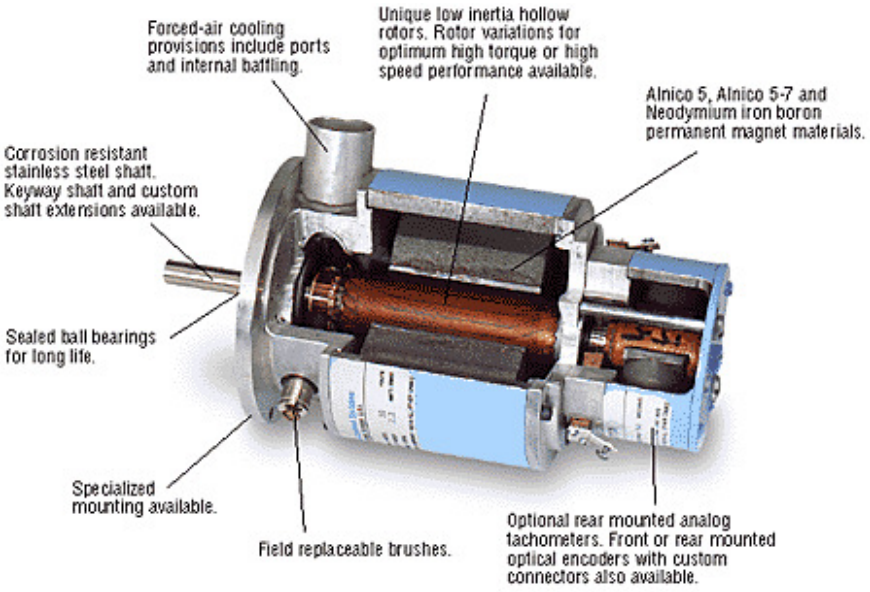
Low Inertia PMDC Servomotors

The Pacific Scientific family of Low Inertia servomotors has unique characteristics that provide ultra-fast positioning performance to meet the most demanding incremental motion control requirements. Their low inertia rotors, coupled with very high pulse torque capabilities, result in a family of very special motors. They have very high torque-to-inertia characteristics to move loads through extremely fast and precise start-stop sequences and speed profiles. These types of motors are also referred to as:

- Moving coil motors
- Basket rotor motors
- Coreless motors
- Ironless rotor motors

These motors provide instantaneous acceleration and torque production plus very precise speed regulation because:

- The motor has low inductance and low inertia, so the electrical and mechanical time constants are very low.
- Pulse torque capability is up to 7 times the rated torque. High pulse currents can be applied to the motor to move loads ultra-fast.
- Performance may be extended with forced air cooling.



Closing the Servo Loop

These motors are available with feedback devices for closed-loop servo control. Analog tachometers with 2.5, 3.0 and 5.0 voltage constants and optical encoders with line counts in the range of 50 - 2500 and single or dual channel outputs, sine or square wave, with or without index are all standard options. In addition, some applications require both a tachometer and encoder. This configuration is available as a special option. Also, some users prefer to mount their own encoder on either the front or rear of the motor. Encoder mounting provisions are standard on all motors except non-metric 2VM models. Contact the factory.

Extended performance

The motors can be provided with provisions for forced-air cooling (pressurized air or suction/vacuum). When continuous duty torque (or RMS torque) requirements exceed non-cooled motor capabilities, forced-air cooling can increase the torque capability an impressive 200%.

Long, trouble-free life

Low inertia PMDC servomotors use carbon brushes for commutation. The brushes have demonstrated reliable, long life performance over many years in a host of demanding applications. Brush life varies with the specific end use but it is typically in the order of 5000 hours on the first set of brushes. Brushes are conveniently field replaceable and brush life on the second set can be up to 5000 hours too, providing years of trouble-free operation.

Application specific modifications

Mechanical

English and metric mounting configurations are available and custom mounting provisions are available. Pacific Scientific also recognizes that special shaft configurations are often necessary to optimize the coupling of the motor to the load. Typical custom shafts include special diameters and lengths plus features such as flats and cross-drilled holes. Contact the factory.

Electrical (windings)

In addition to the standard low, medium and high torque constants, special windings are available to optimize application specific torque and speed requirements. Contact the factory.

Agency Approval (CE)

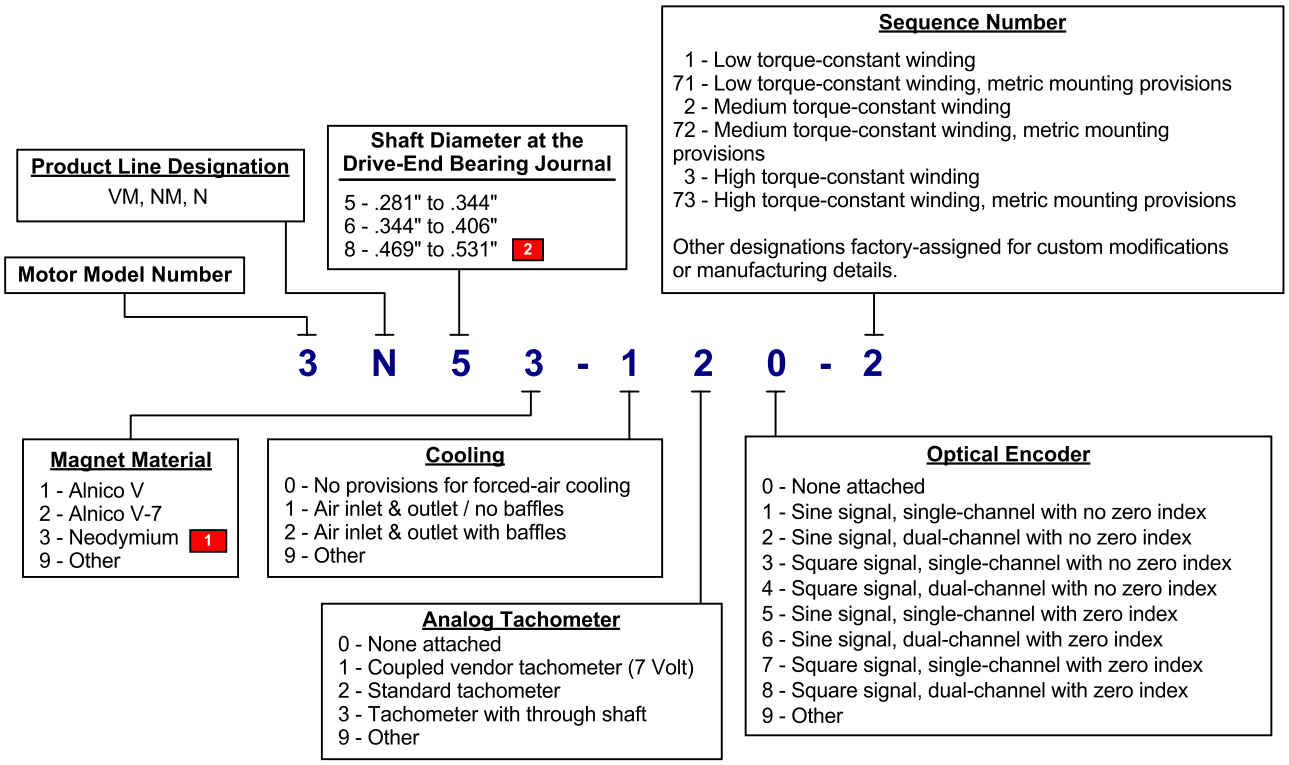
Based on CE rules, it is *not allowed* to provide a "Declaration of Conformity" and to mark a product with the CE mark for components, instruments and machines that are destined to be built into other equipment. Since Pacific Scientific’s Low Inertia DC Servomotors are solely components in a larger piece of equipment, they do not include CE approval markings.

In addition, the CE Low Voltage Directive applies to equipment that involves voltage levels from 75 to 1500 Volts DC. The highest voltage rating on Pacific Scientific's Low Inertia DC Servomotors is 60 Volts DC.

Model Number Code

To construct a motor listing, select the combination of features required and put all the coded information in the proper sequence. Please account for the information in each field.

