

Σ-II PLUS SERIES AC SERVOPACK SGDP 取扱説明書 INSTRUCTIONS

形式 (Type) : SGDP- □PA (位置制御用) (for position control)

この取扱説明書は、最終的に本製品をお使いになる方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。

Upon receipt of the product and prior to installing the product, read these instructions thoroughly, and retain for future reference.

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YASKAWA

株式会社 安川電機

資料番号 (MANUAL NO.) TOB-S800-33.10

INTRODUCTION

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■ Manual Contents

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This manual consists of Japanese Version and English Version.

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- Japanese Version: Described on pages J-1 to J-23.
- English Version: Described on pages E-1 to E-23.

Use the Japanese Version or English Version as needed.

■ User Instructions

Use these instructions for the following jobs:

- Checking Σ -II PLUS Series SERVOPACK on delivery
- Installing Σ -II PLUS Series SERVOPACK
- Wiring Σ -II PLUS Series SERVOPACK
- Operating Σ -II PLUS Series SERVOPACK
- Inspecting and maintenance of Σ -II PLUS Series SERVOPACK

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INSTRUCTIONS

Σ-II PLUS SERIES AC SERVOPACK

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This instruction manual covers Σ -II PLUS series SERVOPACK controlling Σ -II PLUS series AC SERVOMOTOR.

To properly use the Σ -II PLUS series SERVOPACK, read this manual thoroughly and retain for easy reference for inspections and maintenance, etc.

Reference materials are listed below:

Manual Titles	Manual No.
Σ -II PLUS Series SGM□H/SGDP USER'S MANUAL Servo Selection and Data Sheets	SIE-S800-33.11
Σ -II PLUS Series SGM□H/SGDP USER'S MANUAL Design and Maintenance	SIE-S800-33.12
AC Servomotor INSTRUCTIONS	TOE-C231-2

General Precautions

- Some drawings in this manual are shown with the protective cover or shields removed, in order to describe the detail with more clarity. Make sure all covers and shields are replaced before operating this product.
- Some drawings in this manual are shown as typical example and may differ from the shipped product.
- This manual may be modified when necessary because of improvement of the product, modification or changes in specifications. Such modification is made as a revision by renewing the manual No.
- To order a copy of this manual, if your copy has been damaged or lost, contact your YASKAWA representative listed on the last page stating the manual No. on the front cover.
- YASKAWA is not responsible for accidents or damages due to any modification of the product made by the user since that will void our guarantee.

SYMBOLS FOR SAFE OPERATION


In this manual, the NOTES FOR SAFE OPERATION are classified as “WARNING” or “CAUTION”. The following symbols are used.



Indicates a potentially hazardous situation which, if not avoided, could result in death or serious personal injury.



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate personal injury and/or damage to the equipment.

In some instances, items described in  may also result in a serious accident. In either case, follow these important items.

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NOTES FOR SAFE OPERATION


Read this manual thoroughly before installation, operation, maintenance or inspection of the AC Servo Drives.

 WARNING	
	(Ref.No.)
(WIRING)	
<ul style="list-style-type: none">● SERVOPACK Grounding must be in accordance with the national code and consistent with sound local practices. <p>Failure to observe this warning may lead to electric shock or fire.</p>	E - 11
(INSPECTION AND MAINTENANCE)	
<ul style="list-style-type: none">● Be sure to turn OFF power before inspection or maintenance. <p>Otherwise, electric shock may result.</p>	E - 16
<ul style="list-style-type: none">● Never open the terminal cover while power is ON, and never turn ON power when the terminal cover is open. <p>Otherwise, electric shock may result.</p>	E - 16
<ul style="list-style-type: none">● After turning OFF power, wait at least five minutes before servicing the product. <p>Otherwise, residual electric charges may result in electric shock.</p>	E - 16

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Line id: @zz  **CAUTION**

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 CAUTION	
	(Ref.No.)
(RECEIVING)	
<ul style="list-style-type: none">● Use the specified combination of Servomotor and SERVOPACK. <p>Failure to observe this caution may lead to fire or failure.</p>	E - 7
(INSTALLATION)	
<ul style="list-style-type: none">● Never use the equipment where it may be exposed to splashes of water, corrosive or flammable gases, or near flammable materials. <p>Failure to observe this caution may lead to electric shock or fire.</p>	E - 9
(WIRING)	
<ul style="list-style-type: none">● Do not connect three-phase power supply to SERVOPACK output terminals U, V, and W. <p>Failure to observe this caution may lead to personal injury or fire.</p>	E - 11
<ul style="list-style-type: none">● Securely tighten screws on the power supply and motor output terminals. <p>Failure to observe this caution can result in a fire.</p>	E - 11

⚠ CAUTION

(OPERATION)

- To avoid inadvertent accidents, run the servomotor only in test run (without load). E - 15
Failure to observe this caution may result in personal injury.
- Before starting operation with a load connected, set up parameters suitable for the machine. E - 15
Starting operation without setting up parameters may lead to overrun failure.
- Before starting operation with a load connected, make sure emergency-stop procedures are in place. E - 15
Failure to observe this caution may result in personal injury.
- During operation, do not touch the SERVOPACK's heat sink. E - 15
Failure to observe this caution may result in burns.

