Model Designations

SGMXG - 09 A U A 2 1 A 1

Σ-X-Series Servomotor SGMXG model

1st+2nd digits: Rated Output

Code	Specification
03	300 W
05	450 W
09	850 W
13	1.3 kW
20	1.8 kW
30	2.9 kW
44	4.4 kW
55	5.5 kW
75	7.5 kW
1A	11 kW
1E	15 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 (SGMXG-03 to -20 only)
6	Straight with key and tap
8	Straight without key, with tap (SGMXG-30 to -1E only)

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

8th digit: Destination

A

9th digit: Ancillary Specification

Code	Specification
1	Standard
2	Σ-7 compatible

Note:

The rated output is 2.4 kW if you combine the SGMXG-30A with the SGDXS-200A.

Specifications and Ratings

Specifications

Voltage	200 V									
Model SGMXG-	03A, 05A	09A	13A	20A	30A	44A	55A	75A	1AA	1EA
Time Rating	Continuous									
Thermal Class	UL: F, CE: F									
Insulation Resistance	500 VDC, 10 MΩ 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									

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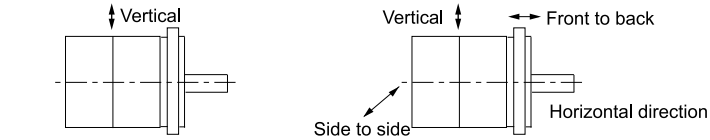
Voltage		200 V									
Model SGMXG-		03A, 05A	09A	13A	20A	30A	44A	55A	75A	1AA	1EA
Environmental Conditions	Surrounding Air Temperature	0°C to 40°C (60°C max.) *3									
	Surrounding Air Humidity	20% to 80% relative humidity (with no condensation)									
	Installation Site	• Must be indoors and free 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 1000 m or less. (With derating, usage is possible between 1000 m and 2000 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 (with no condensation)									
Impact Resistance *2	Impact Acceleration (at Flange)	490 m/s²									
	Number of Impacts	2 times									
Vibration Resistance *2	Vibration Acceleration (at Flange)	49 m/s² (24.5 m/s² front-to-back)						24.5 m/s²			
Applicable SERVOPACKs *4	SGDXS	3R8A	7R6A (120A) *4	120A (180A) *4	180A (200A) *4	330A (470A) *4	330A (550A) *4	470A (780A) *4	550A	590A	780A
	SGDXW	5R5A *5, 7R6A *5	7R6A	–							

*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 rate.
☞ *Derating Rates on page 126*

*4 To increase instantaneous maximum torque, use the SERVOPACK with the model given in parentheses.
Refer to the following sections for the instantaneous maximum torque of each SERVOPACK.
☞ *Servomotor Ratings (SGMXG-03 to -20) on page 117*
☞ *Servomotor Ratings (SGMXG-30 to -1E) on page 119*
☞ *Torque-Rotation Speed Characteristics on page 122*

*5 If you use a servomotor together with a Σ-XW SERVOPACK, the control gain may not increase as much as with a Σ-XS SERVOPACK and other performances may be lower than those achieved with a Σ-XS SERVOPACK.

Servomotor Ratings (SGMXG-03 to -20)

Voltage		200 V				
Model SGMXG-		03A	05A	09A	13A	20A
Rated Output *1	kW	0.3	0.45	0.85	1.3	1.8
Rated Torque *1, *2	N·m	1.96	2.86	5.39	8.34	11.5
Instantaneous Maximum Torque *1	N·m	5.88	8.92	14.2 20.0 *3	23.3 30.0 *4	28.7 35.4 *5

