Model Designations

SGM7A - 01 A 7 A 2 1

	1st + 2nd	3rd	4th	5th	6th	7th	digit
Sigma-7 series Servomotors: SGM7A							

1st + 2nd digit - Rated output

Code	Specification
A5	50 W
01	100 W
C2	150 W
02	200 W
04	400 W
06	600 W
08	750 kW
10	1.0 kW
15	1.5 kW
20	2.0 kW
30	3.0 kW
40	4.0 kW
50	5.0 kW
70	7.0 kW

Note: Readily available up to 1.5 kW. Others available on request.

3rd digit - Power supply voltage

Code	Specification
A	200 VAC

4th digit - Serial encoder

Code	Specification
6	24-bit batteryless absolute
7	24-bit absolute
F	24-bit incremental

5th digit - Design revision order

Code	Specification
A	Standard model

6th digit - Shaft end

Code	Specification
2	Straight without key
6	Straight with key and tap
B*	With two flat seats

* Code B is not supported for models with a rated output of 1.5 kW or higher.

7th digit - Options

Code	Specification
1	Without options
C*	With holding brake (24 VDC)
E	With oil seal and holding brake (24 VDC)
S	With oil seal

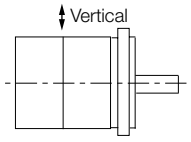
Specifications and Ratings

Specifications

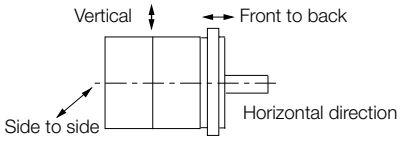
Voltage			200 V									
Model SGM7A-			A5A	01A	C2A, 02A	04A	06A. 08A	10A, 15A	20A	25A, 30A	40A, 50A	70A
Time Rating			Continuous									
Thermal Class			Models A5A to 10A: B; Models 15A to 70A: F									
Insulation Resistance			500 VDC, 10 MOhm min.									
Withstand Voltage			1,500 VAC for 1 minute									
Excitation			Permanent magnet									
Mounting			Flange mounted									
Drive Method			Direct drive									
Rotation Direction			Counterclockwise (CCW) for forward reference when viewed from the load side									
Vibration Class*1			V15									
Environmental Conditions	Surrounding Air Temperature		0 °C to 40 °C (With derating, usage is possible between 40 °C and 60 °C)*3									
	Surrounding Air Humidity		20% to 80% relative humidity (non-condensing)									
	Installation Site		• Must be indoors and free of corrosive and explosive gases. • Must be well-ventilated and free of dust and moisture. • Must facilitate inspection and cleaning. • Must have an altitude of 1,000 m or less. (With derating, usage is possible between 1,000 m and 2,000 m.)*3 • Must be free of strong magnetic fields.									
	Storage Environment		• Store the Servomotor in the following environment if you store it with the power cable disconnected. • Storage Temperature: -20 °C to 60 °C (with no freezing) • Storage Humidity: 20% to 80% relative humidity (non-condensing)									
Shock Resistance*2	Impact Acceleration Rate at Flange		490 m/s²									
	Number of Impacts		2 times									
Vibration Resistance*2	Vibration Acceleration Rate at Flange		49 m/s² (Models 15A to 50A: 24.5 m/s² front to back)									14.7 m/s²
Applicable SERVOPACKS		SGD7S-	R70A, R70F	R90A, R90F	1R6A, 2R1F	2R8A, 2R8F	5R5A	120A	180A	200A	330A	550A
		SGD7W- SGD7C-	1R6A*4	2R8A*4	1R6A, 2R8A*4	2R8A, 5R5A*4, 7R6A*4	5R5A, 7R6A	–				

Note: Readily available up to 1.5 kW. Others available on request.

*1 A Vibration class of V15 indicates a vibration amplitude of 15 μm maximum on the Servomotor without a load at the rated motor speed.
*2 The given values are for when the Servomotor shaft is mounted horizontally and shock or vibration is applied in the directions shown in the following figures. The strength of the vibration that the Servomotor can withstand depends on the application. Always check the vibration acceleration rate that is applied to the Servomotor with the actual equipment.



Shock Applied to the Servomotor



Vibration Applied to the Servomotor

*3 Refer to the Derating Rates section.
*4 If you use a Servomotor together with a Sigma-7W or Sigma-7C SERVOPACK, the control gain may not increase as much as with a Sigma-7S SERVOPACK and other performances may be lower than those achieved with a Sigma-7S SERVOPACK.

Ratings

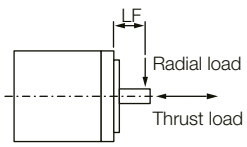
Voltage			200 V							
Model SGM7A-			A5A	01A	C2A	02A	04A	06A	08A	10A
Rated Output *1		W	50	100	150	200	400	600	750	1,000
Rated Torque *1, *2		Nm	0.159	0.318	0.477	0.637	1.27	1.91	2.39	3.18
Instantaneous Maximum Torque *1		Nm	0.557	1.11	1.67	2.23	4.46	6.69	8.36	11.1
Rated Current *1		A	0.57	0.89	1.5	1.5	2.4	4.5	4.4	6.4
Instantaneous Maximum Current *1		A	2.1	3.2	5.6	5.9	9.3	16.9	16.8	23.2
Rated Motor Speed *1		min^{-1}	3000							
Maximum Motor Speed		min^{-1}	6000							
Torque Constant		Nm/A	0.307	0.387	0.335	0.461	0.582	0.461	0.590	0.547
Motor Moment of Inertia		$\times10^{-4}$ kg·m^2	0.0217 (0.0297)	0.0337 (0.0417)	0.0458 (0.0538)	0.139 (0.209)	0.216 (0.286)	0.315 (0.385)	0.775 (0.955)	0.971 (1.15)
Rated Power Rate *1		kW/s	11.7 (8.51)	30.0 (24.2)	49.7 (42.2)	29.2 (19.4)	74.7 (56.3)	115 (94.7)	73.7 (59.8)	104 (87.9)
Rated Angular Acceleration Rate *1		rad/s	73,200 (53,500)	94,300 (76,200)	104,000 (88,600)	45,800 (30,400)	58,700 (44,400)	60,600 (49,600)	30,800 (25,000)	32,700 (27,600)
Derating Rate for Servomotor with Oil Seal		%	80		90		95			
Heat Sink Size (Aluminium)		mm	200 × 200 × 6		250 × 250 × 6			300 × 300 × 12 *7	250 × 250 × 6	300 × 300 × 12
Protective Structure *3			Totally enclosed, self-cooled, IP67							
Holding Brake Specifications *4	Rated Voltage	V	24 VDC±10%							
	Capacity	W		5.5		6			6.5	
	Holding Torque	Nm	0.159	0.318	0.477	0.637	1.27	1.91	2.39	3.18
	Coil Resistance	Ω (at 20 °C)		104.8±10%		96±10%			88.6±10%	
	Rated Current	A (at 20 °C)		0.23		0.25			0.27	
	Time Required to Release Brake	ms			60				80	
	Time Required to Brake	ms				100				
Allowable Load Moment of Inertia (Motor Moment of Inertia Ratio)			40 times			30 times	20 times		20 times	
	With External Regenerative Resistor and Dynamic Brake Resistor								30 times	
Allowable Shaft Load *5	LF	mm	20			25			35	
	Allowable Radial Load	N	78			245			392	
	Allowable Thrust Load	N	54			74			147	

Note: Readily available up to 1.5 kW. Others available on request.

Notes:
*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. The values for other items are at 20°C. These are typical values.
*2. The rated torques are the continuous allowable torque values at a surrounding air temperature of 40°C with an aluminum heat sink of the dimensions given in the table.
*3. Refer to the Servomotor Heat Dissipation Conditions section for the relation between the heat sinks and derating rate.
*4. This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.
*5. Observe the following precautions if you use a Servomotor with a Holding Brake.
- The holding brake cannot be used to stop the Servomotor.
- The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
- The 24-VDC power supply is not provided by YASKAWA.

*6. The motor moment of inertia scaling factor is the value for a standard Servomotor without a Holding Brake.
*7. To externally connect a dynamic brake resistor, select hardware option specification 020 for the SERVOPACK. However, you cannot externally connect a dynamic brake resistor if you use the following SERVOPACKs (maximum applicable motor capacity: 400 W).
- SGD7S-R70□□□A020 to -2R8□□□A020
- SGD7W-1R6A20A020 to -2R8A20A020
- SGD7C-1R6AMAA020 to -2R8AMAA020

*8. Design the mechanical system so that the thrust and radial loads applied to the Servomotor shaft end during operation do not exceed the values given in the table.



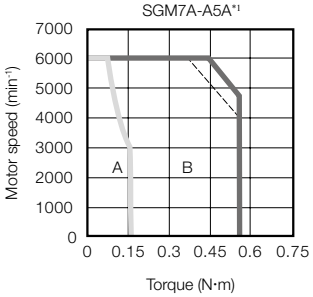
*9. If the heat sink is 250 mm × 250 mm × 6 mm, the rated output is 550 W and the rated torque is 1.75 N·m. Refer to the Servomotor Heat Dissipation Conditions section for details.