This chart identifies the components of a typical model number code for Low Inertia Servomotors. Contact your Pacific Scientific Motor Products Distributor or the Customer Center (815/226-3100, FAX 815/226-3148) for additional information and application assistance.



1 N motors only

2 This shaft size not available with N motors

Cooling Options (all motors except 2VM)

Motors may be operated well beyond the normal ratings with the provision of forced air-cooling. For example, the motor's pulse torque capability is 5 to 7 times the rated current. When intermittent duty operation (high pulse currents for example) exceed the continuous duty non-cooled motor rating, use forced air-cooling. Continuous torque capability may be increased as much as 200%. In addition, see Torque/Speed Curves below.

Forced air cooling significantly enhances heat dissipation and permits higher pulse currents

- Type 1 cooling. Ports with screening are provided for forced air intake. Pressurized air or suction/vacuum can be use to cause the forced airflow.
- Type 2 cooling. In addition to the screened ports used on Type 1, internal baffles are added to provide more efficient circulation and permits the use of greater volume (SCFM) of forced air.

Torque/Speed Curves

Torque/speed curves are shown for each motor family. They represent typical motor performance when driven by a drive with the DC bus indicated and continuous and peak current capabilities to match the data in the Ratings and Characteristics tables. Note that the curve shows both continuous and intermittent duty areas of operation.

Continuous Duty

The motor may be operated at any speed and torque within the continuous duty area for any length of time. This area is bordered by the continuous torque output line and the maximum speed line.

The continuous torque line represents the maximum torque the motor can produce continuously at different speeds without exceeding the rated winding temperature of 155 degrees C in a 25 degrees C ambient environment. It is a function of the motor's cooling.

The maximum speed line represents the maximum speed the motor can reach at different loads. It is a function of the bus voltage of the drive and the motor winding. Different windings may produce higher maximum speeds, but at the expense of higher current required to produce a given torque.

Intermittent Duty

The motor may be operated at any speed and torque within the intermittent duty area for shorter lengths of time. The area is bordered by the peak torque output line and the maximum speed line.

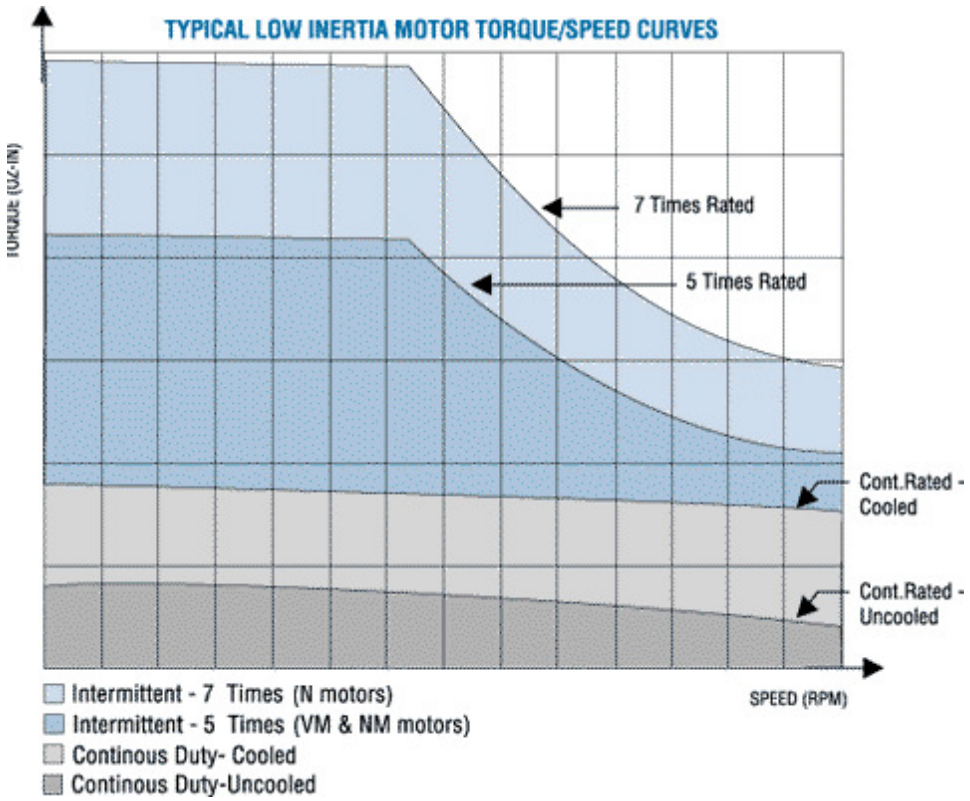
The peak torque line for a given motor is a function of the peak pulse current allowed by the motor. A motor may normally operate safely in an application, which requires operation in the intermittent duty area if the calculated RMS (Root Mean Square) torque falls within the continuous duty area.

If assistance is desired in calculating RMS torque or if you have any questions on the proper application of the motor, do not hesitate to contact the factory. We routinely assist in sizing and selection and will do a detailed analysis to optimize the motor based on your specific requirements

High Peak Torques Move Loads Faster!

For the purpose of conveying performance data in the individual torque-speed curves, the peak rated torque is shown as approximately five to seven times continuous rated torque. The motor is capable of handling much higher peak currents (without demagnetization) and therefore much higher peak torques can be realized on an intermittent basis provided the thermal capacity of the motor is not exceeded. This capability should be considered if it is desirable to significantly decrease the time required to accelerate a load.

As shown in the figure below, up to seven times the continuous torque is possible on some motors when a drive with high peak current capability is used. However, operation in this intermittent area must be limited to a duty cycle that produces an RMS torque that falls within the continuous operating area of the selected motor. See Intermittent Duty Area above.



Feedback Options

Characteristics... Standard Analog Tachometers

Parameter	Units			
Voltage constant	Volts/kRPM	2.5 +/- 5%*	3.0 +/- 5%	5.0 +/- 5%**
Voltage ripple exclusive of any drive speed variations	% p-p	1.5 max	1.5 max.	3.0 max.
Voltage linearity (bi-directional with respect to best straight line above 50 RPM)	% of output	+/- 0.5	+/- 0.5	+/- 0.5
Terminal resistance at25 degrees C (average)	Ohms	50	75	195
Rotor inertia (reference)	oz-in-S^2	0.00005	0.00005	0.000063
Overall dimensions (max.)	inches	2.062" length	2.062" length	2.062" length
	inches	2.765" diameter	2.765" diameter	2.765" diameter

* standard on N and VM models
** standard on NM models

Characteristics... Optical Encoder Options

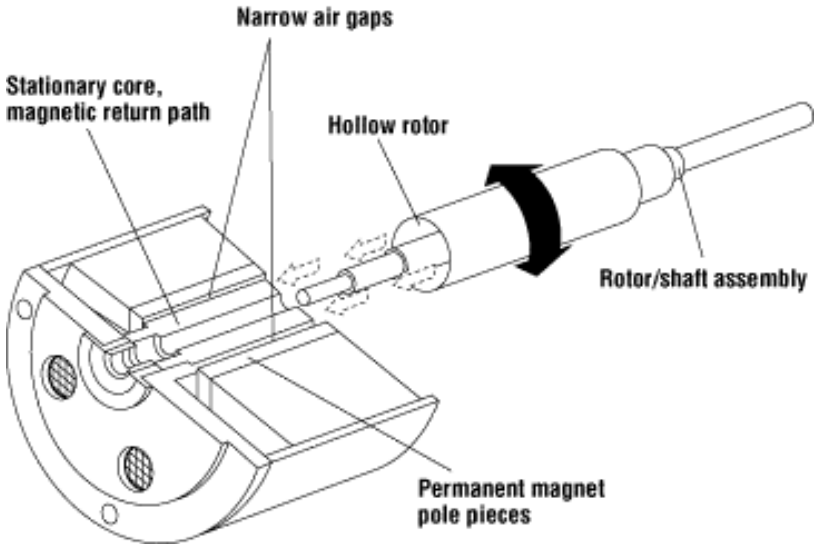
Line counts	50 - 2500 lines
Flutter	Less than 1.0% peak-to-peak (once per revolution)
Output(s)	Single or dual channel, sine or square wave, with or without index
Frequency range	DC to 100 kHz
Inertia	Less than 0.00001 oz-in-S^2
Input power	5V dc +/- 5% @ 150 mA
Light source	LED

Low Inertia Technology Overview

Pacific Scientific low inertia DC Servomotors, with their hollow rotors, result in the highest torque to inertia ratios of any motor technology. These specialized motors produce extraordinarily high accel/decel rates and precision start/stops. They are used to execute rapid, repetitive, complex incremental motion profiles -- even with appreciable and varying loads.

