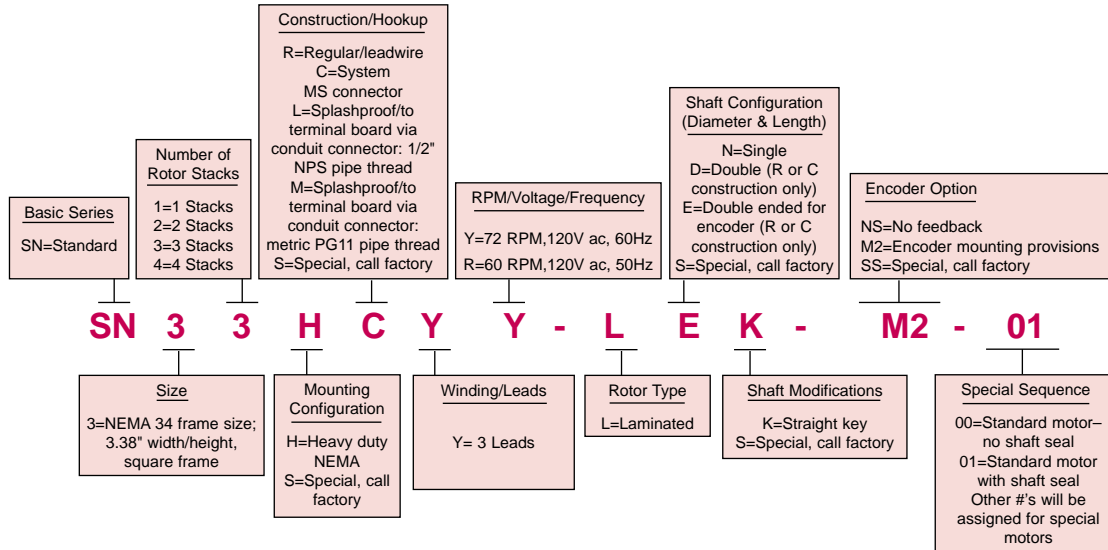


POWERSYNC™

NEMA 34 & 42 Frame

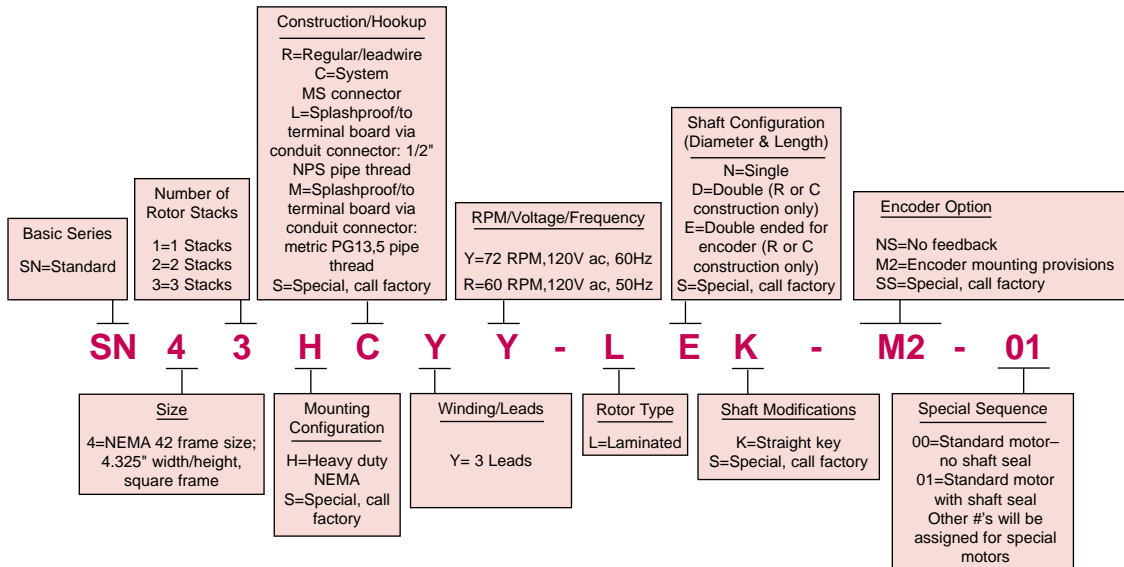
(3.38" & 4.325" Square)

MODEL NUMBER CODE - NEMA 34 FRAME



The example model number above indicates a standard NEMA 34 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 operates at 72 RPM with 120V ac, 60 Hz input voltage. It has a three lead winding, a straight keyway, encoder mounting provisions and a shaft seal.

MODEL NUMBER CODE - NEMA 42 FRAME



The example model number above indicates a standard 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 operates at 72 RPM with 120V ac, 60 Hz input power. It has a three lead winding, a straight keyway, encoder mounting options and a shaft seal.

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.

POWERSYNC™

SELECTION OVERVIEW

POWERSYNC™

AC SYNCRHONOUS MOTORS

RPM	Voltage	Frequency	Rated torque oz-in. (Nm)	Rated inertia oz-in-s ² (kgm ² x 10 ⁻³)	Page
72	120V ac	60Hz	280-1500 (1,98 - 10,58)	.21-.92 (1,48 - 6,49)	86
60	120V ac	50Hz	375-1440 (2,64 - 10,17)	.29-1.3 (2,05 - 9,18)	87

For assistance in selecting a motor, see page 83.

