

# SGMXA

## Model Designations

SGMXA - 01 A U A 2 1 A 1

Σ-X-Series Servomotor SGMXA model

1st+2nd digits

3rd digit

4th digit

5th digit

6th digit

7th digit

8th digit

9th digit

1st+2nd digits Rated Output

Code	Specification
A5	50 W
01	100 W
C2	150 W
02	200 W
04	400 W
06	600 W
08	750 W
10	1.0 kW
15	1.5 kW
20	2.0 kW
25	2.5 kW
30	3.0 kW
40	4.0 kW
50	5.0 kW
70	7.0 kW

3rd digit Power Supply Voltage

Code	Specification
A	200 VAC

4th digit Serial Encoder

Code	Specification
U	26-bit absolute encoder
W	26-bit batteryless absolute encoder

5th digit Design Revision Order

A

6th digit Shaft End

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

\* Code B does not support models above 1.5 kW.

7th digit Options

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

Note: The SGMXA-70A does not support models with a holding brake.

8th digit Destination

A

9th digit Ancillary Specification

Code	Specification
1	Standard
2	Σ-7 compatible

## Specifications and Ratings

### Specification

Voltage	200 V										
	Model SGMXA-	A5A	01A	C2A, 02A	04A	06A, 08A	10A	15A	20A	25A, 30A	40A, 50A
Time Rating	Continuous										
Thermal Class	UL: B, CE: B						UL: F, CE: F				
Insulation Resistance	500 VDC, 10 MΩ min.										
Withstand Voltage	1500 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										

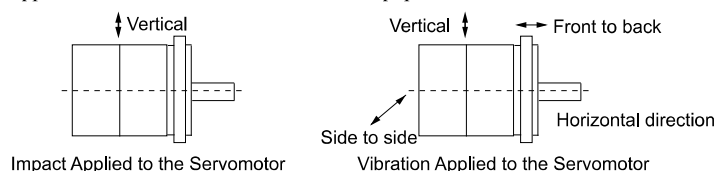
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SGMXA

Voltage		200 V										
Model SGMXA-		A5A	01A	C2A, 02A	04A	06A, 08A	10A	15A	20A	25A, 30A	40A, 50A	70A
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 (with no condensation)										
	Installation Site	<ul style="list-style-type: none"> <li>• Must be indoors and free of corrosive and explosive gases.</li> <li>• Must be well-ventilated and free of dust and moisture.</li> <li>• Must facilitate inspection and cleaning.</li> <li>• Must have an altitude of 1000 m or less. (With derating, usage is possible between 1000 m and 2000 m.) *3</li> <li>• Must be free of strong magnetic fields.</li> </ul>										
	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 (with no condensation)										
Impact Resistance *2	Impact Acceleration (at Flange)	490 m/s <sup>2</sup>										
	Number of Impacts	2 times										
Vibration Resistance *2	Vibration Acceleration (at Flange)	49 m/s <sup>2</sup>						49 m/s <sup>2</sup> (24.5 m/s <sup>2</sup> front to back)				14.7 m/s <sup>2</sup>
Applicable SERVOPACKs	SGDXS	R70A	R90A	1R6A	2R8A	5R5A	120A	120A	180A	200A	330A	550A
	SGDXW	1R6A *4, 2R8A *4	1R6A *4, 2R8A *4	1R6A, 2R8A *4	2R8A, 5R5A *4, 7R6A *4	5R5A, 7R6A	-	-	-	-	-	-
	SGDXT-	1R6A *4, 2R8A *4	1R6A *4, 2R8A *4	1R6A, 2R8A *4	2R8A	-	-	-	-	-	-	-

- \*1 A vibration class of V15 indicates a vibration amplitude of 15 μm maximum on the servomotor without a load at the rated rotation speed.  
 \*2 The given values are for when the servomotor shaft is mounted horizontally and impact 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 that is applied to the servomotor with the actual equipment.



- \*3 Refer to the following section for the derating rates.  
 *Derating Rates on page 80*  
 \*4 If you use this combination, performance may not be as good, e.g., the control gain may not increase, in comparison with using a Σ-XS SERVOPACK.

