

## ACサーボパック $\Sigma$ -Vシリーズ 安全上のご注意

形式 SGDV-□□□F□□A  
SGDV-□□□A□□□  
SGDV-□□□D□□A

製品を安全にお使いいただくために、本書を必ずお読みください。  
また、本書をお手元に保管していただくとともに、最終的に本製品をご使用になるユーザー様のお手元に確実に届けられるよう、お取り計らい願います。

## AC SERVOPACK $\Sigma$ -V SERIES SAFETY PRECAUTIONS

Type SGDV-□□□F□□A  
SGDV-□□□A□□□  
SGDV-□□□D□□A

To properly use the product, read this manual thoroughly and retain for easy reference, inspection, and maintenance. Ensure the end user receives this manual.

## SERVOPACK CA SERIE $\Sigma$ -V PRECAUTIONS DE SECURITE

Type SGDV-□□□F□□A  
SGDV-□□□A□□□  
SGDV-□□□D□□A

Pour utiliser correctement le produit, lisez attentivement ce manuel. Conservez-le comme références et pour les cas d'inspections et de maintenance. Assurez-vous que l'utilisateur final reçoive ce manuel.



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## General Precautions

- The drawings presented in this manual are sometimes shown without covers or protective guards. Always replace the cover or protective guard as specified first, and then operate the products in accordance with the manual.
- The drawings presented in this manual are typical examples and may not match the product you received.
- This manual is subject to change due to product improvement, specification modification, and manual improvement. When this manual is revised, the manual code is updated and the new manual is published as a next edition. The edition number appears on the front and back covers.
- Yaskawa will not take responsibility for the results of unauthorized modifications of this product. Yaskawa shall not be liable for any damages or troubles resulting from unauthorized modification.

## Safety Information

The following conventions are used to indicate precautions in this manual. Failure to heed precautions provided in this manual can result in serious or possibly even fatal injury or damage to the products or to related equipment and systems.




Indicates precautions that, if not heeded, could possibly result in loss of life or serious injury.




Indicates precautions that, if not heeded, could result in relatively serious or minor injury, damage to the product, or faulty operation.

In some situations, the precautions indicated could have serious consequences if not heeded.



Indicates prohibited actions that must not be performed. For example, this symbol would be used to indicate that fire is prohibited as follows: .



Indicates compulsory actions that must be performed. For example, this symbol would be used as follows to indicate that grounding is compulsory: .


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## Notes for Safe Operation

### WARNING

- Never touch any rotating motor parts while the motor is running.  
Failure to observe this warning may result in injury.
- Before starting operation with a machine connected, make sure that an emergency stop can be applied at any time.  
Failure to observe this warning may result in injury or damage to the product.
- Never touch the inside of the SERVOPACKs.  
Failure to observe this warning may result in electric shock.
- Do not remove the cover of power supply terminal while the power is ON.  
Failure to observe this warning may result in electric shock.
- Do not touch terminals for five minutes after the power is turned OFF.  
Residual voltage may cause electric shock.
- Do not touch terminals while the charge indicator is lit.  
Residual voltage may cause electric shock.
- Do not touch terminals for five minutes after voltage resistance test.  
Residual voltage may cause electric shock.
- Follow the procedures and instructions for the trial operation as noted in the applicable manual for that product.  
Malfunctions that occur after the servomotor is connected to the equipment not only damage the equipment, but may also cause an accident resulting in death or injury.
- The output range of multi-turn data for  $\Sigma$ -V series absolute detection system differs from that for conventional systems (15-bit encoder and 12-bit encoder). Especially when "Infinite length positioning system" of  $\Sigma$  series is to be configured with  $\Sigma$ -V series, be sure to make the system modification.

## WARNING

- The multi-turn limit value must be changed only for special applications.  
Changing it inappropriately or unintentionally can be dangerous.
- If the Multi-turn Limit Disagreement alarm occurs, check the setting of parameter Pn205 in the SERVOPACK to be sure that it is correct.  
If Fn013 is executed when an incorrect value is set in Pn205, an incorrect value will be set in the encoder. The alarm will disappear even if an incorrect value is set, but incorrect positions will be detected, resulting in a dangerous situation where the machine will move to unexpected positions.
- Do not remove the front cover, cables, connectors, or optional items on the foreside while the power is ON.  
Failure to observe this warning may result in electric shock.
- Do not damage, press, exert excessive force or place heavy objects on the cables.  
Failure to observe this warning may result in electric shock, stopping operation of the product, or fire.
- Do not modify the product.  
Failure to observe this warning may result in injury, damage to the product, or fire.
- Provide an appropriate stopping device on the machine side to ensure safety. A holding brake for a servomotor with brake is not a stopping device for ensuring safety.  
Failure to observe this warning may result in injury.
- Do not come close to the machine immediately after resetting momentary power loss to avoid an unexpected restart. Take appropriate measures to ensure safety against an unexpected restart.  
Failure to observe this warning may result in injury.
-  Connect the ground terminal to electrical codes (ground resistance: 100  $\Omega$  or less for a SERVOPACK with a 200 V/100 V power supply. 10  $\Omega$  or less for a SERVOPACK with a 400 V power supply).  
Improper grounding may result in electric shock or fire.



## WARNING



- Installation, disassembly, or repair must be performed only by authorized personnel.  
Failure to observe this warning may result in electric shock or injury.
- The person who designs a system using the safety function (Hard Wire Baseblock function) must have full knowledge of the related safety standards and full understanding of the instructions in  $\Sigma$ -V series User's Manual Design and Maintenance.  
Failure to observe this warning may result in injury or damage to the product.

