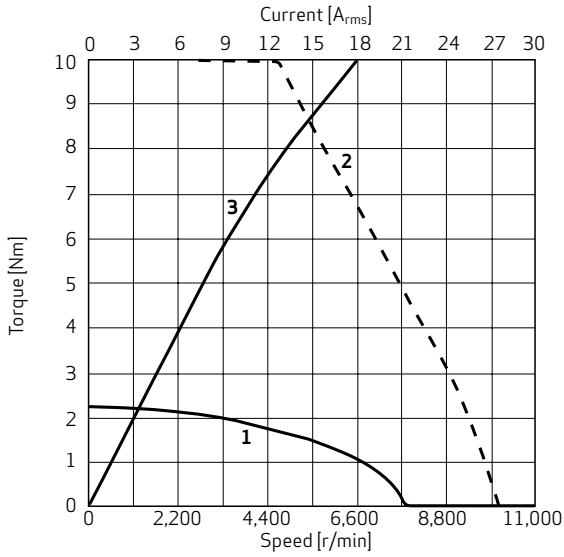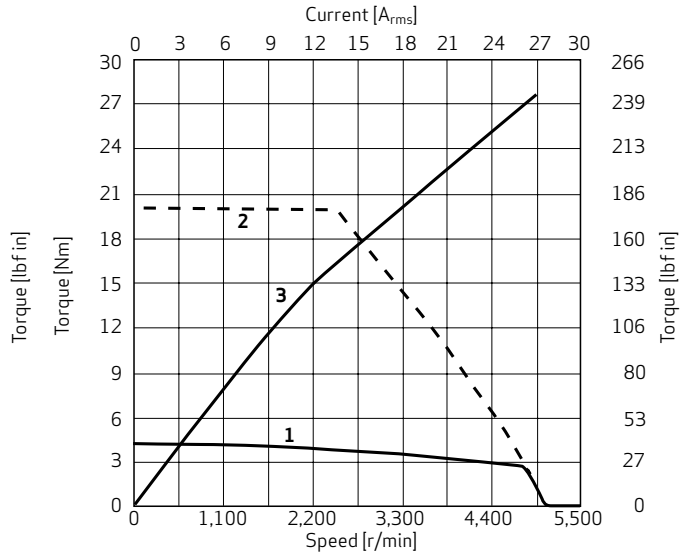3. Motor Pole Count: 8
4. DC Link voltage 565 V

SIZE 3
Natural Cooling, Standard Dynamic, Type JSC3
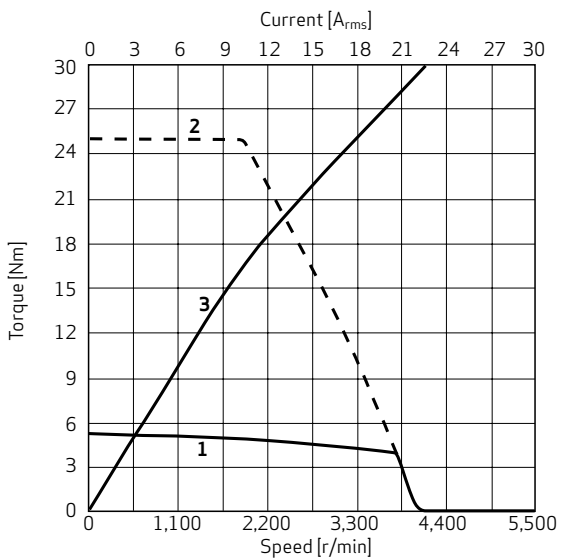
Motor Characteristics
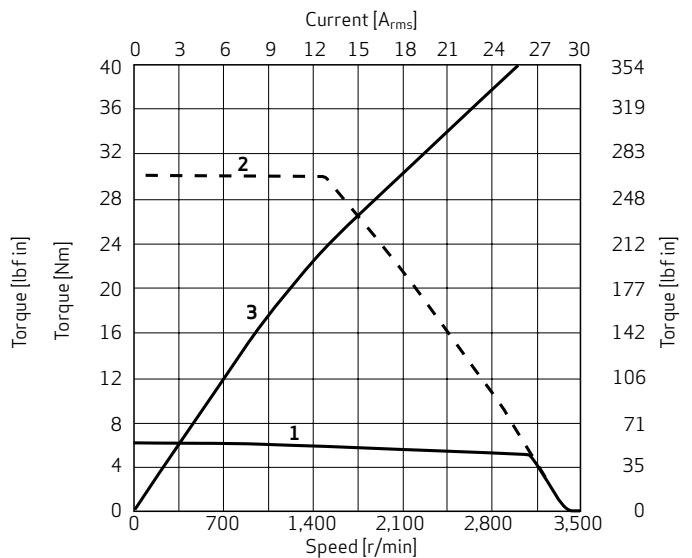
JSC3-020

JSC3-040

JSC3-050

JSC3-060
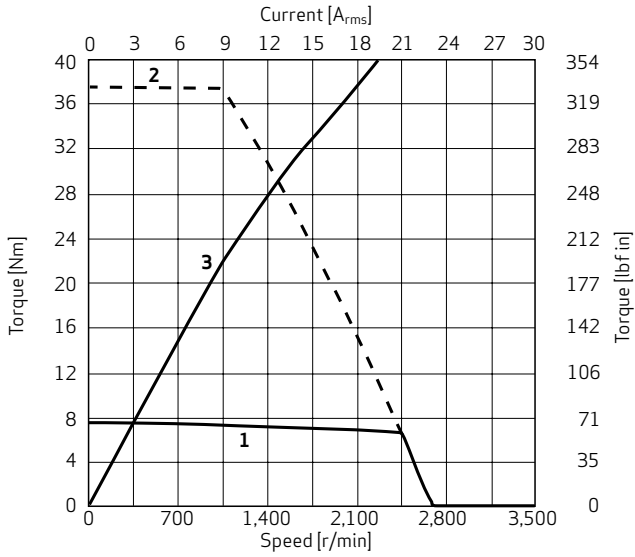

1   Continuous torque
2   Maximum torque
3   Torque constant k_T

SIZE 3
Natural Cooling, Standard Dynamic, Type JSC3
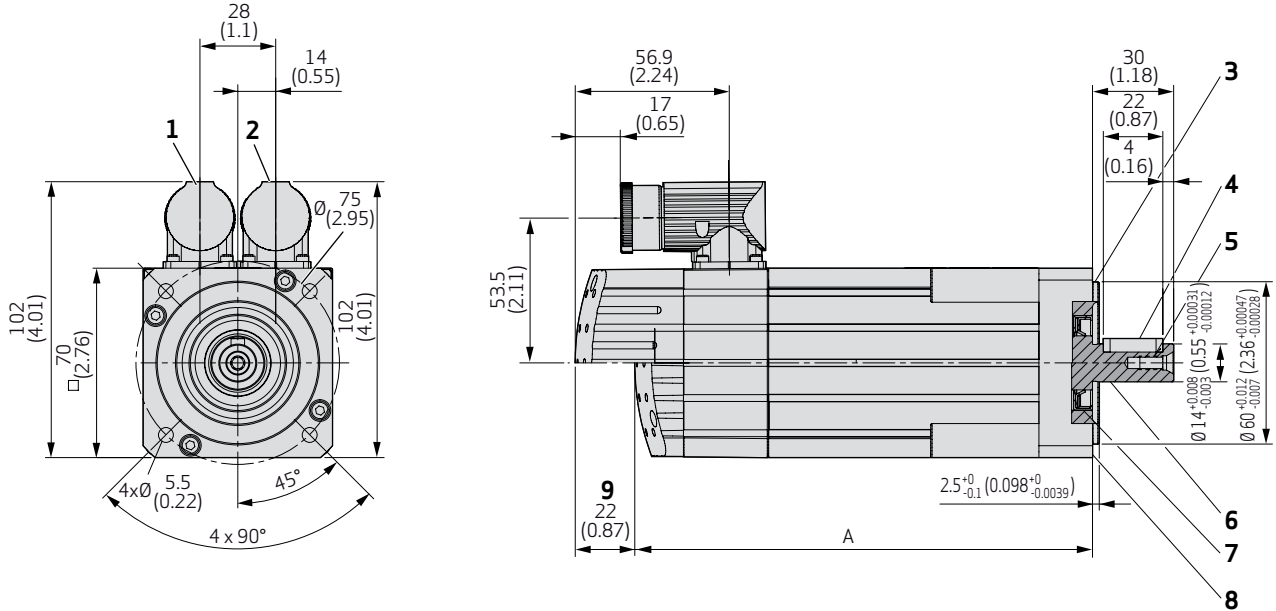
Motor Characteristics

JSC3-075

1   Continuous torque
2   Maximum torque
3   Torque constant k_T

SIZE 3
Natural Cooling, Standard Dynamic, Type JSC3

JSC3 with Resolver

JSC3 with Encoder
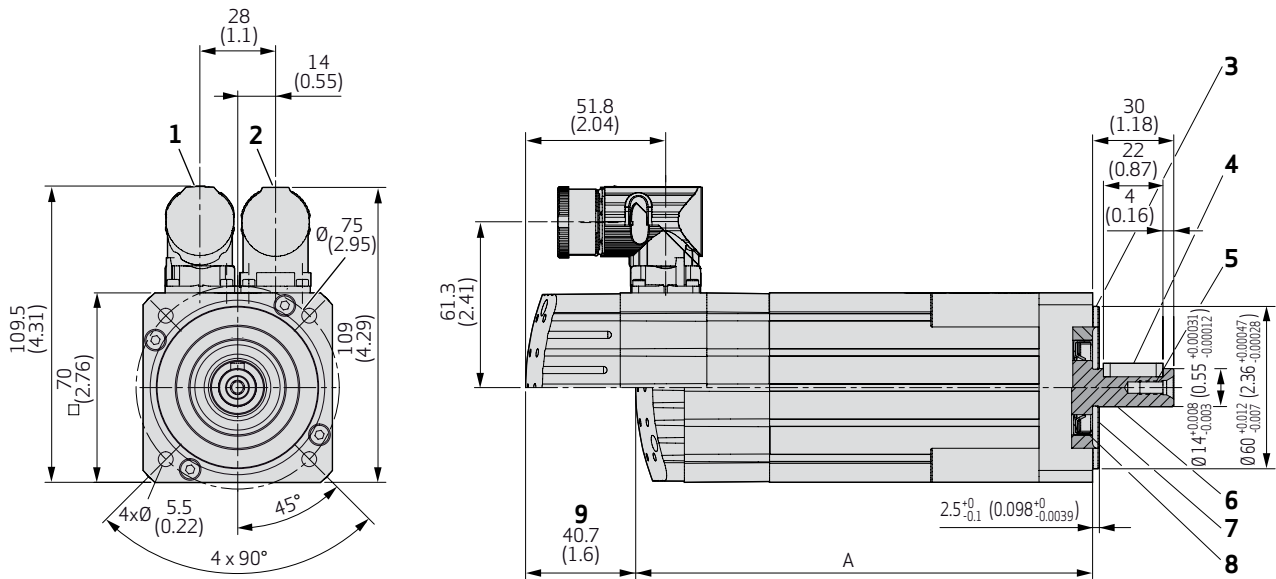
Model No.	Dimension "A" Encoder [1]	Dimension "A" Resolver [1]
	mm (in)	mm (in)
JSC3-020	169.2 (6.7)	169.2 (6.7)
JSC3-040	220.2 (8.7)	220.2 (8.7)
JSC3-050	245.7 (9.7)	245.7 (9.7)
JSC3-060	271.2 (10.7)	271.2 (10.7)
JSC3-075	308.7 (12.2)	308.7 (12.2)

[1] Standard bearing

1　Power connector
2　Signal connector
3　Tolerances of shaft extension-run-out and of mounting flange per DIN 42955
4　Optional key DIN 6885-A 5x5x22
5　Thread M5x12.5 DIN 13
6　Shaft DIN 748-3
7　Flange DIN 42948
8　Optional shaft seal
9　With brake

SIZE 4
Natural Cooling, Standard Dynamic, Type JSC4

Characteristics and Nominal Values with Sinusoidal Drive

Characteristics		JSC4-026	JSC4-040	JSC4-053	JSC4-067	JSC4-080	Units
Continuous stall torque	M_0	4.9 (43.4)	6.8 (60.2)	8.5 (75.2)	10.2 (90.3)	11.7 (104)	Nm (lbf in)
Nominal torque	M_N	3.36 (29.7)	4.71 (41.7)	5.56 (49.2)	7.77 (68.8)	8.79 (77.8)	Nm (lbf in)
Maximum torque	M_{max}	18.9 (167)	29.0 (257)	38.5 (341)	48.6 (430)	58.0 (513)	Nm (lbf in)
Nominal speed	n_N	5,100	4,300	4,100	3,200	2,700	r/min
Maximum speed	n_{max}	9,680	6,300	4,750	3,760	3,150	r/min
Continuous stall current	I_0	6.57	5.96	5.6	5.33	5.14	A_{rms}
Nominal power	P_N	1.8 (2.4)	2.12 (2.8)	2.39 (3.2)	2.6 (3.5)	2.49 (3.3)	kW (hp)
Torque constant	k_T	0.75 (6.6)	1.15 (10.2)	1.52 (13.5)	1.91 (16.9)	2.28 (20.2)	Nm/A_{rms} ($lbf\ in/A_{rms}$)
Voltage constant	k_e	45.4	69.8	92.5	116.9	139.6	$V_{rms}/k_{r/min}$
Thermal time constant	t_{th}	1,570	1,812	1,952	2,078	2,174	s
Winding resistance at 25 °C (77 °F) (phase to phase)	R_{tt}	1.527	2.074	2.581	3.128	3.635	Ohm
Winding inductance (phase to phase)	L_{tt}	7.4	11.3	14.8	18.7	22.4	mH
Rotor inertia with resolver	J	2.2 (19.5)	3.1 (27.4)	3.94 (34.9)	4.84 (42.8)	5.68 (50.3)	$kg\ cm^2$ ($10^{-4}\ lbf\ in\ s^2$)
Rotor inertia with encoder	J	2.2 (19.5)	3.1 (27.4)	3.94 (34.9)	4.84 (42.8)	5.68 (50.3)	$kg\ cm^2$ ($10^{-4}\ lbf\ in\ s^2$)
Weight (without brake)	m	7.0 (15.4)	8.1 (17.9)	9.1 (20.1)	10.1 (22.3)	12.6 (27.8)	kg (lb)

Optional holding brake	Option 1	Option 2	Units
Holding torque	N/A	15 (133)	Nm (lbf in)
Extra weight	N/A	0.75 (1.7)	kg (lb)
Extra inertia with resolver	N/A	1 (8.9)	$kg\ cm^2$ ($10^{-4}\ lbf\ in\ s^2$)
Extra inertia with encoder	N/A	1.9 (16.8)	$kg\ cm^2$ ($10^{-4}\ lbf\ in\ s^2$)
Power requirement	N/A	18	W
Voltage requirement (+6 % -10 %)	N/A	24	V_{DC}

Notes:

1. Different windings available to decrease nominal speed
2. Motor performances as measured with Moog's Servo Drive of proper size
3. Motor Pole Count: 8
4. DC Link voltage 565 V

SIZE 4
Natural Cooling, Standard Dynamic, Type JSC4

Motor Characteristics

JSC4-026

JSC4-040

JSC4-053

JSC4-067

1   Continuous torque
2   Maximum torque
3   Torque constant k_T

SIZE 4
Natural Cooling, Standard Dynamic, Type JSC4

Motor Characteristics

JSC4-080

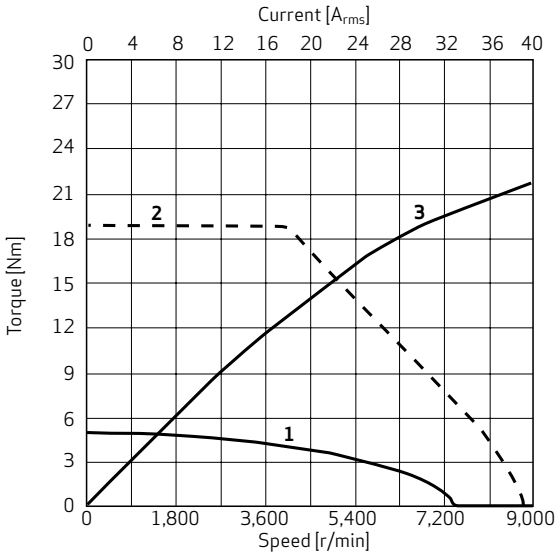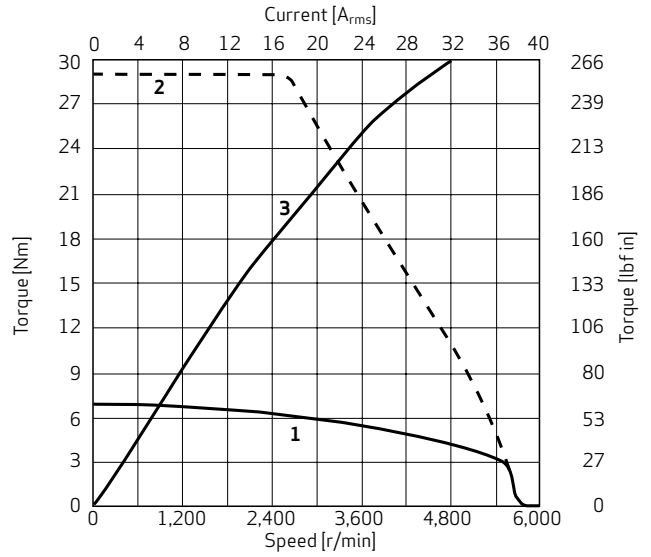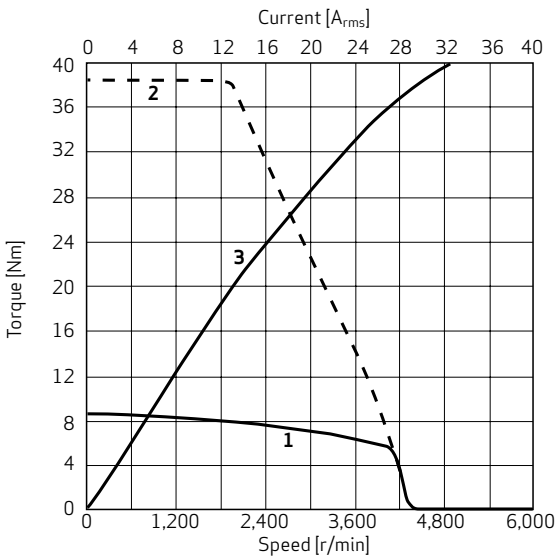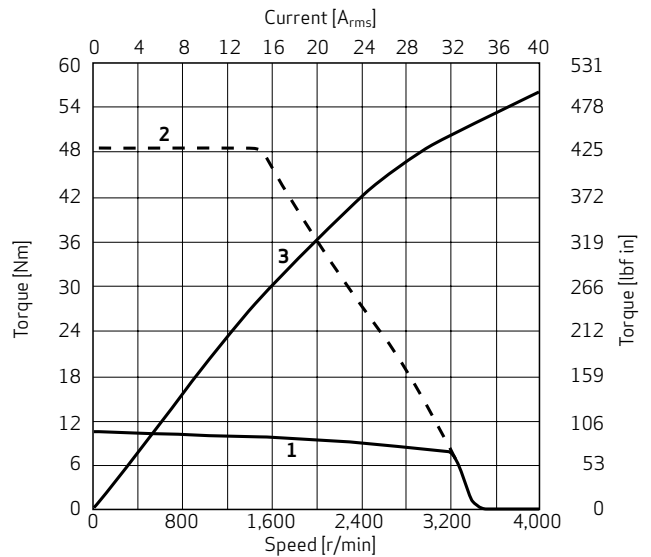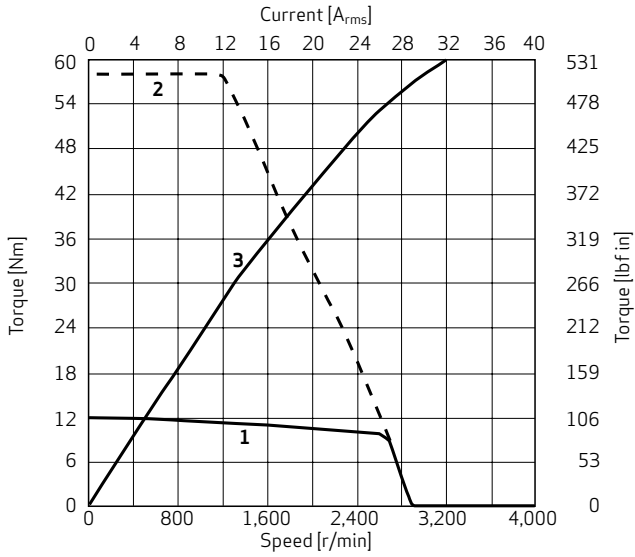1   Continuous torque
2   Maximum torque
3   Torque constant k_T

SIZE 4
Natural Cooling, Standard Dynamic, Type JSC4

JSC4 with Resolver
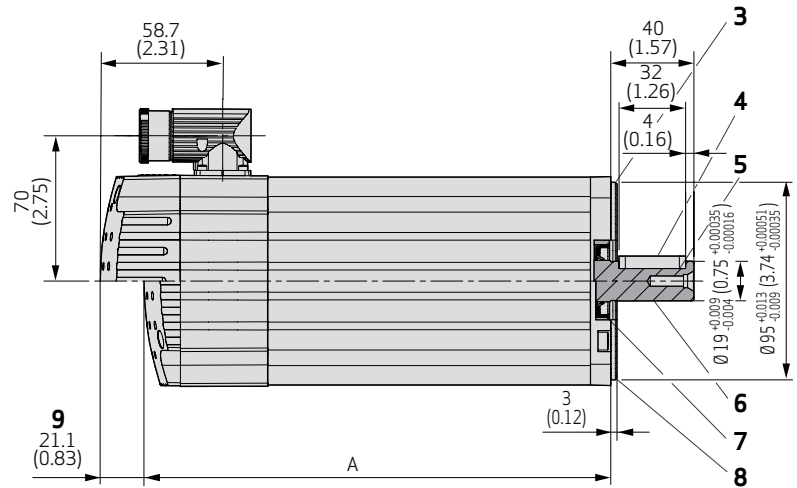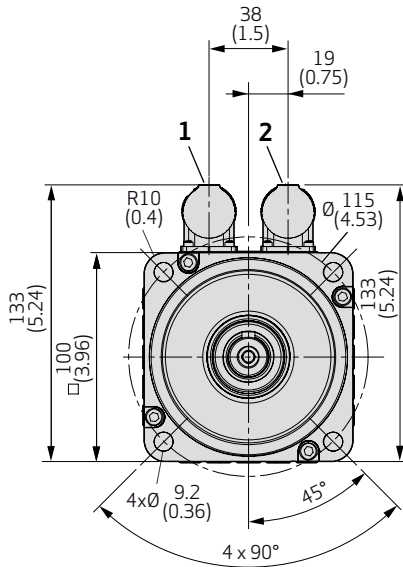
JSC4 with Encoder
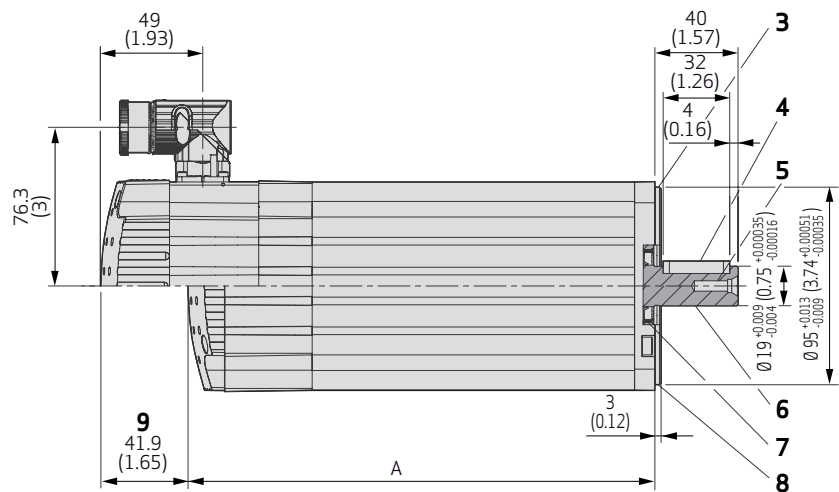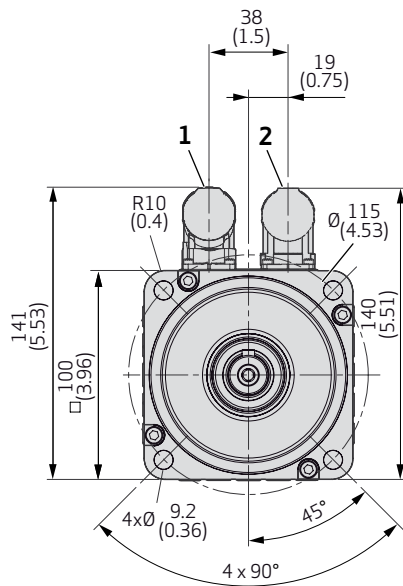
Model No.	Dimension "A" Encoder [1]	Dimension "A" Resolver [1]
	mm (in)	mm (in)
JSC4-026	224.5 (8.8)	224.5 (8.8)
JSC4-040	259.5 (10.2)	259.5 (10.2)
JSC4-053	292.5 (11.5)	292.5 (11.5)
JSC4-067	327.5 (12.9)	327.5 (12.9)
JSC4-080	360.5 (14.2)	360.5 (14.2)

