The example model number above indicates a K series (Sigma®) NEMA 42 frame motor with a three stack rotor. This motor is equipped with a heavy duty front end bell and shaft, and a sealed system rear end bell with MS connectors. It also has a bipolar parallel connection, a J winding, a straight keyway, a shaft seal and encoder mounting provisions.

**HOW TO ORDER**

Review the Motor Model Number Code to assure that all options are designated. Call your nearest Pacific Scientific Motor Products Distributor to place orders and for application assistance. If you need to identify your Distributor, call the Motor Products Division at (815) 226-3100.
### NEMA 42 FRAME (4.325" Square)—Ratings and Characteristics

Review the Model Number Code, page 25, to assure that all options are designated. Connections, encoders and phasing diagrams start on page 34. Motor dimensions start on page 32. In addition to those below, motors with characteristics for specific performance requirements are offered. Contact factory for more details.

<table>
<thead>
<tr>
<th>Model Number Code</th>
<th>Connection</th>
<th>Rated Torque (2 phases on) (oz-in)</th>
<th>Rated Current (amps DC)</th>
<th>Phase Resistance (ohms)</th>
<th>Thermal Resistance (°C/watt)</th>
<th>Deflect Torque (oz-in)</th>
<th>Rotor Inertia (kgm² x 10⁻³)</th>
<th>Weight (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K41HXH-J-LXK-XX-XX</td>
<td>Parallel</td>
<td>2135 (15.07)</td>
<td>10.7</td>
<td>0.16</td>
<td>2.2</td>
<td>10</td>
<td>0.0783</td>
<td>11</td>
</tr>
<tr>
<td>K41HXL-LXK-XX-XX</td>
<td>Serie</td>
<td>1090 (7.38)</td>
<td>5.3</td>
<td>0.83</td>
<td>8.7</td>
<td>10</td>
<td>0.0783</td>
<td>11</td>
</tr>
<tr>
<td>K41HXL-LXK-XX-XX</td>
<td>Unipolar</td>
<td>1090 (7.38)</td>
<td>4.4</td>
<td>0.83</td>
<td>12.3</td>
<td>10</td>
<td>0.0783</td>
<td>11</td>
</tr>
<tr>
<td>K41HXL-LXK-XX-XX</td>
<td>Unipolar</td>
<td>1090 (7.38)</td>
<td>4.4</td>
<td>0.83</td>
<td>12.3</td>
<td>10</td>
<td>0.0783</td>
<td>11</td>
</tr>
<tr>
<td>N41HXL-H-LXK-XX-XX</td>
<td>Parallel</td>
<td>1655 (11.68)</td>
<td>10.7</td>
<td>0.16</td>
<td>2.6</td>
<td>10</td>
<td>0.0783</td>
<td>11</td>
</tr>
<tr>
<td>N41HXL-M-LXK-XX-XX</td>
<td>Serie</td>
<td>1655 (11.68)</td>
<td>5.3</td>
<td>0.83</td>
<td>11.1</td>
<td>10</td>
<td>0.0783</td>
<td>11</td>
</tr>
<tr>
<td>N41HXL-LXK-XX-XX</td>
<td>Unipolar</td>
<td>1170 (8.26)</td>
<td>4.4</td>
<td>0.83</td>
<td>15.6</td>
<td>10</td>
<td>0.0783</td>
<td>11</td>
</tr>
<tr>
<td>N41HXL-LXK-XX-XX</td>
<td>Unipolar</td>
<td>1170 (8.26)</td>
<td>4.4</td>
<td>0.83</td>
<td>15.6</td>
<td>10</td>
<td>0.0783</td>
<td>11</td>
</tr>
<tr>
<td>N41HXL-LXK-XX-XX</td>
<td>Unipolar</td>
<td>1170 (8.26)</td>
<td>4.4</td>
<td>0.83</td>
<td>15.6</td>
<td>10</td>
<td>0.0783</td>
<td>11</td>
</tr>
<tr>
<td>N41HXL-J-LXK-XX-XX</td>
<td>Parallel</td>
<td>1630 (11.50)</td>
<td>5.5</td>
<td>0.83</td>
<td>10.1</td>
<td>10</td>
<td>0.0783</td>
<td>11</td>
</tr>
<tr>
<td>N41HXL-LXK-XX-XX</td>
<td>Serie</td>
<td>1630 (11.50)</td>
<td>2.7</td>
<td>0.83</td>
<td>40.4</td>
<td>10</td>
<td>0.0783</td>
<td>11</td>
</tr>
<tr>
<td>N41HXL-LXK-XX-XX</td>
<td>Unipolar</td>
<td>1150 (8.12)</td>
<td>2.7</td>
<td>0.83</td>
<td>40.4</td>
<td>10</td>
<td>0.0783</td>
<td>11</td>
</tr>
<tr>
<td>N41HXL-LXK-XX-XX</td>
<td>Unipolar</td>
<td>1150 (8.12)</td>
<td>2.7</td>
<td>0.83</td>
<td>40.4</td>
<td>10</td>
<td>0.0783</td>
<td>11</td>
</tr>
</tbody>
</table>