## Storage and Transportation

### CAUTION

- Do not store or install the product in the following places.
  - Locations subject to direct sunlight.
  - Locations subject to temperatures outside the range specified in the storage/installation temperature conditions.
  - Locations subject to humidity outside the range specified in the storage/installation humidity conditions.
  - Locations subject to condensation as the result of extreme changes in temperature.
  - Locations subject to corrosive or flammable gases.
  - Locations subject to dust, salts, or iron dust.
  - Locations subject to exposure to water, oil, or chemicals.
  - Locations subject to shock or vibration.

Failure to observe this caution may result in fire, electric shock, or damage to the product.

- Do not hold the product by the cables, motor shaft, or detector while transporting it.  
Failure to observe this caution may result in injury or malfunction.
- Do not place any load exceeding the limit specified on the packing box.  
Failure to observe this caution may result in injury or malfunction.
- If disinfectants or insecticides must be used to treat packing materials such as wooden frames, pallets, or plywood, the packing materials must be treated before the product is packaged, and methods other than fumigation must be used.

Example: Heat treatment, where materials are kiln-dried to a core temperature of 56°C for 30 minutes or more.

If the electronic products, which include stand-alone products and products installed in machines, are packed with fumigated wooden materials, the electrical components may be greatly damaged by the gases or fumes resulting from the fumigation process. In particular, disinfectants containing halogen, which includes chlorine, fluorine, bromine, or iodine can contribute to the erosion of the capacitors.

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## Installation

 **CAUTION**

- Never use the products in an environment subject to water, corrosive gases, inflammable gases, or combustibles.  
Failure to observe this caution may result in electric shock or fire.
- Do not step on or place a heavy object on the product.  
Failure to observe this caution may result in injury or malfunction.
- Do not cover the inlet or outlet ports and prevent any foreign objects from entering the product.  
Failure to observe this caution may cause internal elements to deteriorate resulting in malfunction or fire.
- Be sure to install the product in the correct direction.  
Failure to observe this caution may result in malfunction.
- Provide the specified clearances between the SERVOPACK and the control panel or with other devices.  
Failure to observe this caution may result in fire or malfunction.
- Do not apply any strong impact.  
Failure to observe this caution may result in malfunction.



## Wiring



### CAUTION

- **Be sure to wire correctly and securely.**  
Failure to observe this caution may result in motor overrun, injury, or malfunction.
- **Do not connect a commercial power supply to the U, V, or W servomotor connection terminals.**  
Failure to observe this caution may result in injury or fire.
- **Securely connect the power supply terminal screws and servomotor connection terminal screws.**  
Failure to observe this caution may result in fire.
- **Do not bundle or run the main circuit cables and input/output signal lines or the encoder cables together in the same duct. Keep power and signal lines separated by at least 30 cm.**
- **Use twisted-pair shielded wires or multi-core twisted pair shielded wires for input/output signal lines and the encoder cables.**  
The maximum length is 3 m for input/output signal lines and 20 m for encoder cables.
- **Do not touch the power terminals for 5 minutes after turning power OFF because high voltage may still remain in the SERVOPACK.**  
Make sure the charge indicator is out first before wiring or starting an inspection.
- **Observe the following precautions when wiring main circuit terminal blocks.**
  - If the main circuit terminal is the connector, remove the connector from the SERVOPACK prior to wiring.
  - Insert only one wire per insertion slot on the terminal block and the connector.
  - Make sure that the core wire is not electrically shorted to adjacent core wires.

## CAUTION

- Install the battery at either the host controller and the battery unit of the encoder.  
It is dangerous to install batteries at both simultaneously, because that sets up a loop circuit between the batteries.
- Always use the specified power supply voltage.  
An incorrect voltage may result in fire.
- Take appropriate measures to ensure that the input power supply is supplied within the specified voltage fluctuation range. Be particularly careful in places where the power supply is unstable.  
An incorrect power supply may result in damage to the product.
- Install external breakers or other safety devices against short-circuiting in external wiring.  
Failure to observe this caution may result in fire.
- Take appropriate and sufficient countermeasures for each when installing systems in the following locations.
  - Locations subject to static electricity or other forms of noise.
  - Locations subject to strong electromagnetic fields and magnetic fields.
  - Locations subject to possible exposure to radioactivity.
  - Locations close to power supplies.Failure to observe this caution may result in damage to the product.
- Do not reverse the polarity of the battery when connecting it.  
Failure to observe this caution may damage the battery, SERVOPACK, and servomotor or cause it to explode.
- Wiring or inspection must be performed by a technical expert.

## Operation

### CAUTION

- Conduct trial operation on the servomotor alone with the motor shaft disconnected from machine to avoid any unexpected accidents.  
Failure to observe this caution may result in injury.
- Before starting operation with a machine connected, change the settings to match the parameters of the machine.  
Starting operation without matching the proper settings may cause the machine to run out of control or malfunction.
- Avoid frequently turning power ON and OFF.  
Since the SERVOPACK has a capacitor in the power supply, a high charging current flows when power is turned ON. Frequently turning power ON and OFF causes main power devices like capacitors and fuses to deteriorate, resulting in unexpected problems.
- Forced stop function with forward/reverse overtravel is not effective during JOG mode operation using utility function Fn002 and zero point search using Fn003.
- When using the servomotor for a vertical axis, install the safety devices to prevent workpieces to fall off due to occurrence of alarm or overtravel. Set the servomotor so that it will stop in the zero clamp state at occurrence of overtravel.  
Failure to observe this caution may cause workpieces to fall off due to overtravel.
- When not using the tuning-less function, set to the correct moment of inertia ratio Pn103.  
Setting to an incorrect moment of inertia ratio may cause vibration.
- Do not touch the SERVOPACK heatsinks, regenerative resistor, or servomotor while power is ON or soon after the power is turned OFF.  
Failure to observe this caution may result in burns due to high temperatures.
- Do not make any extreme adjustments or setting changes of parameters.  
Failure to observe this caution may result in injury or damage to the product due to unstable operation.

