

# SANMOTION

SERVO SYSTEMS

# R

100 VAC 30-200 W, 200 VAC 30 W-30 kW



Ver. 4.1

SANYO DENKI

# SANMOTION R

## SERVO SYSTEMS

**Input voltage** 100, 200 VAC

**Output capacity** 30 W to 30 kW

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### Servo amplifier



**Amplifier capacity** 10 A, 20 A, 30 A, 50 A, 75 A, 100 A,  
150 A, 300 A, 600 A

### Servo motor



**Flange size** 40 mm sq., 60 mm sq., 80 mm sq., 86 mm sq., 100 mm sq.,  
130 mm sq., 180 mm sq., 220 mm sq., 275 mm sq.



**Rated output** 100 VAC: 30 to 200 W  
200 VAC: 30 W to 30 kW



## Contents

Lineup .....	p. 6
Features .....	p. 8
List of Compatible Servo Amplifiers and Servo Motors .....	p. 14
Standard Model Number List .....	p. 16

## Servo Amplifiers

R 3E Model Analog/Pulse Input type .....	p. 35
EtherCAT Interface type .....	p. 57
Built-in Positioning Function Type .....	p. 75
Safety Interface type .....	p. 102

## Servo Motors .....

### Specifications

- Servo Amplifiers + Servo Motors	
100 V system .....	p. 110
200 V system .....	p. 114

## Servo Motor Dimensions .....

## Options .....

## Linear Servo Motors .....

## SANMOTION S

Spindle Motors and Servo Amplifiers .....	p. 181
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## Models No Longer Listed and Their Replacing Models .....

## Selection Guide .....

## Motor Protection Rating .....

## Safety Precautions .....

# SANMOTION R

## AC SERVO SYSTEMS

The SANMOTION R series servo systems contribute to the evolution of your devices with a rich product lineup of high-precision servo amplifiers and servo motors.

These high-precision and highly reliable systems offer a wide range of products from small to large capacity servo systems.



### Input Device & Controller

#### SANMOTION C Controller

EtherCAT



For more information, see the SANMOTION C catalog.

### Servo system SANMOTION R

#### SANMOTION R 3E Model

### Servo Amplifier

Analog/Pulse

Safety



EtherCAT

Safety



Built-in Positioning Function

Safety



### Servo Motor

Servo motor  
(Rotary motor)



Linear  
servo motor



Note: Linear servo motors are not compatible with the Safety expansion.

#### • What is a servo system?

A servo system has an encoder (position and rotation detector) mounted on the servo motor and provides highly-reliable precise operation by giving feedback to commands from the servo amplifier. It can be used with confidence in applications that require high-speed and large-capacity operations.





## Application Examples

Its high-precision and accurate positioning features allow it to be used in a wide range of applications.

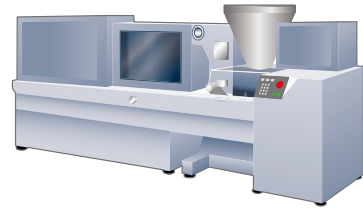
- Industrial robots, machine tools, injection molding machines, food machinery, chip mounters, semiconductor related equipment, medical equipment, etc.



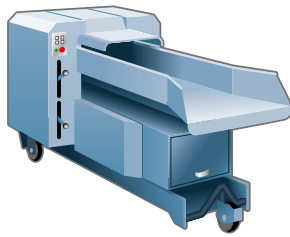
Industrial robots



Machine tools



Injection molding machines



Food machinery



Chip mounters

### Conformance to Safety Standards

Our R 3E Model servo amplifiers conform to safety standards (UL, cUL, and EN standards) and the KC Mark as standard. You can also employ servo motors that conform to the UL, c-UL and EN standards. (some models are still in preparation) In addition, all model numbers manufactured after October 2012 in this catalog conform with the acceptable values of specific hazardous substances (cadmium, lead, mercury, hexavalent chrome, PBB, and PBDE) in Appendix II of EU RoHS directive (2011/65/EU).



# Lineup

## Servo Amplifier

### SANMOTION R 3E Model

#### Analog/Pulse Input type

→ p. 35

More evolved AC servo amplifiers that provide improved basic performance including high responsiveness, and are more eco-efficient and easier to use.

Lineup: 10 A, 20 A, 30 A, 50 A, 75 A, 100 A, 150 A, 300 A, 600 A



#### EtherCAT Interface type

→ p. 57

With a 62.5  $\mu$ s minimum communication cycle, the high-speed EtherCAT fieldbus subdivides position commands, realizing smoother operation of devices. It can be used together with our controller "SANMOTION C EtherCAT Interface type" .

Lineup: 10 A, 20 A, 30 A, 50 A, 75 A, 100 A, 150 A, 300 A, 600 A



#### Built-in Positioning Function (Parallel or Serial) type

→ p. 75

The need for a positioning control unit is eliminated, simplifying the system.

Lineup: 10 A, 20 A, 30 A, 50 A, 75 A, 100 A, 150 A, 300 A, 600 A



#### Safety (With Functional Safety Module)

→ p. 102

Analog/Pulse

EtherCAT

Built-in Positioning Function

With the functional safety expansion, this amplifier can be used with confidence for equipment and robots operated near people. Also, maintenance can be performed without shutting down the equipment power.

Note: This cannot be combined with linear servo motors.

Functional safety IEC/EN 61800-5-2:2016, STO (Safe Torque Off), SS1 (Safe Stop 1), SS2 (Safe Stop 2), SOS (Safe Operating Stop), SLS (Safely-Limited Speed), SBC (Safe Brake Control), and SSM (Safe Speed Monitor)






The products listed in this catalog have main circuit power input within range of 100 to 200 VAC. Besides them, 400 VAC and 48 VDC input servo systems are also available. See our website and catalogs for more information.

## Servo Amplifier

### Servo Motor (Rotary Motor)

→ p. 109

Motor type	Flange size, features	
<b>R2 Servo Motor</b> <b>Medium inertia</b> Low ripple	40 mm sq., 60 mm sq., 80 mm sq., 86 mm sq., 100 mm sq., 130 mm sq., 180 mm sq., 220 mm sq., 275 mm sq.	The lineup offers a wide range of medium-inertia servo motors. These are ideal for robots, injection molding machines, and general industrial machines. 
<b>R1 Servo Motor</b> <b>Low inertia</b> High power rate	40 mm sq., 60 mm sq., 80 mm sq., 100 mm sq., 130 mm sq., 180 mm sq., 220 mm sq.	Low inertia servo motors that feature high-acceleration drive and high torque even at high rotational speed. Ideal for injection molding machines and general industrial machines. 
<b>R5 Servo Motor</b> <b>Medium inertia</b> Ultra low torque ripple	60 mm sq., 80 mm sq.	These motors are suitable for applications that require smoothness, such as the feed axes of machine tools. 

### Linear Servo Motor

→ p. 171

These are compact, high-thrust linear servo motors. We offer three types of linear servo motors: a flat type, a dual magnet type, and a center magnet type. Compared with linear motion systems with ball screws, these enable you to build a faster, higher-precision, and simpler system. No use of ball screws eliminates grease buildup, making them ideal for applications that require a clean environment such as semiconductor manufacturing equipment and chip mounters.



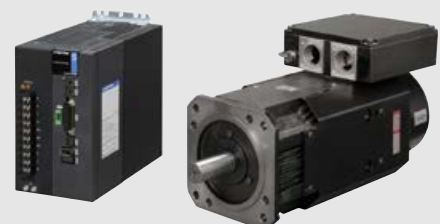
## Spindle Motor and Servo Amplifier

→ p. 181

### SANMOTION S

A servo system with a spindle motor and a servo amplifier. Provides high rotational speed and high torque at low speed, which improves productivity of the device. Ideal for the main shaft of machine tools that require highly precise tapping synchronized with the feed shaft.

Lineup: Output capacity 3.2, 4.5 kW Amplifier capacity 150 A



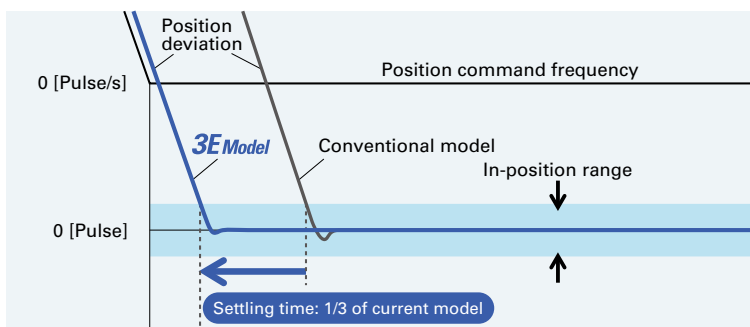
The 3rd generation of SANMOTION R servo amplifier series “3E Model” features evolved performance with high responsiveness and are more eco-efficient and easier to use. It contributes to improving the device performance.

# Evolved

### Cycle time can be shortened by high-speed positioning control

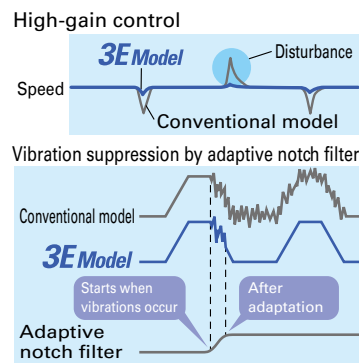
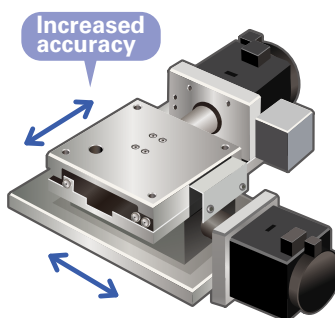
The 3E Model has a speed frequency response of 2.2 kHz, approximately twice that of our conventional product.\* Additionally, the position settling time has been shortened to 1/3 of the original time. A function for switching the trajectory control and the positioning control in real time has been incorporated, significantly reducing the cycle time of devices.

\* For amplifiers with capacities from 10 to 50 A. Compared with our conventional AC servo amplifier, “SANMOTION R ADVANCED MODEL”



### Improved control accuracy

The 3E Model is equipped with a gain increase function, a function for suppressing microvibrations at settling time, an adaptive notch filter for suppressing mechanical resonance, and a feed-forward vibration control function. The improved 5th-order notch filter realizes accurate shaft feeding for machine tools, significantly enhancing the processing quality.



### Built-in safety functions

The series product lineup includes Safe Torque Off (STO) function models<sup>(1)</sup> and Safety models<sup>(2)</sup> that offer even wider range of safety functions. Safety models feature monitoring of position and speed of devices as well as safe operation stop so that workers nearby can concentrate on their work with confidence. With these safety functions, motors can be stopped without shutting down the amplifier power, shortening the device reboot time. These products are suitable for devices that require high levels of safety.

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

(2) In addition to \*1, SS1 (Safe Stop 1), SS2 (Safe Stop 2), SOS (Safe Operating Stop), SLS (Safely-Limited Speed), SBC (Safe Brake Control), and SSM (Safe Speed Monitor)

### Functional safety specifications Models that facilitate easy integration of safety functions in devices to comply with functional safety are available.

Servo amplifier type	Model no.		Functional safety specifications
	Analog/Pulse	EtherCAT, built-in positioning function	
SANMOTION R 3E Model	RS3□□□□□□□0	—	Models not conforming to the functional safety.
	RS3□□□□□□□2	RS3□□□□A□□□4	These models have the Safe Torque Off function. IEC/EN 61800-5-2:2016, STO (Safe Torque Off)
SANMOTION R 3E Model Safety → p. 102	RS3□□□□A□□□C	RS3□□□□A□□□E	This model has integrated extended safety functions in addition to Safe Torque Off function. Maintenance work can be performed without shutting off the power to the device. System restarting after maintenance work has also been made easy. IEC/EN 61800-5-2:2016, STO (Safe Torque Off), SS1 (Safe Stop 1), SS2 (Safe Stop 2), SOS (Safe Operating Stop), SLS (Safely-Limited Speed), SBC (Safe Brake Control), and SSM (Safe Speed Monitor)

# Eco-efficient

## Reduced power consumption

By incorporating new-generation power devices, the 3E Model decreases electric power losses by up to 10%.\* The 3E Model has up to 10% lower standby power consumption as it limits unnecessary energy consumption by controlling the fan speed according to the internal temperature of the servo amplifier.\*



\* For amplifiers with capacities from 100 to 300 A.

## Power consumption management

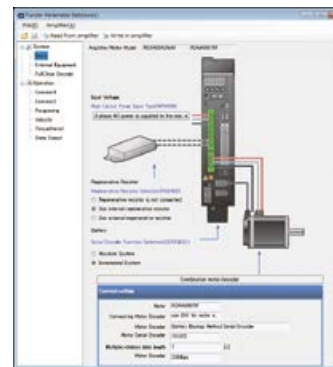
Power consumption of the device can be managed by the monitoring function. The servo amplifier calculates power consumption based on the motor current, and displays it on the setup software or digital operator.

Axis	Power consumption	Unit
X	0.41	kWh
Y	0.75	kWh
Z	0.21	kWh
Total	1.37	kWh

# Easy to use

## Easy startup

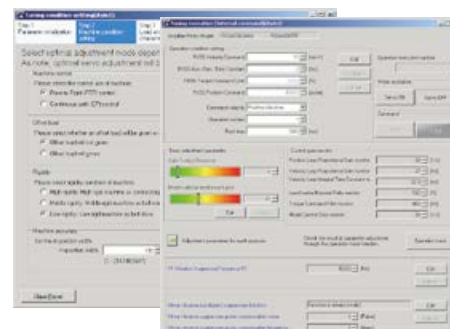
The SANMOTION MOTOR SETUP SOFTWARE enables easy and quick system startup by displaying parameters required for operation in an easy-to-understand manner. It has a virtual motor operation function to simulate motor and amplifier operations without actually operating the machine, and a jog function for testing the motor and amplifier connection, enabling test operations to be performed without connecting to a controller.



Minimally required parameters can be set prior to the start of an operation, which are lumped together by categories, to shorten time for startup.

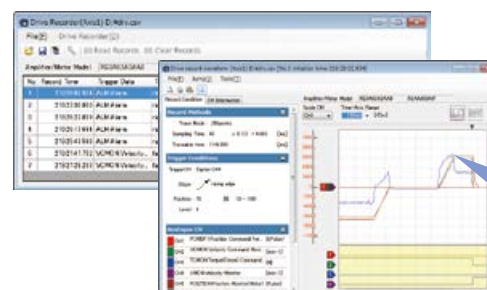
## Easy servo tuning

With the setup software, the 3E Model amplifiers offer a variety of servo tuning support functions such as the automatic optimal tuning mode selection according to equipment and load conditions, basic tuning mode for 2-parameter adjustment, and application tuning mode for adjustment by purpose. This greatly shortens the time required for servo tuning.



## Easy troubleshooting

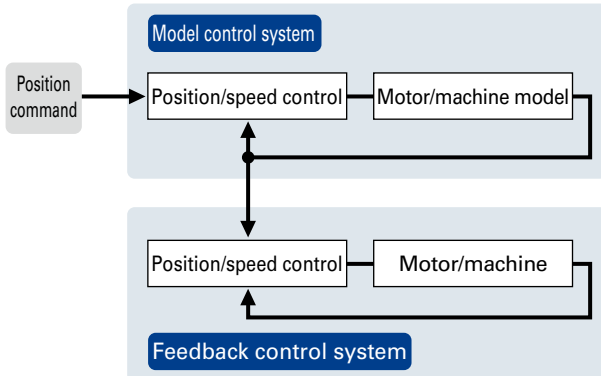
The drive recorder function that records motor and amplifier operating status in 1 ms time stamps allows you to assess the alarms and other abnormalities later for easy troubleshooting.



The drive recorder function simplifies the diagnosis of device abnormalities.

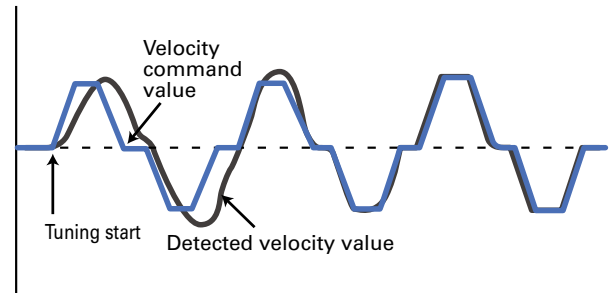
## Model-based following control

Model-based following control enables an improved target value response, enhanced disturbance suppression, and greater robustness.



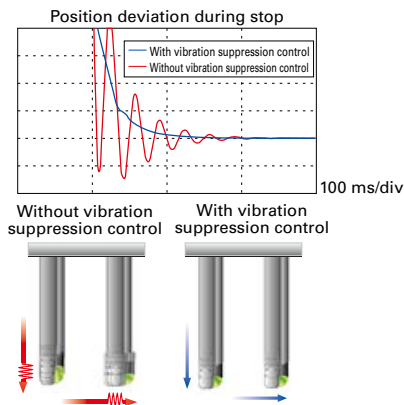
## Auto-tuning

The servo amplifier automatically optimizes servo gain and filter frequency in real time.



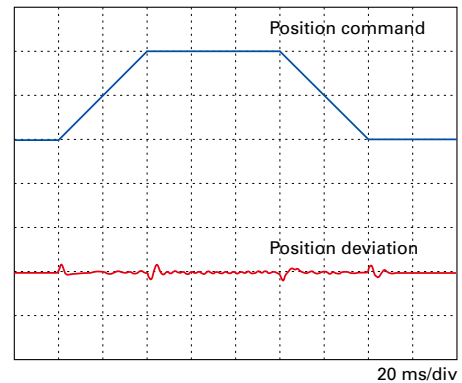
## Feed-forward vibration suppression control

With feed-forward vibration suppression control, vibrations at the end effector and base of a machine can be suppressed through simple tuning procedures. Vibration control frequencies are selectable.



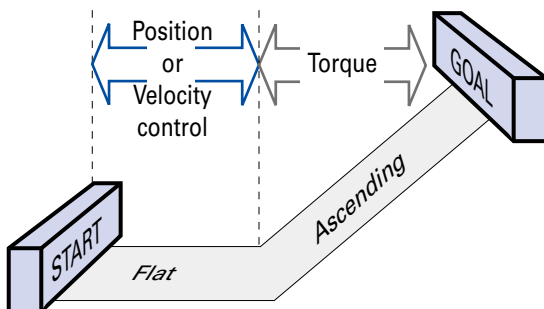
## Command following control

Newly-employed position and velocity controller has improved the tracking capability to the position commands. Position deviation  $\approx 0$  has been achieved.



## All-in-one control

Configurable parameters allow switching between control modes for torque, position or velocity.



## 5-Digit LED display, digital operator

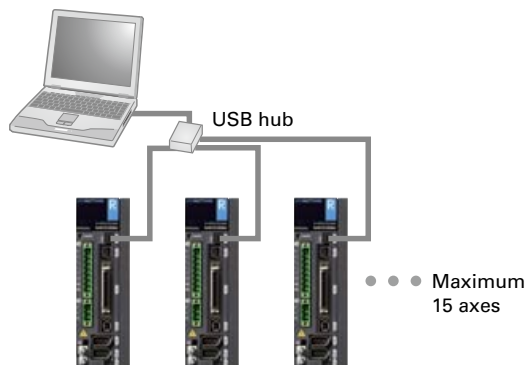
The built-in digital operator allows you to change parameters and monitor amplifier status and alarm traces.





## Multiaxial monitor function

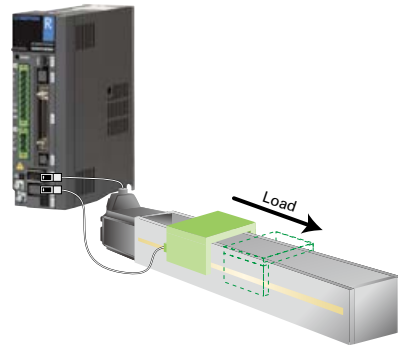
The setup software allows up to 15 axes—that is, 15 sets of a servo motor and a servo amplifier—to be monitored.



## Dual position feedback fully-closed loop control

Dual position feedback fully-closed loop control is possible by using information from two encoders: a linear encoder mounted on the device (load) and a high resolution motor-mounted encoder.

Even when there is high motor shaft torsion from the load, servo gain can be improved and high response achieved.



## EtherCAT Interface type

EtherCAT is a 100 Mbps high-speed fieldbus system.

This contributes to reducing equipment cycle time. This highly versatile EtherCAT is compatible with Ethernet, which makes it possible to build a system that co-exists with various devices. The servo amplifier firmware can be updated via EtherCAT network. 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



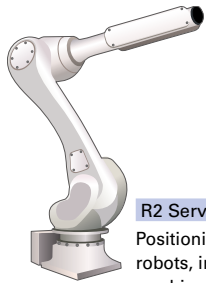
## Built-in Positioning Function type

Servo amplifier models with a built-in positioning function are available. These eliminate the need for a positioning control unit, reducing the number of wires and save space. Two types of interface are available: a parallel type and a serial type. These are suitable for conveying applications.



## Medium inertia servo motors selectable for different applications

Two types of medium inertia servo motors are available: R2 servo motors with a wide lineup for positioning applications, and R5 servo motors that are ideal for smooth operations such as for feed shafts of small-sized machine tools.



**R2 Servo Motor**  
Positioning applications with robots, injection molding machines, general industrial machinery, etc.

**R5 Servo Motor**  
Feed axes in machine tools



## Downsized servo motors

R2 series servo motors have been downsized by as much as 30% in length and 25% in volume from our conventional product\*, while still achieving high torque and high performance. (When using a battery-backup absolute encoder.)

\* Compared with our conventional SANMOTION Q AC servo motor.

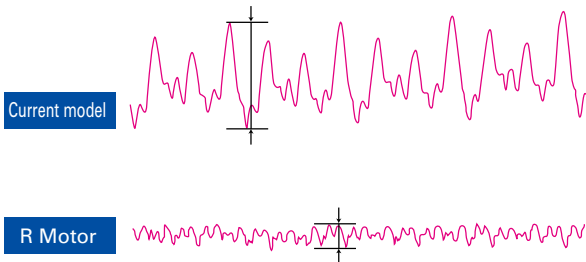


30% reduction

## Low cogging torque

Cogging torque has been reduced in comparison with our conventional products, achieving smoother movement.

Comparison of cogging torque waveforms



(Waveform image for reference)

## Waterproof and dustproof

Our servo motors are highly resistant to water and dust ingress with an IP65 rating, ensuring normal operation even in severe environments.

An IP67 protection is available as an option for small-capacity motors.



Note: Except for shaft through-hole and cable ends. Use with a waterproof cannon plug connector.

## Compact and large thrust linear servo motors

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



IP 6 5

Protection against dust		Protection against water	
<b>6</b>	Complete protection against dust	<b>5</b>	Protection against water jets
		<b>7</b>	Protection against temporary immersion in water

## Highly precise battery-less absolute encoder

This high-precision battery-less absolute encoder Model No. HA035 comes equipped with our servo motors as standard. It does not require a battery, a periodic replacement part, so the need for cumbersome maintenance and export procedures are eliminated.



No need to worry about battery life and battery exporting procedures.

We offer various encoders that help to select the best encoder for your device. Refer to the following table.

### Absolute encoder

Type (Encoder model number in parentheses)	Single-turn resolution	Multi-turn resolution	Baud rate	Absolute angular accuracy	Custom options
<p><b>Battery-less absolute encoder</b> (Model No. HA035)</p> <p>This is a high-precision, battery-less, optical multi-turn encoder. Because there is no need to replace batteries, the encoder is maintenance free.</p>	131072 (17 bit)	65536 (16 bit)	2.5 Mbps	Approx. 0.167°	<ul style="list-style-type: none"> <li>Single-turn resolution 1048576 (20 bit) 8388608 (23 bit)</li> <li>Baud rate 4.0 Mbps</li> <li>Absolute angular accuracy Under 0.0167°</li> </ul>
<p><b>Single-turn absolute encoder</b> (Model No. PA035S)</p> <p>This is a thin, optical single-turn encoder. It achieves wire saving particularly for systems that currently use incremental encoders, and helps downsize the systems.</p>	131072 (17 bit)	—	2.5 Mbps	Approx. 0.167°	<ul style="list-style-type: none"> <li>Single-turn resolution 1048576 (20 bit)</li> <li>Baud rate 4.0 Mbps</li> </ul>
<p><a href="#">Options</a></p> <p><b>Battery-backup absolute encoder</b> (Model No. PA035C)</p> <p>This is a thin, battery-backed, optical multi-turn encoder. Because the length of the motor can be shortened, it is ideal for devices with limited motor installation space. It requires an optional battery.</p>	131072 (17 bit)	65536 (16 bit)	2.5 Mbps	Approx. 0.167°	<ul style="list-style-type: none"> <li>Single-turn resolution 1048576 (20 bit)</li> <li>Baud rate 4.0 Mbps</li> </ul>
<p><a href="#">Options</a></p> <p><b>Battery-less absolute resolver encoder</b> (Model No. RA035C)</p> <p>This is a resolver method battery-less multi-turn encoder. This is an environmentally durable resolver encoder.</p>	131072 (17 bit)	65536 (16 bit)	2.5 Mbps	Approx. 0.167°	<ul style="list-style-type: none"> <li>Baud rate 4.0 Mbps</li> </ul>

### Incremental encoder

Type (Encoder model number in parentheses)	Classification	Pulse/rotation
<p><b>Wire-saving incremental encoder</b> (Model No. PP031H)</p> <p>This is an incremental encoder with A, B, and Z-phase outputs that can easily be combined with a host controller.</p>	Options	Up to 10000 P/R

# List of Compatible Servo Amplifiers and Servo Motors

Standard specifications **C**···Output shaft: Straight, Oil seal: None, Connection: Cable

**P**···Output shaft: With key, Oil seal: Yes, Connection: Cannon Plug (15 kW or lower), Terminal block (20 kW or higher)

Servo motor							Servo amplifier
Motor type	Rated output [kW]	Flange size	Model name (Partial model no.)	Standard specification	Page		<b>R 3E Model</b> <b>Analog/Pulse Input type</b> p. 35 <b>EtherCAT Interface type</b> p. 57 <b>Built-in Positioning Function type</b> p. 75
					Specifications	Dimensions	
<b>R2</b> Servo motor 100 V system Medium inertia	0.03	40 mm sq.	R2EA04003F□□	<b>C</b>	p. 110	p. 134	RS3E01A□□〈10 A〉
	0.05	40 mm sq.	R2EA04005F□□	<b>C</b>	p. 110	p. 134	RS3E02A□□〈20 A〉
	0.08	40 mm sq.	R2EA04008F□□	<b>C</b>	p. 110	p. 134	RS3E02A□□〈20 A〉
	0.1	60 mm sq.	R2EA06010F□□	<b>C</b>	p. 111	p. 134	RS3E02A□□〈20 A〉
	0.2	60 mm sq.	R2EA06020F□□	<b>C</b>	p. 111	p. 134	RS3E03A□□〈30 A〉
<b>R1</b> Servo motor 100 V system Low inertia	0.05	40 mm sq.	R1EA04005F□□	<b>C</b>	p. 112	p. 134	RS3E02A□□〈20 A〉
	0.1	40 mm sq.	R1EA04010F□□	<b>C</b>	p. 112	p. 134	RS3E02A□□〈20 A〉
	0.2	60 mm sq.	R1EA06020F□□	<b>C</b>	p. 113	p. 134	RS3E03A□□〈30 A〉
<b>R2</b> Servo motor 200 V system Medium inertia	0.03	40 mm sq.	R2AA04003F□□	<b>C</b>	p. 114	p. 134	RS3A01A□□〈10 A〉
	0.05	40 mm sq.	R2AA04005F□□	<b>C</b>	p. 114	p. 134	RS3A01A□□〈10 A〉
	0.1(0.09)*	40 mm sq.	R2AA04010F□□	<b>C</b>	p. 114	p. 134	RS3A01A□□〈10 A〉
	0.1	60 mm sq.	R2AA06010F□□	<b>C</b>	p. 114	p. 134	RS3A01A□□〈10 A〉
		60 mm sq.	R2AA06020F□□	<b>C</b>	p. 115	p. 134	RS3A02A□□〈20 A〉
	0.2	80 mm sq.	R2AA08020F□□	<b>C</b>	p. 115	p. 134	RS3A02A□□〈20 A〉
		60 mm sq.	R2AA06040H□□	<b>C</b>	p. 115	p. 134	RS3A02A□□〈20 A〉
	0.4(0.36)*	60 mm sq.	R2AA06040F□□	<b>C</b>	p. 115	p. 134	RS3A02A□□〈20 A〉
		80 mm sq.	R2AA08040F□□	<b>C</b>	p. 116	p. 134	RS3A02A□□〈20 A〉
	0.4	130 mm sq.	R2AA13050H□□	<b>P</b>	p. 117	p. 137	RS3A03A□□〈30 A〉
		130 mm sq.	R2AA13050D□□	<b>P</b>	p. 117	p. 137	RS3A03A□□〈30 A〉
	0.55	80 mm sq.	R2AA08075F□□	<b>C</b>	p. 116	p. 134	RS3A03A□□〈30 A〉
		100 mm sq.	R2AA10075F□□	<b>C</b>	p. 116	p. 134	RS3A03A□□〈30 A〉
		86 mm sq.	R2AAB8075F□□	<b>C</b>	p. 118	p. 134	RS3A05A□□〈50 A〉
	1	86 mm sq.	R2AAB8100H□□	<b>C</b>	p. 116	p. 134	RS3A03A□□〈30 A〉
		86 mm sq.	R2AAB8100F□□	<b>C</b>	p. 118	p. 134	RS3A05A□□〈50 A〉
		100 mm sq.	R2AA10100F□□	<b>C</b>	p. 118	p. 134	RS3A05A□□〈50 A〉
		130 mm sq.	R2AA13120B□□	<b>P</b>	p. 117	p. 137	RS3A03A□□〈30 A〉
	1.2	130 mm sq.	R2AA13120L□□	<b>P</b>	p. 119	p. 137	RS3A05A□□〈50 A〉
		130 mm sq.	R2AA13120D□□	<b>P</b>	p. 119	p. 137	RS3A05A□□〈50 A〉
		100 mm sq.	R2AA10150H□□	<b>P</b>	p. 118	p. 136	RS3A05A□□〈50 A〉
	1.5	130 mm sq.	R2AA13180H□□	<b>P</b>	p. 119	p. 137	RS3A05A□□〈50 A〉
		130 mm sq.	R2AA13180D□□	<b>P</b>	p. 120	p. 137	RS3A07A□□〈75 A〉
	1.8	130 mm sq.	R2AA13200L□□	<b>P</b>	p. 119	p. 137	RS3A10A□□〈100 A〉
		130 mm sq.	R2AA13200D□□	<b>P</b>	p. 120	p. 137	RS3A05A□□〈50 A〉
	2	180 mm sq.	R2AA18350V□□	<b>P</b>	p. 120	p. 138	RS3A07A□□〈75 A〉
		180 mm sq.	R2AA18350L□□	<b>P</b>	p. 120	p. 138	RS3A10A□□〈100 A〉
180 mm sq.		R2AA18350D□□	<b>P</b>	p. 121	p. 138	RS3A15A□□〈150 A〉	
3.5	180 mm sq.	R2AA18450H□□	<b>P</b>	p. 121	p. 138	RS3A15A□□〈150 A〉	
4.5	220 mm sq.	R2AA22500L□□	<b>P</b>	p. 121	p. 139	RS3A15A□□〈150 A〉	
	180 mm sq.	R2AA18550R□□	<b>P</b>	p. 121	p. 138	RS3A15A□□〈150 A〉	
5.5	180 mm sq.	R2AA18550H□□	<b>P</b>	p. 122	p. 138	RS3A15A□□〈150 A〉	
	220 mm sq.	R2AA22700S□□	<b>P</b>	p. 122	p. 139	RS3A30A□□〈300 A〉	
7	220 mm sq.	R2AA22700S□□	<b>P</b>	p. 122	p. 139	RS3A15A□□〈150 A〉	

\* Values in parentheses are derated output values for motors with brake.

Note: With optional oil seals, motor outputs may be derated to 80 to 95% of the values in the table above.

Servo motor						
Motor type	Rated output [kW]	Flange size	Model name (Partial model no.)	Standard specification	Page	
					Specifications	Dimensions
<b>R2</b> Servo motor 200 V system Medium inertia	7.5	180 mm sq.	R2AA18750H□□	P	p. 122	p. 138
	11	180 mm sq.	R2AA1811KR□□	P	p. 122	p. 138
		220 mm sq.	R2AA2211KB□□	P	p. 123	p. 139
	15	220 mm sq.	R2AA2215KB□□	P	p. 123	p. 139
	20	220 mm sq.	R2AA2220KB□□	P	p. 123	p. 140
	30	275 mm sq.	R2AA2830KV□□	P	p. 123	p. 140
<b>R1</b> Servo motor 200 V system Low inertia	0.05	40 mm sq.	R1AA04005F□□	C	p. 124	p. 134
	0.1	40 mm sq.	R1AA04010F□□	C	p. 124	p. 134
	0.2	60 mm sq.	R1AA06020F□□	C	p. 124	p. 134
	0.4	60 mm sq.	R1AA06040F□□	C	p. 125	p. 134
	0.75	80 mm sq.	R1AA08075V□□	C	p. 125	p. 134
		80 mm sq.	R1AA08075F□□	C	p. 125	p. 134
	1	100 mm sq.	R1AA10100H□□	P	p. 127	p. 141
		100 mm sq.	R1AA10100F□□	P	p. 126	p. 141
	1.5	100 mm sq.	R1AA10150H□□	P	p. 127	p. 141
		100 mm sq.	R1AA10150F□□	P	p. 126	p. 141
	2	100 mm sq.	R1AA10200H□□	P	p. 127	p. 141
		100 mm sq.	R1AA10200F□□	P	p. 126	p. 141
	2.5	100 mm sq.	R1AA10250H□□	P	p. 127	p. 141
		100 mm sq.	R1AA10250F□□	P	p. 126	p. 141
	3	130 mm sq.	R1AA13300H□□	P	p. 129	p. 141
		130 mm sq.	R1AA13300F□□	P	p. 128	p. 141
	4	130 mm sq.	R1AA13400H□□	P	p. 129	p. 141
		130 mm sq.	R1AA13400F□□	P	p. 128	p. 141
	5	130 mm sq.	R1AA13500H□□	P	p. 129	p. 141
		130 mm sq.	R1AA13500F□□	P	p. 128	p. 141
5.5	180 mm sq.	R1AA18550H□□	P	p. 130	p. 142	
7.5	180 mm sq.	R1AA18750L□□	P	p. 130	p. 142	
11	180 mm sq.	R1AA1811KR□□	P	p. 131	p. 142	
15	180 mm sq.	R1AA1815KB□□	P	p. 131	p. 142	
21	220 mm sq.	R1AA2220KV□□	P	p. 131	p. 142	
<b>R5</b> Servo motor 200 V system Medium inertia	0.2	60 mm sq.	R5AA06020H□□	C	p. 132	p. 134
		60 mm sq.	R5AA06020F□□	C	p. 133	p. 134
	0.4(0.38)*	60 mm sq.	R5AA06040H□□	C	p. 132	p. 134
	0.4	60 mm sq.	R5AA06040F□□	C	p. 133	p. 134
	0.75(0.71)*	80 mm sq.	R5AA08075D□□	C	p. 132	p. 134
0.75(0.675)*	80 mm sq.	R5AA08075F□□	C	p. 133	p. 134	
<b>Linear</b> Servo motor 200 V system	Dual magnet type [with core]	DD045CB4AN (Coil model no.)		p. 176	p. 176	
		DD035CC2AN (Coil model no.)		p. 177	p. 177	
	Flat type [with core]	DS045CC1AN (Coil model no.)		p. 178	p. 178	
		DT030CD1AN (Coil model no.)		p. 179	p. 179	

Servo amplifier	
<b>R 3E Model</b>	
Analog/Pulse Input type p. 35	
EtherCAT Interface type p. 57	
Built-in Positioning Function type p. 75	
RS3A30A□□〈300 A〉	
RS3A30A□□〈300 A〉	
RS3A30A□□〈300 A〉	
RS3A30A□□〈300 A〉	
RS3W60A□□〈600 A〉	
RS3W60A□□〈600 A〉	
RS3A01A□□〈10 A〉	
RS3A01A□□〈10 A〉	
RS3A02A□□〈20 A〉	
RS3A02A□□〈20 A〉	
RS3A03A□□〈30 A〉	
RS3A05A□□〈50 A〉	
RS3A03A□□〈30 A〉	
RS3A05A□□〈50 A〉	
RS3A03A□□〈30 A〉	
RS3A05A□□〈50 A〉	
RS3A05A□□〈50 A〉	
RS3A07A□□〈75 A〉	
RS3A05A□□〈50 A〉	
RS3A07A□□〈75 A〉	
RS3A07A□□〈75 A〉	
RS3A10A□□〈100 A〉	
RS3A10A□□〈100 A〉	
RS3A15A□□〈150 A〉	
RS3A10A□□〈100 A〉	
RS3A15A□□〈150 A〉	
RS3A30A□□〈300 A〉	
RS3A30A□□〈300 A〉	
RS3A30A□□〈300 A〉	
RS3A30A□□〈300 A〉	
RS3W60A□□〈600 A〉	
RS3A01A□□〈10 A〉	
RS3A02A□□〈20 A〉	
RS3A02A□□〈20 A〉	
RS3A02A□□〈20 A〉	
RS3A03A□□〈30 A〉	
RS3A03A□□〈30 A〉	
RS3A07□□〈75 A〉	
RS3A07□□〈75 A〉	
RS3A03□□〈30 A〉	
RS3A03□□〈30 A〉	

\* Values in parentheses are derated output values for motors with brake.  
Note: With optional oil seals, motor outputs may be derated to 80 to 95% of the values in the table above.

# Standard Model Number List

For specifications on other models, contact us for details.

Input voltage **100 VAC**

## Servo Amplifier R 3E Model Analog/Pulse Input type

Main circuit power supply	Control circuit power supply	Encoder type	General-purpose output	Internal regenerative resistor	Safe Torque Off function <sup>(1)</sup>	Safety <sup>(2)</sup>	Amplifier capacity	Model no.	Page							
									Specifications	Dimensions						
100 VAC system 100 to 120 VAC single-phase	100 VAC system 100 to 120 VAC single-phase	Absolute encoder	Sinking type (NPN)	-	-	-	10 A	RS3E01A0AL0	p. 46	p. 48						
							20 A	RS3E02A0AL0	p. 46	p. 48						
							30 A	RS3E03A0AL0	p. 46	p. 48						
					✓ (without delay circuit)	-	-	10 A	RS3E01A0AL2	p. 46	p. 48					
								20 A	RS3E02A0AL2	p. 46	p. 48					
								30 A	RS3E03A0AL2	p. 46	p. 48					
						✓ (without delay circuit)	✓	-	10 A	RS3E01A0ALC	pp. 46, 102	p. 48				
									20 A	RS3E02A0ALC	pp. 46, 102	p. 48				
									30 A	RS3E03A0ALC	pp. 46, 102	p. 48				
				✓	-	-	10 A	RS3E01A0AA0	p. 46	p. 48						
							20 A	RS3E02A0AA0	p. 46	p. 48						
							30 A	RS3E03A0AA0	p. 46	p. 48						
					✓ (without delay circuit)	-	-	10 A	RS3E01A0AA2	p. 46	p. 48					
								20 A	RS3E02A0AA2	p. 46	p. 48					
								30 A	RS3E03A0AA2	p. 46	p. 48					
						✓ (without delay circuit)	✓	-	10 A	RS3E01A0AAC	pp. 46, 102	p. 48				
									20 A	RS3E02A0AAC	pp. 46, 102	p. 48				
									30 A	RS3E03A0AAC	pp. 46, 102	p. 48				
			Sourcing type (PNP)	-	-	-	-	-	-	10 A	RS3E01A0BL0	p. 46	p. 48			
										20 A	RS3E02A0BL0	p. 46	p. 48			
										30 A	RS3E03A0BL0	p. 46	p. 48			
					✓ (without delay circuit)	-	-	-	-	-	-	10 A	RS3E01A0BL2	p. 46	p. 48	
												20 A	RS3E02A0BL2	p. 46	p. 48	
												30 A	RS3E03A0BL2	p. 46	p. 48	
						✓ (without delay circuit)	✓	-	-	-	-	-	10 A	RS3E01A0BLC	pp. 46, 102	p. 48
													20 A	RS3E02A0BLC	pp. 46, 102	p. 48
													30 A	RS3E03A0BLC	pp. 46, 102	p. 48
				✓	-	-	-	-	-	-	10 A	RS3E01A0BA0	p. 46	p. 48		
											20 A	RS3E02A0BA0	p. 46	p. 48		
											30 A	RS3E03A0BA0	p. 46	p. 48		
					✓ (without delay circuit)	-	-	-	-	-	-	10 A	RS3E01A0BA2	p. 46	p. 48	
												20 A	RS3E02A0BA2	p. 46	p. 48	
												30 A	RS3E03A0BA2	p. 46	p. 48	
						✓ (without delay circuit)	✓	-	-	-	-	-	10 A	RS3E01A0BAC	pp. 46, 102	p. 48
													20 A	RS3E02A0BAC	pp. 46, 102	p. 48
													30 A	RS3E03A0BAC	pp. 46, 102	p. 48

Our standard servo amplifiers conform to UL, c-UL, and EN standards as well as KC mark.

The servo amplifiers above are for rotary servo motors. For servo amplifiers for linear servo motors, contact us for details.

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

(2) In addition to (1), SS1 (Safe Stop 1), SS2 (Safe Stop 2), SOS (Safe Operating Stop), SLS (Safely-Limited Speed), SBC (Safe Brake Control), and SSM (Safe Speed Monitor)



# Input voltage 100 VAC

## Servo Amplifier R 3E Model EtherCAT Interface type

Main circuit power supply	Control circuit power supply	Encoder type	General-purpose output	Internal regenerative resistor	Safe Torque Off function <sup>(1)</sup>	Safety <sup>(2)</sup>	Amplifier capacity	Model no.	Page	
									Specifications	Dimensions
100 VAC system 100 to 115 VAC single-phase	100 VAC system 100 to 115 VAC single-phase	Absolute encoder	Photo relay output	-	✓ (with delay circuit)	-	10 A	RS3E01A2HL4	p. 68	p. 69
							20 A	RS3E02A2HL4	p. 68	p. 69
							30 A	RS3E03A2HL4	p. 68	p. 69
							10 A	RS3E01A2HLE	pp. 68, 102	p. 69
							20 A	RS3E02A2HLE	pp. 68, 102	p. 69
							30 A	RS3E03A2HLE	pp. 68, 102	p. 69
				✓	✓ (with delay circuit)	-	10 A	RS3E01A2HA4	p. 68	p. 69
							20 A	RS3E02A2HA4	p. 68	p. 69
							30 A	RS3E03A2HA4	p. 68	p. 69
							10 A	RS3E01A2HAE	pp. 68, 102	p. 69
							20 A	RS3E02A2HAE	pp. 68, 102	p. 69
							30 A	RS3E03A2HAE	pp. 68, 102	p. 69

Our standard servo amplifiers conform to UL, c-UL, and EN standards as well as KC mark.

The servo amplifiers above are for rotary servo motors. For servo amplifiers for linear servo motors, contact us for details.

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

(2) In addition to (1), SS1 (Safe Stop 1), SS2 (Safe Stop 2), SOS (Safe Operating Stop), SLS (Safely-Limited Speed), SBC (Safe Brake Control), and SSM (Safe Speed Monitor)

# Standard Model Number List

For specifications on other models, contact us for details.

Input voltage **100 VAC**

## Servo Amplifier R 3E Model Built-in Positioning Function, Parallel type

Main circuit power supply	Control circuit power supply	Encoder type	General-purpose output	Internal regenerative resistor	Safe Torque Off function <sup>(1)</sup>	Safety <sup>(2)</sup>	Amplifier capacity	Model no.	Page				
									Specifications	Dimensions			
100 VAC system 100 to 120 VAC single-phase	100 VAC system 100 to 120 VAC single-phase	Absolute encoder	Sinking type (NPN) / Sourcing type (PNP)	-	✓ (with delay circuit)	-	10 A	RS3E01A0CL4	p. 86	p. 88			
							20 A	RS3E02A0CL4	p. 86	p. 88			
							30 A	RS3E03A0CL4	p. 86	p. 88			
							10 A	RS3E01A0CLE	pp. 86, 102	p. 88			
							20 A	RS3E02A0CLE	pp. 86, 102	p. 88			
							30 A	RS3E03A0CLE	pp. 86, 102	p. 88			
			✓	✓	-	-	-	-	-	10 A	RS3E01A0CA4	p. 86	p. 88
										20 A	RS3E02A0CA4	p. 86	p. 88
										30 A	RS3E03A0CA4	p. 86	p. 88
										10 A	RS3E01A0CAE	pp. 86, 102	p. 88
										20 A	RS3E02A0CAE	pp. 86, 102	p. 88
										30 A	RS3E03A0CAE	pp. 86, 102	p. 88

## Servo Amplifier R 3E Model Built-in Positioning Function, Serial type

Main circuit power supply	Control circuit power supply	Encoder type	General-purpose output	Internal regenerative resistor	Safe Torque Off function <sup>(1)</sup>	Safety <sup>(2)</sup>	Amplifier capacity	Model no.	Page					
									Specifications	Dimensions				
100 VAC system 100 to 120 VAC single-phase	100 VAC system 100 to 120 VAC single-phase	Absolute encoder	Photo relay output	-	✓ (with delay circuit)	-	10 A	RS3E01A0FL4	p. 86	p. 92				
							20 A	RS3E02A0FL4	p. 86	p. 92				
							30 A	RS3E03A0FL4	p. 86	p. 92				
							10 A	RS3E01A0FLE	pp. 86, 102	p. 92				
							20 A	RS3E02A0FLE	pp. 86, 102	p. 92				
							30 A	RS3E03A0FLE	pp. 86, 102	p. 92				
			✓	✓	-	-	-	-	-	-	10 A	RS3E01A0FA4	p. 86	p. 92
											20 A	RS3E02A0FA4	p. 86	p. 92
											30 A	RS3E03A0FA4	p. 86	p. 92
											10 A	RS3E01A0FAE	pp. 86, 102	p. 92
											20 A	RS3E02A0FAE	pp. 86, 102	p. 92
											30 A	RS3E03A0FAE	pp. 86, 102	p. 92

Our standard servo amplifiers conform to UL, c-UL, and EN standards as well as KC mark.

The servo amplifiers above are for rotary servo motors. For servo amplifiers for linear servo motors, contact us for details.

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

(2) In addition to (1), SS1 (Safe Stop 1), SS2 (Safe Stop 2), SOS (Safe Operating Stop), SLS (Safely-Limited Speed), SBC (Safe Brake Control), and SSM (Safe Speed Monitor)

Input voltage **100 VAC**

## R2 Servo Motor Small Capacity, Medium Inertia

Standard specifications Output shaft: Straight, Oil seal: None, Connection: Cable (no connector)

Motor flange size	Rated output	Protection code	Holding brake (24 VDC)	CE and UL approved	Model no.		Page	
					Battery-less absolute encoder (Model No. HA035)	Single-turn absolute encoder (Model No. PA035S)	Specifications	Dimensions
40 mm sq.	30 W	IP65	–	✓	R2EA04003FXR03M	R2EA04003FXH03M	p. 110	p. 134
			✓	✓	R2EA04003FCR03M	R2EA04003FCH03M	p. 110	p. 134
	50 W	IP65	–	✓	R2EA04005FXR03M	R2EA04005FXH03M	p. 110	p. 134
			✓	✓	R2EA04005FCR03M	R2EA04005FCH03M	p. 110	p. 134
	80 W	IP65	–	✓	R2EA04008FXR03M	R2EA04008FXH03M	p. 110	p. 134
			✓	✓	R2EA04008FCR03M	R2EA04008FCH03M	p. 110	p. 134
60 mm sq.	100 W	IP65	–	✓	R2EA06010FXR03M	R2EA06010FXH03M	p. 111	p. 134
			✓	✓	R2EA06010FCR03M	R2EA06010FCH03M	p. 111	p. 134
	200 W	IP65	–	✓	R2EA06020FXR03M	R2EA06020FXH03M	p. 111	p. 134
			✓	✓	R2EA06020FCR03M	R2EA06020FCH03M	p. 111	p. 134

Note 1: With optional oil seals, motor outputs may be derated to 80 to 95% of the values in the table above.

Note 2: If you would like to use an IP67-rated servo motor, please contact us.

## R1 Servo Motor Small Capacity, Low Inertia

Standard specifications Output shaft: Straight, Oil seal: None, Connection: Cable (no connector)

Motor flange size	Rated output	Protection code	Holding brake (24 VDC)	CE and UL approved	Model no.		Page	
					Battery-less absolute encoder (Model No. HA035)	Single-turn absolute encoder (Model No. PA035S)	Specifications	Dimensions
40 mm sq.	50 W	IP65	–	✓	R1EA04005FXR03M	R1EA04005FXH03M	p. 112	p. 134
			✓	✓	R1EA04005FCR03M	R1EA04005FCH03M	p. 112	p. 134
	100 W	IP65	–	✓	R1EA04010FXR03M	R1EA04010FXH03M	p. 112	p. 134
			✓	✓	R1EA04010FCR03M	R1EA04010FCH03M	p. 112	p. 134
60 mm sq.	200 W	IP65	–	✓	R1EA06020FXR03M	R1EA06020FXH03M	p. 113	p. 134
			✓	✓	R1EA06020FCR03M	R1EA06020FCH03M	p. 113	p. 134

Note 1: With optional oil seals, motor outputs may be derated to 80 to 95% of the values in the table above.

Note 2: If you would like to use an IP67-rated servo motor, please contact us.

# Standard Model Number List

For specifications on other models, contact us for details.

Input voltage **200 VAC**

## Servo Amplifier R 3E Model Analog/Pulse Input type

Main circuit power supply	Control circuit power supply	Encoder type	General-purpose output	Internal regenerative resistor	Safe Torque Off function <sup>(1)</sup>	Safety <sup>(2)</sup>	Amplifier capacity	Model no.	Page	
									Specifications	Dimensions
200 VAC system 200 to 240 VAC 3-phase (Single-phase input can also be used for 50 A or lower models)	200 VAC system 200 to 240 VAC single-phase	Absolute encoder	Sinking type (NPN)	-	-	-	10 A	RS3A01A0AL0	p. 46	p. 48
							20 A	RS3A02A0AL0	p. 46	p. 48
							30 A	RS3A03A0AL0	p. 46	p. 48
							50 A	RS3A05A0AL0	p. 46	p. 49
							75 A	RS3A07A0AL0	p. 46	p. 49
							100 A	RS3A10A0AL0	p. 46	p. 49
							150 A	RS3A15A0AL0	p. 46	p. 49
							300 A	RS3A30A0AL0	p. 46	p. 50
				600 A	RS3W60A0AM0 <sup>(3)</sup>	p. 46	p. 50			
				-	✓ (without delay circuit)	-	10 A	RS3A01A0AL2	p. 46	p. 48
							20 A	RS3A02A0AL2	p. 46	p. 48
							30 A	RS3A03A0AL2	p. 46	p. 48
							50 A	RS3A05A0AL2	p. 46	p. 49
							75 A	RS3A07A0AL2	p. 46	p. 49
							100 A	RS3A10A0AL2	p. 46	p. 49
							150 A	RS3A15A0AL2	p. 46	p. 49
							300 A	RS3A30A0AL2	p. 46	p. 50
				600 A	RS3W60A0AM2 <sup>(3)</sup>	p. 46	p. 50			
				-	✓ (without delay circuit)	✓	10 A	RS3A01A0ALC	pp. 46, 102	p. 48
							20 A	RS3A02A0ALC	pp. 46, 102	p. 48
							30 A	RS3A03A0ALC	pp. 46, 102	p. 48
							50 A	RS3A05A0ALC	pp. 46, 102	p. 49
							75 A	RS3A07A0ALC	pp. 46, 102	p. 49
							100 A	RS3A10A0ALC	pp. 46, 102	p. 49
							150 A	RS3A15A0ALC	pp. 46, 102	p. 49
							300 A	RS3A30A0ALC	pp. 46, 102	p. 50
				600 A	RS3W60A0AMC <sup>(3)</sup>	pp. 46, 102	p. 50			
				✓	-	-	10 A	RS3A01A0AA0	p. 46	p. 48
							20 A	RS3A02A0AA0	p. 46	p. 48
							30 A	RS3A03A0AA0	p. 46	p. 48
							50 A	RS3A05A0AA0	p. 46	p. 49
							75 A	RS3A07A0AA0	p. 46	p. 49
							100 A	RS3A10A0AA0	p. 46	p. 49
				✓	✓ (without delay circuit)	-	10 A	RS3A01A0AA2	p. 46	p. 48
							20 A	RS3A02A0AA2	p. 46	p. 48
							30 A	RS3A03A0AA2	p. 46	p. 48
50 A	RS3A05A0AA2	p. 46	p. 49							
75 A	RS3A07A0AA2	p. 46	p. 49							
100 A	RS3A10A0AA2	p. 46	p. 49							
✓	✓ (without delay circuit)	✓	10 A	RS3A01A0AAC	pp. 46, 102	p. 48				
			20 A	RS3A02A0AAC	pp. 46, 102	p. 48				
			30 A	RS3A03A0AAC	pp. 46, 102	p. 48				
			50 A	RS3A05A0AAC	pp. 46, 102	p. 49				
			75 A	RS3A07A0AAC	pp. 46, 102	p. 49				
			100 A	RS3A10A0AAC	pp. 46, 102	p. 49				
			150 A	RS3A15A0AAC	pp. 46, 102	p. 49				

Our standard servo amplifiers conform to UL, c-UL, and EN standards as well as KC mark.

The servo amplifiers above are for rotary servo motors. For servo amplifiers for linear servo motors, contact us for details.

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

(2) In addition to (1), SS1 (Safe Stop 1), SS2 (Safe Stop 2), SOS (Safe Operating Stop), SLS (Safely-Limited Speed), SBC (Safe Brake Control), and SSM (Safe Speed Monitor)

(3) 600 A servo amplifiers are used as a set with the following power supply units.

## Power Supply Unit for 600 A Servo Amplifier

Used together with 600 A amplifier unit.

Model no.	Page (dimensions)
RS3PAA27000	p. 50

# Input voltage 200 VAC

## Servo Amplifier R 3E Model Analog/Pulse Input type

Main circuit power supply	Control circuit power supply	Encoder type	General-purpose output	Internal regenerative resistor	Safe Torque Off function <sup>(1)</sup>	Safety <sup>(2)</sup>	Amplifier capacity	Model no.	Page	
									Specifications	Dimensions
200 VAC system 200 to 240 VAC 3-phase (Single-phase input can also be used for 50 A or lower models)	200 VAC system 200 to 240 VAC single-phase	Absolute encoder	Sourcing type (PNP)	-	-	-	10 A	RS3A01A0BL0	p. 46	p. 48
							20 A	RS3A02A0BL0	p. 46	p. 48
							30 A	RS3A03A0BL0	p. 46	p. 48
							50 A	RS3A05A0BL0	p. 46	p. 49
							75 A	RS3A07A0BL0	p. 46	p. 49
							100 A	RS3A10A0BL0	p. 46	p. 49
							150 A	RS3A15A0BL0	p. 46	p. 49
							300 A	RS3A30A0BL0	p. 46	p. 50
				600 A	RS3W60A0BM0 <sup>(3)</sup>	p. 46	p. 50			
				-	✓ (without delay circuit)	-	10 A	RS3A01A0BL2	p. 46	p. 48
							20 A	RS3A02A0BL2	p. 46	p. 48
							30 A	RS3A03A0BL2	p. 46	p. 48
							50 A	RS3A05A0BL2	p. 46	p. 49
							75 A	RS3A07A0BL2	p. 46	p. 49
							100 A	RS3A10A0BL2	p. 46	p. 49
							150 A	RS3A15A0BL2	p. 46	p. 49
							300 A	RS3A30A0BL2	p. 46	p. 50
				600 A	RS3W60A0BM2 <sup>(3)</sup>	p. 46	p. 50			
				-	✓ (without delay circuit)	✓	10 A	RS3A01A0BLC	pp. 46, 102	p. 48
							20 A	RS3A02A0BLC	pp. 46, 102	p. 48
							30 A	RS3A03A0BLC	pp. 46, 102	p. 48
							50 A	RS3A05A0BLC	pp. 46, 102	p. 49
							75 A	RS3A07A0BLC	pp. 46, 102	p. 49
							100 A	RS3A10A0BLC	pp. 46, 102	p. 49
							150 A	RS3A15A0BLC	pp. 46, 102	p. 49
							300 A	RS3A30A0BLC	pp. 46, 102	p. 50
				600 A	RS3W60A0BMC <sup>(3)</sup>	pp. 46, 102	p. 50			
				✓	-	-	10 A	RS3A01A0BA0	p. 46	p. 48
							20 A	RS3A02A0BA0	p. 46	p. 48
							30 A	RS3A03A0BA0	p. 46	p. 48
							50 A	RS3A05A0BA0	p. 46	p. 49
							75 A	RS3A07A0BA0	p. 46	p. 49
				✓	✓ (without delay circuit)	-	10 A	RS3A01A0BA2	p. 46	p. 48
							20 A	RS3A02A0BA2	p. 46	p. 48
							30 A	RS3A03A0BA2	p. 46	p. 48
							50 A	RS3A05A0BA2	p. 46	p. 49
							75 A	RS3A07A0BA2	p. 46	p. 49
				✓	✓ (without delay circuit)	✓	10 A	RS3A01A0BAC	pp. 46, 102	p. 48
							20 A	RS3A02A0BAC	pp. 46, 102	p. 48
							30 A	RS3A03A0BAC	pp. 46, 102	p. 48
							50 A	RS3A05A0BAC	pp. 46, 102	p. 49
							75 A	RS3A07A0BAC	pp. 46, 102	p. 49
100 A	RS3A10A0BAC	pp. 46, 102	p. 49							
				150 A	RS3A15A0BAC	pp. 46, 102	p. 49			

Our standard servo amplifiers conform to UL, c-UL, and EN standards as well as KC mark.

The servo amplifiers above are for rotary servo motors. For servo amplifiers for linear servo motors, contact us for details.

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

(2) In addition to (1), SS1 (Safe Stop 1), SS2 (Safe Stop 2), SOS (Safe Operating Stop), SLS (Safely-Limited Speed), SBC (Safe Brake Control), and SSM (Safe Speed Monitor)

(3) 600 A servo amplifiers are used as a set with the following power supply units.

### Power Supply Unit for 600 A Servo Amplifier Used together with 600 A amplifier unit.

Model no.	Page (dimensions)
RS3PAA27000	p. 50

# Standard Model Number List

For specifications on other models, contact us for details.

Input voltage **200 VAC**

## Servo Amplifier R 3E Model EtherCAT Interface type

Main circuit power supply	Control circuit power supply	Encoder type	General-purpose output	Internal regenerative resistor	Safe Torque Off function <sup>(1)</sup>	Safety <sup>(2)</sup>	Amplifier capacity	Model no.	Page	
									Specifications	Dimensions
200 VAC system 200 to 230 VAC 3-phase	200 VAC system 200 to 230 VAC single-phase	Absolute encoder	Photo relay output	-	✓ (with delay circuit)	-	10 A	RS3A01A2HL4	p. 68	p. 69
							20 A	RS3A02A2HL4	p. 68	p. 69
							30 A	RS3A03A2HL4	p. 68	p. 69
							50 A	RS3A05A2HL4	p. 68	p. 70
							75 A	RS3A07A2HL4	p. 68	p. 70
							100 A	RS3A10A2HL4	p. 68	p. 70
							150 A	RS3A15A2HL4	p. 68	p. 71
							300 A	RS3A30A2HL4	p. 68	p. 71
				600 A	RS3W60A2HM4 <sup>(3)</sup>	p. 68	p. 71			
				-	✓ (with delay circuit)	✓	10 A	RS3A01A2HLE	pp. 68, 102	p. 69
							20 A	RS3A02A2HLE	pp. 68, 102	p. 69
							30 A	RS3A03A2HLE	pp. 68, 102	p. 69
							50 A	RS3A05A2HLE	pp. 68, 102	p. 70
							75 A	RS3A07A2HLE	pp. 68, 102	p. 70
							100 A	RS3A10A2HLE	pp. 68, 102	p. 70
							150 A	RS3A15A2HLE	pp. 68, 102	p. 71
							300 A	RS3A30A2HLE	pp. 68, 102	p. 71
				600 A	RS3W60A2HME <sup>(3)</sup>	pp. 68, 102	p. 71			
				✓	✓ (with delay circuit)	-	10 A	RS3A01A2HA4	p. 68	p. 69
							20 A	RS3A02A2HA4	p. 68	p. 69
							30 A	RS3A03A2HA4	p. 68	p. 69
							50 A	RS3A05A2HA4	p. 68	p. 70
							75 A	RS3A07A2HA4	p. 68	p. 70
							100 A	RS3A10A2HA4	p. 68	p. 70
✓	✓ (with delay circuit)	✓	150 A	RS3A15A2HA4	p. 68	p. 71				
			10 A	RS3A01A2HAE	pp. 68, 102	p. 69				
			20 A	RS3A02A2HAE	pp. 68, 102	p. 69				
			30 A	RS3A03A2HAE	pp. 68, 102	p. 69				
			50 A	RS3A05A2HAE	pp. 68, 102	p. 70				
			75 A	RS3A07A2HAE	pp. 68, 102	p. 70				
			100 A	RS3A10A2HAE	pp. 68, 102	p. 70				
150 A	RS3A15A2HAE	pp. 68, 102	p. 71							

Our standard servo amplifiers conform to UL, c-UL, and EN standards as well as KC mark.

The servo amplifiers above are for rotary servo motors. For servo amplifiers for linear servo motors, contact us for details.

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

(2) In addition to (1), SS1 (Safe Stop 1), SS2 (Safe Stop 2), SOS (Safe Operating Stop), SLS (Safely-Limited Speed), SBC (Safe Brake Control), and SSM (Safe Speed Monitor)

(3) 600 A servo amplifiers are used as a set with the following power supply units.

## Power Supply Unit for 600 A Servo Amplifier Used together with 600 A amplifier unit.

Model no.	Page (dimensions)
RS3PAA27000	p. 71



# Input voltage 200 VAC

## Servo Amplifier R 3E Model Built-in Positioning Function, Parallel type

Main circuit power supply	Control circuit power supply	Encoder type	General-purpose output	Internal regenerative resistor	Safe Torque Off function <sup>(1)</sup>	Safety <sup>(2)</sup>	Amplifier capacity	Model no.	Page	
									Specifications	Dimensions
200 VAC system 200 to 240 VAC 3-phase (Single-phase input can also be used for 50 A or lower models)	200 VAC system 200 to 240 VAC single-phase	Absolute encoder	Sinking type (NPN) / Sourcing type (PNP)	-	✓ (with delay circuit)	-	10 A	RS3A01A0CL4	p. 86	p. 88
							20 A	RS3A02A0CL4	p. 86	p. 88
							30 A	RS3A03A0CL4	p. 86	p. 88
							50 A	RS3A05A0CL4	p. 86	p. 89
							75 A	RS3A07A0CL4	p. 86	p. 89
							100 A	RS3A10A0CL4	p. 86	p. 89
							150 A	RS3A15A0CL4	p. 86	p. 90
							300 A	RS3A30A0CL4	p. 86	p. 90
							600 A <sup>(3)</sup>	RS3W60A0CM4	p. 86	p. 91
							10 A	RS3A01A0CLE	pp. 86, 102	p. 88
							20 A	RS3A02A0CLE	pp. 86, 102	p. 88
							30 A	RS3A03A0CLE	pp. 86, 102	p. 88
			50 A	RS3A05A0CLE	pp. 86, 102	p. 89				
			75 A	RS3A07A0CLE	pp. 86, 102	p. 89				
			100 A	RS3A10A0CLE	pp. 86, 102	p. 89				
			150 A	RS3A15A0CLE	pp. 86, 102	p. 90				
			300 A	RS3A30A0CLE	pp. 86, 102	p. 90				
			600 A <sup>(3)</sup>	RS3W60A0CME	pp. 86, 102	p. 91				
			10 A	RS3A01A0CA4	p. 86	p. 88				
			20 A	RS3A02A0CA4	p. 86	p. 88				
			30 A	RS3A03A0CA4	p. 86	p. 88				
			50 A	RS3A05A0CA4	p. 86	p. 89				
			75 A	RS3A07A0CA4	p. 86	p. 89				
			100 A	RS3A10A0CA4	p. 86	p. 89				
150 A	RS3A15A0CA4	p. 86	p. 90							
10 A	RS3A01A0CAE	pp. 86, 102	p. 88							
20 A	RS3A02A0CAE	pp. 86, 102	p. 88							
30 A	RS3A03A0CAE	pp. 86, 102	p. 88							
50 A	RS3A05A0CAE	pp. 86, 102	p. 89							
75 A	RS3A07A0CAE	pp. 86, 102	p. 89							
100 A	RS3A10A0CAE	pp. 86, 102	p. 89							
150 A	RS3A15A0CAE	pp. 86, 102	p. 90							

Our standard servo amplifiers conform to UL, c-UL, and EN standards as well as KC mark.

The servo amplifiers above are for rotary servo motors. For servo amplifiers for linear servo motors, contact us for details.

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

(2) In addition to (1), SS1 (Safe Stop 1), SS2 (Safe Stop 2), SOS (Safe Operating Stop), SLS (Safely-Limited Speed), SBC (Safe Brake Control), and SSM (Safe Speed Monitor)

(3) 600 A servo amplifiers are used as a set with the following power supply units.

### Power Supply Unit for 600 A Servo Amplifier Used together with 600 A amplifier unit.

Model no.	Page (dimensions)
RS3PAA27000	p. 91

# Standard Model Number List

For specifications on other models, contact us for details.

Input voltage **200 VAC**

## Servo Amplifier R 3E Model Built-in Positioning Function, Serial type

Main circuit power supply	Control circuit power supply	Encoder type	General-purpose output	Internal regenerative resistor	Safe Torque Off function <sup>(1)</sup>	Safety <sup>(2)</sup>	Amplifier capacity	Model no.	Page	
									Specifications	Dimensions
200 VAC system 200 to 240 VAC 3-phase (Single-phase input can also be used for 50 A or lower models)	200 VAC system 200 to 240 VAC single-phase	Absolute encoder	Photo relay output	-	✓ (with delay circuit)	-	10 A	RS3A01A0FL4	p. 86	p. 92
							20 A	RS3A02A0FL4	p. 86	p. 92
							30 A	RS3A03A0FL4	p. 86	p. 92
							50 A	RS3A05A0FL4	p. 86	p. 93
							75 A	RS3A07A0FL4	p. 86	p. 93
							100 A	RS3A10A0FL4	p. 86	p. 93
							150 A	RS3A15A0FL4	p. 86	p. 94
							300 A	RS3A30A0FL4	p. 86	p. 94
							600 A <sup>(3)</sup>	RS3W60A0FM4	p. 86	p. 95
							10 A	RS3A01A0FLE	pp. 86, 102	p. 92
							20 A	RS3A02A0FLE	pp. 86, 102	p. 92
							30 A	RS3A03A0FLE	pp. 86, 102	p. 92
				50 A	RS3A05A0FLE	pp. 86, 102	p. 93			
				75 A	RS3A07A0FLE	pp. 86, 102	p. 93			
				100 A	RS3A10A0FLE	pp. 86, 102	p. 93			
				150 A	RS3A15A0FLE	pp. 86, 102	p. 94			
				300 A	RS3A30A0FLE	pp. 86, 102	p. 94			
				600 A <sup>(3)</sup>	RS3W60A0FME	pp. 86, 102	p. 95			
				10 A	RS3A01A0FA4	p. 86	p. 92			
				20 A	RS3A02A0FA4	p. 86	p. 92			
				30 A	RS3A03A0FA4	p. 86	p. 92			
				50 A	RS3A05A0FA4	p. 86	p. 93			
				75 A	RS3A07A0FA4	p. 86	p. 93			
				100 A	RS3A10A0FA4	p. 86	p. 93			
150 A	RS3A15A0FA4	p. 86	p. 94							
10 A	RS3A01A0FAE	pp. 86, 102	p. 92							
20 A	RS3A02A0FAE	pp. 86, 102	p. 92							
30 A	RS3A03A0FAE	pp. 86, 102	p. 92							
50 A	RS3A05A0FAE	pp. 86, 102	p. 93							
75 A	RS3A07A0FAE	pp. 86, 102	p. 93							
100 A	RS3A10A0FAE	pp. 86, 102	p. 93							
150 A	RS3A15A0FAE	pp. 86, 102	p. 94							

Our standard servo amplifiers conform to UL, c-UL, and EN standards as well as KC mark.

The servo amplifiers above are for rotary servo motors. For servo amplifiers for linear servo motors, contact us for details.

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

(2) In addition to (1), SS1 (Safe Stop 1), SS2 (Safe Stop 2), SOS (Safe Operating Stop), SLS (Safely-Limited Speed), SBC (Safe Brake Control), and SSM (Safe Speed Monitor)

(3) 600 A servo amplifiers are used as a set with the following power supply units.

### Power Supply Unit for 600 A Servo Amplifier

Used together with 600 A amplifier unit.

Model no.	Page (dimensions)
RS3PAA27000	p. 95

# Input voltage 200 VAC

## R2 Servo Motor Small Capacity, Medium Inertia

Standard specifications Output shaft: Straight, Oil seal: None, Connection: Cable (no connector)

Motor flange size	Rated output	Protection code	Holding brake (24 VDC)	CE and UL approved	Model no.		Page	
					Battery-less absolute encoder (Model No. HA035)	Single-turn absolute encoder (Model No. PA035S)	Specifications	Dimensions
40 mm sq.	30 W	IP65	–	✓	R2AA04003FXR03M	R2AA04003FXH03M	p. 114	p. 134
			✓	✓	R2AA04003FCR03M	R2AA04003FCH03M	p. 114	p. 134
	50 W	IP65	–	✓	R2AA04005FXR03M	R2AA04005FXH03M	p. 114	p. 134
			✓	✓	R2AA04005FCR03M	R2AA04005FCH03M	p. 114	p. 134
	90 W	IP65	✓	✓	R2AA04010FCR03M6	R2AA04010FCH03M6	p. 114	p. 134
100 W	IP65	–	✓	R2AA04010FXR03M	R2AA04010FXH03M	p. 114	p. 134	
60 mm sq.	100 W	IP65	–	✓	R2AA06010FXR03M	R2AA06010FXH03M	p. 114	p. 134
			✓	✓	R2AA06010FCR03M	R2AA06010FCH03M	p. 114	p. 134
	200 W	IP65	–	✓	R2AA06020FXR03M	R2AA06020FXH03M	p. 115	p. 134
			✓	✓	R2AA06020FCR03M	R2AA06020FCH03M	p. 115	p. 134
80 mm sq.	200 W	IP65	–	✓	R2AA08020FXR03M	R2AA08020FXH03M	p. 115	p. 134
			✓	✓	R2AA08020FCR03M	R2AA08020FCH03M	p. 115	p. 134
60 mm sq.	360 W	IP65	✓	✓	R2AA06040FCR03M6	R2AA06040FCH03M6	p. 115	p. 134
				✓	R2AA06040HCR03M6	R2AA06040HCH03M6	p. 115	p. 134
	400 W	IP65	–	✓	R2AA06040FXR03M	R2AA06040FXH03M	p. 115	p. 134
				✓	R2AA06040HXR03M	R2AA06040HXH03M	p. 115	p. 134
80 mm sq.	400 W	IP65	–	✓	R2AA08040FXR03M	R2AA08040FXH03M	p. 116	p. 134
			✓	✓	R2AA08040FCR03M	R2AA08040FCH03M	p. 116	p. 134
	750 W	IP65	–	✓	R2AA08075FXR03M	R2AA08075FXH03M	p. 116	p. 134
			✓	✓	R2AA08075FCR03M	R2AA08075FCH03M	p. 116	p. 134
86 mm sq.	750 W	IP65	–	✓	R2AAB8075FXR03M	R2AAB8075FXH03M	p. 118	p. 134
			✓	✓	R2AAB8075FCR03M	R2AAB8075FCH03M	p. 118	p. 134
100 mm sq.	750 W	IP65	–	✓	R2AA10075FXR03M	R2AA10075FXH03M	p. 116	p. 134
			✓	✓	R2AA10075FCR03M	R2AA10075FCH03M	p. 116	p. 134
86 mm sq.	1 kW	IP65	–	✓	R2AAB8100FXR03M	R2AAB8100FXH03M	p. 118	p. 134
			✓	✓	R2AAB8100FCR03M	R2AAB8100FCH03M	p. 118	p. 134
		IP65	–	✓	R2AAB8100HXR03M	R2AAB8100HXH03M	p. 116	p. 134
			✓	✓	R2AAB8100HCR03M	R2AAB8100HCH03M	p. 116	p. 134
100 mm sq.	1 kW	IP65	–	✓	R2AA10100FXR03M	R2AA10100FXH03M	p. 118	p. 134
			✓	✓	R2AA10100FCR03M	R2AA10100FCH03M	p. 118	p. 134

Note 1: With optional oil seals, motor outputs may be derated to 80 to 95% of the values in the table above.

Note 2: If you would like to use an IP67-rated servo motor, please contact us.

# Standard Model Number List

For specifications on other models, contact us for details.

Input voltage **200 VAC**

## R2 Servo Motor Medium Capacity, Medium Inertia

Standard specifications Output shaft: With key, Oil seal: Yes, Connection: Cannon plug (550 W to 15 kW), Terminal block (20 kW or higher)

Motor flange size	Rated output	Protection code	Holding brake (24 VDC)	CE and UL approved	Model no.		Page	
					Battery-less absolute encoder (Model No. HA035)	Single-turn absolute encoder (Model No. PA035S)	Specifications	Dimensions
130 mm sq.	550 W	IP65	–	✓	R2AA13050HXR00M	R2AA13050HXH00M	p. 117	p. 137
			✓	✓	R2AA13050HCR00M	R2AA13050HCH00M	p. 117	p. 137
			–	✓	R2AA13050DXR00M	R2AA13050DXH00M	p. 117	p. 137
			✓	✓	R2AA13050DCR00M	R2AA13050DCH00M	p. 117	p. 137
	1.2 kW	IP65	–	✓	R2AA13120BXR00M	R2AA13120BXH00M	p. 117	p. 137
			✓	✓	R2AA13120BCR00M	R2AA13120BCH00M	p. 117	p. 137
			–	✓	R2AA13120LXR00M	R2AA13120LXH00M	p. 119	p. 137
			✓	✓	R2AA13120LCR00M	R2AA13120LCH00M	p. 119	p. 137
100 mm sq.	1.5 kW	IP65	–	✓	R2AA13120DXR00M	R2AA13120DXH00M	p. 119	p. 137
			✓	✓	R2AA13120DCR00M	R2AA13120DCH00M	p. 119	p. 137
			–	✓	R2AA10150HXR00M	R2AA10150HXH00M	p. 118	p. 136
			✓	✓	R2AA10150HCR00M	R2AA10150HCH00M	p. 118	p. 136
130 mm sq.	1.8 kW	IP65	–	✓	R2AA13180HXR00M	R2AA13180HXH00M	p. 119	p. 137
			✓	✓	R2AA13180HCR00M	R2AA13180HCH00M	p. 119	p. 137
			–	✓	R2AA13180DXR00M	R2AA13180DXH00M	p. 120	p. 137
			✓	✓	R2AA13180DCR00M	R2AA13180DCH00M	p. 120	p. 137
	2 kW	IP65	–	✓	R2AA13200LXR00M	R2AA13200LXH00M	p. 119	p. 137
			✓	✓	R2AA13200LCR00M	R2AA13200LCH00M	p. 119	p. 137
			–	✓	R2AA13200DXR00M	R2AA13200DXH00M	p. 120	p. 137
			✓	✓	R2AA13200DCR00M	R2AA13200DCH00M	p. 120	p. 137
180 mm sq.	3.5 kW	IP65	–	✓	R2AA18350LXR00M	R2AA18350LXH00M	p. 120	p. 138
			✓	✓	R2AA18350LCR00M	R2AA18350LCH00M	p. 120	p. 138
			–	✓	R2AA18350DXR00M	R2AA18350DXH00M	p. 121	p. 138
			✓	✓	R2AA18350DCR00M	R2AA18350DCH00M	p. 121	p. 138
	4.5 kW	IP65	–	✓	R2AA18350VXR00M	R2AA18350VXH00M	p. 120	p. 138
			✓	✓	R2AA18350VCR00M	R2AA18350VCH00M	p. 120	p. 138
			–	✓	R2AA18450HXR00M	R2AA18450HXH00M	p. 121	p. 138
			✓	✓	R2AA18450HCR00M	R2AA18450HCH00M	p. 121	p. 138

Note: Optional cable connection models are also available. (Note that cables are not removable.)

# Input voltage 200 VAC

## R2 Servo Motor Medium Capacity, Medium Inertia

Standard specifications Output shaft: With key, Oil seal: Yes, Connection: Cannon plug (550 W to 15 kW), Terminal block (20 kW or higher)

Motor flange size	Rated output	Protection code	Holding brake (24 VDC)	CE and UL approved	Model no.		Page	
					Battery-less absolute encoder (Model No. HA035)	Single-turn absolute encoder (Model No. PA035S)	Specifications	Dimensions
220 mm sq.	5 kW	IP65	–	✓	R2AA22500LXR00M	R2AA22500LXH00M	p. 121	p. 139
			✓	✓	R2AA22500LCR00M	R2AA22500LCH00M	p. 121	p. 139
180 mm sq.	5.5 kW	IP65	–	✓	R2AA18550RXR00M	R2AA18550RXH00M	p. 121	p. 138
			✓	✓	R2AA18550RCR00M	R2AA18550RCH00M	p. 121	p. 138
		IP65	–	✓	R2AA18550HXR00M	R2AA18550HXH00M	p. 122	p. 138
			✓	✓	R2AA18550HCR00M	R2AA18550HCH00M	p. 122	p. 138
220 mm sq.	7 kW	IP65	–	✓	R2AA22700SXR00M	R2AA22700SXH00M	p. 122	p. 139
			✓	✓	R2AA22700SCR00M	R2AA22700SCH00M	p. 122	p. 139
180 mm sq.	7.5 kW	IP65	–	✓	R2AA18750HXR00M	R2AA18750HXH00M	p. 122	p. 138
			✓	✓	R2AA18750HCR00M	R2AA18750HCH00M	p. 122	p. 138
	11 kW	IP65	–	✓	R2AA1811KRXR00M	R2AA1811KRXH00M	p. 122	p. 138
			✓	✓	R2AA1811KRCR00M	R2AA1811KRCH00M	p. 122	p. 138
220 mm sq.	11 kW	IP65	–	✓	R2AA2211KBXR00M	R2AA2211KBXH00M	p. 123	p. 139
			✓	✓	R2AA2211KBCR00M	R2AA2211KBCH00M	p. 123	p. 139
	15 kW	IP65	–	✓	R2AA2215KBXR00M	R2AA2215KBXH00M	p. 123	p. 139
			✓	✓	R2AA2215KBCR00M	R2AA2215KBCH00M	p. 123	p. 139
220 mm sq.	20 kW	IP65*	–	✓	R2AA2220KBXR00M	R2AA2220KBXH00M	p. 123	p. 140
			✓	✓	R2AA2220KBCR00M	R2AA2220KBCH00M	p. 123	p. 140
	30 kW	IP65*	–	✓	R2AA2830KVXR00M	R2AA2830KVXH00M	p. 123	p. 140
			✓	✓	R2AA2830KVCR00M	R2AA2830KVCH00M	p. 123	p. 140

\* Except for cooling fans and terminal boxes

## R1 Servo Motor Small Capacity, Low inertia

Standard specifications Output shaft: Straight, Oil seal: None, Connection: Cable (no connector)

Motor flange size	Rated output	Protection code	Holding brake (24 VDC)	CE and UL approved	Model no.		Page	
					Battery-less absolute encoder (Model No. HA035)	Single-turn absolute encoder (Model No. PA035S)	Specifications	Dimensions
40 mm sq.	50 W	IP65	–	✓	R1AA04005FXR03M	R1AA04005FXH03M	p. 124	p. 134
			✓	✓	R1AA04005FCR03M	R1AA04005FCH03M	p. 124	p. 134
	100 W	IP65	–	✓	R1AA04010FXR03M	R1AA04010FXH03M	p. 124	p. 134
			✓	✓	R1AA04010FCR03M	R1AA04010FCH03M	p. 124	p. 134
60 mm sq.	200 W	IP65	–	✓	R1AA06020FXR03M	R1AA06020FXH03M	p. 124	p. 134
			✓	✓	R1AA06020FCR03M	R1AA06020FCH03M	p. 124	p. 134
	400 W	IP65	–	✓	R1AA06040FXR03M	R1AA06040FXH03M	p. 125	p. 134
			✓	✓	R1AA06040FCR03M	R1AA06040FCH03M	p. 125	p. 134
80 mm sq.	750 W	IP65	–	✓	R1AA08075VXR03M	R1AA08075VXH03M	p. 125	p. 134
			✓	✓	R1AA08075VCR03M	R1AA08075VCH03M	p. 125	p. 134
	750 W	IP65	–	✓	R1AA08075FXR03M	R1AA08075FXH03M	p. 125	p. 134
			✓	✓	R1AA08075FCR03M	R1AA08075FCH03M	p. 125	p. 134

Note 1: With optional oil seals, motor outputs may be derated to 80 to 95% of the values in the table above.

Note 2: If you would like to use an IP67-rated servo motor, please contact us.

# Standard Model Number List

For specifications on other models, contact us for details.

Input voltage **200 VAC**

## R1 Servo Motor Medium Capacity, Low Inertia

Standard specifications Output shaft: With key, Oil seal: Yes, Connection: Cannon plug (15 kW or lower), Terminal block (21 kW)

Motor flange size	Rated output	Protection code	Holding brake (24 VDC)	CE and UL approved	Model no.		Page	
					Battery-less absolute encoder (Model No. HA035)	Single-turn absolute encoder (Model No. PA035S)	Specifications	Dimensions
100 mm sq.	1 kW	IP65	–	✓	R1AA10100FXR00M	R1AA10100FXH00M	p. 126	p. 141
			✓	✓	R1AA10100FCR00M	R1AA10100FCH00M	p. 126	p. 141
			–	✓	R1AA10100HXR00M	R1AA10100HXH00M	p. 127	p. 141
			✓	✓	R1AA10100HCR00M	R1AA10100HCH00M	p. 127	p. 141
	1.5 kW	IP65	–	✓	R1AA10150FXR00M	R1AA10150FXH00M	p. 126	p. 141
			✓	✓	R1AA10150FCR00M	R1AA10150FCH00M	p. 126	p. 141
			–	✓	R1AA10150HXR00M	R1AA10150HXH00M	p. 127	p. 141
			✓	✓	R1AA10150HCR00M	R1AA10150HCH00M	p. 127	p. 141
	2 kW	IP65	–	✓	R1AA10200FXR00M	R1AA10200FXH00M	p. 126	p. 141
			✓	✓	R1AA10200FCR00M	R1AA10200FCH00M	p. 126	p. 141
			–	✓	R1AA10200HXR00M	R1AA10200HXH00M	p. 127	p. 141
			✓	✓	R1AA10200HCR00M	R1AA10200HCH00M	p. 127	p. 141
2.5 kW	IP65	–	✓	R1AA10250FXR00M	R1AA10250FXH00M	p. 126	p. 141	
		✓	✓	R1AA10250FCR00M	R1AA10250FCH00M	p. 126	p. 141	
		–	✓	R1AA10250HXR00M	R1AA10250HXH00M	p. 127	p. 141	
		✓	✓	R1AA10250HCR00M	R1AA10250HCH00M	p. 127	p. 141	
130 mm sq.	3 kW	IP65	–	✓	R1AA13300FXR00M	R1AA13300FXH00M	p. 128	p. 141
			✓	✓	R1AA13300FCR00M	R1AA13300FCH00M	p. 128	p. 141
			–	✓	R1AA13300HXR00M	R1AA13300HXH00M	p. 129	p. 141
			✓	✓	R1AA13300HCR00M	R1AA13300HCH00M	p. 129	p. 141
	4 kW	IP65	–	✓	R1AA13400FXR00M	R1AA13400FXH00M	p. 128	p. 141
			✓	✓	R1AA13400FCR00M	R1AA13400FCH00M	p. 128	p. 141
			–	✓	R1AA13400HXR00M	R1AA13400HXH00M	p. 129	p. 141
			✓	✓	R1AA13400HCR00M	R1AA13400HCH00M	p. 129	p. 141
	5 kW	IP65	–	✓	R1AA13500FXR00M	R1AA13500FXH00M	p. 128	p. 141
			✓	✓	R1AA13500FCR00M	R1AA13500FCH00M	p. 128	p. 141
			–	✓	R1AA13500HXR00M	R1AA13500HXH00M	p. 129	p. 141
			✓	✓	R1AA13500HCR00M	R1AA13500HCH00M	p. 129	p. 141
180 mm sq.	5.5 kW	IP65 <sup>(1)</sup>	–	✓	R1AA18550HXR00M	R1AA18550HXH00M	p. 130	p. 142
			✓	✓	R1AA18550HCR00M	R1AA18550HCH00M	p. 130	p. 142
	7.5 kW	IP65 <sup>(1)</sup>	–	✓	R1AA18750LXR00M	R1AA18750LXH00M	p. 130	p. 142
			✓	✓	R1AA18750LCR00M	R1AA18750LCH00M	p. 130	p. 142
	11 kW	IP65 <sup>(1)</sup>	–	✓	R1AA1811KRXR00M	R1AA1811KRXH00M	p. 131	p. 142
			✓	✓	R1AA1811KRCR00M	R1AA1811KRCH00M	p. 131	p. 142
15 kW	IP65 <sup>(1)</sup>	–	✓	R1AA1815KBXR00M	R1AA1815KBXH00M	p. 131	p. 142	
		✓	✓	R1AA1815KBCR00M	R1AA1815KBCH00M	p. 131	p. 142	
220 mm sq.	21 kW	IP65 <sup>(2)</sup>	–	✓	R1AA2220KVXR00M	R1AA2220KVXH00M	p. 131	p. 142

(1) Except for cooling fans

(2) Except for cooling fans and terminal boxes



# Input voltage 200 VAC

## R5 Servo Motor Small Capacity, Medium Inertia

Standard specifications Output shaft: Straight, Oil seal: None, Connection: Cable (no connector)

Motor flange size	Rated output	Protection code	Holding brake (24 VDC)	CE and UL approved	Model no.		Page	
					Battery-less absolute encoder (Model No. HA035)	Single-turn absolute encoder (Model No. PA035S)	Specifications	Dimensions
60 mm sq.	200 W	IP65	–	✓	R5AA06020HXR03M	R5AA06020HXH03M	p. 132	p. 134
			✓	✓	R5AA06020HCR03M	R5AA06020HCH03M	p. 132	p. 134
			–	✓	R5AA06020FXR03M	R5AA06020FXH03M	p. 133	p. 134
			✓	✓	R5AA06020FCR03M	R5AA06020FCH03M	p. 133	p. 134
	380 W	IP65	✓	✓	R5AA06040HCR03M	R5AA06040HCH03M	p. 132	p. 134
			–	✓	R5AA06040HXR03M	R5AA06040HXH03M	p. 132	p. 134
	400 W	IP65	–	✓	R5AA06040FXR03M	R5AA06040FXH03M	p. 133	p. 134
			✓	✓	R5AA06040FCR03M	R5AA06040FCH03M	p. 133	p. 134
–			✓	R5AA08075FCR03M	R5AA08075FCH03M	p. 133	p. 134	
80 mm sq.	675 W	IP65	✓	✓	R5AA08075DCR03M	R5AA08075DCH03M	p. 132	p. 134
	710 W	IP65	–	✓	R5AA08075DXR03M	R5AA08075DXH03M	p. 132	p. 134
	750 W	IP65	–	✓	R5AA08075FXR03M	R5AA08075FXH03M	p. 133	p. 134
			–	✓	R5AA08075FXR03M	R5AA08075FXH03M	p. 133	p. 134

Note 1: With optional oil seals, motor outputs may be derated to 80 to 95% of the values in the table above.

Note 2: If you would like to use an IP67-rated servo motor, please contact us.

# Standard Model Number List

For specifications on other models, contact us for details.

## Servo Amplifier R 3E Model Option

Model no.	Category	Remarks	page
AL-00385594	Connector to connect servo amplifier	Single item, CN1	pp. 146 to 149 pp. 154 to 157
AL-00842383	Connector to connect servo amplifier	Single item, CN2	pp. 150 to 153 pp. 158 to 161
AL-00849548-02	Connector to connect servo amplifier	Single item, CN4	pp. 146 to 149 pp. 150 to 161
AL-00718252-01	Connector to connect servo amplifier	Single item, CN4	pp. 146 to 161
AL-Y0011185-01	Connector to connect servo amplifier	Single item, CN8	pp. 149, 153 pp. 157, 161
AL-00608710	Connector to connect servo amplifier	Single item, CN9	pp. 149, 153 pp. 157, 161
AL-00686902-01	Connector to connect servo amplifier	Single item, CNA	pp. 146, 150 pp. 154, 156 pp. 158
AL-Y0011766-01	Connector to connect servo amplifier	Single item, CNA	pp. 147, 151 pp. 155, 159
AL-Y0004079-01	Connector to connect servo amplifier	Single item, CNB	pp. 146, 149 pp. 150, 153 pp. 154, 157 pp. 158, 161
AL-Y0011768-01	Connector to connect servo amplifier	Single item, CNB	pp. 147, 151 pp. 155, 159
AL-Y0005159-01	Connector to connect servo amplifier	Single item, CNA/CNC	pp. 147 to 149 pp. 151 to 153 pp. 155 to 157 pp. 159 to 161
AL-00632607	Connector to connect servo amplifier	Single item, EN1/EN2	pp. 146 to 149
AL-Y0012504-01	Connector to connect servo amplifier	Single item, EN1/EN2	pp. 150 to 161
AL-00696037	Connector to connect servo amplifier	Connector set	p. 146
AL-00723282	Connector to connect servo amplifier	Connector set	p. 146
AL-00723284	Connector to connect servo amplifier	Connector set	p. 146
AL-00723286	Connector to connect servo amplifier	Connector set	p. 146
AL-00723288	Connector to connect servo amplifier	Connector set	p. 146
AL-00723290	Connector to connect servo amplifier	Connector set	pp. 146 to 149
AL-00723155	Connector to connect servo amplifier	Connector set	pp. 146, 154
AL-00723156	Connector to connect servo amplifier	Connector set	pp. 146, 154
AL-00723157	Connector to connect servo amplifier	Connector set	pp. 146, 154
AL-00723158	Connector to connect servo amplifier	Connector set	pp. 146, 154
AL-00723159	Connector to connect servo amplifier	Connector set	pp. 146 to 149 pp. 154 to 157
AL-00946084	Connector to connect servo amplifier	Connector set	p. 147
AL-00946086	Connector to connect servo amplifier	Connector set	p. 147
AL-00946088	Connector to connect servo amplifier	Connector set	p. 147
AL-00946090	Connector to connect servo amplifier	Connector set	p. 147
AL-00946092	Connector to connect servo amplifier	Connector set	p. 147
AL-00946094	Connector to connect servo amplifier	Connector set	p. 147
AL-00946096	Connector to connect servo amplifier	Connector set	pp. 147, 155
AL-00946098	Connector to connect servo amplifier	Connector set	pp. 147, 155
AL-00946100	Connector to connect servo amplifier	Connector set	pp. 147, 155
AL-00946102	Connector to connect servo amplifier	Connector set	pp. 147, 155
AL-00751448	Connector to connect servo amplifier	Connector set	p. 148
AL-00751450	Connector to connect servo amplifier	Connector set	p. 148
AL-00751452	Connector to connect servo amplifier	Connector set	pp. 148, 156
AL-00751454	Connector to connect servo amplifier	Connector set	pp. 148, 156
AL-00892848	Connector to connect servo amplifier	Connector set	p. 149
AL-00892850	Connector to connect servo amplifier	Connector set	p. 149
AL-00892854	Connector to connect servo amplifier	Connector set	p. 149
AL-00892856	Connector to connect servo amplifier	Connector set	pp. 149, 157
AL-00892858	Connector to connect servo amplifier	Connector set	pp. 149, 157
AL-00977724	Connector to connect servo amplifier	Connector set	pp. 150, 158
AL-00977726	Connector to connect servo amplifier	Connector set	pp. 150, 158
AL-00977728	Connector to connect servo amplifier	Connector set	pp. 150, 158
AL-00977730	Connector to connect servo amplifier	Connector set	pp. 150, 158
AL-00977732	Connector to connect servo amplifier	Connector set	pp. 150 to 153 pp. 158 to 161
AL-00977734	Connector to connect servo amplifier	Connector set	pp. 151, 159
AL-00977736	Connector to connect servo amplifier	Connector set	pp. 151, 159
AL-00977738	Connector to connect servo amplifier	Connector set	pp. 151, 159
AL-00977740	Connector to connect servo amplifier	Connector set	pp. 151, 159
AL-00977742	Connector to connect servo amplifier	Connector set	pp. 152, 160
AL-00977744	Connector to connect servo amplifier	Connector set	pp. 152, 160
AL-00977746	Connector to connect servo amplifier	Connector set	pp. 153, 161
AL-00977748	Connector to connect servo amplifier	Connector set	pp. 153, 161
AL-Y0012189-01	Connector to connect servo amplifier	Single item, SF-CN1/ SF-CN2*	pp. 146 to 161

\* Note that this is not a set of two connectors, but a single connector.

Model no.	Category	Remarks	page
AL-00896515-01	USB communication cable for setup software	1.0 m	p. 166
AL-00896515-02	USB communication cable for setup software	2.0 m	p. 166
AL-00911582-01	Communication cable between amplifiers for tandem operation	0.2 m	p. 166
AL-00911582-02	Communication cable between amplifiers for tandem operation	3.0 m	p. 166
AL-01101867-01	Controller-amplifier communication cable	1 m	p. 166
AL-01101867-03	Controller-amplifier communication cable	3 m	p. 166
AL-01101867-05	Controller-amplifier communication cable	5 m	p. 166
AL-01101867-07	Controller-amplifier communication cable	7 m	p. 166
AL-01101867-10	Controller-amplifier communication cable	10 m	p. 166
AL-01101866-01	Amplifier-amplifier Modbus communication cable	0.2 m	p. 166
AL-01101866-02	Amplifier-amplifier Modbus communication cable	0.5 m	p. 166
AL-01101866-03	Amplifier-amplifier Modbus communication cable	1 m	p. 166
AL-01101866-04	Amplifier-amplifier Modbus communication cable	3 m	p. 166
AL-01101866-05	Amplifier-amplifier Modbus communication cable	5 m	p. 166
AL-01101866-06	Amplifier-amplifier Modbus communication cable	7 m	p. 166
AL-01101866-07	Amplifier-amplifier Modbus communication cable	10 m	p. 166
AL-01101864	Terminating connector	For short-circuiting terminating resistor	p. 166
AL-00918125-01	Connection copper bar between units	600 A	p. 166
AL-00917284	Connection cable between units	600 A	p. 166
Q-MON-3	Analog monitor box		p. 167
AL-00690525-01	Analog monitor dedicated cable		p. 167
REGIST-080W50B	External regenerative resistor	80 W	p. 167
REGIST-080W100B	External regenerative resistor	80 W	p. 167
REGIST-120W50B	External regenerative resistor	120 W	p. 167
REGIST-120W100B	External regenerative resistor	120 W	p. 167
REGIST-220W20B	External regenerative resistor	220 W	p. 167
REGIST-220W50B	External regenerative resistor	220 W	p. 167
REGIST-220W100B	External regenerative resistor	220 W	p. 167
REGIST-500CW7B	External regenerative resistor	500 W	p. 167
REGIST-500CW10B	External regenerative resistor	500 W	p. 167
REGIST-500CW14B	External regenerative resistor	500 W	p. 167
REGIST-500CW20B	External regenerative resistor	500 W	p. 167
AL-00880390-01	Front mounting brackets	10 to 30 A	p. 168
AL-00880391-01	Front mounting brackets	50 A	p. 168
AL-00907039-01	Front mounting brackets	100 A, 150 A	p. 168
AL-00907040-01	Front mounting brackets	300 A	p. 168

Note: For connectors to connect motors, refer to pp. 162 to 163. For servo motor extension cables and for servo motors with extension cable connectors, refer to p. 170.

