SANMOTION

DC SERVO SYSTEMS

K

DC Servo Systems

Ver.1.2

SANYO DENKI

SANMOTION K

DC SERVO SYSTEMS

Input voltage 24 VDC, 75 VDC

Servo motor

Flange size 42, 54, 76, 88 mm

Rated output 23 to 500 W

Contents

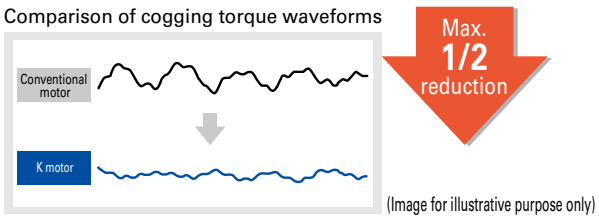
SANMOTION K
DC SERVO SYSTEMS

The SANMOTION K DC servo motors achieve smooth operation, high efficiency, and low noise. These motors are suitable for applications requiring high precision, including precision measuring instruments and medical equipment.

Features

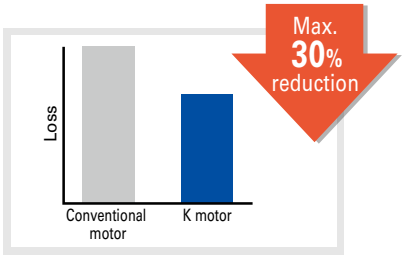
High accuracy (Smooth operation)

Cogging torque has been reduced by up to half compared with our conventional DC servo motors.* This enables smooth motor operation even at low speeds, improving the accuracy of equipment movements.



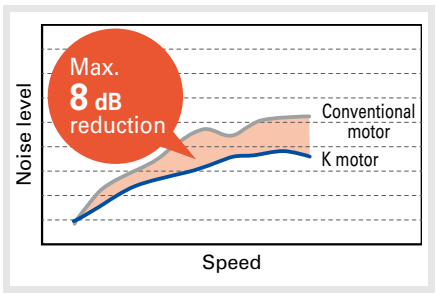
Energy-saving (High efficiency)

Power loss has been reduced by up to approximately 30% and efficiency has been increased by 10% compared with our conventional DC servo motors.* This reduces heat generation within equipment and contributes to energy savings.



Low noise

Brush vibrations have been reduced, and the rigidity of motor parts has been improved. Compared with our conventional DC servo motors,* noise levels have been reduced by up to 8 dB.



IP43 protection rating

→page 14

All servo motors have a protection rating of IP43.

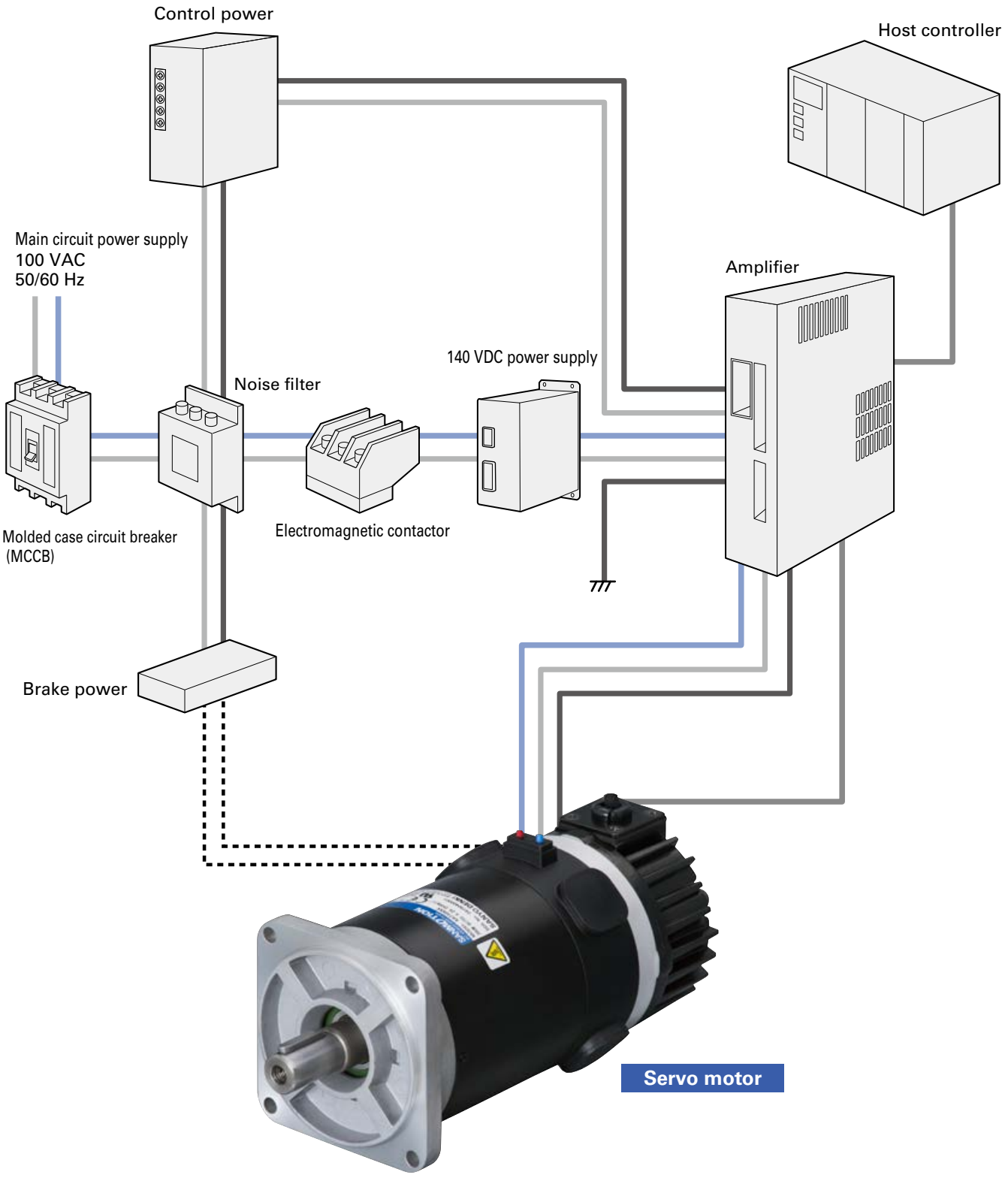
Low-voltage models available

In addition to 75 VDC class models, low-voltage (24 VDC class) models are also available. The low-voltage models are safe for use in medical equipment and other applications close to people.

* Compared with our conventional SANMOTION T DC servo motors.

System Configuration Example

Contact us if you need an amplifier.



Servo motor

Low Cogging Torque, Low Loss, Low Noise

Output capacity: 23 to 500 W

For 42 and 54 mm motors, low-voltage (24 VDC) models are also available.

■ How to read model numbers

Not all combinations of descriptions below are valid.
For model numbers valid as standard products, refer to "Standard Model Number List."

K A 7 30 B S0

Incremental encoder

Code	Pulses per revolution	Output circuit	Remarks
XX	—	—	Standard
S0	2000	Line driver	Options
S6	200		
S7	500		
S8	1000		
C0	2000	Open collector	
C6	200		
C7	500		
C8	1000		

Holding brake / Tachogenerator

Code	Brake	Tachogenerator	Remarks
X	—	–	Standard
B	90 VDC		Options
C	24 VDC		
D	48 VDC		
T	—	✓	Standard
J	90 VDC		
H	24 VDC		Options
K	48 VDC		

Rated output

Code	Specifications	Remarks
02	23 W	
04	40 W	
06	60 W	
08	80 W	
11	80 W	For 24 VDC input voltage
	110 W	For 75 VDC input voltage
20	200 W	
30	300 W	
40	400 W	
50	500 W	

Flange size

Code	Specifications
4	42 mm sq.
5	54 mm sq.
7	76 mm sq.
8	88 mm sq.

Input voltage

Code	Input voltage	Remarks
A	75 VDC class	
B	24 VDC class	Only for 42 and 54 mm sizes

K series

Standard Model Number List

Input voltage 24 VDC class (Low-voltage model)

Flange size	Rated output	Encoder	Tachogenerator	Holding brake (90 VDC)	Model no.	Page	
						Specifications	Dimensions
42 mm sq.	23 W	—	—	—	KB402XXX	p. 10	p. 16
		✓	—	—	KB402XS0	p. 10	p. 17
		—	✓	—	KB402TXX	p. 10	p. 18
	40 W	—	—	—	KB404XXX	p. 10	p. 16
		✓	—	—	KB404XS0	p. 10	p. 17
		—	✓	—	KB404TXX	p. 10	p. 18
	60 W	—	—	—	KB406XXX	p. 10	p. 16
		✓	—	—	KB406XS0	p. 10	p. 17
		—	✓	—	KB406TXX	p. 10	p. 18
54 mm sq.	60 W	—	—	—	KB506XXX	p. 11	p. 16
		✓	—	—	KB506XS0	p. 11	p. 17
		—	✓	—	KB506TXX	p. 11	p. 18
		—	—	✓	KB506BXX	p. 11	p. 19
		✓	—	✓	KB506BS0	p. 11	p. 20
		—	✓	✓	KB506JXX	p. 11	p. 21
		✓	✓	—	KB506TS0	p. 11	p. 22
		✓	✓	✓	KB506JS0	p. 11	p. 23
	80 W	—	—	—	KB511XXX	p. 11	p. 16
		✓	—	—	KB511XS0	p. 11	p. 17
		—	✓	—	KB511TXX	p. 11	p. 18
		—	—	✓	KB511BXX	p. 11	p. 19
		✓	—	✓	KB511BS0	p. 11	p. 20
		—	✓	✓	KB511JXX	p. 11	p. 21
		✓	✓	—	KB511TS0	p. 11	p. 22
		✓	✓	✓	KB511JS0	p. 11	p. 23

■Options

Brush (Maintenance parts)

Applicable product	Model no.	Quantity
For 42 mm sq. motors	AL-01027427	2 pcs
For 54 mm sq. motors	AL-01027428	2 pcs (60 W, 110 W), 4 pcs (80 W)
For 76 mm sq. motors	AL-01027429	4 pcs
For 88 mm sq. motors	AL-01027430	4 pcs
For 42 mm sq. tachogenerators	S813053-1A-87	2 pcs
For 54 mm sq. tachogenerators	S782281-1A-87	2 pcs
For 76 and 88 mm sq. tachogenerators	S782279-1A-87	2 pcs