## CAUTION

- When an alarm occurs, remove the cause, reset the alarm after confirming safety, and then resume operation.  
Failure to observe this caution may result in damage to the product, fire, or injury.
  - Do not use the holding brake of the servomotor for braking.  
Failure to observe this caution may result in malfunction.
  - Always use the servomotor and SERVOPACK in one of the specified combinations.  
Failure to observe this caution so may result in fire or malfunction.
  - The servomotor stopping method of turning the main-circuit or control-circuit power OFF without turning the servo OFF during operation can not be set in Parameter Pn001.
    - When turning the main-circuit power OFF without turning the servo OFF:  
The servomotor will be stopped by dynamic braking (DB).
    - When turning the control-circuit power OFF without turning the servo OFF:  
The stopping method will vary depending on the SERVOPACK model.
- Refer to the  $\Sigma$ -V Series User's Manual Design and Maintenance for details.

## Maintenance and Inspection

### CAUTION

- Do not disassemble the SERVOPACK.  
Failure to observe this caution may result in electric shock or injury.
- Do not attempt to change wiring while the power is ON.  
Failure to observe this caution may result in electric shock or injury.
- When replacing the SERVOPACK, resume operation only after transferring the previous SERVOPACK parameters to the new SERVOPACK.  
Failure to observe this caution may result in damage to the product.

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## Disposal



### CAUTION

- Correctly discard the product as stipulated by regional, local, and municipal laws and regulations. Be sure to include these contents in all labelling and warning notifications on the final product as necessary.



## Warranty Information

### Free Warranty Period

This product is warranted for twelve months after being delivered to Yaskawa's customer or if applicable eighteen months from the date of shipment from Yaskawa's factory whichever comes first.

### Scope of Warranty

If a Yaskawa product is found to be defective due to Yaskawa workmanship or materials and the defect occurs during the warranty period, Yaskawa will provide a replacement, repair the defective product, and provide shipping to and from the site free of charge.

However, if the Yaskawa Authorized Service Center determines that the problem with a Yaskawa product is not due to defects in Yaskawa's workmanship or materials, then the customer will be responsible for the cost of any necessary repairs.

# 1 Checking Products on Delivery

Check the following items when the  $\Sigma$ -V Series SERVOPACK is delivered.

Items	Check Method
Is the delivered SERVOPACK the one that was ordered?	Check the model numbers marked on the nameplates of the SERVOPACK. Check the accessories as well.
Is there any damage?	Check the overall appearance, and check for damage or scratches that may have occurred during shipping.
Are there any loose screws?	Check screws for looseness using a screwdriver.

If any of the above items are faulty or incorrect, contact your Yaskawa sales representative or the dealer from whom you purchased the products.

## 1.1 Nameplate



SERVOPACK nameplate

## 2 Installation

Observe the Installation instructions in *Σ-V series User's Manual Setup Rotational Motor* (SIEPS80000043) or *Σ-V series User's Manual Setup Linear Motor* (SIEPS80000044).

For installation sites, use proper care with the following notes.

Situation	Notes on Installation
When installed in a control panel	<ul style="list-style-type: none"> <li>• Design the control panel size, unit layout, and cooling method so that the surrounding air temperature of the SERVOPACK does not exceed 55°C.</li> <li>• When installing multiple SERVOPACKs side by side in a control panel, install cooling fans and provide sufficient space around each SERVOPACK to allow cooling by fan and natural convection.</li> </ul>
When installed near a heating unit	Suppress radiation heat from the heating unit and a temperature rise caused by convection so that the surrounding air temperature of the SERVOPACK does not exceed 55°C.
When installed near a source of vibration	Install a vibration isolator underneath the SERVOPACK to prevent it from receiving vibration.
When installed in a place receiving corrosive gases	Corrosive gases do not immediately affect the SERVOPACK but will eventually cause SERVOPACK or contactor-related devices to malfunction. Take appropriate action to protect against corrosive gases.
Others	<ul style="list-style-type: none"> <li>• Avoid installation in a hot and humid place or where excessive dust or iron powder is present in the air.</li> <li>• Be sure there is no condensation or freezing.</li> <li>• Keep the surrounding air temperature 45 °C or less to ensure long-term reliability.</li> </ul>

## 3 Wiring

### 3.1 Molded-case Circuit Breaker and Fuse

When choosing a molded-case circuit breaker and a fuse capacity, refer to this table. The rated input current of the SERVOPACK is the nominal value at the rated load.

Select the appropriate capacity in accordance with the specified derating.

Cutoff characteristics (25°C): 300% five seconds min.

