

Motor and Control Components Datasheet

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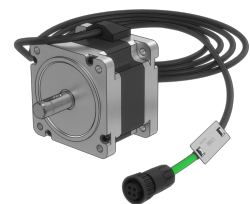
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Overview

Vention offers a range of motors and control components that are compatible with the [MachineMotion 1](#) and [MachineMotion 2](#) controller and [IO module](#). Depending on your application and technical requirements, compare the specifications of each control component below.

MachineMotion 1 Motors



Name	156mm NEMA 34 Stepper Motor	100mm NEMA 34 Stepper Motor	65mm NEMA 34 Stepper Motor
Part Number	MO-SM-001-0001	MO-SM-002-0001	MO-SM-003-0001
Compatibility	<ul style="list-style-type: none"> Belt Rack Actuator Enclosed Lead Screw Actuator Enclosed Ball Screw Actuator Enclosed Timing Belt Actuator Rack and Pinion Timing Belt Actuator Rotary Actuator Roller Conveyors HD Roller Conveyors Belt Conveyors 	<ul style="list-style-type: none"> Belt Rack Actuator Enclosed Lead Screw Actuator Enclosed Ball Screw Actuator Enclosed Timing Belt Actuator Rack and Pinion Timing Belt Actuator Rotary Actuator Roller Conveyors HD Roller Conveyors Belt Conveyors 	<ul style="list-style-type: none"> Belt Rack Actuator Enclosed Lead Screw Actuator Enclosed Ball Screw Actuator Rack and Pinion Timing Belt Actuator Rotary Actuator Roller Conveyors HD Roller Conveyors Belt Conveyors
Motor Type	Bipolar Stepper	Bipolar Stepper	Bipolar Stepper
Motor Flange	NEMA 34, 86 mm	NEMA 34, 86 mm	NEMA 34, 86 mm
Motor Length	156 mm	100 mm	65 mm

Step Angle	1.8° ± 5%	1.8° ± 5%	1.8° ± 5%
Holding Torque	12 Nm	6.5 Nm	2.8 Nm
Rated Current	6.2 A	5.0 A	3.0 A
Inductance	9 mH ± 20%	4 mH ± 20%	6.5 mH ± 20%
Phase Resistance	0.7 Ohm ± 10%	0.5 Ohm ± 10%	1.1 Ohm ± 10%
Insulation Class	B	B	B
Insulation Resistance	100 Mohm	100 Mohm	100 Mohm
Controller Side Connector	M12 4-pin quick-disconnect	M12 4-pin quick-disconnect	M12 4-pin quick-disconnect
Input shaft	9.5 mm	9.5 mm	9.5 mm
Output shaft	14 mm	14 mm	14 mm
Operating Temperature	-25°C to + 70°C	-25°C to + 70°C	-25°C to + 70°C
Relative Humidity	0% -85% RH, non-condensing, non-splash	0% -85% RH, non-condensing, non-splash	0% -85% RH, non-condensing, non-splash
Housing Material	Steel	Steel	Steel
Width	86 mm	86 mm	86 mm
Length	224 mm	168 mm	133 mm
Weight	5.22 kg	3.33 kg	2.16 kg
Cable Length	3 m (5 m extension cable available)	3 m (5 m extension cable available)	3 m (5 m extension cable available)

Note: During MachineMotion's boot up sequence, the holding torque is momentarily 65% of its rated value. Please keep in mind when using in vertical and/or angled applications.

