YASKAWA ELECTRIC

TSE-C249-10B

SMALL SIZE DC SERVOMOTORS

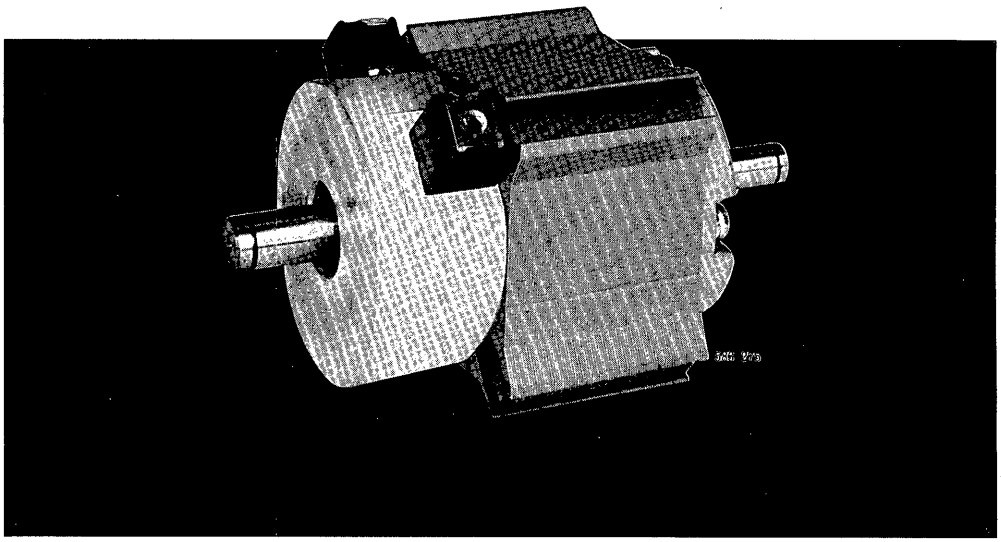
Minertia® Motor J Series

Type J02

Designed to meet the Demands of Computer Peripherals

Creative design engineering and time-proven manufacturing technologies blended with accumulated knowledge of computer peripherals, achieve light weight, low cost, and high reliability in J Series.

J series is a new line mainly for printer drivers. Construction feature is the employment of ceramic magnet for magnetic field formation and slotted core armature. Modifications are easily accomplished in a compact figure, because detecting devices like DC tachometer generators and optical encoders can be built-on the motors.



FEATURES

- Ceramic magnet DC servomotor
- 4-pole configuration for high performance in a small package
- Low inertia—High peak torque
- High torque-to-size ratio due to low thermal resistance
- Available with analog tachometers and optical encoders
- Substantial price reductions in OEM volumes

APPLICATIONS

- Carriage of medium- or low-speed printers
- Small-size general-purpose machinery

RATINGS AND SPECIFICATIONS

Table 1 Ratings and Specifications

Minertia Motor J Series		J02TA	J02TB	J02TC	J02SA	J02SB	J02SC	J02EA	J02EB	J02EC	J02MA	J02MB	J02MC	J02LA	J02LB	J02LC
Peak Rated Torque	oz·in	42			98			143			192			260		
Rated Torque	oz·in	10			24			32			40			50		
Torque Constant	oz·in/amp ±10%	2.16	4.33	6.49	5.01	10	15	7.31	14.6	21.9	9.74	19.5	29.2	13.5	27.1	40.6
Armature Winding Resistance (at 25℃)	Ω ±10%	0.45	1.86	4.17	0.65	2.66	5.96	0.85	3.47	7.75	1.04	4.27	9.53	1.44	5.88	13.1
Armature Inductance	mH	0.26	1.03	2.32	0.6	2.4	5.4	0.95	3.8	8.6	1.3	5.2	11.7	2.0	8.0	18
Peak Current	A	20	10	6.7	20	10	6.7	20	10	6.7	20	10	6.7	20	10	6.7
Voltage Constant	V/1000rpm ±10%	1.6	3.2	4.8	3.7	7.4	11.1	5.4	10.8	16.2	7.2	14.4	21.6	10	20	30
Viscous Damping Coefficient	oz·in/1000rpm	0.2			0.47			0.73			1.0			1.5		
Friction Torque	oz·in	1.35			2.0			2.65			3.3			4.6		
Breakaway Torque	oz·in	2.0			3.0			4.0			5.0			7.1		
Inertia	oz·in·sec^2 ×10^{-3}	1.14			2.14			3.09			4.08			6.0		
Mechanical Time Constant	ms	16			8.0			7.1			6.4			6.8		
Electrical Time Constant	ms	0.56			0.91			1.1			1.2			1.4		
Power Rate	kW/sec	0.62			1.9			2.34			2.77			2.94		
Torque Inertia Ratio	rad/sec^2	8740			11200			10400			9800			8330		
Thermal Resistance	deg C/watt	4.8			3.3			3.1			2.9			2.5		
Thermal Time Constant	minutes	9.0			10			11			12			14		
Max Allowable Armature Temperature	℃	155			155			155			155			155		
Rated Speed	rpm	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500	500	500
Max Safe Operating Speed	rpm	4000	4000	4000	4000	4000	4000	4000	4000	2300	4000	2900	1400	1500	1500	1000
Max No Load Speed	rpm	6000	6000	6000	6000	6000	4700	6000	4900	3200	6000	3600	2400	2000	2000	1700
Cooling Required	cfm, in H_2O	TENV			TENV			TENV			TENV			TENV		

