



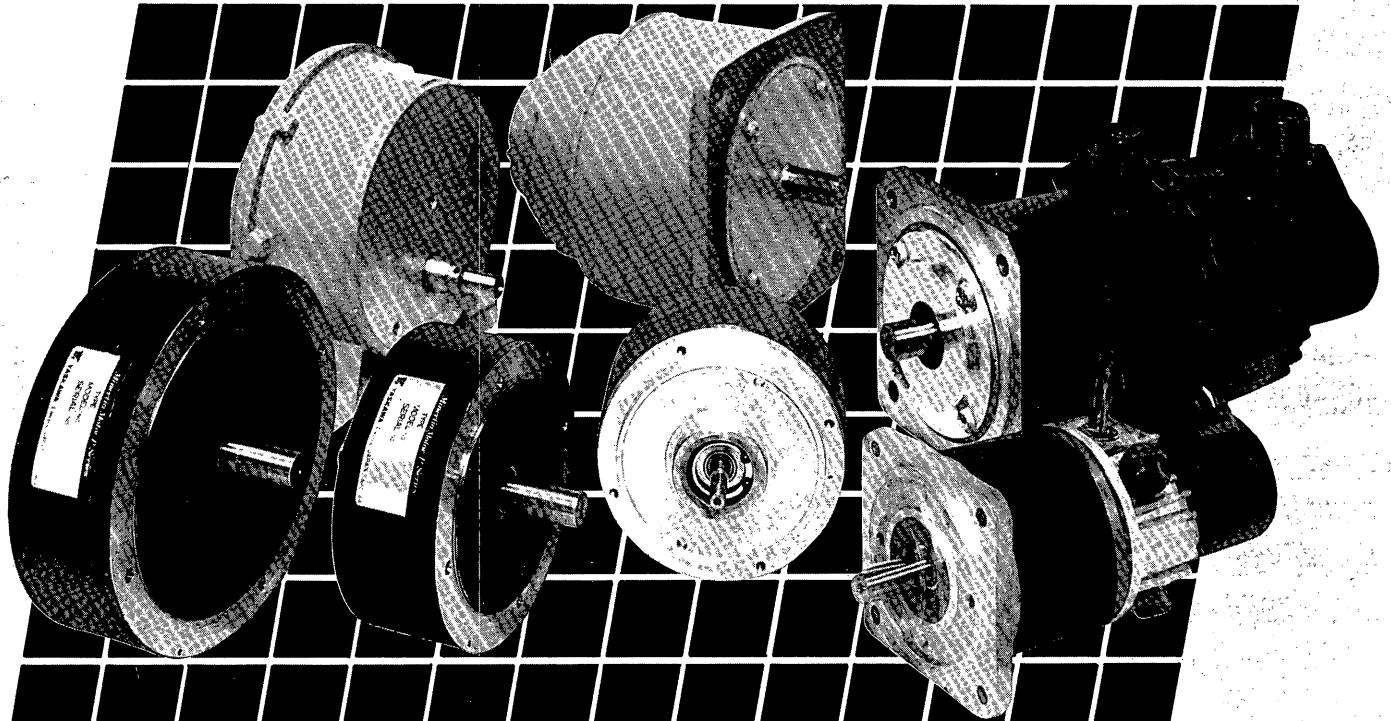
**YASKAWA
ELECTRIC**

KAA-C240-0

OUTSTANDING IN PERFORMANCE AND RELIABILITY

DC Servomotors

FOR INDUSTRIAL APPLICATIONS



SPANNING A WIDE SPECTRUM OF APPLICATIONS

● Many other applications

Yaskawa offers the largest selection of OEM-oriented DC servomotors. A large share of our annual production goes into computer peripherals, NC machine tools, office machines, and many other industrial applications. With our wide variety and quality line you can choose the drive motor that best meets your application needs.

- Valve controllers
- Tire bias cutters
- Coil forming machines
- Glass cutters
- Automated warehouses
- Tensile & compression testers
- Ham slicers
- Pipe benders
- Constant feeders
- Electric carts
- Antenna tracking drives
- Radiator-fans
- Plating machines
- Constant delivery pumps

● Medical treatment machines

- Diagnostic X-ray table (traverse, revolution)
- X-ray film feeder
- Artificial heart-lung equipment
- Tableting machine

● Paper and plastic machines

- Slitters
- Rotary cutters
- Auto. packing machines
- Printing machines
- Paper cutting machines

● Textile machines

- Flat knitting machines
- Printing machines
- Industrial sewing machines

● Machine tools

- Index tables
- Milling machines
- Conveyers
- Roll lathes
- Profile milling machines
- Lathes
- Press feeders
- Electric discharge machines
- Hobbing machines

