SANYO DENKI

AC SERVO SYSTEMS

SANMOTION G

200 VAC 30 W to 5 kW
100 VAC 30 to 200 W

AC servo systems

Ver.2
English

SANMOTION G
AC SERVO SYSTEMS

CONTENTS

Next-Level Servo System That Combines Strength and Flexibility

Servo Motors

Lineup

200 V class
Low-inertia models : 40 to 130 mm sq., 50 W to 5 kW
Medium-inertia models : 40 to 130 mm sq., 30 W to 3 kW
100 V class
Low-inertia models : 40 to 60 mm sq., 50 to 200 W
Medium-inertia models : 40 to 60 mm sq., 30 to 200 W

Motor length up to **22% shorter**	High-resolution encoder up to **27-bit**
Max. speed **6500 min^{-1}**	Holding brake with increased **reliability**

Servo Amplifiers

Lineup

Analog/Pulse **EtherCAT**

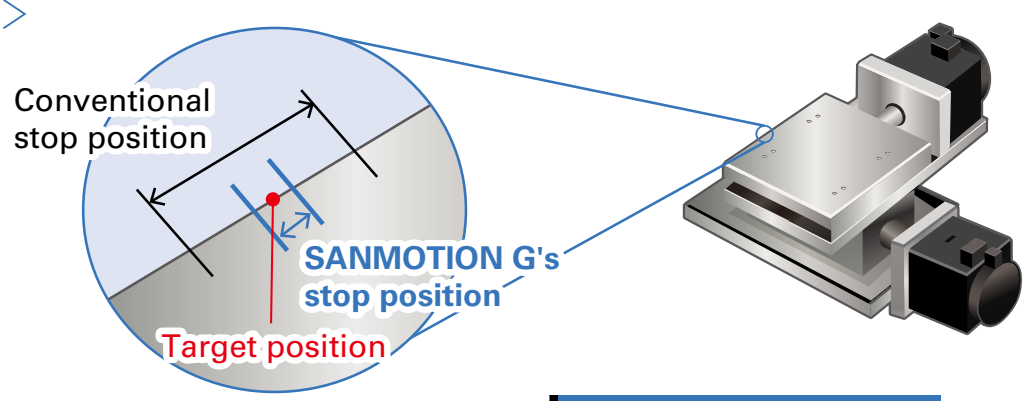
200 V class: 10, 20, 30, 50, 75, 100,150 A
100 V class: 10, 20, 30 A

Speed frequency response **3.5 kHz** (1.6 times higher)	Positioning settling time **1/3** of predecessor
Various diagnosis for system status monitoring and preventive maintenance	**Encoder resolution shifting** Servo amplifier feature for shifting encoder resolution

The Servo System That Delivers What Customers Desire

Precise and stable positioning

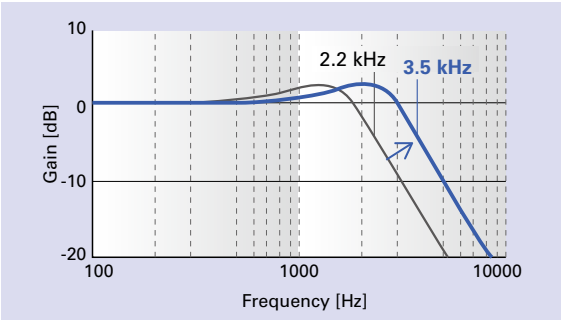
This product comes with a **23-bit** encoder as standard (64 times that of our conventional product),(1) and even an encoder with a maximum of 27-bit high resolution can be selected as an option. The high-resolution encoder enables high-precision and stable positioning.

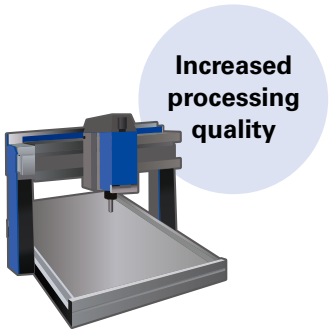


Conventional product(1) 17 bit: 131,072 P/R

SANMOTION G
23 bit: 8,388,608 P/R
27 bit: 134,217,728 P/R

Enhance processing quality with high-response control

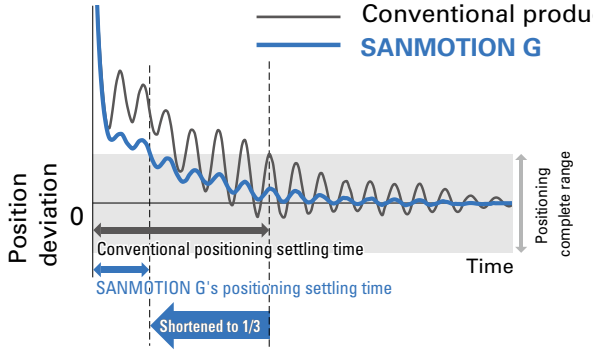




With newly developed current control, speed frequency response has been increased to **3.5 kHz** (1.6 times higher than the conventional product(1)). This helps improve the processing quality of machinery.

Quick positioning

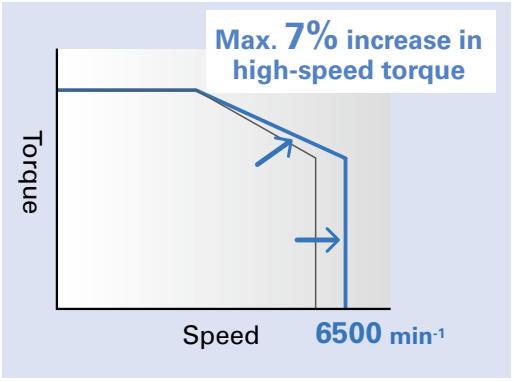
By accurately detecting and compensating for Coulomb friction, viscous friction, and the force of gravity, the positioning settling time has been made **1/3** that of the conventional product.(1)

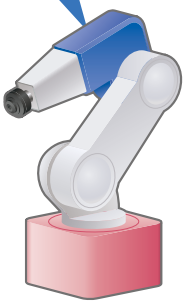


(1) Conventional product: SANMOTION R AC servo systems

Faster motor without size increase

Faster motor speed while maintaining the motor size and precision, which is essential for robots





The servo motor's maximum speed has been increased from 6000 min^{-1} to **6500 min^{-1}** compared to the conventional product.(1) Also, the new PWM control has increased the maximum torque at high speeds by approximately 7%, expanding the motor output range by up to 15%.
This enables the equipment to speed up without using a larger motor while achieving low cogging and low heat generation as well.

Make your equipment smaller and lighter

By optimizing the electromagnetic field and the brake structure, the motor length and mass have been reduced compared to the conventional product.(1)

Motor length up to 22% shorter
Motor mass up to 28% lighter

The average value of all low- and medium-inertia servo motor models

With an optimized thermal design and smaller components used, the servo amplifier has been made up to 19% lighter than the conventional product.(1)

Want to make your system more efficient

Compared to our conventional product,(1) power consumption of servo motors and holding brakes has been reduced by up to **29%** and **44%**, respectively. The servo amplifier's power loss has been reduced by up to **26%** thanks to use of the latest power device and a high-efficiency LSI (large-scale integrated) circuit.
This reduces CO_2 emissions, contributing to SDGs.
Using eco-friendly technologies, the SANMOTION G products are qualified as Eco Products, meeting our own eco-design requirements.

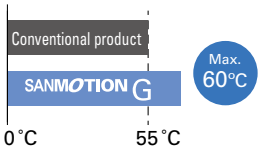
ECO PRODUCTS

(1) Conventional product: SANMOTION R AC servo systems
(2) For models where maximum speed increased from 3000 min^{-1} to 4000 min^{-1}

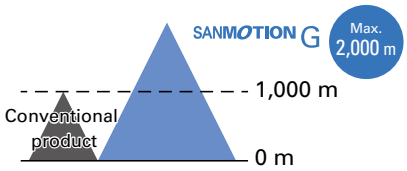
Use in high temperature/altitude environments

Compared to the conventional product,(1) **the operating temperature range and operating altitude have been expanded**, enabling use in severe environments in various regions.

Operating temperature range (Servo amplifiers)



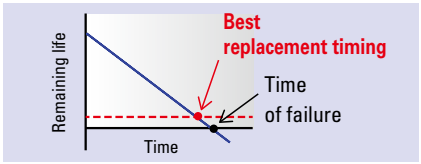
Operating altitude (Servo amplifiers and servo motors)



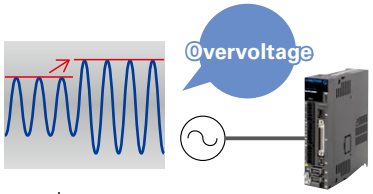
Note: Output values might be derated.

Enhance monitoring to prevent failures

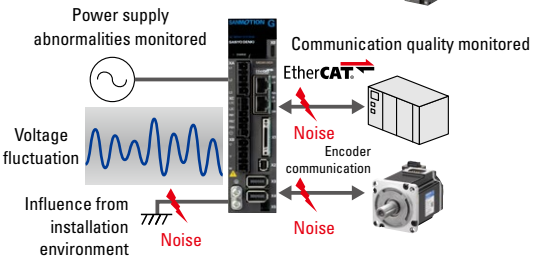
Failure of **holding brake** and electronic components can be prevented by predicting the **remaining life** of the holding brake, in systems where braking is needed, and by **optimally controlling the inrush current limiting circuit**.



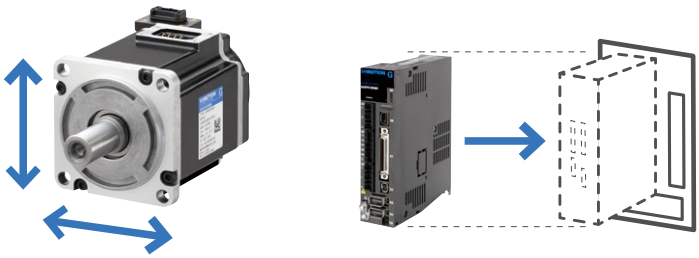
The monitoring of the main circuit input voltage and the detection of overvoltage in the control circuit power supply can be performed. Early identification of faults can help **shorten system downtime**.



The quality of encoder and EtherCAT communication can be diagnosed. The impact on communication quality due to noise and installation environments can be monitored, contributing to improving the **environmental durability** of the system.



Replace your current system without a hassle

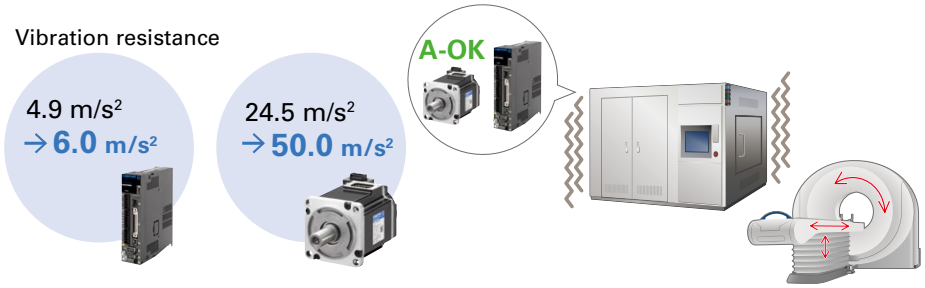


With the motor flange size, output shaft shape, amplifier dimensions, mounting, interface, and functionality fully compatible with our conventional SANMOTION R series, **replacement can be done smoothly**.

(1) Conventional product: SANMOTION R AC servo systems

Easy to use in machines with vibration

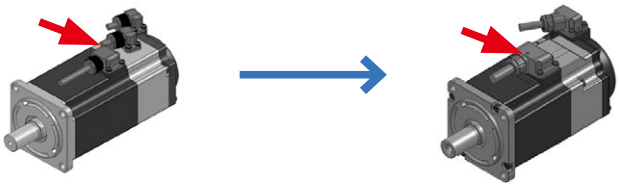
Compared to the conventional product,(1) the **vibration resistance** of the servo amplifier and servo motor have been increased by approximately **20%** and **2 times**, respectively. This makes it even more suitable for equipment with high levels of vibration such as CT scanners and press machines.



Simplify cable connections

40 to 86 mm sq. servo motors come with a connector that **integrates power and brake connections into one**. This reduces the number of parts and makes wiring easier.
100 to 130 mm sq. servo motors come with push-pull connectors for easy wiring. As an option, one with jack screws like our conventional product(1) is also available.

Power and brake connections integrated into one:
3 cables → 2 cables



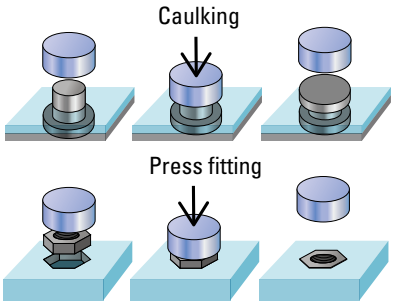
Improve holding brake reliability

The newly developed holding brake features enhanced environmental resistance, and the holding torque does not decrease even at high temperatures and high humidity.
This is a **safe and reliable brake** that causes little wear on the friction material even when the motor idles or brakes abruptly.

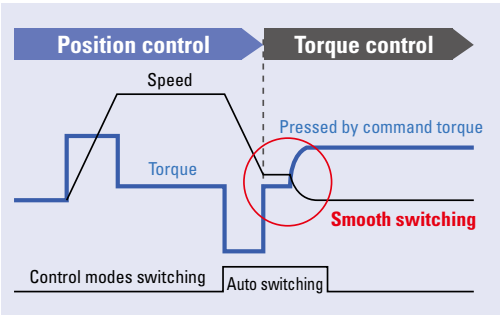
(1) Conventional product: SANMOTION R AC servo systems

Seamlessly switch from position control to torque control

Control modes can be **switched smoothly in real time**.
This improves shock mitigation during control modes switching (from position control to torque control) and controllability during pressing.

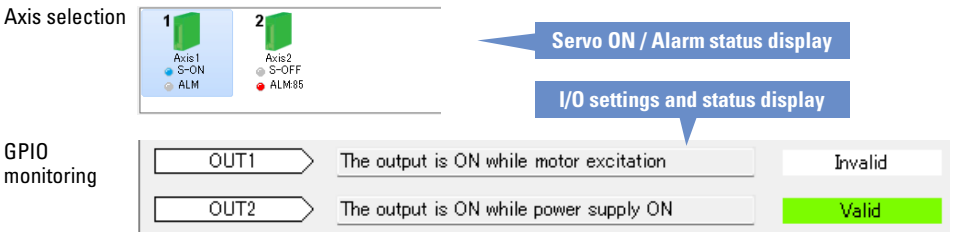


Switch to torque control when press-fitting



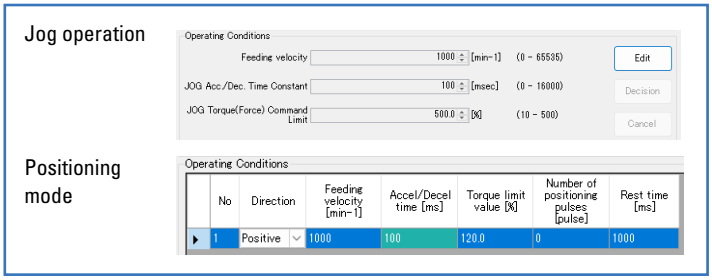
Check the servo amplifier status easily

The amplifier status is visually displayed on the PC screen, allowing user to intuitively check the status.



Save test run settings

The new software will provide expanded setting retention functions for test runs while maintaining the operability of the existing setup software, SANMOTION MOTOR SETUP SOFTWARE.



Test run settings are saved as a project file

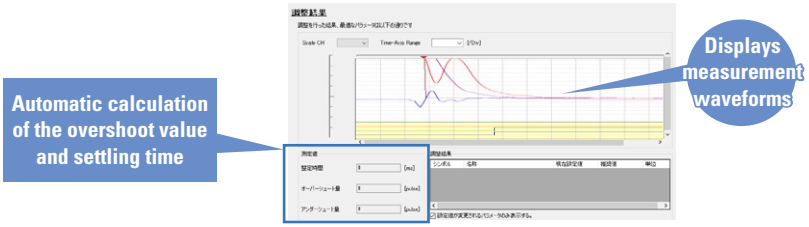
Build a system conforming to safety standards

It complies with **ISO 13849-1 (Cat3, PL=e) and IEC 61508 (SIL3)**, making it easy to build safety systems for equipment.
It also complies with various regulations required to obtain safety standards for equipment. (For the compliance with safety standards of linear servo motors, contact us for details)

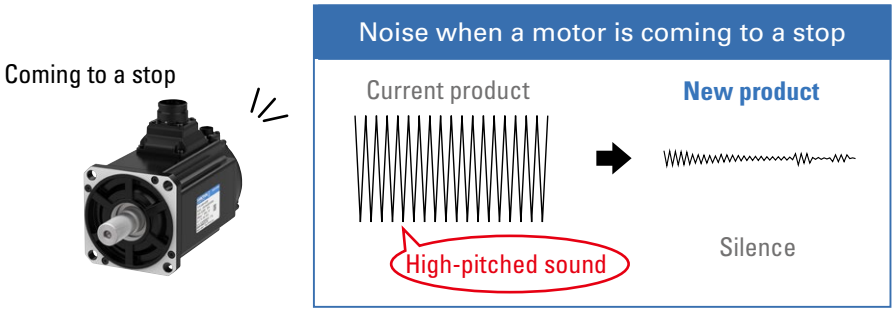
For servo amplifiers only

Start up your equipment faster

This product is equipped with the **advanced tuning** that ensures automatic tuning of parameters by precisely measuring resonance, friction, and load inertia of mechanical systems. Servo gain and filter can be **automatically adjusted** to stabilize operation and shorten the settling time based on the results of frequency characteristic measurement, which is **11 times more accurate** than the conventional product.(1)
Startup time of equipment can be shortened and its performance can be increased.

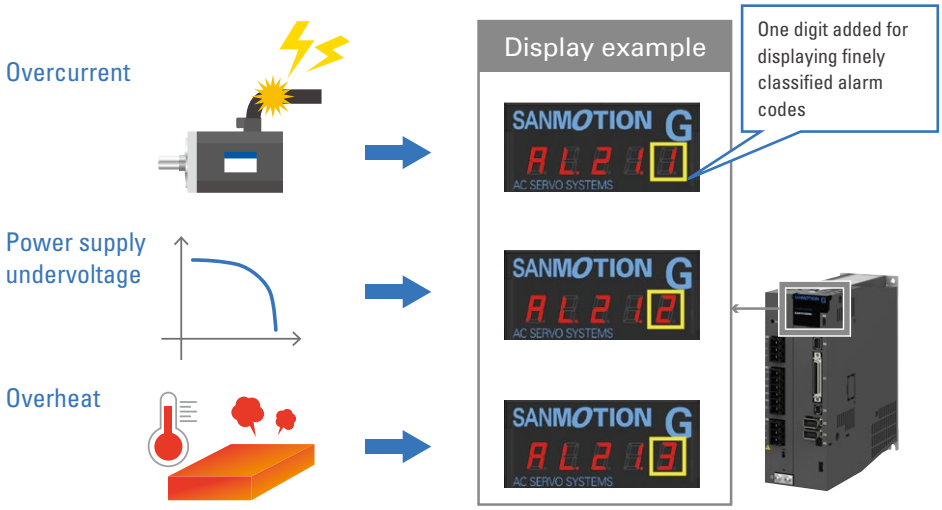


Reduce motor noise



The amplifier can reduce the disturbing motor noises produced when the motor is coming to a stop by increasing the switching frequency beyond human hearing range.

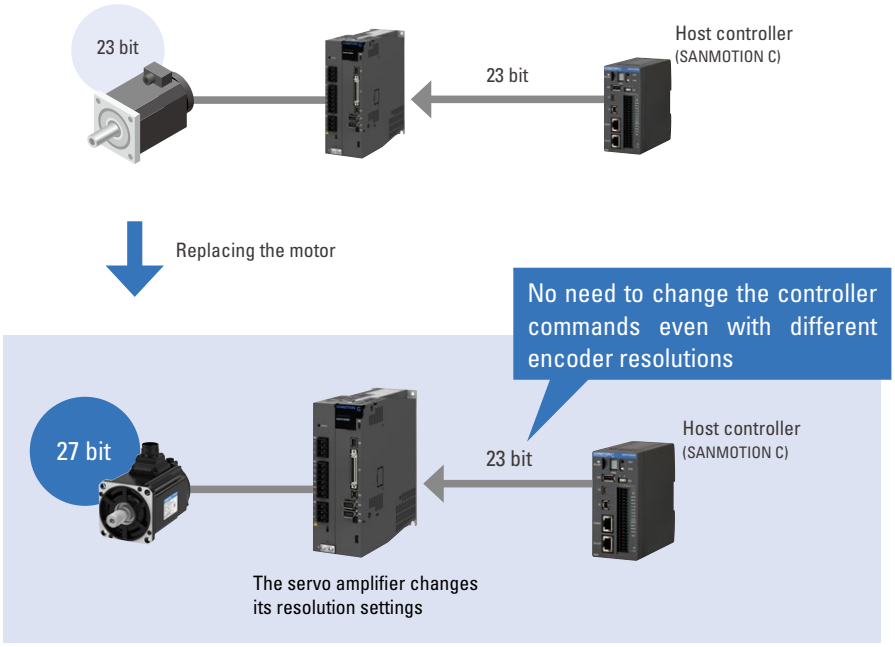
Reduce downtime in the event of an error



In the event of an error, the amplifier identifies the cause and displays alarm codes based on the finely classified alarm types,(2) making error analysis easy. This early error cause identification can help shorten system downtime.

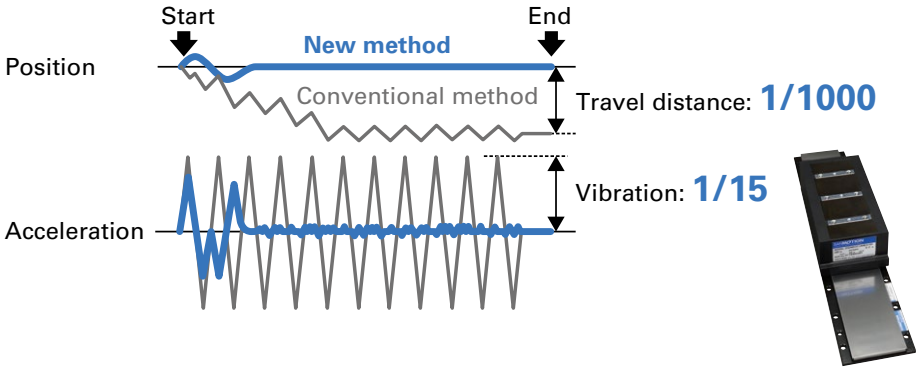
(1) Conventional product: SANMOTION R AC servo systems
(2) The fine root cause classification for the Output Power Device Error alarm (Alarm code 21) is available only for 75 to 150 A amplifier capacities.

Replace motors without much change in controller commands



The servo amplifier's resolution settings can be adjusted without changing the encoder resolution. Since there is no need to change the controller commands according to changes in the encoder resolution, replacing servo motors can be done effortlessly.

Minimize travel distance and vibration of a linear servo motor during startup



When a linear servo motor without a hall sensor is started, position control stabilizes the position, reducing both travel distance and vibration.

Water and dust protection

Our servo motors are highly resistant to water and dust ingress with an IP67 rating, ensuring normal operation even in severe environments.

IP 6 7

Protection against dust		Protection against water	
6	Dust tight	7	Protection against temporary immersion in water

Protection does not cover the shaft seal part. Protection rating is for when connectors are mounted.

EtherCAT communication

EtherCAT is a 100 Mbps high-speed fieldbus system.
It contributes to shortening machine cycle time. This highly versatile EtherCAT is compatible with Ethernet, which makes it possible to build a system where various machines co-exist. Also, the EtherCAT conformance test certificate from a trusted third party has been acquired.

EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

EtherCAT Conformance tested

Compact and high-thrust linear servo motors

Linear servo motors with direct, straight-line drive and high thrust are available.

Fully closed-loop control

A fully closed-loop control is possible by using information from two encoders: e.g., a linear encoder mounted on the load machine and a high-resolution motor-mounted encoder. This achieves high responsiveness even when the motor axis and load are highly skewed.

High-precision battery-less absolute encoder

Our servo motors come with a high-precision battery-less absolute encoder as standard. It does not use batteries, which require periodic replacement, eliminating cumbersome maintenance work and export procedures.

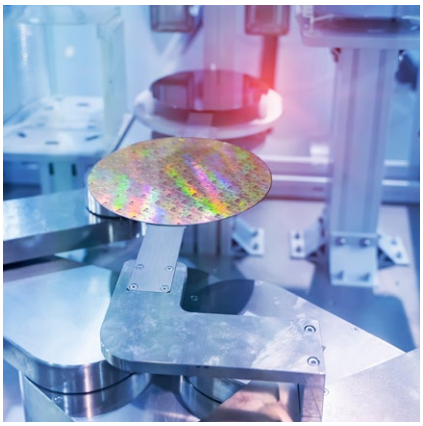
We offer various encoders that help select the best encoder for your machine. See the table below.

No need to concern about battery life or export procedures

Type (Encoder model no. in parentheses)	Standard				Customization
	Single-turn resolution	Multi-turn resolution	Baud rate	Absolute angular accuracy	
Battery-less absolute encoder (Model No. GAER) This is a high-precision battery-less optical multi-turn encoder. It reduces maintenance because it doesn't need batteries, which require maintenance.	8388608 (23-bit)	65536 (16-bit)	4.0 Mbps	Approx. 0.167°	• Single-turn resolution: 131072 (17-bit), 1048576 (20-bit), 134217728 (27-bit) • Baud rate: 2.5 Mbps • Absolute angular accuracy: Under 0.0167°
Single-turn absolute encoder (Model No. GAEN) This is a thin profile, optical single-turn encoder. It achieves wire saving particularly for systems that currently use incremental encoders, and helps downsize the systems.	8388608 (23-bit)	–	4.0 Mbps	Approx. 0.167°	• Single-turn resolution: 131072 (17-bit), 1048576 (20-bit), 134217728 (27-bit) • Baud rate: 2.5 Mbps • Absolute angular accuracy: Under 0.0167°

Contact us for more information on other encoders.

Application Examples



CMP (chemical mechanical polishing) equipment

Equipment for polishing and flattening semiconductor wafers

Servo systems are used to rotate semiconductor wafers and rotary tables.
SANMOTION G is ideal for semiconductor manufacturing applications, where smooth, precise positioning is required.

Overhead conveyor

Automatic conveyor equipment that is suspended from and moves along the guide rails installed overhead

Servo systems are used to move conveyor trolleys, and grab and move up and down the boxes containing semiconductor wafers, making efficient semiconductor manufacturing possible.

Filling machine

Used to fill containers with liquids

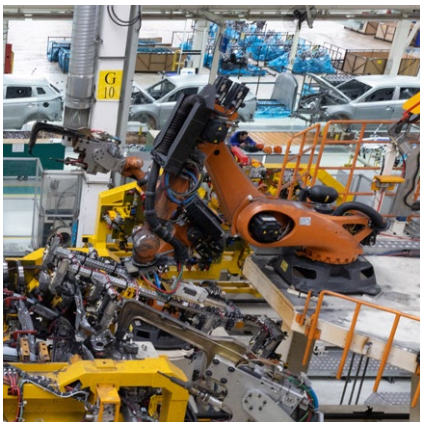
With high precision synchronous control of water- and dust-resistant motors, this servo system can be used with confidence in machines that handle food and beverages.

CT scanner

Used to perform a scan of a patient to create cross-sectional images of the body by using a rotating X-ray tube and a row of detectors

Servo systems are used for the gantry drive axis, and the vertical and horizontal bed moving axes. This application requires high vibration resistance and smooth motion.

Application Examples



Robots

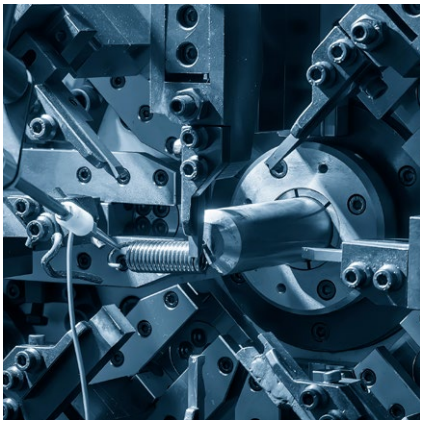
Equipment used in various applications such as conveying, coating, and processing

Servo systems are used in the joints of articulated robots. SANMOTION G servo systems provide high precision and smooth motion, contributing to enhancing factory automation.

Injection molding machines

Equipment for manufacturing plastic products by pouring and molding resin material

Servo systems are used for measuring and injecting resin material, clamping, and removing molded components. SANMOTION G servo systems are best suited for applications that require high torque.



Spring forming machines

Equipment for manufacturing springs of various shapes

Servo systems are used for feeding materials and processing and cutting springs. By operating multiple SANMOTION G servo system products in sync, complex shapes can be formed quickly and precisely.

Carton forming machines

Equipment for forming flat carton blanks into cartons

Servo systems are used in the rollers and elevators of conveyors that feed cardboard, as well as in the axes that perform forming. The SANMOTION G servo systems enable fast, accurate feeding and assembly processes.

Lineup

Servo motor	Input voltage	Flange size [mm]	Rated output [kW]
Low-inertia servo motor These motors feature high acceleration and high high-speed torque. They are suitable for injection molding machines and general industrial machinery.	200 V	40 sq.	0.05, 0.1, 0.15
		60 sq.	0.2, 0.4, 0.6
		80 sq.	0.75, 1
		100 sq.	1, 1.5, 2, 2.5
		130 sq.	3, 4, 5
	100 V	40 sq.	0.05, 0.1
		60 sq.	0.2
Medium-inertia servo motors These motors feature compact size, light weight, and high efficiency. They are ideal for robots, injection molding machines, and general industrial machinery.	200 V	40 sq.	0.03, 0.05, 0.1, 0.15
		60 sq.	0.1, 0.2, 0.4, 0.6
		80 sq.	0.2, 0.4, 0.75, 1
		86 sq.	0.75, 1
		100 sq.	0.75, 1, 1.5
		130 sq.	0.55, 1.2, 1.8, 2, 3
	100 V	40 sq.	0.03, 0.05, 0.1
		60 sq.	0.1, 0.2

Linear servo motor	Input voltage	Rated thrust [N]
Dual magnet type with core	200 V	610, 800
Flat type with core	200 V	140, 200, 260, 310, 340
Center magnet type with core	200 V	350

Servo amplifier	Features	Amplifier capacity [A]	Compatible motor rated output [kW]
Analog/Pulse	This servo amplifier can enhance the value of combined equipment by increasing responsiveness and ensuring safety with a variety of safety functions. This general-purpose interface enables torque/speed control by analog voltage command and position control by pulse command.	200 VAC class 10, 20, 30, 50, 75, 100, 150	0.03 to 7.0
		100 VAC class 10, 20, 30	0.03 to 0.2
EtherCAT	EtherCAT, a high-speed fieldbus, is an open network with high versatility and widely used with high-precision industrial equipment. It can be used in combination with our SANMOTION C motion controller. For more information, see the SANMOTION C catalog.	200 VAC class 10, 20, 30, 50, 75, 100, 150	0.03 to 7.0
		100 VAC class 10, 20, 30	0.03 to 0.2

Standard Model Number List

Contact us for specifications of models that are not listed.

200 V Low-inertia servo motors

Standard specifications... Ingress protection: IP67, standards conformity: UL, cUL, CE, UKCA

Motor flange size	Rated output	Model no.				Page	Compatible servo amplifier capacity
		Battery-less absolute encoder		Single-turn absolute encoder			
		Without holding brake	With holding brake	Without holding brake	With holding brake		
40 mm sq.	50 W	GAM1A4005F0XRK□	GAM1A4005F0CRK□	GAM1A4005F0XNK□	GAM1A4005F0CNK□	p. 22	10 A
	100 W	GAM1A4010F0XRK□	GAM1A4010F0CRK□	GAM1A4010F0XNK□	GAM1A4010F0CNK□	p. 22	10 A
	150 W	GAM1A4015F0XRK□	GAM1A4015F0CRK□	GAM1A4015F0XNK□	GAM1A4015F0CNK□	p. 22	20 A
60 mm sq.	200 W	GAM1A6020F0XRK□	GAM1A6020F0CRK□	GAM1A6020F0XNK□	GAM1A6020F0CNK□	p. 24	20 A
	400 W	GAM1A6040F0XRK□	GAM1A6040F0CRK□	GAM1A6040F0XNK□	GAM1A6040F0CNK□	p. 24	20 A
	600 W	GAM1A6060F0XRK□	GAM1A6060F0CRK□	GAM1A6060F0XNK□	GAM1A6060F0CNK□	p. 24	50 A
80 mm sq.	750 W	GAM1A8075V0XRK□	GAM1A8075V0CRK□	GAM1A8075V0XNK□	GAM1A8075V0CNK□	p. 26	30 A
		GAM1A8075F0XRK□	GAM1A8075F0CRK□	GAM1A8075F0XNK□	GAM1A8075F0CNK□	p. 26	50 A
	1 kW	GAM1A8100F0XRK□	GAM1A8100F0CRK□	GAM1A8100F0XNK□	GAM1A8100F0CNK□	p. 26	50 A
100 mm sq.	1 kW	GAM1AA100H0XRK□*	GAM1AA100H0CRK□*	GAM1AA100H0XNK□*	GAM1AA100H0CNK□*	p. 28	30 A
		GAM1AA100F0XRK□	GAM1AA100F0CRK□	GAM1AA100F0XNK□	GAM1AA100F0CNK□	p. 28	50 A
	1.5 kW	GAM1AA150H0XRK□*	GAM1AA150H0CRK□*	GAM1AA150H0XNK□*	GAM1AA150H0CNK□*	p. 28	30 A
		GAM1AA150F0XRK□	GAM1AA150F0CRK□	GAM1AA150F0XNK□	GAM1AA150F0CNK□	p. 28	50 A
	2 kW	GAM1AA200H0XRK□	GAM1AA200H0CRK□	GAM1AA200H0XNK□	GAM1AA200H0CNK□	p. 29	50 A
		GAM1AA200F0XRK□	GAM1AA200F0CRK□	GAM1AA200F0XNK□	GAM1AA200F0CNK□	p. 29	75 A
	2.5 kW	GAM1AA250H0XRK□	GAM1AA250H0CRK□	GAM1AA250H0XNK□	GAM1AA250H0CNK□	p. 29	50 A
		GAM1AA250F0XRK□	GAM1AA250F0CRK□	GAM1AA250F0XNK□	GAM1AA250F0CNK□	p. 29	75 A
130 mm sq.	3 kW	GAM1AB300H0XRK□	GAM1AB300H0CRK□	GAM1AB300H0XNK□	GAM1AB300H0CNK□	p. 32	75 A
		GAM1AB300F0XRK□	GAM1AB300F0CRK□	GAM1AB300F0XNK□	GAM1AB300F0CNK□	p. 32	100 A
	4 kW	GAM1AB400H0XRK□	GAM1AB400H0CRK□	GAM1AB400H0XNK□	GAM1AB400H0CNK□	p. 32	100 A
		GAM1AB400F0XRK□	GAM1AB400F0CRK□	GAM1AB400F0XNK□	GAM1AB400F0CNK□	p. 33	150 A
	5 kW	GAM1AB500H0XRK□	GAM1AB500H0CRK□	GAM1AB500H0XNK□	GAM1AB500H0CNK□	p. 33	100 A
		GAM1AB500F0XRK□	GAM1AB500F0CRK□	GAM1AB500F0XNK□	GAM1AB500F0CNK□	p. 33	150 A

* GAM1AA100H0, GAM1AA150H0...When using a single-phase input power supply for the servo amplifier, make sure that the servo motor output is 750 W or less by adjusting the torque and speed.

100 V Low-inertia servo motors

Standard specifications... Ingress protection: IP67, standards conformity: UL, cUL, CE, UKCA

Motor flange size	Rated output	Model no.				Page	Compatible servo amplifier capacity
		Battery-less absolute encoder		Single-turn absolute encoder			
		Without holding brake	With holding brake	Without holding brake	With holding brake		
40 mm sq.	50 W	GAM1E4005F0XRK□	GAM1E4005F0CRK□	GAM1E4005F0XNK□	GAM1E4005F0CNK□	p. 36	20 A
	100 W	GAM1E4010F0XRK□	GAM1E4010F0CRK□	GAM1E4010F0XNK□	GAM1E4010F0CNK□	p. 36	20 A
60 mm sq.	200 W	GAM1E6020F0XRK□	GAM1E6020F0CRK□	GAM1E6020F0XNK□	GAM1E6020F0CNK□	p. 37	30 A

Note: The □ symbol in the model number denotes the following:

0: Circular shaft (without key) without oil seal

1: Circular shaft (without key) with oil seal

2: Keyway shaft without oil seal

3: Keyway shaft with oil seal

The motor outputs may be derated to 90 to 95% of the rated values due to the combined brake and oil seal.

Standard Model Number List

200 V Medium-inertia servo motors

Standard specifications... Ingress protection: IP67, standards conformity: UL, cUL, CE, UKCA

Motor flange size	Rated output	Model no.				Page	Compatible servo amplifier capacity
		Battery-less absolute encoder		Single-turn absolute encoder			
		Without holding brake	With holding brake	Without holding brake	With holding brake		
40 mm sq.	30 W	GAM2A4003F0XRK□	GAM2A4003F0CRK□	GAM2A4003F0XNK□	GAM2A4003F0CNK□	p. 38	10 A
	50 W	GAM2A4005F0XRK□	GAM2A4005F0CRK□	GAM2A4005F0XNK□	GAM2A4005F0CNK□	p. 38	10 A
	100 W	GAM2A4010F0XRK□	GAM2A4010F0CRK□	GAM2A4010F0XNK□	GAM2A4010F0CNK□	p. 38	10 A
	150 W	GAM2A4015V0XRK□	GAM2A4015V0CRK□	GAM2A4015V0XNK□	GAM2A4015V0CNK□	p. 38	10 A
		GAM2A4015F0XRK□	GAM2A4015F0CRK□	GAM2A4015F0XNK□	GAM2A4015F0CNK□	p. 38	20 A
60 mm sq.	100 W	GAM2A6010F0XRK□	GAM2A6010F0CRK□	GAM2A6010F0XNK□	GAM2A6010F0CNK□	p. 40	10 A
	200 W	GAM2A6020F0XRK□	GAM2A6020F0CRK□	GAM2A6020F0XNK□	GAM2A6020F0CNK□	p. 40	20 A
	400 W	GAM2A6040F0XRK□	GAM2A6040F0CRK□	GAM2A6040F0XNK□	GAM2A6040F0CNK□	p. 40	20 A
	600 W	GAM2A6060V0XRK□	GAM2A6060V0CRK□	GAM2A6060V0XNK□	GAM2A6060V0CNK□	p. 40	30 A
		GAM2A6060F0XRK□	GAM2A6060F0CRK□	GAM2A6060F0XNK□	GAM2A6060F0CNK□	p. 40	50 A
80 mm sq.	200 W	GAM2A8020F0XRK□	GAM2A8020F0CRK□	GAM2A8020F0XNK□	GAM2A8020F0CNK□	p. 42	20 A
	400 W	GAM2A8040F0XRK□	GAM2A8040F0CRK□	GAM2A8040F0XNK□	GAM2A8040F0CNK□	p. 42	20 A
	750 W	GAM2A8075V0XRK□	GAM2A8075V0CRK□	GAM2A8075V0XNK□	GAM2A8075V0CNK□	p. 42	30 A
		GAM2A8075F0XRK□	GAM2A8075F0CRK□	GAM2A8075F0XNK□	GAM2A8075F0CNK□	p. 42	50 A
	1 kW	GAM2A8100F0XRK□	GAM2A8100F0CRK□	GAM2A8100F0XNK□	GAM2A8100F0CNK□	p. 42	50 A
86 mm sq.	750 W	GAM2A9075F0XRK□	GAM2A9075F0CRK□	GAM2A9075F0XNK□	GAM2A9075F0CNK□	p. 44	50 A
	1 kW	GAM2A9100H0XRK□*	GAM2A9100H0CRK□*	GAM2A9100H0XNK□*	GAM2A9100H0CNK□*	p. 44	30 A
		GAM2A9100F0XRK□	GAM2A9100F0CRK□	GAM2A9100F0XNK□	GAM2A9100F0CNK□	p. 44	50 A
100 mm sq.	750 W	GAM2AA075F0XRK□	GAM2AA075F0CRK□	GAM2AA075F0XNK□	GAM2AA075F0CNK□	p. 46	30 A
	1 kW	GAM2AA100F0XRK□	GAM2AA100F0CRK□	GAM2AA100F0XNK□	GAM2AA100F0CNK□	p. 46	50 A
	1.5 kW	GAM2AA150H0XRK□	GAM2AA150H0CRK□	GAM2AA150H0XNK□	GAM2AA150H0CNK□	p. 46	50 A
		GAM2AA150F0XRK□	GAM2AA150F0CRK□	GAM2AA150F0XNK□	GAM2AA150F0CNK□	p. 46	50 A
130 mm sq.	550 W	GAM2AB055D0XRK□	GAM2AB055D0CRK□	GAM2AB055D0XNK□	GAM2AB055D0CNK□	p. 48	30 A
	1.2 kW	GAM2AB120B0XRK□*	GAM2AB120B0CRK□*	GAM2AB120B0XNK□*	GAM2AB120B0CNK□*	p. 48	30 A
		GAM2AB120H0XRK□	GAM2AB120H0CRK□	GAM2AB120H0XNK□	GAM2AB120H0CNK□	p. 48	50 A
		GAM2AB120D0XRK□	GAM2AB120D0CRK□	GAM2AB120D0XNK□	GAM2AB120D0CNK□	p. 48	50 A
	1.8 kW	GAM2AB180H0XRK□	GAM2AB180H0CRK□	GAM2AB180H0XNK□	GAM2AB180H0CNK□	p. 49	50 A
		GAM2AB180D0XRK□	GAM2AB180D0CRK□	GAM2AB180D0XNK□	GAM2AB180D0CNK□	p. 49	75 A
	2 kW	GAM2AB200H0XRK□	GAM2AB200H0CRK□	GAM2AB200H0XNK□	GAM2AB200H0CNK□	p. 49	50 A
		GAM2AB200D0XRK□	GAM2AB200D0CRK□	GAM2AB200D0XNK□	GAM2AB200D0CNK□	p. 49	75 A
	3 kW	GAM2AB300B0XRK□	GAM2AB300B0CRK□	GAM2AB300B0XNK□	GAM2AB300B0CNK□	p. 49	100 A

Note: The □ symbol in the model number denotes the following:

0: Circular shaft (without key) without oil seal

1: Circular shaft (without key) with oil seal

2: Keyway shaft without oil seal

3: Keyway shaft with oil seal

The motor outputs may be derated to 80 to 95% of the rated values due to the combined brake and oil seal.

* GAM2A9100H0, GAM2AB120B0...When using a single-phase input power supply for the servo amplifier, make sure that the servo motor output is 750 W or less by adjusting the torque and speed.

Standard Model Number List

100 V Medium-inertia servo motors

Standard specifications... Ingress protection: IP67, standards conformity: UL, cUL, CE, UKCA

Motor flange size	Rated output	Model no.				Page	Compatible servo amplifier capacity
		Battery-less absolute encoder		Single-turn absolute encoder			
		Without holding brake	With holding brake	Without holding brake	With holding brake		
40 mm sq.	30 W	GAM2E4003F0XRK□	GAM2E4003F0CRK□	GAM2E4003F0XNK□	GAM2E4003F0CNK□	p. 52	10 A
	50 W	GAM2E4005F0XRK□	GAM2E4005F0CRK□	GAM2E4005F0XNK□	GAM2E4005F0CNK□	p. 52	20 A
	100 W	GAM2E4010F0XRK□	GAM2E4010F0CRK□	GAM2E4010F0XNK□	GAM2E4010F0CNK□	p. 52	20 A
60 mm sq.	100 W	GAM2E6010F0XRK□	GAM2E6010F0CRK□	GAM2E6010F0XNK□	GAM2E6010F0CNK□	p. 53	20 A
	200 W	GAM2E6020F0XRK□	GAM2E6020F0CRK□	GAM2E6020F0XNK□	GAM2E6020F0CNK□	p. 53	30 A

Note: The □ symbol in the model number denotes the following:
0: Circular shaft (without key) without oil seal
1: Circular shaft (without key) with oil seal
2: Keyway shaft without oil seal
3: Keyway shaft with oil seal

200 V Linear servo motors

Type	Model no.				Page	Compatible servo amplifier capacity
	Coil		Magnet rail			
	Without hall sensor	With hall sensor	Without magnet cover	With magnet cover		
Dual magnet type with core	DD035CC2ANAA△00	DD035CC2ANEA△00	DD035MB□□□A00	DD035MB□□□B00	p. 56	75 A
	DD045CB4ANAA△00	DD045CB4ANEA△00	DD045MB□□□A00	DD045MB□□□B00	p. 57	75 A
Flat type with core	DS025CC1ANAA△00	DS025CC1ANEA△00	DS025MC□□□A00	DS025MC□□□B00	p. 58	20 A
	DS035CC1ANAA△00	DS035CC1ANEA△00	DS035MC□□□A00	DS035MC□□□B00	p. 59	30 A
	DS045CC1ANAA△00	DS045CC1ANEA△00	DS045MC□□□A00	DS045MC□□□B00	p. 59	30 A
	DS055CC1ANAA△00	DS055CC1ANEA△00	DS055MC□□□A00	DS055MC□□□B00	p. 59	30 A
	DS065CC1ANAA△00	DS065CC1ANEA△00	DS065MC□□□A00	DS065MC□□□B00	p. 59	50 A
	DS050CD1ANAA△00	DS050CD1ANEA△00	DS050MD□□□A00	DS050MD□□□B00	p. 60	30 A
Center magnet type with core	DT030CD1ANAA△00	DT030CD1ANEA△00	DT030M□□□A00	DT030M□□□B00	p. 61	30 A

Note 1: The Δ symbol in the model number denotes the following:
1: Cable length 300 mm **2**: Cable length 600 mm

Note 2: The □ symbols in the model number denote the following: A 64 mm magnet rail is not available for the center magnet type.
064: Magnet rail length 64 mm **128**: Magnet rail length 128 mm **256**: Magnet rail length 256 mm **512**: Magnet rail length 512 mm

Standard Model Number List

200 V Servo amplifiers

Analog/Pulse input type

Standard specifications... Standards conformity: UL, cUL, CE, UKCA, KC mark (KC mark applies to servo amplifiers only)

Input voltage	GPO	Regenerative resistor	STO	Amplifier capacity	Model no.	Page	
						Specifications	Dimensions
200 VAC class 200 to 240 VAC 3-/single-phase	Sinking type	Built-in	✓ (Without delay circuit)	10 A	GADSA01AA22	p. 68	p. 69
				20 A	GADSA02AA22	p. 68	p. 69
				30 A	GADSA03AA22	p. 68	p. 69
				50 A	GADSA05AA22	p. 68	p. 69
				75 A	GADSA07AA22	p. 68	p. 70
				100 A	GADSA10AA22	p. 68	p. 70
				150 A	GADSA15AA22	p. 68	p. 70
		External	✓ (Without delay circuit)	10 A	GADSA01LA22	p. 68	p. 69
				20 A	GADSA02LA22	p. 68	p. 69
				30 A	GADSA03LA22	p. 68	p. 69
				50 A	GADSA05LA22	p. 68	p. 69
	Sourcing type	Built-in	✓ (Without delay circuit)	10 A	GADSA01AB22	p. 68	p. 69
				20 A	GADSA02AB22	p. 68	p. 69
				30 A	GADSA03AB22	p. 68	p. 69
				50 A	GADSA05AB22	p. 68	p. 69
				75 A	GADSA07AB22	p. 68	p. 70
				100 A	GADSA10AB22	p. 68	p. 70
				150 A	GADSA15AB22	p. 68	p. 70
		External	✓ (Without delay circuit)	10 A	GADSA01LB22	p. 68	p. 69
				20 A	GADSA02LB22	p. 68	p. 69
				30 A	GADSA03LB22	p. 68	p. 69
				50 A	GADSA05LB22	p. 68	p. 69

EtherCAT interface type

Standard specifications... Standards conformity: UL, cUL, CE, UKCA, KC mark (KC mark applies to servo amplifiers only)

Input voltage	GPO	Regenerative resistor	STO	Amplifier capacity	Model no.	Page	
						Specifications	Dimensions
200 VAC class 200 to 240 VAC 3-/single-phase	Sinking/ Sourcing type	Built-in	✓ (with delay circuit)	10 A	GADSA01AH24	p. 80	p. 81
				20 A	GADSA02AH24	p. 80	p. 81
				30 A	GADSA03AH24	p. 80	p. 81
				50 A	GADSA05AH24	p. 80	p. 81
				75 A	GADSA07AH24	p. 80	p. 82
				100 A	GADSA10AH24	p. 80	p. 82
				150 A	GADSA15AH24	p. 80	p. 82
		External	✓ (with delay circuit)	10 A	GADSA01LH24	p. 80	p. 81
				20 A	GADSA02LH24	p. 80	p. 81
				30 A	GADSA03LH24	p. 80	p. 81
				50 A	GADSA05LH24	p. 80	p. 81

Standard Model Number List

100 V Servo amplifiers

Analog/Pulse input type

Standard specifications... Standards conformity: UL, cUL, CE, UKCA, KC mark (KC mark applies to servo amplifiers only)

Input voltage	GPO	Regenerative resistor	STO	Amplifier capacity	Model no.	Page	
						Specifications	Dimensions
100 VAC class 100 to 120 VAC Single-phase	Sinking type	Built-in	✓ (Without delay circuit)	10 A	GADSE01AA22	p. 68	p. 69
				20 A	GADSE02AA22	p. 68	p. 69
				30 A	GADSE03AA22	p. 68	p. 69
		External	✓ (Without delay circuit)	10 A	GADSE01LA22	p. 68	p. 69
				20 A	GADSE02LA22	p. 68	p. 69
				30 A	GADSE03LA22	p. 68	p. 69
	Sourcing type	Built-in	✓ (Without delay circuit)	10 A	GADSE01AB22	p. 68	p. 69
				20 A	GADSE02AB22	p. 68	p. 69
				30 A	GADSE03AB22	p. 68	p. 69
		External	✓ (Without delay circuit)	10 A	GADSE01LB22	p. 68	p. 69
				20 A	GADSE02LB22	p. 68	p. 69
				30 A	GADSE03LB22	p. 68	p. 69

EtherCAT interface type

Standard specifications... Standards conformity: UL, cUL, CE, UKCA, KC mark (KC mark applies to servo amplifiers only)

Input voltage	GPO	Regenerative resistor	STO	Amplifier capacity	Model no.	Page	
						Specifications	Dimensions
100 VAC class 100 to 120 VAC Single-phase	Sinking/ Sourcing type	Built-in	✓ (with delay circuit)	10 A	GADSE01AH24	p. 80	p. 81
				20 A	GADSE02AH24	p. 80	p. 81
				30 A	GADSE03AH24	p. 80	p. 81
		External	✓ (with delay circuit)	10 A	GADSE01LH24	p. 80	p. 81
				20 A	GADSE02LH24	p. 80	p. 81
				30 A	GADSE03LH24	p. 80	p. 81

STO delay circuit of servo amplifiers

Two types are available: "without delay circuit" and "with delay circuit" between the input circuits of safety input 1 (HWGOFF1)/safety input 2 (HWGOFF2) and the control signal blocking circuit.
For vertical axis applications, models with a delay circuit can prevent the motor shaft from falling due to a delay in the holding brake when the STO function is activated.