STARTING AND OVERLOAD CHARACTERISTICS

Fig. 1 shows the allowable condition time of armature current at starting and during overload operation.

At cold state, curve is obtained when armature temperature is equal to ambient temperature. At hot state, curve is obtained when armature temperature is at optimum at the rated operation.

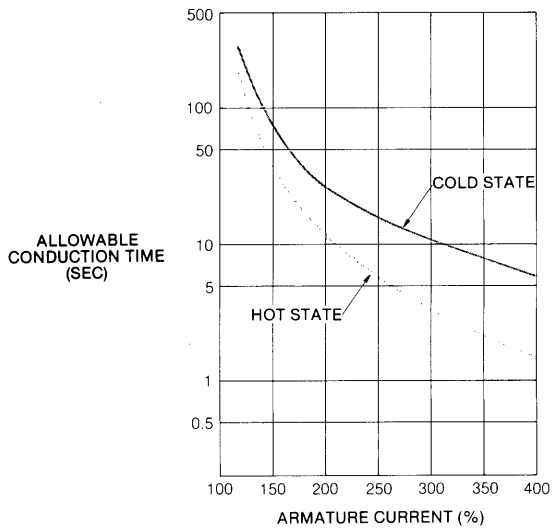
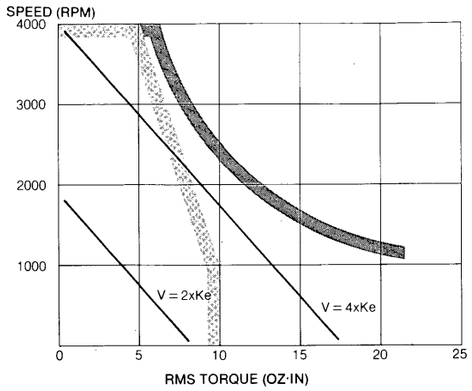


Fig. 1 Starting and Overload Characteristics

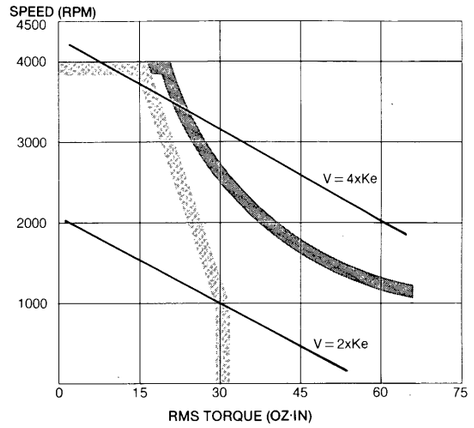
TORQUE-SPEED CURVES

Fig. 2 shows torque-speed characteristics, continuous duty zone, and instantaneous duty zone.