D.
Servo

● Electric cable machines

- Traversers
- Winders

● Cash handling machines

- Bank cashing machines
- Ticket venders
- Cash registers

● Robots

- Sealing robots
- Arc welding robots
- Spot welding robots
- Assembling robots
- Handling robots

● Electronic machines ● Automatic assembling machines

- Inserters
- Automatic binders
- Automatic wire lapping devices
- Auto. pressure welders
- Capacitor paper winders
- Coil winders

● Semiconductor manufacturing

- IC bonders
- Wafer dicing machines
- Die bonders
- Wafer coater
- Mask aligning devices
- Floating crystal pullers

● Welding and cutting

- Wire feeders
- Carriages
- Tracking welders
- Gas cutters

● Computers and business machines

- Disk drives
- Printers
- Copying machines
- Drafting machines
- X-Y plotters

EXPANDED DC SERVOMOTOR CAPABILITIES FROM YASKAWA

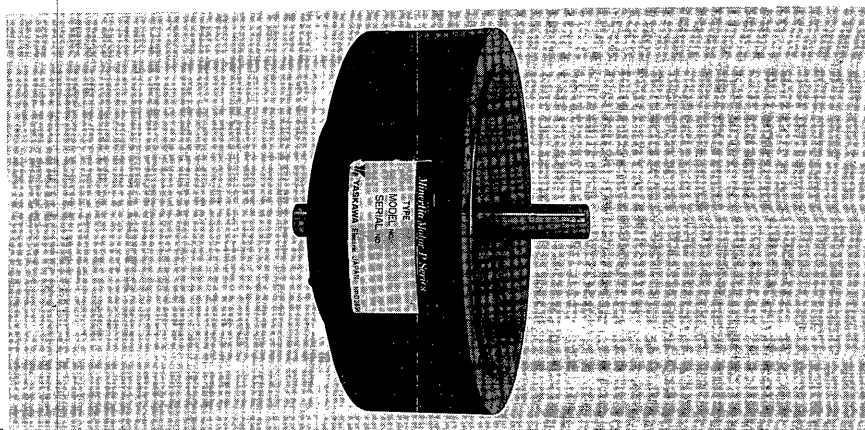
Creative design engineering and time-proven manufacturing technologies blended with accumulated knowledge of servos, have resulted in a countless number of YASKAWA DC servomotors. They are successfully operating as key drivers in sophisticated mechanisms wherever they are used.

Behind the enviable reputation of Yaskawa servomotors, there exist unmatched advantages—optimum performance, superior cost effectiveness, space-saving design, and most important: *reliability* assured by 100% testing.

P Series

For:

- Robots
- Machine tool tables
- Welding positioners
- Material winders



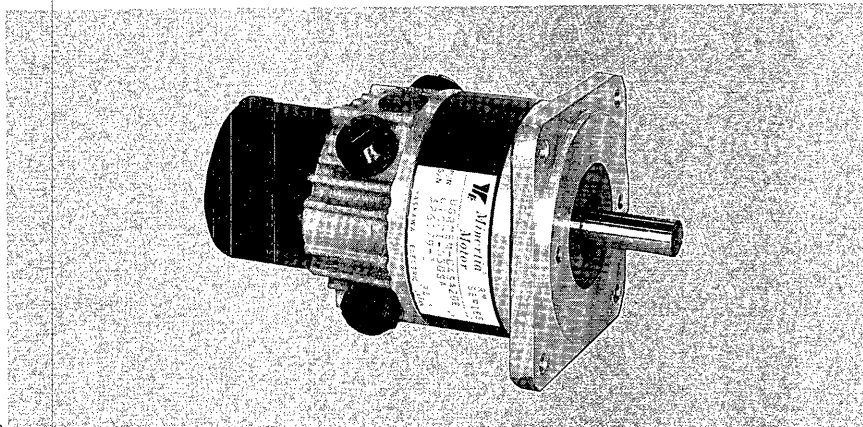
586-203

- Strong permanent alnico magnets. Ferrite Type also available.
- Quick response and accurate positioning.
- Extremely low ripples and no cogging.
- Available with analog tachometers and optical encoders.
- Compatible with conventional disc armature motors.

R Series

For:

- Robots
- Insertion machines
- IC bonders
- High-precision XY tables



584-42

- Rare earth magnet.
- Rated speeds up to 3000 rpm.
- Compact and light weight.
 - Small diameter
 - Short length
- Excellent torque/weight and torque/volume ratios.
- Available with optical encoders, feedback units, DC tachometers.