Torque-Motor Speed Characteristics

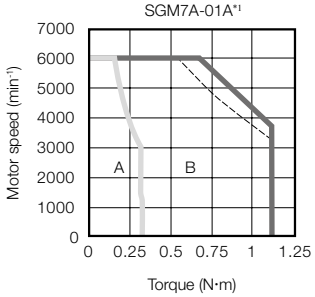
A : Continuous duty zone
B : Intermittent duty zone

——— (solid lines): With three-phase 200-V or single-phase 230-V input
- - - - - - - - (dotted lines): With single-phase 200-V input
— – — (dashed-dotted lines): With single-phase 100-V input

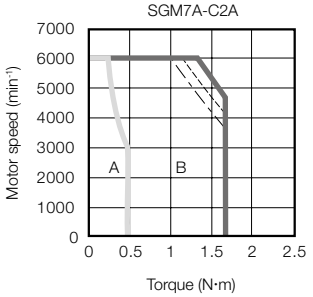
SGM7A-A5A*1



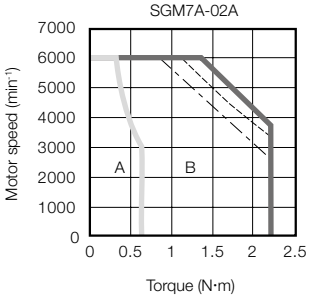
SGM7A-01A*1



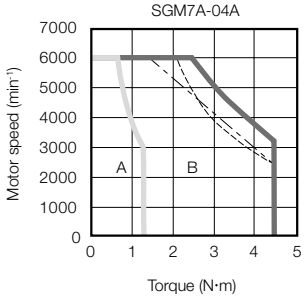
SGM7A-C2A



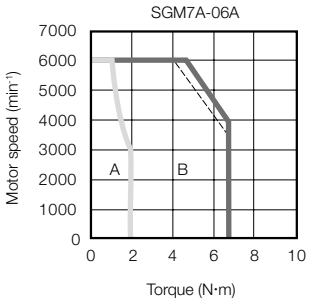
SGM7A-02A



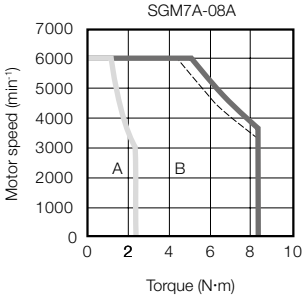
SGM7A-04A



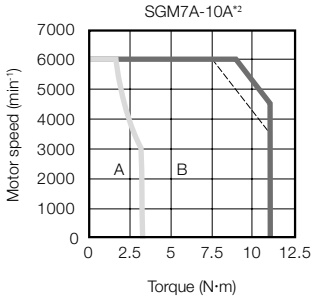
SGM7A-06A



SGM7A-08A



SGM7A-10A*2



* The characteristics are the same for three-phase 200 V and single-phase 200 V.
A single-phase power input can be used in combination with the SGD7S-120A□□A008.

Notes:
1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100 °C. These are typical values.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective torque is within the allowable range for the rated torque, the Servomotor can be used within the intermittent duty zone.
4. If you use a Servomotor Motor Power Cable that exceeds 20 m, the intermittent duty zone in the torquemotor speed characteristics will become smaller because the voltage drop increases.

Ratings continued

Model SGM7A-			15A	20A	25A	30A	40A	50A	70A
Rated Output *1		kW	1.5	2.0	2.5	3.0	4.0	5.0	7.0
Rated Torque *1, *2		Nm	4.90	6.36	7.96	9.80	12.6	15.8	22.3
Instantaneous Maximum Torque *1		Nm	14.7	19.1	23.9	29.4	37.8	47.6	54.0
Rated Current *1		A	9.3	12.1	15.6	17.9	25.4	27.6	38.3
Instantaneous Maximum Current *1		A	28	42	51	56	77	84	105
Rated Motor Speed *1		min^{-1}	3,000						
Maximum Motor Speed *1		min^{-1}	6,000*9						
Torque Constant		Nm/A	0.590	0.561	0.538	0.582	0.519	0.604	0.604
Motor Moment of Inertia		$\times10^{-4}$ kg·m^2	2.00	2.47	3.19	7.00	9.60	12.3	12.3
	with holding brake		2.25	2.72	3.44	9.20	11.8	14.5	–
	with batteryless absolute encoder		2.00	2.47	3.19	7.00	9.60	12.3	12.3
Rated Power Rate *1		kW/s	120	164	199	137	165	203	404
	with holding brake		106	148	184	104	134	172	–
Rated Angular Acceleration Rate *1		rad/s^2	24,500	25,700	24,900	14,000	13,100	12,800	18,100
	with holding brake		21,700	23,300	23,100	10,600	10,600	10,800	–
Heat Sink Size*3		mm	300 × 300 × 12			400 × 400 × 20			
Protective Structure*4			Totally enclosed, self-cooled, IP67						Totally enclosed, separately cooled (with fan), IP22
Holding Brake Specifications *5	Rated Voltage	V	24 VDC $^{+10\%}_{0}$						–
	Capacity	W	12			10			
	Holding Torque	Nm	7.84		10	20			
	Coil Resistance	Ω (at 20 °C)	48			59			
	Rated Current	A (at 20 °C)	0.5			0.41			
	Time Required to Release Brake	ms	170			100			
	Time Required to Brake	ms	80						
Allowable Load Moment of Inertia (Motor Moment of Inertia Ratio)*6			10 times			5 times			
	With External Regenerative Resistor and Dynamic Brake Resistor*7		20 times			15 times			
Allowable Shaft Load *8	LF	mm	45			63			
	Allowable Radial Load	N	686			980	1,176		
	Allowable Thrust Load	N	196			392			

Note: Readily available up to 1.5 kW. Others available on request.

*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100 °C. The values for other items are at 20 °C. These are typical values.

*2. The rated torques are the continuous allowable torque values at a surrounding air temperature of 40 °C with an aluminum heat sink of the dimensions given in the table.

*3. Refer to the Servomotor Heat Dissipation Conditions section for the relation between the heat sinks and derating rate.

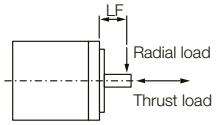
*4. This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.

*5. Observe the following precautions if you use a Servomotor with a Holding Brake.
- The holding brake cannot be used to stop the Servomotor.
- The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
- The 24-VDC power supply is not provided by YASKAWA.

*6. The motor moment of inertia scaling factor is the value for a standard Servomotor without a Holding Brake.

*7. To externally connect a dynamic brake resistor, select hardware option specification 020 for the SERVOPACK. However, you cannot externally connect a dynamic brake resistor if you use the following SERVOPACKs (maximum applicable motor capacity: 400 W).
- SGD7S-R70□□□A020 to -2R8□□□A020
- SGD7W-1R6A20A020 to -2R8A20A020
- SGD7C-1R6AMAA020 to -2R8AMAA020

*8. Design the mechanical system so that the thrust and radial loads applied to the Servomotor shaft end during operation do not exceed the values given in the table.

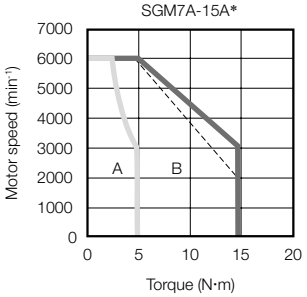


*9. For the SGM7A-25A or SGM7A-50A, the maximum motor speed for the continuous duty zone is 5,000 min^{-1}. Use the Servomotor within the continuous duty zone for the average motor speed and effective torque.

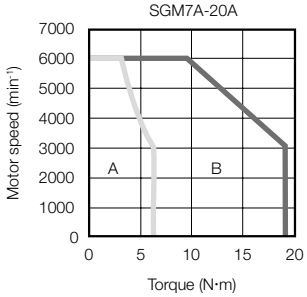
Torque-Motor Speed Characteristics

A : Continuous duty zone
B : Intermittent duty zone
——— (solid lines): With three-phase 200-V or single-phase 230-V input
- - - - - - - (dotted lines): With single-phase 200-V input

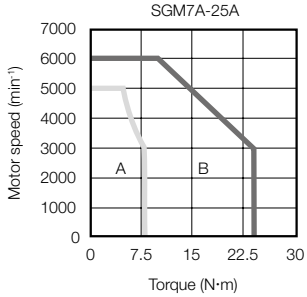
SGM7A-15A*



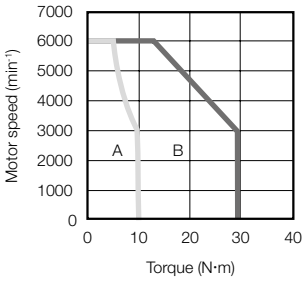
SGM7A-20A



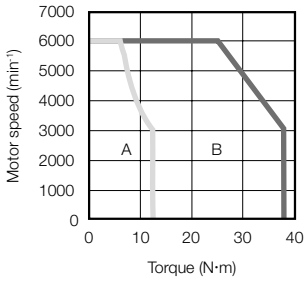
SGM7A-25A



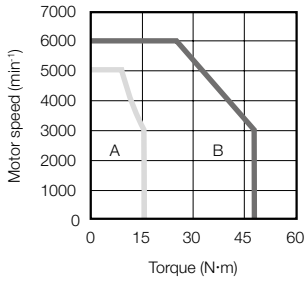
SGM7A-30A



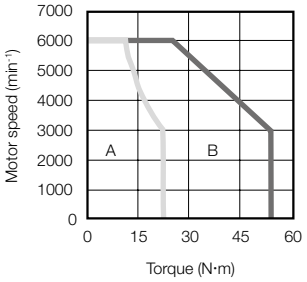
SGM7A-40A



SGM7A-50A



SGM7A-70A



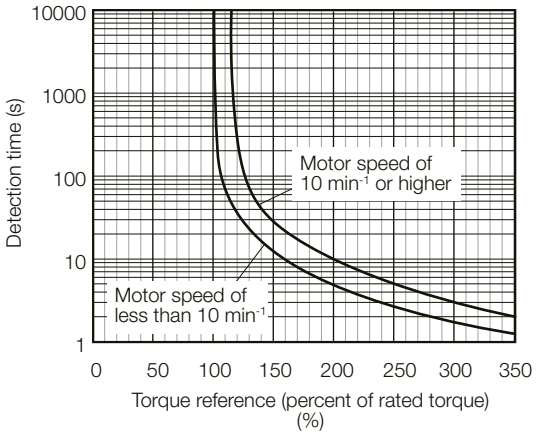
* A single-phase power input can be used in combination with the SGD7S-120A□□A008.

Notes:
1 These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20 °C. These are typical values.
2 The characteristics in the intermittent duty zone depend on the power supply voltage.
3 If the effective torque is within the allowable range for the rated torque, the Servomotor can be used within the intermittent duty zone.
4 If you use a Servomotor Motor Power Cable that exceeds 20 m, the intermittent duty zone in the torquemotor speed characteristics will become smaller because the voltage drop increases.