### Servo motor extension cable

Model no.	Category	Remarks	page
RS-CM4-01-R	For power connection	1 m	p. 170
RS-CM4-02-R	For power connection	2 m	p. 170
RS-CM4-03-R	For power connection	3 m	p. 170
RS-CM4-05-R	For power connection	5 m	p. 170
RS-CM4-10-R	For power connection	10 m	p. 170
RS-CB3-01-R	For brake connection	1 m	p. 170
RS-CB3-02-R	For brake connection	2 m	p. 170
RS-CB3-03-R	For brake connection	3 m	p. 170
RS-CB3-05-R	For brake connection	5 m	p. 170
RS-CB3-10-R	For brake connection	10 m	p. 170
RS-CA4-01-R	For encoder connection (For the analog/pulse type)	1 m	p. 170
RS-CA4-02-R	For encoder connection (For the analog/pulse type)	2 m	p. 170
RS-CA4-03-R	For encoder connection (For the analog/pulse type)	3 m	p. 170
RS-CA4-05-R	For encoder connection (For the analog/pulse type)	5 m	p. 170
RS-CA4-10-R	For encoder connection (For the analog/pulse type)	10 m	p. 170
RS-CA7-01-R	For encoder connection (For absolute encoder with EtherCAT or built-in positioning function type)	1 m	p. 170
RS-CA7-02-R	For encoder connection (For absolute encoder with EtherCAT or built-in positioning function type)	2 m	p. 170
RS-CA7-03-R	For encoder connection (For absolute encoder with EtherCAT or built-in positioning function type)	3 m	p. 170
RS-CA7-05-R	For encoder connection (For absolute encoder with EtherCAT or built-in positioning function type)	5 m	p. 170
RS-CA7-10-R	For encoder connection (For absolute encoder with EtherCAT or built-in positioning function type)	10 m	p. 170
RS-CA8-01-R	For encoder connection (For incremental encoder with EtherCAT or built-in positioning function type)	1 m	p. 170
RS-CA8-02-R	For encoder connection (For incremental encoder with EtherCAT or built-in positioning function type)	2 m	p. 170
RS-CA8-03-R	For encoder connection (For incremental encoder with EtherCAT or built-in positioning function type)	3 m	p. 170
RS-CA8-05-R	For encoder connection (For incremental encoder with EtherCAT or built-in positioning function type)	5 m	p. 170
RS-CA8-10-R	For encoder connection (For incremental encoder with EtherCAT or built-in positioning function type)	10 m	p. 170

### Servo motor with extension cable connectors

Model no.	Category	Remarks	page
R2AA04003FXRA0M	30 W	40 mm sq.	p. 170
R2AA04003FCRA0M	30 W	40 mm sq.	p. 170
R2AA04005FXRA0M	50 W	40 mm sq.	p. 170
R2AA04005FCRA0M	50 W	40 mm sq.	p. 170
R2AA04010FCRA0M6	90 W	40 mm sq.	p. 170
R2AA04010FXRA0M	100 W	40 mm sq.	p. 170
R2AA06010FXRA0M	100 W	60 mm sq.	p. 170
R2AA06010FCRA0M	100 W	60 mm sq.	p. 170
R2AA06020FXRA0M	200 W	60 mm sq.	p. 170
R2AA06020FCRA0M	200 W	60 mm sq.	p. 170
R2AA06040FCRA0M6	360 W	60 mm sq.	p. 170
R2AA06040FXRA0M	400 W	60 mm sq.	p. 170
R2AA08075FXRA0M	750 W	80 mm sq.	p. 170
R2AA08075FCRA0M	750 W	80 mm sq.	p. 170

Note: For connectors to connect motors, refer to pp. 162 to 163. For servo motor extension cables and for servo motors with extension cable connectors, refer to p. 170.

## Set Models

Input voltage **200 VAC**

· We offer 30 to 750 W AC servo motors and servo amplifiers in sets with peripheral cables and connectors.

### Set contents



**Servo motor  
Servo amplifier  
Connectors**



### Cable (option)

• **Servo motor extension cable (1, 2, 3, 5, and 10 m)**

\* Select the cable length

• **USB communication cable (1 and 2 m)**

\* Select the cable length

### Servo motor specifications: Cable with relay connector

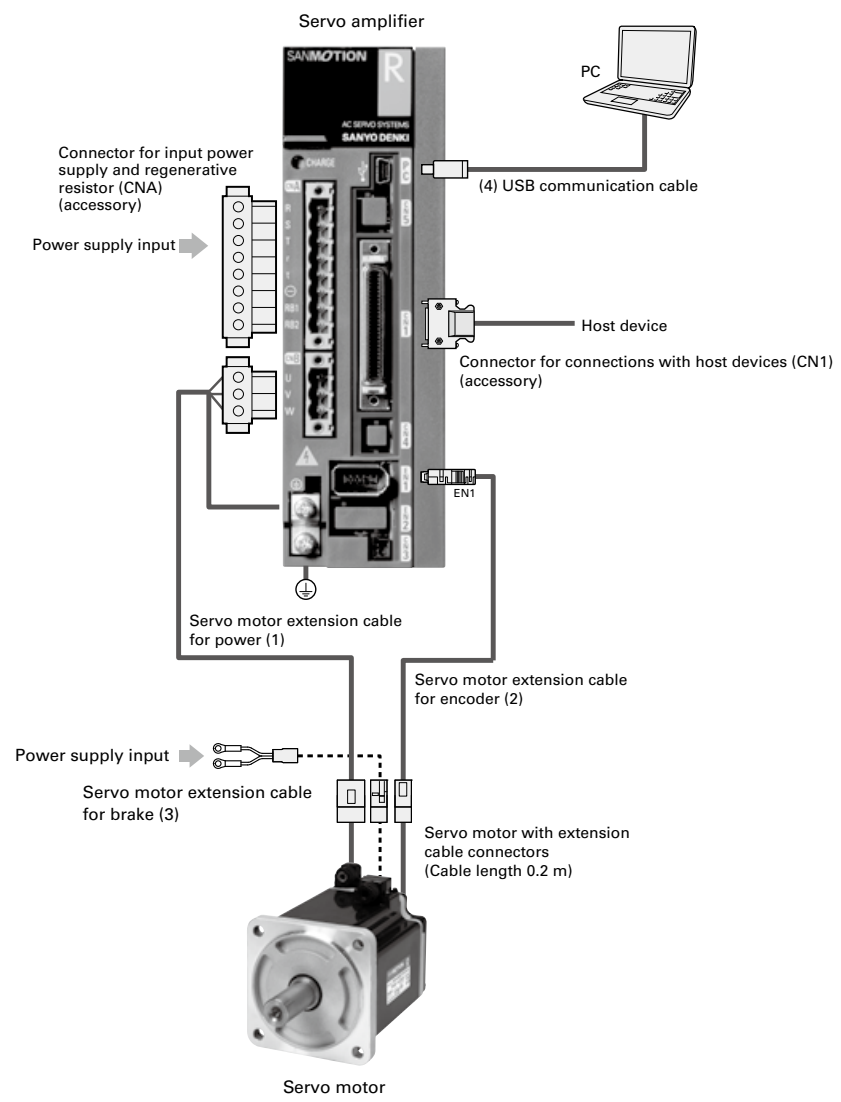
Protection code: IP67, CE/UL approval, encoder classification: battery-backup absolute encoder (Model No. HA035), output shaft: straight, oil seal: none

### Servo amplifier specifications Main circuit power supply: 3-Phase 200 to 240 VAC, Interface: Analog/Pulse input type, general-purpose output: sink (NPN), built-in regenerative resistor, Safe Torque Off function: none

Motor flange size	Rated output	Holding brake (24 VDC)	Order number for set models	Motor model no.	Set components					
					Page		Amplifier model no.	Page		Connector
					Specifications	Dimensions		Specifications	Dimensions	
40 mm sq.	30 W	No	SR403XR01M	R2AA04003FXRA0M	p. 114	p. 134	RS3A01A0AA0	p. 46	p. 48	Connector for controller connection (CN1)
		Yes	SR403CR01M	R2AA04003FCRA0M	p. 114	p. 134				
	50 W	No	SR405XR01M	R2AA04005FXRA0M	p. 114	p. 134				
		Yes	SR405CR01M	R2AA04005FCRA0M	p. 114	p. 134				
	90 W	Yes	SR410CR01M	R2AA04010FCRA0M6	p. 114	p. 134				
	100 W	No	SR410XR01M	R2AA04010FXRA0M	p. 114	p. 134				
60 mm sq.	100 W	No	SR610XR01M	R2AA06010FXRA0M	p. 114	p. 134	RS3A02A0AA0	p. 46	p. 48	Connector for input power supply and regenerative resistor connections (CNA)
		Yes	SR610CR01M	R2AA06010FCRA0M	p. 114	p. 134				
	200 W	No	SR620XR02M	R2AA06020FXRA0M	p. 115	p. 134				
		Yes	SR620CR02M	R2AA06020FCRA0M	p. 115	p. 134				
	360 W	Yes	SR640CR02M	R2AA06040FCRA0M6	p. 115	p. 134				
	400 W	No	SR640XR02M	R2AA06040FXRA0M	p. 115	p. 134				
80 mm sq.	750 W	No	SR875XR03M	R2AA08075FXRA0M	p. 116	p. 134	RS3A03A0AA0	p. 46	p. 48	
		Yes	SR875CR03M	R2AA08075FCRA0M	p. 116	p. 134				

**Options (sold separately)** These items will be shipped altogether with the purchased set model.

Type	Cable length (m)	Model no.	Page	
Servo motor extension cable (Servo motor ↔ Servo amplifier)	(1) For power connection	1	RS-CM4-01-R	p. 170
		2	RS-CM4-02-R	p. 170
		3	RS-CM4-03-R	p. 170
		5	RS-CM4-05-R	p. 170
		10	RS-CM4-10-R	p. 170
	(2) For encoder connection	1	RS-CA4-01-R	p. 170
		2	RS-CA4-02-R	p. 170
		3	RS-CA4-03-R	p. 170
		5	RS-CA4-05-R	p. 170
		10	RS-CA4-10-R	p. 170
	(3) For brake connection	1	RS-CB3-01-R	p. 170
		2	RS-CB3-02-R	p. 170
		3	RS-CB3-03-R	p. 170
		5	RS-CB3-05-R	p. 170
		10	RS-CB3-10-R	p. 170
(4) USB communication cable (PC communication cable for setup software)	1	AL-00896515-01	p. 166	
	2	AL-00896515-02	p. 166	





# Servo Amplifiers

## R 3E Model Analog/Pulse Input type

Servo Amplifier Capacity: 10 to 600 A

More evolved AC servo amplifiers that provide improved basic performance such as high responsiveness, and are more eco-efficient and easier to use.

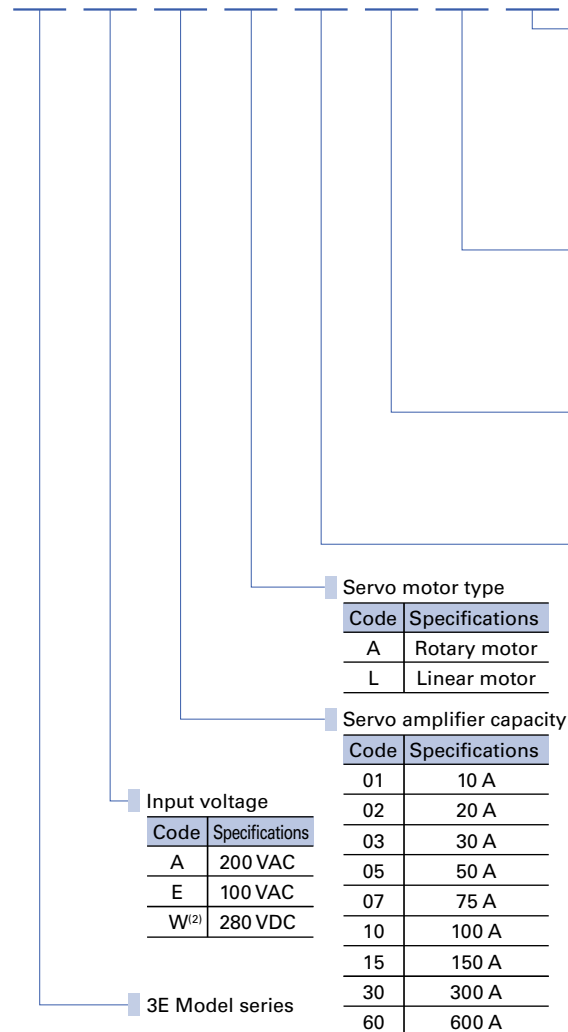


### How to read model numbers

Note that not all the possible combinations of the numbers and characters below are valid. Also, some of the numbers/characters listed below are for optional models. For model numbers valid as standard products, refer to "Standard Model Number List".

#### Servo amplifier

**RS3 A 01 A 0 A A 0**



#### Option 2

Code	Speed/torque command input circuit	Safe Torque Off function	Safety
0	Available	None	None
2	Available	Available (without delay circuit)	None
4	Available	Available (with delay circuit)	None
C	Available	Available (without delay circuit)	Available <sup>(1)</sup>
E	Available	Available (with delay circuit)	Available <sup>(1)</sup>

#### Option 1

Code	Amplifier capacity	Specifications
A	100 to 150 A	With built-in regenerative resistor & With DB resistor
L	10 to 300 A	Without built-in regenerative resistor & With DB resistor
M	600 A	Without built-in regenerative resistor & Without DB resistor

#### Interface type

Code	Specifications
A	Analog/pulse, sinking type (NPN) general-purpose output
B	Analog/pulse, sourcing type (PNP) general-purpose output

#### Encoder connection type (Rotary motor)

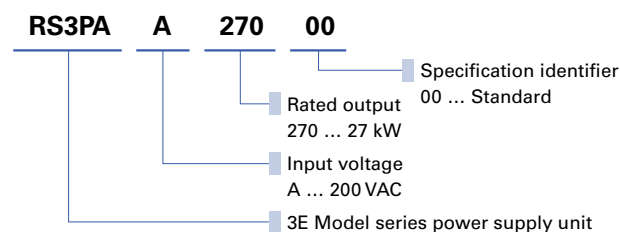
Code	EN1 (motor encoder)	EN2 (Motor encoder or external encoder)
0	Absolute encoder	—
2	Absolute encoder	Incremental encoder for motor / External incremental encoder for fully closed-loop systems
8	Incremental encoder	—
A	Incremental encoder	External incremental encoder for fully closed-loop systems

#### Encoder connection type (Linear motor)

Code	EN1 (Linear encoder)	EN2 (Hall sensor)
A	Incremental encoder	Line driver
B	Incremental encoder	Open collector

- (1) Linear servo motors are not compatible with the Safety expansion.  
 (2) 600 A only. The power supply unit used together has 200 VAC input.

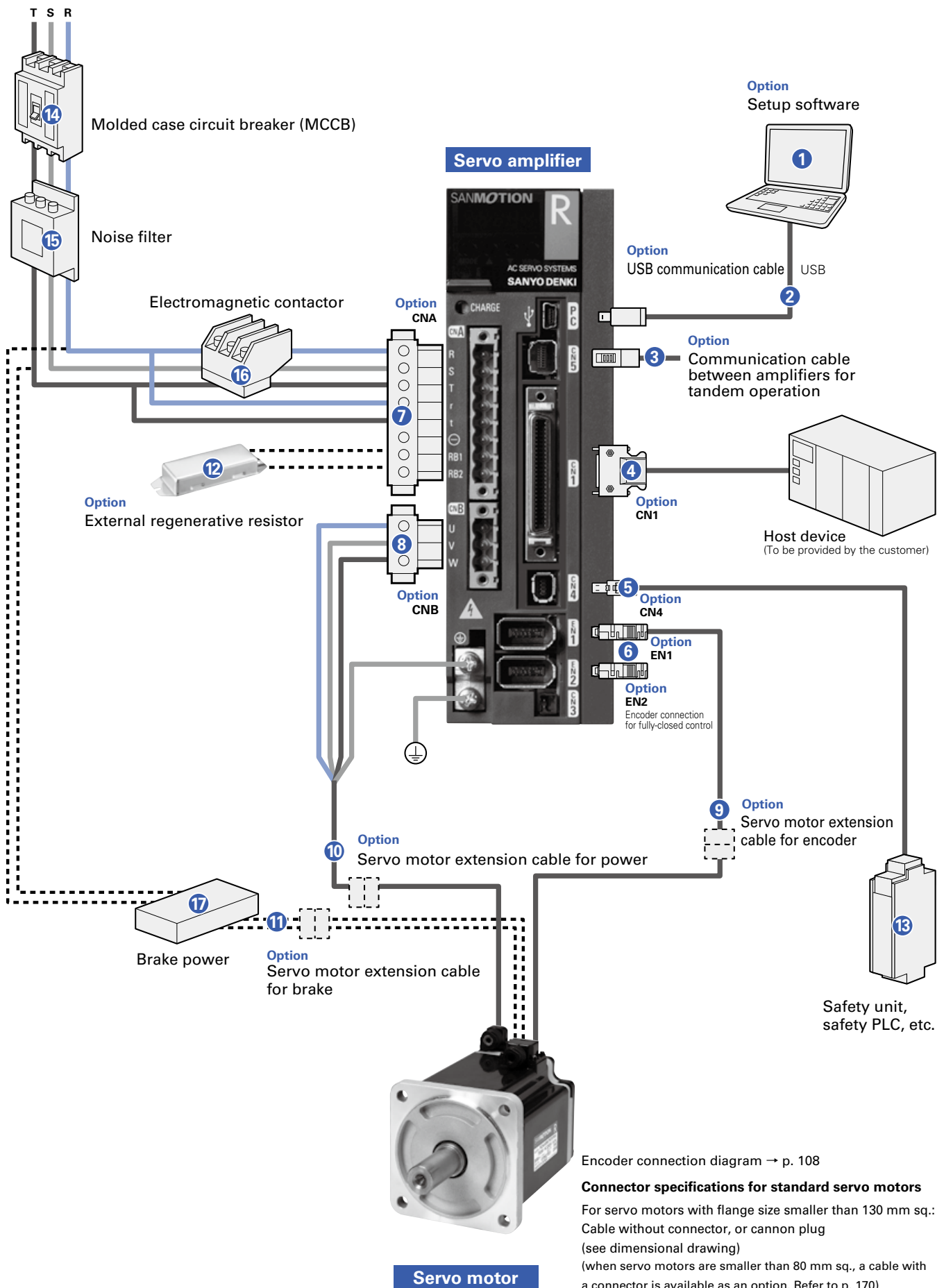
#### Power supply unit for 600 A





# System Configuration

**10 to 50 A** The photograph shows the 30 A model.



## Options and Peripherals (10 to 50 A)

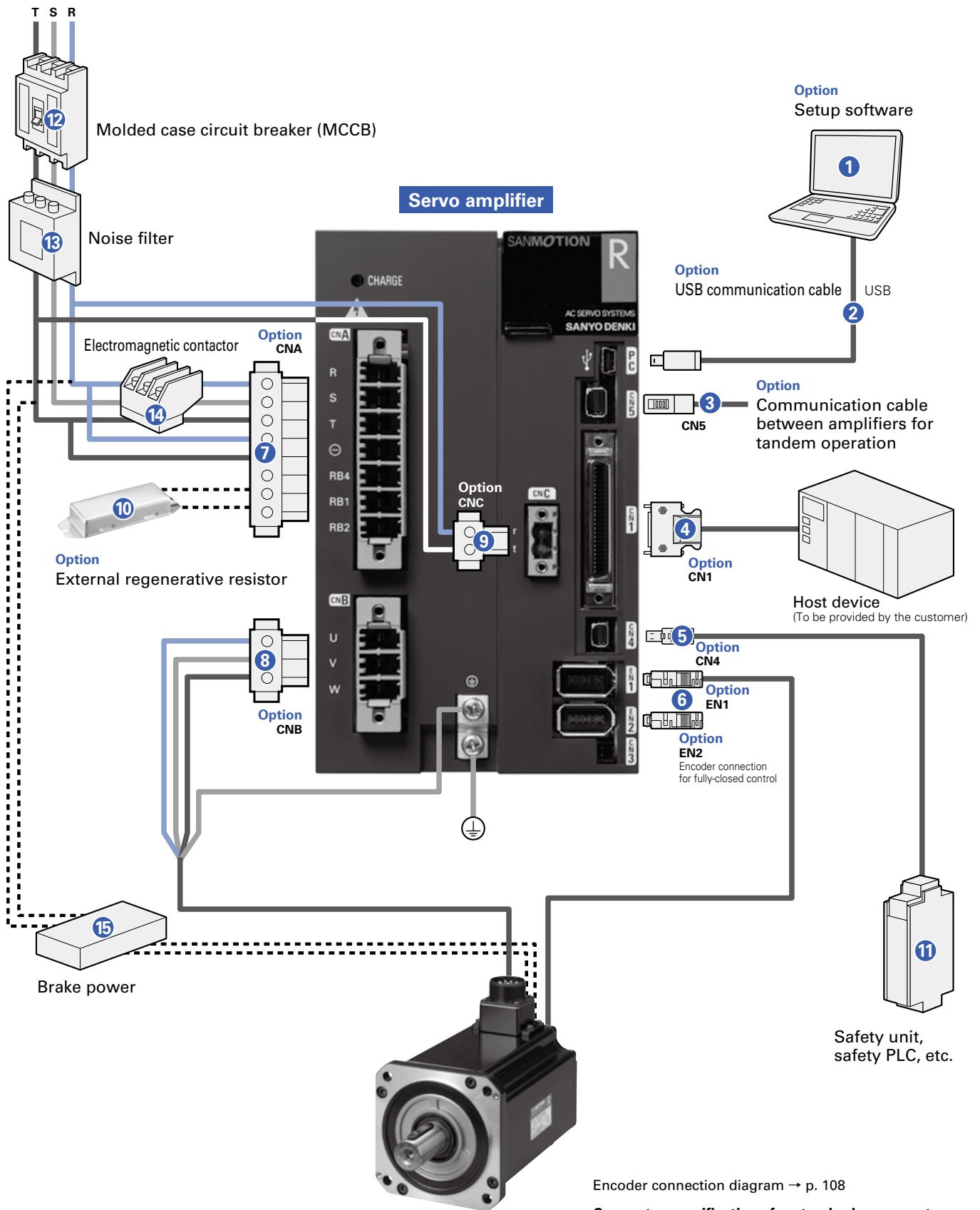
No.	Name	Model no.	Description	Page
1	Setup software	Can be downloaded from Product Information on our website.	Parameters can be set and monitored via communication with a PC.	p. 144
2	USB communication cable	AL-00896515-0□	PC communication cable for setup software	p. 166
3	Communication cable between amplifiers for tandem operation	AL-00911582-0□	Connects between amplifiers for tandem operation (CN5 ⇔ CN5) Consult us if using the tandem operation function.	p. 166
4	CN1 connector	AL-00385594	For controller connection	p. 146
5	CN4 connector	AL-00849548-02 (for short-circuiting), AL-00718252-01 (for wiring)	For safety device connection When CN4 is not used, be sure to buy and insert the optional short-circuiting connector to CN4 on the servo amplifier. (For STO models only)	p. 146
6	EN1 connector	AL-00632607	For encoder connection	p. 146
	EN2 connector	AL-00632607	For encoder connection	p. 146
7	CNA connector	AL-00686902-01	For input power supply and regenerative resistor connections Servo amplifiers with a built-in regenerative resistor come with a CNA connector.	p. 146
8	CNB connector	AL-Y0004079-01	For servo motor connection	p. 146
9	Servo motor extension cable (Compatible with the optional servo motors with connectors for extension cables)	RS-CA4-□□-R	Encoder extension cable with connectors on both ends	p. 170
10		RS-CM4-□□-R	Power extension cable with connectors on both ends	p. 170
11		RS-CB3-□□-R	Brake extension cable with connectors on both ends	p. 170
12	External regenerative resistor	REGIST-□□□W□…□B REGIST-500CW□…□B	Used for special operations, such as high frequency applications that require greater power dissipation than that provided by the servo amplifier's built-in regenerative resistor	p. 167
13	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 the safety unit and safety PLC.	—
14	Molded case circuit breaker (MCCB)	To be provided by the customer	Used to protect the power line.	—
15	Noise filter	To be provided by the customer	Used to prevent external noise from the power source line.	—
16	Electromagnetic contactor	To be provided by the customer	Used to switch the power on and off.	—
17	Brake power	To be provided by the customer	Used for servo motors with brake	—

Note 1: Connector sets are also available. See respective pages.

Note 2: For the accessories and options for the Safety module, see page 102.

# System Configuration

75 A



Encoder connection diagram → p. 108

**Connector specifications for standard servo motors**  
 For servo motors with flange size larger than 100 mm sq.:  
 Cannon plug (when the motor capacity is less than 15 kW)

## Options and Peripherals (75 A)

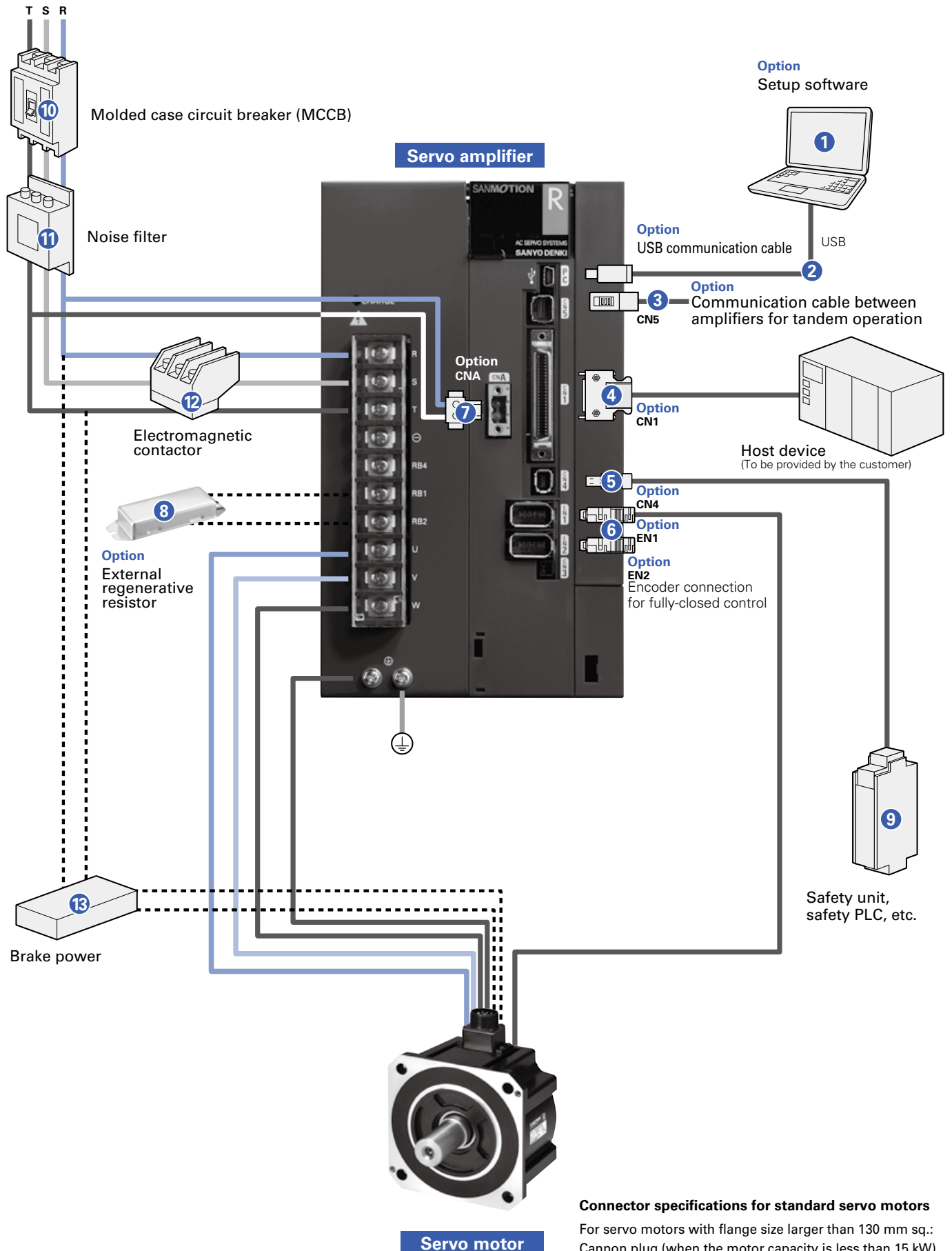
No.	Name	Model no.	Description	Page
1	Setup software	Can be downloaded from Product Information on our website.	Parameters can be set and monitored via communication with a PC.	p. 144
2	USB communication cable	AL-00896515-0□	PC communication cable for setup software	p. 166
3	Communication cable between amplifiers for tandem operation	AL-00911582-0□	Connects between amplifiers for tandem operation (CN5 ⇔ CN5) Consult us if using the tandem operation function.	p. 166
4	CN1 connector	AL-00385594	For controller connection	p. 147
5	CN4 connector	AL-00849548-02 (for short-circuiting), AL-00718252-01 (for wiring)	For safety device connection When CN4 is not used, be sure to buy and insert the optional short-circuiting connector to CN4 on the servo amplifier. (For STO models only)	p. 147
6	EN1 connector	AL-00632607	For encoder connection	p. 147
	EN2 connector	AL-00632607	For encoder connection	p. 147
7	CNA connector	AL-Y0011766-01	For main circuit power supply and regenerative resistor connections Servo amplifiers with a built-in regenerative resistor come with a CNA connector.	p. 147
8	CNB connector	AL-Y0011768-01	For servo motor connection	p. 147
9	CNC connector	AL-Y0005159-01	For control circuit power supply connection	p. 147
10	External regenerative resistor	REGIST-□□□W□…□B REGIST-500CW□…□B	Used for special operations, such as high frequency applications that require greater power dissipation than that provided by the servo amplifier's built-in regenerative resistor	p. 167
11	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 the safety unit and safety PLC.	—
12	Molded case circuit breaker (MCCB)	To be provided by the customer	Used to protect the power line.	—
13	Noise filter	To be provided by the customer	Used to prevent external noise from the power source line.	—
14	Electromagnetic contactor	To be provided by the customer	Used to switch the power on and off.	—
15	Brake power	To be provided by the customer	Used for servo motors with brake	—

Note 1: Connector sets are also available. See respective pages.

Note 2: For the accessories and options for the Safety module, see page 102.

# System Configuration

100 A, 150 A The photograph shows the 150 A model.



**Connector specifications for standard servo motors**  
 For servo motors with flange size larger than 130 mm sq.:  
 Cannon plug (when the motor capacity is less than 15 kW)

## Options and Peripherals (100 A, 150 A)

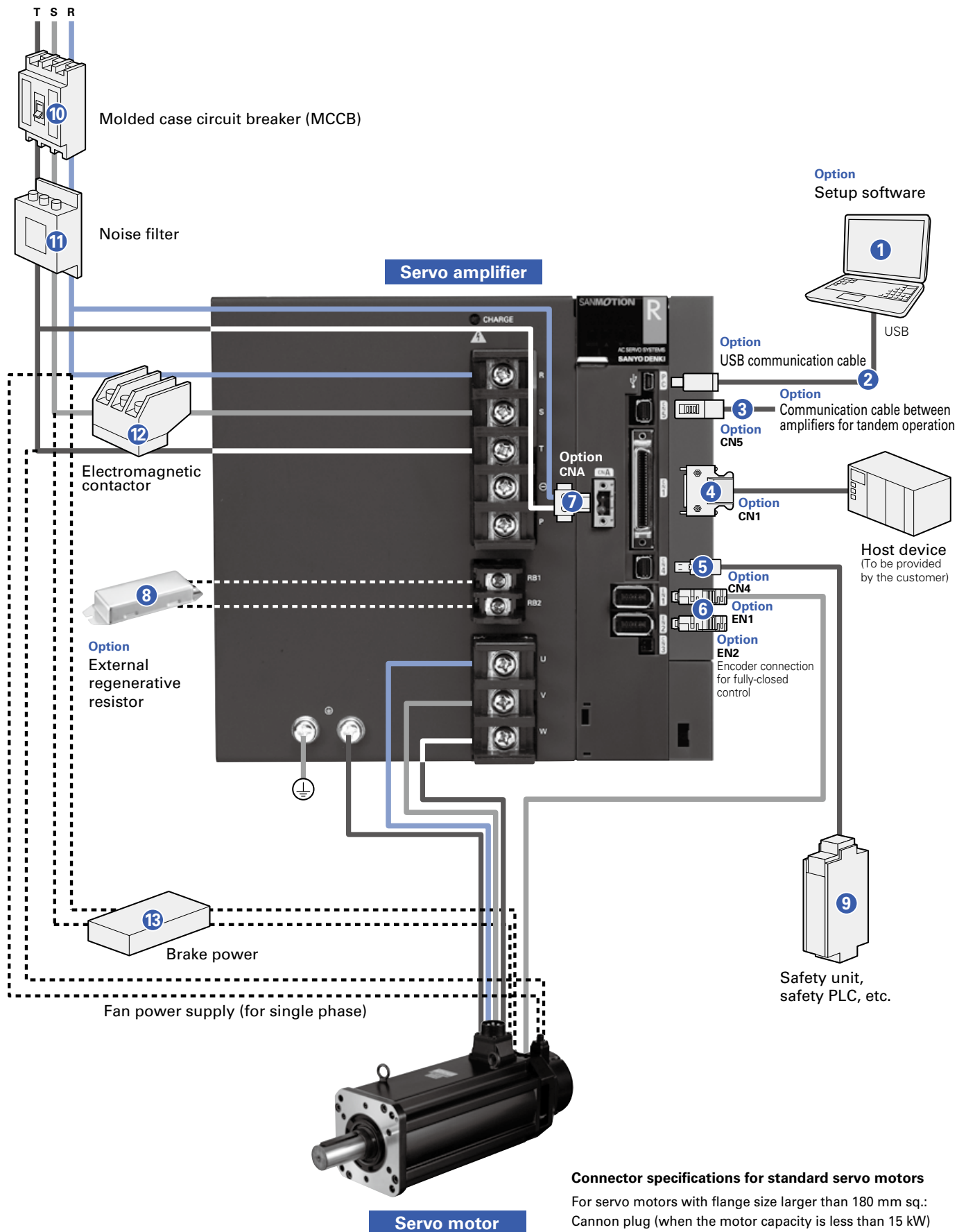
No.	Name	Model no.	Description	Page
①	Setup software	Can be downloaded from Product Information on our website.	Parameters can be set and monitored via communication with a PC.	p. 144
②	USB communication cable	AL-00896515-0□	PC communication cable for setup software	p. 166
③	Communication cable between amplifiers for tandem operation	AL-00911582-0□	Connects between amplifiers for tandem operation (CN5 ⇔ CN5) Consult us if using the tandem operation function.	p. 166
④	CN1 connector	AL-00385594	For controller connection	p. 148
⑤	CN4 connector	AL-00849548-02 (for short-circuiting), AL-00718252-01 (for wiring)	For safety device connection When CN4 is not used, be sure to buy and insert the optional short-circuiting connector to CN4 on the servo amplifier. (For STO models only)	p. 148
⑥	EN1 connector	AL-00632607	For encoder connection	p. 148
	EN2 connector	AL-00632607	For encoder connection	p. 148
⑦	CNA connector	AL-Y0005159-01	For control circuit power supply input	p. 148
⑧	External regenerative resistor	REGIST-□□□□W□□□□B REGIST-500CW□□□□B	Used for special operations, such as high frequency applications that require greater power dissipation than that provided by the servo amplifier's built-in regenerative resistor	p. 167
⑨	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 the safety unit and safety PLC.	—
⑩	Molded case circuit breaker (MCCB)	To be provided by the customer	Used to protect the power line.	—
⑪	Noise filter	To be provided by the customer	Used to prevent external noise from the power source line.	—
⑫	Electromagnetic contactor	To be provided by the customer	Used to switch the power on and off.	—
⑬	Brake power	To be provided by the customer	Used for servo motors with brake	—

Note 1: Connector sets are also available. See respective pages.

Note 2: For the accessories and options for the Safety module, see page 102.

# System Configuration

300 A



**Connector specifications for standard servo motors**  
 For servo motors with flange size larger than 180 mm sq.:  
 Cannon plug (when the motor capacity is less than 15 kW)



## Options and Peripherals (300 A)

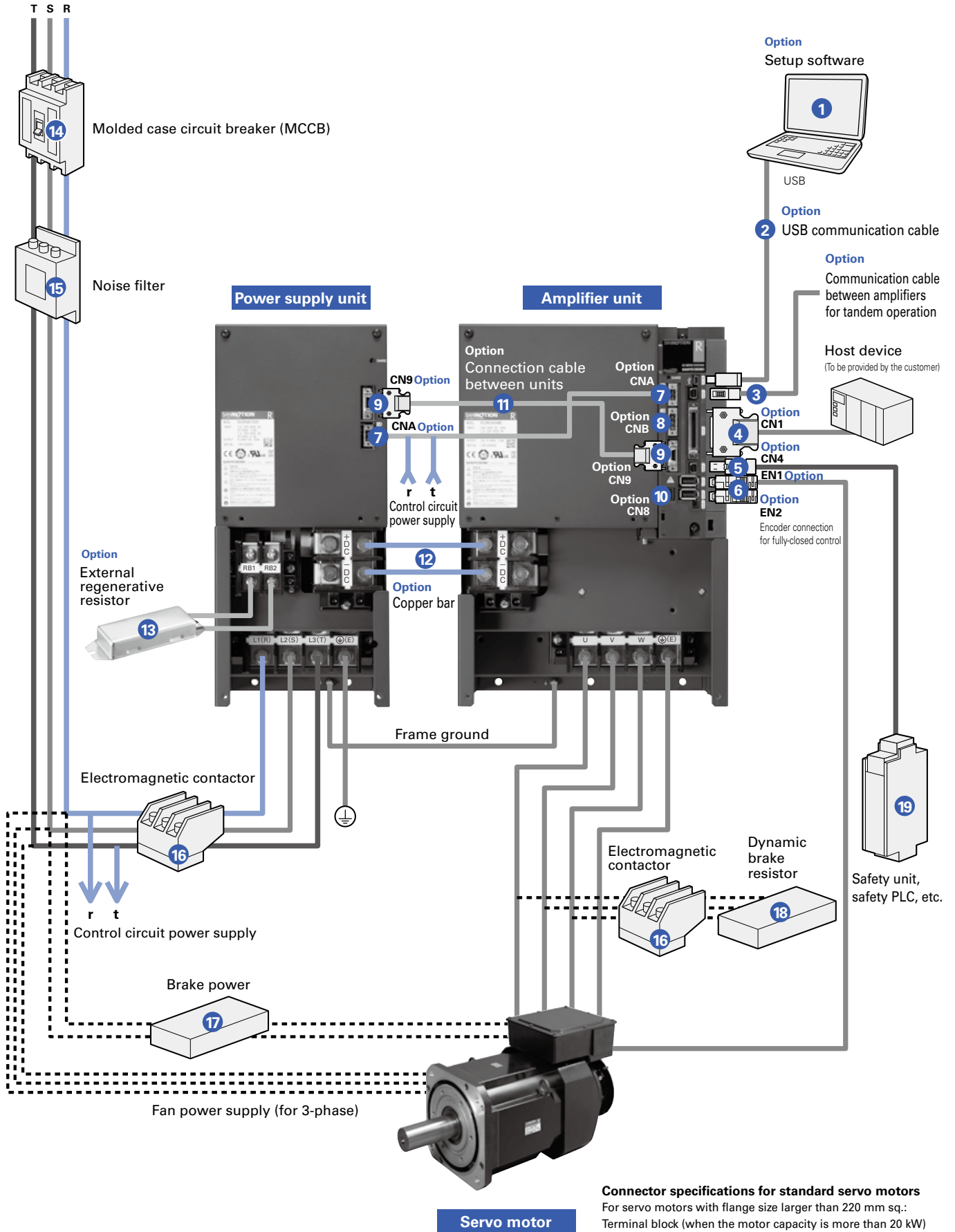
No.	Name	Model no.	Description	Page
1	Setup software	Can be downloaded from Product Information on our website.	Parameters can be set and monitored via communication with a PC.	p. 144
2	USB communication cable	AL-00896515-0□	PC communication cable for setup software	p. 166
3	Communication cable between amplifiers for tandem operation	AL-00911582-0□	Connects between amplifiers for tandem operation (CN5 ⇔ CN5) Consult us if using the tandem operation function.	p. 166
4	CN1 connector	AL-00385594	For controller connection	p. 148
5	CN4 connector	AL-00849548-02 (for short-circuiting), AL-00718252-01 (for wiring)	For safety device connection When CN4 is not used, be sure to buy and insert the optional short-circuiting connector to CN4 on the servo amplifier. (For STO models only)	p. 148
6	EN1 connector	AL-00632607	For encoder connection	p. 148
	EN2 connector	AL-00632607	For encoder connection	p. 148
7	CNA connector	AL-Y0005159-01	For control circuit power supply input	p. 148
8	External regenerative resistor	REGIST-□□□□W□□□□B REGIST-500CW□□□□B	Used for special operations, such as high frequency applications that require greater power dissipation than that provided by the servo amplifier's built-in regenerative resistor	p. 167
9	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 the safety unit and safety PLC.	—
10	Molded case circuit breaker (MCCB)	To be provided by the customer	Used to protect the power line.	—
11	Noise filter	To be provided by the customer	Used to prevent external noise from the power source line.	—
12	Electromagnetic contactor	To be provided by the customer	Used to switch the power on and off.	—
13	Brake power	To be provided by the customer	Used for servo motors with brake	—

Note 1: Connector sets are also available. See respective pages.

Note 2: For the accessories and options for the Safety module, see page 102.

# System Configuration

600 A



## Options and Peripherals (600 A)

No.	Name	Model no.	Description	Page
1	Setup software	Can be downloaded from Product Information on our website.	Parameters can be set and monitored via communication with a PC.	p. 144
2	USB communication cable	AL-00896515-0□	PC communication cable for setup software	p. 166
3	Communication cable between amplifiers for tandem operation	AL-00911582-0□	Connects between amplifiers for tandem operation (CN5 ↔ CN5) Consult us if using the tandem operation function.	p. 166
4	CN1 connector	AL-00385594	For controller connection	p. 149
5	CN4 connector	AL-00849548-02 (for short-circuiting), AL-00718252-01 (for wiring)	For safety device connection When CN4 is not used, be sure to buy and insert the optional short-circuiting connector to CN4 on the servo amplifier. (For STO models only)	p. 149
6	EN1 connector	AL-00632607	For encoder connection	p. 149
	EN2 connector	AL-00632607	For encoder connection	p. 149
7	CNA connector	AL-Y0005159-01	For control circuit power supply input	p. 149
8	CNB connector	AL-Y0004079-01	For dynamic brake signal	p. 149
9	CN9 connector	AL-00608710	For unit-to-unit connection (single item)	p. 149
10	CN8 connector	AL-Y001185-01	For external alarm signal	p. 149
11	Connection cable between units	AL-00917284	To connect between power unit (CN9) and amplifier unit (CN9)	p. 166
12	Copper bar	AL-00918125-01	To connect main power supply between power unit (CN9) and amplifier unit (CN9) Terminal number: Between +DC/-DC 2-pc. set (5 mm between units)	p. 166
13	External regenerative resistor	REGIST-□□□□W□□□□B REGIST-500CW□□□□B	Used for special operations, such as high frequency applications that require greater power dissipation than that provided by the servo amplifier's built-in regenerative resistor	p. 167
14	Molded case circuit breaker (MCCB)	To be provided by the customer	Used to protect the power line.	—
15	Noise filter	To be provided by the customer	Used to prevent external noise from the power source line.	—
16	Electromagnetic contactor	To be provided by the customer	Used to turn on and off the servo power or dynamic brake resistors.	—
17	Brake power	To be provided by the customer	Used for servo motors with brake	—
18	Dynamic brake resistor	To be provided by the customer	Not built in this servo amplifier. Connect as necessary.	—
19	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 the safety unit and safety PLC.	—

Note 1: Connector sets are also available. See respective pages.

Note 2: For the accessories and options for the Safety module, see page 102.

# General Specifications

Control function	Position control, Speed control, Torque control (Parameter switching)	
Control system	IGBT: PWM control, sinusoidal drive	
Main Circuit Power Supply	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) <sup>(1)</sup> Single-phase: 100 to 120VAC (+10, -15%), 50/60 Hz (±3 Hz) <sup>(2)</sup>	
Control circuit power supply	Single-phase: 200 to 240 VAC (+10, -15%), 50/60 Hz (±3 Hz) Single-phase: 100 to 120 VAC (+10, -15%), 50/60 Hz (±3 Hz) <sup>(2)</sup>	
Environment	Ambient temperature	0 to +55°C
	Storage temperature	-20 to +65°C
	Operation and Storage humidity	Below 90% RH (non-condensing)
	Operation altitude	Below 1000 m
	Vibration resistance	4.9 m/s <sup>2</sup>
	Impact resistance	19.6m/s <sup>2</sup>
Structure	10 to 300 A: Built-in tray type power supply, 600 A: Separate power supply unit	

(1) Single-phase 200 VAC class input can be used with RS3A□□□ models only. Please set parameters before using single-phase input.  
(2) Single-phase 100 VAC class input can be used with RS3E□□□ models only. Please set parameters before using single-phase input.



## Performance

Speed control range	1:5000 (Internal speed command)
Frequency characteristics	2200 Hz (In high frequency sampling mode)
Permissible load moment of inertia	10 times the motor rotary inertia

## Built-in functions

Protection functions	Overcurrent, Current detection error, Overload, Regeneration error, Overheating, External error, Overvoltage, Main circuit power supply undervoltage, Main circuit power supply open phase, Control circuit power supply undervoltage, Encoder error, Overspeed, Speed control error, Speed feedback error, Excessive position deviation, Position command pulse error, Built-in memory error, Parameter error, Cooling fan error
Digital operator	Status display, Monitor display, Alarm display, Parameter setting, Test run, Adjustment mode
Dynamic brake	10 to 300 A: Built-in, 600 A: None
Regenerative resistor	10 to 150 A: Built-in/None (selectable), 300 A, 600 A: None Note: Optional external regenerative resistors are available (10 to 600 A).
Monitor	Speed monitor (VMON) 2.0 V±10% (at 1000 min <sup>-1</sup> ), Torque (thrust force) command monitor (TCMON) 2.0 V±10% (at 100%)

## Safety standards

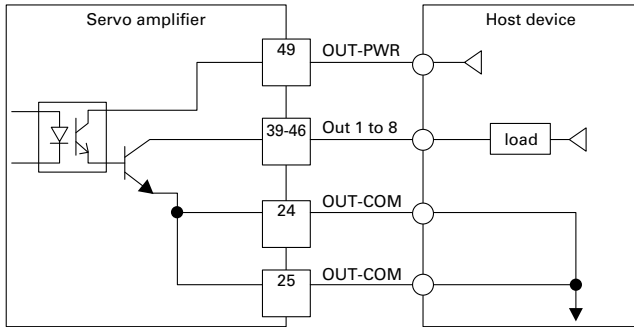
Servo amplifier type	Safety standards			
RS3□□□□□□□□0	North American safety standards (UL, c-UL)		UL 61800-5-1	
	European directive	Low-voltage directive	IEC/EN 61800-5-1	
		EMC directive	IEC/EN 61800-3, IEC/EN 61326-3-1	
	KC Mark (Korea Certification Mark)		KN 61000-6-2, KN 61000-6-4	
RS3□□□□□□□□2 (Safe Torque Off function) RS3□□□□A□□□□C (Safety)	North American safety standards (UL, c-UL)		UL 61800-5-1	
	European directive	Low-voltage directive	IEC/EN 61800-5-1	
		EMC directive	IEC/EN 61000-6-4	IEC/EN 61800-3
			IEC/EN 61000-6-2	IEC/EN 61326-1
KC Mark (Korea Certification Mark)		KN 61000-6-2, KN 61000-6-4		

## Functional safety specifications

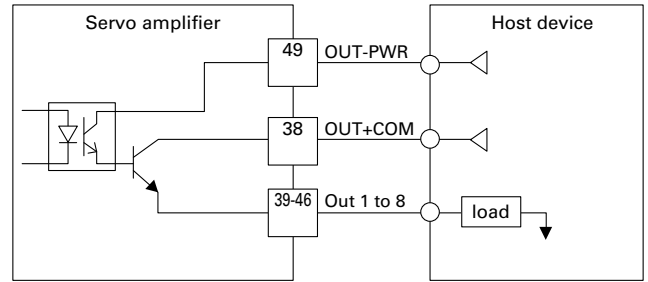
Servo amplifier type			IEC/EN 61800-5-2: 2016	Description	Safety level	
RS3□□□□□□□□0	RS3□□□□□□□□2 (Safe Torque Off function)	RS3□□□□A□□□□C (Safety)			EN 61508 IEC/EN 62061	ISO 13849-1: 2015 EN ISO 13849-1: 2015
—	✓	✓	STO	Safe Torque Off	SIL3 SILCL3	Cat.3 PL e
—	—	✓	SS1	Safe Stop 1		
—	—	✓	SS2	Safe Stop 2		
—	—	✓	SOS	Safe Operating Stop		
—	—	✓	SLS	Safely-Limited Speed		
—	—	✓	SBC	Safe Brake Control		
—	—	✓	SSM	Safe Speed Monitor		

## ■ General-purpose output specifications

### Sink type (NPN)



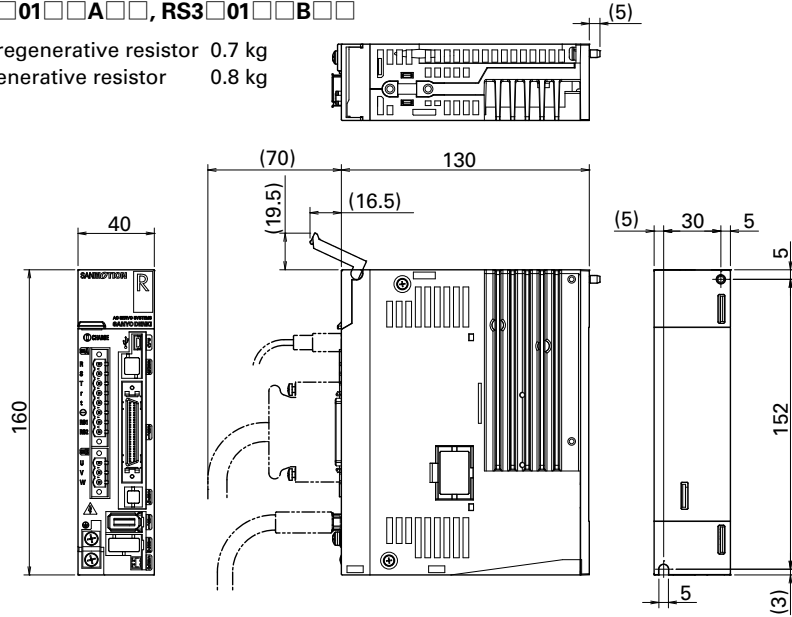
### Source type (PNP)



# Dimensions [Unit: mm] Refer to p. 104 for dimensional drawings of Safety.

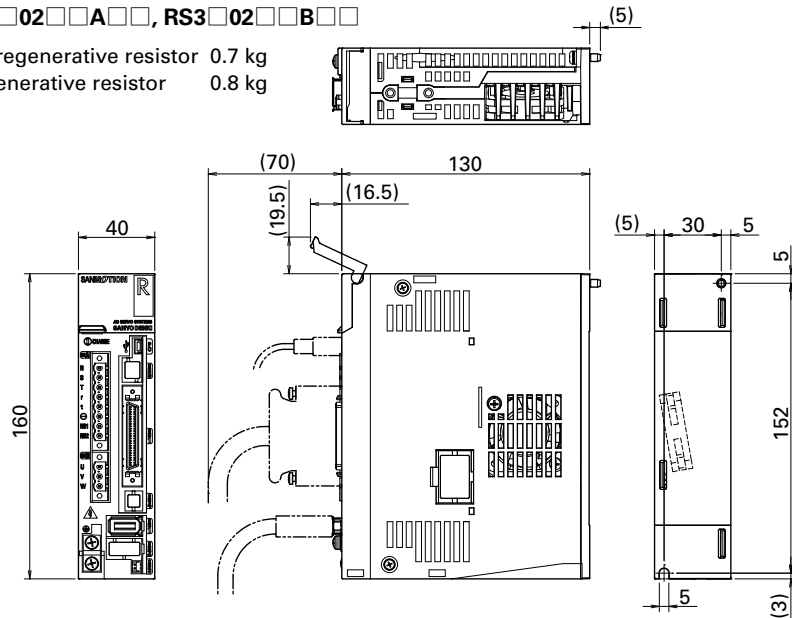
**10 A - Model no.: RS3□01□□A□□, RS3□01□□B□□**

Mass: Without built-in regenerative resistor 0.7 kg  
 With built-in regenerative resistor 0.8 kg



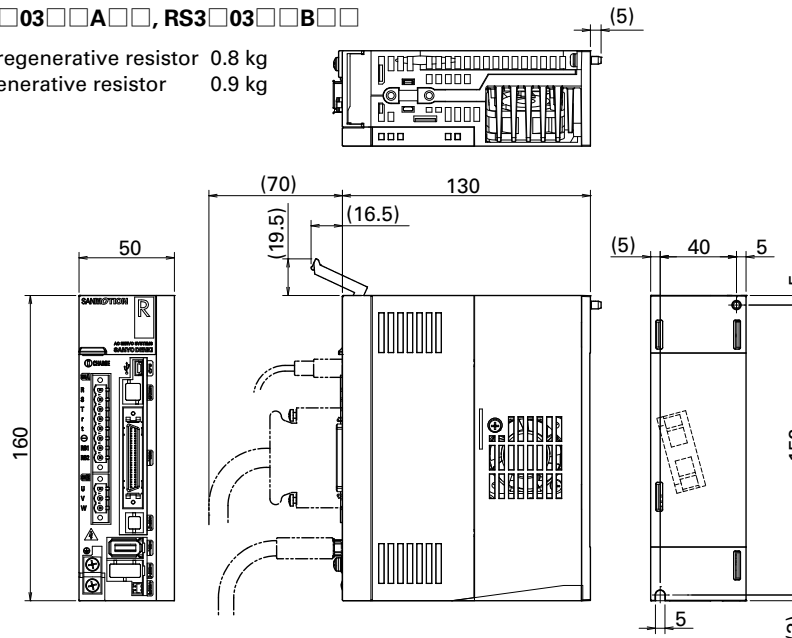
**20 A - Model no.: RS3□02□□A□□, RS3□02□□B□□**

Mass: Without built-in regenerative resistor 0.7 kg  
 With built-in regenerative resistor 0.8 kg



**30 A - Model no.: RS3□03□□A□□, RS3□03□□B□□**

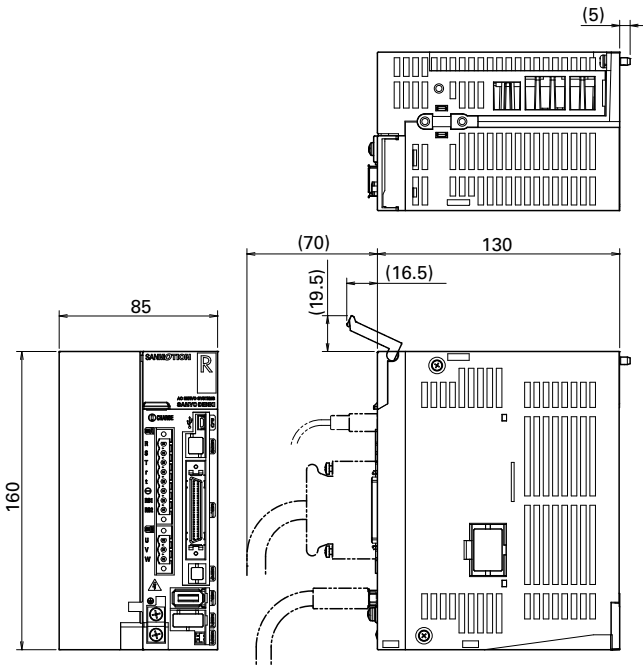
Mass: Without built-in regenerative resistor 0.8 kg  
 With built-in regenerative resistor 0.9 kg



Refer to p. 105 for dimensional drawings of Safety.

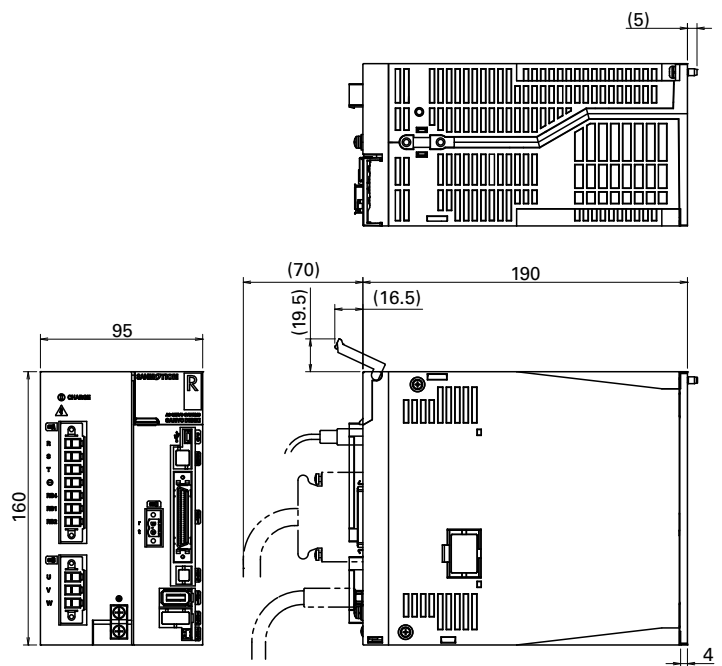
**50 A - Model no.: RS3□05□□A□□, RS3□05□□B□□**

Mass: Without built-in regenerative resistor 1.5 kg  
 With built-in regenerative resistor 1.6 kg



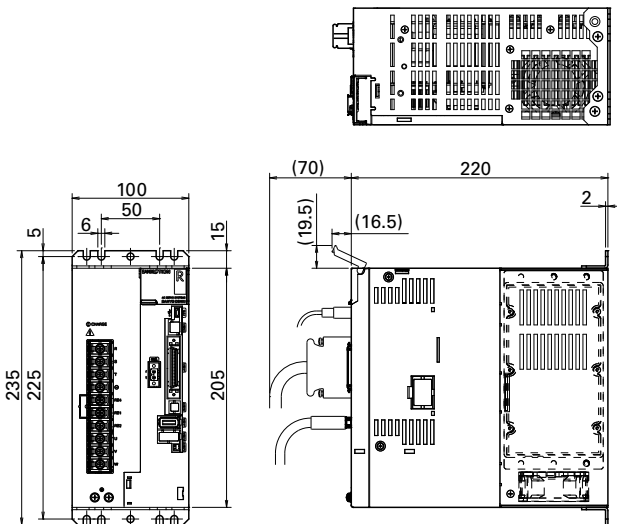
**75 A - Model no.: RS3□07□□A□□, RS3□07□□B□□**

Mass: Without built-in regenerative resistor 2.3 kg  
 With built-in regenerative resistor 2.5 kg



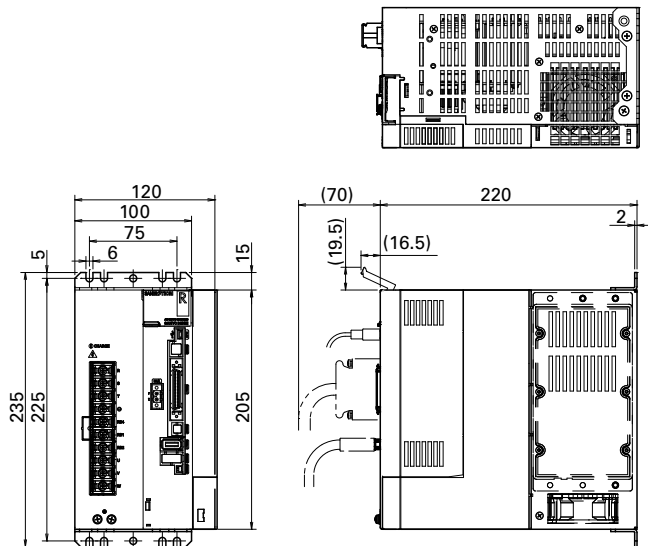
**100 A - Model no.: RS3□10□□A□□, RS3□10□□B□□**

Mass: Without built-in regenerative resistor 4.0 kg  
 With built-in regenerative resistor 4.2 kg



**150 A - Model no.: RS3□15□□A□□, RS3□15□□B□□**

Mass: Without built-in regenerative resistor 4.8 kg  
 With built-in regenerative resistor 5.0 kg



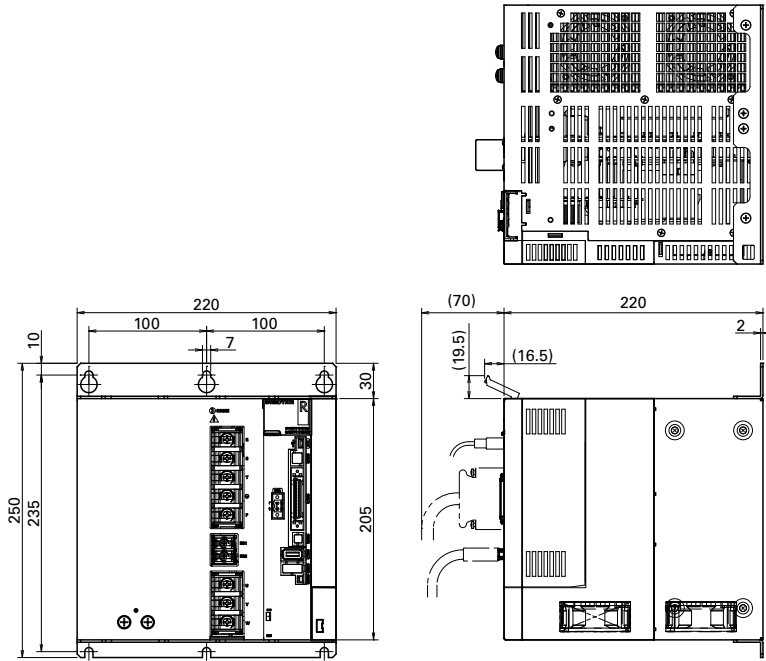
Features	List of Compatible Servo Amplifiers and Servo Motors	Standard Model Number List	Analog/Pulse	Servo Amplifiers R 3E Model EtherCAT	Built-in Positioning Function	Safety	Servo Motors Rotary Motors	Options	Linear Servo Motors	SANMOTION S	Selection Guide
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# Dimensions [Unit: mm] Refer to p. 106 for dimensional drawings of Safety.

**300 A - Model no.: RS3□30□□A□□, RS3□30□□B□□**

Mass: 9.8 kg



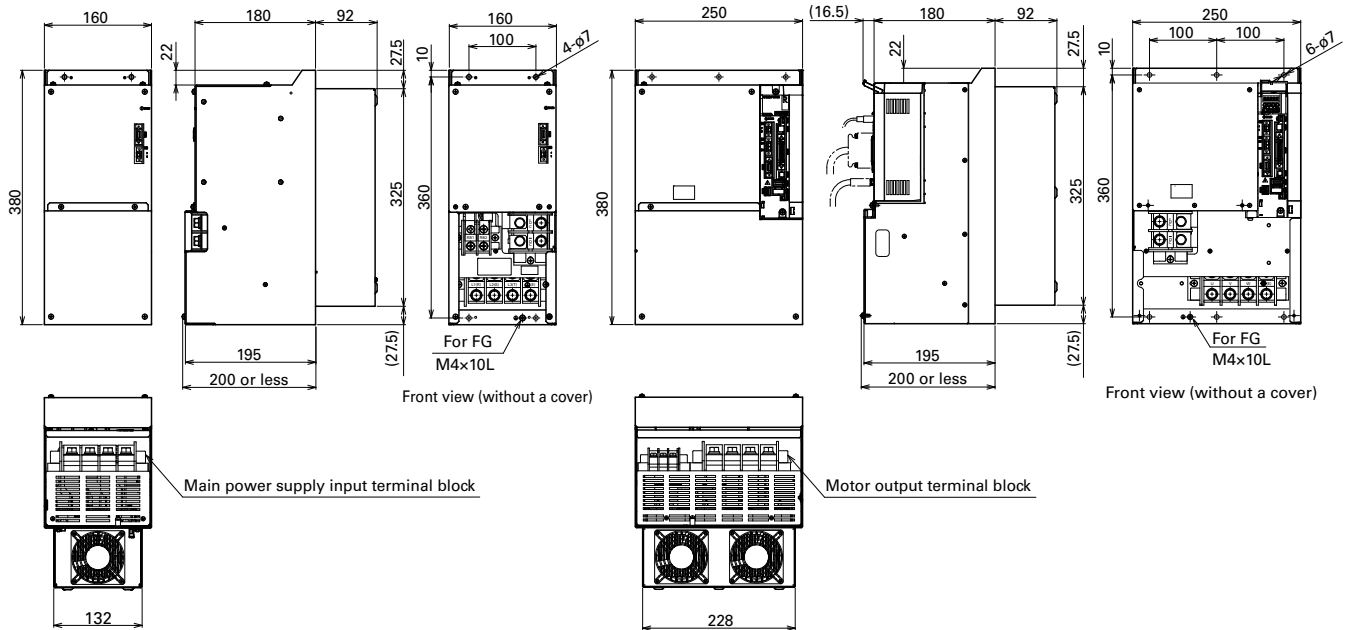
## 600 A

Power supply unit model no.: RS3PAA27000

Mass: 11.8 kg

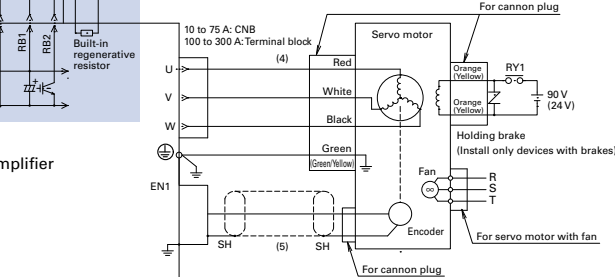
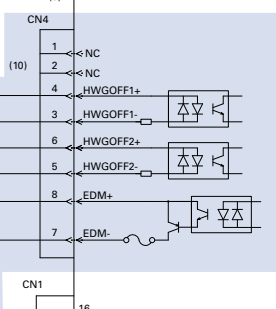
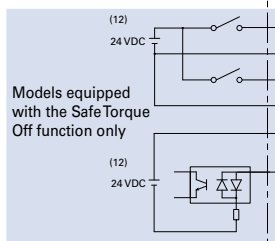
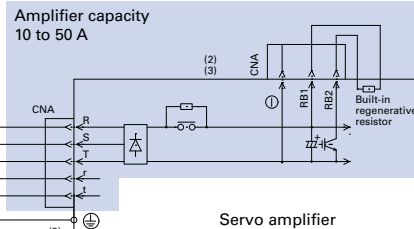
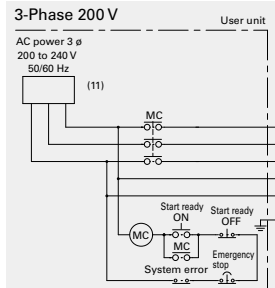
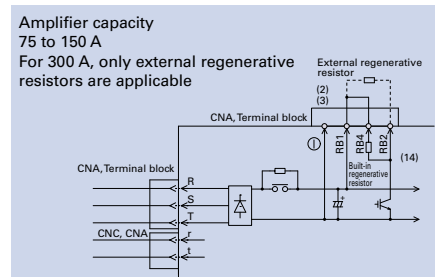
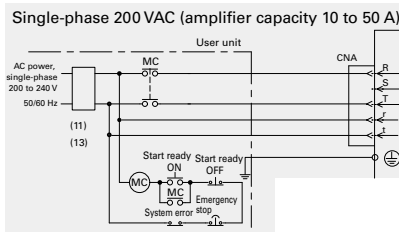
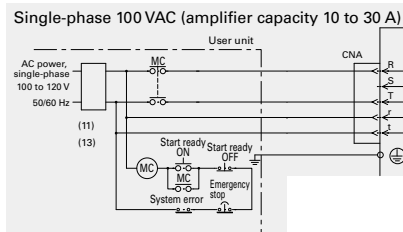
Amplifier unit model no.: RS3□60□□A□□, RS3□60□□B□□

Mass: 18 kg

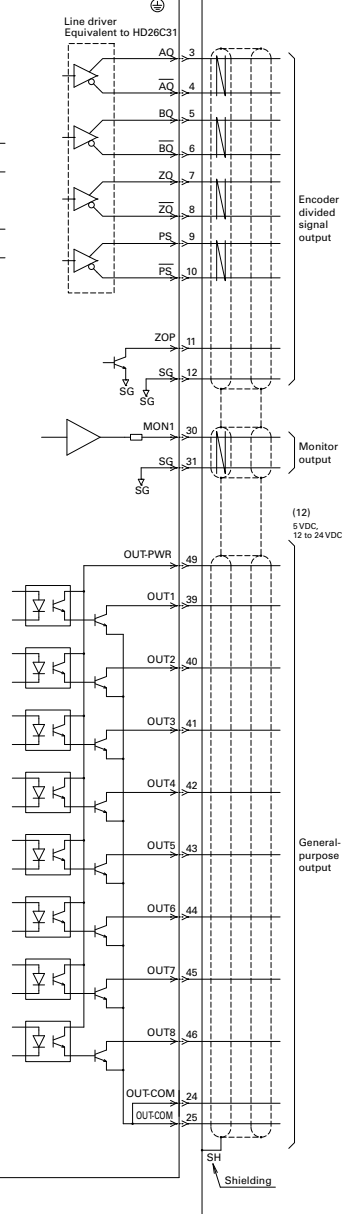
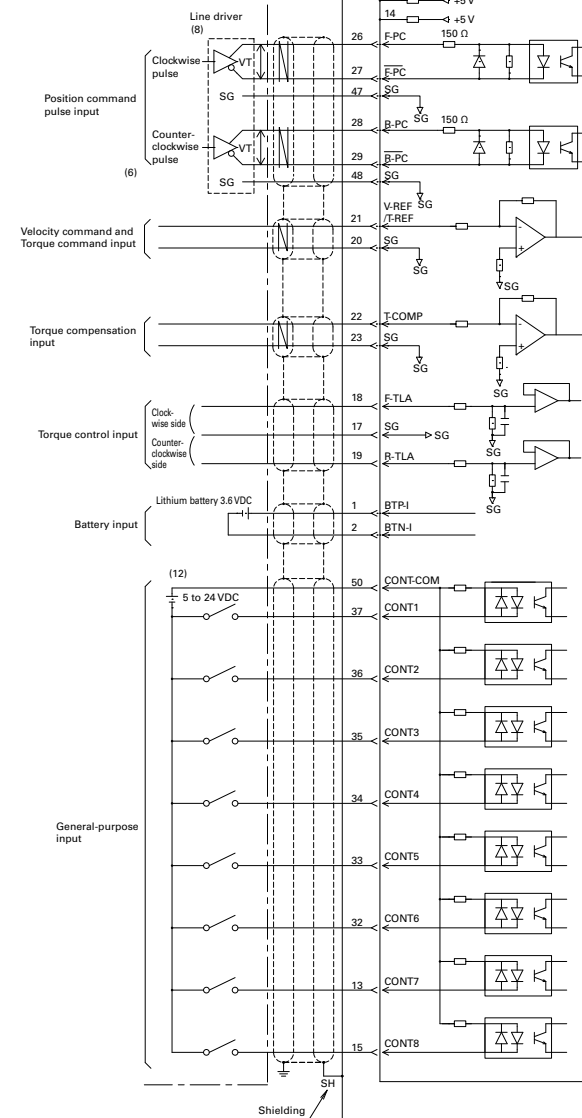


# External Wiring Diagram

## 10 to 300 A Sinking type (NPN) output



Connector No.	Name	Housing, plug, shell
CNA 10 to 50 A	Main/control circuit power supply input connector	MSTBT2.5/8-STF-5.08LUB
CNB 10 to 50 A	Servo motor power line connector	MSTBT2.5/3-STF-5.08
CNA 75 A	Main power supply input connector	PC5/7-STF1-7.62
CNB 75 A	Servo motor power line connector	PC5/3-STF1-7.62
CNC 75 A	Control circuit power supply input connector	MSTBT2.5/2-STF-5.08
CNA 100 to 300 A	Control circuit power supply input connector	MSTBT2.5/2-STF-5.08
CN1	Connector for host device input signal	Plug: 10150-3000PE Shell: 10350-52A0-008
EN1	Connector for encoder signal	Connector: 36210-0100PL Shell kit: 36310-3200-008
CN4	STO connector	For short-circuiting: 1971153-2 For wiring: 2013595-3

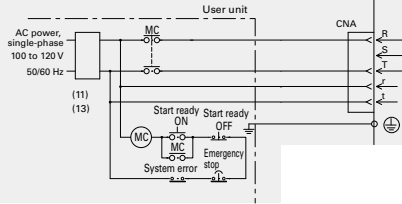


- Use a twisted pair shielded cable.
- For amplifier capacity 10 to 50 A: Connect an external regenerative resistor "between the RB1 and RB2 terminals". When using an external regenerative resistor, remove the wiring of the built-in regenerative resistor connected between the RB1 and RB2 terminals and then connect the external regenerative resistor "between the RB1 and RB2 terminals".  
For amplifier capacity 75 A, 100 A, 150 A: When using the built-in regenerative resistor, short the circuit "between the RB1 and RB4 terminals". When using an external regenerative resistor, remove the shorting bar connected between the RB1 and RB4 terminals and then connect the regenerative resistor "between the RB1 and RB2 terminals".  
For amplifier capacity 300 A: Connect an external regenerative resistor "between the RB1 and RB2 terminals".
- ⊕ is a maintenance terminal (high-voltage circuit). Do not wire this terminal.
- Connections on the motor side vary depending on the motor specifications. The indications of red, white, black, green and orange apply when the motor power and brake lines are the lead type. When they are the cannon plug type, perform connections according to the motor specifications.
- Refer to the encoder connection figure for the wiring of the connector for the encoder connection.
- Be sure to connect SG (signal ground) between the equipment and the servo amplifier when you use a differential input signal.
- R, S, T, r, t, ⊖, RB1, RB2, U, V, and W are high-voltage circuits. All other lines are low-voltage. Ensure that there is sufficient differential between the high- and low-voltage circuits.
- Use a line driver with a differential voltage difference (VT) from 2.5 to 3.8 V. If the differential voltage is less than 2.5 V or more than 3.8 V, it may lead to malfunction due to missing pulses.
- CN4 is a connector for the Safe Torque Off function. To turn Servo ON (motor in operation), it is required to connect safety equipment to CN4 and get STO enabled. If not using STO, be sure to insert the short-circuiting STO connector (Mfr. part no.: 1971153-2) to CN4.
- Do not connect anything to CN4 pin 1 and 2.
- An earth leakage circuit breaker conforming either to UL, IEC, or EN standards is recommended.
- The external power supply is to be arranged by the customer.
- Do not wire the S phase for a single-phase power supply.
- There is no built-in regenerative resistor or RB4 terminal for 300 A capacity amplifiers.

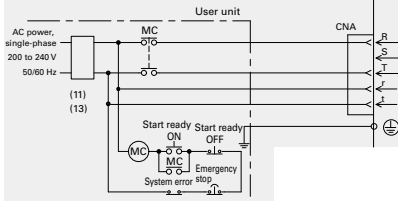
# External Wiring Diagram

## 10 to 300 A Sourcing type (PNP) output

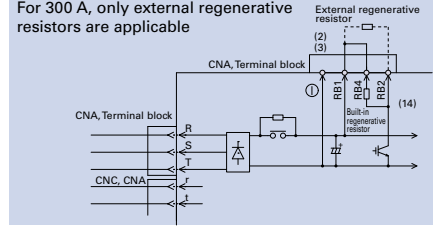
Single-phase 100 V (amplifier capacity 10 o 30 A)



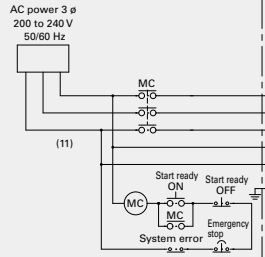
Single-phase 200 V (amplifier capacity 10 to 50 A)



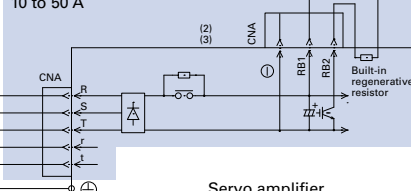
Amplifier capacity 75 to 150 A  
For 300 A, only external regenerative resistors are applicable



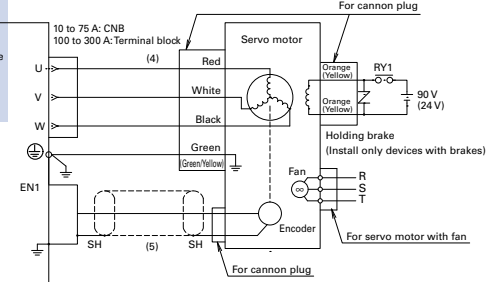
3-Phase 200 V



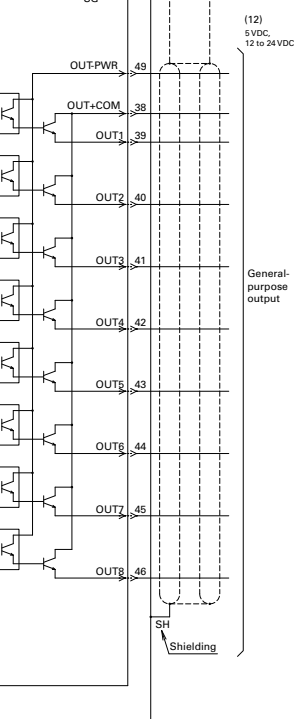
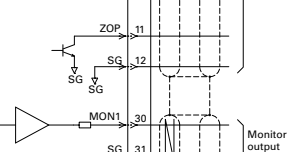
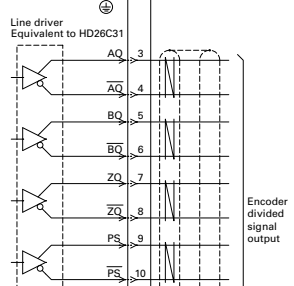
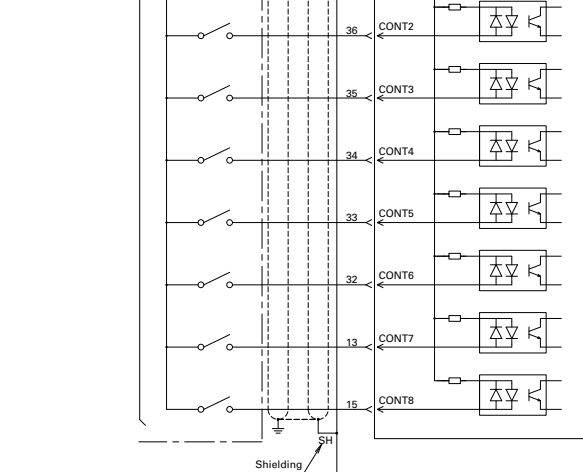
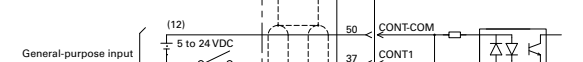
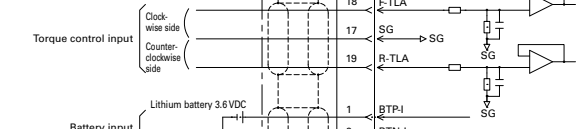
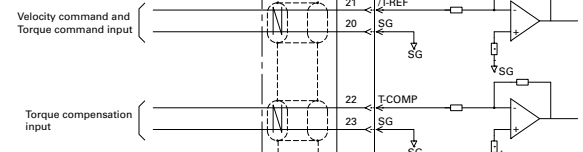
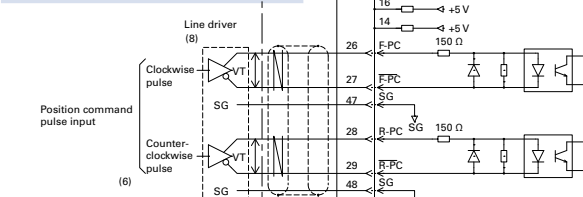
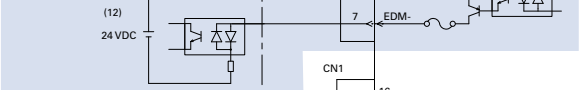
Amplifier capacity 10 to 50 A



Servo amplifier



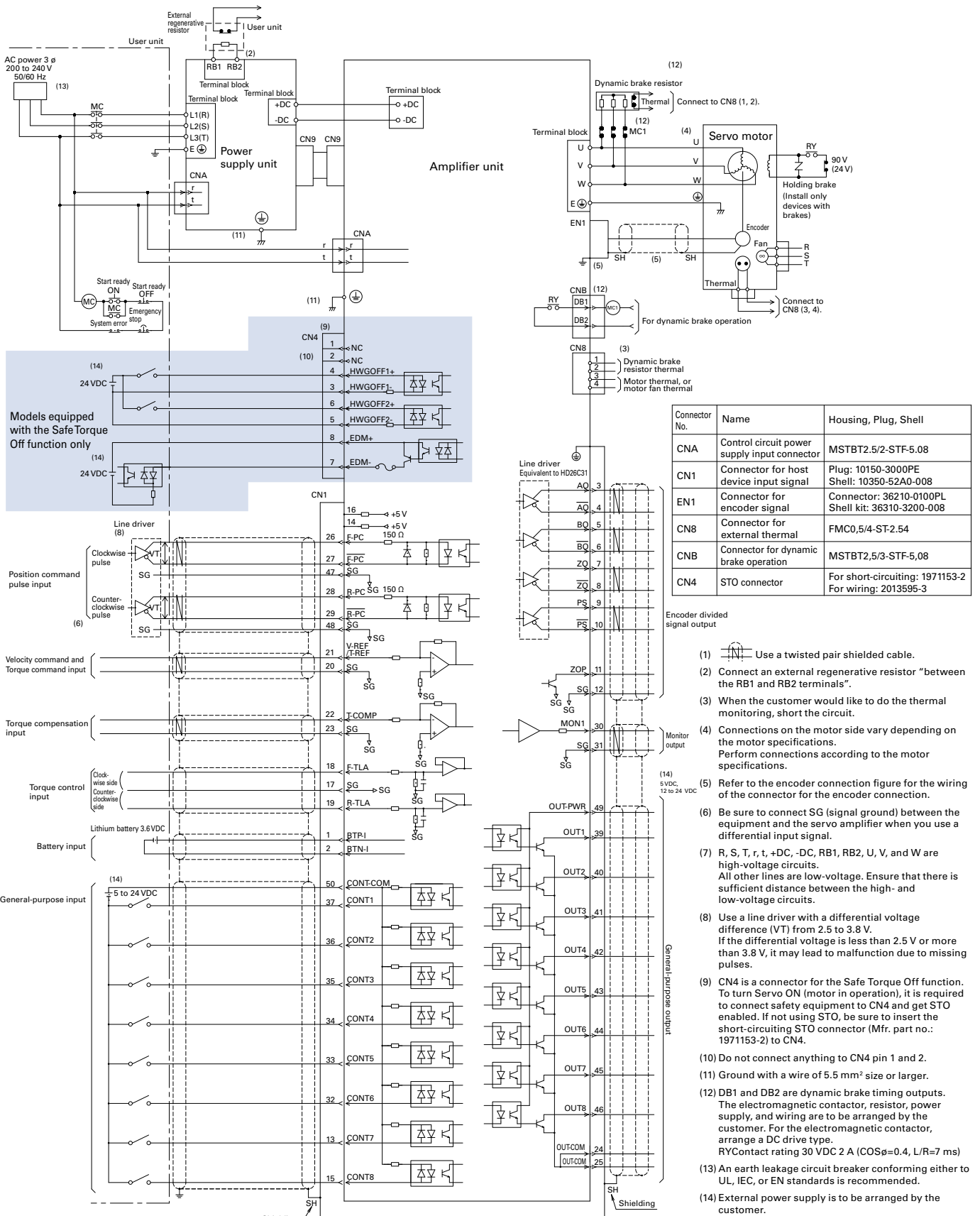
Models equipped with the Safe Torque Off function only



Connector No.	Name	Housing, plug, shell
CNA 10 to 50 A	Main/control circuit power supply input connector	MSTBT2.5/8-STF-5.08LUB
CNB 10 to 50 A	Servo motor power line connector	MSTBT2.5/3-STF-5.08
CNA 75 A	Main power supply input connector	PC5/7-STF1-7.62
CNB 75 A	Servo motor power line connector	PC5/3-STF1-7.62
CNC 75 A	Control circuit power supply input connector	MSTBT2.5/2-STF-5.08
CNA 100 to 300 A	Control circuit power supply input connector	MSTBT2.5/2-STF-5.08
CN1	Connector for host device input signal	Plug: 10150-3000PE Shell: 10350-52A0-008
EN1	Connector for encoder signal	Connector: 36210-0100PL Shell kit: 36310-3200-008
CN4	STO connector	For short-circuiting: 1971153-2 For wiring: 2013595-3

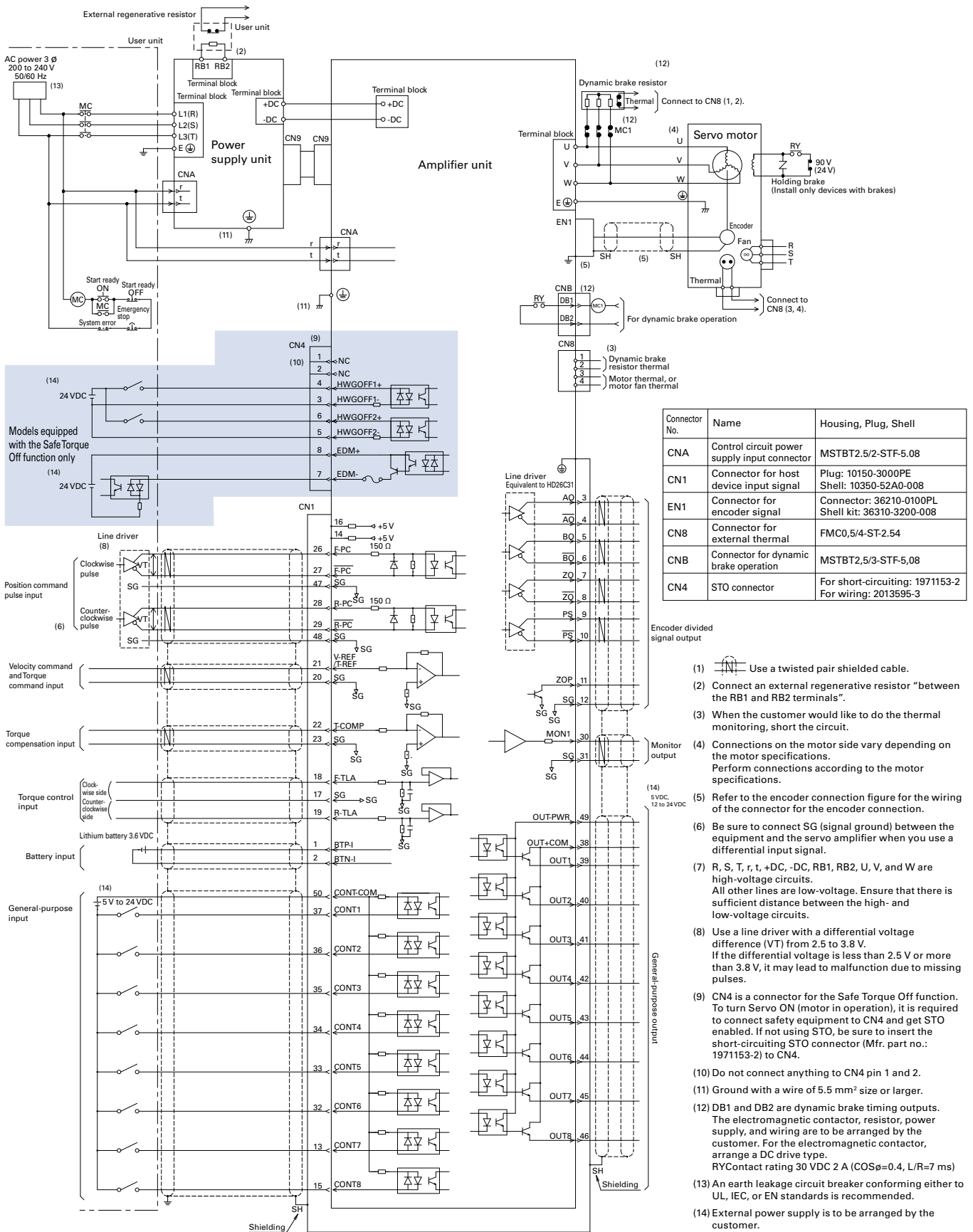
- Use a twisted pair shielded cable.
- For amplifier capacity 10 to 50 A:  
Connect the external regenerative resistor "between the RB1 and RB2 terminals". When using an external regenerative resistor, remove the wiring of built-in regenerative resistor connected between the RB1 and RB2 terminals and then connect the external regenerative resistor "between the RB1 and RB2 terminals".  
For amplifier capacity 75 A, 100 A, 150 A:  
When using the built-in regenerative resistor, short the circuit "between the RB1 and RB4 terminals". When using an external regenerative resistor, remove the shorting bar connected between the RB1 and RB4 terminals and then connect the regenerative resistor "between the RB1 and RB2 terminals".  
For amplifier capacity 300 A:  
Connect an external regenerative resistor "between the RB1 and RB2 terminals".
- ⊖ is a maintenance terminal (high-voltage circuit). Do not wire this terminal.
- Connections on the motor side vary depending on the motor specifications.  
The indications of red, white, black, green and orange apply when the motor power and brake lines are the lead type. When they are the cannon plug type, perform connections according to the motor specifications.
- Refer to the encoder connection figure for the wiring of the connector for the encoder connection.
- Be sure to connect SG (signal ground) between the equipment and the servo amplifier when you use a differential input signal.
- R, S, T, r, ⊕, RB1, RB2, U, V, and W are high-voltage circuits. All other lines are low-voltage. Ensure that there is sufficient distance between the high- and low-voltage circuits.
- Use a line driver with a differential voltage difference (VT) from 2.5 to 3.8 V.  
If the differential voltage is less than 2.5 V or more than 3.8 V, it may lead to malfunction due to missing pulses.
- CN4 is a connector for the Safe Torque Off function. To turn Servo ON (motor in operation), it is required to connect safety equipment to CN4 and get STO enabled. If not using STO, be sure to insert the short-circuiting STO connector (Mfr. part no.: 1971153-2) to CN4.
- Do not connect anything to CN4 pin 1 and 2.
- An earth leakage circuit breaker conforming either to UL, IEC, or EN standards is recommended.
- The external power supply is to be arranged by the customer.
- Do not wire the S phase for a single-phase power supply.
- There is no built-in regenerative resistor or RB4 terminal for 300 A capacity amplifiers.

# 600 A Sinking type (NPN) output



# External Wiring Diagram

## 600A Sourcing type (PNP) output

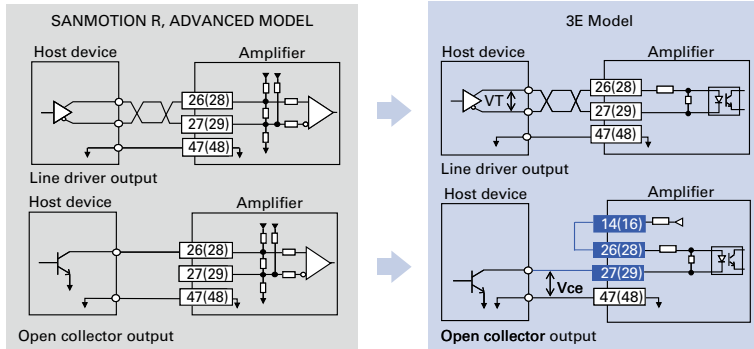


# Precautions when Replacing Our Conventional Products

For analog/pulse type

## Position command pulse input

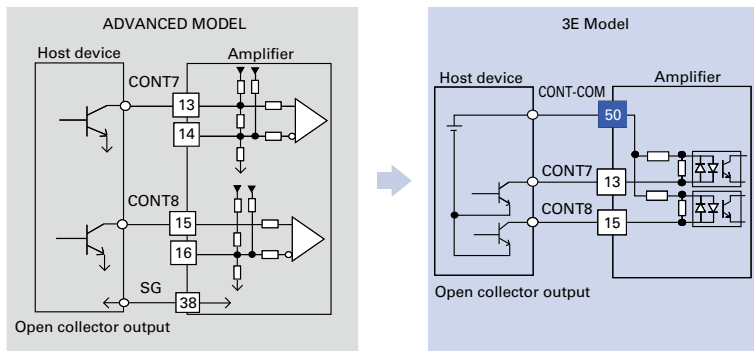
There are constraints on the specifications of the available position pulse signals for the SANMOTION R 3E Model. Also, if the host device output is open collector type, a wiring change is necessary.



Pulse output circuit of the host devices	Wiring compatibility	Constraint conditions
Differential output type (Line driver)	Yes	Voltage difference between differential signals (VT) : 2.5 to 3.8V
Open collector type	No	Saturation voltage of the transistor (Vce): 1.5V max.

## General-purpose input

For the SANMOTION R 3E Model, differential (line driver) output type cannot be used as a host device side output circuit. Furthermore, wiring change will be required even if open collector output is used.



General-purpose output circuit of the host devices	Wiring compatibility	Constraint conditions
Differential output type (Line driver)	-	Change to open collector type.
Open collector type	No (Refer to the figure)	Wire in the same way as CONT1 to 6.

## Setup software

The setup software for the SANMOTION R 3E Model series is SANMOTION MOTOR SETUP SOFTWARE.

The software is available for download from our website.

Beware that SANMOTION R Setup Software cannot be used.

Use an optional product or a USB cable available on the market (with USB Mini-B connector on the servo amplifier side) for communication cable.





# Servo Amplifiers

## R 3E Model EtherCAT Interface type

Servo Amplifier Capacity: 10 to 600 A

More evolved AC servo amplifiers that provide improved basic performance such as high responsiveness, and are more eco-efficient and easier to use. With a 62.5  $\mu$ s minimum communication cycle, the high-speed EtherCAT field-bus subdivides commands, realizing smoother operation of devices.

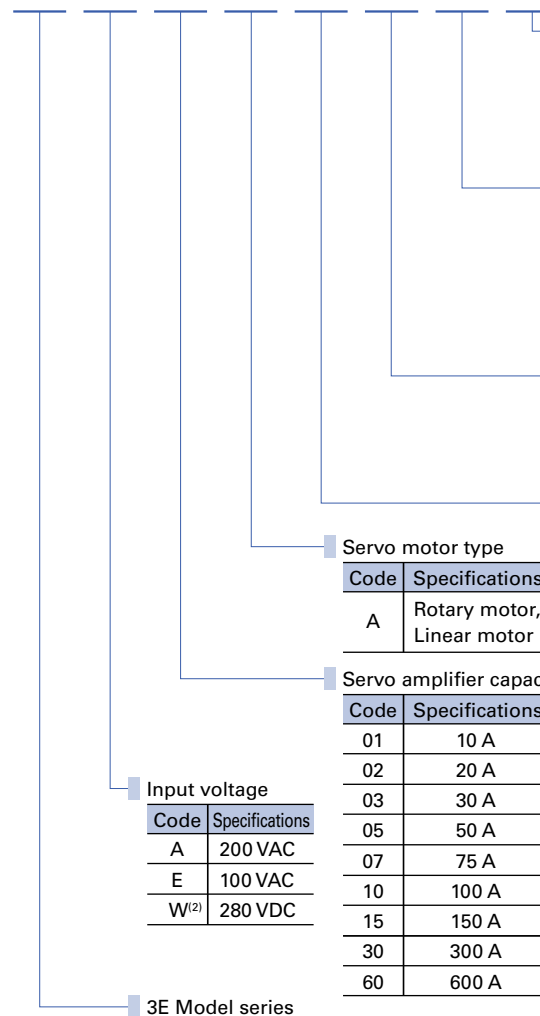


### How to read model numbers

Note that not all the possible combinations of the numbers and characters below are valid. Also, some of the numbers/characters listed below are for optional models. For model numbers valid as standard products, refer to "Standard Model Number List".