The heart of a low inertia motor is its small diameter, basket-shaped wound rotor. Individual coil forms are wound around a precision cylindrical mandrel, then are fiberglass and epoxy reinforced. The rigid hollow rotor is mated to a shaft-mounted commutator.

Unlike conventional permanent magnet DC motors, there is no rotating iron. Only the hollow rotor, commutator, shaft and ball bearings rotate. The rotor fits over an ingenious stationary core that provides a magnetic return path. Extremely narrow air gaps (typically 0.005") separate rotor ID from magnet pole pieces and rotor ID from the stationary core, helping these motors to be quite responsive.



This type of motor is used in applications requiring the ultimate high performance, throughput and reliability.

Consider the following to relate to the incredible performance these motors provide:

- In the time it takes you to read this sentence, a low inertia servomotor can start and stop over 18,000 times!
- The fastest motor provides a peak acceleration of 576,000 radians/second^2!
- A typical low inertia servomotor can accelerate a load equal to the motor's inertia from a dead stop to 2000 RPM in 2/3 of a millisecond and in less than 2 degrees of shaft rotation!
- Even the largest motor is quick. While a pen drops from chest high to the floor, these motors can start and stop 200 times!

Selection Overview

Motor Family					
Parameter		2VM	3N	4N	55NM
Torque Oz-in (Nm)	- Continuous Stall - Continuous Rated	17 - 23 (.12 - .16) 16 - 22 (.11 - .16)	31 - 92 (.22 - .65) 29 - 86 (.20 - .61)	60 - 174 (.42 - 1.23) 55 - 163 (.39 - 1.15)	177 - 566 (1.25 - 4.0) 167 - 541 (1.18 - 3.8)
Current (Amps)	- Peak Rated - Continuous Stall - Continuous Rated	15 - 28 2.9 - 5.2 3.1 - 5.7	26 - 46 3.1 - 15.3 3.5 - 15.2	47 - 48 6.7 - 14.5 6.7 - 14.2	54 - 67 10.3 - 23.6 10.8 -23.2
Speed (RPM)	- Rated	3475 - 3900	3100 - 4350	3250 - 3440	1420-1970
Size	- Diameter, in. (mm) - Length, in. (mm) - Weight, lbs. (kg)	2.7 (68.6) 3.5 (88.9) 2.75 (1.25)	2.7 (68.6) 3.5 (88.9) 3.0 (1.36)	2.7 (68.6) 4.7 (119.4) 4.8 (2.18)	5.5 (139.7) 4.6 (116.8) 15.0 (6.8)

Typical Applications

Typical applications that rely on this very rapid incremental motion positioning and/or precise speed control capability are:

Industry	Function
Semiconductor Manufacturing	**- PC board drilling** **- component insertion (pick and place)** - wafer spinning **- wire bonding**
Industrial Test Equipment	- optical incremental encoder tester - gas analyzer
Medical Equipment	**- x-ray camera** - blood analyzer *- tooth grinder*
Business Equipment	**- label printer** **- check processing (printing, sorting, canceling)** **- x-y plotter**
Film/Camera Equipment	**- film editing, processing, reproduction** **- electronic projector** **- laser recorder** *- camera valve control*
Industrial manufacturing	**- EDM (Electrostatic Discharge Machine)** **- CNC drilling machine** - precision tensioning devices **- sewing/embroidery machines** **- robots** **- packaging (caps on containers)** *- coil winding*
Textile	**- fabric cutting** **- plotter**
Other	*- hydraulic valve control* **- mail processing equipment** - high performance loudspeaker **- optical (laser) data storage**

- **Boldface type** indicates an application that relies on the Low Inertia Motor's capabilities for accurate positioning
- Normal type indicates an application that relies on the Low Inertia Motor's capabilities for precise speed control
- *Italic type* indicates an application that relies on the Low Inertia Motor's capabilities for both accurate positioning and precise speed control

2VM Series

Ratings and Characteristics [1] [2]

	Catalog Listing	2VM61-000-1	2VM61-000-2	2VM61-000-3	2VM62-000-1	2VM62-000-2	2VM62-000-3
	Torque Constant	Low	Medium	High	Low	Medium	High
Parameter	Units						
Rated Torque	oz-in. // Nm	16 // 0,113	18 // 0,127	18 // 0,127	19 // 0,134	21 // 0,148	22 // 0,155
Rated Current (RMS)	amps	5.7	4.4	3.1	5.8	4.5	3.2
Thermal Resistance (Rotor-Ambient)	deg C/watt	2.41	2.41	2.41	2.41	2.41	2.41
Continuous Power Dissipation (Power In - Power Out) [2]	watts	54	54	54	54	54	54
Rated Voltage	volts	18	24	36	18	24	36
Rated Speed	RPM	4050	3900	4500	3500	3475	3700
Rated Power Out	watts	48	52	60	49	54	60
Pulse Current	amps max.	28	22	15	28	22	16
Continuous Stall Torque	oz-in Nm	.17 0,120	19 0,134	19 0,134	20 0,141	22 0,155	23 0,162
No Load Speed at Rated Voltage	RPM	7100	6680	6920	6450	5865	6010
Torque Constant (back EMF constant x 1.353)	oz-in./amp Nm/amp	3.3 0,023	4.6 0,032	6.7 0,047	3.6 0,025	5.3 0,037	7.8 0,055
Back EMF Constant [3]	V / kRPM	2.39	3.40	4.95	2.66	3.92	5.76
Motor Terminal Resistance [4]	ohms @ 25 deg. C ohms @ 155 deg. C	1.0 1.41	1.59 2.3	3.0 4.41	1.0 1.41	1.59 2.3	3.0 4.41
Rotor Inertia	oz-in-S^2 kg-m^2	.00047 3.3 x 10^-6	.00047 3.3 x 10^-6	.00052 3.6 x 10^-6	. .00047 3.3 x 10^-6	.00047 3.3 x 10^-6	.00052 3.6 x 10^-6
Viscous Damping Coefficient	oz-in/kRPM Nm/kRPM	0.4 0,003	0.4 0,003	0.5 0,004	0.4 0,003	0.5 0,004	0.6 0,004
Static Friction Torque, max.	oz-in. // Nm	1.8 // 0,013	1.8 // 0,013	1.8 // 0,013	1.8 // 0,013	1.8 // 0,013	1.8 // 0,013
Rotor Inductance	microhenries	110	265	500	110	265	500
Mechanical Time Constant @ 25 deg. C ([rotor inertia x terminal resistance x 105/torque constant]/ back EMF constant	mS	6.3	5.0	4.9	5.1	3.8	3.6
Electrical Time Constant @ 25 deg.C (rotor inductance/terminal resistance)	mS	0.11	0.17	0.17	0.11	0.17	0.17
Weight	lbs. // kg	2.75 //1.25	2.75 //1.25	2.75 //1.25	2.75 //1.25	2.75 //1.25	2.75 //1.25