Servo amplifier model no.	Delay circuit (Delay time)
GADS□□□□□□2	Without delay circuit (0 to 20 ms)
GADS□□□□□□4	With delay circuit (200 to 700 ms)

Note 1: Even models without delay circuit have delay of up to 20 ms before the STO function is activated due to a delay in the input circuit.
Note 2: Holding brake excitation signal and servo motor holding brake are not safety-related parts.

Servo Motors

Rotary motors

Output capacity: 30 W to 5 kW

■ How to read model numbers

Note that not all possible combinations of field values may yield valid products. Also, some of the values listed below are for options.
Refer to the Standard Model Number List section for standard models with valid model numbers.

GA M 2 A 4 003 F0 X R K 0

GA ··· SANMOTION G series

M ··· Servo motor

Motor type

Code	Specifications
1	Low inertia
2	Medium inertia

Power supply voltage

Code	Specifications
A	200 VAC
E	100 VAC

Flange size

Code	Specifications
4	40 mm sq.
6	60 mm sq.
8	80 mm sq.
9	86 mm sq.
A	100 mm sq.
B	130 mm sq.

Rated output

Code	Specifications
003	30 W
005	50 W
010	100 W
015	150 W
020	200 W
040	400 W
055	550 W
060	600 W
075	750 W
100	1.0 kW
120	1.2 kW
150	1.5 kW

Code	Specifications
180	1.8 kW
200	2 kW
250	2.5 kW
300	3 kW
400	4 kW
500	5 kW

Maximum speed
For the numeric values, see the specification table.

Holding brake

Code	Specifications
X	No brake
C	24 VDC brake

Encoder type

Code	Specifications
R	Battery-less absolute encoder
N	Single-turn absolute encoder

Encoder resolution

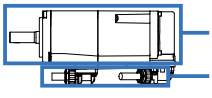
Code	Specifications
B	17 bit
F	20 bit
K	23 bit
Q	27 bit

Output shaft specifications

Code	Specifications
0	Circular (without key) without oil seal
1	Circular (without key) with oil seal
2	Keyway shaft without oil seal
3	Keyway shaft with oil seal

When using motors with oil seal or brake, or using them at 1000 m or higher altitudes, derating may be required. Please contact us for details.

Cable exit directions of SANMOTION G servo motors are different from our conventional SAMMOTION R servo motors. Optional power/encoder cables are available for your selection.



200 V **Low-inertia servo motors**

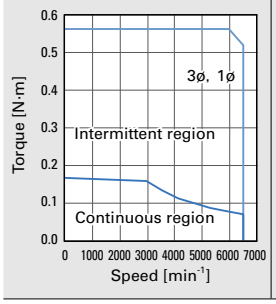
40 mm sq.

Servo motor model no.		Symbol	Unit	GAM1A4005F0	GAM1A4010F0	GAM1A4015F0
★ Rated output		P_R	kW	0.05	0.10	0.15
★ Rated torque		T_R	N・m	0.159	0.318	0.48
★ Continuous torque at stall		T_S	N・m	0.167	0.353	0.525
★ Peak torque at stall		T_P	N・m	0.56	1.18	1.67
★ Rated speed		N_R	min^{-1}	3000	3000	3000
★ Maximum speed		N_{max}	min^{-1}	6500	6500	6500
★ Rated armature current		I_R	Arms	0.81	1.0	1.7
★ Continuous armature current at stall		I_S	Arms	0.81	1.05	1.8
★ Peak armature current at stall		I_P	Arms	2.9	4.1	6.4
Torque constant		K_T	N・m/Arms	0.244	0.372	0.327
Phase resistance		R_ϕ	Ω	7.0	6.9	3.9
Rotor inertia	Without brake	J_M	$\times 10^{-4}$kg·m^2 ($GD^2/4$)	0.0153	0.0259	0.0354
	With brake			0.0218	0.0324	0.0419
Encoder inertia*		J_S		0.0025	0.0025	0.0025
★ Rated power rate	Without brake	Q_R	kW/s	17	39	65
	With brake			12	31	55
Servo motor mass*	Without brake	W_E	kg	0.38	0.52	0.66
	With brake			0.57	0.71	0.85
Size of heat dissipation aluminum plate		—	mm	250 × 250 × 6	250 × 250 × 6	305 × 305 × 12
Holding brake static friction torque		T_b	N·m	0.48 or greater	0.48 or greater	0.48 or greater
Holding brake rated voltage		V_b	V	24 VDC ±10%	24 VDC ±10%	24 VDC ±10%
Holding brake current consumption		I_b	A	0.26	0.26	0.26
Holding brake engage time			ms	30 or less	30 or less	30 or less
Holding brake release time (varistor)			ms	20 or less	20 or less	20 or less
Holding brake release time (diode)			ms	100 or less	100 or less	100 or less
Compatible servo amplifier model no.			—	GADSA01 (10 A)	GADSA01 (10 A)	GADSA02 (20 A)

■ Speed-Torque Characteristics

3ø: When the power supply voltage is 3-phase, 1ø: When the power supply voltage is single-phase

GAM1A4005F0



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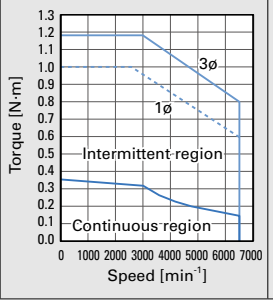
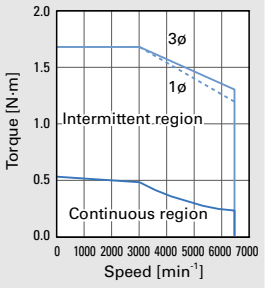


GAM1A4015F0



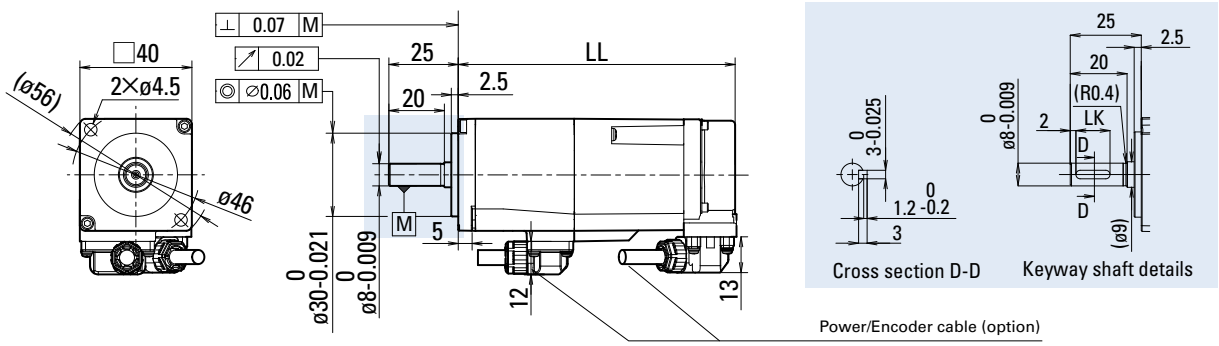
Note 1: Speed-torque characteristics curves and values in the row with a black star symbol (★) are the values after thermal equilibrium is established. All other values are at a temperature of 20ºC.

Note 2: All values are typical values. Torque constant is the value when mounted on the heat dissipation aluminum plate in the table.

Note 3: The holding brake cannot be used for dynamic braking. Holding brake engage/release time denotes the delay time of holding brake activation. Values of holding brake engage/release time vary depending on the circuit used. Please check the delay time on the actual equipment before use.

* The encoder inertia and servo motor mass values are when equipped with a battery-less absolute encoder. Contact us for more information on other encoders.

■ Dimensions [Unit: mm]



	Without oil seal		With oil seal		
	Without brake	With brake	Without brake	With brake	
Servo motor model no.	LL	LL	LL	LL	LK
GAM1□4005	74.5	103	79.5	108	12
GAM1□4010	93.5	122	98.5	127	12
GAM1□4015	112.5	141	117.5	146	15

Options

■ Power/Encoder cable

Front and rear cable exits are directed to the output shaft direction and the opposite direction, respectively.

Cable model no.						Cable exit direction	Cable length [m]
Power*		Encoder					
Standard	Oil-resistant	Standard		Oil-resistant			
w/o amplifier connector	w/o amplifier connector	w/o amplifier connector	w/ amplifier connector	w/o amplifier connector	w/ amplifier connector		
GSSF0100S	GSSF0100C	GESF0100S	GESF0100SA	GESF0100C	GESF0100CA	Front	1
GSSR0100S	GSSR0100C	GESR0100S	GESR0100SA	GESR0100C	GESR0100CA	Rear	1
GSSF0300S	GSSF0300C	GESF0300S	GESF0300SA	GESF0300C	GESF0300CA	Front	3
GSSR0300S	GSSR0300C	GESR0300S	GESR0300SA	GESR0300C	GESR0300CA	Rear	3
GSSF0500S	GSSF0500C	GESF0500S	GESF0500SA	GESF0500C	GESF0500CA	Front	5
GSSR0500S	GSSR0500C	GESR0500S	GESR0500SA	GESR0500C	GESR0500CA	Rear	5

* Power cable is common to both models, with or without a brake.

Plugs

■ Motor power / holding brake plug (motor side)

Manufacturer: Japan Aviation Electronics Industry, Ltd.

Cable exit direction	Plug mfr. part no.	Compatible cable diameter	Contact mfr. part no.		Compatible wire diameter (including insulation)		Compatible wire size (AWG)	
			Power	Brake	Power	Brake	Power	Brake
Front	JN16FE06SS1	ø5.2 to 5.6 mm	JN16S10K4A1		ø1.0 to 1.55 mm		22 to 24	
Rear	JN16FE06SS2							

■ Encoder plug (motor side)

Manufacturer: Japan Aviation Electronics Industry, Ltd.

Cable exit direction	Plug mfr. part no.	Compatible cable diameter	Contact mfr. part no.	Compatible wire diameter (including insulation)	Compatible wire size (AWG)
Front	JN16FS09SS1	ø4.9 to 5.6 mm	JN-24S-C2B-B1-10000	ø0.7 to 0.9 mm	26
Rear	JN16FS09SS2				

Note 1: Plugs and contacts are not provided. Please contact the connector manufacturer.
Note 2: See the catalogs and instruction manuals issued by the connector manufacturer for handling and safety precautions.

200 V **Low-inertia servo motors**

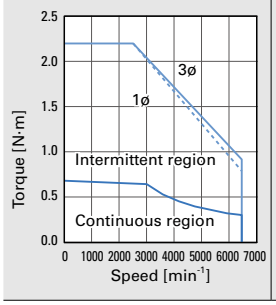
60 mm sq.

Servo motor model no.		Symbol	Unit	GAM1A6020F0	GAM1A6040F0	GAM1A6060F0
★ Rated output		P_R	kW	0.2	0.4	0.6
★ Rated torque		T_R	N・m	0.637	1.27	1.91
★ Continuous torque at stall		T_S	N・m	0.686	1.37	1.91
★ Peak torque at stall		T_P	N・m	2.2	4.8	6.7
★ Rated speed		N_R	min^{-1}	3000	3000	3000
★ Maximum speed		N_{max}	min^{-1}	6500	6500	6500
★ Rated armature current		I_R	Arms	1.51	2.8	5.1
★ Continuous armature current at stall		I_S	Arms	1.52	2.8	4.7
★ Peak armature current at stall		I_P	Arms	5.8	12.0	20.5
Torque constant		K_T	N・m/Arms	0.519	0.544	0.456
Phase resistance		$R_Ø$	Ω	3.8	1.5	0.71
Rotor inertia	Without brake	J_M	$\times 10^{-4}$kg·m^2 ($GD^2/4$)	0.121	0.213	0.287
	With brake			0.182	0.272	0.348
Encoder inertia*		J_S		0.0025	0.0025	0.0025
★ Rated power rate	Without brake	Q_R	kW/s	34	76	127
	With brake			22	59	105
Servo motor mass*	Without brake	W_E	kg	0.94	1.4	1.9
	With brake			1.4	1.8	2.3
Size of heat dissipation aluminum plate		—	mm	250 × 250 × 6	250 × 250 × 6	305 × 305 × 12
Holding brake static friction torque		T_b	N·m	1.37 or greater	1.37 or greater	1.91 or greater
Holding brake rated voltage		V_b	V	24 VDC ±10%	24 VDC ±10%	24 VDC ±10%
Holding brake current consumption		I_b	A	0.29	0.29	0.32
Holding brake engage time			ms	30 or less	30 or less	40 or less
Holding brake release time (varistor)			ms	20 or less	20 or less	20 or less
Holding brake release time (diode)			ms	120 or less	120 or less	120 or less
Compatible servo amplifier model no.			—	GADSA02 (20 A)	GADSA02 (20 A)	GADSA05 (50 A)

■ Speed-Torque Characteristics

3ø: When the power supply voltage is 3-phase, 1ø: When the power supply voltage is single-phase

GAM1A6020F0



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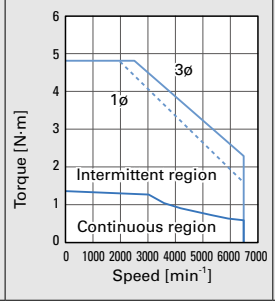

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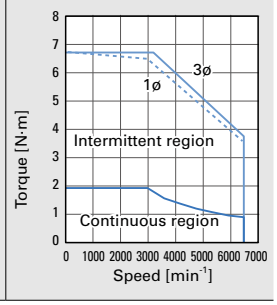


Model No. GAM1A6040 and GAM1A6060 may be derated with brake or oil seal.

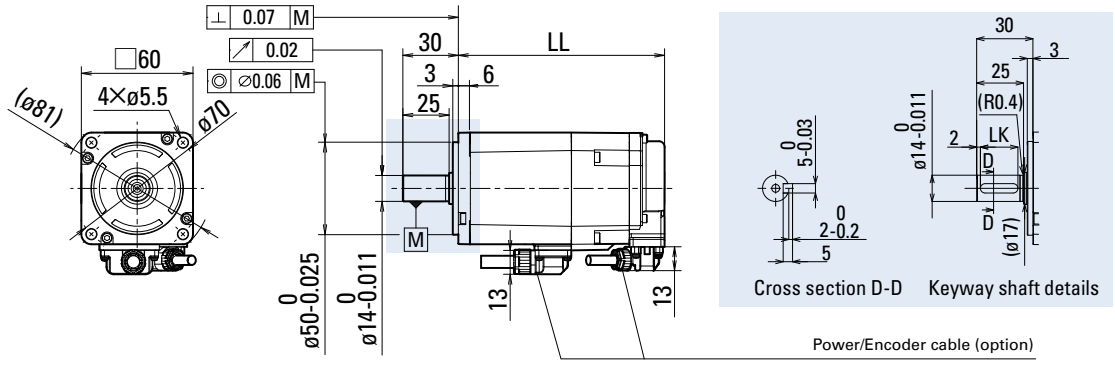
Note 1: Speed-torque characteristics curves and values in the row with a black star symbol (★) are the values after thermal equilibrium is established. All other values are at a temperature of 20°C.

Note 2: All values are typical values. Torque constant is the value when mounted on the heat dissipation aluminum plate in the table.

Note 3: The holding brake cannot be used for dynamic braking. Holding brake engage/release time denotes the delay time of holding brake activation. Values of holding brake engage/release time vary depending on the circuit used. Please check the delay time on the actual equipment before use.

* The encoder inertia and servo motor mass values are when equipped with a battery-less absolute encoder. Contact us for more information on other encoders.

■ Dimensions [Unit: mm]



	Without oil seal		With oil seal		
	Without brake	With brake	Without brake	With brake	
Servo motor model no.	LL	LL	LL	LL	LK
GAM1□6020	85.5	108.5	92.5	115.5	20
GAM1□6040	110	132.5	117	139.5	20
GAM1□6060	144	169	151	176	20

Options

■ Power/Encoder cable

Front and rear cable exits are directed to the output shaft direction and the opposite direction, respectively.

Cable model no.						Cable exit direction	Cable length [m]
Power*		Encoder					
Standard	Oil-resistant	Standard		Oil-resistant			
w/o amplifier connector	w/o amplifier connector	w/o amplifier connector	w/ amplifier connector	w/o amplifier connector	w/ amplifier connector		
GMSF0100S	GMSF0100C	GESF0100S	GESF0100SA	GESF0100C	GESF0100CA	Front	1
GMSR0100S	GMSR0100C	GESR0100S	GESR0100SA	GESR0100C	GESR0100CA	Rear	1
GMSF0300S	GMSF0300C	GESF0300S	GESF0300SA	GESF0300C	GESF0300CA	Front	3
GMSR0300S	GMSR0300C	GESR0300S	GESR0300SA	GESR0300C	GESR0300CA	Rear	3
GMSF0500S	GMSF0500C	GESF0500S	GESF0500SA	GESF0500C	GESF0500CA	Front	5
GMSR0500S	GMSR0500C	GESR0500S	GESR0500SA	GESR0500C	GESR0500CA	Rear	5

* Power cable is common to both models, with or without a brake.

Plugs

■ Motor power / holding brake plug (motor side)

Manufacturer: Japan Aviation Electronics Industry, Ltd.

Cable exit direction	Plug mfr. part no.	Compatible cable diameter	Contact mfr. part no.		Compatible wire diameter (including insulation)		Compatible wire size (AWG)	
			Power	Brake	Power	Brake	Power	Brake
Front	JN16FG06SS1	ø6.3 to 6.9 mm	JN16S25H3A1	JN16S10K4A1	ø1.2 to 1.85 mm	ø1.0 to 1.55 mm	19	23
Rear	JN16FG06SS2							

■ Encoder plug (motor side)

Manufacturer: Japan Aviation Electronics Industry, Ltd.

Cable exit direction	Plug mfr. part no.	Compatible cable diameter	Contact mfr. part no.	Compatible wire diameter (including insulation)	Compatible wire size (AWG)
Front	JN16FS09SS1	ø4.9 to 5.6 mm	JN-24S-C2B-B1-10000	ø0.7 to 0.9 mm	26
Rear	JN16FS09SS2				

Note 1: Plugs and contacts are not provided. Please contact the connector manufacturer.
Note 2: See the catalogs and instruction manuals issued by the connector manufacturer for handling and safety precautions.

200 V **Low-inertia servo motors**

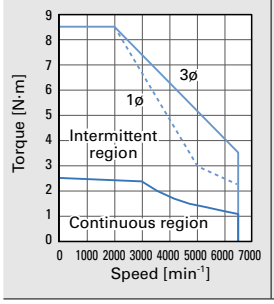
80 mm sq.

Servo motor model no.		Symbol	Unit	GAM1A8075V0	GAM1A8075F0	GAM1A8100F0
★ Rated output		P_R	kW	0.75	0.75	1.0
★ Rated torque		T_R	N・m	2.39	2.39	3.18
★ Continuous torque at stall		T_S	N・m	2.55	2.55	3.50
★ Peak torque at stall		T_P	N・m	8.5	8.5	11.1
★ Rated speed		N_R	min^{-1}	3000	3000	3000
★ Maximum speed		N_{max}	min^{-1}	6500	6500	6500
★ Rated armature current		I_R	Arms	4.2	5.9	6.8
★ Continuous armature current at stall		I_S	Arms	4.1	5.7	6.8
★ Peak armature current at stall		I_P	Arms	15.5	22.0	26.5
Torque constant		K_T	N・m/Arms	0.670	0.501	0.561
Phase resistance		R_ϕ	Ω	0.61	0.32	0.31
Rotor inertia	Without brake	J_M	$\times 10^{-4}$kg·m^2 ($GD^2/4$)	0.739	0.739	0.959
	With brake			0.936	0.936	1.16
Encoder inertia*		J_S		0.0025	0.0025	0.0025
★ Rated power rate	Without brake	Q_R	kW/s	77	77	105
	With brake			61	61	88
Servo motor mass*	Without brake	W_E	kg	2.9	2.9	3.5
	With brake			3.7	3.7	4.3
Size of heat dissipation aluminum plate		—	mm	250 × 250 × 6	250 × 250 × 6	305 × 305 × 12
Holding brake static friction torque		T_b	N·m	3.18 or greater	3.18 or greater	3.18 or greater
Holding brake rated voltage		V_b	V	24 VDC ±10%	24 VDC ±10%	24 VDC ±10%
Holding brake current consumption		I_b	A	0.33	0.33	0.33
Holding brake engage time			ms	50 or less	50 or less	50 or less
Holding brake release time (varistor)			ms	30 or less	30 or less	30 or less
Holding brake release time (diode)			ms	200 or less	200 or less	200 or less
Compatible servo amplifier model no.			—	GADSA03 (30 A)	GADSA05 (50 A)	GADSA05 (50 A)

■ Speed-Torque Characteristics

3ø: When the power supply voltage is 3-phase, 1ø: When the power supply voltage is single-phase

GAM1A8075V0



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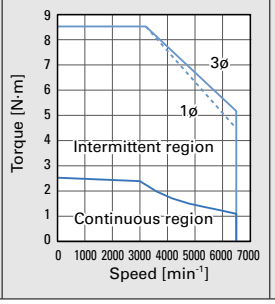
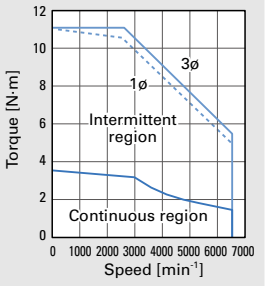


GAM1A8100F0



Model No. GAM1A8075 may be derated with brake or oil seal.

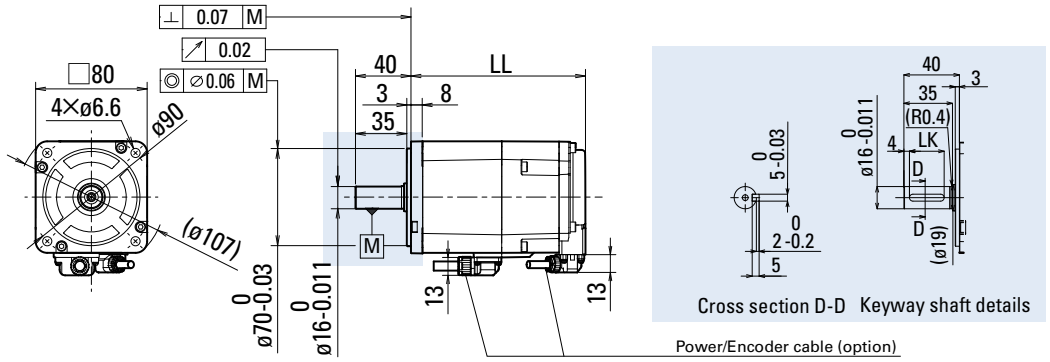
Note 1: Speed-torque characteristics curves and values in the row with a black star symbol (★) are the values after thermal equilibrium is established. All other values are at a temperature of 20°C.

Note 2: All values are typical values. Torque constant is the value when mounted on the heat dissipation aluminum plate in the table.

Note 3: The holding brake cannot be used for dynamic braking. Holding brake engage/release time denotes the delay time of holding brake activation. Values of holding brake engage/release time vary depending on the circuit used. Please check the delay time on the actual equipment before use.

* The encoder inertia and servo motor mass values are when equipped with a battery-less absolute encoder. Contact us for more information on other encoders.

■ Dimensions [Unit: mm]



	Without oil seal		With oil seal		
	Without brake	With brake	Without brake	With brake	
Servo motor model no.	LL	LL	LL	LL	LK
GAM1□8075	125	155.5	132	162.5	25
GAM1□8100	153	183.5	160	190.5	25

Options

■ Power/Encoder cable

Front and rear cable exits are directed to the output shaft direction and the opposite direction, respectively.

Cable model no.						Cable exit direction	Cable length [m]
Power*		Encoder					
Standard	Oil-resistant	Standard		Oil-resistant			
w/o amplifier connector	w/o amplifier connector	w/o amplifier connector	w/ amplifier connector	w/o amplifier connector	w/ amplifier connector		
GMSF0100S	GMSF0100C	GESF0100S	GESF0100SA	GESF0100C	GESF0100CA	Front	1
GMSR0100S	GMSR0100C	GESR0100S	GESR0100SA	GESR0100C	GESR0100CA	Rear	1
GMSF0300S	GMSF0300C	GESF0300S	GESF0300SA	GESF0300C	GESF0300CA	Front	3
GMSR0300S	GMSR0300C	GESR0300S	GESR0300SA	GESR0300C	GESR0300CA	Rear	3
GMSF0500S	GMSF0500C	GESF0500S	GESF0500SA	GESF0500C	GESF0500CA	Front	5
GMSR0500S	GMSR0500C	GESR0500S	GESR0500SA	GESR0500C	GESR0500CA	Rear	5

* Power cable is common to both models, with or without a brake.

Plugs

■ Motor power / holding brake plug (motor side)

Manufacturer: Japan Aviation Electronics Industry, Ltd.

Cable exit direction	Plug mfr. part no.	Compatible cable diameter	Contact mfr. part no.		Compatible wire diameter (including insulation)		Compatible wire size (AWG)	
			Power	Brake	Power	Brake	Power	Brake
Front	JN16FG06SS1	ø6.3 to 6.9 mm	JN16S25H3A1	JN16S10K4A1	ø1.2 to 1.85 mm	ø1.0 to 1.55 mm	19	23
Rear	JN16FG06SS2							

■ Encoder plug (motor side)

Manufacturer: Japan Aviation Electronics Industry, Ltd.

Cable exit direction	Plug mfr. part no.	Compatible cable diameter	Contact mfr. part no.	Compatible wire diameter (including insulation)	Compatible wire size (AWG)
Front	JN16FS09SS1	ø4.9 to 5.6 mm	JN-24S-C2B-B1-10000	ø0.7 to 0.9 mm	26
Rear	JN16FS09SS2				

Note 1: Plugs and contacts are not provided. Please contact the connector manufacturer.
Note 2: See the catalogs and instruction manuals issued by the connector manufacturer for handling and safety precautions.

200 V **Low-inertia servo motors**

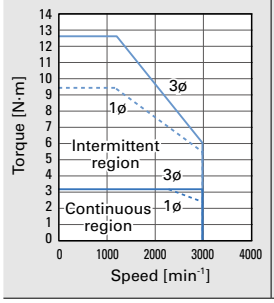
100 mm sq.

Servo motor model no.		Symbol	Unit	GAM1AA100H0	GAM1AA100F0	GAM1AA150H0	GAM1AA150F0
★ Rated output		P_R	kW	1.0	1.0	1.5	1.5
★ Rated torque		T_R	N・m	3.2	3.2	4.8	4.8
★ Continuous torque at stall		T_S	N・m	3.2	3.2	4.9	4.9
★ Peak torque at stall		T_P	N・m	12.6	10.5	18.0	15.0
★ Rated speed		N_R	min^{-1}	3000	3000	3000	3000
★ Maximum speed		N_{max}	min^{-1}	3000	6000	3000	6000
★ Rated armature current		I_R	Arms	4.5	7.7	5.2	8.7
★ Continuous armature current at stall		I_S	Arms	3.8	7.4	3.8	8.2
★ Peak armature current at stall		I_P	Arms	16.3	26.5	15.5	26.5
Torque constant		K_T	N・m/Arms	0.971	0.456	1.35	0.642
Phase resistance		$R_Ø$	Ω	1.40	0.27	1.26	0.26
Rotor inertia	Without brake	J_M	$\times 10^{-4}$kg・m^2 ($GD^2/4$)	1.33	1.33	1.98	1.98
	With brake			1.66	1.66	2.31	2.31
Encoder inertia*		J_S		0.0025	0.0025	0.0025	0.0025
★ Rated power rate	Without brake	Q_R	kW/s	77	77	116	116
	With brake			62	62	100	100
Servo motor mass*	Without brake	W_E	kg	3.8	3.8	5.0	5.0
	With brake			5.3	5.3	6.6	6.6
Size of heat dissipation aluminum plate		—	mm	400 × 400 × 20	400 × 400 × 20	400 × 400 × 20	400 × 400 × 20
Holding brake static friction torque		T_b	N·m	8 or greater	8 or greater	8 or greater	8 or greater
Holding brake rated voltage		V_b	V	24 VDC ±10%	24 VDC ±10%	24 VDC ±10%	24 VDC ±10%
Holding brake current consumption		I_b	A	0.67	0.67	0.67	0.67
Holding brake engage time			ms	100 or less	100 or less	100 or less	100 or less
Holding brake release time (varistor)			ms	30 or less	30 or less	30 or less	30 or less
Holding brake release time (diode)			ms	200 or less	200 or less	200 or less	200 or less
Compatible servo amplifier model no.			—	GADSA03 (30 A)	GADSA05 (50 A)	GADSA03 (30 A)	GADSA05 (50 A)

■ Speed-Torque Characteristics

3ø: When the power supply voltage is 3-phase, 1ø: When the power supply voltage is single-phase (GAM1AA100H and GAM1AA150H0 will be derated to 750 W)

GAM1AA100H0



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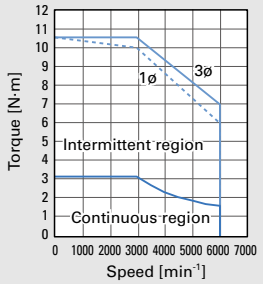

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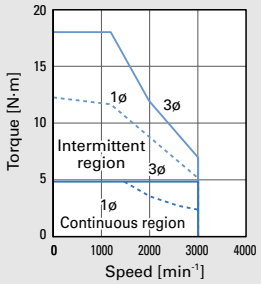

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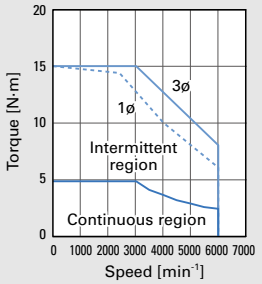


Note 1: Speed-torque characteristics curves and values in the row with a black star symbol (★) are the values after thermal equilibrium is established. All other values are at a temperature of 20°C.

Note 2: All values are typical values. Torque constant is the value when mounted on the heat dissipation aluminum plate in the table.

Note 3: The holding brake cannot be used for dynamic braking. Holding brake engage/release time denotes the delay time of holding brake activation. Values of holding brake engage/release time vary depending on the circuit used. Please check the delay time on the actual equipment before use.

* The encoder inertia and servo motor mass values are when equipped with a battery-less absolute encoder. Contact us for more information on other encoders.

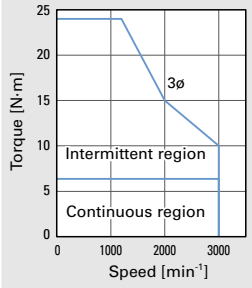
100 mm sq.

GAM1AA200H0	GAM1AA200F0	GAM1AA250H0	GAM1AA250F0	Servo motor model no.			
				Unit	Symbol		
2.0	2.0	2.5	2.5	kW	P_R	★ Rated output	
6.37	6.37	7.97	7.97	N・m	T_R	★ Rated torque	
6.37	6.37	7.97	7.97	N・m	T_S	★ Continuous torque at stall	
24.0	20.0	27.5	24.0	N・m	T_P	★ Peak torque at stall	
3000	3000	3000	3000	min^{-1}	N_R	★ Rated speed	
3000	6500	3000	6500	min^{-1}	N_{max}	★ Maximum speed	
7.7	13.9	9.0	14.8	Arms	I_R	★ Rated armature current	
6.8	13.1	7.2	13.9	Arms	I_S	★ Continuous armature current at stall	
26.5	45.5	26.5	45.5	Arms	I_P	★ Peak armature current at stall	
1.07	0.513	1.24	0.625	N・m/Arms	K_T	Torque constant	
0.61	0.15	0.58	0.17	Ω	Rø	Phase resistance	
2.30	2.30	2.80	2.80	$\times 10^{-4}$kg·m^2 ($GD^2/4$)	J_M	Rotor inertia	Without brake
2.59	2.59	3.11	3.11				With brake
0.0025	0.0025	0.0025	0.0025		J_S	Encoder inertia*	
176	176	227	227	kW/s	Q_R	★ Rated power rate	Without brake
157	157	204	204				With brake
5.7	5.7	6.7	6.7	kg	W_E	Servo motor mass*	Without brake
7.2	7.2	8.2	8.2				With brake
540 × 540 × 20	540 × 540 × 20	540 × 540 × 20	540 × 540 × 20	mm	—	Size of heat dissipation aluminum plate	
8 or greater	8 or greater	8 or greater	8 or greater	N·m	T_b	Holding brake static friction torque	
24 VDC ±10%	24 VDC ±10%	24 VDC ±10%	24 VDC ±10%	V	V_b	Holding brake rated voltage	
0.67	0.67	0.67	0.67	A	I_b	Holding brake current consumption	
100 or less	100 or less	100 or less	100 or less	ms	Holding brake engage time		
30 or less	30 or less	30 or less	30 or less	ms	Holding brake release time (varistor)		
200 or less	200 or less	200 or less	200 or less	ms	Holding brake release time (diode)		
GADSA05 (50 A)	GADSA07 (75 A)	GADSA05 (50 A)	GADSA07 (75 A)	—	Compatible servo amplifier model no.		

■ Speed-Torque Characteristics

3ø: When the power supply voltage is 3-phase

GAM1AA200H0



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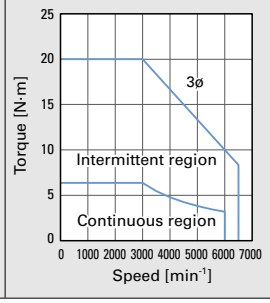

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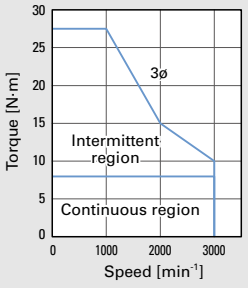

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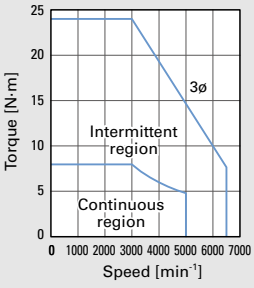
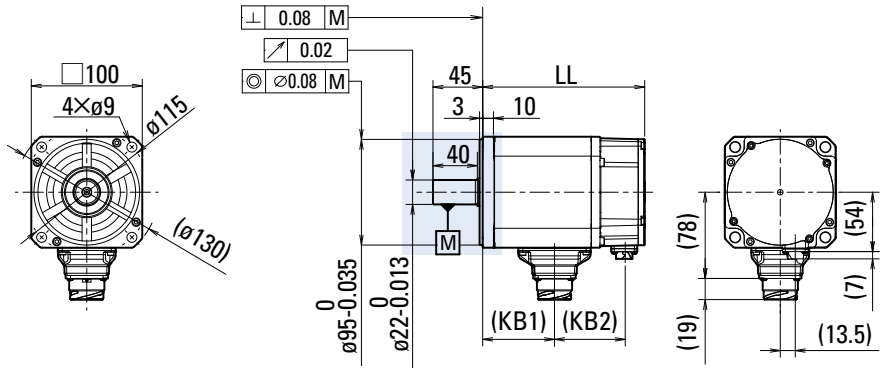
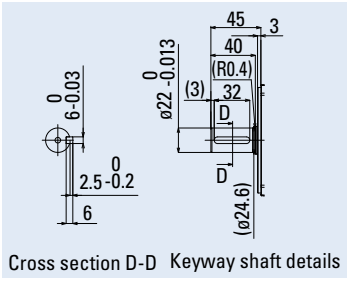


■ Dimensions [Unit: mm] The LL value does not change with or without oil seal.





Cross section D-D Keyway shaft details

	Without brake	With brake	Without brake		With brake	
Servo motor model no.	LL	LL	KB1	KB2	KB1	KB2
GAM1AA100	132.5	169	61	53	61	90
GAM1AA150	156.5	193	85	53	85	90
GAM1AA200	167.5	204	96	53	96	90
GAM1AA250	187.5	224	116	53	116	90

Options

■ Power/Encoder cable

Cable model no.					Cable length [m]
Power (without brake)		Power (with brake)		Encoder	
Push-pull locking	Jack screw locking	Push-pull locking	Jack screw locking	Jack screw locking	
w/o amplifier connector	w/o amplifier connector	w/o amplifier connector	w/o amplifier connector	w/ amplifier connector	
GPPB0100S	AL-01190701-01	GQPB0100SB	AL-01190702-01	RS-CA9-01-R	1
GPPB0300S	AL-01190701-03	GQPB0300SB	AL-01190702-03	RS-CA9-03-R	3
GPPB0500S	AL-01190701-05	GQPB0500SB	AL-01190702-05	RS-CA9-05-R	5

Plugs

■ Motor power / holding brake plug (motor side) Manufacturer: Japan Aviation Electronics Industry, Ltd.

Holding brake	Receptacle mfr. part no.	Pin assignment					Recommended motor power cable size (U, V, W, and ground)	
		U phase	V phase	W phase	Ground	Brake	mm^2	AWG No.
None	JL10-2E20-4PE-B	A	B	C	D	—	2.0	14
Yes	JL10-2E20-18PE-B	F	I	B	E, D	G, H	2.0	14

Holding brake	Plug fixing method	Plug mfr. part no.		Cable clamp	
		Straight	Angled	Mfr. part no.	Compatible cable outer diameter
None	Push-pull locking	JL10-6A20-4SE-EB	JL10-8A20-4SE-EB	JL04-2022CK(14)-R	ø12.9 to 16 mm
	Jack screw locking	JL04V-6A20-4SE-EB-RK	JL04V-8A20-4SE-EBH-RK	JL04-2022CK(14)-R	ø12.9 to 16 mm
Yes	Push-pull locking	JL10-6A20-18SE-EB	JL10-8A20-18SE-EB	JL04-2022CK(14)-R	ø12.9 to 16 mm
	Jack screw locking	JL04V-6A20-18SE-EB-RK	JL04V-8A20-18SE-EBH-R	JL04-2022CK(14)-R	ø12.9 to 16 mm

■ Encoder plug (motor side) Manufacturer: Japan Aviation Electronics Industry, Ltd.

Receptacle mfr. part no.	Plug mfr. part no.		Compatible cable diameter
	Straight	Angled	
JN2AS10ML2-R	JN2DS10SL1-R	JN2FS10SL1-R	ø5.7 to 7.3 mm
	JN2DS10SL2-R	JN2FS10SL2-R	ø6.5 to 8.0 mm
	JN2DS10SL3-R	JN2FS10SL3-R	ø3.5 to 5.0 mm

Contact size	Classification	Applicable socket contact	
		Mfr. part no.	Compatible wire size
#22	Manual crimping tool type	JN1-22-20S-R-PKG100	20 AWG
		JN1-22-22S-PKG100	AWG 21 to 25
		JN1-22-26S-PKG100	AWG 26 to 28
	Soldering type	JN1-22-22F-PKG100	20 AWG or smaller

Note: See the catalogs and instruction manuals issued by the connector manufacturer for handling and safety precautions.

200 V **Low-inertia servo motors**

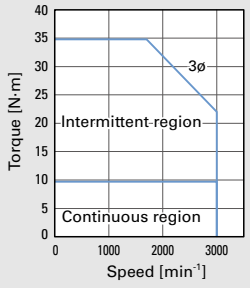
130 mm sq.

Servo motor model no.		Symbol	Unit	GAM1AB300H0	GAM1AB300F0	GAM1AB400H0
★ Rated output		P_R	kW	3.0	3.0	4.0
★ Rated torque		T_R	N・m	9.7	9.7	12.8
★ Continuous torque at stall		T_S	N・m	9.7	9.7	12.8
★ Peak torque at stall		T_P	N・m	34.8	29.0	47.0
★ Rated speed		N_R	min^{-1}	3000	3000	3000
★ Maximum speed		N_{max}	min^{-1}	3000	6000	3000
★ Rated armature current		I_R	Arms	14.7	17.5	17.8
★ Continuous armature current at stall		I_S	Arms	11.5	16.8	15.5
★ Peak armature current at stall		I_P	Arms	45.5	55.0	55.0
Torque constant		K_T	N・m/Arms	0.917	0.625	1.01
Phase resistance		R_ϕ	Ω	0.18	0.080	0.13
Rotor inertia	Without brake	J_M	$\times 10^{-4}$kg・m^2 ($GD^2/4$)	7.00	7.00	8.80
	With brake			8.00	8.00	9.88
Encoder inertia*		J_S		0.0105	0.0105	0.0105
★ Rated power rate	Without brake	Q_R	kW/s	134	134	186
	With brake			118	118	166
Servo motor mass*	Without brake	W_E	kg	9.7	9.7	12.2
	With brake			12.2	12.2	14.7
Size of heat dissipation aluminum plate		—	mm	470 × 470 × 20	470 × 470 × 20	470 × 470 × 20
Holding brake static friction torque		T_b	N・m	16 or greater	16 or greater	16 or greater
Holding brake rated voltage		V_b	V	24 VDC ±10%	24 VDC ±10%	24 VDC ±10%
Holding brake current consumption		I_b	A	0.78	0.78	0.78
Holding brake engage time			ms	100 or less	100 or less	100 or less
Holding brake release time (varistor)			ms	30 or less	30 or less	30 or less
Holding brake release time (diode)			ms	200 or less	200 or less	200 or less
Compatible servo amplifier model no.			—	GADSA07 (75 A)	GADSA10 (100 A)	GADSA10 (100 A)

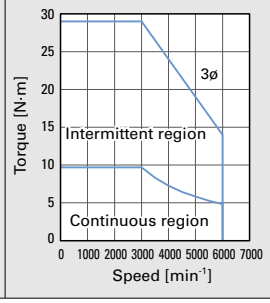
■ Speed-Torque Characteristics

3ø: When the power supply voltage is 3-phase

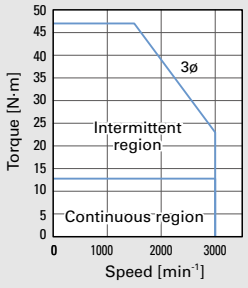
GAM1AB300H0



GAM1AB300F0



GAM1AB400H0



Note 1: Speed-torque characteristics curves and values in the row with a black star symbol (★) are the values after thermal equilibrium is established. All other values are at a temperature of 20°C.

Note 2: All values are typical values. Torque constant is the value when mounted on the heat dissipation aluminum plate in the table.

Note 3: The holding brake cannot be used for dynamic braking. Holding brake engage/release time denotes the delay time of holding brake activation. Values of holding brake engage/release time vary depending on the circuit used. Please check the delay time on the actual equipment before use.

* The encoder inertia and servo motor mass values are when equipped with a battery-less absolute encoder. Contact us for more information on other encoders.

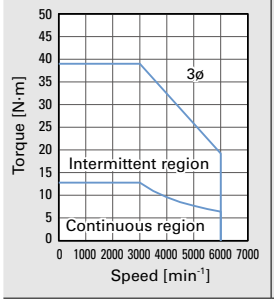
130 mm sq.

GAM1AB400F0	GAM1AB500H0	GAM1AB500F0	Servo motor model no. Unit	Symbol		
4.0	5.0	5.0	kW	P_R	★ Rated output	
12.8	16.0	16.0	N・m	T_R	★ Rated torque	
12.8	16.0	16.0	N・m	T_S	★ Continuous torque at stall	
39.0	55.0	48.0	N・m	T_P	★ Peak torque at stall	
3000	3000	3000	min^{-1}	N_R	★ Rated speed	
6000	3000	6000	min^{-1}	N_{max}	★ Maximum speed	
23.4	20.0	27.7	Arms	I_R	★ Rated armature current	
22.5	14.1	26.6	Arms	I_S	★ Continuous armature current at stall	
74.0	55.0	83.0	Arms	I_P	★ Peak armature current at stall	
0.625	1.21	0.653	N・m/Arms	K_T	Torque constant	
0.053	0.15	0.047	Ω	Rø	Phase resistance	
8.80	10.6	10.6	$\times 10^{-4} kg \cdot m^2$ ($GD^2/4$)	J_M	Rotor inertia	Without brake
9.88	11.8	11.8				With brake
0.0105	0.0105	0.0105		J_S	Encoder inertia*	
186	242	242	kW/s	Q_R	★ Rated power rate	Without brake
166	218	218				With brake
12.2	14.3	14.3	kg	W_E	Servo motor mass*	Without brake
14.7	16.8	16.8				With brake
470 × 470 × 20	540 × 540 × 20	540 × 540 × 20	mm	—	Size of heat dissipation aluminum plate	
16 or greater	16 or greater	16 or greater	N·m	T_b	Holding brake static friction torque	
24 VDC ±10%	24 VDC ±10%	24 VDC ±10%	V	V_b	Holding brake rated voltage	
0.78	0.78	0.78	A	I_b	Holding brake current consumption	
100 or less	100 or less	100 or less	ms	Holding brake engage time		
30 or less	30 or less	30 or less	ms	Holding brake release time (varistor)		
200 or less	200 or less	200 or less	ms	Holding brake release time (diode)		
GADSA15 (150 A)	GADSA10 (100 A)	GADSA15 (150 A)	—	Compatible servo amplifier model no.		

■ Speed-Torque Characteristics

3ø: When the power supply voltage is 3-phase

GAM1AB400F0



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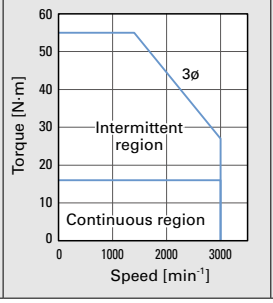

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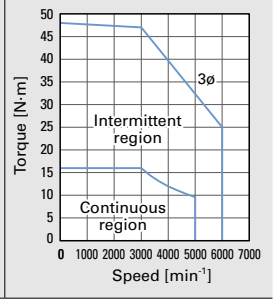
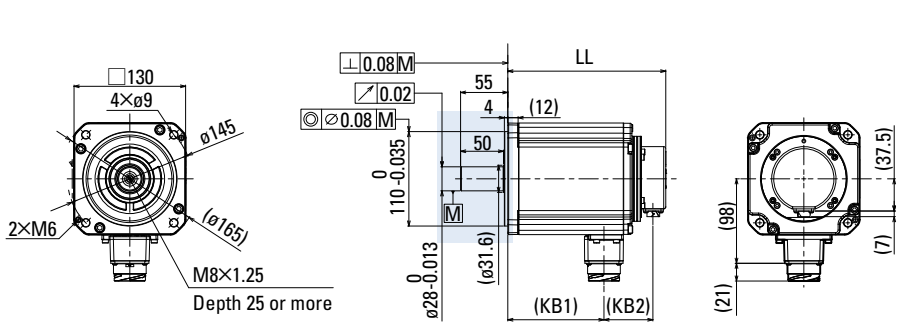
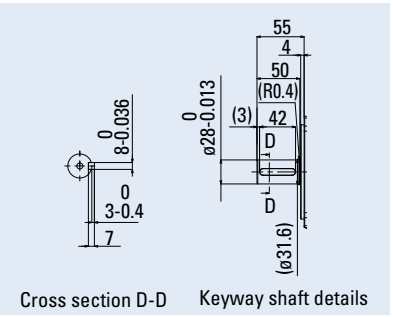


■ Dimensions [Unit: mm] The LL value does not change with or without oil seal.