#### Servo amplifier

**RS3 A 01 A 2 H A 4**



#### Option 2

Code	Safe Torque Off function	Safety
4	Available (with delay circuit)	None
E	Available (with delay circuit)	Available <sup>(1)</sup>

#### Option 1

Code	Amplifier capacity	Specifications
A	100 to 150 A	With built-in regenerative resistor & With DB resistor
L	10 to 300 A	Without built-in regenerative resistor & With DB resistor
M	600 A	Without built-in regenerative resistor & Without DB resistor

#### Interface type

Code	Specifications
H	EtherCAT

#### Encoder connection type (Rotary motor)

Code	EN1 (motor encoder)	EN2 (Motor encoder or external encoder)
2	Absolute encoder	Incremental encoder for motor / External incremental encoder for fully closed-loop systems
9	Incremental encoder	Absolute encoder
A	Incremental encoder	External incremental encoder for fully closed-loop systems

#### Servo motor type

Code	Specifications
A	Rotary motor, Linear motor

#### Servo 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
30	300 A
60	600 A

#### Input voltage

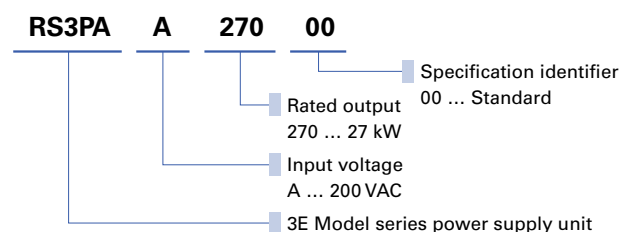
Code	Specifications
A	200 VAC
E	100 VAC
W <sup>(2)</sup>	280 VDC

#### Encoder connection type (Linear motor)

Code	EN1 (Linear encoder)	EN2 (Hall sensor)
A	Incremental encoder	Line driver
B	Incremental encoder	Open collector

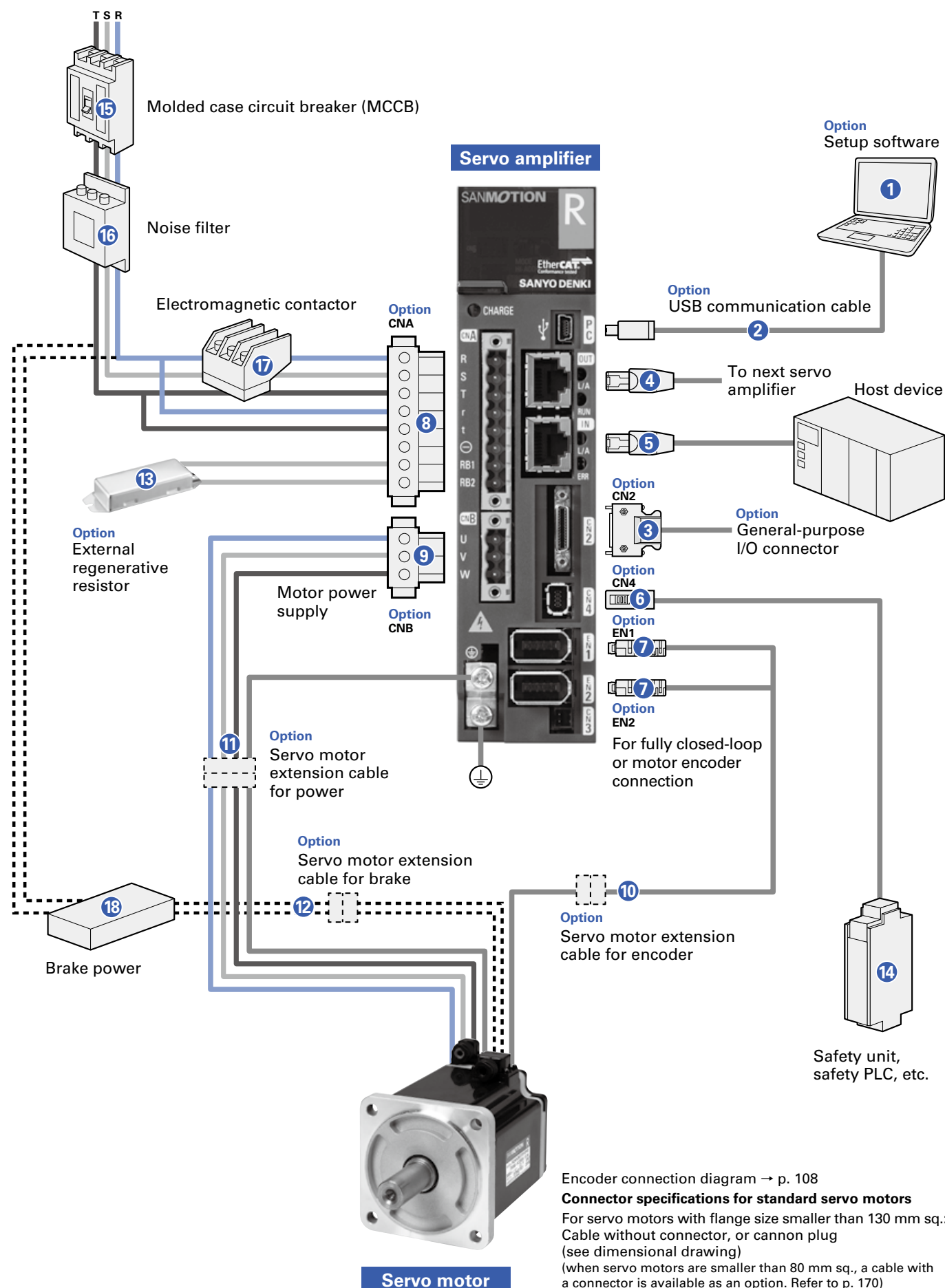
(1) Linear servo motors are not compatible with the Safety expansion.  
 (2) 600 A only. The power supply unit used together has 200 VAC input.

#### Power supply unit for 600 A



# System Configuration

**10 to 50 A** The photograph shows the 10 A model.



## Options and Peripherals (10 to 50 A)

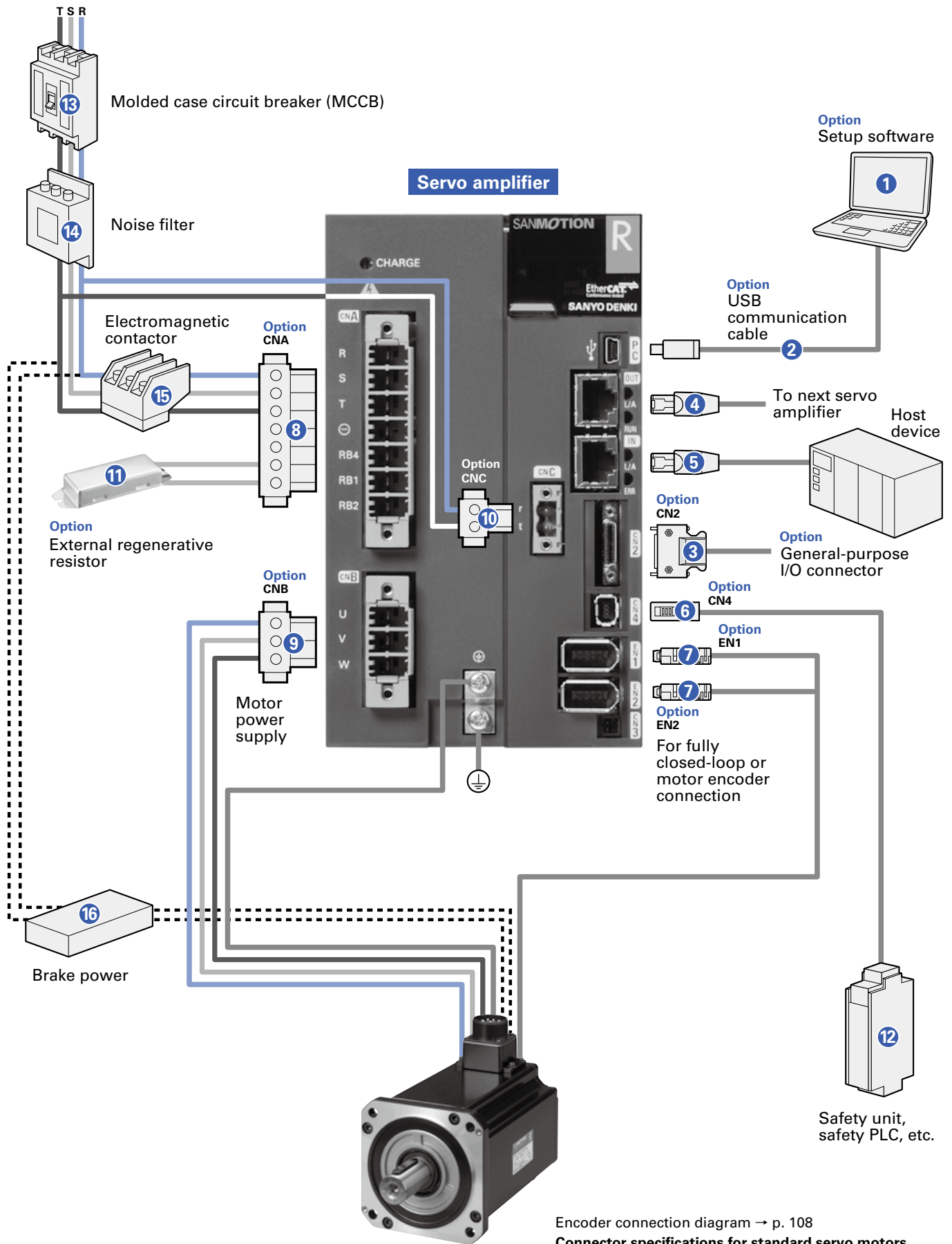
No.	Name	Model no.	Description	Page
1	Setup software	Can be downloaded from Product Information on our website.	Parameters can be set and monitored via communication with a PC.	p. 144
2	USB communication cable	AL-00896515-0□	PC communication cable for setup software	p. 166
3	CN2 connector	AL-00842383	General-purpose I/O connector	p. 150
4	OUT connector	To be provided by the customer	EtherCAT OUT (to the next servo amplifier)	—
5	IN connector	To be provided by the customer	EtherCAT IN (host device)	—
6	CN4 connector	AL-00718252-01	For safety device connection When CN4 is not used, be sure to insert the included short-circuiting connector to CN4 on the servo amplifier.	p. 150
7	EN1 connector	AL-Y0012504-01	For encoder connection	p. 150
	EN2 connector	AL-Y0012504-01	For encoder connection	p. 150
8	CNA connector	AL-00686902-01	For input power supply and regenerative resistor connections Servo amplifiers with a built-in regenerative resistor come with a CNA connector.	p. 150
9	CNB connector	AL-Y0004079-01	For servo motor connection	p. 150
10	Servo motor extension cable (Compatible with the optional servo motors with connectors for extension cables)	RS-CA7-□□-R	Absolute encoder extension cable with connectors on both ends	p. 170
		RS-CA8-□□-R	Incremental encoder extension cable with connectors on both ends	p. 170
		RS-CM4-□□-R	Power extension cable with connectors on both ends	p. 170
		RS-CB3-□□-R	Brake extension cable with connectors on both ends	p. 170
13	External regenerative resistor	REGIST-□□□□W□□□□B REGIST-500CW□□□□B	Used for special operations, such as high frequency applications that require greater power dissipation than that provided by the servo amplifier's built-in regenerative resistor	p. 167
14	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 the safety unit and safety PLC.	—
15	Molded case circuit breaker (MCCB)	To be provided by the customer	Used to protect the power line.	—
16	Noise filter	To be provided by the customer	Used to prevent external noise from the power source line.	—
17	Electromagnetic contactor	To be provided by the customer	Used to switch the power on and off.	—
18	Brake power	To be provided by the customer	Used for servo motors with brake	—

Note 1: Connector sets are also available. See respective pages.

Note 2: For the accessories and options for the Safety module, see page 102.

# System Configuration

75 A



Encoder connection diagram → p. 108  
**Connector specifications for standard servo motors**  
 For servo motors with flange size larger than 100 mm sq.:  
 Cannon plug (when the motor capacity is less than 15 kW)

Servo motor

## Options and Peripherals (75 A)

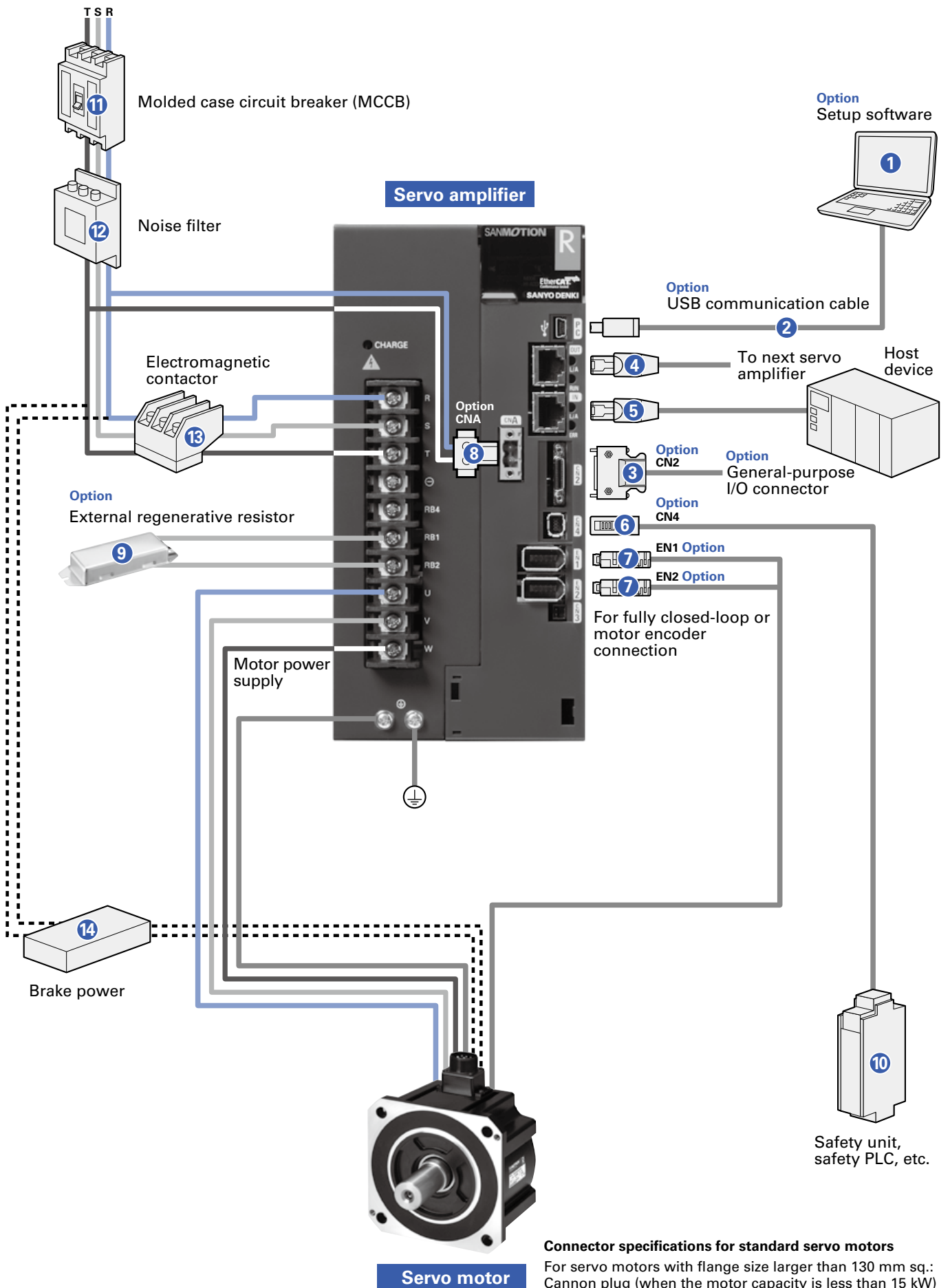
No.	Name	Model no.	Description	Page
1	Setup software	Can be downloaded from Product Information on our website.	Parameters can be set and monitored via communication with a PC.	p. 144
2	USB communication cable	AL-00896515-0□	PC communication cable for setup software	p. 166
3	CN2 connector	AL-00842383	General-purpose I/O connector	p. 151
4	OUT connector	To be provided by the customer	EtherCAT OUT (to the next servo amplifier)	—
5	IN connector	To be provided by the customer	EtherCAT IN (host device)	—
6	CN4 connector	AL-00718252-01	For safety device connection When CN4 is not used, be sure to insert the included short-circuiting connector to CN4 on the servo amplifier.	p. 151
7	EN1 connector	AL-Y0012504-01	For encoder connection	p. 151
	EN2 connector	AL-Y0012504-01	For encoder connection	p. 151
8	CNA connector	AL-Y0011766-01	For main circuit power supply and regenerative resistor connection Servo amplifiers with a built-in regenerative resistor come with a CNA connector.	p. 151
9	CNB connector	AL-Y0011768-01	For servo motor connection	p. 151
10	CNC connector	AL-Y0005159-01	For control circuit power supply connection	p. 151
11	External regenerative resistor	REGIST-□...□W□...□B REGIST-500CW□...□B	Used for special operations, such as high frequency applications that require greater power dissipation than that provided by the servo amplifier's built-in regenerative resistor	p. 167
12	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 the safety unit and safety PLC.	—
13	Molded case circuit breaker (MCCB)	To be provided by the customer	Used to protect the power line.	—
14	Noise filter	To be provided by the customer	Used to prevent external noise from the power source line.	—
15	Electromagnetic contactor	To be provided by the customer	Used to switch the power on and off.	—
16	Brake power	To be provided by the customer	Used for servo motors with brake	—

Note 1: Connector sets are also available. See respective pages.

Note 2: For the accessories and options for the Safety module, see page 102.

# System Configuration

100 A, 150 A The photograph shows the 100 A model.



## Options and Peripherals (100 A, 150 A)

No.	Name	Model no.	Description	Page
①	Setup software	Can be downloaded from Product Information on our website.	Parameters can be set and monitored via communication with a PC.	p. 144
②	USB communication cable	AL-00896515-0□	PC communication cable for setup software	p. 166
③	CN2 connector	AL-00842383	General-purpose I/O connector	p. 152
④	OUT connector	To be provided by the customer	EtherCAT OUT (to the next servo amplifier)	—
⑤	IN connector	To be provided by the customer	EtherCAT IN (host device)	—
⑥	CN4 connector	AL-00718252-01	For safety device connection When CN4 is not used, be sure to insert the included short-circuiting connector to CN4 on the servo amplifier.	p. 152
⑦	EN1 connector	AL-Y0012504-01	For encoder connection	p. 152
	EN2 connector	AL-Y0012504-01	For encoder connection	p. 152
⑧	CNA connector	AL-Y0005159-01	For control circuit power supply input	p. 152
⑨	External regenerative resistor	REGIST-□□□□W□□□□B REGIST-500CW□□□□B	Used for special operations, such as high frequency applications that require greater power dissipation than that provided by the servo amplifier's built-in regenerative resistor	p. 167
⑩	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 the safety unit and safety PLC.	—
⑪	Molded case circuit breaker (MCCB)	To be provided by the customer	Used to protect the power line.	—
⑫	Noise filter	To be provided by the customer	Used to prevent external noise from the power source line.	—
⑬	Electromagnetic contactor	To be provided by the customer	Used to switch the power on and off.	—
⑭	Brake power	To be provided by the customer	Used for servo motors with brake	—

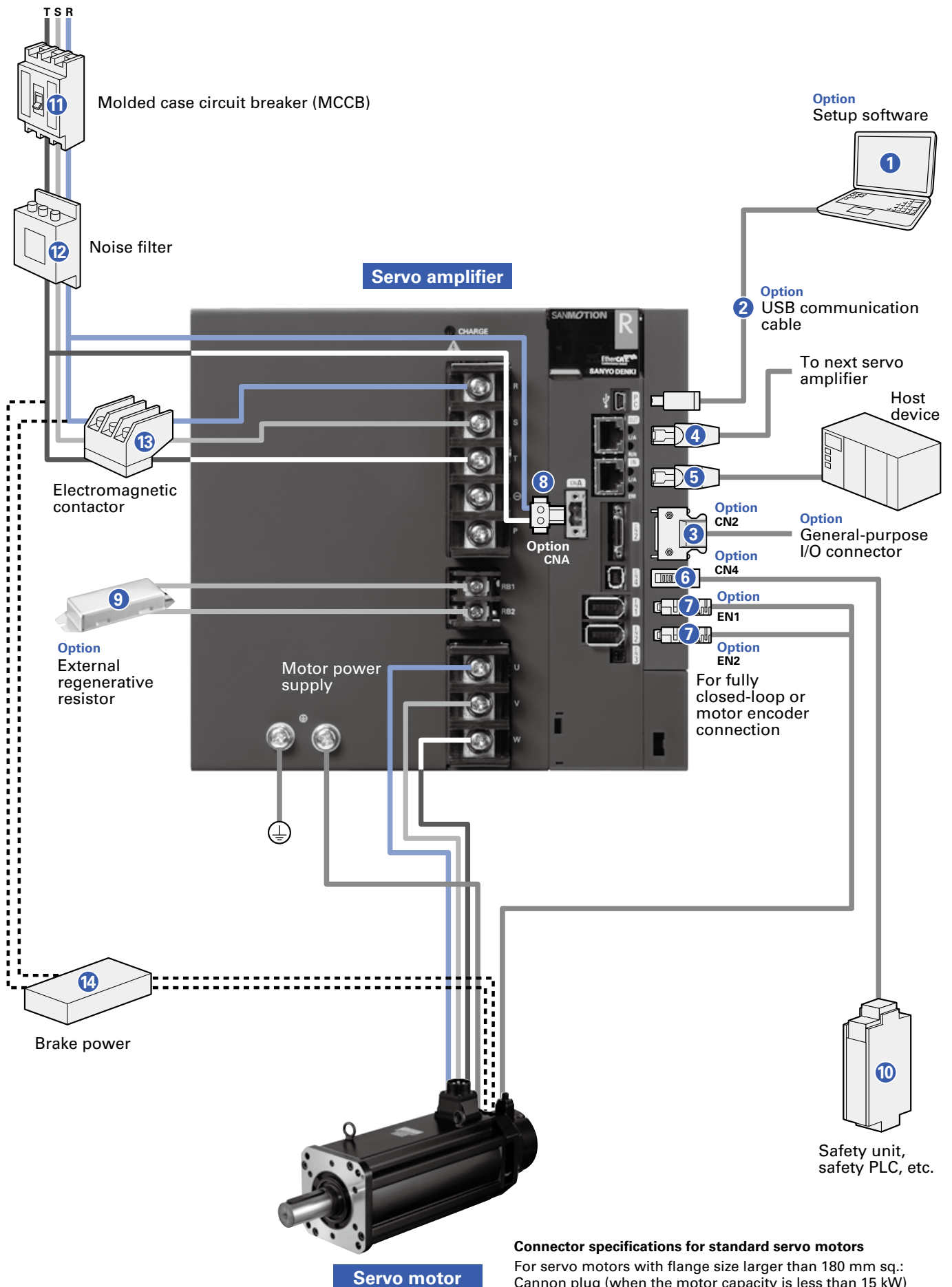
Note 1: Connector sets are also available. See respective pages.

Note 2: For the accessories and options for the Safety module, see page 102.



# System Configuration

300 A



**Connector specifications for standard servo motors**  
 For servo motors with flange size larger than 180 mm sq.:  
 Cannon plug (when the motor capacity is less than 15 kW)

## Options and Peripherals (300 A)

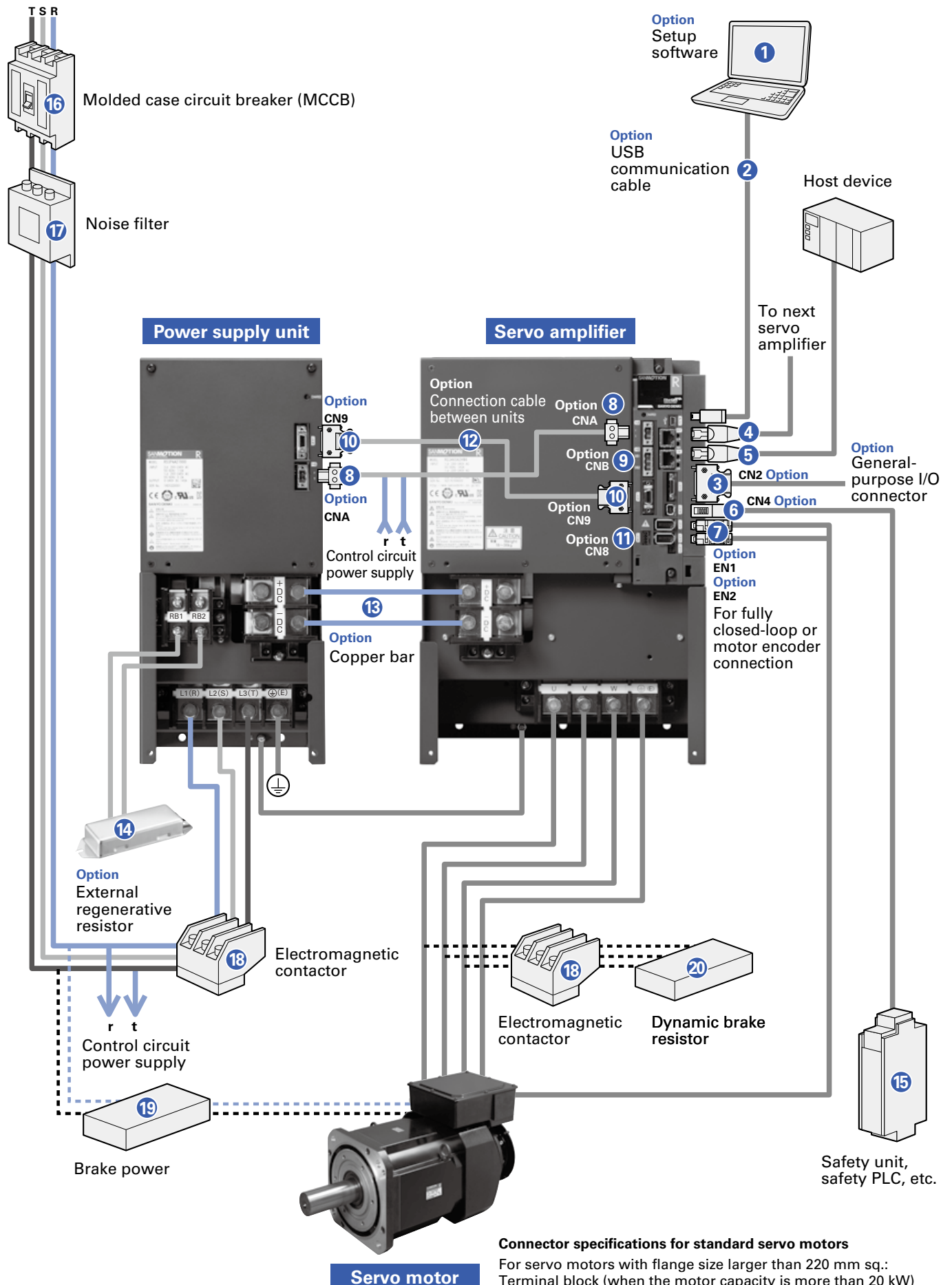
No.	Name	Model no.	Description	Page
1	Setup software	Can be downloaded from Product Information on our website.	Parameters can be set and monitored via communication with a PC.	p. 144
2	USB communication cable	AL-00896515-0□	PC communication cable for setup software	p. 166
3	CN2 connector	AL-00842383	General-purpose I/O connector	p. 152
4	OUT connector	To be provided by the customer	EtherCAT OUT (to the next servo amplifier)	—
5	IN connector	To be provided by the customer	EtherCAT IN (host device)	—
6	CN4 connector	AL-00718252-01	For safety device connection When CN4 is not used, be sure to insert the included short-circuiting connector to CN4 on the servo amplifier.	p. 152
7	EN1 connector	AL-Y0012504-01	For encoder connection	p. 152
	EN2 connector	AL-Y0012504-01	For encoder connection	p. 152
8	CNA connector	AL-Y0005159-01	For control circuit power supply input	p. 152
9	External regenerative resistor	REGIST-□□□□W□□□□B REGIST-500CW□□□□B	Used for special operations, such as high frequency applications that require greater power dissipation than that provided by the servo amplifier's built-in regenerative resistor	p. 167
10	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 the safety unit and safety PLC.	—
11	Molded case circuit breaker (MCCB)	To be provided by the customer	Used to protect the power line.	—
12	Noise filter	To be provided by the customer	Used to prevent external noise from the power source line.	—
13	Electromagnetic contactor	To be provided by the customer	Used to switch the power on and off.	—
14	Brake power	To be provided by the customer	Used for servo motors with brake	—

Note 1: Connector sets are also available. See respective pages.

Note 2: For the accessories and options for the Safety module, see page 102.

# System Configuration

600 A



**Connector specifications for standard servo motors**  
 For servo motors with flange size larger than 220 mm sq.:  
 Terminal block (when the motor capacity is more than 20 kW)

## Options and Peripherals (600 A)

No.	Name	Model no.	Description	Page
1	Setup software	Can be downloaded from Product Information on our website.	Parameters can be set and monitored via communication with a PC.	p. 144
2	USB communication cable	AL-00896515-0□	PC communication cable for setup software	p. 166
3	CN2 connector	AL-00842383	General-purpose I/O connector	p. 153
4	OUT connector	To be provided by the customer	EtherCAT OUT (to the next servo amplifier)	—
5	IN connector	To be provided by the customer	EtherCAT IN (host device)	—
6	CN4 connector	AL-00718252-01	For safety device connection When CN4 is not used, be sure to insert the included short-circuiting connector to CN4 on the servo amplifier.	p. 153
7	EN1 connector	AL-Y0012504-01	For encoder connection	p. 153
	EN2 connector	AL-Y0012504-01	For encoder connection	p. 153
8	CNA connector	AL-Y0005159-01	For input power supply and regenerative resistor connections	p. 153
9	CNB connector	AL-Y0004079-01	For dynamic brake signal	p. 153
10	CN9 connector	AL-00608710	For unit-to-unit connection (single item)	p. 153
11	CN8 connector	AL-Y0011185-01	For external alarm signal	p. 153
12	Connection cable between units	AL-00917284	To connect between power unit (CN9) and amplifier unit (CN9)	p. 166
13	Copper bar	AL-00918125-01	To connect main power supply between power unit (CN9) and amplifier unit (CN9) Terminal number: Between +DC/-DC 2-pc. set (5 mm between units)	p. 166
14	External regenerative resistor	REGIST-□□□□W□□□□B REGIST-500CW□□□□B	Used for special operations, such as high frequency applications that require greater power dissipation than that provided by the servo amplifier's built-in regenerative resistor	p. 167
15	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 the safety unit and safety PLC.	—
16	Molded case circuit breaker (MCCB)	To be provided by the customer	Used to protect the power line.	—
17	Noise filter	To be provided by the customer	Used to prevent external noise from the power source line.	—
18	Electromagnetic contactor	To be provided by the customer	Used to turn on and off the servo power or dynamic brake resistors.	—
19	Brake power	To be provided by the customer	Used for servo motors with brake	—
20	Dynamic brake resistor	To be provided by the customer	Not built in this servo amplifier. Connect as necessary.	—

Note 1: Connector sets are also available. See respective pages.

Note 2: For the accessories and options for the Safety module, see page 102.

# General Specifications

Control function	Position control	
Control system	IGBT: PWM control, sinusoidal drive	
Main Circuit Power Supply	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) <sup>(1)</sup> Single-phase: 100 to 120VAC (+10, -15%), 50/60 Hz (±3 Hz) <sup>(2)</sup>	
Control circuit power supply	Single-phase: 200 to 240 VAC (+10, -15%), 50/60 Hz (±3 Hz) Single-phase: 100 to 120 VAC (+10, -15%), 50/60 Hz (±3 Hz) <sup>(2)</sup>	
Environment	Ambient temperature	0 to +55°C
	Storage temperature	-20 to +65°C
	Operation and Storage humidity	Below 90% RH (non-condensing)
	Operation altitude	Below 1000 m
	Vibration resistance	4.9 m/s <sup>2</sup>
	Impact resistance	19.6m/s <sup>2</sup>
Structure	10 to 300 A: Built-in tray type power supply, 600 A: Separate power supply unit	

(1)  
Single-phase 200 VAC class input can be used with RS3A□□□ models only.  
Please set parameters before using single-phase input.  
(2)  
Single-phase 100 VAC class input can be used with RS3E□□□ models only.  
Please set parameters before using single-phase input.



## Performance

Speed control range	1:5000 (Internal speed command)
Frequency characteristics	1000 Hz (In high frequency sampling mode)
Permissible load moment of inertia	10 times the motor rotary inertia

## Built-in functions

Protection functions	Overcurrent, Current detection error, Overload, Regeneration error, Overheating, External error, Overvoltage, Main circuit power supply undervoltage, Main circuit power supply open phase, Control circuit power supply undervoltage, Encoder error, Overspeed, Speed control error, Speed feedback error, Excessive position deviation, Position command pulse error, Built-in memory error, Parameter error, Cooling fan error
Digital operator	Status display, Monitor display, Alarm display, Test run
Dynamic brake	10 to 300 A: Built-in, 600 A: None
Regenerative resistor	10 to 150 A: Built-in/None (selectable), 300 A, 600 A: None Note: Optional external regenerative resistors are available (10 to 600 A).
Monitor	Speed monitor (VMON) 2.0 V±10% (at 1000 min <sup>-1</sup> ), Torque (thrust force) command monitor (TCMON) 2.0 V±10% (at 100%)

## Safety standards

Servo amplifier type	Safety standards		
All EtherCAT models	North American safety standards (UL, c-UL)		UL 61800-5-1
	European directive	Low-voltage directive	IEC/EN 61800-5-1
		EMC directive	IEC/EN 61000-6-4 IEC/EN 61000-6-2 IEC 61000-6-7
	KC Mark (Korea Certification Mark)		KN 61000-6-2, KN 61000-6-4

## Functional safety specifications

Servo amplifier type		IEC/EN 61800-5-2:2016	Description	Safety level	
RS3□□□A□H□4 (Safe Torque Off function)	RS3□□□A□H□E (Safety)			EN 61508 IEC/EN 62061	ISO 13849-1: 2015 EN ISO 13849-1: 2015
✓	✓	STO	Safe Torque Off	SIL3 SILCL3	Cat.3 PL e
–	✓	SS1	Safe Stop 1		
–	✓	SS2	Safe Stop 2		
–	✓	SOS	Safe Operating Stop		
–	✓	SLS	Safely-Limited Speed		
–	✓	SBC	Safe Brake Control		
–	✓	SSM	Safe Speed Monitor		

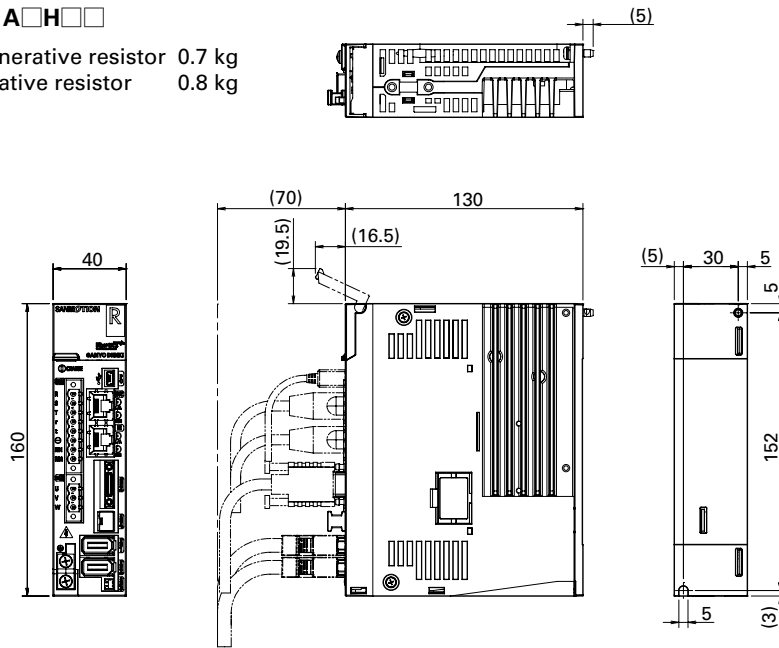
## EtherCAT interface specifications

Physical layer	IEC61158-2, IEEE802.3u 100BASE-TX
Data link layer	IEC 61158-3/4 Type 12
Application layer	IEC 61158-5/6 Type 12
Device profile	IEC 61800-7 Profile Type 1 (CiA 402), CoE (CANopen over EtherCAT), FoE (File access over EtherCAT)
Communication port	RJ45 connector (2 ports)
Baud rate	100 Mbps (Full duplex)
Max. no. of nodes	65535 nodes
Transmission distance/topology	Max. 100 m (between nodes)/Line
Communication cable	Cat5e twisted pair cable (straight or cross cable)
Communication object	SDO (Service Data Object), PDO (Process Data Object)
Minimum communication cycle	125 μs (62.5 μs: Speed and torque control only)
Possible number of PDO-mapped objects	Output: max. 31 objects, Input: max. 31 objects, Total: max. 62 objects
Synchronization mode	SYNC0/1 event synchronization, Asynchronous, SM2 event synchronization
Operation mode	Profile Position mode, Profile Velocity mode, Profile Torque mode, Homing mode, Cyclic Synchronous Position mode, Cyclic Synchronous Velocity mode, Cyclic Synchronous Torque mode
LED indicator	Port 0/1 link display, RUN display, ERROR display
General-purpose I/O	Input x 7, output x 2 (total of 9)

# Dimensions [Unit : mm] Refer to p. 104 for dimensional drawings of Safety.

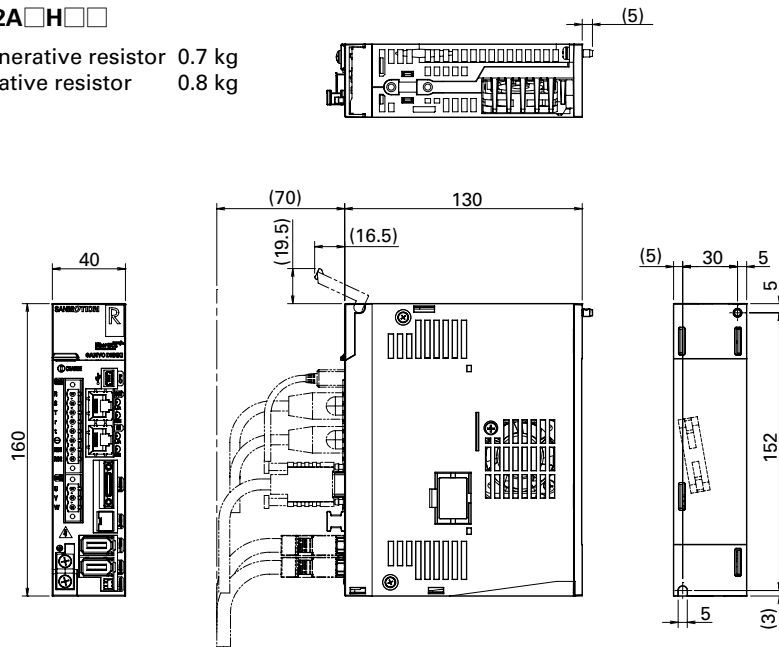
## 10 A - Model no.: RS3□01A□H□□

Mass: Without built-in regenerative resistor 0.7 kg  
 With built-in regenerative resistor 0.8 kg



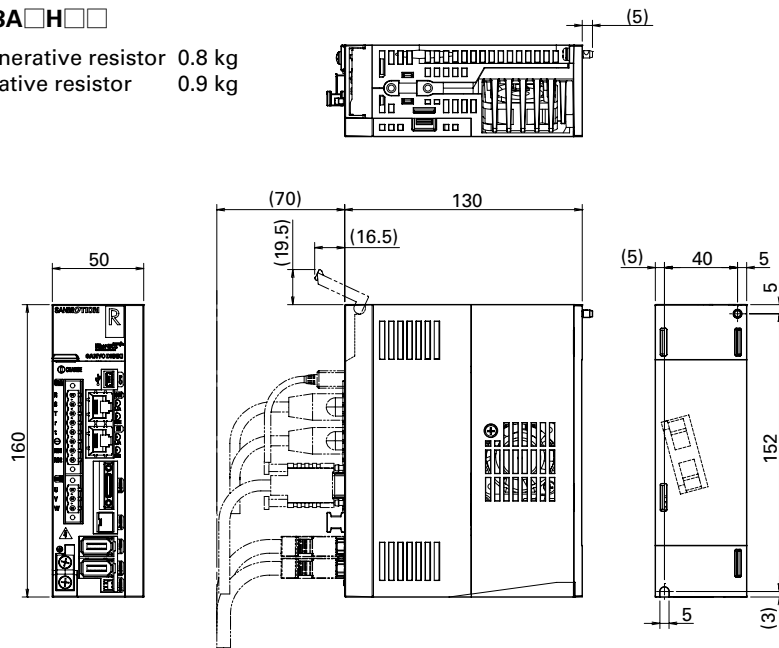
## 20 A - Model no.: RS3□02A□H□□

Mass: Without built-in regenerative resistor 0.7 kg  
 With built-in regenerative resistor 0.8 kg



## 30 A - Model no.: RS3□03A□H□□

Mass: Without built-in regenerative resistor 0.8 kg  
 With built-in regenerative resistor 0.9 kg

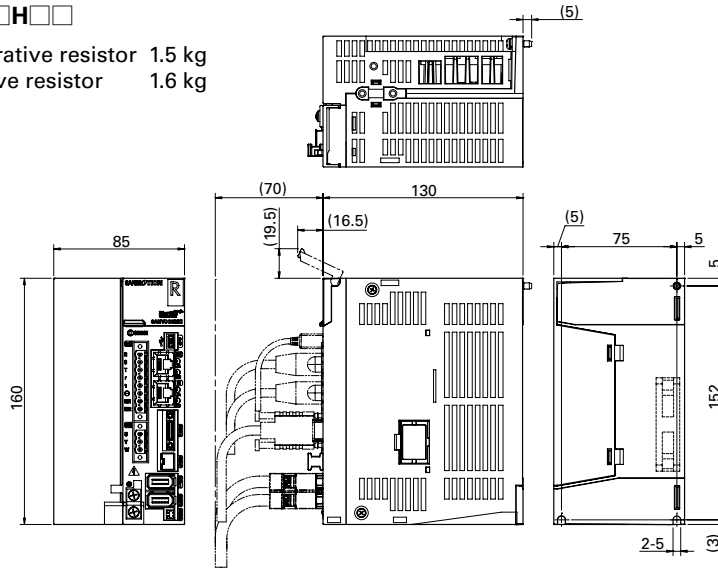


Features	List of Compatible Servo Amplifiers and Servo Motors	Standard Model Number List	Analog/Pulse	Servo Amplifiers: EtherCAT	Servo Amplifiers: R 3E Model Built-in Positioning Function	Safety	Servo Motors: Rotary Motor	Options	Linear Servo Motors	SANMOTION S	Selection Guide
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# Dimensions [Unit : mm] Refer to p. 105 for dimensional drawings of Safety.

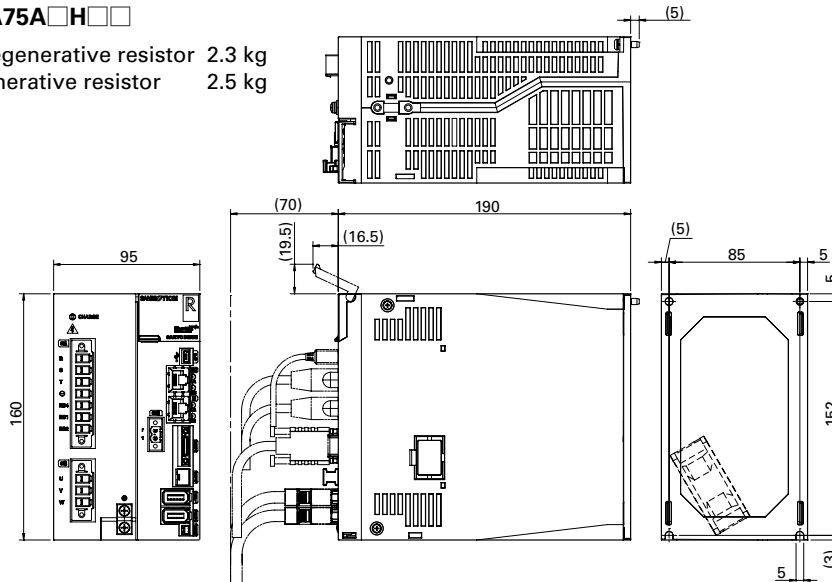
## 50 A - Model no.: RS3A05A□H□□

Mass: Without built-in regenerative resistor 1.5 kg  
 With built-in regenerative resistor 1.6 kg



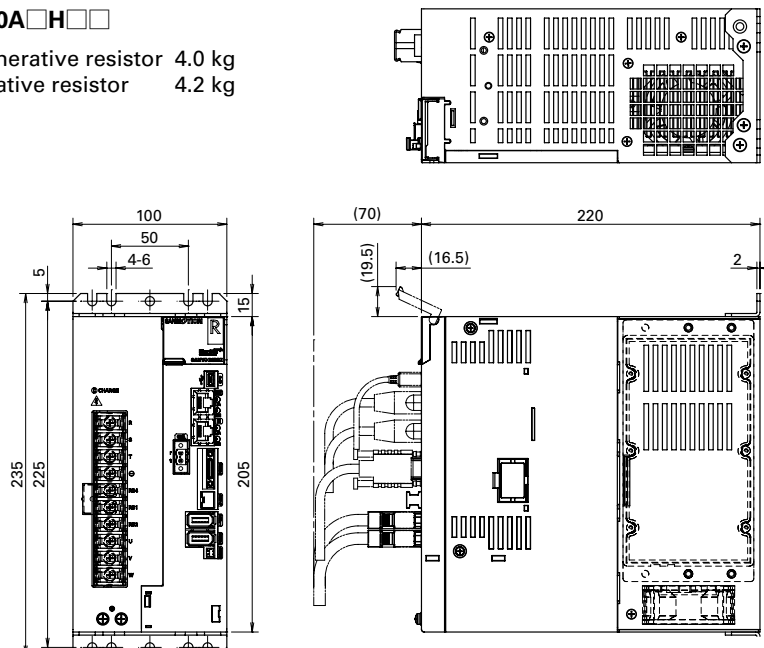
## 75 A - Model no.: RS3A75A□H□□

Mass: Without built-in regenerative resistor 2.3 kg  
 With built-in regenerative resistor 2.5 kg



## 100 A - Model no.: RS3A10A□H□□

Mass: Without built-in regenerative resistor 4.0 kg  
 With built-in regenerative resistor 4.2 kg

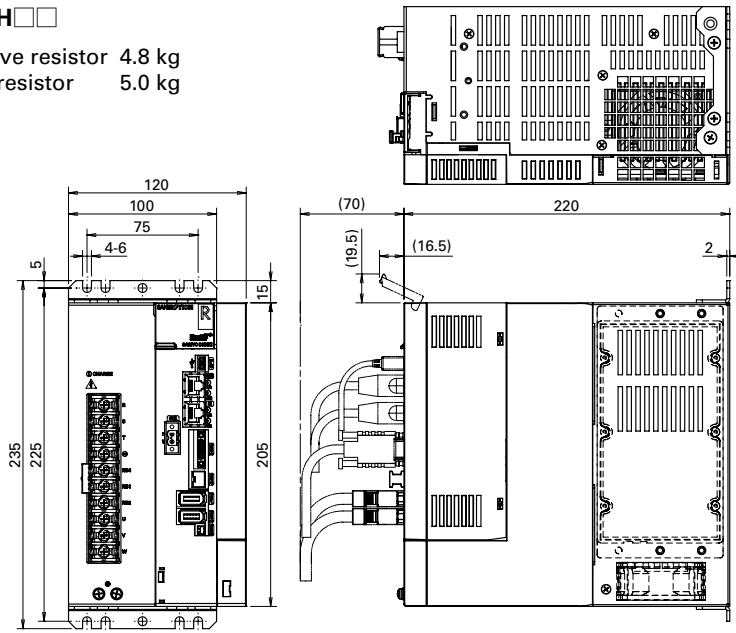




Refer to pp. 105 to 106 for dimensional drawings of Safety.

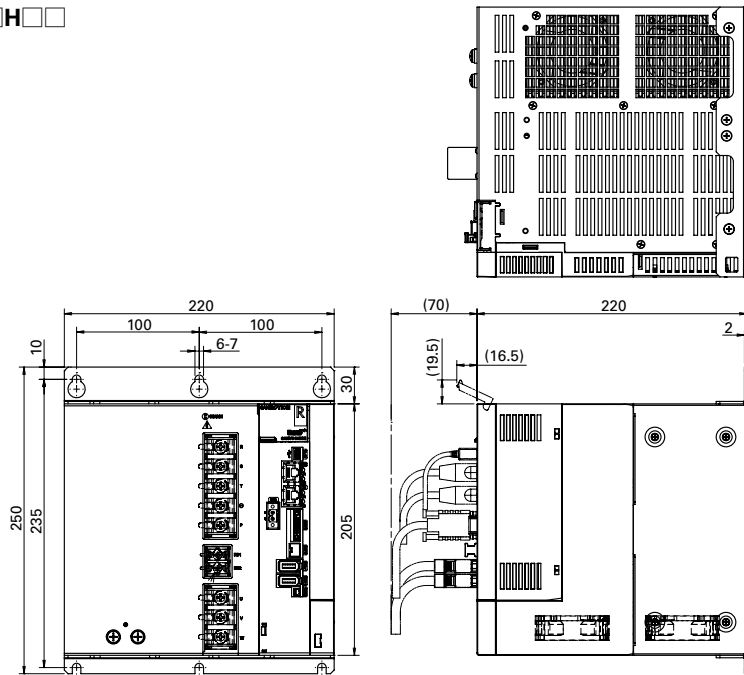
**150 A - Model no.: RS3A15A□H□□**

Mass: Without built-in regenerative resistor 4.8 kg  
 With built-in regenerative resistor 5.0 kg



**300 A - Model no.: RS3A30A□H□□**

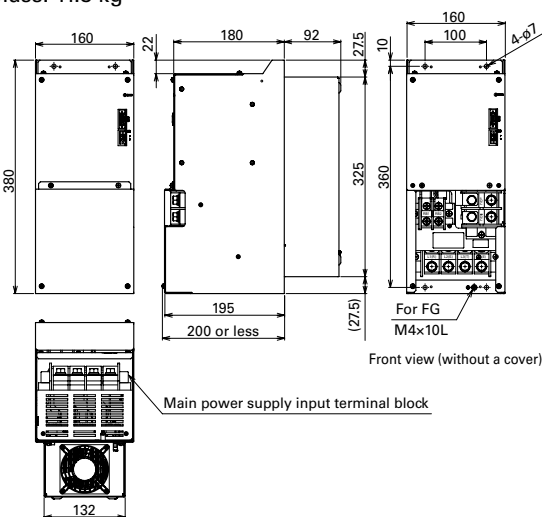
Mass: 9.8 kg



**600 A**

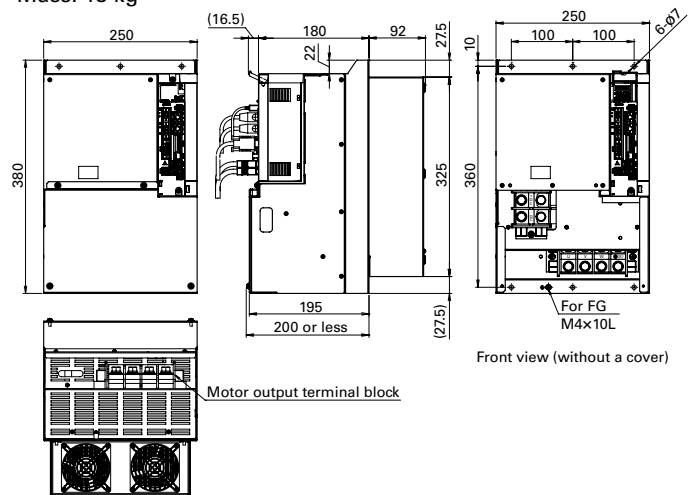
Power supply unit model no.: RS3PAA27000

Mass: 11.8 kg



Amplifier unit model no.: RS3A60A□HL□

Mass: 18 kg

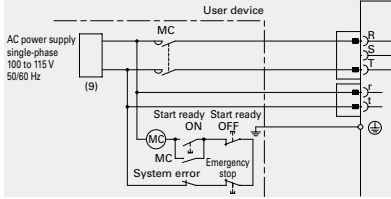


Features	List of Compatible Servo Amplifiers and Servo Motors	Standard Model Number List	Analog/Pulse	Servo Amplifiers: R 3E Model EtherCAT Built-in Positioning Function	Safety	Servo Motors: Rotary Motor	Options	Linear Servo Motors	SANMOTION S	Selection Guide
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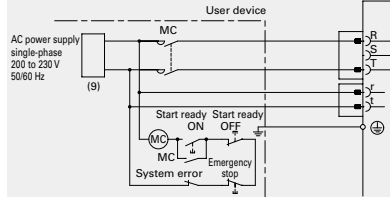
# External Wiring Diagram

## 10 to 300 A

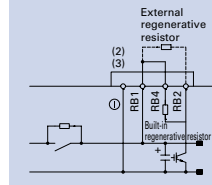
Single-phase 100 V (amplifier capacity 10 to 30 A)



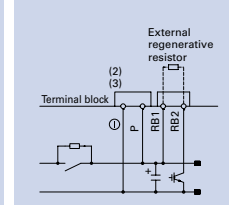
Single-phase 200 V (amplifier capacity 10 to 50 A)



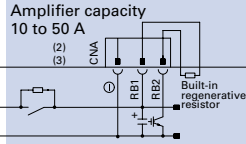
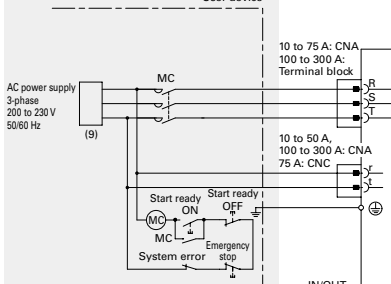
Amplifier capacity  
75 A: CNA  
100 A, 150 A: Terminal block



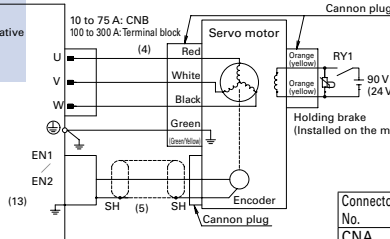
Amplifier capacity  
300 A



3-Phase 200 V

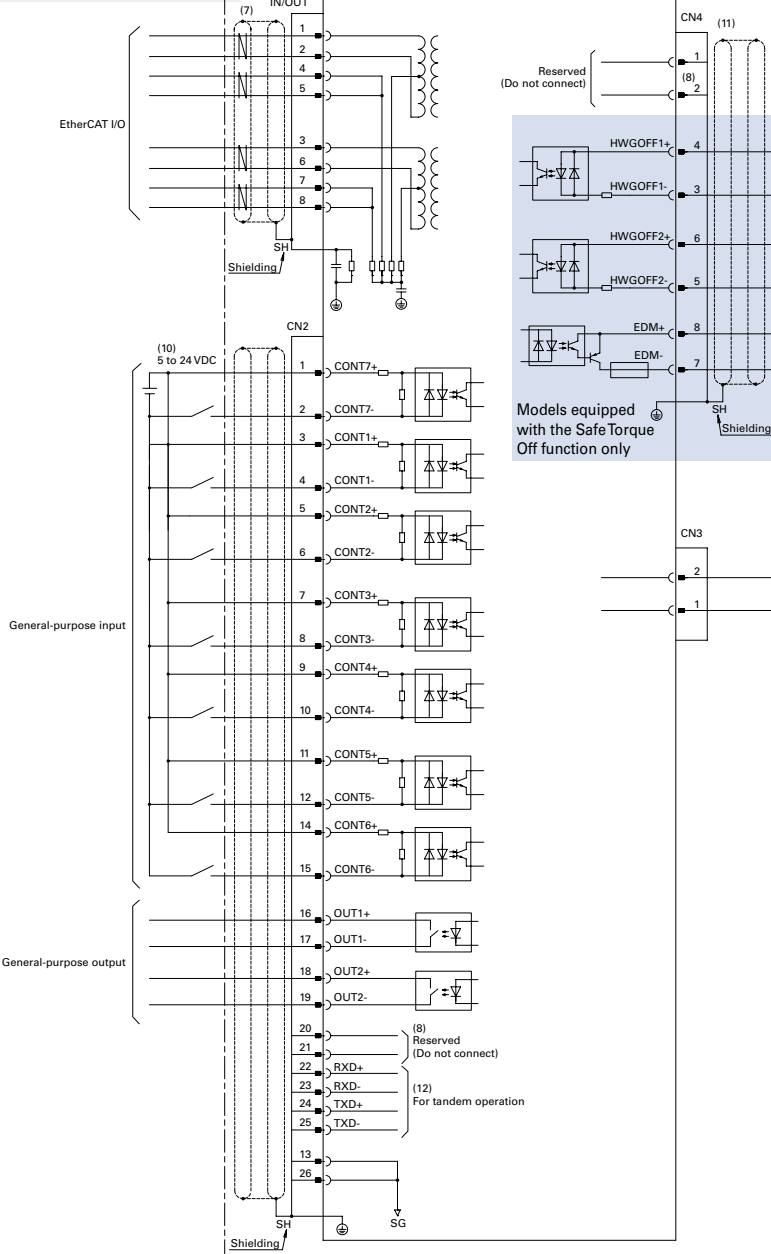


Servo amplifier

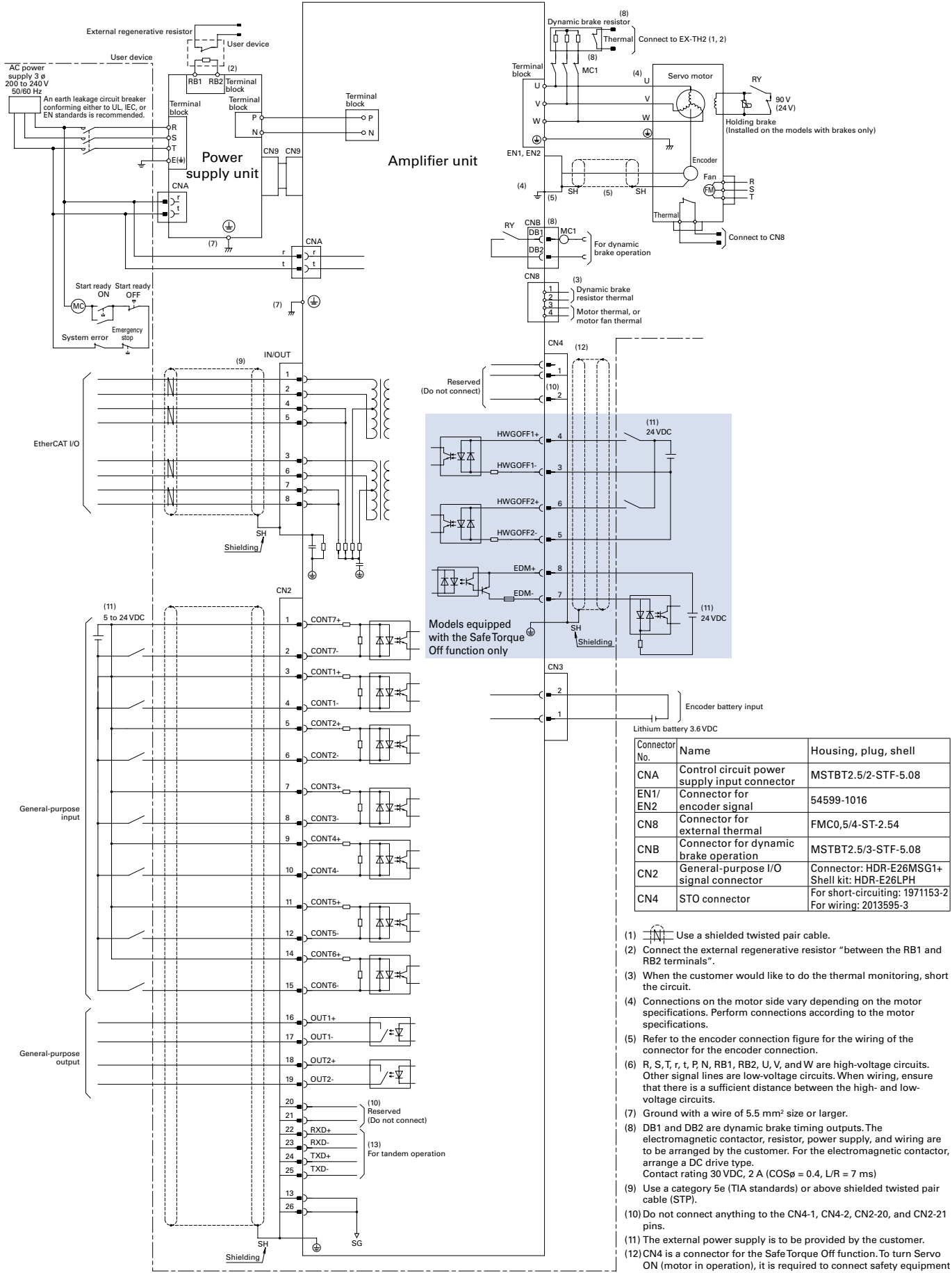


Connector No.	Name	Housing, plug, shell
CNA 10 to 50 A	Main/control circuit power supply input connector	MSTBT2.5/8-STF-5.08LUB
CNA 75 A	Main power supply input connector	PC5/7-STF1-7.62
CNC 75 A	Control circuit power supply input connector	MSTBT2.5/2-STF-5.08
CNA 100 A, 150 A, 300 A	Control circuit power supply input connector	MSTBT2.5/2-STF-5.08
CNB 10 to 50 A	Servo motor power line connector	MSTBT2.5/3-STF-5.08
CNB 75 A	Servo motor power line connector	PC5/3-STF1-7.62
EN1/ EN2	Connector for encoder signal	54599-1016
CN2	General-purpose I/O signal connector	Connector: HDR-E26MSG1+ Shell kit: HDR-E26LPH
CN4	STO connector	For short-circuiting: 1971153-2 For wiring: 2013595-3

- Use a shielded twisted pair cable.
- For amplifier capacity 10 A, 20 A, 30 A, 50 A: Connect the external regenerative resistor "between the RB1 and RB2 terminals". When using an external regenerative resistor, remove the built-in regenerative resistor wiring that is connected to the RB1 terminal and RB2 terminal and then connect the external regenerative resistor "between the RB1 and RB2 terminals".  
For amplifier capacity 75 A, 100 A, 150 A: When using a built-in regenerative resistor, short circuit "between the RB1 and RB4 terminals". When using an external regenerative resistor, remove the short bar that is connected to the RB1 terminal and RB4 terminal and then connect the regenerative resistor "between the RB1 and RB2 terminals".  
For amplifier capacity 300 A: Connect an external regenerative resistor "between the RB1 and RB2 terminals".
- ⊖ and P (300 A only) terminals are used for maintenance (high-voltage circuits). Do not wire to this terminal.
- Connections on the motor side vary depending on the motor specifications. The indications of red, white, black, green and orange apply when the motor power and brake lines are the lead type. When they are the cannon plug type, perform connections according to the motor specifications.
- Refer to the encoder wiring diagram for the wiring of the connector for the encoder connection.
- R, S, T, r, t, ⊖, RB1, RB2, RB4, U, V, and W are high-voltage circuits. Other signal lines are low-voltage circuits. When wiring, ensure that there is a sufficient distance between the high- and low-voltage circuits.
- Use a category 5e (TIA standards) or above shielded twisted pair cable (STP).
- Do not connect anything to the CN4-1, CN4-2, CN2-20, and CN2-21 pins.
- Installing an earth leakage circuit breaker conforming either to UL, IEC, or EN standards is recommended. Do not connect the S phase for the single-phase power supply amplifier.
- The external power supply is to be provided by the customer.
- CN4 is a connector for the Safe Torque Off function. To turn Servo ON (motor in operation), it is required to connect safety equipment to CN4 and get STO enabled. If not using STO, be sure to insert the short-circuiting STO connector (Mfr. part no.: 1971153-2) to CN4.
- The CN2-22 to -25 pins are used for tandem operations.
- When using an incremental encoder in a semi-closed system, connect to EN2.



# 600 A



Connector No.	Name	Housing, plug, shell
CNA	Control circuit power supply input connector	MSTBT2.5/2-STF-5.08
EN1/EN2	Connector for encoder signal	54599-1016
CN8	Connector for external thermal	FMC0,5/4-ST-2.54
CNB	Connector for dynamic brake operation	MSTBT2.5/3-STF-5.08
CN2	General-purpose I/O signal connector	Connector: HDR-E26MSG1+ Shell kit: HDR-E26LPH
CN4	STO connector	For short-circuiting: 1971153-2 For wiring: 2013595-3

- (1) Use a shielded twisted pair cable.
- (2) Connect the external regenerative resistor "between the RB1 and RB2 terminals".
- (3) When the customer would like to do the thermal monitoring, short the circuit.
- (4) Connections on the motor side vary depending on the motor specifications. Perform connections according to the motor specifications.
- (5) Refer to the encoder connection figure for the wiring of the connector for the encoder connection.
- (6) R, S, T, r, t, P, N, RB1, RB2, U, V, and W are high-voltage circuits. Other signal lines are low-voltage circuits. When wiring, ensure that there is a sufficient distance between the high- and low-voltage circuits.
- (7) Ground with a wire of 5.5 mm<sup>2</sup> size or larger.
- (8) DB1 and DB2 are dynamic brake timing outputs. The electromagnetic contactor, resistor, power supply, and wiring are to be arranged by the customer. For the electromagnetic contactor, arrange a DC drive type. Contact rating 30 VDC, 2 A (COSφ = 0.4, L/R = 7 ms)
- (9) Use a category 5e (TIA standards) or above shielded twisted pair cable (STP).
- (10) Do not connect anything to the CN4-1, CN4-2, CN2-20, and CN2-21 pins.
- (11) The external power supply is to be provided by the customer.
- (12) CN4 is a connector for the Safe Torque Off function. To turn Servo ON (motor in operation), it is required to connect safety equipment to CN4 and get STO enabled. If not using STO, be sure to insert the short-circuiting STO connector (Mfr. part no.: 1971153-2) to CN4.
- (13) The CN2-22 to -25 pins are used for tandem operations.
- (14) When using an incremental encoder in a semi-closed system, connect to EN2.



# Servo Amplifiers

## R 3E Model Built-in Positioning Function type

Servo Amplifier Capacity: 10 to 600 A

More evolved AC servo amplifiers that provide improved basic performance such as high responsiveness, and are more eco-efficient and easier to use.

The need for a positioning control unit is eliminated, simplifying the system.

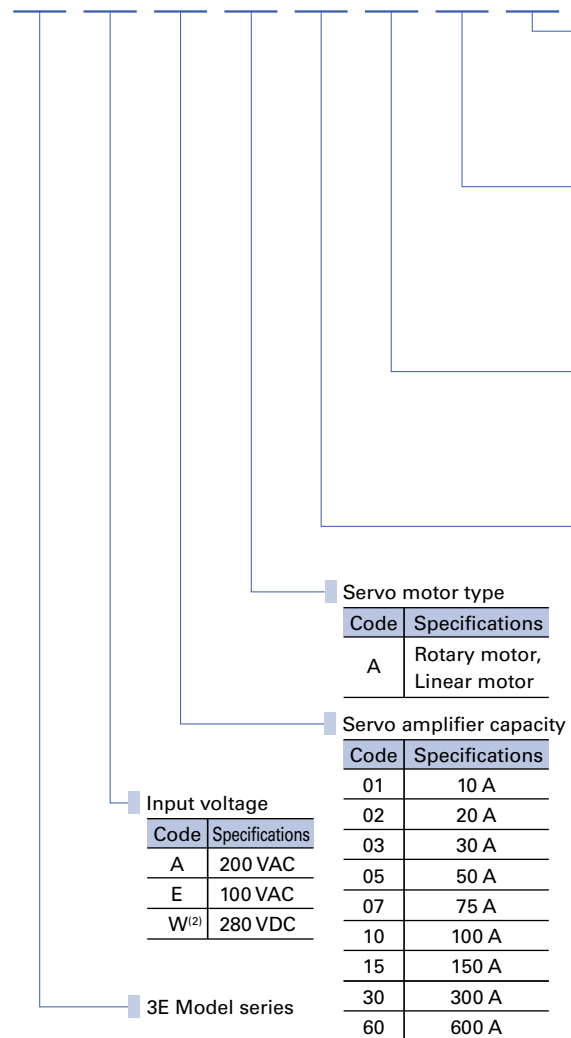


### How to read model numbers

Note that not all the possible combinations of the numbers and characters below are valid. Also, some of the numbers/characters listed below are for optional models. For model numbers valid as standard products, refer to "Standard Model Number List".

#### Servo amplifier

**RS3 A 01 A 0 C A 4**



#### Option 2

Code	Safe Torque Off function	Safety
4	Available (with delay circuit)	None
E	Available (with delay circuit)	Available <sup>(1)</sup>

#### Option 1

Code	Amplifier capacity	Specifications
A	100 to 150 A	With built-in regenerative resistor & With DB resistor
L	10 to 300 A	Without built-in regenerative resistor & With DB resistor
M	600 A	Without built-in regenerative resistor & Without DB resistor

#### Interface type

Code	Specifications
C	Parallel interface
F	Serial interface (RS-485)

#### Encoder connection type (Rotary motor)

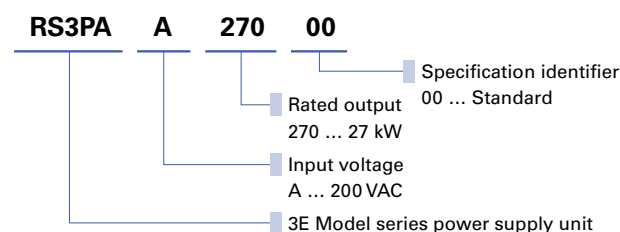
Code	EN1 (Motor encoder)	EN2 (Motor encoder or external encoder)
0	Absolute encoder	—
2	Absolute encoder	Incremental encoder for motor / External incremental encoder for fully closed-loop systems
8	Incremental encoder	—
A	Incremental encoder	External incremental encoder for fully closed-loop systems

#### Encoder connection type (Linear motor)

Code	EN1 (Linear encoder)	EN2 (Hall sensor)
A	Incremental encoder	Line driver
B	Incremental encoder	Open collector

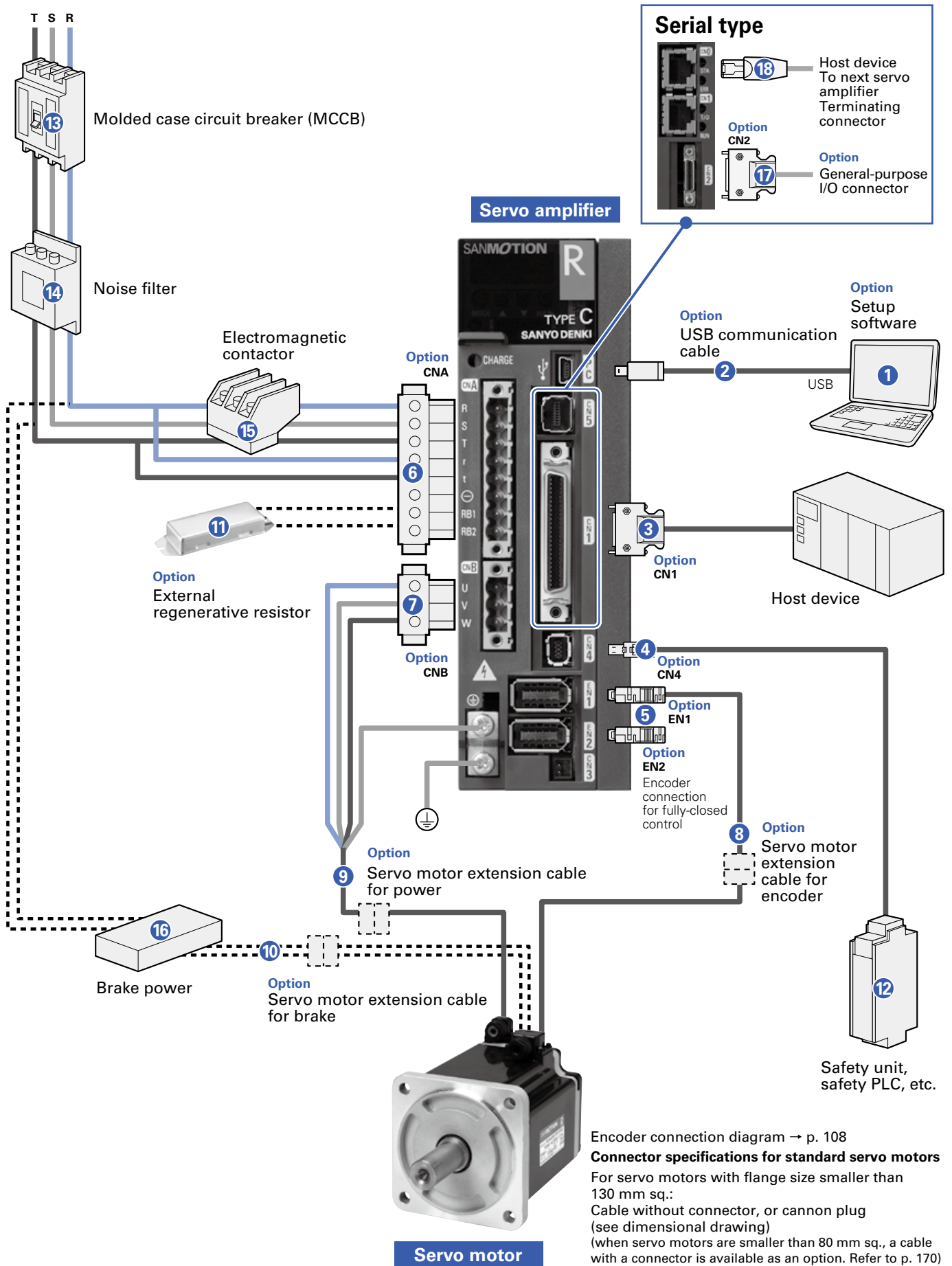
(1) Linear servo motors are not compatible with the Safety expansion.  
 (2) 600 A only. The power supply unit used together has 200 VAC input.

#### Power supply unit for 600 A



# System Configuration

**10 to 50 A Parallel type** The photograph shows the 30 A model.



## Options and Peripherals (10 to 50 A)

### Parallel type

No.	Name	Model no.	Description	Page
1	Setup software	Can be downloaded from Product Information on our website.	Parameters can be set and monitored via communication with a PC.	p. 144
2	USB communication cable	AL-00896515-0□	PC communication cable for setup software	p. 166
3	CN1 connector	AL-00385594	For controller connection	p. 154
4	CN4 connector	AL-00718252-01	For safety device connection When CN4 is not used, be sure to insert the included short-circuiting connector to CN4 on the servo amplifier.	p. 154
5	EN1 connector	AL-Y0012504-01	For encoder connection	p. 154
	EN2 connector	AL-Y0012504-01	For encoder connection	p. 154
6	CNA connector	AL-00686902-01	For input power supply and regenerative resistor connections Servo amplifiers with a built-in regenerative resistor come with a CNA connector.	p. 154
7	CNB connector	AL-Y0004079-01	For servo motor connection	p. 154
8	Servo motor extension cable (Compatible with the optional servo motors with connectors for extension cables)	RS-CA7-□□-R	Absolute encoder extension cable with connectors on both ends	p. 170
		RS-CA8-□□-R	Incremental encoder extension cable with connectors on both ends	p. 170
		RS-CM4-□□-R	Power extension cable with connectors on both ends	p. 170
		RS-CB3-□□-R	Brake extension cable with connectors on both ends	p. 170
9				
10				
11	External regenerative resistor	REGIST-□□□W□…□B REGIST-500CW□…□B	Used for special operations, such as high frequency applications that require greater power dissipation than that provided by the servo amplifier's built-in regenerative resistor	p. 167
12	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 the safety unit and safety PLC.	—
13	Molded case circuit breaker (MCCB)	To be provided by the customer	Used to protect the power line.	—
14	Noise filter	To be provided by the customer	Used to prevent external noise from the power source line.	—
15	Electromagnetic contactor	To be provided by the customer	Used to switch the power on and off.	—
16	Brake power	To be provided by the customer	Used for servo motors with brake	—

**Serial type** The serial type has the same options as the parallel type and also the following options.

No.	Name	Model no.	Description	Page
17	CN2 connector	AL-00842383	General-purpose I/O connector	p. 158
18	CN0, CN1 connectors	AL-01101864	For terminating resistor connection	p. 166
		AL-01101866-0□	Amplifier-amplifier Modbus communication cable	p. 166
		AL-01101867-□□	Controller-amplifier Modbus communication cable	p. 166

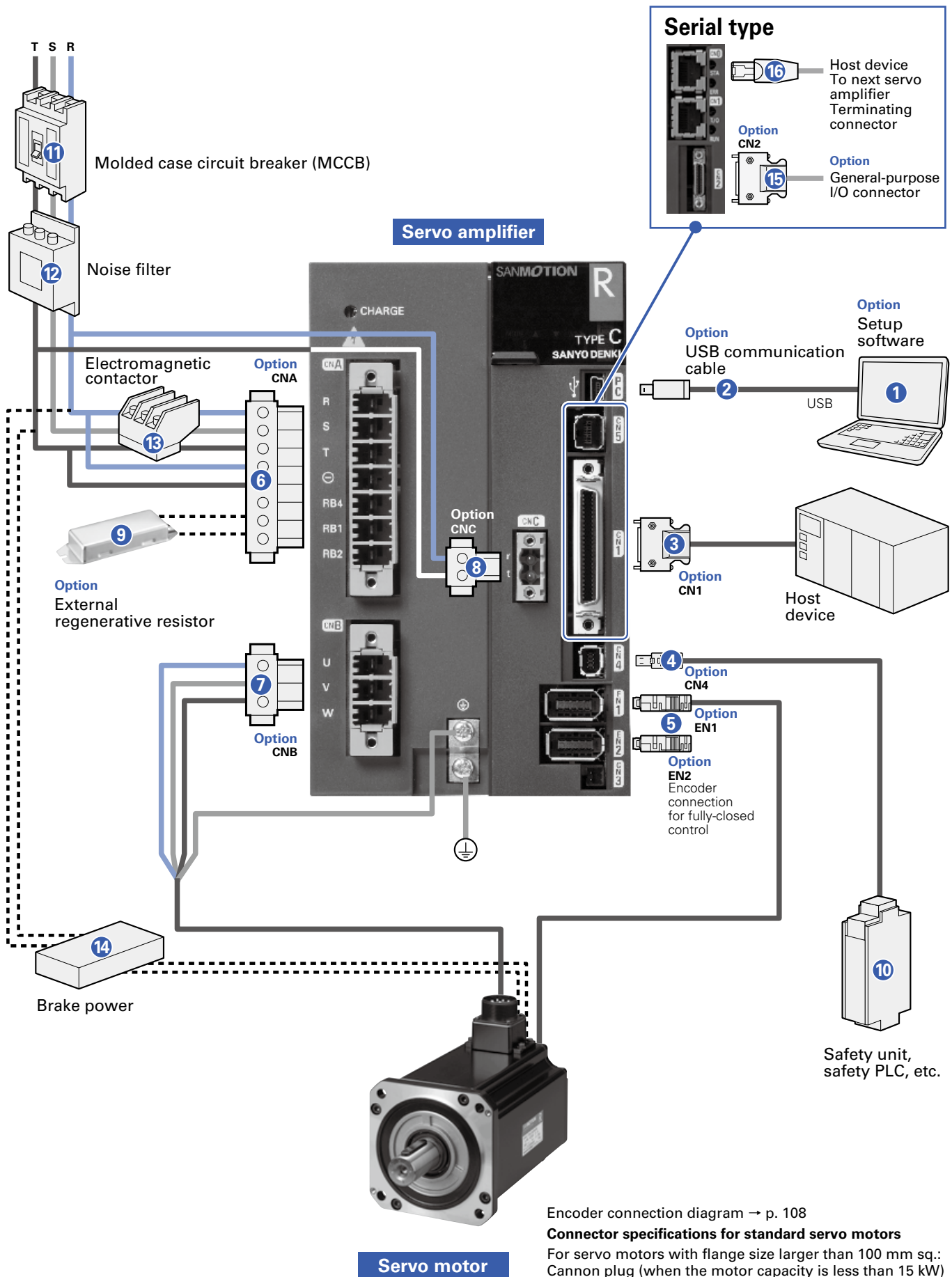
Note 1: Connector sets are also available. See respective pages.

Note 2: For the accessories and options for the Safety module, see page 102.



# System Configuration

## 75 A Parallel type



## Options and Peripherals (75 A)

### Parallel type

No.	Name	Model no.	Description	Page
1	Setup software	Can be downloaded from Product Information on our website.	Parameters can be set and monitored via communication with a PC.	p. 144
2	USB communication cable	AL-00896515-0□	PC communication cable for setup software	p. 166
3	CN1 connector	AL-00385594	For controller connection	p. 155
4	CN4 connector	AL-00718252-01	For safety device connection When CN4 is not used, be sure to insert the included short-circuiting connector to CN4 on the servo amplifier.	p. 155
5	EN1 connector	AL-Y0012504-01	For encoder connection	p. 155
	EN2 connector	AL-Y0012504-01	For encoder connection	p. 155
6	CNA connector	AL-Y0011766-01	For input power supply and regenerative resistor connections Servo amplifiers with a built-in regenerative resistor come with a CNA connector.	p. 155
7	CNB connector	AL-Y0011768-01	For servo motor connection	p. 155
8	CNC connector	AL-Y0005159-01	For control circuit power supply connection	p. 155
9	External regenerative resistor	REGIST-□□□W□□□□B REGIST-500CW□□□□B	Used for special operations, such as high frequency applications that require greater power dissipation than that provided by the servo amplifier's built-in regenerative resistor	p. 167
10	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 the safety unit and safety PLC.	—
11	Molded case circuit breaker (MCCB)	To be provided by the customer	Used to protect the power line.	—
12	Noise filter	To be provided by the customer	Used to prevent external noise from the power source line.	—
13	Electromagnetic contactor	To be provided by the customer	Used to switch the power on and off.	—
14	Brake power	To be provided by the customer	Used for servo motors with brake	—

**Serial type** The serial type has the same options as the parallel type and also the following options.

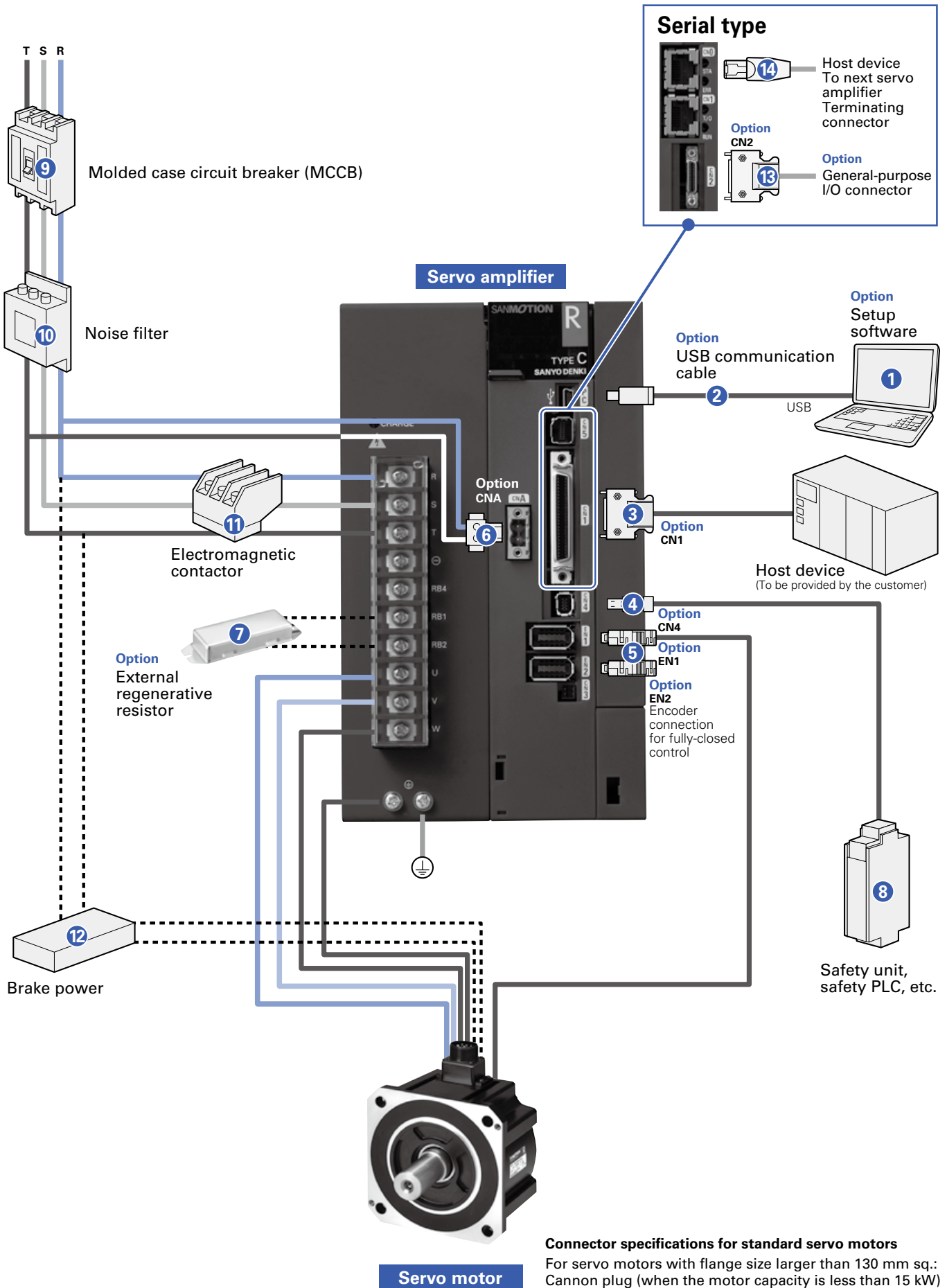
No.	Name	Model no.	Description	Page
15	CN2 connector	AL-00842383	General-purpose I/O connector	p. 159
16	CN0, CN1 connectors	AL-01101864	For terminating resistor connection	p. 166
		AL-01101866-0□	Amplifier-amplifier Modbus communication cable	p. 166
		AL-01101867-□□	Controller-amplifier Modbus communication cable	p. 166

Note 1: Connector sets are also available. See respective pages.

Note 2: For the accessories and options for the Safety module, see page 102.

# System Configuration

**100 A, 150 A Parallel type** The photograph shows the 150 A model.



**Connector specifications for standard servo motors**  
 For servo motors with flange size larger than 130 mm sq.:  
 Cannon plug (when the motor capacity is less than 15 kW)

## Options and Peripherals (100 A, 150 A)

### Parallel type

No.	Name	Model no.	Description	Page
1	Setup software	Can be downloaded from Product Information on our website.	Parameters can be set and monitored via communication with a PC.	p. 144
2	USB communication cable	AL-00896515-0□	PC communication cable for setup software	p. 166
3	CN1 connector	AL-00385594	For controller connection	p. 156
4	CN4 connector	AL-00718252-01	For safety device connection When CN4 is not used, be sure to insert the included short-circuiting connector to CN4 on the servo amplifier.	p. 156
5	EN1 connector	AL-Y0012504-01	For encoder connection	p. 156
	EN2 connector	AL-Y0012504-01	For encoder connection	p. 156
6	CNA connector	AL-Y0005159-01	For control circuit power supply input	p. 156
7	External regenerative resistor	REGIST-□□□□W□□□□B, REGIST-500CW□□□□B	Used for special operations, such as high frequency applications that require greater power dissipation than that provided by the servo amplifier's built-in regenerative resistor	p. 167
8	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 the safety unit and safety PLC.	—
9	Molded case circuit breaker (MCCB)	To be provided by the customer	Used to protect the power line.	—
10	Noise filter	To be provided by the customer	Used to prevent external noise from the power source line.	—
11	Electromagnetic contactor	To be provided by the customer	Used to switch the power on and off.	—
12	Brake power	To be provided by the customer	Used for servo motors with brake	—

**Serial type** The serial type has the same options as the parallel type and also the following options.

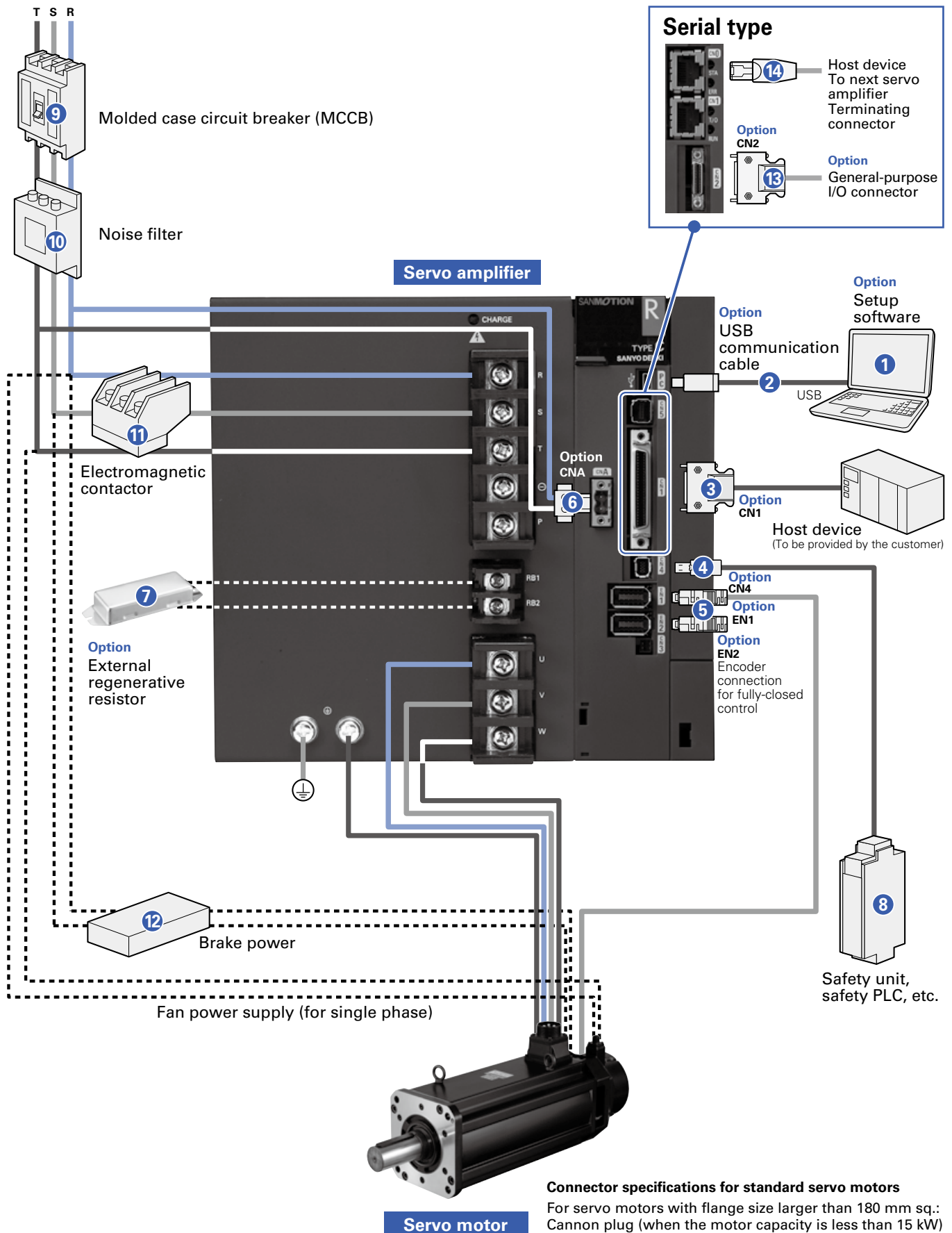
No.	Name	Model no.	Description	Page
13	CN2 connector	AL-00842383	General-purpose I/O connector	p. 160
14	CN0, CN1 connectors	AL-01101864	For terminating resistor connection	p. 166
		AL-01101866-0□	Amplifier-amplifier Modbus communication cable	p. 166
		AL-01101867-□□	Controller-amplifier Modbus communication cable	p. 166

Note 1: Connector sets are also available. See respective pages.

Note 2: For the accessories and options for the Safety module, see page 102.

# System Configuration

## 300 A Parallel type



## Options and Peripherals (300 A)

### Parallel type

No.	Name	Model no.	Description	Page
1	Setup software	Can be downloaded from Product Information on our website.	Parameters can be set and monitored via communication with a PC.	p. 144
2	USB communication cable	AL-00896515-0□	PC communication cable for setup software	p. 166
3	CN1 connector	AL-00385594	For controller connection	p. 156
4	CN4 connector	AL-00718252-01	For safety device connection When CN4 is not used, be sure to insert the included short-circuiting connector to CN4 on the servo amplifier.	p. 156
5	EN1 connector	AL-Y0012504-01	For encoder connection	p. 156
	EN2 connector	AL-Y0012504-01	For encoder connection	p. 156
6	CNA connector	AL-Y0005159-01	For control circuit power supply input	p. 156
7	External regenerative resistor	REGIST-□□□□W□□□□B, REGIST-500CW□□□□B	Used for special operations, such as high frequency applications that require greater power dissipation than that provided by the servo amplifier's built-in regenerative resistor	p. 167
8	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 the safety unit and safety PLC.	—
9	Molded case circuit breaker (MCCB)	To be provided by the customer	Used to protect the power line.	—
10	Noise filter	To be provided by the customer	Used to prevent external noise from the power source line.	—
11	Electromagnetic contactor	To be provided by the customer	Used to switch the power on and off.	—
12	Brake power	To be provided by the customer	Used for servo motors with brake	—

**Serial type** The serial type has the same options as the parallel type and also the following options.

No.	Name	Model no.	Description	Page
13	CN2 connector	AL-00842383	General-purpose I/O connector	p. 160
14	CN0, CN1 connectors	AL-01101864	For terminating resistor connection	p. 166
		AL-01101866-0□	Amplifier-amplifier Modbus communication cable	p. 166
		AL-01101867-□□	Controller-amplifier Modbus communication cable	p. 166

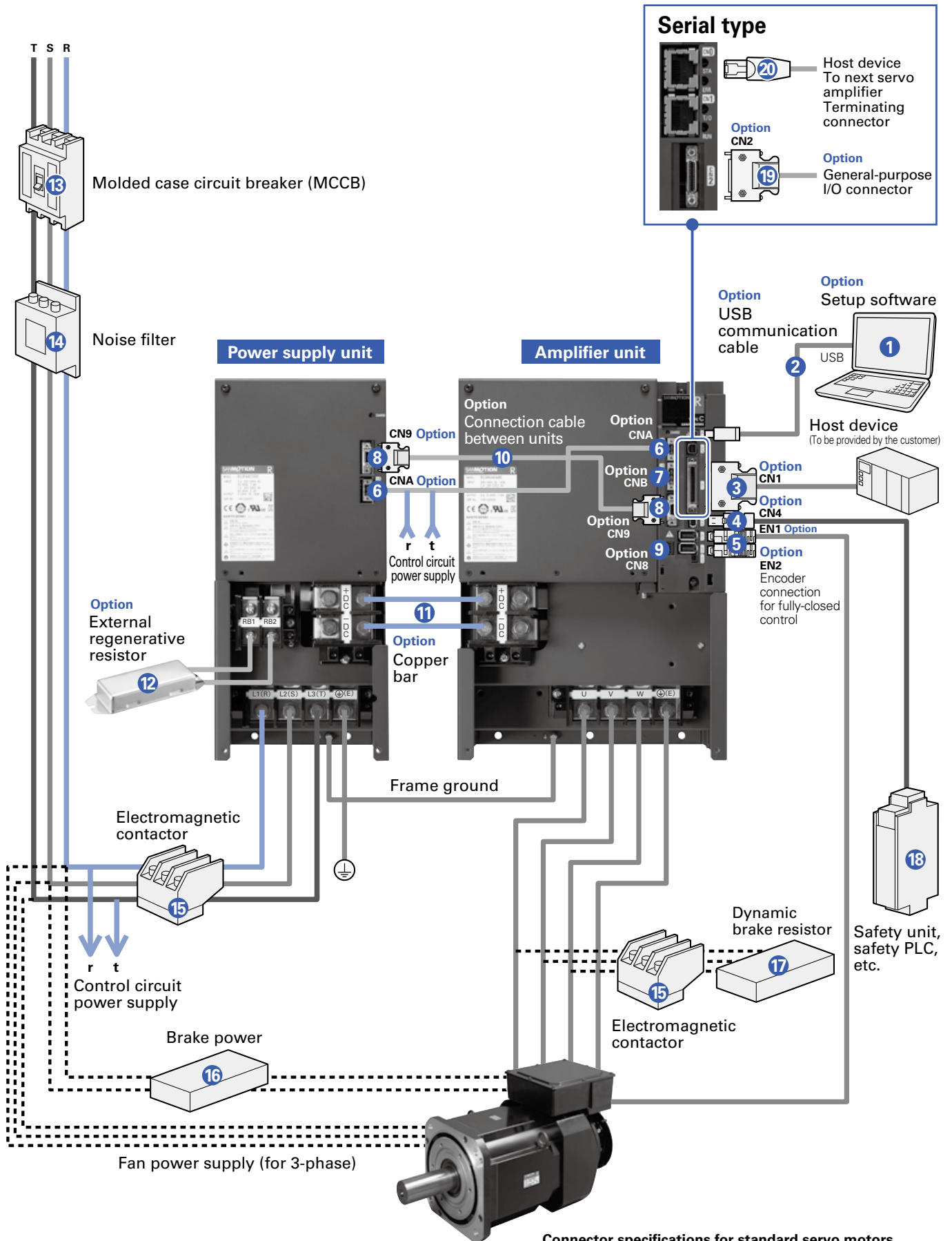
Note 1: Connector sets are also available. See respective pages.