1) Standard bearing

1 Power connector
2 Signal connector
3 Tolerances of shaft extension-run-out and of mounting flange per DIN 42955
4 Optional key DIN 6885-A 6x6x32
5 Thread M6x16 DIN 13
6 Shaft DIN 748-3
7 Optional shaft seal
8 Flange DIN 42948
9 With brake

SIZE 5
Natural Cooling, High Dynamic, Type JHC5

Characteristics and Nominal Values with Sinusoidal Drive

Characteristics		JHC5-047	JHC5-063	JHC5-079	JHC5-094	Units
Continuous stall torque	M_0	21.5 (190)	27.7 (245)	33.3 (295)	39.4 (349)	Nm (lbf in)
Nominal torque	M_N	17.1 (151)	21.1 (187)	24.4 (216)	28.0 (248)	Nm (lbf in)
Maximum torque	M_{max}	64.2 (568)	85.5 (757)	107.0 (947)	128.3 (1136)	Nm (lbf in)
Nominal speed	n_N	2,500	2,500	2,500	2,500	r/min
Maximum speed	n_{max}	2,980	2,980	2,980	2,980	r/min
Continuous stall current	I_0	8.8	11.3	13.6	16.1	A_{rms}
Nominal power	P_N	4.48 (6)	5.52 (7.4)	6.39 (8.6)	7.33 (9.8)	kW (hp)
Torque constant	k_T	2.45 (21.7)	2.45 (21.7)	2.45 (21.7)	2.45 (21.7)	Nm/A_{rms} $(lbf in/A_{rms})$
Voltage constant	k_e	147.6	147.6	147.6	147.6	$V_{rms}/k_{r/min}$
Thermal time constant	t_{th}	2,950	3,400	3,750	3,882	s
Winding resistance at 25 °C (77 °F) (phase to phase)	R_{tt}	1.689	1.167	0.911	0.724	Ohm
Winding inductance (phase to phase)	L_{tt}	18.4	13.7	10.9	9.1	mH
Rotor inertia with resolver	J	10.8 (95.6)	14.0 (124)	17.1 (151)	20.2 (179)	kg cm^2 (10^{-4} lbf in s^2)
Rotor inertia with encoder	J	10.8 (95.6)	14.0 (124)	17.1 (151)	20.2 (179)	kg cm^2 (10^{-4} lbf in s^2)
Weight (without brake)	m	19.2 (42.3)	21.8 (48.1)	24.5 (54)	28.6 (63.1)	kg (lb)

Optional holding brake	Option 1	Option 2	Units
Holding torque	15 (133)	22 (195)	Nm (lbf in)
Extra weight	0.75 (1.7)	1.1 (2.4)	kg (lb)
Extra inertia with resolver	1 (8.9)	3.6 (31.9)	kg cm^2 (10^{-4} lbf in s^2)
Extra inertia with encoder	1.2 (10.6)	3.8 (33.6)	kg cm^2 (10^{-4} lbf in s^2)
Power requirement	15.6	17	W
Voltage requirement (+6 % -10 %)	24	24	V_{DC}

Notes:

1. Different windings available to decrease nominal speed
2. Motor performances as measured with Moog's Servo Drive of proper size
3. Motor Pole Count: 8
4. DC Link voltage 565 V

SIZE 5
Natural Cooling, High Dynamic, Type JHC5

Motor Characteristics

JHC5-047

JHC5-063
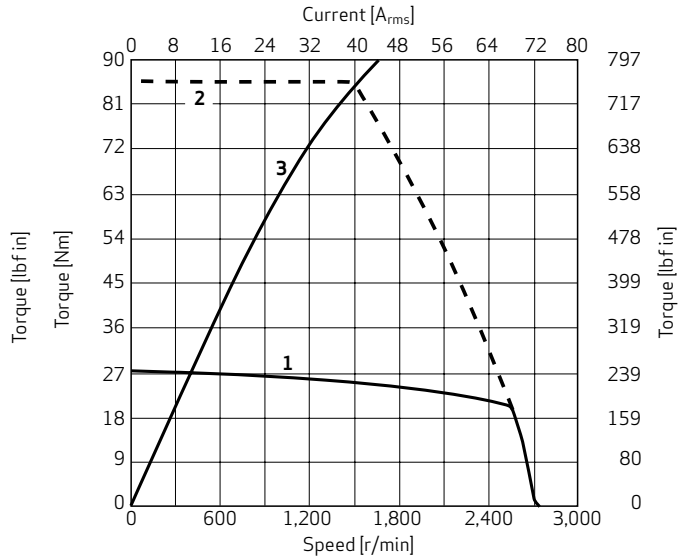
JHC5-079

JHC5-094


1   Continuous torque
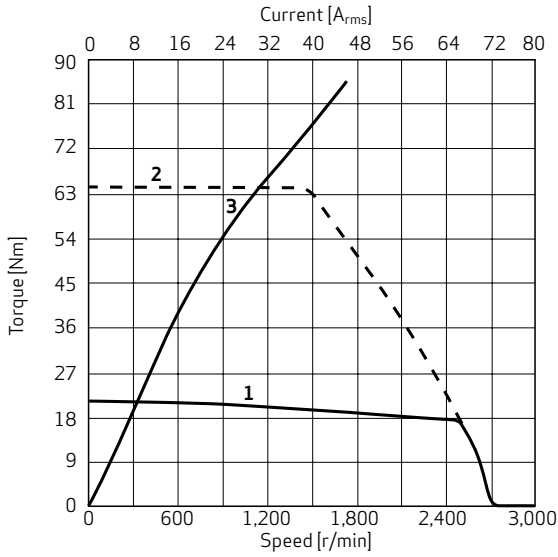2   Maximum torque
3   Torque constant k_T

SIZE 5
Natural Cooling, High Dynamic, Type JHC5

JHC5 with Resolver
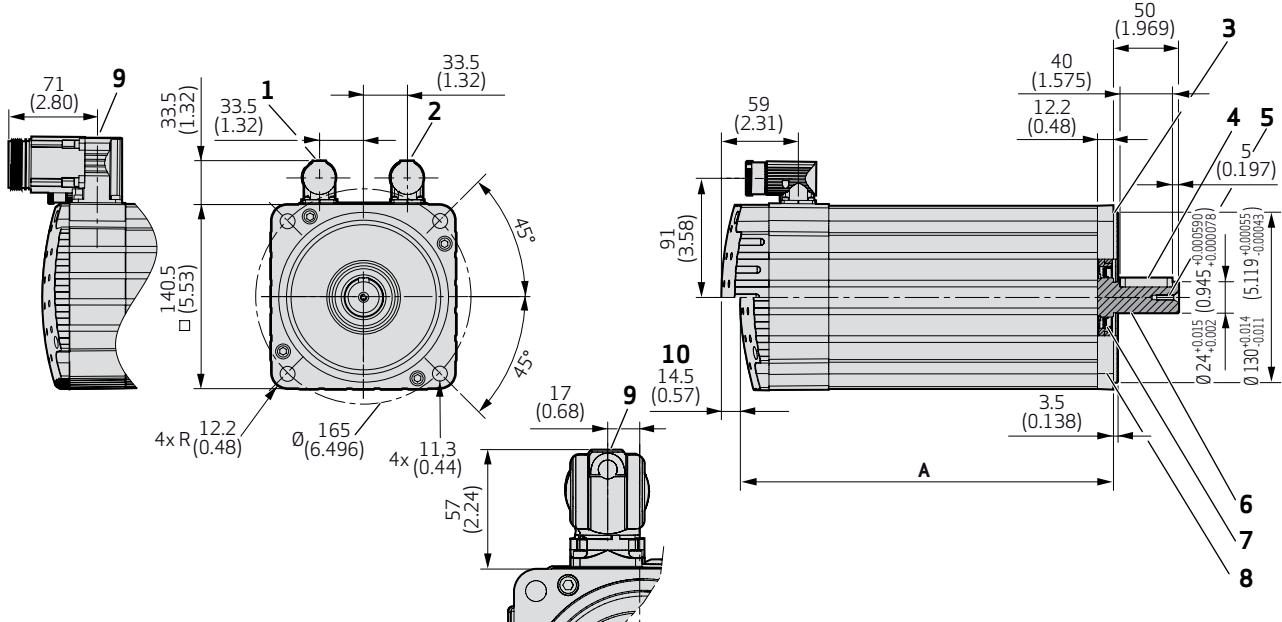
JHC5 with Encoder
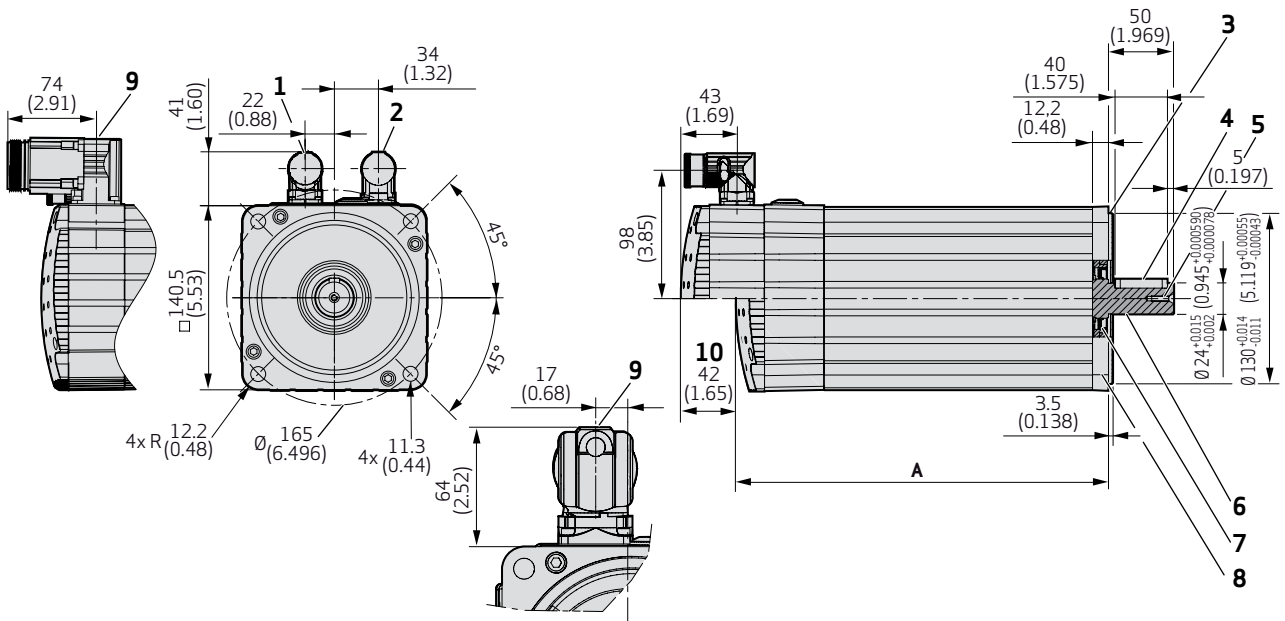
Model No.	Dimension "A" Encoder [1]	Dimension "A" Resolver [1]
	mm (in)	mm (in)
JHC5-047	285 (11.2)	285 (11.2)
JHC5-063	325 (12.8)	325 (12.8)
JHC5-079	365 (14.4)	365 (14.4)
JHC5-094	405 (15.9)	405 (15.9)

1) Standard bearing

1   Power connector JHC5-047, JHC5-063
2   Signal connector
3   Tolerances of shaft extension-run-out and of mounting flange per DIN 42955
4   Optional key DIN 6885-A 8x7x40
5   Thread M4x17 DIN 13
6   Shaft DIN 748-3
7   Optional shaft seal
8   Flange DIN 42948
9   Power connector JHC5-079, JHC5-094
10 With brake

SIZE 5
Liquid Cooling, High Dynamic, Type JHW5

Characteristics and Nominal Values with Sinusoidal Drive

Characteristics		JHW5-047	JHW5-063	JHW5-079	JHW5-094	Units
Continuous stall torque	M_0	46.1 (408)	61.1 (541)	75.3 (666)	90.5 (801)	Nm (lbf in)
Nominal torque	M_N	44.62 (395)	59.52 (527)	73.24 (648)	87.9 (778)	Nm (lbf in)
Maximum torque	M_{max}	64.5 (571)	85.54 (757)	106.99 (947)	128.31 (1,136)	Nm (lbf in)
Nominal speed	n_N	2,000	2,000	2,000	2,000	r/min
Maximum speed	n_{max}	2,980	2,980	2,980	2,980	r/min
Continuous stall current	I_0	19.35	25.61	31.42	37.76	A_{rms}
Nominal power	P_N	9.35 (12.5)	12.47 (16.7)	15.34 (20.6)	18.41 (24.7)	kW (hp)
Torque constant	k_T	2.38 (21.1)	2.39 (21.2)	2.4 (21.2)	2.4 (21.2)	Nm/A_{rms} $(lbf\ in/A_{rms})$
Voltage constant	k_e	147.6	147.6	147.6	147.6	$V_{rms}/k_{r/min}$
Thermal time constant	t_{th}	400	460	507	525	s
Winding resistance at 25 °C (77 °F) (phase to phase)	R_{tt}	1.64	1.14	0.893	0.712	Ohm
Winding inductance (phase to phase)	L_{tt}	17.4	13	10.3	8.6	mH
Rotor inertia with resolver	J	10.8 (95.6)	14.0 (124)	17.1 (151)	20.2 (179)	kg cm^2 (10^{-4} lbf in s^2)
Rotor inertia with encoder	J	10.8 (95.6)	14.0 (124)	17.1 (151)	20.2 (179)	kg cm^2 (10^{-4} lbf in s^2)
Weight (without brake)	m	19.4 (42.8)	24 (52.9)	28.3 (62.4)	32.8 (72.3)	kg (lb)

Optional holding brake	Option 1	Option 2	Units
Holding torque	N/A	22 (195)	Nm (lbf in)
Extra weight	N/A	1.1 (2.4)	kg (lb)
Extra inertia with resolver	N/A	3.6 (31.9)	kg cm^2 (10^{-4} lbf in s^2)
Extra inertia with encoder	N/A	3.8 (33.6)	kg cm^2 (10^{-4} lbf in s^2)
Power requirement	N/A	17	W
Voltage requirement (+6% -10%)	N/A	24	V_{DC}

Notes:

1. Different windings available to decrease nominal speed

2. Motor performances as measured with Moog's Servo Drive of proper size

3. Motor Pole Count: 8

4. DC Link voltage 565 V

SIZE 5
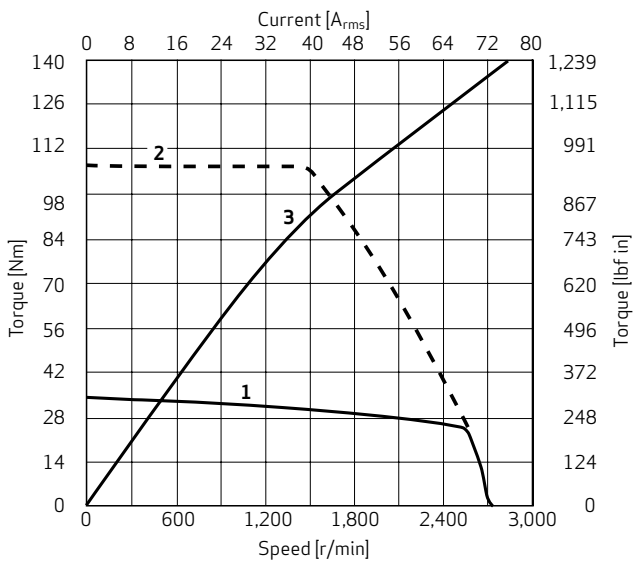# Liquid Cooling, High Dynamic, Type JHW5

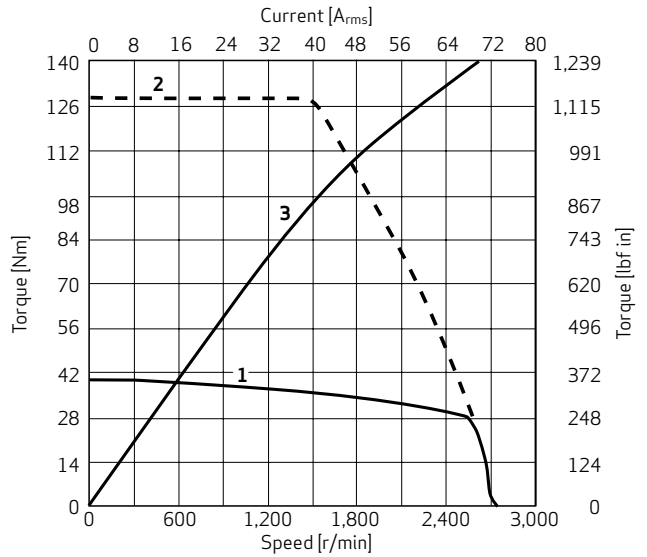**Motor Characteristics**

JHW5-047

JHW5-063

JHW5-079
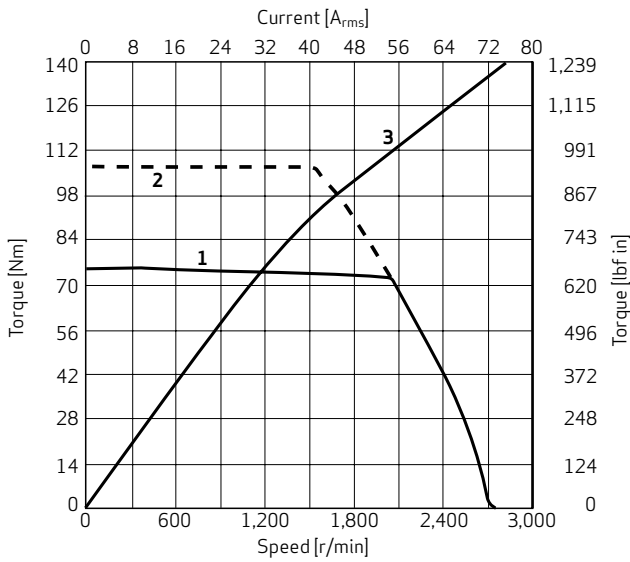
JHW5-094

1 Continuous torque
2 Maximum torque
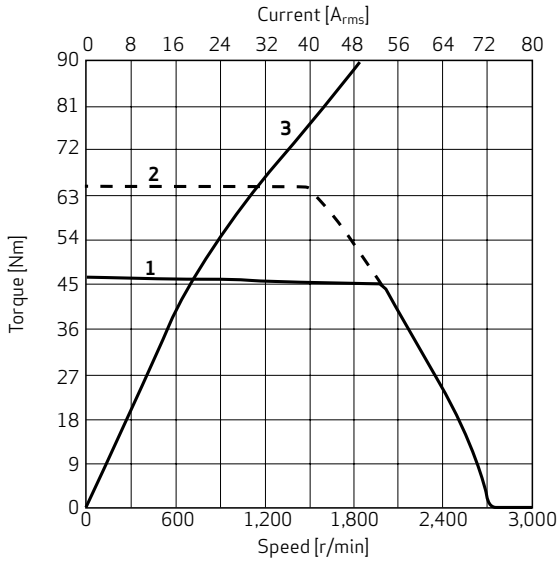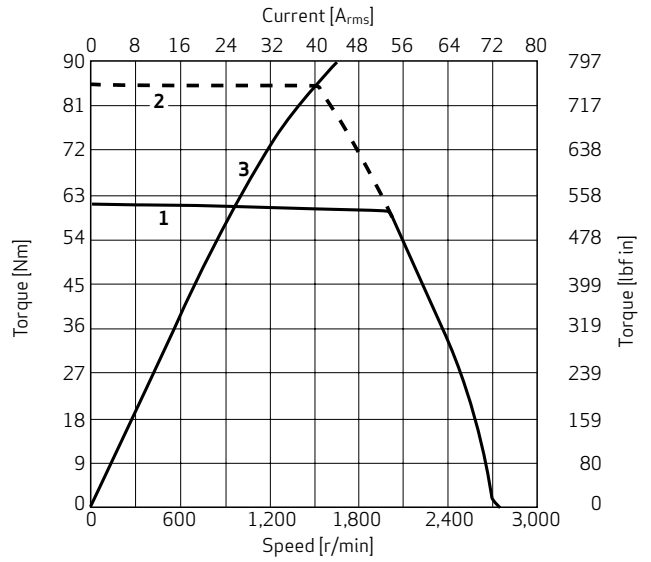3 Torque constant k_T

SIZE 5
Liquid Cooling, High Dynamic, Type JHW5

JHW5 with Resolver
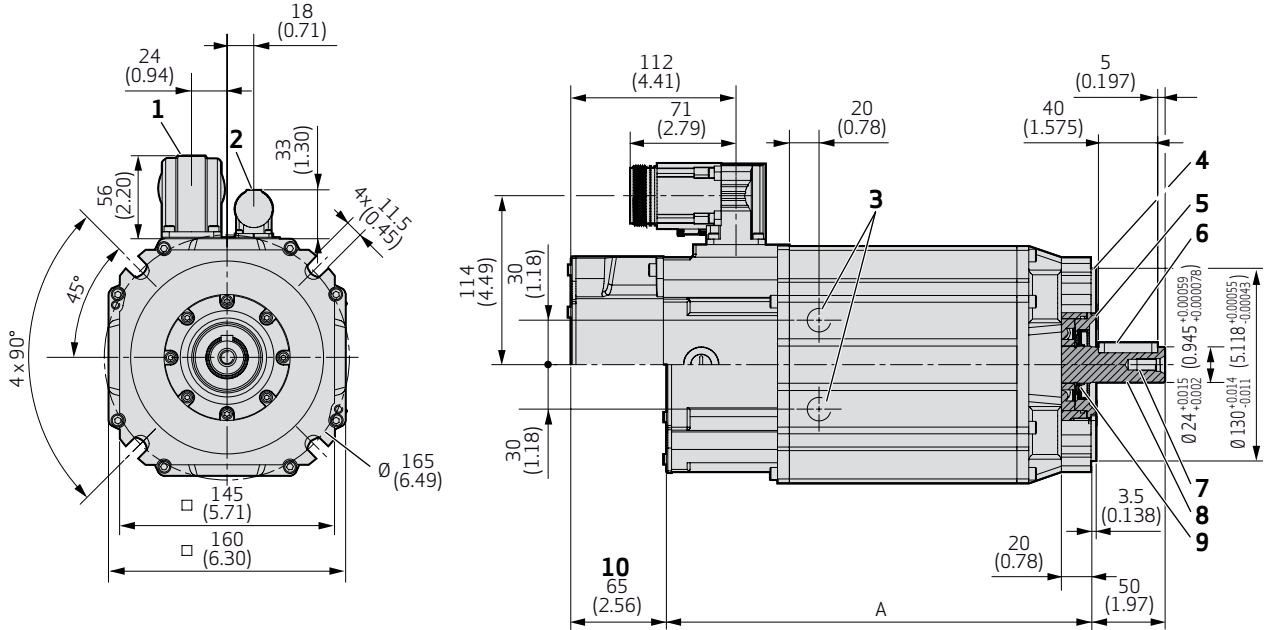
JHW5 with Encoder
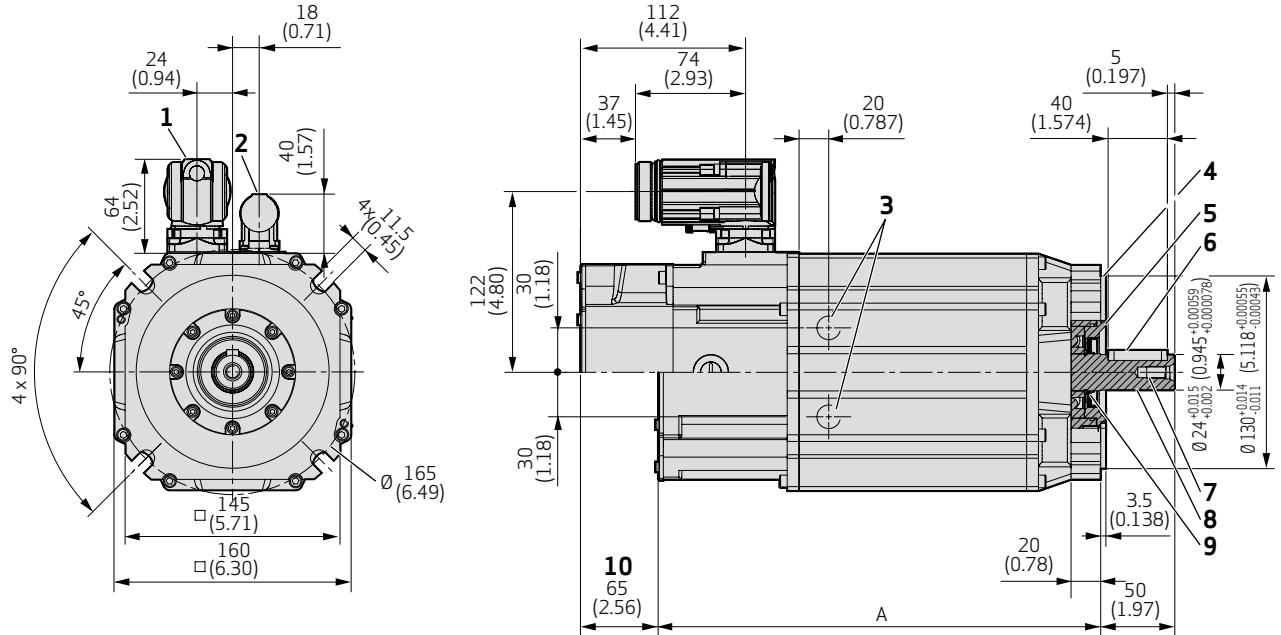
Model No.	Dimension "A" Encoder [1]	Dimension "A" Resolver [1]
	mm (in)	mm (in)
JHW5-047	293 (11.5)	289 (11.4)
JHW5-063	333 (13.1)	329 (13)
JHW5-079	373 (14.7)	369 (14.5)
JHW5-094	413 (16.3)	409 (16.1)