	Without brake	With brake	Without brake		With brake	
Servo motor model no.	LL	LL	KB1	KB2	KB1	KB2
GAM1AB300	184	227	112	57	112	100
GAM1AB400	208	251	136	57	136	100
GAM1AB500	232	275	160	57	160	100

Options

■ Power/Encoder cable

Cable model no.					Cable length [m]
Power (without brake)		Power (with brake)		Encoder	
Push-pull locking	Jack screw locking	Push-pull locking	Jack screw locking	Jack screw locking	
w/o amplifier connector	w/o amplifier connector	w/o amplifier connector	w/o amplifier connector	w/ amplifier connector	
GRPB0100S	AL-01190699-01	GRPB0100SB	AL-01190700-01	RS-CA9-01-R	1
GRPB0300S	AL-01190699-03	GRPB0300SB	AL-01190700-03	RS-CA9-03-R	3
GRPB0500S	AL-01190699-05	GRPB0500SB	AL-01190700-05	RS-CA9-05-R	5

Plugs

■ Motor power / holding brake plug (motor side) Manufacturer: Japan Aviation Electronics Industry, Ltd.

Holding brake	Receptacle mfr. part no.	Pin assignment					Recommended motor power cable size (U, V, W, and ground)	
		U phase	V phase	W phase	Ground	Brake	mm^2	AWG No.
None	JL10-2E24-11PE-B	D	E	F	G, H	—	2.0	14
Yes	JL10-2E24-11PE-B	D	E	F	G, H	A, B	2.0	14

Holding brake	Plug fixing method	Plug mfr. part no.		Cable clamp	
		Straight	Angled	Mfr. part no.	Compatible cable outer diameter
None/Yes	Push-pull locking	JL10-6A24-11SE-EB	JL10-8A24-11SE-EB	JL04-2428CK(17)-R	ø15 to 18 mm
	Jack screw locking	JL04V-6A24-11SE-EB-R	JL04V-8A24-11SE-EBH-RK	JL04-2428CK(17)-R	ø15 to 18 mm

■ Encoder plug (motor side) Manufacturer: Japan Aviation Electronics Industry, Ltd.

Receptacle mfr. part no.	Plug mfr. part no.		Compatible cable diameter
	Straight	Angled	
JN2AS10ML2-R	JN2DS10SL1-R	JN2FS10SL1-R	ø5.7 to 7.3 mm
	JN2DS10SL2-R	JN2FS10SL2-R	ø6.5 to 8.0 mm
	JN2DS10SL3-R	JN2FS10SL3-R	ø3.5 to 5.0 mm

Contact size	Classification	Applicable socket contact	
		Mfr. part no.	Compatible wire size
#22	Manual crimping tool type	JN1-22-20S-R-PKG100	20 AWG
		JN1-22-22S-PKG100	AWG 21 to 25
		JN1-22-26S-PKG100	AWG 26 to 28
	Soldering type	JN1-22-22F-PKG100	20 AWG or smaller

Note: See the catalogs and instruction manuals issued by the connector manufacturer for handling and safety precautions.

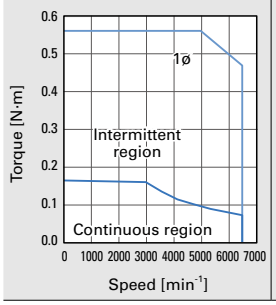
100 V **Low-inertia servo motors**

40 mm sq.

Servo motor model no.		Symbol	Unit	GAM1E4005F0	GAM1E4010F0
★ Rated output		P_R	kW	0.05	0.1
★ Rated torque		T_R	N・m	0.159	0.318
★ Continuous torque at stall		T_S	N・m	0.167	0.318
★ Peak torque at stall		T_P	N・m	0.56	1.11
★ Rated speed		N_R	min^{-1}	3000	3000
★ Maximum speed		N_{max}	min^{-1}	6500	6500
★ Rated armature current		I_R	Arms	1.35	1.75
★ Continuous armature current at stall		I_S	Arms	1.35	1.70
★ Peak armature current at stall		I_P	Arms	5.5	6.8
Torque constant		K_T	N・m/Arms	0.140	0.209
Phase resistance		$R_Ø$	Ω	2.30	2.30
Rotor inertia	Without brake	J_M	$\times 10^{-4}$kg·m^2 ($GD^2/4$)	0.0153	0.0259
	With brake			0.0218	0.0324
Encoder inertia*		J_S		0.0025	0.0025
★ Rated power rate	Without brake	Q_R	kW/s	17	39
	With brake			12	31
Servo motor mass*	Without brake	W_E	kg	0.38	0.52
	With brake			0.57	0.71
Size of heat dissipation aluminum plate		—	mm	250 × 250 × 6	250 × 250 × 6
Holding brake static friction torque		T_b	N·m	0.48 or greater	0.48 or greater
Holding brake rated voltage		V_b	V	24 VDC ±10%	24 VDC ±10%
Holding brake current consumption		I_b	A	0.26	0.26
Holding brake engage time			ms	30 or less	30 or less
Holding brake release time (varistor)			ms	20 or less	20 or less
Holding brake release time (diode)			ms	100 or less	100 or less
Compatible servo amplifier model no.			—	GADSE02 (20 A)	GADSE02 (20 A)

■ Speed-Torque Characteristics

GAM1E4005F0



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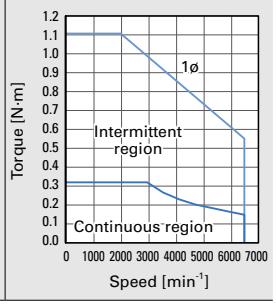


Note 1: Speed-torque characteristics curves and values in the row with a black star symbol (★) are the values after thermal equilibrium is established. All other values are at a temperature of 20ºC.
Note 2: All values are typical values. Torque constant is the value when mounted on the heat dissipation aluminum plate in the table.
Note 3: The holding brake cannot be used for dynamic braking. Holding brake engage/release time denotes the delay time of holding brake activation. Values of holding brake engage/release time vary depending on the circuit used. Please check the delay time on the actual equipment before use.
* The encoder inertia and servo motor mass values are when equipped with a battery-less absolute encoder. Contact us for more information on other encoders.

■ Dimensions/Options/Plugs

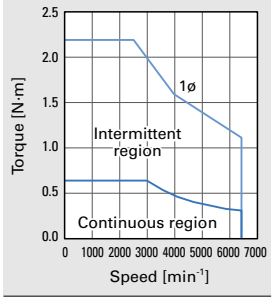
Common to 40 mm sq. 200 V servo motors on p. 23

60 mm sq.

Servo motor model no.		Symbol	Unit	GAM1E6020F0
★ Rated output		P_R	kW	0.2
★ Rated torque		T_R	N・m	0.637
★ Continuous torque at stall		T_S	N・m	0.637
★ Peak torque at stall		T_P	N・m	2.2
★ Rated speed		N_R	min^{-1}	3000
★ Maximum speed		N_{max}	min^{-1}	6500
★ Rated armature current		I_R	Arms	3.8
★ Continuous armature current at stall		I_S	Arms	3.6
★ Peak armature current at stall		I_P	Arms	15.5
Torque constant		K_T	N・m/Arms	0.203
Phase resistance		R_ϕ	Ω	0.62
Rotor inertia	Without brake	J_M	$\times 10^{-4}$kg·m^2 ($GD^2/4$)	0.121
	With brake			0.182
Encoder inertia*		J_S		0.0025
★ Rated power rate	Without brake	Q_R	kW/s	34
	With brake			22
Servo motor mass*	Without brake	W_E	kg	0.94
	With brake			1.4
Size of heat dissipation aluminum plate		—	mm	250 × 250 × 6
Holding brake static friction torque		T_b	N·m	1.37 or greater
Holding brake rated voltage		V_b	V	24 VDC ±10%
Holding brake current consumption		I_b	A	0.29
Holding brake engage time			ms	30 or less
Holding brake release time (varistor)			ms	20 or less
Holding brake release time (diode)			ms	120 or less
Compatible servo amplifier model no.			—	GADSE03 (30 A)

■ Speed-Torque Characteristics

GAM1E6020F0



Note 1: Speed-torque characteristics curves and values in the row with a black star symbol (★) are the values after thermal equilibrium is established. All other values are at a temperature of 20ºC.
Note 2: All values are typical values. Torque constant is the value when mounted on the heat dissipation aluminum plate in the table.
Note 3: The holding brake cannot be used for dynamic braking. Holding brake engage/release time denotes the delay time of holding brake activation. Values of holding brake engage/release time vary depending on the circuit used. Please check the delay time on the actual equipment before use.
* The encoder inertia and servo motor mass values are when equipped with a battery-less absolute encoder. Contact us for more information on other encoders.

■ Dimensions/Options/Plugs

Common to 60 mm sq. 200 V servo motors on p. 25

200 V **Medium-inertia servo motors**

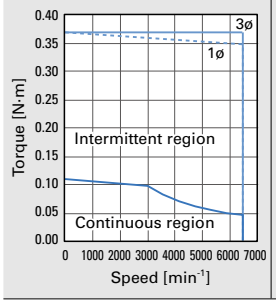
40 mm sq.

Servo motor model no.		Symbol	Unit	GAM2A4003F0	GAM2A4005F0	GAM2A4010F0	GAM2A4015V0	GAM2A4015F0
★ Rated output		P_R	kW	0.03	0.05	0.10	0.15	0.15
★ Rated torque		T_R	N・m	0.098	0.159	0.318	0.48	0.48
★ Continuous torque at stall		T_S	N・m	0.108	0.167	0.318	0.48	0.48
★ Peak torque at stall		T_P	N・m	0.37	0.59	1.18	1.7	1.81
★ Rated speed		N_R	min^{-1}	3000	3000	3000	3000	3000
★ Maximum speed		N_{max}	min^{-1}	6500	6500	6500	6500	6500
★ Rated armature current		I_R	Arms	0.65	0.79	0.99	1.20	1.95
★ Continuous armature current at stall		I_S	Arms	0.65	0.80	0.96	1.20	1.90
★ Peak armature current at stall		I_P	Arms	2.3	2.9	3.6	4.3	7.2
Torque constant		K_T	N・m/Arms	0.183	0.235	0.367	0.441	0.281
Phase resistance		Rø	Ω	10.9	9.3	9.0	8.0	3.3
Rotor inertia	Without brake	J_M	$\times 10^{-4}$kg·m^2 ($GD^2/4$)	0.0233	0.0324	0.0600	0.0876	0.0876
	With brake			0.0303	0.0394	0.0670	0.0946	0.0946
Encoder inertia*		J_S		0.0025	0.0025	0.0025	0.0025	0.0025
★ Rated power rate	Without brake	Q_R	kW/s	4.1	7.8	17	26	26
	With brake			3.2	6.4	15	24	24
Servo motor mass*	Without brake	W_E	kg	0.25	0.29	0.39	0.50	0.50
	With brake			0.44	0.48	0.58	0.69	0.69
Size of heat dissipation aluminum plate		—	mm	250 × 250 × 6	250 × 250 × 6	250 × 250 × 6	305 × 305 × 12	305 × 305 × 12
Holding brake static friction torque		T_b	N·m	0.48 or greater	0.48 or greater	0.48 or greater	0.48 or greater	0.48 or greater
Holding brake rated voltage		V_b	V	24 VDC ±10%	24 VDC ±10%	24 VDC ±10%	24 VDC ±10%	24 VDC ±10%
Holding brake current consumption		I_b	A	0.26	0.26	0.26	0.26	0.26
Holding brake engage time			ms	30 or less	30 or less	30 or less	30 or less	30 or less
Holding brake release time (varistor)			ms	20 or less	20 or less	20 or less	20 or less	20 or less
Holding brake release time (diode)			ms	100 or less	100 or less	100 or less	100 or less	100 or less
Compatible servo amplifier model no.			—	GADSA01 (10 A)	GADSA01 (10 A)	GADSA01 (10 A)	GADSA01 (10 A)	GADSA02 (20 A)

■ Speed-Torque Characteristics

3ø: When the power supply voltage is 3-phase, 1ø: When the power supply voltage is single-phase

GAM2A4003F0



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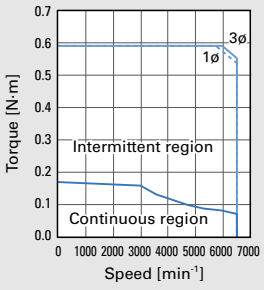

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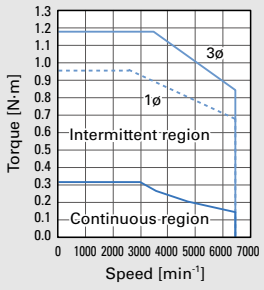

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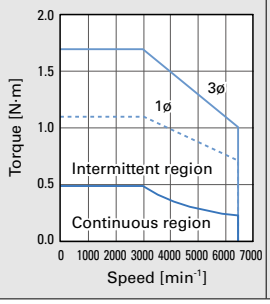
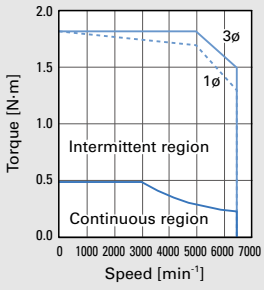


GAM2A4015F0



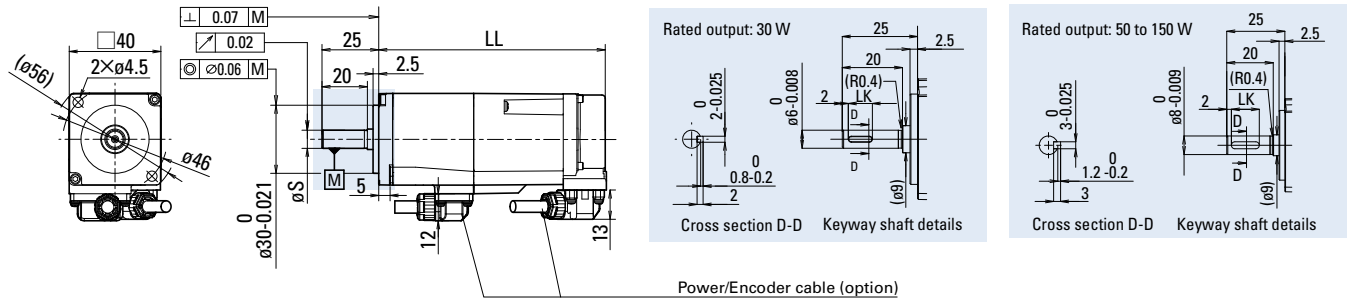
Note 1: Speed-torque characteristics curves and values in the row with a black star symbol (★) are the values after thermal equilibrium is established. All other values are at a temperature of 20ºC.

Note 2: All values are typical values. Torque constant is the value when mounted on the heat dissipation aluminum plate in the table.

Note 3: The holding brake cannot be used for dynamic braking. Holding brake engage/release time denotes the delay time of holding brake activation. Values of holding brake engage/release time vary depending on the circuit used. Please check the delay time on the actual equipment before use.

* The encoder inertia and servo motor mass values are when equipped with a battery-less absolute encoder. Contact us for more information on other encoders.

■ Dimensions [Unit: mm]



	Without oil seal		With oil seal			
	Without brake	With brake	Without brake	With brake		
Servo motor model no.	LL	LL	LL	LL	øS	LK
GAM2□4003	51.5	84	56.5	89	$6^{0}_{-0.008}$	8
GAM2□4005	55.5	88	60.5	93	$8^{0}_{-0.009}$	12
GAM2□4010	68	100.5	73	105.5	$8^{0}_{-0.009}$	12
GAM2A4015	80.5	113	85.5	118	$8^{0}_{-0.009}$	15

Options

■ Power/Encoder cable

Front and rear cable exits are directed to the output shaft direction and the opposite direction, respectively.

Cable model no.						Cable exit direction	Cable length [m]
Power*		Encoder					
Standard	Oil-resistant	Standard		Oil-resistant			
w/o amplifier connector	w/o amplifier connector	w/o amplifier connector	w/ amplifier connector	w/o amplifier connector	w/ amplifier connector		
GSSF0100S	GSSF0100C	GESF0100S	GESF0100SA	GESF0100C	GESF0100CA	Front	1
GSSR0100S	GSSR0100C	GESR0100S	GESR0100SA	GESR0100C	GESR0100CA	Rear	1
GSSF0300S	GSSF0300C	GESF0300S	GESF0300SA	GESF0300C	GESF0300CA	Front	3
GSSR0300S	GSSR0300C	GESR0300S	GESR0300SA	GESR0300C	GESR0300CA	Rear	3
GSSF0500S	GSSF0500C	GESF0500S	GESF0500SA	GESF0500C	GESF0500CA	Front	5
GSSR0500S	GSSR0500C	GESR0500S	GESR0500SA	GESR0500C	GESR0500CA	Rear	5

* Power cable is common to both models, with or without a brake.

Plugs

■ Motor power / holding brake plug (motor side)

Manufacturer: Japan Aviation Electronics Industry, Ltd.

Cable exit direction	Plug mfr. part no.	Compatible cable diameter	Contact mfr. part no.		Compatible wire diameter (including insulation)		Compatible wire size (AWG)	
			Power	Brake	Power	Brake	Power	Brake
Front	JN16FE06SS1	ø5.2 to 5.6 mm	JN16S10K4A1		ø1.0 to 1.55 mm		22 to 24	
Rear	JN16FE06SS2							

■ Encoder plug (motor side)

Manufacturer: Japan Aviation Electronics Industry, Ltd.

Cable exit direction	Plug mfr. part no.	Compatible cable diameter	Contact mfr. part no.	Compatible wire diameter (including insulation)	Compatible wire size (AWG)
Front	JN16FS09SS1	ø4.9 to 5.6 mm	JN-24S-C2B-B1-10000	ø0.7 to 0.9 mm	26
Rear	JN16FS09SS2				

Note 1: Plugs and contacts are not provided. Please contact the connector manufacturer.
Note 2: See the catalogs and instruction manuals issued by the connector manufacturer for handling and safety precautions.

200 V **Medium-inertia servo motors**

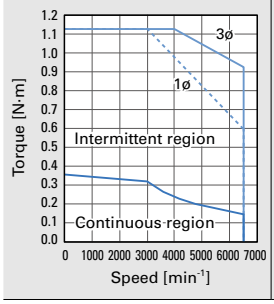
60 mm sq.

Servo motor model no.		Symbol	Unit	GAM2A6010F0	GAM2A6020F0	GAM2A6040F0	GAM2A6060V0	GAM2A6060F0
★ Rated output		P_R	kW	0.1	0.2	0.4	0.6	0.6
★ Rated torque		T_R	N・m	0.318	0.637	1.27	1.91	1.91
★ Continuous torque at stall		T_S	N・m	0.353	0.686	1.37	2.0	2.0
★ Peak torque at stall		T_P	N・m	1.13	2.2	4.8	7.1	7.1
★ Rated speed		N_R	min^{-1}	3000	3000	3000	3000	3000
★ Maximum speed		N_{max}	min^{-1}	6500	6500	6500	6500	6500
★ Rated armature current		I_R	Arms	1.02	1.65	2.9	4.1	5.8
★ Continuous armature current at stall		I_S	Arms	1.06	1.70	2.9	4.0	5.7
★ Peak armature current at stall		I_P	Arms	3.3	5.5	10.8	15	21
Torque constant		K_T	N・m/Arms	0.395	0.456	0.521	0.539	0.384
Phase resistance		R_ϕ	Ω	5.3	2.6	1.38	0.92	0.50
Rotor inertia	Without brake	J_M	$\times 10^{-4}$kg·m^2 ($GD^2/4$)	0.143	0.247	0.466	0.685	0.685
	With brake			0.201	0.306	0.524	0.743	0.743
Encoder inertia*		J_S		0.0025	0.0025	0.0025	0.0025	0.0025
★ Rated power rate	Without brake	Q_R	kW/s	7.1	16	35	53	53
	With brake			5.0	13	31	49	49
Servo motor mass*	Without brake	W_E	kg	0.59	0.80	1.2	1.6	1.6
	With brake			0.88	1.2	1.6	2.0	2.0
Size of heat dissipation aluminum plate		—	mm	250 × 250 × 6	250 × 250 × 6	250 × 250 × 6	305 × 305 × 12	305 × 305 × 12
Holding brake static friction torque		T_b	N·m	0.36 or greater	1.37 or greater	1.37 or greater	1.91 or greater	1.91 or greater
Holding brake rated voltage		V_b	V	24 VDC ±10%	24 VDC ±10%	24 VDC ±10%	24 VDC ±10%	24 VDC ±10%
Holding brake current consumption		I_b	A	0.27	0.29	0.29	0.32	0.32
Holding brake engage time			ms	30 or less	30 or less	30 or less	40 or less	40 or less
Holding brake release time (varistor)			ms	20 or less	20 or less	20 or less	20 or less	20 or less
Holding brake release time (diode)			ms	120 or less	120 or less	120 or less	120 or less	120 or less
Compatible servo amplifier model no.			—	GADSA01 (10 A)	GADSA02 (20 A)	GADSA02 (20 A)	GADSA03 (30 A)	GADSA05 (50 A)

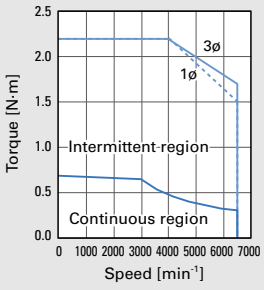
■ Speed-Torque Characteristics

3ø: When the power supply voltage is 3-phase, 1ø: When the power supply voltage is single-phase

GAM2A6010F0



GAM2A6020F0



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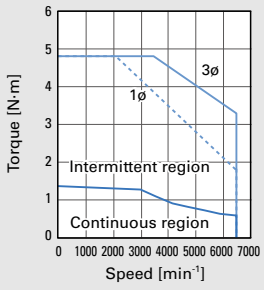

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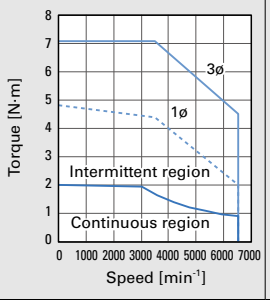

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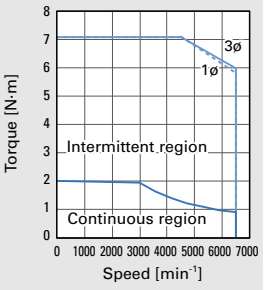


GAM2A6040 and GAM2A6060 models may be derated with brake or oil seal.

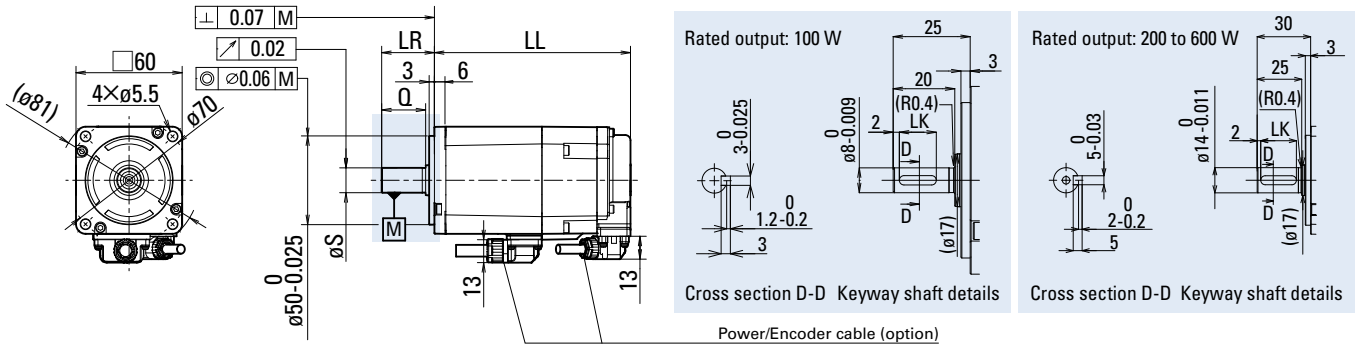
Note 1: Speed-torque characteristics curves and values in the row with a black star symbol (★) are the values after thermal equilibrium is established. All other values are at a temperature of 20ºC.

Note 2: All values are typical values. Torque constant is the value when mounted on the heat dissipation aluminum plate in the table.

Note 3: The holding brake cannot be used for dynamic braking. Holding brake engage/release time denotes the delay time of holding brake activation. Values of holding brake engage/release time vary depending on the circuit used. Please check the delay time on the actual equipment before use.

* The encoder inertia and servo motor mass values are when equipped with a battery-less absolute encoder. Contact us for more information on other encoders.

■ Dimensions [Unit: mm]



	Without oil seal		With oil seal					
	Without brake	With brake	Without brake	With brake				
Servo motor model no.	LL	LL	LL	LL	LR	Q	øS	LK
GAM2□6010	55.5	77.5	62.5	84.5	25	20	$8^{0}_{-0.009}$	12
GAM2□6020	65.5	91.5	72.5	98.5	30	25	$14^{0}_{-0.011}$	20
GAM2A6040	85.5	111.5	92.5	118.5	30	25	$14^{0}_{-0.011}$	20
GAM2A6060	115.5	143.5	122.5	150.5	30	25	$14^{0}_{-0.011}$	20

Options

■ Power/Encoder cable

Front and rear cable exits are directed to the output shaft direction and the opposite direction, respectively.

Cable model no.						Cable exit direction	Cable length [m]
Power*		Encoder					
Standard	Oil-resistant	Standard		Oil-resistant			
w/o amplifier connector	w/o amplifier connector	w/o amplifier connector	w/ amplifier connector	w/o amplifier connector	w/ amplifier connector		
GMSF0100S	GMSF0100C	GESF0100S	GESF0100SA	GESF0100C	GESF0100CA	Front	1
GMSR0100S	GMSR0100C	GESR0100S	GESR0100SA	GESR0100C	GESR0100CA	Rear	1
GMSF0300S	GMSF0300C	GESF0300S	GESF0300SA	GESF0300C	GESF0300CA	Front	3
GMSR0300S	GMSR0300C	GESR0300S	GESR0300SA	GESR0300C	GESR0300CA	Rear	3
GMSF0500S	GMSF0500C	GESF0500S	GESF0500SA	GESF0500C	GESF0500CA	Front	5
GMSR0500S	GMSR0500C	GESR0500S	GESR0500SA	GESR0500C	GESR0500CA	Rear	5

* Power cable is common to both models, with or without a brake.

Plugs

■ Motor power / holding brake plug (motor side)

Manufacturer: Japan Aviation Electronics Industry, Ltd.

Cable exit direction	Plug mfr. part no.	Compatible cable diameter	Contact mfr. part no.		Compatible wire diameter (including insulation)		Compatible wire size (AWG)	
			Power	Brake	Power	Brake	Power	Brake
Front	JN16FG06SS1	ø6.3 to 6.9 mm	JN16S25H3A1	JN16S10K4A1	ø1.2 to 1.85 mm	ø1.0 to 1.55 mm	19	23
Rear	JN16FG06SS2							

■ Encoder plug (motor side)

Manufacturer: Japan Aviation Electronics Industry, Ltd.

Cable exit direction	Plug mfr. part no.	Compatible cable diameter	Contact mfr. part no.	Compatible wire diameter (including insulation)	Compatible wire size (AWG)
Front	JN16FS09SS1	ø4.9 to 5.6 mm	JN-24S-C2B-B1-10000	ø0.7 to 0.9 mm	26
Rear	JN16FS09SS2				

Note 1: Plugs and contacts are not provided. Please contact the connector manufacturer.
Note 2: See the catalogs and instruction manuals issued by the connector manufacturer for handling and safety precautions.

200 V **Medium-inertia servo motors**

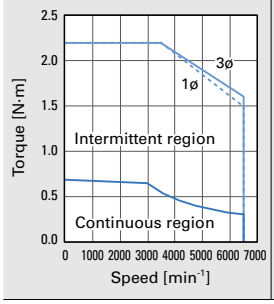
80 mm sq.

Servo motor model no.		Symbol	Unit	GAM2A8020F0	GAM2A8040F0	GAM2A8075V0	GAM2A8075F0	GAM2A8100F0
★ Rated output		P_R	kW	0.2	0.4	0.75	0.75	1.0
★ Rated torque		T_R	N・m	0.637	1.27	2.39	2.39	3.18
★ Continuous torque at stall		T_S	N・m	0.686	1.37	2.55	2.55	3.39
★ Peak torque at stall		T_P	N・m	2.2	4.4	8.5	8.5	11.3
★ Rated speed		N_R	min^{-1}	3000	3000	3000	3000	3000
★ Maximum speed		N_{max}	min^{-1}	6500	6500	6500	6500	6500
★ Rated armature current		I_R	Arms	1.53	2.8	4.3	5.9	6.2
★ Continuous armature current at stall		I_S	Arms	1.59	2.9	4.4	5.9	6.3
★ Peak armature current at stall		I_P	Arms	5.8	9.7	16	21.4	23
Torque constant		K_T	N・m/Arms	0.476	0.530	0.625	0.464	0.579
Phase resistance		R_ϕ	Ω	2.9	1.25	0.65	0.38	0.45
Rotor inertia	Without brake	J_M	$\times 10^{-4}$kg·m^2 ($GD^2/4$)	0.409	0.805	1.56	1.56	1.96
	With brake			0.596	0.992	1.76	1.76	2.16
Encoder inertia*		J_S		0.0025	0.0025	0.0025	0.0025	0.0025
★ Rated power rate	Without brake	Q_R	kW/s	9.9	20	37	37	52
	With brake			6.8	16	32	32	47
Servo motor mass*	Without brake	W_E	kg	1.2	1.5	2.2	2.2	2.5
	With brake			1.8	2.1	3.0	3.0	3.3
Size of heat dissipation aluminum plate		—	mm	250 × 250 × 6	250 × 250 × 6	250 × 250 × 6	250 × 250 × 6	305 × 305 × 12
Holding brake static friction torque		T_b	N·m	1.37 or greater	1.37 or greater	3.18 or greater	3.18 or greater	3.18 or greater
Holding brake rated voltage		V_b	V	24 VDC ±10%	24 VDC ±10%	24 VDC ±10%	24 VDC ±10%	24 VDC ±10%
Holding brake current consumption		I_b	A	0.32	0.32	0.33	0.33	0.33
Holding brake engage time			ms	50 or less	50 or less	50 or less	50 or less	50 or less
Holding brake release time (varistor)			ms	30 or less	30 or less	30 or less	30 or less	30 or less
Holding brake release time (diode)			ms	200 or less	200 or less	200 or less	200 or less	200 or less
Compatible servo amplifier model no.			—	GADSA02 (20 A)	GADSA02 (20 A)	GADSA03 (30 A)	GADSA05 (50 A)	GADSA05 (50 A)

■ Speed-Torque Characteristics

3ø: When the power supply voltage is 3-phase, 1ø: When the power supply voltage is single-phase

GAM2A8020F0



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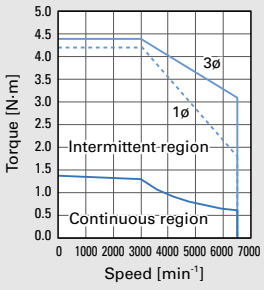
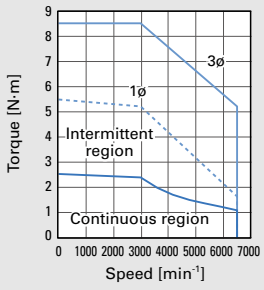


GAM2A8075V0



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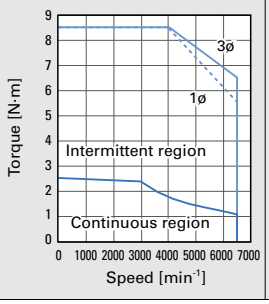
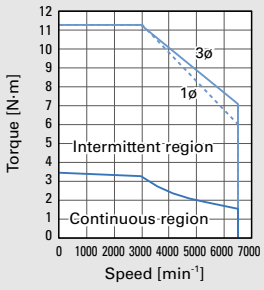


GAM2A8100F0



GAM2A8075 and GAM2A8100 models may be derated with brake or oil seal.

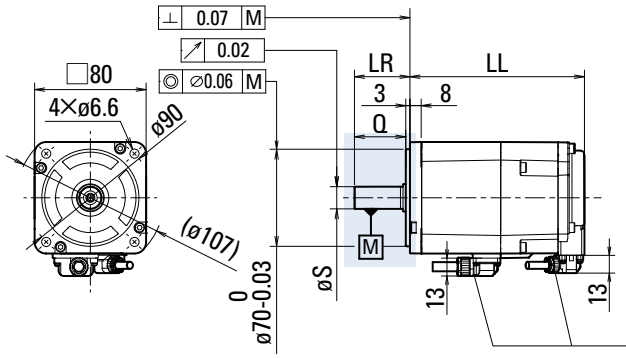
Note 1: Speed-torque characteristics curves and values in the row with a black star symbol (★) are the values after thermal equilibrium is established. All other values are at a temperature of 20°C.

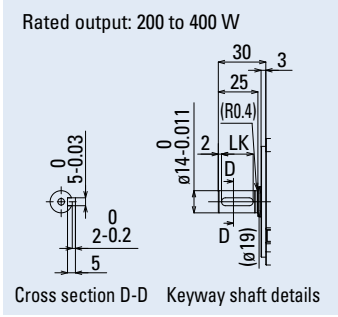
Note 2: All values are typical values. Torque constant is the value when mounted on the heat dissipation aluminum plate in the table.

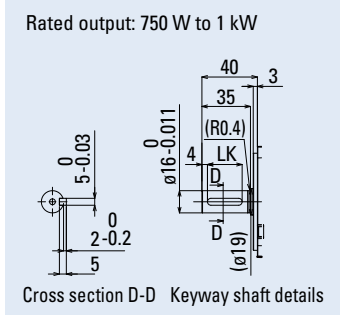
Note 3: The holding brake cannot be used for dynamic braking. Holding brake engage/release time denotes the delay time of holding brake activation. Values of holding brake engage/release time vary depending on the circuit used. Please check the delay time on the actual equipment before use.

* The encoder inertia and servo motor mass values are when equipped with a battery-less absolute encoder. Contact us for more information on other encoders.

■ Dimensions [Unit: mm]







Power/Encoder cable (option)

	Without oil seal		With oil seal					
	Without brake	With brake	Without brake	With brake				
Servo motor model no.	LL	LL	LL	LL	LR	Q	øS	LK
GAM2□8020	63	86.5	70	93.5	30	25	$14^{0}_{-0.011}$	20
GAM2□8040	72.5	96.5	79.5	103.5	30	25	$14^{0}_{-0.011}$	20
GAM2□8075	92	126	99	133	40	35	$16^{0}_{-0.011}$	25
GAM2□8100	102	135.5	109	142.5	40	35	$16^{0}_{-0.011}$	25

Options

■ Power/Encoder cable

Front and rear cable exits are directed to the output shaft direction and the opposite direction, respectively.

Cable model no.						Cable exit direction	Cable length [m]
Power*		Encoder					
Standard	Oil-resistant	Standard		Oil-resistant			
w/o amplifier connector	w/o amplifier connector	w/o amplifier connector	w/ amplifier connector	w/o amplifier connector	w/ amplifier connector		
GMSF0100S	GMSF0100C	GESF0100S	GESF0100SA	GESF0100C	GESF0100CA	Front	1
GMSR0100S	GMSR0100C	GESR0100S	GESR0100SA	GESR0100C	GESR0100CA	Rear	1
GMSF0300S	GMSF0300C	GESF0300S	GESF0300SA	GESF0300C	GESF0300CA	Front	3
GMSR0300S	GMSR0300C	GESR0300S	GESR0300SA	GESR0300C	GESR0300CA	Rear	3
GMSF0500S	GMSF0500C	GESF0500S	GESF0500SA	GESF0500C	GESF0500CA	Front	5
GMSR0500S	GMSR0500C	GESR0500S	GESR0500SA	GESR0500C	GESR0500CA	Rear	5

* Power cable is common to both models, with or without a brake.

Plugs

■ Motor power / holding brake plug (motor side)

Manufacturer: Japan Aviation Electronics Industry, Ltd.

Cable exit direction	Plug mfr. part no.	Compatible cable diameter	Contact mfr. part no.		Compatible wire diameter (including insulation)		Compatible wire size (AWG)	
			Power	Brake	Power	Brake	Power	Brake
Front	JN16FG06SS1	ø6.3 to 6.9 mm	JN16S25H3A1	JN16S10K4A1	ø1.2 to 1.85 mm	ø1.0 to 1.55 mm	19	23
Rear	JN16FG06SS2							

■ Encoder plug (motor side)

Manufacturer: Japan Aviation Electronics Industry, Ltd.

Cable exit direction	Plug mfr. part no.	Compatible cable diameter	Contact mfr. part no.	Compatible wire diameter (including insulation)	Compatible wire size (AWG)
Front	JN16FS09SS1	ø4.9 to 5.6 mm	JN-24S-C2B-B1-10000	ø0.7 to 0.9 mm	26
Rear	JN16FS09SS2				

Note 1: Plugs and contacts are not provided. Please contact the connector manufacturer.
Note 2: See the catalogs and instruction manuals issued by the connector manufacturer for handling and safety precautions.

200 V **Medium-inertia servo motors**

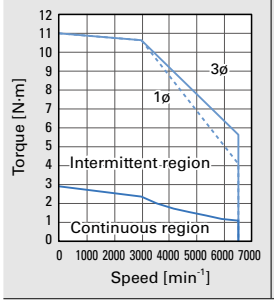
86 mm sq.

Servo motor model no.		Symbol	Unit	GAM2A9075F0	GAM2A9100H0	GAM2A9100F0
★ Rated output		P_R	kW	0.75	1.0	1.0
★ Rated torque		T_R	N・m	2.38	3.18	3.18
★ Continuous torque at stall		T_S	N・m	2.94	3.92	3.92
★ Peak torque at stall		T_P	N・m	11.0	11.6	14.3
★ Rated speed		N_R	min^{-1}	3000	3000	3000
★ Maximum speed		N_{max}	min^{-1}	6500	3000	6500
★ Rated armature current		I_R	Arms	4.7	4.6	6.0
★ Continuous armature current at stall		I_S	Arms	5.5	4.7	6.8
★ Peak armature current at stall		I_P	Arms	23.5	15.5	25.7
Torque constant		K_T	N・m/Arms	0.547	0.825	0.582
Phase resistance		R_ϕ	Ω	0.62	0.85	0.44
Rotor inertia	Without brake	J_M	$\times 10^{-4}$kg·m^2 ($GD^2/4$)	1.57	2.45	2.45
	With brake			1.87	2.75	2.75
Encoder inertia*		J_S		0.0025	0.0025	0.0025
★ Rated power rate	Without brake	Q_R	kW/s	36	41	41
	With brake			30	37	37
Servo motor mass*	Without brake	W_E	kg	2.7	3.4	3.4
	With brake			3.5	4.2	4.2
Size of heat dissipation aluminum plate		—	mm	305 × 305 × 12	305 × 305 × 12	305 × 305 × 12
Holding brake static friction torque		T_b	N·m	3.92 or greater	3.92 or greater	3.92 or greater
Holding brake rated voltage		V_b	V	24 VDC ±10%	24 VDC ±10%	24 VDC ±10%
Holding brake current consumption		I_b	A	0.34	0.34	0.34
Holding brake engage time			ms	50 or less	50 or less	50 or less
Holding brake release time (varistor)			ms	30 or less	30 or less	30 or less
Holding brake release time (diode)			ms	200 or less	200 or less	200 or less
Compatible servo amplifier model no.			—	GADSA05 (50 A)	GADSA03 (30 A)	GADSA05 (50 A)

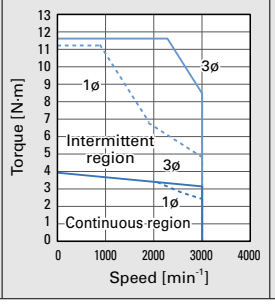
■ Speed-Torque Characteristics

3ø: When the power supply voltage is 3-phase, 1ø: When the power supply voltage is single-phase (GAM2A9100H0 will be derated to 750 W)

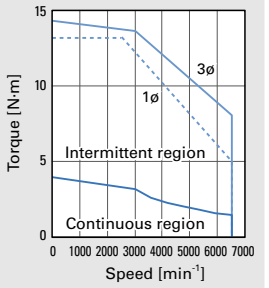
GAM2A9075F0



GAM2A9100H0



GAM2A9100F0



GAM2A9100 models may be derated with brake or oil seal.

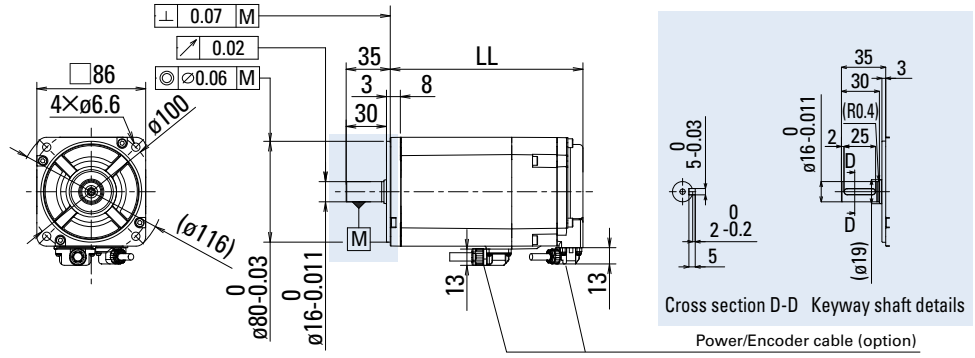
Note 1: Speed-torque characteristics curves and values in the row with a black star symbol (★) are the values after thermal equilibrium is established. All other values are at a temperature of 20°C.

Note 2: All values are typical values. Torque constant is the value when mounted on the heat dissipation aluminum plate in the table.

Note 3: The holding brake cannot be used for dynamic braking. Holding brake engage/release time denotes the delay time of holding brake activation. Values of holding brake engage/release time vary depending on the circuit used. Please check the delay time on the actual equipment before use.

* The encoder inertia and servo motor mass values are when equipped with a battery-less absolute encoder. Contact us for more information on other encoders.

■ Dimensions [Unit: mm] The LL value does not change with or without oil seal.



	Without brake	With brake
Servo motor model no.	LL	LL
GAM2□9075	104.5	130
GAM2□9100	127	153

Options

■ Power/Encoder cable

Front and rear cable exits are directed to the output shaft direction and the opposite direction, respectively.

Cable model no.						Cable exit direction	Cable length [m]
Power*		Encoder					
Standard	Oil-resistant	Standard		Oil-resistant			
w/o amplifier connector	w/o amplifier connector	w/o amplifier connector	w/ amplifier connector	w/o amplifier connector	w/ amplifier connector		
GMSF0100S	GMSF0100C	GESF0100S	GESF0100SA	GESF0100C	GESF0100CA	Front	1
GMSR0100S	GMSR0100C	GESR0100S	GESR0100SA	GESR0100C	GESR0100CA	Rear	1
GMSF0300S	GMSF0300C	GESF0300S	GESF0300SA	GESF0300C	GESF0300CA	Front	3
GMSR0300S	GMSR0300C	GESR0300S	GESR0300SA	GESR0300C	GESR0300CA	Rear	3
GMSF0500S	GMSF0500C	GESF0500S	GESF0500SA	GESF0500C	GESF0500CA	Front	5
GMSR0500S	GMSR0500C	GESR0500S	GESR0500SA	GESR0500C	GESR0500CA	Rear	5

* Power cable is common to both models, with or without a brake.

Plugs

■ Motor power / holding brake plug (motor side)

Manufacturer: Japan Aviation Electronics Industry, Ltd.

Cable exit direction	Plug mfr. part no.	Compatible cable diameter	Contact mfr. part no.		Compatible wire diameter (including insulation)		Compatible wire size (AWG)	
			Power	Brake	Power	Brake	Power	Brake
Front	JN16FG06SS1	ø6.3 to 6.9 mm	JN16S25H3A1	JN16S10K4A1	ø1.2 to 1.85 mm	ø1.0 to 1.55 mm	19	23
Rear	JN16FG06SS2							

■ Encoder plug (motor side)

Manufacturer: Japan Aviation Electronics Industry, Ltd.

Cable exit direction	Plug mfr. part no.	Compatible cable diameter	Contact mfr. part no.	Compatible wire diameter (including insulation)	Compatible wire size (AWG)
Front	JN16FS09SS1	ø4.9 to 5.6 mm	JN-24S-C2B-B1-10000	ø0.7 to 0.9 mm	26
Rear	JN16FS09SS2				

Note 1: Plugs and contacts are not provided. Please contact the connector manufacturer.
Note 2: See the catalogs and instruction manuals issued by the connector manufacturer for handling and safety precautions.

200 V Medium-inertia servo motors

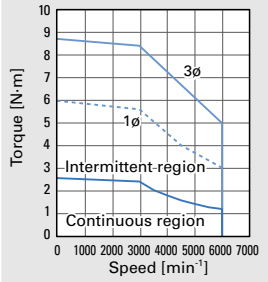
100 mm sq.

Servo motor model no.		Symbol	Unit	GAM2AA075F0	GAM2AA100F0	GAM2AA150H0	GAM2AA150F0
★ Rated output		P_R	kW	0.75	1.0	1.5	1.5
★ Rated torque		T_R	N・m	2.39	3.18	7.2	4.8
★ Continuous torque at stall		T_S	N・m	2.55	3.92	8.0	4.9
★ Peak torque at stall		T_P	N・m	8.7	14.7	21.0	14.7
★ Rated speed		N_R	min^{-1}	3000	3000	2000	3000
★ Maximum speed		N_{max}	min^{-1}	6000	6000	3000	6000
★ Rated armature current		I_R	Arms	4.5	5.5	8.3	8.6
★ Continuous armature current at stall		I_S	Arms	4.6	6.2	8.9	8.5
★ Peak armature current at stall		I_P	Arms	16.3	26.5	25.5	26.5
Torque constant		K_T	N・m/Arms	0.639	0.665	0.983	0.633
Phase resistance		$R_Ø$	Ω	0.69	0.32	0.43	0.16
Rotor inertia	Without brake	J_M	$\times 10^{-4}$kg・m^2 ($GD^2/4$)	2.36	3.97	6.10	6.10
	With brake			2.69	4.30	6.45	6.45
Encoder inertia*		J_S		0.0025	0.0025	0.0025	0.0025
★ Rated power rate	Without brake	Q_R	kW/s	24	25	85	38
	With brake			21	24	80	36
Servo motor mass*	Without brake	W_E	kg	3.3	4.1	5.9	5.9
	With brake			4.1	4.9	7.5	7.5
Size of heat dissipation aluminum plate		—	mm	305 × 305 × 12	305 × 305 × 12	400 × 400 × 20	400 × 400 × 20
Holding brake static friction torque		T_b	N·m	3.92 or greater	3.92 or greater	8 or greater	8 or greater
Holding brake rated voltage		V_b	V	24 VDC ±10%	24 VDC ±10%	24 VDC ±10%	24 VDC ±10%
Holding brake current consumption		I_b	A	0.36	0.36	0.67	0.67
Holding brake engage time			ms	50 or less	50 or less	100 or less	100 or less
Holding brake release time (varistor)			ms	30 or less	30 or less	30 or less	30 or less
Holding brake release time (diode)			ms	200 or less	200 or less	200 or less	200 or less
Compatible servo amplifier model no.			—	GADSA03 (30 A)	GADSA05 (50 A)	GADSA05 (50 A)	GADSA05 (50 A)

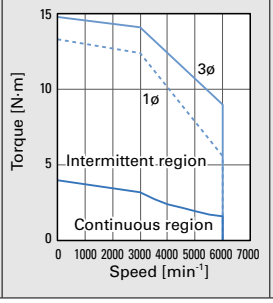
■ Speed-Torque Characteristics

3ø: When the power supply voltage is 3-phase, 1ø: When the power supply voltage is single-phase

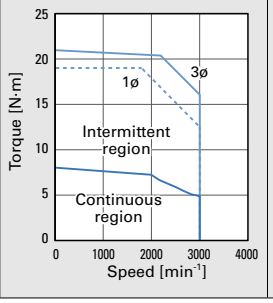
GAM2AA075F0



GAM2AA100F0



GAM2AA150H0



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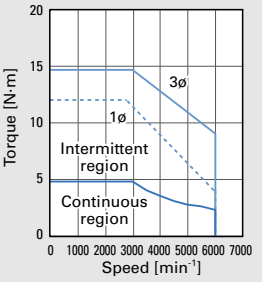


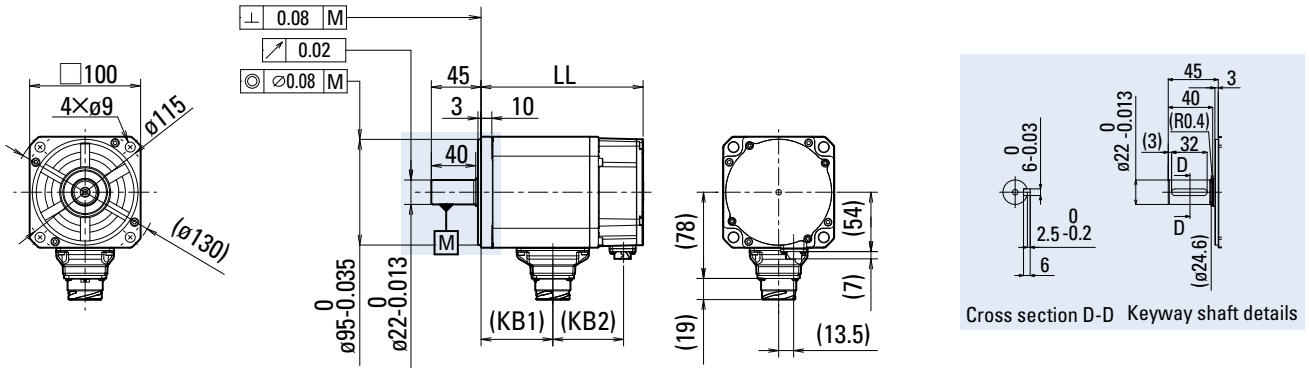
Note 1: Speed-torque characteristics curves and values in the row with a black star symbol (★) are the values after thermal equilibrium is established. All other values are at a temperature of 20ºC.