MachineMotion 2 Motors



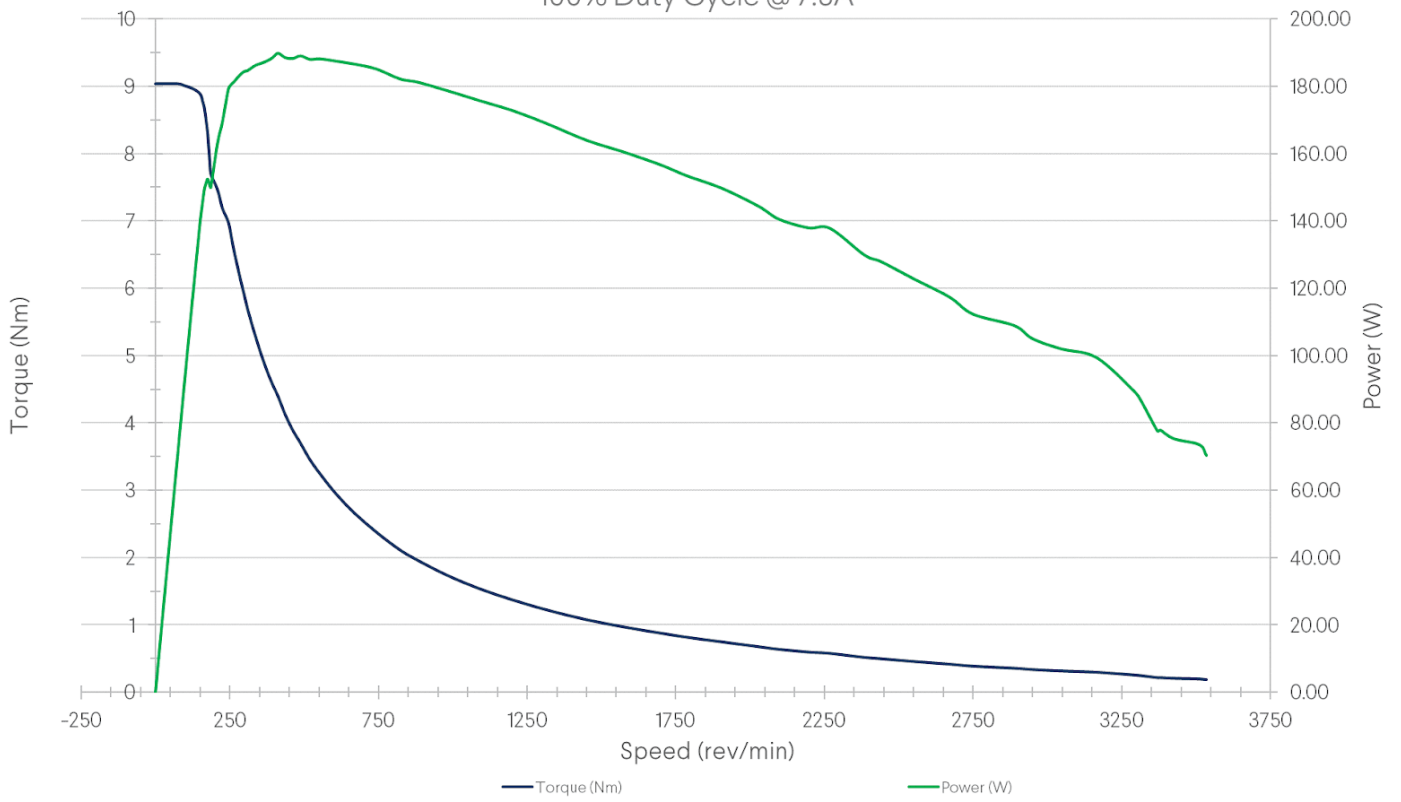
Name	157mm NEMA 34 Stepper Servo Motor	100mm NEMA 34 Stepper Servo Motor	68mm NEMA 34 Stepper Servo Motor
Part Number	MO-SM-011-0000	MO-SM-012-0000	MO-SM-013-0000
Certifications	<ul style="list-style-type: none"> • UL 1004-1:2012 • UL 1004-6:2012 • CSA C22.2 #100:2014 • EN IEC 61000-6-2 (EMC Directive) • EN 55011:2016 (EMC Directive) • EN 60034-1:2017 (Low Voltage Directive) • EN IEC 60204-1:2016 (Low Voltage Directive) • EN 63000:2016 (RoHS Directive) 	<ul style="list-style-type: none"> • UL 1004-1:2012 • UL 1004-6:2012 • CSA C22.2 #100:2014 • EN IEC 61000-6-2 (EMC Directive) • EN 55011:2016 (EMC Directive) • EN 60034-1:2017 (Low Voltage Directive) • EN IEC 60204-1:2016 (Low Voltage Directive) • EN 63000:2016 (RoHS Directive) 	<ul style="list-style-type: none"> • UL 1004-1:2012 • UL 1004-6:2012 • CSA C22.2 #100:2014 • EN IEC 61000-6-2 (EMC Directive) • EN 55011:2016 (EMC Directive) • EN 60034-1:2017 (Low Voltage Directive) • EN IEC 60204-1:2016 (Low Voltage Directive) • EN 63000:2016 (RoHS Directive)
Compatibility	<ul style="list-style-type: none"> • Belt Rack Actuator • Enclosed Lead Screw Actuator • Enclosed Ball Screw Actuator • Enclosed Timing Belt Actuator • Rack and Pinion • Timing Belt Actuator • Rotary Actuator • Roller Conveyors • HD Roller Conveyors • Belt Conveyors 	<ul style="list-style-type: none"> • Belt Rack Actuator • Enclosed Lead Screw Actuator • Enclosed Ball Screw Actuator • Enclosed Timing Belt Actuator • Rack and Pinion • Timing Belt Actuator • Rotary Actuator • Roller Conveyors • HD Roller Conveyors • Belt Conveyors 	<ul style="list-style-type: none"> • Belt Rack Actuator • Enclosed Lead Screw Actuator • Enclosed Ball Screw Actuator • Rack and Pinion • Timing Belt Actuator • Rotary Actuator • Roller Conveyors • HD Roller Conveyors • Belt Conveyors
Motor Type	Bipolar Stepper Servo	Bipolar Stepper Servo	Bipolar Stepper Servo
Motor Flange	NEMA 34, 86 mm	NEMA 34, 86 mm	NEMA 34, 86 mm
Motor Length	157 mm	96 mm	66.5 mm
Step Angle	1.8° ± 5%	1.8° ± 5%	1.8° ± 5%

