

PSA Planetary Geared Servo Motors

Exlar PSA Series actuators offer you one of the highest power densities available in an electric rotary actuator system. Their unique design is especially valued in applications where weight or space is at a premium.

We created this very compact package by tucking the front motor bearing into the planet carrier and putting the rear motor bearing into the motor armature. This patented design yields much more torque in a smaller package than traditional servo motor counterparts.

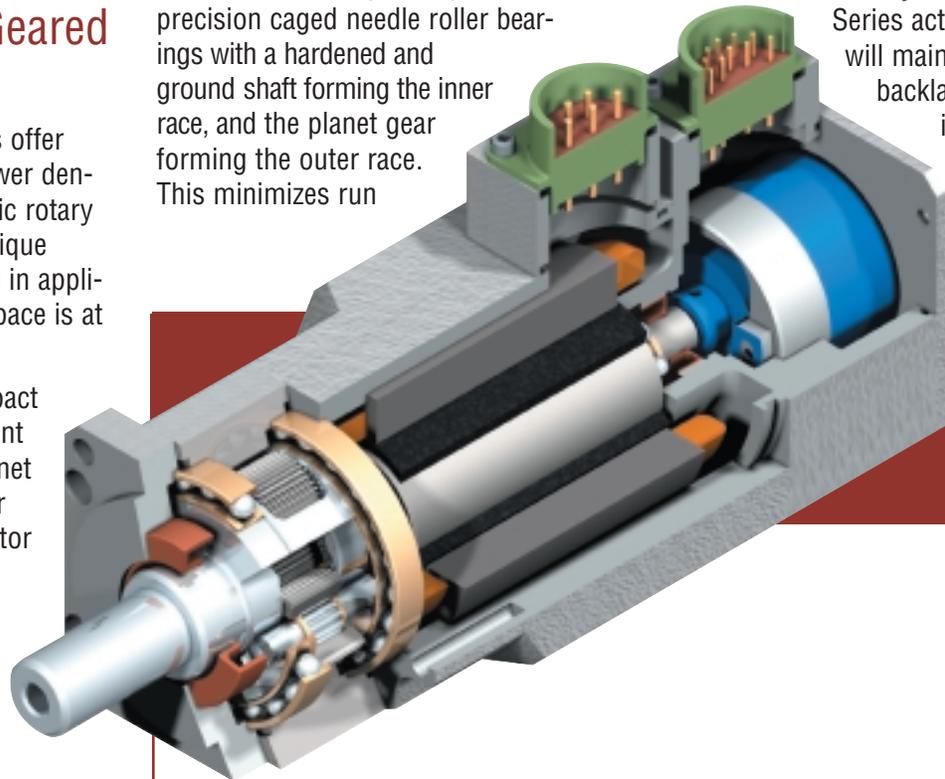
Brushless Servo Motor and Planetary Gears

The PSA Series is comprised of a brushless permanent magnet motor optimized for use with an integral planetary gear set. The motor uses neodymium iron boron magnets and is capable of operating speeds to 5000 rpm. Brushless servo design and multiple feedback options make the PSA Series actuators compatible with nearly any manufacturers' servo drives. This design is perfect for velocity, position and torque control applications.

The planet carrier and output shaft is manufactured from a single piece of stainless steel and operates with a pair of oversized ball bearings on either side of the planet gears to assure long life, high rigidity and high side load capacity. The ring and sun gears are each made from a single piece of stainless steel and

heat-treated for long lasting performance. Planet gears are manufactured from 8620 steel and heat-treated. The planet gears use precision caged needle roller bearings with a hardened and ground shaft forming the inner race, and the planet gear forming the outer race. This minimizes run

out and bearing play assuring very low backlash, under 10 arc-min. Bearing friction is reduced which means your PSA Series actuator will maintain its backlash specifications longer.



Feature	Standard	Optional
Sealed Case	IP 65 Rating	Complete Sealing
Lubrication	Shipped with Permanent (Grease) Lubrication	--
Cooling	Ports Provided on PSA 90, 115, & 142 for Conversion to Oil Lubrication & Cooling at Any Time	External Oil Circ. Component
Materials & Coatings	Exposed Metal: 17-4 SS & 6061 T6 Al. Case Coating: Epoxy Pwdr Coat, Wrinkle Finish (Grey)	Food Grade White Epoxy, Electroless Nickel, Stainless Steel
Motor Voltage	170, 325, 650VDC	24VDC & Others
Motor Speed	3,000 - 5,000 RPM	To Meet O.E.M. Requirements
Servo Drive Compatability	Encoder or Resolver Feedbacks to Match Drives from Over 15 Mfgs.	Special Feedback Devices To Meet Application Requirements
Gear Reductions	3:1, 5:1 & 10:1	Yes*
Class I & II Explosion Proof	No	Yes*
Integral Power-Off Brake (24 VDC)	No	Yes*

*Special OEM options, see details page 53.

Sealed Units

The standard case coating is epoxy powder coat, gray wrinkle finish. All models are greased with a synthetic lubricant containing EP (Extreme Pressure) additives suitable for gears and sealed to the IP65 standard. Viton seals assure maximum seal life and O-rings provide complete sealing of the body of the motor. For more torque and higher power on a continuous basis, an oil cooling option is available. (See text on options, next page.)

Standard Metric Dimensions

PSA flanges are designed to make retrofitting easy. They are available in 60, 90, 115, and 142 metric frame sizes with industry standard mounting dimensions.

Benefits of Servo Motor/Gear Reducer Combinations

Many applications require less speed and more torque than is economically available from a servo motor connected directly to the load. A gear reducer trades top end speed, which may not be required, for an increase in output torque. Optionally, PSA motors can be wound to operate at higher than conventional servo motor speeds to further optimize the design for high power and critically compact applications.