Input voltage 75 VDC class

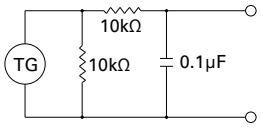
Flange size	Rated output	Encoder	Tachogenerator	Holding brake (90 VDC)	Model no.	Page	
						Specifications	Dimensions
42 mm sq.	40 W	—	—	—	KA404XXX	p. 12	p. 16
		✓	—	—	KA404XS0	p. 12	p. 17
		—	✓	—	KA404TXX	p. 12	p. 18
	60 W	—	—	—	KA406XXX	p. 12	p. 16
		✓	—	—	KA406XS0	p. 12	p. 17
		—	✓	—	KA406TXX	p. 12	p. 18
54 mm sq.	60 W	—	—	—	KA506XXX	p. 12	p. 16
		✓	—	—	KA506XS0	p. 12	p. 17
		—	✓	—	KA506TXX	p. 12	p. 18
		—	—	✓	KA506BXX	p. 12	p. 19
		✓	—	✓	KA506BS0	p. 12	p. 20
		—	✓	✓	KA506JXX	p. 12	p. 21
		✓	✓	—	KA506TS0	p. 12	p. 22
		✓	✓	✓	KA506JS0	p. 12	p. 23
	110 W	—	—	—	KA511XXX	p. 12	p. 16
		✓	—	—	KA511XS0	p. 12	p. 17
		—	✓	—	KA511TXX	p. 12	p. 18
		—	—	✓	KA511BXX	p. 12	p. 19
		✓	—	✓	KA511BS0	p. 12	p. 20
		—	✓	✓	KA511JXX	p. 12	p. 21
		✓	✓	—	KA511TS0	p. 12	p. 22
		✓	✓	✓	KA511JS0	p. 12	p. 23
76 mm sq.	200 W	—	—	—	KA720XXX	p. 13	p. 16
		✓	—	—	KA720XS0	p. 13	p. 17
		—	✓	—	KA720TXX	p. 13	p. 18
		—	—	✓	KA720BXX	p. 13	p. 19
		✓	—	✓	KA720BS0	p. 13	p. 20
		—	✓	✓	KA720JXX	p. 13	p. 21
		✓	✓	—	KA720TS0	p. 13	p. 22
		✓	✓	✓	KA720JS0	p. 13	p. 23
	300 W	—	—	—	KA730XXX	p. 13	p. 16
		✓	—	—	KA730XS0	p. 13	p. 17
		—	✓	—	KA730TXX	p. 13	p. 18
		—	—	✓	KA730BXX	p. 13	p. 19
		✓	—	✓	KA730BS0	p. 13	p. 20
		—	✓	✓	KA730JXX	p. 13	p. 21
		✓	✓	—	KA730TS0	p. 13	p. 22
		✓	✓	✓	KA730JS0	p. 13	p. 23
88 mm sq.	400 W	—	—	—	KA840XXX	p. 13	p. 16
		✓	—	—	KA840XS0	p. 13	p. 17
		—	✓	—	KA840TXX	p. 13	p. 18
		—	—	✓	KA840BXX	p. 13	p. 19
		✓	—	✓	KA840BS0	p. 13	p. 20
		—	✓	✓	KA840JXX	p. 13	p. 21
		✓	✓	—	KA840TS0	p. 13	p. 22
		✓	✓	✓	KA840JS0	p. 13	p. 23
	500 W	—	—	—	KA850XXX	p. 13	p. 16
		✓	—	—	KA850XS0	p. 13	p. 17
		—	✓	—	KA850TXX	p. 13	p. 18
		—	—	✓	KA850BXX	p. 13	p. 19
		✓	—	✓	KA850BS0	p. 13	p. 20
		—	✓	✓	KA850JXX	p. 13	p. 21
		✓	✓	—	KA850TS0	p. 13	p. 22
		✓	✓	✓	KA850JS0	p. 13	p. 23

Specifications

Input voltage 24 VDC class (Low-voltage model)

Servo motor model no. Inside 《 》 indicates motor flange size					KB402 《42 mm sq.》	KB404 《42 mm sq.》	KB406 《42 mm sq.》
		Condition	Symbol	Unit			
Motor	Rated output	☆☆	P_R	W	23	40	60
	Rated armature voltage	☆☆	V_R	V	20	24	24
	Rated torque	☆☆	T_R	N·m	0.074	0.13	0.19
	Rated armature current	☆☆	I_R	A	1.8	2.7	4.1
	Rated speed	☆☆	N_R	min^{-1}	3000	3000	3000
	Continuous stall torque	☆☆	T_S	N·m	0.08	0.14	0.20
	Peak stall torque	☆☆	T_P(N)	N·m	0.42	0.76	1.2
	Armature stall current	☆☆	I_S	A	1.8	2.7	4.1
	Peak armature stall current	☆☆	I_P(N)	A	10	14	23
	Maximum speed		N_{max}	min^{-1}	5000	5000	5000
	Rated power rate	☆☆	Q_R	kW/s	1.2	2.0	3.3
	Torque constant	☆	K_T	N·m/A	0.047	0.057	0.056
	Voltage constant	☆	K_E	$\times10^{-3}$V/min^{-1}	4.9	6.0	5.9
	Rotor inertia		J_M	$\times10^{-4}kg{\cdot}m^2$	0.047	0.084	0.108
	Armature winding resistance	☆	Ra	Ω	3.2	1.7	0.94
	Armature inductance	☆	La	mH	0.9	0.7	0.5
	Mechanical time constant	☆	tm	ms	6.9	4.4	3.2
	Electrical time constant	☆	te	ms	0.28	0.41	0.53
Tachogenerator	Coefficient of voltage generated	☆	K_{EG}	V/min^{-1}	$3\times10^{-3}\pm10\%$		
	Effective (rms) ripple	☆	ε_s	%	2		
	Peak-to-peak ripple	☆	ε_s	%	5		
	Linearity	☆	δ_L	%	1		
	Armature winding resistance	☆	R_1	Ω	37		
	Armature inductance	☆	L_1	mH	5		
	Minimum load resistance	☆	R_L	kΩ	10		
	Rotor inertia		J_{TG}	$\times10^{-4}kg{\cdot}m^2$	0.011		
Brake	Voltage	☆	V_B	V	——		
	Current	☆	I_B	A	——		
	Holding torque	☆☆	T_B	N·m	——		
	Inertia		J_B	$\times10^{-4}kg{\cdot}m^2$	——		
	Resistance	☆	R_B	Ω	——		
Mass					See the Dimensions section		
Size of aluminum plates for heat dissipation during measurement					250 × 250 × 6 mm		
Pulses per revolution for encoder		Line driver			Standard: 2000 P/R Optional: 200, 500, 1000 P/R		
		Open collector			Optional: 200, 500, 1000, 2000 P/R		
Oil seal					——		

The values in the row with "☆" are for when the ambient temperature and armature winding temperature are 25°C.
The values in the row with "☆☆" are after thermal equilibrium is established.
The values in the table above are for when operated with a stable DC current at ambient temperatures below 40°C.
The values for the tachogenerator are for when the test circuit shown below is used.

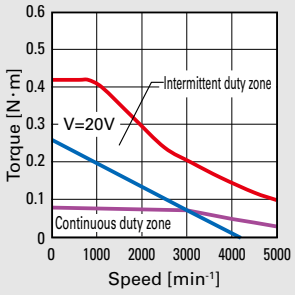


Encoders can not be installed to KB4 models with a tachogenerator.
The holding brake cannot be used for dynamic braking.
Holding brakes are also available in 24 and 48 V. (Optional)
Specifications are subject to change without notice.
24 VDC class models (low-voltage models) are outside the scope of CE marking and UKCA marking.

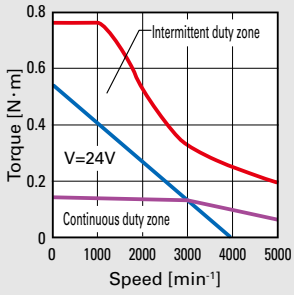
■ Speed-Torque Characteristics

Servo motor model no. / Flange size / Rated output

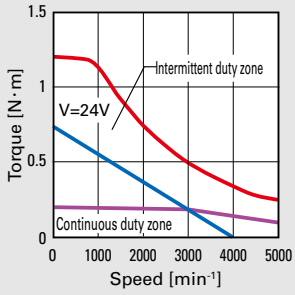
KB402/42 mm/23 W



KB404/42 mm/40 W



KB406/42 mm/60 W

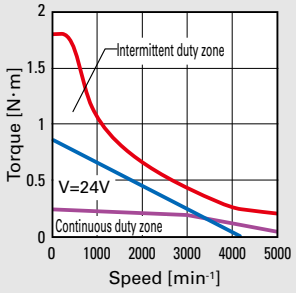


KB506 《54 mm sq.》	KB511 《54 mm sq.》	Servo motor model no. Inside 《 》 indicates motor flange size				
		Unit	Symbol	Condition		
60	80	W	P_R	☆☆	Rated output	Motor
24	24	V	V_R	☆☆	Rated armature voltage	
0.19	0.26	N·m	T_R	☆☆	Rated torque	
3.9	5.0	A	I_R	☆☆	Rated armature current	
3000	3000	min^{-1}	N_R	☆☆	Rated speed	
0.24	0.32	N·m	T_S	☆☆	Continuous stall torque	
1.8	2.16	N·m	T_P(N)	☆☆	Peak stall torque	
4.5	5.2	A	I_S	☆☆	Armature stall current	
31	40	A	I_P(N)	☆☆	Peak armature stall current	
5000	5000	min^{-1}	N_{max}		Maximum speed	
1.6	1.8	kW/s	Q_R	☆☆	Rated power rate	
0.057	0.06	N·m/A	K_T	☆	Torque constant	
6.0	6.3	$\times10^{-3}$V/min^{-1}	K_E	☆	Voltage constant	
0.22	0.37	$\times10^{-4}$kg·m^2	J_M		Rotor inertia	
1.1	0.44	Ω	Ra	☆	Armature winding resistance	
0.5	0.3	mH	La	☆	Armature inductance	
7.4	4.5	ms	tm	☆	Mechanical time constant	
0.45	0.61	ms	te	☆	Electrical time constant	
7×10^{-3}±10%		V/min^{-1}	K_{EG}	☆	Coefficient of voltage generated	Tachogenerator
1		%	ε_s	☆	Effective (rms) ripple	
3		%	ε_s	☆	Peak-to-peak ripple	
1		%	δ_L	☆	Linearity	
26		Ω	R_1	☆	Armature winding resistance	
4.1		mH	L_1	☆	Armature inductance	
10		kΩ	R_L	☆	Minimum load resistance	
0.12		$\times10^{-4}$kg·m^2	J_{TG}		Rotor inertia	
90±10%		V	V_B	☆	Voltage	Brake
0.06		A	I_B	☆	Current	
0.29		N·m	T_B	☆☆	Holding torque	
0.01		$\times10^{-4}$kg·m^2	J_B		Inertia	
1600		Ω	R_B	☆	Resistance	
See the Dimensions section		Mass				
305 × 305 × 12 mm		Size of aluminum plates for heat dissipation during measurement				
Standard: 2000 $^P/_R$ Optional: 200, 500, 1000 $^P/_R$		Line driver			Pulses per revolution for encoder	
Optional: 200, 500, 1000, 2000 $^P/_R$		Open collector				
Can be used		Oil seal				