(INSPECTION AND MAINTENANCE)

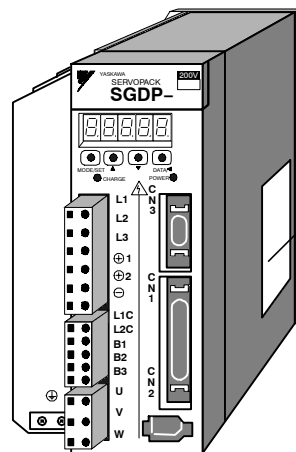
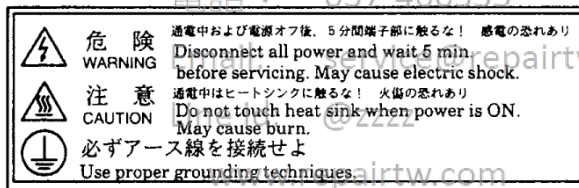
- Never change wiring while power is ON. E - 16
Failure to observe this caution may result in electric shock or personal injury.

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WARNING LABEL

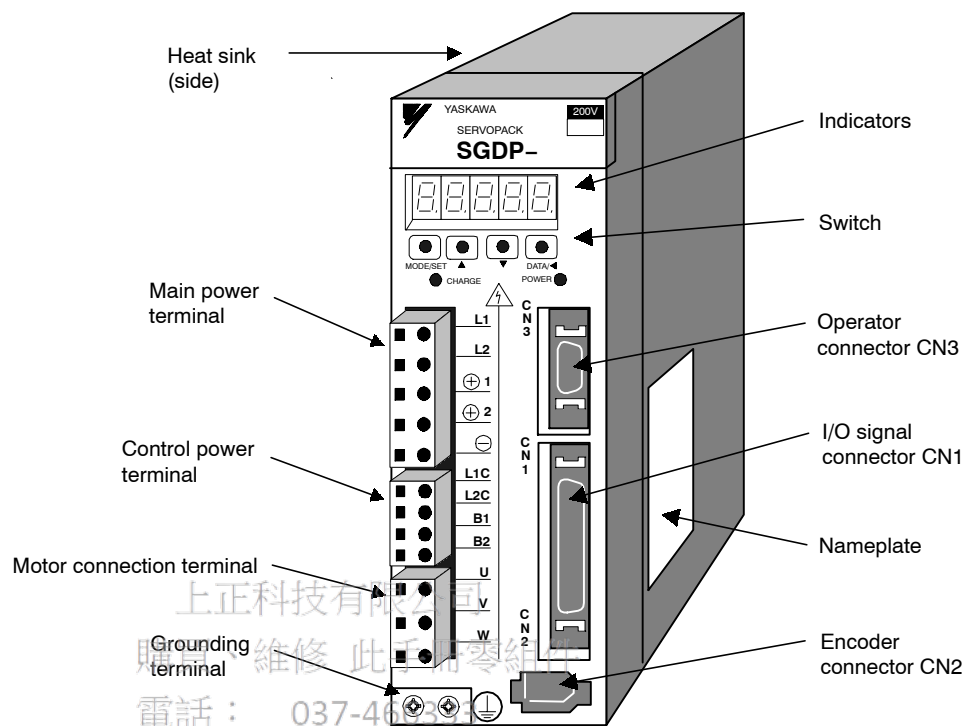


SERVOPACK warning lable position

SERVOPACK Warning Lable and Grounding Mark Position

1 PARTS

Σ -II PLUS Series SERVOPACK parts names are as follows:



2 CHECKING ON DELIVERY

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CAUTION

- Use the specified combination of servomotor and SERVOPACK.
Failure to observe this caution may lead to fire or failure.
For more information, refer to Σ -II PLUS Series SGM□H/SGDP User's Manual Design and Maintenance Par. 8.2.1.

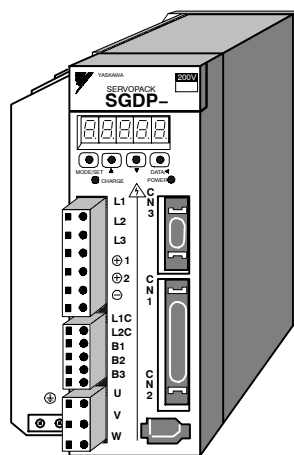
2.1 Checking Items

When Σ -II PLUS Series products are delivered, check the following items:

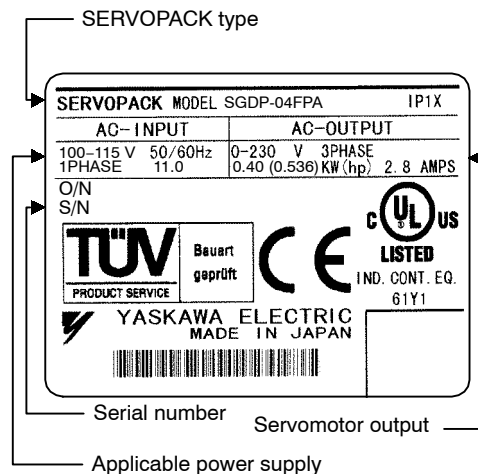
Check Items	Remarks
Check if the delivered products are the ones you ordered.	Check the types marked on the nameplates of servomotor and SERVOPACK (see the next page).
Check if the motor shaft rotates smoothly.	If the motor shaft is smoothly turned by hand, it is normal. However, if the motor has brakes, it cannot be turned manually.
Check for damage.	Check the overall appearance, and check for damage or scratches resulting from transportation.
Check screws for looseness.	Check for looseness with a screwdriver.

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

2.2 Appearance and Nameplate



Σ-II PLUS Series
SGDP SERVOPACK



2.3 Type Designation

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SGDP - 08 A P A - □

Σ-II PLUS series
SGDP SERVOPACK

Max. applicable
servomotor output
(See table below)

Voltage _____
A: Input 200 V to drive 200-V motor
B: Input 100 V to drive 100-V motor
F: Input 100 V to drive 200-V motor

Model _____
P: Position control


Design revision order _____
(Blank, A, B, C, ...)

