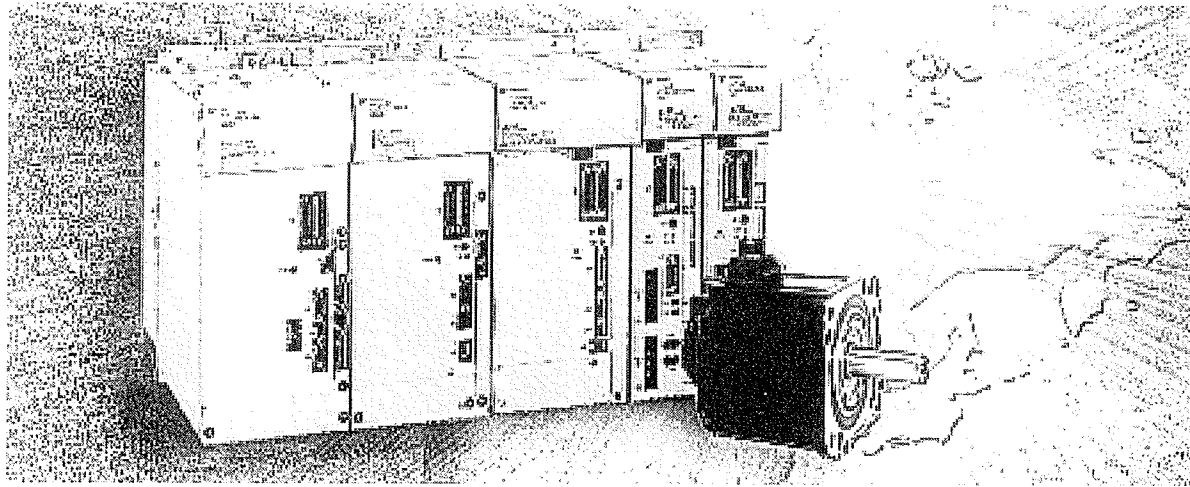


Drive Unit for Machine Tools

USER'S MANUAL

FOR HARDWARE
SGMKS Servomotor
SGDK SERVOPACK
Spindle Drive
Spindle Motor



YASKAWA

MANUAL NO. SIE-S800-60

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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.



WARNING

Indicates precautions that, if not heeded, could result in loss of life or serious injury. The following mark is used on WARNING labels on the product:



CAUTION

Indicates precautions that, if not heeded, could result in relatively serious or minor injury, damage to the product, or faulty operation. Some precautions classified as cautions could, if not heeded, have serious results.



PROHIBITED

Indicates actions that must never be taken. For example, indicates that fire and flame are prohibited.

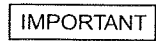


MANDATORY

Indicates actions that must always be taken. For example, indicates that grounding is required.

Visual Aids

The following aids are used to indicate certain types of information for easier reference.



Indicates important information that should be memorized, including precautions such as alarm displays to avoid damaging the devices.



Indicates programming, operation, and other application examples.



Indicates supplemental information.



Indicates definitions of difficult terms or terms that have not been previously explained in this manual.

CONTENTS

About this Manual	viii
Using this Manual	viii
Safety Precautions	ix
Warning Labels	xviii
1 System Configuration	
1.1 CNC System Configuration	1-2
1.2 Drive Unit Equipment	1-3
1.3 SERVOPACK Model Numbers	1-6
2 Control Panel Installation	
2.1 Control Panel and Electrical Component Installation Conditions	2-2
2.2 Cabinet Design	2-3
2.2.1 Thermal Design	2-3
2.2.2 Heat Loss	2-5
2.2.3 Weight	2-7
2.3 Noise Countermeasures	2-8
2.3.1 Wiring Separation	2-8
2.3.2 Noise Countermeasure Equipment	2-9
2.3.3 Grounding	2-11
2.3.4 Cable Shields and Clamps	2-12
2.4 Mounting Precautions	2-13
2.4.1 General Precautions	2-13
2.4.2 Precautions for Mounting Feed Axis/Spindle SERVOPACK	2-14
2.4.3 SERVOPACK Installation Direction and Space	2-15
2.4.4 Installing Lightning Surge Countermeasure Equipment	2-16
3 Motor Installation	
3.1 Servomotor	3-2
3.1.1 Servomotor Model Number	3-2
3.1.2 Servomotor Dimensions	3-3
3.1.3 Servomotor Characteristics	3-6
3.1.4 Servomotor Torque Characteristics	3-8
3.1.5 Installation Location	3-12
3.1.6 Installation Direction	3-12
3.1.7 Machine Coupling	3-12
3.1.8 Shaft Extension Load	3-13

3.1.9 Oil or Water Countermeasures	3-14
3.2 Spindle Motor	3-15
3.2.1 Spindle Motor Model Number	3-15
3.2.2 Spindle Motor Dimensions	3-16
3.2.3 Spindle Motor Characteristics	3-19
3.2.4 Spindle Motor Output Characteristics	3-21
3.2.5 Installation Location	3-25
3.2.6 Installation Direction	3-25
3.2.7 Machine Coupling	3-26
3.2.8 Oil or Water Countermeasures	3-27
4 Connection Diagram	
4.1 Connection Diagram	4-2
4.2 Locations of Connectors and Switches	4-4
4.2.1 Converters	4-4
4.2.2 Inverters	4-6
4.2.3 1-Axis Servo Units	4-7
4.2.4 2-Axis Servo Unit	4-9
5 Power Supply Connection	
5.1 Converter Unit	5-2
5.1.1 Power Supply Connection	5-2
5.1.2 Wiring Specifications	5-3
5.2 Power Supply ON/OFF Signal	5-6
6 Peripheral Device Connection	
6.1 PROFIBUS-DP	6-2
6.1.1 Connection between Machine Panel I/O, I/O, and Converter Unit	6-2
6.1.2 PROFIBUS-DP Address and Termination Setting	6-3
6.1.3 Wiring Specifications	6-5
6.2 SERVOPACK	6-7
6.2.1 Connection between Device	6-7
6.2.2 Detailed Connection	6-9
6.2.3 Wiring Specifications	6-11
6.2.4 Setting Inverter and Servo Unit Rotary Switches	6-18
6.3 Servomotor	6-19
6.4 Spindle Motor	6-22
6.4.1 Motor Pulse Encoder Connection	6-22
6.4.2 Connection between Motor Serial Encoder and External PG	6-23
6.4.3 Serial Encoder Connection in the Motor Terminal Box	6-24
6.5 Direct IN Signal	6-25

A	Cable Assembly	
A.1	Servomotor Main Circuit Cables	A-2
A.2	Servomotor Encoder Cables	A-5
A.3	Servomotor Connectors	A-8
A.4	Servo Unit/External Pulse Encoder Cables	A-12
A.5	Spindle Motor Cable	A-14
A.6	Spindle Motor Encoder Connectors	A-16
B	Dimensions and Specifications	
B.1	Brake Power Supply Unit	B-2
B.2	Noise Filter	B-4
B.3	Magnetic Contactor for Winding Selection	B-8
B.4	AC Reactor	B-10
B.5	Pulse Generator for Spindle	B-12
B.6	Converter	B-13
B.7	Inverter	B-17
B.8	1-Axis Servo Unit	B-19
B.9	2-Axis Servo Unit	B-25
B.10	3-Axis Servo Unit	B-27

About this Manual

- This manual provides the following information of the SERVOPACK Drive Unit for Machine Tools: Electrical and structural specifications for connecting the Drive Unit to the control device, machine, high-power circuits, and external devices.
- Connections will depend on the control boards produced by the machine tool manufacturer. Use the portions of this manual required for your application.

Using this Manual

■ Indication of Reverse Signals

In this manual, the names of reverse signals (ones that are valid when low) are written with a forward slash (/) before the signal name, as shown in the following examples:

- $\overline{S-ON}=/S-ON$
- $\overline{P-CON}=/P-CON$

■ Description of Technical Terms

In this manual, the following terms are defined as follows:

- Servo Unit
A unit that drives a Servomotor
- Inverter
A unit that drives a spindle motor
- Converter
A unit that converts AC power to DC power and supplies it to the Servo Unit and Inverter
- SERVOPACK
A generic name that includes the Servo Unit, Inverter, and Converter

Trademarks

- Windows and Windows NT are registered trademarks of the Microsoft Corporation.
- Ethernet is a registered trademark of the Xerox Corporation.

Safety Precautions

This section provides important precautions that must be heeded to ensure the safe application of the product. Please read this manual and all accompanying documents completely and be sure you understand the information provided before attempting to install, operate, maintain, or inspect the product. Use the product only after you have acquired a complete understanding of the product, as well as product safety information and precautions.

■ Transportation



WARNING

- Do not hold onto the cables when transporting the product.
Failure to observe this precaution may result in injury or accidents.
- After installing the product into the equipment, remove the eyebolts and replace them with standard bolts of a suitable size.
Failure to observe this precaution may result in accidents.



PROHIBITED

- Do not transport the product through areas that would subject it to rain or water drops, harmful gases, liquids, or other contaminants.
Failure to observe this precaution may result in human injury or accidents.

■ Storage



PROHIBITED

- Do not store the product in locations that would subject it to rain or water drops, harmful gases, liquids, or other contaminants.
Failure to observe this precaution may result in accidents.
- Do not drop the product in its package from a height greater than 60 cm.
Failure to observe this precaution may result in accidents.

MANDATORY

- Store the product in a clean location indoors within the following temperature and humidity ranges.
 - Ambient temperature –20 to 60 °C
 - Ambient humidity: 10% to 90%
 - Elevation: 1,000 m max.
- Failure to observe this precaution may result in accidents.

■ Installation

CAUTION

- Install the product in a location where the ventilation openings are not restricted. Also, install the product so that foreign material does not enter it.
Failure to observe this precaution may result in fires or accidents.
 - Do not subject the product to strong shock when installing it.
Failure to observe this precaution may result in accidents.
 - Design the power supply line with a capacity higher than the power consumption of the product.
Failure to observe this precaution may result in malfunction of the product.
 - The power supply capacity of the 24-VDC External Power Supply Unit for I/O contacts will depend on the number of contacts that are used.
Install an additional External Power Supply Unit if the current capacity is not sufficient.
 - The end of the motor shaft and flange are coated with an anti-corrosive coating. Wipe this coating off with a cloth before installation.
 - Always confirm that the motor shaft and the machine to which it is being connected are aligned before connecting them.
Failure to observe this precaution may result in vibration, accidents, or human injury.
 - Take the following preventative measures when designing and installing the box.
 - The box must have a sealed structure.
 - The average increase in temperature inside the box must be within 10°C of the external temperature.
 - Use a fan to circulate the air in the sealed box to increase the cooling efficiency in the box and prevent localized increases in temperature. (We recommend using a UL-certified fan.)
 - Provide proper seals on cable openings, covers, and other openings.
 - Structure the box to prevent dust and dirt from entering it. Airborne dust and dirt may collect on units and PCBs and cause malfunctions.
 - Cover the cable openings, covers, and other openings with some packing to eliminate any gaps.
- Failure to observe this precaution may result in accidents or malfunction.



CAUTION

- Take the following preventative measures when installing the units.
 - Install the Servo Unit horizontally with screws or bolts.
 - The Servo Unit generates heat. Provide ventilation space above and below the unit so that heat does not collect in one location.
 - To reduce internal loss caused by heat generation, install the Servo Unit so that the heat sink fins extend outside of the box and provide an external airflow (2.5 m/s) on the fins.
 - When circulating air inside the box, do not allow the air current to strike the Servo Unit directly. Air currents may directly cause dust and dirt to collect on the unit.
 - Mount the units so that they can be easily maintained and inspected, and so that parts can be easily replaced.

Failure to observe this precaution may result in accidents or malfunction.

- When carrying a unit, do not hold it by the front cover. Hold it by the mounting base.
Failure to observe this precaution may result in injury.
- Mount the unit to a metal or otherwise non-flammable surface.
Failure to observe this precaution may result in fire.
- Keep the operating temperature to 55°C max. and the temperature of the air entering the heat sink to 45°C.
Failure to observe this precaution may result in fire or other accidents.
- Install an external emergency stop circuit so that any operation can be stopped and the power supply can be cut off immediately.
Failure to observe this precaution may result in injury.

■ Wiring



WARNING

- Always confirm that the input power supply is turned off before wiring.
Failure to observe this precaution may result in electric shock or fire.
- All wiring to be performed only by a qualified electrical engineer.
Failure to observe this precaution may result in electric shock or fire.
- Always check operation after wiring the emergency stop circuit.
(The user is responsible for all wiring.)
Failure to observe this precaution may result in injury.
- Always ground the ground terminal.
Failure to observe this precaution may result in electric shock or fire.



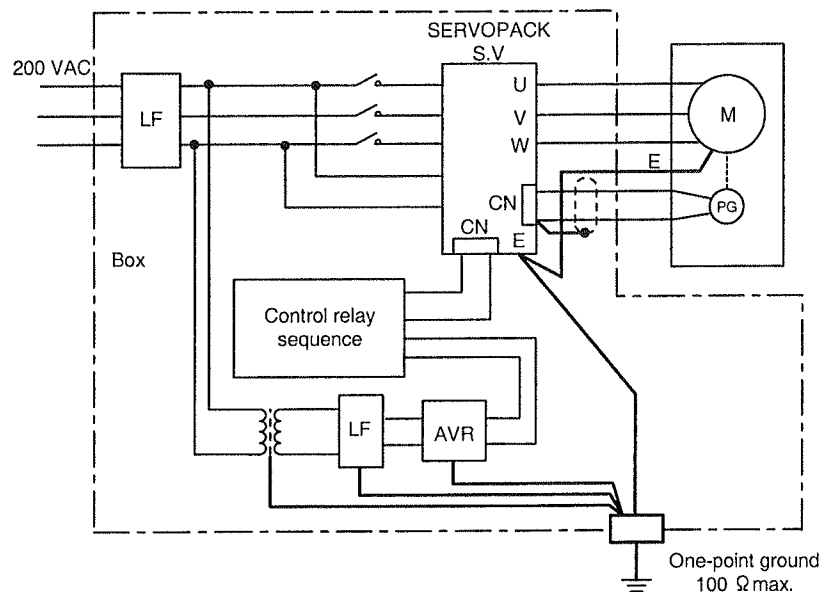
CAUTION

- Confirm that all wiring is performed correctly by a qualified electrical engineer.
Failure to observe this precaution may result in electrical shock, fire, or malfunction.
- Do not connect a three-phase power supply to the U, V, and W motor output terminals on the SERVOPACK.
The SERVOPACK will be damaged if a three-phase power supply is connected.
- Select a suitable power supply of a suitable size for the operating environment and current capacity. The applicable current of the cable will be reduced if the ambient temperature exceeds 30°C. Select cables of a suitable size based on the technical standards of the electric facility and technical references from the cable manufacturer.
Failure to observe this precaution may result in fire.
- Use twisted pair, multi-conductor twisted pair, or shielded multi-conductor twisted pair cables for signal lines. Always use the specified cable if the cable is specified in this manual and connect the cable correctly.
Failure to observe this precaution may result in malfunction.
- Keep the wiring distances as short as possible.
Failure to observe this precaution may result in malfunction.
- Do not bundle I/O signal lines with power lines or place them in the same duct either inside or outside of the control panel.
Sufficient separation from power lines can reduce the effects of noise.
- If there is noise from the power supply line, use a noise filter as a preventative measure. Refer to *B.2 Noise Filter*.
Proper application of a noise filter can reduce the effects of noise.
- Attach a Terminating Connector to the last SERVOPACK Module.
Failure to observe this precaution may result in malfunction.
- Confirm that the voltages of the Converter's rated power supply and AC power supply are the same.
Failure to observe this precaution may result in injury or fire.
- Do not perform withstand voltage tests on the Inverter or Converter.
Failure to observe this precaution may destroy semiconductor elements or other components.
- Connect the Inverter and Converter correctly according to the mutual wiring diagrams.
Incorrect connections may damage the Inverter or Converter.
- Tighten all screws to the specified torque.
Failure to observe this precaution may result in fire.
- Do not connect the main circuit AC power supply to the U/T1, V/T2, and W/T3 output.
Failure to observe this precaution may destroy damage the Inverter.

! MANDATORY

- Independently connect the ground wire from all units to the box or ground plate.

Grounding Example



- Wire facilities according to the technical standards of electrical facility and internal wiring standards.
- Always connect the Motor's ground terminal to the ground terminal on the SERVOPACK.
- Ground at one point only and to a resistance of 100 Ω or less.
Failure to observe this precaution may result in electric shock, fire, or malfunction.
- Do not use the same ground line for both power devices and the SERVOPACK.
Failure to observe this precaution may result in malfunction.

■ Operation

WARNING

- Never touch any unit or terminal while power is being supplied.
Failure to observe this precaution may result in electrical shock or malfunction.
- Some parts will still be charged immediately after the power supply is turned off. Do not touch any electrically charged parts for at least five minutes after turning off the power supply.
Failure to observe this precaution may result in electrical shock or malfunction.
- Do not damage the cables, apply excessive force to them, or pinch them between objects.
Failure to observe this precaution may result in electrical shock.
- Never touch any rotating parts while power is being supplied.
Failure to observe this precaution may result in injury.
- Never attempt to modify the product in any way.
Failure to observe this precaution may result in electric shock, fire, or accidents.
- Always close the top and bottom covers before turning on the input power supply.
Failure to observe this precaution may result in electric shock.
- Prepare a separate emergency stop switch.
Failure to observe this precaution may result in injury.

CAUTION

- Use the product in the following environment.
 - Free from corrosive and explosive gases or vapors.
 - Free from cutting oil or organic solvents.
 - Relative humidity of 10% to 90%, with no condensation.
 - Ambient temperature of 5 to 30°C for the control panel, and not subject to freezing. (The location must not be in direct sunlight, must be separated from sources of heat, and must not be outdoors.)
 - Maximum vibration of 4.9 m/s².
 Using the product under high temperatures, high humidity, dust, dirt, corrosive gases, vibration, and shock may result in fire, electric shock, or malfunction.
- No wire clippings or other foreign matter must enter the product.
Failure to observe this precaution may result in fire, accidents, or malfunction.
- Observe all precautions for programming functions in the operation manual.
Failure to observe this precaution may result in human injury or malfunction.
- Do not touch the heat sink, because it may reach high temperatures.
Failure to observe this precaution may result in injury.
- The Inverter can be easily set to operate from low to high speed. Confirm that the Motor and other equipment have sufficient leeway before starting operation.
Failure to observe this precaution may result in injury.



CAUTION

- Do not check signals during operation.
Failure to observe this precaution may damage the Inverter.
- The correct Inverter settings are made before shipping from the factory. Do not needlessly change settings.
Failure to observe this precaution may damage the equipment.



MANDATORY

- When cycling the power supply, turn off the power and then wait at least two seconds before turning it back on.
Failure to observe this precaution may result in malfunction.



PROHIBITED

- Never disassemble or modify any unit or device in the SERVOPACK.
Failure to observe this precaution may result in fire, accidents, or malfunction.
- Do not change the settings of the devices or variable resistors in the control panel.
Failure to observe this precaution may result in fire, accidents, or malfunction.

■ Maintenance and Inspection

WARNING

- The Inverter, Servo Unit, and Converter contain high-voltage terminals that are extremely dangerous. Do not touch the terminals.
Failure to observe this precaution may result in electric shock.
- Always keep the top and bottom covers closed while power is being supplied. Always turn off the power supply and the wiring breaker before opening a cover.
Failure to observe this precaution may result in electric shock.
- After turning off the main circuit power supply and control power supply, always confirm that the CHARGE indicator has turned off before performing maintenance or inspections.
The capacitor will still be charged, presenting a potential danger.
- Maintenance, inspections, and the replacement of parts should be performed by authorized personnel only.
Failure to observe this precaution may result in electric shock.

CAUTION

- The control boards use CMOS ICs. Handle the boards with care.
Directly touching the boards or ICs with your hands can destroy the IC due to static electricity.
- Do not change the wiring, or connect or disconnect connectors, while power is being supplied.
Failure to observe this precaution may result in electric shock or injury.

■ Other Precautions

WARNING

- Do not attempt to modify any unit.
Failure to observe this precaution may result in electric shock or injury.

■ General Precautions

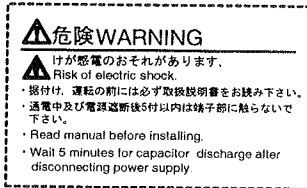
Note the following to ensure safe application.

- The drawings presented in this manual are sometimes shown without covers or protective guards. Always replace the covers or protective guards 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 the next edition. The edition number appears on the front and back covers.
- If the manual must be ordered due to loss or damage, contact your nearest Yaskawa representative or one of the offices listed on the back of this manual.
- If the nameplates on the product are worn or otherwise damaged, order new ones from your nearest Yaskawa representative or one of the offices listed on the back of this manual.
- 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 modifications.

Warning Labels

Application warnings are provided on the product in the following locations. Always observe these warnings when handling the product.

Warning 1



May cause injury or electric shock.

Follow the instructions in the manual before installation or operation.

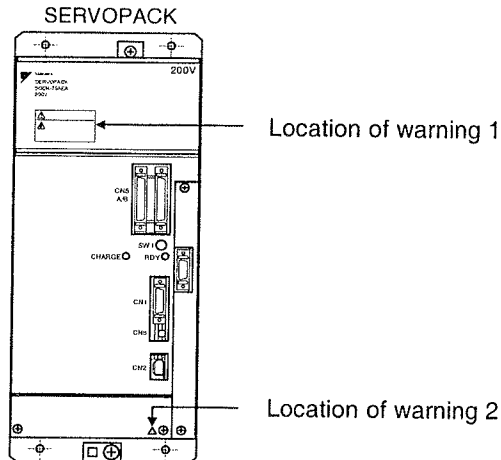
Disconnect all power before opening the front cover of the unit. Wait five minutes until the DC Bus capacitors discharge.

Warning 2



May cause electric shock.

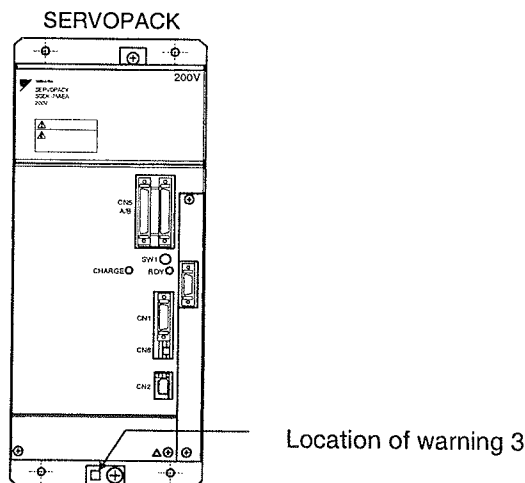
Disconnect all power and wait five minutes before servicing.



Warning 3



Always connect a ground line to the unit's ground terminal.



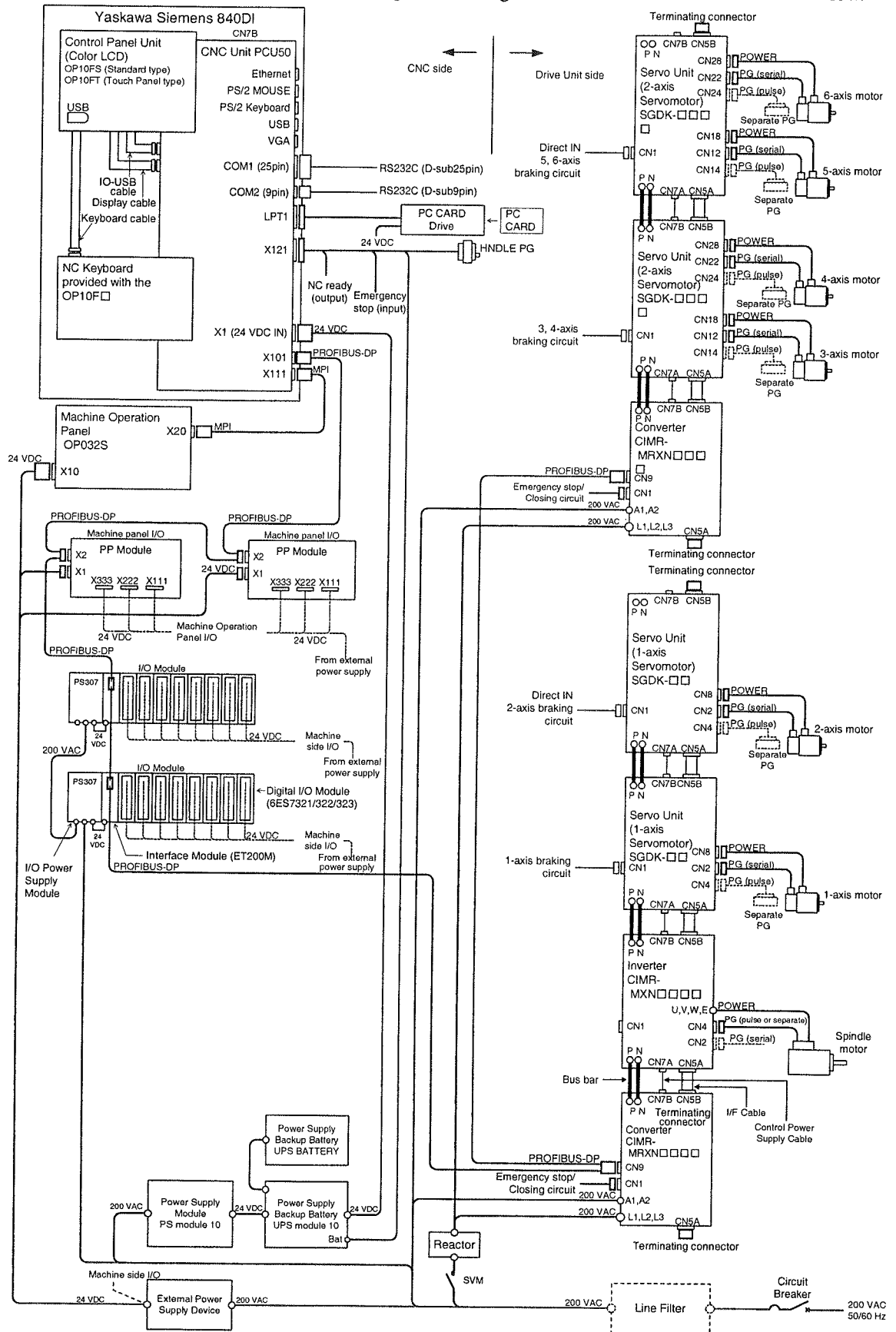
System Configuration

This section describes the configuration of the control panel.

1.1 CNC System Configuration	1-2
1.2 Drive Unit Equipment	1-3
1.3 SERVOPACK Model Numbers	1-6

1.1 CNC System Configuration

An example CNC system configuration using Yaskawa Siemens devices is shown below.



1.2 Drive Unit Equipment

The model numbers for the drive unit equipment are listed in this table.

Type	Name	Equipment name	Model/order number	Specifications, notes
SERVOPACK	Converter	45-kW Converter	CIMR-MRXN20455A	—
		37-kW Converter	CIMR-MRXN20375A	—
		30-kW Converter	CIMR-MRXN20305A	—
		22-kW Converter	CIMR-MRXN20225A	—
		18.5-kW Converter	CIMR-MRXN20185A	—
		15-kW Converter	CIMR-MRXN20155A	—
		11-kW Converter	CIMR-MRXN20115A	—
		7.5-kW Converter	CIMR-MRXN27P55A	—
		5.5-kW Converter	CIMR-MRXN25P55A	—
		3.7-kW Converter	CIMR-MRXN23P75A	—
	Inverter	45-kW Inverter	CIMR-MXN20455A	—
		37-kW Inverter	CIMR-MXN20375A	—
		30-kW Inverter	CIMR-MXN20305A	—
		22-kW Inverter	CIMR-MXN20225A	—
		18.5-kW Inverter	CIMR-MXN20185A	—
		15-kW Inverter	CIMR-MXN20155A	—
		11-kW Inverter	CIMR-MXN20115A	—
		7.5-kW Inverter	CIMR-MXN27P55A	—
		5.5-kW Inverter	CIMR-MXN25P55A	—
		3.7-kW Inverter	CIMR-MXN23P75A	—
	1-axis Servo Unit	0.5-kW Servo Unit	SGDK-05AEA	—
		1-kW Servo Unit	SGDK-10AEA	—
		1.5-kW Servo Unit	SGDK-15AEA	—
		2-kW Servo Unit	SGDK-20AEA	—
		3-kW Servo Unit	SGDK-30AEA	—
		5-kW Servo Unit	SGDK-50AEA	—
		6-kW Servo Unit	SGDK-60AEA	—
		7.5-kW Servo Unit	SGDK-75AEA	—
	2-axis Servo Unit	0.5-kW × 2 Servo Unit	SGDK-0505AEA	The sum of the actual output current of two axes must be equal to or less than 70% of the continuous output current multiplied by 2.
		1-kW × 2 Servo Unit	SGDK-1010AEA	
		1.5-kW × 2 Servo Unit	SGDK-1515AEA	
		2-kW × 2 Servo Unit	SGDK-2020AEA	
		3-kW × 2 Servo Unit	SGDK-3030AEA	
3-axis Servo Unit	0.5-kW × 3 Servo Unit	SGDK-050505AEA	The sum of the actual output current of unit must be equal to or less than 70% of the continuous output current multiplied by the number of axes.	
	1.0-kW × 3 Servo Unit	SGDK-101010AEA		
Option Unit	External PG Card	SGDK-CF01A	One per axis	

Type	Name	Equipment name	Model/order number	Specifications, notes
Motor	Spindle Motor	Single Winding Type 30-kW	UAKA-30A□□□□□□	—
		Single Winding Type 37-kW	UAKA-37A□□□□□□	—
		Winding Selection Type 18.5-kW	UAKB-19A□□□□□□	—
		Winding Selection Type 22-kW	UAKB-22A□□□□□□	—
	Servomotor	0.45-kW Servomotor	SGMKS-05A□□□□□□	—
		0.85-kW Servomotor	SGMKS-09A□□□□□□	—
		1.3-kW Servomotor	SGMKS-13A□□□□□□	—
		1.8-kW Servomotor	SGMKS-20A□□□□□□	—
		2.9-kW Servomotor	SGMKS-30A□□□□□□	—
		4.4-kW Servomotor	SGMKS-44A□□□□□□	—
5.5-kW Servomotor		SGMKS-55A□□□□□□	—	
7.5-kW Servomotor	SGMKS-75A□□□□□□	—		
Bus Bar	Bus Bar	—	JZSP-CGB02-1	250-mm wide unit For internal connection
		—	JZSP-CGB02-2	For 250 mm to 150 mm width
		—	JZSP-CGB02-4	For 250 mm to 75 mm width
		—	JZSP-CGB02-3	For 150mm to 150 mm width
		—	JZSP-CGB02-5	For 150 mm to 75mm width
		—	JZSP-CGB02-6	For 75 mm to 75mm width
		—	JZSP-CGB02-7	For 150 mm to 250 mm width
		—	JZSP-CGB02-8	For 75 mm to 250 mm width
		—	JZSP-CGB02-9	For 75 mm to 150 mm width
	Local Bus Cable	—	JZSP-CNS90-1	For 250 mm to 150 mm width For 150 mm to 150 mm width 75 mm to 150mm width
		—	JZSP-CNS90-2	For 250 mm to 75 mm width For 150 mm to 75mm width For 75 mm to 75 mm width
		—	JZSP-CNS90-4	For top/bottom connection (cable length: 1 m)
		—	JZSP-CNS90-5	For 150 mm to 250 mm width For 75 mm to 250mm width
Control Power Supply Cable	—	JZSP-CNB00-1	For 250 mm to 150 mm width For 150 mm to 150 mm width For 75 mm to 150 mm width	
Bus Bar	Control Power Supply Cable	—	JZSP-CNB00-2	For 250 mm to 75 mm width For 150 mm to 75 mm width For 75 mm to 75 mm width
		—	JZSP-CNB00-3	For top/bottom connection (cable length: 1 m)
		—	JZSP-CNB00-4	150 mm to 250mm width 75 mm to 250mm width
	Terminating Connector	—	JZSP-CNS90-9	—

Type	Name	Equipment name	Model/order number	Specifications, notes
AC Reactor	Reactor	UZBA-B, 150 A, 0.07 mH	X10199	For 45-kW Converter
		UZBA-B, 120 A, 0.09 mH	X10201	For 37-kW Converter
		UZBA-B, 92 A, 0.10 mH	X10205	For 30-kW Converter
		UZBA-B, 77 A, 0.14 mH	X10204	For 22-kW Converter
		UZBA-B, 63 A, 0.17 mH	X10203	For 18-kW Converter
		UZBA-B, 46 A, 0.21 mH	X10202	For 15-kW Converter
		UZBA-B, 32 A, 0.28 mH	X10217	For 11-kW Converter
		UZBA-B, 23 A, 0.41 mH	X10216	For 7.5-kW Converter
		UZBA-B, 16 A, 0.56 mH	X10215	For 5.5-kW Converter
		UZBA-B, 10 A, 0.84 mH	X10214	For 3.7-kW Converter
Related Equipment	Brake Power Supply Unit	BK Unit	OPR-109A	For 200 VAC
			OPR-109F	For 100 VAC
	PROFIBUS-DP Connector	Horizontal wiring type connector	6GK1500-0EA0	For Converter

1.3 SERVOPACK Model Numbers

■ Converter

CIMR - MRX N 2 045 5

Series name

Specification
N: NC System (YS840DI)

Power supply
voltage
2: 200 V

Protective structure
5: External cooling

Max. output

045	45 kW
037	37 kW
030	30 kW
022	22 kW
018	18 kW
015	15 kW
011	11 kW
7P5	7.5 kW
5P5	5.5 kW
3P7	3.7 kW

■ Inverter

CIMR - MX N 2 030 5

Series name

Specification
N: NC System (YS840DI)

Power supply
voltage
2: 200 V

Protective structure
5: External cooling

Max. output

045	45 kW
037	37 kW
030	30 kW
022	22 kW
018	18 kW
015	15 kW
011	11 kW
7P5	7.5 kW
5P5	5.5 kW
3P7	3.7 kW

■ Servo Unit

SGDK - 75 - A E A

or
3030

Series name
Output (see
table below)

Basic specifications
(A only)
Communications
command (E only)
Voltage
A: 200 V

1-axis Unit		2-axis Unit	
Symbol	Capacity	Symbol	Capacity
0.5	0.5 kW	0505	0.5 kW
10	1 kW	1010	1 kW
15	1.5 kW	1515	1.5 kW
20	2 kW	2020	2 kW
30	3 kW	3030	3 kW
50	5 kW	—	—
60	6 kW	—	—
75	7.5 kW	—	—

Control Panel Installation

This section describes the method for installing the drive units.