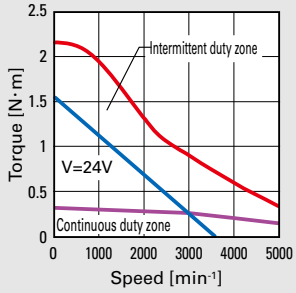
■ Speed-Torque Characteristics

Servo motor model no. / Flange size / Rated output

KB506/54 mm/60 W



KB511/54 mm/80 W

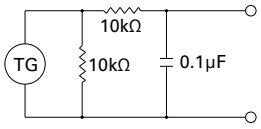


Specifications

Input voltage 75 VDC class

Servo motor model no. Inside 《》 indicates motor flange size		Condition	Symbol	Unit	KA404 《42 mm sq.》	KA406 《42 mm sq.》	KA506 《54 mm sq.》	KA511 《54 mm sq.》
Motor	Rated output	☆☆	P_R	W	40	60	60	110
	Rated armature voltage	☆☆	V_R	V	72	70	75	75
	Rated torque	☆☆	T_R	N·m	0.13	0.19	0.19	0.35
	Rated armature current	☆☆	I_R	A	0.9	1.2	1.1	2.0
	Rated speed	☆☆	N_R	min^{-1}	3000	3000	3000	3000
	Continuous stall torque	☆☆	T_S	N·m	0.14	0.20	0.24	0.42
	Peak stall torque	☆☆	T_P(N)	N·m	0.76	1.2	1.8	3.4
	Armature stall current	☆☆	I_S	A	0.9	1.2	1.4	2.1
	Peak armature stall current	☆☆	I_P(N)	A	4.7	7.6	10	18
	Maximum speed		N_{max}	min^{-1}	5000	5000	5000	5000
	Rated power rate	☆☆	Q_R	kW/s	2.0	3.3	1.6	3.3
	Torque constant	☆	K_T	N·m/A	0.174	0.177	0.17	0.20
	Voltage constant	☆	K_E	$\times10^{-3}$V/min^{-1}	18.2	18.5	17.8	20.8
	Rotor inertia		J_M	$\times10^{-4}$kg·m^2	0.084	0.108	0.22	0.37
	Armature winding resistance	☆	Ra	Ω	16.8	9.8	9.4	4.8
	Armature inductance	☆	La	mH	7.6	4.5	4.4	3.0
	Mechanical time constant	☆	tm	ms	4.7	3.4	7.2	4.5
	Electrical time constant	☆	te	ms	0.45	0.46	0.47	0.63
Tachogenerator	Coefficient of voltage generated	☆	K_{EG}	V/min^{-1}	3×10^{-3}±10%		7×10^{-3}±10%	
	Effective (rms) ripple	☆	ε_s	%	2		1	
	Peak-to-peak ripple	☆	ε_R	%	5		3	
	Linearity	☆	δ_L	%	1		1	
	Armature winding resistance	☆	R_1	Ω	37		26	
	Armature inductance	☆	L_1	mH	5		4.1	
	Minimum load resistance	☆	R_L	kΩ	10		10	
	Rotor inertia		J_{TG}	$\times10^{-4}$kg·m^2	0.011		0.12	
Brake	Voltage	☆	V_B	V	——		90±10%	
	Current	☆	I_B	A	——		0.06	
	Holding torque	☆☆	T_B	N·m	——		0.29	
	Inertia		J_B	$\times10^{-4}$kg·m^2	——		0.01	
	Resistance	☆	R_B	Ω	——		1600	
Mass					See the Dimensions section			
Size of aluminum plates for heat dissipation during measurement					250 × 250 × 6 mm		305 × 305 × 12 mm	
Pulses per revolution for encoder		Line driver			Standard: 2000 P/R Optional: 200, 500, 1000 P/R			
		Open collector			Optional: 200, 500, 1000, 2000 P/R			
Oil seal					——		Can be used	

The values in the row with "☆" are for when the ambient temperature and armature winding temperature are 25°C.
The values in the row with "☆☆" are after thermal equilibrium is established.
The values in the table above are for when operated with a stable DC current at ambient temperatures below 40°C.
The values for the tachogenerator are for when the test circuit shown below is used.

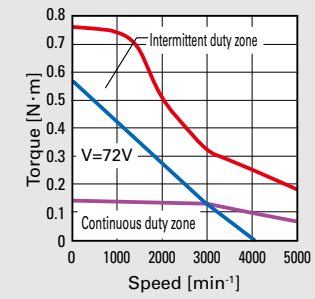


Encoders can not be installed to KB4 models with a tachogenerator.
The holding brake cannot be used for dynamic braking.
Holding brakes are also available in 24 and 48 V. (Optional)
Specifications are subject to change without notice.

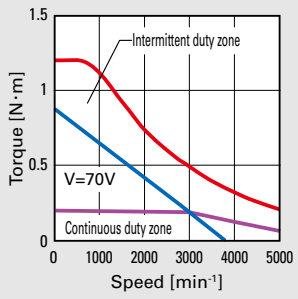
■ Speed-Torque Characteristics

Servo motor model no. / Flange size / Rated output

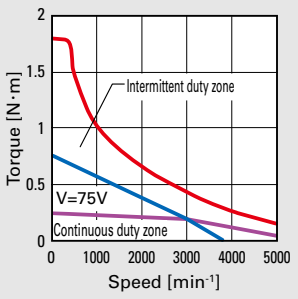
KA404/42 mm/40 W



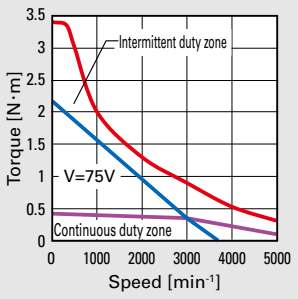
KA406/42 mm/60 W



KA506/54 mm/60 W



KA511/54 mm/110 W

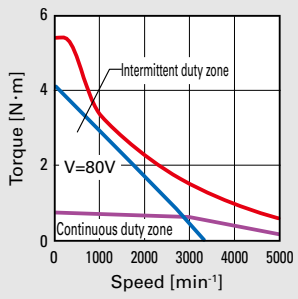


KA720 《76 mm sq.》	KA730 《76 mm sq.》	KA840 《88 mm sq.》	KA850 《88 mm sq.》	Servo motor model no. Inside 《 》 indicates motor flange size				
				Unit	Symbol	Condition		
200	300	400	500	W	P_R	☆☆	Rated output	Motor
80	75	85	80	V	V_R	☆☆	Rated armature voltage	
0.64	1.15	1.53	1.91	N·m	T_R	☆☆	Rated torque	
3.4	4.8	5.7	7.4	A	I_R	☆☆	Rated armature current	
3000	2500	2500	2500	min^{-1}	N_R	☆☆	Rated speed	
0.77	1.43	1.70	2.16	N·m	T_S	☆☆	Continuous stall torque	
5.4	9.8	12	16.7	N·m	T_P(N)	☆☆	Peak stall torque	
3.6	5.4	6.0	7.6	A	I_S	☆☆	Armature stall current	
25	40	40	62	A	I_P(N)	☆☆	Peak armature stall current	
5000	4000	4000	3000	min^{-1}	N_{max}		Maximum speed	
2.8	4.9	4.7	6.1	kW/s	Q_R	☆☆	Rated power rate	
0.23	0.27	0.31	0.286	N·m/A	K_T	☆	Torque constant	
24.2	28.6	32.9	30.0	$\times10^{-3}$V/min^{-1}	K_E	☆	Voltage constant	
1.47	2.7	5.0	6.0	$\times10^{-4}$kg·m^2	J_M		Rotor inertia	
2.2	1.05	0.95	0.53	Ω	Ra	☆	Armature winding resistance	
3.3	1.7	1.5	0.86	mH	La	☆	Armature inductance	
6.1	3.8	4.8	3.9	ms	tm	☆	Mechanical time constant	
1.5	1.6	1.5	1.6	ms	te	☆	Electrical time constant	
7×10^{-3}±10%				V/min^{-1}	K_{EG}	☆	Coefficient of voltage generated	Tachogenerator
1				%	ε_s	☆	Effective (rms) ripple	
3				%	ε_R	☆	Peak-to-peak ripple	
1				%	δ_L	☆	Linearity	
26				Ω	R_1	☆	Armature winding resistance	
4.1				mH	L_1	☆	Armature inductance	
10				kΩ	R_L	☆	Minimum load resistance	
0.12				$\times10^{-4}$kg·m^2	J_{TG}		Rotor inertia	
90±10%		90±10%		V	V_B	☆	Voltage	Brake
0.11		0.11		A	I_B	☆	Current	
1.47		1.96		N·m	T_B	☆☆	Holding torque	
0.09		0.2		$\times10^{-4}$kg·m^2	J_B		Inertia	
820		820		Ω	R_B	☆	Resistance	
See the Dimensions section				Mass				
305 × 305 × 12 mm				Size of aluminum plates for heat dissipation during measurement				
Standard: 2000 P/R Optional: 200, 500, 1000 P/R				Line driver			Pulses per revolution for encoder	
Optional: 200, 500, 1000, 2000 P/R				Open collector				
Can be used				Oil seal				

