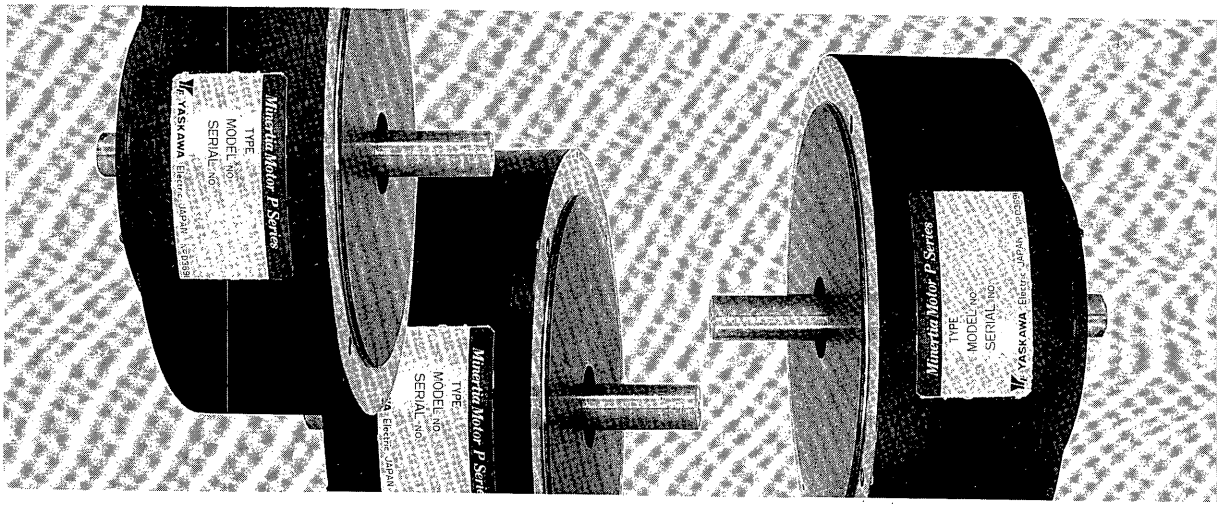
Minertia Motor P Series

SMALL SIZE DC SERVOMOTORS

WITH TACHOMETER GENERATOR
TYPE P09S3, P12S3, P12H3



YASKAWA

P Series Minertia Motors are disc-armature DC motors. The principle of disc armature DC motors was developed by SEA in France. They feature epochmaking armature construction—"flat" armature—.

In 1964, Yaskawa achieved technological breakthroughs and gained success by manufacturing the highly-reliable, highly-durable armatures of stabilized performance in quantity. P Series motors incorporating these armatures have been widely used throughout the world for both general and special industrial applications including robots, X-Y tables and computer peripherals.

FEATURES

- Small-size tachometer generator directly mounted on motor permits easy brush replacement, without disassembly.
- Low inertia of tachometer generator
- Strong permanent alnico magnets
- Quick response and accurate positioning
- Very low ripples; no cogging
- Compatible with conventional flat armature motors
- Ferrite type also available
- Available with analog tachometers and optical encoders
- Fast-reacting service centers in U.S.A. for maintenance and rapair service
- 100% Quality control testing

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

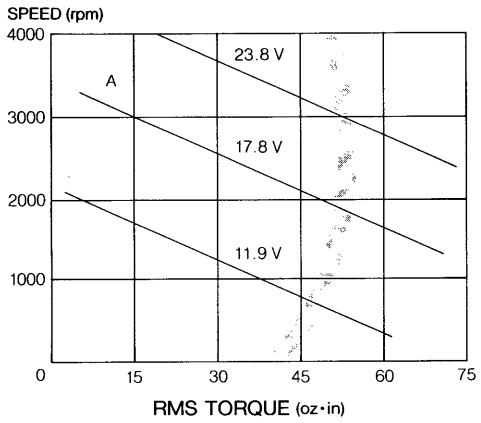
RATINGS AND SPECIFICATIONS

Specifications \ Motor Type		P09S3	P12S3	P12H3
Peak Rated Torque	oz·in	256	642	889
Rated Torque	oz·in	51.1	128.2	177.8
Torque Constant	oz·in/amp	6.56	15.63	24.10
Armature Winding Resistance (at 25°C)	Ω	0.65	0.61	0.61
Armature Inductance	mH	< 0.1	< 0.1	< 0.1
Peak Current	A	39.5	41	37.1
Voltage Constant	V/1000rpm	4.85	11.55	17.80
Viscous Damping Coefficient	oz·in/1000rpm	1.00	3.19	5.70
Friction Torque	oz·in	2.20	3.47	3.47
Inertia	$oz \cdot in \cdot sec^2 \times 10^{-3}$	5.4	20.1	20.4
Mechanical Time Constant	millisec	11.3	7.0	3.0
Electrical Time Constant	millisec	< 0.15	< 0.16	< 0.16
Power Rate	kW/sec	3.4	5.8	10.7
Torque Inertia Ratio	rad/sec^2	9400	6400	8900
Thermal Resistance	deg C/watt	1.3	1.27	1.27
Max Allowable Armature Temperature	°C	150	150	150
Rated Speed	rpm	3000	3000	3000
Max Safe Operating Speed	rpm	4000	4000	4000