1) Standard bearing

1   Power connector
2   Signal connector
3   Cooler outlets G3/8" left side
4   Tolerances of shaft extension-run-out and of mounting flange per DIN 42955
5   Flange DIN 42948
6   Optional key DIN 6885-A 8x7x40
7   Thread M8x19 DIN 13
8   Shaft DIN 748-3
9   Optional shaft seal
10 With brake

SIZE 5
Natural Cooling, Standard Dynamic, Type JSC5

Characteristics and Nominal Values with Sinusoidal Drive

Characteristics		JSC5-063	JSC5-084	JSC5-105	JSC5-126	Units
Continuous stall torque	M_0	28.2 (250)	36.7 (325)	45.2 (400)	53.5 (474)	Nm (lbf in)
Nominal torque	M_N	19.8 (175)	28.1 (249)	36.7 (325)	45.0 (398)	Nm (lbf in)
Maximum torque	M_{max}	136 (1204)	182 (1611)	227 (2009)	273 (2416)	Nm (lbf in)
Nominal speed	n_N	3,000	2,300	1,800	1,500	r/min
Maximum speed	n_{max}	3,740	2,800	2,240	1,870	r/min
Continuous stall current	I_0	17	16.6	16.3	16.1	A_{rms}
Nominal power	P_N	6.2 (8.3)	6.8 (9.1)	6.9 (9.2)	7.1 (9.5)	kW (hp)
Torque constant	k_T	1.66 (14.7)	2.21 (19.6)	2.76 (24.4)	3.31 (29.3)	Nm/A_{rms} $(lbf\ in/A_{rms})$
Voltage constant	k_e	118	157	196	235	$V_{rms}/k_{r/min}$
Thermal time constant	t_{th}	2,600	3,467	4,333	5,200	s
Winding resistance at 25 °C (77 °F) (phase to phase)	R_{tt}	0.588	0.736	0.884	1.031	Ohm
Winding inductance (phase to phase)	L_{tt}	4.6	6.2	7.7	9.2	mH
Rotor inertia with resolver	J	28.9 (256)	36.4 (322)	46.1 (408)	54.7 (484)	kg cm^2 $(10^{-4}$ lbf in s$^2)$
Rotor inertia with encoder	J	28.9 (256)	36.4 (322)	46.1 (408)	54.7 (484)	kg cm^2 $(10^{-4}$ lbf in s$^2)$
Weight (without brake)	m	22.1 (48.7)	25.1 (55.3)	31.3 (69)	35.6 (78.5)	kg (lb)

Optional holding brake	Option 1	Option 2	Units
Holding torque	15 (133)	22 (195)	Nm (lbf in)
Extra weight	0.75 (1.7)	1.1 (2.4)	kg (lb)
Extra inertia with resolver	1 (8.9)	3.6 (31.9)	kg cm^2 $(10^{-4}$ lbf in s$^2)$
Extra inertia with encoder	1.2 (10.6)	3.8 (33.6)	kg cm^2 $(10^{-4}$ lbf in s$^2)$
Power requirement	15.6	17	W
Voltage requirement (+6 % -10 %)	24	24	V_{DC}

Notes:

1. Different windings available to decrease nominal speed

2. Motor performances as measured with Moog's Servo Drive of proper size

3. Motor Pole Count: 8

4. DC Link voltage 565 V

SIZE 5
Natural Cooling, Standard Dynamic, Type JSC5
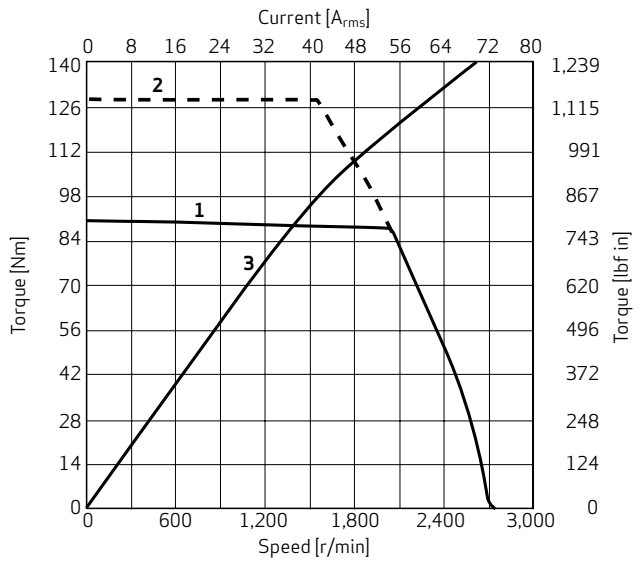
Motor Characteristics

JSC5-063


JSC5-084
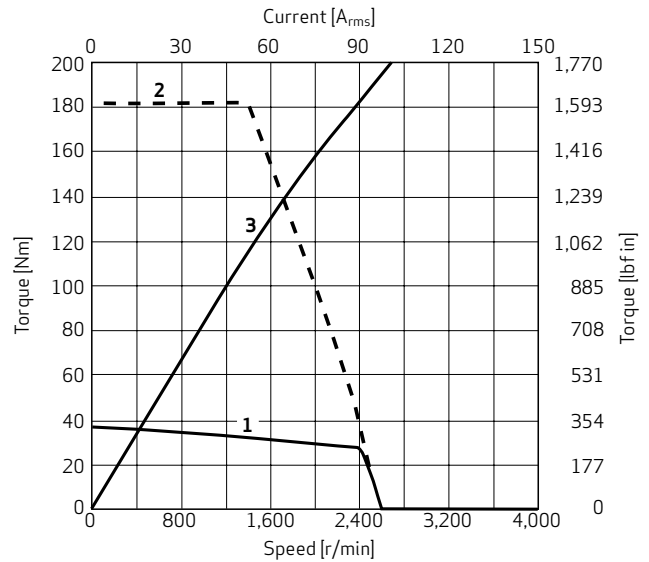
JSC5-105

JSC5-126

1   Continuous torque
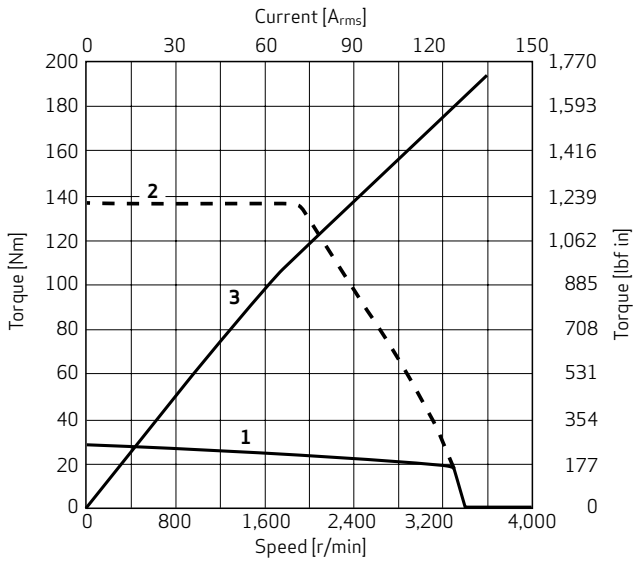2   Maximum torque
3   Torque constant k_T

SIZE 5
Natural Cooling, Standard Dynamic, Type JSC5

JSC5 with Resolver
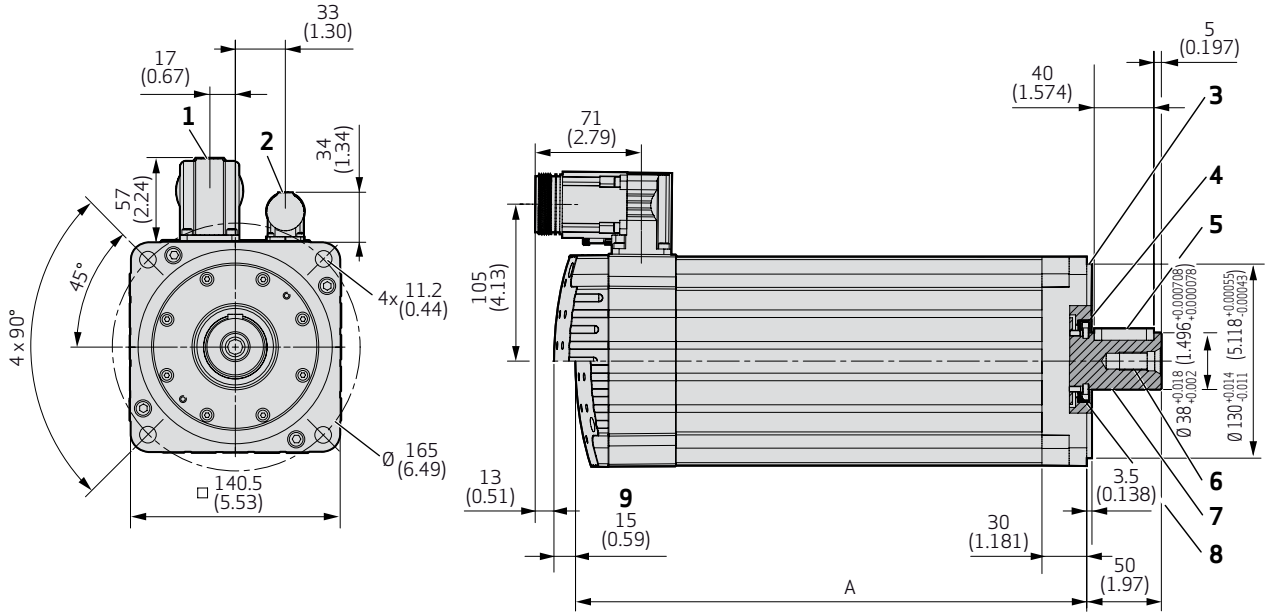
JSC5 with Encoder
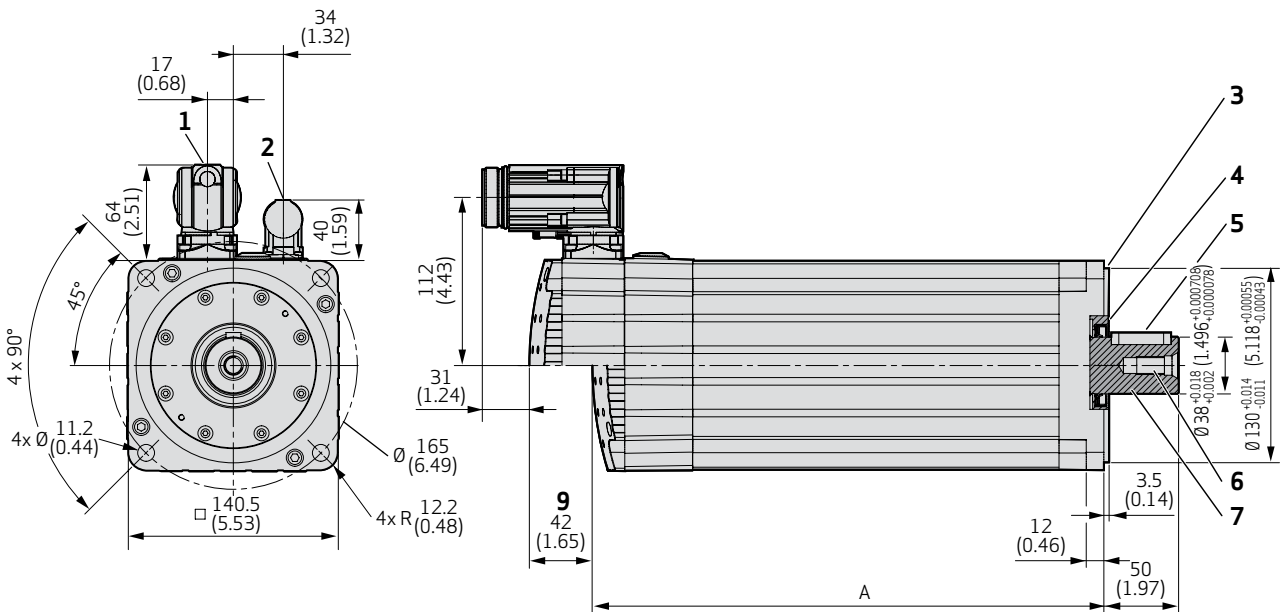
Model No.	Dimension "A" Encoder [1]	Dimension "A" Resolver [1]
	mm (in)	mm (in)
JSC5-063	343 (13.5)	343 (13.5)
JSC5-084	396 (15.6)	396 (15.6)
JSC5-105	450 (17.7)	450 (17.7)
JSC5-126	503 (19.8)	503 (19.8)

1) Standard bearing

1   Power connector
2   Signal connector
3   Tolerances of shaft extension-run-out and of mounting flange per DIN 42955
4   Flange DIN 42948
5   Optional key DIN 6885-A 10x8x40
6   Thread M12x28 DIN 13
7   Shaft DIN 748-3
8   Optional shaft seal
9   With brake

SIZE 5
Liquid Cooling, Standard Dynamic, Type JSW5

Characteristics and Nominal Values with Sinusoidal Drive

Characteristics		JSW5-063	JSW5-084	JSW5-105	JSW5-126	Units
Continuous stall torque	M_0	59.3 (525)	78.7 (697)	98.0 (867)	117.4 (1039)	Nm (lbf in)
Nominal torque	M_N	56.2 (497)	75.5 (668)	94.8 (839)	114.2 (1011)	Nm (lbf in)
Maximum torque	M_{max}	136 (1204)	182 (1611)	227 (2009)	273 (2416)	Nm (lbf in)
Nominal speed	n_N	2,700	2,000	1,600	1,300	r/min
Maximum speed	n_{max}	3,740	2,800	2,240	1,870	r/min
Continuous stall current	I_0	35.6	35.5	35.3	35.3	A_{rms}
Nominal power	P_N	15.9 (21.3)	15.8 (21.2)	15.9 (21.3)	15.6 (20.9)	kW (hp)
Torque constant	k_T	1.66 (14.7)	2.22 (19.6)	2.77 (24.5)	3.33 (29.5)	Nm/A_{rms} $(lbf\ in/A_{rms})$
Voltage constant	k_e	118	157	196	235	$V_{rms}/k_{r/min}$
Thermal time constant	t_{th}	353	470	588	706	s
Winding resistance at 25 °C (77 °F) (phase to phase)	R_{tt}	0.588	0.736	0.884	1.031	Ohm
Winding inductance (phase to phase)	L_{tt}	4.6	6.1	7.7	9.2	mH
Rotor inertia with resolver	J	29.1 (258)	37.7 (334)	46.3 (410)	54.9 (486)	$kg\ cm^2$ $(10^{-4}\ lbf\ in\ s^2)$
Rotor inertia with encoder	J	29.1 (258)	37.7 (334)	46.3 (410)	54.9 (486)	$kg\ cm^2$ $(10^{-4}\ lbf\ in\ s^2)$
Weight (without brake)	m	25.6 (56.4)	31 (68.4)	36.4 (80.3)	41.8 (92.2)	kg (lb)

Optional holding brake	Option 1	Option 2	Units
Holding torque	N/A	22 (195)	Nm (lbf in)
Extra weight	N/A	1.1 (2.4)	kg (lb)
Extra inertia with resolver	N/A	3.6 (31.9)	$kg\ cm^2$ $(10^{-4}\ lbf\ in\ s^2)$
Extra inertia with encoder	N/A	3.8 (33.6)	$kg\ cm^2$ $(10^{-4}\ lbf\ in\ s^2)$
Power requirement	N/A	17	W
Voltage requirement (+6% -10%)	N/A	24	V_{DC}

Notes:

1. Different windings available to decrease nominal speed

2. Motor performances as measured with Moog's Servo Drive of proper size

3. Motor Pole Count: 8

4. DC Link voltage 565 V

SIZE 5
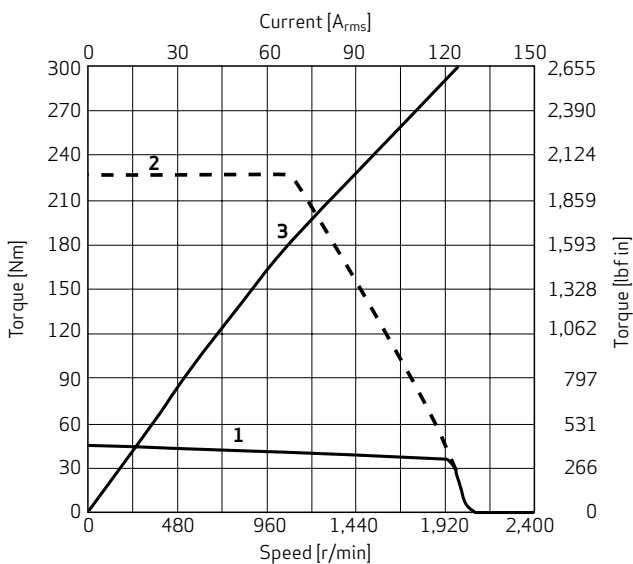# Liquid Cooling, Standard Dynamic, Type JSW5
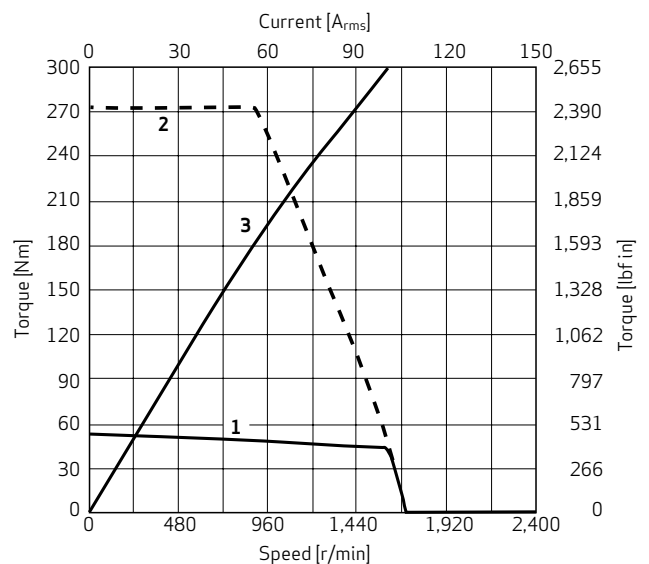
Motor Characteristics

### JSW5-063

JSW5-084
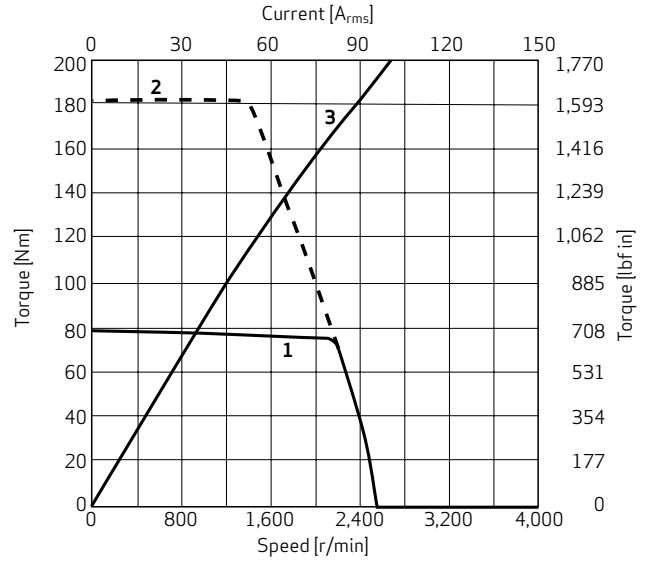
JSW5-105
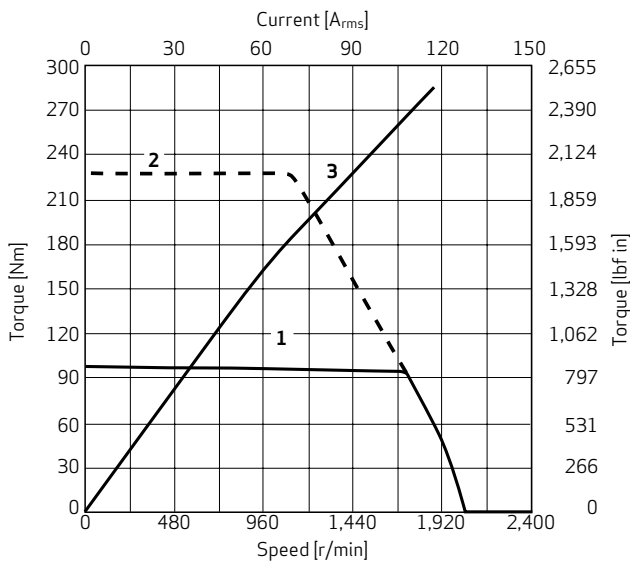
JSW5-126

1   Continuous torque

2   Maximum torque
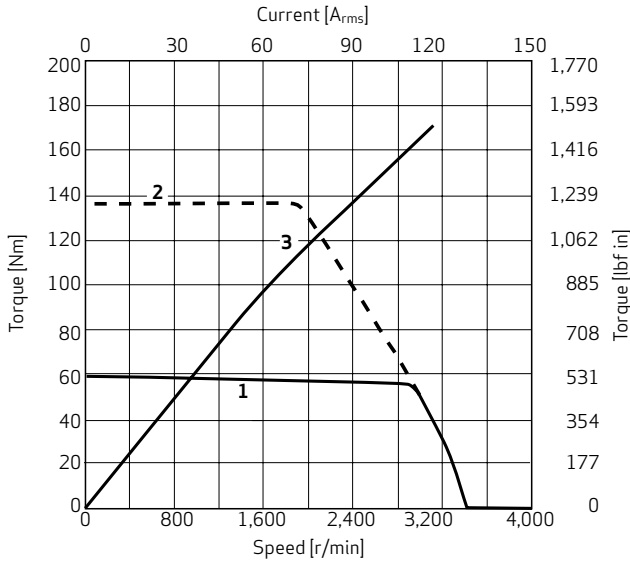
3   Torque constant k_T

SIZE 5
Liquid Cooling, Standard Dynamic, Type JSW5

JSW5 with Resolver
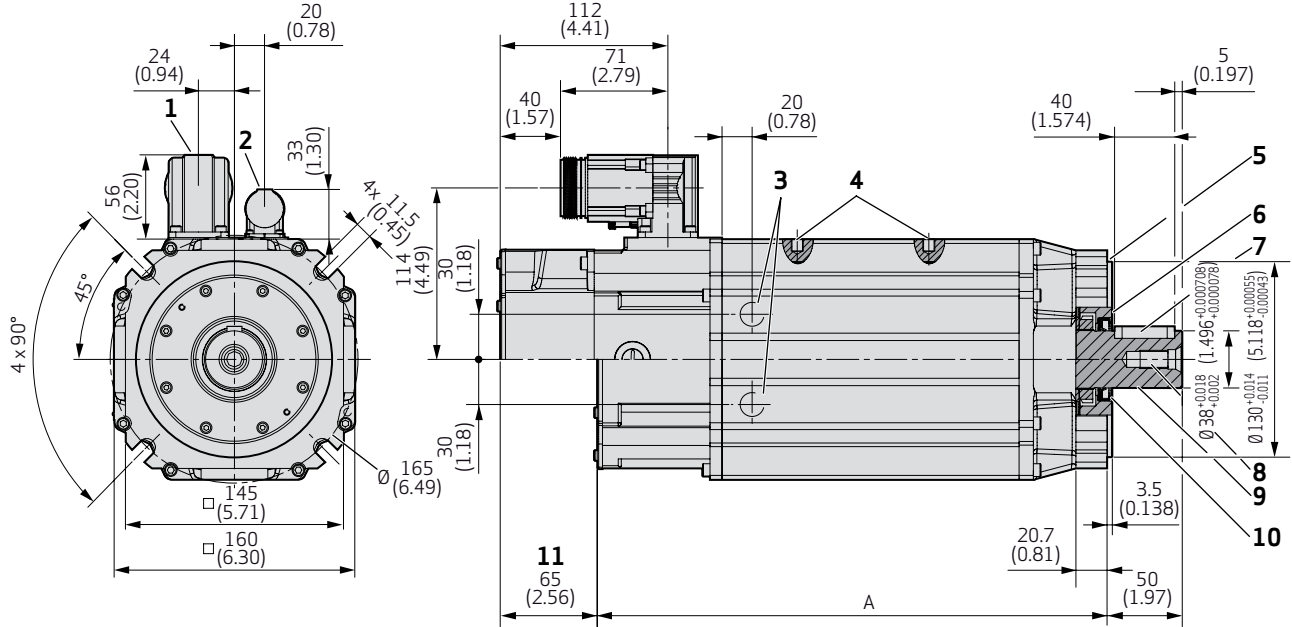
JSW5 with Encoder
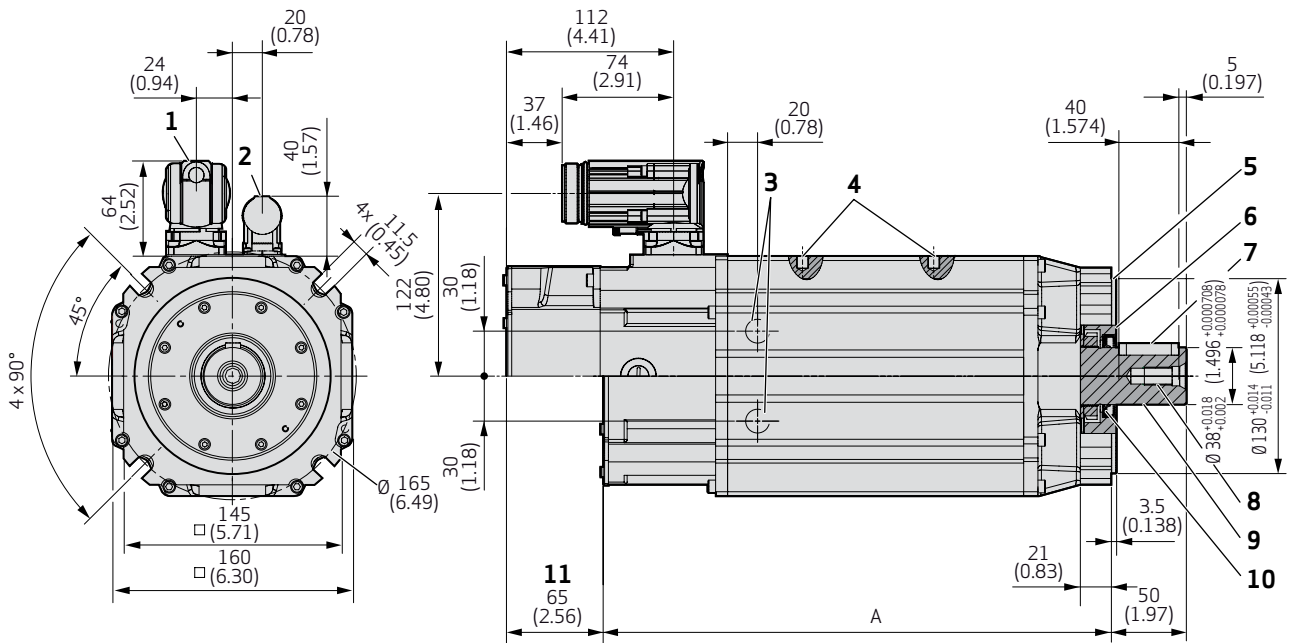
Model No.	Dimension "A" Encoder [1]	Dimension "A" Resolver [1]
	mm (in)	mm (in)
JSW5-063	345 (13.6)	341 (13.4)
JSW5-084	398 (15.7)	394 (15.5)
JSW5-105	452 (17.8)	448 (17.6)
JSW5-126	505 (19.9)	501 (19.7)

