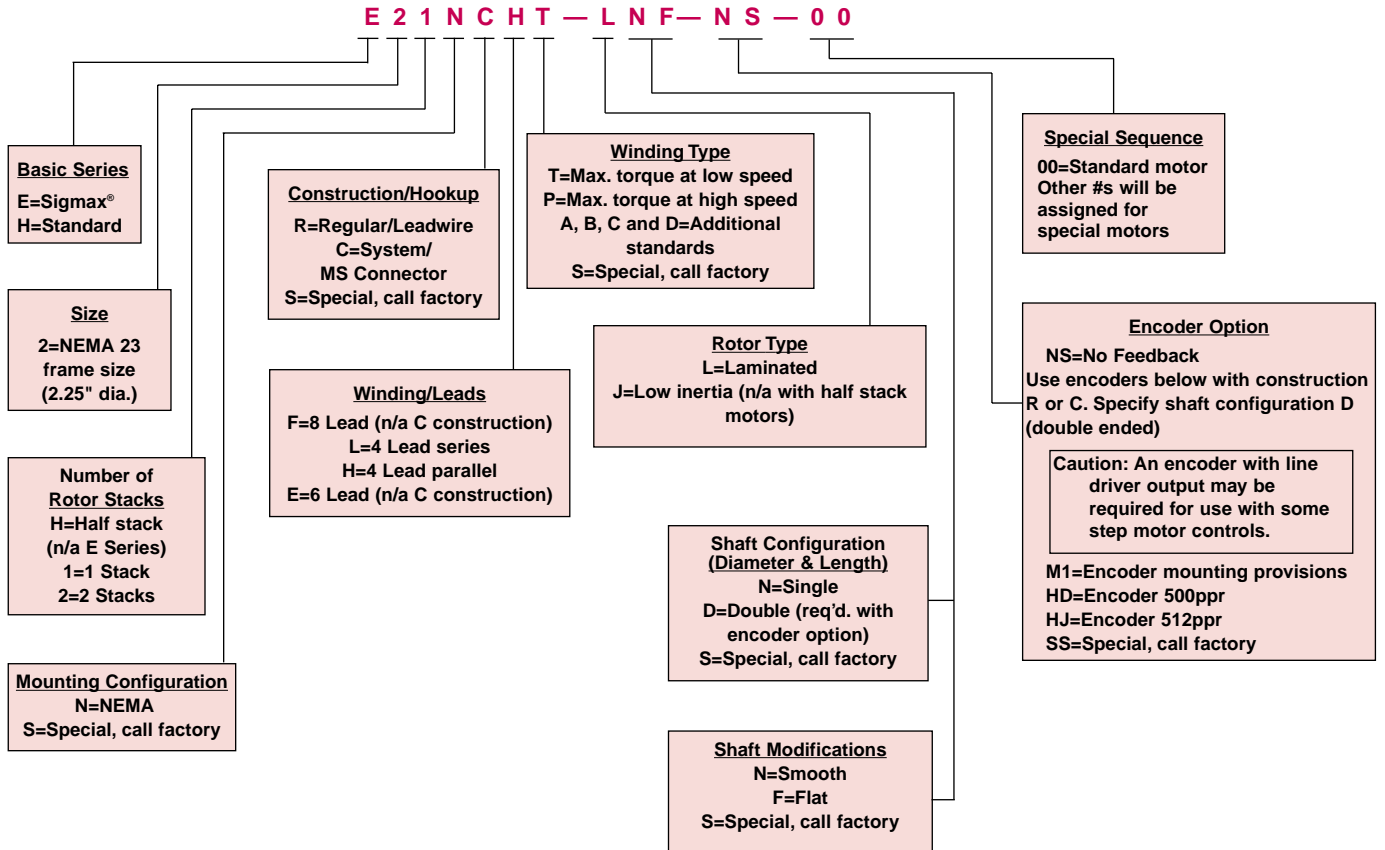


# GENERAL PURPOSE— CONVENTIONAL HYBRIDS NEMA 23 FRAME (2.3" Dia.)

## GENERAL PURPOSE—CONVENTIONAL HYBRIDS NEMA 23 FRAME (2.3" Dia.)

### MODEL NUMBER CODE



The example model number above indicates an E series (Sigmax®) NEMA 23 frame motor with a one stack rotor. This motor is equipped with an MS connector on the end of a 12 inch cable for power, a bipolar parallel connection, a maximum torque at low speed winding and a single ended shaft with a flat.