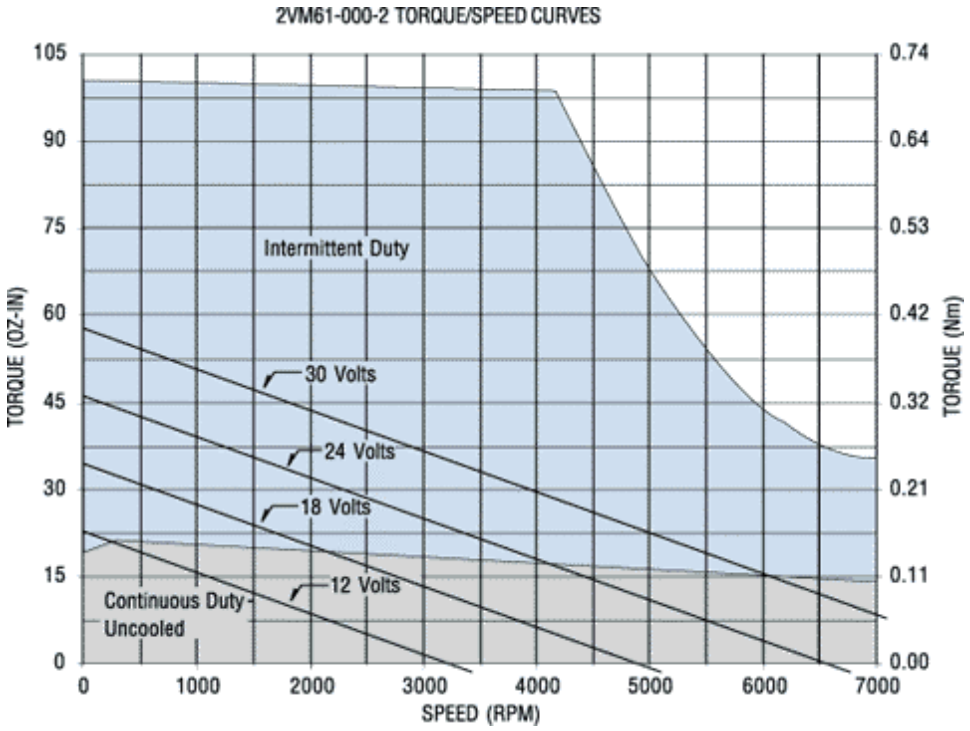
1. Ratings indicated in the motor ratings and characteristics table are interdependent and express a capability of the motor at one set of performance conditions. As illustrated in the speed/torque curves, all other ratings may be varied, as long as the motor's rated continuous power dissipation is not exceeded.

2. Unless otherwise noted, all specifications apply with the motor mounted on a 5" x 8-1/2" x 1/2" (127,0 x 215,9 x 12,7 mm) aluminum heat sink at continuous operating conditions, and at 25 degrees C ambient temperature with the rotor temperature stabilized at 155 degrees C, and with the shaft rotation in either direction.

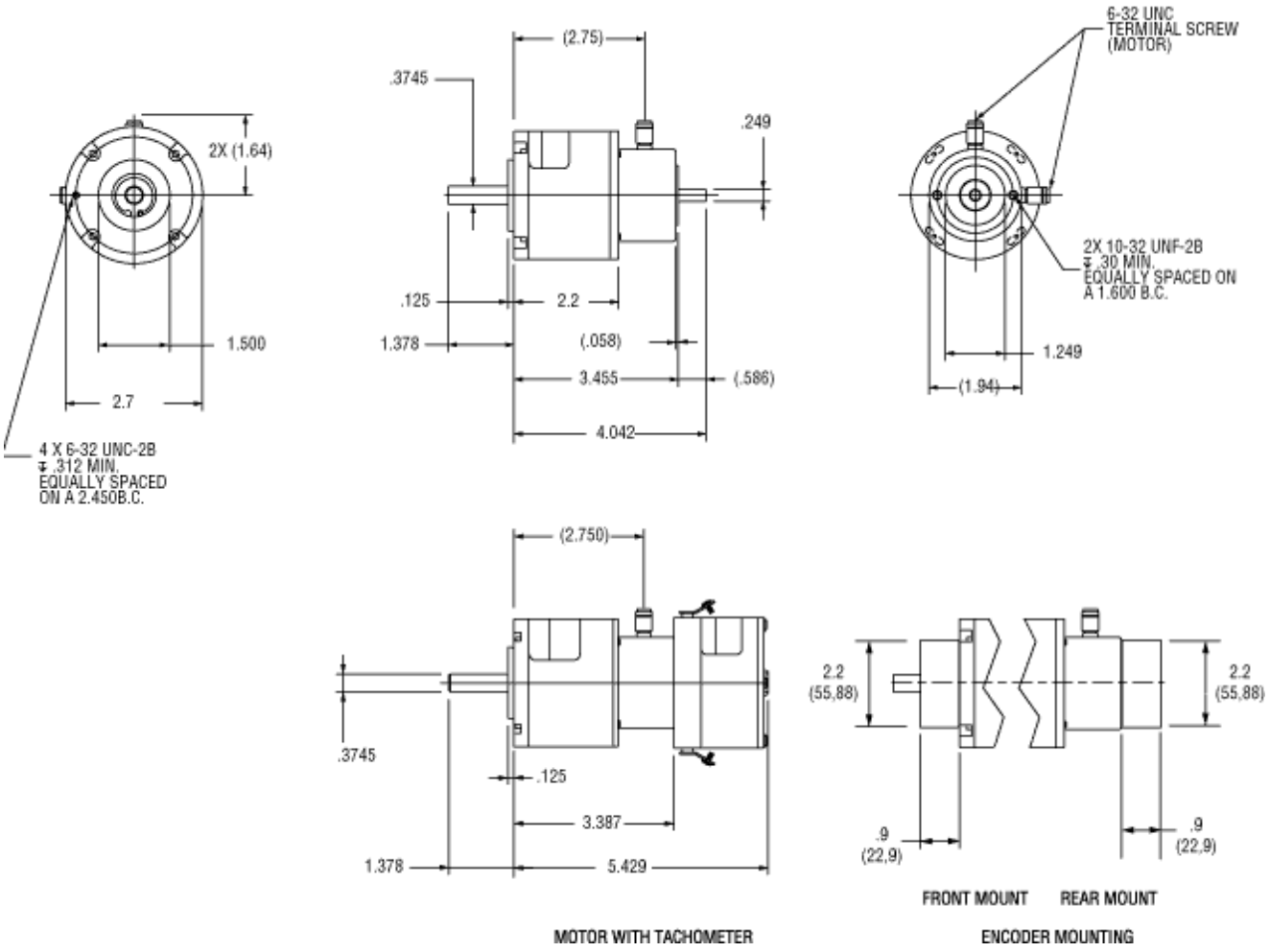
3. Measured as follows: With the motor at 25 degrees C ambient, and driven as a generator at 3600 RPM minimum, the generated voltage is measured with a high-impedance voltmeter. This voltage, divided by the speed, is the back EMF constant.

4. Measured as follows: Using the same measurement technique used in Note 3, measure both with and without a 3.0 amp resistive load installed between the motor terminals. The difference between the two voltages, divided by the respective current, is the terminal resistance.

5. With an integral analog tachometer, the power dissipation capability increases by 5 watts (to 59 watts).



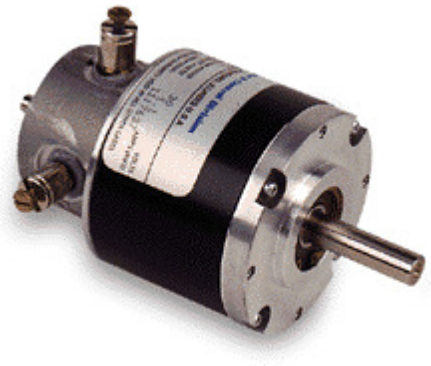
2VM Dimensions, motor and motor plus tach and motor plus encoder.