2.1 Control Panel and Electrical Component Installation	
Conditions	2-2
2.2 Cabinet Design	2-3
2.2.1 Thermal Design	2-3
2.2.2 Heat Loss	2-5
2.2.3 Weight	2-7
2.3 Noise Countermeasures	2-8
2.3.1 Wiring Separation	2-8
2.3.2 Noise Countermeasure Equipment	2-9
2.3.3 Grounding	2-11
2.3.4 Cable Shields and Clamps	2-12
2.4 Mounting Precautions	2-13
2.4.1 General Precautions	2-13
2.4.2 Precautions for Mounting Feed Axis/Spindle Axis SERVOPACK	2-14
2.4.3 SERVOPACK Installation Direction and Space	2-15
2.4.4 Installing Lightning Surge Countermeasure Equipment	2-16

2.1 Control Panel and Electrical Component Installation Conditions

The operating temperature limits for drive unit equipment are listed below.

Name	Equipment name	Temperature limits
SERVOPACK	SERVOPACK	0 to 55°C 0 to 45°C (heat sink part)
Reactor, switching device	Reactor	-10 to 55°C
Brake power supply unit	BK Unit	0 to 60°C

IMPORTANT

The performance may drop if the above temperature limits are exceeded during operation.

The environmental conditions are listed below for information when the customer installs the control panel.

Table 2.1 Control Panel and Electrical Component Installation Conditions

Item		Condition	
Environmental conditions	Operating temperature ^{*1}	During storage and transport	-20 to +60°C
		Ambient temperature during control panel operation	5 to 30°C ^{*2}
	Humidity	10 to 90% RH (no condensation)	
	Vibration/impact	During operation: 4.9 m/s ² /19.6 m/s ²	
	Atmosphere	Avoid use in environments subject to high levels of dust or high concentrations of cutting oils or organic solvents.	
	Converter	Main circuit power supply	3-phase, 200 to 230 VAC +10 to -15%, 50/60 Hz ±5%
Control power supply		Single-phase, 200V to 230 VAC +10 to -15%, 50/60Hz ±5%	

*1 Refrain from installing in a place subject to direct sunlight, near a heat source, or outdoors, even if the conditions are within the designated operating range.

*2 The ambient temperature of the control panel during operation is 5 to 30°C assuming a temperature rise of +10°C. Considering the control panel's interior temperature, the value corresponds to the operating temperature limit of the UPS battery.

2.2 Cabinet Design

2.2.1 Thermal Design

The design prerequisite for the cabinet to hold the drive unit and other units is that the average internal temperature rise of the closed structure be no more than 10°C higher than the outside air.

■ Cabinet Internal Temperature Rise (Average Temperature Rise)

The internal temperature rise for sheet-metal cabinets shall be as follows.

$$\Delta T = \frac{P}{q_e} = \frac{P}{k \cdot A}$$

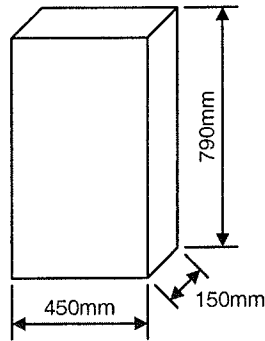
ΔT	Internal temperature rise (°C)
P	Heat generated inside cabinet (W)
q_e	Cabinet thermal flow rate (W/°C)
k	Sheet metal heat transfer coefficient (W/m ² °C)
	Circulating fan inside cabinet: 6W/m ² °C
	No circulating fan inside cabinet: 4W/m ² °C
A	Effective heat discharge area (m ²)*

* The part of the cabinet surface area that is capable of heat discharge excluding surfaces that are in contact with other structures.

◀ EXAMPLE ▶

Example of allowable heat loss for a cabinet equipped with a circulating fan

Cabinet size (W × H × D): 450 × 790 × 150



• Effective heat discharging area

$$A = 1.0155 \text{ (m}^2\text{)}$$

Due to the standalone installation design, the bottom surface is excluded.

• Heat generated inside cabinet

$$P = 60 \text{ (W)}$$

• Internal temperature rise

$$\Delta T = \frac{P}{q_e} = \frac{P}{k \cdot A} = \frac{60}{6 \times 1.0155} = 9.8 \text{ (}^\circ\text{C)}$$

From the above, the internal temperature rise of $\Delta T = 9.8 \text{ (}^\circ\text{C)}$ clears the standard of 10 (°C) max.

If the temperature rise exceeds 10°C, a separate cooling countermeasure must be provided.

■ Cooling Capacity of the Heat Exchanger

When it is not sufficient to simply install a circulating fan inside the cabinet, provide the following heat exchanger.

Table 2.2 Heat Exchanger

Model	Name	Cooling capacity	Dimensions (mm)
DE9404550-1	REX1600ESYE	110 W/10°C	194 × 800 × 65 (W × H × D)

* This is the allowable heat loss when the temperature rise is maintained at 10°C max.

◀ EXAMPLE ▶

Example of allowable heat loss in a cabinet equipped with a heat exchanger

In order to install the heat exchanger described in the table above and keep the temperature rise to 10°C max. in the example cabinet given for internal temperature rise, the following formula shows that the internal heat loss must be 359 W max.

- $P = k \cdot A \cdot \Delta T + 110\text{W}/10^\circ\text{C} = 6 \times 4.16 \times 10 + 110 = 359\text{W}$

■ Installing the Heat Exchanger

Install the heat exchanger into the customer-built cabinet.

Install so that the outside air is drawn in from the bottom and discharged to the top. This will cause the internal air to be drawn in from the top and discharged to the bottom.

MANDATORY

- Be sure to install a heat exchanger.
Not installing a heat exchanger may cause a malfunction.

An installatin example is given below.

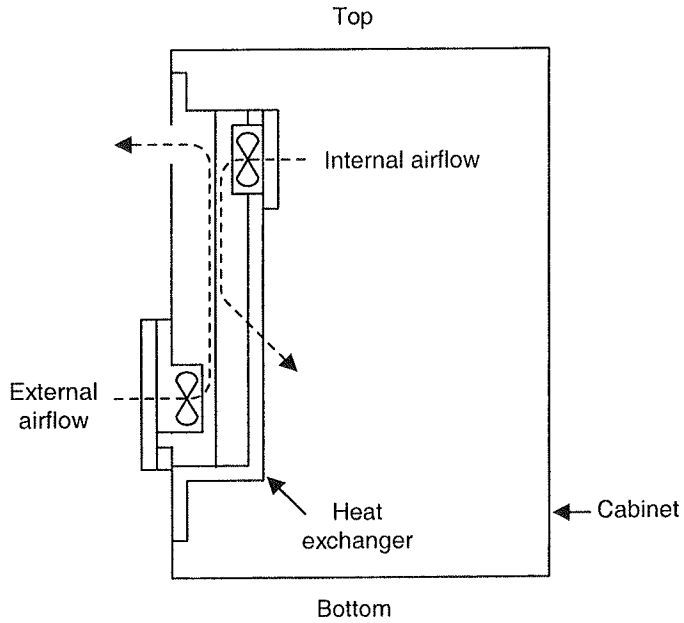


Fig. 2.1 Heat Exchanger Installation

2.2.2 Heat Loss

The heat loss of the drive units is shown below.

■ Servo Unit

Name	Equipment name	Heat loss at 60% load			Heat loss at 70% load			Min. cooling air velocity (m/s)
		Total heat loss (W)	Residual heat loss inside panel (W)	Heat loss outside panel (heat sink part) (W)	Total heat loss (W)	Residual heat loss inside panel (W)	Heat loss outside panel (heat sink part) (W)	
1-axis Servo Unit	SGDK-75AEA	240	80	160	270	90	180	2.5
	SGDK-60AEA	220	80	140	240	80	160	
	SGDK-50AEA	170	70	100	180	70	110	
	SGDK-30AEA	135	60	75	150	65	85	
	SGDK-20AEA	115	60	55	125	60	65	
	SGDK-15AEA	90	55	35	95	55	40	
	SGDK-10AEA	75	50	25	80	55	25	
	SGDK-05AEA	60	50	10	65	50	15	
2-axis Servo Unit	SGDK-3030AEA	260	110	150	290	120	170	2.5
	SGDK-2020AEA	210	100	110	230	100	130	
	SGDK-1515AEA	165	95	70	180	100	80	
	SGDK-1010AEA	135	90	45	145	90	55	
	SGDK-0505AEA	110	85	25	110	85	25	
3-axis Servo Unit	SGDK-101010AEA	205	135	70	220	135	85	2.5
	SGDK-050505AEA	170	130	40	170	130	40	

■ Heat loss of Converter and Inverter Units

Name	Equipment name	Heat loss during continuous, rated operation			Heat loss during 50% ED			Min. cooling air velocity (m/s)
		Total heat loss (W)	Residual heat loss inside panel (W)	Heat loss outside panel (heat sink part) (W)	Total heat loss (W)	Residual heat loss inside panel (W)	Heat loss outside panel (heat sink part) (W)	
Converter	CIMR-MRXN20455A	590	210	380	720	250	470	2.5
	CIMR-MRXN20375A	400	170	230	490	200	290	
	CIMR-MRXN20305A	330	150	180	440	180	260	
	CIMR-MRXN20225A	290	140	150	330	150	180	
	CIMR-MRXN20185A	260	130	130	300	140	160	
	CIMR-MRXN20155A	210	120	90	260	130	130	
	CIMR-MRXN20115A	180	110	70	220	120	100	
	CIMR-MRXN27P55A	160	110	50	190	120	70	
	CIMR-MRXN25P55A	140	110	30	160	110	50	
	CIMR-MRXN23P75A	120	100	20	140	110	30	
Inverter	CIMR-MXN20455A	1200	340	860	1500	450	1050	2.5
	CIMR-MXN20375A	950	300	650	1200	380	820	
	CIMR-MXN20305A	700	220	480	950	320	630	
	CIMR-MXN20225A	590	190	400	950	230	720	
	CIMR-MXN20185A	500	160	340	600	200	400	
	CIMR-MXN20155A	390	130	260	520	180	340	
	CIMR-MXN20115A	280	100	180	400	150	250	
	CIMR-MXN27P55A	230	85	145	300	110	190	
	CIMR-MXN25P55A	180	70	110	230	95	135	
	CIMR-MXN23P75A	150	60	90	215	85	130	

■ Reactor Heat loss

Name	Equipment name	Heat loss (W)
Reactor	UZBA-B, 150A, 0.07 mH	88
	UZBA-B, 120 A, 0.09 mH	93
	UZBA-B, 92 A, 0.10 mH	85
	UZBA-B, 77 A, 0.14 mH	80
	UZBA-B, 63 A, 0.17 mH	70
	UZBA-B, 46 A, 0.21 mH	55
	UZBA-B, 32 A, 0.28 mH	52
	UZBA-B, 23 A, 0.41 mH	50
	UZBA-B, 16 A, 0.56 mH	31
	UZBA-B, 10 A, 0.84 mH	21

2.2.3 Weight

The drive unit weight is shown below.

Name	Equipment name	Mass (kg)
Converter	CIMR-MRXN20455A	17.5
	CIMR-MRXN20375A	17.5
	CIMR-MRXN20305A	11
	CIMR-MRXN20225A	10.5
	CIMR-MRXN20185A	10.5
	CIMR-MRXN20155A	10.5
	CIMR-MRXN20115A	5.5
	CIMR-MRXN27P55A	5.5
	CIMR-MRXN25P55A	5.5
	CIMR-MRXN23P75A	5.5
	Inverter	CIMR-MXN20455A
CIMR-MXN20375A		
CIMR-MXN20305A		11
CIMR-MXN20225A		11
CIMR-MXN20185A		11
CIMR-MXN20155A		11
CIMR-MXN20115A		5.5
CIMR-MXN27P55A		5.5
CIMR-MXN25P55A		4
CIMR-MXN23P75A		4
1-axis Servo Unit		SGDK-75AEA
	SGDK-60AEA	
	SGDK-50AEA	4
	SGDK-30AEA	
	SGDK-20AEA	
	SGDK-15AEA	
	SGDK-10AEA	
	SGDK-05AEA	
2-axis Servo Unit	SGDK-3030AEA	4.2
	SGDK-2020AEA	
	SGDK-1515AEA	3.7
	SGDK-1010AEA	
	SGDK-0505AEA	
3-axis Servo Unit	SGDK-101010AEA	3.7
	SGDK-050505AEA	
Reactor	UZBA-B, 150 A, 0.07 mH	34
	UZBA-B, 120 A, 0.09 mH	16
	UZBA-B, 92 A, 0.10 mH	12
	UZBA-B, 77 A, 0.14 mH	12
	UZBA-B, 63 A, 0.17 mH	8
	UZBA-B, 46 A, 0.21 mH	8
	UZBA-B, 32 A, 0.28 mH	6
	UZBA-B, 23 A, 0.41 mH	4
	UZBA-B, 16 A, 0.56 mH	3
	UZBA-B, 10 A, 0.84 mH	2.5

2.3 Noise Countermeasures

2.3.1 Wiring Separation

The cables used in the CNC system are classified as shown below.

Use the cables in each category according to the handling instructions.

Category	Cable	Handling
Power lines	AC power supply line (primary side/secondary side)	Bundle these cables separately from those classified as DC power lines and signal wires, or provide electromagnetic shields. Install a spark killer or diode on solenoids, relays, etc.
	Power supply lines to the main motor and Servomotor	
	AC power supply lines to solenoids, contactors, relays, etc.	
DC power lines	DC power supply lines (24 VDC) for CNC, I/O, power supply modules, etc.	Bundle these cables separately from those classified as power lines, or provide electromagnetic shields. Separate these cables as much as possible from the cables classified as signal wires. Install a diode on DC solenoids and relays.
	I/O lines (24 VDC) for use between I/O and machines.	
	Power supply lines (24 VDC) to solenoids, relays, etc.	
Signal wires	PROFIBUS-DP cables between CNC, I/O modules, and converter.	Bundle these cables separately from those classified as power lines, or provide electromagnetic shields. Separate these cables as much as possible from the cables classified as DC power lines. Be sure to install shields on all cables with shield processing instructions.
	RS-232C cables	
	Manual pulse generator cables	
	Encoder cables between main-axis inverter and main-axis motor	
	Encoder cables between Servo Unit and Servomotor.	
	Standalone PG cables	
	Battery cables	
	All cables with shield processing instructions	



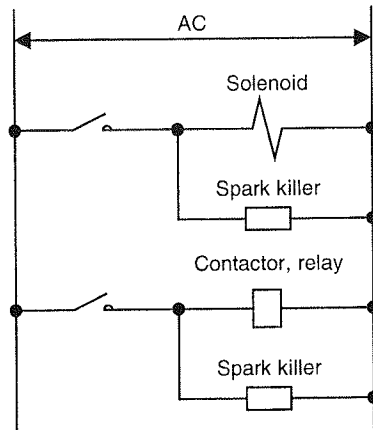
- Separate bundling refers to separating the cable categories by a minimum of 100 mm.
- Electromagnetic shields refer to grounded metal plates which are used as a block between cables of different categories.

2.3.2 Noise Countermeasure Equipment

■ Installing CR-type Spike Killers

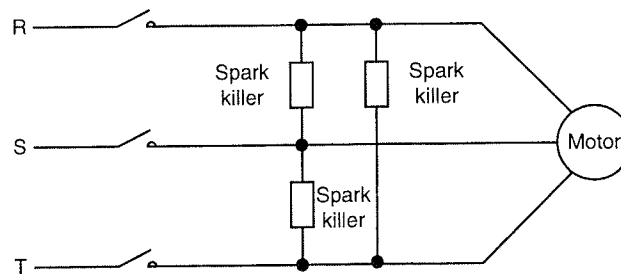
Install CR-type spike killers on AC power supply solenoids, contactors, relays, induction motors, etc.

Solenoids, contactors, and relays



Note: Install the spark killer near the coil.

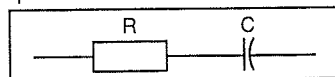
Induction motors (not spindle motor)



Note: Install the spark killers near the coil.



■ Spark killer construction



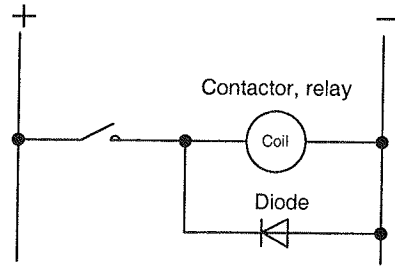
Use the following guideline for selecting spark killers.

- $R = \text{Coil's DC resistance equivalent } (\Omega)$
- $C = \frac{I^2}{10} \text{ to } \frac{I^2}{20} \text{ } (\mu\text{F})$

Note: $I = \text{Steady coil current.}$

■ Installing Diodes

Install diodes to DC power supply contactors, relays, etc.



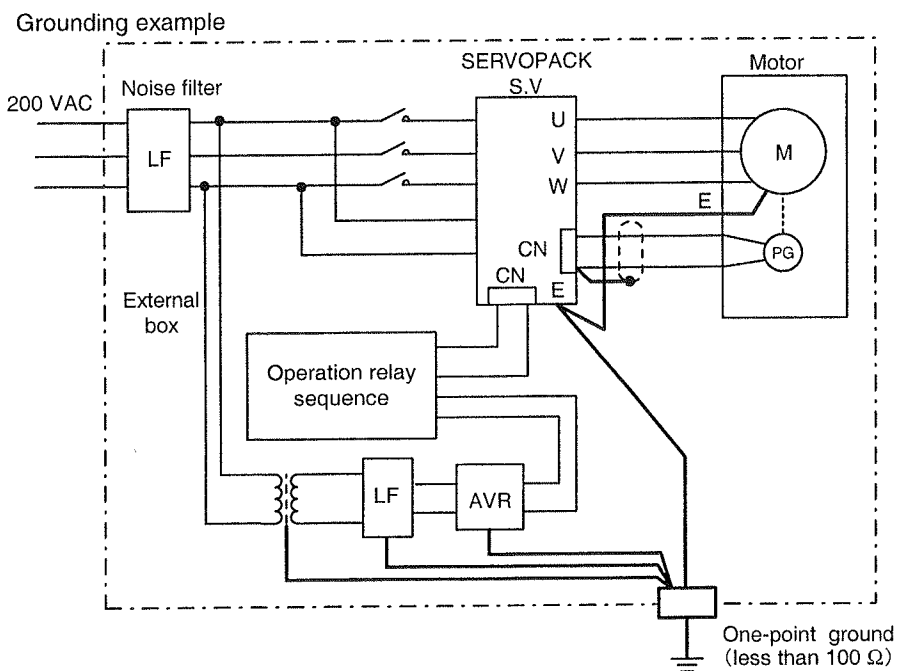
Note: Install the diode near the coil. Be careful of polarity.



As a guideline, select diodes with about twice the applied voltage and current.

2.3.3 Grounding

Wire the ground wire for each unit separately to the cabinet or a ground plate.



- For information on cables for installation, refer to the relative regulations (e.g., *Electrical Facilities Technical Standard and Internal Wiring Regulations* in Japan).
- Be sure to connect the motor's ground terminal to the SERVOPACK's ground terminal.
- Be sure to use single grounding of less than 100 Ω. Failure to follow these instructions may cause electric shock, fire, and/or malfunction.
- Do not use the ground wires for this equipment for jointly grounding other power equipment. Failure to follow these instructions may cause malfunction.

2.3.4 Cable Shields and Clamps

Be sure to use shielding on the encoder cables between the Servo Unit and the motor. Shields of the encoder cables must also be grounded.

Following the method shown below, use cable clamping brackets to connect the cables securely to the ground plate.

Because this clamp shields the cables as well as supports them, it serves an extremely important safety role. Be sure to use it.

As shown in the recommended example below, part of the cable cover is removed to expose the shield's outer covering, and this outer covering is pressed against the ground plate by the cable clamp.

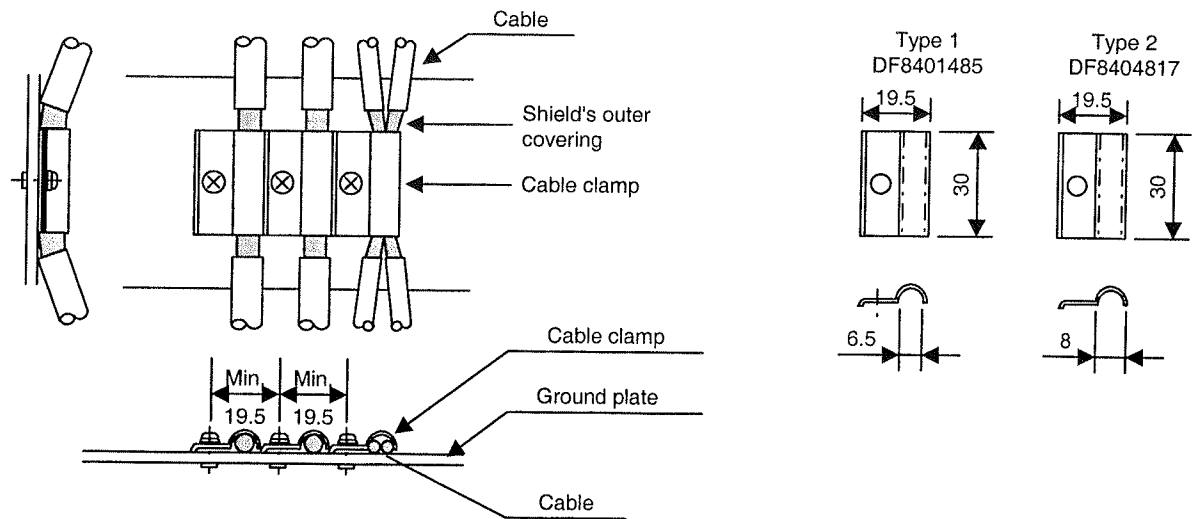


Fig. 2.2 Cable Clamp

Mount the ground plate near the SERVOPACK, as shown in the figure below.

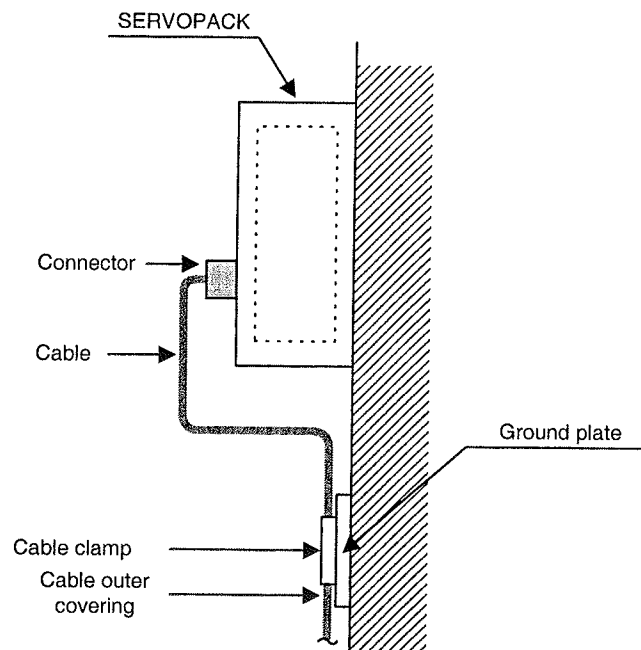


Fig. 2.3 Ground Plate Positioning Example

2.4 Mounting Precautions

When designing the cabinet to hold the CNC Unit or other, consider the following points.

2.4.1 General Precautions

- Be sure that the cabinet has a closed structure.
- Mount the units so that they can be easily inspected (during maintenance), removed, and installed.
- To prevent blocking the airflow, leave about 100 mm between components and the cabinet wall surface.
- When embedding the control panel into a machine door or something similar, be sure to provide reinforcement against vibration, because it will definitely be affected by vibration from the machine.
- Design the cabinet so that the average internal temperature rise will be no more than 10°C higher than the outside air.
- To increase the cooling efficiency of the closed cabinet, and to prevent local temperature rises, use a fan to circulate the air.
- To prevent malfunction due to noise, allow at least 10 mm of space between the units and all cables and components of 90 VDC or more, and between the units and AC power supply cables and components.

When wiring, observe the following points.

- Separate AC lines (power supply lines) and DC wires (signal wires).
- Separate primary side and secondary side parts (transformer, line filter, etc.)

2.4.2 Precautions for Mounting Feed Axis/Spindle SERVOPACK

- The SERVOPACK is designed for wall mounting. Use screws or bolts to mount it securely, making sure that it is vertical.
- When mounting, allow for easy inspection and replacement during maintenance.
- In order to minimize internal loss of generated heat, bring the SERVOPACK's heat sink outside the cabinet and expose the heat discharge fins to the outside air. This results in a closed structure, and reduces the heat sink capacity. (See figure below.)
- To cool the heat sink, an airflow of 2.5 m/s is necessary near the heat sink.
- Make sure that sufficient cooling airflow reaches every individual SERVOPACK.
- A metal cooling fan is recommended. Plastic (resin) fans become degraded when cutting oils adhere to them, resulting in drive malfunctions and other problems.

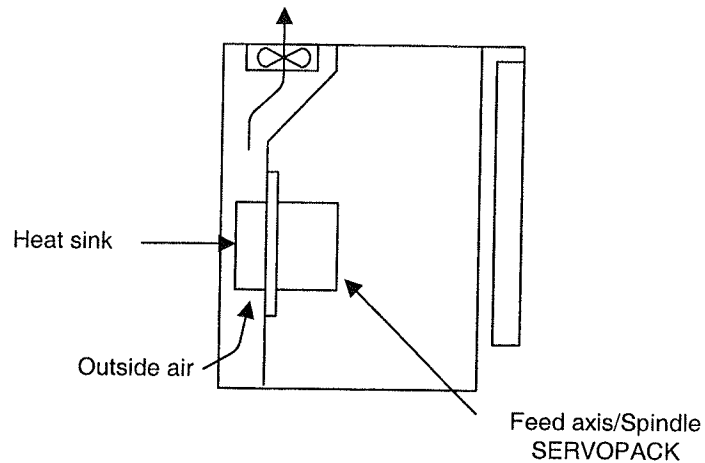


Fig. 2.4 Type of Heat Sink Brought Outside the Cabinet

2.4.3 SERVOPACK Installation Direction and Space

For efficient cooling, be sure to mount the SERVOPACK vertically and allow the space shown in the figure below.

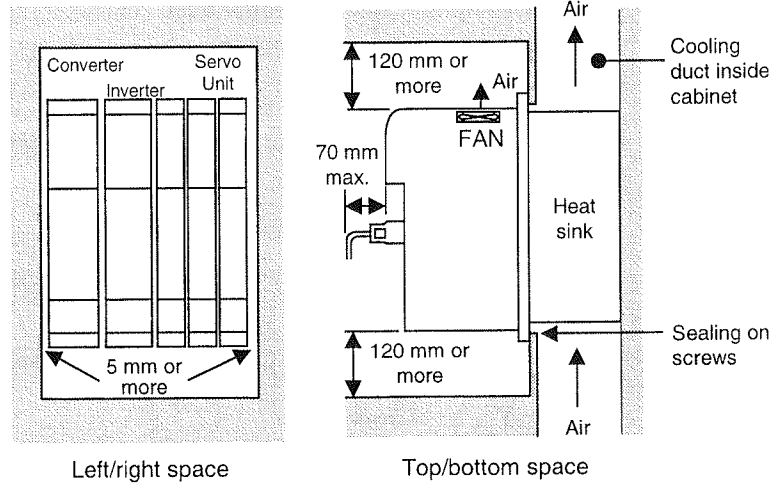


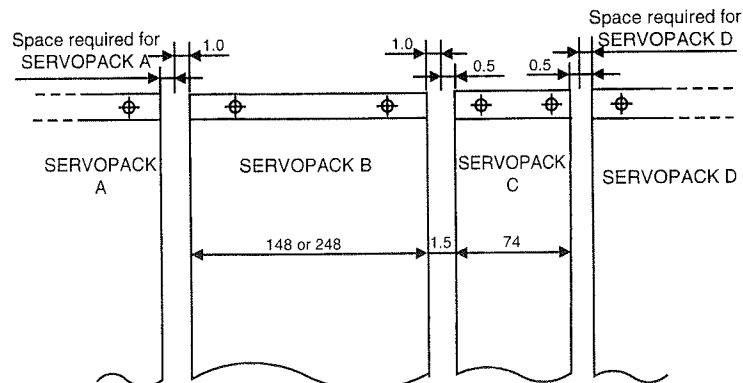
Fig. 2.5 SERVOPACK Installation Direction and Space

- All SERVOPACKS are designed with externally cooled heat sinks.
- For the external dimensions installation dimensions of all products, refer to the dimension diagrams in Attachment B, 13 to 15.
- Make sure the inlet air temperature for the SERVOPACK is 0 to 45°C at the heat sink, and 0 to 55°C inside the panel.
- Use sealing on the SERVOPACK screws to prevent oil from entering.
- The SERVOPACK includes the built-in fan shown in the figure above.
- Because the SERVOPACK generates heat, allow space above and below it when installing other units and devices to prevent the heat from remaining inside.
- When circulating air inside the cabinet, do not allow the air to directly strike the SERVOPACK (to prevent the adherence of dust and dirt).

Leave the following space on both sides of each SERVOPACK.

SERVOPACK width	Required space for each unit
74 mm	0.5 mm on both right and left
148 mm or 248 mm	1.0 mm on both right and left

As shown in the figure below, the space between units is the sum of the space required for each of the units.



2.4.4 Installing Lightning Surge Countermeasure Equipment

Lightning surge countermeasures refer to those which prevent malfunction in electric or electronic equipment when the power lines, communication lines and signal wires are disrupted by high energy, i.e., when they are subjected to switching or lightning surge voltage during operation.

Normally, surge absorbers should be installed on the power lines, as shown in the figure below.

- Surge absorbers between power lines (normal)
- Surge absorbers between power lines and ground (common)

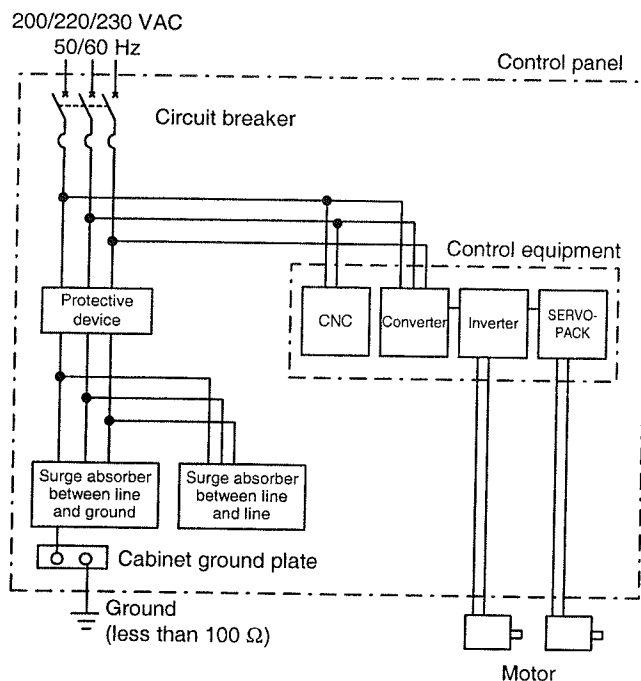


Fig. 2.6 Installing Lightning Surge Countermeasure

■ Recommended surge absorber models

Installation location	Recommended model	Maker
Between power lines (normal)	R·A·V-781BYZ-2	Okaya Electric
Between power lines and ground (common)	R·A·V-781BXZ-4	Okaya Electric

IMPORTANT

To prevent wires or other parts from burning because a surge absorber short-circuits due to frequent lightning surges or switching, be sure to include a protective device, such as a 5-A circuit protector or fuse, in the circuit.

Motor Installation

This section describes the installation of the YS840DI motor.