## Servomotor Ratings


### ■ SGMXA-A5 to -10

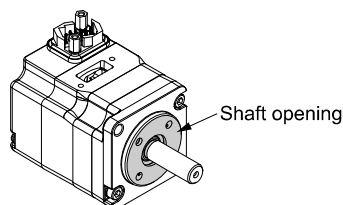
Voltage		200 V								
Model SGMXA-		A5A	01A	C2A	02A	04A	06A	08A	10A	
Rated Output <sup>*1</sup>	W	50	100	150	200	400	600	750	1000	
Rated Torque <sup>*1, *2</sup>	N·m	0.159	0.318	0.477	0.637	1.27	1.91	2.39	3.18	
Instantaneous Maximum Torque <sup>*1</sup>	N·m	0.557	1.11	1.67	2.23	4.46	6.69	8.36	11.1	
Rated Current <sup>*1</sup>	Arms	0.57	0.89	1.5	1.5	2.4	4.5	4.4	6.4	
Instantaneous Maximum Current <sup>*1</sup>	Arms	2.1	3.2	5.6	5.9	9.3	16.9	16.8	23.2	
Rated Rotation Speed <sup>*1</sup>	min <sup>-1</sup>	3000								
Continuous Allowable Rotation Speed	min <sup>-1</sup>	7000				6000				
Maximum Rotation Speed <sup>*1</sup>	min <sup>-1</sup>	7000								
Torque Constant	N·m/Arms	0.304	0.384	0.332	0.458	0.576	0.456	0.584	0.541	
Rotor Moment of Inertia	Without Holding Brakes	× 10 <sup>-4</sup> kg·m <sup>2</sup>	0.0220	0.0340	0.0461	0.139	0.216	0.315	0.773	0.969
	With Holding Brakes		0.0300	0.0420	0.0541	0.199	0.276	0.375	0.943	1.14
	Without Holding Brake and with Batteryless Absolute Encoder		0.0257	0.0377	0.0498	0.143	0.220	0.319	0.777	0.973
	With Holding Brake and Batteryless Encoder		0.0337	0.0457	0.0578	0.203	0.280	0.379	0.947	1.14
Rated Power Rate <sup>*1</sup>	Without Holding Brakes	kW/s	11.5	29.7	49.4	29.1	74.7	116	73.7	104
	With Holding Brakes		8.42	24.1	42.1	20.4	58.5	97.3	60.4	88.8
Rated Angular Acceleration <sup>*1</sup>	Without Holding Brakes	rad/s <sup>2</sup>	72200	93500	103500	45700	58800	60600	30800	32800
	With Holding Brakes		53000	75700	88200	31900	46000	50900	25300	27900
Derating Rate for Servomotor with Oil Seal	%	80	90			95				
Heat Sink Size (aluminum) <sup>*3</sup>	mm	200 × 200 × 6			250 × 250 × 6		300 × 300 × 12 <sup>*9</sup>	250 × 250 × 6	300 × 300 × 12	
Protective Structure <sup>*4</sup>	Totally enclosed, self-cooled, IP67									

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Voltage			200 V								
Model SGMXA-			A5A	01A	C2A	02A	04A	06A	08A	10A	
Holding Brake Spec- ifications *5	Rated Voltage	V	24 VDC ±10%								
	Capacity	W	5.5			6		6.5			
	Holding Torque	N·m	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 (Rotor Moment of Inertia Ratio) *6	At 6000 min <sup>-1</sup>		40 times	40 times	40 times	30 times	20 times	20 times	20 times	20 times	
	At 7000 min <sup>-1</sup>					25 times	15 times	20 times	15 times	20 times	
	With Exter- nal Regener- ative Resis- tor and External Dynamic Brake Resis- tor *7	At 6000 min <sup>-1</sup> At 7000 min <sup>-1</sup>	40 times	40 times	40 times	30 times	20 times	20 times	20 times	30 times	
Allowable Shaft Loads *8	LF	mm	20			25		35			
	Allowable Radial Load	N	78			245		392			
	Allowable Thrust Load	N	54			74		147			

- \*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 following section for the relation between the heat sinks and derating rate.  
 *Servomotor Heat Dissipation Conditions on page 80*
- \*4 This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.

