

EXLAR
ER Explosion Proof Rotary Motors

ER Series Rotary Motor and Gearmotor

For hazardous duty environments with constant exposure to flammable gasses or vapors* Exlar's ER Series rotary explosion-proof motors and gearmotors provide an excellent solution. Exlar's motors utilizing T-LAM™ technology, an innovative segmented winding, have been designed for efficiency, power and durability and provide a very high torque-to-size ratio when compared to other suppliers' motors.

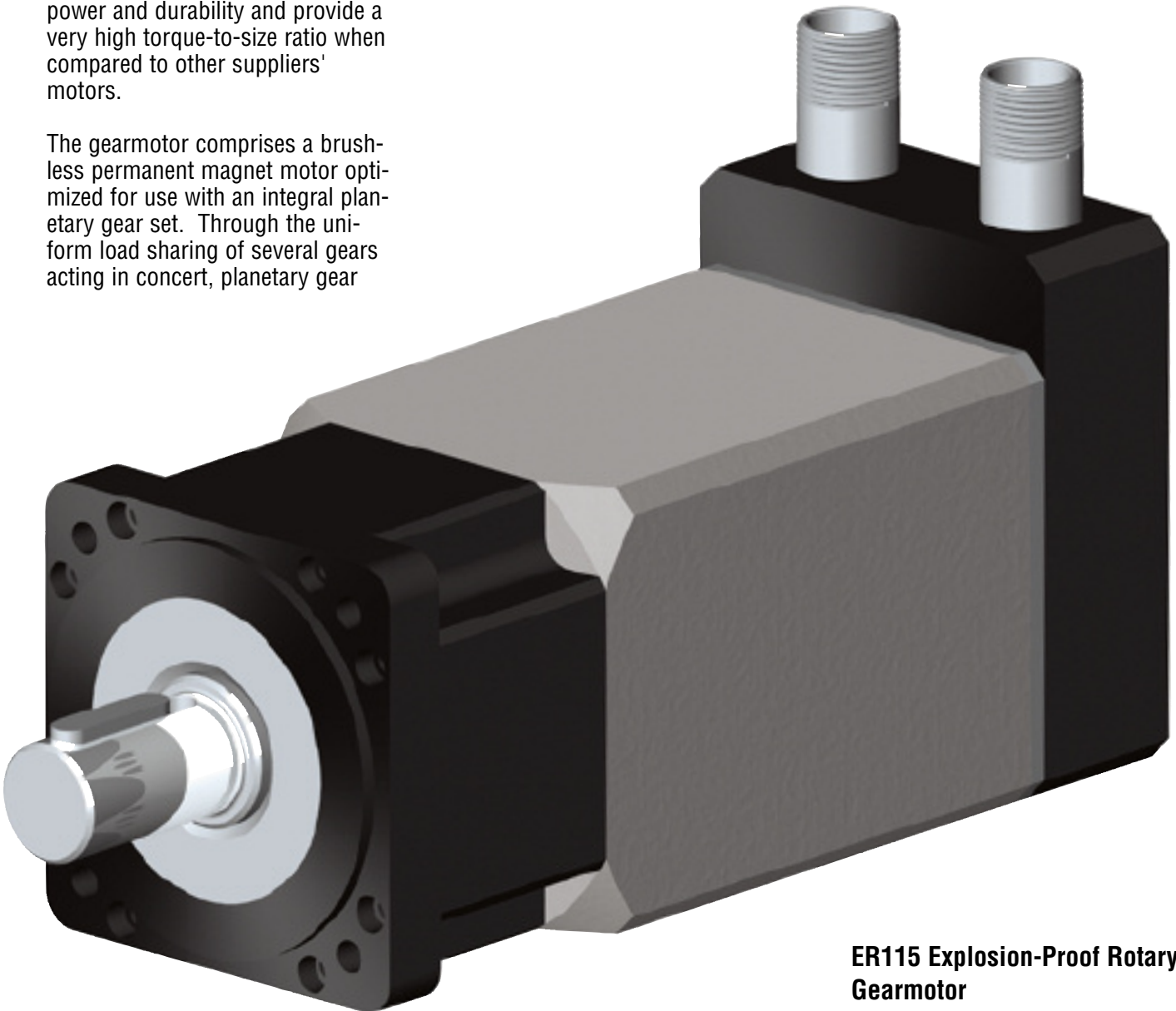
The gearmotor comprises a brushless permanent magnet motor optimized for use with an integral planetary gear set. Through the uniform load sharing of several gears acting in concert, planetary gear

heads are a very compact, reliable solution providing high torque, low backlash and low maintenance.