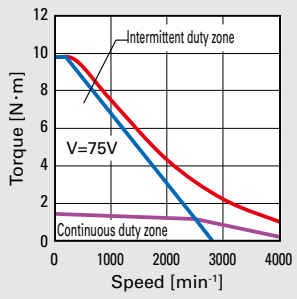
■ Speed-Torque Characteristics

Servo motor model no. / Flange size / Rated output

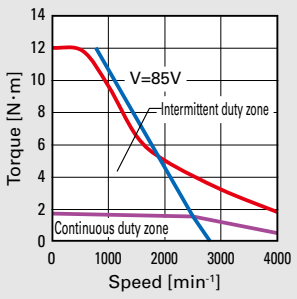
KA720/76 mm/200 W



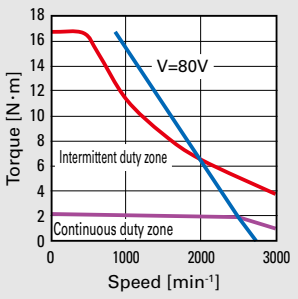
KA730/76 mm/300 W



KA840/88 mm/400 W



KA850/88 mm/500 W

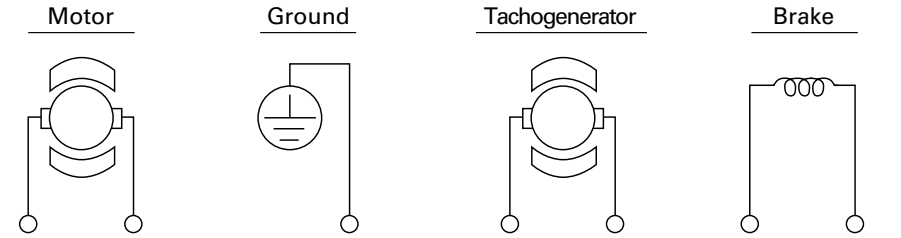


Common Specifications

■Specifications common to all motors

Items	Specifications
Rated	Continuous (S1)
Thermal class	F
Excitation system	Permanent magnet
Insulation resistance	10 MΩ or more at 500 VDC
Dielectric strength	1500 VAC (600 V for 24 V class and tachogenerator models), for one minute (However, do not measure dielectric strength between encoder and motor)
Rotation	Forward and reverse rotations possible
Ambient temperature	0 to 40℃
Humidity	20 to 90% RH (non-condensing)
Paint color	Black
Protection	Fully enclosed (IP43)
Lead wire length	1000 mm

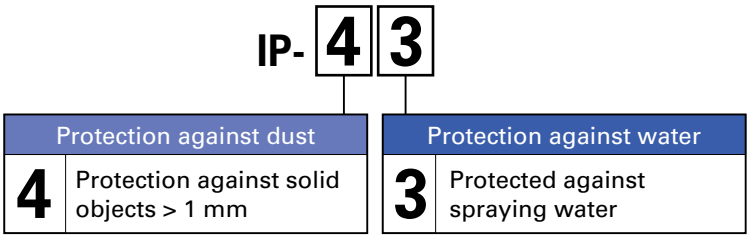
■How to connect



Motor rotation direction
When (Red): + and (Blue): -, counterclockwise as viewed from the output axis
Tachogenerator polarity
When rotating counterclockwise as viewed from the output axis, (Red): + and (Blue): -

■Protection rating

The protection ratings of our servo motors comply with IEC standards (IEC 60034-5 Edition 4.1, 2006-11).



■Compliance with International Standards and Directives

	Directive	Standards
CE marking in Europe	Low Voltage Directive 2014/35/EU	IEC 60034-1, IEC60034-5 Only 75 VDC class models are CE marking-compliant. 24 VDC class models are outside the scope of CE marking.
	RoHS Directive 2011/65/EU	EN IEC 63000 : 2018
UKCA marking in Great Britain In compliance from July 2022 production onwards.	Electrical Equipment (safety) Regulaton 2016	IEC 60034-1, IEC60034-5 Only 75 VDC class models are UKCA marking-compliant. 24 VDC class models are outside the scope of UKCA marking.
	RoHS Regulations 2012	EN IEC 63000 : 2018

	Directive	Standards	File no.
UL	UL, c-UL	UL1004-1, UL1004-6, CSA_C22.2_No.100	E179832(PRHZ2, PRHZ8)

Encoder Specifications

Items	Unit	Specifications
Encoder type		Incremental encoder
Pulses per revolution	P/R	Standard: 2000 (Optional: 200, 500, 1000)
Output circuit		Line driver
Number of channels		3
Power supply	VDC	+5±5%
Current consumption	mA	160 max.
Output circuit voltage	VDC	V_{OH}=2.4 min., V_{OL}=0.5 max. at I_o = ±20 mA
Output circuit current	mA	20 max.
Response frequency	kHz	200
PWM duty cycle		$T_1 = 1/2T_0 \pm 1/8T_0$
Output phase difference		$T_{2\ to\ 5} = 1/4T_0 \pm 1/8T_0$
Zero-point signal		$T_6 = T_0 \pm 0.4T_0$
Operating temperature	℃	0 to +85 (inside the encoder)
Inertia	$\times 10^{-4}kgm^2$	0.005

Note: An open collector output type is also available as an option.

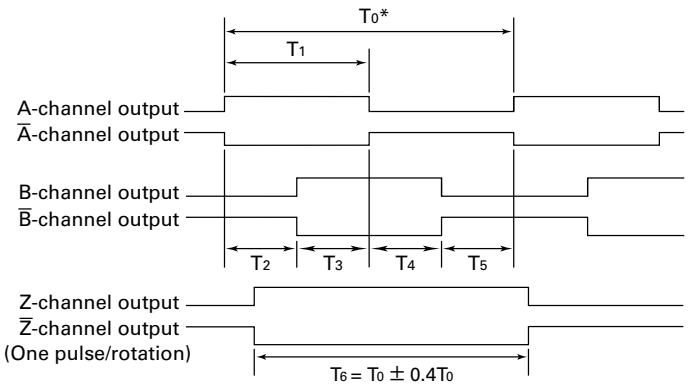
■External connection

Lead wire color	Application
Red	+5 VDC
Black	GND(0 V)
Shielded	Chassis ground
Blue	A-channel output
Brown	$\overline{A}$-channel output
Green	B-channel output
Purple	$\overline{B}$-channel output
White	Z-channel output (zero point)
Yellow	$\overline{Z}$-channel output (zero point)

■Output waveform

●Line driver output

(When rotating counterclockwise as viewed from the motor output shaft)

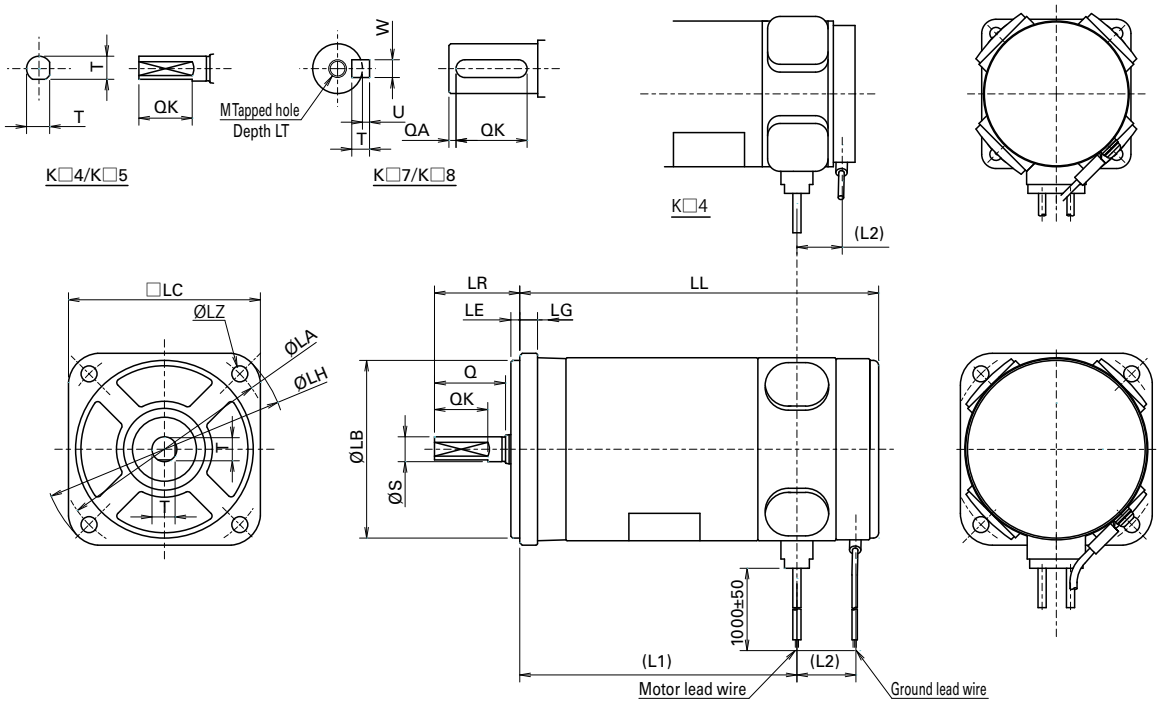


*T_0 is the average time for one encoder rotation when the encoder is rotated at a constant speed.

- Do not exert forces in the axial direction when handling.
- Do not perform insulation resistance or dielectric strength testing as it may damage the electronic circuit.
- The specifications above do not take deviations arising from motor dependencies into account.

Dimensions

■Servo motor

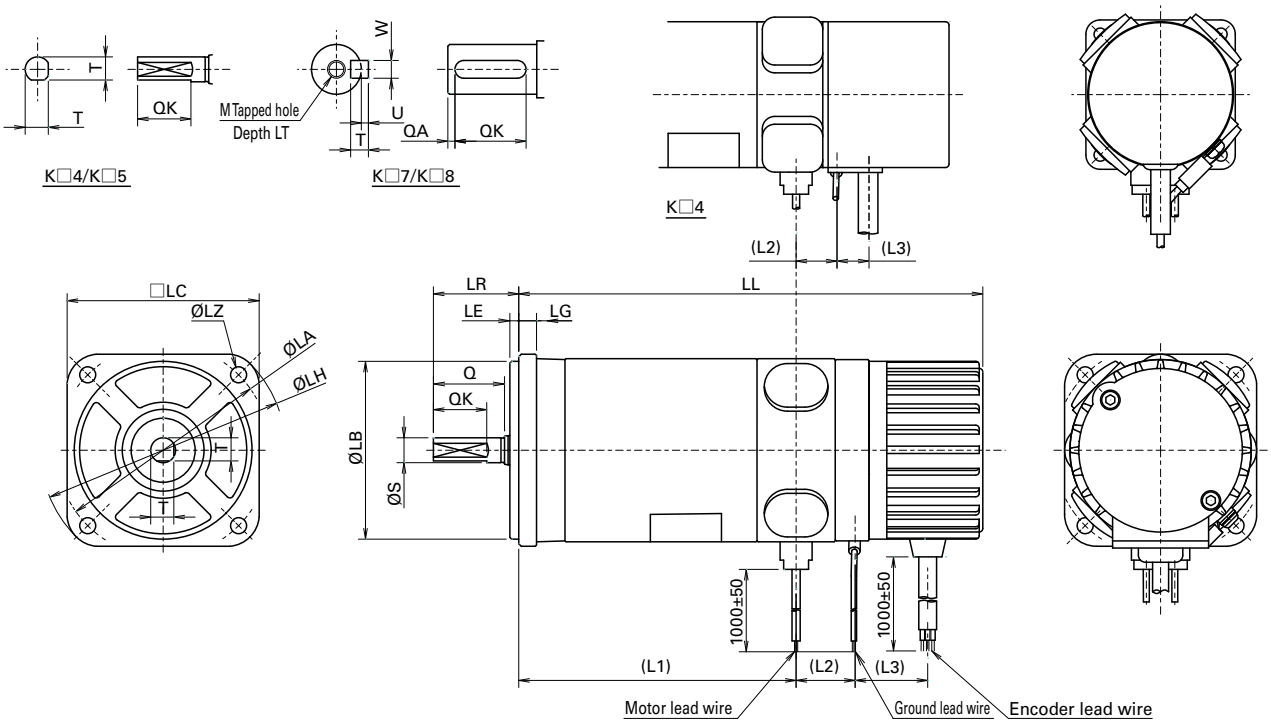


(Unit: mm)