1) Standard bearing

1   Power connector
2   Signal connector
3   Cooler outlets G3/8"
4   Motor lifting holes M8 DIN 332
5   Tolerances of shaft extension-run-out and of mounting flange per DIN 42955
6   Flange DIN 42948
7   Optional key DIN 6885-A 10x8x40
8   Thread M12x28 DIN 13
9   Shaft DIN 748-3
10   Optional shaft seal
11   With brake

SIZE 6
Natural Cooling, High Dynamic, Type JHC6

Characteristics and Nominal Values with Sinusoidal Drive

Characteristics		JHC6-079	JHC6-105	JHC6-131	JHC6-157	Units
Continuous stall torque	M_0	70.8 (627)	92.9 (822)	114.6 (1014)	136.4 (1207)	Nm (lbf in)
Nominal torque	M_N	50.2 (444)	64.4 (570)	82.1 (727)	95.5 (845)	Nm (lbf in)
Maximum torque	M_{max}	276 (2443)	365 (3231)	456 (4036)	547 (4841)	Nm (lbf in)
Nominal speed	n_N	1,900	1,800	1,600	1,600	r/min
Maximum speed	n_{max}	2,200	2,060	1,880	1,830	r/min
Continuous stall current	I_0	21.4	26.3	29.6	34.4	A_{rms}
Nominal power	P_N	10.0 (13.4)	12.1 (16.2)	13.8 (18.5)	16.0 (21.4)	kW (hp)
Torque constant	k_T	3.31 (29.3)	3.53 (31.2)	3.87 (34.3)	3.97 (35.1)	Nm/A_{rms} $(lbf\ in/A_{rms})$
Voltage constant	k_e	200	213	233	240	$V_{rms}/k_{r/min}$
Thermal time constant	t_{th}	4,000	4,200	4,620	5,200	s
Winding resistance at 25 °C (77 °F) (phase to phase)	R_{tt}	0.483	0.385	0.355	0.302	Ohm
Winding inductance (phase to phase)	L_{tt}	8.3	7	6.7	5.9	mH
Rotor inertia with resolver	J	78.4 (694)	103.7 (918)	128.9 (1,141)	154.2 (1,365)	kg cm^2 (10^{-4} lbf in s^2)
Rotor inertia with encoder	J	78.4 (694)	103.7 (918)	128.9 (1,141)	154.2 (1,365)	kg cm^2 (10^{-4} lbf in s^2)
Weight (without brake)	m	53.6 (118.2)	64.7 (142.7)	75.4 (166.3)	88.4 (194.9)	kg (lb)

Optional holding brake	Option 1	Option 2	Units
Holding torque	22 (195)	72 (637)	Nm (lbf in)
Extra weight	1.1 (2.4)	2.9 (6.4)	kg (lb)
Extra inertia with resolver	3.6 (31.9)	16 (142)	kg cm^2 (10^{-4} lbf in s^2)
Extra inertia with encoder	3.8 (33.6)	16.1 (142)	kg cm^2 (10^{-4} lbf in s^2)
Power requirement	17	40	W
Voltage requirement (+6% -10%)	24	24	V_{DC}

Notes:

1. Different windings available to decrease nominal speed

2. Motor performances as measured with Moog's Servo Drive of proper size

3. Motor Pole Count: 8

4. DC Link voltage 565 V

SIZE 6
# Natural Cooling, High Dynamic, Type JHC6

Motor Characteristics

JHC6-079

JHC6-105
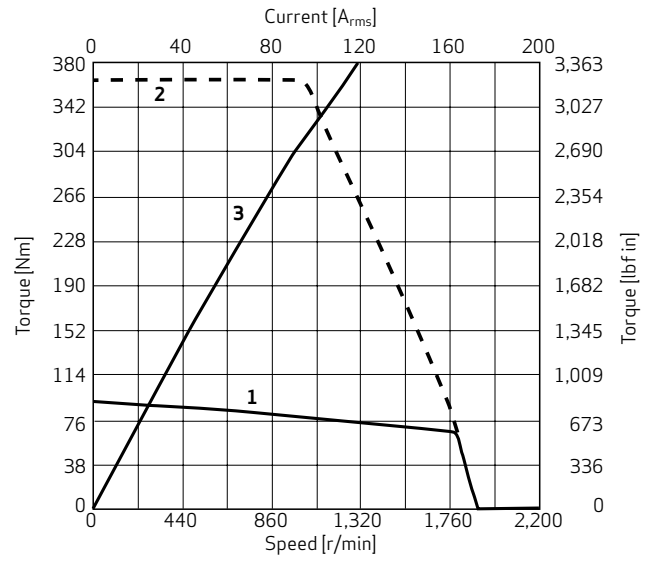
JHC6-131

JHC6-157

1   Continuous torque
2   Maximum torque
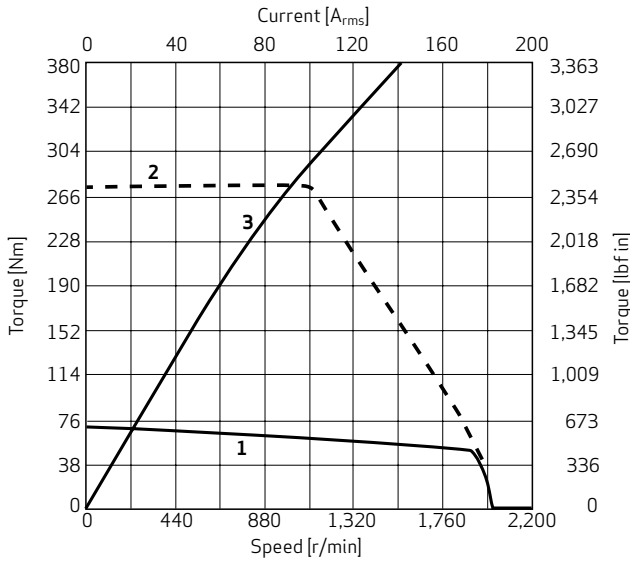3   Torque constant k_T

SIZE 6
Natural Cooling, High Dynamic, Type JHC6

JHC6 with Resolver
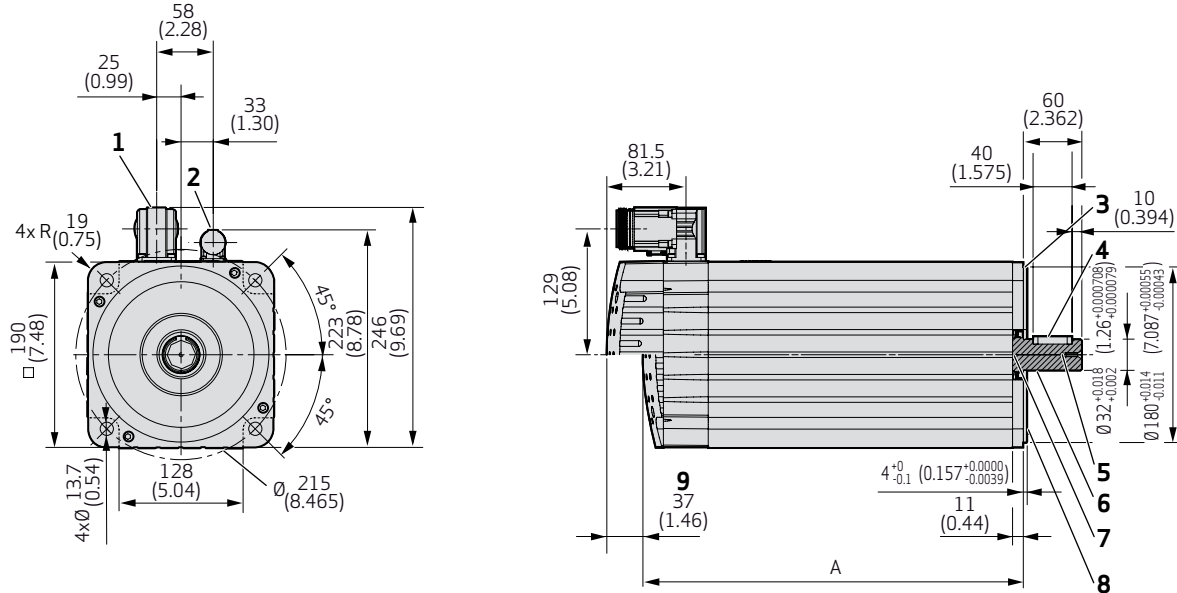
JHC6 with Encoder
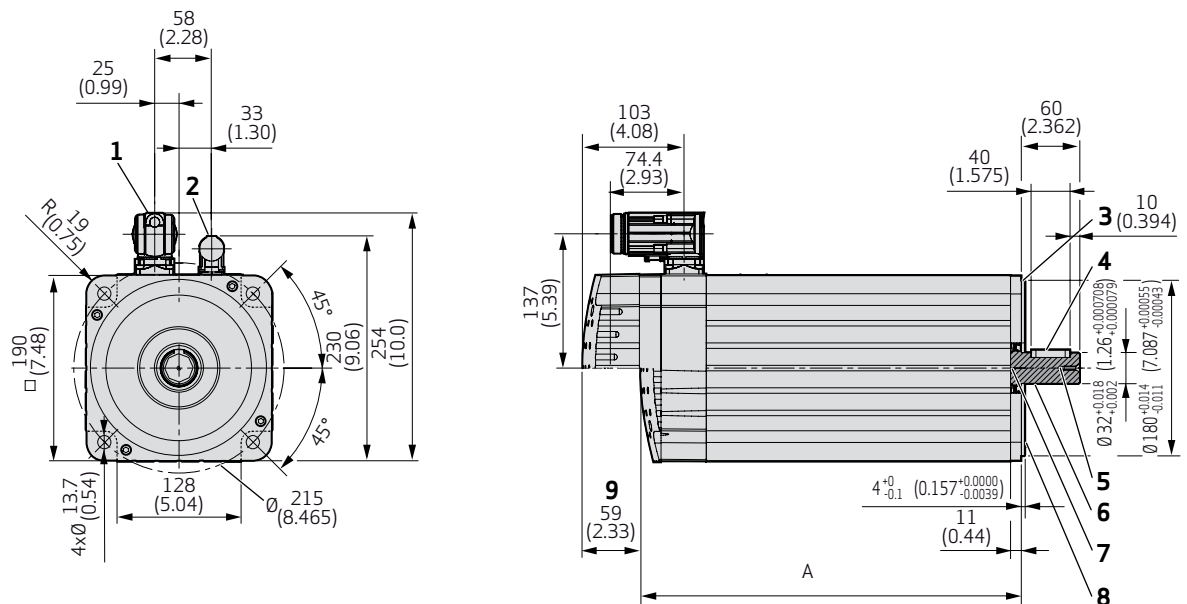
Model No.	Dimension "A" Encoder [1]	Dimension "A" Resolver [1]
	mm (in)	mm (in)
JHC6-079	390 (15.4)	390 (15.4)
JHC6-105	457 (18)	457 (18)
JHC6-131	524 (20.6)	524 (20.6)
JHC6-157	590 (23.2)	590 (23.2)

1) Standard bearing

1   Power connector
2   Signal connector
3   Tolerances of shaft extension-run-out and of mounting flange per DIN 42955
4   Optional key DIN 6885-A 10x8x40
5   Thread M4x17 DIN 13
6   Shaft DIN 748-3
7   Optional shaft seal
8   Flange DIN 42948
9   With brake

SIZE 6
Liquid Cooling, High Dynamic, Type JHW6

Characteristics and Nominal Values with Sinusoidal Drive

Characteristics		JHW6-079	JHW6-105	JHW6-131	JHW6-157	Units
Continuous stall torque	M_0	114 (1009)	151 (1336)	188 (1664)	225 (1991)	Nm (lbf in)
Nominal torque	M_N	104 (920)	138 (1221)	171 (1513)	207 (1832)	Nm (lbf in)
Maximum torque	M_{max}	276 (2443)	365 (3231)	456 (4036)	547 (4841)	Nm (lbf in)
Nominal speed	n_N	1,700	1,600	1,500	1,400	r/min
Maximum speed	n_{max}	2,200	2,060	1,880	1,830	r/min
Continuous stall current	I_0	34.5	42.98	48.86	57.05	A_{rms}
Nominal power	P_N	18.4 (24.7)	23.1 (31)	26.9 (36.1)	30.3 (40.6)	kW (hp)
Torque constant	k_T	3.29 (29.1)	3.52 (31.2)	3.85 (34.1)	3.95 (35)	Nm/A_{rms} $(lbf\ in/A_{rms})$
Voltage constant	k_e	200	213	233.328	239.515	$V_{rms}/k_{r/min}$
Thermal time constant	t_{th}	541	568	660	704	s
Winding resistance at 25 °C (77 °F) (phase to phase)	R_{tt}	0.483	0.385	0.355	0.302	Ohm
Winding inductance (phase to phase)	L_{tt}	8.3	7.1	6.8	5.9	mH
Rotor inertia with resolver	J	84.2 (745)	109.5 (969)	134.8 (1,193)	160 (1,416)	kg cm^2 (10^{-4} lbf in s^2)
Rotor inertia with encoder	J	84.2 (745)	109.5 (969)	134.8 (1,193)	160 (1,416)	kg cm^2 (10^{-4} lbf in s^2)
Weight (without brake)	m	59.1 (130.3)	66.8 (147.3)	77.8 (1,71.5)	90.6 (199.8)	kg (lb)

Optional holding brake	Option 1	Option 2	Units
Holding torque	N/A	72 (637)	Nm (lbf in)
Extra weight	N/A	2.9 (6.4)	kg (lb)
Extra inertia with resolver	N/A	16 (142)	kg cm^2 (10^{-4} lbf in s^2)
Extra inertia with encoder	N/A	16.1 (142)	kg cm^2 (10^{-4} lbf in s^2)
Power requirement	N/A	40	W
Voltage requirement (+6% -10%)	N/A	24	V_{DC}

Notes:

1. Different windings available to decrease nominal speed

2. Motor performances as measured with Moog's Servo Drive of proper size

3. Motor Pole Count: 8

4. DC Link voltage 565 V

SIZE 6
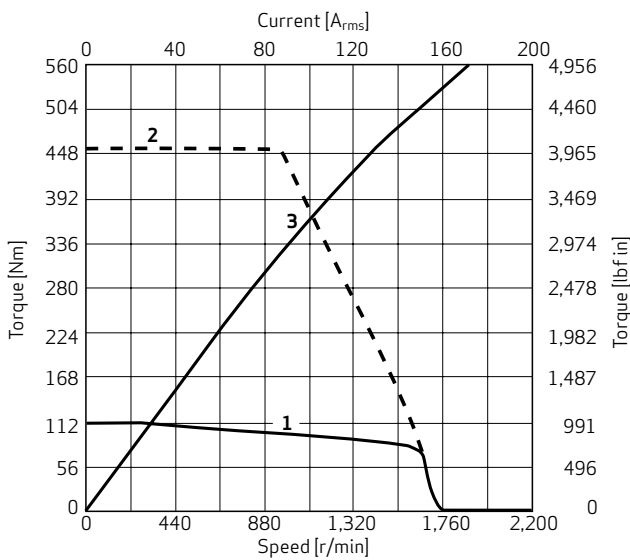# Liquid Cooling, High Dynamic, Type JHW6
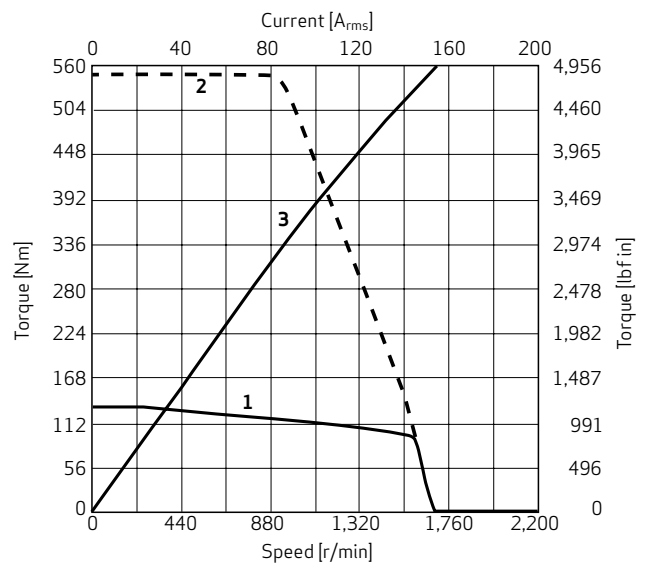
Motor Characteristics

JHW6-079

JHW6-105
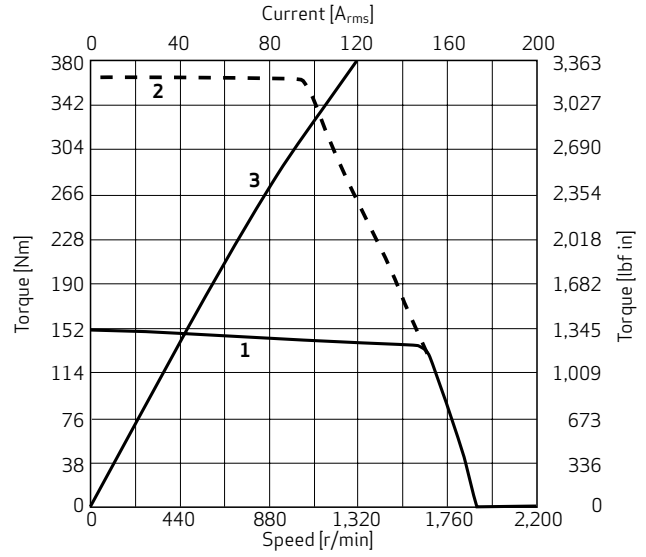
JHW6-131
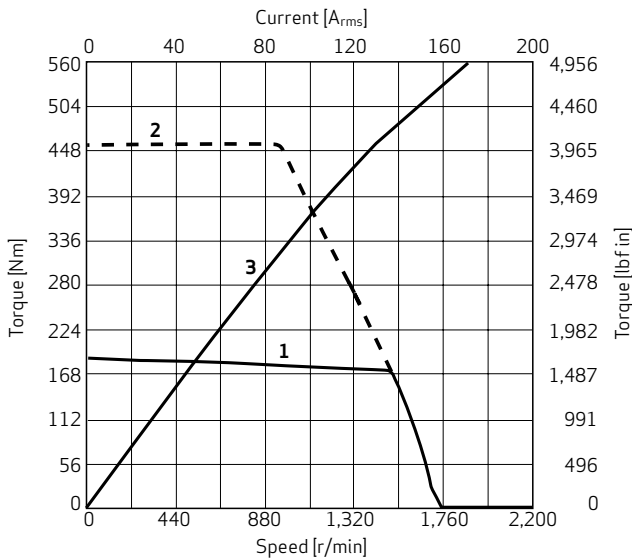
JHW6-157

1 Continuous torque
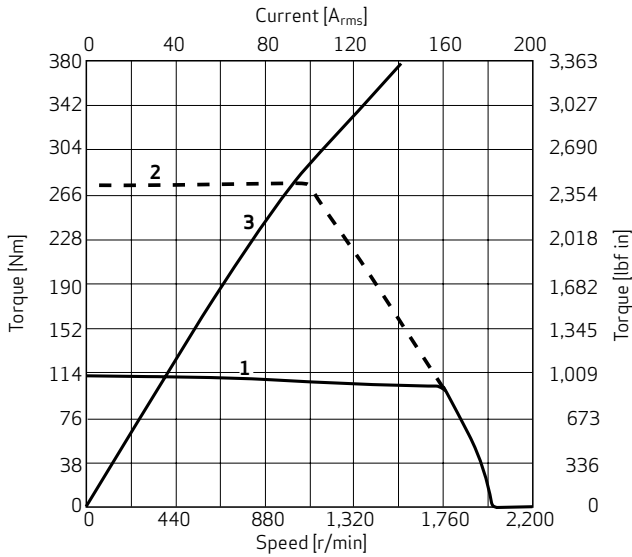2 Maximum torque
3 Torque constant k_T

SIZE 6
Liquid Cooling, High Dynamic, Type JHW6

JHW6 with Resolver
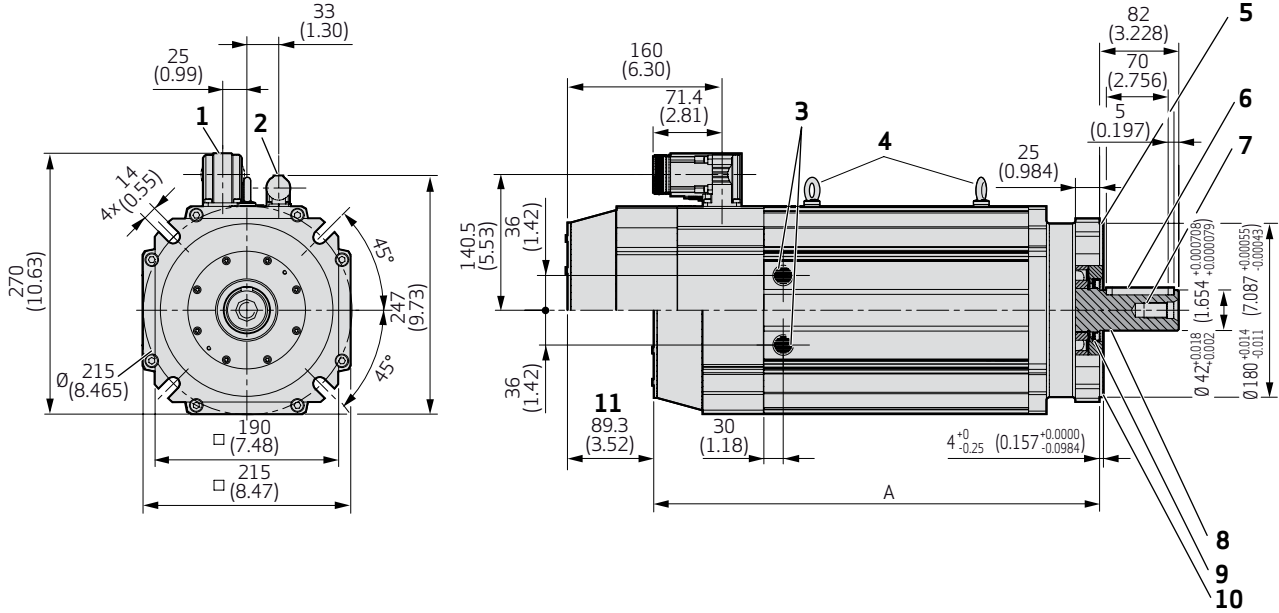
JHW6 with Encoder
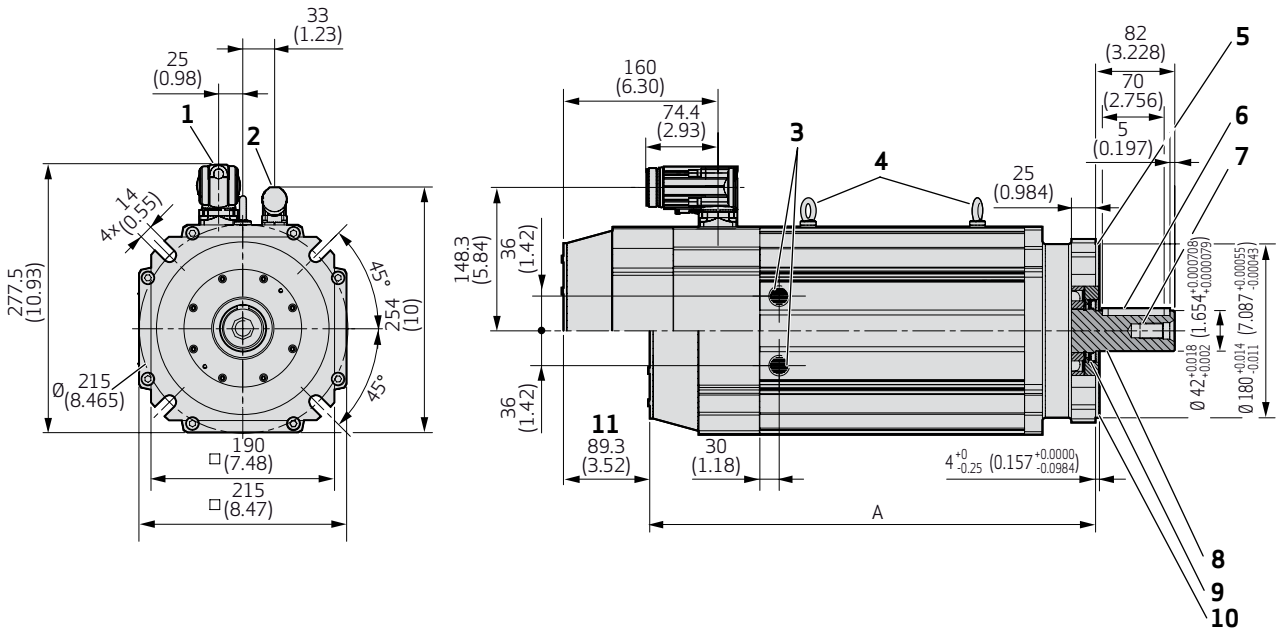
Model No.	Dimension "A" Encoder [1]	Dimension "A" Resolver [1]
	mm (in)	mm (in)
JHW6-079	464 (18.3)	464 (18.3)
JHW6-105	531 (20.9)	531 (20.9)
JHW6-131	598 (23.5)	598 (23.5)
JHW6-157	664 (26.1)	664 (26.1)