The ER Series motors are compatible with nearly any manufacturers' resolver-based amplifier.

**ER Series motors are rated for Class I, div 1, Groups B, C and D. "Class I" means that flammable gasses or vapors may be present in the air in quantities sufficient to produce explosive or ignitable mixtures. "Division 1" means that hazardous concentrations in the air may exist continuously, intermit-*

tently, or periodically under normal operating conditions. "Group B" allows for atmospheres containing hydrogen, or gasses (or vapors) of equivalent hazard, such as manufactured gas. "Group C" allows for atmospheres containing ethyl-ether vapors, ethylene or cyclo propane. "Group D" allows for atmospheres containing gasoline, hexane, naphtha, benzene, butane, alcohol, acetone, benzol, lacquer solvent vapors or natural gas. ER Series motors are not rated for operation in atmospheres containing acetylene.



ER115 Explosion-Proof Rotary Gearmotor

Class I, div 1, Groups B, C and D

Features

T-LAM technology yielding 35% increase in continuous motor torque over traditional windings

Resolver feedback

8 pole motors

Rod end options

1, 2, or 3 stack motor availability compatible with nearly any resolver based servo amplifier

Several mounting configurations

Potted NPT connectors

Windings from 24 VDC to 460 VAC rms

Class 180H insulation system

**TYPICAL APPLICATIONS
FOR EL SERIES
EXPLOSION-PROOF MOTORS
ARE WELL-SUITED TO MANY
APPLICATIONS SUCH AS:**

Turbine fuel flow

Printing presses

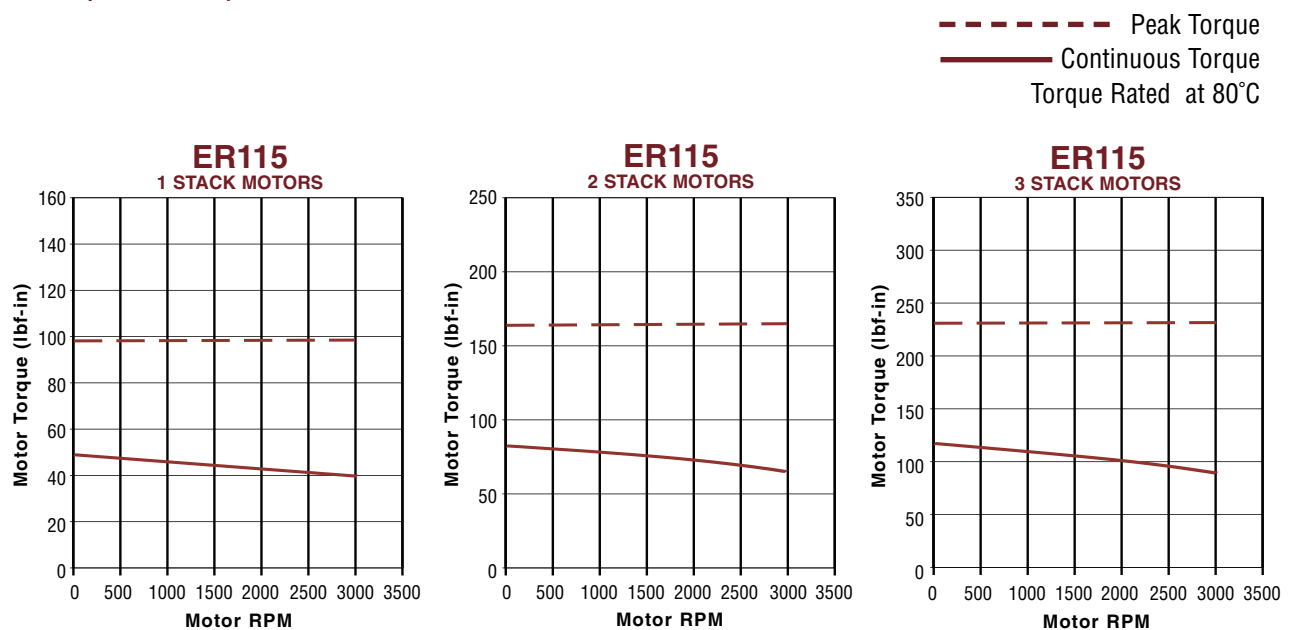
Engine test stands

Fuel distribution systems

Chemical process plants

Shipbound fuel management

ER Speed/Torque Curves



ER115 Electrical/Mechanical Specifications

ER115 Motor Stator Data		1A8	1B8	118	138	158	168	2A8	2B8	238	258	268	338	358	368	
Sinusoidal Commutation Data																
Continuous Motor Torque*	lbf-in	49.7	49.7	50.5	50.5	50.6	50.5	83.3	83.3	84.0	82.5	84.0	117.3	117.6	120.4	
	(N-m)	(5.61v)	(5.61v)	(5.70)	(5.70v)	(5.72)	(5.70)	(9.41)	(9.41)	(9.49)	(9.32)	(9.49)	(13.25)	(13.29)	(13.60)	
Peak Motor Torque	lbf-in	99.3	99.3	101.0	101.0	101.2	100.9	166.6	166.6	168.0	165.0	168.0	234.6	235.3	240.8	
	(N-m)	(11.22)	(11.22)	(11.41)	(11.41)	(11.44)	(11.40)	(18.82)	(18.82)	(18.98)	(18.64)	(18.98)	(26.50)	(26.58)	(27.21)	
Torque Constant (Kt)	lbf-in/A	5.3	5.3	4.3	8.7	15.7	17.4	5.3	5.3	8.7	15.9	17.4	8.5	15.9	17.6	
(+/- 10% @ 80°C)	N-m/A	0.60	0.6	0.5	1.0	1.8	2.0	0.6	0.6	1.0	1.8	2.0	1.0	1.8	2.0	
Cont. Current Rating	A	10.5	10.5	13.0	6.5	3.6	3.2	17.6	17.6	10.8	5.8	5.4	15.4	8.3	7.7	