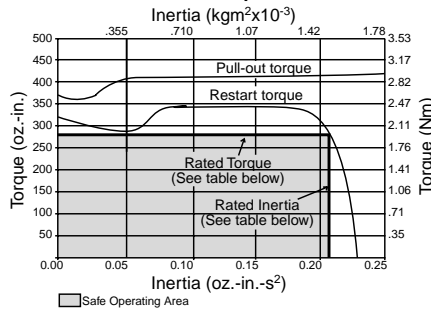
POWERSYNC™

Ratings and Characteristics

72 RPM, 120 Vac, 60 Hz

Typical Performance Curve

also see p.97



PULL-OUT Torque Curve The maximum friction load, at a particular inertial load, that can be applied to the shaft of an AC synchronous motor (running at constant speed) and not cause it to lose synchronism.

RESTART Torque Curve The maximum friction load, at a particular inertial load, that can be applied to the shaft of an AC synchronous motor without causing it to lose synchronism when accelerating to a constant speed from standstill.

For 72RPM, 120V ac, 60 Hz

NEMA Frame Size (in)	Model Number [△]	Rated Torque [△] oz-in [△] (Nm)	Rated Inertia [△] oz-in-s ² [△] (kgm ² x10 ⁻³)	Max. Pull-out Torque [△] oz-in [△] (Nm)	RMS per Phase Current @ 80% Pull-out (Amps)	Detent Torque [△] oz-in [△] (Nm)	Thermal Res. [△] (°C/watt)	Phase Res. (Ohms)	Phase Ind. (mH)	Rotor Inertia [△] oz-in-s ² [△] (kgm ² x10 ⁻³)	Weight lbs (kg)
34	SN31HXYY-LXK-XX-XX	280 (1,98)	0.21 (1,48)	410 (2,9)	0.38	18 (0,13)	2.7	86	601	0.0202 (0,14)	5 (2,27)
34	SN32HXYY-LXK-XX-XX	480 (3,39)	0.29 (2,05)	690 (4,87)	0.47	36 (0,25)	2	38	383	0.038 (0,27)	8.4 (3,81)
34	SN33HXYY-LXK-XX-XX	690 (4,87)	0.53 (3,74)	1015 (7,17)	0.78	54 (0,38)	1.6	32	362	0.0567 (0,4)	11.9 (5,39)
34	SN34HXYY-LXK-XX-XX	900 (6,36)	0.53 (3,74)	1520 (10,73)	1.43	57 (0,4)	1.3	16	191	0.075 (0,53)	15.1 (6,84)
42	SN41HXYY-LXK-XX-XX	715 (5,05)	0.4 (2,82)	1045 (7,38)	0.8	42 (0,3)	1.9	21	334	0.0783 (0,55)	11 (4,98)
42	SN42HXYY-LXK-XX-XX	1200 (8,47)	0.82 (5,79)	1580 (11,16)	1.19	84 (0,59)	1.3	9.5	198	0.1546 (1,09)	18.4 (8,34)
42	SN43HXYY-LXK-XX-XX	1500 (10,59)	0.92 (6,49)	2000 (14,12)	1.46	106 (0,75)	1	7.2	148	0.2293 (1,62)	25.7 (11,64)

[△] An "X" in the Model Number Code indicates an undefined option. See page 83.

[△] Rated Torque and Inertia are maximum values. The rated torque is the combination of load torque and friction torque. The motor will accelerate and run at synchronous speed, delivering the rated torque value while moving an inertia up to the rated inertia value. Rated inertia is a combination of the load inertia and the motor's rotor inertia. For assistance in motor selection, see page 95.

[△] Rated Torque and Rated Inertia denote restart conditions with a stiff coupling of .3 arc sec/oz-in. minimum.

[△] Detent torque is the maximum torque that can be applied to an unenergized step motor without causing continuous rotating motion.

[△] Thermal resistance from motor winding to ambient with motor hanging in still air, unmounted.

[△] Small signal inductance as measured with impedance bridge at 1kHz, 1 amp.

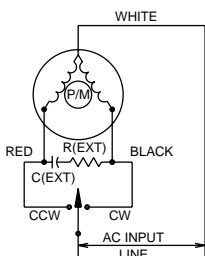
R-C PHASE SHIFT NETWORKS

A phase shift network is required and values have been selected to eliminate reversing torque and motor oscillations during motor startup. The network is placed in the circuit as shown in the diagram below. It is important to use the recommended values for the resistor and capacitor which vary with each motor, see p. 100. The resistors and capacitors are standard and are readily available from electronic component suppliers.

For 72RPM, 120V ac, 60 Hz

Model Number	Resistor		Capacitor	
	(Ohms)	(Watts)	(µf)	(rated Vac)
SN31HXYY-LXK-XX-XX	200	50	6	370
SN32HXYY-LXK-XX-XX	200	50	10	370
SN33HXYY-LXK-XX-XX	100	100	10	370
SN34HXYY-LXK-XX-XX	50	100	17.5	370
SN41HXYY-LXK-XX-XX	100	100	12.5	370
SN42HXYY-LXK-XX-XX	75	100	20	370
SN43HXYY-LXK-XX-XX	50	100	20	370

Schematic Diagram All Constructions



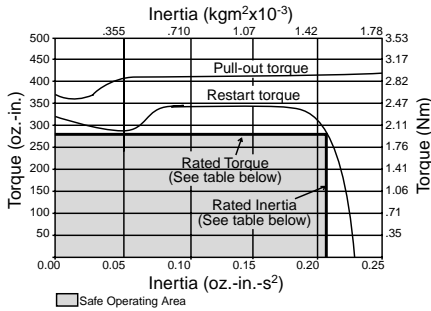
POWERSYNC™

Ratings and Characteristics

60 RPM, 120 Vac, 50 Hz

Typical Performance Curve

also see p.97



PULL-OUT Torque Curve The maximum friction load, at a particular inertial load, that can be applied to the shaft of an AC synchronous motor (running at constant speed) and not cause it to lose synchronism.