1) Standard bearing

1   Power connector
2   Signal connector
3   Cooler outlets G1/2" left side
4   M8 eye bolts for motor lifting
5   Tolerances of shaft extension-run-out and of mounting flange per DIN 42955
6   Optional key DIN 6885-A 12x8x70
7   Thread M 16x36 DIN 13
8   Shaft DIN 748-3
9   Optional shaft seal
10 Flange DIN 42948
11 With brake

SIZE 6
Natural Cooling, Standard Dynamic, Type JSC6

Characteristics and Nominal Values with Sinusoidal Drive

Characteristics		JSC6-100	JSC6-134	JSC6-167	JSC6-201	Units
Continuous stall torque	M_0	84 (743)	110 (974)	135 (1,195)	160 (1,416)	Nm (lbf in)
Nominal torque	M_N	43 (381)	70 (620)	98 (867)	122 (1,080)	Nm (lbf in)
Maximum torque	M_{max}	612 (5,417)	816 (7,222)	1,021 (9,037)	1,225 (10,842)	Nm (lbf in)
Nominal speed	n_N	2,200	1,600	1,200	1,000	r/min
Maximum speed	n_{max}	2,570	1,930	1,540	1,290	r/min
Continuous stall current	I_0	28.4	27.7	27.3	27	A_{rms}
Nominal power	P_N	9.9 (13.3)	11.7 (15.7)	12.3 (16.5)	12.8 (17.2)	kW (hp)
Torque constant	k_T	2.96 (26.2)	3.95 (35)	4.93 (43.6)	5.92 (52.4)	Nm/A_{rms} ($lbf\,in/A_{rms}$)
Voltage constant	k_e	171	228	284	342	$V_{rms}/k_{r/min}$
Thermal time constant	t_{th}	4,180	4,622	5,300	6,000	s
Winding resistance at 25 °C (77 °F) (phase to phase)	R_{tt}	0.238	0.301	0.364	0.428	Ohm
Winding inductance (phase to phase)	L_{tt}	2.1	2.8	3.5	4.2	mH
Rotor inertia with resolver	J	257 (2,274)	333 (2,947)	409 (3,620)	484 (4,283)	$kg\,cm^2$ ($10^{-4}\,lbf\,in\,s^2$)
Rotor inertia with encoder	J	257 (2,274)	333 (2,947)	409 (3,620)	484 (4,283)	$kg\,cm^2$ ($10^{-4}\,lbf\,in\,s^2$)
Weight (without brake)	m	62.4 (137.6)	79.3 (174.9)	92.8 (204.6)	105.2 (232)	kg (lb)

Optional holding brake	Option 1	Option 2	Units
Holding torque	22 (195)	72 (637)	Nm (lbf in)
Extra weight	1.1 (2.4)	2.9 (6.4)	kg (lb)
Extra inertia with resolver	3.6 (31.9)	16 (142)	$kg\,cm^2$ ($10^{-4}\,lbf\,in\,s^2$)
Extra inertia with encoder	3.8 (33.6)	16.1 (142)	$kg\,cm^2$ ($10^{-4}\,lbf\,in\,s^2$)
Power requirement	17	40	W
Voltage requirement (+6 % -10 %)	24	24	V_{DC}

Notes:

1. Different windings available to decrease nominal speed

2. Motor performances as measured with Moog's Servo Drive of proper size

3. Motor Pole Count: 8

4. DC Link voltage 565 V

SIZE 6
Natural Cooling, Standard Dynamic, Type JSC6
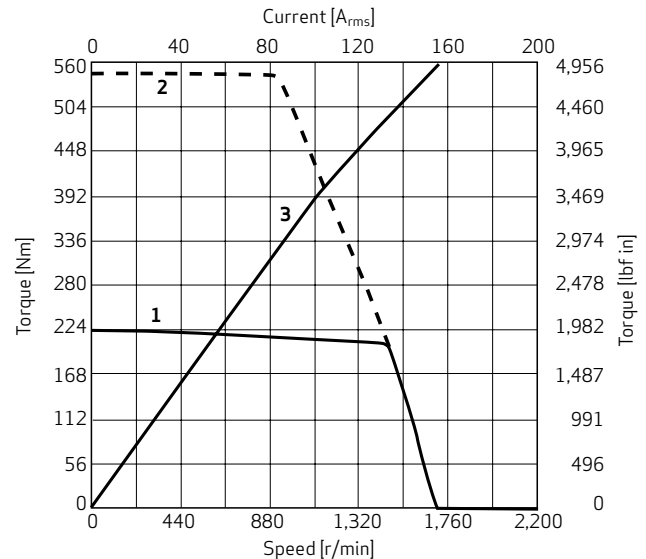
Motor Characteristics
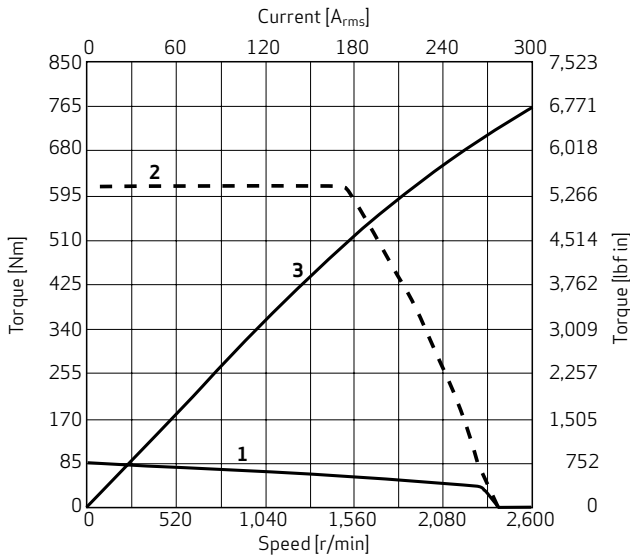
JSC6-100

JSC6-134
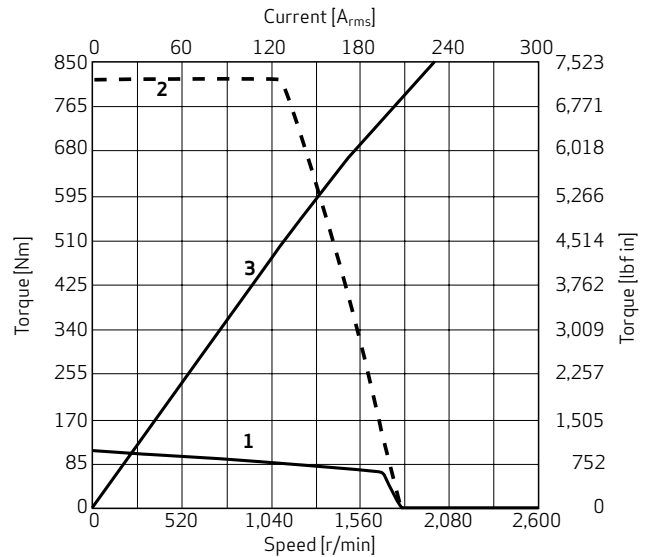
JSC6-167

JSC6-201

1   Continuous torque
2   Maximum torque
3   Torque constant k_T

SIZE 6
Natural Cooling, Standard Dynamic, Type JSC6

JSC6 with Resolver
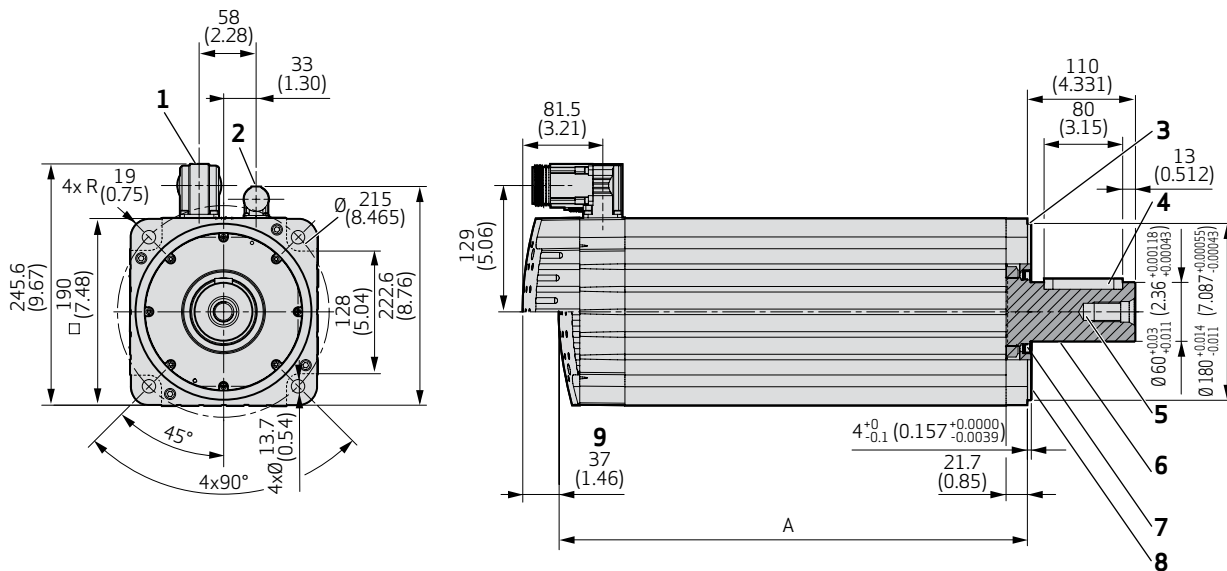
JSC6 with Encoder
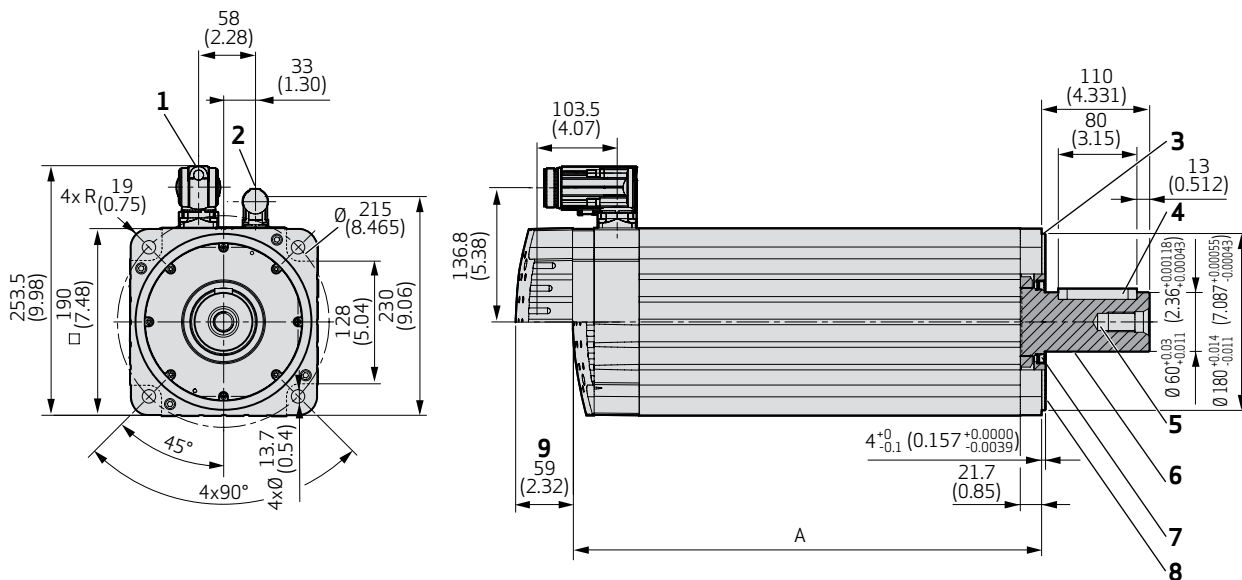
Model No.	Dimension "A" Encoder [1]	Dimension "A" Resolver [1]
	mm (in)	mm (in)
JSC6-100	477 (18.8)	477 (18.8)
JSC6-134	562 (22.1)	562 (22.1)
JSC6-167	647 (25.5)	647 (25.5)
JSC6-201	732 (28.8)	732 (28.8)

1) Standard bearing

1   Power connector
2   Signal connector
3   Tolerances of shaft extension-run-out and of mounting flange per DIN 42955
4   Optional key DIN 6885-A 18x11x80
5   Thread M 20x42 DIN 13
6   Shaft DIN 748-3
7   Optional shaft seal
8   Flange DIN 42948
9   With brake

SIZE 6
Liquid Cooling, Standard Dynamic, Type JSW6

Characteristics and Nominal Values with Sinusoidal Drive

Characteristics		JSW6-100	JSW6-134	JSW6-167	JSW6-201	Units
Continuous stall torque	M_0	134 (1,186)	177 (1,567)	218 (1,929)	261 (2,310)	Nm (lbf in)
Nominal torque	M_N	114 (1,009)	157 (1,390)	198 (1,752)	239 (2,115)	Nm (lbf in)
Maximum torque	M_{max}	610 (5,399)	817 (7,231)	1,019 (9,019)	1,226 (10,851)	Nm (lbf in)
Nominal speed	n_N	2,100	1,500	1,200	1,000	r/min
Maximum speed	n_{max}	2,580	1,930	1,550	1,280	r/min
Continuous stall current	I_0	45.3	44.6	44.2	43.8	A_{rms}
Nominal power	P_N	25.1 (33.6)	24.6 (33)	24.8 (33.2)	25.1 (33.6)	kW (hp)
Torque constant	k_T	2.96 (26.2)	3.97 (35.1)	4.95 (43.8)	5.95 (52.7)	Nm/A_{rms} $(lbf\ in/A_{rms})$
Voltage constant	k_e	170	228	284	342	$V_{rms}/k_{r/min}$
Thermal time constant	t_{th}	566	625	717	812	s
Winding resistance at 25 °C (77 °F) (phase to phase)	R_{tt}	0.237	0.301	0.364	0.428	Ohm
Winding inductance (phase to phase)	L_{tt}	2.1	2.8	3.5	4.2	mH
Rotor inertia with resolver	J	260 (2,301)	336 (2,974)	410 (3,629)	486 (4,301)	kg cm^2 (10^{-4} lbf in s^2)
Rotor inertia with encoder	J	260 (2,301)	336 (2,974)	410 (3,629)	486 (4,301)	kg cm^2 (10^{-4} lbf in s^2)
Weight (without brake)	m	66.2 (146)	81.1 (178.8)	96.6 (213)	119.2 (262.8)	kg (lb)

| Optional holding brake	Option 1	Option 2	Units
Holding torque	N/A	72 (637)	Nm (lbf in)
Extra weight	N/A	2.9 (6.4)	kg (lb)
Extra inertia with resolver	N/A	16 (142)	kg cm^2 (10^{-4} lbf in s^2)
Extra inertia with encoder	N/A	16.1 (142)	kg cm^2 (10^{-4} lbf in s^2)
Power requirement	N/A	40	W
Voltage requirement (+6% -10%)	N/A	24	V_{DC}

Notes:

1. Different windings available to decrease nominal speed
2. Motor performances as measured with Moog's Servo Drive of proper size
3. Motor Pole Count: 8
4. DC Link voltage 565 V

SIZE 6
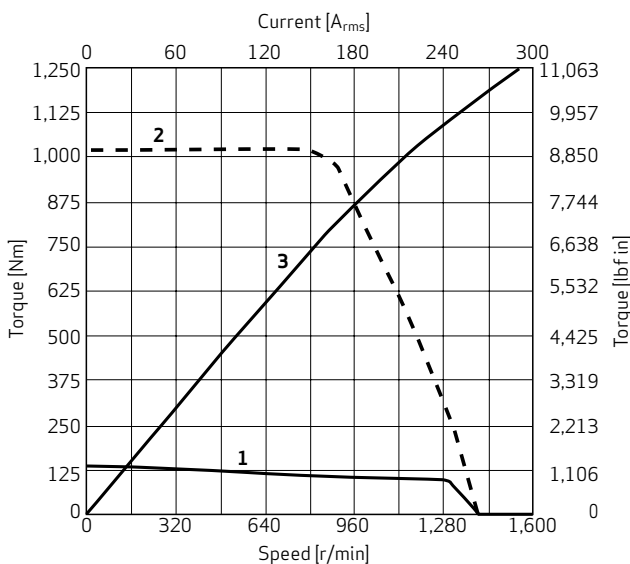# Liquid Cooling, Standard Dynamic, Type JSW6

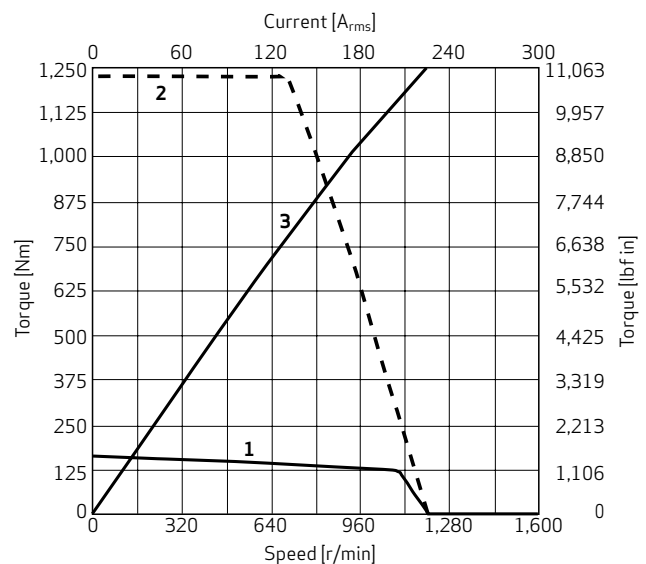**Motor Characteristics**
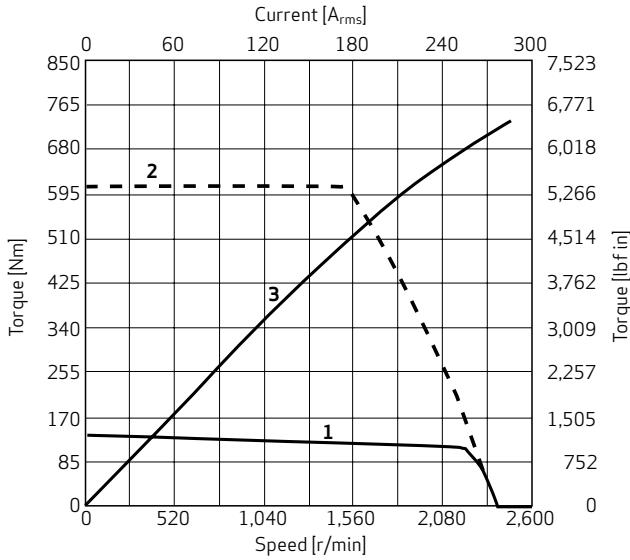
JSW6-100

JSW6-134
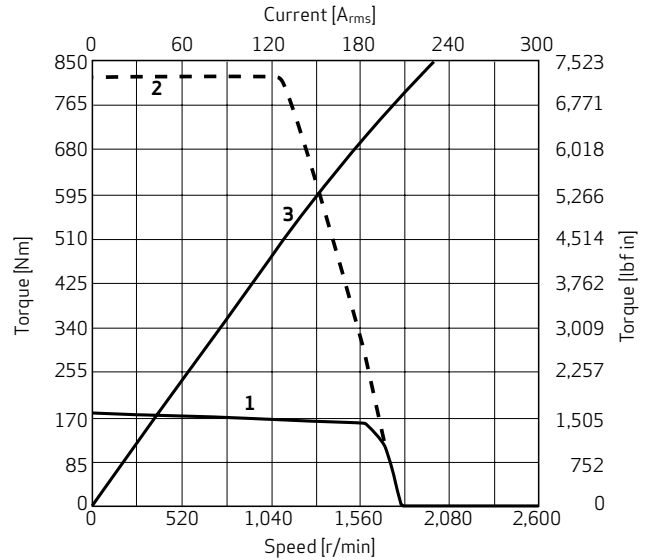
JSW6-167

JSW6-201


1   Continuous torque
2   Maximum torque
3   Torque constant k_T

SIZE 6
Liquid Cooling, Standard Dynamic, Type JSW6

JSW6 with Resolver
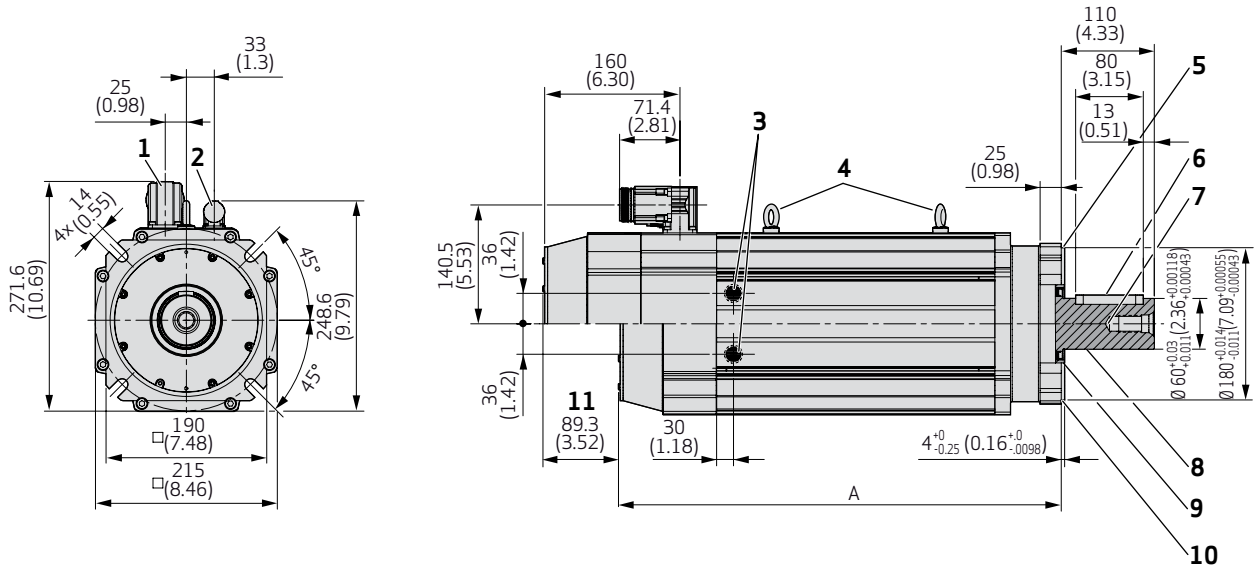
JSW6 with Encoder
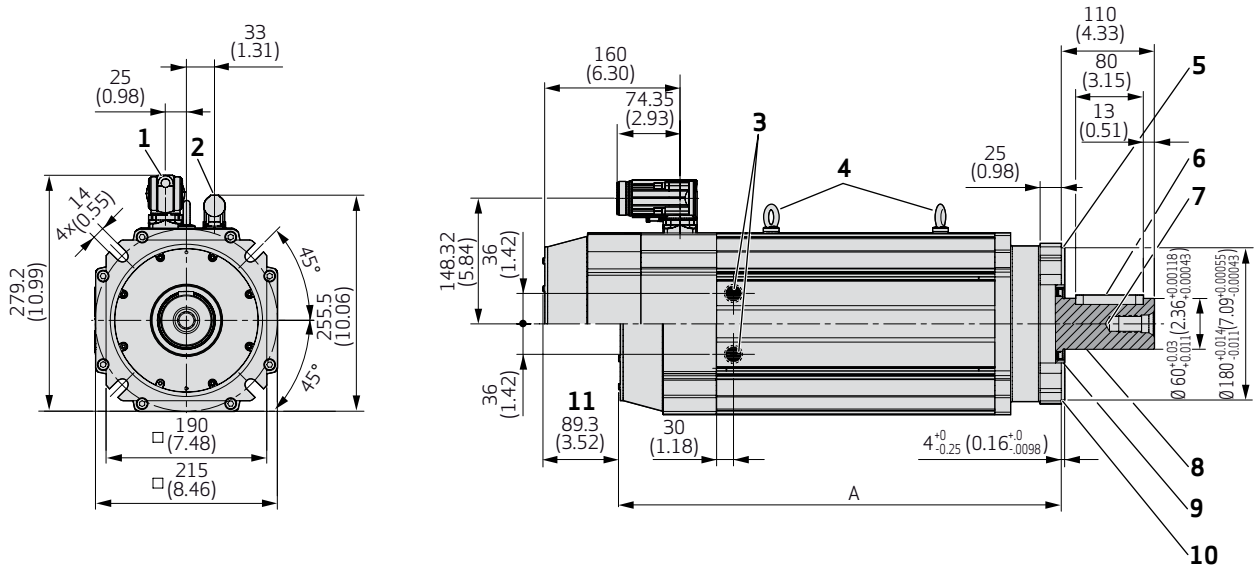
Model No.	Dimension "A" Encoder [1]	Dimension "A" Resolver [1]
	mm (in)	mm (in)
JSW6-100	523.5 (20.6)	523.5 (20.6)
JSW6-134	608.5 (24)	608.5 (24)
JSW6-167	693.5 (27.3)	693.5 (27.3)
JSW6-201	778.5 (30.6)	778.5 (30.6)