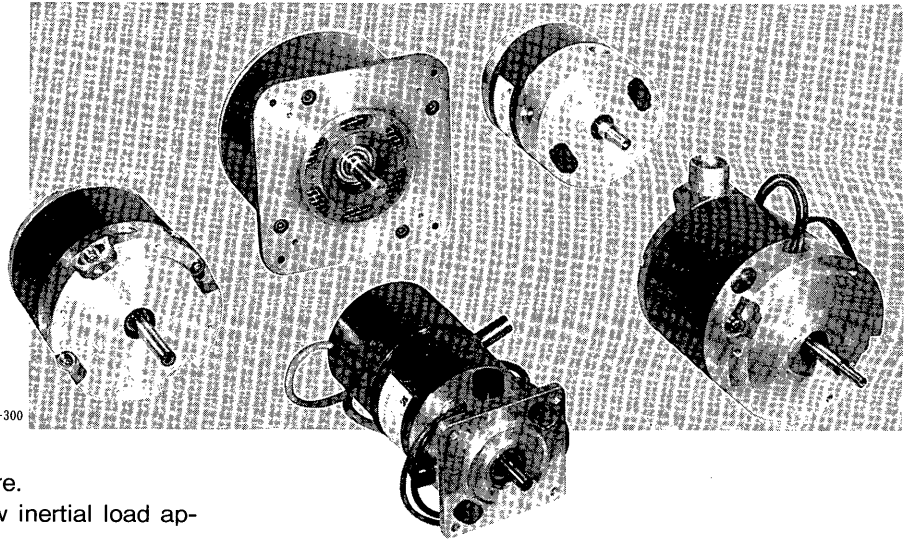
- Unique bearing configuration—no thrust movement of motor shaft.

S Series

For:

- IC bonders
- IC insertion machines
- Surface mounters
- High-precision XY tables

583-300



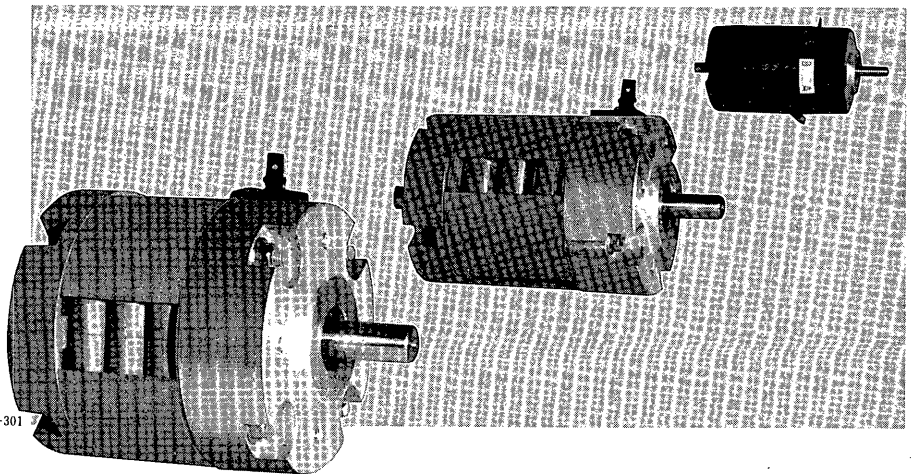
- New, high performance, cup armature.
- Highest possible acceleration in low inertial load applications.
- Mechanical time constants of less than one millisecond.
- 10 Times rated torque without field demagnetization.
- Low armature inductance—no cogging, long brush life.

T Series

For:

- Small precision industrial machines
- Medical treatment machines
- High-precision XY tables

583-301



- Light weight, compact, high performance.
- Large load capacity.
- Thermal time constants from 7 to 27 minutes protect motor from short term overloads.
- Smooth operation.
- Motors are available with optical encoders and analog tachometers.

Disc Armature, Pancake Brackets

Minertia® Motor **P** Series

P series is divided into two groups: motors only (ferrite magnet and alnico magnet), and motors with reduction gears.

Ferrite magnet type:

Thin and lightweight, yet solid and mighty torque to move loads, punched and bonded copper armature allows direct brush commutation, and waffle-shape disc minimizes armature inertia. In combination with powerful ferrite magnets, the motor offers rapid stop-start for precise positioning. Ideally suited for simple adjustable speed drive where mounting space is critical.