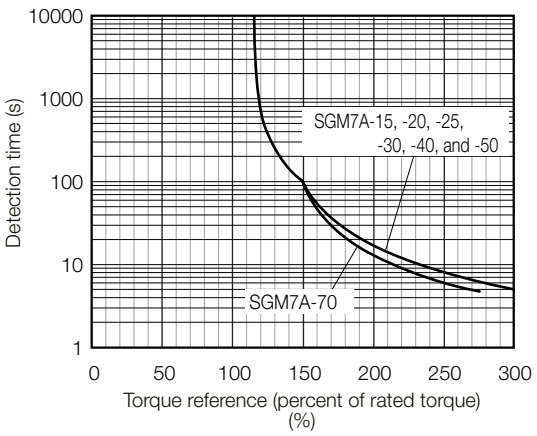
Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions with a Servomotor surrounding air temperature of 40 °C.

SGM7A-A5, -01, -C2, -02, -04, -06, -08, and -10



SGM7A-15, -20, -25, -30, -40, -50, and -70

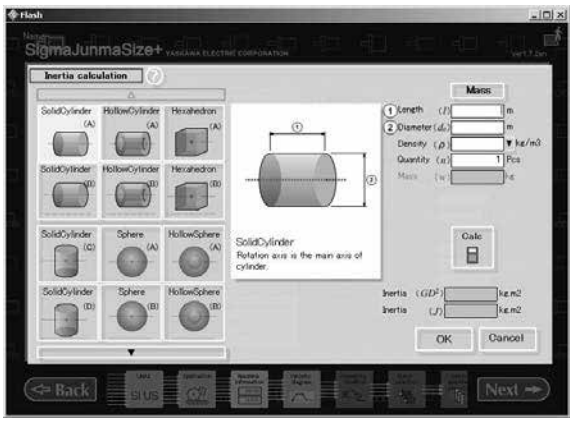


Note:

The above overload characteristics does not give permission to perform continuous duty operation with an output of 100% or higher. Use the Servomotor so that the effective torque remains within the continuous duty zone given in Torque-Motor Speed Characteristics.

Allowable Load Moment of Inertia

The load moment of inertia indicates the inertia of the load. The larger the load moment of inertia, the worse the response. If the moment of inertia is too large, operation will become unstable.
Refer to Servomotor Ratings. This value is provided strictly as a guideline and results depend on Servomotor driving conditions. Use the SigmaJunmaSize+ AC Servo Drive Capacity Selection Program to check the driving conditions. Contact your YASKAWA representative for information on this program.



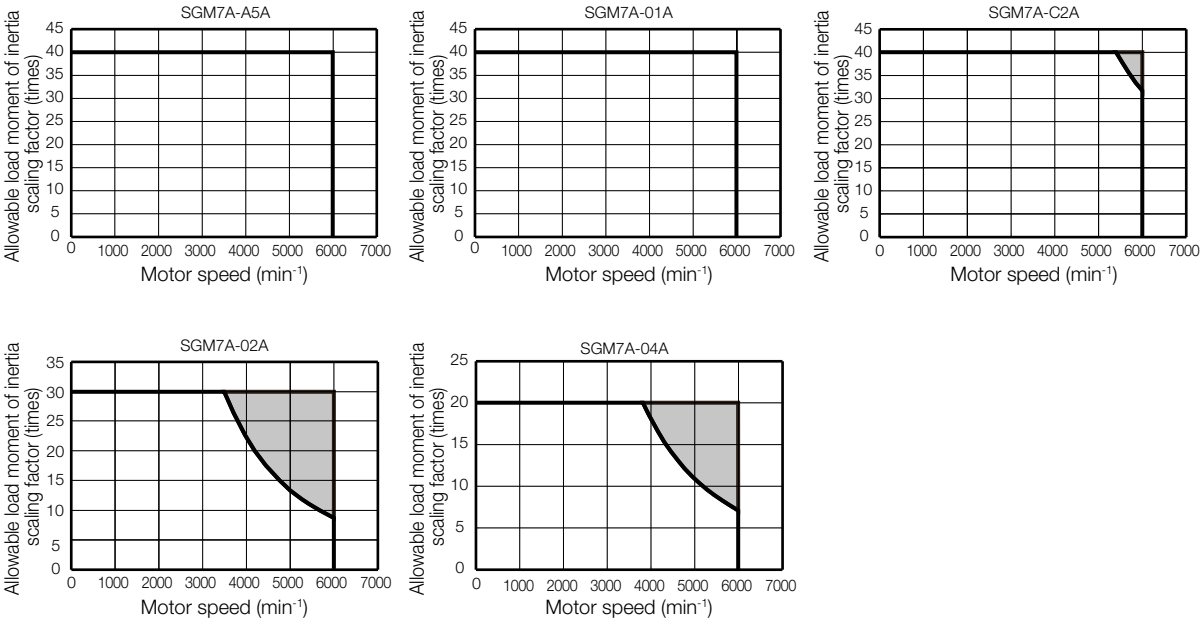
An Overvoltage Alarm (A.400) is likely to occur during deceleration if the load moment of inertia exceeds the allowable load moment of inertia. SERVOPACKs with a built-in regenerative resistor may generate a Regenerative Overload Alarm (A.320). Perform one of the following steps if this occurs.

- Reduce the torque limit.
- Reduce the deceleration rate.
- Reduce the maximum motor speed.
- Install an External Regenerative Resistor if the alarm cannot be cleared using the above steps.

Regenerative resistors are not built into SERVOPACKs for 400-W Servomotors or smaller Servomotors. Even for SERVOPACKs with built-in regenerative resistors, an External Regenerative Resistor is required if the energy that results from the regenerative driving conditions exceeds the allowable loss capacity (W) of the built-in regenerative resistor.

SERVOPACKs without built-in Regenative Resistors

The following graph shows the allowable load moment of inertia scaling factor of the motor speed (reference values for deceleration operation at or above the rated torque). Application is possible without an external regenerative resistor within the allowable value. However, an External Regenerative Resistor is required in the shaded areas of the graphs.



Note: Applicable SERVOPACK models: SGD7S-R70A, -R90A, -1R6A, -2R8A, -R70F, -R90F, -2R1F, and -2R8F

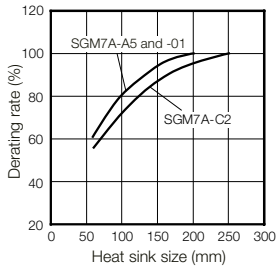
When an External Regenerative Resistor Is Required

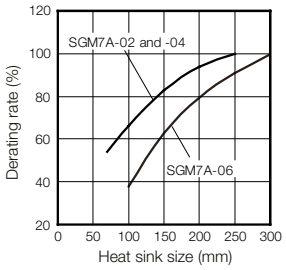
Install the External Regenerative Resistor. Refer to the External Regenerative Resistors section for the recommended products.

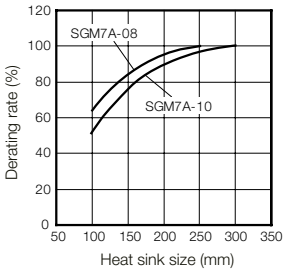
Derating Rates

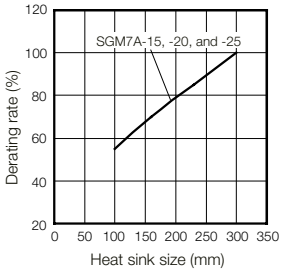
Servomotor Heat Dissipation Conditions

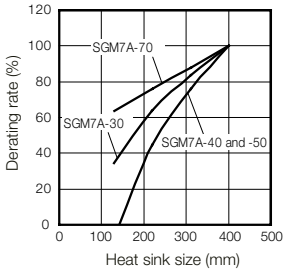
The Servomotor ratings are the continuous allowable values at a surrounding air temperature of 40°C when a heat sink is installed on the Servomotor. If the Servomotor is mounted on a small device component, the Servomotor temperature may rise considerably because the surface for heat dissipation becomes smaller. Refer to the following graphs for the relation between the heat sink size and derating rate.









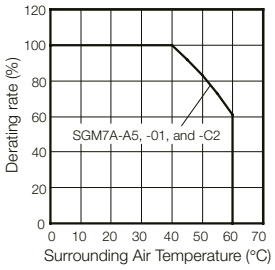


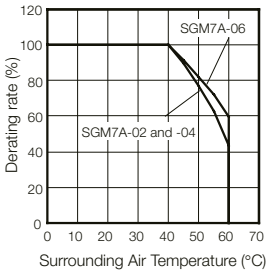
Important

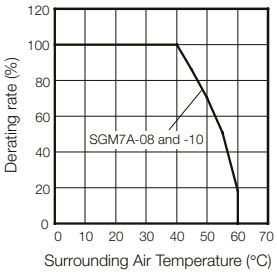
The actual temperature rise depends on how the heat sink (i.e., the Servomotor mounting section) is attached to the installation surface, what material is used for the Servomotor mounting section, and the motor speed. Always check the Servomotor temperature with the actual equipment.

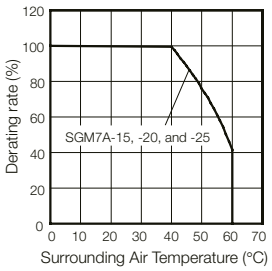
Applications Where the Surrounding Air Temperature Exceeds 40°C

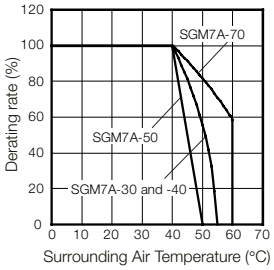
The Servomotor ratings are the continuous allowable values at a surrounding air temperature of 40°C. If you use a Servomotor at a surrounding air temperature that exceeds 40°C (60°C max.), apply a suitable derating rate from the following graphs.