Note 2: All values are typical values. Torque constant is the value when mounted on the heat dissipation aluminum plate in the table.

Note 3: The holding brake cannot be used for dynamic braking. Holding brake engage/release time denotes the delay time of holding brake activation. Values of holding brake engage/release time vary depending on the circuit used. Please check the delay time on the actual equipment before use.

* The encoder inertia and servo motor mass values are when equipped with a battery-less absolute encoder. Contact us for more information on other encoders.

■ Dimensions [Unit: mm] The LL value does not change with or without oil seal.



	Without brake	With brake	Without brake		With brake	
Servo motor model no.	LL	LL	KB1	KB2	KB1	KB2
GAM2□A075	111	129	47.5	45	47.5	63
GAM2□A100	128	146	64.5	45	64.5	63
GAM2□A150	161	205.5	97.5	45	97.5	90

Options

■ Power/Encoder cable

Cable model no.					Cable length [m]
Power (without brake)		Power (with brake)		Encoder	
Push-pull locking	Jack screw locking	Push-pull locking	Jack screw locking	Jack screw locking	
w/o amplifier connector	w/o amplifier connector	w/o amplifier connector	w/o amplifier connector	w/ amplifier connector	
GPPB0100S	AL-01190701-01	GQPB0100SB	AL-01190702-01	RS-CA9-01-R	1
GPPB0300S	AL-01190701-03	GQPB0300SB	AL-01190702-03	RS-CA9-03-R	3
GPPB0500S	AL-01190701-05	GQPB0500SB	AL-01190702-05	RS-CA9-05-R	5

Plug specifications

■ Motor power / holding brake plug (motor side) Manufacturer: Japan Aviation Electronics Industry, Ltd.

Holding brake	Receptacle mfr. part no.	Pin assignment					Recommended motor power cable size (U, V, W, and ground)	
		U phase	V phase	W phase	Ground	Brake	mm^2	AWG No.
None	JL10-2E20-4PE-B	A	B	C	D	—	2.0	14
Yes	JL10-2E20-18PE-B	F	I	B	E, D	G, H	2.0	14

Holding brake	Plug fixing method	Plug mfr. part no.		Cable clamp	
		Straight	Angled	Mfr. part no.	Compatible cable outer diameter
None	Push-pull locking	JL10-6A20-4SE-EB	JL10-8A20-4SE-EB	JL04-2022CK(14)-R	ø12.9 to 16 mm
	Jack screw locking	JL04V-6A20-4SE-EB-RK	JL04V-8A20-4SE-EBH-RK	JL04-2022CK(14)-R	ø12.9 to 16 mm
Yes	Push-pull locking	JL10-6A20-18SE-EB	JL10-8A20-18SE-EB	JL04-2022CK(14)-R	ø12.9 to 16 mm
	Jack screw locking	JL04V-6A20-18SE-EB-RK	JL04V-8A20-18SE-EBH-R	JL04-2022CK(14)-R	ø12.9 to 16 mm

■ Encoder plug (motor side) Manufacturer: Japan Aviation Electronics Industry, Ltd.

Receptacle mfr. part no.	Plug mfr. part no.		Compatible cable diameter
	Straight	Angled	
JN2AS10ML2-R	JN2DS10SL1-R	JN2FS10SL1-R	ø5.7 to 7.3 mm
	JN2DS10SL2-R	JN2FS10SL2-R	ø6.5 to 8.0 mm
	JN2DS10SL3-R	JN2FS10SL3-R	ø3.5 to 5.0 mm

Contact size	Classification	Applicable socket contact	
		Mfr. part no.	Compatible wire size
#22	Manual crimping tool type	JN1-22-20S-R-PKG100	20 AWG
		JN1-22-22S-PKG100	AWG 21 to 25
		JN1-22-26S-PKG100	AWG 26 to 28
	Soldering type	JN1-22-22F-PKG100	20 AWG or smaller

Note: See the catalogs and instruction manuals issued by the connector manufacturer for handling and safety precautions.

200 V **Medium-inertia servo motors**

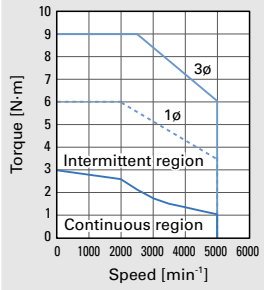
130 mm sq.

Servo motor model no.		Symbol	Unit	GAM2AB055D0	GAM2AB120B0	GAM2AB120H0	GAM2AB120D0
★ Rated output		P_R	kW	0.55	1.2	1.2	1.2
★ Rated torque		T_R	N・m	2.6	5.8	5.8	5.8
★ Continuous torque at stall		T_S	N・m	3.0	6.0	6.0	6.0
★ Peak torque at stall		T_P	N・m	9.0	16.5	20.0	16.5
★ Rated speed		N_R	min^{-1}	2000	2000	2000	2000
★ Maximum speed		N_{max}	min^{-1}	5000	3000	4000	5000
★ Rated armature current		I_R	Arms	4.3	5.2	6.7	8.7
★ Continuous armature current at stall		I_S	Arms	4.7	5.2	6.6	8.6
★ Peak armature current at stall		I_P	Arms	16.3	15.5	26.5	26.0
Torque constant		K_T	N・m/Arms	0.702	1.26	0.971	0.756
Phase resistance		$R_Ø$	Ω	0.64	0.71	0.40	0.24
Rotor inertia	Without brake	J_M	$\times 10^{-4}$kg・m^2 ($GD^2/4$)	4.36	7.78	7.78	7.78
	With brake			5.43	8.86	8.86	8.86
Encoder inertia*		J_S		0.0025	0.0025	0.0025	0.0025
★ Rated power rate	Without brake	Q_R	kW/s	16	43	43	43
	With brake			12	38	38	38
Servo motor mass*	Without brake	W_E	kg	4.2	5.5	5.5	5.5
	With brake			5.8	7.1	7.1	7.1
Size of heat dissipation aluminum plate		—	mm	305 × 305 × 20	400 × 400 × 20	400 × 400 × 20	400 × 400 × 20
Holding brake static friction torque		T_b	N·m	13 or greater	13 or greater	13 or greater	13 or greater
Holding brake rated voltage		V_b	V	24 VDC ±10%	24 VDC ±10%	24 VDC ±10%	24 VDC ±10%
Holding brake current consumption		I_b	A	0.39	0.39	0.39	0.39
Holding brake engage time			ms	100 or less	100 or less	100 or less	100 or less
Holding brake release time (varistor)			ms	30 or less	30 or less	30 or less	30 or less
Holding brake release time (diode)			ms	200 or less	200 or less	200 or less	200 or less
Compatible servo amplifier model no.			—	GADSA03 (30 A)	GADSA03 (30 A)	GADSA05 (50 A)	GADSA05 (50 A)

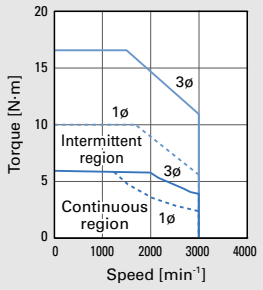
■ Speed-Torque Characteristics

3ø: When the power supply voltage is 3-phase, 1ø: When the power supply voltage is single-phase (GAM2AB120B0 will be derated to 750 W)

GAM2AB055D0



GAM2AB120B0



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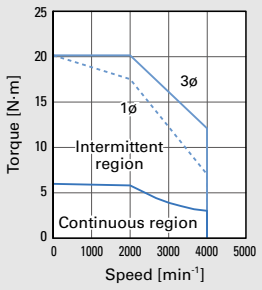
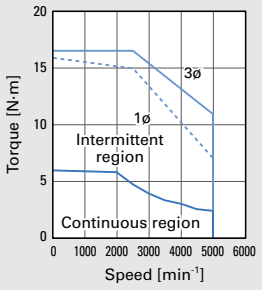


GAM2AB120D0



Note 1: Speed-torque characteristics curves and values in the row with a black star symbol (★) are the values after thermal equilibrium is established. All other values are at a temperature of 20°C.

Note 2: All values are typical values. Torque constant is the value when mounted on the heat dissipation aluminum plate in the table.

Note 3: The holding brake cannot be used for dynamic braking. Holding brake engage/release time denotes the delay time of holding brake activation. Values of holding brake engage/release time vary depending on the circuit used. Please check the delay time on the actual equipment before use.

* The encoder inertia and servo motor mass values are when equipped with a battery-less absolute encoder. Contact us for more information on other encoders.

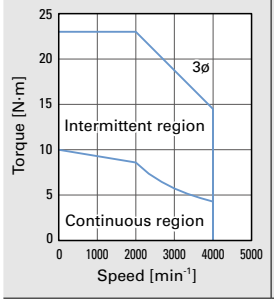
130 mm sq.

GAM2AB180H0	GAM2AB180D0	GAM2AB200H0	GAM2AB200D0	GAM2AB300B0	Servo motor model no. Unit	Symbol	
1.8	1.8	2.0	2.0	3.0	kW	P_R	★ Rated output
8.6	8.6	9.5	9.5	14.4	N・m	T_R	★ Rated torque
10.0	10.0	12.0	12.0	16.0	N・m	T_S	★ Continuous torque at stall
23.0	25.5	25.0	31.0	47.3	N・m	T_P	★ Peak torque at stall
2000	2000	2000	2000	2000	min^{-1}	N_R	★ Rated speed
4000	5000	4000	5000	3000	min^{-1}	N_{max}	★ Maximum speed
9.4	13.8	9.4	12.9	14.0	Arms	I_R	★ Rated armature current
10.5	15.7	11.6	15.8	14.9	Arms	I_S	★ Continuous armature current at stall
26.5	45.5	26.5	45.5	50.1	Arms	I_P	★ Peak armature current at stall
1.00	0.673	1.09	0.794	1.13	N・m/Arms	K_T	Torque constant
0.238	0.105	0.21	0.102	0.151	Ω	Rø	Phase resistance
11.5	11.5	15.0	15.0	18.7	$\times10^{-4}kg{\cdot}m^2$ ($GD^2/4$)	J_M	Rotor inertia — Without brake
12.5	12.5	16.2	16.2	19.8			Rotor inertia — With brake
0.0025	0.0025	0.0105	0.0105	0.0105		J_S	Encoder inertia*
64	64	60	60	111	kW/s	Q_R	★ Rated power rate — Without brake
59	59	56	56	105			★ Rated power rate — With brake
6.9	6.9	8.4	8.4	9.8	kg	W_E	Servo motor mass* — Without brake
8.5	8.5	11.0	11.0	12.4			Servo motor mass* — With brake
470 × 470 × 20	470 × 470 × 20	470 × 470 × 20	470 × 470 × 20	470 × 470 × 20	mm	—	Size of heat dissipation aluminum plate
13 or greater	13 or greater	13 or greater	13 or greater	16 or greater	N·m	T_b	Holding brake static friction torque
24 VDC ±10%	24 VDC ±10%	24 VDC ±10%	24 VDC ±10%	24 VDC ±10%	V	V_b	Holding brake rated voltage
0.39	0.39	0.39	0.39	0.78	A	I_b	Holding brake current consumption
100 or less	100 or less	100 or less	100 or less	100 or less	ms	Holding brake engage time	
30 or less	30 or less	30 or less	30 or less	30 or less	ms	Holding brake release time (varistor)	
200 or less	200 or less	200 or less	200 or less	200 or less	ms	Holding brake release time (diode)	
GADSA05 (50 A)	GADSA07 (75 A)	GADSA05 (50 A)	GADSA07 (75 A)	GADSA10 (100 A)	—	Compatible servo amplifier model no.	

■ Speed-Torque Characteristics

3ø: When the power supply voltage is 3-phase

GAM2AB180H0



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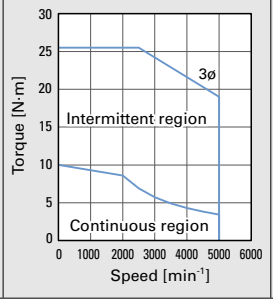
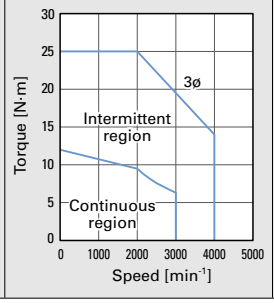


GAM2AB200H0



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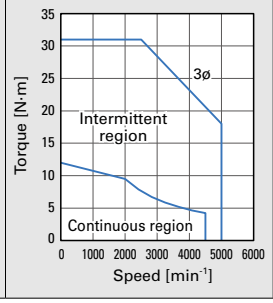
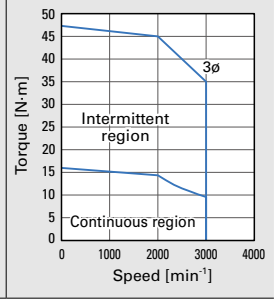
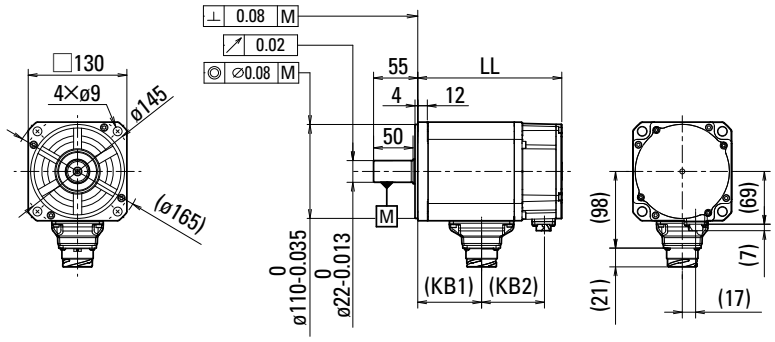
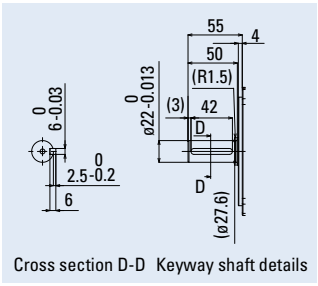


GAM2AB300B0



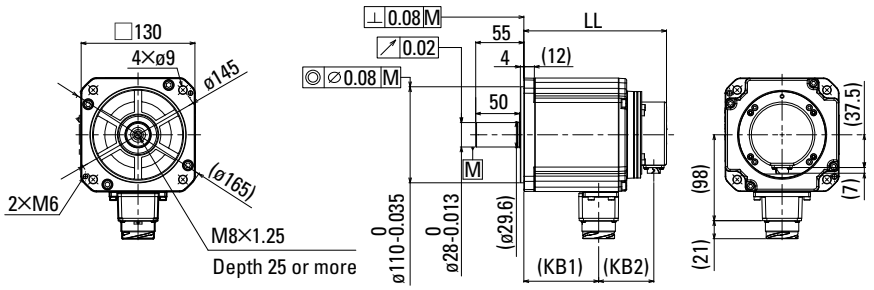
■ Dimensions [Unit: mm] The LL value does not change with or without oil seal.

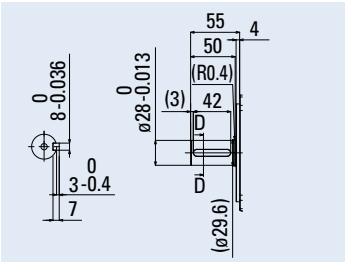




Cross section D-D Keyway shaft details

	Without brake	With brake	Without brake		With brake	
Servo motor model no.	LL	LL	KB1	KB2	KB1	KB2
GAM2AB055	96.5	121.5	42.5	35	42.5	59
GAM2AB120	110.5	135.5	56.5	35	56.5	59
GAM2AB180	125.5	150.5	71.5	35	71.5	59





Cross section D-D Keyway shaft details

	Without brake	With brake	Without brake		With brake	
Servo motor model no.	LL	LL	KB1	KB2	KB1	KB2
GAM2AB200	163	216	85.5	63	85.5	116
GAM2AB300	178	231	100.5	63	100.5	116

Options

■ Power/Encoder cable

Cable model no.					Cable length [m]
Power (without brake)		Power (with brake)		Encoder	
Push-pull locking	Jack screw locking	Push-pull locking	Jack screw locking	Jack screw locking	
w/o amplifier connector	w/o amplifier connector	w/o amplifier connector	w/o amplifier connector	w/ amplifier connector	
GRPB0100S	AL-01190699-01	GRPB0100SB	AL-01190700-01	RS-CA9-01-R	1
GRPB0300S	AL-01190699-03	GRPB0300SB	AL-01190700-03	RS-CA9-03-R	3
GRPB0500S	AL-01190699-05	GRPB0500SB	AL-01190700-05	RS-CA9-05-R	5

Plugs

■ Motor power / holding brake plug (motor side) Manufacturer: Japan Aviation Electronics Industry, Ltd.

Holding brake	Receptacle mfr. part no.	Pin assignment					Recommended motor power cable size (U, V, W, and ground)	
		U phase	V phase	W phase	Ground	Brake	mm^2	AWG No.
None	JL10-2E24-11PE-B	D	E	F	G, H	—	2.0	14
Yes	JL10-2E24-11PE-B	D	E	F	G, H	A, B	2.0	14

Holding brake	Plug fixing method	Plug mfr. part no.		Cable clamp	
		Straight	Angled	Mfr. part no.	Compatible cable outer diameter
None/Yes	Push-pull locking	JL10-6A24-11SE-EB	JL10-8A24-11SE-EB	JL04-2428CK(17)-R	ø15 to 18 mm
	Jack screw locking	JL04V-6A24-11SE-EB-R	JL04V-8A24-11SE-EBH-RK	JL04-2428CK(17)-R	ø15 to 18 mm

■ Encoder plug (motor side) Manufacturer: Japan Aviation Electronics Industry, Ltd.

Receptacle mfr. part no.	Plug mfr. part no.		Compatible cable diameter
	Straight	Angled	
JN2AS10ML2-R	JN2DS10SL1-R	JN2FS10SL1-R	ø5.7 to 7.3 mm
	JN2DS10SL2-R	JN2FS10SL2-R	ø6.5 to 8.0 mm
	JN2DS10SL3-R	JN2FS10SL3-R	ø3.5 to 5.0 mm

Contact size	Classification	Applicable socket contact	
		Mfr. part no.	Compatible wire size
#22	Manual crimping tool type	JN1-22-20S-R-PKG100	20 AWG
		JN1-22-22S-PKG100	AWG 21 to 25
		JN1-22-26S-PKG100	AWG 26 to 28
	Soldering type	JN1-22-22F-PKG100	20 AWG or smaller

Note: See the catalogs and instruction manuals issued by the connector manufacturer for handling and safety precautions.

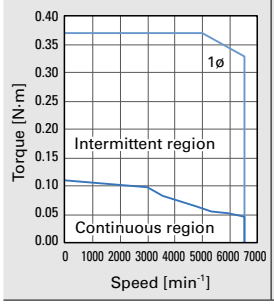
100 V **Medium-inertia servo motors**

40 mm sq.

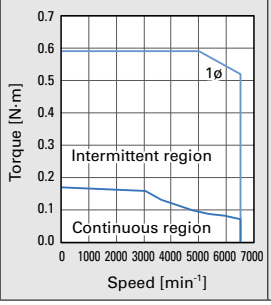
Servo motor model no.		Symbol	Unit	GAM2E4003F0	GAM2E4005F0	GAM2E4010F0
★ Rated output		P_R	kW	0.03	0.05	0.1
★ Rated torque		T_R	N・m	0.098	0.159	0.318
★ Continuous torque at stall		T_S	N・m	0.108	0.167	0.318
★ Peak torque at stall		T_P	N・m	0.37	0.59	1.18
★ Rated speed		N_R	min^{-1}	3000	3000	3000
★ Maximum speed		N_{max}	min^{-1}	6500	6500	6500
★ Rated armature current		I_R	Arms	1.00	1.62	1.98
★ Continuous armature current at stall		I_S	Arms	1.00	1.58	1.92
★ Peak armature current at stall		I_P	Arms	3.5	5.8	7.2
Torque constant		K_T	N・m/Arms	0.123	0.117	0.183
Phase resistance		R_ϕ	Ω	4.5	2.33	2.25
Rotor inertia	Without brake	J_M	$\times 10^{-4}$kg·m^2 ($GD^2/4$)	0.0233	0.0324	0.0600
	With brake			0.0303	0.0394	0.0670
Encoder inertia*		J_S		0.0025	0.0025	0.0025
★ Rated power rate	Without brake	Q_R	kW/s	4.1	7.8	17
	With brake			3.2	6.4	15
Servo motor mass*	Without brake	W_E	kg	0.25	0.29	0.40
	With brake			0.44	0.48	0.60
Size of heat dissipation aluminum plate		—	mm	250 × 250 × 6	250 × 250 × 6	250 × 250 × 6
Holding brake static friction torque		T_b	N·m	0.48 or greater	0.48 or greater	0.48 or greater
Holding brake rated voltage		V_b	V	24 VDC ±10%	24 VDC ±10%	24 VDC ±10%
Holding brake current consumption		I_b	A	0.26	0.26	0.26
Holding brake engage time			ms	30 or less	30 or less	30 or less
Holding brake release time (varistor)			ms	20 or less	20 or less	20 or less
Holding brake release time (diode)			ms	100 or less	100 or less	100 or less
Compatible servo amplifier model no.			—	GADSE01 (10 A)	GADSE02 (20 A)	GADSE02 (20 A)

■ Speed-Torque Characteristics

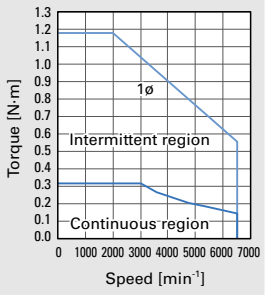
GAM2E4003F0



GAM2E4005F0



GAM2E4010F0



Note 1: Speed-torque characteristics curves and values in the row with a black star symbol (★) are the values after thermal equilibrium is established. All other values are at a temperature of 20ºC.
Note 2: All values are typical values. Torque constant is the value when mounted on the heat dissipation aluminum plate in the table.
Note 3: The holding brake cannot be used for dynamic braking. Holding brake engage/release time denotes the delay time of holding brake activation. Values of holding brake engage/release time vary depending on the circuit used. Please check the delay time on the actual equipment before use.
* The encoder inertia and servo motor mass values are when equipped with a battery-less absolute encoder. Contact us for more information on other encoders.

■ Dimensions/Options/Plugs

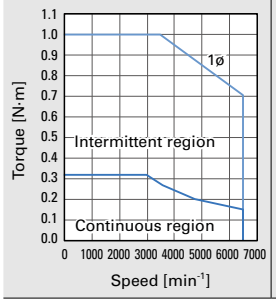
Common to 40 mm sq. 200 V servo motors on p. 39

60 mm sq.

Servo motor model no.		Symbol	Unit	GAM2E6010F0	GAM2E6020F0
★ Rated output		P_R	kW	0.1	0.2
★ Rated torque		T_R	N・m	0.318	0.637
★ Continuous torque at stall		T_S	N・m	0.318	0.686
★ Peak torque at stall		T_P	N・m	1.0	2.2
★ Rated speed		N_R	min^{-1}	3000	3000
★ Maximum speed		N_{max}	min^{-1}	6500	6500
★ Rated armature current		I_R	Arms	2.05	3.3
★ Continuous armature current at stall		I_S	Arms	1.97	3.4
★ Peak armature current at stall		I_P	Arms	5.8	11.1
Torque constant		K_T	N・m/Arms	0.197	0.228
Phase resistance		Rø	Ω	1.33	0.66
Rotor inertia	Without brake	J_M	$\times 10^{-4}$kg・m^2 ($GD^2/4$)	0.143	0.247
	With brake			0.201	0.306
Encoder inertia*		J_S		0.0025	0.0025
★ Rated power rate	Without brake	Q_R	kW/s	7.1	16
	With brake			5.0	13
Servo motor mass*	Without brake	W_E	kg	0.59	0.80
	With brake			0.88	1.2
Size of heat dissipation aluminum plate		—	mm	250 × 250 × 6	250 × 250 × 6
Holding brake static friction torque		T_b	N・m	0.36 or greater	1.37 or greater
Holding brake rated voltage		V_b	V	24 VDC ±10%	24 VDC ±10%
Holding brake current consumption		I_b	A	0.27	0.29
Holding brake engage time			ms	30 or less	30 or less
Holding brake release time (varistor)			ms	20 or less	20 or less
Holding brake release time (diode)			ms	120 or less	120 or less
Compatible servo amplifier model no.			—	GADSE02 (20 A)	GADSE03 (30 A)

■ Speed-Torque Characteristics

GAM2E6010F0



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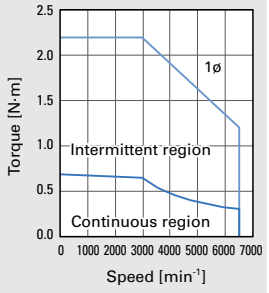


Note 1: Speed-torque characteristics curves and values in the row with a black star symbol (★) are the values after thermal equilibrium is established. All other values are at a temperature of 20°C.
Note 2: All values are typical values. Torque constant is the value when mounted on the heat dissipation aluminum plate in the table.
Note 3: The holding brake cannot be used for dynamic braking. Holding brake engage/release time denotes the delay time of holding brake activation. Values of holding brake engage/release time vary depending on the circuit used. Please check the delay time on the actual equipment before use.
* The encoder inertia and servo motor mass values are when equipped with a battery-less absolute encoder. Contact us for more information on other encoders.

■ Dimensions/Options/Plugs

Common to 60 mm sq. 200 V servo motors on p. 41

Servo Motor Specification

Motor duty rating	Continuous
Thermal class	F
Dielectric strength	100 VAC power supply: 1500 VAC for 1 min 200 VAC power supply: 1500 VAC for 1 min
Insulation resistance	10 MΩ min. at 500 VDC
Protection	Totally Enclosed Non-Ventilated
Operating ambient temperature	0 to 40°C
Storage temperature	-20 to 65°C (non-condensing)
Operating and storage humidity	20 to 90% (non-condensing)
Operating altitude	2000 m max.*
Vibration class	V15
Excitation system	Permanent magnet
Mounting	Flange
Installation locations	Indoors (not exposed to direct sunlight) A location free of corrosive gases, flammable gases, powder dust, and other substances that are detrimental to the used machines and motors.
Protection rating	IP67

* When used in environments above 1000 m in altitude, derating may be required. Please contact us for limitations such as continuous rating.

Signal Names and Pin Numbers of Servo Amplifier and Encoder

(Common to analog/pulse and EtherCAT types)

Battery-less absolute encoder
Single-turn absolute encoder

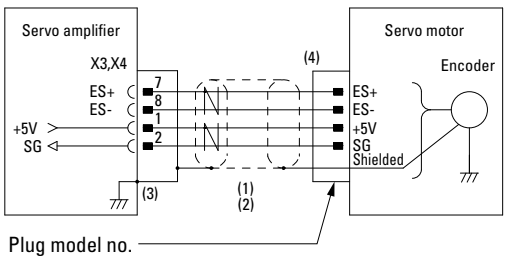
Servo amplifier connector X3 or X4		Encoder					
Terminal no. (Connector pin no.)	Signal name	For 40 to 86 mm sq. motors		For 100 to 130 mm sq. motors		Description	Remarks(1)
		Connector pin no.	Cable wire color	Connector pin no.	Cable wire color		
1	5V	2	Red	9	Red	Power supply	Twisted pair (Recommended)
2	SG	3	Black	10	Black	Common power supply	
3	5V(3)	–	–	–	–	No connection (3)	–
4	SG(3)	–	–	–	–	No connection (3)	–
5	(NC)	–	–	–	–	No connection (4)	–
6	(NC)	–	–	–	–	No connection (4)	–
7	ES+	6	Brown	1	Brown	Serial communication signal	Twisted pair
8	ES-	7	Blue	2	Blue		
9	(NC)	–	–	–	–	No connection (4)	–
10	(NC)	–	–	–	–	No connection (4)	–
(2)	Ground	1	Shielded	7	Shielded	Shielded	–

(1) Use shielded twisted pair cables.
(2) Connect the shielded cables to the metal case (ground) of the encoder connectors (X3, X4) of the servo amplifier and the ground of the motor encoder, respectively.
(3) If you plan to use pins 3 or 4 of the servo amplifier connectors X3 or X4, please contact us.
(4) Please make sure to leave pins 5, 6, 9, and 10 unconnected.

Note: Contact us if the cable length is to be longer than 10 m and 25 m for 40 to 86 mm sq. models and 100 to 130 mm sq. models, respectively.

Encoder Wiring Diagram

(Common to analog/pulse and EtherCAT types)



Plug model no.

40 to 86 mm sq.	100 mm sq. or larger	
JN16FS09SS1	JN2DS10SL1-R	JN2FS10SL1-R
JN16FS09SS2	JN2DS10SL2-R	JN2FS10SL2-R
	JN2DS10SL3-R	JN2FS10SL3-R

Battery-less absolute encoder, single-turn absolute encoder

(1) Use shielded twisted pair (STP) cables.
(2) Max. permissible cable length of power supply wiring (5 V to SG) by conductor size:

Conductor size		Conductor resistance [Ω/km] at 60°C*	Length [m]
AWG	SQ (mm²)		
26	0.10	195 or less	5
26	0.14	138 or less	10
24	0.2	85 or less	15
22	0.3	55 or less	20
22	0.3	55 or less	25
20	0.5	35 or less	30
20	0.5	35 or less	35
20	0.5	35 or less	40

The conductor resistance varies depending on the conductor specifications.

(3) Connect the shielded cable to the metal case (ground) of X3 and X4, and connect its other end to the ground wire of the motor encoder.
(4) Connector pin nos. are as follows.

	ES+	ES-	+5 V	SG	FG
Pin no. (86 mm sq. or smaller)	6	7	2	3	1
Pin no. (100 mm sq. or larger)	1	2	9	10	7

Linear Servo Motors

Dual magnet type with core
Flat type with core
Center magnet type with core

■ How to read model numbers

Note that not all possible combinations of field values may yield valid products. Also, some of the values listed below are for options.

Coil

DS 045 C C1 A N E A 1 00 □

- **Type**

Code	Specifications
DD	Twin
DS	Flat
DT	Center magnet

- **Magnet width** — See the Dimensions section.
- **Coil**
- **Coil length**

Code	Specifications
B4	349 mm
C2	253 mm
C1	130 mm
D1	145 mm

- **Power supply voltage** — A ··· 200 VAC
- **Winding** — N ··· Standard
- **Hall sensor**

Code	Specifications
A	Without hall sensor
E	With hall sensor

- **Thermal protection** — A ··· None
- **Cable length**

Code	Specifications
1	300 mm
2	600 mm

- **Specification identifier** — 00 ··· Standard
- **Standards conformity**

Code	Specifications
None	Blank
M	CE/UKCA/UL certified
E	CE/UKCA certified

Magnet rail

DS 045 M C 512 B 00 □

- **Type**

Code	Specifications
DD	Twin
DS	Flat
DT	Center magnet

- **Magnet width** — See the Dimensions section.
- **Magnet rail**
- **Rail type**

Code	Specifications
B	Twin, type B
C	Flat, type C
D	Flat, type D
None	Center magnet

- **Rail length**

Code	Specifications
064	64 mm
128	128 mm
256	256 mm
512	512 mm

- **Magnet cover**

Code	Specifications
A	Without cover
B	With cover

- **Specification identifier** — 00 ··· Standard
- **Standards conformity**

Code	Specifications
None	Blank
U	UL certified

Dual Magnet Type with Core

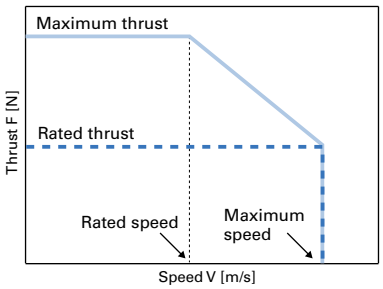
[Unit in drawings: mm]

■ Specifications

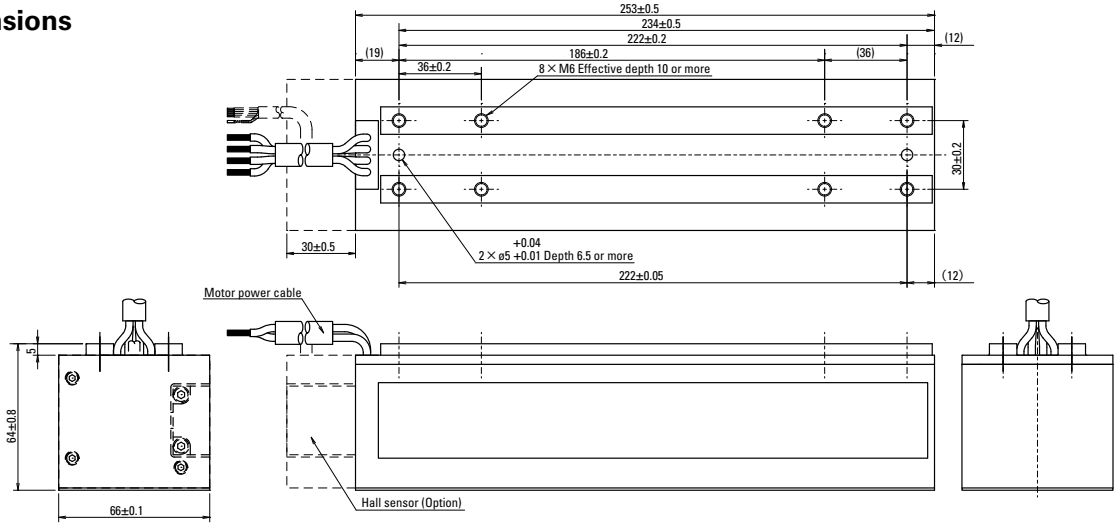
Coil model no.	Rated thrust [N]	Max. thrust [N]	Rated speed [m/s]	Max. speed [m/s]	Magnetic attraction force [N]	Coil mass [kg]	Compatible magnet rail model no.	Compatible servo amplifier capacity
DD035CC2AN□A□00	610	1400	2.0	3.0	350	5.0	DD035MB□□□	75 A

Magnet rail model no.	Magnet rail mass (total of 2 rails) [kg]	Dimensions [mm]			
		L1	L2	N1	N2
DD035MB064□00	0.9	64	32	1	2
DD035MB128□00	1.9	128	96	3	4
DD035MB256□00	3.7	256	224	7	8
DD035MB512□00	7.5	512	480	15	16

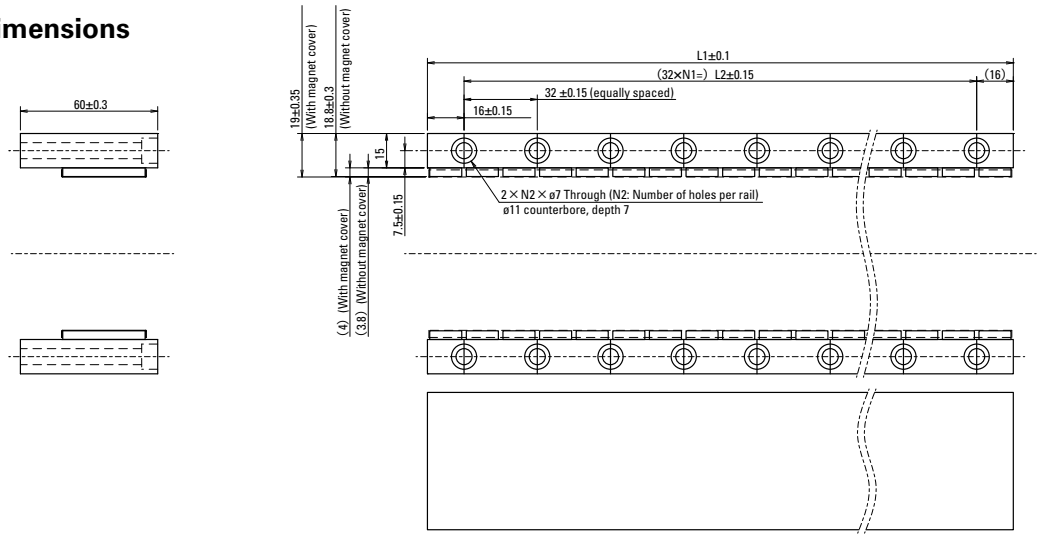
Thrust-Speed Characteristics



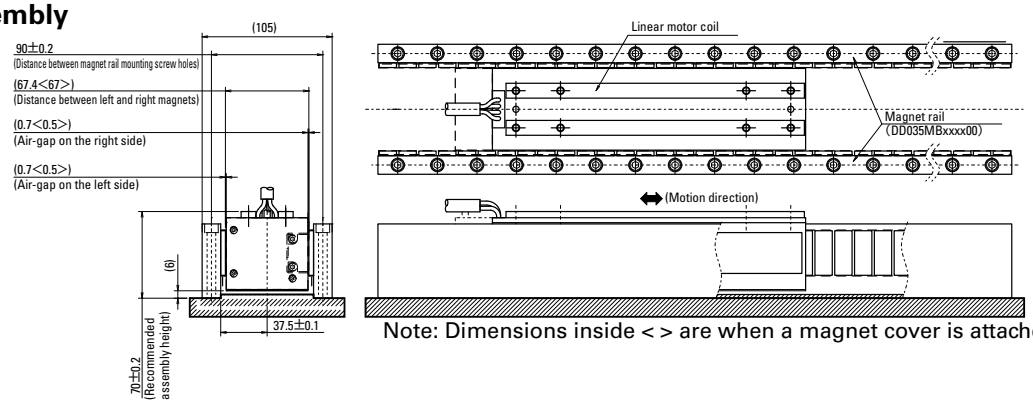
■ Coil dimensions



■ Magnet rail dimensions



■ Recommended assembly example diagram



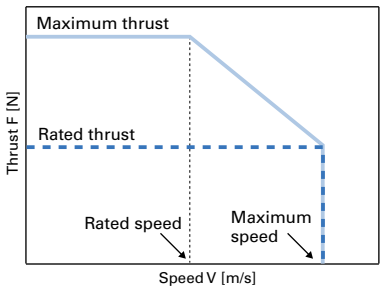
Note: Dimensions inside < > are when a magnet cover is attached

■ Specifications

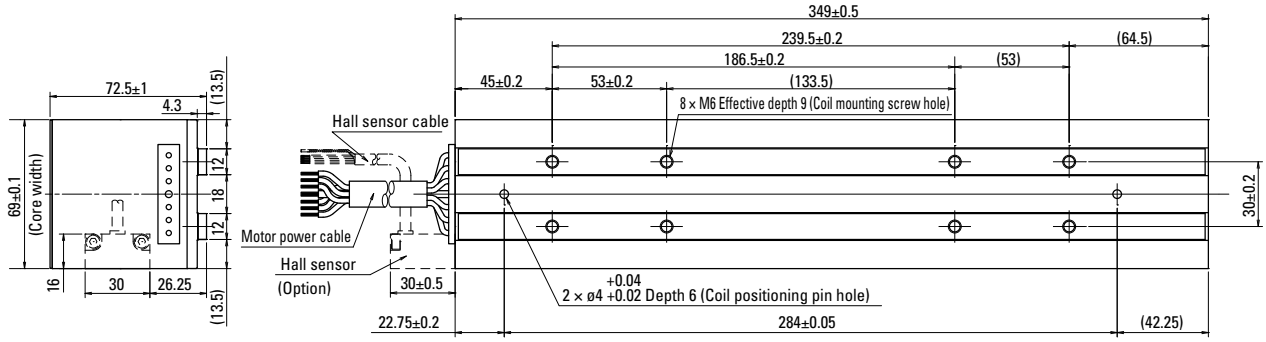
Coil model no.	Rated thrust [N]	Max. thrust [N]	Rated speed [m/s]	Max. speed [m/s]	Magnetic attraction force [N]	Coil mass [kg]	Compatible magnet rail model no.	Compatible servo amplifier capacity
DD045CB4AN□A□00	800	2200	1.9	3.0	600	8.6	DD045MB□□□	75 A

Magnet rail model no.	Magnet rail mass (total of 2 rails) [kg]	Dimensions [mm]			
		L1	L2	N1	N2
DD045MB064□00	1.4	64	32	1	2
DD045MB128□00	2.8	128	96	3	4
DD045MB256□00	5.5	256	224	7	8
DD045MB512□00	11.1	512	480	15	16

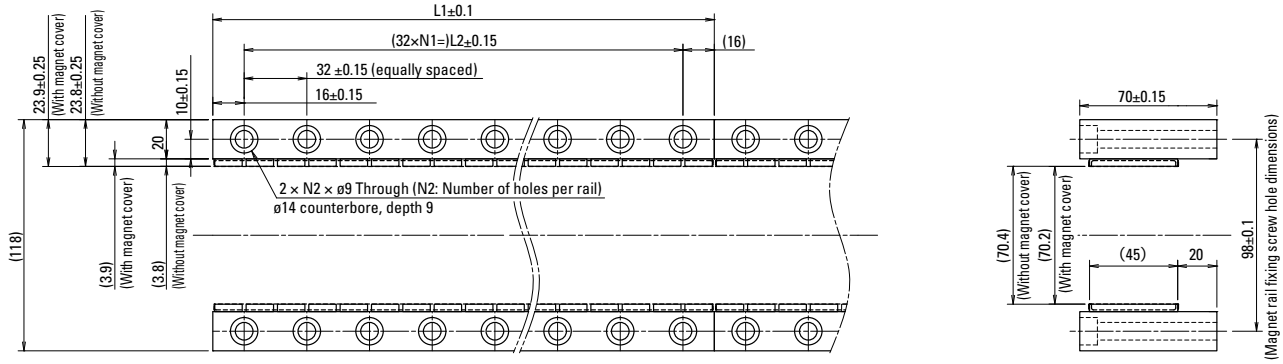
Thrust-Speed Characteristics



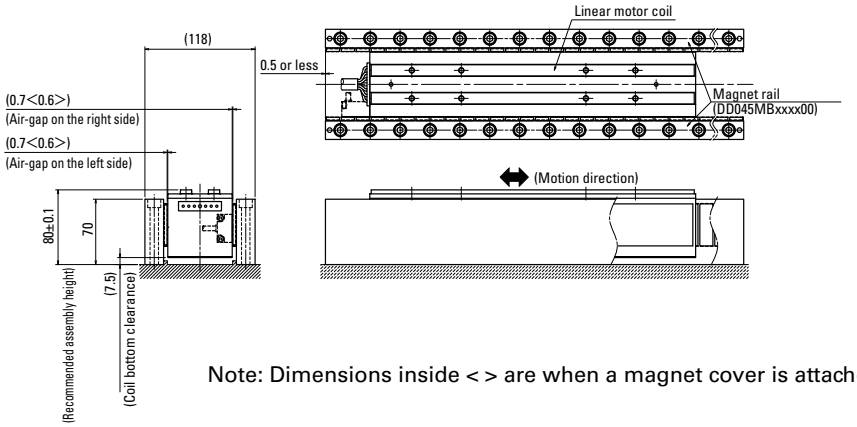
■ Coil dimensions



■ Magnet rail dimensions



■ Diagram of recommended assembly example



Note: Dimensions inside < > are when a magnet cover is attached

Flat Type with Core

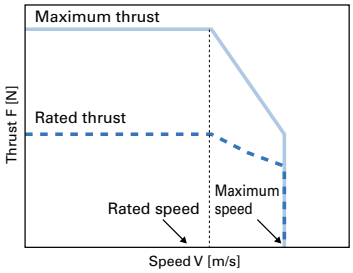
[Unit in drawings: mm]

■ Specifications

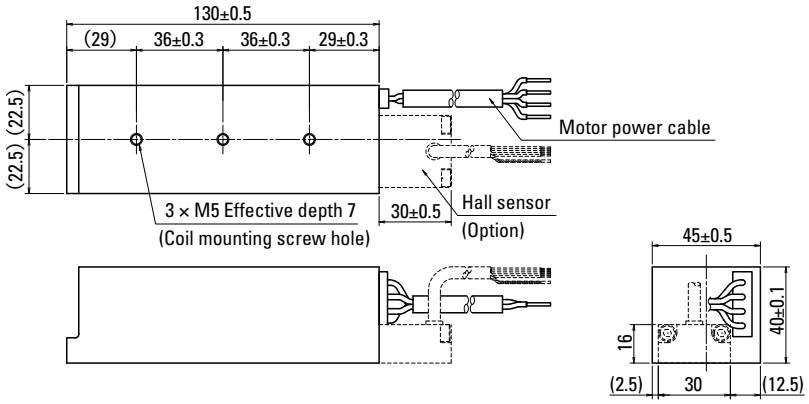
Coil model no.	Rated thrust [N]	Max. thrust [N]	Rated speed [m/s]	Max. speed [m/s]	Magnetic attraction force [N]	Coil mass [kg]	Compatible magnet rail model no.	Compatible servo amplifier capacity
DS025CC1AN□A□00	140	270	2.3	3.2	940	1.1	DS025MC□□□	20 A

Magnet rail model no.	Magnet rail mass [kg]	Dimensions [mm]			
		L1	L2	N1	N2
DS025MC064□00	0.1	64	32	1	4
DS025MC128□00	0.3	128	96	3	8
DS025MC256□00	0.5	256	224	7	16
DS025MC512□00	1.0	512	480	15	32

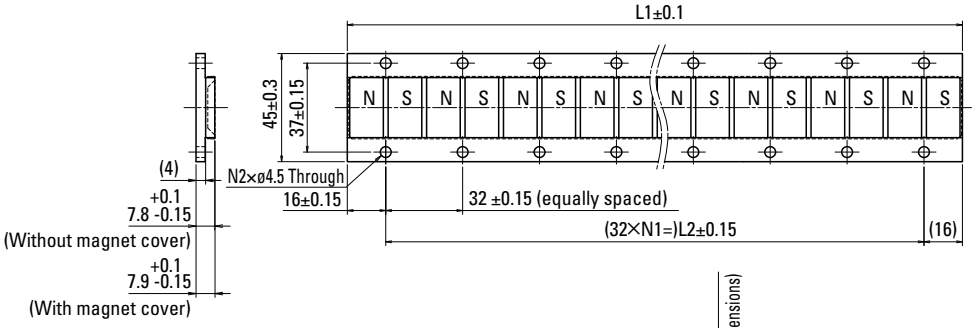
Thrust-Speed Characteristics



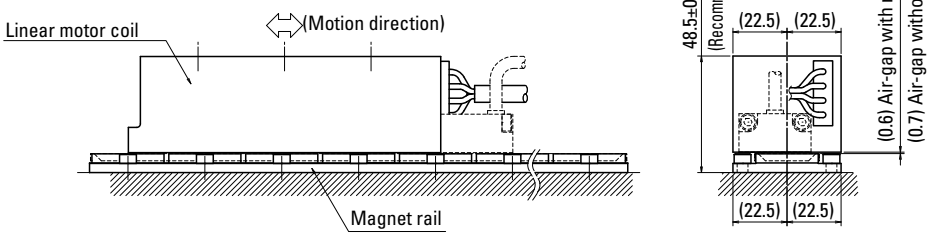
■ Coil dimensions



■ Magnet rail dimensions



■ Diagram of recommended assembly example

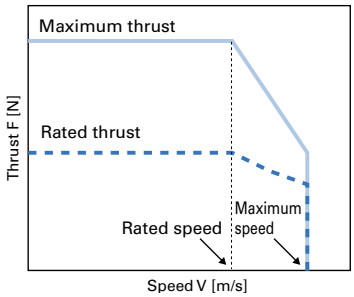


■ Specifications

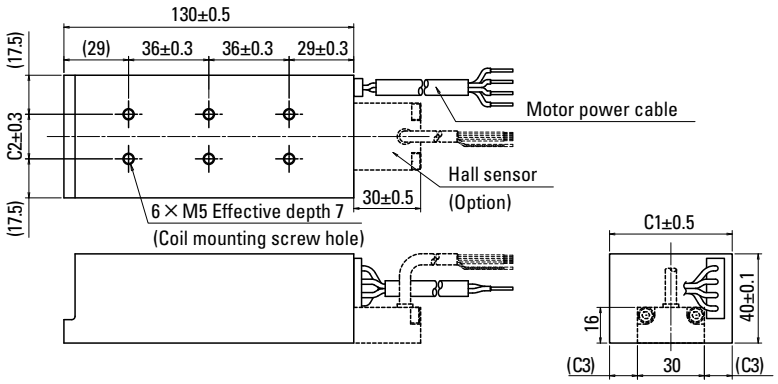
Coil model no.	Rated thrust [N]	Max. thrust [N]	Rated speed [m/s]	Max. speed [m/s]	Magnetic attraction force [N]	Coil mass [kg]	Dimensions [mm]			Compatible magnet rail model no.	Compatible servo amplifier capacity
							C1	C2	C3		
DS035CC1AN□A□00	200	390	1.9	2.6	1300	1.5	55	20	12.5	DS035MC□□□	30 A
DS045CC1AN□A□00	260	500	1.8	3.0	1700	1.8	65	30	17.5	DS045MC□□□	30 A
DS055CC1AN□A□00	310	600	1.9	3.0	2300	2.1	75	40	22.5	DS055MC□□□	30 A
DS065CC1AN□A□00	340	700	2.1	3.0	2700	2.5	85	50	27.5	DS065MC□□□	50 A