Note 2: For the accessories and options for the Safety module, see page 102.



# System Configuration

## 600 A Parallel type



**Servo motor**



## Options and Peripherals (600 A)

### Parallel type

No.	Name	Model no.	Description	Page
1	Setup software	Can be downloaded from Product Information on our website.	Parameters can be set and monitored via communication with a PC.	p. 144
2	USB communication cable	AL-00896515-0□	PC communication cable for setup software	p. 166
3	CN1 connector	AL-00385594	For controller connection	p. 157
4	CN4 connector	AL-00718252-01	For safety device connection When CN4 is not used, be sure to insert the included short-circuiting connector to CN4 on the servo amplifier.	p. 157
5	EN1 connector	AL-Y0012504-01	For encoder connection	p. 157
	EN2 connector	AL-Y0012504-01	For encoder connection	p. 157
6	CNA connector	AL-Y0005159-01	For control circuit power supply input	p. 157
7	CNB connector	AL-Y0004079-01	For dynamic brake signal	p. 157
8	CN9 connector	AL-00608710	For unit-to-unit connection (single item)	p. 157
9	CN8 connector	AL-Y0011185-01	For external alarm signal	p. 157
10	Connection cable between units	AL-00917284	To connect between power unit (CN9) and amplifier unit (CN9)	p. 166
11	Copper bar	AL-00918125-01	To connect main power supply between power unit (CN9) and amplifier unit (CN9) Terminal number: Between +DC/-DC 2-pc. set (5 mm between units)	p. 166
12	External regenerative resistor	REGIST-□...□W□...□B, REGIST-500CW□...□B	Used for special operations, such as high frequency applications that require greater power dissipation than that provided by the servo amplifier's built-in regenerative resistor	p. 167
13	Molded case circuit breaker (MCCB)	To be provided by the customer	Used to protect the power line.	—
14	Noise filter	To be provided by the customer	Used to prevent external noise from the power source line.	—
15	Electromagnetic contactor	To be provided by the customer	Used to turn on and off the servo power or dynamic brake resistors.	—
16	Brake power	To be provided by the customer	Used for servo motors with brake	—
17	Dynamic brake resistor	To be provided by the customer	Not built in this servo amplifier. Connect as necessary.	—
18	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 the safety unit and safety PLC.	—

**Serial type** The serial type has the same options as the parallel type and also the following options.

No.	Name	Model no.	Description	Page
19	CN2 connector	AL-00842383	General-purpose I/O connector	p. 161
20	CN0, CN1 connectors	AL-01101864	For terminating resistor connection	p. 166
		AL-01101866-0□	Amplifier-amplifier Modbus communication cable	p. 166
		AL-01101867-□□	Controller-amplifier Modbus communication cable	p. 166

Note 1: Connector sets are also available. See respective pages.

Note 2: For the accessories and options for the Safety module, see page 102.

# General Specifications

Control function	Position control	
Control system	IGBT: PWM control, sinusoidal drive	
Main Circuit Power Supply	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) <sup>(1)</sup> Single-phase: 100 to 120VAC (+10, -15%), 50/60 Hz (±3 Hz) <sup>(2)</sup>	
Control circuit power supply	Single-phase: 200 to 240 VAC (+10, -15%), 50/60 Hz (±3 Hz) Single-phase: 100 to 120 VAC (+10, -15%), 50/60 Hz (±3 Hz) <sup>(2)</sup>	
Environment	Ambient temperature	0 to +55°C
	Storage temperature	-20 to +65°C
	Operation and Storage humidity	Below 90% RH (non-condensing)
	Operation altitude	Below 1000 m
	Vibration resistance	4.9 m/s <sup>2</sup>
	Impact resistance	19.6m/s <sup>2</sup>
Structure	10 to 300 A: Built-in tray type power supply, 600 A: Separate power supply unit	

(1)  
Single-phase 200 VAC class input can be used with RS3A□□ models only.  
Please set parameters before using single-phase input.  
(2)  
Single-phase 100 VAC class input can be used with RS3E□□ models only.  
Please set parameters before using single-phase input.



## Performance

Speed control range	1:5000 (Internal speed command)
Frequency characteristics	1000 Hz
Permissible load moment of inertia	10 times the motor rotary inertia

## Built-in functions

Protection functions	Overcurrent, Current detection error, Overload, Regeneration error, Overheating, External error, Overvoltage, Main circuit power supply undervoltage, Main circuit power supply open phase, Control circuit power supply undervoltage, Encoder error, Overspeed, Speed control error, Speed feedback error, Excessive position deviation, Position command pulse error, Built-in memory error, Parameter error, Cooling fan error
Digital operator	Status display, Monitor display, Alarm display
Dynamic brake	10 to 300 A: Built-in, 600 A: None
Regenerative resistor	10 to 150 A: Built-in/None (selectable), 300 A, 600 A: None Note: Optional external regenerative resistors are available (10 to 600 A).
Monitor	Speed monitor (VMON) 2.0 V±10% (at 1000 min <sup>-1</sup> ), Torque (thrust force) command monitor (TCMON) 2.0 V±10% (at 100%)

## Safety standards

Servo amplifier type	Safety standards		
All built-in positioning function models	North American safety standards (UL, c-UL)		UL 61800-5-1
	European directive	Low-voltage directive	IEC/EN 61800-5-1
		EMC directive	IEC/EN 61000-6-4 IEC/EN 61000-6-2 IEC 61000-6-7
	KC Mark (Korea Certification Mark)		KN 61000-6-2, KN 61000-6-4

## Functional safety specifications

Servo amplifier type		IEC 61800-5-2:2016 EN 61800-5-2:2017	Description	Safety level	
RS3□□□A□C□4 (Safe Torque Off function)	RS3□□□A□C□E (Safety)		STO	SIL3 SILCL3	Cat.3 PL e
✓	✓		SS1		
–	✓		SS2		
–	✓		SOS		
–	✓		SLS		
–	✓		SBC		
–	✓		SSM		
–	✓				

## RS-485 communication specifications

Item	Description	Default value	Remarks
Protocol	Modbus-RTU	—	Fixed to binary mode (ASCII mode is not supported)
Interface	RS-485 (1:N)	—	N = 8*
Transmission speed (bps)	4800, 9600, 19200, 38400, 57600, 115200	115200	Set up with setup software or rotary switch on the front surface of the amplifier.
Start bit	1	1	Fixed
Data length (bit)	8	8	Fixed
Parity	None, even number, odd number	Even number	Set up with setup software.
Stop bit	1, 2	1	
Electrical Specifications	RS-485 compliant (half duplex communication)	RS-485 compliant (half duplex communication)	Fixed
Connector	RJ-45	—	

Note: This servo amplifier can be connected to up to 8 axes per segment. When connecting 8 axes or more, contact us for details.

# Positioning Function Specifications and Operation Examples

Positioning Function	Number of controllable axes	1 axis
	Number of points to be registered	Up to 254 points (P000 to P253) can be set
	Max. command amount	-2,147,483,648 to +2,147,483,647
	Command unit	Selectable from mm/pulse/deg
	Rapid feed rate	2,147,483,647 mm/sec (0.001 mm/pulse selected)
	Acceleration/deceleration	Automatic acceleration/deceleration (straight line/S-shape switchover)
	Point data setting	Set by inputting numeric values using a PC or by teaching
	Movement point number setting	Parallel 8 bit (binary code)
	Torque limit	0 to 510% (With 100% be the rated torque value) However, less than instantaneous max. stall current
	Software limit	Yes
	Move mode	Homing, Manual (JOG, 1 Step), Point specified move
Area signal	Up to 8 zones	
I/O	Sequential input signal	Servo motor power ON, Alarm reset, Start, Homing, Manual, Override/Manual high speed, Cancel, Decelerate before home position, External error, Over travel, 1 Step feed, Interrupt startup, Output selection, MFIN, Point specified input
	Sequential output signal	NC ready, Holding brake timing, Error, External operation enabled, In operation Positioning complete, In-position output, Homing complete, General-purpose output (8 bit)

## Operation examples of amplifiers with built-in positioning function

By starting point 1, point 2 and point 3 can be continuously operated.

No	Feed Rate	Position	Operation Pattern								M Output												
			gain_selection	MODE1	MODE2	MODE3	ABSINC	Norm/Steering	Step/Continue	Accel	Time_of_S-Shaped	Current_Limit	Type	Delay	Code	IP	Dwell_Time	loop_incde	Jump_No	Repetition			
	Pulses/s	Pulse								U/min	ms	%	Pulse			ms							
0	40960	0192	0	0	1	0	0	0	0	0	4096	0	0	0	0	0	0	0	0	1	253	0	
1	100	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0
2	409600	1000	0	0	1	0	1	0	1	0	4096	0	0	0	0	0	0	0	0	0	0	0	0
3	40960	100	0	0	1	0	0	0	1	0	4096	0	0	0	0	0	0	0	0	2	0	100	0
4	100	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0
5	100	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0
6	409600	0	0	0	1	0	1	0	0	0	4096	0	0	0	0	0	0	0	0	0	0	0	0
7	409600	-100	0	0	1	0	1	0	1	0	4096	0	0	0	0	0	0	0	0	0	0	0	0
8	409600	110	0	0	1	0	1	0	1	0	4096	0	0	0	0	0	0	0	0	3	7	3	0
9	409600	1000	0	0	1	0	0	1	0	0	4096	0	0	0	0	0	0	0	0	3	7	3	0

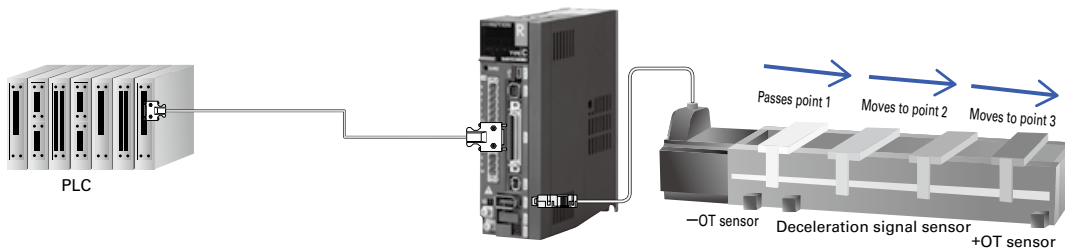
### Point data setting

By using Setup Software, point data can be set, saved, and read from a computer.

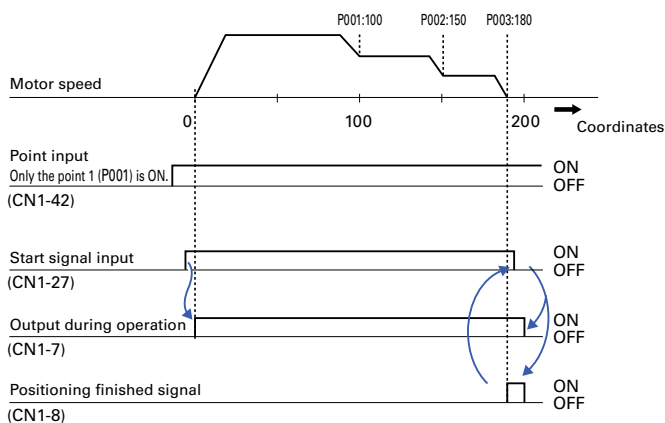
Mode 1: "01" = Positioning operation enabled,  
Mode 2: "00" = Final movement,

"01" = Continues to the next point number

Speed change: Stopped/Continuous: "1" = Continuous speed change operation



### With 0 as the start coordinate, start point 001 (P001).

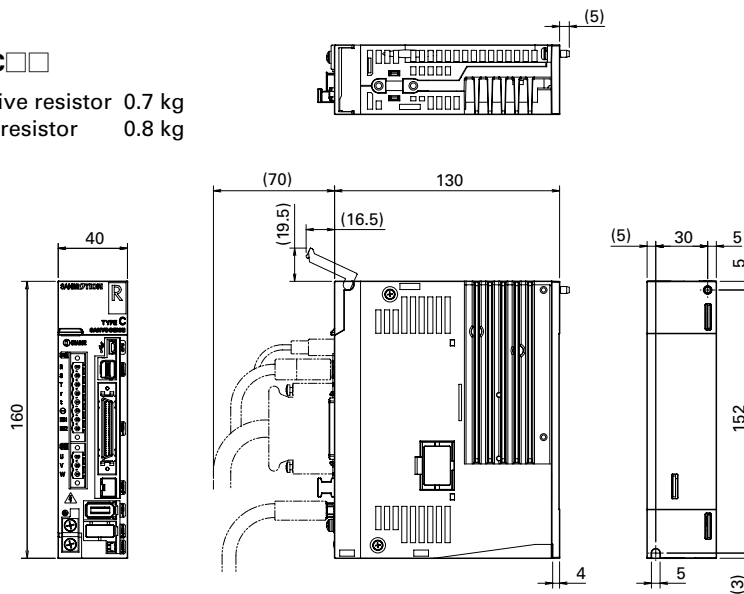


# Dimensions [Unit : mm] Refer to p. 104 for dimensional drawings of Safety.

## Parallel type

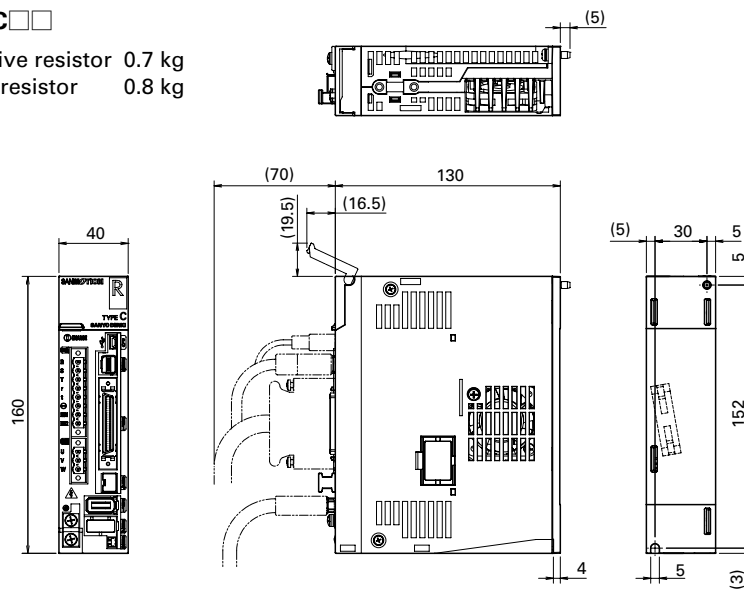
**10 A - Model no.: RS3□01A□C□□**

Mass: Without built-in regenerative resistor 0.7 kg  
 With built-in regenerative resistor 0.8 kg



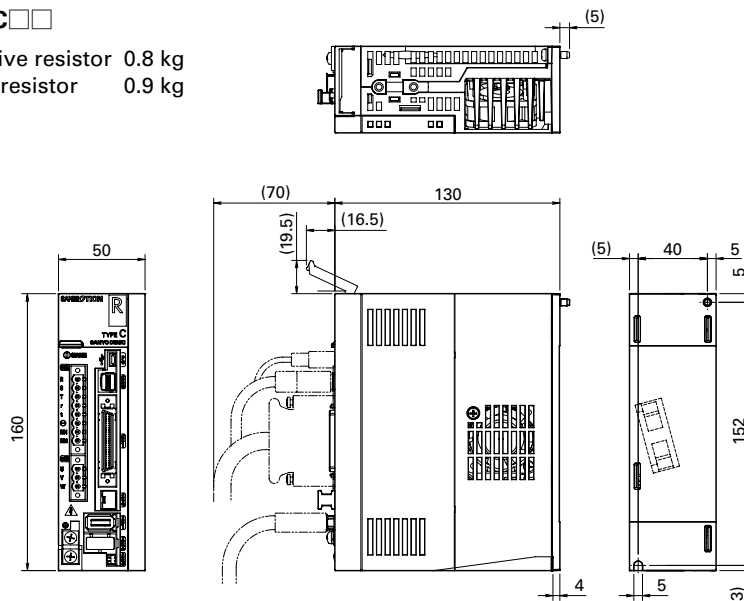
**20 A - Model no.: RS3□02A□C□□**

Mass: Without built-in regenerative resistor 0.7 kg  
 With built-in regenerative resistor 0.8 kg



**30 A - Model no.: RS3□03A□C□□**

Mass: Without built-in regenerative resistor 0.8 kg  
 With built-in regenerative resistor 0.9 kg

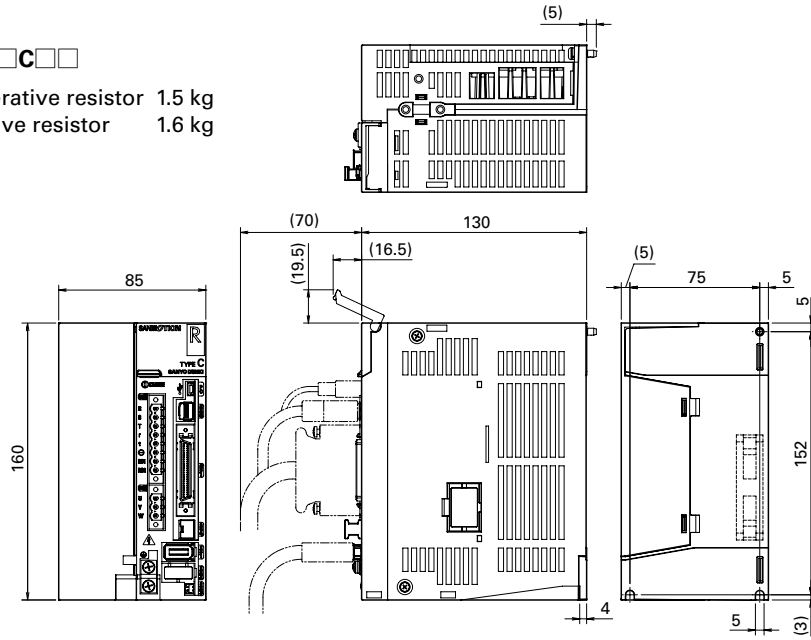


Refer to p. 105 for dimensional drawings of Safety.

### Parallel type

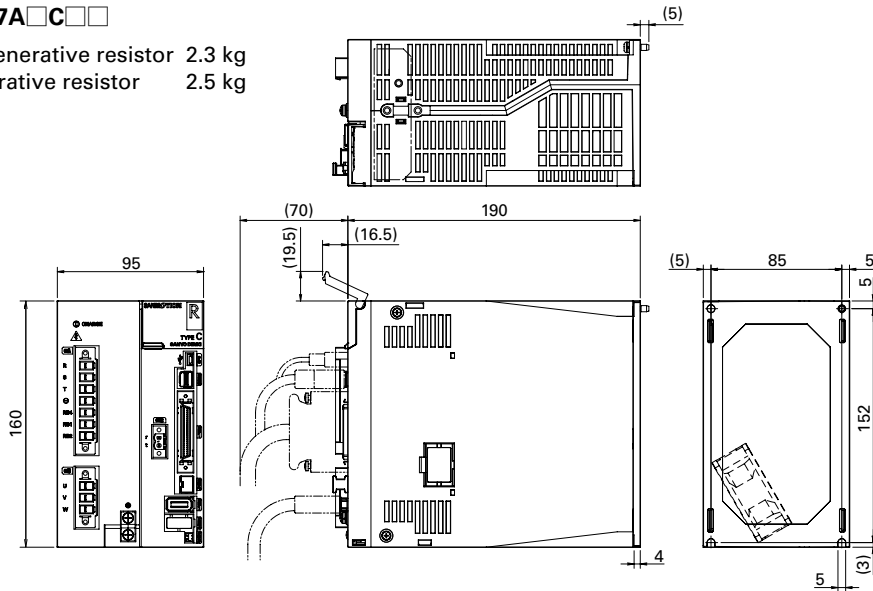
**50 A - Model no.: RS3A05A□C□□**

Mass: Without built-in regenerative resistor 1.5 kg  
 With built-in regenerative resistor 1.6 kg



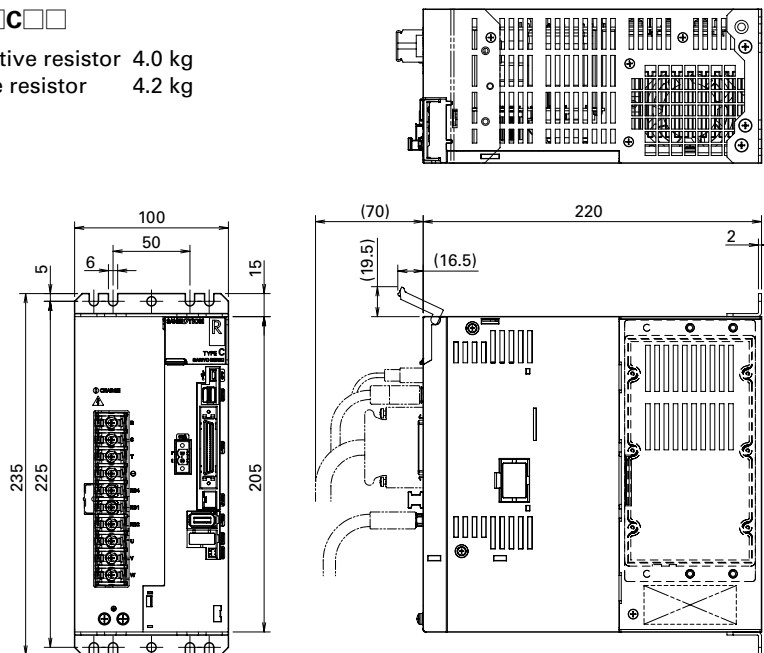
**75 A - Model no.: RS3A07A□C□□**

Mass: Without built-in regenerative resistor 2.3 kg  
 With built-in regenerative resistor 2.5 kg



**100 A - Model no.: RS3A10A□C□□**

Mass: Without built-in regenerative resistor 4.0 kg  
 With built-in regenerative resistor 4.2 kg



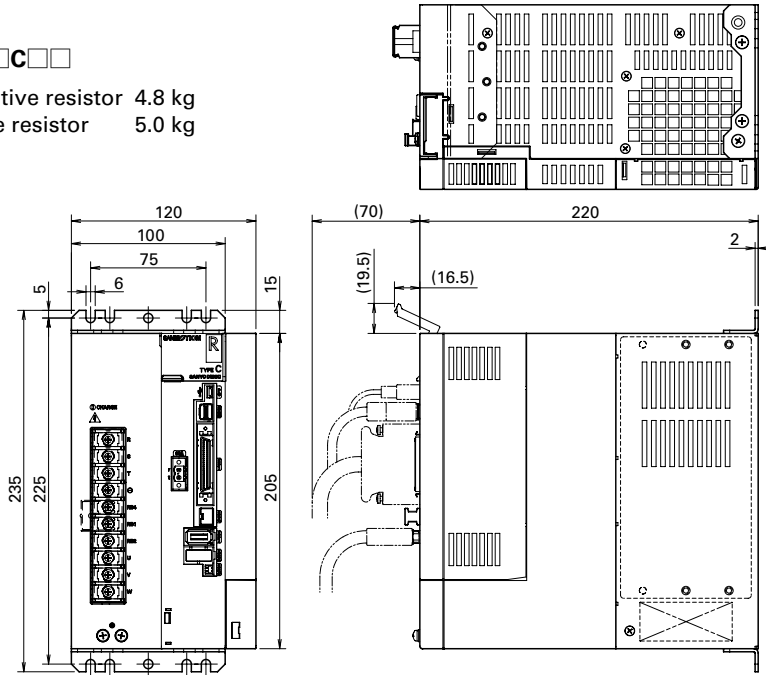
Features	List of Compatible Servo Amplifiers and Servo Motors	Standard Model Number List	Analog/Pulse	Servo Amplifiers: R 3E Model EtherCAT Built-in Positioning Function	Safety	Servo Motors: Rotary Motor	Options	Linear Servo Motors	SANMOTION S	Selection Guide
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# Dimensions [Unit : mm] Refer to p. 105 to 106 for dimensional drawings of Safety.

## Parallel type

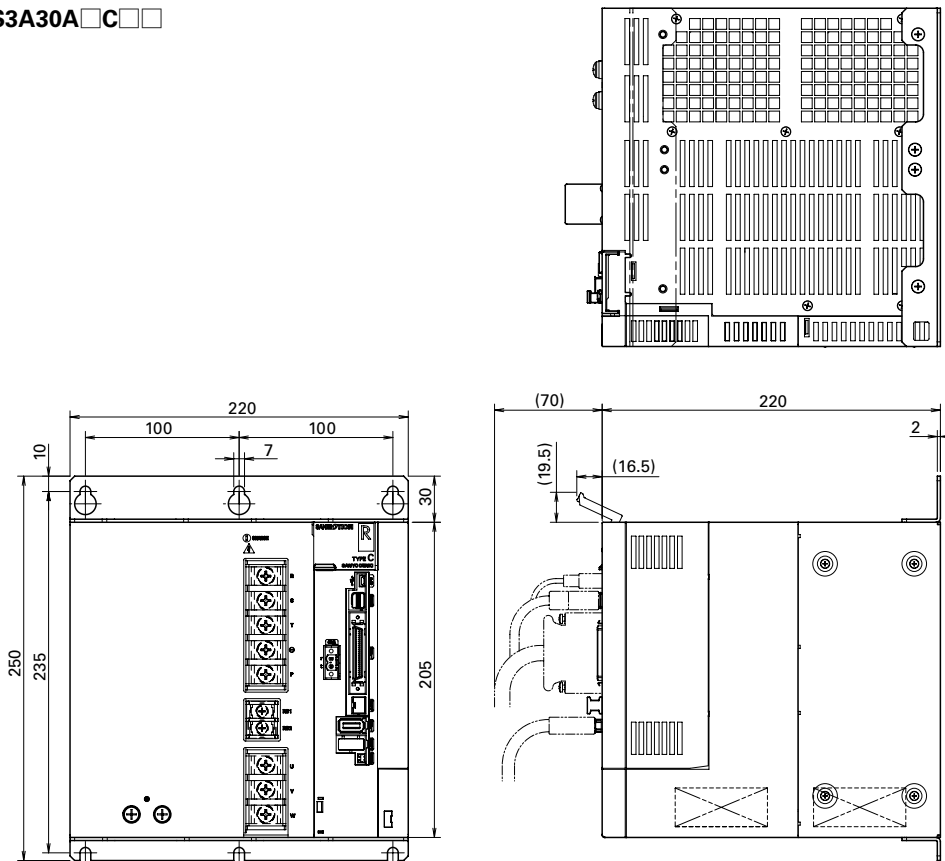
150 A - Model no.: RS3A15A□C□□

Mass: Without built-in regenerative resistor 4.8 kg  
 With built-in regenerative resistor 5.0 kg



300 A - Model no.: RS3A30A□C□□

Mass: 9.8 kg



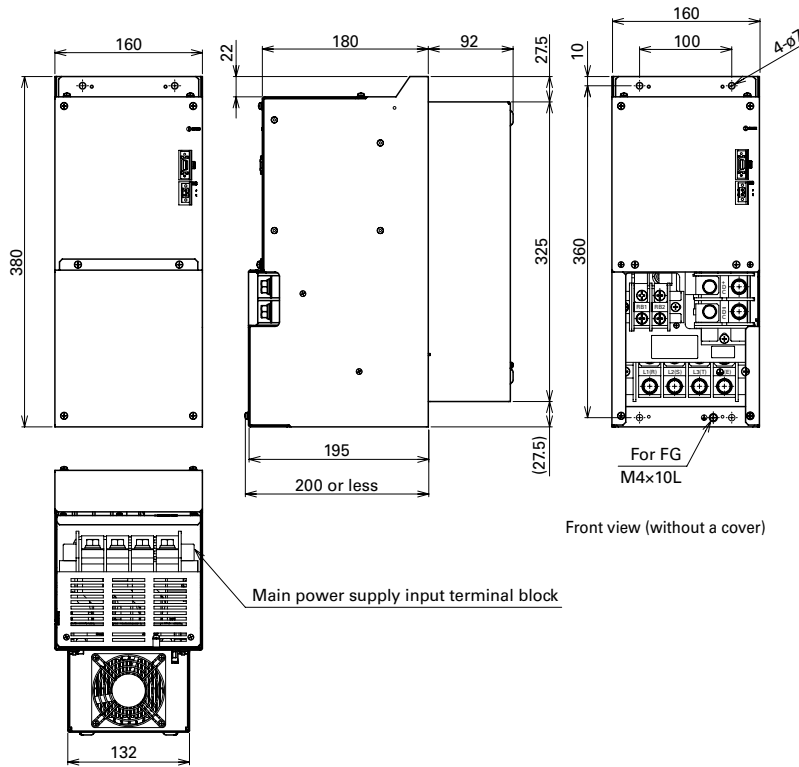
Refer to p. 106 for dimensional drawings of Safety.

## Parallel type

### 600 A

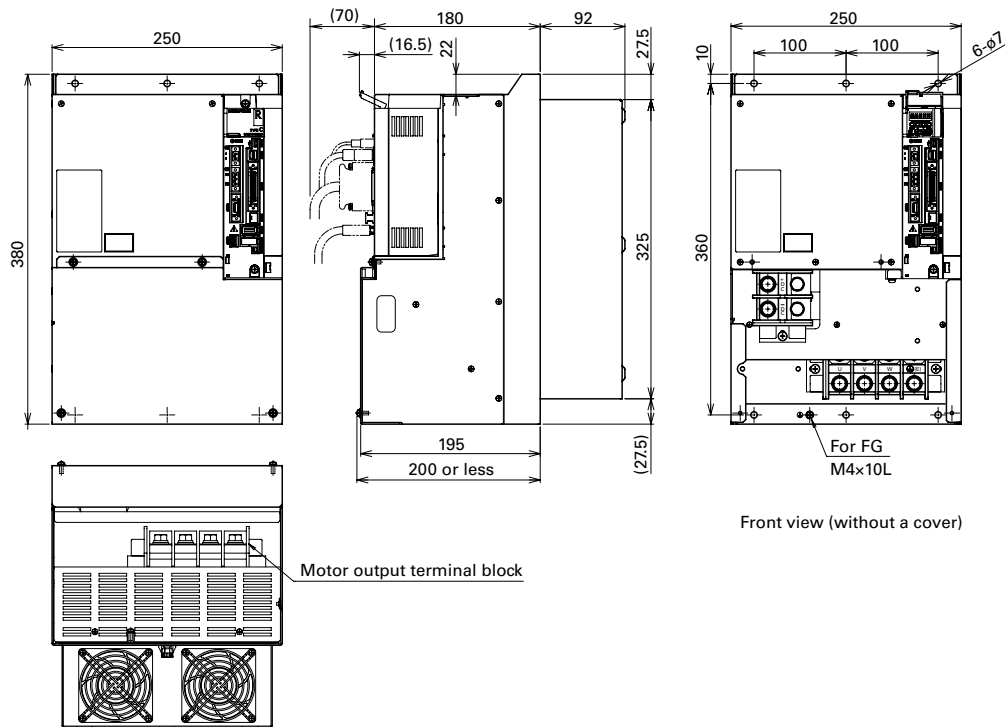
Power supply unit model no.: RS3PAA27000

Mass: 11.8 kg



Amplifier unit model no.: RS3A60A□CL□

Mass: 18 kg



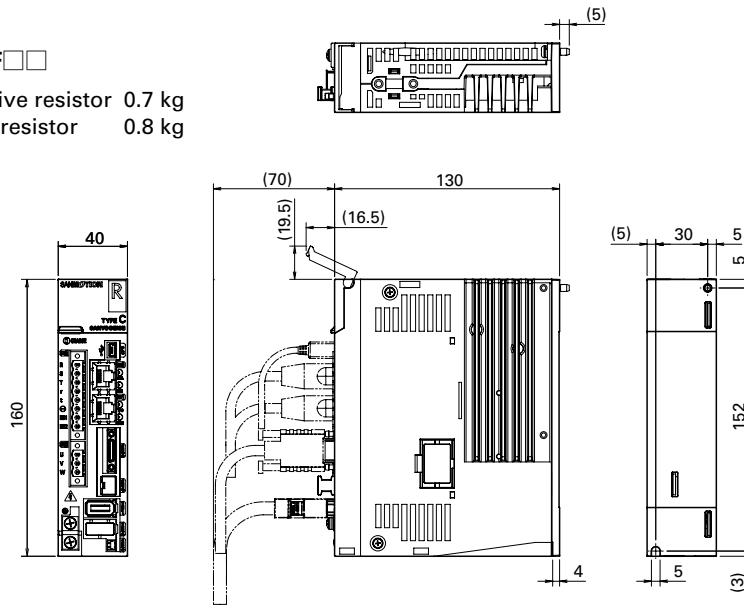


# Dimensions [Unit : mm] Refer to p. 104 for dimensional drawings of Safety.

## Serial type

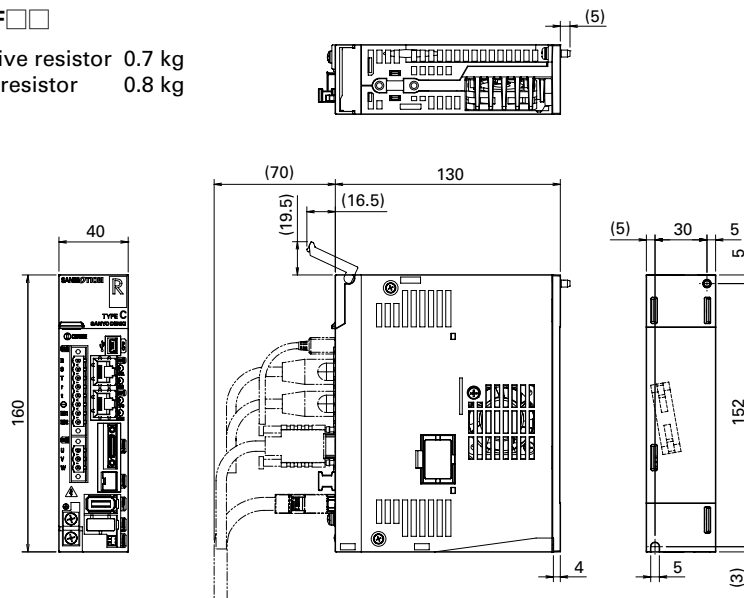
**10 A - Model no.: RS3□01A□F□□**

Mass: Without built-in regenerative resistor 0.7 kg  
 With built-in regenerative resistor 0.8 kg



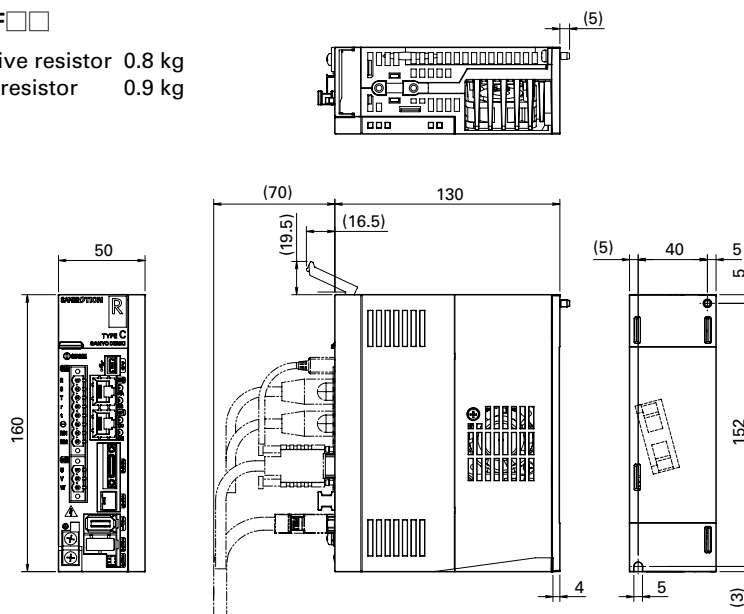
**20 A - Model no.: RS3□02A□F□□**

Mass: Without built-in regenerative resistor 0.7 kg  
 With built-in regenerative resistor 0.8 kg



**30 A - Model no.: RS3□03A□F□□**

Mass: Without built-in regenerative resistor 0.8 kg  
 With built-in regenerative resistor 0.9 kg

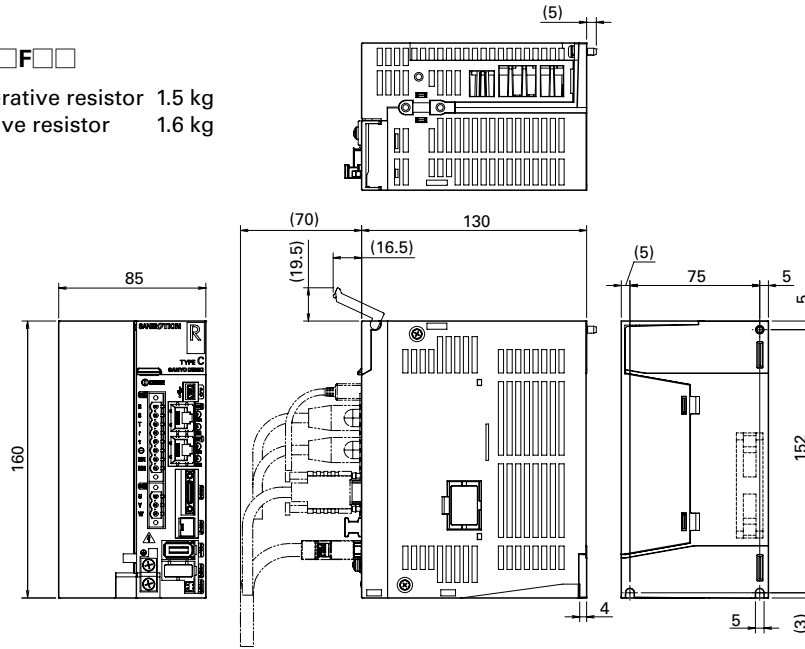


Refer to p. 105 for dimensional drawings of Safety.

## Serial type

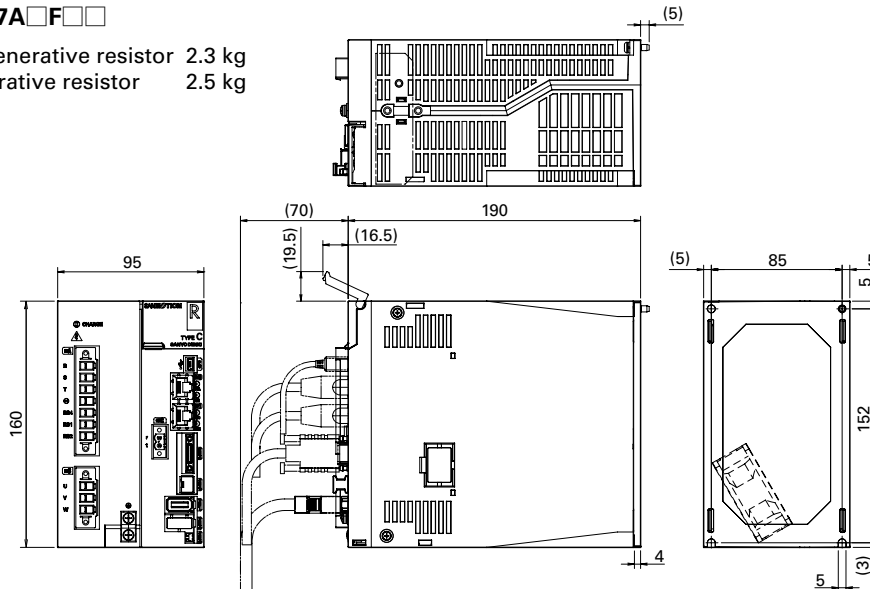
**50 A - Model no.: RS3A05A□F□□**

Mass: Without built-in regenerative resistor 1.5 kg  
 With built-in regenerative resistor 1.6 kg



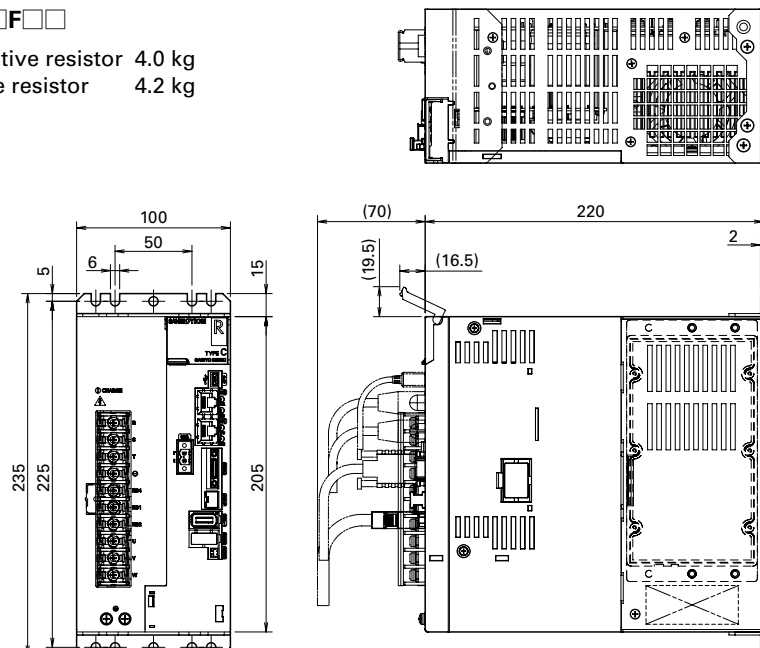
**75 A - Model no.: RS3A07A□F□□**

Mass: Without built-in regenerative resistor 2.3 kg  
 With built-in regenerative resistor 2.5 kg



**100 A - Model no.: RS3A10A□F□□**

Mass: Without built-in regenerative resistor 4.0 kg  
 With built-in regenerative resistor 4.2 kg

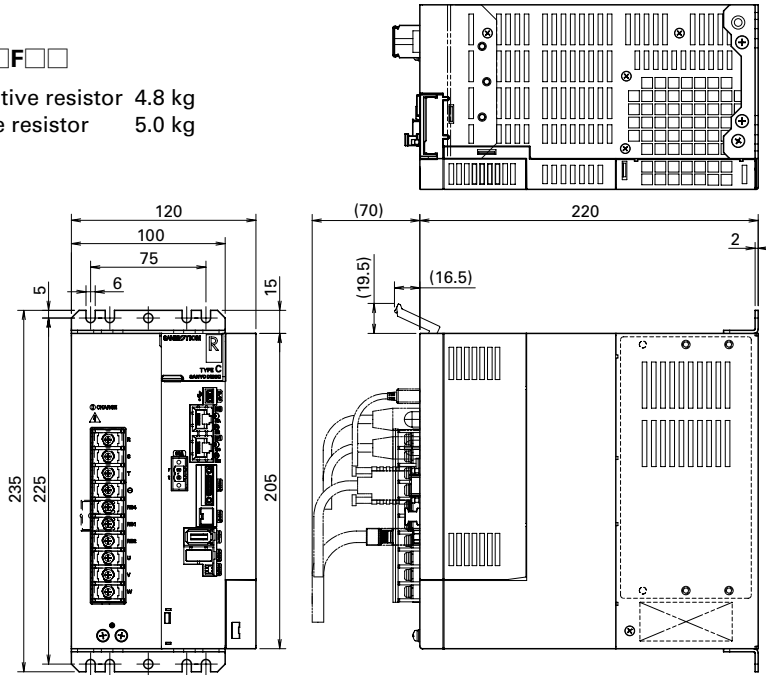


# Dimensions [Unit : mm] Refer to p. 105 to 106 for dimensional drawings of Safety.

## Serial type

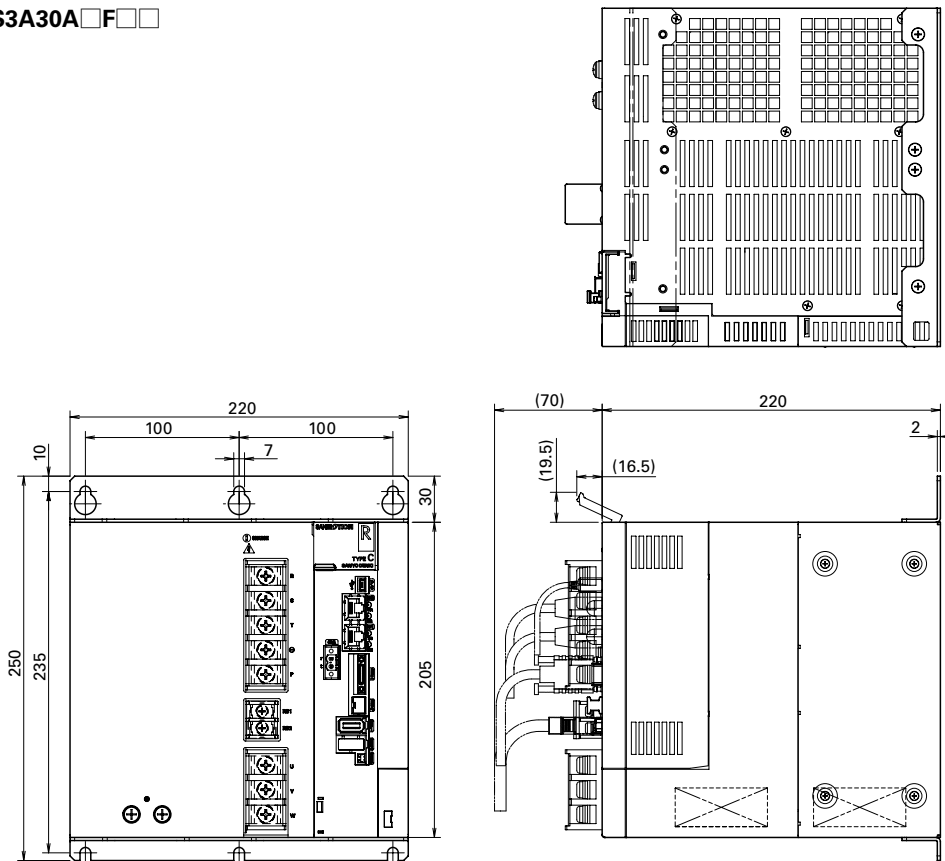
150 A - Model no.: RS3A15A□F□□

Mass: Without built-in regenerative resistor 4.8 kg  
 With built-in regenerative resistor 5.0 kg



300 A - Model no.: RS3A30A□F□□

Mass: 9.8 kg



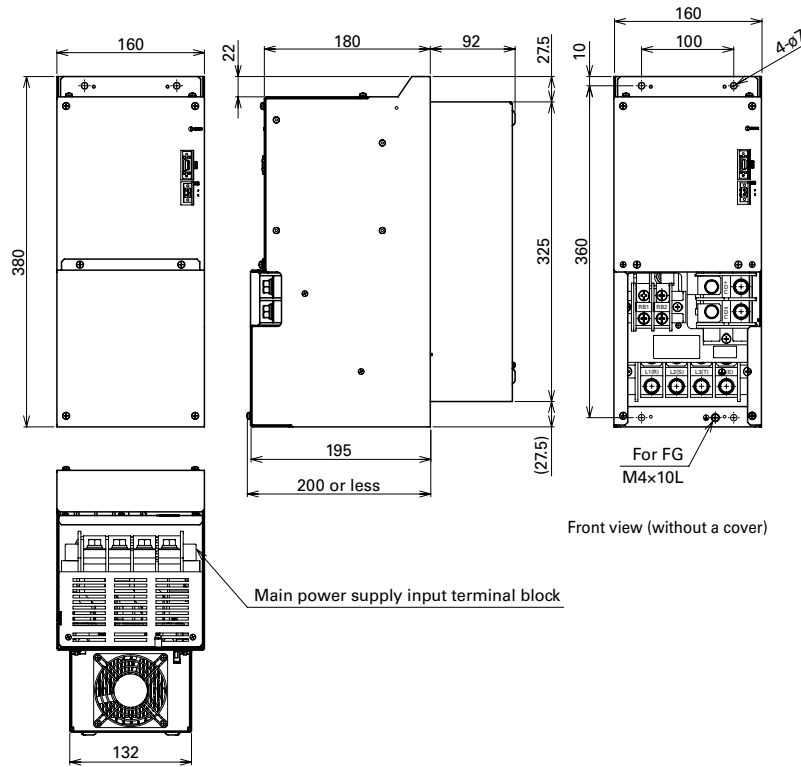
Refer to p. 106 for dimensional drawings of Safety.

## Serial type

### 600 A

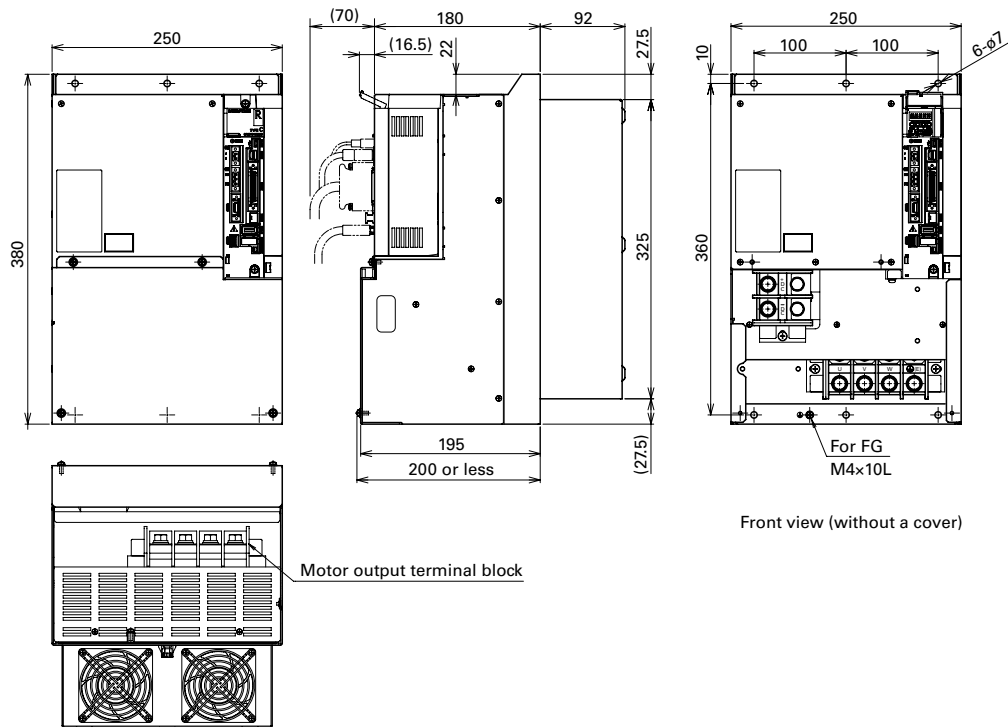
Power supply unit model no.: RS3PAA27000

Mass: 11.8 kg



Amplifier unit model no.: RS3A60A□FL□

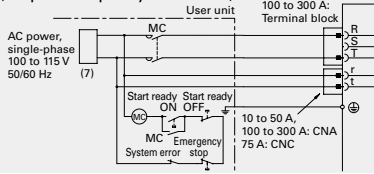
Mass: 18 kg



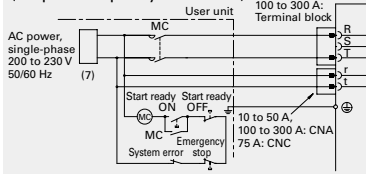
# External Wiring Diagram

## Parallel type 10 to 300 A Sinking type (NPN) output

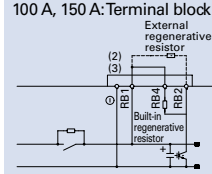
Single-phase 100 VAC (amplifier capacity 10 to 30 A)



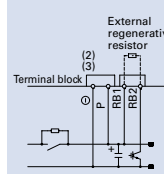
Single-phase 200 VAC (amplifier capacity 10 to 50 A)



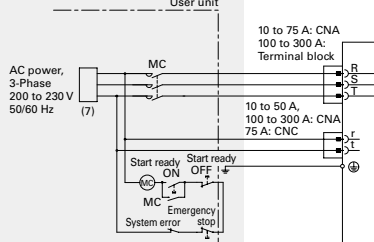
Amplifier capacity 75 A: CNA 100 A, 150 A: Terminal block



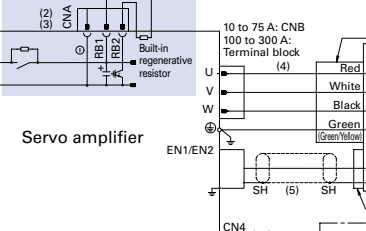
Amplifier capacity 300 A



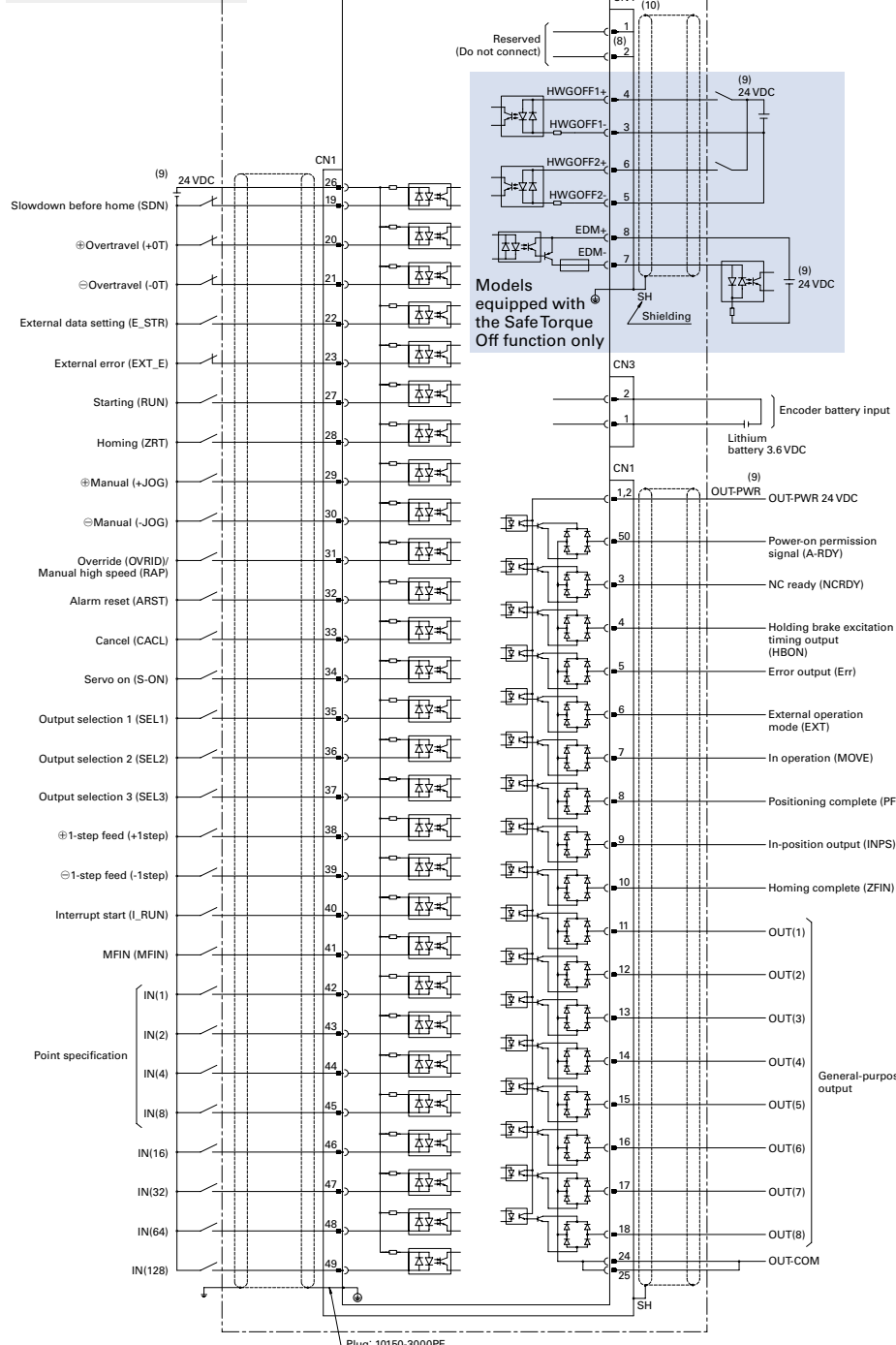
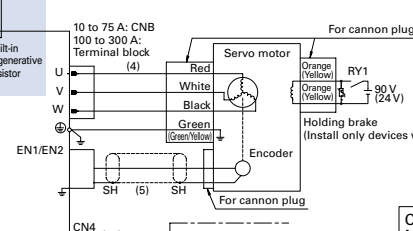
3-Phase 200 V



Amplifier capacity 10 to 50 A



Servo amplifier

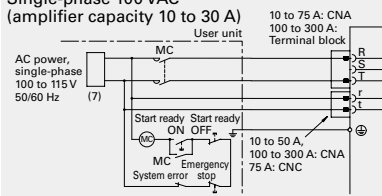


Connector No.	Name	Housing, plug, shell
CNA 10 to 50 A	Main/control circuit power supply input connector	MSTBT2.5/8-STF-5.08LUB
CNA 75 A	Main power supply input connector	PC5/7-STF1-7.62
CNC 75 A	Control circuit power supply input connector	MSTBT2.5/2-STF-5.08
CNA 100 A, 150 A, 300 A	Control circuit power supply input connector	MSTBT2.5/2-STF-5.08
CNB 10 to 50 A	Servo motor power line connector	MSTBT2.5/3-STF-5.08
CNB 75 A	Servo motor power line connector	PCS5/3-STF1-7.62
EN1/EN2	Connector for encoder signal	Connector: 36210-0100PL Shell kit: 36310-3200-008
CN1	General-purpose I/O signal connector	Plug: 10150-3000PE Shell: 10350-52A0-008
CN4	STO connector	For short-circuiting: 1971153-2 For wiring: 2013595-3

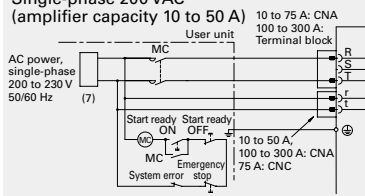
- Use a twisted pair shielded cable.
- For amplifier capacity 10 A, 20 A, 30 A, 50 A: Connect the regenerative resistor "between the RB1 and RB2 terminals". When using an external regenerative resistor, remove the wiring of the built-in regenerative resistor connected between the RB1 and RB2 terminals and then connect the external regenerative resistor "between the RB1 and RB2 terminals".  
For amplifier capacity 75 A, 100 A, 150 A: When using the built-in regenerative resistor, short the circuit "between the RB1 and RB4 terminals". When using an external regenerative resistor, remove the shorting bar connected between the RB1 and RB4 terminals and then connect the regenerative resistor "between the RB1 and RB2 terminals".  
For amplifier capacity 300 A: Connect the regenerative resistor "between the RB1 and RB2 terminals".
- ⊖ and P (300 A only) terminals are used for maintenance (high-voltage circuits). Do not wire to this terminal.
- Connections on the motor side vary depending on the motor specifications. The indications of red, white, black, green and orange apply when the motor power and brake lines are the lead type. When they are the cannon plug type, perform connections according to the motor specifications.
- Refer to the encoder connection figure for the wiring of the connector for the encoder connection.
- R, S, T, r, t, ⊖, P, RB1, RB2, RB4, U, V, and W are high-voltage circuits. All other lines are low-voltage. Ensure that there is sufficient differential between the high- and low-voltage circuits.
- Installing an earth leakage circuit breaker conforming either to UL, IEC, or EN standards is recommended. Do not connect the S phase for the single-phase power supply amplifier.
- Do not connect anything to CN4 pin 1 and 2.
- External power supply is to be arranged by the customer.
- CN4 is a connector for the Safe Torque Off function. To turn Servo ON (motor in operation), it is required to connect safety equipment to CN4 and get STO enabled. If not using STO, be sure to insert an optional connector (Mfr. part no.: 1971153-2) to CN4.

# Parallel type 10 to 300 A Sourcing type (PNP) output

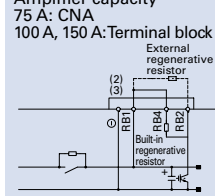
Single-phase 100 VAC  
(amplifier capacity 10 to 30 A)



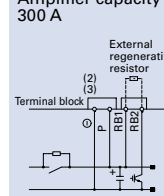
Single-phase 200 VAC  
(amplifier capacity 10 to 50 A)



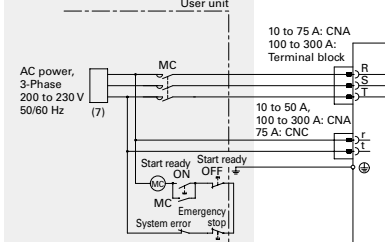
Amplifier capacity  
75 A: CNA  
100 A, 150 A: Terminal block



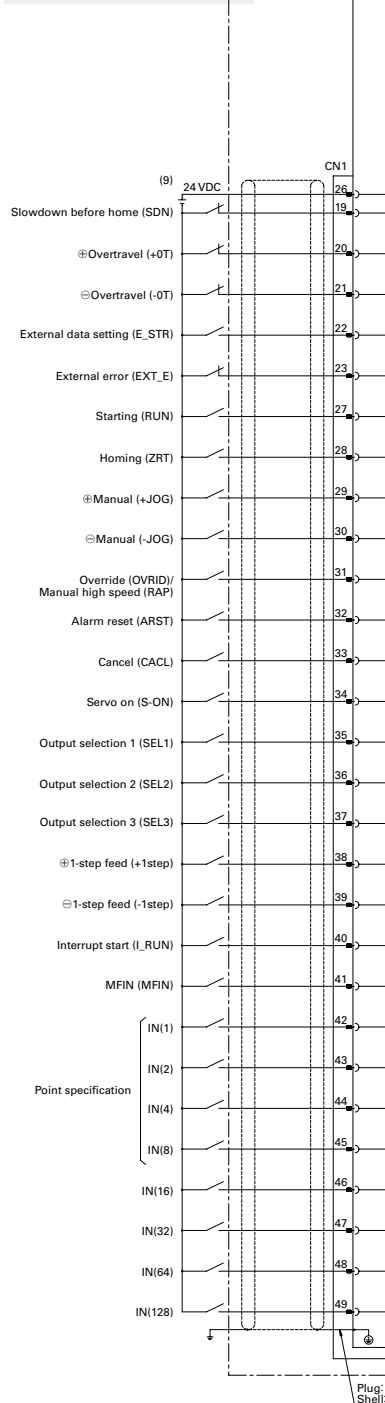
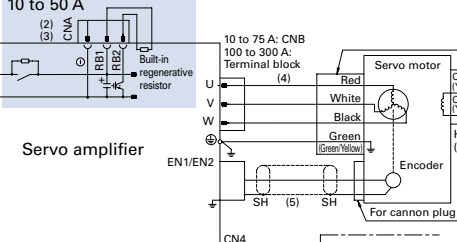
Amplifier capacity  
300 A



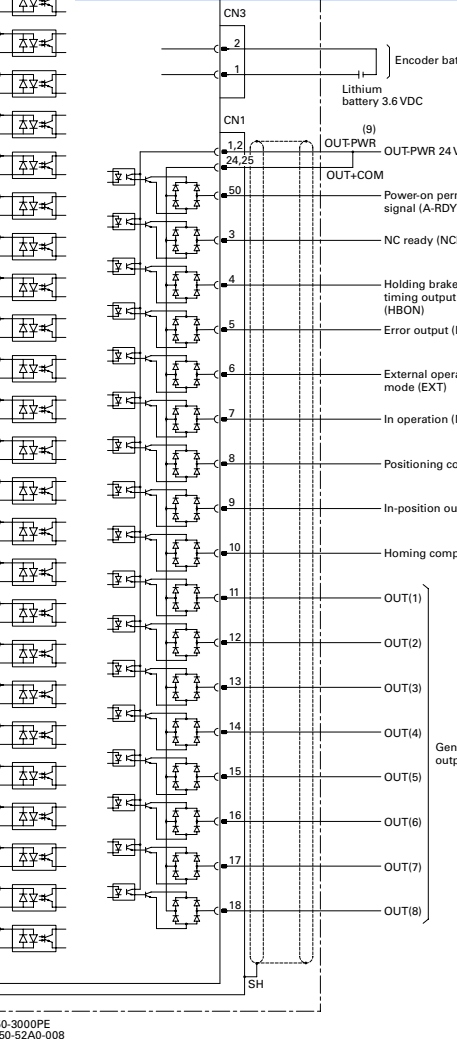
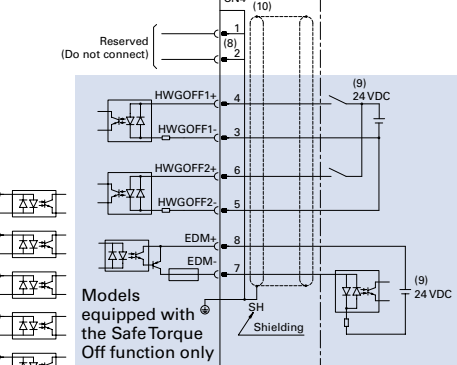
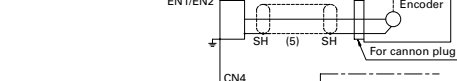
3-Phase 200 V



Amplifier capacity  
10 to 50 A



Servo amplifier

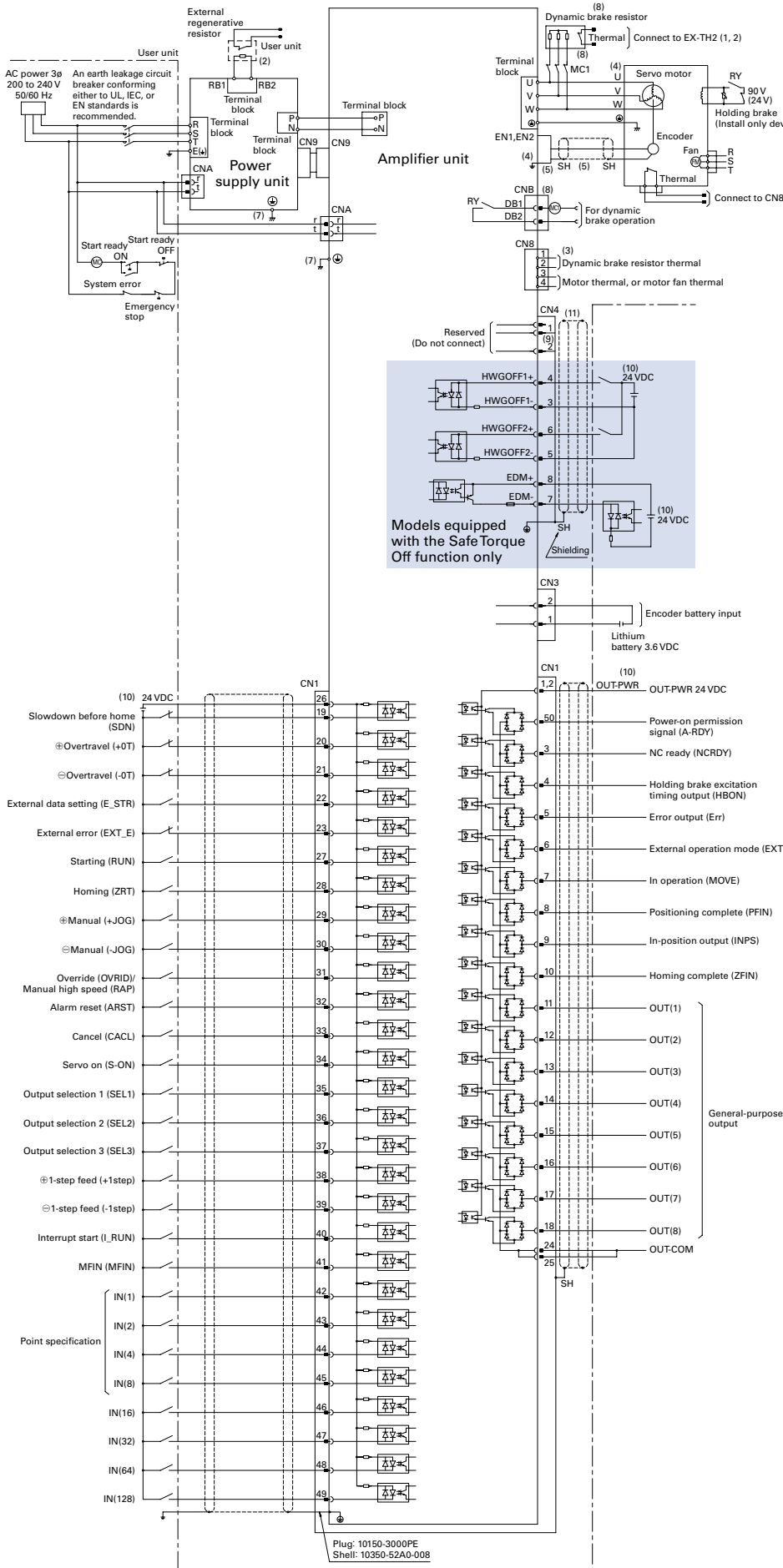


Connector No.	Name	Housing, plug, shell
CNA 10 to 50 A	Main/control circuit power supply input connector	MSTBT2.5/8-STF-5.08LUB
CNA 75 A	Main power supply input connector	PC5/7-STF1-7.62
CNC 75 A	Control circuit power supply input connector	MSTBT2.5/2-STF-5.08
CNA 100 A, 150 A, 300 A	Control circuit power supply input connector	MSTBT2.5/2-STF-5.08
CNB 10 to 50 A	Servo motor power line connector	MSTBT2.5/3-STF-5.08
CNB 75 A	Servo motor power line connector	PCS5/3-STF1-7.62
EN1/EN2	Connector for encoder signal	Connector: 36210-0100PL Shell kit: 36310-3200-008
CN1	General-purpose I/O signal connector	Plug: 10150-3000PE Shell: 10350-52A0-008
CN4	STO connector	For short-circuiting: 1971153-2 For wiring: 2013595-3

- Use a twisted pair shielded cable.
- For amplifier capacity 10 A, 20 A, 30 A, 50 A: Connect the regenerative resistor "between the RB1 and RB2 terminals". When using an external regenerative resistor, remove the wiring of the built-in regenerative resistor connected between the RB1 and RB2 terminals and then connect the external regenerative resistor "between the RB1 and RB2 terminals".  
For amplifier capacity 75 A, 100 A, 150 A: When using the built-in regenerative resistor, short the circuit "between the RB1 and RB4 terminals". When using an external regenerative resistor, remove the shorting bar connected between the RB1 and RB4 terminals and then connect the regenerative resistor "between the RB1 and RB2 terminals".  
For amplifier capacity 300 A: Connect the regenerative resistor "between the RB1 and RB2 terminals".
- ⊖ and P (300 A only) terminals are used for maintenance (high-voltage circuits). Do not wire to this terminal.
- Connections on the motor side vary depending on the motor specifications. The indications of red, white, black, green and orange apply when the motor power and brake lines are the lead type. When they are the cannon plug type, perform connections according to the motor specifications.
- Refer to the encoder connection figure for the wiring of the connector for the encoder connection.
- R, S, T, r, ⊖, P, RB1, RB2, RB4, U, V, and W are high-voltage circuits. All other lines are low-voltage. Ensure that there is sufficient differential between the high- and low-voltage circuits.
- Installing an earth leakage circuit breaker conforming either to UL, IEC, or EN standards is recommended. Do not connect the S phase for the single-phase power supply amplifier.
- Do not connect anything to CN4 pin 1 and 2.
- External power supply is to be arranged by the customer.
- CN4 is a connector for the Safe Torque Off function. To turn Servo ON (motor in operation), it is required to connect safety equipment to CN4 and get STO enabled. If not using STO, be sure to insert an optional connector (Mfr. part no.: 1971153-2) to CN4.

# External Wiring Diagram

## Parallel type 600 A Sinking type (NPN) output

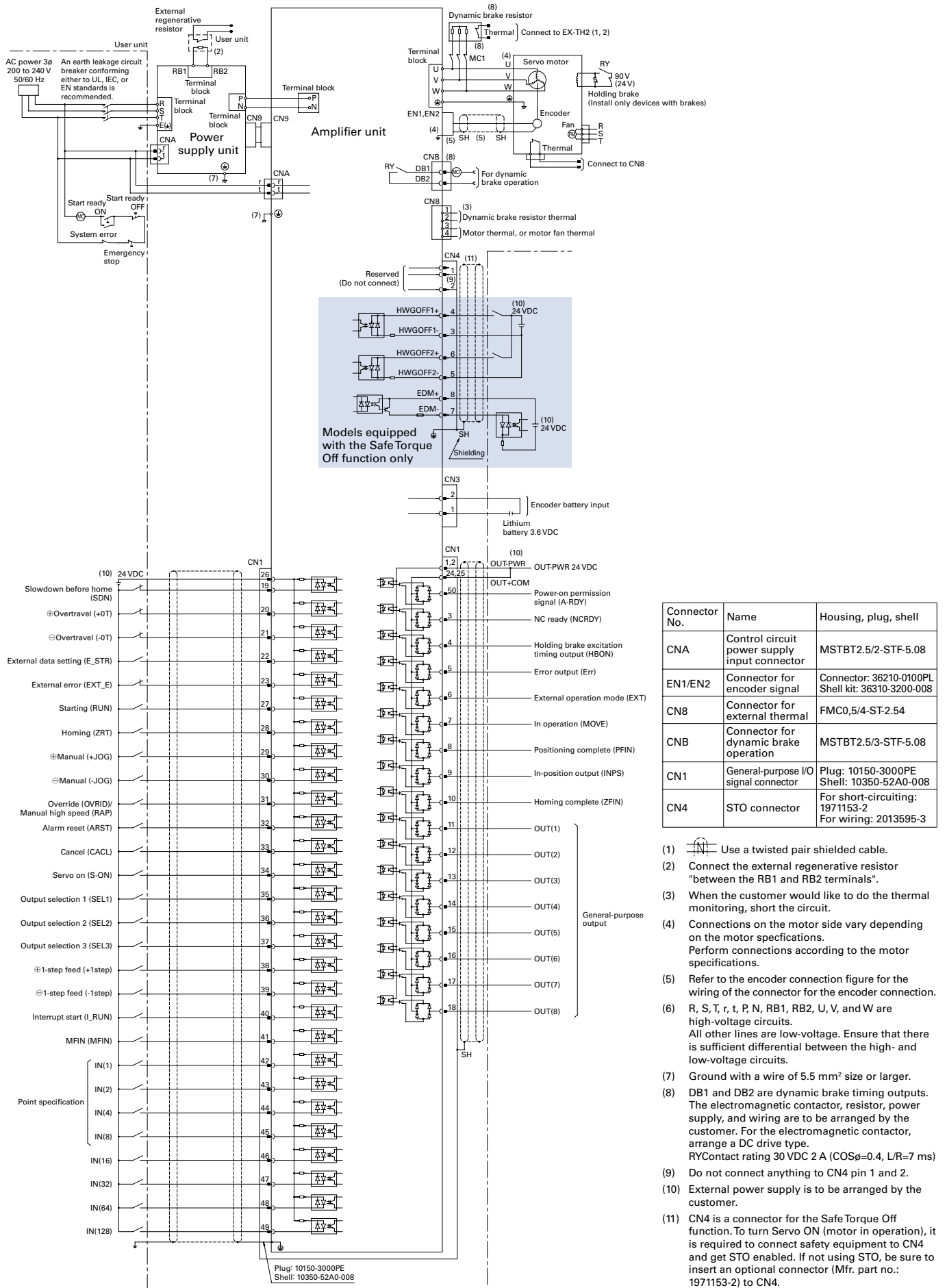


Connector No.	Name	Housing, plug, shell
CNA	Control circuit power supply input connector	MSTBT2.5/2-STF-5.08
EN1/EN2	Connector for encoder signal	Connector: 36210-0100PL Shell kit: 36310-3200-008
CN8	Connector for external thermal	FMC0,5/4-ST-2.54
CNB	Connector for dynamic brake operation	MSTBT2.5/3-STF-5.08
CN1	General-purpose I/O signal connector	Plug: 10150-3000PE Shell: 10350-52A0-008
CN4	STO connector	For short-circuiting: 1971153-2 For wiring: 2013595-3

- Use a twisted pair shielded cable.
- Connect the external regenerative resistor "between the RB1 and RB2 terminals".
- When the customer would like to do the thermal monitoring, short the circuit.
- Connections on the motor side vary depending on the motor specifications. Perform connections according to the motor specifications.
- Refer to the encoder connection figure for the wiring of the connector for the encoder connection.
- R, S, T, r, t, P, N, RB1, RB2, U, V, and W are high-voltage circuits. All other lines are low-voltage. Ensure that there is sufficient differential between the high- and low-voltage circuits.
- Ground with a wire of 5.5 mm<sup>2</sup> size or larger.
- DB1 and DB2 are dynamic brake timing outputs. The electromagnetic contactor, resistor, power supply, and wiring are to be arranged by the customer. For the electromagnetic contactor, arrange a DC drive type. RYContact rating 30 VDC 2 A (COS $\phi$ =0.4, L/R=7 ms)
- Do not connect anything to CN4 pin 1 and 2.
- External power supply is to be arranged by the customer.
- CN4 is a connector for the Safe Torque Off function. To turn Servo ON (motor in operation), it is required to connect safety equipment to CN4 and get STO enabled. If not using STO, be sure to insert an optional connector (Mfr. part no.: 1971153-2) to CN4.



# Parallel type 600 A Sourcing type (PNP) output

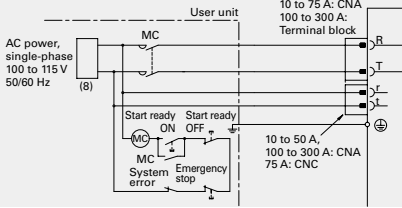


- Use a twisted pair shielded cable.
- Connect the external regenerative resistor "between the RB1 and RB2 terminals".
- When the customer would like to do the thermal monitoring, short the circuit.
- Connections on the motor side vary depending on the motor specifications. Perform connections according to the motor specifications.
- Refer to the encoder connection figure for the wiring of the connector for the encoder connection.
- R, S, T, r, t, P, N, RB1, RB2, U, V, and W are high-voltage circuits. All other lines are low-voltage. Ensure that there is sufficient differential between the high- and low-voltage circuits.
- Ground with a wire of 5.5 mm<sup>2</sup> size or larger.
- DB1 and DB2 are dynamic brake timing outputs. The electromagnetic contactor, resistor, power supply, and wiring are to be arranged by the customer. For the electromagnetic contactor, arrange a DC drive type. RYContact rating 30 VDC 2 A (COSφ=0.4, L/R=7 ms)
- Do not connect anything to CN4 pin 1 and 2.
- External power supply is to be arranged by the customer.
- CN4 is a connector for the Safe Torque Off function. To turn Servo ON (motor in operation), it is required to connect safety equipment to CN4 and get STO enabled. If not using STO, be sure to insert an optional connector (Mfr. part no.: 1971153-2) to CN4.

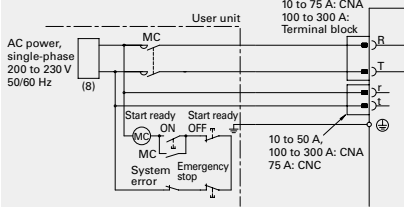
# External Wiring Diagram

## Serial type 10 to 300 A

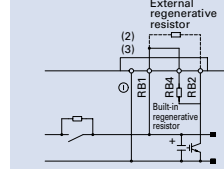
Single-phase 100 VAC (amplifier capacity 10 to 30 A)



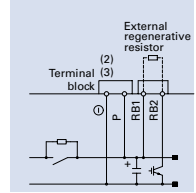
Single-phase 200 VAC (amplifier capacity 10 to 50 A)



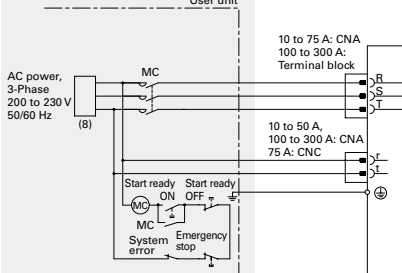
Amplifier capacity 75 A: CNA  
100 A, 150 A: Terminal block



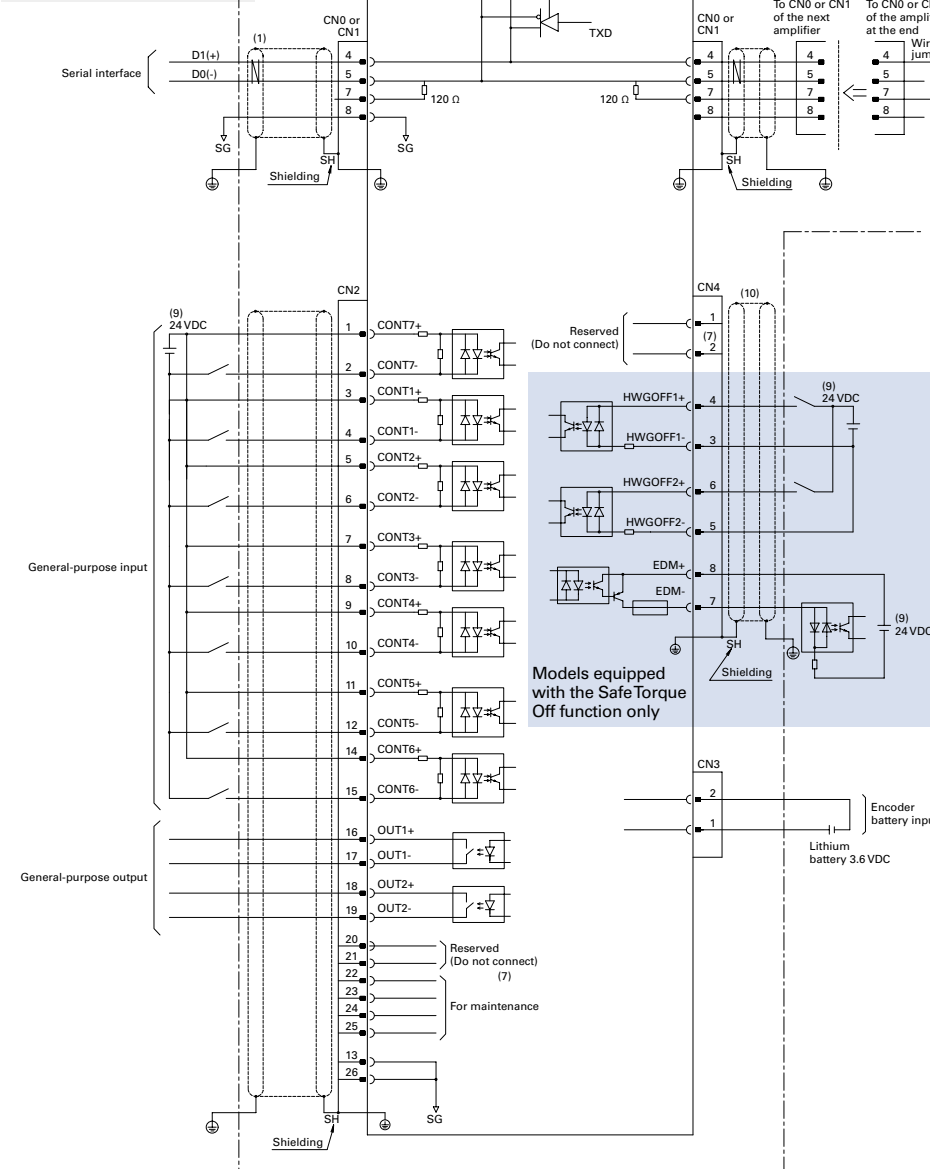
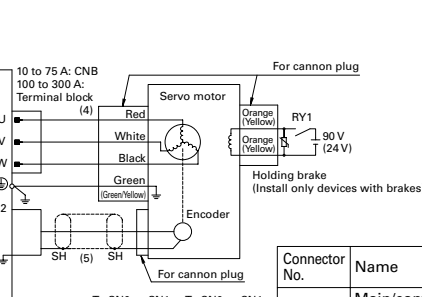
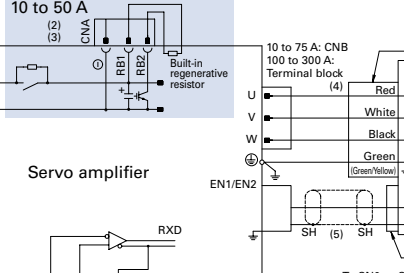
Amplifier capacity 300 A



3-Phase 200 V



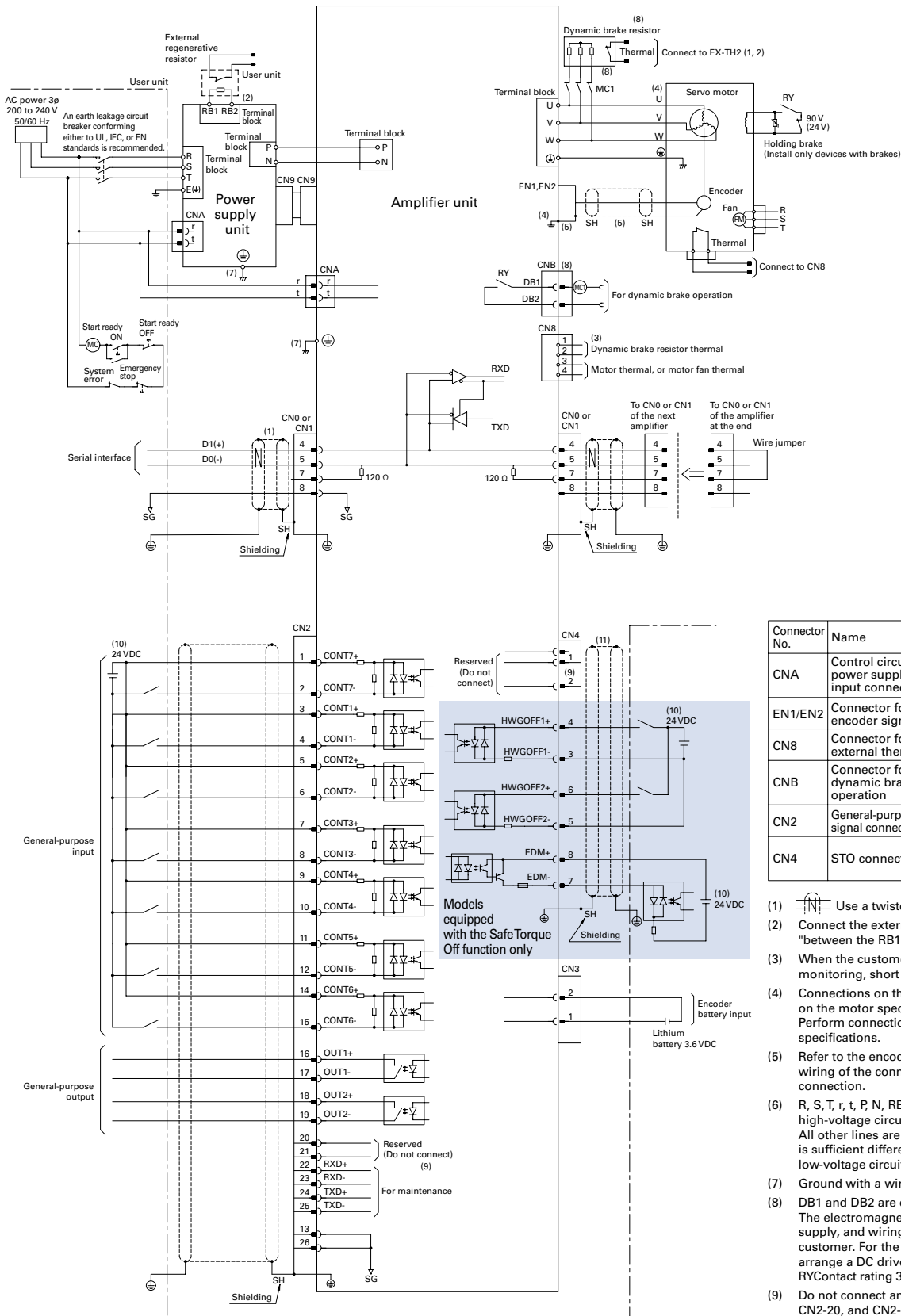
Amplifier capacity 10 to 50 A



Connector No.	Name	Housing, plug, shell
CNA 10~50 A	Main/control circuit power supply input connector	MSTBT2.5/8-STF-5.08LUB
CNA 75 A	Main power supply input connector	PC5/7-STF1-7.62
CNC 75 A	Control circuit power supply input connector	MSTBT2.5/2-STF-5.08
CNA 100 A, 150 A, 300 A	Control circuit power supply input connector	MSTBT2.5/2-STF-5.08
CNB 10~50 A	Servo motor power line connector	MSTBT2.5/3-STF-5.08
CNB 75 A	Servo motor power line connector	PCS5/3-STF1-7.62
EN1/EN2	Connector for encoder signal	Connector: HDR-E26MSG1+ Shell kit: HDR-E26LPH
CN2	General-purpose I/O signal connector	Connector: HDR-E26MSG1+ Shell kit: HDR-E26LPH
CN4	STO connector	For short-circuiting: 1971153-2 For wiring: 2013595-3

- Use a twisted pair shielded cable.
- For amplifier capacity 10 A, 20 A, 30 A, 50 A:  
Connect the regenerative resistor "between the RB1 and RB2 terminals". When using an external regenerative resistor, remove the wiring of the built-in regenerative resistor connected between the RB1 and RB2 terminals and then connect the external regenerative resistor "between the RB1 and RB2 terminals".  
For amplifier capacity 75 A, 100 A, 150 A:  
When using the built-in regenerative resistor, short the circuit "between the RB1 and RB4 terminals".  
When using an external regenerative resistor, remove the shorting bar connected between the RB1 and RB4 terminals and then connect the regenerative resistor "between the RB1 and RB2 terminals".  
For amplifier capacity 300 A:  
Connect the regenerative resistor "between the RB1 and RB2 terminals".
- ⊖ and P (300 A only) terminals are used for maintenance (high-voltage circuits). Do not wire to this terminal.
- Connections on the motor side vary depending on the motor specifications.  
The indications of red, white, black, green and orange apply when the motor power and brake lines are the lead type.  
When they are the cannon plug type, perform connections according to the motor specifications.
- Refer to the encoder connection figure for the wiring of the connector for the encoder connection.
- R, S, T, r, t, ⊖, P, RB1, RB2, RB4, U, V, and W are high-voltage circuits.  
All other lines are low-voltage. Ensure that there is sufficient differential between the high- and low-voltage circuits.
- Do not connect anything to the CN4-1, CN4-2, CN2-20, and CN2-21 pins.
- Installing an earth leakage circuit breaker conforming either to UL, IEC, or EN standards is recommended. Do not connect the S phase for the single-phase power supply amplifier.
- External power supply is to be arranged by the customer.
- CN4 is a connector for the SafeTorque Off function. To turn Servo ON (motor in operation), it is required to connect safety equipment to CN4 and get STO enabled. If not using STO, be sure to insert an optional connector (Mfr. part no.: 1971153-2) to CN4.

# Serial type 600 A



Connector No.	Name	Housing, plug, shell
CNA	Control circuit power supply input connector	MSTBT2.5/2-STF-5.08
EN1/EN2	Connector for encoder signal	Connector: 36210-0100PL Shell kit: 36310-3200-008
CN8	Connector for external thermal	FMC0,5/4-ST-2.54
CNB	Connector for dynamic brake operation	MSTBT2.5/3-STF-5.08
CN2	General-purpose I/O signal connector	Connector: HDR-E26MSG1+ Shell kit: HDR-E26LPH
CN4	STO connector	For short-circuiting: 1971153-2 For wiring: 2013595-3

- Use a twisted pair shielded cable.
- Connect the external regenerative resistor "between the RB1 and RB2 terminals".
- When the customer would like to do the thermal monitoring, short the circuit.
- Connections on the motor side vary depending on the motor specifications. Perform connections according to the motor specifications.
- Refer to the encoder connection figure for the wiring of the connector for the encoder connection.
- R, S, T, r, t, P, N, RB1, RB2, U, V, and W are high-voltage circuits. All other lines are low-voltage. Ensure that there is sufficient differential between the high- and low-voltage circuits.
- Ground with a wire of 5.5 mm<sup>2</sup> size or larger.
- DB1 and DB2 are dynamic brake timing outputs. The electromagnetic contactor, resistor, power supply, and wiring are to be arranged by the customer. For the electromagnetic contactor, arrange a DC drive type. RYContact rating 30 VDC 2 A (COSφ=0.4, L/R=7 ms)
- Do not connect anything to the CN4-1, CN4-2, CN2-20, and CN2-21 pins.
- External power supply is to be arranged by the customer.
- CN4 is a connector for the SafeTorque Off function. To turn Servo ON (motor in operation), it is required to connect safety equipment to CN4 and get STO enabled. If not using STO, be sure to insert an optional connector (Mfr. part no.: 1971153-2) to CN4.

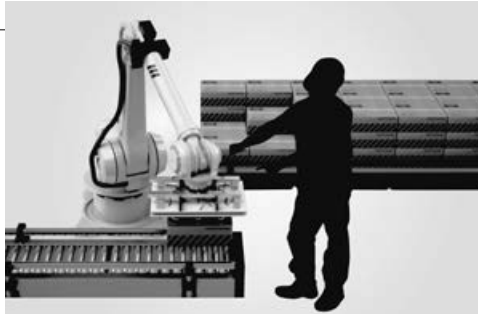
# Safety

Broadly compatible with functional safety, enabling easy integration of safety functions in a device.

Functional safety IEC/EN 61800-5-2:2016, STO (Safe Torque Off), SS1 (Safe Stop 1), SS2 (Safe Stop 2), SOS (Safe Operating Stop), SLS (Safely-Limited Speed), SBC (Safe Brake Control), and SSM (Safe Speed Monitor)

■ **Application Examples** With combination use with safety components and safety controllers, Safety can be used in the following applications:

Industrial robots



- By setting a stop area around a robot, the SS1 function can slow down and stop the robot (once stopped the motor power is shut off) when a worker enters the area.
- By setting a speed limit area, the SLS function can limit the robot's operation speed to a safe level while a worker is within the area.

Conveyor line



- The STO function can shut off the power of motors without shutting off the conveyor power, enabling workers to safely perform maintenance and other works. Furthermore, the conveyor operation can be resumed right away for improved work efficiency.
- The SLS function can limit the machine operation speed at safe levels, enabling workers to do inspection and setup works without shutting off the conveyor operation.

## General Specifications

For amplifier specifications such as ratings, built-in functions, and general-purpose outputs, see the respective pages of the Analog/Pulse, EtherCAT, and built-in positioning function types.