Option _____
R: Rack mounted type

Max. Applicable Servomotor Output Code	Output (kW)
A3	0.03
A5	0.05
01	0.10
02	0.20
04	0.40
08	0.75

3 INSTALLATION

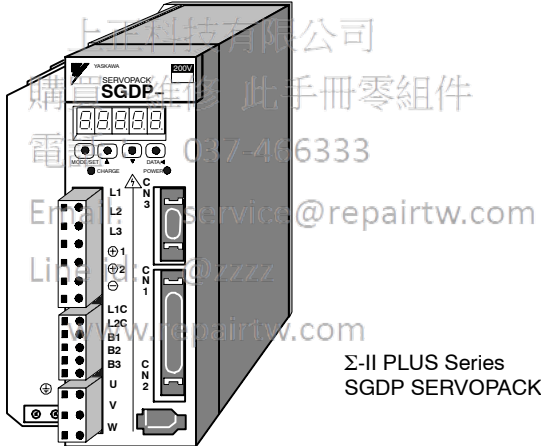
Σ -II PLUS Series SGDP SERVOPACK is a base-mount type servo controller. Incorrect installation will cause problems. Always observe the installation instructions described below.

 CAUTION
<ul style="list-style-type: none"> ● Never use the equipment where it may be exposed to splashes of water, corrosive or flammable gases, or near flammable materials. <p style="margin-left: 20px;">Failure to observe this caution may lead to electric shock or fire.</p>

3.1 Storage

When the SERVOPACK is to be stored with the power cable disconnected, store it in the following temperature range:

Between $-20 \sim +85 \text{ C}^\circ$



3.2 Installation Sites

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

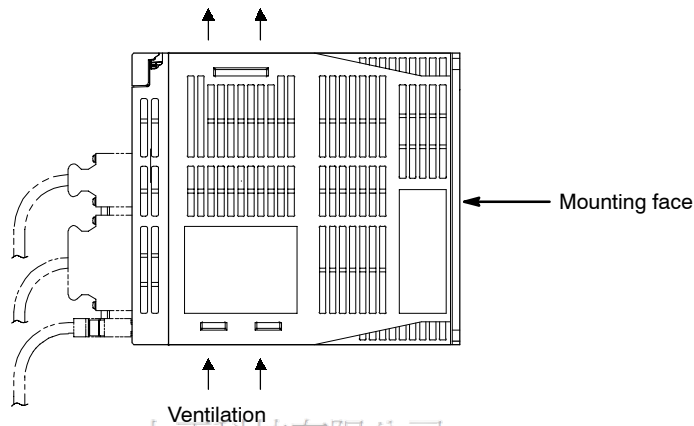
Situation	Notes on Installation
When installed in a control panel	Design the control panel size, unit layout, and cooling method so that the temperature around the periphery of the SERVOPACK does not exceed 55°C.
When installed near a heating unit	Suppress radiation heat from the heating unit and a temperature rise caused by convection so that the temperature around the periphery 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 contactor-related devices to malfunction. Take appropriate action to protect against corrosive gases.
Others	Avoid installation in a hot and humid place or where excessive dust or iron powder is present in the air.

3.3 Orientation

Install the SERVOPACK perpendicular to the wall as shown in the figure below.

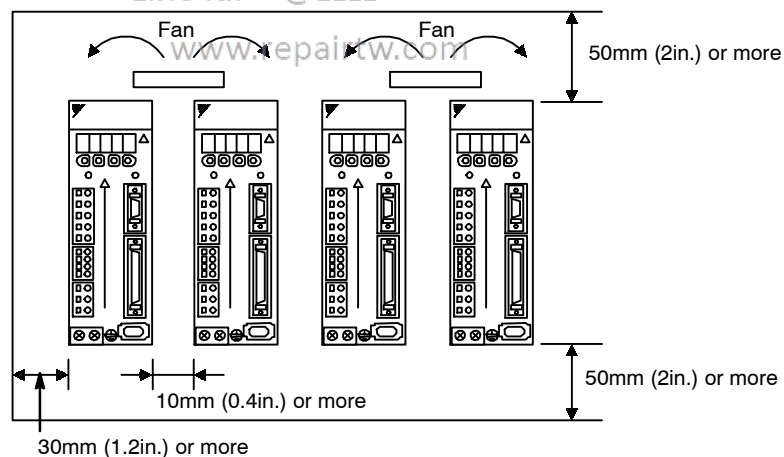
The SERVOPACK must be orientated as shown in the figure.

Firmly secure the SERVOPACK through two to four mounting holes depending on the SERVOPACK capacity.



3.4 Installation Precautions

When installing multiple SERVOPACKs side by side in a control panel, observe the following installation method:



■ Front Panel

Install SERVOPACK perpendicular to the wall so that the front panel (digital operator mounted face) faces outward.

■ Cooling

Provide sufficient space around each SERVOPACK to allow cooling by fan and natural convection.

■ Where mounted side by side

When installing SERVOPACKs side by side, provide at least 10mm (0.4in.) space between them and at least 50mm (2in.) space above and below them as shown in the figure above. Install cooling fans above the SERVOPACKs to prevent the temperature around each SERVOPACK from increasing excessively and also to maintain the temperature inside the control panel evenly.


■ Environments in Control Panel


Maintain the following conditions inside the control panel:

- Ambient temperature for SERVOPACK: 0 to 55°C
- Humidity: 90%RH or less
- Vibration: 4.9 m/s²
- Condensation and freezing: None
- Ambient temperature to ensure long-term reliability: 45°C or less

4 WIRING

This section shows a standard example for connecting Σ -II PLUS Series products to peripheral devices and briefly explains how to connect each peripheral device.