MOTOR WITH TACHOMETER

ENCODER MOUNTING

3N Series



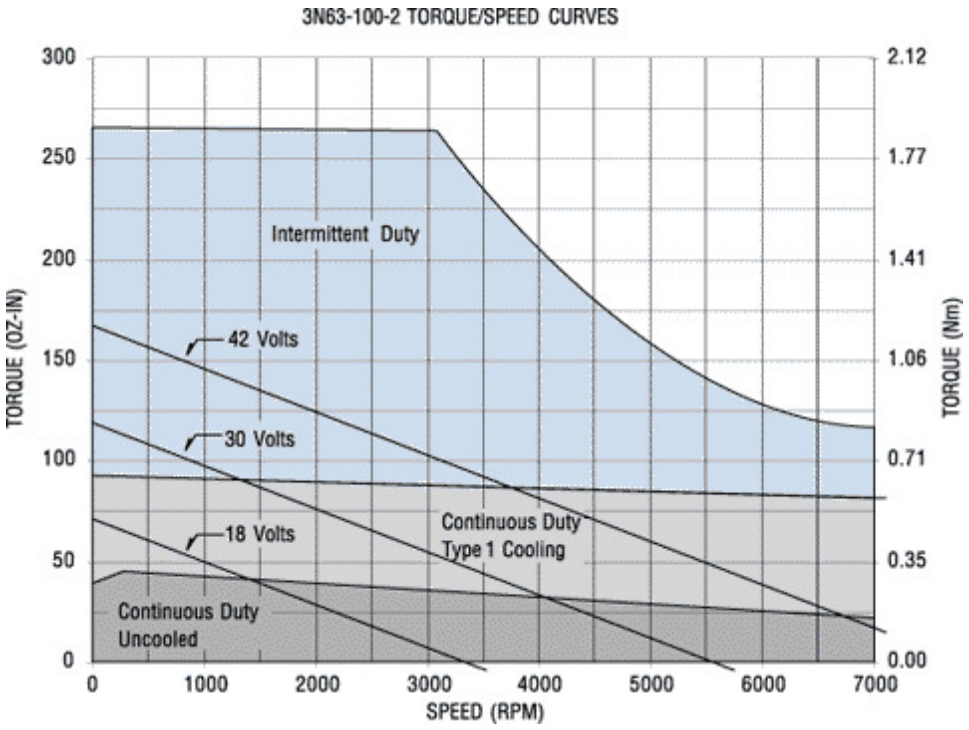
3N Ratings and Characteristics [1] [2]

	Catalog Listing	3N63-000-1	3N63-100-1	3N63-000-2	3N63-100-2	3N63-000-3	3N63-100-3
	Cooling [5]	None	Type 1	None	Type 1	None	Type 1
Parameter	Units						
Rated Torque	oz-in. // Nm	29 // 0,21	79 // 0,56	33 // 0,23	86 // 0,61	31 // 0,22	83 // 0,59
Rated Current (RMS)	amps	6.4	15.2	5.3	12.2	3.5	8.3
Thermal Resistence (Rotor-Ambient)	deg C/watt	2.13	0.47	2.13	0.47	2.13	0.47
Continuous Power Dissipation (Power In - Power Out) [6]	watts	61	275	61	275	61	275
Rated Voltage	volts	24	30	30	42	42	60
Rated Speed	RPM	4350	3100	3980	3730	3830	3620
Rated Power Out	watts	93	181	97	237	88	222
Pulse Current	amps max.	46	46	36	36	26	26
Continuous Stall Torque	oz-in Nm	31 0,219	83 0,586	35 0,247	92 0,650	33 0,233	89 0,629
No Load Speed at Rated Voltage	RPM	5420	6780	5000	7000	4850	6950
Torque Constant (back EMF constant x 1.353)	oz-in./amp Nm/amp	5.8 0,041	5.8 0,041	7.9 0,056	7.9 0,056	11.3 0,080	11.3 0,080
Back EMF Constant [3]	V / kRPM	4.29	4.29	5.85	5.85	8.36	8.36
Motor Terminal Resistance [4]	ohms @ 25 deg. C ohms @ 155 deg. C	0.85 1.24	0.85 1.24	1.29 1.90	1.29 1.90	2.75 4.15	2.75 4.15
Rotor Inertia	oz-in-S^2 kg-m^2	.00047 3.3 x 10^-6	.00047 3.3 x 10^-6	.00047 3.3 x 10^-6	.00047 3.3 x 10^-6	.00052 3.67 x 10^-6	.00052 3.67 x 10^-6

Viscous Damping Coefficient	oz-in/kRPM Nm/kRPM	0.75 0,005	0.75 0,005	0.75 0,005	0.75 0,005	1.0 0,007	1.0 0,007
Static Friction Torque, max.	oz-in. // Nm	1.8 // 0,013	1.8 // 0,013	1.8 // 0,013	1.8 // 0,013	1.8 // 0,013	1.8 // 0,013
Rotor Inductance	microhenries	110	110	210	210	400	400
Mechanical Time Constant @ 25 deg. C ([rotor inertia x terminal resistance x 105/torque constant]/ back EMF constant	mS	1.7	1.7	1.4	1.4	1.6	1.6
Electrical Time Constant @ 25 deg.C (rotor inductance/terminal resistance)	mS	.13	.13	.16	.16	.15	.15
Weight	lbs. // kg	3.0 // 1.36	3.0 //1.36	3.0 // 1.36	3.0 // 1.36	3.0 // 1.36	3.0 // 1.36

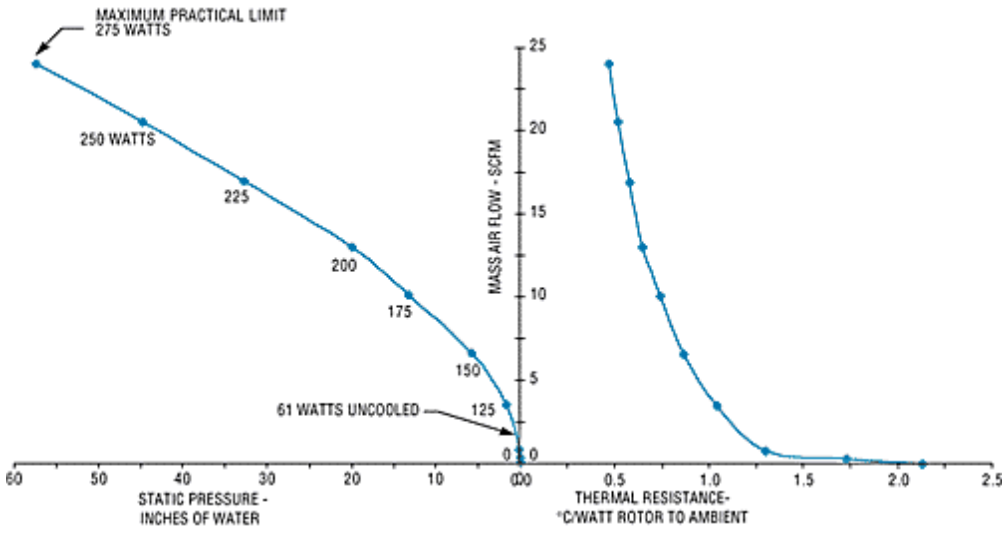
1. Ratings indicated in the motor ratings and characteristics table are interdependent and express a capability of the motor at one set of performance conditions. As illustrated in the speed/torque curves, all other ratings may be varied, as long as the motor's rated continuous power dissipation is not exceeded.
2. Unless otherwise noted, all specifications apply with the motor mounted on a 5" x 8-1/2" x 1/2" (127,0 x 215,9 x 12,7 mm) aluminum heat sink at continuous operating conditions, and at 25 degrees C ambient temperature with the rotor temperature stabilized at 155 degrees C, and with the shaft rotation in either direction. The 3N motor torque constants are reduced by a 0.890 multiplier under these designated conditions when motor is non-cooled, and by a 0.935 multiplier when cooled.
3. Measured as follows: With the motor at 25 degrees C ambient, and driven as a generator at 1200 RPM minimum, the generated voltage is measured with a high-impedance voltmeter. This voltage, divided by the speed, is the back EMF constant.
4. Measured as follows: Using the same measurement technique used in Note 3, measure both with and without a 6.0 amp resistive load installed between the motor terminals. The difference between the two voltages, divided by the respective current, is the terminal resistance.
5. Type-1 mass air flow of 24.0 Standard Cubic Feet-Per-Minute (SCFM) [11.3 liters-per-second] and static pressure drop of 57.4 inches of water (14.3 kilopascals) for the maximum practical cooled limit
6. With an integral analog tachometer, the power dissipation capability increases by 5 watts (to 66 watts).