RESTART Torque Curve The maximum friction load, at a particular inertial load, that can be applied to the shaft of an AC synchronous motor without causing it to lose synchronism when accelerating to a constant speed from standstill.

For 60RPM, 120V ac, 50 Hz

NEMA Frame Size (in)	Model Number [△]	Rated Torque [△] oz-in [△] (Nm)	Rated Inertia [△] oz-in-s ² [△] (kgm ² x10 ⁻³)	Max. Pull-out Torque oz-in (Nm)	RMS per Phase Current @ 80% Pull-out (Amps)	Detent Torque oz-in (Nm)	Thermal Res. [△] (°C/watt)	Phase Res. (Ohms)	Phase Ind. (mH)	Rotor Inertia [△] oz-in-s ² [△] (kgm ² x10 ⁻³)	Weight lbs (kg)
34	SN31HXYR-LXK-XX-XX	375 (2,64)	0.29 (2,05)	490 (3,46)	0.34	18 (0,13)	2.7	136	990	0.0202 (0,14)	5 (2,27)
34	SN32HXYR-LXK-XX-XX	600 (4,24)	0.52 (3,67)	870 (6,14)	0.64	36 (0,25)	2	53	493	0.038 (0,27)	8.4 (3,81)
34	SN33HXYR-LXK-XX-XX	800 (5,65)	0.6 (4,23)	1120 (7,91)	0.67	54 (0,38)	1.6	35	417	0.0567 (0,4)	11.9 (5,39)
34	SN34HXYR-LXK-XX-XX	990 (6,99)	0.53 (3,74)	1565 (11,05)	1.1	57 (0,4)	1.3	18	226	0.075 (0,53)	15.1 (6,84)
42	SN41HXYR-LXK-XX-XX	700 (4,94)	0.53 (3,74)	1060 (7,49)	0.71	42 (0,3)	1.9	33	513	0.0783 (0,55)	11 (4,98)
42	SN42HXYR-LXK-XX-XX	1020 (7,22)	1.16 (8,19)	1575 (11,12)	0.93	84 (0,59)	1.3	15	300	0.1546 (1,09)	18.4 (8,34)
42	SN43HXYR-LXK-XX-XX	1440 (10,17)	1.3 (9,18)	2000 (14,12)	1.6	106 (0,75)	1	12	267	0.2293 (1,62)	25.7 (11,64)

[△] An "X" in the Model Number Code indicates an undefined option. See page 83.

[△] Rated Torque and Inertia are maximum values. The rated torque is the combination of load torque and friction torque. The motor will accelerate and run at synchronous speed, delivering the rated torque value while moving an inertia up to the rated inertia value. Rated inertia is a combination of the load inertia and the motor's rotor inertia. For assistance in motor selection, see page 95.

[△] Rated Torque and Rated Inertia denote restart conditions with a stiff coupling of .3 arc sec/oz-in. minimum.

[△] Detent torque is the maximum torque that can be applied to an unenergized step motor without causing continuous rotating motion.

[△] Thermal resistance from motor winding to ambient with motor hanging in still air, unmounted.

[△] Small signal inductance as measured with impedance bridge at 1kHz, 1 amp.

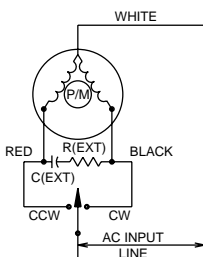
R-C PHASE SHIFT NETWORKS

A phase shift network is required and values have been selected to eliminate reversing torque and motor oscillations during motor startup. The network is placed in the circuit as shown in the diagram below. It is important to use the recommended values for the resistor and capacitor which vary with each motor, see p. 100. The resistors and capacitors are standard and are readily available from electronic component suppliers.

For 60RPM, 120V ac, 50 Hz

Model Number	Resistor		Capacitor	
	(Ohms)	(Watts)	(µf)	(rated Vac)
SN31HXYR-LXK-XX-XX	150	25	2	2.75
SN32HXYR-LXK-XX-XX	100	50	4	4.75
SN33HXYR-LXK-XX-XX	100	50	4	4.75
SN34HXYR-LXK-XX-XX	75	100	6.5	7.38
SN41HXYR-LXK-XX-XX	100	50	4	4.75
SN42HXYR-LXK-XX-XX	100	100	6.5	7.38
SN43HXYR-LXK-XX-XX	50	225	10.5	11.38