### ■ Safety standards

Safety standards		
North American safety standards (UL, c-UL)		UL 61800-5-1
European directive	Low-voltage directive	IEC/EN 61800-5-1
	EMC directive	IEC/EN 61000-6-4 IEC/EN 61800-3
		IEC/EN 61000-6-2 IEC/EN 61326-1 IEC 61000-6-7
KC Mark (Korea Certification Mark)		KN 61000-6-2, KN 61000-6-4

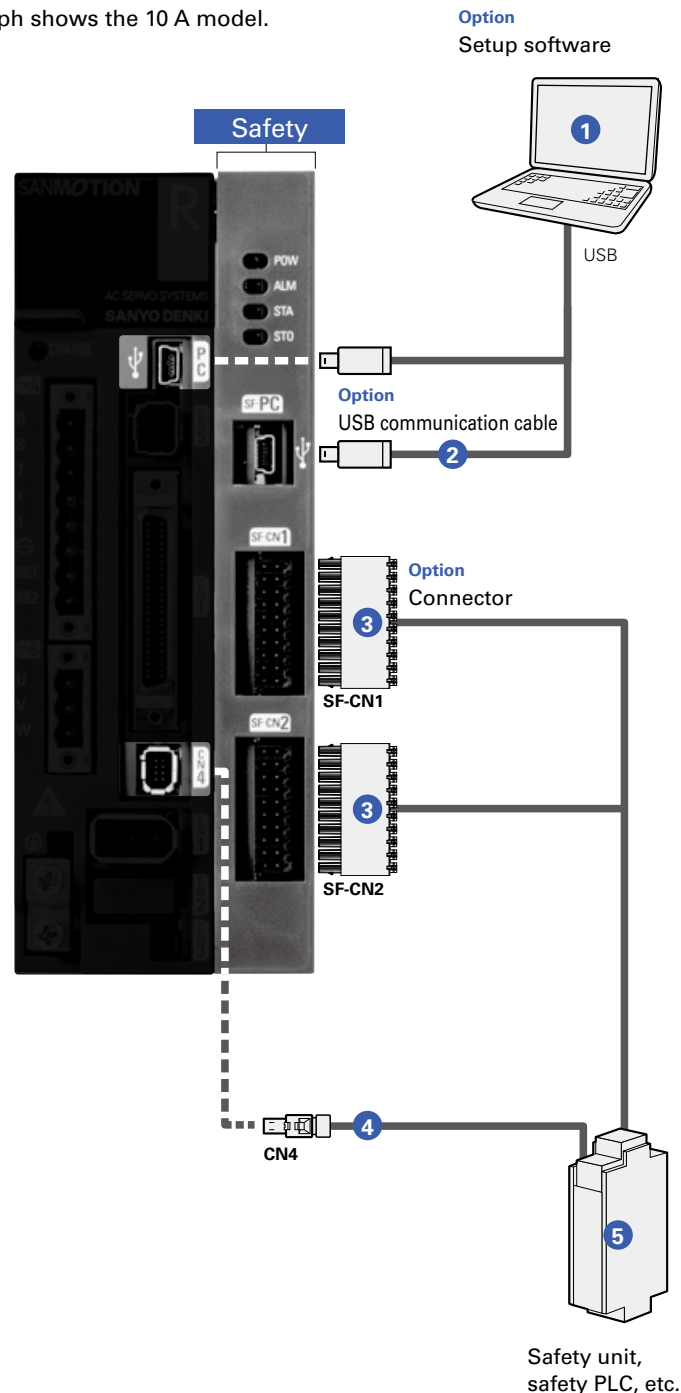
### ■ Functional safety specifications

IEC/EN 61800-5-2:2016	Description	Safety level	
		EN 61508 IEC/EN 62061	ISO 13849-1:2015 EN ISO 13849-1:2015
STO	Safe Torque Off	SIL3 SILCL3	Cat.3 PL e
SS1	Safe Stop 1		
SS2	Safe Stop 2		
SOS	Safe Operating Stop		
SLS	Safely-Limited Speed		
SBC	Safe Brake Control		
SSM	Safe Speed Monitor		

# System Configuration

For the servo amplifier part, see respective pages of analog/pulse, EtherCAT, and positioning function types.

**10 to 600 A** The photograph shows the 10 A model.



## Options and Peripherals (10 to 600 A)

No.	Name	Model no.	Description	Page
1	Setup software	Can be downloaded from Product Information on our website.	Parameters can be set and monitored via communication with a PC.	p. 144
2	USB communication cable	AL-00896515-0□	PC communication cable for setup software	p. 166
3	SF-CN1 connectors SF-CN2 connectors	AL-Y0012189-01	To connect safety device Note that this is not a set of two connectors, but a single connector.	pp. 146 to 160
4	CN4 connector	AL-00849548-02 (for short-circuiting), AL-00718252-01 (for wiring)	To be connect to safety device (for short-circuiting and wiring)	pp. 146 to 161
5	Safety unit, safety PLC, etc.	To be provided by the customer	Connects input and output signals of each safety function to such devices as safety units and safety PLCs.	—

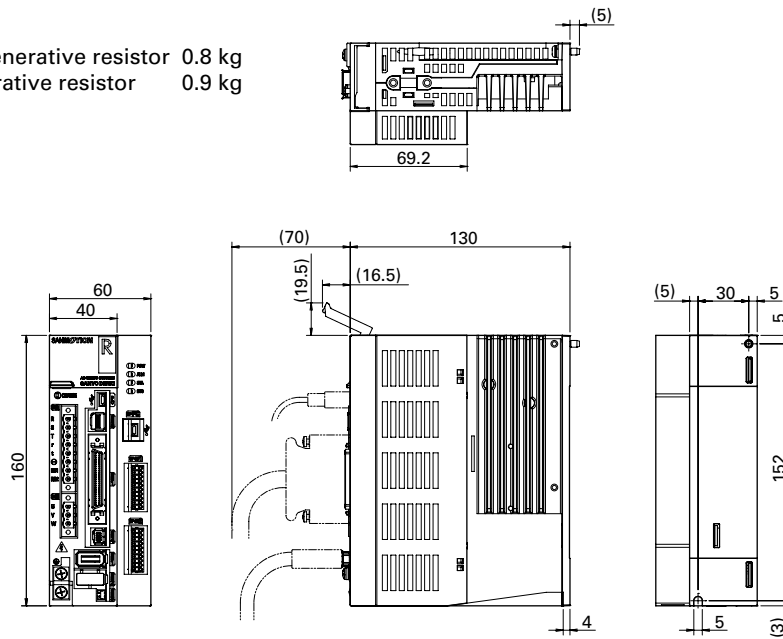
# Dimensions

[Unit: mm]

Shown below are the dimensional drawings of analog/pulse type servo amplifiers combined with a Safety module. The combination with EtherCAT or positioning function type amplifiers have different connectors, but have the same dimensions.

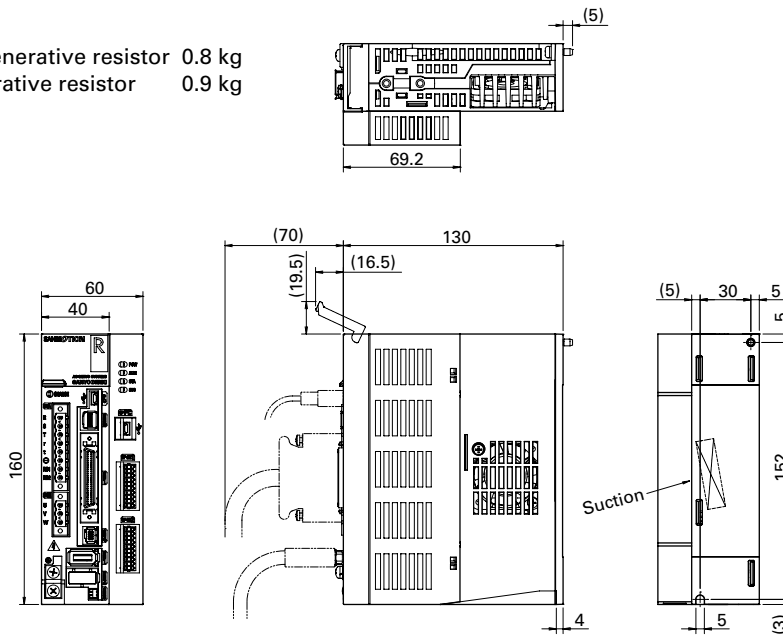
## 10 A

Mass: Without built-in regenerative resistor 0.8 kg  
 With built-in regenerative resistor 0.9 kg



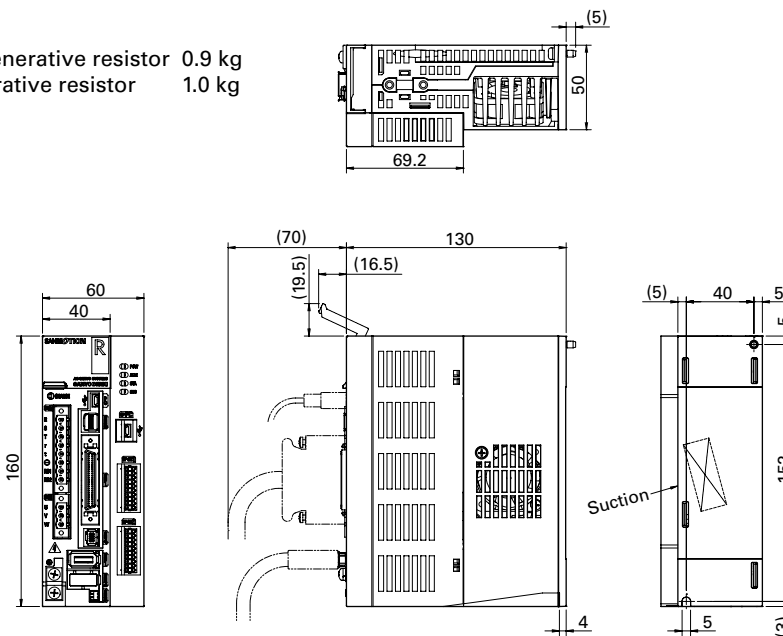
## 20 A

Mass: Without built-in regenerative resistor 0.8 kg  
 With built-in regenerative resistor 0.9 kg



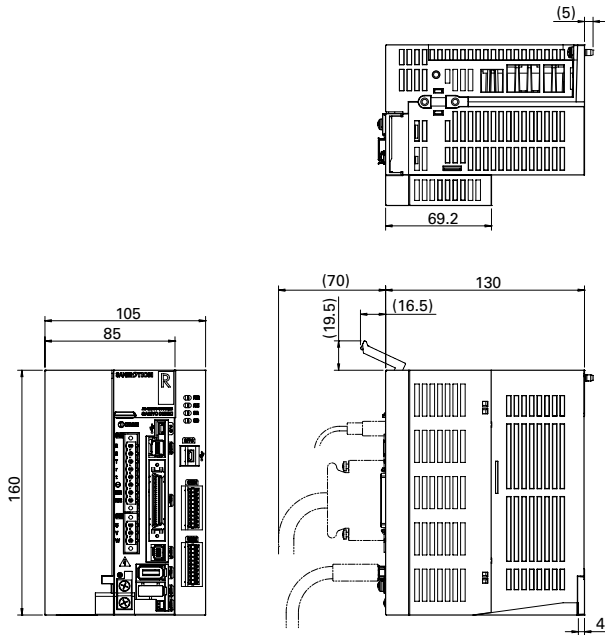
## 30 A

Mass: Without built-in regenerative resistor 0.9 kg  
 With built-in regenerative resistor 1.0 kg



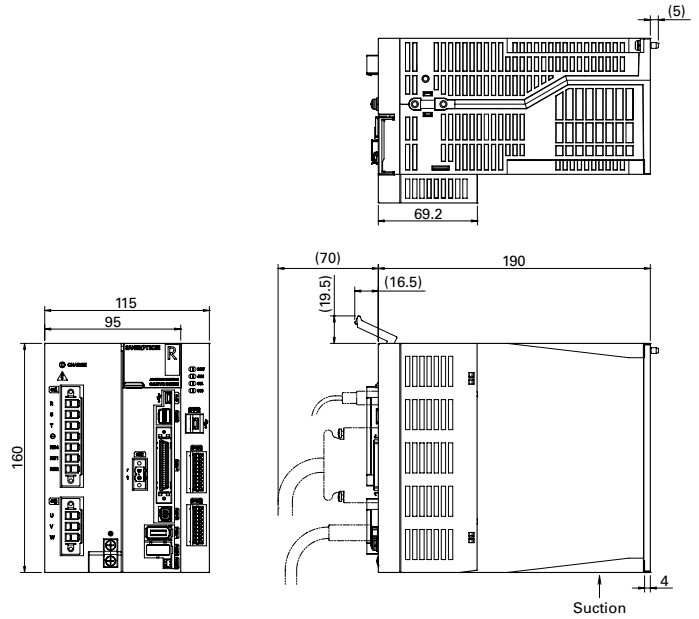
### 50 A

Mass: Without built-in regenerative resistor 1.6 kg  
 With built-in regenerative resistor 1.7 kg



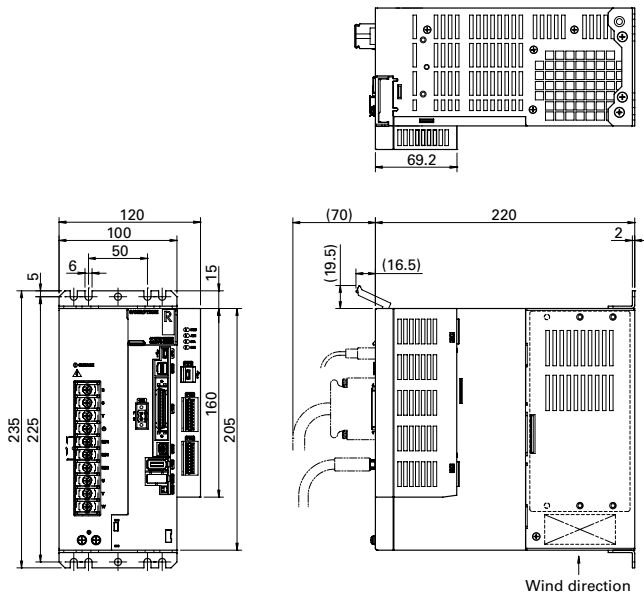
### 75 A

Mass: Without built-in regenerative resistor 2.4 kg  
 With built-in regenerative resistor 2.6 kg



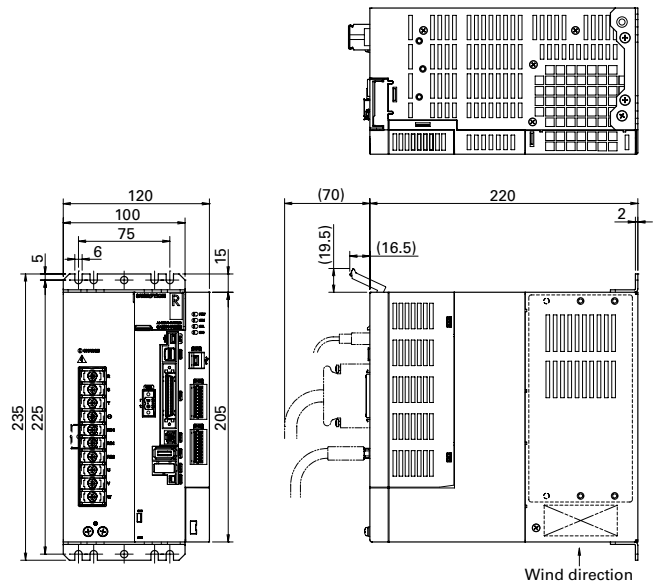
### 100 A

Mass: Without built-in regenerative resistor 4.1 kg  
 With built-in regenerative resistor 4.3 kg



### 150 A

Mass: Without built-in regenerative resistor 4.9 kg  
 With built-in regenerative resistor 5.1 kg





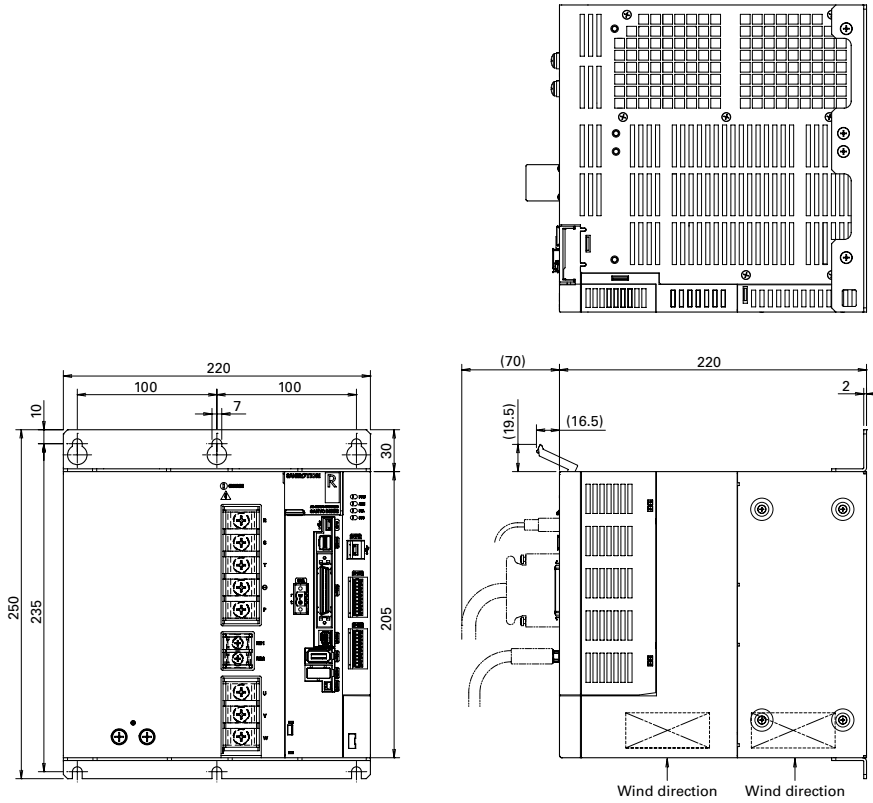
# Dimensions

[Unit: mm]

Shown below are the dimensional drawings of analog/pulse type servo amplifiers combined with a Safety module. The combination with EtherCAT or positioning function type amplifiers have different connectors, but have the same dimensions.

## 300 A

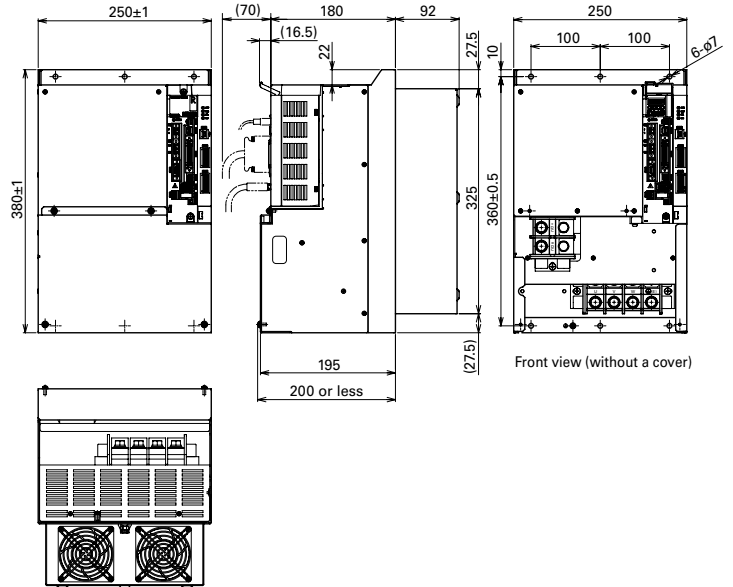
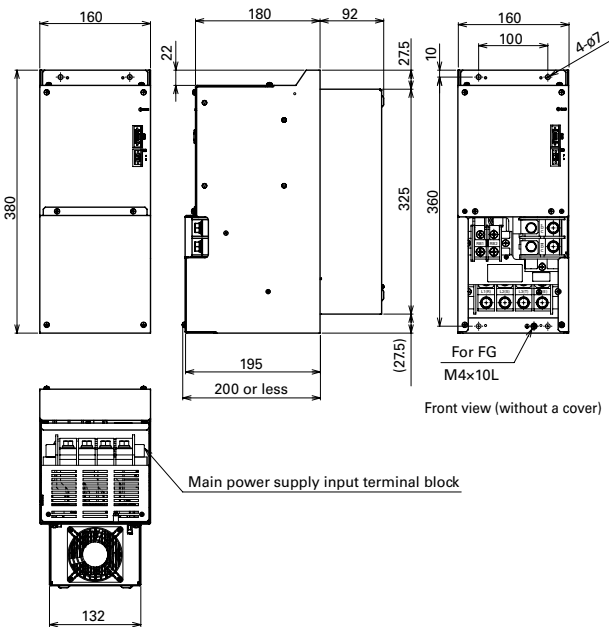
Mass: 9.9 kg



## 600 A

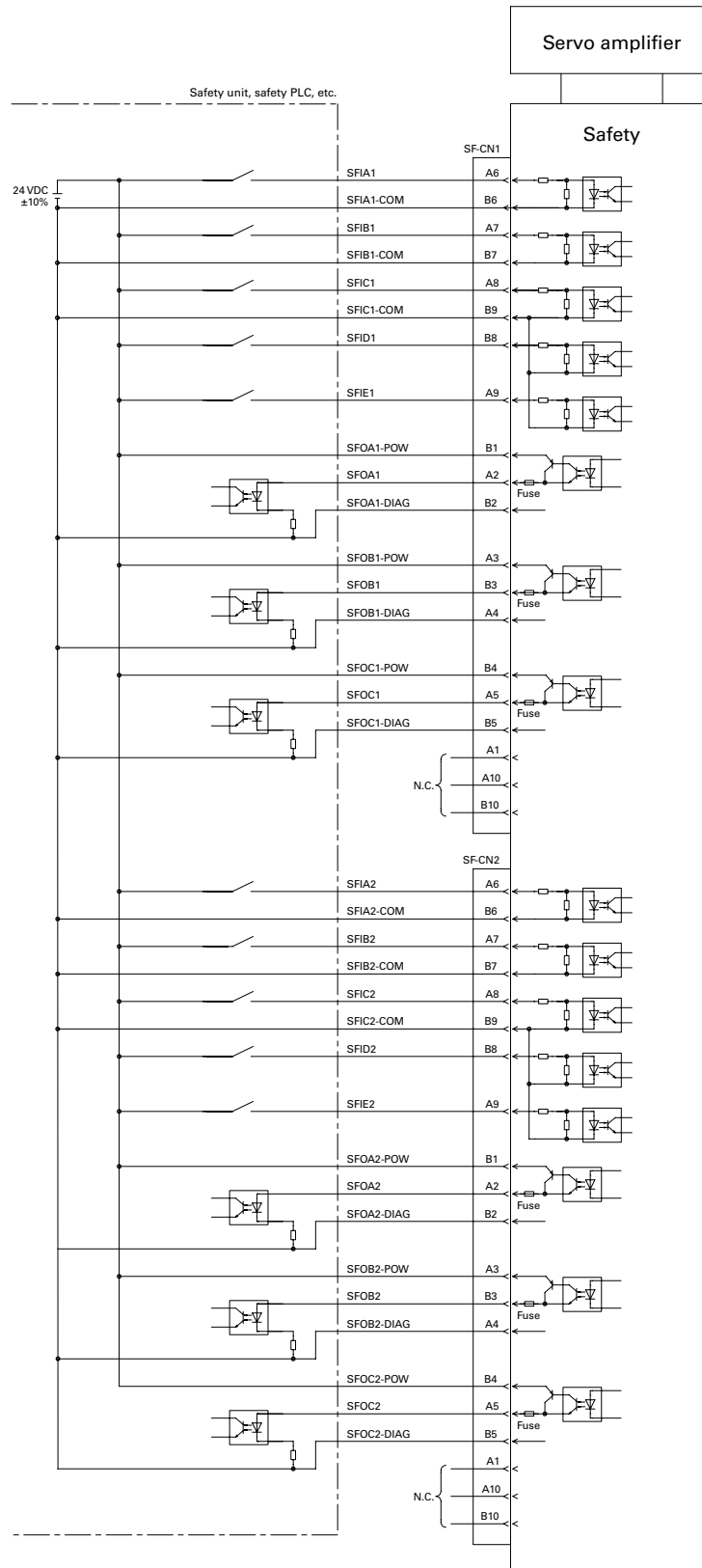
Power supply unit Mass: 11.8 kg

Amplifier unit Mass: 18.1 kg



# External Wiring Diagram Safety

For the external wiring diagram of the servo amplifier part, see respective pages of analog/pulse, EtherCAT, and positioning function types.



# Encoder Wiring Diagram

(Common to analog/pulse, EtherCAT, built-in positioning function, and Safety models)

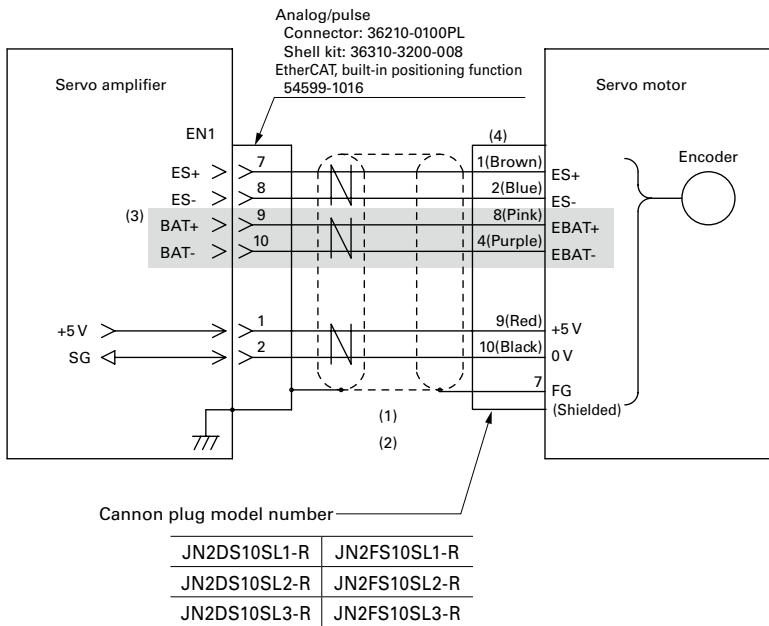
## Absolute encoder

Battery-less absolute encoder [Model No. HA035]

Single-turn absolute encoder [Model No. PA035S]

Option: Battery-backup absolute encoder [Model No. PA035C],

Battery-less absolute resolver encoder [Model No. RA035C]



- (1) Use a shielded twisted pair cable.
- (2) Maximum cable lengths by conductor size of the power supply cable (5 V, SG) are shown in the table below.

Conductor size		Conductor resistance (Ω/km) *at 20°C	Length (m)
AWG	SQ (mm <sup>2</sup> )		
26	0.15	150 or less	5
24	0.2	100 or less	10
22	0.3	60 or less	15
20	0.5	40 or less	25
18	0.75	25 or less	40

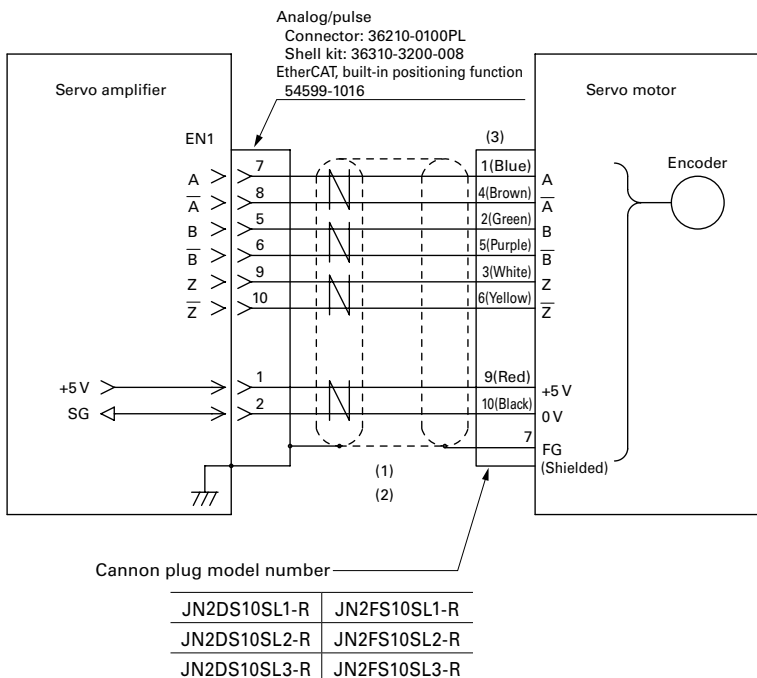
\*Conductor resistance differs by conductor specifications.

- (3) Battery lines (EBAT+, EBAT-) are necessary only when a battery-backup absolute encoder is used.
- (4) Lead wire colors are indicated in parentheses. For lead wire colors and cannon plug pin numbers, see the following table.

	ES+	ES-	EBAT+	EBAT-	+5V	0V	FG
Lead wire color	Brown	Blue	Pink <sup>(3)</sup>	Purple <sup>(3)</sup>	Red	Black	Shielded
Pin no.	1	2	8 <sup>(3)</sup>	4 <sup>(3)</sup>	9	10	7

## Incremental encoder (Option)

Wire-saving incremental encoder



- (1) Use a shielded twisted pair cable.
- (2) Maximum cable lengths by conductor size of the power supply cable (5 V, SG) are shown in the table below.

Conductor size		Conductor resistance (Ω/km) *at 20°C	Length (m)
AWG	SQ (mm <sup>2</sup> )		
26	0.15	150 or less	5
24	0.2	100 or less	10
22	0.3	60 or less	15
20	0.5	40 or less	25
18	0.75	25 or less	40

\*Conductor resistance differs by conductor specifications.

- (3) Lead wire colors are indicated in parentheses. For lead wire colors and cannon plug pin numbers, see the following table:

	A	A-bar	B	B-bar	Z	Z-bar	+5V
Lead wire color	Blue	Brown	Green	Purple	White	Yellow	Red
Pin no.	1	4	2	5	3	6	9
	0V	FG					
Lead wire color	Black	Shielded					
Pin no.	10	7					

# Servo Motors

## R2·R1·R5

### Rotary Motor

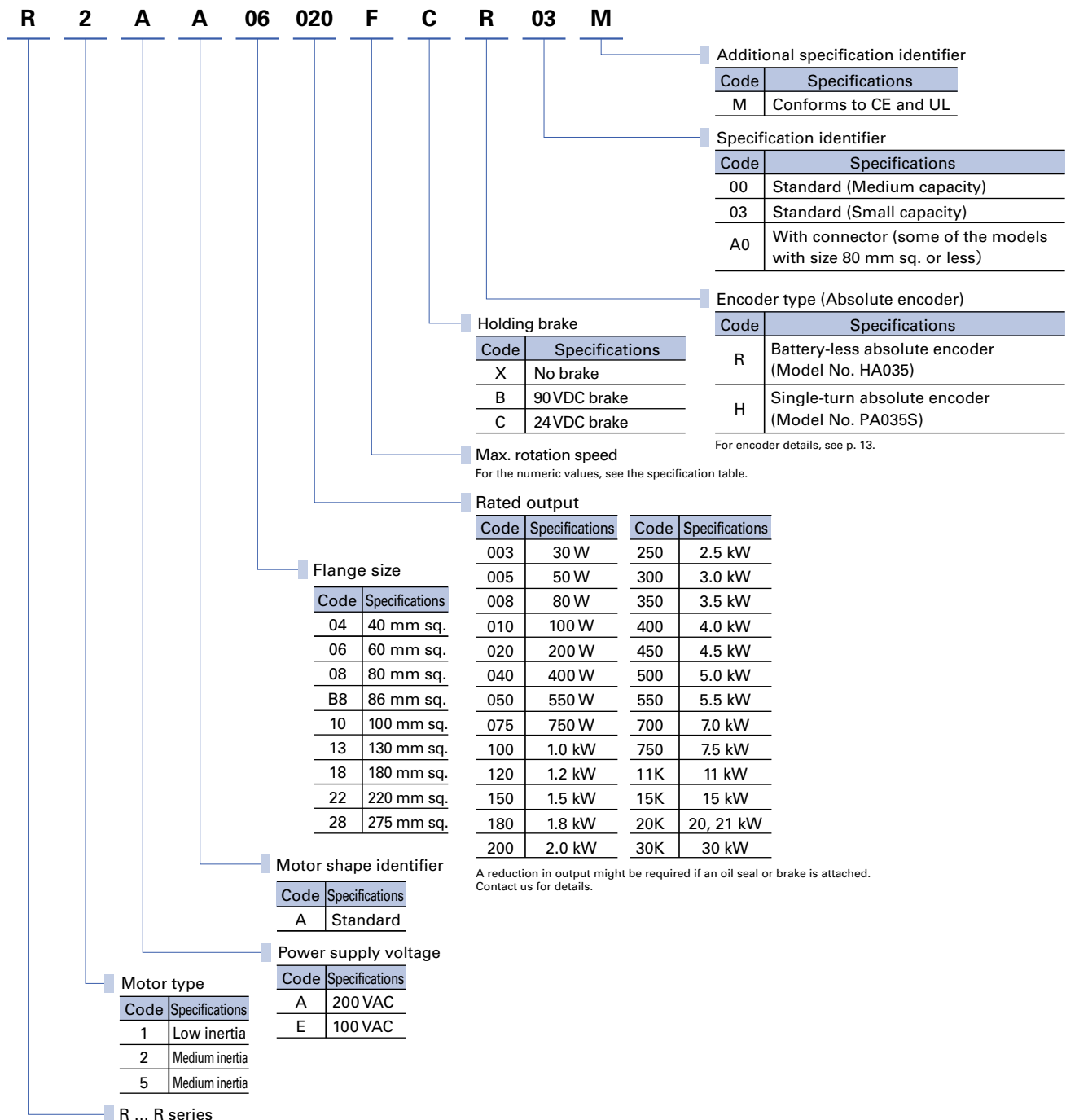
Output capacity: 30 W to 30 kW

Rotary servo motors with a wide range of products.



#### How to read model numbers

Note that not all the possible combinations of the numbers and characters below are valid. Also, some of the numbers/characters listed below are for optional models. For model numbers valid as standard products, refer to "Standard Model Number List".



# Specifications

## R2 Servo Motors Medium Inertia and Low Ripple RoHS

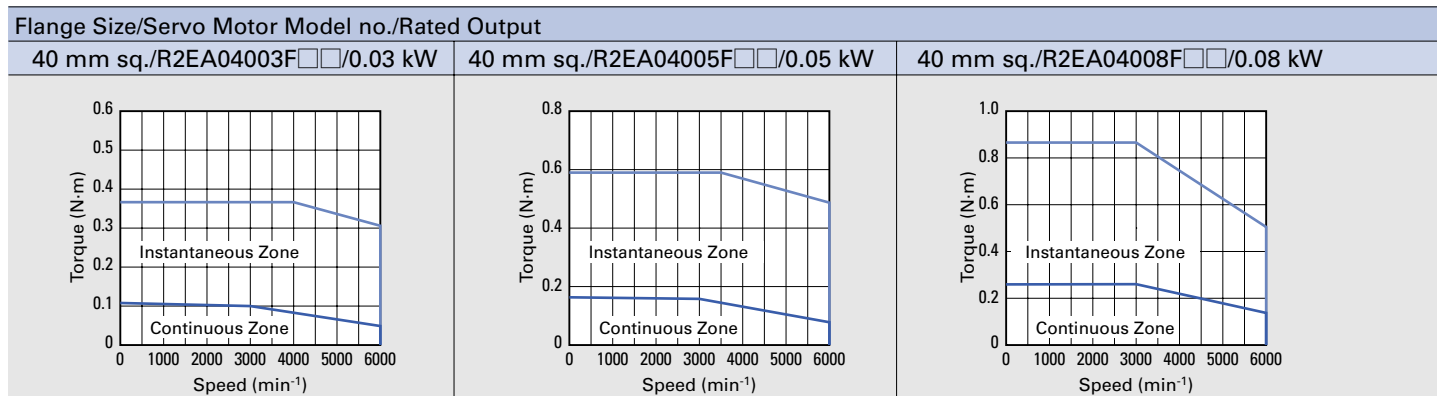
Input voltage **100 VAC**

Flange size				40 mm sq.		
Servo motor model no.				R2EA04003F□□	R2EA04005F□□	R2EA04008F□□
Compatible servo amplifier model no.				RS3E01□□	RS3E02□□	
	Status	Symbol	Unit	《10 A》	《20 A》	
Rated Output	★	P <sub>R</sub>	kW	0.03	0.05 <sup>(2)</sup>	0.08
Rated Speed	★	N <sub>R</sub>	min <sup>-1</sup>	3000	3000	3000
Maximum Speed	★	N <sub>max</sub>	min <sup>-1</sup>	6000	6000	6000
Rated Torque	★	T <sub>R</sub>	N·m	0.098	0.159 <sup>(2)</sup>	0.255
Continuous Stall Torque	★	T <sub>S</sub>	N·m	0.108	0.167	0.255
Peak Stall Torque	★	T <sub>P</sub>	N·m	0.37	0.59	0.86
Rated Armature Current	★	I <sub>R</sub>	Arms	0.94	1.2	1.3
Armature Stall Current	★	I <sub>S</sub>	Arms	1.0	1.3	1.3
Peak Armature Stall Current	★	I <sub>P</sub>	Arms	3.7	4.9	4.5
Torque Constant	☆	K <sub>T</sub>	N·m/Arms	0.116	0.142	0.22
Phase Resistance	☆	R <sub>φ</sub>	Ω	4.0	3.0	2.9
Rated Power Rate	★	Q <sub>R</sub>	kW/s	3.9	6.7 <sup>(2)</sup>	10
Rotor Inertia		J <sub>M</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	0.0247	0.0376	0.0627
Encoder Inertia <sup>(1)</sup>		J <sub>S</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)		0.0042	
Servo Motor Mass <sup>(1)</sup>		W <sub>e</sub>	kg	0.37 (0.64)	0.41 (0.68)	0.53 (0.8)
Brake Static Friction Torque		T <sub>b</sub>	N·m		0.32 min.	
Brake Rated Voltage		V <sub>b</sub>	V		90 VDC/24 VDC ±10%	
Brake Rated Current		I <sub>b</sub>	A		0.07/0.27	
Rotor Moment of Inertia (Brake)		J <sub>b</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)		0.0078	
Servo amplifier power supply capacity (rating)			kVA	0.2	0.2	0.4
CE and UL approved servo motors <sup>(3)</sup>					Yes	
Servo motor protection code					IP65 (Option: IP67)	
Size of aluminum plates for heat radiation during measurement					250×250×6 mm	
Page for motor dimensions					p. 134	

★ Values are for a combination with a standard servo amplifier after thermal equilibrium is established. All values are typical values.  
 ☆ Indicates a typical value when the winding temperature is 20°C. All values are typical values.

- (1) The values for "Encoder inertia" and "servo motor mass" are for when with a [Model No. HA035] battery-less absolute encoder. Contact us for details on other encoders. Values inside ( ) are for when with a brake attached.
- (2) With optional oil seals, motor outputs may be derated to 80 to 95% of the values in the table above.
- (3) Our standard servo amplifiers conform to CE and UL standards.

### Speed-Torque Characteristics



Note: These values are for when the input voltage is a 100 VAC circuit. The area of the instantaneous zone decreases when the power supply voltage is less than 100 VAC.

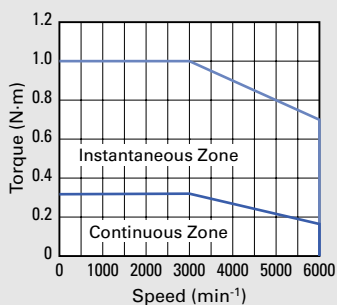
60 mm sq.		Flange size		
R2EA06010F□□	R2EA06020F□□	Servo motor model no.		
RS3E02□□ 《20 A》	RS3E03□□ 《30 A》	Compatible servo amplifier model no.		
		Unit	Symbol	Status
0.1	0.2	kW	PR	★ Rated Output
3000	3000	min <sup>-1</sup>	NR	★ Rated Speed
6000	6000	min <sup>-1</sup>	N <sub>max</sub>	★ Maximum Speed
0.318	0.637	N·m	TR	★ Rated Torque
0.318	0.686	N·m	TS	★ Continuous Stall Torque
1.0	2.2	N·m	TP	★ Peak Stall Torque
1.7	3.1	Arms	IR	★ Rated Armature Current
1.7	3.2	Arms	IS	★ Armature Stall Current
5.6	11.9	Arms	IP	★ Peak Armature Stall Current
0.206	0.224	N·m/Arms	KT	☆ Torque Constant
1.5	0.6	Ω	R <sub>φ</sub>	☆ Phase Resistance
8.6	19	kW/s	QR	★ Rated Power Rate
0.117	0.219	×10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	JM	Rotor Inertia
	0.0042	×10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	JS	Encoder Inertia <sup>(1)</sup>
0.74 (1.1)	0.99 (1.4)	kg	We	Servo Motor Mass <sup>(1)</sup>
0.36 min.	1.37 min.	N·m	Tb	Brake Static Friction Torque
90 VDC/24 VDC ±10%		V	Vb	Brake Rated Voltage
0.07/.27	0.11/0.32	A	Ib	Brake Rated Current
	0.06	×10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	Jb	Rotor Moment of Inertia (Brake)
0.5	0.6	kVA		Servo amplifier power supply capacity (rating)
Yes				CE and UL approved servo motors <sup>(3)</sup>
IP65 (Option: IP67)				Servo motor protection code
250×250×6 mm				Size of aluminum plates for heat radiation during measurement
p. 134				Page for motor dimensions

## Servo Motor Operating Ambient Conditions

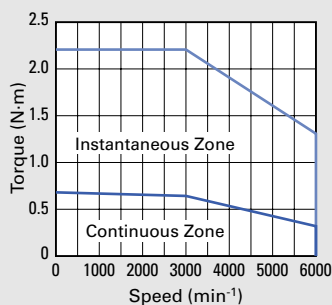
Operating temperature and humidity	Temp.: 0 to 40°C. Humidity: 90% max. (non-condensing)
Vibration resistance	24.5 m/s <sup>2</sup>
Shock resistance	98 m/s <sup>2</sup> , 2 times
Operation altitude	1000 m or lower above sea level
Installation location	Indoor (without direct sunlight) Location where no substance that gives adverse effects on the device and motor, such as corrosive gas, flammable gas, or dust exists

## Flange Size/Servo Motor Model no./Rated Output

60 mm sq./R2EA06010F□□/0.1 kW



60 mm sq./R2EA06020F□□/0.2 kW



# Specifications

## R1 Servo Motors Low Inertia and High Power Rate RoHS

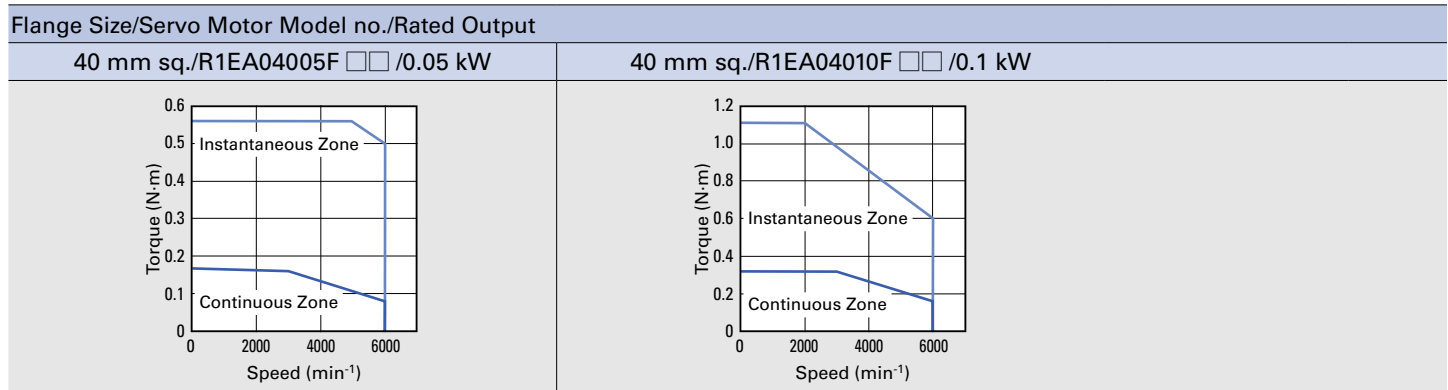
Input voltage **100 VAC**

Flange size				40 mm sq.	
Servo motor model no.				R1EA04005F□□	R1EA04010F□□
Compatible servo amplifier model no.				RS3E02□□ (20 A)	
	Status	Symbol	Unit		
Rated Output	★	P <sub>R</sub>	kW	0.05	0.1
Rated Speed	★	N <sub>R</sub>	min <sup>-1</sup>	3000	3000
Maximum Speed	★	N <sub>max</sub>	min <sup>-1</sup>	6000	6000
Rated Torque	★	T <sub>R</sub>	N·m	0.159	0.318
Continuous Stall Torque	★	T <sub>S</sub>	N·m	0.167	0.318
Peak Stall Torque	★	T <sub>P</sub>	N·m	0.56	1.11
Rated Armature Current	★	I <sub>R</sub>	Arms	1.3	1.7
Armature Stall Current	★	I <sub>S</sub>	Arms	1.4	1.8
Peak Armature Stall Current	★	I <sub>P</sub>	Arms	5.5	6.5
Torque Constant	☆	K <sub>T</sub>	N·m/Arms	0.135	0.202
Phase Resistance	☆	R <sub>φ</sub>	Ω	2.3	2.4
Rated Power Rate	★	Q <sub>R</sub>	kW/s	17	42
Rotor Inertia		J <sub>M</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	0.0146	0.0242
Encoder Inertia <sup>(1)</sup>		J <sub>S</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	0.0033	0.0033
Servo Motor Mass <sup>(1)</sup>		W <sub>e</sub>	kg	0.46 (0.70)	0.61 (0.85)
Brake Static Friction Torque		T <sub>b</sub>	N·m	0.32 min.	
Brake Rated Voltage		V <sub>b</sub>	V	24 VDC	
Brake Rated Current		I <sub>b</sub>	A	0.27	
Rotor Moment of Inertia (Brake)		J <sub>b</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	0.0078	
Servo amplifier power supply capacity (rating)			kVA	0.2	0.4
Cooling fan power		P <sub>F</sub>	W	—	
CE and UL approved servo motors <sup>(2)</sup>				Yes	
Servo motor protection code				IP65 (Option: IP67)	
Size of aluminum plates for heat radiation during measurement				250×250×6 mm	
Page for motor dimensions				p. 134	

★ Values are for a combination with a standard servo amplifier after thermal equilibrium is established. All values are typical values.  
 ☆ Indicates a typical value when the winding temperature is 20°C. All values are typical values.

(1) The values for "Encoder inertia" and "servo motor mass" are for when with a [Model No. HA035] battery-less absolute encoder. Contact us for details on other encoders. Values inside ( ) are for when with a brake attached.  
 (2) Our standard servo amplifiers conform to CE and UL standards.

### Speed-Torque Characteristics



Note: These values are for when the input voltage is a 3-phase 200 VAC circuit. The characteristics of the instantaneous zone may change when the input voltage is less than 200 VAC or single-phase 200 VAC.



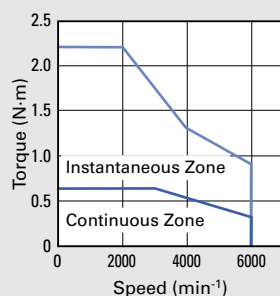
60 mm sq.	Flange size			
R1EA06020F□□	Servo motor model no.			
RS3E03□□ 《30 A》	Compatible servo amplifier model no.			
	Unit	Symbol	Status	
0.2	kW	P <sub>R</sub>	★	Rated Output
3000	min <sup>-1</sup>	N <sub>R</sub>	★	Rated Speed
6000	min <sup>-1</sup>	N <sub>max</sub>	★	Maximum Speed
0.637	N·m	T <sub>R</sub>	★	Rated Torque
0.637	N·m	T <sub>S</sub>	★	Continuous Stall Torque
2.2	N·m	T <sub>P</sub>	★	Peak Stall Torque
4	Arms	I <sub>R</sub>	★	Rated Armature Current
4.2	Arms	I <sub>S</sub>	★	Armature Stall Current
15.5	Arms	I <sub>P</sub>	★	Peak Armature Stall Current
0.203	N·m/Arms	K <sub>T</sub>	☆	Torque Constant
0.65	Ω	R <sub>φ</sub>	☆	Phase Resistance
33	kW/s	Q <sub>R</sub>	★	Rated Power Rate
0.122	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	J <sub>M</sub>		Rotor Inertia
0.0033	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	J <sub>S</sub>		Encoder Inertia <sup>(1)</sup>
1.1 (1.5)	kg	We		Servo Motor Mass <sup>(1)</sup>
1.37 min.	N·m	T <sub>b</sub>		Brake Static Friction Torque
24 VDC	V	V <sub>b</sub>		Brake Rated Voltage
0.32	A	I <sub>b</sub>		Brake Rated Current
0.06	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	J <sub>b</sub>		Rotor Moment of Inertia (Brake)
0.6	kVA			Servo amplifier power supply capacity (rating)
—	W	P <sub>F</sub>		Cooling fan power
Yes				CE and UL approved servo motors <sup>(2)</sup>
IP65 (Option: IP67)				Servo motor protection code
250×250×6 mm				Size of aluminum plates for heat radiation during measurement
p. 134				Page for motor dimensions

## Servo Motor Operating Ambient Conditions

Operating temperature and humidity	Temp.: 0 to 40°C. Humidity: 90% max. (non-condensing)
Vibration resistance	24.5 m/s <sup>2</sup>
Shock resistance	98 m/s <sup>2</sup> , 2 times
Operation altitude	1000 m or lower above sea level
Installation location	Indoor (without direct sunlight) Location where no substance that gives adverse effects on the device and motor, such as corrosive gas, flammable gas, or dust exists

## Flange Size/Servo Motor Model no./Rated Output

60 mm sq./R1EA06020F□□/0.2 kW



# Specifications

## R2 Servo Motors Medium Inertia and Low Ripple RoHS

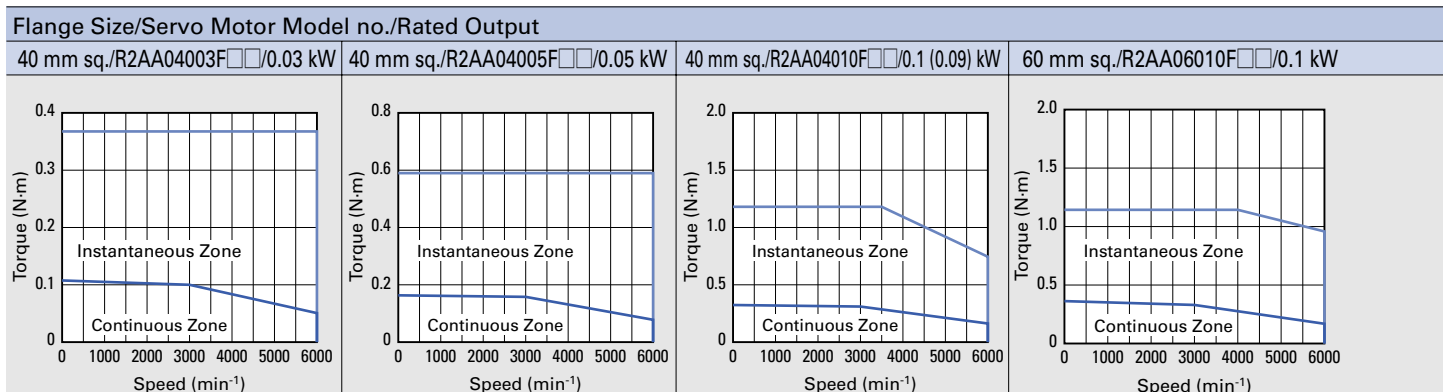
Input voltage **200 VAC**

Flange size				40 mm sq.			60 mm sq.
Servo motor model no.				R2AA04003F <input type="checkbox"/>	R2AA04005F <input type="checkbox"/>	R2AA04010F <input type="checkbox"/>	R2AA06010F <input type="checkbox"/>
Compatible servo amplifier model no.				RS3A01 <input type="checkbox"/>			
	Status	Symbol	Unit	《10 A》			
Rated Output	★	PR	kW	0.03	0.05 <sup>(2)</sup>	0.1 (0.09) <sup>(2)</sup>	0.1
Rated Speed	★	NR	min <sup>-1</sup>	3000	3000	3000	3000
Maximum Speed	★	N <sub>max</sub>	min <sup>-1</sup>	6000	6000	6000	6000
Rated Torque	★	TR	N·m	0.098	0.159 <sup>(2)</sup>	0.318 (0.286) <sup>(2)</sup>	0.318
Continuous Stall Torque	★	TS	N·m	0.108	0.167	0.318	0.353
Peak Stall Torque	★	TP	N·m	0.37	0.59	1.18	1.13
Rated Armature Current	★	IR	Arms	0.51	0.67	0.81	0.86
Armature Stall Current	★	IS	Arms	0.56	0.69	0.81	0.86
Peak Armature Stall Current	★	IP	Arms	2.15	2.8	3.3	3.5
Torque Constant	☆	KT	N·m/Arms	0.201	0.246	0.424	0.375
Phase Resistance	☆	R <sub>φ</sub>	Ω	12	9	9.3	4.8
Rated Power Rate	★	QR	kW/s	3.9	6.7 <sup>(2)</sup>	16 (13) <sup>(2)</sup>	8.6
Rotor Inertia		J <sub>M</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	0.0247	0.0376	0.0627	0.117
Encoder Inertia <sup>(1)</sup>		J <sub>S</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	0.0042			
Servo Motor Mass <sup>(1)</sup>		We	kg	0.37 (0.64)	0.41 (0.68)	0.53 (0.8)	0.74 (1.1)
Brake Static Friction Torque		T <sub>b</sub>	N·m	0.32 min.			0.36 min.
Brake Rated Voltage		V <sub>b</sub>	V	90 VDC/24 VDC ±10%			
Brake Rated Current		I <sub>b</sub>	A	0.07/0.27			
Rotor Moment of Inertia (Brake)		J <sub>b</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	0.0078			0.06
Servo amplifier power supply capacity (rating)			kVA	0.2	0.2	0.3	0.3
CE and UL approved servo motors <sup>(3)</sup>				Yes			
Servo motor protection code				IP65 (Option: IP67)			
Size of aluminum plates for heat radiation during measurement				250×250×6 mm			
Page for motor dimensions				p. 134			

★ Values are for a combination with a standard servo amplifier after thermal equilibrium is established. All values are typical values.  
 ☆ Indicates a typical value when the winding temperature is 20°C. All values are typical values.

(1) The values for "Encoder inertia" and "servo motor mass" are for when with a [Model No. HA035] battery-less absolute encoder. Contact us for details on other encoders.  
 Values inside ( ) are for when with a brake attached.  
 (2) With optional oil seals, motor outputs may be derated to 80 to 95% of the values in the table above.  
 Values inside ( ) are for when with a brake attached.  
 (3) Our standard servo amplifiers conform to CE and UL standards.

### Speed-Torque Characteristics



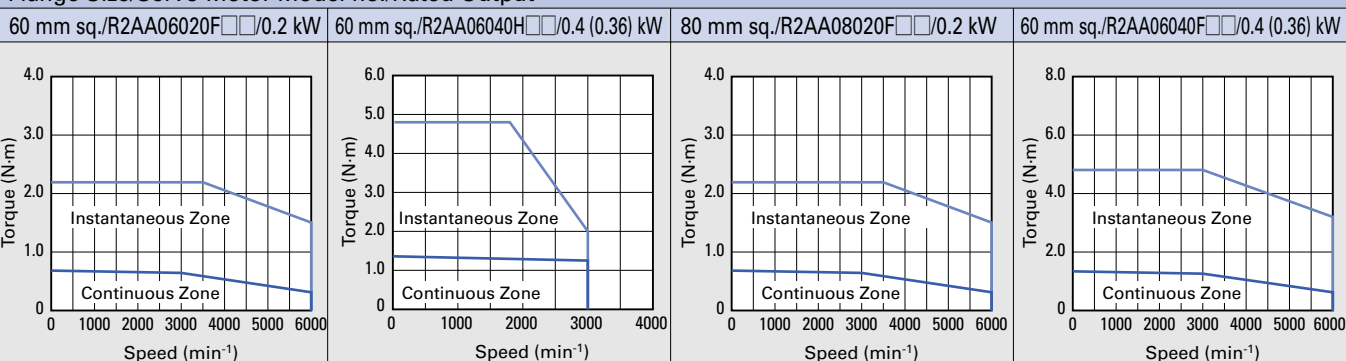
Note: These values are for when the input voltage is a 3-phase 200 VAC circuit. The characteristics of the instantaneous zone may change when the input voltage is less than 200 VAC or single-phase 200 VAC.

60 mm sq.		80 mm sq.		60 mm sq.		Flange size	
R2AA06020F□□		R2AA06040H□□		R2AA08020F□□		R2AA06040F□□	
RS3A02□□ 《20 A》				Servo motor model no.			
				Compatible servo amplifier model no.			
				Unit	Symbol	Status	
0.2	0.4 (0.36) <sup>(2)</sup>	0.2	0.4 (0.36) <sup>(2)</sup>	kW	P <sub>R</sub>	★	Rated Output
3000	3000	3000	3000	min <sup>-1</sup>	N <sub>R</sub>	★	Rated Speed
6000	3000	6000	6000	min <sup>-1</sup>	N <sub>max</sub>	★	Maximum Speed
0.637	1.27 (1.15) <sup>(2)</sup>	0.637	1.27 (1.15) <sup>(2)</sup>	N·m	T <sub>R</sub>	★	Rated Torque
0.686	1.37	0.686	1.37	N·m	T <sub>S</sub>	★	Continuous Stall Torque
2.2	4.8	2.2	4.8	N·m	T <sub>P</sub>	★	Peak Stall Torque
1.5	1.7	1.5	2.8	Arms	I <sub>R</sub>	★	Rated Armature Current
1.6	1.8	1.5	2.8	Arms	I <sub>S</sub>	★	Armature Stall Current
5.6	7.1	4.8	10.8	Arms	I <sub>P</sub>	★	Peak Armature Stall Current
0.476	0.816	0.516	0.524	N·m/Arms	K <sub>T</sub>	☆	Torque Constant
2.7	3.3	2.3	1.36	Ω	R <sub>φ</sub>	☆	Phase Resistance
19	39 (32) <sup>(2)</sup>	8	39 (32) <sup>(2)</sup>	kW/s	Q <sub>R</sub>	★	Rated Power Rate
0.219	0.412	0.52	0.412	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	J <sub>M</sub>		Rotor Inertia
0.0042				x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	J <sub>S</sub>		Encoder Inertia <sup>(1)</sup>
0.99 (1.4)	1.5 (1.9)	1.4 (2.2)	1.5 (1.9)	kg	We		Servo Motor Mass <sup>(1)</sup>
1.37 min.	1.37 min.	2.55 min.	1.37 min.	N·m	T <sub>b</sub>		Brake Static Friction Torque
90 VDC/24 VDC ±10%				V	V <sub>b</sub>		Brake Rated Voltage
0.11/0.32	0.11/0.32	0.12/0.37	0.11/0.32	A	I <sub>b</sub>		Brake Rated Current
0.06	0.060	0.25	0.06	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	J <sub>b</sub>		Rotor Moment of Inertia (Brake)
0.6	1.0	0.6	1.0	kVA			Servo amplifier power supply capacity (rating)
Yes							CE and UL approved servo motors <sup>(3)</sup>
IP65 (Option: IP67)							Servo motor protection code
250×250×6 mm							Size of aluminum plates for heat radiation during measurement
p. 134							Page for motor dimensions

## Servo Motor Operating Ambient Conditions

Operating temperature and humidity	Temp.: 0 to 40°C. Humidity: 90% max. (non-condensing)
Vibration resistance	24.5 m/s <sup>2</sup>
Shock resistance	98 m/s <sup>2</sup> , 2 times
Operation altitude	1000 m or lower above sea level
Installation location	Indoor (without direct sunlight) Location where no substance that gives adverse effects on the device and motor, such as corrosive gas, flammable gas, or dust exists

## Flange Size/Servo Motor Model no./Rated Output



# Specifications

## R2 Servo Motors Medium Inertia and Low Ripple RoHS

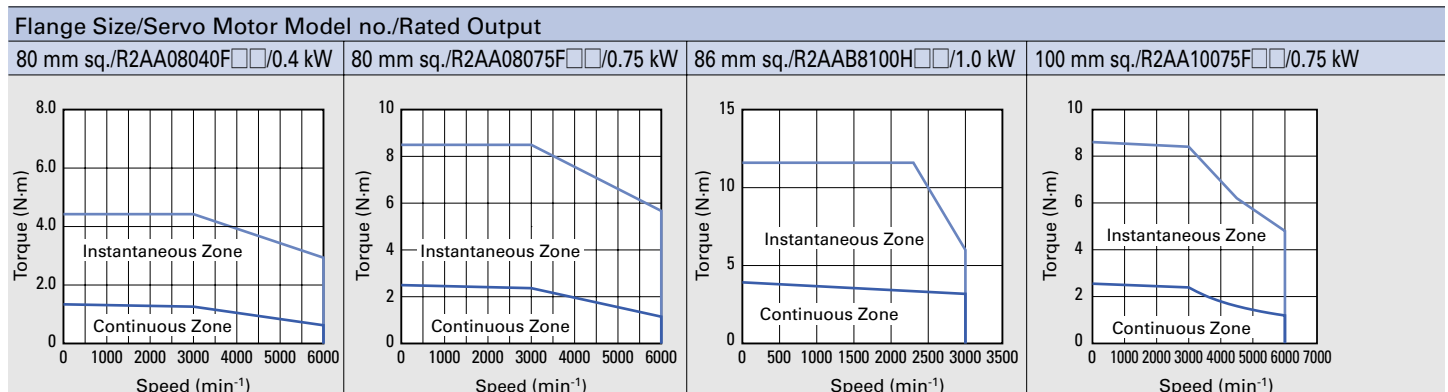
Input voltage **200 VAC**

Flange size				80 mm sq.		86 mm sq.	100 mm sq.
Servo motor model no.				<b>R2AA08040F</b> <input type="checkbox"/>	<b>R2AA08075F</b> <input type="checkbox"/>	<b>R2AAB8100H</b> <input type="checkbox"/>	<b>R2AA10075F</b> <input type="checkbox"/>
Compatible servo amplifier model no.				<b>RS3A02</b> <input type="checkbox"/>		<b>RS3A03</b> <input type="checkbox"/>	
	Status	Symbol	Unit	《20 A》		《30 A》	
Rated Output	★	P <sub>R</sub>	kW	0.4	0.75 <sup>(2)</sup>	1.0	0.75
Rated Speed	★	N <sub>R</sub>	min <sup>-1</sup>	3000	3000	3000	3000
Maximum Speed	★	N <sub>max</sub>	min <sup>-1</sup>	6000	6000	3000	6000
Rated Torque	★	T <sub>R</sub>	N·m	1.27	2.39 <sup>(2)</sup>	3.18	2.39
Continuous Stall Torque	★	T <sub>S</sub>	N·m	1.37	2.55	3.92	2.55
Peak Stall Torque	★	T <sub>P</sub>	N·m	4.4	8.5	11.6	8.6
Rated Armature Current	★	I <sub>R</sub>	Arms	2.6	4.6	4.6	4.4
Armature Stall Current	★	I <sub>S</sub>	Arms	2.6	4.6	4.7	4.6
Peak Armature Stall Current	★	I <sub>P</sub>	Arms	8.9	15.5	15.5	15.5
Torque Constant	☆	K <sub>T</sub>	N·m/Arms	0.559	0.559	0.825	0.582
Phase Resistance	☆	R <sub>φ</sub>	Ω	0.93	0.4	0.85	0.69
Rated Power Rate	★	Q <sub>R</sub>	kW/s	16	31 <sup>(2)</sup>	42	29
Rotor Inertia		J <sub>M</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	1.04	1.82	2.38	2.00
Encoder Inertia <sup>(1)</sup>		J <sub>S</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	0.0042			
Servo Motor Mass <sup>(1)</sup>		W <sub>e</sub>	kg	1.8 (2.7)	2.8 (3.7)	3.6 (4.5)	3.3 (4.2)
Brake Static Friction Torque		T <sub>b</sub>	N·m	2.55 min.		3.92 min.	
Brake Rated Voltage		V <sub>b</sub>	V	90 VDC/24 VDC ±10%			
Brake Rated Current		I <sub>b</sub>	A	0.12/0.37		0.09/0.30	
Rotor Moment of Inertia (Brake)		J <sub>b</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	0.25		0.343	
Servo amplifier power supply capacity (rating)			kVA	1.0	1.6	2.0	1.7
CE and UL approved servo motors <sup>(3)</sup>				Yes			
Servo motor protection code				IP65 (Option: IP67)			
Size of aluminum plates for heat radiation during measurement				250×250×6 mm		305×305×12 mm	
Page for motor dimensions				p. 134			

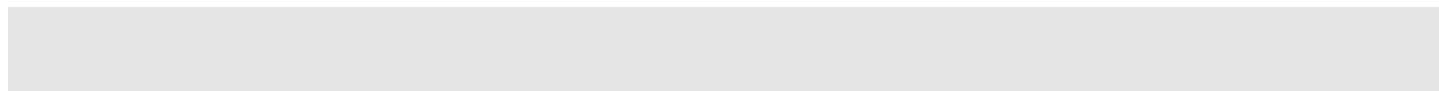
★ Values are for a combination with a standard servo amplifier after thermal equilibrium is established. All values are typical values.  
 ☆ Indicates a typical value when the winding temperature is 20°C. All values are typical values.

- (1) The values for "Encoder inertia" and "servo motor mass" are for when with a [Model No. HA035] battery-less absolute encoder. Contact us for details on other encoders. Values inside ( ) are for when with a brake attached.
- (2) With optional oil seals, motor outputs may be derated to 80 to 95% of the values in the table above.
- (3) Our standard servo amplifiers conform to CE and UL standards.

### Speed-Torque Characteristics



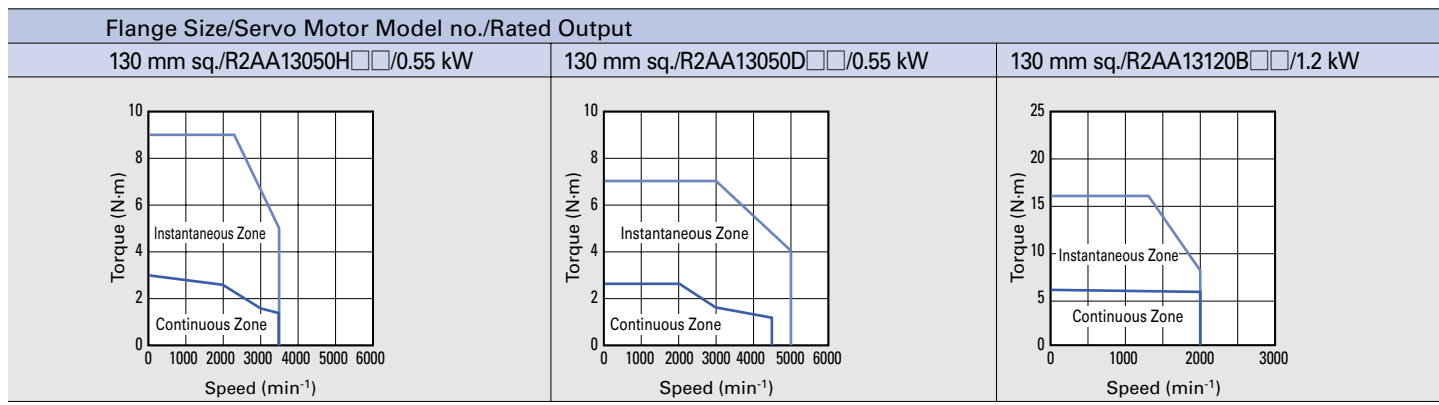
Note: These values are for when the input voltage is a 3-phase 200 VAC circuit. The characteristics of the instantaneous zone may change when the input voltage is less than 200 VAC or single-phase 200 VAC.



130 mm sq.			Flange size			
R2AA13050H□□	R2AA13050D□□	R2AA13120B□□	Servo motor model no.			
RS3A03□□ 《30 A》			Compatible servo amplifier model no.			
			Unit	Symbol	Status	
0.55	0.55	1.2	kW	P <sub>R</sub>	★	Rated Output
2000	2000	2000	min <sup>-1</sup>	N <sub>R</sub>	★	Rated Speed
3500	5000	2000	min <sup>-1</sup>	N <sub>max</sub>	★	Maximum Speed
2.6	2.6	5.7	N·m	T <sub>R</sub>	★	Rated Torque
3.0	2.6	6.0	N·m	T <sub>S</sub>	★	Continuous Stall Torque
9.0	7.0	16	N·m	T <sub>P</sub>	★	Peak Stall Torque
4.2	5.2	5.2	Arms	I <sub>R</sub>	★	Rated Armature Current
4.6	5.2	5.2	Arms	I <sub>S</sub>	★	Armature Stall Current
15.5	15.5	15.5	Arms	I <sub>P</sub>	★	Peak Armature Stall Current
0.67	0.53	1.09	N·m/Arms	K <sub>T</sub>	☆	Torque Constant
0.65	0.39	0.64	Ω	R <sub>φ</sub>	☆	Phase Resistance
22	22	54	kW/s	Q <sub>R</sub>	★	Rated Power Rate
3.1	3.1	6.0	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	J <sub>M</sub>		Rotor Inertia
	0.0042		x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	J <sub>S</sub>		Encoder Inertia <sup>(1)</sup>
4.5 (6)	4.5 (6)	6.1 (8)	kg	We		Servo Motor Mass <sup>(1)</sup>
3.5 min.	3.5 min.	9.0 min.	N·m	T <sub>b</sub>		Brake Static Friction Torque
90 VDC/24 VDC ±10%			V	V <sub>b</sub>		Brake Rated Voltage
0.15/0.41	0.15/0.41	0.17/0.51	A	I <sub>b</sub>		Brake Rated Current
0.5	0.5	0.5	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	J <sub>b</sub>		Rotor Moment of Inertia (Brake)
1.2	1.2	2.2	kVA			Servo amplifier power supply capacity (rating)
Yes						CE and UL approved servo motors <sup>(3)</sup>
IP65						Servo motor protection code
305×305×20 mm		400×400×20 mm				Size of aluminum plates for heat radiation during measurement
p. 137						Page for motor dimensions

Servo Motor Operating Ambient Conditions

Operating temperature and humidity	Temp.: 0 to 40°C. Humidity: 90% max. (non-condensing)
Vibration resistance	24.5 m/s <sup>2</sup>
Shock resistance	98 m/s <sup>2</sup> , 2 times
Operation altitude	1000 m or lower above sea level
Installation location	Indoor (without direct sunlight) Location where no substance that gives adverse effects on the device and motor, such as corrosive gas, flammable gas, or dust exists



# Specifications

## R2 Servo Motors Medium Inertia and Low Ripple RoHS

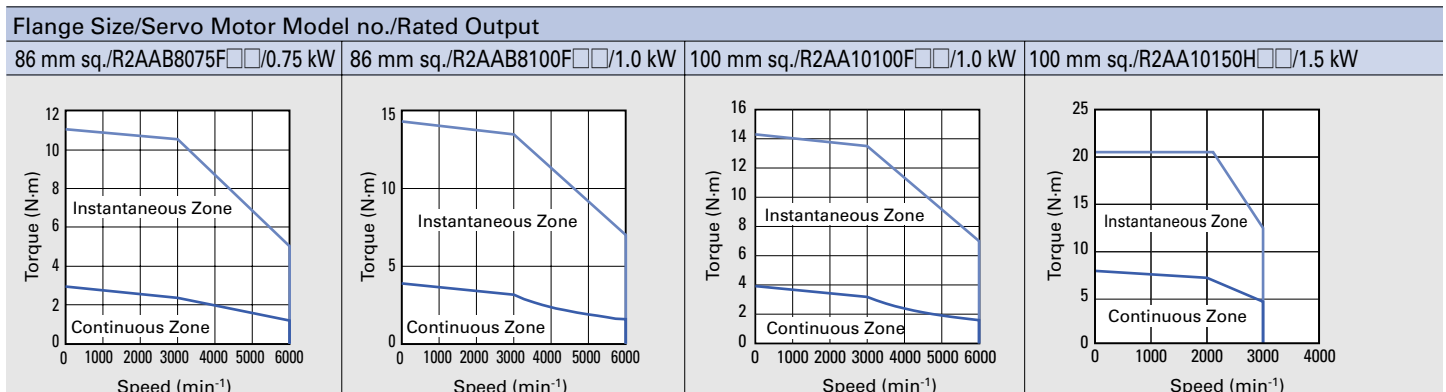
Input voltage **200 VAC**

Flange size				86 mm sq.		100 mm sq.	
Servo motor model no.				R2AAB8075F□□	R2AAB8100F□□	R2AA10100F□□	R2AA10150H□□
Compatible servo amplifier model no.				RS3A05□□ (50 A)			
	Status	Symbol	Unit				
Rated Output	★	P <sub>R</sub>	kW	0.75	1.0	1.0	1.5
Rated Speed	★	N <sub>R</sub>	min <sup>-1</sup>	3000	3000	3000	2000
Maximum Speed	★	N <sub>max</sub>	min <sup>-1</sup>	6000	6000	6000	3000
Rated Torque	★	T <sub>R</sub>	N·m	2.38	3.18	3.18	7.2
Continuous Stall Torque	★	T <sub>S</sub>	N·m	2.94	3.92	3.92	8.0
Peak Stall Torque	★	T <sub>P</sub>	N·m	11.0	14.3	14.3	20.5
Rated Armature Current	★	I <sub>R</sub>	Arms	4.7	6.0	5.7	8.6
Armature Stall Current	★	I <sub>S</sub>	Arms	5.5	6.8	6.8	9.4
Peak Armature Stall Current	★	I <sub>P</sub>	Arms	23.7	25.7	25.7	25.5
Torque Constant	☆	K <sub>T</sub>	N·m/Arms	0.547	0.582	0.584	0.98
Phase Resistance	☆	R <sub>φ</sub>	Ω	0.62	0.44	0.35	0.43
Rated Power Rate	★	Q <sub>R</sub>	kW/s	35	42	29	70
Rotor Inertia		J <sub>M</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	1.64	2.38	3.50	7.4
Encoder Inertia <sup>(1)</sup>		J <sub>S</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	0.0042			
Servo Motor Mass <sup>(1)</sup>		W <sub>e</sub>	kg	2.9 (3.8)	3.6 (4.5)	4.1 (5)	6.5 (8.1)
Brake Static Friction Torque		T <sub>b</sub>	N·m	3.92 min.	3.92 min.	3.92 min.	9.3 min.
Brake Rated Voltage		V <sub>b</sub>	V	90 VDC/24 VDC ±10%			24 VDC ±10%
Brake Rated Current		I <sub>b</sub>	A	0.09/0.30	0.09/0.30	0.09/0.30	0.70
Rotor Moment of Inertia (Brake)		J <sub>b</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	0.34	0.34	0.343	0.30
Servo amplifier power supply capacity (rating)			kVA	1.6	2.3	2.3	2.8
CE and UL approved servo motors <sup>(2)</sup>				Yes			
Servo motor protection code				IP65 (Option: IP67)			IP65
Size of aluminum plates for heat radiation during measurement				305×305×12 mm			400×400×20 mm
Page for motor dimensions				p. 134			p. 136

★ Values are for a combination with a standard servo amplifier after thermal equilibrium is established. All values are typical values.  
 ☆ Indicates a typical value when the winding temperature is 20°C. All values are typical values.

(1) The values for "Encoder inertia" and "servo motor mass" are for when with a [Model No. HA035] battery-less absolute encoder. Contact us for details on other encoders. Values inside ( ) are for when with a brake attached.  
 (2) Our standard servo amplifiers conform to CE and UL standards.

### Speed-Torque Characteristics

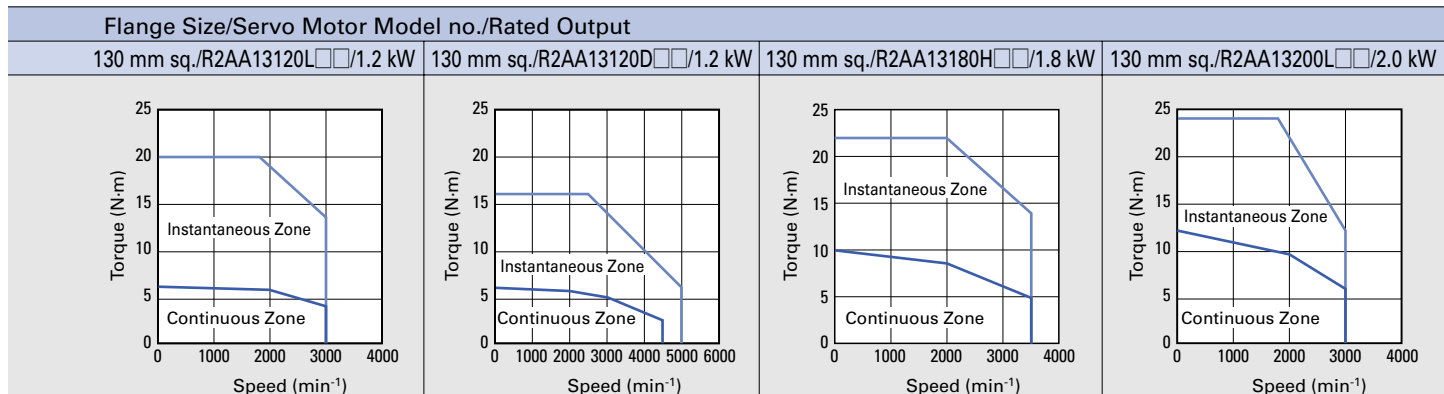


Note: These values are for when the input voltage is a 3-phase 200 VAC circuit. The characteristics of the instantaneous zone may change when the input voltage is less than 200 VAC or single-phase 200 VAC.

130 mm sq.				Flange size			
R2AA13120L	R2AA13120D	R2AA13180H	R2AA13200L	Servo motor model no.			
RS3A05 《50 A》				Compatible servo amplifier model no.			
				Unit	Symbol	Status	
1.2	1.2	1.8	2	kW	PR	★	Rated Output
2000	2000	2000	2000	min <sup>-1</sup>	NR	★	Rated Speed
3000	5000	3500	3000	min <sup>-1</sup>	N <sub>max</sub>	★	Maximum Speed
5.7	5.7	8.6	9.5	N·m	TR	★	Rated Torque
6.0	6.0	10.0	12	N·m	TS	★	Continuous Stall Torque
20	16	22	24	N·m	TP	★	Peak Stall Torque
7.6	9.1	11.0	11.0	Arms	IR	★	Rated Armature Current
8.4	9.3	11.8	12.0	Arms	IS	★	Armature Stall Current
26.5	25.4	26.5	26.5	Arms	IP	★	Peak Armature Stall Current
0.77	0.65	0.89	0.97	N·m/Arms	KT	☆	Torque Constant
0.35	0.23	0.23	0.22	Ω	R <sub>φ</sub>	☆	Phase Resistance
54	54	82	74	kW/s	QR	★	Rated Power Rate
6.0	6.0	9.0	12.2	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	JM		Rotor Inertia
0.0042				x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	Js		Encoder Inertia <sup>(1)</sup>
6.1 (8)	6.1 (8)	8 (9.2)	10 (12)	kg	We		Servo Motor Mass <sup>(1)</sup>
9.0 min.	9.0 min.	9.0 min.	12 min.	N·m	Tb		Brake Static Friction Torque
90 VDC/24 VDC ±10%				V	Vb		Brake Rated Voltage
0.17/0.51	0.17/0.51	0.17/0.51	0.17/0.66	A	Ib		Brake Rated Current
0.5	0.5	0.5	0.5	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	Jb		Rotor Moment of Inertia (Brake)
2.8	2.8	3.6	4.0	kVA			Servo amplifier power supply capacity (rating)
Yes							CE and UL approved servo motors <sup>(2)</sup>
IP65							Servo motor protection code
400×400×20 mm		470×470×20 mm					Size of aluminum plates for heat radiation during measurement
p. 137							Page for motor dimensions

Servo Motor Operating Ambient Conditions

Operating temperature and humidity	Temp.: 0 to 40°C. Humidity: 90% max. (non-condensing)
Vibration resistance	24.5 m/s <sup>2</sup>
Shock resistance	98 m/s <sup>2</sup> , 2 times
Operation altitude	1000 m or lower above sea level
Installation location	Indoor (without direct sunlight) Location where no substance that gives adverse effects on the device and motor, such as corrosive gas, flammable gas, or dust exists





# Specifications

## R2 Servo Motors Medium Inertia and Low Ripple RoHS

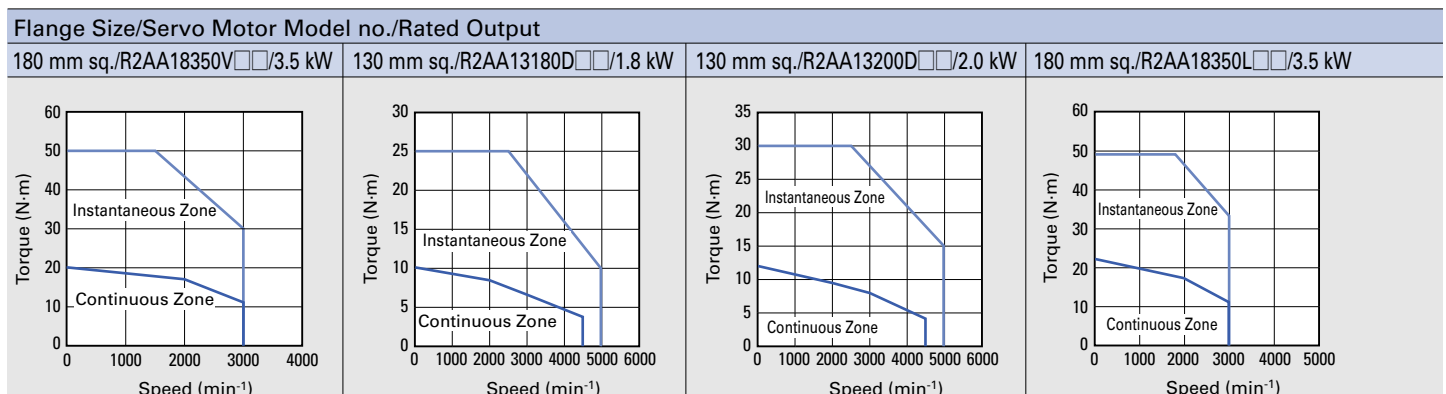
Input voltage **200 VAC**

Flange size				180 mm sq.	130 mm sq.		180 mm sq.
Servo motor model no.				R2AA18350V□□	R2AA13180D□□	R2AA13200D□□	R2AA18350L□□
Compatible servo amplifier model no.				RS3A07□□	RS3A07□□ <75 A> RS3A10□□ <100 A>		RS3A10□□
	Status	Symbol	Unit	<75 A>			<100 A>
Rated Output	★	P <sub>R</sub>	kW	3.5	1.8	2	3.5
Rated Speed	★	N <sub>R</sub>	min <sup>-1</sup>	2000	2000	2000	2000
Maximum Speed	★	N <sub>max</sub>	min <sup>-1</sup>	3000	5000	5000	3000
Rated Torque	★	T <sub>R</sub>	N·m	17	8.6	9.5	17
Continuous Stall Torque	★	T <sub>S</sub>	N·m	20	10.0	12	22.0
Peak Stall Torque	★	T <sub>P</sub>	N·m	50	25	30	49
Rated Armature Current	★	I <sub>R</sub>	Arms	16.8	15.6	14.3	19.1
Armature Stall Current	★	I <sub>S</sub>	Arms	17.8	17.3	17.5	23.7
Peak Armature Stall Current	★	I <sub>P</sub>	Arms	45.5	43.0	45.5	55.0
Torque Constant	☆	K <sub>T</sub>	N·m/Arms	1.21	0.63	0.70	1.00
Phase Resistance	☆	R <sub>φ</sub>	Ω	0.114	0.13	0.11	0.085
Rated Power Rate	★	Q <sub>R</sub>	kW/s	72	82	74	72
Rotor Inertia		J <sub>M</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	40	9.0	12.2	40
Encoder Inertia <sup>(1)</sup>		J <sub>S</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	0.0042		0.012	
Servo Motor Mass <sup>(1)</sup>		W <sub>e</sub>	kg	15.5	8 (9.2)	10 (12)	15.5 (20)
Brake Static Friction Torque		T <sub>b</sub>	N·m	22 min.	9.0 min.	12 min.	22 min.
Brake Rated Voltage		V <sub>b</sub>	V	90 VDC/24 VDC ±10%			
Brake Rated Current		I <sub>b</sub>	A	0.32/1.2	0.17/0.51	0.17/0.66	0.32/1.2
Rotor Moment of Inertia (Brake)		J <sub>b</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	5.1	0.5	0.5	5.1
Servo amplifier power supply capacity (rating)			kVA	6.0	4.0	5.0	6.0
CE and UL approved servo motors <sup>(2)</sup>				Yes			
Servo motor protection code				IP65			
Size of aluminum plates for heat radiation during measurement				470×470×20 mm			
Page for motor dimensions				p. 138	p. 137		p. 138

★ Values are for a combination with a standard servo amplifier after thermal equilibrium is established. All values are typical values.  
 ☆ Indicates a typical value when the winding temperature is 20°C. All values are typical values.

(1) The values for "Encoder inertia" and "servo motor mass" are for when with a [Model No. HA035] battery-less absolute encoder. Contact us for details on other encoders. Values inside ( ) are for when with a brake attached.  
 (2) Our standard servo amplifiers conform to CE and UL standards.

### Speed-Torque Characteristics



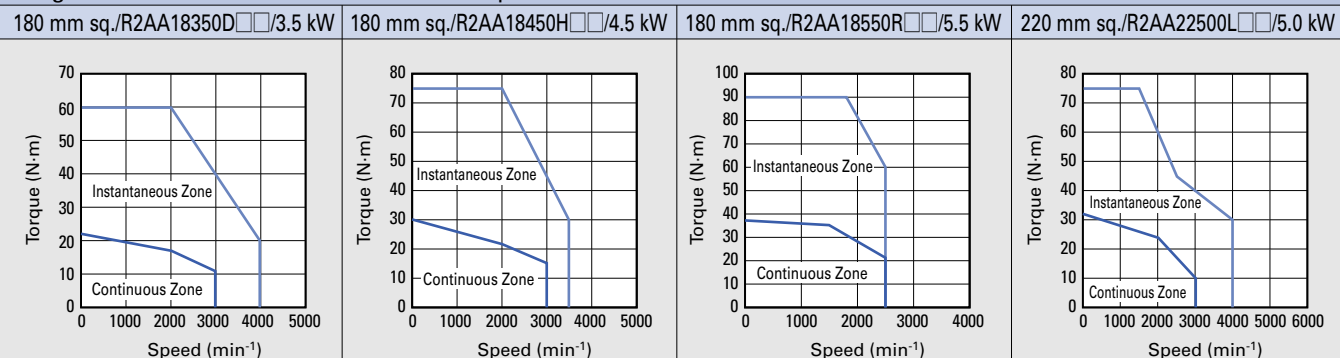
Note: These values are for when the input voltage is a 3-phase 200 VAC circuit. The characteristics of the instantaneous zone may change when the input voltage is less than 200 VAC.

180 mm sq.				220 mm sq.	Flange size		
R2AA18350D	R2AA18450H	R2AA18550R	R2AA22500L	Servo motor model no.			
RS3A15 《150 A》				Compatible servo amplifier model no.			
				Unit	Symbol	Status	
3.5	4.5	5.5	5	kW	P <sub>R</sub>	★	Rated Output
2000	2000	1500	2000	min <sup>-1</sup>	N <sub>R</sub>	★	Rated Speed
4000	3500	2500	4000	min <sup>-1</sup>	N <sub>max</sub>	★	Maximum Speed
17	21.5	35	24	N·m	T <sub>R</sub>	★	Rated Torque
22.0	30.0	37.3	32	N·m	T <sub>S</sub>	★	Continuous Stall Torque
60	75	90	75	N·m	T <sub>P</sub>	★	Peak Stall Torque
21.7	23.7	31.6	22.0	Arms	I <sub>R</sub>	★	Rated Armature Current
27.0	31.7	32.9	34.0	Arms	I <sub>S</sub>	★	Armature Stall Current
83.0	83.0	83.0	83.0	Arms	I <sub>P</sub>	★	Peak Armature Stall Current
0.88	1.02	1.23	1.00	N·m/Arms	K <sub>T</sub>	☆	Torque Constant
0.075	0.065	0.059	0.047	Ω	R <sub>φ</sub>	☆	Phase Resistance
72	92	180	105	kW/s	Q <sub>R</sub>	★	Rated Power Rate
40	50	68	55	×10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	J <sub>M</sub>		Rotor Inertia
0.012				×10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	J <sub>S</sub>		Encoder Inertia <sup>(1)</sup>
15.5 (20)	20 (24)	26 (31)	22.5 (26)	kg	We		Servo Motor Mass <sup>(1)</sup>
22 min.	32 min.	42 min.	42 min.	N·m	T <sub>b</sub>		Brake Static Friction Torque
90 VDC/24 VDC ±10%				V	V <sub>b</sub>		Brake Rated Voltage
0.32/1.2	0.27/1.0	0.27/1.0	0.32/1.2	A	I <sub>b</sub>		Brake Rated Current
5.1	5.1	5.1	5.1	×10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	J <sub>b</sub>		Rotor Moment of Inertia (Brake)
7.0	7.4	8.4	9.6	kVA			Servo amplifier power supply capacity (rating)
Yes							CE and UL approved servo motors <sup>(2)</sup>
IP65							Servo motor protection code
470 x470 x20 mm		540 x540 x20 mm					Size of aluminum plates for heat radiation during measurement
p. 138			p. 139				Page for motor dimensions

Servo Motor Operating Ambient Conditions

Operating temperature and humidity	Temp.: 0 to 40°C. Humidity: 90% max. (non-condensing)
Vibration resistance	24.5 m/s <sup>2</sup>
Shock resistance	98 m/s <sup>2</sup> , 2 times
Operation altitude	1000 m or lower above sea level
Installation location	Indoor (without direct sunlight) Location where no substance that gives adverse effects on the device and motor, such as corrosive gas, flammable gas, or dust exists

Flange Size/Servo Motor Model no./Rated Output



# Specifications

## R2 Servo Motors Medium Inertia and Low Ripple RoHS

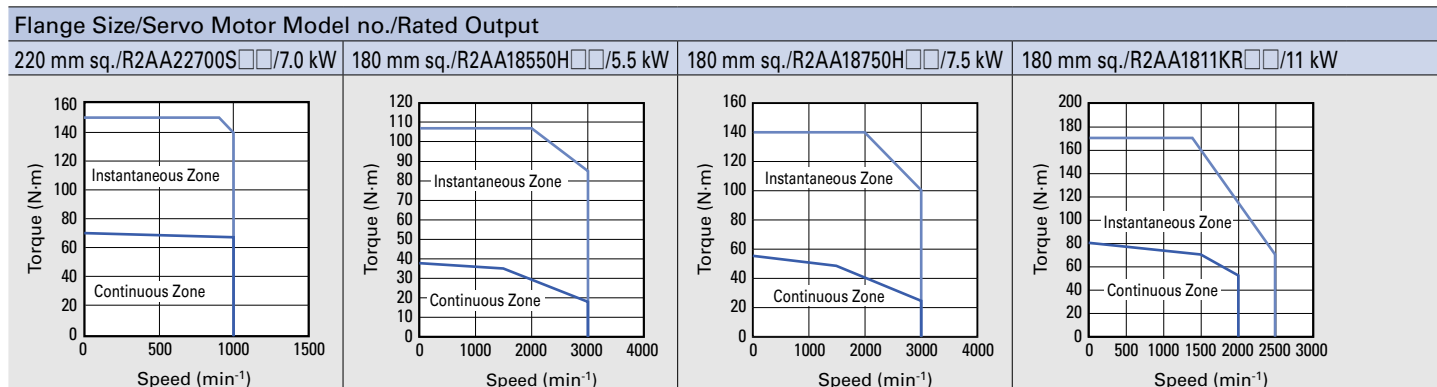
Input voltage **200 VAC**

Flange size				220 mm sq.	180 mm sq.		
Servo motor model no.				R2AA22700S□□	R2AA18550H□□	R2AA18750H□□	R2AA1811KR□□
Compatible servo amplifier model no.				RS3A15□□ 《150 A》	RS3A30□□ 《300 A》		
	Status	Symbol	Unit				
Rated Output	★	P <sub>R</sub>	kW	7	5.5	7.5	11
Rated Speed	★	N <sub>R</sub>	min <sup>-1</sup>	1000	1500	1500	1500
Maximum Speed	★	N <sub>max</sub>	min <sup>-1</sup>	1000	3000	3000	2500
Rated Torque	★	T <sub>R</sub>	N·m	67	35	48	70
Continuous Stall Torque	★	T <sub>S</sub>	N·m	70	37.5	54.9	80.0
Peak Stall Torque	★	T <sub>P</sub>	N·m	150	107	140	170
Rated Armature Current	★	I <sub>R</sub>	Arms	34.0	46.2	51.2	61.9
Armature Stall Current	★	I <sub>S</sub>	Arms	34.0	48.0	56.8	66.0
Peak Armature Stall Current	★	I <sub>P</sub>	Arms	83.0	155.0	155.0	155.0
Torque Constant	☆	K <sub>T</sub>	N·m/Arms	2.25	0.84	1.04	1.25
Phase Resistance	☆	R <sub>φ</sub>	Ω	0.085	0.030	0.030	0.035
Rated Power Rate	★	Q <sub>R</sub>	kW/s	330	180	235	445
Rotor Inertia		J <sub>M</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	136	68	98	110
Encoder Inertia <sup>(1)</sup>		J <sub>S</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	0.012			
Servo Motor Mass <sup>(1)</sup>		W <sub>e</sub>	kg	43 (53)	26 (31)	34 (38)	41 (52)
Brake Static Friction Torque		T <sub>b</sub>	N·m	90 min.	42 min.	54.9 min.	100 min.
Brake Rated Voltage		V <sub>b</sub>	V	90 VDC/24 VDC ±10%			
Brake Rated Current		I <sub>b</sub>	A	0.44/1.7	0.27/1.0	0.37/1.4	0.5/1.9
Rotor Moment of Inertia (Brake)		J <sub>b</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	24	5.1	4.5	9.7
Servo amplifier power supply capacity (rating)			kVA	12.2	9.3	11.6	16.0
Cooling fan power		P <sub>F</sub>	W	—			31/29 180 to 253 VAC Single-phase 50 Hz/60 Hz
CE and UL approved servo motors <sup>(2)</sup>				Yes			
Servo motor protection code				IP65			IP65 (excluding the cooling fan)
Size of aluminum plates for heat radiation during measurement				540×540×20 mm			610×610×30 mm
Page for motor dimensions				p. 139	p. 138		

★ Values are for a combination with a standard servo amplifier after thermal equilibrium is established. All values are typical values.  
 ☆ Indicates a typical value when the winding temperature is 20°C. All values are typical values.

(1) The values for "Encoder inertia" and "servo motor mass" are for when with a [Model No. HA035] battery-less absolute encoder. Contact us for details on other encoders. Values inside ( ) are for when with a brake attached.  
 (2) Our standard servo amplifiers conform to CE and UL standards.

### Speed-Torque Characteristics



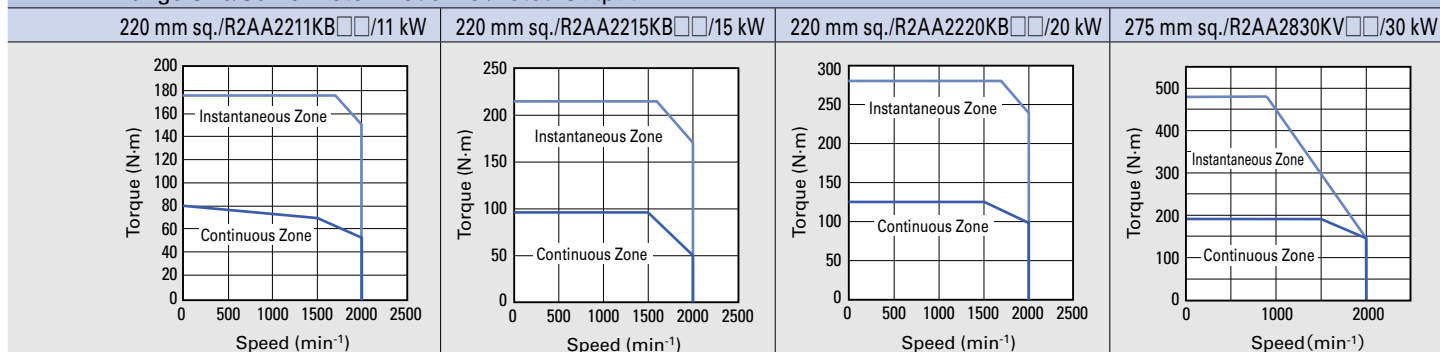
Note: These values are for when the input voltage is a 3-phase 200 VAC circuit. The characteristics of the instantaneous zone may change when the input voltage is less than 200 VAC.