SERVOPACK Model SGD V-	Power Supply Capacity per SERVOPACK (kVA)	Rated Input Current of SERVOPACK (Arms)		Rated Voltage									
		Main circuit power supply	Control circuit power supply	Fuse	MCCB								
R70F	0.2	1.5	0.38	250 V	240 V								
R90F	0.3	2.5											
2R1F	0.7	5											
2R8F	1.4	10											
R70A	0.2	1.0	0.2			250 V	240 V						
R90A	0.3	1.0											
1R6A	0.6	2.0											
2R8A	1	3.0											
3R8A	1.4	3.0											
5R5A	1.6	6.0											
7R6A	2.3	6.0											
120A	3.2	7.5	0.25					250 V	240 V				
180A	4	10											
200A	5.9	15											
330A	7.5	25											
470A	10.7	29	0.3	250 V	240 V								
550A	14.6	37											
590A	21.7	54											
780A	29.6	73	0.45			600 V	480 V						
1R9D	1.1	1.4											
3R5D	2.3	2.9	1.2							600 V	480 V		
5R4D	3.5	4.3											
8R4D	4.5	5.8											
120D	7.1	8.6	1.4									600 V	480 V
170D	11.7	14.5											
210D	12.4	17.4											
260D	14.4	21.7											
280D	21.9	31.8	1.5					600 V	480 V				
370D	30.6	43.4											
			1.7	600 V	480 V								



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## 3.2 Main Circuit Wiring

The maximum available voltage is

- With 100-V class: 115 Vrms
- With 200-V class: 230 Vrms
- With 400-V class: 480 Vrms (neutral grounding)

Use a flexible cable for moving parts when the SERVOPACK is used with a linear servomotor.

## 3.3 Wire Size and Tightening Torque

### ■ Cable Types

- Wire sizes are selected for three cables per bundle at 40°C surrounding air temperature with the rated current.
- Use cable with a minimum withstand voltage of 600 V for main circuits.
- If cables are bundled in PVC or metal ducts, consider the reduction ratio of the allowable current.
- Use heat-resistant cables under high surrounding air or panel temperatures where normal vinyl cables will rapidly deteriorate.
- Use cables within the allowable moment of inertia.
- Do not use cables under continuous regenerative state.

The following table shows the wire size and allowable current for three cables. Use a cable whose specifications meet or are less than the values in the table.

## 600-V Heat-resistant Vinyl Cables (HIV)

AWG Size	Nominal Cross Section Diameter mm <sup>2</sup>	Configuration Number of wires/mm <sup>2</sup>	Conductive Resistance Ω/km	Allowable Current at Surrounding Air Temperature A		
				30°C	40°C	50°C
20	0.5	19/0.18	39.5	6.6	5.6	4.5
–	0.75	30/0.18	26.0	8.8	7.0	5.5
18	0.9	37/0.18	24.4	9.0	7.7	6.0
16	1.25	50/0.18	15.6	12.0	11.0	8.5
14	2.0	7/0.6	9.53	23	20	16
12	3.5	7/0.8	5.41	33	29	24
10	5.5	7/1.0	3.47	43	38	31
8	8.0	7/1.2	2.41	55	49	40
6	14.0	7/1.6	1.35	79	70	57
4	22.0	7/2.0	0.85	91	81	66

Note: The values in the table are only for reference.

### ■ Wire Size


The following table shows the markings for the power-supply terminals, the wire sizes, the screw sizes and torque for the ground terminals of the SERVOPACK.

L1, L2, L3: Main circuit power-supply input terminals


U, V, W: Servomotor connection terminals

L1C, L2C / 24 V, 0 V: Control power input terminals


B1, B2: External regenerative resistor terminals

: Ground terminal

## Wire Size and Tightening Torque for Connectors

SERVOPACK Model SGDV-	Terminal Symbol and Wire Size(mm <sup>2</sup> )					Ground Terminal			
	L1, L2, L3 /L1, L2	U, V, W	L1C, L2C /24V, 0V	B1/+, B2		Terminal Screw Size	Tightening Torque (N·m)		
R70F	HIV 1.25	HIV 1.25	HIV 1.25	HIV 1.25	HIV2.0 or more	M4	1.2 to 1.4		
R90F									
2R1F									
2R8F									
R70A	HIV 1.25	HIV 1.25	HIV 1.25	HIV 1.25	HIV2.0 or more	M4	1.2 to 1.4		
R90A									
1R6A									
2R8A								HIV 2.0	
3R8A									HIV 2.0
5R5A									
7R6A									
120A									
1R9D	HIV 1.25	HIV 1.25	HIV 1.25	HIV 1.25	HIV2.0 or more	M4	1.2 to 1.4		
3R5D									
5R4D									


## Wire Size and Tightening Torque for Terminal Screws


SERVOPACK Model SGD V-	Terminal Symbol and Wire Size(mm <sup>2</sup> )					Terminal Screw Size	Tightening Torque (N·m)	
	L1, L2, L3	U, V, W	L1C, L2C /24V, 0V	B1/+, B2				
180A	HIV 3.5	HIV 3.5	HIV 1.25	HIV 2.0	HIV2.0 or more	M4	1.2 to 1.4* <sup>1</sup>	
200A		HIV 5.5		HIV 3.5				
330A	HIV 5.5	HIV 8.0		HIV 5.5				
470A	HIV 8.0	HIV 14.0		HIV 8.0				
550A	HIV 14.0							
590A	HIV 22.0							
780A		HIV 22.0		HIV 22.0				
8R4D	HIV 2.0	HIV 2.0	HIV 1.25	HIV 1.25	HIV2.0 or more	M4* <sup>3</sup>	1.2 to 1.4* <sup>3</sup>	
120D								
170D	HIV 3.5	HIV 3.5				HIV 2.0	M5* <sup>4</sup>	1.6 to 2.4* <sup>4</sup>
210D	HIV 3.5	HIV 5.5				HIV 3.5	M6* <sup>5</sup>	4.5 to 5.5* <sup>5</sup>
260D	HIV 5.5							
280D	HIV 8.0	HIV 8.0				HIV 5.5		
370D	HIV 14.0	HIV 14.0				HIV 8.0		

\* 1. The tightening torque is 1.8 N·m for the following terminal on the SGD V-330A SERVOPACK.