3.1 Servomotor	3-2
3.1.1 Servomotor Model Number	3-2
3.1.2 Servomotor Dimensions	3-3
3.1.3 Servomotor Characteristics	3-6
3.1.4 Servomotor Torque Characteristics	3-8
3.1.5 Installation Location	3-12
3.1.6 Installation Direction	3-12
3.1.7 Machine Coupling	3-12
3.1.8 Shaft Extension Load	3-13
3.1.9 Oil or Water Countermeasures	3-14
3.2 Spindle Motor	3-15
3.2.1 Spindle Motor Model Number	3-15
3.2.2 Spindle Motor Dimensions	3-16
3.2.3 Spindle Motor Characteristics	3-19
3.2.4 Spindle Motor Output Characteristics	3-21
3.2.5 Installation Location	3-25
3.2.6 Installation Direction	3-25
3.2.7 Machine Coupling	3-26
3.2.8 Oil or Water Countermeasures	3-27

3.1 Servomotor

3.1.1 Servomotor Model Number

SGMKS - 05 A 2 A 2 S

Servomotor

Servomotor capacity

Code	SGMKS(kW) 1500 min ⁻¹
05	0.45
09	0.85
13	1.3
20	1.8
30	2.9
44	4.4
55	5.5
75	7.5

Brake, oil seal specifications

- 1: No brake, oil seal
- S: With oil seal
- B: With 90-VDC brake
- C: With 24-VDC brake
- D: With oil seal, 90-VDC brake
- E: With oil seal, 24-VDC brake

Shaft extension specifications

Code	Specification	SGMKS
2	Straight, no key	⊙
3	Taper 1/10, with parallel key	○
6	Straight, key, with tap	○

⊙: Standard, ○: Option

Design order: A

Serial encoder specifications

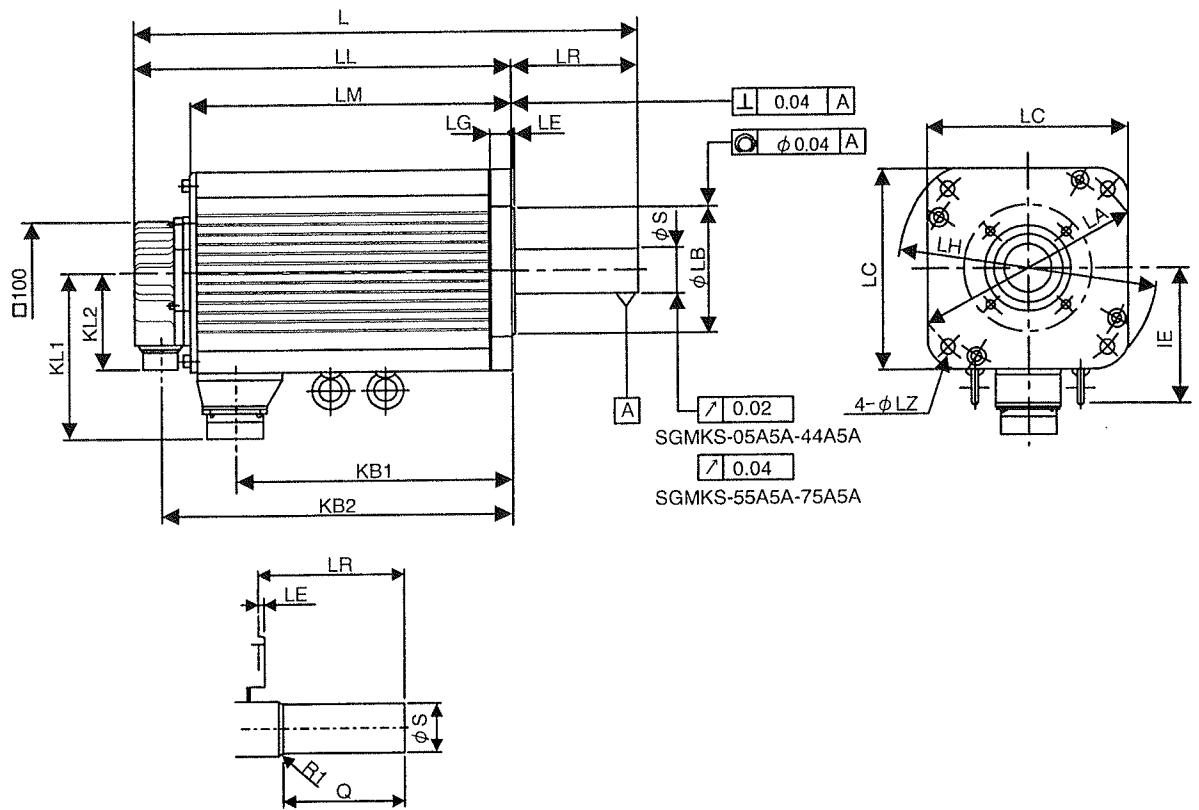
Code	Specification	SGMKS
2	17-bit absolute value	○
3	20-bit absolute value	○
5	17-bit absolute value with super capacitor	⊙
C	17-bit incremental	○

⊙: Standard, ○: Option

Voltage
A: 200 V

3.1.2 Servomotor Dimensions

■ Motor without Brake



Note: There is no eyebolt on the SGMKS-05A5A to -30A5A.

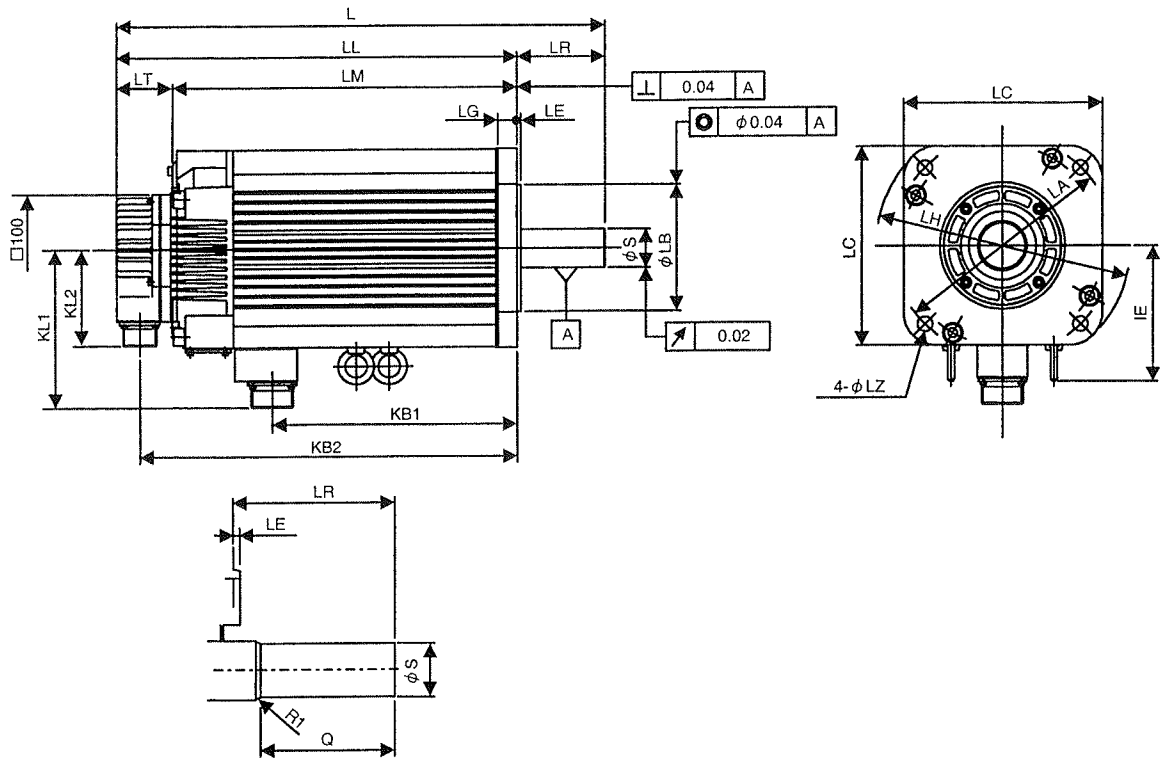
(Unit: mm)

Model SGMKS-	L	LL	LM	LR	KB1	KB2	IE	KL1	KL2
05A5A	251	193	144	58	115	173	—	109	88
09A5A	280	222	173	58	144	202	—	109	88
13A5A	310	252	203	58	174	232	—	109	88
20A5A	316	237	188	79	156	217	—	140	88
30A5A	354	275	226	79	194	255	—	140	88
44A5A	394	315	266	79	234	295	123	140	88
55A5A	482	369	320	113	279	349	123	150	88
75A5A	562	449	400	113	359	429	123	150	88

3.1.2 Servomotor Dimensions

Model SGMKS-	Flange surface dimensions (mm)							Shaft extension dimensions (mm)		Approx. mass (kg)
	LA	LB	LC	LE	LG	LH	LZ	S	Q	
05A5A	145	110 ⁰ _{-0.035}	130	6	12	165	9	19 ⁰ _{-0.013}	40	6.9
09A5A	145	110 ⁰ _{-0.035}	130	6	12	165	9	19 ⁰ _{-0.013}	40	9.8
13A5A	145	110 ⁰ _{-0.035}	130	6	12	165	9	22 ⁰ _{-0.013}	40	12
20A5A	200	114.3 ⁰ _{-0.025}	180	3.2	18	230	13.5	35 ^{+0.01} ₀	76	18
30A5A	200	114.3 ⁰ _{-0.025}	180	3.2	18	230	13.5	35 ^{+0.01} ₀	76	23
44A5A	200	114.3 ⁰ _{-0.025}	180	3.2	18	230	13.5	35 ^{+0.01} ₀	76	29
55A5A	200	114.3 ⁰ _{-0.025}	180	3.2	18	230	13.5	42 ⁰ _{-0.016}	110	37
75A5A	200	114.3 ⁰ _{-0.025}	180	3.2	18	230	13.5	42 ⁰ _{-0.016}	110	49

■ Motor with Brake



Note: There is no eyebolt on models SGMKS-05A5A to SGMKS-30A5A.

(Unit: mm)

Model SGMKS-	L	LL	LM	LR	LT	KB1	KB2	IE	KL1	KL2
05A5A□B	286	228	180	58	48	106	206	—	116	88
09A5A□B	315	257	209	58	48	135	235	—	116	88
13A5A□B	345	287	239	58	48	165	265	—	116	88
20A5A□B	367	288	236	79	52	146	266	—	146	88
30A5A□B	405	326	274	79	52	184	304	—	146	88
44A5A□B	445	366	314	79	52	224	344	123	146	88

Model SGMKS-	Flange surface dimensions (mm)							Shaft extension dimensions (mm)		Approx. mass (kg)
	LA	LB	LC	LE	LG	LH	LZ	S	Q	
05A5A□B	145	110 ⁰ _{-0.035}	130	6	12	165	9	19 ⁰ _{-0.013}	40	9
09A5A□B	145	110 ⁰ _{-0.035}	130	6	12	165	9	19 ⁰ _{-0.013}	40	12
13A5A□B	145	110 ⁰ _{-0.035}	130	6	12	165	9	22 ⁰ _{-0.013}	40	14
20A5A□B	200	114.3 ⁰ _{-0.025}	180	3.2	18	230	13.5	35 ^{+0.01} ₀	76	24
30A5A□B	200	114.3 ⁰ _{-0.025}	180	3.2	18	230	13.5	35 ^{+0.01} ₀	76	29
44A5A□B	200	114.3 ⁰ _{-0.025}	180	3.2	18	230	13.5	35 ^{+0.01} ₀	76	35

3.1.3 Servomotor Characteristics

Servomotor model SGMKS-		05A□A		09A□A		13A□A	
Combination Servo Unit capacity		Same frame	One frame larger	Same frame	One frame larger	Same frame	One frame larger
Rated output*	kW	0.38	0.45	0.85	0.85	1.3	1.3
Rated torque*	N·m	2.40	2.84	5.39	5.39	8.34	8.34
Instantaneous maximum torque*	N·m	7.55	11.4	13.4	21.6	22.9	33.4
Rated armature current*	Arms	3.8	4.5	7.3	7.3	10.7	10.7
Instantaneous maximum armature current*	Arms	11.0	16.9	17.0	28.0	28.0	41.7
Rated rotational speed*	min ⁻¹	1500	1500	1500	1500	1500	1500
Maximum rotational speed*	min ⁻¹	3000	3000	3000	3000	3000	3000
Torque constant	N·m/Arms	0.708	0.708	0.811	0.811	0.842	0.842
Rotor moment of inertia	× 10 ⁻⁴ kg·m ²	13	13	25	25	36.9	36.9
Rated power rate*	kW/s	4.42	6.2	11.6	11.6	18.8	18.8
Rated angular velocity*	rad/s ²	1840	2180	2160	2160	2260	2260
Mechanical time constant	ms	8.2	8.2	5.2	5.2	4.0	4.0
Electrical time constant	ms	2.3	2.3	3.1	3.1	3.5	3.5
Brake moment of inertia	× 10 ⁻⁴ kg·m ²	2.1	2.1	2.1	2.1	2.1	2.1
Brake static friction torque	N·m	4.41	4.41	12.7	12.7	12.7	12.7

Servomotor model SGMKS-		20A□A			30A□A		
Combination Servo Unit capacity		Same frame	One frame larger	Two frames larger	Same frame	One frame larger	Two frames larger
Rated output*	kW	1.8	1.8	1.8	2.9	2.9	2.9
Rated torque*	N·m	11.5	11.5	11.5	18.6	18.6	18.6
Instantaneous maximum torque*	N·m	30.9	41.1	46.0	42.9	63.1	74.4
Rated armature current*	Arms	15.7	15.7	15.7	24.8	24.8	24.8
Instantaneous maximum armature current*	Arms	41.3	54.9	61.5	56.0	84.0	99.0
Rated rotational speed*	min ⁻¹	1500	1500	1500	1500	1500	1500
Maximum rotational speed*	min ⁻¹	3000	3000	3000	3000	3000	3000
Torque constant	N·m/Arms	0.788	0.788	0.788	0.791	0.791	0.791
Rotor moment of inertia	× 10 ⁻⁴ kg·m ²	57.1	57.1	57.1	82.8	82.8	82.8
Rated power rate*	Kw/s	23.2	23.2	23.2	41.8	41.8	41.8
Rated angular velocity*	rad/s ²	2010	2010	2010	2250	2250	2250
Mechanical time constant	ms	4.2	4.2	4.2	2.8	2.8	2.8
Electrical time constant	ms	7.2	7.2	7.2	7.4	7.4	7.4
Brake moment of inertia	× 10 ⁻⁴ kg·m ²	8.5	8.5	8.5	8.5	8.5	8.5
Brake static friction torque	N·m	43.1	43.1	43.1	43.1	43.1	43.1

Servomotor model SGMKS-		44A□A			55A□A		75A□A
Combination Servo Unit capacity		Same frame	One frame larger	Two frames larger	Same frame	One frame larger	Same frame
Rated output*	kW	3.9	4.4	4.4	5.5	5.5	7.5
Rated torque*	N·m	24.9	28.4	28.4	35.0	35.0	48.0
Instantaneous maximum torque*	N·m	64.4	82.6	114	93.5	125	131
Rated armature current*	Arms	32.9	37.5	37.5	42.5	42.5	55.6
Instantaneous maximum armature current*	Arms	84.0	110	150	110	150	150
Rated rotational speed*	min ⁻¹	1500	1500	1500	1500	1500	1500
Maximum rotational speed*	min ⁻¹	3000	3000	3000	3000	3000	3000
Torque constant	N-m/Arms	0.791	0.791	0.791	0.877	0.877	0.920
Rotor moment of inertia	× 10 ⁻⁴ kg·m ²	122	122	122	160	160	225
Rated power rate*	kW/s	50.9	66.1	66.1	76.6	76.6	102
Rated angular velocity*	rad/s ²	2040	2330	2330	2190	2190	2130
Mechanical time constant	ms	2.3	2.3	2.3	2.0	2.0	1.6
Electrical time constant	ms	8.8	8.8	8.8	10	10	11.5
Brake moment of inertia	× 10 ⁻⁴ kg·m ²	8.5	8.5	8.5	—	—	—
Brake static friction torque	N·m	43.1	43.1	43.1	—	—	—

*These items and the torque and rotational speed characteristics are measured when running in combination with an SGDK Servo Unit, where the armature winding temperature is 20°C.

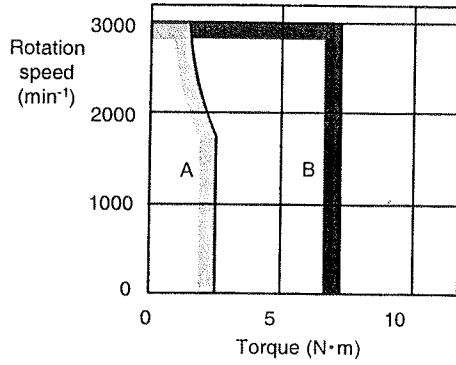
Note: These characteristics show the values when the following heat sinks are installed as a cooling condition.

400 × 400 × 20 (mm) Fe plate: 05A□A to 13A□A Servomotors

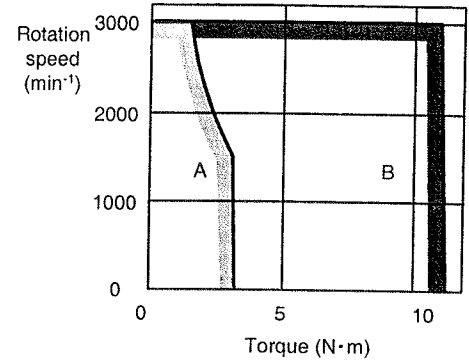
550 × 550 × 30 (mm) Fe plate: 20A□A to 75A□A Servomotors

3.1.4 Servomotor Torque Characteristics

■ SGMKS-05A □ A

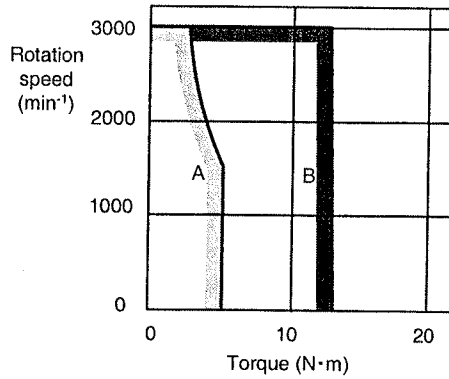


Combined with same-frame Servo Unit

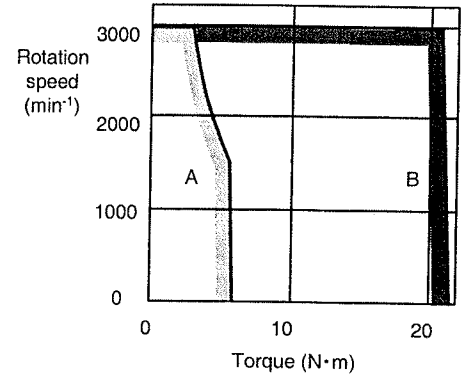


Combined with one frame larger Servo Unit

■ SGMKS-09A □ A

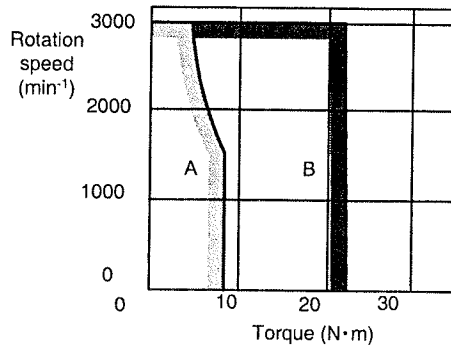


Combined with same-frame Servo Unit

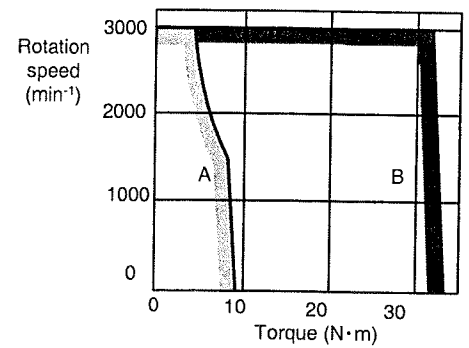


Combined with one frame larger Servo Unit

■ SGMKS-13A □ A



Combined with same-frame Servo Unit

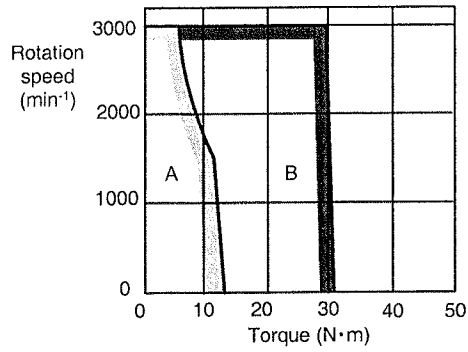


Combined with one frame larger Servo Unit

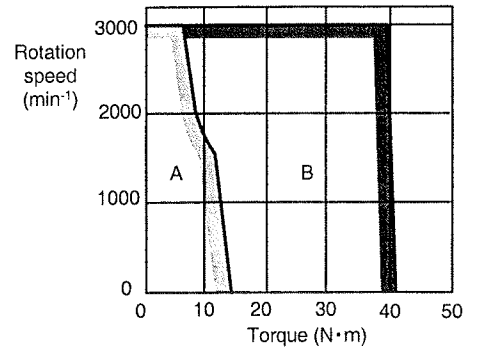
A: Continuous operation

B: Repetitive operation

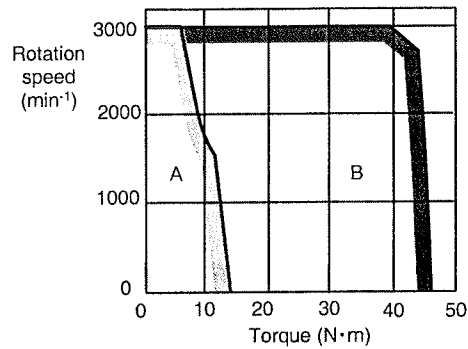
■ SGMKS-20A□A



Combined with same-frame Servo Unit



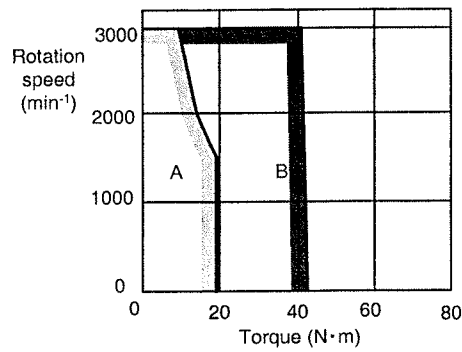
Combined with one frame larger Servo Unit



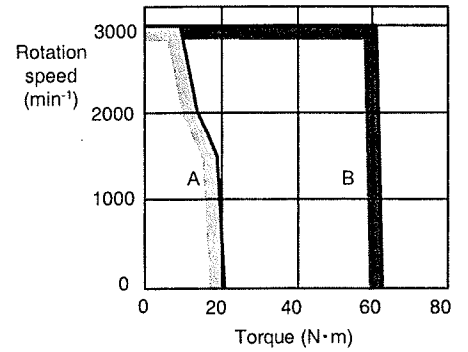
Combined with two frames larger Servo Unit

A: Continuous operation
B: Repetitive operation

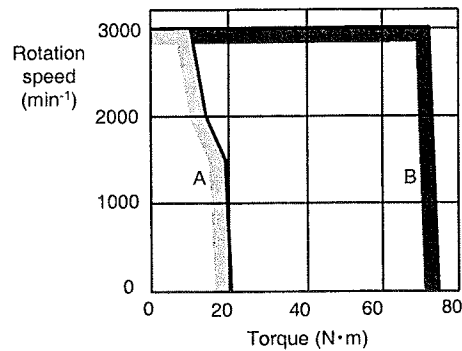
■ SGMKS-30A□A



Combined with same-frame Servo Unit



Combined with one frame larger Servo Unit

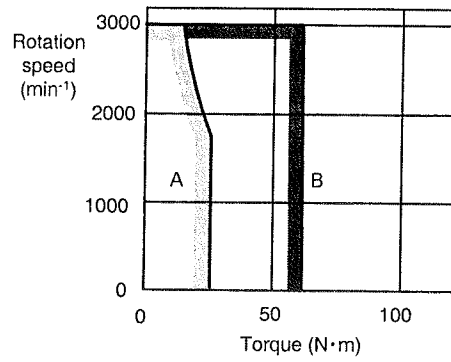


Combined with two frames larger Servo Unit

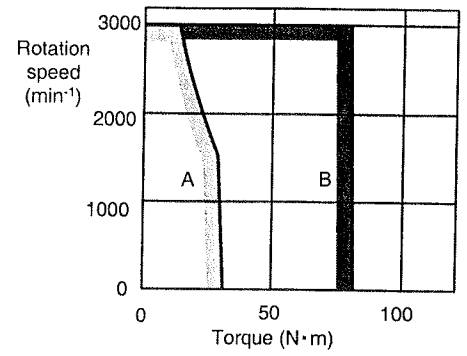
A: Continuous operation
B: Repetitive operation

3.1.4 Servomotor Torque Characteristics

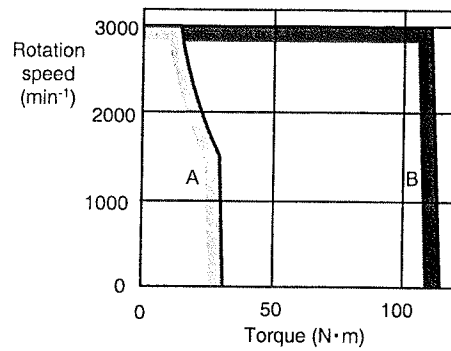
■ SGMKS-44A□A



Combined with same-frame Servo Unit



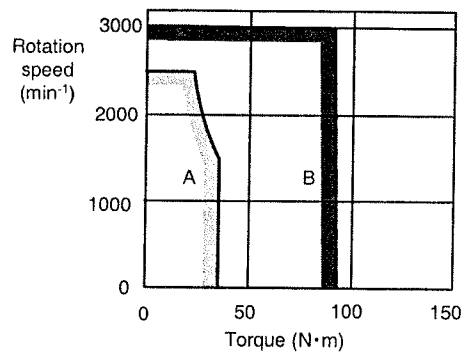
Combined with one frame larger Servo Unit



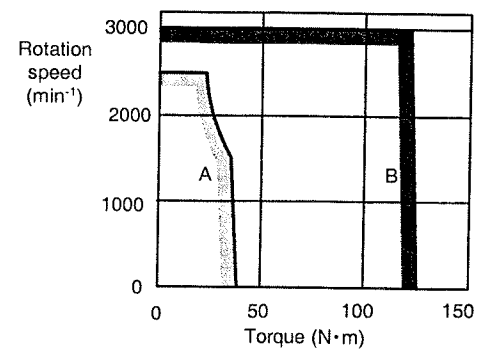
Combined with two frames larger Servo Unit

A: Continuous operation
B: Repetitive operation

■ SGMKS-55A□A



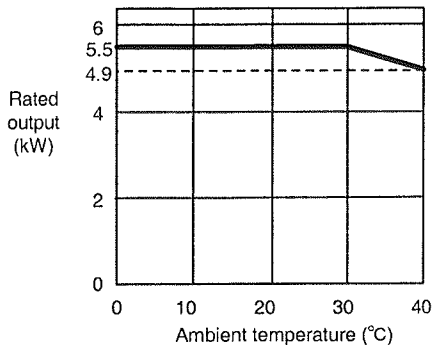
Combined with same-frame Servo Unit



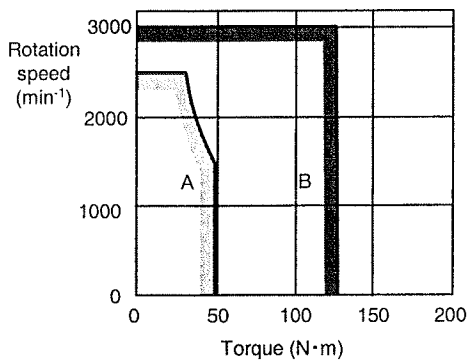
Combined with one frame larger Servo Unit

A: Continuous operation
B: Repetitive operation

When used in ambient temperature above 30°C, the rated output decreases as shown in the figure below.



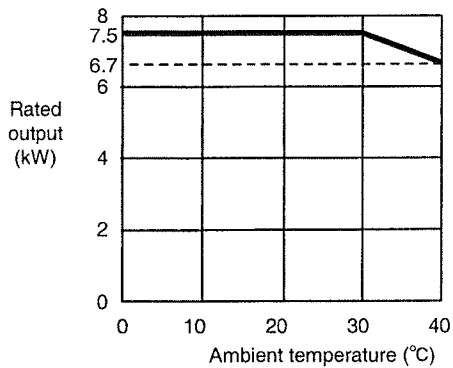
■ SGMKS-75A□A



A: Continuous operation
B: Repetitive operation

Combined with same-frame Servo Unit

When used in ambient temperature above 30°C, the rated output decreases as shown in the figure below.



3.1.5 Installation Location

The SGMKS Servomotor is designed for use indoors.

Use it in an environment that satisfies the following conditions.

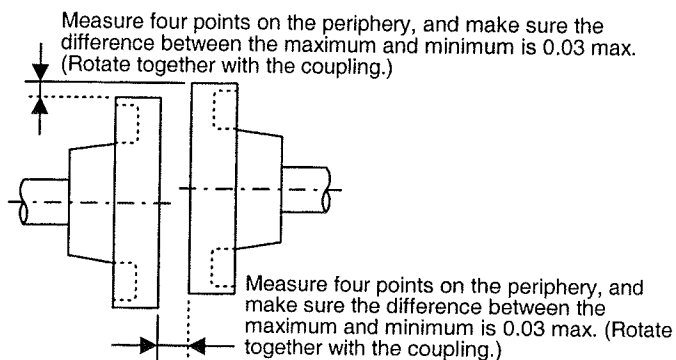
- An indoor location with no corrosive or explosive gases.
- A location with good ventilation and low levels of dust, dirt and humidity
- A location with ambient temperature within 0 to 40°C.
- A location with relative humidity between 20% and 80%, and no condensation.
- A location that allows easy inspection and cleaning.

3.1.6 Installation Direction

The SGMKS Servomotor can be installed either horizontally or vertically.

3.1.7 Machine Coupling

Make sure that the center of the Servomotor axis and the center of the machine axis are aligned when coupling. Install the Servomotor so that the centering is within the precision shown in the figure below.



IMPORTANT

- Insufficient centering may cause vibration and damage the bearing.
- Do not subject the axis to direct impact when installing the coupling. This may damage the encoder installed on the end of the axis opposite to the load.

3.1.8 Shaft Extension Load

Design the machine system so that the thrust load and radial load on the Servomotor shaft extension during operation satisfy the tolerance values in the table below.

The allowable radial loads shown in the list are the maximum loads that can be applied to the output shaft extension.

Table 3.1 Servomotor Allowable Radial Load and Thrust Load¹

Motor model SGMKS-	Allowable radial load Fr [N(kgf)]	Allowable thrust load Fs [N(kgf)]	LR [mm]	Reference diagram
05A□A	490(50)	98(10)	58	
09A□A	490(50)	98(10)		
13A□A	686 (70)	343(35)		
20A□A	1176(120)	490(50)	79	
30A□A	1470(150)	490(50)		
44A□A	1470(150)	490(50)		
55A□A	1764(180)	588(60)	113	
75A□A	1764(180)	588(60)		



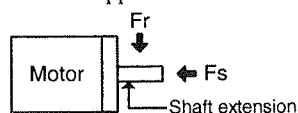
¹ Thrust load, radial load

Thrust load (Fs)

The load applied to the shaft extension in the direction parallel to the axial center.

Radial load (Fr)

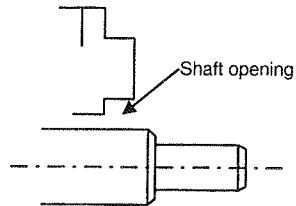
The load applied to the shaft extension in the direction perpendicular to the axial center.



3.1.9 Oil or Water Countermeasures

Measures can be taken to protect the motor when it is used in locations that are subject to drops of water or oil. To ensure sealing around the shaft opening¹, order a motor equipped with an oil seal.

Also, install so that the connector faces downward.

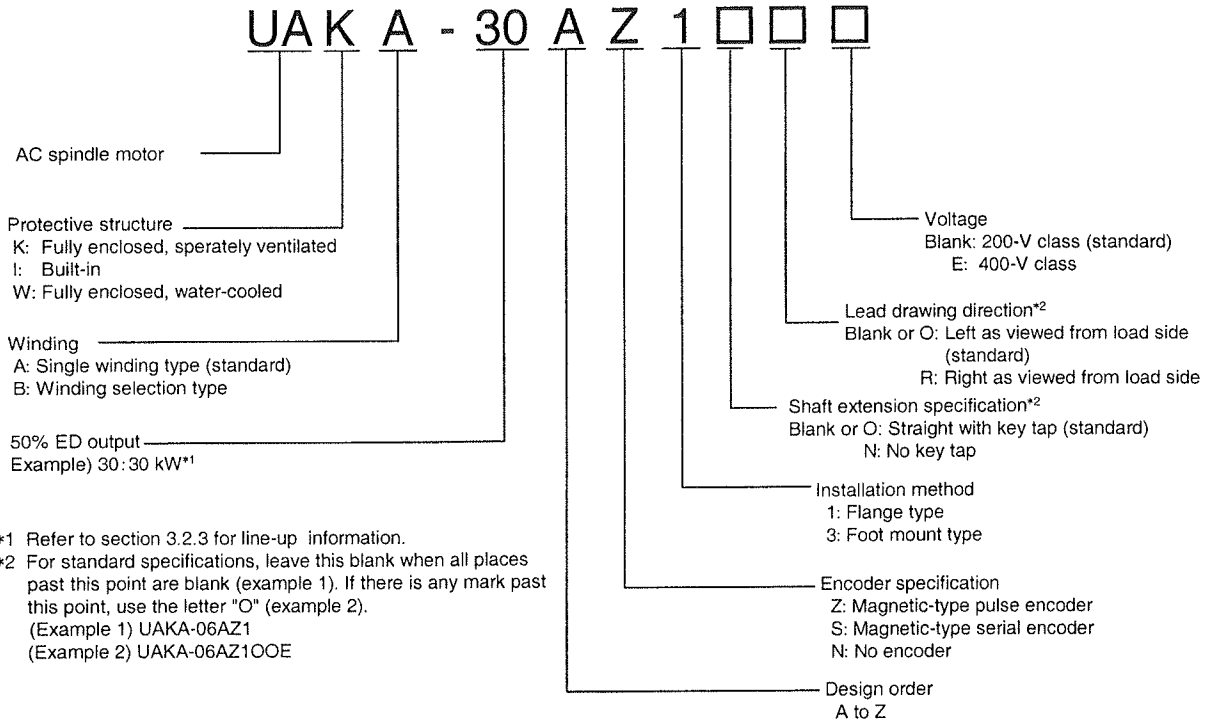


¹ Shaft opening

The part of the shaft that protrudes from the bearing.