Model No.	LL	LG	L1	L2	LA	LB	LE	LH	LC	LZ	LR
KB402XXX	56±1	5±0.5	40.5	11.5	48±0.2	0 34-0.025	2±0.3	56	42±0.5	4-ϕ3.5	24±0.8
K□404XXX	69±1		53.5								
K□406XXX	82±1		66.5								
K□506XXX	81±1		58	17	60±0.3	0 50-0.025	2.5±0.3	69	54±0.5	4-ϕ4.5	
K□511XXX	101±2		78								
KA720XXX	100.5±2	8±0.5	74.5	17.5	90±0.3	0 70-0.030	3±0.4	100	76±0.8	4-ϕ5.5	30±0.8
KA730XXX	124.5±2		98.5								
KA840XXX	134±2		103.5	22	100±0.3	0 80-0.030		112	88±0.8	4-ϕ6.6	35±0.8
KA850XXX	149±2		118.5								

Model No.	S	Q	QA	QK	W	T	U	M	LT	Mass [kg]
KB402XXX	0 7 -0.009	20±0.5	–	15±1.5	Two slots 6.5±0.2			–	–	0.30
K□404XXX										0.40
K□406XXX										0.50
K□506XXX										0.70
K□511XXX										0.90
KA720XXX	0 14 -0.011	25±0.5	2	20±0.7	+0.024 5+0.012	5	0 2-0.2	M5	8	1.80
KA730XXX										2.50
KA840XXX	0 16 -0.011	30±0.5		25±0.7				M6	10	3.40
KA850XXX										4.10

■Servo motor with encoder



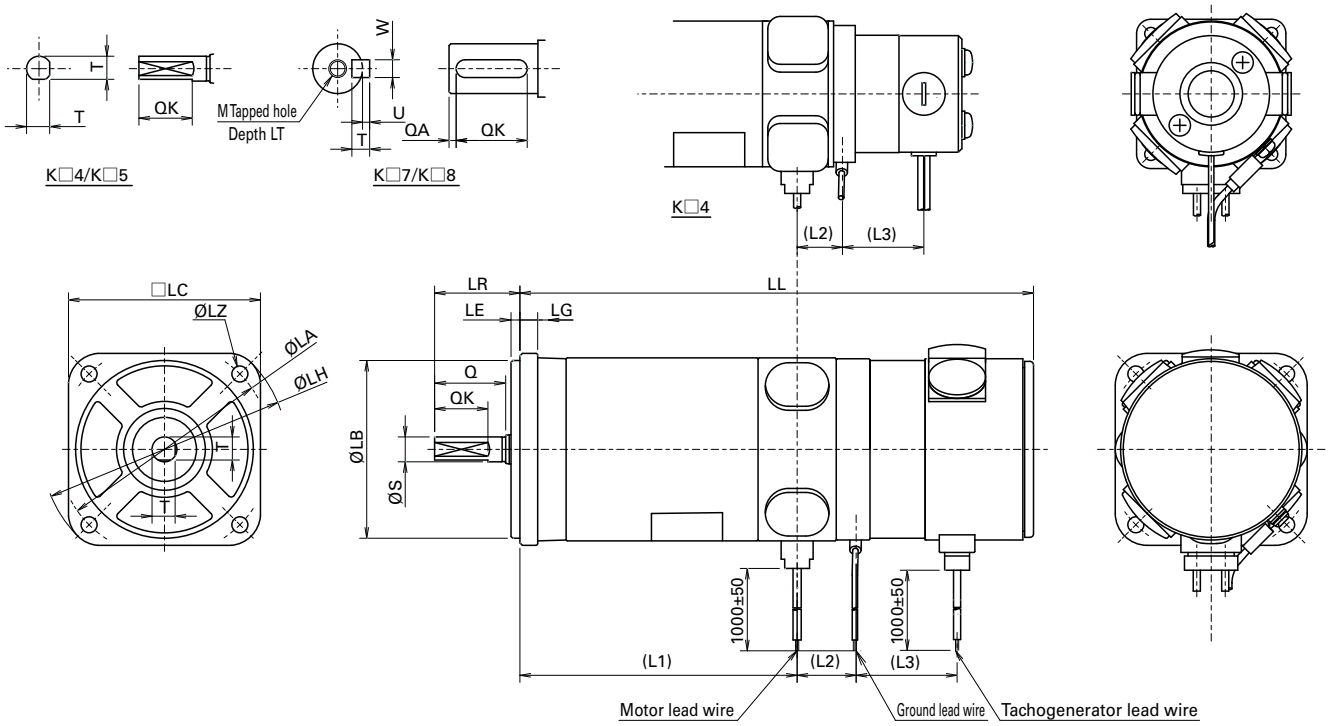
(Unit: mm)

Model No.	LL	LG	L1	L2	L3	LA	LB	LE	LH	LC	LZ	LR
KB402XS0	83±1	5±0.5	40.5	11.5	9	48±0.2	0 34-0.025	2±0.3	56	42±0.5	4-ϕ3.5	24±0.8
K□404XS0	96±1		53.5									
K□406XS0	109±2		66.5									
K□506XS0	110.5±2		58	17	20	60±0.3	0 50-0.025	2.5±0.3	69	54±0.5	4-ϕ4.5	
K□511XS0	130.5±2		78									
KA720XS0	134.5±2	8±0.5	74.5	17.5	27	90±0.3	0 70-0.030	3±0.4	100	76±0.8	4-ϕ5.5	30±0.8
KA730XS0	158.5±2		98.5									
KA840XS0	166±2		103.5	22	25	100±0.3	0 80-0.030		112	88±0.8	4-ϕ6.6	35±0.8
KA850XS0	181±2		118.5									

Model No.	S	Q	QA	QK	W	T	U	M	LT	Mass [kg]
KB402XS0	0 7 -0.009	20±0.5	—	15±1.5	Two slots 6.5±0.2			—	—	0.40
K□404XS0										0.55
K□406XS0										0.65
K□506XS0										0.80
K□511XS0										1.10
KA720XS0	0 14 -0.011	25±0.5	2	20±0.7	+0.024 5+0.012	5	0 2-0.2	M5	8	2.10
KA730XS0										3.10
KA840XS0	0 16 -0.011	30±0.5		25±0.7				M6	10	3.65
KA850XS0										4.25

Dimensions

■Servo motor with tachogenerator

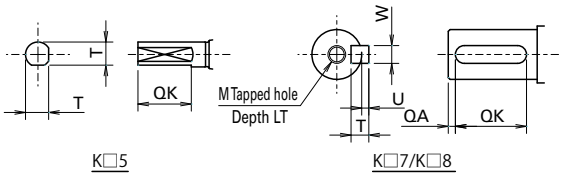


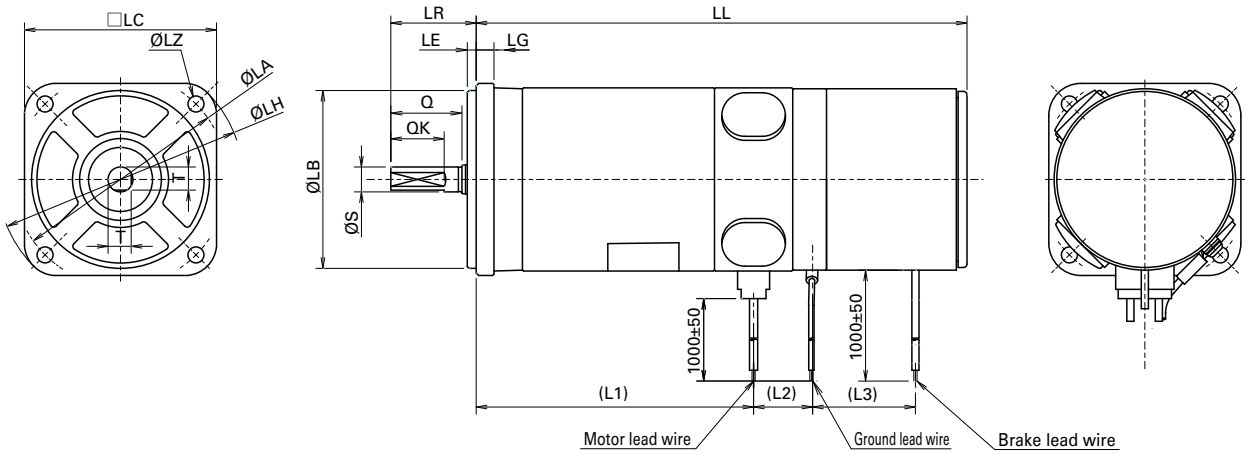
(Unit: mm)

Model No.	LL	LG	L1	L2	L3	LA	LB	LE	LH	LC	LZ	LR
KB402TXX	85±1	5±0.5	40.5	11.5	23	48±0.2	0 34-0.025	2±0.3	56	42±0.5	4-ϕ3.5	24±0.8
K□404TXX	98±1		53.5									
K□406TXX	111±2		66.5									
K□506TXX	124.5±2		58	17	28	60±0.3	0 50-0.025	2.5±0.3	69	54±0.5	4-ϕ4.5	
K□511TXX	144.5±2		78									
KA720TXX	148.5±2	8±0.5	74.5	17.5	34	90±0.3	0 70-0.030	3±0.4	100	76±0.8	4-ϕ5.5	30±0.8
KA730TXX	172.5±2		98.5									
KA840TXX	183±2		103.5	22	33	100±0.3	0 80-0.030		112	88±0.8	4-ϕ6.6	35±0.8
KA850TXX	197.5±2		118.5									