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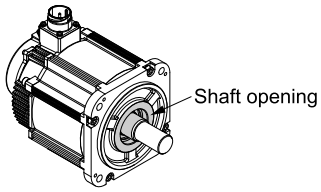
Voltage			200 V				
Model SGMXG-			03A	05A	09A	13A	20A
Rated Current *1		Arms	2.8	3.8	6.9	10.7	16.7
Instantaneous Maximum Current *1		Arms	8.0	11	17 28 *3	28 40 *4	42 56 *5
Rated Rotation Speed *1		min^{-1}	1500				
Continuous Allowable Rotation Speed		min^{-1}	4000				3000
Maximum Rotation Speed *1		min^{-1}	4000				
Torque Constant *1		N·m/Arms	0.776	0.854	0.859	0.891	0.748
Rotor Moment of Inertia *6	Without Holding Brakes	$\times 10^{-4}$ kg·m^2	2.48	3.33	13.9	19.9	26.0
	With Holding Brakes		2.73	3.58	16.0	22.0	28.1
Rated Power Rate *1	Without Holding Brakes	kW/s	15.5	24.6	20.9	35.0	50.9
	With Holding Brakes		14.1	22.9	18.2	31.6	47.1
Rated Angular Acceleration *1	Without Holding Brakes	rad/s^2	7900	8590	3880	4190	4420
	With Holding Brakes		7180	7990	3370	3790	4090
Heat Sink Size *7		mm	250 ×250 × 6 (aluminum)		400 × 400 × 20 (steel)		
Protective Structure *8			Totally enclosed, self-cooled, IP67				
Holding Brake Specifications *9	Rated Voltage	V	24 $VDC^{+10\%}_{0}$				
	Capacity	W	10				
	Holding Torque	N·m	4.5		12.7	19.6	
	Coil Resistance	Ω (at 20°C)	56		59		
	Rated Current	A (at 20°C)	0.43		0.41		
	Time Required to Release Brake	ms	100				
	Time Required to Brake	ms	80				
Allowable Load Moment of Inertia (Rotor Moment of Inertia Ratio) *10	At 3000 min^{-1}		15 times		5 times		
	At 4000 min^{-1}		8.4 times		2 times		5 times
	With External Regenerative Resistor and External Dynamic Brake Resistor *11	At 3000 min^{-1}	15 times		10 times		
		At 4000 min^{-1}	8.4 times		8 times	9 times	7 times
Allowable Shaft Loads *12	LF	mm	40		58		
	Allowable Radial Load	N	490			686	980
	Allowable Thrust Load	N	98			343	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 with an aluminum or steel heat sink of the dimensions given in the table.
*3 This is the value if you combine with the SERVOPACK SGDXS-120A.
*4 This is the value if you combine with the SERVOPACK SGDXS-180A.
*5 This is the value if you combine with the SERVOPACK SGDXS-200A.
*6 The values for the servomotors with batteryless absolute encoders (and holding brakes) are the same as those in the table.
*7 Refer to the following section for the relation between the heat sinks and derating rate.
☞ *Servomotor Heat Dissipation Conditions on page 126*

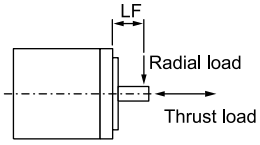
*8 This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.



*9 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.

*10 The rotor moment of inertia scaling factor is the value for a standard servomotor without a holding brake.
*11 To externally connect a dynamic brake resistor, select hardware option specification 0020 for the SERVOPACK.
*12 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.



Servomotor Ratings (SGMXG-30 to -1E)