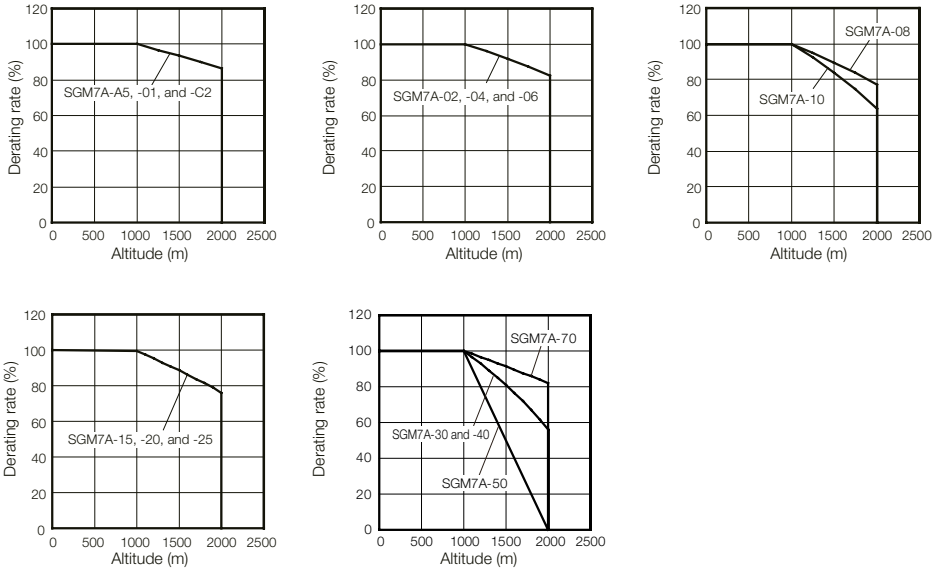






Applications Where the Altitude Exceeds 1,000 m

The Servomotor ratings are the continuous allowable values at an altitude of 1,000 m or less. If you use a Servomotor at an altitude that exceeds 1,000 m (2,000 m max.), the heat dissipation effect of the air is reduced. Apply the appropriate derating rate from the following graphs.



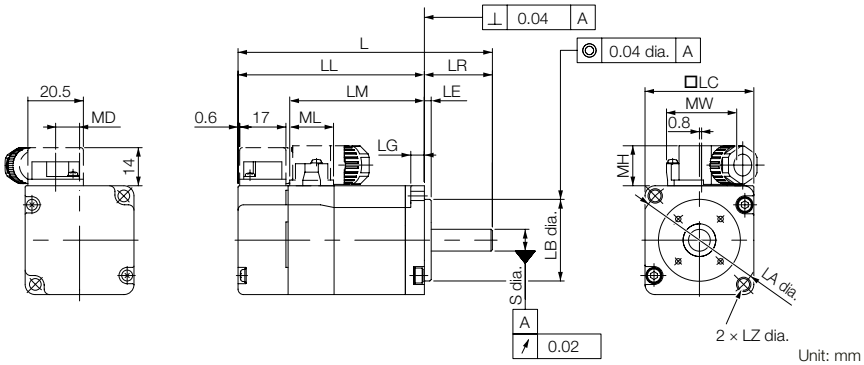
Information
When using Servomotors with derating, change the detection timing of overload warning and overload alarm based on the overload detection level of the motor given in “Servomotor Overload Protection Characteristics”.

Note
1. Use the combination of the SERVOPACK and Servomotor so that the derating conditions are satisfied for both the SERVOPACK and Servomotor.
2. The derating rates are applicable only when the average motor speed is less than or equal to the rated motor speed. If the average motor speed exceeds the rated motor speed, consult with your Yaskawa representative.

External Dimensions

Servomotors

SGM7A-A5, -01, -C2



Unit: mm

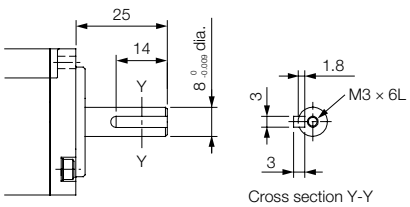
Model SMG7A	L*	LL*	LM	Flange Dimensions							S	MD	MW	MH	ML	Approx. Mass [kg]
				LR	LE	LG	LC	LA	LB	LZ						
A5A□A2□	81.5 (122)	56.5 (97)	37.9	25	2.5	5	40	46	$30^{0}_{-0.021}$	4.3	$8^{0}_{-0.009}$	8.8	25.8	14.7	16.1	0.3 (0.6)
01A□A2□	93.5 (134)	68.5 (109)	49.9	25	2.5	5	40	46	$30^{0}_{-0.021}$	4.3	$8^{0}_{-0.009}$	8.8	25.8	14.7	16.1	0.4 (0.7)
C2A□A2□	105.5 (153.5)	80.5 (128.5)	61.9	25	2.5	5	40	46	$30^{0}_{-0.021}$	4.3	$8^{0}_{-0.009}$	8.8	25.8	14.7	16.1	0.5 (0.8)

* For models that have a batteryless absolute encoder, L and LL are 8 mm greater than the given value. Refer to the Dimensions of Servomotors with Batteryless Absolute Encoders section for the values for individual models.

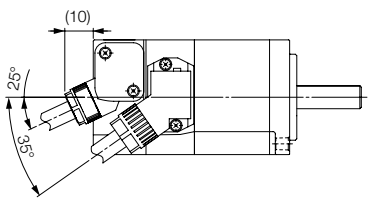
Notes:
1 The values in parentheses are for Servomotors with Holding Brakes.
2The values for a straight, without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

Shaft End Specifications

Straight with Key and Tap

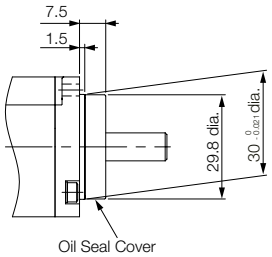


With Two Flat Seats

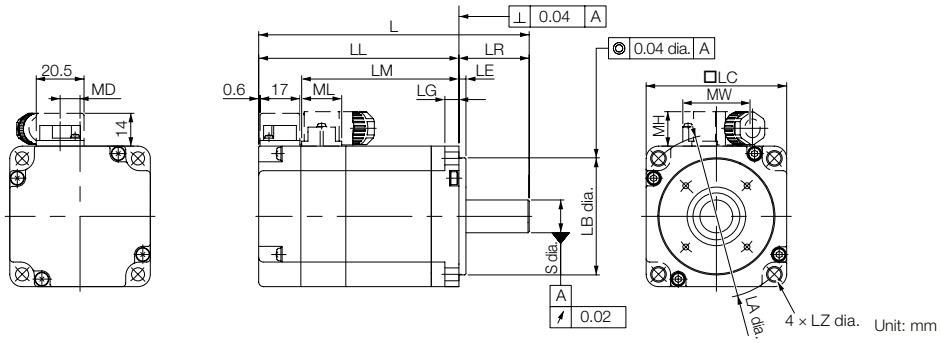


Specification of Options

Oil Seal



SGM7A-02, -04 and -06



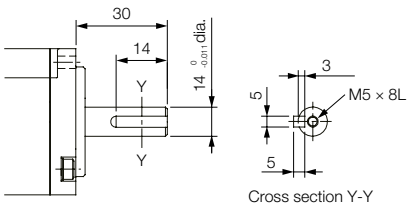
Model SMG7A	L*	LL*	LM	Flange Dimensions							S	MD	MW	MH	ML	Approx. Mass [kg]
				LR	LE	LG	LC	LA	LB	LZ						
02A□A2□	99.5 (140)	69.5 (110)	51.2	30	3	6	60	70	$50^{0}_{-0.025}$	5.5	$14^{0}_{-0.011}$	8.5	28.7	14.7	17.1	0.8 (1.4)
04A□A2□	115.5 (156)	85.5 (126)	67.2	30	3	6	60	70	$50^{0}_{-0.025}$	5.5	$14^{0}_{-0.011}$	8.5	28.7	14.7	17.1	1.2 (1.8)
06A□A2□	137.5 (191.5)	107.5 (161.5)	89.2	30	3	6	60	70	$50^{0}_{-0.025}$	5.5	$14^{0}_{-0.011}$	8.5	28.7	14.7	17.1	1.6 (2.2)

* For models that have a batteryless absolute encoder, L and LL are 8 mm greater than the given value. Refer to the Dimensions of Servomotors with Batteryless Absolute Encoders section for the values for individual models.

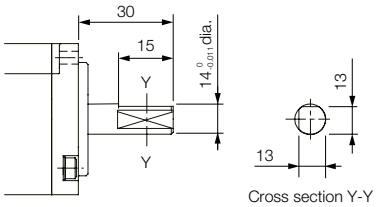
Notes:
1 The values in parentheses are for Servomotors with Holding Brakes.
2 The values for a straight, without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

Shaft End Specifications

Straight with Key and Tap

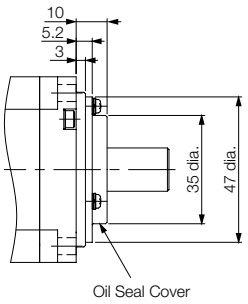


With Two Flat Seats

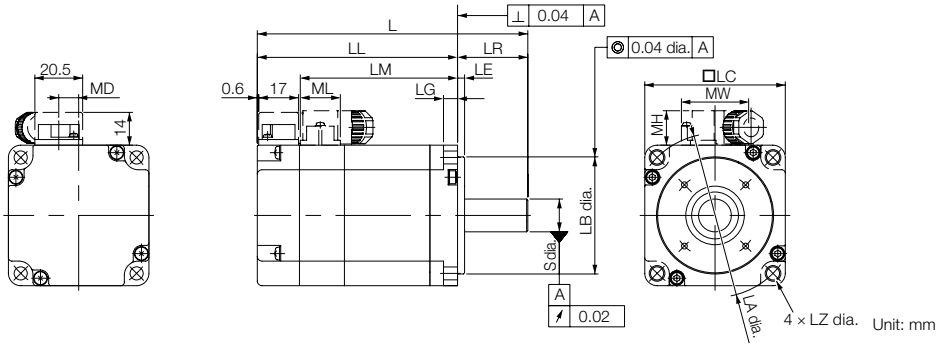


Specification of Options

Oil Seal



SGM7A-08 and -10



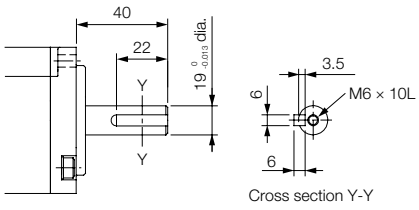
Model SMG7A	L*	LL*	LM	Flange Dimensions							S	MD	MW	MH	ML	Approx. Mass [kg]
				LR	LE	LG	LC	LA	LB	LZ						
08A□A2□	137 (184)	97 (144)	78.5	40	3	8	80	90	$70^{0}_{-0.030}$	7	$19^{0}_{-0.013}$	13.6	38	14.7	19.3	2.3 (2.9)
10A□A2□	162 (209)	122 (169)	103.5	40	3	8	80	90	$70^{0}_{-0.030}$	7	$19^{0}_{-0.013}$	13.6	38	14.7	19.3	3.1 (3.7)

* For models that have a batteryless absolute encoder, L and LL are 8 mm greater and the approximate mass is 0.1 kg greater than the given value. Refer to the Dimensions of Servomotors with Batteryless Absolute Encoders section for the values for individual models.