 WARNING
<ul style="list-style-type: none"> ● SERVOPACK Grounding must be in accordance with the national code and consistent with sound local practices. <p>Failure to observe this warning may lead to electric shock or fire.</p>

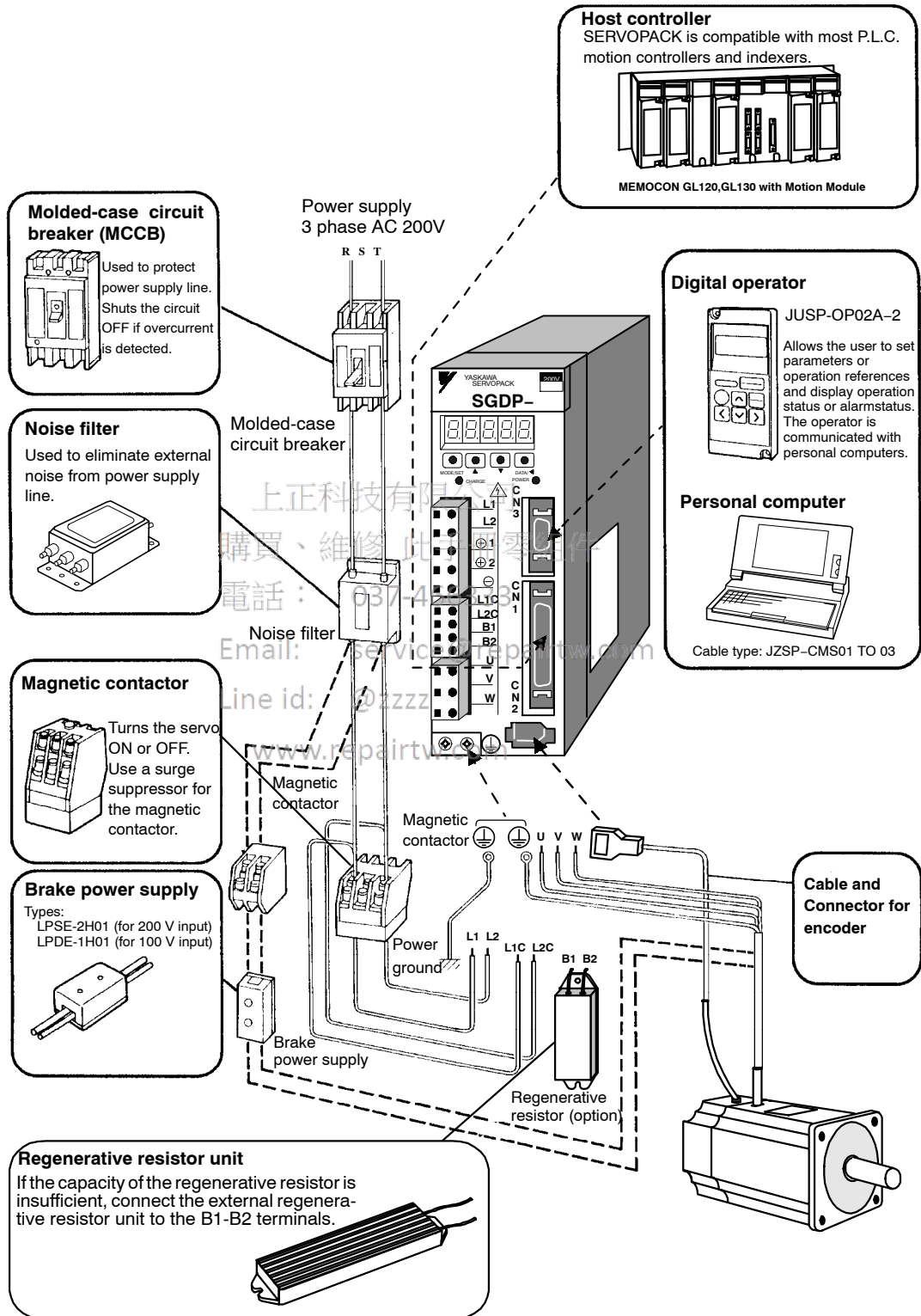
 CAUTION
<p>(WIRING)</p> <ul style="list-style-type: none"> ● Do not connect three-phase power supply to SERVOPACK output terminals U, V and W. Failure to observe this caution may lead to personal injury or fire. ● Securely tighten screws on the power supply and motor output terminals. Failure to observe this caution can result in a fire.

For the following wiring, refer to Σ -II PLUS Series SGM□H/SGDP User's Manual Design and Maintenance (SIE-S800-33.12).