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

- Motor connections are determined by the Windings/Leads designation in the Model Number Code on page 25. Note that the F designation, although not shown in the above tables, is an 8-lead option...see Terminations, page 34. In addition to the lead wire termination, terminal board and MS connector hookup for parallel, series or unipolar operation is also available.

- With rated current applied. Windings at 130°C and motor unmounted and in still air at 40°C.
- Windings at 130°C and motor in still air at 40°C (without heat sink).
- Motors may be operated up to 2 times rated current to provide high peak torque with good torque linearity - duty cycle dependent, contact factory.
- Small signal inductance as measured with impedance bridge at 1kHz, 1 amp.
- Thermal resistance measured with motor hanging in still air (unmounted).

Powerpac Hybrids

Also see:
- Torque and Acceleration Comparisons, p. 19, 29
- Torque Linearity, p. 29
- Performance Curves, p. 30-31
NEMA 42 FRAME (4.325" Square)—Ratings and Characteristics (Con’t)

Review the Model Number Code, page 25, to assure that all options are designated. Connections, encoders and phasing diagrams start on page 34. Motor dimensions start on page 32. In addition to those below, motors with characteristics for specific performance requirements are offered. Contact factory for more details.

- Torque and Acceleration Comparisons, p. 19, 29
- Torque Linearity, p. 28
- Current/ Phase Thermal Rotor
- Rated Inductance
- Rated currents are in descending order

<table>
<thead>
<tr>
<th>Motor Type</th>
<th>Model Number Code</th>
<th>Rated Torque</th>
<th>Rated Current/ Phase (amps DC)</th>
<th>Phase Inductance</th>
<th>Detent Torque oz-in (Nm)</th>
<th>Thermal Resistance (°C/watt)</th>
<th>Rotor Inertia (kgm² x 10⁻⁶)</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>K Series - SIGMAX®</td>
<td>K4200LXH-XX-XX</td>
<td>3140 (22.03)</td>
<td>21215 (15.63)</td>
<td>0.21 1.2</td>
<td>126 (1.3)</td>
<td>0.1546 (18.4)</td>
<td>2580 (0.59)</td>
<td>1.3</td>
</tr>
<tr>
<td>K Series - SIGMAX®</td>
<td>K4200LXK-XX-XX</td>
<td>3140 (22.03)</td>
<td>21215 (15.63)</td>
<td>0.21 1.2</td>
<td>126 (1.3)</td>
<td>0.1546 (18.4)</td>
<td>2580 (0.59)</td>
<td>1.3</td>
</tr>
<tr>
<td>N Series - Standard</td>
<td>N4200LXH-XX-XX</td>
<td>3140 (22.03)</td>
<td>21215 (15.63)</td>
<td>0.21 1.2</td>
<td>126 (1.3)</td>
<td>0.1546 (18.4)</td>
<td>2580 (0.59)</td>
<td>1.3</td>
</tr>
<tr>
<td>N Series - Standard</td>
<td>N4200LXK-XX-XX</td>
<td>3140 (22.03)</td>
<td>21215 (15.63)</td>
<td>0.21 1.2</td>
<td>126 (1.3)</td>
<td>0.1546 (18.4)</td>
<td>2580 (0.59)</td>
<td>1.3</td>
</tr>
</tbody>
</table>

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

- With rated current applied: Windings at 130°C and motor unmounted and in still air at 40°C.
- Windings at 130°C and motor in still air at 40°C (without heat sink). Motors may be operated up to 2 times rated current to provide high peak torque with good torque linearity - duty cycle dependent, contact factory.
- Small signal inductance as measured with impedance bridge at 1kHz, 1 amp.
- Thermal resistance measured with motor hanging in still air (unmounted).