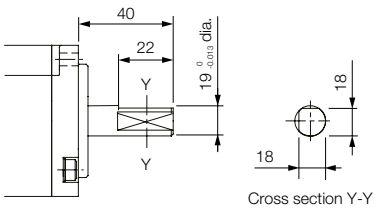
Notes:
1. The values in parentheses are for Servomotors with Holding Brakes.
2. The values for a straight, without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

Shaft End Specifications

Straight with Key and Tap

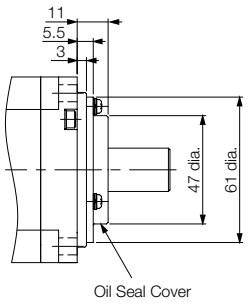


With Two Flat Seats



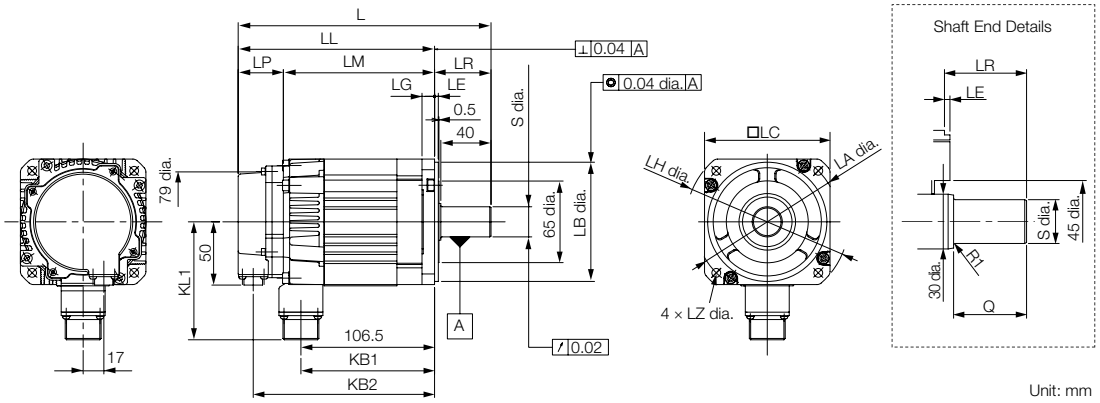
Specification of Options

Oil Seal



Servomotors without Holding Brakes

SGM7A-15, -20, and -25



Unit: mm

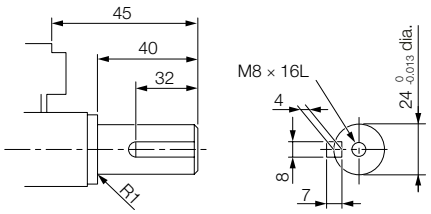
Model SGM7A-	L*	LL*	LM	LP	LR	KB1	KB2*	KL1	Flange Dimensions							Shaft End Dimensions		Approx. Mass[kg]
									LA	LB	LC	LE	LG	LH	LZ	S	Q	
15A□A21	202	157	121	36	45	107	145	94	115	$95^{0}_{-0.035}$	100	3	10	130	7	$24^{0}_{-0.013}$	40	4.6
20A□A21	218	173	137	36	45	123	161	94	115	$95^{0}_{-0.035}$	100	3	10	130	7	$24^{0}_{-0.013}$	40	5.4
25A□A21	241	196	160	36	45	146	184	94	115	$95^{0}_{-0.035}$	100	3	10	130	7	$24^{0}_{-0.013}$	40	6.8

* For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the Dimensions of Servomotors with Batteryless Absolute Encoders section for the values for individual models.

Notes:
1 The values in parentheses are for Servomotors with Holding Brakes.
2 The values for a straight, without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

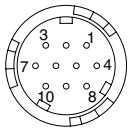
Shaft End Specifications

Straight with Key and Tap



Connector Specifications

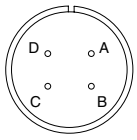
Encoder Connector (24-bit Encoder)



1	PS	6*	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5*	BAT(-)	10	FG (frame ground)

* A battery is required only for an absolute encoder.
Receptacle: CM10-R10P-D
Applicable plug: Not provided by Yaskawa.
Plug: CM10-AP10S-□-D for Right-angle Plug
CM10-SP10S-□-D for Straight Plug
(□ depends on the applicable cable size.)
Manufacturer: DDK Ltd.

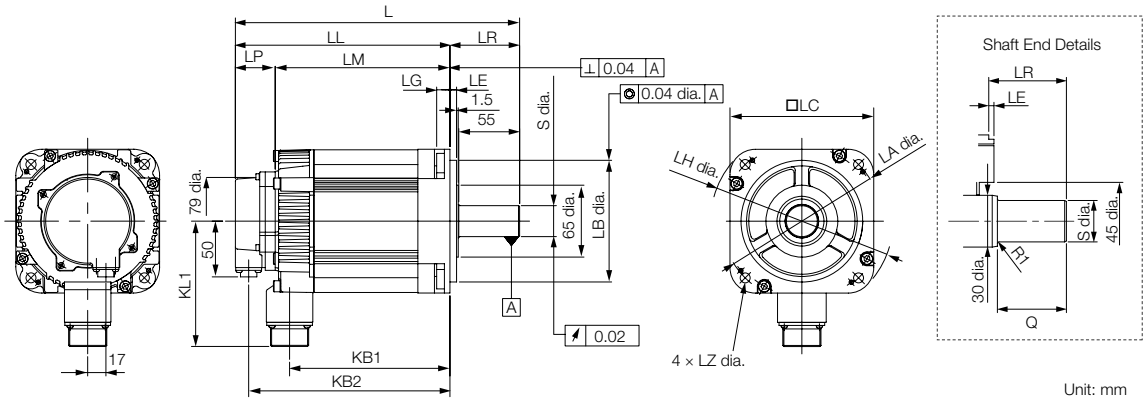
Servomotor Connector



A	Phase U	C	Phase W
B	Phase V	D	FG (frame ground)

Manufacturer: DDK Ltd.

SGM7A-30, -40, and -50



Unit: mm

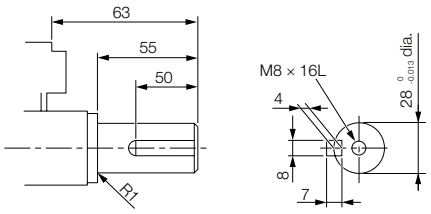
Model SGM7A-	L*	LL*	LM	LP	LR	KB1	KB2*	KL1	Flange Dimensions							Shaft End Dimensions		Approx. Mass[kg]
									LA	LB	LC	LE	LG	LH	LZ	S	Q	
30A□A21	257	194	158	36	63	145	182	114	145	$110^{0}_{-0.035}$	130	6	12	165	9	$28^{0}_{-0.013}$	55	10.5
40A□A21	296	233	197	36	63	184	221	114	145	$110^{0}_{-0.035}$	130	6	12	165	9	$28^{0}_{-0.013}$	55	13.5
50A□A21	336	273	237	36	63	224	261	114	145	$110^{0}_{-0.035}$	130	6	12	165	9	$82^{0}_{-0.013}$	55	16.5

* For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the Dimensions of Servomotors with Batteryless Absolute Encoders section for the values for individual models.

Notes:
1 The values in parentheses are for Servomotors with Holding Brakes.
2 The values for a straight, without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

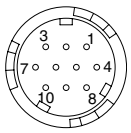
Shaft End Specifications

Straight with Key and Tap



Connector Specifications

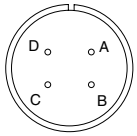
Encoder Connector (24-bit Encoder)



1	PS	6*	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5*	BAT(-)	10	FG (frame ground)

* A battery is required only for an absolute encoder.
Receptacle: CM10-R10P-D
Applicable plug: Not provided by Yaskawa.
Plug: CM10-AP10S-□-D for Right-angle Plug
CM10-SP10S-□-D for Straight Plug
(□ depends on the applicable cable size.)
Manufacturer: DDK Ltd.

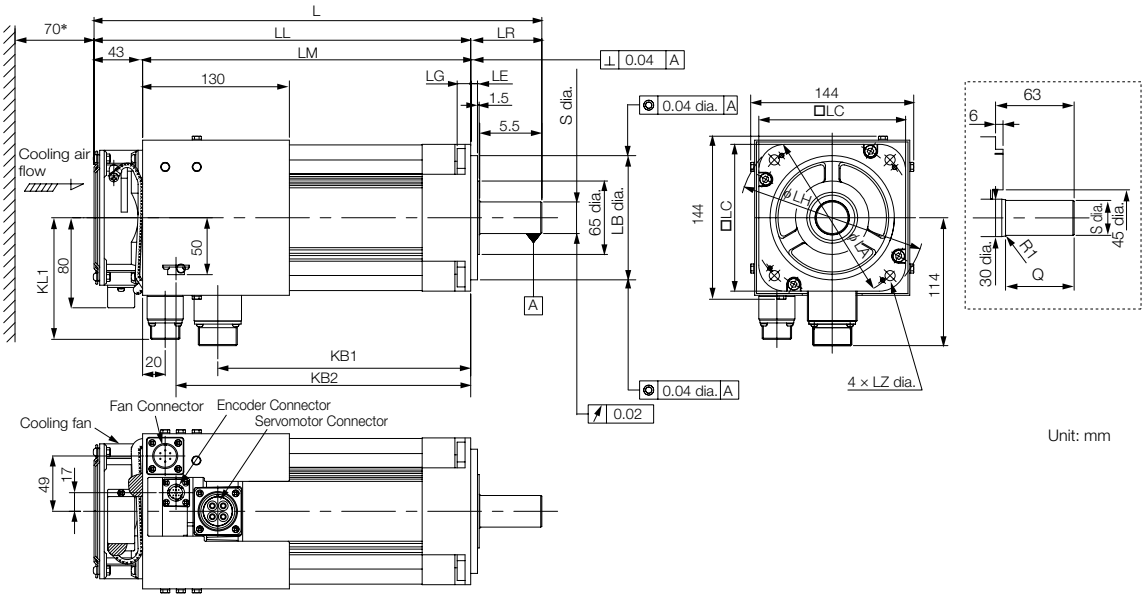
Servomotor Connector



A	Phase U	C	Phase W
B	Phase V	D	FG (frame ground)

Manufacturer: DDK Ltd.