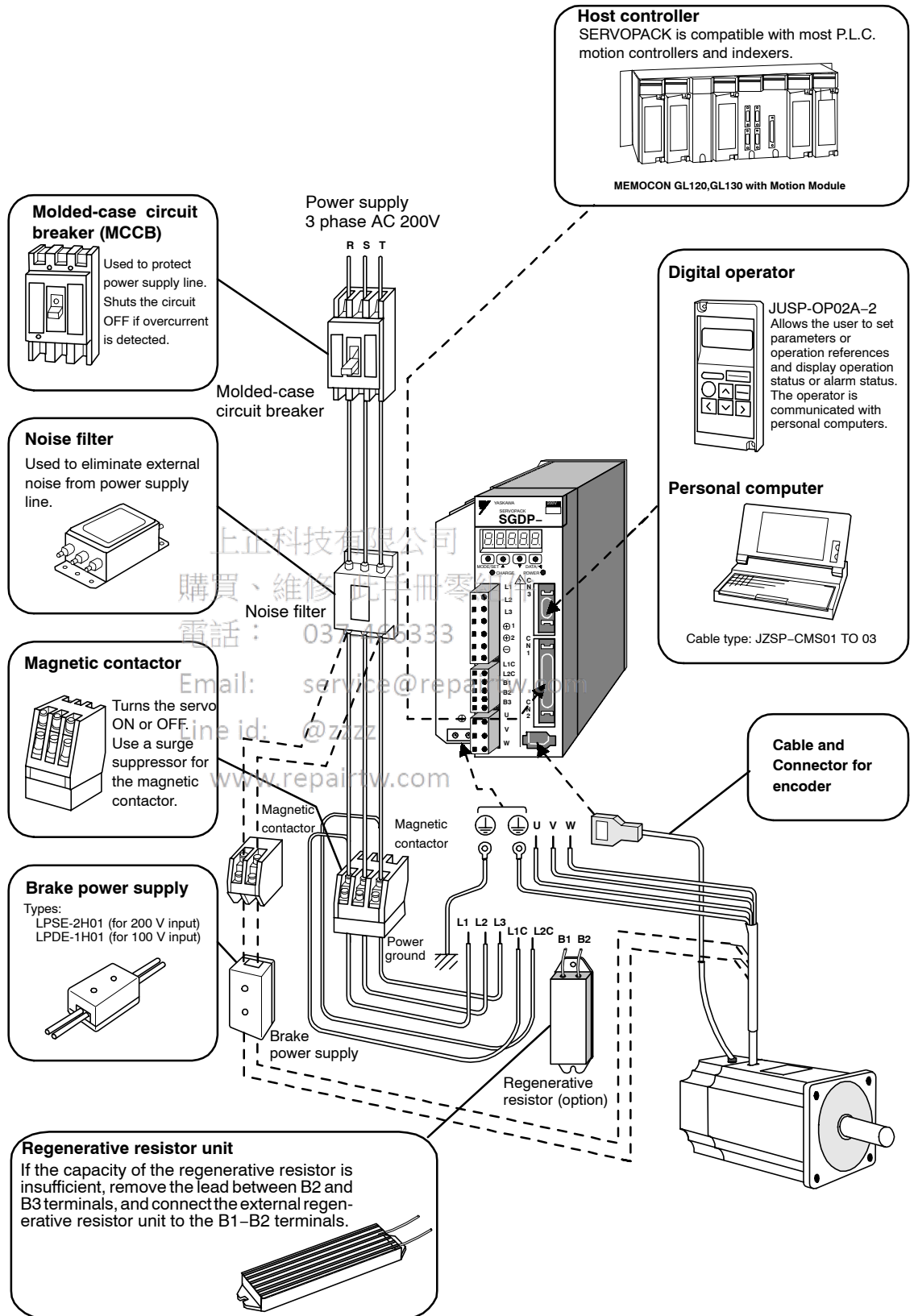
- Main circuit wiring
- I/O signal wiring
- Encoder wiring
- Example of connections

4.1 Connecting to Peripheral Devices

■ Single-phase Main Circuit (100VAC or 200VAC)

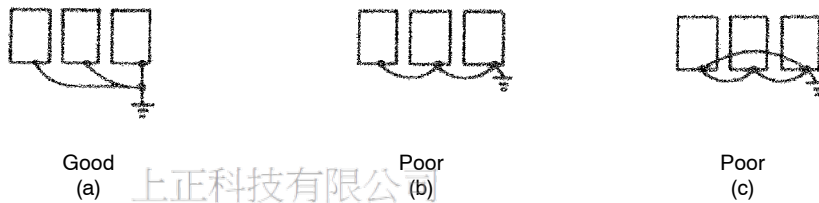


■ Three-phase Main Circuit (200VAC)



4.2 Grounding Wire

- In conformance with local electrical codes, ground the SERVOPACK's grounding terminal ⊕ (grounding resistance: 100 Ω or less).
- Be sure to connect the grounding wire of the servomotor to ⊕ of the SERVOPACK.
- Never share the grounding cable or grounding rod with welders, power equipment, or other high-voltage devices. Separate the grounding cable from wiring of high-voltage equipments.
- Make the grounding wire as short as possible. As for cable size, see Σ-II PLUS Series SGM□H/SGDP User's Manual Servo Selection and Data Sheets Par. 6.1.1 Cable Size (SIE-S800-33.1) .
- If two or more SERVOPACKs are used, ground them as shown in (a) below. Avoid methods (b) and (c).



4.3 Power Supply

Use the SERVOPACK power supply according to product ratings. See the following table.

Power	SERVOPACK	Motor Output	Specifications	Connection Terminals
100V	SGDP-□BPA	200W (0.27HP) max.	1-Phase 100V to 115VAC (+10% to -15%), 50/60Hz	L1, L2 (Main) L1C, L2C (Control)
	SGDP-□FPA	400W (0.54HP)		
200V	SGDP-□APA	400W (0.54HP) max.	1-Phase 200V to 230VAC (+10% to -15%), 50/60Hz	L1, L2 (Main) L1C, L2C (Control)
		750W (1.01HP)	3-Phase 200V to 230VAC (+10% to -15%), 50/60Hz	L1, L2, L3 (Main)
			1-Phase 200V to 230VAC (+10% to -15%), 50/60Hz	L1C, L2C (Control)

4.4 Noise Control

If the signal line is affected by noise, malfunction may result.

- Separate power cables from control cables.
- Make the signal line as short as possible and use twisted-pair wires.