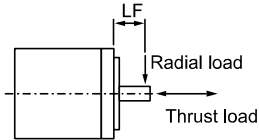


- \*5 Observe the following precautions if you use a servomotor with a holding brake.
- The holding brake cannot be used to stop the servomotor.
  - The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
  - The 24-VDC power supply is not provided by Yaskawa.
- \*6 The rotor 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 0020 for the SERVOPACK. However, you cannot externally connect a dynamic brake resistor if you use the following SERVOPACKs (maximum applicable motor capacity: 400 W).

- SGDXS-R70A□□A0020 to -2R8A□□A0020
- SGDXW-1R6A□□A0020, -2R8A□□A0020
- SGDXT-1R6A□□A0020, -2R8A□□A0020

\*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 following section for details.

Servomotor Heat Dissipation Conditions on page 80


## ■ SGMXA-15 to -70

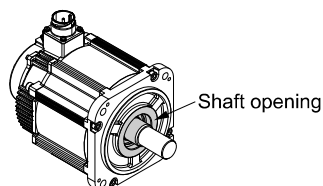
Voltage		200 V							
Model SGMXA-		15A	20A	25A	30A	40A	50A	70A	
Rated Output *1	kW	1.5	2.0	2.5	3.0	4.0	5.0	7.0	
Rated Torque *1, *2	N·m	4.90	6.36	7.96	9.80	12.6	15.8	22.3	
Instantaneous Maximum Torque *1	N·m	14.7	19.1	23.9	29.4	37.8	47.6	54.0	
Rated Current *1	Arms	9.3	12.1	15.6	17.9	25.4	27.6	38.3	
Instantaneous Maximum Current *1	Arms	28	42	51	56	77	84	105	
Rated Rotation Speed *1	min <sup>-1</sup>	3000							
Continuous Allowable Rotation Speed	min <sup>-1</sup>	6000		5000	6000		5000	6000	
Maximum Rotation Speed *1	min <sup>-1</sup>	6000 *3							
Torque Constant *1	N·m/Arms	0.590	0.561	0.538	0.582	0.519	0.604	0.604	
Rotor Moment of Inertia *4	Without Holding Brakes	× 10 <sup>-4</sup> kg·m <sup>2</sup>	2.00	2.47	3.19	7.00	9.60	12.3	12.3
	With Holding Brakes		2.25	2.72	3.44	9.20	11.8	14.5	—
Rated Power Rate *1	Without Holding Brakes	kW/s	120	164	199	137	165	203	404
	With Holding Brakes		107	149	184	104	134	172	—
Rated Angular Acceleration *1	Without Holding Brakes	rad/s <sup>2</sup>	24500	25700	24900	14000	13100	12800	18100
	With Holding Brakes		21700	23300	23100	10600	10600	10800	—
Heat Sink Size (aluminum) *5	mm	300 × 300 × 12			400 × 400 × 20				
Protective Structure *6	Totally enclosed, self-cooled, IP67							Totally enclosed, forced ventilation (with fan), IP22	

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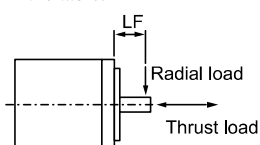
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Voltage			200 V						
Model SGMXA-			15A	20A	25A	30A	40A	50A	70A
Holding Brake Specifications *7	Rated Voltage	V	24 VDC±10%						
	Capacity	W	12			10			
	Holding Torque	N·m	7.84		10		20		
	Coil Resistance	Ω (at 20°C)	48			59			
	Rated Current	A (at 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 (Rotor Moment of Inertia Ratio) *8	Without External Devices		10 times			5 times			
	With External Regenerative Resistor and External Dynamic Brake Resistor *9		20 times			15 times			
Allowable Shaft Loads *10	LF	mm	45			63			
	Allowable Radial Load	N	686			980	1176		
	Allowable Thrust Load	N	196			392			