- Servomotor connection terminals (U, V, W)

\* 2. The tightening torque is 2.5 to 3.8 N·m for the following terminal on the SGD V-470A, -550A, -590A, and -780A SERVOPACKs.

- Ground terminal ()

\* 3. The tightening torque is 1.4 N·m for all terminals other than the ground terminal () on the SGD V-8R4D and -120D SERVOPACKs.


\* 4. The screw size is M5 and the tightening torque is 2.4 N·m for the following terminals on the SGD V-170D SERVOPACK.

- Main circuit power-supply input terminals (L1, L2, L3)
- Servomotor connection terminals (U, V, W)

The screw size is M4 and the tightening torque is 1.8 N·m for the following terminals on the SGD V-170D SERVOPACK.

- Control power input terminals (24 V, 0 V)

- External regenerative resistor terminals (B1/+, B2)
- \* 5. The tightening torque is 2.5 to 3.8 N·m for the following terminals on the SGD V-210D, -260D, -280D, and -370D SERVOPACKs.

- Ground terminal ()

The screw size is M4 and the tightening torque is 1.4 N·m for the following terminals on the SGD V-210D, -260D, -280D, and -370D SERVOPACKs.

- Control power input terminals (24 V, 0 V)

## 4 Inspection

### 4.1 SERVOPACK Inspection

For inspections and maintenance of the SERVOPACK, follow the inspection procedures in the table below at least once every year.

Item	Frequency	Procedure	Remedy
Exterior	At least once a year	Check for dust, dirt, and oil on surfaces.	Clean with compressed air or cloth.
Loose screws		Check for loose terminal block and connector screws.	Tighten any loose screws.

### 4.2 SERVOPACK's Parts Replacement Schedule

The following electric or electronic parts are subject to mechanical wear or deterioration over time. To avoid failure, replace these parts at the frequency indicated.

Refer to the standard replacement period in the following table, contact your Yaskawa representative. After an examination of the part in question, we will determine whether the parts should be replaced or not.

The parameters of any SERVOPACKS overhauled by Yaskawa are reset to the factory settings before shipping. Be sure to confirm that the parameters are properly set before starting operation.

Part	Standard Replacement Period	Operating Conditions
Cooling Fan	4 to 5 years	<ul style="list-style-type: none"><li>• Surrounding Air Temperature: Annual average of 30°C</li><li>• Load Factor: 80% max.</li><li>• Operation Rate: 20 hours/day max.</li></ul>
Smoothing Capacitor	7 to 8 years	
Relays	–	
Fuses	10 years	
Aluminum Electrolytic Capacitor on Circuit Board	5 years	

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## 5 Compliance with CE Marking

### 5.1 Installation Conditions of EMC Directive

To adapt the EMC directives (EN55011 group 1 class A, EN61800-3) for a combination test using servomotors and SERVOPACKs from the  $\Sigma$ -V series, a ferritic core, a noise filter, or a surge absorber must be used. For details, read the Installation instructions in  *$\Sigma$ -V series User's Manual Setup Rotational Motor* (SIEPS80000043) or  *$\Sigma$ -V series User's Manual Setup Linear Motor* (SIEPS80000044).

However, because this product is built-in, check that the following conditions are still met after being installed in the final product.

### 5.2 Conditions Corresponding to Low Voltage Directive

To adapt SERVOPACKs to the Low Voltage Directive, make sure that the following environmental conditions are met.

- Installation category: III
- Pollution degree: 2
- Protection class: 10
- Altitude: 1000 m max.

Be sure to install a fuse for the main circuit power-supply as well as meeting these environmental conditions. To choose the fuse capacity, refer to *3.1 Molded-case Circuit Breaker and Fuse*.

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## 6 Installation Conditions of UL Standards

To adapt SERVOPACKs to the UL standards, make sure that the following conditions are met.

- Pollution degree: 2
- Protection class: 10
- Altitude: 1000 m max.
- Use the maximum tightening torque listed in the tables in the *3.3 Wire Size and Tightening Torque*.
- Use 75°C heat-resistant copper wires or an equivalent.
- The maximum applicable voltage is given below regardless of the short-circuit current rating (SCCR).
  - With 100-V class: 115 Vrms
  - With 200-V class: 230 Vrms
  - With 400-V class: 480 Vrms (neutral grounding)
- SERVOPACKs must be used with UL-listed fuses or circuit breakers, in accordance with the guidelines of the National Electrical Code (NEC).
- The short-circuit current rating (SCCR) of 100-V class and 200-V class SERVOPACKs is 5,000 Arms (sine wave).
- For 400-V class SERVOPACKs, the short-circuit current rating (SCCR) of the SERVOPACK depends on the type of branch circuit protective device that you connect. The end user must use a transient suppressive device on the 24-VDC control power input to limit transient overvoltages to 500 V maximum. (Example: surge absorber, etc.)



■ **Short-circuit Current Rating (SCCR): 5,000 Arms (Sine Wave)**

When choosing a molded-case circuit breaker and a fuse capacity, refer to the table in the *3.1 Molded-case Circuit Breaker and Fuse*. The following restrictions apply, depending on the SERVOPACKs used.