Never use a line filter (for power input) for servomotor circuit. If peripheral devices malfunction due to the noise from SERVOPACK, insert a line filter (for output, type LF-310KA, made by Tokin Corp.) between servomotor and SERVOPACK.

5 OPERATION

This section provides precautions at test run and operation. For instructions on test run and operation, refer to Σ -II PLUS Series SGM□H/SGDP User's Manual Design and Maintenance (SIE-S800-33.12).

5.1 Precautions at Test Run

CAUTION

- To avoid inadvertent accidents, run the SERVOMOTOR only in test run (without load).
Failure to observe this caution may result in personal injury.
- Before starting operation with a load connected, set up parameters suitable for the machine.
Starting operation without setting up parameters may lead to overrun failure.
- Before starting operation with a connected load, make sure emergency-stop procedures are in place.
Failure to observe this caution may result in personal injury.

■ Conducting Test Run with Servomotor Connected to Machine

SERVOPACK initial parameters setting is performed assuming normal operation conditions.

Before test run, set up parameters suitable for the machine.

Failure to set up the parameter initial setting may result in machine overrun or breakdown.

As for the setting procedures and methods, refer to Σ -II PLUS Series SGM□H/SGDP User's Manual Design and Maintenance (SIE-S800-33.12).

■ Check Item during Test Run

The following items should be checked during test run.

- Unusual vibration
- Abnormal noise
- Excessive temperature rise

5.2 Precautions at Operation

CAUTION

- During operation, do not touch the SERVOPACK's heat sink.
Failure to observe this caution may result in burns.

6 INSPECTION AND MAINTENANCE

This section describes the basic inspections and maintenance for Σ -II PLUS Series SERVOPACK. If any failure occurs on SERVOPACK, refer to Σ -II PLUS Series SGM□H/SGDP User's Manual Design and Maintenance Section 9.2 Troubleshooting (SIE-S800-33.12). Contact your YASKAWA representative if the problem cannot be solved by the procedures described.



WARNING

- Be sure to turn OFF power before inspection or maintenance.
Otherwise, electric shock may result.
- Never open the terminal cover while power is ON, and never turn ON power when the terminal cover is open.
Otherwise, electric shock may result.
- After turning OFF power, wait at least five minutes before servicing the product.
Otherwise, residual electric charges may result in electric shock.



CAUTION

- Never change wiring while power is ON.
Failure to observe this caution may result in electric shock or personal injury.

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6.1 SERVOPACK

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

Clean unit interior and circuit boards	Yearly	Check for dust, dirt, and oil on surfaces.	Clean with compressed air.
Loose screws	Yearly	Check for loose terminal block and connector screws.	Tighten any loose screws.
Defective parts in unit or on circuit boards.	Yearly	Check for discoloration, damage or discontinuities due to heating.	Contact your YASKAWA representative.

■ Replacement Parts

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

Parts	Standard Replacement Period	Replacement Method
Cooling fan	4 to 5 years	Replace with new part.
Smoothing Capacitor	7 to 8 years	Test. Replace with new part if necessary.
Relays	—	Test. Replace if necessary.
Fuse	10 years	Replace with new part.
Electrolytic Capacitor on Circuit Board	5 years	Test. Replace with new circuit board if necessary.

■ Operating Conditions

- Ambient Temperature: annual average 30C°
- Load Factor: 80% max.
- Operation Rate: 20 hours/day max.

If the SERVOPACK has been already overhauled at YASKAWA, its parameters will be set back to standard settings at shipment. Always check parameters before operating the motor.

7 INSTALLATION CONDITIONS OF EMC DIRECTIVE

To adapt a combination of a SGM□H servomotor and a SGDP SERVOPACK to EMC Directives, (EN50081-2 and EN50082-2), the following conditions must be satisfied.

7.1 EMC Installation Conditions

This section describes the installation conditions that satisfy EMC guidelines for each model of the SGDP SERVOPACK. The conditions required for the standard type (base mounted) of SERVOPACK are described. Refer to this section for other SERVOPACK models such as the rack mounted types as well.

This section describes the EMC installation conditions satisfied in test conditions prepared by Yaskawa. The actual EMC level may differ depending on the actual system's configuration, wiring, and other conditions.

Note: The EMC installation conditions are also recommended for the SGDP-04FPA though it is not approved for this model.