- \*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 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 For SGMXA-25A and -50A servomotors, the maximum rotation speed in the continuous duty zone is 5000 min<sup>-1</sup>. Use the servomotor in a range where the average motor speed and effective torque stay in the continuous zone.  
 \*4 The values for SGMXA-15A to -70A servomotors with batteryless absolute encoders (and holding brakes) are the same as those in the table.  
 \*5 Refer to the following section for the relation between the heat sinks and derating rate.  
 Servomotor Heat Dissipation Conditions on page 80  
 \*6 This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.

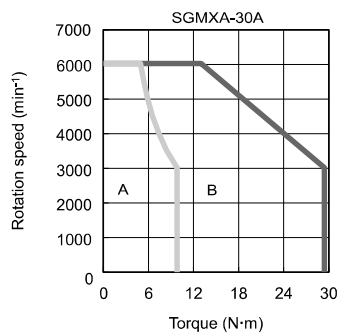
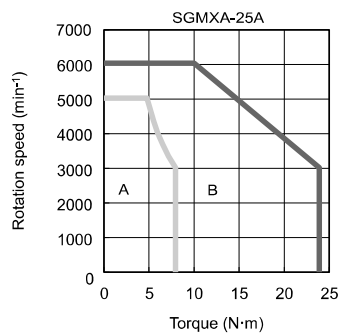
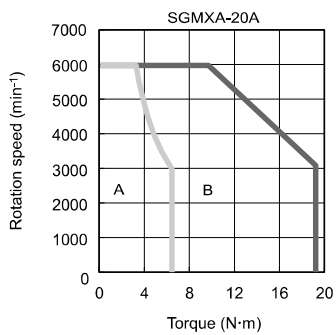
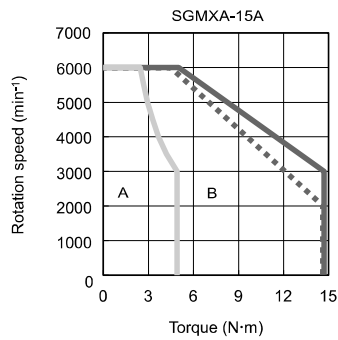
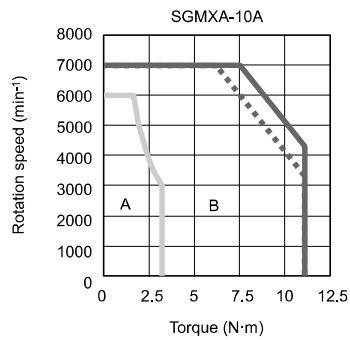
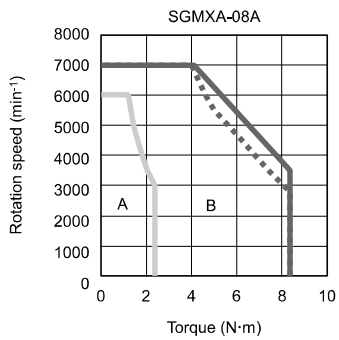
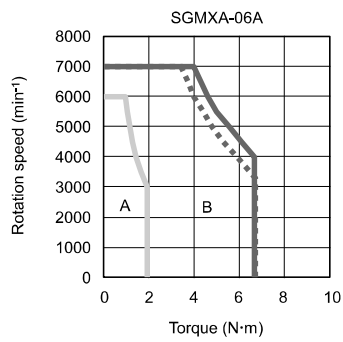
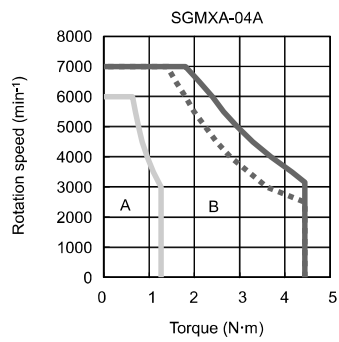
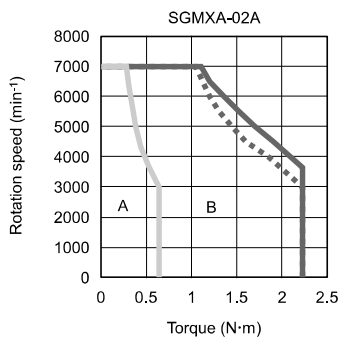
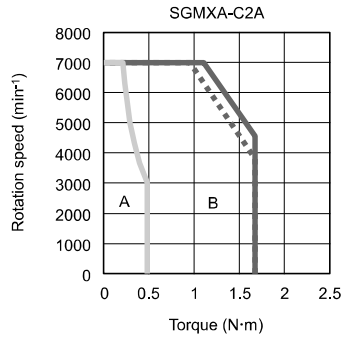
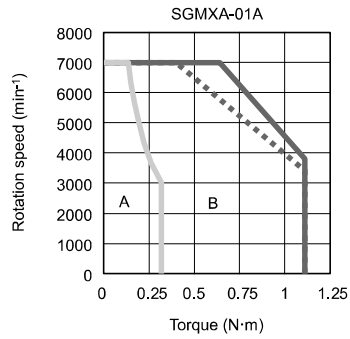
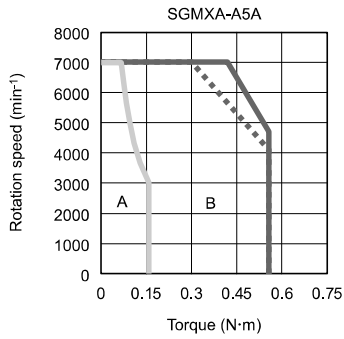