Voltage			200 V						
Model SGMXG-			30A	30A *3	44A	55A	75A	1AA	1EA
Rated Output *1		kW	2.9	(2.4)	4.4	5.5	7.5	11	15
Rated Torque *1, *2		N·m	18.6	(15.1)	28.4	35.0	48.0	70.0	95.4
Instantaneous Maximum Torque *1		N·m	54.0 66.8 *4	(45.1)	71.6 95.6 *5	102 134 *6	119	175	224
Rated Current *1		Arms	24.5	(19.6)	32.9	37.2	54.7	58.6	74.0
Instantaneous Maximum Current *1		Arms	71 92 *4	(56)	84 115 *5	110 149 *6	130	140	170
Rated Rotation Speed *1		min^{-1}	1500						
Continuous Allowable Rotation Speed		min^{-1}	3000					2000	
Maximum Rotation Speed *1		min^{-1}	4000					3000	
Torque Constant *1		N·m/Arms	0.826		0.932	1.02	0.957	1.38	1.44
Rotor Moment of Inertia *7	Without Holding Brakes	$\times 10^{-4}$ kg·m^2	46.0		67.5	89.0	125	242	303
	With Holding Brakes		53.9		75.4	96.9	133	261	341
Rated Power Rate *1	Without Holding Brakes	kW/s	75.2	(49.6)	119	138	184	202	300
	With Holding Brakes		64.2	(42.3)	107	126	173	188	267
Rated Angular Acceleration *1	Without Holding Brakes	rad/s^2	4040	(3280)	4210	3930	3840	2890	3150
	With Holding Brakes		3450	(2800)	3770	3610	3610	2680	2800
Heat Sink Size *8		mm	550 × 550 × 30 (steel)					650 ×650 × 35 (steel)	

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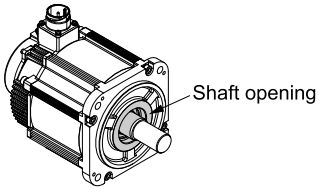
Voltage			200 V						
Model SGMXG-			30A	30A *3	44A	55A	75A	1AA	1EA
Protective Structure *9			Totally enclosed, self-cooled, IP67						
Holding Brake Specifications *10	Rated Voltage	V	24 VDC $^{+10\%}_{0}$						
	Capacity	W	18.5			25		32	35
	Holding Torque	N·m	43.1			72.6		84.3	114.6
	Coil Resistance	Ω (at 20°C)	31			23		18	17
	Rated Current	A (at 20°C)	0.77			1.05		1.33	1.46
	Time Required to Release Brake	ms	170						250
	Time Required to Brake	ms	100			80			
Allowable Load Moment of Inertia (Rotor Moment of Inertia Ratio) *11	At 2000 min^{-1}		–					5 times	
	At 3000 min^{-1}		5 times	3 times	5 times	5 times	5 times	2.2 times	1.5 times
	At 4000 min^{-1}		4 times	2.2 times	2.4 times	3.5 times	2.2 times	–	
	With External Regenerative Resistor and External Dynamic Brake Resistor *12	At 2000 min^{-1}	–					10 times	
		At 3000 min^{-1}	10 times	7 times	10 times	10 times	10 times	4 times	2 times
		At 4000 min^{-1}	5 times	4 times	5 times	5 times	4 times	–	
Allowable Shaft Loads *13	LF	mm	79			113		116	
	Allowable Radial Load	N	1470			1764			4998
	Allowable Thrust Load	N	490			588			2156

*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 with an aluminum or steel heat sink of the dimensions given in the table.
*3 This is the value if you combine with the SERVOPACK SGDXS-200A.
The output of the servomotor will be limited by the rated current and maximum current of the SERVOPACK that is used. The load ratio is calculated based on the servomotor's rated current of 24.5 Arms. Use the servomotor with a load ratio of 80% or less.
*4 This is the value if you combine with the SERVOPACK SGDXS-470A.
*5 This is the value if you combine with the SERVOPACK SGDXS-550A.
*6 This is the value if you combine with the SERVOPACK SGDXS-780A.
*7 The values for the servomotors with batteryless absolute encoders (and holding brakes) are the same as those in the table.
*8 Refer to the following section for the relation between the heat sinks and derating rate.
☞ *Servomotor Heat Dissipation Conditions on page 126*
*9 This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.

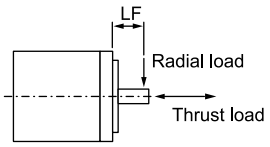


*10 Observe the following precautions if you use a servomotor with a holding brake.

- 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.