Construction		Motors Only											
		580-69			580-67			586-194					
Construction													
Specifications	Motor Type	P12D	P12E	P12F	P16D	P16E	P16F	P09S	P12S	P12H			
Peak Rated Torque	oz·in	140	235	425	510	256	642	889					
Rated Torque	oz·in	28	47	85	170	51.1	128.2	177.8					
Torque Constant	oz·in/A	7.2	7.2	17.3	17.3	6.56	15.63	24.10					
Armature Winding Resistance (at 25°C)	Ω	0.69	0.69	0.84	0.84	0.65	0.61	0.61					
Peak Current	A	22	36	27	33	39.5	41	37.1					
Voltage Constant	V/1000rpm	5.3	5.3	12.8	12.8	4.85	11.55	17.80					
Inertia	oz·in·s ² × 10 ⁻³	21.0	21.0	89.0	89.0	5.4	20.1	20.4					
Mechanical Time Constant	ms	38	38	35	35	11.3	7.0	3.0					
Electrical Time Constant	ms	0.07	0.07	0.12	0.12	<0.15	<0.16	<0.16					
Power Rate	KW/s	0.26	0.72	0.56	2.2	3.4	5.8	10.7					
Rated Speed	rpm	3600	3600	2800	2800	3000	3000	3000					
Max Safe Operating Speed	rpm	5000	5000	4000	4000	4000	4000	4000					
Weight	lb	2.7	2.9	7.3	7.8	4.1	6.8	7.9					
Dimensions in inches	L	2.86	3.33	4.24	3.25	3.78	5.04	4.171	3.625	4.525			
	LL	1.28	1.26	2.17	1.48	1.42	2.64	2.921	2.375	3.275			
	LA	5.591	5.591	7.874	7.874	1.850	2.382	2.382	2.382				
	LC	5.99	5.99	8.47	8.47	4.37	5.50	5.50					
	LR	1.58	2.07	1.77	2.36	2.36	1.25	1.25	1.25				
		580-75			580-83			586-202			586-200		

*For reduction ratio 1/10, 1/25
 †For reduction ratio 1/50

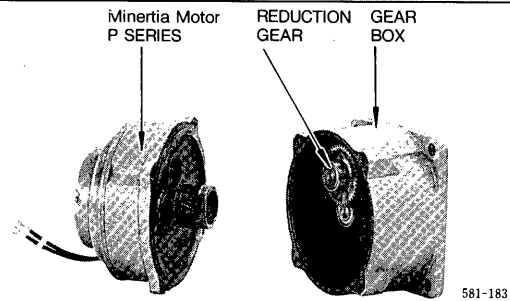
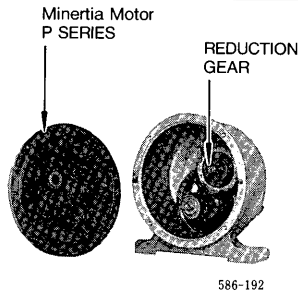
Alnico magnet type:

Disc armature is placed between the strong permanent alnico magnets mounted on the front and rear brackets, which are all housed in a ring. The motors can fully withstand punishing frequent bi-directional operations yet react with quick response and accurate positioning. Their dynamic motion with no cogging and minimal ripples makes them suitable for robots, positioning of machine tool tables, welding positioners, and material winders.

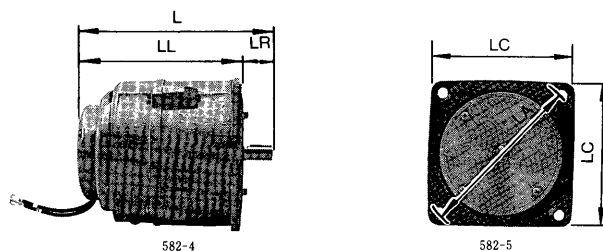
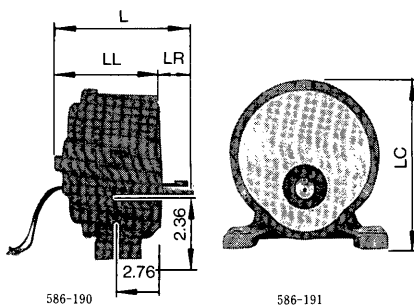
Geared standard type:

Geared Standard Series carries on its drive end a rigid cast-iron reduction gear casing, resulting in less vibration, less inertia, and high gearing efficiency. This transmits quick motion of the Standard Series at reduced speeds.