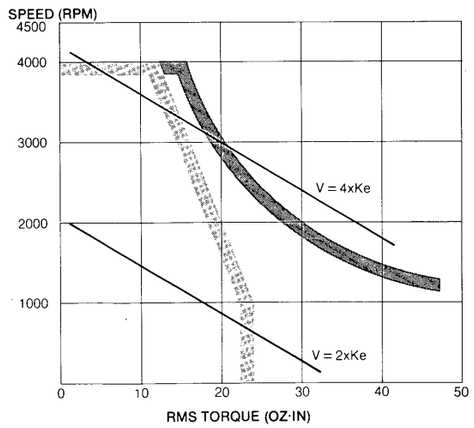
Type J02T



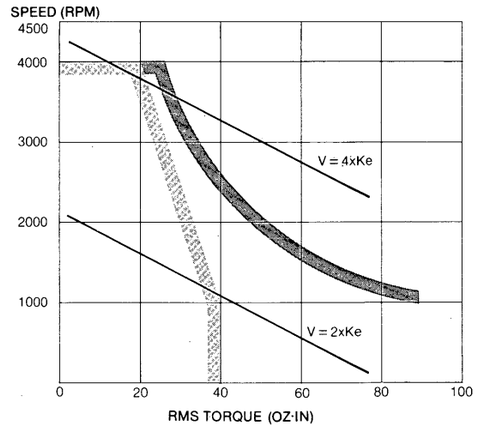
Type J02E



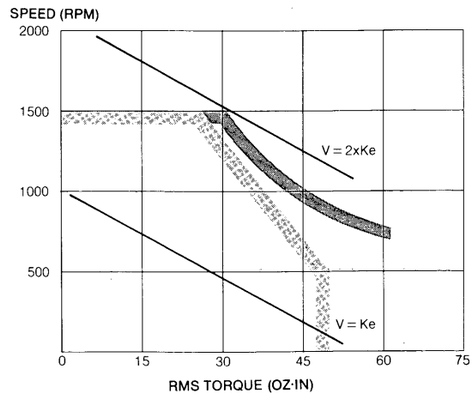
Type J02S



Type J02M



Type J02L



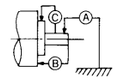
Continuous duty zone
Instantaneous duty zone
Note: Thermal characteristics are for motors mounted on a10" × 10" × 1/4" heat sink.

Fig. 2 Torque-Speed Curves

MECHANICAL CHARACTERISTICS

MECHANICAL SPECIFICATIONS

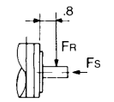
Table 2 Mechanical Specifications of Minertia Motor J Series Type 02□B

Accuracy (T. I. R)*		Reference Diagram
Shaft Runout Ⓐ	.002″	
Mounting Surface Perpendicular to Shaft Ⓑ	.005″	
Pilot Diameter Concentric to Shaft Ⓒ	.004″	

* *T.I.R. : Total Indicator Reading*

ALLOWABLE THRUST LOAD AND EQUIVALENT RADIAL LOAD

Table 3 Allowable Loads according to Motor Types

Minertia Motor Type	Allowable Radial Load F_R lb	Allowable Thrust Load F_S lb	Reference Diagram in.
J02TB	18.5	12	
J02SB			
J02EB			
J02MB			
J02LB	18.5	24	

Note: Allowable thrust and radial loads are based on the assumption that motor is driven at rated speed and has 10,000 hours of bearing life.

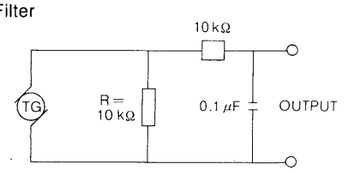
DC TACHOMETER GENERATOR CHARACTERISTICS

Table 4 DC Tachometer Generator Characteristics

Characteristics \ Tachometer Generator Type		G3VC	G7SC
Voltage Sensitivity*	(V/1000rpm) ±10%	3	7
Ripple Voltage†	%p-p (at 1000rpm)	1.5	1.5
Ripple Frequency	cycles/rev.	13	13
Linearity†,‡	% (200–4000rpm)	1	1
Direction Deviation†,#	% (200–4000rpm)	1	1
Armature Inertia	$oz \cdot in \cdot sec^2 \times 10^{-3}$	0.28	0.28
	$g \cdot cm \cdot s^2 \times 10^{-3}$	20	20
Armature Resistance	Ω (25°C) ±10%	32	150
Stability (Temperature Coefficient)	%/°C	< 0.05	< 0.05
Effective Speed Range	rpm	200-4000	200-4000
Max Safety Speed	rpm	5000	5000
Min Load Impedance	kΩ	5.1	5.1
Insulation Resistance with a 500V Megger	MΩ	10	10
Withstand Voltage for 1 Minute	VAC	500	500
Temperature	°C	0–80	0–80
Humidity (without a Drop of Water)	%	20–80	20–80
Rated Operating Life at 1000rpm	Hours	5000	5000