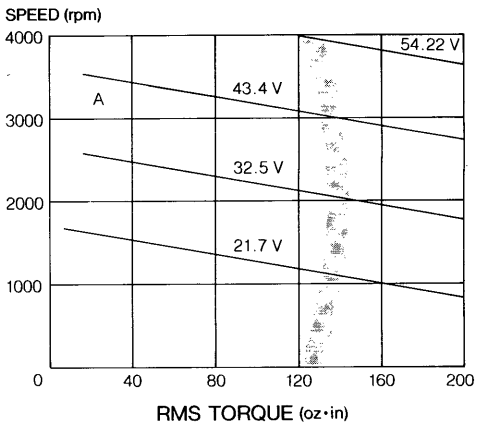
The data in the above table are obtained under the following conditions.
Time Rating: Continuous
Dielectric Strength: 500 VAC
Enclosure: Totally-enclosed self-cooled type
Ambient Temperature: −10°C to 25°C

SPEED-TORQUE CHARACTERISTICS

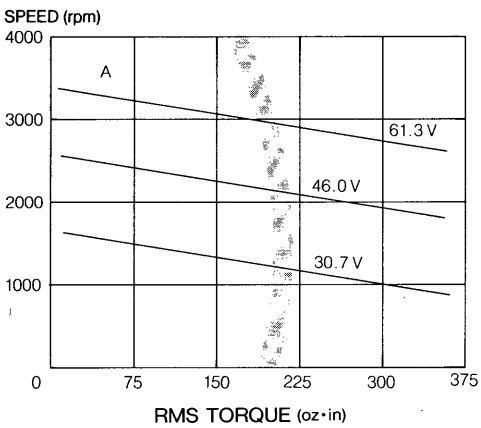
TYPE P09S3



TYPE P12S3



TYPE P12H3



A: Area of safe continuous operation without air cooling.
Note: Curves are for motors mounted on 8" × 16" × 3/8" heat sinks and armature temperature of 125°C.

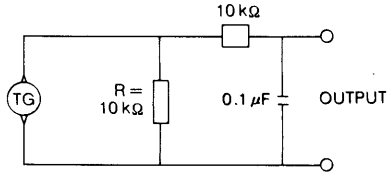
DC Tachometer Generator Characteristics

Characteristics \ Tachometer Generator Type		G3VCX
Voltage Sensitivity*	(V/1000rpm)±10%	3.0
Ripple Voltage†	%P-P(at 1000 rpm)	1.5
Ripple Frequency	cycles/rev.	13
Linearity†‡	%	1.0
Direction Deviation†#	%	1.0
Armature Inertia	$oz \cdot in \cdot sec^2 \times 10^{-3}$	0.125
	$g \cdot cm \cdot sec^2 \times 10^{-3}$	9.0
Armature Resistance	Ω(25°C)±10%	100
Stability (Temperature Coefficient)	%/°C	0.05
Effective Speed Range	rpm	200—4000
Max Safety Speed	rpm	5000
Min Load Impedance	kΩ	5.1
Insulation Resistance with a 500V Megger	MΩ	10
Withstand Voltage for 1 Minute	VAC	500
Temperature	℃	0—60
Humidity (without a Drop of Water)	%	20—80
Rated Operating Life at 1000rpm	Hours	5000

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, tach-generator winding to be isolated from motor drive source.*