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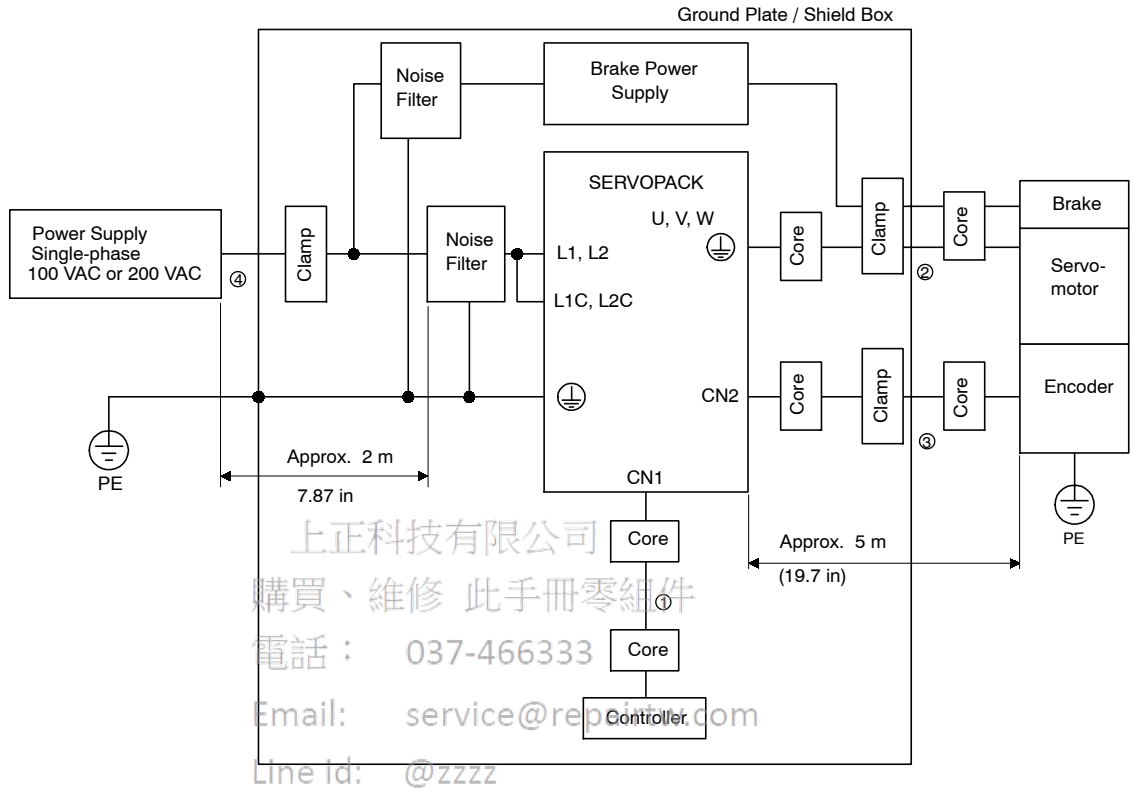
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■ Single-phase 100 V/200 V:

SGDP-A3BPA to -02BPA (Single-phase 100 V, 30 W to 200 W)

SGDP-04FPA (Single-phase 100 V, 400 W)

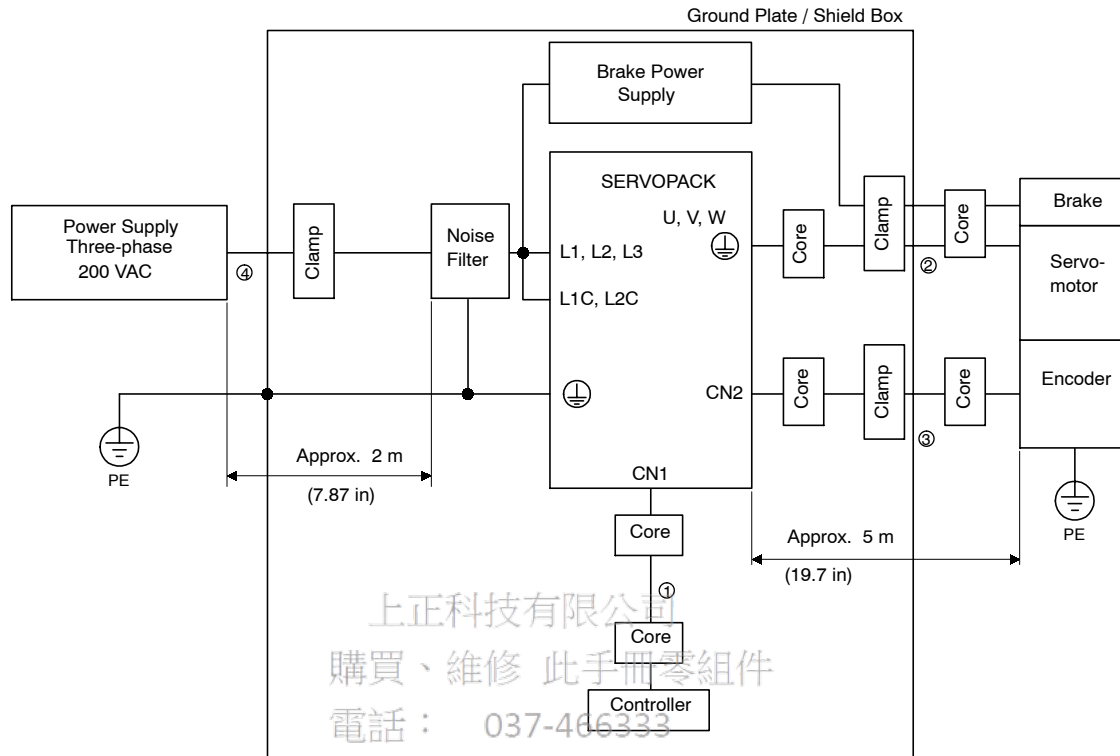
SGDP-A3APA to -04APA (Single-phase 200 V, 30 W to 400 W)



Symbol	Cable Name	Specification
①	Controller cable	Shield cable
②	Servomotor cable	Shield cable
③	Encoder cable	Shield cable
④	AC Line cable	Shield cable

■ Three-phase 200 V, 0.75 kW:

SGDP-08APA (Three-phase 200 V, 0.75 kW)



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Symbol	Cable Name	Specification
①	Controller cable	Shield cable
②	Servomotor cable	Shield cable
③	Encoder cable	Shield cable
④	AC Line cable	Shield cable

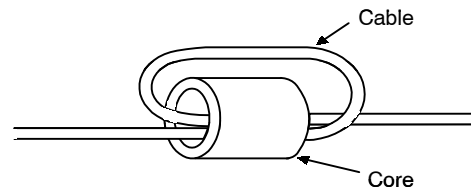
7.2 Cable Core and Cable Clamp

■ The Cable Core

Attach the core on the cable as shown below:

Cable model	ESD-SR-25
Quantity	1
Turn	2
Manufacturer	Tokin.corp.