Peak Current Rating	A	21.0	21.0	26.0	13.0	7.2	6.5	35.2	35.2	2.16	11.6	10.8	30.8	16.6	15.3	
Trapezoidal Commutation Data																
Continuous Motor Torque	lbf-in	47.4	47.4	48.2	48.2	48.3	48.2	79.5	79.5	80.2	78.8	80.2	112.0	112.3	115.0	
	(N-m)	(5.36)	(5.36)	(5.45)	(5.45)	(5.46)	(5.45)	(8.99)	(8.99)	(9.06)	(8.90)	(9.06)	(12.66)	(12.69)	(12.99)	
Peak Motor Torque	lbf-in	94.8	94.8	96.4	96.4	96.7	96.4	159.1	159.1	160.4	157.6	160.4	224.0	224.7	230.0	
	(N-m)	(10.71)	(10.7)	(10.9)	(10.9)	(10.9)	(10.9)	(18.0)	(18.0)	(18.1)	(17.8)	(18.1)	(25.3)	(25.4)	(26.0)	
Torque Constant (Kt)	lbf-in/A	4.12	4.12	3.39	6.78	12.22	13.55	4.12	4.12	6.78	12.37	13.55	6.63	12.37	13.70	
(+/- 10% @ 80°C)	(N-m/A)	(0.47)	(0.47)	(0.38)	(0.77)	(1.38)	(1.53)	(0.47)	(0.47)	(0.77)	(1.40)	(1.53)	(0.75)	(1.40)	(1.55)	
Cont. Current Rating	A	12.85	12.85	15.90	7.95	4.42	3.97	21.55	21.55	13.23	7.12	6.61	18.88	10.14	9.38	
Peak Current Rating	A	25.69	25.69	31.81	15.90	8.84	7.95	43.10	43.10	26.46	14.23	13.23	37.76	20.29	18.76	
Motor Data																
Voltage Constant (Ke)	Vrms/Krpm	51.1	51.1	42.0	83.9	151.4	167.9	53.1	51.1	83.9	153.3	167.9	82.1	153.3	169.7	
(+/- 10% @ 80°C)	Vpk /Krpm	36.1	36.1	29.7	59.4	107.1	118.7	36.1	36.1	59.4	108.4	118.7	58.1	108.4	120.0	
Pole Configuration		8	8	8	8	8	8	8	8	8	8	8	8	8	8	
Resistance (L-L) (+/- 5% @ 25°C)	Ohms	0.31	0.31	0.20	0.80	2.60	3.21	0.13	0.13	0.34	1.17	1.35	0.20	0.69	0.81	
Inductance (L-L) (+/- 15%)	mH	4.8	4.8	3.3	13.0	42.4	52.1	2.3	2.3	6.3	21.1	25.3	4.0	13.9	17.1	
Armature Inertia	lb-in-sec ²	0.00555					0.00833					0.01112				
	(kg-cm ²)	(6.27)					(9.42)					(12.56)				
Mech. Time Constant (tm),	ms	0.85	0.85	0.82	0.82	0.82	0.82	0.53	0.53	0.52	0.54	0.52	0.43	0.42	0.40	
Electrical Time Constant (te)	ms	15.73	15.73	16.26	16.26	16.34	16.25	18.41	18.41	18.72	18.06	18.72	20.08	20.19	21.16	
Damping Constant	lbf-in/krpm	0.21	0.21	0.21	0.21	0.21	0.21	0.35	0.35	0.35	0.35	0.35	0.40	0.40	0.40	
	(N-m/krpm)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.045)	(0.045)	(0.045)	
Friction Torque	lbf-in	0.56	0.56	0.56	0.56	0.56	0.56	1.00	1.00	1.00	1.00	1.00	1.20	1.20	1.20	
	(N-m)	(0.063)	(0.063)	(0.063)	(0.063)	(0.063)	(0.063)	(0.113)	(0.113)	(0.113)	(0.113)	(0.113)	(0.136)	(0.136)	(0.136)	
Bus Voltage	Vrms	24VDC	48VDC	115	230	400	460	24VDC	48VDC	230	400	460	230	400	460	
Speed @Bus Voltage	RPM	300	750	3000	3000	3000	3000	300	750	3000	3000	3000	3000	3000	3000	
Motor Wire Insulation	°C (class)	180(H)														
Insulation System Voltage Rating		460														
Thermal Switch, Stator Temp.	°C	T4 = 130°							T3A = 165°							
Environmental Rating		IP65														