Motors With Reduction Gears



	P12E-G	P12E-H	P12F-H	P12E-F	P12F-F	P16E-F	P16F-F	P09B-F	P12B-F
	975-3900	1200-1770	2040-6000	708-3540	1203-6018	5400-10800	10800-21600	863-4304	2292-11500
	650-2600	400-590	680-2000	236-1180	401-2006	1800-3600	3600-7200	288-1434	764-3833
	7.2	7.2	7.2	7.2	7.2	17.0	17.0	7.0	15.6
	0.69	0.69	0.69	0.69	0.69	0.84	0.84	0.55	0.69
	6.8	12.0	20	12.0	20	15.4	30.4	14.7	17.5
	5.3	5.3	5.3	5.3	5.3	12.8	12.8	5.2	11.5
	21.0	21.0	21.0	21.0	21.0	89.0	19.0	7.1	23.5
	38	38	38	38	38	35	35	11	9.5
	0.07	0.07	0.07	0.07	0.07	0.12	0.12	0.04	0.1
	0.26	0.26	0.72	0.26	0.72	0.56	2.2	1.1	2.5
	30-120	144-212	72-212	72-360	72-360	56-112	56-112	80-400	60-300
	50-200	200-294	100-294	100-500	100-500	80-160	80-160	132-660	99-495
	8.4	10.4	10.6	17.7	17.9	39.7	40.2	18.74	26.46* or 36.38†
	5.59	5.95	6.34	6.62	7.19	8.07	8.90	7.56	8.23* or 9.37†
	4.21	4.57	4.96	5.20	5.77	6.29	7.12	6.14	6.81* or 7.60†
	—	—	—	7.09	7.09	9.252	9.252	7.09	7.09* or 9.25†
	6.54	6.58	6.58	6.06	6.06	8.07	8.07	7.95	7.95* or 10.43†
	1.38	1.38	1.38	1.42	1.42	1.78	1.78	1.42	1.42* or 1.77†



Compact, Light Weight, Yet Excellent Torque/Weight and Torque/Volume Ratios

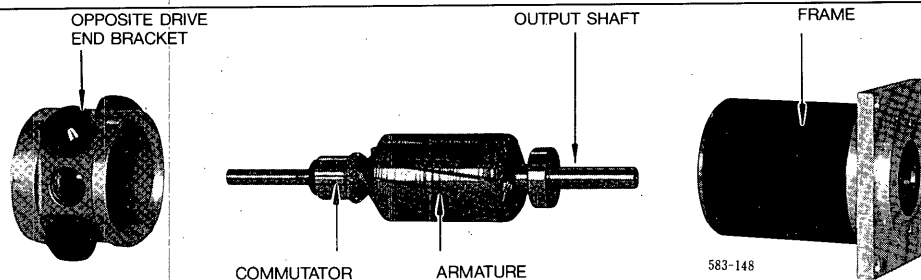
Minertia® Motor **R** Series

R series is a new line introduced for integration into robots as an articulate power drive, or as a drive for insertion machines, IC bonders, or high-precision XY tables.

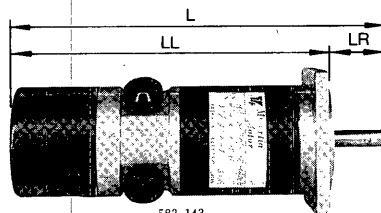
The rare earth magnet is the key feature of the ide-

al performance characteristics for servo drive applications in the R series: small size, light weight, yet excellent torque/weight and torque/volume ratios. Yaskawa's R series motor employs a slotted-core armature and is designed for 3000 rpm rated speed.

Construction

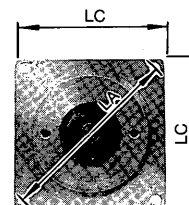


Motor Type		R01SA	R02SA	R02MA	R04SA	R04MA	R08SA	R08MB	R40SA	R40MA
Peak Rated Torque	oz·in	75	150	250	300	500	750	1250	1190	2140
Rated Torque	oz·in	15	30	50	60	100	150	250	450	850
Torque Constant	oz·in/A	7.58	8.12	11.5	11.9	16.8	20.2	32.7	51.6	69.0
Armature Winding Resistance	Ω (at 25°C)	2.75	1.12	0.94	0.59	0.41	0.41	0.49	0.57	0.34
Peak Current	A	10	18.8	22.1	25.5	30.1	37.5	38.5	27.6	36.3
Voltage Constant	V/1000 rpm	5.6	6.0	8.5	8.8	12.4	14.9	24.2	38.2	38.2
Inertia	oz·in·s ² × 10 ⁻³	0.652	2.22	3.96	13.6	23.7	72.2	118	366	625
Mechanical Time Constant	ms	4.4	5.4	4.0	8.0	4.9	10	7.7	11	6.1
Electrical Time Constant	ms	0.44	0.8	0.96	1.2	1.5	2.9	4.1	7.1	9.4
Power Rate	kW/s	2.43	2.86	4.45	1.87	2.97	2.2	3.73	3.94	8.16
Rated Speed	rpm	3000	3000	3000	3000	3000	3000	3000	2500	2200
Max Safe Operating Speed	rpm	4000	4000	4000	4000	4000	4000	4000	4000	3500
Weight	lb	0.89	1.77	2.43	3.09	4.86	8.36	11.5	20.3	26.5
Dimensions in inches	L	4.60	5.71	6.81	5.91	6.93	8.31	9.25	11.14	12.52
	LL	3.86	4.25	5.35	4.45	5.47	6.85	7.80	9.37	10.75
	LA	1.260	3.150	3.150	3.543	3.543	5.118	5.118	5.71	5.71
	LC	—	2.56	2.56	3.15	3.15	4.72	4.72	5.12	5.12
	LR	0.63	1.18	1.18	1.18	1.18	1.18	1.18	1.77	1.77