Holding Torque	13 Nm	7.2 Nm	4 Nm
Rated Current	10 A	10 A	10 A
Inductance	2.9 mH ± 20%	1.9 mH ± 20%	1.0 mH ± 20%
Phase Resistance	0.24 Ohm ± 0.1 Ohm	0.19 Ohm ± 0.1 Ohm	0.14 Ohm ± 0.1 Ohm
Insulation Class	B	B	B
Insulation Resistance	100 Mohm	100 Mohm	100 Mohm
Controller Side Connector	M23 Amphenol Sine	M23 Amphenol Sine	M23 Amphenol Sine
Input shaft	9.5 mm	9.5 mm	9.5 mm
Output shaft	14 mm	14 mm	14 mm
Operating Temperature	0°C to + 40°C	0°C to + 40°C	0°C to + 40°C
Relative Humidity	0% -85% RH, non-condensing, non-splash	0% -85% RH, non-condensing, non-splash	0% -85% RH, non-condensing, non-splash
Housing Material	Steel motor and plastic encoder housing	Steel motor and plastic encoder housing	Steel motor and plastic encoder housing
Width	86 mm	86 mm	86 mm
Length	258 mm	198 mm	168 mm
Weight	6.37 kg	4.53 kg	3.43 kg
Cable Length	5-meter signal-power hybrid cable	5-meter signal-power hybrid cable	5-meter signal-power hybrid cable