ER115 Gearmotor Data

ER 115 Armature Inertia*	lbf-in-sec ² (kg-cm ²)	0.00344 (3.89)					0.00441 (4.99)					0.00538 (6.08)				
For amplifiers using peak sinusoidal ratings,multiply RMS sinusoidal Kt by 0.707,and peak current by 1.414.																
Gearing Reflected Inertia		Single Reduction					Double Reduction									
	Gear Stages	lbf-in-sec ²			(kg-cm ²)	Gear Stages			lbf-in-sec ²			(kg-cm ²)				
	4:1	0.0000132			(0.0149)	16:1			0.0000121			(0.0137)				
	5:1	0.0000087			(0.00984)	20:1, 25:1			0.0000080			(0.00906)				
	10:1	0.0000023			(0.00261)	40:1, 50:1, 100:1			0.0000021			(0.00242)				
Backlash at 1% rated torque:	10 Arc minutes					Efficiency: Single reduction 91%					Double Reduction: 86%					
*Add armature inertia to gearing inertia for total ER system inertia																

ER Series Gearmotor General Performance Specifications

Two torque ratings for the ER Series Gearmotors are given in the table below. The left hand columns give the maximum (peak) allowable output torque for the indicated ratios of each size ER Series Gearmotor. This IS NOT the rated output torque of the motor multiplied by the ratio of the reducer.

It is possible to select a configuration of the motor selection and gear ratio such that the rated motor torque, multiplied by the gear ratio exceeds these ratings. It is the responsibility of the user to ensure that the settings of the system, including the amplifier, do not allow these values to be exceeded.

The right hand columns give the output torque at the indicated speed which will result in 10,000 hour (L10). The setup of the system, including the amplifier, will determine the actual output torque and speed.

Output Torque Ratings - Mechanical

		Maximum		Output Torque @ Speed for 10,000 Hour Life					
		Output Torque		1000 RPM		3000 RPM		5000 RPM	
ER115	4:1	4696	(530.4)	1392	(157.3)	1132	(127.9)	1000	(112.9)
	5:1	4066	(459.4)	1445	(163.3)	1175	(132.8)	1040	(117.5)
	10:1	2545	(287.5)	1660	(187.6)	1350	(152.6)	1200	(135.6)
	16:1	4696	(530.4)	2112	(238.6)	1714	(193.0)	1518	(171.0)
	20:1	4696	(530.4)	2240	(253.1)	1840	(207.9)	1620	(183.0)
	25:1	4066	(459.4)	2350	(265.5)	1900	(214.7)	1675	(189.2)
	40:1	4696	(530.4)	2800	(316.4)	2240	(253.1)	2000	(225.9)
	50:1	4066	(459.4)	2900	(327.7)	2350	(265.5)	2100	(237.3)
	100:1	2545	(287.5)	2500	(282.5)	2500	(282.5)	2400	(271.2)

Radial Load and Bearing Life

Side load ratings shown below are for 10,000 hour bearing life at 25mm from motor face at given rpm. Visit www.exlar.com for full details on radial load and bearing life.