*11 The rotor moment of inertia scaling factor is the value for a standard servomotor without a holding brake.
*12 To externally connect a dynamic brake resistor, select hardware option specification 0020 for the SERVOPACK.

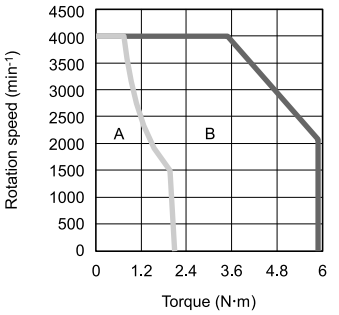
*13 Design the mechanical system so that the thrust and radial loads applied to the servomotor shaft end during operation do not exceed the values given in the table.



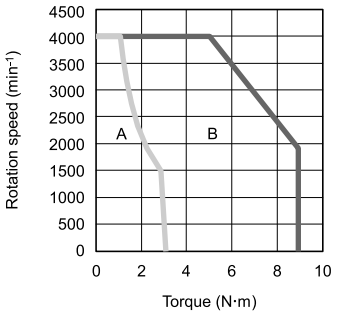
Torque-Rotation Speed Characteristics

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

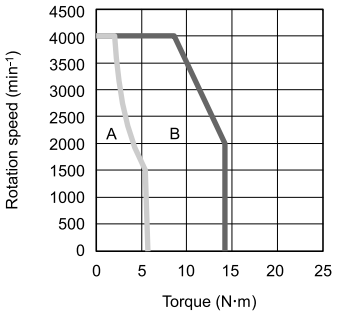
SGMXG-03A



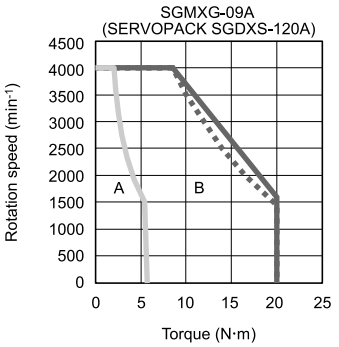
SGMXG-05A



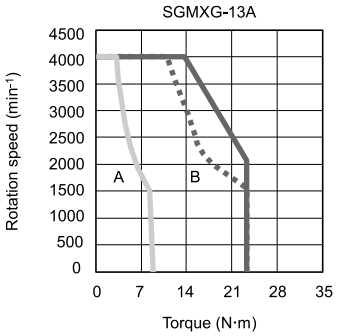
SGMXG-09A



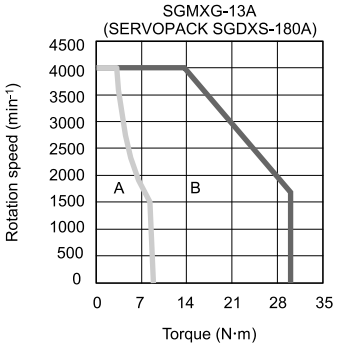
SGMXG-09A
(SERVOPACK SGDXS-120A)



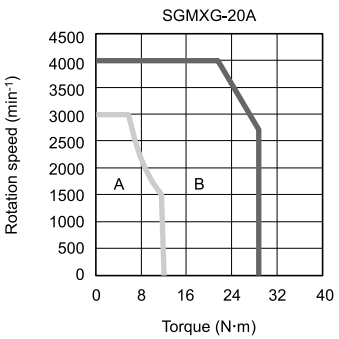
SGMXG-13A



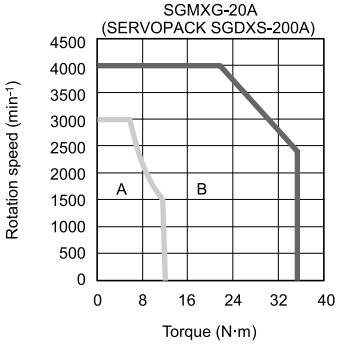
SGMXG-13A
(SERVOPACK SGDXS-180A)