- Motor connections are determined by the Windings/ Leads designation in the Model Number Code on page 25. Note that the “P” designation, although not shown in the above tables, is an 8-lead option. See Terminations, page 34. In addition to the F designation, although not shown in the above tables, is an undefined option. Colored letter indicates winding. See Model Number Code on page 25. Note that the “P” designation, although not shown in the above tables, is a 8-lead option. See Terminations, page 34.
- Colored letter indicates winding. See Model Number Code on page 25.
### 3 rotor stacks

#### Standard

**N Series** -
- 21.24-30.81 Nm
- 188.1-272.8 lb-in.
- 3010-4365 oz-in.

**K Series** -
- 27.60-40.23 Nm
- 244.3-356.0 lb-in.
- 3910-5700 oz-in.

Torque range:
- SIGMAX®
- K Series

Note: Characteristics for specific performance requirements are offered. Contact factory for more details.

### Optional options

- Motor dimensions start on page 32.
- In addition to those below, motors with
- 
- -LXK-XX-XX

#### Model Number Code

- K43HXH-LXK-XX-XX
- N43HXL-LXK-XX-XX
- M43HXL-LXK-XX-XX
- K43HXL-LXK-XX-XX
- N43HXL-LXK-XX-XX

#### Connection

- **Motor** (2 phases on) Phase Resistance Detent Resistance Inertia
- **Parallel**
- **Series**
- **Unipolar**

### Ratings and Characteristics (Cont.)

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


- Motor connections are determined by the Windings/Leads designation in the Model Number Code on page 25. Note that the F designation, although not shown in the above tables, is a bipolar option. See Terminations, page 34. In addition to the lead wire termination, terminal board and MS connector hookup for parallel, series or unipolar operation is also available.

- With rated current applied, windings at 130°C and motor unmounted and in still air at 40°C.

- Windings at 130°C and motor in still air at 40°C (without heat sink). Motors may be operated up to 2 times rated current to provide high peak torque with good torque linearity - duty cycle dependent, contact factory.

- Small signal Inductance as measured with impedance bridge at 1kHz, 1 amp.

- Thermal resistance measured with motor hanging in still air (unmounted).

### Additional Information

- Review the Model Number Code, page 25, to assure that all options are designated. Connections, encoders and phasing diagrams start on page 34.

- Review the Model Number Code, page 25, to assure that all options are designated. Connections, encoders and phasing diagrams start on page 34. Motor dimensions start on page 32. In addition to those below, motors with

<table>
<thead>
<tr>
<th>Motor Model Number</th>
<th>Connection</th>
<th>Rated Torque (Nm)</th>
<th>Phase Current/Phase Resistance (amps DC/ohms)</th>
<th>Phase Inductance (mH)</th>
<th>Detent Torque (oz-in)</th>
<th>Thermal Resistance at 10°C (kgm² x 10⁻³ lbs)</th>
<th>Motor Inertia (oz-in-S)</th>
<th>Weight (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K43HXH-LXK-XX-XX</td>
<td>Parallel</td>
<td>5700(40.23)</td>
<td>15.4</td>
<td>0.14</td>
<td>2.5</td>
<td>118</td>
<td>1</td>
<td>0.2293</td>
</tr>
<tr>
<td>K43HNL-LXK-XX-XX</td>
<td>Series</td>
<td>5700(40.23)</td>
<td>7.7</td>
<td>0.55</td>
<td>10</td>
<td>106</td>
<td>1</td>
<td>0.2293</td>
</tr>
<tr>
<td>K43HXL-LXK-XX-XX</td>
<td>Unipolar</td>
<td>4050(28.44)</td>
<td>10.9</td>
<td>0.28</td>
<td>2.5</td>
<td>(0.75)</td>
<td>1</td>
<td>(1.62)</td>
</tr>
<tr>
<td>K43HXH-LXK-XX-XX</td>
<td>Parallel</td>
<td>5650(39.74)</td>
<td>9.9</td>
<td>0.33</td>
<td>5.9</td>
<td>118</td>
<td>1</td>
<td>0.2293</td>
</tr>
<tr>
<td>K43HNL-LXK-XX-XX</td>
<td>Series</td>
<td>5650(39.74)</td>
<td>4.9</td>
<td>1.32</td>
<td>25.7</td>
<td>106</td>
<td>1</td>
<td>0.2293</td>
</tr>
<tr>
<td>K43HXL-LXK-XX-XX</td>
<td>Unipolar</td>
<td>4050(28.12)</td>
<td>7.8</td>
<td>0.66</td>
<td>5.9</td>
<td>(0.75)</td>
<td>1</td>
<td>(1.62)</td>
</tr>
<tr>
<td>K43HXH-LXK-XX-XX</td>
<td>Parallel</td>
<td>5550(39.91)</td>
<td>6.2</td>
<td>0.82</td>
<td>15.2</td>
<td>118</td>
<td>1</td>
<td>0.2293</td>
</tr>
<tr>
<td>K43HNL-LXK-XX-XX</td>
<td>Series</td>
<td>5550(39.91)</td>
<td>3.1</td>
<td>3.29</td>
<td>60.7</td>
<td>106</td>
<td>1</td>
<td>0.2293</td>
</tr>
<tr>
<td>K43HXL-LXK-XX-XX</td>
<td>Unipolar</td>
<td>4050(28.23)</td>
<td>4.4</td>
<td>1.65</td>
<td>15.2</td>
<td>(0.75)</td>
<td>1</td>
<td>(1.62)</td>
</tr>
</tbody>
</table>