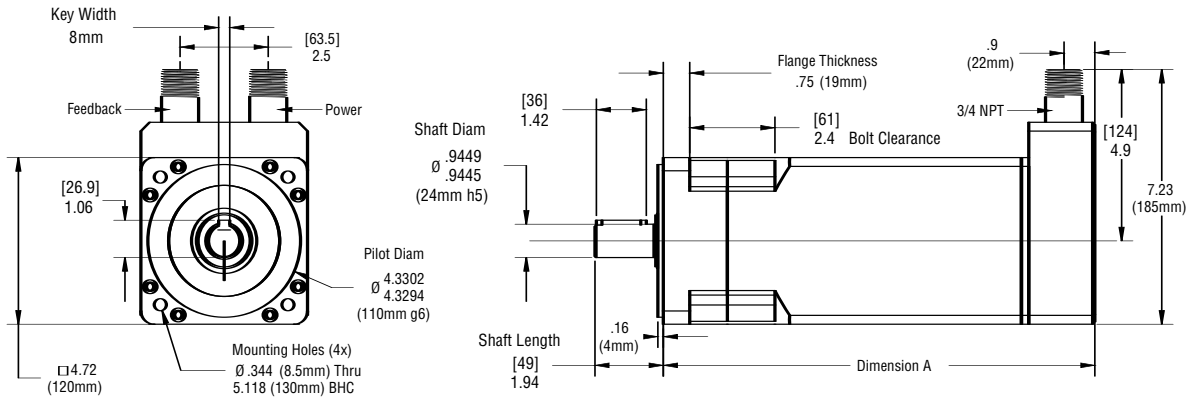
RPM		50	100	250	500	1000
ER115	lbf (N)	939 (4177)	745 (3314)	549 (2442)	435 (1935)	346 (1539)

Motor and Gearmotor Weight (lbs)

ER115	Motor	1 Stage	2 Stage
1 Stack	14.2	28	34
2 Stack	22.0	35.8	41.8
3 Stack	29.8	43.6	49.6

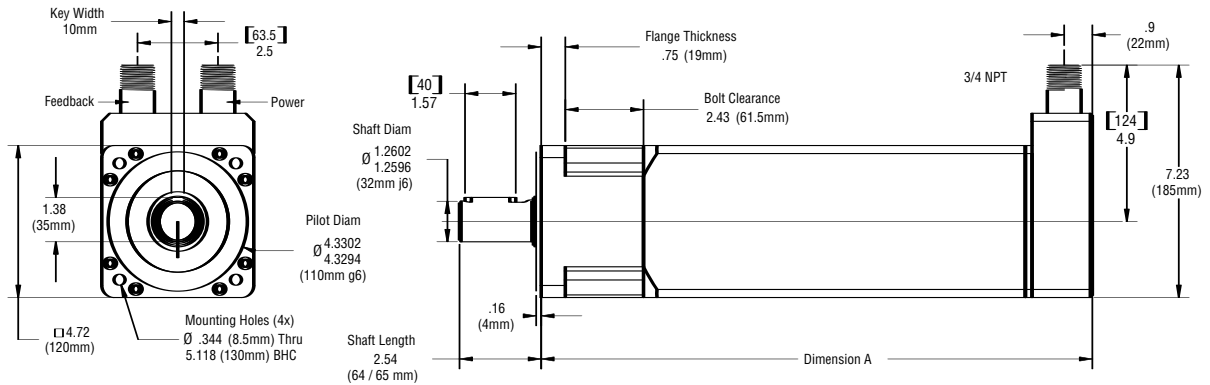
ER115 Brake Add 4.1 lbs.

ER115



Gear Reduction		Dimension "A"
Stages	Stacks	Length
0	1	8.3" (210 mm)
0	2	10.3" (261 mm)
0	3	12.3" (311 mm)

ER115 With Gear Reduction Option



Gear Reduction		Dimension "A"
Stages	Stacks	Length
1	1	11.6" (293 mm)
1	2	13.6" (344 mm)
1	3	15.6" (395 mm)
2	1	13.2" (334 mm)
2	2	15.2" (385 mm)
2	3	17.2" (436 mm)

Drawings subject to change. Consult Exlar for certified drawings.