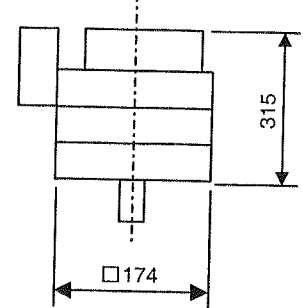
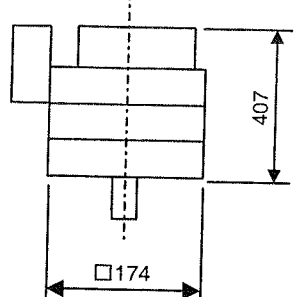
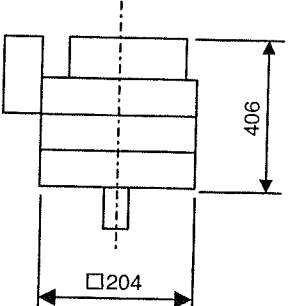
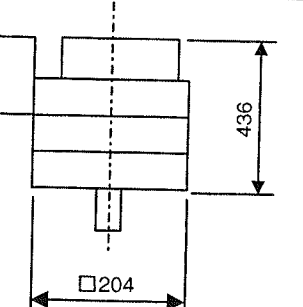
3.2 Spindle Motor

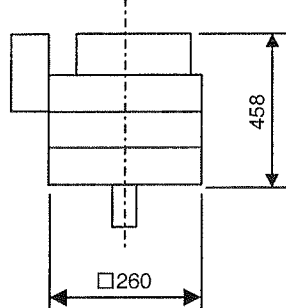
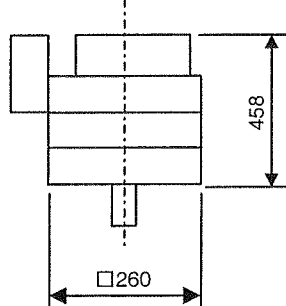
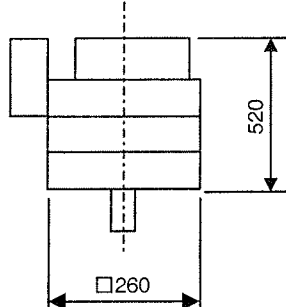
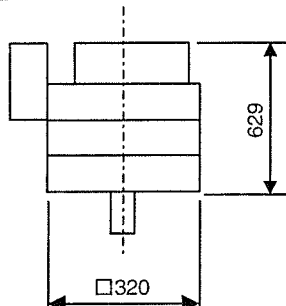
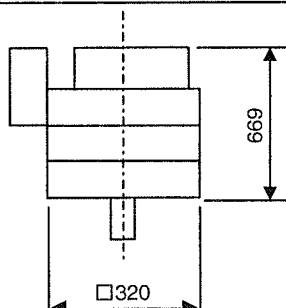
3.2.1 Spindle Motor Model Number

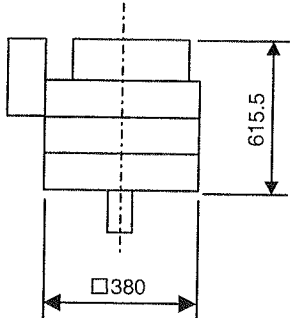


3.2.2 Spindle Motor Dimensions

The dimensions in the following table are approximate. For detailed design dimensions, inquire about the dimensions for each model.

Capacity (kW) 50%ED/cont	UAKA (Unit: mm)
3.7/2.2	 <p>Technical drawing of spindle motor 3.7/2.2. The drawing shows a side view of the motor with a vertical dashed centerline. The total height of the motor is indicated as 315 mm. The width of the motor is indicated as 174 mm. The motor has a flange on the left side and a mounting bracket on the right side.</p>
5.5/3.7	 <p>Technical drawing of spindle motor 5.5/3.7. The drawing shows a side view of the motor with a vertical dashed centerline. The total height of the motor is indicated as 407 mm. The width of the motor is indicated as 174 mm. The motor has a flange on the left side and a mounting bracket on the right side.</p>
7.5/5.5	 <p>Technical drawing of spindle motor 7.5/5.5. The drawing shows a side view of the motor with a vertical dashed centerline. The total height of the motor is indicated as 406 mm. The width of the motor is indicated as 204 mm. The motor has a flange on the left side and a mounting bracket on the right side.</p>
11/7.5	 <p>Technical drawing of spindle motor 11/7.5. The drawing shows a side view of the motor with a vertical dashed centerline. The total height of the motor is indicated as 436 mm. The width of the motor is indicated as 204 mm. The motor has a flange on the left side and a mounting bracket on the right side.</p>

Capacity (kW) 50%ED/cont	UAKA (Unit: mm)
15/11	
18.5/15	
22/18.5	
30/22	
37/30	

Capacity (kW) 50%ED/cont	UAKA (Unit: mm)
45/37	 <p>The diagram shows a side view of a spindle motor assembly. A vertical dashed line indicates the central axis. A horizontal dimension line at the bottom indicates a width of 380 mm. A vertical dimension line on the right indicates a height of 615.5 mm. The motor consists of several stacked cylindrical components, with a smaller component protruding from the bottom center.</p>

3.2.3 Spindle Motor Characteristics

■ Single Winding Series (200-V Specifications)

Model		Single winding series									
		A-04	A-06	A-08	A-11	A-15	A-19	A-22	A-30	A-37	A-45
S3 50% ED	kW	3.7	5.5	7.5	11	15	18.5	22	30	37	45
S1 Continuous rating	kW	2.2	3.7	5.5	7.5	—	—	—	22	30	—
Continuous rated torque	N·m	14.0	23.5	35.0	47.7	—	—	—	183	249	—
Base rotation speed	min ⁻¹	1500							1150		—
Maximum rotation speed	min ⁻¹	8000			6000				4500		—
Moment of inertia (GD ² /4) × 10 ⁻³	kgm ²	6.6	14	21	26	—	—	—	231	266	—
Vibration	μm	V5							V10		—
Noise	dB(A)	75 max.							80 max.		—
Approx. weight	kg	29	47	52	59	—	—	—	198	230	—
Cooling method	Fully enclosed, separately ventilated type										
Enclosure rating	IP44 (IEC34-5)										
Cooling fan motor	Three-phase 200 V 50/60 Hz, 220 V 50/60 Hz, 230 V 60 Hz										
Encoder	Standard: Magnetic-type pulse encoder (1024 P/R) Semi-standard: Magnetic-type serial transmission, high-resolution encoder (17-bit)										
Installation	Flange: IM B5, IM V1 (output shaft facing horizontal, vertically downward), Foot-mount: IM B3 (floor mounted) (Ref.: IEC 34-7)										
Overload capacity	209% of S1 rating for 10 s	200% of S1 rating for 10 s	180% of S1 rating for 10 s	200% of S1 rating for 10 s	—	—	—	—	200% of S1 rating for 10 s	180% of S1 rating for 10 s	—
Insulation	F-class										
Ambient temperature, humidity	0 to 40°C, 95% RH max. (with no condensation)										
Bearing lubricant	Grease										

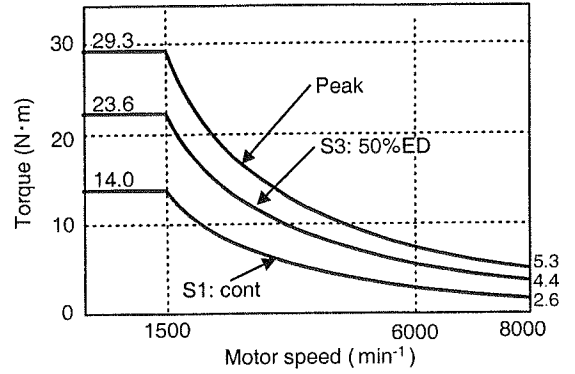
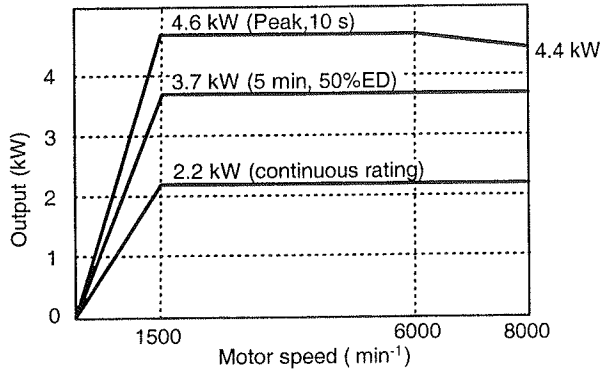
■ Winding Selection Series (200-V Specifications)

Model		Winding Selection Series						
		B-06	B-08	B-11	B-15	B-19	B-22	B-30
S3 50% ED	kW	5.5	7.5	11	15	18.5	22	30
S1 Continuous rating	kW	—	—	—	—	15	18.5	—
Continuous rating torque	N·m	—	—	—	—	249	307	—
Base rotation speed	min ⁻¹	—			—	575		—
Maximum rotation speed	min ⁻¹	—			—	4500		—
Moment of inertia (GD ² /4) x 10 ⁻³	kgm ²	—	—	—	—	231	266	—
Vibration	μm	—			—	V10		—
Noise	dB(A)	—			—	80 max.		—
Approx. weight	kg	—	—	—	—	214	250	—
Cooling method	Fully enclosed, separately ventilated type							
Enclosure rating	IP44 (IEC34-5)							
Cooling fan motor	3-phase, 200 V 50/60 Hz, 220 V 50/60 Hz, 230 V 60 Hz							
Encoder	Standard: Magnetic pulse encoder (1024 P/R) Semi-standard: Magnetic serial transmission, high-resolution encoder (17-bit)							
Installation	Flange: IM B5, IM V1 (output shaft facing horizontal, vertically downward), Foot-mount: IM B3 (floor mounted) (Ref.: IEC 34-7)							
Overload capacity	Low-speed winding	—				120% of S3 rating for 10 s		—
	High-speed winding	—				200% of S1 rating for 10 s		—
Insulation	F-class							
Ambient temperature, humidity	0 to 40°C, 95% RH max. (with no condensation)							
Bearing lubricant	Grease							

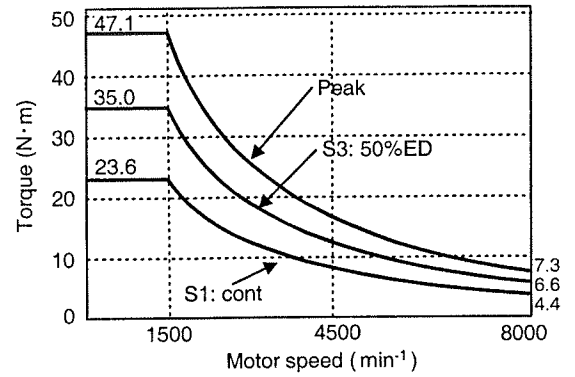
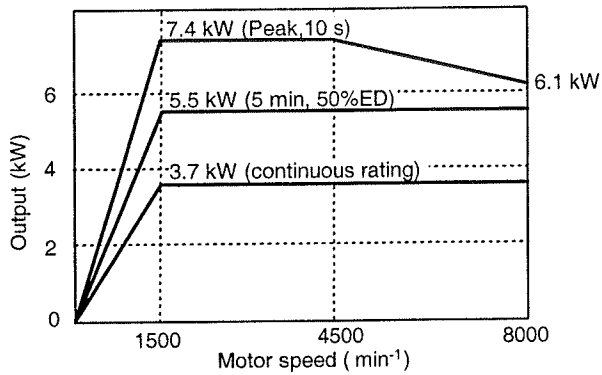
3.2.4 Spindle Motor Output Characteristics

■ Single Winding Series

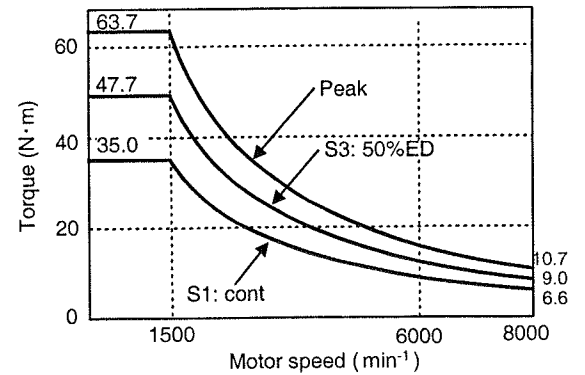
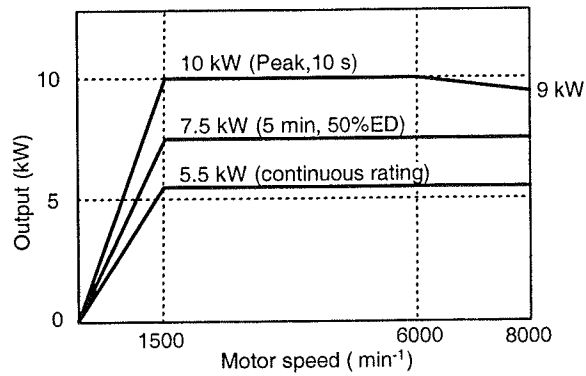
3.7/2.2 kW



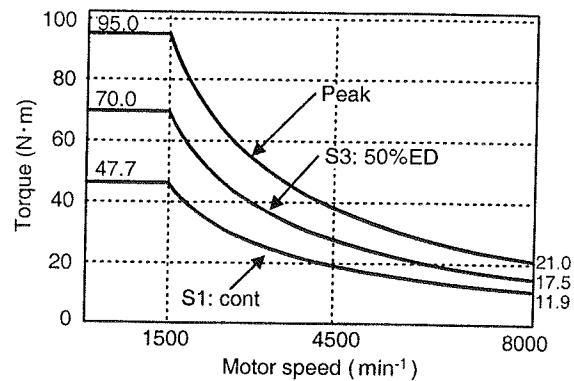
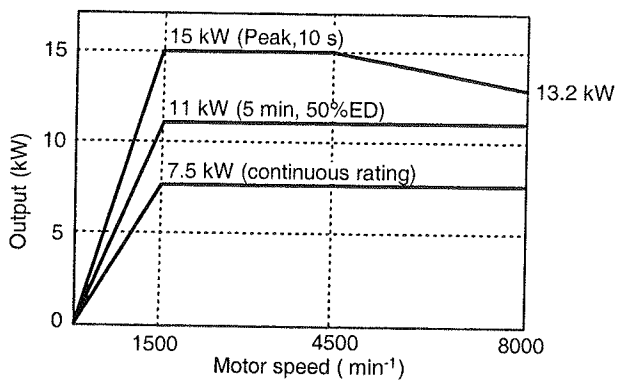
5.5/3.7 kW



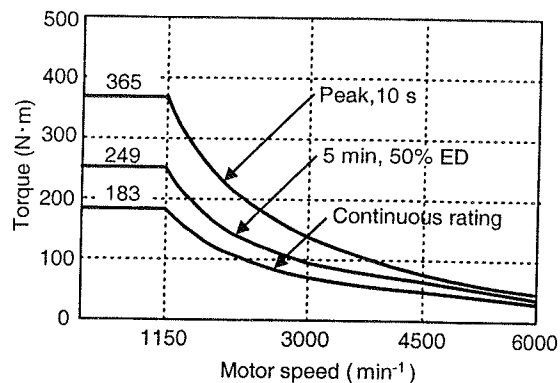
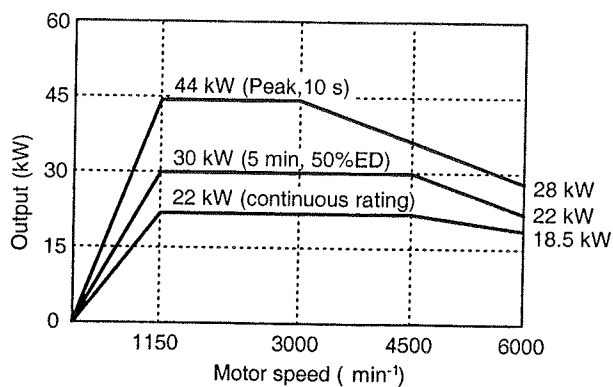
7.5/5.5 kW



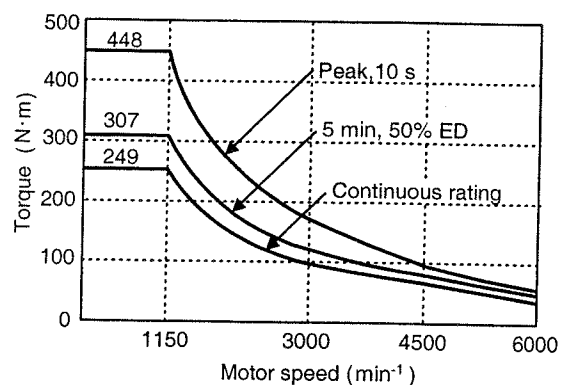
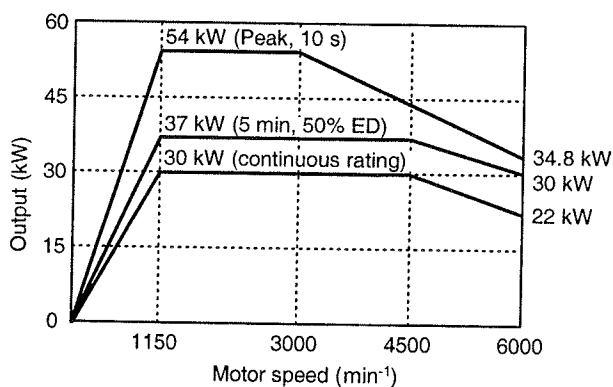
11/7.5 kW



30/22 kW

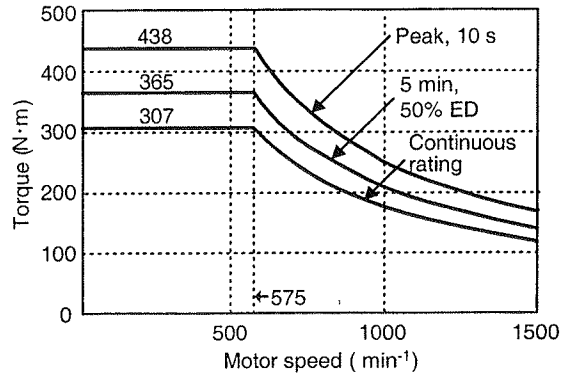
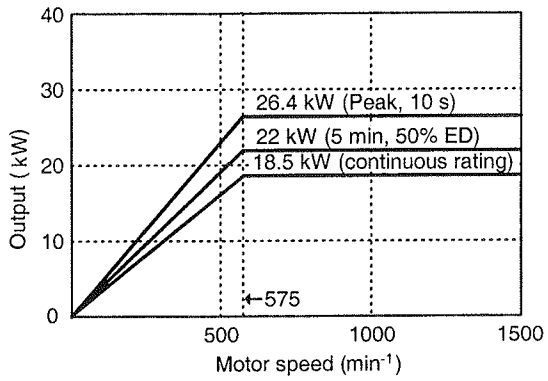


37/30 kW

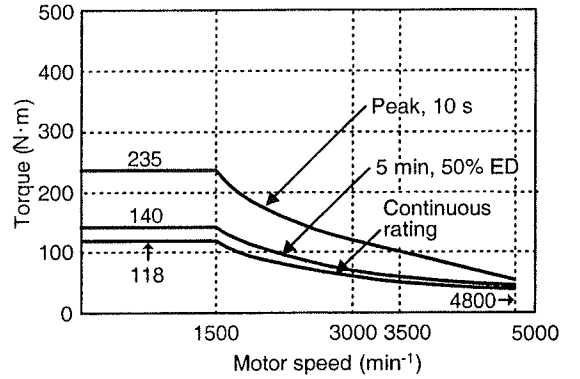
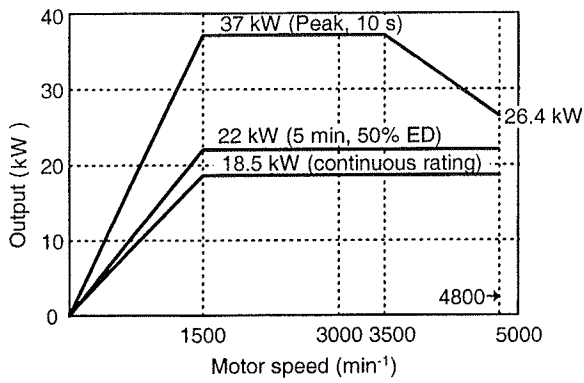


■ Winding Selection Series

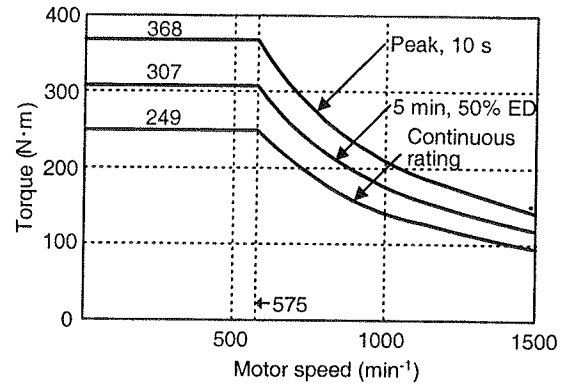
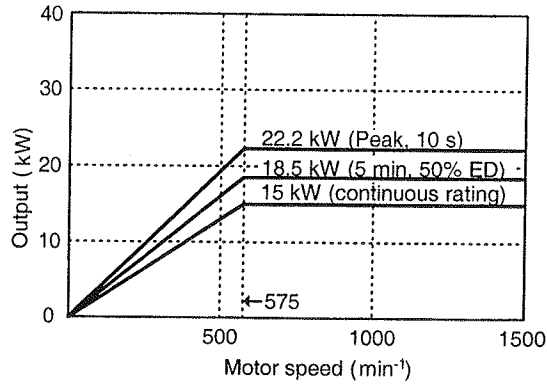
22/18.5 kW Low-speed Winding



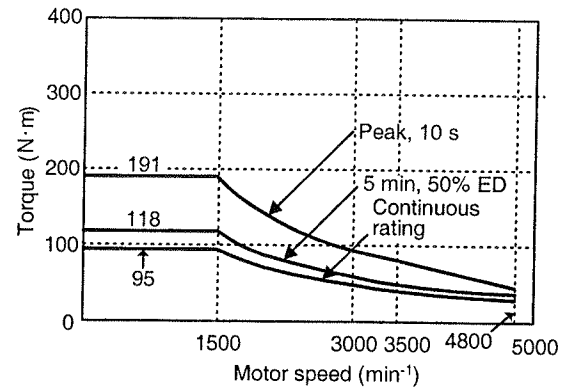
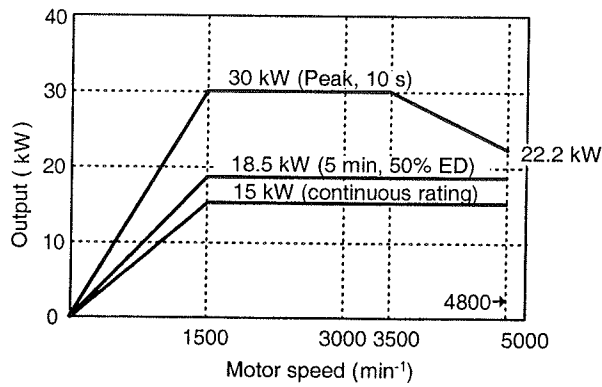
22/18.5 kW High-speed Winding



18.5 kW/15 kW Low-speed Winding



18.5 kW/15 kW High-speed Winding



3.2.5 Installation Location

- Ensure that there is sufficient cooling air flowing to the cooling fan. Leave a minimum of 100 mm between the motor (the side opposite the load, i.e., the cooling exhaust side) and the machine.

If there is not sufficient ventilation, the motor temperature protective function will be triggered even under the rated load.

- Provide a sturdy structure for the bed and foundation, or frame, holding the motor. In addition to the weight of the motor, the dynamic load during operating is applied to the bed, which can lead to vibration.
- The cooling system is designed so that the built-in fan sends air to the core of the unit. If dust or other material accumulates in the airflow path, the cooling capacity will be lowered and the motor temperature protective function will be triggered even under the rated load.

3.2.6 Installation Direction

- The flange shape allows installation with the motor output axis on the load to face either horizontally or vertically downward. If the unit is used with the output axis facing upward, an excessive load will be applied to the motor bearing, adversely affecting the service life of the unit.
- Install the foot-mount type with the foot facing downward and sitting on the floor. If the unit is suspended with the foot facing upward, an excessive load will be applied to the foot, adversely affecting the service life of the unit.
- When using with the output axis horizontal, install the unit so that the terminal box faces upward. If the unit is installed so that the terminal box faces to the side or downward, dirt and dust will easily enter the airflow port under the load-side bracket, leading to malfunction.

3.2.7 Machine Coupling

- When coupling directly, position the motor and machine so that the center of the motor axis and the center of the machine axis are precisely aligned. If necessary adjust by inserting a liner. If the axis centers are not aligned, excessive torsion will be applied to both the motor axis and the machine axis, adversely affecting the service life of the bearing and possibly leading to damage.

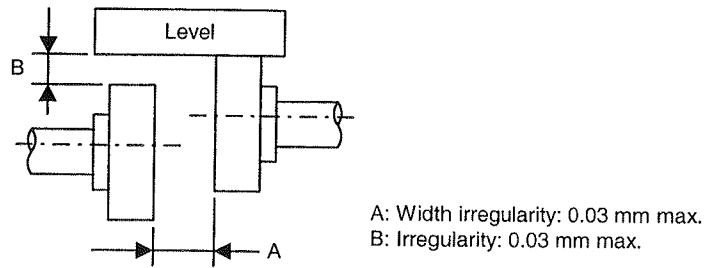
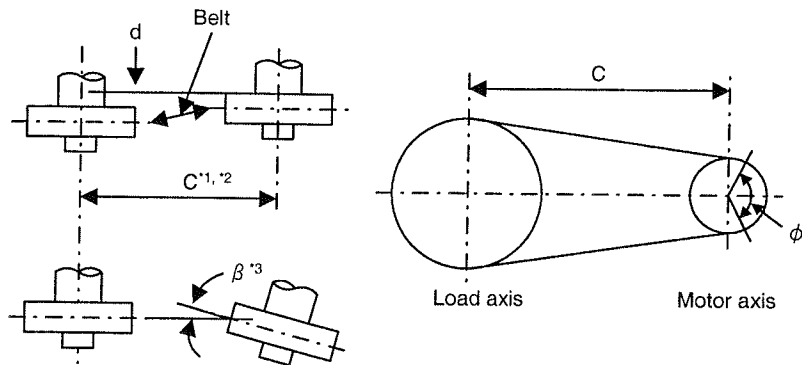


Fig. 3.1 Motor-Machine Coupling Accuracy

- When coupling with a belt, make the motor axis and machine axis parallel, and make the line joining the centers of both pulleys and each of the axes perpendicular. There is a limit to the amount of radial load that can be applied to the end of the motor output axis. Make sure that you do not exceed the allowable radial load. If the perpendicularity of the belt is insufficient, vibration will result, leading to belt slippage. If a load in excess of the allowable radial load is applied to the motor output axis, it will place excessive force on the motor axis bearing and shorten the service life of the unit.
- Make the belt-pulley contact angle ϕ at least 140° . If the contact angle is too small, it will lead to belt slippage.



- *1. When C is less than or equal to 1000 mm, $d < 1$ mm
- *2. When C is more than 1000 mm, $d / C < 1 / 1000$
- *3. $\beta < 1 / 3^\circ$

Fig. 3.2 Belt Tension

- When coupling with a gear, make the motor axis and machine axis parallel, and ensure that the gear teeth mesh correctly in the center. If the gear teeth do not mesh correctly, it will cause gear noise.

- When attaching a pulley or gear to the motor output axis, ensure proper balance. The timing balance is adjusted with a half key, which is 1/2 the thickness of the key shown in the external dimensions diagram (shaft diagram).
Because the axis rotates at high speed, even a slight unbalance will cause vibration.

3.2.8 Oil or Water Countermeasures

Do not allow oil or water to contact the motor directly. If there is a possibility that oil or water will contact the motor, provide a protective cover. If soiled oil or water penetrates the inside of the motor, insulation will be lowered, possibly resulting in a ground fault.

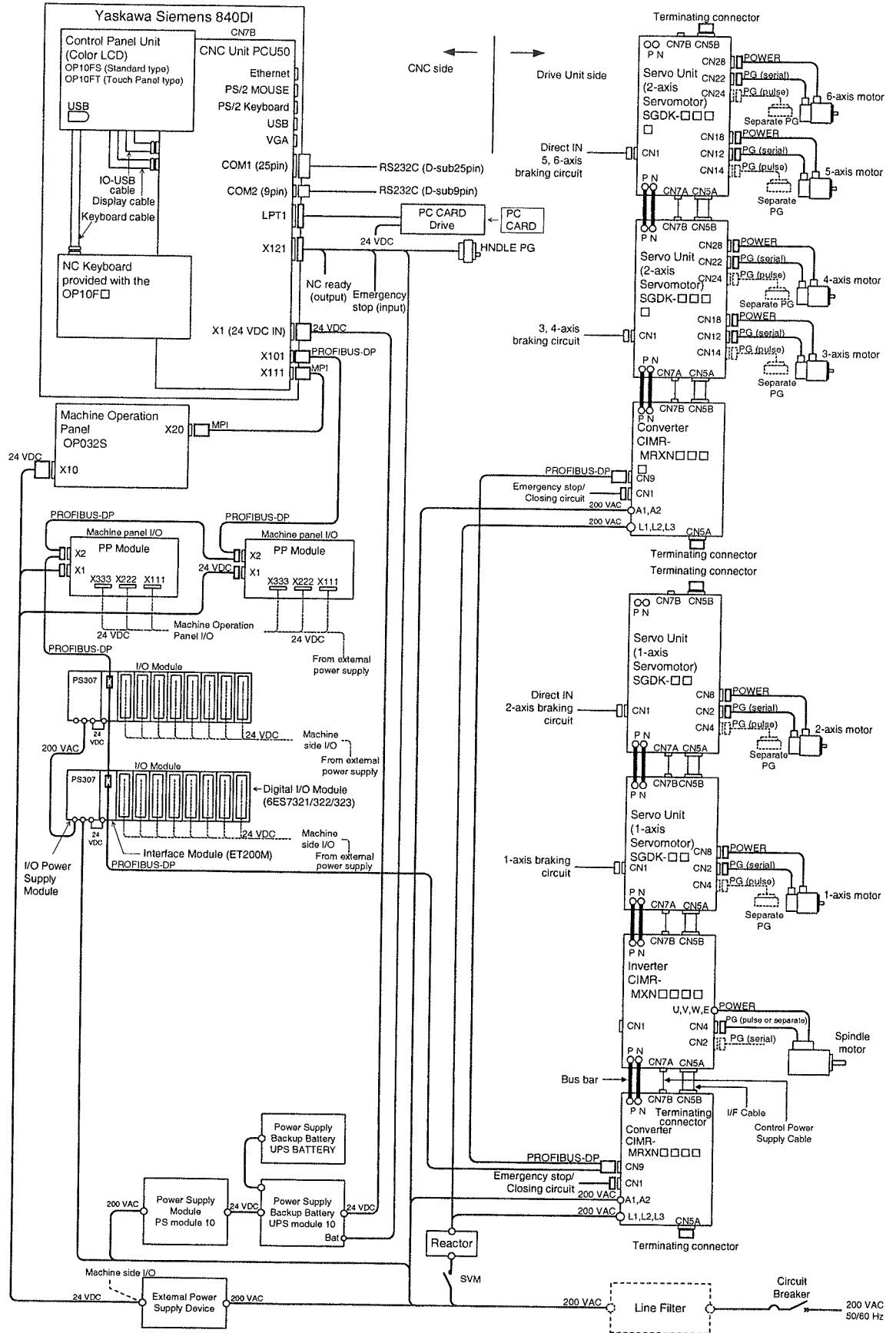
Connection Diagram

This section describes the connections between machines.

4.1 Connection Diagram	4-2
4.2 Locations of Connectors and Switches	4-4
4.2.1 Converters	4-4
4.2.2 Inverters	4-6
4.2.3 1-Axis Servo Units	4-7
4.2.4 2-Axis Servo Unit	4-9

4.1 Connection Diagram

The following figure shows an example of connections between equipment for the CNC System.