3N Torque/Speed Curves

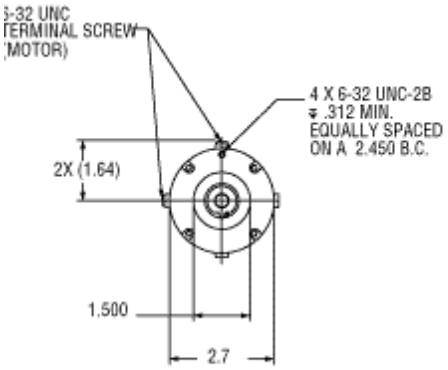


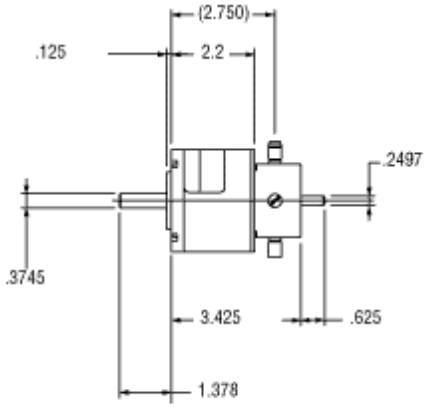
3N Thermal Characteristics

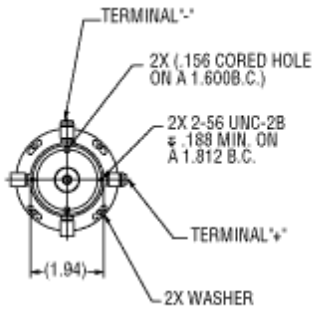
3N thermal characteristics with type 1 cooling, @ 25 degrees C ambient temperature, mounted on a 5 x 8-1/2 x 1/2 inch aluminum heat sink

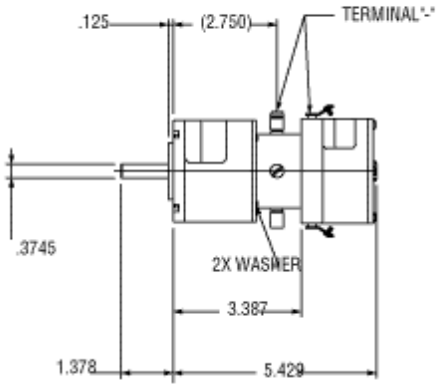


3N Dimensions, motor and motor plus tach and motor plus encoder.

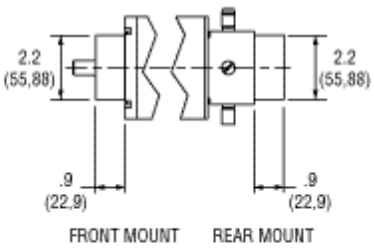








MOTOR WITH TACHOMETER



ENCODER MOUNTING

4N Series

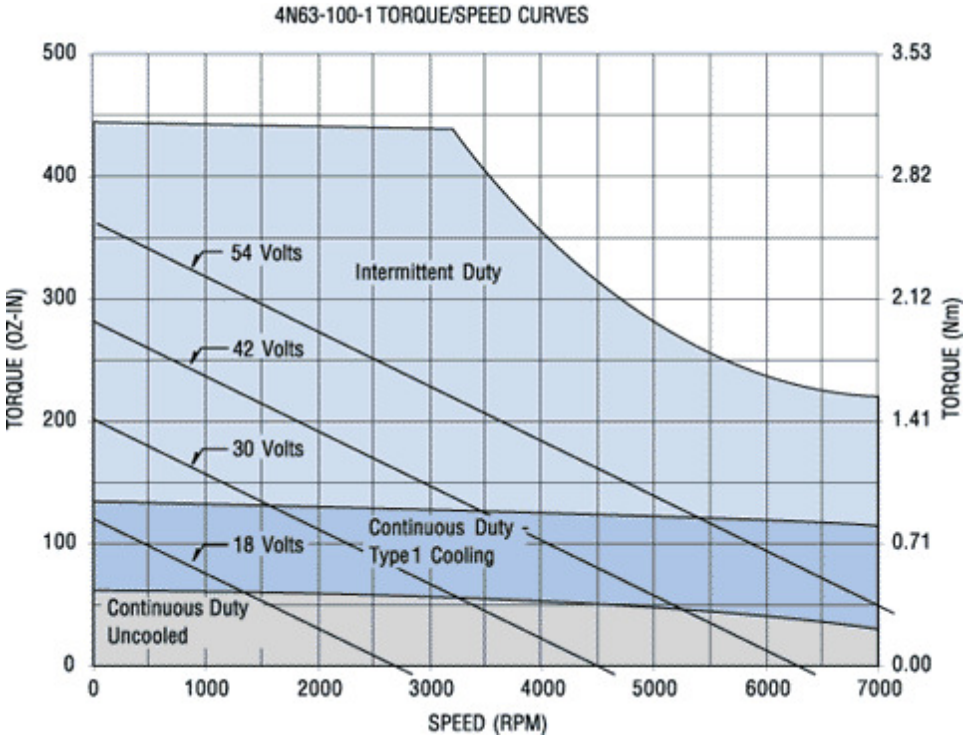
4N Ratings and Characteristics 1 2

	Catalog Listing	4N63-000-1	4N63-100-1	4N63-000-2	4N63-100-2
	Cooling 5	None	Type 1	None	Type 1
Parameter	Units				
Rated Torque	oz-in. // Nm	55 // 0,39	126 // 0,89	70 // 0,49	163 //1,15
Rated Current (RMS)	amps	6.8	14.2	6.7	14.1
Thermal Resistence (Rotor-Ambient)	deg C/watt	1.81	0.47	1.81	0.47
Continuous Power Dissipation (Power In - Power Out) 6	watts	72	275	72	275
Rated Voltage	volts	30	42	36	48
Rated Speed	RPM	3250	3440	3250	3350
Rated Power Out	watts	132	321	168	404
Pulse Current	amps max.	48	48	47	47
Continuous Stall Torque	oz-in Nm	60 0,424	134 0,946	77 0,544	174 1,23
No Load Speed at Rated Voltage	RPM	4025	5640	3750	5000
Torque Constant (back EMF constant x 1.353)	oz-in./amp Nm/amp	9.9 0,070	9.9 0,070	12.8 0,090	12.8 0,090
Back EMF Constant 3	V / kRPM	7.33	7.33	9.47	9.47
Motor Terminal Resistance 4	ohms @ 25 deg. C ohms @ 155 deg. C	0.89 1.31	0.89 1.31	0.89 1.29	0.89 1.29
Rotor Inertia	oz-in-S^2 kg-m^2	.00050 3.5 x 10^-6	.00050 3.5 x 10^-6	.00089 6.3 x 10^-6	.00089 6.3 x 10^-6
Viscous Damping Coefficient	oz-in/kRPM Nm/kRPM	1.1 0,008	1.1 0,008	1.5 0,011	1.5 0,011
Static Friction Torque, max.	oz-in. // Nm	2.0 // 0,014	2.0 // 0,014	2.0 // 0,014	2.0 // 0,014

Rotor Inductance	microhenries	100	100	175	175
Mechanical Time Constant @ 25 deg. C ([rotor inertia x terminal resistance x 105/torque constant]/ back EMF constant	mS	0.6	0.6	0.7	0.7
Electrical Time Constant @ 25 deg.C (rotor inductance/terminal resistance)	mS	.11	.11	.20	.20
Weight	lbs. // kg	4.8 // 2.2	4.8 // 2.2	4.8 // 2.2	4.8 // 2.2