Model No.	S	Q	QA	QK	W	T	U	M	LT	Mass [kg]
KB402TXX	0 7 -0.009	20±0.5	–	15±1.5	Two slots 6.5±0.2			–	–	0.34
K□404TXX										0.49
K□406TXX										0.59
K□506TXX										1.0
K□511TXX										1.21
KA720TXX	0 14 -0.011	25±0.5	2	20±0.7	+0.024 5+0.012	5	0 2-0.2	M5	8	2.15
KA730TXX										2.85
KA840TXX	0 16 -0.011	30±0.5		25±0.7				M6	10	3.85
KA850TXX										4.45

■Servo motor with holding brake





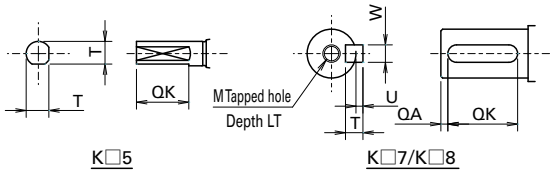
(Unit: mm)

Model No.	LL	LG	L1	L2	L3	LA	LB	LE	LH	LC	LZ	LR
K□506BXX	118±2	5±0.5	58	17	28.5	60±0.3	0 50-0.025	2.5±0.3	69	54±0.5	4-ϕ4.5	24±0.8
K□511BXX	138±2		78									
KA720BXX	138.5±2	8±0.5	74.5	17.5	30.5	90±0.3	0 70-0.030	3±0.4	100	76±0.8	4-ϕ5.5	30±0.8
KA730BXX	162.5±2		98.5									
KA840BXX	169.5±2		103.5	22	27	100±0.3	0 80-0.030		112	88±0.8	4-ϕ6.6	35±0.8
KA850BXX	184.5±2		118.5									

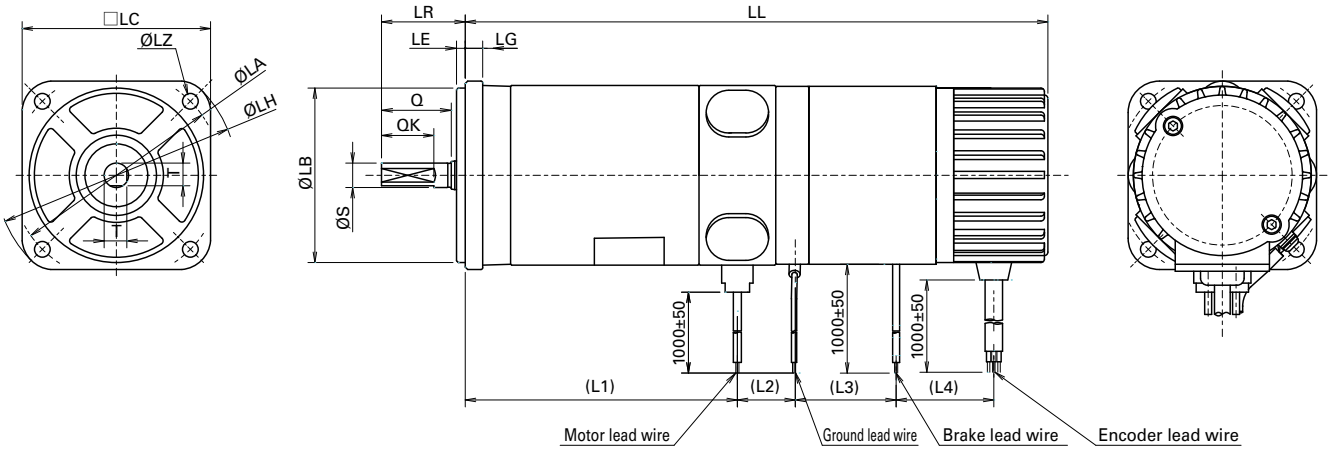
Model No.	S	Q	QA	QK	W	T	U	M	LT	Mass [kg]
K□506BXX	0 7 -0.009	20±0.5	—	15±1.5	Two slots 6.5±0.2			—	—	0.91
K□511BXX										1.21
KA720BXX	0 14 -0.011	25±0.5	2	20±0.7	+0.024 5+0.012	5	0 2-0.2	M5	8	2.39
KA730BXX										3.09
KA840BXX	0 16 -0.011	30±0.5		25±0.7				M6	10	4.20
KA850BXX										4.79

Dimensions

■Servo motor with encoder and holding brake



K□5 K□7/K□8

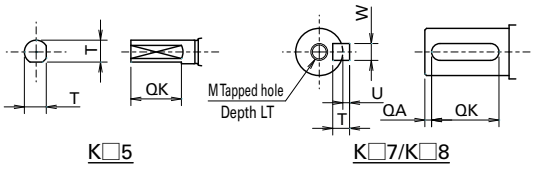


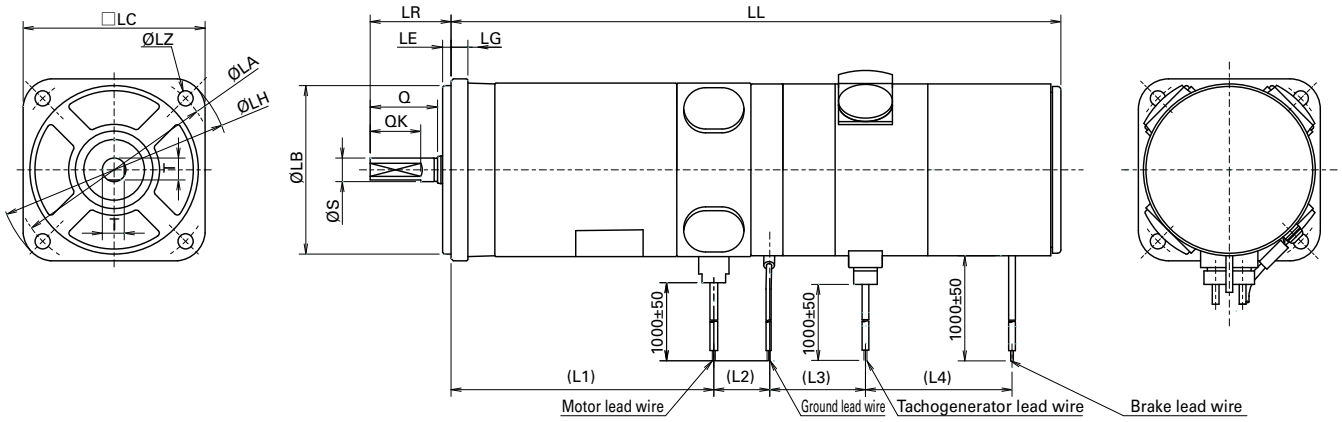
(Unit: mm)

Model No.	LL	LG	L1	L2	L3	L4	LA	LB	LE	LH	LC	LZ
K□506BS0	147±2	5±0.5	58	17	28.5	28	60±0.3	0 50-0.025	2.5±0.3	69	54±0.5	4-ϕ4.5
K□511BS0	167±2		78									
KA720BS0	172.5±2	8±0.5	74.5	17.5	30.5	34.5	90±0.3	0 70-0.030	3±0.4	100	76±0.8	4-ϕ5.5
KA730BS0	196.5±2		98.5									
KA840BS0	203±3		103.5	22	27	35	100±0.3	0 80-0.030		112	88±0.8	4-ϕ6.6
KA850BS0	218±3		118.5									

Model No.	LR	S	Q	QA	QK	W	T	U	M	LT	Mass [kg]
K□506BS0	24±0.8	0 7 -0.009	20±0.5	—	15±1.5	Two slots 6.5±0.2			—	—	1.16
K□511BS0											1.46
KA720BS0	30±0.8	0 14 -0.011	25±0.5	2	20±0.7	+0.024 5+0.012	5	0 2-0.2	M5	8	2.64
KA730BS0											3.44
KA840BS0	35±0.8	0 16 -0.011	30±0.5		25±0.7				M6	10	4.44
KA850BS0											5.04

■Servo motor with tachogenerator and holding brake





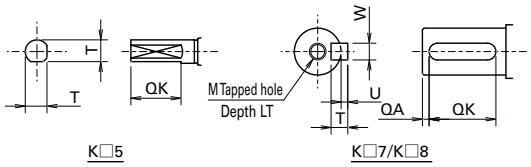
(Unit: mm)

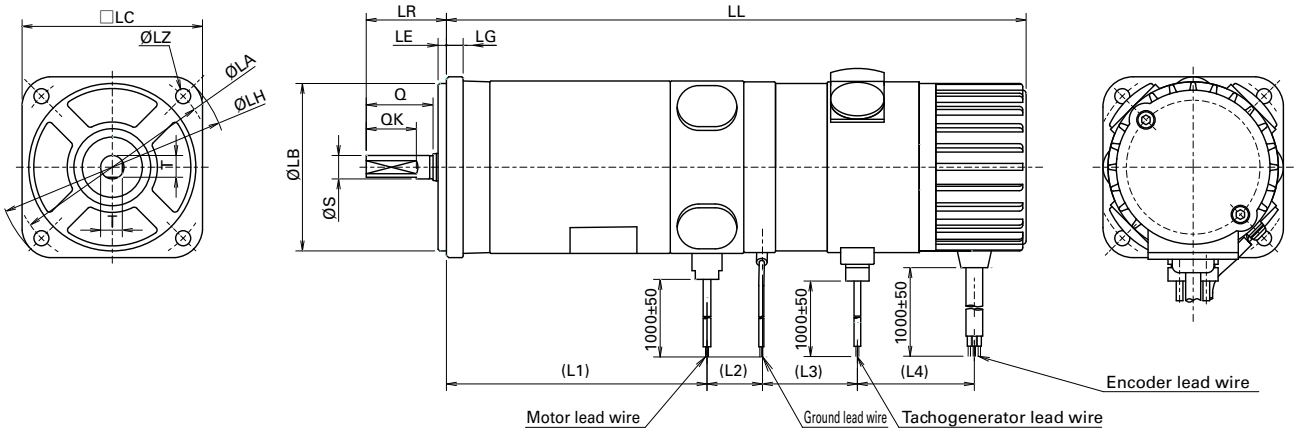
Model No.	LL	LG	L1	L2	L3	L4	LA	LB	LE	LH	LC	LZ
K□506JXX	161±2	5±0.5	58	17	28	43.5	60±0.3	0 50-0.025	2.5±0.3	69	54±0.5	4-ϕ4.5
K□511JXX	181±2		78									
KA720JXX	186.5±2	8±0.5	74.5	17.5	34	43.5	90±0.3	0 70-0.030	3±0.4	100	76±0.8	4-ϕ5.5
KA730JXX	210.5±3		98.5									
KA840JXX	219.5±3		103.5	22	33	44	100±0.3	0 80-0.030		112	88±0.8	4-ϕ6.6
KA850JXX	234.5±3		118.5									