*Terminal Open

†Filter



‡Linearity

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

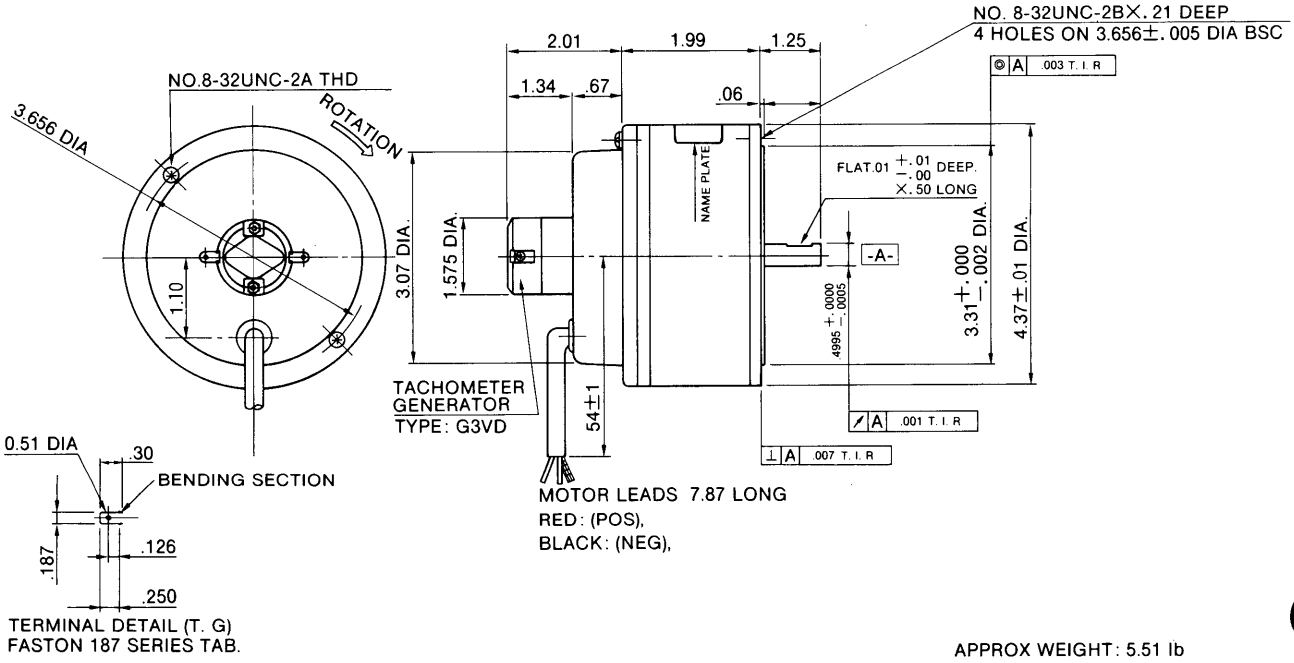
$$Ea = \frac{E_1 + E_2 + \cdots\cdots En}{N_1 + N_2 + \cdots\cdots Nn}$$