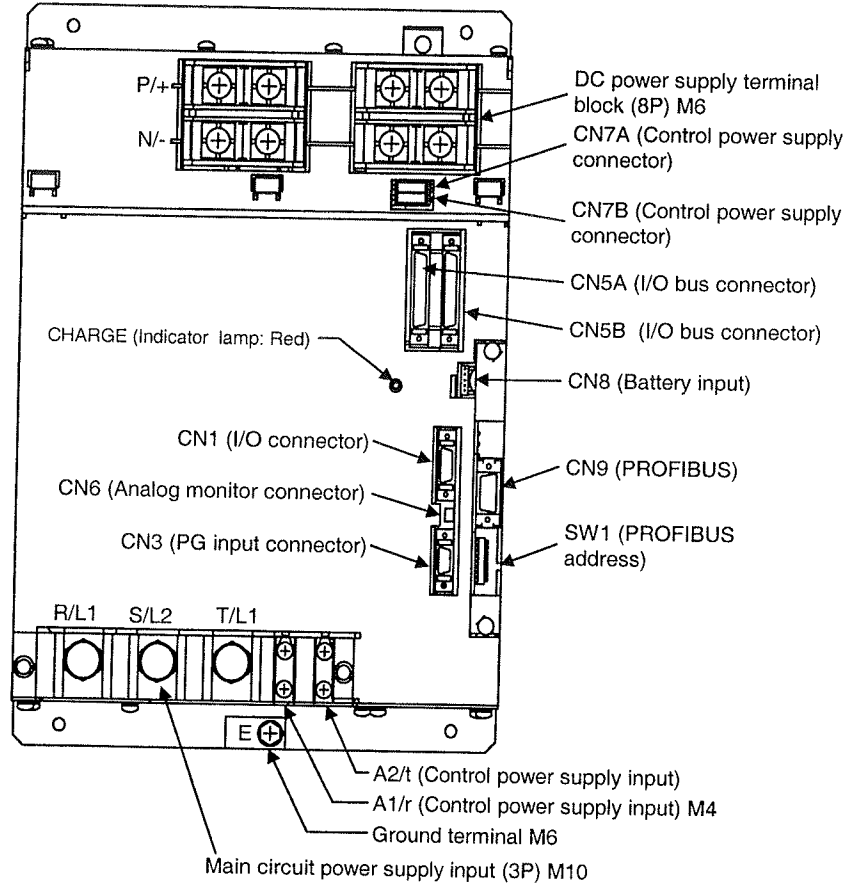
IMPORTANT

-
- **Number of Axes**
Up to seven axes can be used per converter (including the main axis).
 - **External Power Supply Device**
The customer must supply an external power supply device with appropriate capacity to suit the design.
 - **Using a Standalone Encoder**
The standalone Encoder is an option for all Servo Units and Inverters.
 - **Systems using two converters must also connect two Emergency stop/Closing circuits.**
 - **Brake Circuit**
Connect brakes only to axes that require them.
 - **Direct IN**
Connect a direct IN signal to only one Servo Unit in each Converter System.
-

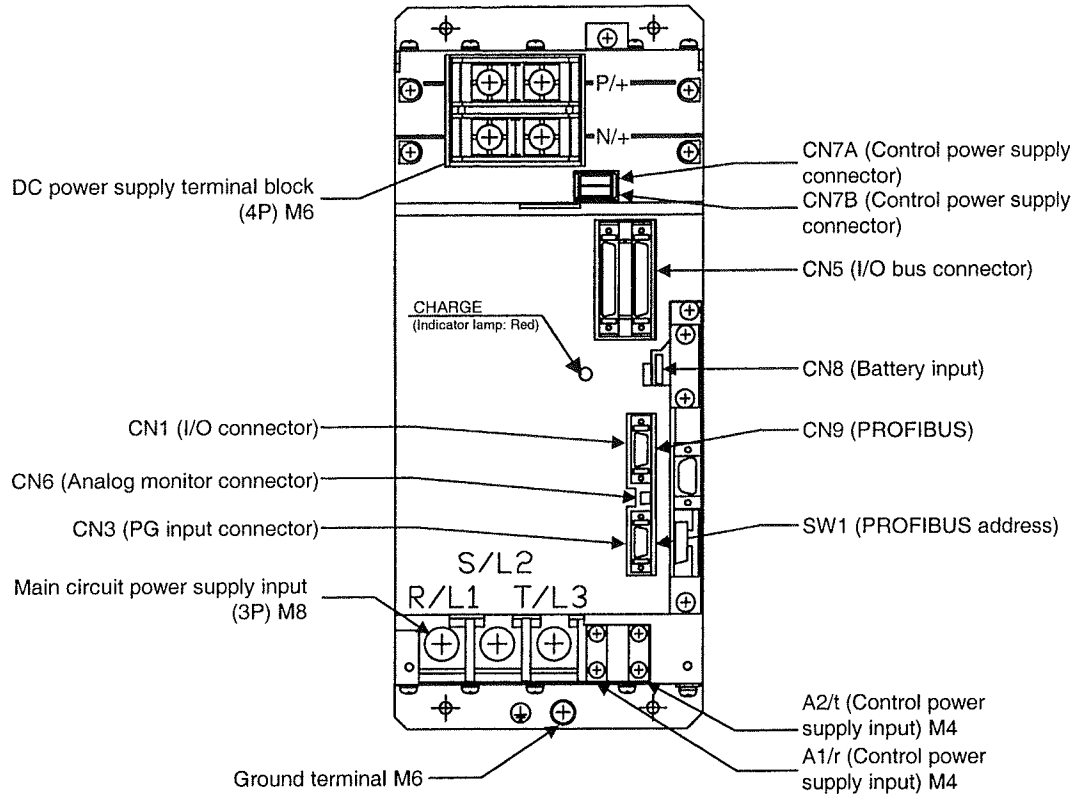
4.2 Locations of Connectors and Switches

4.2.1 Converters

■ CIMR-MRXN20455A (45 kW), -MRXN2037 (37 kW)

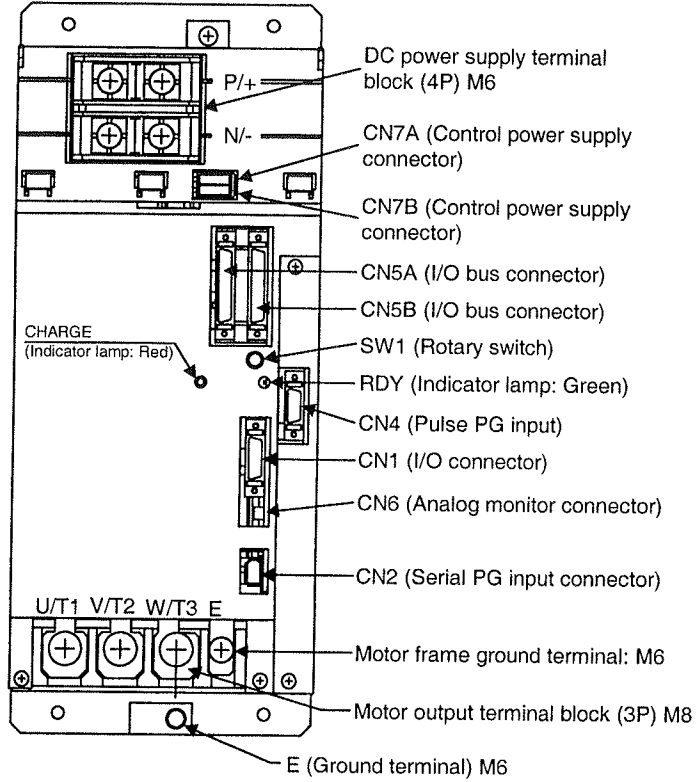


■ CIMR-MRXN20305A (30 kW), -MRXN20225A (22 kW),
 -MRXN20185A (18.5 kW), -MRXN20155A (15 kW)



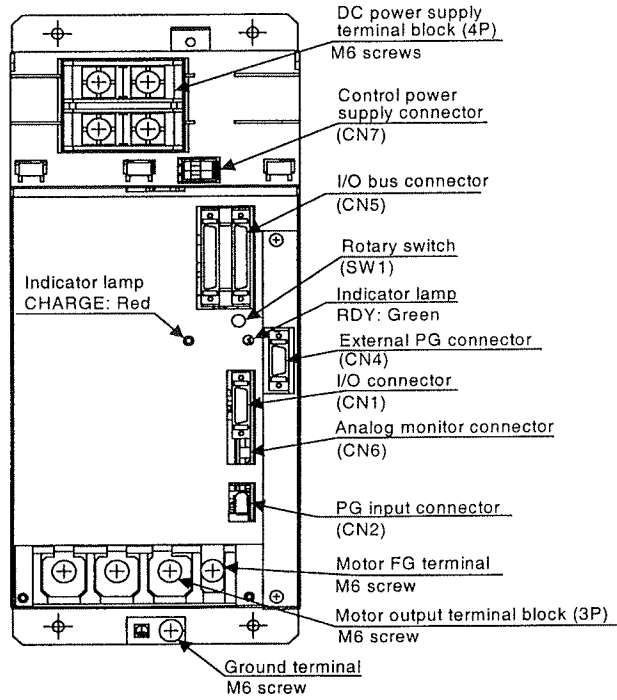
4.2.2 Inverters

- CIMR-MXN20305A (30 kW), -MXN20225A (22 kW),
-MXN20185A (18.5 kW), -MXN20155A (15 kW)

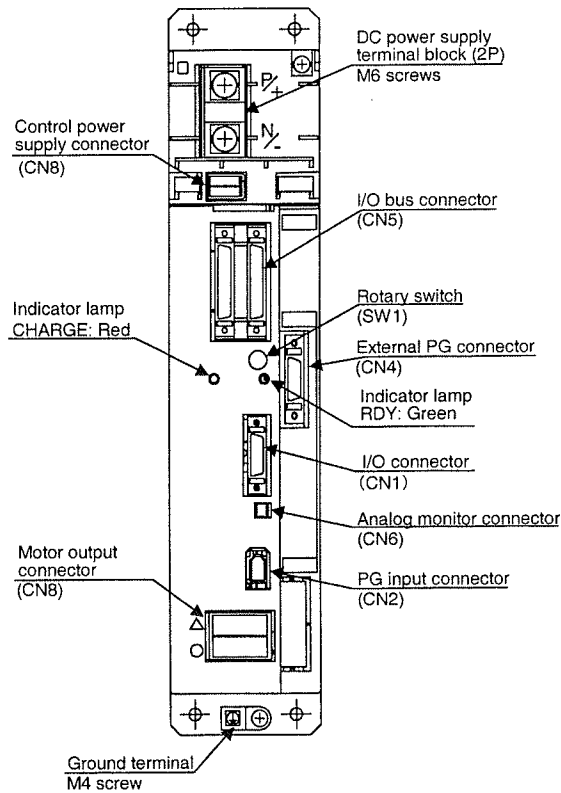


4.2.3 1-Axis Servo Units

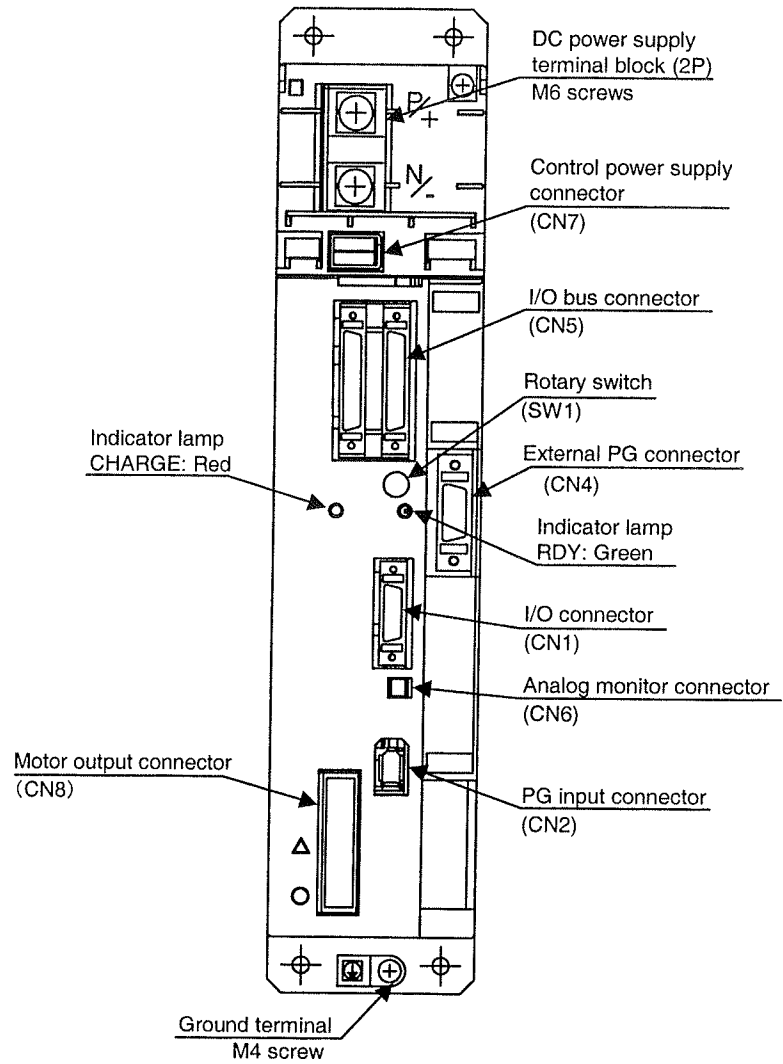
■ SGDK-60AEA (6 kW), -75AEA (7.5 kW)



■ SGDK-50AEA (5 kW)

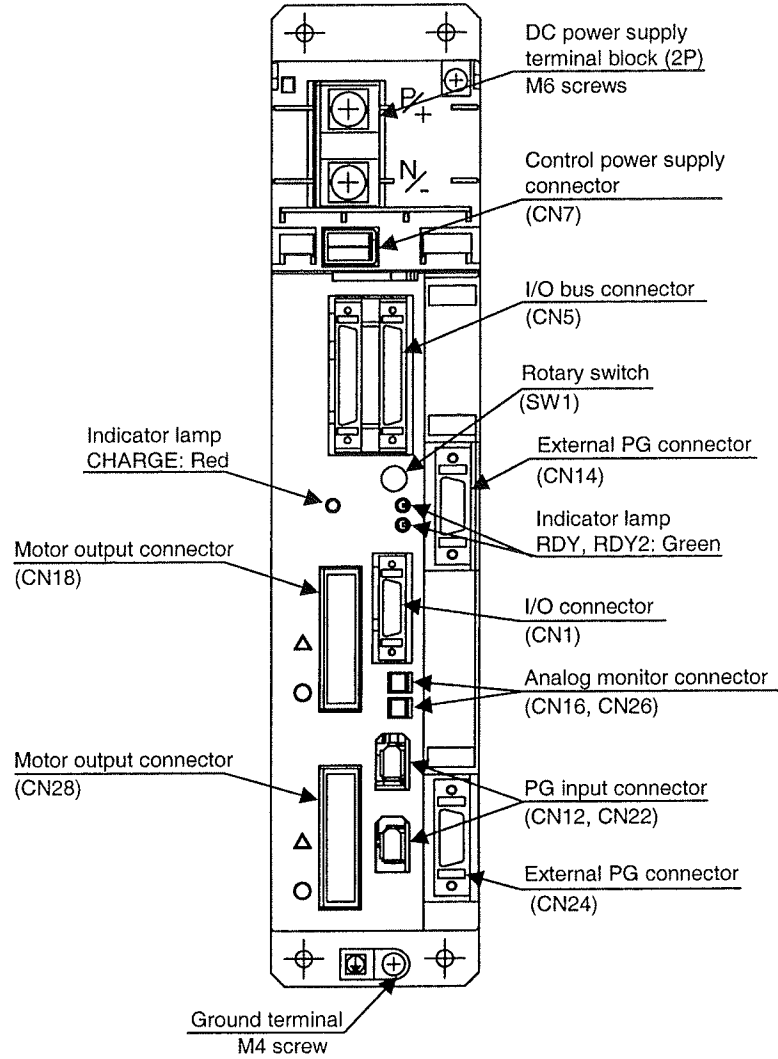


■ SGDK-05AEA (0.5kW), -10AEA (1 kW), -15AEA (1.5 kW),
-20AEA (2 kW), -30AEA (3 kW)



4.2.4 2-Axis Servo Unit

- SGDK-0505AEA (0.5 kW), -1010AEA (1 kW), -1515AEA (1.5 kW), -2020AEA (2 kW) -3030AEA (3 kW)



Power Supply Connection

This section describes the power supply connection.

5.1 Converter Unit	5-2
5.1.1 Power Supply Connection	5-2
5.1.2 Wiring Specifications	5-3
5.2 Power Supply ON/OFF Signal	5-6

5.1 Converter Unit

5.1.1 Power Supply Connection

The following figure shows the power supply connection for the Converter Unit.

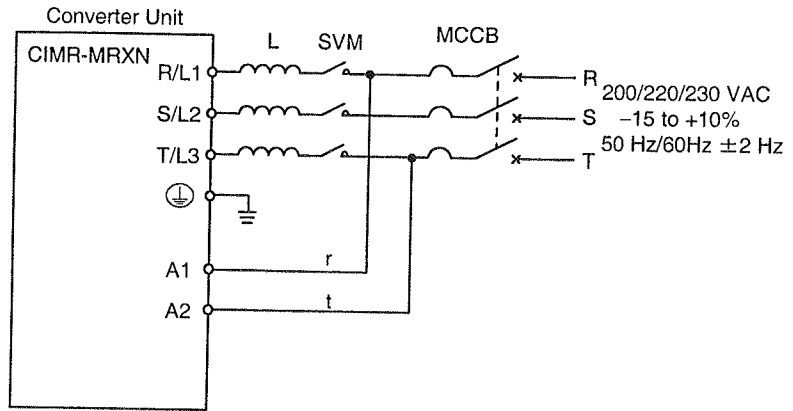


Fig. 5.1 Supplying Power to the Converter Unit

Table 5.1 Power Supply Specifications for Model Selection

Converter model CIMR- MRXN2□□□	Appli- cable capa- city (kW)	Output capacity* (kW)	Power supply capacity (kVA)	Rated current (A)		Reactor Specification Code No. (L)
				Circuit breaker (MCCB)	Electro- magnetic contactor (SVM)	
3P7	3.7	2.2	7	30	20	10A 0.84 mH
		3.7				X10214
5P5	5.5	3.7	9	40	30	16A 0.56 mH
		5.5				X10215
7P5	7.5	5.5	12	50	40	23A 0.41 mH
		7.5				X10216
011	11	7.5	19	75	60	32A 0.28 mH
		11				X10217
015	15	11	24	100	75	46A 0.21 mH
		15				X10202
018	18.5	15	30	125	100	63A 0.17 mH
		18.5				X10203
022	22	18.5	36	150	125	77A 0.14 mH
		22				X10204
030	30	22	48	175	150	92A 0.10 mH
		30				X10205
037	37	30	60	250	200	120A 0.09 mH
		37				X010201
045	45	37	72	300	250	150A 0.07 mH
		45				X010199

* The output capacity is shown for two conditions.
Upper row: Continuous rating, Lower row: 50% ED


5.1.2 Wiring Specifications


The following table shows the parts necessary for connecting the power line and control power source of the Converter.


CIMR-MRXN20455A (45 kW)			
Terminal symbol	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V cross-linked polyethylene wire (IC) 90°C (mm ²)
P/+, N/-	M6 × 8	2.94	Use the special bus bar to connect.
R/L1, S/L2, T/L3	M10	17.7 to 22.5	50
A1/r, A2/t	M4	1.0 to 1.2	2
Ground terminal ⊥	M6	4.0 to 4.9	30


CIMR-MRXN20375A (37 kW)			
Terminal symbol	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V cross-linked polyethylene wire (IC) 90°C (mm ²)
P/+, N/-	M6 × 8	2.94	Use the special bus bar to connect.
R/L1, S/L2, T/L3	M10	17.7 to 22.5	30
A1/r, A2/t	M4	1.0 to 1.2	2
Ground terminal ⊥	M6	4.0 to 4.9	30

CIMR-MRXN20305A (30 kW)			
Terminal symbol	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V cross-linked polyethylene wire (IC) 90°C (mm ²)
P/+, N/-	M6 × 4	2.94	Use the special bus bar to connect.
R/L1, S/L2, T/L3	M8	8.9 to 10.7	22
A1/r, A2/t	M4	1.0 to 1.2	2
Ground terminal ⊥	M6	4.0 to 4.9	22

CIMR-MRXN20225A (22 kW)			
Terminal symbol	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V cross-linked polyethylene wire (IC) 90°C (mm ²)
P/+, N/-	M6 × 4	2.94	Use the special bus bar to connect.
R/L1, S/L2, T/L3	M8	8.9 to 10.7	14
A1/r, A2/t	M4	1.0 to 1.2	2
Ground terminal 	M6	4.0 to 4.9	14

CIMR-MRXN20185A (18.5 kW)			
Terminal symbol	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V cross-linked polyethylene wire (IC) 90°C (mm ²)
P/+, N/-	M6 × 4	2.94	Use the special bus bar to connect.
R/L1, S/L2, T/L3	M8	8.9 to 10.7	14
A1/r, A2/t	M4	1.0 to 1.2	2
Ground terminal 	M6	4.0 to 4.9	14

CIMR-MRXN20155A (15 kW)			
Terminal symbol	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V cross-linked polyethylene wire (IC) 90°C (mm ²)
P/+, N/-	M6 × 4	2.94	Use the special bus bar to connect.
R/L1, S/L2, T/L3	M8	8.9 to 10.7	8
A1/r, A2/t	M4	1.0 to 1.2	2
Ground terminal 	M6	4.0 to 4.9	14

CIMR-MRXN20115A (11 kW)			
Terminal symbol	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V cross-linked polyethylene wire (IC) 90°C (mm ²)
P/+, N/-	M6 × 2	2.94	Use the special bus bar to connect.
R/L1, S/L2, T/L3	M5	2.0 to 2.5	5.5
A1/r, A2/t	M5	2.0 to 2.5	2
Ground terminal 	M5	2.0 to 2.5	8

CIMR-MRXN27P55A (7.5 kW)			
Terminal symbol	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V cross-linked polyethylene wire (IC) 90°C (mm ²)
P/+, N/-	M6 × 2	2.94	Use the special bus bar to connect.
R/L1, S/L2, T/L3	M5	2.0 to 2.5	3.5
A1/r, A2/t	M5	2.0 to 2.5	2
Ground terminal ⊥	M5	2.0 to 2.5	8

CIMR-MRXN25P55A (5.5 kW)			
Terminal symbol	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V cross-linked polyethylene wire (IC) 90°C (mm ²)
P/+, N/-	M6 × 2	2.94	Use the special bus bar to connect.
R/L1, S/L2, T/L3	M5	2.0 to 2.5	3.5
A1/r, A2/t	M5	2.0 to 2.5	2
Ground terminal ⊥	M5	2.0 to 2.5	8

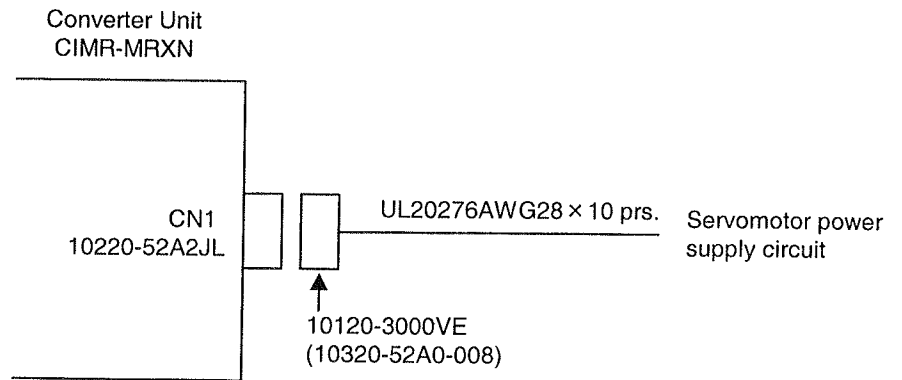
CIMR-MRXN23P75A (3.7 kW)			
Terminal symbol	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V cross-linked polyethylene wire (IC) 90°C (mm ²)
P/+, N/-	M6 × 2	2.94	Use the special bus bar to connect.
R/L1, S/L2, T/L3	M5	2.0 to 2.5	3.5
A1/r, A2/t	M5	2.0 to 2.5	2
Ground terminal ⊥	M5	2.0 to 2.5	8

5.2 Power Supply ON/OFF Signal

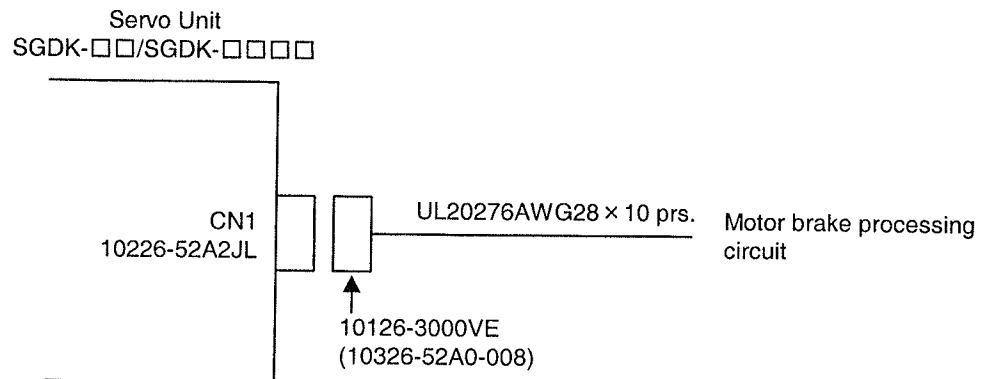
The connections for the Servomotor power supply ON (SVMX) output signal and brake release (BKX) output signal are shown below.

■ Connections Between Equipment

Servomotor power supply ON (SVMX) output signal



Brake release (BKX) output signal



■ Detailed Connection Example

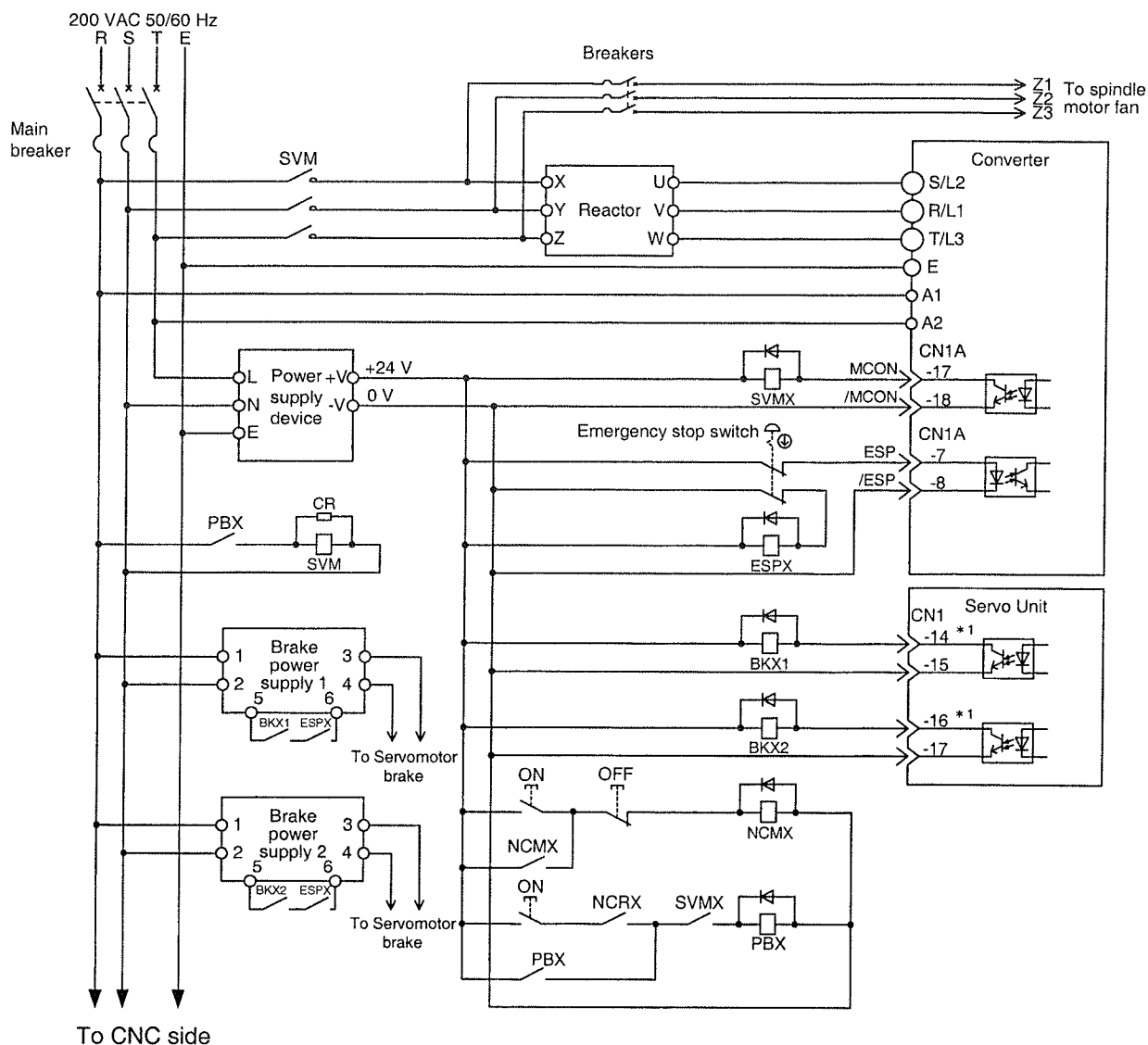


Fig. 5.2 Detailed Connection of SVMX Output Signal and BKK Output Signal

*1. The brake release output signal shown in the recommended circuit is an example of a 2-axis group Servo Unit.

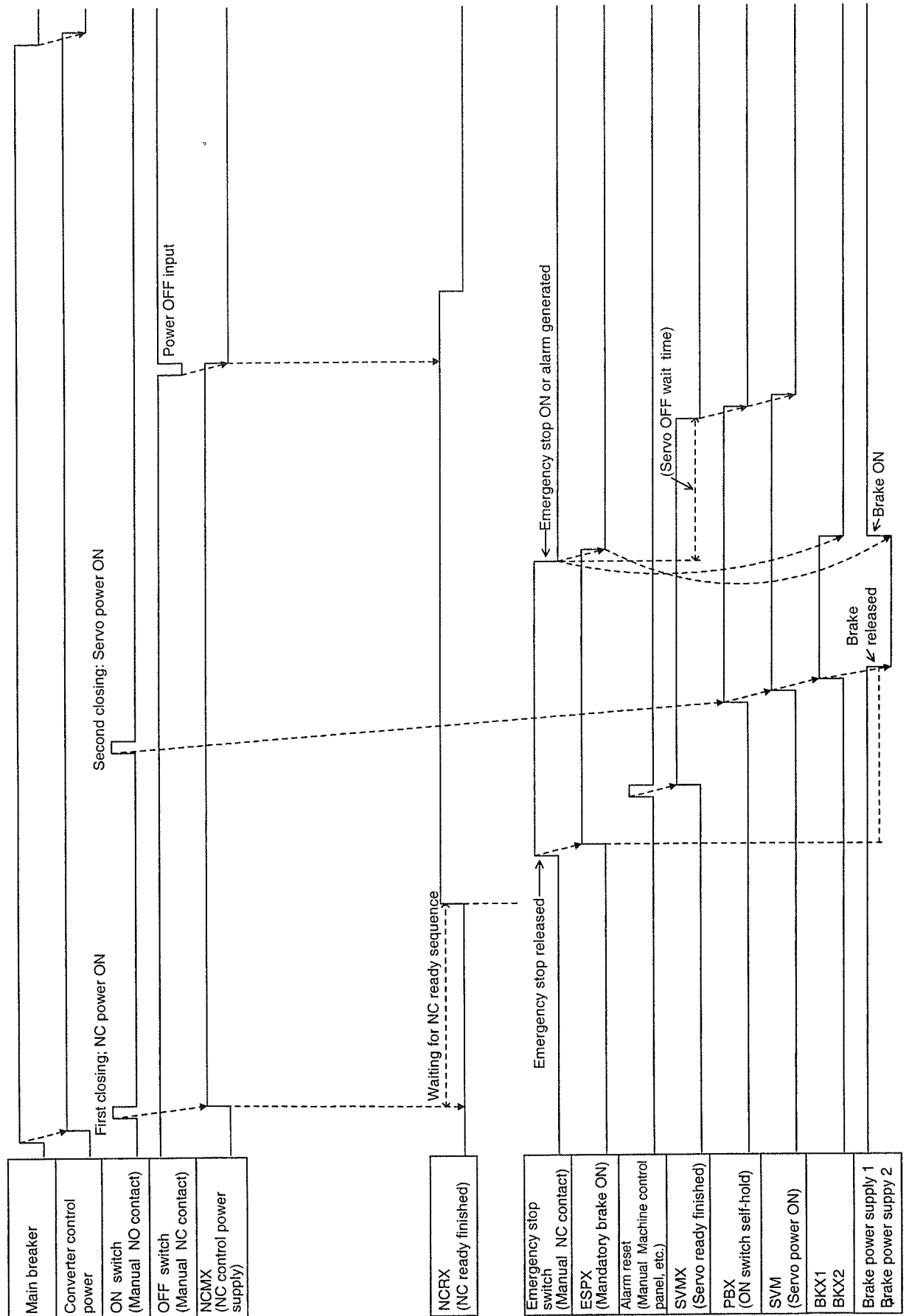
- For a 1-axis Servo Unit, connect only to pins 14 and 15.
- For a 2-axis Servo Unit, connect the first axis to pins 14 and 15, and connect the second axis to pins 16 and 17.
- For a 3-axis Servo Unit, connect the third axis to pins 18 and 19.

Corresponding axis	Pin number
1st axis	CN1-14 (+24-V Relay Coil)
	CN1-15 (0 V)
2nd axis	CN1-16 (+24-V Relay Coil)
	CN1-17 (0 V)
3rd axis	CN1-18 (+24-V Relay Coil)
	CN1-19 (0 V)



- Use the signal from a Servo Unit connected to a motor with a brake for the brake release output signal.
 - If necessary, add an interlock between the brake release output signal and BKK.
 - The customer must supply the emergency stop switch.
 - Use miniature relays (24-VDC) for the SVMX, ESPX, and BKK relays.
Recommended product: OMRON LY-2
-

■ Power Supply ON/OFF Timing Chart



Peripheral Device Connections

This section describes the connections to the Drive Unit's peripheral equipment.