Magnet rail model no.	Magnet rail mass [kg]	Dimensions [mm]													
		L1	L2	N1	N2	E1	E2	E3	E4	E5	S1	S2	S3	S4	S5
DS035MC064□00	0.2	64	32	1	4	55	47	4	7.8	7.9	27.5	27.5	48.5	0.6	0.7
DS035MC128□00	0.3	128	96	3	8	55	47	4	7.8	7.9	27.5	27.5	48.5	0.6	0.7
DS035MC256□00	0.7	256	224	7	16	55	47	4	7.8	7.9	27.5	27.5	48.5	0.6	0.7
DS035MC512□00	1.3	512	480	15	32	55	47	4	7.8	7.9	27.5	27.5	48.5	0.6	0.7
DS045MC064□00	0.2	64	32	1	4	62	54	4	7.8	7.9	32.5	31	48.5	0.6	0.7
DS045MC128□00	0.4	128	96	3	8	62	54	4	7.8	7.9	32.5	31	48.5	0.6	0.7
DS045MC256□00	0.8	256	224	7	16	62	54	4	7.8	7.9	32.5	31	48.5	0.6	0.7
DS045MC512□00	1.5	512	480	15	32	62	54	4	7.8	7.9	32.5	31	48.5	0.6	0.7
DS055MC064□00	0.3	64	32	1	4	75	67	5.5	9.5	9.6	37.5	37.5	50	0.4	0.5
DS055MC128□00	0.6	128	96	3	8	75	67	5.5	9.5	9.6	37.5	37.5	50	0.4	0.5
DS055MC256□00	1.2	256	224	7	16	75	67	5.5	9.5	9.6	37.5	37.5	50	0.4	0.5
DS055MC512□00	2.4	512	480	15	32	75	67	5.5	9.5	9.6	37.5	37.5	50	0.4	0.5
DS065MC064□00	0.4	64	32	1	4	85	77	5.5	9.5	9.6	42.5	42.5	50	0.4	0.5
DS065MC128□00	0.7	128	96	3	8	85	77	5.5	9.5	9.6	42.5	42.5	50	0.4	0.5
DS065MC256□00	1.4	256	224	7	16	85	77	5.5	9.5	9.6	42.5	42.5	50	0.4	0.5
DS065MC512□00	2.8	512	480	15	32	85	77	5.5	9.5	9.6	42.5	42.5	50	0.4	0.5

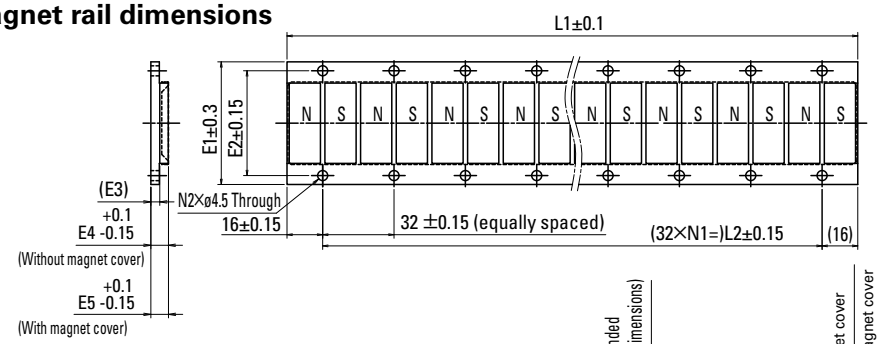
Thrust-Speed Characteristics



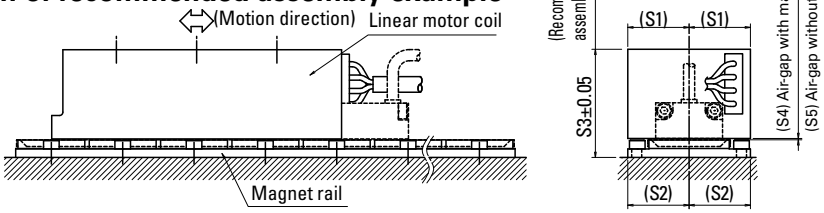
■ Coil dimensions



■ Magnet rail dimensions



■ Diagram of recommended assembly example



Flat Type with Core

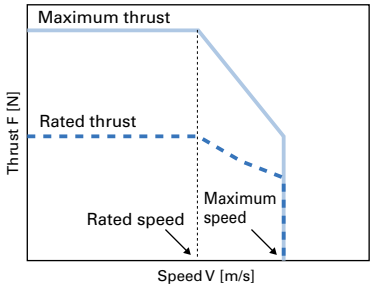
[Unit in drawings: mm]

■ Specifications

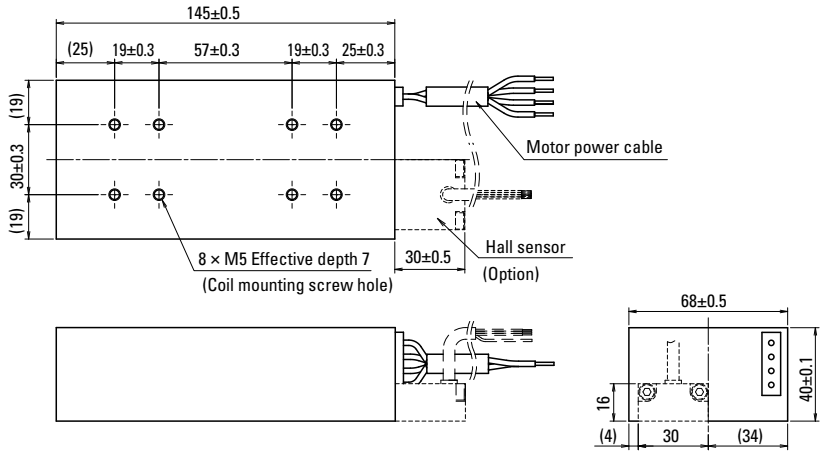
Coil model no.	Rated thrust [N]	Max. thrust [N]	Rated speed [m/s]	Max. speed [m/s]	Magnetic attraction force [N]	Coil mass [kg]	Compatible magnet rail model no.	Compatible servo amplifier capacity
DS050CD1AN□A□00	340	630	2.0	3.0	2000	2.15	DS050MD□□□	30 A

Magnet rail model no.	Magnet rail mass [kg]	Dimensions [mm]			
		L1	L2	N1	N2
DS050MD064□00	0.2	64	32	1	4
DS050MD128□00	0.5	128	96	3	8
DS050MD256□00	0.9	256	224	7	16
DS050MD512□00	1.8	512	480	15	32

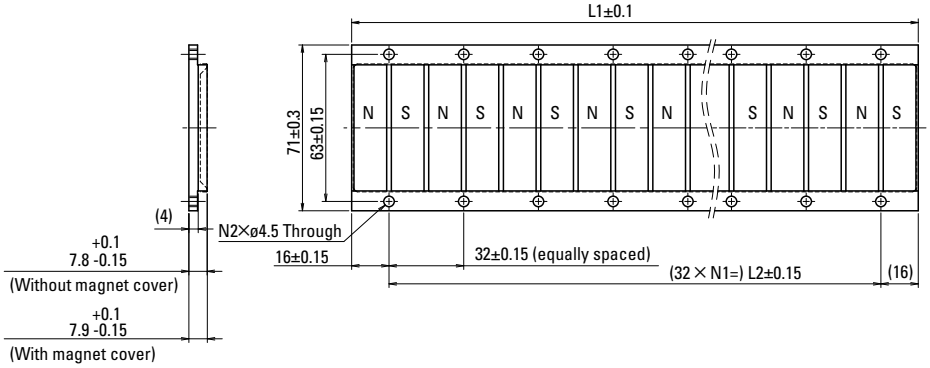
Thrust-Speed Characteristics



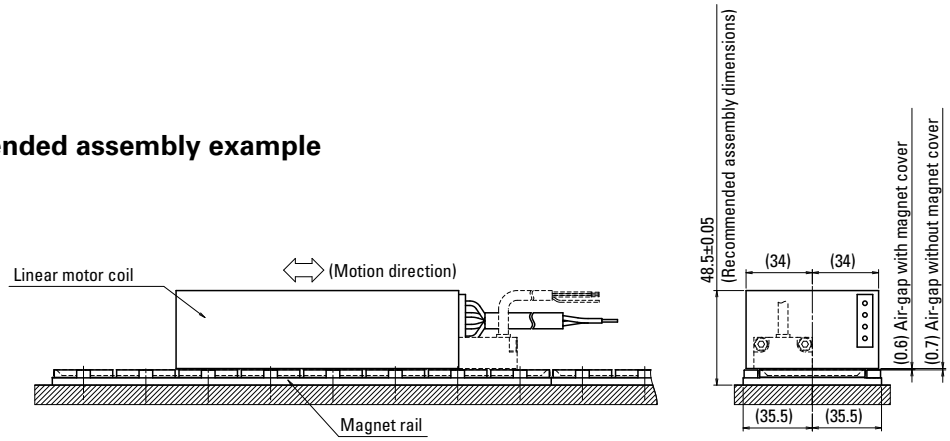
■ Coil dimensions



■ Magnet rail dimensions



■ Diagram of recommended assembly example



Center Magnet Type with Core

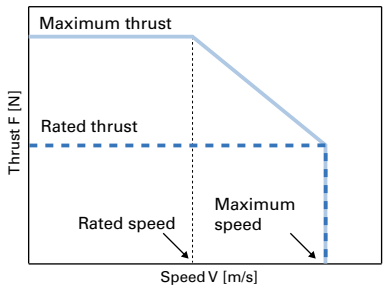
[Unit in drawings: mm]

■ Specifications

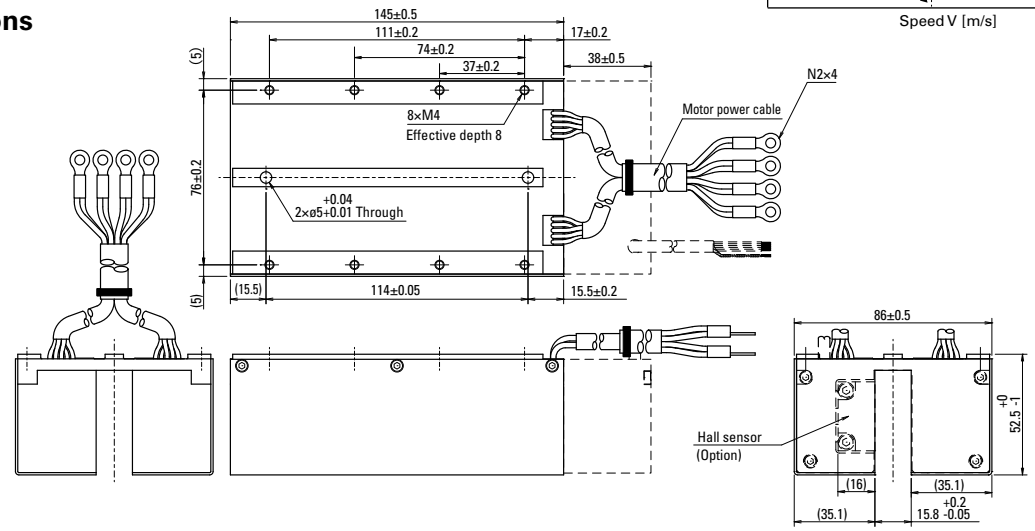
Coil model no.	Rated thrust [N]	Max. thrust [N]	Rated speed [m/s]	Max. speed [m/s]	Magnetic attraction force [N]	Coil mass [kg]	Compatible magnet rail model no.	Compatible servo amplifier capacity
DT030CD1AN□A□00	350	650	1.9	2.5	0	2.4	DT030M□□□	30 A

Magnet rail model no.	Magnet rail mass [kg]	Dimensions [mm]				
		L1	L2	L3	N1	N2
DT030M128□00	0.5	128	96	80	7	6
DT030M256□00	0.9	256	224	208	15	14
DT030M512□00	1.9	512	480	464	31	30

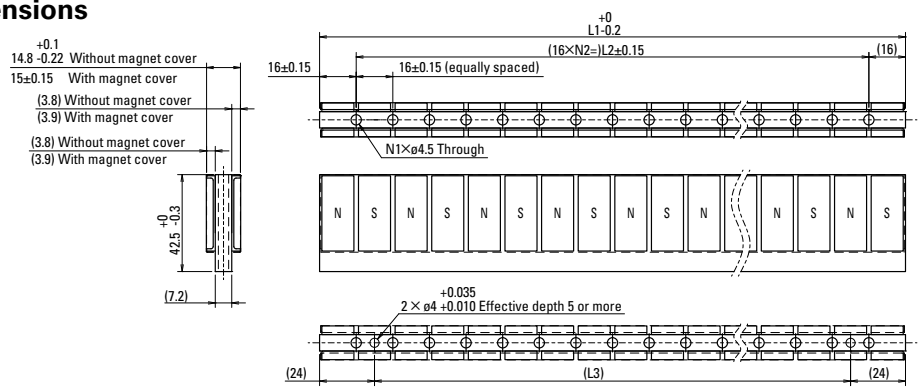
Thrust-Speed Characteristics



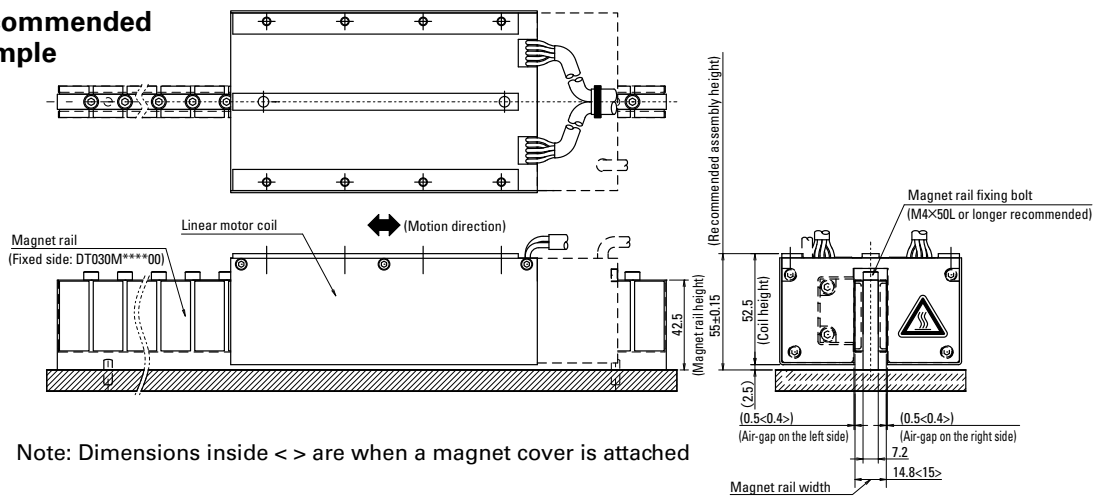
■ Coil dimensions



■ Magnet rail dimensions



■ Diagram of recommended assembly example



Note: Dimensions inside < > are when a magnet cover is attached

Servo Amplifiers

Analog/Pulse input type

Amplifier capacity: 10 to 150 A

■ How to read model numbers

Note that not all possible combinations of field values may yield valid products. Also, some of the values listed below are for options.
Refer to the Standard Model Number List section for standard models with valid model numbers.

Servo amplifier

GA D SA 01 A A 2 2

Option 2

Code	STO function	Tandem configuration	Standard/Option
0	—	—	Option
2	✓(Without delay circuit)	✓	Standard
4	✓(With delay circuit)	✓	Option

Motor encoder type

Rotary motor

Code	To connector X3 (Top): Rotary motor encoder	To connector X4 (Bottom): Rotary motor encoder or external encoder	Standard/Option
1	Absolute encoder	Absolute encoder	Option
2	Absolute encoder	Incremental encoder	Standard
A	Incremental encoder	Incremental encoder	Option

Linear motor

Code	To connector X3 (Top): Linear motor encoder	To connector X4 (Bottom): Linear motor encoder or hall sensor	Standard/Option
2	Absolute encoder	Incremental encoder	Standard
A	Incremental encoder	Line driver	Option

Interface

Code	Specifications
A	Analog/Pulse, sinking type general-purpose output
B	Analog/Pulse, sourcing type general-purpose output

Option 1

Code	Specifications
A	With built-in regenerative resistor & With DB resistor
L	Without built-in regenerative resistor & With DB resistor

Amplifier capacity

Code	Specifications
01	10 A
02	20 A
03	30 A
05	50 A
07	75 A
10	100 A
15	150 A

Input power supply voltage

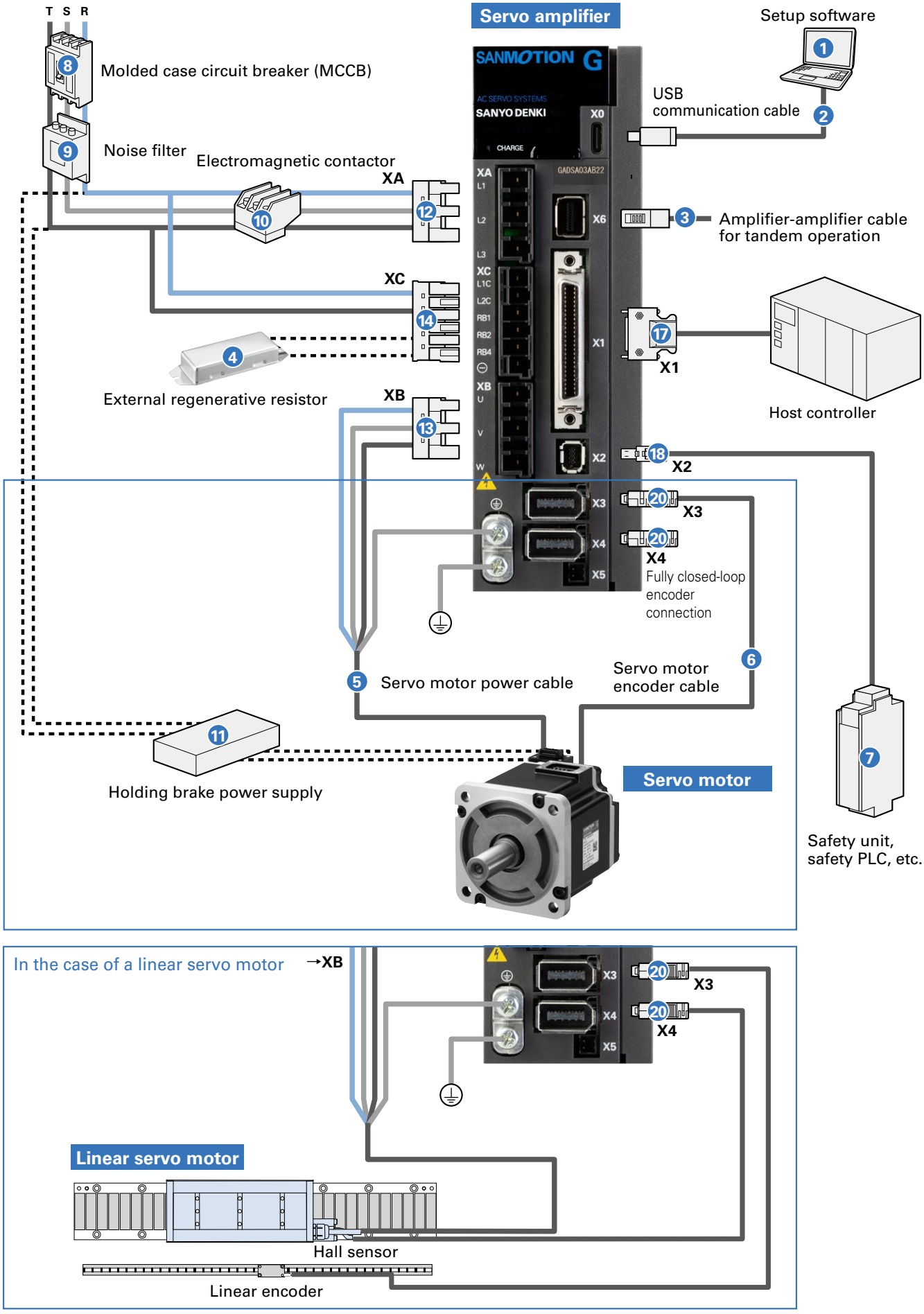
Code	Specifications
SA	AC 200 V
SE	AC 100 V

D···Servo amplifier

GA···SANMOTION G series

System Configuration Diagram

10 to 50 A The photo shows a 30 A model.



Options and Peripheral Items (10 to 50 A)

No.	Name	Model no.	Description	
❶	Setup software	To download, go to the Products tab on our website.	Parameters can be set and monitored via communication with a PC.	
❷	USB communication cable	AL-Y0020355-0□	PC side: Type A, amplifier side: Type C	PC communication cable for setup software
		AL-Y0021049-0□	PC side: Type C, amplifier side: Type C	
❸	Amplifier-to-amplifier cable for tandem operation	AL-01134653-0□	Connects between amplifiers for tandem operation (X6 ⇔ X6) Consult us if using the tandem operation function.	
❹	External regenerative resistor	AL-R□□□W□□B	Used when more regenerative capacity is needed, e.g., for high-frequency movements	
❺	Servo motor power cable	p. 87 to p. 88	For rotary motors only	
❻	Servo motor encoder cable	p. 89		
❼	Safety unit, safety PLC, etc.	To be provided by the customer	Connects I/O signals from the Safe Torque Off function to devices such as a safety unit and safety PLC.	
❽	Molded case circuit breaker (MCCB)	To be provided by the customer	Used to protect power lines	
❾	Noise filter	To be provided by the customer	Used to prevent external noise from power lines	
❿	Electromagnetic contactor	To be provided by the customer	Used to switch the power on and off (prepare a protective circuit)	
⓫	Holding brake	To be provided by the customer	Used for servo motors with holding brake	

Individual connectors

Amplifiers with ⓲X2 connector come with a STO short-circuit connector. Note that other connectors are not included and need to be prepared by the customer.

No.	Connector code	Details		Model no.	Mfr. part no.	Manufacturer
⓬	XA	Power connector	For main circuit power supply connection	AL-01111794-01	03JFAT-SAXGDK-KT10	J.S.T.
⓭	XB		For servo motor/linear servo motor connection	AL-01111795-01	03JFAT-SAYGDK-KT10	
⓮	XC		For control circuit power supply / external regenerative resistor connection	AL-01111793-01	06JFAT-SAXGDK-K5.0	
⓯	XC		For control circuit power supply / built-in regenerative resistor connection (with short-circuit wiring)	AL-AP000439-01	06JFAT-SAXGDK-K5.0 + short-circuit wiring	
⓰	OT	Connector tool for XA/XB/XC		AL-00961844-01	J-FAT-OT(N)	
⓱	X1	GPIO connector		AL-00385594	10150-3000PE and 10350-52A0-008	3M Japan Ltd.
⓲	X2	Signal connector	STO wiring connector	AL-00718252-01	2013595-3	Tyco Electronics Japan G.K.
⓳	X2		STO short-circuit connector*	AL-00849548-02	1971153-2	
⓴	X3, X4		For encoder connection (With linear servo motors, linear encoder / hall sensor connection)	AL-00530312-01	54599-1019	Molex Japan Co., Ltd.

* If not wiring X2, be sure to insert a supplied STO short-circuit connector to X2.

Power connector sets

Name	Model no.	Connectors included in the set (see above, numbers in the "Individual connectors" table)				
		⓬ XA	⓭ XB	⓮ XC	⓯ XC with short-circuit wiring	⓰ OT
Power connector set A (With built-in regenerative resistor)	AL-01135740-01	✓	✓	–	✓	✓
Power connector set B (With external regenerative resistor)	AL-01133414-01	✓	✓	✓	–	✓

Signal connector sets

Name	Model no.	Connectors included in the set (see above, numbers in the "Individual connectors" table)		
		⓱ X1	⓲ X2	⓴ X3, X4
Signal connector set A1 (STO not used)	AL-01136300-01	✓	– Use the short-circuiting connector included with the servo amplifier	✓
Signal connector set A2 (STO used)	AL-01136301-01	✓	✓	✓

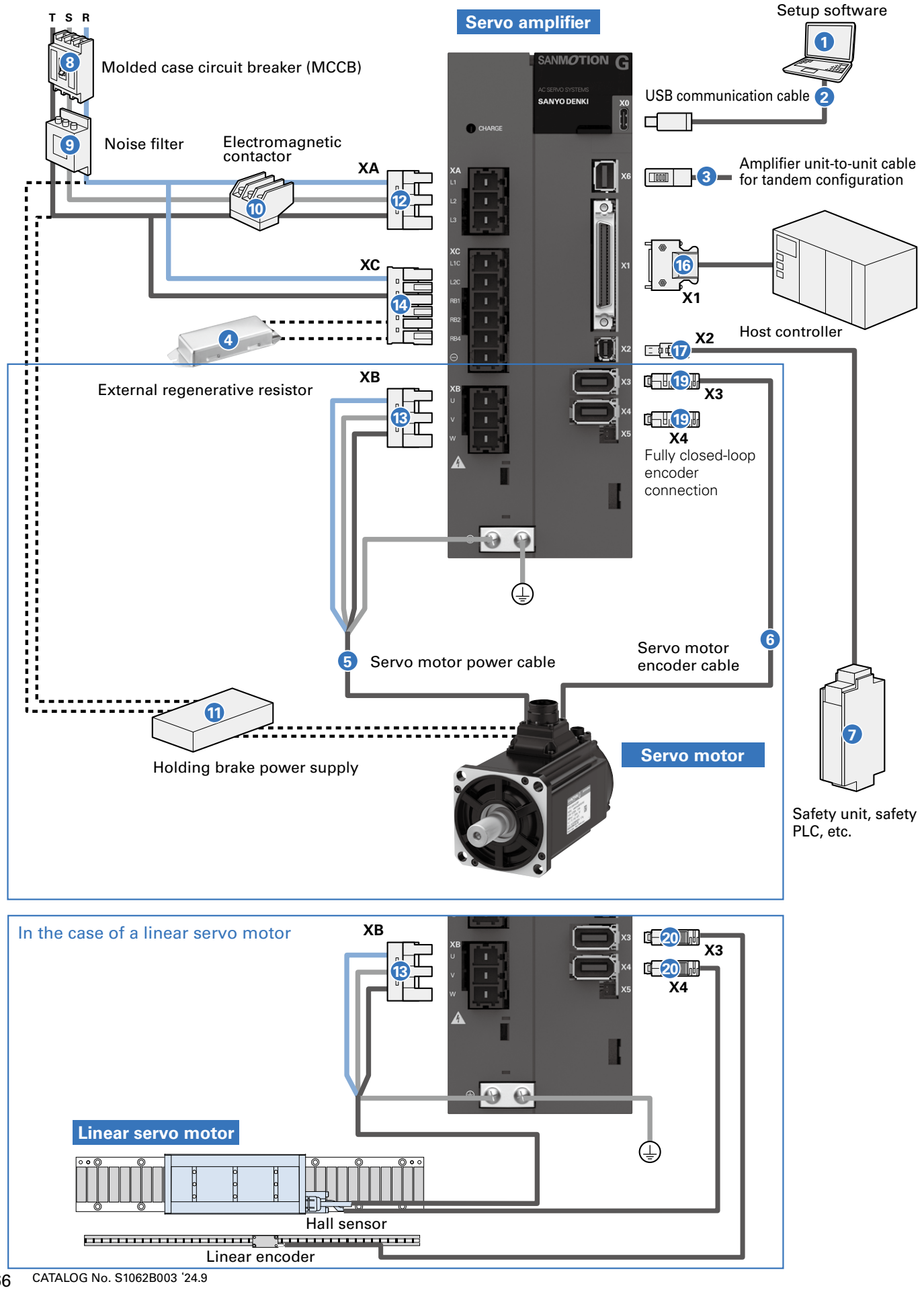
Power/Signal connector set

For semi closed-loop control. For fully closed-loop control applications or when using a hall sensor with a linear servo motor, prepare another ⓴ encoder connector.

Name	Built-in regenerative resistor	STO	Model no.	Connectors included in the set (see above, numbers in the "Individual connectors" table)							
				⓬ XA	⓭ XB	⓮ XC	⓯ XC with short-circuit wiring	⓰ OT	⓱ X1	⓲ X2	⓴ X3, X4
Power/Signal connector set A	✓	–	AL-01134646-01	✓	✓	–	✓	✓	✓	–	✓
	–	–	AL-01134645-01	✓	✓	✓	–	✓	✓	–	✓
	✓	✓	AL-01134648-01	✓	✓	–	✓	✓	✓	✓	✓
	–	✓	AL-01134647-01	✓	✓	✓	–	✓	✓	✓	✓

System Configuration Diagram

75 to 150 A The photo shows a 75 A model.



Options and Peripheral Items (75 to 150 A)

No.	Name	Model no.	Description	
❶	Setup software	To download, go to the Products tab on our website.	Parameters can be set and monitored via communication with a PC.	
❷	USB communication cable	AL-Y0020355-0□	PC side: Type A, amplifier side: Type C	PC communication cable for setup software
		AL-Y0021049-0□	PC side: Type C, amplifier side: Type C	
❸	Amplifier-to-amplifier cable for tandem operation	AL-01134653-0□	Connects between amplifiers for tandem operation (X6 ⇔ X6) Consult us if using the tandem operation function.	
❹	External regenerative resistor	AL-R□□□W□□B	Used when more regenerative capacity is needed, e.g., for high-frequency movements	
❺	Servo motor power cable	p. 87 to p. 88	For rotary motors only	
❻	Servo motor encoder cable	p. 89		
❼	Safety unit, safety PLC, etc.	To be provided by the customer	Connects I/O signals from the Safe Torque Off function to devices such as a safety unit and safety PLC.	
❽	Molded case circuit breaker (MCCB)	To be provided by the customer	Used to protect power lines	
❾	Noise filter	To be provided by the customer	Used to prevent external noise from power lines	
❿	Electromagnetic contactor	To be provided by the customer	Used to switch the power on and off (prepare a protective circuit)	
⓫	Holding brake	To be provided by the customer	Used for servo motors with holding brake	

Individual connectors

Amplifiers with ⓲X2 connector come with a STO short-circuit connector. Note that other connectors are not included and need to be prepared by the customer.

No.	Connector code	Details		Model no.	Mfr. part no.	Manufacturer
⓬	XA	Power connector	For main circuit power supply connection	AL-01178350-01	831-1103/302-004	Wago Company of Japan, Ltd.
⓭	XB		For servo motor/linear servo motor connection	AL-01178351-01	831-099/Z000-082	
⓮	XC		For control circuit power supply / external regenerative resistor connection	AL-01178352-01	831-1106/302-004	
⓯	XC		For control circuit power supply / built-in regenerative resistor connection (with short-circuit wiring)	AL-01188659-01	831-1106/302-004 + short-circuit wiring	
⓰	X1	GPIO connector		AL-00385594	10150-3000PE and 10350-52A0-008	3M Japan Ltd.
⓱	X2	Signal connector	STO wiring connector	AL-00718252-01	2013595-3	Tyco Electronics Japan G.K.
⓲	X2		STO short-circuit connector*	AL-00849548-02	1971153-2	
⓳	X3, X4		For encoder connection (With linear servo motors, linear encoder / hall sensor connection)	AL-00530312-01	54599-1019	Molex Japan Co., Ltd.

* If not wiring X2, be sure to insert a supplied STO short-circuit connector to X2.

Signal connector sets

Name	Model no.	Connectors included in the set (see above, numbers in the "Individual connectors" table)		
		⓰ X1	⓱ X2	⓳ X3, X4
Signal connector set A1 (STO not used)	AL-01136300-01	✓	– Use the short-circuiting connector included with the servo amplifier	✓
Signal connector set A2 (STO used)	AL-01136301-01	✓	✓	✓

General Specifications

Model no.			GADS□01□□	GADS□02□□	GADS□03□□	GADS□05□□	GADS□07□□	GADS□10□□	GADS□15□□
Capacity			10 A	20 A	30 A	50 A	75 A	100 A	150 A
Maximum compatible motor output			200 W	400 W	1.5 kW	2.5 kW	3.5 kW	5.0 kW	7.0 kW
Continuous output current			1.2 Arms	3.1 Arms	5.2 Arms	12.0 Arms	18.0 Arms	24.0 Arms	34.0 Arms
Peak output current			4.3 Arms	12.0 Arms	16.3 Arms	26.5 Arms	45.5 Arms	55.0 Arms	83.0 Arms
Control function			Position/speed/torque control (switched with parameters)						
Control system			IGBT-based, sinusoidal PWM control						
Main circuit power supply	Input voltage		3-phase : 200 to 240 VAC (+10, -15%), 50/60 Hz (±3 Hz) Single-phase : 200 to 240 VAC (+10, -15%), 50/60 Hz (±3 Hz)(1) DC : 300 VDC (±20%)(1) Single-phase : 100 to 120 VAC (+10, -15%), 50/60 Hz (±3 Hz)(2) DC : 150 VDC (±20%)(2)				3-phase: 200 to 240 VAC (+10, -15%), 50/60 Hz (±3 Hz)		
	Input current (3-/single-phase)		1.2/2.0 Arms	2.2/3.9 Arms	6.9/7.0 Arms	11.0/11.6 Arms	18.5 Arms	24.7 Arms	34.0 Arms
	Power supply capacity		0.4 kVA	0.8 kVA	2.4 kVA	3.8 kVA	7.1 kVA	9.4 kVA	13.0 kVA
Control circuit power supply	Input voltage range		Single-phase : 200 to 240 VAC (+10, -15%), 50/60 Hz (±3 Hz)(1) DC : 300 VDC (±20%)(1) Single-phase : 100 to 120 VAC (+10, -15%), 50/60 Hz (±3 Hz)(2) DC : 150 VDC (±20%)(2)				Single-phase: 200 to 240 VAC (+10, -15%), 50/60 Hz (±3 Hz)(1)		
	Input current		0.5 Arms			0.3 Arms	0.3 Arms	0.3 Arms	0.3 Arms
Regenerative resistor	Built-in regenerative resistor	Resistance	25 Ω			17 Ω	10 Ω	10 Ω	6 Ω
		Max. power consumption	5 W			20 W	60 W	90 W	120 W
	Min. allowable external resistance		25 Ω			17 Ω	10 Ω	10 Ω	6 Ω
Environment	Operating ambient temperature		0 to +60°C(3)						
	Storage temperature		-20 to +65°C						
	Operating and storage humidity		95% RH max. (non-condensing)						
	Operating altitude		2000 m max.(3)						
	Vibration resistance		6 m/s^2						
	Shock resistance		20 m/s^2						
	Overvoltage category		III						
Structure			Built-in tray-type power supply						

(1) 200 VAC single-phase input and 300 VDC input are compatible only with GADSA□□ models. When using single-phase input or DC input, parameter settings will be necessary.
(2) 100 VAC single-phase input and 150 VDC input are compatible only with GADSE□□ models. When using single-phase input or DC input, parameter settings will be necessary.
(3) When used in environments with an ambient temperature of +55 to +60°C or an altitude of 1000 to 2000 m, motor performance undergoes derating.

■ Performance

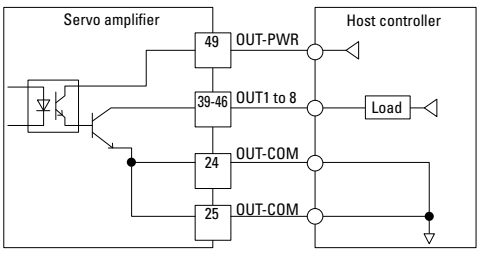
Velocity control range	1:5000 (Internal velocity command)
Frequency characteristics	3500 Hz (With 400 W or lower motors in high-speed command mode)
Allowable range of load inertia	10 times the motor rotor inertia

■ Built-in functions

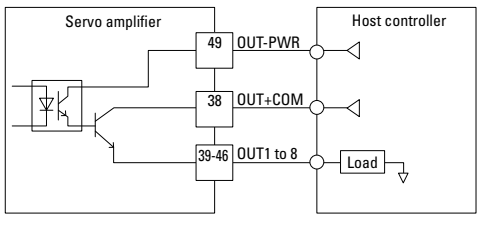
Protection functions	Output power device error (overcurrent), current detection error, STO error, cooling fan error, overload, regenerative error, magnetic pole position estimation error, continuous overspeed, overheating error, external error, servo amplifier temperature error, overvoltage, main circuit power supply undervoltage, main circuit power supply open phase, main circuit power supply voltage detection error, inrush current protection time error, control circuit power supply error, control circuit power supply undervoltage, encoder error, overspeed, speed control error, speed feedback error, model-following vibration control error, excessive position deviation, positioning command error, excessive inter-axis synchronization deviation, excessive dual positioning deviation, dual positioning feedback error, inter-amplifier communication error, excessive position deviation difference, memory error, CPU error, parameter error, control circuit error, task process error
Digital operator	Status display, parameter settings, adjustment mode, test run mode, alarm logging, monitoring, motor code settings
Dynamic brake circuit	Built-in
Regenerative circuit	Built-in
Analog monitor	Ch 1: Velocity monitoring (VMON) 2.0 V ±10% (at 1000 min^{-1}), Ch 2: Torque command monitoring (TCMON) 2.0 V ±10% (at 100%)

■ General-purpose output (GPO) specifications

Sinking type



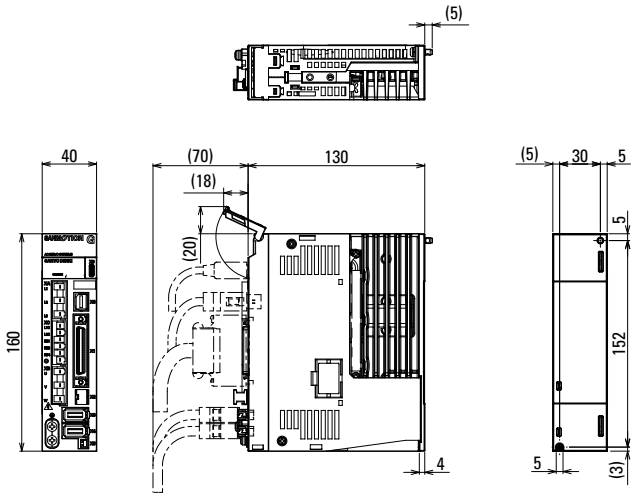
Sourcing type



Dimensions [Unit: mm]

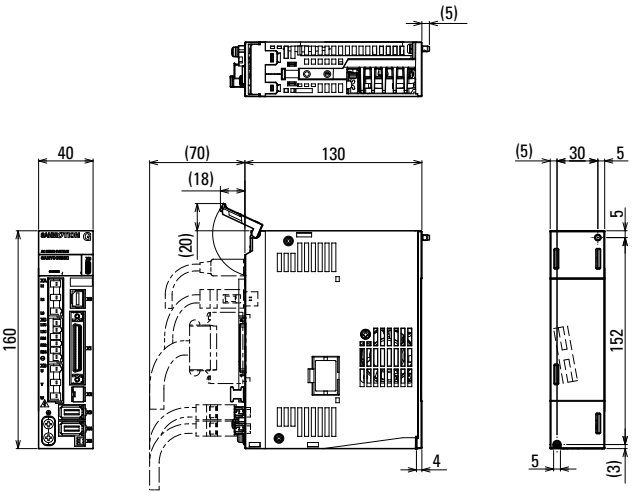
《10 A》

Mass: 0.80 kg



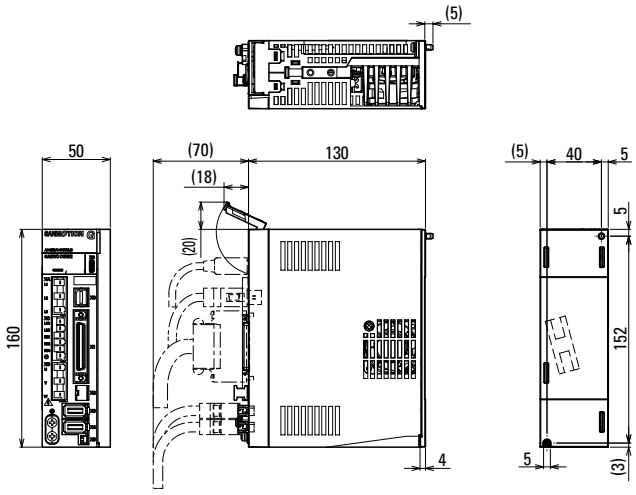
《20 A》

Mass: 0.80 kg



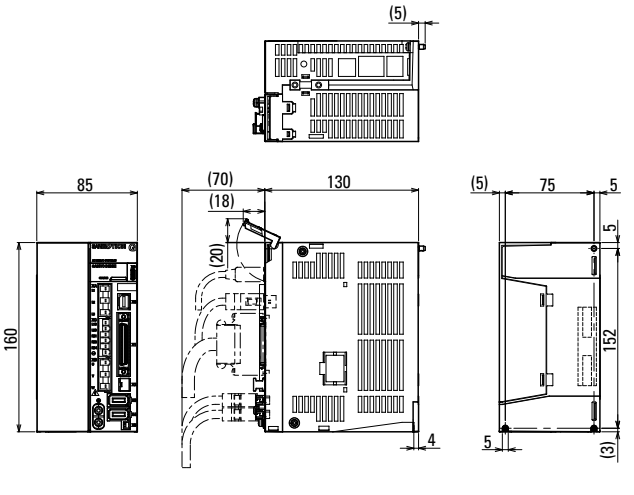
《30 A》

Mass: 0.90 kg



《50 A》

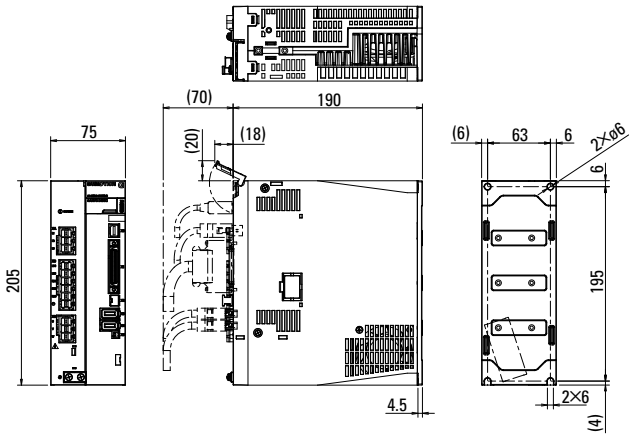
Mass: 1.50 kg



Dimensions [Unit: mm]

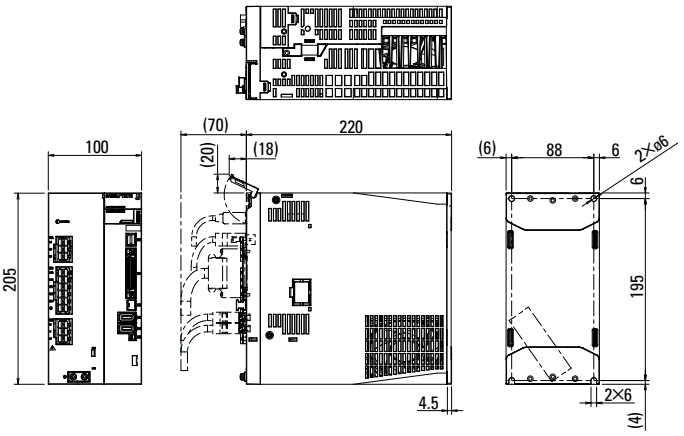
《75 A》

Mass: 2.4 kg



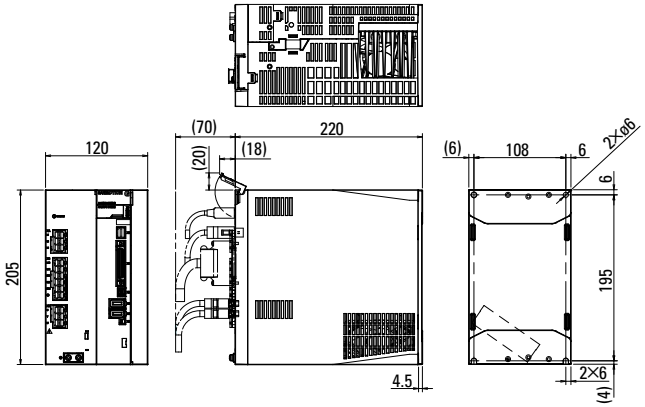
《100 A》

Mass: 3.4 kg



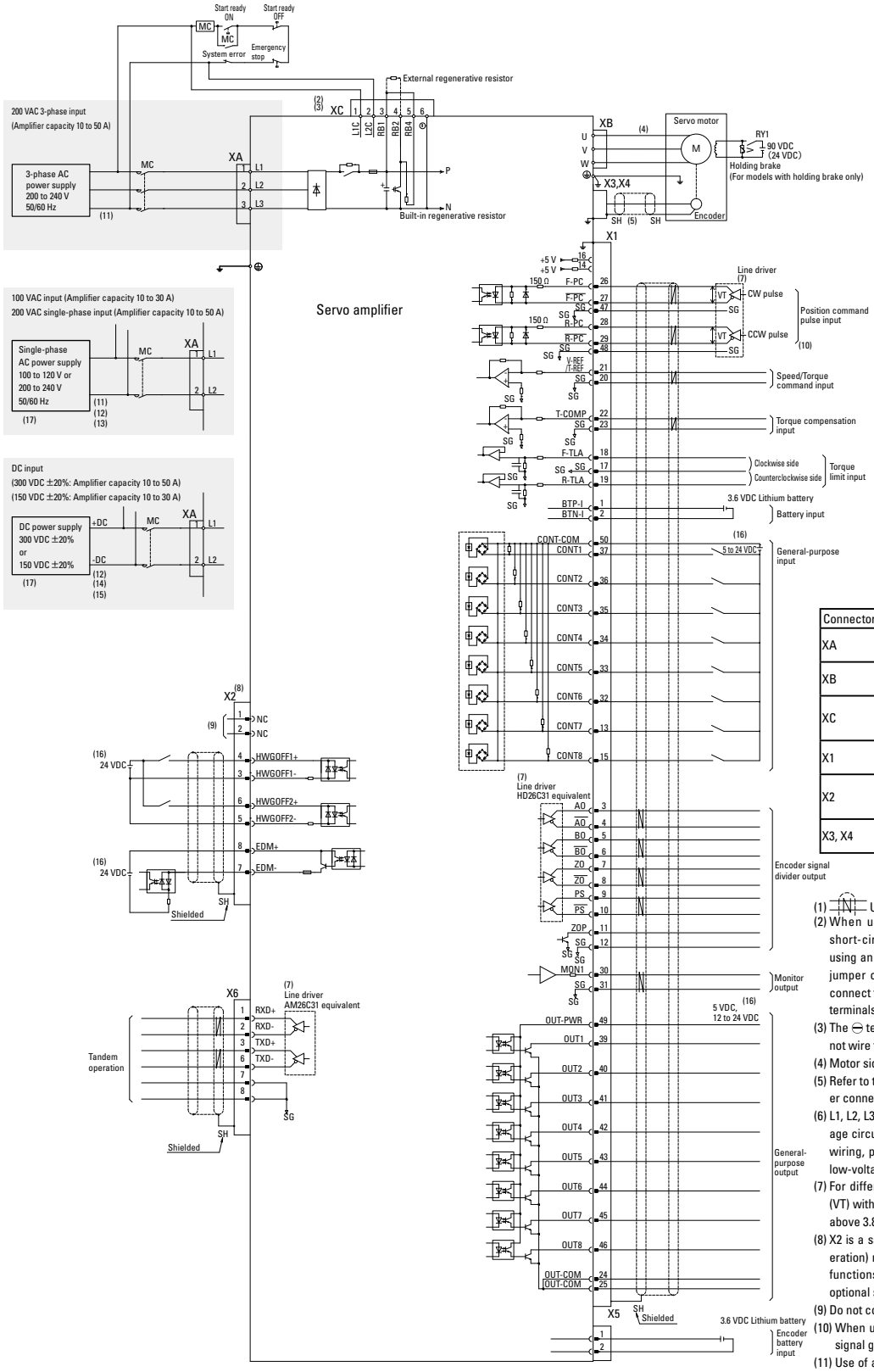
《150 A》

Mass: 4.2 kg



External Wiring Diagram

10 to 50 A, sinking output

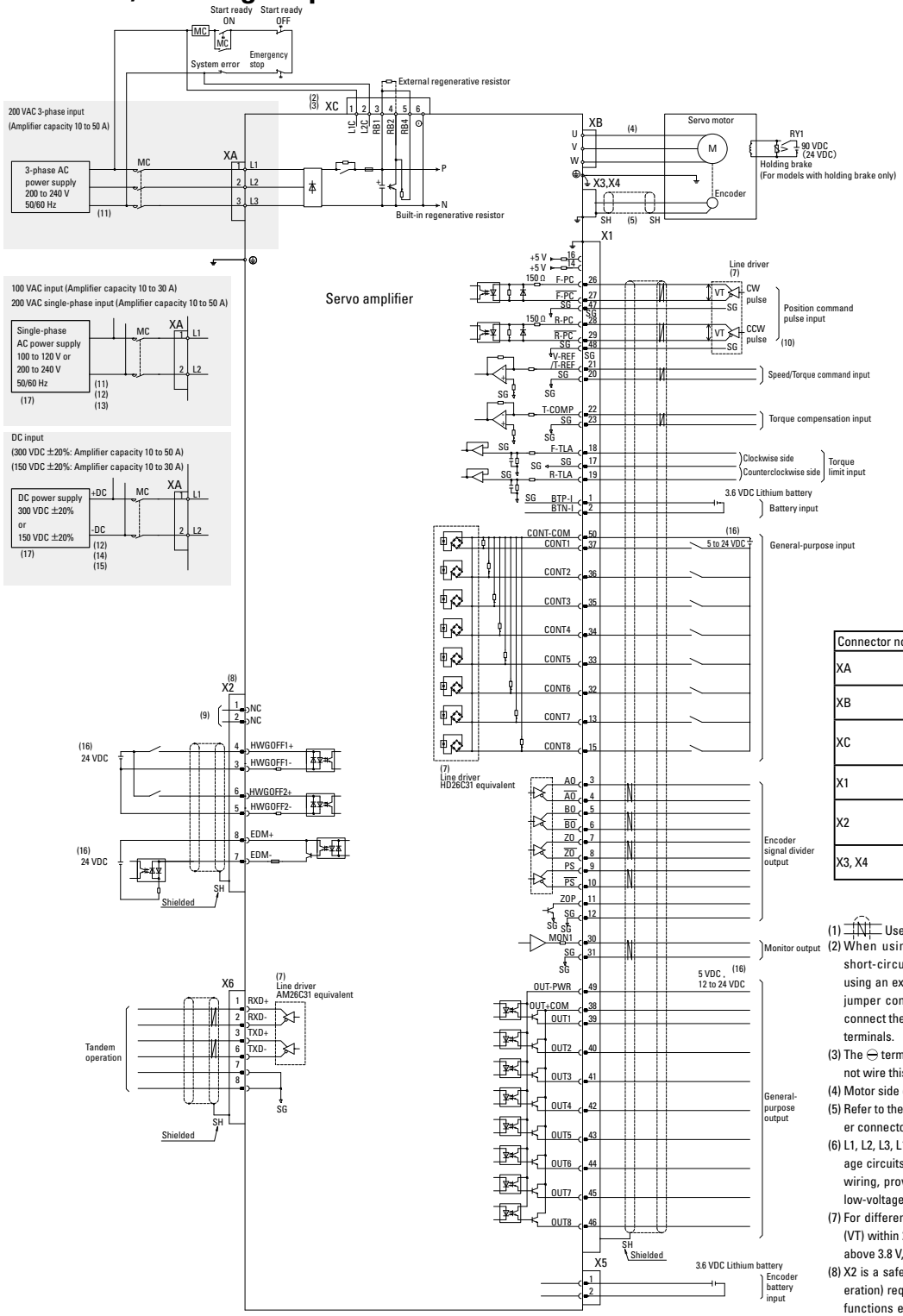


Connector no.	Name	Housing, plug, shell
XA	Main circuit power input connector	03JFAT-SAXGDK-KT10
XB	Servo motor / linear servo motor connector	03JFAT-SAYGDK-KT10
XC	Control power supply / external regenerative resistor connector	06JFAT-SAXGDK-K5.0
X1	GPIO connector	Plug: 10150-3000PE Shell: 10350-52A0-008
X2	STO connector	For short-circuiting: 1971153-2 For wiring: 2013595-3
X3, X4	Encoder connector	I/O connector: 54599-1019

(1) Use shielded twisted pair (STP) cables.
(2) When using the built-in regenerative resistor, connect a short-circuit jumper between RB1 and RB4 terminals. When using an external regenerative resistor, remove the short-circuit jumper connected between RB1 and RB4 terminals, and then connect the external regenerative resistor between RB1 and RB2 terminals.
(3) The ⏚ terminal is for maintenance use (high-voltage circuit). Do not wire this terminal.
(4) Motor side connections vary depending on motor specifications.
(5) Refer to the encoder connection diagram for the wiring of encoder connectors.
(6) L1, L2, L3, L1C, L2C, RB1, RB2, RB4, ⏚, U, V, and W are high-voltage circuits. All other signal lines are low-voltage circuits. When wiring, provide sufficient clearance between high-voltage and low-voltage circuits.
(7) For differential line drivers, use one with a differential voltage (VT) within 2.5 to 3.8 V. If the differential voltage is below 2.5 V or above 3.8 V, it may cause malfunction due to missing pulses.
(8) X2 is a safety device connector. Turning Servo ON (motor in operation) requires to connect a safety device to X2 and get safety functions enabled. When not using safety functions, insert an optional short-circuit connector to X2.
(9) Do not connect anything to the X2-1 or X2-2 pins.
(10) When using a differential input signal, be sure to connect the signal ground (SG) between the servo amplifier and equipment.
(11) Use of a UL or IEC/EN compliant leakage circuit breaker is recommended.
(12) When using single-phase 100/200 VAC or DC input, connect the main circuit power supply to L1 and L2, and do not use L3.
(13) When using a single-phase power supply, please check our User's Manual or Product Specification for accompanying limitations.
(14) Use of a UL or IEC/EN compliant leakage circuit breaker is recommended on the primary side of the DC power supply.
(15) When using a DC power supply, please check our User's Manual or Product Specification for accompanying limitations.
(16) An external power supply is to be prepared by the customer.
(17) Use an input voltage that meets the product specifications.