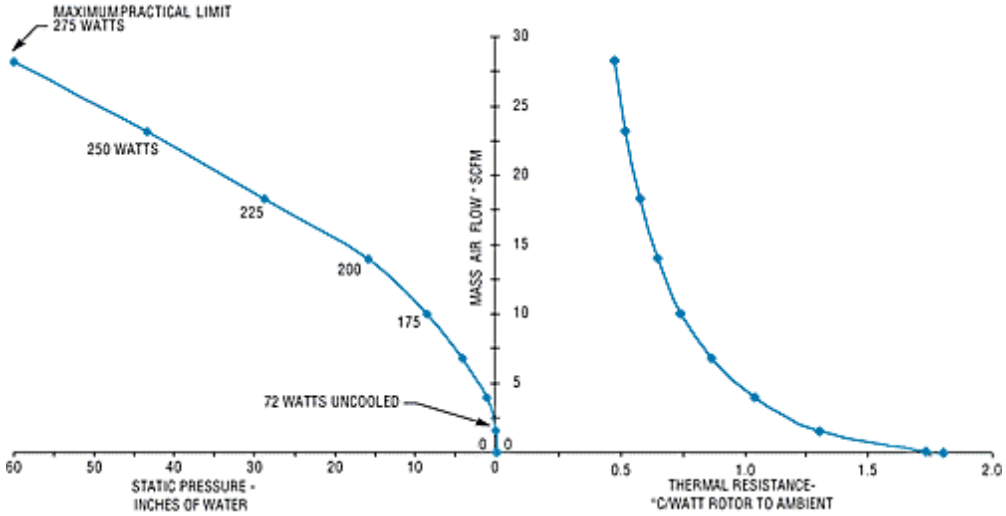
1. Ratings indicated in the motor ratings and characteristics table are interdependent and express a capability of the motor at one set of performance conditions. As illustrated in the speed/torque curves, all other ratings may be varied, as long as the motor's rated continuous power dissipation is not exceeded.
2. Unless otherwise noted, all specifications apply with the motor mounted on a 5" x 8-1/2" x 1/2" (127,0 x 215,9 x 12,7 mm) aluminum heat sink at continuous operating conditions, and at 25 degrees C ambient temperature with the rotor temperature stabilized at 155 degrees C, and with the shaft rotation in either direction. The 4N motor torque constants are reduced by a 0.890 multiplier under these designated conditions when motor is uncooled, and by a 0.935 multiplier when cooled.
3. Measured as follows: With the motor at 25 degrees C ambient, and driven as a generator at 1200 RPM minimum, the generated voltage is measured with a high-impedance voltmeter. This voltage, divided by the speed, is the back EMF constant.
4. Measured as follows: Using the same measurement technique used in Note 3, measure both with and without a 6.0 amp resistive load installed between the motor terminals. The difference between the two voltages, divided by the respective current, is the terminal resistance.
5. Type-1 mass air flow of 28.2 Standard Cubic Feet-Per-Minute (SCFM) [13.3 liters-per-second] and static pressure drop of 60.0 inches of water (14.9 kilopascals) for the maximum practical cooled limit
6. With an integral analog tachometer, the power dissipation capability increases by 8 watts (to 80 watts).

4N Torque/Speed Curves

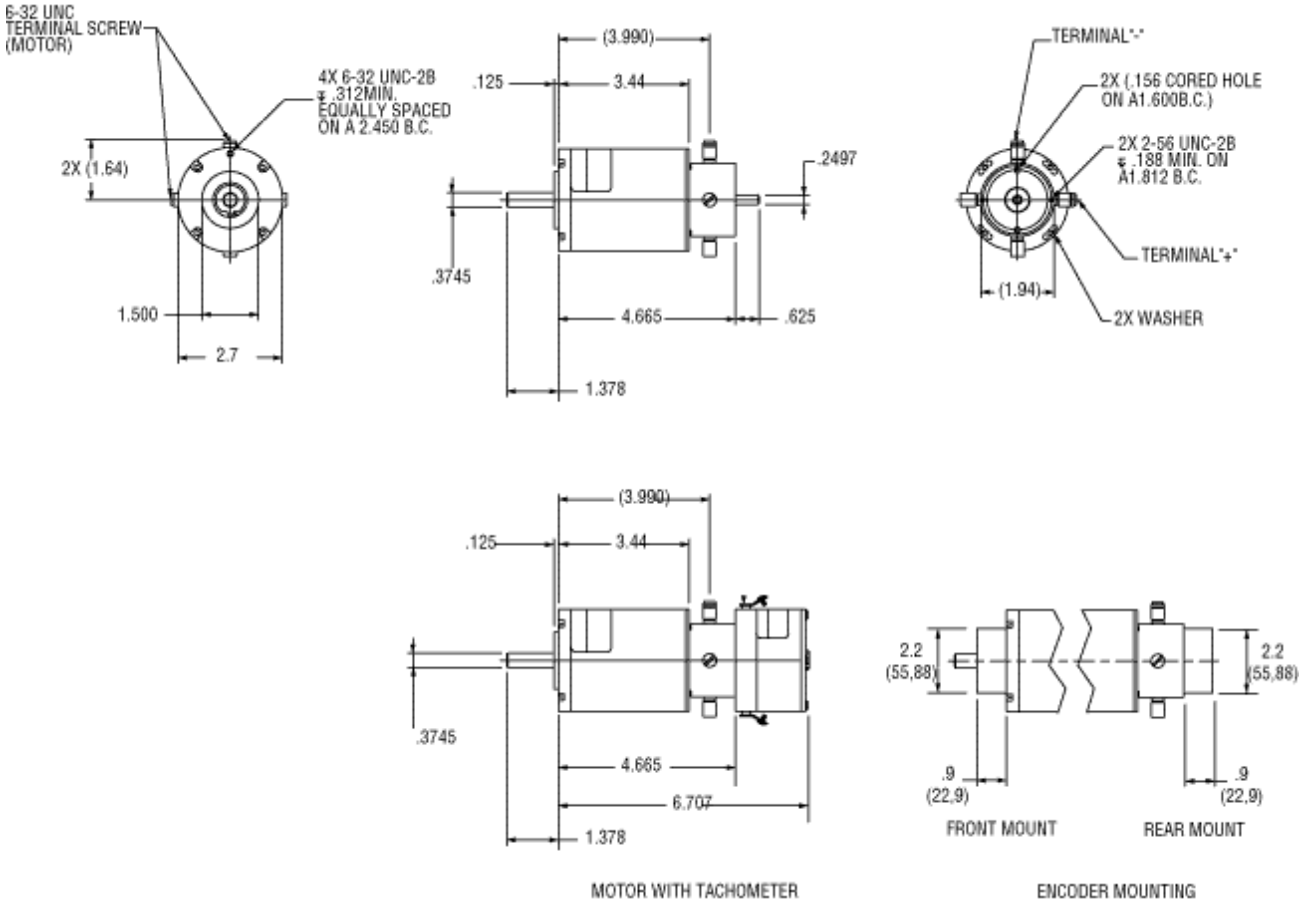


4N Thermal Characteristics

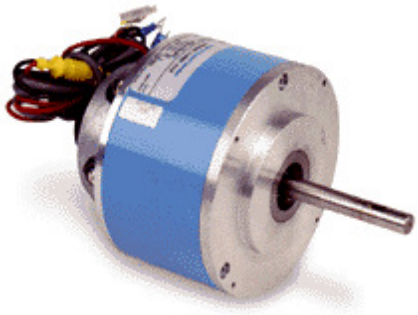
4N thermal characteristics with type 1 cooling, @ 25 degrees C ambient temperature, with integral analog tachometer and mounted on a 5 x 8 1/2 x 1/2 inch aluminum heat sink



4N Dimensions, motor and motor plus tach and motor plus encoder.



55NM Series



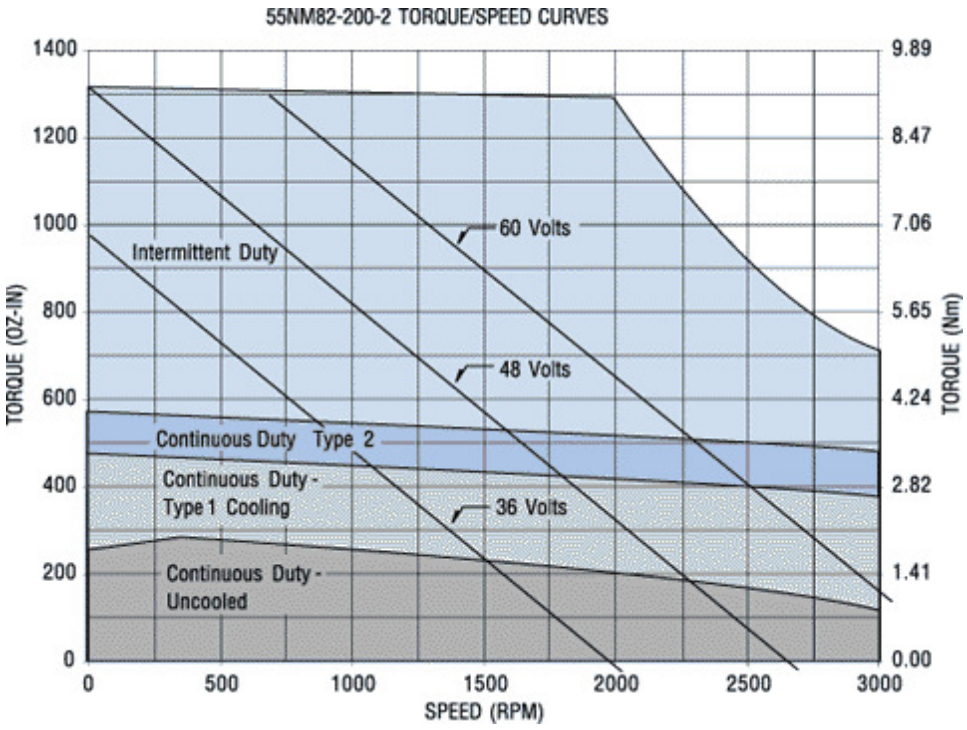
55NM Ratings and Characteristics [1] [2]