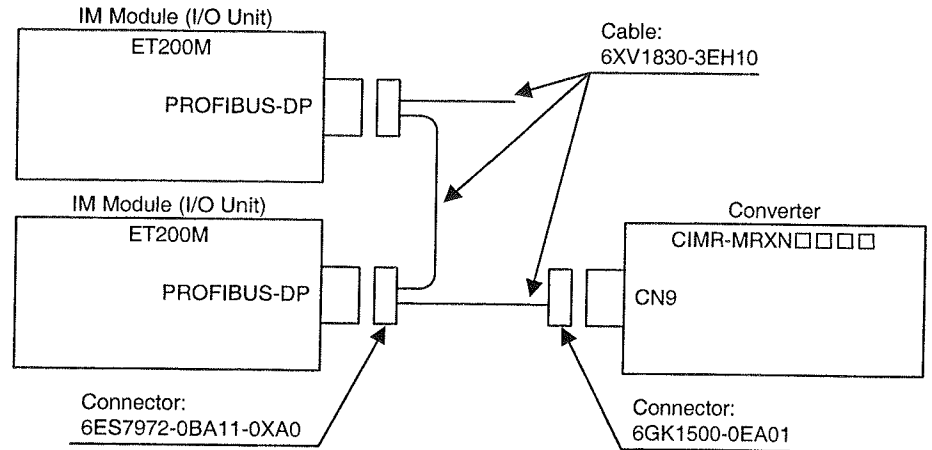
6.1 PROFIBUS-DP	6-2
6.1.1 Connection between Machine Panel I/O, I/O, and Converter Unit	6-2
6.1.2 PROFIBUS-DP Address and Termination Setting	6-3
6.1.3 Wiring Specifications	6-5
6.2 SERVOPACK	6-7
6.2.1 Connection between Devices	6-7
6.2.2 Detailed Connection	6-9
6.2.3 Wiring Specifications	6-11
6.2.4 Setting Inverter and Servo Unit Rotary Switches	6-18
6.3 Servomotor	6-19
6.4 Spindle Motor	6-22
6.4.1 Motor Pulse Encoder Connection	6-22
6.4.2 Connection between Motor Serial Encoder and External PG	6-23
6.4.3 Serial Encoder Connection in the Motor Terminal Box	6-24
6.5 Direct IN Signal	6-25

6.1 PROFIBUS-DP

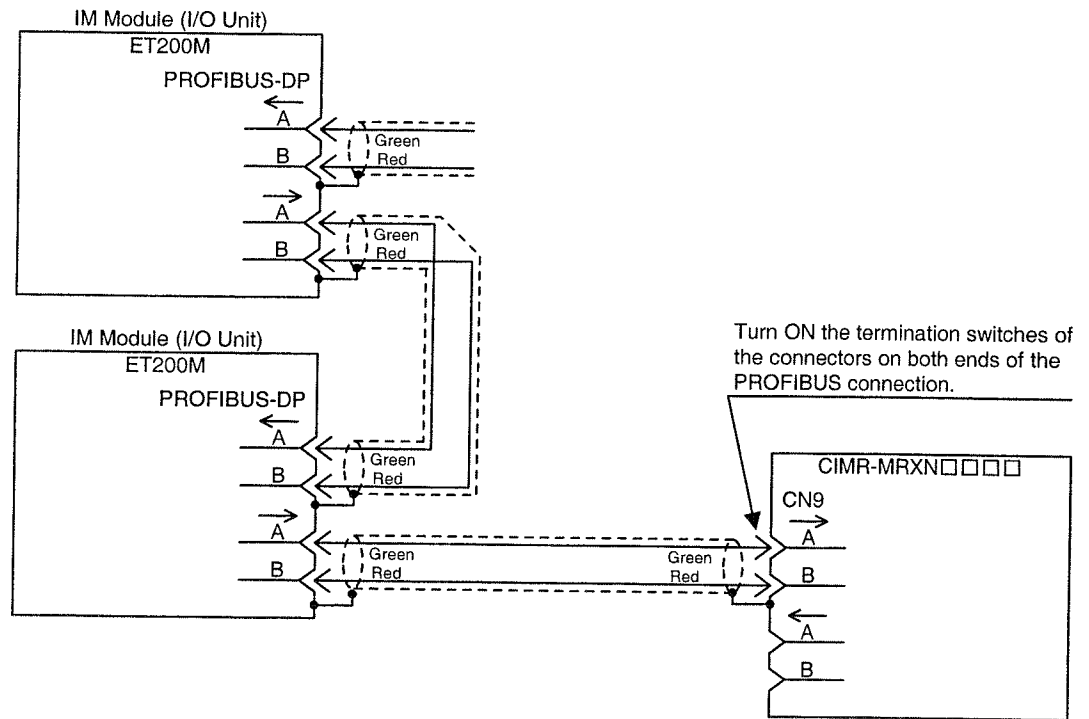
6.1.1 Connection between Machine Panel I/O, I/O, and Converter Unit

The following figure shows the connection of the IM Module (ET200M) and Converter Unit.

■ Connecting Between Machines



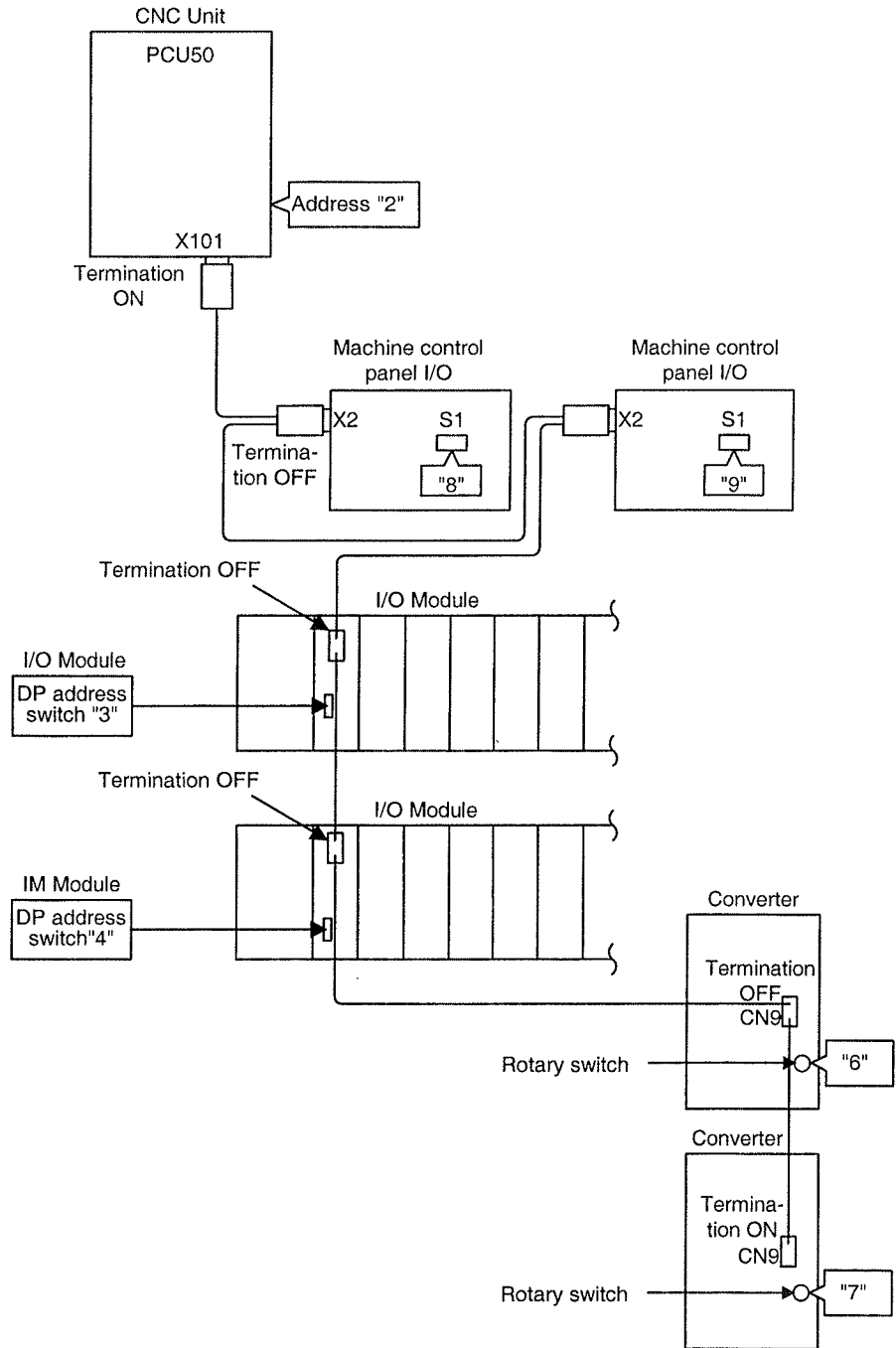
■ Detailed Connection



6.1.2 PROFIBUS-DP Address and Termination Setting

The following figure shows examples of PROFIBUS-DP address and terminal settings.

■ Connection Example



■ CNC Unit Address Setting

The CNC Unit address ("2") is fixed. There is no hardware setting.

■ Machine Control Panel I/O

Set DIP switch S1 on the circuit board to a setting between 3 and 32, making sure that it is not the same setting as any other unit.

■ I/O Module

Set the DP address switch (DIP switch) on the Interface Module (IM Module: ET200M) to a setting between 3 and 32, making sure that it is not the same setting as any other unit.

■ Converter

Set the DIP switch to a setting between 3 and 32, making sure that it is not the same setting as any other unit.

■ Termination Setting

Set the termination switch on the PROFIBUS-DP connector as shown in the table below.

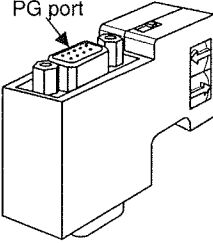
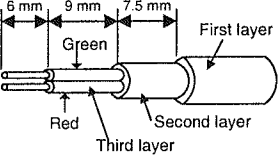
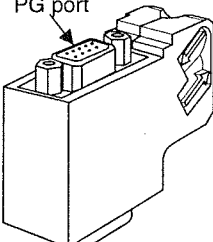
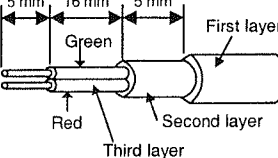
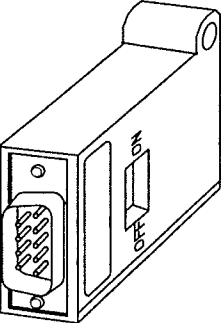
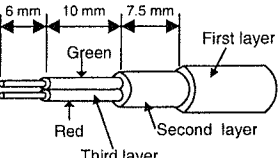
Device position	Termination switch setting
CNC Unit	ON
Units positioned in the middle	OFF
Units positioned at both ends	ON



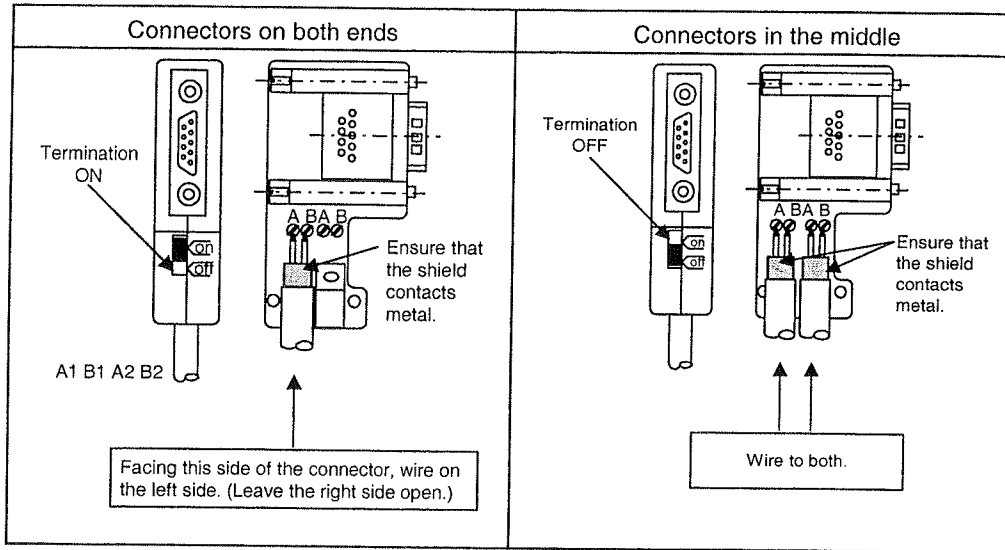
- Do not set any units to 0, 1, or 2 (except for the CNC).
- The maximum number of addresses for a PROFIBUS-DP used with the YS840DI is 32.
- Refer to the *YS840DI Maintenance Manual Serviceman Handbook* (NCSIE-SP02-19) for instructions on setting addresses by software.

6.1.3 Wiring Specifications

The following table shows the cables and connectors to be used for PROFIBUS-DP connection.

Type	Model	Configuration	Cable processing	Applicable equipment	Connector
Vertical wiring type	<ul style="list-style-type: none"> • 6ES7 972-0BA11-0XA0 without PG port • 6ES7 972-0BB11-0XA0 with PG port 		 <p>6XV1830-3EH10 Cable</p>	<ul style="list-style-type: none"> • CNC Unit • Contro panel I/O • ET200M 	<ul style="list-style-type: none"> • X101 • X2 • PROFIBUS-DP
35-degree wiring type	<ul style="list-style-type: none"> • 6ES7 972-0BA40-0XA0 without PG port • 6ES7 972-0BB40-0XA0 with PG port 		 <p>6XV1830-3EH10 Cable</p>	<ul style="list-style-type: none"> • CNC Unit • Contro panel I/O • ET200M 	<ul style="list-style-type: none"> • X101 • X2 • PROFIBUS-DP
Horizontal wiring type	6GK1 500-0EA0		 <p>6XV1830-3EH10 Cable</p>	Converter	CN9

There is one green third layer and one red third layer in the PROFIBUS-DP cable. Connect the green wire to connector A, and the red wire to connector B.

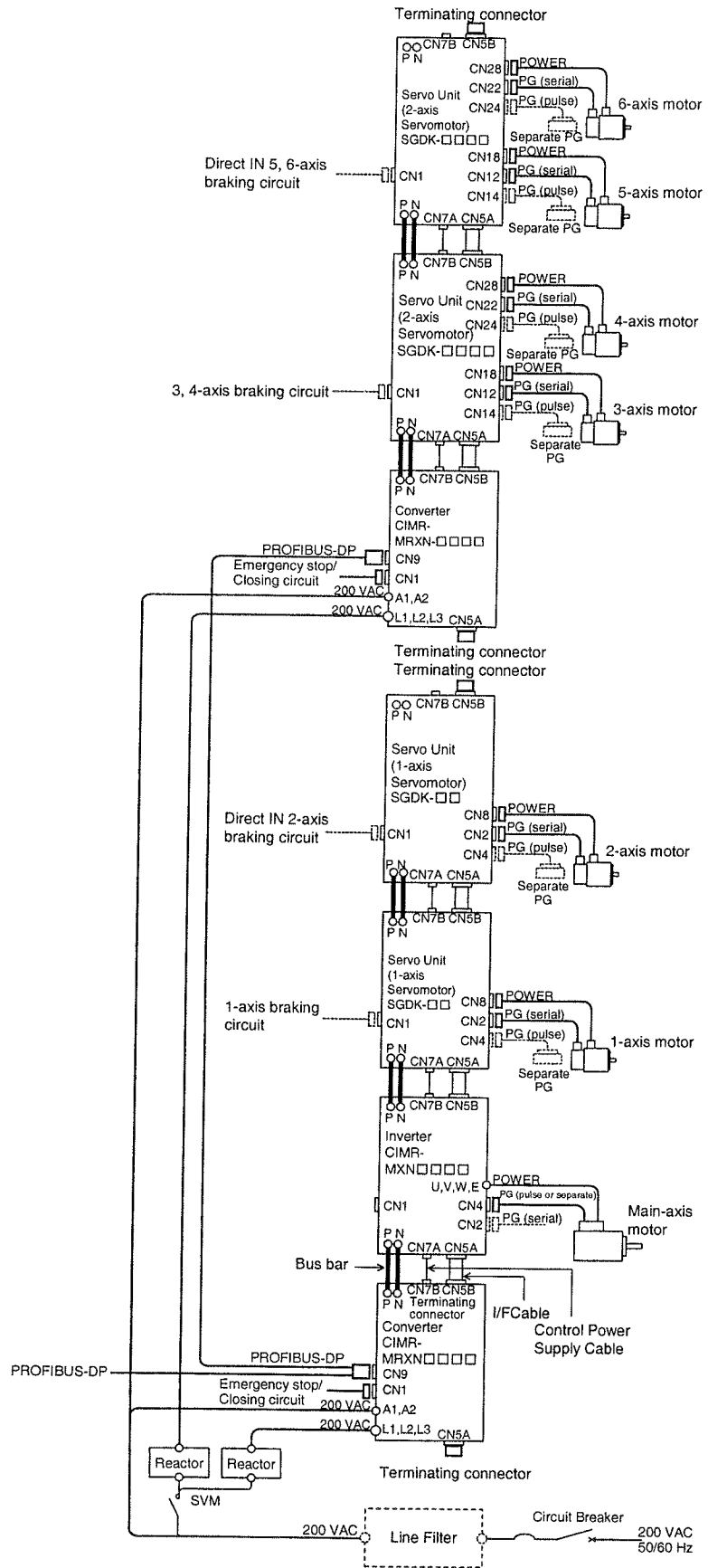


Note: This figure shows a vertical wiring type with no PG port as an example. The PG port is a connector that allows continuous, multiple PROFIBUS-DP connection. Ordinarily select types without the PG port.

6.2 SERVOPACK

6.2.1 Connection between Devices

An example of a SERVOPACK (Servo Unit, Inverter, Converter) connection is given by the following connection diagram.



Use cable clamp fittings to ground the outer shield coverings of the signal cables to the ground plate (for all signal cables except the PROFIBUS-DP cable).

6.2.2 Detailed Connection

The following diagram shows the detailed SERVOPACK connection.

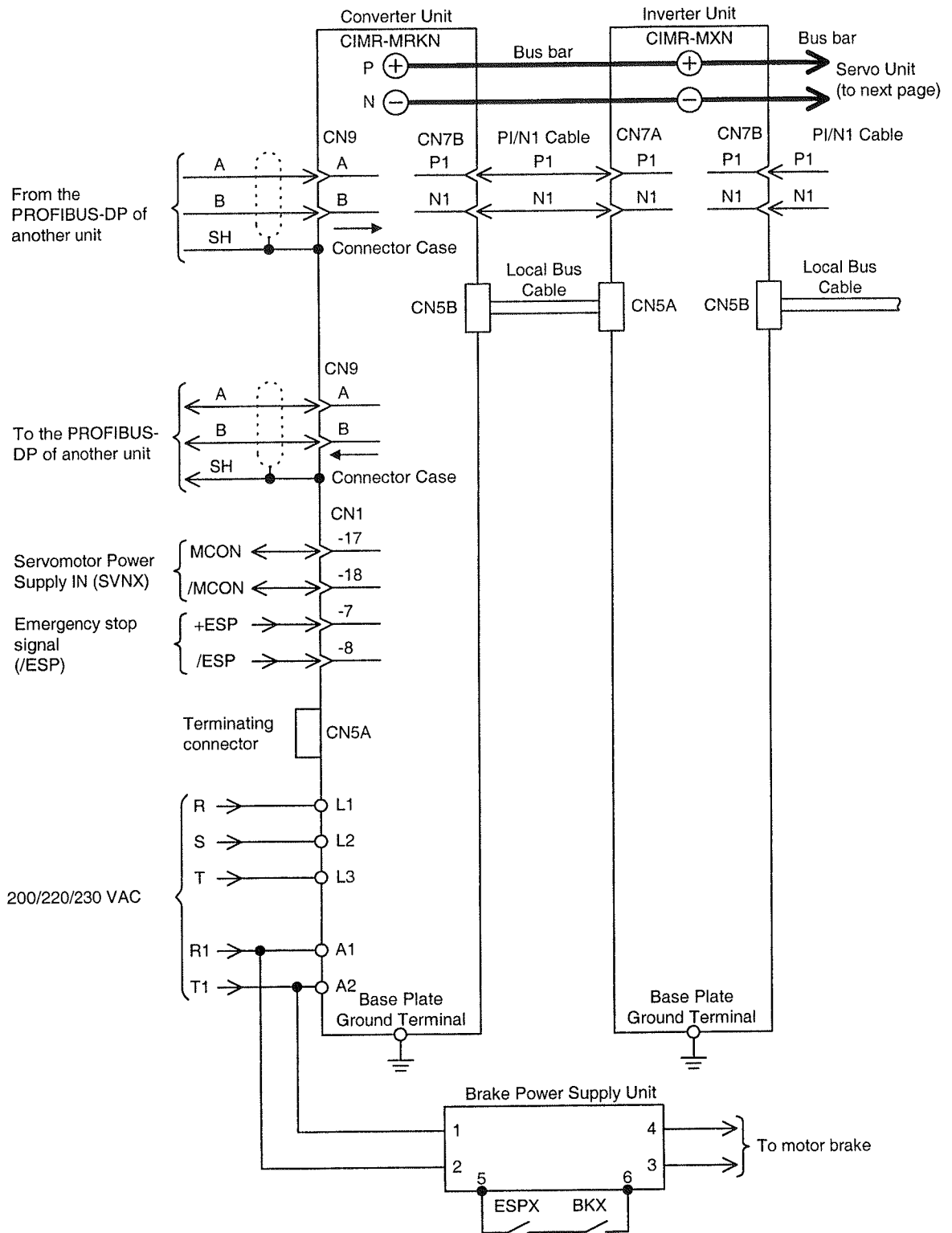
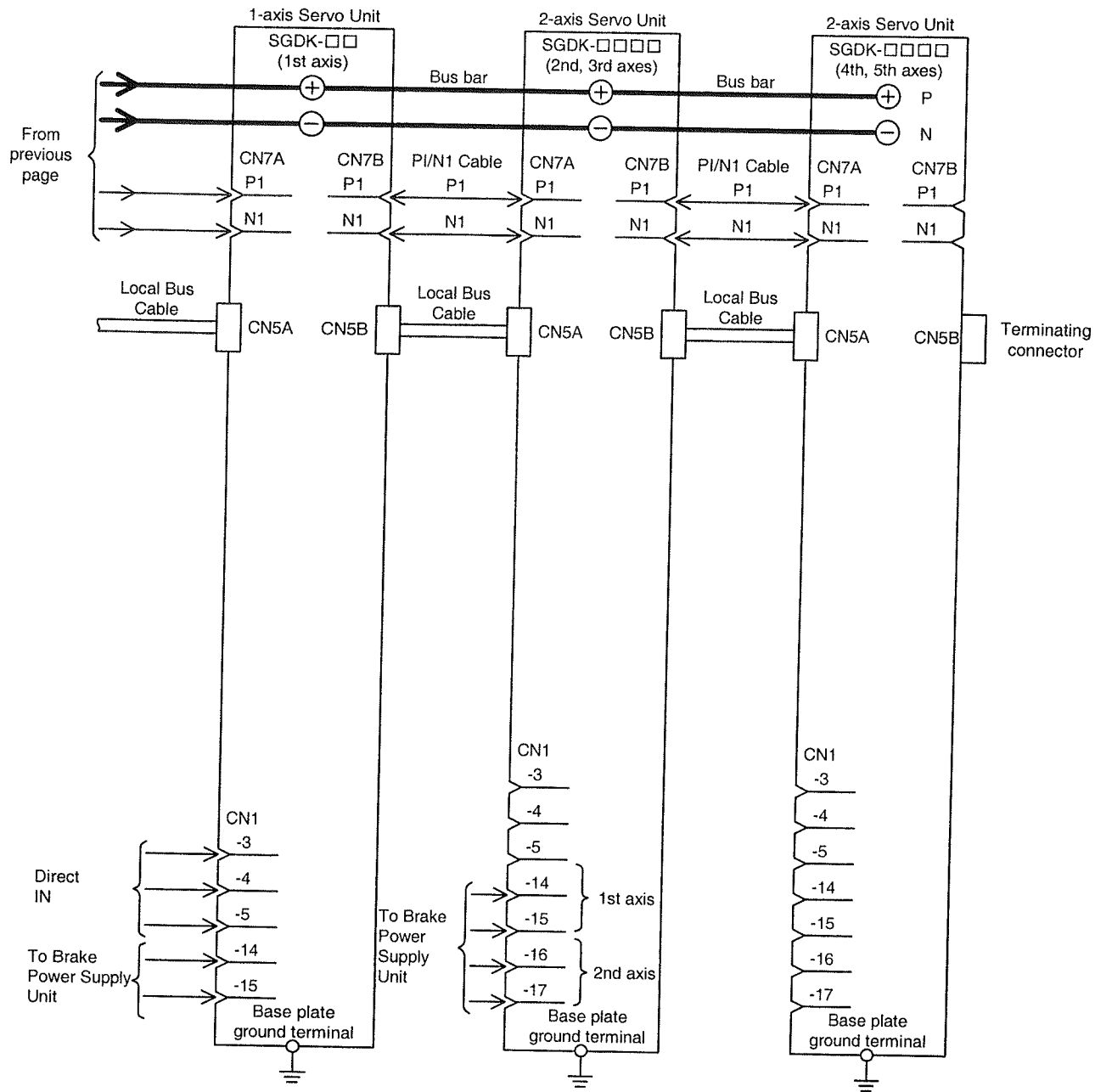


Fig. 6.1 Detailed Connection of CNC Unit and SERVOPACK



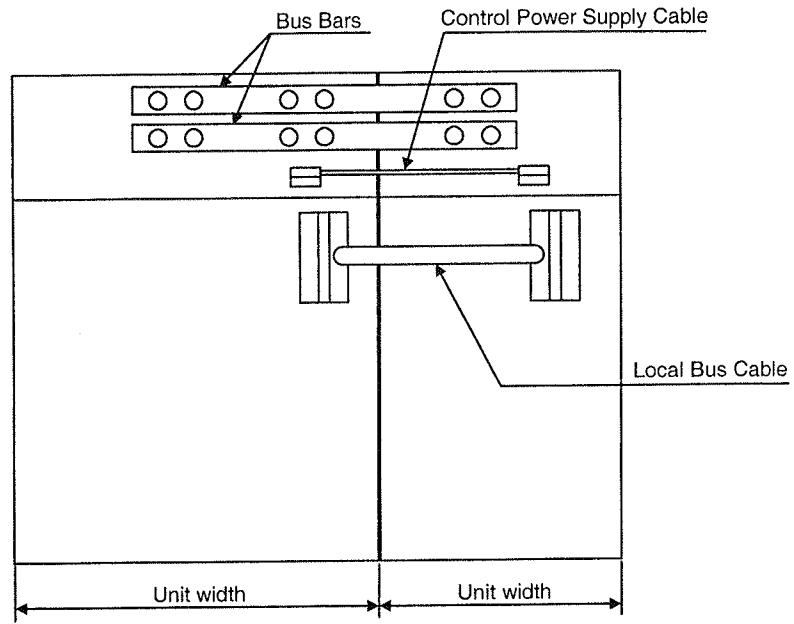
Note: A brake release signal must be provided for Servo Units that are connected to brake-equipped motors.

Fig. 6.2 Detailed Connection of CNC Unit and SERVOPACK

6.2.3 Wiring Specifications

■ SERVOPACK Connection Parts

The SERVOPACK connection parts consist of special cables and bus bars for connecting the Converter Unit, Inverter Unit, and Servo Unit.



Select from the table below to match the width dimension of the equipment being used.

Connection parts	Unit width combination*		Model
	Left-side unit width	Right-side unit width	
Bus Bar	For internal connection of 250-mm width unit		JZSP-CGB02-1
	250 mm	150 mm	JZSP-CGB02-2
		75 mm	JZSP-CGB02-4
	150 mm	150 mm	JZSP-CGB02-3
		75 mm	JZSP-CGB02-5
	75 mm	75 mm	JZSP-CGB02-6
	150 mm	250 mm	JZSP-CGB02-7
	75 mm	250 mm	JZSP-CGB02-8
		150 mm	JZSP-CGB02-9
Control Power Supply Cable CN7A, CN7B	250 mm	150 mm	JZSP-CNB00-1
		75 mm	JZSP-CNB00-2
	150 mm	150 mm	JZSP-CNB00-1
		75 mm	JZSP-CNB00-2
	75 mm	75 mm	JZSP-CNB00-2
	150 mm	250 mm	JZSP-CNB00-4
	75 mm	250 mm	JZSP-CNB00-4
		150 mm	JZSP-CNB00-1
For top/bottom connection (length 1 m)		JZSP-CNB00-3	
Local Bus Cable CN5A, CN5B	250 mm	150 mm	JZSP-CNS90-1
		75 mm	JZSP-CNS90-2
	150 mm	150 mm	JZSP-CNS90-1
		75 mm	JZSP-CNS90-2
	75 mm	75 mm	JZSP-CNS90-2
	150 mm	250 mm	JZSP-CNS90-5
	75 mm	250 mm	JZSP-CNS90-5
		150 mm	JZSP-CNS90-1
For top/bottom connection (length 1 m)		JZSP-CNS90-4	
Terminating Resistance Connector CN5A, CN5B	———	———	JZSP-CNS90-9

* The unit widths given in this table are approximate.

The precise dimensions are as follows:

250 mm → 248 mm

150 mm → 148 mm

75 mm → 74 mm

■ Common Connectors

Common connectors are those that can be used regardless of the capacity.

Connector No.	Converter	Inverter	Servo Unit
CN1	Connector: 10120-3000VE Housing: 10320-52A0-008 (Mfd. by SUMITOMO 3M)	Connector: 10126-3000VE Housing: 10326-52A0-008 (Mfd. by SUMITOMO 3M)	Connector: 10126-3000VE Housing: 10326-52A0-008 (Mfd. by SUMITOMO 3M)
CN2 CN12 CN22	————	JZSP-CMP9-1 (soldering) (Mfd. by Yaskawa Siemens)	JZSP-CMP9-1 (soldering) (Mfd. by Yaskawa Siemens)
CN4 CN14 CN24	————	Connector: 10120-3000VE Housing: 10320-52A0-008 (Mfd. by SUMITOMO 3M)	Connector: 10120-3000VE Housing: 10320-52A0-008 (Mfd. by SUMITOMO 3M)
CN9	6GK1500-0EA01 (Mfd. by Yaskawa Siemens)	————	————

■ Servomotor Power Connector (1-axis and 2-axis Servo Units)

The model number of the Servomotor Power Connector varies according to the capacity.

Connector No.	7.5 kW, 6 kW	5 kW	3 kW, 2 kW, 1.5 kW, 1 kW	0.5 kW
Terminal block	U, V, W: M6 FG: M6	————	————	————
CN8 CN18 CN28	————	Connector: 1-917807-2 Contact: 1318697-6 (Mfd. by AMP)	Connector: 1-179958-4 Contact: 316041-2 (Mfd. by AMP)	Connector: 1-179958-4 Contact: 316040-2 (Mfd. by AMP)

■ Servomotor Power Connector (3-axis Servo Unit)

Connector No.	1 kW, 0.5 kW
CN18 CN28 CN38	Connector: 1-178128-4 Contact: 353717-2 (Mfd. By AMP)

■ Terminal Block Tightening Torque

The screw size and tightening torque for the P/+ and N/- terminals are the same for all SERVOPACKs.

Use the special bus bar for connection.

- Terminal screw size: M6
- Tightening torque: 2.94 N·m

The screw size, screw tightening torque, and recommended wire size for the terminal blocks of the Inverter and Servo Unit are as follows.

Inverter CIMR-MXN20455A (45 kW)			
Terminal code	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V cross-linked polyethelene wire (IC) 90°C (mm ²)
U/T1, V/T2, W/T3	M10	17.7 to 22.5	60
Motor FG terminal Ⓧ	M6	4.0 to 4.9	14
Ground terminal Ⓧ	M6	4.0 to 4.9	30

Inverter CIMR-MXN20375A (37 kW)			
Terminal code	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V cross-linked polyethelene wire (IC) 90°C (mm ²)
U/T1, V/T2, W/T3	M10	17.7 to 22.5	50
Motor FG terminal Ⓧ	M6	4.0 to 4.9	14
Ground terminal Ⓧ	M6	4.0 to 4.9	30

Inverter CIMR-MXN20305A (30 kW)			
Terminal code	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V cross-linked polyethelene wire (IC) 90°C (mm ²)
U/T1, V/T2, W/T3	M8	8.9 to 10.7	38
Motor FG terminal Ⓧ	M6	4.0 to 4.9	14
Ground terminal Ⓧ	M6	4.0 to 4.9	22

Inverter CIMR-MXN20225A (22 kW)			
Terminal code	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V cross-linked polyethelene wire (IC) 90°C (mm ²)
U/T1, V/T2, W/T3	M8	8.9 to 10.7	22
Motor FG terminal Ⓧ	M6	4.0 to 4.9	14
Ground terminal Ⓧ	M6	4.0 to 4.9	22

Inverter CIMR-MXN20185A (18 kW)			
Terminal code	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V cross-linked polyethelene wire (IC) 90°C (mm ²)
U/T1, V/T2, W/T3	M8	8.9 to 10.7	22
Motor FG terminal ⊥	M6	4.0 to 4.9	14
Ground terminal ⊥	M6	4.0 to 4.9	14

Inverter CIMR-MXN20155A (15 kW)			
Terminal code	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V cross-linked polyethelene wire (IC) 90°C (mm ²)
U/T1, V/T2, W/T3	M8	8.9 to 10.7	14
Motor FG terminal ⊥	M6	4.0 to 4.9	14
Ground terminal ⊥	M6	4.0 to 4.9	14

Inverter CIMR-MXN20115A (11 kW)			
Terminal code	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V cross-linked polyethelene wire (IC) 90°C (mm ²)
U/T1, V/T2, W/T3	M5	2.0 to 2.5	8
Motor FG terminal ⊥	M5	2.0 to 2.5	14
Ground terminal ⊥	M5	2.0 to 2.5	8

Inverter CIMR-MXN27P55A (7.5 kW)			
Terminal code	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V cross-linked polyethelene wire (IC) 90°C (mm ²)
U/T1, V/T2, W/T3	M5	2.0 to 2.5	5.5
Motor FG terminal ⊥	M5	2.0 to 2.5	14
Ground terminal ⊥	M5	2.0 to 2.5	8

Inverter CIMR-MXN25P55A (5.5 kW)			
Terminal code	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V cross-linked polyethelene wire (IC) 90°C (mm ²)
U/T1, V/T2, W/T3	Connector connection	-	3.5
Motor FG terminal ⊥	Connector connection	-	8
Ground terminal ⊥	M4	1.0 to 1.2	8

Inverter CIMR-MXN23P75A (3.7 kW)			
Terminal code	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V cross-linked polyethylene wire (IC) 90°C (mm ²)
U/T1, V/T2, W/T3	Connector connection	-	3.5
Motor FG terminal ⊥	Connector connection	-	8
Ground terminal ⊥	M4	1.0 to 1.2	5.5

Servo Unit SGDK-75AEA (7.5 kW), -60AEA (6.0 kW)			
Terminal code	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V special heat-resistant vinyl wire (HIV) 75°C (mm ²)
U, V, W, FG	M6	3.1	14
Ground terminal ⊥	M6	3.1	2

Servo Unit SGDK-50AEA (5.0 kW)			
Terminal code	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V special heat-resistant vinyl wire (HIV) 75°C (mm ²)
U, V, W, FG	Connector connection	-	5.5
Ground terminal ⊥	M4	1.1	2

Servo Unit SGDK-30AEA (3.0 kW)			
Terminal code	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V special heat-resistant vinyl wire (HIV) 75°C (mm ²)
U, V, W, FG	Connector connection	-	5.5
Ground terminal ⊥	M4	1.1	2

Servo Unit SGDK-20AEA (2.0 kW)			
Terminal code	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V special heat-resistant vinyl wire (HIV) 75°C (mm ²)
U, V, W, FG	Connector connection	-	3.5
Ground terminal ⊥	M4	1.1	2

Servo Unit SGDK-15AEA (1.5 kW)			
Terminal code	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V special heat-resistant vinyl wire (HIV) 75°C (mm ²)
U, V, W, FG	Connector connection	-	3.5
Ground terminal \oplus	M4	1.1	2

Servo Unit SGDK-10AEA (1.0 kW)			
Terminal code	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V special heat-resistant vinyl wire (HIV) 75°C (mm ²)
U, V, W, FG	Connector connection	-	3.5
Ground terminal \oplus	M4	1.1	2

Servo Unit SGDK-05AEA(0.5 kW)			
Terminal code	Terminal screw	Screw tightening torque (N·m)	Recommended wire size
			600-V special heat-resistant vinyl wire (HIV) 75°C (mm ²)
U, V, W, FG	Connector connection	-	2
Ground terminal \oplus	M4	1.1	2

6.2.4 Setting Inverter and Servo Unit Rotary Switches

Each Servo Unit and Inverter is equipped with a rotary switch for setting the PROFIBUS slot information. Set these switches as described below.