### HOW TO ORDER

Review the Motor Model Number code to assure that all options are designated. Connections, encoders and phasing diagrams start on page 76. Motor dimensions are on page 60.

# CONVENTIONAL HYBRIDS

## NEMA 23, 34 and 42 Frames



The H and E Series are both high efficiency, low loss hybrid step motors in conventional (round frame) configurations.

For increased torque and acceleration, E Series general purpose motors feature our patented Sigmax<sup>®</sup> technology.

Both H and E Series motors provide the high speed capability required for rapid traverse applications.

### AGENCY APPROVAL

All NEMA 34 and 42 frame motors are UL 1004 recognized (E61960); Class B motor insulation ( File E103510).

### STANDARD OPTIONS

Our general purpose hybrid steppers allow you to tailor a motor to your in-plant or OEM application.

Select from terminal board connections (via conduit), MS connectors or flying lead connections in waterproof or standard enclosures. Options include shaft keyways or flats, oversized drive shaft, rear shaft extensions and various encoder options. Bipolar or unipolar phase sequencing is also available.

### WIDE RANGE OF WINDINGS

General purpose step motors are available with a wide range of windings.

Use our A through E windings to duplicate or improve upon existing motor performance. They will directly replace a large number of OEM catalog step motors.

T and P windings are offered to optimize performance. T windings generate maximum low end torque, while P windings deliver an edge in torque at higher speeds.

### FEATURES

Torque Production Over Wide Speed Range

Extensive Selection of Shaft, End Bell, Termination, Encoder, and Splashproof Options

UL Recognized Models

Wide Range of Industry and Standard Winding Configurations

Sigmax<sup>®</sup> Technology

NEMA 23, 34, and 42 Frames

Two Year Warranty

### BENEFITS

High quality, long life motor

An array of options to meet your needs

Safety and acceptability

Match motor performance to your application

Flux focusing increases torque

Broad selection to meet your application specific requirements

High quality, dependable operation

# CONVENTIONAL HYBRID SELECTION OVERVIEW

General Purpose Conventional Hybrids		NEMA 23		NEMA 34		NEMA 42	
		(2.3" square frame)		(3.4" square frame)		(4.2" square frame)	
		Holding torque range		Holding torque range		Holding torque range	
		oz-in. (Nm)	Page	oz-in. (Nm)	Page	oz-in. (Nm)	Page
E Series-Sigma <sup>®</sup> technology	1 stack	85-126 (0.60-0.89)	58	223-349 (1.58-1.90)	62	957-1378 (6.76-9.73)	69
	2 stacks	148-225 (1.05-1.59)	59	443-676 (3.13-4.75)	63	1805-2698 (12.75-19.06)	70
	3 stacks			656-995 (4.63-5.40)	63	2667-3958 (18.84-27.95)	71
	4 stacks			879-1300 (6.21-9.18)	64		
H-Series-standard hybrid	1/2 stack	36-51 (0.25-0.36)	58				
	1 stack	59-87 (0.41-0.61)	58	158-186 (1.21-1.71)	62	585-839 (4.13-5.93)	69
	2 stacks	103-156 (0.73-1.10)	59	314-471 (2.22-3.32)	63	1118-1652 (7.90-11.66)	70
	3 stacks			466-698 (3.29-4.93)	64	1529-2651 (10.80-18.72)	71
	4 stacks			624-916 (4.41-6.47)	64		
Special Purpose Conventional Hybrids							
E "J" Series- Sigma <sup>®</sup> technology- low inertia rotor	1 stack	77-108 (0.54-0.77)	75				
	2 stacks	139-196 (0.98-1.39)	75				
H "J" Series- standard hybrid-low inertia rotor	1 stack	54-77 (0.38-0.54)	75				
	2 stacks	99-141 (0.70-0.99)	75				

# GENERAL PURPOSE—CONVENTIONAL HYBRIDS

## NEMA 23 FRAME (2.3" Dia.)—Ratings and Characteristics

Review the Model Number Code, page 55, to assure that all options are designated. Connections, encoders and phasing diagrams start on page 76. Motor dimensions are on page 60. In addition to those below, motors with characteristics for specific performance requirements are offered. Contact factory for more details.