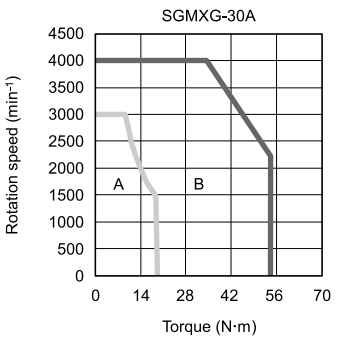
SGMXG-20A



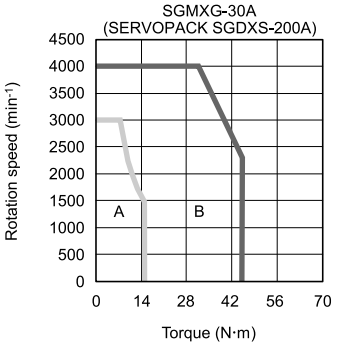
SGMXG-20A
(SERVOPACK SGDXS-200A)



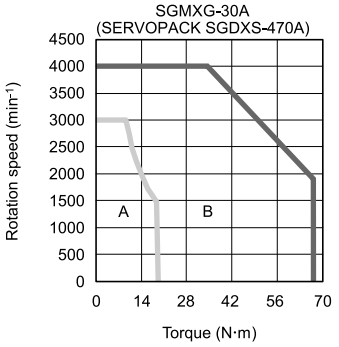
SGMXG-30A

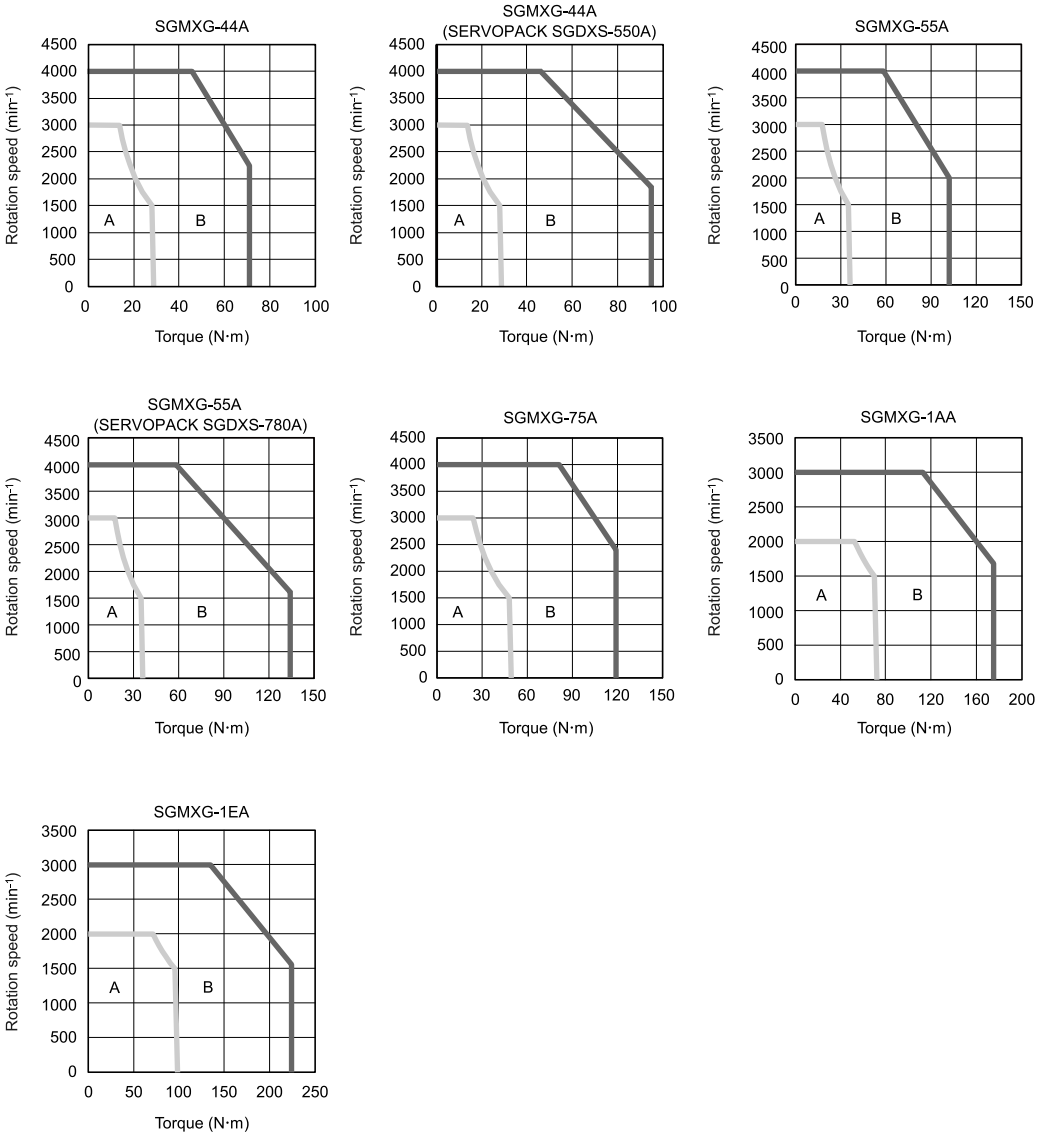


SGMXG-30A
(SERVOPACK SGDXS-200A)



SGMXG-30A
(SERVOPACK SGDXS-470A)





Note:

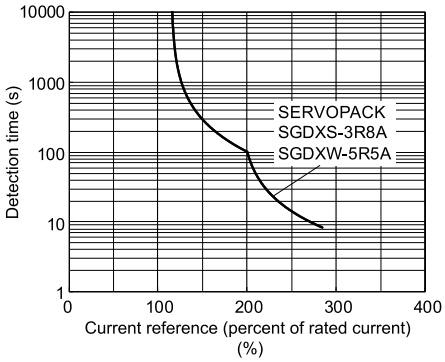
- These values (typical values) are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C.
- The characteristics in the intermittent duty zone depend on the power supply voltage.
- If the effective torque is within the allowable range for the rated torque, the servomotor can be used within the intermittent duty zone.
- 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.
- The SGMXG-09A and -13A can use a single-phase power input in combination with the SGDXS-120A□□A0008.

Servomotor Overload Protection Characteristics

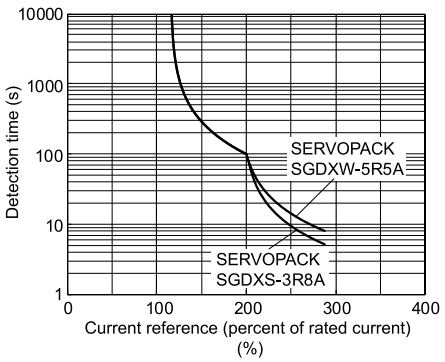
The overload detection level is set for hot start conditions with a servomotor surrounding air temperature of 40°C.

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.