- Set one number per axis, starting with 0 and increasing in order.
- When using a Servo Unit with two axes, numbers are required for the two axes, but there is only one rotary switch. In this case, setting the number "2," for example, will take up both numbers 2 and 3. Accordingly, set the next unit to number "4." Also, set the rotary switches for Servo Units with two axes to even numbers (0, 2, 4, etc.).
- Numbers from 0 to 6 can be set for the units connected to one Converter. As long as the numbers are not duplicated, the units do not have to be positioned so that the numbers of the rotary switches are in order.



When a setting is incorrect, the LED on the PROFIBUS connector of the Converter will illuminate in red. When the setting is correct, this LED illuminates in green.

6.3 Servomotor

■ For Motors with a Built-in Encoder

This is the same for incremental and absolute encoders.

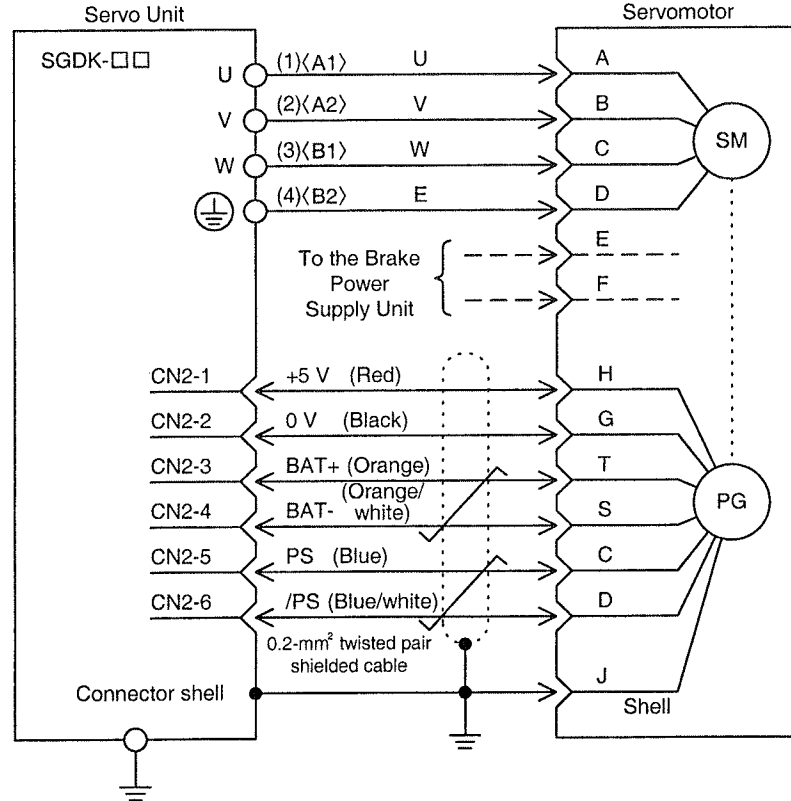


Fig. 6.3 Servomotor Connection (for Motors with a Built-in Encoder)

For Servomotors with a holding brake, connect the cable from the Brake Power Supply Unit to the connector E and F terminals on the motor.



The numbers inside parentheses () are for connector type Servo Units of 3 kW or less.

The numbers inside angle brackets ⟨ ⟩ are for connector type 5-kW Servo Units.

For detailed information, refer to A.1 Servomotor Main Circuits Cables.

■ For Separate Feedback Units

The following wiring is necessary when connecting separate Feedback Units. This is restricted, however, to Yaskawa Feedback Units of the same specifications.

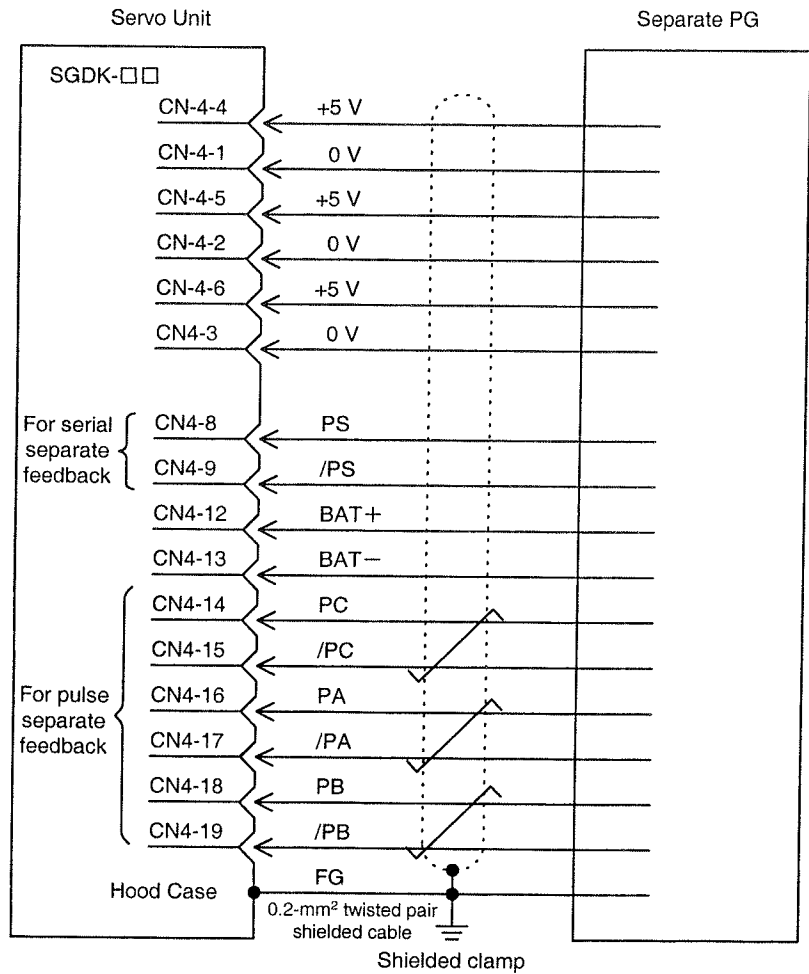


Fig. 6.4 Servomotor Connection (for Separate Feedback Units)

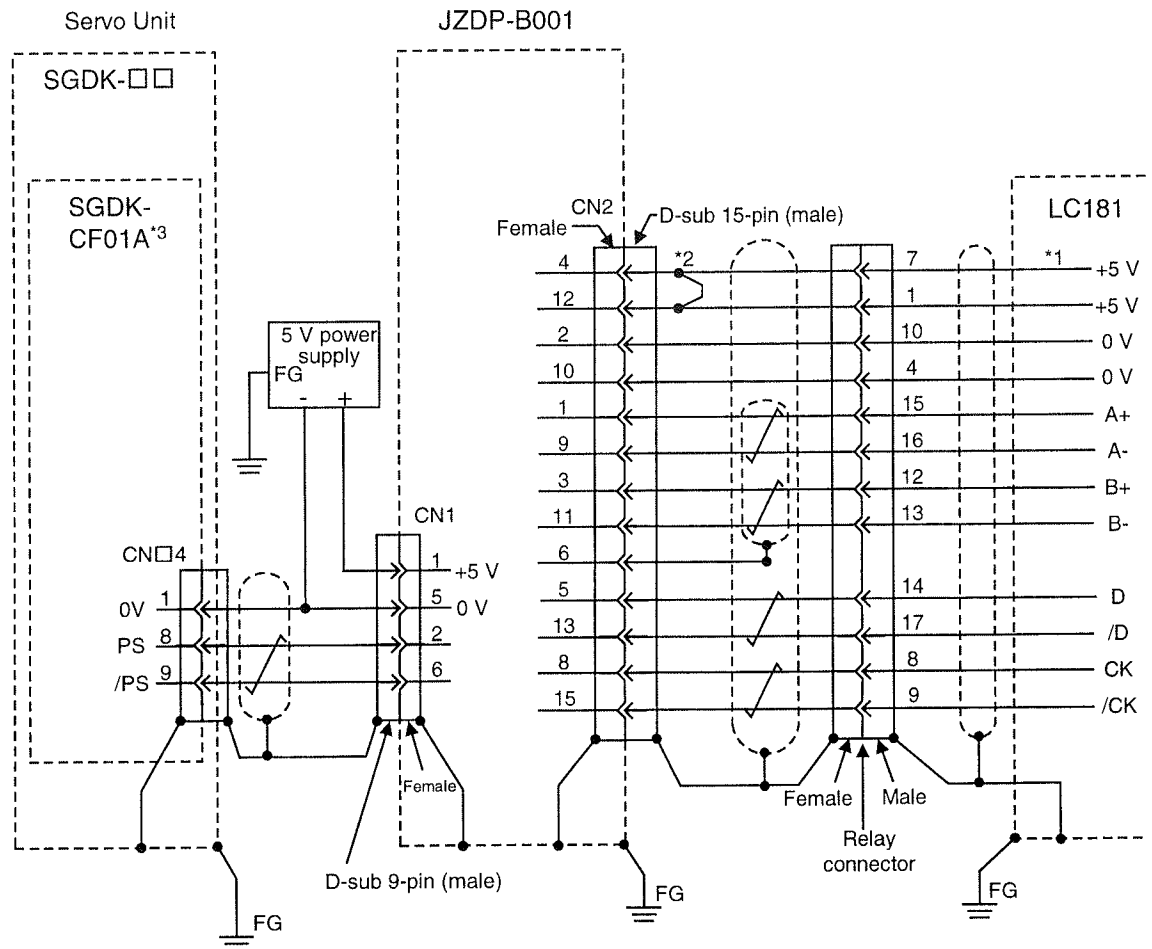


- Only one type of separate PG, serial or pulse, can be connected.
- For 2-axis Servo Units, the connection is CN14 or CN24.

■ Connection Example for EnDat Interface Separate Feedback Unit

This is an example of using the JZDP-B001 Serial Conversion Unit supplied by Yaskawa to connect the LC181 shielded type absolute length measurement system manufactured by Heidenhain.

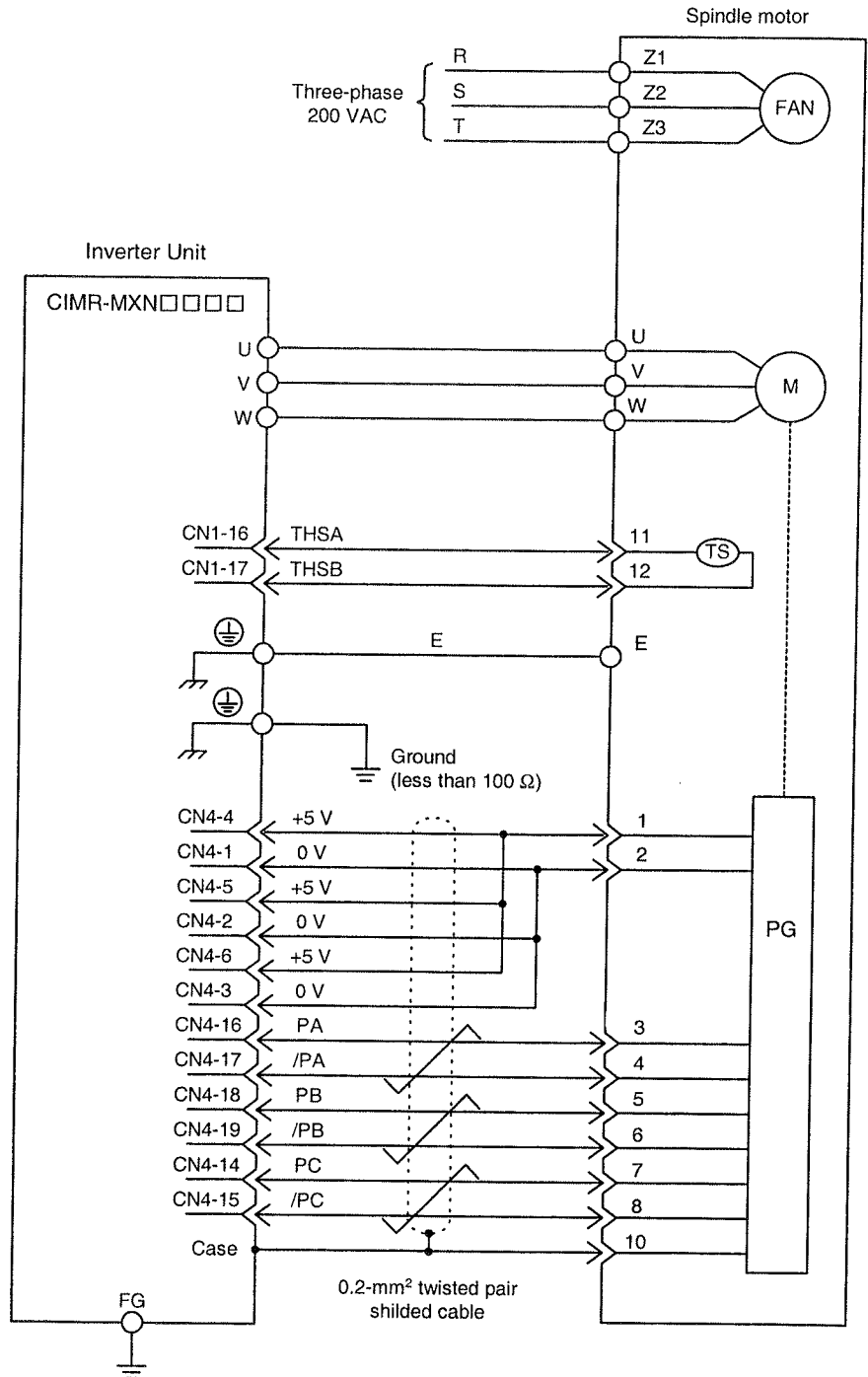
For information on the relay connector between the JZDP-B001 and the LC181, refer to the LC181 data.



- *1. The +5V is JZDP-B001, LC181 input, and must be between 4.75 V and 5.25 V.
Select cables that will suit the current consumption of 300 mA for the JZDP-B001 and 300 mA for the LC181.
- *2. Short-circuit pins 4 and 12 of CN2 inside the JZDP-B001 connector.
- *3. External PG card (Optional)

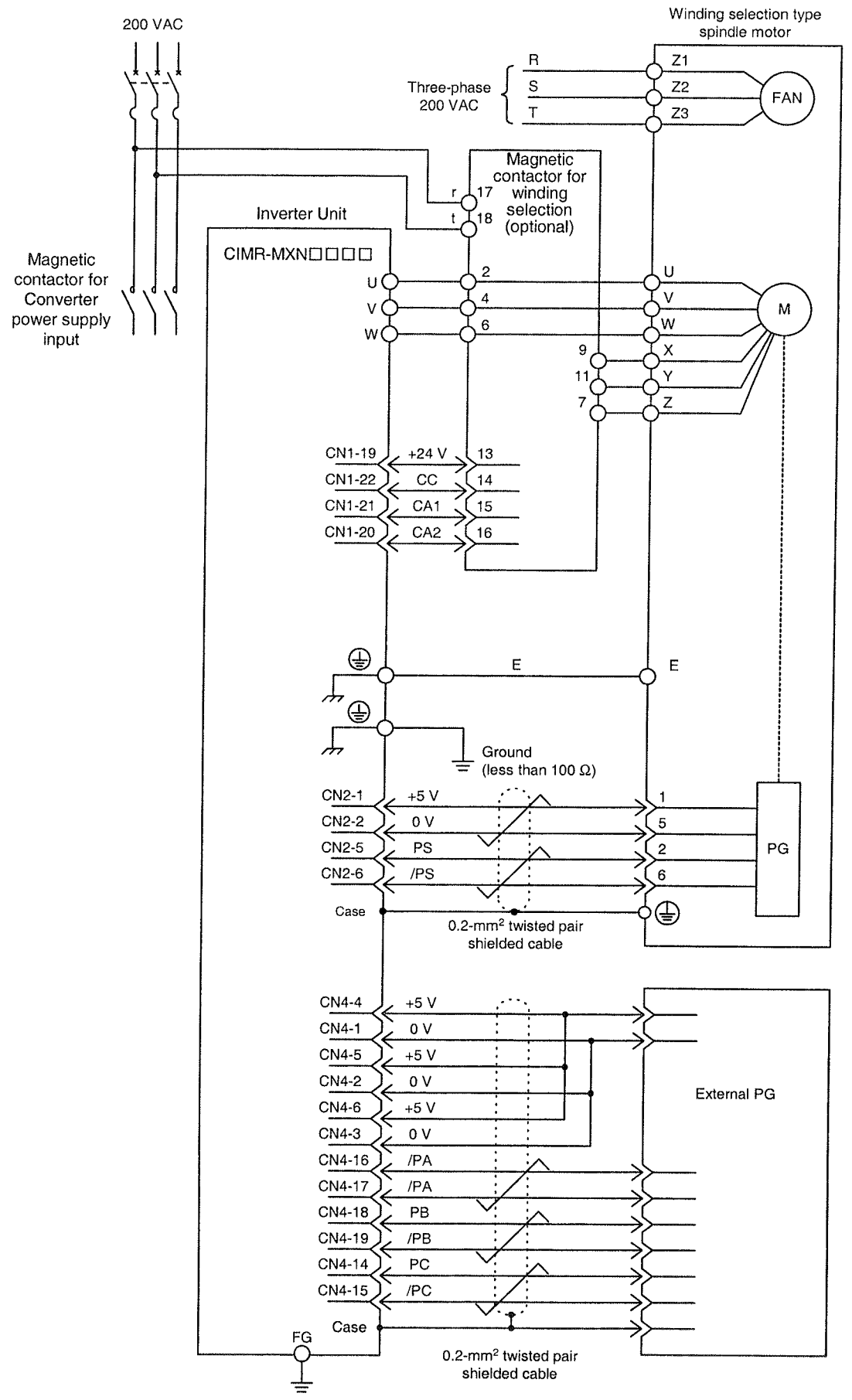
6.4 Spindle Motor

6.4.1 Motor Pulse Encoder Connection



Wire the cable shield to the connector case, and be sure to leave CN4-7 and CN4-20 open.

6.4.2 Connection between Motor Serial Encoder and External PG

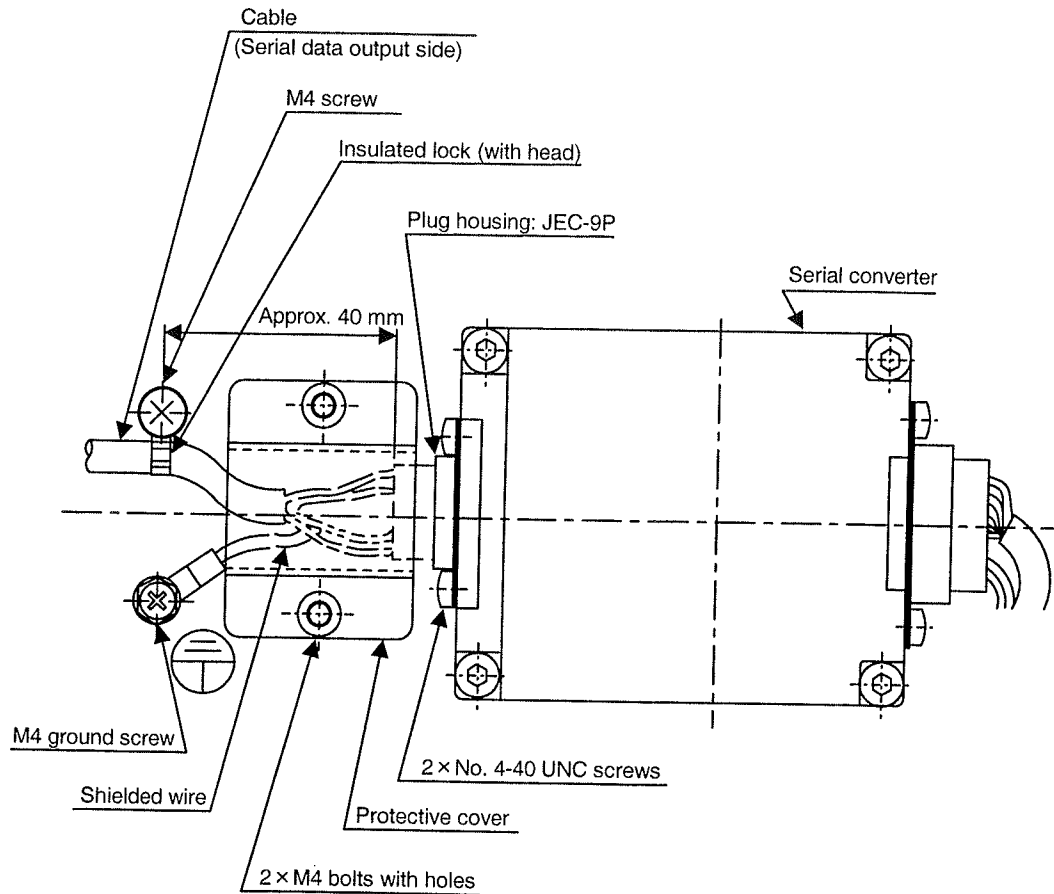




- Wire the cable shield to the connector case, and be sure to leave CN4-7 and CN4-20 open.
- Do not connect the power supply for switchable winding (r, t) to the secondary side of the electromagnetic contactor used for the Converter power supply input.

6.4.3 Serial Encoder Connection in the Motor Terminal Box

The manufacturing specifications for the motor-side connector on the cable for the serial encoder built into the motor, and the connection method inside the spindle terminal box are shown below.



*1. When tightening the No. 4-40 UNC screws, the location makes it difficult to insert the screwdriver. Be careful not to tighten at an angle.

*2. When securing the cable with the insulated lock, do not apply force to the cable or the connection part of the plug housing.

Note 1. Make sure that the signal wires and shielded wires are not pinched in the protective cover edge.

2. The standing depth of the M4 screw is 7 mm.

6.5 Direct IN Signal

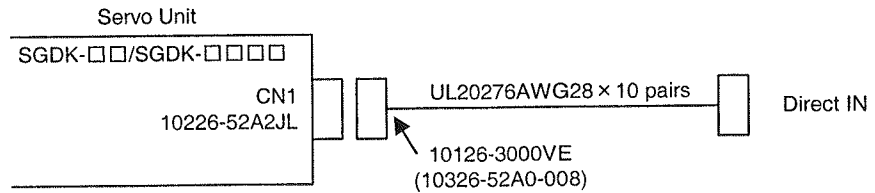
The Direct IN signal can be used for two input signals.

Connect the Direct IN signal to only one of the Servo Units.

If the Direct IN signal is connected to multiple Servo Units, it will not function correctly.

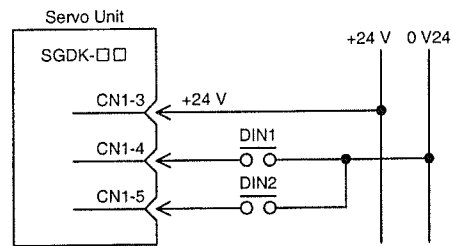
The use of shielded cables is recommended.

■ Connection between Equipment

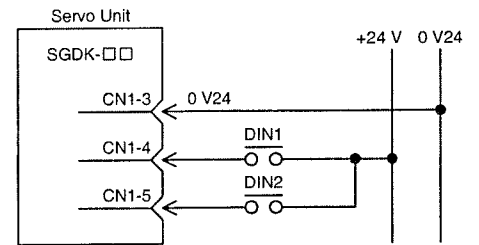


■ Detailed Connection

Servo Unit



24-V common connection



0-V common connection

A

Cable Assembly

A.1	Servomotor Main Circuit Cables	A-2
A.2	Servomotor Encoder Cables	A-5
A.3	Servomotor Connectors	A-8
A.4	Servo Unit/External Pulse Encoder Cables	A-12
A.5	Spindle Motor Cable	A-14
A.6	Spindle Motor Encoder Connectors	A-16

A.1 Servomotor Main Circuit Cables

■ Recommended Wire Size

Servomotor capacity SGMKS-	Power cable (U, V, W, E)	Brake cable
05	HIV 2.0 mm ² or larger	HIV 1.25 mm ² or larger
09	HIV 3.5 mm ² or larger	
13		
20		
30	HIV 5.5 mm ² or larger	
44		
55	HIV 14 mm ² or larger	
75		

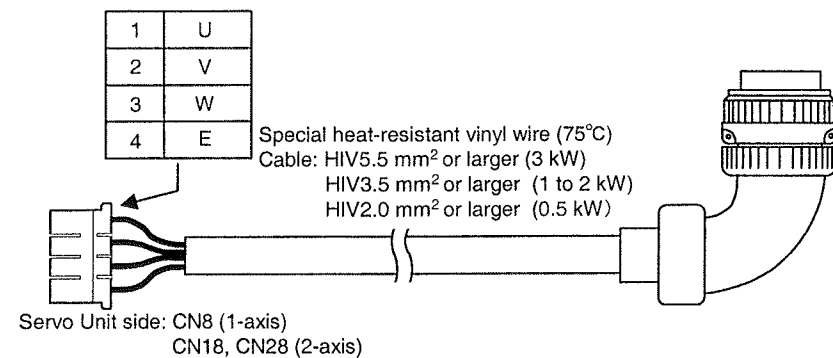
- Note 1. Wire size selection conditions: Rated current flowing to the three lead wires at an ambient temperature of 40°C.
2. Use special heat-resistant vinyl wire for the motor power line.
Because ordinary vinyl wire quickly deteriorates when the ambient temperature (panel interior temperature) is high, it becomes unusable in a relatively short time.
3. When bundling wires and placing them into a hard vinyl tube or metal duct, the reduction rate of the wires' allowable current must be considered.

■ 0.5- to 3.0-kW Cables

Use for the following Servo Units.

1-axis	2-axis	3-axis
SGDK-05AEA (0.5 kW)	SGDK-0505AEA (0.5 kW)	SGDK-050505AEA (0.5kW)
SGDK-10AEA (1.0 kW)	SGDK-1010AEA (1.0 kW)	SGDK-101010AEA (1.0 kW)
SGDK-15AEA (1.5 kW)	SGDK-1515AEA (1.5 kW)	—
SGDK-20AEA (2.0 kW)	SGDK-2020AEA (2.0 kW)	—
SGDK-30AEA (3.0 kW)	SGDK-3030AEA (3.0 kW)	—

Use one of the following cables per motor.



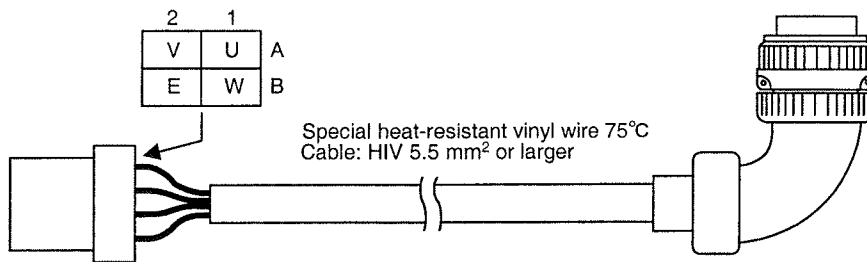
Plug connector	1-179958-4 (AMP)
Contact	316041-2 (1 to 3 kW) 316040-2 (0.5 kW)

Refer to A.3 Servomotor Connectors for details about the motor side.

Servo Unit side: CN18, CN28, CN38 (3-axis)

Plug connector	1-178128-4 (AMP)
Contact	353717-2

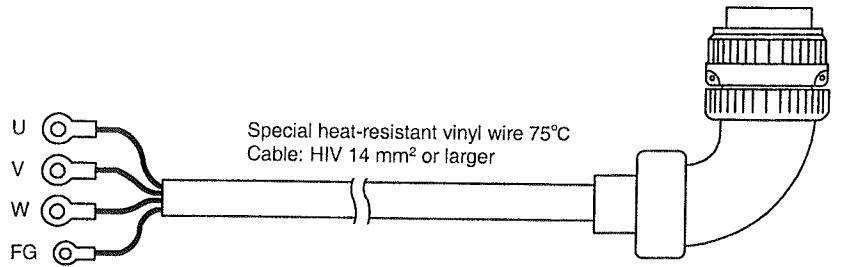
■ SGDK-50AEA (5-kW) Cable



Plug connector	1-917807-2 (AMP)
Contact	1318697-6

Refer to A.3 Servomotor Connectors for details about the motor side.

■ SGDK-60AEA (6-kW), SGDK-75AEA (7.5-kW) Cable



Servo Unit side

U, V, W terminal	M6 crimp terminal
FG terminal	M6 crimp terminal

Refer to A.3 *Servomotor Connectors* for details about the motor side.

A.2 Servomotor Encoder Cables

The encoder cable serves to connect the encoder that is installed on the motor with the Servo Unit.

The model numbers and appearances of the encoder cables are shown below. Provide the model number when purchasing cables.

■ Cables with Connectors on Both Ends for the Servo Unit and Servomotor Sides

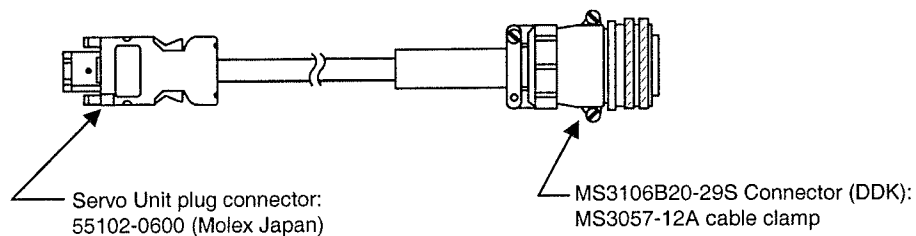
The cable model numbers are listed in the following table.

Cables with Connectors on Both Ends for the Servo Unit and Servomotor Sides

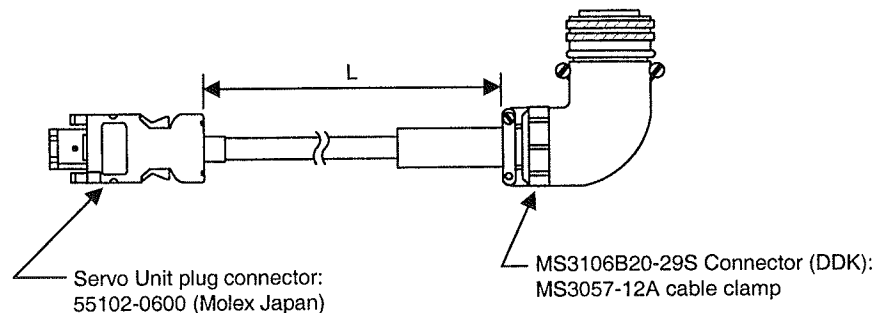
Applicable Servomotor		Cable model	Length (L)
SGMKS Servomotor	With straight plug	JZSP-CMP01-03	3 m
		JZSP-CMP01-05	5 m
		JZSP-CMP01-10	10 m
		JZSP-CMP01-15	15 m
		JZSP-CMP01-20	20 m
	With L-shaped plug	JZSP-CMP02-03	3 m
		JZSP-CMP02-05	5 m
		JZSP-CMP02-10	10 m
		JZSP-CMP02-15	15 m
		JZSP-CMP02-20	20 m

External dimensions are shown below.

- Servomotor cable with straight plug



- Servomotor cable with L-shaped plug

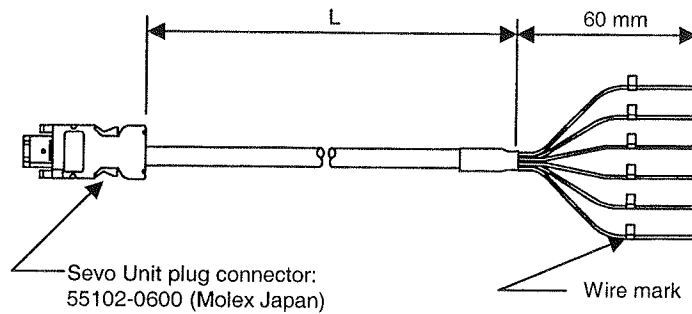


■ Cables for Servo Unit (with Connector) and Encoder (Split Lead)

Types of Cables for Servo Unit (with Connector) and Encoder (Split Lead)

Cable model	Length (L)
JZSP-CMP03-03	3 m
JZSP-CMP03-05	5 m
JZSP-CMP03-10	10 m
JZSP-CMP03-15	15 m
JZSP-CMP03-20	20 m

External dimensions are shown below.

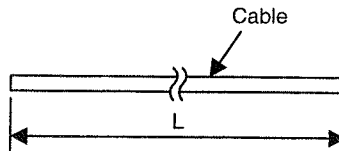


■ Cable Wire Material

The types and specifications of encoder cable wire material are described below. Types and model numbers are given in the following table.

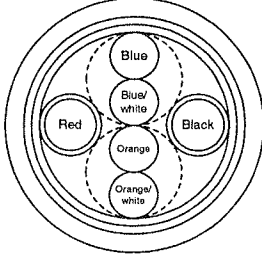
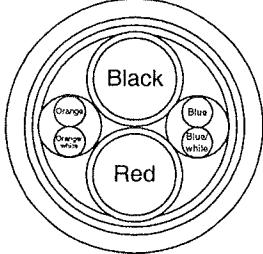
Table A.1 Types of Cable Wire Material

Cable type	Cable model	Length (L)
Standard encoder cables For wiring lengths of up to 20 m	JZSP-CMP09-05	5 m
	JZSP-CMP09-10	10 m
	JZSP-CMP09-15	15 m
	JZSP-CMP09-20	20 m
50-m encoder cables For wiring lengths of up to 50 m	JZSP-CMP19-30	30 m
	JZSP-CMP19-40	40 m
	JZSP-CMP19-50	50 m



The applicable cable specifications are listed in the table below for encoder cables (wire material). These cables are not supplied with the SERVOPACK or Servomotor. They must be purchased separately.