	Catalog Listing	55NM81-000-1	55NM82-000-2	55NM81-100-2	55NM81-200-2	55NM82-100-2	55NM82-200-2
	Cooling	None	None	Type 1 [5]	Type 2 [6]	Type 1 [5]	Type 2 [6]
Parameter	Units						
Rated Torque	oz-in. // Nm	167 // 1,179	236 // 1,667	389 // 2,747	472 // 3,333	439 // 3,100	532 // 3,757
Rated Current (RMS)	amps	12.4	10.9	19.2	23.2	19.2	23.2
Thermal Resistance (Rotor-Ambient)	deg C/watt	1.00	1.00	0.37	0.26	0.37	0.26
Continuous Power Dissipation (Power In - Power Out)	watts	130	130	350	500	350	500
Rated Voltage	volts	30	36	42	48	42	48
Rated Speed	RPM	1970	1495	1600	1750	1420	1560
Rated Power Out	watts	243	261	460	611	461	614
Pulse Current	amps max.	62	55	54	54	55	55
Continuous Stall Torque	oz-in Nm	177 1,25	250 1,77	421 2,97	504 3,56	474 3,35	566 4,00
No Load Speed at Rated Voltage	RPM	2535	1980	2590	2965	2310	2650
Torque Constant (back EMF constant x 1.353)	oz-in./amp Nm/amp	15.5 0,1095	24.0 0,1695	21.4 0,1511	21.4 0,1511	24.0 0,1695	24.0 0,1695
Back EMF Constant [3]	V / kRPM	11.47	17.73	15.82	15.82	17.73	17.73
Motor Terminal Resistance [4]	ohms @ 25° C ohms @ 155° C	0.47 0.61	0.65 0.88	0.65 0.88	0.65 0.88	0.65 0.88	0.65 0.88
Rotor Inertia	oz-in-S^2 kg-m^2	.010 7.1 x 10^-5	.010 7.1 x 10^-5	.010 7.1 x 10^-5	.010 7.1 x 10^-5	.010 7.1 x 10^-5	.010 7.1 x 10^-5
Viscous Damping Coefficient	oz-in/kRPM Nm/kRPM	10 0,071	12 0,085	10 0,071	10 0,071	12 0,085	12 0,085
Static Friction Torque, max.	oz-in. // Nm	10 // 0,071	10 // 0,071	10 // 0,071	10 // 0,071	10 // 0,071	10 // 0,071
Rotor Inductance	microhenries	100	225	225	225	225	225

Mechanical Time Constant @ 25 deg. C ([rotor inertia x terminal resistance x 105/torque constant]/ back EMF constant	mS	2.8	1.6	2.0	2.0	1.6	1.6
Electrical Time Constant @ 25 deg.C (rotor inductance/terminal resistance)	mS	.21	.35	.35	.35	.35	.35
Weight	lbs. // kg	15 // 6.8	15 // 6.8	15 // 6.8	15 // 6.8	15 // 6.8	15 // 6.8

1. Ratings indicated in the motor ratings and characteristics table are interdependent and express a capability of the motor at one set of performance conditions. As illustrated in the speed/torque curves, all other ratings may be varied, as long as the motor's rated continuous power dissipation is not exceeded.
2. Unless otherwise noted, all specifications apply with the motor mounted on a 8" x 10" x 1/2" (203,2 x 254,0 x 12,7 mm) aluminum heat sink at continuous operating conditions, and at 25 degrees C ambient temperature with the rotor temperature stabilized at 155 degrees C, and with the shaft rotation in either direction.
3. Measured as follows: With the motor at 25 degrees C ambient, and driven as a generator at 1200 RPM minimum, the generated voltage is measured with a high-impedance voltmeter. This voltage, divided by the speed, is the back EMF constant.
4. Measured as follows: Using the same measurement technique used in Note 3, measure both with and without a 6.0 amp resistive load installed between the motor terminals. The difference between the two voltages, divided by the respective current, is the terminal resistance.
5. Type-1 mass air flow of 36.4 Standard Cubic Feet-Per-Minute (SCFM) [17.2 liters-per-second] and static pressure drop of 3.2 inches of water (0.8 kilopascals) for the maximum practical cooled limit.
6. Type-2 mass air flow of 23.1 Standard Cubic Feet-Per-Minute (SCFM) [10.9 liters-per-second] and static pressure drop of 13.1 inches of water (3.26 kilopascals) for the maximum practical cooled limit.

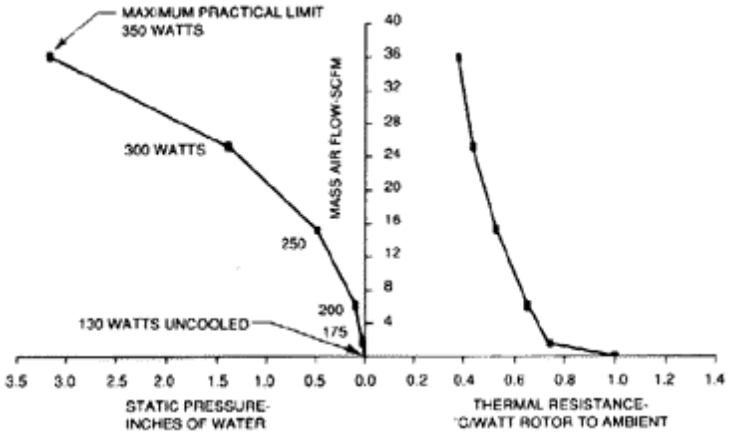
55NM Torque/Speed Curves



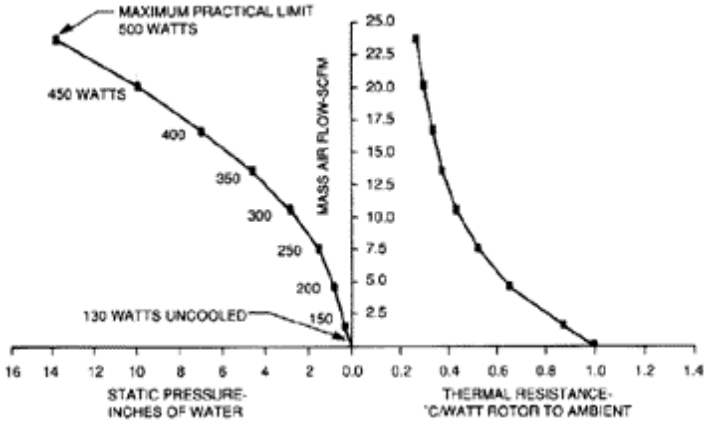
55NM Thermal Characteristics

Type 1 cooling

55NM thermal characteristics with type 1 cooling, @ 25 degrees C ambient temperature, with integral analog tachometer, and mounted on an 8 x 10 x 1/2 inch aluminum heat sink



Type 2 cooling
55NM thermal characteristics with type 2 cooling, @ 25 degrees C ambient temperature, with integral analog tachometer, and mounted on an 8 x 10 x 1/2 inch aluminum heat sink



55NM Dimensions, motor and motor plus tach and motor plus encoder.