#Direction Deviation

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

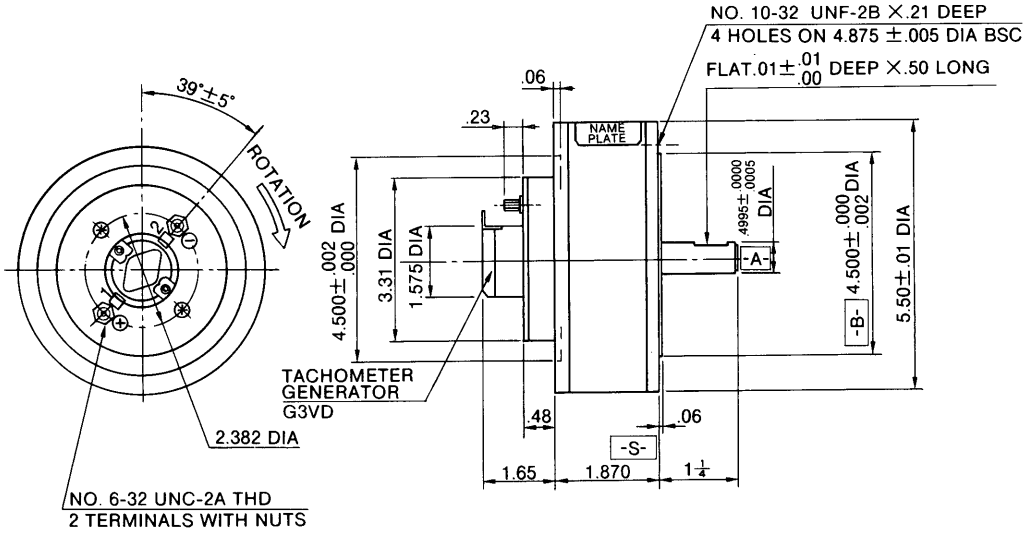
DIMENSIONS in inches

TYPE P09S3



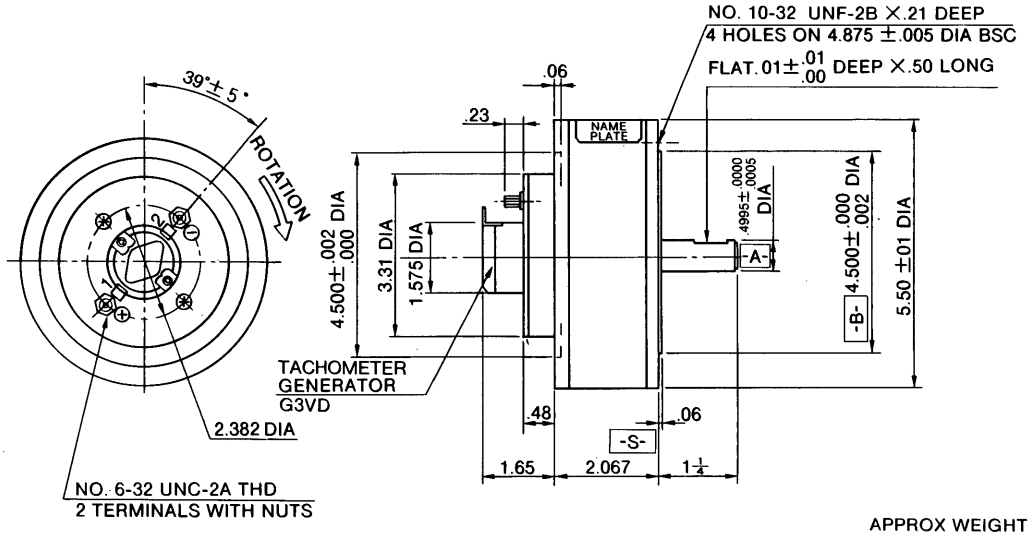
APPROX WEIGHT: 5.51 lb

TYPE P12S3



APPROX WEIGHT: 7.1 lb

TYPE P12H3



APPROX WEIGHT: 8.2 lb

Note:

1. *Shaft dia -A- runout not to exceed 0.001 inch per inch.*
2. *Pilot dia -B- concentric to -A- within 0.003 inch T.I.R.*
3. *Mounting surface -S- perpendicular to -A- within 0.005" for Type P09S3; 0.007" for Types P12S3 and P12H3.*
4. *Shaft end play 0.001" max under a thrust in the direction shown of: 10 lb.*
5. *Maximum pure radial load, 1" from surface "S": 25 lb for Type P09S3.*
6. *Maximum pure axial load is 11 lb for Type P09S3; 55. lb for Types P12S3 and P12H3.*
7. *Tachometer generator output voltage at 3 V/1000 rpm terminal No.1 (positive),and No.2 (negative).*

ORDERING INFORMATION

- Application
- Type
- Ratings: output, voltage, current, torque, speed
- Environmental conditions: ambient temperature, location
- Others to be specified

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WITH TACHOMETER GENERATOR
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TOKYO OFFICE Ohtemachi Bldg, 1-6-1 Ohtemachi, Chiyoda-ku, Tokyo, 100 Japan
Phone (03) 3284-9111 Telex YASKAWA J33530 Fax (03) 3284-9034
SEOUL OFFICE 8th Floor Seoul Center Bldg, 91-1, Sogong-Dong, Chung-ku, Seoul, Korea 100-070
Phone (02) 776-7844 Fax (02) 753-2639
TAIPEI OFFICE Shen Hsiang Tang Sung Chiang Building 10F 146 Sung Chiang Road, Taipei, Taiwan
Phone (02) 563-0010, -7732 Fax (02) 567-4677
YASKAWA ELECTRIC AMERICA, INC.
Chicago-Corporate Headquarters 2942 MacArthur Blvd. Northbrook, IL 60062-2028, U.S.A.
Phone (708) 291-2340 Fax (708) 498-2430
Chicago-Technical Center 3160 MacArthur Blvd. Northbrook, IL 60062-1917, U.S.A.
Phone (708) 291-0411 Fax (708) 291-1018
MOTOMAN INC.
805 Liberty Lane West Carrollton, OH 45449, U.S.A.
Phone (513) 847-6200 Fax (513) 847-6277
YASKAWA ELECTRIC EUROPE GmbH
Niederhöchstädter Straße 73, 61476 Kronberg-Oberhöchstadt, Germany
Phone (06173) 9380 Telex 415660 YASE D, Fax (06173) 68421
YASKAWA ELÉTRICO DO BRASIL COMÉRCIO LTDA.
Rua Conde Do Pinhal 8-5°, Andar Sala 51 CEP 01501-São Paulo-SP, Brasil
Phone (011) 35-1911 Fax (011) 37-7375
YASKAWA ELECTRIC (SINGAPORE) PTE. LTD.
Head Office : CPF Bldg, 79 Robinson Road # 13-05, Singapore 0106, SINGAPORE
Phone 221-7530 Telex (87) 24890 YASKAWA RS Fax 224-5854
Service Center : 221 Henderson Road, # 07-20 Henderson Building Singapore 0315, SINGAPORE
Phone 276-7407 Fax 276-7406
YATEC ENGINEERING CORPORATION
Shen Hsiang Tang Sung Chiang Building 10F 146 Sung Chiang Road, Taipei, Taiwan
Phone (02) 563-0010 Fax (02) 567-4677

YASKAWA ELECTRIC CORPORATION

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