A servo system's performance is optimal when the load inertia is similar to the motor inertia. Frequently, instability and settling time delays result if the load inertia is high, compared to the motor armature inertia. Gear reducers are the perfect solution for this common phenomenon. The reflected inertia,

which is the load inertia as seen by the control system, is reduced by the square of the gear ratio when a gear reducer is employed. For example, a 5 to 1 reduction ratio provides a 25 times reduction in the reflected load inertia ratio, thus assuring stable system operation and optimal machine performance.

Planetary Gears – A Superior Choice

Through the uniform load sharing of several gears acting in concert, planetary gearheads are a very compact, reliable solution with high torque ratings, low backlash and low maintenance. Planetary gears stay well lubricated due to the mixing motion of the planet gears with the outer ring gear. A single drop of lubricant on one tooth will eventually get evenly redistributed over the entire gear set, which is not the case for gear reducers using non-planetary gear arrangements.

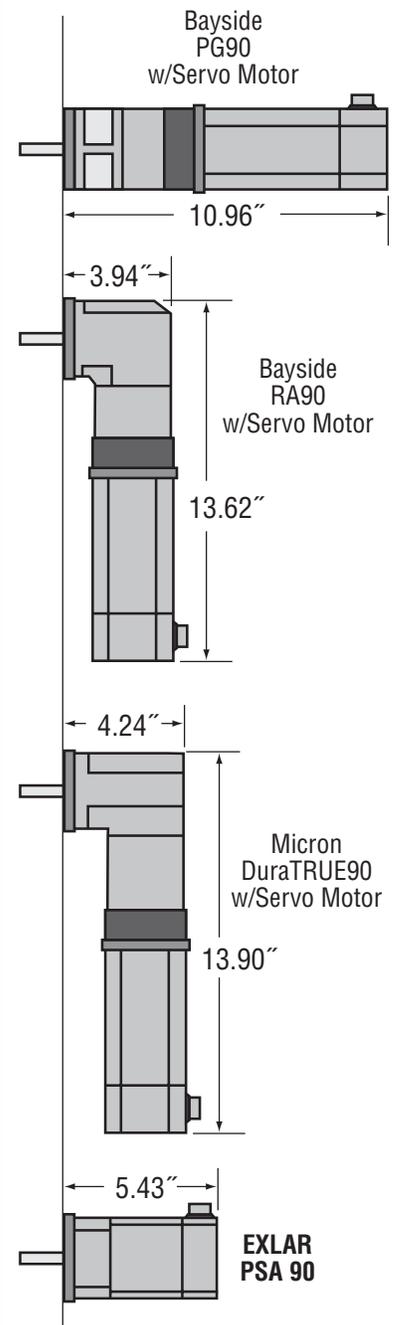
No More Clamp or Pinion Gear Problems

Add-on servo gearheads use a collar clamp to attach the pinion gear to the motor shaft which can easily be mis-aligned. By integrating our planetary gears within the motor we have eliminated all clamps, pinions and the associated problems.

No Need for a Right Angle Gear Reducer

In the past, right angle reducers were used when the shortest possible motor/gear reducer length was required. Because they use an extra set of bevel gears to make the turn, they are expensive and the extra set of gears compromises both positioning accuracy and working life.

Comparisons of Common Servo Actuator's Overhang Dimensions



Custom Engineered Solutions to Fit Your Requirements

- With oil cooling, the PSA Series actuators can typically operate at up to three times the nominal torque and power rating. The system pumps a small amount of low pressure cooling oil through the actuator, removing excess heat and lubricating the gear set and bearings. The PSA90, PSA115 and PSA142 actuators each has two threaded ports which are used for connecting the cooling oil lines (a standard feature on these sizes). Installation can be done even after the actuator has been installed should excessive heat generation unexpectedly occur during initial machine trials because additional torque or power is needed.

- Alternative connector options to the standard MS type are available.
- The integrated brushless motor can be specially designed for operation with amplifiers that operate on other input voltages such as 24, 48 or 125VDC.
- Exlar can provide a wide range of output options. The shaft may be a standard keyed shaft, a smooth shaft, or an ISO 9409 flange may also be supplied. To extend the radial load capacity special bearings can be utilized. The standard actuator is supplied with metric pilot diameters and mounting hole patterns. Other pilot diameters and hole patterns can be supplied. A side mount option is also available.
- Feedback options include encoder or resolver-based feedback configured for nearly any servo amplifier. Special feedback devices may also be incorporated.
- Special materials can be specified for the housing. Exlar can recommend various materials and coatings for demanding environments including salt water, chloride, food processing and more.

If your application requires special OEM options such as brakes, special gear ratios or explosion proof design, these can be engineered. Please call us at 952-368-3434 to discuss the quotation and the longer lead time that applies to special options.