Note: The diagram below shows 2 turns of the cable.



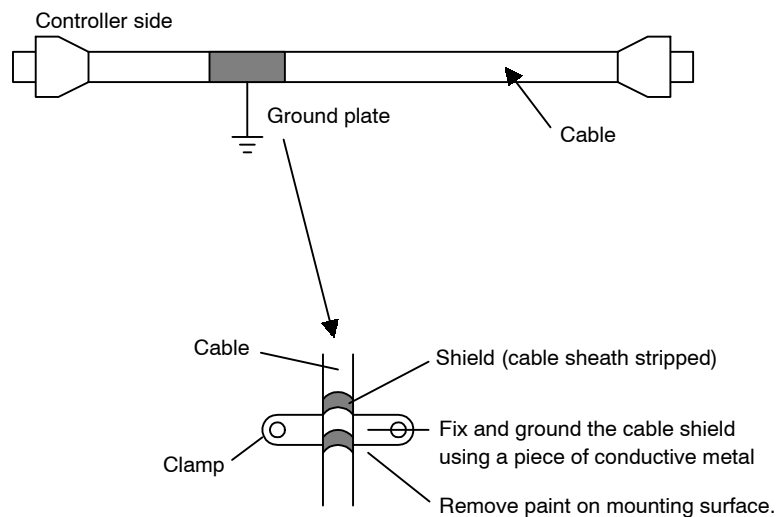
The table below shows the cable and the position where the core are attached.

Cable Name	Mounting Position of the Core
Controller cable	Near the controller and the SERVOPACK.
Servomotor cable	Near the SERVOPACK and the Servomotor.
Encoder cable	Near the SERVOPACK and the Servomotor.

■ Cable Clamp

Fix and ground the cable shield using a piece of conductive metal.

<Example of Cable Clamp>



8 PERIPHERAL DEVICE

8.1 Peripheral Device Types and Capacities

Main Circuit Power Supply	Model		Applicable Servomotor	Power Supply Capacity per SERVOPACK (kVA)	MCCB or Fuse Capacity *1 (A _{rms})	Recommended Noise Filter *2		Magnetic Contactor *3
	Capacity (kW)	SGDP-				Model	Specifications	
Single-phase 100 V	0.03	A3BPA	SGMAH-A3B	0.15	4	FN2070 -6/07	Single-phase 250 VAC, 6 A	HI-11J (20 A)
	0.05	A5BPA	SGMAH-A5B	0.25	4	FN2070 -6/07	Single-phase 250 VAC, 6 A	HI-11J (20 A)
	0.10	01BPA	SGMAH-01B	0.40	4	FN2070 -6/07	Single-phase 250 VAC, 6 A	HI-11J (20 A)
			SGMPH-01B					
	0.20	02BPA	SGMAH-02B	0.60	6	FN2070 -10/07	Single-phase 250 VAC, 10 A	
SGMPH-02B								
0.40	04FPA	SGMAH-04A	1.2	12	FN2070 -16/07	Single-phase 250 VAC, 16 A	HI-15J (35 A)	
		SGMPH-04A						
Single-phase 200 V	0.03	A3APA	SGMAH-A3A	0.20	4	FN2070 -6/07	Single-phase 250 VAC, 6 A	HI-11J (20 A)
	0.05	A5APA	SGMAH-A5A	0.25	4	FN2070 -6/07	Single-phase 250 VAC, 6 A	HI-11J (20 A)
	0.10	01APA	SGMAH-01A	0.40	4	FN2070 -6/07	Single-phase 250 VAC, 6 A	HI-11J (20 A)
			SGMPH-01A					
	0.20	02APA	SGMAH-02A	0.75	8	FN2070 -10/07	Single-phase 250 VAC, 10 A	HI-15J (35 A)
SGMPH-02A								
0.40	04APA	SGMAH-04A	1.2	8	FN2070 -10/07	Single-phase 250 VAC, 10 A	HI-15J (35 A)	
		SGMPH-04A						
Three-phase 200 V	0.75	08APA	SGMAH-08A	1.9	7	FN258L -16/07	Three-phase 480 VAC, 16 A	HI-15J (35 A)
			SGMPH-08A					

* 1. This is the net value for a rated load. When selecting fuses, determine the capacity using the prescribed derating.

Braking characteristics at 25 °C: 200 % for 2s min. ; 700 % for 0.01s min.

* 2. The FN type Noise filter is made by SCHAFFNER.

* 3. Made by YASKAWA CONTROLS.

8.2 Noise Filter for Brake Power Supply

FN2070-6/07 (Made by SCHAFFNER) for a servomotor of 0.4 kW or less.

8.3 Cable Specifications

Shield cables should be used for the following cables :

AC power input line cable (between the power supply and the noise filter)

Servomotor cable (between the SERVOPACK and the Servomotor)

Encoder cable (between the SERVOPACK and the Servomotor)

Controller cable (between the SERVOPACK and the controller)

8.4 Recommended Ferrite Cores

Cable Name		Ferrite Cores	Manufacturer
Controller cable		ESD-SR-25	Tokin
Encoder cable			
Servomotor cable	400 W max.	ESD-SR-25	Tokin
	500 W min.	PC40 T96 × 20 × 70	TDK

8.5 Shield Box

A shield box, a closed metallic enclosure, should be used for shielding electromagnetic interference. The structure of the box should allow the main body, door, cooling unit, etc. to be attached to the ground. The box opening should be as small as possible.

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Σ-II PLUS SERIES AC SERVOPACK SGDP 取扱説明書 INSTRUCTIONS

製造・販売

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