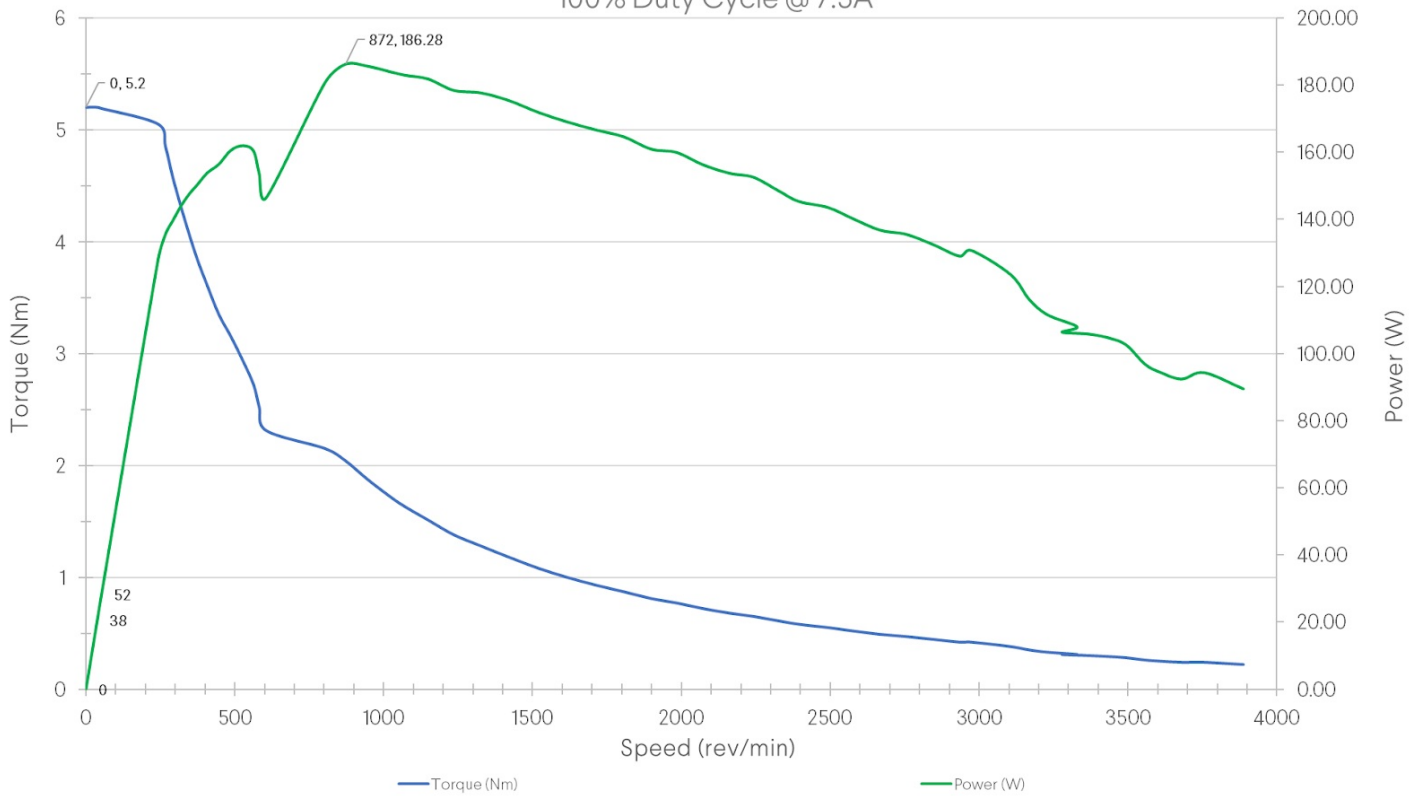
Note: During MachineMotion's boot up sequence, the holding torque is momentarily 65% of its rated value. Please keep in mind when using in vertical and/or angled applications.