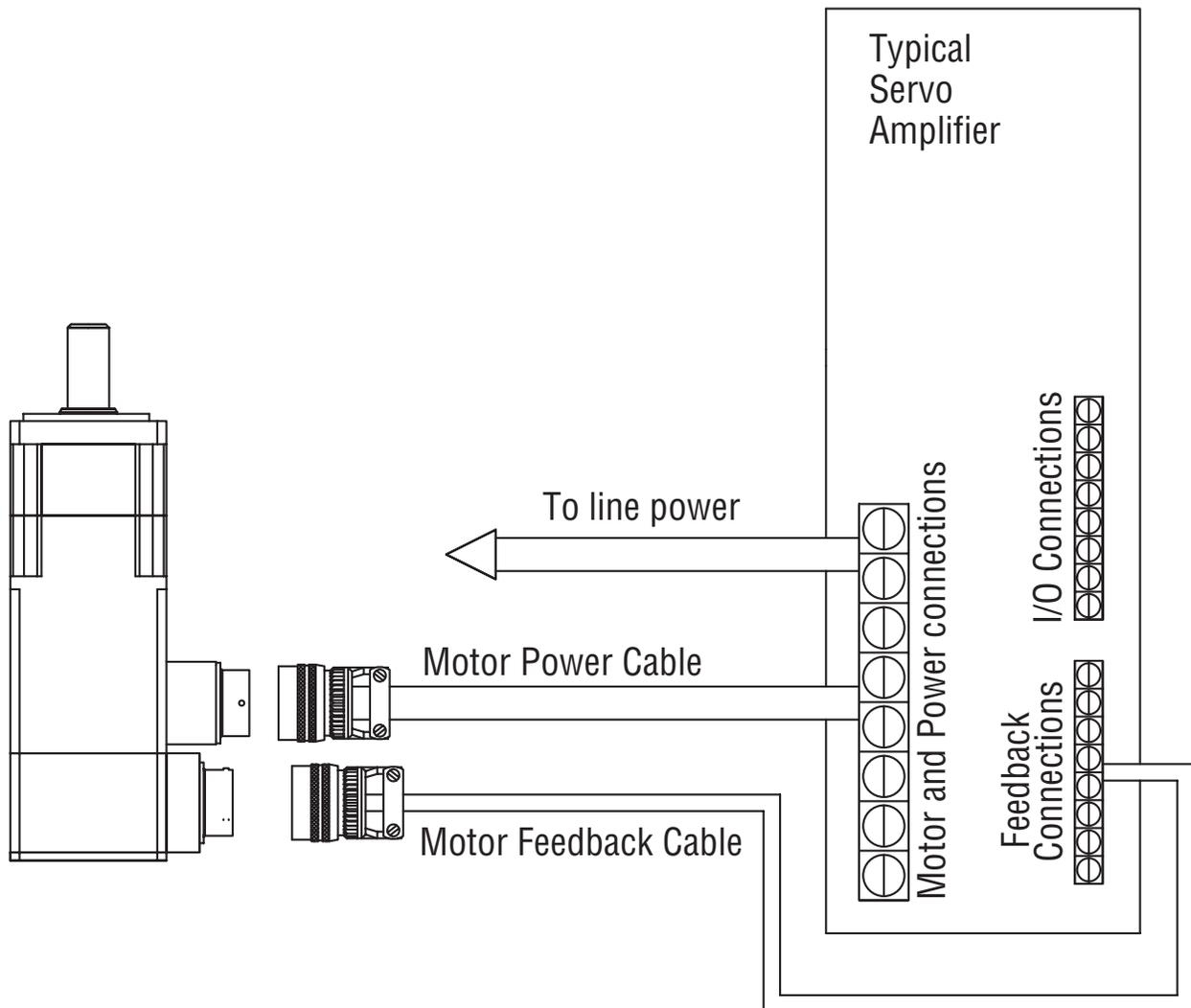
PSA Actuator System Configuration

PSA Series actuators include integrated brushless servo motors. Exlar's unique design gives users a variety of the feedback configuration options so PSA units can be powered by almost any brushless motor amplifier on the market.

This flexibility means PSA actuators can be incorporated into today's highest performance single and multi-axis motion control systems. In anything from food and beverage packaging, to multi-axis turning centers, to aircraft assembly, PSA Series units show incredible performance and durability.

The schematic below shows the typical connections for a single axis system with actuator and servo amplifier.

Typical System Configuration



Drawings subject to change. Consult Exlar for certified drawings.

PSA Series Actuator Cable Selection Guide

This section provides you with cable and wiring information for operation of your PSA Series with both Exlar's and other manufacturers' servo drives.

The "O" connector option on the PSA series of actuators provides for an actuator with Exlar's standard MS style connectors, compatible with Exlar's standard cables.

The "M" connector option on the PSA series of actuators provides for an actuator configured with connectors that allow the end user to purchase the feedback cable, or power and feedback cables for their actuator from the manufacturer of their servo amplifier, thus eliminating the headaches and confusion that can arise from power and feedback wiring.

Depending on actuator size, voltage, and the cable availability from the amplifier manufacturer, some cables must be obtained from Exlar.

For amplifier manufacturers who use standard style military connectors, with

molded and shielded cables, the feedback cable can be purchased from the amplifier manufacturer, and the power cable purchased from Exlar. The Exlar power cables with the PCx-MC-xxx model numbers are molded and shielded and provide a good match with the cables provided by the amplifier manufacturer.

For some amplifier manufacturers who utilize a different style of connector, when the "M" option is available from Exlar, both the connectors will be configured to allow the feedback and power cables to be purchased from the amplifier manufacturer. Consult Exlar for details on all connector configurations.

Cable Selection For PSA Series Actuators With "O" Connectors

Exlar Actuator	Cable Type	Cable manufacturer	Cable part number
PSA60, PSA90	Power Cable	Exlar	PC1-AC-xxx
	Resolver Feedback cable	Exlar	RC1-AC-xxx
	Encoder cable	Exlar	EC1-AC-xxx
	Brake/Limit Switch cable	Exlar	BC1-AC-xxx
PSA115, PSA142	Power Cable	Exlar	PC1-AC-xxx
	Resolver Feedback cable	Exlar	RC1-AC-xxx
	Encoder cable	Exlar	EC1-AC-xxx
	Brake/Limit Switch cable	Exlar	BC1-AC-xxx

Each of the cables shown in the above table is connectorized with military connectors on the motor end and has flying leads on the amplifier end. These cables will require the end user to attach any required connectors on the amplifier end. Amplifiers with screw terminals or interface terminal strips can be directly connected using these cables.