Rated currents are in descending order	Motor Model Number $\Delta$	Connection $\Delta$			Holding Torque $\Delta$ (2 phases on) oz-in (Nm) $\pm 10\%$	Rated Current/Phase $\Delta$ (amps DC)	Phase Resistance (ohms) $\pm 10\%$	Phase Inductance $\Delta$ (mH) Typical	Detent Torque oz-in (Nm)	Thermal Resistance $\Delta$ (°C/watt)	Rotor Inertia oz-in-S <sup>2</sup> (kgm <sup>2</sup> x 10 <sup>-3</sup> )	Weight lbs (kg)					
		Parallel	Series	Unipolar													
<b>Torque range:</b> 36-51 oz-in. .25-.36 Nm	H2HNXHA-LXX-XX-00	•			51 (0.36)	4.9	0.22	0.5	↑	↑	↑	↑					
	H2HNXLA-LXX-XX-00	•			51 (0.36)	2.4	0.79	2.0									
	H2HNXEALXX-XX-00			•	36 (0.26)	3.5	0.41	0.5									
	<b>STANDARD</b>																
	<b>H2H Series</b>																
	<b>1/2 rotor stack</b>																
	H2HNXHT-LXX-XX-00	•			50 (0.36)	2.5	0.75	1.8					1.6 (0.011)	7.1	0.0010 (0.007)	0.9 (0.41)	
	H2HNXLTLXX-XX-00	•			50 (0.36)	1.26	2.89	7.3									
	H2HNXETLXX-XX-00	•			36 (0.25)	1.78	1.46	1.8									
H2HNXHB-LXX-XX-00	•			51 (0.36)	2.4	0.79	2.0	↓	↓	↓	↓						
H2HNXLBLXX-XX-00	•			51 (0.36)	1.22	3.05	8.1										
H2HNXEALXX-XX-00			•	36 (0.26)	1.73	1.54	2.0										
<b>Torque range:</b> 85-126 oz-in. .60-.89 Nm	E21NXHC-LXX-XX-00	•			120 (0.85)	5.8	0.19	0.5	↑	↑	↑	↑					
	E21NXLC-LXX-XX-00	•			120 (0.85)	2.9	0.67	1.9									
	E21NXEALXX-XX-00			•	85 (0.60)	4.1	0.35	0.5									
	<b>SIGMAX®</b>																
	<b>E21 Series</b>																
	<b>1 rotor stack</b>																
	E21NXHA-LXX-XX-00	•			126 (0.89)	5.4	0.20	0.6					4.8 (0.034)	6.0	0.0015 (0.011)	1.2 (0.55)	
	E21NXLALXX-XX-00	•			126 (0.89)	2.7	0.76	2.5									
	E21NXEALXX-XX-00			•	89 (0.63)	3.8	0.40	0.6									
	E21NXHT-LXX-XX-00	•			123 (0.87)	2.8	0.72	2.2					↓	↓	↓	↓	
	E21NXLTLXX-XX-00	•			123 (0.87)	1.39	2.8	8.7									
	E21NXETLXX-XX-00	•			87 (0.61)	1.97	1.42	2.2									
	E21NXHB-LXX-XX-00	•			123 (0.87)	1.41	2.73	8.5					↓	↓	↓	↓	
	E21NXLBLXX-XX-00	•			123 (0.87)	0.71	10.8	33.9									
	E21NXEALXX-XX-00			•	87 (0.61)	1.0	5.42	8.5									
<b>Torque range:</b> 59-87 oz-in. .41-.61 Nm	H21NXHC-LXX-XX-00	•			83 (0.58)	5.8	0.19	0.6	↑	↑	↑	↑					
	H21NXLC-LXX-XX-00	•			83 (0.58)	2.9	0.67	2.2									
	H21NXEALXX-XX-00			•	59 (0.41)	4.1	0.35	0.6									
	<b>STANDARD</b>																
	<b>H21 Series</b>																
	<b>1 rotor stack</b>																
	H21NXHA-LXX-XX-00	•			87 (0.61)	5.4	0.21	0.7					2.8 (0.02)	6.0	0.0015 (0.011)	1.2 (0.55)	
	H21NXLALXX-XX-00	•			87 (0.61)	2.7	0.76	2.9									
	H21NXEALXX-XX-00			•	61 (0.43)	3.8	0.40	0.7									
	H21NXHT-LXX-XX-00	•			85 (0.60)	2.8	0.72	2.5					↓	↓	↓	↓	
	H21NXLTLXX-XX-00	•			85 (0.60)	1.39	2.8	10.2									
	H21NXETLXX-XX-00	•			60 (0.42)	1.97	1.42	1.42									
	H21NXHB-LXX-XX-00	•			84 (0.60)	1.41	2.73	9.9					↓	↓	↓	↓	
	H21NXLBLXX-XX-00	•			84 (0.60)	0.71	10.8	39.5									
	H21NXEALXX-XX-00			•	60 (0.42)	1.0	5.42	9.9									