Schematic Diagram All Constructions



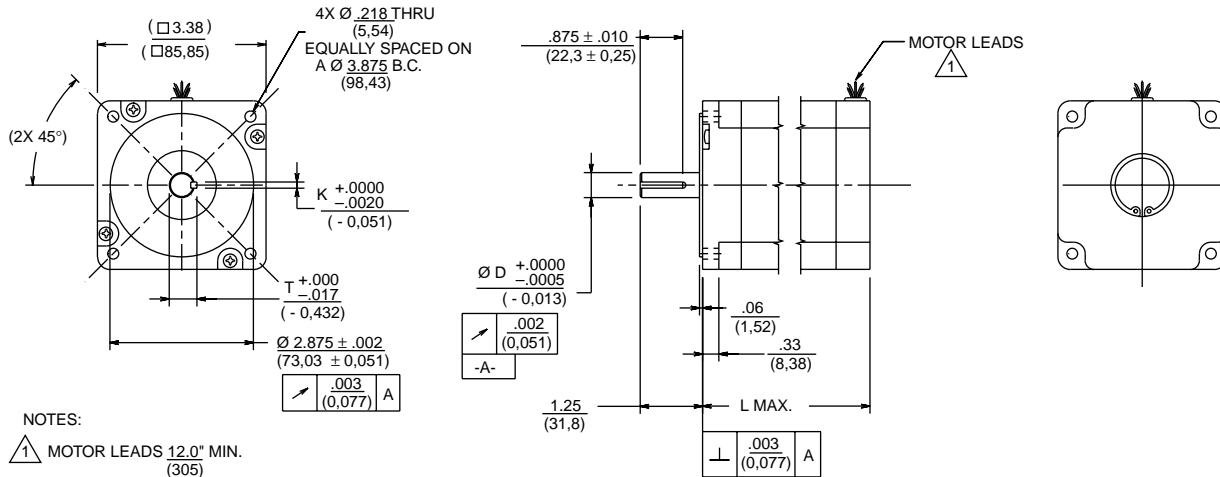
DIMENSIONS . . . POWERSYNC™

in. (metric dimensions for ref. only)
mm

NEMA 34 FRAME: All motors have a heavy duty NEMA front end bell and large diameter shaft to support the higher output torques

LEADWIRE HOOKUP - ENCODER OPTIONS

Model Number Code designation R (Construction/Hookup), p.83

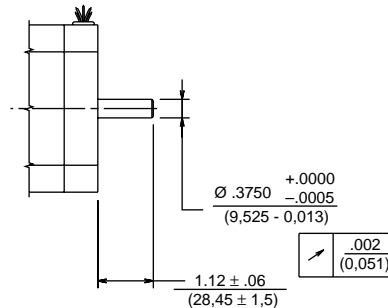


MOTOR*	D	K	T	L MAX.
31HR	.5000 (12,70)	.1250 (3,175)	.555 (14,09)	3.13 (79,5)
32HR	.5000 (12,70)	.1250 (3,175)	.555 (14,09)	4.65 (118,1)
33HR	.6250 (15,875)	.1875 (4,763)	.705 (17,91)	6.17 (156,7)
34HR	.6250 (15,875)	.1875 (4,763)	.705 (17,91)	7.68 (195,1)

*See Model Number Code, p 83.

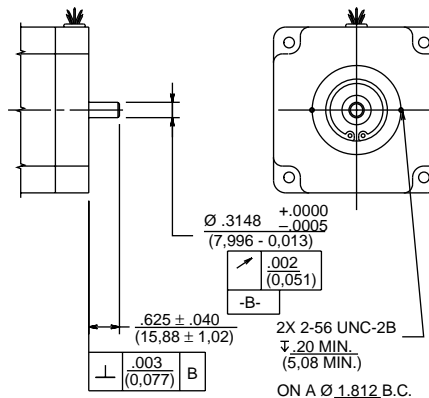
LEADWIRE HOOKUP DOUBLE SHAFT CONFIGURATION