Cable Selection For PSA Series Actuators With "M" Connectors

Exlar Actuator	Amp Manufacturer and Model	Cable Type	Cable Manufacturer	Manufacturer Cable Part Number
PSA60, PSA90	Allen Bradley Ultra	Encoder feedback Power	Allen Bradley Exlar	9101-1366-xxx PC6-MC-xxx
	Electro-Craft BRU-Series Advantage	Encoder feedback Power	Electro-Craft Exlar	9101-1366-xxx PC6-MC-xxx
	Emerson EN and Epsilon Series	Encoder feedback Power	Emerson Emerson	CFCS-xxx CMDS-xxx
	Emerson FX Series	Resolver feedback Power	Emerson Emerson	ECF-xxx ECM-xxx
	Exlar TX Series	Encoder Feedback Power	Exlar Exlar	EC3-MC-xxx PC6-MC-xxx
	Kollmorgen Servo Star	Power Resolver feedback	Kollmorgen Kollmorgen	CS-SSRHA1HE-xx CS-SSRHA1HE-xx
PSA115, PSA142	Allen Bradley Ultra Series	Encoder feedback Power	Allen Bradley Exlar	9101-1366-xxx PC7-MC-xxx
	Electro-Craft BRU-Series Advantage	Encoder feedback Power	Electro-Craft Exlar	9101-1366-xxx PC7-MC-xxx
	Emerson EN and Epsilon Series	Encoder feedback Power	Emerson Emerson	CFCS-xxx CMMS-xxx
	Emerson FX Series	Resolver feedback Power	Emerson Emerson	ECF-xxx ECL-xxx
	Kollmorgen Servo Star	Resolver Feedback Power	Kollmorgen Kollmorgen	CS-SSRHA1HE-xx CS-SSRHA1HE-xx

If you would like to use a configuration not shown above, contact Exlar applications engineering. Exlar is not responsible for changes made by amplifier manufacturers. This information is believed to be correct and is subject to change without notice.

General Performance Specifications

PSA 60		Torque with Grease Lubrication			Torque with Oil Cooling		
Reduction Ratio	Max Output RPM*	Short Stack in-lb (Nm)	Med. Stack in-lb (Nm)	Long Stack in-lb (Nm)	To achieve the smallest possible package size, the PSA60 does not have standard ports for oil cooling. For a custom design with ports, contact Exlar engineering. The PSA90,115 and 142 have standard ports.		
3	1666	15 (1.7)	28 (3.2)	36 (4.1)			
5	1000	25 (2.8)	47 (5.3)	60 (6.8)			
10	500	50 (5.6)	93 (10.5)	120 (13.6)			
PSA 90		Torque with Grease Lubrication			Torque with Oil Cooling		
Reduction Ratio	Max Output RPM*	Short Stack in-lb (Nm)	Med. Stack in-lb (Nm)	Long Stack in-lb (Nm)	Short Stack in-lb (Nm)	Med. Stack in-lb (Nm)	Long Stack in-lb (Nm)
3	1000	33 (3.7)	60 (6.8)	86 (9.7)	99 (11.2)	180 (20.3)	258 (29.2)
5	600	55 (6.2)	100 (11.3)	143 (16.2)	165 (18.6)	300 (33.9)	430 (48.6)
10	300	110 (12.4)	200 (22.6)	287 (32.4)	330 (37.3)	525 (59.3)	525 (59.3)
PSA 115		Torque with Grease Lubrication			Torque with Oil Cooling		
Reduction Ratio	Max Output RPM*	Short Stack in-lb (Nm)	Med. Stack in-lb (Nm)	Long Stack in-lb (Nm)	Short Stack in-lb (Nm)	Med. Stack in-lb (Nm)	Long Stack in-lb (Nm)
3	1000	97 (11.0)	153 (17.3)	213 (24.1)	291 (32.9)	459 (51.9)	639 (72.2)
5	600	162 (18.3)	255 (28.8)	355 (40.1)	485 (54.8)	765 (86.4)	1010 (114.1)
10	300	323 (36.5)	510 (57.6)	710 (80.2)	970 (109.6)	970 (109.6)	970 (109.6)
PSA 142		Torque with Grease Lubrication			Torque with Oil Cooling		
Reduction Ratio	Max Output RPM*	Short Stack in-lb (Nm)	Med. Stack in-lb (Nm)	Long Stack in-lb (Nm)	Short Stack in-lb (Nm)	Med. Stack in-lb (Nm)	Long Stack in-lb (Nm)
3	800	135 (15.2)	228 (25.7)	387 (43.7)	270 (30.5)	456 (51.5)	774 (87.5)
5	480	225 (25.4)	380 (42.9)	645 (72.8)	450 (50.8)	760 (85.9)	1290 (145.8)
10	240	450 (50.8)	760 (85.9)	1290 (145.8)	900 (101.7)	1520 (171.8)	2580 (291.5)

The values in this table are approximate. The performance and type of commutation performed by the chosen servo amplifier will affect the continuous torque rating. Consult the detailed motor information to determine the torque for your amplifier. These are attainable steady state torques, and assume an ambient temperature of 25 degrees C.

These torques may be exceeded momentarily, consult Exlar for details. Specifications subject to change without notice.

*Voltage options allow for catalog rated performance at varying amplifier bus voltages.

General Specifications (For total inertia, add correct armature inertia to proper ratio gear inertia.)