- All ratings typical and at 25°C unless otherwise noted.
- $\Delta$  An "X" in the Model Number Code indicates an undefined option. Colored letter indicates winding. See How to Order and Model Number Code on page 55.
  - $\Delta$  Motor connections are determined by the Windings/Leads designation in the Model Number Code on page 55. Note that the F designation, although not shown in the above tables, is an 8-lead option...see Terminations, page 76. In addition to the lead wire termination, terminal board and MS connector hookup for parallel, series or unipolar operation is also available.
  - $\Delta$  With rated current applied. Windings at 130°C and motor unmounted and in still air at 40°C (without heat sink).
  - $\Delta$  Windings at 130°C and motor in still air at 40°C (without heat sink). Operation of these motors above rated current may cause demagnetization. Contact factory.
  - $\Delta$  Small signal inductance as measured with impedance bridge at 1kHz, 1 amp.
  - $\Delta$  Thermal resistance measured with motor hanging in still air (unmounted).

# GENERAL PURPOSE—CONVENTIONAL HYBRIDS

## NEMA 23 FRAME (2.3" Dia.)—Ratings and Characteristics

Review the Model Number Code, page 55, to assure that all options are designated. Connections, encoders and phasing diagrams start on page 76. Motor dimensions are on page 60. In addition to those below, motors with characteristics for specific performance requirements are offered. Contact factory for more details.