Model No.	LR	S	Q	QA	QK	W	T	U	M	LT	Mass [kg]
K□506JXX	24±0.8	0 7 -0.009	20±0.5	—	15±1.5	Two slots 6.5±0.2			—	—	1.30
K□511JXX											1.47
KA720JXX	30±0.8	0 14 -0.011	25±0.5	2	20±0.7	+0.024 5+0.012	5	0 2-0.2	M5	8	2.80
KA730JXX											3.40
KA840JXX	35±0.8	0 16 -0.011	30±0.5		25±0.7				M6	10	4.64
KA850JXX											5.24

Dimensions

■Servo motor with encoder and tachogenerator



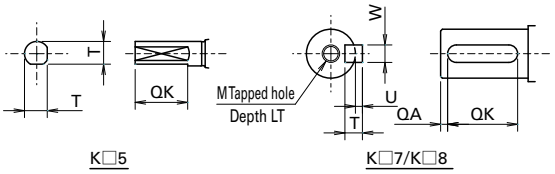


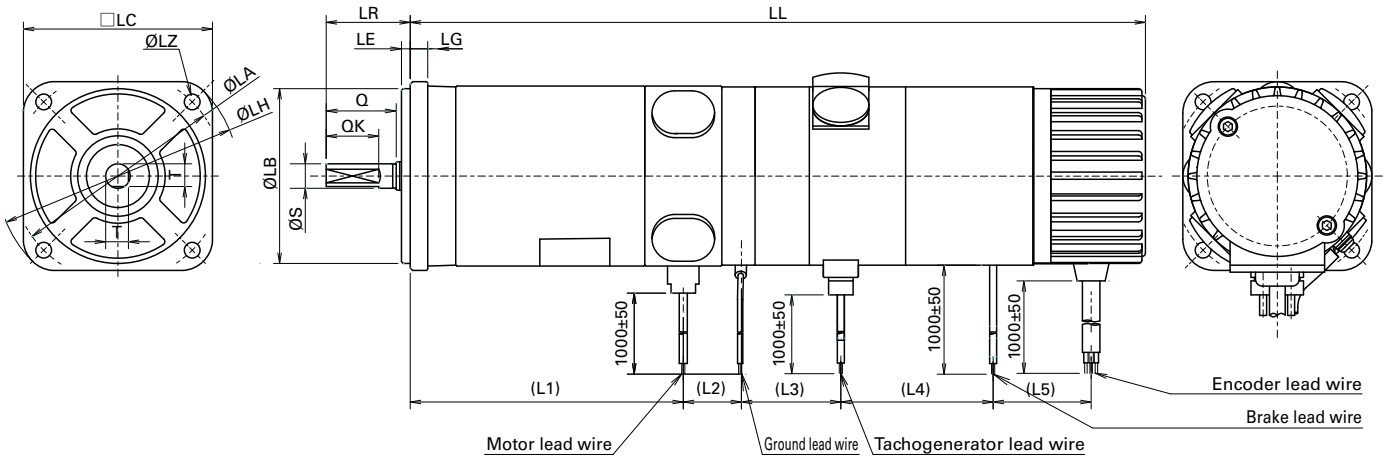
(Unit: mm)

Model No.	LL	LG	L1	L2	L3	L4	LA	LB	LE	LH	LC	LZ
K□506TS0	153.5±2	5±0.5	58	17	28	35	60±0.3	0 50-0.025	2.5±0.3	69	54±0.5	4-ϕ4.5
K□511TS0	173.5±2		78									
KA720TS0	182±2	8±0.5	74.5	17.5	34	40	90±0.3	0 70-0.030	3±0.4	100	76±0.8	4-ϕ5.5
KA730TS0	206±3		98.5									
KA840TS0	216±3		103.5	22	33	42	100±0.3	0 80-0.030		112	88±0.8	4-ϕ6.6
KA850TS0	231±3		118.5									

Model No.	LR	S	Q	QA	QK	W	T	U	M	LT	Mass [kg]
K□506TS0	24±0.8	0 7 -0.009	20±0.5	—	15±1.5	Two slots 6.5±0.2			—	—	1.16
K□511TS0											1.36
KA720TS0	30±0.8	0 14 -0.011	25±0.5	2	20±0.7	+0.024 5+0.012	5	0 2-0.2	M5	8	2.40
KA730TS0											3.10
KA840TS0	35±0.8	0 16 -0.011	30±0.5		25±0.7				M6	10	4.10
KA850TS0											4.70

■Servo motor with encoder, tachogenerator, and holding brake





(Unit: mm)

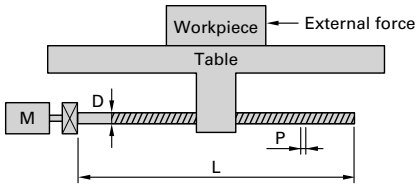
Model No.	LL	LG	L1	L2	L3	L4	L5	LA	LB	LE	LH	LC
K□506JS0	190±2	5±0.5	58	17	28	43.5	28	60±0.3	0 50-0.025	2.5±0.3	69	54±0.5
K□511JS0	210±3		78									
KA720JS0	220±3	8±0.5	74.5	17.5	34	43.5	34.5	90±0.3	0 70-0.030	3±0.4	100	76±0.8
KA730JS0	244±3		98.5									
KA840JS0	253±3		103.5	22	33	44	35	100±0.3	0 80-0.030		112	88±0.8
KA850JS0	268±3		118.5									

Model No.	LZ	LR	S	Q	QA	QK	W	T	U	M	LT	Mass [kg]
K□506JS0	4-ϕ4.5	24±0.8	0 7 -0.009	20±0.5	—	15±1.5	Two slots 6.5±0.2			—	—	1.42
K□511JS0												1.62
KA720JS0	4-ϕ5.5	30±0.8	0 14 -0.011	25±0.5	2	20±0.7	+0.024 5+0.012	5	0 2-0.2	M5	8	3.0
KA730JS0												3.70
KA840JS0	4-ϕ6.6	35±0.8	0 16 -0.011	30±0.5		25±0.7				M6	10	4.90
KA850JS0												5.50

Selection Guide By mechanism

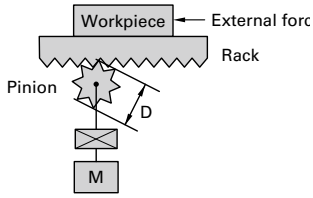
Typical examples of mechanisms and items that require selection are shown below. Provide this information when placing an order.

Ball screw



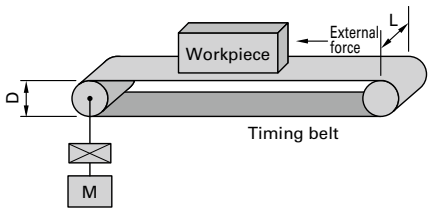
External force	F	N
Workpiece + table mass	W	kg
Ball screw diameter	D	m
Ball screw length	L	m
Ball screw lead	P	m
Ball screw density	ρ	kg/m^3
Friction coefficient	μ	
Gear ratio *	G	
Machine efficiency	η	

Rack & pinion



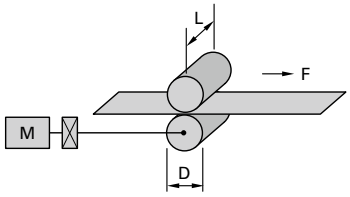
External force	F	N
Workpiece + rack mass	W	kg
Pinion diameter	D	m
Pinion thickness	L	m
Pinion density	ρ	kg/m^3
Friction coefficient	μ	
Gear ratio *	G	
Machine efficiency	η	

Belt drive



External force	F	N
Workpiece + belt mass	W	kg
Pulley diameter	D	m
Pulley width	L	m
Pulley density	ρ	kg/m^3
Pulley moment of inertia	J	kg·m^2
Gear ratio *	G	
Machine efficiency	η	

Roll feed



Sheet tension	F	N
Roll diameter	D	m
Roll width	L	m
Roll density	ρ	kg/m^3
Roll moment of inertia	J	kg·m^2
Gear ratio *	G	
Machine efficiency	η	

Rotary indexing table

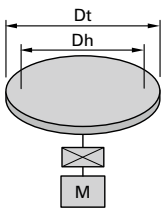
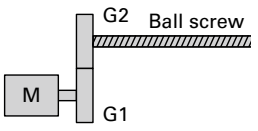


Table mass	W	kg
Table diameter	Dt	m
Table support diameter	Dh	m
Table moment of inertia	J	kg·m^2
Friction coefficient of table support	μ	
Gear ratio *	G	
Machine efficiency	η	

* Derivation of gear ratio (G)



$$G = \frac{\text{Number of screw threads (G2)}}{\text{Number of motor gear teeth (G1)}}$$

Safety Precautions

The servo motors in this catalog are designed to be used with general industrial equipment. When using them, pay sufficient attention to the following points.

- Read these Safety Precautions and the included Instruction Manual carefully before installing, assembling, and using the motor for proper use.
- Do not use the motor in an environment where vibration is present, such as in moving vehicles or shipping vessels.
- Do not modify or alter the motor in any way.
- Contact us or your point of sale for installation or maintenance services of the motor.
- Consult us or your point of sale when using the motor for the following uses, as these require special considerations for installation, operations, maintenance, and management such as redundancy and emergency power generators.

  ❶ Use in medical equipment that may have an effect on human life or the human body
  ❷ Use in transportation systems or transport-related equipment such as trains or elevators that may have an effect on human life or the human body
  ❸ Use in computer systems or devices that have a major impact on society or on the public
  ❹ Use in other devices that have a major impact on human safety or on maintaining public operations

- For use in space, aviation, nuclear power, electric power, and submarine repeaters-related applications, contact us or your point of sale.

Safety Alert Symbols

The following safety symbols are used in the manual to indicate different hazardous situations and prohibited/required actions.

Indicates hazards that could cause severe bodily injury or death as a result of failure to follow the instructions.

Indicates possible hazards that could cause moderate bodily injury or only property damage as a result of failure to follow the instructions.

Note that even items with a ⚠CAUTION symbol could potentially lead to serious outcomes, depending on the situation.

Indicates actions that must not be taken.

Indicates actions that must be taken.