ER115 Series Motor Ordering Information

ER - **AAA** - **BBB** - **C** - **D** - **F** - **GGG** - **HHH** - **II** - **JJJ** - **XX** - **#####**

ER = Model Series
ER = ER Series

AAA = Frame Size
115 = 115 mm frame

BBB = Gear Reduction Ratio
(Optional - blank for motor)
004 = 4:1 Single stage reduction
005 = 5:1 Single stage reduction
010 = 10:1 Single stage reduction
016 = 16:1 Two stage reduction
020 = 20:1 Two stage reduction
025 = 25:1 Two stage reduction
040 = 40:1 Two stage reduction
050 = 50:1 Two stage reduction
100 = 100:1 Two stage reduction
X = Special Gear Reduction Ratio

C = Shaft Type
K = Keyed
R = Smooth /Round
X = Special shaft

D = Connector Options
N## = Potted NPT with flying leads
= length of flying leads in feet

F = Brake Options
S = Standard no brake

1. Use of the Allen-Bradley 1394 requires assistance from Allen-Bradley to configure the axis for a custom motor.
2. Amplifiers require motor data files for operation. See www.exlar.com or contact Exlar engineering.

GGG = Brushless Amplifier (Please indicate the amplifier to be used to power the actuator)

XX1 = Custom Feedback - purchaser must supply drawing of feedback device and desired wiring drawings

001 = Standard Feedback Mount - actuator is supplied ready for size 15 resolver or encoder, includes .375 mm shaft

002 = Same as above with 8mm shaft

AB6 = Allen Bradley 1394¹ (resolver, type 2)(replaces AB2)

AP1 = API resolver based (resolver, type 2)

AM3 = Advanced Motion Controls (resolver, type 1)

BO1 = Bosch (resolver, type 2)

CC1 = Cleveland Machine Controls (resolver, type 1)

CM1 = Comau (resolver, type 1)

CS1 = Parker (Custom Servo Motors) MPA, MPSTL (resolver, type 1)

EL1 = Elmo Motion Control (resolver, type 1)

EX4 = Exlar SV2000 Series (resolver, type 1) (replaces EX3)

IN4 = Bosch-Rexroth (Indramat) ECO Drive, Standard resolver (resolver, type 1)(replaces IN3)

KM1 = Kollmorgen ServoStar Series² 230V (resolver, type 2)

KM5 = Kollmorgen ServoStar600 Series² and ServoStar CD(resolver, type 2)(replaces KM2)

LZ2 = Lenze 9300 Series (resolver, type 2)

MD1 = Modicon (resolver, type 1)

MX1 = Metronix ARS Series, Resolver type 1

OR1 = Ormec (resolver, type 2)

PC1 = Parker Compumotor Apex & Z Series (resolver, type 1)

PS3 = Pacific Scientific SC900, 700 Series (resolver, type 1)(replaces PS1)

SM2 = Siemens (resolver, type 1)

SP2 = In Motion, PAM Series (resolver, type 1)

WD1 = Whedco (GE-Fanuc) (resolver, type 1)

HHH = Motor Stator, All 8 Pole

1A8 = 1 stack, 24 Vrms, 8 pole	2A8 = 2 stack, 24 Vrms, 8 pole	338 = 3 stack, 230 Vrms, 8 pole
1B8 = 1 stack, 48 Vrms, 8 pole	2B8 = 2 stack, 48 Vrms, 8 pole	358 = 3 stack, 400 Vrms, 8 pole
118 = 1 stack, 115 Vrms, 8 pole	238 = 2 stack, 230 Vrms, 8 pole	368 = 3 stack, 460 Vrms, 8 pole
138 = 1 stack, 230 Vrms, 8 pole	258 = 2 stack, 400 Vrms, 8 pole	
158 = 1 stack, 400 Vrms, 8 pole	268 = 2 stack, 460 Vrms, 8 pole	
168 = 1 stack, 460 Vrms, 8 pole		

II = Speed Designations

01-99 Two digit number. Rated speed in rpm X 100

JJJ = Hazardous Location Temperature Rating

T3A = 180°C (Samarium Cobalt magnets)

T4 = 135°C (Neodymium-Iron-Boron magnets)

XX = Optional Speed & Mechanical Designations

XL = Special lubrication

= Part Number Designator for Specials

= Optional 5 digit assigned part number to designate unique model number for specials

Consult Exlar's application engineering department regarding all special actuator components.