Model Number Code designation D (Shaft Configuration), p. 83



LEADWIRE HOOKUP ENCODER MOUNTING PROVISION

Model Number Code designation M2 (Encoder Mounting Option), p.83



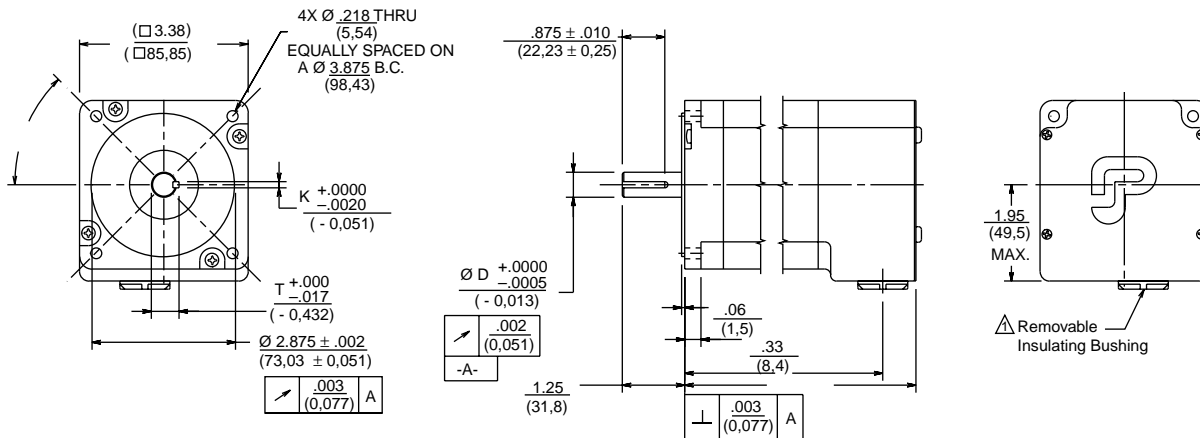
DIMENSIONS . . . POWERSYNC™

in. (metric dimensions for ref. only)
mm

NEMA 34 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 83

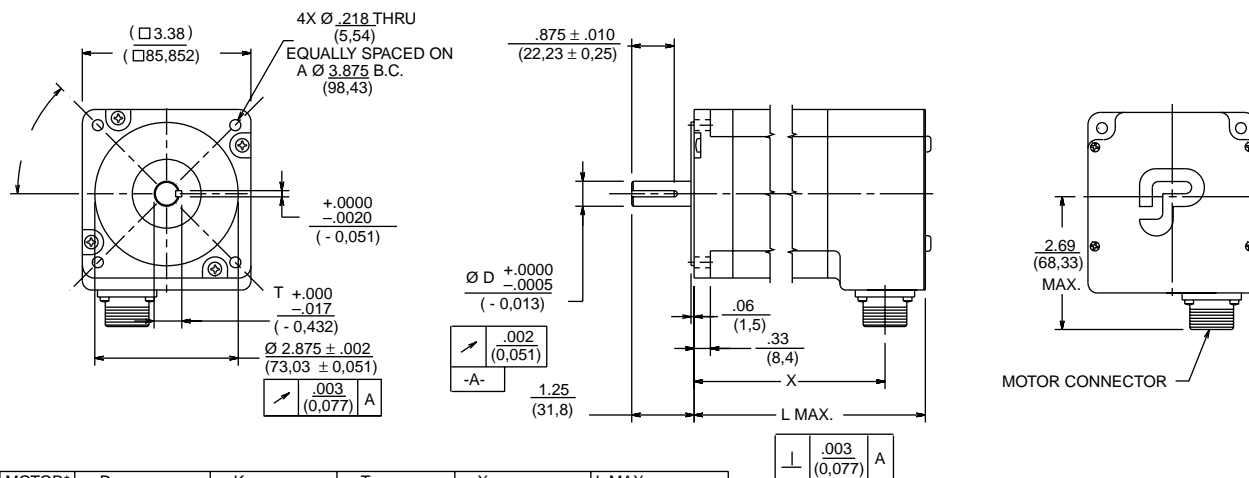


MOTOR*	D	K	T	X	L MAX.
31HR	.5000 (12,70)	.1250 (3,175)	.555 (14,09)	3.70 (93,9)	4.44 (112,8)
32HR	.5000 (12,70)	.1250 (3,175)	.555 (14,09)	5.22 (132,6)	5.96 (151,4)
33HR	.6250 (15,875)	.1875 (4,763)	.705 (17,91)	6.74 (171,20)	7.48 (189,9)
34HR	.6250 (15,875)	.1875 (4,763)	.705 (17,91)	8.25 (209,6)	8.99 (228,4)

*See Model Number Code, p 83.

SPLASHPROOF CONSTRUCTION/MS CONNECTOR(S)— ENCODER OPTION

Model Number Code designation C/System (Construction/Hookup) and Encoder Mounting Option, p 83



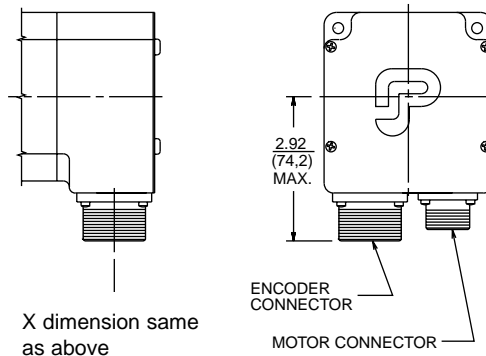
MOTOR*	D	K	T	X	L MAX.
31HR	.5000 (12,70)	.1250 (3,175)	.555 (14,09)	3.56 (90,42)	4.44 (112,8)
32HR	.5000 (12,70)	.1250 (3,175)	.555 (14,09)	5.07 (128,78)	5.96 (151,4)
33HR	.6250 (15,875)	.1875 (4,763)	.705 (17,91)	6.59 (167,39)	7.48 (189,9)
34HR	.6250 (15,875)	.1875 (4,763)	.705 (17,91)	8.11 (205,99)	8.99 (228,4)

*See Model Number Code, p 83.

ENCODER MOUNTING OPTION

NOTES:

- △ L Construction = Conduit connection (1/2 NPSC TAP) with $\frac{56}{14,2}$ I.D. removable insulating bushing
- M Construction = Conduit connection (PG 11 TAP). (No insulating bushing supplied)



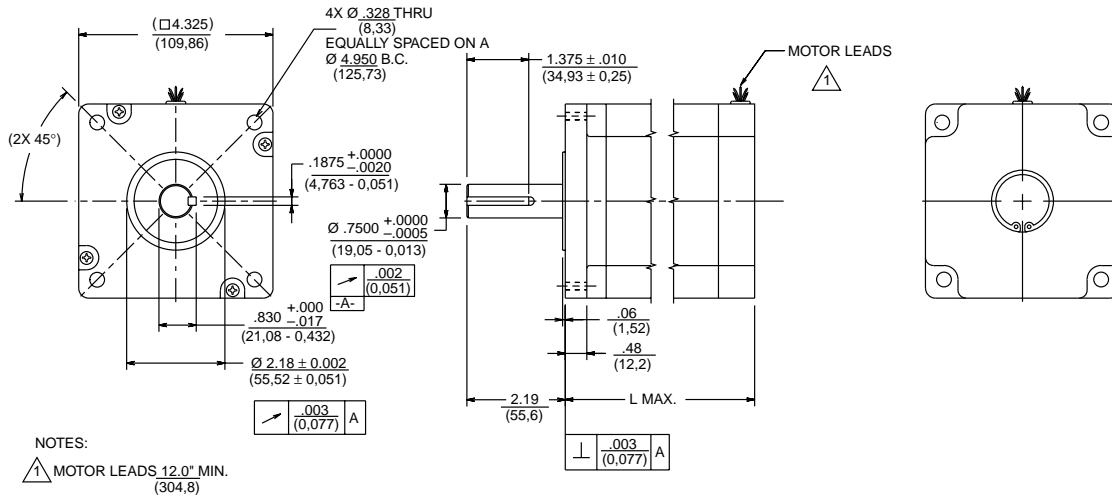
DIMENSIONS . . . POWERSYNC™

in. (metric dimensions for ref. only)
mm

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. 83

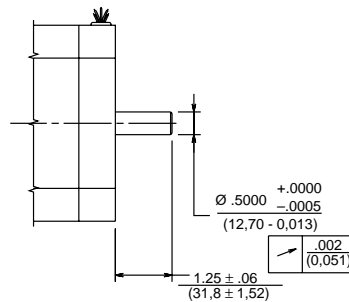


MOTOR*	L MAX.
41HR	3.89 (98,8)
42HR	5.91 (150,1)
43HR	7.92 (201,2)