External Wiring Diagram

10 to 50 A, sourcing output

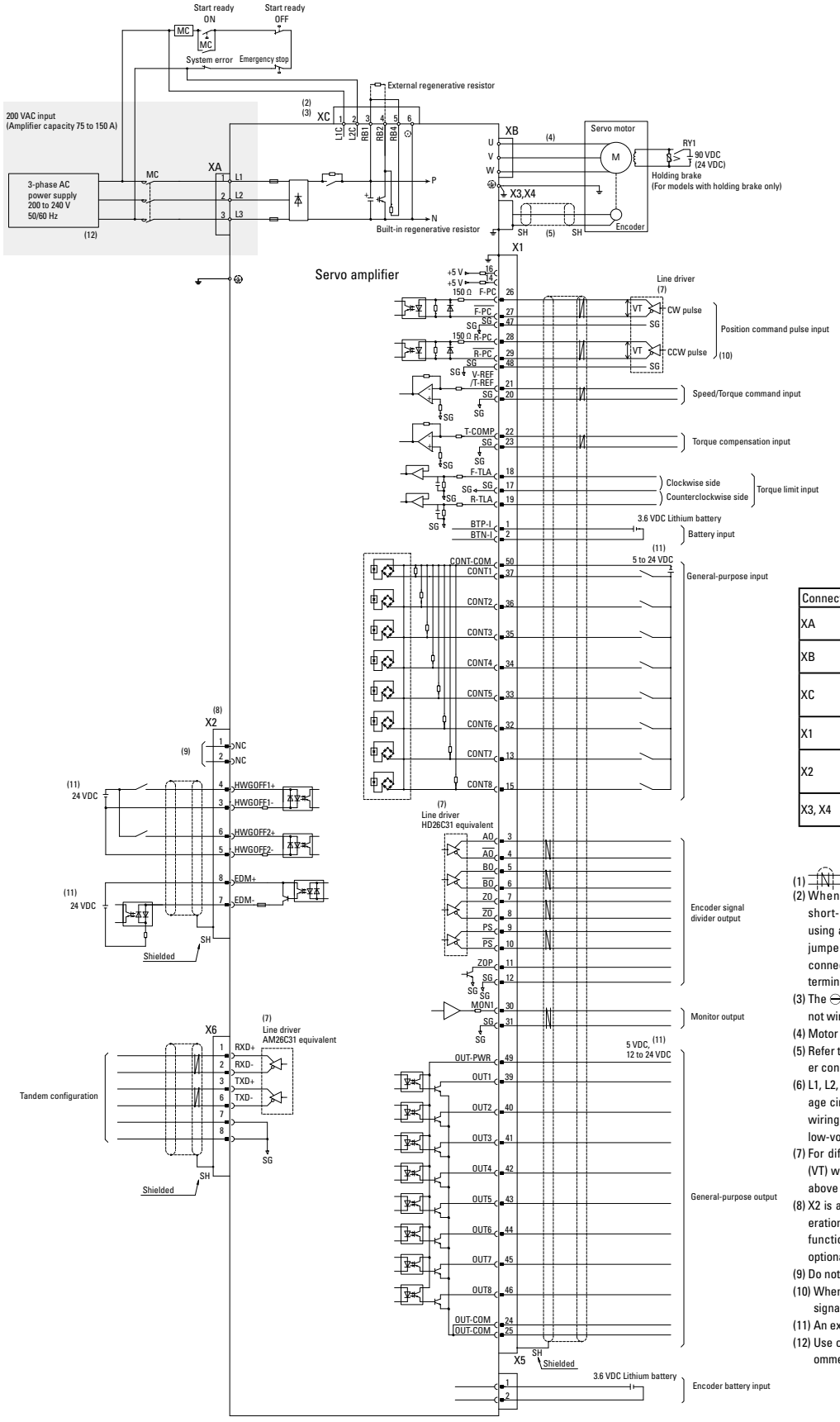


Connector no.	Name	Housing, plug, shell
XA	Main circuit power input connector	03JFAT-SAXGDK-KT10
XB	Servo motor / linear servo motor connector	03JFAT-SAYGDK-KT10
XC	Control power supply / external regenerative resistor connector	06JFAT-SAXGDK-K5.0
X1	GPIO connector	Plug: 10150-3000PE Shell: 10350-52A0-008
X2	STO connector	For short-circuiting: 1971153-2 For wiring: 2013595-3
X3, X4	Encoder connector	I/O connector: 54599-1019

(1) Use shielded twisted pair (STP) cables.
(2) When using the built-in regenerative resistor, connect a short-circuit jumper between RB1 and RB4 terminals. When using an external regenerative resistor, remove the short-circuit jumper connected between RB1 and RB4 terminals, and then connect the external regenerative resistor between RB1 and RB2 terminals.
(3) The ⏚ terminal is for maintenance use (high-voltage circuit). Do not wire this terminal.
(4) Motor side connections vary depending on motor specifications.
(5) Refer to the encoder connection diagram for the wiring of encoder connectors.
(6) L1, L2, L3, L1C, L2C, RB1, RB2, RB4, ⏚, U, V, and W are high-voltage circuits. All other signal lines are low-voltage circuits. When wiring, provide sufficient clearance between high-voltage and low-voltage circuits.
(7) For differential line drivers, use one with a differential voltage (VT) within 2.5 to 3.8 V. If the differential voltage is below 2.5 V or above 3.8 V, it may cause malfunction due to missing pulses.
(8) X2 is a safety device connector. Turning Servo ON (motor in operation) requires to connect a safety device to X2 and get safety functions enabled. When not using safety functions, insert an optional short-circuiting connector to X2.
(9) Do not connect anything to the X2-1 or X2-2 pins.
(10) When using a differential input signal, be sure to connect the signal ground (SG) between the servo amplifier and equipment.
(11) Use of a UL or IEC/EN compliant leakage circuit breaker is recommended.
(12) When using single-phase 100/200 VAC or DC input, connect the main circuit power supply to L1 and L2, and do not use L3.
(13) When using a single-phase power supply, please check our User's Manual or Product Specification for accompanying limitations.
(14) Use of a UL or IEC/EN compliant leakage circuit breaker is recommended on the primary side of the DC power supply.
(15) When using a DC power supply, please check our User's Manual or Product Specification for accompanying limitations.
(16) An external power supply is to be prepared by the customer.
(17) Use an input voltage that meets the product specifications.

External Wiring Diagram

75 to 150 A, sinking output

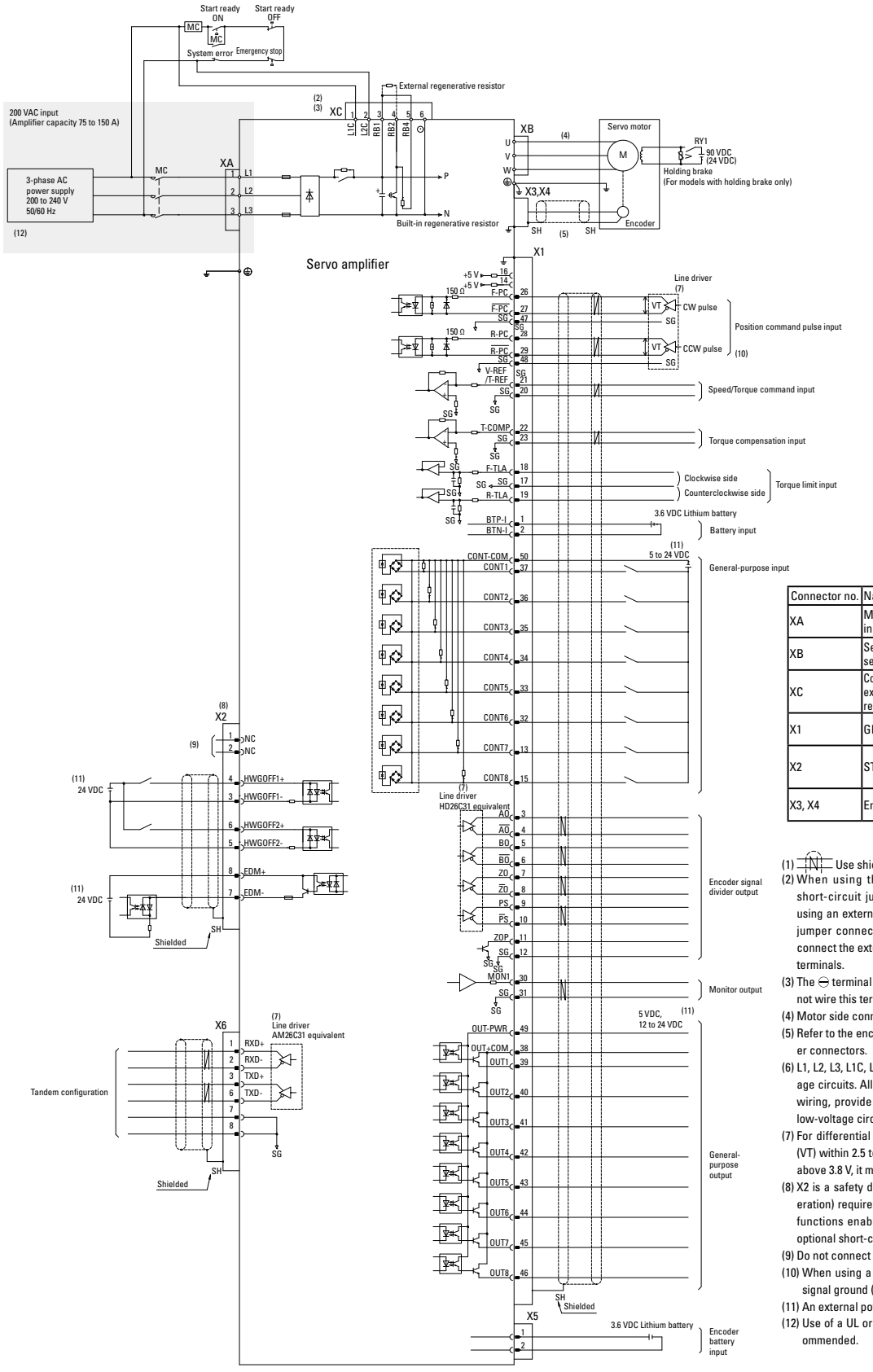


Connector no.	Name	Housing, plug, shell
XA	Main circuit power input connector	831-1103/302-004
XB	Servo motor / linear servo motor connector	831-099/Z000-0082
XC	Control power supply / external regenerative resistor connector	831-1106/302-004
X1	GPIO connector	Plug: 10150-3000PE Shell: 10350-52A0-008
X2	STO connector	For short-circuiting: 1971153-2 For wiring: 2013595-3
X3, X4	Encoder connector	I/O connector: 54599-1019

(1) Use shielded twisted pair (STP) cables.
(2) When using the built-in regenerative resistor, connect a short-circuit jumper between RB1 and RB4 terminals. When using an external regenerative resistor, remove the short-circuit jumper connected between RB1 and RB4 terminals, and then connect the external regenerative resistor between RB1 and RB2 terminals.
(3) The ⏚ terminal is for maintenance use (high-voltage circuit). Do not wire this terminal.
(4) Motor side connections vary depending on motor specifications.
(5) Refer to the encoder connection diagram for the wiring of encoder connectors.
(6) L1, L2, L3, L1C, L2C, RB1, RB2, RB4, ⏚, U, V, and W are high-voltage circuits. All other signal lines are low-voltage circuits. When wiring, provide sufficient clearance between high-voltage and low-voltage circuits.
(7) For differential line drivers, use one with a differential voltage (VT) within 2.5 to 3.8 V. If the differential voltage is below 2.5 V or above 3.8 V, it may cause malfunction due to missing pulses.
(8) X2 is a safety device connector. Turning Servo ON (motor in operation) requires to connect a safety device to X2 and get safety functions enabled. When not using safety functions, insert an optional short-circuit connector to X2.
(9) Do not connect anything to the X2-1 or X2-2 pins.
(10) When using a differential input signal, be sure to connect the signal ground (SG) between the servo amplifier and equipment.
(11) An external power supply is to be prepared by the customer.
(12) Use of a UL or IEC/EN compliant leakage circuit breaker is recommended.

External Wiring Diagram

75 to 150 A, sourcing output



Connector no.	Name	Housing, plug, shell
XA	Main circuit power input connector	831-1103/302-004
XB	Servo motor / linear servo motor connector	831-099/Z000-0082
XC	Control power supply / external regenerative resistor connector	831-1106/302-004
X1	GPIO connector	Plug: 10150-3000PE Shell: 10350-52A0-008
X2	STO connector	For short-circuiting: 1971153-2 For wiring: 2013595-3
X3, X4	Encoder connector	I/O connector: 54599-1019

(1) Use shielded twisted pair (STP) cables.
(2) When using the built-in regenerative resistor, connect a short-circuit jumper between RB1 and RB4 terminals. When using an external regenerative resistor, remove the short-circuit jumper connected between RB1 and RB4 terminals, and then connect the external regenerative resistor between RB1 and RB2 terminals.
(3) The ⏚ terminal is for maintenance use (high-voltage circuit). Do not wire this terminal.
(4) Motor side connections vary depending on motor specifications.
(5) Refer to the encoder connection diagram for the wiring of encoder connectors.
(6) L1, L2, L3, L1C, L2C, RB1, RB2, RB4, ⏚, U, V, and W are high-voltage circuits. All other signal lines are low-voltage circuits. When wiring, provide sufficient clearance between high-voltage and low-voltage circuits.
(7) For differential line drivers, use one with a differential voltage (VT) within 2.5 to 3.8 V. If the differential voltage is below 2.5 V or above 3.8 V, it may cause malfunction due to missing pulses.
(8) X2 is a safety device connector. Turning Servo ON (motor in operation) requires to connect a safety device to X2 and get safety functions enabled. When not using safety functions, insert an optional short-circuiting connector to X2.
(9) Do not connect anything to the X2-1 or X2-2 pins.
(10) When using a differential input signal, be sure to connect the signal ground (SG) between the servo amplifier and equipment.
(11) An external power supply is to be prepared by the customer.
(12) Use of a UL or IEC/EN compliant leakage circuit breaker is recommended.

Servo Amplifiers

EtherCAT interface type

Amplifier capacity: 10 to 150 A

■ How to read model numbers

Note that not all possible combinations of field values may yield valid products. Also, some of the values listed below are for options.
Refer to the Standard Model Number List section for standard models with valid model numbers.

GA D SA 01 A H 2 4

GA···SANMOTION G series

D···Servo amplifier

Input power supply voltage

Code	Specifications
SA	200 VAC
SE	100 VAC

Amplifier capacity

Code	Specifications
01	10 A
02	20 A
03	30 A
05	50 A
07	75 A
10	100 A
15	150 A

Option 1

Code	Specifications
A	With built-in regenerative resistor & With DB resistor
L	Without built-in regenerative resistor & With DB resistor

Interface

Code	Specifications
H	EtherCAT

Motor encoder type

Rotary motor

Code	To connector X3 (Top): Rotary motor encoder	To connector X4 (Bottom): Rotary motor encoder or external encoder	Standard/Option
1	Absolute encoder	Absolute encoder	Option
2	Absolute encoder	Incremental encoder	Standard
A	Incremental encoder	Incremental encoder	Option

Linear motor

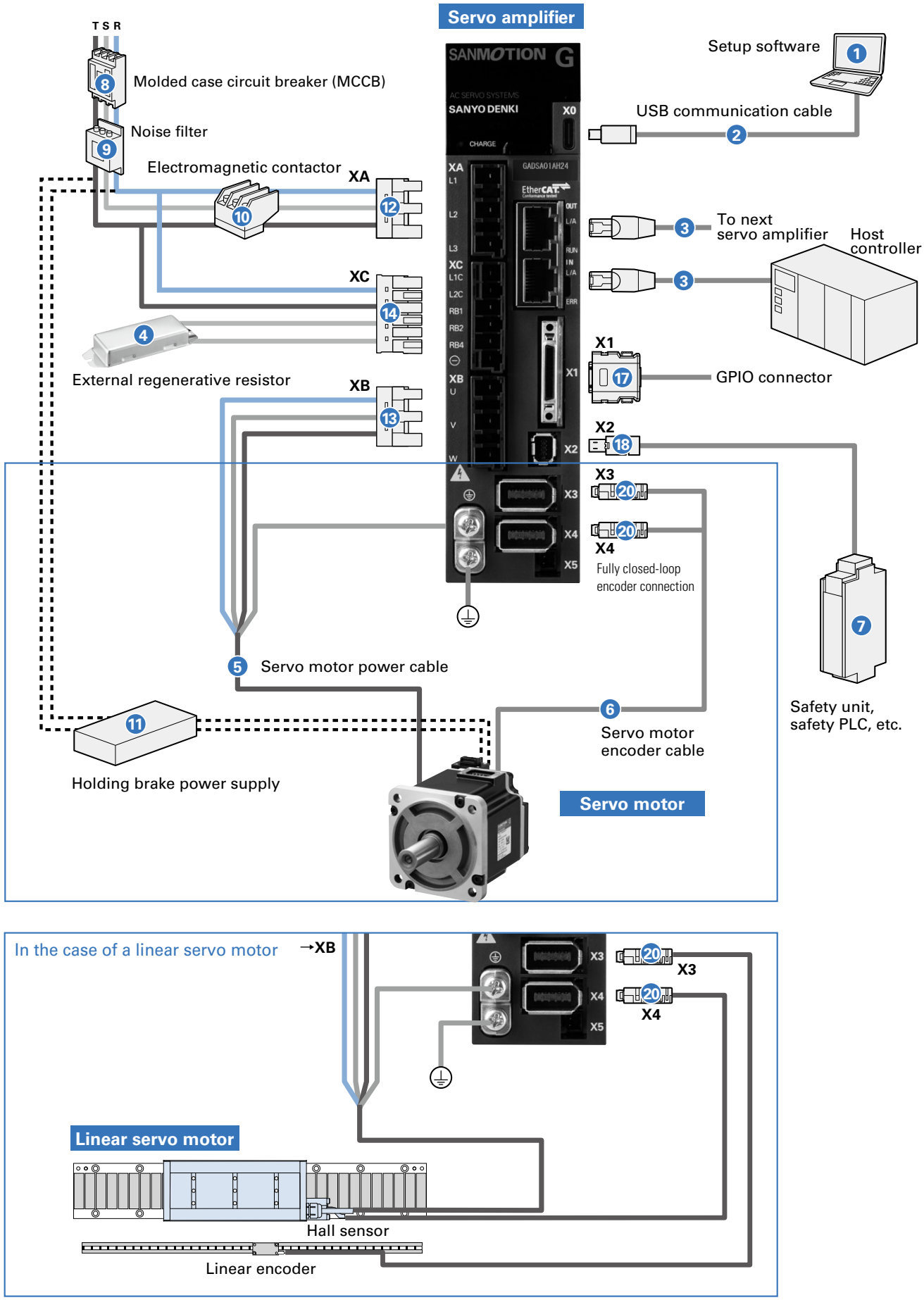
Code	To connector X3 (Top): Linear motor encoder	To connector X4 (Bottom): Linear motor encoder or hall sensor	Standard/Option
2	Absolute encoder	Incremental encoder	Standard
A	Incremental encoder	Line driver	Option

Option 2

Code	STO function	Tandem configuration	Standard/Option
2	✓(Without delay circuit)	✓	Option
4	✓(With delay circuit)	✓	Standard

System Configuration

10 to 50 A The photo shows a 10 A model.



Options and Peripheral Items (10 to 50 A)

No.	Name	Model no.	Description	
❶	Setup software	To download, go to the Products tab on our website.	Parameters can be set and monitored via communication with a PC.	
❷	USB communication cable	AL-Y0020355-0□	PC side: Type A, amplifier side: Type C	PC communication cable for setup software
		AL-Y0021049-0□	PC side: Type C, amplifier side: Type C	
❸	EtherCAT communication cable	AL-01109322-□	Communication with controller or another servo amplifier	
❹	External regenerative resistor	AL-R□□□W□□B	Used when more regenerative capacity is needed, e.g., for high-frequency movements	
❺	Servo motor power cable	p. 87 to p. 88	For rotary motors only	
❻	Servo motor encoder cable	p. 89		
❼	Safety unit, safety PLC, etc.	To be provided by the customer	Connects I/O signals from the Safe Torque Off function to devices such as a safety unit and safety PLC.	
❽	Molded case circuit breaker (MCCB)	To be provided by the customer	Used to protect power lines	
❾	Noise filter	To be provided by the customer	Used to prevent external noise from power lines	
❿	Electromagnetic contactor	To be provided by the customer	Used to switch the power on and off (prepare a protective circuit)	
⓫	Holding brake	To be provided by the customer	Used for servo motors with holding brake	

Individual connectors

Only a ⓳STO short-circuit connector is included with a servo amplifier. Note that other connectors are not included and need to be prepared by the customer.

No.	Connector code	Details		Model no.	Mfr. part no.	Manufacturer
⓬	XA	Power connector	For main circuit power supply connection	AL-01111794-01	03JFAT-SAXGDK-KT10	J.S.T.
⓭	XB		For servo motor/linear servo motor connection	AL-01111795-01	03JFAT-SAYGDK-KT10	
⓮	XC		For control circuit power supply / external regenerative resistor connection	AL-01111793-01	06JFAT-SAXGDK-K5.0	
⓯	XC		For control circuit power supply / built-in regenerative resistor connection (with short-circuit wiring)	AL-AP000439-01	06JFAT-SAXGDK-K5.0 + short-circuit wiring	
⓰	OT	Connector tool for XA/XB/XC		AL-00961844-01	J-FAT-OT(N)	
⓱	X1	GPIO connector		AL-01131482-01	DH-27-CT1B, DH40-27S, DH-27-CMB(7.3)	Hirose Electric Co., Ltd.
⓲	X2	Signal connector	STO wiring connector	AL-00718252-01	2013595-3	Tyco Electronics Japan G.K.
⓳	X2		STO short-circuit connector*	AL-00849548-02	1971153-2	
⓴	X3, X4		For encoder connection (With linear servo motors, linear encoder / hall sensor connection)	AL-00530312-01	54599-1019	Molex Japan Co., Ltd.

* If not wiring X2, be sure to insert a supplied STO short-circuit connector to X2.

Power connector sets

Name	Model no.	Connectors included in the set (see above, numbers in the "Individual connectors" table)				
		⓬ XA	⓭ XB	⓮ XC	⓯ XC with short-circuit wiring	⓰ OT
Power connector set A (With built-in regenerative resistor)	AL-01135740-01	✓	✓	–	✓	✓
Power connector set B (With external regenerative resistor)	AL-01133414-01	✓	✓	✓	–	✓

Signal connector sets

Name	Model no.	Connectors included in the set (see above, numbers in the "Individual connectors" table)		
		⓱ X1	⓲ X2	⓴ X3, X4
Signal connector set B1 (STO not used)	AL-01136298-01	✓	– Use the short-circuiting connector included with the servo amplifier	✓
Signal connector set B2 (STO used)	AL-01136299-01	✓	✓	✓

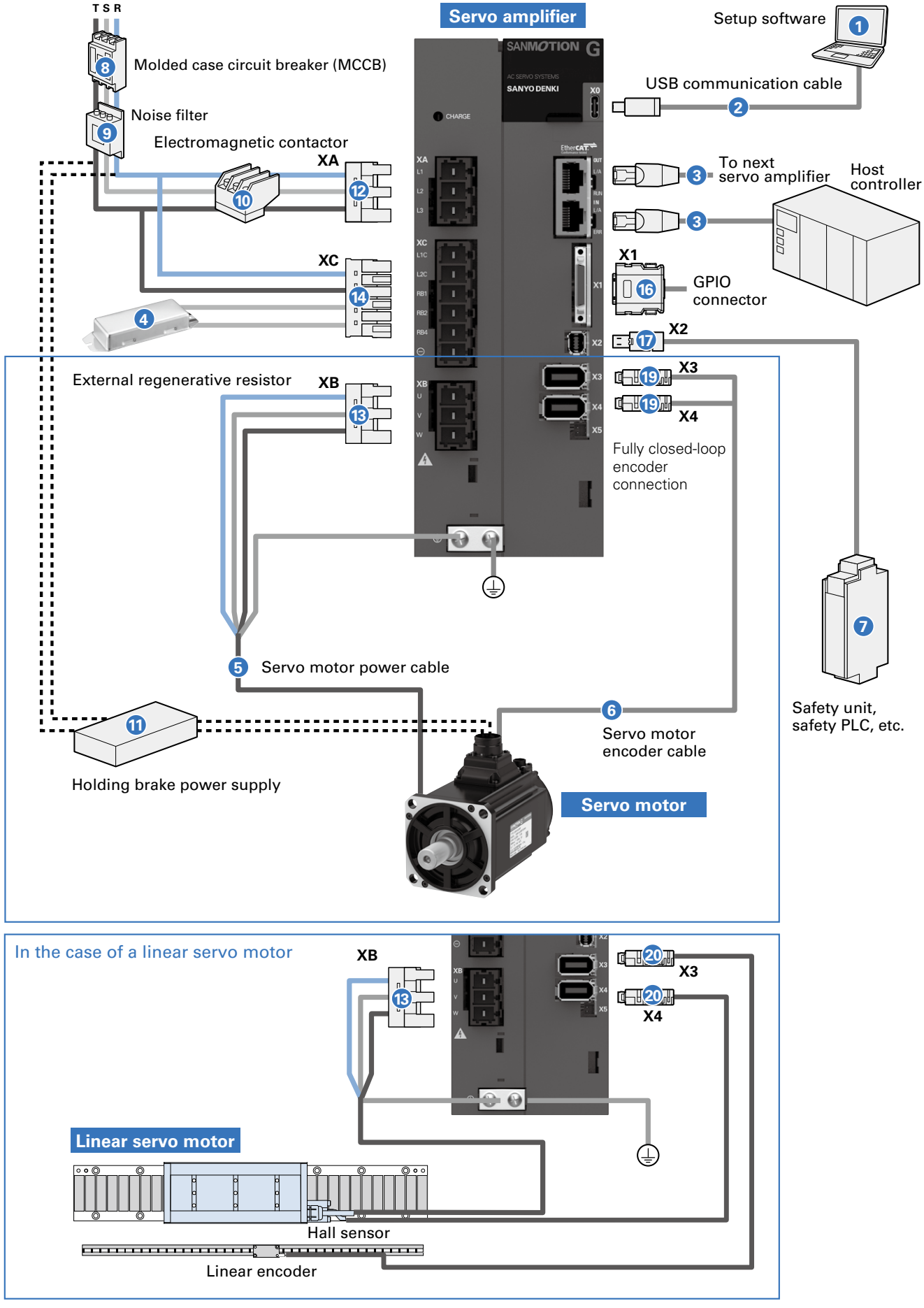
Power/Signal connector set

For semi closed-loop control. For fully closed-loop control applications or when using a hall sensor with a linear servo motor, prepare another ⓴ encoder connector.

Name	Built-in regenerative resistor	STO	Model no.	Connectors included in the set (see above, numbers in the "Individual connectors" table)							
				⓬ XA	⓭ XB	⓮ XC	⓯ XC with short-circuit wiring	⓰ OT	⓱ X1	⓲ X2	⓴ X3, X4
Power/Signal connector set B	✓	–	AL-01100889-01	✓	✓	–	✓	✓	✓	–	✓
	–	–	AL-01100888-01	✓	✓	✓	–	✓	✓	–	✓
	✓	✓	AL-01100925-01	✓	✓	–	✓	✓	✓	✓	✓
	–	✓	AL-01100893-01	✓	✓	✓	–	✓	✓	✓	✓

System Configuration Diagram

75 to 150 A The photo shows a 75 A model.



Options and Peripheral Items (75 to 150 A)

No.	Name	Model no.	Description	
①	Setup software	To download, go to the Products tab on our website.	Parameters can be set and monitored via communication with a PC.	
②	USB communication cable	AL-Y0020355-0□	PC side: Type A, amplifier side: Type C	PC communication cable for setup software
		AL-Y0021049-0□	PC side: Type C, amplifier side: Type C	
③	EtherCAT communication cable	AL-01109322-□	Communication with controller or another servo amplifier	
④	External regenerative resistor	AL-R□□□W□□B	Used when more regenerative capacity is needed, e.g., for high-frequency movements	
⑤	Servo motor power cable	p. 87 to p. 88	For rotary motors only	
⑥	Servo motor encoder cable	p. 89		
⑦	Safety unit, safety PLC, etc.	To be provided by the customer	Connects I/O signals from the Safe Torque Off function to devices such as a safety unit and safety PLC.	
⑧	Molded case circuit breaker (MCCB)	To be provided by the customer	Used to protect power lines	
⑨	Noise filter	To be provided by the customer	Used to prevent external noise from power lines	
⑩	Electromagnetic contactor	To be provided by the customer	Used to switch the power on and off (prepare a protective circuit)	
⑪	Holding brake	To be provided by the customer	Used for servo motors with holding brake	

Individual connectors

Amplifiers with ⑱X2 connector come with a STO short-circuit connector. Note that other connectors are not included and need to be prepared by the customer.

No.	Connector code	Details		Model no.	Mfr. part no.	Manufacturer
⑫	XA	Power connector	For main circuit power supply connection	AL-01178350-01	831-1103/302-004	Wago Company of Japan, Ltd.
⑬	XB		For servo motor/linear servo motor connection	AL-01178351-01	831-099/Z000-082	
⑭	XC		For control circuit power supply / external regenerative resistor connection	AL-01178352-01	831-1106/302-004	
⑮	XC		For control circuit power supply / built-in regenerative resistor connection (with short-circuit wiring)	AL-01188659-01	831-1106/302-004 + short-circuit wiring	
⑯	X1	GPIO connector		AL-01131482-01	DH-27-CT1B, DH40-27S, DH-27-CMB(7.3)	Hirose Electric Co., Ltd.
⑰	X2	Signal connector	STO wiring connector	AL-00718252-01	2013595-3	Tyco Electronics Japan G.K.
⑱	X2		STO short-circuit connector*	AL-00849548-02	1971153-2	
⑲	X3, X4		For encoder connection (With linear servo motors, linear encoder / hall sensor connection)	AL-00530312-01	54599-1019	Molex Japan Co., Ltd.

* If not wiring X2, be sure to insert a supplied STO short-circuit connector to X2.

Signal connector sets

Name	Model no.	Connectors included in the set (see above, numbers in the "Individual connectors" table)		
		⑯ X1	⑰ X2	⑲ X3, X4
Signal connector set B1 (STO not used)	AL-01136298-01	✓	– Use the short-circuiting connector included with the servo amplifier	✓
Signal connector set B2 (STO used)	AL-01136299-01	✓	✓	✓

General Specifications

Model no.			GADS□01□□	GADS□02□□	GADS□03□□	GADS□05□□	GADS□07□□	GADS□10□□	GADS□15□□
Capacity			10 A	20 A	30 A	50 A	75 A	100 A	150 A
Maximum compatible motor output			200 W	400 W	1.5 kW	2.5 kW	3.5 kW	5.0 kW	7.0 kW
Continuous output current			1.2 Arms	3.1 Arms	5.2 Arms	12.0 Arms	18.0 Arms	24.0 Arms	34.0 Arms
Peak output current			4.3 Arms	12.0 Arms	16.3 Arms	26.5 Arms	45.5 Arms	55.0 Arms	83.0 Arms
Control function			Position/speed/torque control (switched with parameters)						
Control system			IGBT-based, sinusoidal PWM control						
Main circuit power supply	Input voltage		3-phase : 200 to 240 VAC (+10, -15%), 50/60 Hz (±3 Hz) Single-phase : 200 to 240 VAC (+10, -15%), 50/60 Hz (±3 Hz)(1) DC : 300 VDC (±20%)(1) Single-phase : 100 to 120 VAC (+10, -15%), 50/60 Hz (±3 Hz)(2) DC : 150 VDC (±20%)(2)				3-phase: 200 to 240 VAC (+10, -15%), 50/60 Hz (±3 Hz)		
	Input current (3-/single-phase)		1.2/2.0 Arms	2.2/3.9 Arms	6.9/7.0 Arms	11.0/11.6 Arms	18.5 Arms	24.7 Arms	34.0 Arms
	Power supply capacity		0.4 kVA	0.8 kVA	2.4 kVA	3.8 kVA	7.1 kVA	9.4 kVA	13.0 kVA
Control circuit power supply	Input voltage range		Single-phase : 200 to 240 VAC (+10, -15%), 50/60 Hz (±3 Hz)(1) DC : 300 VDC (±20%)(1) Single-phase : 100 to 120 VAC (+10, -15%), 50/60 Hz (±3 Hz)(2) DC : 150 VDC (±20%)(2)				Single-phase: 200 to 240 VAC (+10, -15%), 50/60 Hz (±3 Hz)(1)		
	Input current		0.5 Arms			0.3 Arms	0.3 Arms	0.3 Arms	0.3 Arms
Regenerative resistor	Built-in regenerative resistor	Resistance	25 Ω			17 Ω	10 Ω	10 Ω	6 Ω
		Max. power consumption	5 W			20 W	60 W	90 W	120 W
	Min. allowable external resistance		25 Ω			17 Ω	10 Ω	10 Ω	6 Ω
Environment	Operating ambient temperature		0 to +60°C(3)						
	Storage temperature		-20 to +65°C						
	Operating and storage humidity		95% RH max. (non-condensing)						
	Operating altitude		2000 m max.(3)						
	Vibration resistance		6 m/s^2						
	Shock resistance		20 m/s^2						
	Overvoltage category		III						
Structure			Built-in tray-type power supply						

(1) 200 VAC single-phase input and 300 VDC input are compatible only with GADSA□□ models. When using single-phase input or DC input, parameter settings will be necessary.
(2) 100 VAC single-phase input and 150 VDC input are compatible only with GADSE□□ models. When using single-phase input or DC input, parameter settings will be necessary.
(3) When used in environments with an ambient temperature of +55 to +60°C or an altitude of 1000 to 2000 m, motor performance undergoes derating.

■ Performance

Velocity control range	1:5000 (Internal velocity command)
Frequency characteristics	3500 Hz (With 400 W or lower motors in high-speed command mode)
Allowable range of load inertia	10 times the motor rotor inertia

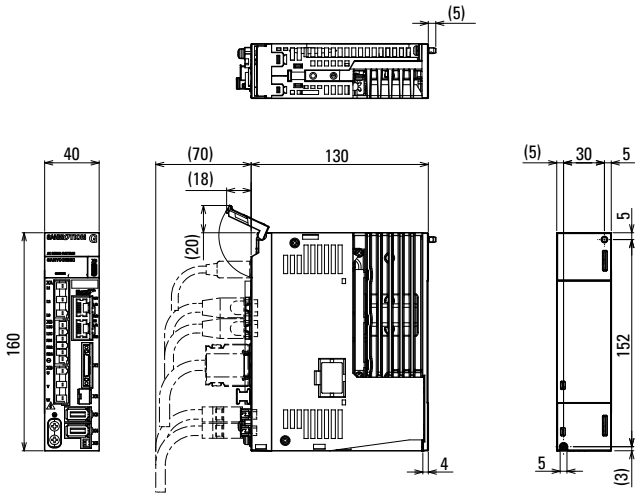
■ Built-in functions

Protection functions	Output power device error (overcurrent), current detection error, STO error, cooling fan error, overload, regenerative error, magnetic pole position estimation error, continuous overspeed, overheating error, external error, servo amplifier temperature error, overvoltage, main circuit power supply undervoltage, main circuit power supply open phase, main circuit power supply voltage detection error, inrush current protection time error, control circuit power supply error, control circuit power supply undervoltage, encoder error, overspeed, speed control error, speed feedback error, model-following vibration control error, excessive position deviation, positioning command error, excessive inter-axis synchronization deviation, excessive dual positioning deviation, dual positioning feedback error, inter-amplifier communication error, excessive position deviation difference, memory error, CPU error, parameter error, control circuit error, task process error
Digital operator	Status display, test run, alarm log, monitoring
Dynamic brake circuit	Built-in
Regenerative circuit	Built-in
Monitoring	Ch 1: Velocity monitoring (VMON) 2.0 V ±10% (at 1000 min^{-1}), Ch 2: Torque command monitoring (TCMON) 2.0 V ±10% (at 100%)

Dimensions [Unit: mm]

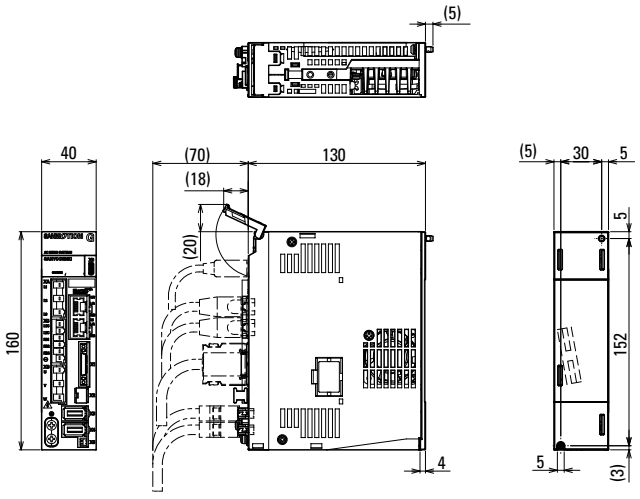
《10 A》

Mass: 0.80 kg



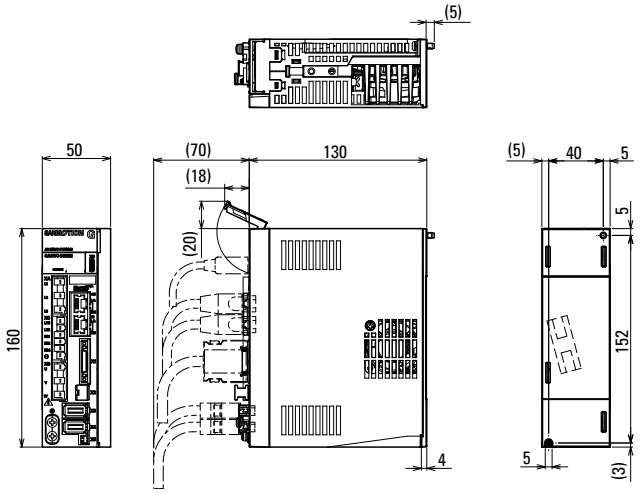
《20 A》

Mass: 0.80 kg



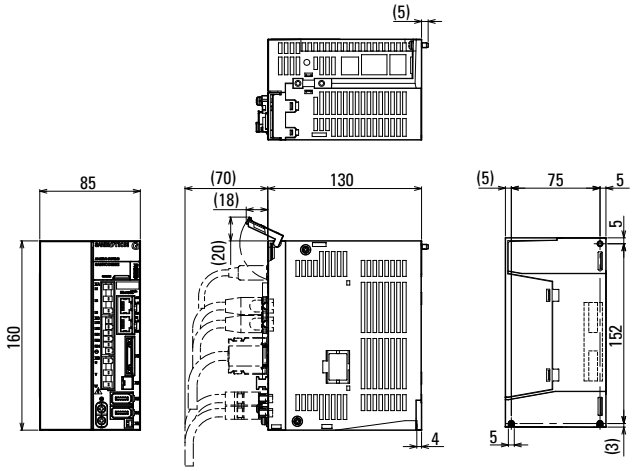
《30 A》

Mass: 0.90 kg



《50 A》

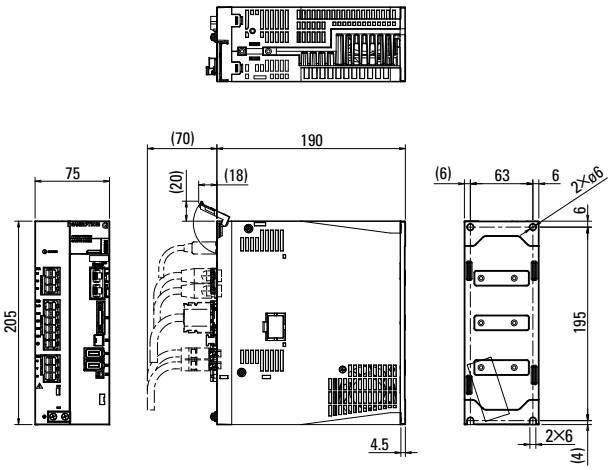
Mass: 1.50 kg



Dimensions [Unit: mm]