⚠ DANGER

General

1. Do not use the motor in an explosive, flammable, or corrosive atmosphere (sulfide gas, chlorine gas, ammonia, etc.), in a location exposed to water or corrosive liquids (hydrochloric acid, sulfuric acid, nitric acid, etc.), or near combustible materials. Failure to follow this may cause injury, fire, or damage.
2. Only technically qualified personnel should transport, install, wire, operate, or perform maintenance and inspection on the motor. Failure to follow this may cause electric shock, injury, or fire.
3. Do not work on wiring, maintenance servicing, or inspection with power on. Perform either of those at least 15 minutes after turning the power off. Failure to follow this may cause electric shock.
4. When the protective functions of the motor are activated, turn the power off immediately and eliminate the cause. If restarting the operation without eliminating the cause, the motor may malfunction and cause injury or equipment damage.
5. Perform sufficient test runs of the motor to verify operation before actual use. Doing otherwise may cause injury or equipment damage.

Wiring

6. Do not connect the servo motor directly to a mains outlet. Failure to follow this may cause electric shock, injury, or fire. The servo motor should be powered by the servo amplifier.
7. Use an input voltage within the rated voltage range. Failure to follow this may cause fire or an electric shock.
8. Ensure that the servo motor and servo amplifier are grounded. Failure to follow this may cause electric shock.
9. Do not damage, apply excessive stress, put heavy things on, or tuck down connectors or cables. Failure to follow this may cause electric shock.
10. Connectors and power cables must be wired as instructed in the wiring diagram or the Instruction Manual. Failure to follow this may cause electric shock or fire.
11. Our servo motor cables are for fixed-wiring use, so do not use them in applications where flex cables are required. Failure to follow this may cause electric shock, injury, or fire.

⚠ CAUTION

General

12. Before installation, operation, maintenance servicing, or inspection, be sure to read and follow the Instruction Manual. Failure to follow this may cause electric shock, injury, or fire.
13. Do not use the servo motor in conditions that exceed the specification values. Failure to follow this may cause electric shock, injury, or fire.
14. Do not insert a finger or an object into the opening of the motor. Failure to follow this may cause electric shock, injury, or fire.
15. Do not use a damaged servo motor. Doing so may cause injury or fire.
16. If using a servo amplifier, refer to the servo motor characteristics in the catalog when setting its parameters. Failure to follow this may cause fire or product failures.
17. Use the servo amplifier and servo motor only after testing them enough in combination. Failure to follow this may cause fire or product failures.
18. The servo amplifier, servo motor, and peripheral devices become hot during and after operation, so handle them carefully. Failure to follow this may result in a burn.
19. Never disassemble, repair, modify, or alter the motor. Failure to follow this may cause electric shock, injury, or fire.
20. Handle the motor with great care to avoid the risk of it falling or tipping over.

Unpacking

21. Unpack the box with the right side up. Failure to follow this may cause injury.
22. Confirm that the product you received is the one that you have ordered. Installing an incorrect product may cause a damage.

Wiring

23. Perform wiring work according to local standards of electrical installations. Failure to follow this may result in burnout or fire.
24. Perform wiring correctly and securely. Incorrect wiring may cause the servo motor to run out of control, resulting in injury.
25. The power cable for connecting the servo motor and servo amplifier should be longer than the recommended cable length specified in the Instruction Manual. Failure to follow this may cause electric shock or fire.
26. The servo motor power cable, input/output signal cable, tachogenerator (DC servo motors only), and encoder cable must not be tied together or passed through the same duct or conduit. Failure to follow this may cause faulty operation.
27. Check that the power supply has the right voltage for the servo motor's holding brake. Failure to follow this may cause fire or product damage.
28. The surge absorber for the servo motor's holding brake relay prolongs the brake delay time. Therefore, program a sequence taking the delay time into account. Failure to do so may cause the motor to fall, possibly resulting in injury.
29. Do not use half-wave rectifier circuits to power the holding brake. Failure to follow this may cause overheating or product failures.

Installation

30. The motor output shaft is coated with antirust oil. Wipe it off before installation.
31. Install the motor according to the instructions in the Instruction Manual.
32. Avoid installing the motor in locations exposed to water, cutting oil, oil mist, iron powder, or metal chips. Failure to follow this may cause electric shock or fire.
33. Do not stand on the motor or place heavy objects on top of it. Failure to follow this may cause injury.
34. Keep the air intake and exhaust vents free of obstructions and foreign matter. Failure to follow this may cause fire.
35. Install the motor with great care to avoid the risk of it falling or tipping over.
36. Lift the motor by the eyebolts when transporting motors with eyebolts by crane.
37. Mount the motor to incombustible materials such as metals. Failure to do so may cause fire, injury, or equipment damage.
38. Ensure that the servo motor is securely mounted to equipment. Doing otherwise may cause it to fly out while operating.
39. Keep any combustible materials away from where the motor is installed. Failure to follow this may result in fire or burns.
40. Be sure to secure a ventilation path when installing the motor, and keep the intake and exhaust vents unblocked. Failure to do so may result in electric shock, injury, fire, or equipment damage.
41. Check the rotating direction of the motor before connecting it with equipment. Failure to follow this may cause injury or product damage.
42. Make sure that oil, flammable foreign objects, or conductive foreign objects such as metal fragments do not get inside the servo motor. Failure to follow this may cause electric shock, fire, or product damage.
43. Do not apply excessive force on the connector. Failure to follow this may cause electric shock or fire.
44. Do not touch the motor output shaft (especially the keyway and gears) with your bare hand. Failure to follow this may cause injury.
45. Do not apply loads to the motor shaft exceeding the specified allowable load. Failure to follow this may cause injury or product damage.
46. Make sure that the axial belt tension does not exceed the allowable load when operating the belt drive. The allowable load can be divided into the thrust (axial) load and radial load applied independently in the individual directions to the output shaft.
47. When attaching a pulley or coupling to the output shaft of a servo motor, make sure that the motor unbalance is small enough. A large motor unbalance will increase vibration, which may result in shortened service life and premature damage.
48. Do not strike the motor shaft with a hammer when installing or removing a coupling to the shaft. Failure to follow this may cause product damage.
49. Make sure that the output shaft of the motor and the mating machine are well aligned. Failure to follow this may increase vibration, which may result in shortened service life or premature damage.
50. Fix the output shaft of the servo motor to the mating machine around the entire shaft circumference to prevent fretting. Failure to follow this may cause product damage.

Operation

51. Servo motors do not come with any protective devices. Ensure safe operation by using safety devices such as an overvoltage protection device, earth leakage breaker, overheat protection device, and emergency stop device. Failure to follow this may cause injury or fire.
52. Do not run the motor while loads exceeding the specified allowable load are applied to the motor shaft. Failure to follow this may cause injury or product damage.
53. While power is on or for some time after power-off, do not touch the servo motor as it may be hot. Failure to follow this may result in a burn. The temperature of the servo motor rises considerably depending on the operating conditions.
54. Stop operations immediately when an emergency occurs. Failure to do so may cause an electric shock, injury, or fire.
55. Do not make extreme setting changes as doing so may result in unstable operations. Failure to follow this may cause injury.
56. Perform test runs of the motor in an isolated environment, then connect it with equipment. Failure to follow this may cause injury.
57. Take safety measures such as covering the rotating parts of the servo motor during operation to prevent them from being touched. Failure to follow this may cause injury.
58. When an alarm is activated, remove the cause and ensure safety before resuming operations. Failure to follow this may cause injury.
59. Stay away from equipment when power is restored after an outage because the system may restart suddenly. (Make settings on equipment to secure the safety on such occasions.) Failure to follow this may cause injury.
60. Use the right power supply for the motor. Failure to follow this may cause product failures.
61. The electromagnetic brake is designed to hold the motor position in place. Do not use it as dynamic braking. Failure to follow this may cause equipment damage.
62. Secure the key when operating the motor with a key. Failure to follow this may cause injury.
63. A rattling noise may occur from the brake when the servo motor is running, but there is no problem with performance.
64. Running a servo motor with an oil seal may produce some noise, but there is no problem with performance.

65. For use in applications where varying loads are applied to the shaft, contact us in advance. Use in varying load applications (precession motion, etc.) might result in product failures.

Maintenance

66. Perform maintenance or inspection with great care since servo motor frames become very hot. Failure to follow this may result in a burn.
67. Servo motor's oil seals, holding brakes, bearings, and brushes (for DC servo motors only) are life-limited parts. Determine when to replace them based on the results of the actual equipment evaluation.
68. Contact us or your point of sale for repair. Disassembling the product by yourself may end up causing more damage.

Transportation

69. Transport the motor with great care to avoid the risk of it falling or tipping over.
70. Do not hold it by the motor output shaft or cable during transportation. Doing so may cause product damage or injury.

⃠ PROHIBITED

Storage

71. Avoid storing products in environments exposed to rain or water drops or with hazardous gas or liquid. Failure to follow this may cause product failures.

Maintenance

72. Do not disassemble or repair the product. Doing so may cause fire or an electric shock.
73. Do not measure the insulation resistance or dielectric strength of the motor by yourself. Failure to follow this may cause product damage.

General

74. Do not remove the nameplate. Using motors with incorrect ratings may result in fire.
75. Do not apply static electricity or high voltage to the encoder cable. Failure to follow this may cause product failures.

Operation

76. The brake built into servo motors is a holding brake and must not be used for dynamic braking. Doing so may reduce brake torque, cause burnout, or accelerate brake wear, resulting in product failures.

❗ MANDATORY

Storage

77. Store the product out of direct sunlight within the specified temperature and humidity ranges.
78. Contact us before using a servo motor that has been stored for a long period (roughly 3 years or longer). Checking on bearings and brakes will be needed.

Operation

79. Install an emergency stop circuit to the outside of equipment to turn the power off immediately whenever needed.
80. Operate the motor within the specified ambient temperature and humidity ranges.
81. When operating servo motors with a cooling fan, be sure to use the cooling fan. Failure to follow this may cause fire or product failures.

Transportation

82. Avoid overstacking and stack boxes in compliance with the instructions given on the outside of the package to prevent collapse.

Disposal

83. Dispose of servo motors as general industrial waste.

Safety Precautions

- Read the accompanying Instruction Manual carefully prior to using the product.
- Do not use this product in an environment where vibration is present, such as in moving vehicles or shipping vessels.
- Do not perform any retrofitting, re-engineering, or modification to the product.

Please contact us beforehand if you intend to use this product in the following applications.

- Medical equipment that may have an effect on human life
- Systems or equipment that may have a major impact on society or on the public
- Special applications related to aviation and space, nuclear power, electric power, submarine repeaters, etc.

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