SERVOPACK Model SGD V-	Restrictions
180A, 200A	Available rated current for molded-case circuit breaker: 40 A or less
330A	<ul style="list-style-type: none"> <li>• Available rated current for non-time delay fuse: 70 A or less</li> <li>• Available rated current for time delay fuse: 40 A or less</li> <li>• Do not use single wires.</li> </ul>
470A, 550A	<ul style="list-style-type: none"> <li>• Available rated current for molded-case circuit breaker: 60 A or less</li> <li>• Available rated current for non-time delay fuse or time delay fuse: 60 A or less</li> </ul>
590A, 780A	<ul style="list-style-type: none"> <li>• Available rated current for molded-case circuit breaker: 100 A or less</li> <li>• Available rated current for non-time delay fuse or time delay fuse: 100 A or less</li> </ul> (Available rated current for class J non-time delay or faster fuse: 125 A or less)
210D, 260D	<ul style="list-style-type: none"> <li>• Available rated current for molded-case circuit breaker: 60 A or less</li> <li>• Available rated current for non-time delay fuse: 60 A or less</li> <li>• Available rated current for time delay fuse: 35 A or less</li> </ul>
280D, 370D	<ul style="list-style-type: none"> <li>• Available rated current for molded-case circuit breaker: 80 A or less</li> <li>• Available rated current for non-time delay fuse: 125 A or less</li> <li>• Available rated current for time delay fuse: 75 A or less</li> </ul>

■ Short-circuit Current Rating (SCCR): 42,000 Arms (Sine Wave)

SERVOPACKs must be used with the following fuses.

SERVOPACK Model SGDv-	Rated Output Current (Arms)	FWH Series* <sup>1</sup>	A70QS (22F) Series* <sup>2</sup>	A70QS (14F) Series* <sup>2</sup>
1R9D	1.9	FWH-35B	A70QS50-22F	A70QS40-14F
3R5D	3.5			
5R4D	5.4			
8R4D	8.4	FWH-50B	A70QS63-22F	A70QS50-14F
120D	11.9			
170D	16.5	FWH-60B	A70QS80-22F	-
210D	20.8			
260D	25.7			
280D	28.1	FWH-100B	A70QS100-22F	-
370D	37.2			

\* 1. FWH series is manufactured by Bussmann.

\* 2. A70QS series is manufactured by Mersen.





■ Servomotor Overtemperature Protection

Motor overtemperature protection that complies with UL standards (i.e., has speed-sensitive overload protection) is not provided. Motor overtemperature protection must be provided in the end use when required by the NEC/NFPA70 (Article 430, Chapter X, 430.126).

When used with a Yaskawa SGM□□ servomotor, external overtemperature protection may not be needed because the motor is rated for continuous torque from 0 to the rated speed.

## 6 Installation Conditions of UL Standards


For the SGD V-330A, -590A, -780A, -280D and -370D SERVOPACKs, connect cables using following terminal kits.

SERVOPACK Model SGD V-	Connection Terminals	Crimp Terminal Model (By J.S.T.Mfg. Co.,Ltd.)	Sleeve Model (By Tokyo Dip Co.,Ltd.)	Terminal Kit Model (Quantity of Crimp Terminal and Sleeve Required per SERVOPACK)
330A	L1C, L2C (Control Power Input)	R1.25-4*1	TP-003 (Black)*7	JZSP-CVT9-330A-E: 1 set*12
	-1, -2 (DC Reactor) B1+, -2 (DC Power Input)	5.5-4NS	TP-006 (White)*8	
	U, V, W (Motor Main Circuit)	8-4NS	TP-014 (Black)*9	
	 (Input Power and Motor Main Circuit)	R2-4*2	/	
590A, 780A	L1, L2, L3 (Main Power Input)	R22-6*3	TP-038 (Black)*10	JZSP-CVT9-780A-E: 1 set*12
	U, V, W (Motor Main Circuit)			
	 (Input Power and Motor Main Circuit)	R2-6*4	/	
280D	U, V, W (Motor Main Circuit)	R8-6*5	TP-014 (Black)*9	JZSP-CVT9-280D-E: 1 set*12
	 (Input Power and Motor Main Circuit)	R2-6*4	/	
370D	U, V, W (Motor Main Circuit)	R14-6*6	TP-022 (Black)*11	JZSP-CVT9-370D-E: 1 set*12
	 (Input Power and Motor Main Circuit)	R2-6*4	/	

- 
- \* 1. The 170721-1 crimp terminal manufactured by Tyco Electronics AMP K.K. can be used as an alternative.
  - \* 2. The 170722-1 crimp terminal manufactured by Tyco Electronics AMP K.K. can be used as an alternative.
  - \* 3. The 170733-1 crimp terminal manufactured by Tyco Electronics AMP K.K. can be used as an alternative.
  - \* 4. The 170724-1 crimp terminal manufactured by Tyco Electronics AMP K.K. can be used as an alternative.
  - \* 5. The 170728-2 crimp terminal manufactured by Tyco Electronics AMP K.K. can be used as an alternative.
  - \* 6. The 170730-2 crimp terminal manufactured by Tyco Electronics AMP K.K. can be used as an alternative.
  - \* 7. The TCM-21-14 sleeve manufactured by Shinagawa Shoko CO., LTD. can be used as an alternative.
  - \* 8. The TCM-53-12 sleeve manufactured by Shinagawa Shoko CO., LTD. can be used as an alternative.
  - \* 9. The TCM-141-14 sleeve manufactured by Shinagawa Shoko CO., LTD. can be used as an alternative.
  - \* 10. The TCM-381-14 sleeve manufactured by Shinagawa Shoko CO., LTD. can be used as an alternative.
  - \* 11. The TCM-221-14 sleeve manufactured by Shinagawa Shoko CO., LTD. can be used as an alternative.
  - \* 12. Since it is packed up together with SERVOPACK, it is not necessary to order the terminal kit.

## 6 Installation Conditions of UL Standards

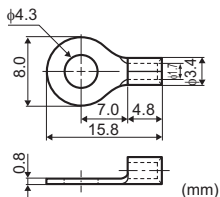
For the SERVOPACKs without special terminal kit other than those in the table on the previous page, connect the cable to the ground terminal using following terminal kits.