* See Model Number Code, p.83

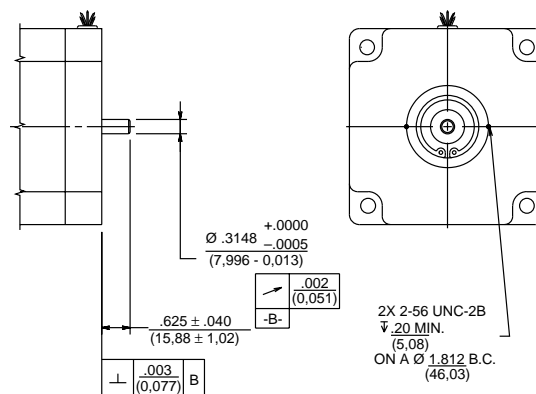
LEADWIRE HOOKUP DOUBLE SHAFT CONFIGURATION

Model Number Code designation D (Shaft Configuration), p. 83
Available on R construction only.



LEADWIRE HOOKUP ENCODER MOUNTING PROVISION

Model Number Code designation M2 (Encoder Mounting Option), p.83



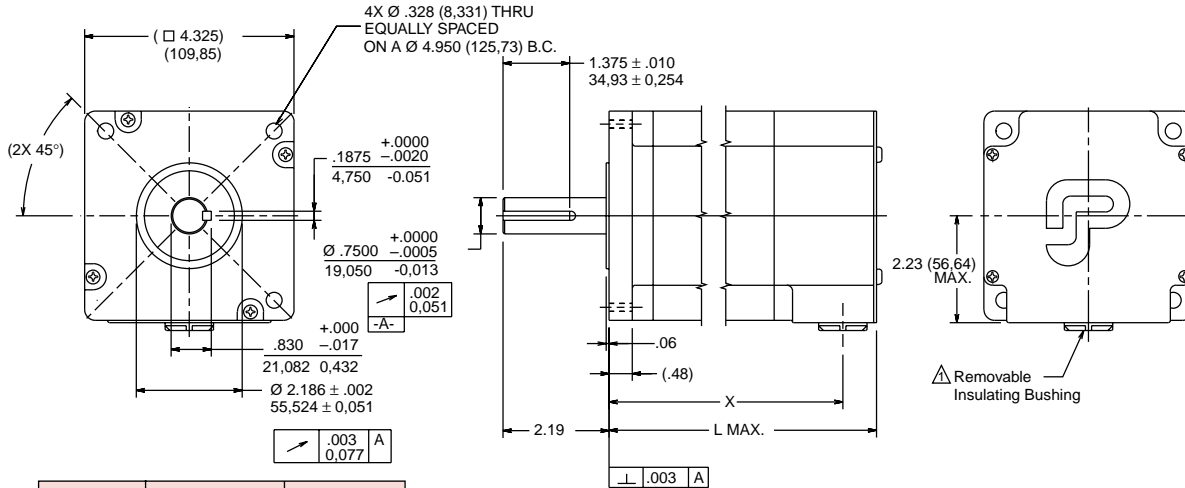
DIMENSIONS . . . POWERSYNC™

in. (metric dimensions for ref. only)
mm

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. 83.