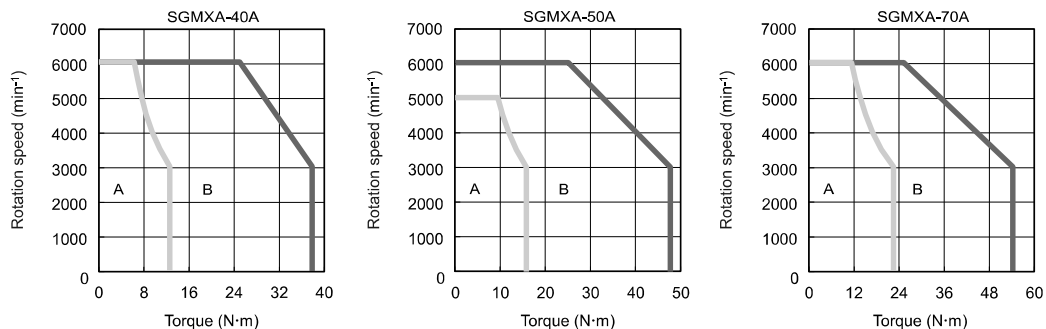
- \*7 Observe the following precautions if you use a servomotor with a holding brake.
- The holding brake cannot be used to stop the servomotor.
  - The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
  - The 24-VDC power supply is not provided by Yaskawa.
- \*8 The rotor moment of inertia scaling factor is the value for a standard servomotor without a holding brake.  
 \*9 To externally connect a dynamic brake resistor, select hardware option specification 0020 for the SERVOPACK. However, you cannot externally connect a dynamic brake resistor if you use the following SERVOPACKs (maximum applicable motor capacity: 400 W).
- SGDXS-R70A□□A0020 to -2R8A□□A0020
  - SGDXW-1R6A□□A0020 to -2R8A□□A0020
- \*10 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.