PSA 60				
		Short	Medium	Long
Nominal Backlash, arc-min		10		
Armature inertia (motor only)	lbf-in-sec ² (kg-m ²)	2.42x10 ⁻⁴ (2.74x10 ⁻⁵)	4.56x10 ⁻⁴ (5.17x10 ⁻⁵)	6.87x10 ⁻⁴ (7.76x10 ⁻⁵)
Reflected inertia 3:1 gear set	lbf-in-sec ² (kg-m ²)	7.07x10 ⁻⁵ (7.98x10 ⁻⁶)		
Reflected inertia 5:1 gear set	lbf-in-sec ² (kg-m ²)	2.22x10 ⁻⁵ (2.51x10 ⁻⁶)		
Reflected inertia 10:1 gear set	lbf-in-sec ² (kg-m ²)	5.56x10 ⁻⁶ (6.29x10 ⁻⁷)		
PSA 90				
Nominal Backlash, arc-min		10		
Armature inertia (motor only)	lbf-in-sec ² (kg-m ²)	5.50x10 ⁻⁴ (6.21x10 ⁻⁵)	8.99x10 ⁻⁴ (1.02x10 ⁻⁵)	1.34x10 ⁻³ (1.52x10 ⁻⁴)
Reflected inertia 3:1 gear set	lbf-in-sec ² (kg-m ²)	4.54x10 ⁻⁴ (5.13x10 ⁻⁵)		
Reflected inertia 5:1 gear set	lbf-in-sec ² (kg-m ²)	1.90x10 ⁻⁴ (2.15x10 ⁻⁵)		
Reflected inertia 10:1 gear set	lbf-in-sec ² (kg-m ²)	4.79x10 ⁻⁶ (5.41x10 ⁻⁶)		
PSA 115				
Nominal Backlash, arc-min		10		
Armature inertia (motor only)	lbf-in-sec ² (kg-m ²)	2.36x10 ⁻³ (2.66x10 ⁻⁴)	4.26x10 ⁻³ (4.816x10 ⁻⁴)	6.165x10 ⁻³ (6.97x10 ⁻⁴)
Reflected inertia 3:1 gear set	lbf-in-sec ² (kg-m ²)	1.97x10 ⁻³ (2.23x10 ⁻⁴)		
Reflected inertia 5:1 gear set	lbf-in-sec ² (kg-m ²)	7.36x10 ⁻⁴ (8.32x10 ⁻⁵)		
Reflected inertia 10:1 gear set	lbf-in-sec ² (kg-m ²)	1.84x10 ⁻⁴ (2.08x10 ⁻⁵)		
PSA 142				
Nominal Backlash, arc-min		10		
Armature inertia (motor only)	lbf-in-sec ² (kg-m ²)	4.85x10 ⁻³ (5.48x10 ⁻⁴)	8.81x10 ⁻³ (9.96x10 ⁻⁴)	1.76x10 ⁻² (1.99x10 ⁻³)
Reflected inertia 3:1 gear set	lbf-in-sec ² (kg-m ²)	5.49x10 ⁻³ (6.21x10 ⁻⁴)		
Reflected inertia 5:1 gear set	lbf-in-sec ² (kg-m ²)	1.83x10 ⁻³ (2.07x10 ⁻⁴)		
Reflected inertia 10:1 gear set	lbf-in-sec ² (kg-m ²)	4.53x10 ⁻⁴ (5.11x10 ⁻⁵)		
Standard Connection Receptacles				
Standard motor power receptacle*		MS-3112-16-8P		
Standard motor feedback receptacle*		MS-3112-14-18P		
Stator wire insulation		Class H		
Motor stator rating		Class F		
*Note: The "M" manufacturer's connector option may use different receptacles than the standard that are listed in this table. Contact Exlar Engineering for details. All specifications subject to change without notice.				

Motor Specifications

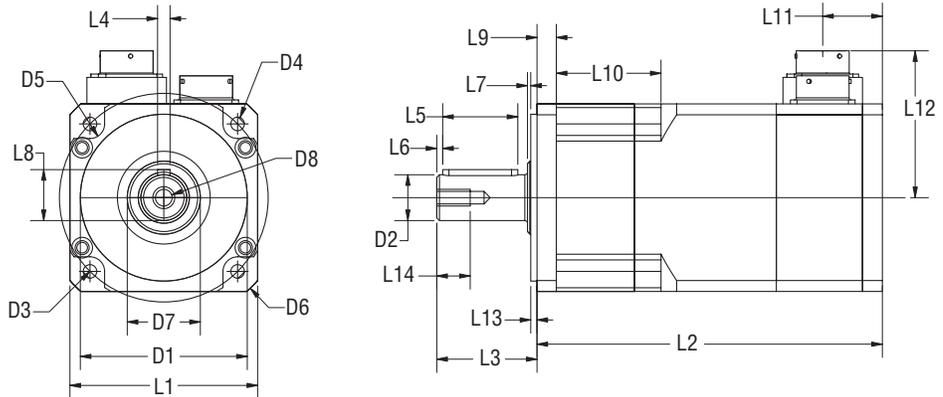
PSA60		L6 Medium	M6 Short	M6 Medium	M6 Long	H6 Medium
Trapezoidal Commutation						
Continuous Motor Torque	lbf-in (Nm)	9.7 (1.10)	5.1 (0.58)	9.3 (1.05)	12.3 (1.39)	8.7 (0.98)
Peak Motor Torque	lbf-in (Nm)	19.4 (2.19)	10.2 (1.15)	18.6 (2.10)	24.6 (2.78)	17.4 (1.20)
Torque Constant (Kt)	lbf-in/A (Nm/A)	2.26 (0.26)	4.43 (0.50)	4.69 (0.53)	4.55 (0.51)	9.35 (1.06)
Continuous Current Rating	Amps	4.30	1.16	1.98	2.70	0.93
Peak Current Rating	Amps	8.60	2.32	3.95	5.40	1.86
RMS Sinusoidal Commutation						
Continuous Motor Torque	lbf-in (Nm)	10.2 (1.15)	5.4 (0.61)	9.7 (1.10)	12.9 (1.45)	9.1 (1.03)
Peak Motor Torque	lbf-in (Nm)	20.4 (2.31)	10.8 (1.22)	19.4 (2.19)	25.8 (2.92)	18.2 (2.06)
Torque Constant (Kt)	lbf-in/A (Nm/A)	2.90 (0.33)	5.68 (0.64)	6.02 (0.68)	5.83 (0.66)	12.00 (1.36)
Continuous Current Rating	Amps	3.51	0.95	1.61	2.20	0.76
Peak Current Rating	Amps	7.02	1.89	3.23	4.41	1.52
Motor Stator Data						
Voltage Constant (Ke)	Vrms/krpm (Vpk/kprm)	19.6 (28.10)	40.1 (57.5)	40.8 (58.5)	39.5 (56.0)	81.6 (117.0)
Pole Configuration		6	6	6	6	6
Resistance	(L-L) Ohms	1.72	23.66	8.11	4.35	36.52
Inductance	(L-L) mH	1.08	9.26	4.69	2.87	18.76
Bus Voltage	VDC	170	325	325	325	650
Speed @ Bus Voltage	rpm	5000	5000	5000	5000	5000