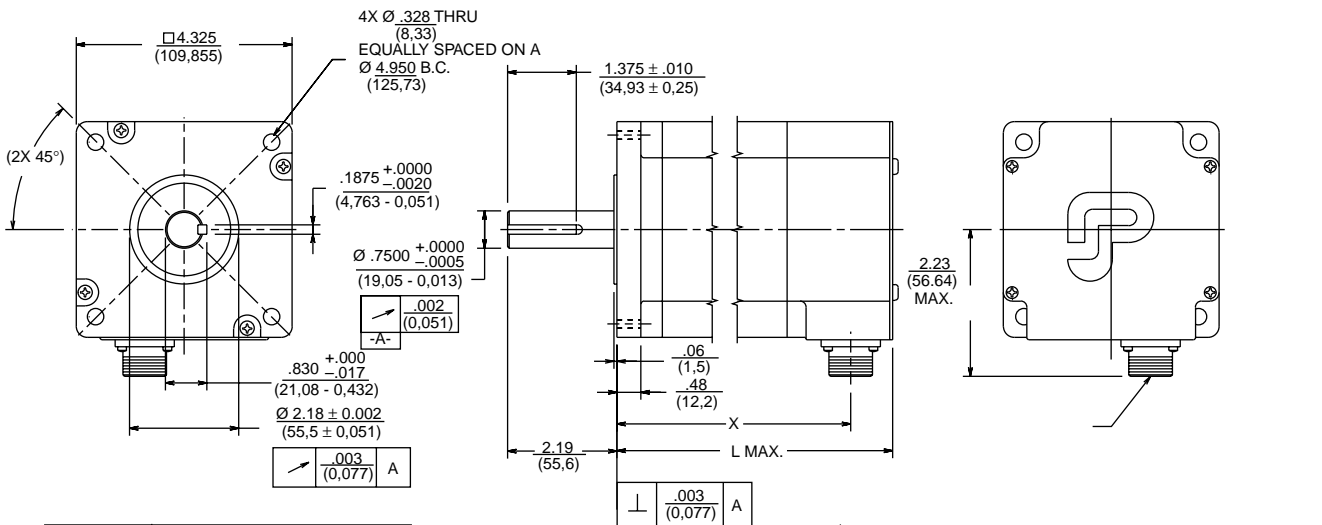


MOTOR*	X	L MAX.
41HR	4.46 (113,3)	3.89 (98,9)
42HR	6.48 (164,6)	5.91 (150,1)
43HR	8.49 (215,7)	7.92 (201,2)

* See Model Number Code, p.83

SPLASHPROOF CONSTRUCTION/MS CONNECTOR(S)— ENCODER OPTION

Model Number Code designation C/System (Construction/Hookup) and Encoder Mounting Option, p. 83.



MOTOR*	X	L MAX.
41HR	4.32 (109,7)	5.20 (132,1)
42HR	6.33 (160,8)	7.22 (183,4)
43HR	8.35 (212,1)	9.23 (234,4)

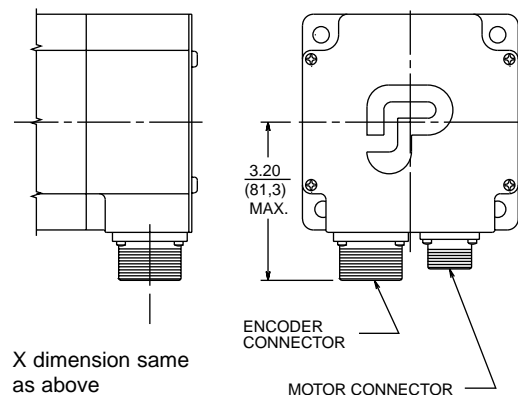
* See Model Number Code, p.83

NOTES:

△ L Construction = Conduit connection (1/2 NPSC TAP) with $\frac{56}{14,2}$ I.D. removable insulating bushing

M Construction = Conduit connection (PG 13, 5 TAP). (No insulating bushing supplied)

ENCODER MOUNTING OPTION



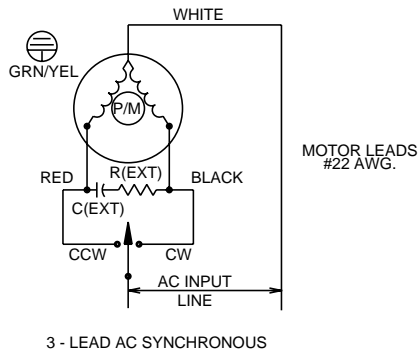
POWERSYNC™ TECHNICAL DATA

MOTOR POWER CONNECTIONS

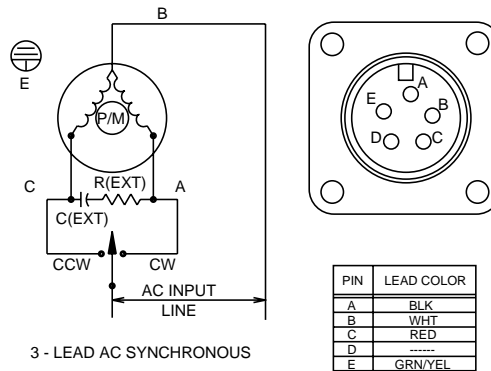
- Connection options: Flying Leads, MS Connectors, Terminal Board

For all motor terminations refer to the following AC synchronous motor connection diagram to assure that proper connections are made. Consult our application engineers for assistance if necessary.

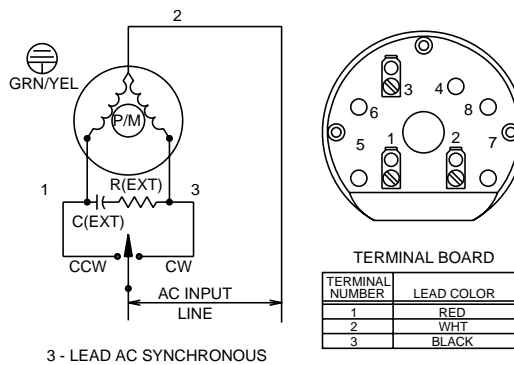
FLYING LEADS



MS CONNECTOR



TERMINAL BOARD

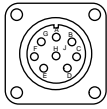


ENCODER OPTIONS...**POWERSYNC™**

NEMA 34 AND NEMA 42 ENCODER MOUNTING OPTIONS

Encoder factory installed (inside).
See NEMA 34 drawing, p. 89 and
NEMA 42 drawing, p. 91.

Encoder factory installed (outside on rear
end bell). See NEMA 34 drawing, p. 88
and NEMA 42 drawing, p. 90.



ENCODER CONNECTOR Δ

PIN	FUNCTION
A	CHANNEL A
B	CHANNEL \bar{A}
C	CHANNEL B
D	CHANNEL \bar{B}
E	CHANNEL Z
F	CHANNEL \bar{Z}
G	+ 5 VDC
H	5 VDC RTN

MOTOR FEEDBACK CONNECTOR
CA3102E20-7P-A206-F80-F0

SUGGESTED MATING CONNECTOR	
PAC SCI P.N.	CANNON P.N.
CZ00008	MS3106A20-7S-621

NOTE:

Δ NEMA 34, NEMA 42
SYSTEM CONSTRUCTION

SHAFT LOAD AND BEARING FATIGUE LIFE (L_{10})...POWERSYNC™

The **POWERSYNC** H-mount configuration has a heavy duty NEMA front end bell and a large diameter shaft to support the higher torque outputs.