SGM7A-70



Unit: mm

* Leave a minimum space of 70 mm around the Servomotor from walls and other equipment to allow for a sufficient amount of cooling air.

Model SGM7A-	L	LL	LM	LR	KB1	KB2*	KL1	Flange Dimensions							Shaft End Dimensions		Approx. Mass[kg]
								LA	LB	LC	LE	LG	LH	LZ	S	Q	
70A□A21	397	334	291	63	224	261	108	145	$110^{0}_{-0.035}$	130	6	12	165	9	$28^{0}_{-0.013}$	55	18.5

* For models that have a batteryless absolute encoder, KB2 are 8 mm greater than the given value. Refer to the Dimensions of Servomotors with Batteryless Absolute Encoders section for the values for individual models.

Notes:
1 The values in parentheses are for Servomotors with Holding Brakes.
2 The values for a straight, without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

Cooling Fan Specifications

Single-phase, 200 V
50/60 Hz
17/15 W
0.11/0.09 A

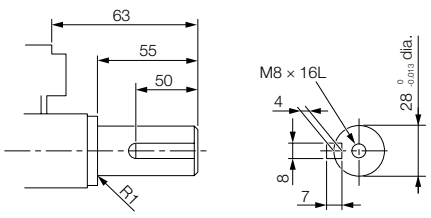
Specifications of Fan Operation Error Detector

Contact Capacity
- Maximum allowable voltage: 350 V (AC/DC)
- Maximum allowable current: 120 mA (AC/ DC)
- Maximum controllable power: 360 mW

Alarm Contacts
- ON for normal fan rotation.
- OFF at 1,680 ± 100 min-1 max.
- OFF for 3 seconds at startup.

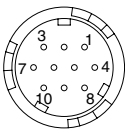
Shaft End Specifications

Straight with Key and Tap



Connector Specifications

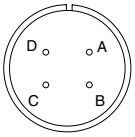
Encoder Connector (24-bit Encoder)



1	PS	6*	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5*	BAT(-)	10	FG (frame ground)

* A battery is required only for an absolute encoder.
Receptacle: CM10-R10P-D
Applicable plug: Not provided by Yaskawa.
Plug: CM10-AP10S-□-D for Right-angle Plug
CM10-SP10S-□-D for Straight Plug
(□ depends on the applicable cable size.)
Manufacturer: DDK Ltd.

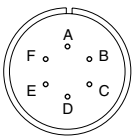
Servomotor Connector



A	Phase U	C	Phase W
B	Phase V	D	FG (frame ground)

Manufacturer: DDK Ltd.

Fan Connector

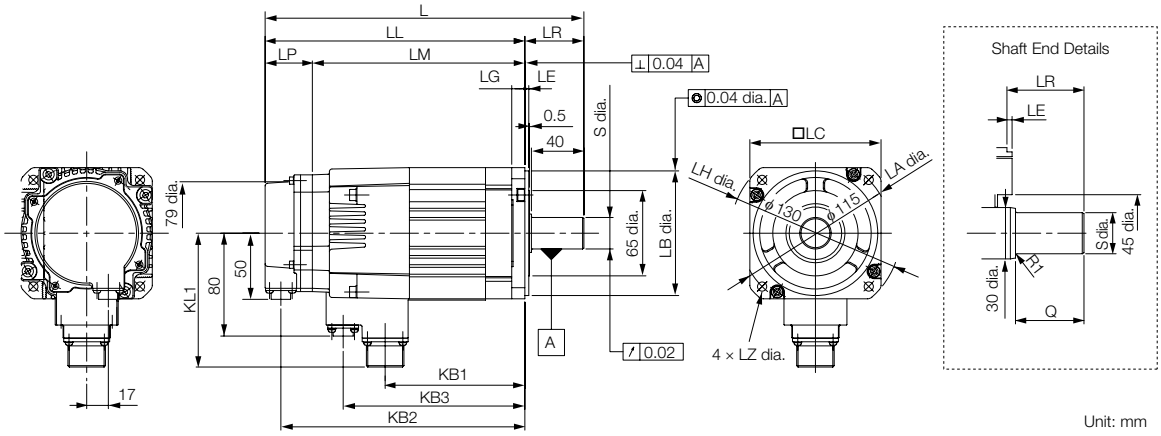


A	Fan motor	D	Alarm pin
B	Fan motor	E	Alarm pin
C	–	F	FG (frame ground)

Receptacle: MS3102A14S-6P
Applicable Plug (Available from Yaskawa Controls Co., Ltd.)
Plug: MS3108B14S-6S
Cable Clamp: MS3057-6A
Note: The Servomotor Connector (receptacle) is RoHS compliant.Contact the connector manufacturer for RoHS-compliant cable-side connectors (not provided by Yaskawa).

Servomotors with Holding Brakes

SGM7A-15, -20, and -25



Unit: mm

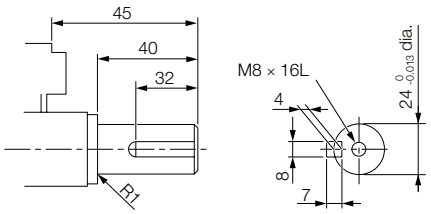
Model SGM7A-	L*	LL*	LM	LP	LR	KB1	KB2*	KB3	KL1	Flange Dimensions							Shaft End Dimensions		Approx. Mass[kg]
										LA	LB	LC	LE	LG	LH	LZ	S	Q	
15A□A2C	243	198	162	36	45	107	186	139	102	115	$95^{0}_{-0.035}$	100	3	10	130	7	$24^{0}_{-0.013}$	40	6.0
20A□A2C	259	214	178	36	45	123	202	155	102	115	$95^{0}_{-0.035}$	100	3	10	130	7	$24^{0}_{-0.013}$	40	6.8
25A□A2C	292	247	211	36	45	156	235	188	102	115	$95^{0}_{-0.035}$	100	3	10	130	7	$24^{0}_{-0.013}$	40	8.7

* For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the Dimensions of Servomotors with Batteryless Absolute Encoders section for the values for individual models.

Notes:
1 The values in parentheses are for Servomotors with Holding Brakes.
2 The values for a straight, without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

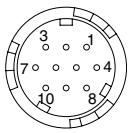
Shaft End Specifications

Straight with Key and Tap



Connector Specifications

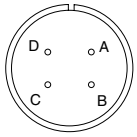
Encoder Connector (24-bit Encoder)



1	PS	6*	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5*	BAT(-)	10	FG (frame ground)

* A battery is required only for an absolute encoder.
Receptacle: CM10-R10P-D
Applicable plug: Not provided by Yaskawa.
Plug: CM10-AP10S-□-D for Right-angle Plug
CM10-SP10S-□-D for Straight Plug
(□ depends on the applicable cable size.)
Manufacturer: DDK Ltd.

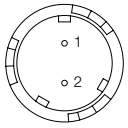
Servomotor Connector



A	Phase U	C	Phase W
B	Phase V	D	FG (frame ground)

Manufacturer: DDK Ltd.

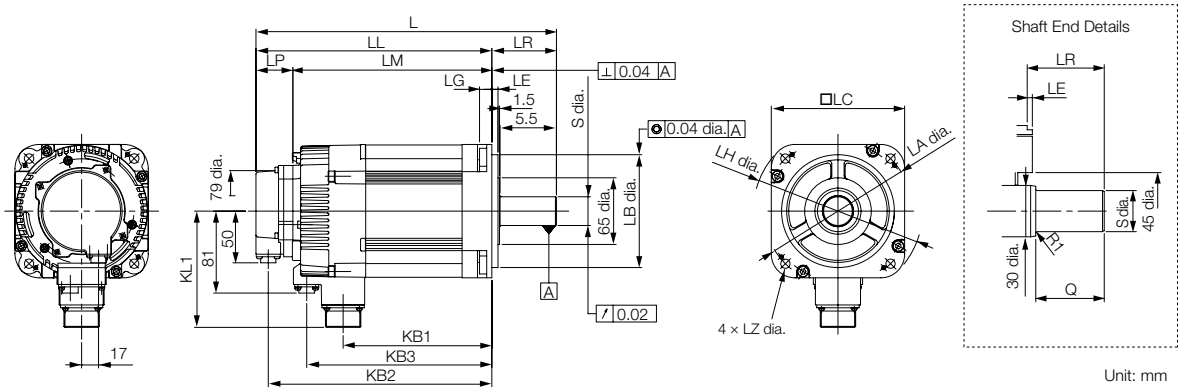
Brake Connector



1	Brake terminal
2	Brake terminal

Note: There is no voltage polarity for the brake terminals.
Receptacle: CM10-R10P-D
Applicable plug: Not provided by Yaskawa.
Plug: CM10-AP2S-□-D for Right-angle Plug
CM10-SP2S-□-D for Straight Plug
(□ depends on the applicable cable size.)
Manufacturer: DDK Ltd.