220 mm sq.		275 mm sq.		Flange size			
R2AA2211KB	R2AA2215KB	R2AA2220KB	R2AA2830KV	Servo motor model no.			
RS3A30 《300 A》		RS3W60 《600 A》		Compatible servo amplifier model no.			
				Unit	Symbol	Status	
11	15	20	30	kW	P <sub>R</sub>	★	Rated Output
1500	1500	1500	1500	min <sup>-1</sup>	N <sub>R</sub>	★	Rated Speed
2000	2000	2000	2000	min <sup>-1</sup>	N <sub>max</sub>	★	Maximum Speed
70	95	125	191.1	N·m	T <sub>R</sub>	★	Rated Torque
80	95	125	191.1	N·m	T <sub>S</sub>	★	Continuous Stall Torque
176	215	280	480	N·m	T <sub>P</sub>	★	Peak Stall Torque
60	66	116	116	Arms	I <sub>R</sub>	★	Rated Armature Current
66	66	113	114	Arms	I <sub>S</sub>	★	Armature Stall Current
155	155	290	290	Arms	I <sub>P</sub>	★	Peak Armature Stall Current
1.38	1.50	1.21	1.78	N·m/Arms	K <sub>T</sub>	☆	Torque Constant
0.022	0.017	0.013	0.013	Ω	R <sub>φ</sub>	☆	Phase Resistance
275	380	659	865	kW/s	Q <sub>R</sub>	★	Rated Power Rate
178	237	237	422	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	J <sub>M</sub>		Rotor Inertia
0.012				x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	J <sub>S</sub>		Encoder Inertia <sup>(1)</sup>
55 (65)	62 (72)	73 (90)	110 (127)	kg	We		Servo Motor Mass <sup>(1)</sup>
90 min.	90 min.	170 min.	191.2 min.	N·m	T <sub>b</sub>		Brake Static Friction Torque
90 VDC/24 VDC ±10%		24 VDC ±10%		V	V <sub>b</sub>		Brake Rated Voltage
0.44/1.7	0.44/1.7	1.5	2.6	A	I <sub>b</sub>		Brake Rated Current
24	24	12	11.8	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	J <sub>b</sub>		Rotor Moment of Inertia (Brake)
16.0	21.4	30.0	42.0	kVA			Servo amplifier power supply capacity (rating)
65/65 180 to 253 VAC 3-phase 50 Hz/60 Hz				W	P <sub>F</sub>		Cooling fan power
Yes							CE and UL approved servo motors <sup>(2)</sup>
IP65 (excluding the cooling fan)	IP65	IP65 (excluding the cooling fan)					Servo motor protection code
610×610×30 mm							Size of aluminum plates for heat radiation during measurement
p. 139		p. 140					Page for motor dimensions

Servo Motor Operating Ambient Conditions

Operating temperature and humidity	Temp.: 0 to 40°C. Humidity: 90% max. (non-condensing)
Vibration resistance	24.5 m/s <sup>2</sup>
Shock resistance	98 m/s <sup>2</sup> , 2 times
Operation altitude	1000 m or lower above sea level
Installation location	Indoor (without direct sunlight) Location where no substance that gives adverse effects on the device and motor, such as corrosive gas, flammable gas, or dust exists

Flange Size/Servo Motor Model no./Rated Output



# Specifications

## R1 Servo Motors Low Inertia and High Power Rate RoHS

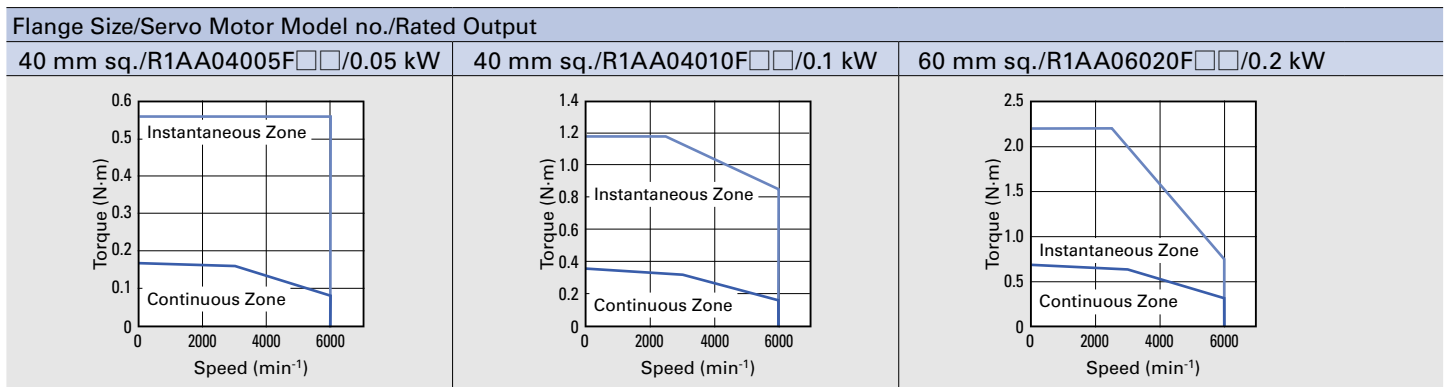
Input voltage **200 VAC**

Flange size				40 mm sq.		60 mm sq.
Servo motor model no.				R1AA04005F <input type="checkbox"/>	R1AA04010F <input type="checkbox"/>	R1AA06020F <input type="checkbox"/>
Compatible servo amplifier model no.				RS3A01 <input type="checkbox"/>		RS3A02 <input type="checkbox"/>
	Status	Symbol	Unit	《10 A》		《20 A》
Rated Output	★	P <sub>R</sub>	kW	0.05	0.1	0.2
Rated Speed	★	N <sub>R</sub>	min <sup>-1</sup>	3000	3000	3000
Maximum Speed	★	N <sub>max</sub>	min <sup>-1</sup>	6000	6000	6000
Rated Torque	★	T <sub>R</sub>	N·m	0.159	0.318	0.637
Continuous Stall Torque	★	T <sub>S</sub>	N·m	0.167	0.353	0.686
Peak Stall Torque	★	T <sub>P</sub>	N·m	0.56	1.18	2.2
Rated Armature Current	★	I <sub>R</sub>	Arms	0.8	1	1.5
Armature Stall Current	★	I <sub>S</sub>	Arms	0.9	1.1	1.6
Peak Armature Stall Current	★	I <sub>P</sub>	Arms	2.9	4.1	5.8
Torque Constant	☆	K <sub>T</sub>	N·m/Arms	0.232	0.35	0.519
Phase Resistance	☆	R <sub>φ</sub>	Ω	7	7.1	3.8
Rated Power Rate	★	Q <sub>R</sub>	kW/s	17	42	33
Rotor Inertia		J <sub>M</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	0.0146	0.0242	0.122
Encoder Inertia <sup>(1)</sup>		J <sub>S</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	0.0033	0.0033	0.0033
Servo Motor Mass <sup>(1)</sup>		W <sub>e</sub>	kg	0.46 (0.7)	0.61 (0.85)	1.1 (1.5)
Brake Static Friction Torque		T <sub>b</sub>	N·m	0.32 min.		1.37 min.
Brake Rated Voltage		V <sub>b</sub>	V	24 VDC		
Brake Rated Current		I <sub>b</sub>	A	0.27		0.32
Rotor Moment of Inertia (Brake)		J <sub>b</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	0.0078		0.06
Servo amplifier power supply capacity (rating)			kVA	0.2	0.3	0.6
Cooling fan power		P <sub>F</sub>	W	—		
CE and UL approved servo motors <sup>(2)</sup>				Yes		
Servo motor protection code				IP65		
Size of aluminum plates for heat radiation during measurement				250×250×6 mm		
Page for motor dimensions				p. 134		

★ Values are for a combination with a standard servo amplifier after thermal equilibrium is established. All values are typical values.  
 ☆ Indicates a typical value when the winding temperature is 20°C. All values are typical values.

(1) The values for "Encoder inertia" and "servo motor mass" are for when with a [Model No. HA035] battery-less absolute encoder. Contact us for details on other encoders. Values inside ( ) are for when with a brake attached.  
 (2) Our standard servo amplifiers conform to CE and UL standards.

### Speed-Torque Characteristics



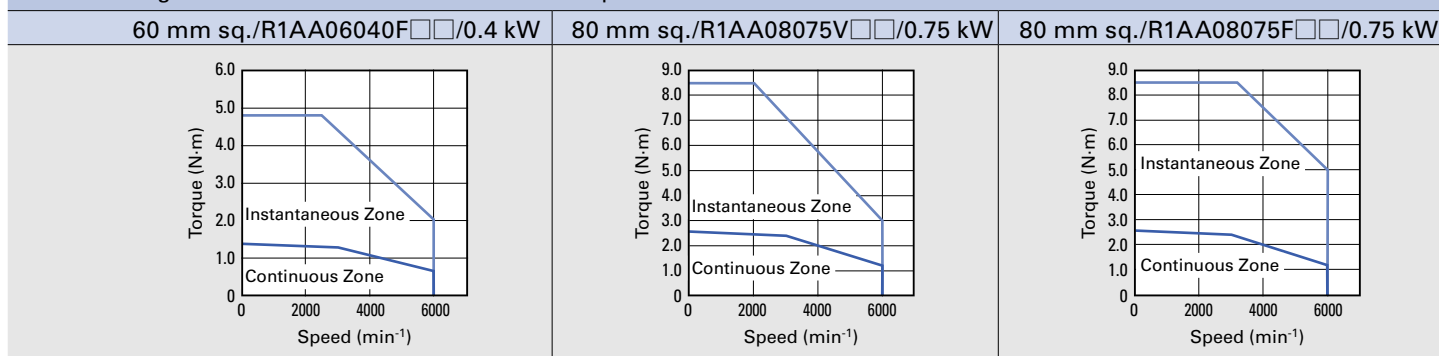
Note: These values are for when the input voltage is a 3-phase 200 VAC circuit. The characteristics of the instantaneous zone may change when the input voltage is less than 200 VAC or single-phase 200 VAC.

60 mm sq.	80 mm sq.		Flange size			
R1AA06040F□□	R1AA08075V□□	R1AA08075F□□	Servo motor model no.			
RS3A02□□ 《20 A》	RS3A03□□ 《30 A》	RS3A05□□ 《50 A》	Compatible servo amplifier model no.			
			Unit	Symbol	Status	
0.4	0.75	0.75	kW	P <sub>R</sub>	★	Rated Output
3000	3000	3000	min <sup>-1</sup>	N <sub>R</sub>	★	Rated Speed
6000	6000	6000	min <sup>-1</sup>	N <sub>max</sub>	★	Maximum Speed
1.27	2.39	2.39	N·m	T <sub>R</sub>	★	Rated Torque
1.37	2.55	2.55	N·m	T <sub>S</sub>	★	Continuous Stall Torque
4.8	8.5	8.5	N·m	T <sub>P</sub>	★	Peak Stall Torque
2.7	4.5	6	Arms	I <sub>R</sub>	★	Rated Armature Current
2.8	4.6	6.2	Arms	I <sub>S</sub>	★	Armature Stall Current
11.7	15.5	22	Arms	I <sub>P</sub>	★	Peak Armature Stall Current
0.521	0.67	0.49	N·m/Arms	K <sub>T</sub>	☆	Torque Constant
1.5	0.61	0.34	Ω	R <sub>φ</sub>	☆	Phase Resistance
80	79	79	kW/s	Q <sub>R</sub>	★	Rated Power Rate
0.203	0.719	0.719	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	J <sub>M</sub>		Rotor Inertia
0.0033	0.0033	0.0033	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	J <sub>S</sub>		Encoder Inertia <sup>(1)</sup>
1.5 (2.0)	3.1 (4.1)	3.1 (4.1)	kg	We		Servo Motor Mass <sup>(1)</sup>
1.37 min.	2.55 min.	2.55 min.	N·m	T <sub>b</sub>		Brake Static Friction Torque
24 VDC			V	V <sub>b</sub>		Brake Rated Voltage
0.32	0.37		A	I <sub>b</sub>		Brake Rated Current
0.06	0.25		x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	J <sub>b</sub>		Rotor Moment of Inertia (Brake)
1.0	1.6	1.6	kVA			Servo amplifier power supply capacity (rating)
	—		W	P <sub>F</sub>		Cooling fan power
	Yes					CE and UL approved servo motors <sup>(2)</sup>
	IP65					Servo motor protection code
250×250×6 mm						Size of aluminum plates for heat radiation during measurement
p. 134						Page for motor dimensions

Servo Motor Operating Ambient Conditions

Operating temperature and humidity	Temp.: 0 to 40°C. Humidity: 90% max. (non-condensing)
Vibration resistance	24.5 m/s <sup>2</sup>
Shock resistance	98 m/s <sup>2</sup> , 2 times
Operation altitude	1000 m or lower above sea level
Installation location	Indoor (without direct sunlight) Location where no substance that gives adverse effects on the device and motor, such as corrosive gas, flammable gas, or dust exists

Flange Size/Servo Motor Model no./Rated Output



# Specifications

## R1 Servo Motors Low Inertia and High Power Rate RoHS

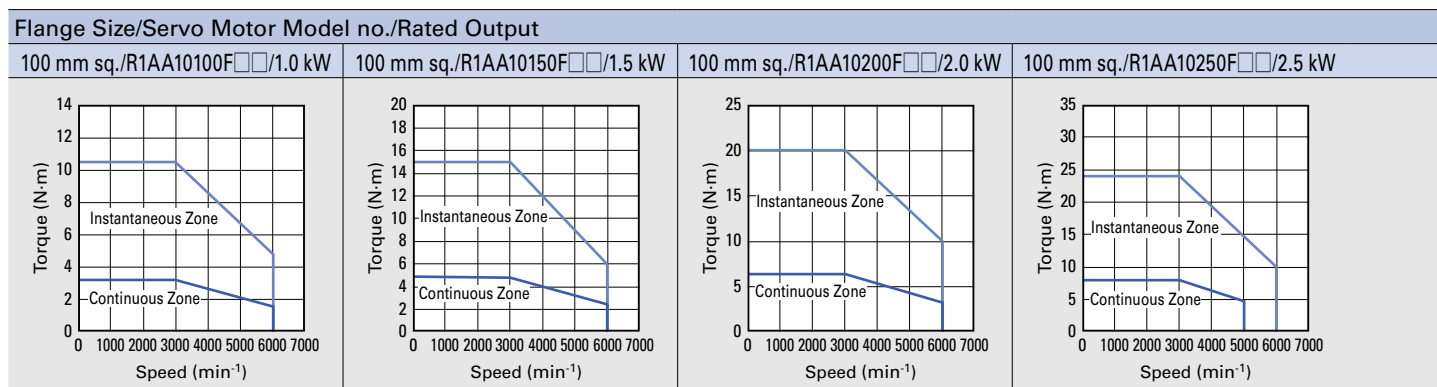
Input voltage **200 VAC**

Flange size				100 mm sq.			
Servo motor model no.				R1AA10100F□□	R1AA10150F□□	R1AA10200F□□	R1AA10250F□□
Compatible servo amplifier model no.				RS3A05□□ 《50 A》		RS3A07□□ 《75 A》	
	Status	Symbol	Unit				
Rated Output	★	P <sub>R</sub>	kW	1.0	1.5	2.0	2.5
Rated Speed	★	N <sub>R</sub>	min <sup>-1</sup>	3000	3000	3000	3000
Maximum Speed	★	N <sub>max</sub>	min <sup>-1</sup>	6000	6000	6000	6000
Rated Torque	★	T <sub>R</sub>	N·m	3.2	4.8	6.37	7.97
Continuous Stall Torque	★	T <sub>S</sub>	N·m	3.2	4.9	6.37	7.97
Peak Stall Torque	★	T <sub>P</sub>	N·m	10.5	15.0	20.0	24.0
Rated Armature Current	★	I <sub>R</sub>	Arms	7.7	8.2	13.9	14.8
Armature Stall Current	★	I <sub>S</sub>	Arms	7.4	7.7	13.1	13.9
Peak Armature Stall Current	★	I <sub>P</sub>	Arms	26.5	26.5	45.5	45.5
Torque Constant	☆	K <sub>T</sub>	N·m/Arms	0.46	0.64	0.51	0.62
Phase Resistance	☆	R <sub>φ</sub>	Ω	0.27	0.26	0.15	0.17
Rated Power Rate	★	Q <sub>R</sub>	kW/s	73	115	176	227
Rotor Inertia		J <sub>M</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	1.4	2.0	2.3	2.8
Encoder Inertia <sup>(1)</sup>		J <sub>S</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	0.0042			
Servo Motor Mass <sup>(1)</sup>		W <sub>e</sub>	kg	3.8 (5.3)	5.0 (6.6)	5.7 (7.2)	6.7 (8.2)
Brake Static Friction Torque		T <sub>b</sub>	N·m	9.3 min.	9.3 min.	9.3 min.	9.3 min.
Brake Rated Voltage		V <sub>b</sub>	V	24 VDC ±10%			
Brake Rated Current		I <sub>b</sub>	A	0.70	0.70	0.70	0.70
Rotor Moment of Inertia (Brake)		J <sub>b</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	0.30	0.30	0.30	0.30
Servo amplifier power supply capacity (rating)			kVA	2.3	3.0	4.0	5.0
Cooling fan power		P <sub>F</sub>	W	—	—	—	—
CE and UL approved servo motors <sup>(2)</sup>				Yes			
Servo motor protection code				IP65			
Size of aluminum plates for heat radiation during measurement				400×400×20 mm		470×470×20 mm	
Page for motor dimensions				p. 141			

★ Values are for a combination with a standard servo amplifier after thermal equilibrium is established. All values are typical values.  
 ☆ Indicates a typical value when the winding temperature is 20°C. All values are typical values.

(1) The values for "Encoder inertia" and "servo motor mass" are for when with a [Model No. HA035] battery-less absolute encoder. Contact us for details on other encoders. Values inside ( ) are for when with a brake attached.  
 (2) Our standard servo amplifiers conform to CE and UL standards.

### Speed-Torque Characteristics



Note: These values are for when the input voltage is a 3-phase 200 VAC circuit. The characteristics of the instantaneous zone may change when the input voltage is less than 200 VAC or single-phase 200 VAC.

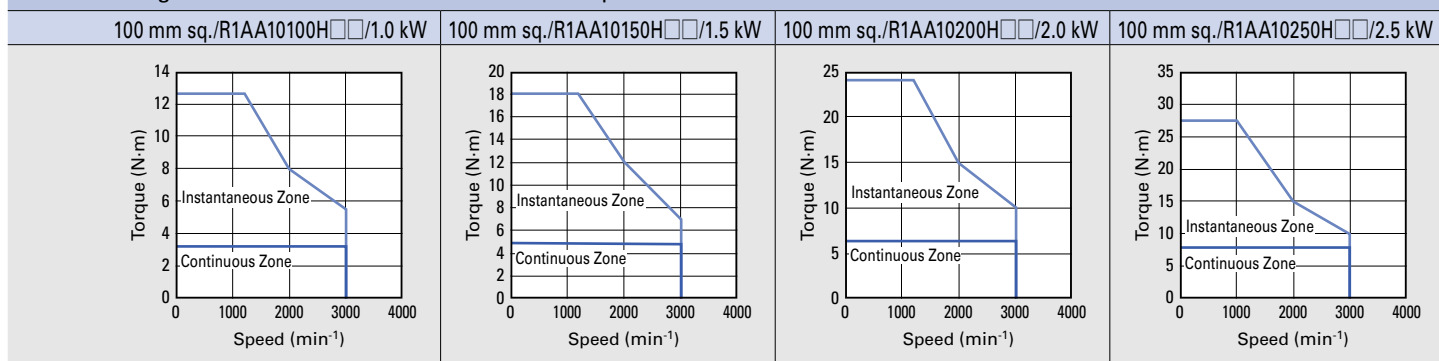


100 mm sq.				Flange size			
R1AA10100H□□	R1AA10150H□□	R1AA10200H□□	R1AA10250H□□	Servo motor model no.			
RS3A03□□ 《30 A》		RS3A05□□ 《50 A》		Compatible servo amplifier model no.			
				Unit	Symbol	Status	
1.0	1.5	2.0	2.5	kW	PR	★	Rated Output
3000	3000	3000	3000	min <sup>-1</sup>	NR	★	Rated Speed
3000	3000	3000	3000	min <sup>-1</sup>	N <sub>max</sub>	★	Maximum Speed
3.2	4.8	6.37	7.97	N·m	TR	★	Rated Torque
3.2	4.9	6.37	7.97	N·m	TS	★	Continuous Stall Torque
12.6	18.0	24.0	27.5	N·m	TP	★	Peak Stall Torque
4.5	5.2	7.7	9.0	Arms	IR	★	Rated Armature Current
3.8	3.8	6.8	7.2	Arms	IS	★	Armature Stall Current
15.5	15.5	26.5	26.5	Arms	IP	★	Peak Armature Stall Current
0.97	1.35	1.07	1.24	N·m/Arms	KT	☆	Torque Constant
1.4	1.3	0.61	0.58	Ω	R <sub>φ</sub>	☆	Phase Resistance
73	115	176	227	kW/s	QR	★	Rated Power Rate
1.4	2	2.3	2.8	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	JM		Rotor Inertia
0.0042				x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	JS		Encoder Inertia <sup>(1)</sup>
3.8 (5.3)	5.0 (6.6)	5.7 (7.2)	6.7 (8.2)	kg	We		Servo Motor Mass <sup>(1)</sup>
9.3 min.	9.3 min.	9.3 min.	9.3 min.	N·m	Tb		Brake Static Friction Torque
24 VDC ±10%				V	Vb		Brake Rated Voltage
0.70	0.70	0.70	0.70	A	Ib		Brake Rated Current
0.30	0.30	0.30	0.30	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	Jb		Rotor Moment of Inertia (Brake)
2.3	3.0	4.0	5.0	kVA			Servo amplifier power supply capacity (rating)
—	—	—	—	W	PF		Cooling fan power
Yes							CE and UL approved servo motors <sup>(2)</sup>
IP65							Servo motor protection code
400×400×20 mm		470×470×20 mm					Size of aluminum plates for heat radiation during measurement
p. 141							Page for motor dimensions

**Servo Motor Operating Ambient Conditions**

Operating temperature and humidity	Temp.: 0 to 40°C. Humidity: 90% max. (non-condensing)
Vibration resistance	When driving: under 49 m/s <sup>2</sup> , when stopped: Under 24.5 m/s <sup>2</sup>
Shock resistance	Under 98 m/s <sup>2</sup> , 2 times
Operation altitude	1000 m or lower above sea level
Installation location	Indoor (without direct sunlight) Location where no substance that gives adverse effects on the device and motor, such as corrosive gas, flammable gas, or dust exists

**Flange Size/Servo Motor Model no./Rated Output**



# Specifications

## R1 Servo Motors Low Inertia and High Power Rate RoHS

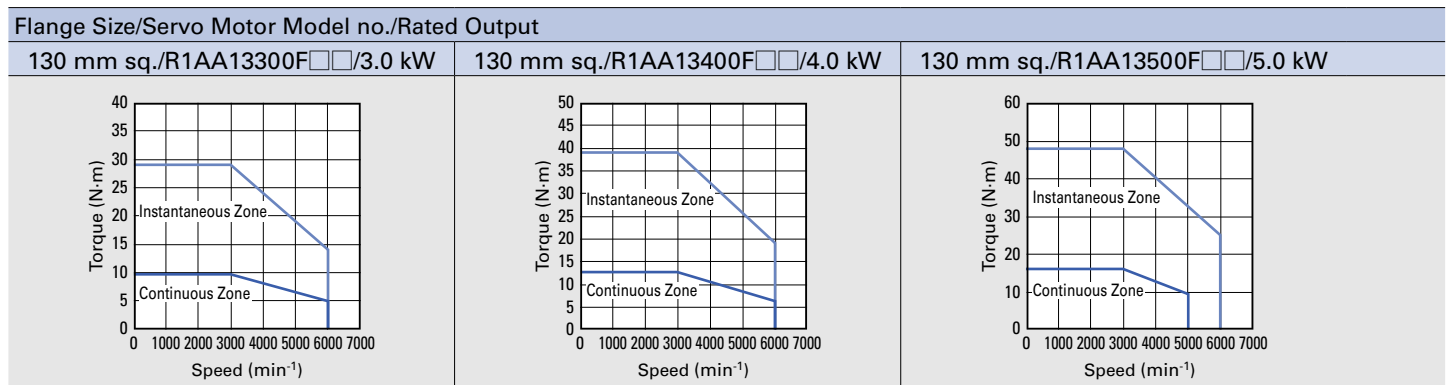
Input voltage **200 VAC**

Flange size				130 mm sq.		
Servo motor model no.				R1AA13300F□□	R1AA13400F□□	R1AA13500F□□
Compatible servo amplifier model no.				RS3A10□□	RS3A15□□	
	Status	Symbol	Unit	《100 A》	《150 A》	
Rated Output	★	P <sub>R</sub>	kW	3.0	4.0	5.0
Rated Speed	★	N <sub>R</sub>	min <sup>-1</sup>	3000	3000	3000
Maximum Speed	★	N <sub>max</sub>	min <sup>-1</sup>	6000	6000	6000
Rated Torque	★	T <sub>R</sub>	N·m	9.7	12.8	16.0
Continuous Stall Torque	★	T <sub>S</sub>	N·m	9.7	12.8	16.0
Peak Stall Torque	★	T <sub>P</sub>	N·m	29.0	39.0	48.0
Rated Armature Current	★	I <sub>R</sub>	Arms	17.5	23.4	27.7
Armature Stall Current	★	I <sub>S</sub>	Arms	16.8	22.5	26.6
Peak Armature Stall Current	★	I <sub>P</sub>	Arms	55.0	74.0	83.0
Torque Constant	☆	K <sub>T</sub>	N·m/Arms	0.63	0.62	0.65
Phase Resistance	☆	R <sub>φ</sub>	Ω	0.08	0.053	0.047
Rated Power Rate	★	Q <sub>R</sub>	kW/s	134	186	242
Rotor Inertia		J <sub>M</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	7.0	8.8	10.6
Encoder Inertia <sup>(1)</sup>		J <sub>S</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	0.012		
Servo Motor Mass <sup>(1)</sup>		W <sub>e</sub>	kg	9.7 (11.8)	12.2 (14.7)	14.3 (16.8)
Brake Static Friction Torque		T <sub>b</sub>	N·m	12 min.	16 min.	16 min.
Brake Rated Voltage		V <sub>b</sub>	V	24 VDC ±10%		
Brake Rated Current		I <sub>b</sub>	A	0.66	0.60	0.60
Rotor Moment of Inertia (Brake)		J <sub>b</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	0.50	2.1	2.1
Servo amplifier power supply capacity (rating)			kVA	6.0	6.7	8.3
Cooling fan power		P <sub>F</sub>	W	—	—	—
CE and UL approved servo motors <sup>(2)</sup>				Yes		
Servo motor protection code				IP65		
Size of aluminum plates for heat radiation during measurement				470×470×20 mm		540×540×20 mm
Page for motor dimensions				p. 141		

★ Values are for a combination with a standard servo amplifier after thermal equilibrium is established. All values are typical values.  
 ☆ Indicates a typical value when the winding temperature is 20°C. All values are typical values.

(1) The values for "Encoder inertia" and "servo motor mass" are for when with a [Model No. HA035] battery-less absolute encoder. Contact us for details on other encoders. Values inside ( ) are for when with a brake attached.  
 (2) Our standard servo amplifiers conform to CE and UL standards.

### Speed-Torque Characteristics



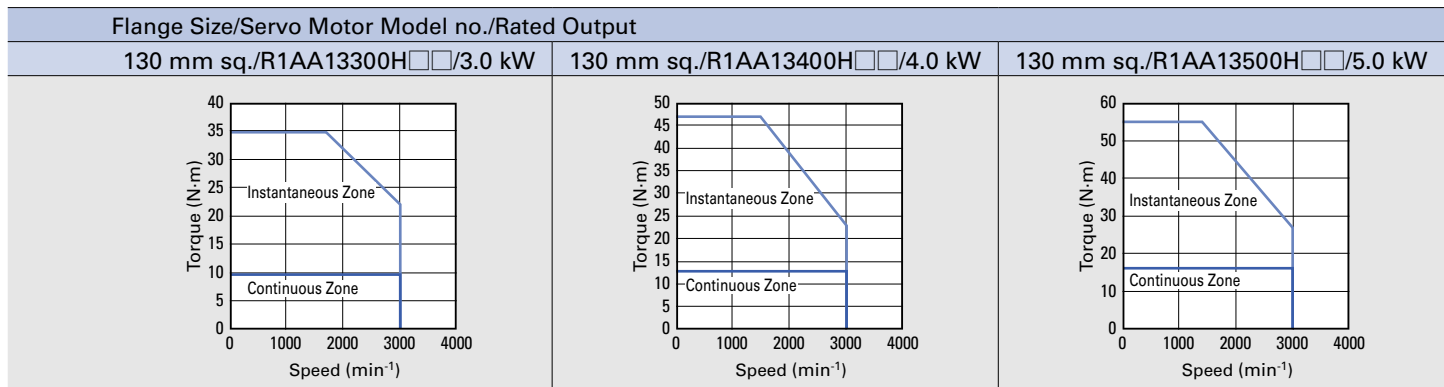
Note: These values are for when the input voltage is a 3-phase 200 VAC circuit. The characteristics of the instantaneous zone may change when the input voltage is less than 200 VAC or single-phase 200 VAC.



130 mm sq.			Flange size			
R1AA13300H□□	R1AA13400H□□	R1AA13500H□□	Servo motor model no.			
RS3A07□□ 《75 A》	RS3A10□□ 《100 A》		Compatible servo amplifier model no.			
			Unit	Symbol	Status	
3.0	4.0	5.0	kW	PR	★	Rated Output
3000	3000	3000	min <sup>-1</sup>	NR	★	Rated Speed
3000	3000	3000	min <sup>-1</sup>	N <sub>max</sub>	★	Maximum Speed
9.7	12.8	16.0	N·m	TR	★	Rated Torque
9.7	12.8	16.0	N·m	TS	★	Continuous Stall Torque
34.8	47.0	55.0	N·m	TP	★	Peak Stall Torque
14.7	17.8	20.0	Arms	IR	★	Rated Armature Current
11.5	15.5	14.1	Arms	IS	★	Armature Stall Current
45.5	55.0	55.0	Arms	IP	★	Peak Armature Stall Current
0.92	1.01	1.21	N·m/Arms	KT	☆	Torque Constant
0.18	0.13	0.15	Ω	R <sub>φ</sub>	☆	Phase Resistance
134	186	242	kW/s	QR	★	Rated Power Rate
7.0	8.8	10.6	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	JM		Rotor Inertia
	0.012		x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	JS		Encoder Inertia <sup>(1)</sup>
9.7 (11.8)	12.2 (14.7)	14.3 (16.8)	kg	We		Servo Motor Mass <sup>(1)</sup>
12 min.	16 min.	16 min.	N·m	Tb		Brake Static Friction Torque
24 VDC ±10%			V	Vb		Brake Rated Voltage
0.66	0.60	0.60	A	Ib		Brake Rated Current
0.50	2.1	2.1	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	Jb		Rotor Moment of Inertia (Brake)
6.0	6.7	8.3	kVA			Servo amplifier power supply capacity (rating)
—	—	—	W	PF		Cooling fan power
	Yes					CE and UL approved servo motors <sup>(2)</sup>
	IP65					Servo motor protection code
470×470×20 mm		540×540×20 mm				Size of aluminum plates for heat radiation during measurement
p. 141						Page for motor dimensions

Servo Motor Operating Ambient Conditions

Operating temperature and humidity	Temp.: 0 to 40°C. Humidity: 90% max. (non-condensing)
Vibration resistance	When driving: under 49 m/s <sup>2</sup> , when stopped: Under 24.5 m/s <sup>2</sup>
Shock resistance	Under 98 m/s <sup>2</sup> , 2 times
Operation altitude	1000 m or lower above sea level
Installation location	Indoor (without direct sunlight) Location where no substance that gives adverse effects on the device and motor, such as corrosive gas, flammable gas, or dust exists



# Specifications

## R1 Servo Motors Low Inertia and High Power Rate RoHS

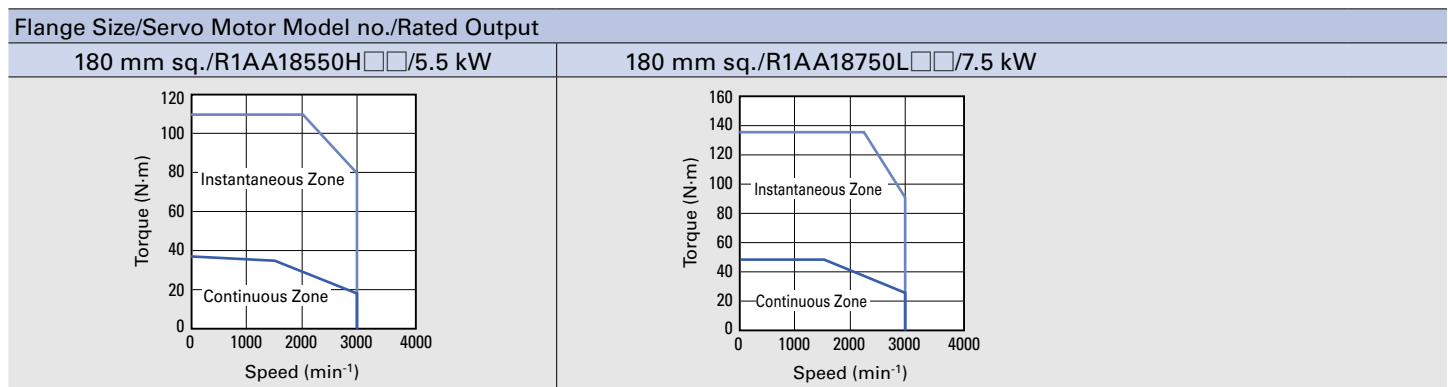
Input voltage **200 VAC**

Flange size				180 mm sq.	
Servo motor model no.				R1AA18550H□□	R1AA18750L□□
Compatible servo amplifier model no.				RS3A30 □□ 《300 A》	
	Status	Symbol	Unit		
Rated Output	★	P <sub>R</sub>	kW	5.5	7.5
Rated Speed	★	N <sub>R</sub>	min <sup>-1</sup>	1500	1500
Maximum Speed	★	N <sub>max</sub>	min <sup>-1</sup>	3000	3000
Rated Torque	★	T <sub>R</sub>	N·m	35	48
Continuous Stall Torque	★	T <sub>S</sub>	N·m	37	48
Peak Stall Torque	★	T <sub>P</sub>	N·m	110	135
Rated Armature Current	★	I <sub>R</sub>	Arms	46	49
Armature Stall Current	★	I <sub>S</sub>	Arms	47	47
Peak Armature Stall Current	★	I <sub>P</sub>	Arms	155	155
Torque Constant	☆	K <sub>T</sub>	N·m/Arms	0.86	1.09
Phase Resistance	☆	R <sub>φ</sub>	Ω	0.029	0.031
Rated Power Rate	★	Q <sub>R</sub>	kW/s	370	550
Rotor Inertia		J <sub>M</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	33	42
Encoder Inertia <sup>(1)</sup>		J <sub>S</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	0.012	
Servo Motor Mass <sup>(1)</sup>		W <sub>e</sub>	kg	33 (38)	39 (44)
Brake Static Friction Torque		T <sub>b</sub>	N·m	53.9 min.	53.9 min.
Brake Rated Voltage		V <sub>b</sub>	V	90 VDC/24 VDC ±10%	
Brake Rated Current		I <sub>b</sub>	A	0.37/1.4	0.37/1.4
Rotor Moment of Inertia (Brake)		J <sub>b</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	5.7	5.7
Servo amplifier power supply capacity (rating)			kVA	9.3	11.6
Cooling fan power		P <sub>F</sub>	W	30/26 200 VAC ±10% Single-phase 50 Hz/60 Hz For CE/UL compliant products: 31/29 180 to 253 VAC Single-phase 50 Hz/60 Hz	
CE and UL approved servo motors <sup>(2)</sup>				Yes	
Servo motor protection code				IP65 (excluding the cooling fan)	
Size of aluminum plates for heat radiation during measurement				540×540×20 mm	
Page for motor dimensions				p. 142	

★ Values are for a combination with a standard servo amplifier after thermal equilibrium is established. All values are typical values.  
 ☆ Indicates a typical value when the winding temperature is 20°C. All values are typical values.

(1) The values for "Encoder inertia" and "servo motor mass" are for when with a [Model No. HA035] battery-less absolute encoder. Contact us for details on other encoders. Values inside ( ) are for when with a brake attached.  
 (2) Our standard servo amplifiers conform to CE and UL standards.

### Speed-Torque Characteristics



Note: These values are for when the input voltage is a 3-phase 200 VAC circuit. The characteristics of the instantaneous zone may change when the input voltage is less than 200 VAC or single-phase 200 VAC.

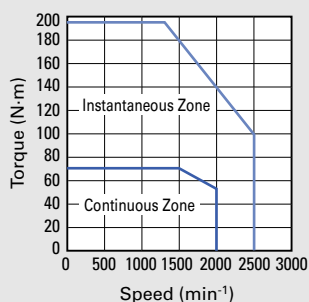
180 mm sq.		220 mm sq.		Flange size		
R1AA1811KR□□		R1AA1815KB□□		R1AA2220KV□□		
RS3A30A □□ 《300 A》		RS3W60 □□ 《600 A》		Servo motor model no.		
				Compatible servo amplifier model no.		
				Unit	Symbol	Status
11	15	21		kW	P <sub>R</sub>	★ Rated Output
1500	1500	1500		min <sup>-1</sup>	N <sub>R</sub>	★ Rated Speed
2500	2000	2000		min <sup>-1</sup>	N <sub>max</sub>	★ Maximum Speed
70	95.5	135		N·m	T <sub>R</sub>	★ Rated Torque
70	95.5	135		N·m	T <sub>S</sub>	★ Continuous Stall Torque
195	230	380		N·m	T <sub>P</sub>	★ Peak Stall Torque
55.0	60.0	100		Arms	I <sub>R</sub>	★ Rated Armature Current
54.0	58.0	96		Arms	I <sub>S</sub>	★ Armature Stall Current
155	155	290		Arms	I <sub>P</sub>	★ Peak Armature Stall Current
1.4	1.77	1.51		N·m/Arms	K <sub>T</sub>	☆ Torque Constant
0.033	0.033	0.014		Ω	R <sub>φ</sub>	☆ Phase Resistance
770	1060	1740		kW/s	Q <sub>R</sub>	★ Rated Power Rate
64	86	105		x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	J <sub>M</sub>	Rotor Inertia
	0.012			x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	J <sub>S</sub>	Encoder Inertia <sup>(1)</sup>
52 (59)	64 (73)	107		kg	We	Servo Motor Mass <sup>(1)</sup>
75 min.	120 min.	—		N·m	T <sub>b</sub>	Brake Static Friction Torque
24 VDC ±10%				V	V <sub>b</sub>	Brake Rated Voltage
1.5	1.9	—		A	I <sub>b</sub>	Brake Rated Current
8.0	9.7	—		x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	J <sub>b</sub>	Rotor Moment of Inertia (Brake)
16.0	21.4	30.0		kVA		Servo amplifier power supply capacity (rating)
30/26 200 VAC ±10% Single-phase 50 Hz/60 Hz For CE/UL compliant products: 31/29 180 to 253 VAC Single-phase 50 Hz/60 Hz				W	P <sub>F</sub>	Cooling fan power
Yes						CE and UL approved servo motors <sup>(2)</sup>
IP65 (excluding the cooling fan)						Servo motor protection code
610×610×30 mm						Size of aluminum plates for heat radiation during measurement
p. 142						Page for motor dimensions

## Servo Motor Operating Ambient Conditions

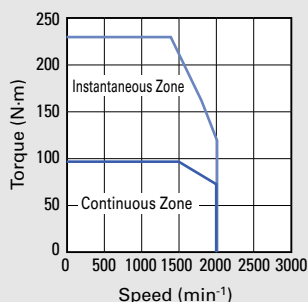
Operating temperature and humidity	Temp.: 0 to 40°C. Humidity: 90% max. (non-condensing)
Vibration resistance	24.5 m/s <sup>2</sup>
Shock resistance	98 m/s <sup>2</sup> , 2 times
Operation altitude	1000 m or lower above sea level
Installation location	Indoor (without direct sunlight) Location where no substance that gives adverse effects on the device and motor, such as corrosive gas, flammable gas, or dust exists

## Flange Size/Servo Motor Model no./Rated Output

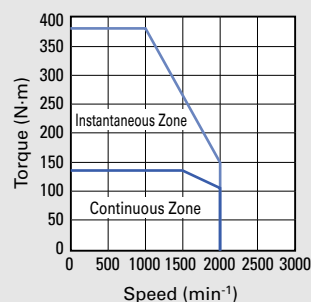
180 mm sq./R1AA1811KR□□/11 kW



180 mm sq./R1AA1815KB□□/15 kW



220 mm sq./R1AA2220KV□□/21 kW



# Specifications

## R5 Servo Motors Medium Inertia and Ultra Low Ripple Low cogging torque RoHS

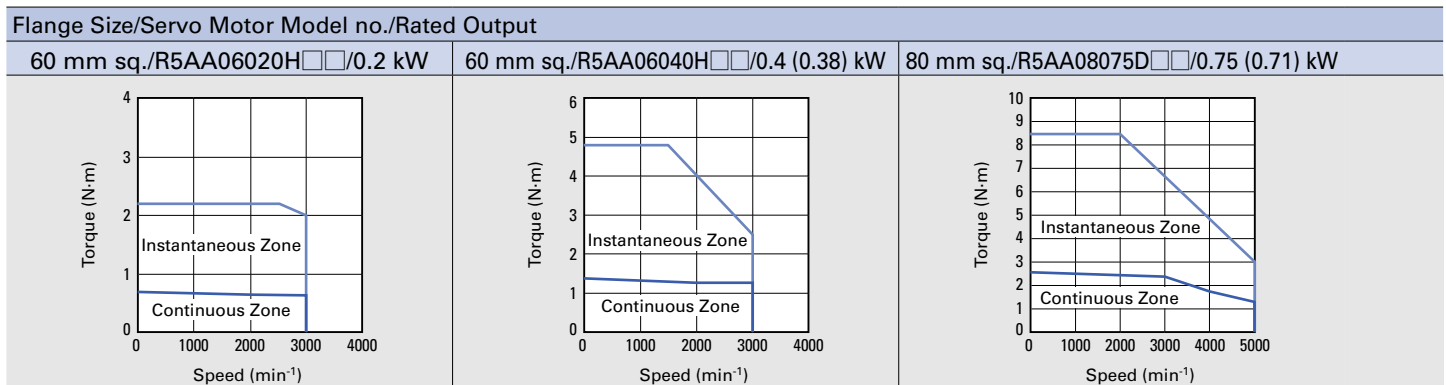
Input voltage **200 VAC**

Flange size				60 mm sq.		80 mm sq.
Servo motor model no.				R5AA06020H□□	R5AA06040H□□	R5AA08075D□□
Compatible servo amplifier model no.				RS3A01□□	RS3A02□□	RS3A03□□
	Status	Symbol	Unit	《10 A》	《20 A》	《30 A》
Rated Output	★	P <sub>R</sub>	kW	0.2	0.4 (0.38) <sup>(2)</sup>	0.75 (0.71) <sup>(2)</sup>
Rated Speed	★	N <sub>R</sub>	min <sup>-1</sup>	3000	3000	3000
Maximum Speed	★	N <sub>max</sub>	min <sup>-1</sup>	3000	3000	5000
Rated Torque	★	T <sub>R</sub>	N·m	0.637	1.27 (1.21) <sup>(2)</sup>	2.39 (2.27) <sup>(2)</sup>
Continuous Stall Torque	★	T <sub>S</sub>	N·m	0.686	1.37	2.55
Peak Stall Torque	★	T <sub>P</sub>	N·m	2.2	4.8	8.5
Rated Armature Current	★	I <sub>R</sub>	Arms	1.1	1.8	3.9
Armature Stall Current	★	I <sub>S</sub>	Arms	1.1	1.8	3.9
Peak Armature Stall Current	★	I <sub>P</sub>	Arms	4.2	7.0	14.4
Torque Constant	☆	K <sub>T</sub>	N·m/Arms	0.649	0.836	0.763
Phase Resistance	☆	R <sub>φ</sub>	Ω	4.8	3.3	0.78
Rated Power Rate	★	Q <sub>R</sub>	kW/s	20	39 (35) <sup>(2)</sup>	35 (31) <sup>(2)</sup>
Rotor Inertia		J <sub>M</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	0.198	0.414	1.65
Encoder Inertia <sup>(1)</sup>		J <sub>S</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)		0.0042	
Servo Motor Mass <sup>(1)</sup>		W <sub>e</sub>	kg	0.99 (1.4)	1.5 (1.9)	2.8 (3.7)
Brake Static Friction Torque		T <sub>b</sub>	N·m	1.37 min.		2.55 min.
Brake Rated Voltage		V <sub>b</sub>	V	90 VDC/24 VDC ±10%		
Brake Rated Current		I <sub>b</sub>	A	0.11/0.32		0.12/0.37
Rotor Moment of Inertia (Brake)		J <sub>b</sub>	x10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	0.060	0.060	0.25
Servo amplifier power supply capacity (rating)			kVA	0.6	1.0	1.6
CE and UL approved servo motors <sup>(3)</sup>				Yes		
Servo motor protection code				IP65 (Option: IP67)		
Size of aluminum plates for heat radiation during measurement				250×250×6 mm		
Page for motor dimensions				p. 134		

★ Values are for a combination with a standard servo amplifier after thermal equilibrium is established. All values are typical values.  
☆ Indicates a typical value when the winding temperature is 20°C. All values are typical values.

- (1) The values for "Encoder inertia" and "servo motor mass" are for when with a [Model No. HA035] battery-less absolute encoder. Contact us for details on other encoders. Values inside ( ) are for when with a brake attached.
- (2) With optional oil seals, motor outputs may be derated to 80 to 95% of the values in the table above. Values inside ( ) are for when with a brake attached.
- (3) Our standard servo amplifiers conform to CE and UL standards.

### Speed-Torque Characteristics



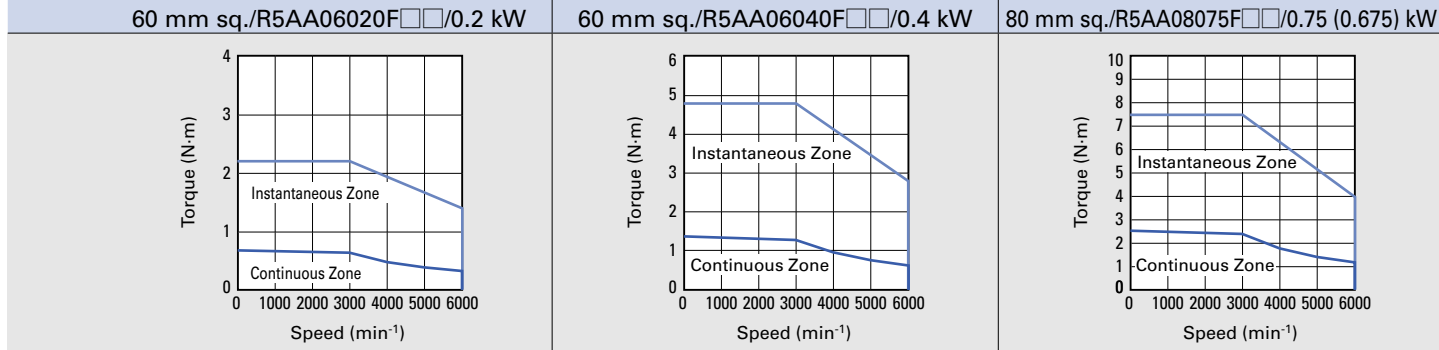
Note: These values are for when the input voltage is a 3-phase 200 VAC circuit. The characteristics of the instantaneous zone may change when the input voltage is less than 200 VAC or single-phase 200 VAC.

60 mm sq.		80 mm sq.	Flange size			
R5AA06020F□□	R5AA06040F□□	R5AA08075F□□	Servo motor model no.			
RS3A02□□ 《20 A》		RS3A03□□ 《30 A》	Compatible servo amplifier model no.			
				Unit	Symbol	Status
0.2	0.4 <sup>(2)</sup>	0.75 (0.675) <sup>(2)</sup>	kW	P <sub>R</sub>	★	Rated Output
3000	3000	3000	min <sup>-1</sup>	N <sub>R</sub>	★	Rated Speed
6000	6000	6000	min <sup>-1</sup>	N <sub>max</sub>	★	Maximum Speed
0.637	1.27 <sup>(2)</sup>	2.39 (2.15) <sup>(2)</sup>	N·m	T <sub>R</sub>	★	Rated Torque
0.686	1.37	2.55	N·m	T <sub>S</sub>	★	Continuous Stall Torque
2.2	4.8	7.5	N·m	T <sub>P</sub>	★	Peak Stall Torque
1.5	2.8	4.5	Arms	I <sub>R</sub>	★	Rated Armature Current
1.6	2.8	4.5	Arms	I <sub>S</sub>	★	Armature Stall Current
5.7	10.8	15.5	Arms	I <sub>P</sub>	★	Peak Armature Stall Current
0.476	0.525	0.607	N·m/Arms	K <sub>T</sub>	☆	Torque Constant
2.7	1.36	0.51	Ω	R <sub>φ</sub>	☆	Phase Resistance
20	39 <sup>(2)</sup>	35 (28) <sup>(2)</sup>	kW/s	Q <sub>R</sub>	★	Rated Power Rate
0.198	0.414	1.65	×10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	J <sub>M</sub>		Rotor Inertia
	0.0042		×10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	J <sub>S</sub>		Encoder Inertia <sup>(1)</sup>
0.99 (1.4)	1.5 (1.9)	2.8 (3.7)	kg	We		Servo Motor Mass <sup>(1)</sup>
1.37 min.		2.55 min.	N·m	T <sub>b</sub>		Brake Static Friction Torque
90 VDC/24 VDC ±10%			V	V <sub>b</sub>		Brake Rated Voltage
0.11/0.32		0.12/0.37	A	I <sub>b</sub>		Brake Rated Current
0.060	0.060	0.25	×10 <sup>-4</sup> kg·m <sup>2</sup> (GD <sup>2</sup> /4)	J <sub>b</sub>		Rotor Moment of Inertia (Brake)
0.6	1.0	1.6	kVA			Servo amplifier power supply capacity (rating)
Yes						CE and UL approved servo motors <sup>(3)</sup>
IP65 (Option: IP67)						Servo motor protection code
250×250×6 mm						Size of aluminum plates for heat radiation during measurement
p. 134						Page for motor dimensions

Servo Motor Operating Ambient Conditions

Operating temperature and humidity	Temp.: 0 to 40°C. Humidity: 90% max. (non-condensing)
Vibration resistance	24.5 m/s <sup>2</sup>
Shock resistance	98 m/s <sup>2</sup> , 2 times
Operation altitude	1000 m or lower above sea level
Installation location	Indoor (without direct sunlight) Location where no substance that gives adverse effects on the device and motor, such as corrosive gas, flammable gas, or dust exists

Flange Size/Servo Motor Model no./Rated Output





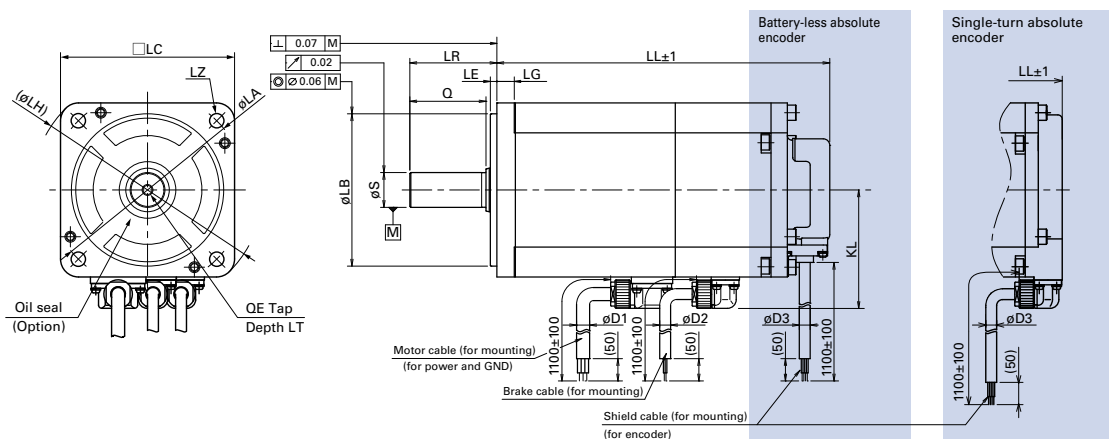
# Dimensions [Unit: mm]

## 40 to 100 mm sq.

### R2 Servo Motor

### R1 Servo Motor

### R5 Servo Motor



This drawing is for a motor equipped with a brake and no extension cable connector.

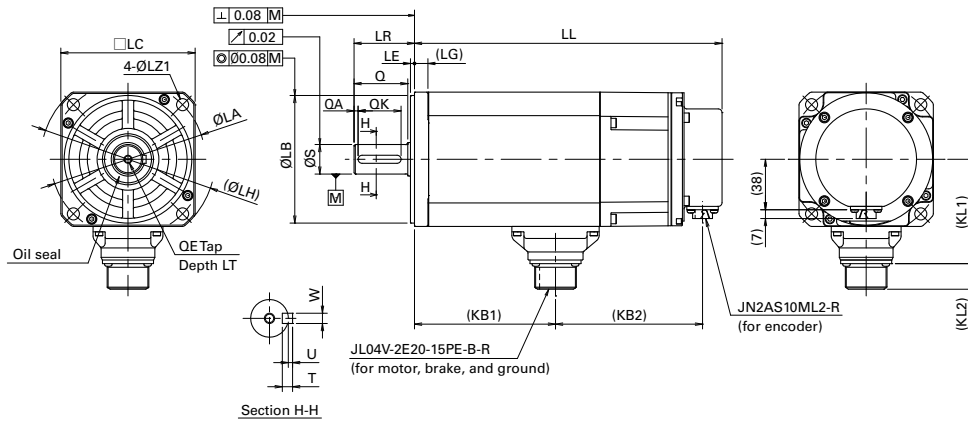
Model no.	Battery-less absolute encoder				Single-turn absolute encoder				LG	KL	LA
	W/out oil seal		With oil seal		W/out oil seal		With oil seal				
	W/out brake	With brake	W/out brake	With brake	W/out brake	With brake	W/out brake	With brake			
	LL	LL	LL	LL	LL	LL	LL	LL			
R2□A04003	62.5	98.5	67.5	103.5	51.5	87.5	56.5	92.5	5	35.4	46
R2□A04005	67.5	103.5	72.5	108.5	56.5	92.5	61.5	97.5			
R2EA04008	83.0	119.0	88.0	124.0	72	108	77	113			
R2AA04010											
R2□A06010	68.5	92.5	75.5	99.5	58.5	82.5	65.5	89.5	6	44.6	70
R2□A06020	79.5	107.5	86.5	114.5	69.5	97.5	76.5	104.5			
R2AA06040	105.5	133.5	112.5	140.5	95.5	123.5	102.5	130.5			
R2AA08020	76.3	112.0	83.3	119.0	66.3	102	73.3	109			
R2AA08040	88.3	124.0	95.3	131.0	78.3	114	85.3	121	8	54.4	90
R2AA08075	117.3	153.0	124.3	160.0	107.3	143	114.3	150			
R2AAB8075	123.1	149.0	123.1	149.0	114.3	140.2	114.3	140.2			
R2AAB8100	145.8	171.8	145.8	171.8	137	163	137	163			
R2AA10075	117.1	134.6	117.1	134.6	111.3	128.8	111.3	128.8	10	66.8	115
R2AA10100	134.1	151.6	134.1	151.6	128.3	145.8	128.3	145.8			
R1□A04005	84	115	89	120	73	104	78	109	5	35.3	46
R1□A04010	103	134	108	139	92	123	97	128			
R1□A06020	96.5	126.5	103.5	133.5	86.5	116.5	93.5	123.5	6	44.4	70
R1AA06040	121	151	128	158	111	141	118	148			
R1AA08075	133	165	140	172	123	155	130	162	8	54.4	90
R5AA06020	79.5	107.5	86.5	114.5	72.5	100.5	79.5	107.5	6	44.6	70
R5AA06040	105.5	133.5	112.5	140.5	98.5	126.5	105.5	133.5			
R5AA08075	117.3	153.0	124.3	150.2	110.3	146	117.3	153			

Note: The cable length of the motor with extension cable connector is 200±30 mm. The connector is attached to the end of the cable. See p. 170

LB	LE	LH	LC	LZ	LR	S	Q	QE	LT	D1	D2	D3	Model no.
0 30 -0.021	2.5	56	40	2-ø4.5	25	0 6 -0.008	20	-	-	6	5	5	R2□A04003
						0 8 -0.009							R2□A04005
						0 8 -0.009							R2EA04008
0 50 -0.025	3	82	60	4-ø5.5	25	0 8 -0.009	25	M5	12	6	5	5	R2□A06010
					30	0 14 -0.011							R2□A06020
0 70 -0.030	3	108	80	4-ø6.6	40	0 16 -0.011	35	M5	12	6	5	5	R2AA08020
0 80 -0.030						0 16 -0.011							R2AA08040
0 95 -0.035	3	115.5	86	4-ø6.6	35	0 16 -0.011	30	M5	12	6	5	5	R2AAB8075
0 30 -0.021						0 22 -0.013							R2AAB8100
0 50 -0.025	3	82	60	4-ø5.5	30	0 14 -0.011	25	M5	12	6	5	5	R2AA10075
0 70 -0.030						0 16 -0.011							R2AA10100
0 50 -0.025	3	82	60	4-ø5.5	30	0 14 -0.011	25	M5	12	6	5	5	R1□A04005
0 70 -0.030						0 16 -0.011							R1□A04010
0 50 -0.025	3	108	80	4-ø6.6	40	0 16 -0.011	35	M5	12	6	5	5	R1□A06020
0 70 -0.030						0 16 -0.011							R1AA06040
0 50 -0.025	3	82	60	4-ø5.5	30	0 14 -0.011	25	M5	12	6	5	5	R1AA08075
0 70 -0.030						0 16 -0.011							R5AA06020
0 50 -0.025	3	82	60	4-ø5.5	30	0 14 -0.011	25	M5	12	6	5	5	R5AA06040
0 70 -0.030						0 16 -0.011							R5AA08075

# Dimensions [Unit: mm]

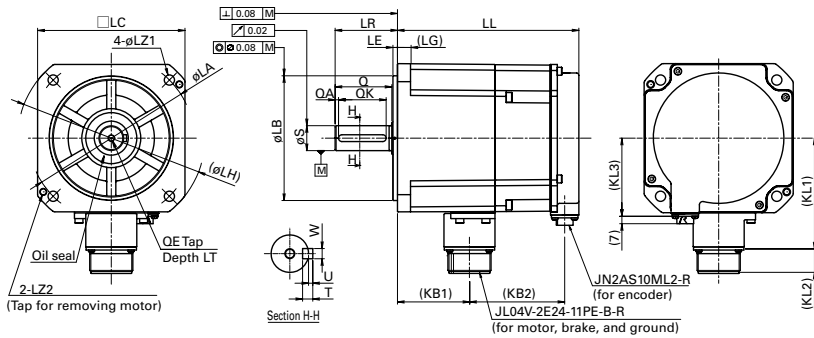
## 100 mm sq. R2 Servo Motor 1.5 kW



This dimensional drawing is for a servo motor equipped with a battery-less absolute encoder with brake.

Model no.	Battery-less absolute encoder, Single-turn absolute encoder													
	W/out brake		With brake		KB1	LG	KL1	KL2	LA	LB	LE	LH	LC	LZ1
R2AA10150	LL	KB2	LL	KB2										
Model no.	LR	S	Q	QA	QK	W	T	U	QE	LT				
R2AA10150	45	22 <sup>0</sup> <sub>-0.013</sub>	40	3	32	6 <sup>0</sup> <sub>-0.030</sub>	6	2.5	M6	20				

# 130 mm sq. R2 Servo Motor 0.55 to 1.8 kW



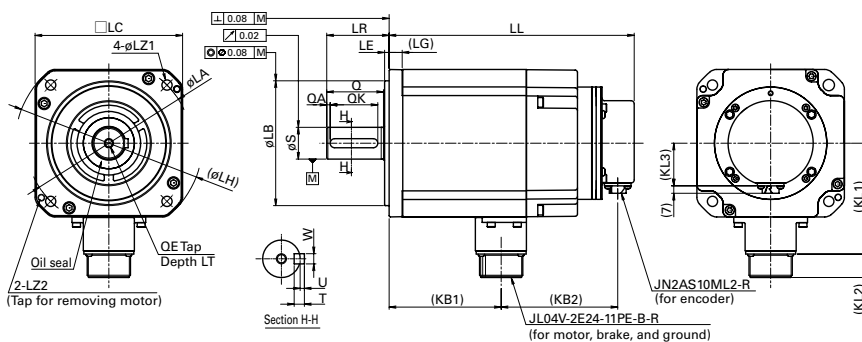
This dimensional drawing is for a servo motor equipped with a battery-less absolute encoder with brake.

Model no.	Battery-less absolute encoder, Single-turn absolute encoder		LL	KB2	LG	KL1	KL2	KL3	LA	LB	LE	LH	LC	LZ1	LZ2	LR	S
	W/out brake	With brake															
R2AA13050	103		139.5	81						110 <sup>0</sup> <sub>-0.035</sub>	4	165	130	9	M6	55	22 <sup>0</sup> <sub>-0.013</sub>
R2AA13120	120.5	44	160	84	12	98	21	69	145								
R2AA13180	138		179	86													

Model no.	Q	QA	QK	W	T	U	KB1	QE	LT
R2AA13050							46		
R2AA13120	50	3	42	6 <sup>0</sup> <sub>-0.030</sub>	6	2.5	64	M6	20
R2AA13180							81		

Note: The brake connection receptacle can be used for power line connection too.

# 130 mm sq. R2 Servo Motor 2 kW

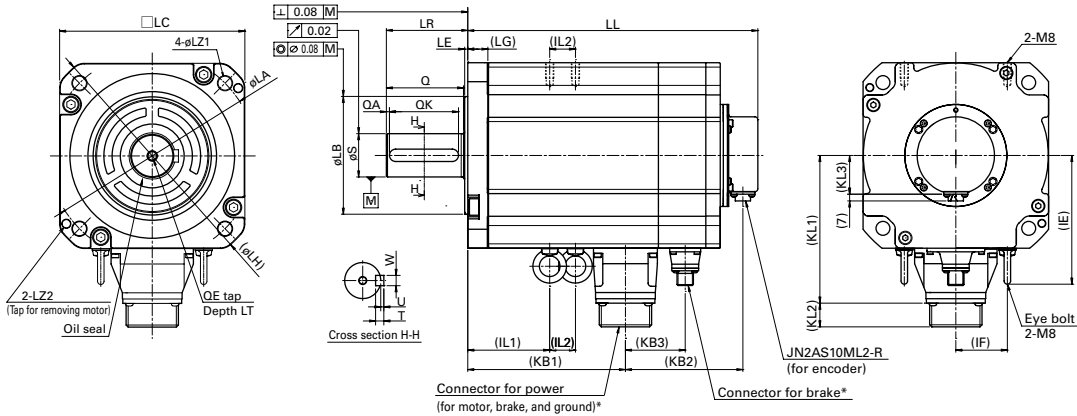


This dimensional drawing is for a servo motor equipped with a battery-less absolute encoder with brake.

Model no.	Battery-less absolute encoder, Single-turn absolute encoder		LL	KB2	LG	KL1	KL2	KL3	LA	LB	LE	LH	LC	LZ1	LZ2	LR	S
	W/out brake	With brake															
R2AA13200	171	57	216	103	12	98	21	38	145	110 <sup>0</sup> <sub>-0.035</sub>	4	165	130	9	M6	55	28 <sup>0</sup> <sub>-0.013</sub>
R2AA13200	50	3	42	8 <sup>0</sup> <sub>-0.036</sub>	7	3	99	M8	25								

# Dimensions [Unit: mm]

## 180 mm sq. R2 Servo Motor 3.5 to 7.5 kW



This dimensional drawing is for a servo motor equipped with a battery-less absolute encoder with brake.

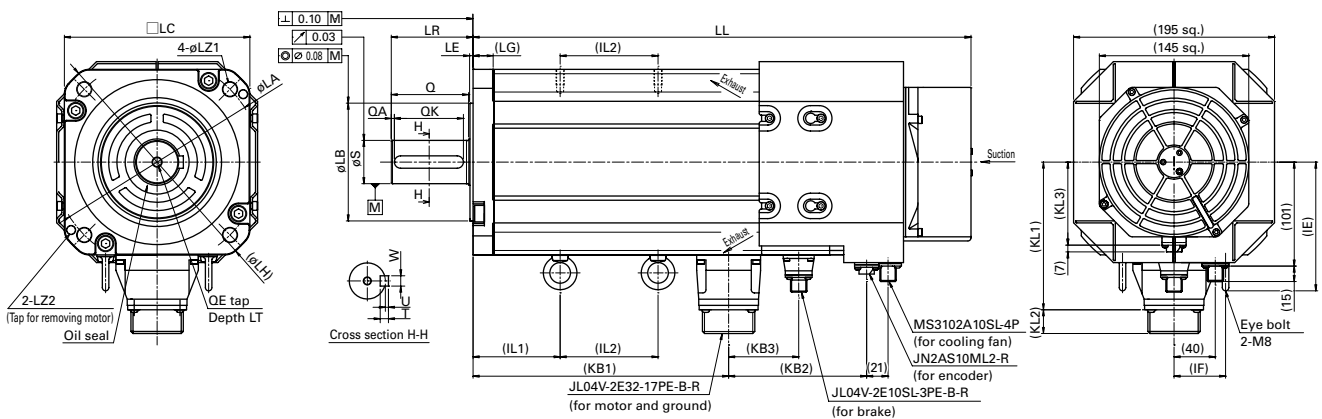
Model no.	Battery-less absolute encoder						Single-turn absolute encoder						LG	KL1	KL2	KL3	LA	LB	LE	LH	LC
	W/out brake			With brake			W/out brake			With brake											
R2AA18350	159	52	—	206	99	—	155	48	—	205	98	—	16	123	21	38	200	114.3 <sup>0</sup> -0.035	3	230	180
R2AA18450	176			223	172	222	274			107	64	228	59	274	107						
R2AA18550	228	59	—	274	107	64	228	59	—	274	107	64	19	144	22	38	200	114.3 <sup>0</sup> -0.035	3	230	180
R2AA18750	273			329	117	74	273			329	117	74									

Model no.	LZ1	LZ2	LR	S	Q	QA	QK	W	T	U	KB1	QE	LT	IE	IF	IL1	IL2	Connector model no. for power	Connector model no. for brake
R2AA18350	13.5	M8	65	0	60	50	0	8	3	92	M8	25	123	50	47	20	20	JL04V-2E24-11PE-B-R	— *
R2AA18450			35 <sup>-0.016</sup>	3	10 <sup>-0.036</sup>	109	57			20									
R2AA18550			79	0	75	67	0	153	123	50	63	41	86	JL04V-2E32-17PE-B-R	JL04V-2E10SL-3PE-B-R				
R2AA18750			42 <sup>-0.016</sup>	12 <sup>-0.043</sup>	198														

\*The brake connection receptacle can be used for power line connection too.

## 180 mm sq. R2 Servo Motor 11 kW



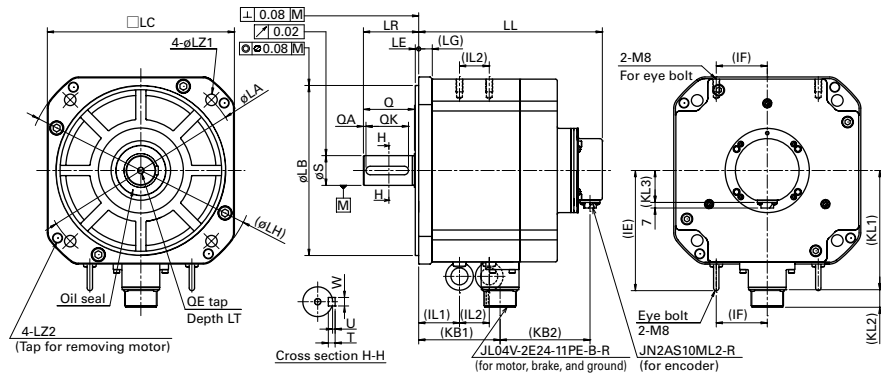
This dimensional drawing is for a servo motor equipped with a battery-less absolute encoder with brake.

Model no.	Battery-less absolute encoder, Single-turn absolute encoder						LG	KL1	KL2	KL3	LA	LB	LE	LH	LC	LZ1	LZ2	LR	S
	W/out brake			With brake															
R2AA1811K	395	60	—	509	173	110	19	143	23	81	200	114.3 <sup>0</sup> -0.035	3	230	180	13.5	M8	79	42 <sup>0</sup> -0.016

Model no.	Q	QA	QK	W	T	U	KB1	QE	LT	IE	IF	IL1	IL2
R2AA1811K	75	3	67	0	8	3	220	M10	25	123	50	63	108

# 220 mm sq. R2 Servo Motor 5 kW



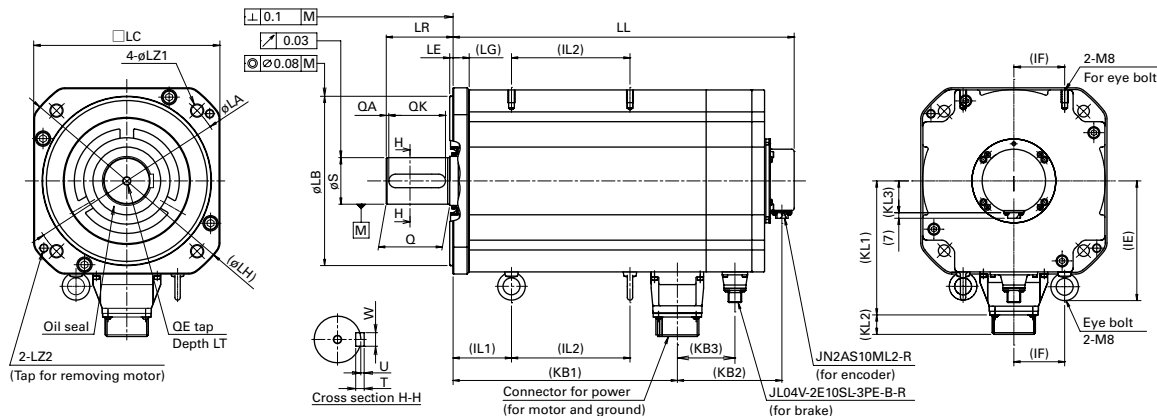
This dimensional drawing is for a servo motor equipped with a battery-less absolute encoder with brake.

Model no.	Battery-less absolute encoder, Single-turn absolute encoder				LG	KL1	KL2	KL3	LA	LB	LE	LH	LC	LZ1	LZ2	LR
	W/out brake	With brake														
R2AA22500	163	52	216	106	16	142	21	38	235	0 200 -0.046	4	270	220	13.5	M12	65

Model no.	S	Q	QA	QK	W	T	U	KB1	QE	LT	IE	IF	IL1	IL2
R2AA22500	0 35 -0.016	60	3	50	0 10 -0.036	8	3	96	M8	25	142	60	48	35

# R2 Servo Motor 7 to 15 kW



This dimensional drawing is for a servo motor equipped with a battery-less absolute encoder with brake.

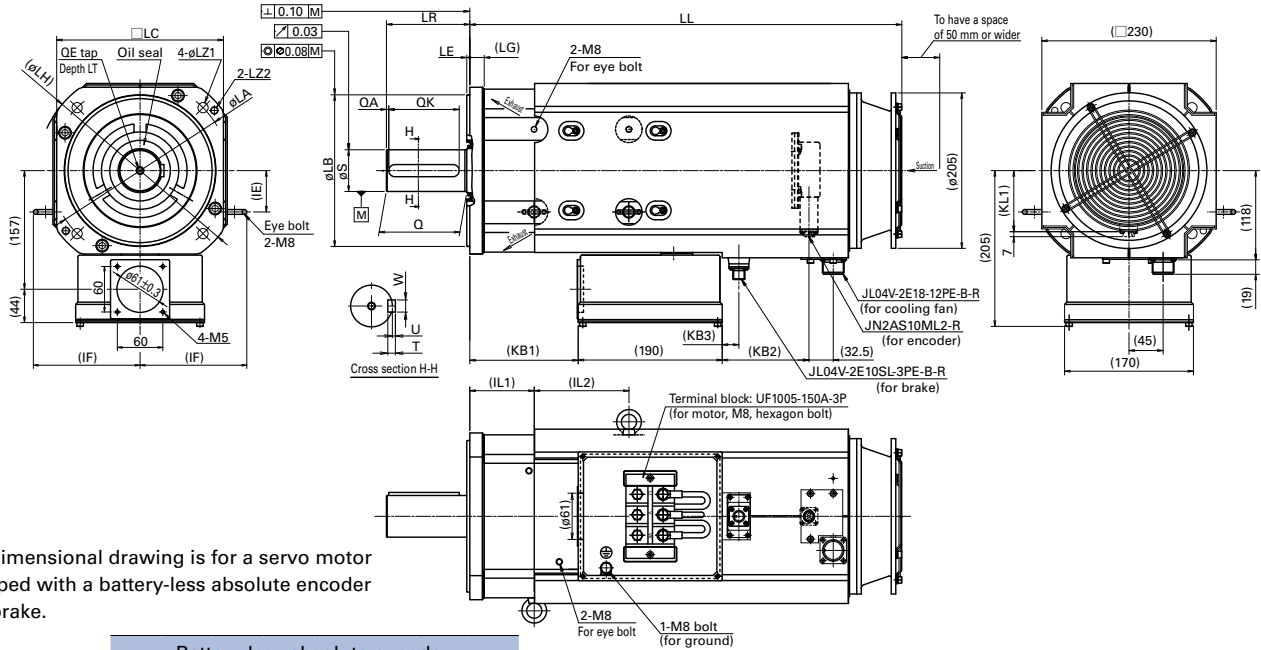
Model no.	Battery-less absolute encoder, Single-turn absolute encoder						LG	KL1	KL2	KL3	LA	LB	LE	LH	LC	LZ1	LZ2	LR	S
	W/out brake	With brake																	
R2AA22700	265	54		325	114	57		141	21		235	0 200 -0.046	4	270	220	13.5	M10	79	0 55 -0.019
R2AA2211K	304			364	123	66	19	162	22	38	235	0 200 -0.046	4	270	220	13.5	M10	79	0 55 -0.019
R2AA2215K	343	63		403	123	66		162	22	38	235	0 200 -0.046	4	270	220	13.5	M10	79	0 55 -0.019

Model no.	Q	QA	QK	W	T	U	KB1	QE	LT	IE	IF	IL1	IL2	Connector model no. for power
R2AA22700							196						62	JL04V-2E24-11PE-B-R
R2AA2211K	75	3	67	0 16 -0.043	10	4	226	M10	25	142	60	69	101	JL04V-2E32-17PE-B-R
R2AA2215K							265						140	

# Dimensions [Unit: mm]

## 220 mm sq. R2 Servo Motor 20 kW



This dimensional drawing is for a servo motor equipped with a battery-less absolute encoder with brake.

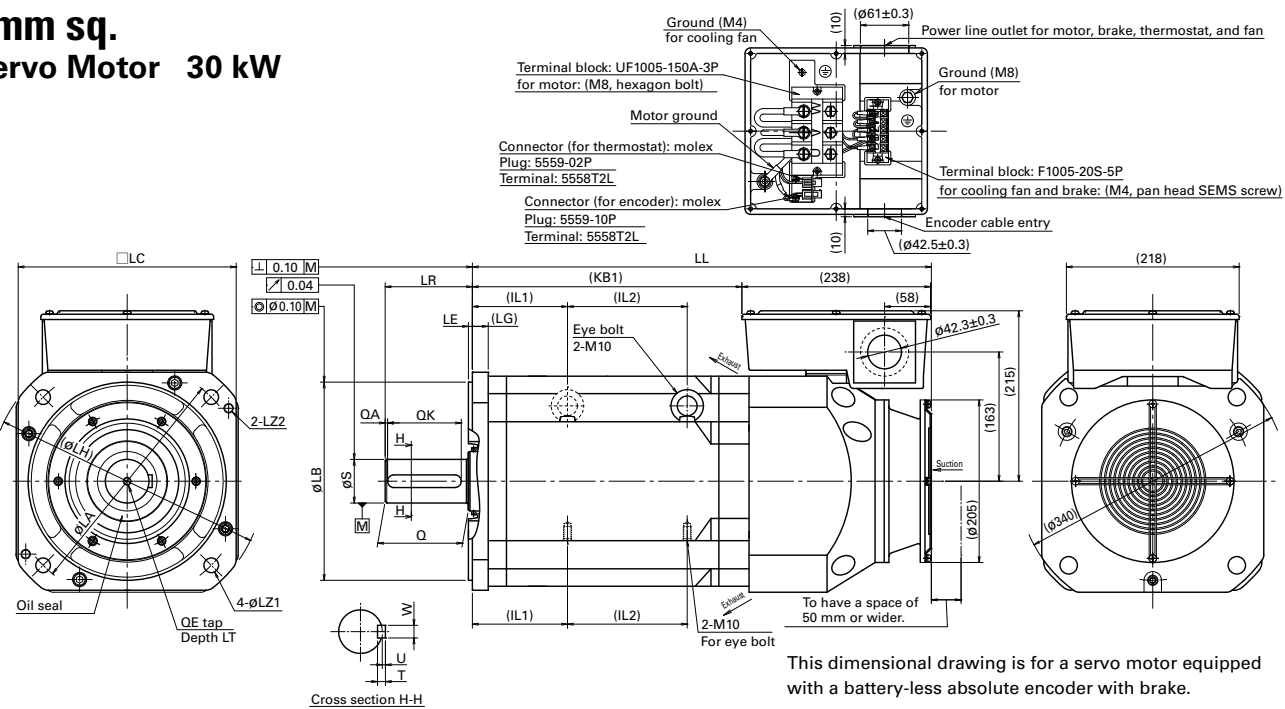
Battery-less absolute encoder,  
Single-turn absolute encoder

Model no.	W/out brake				With brake															
	LL	KB2	KB3	KL1	LL	KB2	KB3	KL1	LG	LA	LB	LE	LH	LC	LZ1	LZ2	LR	S	Q	QA
R2AA2220K	466	10	—	81	570	114	22	81	19	235	200 <sup>0</sup> <sub>-0.046</sub>	4	270	220	13.5	M10	110	55 <sup>0</sup> <sub>-0.019</sub>	106	3

Model no.	QK	W	T	U	KB1	QE	LT	IE	IF	IL1	IL2
R2AA2220K	93	0 <sup>0</sup> <sub>16 -0.043</sub>	10	4	143	M10	25	55	141	85	125

## 275 mm sq. R2 Servo Motor 30 kW



This dimensional drawing is for a servo motor equipped with a battery-less absolute encoder with brake.

Battery-less absolute encoder,  
Single-turn absolute encoder

Model no.	W/out brake				With brake															
	LL	IL1	IL2	KB1	LL	IL1	IL2	KB1	LG	LA	LB	LE	LH	LC	LZ1	LZ2	LR	S	Q	QA
R2AA2830K	479	120	50	240	579	120	151	340	20	300	250 <sup>0</sup> <sub>-0.052</sub>	5	345	275	18.5	M12	110	55 <sup>0</sup> <sub>-0.019</sub>	105	3

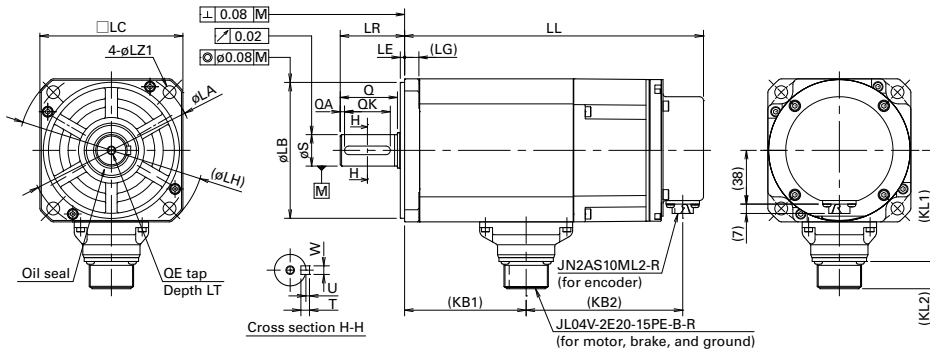
  

Model no.	QK	W	T	U	QE	LT
R2AA2830K	93	0 <sup>0</sup> <sub>16 -0.043</sub>	10	4	M10	25



# 100 mm sq.

## R1 Servo Motor 1 to 2.5 kW



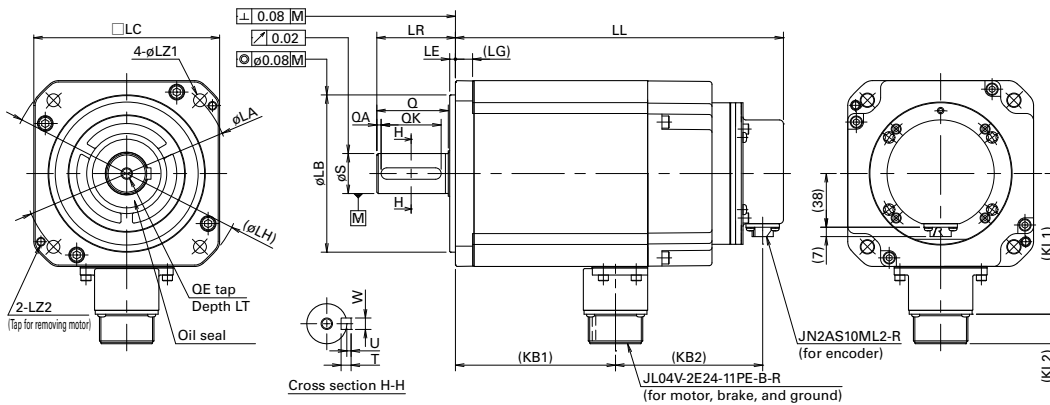
This dimensional drawing is for a servo motor equipped with a battery-less absolute encoder with brake.

Model no.	Battery-less absolute encoder, Single-turn absolute encoder		Model no.	Battery-less absolute encoder, Single-turn absolute encoder		KB1	LG	KL1	KL2	LA	LB	LE	LH	LC	LZ1	LR
	W/out brake	With brake		W/out brake	With brake											
R1AA10100	145	186	R1AA10100	186	62	109	10	78	19	115	0 95 -0.035	3	130	100	9	45
R1AA10150	168	209	R1AA10150	209	85											
R1AA10200	179	220	R1AA10200	220	96											
R1AA10250	199	240	R1AA10250	240	116											

Model no.	S	Q	QA	QK	W	T	U	QE	LT
R1AA10100	0 22 -0.013	40	3	32	0 6 -0.030	6	2.5	M6	20
R1AA10150									
R1AA10200									
R1AA10250									

# 130 mm sq.

## R1 Servo Motor 3 to 5 kW



This dimensional drawing is for a servo motor equipped with a battery-less absolute encoder with brake.

Model no.	Battery-less absolute encoder, Single-turn absolute encoder		Model no.	Battery-less absolute encoder, Single-turn absolute encoder		KB1	LG	KL1	KL2	LA	LB	LE	LH	LC	LZ1	LZ2	LR
	W/out brake	With brake		W/out brake	With brake												
R1AA13300	184	230	R1AA13300	230	112	100	12	98	21	145	0 110 -0.035	4	165	130	9	M6	55
R1AA13400	208	251	R1AA13400	251	136												
R1AA13500	232	275	R1AA13500	275	160												

Model no.	S	Q	QA	QK	W	T	U	QE	LT
R1AA13300	0 28 -0.013	50	3	42	0 8 -0.036	7	3	M8	25
R1AA13400									
R1AA13500									



# Options

Setup Software .....	p. 144
Connector to Connect Servo Amplifier .....	p. 146
Power Connector to Connect Motor, Electric Wire Size .....	p. 162
Connector for Motor Connection .....	p. 164
Communication Cable .....	p. 166
Analog Monitor .....	p. 167
External Regenerative Resistor .....	p. 167
Front Mounting Brackets .....	p. 168
Servo Motor with Servo Motor Extension Cable and Connectors .....	p. 170

# 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. URL: <https://www.sanyodenki.com>

■ Setup software title

SANMOTION MOTOR SETUP SOFTWARE

■ Main functions

- Parameter settings (settings by group, settings by function)
  - Diagnosis (alarm display, warning display, alarm cancellation)
  - Test run execution (speed JOG, positioning operation, motor home position search, absolute 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 (Mini-B) to connect the USB port on the PC and the servo amplifier.

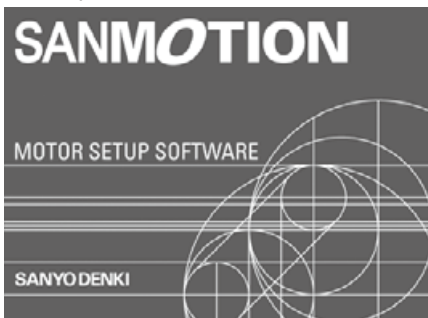
■ Supported OS

Windows 7 / 8 / 10

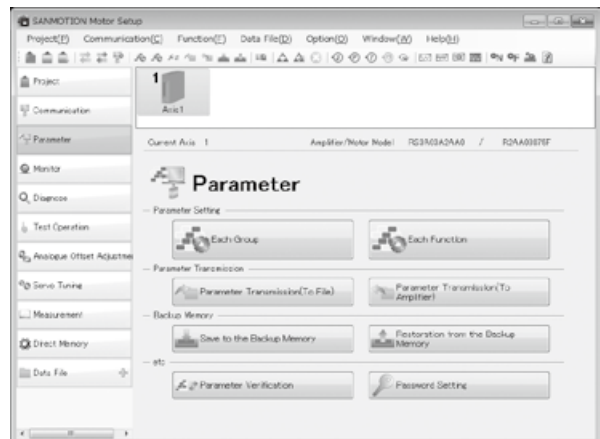
Note: See our website for details on supported OS versions.

## Examples of setting screens and functions with SANMOTION R 3E Model

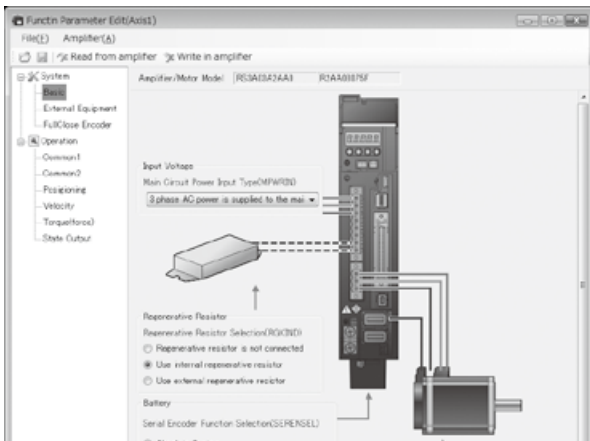
Start-up screen



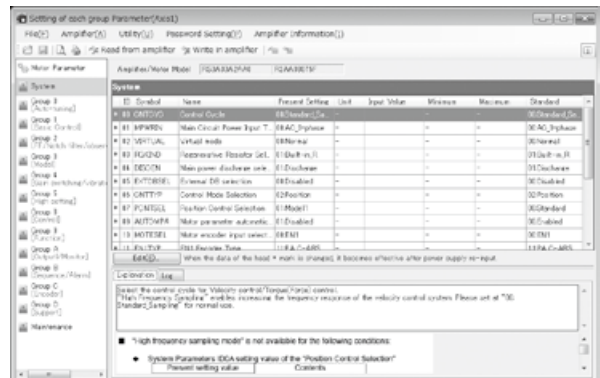
Main screen



Parameter Setting screen

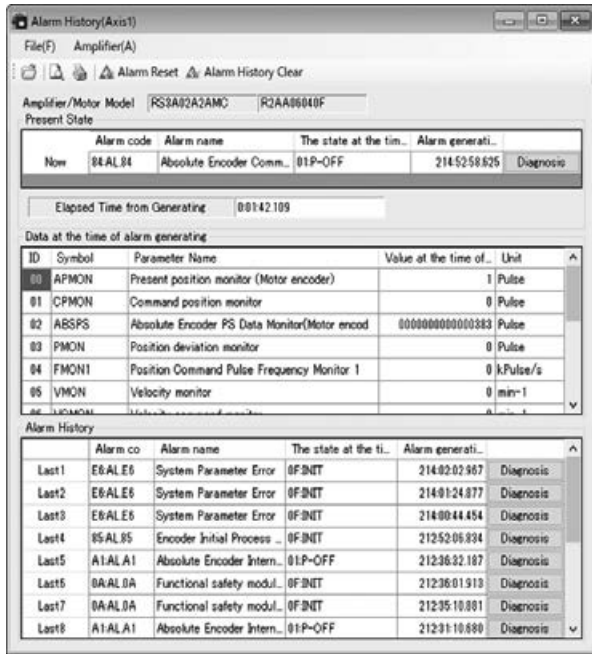


Function Parameter Edit  
Minimum required parameter setting by function can be done.

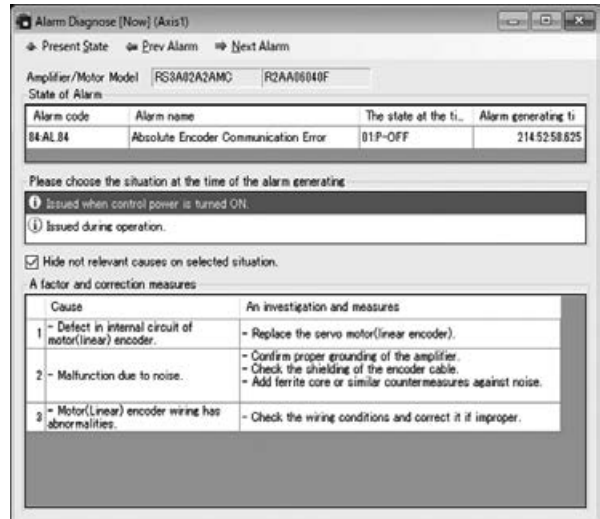


Parameter setting for each group  
Parameters can be set, saved, and more.

### Diagnosis screen

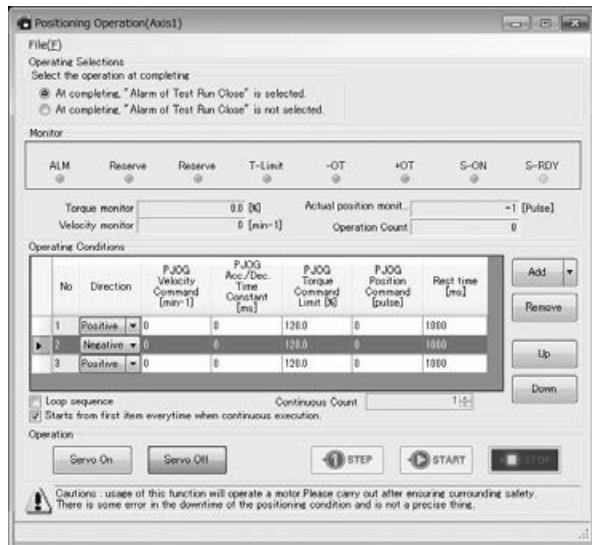


The current and previous 15 alarm occurrences can be checked.



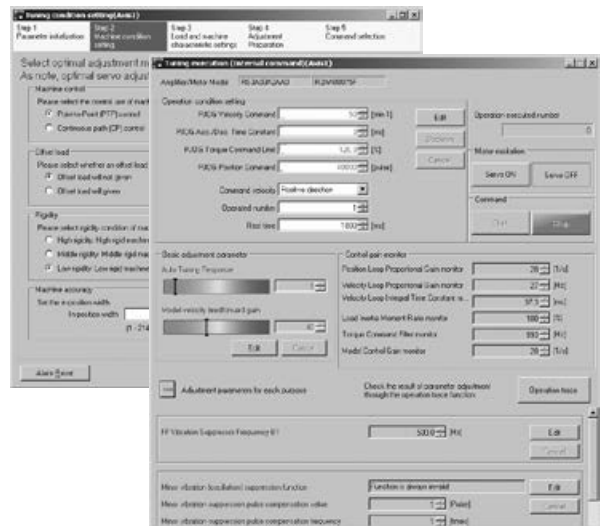
Causes and corrective actions can be checked based on alarm status.

### Test run



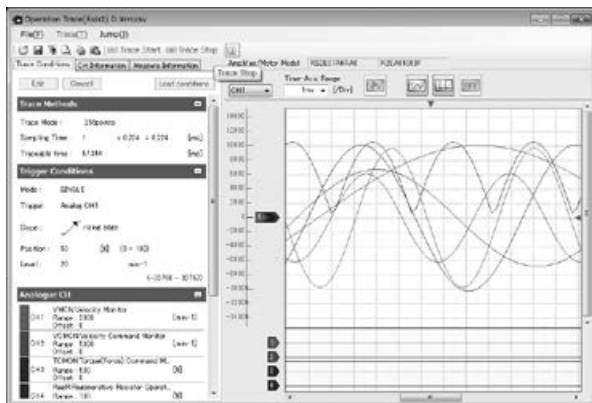
Simple test run of servo motor by issuing velocity commands and position commands from a PC. (Position JOG in operation shown in screen)

### Servo adjustment assist



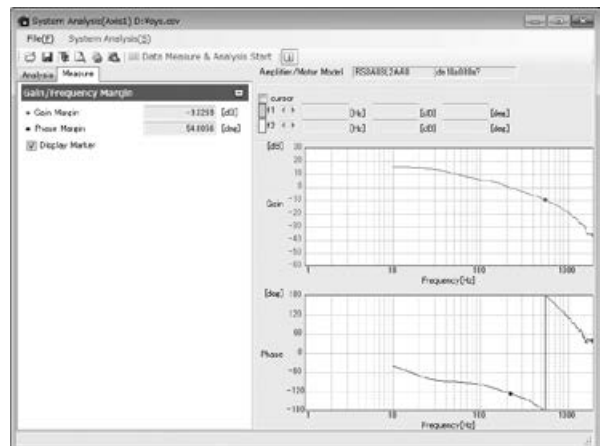
By setting the mechanical conditions, easy servo adjustment is available with the optimal tuning mode.

### Measurement



#### Operation Trace

Graphically displays servo motor's speed, torque and internal status.



#### System Analysis

Analyzes servo system frequency characteristics.

# Connector to Connect Servo Amplifier

## ■ For Analog/Pulse input type

### 10 to 50 A

#### Individual connectors

Connector no.	Description	Model no.	Manufacturer model no.	Manufacturer
CN1	For controller connection	AL-00385594	10150-3000PE, 10350-52A0-008	3M Japan Limited
EN1, EN2	For encoder connection	AL-00632607	36210-0100PL, 36310-3200-008	
CNA <sup>(1)</sup>	For input power supply and regenerative resistor connections	AL-00686902-01	MSTBT2.5/8-STF-5.08LUB	Phoenix Contact.K.K
CNB	For servo motor connection	AL-Y0004079-01	MSTBT2.5/3-STF-5.08	
CN4 <sup>(2)</sup>	For safety device connection (for short-circuiting)	AL-00849548-02	1971153-2	Tyco Electronics Japan G.K.
CN4	For safety device connection (for wiring)	AL-00718252-01	2013595-3	
SF-CN1	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	Phoenix Contact.K.K
SF-CN2	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	

(1) Amplifiers with built-in regenerative resistor are equipped with a CNA connector.