SERVOPACK Model SGDV-	Connection Terminals	Terminal Screw Size	Crimp Terminal Model (By J.S.T.Mfg. Co.,Ltd.)	Terminal Kit Model (Quantity of Terminal Kit Required per SERVOPACK)
□□□F, R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A, 120A, 180A, 200A, 1R9D, 3R5D, 5R4D, 8R4D, 120D	 (Input Power and Motor Main Circuit)	M4	R2-4* <sup>1</sup>	JZSP-CVT9-FGM4-E: 1 set* <sup>4</sup>
170D		M5	R2-5* <sup>2</sup>	JZSP-CVT9-FGM5-E: 1 set* <sup>4</sup>
470A, 550A 210D, 260D		M6	R2-6* <sup>3</sup>	JZSP-CVT9-FGM6-E: 1 set* <sup>4</sup>

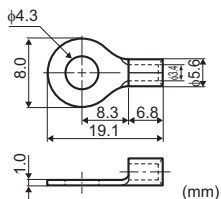
- \* 1. The 170722-1 crimp terminal manufactured by Tyco Electronics AMP K.K. can be used as an alternative.
- \* 2. The 170723-1 crimp terminal manufactured by Tyco Electronics AMP K.K. can be used as an alternative.
- \* 3. The 170724-1 crimp terminal manufactured by Tyco Electronics AMP K.K. can be used as an alternative.
- \* 4. Since it is not attached to SERVOPACK, it is necessary to order. Please place an order to the Yaskawa Control.

## Dimensional Drawing for Crimp Terminals

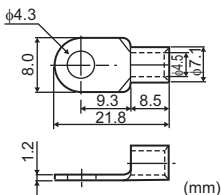
Model: R1.25-4



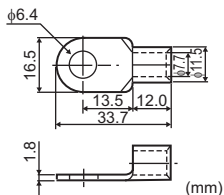
Model: 5.5-4NS



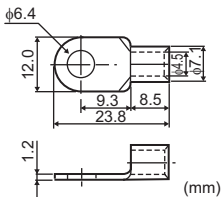
Model: 8-4NS



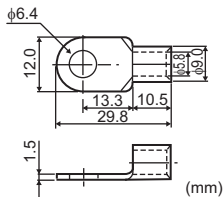
Model: R22-6



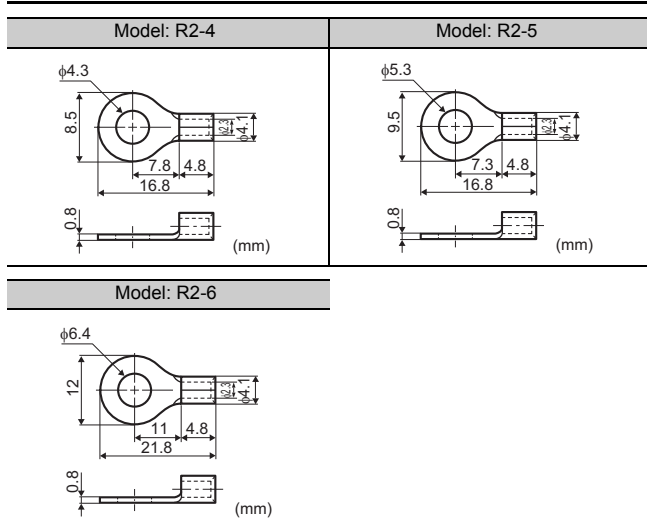
Model: R8-6



Model: R14-6

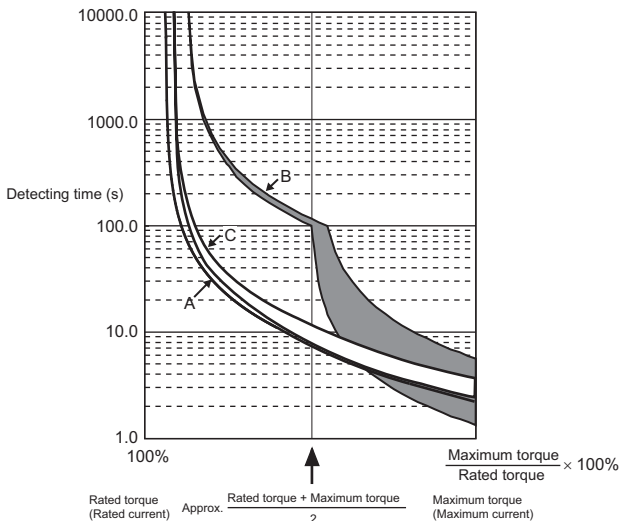


## 6 Installation Conditions of UL Standards



## 7 Overload Characteristics

The overload detection level is set under hot start\* conditions at a servomotor surrounding air temperature of 40°C.



\* A hot start indicates that both the SERVOPACK and the servomotor have run long enough at the rated load to be thermally saturated.

Note: The overload protection characteristics of A, B, and C in the figure are applicable when the SERVOPACK is combined with one of the following servomotors.

Graph Type	Motor Type						
	SGMAV	SGMJV	SGMPS	SGMSV -□□A	SGMSV -□□D	SGMGV -□□A	SGMGV -□□D
A	-	-A5 to -08	-	-	-	-	-
B	-	-	-	-10 to -70	-10 to -50	-03 to -1E	-03 to -1E
C	-A5 to 10	-	-01 to -15	-	-	-	-



# Revision History

The revision dates and numbers of the revised manuals are given on the bottom of the back cover.