## Torque-Rotation Speed Characteristics

**A** : Continuous duty zone — (solid lines): Three-phase, 200 V  
**B** : Intermittent duty zone ..... (dotted lines): Single-phase, 200 V





**Note:**

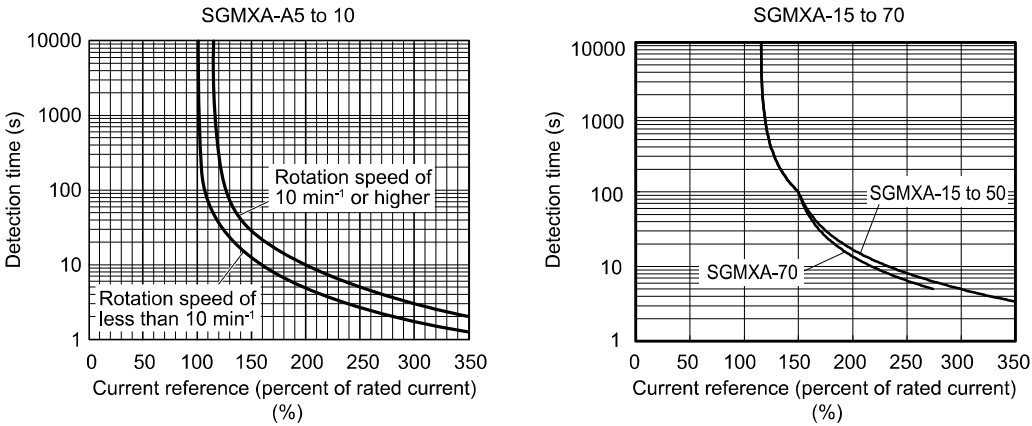
1. SGMXA-A5A to -10: These values (typical values) are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C.  
SGMXA-15A to -70: These values (typical values) are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C.
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 main circuit cable that exceeds 20 m, the intermittent duty zone in the torque-rotation speed characteristics will become smaller because the voltage drop increases.
5. The SGMXA-10A and -15A can use a single-phase power input in combination with the SGDXS-120A□□A0008.



## Servomotor Overload Protection Characteristics

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

For the overload detection level, priority is given to the lower of the detection levels in the overload protection characteristics of the connected SERVOPACK and servomotor.



**Note:**

The above overload protection characteristics do not mean that you can 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-Rotation Speed Characteristics on page 76".

## Allowable Load Moment of Inertia

The allowable load moments of inertia (motor moment of inertia ratios) for the servomotors are given in "Servomotor Ratings on page 72". The values are determined by the regenerative energy processing capacity of the SERVOPACK and are also affected by the drive conditions of the servomotor. Use the SigmaSize+ AC servo capacity selection program \*1 to check the driving conditions. Perform the required steps for each of the following cases.


\*1 Contact your Yaskawa representative for information on this program.

### ■ Exceeding the Allowable Load Moment of Inertia

Use one of the following measures to adjust the load moment of inertia to within the allowable value.

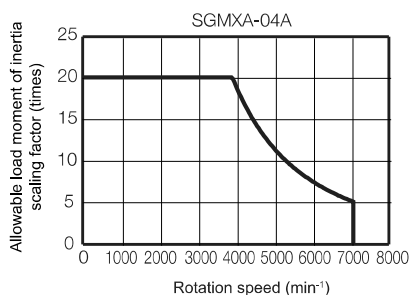
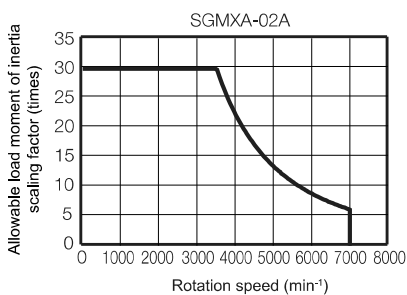
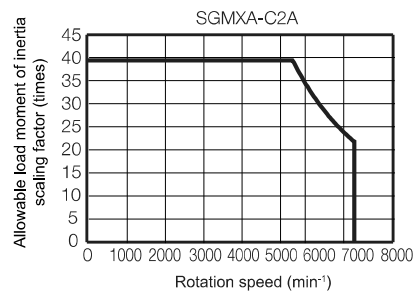
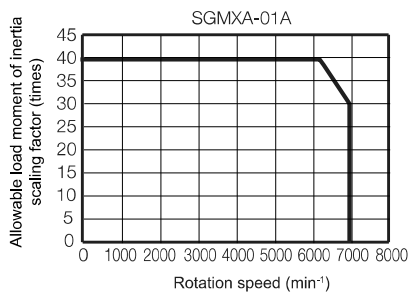
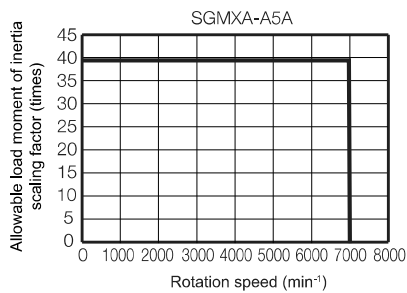
- Reduce the torque limit.
- Reduce the deceleration rate.
- Reduce the maximum motor speed.