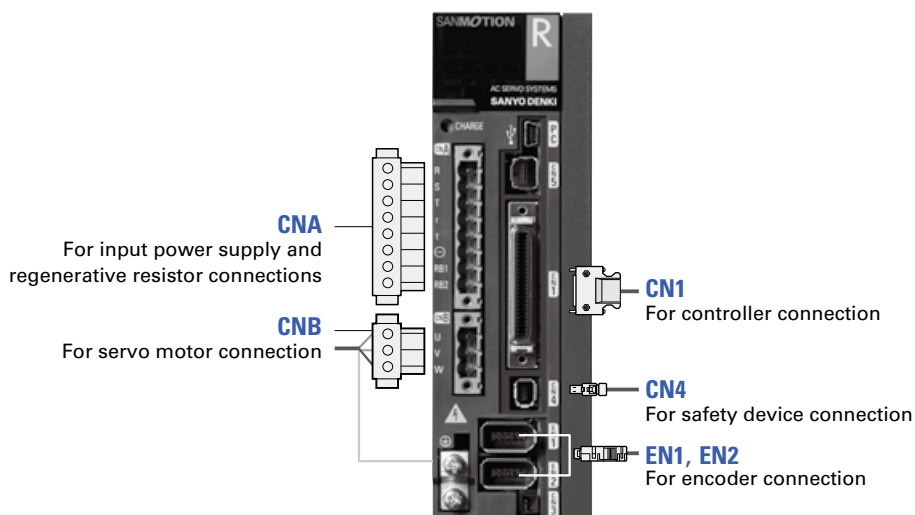
(2) When CN4 is not used, be sure to buy and insert the optional short-circuiting connector to CN4 on the servo amplifier.

#### Connector sets (For non-STO models)

Built-in regenerative resistor		No	Yes	No	Yes	No/Yes	No
Connector set no.		AL-00723282	AL-00723284	AL-00723286	AL-00723288	AL-00723290	AL-00696037
Connectors included in the set	CN1: For controller connection	Yes	Yes	Yes	Yes	Yes	No
	EN1: For encoder connection	Yes	Yes	Yes	Yes	Yes	No
	EN2: For encoder connection	No	No	Yes	Yes	No	No
	CNA: For input power supply and regenerative resistor connections	Yes	No	Yes	No	No	Yes
	CNB: For servo motor connection	Yes	Yes	Yes	Yes	No	Yes
	CN4: For safety device connection (for short-circuiting)	No	No	No	No	No	No
CN4: For safety device connection (for wiring)		No	No	No	No	No	No
Remarks					For fully-closed control systems		

#### Connector sets (For STO models)

Built-in regenerative resistor		No	Yes	No	Yes	No/Yes
Connector set no.		AL-00723155	AL-00723156	AL-00723157	AL-00723158	AL-00723159
Connectors included in the set	CN1: For controller connection	Yes	Yes	Yes	Yes	Yes
	EN1: For encoder connection	Yes	Yes	Yes	Yes	Yes
	EN2: For encoder connection	No	No	Yes	Yes	No
	CNA: For input power supply and regenerative resistor connections	Yes	No	Yes	No	No
	CNB: For servo motor connection	Yes	Yes	Yes	Yes	No
	CN4: For safety device connection (for short-circuiting)	No	No	No	No	No
CN4: For safety device connection (for wiring)		Yes	Yes	Yes	Yes	Yes
Remarks					For fully-closed control systems	





## ■ For Analog/Pulse input type

### 75 A

#### Individual connectors

Connector no.	Description	Model no.	Manufacturer model no.	Manufacturer
CN1	For controller connection	AL-00385594	10150-3000PE, 10350-52A0-008	3M Japan Limited
EN1, EN2	For encoder connection	AL-00632607	36210-0100PL, 36310-3200-008	
CNA (75 A only) <sup>(1)</sup>	For main circuit power supply and regenerative resistor connection	AL-Y0011766-01	PC5/7-STF1-7-62	Phoenix Contact.K.K
CNB (75 A only)	For servo motor connection	AL-Y0011768-01	PC5/3-STF1-7-62	
CNC	For control circuit power supply connection	AL-Y0005159-01	MSTBT2.5/2-STF-5.08	Tyco Electronics Japan G.K.
CN4 <sup>(2)</sup>	For safety device connection (for short-circuiting)	AL-00849548-02	1971153-2	
CN4	For safety device connection (for wiring)	AL-00718252-01	2013595-3	
SF-CN1	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	Phoenix Contact.K.K
SF-CN2	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	

(1) Amplifiers with built-in regenerative resistor are equipped with a CNA connector.

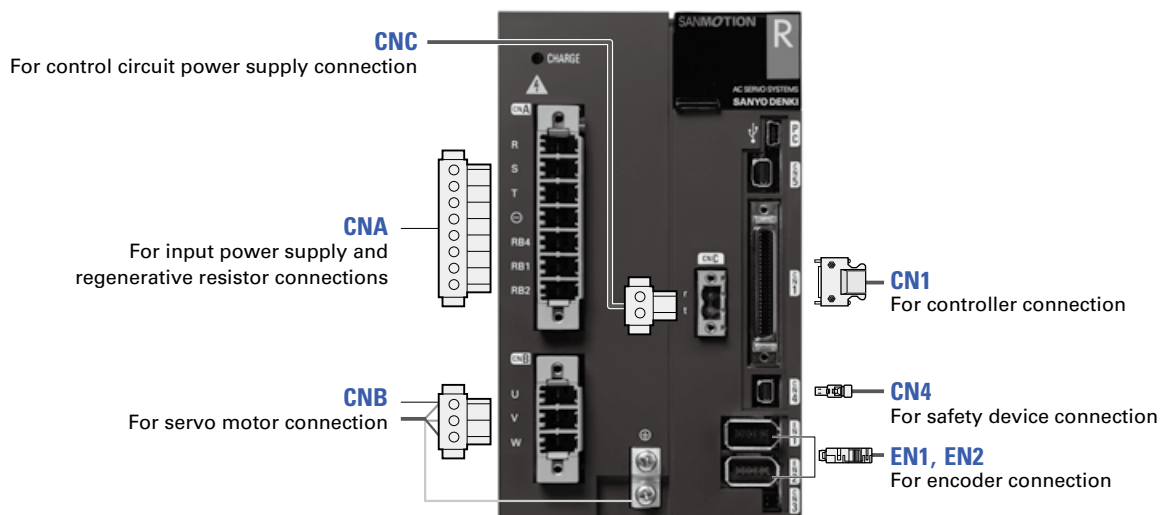
(2) When CN4 is not used, be sure to buy and insert the optional short-circuiting connector to CN4 on the servo amplifier.

#### Connector sets (For non-STO models)

Built-in regenerative resistor		No	Yes	No	Yes	No/Yes	No	Yes
Connector set no.		AL-00946084	AL-00946086	AL-00946088	AL-00946090	AL-00723290	AL-00946092	AL-00946094
Connectors included in the set	CN1: For controller connection	Yes	Yes	Yes	Yes	Yes	No	No
	EN1: For encoder connection	Yes	Yes	Yes	Yes	Yes	No	No
	EN2: For encoder connection	No	No	Yes	Yes	No	No	No
	CNA: For main circuit power supply and regenerative resistor connection	Yes	No	Yes	No	No	Yes	No
	CNB: For servo motor connection	Yes	Yes	Yes	Yes	No	Yes	Yes
	CNC: For control circuit power supply connection	Yes	Yes	Yes	Yes	No	Yes	Yes
	CN4: For safety device connection (for short-circuiting)	No	No	No	No	No	No	No
	CN4: For safety device connection (for wiring)	No	No	No	No	No	No	No
Remarks					For fully-closed control systems			

#### Connector sets (For STO models)

Built-in regenerative resistor		No	Yes	No	Yes	No/Yes
Connector set no.		AL-00946096	AL-00946098	AL-00946100	AL-00946102	AL-00723159
Connectors included in the set	CN1: For controller connection	Yes	Yes	Yes	Yes	Yes
	EN1: For encoder connection	Yes	Yes	Yes	Yes	Yes
	EN2: For encoder connection	No	No	Yes	Yes	No
	CNA: For main circuit power supply and regenerative resistor connection	Yes	No	Yes	No	No
	CNB: For servo motor connection	Yes	Yes	Yes	Yes	No
	CNC: For control circuit power supply connection	Yes	Yes	Yes	Yes	No
	CN4: For safety device connection (for short-circuiting)	No	No	No	No	No
	CN4: For safety device connection (for wiring)	Yes	Yes	Yes	Yes	Yes
Remarks					For fully-closed control systems	





# Connector to Connect Servo Amplifier

## ■ For Analog/Pulse input type

100 A, 150 A, 300 A

Individual connectors

Connector no.	Description	Model no.	Manufacturer model no.	Manufacturer
CN1	For controller connection	AL-00385594	10150-3000PE, 10350-52A0-008	3M Japan Limited
EN1, EN2	For encoder connection	AL-00632607	36210-0100PL, 36310-3200-008	
CNA	To input control circuit power supply	AL-Y0005159-01	MSTBT2.5/2-STF-5.08	Phoenix Contact.K.K
CN4 <sup>(1)</sup>	For safety device connection (for short-circuiting)	AL-00849548-02	1971153-2	Tyco Electronics Japan G.K.
CN4	For safety device connection (for wiring)	AL-00718252-01	2013595-3	
SF-CN1	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	Phoenix Contact.K.K
SF-CN2	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	

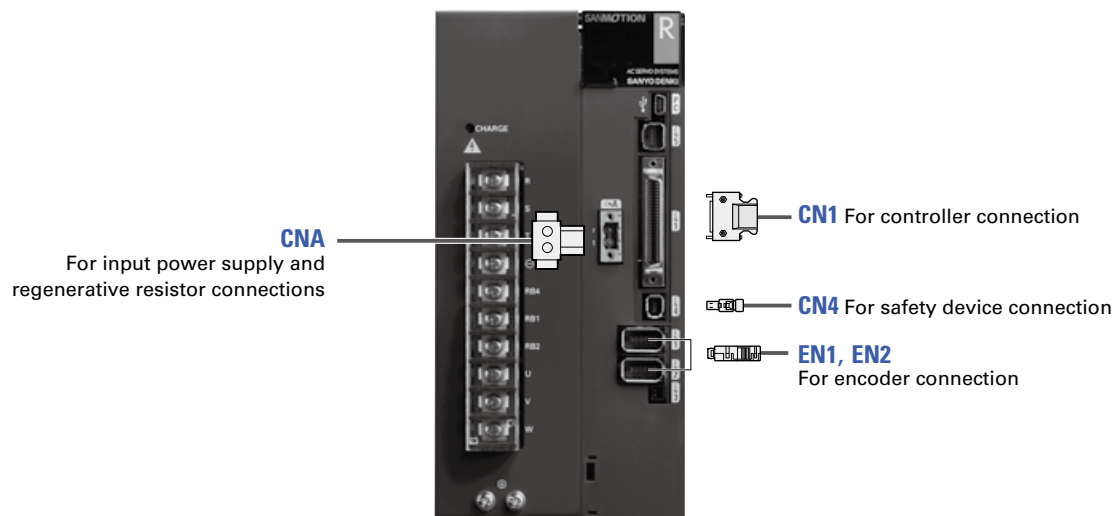
(1) When CN4 is not used, be sure to buy and insert the optional short-circuiting connector to CN4 on the servo amplifier.

### Connector sets (For non-STO models)

Connector set no.	AL-00751448	AL-00751450	AL-00723290	
Connectors included in the set	CN1: For controller connection	Yes	Yes	Yes
	EN1: For encoder connection	Yes	Yes	Yes
	EN2: For encoder connection	No	Yes	No
	CNA: To input control circuit power supply	Yes	Yes	No
	CN4: For safety device connection (for short-circuiting)	No	No	No
	CN4: For safety device connection (for wiring)	No	No	No
Remarks		For fully-closed control systems		

### Connector sets (For STO models)

Connector set no.	AL-00751452	AL-00751454	AL-00723159	
Connectors included in the set	CN1: For controller connection	Yes	Yes	Yes
	EN1: For encoder connection	Yes	Yes	Yes
	EN2: For encoder connection	No	Yes	No
	CNA: To input control circuit power supply	Yes	Yes	No
	CN4: For safety device connection (for short-circuiting)	No	No	No
	CN4: For safety device connection (for wiring)	Yes	Yes	Yes
Remarks		For fully-closed control systems		



## ■ For Analog/Pulse input type

### 600 A

#### Individual connectors

Connector no.	Description	Model no.	Manufacturer model no.	Manufacturer
CN9 <sup>(1)</sup>	For unit-to-unit connection (single item)	AL-00608710	10114-3000PE, 10314-52A0-008	3M Japan Limited
CN1	For controller connection	AL-00385594	10150-3000PE, 10350-52A0-008	
EN1, EN2	For encoder connection	AL-00632607	36210-0100PL, 36310-3200-008	
CNA <sup>(1)</sup>	To input control circuit power supply	AL-Y0005159-01	MSTBT2.5/2-STF-5.08	Phoenix Contact.K.K
CNB	For dynamic brake signal	AL-Y0004079-01	MSTBT2.5/3-STF-5.08	
CN8	For external alarm signal	AL-Y0011185-01	FMC0,5/4-ST-2.54	Tyco Electronics Japan G.K.
CN4 <sup>(2)</sup>	For safety device connection (for short-circuiting)	AL-00849548-02	1971153-2	
CN4	For safety device connection (for wiring)	AL-00718252-01	2013595-3	Phoenix Contact.K.K
SF-CN1	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	
SF-CN2	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	

(1) CN9 and CNA each needs one connector for each of power supply unit and amplifier unit.

(2) When CN4 is not used, be sure to buy and insert the optional short-circuiting connector to CN4 on the servo amplifier.

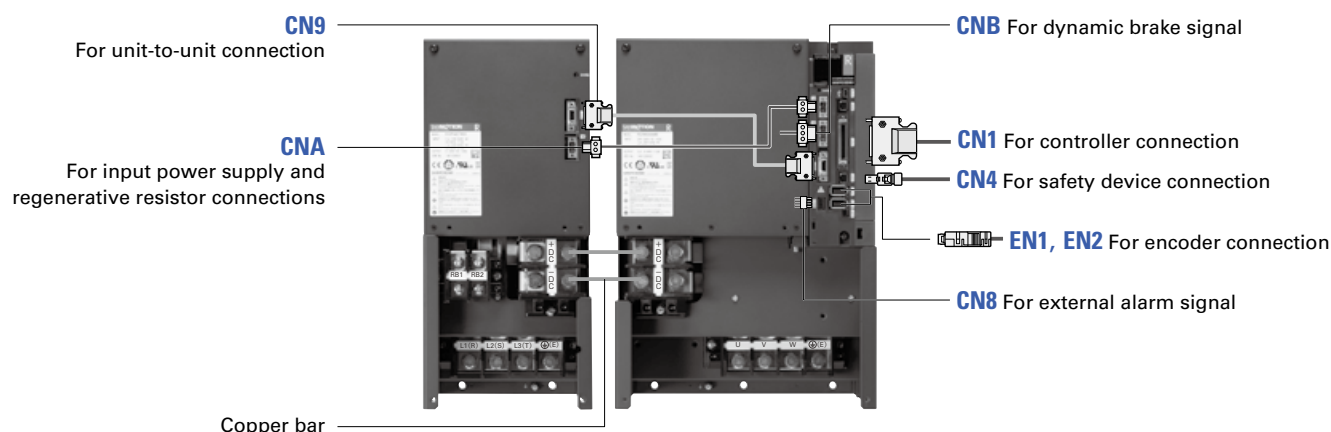
#### Connector sets (For non-STO models)

Connector set no.	AL-00892848	AL-00892850	AL-00723290	AL-00892854	
Connectors included in the set	CN1: For controller connection	Yes	Yes	Yes	No
	EN1: For encoder connection	Yes	Yes	Yes	No
	EN2: For encoder connection	No	Yes	No	No
	CNA: To input control circuit power supply	Yes	Yes	No	Yes
	CNB: For dynamic brake signal	No	No	No	Yes
	CN8: For external alarm signal	Yes	Yes	No	No
	CN4: For safety device connection (for short-circuiting)	No	No	No	No
	CN4: For safety device connection (for wiring)	No	No	No	No
Remarks		For fully-closed control systems			

#### Connector sets (For STO models)

Connector set no.	AL-00892856	AL-00892858	AL-00723159	
Connectors included in the set	CN1: For controller connection	Yes	Yes	Yes
	EN1: For encoder connection	Yes	Yes	Yes
	EN2: For encoder connection	No	Yes	No
	CNA: To input control circuit power supply	Yes	Yes	No
	CNB: For dynamic brake signal	No	No	No
	CN8: For external alarm signal	Yes	Yes	No
	CN4: For safety device connection (for short-circuiting)	No	No	No
	CN4: For safety device connection (for wiring)	Yes	Yes	Yes
Remarks		For fully-closed control systems		

Note: Connector sets are for the amplifier unit only. Please purchase the power supply unit connector separately.



# Connector to Connect Servo Amplifier

## ■EtherCAT interface type

### 10 to 50 A

#### Individual connectors

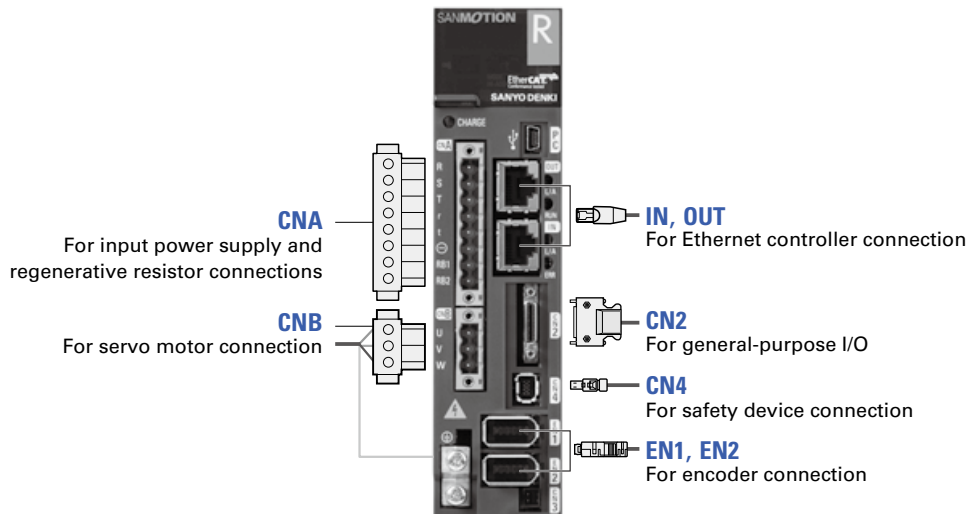
Connector no.	Description	Model no.	Manufacturer model no.	Manufacturer
IN, OUT	Ethernet For controller connection	Not available Use a CAT5e standard-compliant shielded type modular plug (RJ-45).		
EN1, EN2	For encoder connection	AL-Y0012504-01	545991016	Molex Japan Co., Ltd.
CNA <sup>(1)</sup>	For input power supply and regenerative resistor connections	AL-00686902-01	MSTBT2.5/8-STF-5.08LUB	Phoenix Contact.K.K
CNB	For servo motor connection	AL-Y0004079-01	MSTBT2.5/3-STF-5.08	Phoenix Contact.K.K
CN4	For safety device connection (for wiring)	AL-00718252-01	2013595-3	Tyco Electronics Japan G.K.
CN4 <sup>(2)</sup>	For safety device connection (for short-circuiting)	AL-00849548-02	1971153-2	Tyco Electronics Japan G.K.
CN2	For general-purpose I/O	AL-00842383	A set of HDR-E26MSG1+ and HDR-E26LPH	HONDA TSUSHIN KOGYO CO., LTD
SF-CN1	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	Phoenix Contact.K.K
SF-CN2	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	

(1) Amplifiers with built-in regenerative resistor are equipped with a CNA connector.

(2) A safety device connector (for short-circuiting) is included with a servo amplifier.

#### Connector sets (For STO models)

Built-in regenerative resistor		No	Yes	No	Yes	No/Yes
Connector set no.		AL-00977724	AL-00977726	AL-00977728	AL-00977730	AL-00977732
Connectors included in the set	EN1: For encoder connection	Yes	Yes	Yes	Yes	Yes
	EN2: For encoder connection	No	No	Yes	Yes	No
	CNA: To connect input power supply, regenerative resistor	Yes	No	Yes	No	No
	CNB: For servo motor connection	Yes	Yes	Yes	Yes	No
	CN4: For safety device connection (for short-circuiting)	No	No	No	No	No
	CN4: For safety device connection (for wiring)	Yes	Yes	Yes	Yes	Yes
	CN2: For general-purpose I/O	Yes	Yes	Yes	Yes	Yes
Remarks				For fully-closed control systems		



## ■ EtherCAT interface type

### 75 A

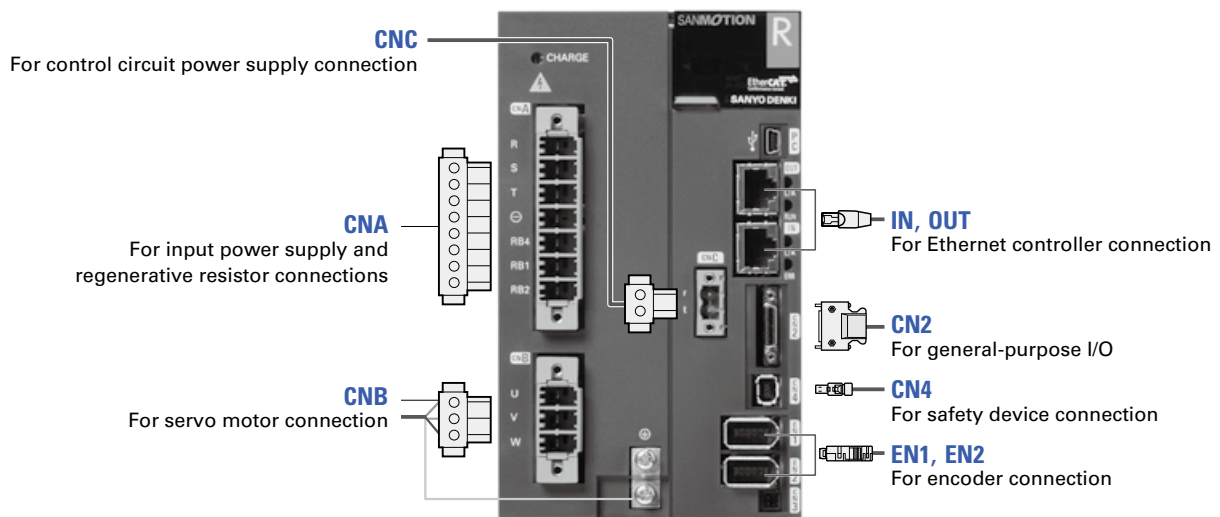
#### Individual connectors

Connector no.	Description	Model no.	Manufacturer model no.	Manufacturer
IN, OUT	Ethernet For controller connection	Not available Use a CAT5e standard-compliant shielded type modular plug (RJ-45).		
EN1,EN2	For encoder connection	AL-Y0012504-01	545991016	Molex Japan Co., Ltd.
CNA	For main circuit power supply and regenerative resistor connection	AL-Y0011766-01	PC5/7-STF1-7.62	Phoenix Contact.K.K
CNB	For servo motor connection	AL-Y0011768-01	PC5/3-STF1-7.62	Phoenix Contact.K.K
CNC	For control circuit power supply connection	AL-Y0005159-01	MSTBT2.5/2-STF-5.08	Phoenix Contact.K.K
CN4	For safety device connection (for wiring)	AL-00718252-01	2013595-3	Tyco Electronics Japan G.K.
CN4 <sup>(1)</sup>	For safety device connection (for short-circuiting)	AL-00849548-02	1971153-2	Tyco Electronics Japan G.K.
CN2	For general-purpose I/O signal	AL-00842383	A set of HDR-E26MSG1+ and HDR-E26LPH	HONDA TSUSHIN KOGYO CO., LTD
SF-CN1	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	Phoenix Contact.K.K
SF-CN2	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	

(1) A safety device connector (for short-circuiting) is included with a servo amplifier.

#### Connector sets (For STO models)

Built-in regenerative resistor	No	Yes	No	Yes	No/Yes
Connector set no.	AL-00977734	AL-00977736	AL-00977738	AL-00977740	AL-00977732
Connectors included in the set	EN1: For encoder connection	Yes	Yes	Yes	Yes
	EN2: For encoder connection	No	No	Yes	No
	CNA: For main circuit power supply and regenerative resistor connection	Yes	No	Yes	No
	CNB: For servo motor connection	Yes	Yes	Yes	No
	CNC: For control circuit power supply connection	Yes	Yes	Yes	No
	CN4: For safety device connection (for short-circuiting)	No	No	No	No
	CN4: For safety device connection (for wiring)	Yes	Yes	Yes	Yes
CN2: For general-purpose I/O	Yes	Yes	Yes	Yes	
Remarks	For fully-closed control systems				



# Connector to Connect Servo Amplifier

## ■ EtherCAT interface type

100 A, 150 A, 300 A

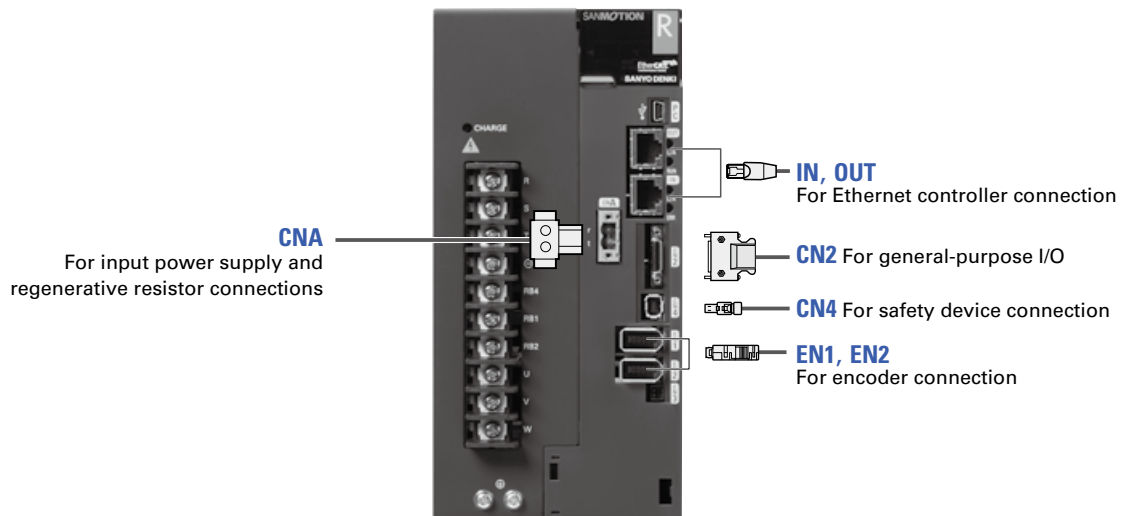
### Individual connectors

Connector no.	Description	Model no.	Manufacturer model no.	Manufacturer
IN, OUT	Ethernet For controller connection	Not available Use a CAT5e standard-compliant shielded type modular plug (RJ-45).		
EN1, EN2	For encoder connection	AL-Y0012504-01	545991016	Molex Japan Co., Ltd.
CNA	To input control circuit power supply	AL-Y0005159-01	MSTBT2.5/3-STF-5.08	Phoenix Contact.K.K
CN4	For safety device connection (for wiring)	AL-00718252-01	2013595-3	Tyco Electronics Japan G.K.
CN4 <sup>(1)</sup>	For safety device connection (for short-circuiting)	AL-00849548-02	1971153-2	Tyco Electronics Japan G.K.
CN2	For general-purpose I/O	AL-00842383	A set of HDR-E26MSG1+ and HDR-E26LPH	HONDA TSUSHIN KOGYO CO., LTD
SF-CN1	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	Phoenix Contact.K.K
SF-CN2	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	

(1) A safety device connector (for short-circuiting) is included with a servo amplifier.

### Connector sets (For STO models)

Connector set no.	AL-00977742	AL-00977744	AL-00977732	
Connectors included in the set	EN1: For encoder connection	Yes	Yes	Yes
	EN2: For encoder connection	No	Yes	No
	CNA: To input control circuit power supply	Yes	Yes	No
	CN4: For safety device connection (for short-circuiting)	No	No	No
	CN4: For safety device connection (for wiring)	Yes	Yes	Yes
	CN2: For general-purpose I/O	Yes	Yes	Yes
Remarks		For fully-closed control systems		



## ■ EtherCAT interface type

### 600 A

#### Individual connectors

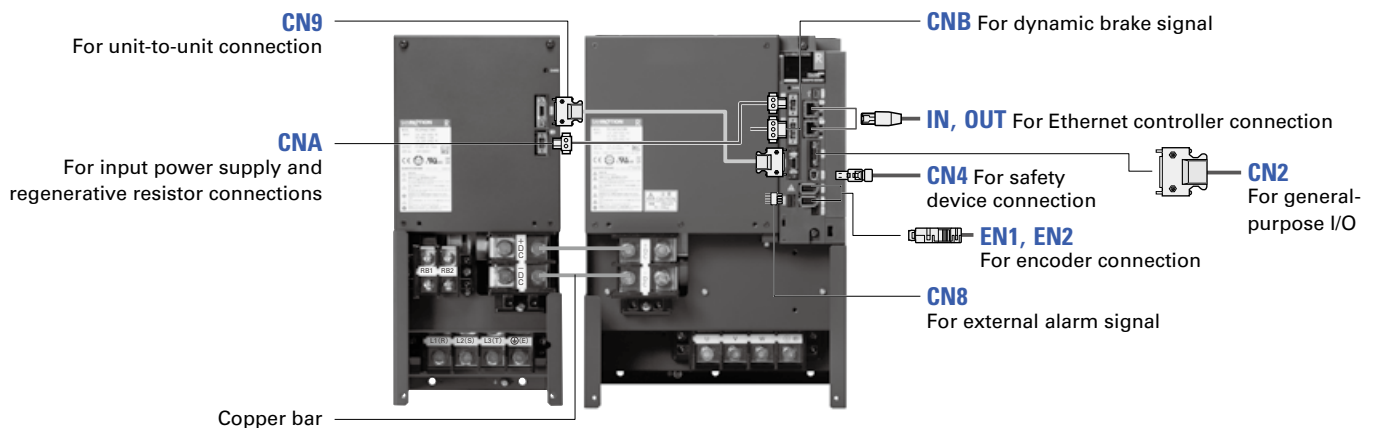
Connector no.	Description	Model no.	Manufacturer model no.	Manufacturer
IN, OUT	Ethernet For controller connection	Not available Use a CAT5e standard-compliant shielded type modular plug (RJ-45).		
CN9 <sup>(1)</sup>	For connecting units (single item)	AL-00608710	10114-3000PE and 10314-52A0-008	3M Japan Limited
EN1, EN2	For encoder connection	AL-Y0012504-01	545991016	Molex Japan Co., Ltd.
CNA <sup>(1)</sup>	To input control circuit power supply	AL-Y0005159-01	MSTBT2.5/2-STF-5.08	Phoenix Contact.K.K
CNB	For dynamic brake signal	AL-Y0004079-01	MSTBT2.5/3-STF-5.08	Phoenix Contact.K.K
CN8	For external alarm signal	AL-Y0011185-01	FMC0,5/4-ST-2.54	Phoenix Contact.K.K
CN4	For safety device connection (for wiring)	AL-00718252-01	2013595-3	Tyco Electronics Japan G.K.
CN4 <sup>(2)</sup>	For safety device connection (for short-circuiting)	AL-00849548-02	1971153-2	Tyco Electronics Japan G.K.
CN2	For general-purpose I/O	AL-00842383	A set of HDR-E26MSG1+ and HDR-E26LPH	HONDA TSUSHIN KOGYO CO., LTD
SF-CN1	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	Phoenix Contact.K.K
SF-CN2	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	

(1) CN9 and CNA each needs one connector for each of power supply unit and amplifier unit.

(2) A safety device connector (for short-circuiting) is included with a servo amplifier.

#### Connector sets (For STO models)

Connector set no.	AL-00977746	AL-00977748	AL-00977732	
Connectors included in the set	EN1: For encoder connection	Yes	Yes	Yes
	EN2: For encoder connection	No	Yes	No
	CNA: To input control circuit power supply	Yes	Yes	No
	CNB: For dynamic brake signal	No	No	No
	CN8: For external alarm signal	Yes	Yes	No
	CN4: For safety device connection (for short-circuiting)	No	No	No
	CN4: For safety device connection (for wiring)	Yes	Yes	Yes
	CN2: For general-purpose I/O	Yes	Yes	Yes
Remarks		For fully-closed control systems		



# Connector to Connect Servo Amplifier

## ■ Built-in positioning function, parallel type

### 10 to 50 A

#### Individual connectors

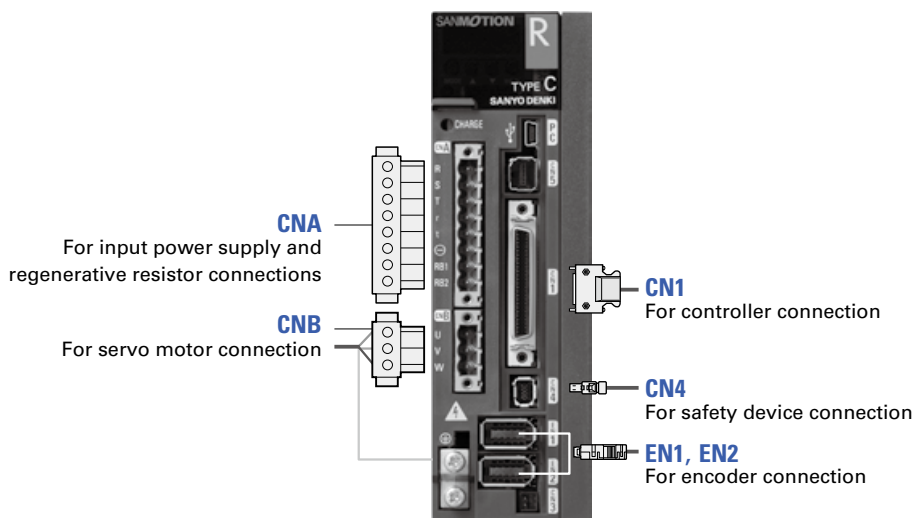
Connector no.	Description	Model no.	Manufacturer model no.	Manufacturer
CN1	For controller connection	AL-00385594	10150-3000PE, 10350-52A0-008	3M Japan Limited
EN1, EN2	For encoder connection	AL-Y0012504-01	545991016	Molex Japan Co., Ltd.
CNA <sup>(1)</sup>	For input power supply and regenerative resistor connections	AL-00686902-01	MSTBT2.5/8-STF-5.08LUB	Phoenix Contact.K.K
CNB	For servo motor connection	AL-Y0004079-01	MSTBT2.5/3-STF-5.08	
CN4 <sup>(2)</sup>	For safety device connection (for short-circuiting)	AL-00849548-02	1971153-2	Tyco Electronics Japan G.K.
CN4	For safety device connection (for wiring)	AL-00718252-01	2013595-3	
SF-CN1	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	Phoenix Contact.K.K
SF-CN2	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	

(1) Amplifiers with built-in regenerative resistor are equipped with a CNA connector.

(2) A safety device connector (for short-circuiting) is included with a servo amplifier.

#### Connector sets (For STO models)

Built-in regenerative resistor		No	Yes	No	Yes	No/Yes
Connector set no.		AL-01108215	AL-01108217	AL-01108218	AL-01108219	AL-01108220
Connectors included in the set	CN1: For controller connection	Yes	Yes	Yes	Yes	Yes
	EN1: For encoder connection	Yes	Yes	Yes	Yes	Yes
	EN2: For encoder connection	No	No	Yes	Yes	No
	CNA: For input power supply and regenerative resistor connections	Yes	No	Yes	No	No
	CNB: For servo motor connection	Yes	Yes	Yes	Yes	No
	CN4: For safety device connection (for short-circuiting)	No	No	No	No	No
	CN4: For safety device connection (for wiring)	Yes	Yes	Yes	Yes	Yes
Remarks				For fully-closed control systems		





## ■ Built-in positioning function, parallel type

### 75 A

#### Individual connectors

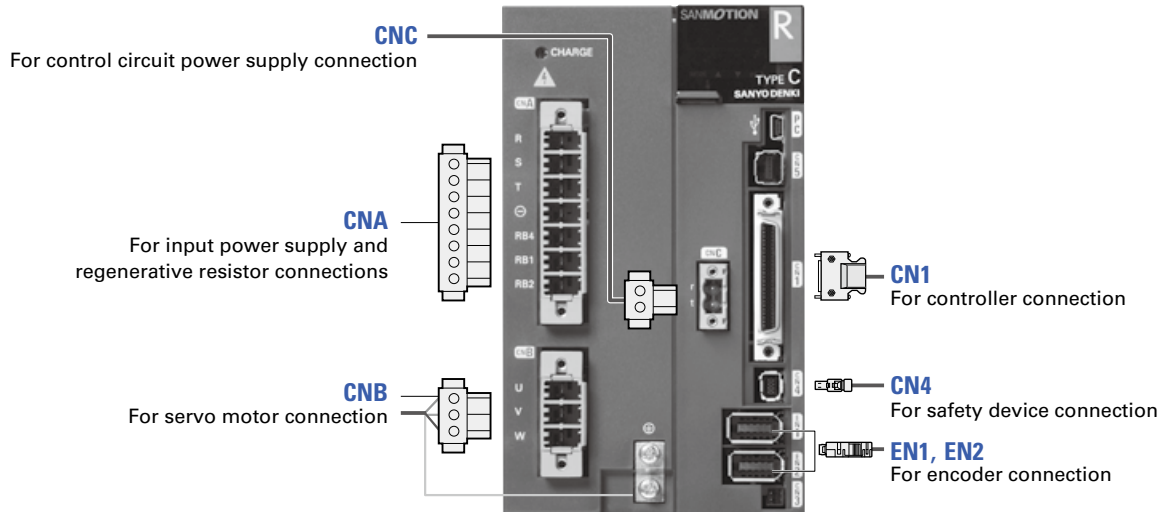
Connector no.	Description	Model no.	Manufacturer model no.	Manufacturer
CN1	For controller connection	AL-00385594	10150-3000PE, 10350-52A0-008	3M Japan Limited
EN1, EN2	For encoder connection	AL-Y0012504-01	545991016	Molex Japan Co., Ltd.
CNA (75 A only) <sup>(1)</sup>	For main circuit power supply and regenerative resistor connection	AL-Y0011766-01	PC5/7-STF1-7-62	Phoenix Contact.K.K
CNB (75 A only)	For servo motor connection	AL-Y0011768-01	PC5/3-STF1-7-62	
CNC	For control circuit power supply connection	AL-Y0005159-01	MSTBT2.5/2-STF-5.08	Tyco Electronics Japan G.K.
CN4 <sup>(2)</sup>	For safety device connection (for short-circuiting)	AL-00849548-02	1971153-2	
CN4	For safety device connection (for wiring)	AL-00718252-01	2013595-3	Phoenix Contact.K.K
SF-CN1	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	
SF-CN2	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	

(1) Amplifiers with built-in regenerative resistor are equipped with a CNA connector.

(2) A safety device connector (for short-circuiting) is included with a servo amplifier.

#### Connector sets (For STO models)

Built-in regenerative resistor	No	Yes	No	Yes	No/Yes
Connector set no.	AL-01108225	AL-01108226	AL-01108227	AL-01108228	AL-01108220
Connectors included in the set	CN1: For controller connection	Yes	Yes	Yes	Yes
	EN1: For encoder connection	Yes	Yes	Yes	Yes
	EN2: For encoder connection	No	No	Yes	Yes
	CNA: For main circuit power supply and regenerative resistor connection	Yes	No	Yes	No
	CNB: For servo motor connection	Yes	Yes	Yes	Yes
	CNC: For control circuit power supply connection	Yes	Yes	Yes	Yes
	CN4: For safety device connection (for short-circuiting)	No	No	No	No
CN4: For safety device connection (for wiring)	Yes	Yes	Yes	Yes	
Remarks			For fully-closed control systems		



# Connector to Connect Servo Amplifier

## ■ Built-in positioning function, parallel type

100 A, 150 A, 300 A

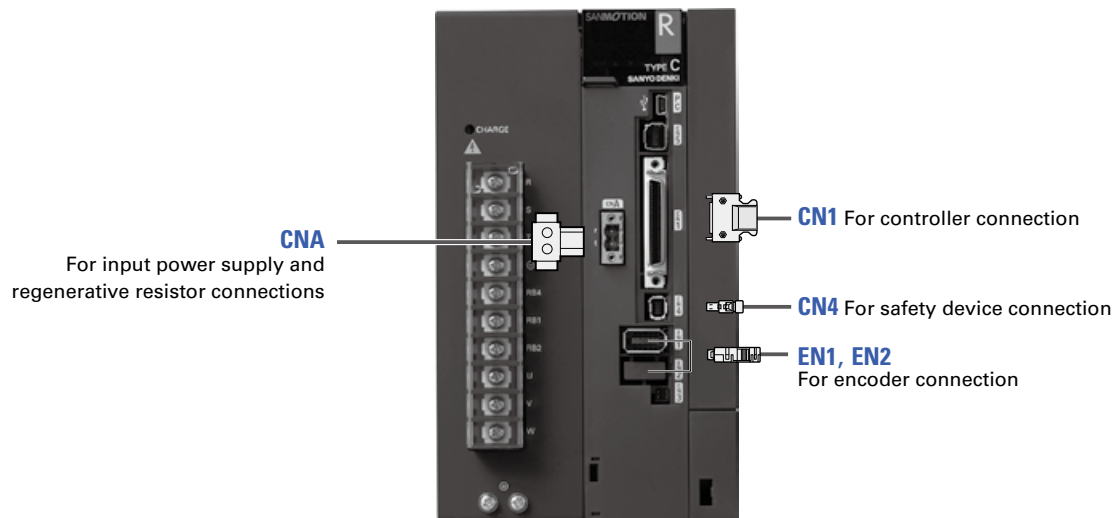
Individual connectors

Connector no.	Description	Model no.	Manufacturer model no.	Manufacturer
CN1	For controller connection	AL-00385594	10150-3000PE, 10350-52A0-008	3M Japan Limited
EN1, EN2	For encoder connection	AL-Y0012504-01	545991016	Molex Japan Co., Ltd.
CNA	To input control circuit power supply	AL-Y0005159-01	MSTBT2.5/2-STF-5.08	Phoenix Contact.K.K
CN4 <sup>(1)</sup>	For safety device connection (for short-circuiting)	AL-00849548-02	1971153-2	Tyco Electronics Japan G.K.
CN4	For safety device connection (for wiring)	AL-00718252-01	2013595-3	
SF-CN1	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	Phoenix Contact.K.K
SF-CN2	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	

(1) A safety device connector (for short-circuiting) is included with a servo amplifier.

## Connector sets (For STO models)

Connector set no.	AL-01108231	AL-01108232	AL-01108220	
Connectors included in the set	CN1: For controller connection	Yes	Yes	Yes
	EN1: For encoder connection	Yes	Yes	Yes
	EN2: For encoder connection	No	Yes	No
	CNA: To input control circuit power supply	Yes	Yes	No
	CN4: For safety device connection (for short-circuiting)	No	No	No
	CN4: For safety device connection (for wiring)	Yes	Yes	Yes
Remarks		For fully-closed control systems		



## ■ Built-in positioning function, parallel type

### 600 A

#### Individual connectors

Connector no.	Description	Model no.	Manufacturer model no.	Manufacturer
CN9 <sup>(1)</sup>	For unit-to-unit connection (single item)	AL-00608710	10114-3000PE, 10314-52A0-008	3M Japan Limited
CN1	For controller connection	AL-00385594	10150-3000PE, 10350-52A0-008	
EN1, EN2	For encoder connection	AL-Y0012504-01	545991016	Molex Japan Co., Ltd.
CNA <sup>(1)</sup>	To input control circuit power supply	AL-Y0005159-01	MSTBT2.5/2-STF-5.08	Phoenix Contact.K.K
CNB	For dynamic brake signal	AL-Y0004079-01	MSTBT2.5/3-STF-5.08	
CN8	For external alarm signal	AL-Y0011185-01	FMC0,5/4-ST-2.54	
CN4 <sup>(2)</sup>	For safety device connection (for short-circuiting)	AL-00849548-02	1971153-2	Tyco Electronics Japan G.K.
CN4	For safety device connection (for wiring)	AL-00718252-01	2013595-3	Phoenix Contact.K.K
SF-CN1	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	
SF-CN2	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	

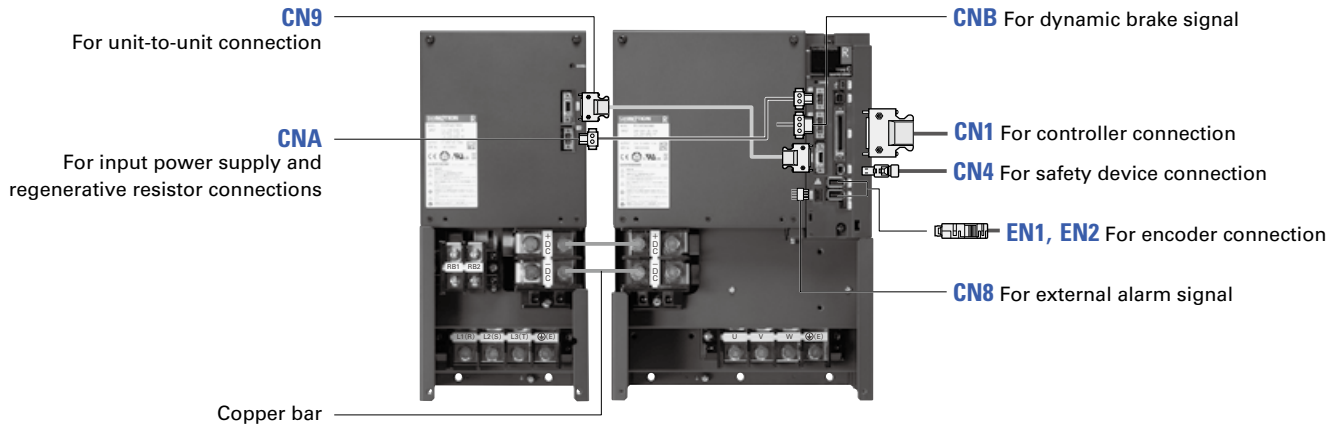
(1) CN9 and CNA each needs one connector for each of power supply unit and amplifier unit.

(2) A safety device connector (for short-circuiting) is included with a servo amplifier.

#### Connector sets (For STO models)

Connector set no.	AL-01108235	AL-01108236	AL-01108220	
Connectors included in the set	CN1: For controller connection	Yes	Yes	Yes
	EN1: For encoder connection	Yes	Yes	Yes
	EN2: For encoder connection	No	Yes	No
	CNA: To input control circuit power supply	Yes	Yes	No
	CNB: For dynamic brake signal	No	No	No
	CN8: For external alarm signal	Yes	Yes	No
	CN4: For safety device connection (for short-circuiting)	No	No	No
	CN4: For safety device connection (for wiring)	Yes	Yes	Yes
Remarks		For fully-closed control systems		

Note: Connector sets are for the amplifier unit only. Please purchase the power supply unit connector separately.



# Connector to Connect Servo Amplifier

## ■ Built-in positioning function, serial type

### 10 to 50 A

#### Individual connectors

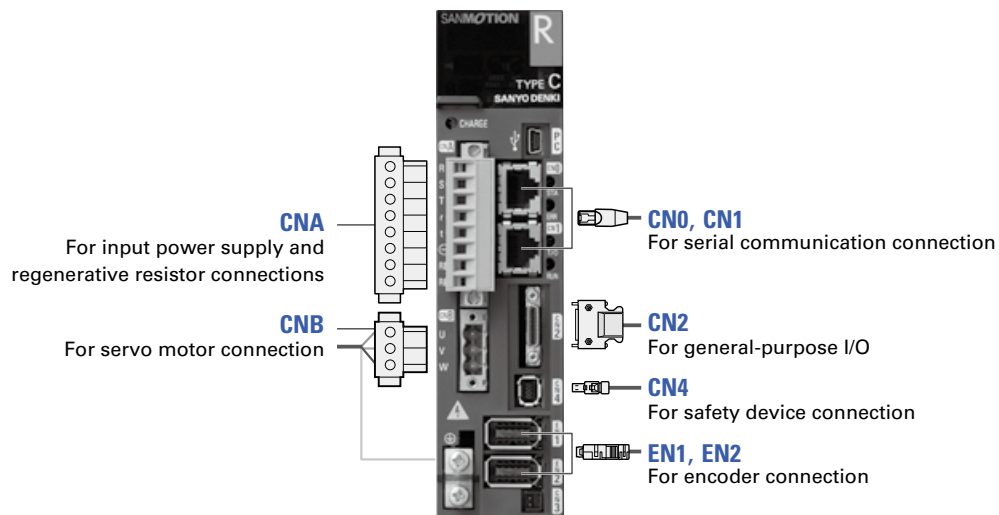
Connector no.	Description	Model no.	Manufacturer model no.	Manufacturer
CN0, CN1	For serial communication	Not available Use a shielded modular plug (RJ-45).		
EN1, EN2	For encoder connection	AL-Y0012504-01	545991016	Molex Japan Co., Ltd.
CNA <sup>(1)</sup>	For input power supply and regenerative resistor connections	AL-00686902-01	MSTBT2.5/8-STF-5.08LUB	Phoenix Contact.K.K
CNB	For servo motor connection	AL-Y0004079-01	MSTBT2.5/3-STF-5.08	Phoenix Contact.K.K
CN4	For safety device connection (for wiring)	AL-00718252-01	2013595-3	Tyco Electronics Japan G.K.
CN4 <sup>(2)</sup>	For safety device connection (for short-circuiting)	AL-00849548-02	1971153-2	Tyco Electronics Japan G.K.
CN2	For general-purpose I/O	AL-00842383	A set of HDR-E26MSG1+ and HDR-E26LPH HONDA TSUSHIN KOGYO CO., LTD	
SF-CN1	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54 Phoenix Contact.K.K	
SF-CN2	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	

(1) Amplifiers with built-in regenerative resistor are equipped with a CNA connector.

(2) A safety device connector (for short-circuiting) is included with a servo amplifier.

#### Connector sets (For STO models)

Built-in regenerative resistor	No	Yes	No	Yes	No/Yes
Connector set no.	AL-00977724	AL-00977726	AL-00977728	AL-00977730	AL-00977732
Connectors included in the set	EN1: For encoder connection	Yes	Yes	Yes	Yes
	EN2: For encoder connection	No	No	Yes	Yes
	CNA: To connect input power supply, regenerative resistor	Yes	No	Yes	No
	CNB: For servo motor connection	Yes	Yes	Yes	Yes
	CN4: For safety device connection (for short-circuiting)	No	No	No	No
	CN4: For safety device connection (for wiring)	Yes	Yes	Yes	Yes
	CN2: For general-purpose I/O	Yes	Yes	Yes	Yes
Remarks					For fully-closed control systems



## ■ Built-in positioning function, serial type

### 75 A

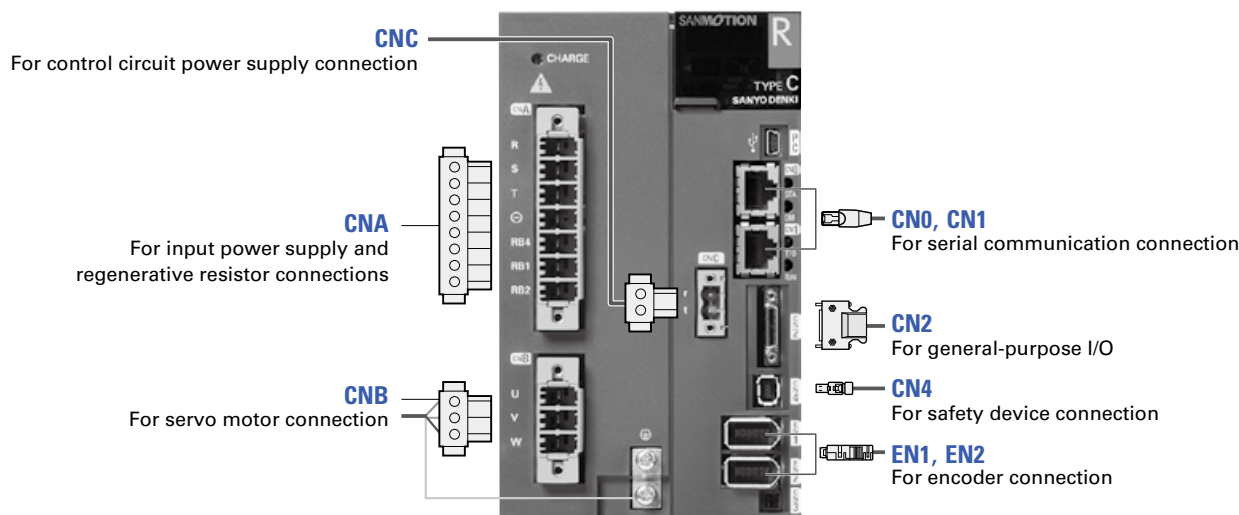
#### Individual connectors

Connector no.	Description	Model no.	Manufacturer model no.	Manufacturer
CN0, CN1	For serial communication	Not available Use a shielded modular plug (RJ-45).		
EN1, EN2	For encoder connection	AL-Y0012504-01	545991016	Molex Japan Co., Ltd.
CNA	For main circuit power supply and regenerative resistor connection	AL-Y0011766-01	PC5/7-STF1-7.62	Phoenix Contact.K.K
CNB	For servo motor connection	AL-Y0011768-01	PC5/3-STF1-7.62	Phoenix Contact.K.K
CNC	For control circuit power supply connection	AL-Y0005159-01	MSTBT2.5/2-STF-5.08	Phoenix Contact.K.K
CN4	For safety device connection (for wiring)	AL-00718252-01	2013595-3	Tyco Electronics Japan G.K.
CN4 <sup>(1)</sup>	For safety device connection (for short-circuiting)	AL-00849548-02	1971153-2	Tyco Electronics Japan G.K.
CN2	For general-purpose I/O signal	AL-00842383	A set of HDR-E26MSG1+ and HDR-E26LPH HONDA TSUSHIN KOGYO CO., LTD	
SF-CN1	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54 Phoenix Contact.K.K	
SF-CN2	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	

(1) A safety device connector (for short-circuiting) is included with a servo amplifier.

#### Connector sets (For STO models)

Built-in regenerative resistor	No	Yes	No	Yes	No/Yes
Connector set no.	AL-00977734	AL-00977736	AL-00977738	AL-00977740	AL-00977732
Connectors included in the set	EN1: For encoder connection	Yes	Yes	Yes	Yes
	EN2: For encoder connection	No	No	Yes	No
	CNA: For main circuit power supply and regenerative resistor connection	Yes	No	Yes	No
	CNB: For servo motor connection	Yes	Yes	Yes	No
	CNC: For control circuit power supply connection	Yes	Yes	Yes	Yes
	CN4: For safety device connection (for short-circuiting)	No	No	No	No
	CN4: For safety device connection (for wiring)	Yes	Yes	Yes	Yes
CN2: For general-purpose I/O	Yes	Yes	Yes	Yes	
Remarks	For fully-closed control systems				



# Connector to Connect Servo Amplifier

## ■ Built-in positioning function, serial type

100 A, 150 A, 300 A

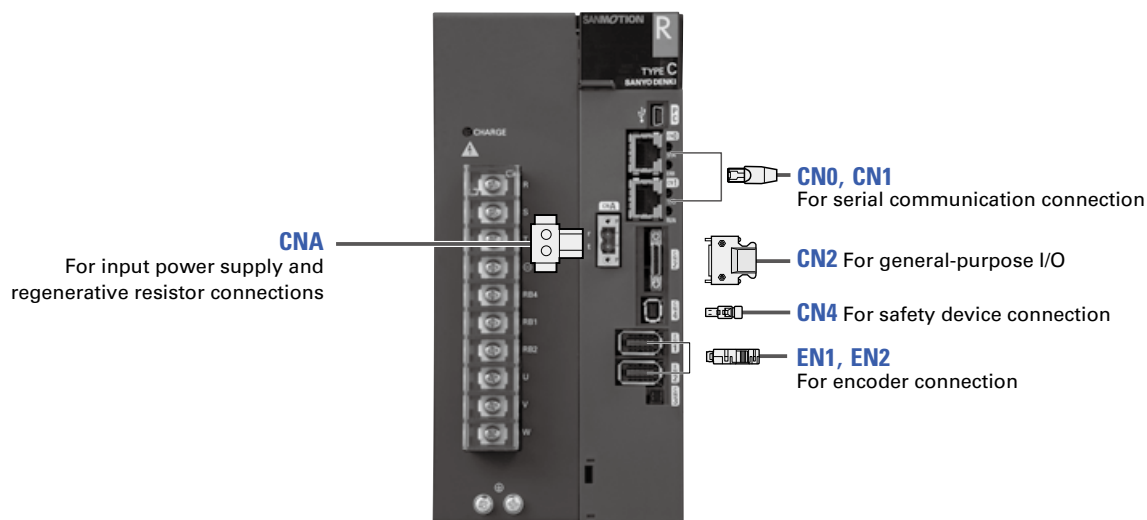
### Individual connectors

Connector no.	Description	Model no.	Manufacturer model no.	Manufacturer
CN0, CN1	For serial communication	Not available Use a shielded modular plug (RJ-45).		
EN1, EN2	For encoder connection	AL-Y0012504-01	545991016	Molex Japan Co., Ltd.
CNA	To input control circuit power supply	AL-Y0005159-01	MSTBT2.5/3-STF-5.08	Phoenix Contact.K.K
CN4	For safety device connection (for wiring)	AL-00718252-01	2013595-3	Tyco Electronics Japan G.K.
CN4 <sup>(1)</sup>	For safety device connection (for short-circuiting)	AL-00849548-02	1971153-2	Tyco Electronics Japan G.K.
CN2	For general-purpose I/O	AL-00842383	A set of HDR-E26MSG1+ and HDR-E26LPH	HONDA TSUSHIN KOGYO CO., LTD
SF-CN1	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	Phoenix Contact.K.K
SF-CN2	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	

(1) A safety device connector (for short-circuiting) is included with a servo amplifier.

### Connector sets (For STO models)

Connector set no.	AL-00977742	AL-00977744	AL-00977732	
Connectors included in the set	EN1: For encoder connection	Yes	Yes	Yes
	EN2: For encoder connection	No	Yes	No
	CNA: To input control circuit power supply	Yes	Yes	No
	CN4: For safety device connection (for short-circuiting)	No	No	No
	CN4: For safety device connection (for wiring)	Yes	Yes	Yes
	CN2: For general-purpose I/O	Yes	Yes	Yes
Remarks		For fully-closed control systems		



## ■ Built-in positioning function, serial type

### 600 A

#### Individual connectors

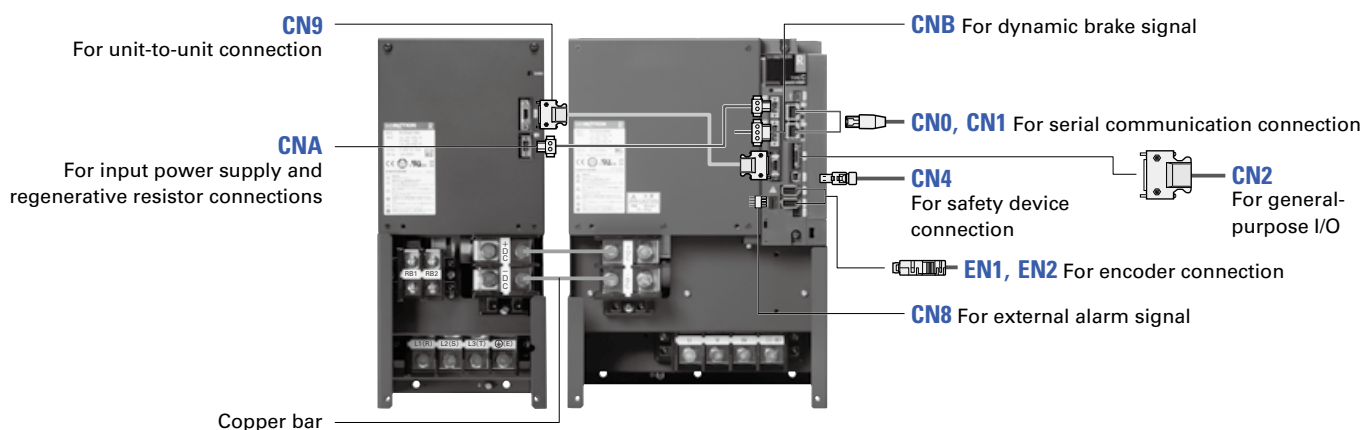
Connector no.	Description	Model no.	Manufacturer model no.	Manufacturer
CN0, CN1	For serial communication	Not available Use a shielded modular plug (RJ-45).		
CN9 <sup>(1)</sup>	For connecting units (single item)	AL-00608710	10114-3000PE and 10314-52A0-008	3M Japan Limited
EN1, EN2	For encoder connection	AL-Y0012504-01	545991016	Molex Japan Co., Ltd.
CNA <sup>(1)</sup>	To input control circuit power supply	AL-Y0005159-01	MSTBT2.5/2-STF-5.08	Phoenix Contact.K.K
CNB	For dynamic brake signal	AL-Y0004079-01	MSTBT2.5/3-STF-5.08	Phoenix Contact.K.K
CN8	For external alarm signal	AL-Y0011185-01	FMC0,5/4-ST-2.54	Phoenix Contact.K.K
CN4	For safety device connection (for wiring)	AL-00718252-01	2013595-3	Tyco Electronics Japan G.K.
CN4 <sup>(2)</sup>	For safety device connection (for short-circuiting)	AL-00849548-02	1971153-2	Tyco Electronics Japan G.K.
CN2	For general-purpose I/O	AL-00842383	A set of HDR-E26MSG1+ and HDR-E26LPH	HONDA TSUSHIN KOGYO CO., LTD
SF-CN1	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	Phoenix Contact.K.K
SF-CN2	For safety device connection (Safety only)	AL-Y0012189-01	DFMC 0,5/10-ST-2,54	

(1) CN9 and CNA each needs one connector for each of power supply unit and amplifier unit.

(2) A safety device connector (for short-circuiting) is included with a servo amplifier.

#### Connector sets (For STO models)

Connector set no.	AL-00977746	AL-00977748	AL-00977732	
Connectors included in the set	EN1: For encoder connection	Yes	Yes	Yes
	EN2: For encoder connection	No	Yes	No
	CNA: To input control circuit power supply	Yes	Yes	No
	CNB: For dynamic brake signal	No	No	No
	CN8: For external alarm signal	Yes	Yes	No
	CN4: For safety device connection (for short-circuiting)	No	No	No
	CN4: For safety device connection (for wiring)	Yes	Yes	Yes
	CN2: For general-purpose I/O	Yes	Yes	Yes
Remarks		For fully-closed control systems		





# Power Connector to Connect Motor, Electric Wire Size

Manufacturer: Japan Aviation Electronics Industry, Limited

Flange size (mm)	Motor model no.	For power standard specification		For power waterproofing specification TÜV standard plug		For brake standard specification waterproof specification TÜV standard plug					
		(1) Plug (manufacturer model no.) (2) Cable clamp (manufacturer model no.) (3) Plug + cable clamp (SANYO DENKI part numbers)		(1) Plug (manufacturer model no.) (2) Cable clamp (manufacturer model no.) (3) Plug + cable clamp (SANYO DENKI part numbers)		(1) Plug (manufacturer model no.) (2) Cable clamp (manufacturer model no.) (3) Plug + cable clamp (SANYO DENKI part numbers)					
		Straight	Angle	Straight	Angle	Straight	Angle				
100 sq.	R2AA10150	(1) N/MS3106B20-15S (2) N/MS3057-12A (3) MS06B20-15S-12	(1) N/MS3108B20-15S (2) N/MS3057-12A (3) MS08B20-15S-12	(1) JL04V-6A20-15SE-EB-R (2) JL04-2022CK-R (3) 332706X5	(1) JL04V-8A20-15SE-EBH-R (2) JL04-2022CK-R (3) 332707X5	Same part number as for power					
130 sq.	R2AA13050	(1) N/MS3106B24-11S (2) N/MS3057-16A (3) MS06B24-11S-16	(1) N/MS3108B24-11S (2) N/MS3057-16A (3) MS08B24-11S-16	(1) JL04V-6A24-11SE-EB-R (2) JL04-2428CK-R (3) 332706X10	(1) JL04V-8A24-11SE-EBH-R (2) JL04-2428CK-R (3) 332707X10	Same part number as for power					
	R2AA13120										
	R2AA13180										
	R2AA13200										
180 sq.	R2AA18350L	(1) N/MS3106B24-11S (2) N/MS3057-16A (3) MS06B24-11S-16	(1) N/MS3108B24-11S (2) N/MS3057-16A (3) MS08B24-11S-16	(1) JL04V-6A24-11SE-EB-R (2) JL04-2428CK-R (3) 332706X10	(1) JL04V-8A24-11SE-EBH-R (2) JL04-2428CK-R (3) 332707X10	Same part number as for power					
	R2AA18350D										
	R2AA18450H										
	R2AA18550R					(1) N/MS3106B32-17S (2) N/MS3057-20A (3) MS06B32-17S-20	(1) N/MS3108B32-17S (2) N/MS3057-20A (3) MS08B32-17S-20	(1) JL04V-6A32-17SE-R (Conduit) (3) JL04V-6A32-17SE	-	(1) JL04V-6A10SL-3SE-EB-R (2) JL04-1012CK-R (3) 332706X1	(1) JL04V-8A10SL-3SE-EBH-R (2) JL04-1012CK-R (3) 332707X1
R2AA18550H											
R2AA18750H											
R2AA1811KR											
220 sq.	R2AA22500L	(1) N/MS3106B24-11S (2) N/MS3057-16A (3) MS06B24-11S-16	(1) N/MS3108B24-11S (2) N/MS3057-16A (3) MS08B24-11S-16	(1) JL04V-6A24-11SE-EB-R (2) JL04-2428CK-R (3) 332706X10	(1) JL04V-8A24-11SE-EBH-R (2) JL04-2428CK-R (3) 332707X10	Same part number as for power					
	R2AA22700S										
	R2AA2211KB					(1) N/MS3106B32-17S (2) N/MS3057-20A (3) MS06B32-17S-20	(1) N/MS3108B32-17S (2) N/MS3057-20A (3) MS08B32-17S-20	(1) JL04V-6A32-17SE-R (Conduit) (3) JL04V-6A32-17SE	-	(1) JL04V-6A10SL-3SE-EB-R (2) JL04-1012CK-R (3) 332706X1	(1) JL04V-8A10SL-3SE-EBH-R (2) JL04-1012CK-R (3) 332707X1
	R2AA2215KB										
275 sq.	R2AA2830KV	Terminal block; therefore, plug is not necessary									
100 sq.	R1AA10100	(1) N/MS3106B20-15S (2) N/MS3057-12A (3) MS06B20-15S-12	(1) N/MS3108B20-15S (2) N/MS3057-12A (3) MS08B20-15S-12	(1) JL04V-6A20-15SE-EB-R (2) JL04-2022CK-R (3) 332706X5	(1) JL04V-8A20-15SE-EBH-R (2) JL04-2022CK-R (3) 332707X5	Same part number as for power					
	R1AA10150										
	R1AA10200										
	R1AA10250										
130 sq.	R1AA13300	(1) N/MS3106B24-11S (2) N/MS3057-16A (3) MS06B24-11S-16	(1) N/MS3108B24-11S (2) N/MS3057-16A (3) MS08B24-11S-16	(1) JL04V-6A24-11SE-EB-R (2) JL04-2428CK-R (3) 332706X10	(1) JL04V-8A24-11SE-EBH-R (2) JL04-2428CK-R (3) 332707X10	Same part number as for power					
	R1AA13400										
	R1AA13500										
180 sq.	R1AA18550H	(1) N/MS3106B32-17S (2) N/MS3057-20A (3) MS06B32-17S-20	(1) N/MS3108B32-17S (2) N/MS3057-20A (3) MS08B32-17S-20	(1) JL04V-6A32-17SE-R (Conduit) (3) JL04V-6A32-17SE	-	(1) JL04V-6A10SL-3SE-EB-R (2) JL04-1012CK-R (3) 332706X1	(1) JL04V-8A10SL-3SE-EBH-R (2) JL04-1012CK-R (3) 332707X1				
	R1AA18750L										
	R1AA1811KR										
	R1AA1815KB										

Note 1: See the catalogs and instruction manuals of the connector manufacturer (Japan Aviation Electronics Industry, Limited) for how to handle the items and precautions.

Note 2: Conduit is not provided.

Note 3: Suffixes of manufacturer model number for plug (JL04V) and cable clamp (JL04) connectors have changed in accordance with the RoHS revision.

Manufacturer: Japan Aviation Electronics Industry, Limited

Flange size (mm)	Motor model no.	Receptacle for power (motor side)	Receptacle for brake (motor side)	Pin layout symbol					Applicable amplifier capacity (R 3E Model)	Recommended motor power wire size (U, V, W, GND)		Wire size of main power supply (R, S, T, GND)	
				U phase	V phase	W phase	Ground	Brake		mm <sup>2</sup>	AWG No.	mm <sup>2</sup>	AWG No.
100 sq.	R2AA10150H	JL04V-2E20-15PE-B-R	Same part number as for power	A	B	C	D	E, F	50 A	2	#14	2	#14
130 sq.	R2AA13050H	JL04V-2E24-11PE-B-R	Same part number as for power	D	E	F	G, H	A, B	30 A	0.75	#19	2	#14
	R2AA13050D			D	E	F	G, H	A, B	50 A	2	#14	2	#14
	R2AA13120B												
	R2AA13120L												
	R2AA13120D												
	R2AA13180H												
	R2AA13180D												
	R2AA13200L												
R2AA13200D	100 A	5.5	#10	5.5	#10								
180 sq.	R2AA18350L	JL04V-2E24-11PE-B-R	Same part number as for power	D	E	F	G, H	A, B	50 A	2	#14	2	#14
	R2AA18350D								100 A	5.5	#10	5.5	#10
	R2AA18450H								100 A	5.5	#10	5.5	#10
	R2AA18550R	JL04V-2E32-17PE-B-R	JL04V-2E10SL-3PE-B-R	A	B	C	D	A, B	150 A	5.5	#10	8	#8
	R2AA18550H								150 A	8	#8	8	#8
	R2AA18750H								300 A	14	#6	14	#6
	R2AA1811KR												
220 sq.	R2AA22500L	JL04V-2E24-11PE-B-R	Same part number as for power	D	E	F	G, H	A, B	150 A	5.5	#10	8	#8
	R2AA22700S		JL04V-2E10SL-3PE-B-R										
	R2AA2211KB	JL04V-2E32-17PE-B-R	JL04V-2E10SL-3PE-B-R	A	B	C	D	A, B	300 A	14	#6	14	#6
	R2AA2215KB												
275 sq.	R2AA2830KV	Terminal block: UF1005-150A-3P (M8, Hexagon bolt)	Terminal block: F1005-20S-5P (M4, Screws)	—	—	—	—	—	600 A	38	#2	38	#2
100 sq.	R1AA10100H	JL04V-2E20-15PE-B-R	Same part number as for power	A	B	C	D	E, F	30 A	0.75	#19	2	#14
	R1AA10150H			A	B	C	D	E, F	50 A	2	#14	2	#14
	R1AA10100F												
	R1AA10150F												
	R1AA10200H												
	R1AA10250H												
	R1AA10200F												
	R1AA10250F												
130 sq.	R1AA13300H	JL04V-2E24-11PE-B-R	Same part number as for power	D	E	F	G, H	A, B	75 A	3.5	#12	5.5	#10
	R1AA13300F			D	E	F	G, H	A, B	100 A	5.5	#10	5.5	#10
	R1AA13400H												
	R1AA13500H												
	R1AA13400F												
	R1AA13500F												
180 sq.	R1AA18550H	JL04V-2E32-17PE-B-R	JL04V-2E10SL-3PE-B-R	A	B	C	D	A, B	300 A	14	#6	14	#6
	R1AA18750L												
	R1AA1811KR												
	R1AA1815KB												

Note 1: See the catalogs and instruction manuals of the connector manufacturer (Japan Aviation Electronics Industry, Limited) for how to handle the items and precautions.

Note 2: Conduit is not provided.

Features

List of Compatible Servo Amplifiers and Servo Motors

Standard Model Number List

Analogue/Pulse

Servo Amplifiers: EtherCAT

Built-in Positioning Function

Safety

Servo Motors: Rotary Motor

Options

Linear Servo Motors

SANMOTION S

Selection Guide

## Connector for Motor Connection

### Encoder connector

Motor flange size	Combination plug for encoder (with rubber bushing)		Encoder receptacle model number (motor side)	Applicable cable diameter (bushing color phase)	Pin Layout Symbol	Remarks
	Straight	Angle				
R1: 100 to 220 mm sq. R2: 100* to 220 mm sq. (* R2AA10150 only)	JN2DS10SL1-R	JN2FS10SL1-R	JN2AS10ML2-R	ø5.7 to 7.3 mm (Black)	See the encoder wiring diagram for each servo amplifier.	Japan Aviation Electronics Industry, Limited
	JN2DS10SL2-R	JN2FS10SL2-R		ø6.5 to 8.0 mm (Gray)		
	JN2DS10SL3-R	JN2FS10SL3-R		ø3.5 to 5.0 mm (Brick)		
Motor flange size	Connector model no.		Encoder receptacle model number (motor side)	Applicable cable diameter (bushing color phase)	Pin Layout Symbol	Remarks
	Mfr. part no. (Ordering number in parentheses)					
R2: 275 mm sq.	5557-10R (AL-00082504-15)		5559-10P	—	See the encoder wiring diagram for each servo amplifier.	Molex Japan Co., Ltd.

Note: Select the correct plug and contact for the cable size to use. Our ordering numbers are the same as the manufacturer part numbers.

### Applicable contact for encoder plug

Motor flange size	Contact size	Category	Applicable socket contact		Remarks
			Socket contact model no.	Applicable wire size	
R1: 100 to 220 mm sq. R2: 100* to 220 mm sq. (* R2AA10150 only)	#22	Manual crimp tool type	JN1-22-20S-R-PKG100	AWG20	Japan Aviation Electronics Industry, Limited
			JN1-22-22S-PKG100	AWG21 to 25	
			JN1-22-26S-PKG100	AWG26 to 28	
		Solder type	JN1-22-22F-PKG100	AWG20	
Motor flange size	Contact size	Category	Applicable socket contact		Remarks
			Mfr. part no. (Ordering number in parentheses)		
R2: 275 mm sq.	#28	Manual crimp tool type	5556T2L (AL-00171350-01)	AWG22 to 28	Molex Japan Co., Ltd.
			5556GS2L7F (AL-00599690-04)		

Note 1: Select the correct plug and contact for the cable size used.

Note 2: When removing an inserted contact, use a removal tool. Use a commercially available one.

Note 3: For the part number of manual crimp tools, see the instruction manual issued by the respective manufacturers.

Note 4: For a semi-automatic crimp tool, prepare a commercially available one.

Note 5: For safety and handling precautions of connectors and contacts, refer to the catalogs and instruction manuals of the respective manufacturers.

## ■ Cooling fan connector Manufacturer: Japan Aviation Electronics Industry, Limited

### R1, R2 Servo Motor

Motor flange size	Standard specification for cooling fan connectors (1) Plug (manufacturer model number) (2) Cable clamp (manufacturer model number) (3) Plug + cable clamp (SANYO DENKI part numbers)		Receptacle for cooling fan connection	Waterproof specification for cooling fans Plug (cable clamp)		Pin Layout Symbol		
	Straight	Angle		Straight	Angle			
180 mm sq. to 220 mm sq. single-phase fan	(1) N/MS3106B10SL-4S (2) N/MS3057-4A (3) MS06B10SL-4S-4	(1) N/MS3108B10SL-4S (2) N/MS3057-4A (3) MS08B10SL-4S-4	N/MS3102A10SL-4P	JA06A-10SL-4S-J1-R (Conduit)	—	A	B	—

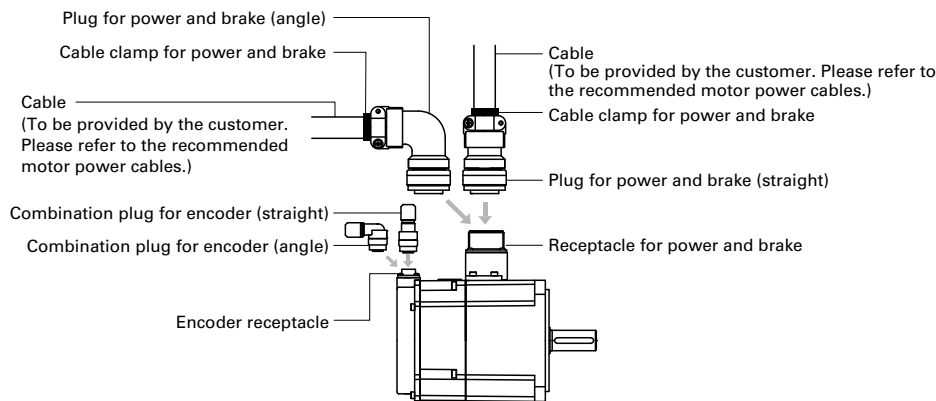
### R2 Servo Motor

Motor flange size	Standard specification for cooling fan connectors (1) Plug (manufacturer model number) (2) Cable clamp (manufacturer model number) (3) Plug + cable clamp (SANYO DENKI part numbers)		Receptacle for cooling fan connection	Pin Layout Symbol				
	Straight	Angle		U	V	W	Ground	Thermos
220 mm sq. 3-phase fan	(1) JL04V-6A18-12SE-EB-R (2) JL04-18CK(13)-R (3) 332706X3	(1) JL04V-8A18-12SE-EBH-R (2) JL04-18CK(13)-R (3) 332707X3	JL04V-2E18-12PE-B-R	A	B	C	—	E, F

Note 1: See the catalogs and instruction manuals issued by the connector manufacturer (Japan Aviation Electronics Industry, Limited) for how to handle the items and precautions.

Note 2: Conduit is not provided.

Note 3: Suffixes of manufacturer model number for plug (JL04V) and cable clamp (JL04) connectors have changed in accordance with the RoHS revision.

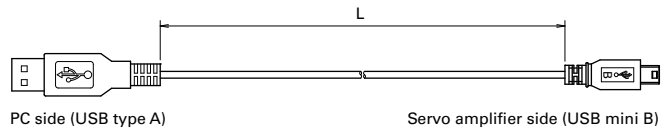


## Communication Cable

### ■ USB communication cable for setup software

PC communication cable for setup software

Cable length: L (m)	Model no.
1.0	AL-00896515-01
2.0	AL-00896515-02

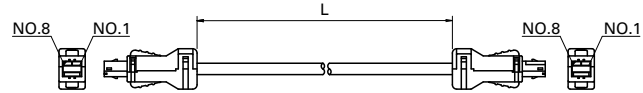


Specifications and external drawings may be changed without prior notice.

### ■ Communication cable between amplifiers for tandem operation

Connects between amplifiers for tandem operation. (CN5↔CN5)

Cable length: L (m)	Model no.
0.2	AL-00911582-01
3.0	AL-00911582-02



Note: Dedicated for Analog/Pulse type amplifiers.

### ■ Serial communication

Name	Description	Model no.	Cable length (m)
Controller-amplifier communication cable	For controller connection (SANMOTION C-amplifier connection)	AL-01101867-01	1
	For controller connection (SANMOTION C-amplifier connection)	AL-01101867-03	3
	For controller connection (SANMOTION C-amplifier connection)	AL-01101867-05	5
	For controller connection (SANMOTION C-amplifier connection)	AL-01101867-07	7
	For controller connection (SANMOTION C-amplifier connection)	AL-01101867-10	10
Amplifier-amplifier Modbus communication cable	For amplifier-amplifier connection	AL-01101866-01	0.2
	For amplifier-amplifier connection	AL-01101866-02	0.5
	For amplifier-amplifier connection	AL-01101866-03	1
	For amplifier-amplifier connection	AL-01101866-04	3
	For amplifier-amplifier connection	AL-01101866-05	5
	For amplifier-amplifier connection	AL-01101866-06	7
	For amplifier-amplifier connection	AL-01101866-07	10
Terminating connector	For terminating resistor connection	AL-01101864	—

### ■ Connection between units

#### For 600 A

Name	Description	Model no.
Copper bar	To connect main power supply between power supply unit and amplifier unit Terminal number: +DC/-DC 2-pc. set (5 mm between units)	AL-00918125-01
Connection cable between units	To connect between power supply unit (CN9) - Amplifier unit (CN9) Separate purchase of the CN9 is not required.	AL-00917284

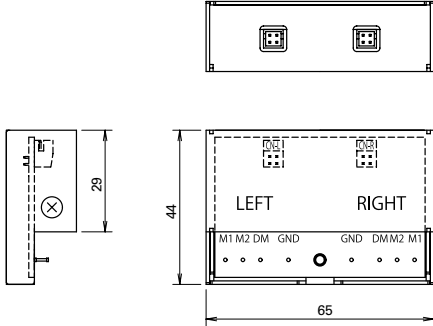
Note: An EtherCAT type amplifier-amplifier communication cable is to be provided by the customer.

# Analog Monitor [Unit: mm]

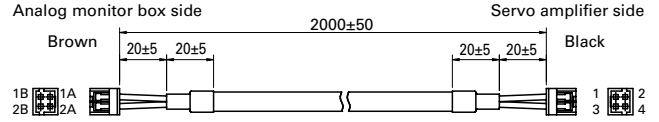
This is an analog monitor that can display velocity waveforms on an oscilloscope for the purpose of system tuning or maintenance.

Name	Description	Model no.
1) Analog monitor box	Analog monitor box body 2 dedicated cables	Q-MON-3
2) Dedicated cable	1 dedicated cable	AL-00690525-01

## 1) Analog monitor box (Q-MON-3)



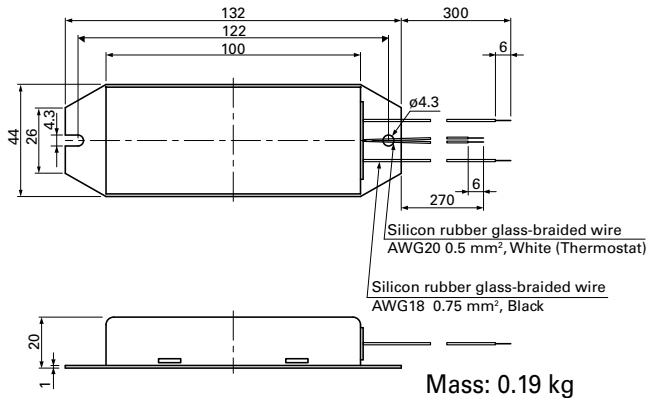
## 2) Dedicated cable (AL-00690525-01)



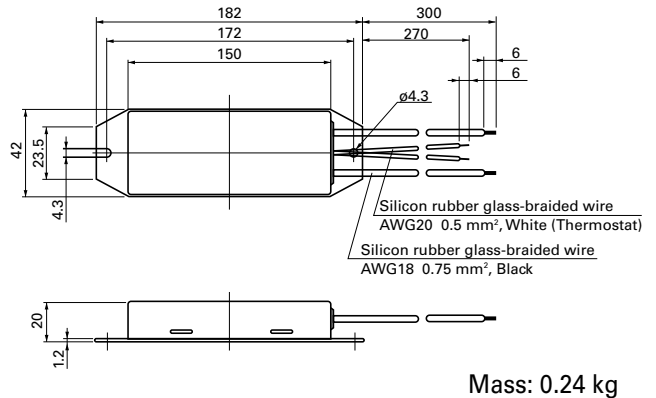
Note 1: The analog monitor box (Q-MON-3) comes with the same two cables above (AL-00690525-01).

Note 2: Power is supplied from the servo amplifier.

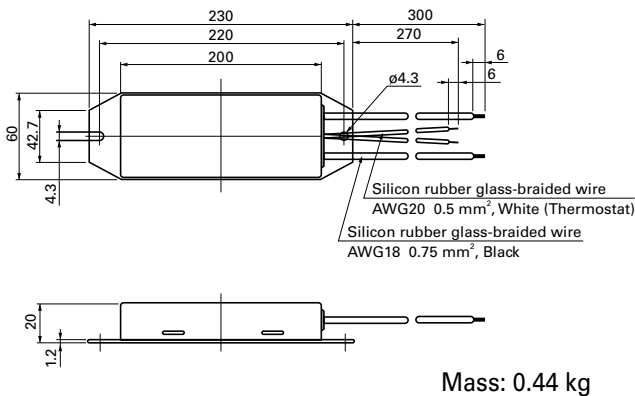
# External Regenerative Resistor [Unit: mm]



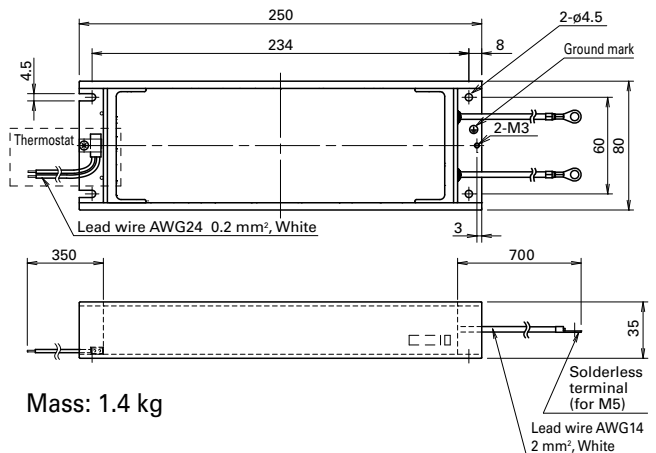
Model no.	Rated power [PR]	Resistance	Thermostat
REGIST-080W50B	80 W	50 Ω	Contact b
REGIST-080W100B	80 W	100 Ω	Contact b



Model no.	Rated power [PR]	Resistance	Thermostat
REGIST-120W50B	120 W	50 Ω	Contact b
REGIST-120W100B	120 W	100 Ω	Contact b



Model no.	Rated power [PR]	Resistance	Thermostat
REGIST-220W20B	220 W	20 Ω	Contact b
REGIST-220W50B	220 W	50 Ω	Contact b
REGIST-220W100B	220 W	100 Ω	Contact b



Model no.	Rated power [PR]	Resistance	Thermostat
REGIST-500CW7B	500 W	7 Ω	Contact b
REGIST-500CW10B	500 W	10 Ω	Contact b
REGIST-500CW14B	500 W	14 Ω	Contact b
REGIST-500CW20B	500 W	20 Ω	Contact b

Thermostat detection temperature 100 ±5°C

# Front Mounting Brackets

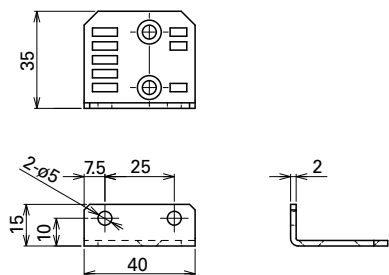
Brackets for mounting the servo amplifier on the front (connector side).

Applicable servo amplifiers	Model no.	Set contents
10 A, 20 A, 30 A (RS3□01, 02, 03)	AL-00880390-01	Top/bottom mounting brackets: 1 each Clamping screws: 4
50 A, 75 A (RS3□05, 07)	AL-00880391-01	Top/bottom mounting brackets: 1 each Clamping screws: 4
100 A, 150 A (RS3□10, 15)	AL-00907039-01	Top/bottom mounting brackets: 1 each Clamping screws: 6
300 A (RS3□30)	AL-00907040-01	Top/bottom mounting brackets: 1 each Clamping screws: 8

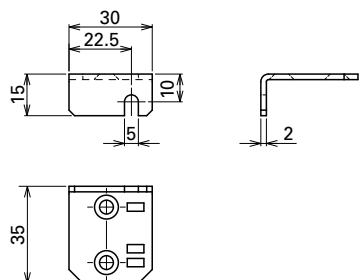
Note 1: Trivalent chrome plating is used. (Surface color is silver-blue, and different from body color.)

Note 2: Cannot be used with battery box. (10 to 50 A)

10 A, 20 A, 30 A  
AL-00880390-01  
Upper side



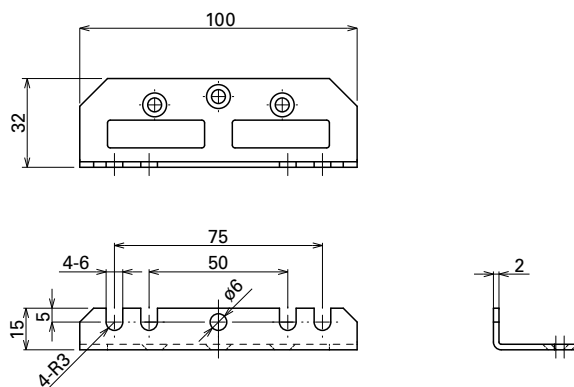
Lower side



100 A, 150 A  
AL-00907039-01

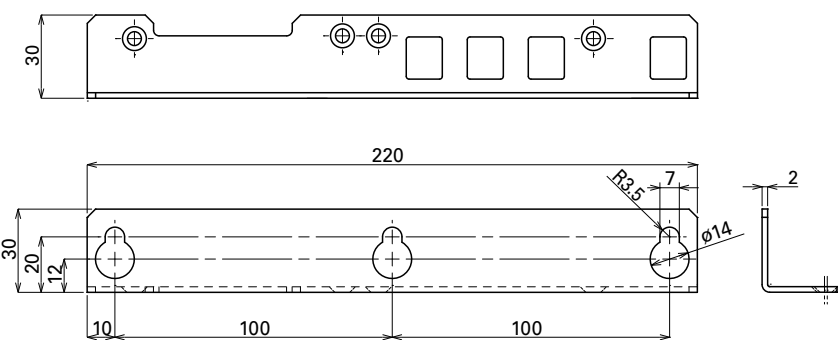
Top and bottom mounting brackets are identical

[Unit: mm]

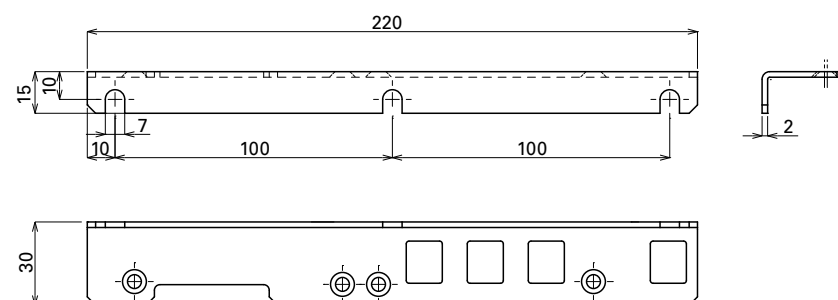


300 A  
AL-00907040-01

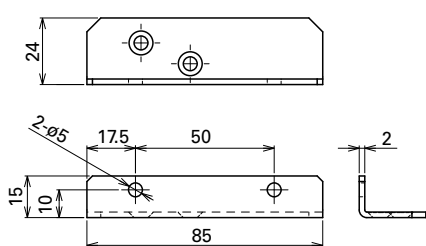
Upper side



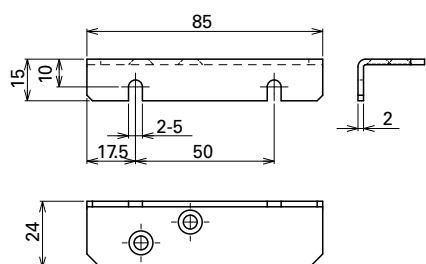
Lower side



50 A, 75 A  
AL-00880391-01  
Upper side



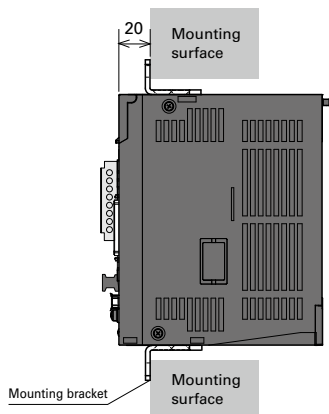
Lower side





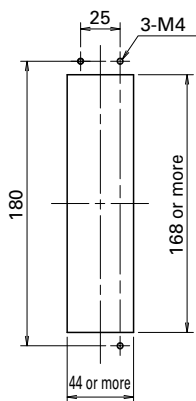
# Front Mounting Brackets [Unit: mm]

Mounting example

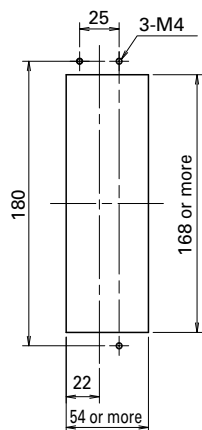


Mounting board dimension examples for reference

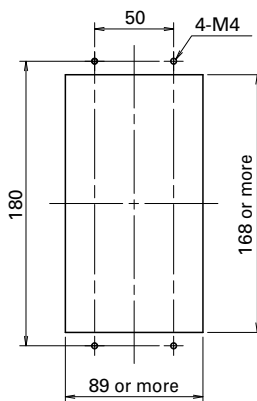
10 A, 20 A



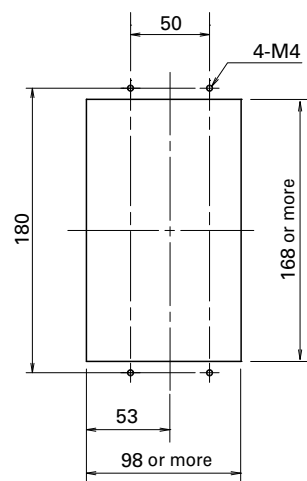
30 A



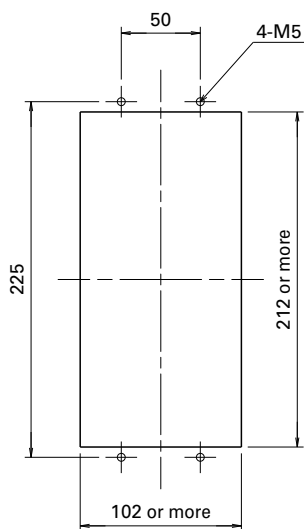
50 A



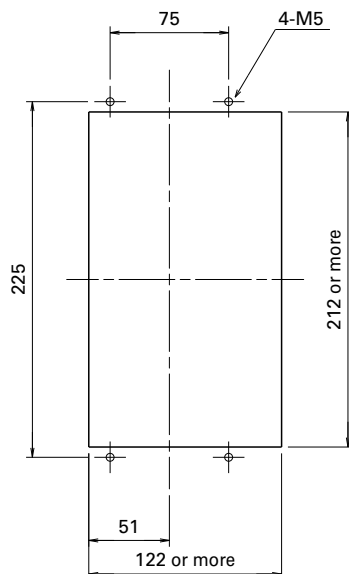
75 A



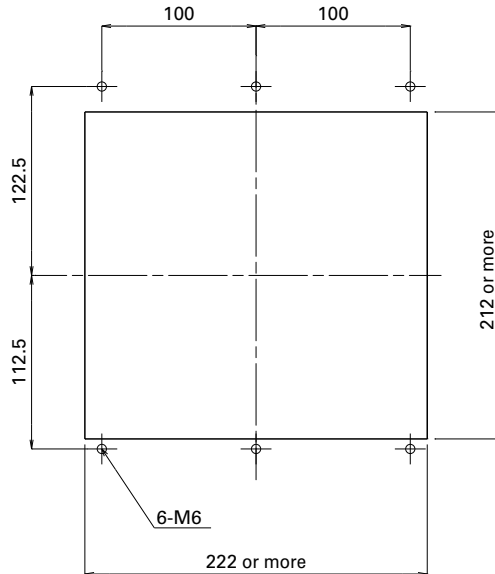
100 A



150 A



300 A



Features

List of Compatible Servo Amplifiers and Servo Motors

Standard Model Number List

Analog/Pulse

Servo Amplifiers R 3E Model EtherCAT Built-in Positioning Function

Safety

Servo Motors Rotary Motor

Options

Linear Servo Motors

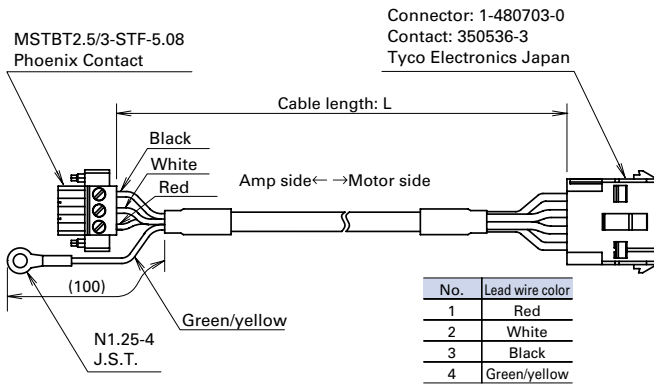
SANMOTION S

Selection Guide

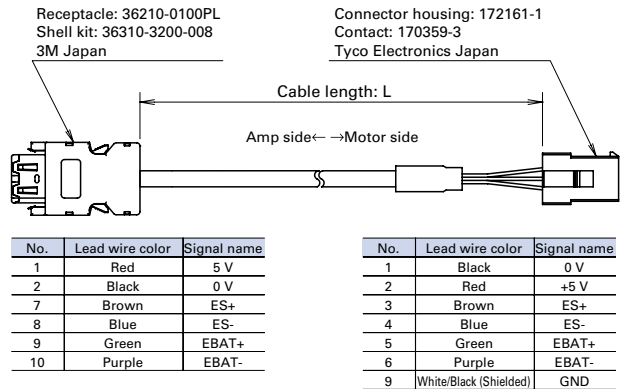
# Servo Motor with Servo Motor Extension Cable and Connectors

## Extension cable for servo motor dimensions

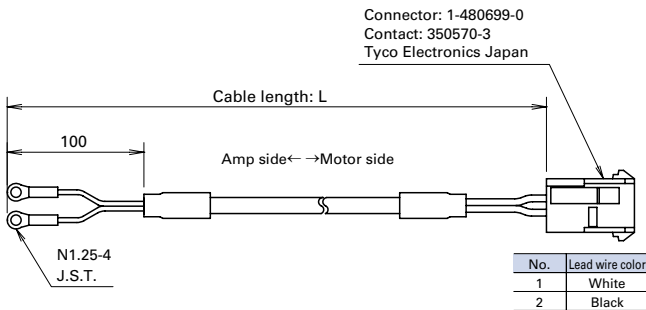
### Power cable



### Encoder cable



### Brake cable



Model no.			Cable length: L (m)
Power cable	Brake cable	Encoder cable	
RS-CM4-01-R	RS-CB3-01-R	RS-CA□-01-R	1
RS-CM4-02-R	RS-CB3-02-R	RS-CA□-02-R	2
RS-CM4-03-R	RS-CB3-03-R	RS-CA□-03-R	3
RS-CM4-05-R	RS-CB3-05-R	RS-CA□-05-R	5
RS-CM4-10-R	RS-CB3-10-R	RS-CA□-10-R	10

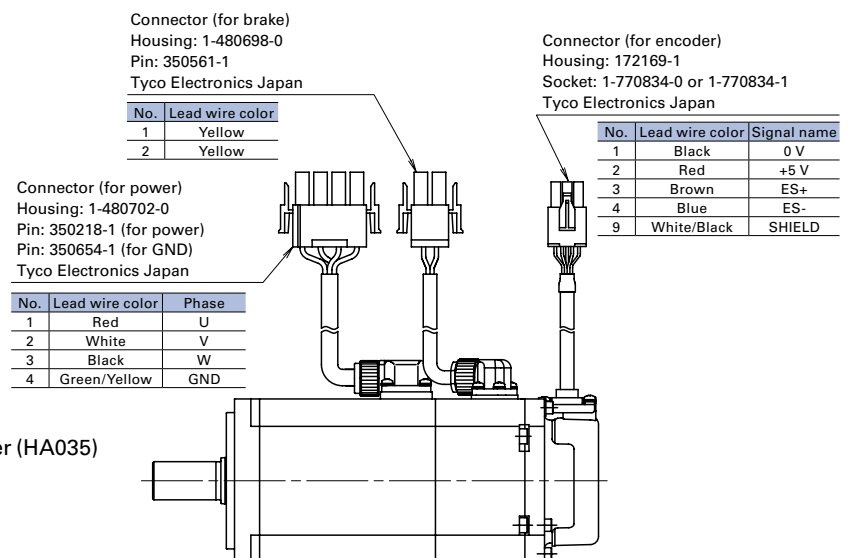
- = 4: For analog/pulse type
- = 7: For absolute encoder with EtherCAT or built-in positioning function type
- = 8: For incremental encoder with EtherCAT or built-in positioning function type

## Servo motors with connectors for extension cables

### 200 V system

Rated output	Motor flange size	Holding brake (24 VDC)	Model no.
30 W	40 mm sq.	No	R2AA04003FXRA0M
		Yes	R2AA04003FCRA0M
No		R2AA04005FXRA0M	
Yes		R2AA04005FCRA0M	
90 W	60 mm sq.	Yes	R2AA04010FCRA0M6
No		R2AA04010FXRA0M	
100 W	60 mm sq.	No	R2AA06010FXRA0M
Yes		R2AA06010FCRA0M	
200 W	60 mm sq.	No	R2AA06020FXRA0M
Yes		R2AA06020FCRA0M	
360 W	80 mm sq.	Yes	R2AA06040FCRA0M6
400 W		No	R2AA06040FXRA0M
750 W	80 mm sq.	No	R2AA08075FXRA0M
		Yes	R2AA08075FCRA0M

Connectors are connected as shown in the figure. The cable length is 200±30 mm.