583-143

Optical encoder is furnished as standard.



583-149

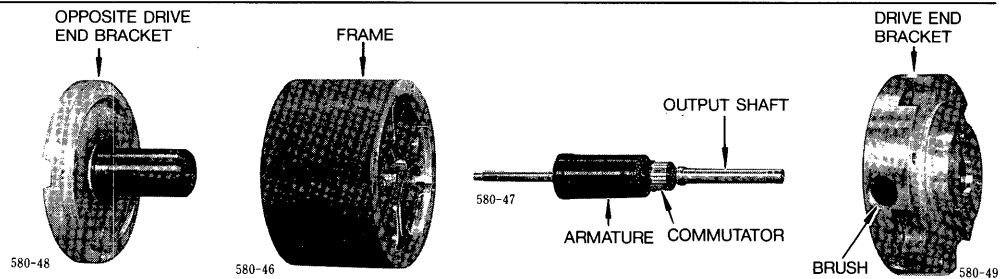
Non-Ferrous Cup-Armature with Customer-Oriented Design for Small Industrial Machines

Minertia[®] Motor **S** Series

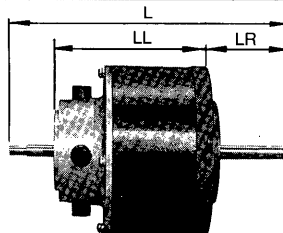
This custom-tailored S series provides the highest possible response speed in low inertial load applications thanks to the non-ferrous cup-armature. Elimination of rotating iron makes it possible for lower armature inertia, lower armature inductance, lower electrical and mechanical time constants and high pulse-torque capability. Mechanical design backed by long and successful

experience provides the highest torsional and lateral resonant frequency. Additional features include small size, light weight, and small power consumption. These features make possible new applications such as IC bonding machines, IC insertion machines, surface moulder, X-Y tables.

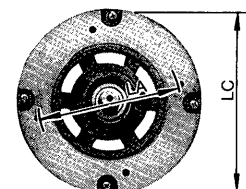
Construction



Motor Type	S02UA	S03UA	S06UA	S12UB	S22UA	
Peak Rated Torque oz·in	347	239	646	541	1475	
Rated Torque oz·in	30	33	72.8	52	187	
Torque Constant oz·in/A	5.82	6.4	10.8	9.1	18.5	
Armature Winding Resistance Ω (at 25°C)	0.82	0.69	0.91	0.68	0.69	
Peak Current A	60	38.1	60	60	80	
Voltage Constant V/1000 rpm	4.3	4.7	8.0	6.7	13.7	
Inertia oz·in·s ² × 10 ⁻³	0.60	0.47	1.73	0.64	10.3	
Mechanical Time Constant ms	2.0	1.1	1.9	0.76	3.0	
Electrical Time Constant ms	0.12	0.15	0.34	0.16	0.7	
Power Rate kW/s	10.6	16.1	21.5	29.6	23.9	
Rated Speed rpm	4000	4000	2000	3000	2000	
Max Safe Operating Speed rpm	6000	6000	4000	6000	4000	
Weight lb	6.6	8.8	9.0	15.4	16.0	
Dimensions in inches	L	5.73	6.38	6.84	7.13	7.35
	LL	3.41	4.06	4.51	4.80	5.02
	LA	3.656	3.656	3.656	3.656	5.118
	LC	4.02	4.02	4.02	4.02	5.50
	LR	1.50	1.50	1.50	1.50	1.50