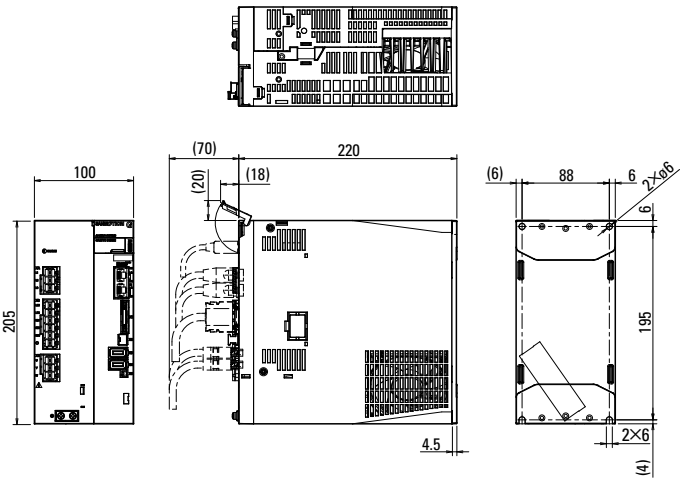
《75 A》

Mass: 2.4 kg



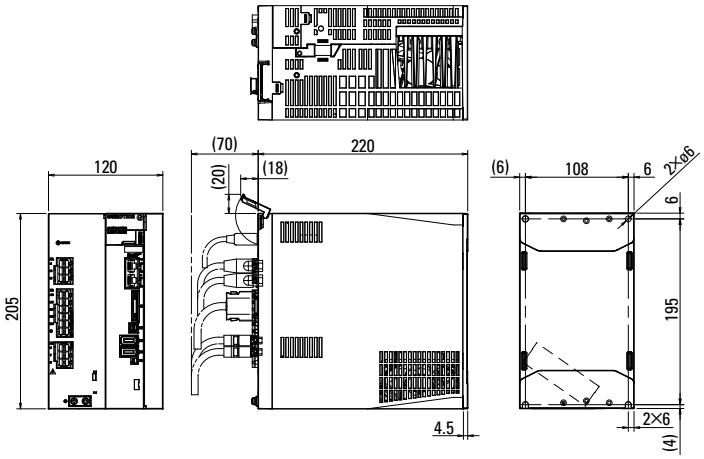
《100 A》

Mass: 3.4 kg



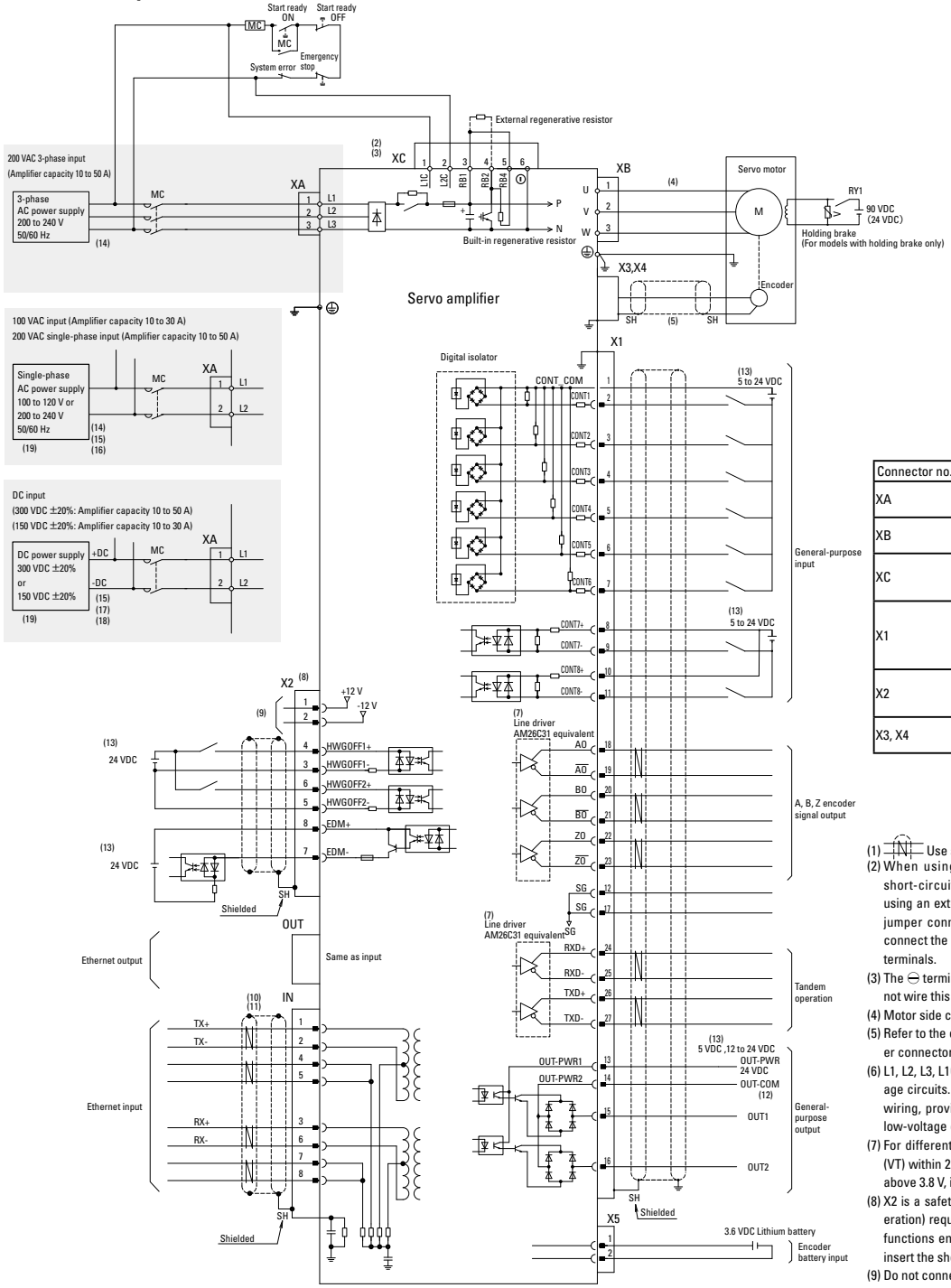
《150 A》

Mass: 4.2 kg



External Wiring Diagram

10 to 50 A, EtherCAT

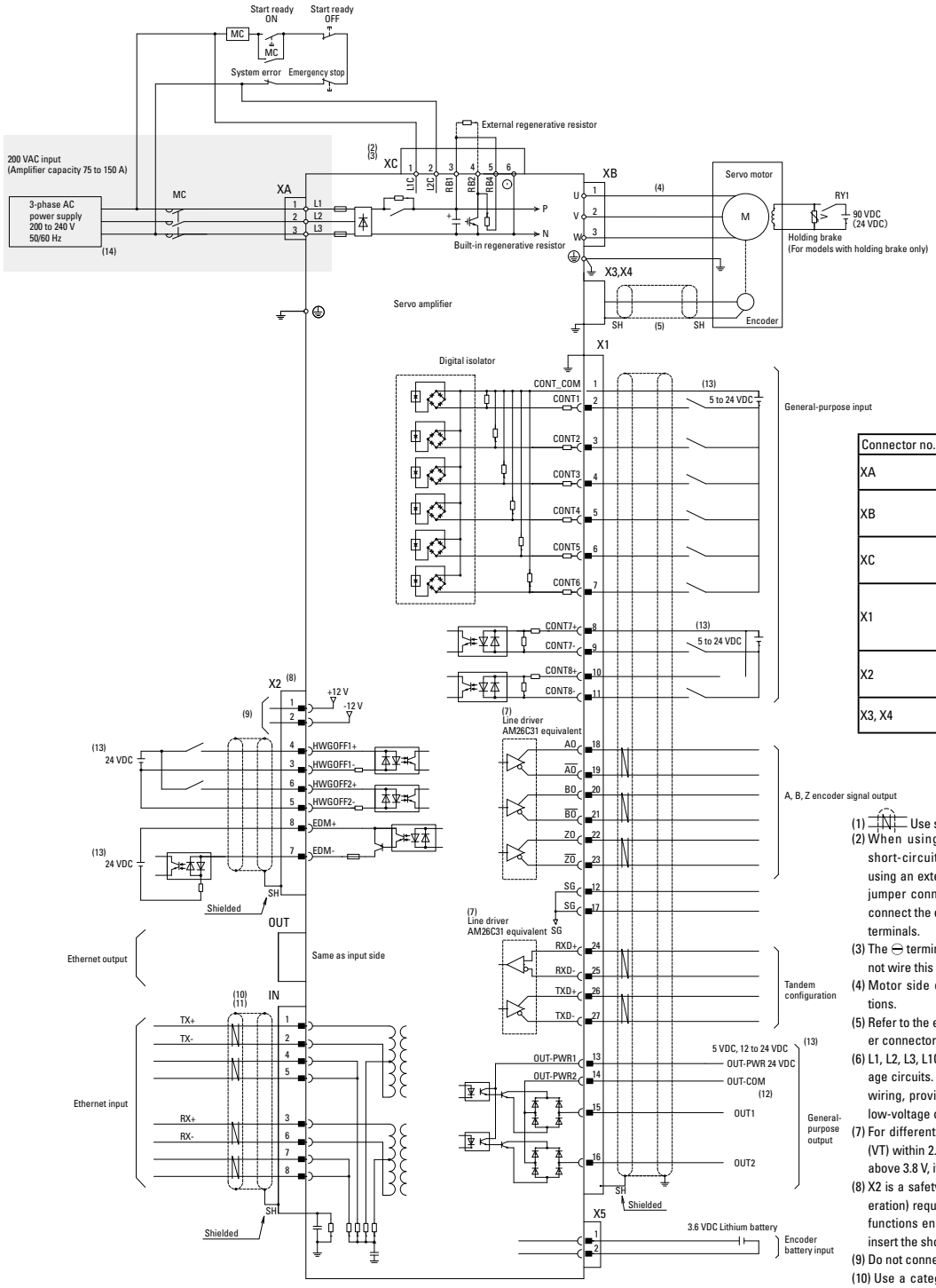


Connector no.	Name	Housing, plug, shell
XA	Main circuit power input connector	03JFAT-SAXGDK-KT10
XB	Servo motor / linear servo motor connector	03JFAT-SAYGDK-KT10
XC	Control power supply / external regenerative resistor connector	06JFAT-SAXGDK-K5.0
X1	GPIO connector	Plug: DH40-27S Cover: DH-27-CT1B Clamp: DH-27-CMB(7.3)
X2	STO connector	For short-circuiting: 1971153-2 For wiring: 2013595-3
X3, X4	Encoder connector	I/O connector: 54599-1019

(1) Use shielded twisted pair (STP) cables.
(2) When using the built-in regenerative resistor, connect a short-circuit jumper between RB1 and RB4 terminals. When using an external regenerative resistor, remove the short-circuit jumper connected between RB1 and RB4 terminals, and then connect the external regenerative resistor between RB1 and RB2 terminals.
(3) The ⏚ terminal is for maintenance use (high-voltage circuit). Do not wire this terminal.
(4) Motor side connections vary depending on motor specifications.
(5) Refer to the encoder connection diagram for the wiring of encoder connectors.
(6) L1, L2, L3, L1C, L2C, RB1, RB2, RB4, ⏚, U, V, and W are high-voltage circuits. All other signal lines are low-voltage circuits. When wiring, provide sufficient clearance between high-voltage and low-voltage circuits.
(7) For differential line drivers, use one with a differential voltage (VT) within 2.5 to 3.8 V. If the differential voltage is below 2.5 V or above 3.8 V, it may cause malfunction due to missing pulses.
(8) X2 is a safety device connector. Turning Servo ON (motor in operation) requires to connect a safety device to X2 and get safety functions enabled. When not using safety functions, be sure to insert the short-circuiting connector to X2.
(9) Do not connect anything to the X2-1 or X2-2 pins.
(10) Use a category 5e (TIA standards) or better shielded twisted pair cable (STP).
(11) Pins 4-5 and 7-8 of the EtherCAT IN/OUT connectors are short-circuited inside the amplifier. Pins 4-5 and 7-8 are connected with 75 Ω resistors as shown on the diagram. They are also connected to the pulse transformer midpoint with a 75 Ω resistor.
(12) For sourcing type output, connect pin X1-14 to an external power supply; for sinking type output, connect pin X1-14 to GND.
(13) An external power supply is to be prepared by the customer.
(14) Use of a UL or IEC/EN compliant leakage circuit breaker is recommended.
(15) When using single-phase 100/200 VAC or DC input, connect the main circuit power supply to L1 and L2, and do not use L3.
(16) When using a single-phase power supply, please check our User's Manual or Product Specification for accompanying limitations.
(17) Use of a UL or IEC/EN compliant leakage circuit breaker is recommended on the primary side of the DC power supply.
(18) When using a DC power supply, please check our User's Manual or Product Specification for accompanying limitations.
(19) Use an input voltage that meets the product specifications.

External Wiring Diagram

75 to 150 A, EtherCAT



Connector no.	Name	Housing, plug, shell
XA	Main circuit power input connector	831-1103/302-004
XB	Servo motor / linear servo motor connector	831-099/Z000-0082
XC	Control power supply / external regenerative resistor connector	831-1106/302-004
X1	GPIO connector	Plug: DH40-27S Cover: DH-27-CT1B Clamp: DH-27-CMB(7.3)
X2	STO connector	For short-circuiting: 1971153-2 For wiring: 2013595-3
X3, X4	Encoder connector	I/O connector: 54599-1019

(1) Use shielded twisted pair (STP) cables.
(2) When using the built-in regenerative resistor, connect a short-circuit jumper between RB1 and RB4 terminals. When using an external regenerative resistor, remove the short-circuit jumper connected between RB1 and RB4 terminals, and then connect the external regenerative resistor between RB1 and RB2 terminals.
(3) The ⏚ terminal is for maintenance use (high-voltage circuit). Do not wire this terminal.
(4) Motor side connections vary depending on motor specifications.
(5) Refer to the encoder connection diagram for the wiring of encoder connectors.
(6) L1, L2, L3, L1C, L2C, RB1, RB2, RB4, ⏚, U, V, and W are high-voltage circuits. All other signal lines are low-voltage circuits. When wiring, provide sufficient clearance between high-voltage and low-voltage circuits.
(7) For differential line drivers, use one with a differential voltage (VT) within 2.5 to 3.8 V. If the differential voltage is below 2.5 V or above 3.8 V, it may cause malfunction due to missing pulses.
(8) X2 is a safety device connector. Turning Servo ON (motor in operation) requires to connect a safety device to X2 and get safety functions enabled. When not using safety functions, be sure to insert the short-circuiting connector to X2.
(9) Do not connect anything to the X2-1 or X2-2 pins.
(10) Use a category 5e (TIA standards) or better shielded twisted pair cable (STP).
(11) Pins 4-5 and 7-8 of the EtherCAT IN/OUT connectors are shorted inside the amplifier. Pins 4-5 and 7-8 are connected with 75 Ω resistors as shown on the diagram. They are also connected to the pulse transformer midpoint with a 75 Ω resistor.
(12) For sourcing type output, connect pin X1-14 to an external power supply; for sinking type output, connect pin X1-14 to GND.
(13) An external power supply is to be prepared by the customer.
(14) Use of a UL or IEC/EN compliant leakage circuit breaker is recommended.

Options

Setup Software

This software allows you to set servo system parameters from a PC.
It also allows you to easily start up and run tests for the servo system.
The software can be downloaded from Product Information on our website.
https://www.sanyodenki.com/

■ Setup software name

SANMOTION MOTOR SETUP SOFTWARE

■ Main functions

- Parameter settings (by group, by function)
- Diagnosis (alarm indicator, warning indicator, alarm cancellation)
- Test run execution (speed jog, positioning operation, motor home position search, serial encoder clearance)
- Servo tuning (notch filter tuning, FF vibration control frequency tuning)
- Various measurement functions (operating waveform display, machinery frequency response measurement)

Use a USB communication cable to connect the USB port on the PC and the servo amplifier.

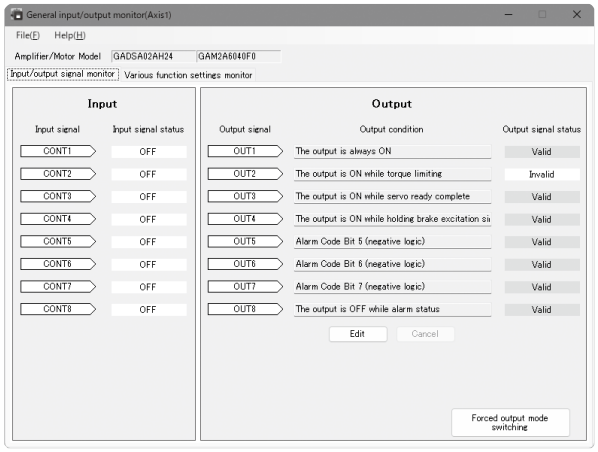
■ Supported operating systems

Windows 10/11

See our website for details on supported OS versions.

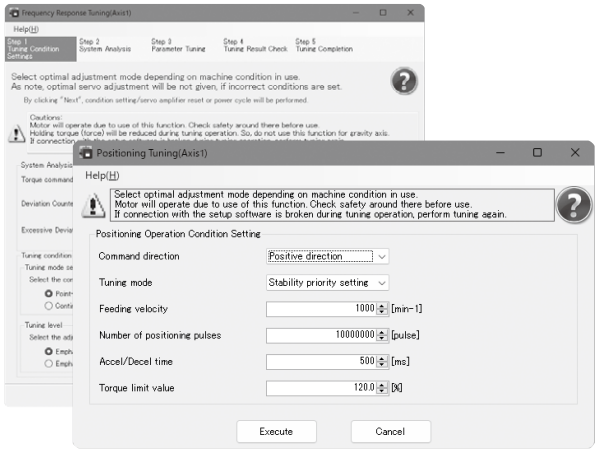
New features of SANMOTION G series

GPIO monitoring



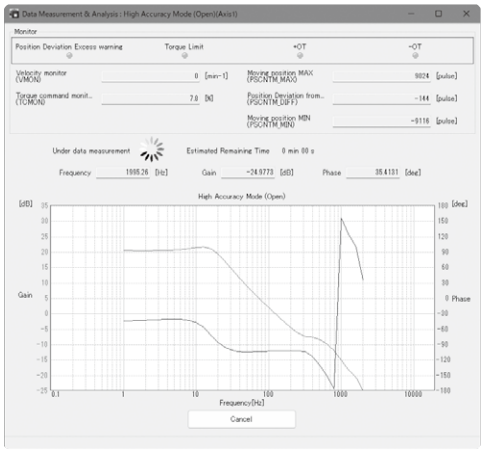
Graphically displays general-purpose I/O signal status

Advanced tuning



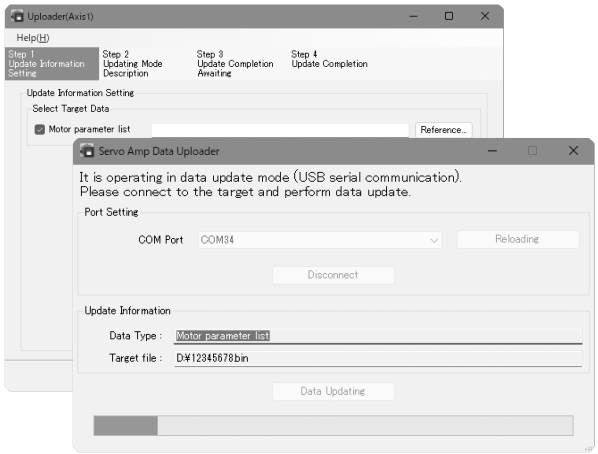
By setting the operating conditions of the machine, the frequency response characteristics and positioning settling characteristics are measured and automatically adjusted to the optimum control parameters.

System analysis (high-precision mode)



A function to measure the frequency response more precisely than the system analysis of the SANMOTION R 3E Model has been added.

Motor parameter downloader



Newly added motors can be easily added with the setup software without updating the amplifier firmware.

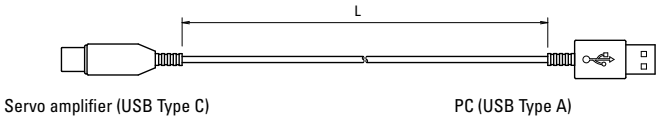
Cables [Unit in drawings: mm]

■ USB communication cable for setup software

Communication cable with computers for setup software use.

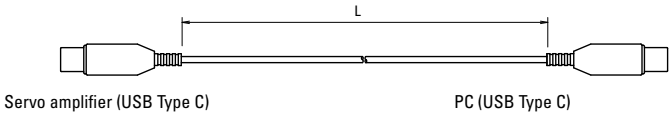
PC side: Type A, amplifier side: Type C

Cable length: L [m]	Model no.
1.0	AL-Y0020355-01
2.0	AL-Y0020355-02



PC side: Type C, amplifier side: Type C

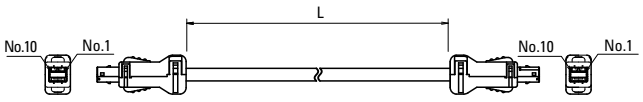
Cable length: L [m]	Model no.
1.0	AL-Y0021049-01
2.0	AL-Y0021049-02



■ Amplifier unit-to-unit cable for tandem operations Dedicated for analog/pulse input type

Connects between servo amplifiers for tandem operation. (X6 ⇔ X6)

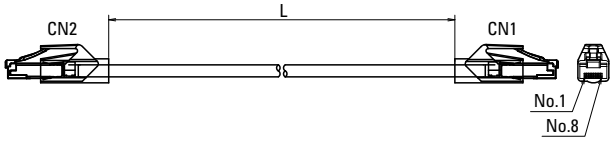
Cable length: L [m]	Model no.
0.2	AL-01134653-01
3.0	AL-01134653-02



■ EtherCAT communication cables Dedicated for EtherCAT interface type

For communication with a controller or another servo amplifier

Cable length: L [m]	Model no.	Remarks
0.5	AL-01109322-R50	Plug: RJ45 (TM21P-88P), on both ends Boot color: black Cable: 20276 ESVP AWG#24X4P, CAT5e
1.0	AL-01109322-01	
3.0	AL-01109322-03	
5.0	AL-01109322-05	
10.0	AL-01109322-10	



■ Servo motor power cable The power supply for the holding brake needs to be provided by the customer

Front and rear cable exits are directed to the output shaft direction and the opposite direction, respectively.

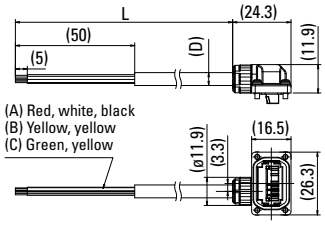
40 mm sq.

Cable exit direction	L [m]	Model no.(1)	
		Standard(2)	Oil-resistant
Front	1	GSSF0100S	GSSF0100C
Rear	1	GSSR0100S	GSSR0100C
Front	3	GSSF0300S	GSSF0300C
Rear	3	GSSR0300S	GSSR0300C
Front	5	GSSF0500S	GSSF0500C
Rear	5	GSSR0500S	GSSR0500C
(A) Power		22 AWG	23 AWG
(B) Brake		24 AWG	24 AWG
(C) Ground		22 AWG	23 AWG
(D) Cable diameter		ø5.4	ø5.4

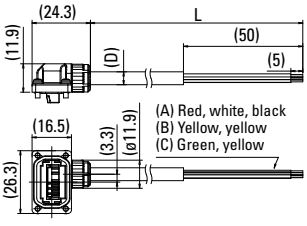
Connection	Lead wire color	Motor signal name	Connector pin no.
	Red	U	1
	White	V	2
	Black	W	3
	Green/Yellow	Ground	4
	Yellow	Brake	5
	Yellow	Brake	6

(1) Power cable is common to both models, with or without a brake.
(2) These cables are for fixed-wiring use and should not be used for moving parts.

Front cable exit



Rear cable exit



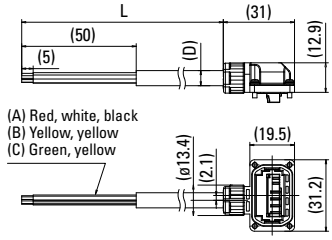
60 to 86 mm sq.

Cable exit direction	L [m]	Model no.(1)	
		Standard(2)	Oil-resistant
Front	1	GMSF0100S	GMSF0100C
Rear	1	GMSR0100S	GMSR0100C
Front	3	GMSF0300S	GMSF0300C
Rear	3	GMSR0300S	GMSR0300C
Front	5	GMSF0500S	GMSF0500C
Rear	5	GMSR0500S	GMSR0500C
(A) Power		19 AWG	19 AWG
(B) Brake		23 AWG	23 AWG
(C) Ground		19 AWG	19 AWG
(D) Cable diameter		ø6.6	ø6.4

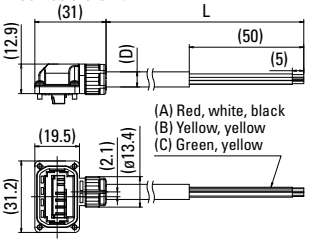
Connection	Lead wire color	Motor signal name	Connector pin no.
	Red	U	1
	White	V	2
	Black	W	3
	Green/Yellow	Ground	4
	Yellow	Brake	5
	Yellow	Brake	6

(1) Power cable is common to both models, with or without a brake.
(2) These cables are for fixed-wiring use and should not be used for moving parts.

Front cable exit



Rear cable exit



Cables

■ Servo motor power cable

The power supply for the holding brake needs to be provided by the customer. These cables are for fixed-wiring use and should not be used for moving parts.

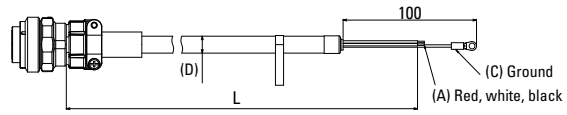
Front and rear cable exits are directed to the output shaft direction and the opposite direction, respectively.

Push-pull locking type

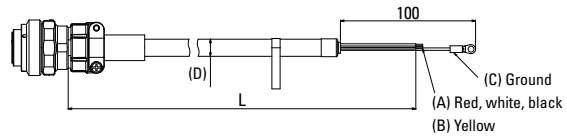
100 mm sq.

L [m]		Model no. (w/o holding brake)			Model no. (w/ holding brake)		
1		GPPB0100S			GQPB0100SB		
3		GPPB0300S			GQPB0300SB		
5		GPPB0500S			GQPB0500SB		
(A) Power		14 AWG			14 AWG		
(B) Brake		—			20 AWG		
(C) Ground	Wire gauge	14 AWG			14 AWG		
	Terminal	N2-M4			N2-M4		
(D) Cable diameter		ø12.5			ø12.5		
Connection		Lead wire color	Motor signal name	Connector pin no.	Lead wire color	Motor signal name	Connector pin no.
		Red	U	A	Red	U	F
		White	V	B	White	V	I
		Black	W	C	Black	W	B
		Green	Ground	D	Green	Ground	E, D
		Yellow	—	—	Yellow	Brake	G, H

Without holding brake



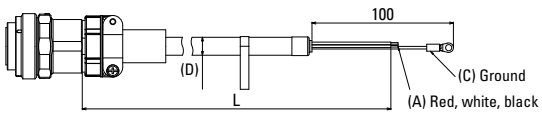
With holding brake



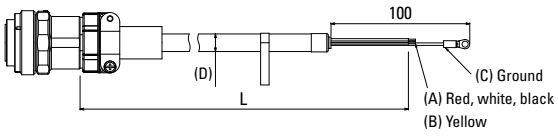
130 mm sq.

L [m]		Model no. (w/o holding brake)			Model no. (w/ holding brake)		
1		GRPB0100S			GRPB0100SB		
3		GRPB0300S			GRPB0300SB		
5		GRPB0500S			GRPB0500SB		
(A) Power		14 AWG			14 AWG		
(B) Brake		—			20 AWG		
(C) Ground	Wire gauge	14 AWG			14 AWG		
	Terminal	N2-M4			N2-M4		
(D) Cable diameter		ø12.5			ø12.5		
Connection		Lead wire color	Motor signal name	Connector pin no.	Lead wire color	Motor signal name	Connector pin no.
		Red	U	D	Red	U	D
		White	V	E	White	V	E
		Black	W	F	Black	W	F
		Green	Ground	G, H	Green	Ground	G, H
		Yellow	—	—	Yellow	Brake	A, B

Without holding brake



With holding brake

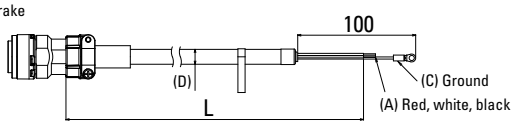


Jack screw locking type

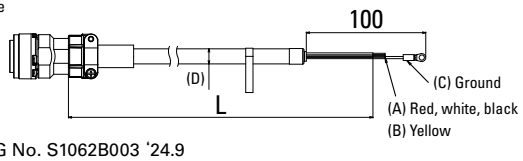
100 mm sq.

L [m]		Model no. (w/o holding brake)			Model no. (w/ holding brake)		
1		AL-01190701-01			AL-01190702-01		
3		AL-01190701-03			AL-01190702-03		
5		AL-01190701-05			AL-01190702-05		
(A) Power		14 AWG			14 AWG		
(B) Brake		—			20 AWG		
(C) Ground	Wire gauge	14 AWG			14 AWG		
	Terminal	N2-M4			N2-M4		
(D) Cable diameter		ø12.5			ø12.5		
Connection		Lead wire color	Motor signal name	Connector pin no.	Lead wire color	Motor signal name	Connector pin no.
		Red	U	A	Red	U	F
		White	V	B	White	V	I
		Black	W	C	Black	W	B
		Green	Ground	D	Green	Ground	E, D
		Yellow	—	—	Yellow	Brake	G, H

Without holding brake



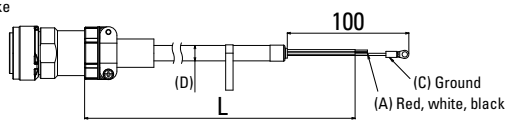
With holding brake



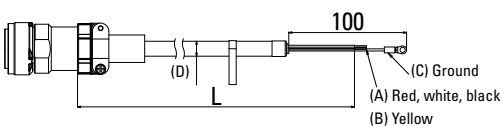
130 mm sq.

L [m]		Model no. (w/o holding brake)			Model no. (w/ holding brake)		
1		AL-01190699-01			AL-01190700-01		
3		AL-01190699-03			AL-01190700-03		
5		AL-01190699-05			AL-01190700-05		
(A) Power		14 AWG			14 AWG		
(B) Brake		—			20 AWG		
(C) Ground	Wire gauge	14 AWG			14 AWG		
	Terminal	N2-M4			N2-M4		
(D) Cable diameter		ø12.5			ø12.5		
Connection		Lead wire color	Motor signal name	Connector pin no.	Lead wire color	Motor signal name	Connector pin no.
		Red	U	D	Red	U	D
		White	V	E	White	V	E
		Black	W	F	Black	W	F
		Green	Ground	G, H	Green	Ground	G, H
		Yellow	—	—	Yellow	Brake	A, B

Without holding brake



With holding brake



Cables

■ Servo motor encoder cable

Without amplifier connector

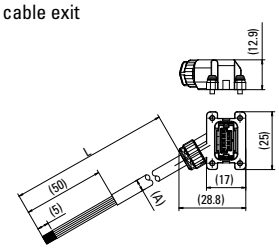
40 to 86 mm sq.

Cable exit direction	L [m]	Model no. (standard)[1]	Model no. (oil-resistant)
Front	1	GESF0100S	GESF0100C
Rear	1	GESR0100S	GESR0100C
Front	3	GESF0300S	GESF0300C
Rear	3	GESR0300S	GESR0300C
Front	5	GESF0500S	GESF0500C
Rear	5	GESR0500S	GESR0500C
Size		26 AWG	26 AWG
(A) Cable diameter		ø5.4	ø5.2

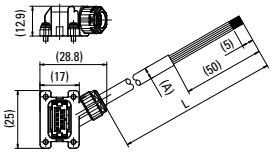
Connection	Lead wire color	Motor signal name	Connector pin no.	Lead wire color	Motor signal name	Connector pin no.
	Shielded	Ground	1	Shielded	Ground	1
	Red	5V	2	Red	5V	2
	Black	SG	3	Black	SG	3
	White[2]	—	4	—	—	4
	Yellow[2]	—	5	—	—	5
	Brown	ES+	6	Brown	ES+	6
	Blue	ES-	7	Blue	ES-	7
	Green[2]	—	8	Pink[2]	—	8
	Purple[2]	—	9	Purple[2]	—	9

(1) These cables are for fixed-wiring use and should not be used for moving parts.
(2) Do not connect unused lead wires (white, yellow, green, pink, or purple) to the servo amplifier.
Note: Contact us if the cable length is to be 10 m or longer.

Front cable exit



Rear cable exit



With amplifier connector

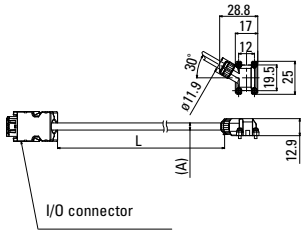
40 to 86 mm sq.

Cable exit direction	L [m]	Model no. (standard)*	Model no. (oil-resistant)
Front	1	GESF0100SA	GESF0100CA
Rear	1	GESR0100SA	GESR0100CA
Front	3	GESF0300SA	GESF0300CA
Rear	3	GESR0300SA	GESR0300CA
Front	5	GESF0500SA	GESF0500CA
Rear	5	GESR0500SA	GESR0500CA
Size		26 AWG	26 AWG
(A) Cable diameter		ø5.4	ø5.2

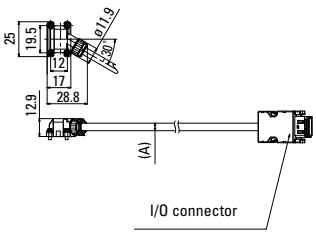
Connection	Motor-side connector pin no.	Amplifier-side connector pin no.	Motor signal name
	1	—	Ground
	2	1	5V
	3	2	SG
	4	—	—
	5	—	—
	6	7	ES+
	7	8	ES-
	8	—	—
	9	—	—

* These cables are for fixed-wiring use and should not be used for moving parts.
Note: Contact us if the cable length is to be 10 m or longer.

Front cable exit



Rear cable exit

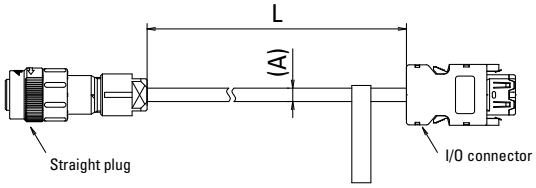


100 to 130 mm sq.

L [m]	Model no.[1]
1	RS-CA9-01-R
3	RS-CA9-03-R
5	RS-CA9-05-R
(A) Cable diameter	ø6.7

Connection	Motor-side connector pin no.	Amplifier-side connector pin no.	Motor signal name
	1	7	ES+
	2	8	ES-
	3	—	—
	4	10	EBAT-[2]
	5	—	—
	6	—	—
	7	—	Ground
	8	9	EBAT+[2]
	9	1	5V
	10	2	SG

(1) These cables are for fixed-wiring use and should not be used for moving parts.
(2) Do not supply power to batteryless encoders.
Note: Contact us if the cable length is to be 25 m or longer.

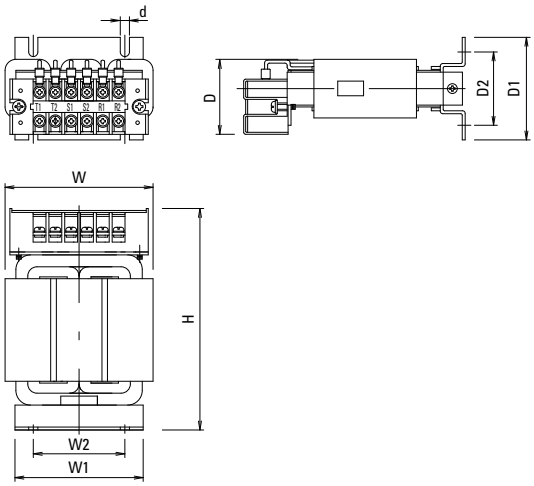


AC Reactors

It is recommended you install an AC reactor to the power supply input to suppress harmonic currents and correct the power factor.

Model no.	Compatible servo amplifier	Dimensions [Unit: mm]								Terminal size	Mass [kg]
		W	W1	W2	H	D	D1	D2	d		
R-ACL-004	GADSA01□ GADSA02□ GADSE01□ GADSE02□ GADSE03□	75	70	50	110	60	60	40	5	M4	0.8
R-ACL-01K	GADSA03□	85	70	50	130	60	60	40		M4	1.2
R-ACL-02K	GADSA05□	120	90	70	150	70	72	60		M4	1.8

Note: Connect an AC reactor to each servo amplifier.



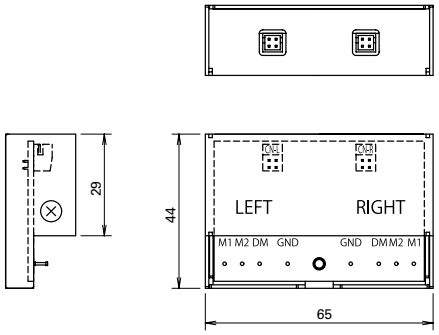
Analog Monitor

[Unit in drawings: mm]

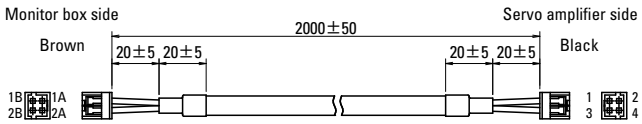
This is an analog monitor that is capable of displaying velocity waveforms and the like on an oscilloscope for the purpose of system tuning or maintenance.

Name	Details	Model no.
Monitor box	Monitor box unit 2 pcs of dedicated cables (on the right)	Q-MON-3

Note: Power is supplied by the servo amplifier.



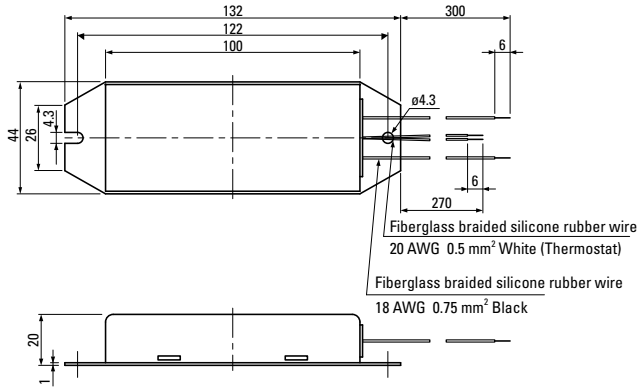
Name	Model no.
Dedicated cable	AL-00690525-01



External Regenerative Resistor [Unit in drawings: mm]

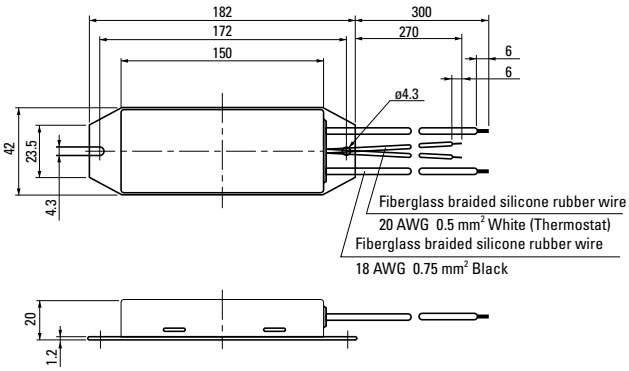
Model no.	Rated power [P_R]	Resistance	Mass
AL-R080W25B	80 W	25 Ω	0.19 kg

Thermostat switching temperature: 135 ± 7°C (Normally-closed contact)



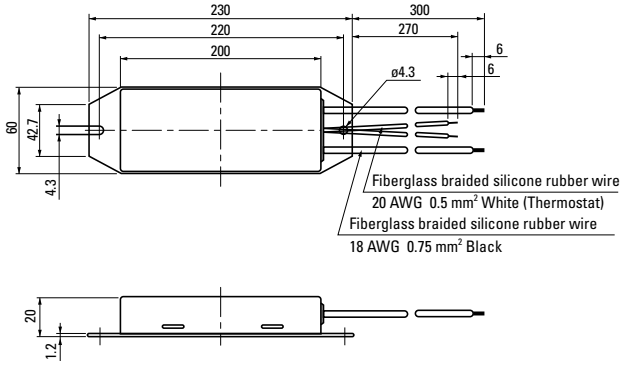
Model no.	Rated power [P_R]	Resistance	Mass
AL-R120W25B	120 W	25 Ω	0.24 kg

Thermostat switching temperature: 135 ± 7°C (Normally-closed contact)



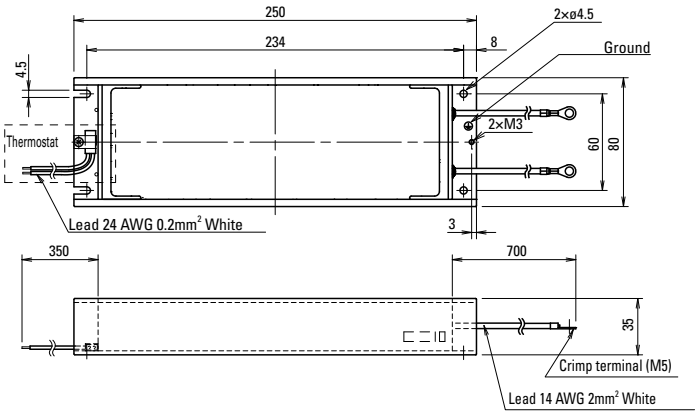
Model no.	Rated power [P_R]	Resistance	Mass
AL-R220W20B	220 W	20 Ω	0.44 kg
AL-R220W25B	220 W	25 Ω	0.44 kg
AL-R220W50B	220 W	50 Ω	0.44 kg

Thermostat switching temperature: 135 ± 7°C (Normally-closed contact)



Model no.	Rated power [P_R]	Resistance	Mass
AL-R500W7B	500 W	7 Ω	1.4 kg
AL-R500W10B	500 W	10 Ω	1.4 kg
AL-R500W14B	500 W	14 Ω	1.4 kg
AL-R500W20B	500 W	20 Ω	1.4 kg
AL-R500W25B	500 W	25 Ω	1.4 kg

Thermostat switching temperature: 100 ± 5°C (Normally-closed contact)



Front Mounting Brackets

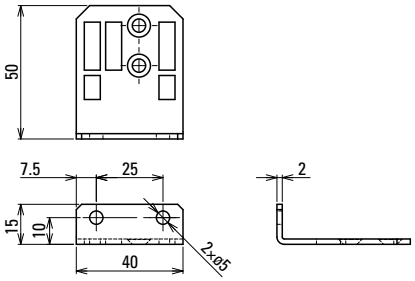
[Unit in drawings: mm]

Brackets for mounting the servo amplifier on the front (connector side).

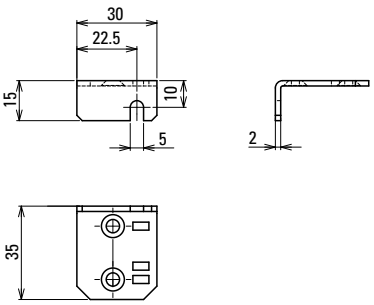
Compatible servo amplifier	Model no.	Set items
10 A, 20 A, 30 A (GADS□01, 02, 03)	AL-01133484-01	Upper and lower mounting brackets: 1 each Mounting screws × 4 (M4 flat head, 8 mm)
50 A (GADSA05)	AL-00880391-01	Upper and lower mounting brackets: 1 each Mounting screws × 4 (M4 flat head, 8 mm)
75 A (GADSA07)	AL-01186398-01	Upper and lower mounting brackets: 1 each Screws × 6 (M4 flat head, 8 mm)
100 A, 150 A (GADSA10, 15)	AL-00907039-01	Upper and lower mounting brackets: 1 each Screws × 6 (M4 flat head, 8 mm)

Note 1: Trivalent chrome plating is used. (Surface color is silver-blue, and different from body color.)
Note 2: Cannot be used with battery box. (10 to 50 A)

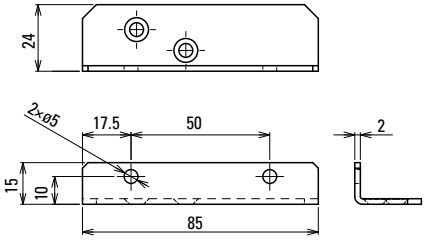
AL-01133484-01
Upper bracket



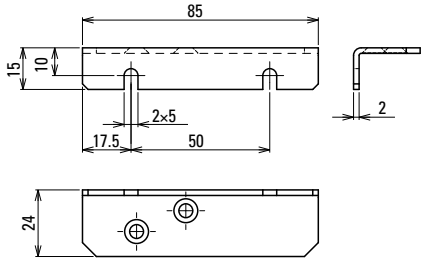
Lower bracket



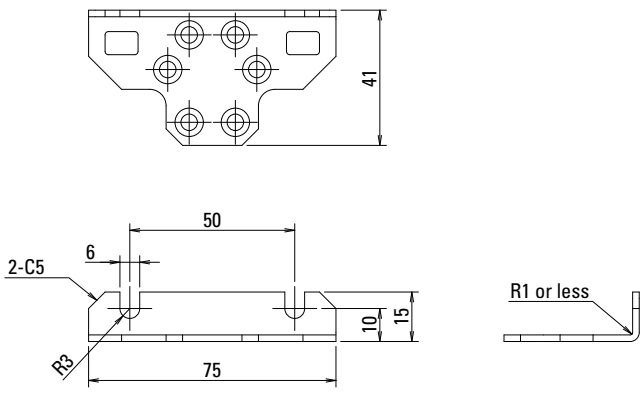
AL-00880391-01
Upper bracket



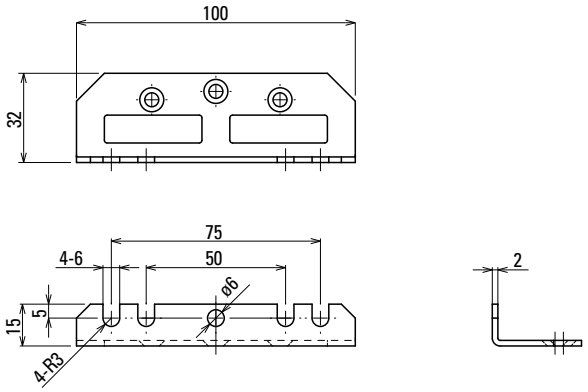
Lower bracket



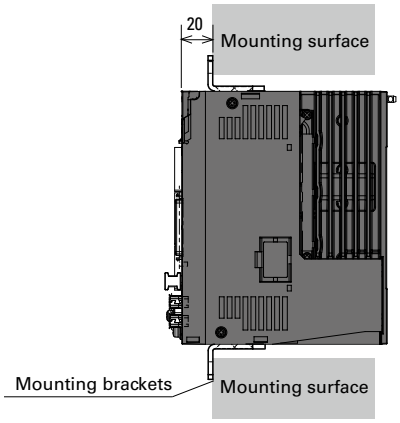
AL-01186398-01
Upper/Lower brackets are identical



AL-00907039-01
Upper/Lower brackets are identical

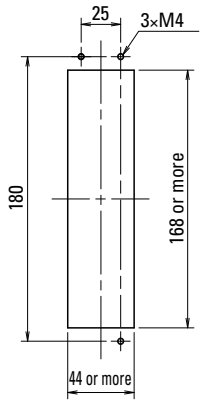


Mounting example

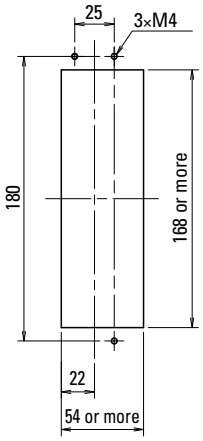


Mounting board dimensions example

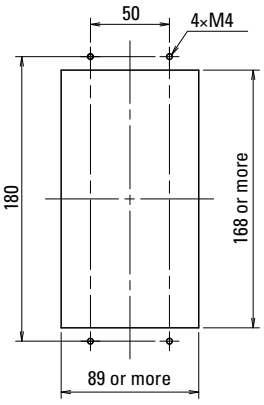
10 A, 20 A



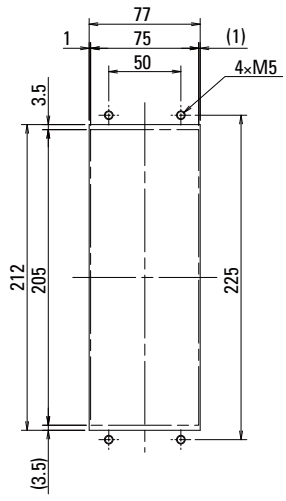
30 A



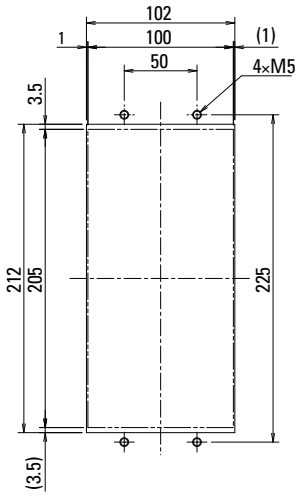
50 A



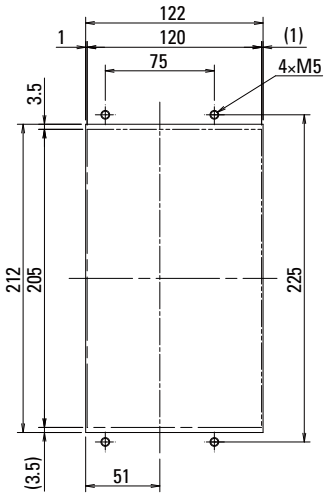
75 A



100 A



150 A



Replacement of Conventional Products

Servo Motors

■ 200 V Low-inertia servo motors

Motor flange size	Holding brake (24 VDC)	Rated output	Conventional SANMOTION R model no.	Rated output	SANMOTION G model no.
40 mm sq.	—	50 W	R1AA04005FX ☐ 03M	50 W	GAM1A4005F0X ☐☐
	✓	50 W	R1AA04005FC ☐ 03M	50 W	GAM1A4005F0C ☐☐
	—	100 W	R1AA04010FX ☐ 03M	100 W	GAM1A4010F0X ☐☐
	✓	100 W	R1AA04010FC ☐ 03M	100 W	GAM1A4010F0C ☐☐
60 mm sq.	—	200 W	R1AA06020FX ☐ 03M	200 W	GAM1A6020F0X ☐☐
	✓	200 W	R1AA06020FC ☐ 03M	200 W	GAM1A6020F0C ☐☐
	—	400 W	R1AA06040FX ☐ 03M	400 W	GAM1A6040F0X ☐☐
	✓	400 W	R1AA06040FC ☐ 03M	400 W	GAM1A6040F0C ☐☐
80 mm sq.	—	750 W	R1AA08075VX ☐ 03M	750 W	GAM1A8075V0X ☐☐
	✓	750 W	R1AA08075VC ☐ 03M	750 W	GAM1A8075V0C ☐☐
	—	750 W	R1AA08075FX ☐ 03M	750 W	GAM1A8075F0X ☐☐
	✓	750 W	R1AA08075FC ☐ 03M	750 W	GAM1A8075F0C ☐☐
100 mm sq.	–	1 kW	R1AA10100FX ☐ 00M	1 kW	GAM1AA100F0X ☐☐
	✓	1 kW	R1AA10100FC ☐ 00M	1 kW	GAM1AA100F0C ☐☐
	–	1 kW	R1AA10100HX ☐ 00M	1 kW	GAM1AA100H0X ☐☐
	✓	1 kW	R1AA10100HC ☐ 00M	1 kW	GAM1AA100H0C ☐☐
	–	1.5 kW	R1AA10150FX ☐ 00M	1.5 kW	GAM1AA150F0X ☐☐
	✓	1.5 kW	R1AA10150FC ☐ 00M	1.5 kW	GAM1AA150F0C ☐☐
	–	1.5 kW	R1AA10150HX ☐ 00M	1.5 kW	GAM1AA150H0X ☐☐
	✓	1.5 kW	R1AA10150HC ☐ 00M	1.5 kW	GAM1AA150H0C ☐☐