Motor torque-speed curves

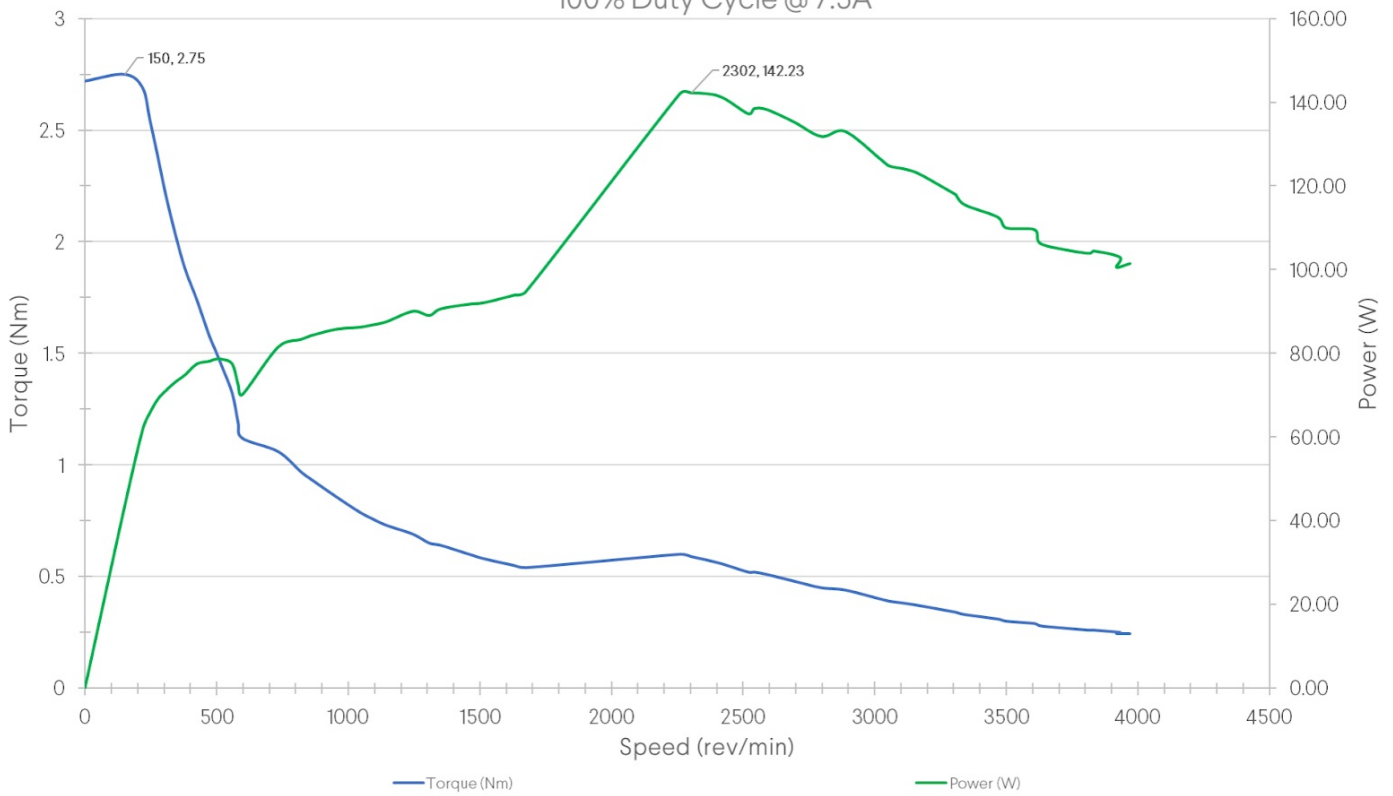
MO-SM-011-0000
100% Duty Cycle @ 7.5A



MO-SM-012-0000
100% Duty Cycle @ 7.5A



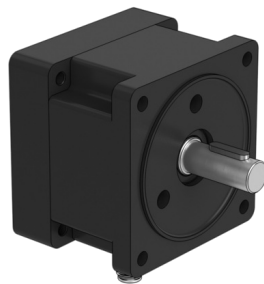
MO-SM-013-0000
100% Duty Cycle @ 7.5A



The table below summarizes the maximum power output that the different motors support derived from the torque-speed curves above.

Motor part number	Maximum Power Output (Torque x Speed)
MO-SM-011-0000 (157mm NEMA 34)	190W
MO-SM-012-0000 (100mm NEMA 34)	186W
MO-SM-013-0000 (68mm NEMA 34)	142W