If the above steps is not possible, install an external regenerative resistor.

**Information** 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). Refer to the following section for the regenerative power (W) that can be processed by the SERVOPACKs.  
 *Specifications of Built-in Regenerative Resistors in SERVOPACKs on page 573*  
 Install an external regenerative resistor when the built-in regenerative resistor cannot process all of the regenerative power.

### ■ SERVOPACKs without Built-in Regenerative Resistors

The following graph shows the allowable load moment of inertia scaling factor of the rotation 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, for the shaded areas of the graphs, use Yaskawa's SigmaSize+, an AC servo capacity selection program, to select an external regenerative resistor.



**Note:**

Applicable SERVOPACK Model: SGDXS-R70A, -90A, -1R6A, -2R8A

## ■ When an External Regenerative Resistor Is Required

Install the external regenerative resistor which is selected with the SigmaSize+. Contact your Yaskawa representative for information on SigmaSize+.

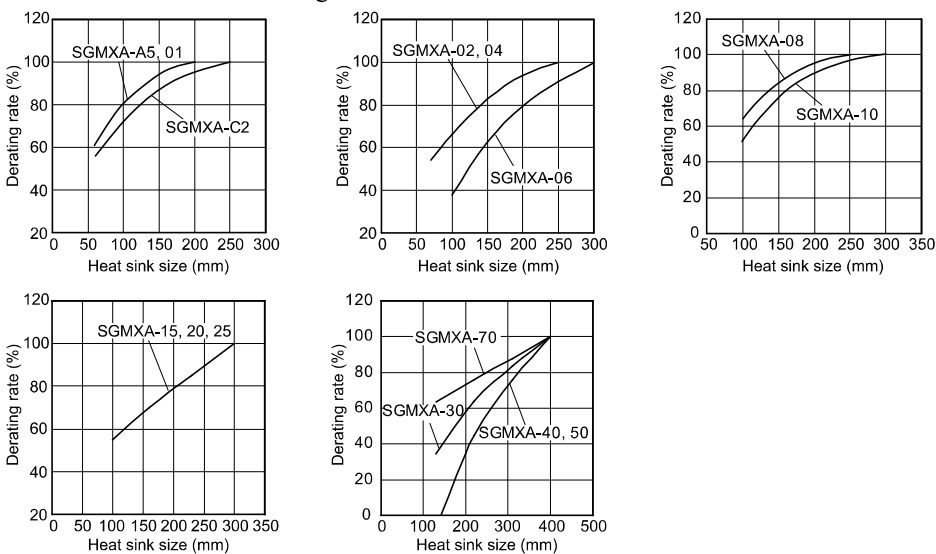
Refer to the following section for details on the external regenerative resistors.