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


- Motor connections are determined by the Windings/Leads designation in the Model Number Code on page 25. Note that the F designation, although not shown in the above tables, is a bipolar option. See Terminations, page 34. In addition to the lead wire termination, terminal board and MS connector hookup for parallel, series or unipolar operation is also available.

- With rated current applied, windings at 130°C and motor unmounted and in still air at 40°C.

- Windings at 130°C and motor in still air at 40°C (without heat sink). Motors may be operated up to 2 times rated current to provide high peak torque with good torque linearity - duty cycle dependent, contact factory.

- Small signal Inductance as measured with impedance bridge at 1kHz, 1 amp.

- Thermal resistance measured with motor hanging in still air (unmounted).
POWERPAC HYBRIDS

NEMA 42 FRAME (4.325" Square)—Torque and Acceleration Comparisons
For comparison with size 34 motor, see page 19.

NEMA 42 FRAME (4.325" Square)—Torque Linearity
A significant POWERPAC performance attribute is that when a current higher than rated current is applied, the increase in torque will be more linear than other hybrids. Furthermore, current levels increasingly higher than rated current are less likely to cause demagnetization. Capitalize on this performance characteristic which will provide an acceleration boost to move loads even faster. This technique is applicable to intermittent duty applications in that the thermal limit of the motor cannot be exceeded. Driving the motor at higher than rated current is duty cycle dependent. Contact the factory for application assistance.

These curves show the torque at rated current and the torque linearity up to two times rated current.
POWERPAC HYBRIDS

NEMA 42 FRAME (4.325" Square)—Performance

Motors will perform continuously as shown without the winding temperature exceeding 130°C when the motor is operated (without heat sink) in an ambient temperature of up to 40°C. The curves do not reflect system resonance points, which will vary with motor coupling and system parameters.

NEMA 42 FRAME – ONE ROTOR STACK

5A per phase; K41* and N41*


---

NEMA 42 FRAME – TWO ROTOR STACKS

8A per phase; K42* and N42*

J winding, parallel connection, See Ratings and Characteristics, p. 27.

---

*See Model Number Code on page 25 for clarification.
POWERPAC HYBRIDS

NEMA 42 FRAME (4.325" Square)—Performance

Motors will perform continuously as shown without the winding temperature exceeding 130°C when the motor is operated (without heat sink) in an ambient temperature of up to 40°C. The curves do not reflect system resonance points, which will vary with motor coupling and system parameters.

NEMA 42 FRAME – THREE ROTOR STACKS

8A per phase; K43* and N43*
L winding, parallel connection, See Ratings and Characteristics, p. 28.

*See Model Number Code on page 25 for clarification.
NEMA 42 FRAME: All motors have a heavy duty NEMA front end bell and large diameter shaft to support the higher output torques.

LEADWIRE HOOKUP
Model Number Code designation R (Construction/Hookup), p. 25.