Power-Off Brake



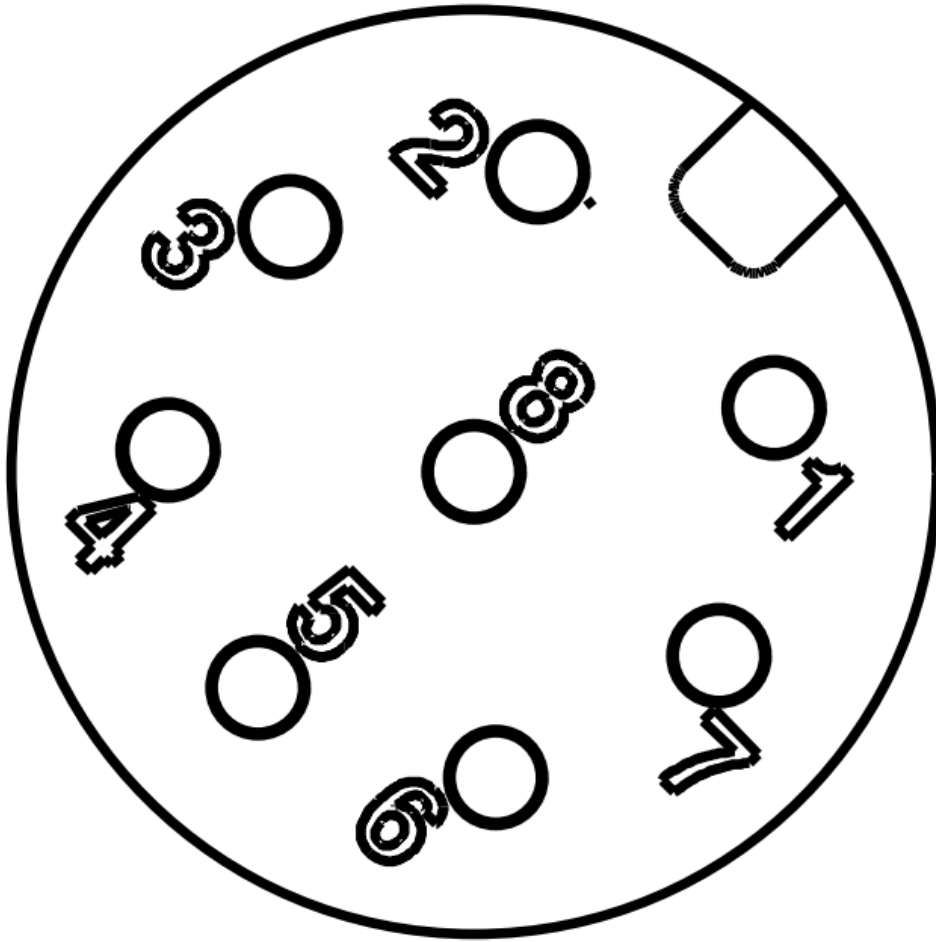
Name	Power-Off Brake
Part Number	MO-PT-002-0001

Current	0.75 A
Holding Torque	9 Nm
Rated Voltage	24 V DC
Rated Power	18 W
Engagement Time	7 ms
Controller Side Connector	8 pin M12 quick-disconnect
Brake Type	Power-off, permanent magnet
Shaft Diameter	14 mm
Bore Diameter	14 mm
Max speed	4 000 rpm
Moment of inertia	$1.0711 \times 10^{-5} \text{ Kg m}^2$
Dimensions	85 mm x 85 mm x 100.5 mm
Weight	1.527 kg

Operation details

The power-off brake is controlled remotely by a 24VDC supply located inside the MachineMotion 2 controller. When the brake is de-energized, the brake shaft is locked. When the brake is energized, the brake shaft can rotate freely. Each motor brake supply on the MachineMotion 2 can be controlled independently. When the controller is in e-stop, all the brakes are de-energized, i.e. locked.

Pinout of Vention's M12, A-coded, male connector pinout of the power-off brake:



Pin	Description
1	24VDC
2	Ground
3	NC
4	NC
5	NC
6	NC
7	NC
8	NC

Hollow Shaft Optical Rotary Encoder



Name	Optical Encoder Hollow shaft
Part Number	CE-SN-002-0001 v2
Sensor Type	Optical Encoder Hollow shaft
Output Type	Incremental
Accuracy	0.1°
Resolution	3600 P/r
Operating Voltage	5 - 24 V
Max. Load Currentp	100 mA
Output Frequency	200 kHz
Cable Color	Black
Cable Material	PVC
Cable Length	5 m
Sensor Side Connector	M12 4-pin quick-disconnect
Controller Side Connector	M12 4-pin quick-disconnect
Operating Temperature	- 10 °C to + 60 °C
Cable Material	- 20 °C to + 70 °C
Housing Material	Aluminum
Bore Diameter	9.525 mm
Mounting type	Hollow shaft with set screw
Length	50.8 mm
Weight	0.568 kg
Starting Torque	2×10^{-3} Nm

Allowable input angular acceleration	10 000 rad/S ²
Max. Speed	6000 r/min
Moment of inertia	4 x 10 ⁻⁷ NmS ²
Shock resistance	980 m/S ³ (3 times X,Y,Z directions)
Vibration resistance	50 m/S ² (2 hrs each in X,Y,Z directions)
Max allowable load	Radial: 20 N, Axial: 10 N
Ingress Protection	IP54