Rated currents are in descending order	Motor Model Number $\Delta$	Connection $\Delta$		Holding Torque $\Delta$ (2 phases on) oz-in (Nm) $\pm 10\%$	Rated Current/Phase $\Delta$ (amps DC)	Phase Resistance (ohms) $\pm 10\%$	Phase Inductance $\Delta$ (mH) Typical	Detent Torque oz-in (Nm)	Thermal Resistance $\Delta$ (°C/watt)	Rotor Inertia oz-in-S <sup>2</sup> (kgm <sup>2</sup> x 10 <sup>-3</sup> )	Weight lbs (kg)					
		Parallel Series	Unipolar													
<b>Torque range:</b> 148-225 oz-in. 1.05-1.59 Nm	E22NXHP-LXX-XX-00	•		210 (1.48)	6.7	0.19	0.5	↑	↑	↑	↑					
	E22NXLP-LXX-XX-00	•		210 (1.48)	3.4	0.68	2.1									
	E22NXEP-LXX-XX-00		•	148 (1.05)	4.7	0.35	0.5									
	<b>SIGMAX®</b>															
	<b>E22 Series</b>															
	<b>2 rotor stacks</b>															
	E22NXHC-LXX-XX-00	•		218 (1.54)	6.4	0.21	0.6									
	E22NXLC-LXX-XX-00		•	218 (1.54)	3.2	0.73	2.5									
	E22NXEC-LXX-XX-00		•	154 (1.09)	4.5	0.38	0.6									
E22NXHT-LXX-XX-00	•		223 (1.58)	5.0	0.33	1.1	9.6 (0.068)	4.4	0.0031 (0.022)	2.1 (0.95)						
E22NXLT-LXX-XX-00		•	223 (1.58)	2.5	1.2	4.5										
E22NXET-LXX-XX-00		•	158 (1.12)	3.5	0.62	1.1										
E22NXHB-LXX-XX-00	•		225 (1.59)	3.1	0.79	2.9	↓	↓	↓	↓						
E22NXLB-LXX-XX-00		•	225 (1.59)	1.6	3.07	11.8										
E22NXEB-LXX-XX-00		•	159 (1.12)	2.2	1.55	2.9										
E22NXHD-LXX-XX-00	•		225 (1.59)	2.4	1.25	4.7	↓	↓	↓	↓						
E22NXLD-LXX-XX-00		•	225 (1.59)	1.22	4.91	19.0										
E22NXED-LXX-XX-00		•	159 (1.12)	1.72	2.47	4.7										
<b>Torque range:</b> 103-156 oz-in. .73-1.10 Nm	H22NXHP-LXX-XX-00	•		146 (1.03)	6.7	0.19	0.6	↑	↑	↑	↑					
	H22NXLP-LXX-XX-00	•		146 (1.03)	3.4	0.68	2.4									
	H22NXEP-LXX-XX-00		•	103 (0.73)	4.7	0.35	0.6									
	<b>STANDARD</b>															
	<b>H22 Series</b>															
	<b>2 rotor stacks</b>															
	H22NXHC-LXX-XX-00	•		151 (1.07)	6.4	0.21	0.7									
	H22NXLC-LXX-XX-00		•	151 (1.07)	3.2	0.73	2.9									
	H22NXEC-LXX-XX-00		•	107 (0.75)	4.5	0.38	0.7									
	H22NXHT-LXX-XX-00	•		155 (1.09)	5.0	0.33	1.3					4.6 (0.032)	4.4	0.0031 (0.022)	2.1 (0.95)	
	H22NXLT-LXX-XX-00		•	155 (1.09)	2.5	1.2	5.1									
	H22NXET-LXX-XX-00		•	109 (0.77)	3.5	0.62	1.3									
	H22NXHB-LXX-XX-00	•		156 (1.10)	3.1	0.79	3.4					↓	↓	↓	↓	
	H22NXLB-LXX-XX-00		•	156 (1.10)	1.54	3.07	13.5									
	H22NXEB-LXX-XX-00		•	110 (0.78)	2.2	1.55	3.4									
H22NXHD-LXX-XX-00	•		156 (1.10)	2.4	1.25	5.5	↓	↓	↓	↓						
H22NXLD-LXX-XX-00		•	156 (1.10)	1.22	4.91	21.8										
H22NXED-LXX-XX-00		•	110 (0.78)	1.72	2.47	5.5										

All ratings typical and at 25°C unless otherwise noted.

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- $\Delta$  Small signal inductance as measured with impedance bridge at 1kHz, 1 amp.
- $\Delta$  Thermal resistance measured with motor hanging in still air (unmounted).