SGM7A-30, -40, and -50



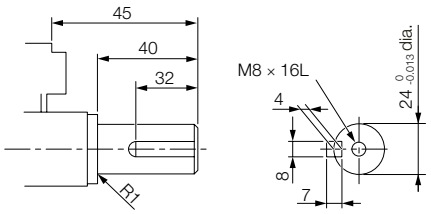
Model SGM7A-	L*	LL*	LM	LP	LR	KB1	KB2*	KB3	KL1	Flange Dimensions							Shaft End Dimensions		Approx. Mass[kg]
										LA	LB	LC	LE	LG	LH	LZ	S	Q	
30A□A2C	293	232	196	36	63	145	220	181	119	145	$110^{0}_{-0.035}$	130	6	12	165	9	$28^{0}_{-0.013}$	55	13
40A□A2C	332	269	233	36	63	184	257	220	119	145	$110^{0}_{-0.035}$	130	6	12	165	9	$28^{0}_{-0.013}$	55	16
50A□A2C	372	309	273	36	63	224	297	260	119	145	$110^{0}_{-0.035}$	130	6	12	165	9	$28^{0}_{-0.013}$	55	19

* For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the Dimensions of Servomotors with Batteryless Absolute Encoders section for the values for individual models.

Notes:
1 The values in parentheses are for Servomotors with Holding Brakes.
2 The values for a straight, without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

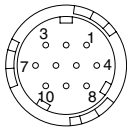
Shaft End Specifications

Straight with Key and Tap



Connector Specifications

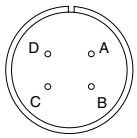
Encoder Connector (24-bit Encoder)



1	PS	6*	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5*	BAT(-)	10	FG (frame ground)

* A battery is required only for an absolute encoder.
Receptacle: CM10-R10P-D
Applicable plug: Not provided by Yaskawa.
Plug: CM10-AP10S-□-D for Right-angle Plug
CM10-SP10S-□-D for Straight Plug
(□ depends on the applicable cable size.)
Manufacturer: DDK Ltd.

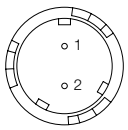
Servomotor Connector



A	Phase U	C	Phase W
B	Phase V	D	FG (frame ground)

Manufacturer: DDK Ltd.

Brake Connector



1	Brake terminal
2	Brake terminal

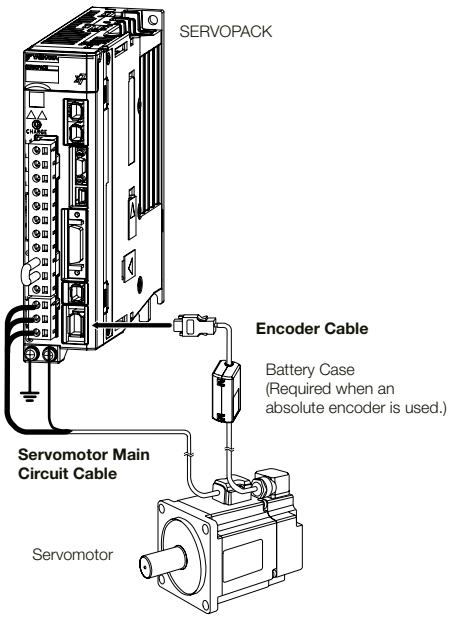
Note: There is no voltage polarity for the brake terminals.
Receptacle: CM10-R10P-D
Applicable plug: Not provided by Yaskawa.
Plug: CM10-AP2S-□-D for Right-angle Plug
CM10-SP2S-□-D for Straight Plug
(□ depends on the applicable cable size.)
Manufacturer: DDK Ltd.

Selecting Cables SGM7A

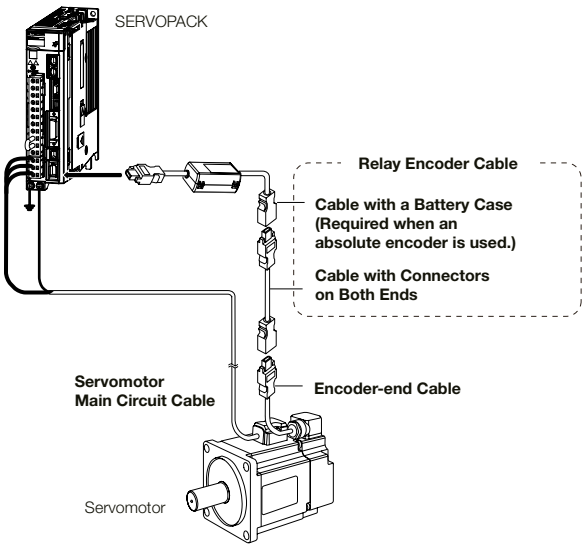
Cable Configurations

The cables shown below are required to connect a Servomotor to a SERVOPACK.

Encoder Cable of 20 m or less



Encoder Cable of 30 m to 50 m (Relay Cable)



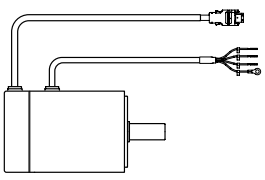
Note:
1. Cables with connectors on both ends that are compliant with an IP67 protective structure and European Safety Standards are not available from YASKAWA for the SGM7A-15A to SGM7A-70A Servomotors. You must make such a cable yourself. Use the Connectors specified by YASKAWA for these Servomotors. (These Connectors are compliant with the standards.) YASKAWA does not specify what wiring materials to use.
2. If the Encoder Cable length exceeds 20 m, be sure to use a Relay Encoder Cable.
3. If you use a Servomotor Motor Power Cable that exceeds 20 m, the intermittent duty zone in the torquemotor speed characteristics will become smaller because the voltage drop increases.
4. Refer to the following manual for the following information.
   - Cable dimensional drawings and cable connection specifications
   - Order numbers and specifications of individual connectors for cables
   - Order numbers and specifications for wiring materials

   Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

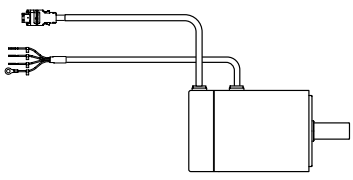
Important

For the SGM7A-A5 to -10, there are different order numbers for the Servomotor Motor Power Cables and Encoder Cables depending on the cable installation direction. Confirm the order numbers before you order.

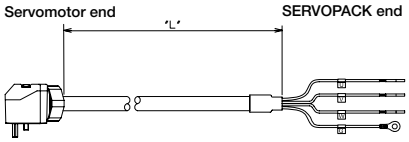
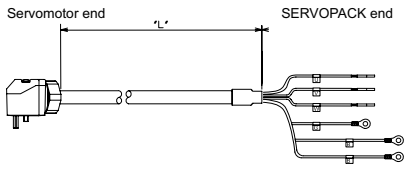
Cable installed towards Load



Cable installed away from Load

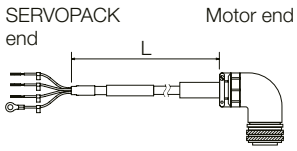
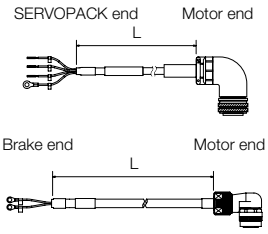
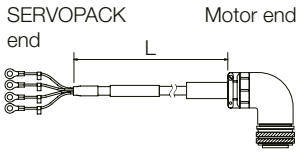
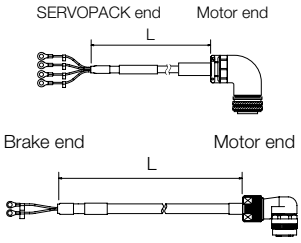


Servomotor Motor Power Cables

Servomotor Model	Description	Length	Order Number Flexible Cable*	Appearance
SGM7A-A5 to -C2 50 W to 150 W	For Servomotors without Holding Brakes Cable installed toward load	3 m	JZSP-CSM21-03-E-G#	
		5 m	JZSP-CSM21-05-E-G#	
		10 m	JZSP-CSM21-10-E-G#	
		15 m	JZSP-CSM21-15-E-G#	
		20 m	JZSP-CSM21-20-E-G#	
SGM7A-02 to -06 200 W to 600 W		3 m	JZSP-CSM22-03-E-G#	
		5 m	JZSP-CSM22-05-E-G#	
		10 m	JZSP-CSM22-10-E-G#	
		15 m	JZSP-CSM22-15-E-G#	
		20 m	JZSP-CSM22-20-E-G#	
SGM7A-08 and -10 750 W, 1.0 kW		3 m	JZSP-CSM23-03-E-G#	
		5 m	JZSP-CSM23-05-E-G#	
		10 m	JZSP-CSM23-10-E-G#	
		15 m	JZSP-CSM23-15-E-G#	
		20 m	JZSP-CSM23-20-E-G#	
		30 m	JZSP-CSM23-30-E-G#	
SGM7A-A5 to -C2 50 W to 150 W	For Servomotors with Holding Brakes Cable installed towards load	3 m	JZSP-CSM31-03-E-G#	
		5 m	JZSP-CSM31-05-E-G#	
		10 m	JZSP-CSM31-10-E-G#	
		15 m	JZSP-CSM31-15-E-G#	
		20 m	JZSP-CSM31-20-E-G#	
SGM7A-02 to -06 200 W to 600 W		3 m	JZSP-CSM32-03-E-G#	
		5 m	JZSP-CSM32-05-E-G#	
		10 m	JZSP-CSM32-10-E-G#	
		15 m	JZSP-CSM32-15-E-G#	
		20 m	JZSP-CSM32-20-E-G#	
SGM7A-08 and -10 750 W, 1.0 kW		3 m	JZSP-CSM33-03-G#	
		5 m	JZSP-CSM33-05-G#	
		10 m	JZSP-CSM33-10-G#	
		15 m	JZSP-CSM33-15-G#	
		20 m	JZSP-CSM33-20-G#	

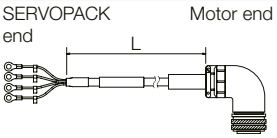
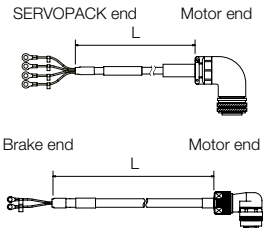
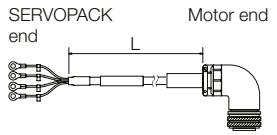
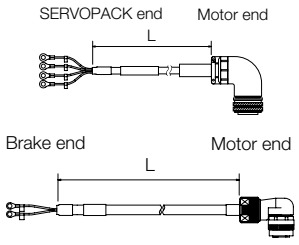
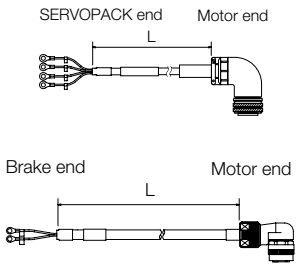
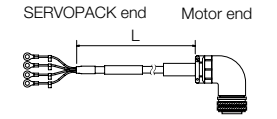
* Use Flexible Cables for moving parts of machines, such as robots. The recommended bending radius (R) is 90 mm or larger.
Note: The digit # of the order number represents the design revision.