☞ *Specifications and Dimensions of External Regenerative Resistors on page 574*

## 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.



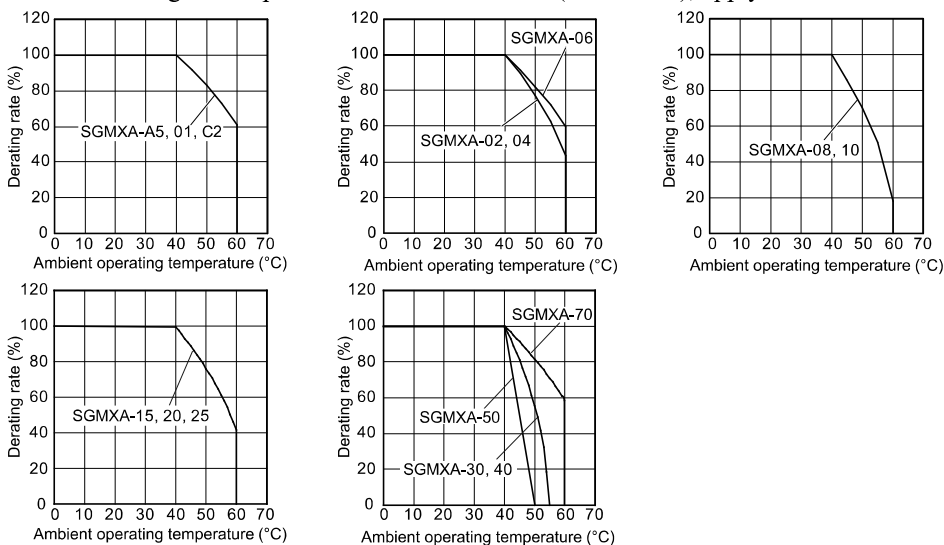
Important

The actual temperature rise depends on the following conditions. Always check the servomotor temperature with the actual equipment.

- How the heat sink (the servomotor mounting section) is attached to the installation surface
- Status between heat sink and servomotor (sealant, reduction gear, etc.)
- What material is used for the servomotor mounting section
- Servomotor rotation speed

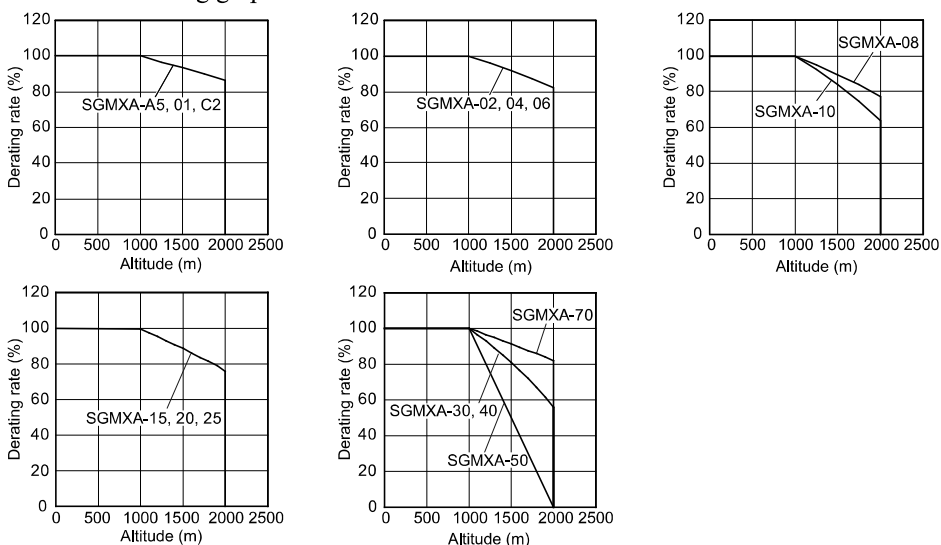
## ■ Applications Where the Surrounding Air Temperature Exceeds 40°C

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 1000 m

The servomotor ratings are the continuous allowable values at an altitude of 1000 m or less. If you use a servomotor at an altitude that exceeds 1000 m (2000 m max.), the heat dissipation effect of the air is reduced. Apply the appropriate derating rate from the following graphs.



### Note:

- 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 on page 78".
- Use the combination of the SERVOPACK and servomotor so that the derating conditions are satisfied for both the SERVOPACK and servomotor.
- The derating rates are applicable only when the average rotation speed is less than or equal to the rated rotation speed. If the average rotation speed exceeds the rated rotation speed, consult with your Yaskawa representative.