Motor Specifications (continued on next page)

All specifications subject to change without notice.

Motor Specifications (continued)						
PSA90		L6 Medium	M6 Short	M6 Medium	M6 Long	H6 Medium
Trapezoidal Commutation						
Continuous Motor Torque	lbf-in (Nm)	20.3 (2.30)	11.0 (1.24)	20.9 (2.37)	29.3 (3.30)	20.8 (2.35)
Peak Motor Torque	lbf-in (Nm)	40.6 (4.59)	22.0 (2.71)	41.8 (4.72)	58.6 (6.62)	41.6 (4.70)
Torque Constant (Kt)	lbf-in/A (Nm/A)	3.63 (0.41)	6.85 (0.77)	7.26 (0.82)	7.48 (0.84)	14.52 (1.64)
Continuous Current Rating	Amps	5.61	1.61	2.88	3.91	1.44
Peak Current Rating	Amps	11.21	3.21	5.77	7.82	2.87
RMS Sinusoidal Commutation						
Continuous Motor Torque	lbf-in (Nm)	21.3 (2.41)	11.5 (1.30)	21.9 (2.48)	30.6 (3.46)	21.8 (2.47)
Peak Motor Torque	lbf-in (Nm)	42.6 (4.81)	23.0 (2.60)	43.8 (4.95)	61.2 (6.92)	43.6 (4.93)
Torque Constant (Kt)	lbf-in/A (Nm/A)	4.65 (0.53)	8.79 (0.99)	9.31 (1.05)	9.59 (1.08)	18.62 (2.10)
Continuous Current Rating	Amps	4.58	1.31	2.35	3.19	1.17
Peak Current Rating	Amps	9.16	2.62	4.71	6.39	2.34
Motor Stator Data						
Voltage Constant (Ke)	Vrms/krpm (Vpk/kprpm)	31.2 (45.0)	61.3 (88.5)	62.4 (90.0)	63.5 (91.5)	124.8 (180.0)
Pole Configuration		6	6	6	6	6
Resistance (L-L)	Ohms	2.37	28.90	8.96	4.87	36.17
Inductance (L-L)	mH	3.92	37.80	15.72	9.62	62.92
Bus Voltage	VDC	170	325	325	325	650
Speed @ Bus Voltage	rpm	3000	3000	3000	3000	3000
PSA115		L8 Medium	M8 Short	M8 Medium	M8 Long	H8 Medium
Trapezoidal Commutation						
Continuous Motor Torque	lbf-in (Nm)	54.2 (6.12)	32.3 (3.65)	52.0 (5.88)	73.0 (8.25)	50.8 (5.74)
Peak Motor Torque	lbf-in (Nm)	108.4 (12.25)	64.6 (7.30)	104.0 (11.75)	146.0 (16.50)	101.6 (11.48)
Torque Constant (Kt)	lbf-in/A (Nm/A)	3.28 (0.37)	6.41 (0.72)	6.55 (0.74)	6.62 (0.75)	13.09 (1.48)
Continuous Current Rating	Amps	16.51	5.04	7.94	11.03	3.88
Peak Current Rating	Amps	33.02	10.08	15.88	22.05	7.76
RMS Sinusoidal Commutation						
Continuous Motor Torque	lbf-in (Nm)	56.7 (6.41)	33.8 (3.82)	54.5 (6.15)	76.5 (8.64)	53.2 (6.01)
Peak Motor Torque	lbf-in (Nm)	113.4 (12.81)	67.6 (7.64)	109.0 (12.32)	153.0 (17.29)	106.4 (12.02)
Torque Constant (Kt)	lbf-in/A (Nm/A)	4.21 (0.48)	8.22 (0.93)	8.40 (0.95)	8.50 (0.96)	16.79 (1.90)
Continuous Current Rating	Amps	13.48	4.12	6.48	9.00	3.17
Peak Current Rating	Amps	26.96	8.23	12.96	18.01	6.34
Motor Stator Data						
Voltage Constant (Ke)	Vrms/krpm (Vpk/kprpm)	28.5 (40.3)	56.9 (80.5)	56.9 (80.5)	56.9 (80.5)	113.8 (161.0)
Pole Configuration		8	8	8	8	8
Resistance (L-L)	Ohms	0.30	3.19	1.29	0.67	5.38
Inductance (L-L)	mH	0.47	3.75	2.49	1.25	7.50
Bus Voltage	VDC	170	325	325	325	650
Speed @ Bus Voltage	rpm	3000	3000	3000	3000	3000
PSA142		L6 Medium	M6 Short	M6 Medium	M6 Long	H6 Medium
Trapezoidal Commutation						
Continuous Motor Torque	lbf-in (Nm)	75.4 (8.52)	43.5 (4.92)	76.5 (8.64)	132.3 (14.94)	74.1 (8.37)
Peak Motor Torque	lbf-in (Nm)	150.8 (17.04)	87.0 (9.83)	153.0 (17.3)	264.60 (29.90)	148.2 (16.75)
Torque Constant (Kt)	lbf-in/A (Nm/A)	4.58 (0.52)	8.83 (1.00)	9.16 (1.03)	9.72 (1.10)	17.88 (2.02)
Continuous Current Rating	Amps	16.47	4.93	8.35	13.60	4.14
Peak Current Rating	Amps	32.95	9.87	16.71	27.21	8.28
RMS Sinusoidal Commutation						
Continuous Motor Torque	lbf-in (Nm)	78.9 (8.92)	45.6 (5.15)	80.1 (9.05)	138.5 (15.65)	77.6 (8.76)
Peak Motor Torque	lbf-in (Nm)	157.8 (17.83)	91.2 (10.31)	160.20 (29.40)	277.0 (31.3)	155.2 (17.54)
Torque Constant (Kt)	lbf-in/A (Nm/A)	5.87 (0.66)	11.32 (1.28)	11.75 (1.33)	12.47 (1.41)	22.94 (2.59)
Continuous Current Rating	Amps	13.45	4.03	6.82	11.11	3.38
Peak Current Rating	Amps	26.90	8.05	13.64	22.21	6.76
Motor Stator Data						
Voltage Constant (Ke)	Vrms/krpm (Vpk/kprpm)	41.0 (57.0)	82.0 (114.0)	82.0 (114.0)	85.0 (118.5)	160.0 (223.0)
Pole Configuration		6	6	6	6	6
Resistance (L-L)	Ohms	0.45	5.02	1.75	0.66	7.12
Inductance (L-L)	mH	1.71	16.43	6.93	3.12	27.54
Bus Voltage	VDC	170	170	325	325	650
Speed @ Bus Voltage	rpm	2400	2400	2400	2400	2400
All ratings at 25 degrees Celsius For amplifiers with peak sinusoidal commutation $K_t = K_{trms}(0.707)$, $I_c = I_{crms}(0.707)$, $I_{pk} = I_{pkrms}(0.707)$						