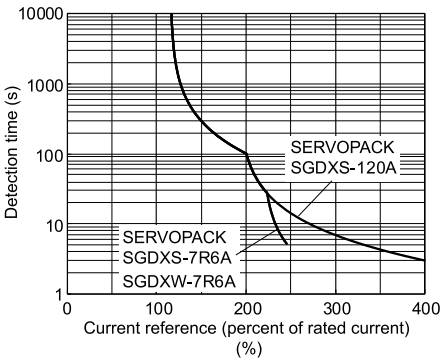
SGMXG-03



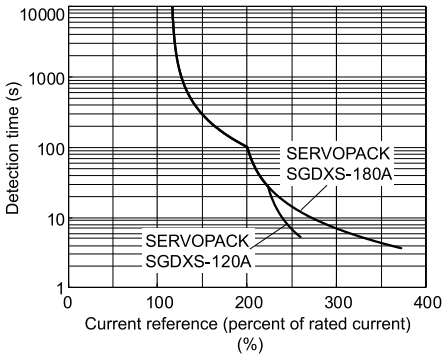
SGMXG-05



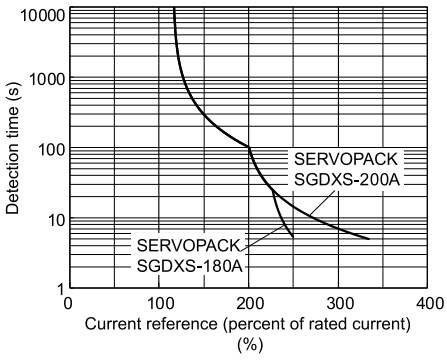
SGMXG-09



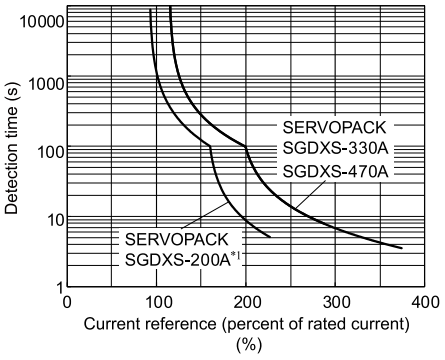
SGMXG-13



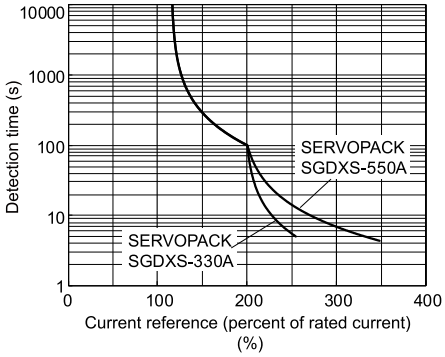
SGMXG-20



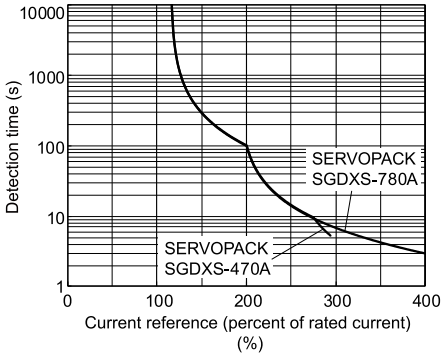
SGMXG-30



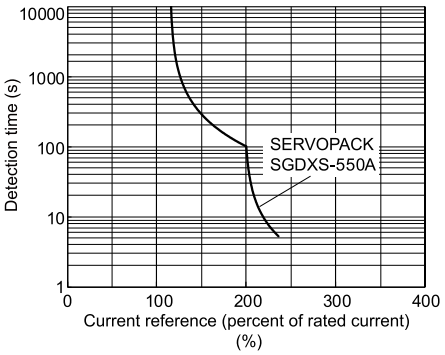
SGMXG-44



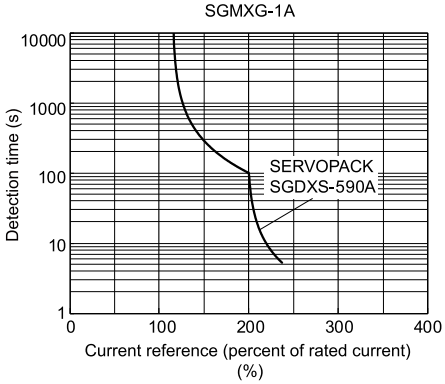
SGMXG-55



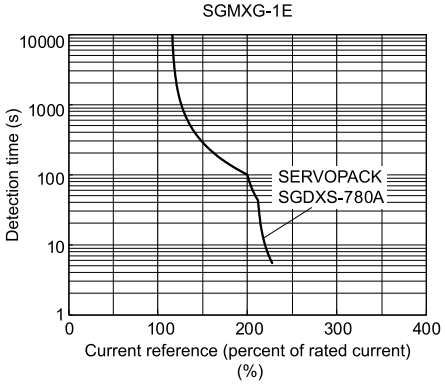
SGMXG-75



SGMXG-1A



SGMXG-1E



*1 The current reference is calculated based on the servomotor's rated current of 24.5 Arms.