580-39



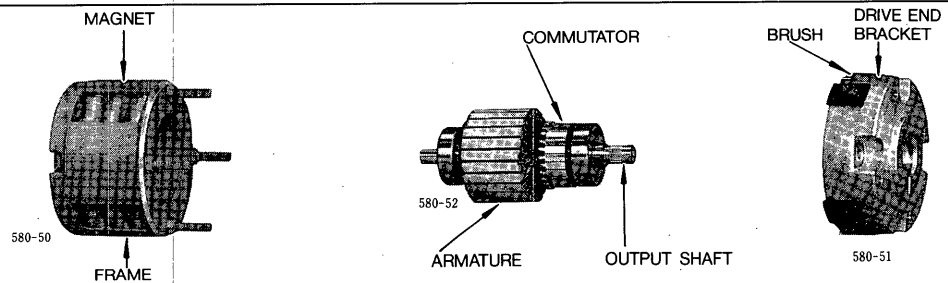
580-38

Special Armature Design, Fast Response, Low Cost

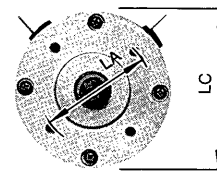
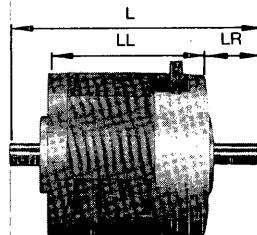
Minertia® Motor **T** Series

T-series features light/weight, low cost, and high reliability. Thermal time constants of ten minutes or more fully protect the motor from short term overloads. Nine standard models range from 1.5 to 3.35 inches in diameter, and their versatile functional ratings cover most application requirements.

Construction



Specifications	Motor Type	T01SB4	T01MB4	T01LB4	T03SB2	T03MB2	T03LB2	T06SB2	T06MB2	T06LB4
Peak Rated Torque	oz·in	16.7	27.8	33.3	67.0	103.0	139.0	125.0	208.0	347.0
Rated Torque	oz·in	8.3	12.5	13.9	36.1	55.6	69.4	61.1	93.1	138.9
Torque Constant	oz·in/A ± 10%	4.9	7.4	8.1	10.7	10.1	16.9	12.9	17.0	24.4
Armature Winding Resistance (at 25°C)	$\Omega \pm 10\%$	3.26	3.77	3.67	1.62	0.68	1.35	1.04	1.05	1.16
Peak Current	A	3.8	4.0	4.5	6.8	10.9	8.7	10.4	12.8	15.0
Voltage Constant	V/1000 rpm ± 10%	3.6	5.5	6.0	7.9	7.5	12.5	9.5	12.6	18.0
Inertia	oz·in·s ² × 10 ⁻³	0.222	0.312	0.375	3.33	4.72	5.28	13.47	14.86	25.0
Mechanical Time Constant	ms	4.1	2.9	2.8	6.7	4.4	3.5	12.0	7.6	6.9
Electrical Time Constant	ms	0.2	0.2	0.2	0.7	1.0	0.9	1.8	1.6	2.7
Power Rate	kW/s	2.2	3.5	3.6	2.8	4.6	6.4	2.0	4.1	5.4
Rated Speed	rpm	3000	2500	2000	2000	1500	1000	1300	1000	700
Max Safe Operating Speed	rpm	4500	4500	4500	3000	3000	2000	2500	2000	3500
Motor Weight	lb	0.49	0.62	0.79	2.4	2.9	3.3	3.5	3.7	5.5
Dimensions in inches	L	3.34	3.71	4.09	4.77	5.32	5.87	5.04	5.32	6.14
	LL	1.99	2.36	2.74	3.07	3.62	4.17	3.07	3.35	4.17
	LA	1.18	1.18	1.18	1.97	1.97	1.97	2.36	2.36	2.36
	LC	1.50	1.50	1.50	2.68	2.68	2.68	3.35	3.35	3.35
	LR	0.63	0.63	0.63	0.98	0.98	0.98	1.18	1.18	1.18



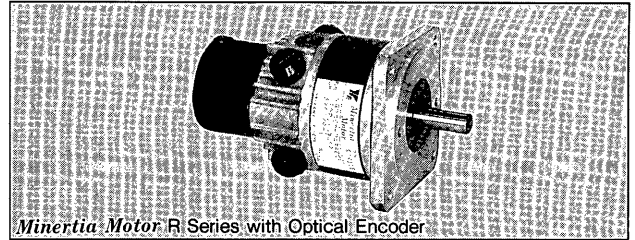
580-45

580-44

Optimum Drive from Modified, Exclusive-Use Controllers

■ SERVOMOTORS WITH DETECTORS

Yaskawa servomotors from an ideal combination with a DC tachometer for speed control, or an optical encoder for position control, or both, in one enclosure. They provide a full range of compact, accurate servo motion controls from general-use adjustable speed to high precision servomotor drives. Shown in the table below are examples of combinations.