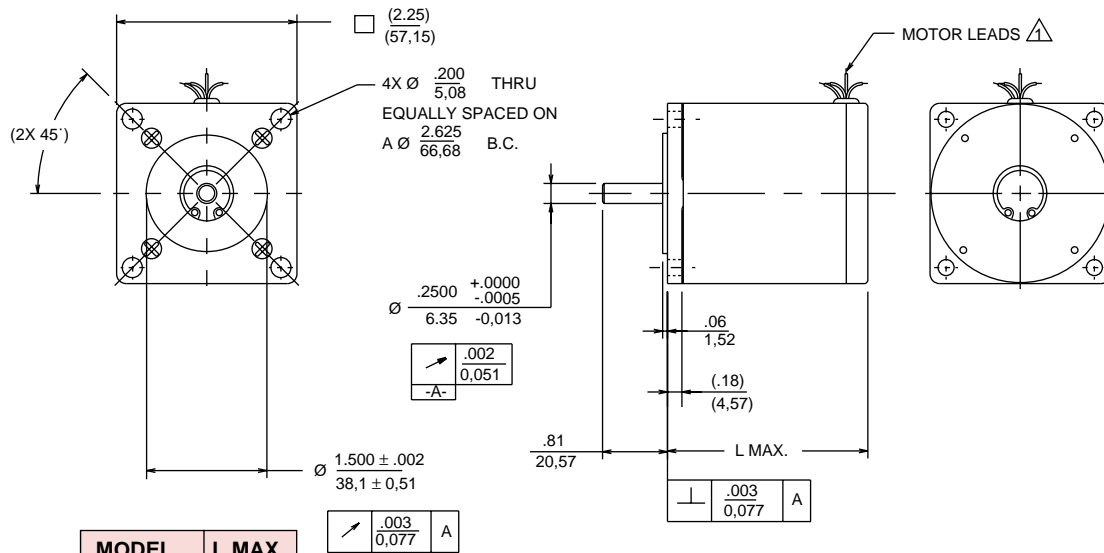
# DIMENSIONS . . . GENERAL PURPOSE—CONVENTIONAL HYBRIDS

in. (metric dimensions for ref. only)  
mm

## NEMA 23 FRAME

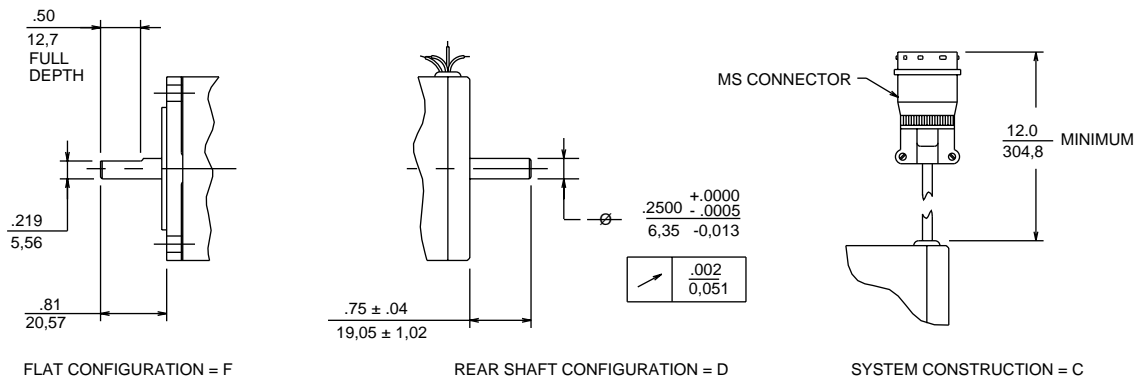
(See page 76 for Technical Data)

### REGULAR CONSTRUCTION/LEADWIRE HOOKUP=R

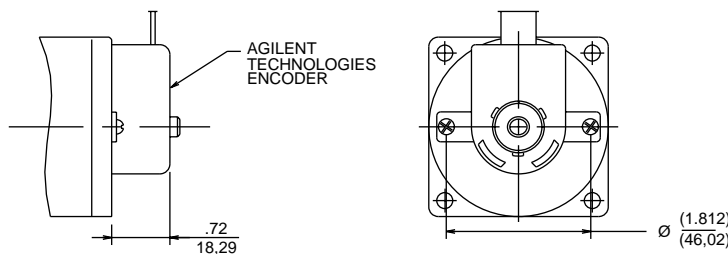


MODEL NUMBER	L MAX.
2HNR	1.56 39.63
21NR	2.06 52.33
22NR	3.06 77.73

### STANDARD OPTIONS



### ENCODER OPTION



NOTE:

△ MOTOR LEADS: #22 AWG, 12.0 MINIMUM. 304.8

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