1) Standard bearing

1   Power connector
2   Signal connector
3   Cooler outlet G1/2" left side
4   M8 eye bolts for motor lifting
5   Tolerances of shaft extension-run-out and of mounting flange per DIN 42955
6   Optional key DIN 6885-A 18x11x80
7   Thread M20x42 DIN 13
8   Shaft DIN 748-3
9   Optional shaft seal
10   Flange DIN 42948
11   With brake

SIZE 7
Natural Cooling, Standard Dynamic, Type JSC7

Characteristics and Nominal Values with Sinusoidal Drive

Characteristics		JSC7-122	JSC7-163	JSC7-204	JSC7-245	Units
Continuous stall torque	M_0	314 (2,779)	419 (3,708)	523 (4,629)	629 (5,567)	Nm (lbf in)
Nominal torque	M_N	268 (2,372)	374 (3,310)	482 (4,266)	575 (5,089)	Nm (lbf in)
Maximum torque	M_{max}	1,002 (8,868)	1,338 (11,842)	1,675 (14,825)	2,012 (17,808)	Nm (lbf in)
Nominal speed	n_N	900	700	550	575	r/min
Maximum speed	n_{max}	1,110	950	760	740	r/min
Continuous stall current	I_0	53.37	60.78	60.71	70.9	A_{rms}
Nominal power	P_N	25.3 (33.9)	27.4 (36.7)	27.8 (37.3)	34.6 (46.4)	kW (hp)
Torque constant	k_T	5.89 (52.1)	6.89 (61)	8.62 (76.3)	8.87 (78.5)	Nm/A_{rms} $(lbf\ in/A_{rms})$
Voltage constant	k_e	394	461	577	594	$V_{rms}/k_{r/min}$
Thermal time constant	t_{th}	5,900	6,850	7,800	8,600	s
Winding resistance at 25 °C (77 °F) (phase to phase)	R_{tt}	0.171	0.164	0.197	0.168	Ohm
Winding inductance (phase to phase)	L_{tt}	4.4	4.5	5.7	5	mH
Rotor inertia with resolver	J	1,021 (9,036)	1,342 (11,877)	1,664 (14,726)	1,985 (17,567)	kg cm^2 (10^{-4} lbf in s^2)
Rotor inertia with encoder	J	1,021 (9,036)	1,342 (11,877)	1,664 (14,726)	1,985 (17,567)	kg cm^2 (10^{-4} lbf in s^2)
Weight (without brake)	m	137 (302.1)	172 (379.3)	208 (458.6)	242 (533.6)	kg (lb)

| Optional holding brake	Option 1	Option 2	Units
Holding torque	TBD	TBD	Nm (lbf in)
Extra weight	TBD	TBD	kg (lb)
Extra inertia with resolver	TBD	TBD	kg cm^2 (10^{-4} lbf in s^2)
Extra inertia with encoder	TBD	TBD	kg cm^2 (10^{-4} lbf in s^2)
Power requirement	TBD	TBD	W
Voltage requirement (+6 % -10 %)	TBD	TBD	V_{DC}

Notes:

1. Different windings available to decrease nominal speed
2. Motor performances as measured with Moog's Servo Drive of proper size
3. Motor Pole Count: 8
4. DC Link voltage 565 V

SIZE 7
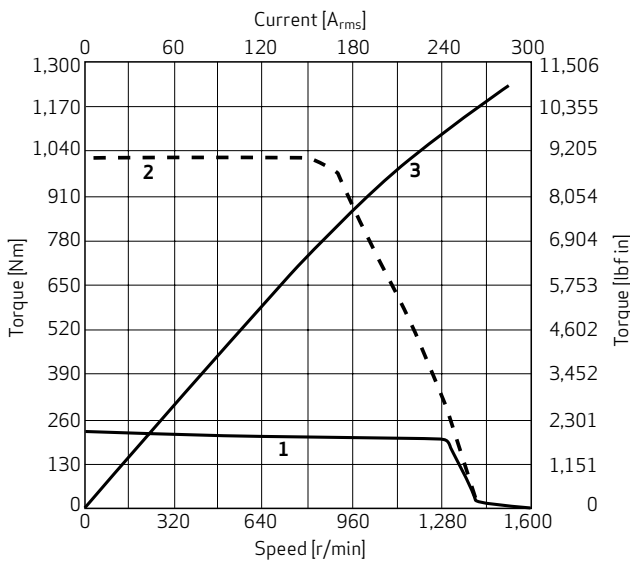# Natural Cooling, Standard Dynamic, Type JSC7

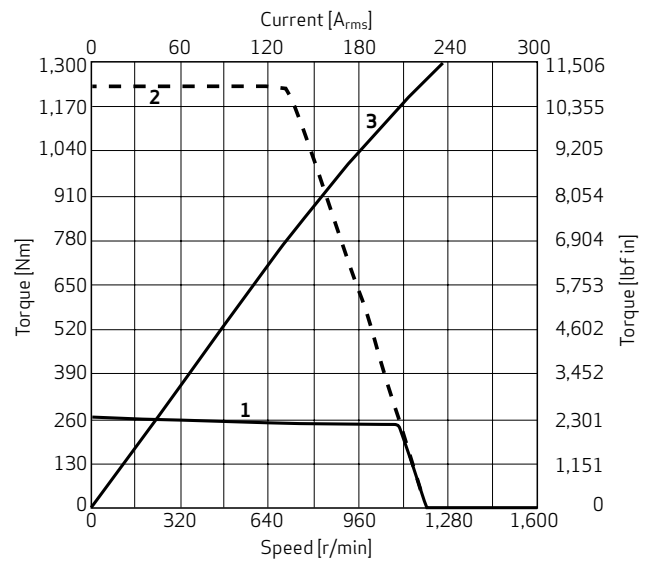**Motor Characteristics**
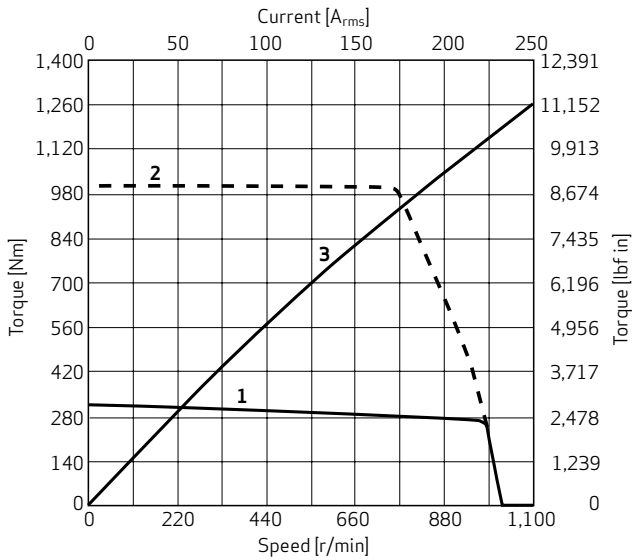
JSC7-122

JSC7-163
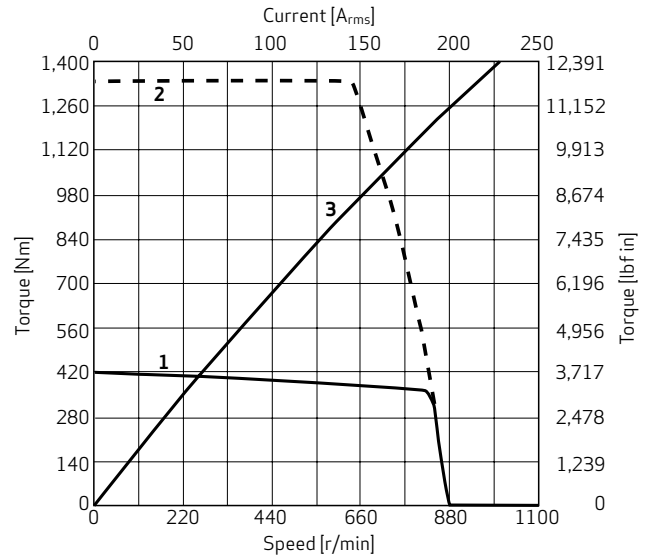
JSC7-204

JSC7-245


1　　Continuous torque

2　　Maximum torque

3　　Torque constant k_T

SIZE 7
Natural Cooling, Standard Dynamic, Type JSC7

JSC7 with Resolver or Encoder
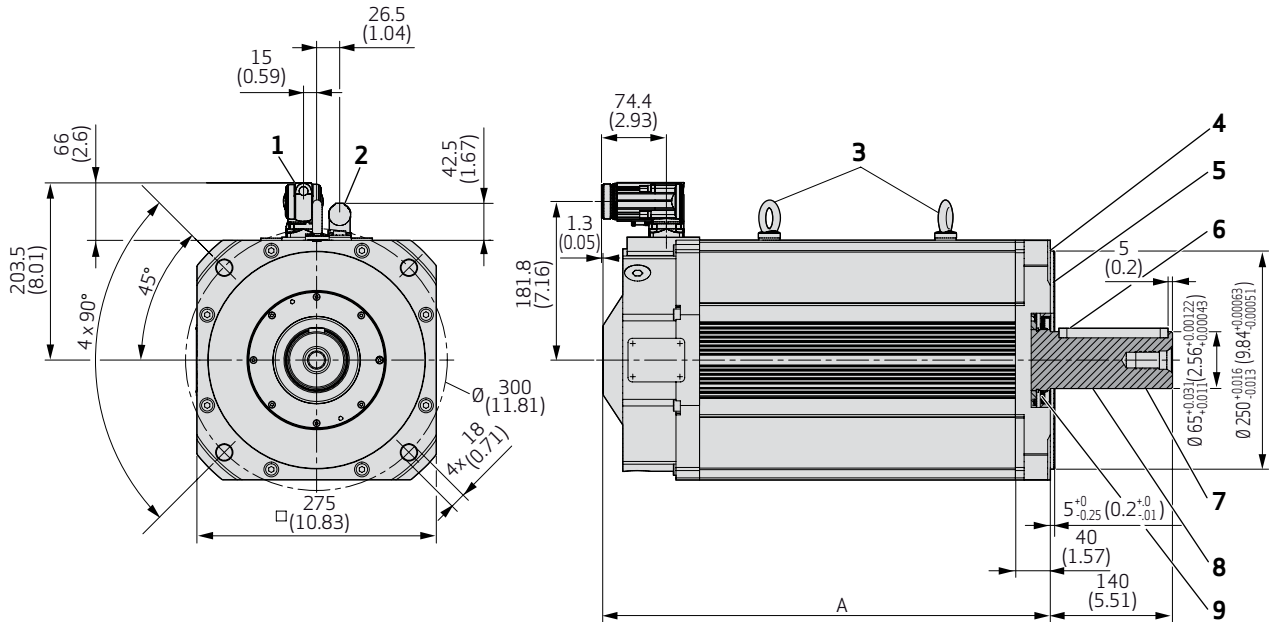
Model No.	Dimension "A" Encoder [1]	Dimension "A" Resolver [1]
	mm (in)	mm (in)
JSC7-122	513 (20.2)	513 (20.2)
JSC7-163	633 (24.9)	633 (24.9)
JSC7-204	737 (29)	737 (29)
JSC7-245	841 (33.1)	841 (33.1)

1) Standard bearing

1   Power connector
2   Signal connector
3   M10 eye bolts for motor lifting
4   Tolerances of shaft extension-run-out and of mounting flange per DIN 42955
5   Flange DIN 42948
6   Optional key DIN 6885-A 18x11x125
7   Thread M20x42 DIN 13
8   Shaft DIN 748-3
9   Optional shaft seal

SIZE 7
Liquid Cooling, Standard Dynamic, Type JSW7

Characteristics and Nominal Values with Sinusoidal Drive

Characteristics		JSW7-122	JSW7-163	JSW7-204	JSW7-245	Units
Continuous stall torque	M_0	516 (4,567)	688 (6,089)	860 (7,612)	1,034 (9,152)	Nm (lbf in)
Nominal torque	M_N	491 (4,346)	662 (5,859)	836 (7,399)	1,003 (8,877)	Nm (lbf in)
Maximum torque	M_{max}	1,002 (8,868)	1,338 (11,842)	1,675 (14,825)	2,012 (17,808)	Nm (lbf in)
Nominal speed	n_N	900	700	550	575	r/min
Maximum speed	n_{max}	1,110	950	760	740	r/min
Continuous stall current	I_0	90.3	103	102.9	120.2	A_{rms}
Nominal power	P_N	46.3 (62.1)	48.6 (65.1)	48.2 (64.6)	60.4 (81)	kW (hp)
Torque constant	k_T	5.71 (50.5)	6.68 (59.1)	8.36 (74)	8.6 (76.1)	Nm/A_{rms} ($lbf\ in/A_{rms}$)
Voltage constant	k_e	394	460.804	576.712	594	$V_{rms}/k_{r/min}$
Thermal time constant	t_{th}	1,680	1,970	2,250	2,500	s
Winding resistance at 25 °C (77 °F) (phase to phase)	R_{tt}	0.171	0.164	0.197	0.168	Ohm
Winding inductance (phase to phase)	L_{tt}	4.6	4.7	5.8	5.1	mH
Rotor inertia with resolver	J	1,021 (9,036)	1,342 (11,877)	1,664 (14,726)	1,985 (17,567)	kg cm² (10^{-4} lbf in s²)
Rotor inertia with encoder	J	1,021 (9,036)	1,342 (11,877)	1,664 (14,726)	1,985 (17,567)	kg cm² (10^{-4} lbf in s²)
Weight (without brake)	m	145 (319.7)	180 (396.9)	216 (476.3)	251 (553.5)	kg (lb)

Optional holding brake	Option 1	Option 2	Units
Holding torque	TBD	TBD	Nm (lbf in)
Extra weight	TBD	TBD	kg (lb)
Extra inertia with resolver	TBD	TBD	kg cm² (10^{-4} lbf in s²)
Extra inertia with encoder	TBD	TBD	kg cm² (10^{-4} lbf in s²)
Power requirement	TBD	TBD	W
Voltage requirement (+6% -10%)	TBD	TBD	V_{DC}

Notes:

1. Different windings available to decrease nominal speed

2. Motor performances as measured with Moog's Servo Drive of proper size

3. Motor Pole Count: 8

4. DC Link voltage 565 V

SIZE 7
Liquid Cooling, Standard Dynamic, Type JSW7

Motor Characteristics
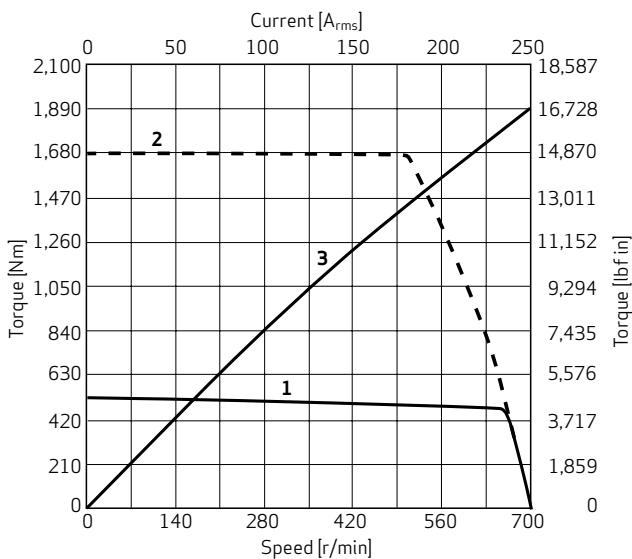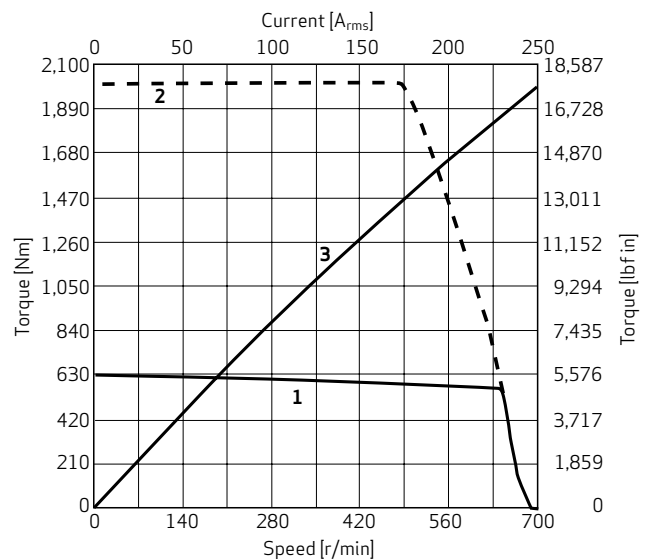
JSW7-122

JSW7-163
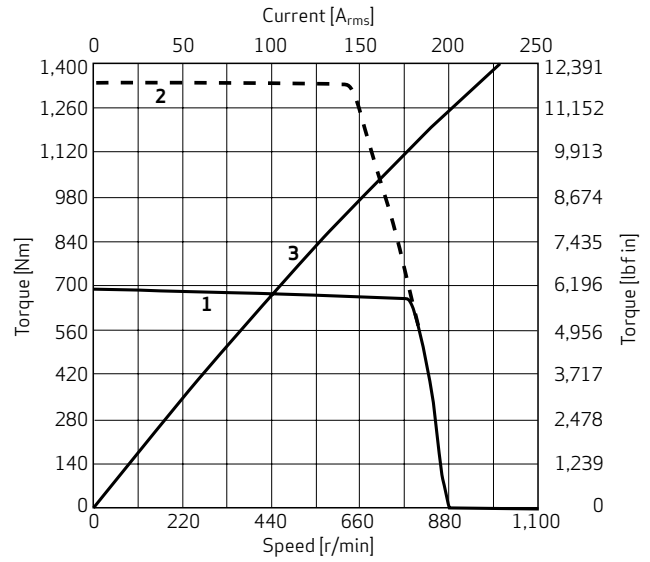
JSW7-204
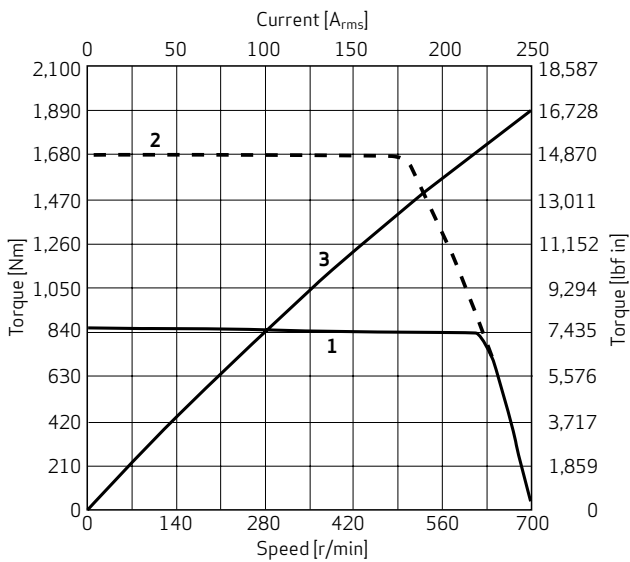
JSW7-245
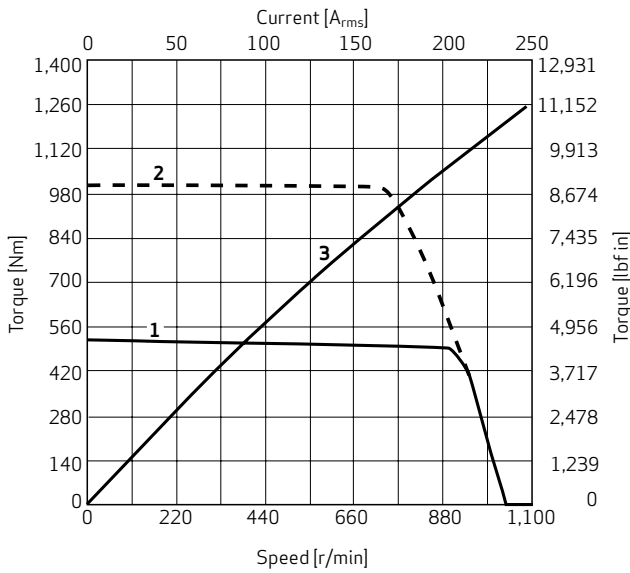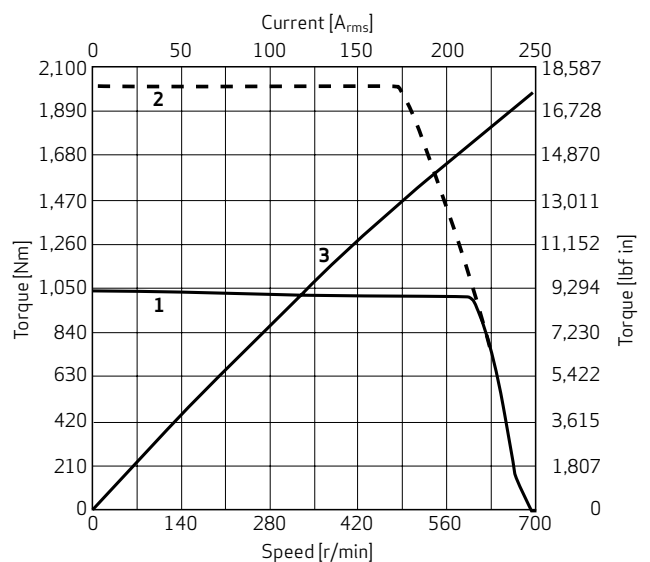

1   Continuous torque

2   Maximum torque

3   Torque constant k_T

SIZE 7
Liquid Cooling, Standard Dynamic, Type JSW7

JSW7 with Resolver or Encoder
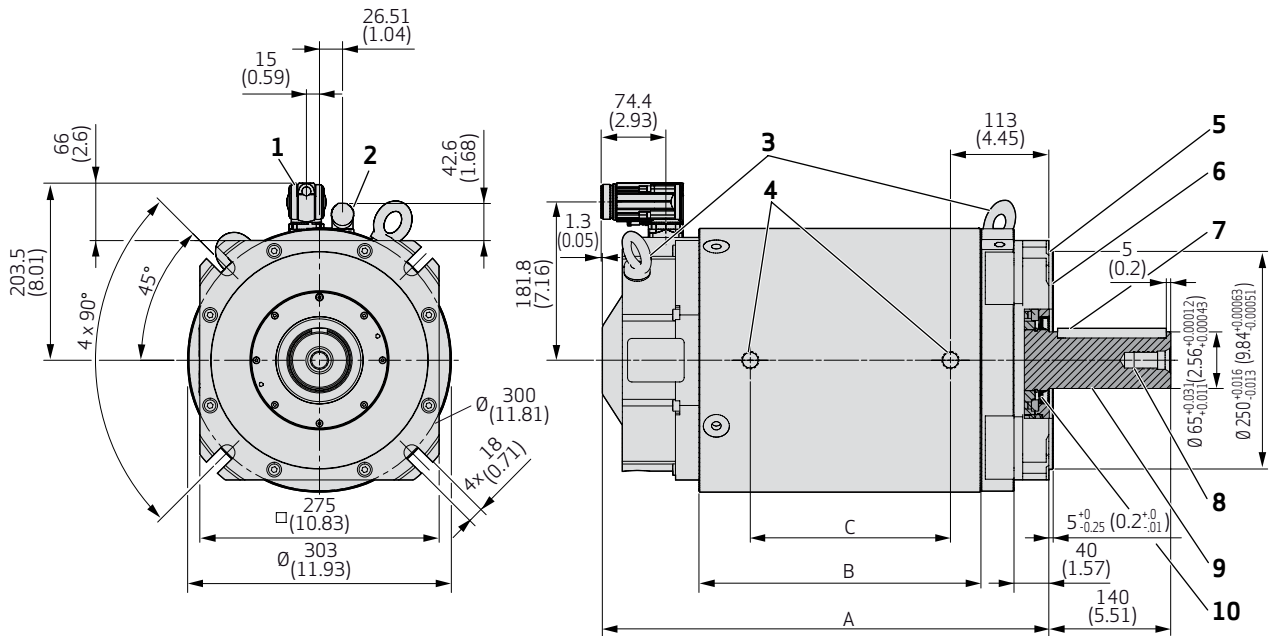
Model No.	Dimension "A" [1]	Dimension "B" [1]	Dimension "C" [1]
	mm (in)	mm (in)	mm (in)
JSW7-122	513 (20.2)	324 (12.8)	230 (9.1)
JSW7-163	633 (24.9)	444 (17.5)	350 (13.8)
JSW7-204	737 (29)	548 (21.6)	454 (17.9)
JSW7-245	841 (33.1)	652 (25.7)	558 (22)