Minertia Motor R Series with Optical Encoder

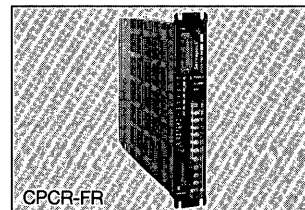
584-42

Servomotors	Attachments	Detectors		
		DC Tachometer Generator	Optical Encoder	Feedback Unit
Minertia Motor P Series		●	●	—
Minertia Motor P Series with Reduction Gear		●	●	●
Minertia Motor R Series		●	●	●
Minertia Motor S Series		●	●	●
Minertia Motor T Series		●	●	●

Note: 1. For machine tool applications, oil seal can be provided around the shaft to keep out oil.
2. Feedback unit is composed of a tachometer generator and an optical encoder.

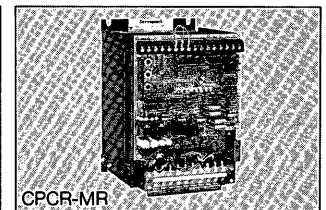
■ SERVOMOTOR CONTROLLERS *Servopack*™

Servopack is exclusively designed for the drive of Yaskawa servomotors to obtain maximum performance. The series incorporates four standard series to meet servomotor ratings, and it establishes a complete integrated motion control system. Servopacks are available in open or enclosed types.



CPCR-FR

585-245



CPCR-MR

581-188

Items	Servopack	PWM Reversing Type CPCR-FR (FET) Bridge Circuit	PWM Reversing Type CPCR-MR (Transistor) Bridge Circuit
	Specifications	Servomotor Output kW	0.05 to 0.5
Derating Factor %		95 and over	95 and over
Speed Range		1000:1	1000:1
Speed Regulation (Load 0 to 100% Fluctuation) %		±0.1	±0.1
Servomotors	Minertia Motor P Series	—	●
	Minertia Motor R Series	●	—
	Minertia Motor S Series	●	—
	Minertia Motor T Series	●	—

Note: Contact your YASKAWA representative for details.

OUTLINE OF YASKAWA ELECTRIC

As one of the leading suppliers of electrical machinery for 70 years, Yaskawa Electric has continually dedicated itself to the "Realization of Reliable Industrial Automation Systems" for the benefit of customers.

Through past practice to meet the demand of customers. Yaskawa has continued to research the optimum in electrical systems. Under its slogan of "Quality is Our Product," Yaskawa has succeeded in obtaining innovative results with its thorough knowledge of motor application technology, new data processing and monitoring techniques.

Yaskawa produces a wide variety of products: electric motors and their control equipment, supervisory control systems and mechatronics equipment such as industrial robots.

To insure smooth quick response, overseas activities, Yaskawa not only maintains offices in various countries, but also has long term agreements with agents and distributors throughout the world to back up its overseas service network.

YASKAWA ACTIVITIES AROUND THE WORLD



985-59



A Better Tomorrow for Industry through Automation

YASKAWA Electric America, Inc.

CHICAGO OFFICE (Head Office) 3160 MacArthur Blvd., Northbrook, Illinois 60062-1917, U.S.A.
 Phone (708) 291-2340, 291-2348 Telex (230) 270197 YSKW YSNC NBRK Fax (708) 498-2430, 480-9731

LOS ANGELES OFFICE 7341 Lincoln Way, Garden Grove, California 92641, U.S.A.
 Phone (714) 894-5911 Telex (230) 678396 YASKAWAUS TSTN Fax (714) 894-3258

NEW JERSEY OFFICE 30 Two Bridges Road, Fairfield, New Jersey 07006, U.S.A.
 Phone (201) 575-5940 Fax (201) 575-5947

YASKAWA ELECTRIC EUROPE GmbH: SUBSIDIARY
 Niederhöchstädter Straße 71-73, 6242 Kronberg-Oberhöchstädt, West Germany
 Phone (06173) 640071, 640072, 640073 Telex 415660 YASE D Fax (06173) 68421

Manufactured by:

YASKAWA ELECTRIC MFG. CO., LTD.

TOKYO OFFICE Ohtemachi Bldg., 1-6-1 Ohtemachi, Chiyoda-ku, Tokyo, 100 Japan
 Phone (03) 284-9111, -9145 Telex YASKAWA J33530 Fax (03) 284-9034

Due to ongoing product modification/improvement, data subject to change without notice.



984-26

The Deming Application Prize Medal Awarded to Yaskawa in 1984 for Exceptional Achievement in Industrial Performance