Motor flange size	Holding brake (24 VDC)	Rated output	Conventional SANMOTION R model no.	Rated output	SANMOTION G model no.
100 mm sq.	✓	2 kW	R1AA10200HC ☐ 00M	2 kW	GAM1AA200H0C ☐☐
	–	2 kW	R1AA10200FX ☐ 00M	2 kW	GAM1AA200F0X ☐☐
	✓	2 kW	R1AA10200FC ☐ 00M	2 kW	GAM1AA200F0C ☐☐
	–	2.5 kW	R1AA10250HX ☐ 00M	2.5 kW	GAM1AA250H0X ☐☐
	✓	2.5 kW	R1AA10250HC ☐ 00M	2.5 kW	GAM1AA250H0C ☐☐
	–	2.5 kW	R1AA10250FX ☐ 00M	2.5 kW	GAM1AA250F0X ☐☐
	✓	2.5 kW	R1AA10250FC ☐ 00M	2.5 kW	GAM1AA250F0C ☐☐
130 mm sq.	–	3 kW	R1AA13300HX ☐ 00M	3 kW	GAM1AB300H0X ☐☐
	✓	3 kW	R1AA13300HC ☐ 00M	3 kW	GAM1AB300H0C ☐☐
	–	3 kW	R1AA13300FX ☐ 00M	3 kW	GAM1AB300F0X ☐☐
	✓	3 kW	R1AA13300FC ☐ 00M	3 kW	GAM1AB300F0C ☐☐
	–	4 kW	R1AA13400HX ☐ 00M	4 kW	GAM1AB400H0X ☐☐
	✓	4 kW	R1AA13400HC ☐ 00M	4 kW	GAM1AB400H0C ☐☐
	–	4 kW	R1AA13400FX ☐ 00M	4 kW	GAM1AB400F0X ☐☐
	✓	4 kW	R1AA13400FC ☐ 00M	4 kW	GAM1AB400F0C ☐☐
	–	5 kW	R1AA13500HX ☐ 00M	5 kW	GAM1AB500H0X ☐☐
	✓	5 kW	R1AA13500HC ☐ 00M	5 kW	GAM1AB500H0C ☐☐
	–	5 kW	R1AA13500FX ☐ 00M	5 kW	GAM1AB500F0X ☐☐
	✓	5 kW	R1AA13500FC ☐ 00M	5 kW	GAM1AB500F0C ☐☐

■ 200 V Medium-inertia servo motors

Motor flange size	Holding brake (24 VDC)	Rated output	Conventional SANMOTION R model no.	Rated output	SANMOTION G model no.
40 mm sq.	—	30 W	R2AA04003FX ☐ 03M	30 W	GAM2A4003F0X ☐☐
	✓	30 W	R2AA04003FC ☐ 03M	30 W	GAM2A4003F0C ☐☐
	—	50 W	R2AA04005FX ☐ 03M	50 W	GAM2A4005F0X ☐☐
	✓	50 W	R2AA04005FC ☐ 03M	50 W	GAM2A4005F0C ☐☐
	—	100 W	R2AA04010FX ☐ 03M	100 W	GAM2A4010F0X ☐☐
	✓	90 W	R2AA04010FC ☐ 03M6	100 W	GAM2A4010F0C ☐☐
60 mm sq.	—	100 W	R2AA06010FX ☐ 03M	100 W	GAM2A6010F0X ☐☐
	✓	100 W	R2AA06010FC ☐ 03M	100 W	GAM2A6010F0C ☐☐
	—	200 W	R2AA06020FX ☐ 03M	200 W	GAM2A6020F0X ☐☐
	✓	200 W	R2AA06020FC ☐ 03M	200 W	GAM2A6020F0C ☐☐
	—	400 W	R2AA06040FX ☐ 03M	400 W	GAM2A6040F0X ☐☐
	✓	360 W	R2AA06040FC ☐ 03M6	400 W	GAM2A6040F0C ☐☐
	—	400 W	R2AA06040HX ☐ 03M	400 W	GAM2A6040F0X ☐☐
	✓	360 W	R2AA06040HC ☐ 03M6	400 W	GAM2A6040F0C ☐☐
80 mm sq.	—	200 W	R2AA08020FX ☐ 03M	200 W	GAM2A8020F0X ☐☐
	✓	200 W	R2AA08020FC ☐ 03M	200 W	GAM2A8020F0C ☐☐
	—	400 W	R2AA08040FX ☐ 03M	400 W	GAM2A8040F0X ☐☐
	✓	400 W	R2AA08040FC ☐ 03M	400 W	GAM2A8040F0C ☐☐
	—	750 W	R2AA08075FX ☐ 03M	750 W	GAM2A8075F0X ☐☐
	✓	750 W	R2AA08075FC ☐ 03M	750 W	GAM2A8075F0C ☐☐
86 mm sq.	—	750 W	R2AAB8075FX ☐ 03M	750 W	GAM2A9075F0X ☐☐
	✓	750 W	R2AAB8075FC ☐ 03M	750 W	GAM2A9075F0C ☐☐
	—	1 kW	R2AAB8100FX ☐ 03M	1 kW	GAM2A9100F0X ☐☐
	✓	1 kW	R2AAB8100FC ☐ 03M	1 kW	GAM2A9100F0C ☐☐
	—	1 kW	R2AAB8100HX ☐ 03M	1 kW	GAM2A9100H0X ☐☐
	✓	1 kW	R2AAB8100HC ☐ 03M	1 kW	GAM2A9100H0C ☐☐

Motor flange size	Holding brake (24 VDC)	Rated output	Conventional SANMOTION R model no.	Rated output	SANMOTION G model no.
100 mm sq.	—	750 W	R2AA10075FX ☐ 03M	750 W	GAM2AA075F0X ☐☐
	✓	750 W	R2AA10075FC ☐ 03M	750 W	GAM2AA075F0C ☐☐
	—	1 kW	R2AA10100FX ☐ 03M	1 kW	GAM2AA100F0X ☐☐
	✓	1 kW	R2AA10100FC ☐ 03M	1 kW	GAM2AA100F0C ☐☐
	—	1.5 kW	R2AA10150HX ☐ 00M	1.5 kW	GAM2AA150H0X ☐☐
	✓	1.5 kW	R2AA10150HC ☐ 00M	1.5 kW	GAM2AA150H0C ☐☐
130 mm sq.	—	550 W	R2AA13050HX ☐ 00M	550 W	GAM2AB055D0X ☐☐
	✓	550 W	R2AA13050HC ☐ 00M	550 W	GAM2AB055D0C ☐☐
	—	550 W	R2AA13050DX ☐ 00M	550 W	GAM2AB055D0X ☐☐
	✓	550 W	R2AA13050DC ☐ 00M	550 W	GAM2AB055D0C ☐☐
	—	1.2 kW	R2AA13120BX ☐ 00M	1.2 kW	GAM2AB120B0X ☐☐
	✓	1.2 kW	R2AA13120BC ☐ 00M	1.2 kW	GAM2AB120B0C ☐☐
	—	1.2 kW	R2AA13120LX ☐ 00M	1.2 kW	GAM2AB120H0X ☐☐
	✓	1.2 kW	R2AA13120LC ☐ 00M	1.2 kW	GAM2AB120H0C ☐☐
	—	1.2 kW	R2AA13120DX ☐ 00M	1.2 kW	GAM2AB120D0X ☐☐
	✓	1.2 kW	R2AA13120DC ☐ 00M	1.2 kW	GAM2AB120D0C ☐☐
	—	1.8 kW	R2AA13180HX ☐ 00M	1.8 kW	GAM2AB180H0X ☐☐
	✓	1.8 kW	R2AA13180HC ☐ 00M	1.8 kW	GAM2AB180H0C ☐☐
	—	1.8 kW	R2AA13180DX ☐ 00M	1.8 kW	GAM2AB180D0X ☐☐
	✓	1.8 kW	R2AA13180DC ☐ 00M	1.8 kW	GAM2AB180D0C ☐☐
	—	2 kW	R2AA13200LX ☐ 00M	2 kW	GAM2AB200H0X ☐☐
	✓	2 kW	R2AA13200LC ☐ 00M	2 kW	GAM2AB200H0C ☐☐
	—	2 kW	R2AA13200DX ☐ 00M	2 kW	GAM2AB200D0X ☐☐
	✓	2 kW	R2AA13200DC ☐ 00M	2 kW	GAM2AB200D0C ☐☐

■ 100 V Low-inertia servo motors

Motor flange size	Holding brake (24 VDC)	Rated output	Conventional SANMOTION R model no.	Rated output	SANMOTION G model no.
40 mm sq.	—	50 W	R1EA04005FX ☐ 03M	50 W	GAM1E4005F0X ☐☐
	✓	50 W	R1EA04005FC ☐ 03M	50 W	GAM1E4005F0C ☐☐
	—	100 W	R1EA04010FX ☐ 03M	100 W	GAM1E4010F0X ☐☐
	✓	100 W	R1EA04010FC ☐ 03M	100 W	GAM1E4010F0C ☐☐
60 mm sq.	—	200 W	R1EA06020FX ☐ 03M	200 W	GAM1E6020F0X ☐☐
	✓	200 W	R1EA06020FC ☐ 03M	200 W	GAM1E6020F0C ☐☐

■ 100 V Low-inertia servo motors

Motor flange size	Holding brake (24 VDC)	Rated output	Conventional SANMOTION R model no.	Rated output	SANMOTION G model no.
40 mm sq.	—	30 W	R2EA04003FX ☐ 03M	30 W	GAM2E4003F0X ☐☐
	✓	30 W	R2EA04003FC ☐ 03M	30 W	GAM2E4003F0C ☐☐
	—	50 W	R2EA04005FX ☐ 03M	50 W	GAM2E4005F0X ☐☐
	✓	50 W	R2EA04005FC ☐ 03M	50 W	GAM2E4005F0C ☐☐
	—	80 W	R2EA04008FX ☐ 03M	100 W	GAM2E4010F0X ☐☐
	✓	80 W	R2EA04008FC ☐ 03M	100 W	GAM2E4010F0C ☐☐
60 mm sq.	—	100 W	R2EA06010FX ☐ 03M	100 W	GAM2E6010F0X ☐☐
	✓	100 W	R2EA06010FC ☐ 03M	100 W	GAM2E6010F0C ☐☐
	—	200 W	R2EA06020FX ☐ 03M	200 W	GAM2E6020F0X ☐☐
	✓	200 W	R2EA06020FC ☐ 03M	200 W	GAM2E6020F0C ☐☐

Replacement of Conventional Products

Servo Amplifiers

■ 200 V Analog/Pulse input type

GPO	Built-in regenerative resistor	STO function*	Amplifier capacity	Conventional SANMOTION R model no.	SANMOTION G model no.
Sinking type	–	–	10 A	RS3A01A0AL0	GADSA01LA00
	–	–	20 A	RS3A02A0AL0	GADSA02LA00
	–	–	30 A	RS3A03A0AL0	GADSA03LA00
	–	–	50 A	RS3A05A0AL0	GADSA05LA00
	–	✓	10 A	RS3A01A0AL2	GADSA01LA22
	–	✓	20 A	RS3A02A0AL2	GADSA02LA22
	–	✓	30 A	RS3A03A0AL2	GADSA03LA22
	–	✓	50 A	RS3A05A0AL2	GADSA05LA22
	✓	–	10 A	RS3A01A0AA0	GADSA01AA00
	✓	–	20 A	RS3A02A0AA0	GADSA02AA00
	✓	–	30 A	RS3A03A0AA0	GADSA03AA00
	✓	–	50 A	RS3A05A0AA0	GADSA05AA00
	✓	–	75 A	RS3A07A0AA0	GADSA07AA00
	✓	–	100 A	RS3A10A0AA0	GADSA10AA00
	✓	–	150 A	RS3A15A0AA0	GADSA15AA00
	✓	✓	10 A	RS3A01A0AA2	GADSA01AA22
	✓	✓	20 A	RS3A02A0AA2	GADSA02AA22
	✓	✓	30 A	RS3A03A0AA2	GADSA03AA22
	✓	✓	50 A	RS3A05A0AA2	GADSA05AA22
	✓	✓	75 A	RS3A07A0AA2	GADSA07AA22
	✓	✓	100 A	RS3A10A0AA2	GADSA10AA22
	✓	✓	150 A	RS3A15A0AA2	GADSA15AA22

GPO	Built-in regenerative resistor	STO function*	Amplifier capacity	Conventional SANMOTION R model no.	SANMOTION G model no.
Sourcing type	–	–	10 A	RS3A01A0BL0	GADSA01LB00
	–	–	20 A	RS3A02A0BL0	GADSA02LB00
	–	–	30 A	RS3A03A0BL0	GADSA03LB00
	–	–	50 A	RS3A05A0BL0	GADSA05LB00
	–	✓	10 A	RS3A01A0BL2	GADSA01LB22
	–	✓	20 A	RS3A02A0BL2	GADSA02LB22
	–	✓	30 A	RS3A03A0BL2	GADSA03LB22
	–	✓	50 A	RS3A05A0BL2	GADSA05LB22
	✓	–	10 A	RS3A01A0BA0	GADSA01AB00
	✓	–	20 A	RS3A02A0BA0	GADSA02AB00
	✓	–	30 A	RS3A03A0BA0	GADSA03AB00
	✓	–	50 A	RS3A05A0BA0	GADSA05AB00
	✓	–	75 A	RS3A07A0BA0	GADSA07AB00
	✓	–	100 A	RS3A10A0BA0	GADSA10AB00
	✓	–	150 A	RS3A15A0BA0	GADSA15AB00
	✓	✓	10 A	RS3A01A0BA2	GADSA01AB22
	✓	✓	20 A	RS3A02A0BA2	GADSA02AB22
	✓	✓	30 A	RS3A03A0BA2	GADSA03AB22
	✓	✓	50 A	RS3A05A0BA2	GADSA05AB22
	✓	✓	75 A	RS3A07A0BA2	GADSA07AB22
	✓	✓	100 A	RS3A10A0BA2	GADSA10AB22
	✓	✓	150 A	RS3A15A0BA2	GADSA15AB22

■ 100 V Analog/Pulse input type

GPO	Built-in regenerative resistor	STO function*	Amplifier capacity	Conventional SANMOTION R model no.	SANMOTION G model no.
Sinking type	–	–	10 A	RS3E01A0AL0	GADSE01LA00
	–	–	20 A	RS3E02A0AL0	GADSE02LA00
	–	–	30 A	RS3E03A0AL0	GADSE03LA00
	–	✓	10 A	RS3E01A0AL2	GADSE01LA22
	–	✓	20 A	RS3E02A0AL2	GADSE02LA22
	–	✓	30 A	RS3E03A0AL2	GADSE03LA22
	✓	–	10 A	RS3E01A0AA0	GADSE01AA00
	✓	–	20 A	RS3E02A0AA0	GADSE02AA00
	✓	–	30 A	RS3E03A0AA0	GADSE03AA00
	✓	✓	10 A	RS3E01A0AA2	GADSE01AA22
	✓	✓	20 A	RS3E02A0AA2	GADSE02AA22
	✓	✓	30 A	RS3E03A0AA2	GADSE03AA22

GPO	Built-in regenerative resistor	STO function*	Amplifier capacity	Conventional SANMOTION R model no.	SANMOTION G model no.
Sourcing type	–	–	10 A	RS3E01A0BL0	GADSE01LB00
	–	–	20 A	RS3E02A0BL0	GADSE02LB00
	–	–	30 A	RS3E03A0BL0	GADSE03LB00
	–	✓	10 A	RS3E01A0BL2	GADSE01LB22
	–	✓	20 A	RS3E02A0BL2	GADSE02LB22
	–	✓	30 A	RS3E03A0BL2	GADSE03LB22
	✓	–	10 A	RS3E01A0BA0	GADSE01AB00
	✓	–	20 A	RS3E02A0BA0	GADSE02AB00
	✓	–	30 A	RS3E03A0BA0	GADSE03AB00
	✓	✓	10 A	RS3E01A0BA2	GADSE01AB22
	✓	✓	20 A	RS3E02A0BA2	GADSE02AB22
	✓	✓	30 A	RS3E03A0BA2	GADSE03AB22

■ 200 V EtherCAT interface type

Built-in regenerative resistor	STO function*	Amplifier capacity	Conventional SANMOTION R model no.	SANMOTION G model no.
–	✓	10 A	RS3A01A2HL4	GADSA01LH24
–	✓	20 A	RS3A02A2HL4	GADSA02LH24
–	✓	30 A	RS3A03A2HL4	GADSA03LH24
–	✓	50 A	RS3A05A2HL4	GADSA05LH24
✓	✓	10 A	RS3A01A2HA4	GADSA01AH24
✓	✓	20 A	RS3A02A2HA4	GADSA02AH24
✓	✓	30 A	RS3A03A2HA4	GADSA03AH24
✓	✓	50 A	RS3A05A2HA4	GADSA05AH24
✓	✓	75 A	RS3A07A2HA4	GADSA07AH24
✓	✓	100 A	RS3A10A2HA4	GADSA10AH24
✓	✓	150 A	RS3A15A2HA4	GADSA15AH24

■ 100 V EtherCAT interface type

Built-in regenerative resistor	STO function*	Amplifier capacity	Conventional SANMOTION R model no.	SANMOTION G model no.
–	✓	10 A	RS3E01A2HL4	GADSE01LH24
–	✓	20 A	RS3E02A2HL4	GADSE02LH24
–	✓	30 A	RS3E03A2HL4	GADSE03LH24
✓	✓	10 A	RS3E01A2HA4	GADSE01AH24
✓	✓	20 A	RS3E02A2HA4	GADSE02AH24
✓	✓	30 A	RS3E03A2HA4	GADSE03AH24

* Safe Torque Off (STO) is a safety function defined in IEC/EN 61800-5-2:2016.

Selection of Servo Motor Output (Rotary Motors)

This is a calculation method for deriving required servo motor output based on specifications of machines.
In this instance an introduction on the procedure for the selection is provided primarily for instances where ball screw (horizontal) mechanism is involved.

Selection steps

1. Determine the motion profile

Determine the mechanism to use and the motion profile.

2. Calculate the axial load moment of inertia, J_L

Calculate the load moment of inertia about the motor axis based on the mechanism.

3. Calculate the moment of inertia of the motor's load, T_L

Calculate the load torque for the mechanism to use.

4. Provisional selection of servo motor output

Provisionally select a motor that meets the following conditions: the load moment of inertia (J_L) is 10 times or below the motor's rotor moment of inertia (J_M), and the load torque (T_L) is 80% or below ($T_R \times 0.8$) the motor's rated torque (T_R).

$J_L \leq J_M \times 10$

$T_L \leq T_R \times 0.8$

5. Calculate the acceleration/deceleration torque

Calculate the total torque required to accelerate/decelerate the system (motor and load) based on the motion profile.

6. Calculate effective torque

Calculate the required actual torque using a formula and the results of the previous steps.

7. Assessment

Check if the calculated acceleration and deceleration torques (T_a and T_b) are 80% or below the selected motor's peak torque at stall ($\leq T_p \times 0.8$) and the calculated actual torque (T_{rms}) is 80% or below the motor's rated torque ($\leq T_R \times 0.8$).

$T_a \leq T_p \times 0.8$

$T_b \leq T_p \times 0.8$

$Trms \leq T_R \times 0.8$

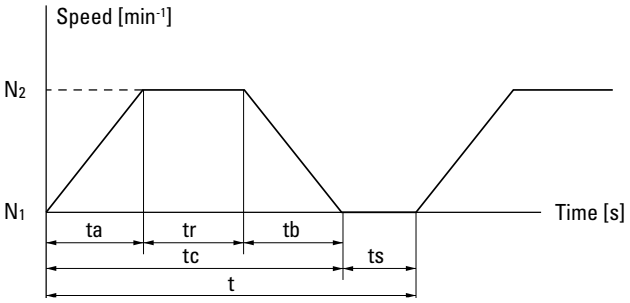
If the selected motor does not meet the conditions above, then change the servo motor output and try one with a larger output.

8. Calculate the regenerative power

Calculate the regenerative power and select an external regenerative resistor if needed.

1. Determine the motion profile

First, determine the machine mechanism and required parameters such as the dimensions of components, positioning resolution, positioning time, and gear ratio. Make a motion profile for the determined drive in a graph with speed and time axes.



N_1: Servo motor rotating velocity before acceleration [min^{-1}]
N_2: Servo motor rotating velocity after acceleration [min^{-1}]
t_a = Time spent accelerating the load [s]
t_b = Time spent decelerating the load [s]
t_r = Time spent while motor is turning at constant speed [s]
t_s = Time spent while motor is at rest [s]
t = 1 cycle [s]

2. Calculate the axial load moment of inertia, J_L

Load moment of inertia is the quantity that expresses an object's resistance to change its state of rotational motion.
The following formula is for calculating it in the case of a (horizontal) ball screw mechanism.

■ Moment of inertia of ball screw

$$J_{L1} = \left(\frac{1}{G}\right)^2 \times \frac{\pi \times \rho \times D^4 \times L}{32} \quad [kg \cdot m^2]$$

G: Gear ratio
ρ : Ball screw density [kg/m^3] (Iron: 7.8×10^3)
D: Ball screw diameter [m]
L: Ball screw length [m]

■ Moments of inertia of workpiece and table

$$J_{L2} = \left(\frac{1}{G}\right)^2 \times W \times \left(\frac{P}{2\pi}\right)^2 \quad [kg \cdot m^2]$$

G: Gear ratio
W: Workpiece mass + table mass [kg]
P: Ball screw pitch [m]

■ Axial load moment of inertia

$J_L = J_{L1} + J_{L2}$

Note: The moments of inertia of the reduction gear and coupling are assumed to be small enough to be negligible.

3. Calculate the axial load torque, T_L

The formula for load torque converts forces exerted on the load due to friction and gravity into the rotational equivalent as reflected to the motor shaft by the lead screw. When activated, this torque always acts as the load.
The following formula is for calculating it in the case of a (horizontal) ball screw mechanism.

$$T_L = \frac{F + \mu W \times 9.8}{\eta} \times \frac{P}{2\pi} \times \frac{1}{G} \quad [N \cdot m]$$

F: External force [N]
η: Mechanical efficiency
μ: Friction coefficient
W: Workpiece mass + table mass [kg]
P: Ball screw lead [m]
G: Gear ratio

4. Provisional selection of servo motor output

Provisionally, select motors that satisfy the following 2 conditions.

- The load moment of inertia (J_L) calculated in step 2 is smaller than or equal to 10 times the motor's rotor moment of inertia ($J_M \times 10$)
  $J_L \leq J_M \times 10$
- The load torque (T_L) calculated in step 3 is smaller than or equal to 80% of the rated torque ($T_R \times 0.8$) of the motor
  $T_L \leq T_R \times 0.8$

5. Calculate the acceleration/deceleration torque

The acceleration/deceleration torque is the torque required to accelerate or decelerate the motor and load.

■ Deriving acceleration torque (T_a)

$$T_a = \frac{2\pi (N_2 - N_1) \times (J_L + J_M)}{60 \times ta} + T_L \quad [N \cdot m]$$

N_2: Servo motor rotating speed after acceleration [min^{-1}]
N_1: Servo motor rotating speed before acceleration [min^{-1}]
J_L: Load moment of inertia about the motor axis [$kg \cdot m^2$]
J_M: Servo motor rotor moment of inertia [$kg \cdot m^2$]
T_L: Axial load torque [N·m]
ta: Acceleration time [s]

■ Deriving deceleration torque (T_b)

$$T_b = \frac{2\pi (N_2 - N_1) \times (J_L + J_M)}{60 \times tb} - T_L \quad [N \cdot m]$$

N_2: Servo motor rotating speed before acceleration [min^{-1}]
N_1: Servo motor rotating speed after acceleration [min^{-1}]
J_L: Load moment of inertia about the motor axis [$kg \cdot m^2$]
J_M: Servo motor rotor moment of inertia [$kg \cdot m^2$]
T_L: Axial load torque [N·m]
tb: Deceleration time [s]

6. Calculate effective torque

The effective torque is a root mean square of the load torque, acceleration torque, and deceleration torque.

$$Trms = \sqrt{\frac{(T_a^2 \times ta) + (T_L^2 \times tr) + (T_b^2 \times tb)}{t}} \quad [N \cdot m]$$

7. Assessment

We use the following conditions for assessment.

- Load torque: $T_L \leq T_R \times 0.8$
  (Load torque ≤ 80% of the rated torque)

- Acceleration torque: $T_a \leq T_P \times 0.8$
  (Acceleration torque ≤ 80% of the peak torque at stall)
  T_P: Peak torque at stall

- Deceleration torque: $T_b \leq T_P \times 0.8$
  (Deceleration torque ≤ 80% of the peak torque at stall)
  T_P: Peak torque at stall

- Effective torque: $T_{rms} \leq T_R \times 0.8$
  (Effective torque ≤ 80% of the rated torque)

- Inertia moment ratio $J_L \leq J_M \times 10$
  (Load moment of inertia ≥ 10 times or below the motor rotor moment of inertia)

Furthermore, the rising temperature of the motor can be inhibited by securing a large margin for torque load ratios. The moment of inertia ratio can be more than 10 times, for example, for mechanisms that slowly rotate a table. Testing with an actual machine is recommended.

8. Calculate the regenerative power

Calculate the regenerative power (P_M) to determine the type of suitable regenerative resistor. The result of this calculation determines if a built-in regenerative resistor can be used or an external one is required.

■ How to calculate the regenerative power (P_M) of horizontal shaft drive

First, calculate the regenerative energy.

$$EM = Ehb = \frac{1}{2} \times N \times 3 \times Ke\phi \times \frac{T_b}{KT} \times tb - \left(\frac{T_b}{KT}\right)^2 \times 3 \times R\phi \times tb$$

EM: Regenerative energy during horizontal driving [J]
Ehb: Regenerative energy during deceleration [J]
Keø: Phase voltage constant [V_{rms}/min^{-1}] (motor constant)
KT: Torque constant [$N \cdot m/A_{rms}$] (motor constant)
N: Motor speed [min^{-1}]
Rø: Phase resistance [Ω] (motor constant)
tb: Deceleration time [s]
T_b: Torque from deceleration [N·m]

Calculate the regenerative power from regenerative energy.

$$PM = \frac{E_M}{t}$$

PM: Regenerative power [W]
EM: Regenerative energy [J]
t: Cycle time [s]

■ Selection of regenerative resistor

Select a regenerative resistor that satisfies the following conditions.

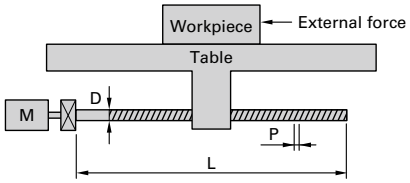
- For servo amplifiers with built-in regenerative resistor
  Required regenerative power [PM] < Maximum regenerative power that can be handled by a built-in regenerative resistor [PR]
- External regenerative resistor
  Required regenerative power [PM] < Maximum regenerative power that can be handled by an external regenerative resistor [PRO]

Note that servo amplifiers come with or without a built-in regenerative resistor for absorbing regenerative power, depending on the model. Carefully select the right model for your needs.

Selection Materials by Mechanism

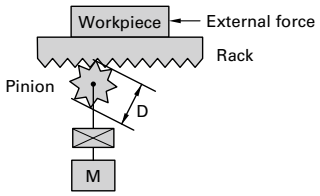
Typical mechanism examples and required selection criteria are shown below. Provide us with these information when consulting us for selection.

Ball screw



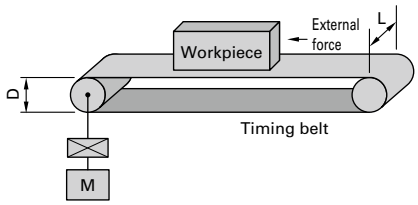
External force	F	N
Workpiece mass + table mass	W	kg
Ball screw diameter	D	m
Ball screw length	L	m
Ball screw pitch	P	m
Ball screw density	ρ	kg/m^3
Friction coefficient	μ	
Gear ratio*	G	
Mechanical efficiency	η	

Rack & Pinion



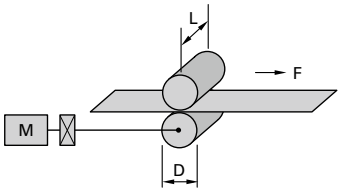
External force	F	N
Workpiece mass + rack mass	W	kg
Pinion diameter	D	m
Pinion thickness	L	m
Pinion density	ρ	kg/m^3
Friction coefficient	μ	
Gear ratio*	G	
Mechanical efficiency	η	

Belt drive



External force	F	N
Workpiece mass + belt mass	W	kg
Pulley diameter	D	m
Pulley width	L	m
Pulley density	ρ	kg/m^3
Gear ratio*	G	
Mechanical efficiency	η	

Roll feed



Sheet tension	F	N
Roll diameter	D	m
Roll width	L	m
Roll density	ρ	kg/m^3
Gear ratio*	G	
Mechanical efficiency	η	

Rotary indexing table

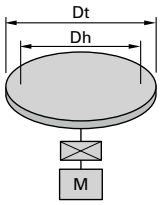
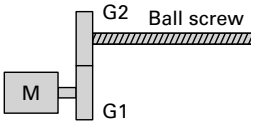


Table mass	W	kg
Table diameter	Dt	m
Table support diameter	Dh	m
Friction coefficient of table support	μ	
Gear ratio*	G	
Mechanical efficiency	η	

* Calculation of gear ratio (G)



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

Standards Conformity

■ All servo motor (rotary motor) models

Contact us for linear servo motors.

Standards conformity		Standard code	Logo
Classification	Category		
UL/cUL standards	—	UL 1004-1, UL 1004-6 (File No. E179832)	c UL us
CE marking for EU Directive	Low Voltage Directive (2014/35/EU)	IEC 60034-1, EN 60034-1 IEC 60034-5, EN 60034-5	CE
	RoHS Directive (2011/65/EU as amended by (EU)2015/863)	EN 63000:2018 IEC 63000:2018	
UKCA marking in Great Britain (UK Conformity Assessed Marking)	Electrical Equipment (Safety) Regulations 2016	IEC 60034-1, EN 60034-1 IEC 60034-5, EN 60034-5	UK CA
	RoHS Regulations 2012	EN 63000:2018 IEC 63000:2018	

■ All servo amplifier models

Safety standards		Standard code	Logo
Classification	Category		
UL/cUL standards	—	UL 61800-5-1 (File No. E179775)	c UL us
KC Mark (Korea Certification Mark)	—	KS C 9610-6-2 KS C 9610-6-4	KC
CE marking in Europe	Low Voltage Directive (2014/35/EU)	IEC 61800-5-1, EN 61800-5-1	CE
	Electromagnetic Compatibility Directive (2014/30/EU)	EN 61000-6-2 IEC 61800-3, EN 61800-3	
	RoHS Directive (2011/65/EU as amended by (EU)2015/863)	EN 63000:2018 IEC 63000:2018	
UKCA marking for Great Britain (UK Conformity Assessed Marking)	Electrical Equipment (Safety) Regulations 2016	IEC 61800-5-1, EN 61800-5-1	UK CA
	Electromagnetic Compatibility Regulations 2016	EN 61000-6-2 IEC 61800-3, EN 61800-3	
	RoHS Regulations 2012	EN 63000:2018 IEC 63000:2018	

■ Servo amplifier with STO

Model no.: GADS□□□□□□2, GADS□□□□□□4

Standards conformity			Standard code	Logo
Classification		Category		
Third party certification (TÜV SÜD)	Electrical safety	Low Voltage Directive (2014/35/EU)	IEC 61800-5-1, EN 61800-5-1	TÜV SÜD
	Functional safety	Generic Functional safety	IEC 61508, EN 61508	
		Functional safety under Machinery Directive (2006/42/EC)	IEC 62061, EN 62061 EN ISO 13849-1	
		Functional safety for PDS under Machinery Directive (2006/42/EC)	IEC 61800-5-2, EN 61800-5-2	
	EMC	Electromagnetic Compatibility Directive (2014/30/EU)	EN 61000-6-2 IEC 61800-3, EN 61800-3	
		Functional safety EMC	IEC 61326-3-1, EN 61326-3-1 EN 61000-6-7	

■ Servo amplifiers without STO

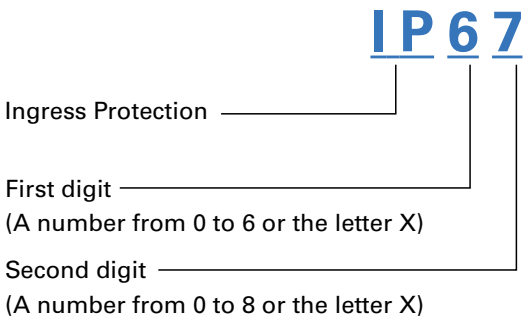
Model no.: GADS□□□□□□0

Options

Standards conformity			Standard code	Logo
Classification		Category		
Third party certification (TÜV SÜD)	Electrical safety	Low Voltage Directive (2014/35/EU)	IEC 61800-5-1, EN 61800-5-1	TÜV SÜD
	EMC	Electromagnetic Compatibility Directive (2014/30/EU)	EN 61000-6-2 IEC 61800-3, EN 61800-3	—

Motor Protection Rating

The protection ratings of our servo motors comply with IEC standards (IEC 60034-5).
The standard states that the liquid used for testing should be fresh (pure) water, and liquids other than water such as oil are not included in the test conditions.



The degree of protection (IP code) is defined by IEC (International Electrotechnical Commission) 60529 "Degrees of Protection Provided by Enclosures (IP Code)" (IEC 60529)

First digit	Description	Definition
0	No protection	–
1	Protection against solid objects > 50 mm	A spherical 50 mm diameter solid probe shall not completely penetrate.
2	Protection against solid objects > 12.5 mm	A spherical 12.5 mm diameter solid probe shall not completely penetrate.
3	Protection against solid objects > 2.5 mm	A spherical 2.5 mm diameter solid probe shall not penetrate at all.
4	Protection against solid objects > 1 mm	A spherical 1 mm diameter solid probe shall not penetrate at all.
5	Dust protected	Although it is impossible to completely prevent the penetration of dust, there should be no intrusion of an amount of dust that could impede the prescribed operation and safety of the electrical equipment.
6	Dust tight	Completely protected against dust.

Second digit	Description	Definition
0	No protection	–
1	Protected against vertically falling drops of water	Vertically dripping water shall have no harmful effect.
2	Protected against vertically falling drops of water even if inclined within 15 degrees	Vertically dripping water shall have no harmful effect when the enclosure is tilted at an angle up to 15° from the vertical.
3	Protected against spraying water	Water falling as a spray at any angle up to 60° from the vertical shall have no harmful effect.
4	Protected against splashing water	Water splashing against the enclosure from any direction shall have no harmful effect.
5	Protected against water jets	Water projected by a nozzle against enclosure from any direction shall have no harmful effects.
6	Protected against powerful water jets	Water projected in powerful jets against the enclosure from any direction shall have no harmful effects.
7	Protected against temporary immersion in water	Ingress of water in harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time.
8	Protected against submersion in water	The equipment is suitable for continuous immersion in water under conditions which shall be specified by the manufacturer. The test conditions are expected to be greater than the depth requirements for IPx7, and other environmental effects may be added.

Note 1: The standard states that the liquid used for testing should be fresh (pure) water, and liquids other than water such as oil are not included in the test conditions.
Separate evaluation is necessary when used in environments subjected to non-water liquids, e.g., where machine tool cutting oil is present.
Our servo motors have a proven track record of optional customization for machine tool applications, so please contact us as necessary.
Note 2: The ratings for water ingress (second digit) are not cumulative beyond IPX6. A device that is compliant with IPX7 (covering immersion in water) is not necessarily compliant with IPX5 or IPX6 (covering exposure to water jets). Select a protection rating suitable for your environment.

Safety Precautions

The products featured in this catalog are designed for use with general industrial machinery.
Pay sufficient attention to the following.

- Read the included Instruction Manual carefully before installing, assembling, and using the product for proper use. The Instruction Manual is available for download from our website.
- Do not modify or alter the product in any way.
- Contact your point of sale or a properly licensed technician for installation or maintenance service of the product.
- Consult us when using the motor for the following uses, as these require special considerations for installation, operations, maintenance, and management such as redundancy and emergency power generators.
  - Use in medical equipment or other devices that may directly affect people' s lives or cause bodily injury.
  - Use in transportation systems or transport-related equipment such as trains or elevators, that may affect people' s lives or cause bodily injury.
  - Systems or equipment that may have a major impact on society or on the public.
  - Special applications related to aviation and space, nuclear power, electric power, submarine repeaters, etc.

For applications subject to vibration such as in vehicles or ships, please contact us in advance.
Please read and understand all of the equipment knowledge, safety information, and precautions before use.

Warning Labels on Products

Products bear the following Warning Labels to indicate the situations as below, depending on the model.

This label is attached in the vicinity of high-voltage portions such as charging or cover-protected parts, to indicate locations with risk of electric shock.

This label is attached in the vicinity of grounding terminals to indicate that grounding is required.

Safety Alert Symbols

■ Warning symbol

⚠DANGER Denotes immediate hazards that will cause severe bodily injury or death if not avoided.

⚠WARNING Denotes immediate hazards which will probably cause severe bodily injury or death if not avoided.

⚠CAUTION Denotes hazards which could cause bodily injury and product or property damage if not avoided.

Notice Denotes hazards which could cause product or property damage without bodily injury if not avoided.

> Note that even items with a ⚠CAUTION symbol could potentially lead to serious outcomes, depending on the situation.
> They all indicate important situations, so be sure to observe them.

■ Prohibited/Mandatory symbol

PROHIBITED Indicates actions that must not be taken.

MANDATORY Indicates actions that must be taken.

Storage

Notice

- Avoid storing products in environments exposed to rain or water drops or with hazardous gas or liquid. Failure to follow this may cause product failures.
- Store products where they are not exposed to direct sunlight, within the specified temperature and humidity ranges of -20 to +65ºC, below 95% RH (non-condensing). Failure to follow this may cause product failures.
- When you use servo amplifiers after a long-term storage (3 years or longer), contact us. The capacitance of electrolytic capacitors can decrease through long-term storage, which must be checked.
- When you use servo motors after a long-term storage (3 years or longer), contact us. Checking on bearings and motor holding brakes will be needed.

Transportation

⚠ CAUTION

- Do not lift the motor by the cable, connector, motor output shaft, or terminal box when transporting. Failure to follow this may cause injury, product failure, or damage.
- Transport the motor with great care to avoid the risk of it falling or tipping over. Failure to follow this may cause injury.
- Follow the instructions displayed on the package box and avoid excessively stacking boxes. Failure to follow this may cause injury or product failures.
- Use the included eyebolts for transporting servo motors alone. Do not use them for transporting machines in which servo motors are used. Failure to follow this may cause product failures.

Installation

⚠ WARNING

- Do not use products in flammable or explosive environments. Failure to follow this may cause fire.
- Mount the motor to incombustible materials such as metals. Failure to follow this may cause fire.
- Use a servo motor in an environment where the motor's protection rating is sufficient. Failure to follow this may cause electric shock, fire, or product failures.
- Avoid installing the motor in locations exposed to water, cutting oil, oil mist, iron powder, or metal chips. Failure to follow this may cause electric shock, fire, or product failures.
- Make sure that oil, flammable foreign objects, cables, or metal fragments do not get inside the motor. Failure to follow this may cause fire.
- Install an emergency stop circuit to the outside of equipment to turn the power off immediately whenever needed. Failure to follow this may cause injury or fire.
- Be sure to connect a molded case circuit breaker (MCCB) or fuse between the power supply and the servo amplifier's main circuit power supply terminals for overcurrent protection. Failure to follow this may cause electric shock or fire.

⚠ CAUTION

- Install safety devices such as circuit breakers in case of short-circuiting of external wiring. Failure to follow this may cause fire.
- Unpack the box with the right side up. Failure to follow this may cause injury.
- Do not stand on the servo motor or place heavy objects on top of it. Failure to follow this may cause injury.
- Install the motor with great care to avoid the risk of it falling or tipping over. Use eyebolts if supplied. Failure to follow this may cause injury.
- Ensure that the servo motor is securely mounted to equipment. Doing otherwise may cause it to fly out while operating.
- Do not touch the servo motor output shaft (especially the keyway and gears) with your bare hand. Failure to follow this may cause injury.
- Make sure that the output shaft of the servo motor and the mating machine are well aligned. Failure to follow this may cause injury or product failures.
- The motor holding brake cannot be used as a dynamic brake to secure the safety of machinery. Install a stopping device to machinery to ensure safety. Failure to do so may result in injury.
- When using servo motors in vertical axes, install safety devices (such as an external brake) to prevent a moving part from falling in the event of an alarm. Failure to follow this may cause injury.
- Designing a safety system that uses the STO function must be done by individuals who have safety standard expertise and have sufficiently understood the descriptions of section 4.5 "Safe Torque Off" in the User's Manual Laws/Regulations Conformity Guidelines. Failure to follow this may cause injury.

Notice

- Keep the ambient temperature of the installed servo amplifier/motor within the specified operating temperature/humidity range. Failure to follow this may cause product failures.
- Make sure to install products in the specified mounting orientation. Failure to follow this may cause product failures.
- The load applied to the servo motor output shaft should be less than the allowable load. Failure to follow this may cause product failures.
- Do not strike the motor shaft with a hammer when installing or removing a coupling to the shaft. Failure to follow this may cause product failures.
- Do not drop products or subject them to excessive shock of any kind. Failure to follow this may cause product failures.
- Do not block the air inlet or outlet. Failure to follow this may cause product failures.
- Keep a specified distance between the servo amplifier and the inner surface of the control board or other devices. Failure to follow this may cause product failures.
- Prepare an external protective circuit to the amplifier to cut off the main circuit power in the event of an alarm. Failure to follow this may cause secondary damage.
- For anti-collision devices, use ones that can sufficiently withstand the maximum output of the system. Failure to follow this may cause product failures.

Wiring

⚠ WARNING

- Be sure to ground the protective grounding terminal (⏚) of a servo amplifier to the machine or control board. The grounding terminal of a servo motor must be connected to the protective grounding terminal (⏚) of the amplifier. Failure to follow this may cause electric shock or fire.
- Do not work on wiring, maintenance servicing, or inspection with power on. After turning off the power, wait for the duration specified on the servo amplifier's main nameplate and ensure the main circuit power supply CHARGE LED (red) has turned off before starting any work. Failure to follow this may cause electric shock.
- Do not connect commercial power supply or ground to the U, V, and W terminals of servo motors. Failure to follow this may cause fire.
- Install safety devices such as circuit breakers in case of short-circuiting of external wiring. Failure to follow this may cause fire.
- Do not damage, apply excessive stresses, put heavy things on, or tuck down cables. Failure to follow this may cause electric shock or fire.
- Use the right power supply (number of phases, voltage, frequency, VAC/VDC) for the motor. Failure to follow this may cause fire.

Notice

- Use servo amplifiers and servo motors in specified combinations. Failure to follow this may cause product failures.
- Perform wiring correctly and securely. Failure to follow this may cause product failures.
- Power cables, including the main circuit power cable and motor power cable of the servo amplifier, and signal cables must not be tied together or passed through the same duct or conduit. Also, the servo motor power cable and encoder cable must not be tied together or passed through the same duct or conduit. Failure to follow this may cause faulty operation.
- When connecting an inductive load such as a relay to the control output signal of the servo amplifier, be sure to connect a surge absorber diode. Ensure that the polarity of the diode is correct. Failure to follow this may cause product failures.
- Check that the power supply for servo motor holding brake and cooling fan meet specifications (number of phases, voltage, frequency, VAC/VDC). Failure to follow this may cause product failures.

Operation

⚠ WARNING

- Never touch inside of servo amplifiers with hands. Failure to follow this may cause electric shock.
- Never touch the rotating part of servo motors during operation. Failure to follow this may cause injury.
- Test-run a servo motor with the motor position fixed and isolated from machine systems. Install the motor to the machine system only after the test is done. Failure to follow this may cause injury.
- Never touch terminals and connectors while electricity is supplied. Failure to follow this may cause electric shock.

⚠ CAUTION

- Do not apply a magnetic field to the encoder cover of the servo motor. (Do not attach magnets such as magnet stands to the encoder cover.) Failure to follow this may cause product failures.
- While power is on and for some time after power-off, the servo amplifier heat sink, regenerative resistor, external dynamic braking resistor, and servo motor may be hot. Take necessary safety measures such as covering to prevent them from being touched accidentally. If safety measures cannot be taken, attach a high-temperature caution label. Failure to follow this may cause burns.

- Do not make extreme setting changes on servo parameters as doing so may result in unstable operations. Failure to follow this may cause injury.
- Stay away from equipment when power is restored after an outage or a momentary outage because the system may restart suddenly. (Make settings on equipment to secure safety on such occasions.) Failure to follow this may cause injury.
- Stop operations immediately when an emergency occurs. When an alarm is activated, remove the cause and ensure safety before resuming operations. Failure to follow this may cause injury.
- Never plug or unplug connectors while power is on (hot swapping) as the resulting surge voltage may cause electronic component malfunctions. Failure to follow this may cause electric shock or product damage.

Notice

- The holding brake built into servo motors must not be used for dynamic braking. Failure to follow this may cause product failures.
- Do not apply static electricity or excessively high voltage to servo motor encoder cables. Failure to follow this may cause product failures.
- For use in high-inertia or high-speed applications, ensure that the generated peak regenerative power does not exceed the level the regenerative resistor used can withstand.
- Do not drive the servo motor by external power when the dynamic brake is activated due to power shutdown or alarm. Failure to follow this may cause product failures.
- Do not turn the power on and off at a frequency of more than 30 times/day or 5 times/hour. Failure to follow this may cause product failures.
- The surge absorber for the servo motor's holding brake relay prolongs the brake delay time. Therefore, program a sequence taking the delay time into account. Failure to follow this may cause product failures. Refer to User's Manual "2. Servo Motor" for holding delay time.

Maintenance and Inspection

WARNING

- Never attempt to disassemble, repair, or alter this product in any way. Doing so might result in electric shock.

CAUTION

- Do not use servo amplifiers or servo motors that have failed, damaged, or burnt out. Failure to follow this may cause fire.

Notice

- Parts and components used in servo amplifiers (such as electrolytic capacitors, cooling fans, lithium batteries for encoders, fuses, and relays) deteriorate by aging. Considering the standard replacement period, replace these parts and components with new ones for preventive maintenance. Failure to follow this may cause product failures. If you need to replace these parts, please contact us.
- Do not perform measurements of insulation resistance or dielectric voltage of the servo amplifier or servo motor. Failure to follow this may cause product failures.

PROHIBITED

- Do not remove the nameplate.

Disposal

MANDATORY

- Dispose of servo amplifiers and servo motors as industrial waste.

Guidelines for Suppressing Harmonics

Harmonic current generated by equipment such as servo amplifiers can potentially have adverse impact on other power consumers, if it flows out. Therefore, "Guideline for Suppressing Harmonics by Customers Receiving High Voltage or Special High Voltage" is published by the Ministry of International Trade and Industry (current Ministry of Economy).

Servo amplifiers used by specific power consumers fall under the category of "harmonic wave generating devices".
Consumers to whom the guideline is applied must determine if harmonic suppression measures are necessary based on the guideline and take measures for keeping harmonic emission within the limit specified by the power contract.
Even for consumers to whom the guideline is not applied, it is recommended they take harmonic suppression measures in order to avoid troubles due to the harmonics.

Our servo amplifiers fall under the circuit classification in Table 1 of the "Guideline for Suppressing Harmonics".

Refer to the following document for calculation method of harmonic currents.
"How to Calculate Harmonic Current of Servo Amplifiers for Specific Power Consumers" (JEM-TR225) by Japan Electrical Manufacturers' Association

Determine whether or not any harmonics suppression measures are required on the converter (AC-DC converter) side if the servo amplifier has a DC input power supply of DC type.

When harmonic suppression measures are necessary for the servo amplifier, connect a harmonic suppression reactor.
Contact us for the harmonic suppression reactor.

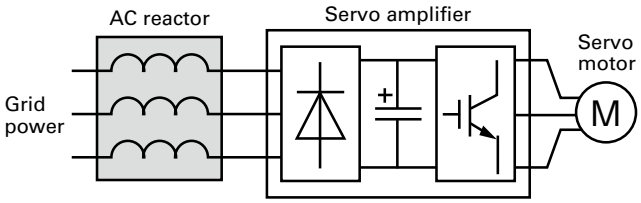


Table 1

Servo amplifier model no.	Power supply	Circuit classification	Circuit type			Conversion coefficient Ki
GADS□01□□□□ GADS□02□□□□ GADS□03□□□□ GADS□05□□□□	3-phase power supply Without AC reactor	3	3-phase bridge (Smoothing capacitor)	3-1	6-pulse converter without reactor	K31 = 3.4
	3-phase power supply With AC reactor			3-2	6-pulse converter with reactor (AC side)	K32 = 1.8
	Single-phase power supply Without AC reactor	4	Single-phase bridge (Smoothing capacitor, full-wave rectification)	4-3	Without reactor	K43 = 2.9
	Single-phase power supply With AC reactor			4-4	With reactor (AC side)	K44 = 1.3

References

- "Guideline for Suppressing Harmonics by Customers Receiving High Voltage or Special High Voltage" (September, 1994) by Ministry of International Trade and Industry (current Ministry of Economy, Trade and Industry)
- "Technical Guidelines for Suppressing Harmonics" (JEAG 9702-2018) by The Japan Electric Association
- "Measures for Suppressing Servo Amplifier and General-purpose Inverter Harmonics" (April 2022), Japan Electrical Manufacturers' Association
- "How to Calculate Harmonic Current of Servo Amplifiers for Specific Power Consumers" (JEM-TR225) by Japan Electrical Manufacturers' Association
- "Guideline for Suppressing Servo Amplifier (input current 20 A or less) Harmonics" (JEM-TR227) by Japan Electrical Manufacturers' Association

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