1) Standard bearing

1   Power connector
2   Signal connector
3   M12 eye bolts for motor lifting
4   Cooler outlet G1/2"
5   Tolerances of shaft extension-run-out and of mounting flange per DIN 42955
6   Flange DIN 42948
7   Optional key DIN 6885-A 18x11x125
8   Thread M20x42 DIN 13
9   Shaft DIN 748-3
10   Optional shaft seal

WIRING DIAGRAMS

Power Connector

Power Connector Size 1
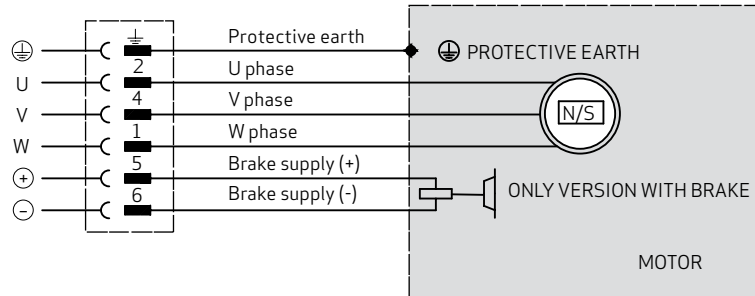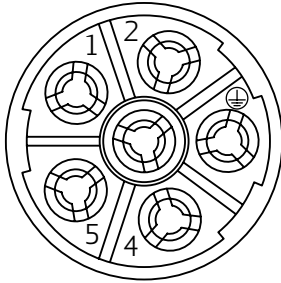
Power Connector Size 1.5
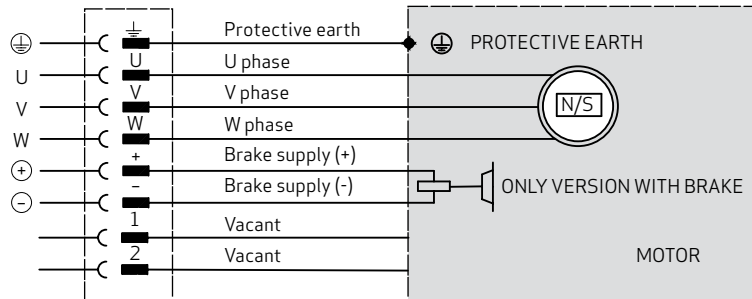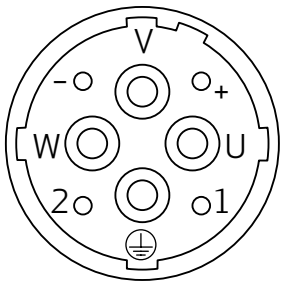
Power Connector for JHW5, JSW5, JHC6 and JSC6
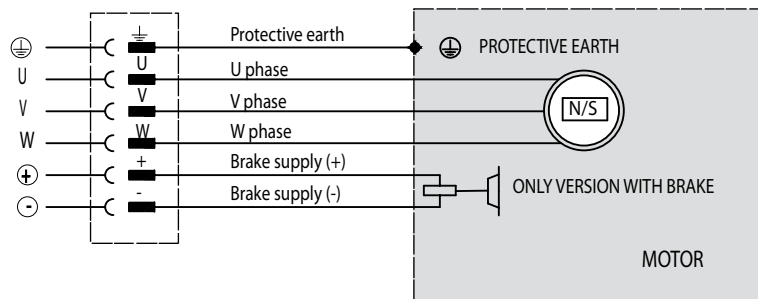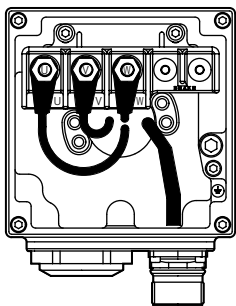
Power Connector for JHW6, JSW6, JSC7 and JSW7
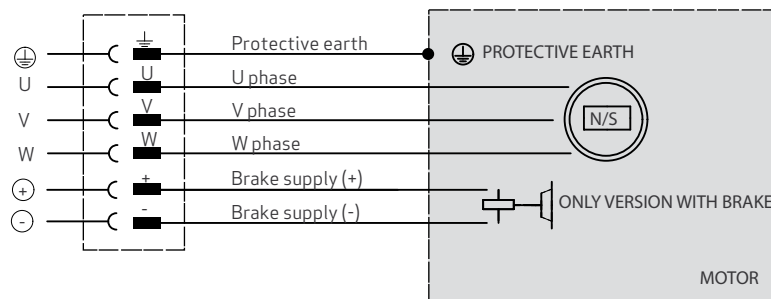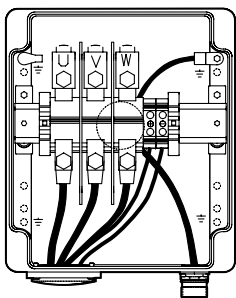
For more information on connectors, please request the MD Series Installation Instructions Manual.

WIRING DIAGRAMS
Signal Resolver Connector

Signal Resolver Connector
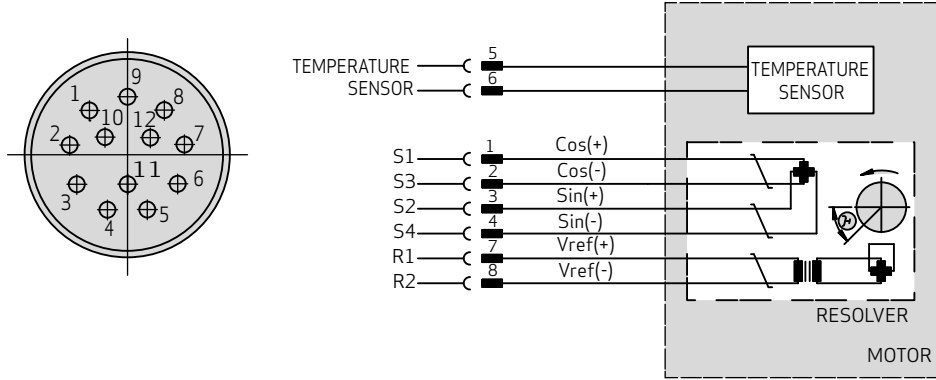
Signal Encoder Connectors[1]

Stegmann Incremental
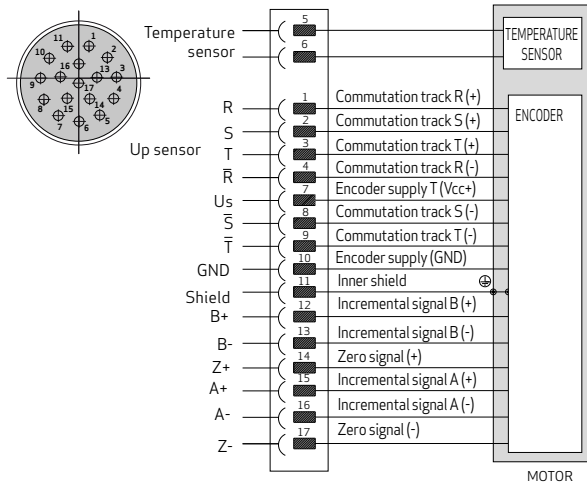
Stegmann Absolute
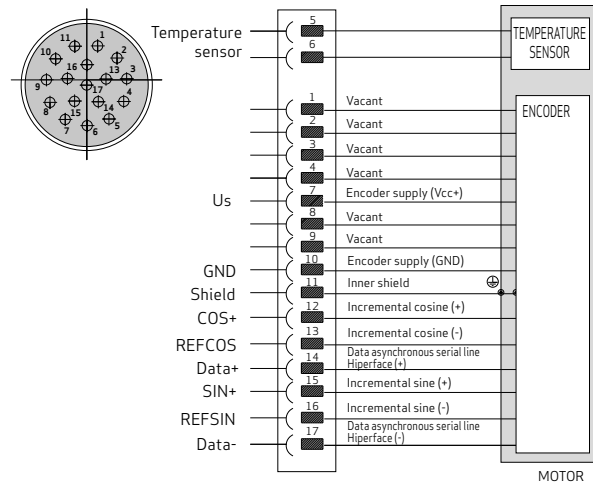
Heidenhain Incremental
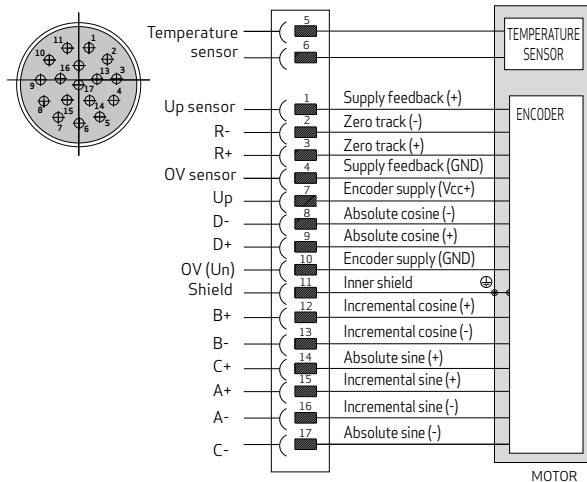
Heidenhain Absolute
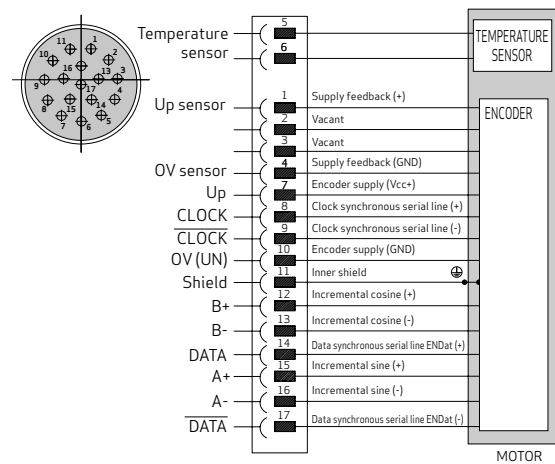
1)   See ordering information; Feedback option

BEARING LOAD DIAGRAMS

Maximum Permissible Shaft Load

The maximum permissible radial load depends on the desired service life.

The bearing load curves display servo motor configurations (motor speed:radial loads) that support an operational life of 20,000 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]	Axial load during installation [N]
JSC3	75	150
JSC4	150	300
JHC5	200	400
JHW5	200	400
JSC5	350	700
JSW5	350	700
JHC6	350	700
JHW6	600	1,200
JSC6	800	1,600
JSW6	1,000	2,000
JSC7	1,000	2,000
JSW7	1,000	2,000

BEARING LOAD DIAGRAMS

Size 3

Natural Cooling, Standard Dynamic, Type JSC3
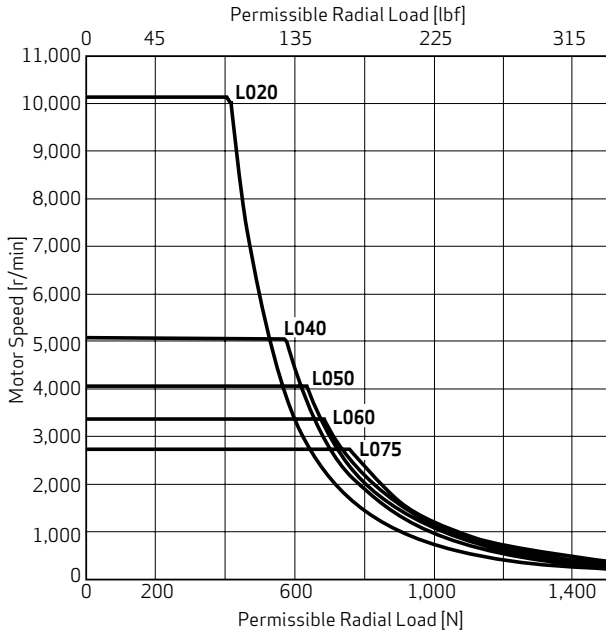
Size 4

Natural Cooling, Standard Dynamic, Type JSC4
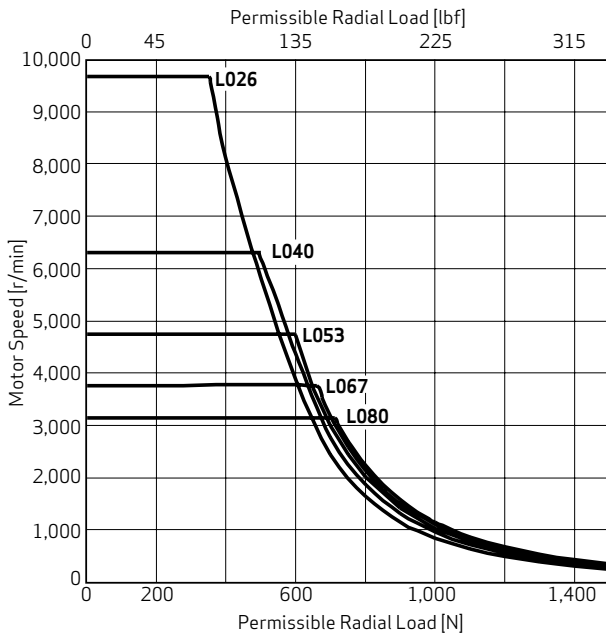
BEARING LOAD DIAGRAMS
Size 5

Natural Cooling, High Dynamic, Type JHC5
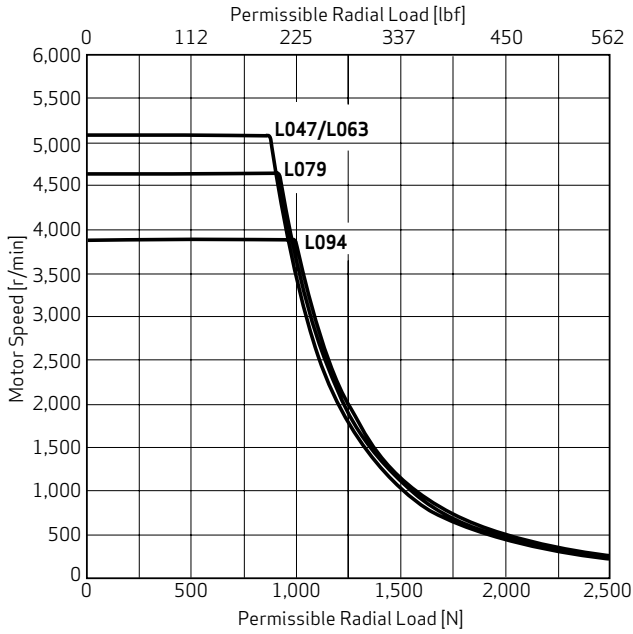
Liquid Cooling, High Dynamic, Type JHW5
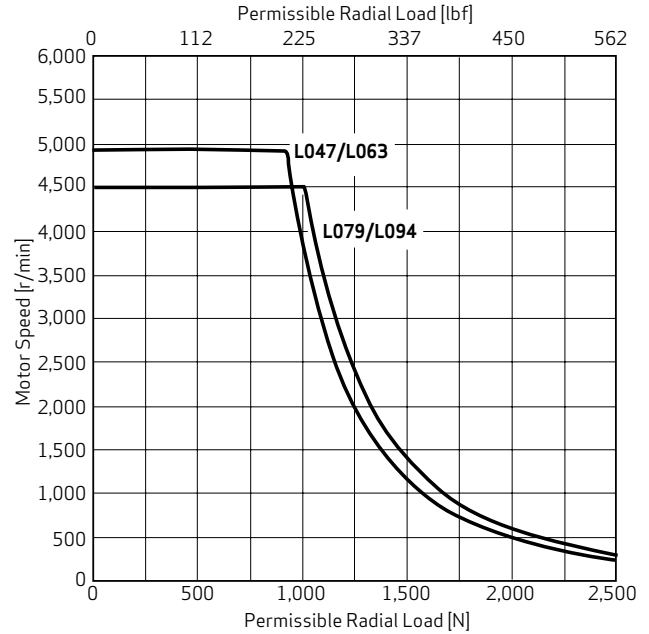
Natural Cooling, Standard Dynamic, Type JSC5
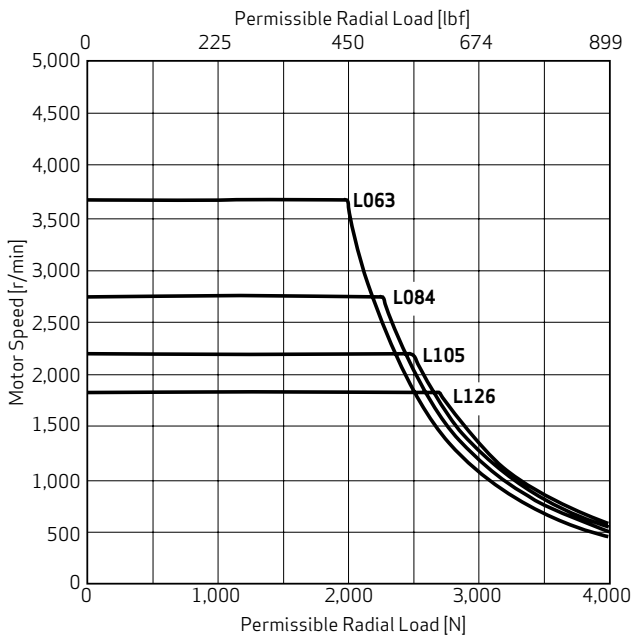
Liquid Cooling, Standard Dynamic, Type JSW5
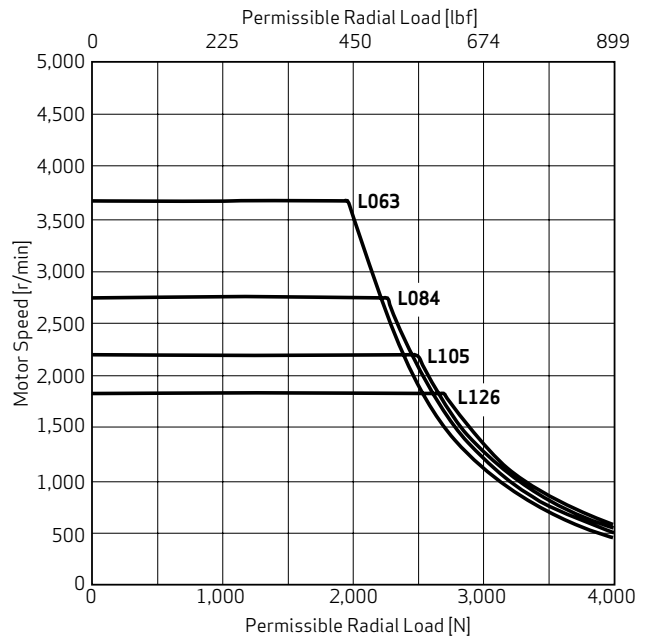
BEARING LOAD DIAGRAMS

Size 6

Natural Cooling, High Dynamic, Type JHC6
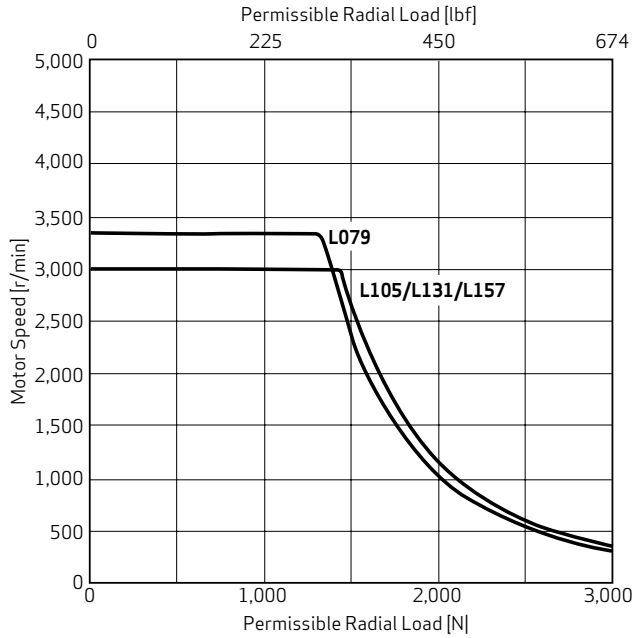
Liquid Cooling, High Dynamic, Type JHW6
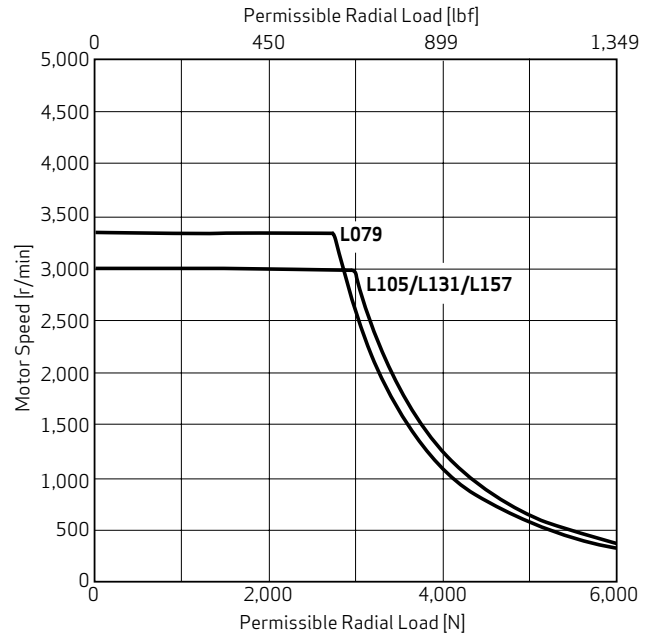
Natural Cooling, Standard Dynamic, Type JSC6
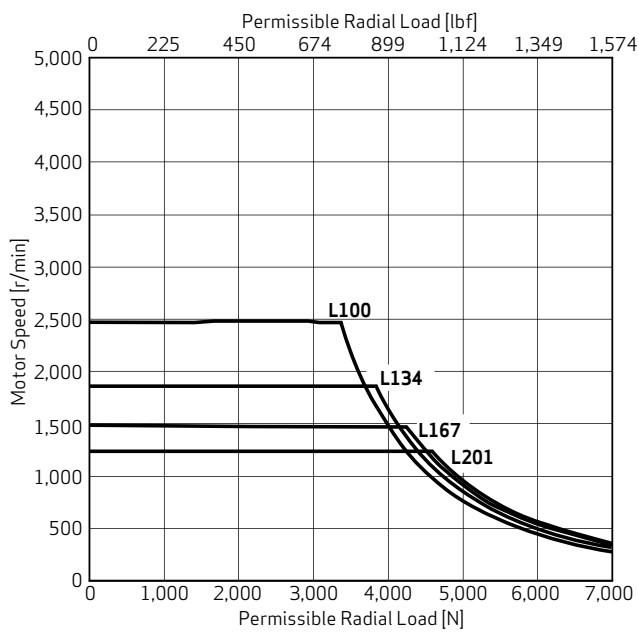
Liquid Cooling, Standard Dynamic, Type JSW6
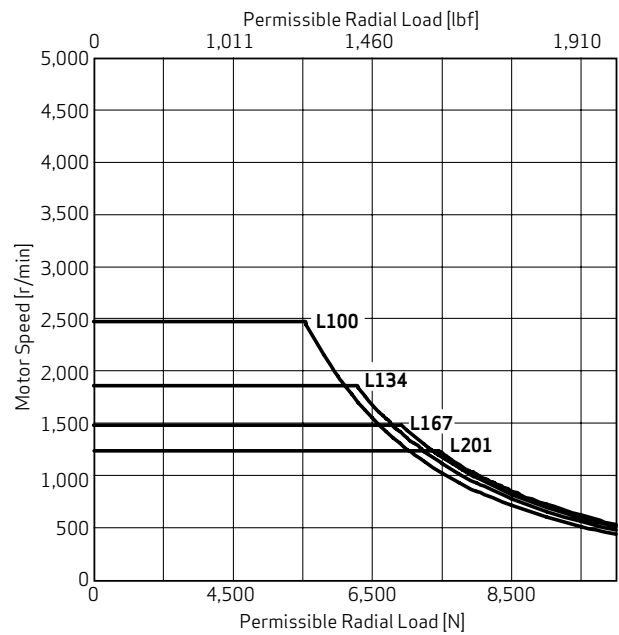
BEARING LOAD DIAGRAMS

Size 7

Natural Cooling, Standard Dynamic, Type JSC7
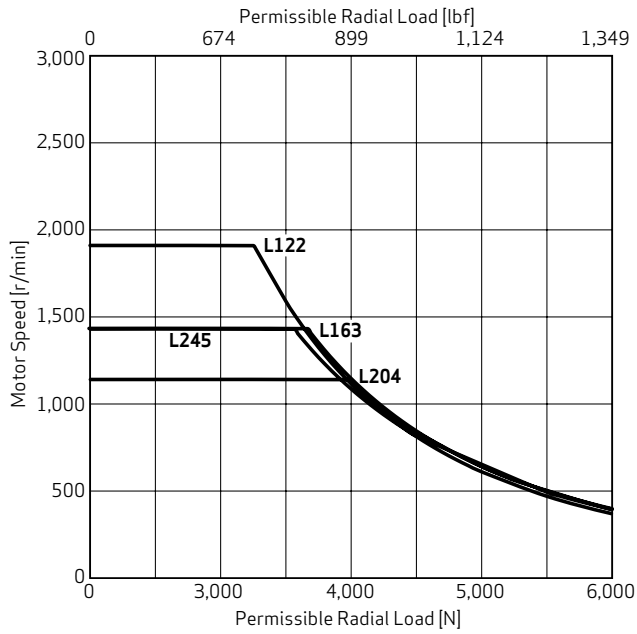
Liquid Cooling, Standard Dynamic, Type JSW7
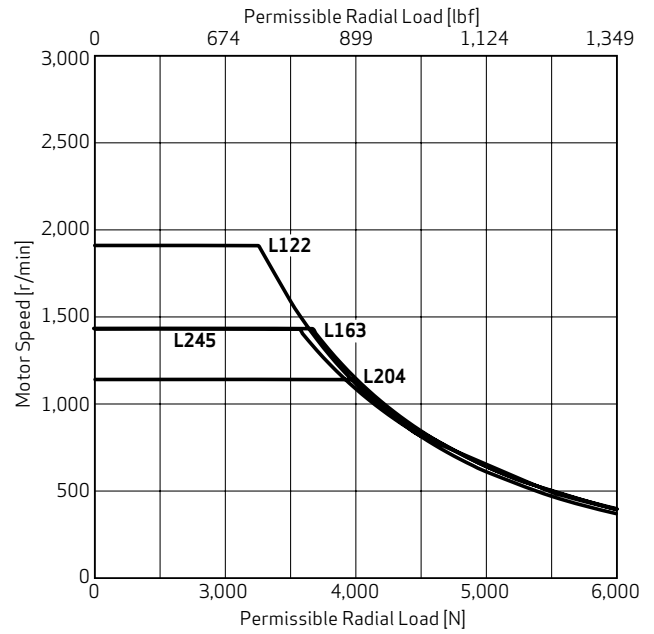
SERVO MOTOR SELECTION AND SIZING

This application note to provide 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.