Bearings are the only wearing component in an AC synchronous motor. PacSci uses heavy duty, long life bearings to assure you the maximum useful life from every AC synchronous motor you purchase.

SHAFT LOADING

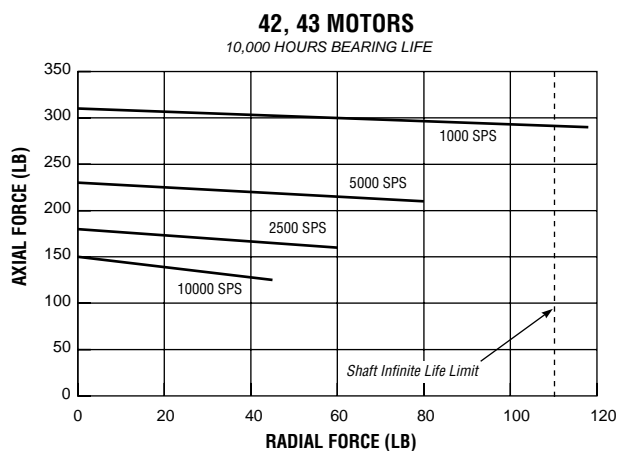
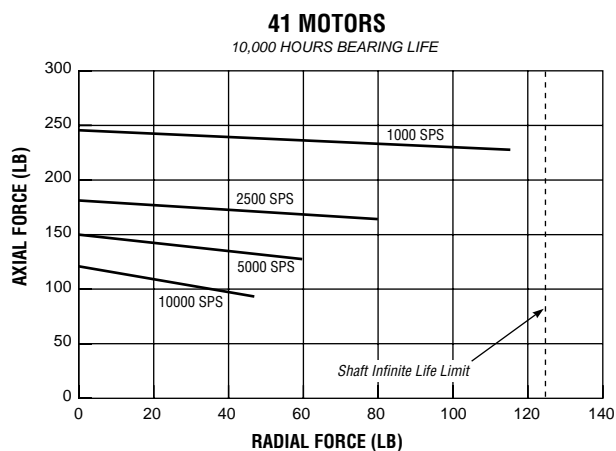
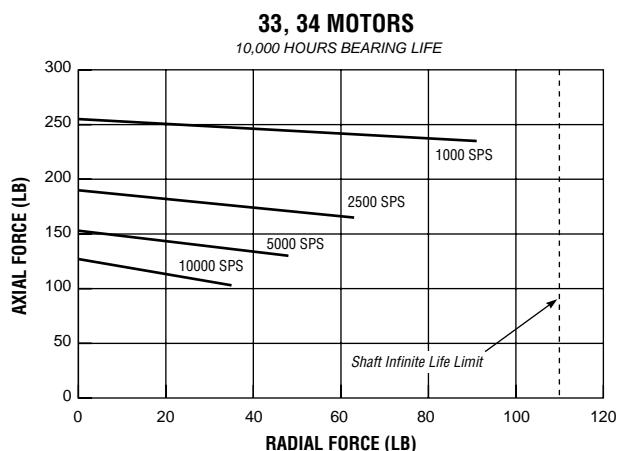
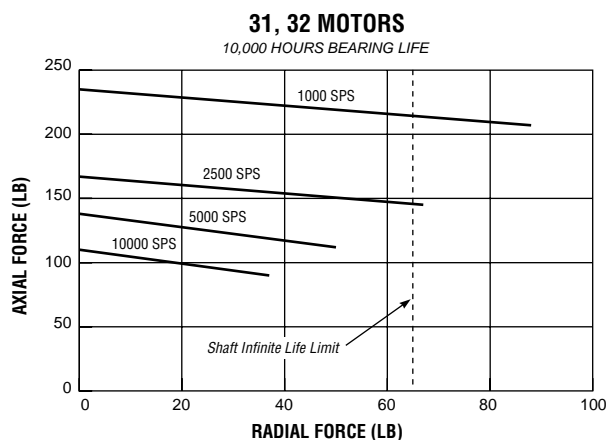
The maximum radial fatigue load ratings reflect the following assumptions:

1. Motors are operated at 1× rated torque
2. Fully reversed radial load applied in the center of the keyway extension
3. Infinite life with 99% reliability
4. Safety factory = 2

Motor	Max. Radial Force (Lb.)	Max. Axial Force (Lb.)
31, 32	65	305
33, 34	110	305
41	125	404
42, 43	110	404

BEARING FATIGUE LIFE (L_{10}) See Model Number Codes on page 4 for clarification.

Note: SPS = Speed, Full Steps Per Second



R-C PHASE SHIFT NETWORK...POWERSYNC™

R-C Network- Resistor and capacitor networks are specific to each motor offering. Reference the data contained in the data table for values and specifications. Deviations from recommended capacitor or resistor values can reduce forward torque and permit the motor to exhibit some of its forward torque in the reverse mode (vibration). This scenario is less of a problem if the load is substantially frictional. Other values can be recommended by the factory for specific applications. Capacitor and resistor values have been selected to provide the highest possible torque without sacrificing smooth operation throughout the safe operating area. Capacitor and resistor values may be adjusted by the factory to accommodate specific application needs. The figure below shows the connection diagram for AC synchronous motors.

TYPICAL OPERATION