**PSA Series
Standard Dimensions**



Model	L1		L2			L3		L4		L5		L6				
	Square Flange		Short Stack Mounted Length (1)		Med Stack Mounted Length (1)		Long Stack Mounted Length (1)		Output Shaft Length		Keyway Width (1)		Keyway Length		Keyway Setback	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
PSA60	2.36	60	5.42	138	6.65	169	7.88	200	1.46	37	0.197	5	0.98	25	0.08	2
PSA90	3.54	90	5.62	143	6.52	166	7.54	192	1.89	48	0.236	6	1.42	36	0.12	3
PSA115	4.53	115	7.65	194	9.03	229	10.4	264	2.56	65	0.394	10	1.97	50	0.2	5
PSA142	5.58	142	7.7	196	8.81	224	11.35	288	3.82	97	0.472	12	2.48	63	0.2	5

Model	L7		L8		L9		L10		L11		L12		L13		L14	
	Shaft Shoulder Height		Keyway Height		Flange Thickness		Max Mounting Bolt Length		Connector Setback CL		Connector Height		Pilot Thickness		Full Thread Depth	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
PSA60	0.06	1.5	0.709	18	0.35	9	2	50	Note 4	2.43	62	0.118	3	0.5	12	
PSA90	0.06	1.5	0.965	24.5	0.36	9	2	50	1.125	28.6	2.82	72	0.11	3	0.63	16
PSA115	0.08	2	1.378	35	0.44	11	2.36	60	1.06	27	3.31	84	0.157	4	1.25	31
PSA142	0.10	2.5	1.7	43	0.54	13.7	3.2	80	1.0	25.4	3.85	98	0.195	5	1.00	25

Model	D1		D2		D3		D4		D5		D6		D7		D8	
	Pilot Diameter (2)		Output Shaft Diameter (3)		Bolt Circle		Bolt Hole		Max Bolt Head Diam.		Housing Diameter		Shaft Shoulder Diameter		Shaft Thread	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm		
PSA60	1.969	50	0.63	16	2.756	70	0.217	5.5	0.394	10	3.15	80	0.87	22	M6 X 1	
PSA90	3.15	80	0.866	22	3.937	100	0.256	6.5	0.551	14	4.57	116	1.38	35	M8 X 1.25	
PSA115	4.331	110	1.26	32	5.118	130	0.335	8.5	0.63	16	5.98	152	1.77	45	M10 X 1.5	
PSA142	5.117	130	1.575	40	6.496	165	0.433	11	0.82	21	7.29	185	2.16	55	M12 X 1.75	

Note 1 - Keyway width is metric dimension with h9 tolerance

Note 3 - Shaft diameter is metric dimension with j6 tolerance

Note 2 - Pilot diameter is metric dimension with g6 tolerance

Note 4 - Connectors are in line, setbacks = .875 (22mm) and 2.385 (61mm)

Dimensions are for estimation only and are subject to change without notice.