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 122*".
- The value for the instantaneous maximum current / rated current (%) for each servomotor is taken as the current reference maximum value.

Allowable Load Moment of Inertia

The allowable load moments of inertia (motor moment of inertia ratios) for the servomotors are given in "*Servomotor Ratings (SGMXG-30 to -1E) on page 119*" and "*Servomotor Ratings (SGMXG-30 to -1E) on page 119*". 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.

■ 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+.

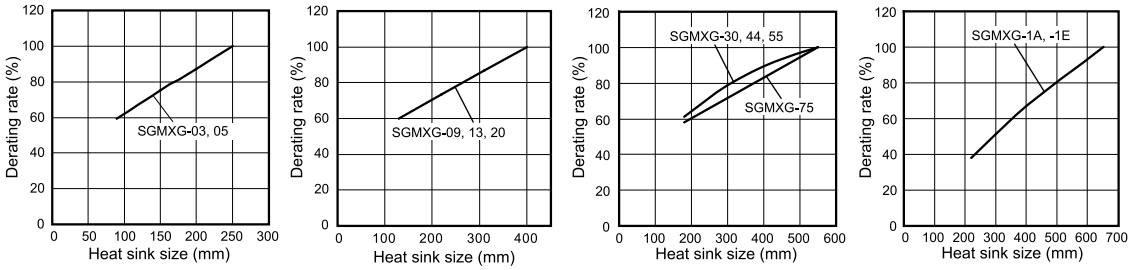
Refer to the following section for details on the external regenerative resistors.

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

Derating Rates

■ Servomotor Heat Dissipation Conditions

The servomotor ratings are the continuous allowable values 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.



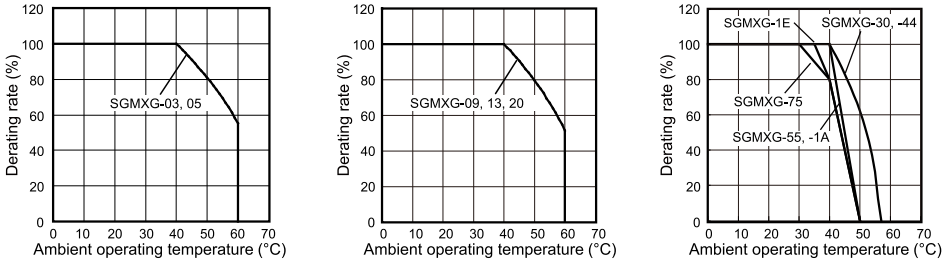
Important

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

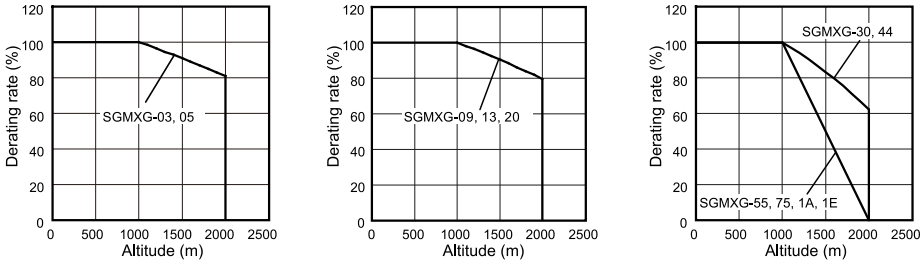
■ Servomotor Derating Rates for Surrounding Air Temperature

Apply a suitable derating rate from the following graphs according to the surrounding air temperature of the servomotor (60° C max.).



■ 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 123*".
- 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.