LEADWIRE HOOKUP
DOUBLE SHAFT CONFIGURATION
Model Number Code designation D (Shaft Configuration), p. 25.
Available on R construction only.

LEADWIRE HOOKUP
ENCODER MOUNTING PROVISION
Model Number Code designation M2 (Encoder Mounting Option), p. 25.
NEMA 42 FRAME: All motors have a heavy duty NEMA front end bell and large diameter shaft to support the higher output torques.

**SPLASHPROOF CONSTRUCTION/Terminal Board Connections**

(via English or Metric thread for conduit) Model Number Code designation L or M (Construction/Hookup), p. 25.

**SPLASHPROOF CONSTRUCTION/MS Connector(s) — Encoder Option**

Model Number Code designation C/System (Construction/Hookup) and Encoder Mounting Option, p. 25.

**Encoder Mounting Option**

- L: Construction = Conduit connection (1/2 NPT/C, 1/2' removable Insulating bushing)
- M: Construction = Conduit connection (PG 13, 5 TAP), (No Insulating bushing supplied)

**NOTES:**

- MOTOR CONNECTOR X L MAX.

---

www.pacsci.com
Holding Torques to 5700 oz-in. (356 lb-in.)

New POWERPAC rugged NEMA 34 and 42 frame hybrid steppers provide the highest torques per frame size in the industry. Optimal magnetics in a “housingless” frame combine with a large diameter rotor and new rotor/stator design to produce more torque and provide high acceleration capabilities. This unique design also features low detent torque for smoother microstepping. In addition, POWERPAC runs cooler than comparable size steppers.

N and K Series

POWERPAC is available in two different designs; the N and K Series. Both provide exceptionally high holding torques. In addition, both have high torque-to-inertia ratios and therefore high acceleration capabilities. The K Series incorporates our patented Sigmax® flux focusing technology and provides 25% more torque than the N Series plus even higher acceleration performance! POWERPAC hybrid steppers meet demanding motion requirements, making them cost effective alternatives to servo motors in applications with moderate speed requirements.

Options

Combinations of standard options are routinely provided to customize the motor for your specific requirements. For termination, select from terminal board connections (via conduit - sealed construction), MS connectors (sealed construction) or flying leads. Rear shaft extensions include one with end bell mounting provisions for a user installed encoder. Factory mounted encoders are installed inside the rear end bell in a sealed construction...or outside, mounted to the rear end bell. Front shaft modifications may be specified. A configuration such as an integral spline is furnished as a special option. Bipolar or unipolar phase sequencing is readily available. In addition to the standard selection of windings, special windings are also provided. Just call us!
Sizing and Selection

Our OPTIMIZER™ Version 3.0 for Windows is a powerful motor sizing and selection software program. It provides a simple, time-saving method to specify the best POWERPAC motor for your specific requirements. Contact your Pacific Scientific distributor for a copy or visit us on the web at www.pacsci.com

FEATURES

- With holding torques to 5700 oz-in. (356 lb-in.), Optimized magnetics provide maximum performance in small envelope, reducing space required for the motor.
- Improved torque linearity (above rated current) provides high peak torque capability (duty cycle dependent, contact factory)
- High torque at moderate speeds
- Low detent torque harmonic
- K Series uses patented Sigmax® technology to develop 25% more torque than N Series
- Runs cooler than comparable steppers using identical drive parameters
- Special rotor design for high acceleration
- Rugged "housingless" square frame
- Sealed per IP65
- Outer bearing races won’t turn—front locked in steel insert and rear held by O-ring
- Extensive selection of shaft configurations, terminations, standard and special windings
- Two phase design
- Optional encoder mounting provisions

BENEFITS

- Optimized magnetics provide maximum performance in small envelope, reducing space required for the motor.
- Acceleration boost to move loads even faster. Provides more torque for intermittent duty applications
- Cost effective alternative to servo motors
- Provides smoother microstepping performance
- Select from broad performance range to meet your requirement
- Longer, more reliable motor life—backed by a 2 year warranty
- Move/position loads fast
- Efficient use of volume for optimal magnetic circuit
- For splashproof requirements
- Long life bearings—also prevents axial shaft movement for encoder applications
- Match your requirements
- Compatible with most drivers, smoother microstepping, and lower input power required vs. three phase for same torque
- Optimizes control scheme

www.pacsci.com