Fundamental Application Data

- A motor is selected to meet four characteristics:
  1. Inertia ratio
  2. RMS torque
  3. Maximum torque
  4. Speed

- Inertia ratio is generally the most important characteristic when selecting a servo system. It is the ratio of reflected total load inertia to the motor shaft inertia. As a general guideline, the more dynamic the system must be, the more important it is to configure these two characteristics with a 1:1 ratio. Higher inertia ratios may not tolerate any significant load change and even become unstable.

- The continuous stall torque is the torque rating at zero speed. This torque is generally higher than the continuous torque at operating speed. The achievable torque depends on a combination of the motor and the drive used.

- Maximum torque is declared for maximum capacity for a duration of 1s. Lower maximum torques can be tolerated for longer durations. For critical applications it is recommended to contact Moog application support.

Special Considerations

- Brushless servo motor based systems are not like a standard asynchronous motors: They are complete control systems. Because there is more freedom of design, there are also more parameters (e.g. mechanical, electric, electronics) to be identified in comparison to a conventional motor-based system.

- Attention must be paid to applications that place heavy load on the motor (typically vertical load applications when decelerating in the downwards direction). The regeneration capacity must not be overloaded.

- A brushless servo motor has a very short response time and closely tracks changes in the control signals.

- Correctly sized servo motors can run with high case temperature. It is important to ensure that motor heat is properly dissipated. Dissipation may be through a volume of "still" air, heatsinks, fan cooling or liquid cooling.

- The speed accuracy depends much more on the quality of the sensor signal (and on the control algorithm of the drive) than on the motor and the load.

- The time lag between a load disturbance and speed adjustment depends on the resolution of the position transducer and on the parameters of the drive.

Selection and Optimization of Systems Parameters

- Transmission ratio

- Mechanical transmission

- Position transducer

- Electronic drive type

- Control approach

Transmission Ratio Considerations

Motors are sized on output torque, so that a high transmission ratio is useful to minimize the motor mass and cost, but it might not be the best choice in terms of overall cost and of dynamic performance.

When a motor is applied directly to the load, maximum stiffness and bandwidth (optimal position/following accuracy in the minimum time) is achieved.

SERVO MOTOR SELECTION AND SIZING

Mechanical Transmission Considerations

The following are the most common mechanical transmissions:

- Timing belt
- Cycloid and epicycloid reducer
- Rack and pinion
- Ball screw

Where N = transmission ratio, the load parameters are transferred to the motor axis according to the following relationship:

- Motor speed = load speed x N
- Motor torque = load torque/N
- Load inertia reflected to the motor axis = load inertia/N^2

In order to identify the optimal mechanical transmission for an application, two main application areas can be identified:

- Low dynamic applications: The main objective of the motion is the supply of power, the dynamic performances are not important, involved power is quite large, the motor cost is a significant percentage of the overall system cost.

- High dynamic applications: The main objective of the motion is mainly positioning with the most of energy used to accelerate, to brake and to position the load in a minimum time with maximum accuracy.

For low dynamic applications, simple speed reducers are acceptable.

For high dynamic applications, the required torques are mainly inertial. Moog's general recommendation is to orientate the choice towards inertial matching (e.g. transmission ratio which makes the load inertia translated to the motor axis equal to the motor inertia).

When the load inertia transferred to the motor is more than a few times the motor inertia, a high control bandwidth is necessary to electronically compensate for the inertia mismatch and mechanical linkages must be stiff and with no backlash.

Based onto these considerations, it is important to consider whether to generate the torque with a long and narrow motor or with a short and compact motor:

- Long motors are optimized for of minimum inertia so that they meet the requirement of high acceleration with low inertia loads

- Short and compact motors are optimized for torsional stiffness so that they meet the requirements of high inertia loads

In applications with large inertia and short positioning time a check must be made on the torsional resonance frequency to ensure it remains above 1,000 Hz assuming that a closed loop bandwidth of 300 Hz is achieved by the high dynamic performances of MD Series Servo Motors. The frequency of torsional resonance of a load with inertia J1 connected to an axis with torsional stiffness S_m is :

$$f = \frac{1}{2}\Pi \times \sqrt{\frac{S_m}{J1}}$$

The torsional stiffness of a steel shaft with diameter D and with length L is:

$$S_m = \frac{\pi \times D^4 \times 2.466 \times 10^{-3}}{L}$$

Considerations on Position Transducers

A high performance brushless motor is required to have low inertia, high torque and high torsional stiffness. The next considerations are the mechanics of the feed system and the position transducer.

Most common position transducers are resolvers and encoders.

Performances can dramatically be improved with encoders as they have:

- 1,000 times better resolution than a resolver
- 20 times better accuracy
- 1,000 times better signal/noise ratio

By using sinusoidal encoders, the rotational uniformity and the velocity dynamics are much higher. In other words, the sinusoidal encoder dramatically improves performance in terms of response time, servo error, overshoot and axis residual vibrations.

With a sinusoidal encoder the static positioning accuracy is about 20 arcs and, more importantly, the accuracy is not affected by the cabling quality. The dynamic error is limited by the signal/noise ratio.

A limitation to the adoption of encoders is the maximum allowed temperature which is on the order of 110 °C (230 °F) while a resolver is able to tolerate the 155 °C (331 °F) of Class F.

Encoders are typically more expensive than resolvers.

SERVO MOTOR SELECTION AND SIZING

Considerations on Servo Drive Type

In order to get the highest rotation uniformity at any speed, torque ripple must be minimized. To achieve this, careful choice of both sinusoidal motor and control system must be made. The motor is matched to a sinusoidal PWM inverter, of which amplitude, frequency and phase are separately controlled.

The PWM frequency used should be at least 10 KHz. Currently, all Moog Servo Dives are fully digital with position, velocity, torque digital loops.

Sampling time should be as short as possible to achieve wide system bandwidth.

Reference signals (position or speed) are provided in analog or digital form.

Analog reference is ±10 V while digital reference can be provided using various protocols.

Considerations on Control Strategy

Control systems can be configured according to three control strategies:

- Torque control: The speed depends on the load
- Velocity control: The torque depends on the load
- Position control: The torque depends on the load

The torque control strategy is used when it is needed to control a force or pull (e.g. winders, unwinders, paper processing, textile). Torque control is intrinsic to brushless motors as they are controlled by electrical current. Hence, torque control does not need accurate transducers.

Velocity control is the most traditional strategy. It uses an integration term so that the speed error is limited to the system offsets.

Position control is carried out only by digital drives, so that the steady state position and speed following error is limited to a few points of the sensor (for an encoder with 4,096 pulse/revolutions this implies 1/16,000 of a revolution). Position loop capability is necessary to synchronize several axes.

Motor Selection

After the choice of the transmission ratio, based on load, speed and other load data, a first preliminary selection of a motor model can be performed.

The following sequence is suggested:

1. Trace the speed/time diagram of the load cycle
2. Transfer the inertia and the loads of the system to the motor shaft
3. Calculate the cycle of the accelerations and the inertial torques
4. Add the load on the motor axis to the inertial torque
5. Calculate the root mean square value of the torque
6. Calculate the root mean square of the speed
7. Calculate the maximum torque in the cycle
8. Calculate the maximum duration time of the maximum torque in the cycle
9. Calculate the required torque at the maximum speed
10. Calculate the maximum torque

With this data, a preliminary choice of the motor (and the drive) can be performed.

Validation is necessary at this point to ensure the correct thermal and electric sizing of the motor. A motor is considered properly sized when it achieves a maximum temperature of 50 °C (122 °F) above room temperature.

The following sequence is suggested to verify the selection:

- Check the maximum torque
- Check the rise in temperature
- Check that the maximum speed that can be reached

Points 1 and 2 can be solved by the selection of a larger motor, while point 3 can be solved by the selection of a motor with a higher speed winding. Also a higher drive current will be necessary.

SERVO MOTOR SELECTION AND SIZING
General information

1. Motors designed to EN 60034 (VDE 0530)
2. Runout class per DIN 42955, IEC 72-1
3. Rotors balanced to Class G 6.3 per ISO 1940
4. Sealing to IP65 (excluding shaft seal) with Moog specified mating connectors
5. Operating ambient temperature -25 to +40 °C (-13 to +104 °F) (up to 130 °C (266 °F) with derated output)
6. Class F winding insulation
7. Motor flange dimensions per IEC 60034, DIN 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

	Option - 00	Option - 01
Type	Transmitter	Transmitter
Pole Count	8	2
Input Voltage	7 V$_{RMS}$	4 V$_{RMS}$
Carrier Frequency	10 kHz	3.4 to 8 kHz
Maximum Input Current	15 mA	35 mA
Transformation Ratio	0.29	0.5

    b. Encoder

    - Incremental

    - Absolute Single-turn

    - Absolute Multi-turn

11. Winding temperature sensors (standard version): PTC with threshold at 155 °C (311 °F)
12. Sealed life-time lubricated bearing

Notes:

1. Continuous ratings based upon:

    a. Operation in still air with ambient temperatures at 25 °C (77 °F)

    b. Winding temperature at 110 °C (230 °F) over ambient

    c. Motor front flange attached to a steel mounting plate measuring 300 x 300 x 25 mm (11.81 x 11.81 x 1.00 in)

2. Peak ratings based on:

    a. Duty cycle: Please contact Moog application engineering

    b. Iron saturation of 15 % or less

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 Servo Drives at 565 V$_{DC}$ link. For other drives and voltage levels, please talk to your local Moog application engineers.

8. Specification tolerances are ±10 %

9. For motors with Encoder feedback, please use a lower Nominal Torque, Continuous Duty, Nominal Speed rating [80 °C (176 °F) temperature rise above Ambient of 40 °C (104 °F)], due to operating temperature limitations [120 °C (248 °F)] of encoder devices

10. 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

11. Resolver feedback motor installation diagrams shown in this catalog assume the use of fixed angled connectors. Encoder feedback motor installation diagrams shown in this catalog assume the use of rotatable angled connectors

12. Although very low maintenance, we advise you talk to your local Moog customer service team to determine an appropriate maintenance schedule for these Servo Motors based on loading and usage

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 2011 sales of USD 629 million and over 40 locations worldwide, is part of Moog Inc. (NYSE:MOG.A and MOG.B) which has sales of USD 2.3 billion.

Moog maintains facilities in 26 countries around the globe. 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.

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

Servo Drives

Servo Motors

Servo Valves

Radial Piston Pumps

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.

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

Flight Simulation

Formula One Simulation Table

- 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.

OPTIONS
Flexible Design Options

Moog's MD Series Servo Motors are available with a variety of standard and customized 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. As a result, if you need something that is not at present listed, contact your local Moog office to see if it is already available.

Standard Options

The standard options for the MD Series Servo Motors are detailed in the type boxcar.

1. Cooling

Natural Convection Cooling

Moog's MD Series Servo Motors are designed to supply high dynamics to normal duty cycle applications. They offer very high angular acceleration in a given package size.

Fan Cooling

To supply high dynamics in high duty cycle applications, Moog offers optional fan cooling on select MD motor models. Fan cooling delivers up to 30 % greater continuous torque output without increasing motor inertia. Fans are powered by an unregulated 24 V_{DC} supply (see Motor Accessories) with dedicated power connector.

Current requirements are 1 A_{DC} per motor.

Liquid Cooling

To supply high dynamics in very high duty cycle applications, Moog offers liquid cooling as standard on all sizes of the MD Series Servo Motors. Liquid cooling can deliver up to 100 % greater continuous torque without adding any additional inertia.

2. Integral Holding Brake

Holding brakes are available for all MD 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 weight-induced load (e.g. vertical axis on a gantry robot).

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.

The integral holding brake requires a regulated 24 V_{DC} supply (see Accessories) for proper operation. Brake power connections are through the standard motor power connector. Refer to motor technical data for brake current requirements.

3. Connectors

Standard connection options included fixed angled connectors, rotatable angled connectors, straight connectors and connection boxes on size 5 and 6 liquid cooling version.

4. Thermal Sensor

In order to help protect the motor from overheating, a single thermal sensor in the stator is supplied as standard. This thermal sensor can be a PTC, NTC or KTY sensor.

For liquid cooling versions of the MD Series Servo Motors, a rear bearing thermal sensor is available as option.

5. Shaft Options

MD 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.

6. Heavy Bearing

Under some load conditions, heavy bearings are required. The MD Series Servo motors have the inclusion of heavy bearings as a standard option (Please contact Moog for details).

7. Shaft Seal

In applications where the shaft/flange mating surface is immersed in fluids, a shaft seal is required to maintain motor integrity. Moog offers PTFE (teflon) type shaft seals which have excellent operating characteristics (resistant to shrinkage and thermal stress).

8. Feedback Devices

As detailed on type code in ordering information, the MD Series Servo Motors boast a variety of resolvers,

incremental encoders and single turn and multiturn optical encoders as standard.

OPTIONS
Customizable Options

Motor Windings

Moog's MD Series Servo Motors are designed to address the needs of most dynamic motion control applications. However, Moog recognizes that OEMs have unique needs which can not 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.

Frameless Options

In addition to offering our compact MD Series Servo Motors in a frameless package, Moog's motor design and application teams are able to develop specialty motors meeting your unique specifications. Moog's high power density design allows our motor to be packaged in envelopes where other motors simply won't fit. In addition, Moog's design expertise includes motors adapted for operation in extreme environments:

- Elevated temperatures
- Explosive/flammable gases
- Underwater applications
- High shock loads
- Radiation zones
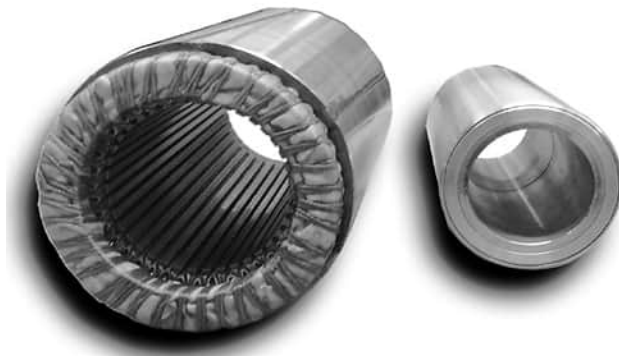
Moog´s MD frameless motor offering is based on the following standard stator dimensions:

Type	Stator diameter (nominal) [mm (in)]
JSx3	63 (2.5)
JSx4	92 (3.6)
JHx5	130 (5.1)
JSx5	130 (5.1)
JHx6	178 (7)
JSx6	178 (7)
JSx7	250 (9.8)

Custom Shafts and Flanges

To support legacy products or meet unique application needs, Moog's modular MD motor design is capable of supporting custom shafts (e.g. length, diameter or spline fittings) and custom flanges.

Custom Connectors

Moog's MD Series Servo Motors standard connector options are detailed in the Ordering Information.

For non standard options, please contact your local Moog office.

Custom Feedback Options

In addition to standard resolver and encoder options as detailed in the Ordering Information, Moog can support requests, where practical, for special feedback devices such as other resolver or encoders types, tachometers and hall effect sensors.

Custom Coatings

Moog's MD Series Servo Motors can be customized for spraydown environments. Moog is capable of coating the motors with FDA required coatings for applications in the food processing industry.

Accessories

To speed 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.

To obtain preassembled motor cables, crimp tools, power supplies, please contact Moog staff.

ORDERING CODE

How to Order

To order a motor, choose the various Type options by filling in the box car on the inside back page of the catalog.

Moog sales department will provide the corresponding Model number suitable for the order.

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

Example

J H W 5 – 0 6 3 – 0 2 9 – 0 0 – 0 3 – 0 1 – 0 0

- Standard version
- 2 Poles resolver
- Keyway, shaft seal
- No brake, standard connectors
- Nominal speed: 2,900 r/min
- Active length: 160 mm (6.3 in)
- Motorsize: Frame size 145 mm (5,71 in)
- Liquid cooling
- High dynamic
- Series: Maximum Dynamic Brushless Servo Motor

ORDERING CODE

J ☐☐☐ - ☐☐☐ - ☐☐☐ - ☐☐ - ☐☐ - ☐☐ - ☐☐
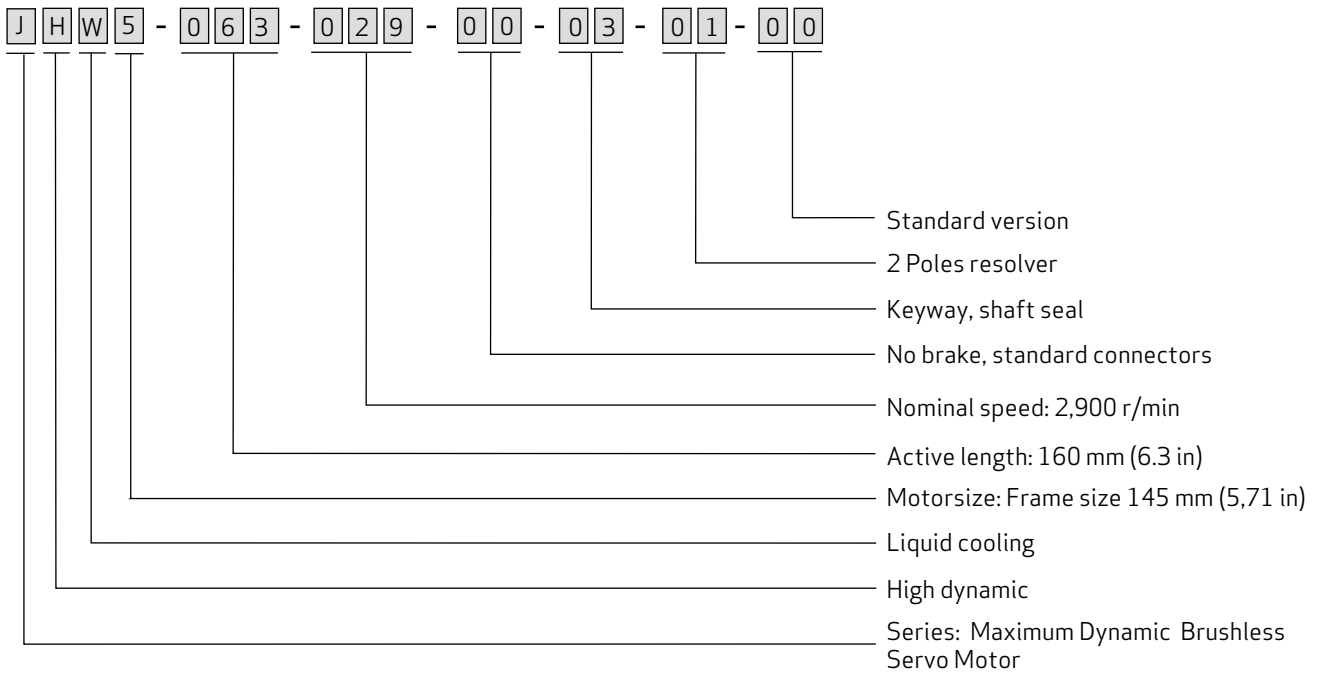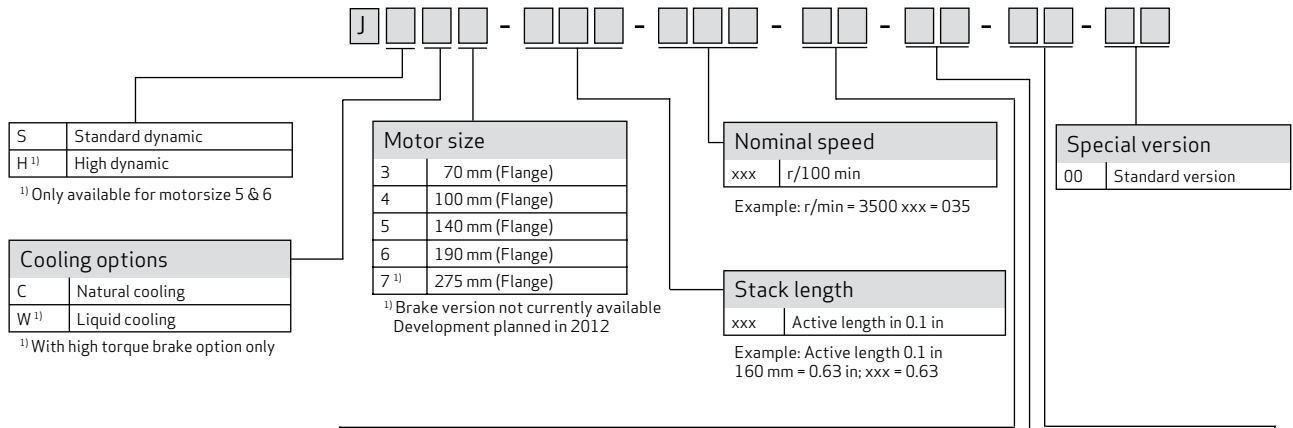
S	Standard dynamic
H [1]	High dynamic

[1] Only available for motorsize 5 & 6

Cooling options

C	Natural cooling
W [1]	Liquid cooling

[1] With high torque brake option only

Motor size

3	70 mm (Flange)
4	100 mm (Flange)
5	140 mm (Flange)
6	190 mm (Flange)
7 [1]	275 mm (Flange)

[1] Brake version not currently available Development planned in 2012

Nominal speed

xxx	r/100 min

Example: r/min = 3500 xxx = 035

Stack length

xxx	Active length in 0.1 in

Example: Active length 0.1 in 160 mm = 0.63 in; xxx = 0.63

Special version

00	Standard version

Electrical options

	Brake options [1] Low-T	Brake options [1] High-T	Straight connector	Rotable connector	Connector box [2]	NTC Thermal sensor	KTY Thermal sensor
00	Standard [3]						
01			■				
02				■			
03					■		
04	■						
05	■		■				
06	■			■			
07	■				■		
08		■					
09		■	■				
10		■		■			
11		■			■		
12						■	
13			■			■	
14				■		■	
15					■	■	
16	■					■	
17	■		■			■	
18	■			■		■	
19	■				■	■	
20		■				■	
21		■	■			■	
22		■		■		■	
23		■			■	■	
24							■
25			■				■
26				■			■
27					■		■
28	■						■
29	■		■				■
30	■			■			■
31	■				■		■
32		■					■
33		■	■				■
34		■		■			■
35		■			■		■
99	Special						

Mechanical options

	Keyway	Shaft exit seal	Heavy bearing	Bearing thermal sensor [1]
00	Standard [2]			
01	■			
02		■		
03	■	■		
07			■	
08	■		■	
09		■	■	
10	■	■	■	
14				■
15	■			■
16		■		■
17	■	■		■
21			■	■
22	■		■	■
23		■	■	■
24	■	■	■	■
99	Special			

[1] Only available for liquid cooling
[2] Plain shaft, standard bearing, no shaft seal, no bearing thermal sensor

Feedback options

	Motor size 3	4	5	6	7	Resolver/Encoder type	
00	Resolver with same number of poles of the motor					Resolver/Encoder type	
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	ECN1113		ECN1313			Absolute single turn	Heidenhain
07	EQN1125		EQN1325			Absolute multi turn	Heidenhain
99	Special						

Brake options

		JSx3	JSx4	Jxx5	Jxx6	Jxx7
1	Low torque	–	–	15 Nm	22 Nm	TBD
2	High torque	4.5 Nm	15 Nm	22 Nm	72 Nm	TBD

[1] Liquid cooling motors have only the high torque brake option.
[2] Applicable only for JxW5, JxW6 and JxW7 as standard.
[3] Fixed angled connectors, PTC sensor, no brake

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.

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