MANUAL NO. TOMP C710800 10A <1>

Published in Japan July 2014

Revision number

Date of publication

Date of Publication	Rev. No.	Section	Revised Content
November 2019	<12>	–	Address in Japanese version.
April 2019	<11>	–	Address in Japanese version.
January 2019	<10>	Preface	Revision: Disposal
November 2018	<9>	Back cover	Revision: Address
May 2017	<8>	Inside of back cover	Revision: Precautions for Korean Radio Waves Act
		Back cover	Revision: Address
February 2017	<7>	3.2, 6	Completely revised.
January 2017	<6>	Back cover	Revision: Address
September 2015	<5>	Back cover	Revision: Address
March 2015	<4>	Front cover, back cover	Revision: Format
October 2014	<3>	Back cover	Revision: Address
August 2014	<2>	–	Japanese version only
July 2014	<1>	Front cover, back cover	Revision: Title in French
May 2014	–	–	First edition

# AC SERVOPACK $\Sigma$ -V SERIES SAFETY PRECAUTIONS

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# YASKAWA

YASKAWA ELECTRIC CORPORATION

In the event that the end user of this product is to be the military and said product is to be employed in any weapons systems or the manufacture thereof, the export will fall under the relevant regulations as stipulated in the Foreign Exchange and Foreign Trade Regulations. Therefore, be sure to follow all procedures and submit all relevant documentation according to any and all rules, regulations and laws that may apply. Specifications are subject to change without notice for ongoing product modifications and improvements.  
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MANUAL NO. TOMP C710800 10B <12>-0

Published in Japan November 2019

18-10-15

Original instructions

**基于“修订版中国 RoHS”（张贴环境保护使用期限）的产品中含有有害物质的信息  
改正中国版 RoHS（環境保護使用期限表示）に基づく有害物質含有情報**

**Information on Hazardous Substances in Revised China RoHS  
(Labeling of Environment-friendly Use Period)**

**Informations concernant les substances dangereuses dans la RoHS chinoise révisée  
(Etiquetage de Période d'utilisation sans risques pour l'environnement)**

本资料根据中国《电器电子产品有害物质限制使用管理办法》制定。

本資料は、中国「電器電子製品有害物質使用制限管理弁法」に基づいて記載しています。  
This is based on the "Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products."

Ceci est basé sur les "Méthodes de gestion pour la restriction d'utilisation des substances dangereuses dans les produits électriques et électroniques."

本表格依据 SJ/T 11364 的规定编制。

本表は SJ/T 11364 の規定により作成したものです。

This table has been prepared in accordance with the provisions outlined in SJ/T 11364.

Ce tableau a été établi conformément aux dispositions énoncées dans la norme SJ/T 11364.

- : 表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。
- ×: 表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。
- : 該当部品全ての均質材料による有害物質の含有量が GB/T 26572 に定める限度量の要求以下であることを示します。
- ×: 該当部品中の少なくとも 1 種類の均質材料における当該有害物質の含有量が、GB/T 26572 に定める限度量を上回っていることを示します。
- : Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below or equal to the limit requirement of GB/T 26572.
- ×: Indicates that said hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572.
- : Indique que ladite substance dangereuse contenue dans tous les matériaux homogènes pour cette pièce est inférieure ou égale à la limite requise par la norme GB/T 26572.
- ×: Indique que ladite substance dangereuse contenue dans au moins un des matériaux homogènes utilisés pour cette pièce est supérieure à la limite requise par la norme GB/T 26572.

注: 本产品符合欧洲的 RoHS 指令。

本表中的“×”表示含有欧盟 RoHS 指令豁免的有害物质。

注記: 本製品は欧州の RoHS 指令に適合しています。

本表の“×”は、欧州 RoHS 指令の適用除外である有害物質を含むことを示します。

Note: This product complies with EU RoHS directives.

In the table, “×” indicates that hazardous substances that are exempt from EU RoHS directives are contained.

Note: Ce produit est conforme aux directives RoHS européennes.

Dans le tableau, la croix “×” indique la présence de substances dangereuses exemptées des directives RoHS européennes.

产品中有害物质的名称及含量  
 製品中の有害物質名称及び含有量  
 Contents of hazardous substances in products  
 Contenu en substances dangereuses dans les produits

部件名称 部位名称 Parts Name Désignation	有害物質 有害物質 Hazardous substances Substances dangereuses					
	鉛 鉛 Lead Plomb (Pb)	汞 水銀 Mercury Mercure (Hg)	镉 カドミウム Cadmium Cadmium (Cd)	六价铬 6価クロム Hexavalent chromium Chrome hexavalent (Cr (VI))	多溴联苯 ポリ臭化 ビフェニル Polybrominated biphenyls Polybromobi- phényles (PBB)	多溴二苯醚 ポリ臭化 ジフェニル エーテル Polybrominated diphenyl ethers Polybromo- diphenyléthers (PBDE)
实装基板 実装基板 Circuit Board Circuit imprimé	×	○	○	○	○	○
电子元件 電子部品 Electronic parts Pièces élec- troniques	×	○	○	○	○	○
散热器 ヒートシンク Heat sink Dissipateur thermique	×	○	○	○	○	○
机械元件 構造部材 Mechanical parts Pièces mécaniques	×	○	○	○	○	○

한국 전파법에 관한 주의사항

韓国電波法に關連する注意事項

Precautions for Korean Radio Waves Act

针对韩国电波法的注意事项

Précautions pour la Loi coréenne relative aux ondes radio

사용자 안내문

사용자 안내문

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서  
가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

(주)사용자 안내문은 “업무용 방송통신기자재”에만 적용한다.