Radial Load Specification

This table (right) shows the L₁₀ life of 10,000 hours at the specified radial load and distance.

Model	Distance from Face		Load at 50 RPM	
	in	mm	Lbf	N
PSA 60	0.5	12.5	180	800
PSA 90	0.8	20	412	1825
PSA 115	1	25	892	3950
PSA 142	1.6	40	1210	5350

All specifications subject to change without notice.

PSA Series Ordering Information	<div style="display: flex; align-items: center; gap: 10px;"> <div style="border: 1px solid black; padding: 2px 5px;">PSA</div> <div style="border: 1px solid black; padding: 2px 5px;">-</div> <div style="border: 1px solid black; padding: 2px 5px;">A</div> <div style="border: 1px solid black; padding: 2px 5px;">-</div> <div style="border: 1px solid black; padding: 2px 5px;">B</div> <div style="border: 1px solid black; padding: 2px 5px;">-</div> <div style="border: 1px solid black; padding: 2px 5px;">CDEF</div> <div style="border: 1px solid black; padding: 2px 5px;">-</div> <div style="border: 1px solid black; padding: 2px 5px;">GHIJ</div> <div style="border: 1px solid black; padding: 2px 5px;">-</div> <div style="border: 1px solid black; padding: 2px 5px;">KKK</div> <div style="border: 1px solid black; padding: 2px 5px;">-</div> <div style="border: 1px solid black; padding: 2px 5px;">Factory Assigned</div> </div>
A = Rotary Servo Actuator Size 60 = 60 mm Square Frame 90 = 90 mm Square Frame 115 = 115 mm Square Frame 142 = 142 mm Square Frame	<p>KKK = Indicate the Brushless Amplifier to be used to power the actuator</p> <p>AB1 = Allen Bradley Ultra Series⁵ (encoder, type 1⁸) AB2 = Allen Bradley 1394⁷ (resolver, type 2) AB3 = Allen Bradley Ultra Plus Series⁵ (encoder, type 2) AP1 = API resolver based (resolver, type 2) AP2 = API encoder based (encoder, type 1⁸) AM1 = Advanced Motion Controls (encoder, type 1⁸) BD1 = Baldor Flex Series (resolver, type 1) CS1 = Custom Servo Motors MPA, MPSL (resolver, type 1) CS2 = Custom Servo Motors Servo Flex (encoder, type 1⁸) EC1 = ElectroCraft BRU Advantage & BSA Series (encoder, type 1) EC2 = ElectroCraft IQ Series⁵ (encoder, type 2) EL1 = ELMO Motion Control (resolver, type 1) EM1 = Emerson EMC FX & LX series, 230 volt (resolver, type 1) EM2 = Emerson En, Epsilon Series and UNI-Drive⁵ (encoder, type 1⁸) EM3 = Emerson MX Series (resolver, type 2) EM4 = Emerson FX 460 volt (resolver, type 2) EX1 = Exlar TX Series Drive (encoder, type 1⁸) IN2 = Indramat ECO Drive, Single turn absolute (PSA 142 only, consult factory) IN3 = Indramat ECO Drive, Standard resolver (resolver, type 1) KM1 = Kollmorgen Servostar and Servostar CD Series⁵ 230 Volt (resolver, type 2) KM2 = Kollmorgen Servostar600 Series⁵ 460 Volt (resolver, type 2) MD1 = Modicon (resolver, type 1) PC1 = Parker Compumotor Apex & Z Series (resolver, type 1) PC2 = Parker Compumotor TQ Series (encoder, type 1⁸) PC3 = Parker Compumotor Gemini Series (encoder, type 1⁸) PS1 = Pacific Scientific SC900, 700 Series (resolver, type 1) SM1 = Siemens (resolver, type 1) SP2 = In Motion, PAM Series (resolver, type 1) XX1 = Other or special (please specify) 001 = Standard feedback mounting provisions only</p>
B = Planetary Reduction Ratio 3 = 3 to 1 Reduction 5 = 5 to 1 Reduction 10 = 10 to 1 Reduction	
C = Backlash T = Standard Backlash (Standard) L = Low Backlash ²	
D = Output Shaft Style K = Keyed Shaft (Standard) X = Custom Shaft ¹	
E = Connections O = MS Style - anodized (Standard) M = MS Style - Manufacturer's ⁶ E = MS Style - electroless nickel plated N = Male NPT connections potted leads X = Special ¹	
F = Housing Options G = Epoxy Coated - (Standard) F = Food Grade Paint N = Electroless Nickel Plating C = Stainless Steel Housing ¹ X = Special ¹	
G = Electric Motor Brake S = No Brake (Standard) B = Brake ⁴	
H = Armature Length S = Short stack length M = Medium stack length L = Long stack length	
I = Motor Winding H = High Voltage, 650 VDC ¹ M = Medium Voltage, 325 VDC (Standard) ¹ L = Low Voltage, 170 VDC ¹ X = Special ^{1, 3}	<p>Notes:</p> <ol style="list-style-type: none"> All special options require consultation of Exlar Engineering. Low backlash not available as of this printing Voltage Options allow for catalog rated performance at varying amplifier bus voltages Brake option not available as of this printing Many amplifiers require personality modules or motor files for compatibility with these actuators. Inquire with Exlar applications engineers for details. Available with EX1, AB1, EM1, EM2, EC1, KM1, KM2, IN2 and IN3 feedback currently. This option allows the customer to use the standard cables supplied by their amplifier manufacturer. See page 55 for cables. User is required to enter motor data by custom motor menu. Encoder type 1 is 2048 line count, 8192 post quadrature.
J = Number of Poles 6 = 6 pole (PSA 60, 90, and 142) 8 = 8 pole (PSA 115)	

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