*Terminal Open

† Filter



‡ Linearity

$$\text{Linearity at Nk (rpm)} = \frac{|Ek - Nk \cdot Ea|}{Nk \cdot Ea} \times 100\,\%$$

$$Ea = \frac{E_1 + E_2 + \cdots\cdots En}{N_1 + N_2 + \cdots\cdots Nn}$$

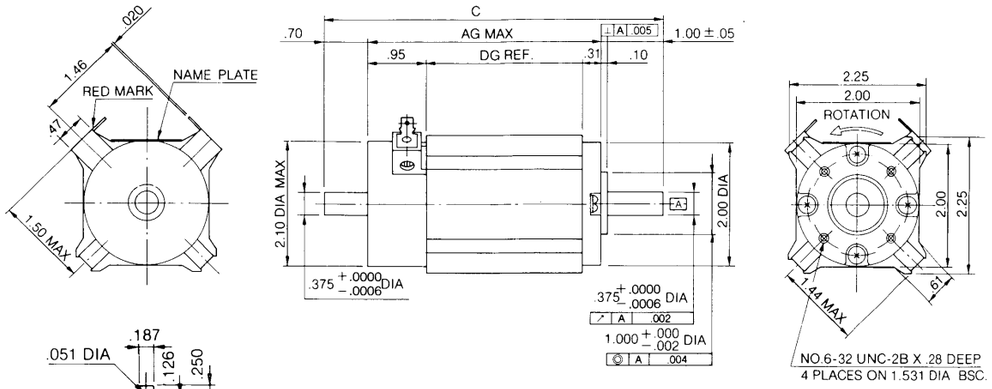
Direction Deviation

$$\text{Direction Deviation} = \frac{|E_{cw} - E_{ccw}|}{E_{cw}} \times 100\,\%$$

Note:
1. *Connecting OUTPUT terminal with resistance, total load impedance may exceed 5.1 kΩ.*
2. *In case of motor drive source with no transformer, tacho-generator winding to be isolated from motor drive source.*

DIMENSIONS in inches

Minertia Motor J Series

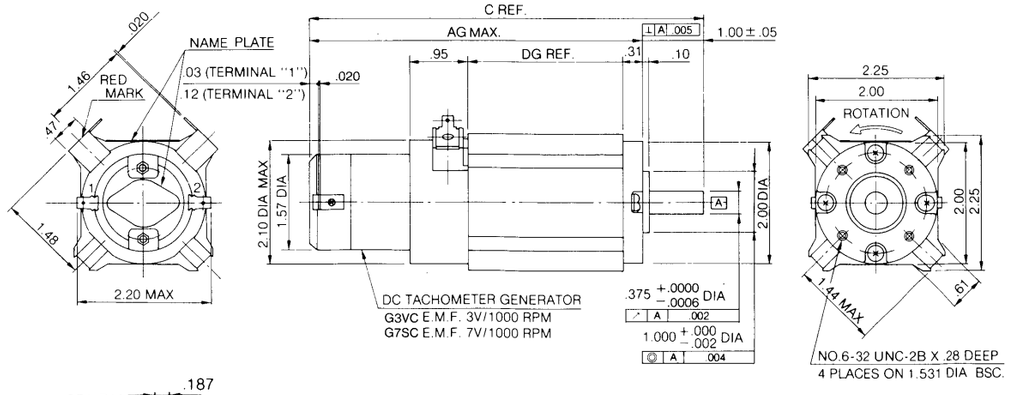


TERMINAL DETAIL
FASTON 187 SERIES TAB

Note:
1. *Ccw rotation with positive voltage applied to red mark terminal when viewed from drive end.*
2. *The motor shaft is pre-loaded with spring washers toward opposite drive end by 5 pounds.*
3. *Shaft end play .002 max under of 2 pounds thrust.*
4. *All dimensions in inches; 2-decimal tolerance ±.03 3-decimal tolerance ±.010.*

Type	C	AG	DG	Weight lbs
J02TB	4.00	2.36	1.04	1.2
J02SB	4.50	2.86	1.54	1.8
J02EB	5.00	3.36	2.04	2.4
J02MB	5.50	3.86	2.54	3.0
J02LB	6.50	4.86	3.54	4.2

Minertia Motor J Series with Tachometer Generator



TERMINAL DETAIL
FASTON 187 SERIES TAB

Note:
1. *Ccw rotation with positive voltage applied to red mark terminal when viewed from drive end.*
2. *Terminal of tachometer generator "1" (Pos.) and "2"(Neg.), cw rotation, when viewed from drive end.*
3. *All dimensions in inches; 2-decimal tolerance ±.03; 3-decimal tolerance ±.010.*

Type	C	AG	DG	Weight lbs
J02TB2/ G3VC	4.93	3.93	1.04	1.64
J02TB2/ G7SC				
J02SB2/ G3VC	5.43	4.43	1.54	2.24
J02SB2/ G7SC				
J02EB2/ G3VC	5.93	4.93	2.04	2.84
J02EB2/ G7SC				
J02MB2/G3VC	6.43	5.43	2.54	3.44
J02MB2/G7SC				
J02LB2/ G3VC	7.43	6.43	3.54	3.44
J02LB2/ G7SC				

Minertia® Motor **J Series**
Type J02

MEMO

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