Servomotor Motor Power Cables

Servomotor Model	Description	Connector Specifications	Length	Order Number Flexible Cable*1	Appearance
SGM7A-15 1.5 kW	For Servomotors without Holding Brakes	Right-angle	3m	JZSP-CVMCA12-03-E-G#	
			5m	JZSP-CVMCA12-05-E-G#	
			10m	JZSP-CVMCA12-10-E-G#	
			15m	JZSP-CVMCA12-15-E-G#	
			20m	JZSP-CVMCA12-20-E-G#	
	For Servomotors with Holding Brakes (Set of Two Cables*2)	Right-angle	3m	JZSP-CVMCA12-03-E-G# JZSP-CVB12Y-03-E-G#	
			5m	JZSP-CVMCA12-05-E-G# JZSP-CVB12Y-05-E-G#	
			10m	JZSP-CVMCA12-10-E-G# JZSP-CVB12Y-10-E-G#	
			15m	JZSP-CVMCA12-15-E-G# JZSP-CVB12Y-15-E-G#	
			20m	JZSP-CVMCA12-20-E-G# JZSP-CVB12Y-20-E-G#	
SGM7A-20 2.0 kW	For Servomotors without Holding Brakes	Right-angle	3m	JZSP-CVMCA12-03-E-G#	
			5m	JZSP-CVMCA12-05-E-G#	
			10m	JZSP-CVMCA12-10-E-G#	
			15m	JZSP-CVMCA12-15-E-G#	
			20m	JZSP-CVMCA12-20-E-G#	
	For Servomotors with Holding Brakes (Set of Two Cables*2)	Right-angle	3m	JZSP-CVMCA12-03-E-G# JZSP-CVB12Y-03-E-G#	
			5m	JZSP-CVMCA12-05-E-G# JZSP-CVB12Y-05-E-G#	
			10m	JZSP-CVMCA12-10-E-G# JZSP-CVB12Y-10-E-G#	
			15m	JZSP-CVMCA12-15-E-G# JZSP-CVB12Y-15-E-G#	
			20m	JZSP-CVMCA12-20-E-G# JZSP-CVB12Y-20-E-G#	

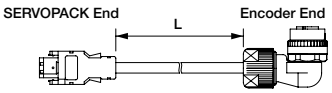
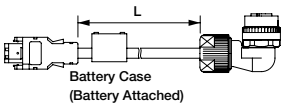
*1. Use Flexible Cables for moving parts of machines, such as robots. The recommended bending radius (R) is 90mm or larger.
*2. This order number is for a set of two cables (Main Power Supply Cable and Holding Brake Cable). When you purchase them separately, the order numbers for Main Power Supply Cables are the same as for a Servomotor without a Holding Brake.
The following order numbers are for a Holding Brake Cable. These Standard Cables are Flexible Cables.
- Cable with Straight Plug: JZSP-U7B23-□□-E
- Cable with Right-angle Plug: JZSP-U7B24-□□-E

Servomotor Main Circuit Cables

Servomotor Model	Description	Connector Specifications	Length	Order Number Flexible Cable*1	Appearance
SGM7A-25 2.5 kW	For Servomotors without Holding Brakes	Right-angle	3m	JZSP-CVMCA12-03-E-G#	
			5m	JZSP-CVMCA12-05-E-G#	
			10m	JZSP-CVMCA12-10-E-G#	
			15m	JZSP-CVMCA12-15-E-G#	
			20m	JZSP-CVMCA12-20-E-G#	
	For Servomotors with Holding Brakes (Set of Two Cables*2)	Right-angle	3m	JZSP-CVMCA12-03-E-G#	
				JZSP-CVB12Y-03-E-G#	
			5m	JZSP-CVMCA12-05-E-G#	
				JZSP-CVB12Y-05-E-G#	
			10m	JZSP-CVMCA12-10-E-G#	
				JZSP-CVB12Y-10-E-G#	
			15m	JZSP-CVMCA12-15-E-G#	
				JZSP-CVB12Y-15-E-G#	
			20m	JZSP-CVMCA12-20-E-G#	
				JZSP-CVB12Y-20-E-G#	
SGM7A-30 3.0 kW	For Servomotors without Holding Brakes	Right-angle	3m	JZSP-CVMCA13-03-E-G#	
			5m	JZSP-CVMCA13-05-E-G#	
			10m	JZSP-CVMCA13-10-E-G#	
			15m	JZSP-CVMCA13-15-E-G#	
			20m	JZSP-CVMCA13-20-E-G#	
	For Servomotors with Holding Brakes (Set of Two Cables*2)	Right-angle	3m	JZSP-CVMCA13-03-E-G#	
				JZSP-CVB12Y-03-E-G#	
			5m	JZSP-CVMCA13-05-E-G#	
				JZSP-CVB12Y-05-E-G#	
			10m	JZSP-CVMCA13-10-E-G#	
				JZSP-CVB12Y-10-E-G#	
			15m	JZSP-CVMCA13-15-E-G#	
				JZSP-CVB12Y-15-E-G#	
			20m	JZSP-CVMCA13-20-E-G#	
				JZSP-CVB12Y-20-E-G#	
SGM7A-40 to -50 4.0 kW & 5.0 kW	For Servomotors with Holding Brakes (Set of Two Cables*2)	Right-angle	3m	JZSP-CVMCA35-03-E-G#	
				JZSP-CVB12Y-03-E-G#	
			5m	JZSP-CVMCA35-05-E-G#	
				JZSP-CVB12Y-05-E-G#	
			10m	JZSP-CVMCA35-10-E-G#	
				JZSP-CVB12Y-10-E-G#	
			15m	JZSP-CVMCA35-15-E-G#	
				JZSP-CVB12Y-15-E-G#	
			20m	JZSP-CVMCA35-20-E-G#	
				JZSP-CVB12Y-20-E-G#	
SGM7A-70 7.0 kW	For Servomotors without Holding Brakes	Right-angle	3m	JZSP-CVMCA35-03-E-G#	
			5m	JZSP-CVMCA35-05-E-G#	
			10m	JZSP-CVMCA35-10-E-G#	
			15m	JZSP-CVMCA35-15-E-G#	
			20m	JZSP-CVMCA35-20-E-G#	
	Fan Cable	Right-angle	3m	BFEV-03(A)-E	
			5m	BFEV-05(A)-E	
			10m	BFEV-10(A)-E	
			15m	BFEV-15(A)-E	
			20m	BFEV-20(A)-E	

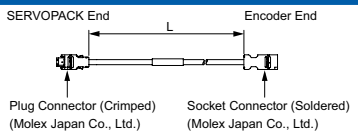
*1. Use Flexible Cables for moving parts of machines, such as robots. The recommended bending radius (R) is 90 mm or larger.
*2. This order number is for a set of two cables (Main Power Supply Cable and Holding Brake Cable). When you purchase them separately, the order numbers for Main Power Supply Cables are the same as for a Servomotor without a Holding Brake.
The following order numbers are for a Holding Brake Cable. These Standard Cables are Flexible Cables.
- Cable with Straight Plug: JZSP-U7B23-□□-E
- Cable with Right-angle Plug: JZSP-U7B24-□□-E

Encoder Cables of 20 m or less

Servomotor Model	Description	Length	Order Number	Appearance
SGM7A-A5 to -10 50 W - 1 kW	Cable direction to load side	3 m	JZSP-C7PI2D-03-E-G#	
		5 m	JZSP-C7PI2D-05-E-G#	
		10 m	JZSP-C7PI2D-10-E-G#	
		15 m	JZSP-C7PI2D-15-E-G#	
		20 m	JZSP-C7PI2D-20-E-G#	
	Cable direction away from load	3 m	JZSP-C7PI2E-03-E-G#	
		5 m	JZSP-C7PI2E-05-E-G#	
		10 m	JZSP-C7PI2E-10-E-G#	
		15 m	JZSP-C7PI2E-15-E-G#	
		20 m	JZSP-C7PI2E-20-E-G#	
	Cable with battery case, direction to load side	3 m	JZSP-C7PA2D-03-E-G#	
		5 m	JZSP-C7PA2D-05-E-G#	
		10 m	JZSP-C7PA2D-10-E-G#	
		15 m	JZSP-C7PA2D-15-E-G#	
		20 m	JZSP-C7PA2D-20-E-G#	
	Cable with battery case, direction away from load side	3 m	JZSP-C7PA2E-03-E-G#	
		5 m	JZSP-C7PA2E-05-E-G#	
		10 m	JZSP-C7PA2E-10-E-G#	
		15 m	JZSP-C7PA2E-15-E-G#	
		20 m	JZSP-C7PA2E-20-E-G#	
SGM7A-15 to -30 1.5 W - 3 kW	For incremental encoder	3 m	JZSP-CVP12-03-E-G#	
		5 m	JZSP-CVP12-05-E-G#	
		10 m	JZSP-CVP12-10-E-G#	
		15 m	JZSP-CVP12-15-E-G#	
		20 m	JZSP-CVP12-20-E-G#	
	For absolute ne-coder with battery case *1	3 m	JZSP-CVP27-03-E-G#	
		5 m	JZSP-CVP27-05-E-G#	
		10 m	JZSP-CVP27-10-E-G#	
		15 m	JZSP-CVP27-15-E-G#	
		20 m	JZSP-CVP27-20-E-G#	

*1. If a battery is connected to the host controller, the Battery Case is not required. If so, use a cable for incremental encoders.

Encoder Extension Cables of 30 m or above

Servomotor Model	Description	Length	Order Number	Appearance
All SGM7A models	Cable with Connectors (For incremental and absolute encoder)	30 m	JZSP-UCMP00-30-E	
		40 m	JZSP-UCMP00-40-E	
		50 m	JZSP-UCMP00-50-E	

Note: Encoder Extension cables can only be used together with suitable Encoder Cables.