Protection code: IP67,\* CE/UL: approved

Encoder classification: battery-less absolute encoder (HA035)

Output shaft: straight, Oil seal: none

\* Except for shaft through-hole and cable ends.

# Linear Servo Motors

**Dual Magnet type** [with core]

**Flat type** [with core]

**Center Magnet type** [with core]

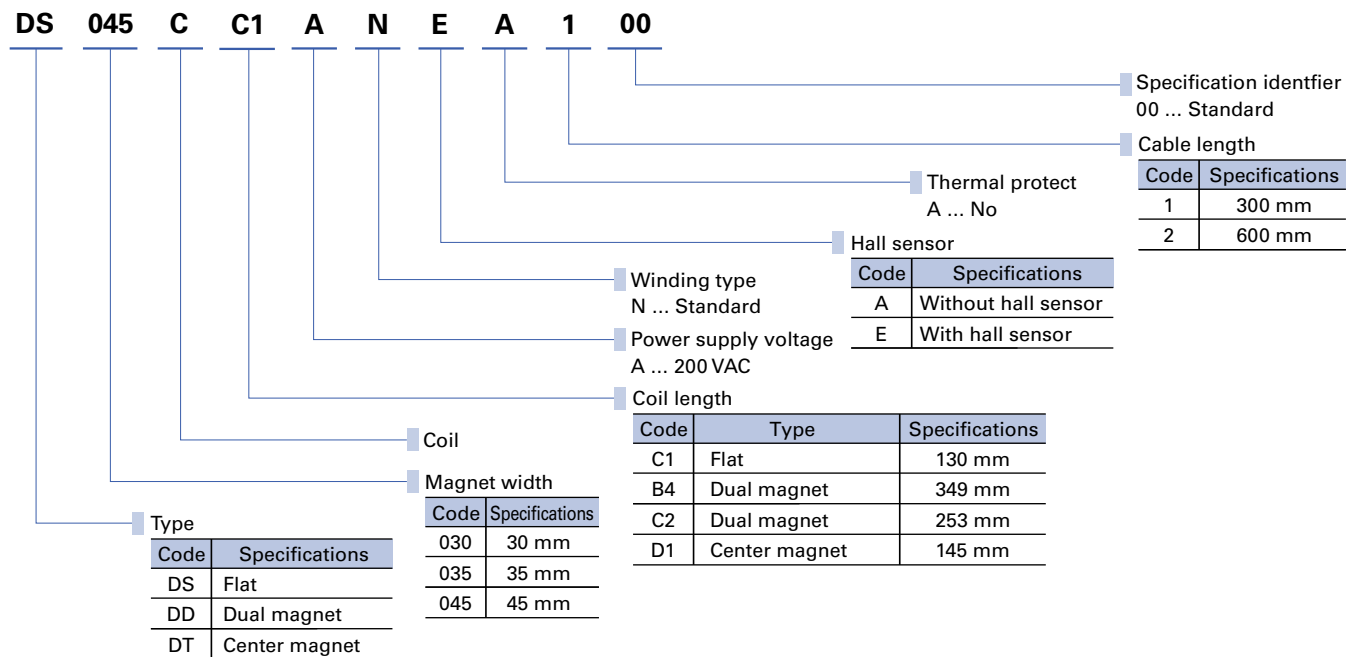
Compact linear servo motors with large thrust.  
Contact us for the model number of compatible amplifiers.



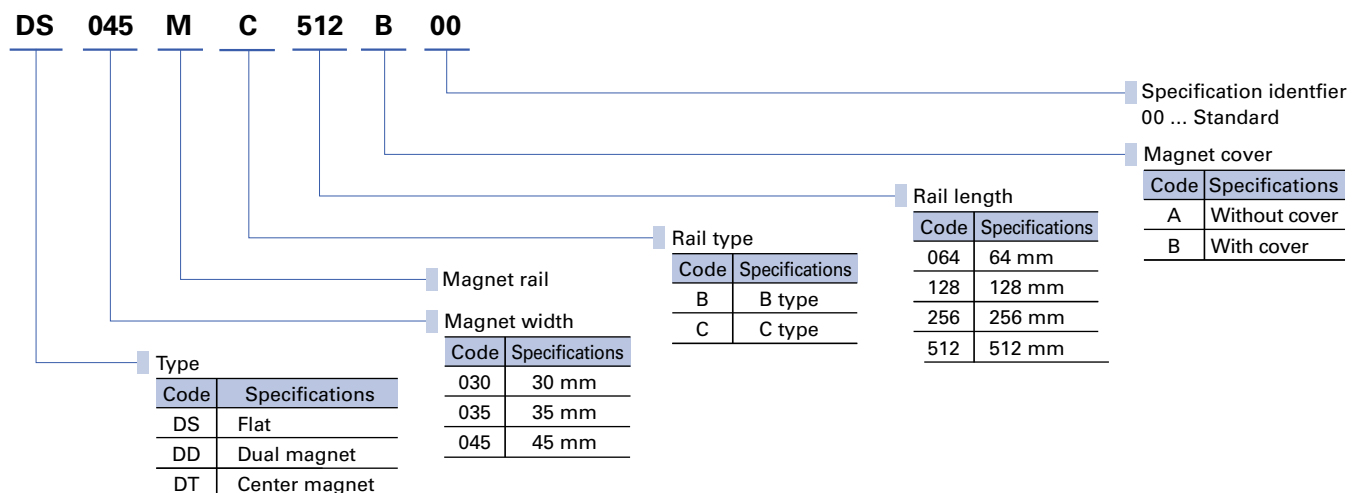
## How to read model numbers

Note that not all the possible combinations of the numbers and characters below are valid. Also, some of the numbers/characters listed below are for optional models.

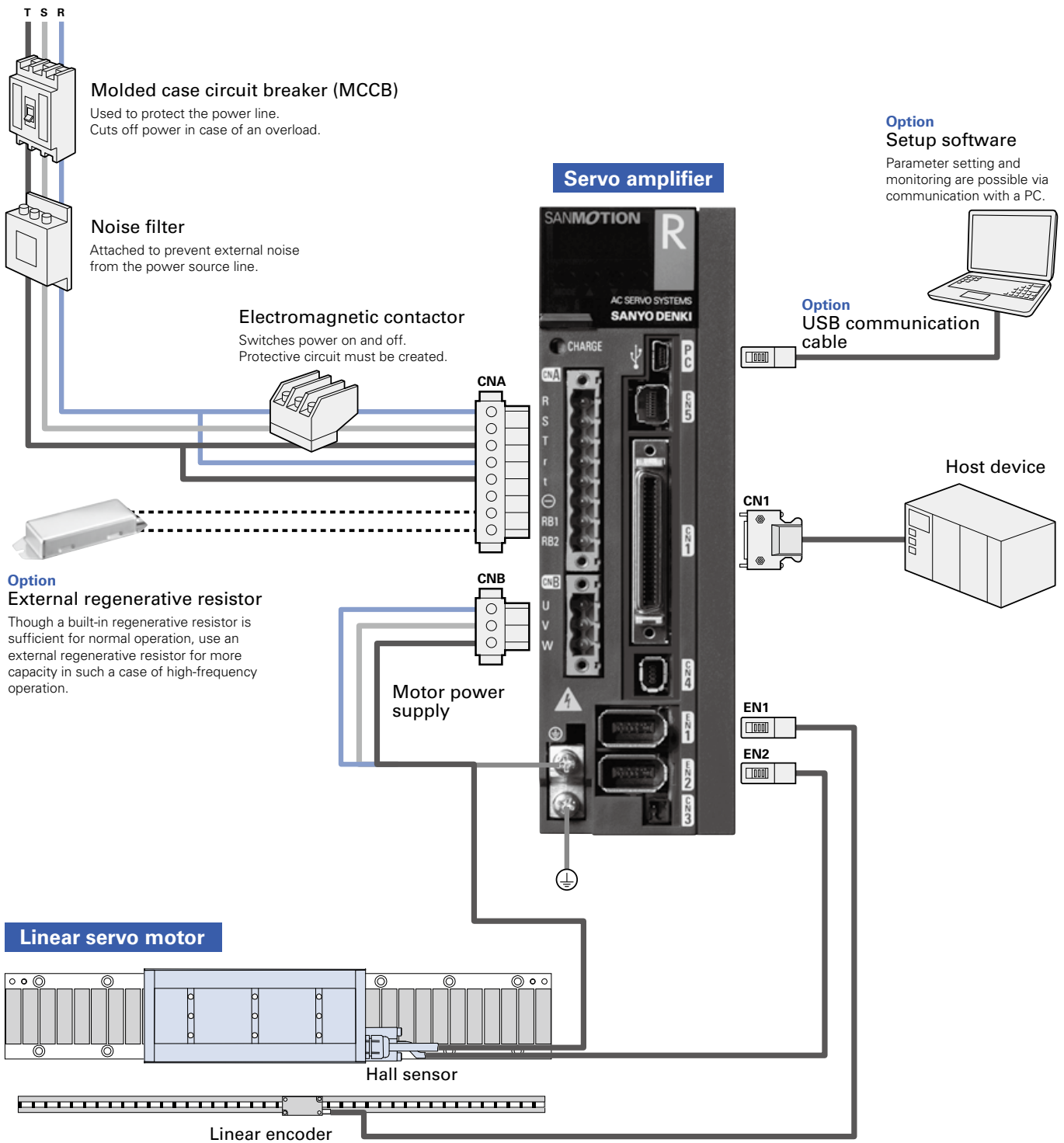
### Coil



### Magnet rail



# System Configuration Analog/Pulse Input type



# Options Analog/Pulse Input type

## ■ Connector to connect servo amplifier 10 to 50 A

### Individual connectors

Connector no.	Item	Model no.	Manufacturer model no.	Manufacturer
CN1	For controller connection	AL-00385594	10150-3000PE and 10350-52A0-008	3M Japan Limited
EN1, EN2	For linear encoder and hall sensor connections	AL-00632607	36210-0100PL and 36310-3200-008	
CNA <sup>(1)</sup>	For input power supply and regenerative resistor connections	AL-00686902-01	MSTBT2.5/8-STF-5.08LUB	Phoenix Contact.K.K
CNB	For linear motor connection	AL-Y0004079-01	MSTBT2.5/3-STF-5.08	
CN4 <sup>(2)</sup>	For safety device connection (for short-circuiting)	AL-00849548-02	1971153-2	Tyco Electronics Japan G.K.
CN4	For safety device connection (for wiring)	AL-00718252-01	2013595-3	

(1) Amplifiers with built-in regenerative resistor are equipped with a CNA connector.

(2) When CN4 is not wired, be sure to insert a safety device connector (for short-circuiting) to CN4 on the servo amplifier.

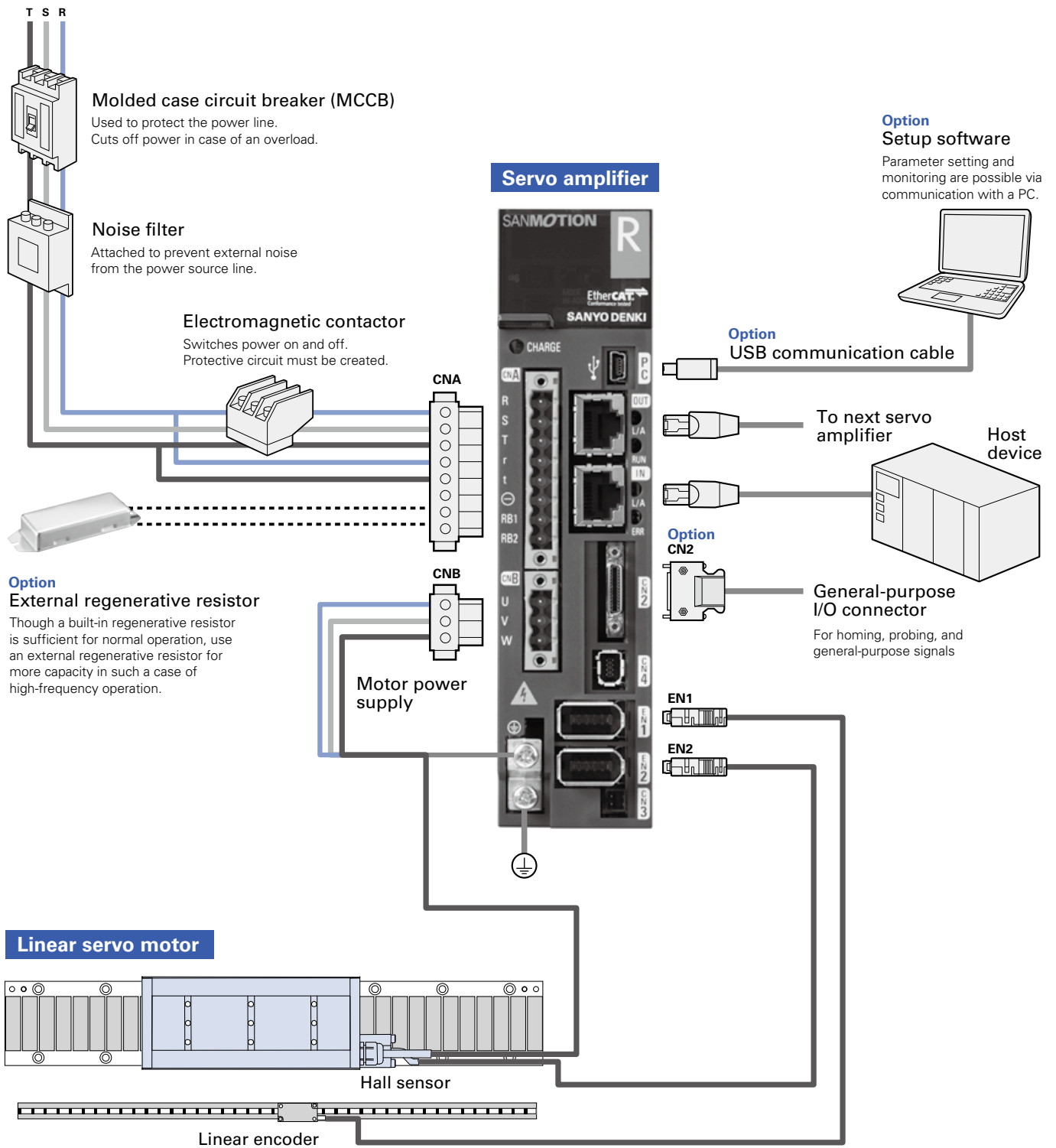
### Connector sets (For non-STO models)

Built-in regenerative resistor		No	Yes	No	Yes	No/Yes	No/Yes	No
Connector set no.		AL-00723282	AL-00723284	AL-00723286	AL-00723288	AL-00723290	AL-00781940	AL-00696037
Connectors included in the set	CN1: For controller connection	Yes	Yes	Yes	Yes	Yes	Yes	No
	EN1: For encoder connection	Yes	Yes	Yes	Yes	Yes	Yes	No
	EN2: For encoder connection	No	No	Yes	Yes	No	Yes	No
	CNA: For input power supply and regenerative resistor connections	Yes	No	Yes	No	No	No	Yes
	CNB: For servo motor connection	Yes	Yes	Yes	Yes	No	No	Yes
	CN4: For safety device connection (for short-circuiting)	No	No	No	No	No	No	No
	CN4: For safety device connection (for wiring)	No	No	No	No	No	No	No
Remarks				With hall sensor				With hall sensor

### Connector sets (For STO models)

Built-in regenerative resistor		No	Yes	No	Yes	No/Yes	No/Yes
Connector set no.		AL-00723155	AL-00723156	AL-00723157	AL-00723158	AL-00723159	AL-00781942
Connectors included in the set	CN1: For controller connection	Yes	Yes	Yes	Yes	Yes	Yes
	EN1: For encoder connection	Yes	Yes	Yes	Yes	Yes	Yes
	EN2: For encoder connection	No	No	Yes	Yes	No	Yes
	CNA: For input power supply and regenerative resistor connections	Yes	No	Yes	No	No	No
	CNB: For servo motor connection	Yes	Yes	Yes	Yes	No	No
	CN4: For safety device connection (for short-circuiting)	No	No	No	No	No	No
	CN4: For safety device connection (for wiring)	Yes	Yes	Yes	Yes	Yes	Yes
Remarks				With hall sensor			With hall sensor

# System Configuration EtherCAT interface type



# Options EtherCAT interface type

## ■ Connector to connect servo amplifier 10 to 50 A

### Individual connectors

Connector no.	Description	Model no.	Manufacturer model no.	Manufacturer
IN, OUT	Ethernet For controller connection	Not available Use a CAT5e standard-compliant shielded type modular plug (RJ-45).		
EN1, EN2	For encoder connection	AL-Y0012504-01	545991016	Molex Japan Co., Ltd.
CNA <sup>(1)</sup>	For input power supply and regenerative resistor connections	AL-00686902-01	MSTBT2.5/8-STF-5.08LUB	Phoenix Contact.K.K
CNB	For servo motor connection	AL-Y0004079-01	MSTBT2.5/3-STF-5.08	Phoenix Contact.K.K
CN4	For safety device connection (for wiring)	AL-00718252-01	2013595-3	Tyco Electronics Japan G.K.
CN4 <sup>(2)</sup>	For safety device connection (for short-circuiting)	AL-00849548-02	1971153-2	Tyco Electronics Japan G.K.
CN2	For general-purpose I/O	AL-00842383	A set of HDR-E26MSG1+ and HDR-E26LPH	HONDA TSUSHIN KOGYO CO., LTD

(1) Amplifiers with built-in regenerative resistor are equipped with a CNA connector.

(2) A safety device connector (for short-circuiting) is included with a servo amplifier.

### Connector sets (For STO models)

Built-in regenerative resistor		No	Yes	No	Yes	No/Yes
Connector set no.		AL-00977724	AL-00977726	AL-00977728	AL-00977730	AL-00977732
Connectors included in the set	EN1: For encoder connection	Yes	Yes	Yes	Yes	Yes
	EN2: For encoder connection	No	No	Yes	Yes	No
	CNA: To connect input power supply, regenerative resistor	Yes	No	Yes	No	No
	CNB: For servo motor connection	Yes	Yes	Yes	Yes	No
	CN4: For safety device connection (for short-circuiting)	No	No	No	No	No
	CN4: For safety device connection (for wiring)	Yes	Yes	Yes	Yes	Yes
	CN2: For general-purpose I/O	Yes	Yes	Yes	Yes	Yes
Remarks				With hall sensor		



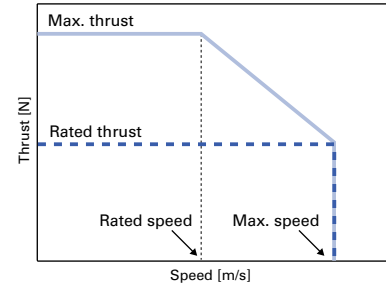
# Dual Magnet type [with core]

## Specifications

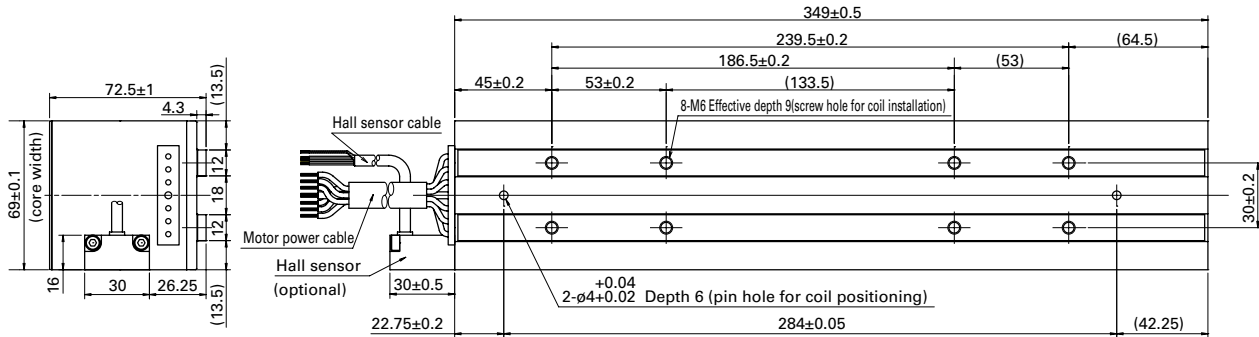
Coil model no.	Rated thrust [N]	Max. thrust [N]	Rated speed [m/s]	Max. speed [m/s]	Magnetic attraction force [N]	Mass of movable element [kg]	Compatible magnet rail model no.	Compatible servo amplifier model no.
DD045CB4AN	800	2200	1.9	3.0	600	8.6	DD045MB□□□	RS3A07L

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

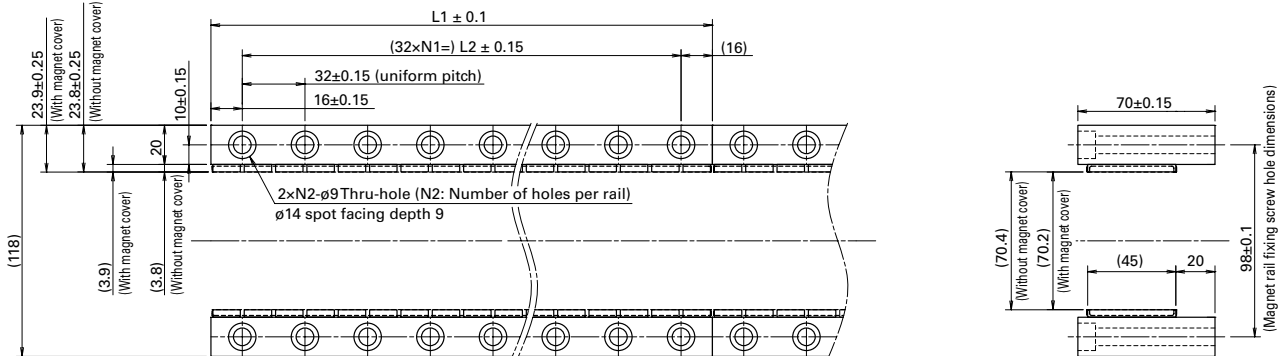
Thrust-Speed Characteristics



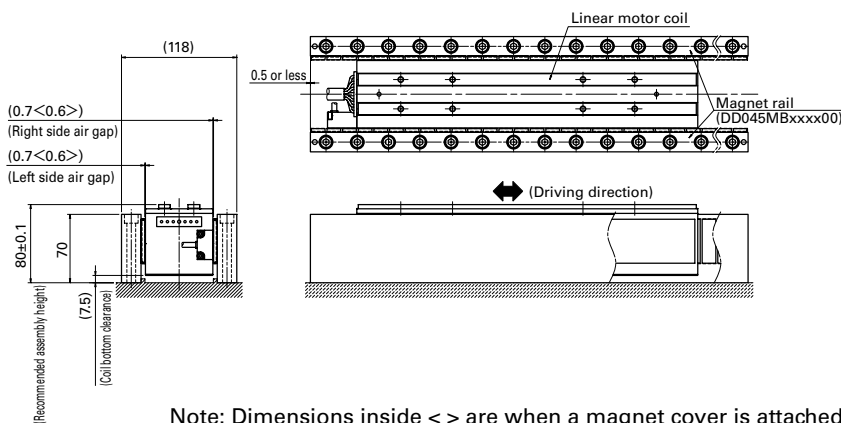
## Coil dimensions



## Magnet rail dimensions



## Diagram of recommended assembly example



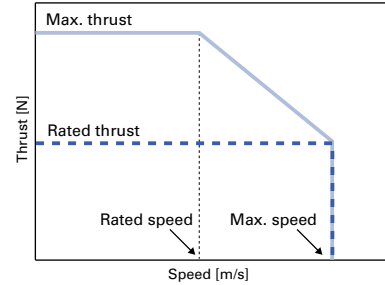
Note: Dimensions inside < > are when a magnet cover is attached

## Specifications

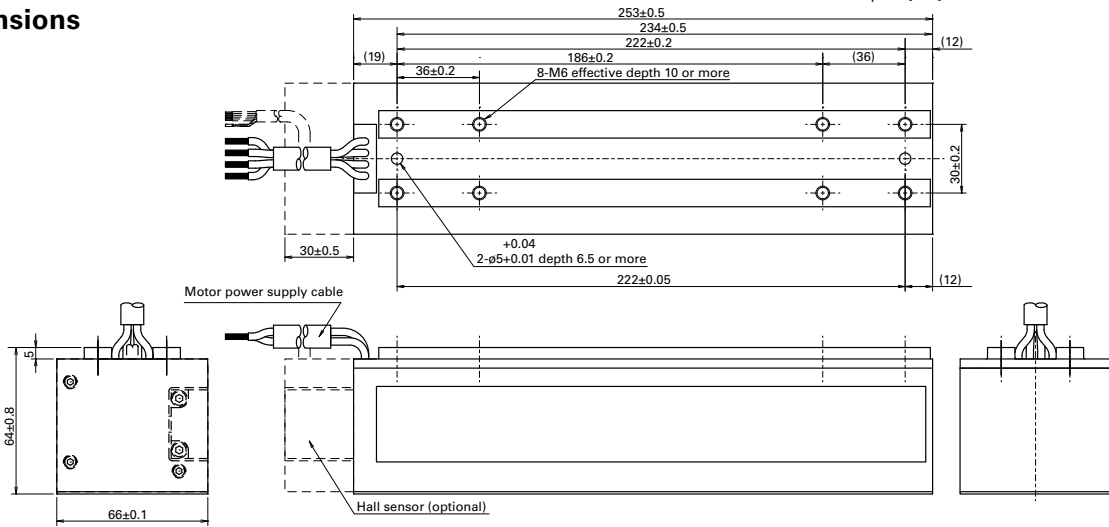
Coil model no.	Rated thrust [N]	Max. thrust [N]	Rated speed [m/s]	Max. speed [m/s]	Magnetic attraction force [N]	Mass of movable element [kg]	Compatible magnet rail model no.	Compatible servo amplifier model no.
DD035CC2AN	610	1400	2.0	3.0	350	5.0	DD035MB□□□	RS3A07L

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

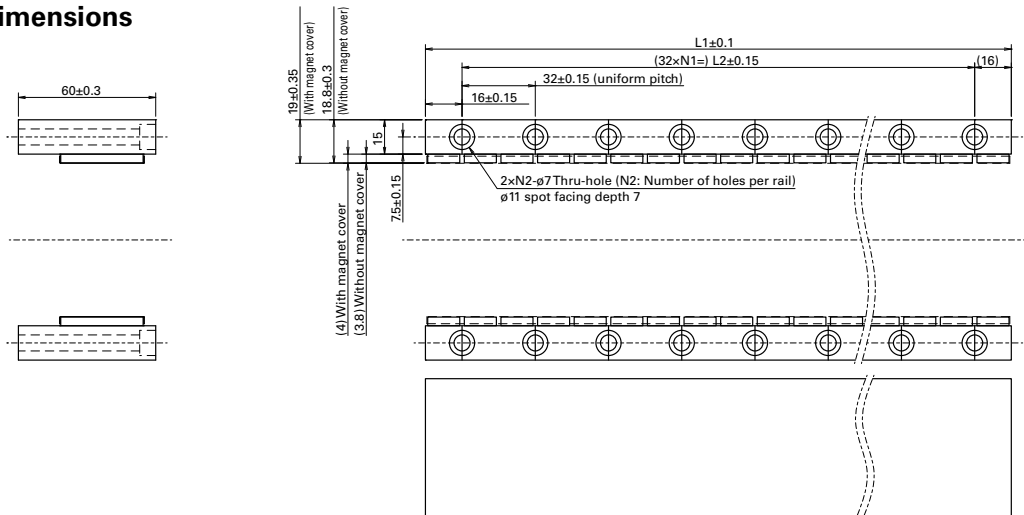
## Thrust-Speed Characteristics



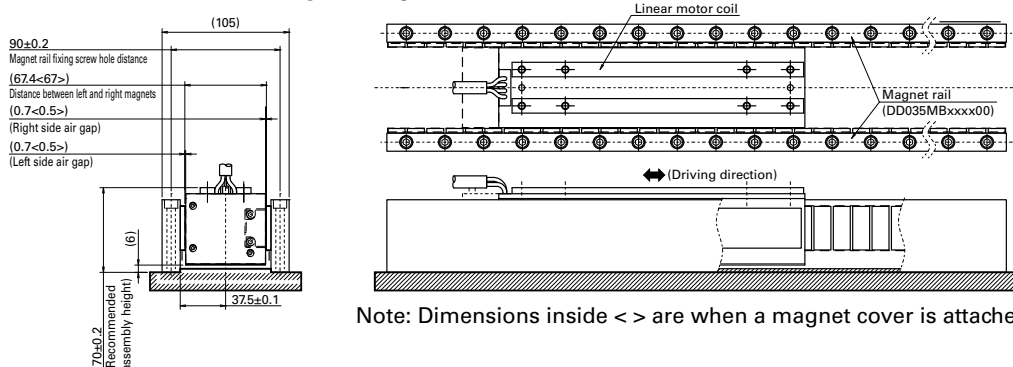
## Coil dimensions



## Magnet rail dimensions



## Diagram of recommended assembly example



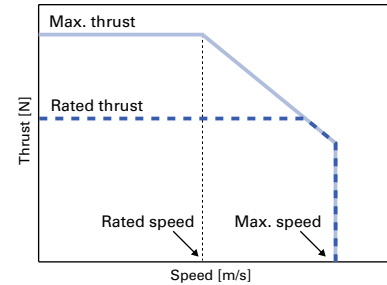
## Flat type [with core]

### Specifications

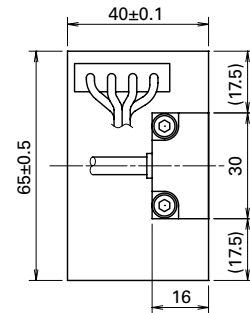
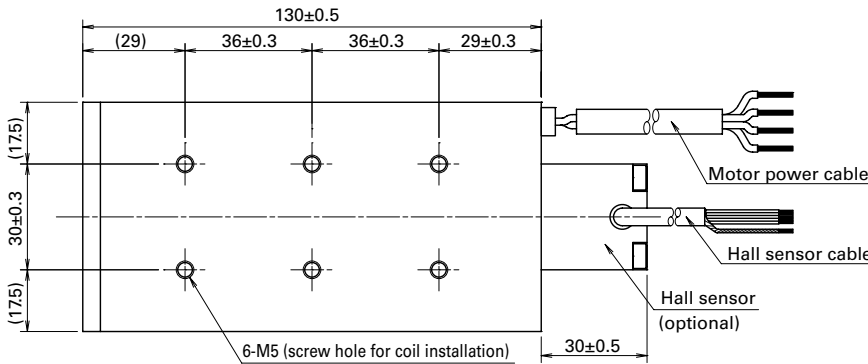
Coil model no.	Rated thrust [N]	Max. thrust [N]	Rated speed [m/s]	Max. speed [m/s]	Magnetic attraction force [N]	Mass of movable element [kg]	Compatible magnet rail model no.	Compatible servo amplifier model no.
DS045CC1AN	260	500	1.8	3.0	1700	1.8	DS045MC□□□□	RS3A03L

Magnet rail model no.	Magnet rail mass [kg]	Dimensions			
		L1	L2	N1	N2
DS045MC064	0.2	64	32	1	4
DS045MC128	0.4	128	96	3	8
DS045MC256	0.8	256	224	7	16
DS045MC512	1.5	512	480	15	32

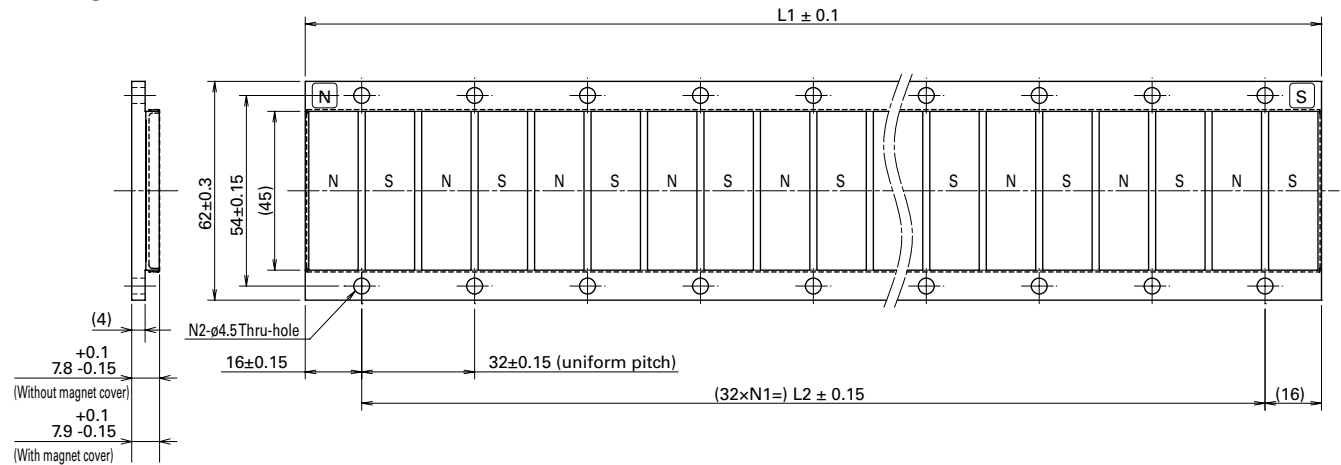
### Thrust-Speed Characteristics



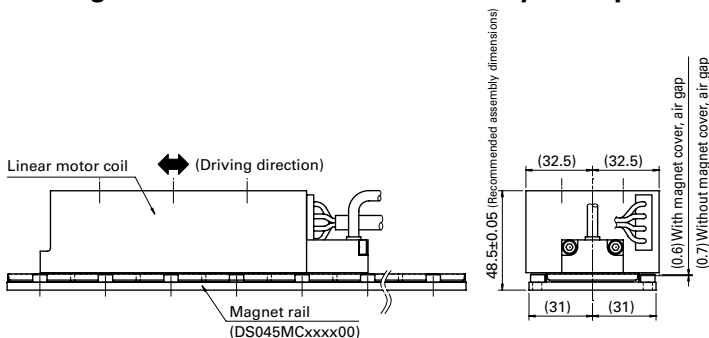
### Coil dimensions



### Magnet rail dimensions



### Diagram of recommended assembly example



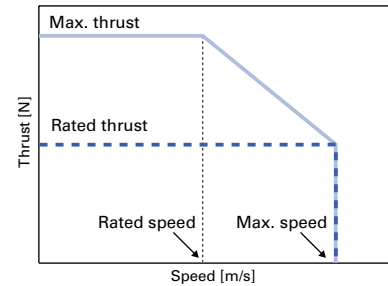
# Center Magnet type [with core]

## Specifications

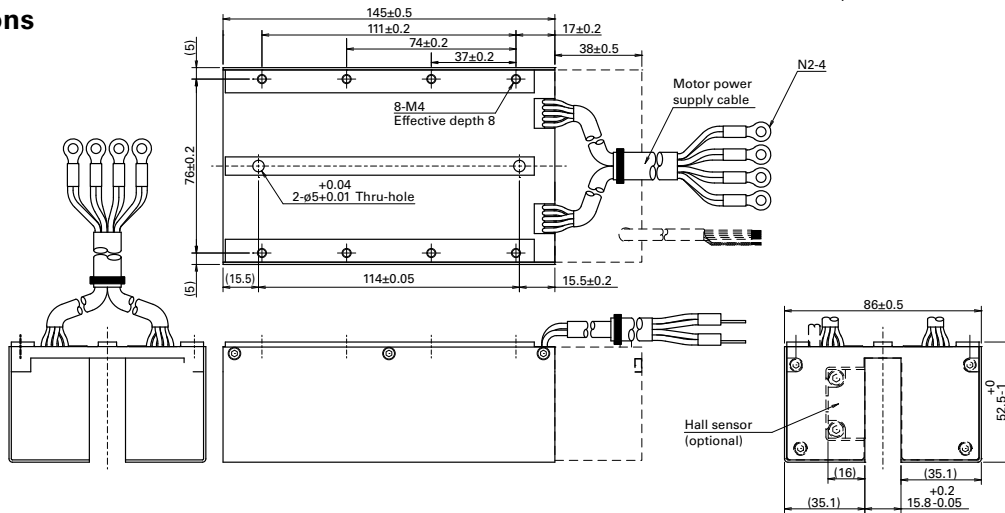
Coil model no.	Rated thrust [N]	Max. thrust [N]	Rated speed [m/s]	Max. speed [m/s]	Magnetic attraction force [N]	Mass of movable element [kg]	Compatible magnet rail model no.	Compatible servo amplifier model no.
DT030CD1AN	350	650	1.9	2.5	0	2.4	DT030M□□□	RS3A03L

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

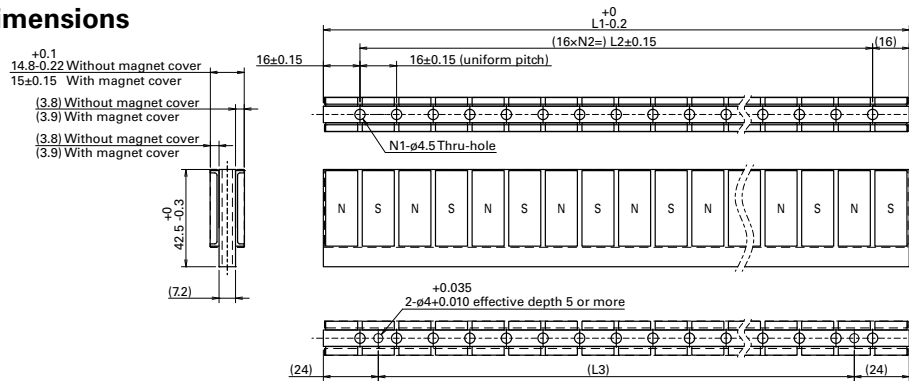
Thrust-Speed Characteristics



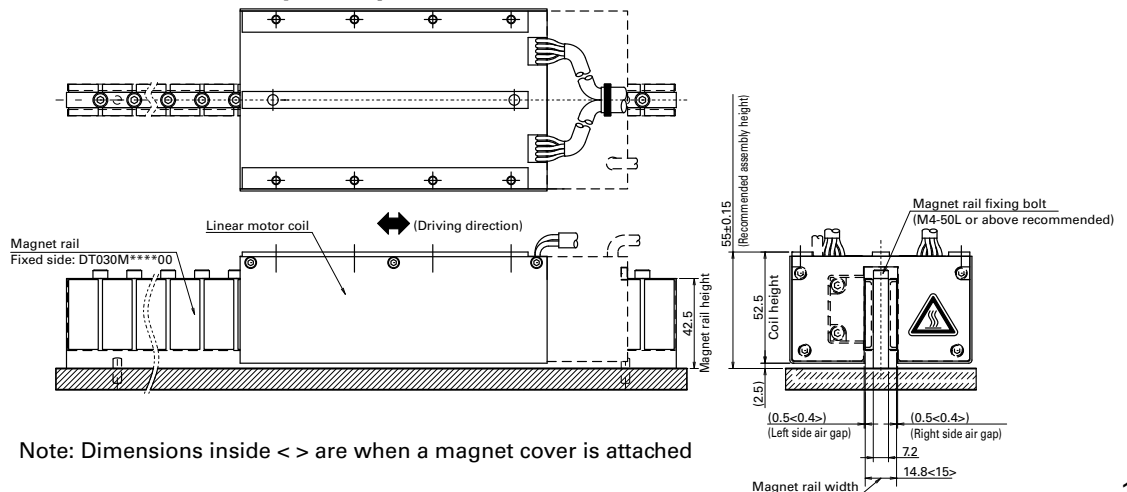
## Coil dimensions



## Magnet rail dimensions



## Diagram of recommended assembly example



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

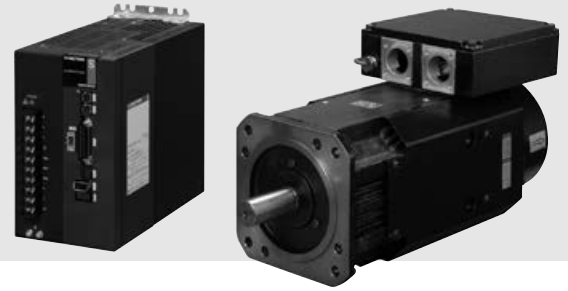


# SANMOTION S

## Spindle Motors and Servo Amplifiers

Servo Amplifier Capacity: 150 A

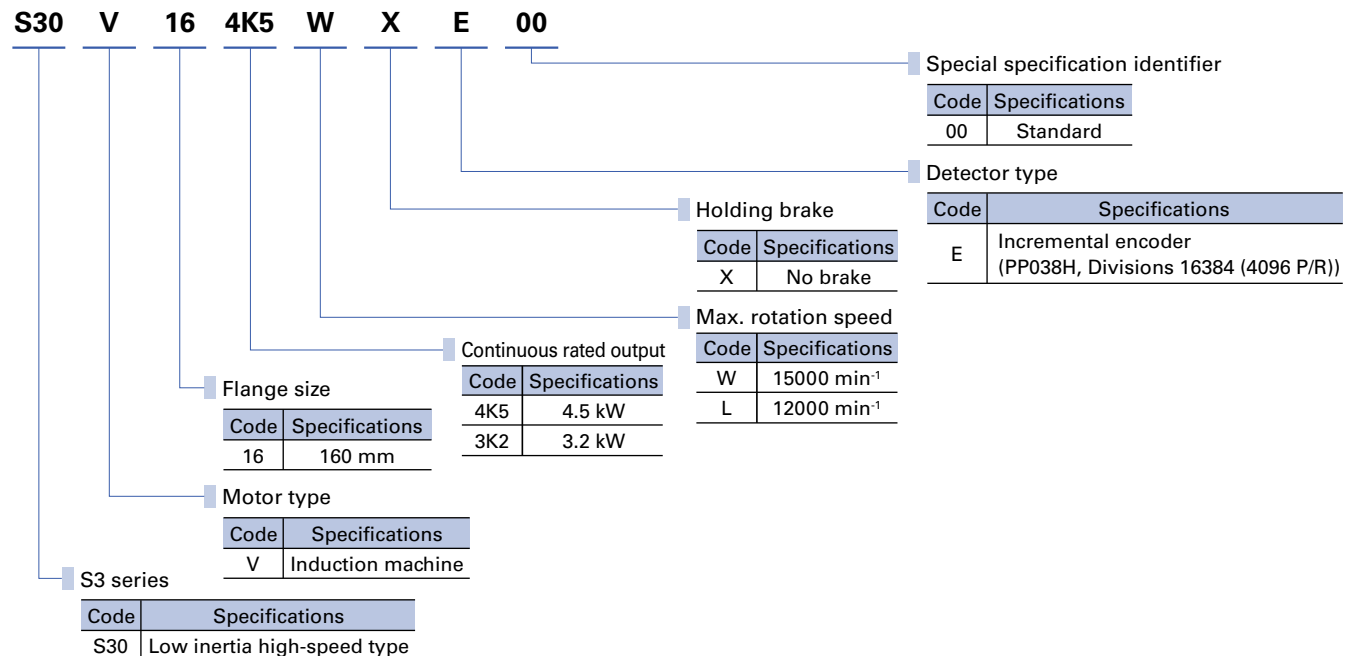
A servo system with a spindle motor and a servo amplifier. Ideal for the main shaft of machine tools that require highly precise tapping synchronized with the feed shaft. It improves productivity of the device.



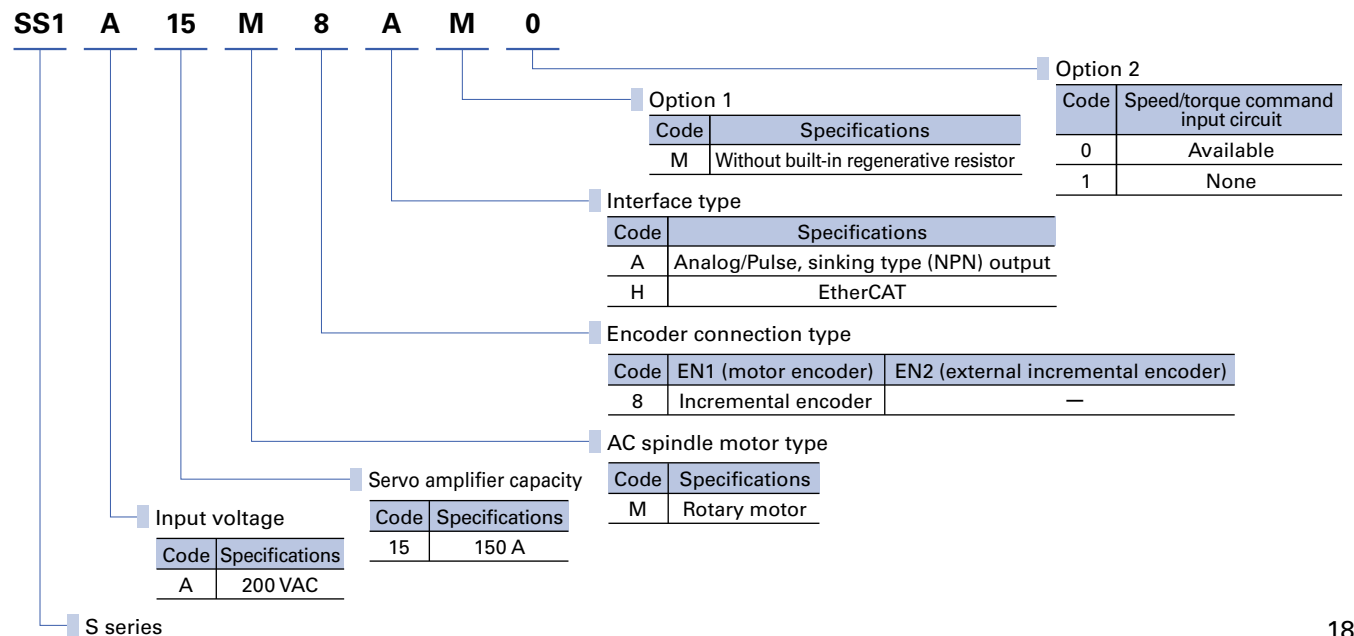
### How to read model numbers

Note that not all the possible combinations of the numbers and characters below are valid. Also, some of the numbers/characters listed below are for optional models. For model numbers valid as standard products, refer to "Standard Model Number List".

#### Spindle motor



#### Servo amplifier

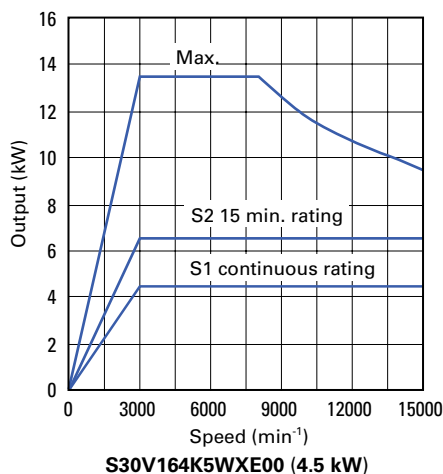
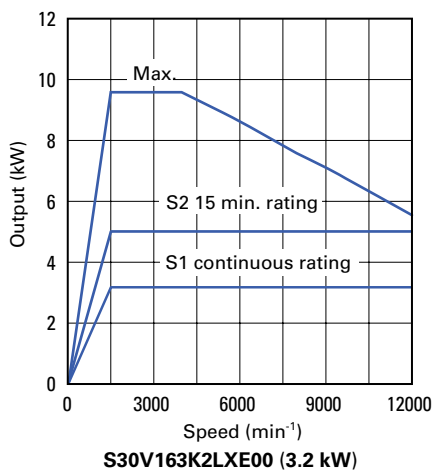


# Spindle Motor Specifications

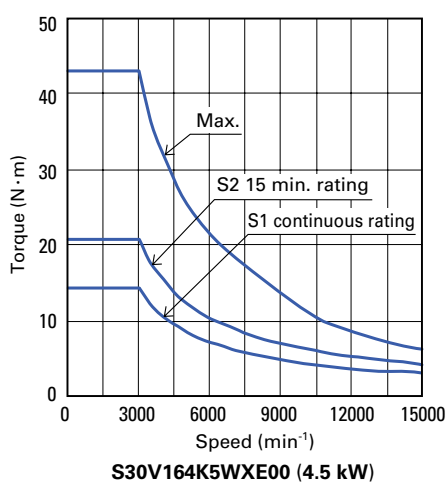
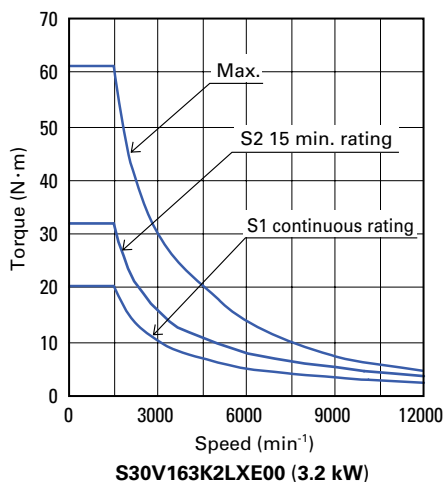
Spindle motor model no.				S30V163K2LXE00	S30V164K5WXE00
Servo amplifier model no. to be combined	Analog/pulse input type			SS1A15M8AM0	
	EtherCAT interface type			SS1A15M8HM1	
S1 continuous rated output	★	$P_R$	kW	3.2	4.5
S2 15 min. rated output	★	$P_{15}$	kW	5.0	6.5
Max. output	★	$P_p$	kW	9.6	13.5
Base rotation speed		$N_R$	$\text{min}^{-1}$	1500	3000
Max. Rotation Speed		$N_{\text{max}}$	$\text{min}^{-1}$	12000	15000
S1 continuous rated torque	★	$T_R$	N·m	20.4	14.3
S2 15 min. rated torque	★	$T_{15}$	N·m	31.8	20.7
Max. torque	★	$T_p$	N·m	61.1	43.0
S1 continuous rated current	★	$I_R$	Arms	27	32
S2 15 min. rated current	★	$I_{15}$	Arms	39	41
Max. current	★	$I_p$	Arms	78	79
Rotor inertia		$J_M$	$\text{kg}\cdot\text{m}^2$ (GD <sup>2</sup> /4)	0.00683	0.00483
Mass		$W_E$	kg	36	29

Note: Items with ★ indicate values after temperature rise saturation. Other items indicate values when the temperature is 20°C. Also, items with ★ indicate values when used with a standard amplifier. All values are typical values.

## Speed-Output characteristics



## Speed-Torque characteristics





# Servo Amplifier Specifications

Model no.	SS1A15M8AM0	SS1A15M8HM1
Interface	Analog/Pulse Input type	EtherCAT Interface type
Power supply voltage	Main circuit power supply: 3-Phase 200 to 230 VAC (+10, -15%), 50/60 Hz ( $\pm 3$ Hz) Control circuit power supply: Single-phase 200 to 230 VAC (+10, -15%), 50/60 Hz ( $\pm 3$ Hz)	
Amplifier capacity	150 A	
Applicable motor capacity	3.2 kW, 4.5 kW	
Supported encoders	4096 P/R (A, B, Z phase pulse signal)	
Control function	Position, speed, torque, orientation controls	
Control system	Sinusoidal PWM control	
Speed control range	1:5000 (internal command)	
Frequency characteristics	200 Hz	
Regenerative process circuit	Built in (regenerative resistor mounted externally)	
Sequence signal	8 Input channels, 8 Output channels	6 Input channels, 2 Output channels
Ambient temperature	0 to 55°C	
Standards	UL, CE, RoHS directives	

Features

List of Compatible Servo Amplifiers and Servo Motors

Standard Model Number List

Analog/Pulse

Servo Amplifiers R 3E Model EtherCAT Built-in Positioning Function

Safety

Servo Motors Rotary Motor

Options

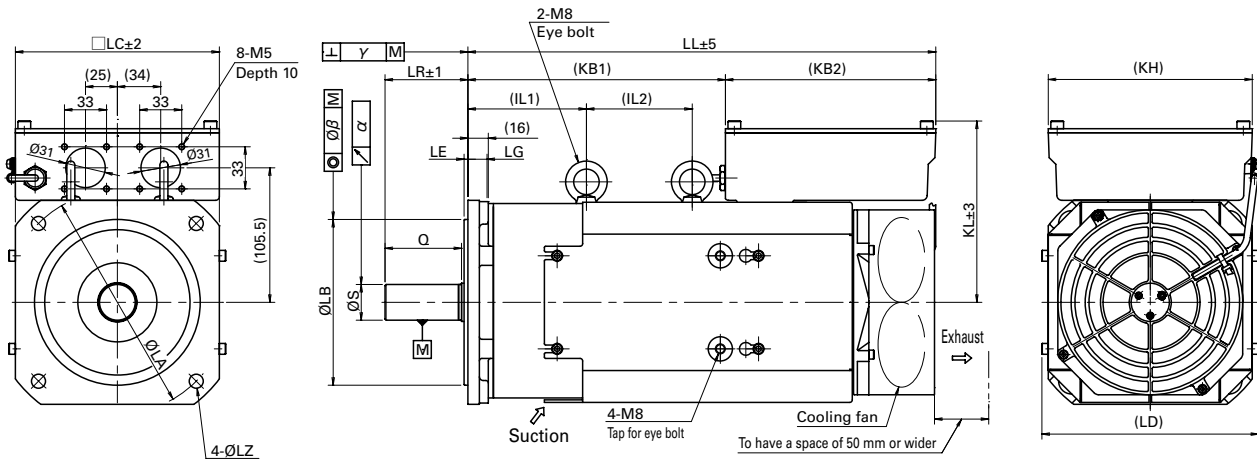
Linear Servo Motors

SANMOTION S

Selection Guide

# Dimensions [Unit: mm]

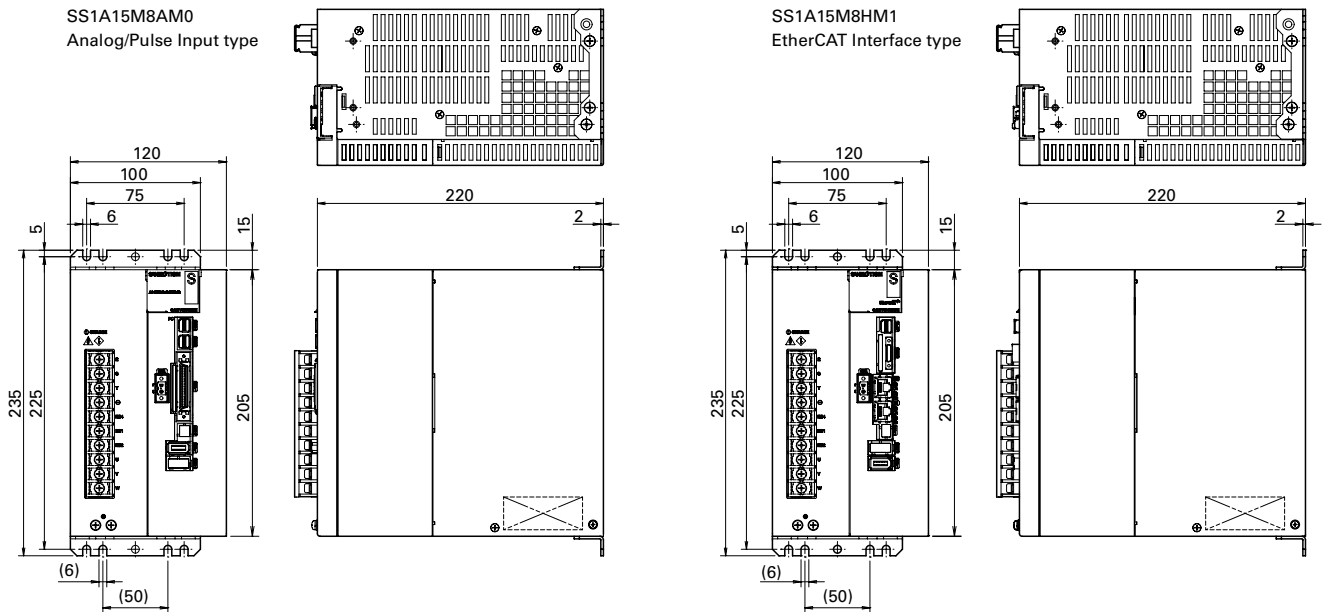
## Spindle motor



Spindle motor model no.	LL	KB2	KL	KH	LG	LA	LB	LE	LC	LZ	LR	LD	S	Q	KB1	IL1	IL2	$\alpha$	$\beta$	$\gamma$
S30V164K5WXE00	367	165	142	160	15	175	130 <sup>0</sup> <sub>-0.040</sub>	3	160	11	65	170	28 <sup>0</sup> <sub>-0.013</sub>	60	202	93	83	0.01	0.03	0.03
S30V163K2LXE00	432														267	148				

## Servo amplifier

**150 A** Mass: 4.9 kg



Features	List of Compatible Servo Amplifiers and Servo Motors	Standard Model Number List	Servo Amplifiers R 3E Model				Servo Motors Rotary Motor	Options	Linear Servo Motors	SANMOTION S	Selection Guide
			Analog/Pulse	EtherCAT	Built-in Positioning Function	Safety					

# Models No Longer Listed and Their Replacing Models

Models that are no longer listed in catalogs and their replacing models are shown below.

■ Servo amplifier

Models no longer listed		Replacing models (R 3E Model)	
		Used with Absolute encoder in semi-closed systems	
Type	Model no.	Model no.	
SANMOTION R 200 V Analog/Pulse Input type	RS1A01AA	RS3A01A0AL0/RS3A02A0AL0	
	RS1A03AA	RS3A02A0AL0/RS3A03A0AL0	
	RS1A05AA	RS3A05A0AA0	
	RS1L01AA	RS3A01A0AA0/RS3A02A0AA0	
	RS1L03AA	RS3A02A0AA0/RS3A03A0AA0	
	RS1L05AA	RS3A05A0AL0	
	RS1A01AB	RS3A01A0BL0/RS3A02A0BL0	
	RS1A03AB	RS3A02A0BL0/RS3A03A0BL0	
	RS1A05AB	RS3A05A0BA0	
	RS1L01AB	RS3A01A0BA0/RS3A02A0BA0	
	RS1L03AB	RS3A02A0BA0/RS3A03A0BA0	
	RS1L05AB	RS3A05A0BL0	
	SANMOTION R 100 V Analog/Pulse Input type	RS1N01AA	RS3E01A0AA0/RS3E02A0AA0
		RS1N03AA	RS3E03A0AA0
RS1E01AA		RS3E01A0AL0/RS3E02A0AL0	
RS1E03AA		RS3E03A0AL0	
RS1N01AB		RS3E01A0BA0/RS3E02A0BA0	
RS1N03AB		RS3E03A0BA0	
RS1E01AB		RS3E01A0BL0/RS3E02A0BL0	
RS1E03AB	RS3E03A0BL0		
SANMOTION R ADVANCED MODEL 200 V Analog/Pulse Input type	RS2A01A0AL0	RS3A01A0AL0/RS3A02A0AL0	
	RS2A03A0AL0	RS3A02A0AL0/RS3A03A0AL0	
	RS2A05A0AL0	RS3A05A0AL0	
	RS2A10A0AL0	RS3A07A0AL0/RS3A10A0AL0	
	RS2A15A0AL0	RS3A15A0AL0	
	RS2A30A0AL0	RS3A30A0AL0	
	RS2A01A0AA0	RS3A01A0AA0/RS3A02A0AA0	
	RS2A03A0AA0	RS3A02A0AA0/RS3A03A0AA0	
	RS2A05A0AA0	RS3A05A0AA0	
	RS2A10A0AA0	RS3A07A0AA0/RS3A10A0AA0	
	RS2A15A0AA0	RS3A15A0AA0	
	RS2A01A0BL0	RS3A01A0BL0/RS3A02A0BL0	
	RS2A03A0BL0	RS3A02A0BL0/RS3A03A0BL0	
	RS2A05A0BL0	RS3A05A0BL0	
	RS2A10A0BL0	RS3A07A0BL0/RS3A10A0BL0	
	RS2A15A0BL0	RS3A15A0BL0	
	RS2A30A0BL0	RS3A30A0BL0	
	RS2A01A0BA0	RS3A01A0BA0/RS3A02A0BA0	
	RS2A03A0BA0	RS3A02A0BA0/RS3A03A0BA0	
	RS2A05A0BA0	RS3A05A0BA0	
RS2A10A0BA0	RS3A07A0BA0/RS3A10A0BA0		
RS2A15A0BA0	RS3A15A0BA0		
SANMOTION R ADVANCED MODEL 100 V Analog/Pulse Input type	RS2E01A0AL0	RS3E01A0AL0/RS3E02A0AL0	
	RS2E03A0AL0	RS3E03A0AL0	
	RS2E01A0AA0	RS3E01A0AA0/RS3E02A0AA0	
	RS2E03A0AA0	RS3E03A0AA0	
	RS2E01A0BL0	RS3E01A0BL0/RS3E02A0BL0	
	RS2E03A0BL0	RS3E03A0BL0	
	RS2E01A0BA0	RS3E01A0BA0/RS3E02A0BA0	
RS2E03A0BA0	RS3E03A0BA0		

Models no longer listed		Replacing models (R 3E Model)
Type	Model no.	Model no.
SANMOTION R ADVANCED MODEL 200 V EtherCAT Interface type	RS2A01A2HL5	RS3A01A2HL4/RS3A02A2HL4
	RS2A03A2HL5	RS3A03A2HL4
	RS2A05A2HL5	RS3A05A2HL4
	RS2A30A2HL5	RS3A30A2HL4
	RS2A01A2HA5	RS3A01A2HA4/RS3A02A2HA4
	RS2A03A2HA5	RS3A03A2HA4
	RS2A05A2HA5	RS3A05A2HA4
	RS2A10A2HA5	RS3A07A2HA4/RS3A10A2HA4
	RS2A15A2HA5	RS3A15A2HA4
SANMOTION R ADVANCED MODEL 100 V EtherCAT Interface type	RS2E01A2HL5	RS3E01A2HL4/RS3E02A2HL4
	RS2E03A2HL5	RS3E03A2HL4
	RS2E01A2HA5	RS3E01A2HA4/RS3E02A2HA4
	RS2E03A2HA5	RS3E03A2HA4

Note 1: The models no longer listed and their corresponding replacing models may not have the same functions, specifications, connectors, or dimensions, etc.

Note 2: Some models that are no longer listed use the same hardware depending on the motor encoder and external encoder that are used together, however, the product model numbers of the replacing models vary with the motor encoder and external encoder that are used together.

Note 3: For model numbers of the R 3E Model servo amplifiers (replacement of SANMOTION R servo amplifiers (model number starts with RS1)) which use a wire-saving incremental encoder as a motor encoder or used in full-closed systems, contact us.

# Servo Motor Capacity Selection (Rotary Motor)

This is a method of calculating the required capacity of servo motors from the mechanical specifications. Here we have introduced the basic selection procedure focusing on a ball screw (flat) mechanism.

## Selection procedure

### 1. Creation of operation patterns

Create the operation patterns.

### 2. Calculation of conversion of motor shaft moment of load inertia $J_L$

Calculate the moment of load inertia from the machine configuration.

### 3. Calculation of load torque $T_L$ for motor shaft conversion

Calculate the load torque from the machine configuration.

### 4. Provisional selection of servo motor capacity

Provisionally select a motor in which the load moment of inertia ( $J_L$ ) is 10 times or less than the rotor moment of inertia ( $J_M$ ) of servo motor, while the load torque ( $T_L$ ) is 80% or less ( $T_R \times 0.8$ ) of rated torque of motor ( $T_R$ ).

$$J_L \leq J_M \times 10$$

$$T_L \leq T_R \times 0.8$$

### 5. Calculation of acceleration/deceleration torque

Calculate the required acceleration/deceleration torque from the operation patterns.

### 6. Calculation of effective torque

Calculate the effective torque from the torque patterns.

### 7. Judgment

Determine whether the acceleration and deceleration torque ( $T_a, T_b$ ) are 80% ( $T_p \times 0.8$ ) or less than the peak stall torque ( $T_p$ ) of the servo motor; and the effective torque ( $T_{rms}$ ) is 80% ( $T_R \times 0.8$ ) or less than the rated torque ( $T_R$ ) of the servo motor.

$$T_a \leq T_p \times 0.8$$

$$T_b \leq T_p \times 0.8$$

$$T_{rms} \leq T_R \times 0.8$$

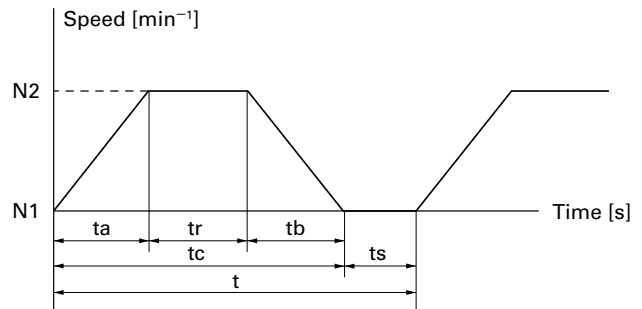
If the judgment results cannot be applied in the aforementioned equation, reconsider the servo motor capacity, for example increasing the capacity.

### 8. Calculation of regenerative power

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

## 1. Creation of operation patterns

First, determine the equipment mechanism, dimensions of all parts, positioning amount, positioning time, gear ratio, etc. An operation pattern is the determined driving force plotted on the speed/time axis.



$t_a$  = Acceleration time [s]

$t_b$  = Deceleration time [s]

$t_r$  = Constant speed-time [s]

$t_s$  = Downtime [s]

$t$  = 1 cycle [s]

## 2. Calculation of conversion of motor shaft moment of load inertia $J_L$

Load moment of inertia is the quantity showing inertia of a rotating object.

Given below is the calculation method used in case of ball screw (flat) mechanism.

### ■ Ball screw moment of inertia

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

G: Gear ratio

$\rho$ : Ball screw specific gravity [ $\text{kg}/\text{m}^3$ ] [Iron:  $7.8 \times 10^3$ ]

D: Ball screw diameter [m]

L: Ball screw length [m]

### ■ Work + table moment of inertia

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

G: Gear ratio

W: Work + table mass [kg]

P: Ball screw pitch [m]

### ■ Conversion of motor shaft moment of load inertia.

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

Note: Moments of inertia of reducer and coupling are assumed to be negligible and have therefore been omitted.

# Servo Motor Capacity Selection (Rotary Motor)

## 3. Calculation of load torque $T_L$ for motor shaft conversion

Load torque is the power generated from the friction of the driving part or from the gravity that is converted on the motor shaft. When activated, this torque always acts as the load.

Given below is the calculation method used in the case of a ball screw (flat) mechanism.

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

- F: External force [kg]
- $\eta$ : Machine efficiency
- $\mu$ : Coefficient of friction
- W: Work + table mass [kg]
- P: Ball screw lead [m]
- G: Gear ratio

## 4. Provisional selection of servo motor capacity

Provisionally select the motors that apply to the following 2 conditions.

- Load moment of inertia ( $J_L$ ) calculated in step 2 is 10 times or less than the rotor moment of inertia ( $J_M$ ) of servo motor  
 $J_L \leq J_M \times 10$
- Load torque ( $T_L$ ) calculated in step 3 is 80% or less ( $T_R \times 0.8$ ) of rated torque ( $T_R$ ) of servo motor  
 $T_L \leq T_R \times 0.8$

## 5. Calculation of acceleration/deceleration torque

Acceleration/deceleration torque is necessary for accelerating and decelerating the motor and load.

### ■ Method of obtaining acceleration torque ( $T_a$ )

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

- $N_2$ : Servo motor rotary speed after acceleration [ $\text{min}^{-1}$ ]
- $N_1$ : Servo motor rotary speed before acceleration [ $\text{min}^{-1}$ ]
- $J_L$ : Conversion of motor shaft moment of load inertia [ $\text{kg}\cdot\text{m}^2$ ]
- $J_M$ : Conversion of servo motor moment of rotor inertia [ $\text{kg}\cdot\text{m}^2$ ]
- $T_L$ : Calculation of load torque for motor shaft conversion [ $\text{N}\cdot\text{m}$ ]
- $t_a$ : Acceleration time [s]

### ■ Method of obtaining deceleration torque ( $T_b$ )

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

- $N_2$ : Servo motor rotary speed before deceleration [ $\text{min}^{-1}$ ]
- $N_1$ : Servo motor rotary speed after deceleration [ $\text{min}^{-1}$ ]
- $J_L$ : Conversion of motor shaft moment of load inertia [ $\text{kg}\cdot\text{m}^2$ ]
- $J_M$ : Conversion of servo motor moment of rotor inertia [ $\text{kg}\cdot\text{m}^2$ ]
- $T_L$ : Calculation of load torque for motor shaft conversion [ $\text{N}\cdot\text{m}$ ]
- $t_b$ : Deceleration time [s]

## 6. Calculation of effective torque

Effective torque is the value per unit time obtained from root mean square of load torque / acceleration torque / deceleration torque .

$$\text{Trms} = \sqrt{\frac{(T_a^2 \times t_a) + (T_L^2 \times t_r) + (T_b^2 \times t_b)}{t}} \quad [\text{N}\cdot\text{m}]$$

## 7. Judgment

Our company's judgment criteria are as follows.

- Load torque load factor  $T_L \leq T_R \times 0.8$   
(Load torque is 80% or less of rated torque)
- Acceleration torque load factor  $T_a \leq T_p \times 0.8$   
(Acceleration torque is 80% or less of peak stall torque)  
 $T_p$ : Peak stall torque
- Deceleration torque load factor  $T_b \leq T_p \times 0.8$   
(Deceleration torque is 80% or less of peak torque at stall)  
 $T_p$ : Peak stall torque
- Effective torque load factor  $\text{Trms} \leq T_R \times 0.8$   
(Effective torque is 80% less than rated torque)
- Moment of inertia ratio  $J_L \leq J_M \times 10$   
(Load moment of inertia is 10 times or less than the rotor moment of inertia of motor)

Rise in motor temperature can be suppressed by keeping a large margin in torque load factor. The moment of inertia ratio can be controlled at 10 times or more, for example, by slowly rotating the table mechanism. Testing with an actual machine is recommended.

## 8. Calculation of regenerative power

Calculate the regenerative efficient power (PM) to determine the regenerative resistor to be used. From the calculation results, determine whether a built-in regenerative resistor can be used.

### ■ Method of obtaining regenerative efficient power (PM) of horizontal drive shaft Derive the regenerative energy.

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

- EM: Regenerative energy in case of horizontal drive shaft [J]
- Ehb: Regenerative energy during deceleration [J]
- $K_e \phi$ : Voltage constant per phase [ $\text{Vrms}/\text{min}^{-1}$ ] (motor constant)
- KT: Torque constant [ $\text{N}\cdot\text{m}/\text{Arms}$ ] (motor constant)
- N: Motor rotary speed [ $\text{min}^{-1}$ ]
- $R\phi$ : Phase resistance [ $\Omega$ ] (motor constant)
- $t_b$ : Deceleration time [s]
- $T_b$ : Deceleration torque [ $\text{N}\cdot\text{m}$ ]

Derive the regenerative efficient power from regenerative energy.

$$\text{PM} = \frac{\text{EM}}{t}$$

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

### ■ Selection of regenerative resistor

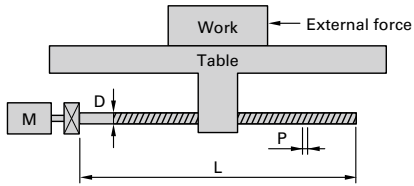
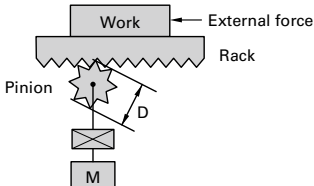
Select a regenerative resistor that meets the following conditions.

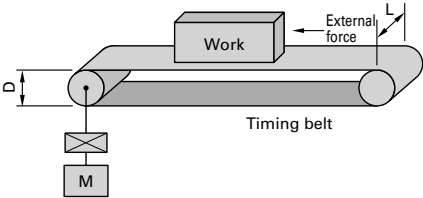
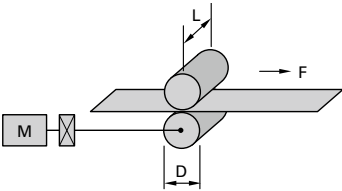
- In case of servo amplifiers with a built-in regenerative resistor:  
Permissible regenerative power [PR] that is less than efficient regenerative power [PM] and can be used with built-in regenerative resistors
- In case of external regenerative resistor:  
Permissible regenerative power [PRO] that is less than efficient regenerative power [PM] and can be used with external regenerative resistors

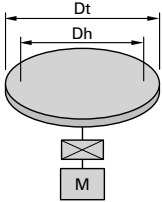
Note that we have servo amplifier models both with and without built-in regenerative resistors for absorbing regenerative power. Select the model accordingly.

# Selection Data for Each Mechanism

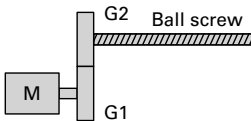
Typical examples of mechanisms and items that require selection are shown below. Provide this information when placing an order.

Ball screw			Rack & pinion		
					
External force	F	<input type="text"/> N	External force	F	<input type="text"/> N
W: Work + table mass	W	<input type="text"/> kg	Work + rack mass	W	<input type="text"/> kg
Ball screw diameter	D	<input type="text"/> m	Pinion diameter	D	<input type="text"/> m
Ball screw length	L	<input type="text"/> m	Pinion thickness	L	<input type="text"/> m
Ball screw lead	P	<input type="text"/> m	Pinion material specific gravity	$\rho$	<input type="text"/> kg/m <sup>3</sup>
Ball screw material specific gravity	$\rho$	<input type="text"/> kg/m <sup>3</sup>	Coefficient of friction	$\mu$	<input type="text"/>
Coefficient of friction	$\mu$	<input type="text"/>	Gear ratio *	G	<input type="text"/>
Gear ratio *	G	<input type="text"/>	Machine efficiency	$\eta$	<input type="text"/>
Machine efficiency	$\eta$	<input type="text"/>			

Belt drive			Roll feed		
					
External force	F	<input type="text"/> N	Sheet tension	F	<input type="text"/> N
Work + belt mass	W	<input type="text"/> kg	Roll diameter	D	<input type="text"/> m
Pulley diameter	D	<input type="text"/> m	Roll width	L	<input type="text"/> m
Pulley width	L	<input type="text"/> m	Roll material specific gravity	$\rho$	<input type="text"/> kg/m <sup>3</sup>
Pulley material specific gravity	$\rho$	<input type="text"/> kg/m <sup>3</sup>	Roll moment of inertia	J	<input type="text"/> kg·m <sup>2</sup>
Pulley moment of inertia	J	<input type="text"/> kg·m <sup>2</sup>	Gear ratio *	G	<input type="text"/>
Gear ratio *	G	<input type="text"/>	Machine efficiency	$\eta$	<input type="text"/>
Machine efficiency	$\eta$	<input type="text"/>			

Rotary table		
		
Table mass	W	<input type="text"/> kg
Table diameter	Dt	<input type="text"/> m
Table support diameter	Dh	<input type="text"/> m
Table moment of inertia	J	<input type="text"/> kg·m <sup>2</sup>
Support part coefficient of friction	$\mu$	<input type="text"/>
Gear ratio *	G	<input type="text"/>
Machine efficiency	$\eta$	<input type="text"/>

\* Derivation of gear ratio (G)



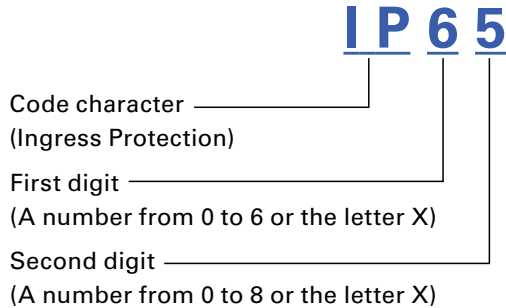
$$G = \frac{\text{Ball screw gear teeth (G2)}}{\text{Motor gear teeth (G1)}}$$



# Motor Protection Rating

## Protection rating

SANYO DENKI servo motor protection ratings are determined in accordance with IEC Standard (IEC 60529, IEC 60034-5) and JIS Standard (JIS C 0920, JIS C 4034-5)



The protection rating (IP code), is defined by IEC (International Electrotechnical Commission) 60529 "DEGREES OF PROTECTION PROVIDED BY ENCLOSURES (IP Code)."  
 Note: 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	Protection against a level of dust that could hinder operation or impair safety	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	Complete protection against dust	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 up to 15°	Vertically dripping water shall have no harmful effect when the enclosure is tilted at an angle up to 15° from its normal position.
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 negotiated with stakeholders. The test conditions are expected to be greater than the requirements for IPx7, and other environmental effects may be added.

Note 1: According to the standard, "the liquid used for the test is to be fresh water," and liquids other than water such as oil are not included in the test conditions.  
 Separate evaluation is necessary when used in environments where machine tool cutting oil is present.  
 Our servo motors have a proven track record for machine tool applications, and we can respond with options, so please contact us as necessary.

Note 2: For the second digit, values of 6 and under indicate compliance with all lower conditions, however when the second digit is 7 it does not indicate protection against jets (indicated by a second digit of 5 or 6)  
 Select a protection rating suitable for your environment.

# Safety Precautions

The products in this catalog are designed to be used with general industrial devices.

Pay sufficient attention to the following:

- Read the Instruction Manual carefully prior to installation, assembly, or operation for the correct usage. The Instruction Manual is available for download from our website.
- Refrain from modifying or processing the product in any way.
- Contact your point of sale or specialized service provider for installation or maintenance services of the product.
- Consult with us when using the product for the following uses, as these require special considerations for operations, maintenance, and management such as redundancy and emergency power generators.

- ❶ Use in medical equipment or other devices that may directly affect people's lives or cause bodily injury
- ❷ Use in transportation systems or transport-related equipment such as trains or elevators, that may affect people's lives or cause bodily injury
- ❸ Use in computer systems that may have a major impact on society or on the public
- ❹ Use in other devices that have a significant impact on human safety or on maintaining public operations

- Consult with us when using the product in an environment where vibrations occur, such as in a moving vehicle or during transportation.
- Use the product only after becoming thoroughly proficient with relevant product knowledge, safety information, and precautions.

## 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 Ranks of the Cautions


The following five safety symbols are used in the manual.


 **DANGER** Indicates immediate hazards that will cause severe bodily injury or death as a result of failure to follow the instructions.

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

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

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

 **PROHIBITED** Indicates actions that must not be taken.

 **MANDATORY** Indicates actions that must be taken.

## **WARNING**

### **Precautions on Use**

1. Do not use the product in explosive environments. Failure to follow this may cause injury or fire.
2. Do not work on wiring, maintenance servicing, or inspection with the power on. After turning off the power, wait at least 15 minutes and confirm extinction of CHARGE-LED for the main circuit power supply, and then start working. Failure to follow this may cause electric shock or product damage.
3. Make sure to ground protective grounding terminals of servo amplifiers to equipment or control board. The grounding terminals of servo motors must be connected to protective grounding terminals of servo amplifiers. Failure to follow this may cause electrical shock.
4. Never touch inside of servo amplifiers with hands. Electrical shock may result.
5. Do not damage, apply excessive stresses, put heavy things on, or tuck down cables. Failure to follow this may cause electrical shock.
6. Never touch the rotating part of servo motors during operation. Failure to follow this may cause injury.

## **CAUTION**

### **Precautions on Use**

1. Use servo amplifiers and servo motors in specified combinations. Failure to follow this may cause fire or product malfunctions.
2. Only technically qualified personnel should transport, install, wire, operate, or perform maintenance and inspection on the product. Failure to follow this may cause electric shock, injury, or fire.
3. Never install the product in a location exposed to water, in a corrosive or flammable gas atmosphere, or in the vicinity of flammable materials. Failure to follow this may cause fire or product malfunctions.
4. Be careful of the high temperatures generated by the servo amplifier/motor and the peripherals. Failure to follow this may cause burns.
5. Never touch regenerative resistors, servo motors, and the radiation fin of servo amplifiers as such equipment reach high temperatures in operation and remain hot for a while after the power is turned off. Failure to follow this may cause burns.
6. When designing a safety system that utilizes Safe Torque Off function, it must be designed by individuals who have specialized knowledge on relevant safety standards after reading and understanding the descriptions of the Instruction Manual. Failure to follow this may cause injury or product failures.
7. Be sure to read the Instruction Manual in advance, and follow the instructions when performing installation, operation, maintenance, and inspection work. Failure to follow this may cause electric shock, injury, or fire.
8. Do not use servo amplifiers and servo motors outside their specified operating ranges. Failure to follow this may cause electric shock, injury, or product damage.
9. For use in high inertial moment or high-speed applications that require high regenerative power that exceeds the capability of the wires in the regenerative resistor, consult us.

### **Transportation**

10. When transporting, do not hold the cables, servo motor shafts, or detector parts. Failure to follow this may cause product damage or injury.
11. Handle the product with care during transportation to prevent it from dropping or falling. Failure to follow this may cause injury.

### **Installation**

12. Do not stand on the product or place heavy objects on top of it. Failure to follow this may cause injury.
13. Make sure that the mounting orientation is correct. Failure to follow this may cause fire or product malfunctions.
14. Do not drop the product or subject it to excessive shock of any kind. Failure to follow this may cause product failures.
15. Do not obstruct the air intake and exhaust vents. Failure to follow this may cause fire.
16. Follow the Instruction Manual and give sufficient spacing within the servo amplifier control board. Failure to follow this may cause fire or product malfunctions.
17. Unpack the box right side up. Failure to follow this may cause injury.
18. Verify that the product you receive is the same product you ordered. Failure to follow this may cause injury or product damage.
19. Take care of falling or overturning of the product during installation. Use eyebolts, if included, for transporting servo motors. Failure to follow this may cause injury.
20. Install the product to incombustible materials such as metals. Failure to follow this may cause fire.
21. For anti-collision devices, use ones that can withstand the maximum output of the system. Failure to follow this may cause injury.

### **Wiring**

22. Perform wiring correctly and securely. Failure to follow this may cause injury.
23. Perform wiring work according to the wiring diagrams or the Instruction Manual. Failure to follow this may cause electric shock or fire.
24. Perform wiring work according to local standards of electrical installations. Failure to follow this may cause motor burnout or fire.

25. Do not connect commercial power supply to the U, V and W terminals of servo motors. Failure to follow this may cause fire or product malfunctions.
26. Install safety devices such as circuit breakers in preparation for short circuiting of external wiring. Failure to follow this may cause fire.
27. Do not bind or band the power cable, input/output signal cable and/or encoder cable together or pass through the same duct or conduit. Failure to follow this may cause faulty operation.
28. When connecting an inductive load such as a relay to the control output signal of the servo amplifier, be sure to connect a surge absorbing diode. Be aware that reverse-connecting the diode polarity may cause servo amplifier malfunctions.
29. Do not connect an AC or 90 VDC power supply to 24 VDC servo motor brakes. Furthermore, do not connect 400 VAC power supply to 200 VAC servo motor cooling fans. Failure to follow this may cause motor burnout or fire.
30. Arrange a relay sequence taking into consideration the delay in hold braking caused by surge absorbers for holding brake relays. Failure to follow this may result in falls or injury.
31. Do not use half-wave rectifier circuits in power supplies of 24 VDC or 90 VDC brakes. Failure to follow this may cause excessive heating or product failures.

### **Controls & Operations**

32. Do not perform drastic setting changes as such changes may cause unstable operation. Failure to follow this may cause injury.
33. Test-run a servo motor with the motor position fixed in isolation from the machinery system. Install the motor to the machinery system only after verifying the motor operation. Failure to follow this may cause injury.
34. The holding brake cannot be used as a dynamic brake for achieving the safety of machinery. For that purpose, install stop devices. Failure to follow this may cause injury.
35. In the case of an alarm, make sure to eliminate the cause and ensure safety before resuming operations. Failure to follow this may cause injury.
36. Verify that the input power supply voltage is within the specified range. Failure to follow this may cause product failures.
37. After a power interruption, avoid getting close to a stopped device as it may restart suddenly. (Design a safety system to prepare for such an event.) Failure to follow this may cause injury.
38. Do not use servo amplifiers or servo motors that have failed, damaged, or burnt out. Failure to follow this may cause injury or fire.
39. Immediately stop operation in case of anomaly. Failure to follow this may cause electric shock, injury, or fire.
40. When using servo motors in vertical axes, install safety devices to prevent a workpiece from falling even in the event of an alarm. Failure to follow this may cause injury or product damage.

### **Maintenance & Inspection**

41. Parts and components used in servo amplifiers (such as electrolytic capacitors, cooling fans, lithium batteries for encoders, fuses, relays, and the like) 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. Contact us when replacing such parts and components.
42. Never touch terminals and connectors while electricity is supplied. Failure to follow this may cause electrical shock.
43. Since the frame of servo amplifiers becomes high in temperature, be careful when conducting maintenance and inspection work. Failure to follow this may cause burns.
44. Contact us for repairs. Disassembling the product by yourself may result in product failures and render it inoperable.

## **PROHIBITED**

### **Storage**

1. Avoid storing the product in places exposed to rain or water drops, or in an environment with hazardous gas or liquid. Failure to follow this may cause malfunctions.

### **Controls & Operations**

2. Brakes equipped with servo motors are intended for holding and must not be used for dynamic braking. Failure to follow this may cause product damage or malfunctions.
3. Do not apply static electricity or excessively high voltage to servo motor encoder cables. Failure to follow this may cause malfunctions.
4. Never rotate servo motors continuously by external force when the amplifier is at "Servo OFF", because it will heat up the motor's standardly-equipped dynamic brake resistor, which is dangerous. Failure to follow this may cause fire or burns.
5. Never use the product with voltages exceeding the specified input voltage range. Failure to follow this may cause component failures, product damage, or injury.
6. Do not turn the power supply on and off frequently. Turning the power supply on and off more than 30 times a day or 5 times per hour may cause premature malfunctions of internal components.

### **Maintenance & Inspection**

7. Do not disassemble or repair the product by yourself. Failure to follow this may cause fire or electric shock.
8. Do not perform measurements of insulation resistance or dielectric voltage. Failure to follow this may cause product damage.

9. Never plug or unplug connectors with the power on (hot swapping) as the resulting surge voltage may cause electronic components malfunctions. Failure to follow this may cause electric shock or product damage.
10. Do not remove the product name plate.

## ⚠ MANDATORY

### Storage

1. Store the product where it is not exposed to direct sunlight, and within the specified temperature and humidity ranges [ -20 to +65°C, below 90% RH (non-condensing)]. Failure to follow this may cause product malfunctions.
2. If servo amplifiers have been stored for a long period (3 years or longer), contact us. The capacitance of electrolytic capacitors can decrease due to the long period storage, which may cause malfunctions.
3. If servo motors have been stored for a long period (3 years or longer), contact us. Check on bearings and brakes will be needed.

### Transportation

4. Follow the instructions written on the package box and avoid excessively stacking the boxes. Failure to follow this may cause injury.
5. For transporting servo motors, use the included eyebolts. Do not use them for transporting the device in which servo motors are embedded in. Failure to follow this may cause injury or product failures.

### Wiring

6. Install an external emergency stop circuit that can stop machinery and cut off the power instantaneously. Also, install an external protective circuit to the amplifier to cut off the power from the main circuit in the case of an alarm. Failure to follow this may cause injury, fire, motor runaway, motor burnout, or secondary damage.

### Controls & Operations

7. Protection devices are not supplied with servo motors. Prepare an overvoltage protection device, earth leakage breaker, overheat protection device, and emergency stop device to ensure safe operation. Failure to follow this may cause injury or fire.
8. Use the products within the specified temperature and humidity ranges.  
For servo amplifiers: temperature: 0 to 55°C; humidity: 90% RH or less (no condensation)  
For servo motors: temperature: 0 to 40°C; humidity: 90% RH or less (no condensation)  
Failure to follow this may cause burnout or malfunction.

### Disposal

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

# Harmonic Suppression Measures Guidelines

Harmonic current generated by equipment such as servo amplifiers can potentially have adversely impact on other power consumers, if it flows out. For that reason, the "How to Calculate Harmonic Current of Servo Amplifiers for Specific Users" was stipulated by the Japan Ministry of International Trade and Industry (current Ministry of Economy, Trade and Industry).

Servo amplifiers used by specific power consumers fall in the category of "harmonic wave generating devices" that are subject to these guidelines. Those power consumers who are subject to these guidelines must determine whether or not any measures for harmonics suppression are required and if so, the measures must be implemented to ensure that the harmonic current emissions are within the limit values stipulated by the contract demand. Implementation of harmonic suppression measures are recommended to prevent impediments arising from harmonics, even for users not subject to the guidelines.

Servo amplifiers we supply are equivalent to the circuit classification shown in Table 1 of the "Application Guide for Evaluation of Harmonic Currents Emitted by Consumers of Middle- or High-Voltage Power Supply".

Refer to the document described below for calculation method of harmonic currents.

- "How to Calculate Harmonic Current of Servo Amplifiers for Specific Power Consumers" (JEM-TR225), 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 countermeasures must be implemented for harmonic suppression of servo amplifiers, connect a harmonic suppression reactor. Contact us for the harmonic suppression reactor.

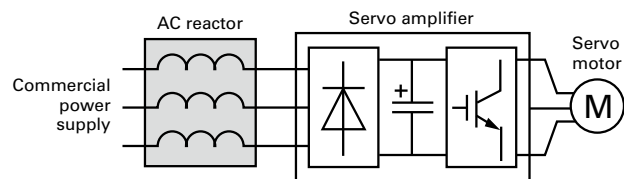


Table 1

Servo amplifier model no.	Power supply	Circuit classification	Circuit type	Conversion factor Ki		
RS3□01□□ RS3□02□□ RS3□03□□ RS3□05□□	3-Phase	3	3-Phase bridge (Condenser smooth)	3-1	6-pulse converter without reactor	K31=3.4
				3-2	6-pulse converter with reactor (AC side)	K32=1.8
	Single-phase	4	Single-phase bridge (Condenser smooth, full-wave rectification)	4-3	Without reactor	K43=2.9
				4-4	With reactor (AC side)	K44=1.3
RS3A10□□ RS3A15□□ RS3A30□□ RS3A07□□ RS3PAA27000 (Power supply unit for RS3W60□□)	3-Phase	3	3-Phase bridge (Condenser smooth)	3-1	6-pulse converter without reactor	K31=3.4
				3-2	6-pulse converter with reactor (AC side)	K32=1.8

References
<ul style="list-style-type: none"> <li>· "Guidelines of Harmonics Reduction for Consumers of High or Ultra-High Voltage Power" (September 1994) Japan Ministry of International Trade and Industry (current Japan Ministry of Economy, Trade and Industry)</li> <li>· "Technical Guidelines for Suppressing Harmonics" (JEAG 9702-2013), The Japan Electric Association</li> <li>· "Measures for Suppressing Servo Amplifier Harmonics" (February 2015), Japan Electrical Manufacturers' Association</li> <li>· "How to Calculate Harmonic Current of Servo Amplifiers for Specific Power Consumers" (JEM-TR225), Japan Electrical Manufacturers' Association</li> <li>· "Guidelines for Suppressing Servo Amplifier (input current of 20 A or less) Harmonics" (JEM-TR227), Japan Electrical Manufacturers' Association</li> </ul>







## ■ ECO PRODUCTS

SANYO DENKI's ECO PRODUCTS are designed with the concept of lessening impact on the environment in the process from product development to waste. The product units and packaging materials are designed for reduced environmental impact. We have established our own assessment criteria on the environmental impacts applicable to all processes, ranging from design to manufacture. Those products that satisfy the criteria are accredited as ECO PRODUCTS.

### Notes before Purchase

The products in this catalog are designed to be used with general industrial devices.

Always follow the following precautions.

- Read the accompanying Instruction Manual carefully prior to using the product.
- If applying to medical devices and other equipment affecting people's lives, please contact us beforehand and take appropriate safety measures.
- If applying to equipment that can have significant effects on society and the general public, please contact us beforehand.

· Do not use this product in an environment where vibration is present, such as in a moving vehicle or shipping vessel.

· Do not perform any retrofitting, re-engineering, or modification to this equipment.

· The products presented in this catalog are meant to be used for general industrial applications. If using for special applications related to aviation and space, nuclear power, electric power, submarine repeaters, and the like, please contact us beforehand.