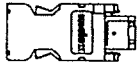
Table A.2 Applicable Cable Specifications

Cable specifications	Wiring length: 20 m (max.)	Wiring length: 50 m (max.)
General specifications	T/20276-SB AWG22 × 2C + AWG24 × 2P	T/20276-SB AWG16 × 2C + AWG26 × 2P
Finished shape	6.8-mm dia.	6.8-mm dia.
Inner construction and lead colors		
Standard length	5 m, 10 m, 15 m, 20 m	30 m, 40 m, 50 m

■ Connector Kit

This part is for connecting the encoder of the Servo Unit or Servomotor.

Table A.3 Connector Kit Type

Type	Connector Kit model	Connector Kit part
Plug (solder type) for the Servo Unit encoder connector (CN2)	JZSP-CMP9-1	

A.3 Servomotor Connectors

■ Servomotor Connectors

There are two types of detector and motor connectors: the standard connector and the IP67 connector. The standard connector is not splash resistant.

The connectors also vary for Servomotors without holding brake and Servomotors with holding brake.

Standard Connectors (without brake)

Table A.4 SGMKS Connectors for Servomotors without Brake

Applicability		Receptacle	L-shaped plug*	Straight plug*	Cable clamp*	
Main circuit connectors	Motor model number SGMKS-	05A□A 09A□A 13A□A	MS3102A18-10P	MS3108B18-10S	MS3106B18-10S	MS3057-10A
		20A□A 30A□A 44A□A	MS3102A22-22P	MS3108B22-22S	MS3106B22-22S	MS3057-12A
		55A□A 75A□A	MS3102A32-17P	MS3108B32-17S	MS3106B32-17S	MS3057-20A
Encoder connectors			MS3102A-29P	MS3108B20-29S	MS3106B20-29S	MS3057-12A

Motor side
Cable side

* A cable clamp and either an L-shaped plug or a straight plug must be provided by the customer.

Standard Connectors (with brake)

Table A.5 SGMKS Connectors for Servomotors with Brake

Applicability		Receptacle	L-shaped plug*	Straight plug*	Cable clamp*	
Main circuit connectors	Motor model number SGMKS-	05A□A 09A□A 13A□A	MS3108B18-10P	MS3108B20-15S	MS3106B20-15S	MS3057-12A
		20A□A 30A□A 44A□A	MS3102A24-10P	MS3108B24-10S	MS3106B24-10S	MS3057-16A
Encoder connectors			MS3102A-29P	MS3108B20-29S	MS3106B20-29S	MS3057-12A

Motor side
Cable side

* A cable clamp and either an L-shaped plug or a straight plug must be provided by the customer.

IP67 Connectors (without brake)

Table A.6 SGMKS Connectors for Servomotors without Brake

Applicability		Receptacle model	Plug-only model ^{*3}	End Bell or Back Shell ^{*1, *3}		Cable clamp model ^{*3}	Manufacturer	
				Angle (L-shaped) model	Straight model			
Main-circuit connectors	Motor model number	05A□A 09A□A 13A□A	CE05-2A18-10PD	MS3106A18-10S (D190)	CE-18BA-S	CE02-18BS-S	CE3057-10A-□ ^{*2}	DDK
	SGMKS-	20A□A 30A□A 44A□A	JL04HV-2E22-22PE-B	JL04V-6A22-22SE	JL04-22EBL	JL04-22EB	JL04-2022CK (14)	Japan Aviation Electronics Ind, Ltd.
		55A□A 75A□A	JL04V-2E32-17PE-B	JL04V-6A32-17SE	Use a flexible conduit.	Use a flexible conduit.	Use a flexible conduit.	Japan Aviation Electronics Ind, Ltd.
		Encoder connectors	97F3102E20-29P	MS3106A20-29S (D190)	CE-20BA-S	CE02-20BS-S	CE3057-12A□ ^{*2}	DDK

Motor side

Cable side

- *1. End Bell is the name of a product manufactured by Japan Aviation Electronics Ind, Ltd., and Back Shell is the name of a product manufactured by DDK.
- *2. Select the character for the box (□) in the Cable Clamp model numbers according to the lead wire diameter.
- *3. A cable clamp and either an L-shaped plug or a straight plug must be provided by the customer.

Note 1. The same detector connector is used for all motors.

2. In order to provide an IP67 protective structure, use a plug, End Bell, Back Shell, and cable clamp from the table above.

3. For information on an applicable flexible conduit, contact the conduit manufacturer.

IP67 Connectors (with brake)

Table A.7 SGMKS Connectors for Servomotors with Brake

Applicability			Receptacle model	Plug-only model ³	End Bell or Back Shell ^{*1, *3}		Cable clamp model ^{*3}	Manufacturer
					Angle (L-shaped) model	Straight model		
Main-circuit connectors	Motor model number SGMKS-	05A□A 09A□A 13A□A	JL04V-2E20-15PE-B	JL04V-6A20-15SE	JL04-20EBL	JL04-20EB	JL04-2022CK (14)	Japan Aviation Electronics Ind, Ltd.
		20A□A 30A□A 44A□A	JL04-2E24-10PE-B	JL04V-6A24-10SE	JL04-24BL	JL04-24EB	JL04-2428CK (17)	Japan Aviation Electronics Ind, Ltd.
Encoder connectors			97F3102E20-29P	MS3106A20-29S (D190)	CD-20BA-S	CE02-20BS-S	CD3507-12A-□ ^{*2}	DDK

Motor side

Cable side

*1. End Bell is the name of a product manufactured by Japan Aviation Electronics Ind, Ltd., and Back Shell is the name of a product manufactured by DDK.

*2. Select the character for the box (□) in the Cable Clamp model numbers according to the lead wire diameter.

*3. A cable clamp and either an L-shaped plug or a straight plug must be provided by the customer.

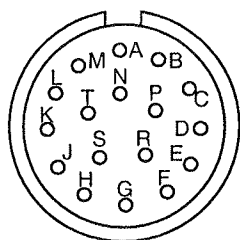
Note 1. The same detector connector is used for all motors.

2. In order to provide an IP67 protective structure, use a plug, End Bell, Back Shell, and cable clamp from the table above.

3. For information on an applicable flexible conduit, contact the conduit manufacturer.

■ Servomotor Connector Pin Arrangement

Encoder Connector Wiring Specifications (Serial Encoder)



Receptacle: MS3102A20-29P

Applicable plug (to be provided by customer)

Plug: MS3108B20-29S

Cable clamp: MS3057-12A

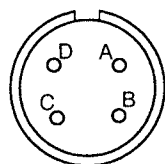
• For an absolute encoder

A	—	K	—
B	—	L	—
C	PS	M	—
D	/PS	N	—
E	—	P	—
F	—	R	—
G	PG0V	S	BAT-
H	PG5V	T	BAT+
J	FG (frame ground)	—	—

• For an incremental encoder

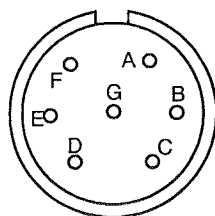
A	—	K	—
B	—	L	—
C	PS	M	—
D	/PS	N	—
E	—	P	—
F	—	R	—
G	PG0V	S	—
H	PG5V	T	—
J	FG (frame ground)	—	—

Main-circuit Connector Wiring Specifications (without Brake)



A	U phase
B	V phase
C	W phase
D	FG (frame ground)

Main-circuit Connector Wiring Specifications (with Brake)



A	U phase	E	Brake terminal
B	V phase	F	Brake terminal
C	W phase	G	Not used.
D	FG (frame ground)	—	—

A.4 Servo Unit/External Pulse Encoder Cables

The connectors and cables used to connect the Servo Unit to an external pulse encoder are described below.

Serial encoder cables are the same as those for the Servomotor encoder.

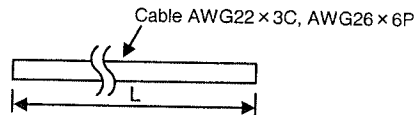
■ Connector Kit (for CN4)

Connector Kit model	Connector Kit parts list			
	Connector		Case	
	Model	Qty.	Model	Qty.
DE9406973	10120-3000VE*	1	10320-52A0-008*	1

* Mfd. by SUMITOMO 3M

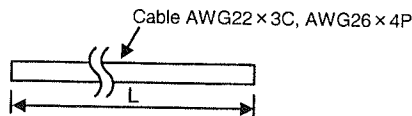
■ Absolute Pulse Encoder Cables

Cable model	L (mm)
DP8409123-1	3000 $\begin{smallmatrix} +100 \\ 0 \end{smallmatrix}$
DP8409123-2	5000 $\begin{smallmatrix} +100 \\ 0 \end{smallmatrix}$
DP8409123-3	10000 $\begin{smallmatrix} +500 \\ 0 \end{smallmatrix}$
DP8409123-4	15000 $\begin{smallmatrix} +500 \\ 0 \end{smallmatrix}$
DP8409123-5	20000 $\begin{smallmatrix} +500 \\ 0 \end{smallmatrix}$



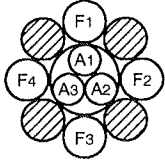
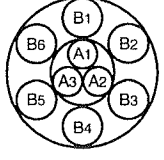
■ Incremental Pulse Encoder Cables

Cable model	L (mm)
B9400064-1	3000 $\begin{smallmatrix} +100 \\ 0 \end{smallmatrix}$
B9400064-2	5000 $\begin{smallmatrix} +100 \\ 0 \end{smallmatrix}$
B9400064-3	10000 $\begin{smallmatrix} +500 \\ 0 \end{smallmatrix}$
B9400064-4	15000 $\begin{smallmatrix} +500 \\ 0 \end{smallmatrix}$
B9400064-5	20000 $\begin{smallmatrix} +500 \\ 0 \end{smallmatrix}$



Cable Wire Material

The applicable cable specifications for pulse encoder cables are shown below.

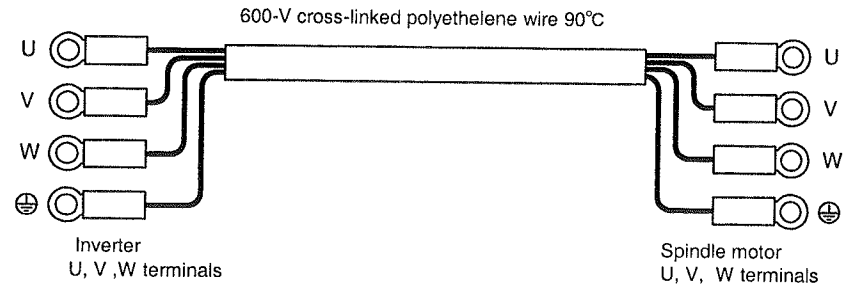
Cable specifications	Incremental encoder	Absolute encoder
General specifications	Composite KQVV-SW AWG22 × 3C, AWG26 × 4P	Composite KQVV-SW AWG22 × 3C, AWG26 × 6P
Finished shape	7.5-mm dia.	8.0-mm dia.
Inner construction and lead colors	 <p>A1: Red A2: Black A3: Green/yellow F1: Blue-white/blue Twisted pair F2: Yellow-White/yellow Twisted pair F3: Green-White/green Twisted pair F4: Orange-White/orange Twisted pair</p>	 <p>A1: Red A2: Black A3: Green/yellow B1: Blue-white/blue Twisted pair B2: Yellow-White/yellow Twisted pair B3: Green-White/green Twisted pair B4: Orange-White/orange Twisted pair B5: Purple-White/purple Twisted pair B6: Grey-White/grey Twisted pair</p>
Standard length	3 m, 5 m, 10 m, 15 m, 20 m	

A.5 Spindle Motor Cable

The size of the crimp-style terminals (power, fan) and encoder connector for the spindle motor are different according to the motor.

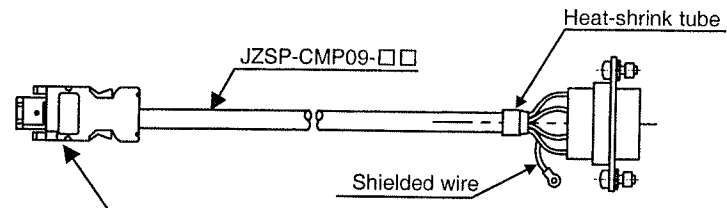
For details, refer to the motor drawing.

■ Spindle Motor Power Cable



For Inverter wire and terminal sizes, see the table for terminal block tightening torque in Section 6.2.3 *Wiring Specifications*.

■ Spindle Motor Serial Encoder Cable



Spindle Inverter plug connector CN2
55102-0600 (Nihon Morex)

Spindle motor encoder connector

Plug housing	JEC-9P (JST)
Pin contact	J-SP114C (JST)
No. 4-40 UNC screw	2 × J-SL-1C (JST)
E-ring	2 × J-ER (JST)

Separate caulking tool required.

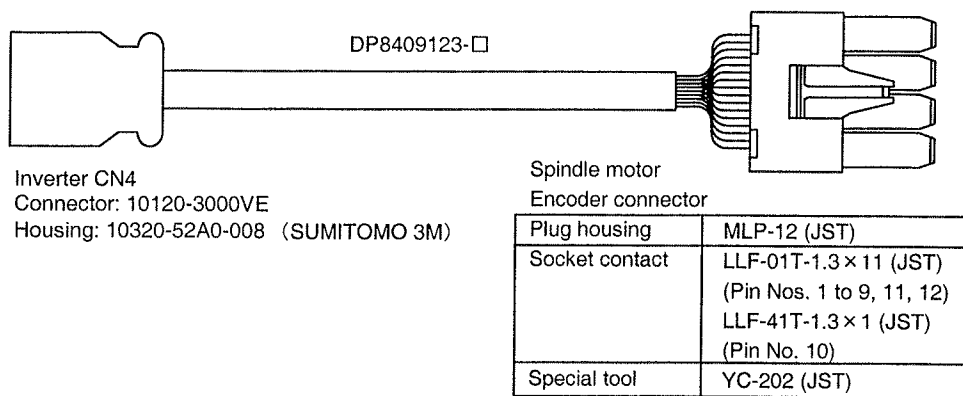
For the serial encoder cable, use the same one that is used for the Servomotor encoder cable.

For details, see the item on cable wire material in A.2. *Servomotor Encoder Cables*.

Observe the following precautions in wiring.

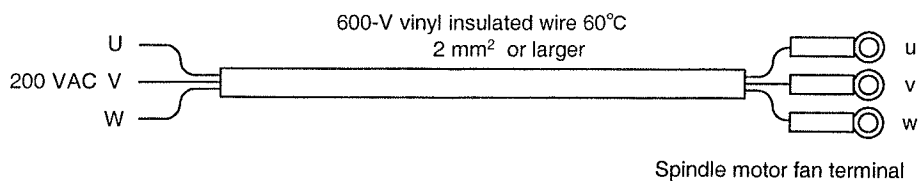
- Bundle the necessary number of shielded wires for the round terminal being used, and cover with a tube.
- Cut off the unused signal wires or shielded wires at the end of the sheath.
- Gather the cut signal wires or shielded wires so that they do not protrude from the heat-shrink tube.
- Make the part of the signal wire not covered by the shield 40 mm or less.

■ Spindle Motor Pulse Encoder Cable



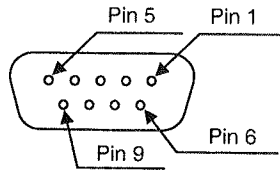
The pulse encoder cable is the same as that for the Servo Unit external pulse encoder (absolute). For details, refer to the item on cable wire material in *Appendix A.4*.

■ Fan Motor Cable for UAKA-30A□□, -37A□□, UAKB-15A□□



A.6 Spindle Motor Encoder Connectors

■ Spindle Motor Serial Encoder Pin Arrangement

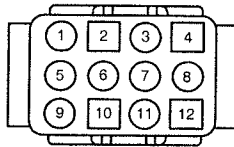


Connector: 17LE-13090-27 (DDK)
 Applicable connector: JEC-9P (JST)
 Cover set: J-C9-1C (JST)
 Pin contact: J-SP114C (JST for AWG20 to 24)
 Special tools
 Pin crimping tool: YRS-440 (JST)
 Pin pulling tool: DEJ-03 (JST)

Pin No.	Signal
1	+5 V
2	S-phase output
3	Open
4	Open
5	0 V
6	/ S-phase output
7	Open
8	Open
9	Open

Note: Do not use open pins.

■ Spindle Motor Pulse Encoder Pin Arrangement



ML connector (MLR-12)

Applicable plug housing: MLP-12

Socket contact
 •LLF-01T-1.3×11
 (Pin Nos. 1 to 9, 11, 12)
 •LLF-41T-1.3×1 (Pin No. 10)

No.	Name	No.	Name
1	+5 V	7	PC
2	0 V	8	/PC
3	PA	9	FG (Frame ground)
4	/PA	10	SS (Shielded)
5	PB	11	TS
6	/PB	12	

Note 1. Pin Nos. 11 and 12 are for the thermistor signal wires from the motor.

2. The slash (/) in front of PA, PB, and PC indicate inverted signals.

B

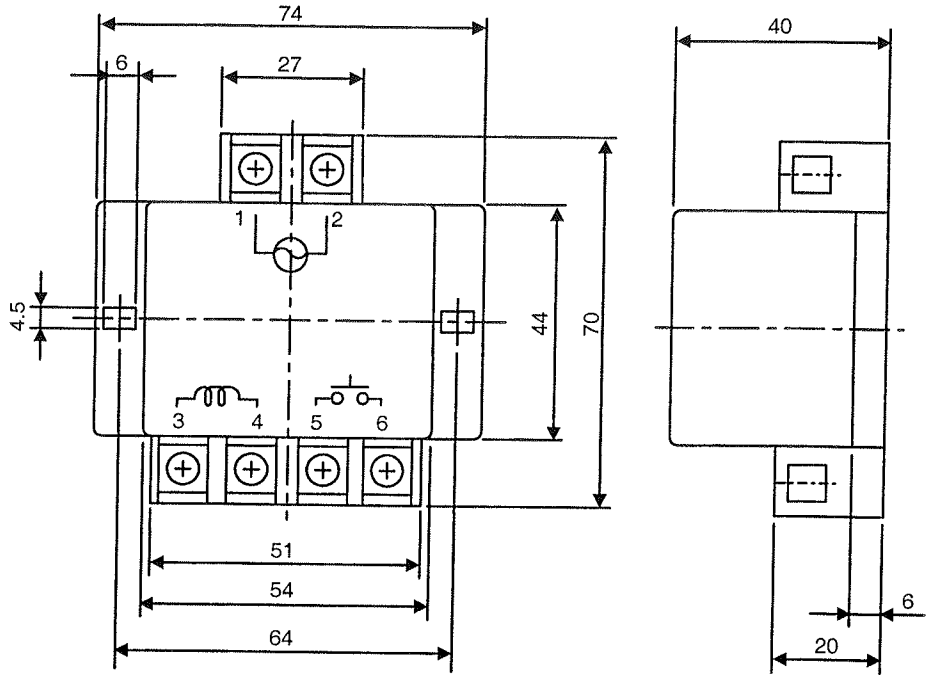
Dimensions and Specifications

B.1	Brake Power Supply Unit	B-2
B.2	Noise Filter	B-4
B.3	Magnetic Contactor for Winding Selection	B-8
B.4	AC Reactor	B-10
B.5	Pulse Generator for Spindle	B-12
B.6	Converter	B-13
B.7	Inverter	B-17
B.8	1-Axis Servo Unit	B-19
B.9	2-Axis Servo Unit	B-25
B.10	3-Axis Servo Unit	B-27

B.1 Brake Power Supply Unit

B.1.1 Dimension Diagram

■ OPR109F, OPR109A



Note 1. Do not short-circuit output terminal numbers 3 and 4.

2. Tighten the terminal block screws securely.

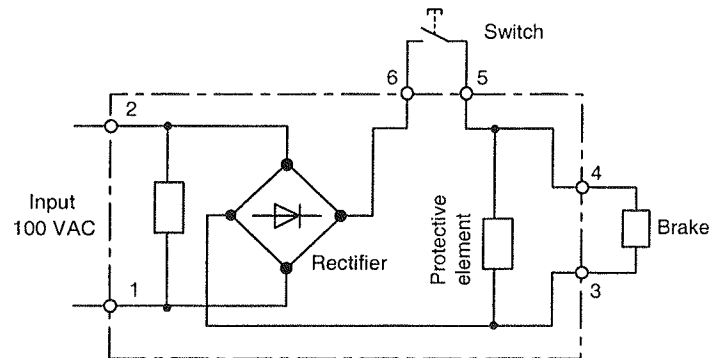
3. A protective element is built-in. There is no need to install an external one.

4. The contacts used for numbers 5 and 6 must be a DC switching type with a switching capacity 5 to 10 times the rated current of the breaker that is used.

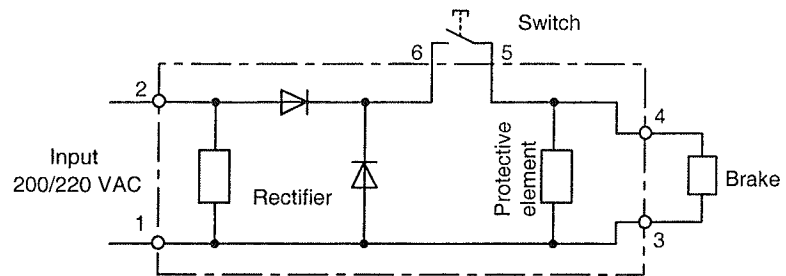
Model	Rectification	Frequency (Hz)	AC input voltage (AC) (V)	DC output voltage (DC) (V)	DC output current (A)	Approximate mass (kg)
OPR109A	Single-phase, half-bridge type	50/60	200	90	1	0.1
OPR109F	Single-phase, full-bridge type	50/60	100	90	1	0.1

B.1.2 Circuit Diagrams

■ OPR109F



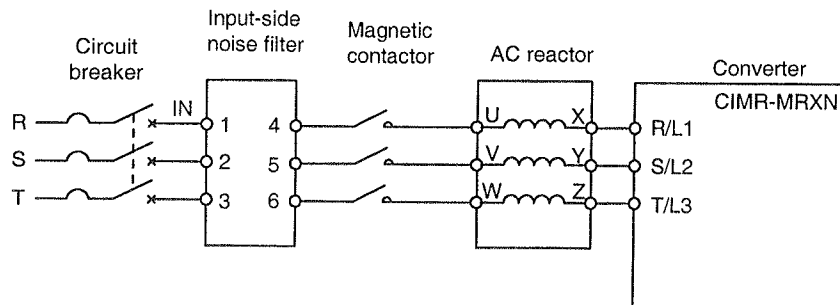
■ OPR109A



B.2 Noise Filter

B.2.1 Connection Example

The noise filter suppresses the high-frequency noise that is generated by the Inverter and relayed to the power supply.



Note: Do not connect the input-side noise filter to the output side (motor side).

B.2.2 Specifications

There are three types of input-side filters: standard, EMC-compliant, and simple. Select the type from the table below according to the Converter capacity.

Capacity	Standard			
	Model	Code No.	Qty.	Current
3.7 kW	FN258L-30-07	FIL001064	1	30 A
5.5 kW	FN258L-42-07	FIL001065	1	42 A
7.5 kW	FN258L-55-07	FIL001066	1	55 A
11 kW	FN258L-75-34	FIL001067	1	75 A
15 kW	FN258L-100-35	FIL001068	1	100 A
18.5 kW	FN258L-130-35	FIL001069	1	130 A
22 kW	FN258L-180-07	FIL001070	1	180 A
30 kW	FN359P-250-99	FIL001071	1	250 A
37 kW	FN359P-250-99	FIL001071	1	250 A
45 kW	FN359P-300-99	FIL001072	1	300 A

Capacity	EMC-compliant		
	Model	Qty.	Current
3.7 kW	FS5973-35-07	1	35 A
5.5 kW	FS5973-35-07	1	35 A
7.5 kW	FS5973-60-07	1	60 A
11 kW	FS5973-60-07	1	60 A
15 kW	FS5973-100-07	1	100 A
18.5 kW	FS5973-130-35	1	130 A
22 kW	FS5973-160-40	1	160 A
30 kW	FS5973-240-37	1	240 A
37 kW	FS5973-240-37	1	240 A
45 kW	Under development	–	–

Capacity	Simple			
	Model	Code No.	Qty.	Current
3.7 kW	LNFD-2303 HY	72600-D2303HY	1	30 A
5.5 kW	LNFD-2303 HY	72600-D2303HY	1	30 A
7.5 kW	LNFD-2303 HY	72600-D2303HY	2	60 A
11 kW	LNFD-2303 HY	72600-D2303HY	2	60 A
15 kW	LNFD-2303 HY	72600-D2303HY	3	90 A
18.5 kW	LNFD-2303 HY	72600-D2303HY	4	120 A
22 kW	–	–	–	–
30 kW	–	–	–	–
37 kW	–	–	–	–
45 kW	–	–	–	–

Note: When using multiple filters, connect them in parallel.

B.2.3 Dimension Diagrams

■ Standard Type

The dimensions of the standard noise filters are shown below. (Unit: mm)

Model	Diagram No.	A	B	C	D	E	F	G	H	J	L	O	P
FN258L-30-07	1	335	150±1	60	305	320	35	6.5	400	1±0.1	9	M5	AWG10
FN258L-42-07	1	329	185±1	70	300	314	45	6.5	500	1.5	12	M6	AWG8
FN258L-55-07	1	329	185±1	80	300	314	55	6.5	500	1.5	12	M6	AWG6
FN258L-75-34	2	329	220	80	300	314	55	6.5	—	1.5	—	M6	—
FN258L-100-35	2	379±1.5	220	90±0.8	350±1.2	364	65	6.5	—	1.5	—	M10	—
FN258L-130-35	2	439±1.5	240	110±0.8	400±1.2	414	80	6.5	—	3	—	M10	—
FN258L-180-07	3	438±1.5	240	110±0.8	400±1.2	413	80	6.5	500	4	15	M10	50 mm ²
FN359P-250-99	4	Dimensions are shown in diagram.											
FN359P-300-99													

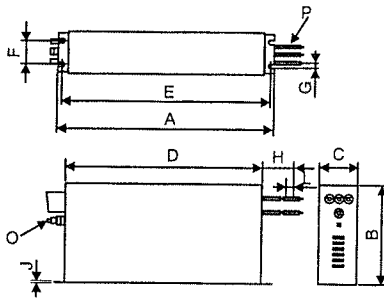


Diagram 1

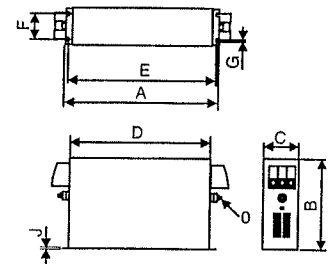


Diagram 2

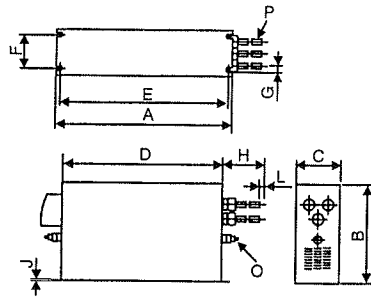


Diagram 3

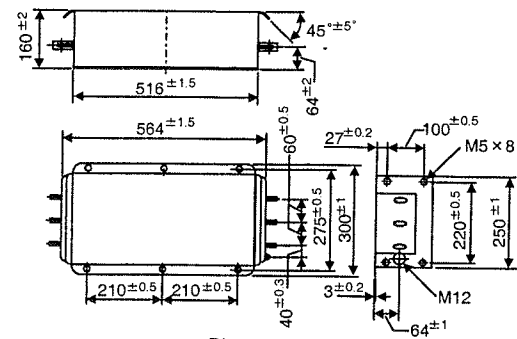


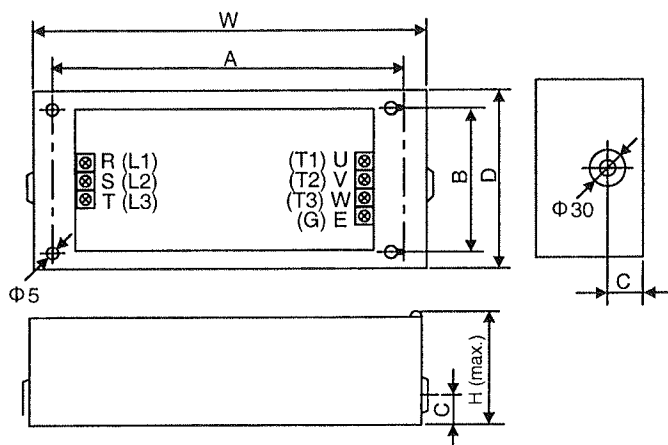
Diagram 4

■ Simplified Type

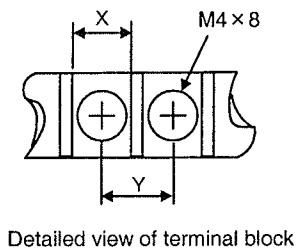
The dimensions of the simplified noise filters are shown below.

(Unit: mm)

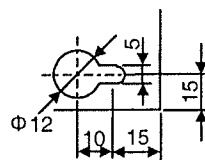
Model	Noise filter						Terminal block		Mass (kg)
	W	D	H	A	B	C	X	Y	
LFND-2303HY	240	125	100	210	95	33	10	13	1.6



Note: The external drawing shows a 3-phase model.



Detailed view of terminal block



Mounting screws: 4-M4 x 10
Detailed view of mounting hole

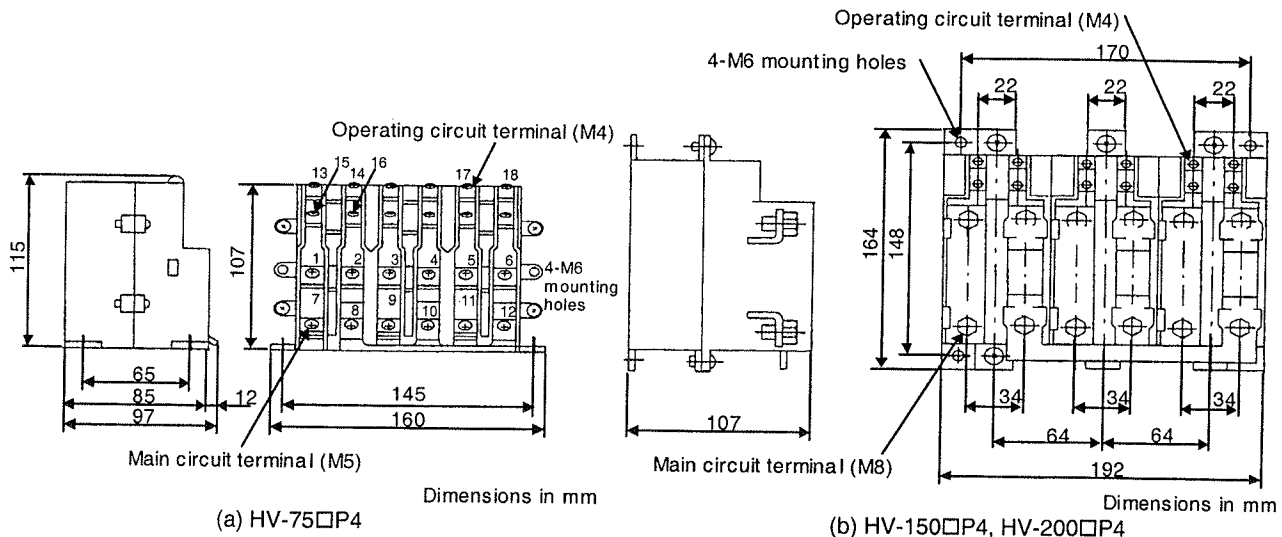
B.3 Magnetic Contactor for Winding Selection

The specifications for the magnetic contactor for winding selection are shown below.

■ Ratings and Specifications

Model	Standard	HV-75AP4	HV-150AP4	HV-200AP4
	IPM motor	HV-75BP4	HV-150BP4	HV-200BP4
Contact form	Three main NO contacts, three main NC contacts and one auxiliary NO contact			
Rated insulation voltage	600 V			
Rated ON current	Continuous	75 A	150 A	200 A
	30 minutes	87 A	175 A	226 A
Interrupting current capacity	220 V	200 A	400 A	400 A
Switching frequency	600 times/h			
Mechanical life	5,000,000 operations			
Electromagnetic coil rating	200 V 50/60 Hz, 220 V 50/60 Hz, 230 V 60 Hz			
Mass		2.5 kg	5.0 kg	5.0 kg
Ambient temperature	-10 to 55°C			
Humidity	10% to 95% RH (with no condensation)			
Inverter capacity	200 V class	3.7 to 15 kW	18.5 to 30 kW	37 kW

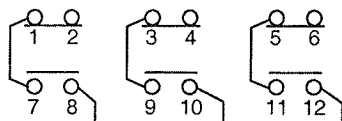
■ Dimension Diagrams



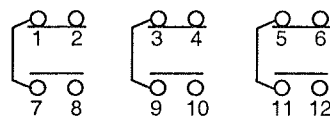
Terminal Description

Terminal names and operating statuses are shown below.

Terminal	Name	Operating status	
		+24 V (low-speed winding)	0 V (high-speed winding)
13-14	Selection signal		
1-2 3-4 5-6	Three main NC contacts	OFF	ON
7-8 9-10 11-12	Three main NO contacts	ON	OFF
15-16	One auxiliary NO contact	OFF	ON
17-18	200-V power supply	—	—



(a) HV-□□□AP4 (Std.)



(b) HV-□□□BP4 (IPM motor)

Fig. B.1 Main Circuit Contact Configuration

Mounting Direction

Use the diagram below to determine mounting direction.

Mounting	HV-75□P4	HV-150□P4, HV-200□P4
Possible		
Not possible		

B.4 AC Reactor

■ Specifications

Converter capacity	Reactor code	Time rating	Circuit voltage (V)	Frequency (Hz)	Rated current (A)	Inductance (mH)	Insulation class	Approx. mass (kg)
45 kW	X010199	100% continuous	230	50/60	150	0.07	B	34
37 kW	X010201	100% continuous	230	50/60	120	0.09	F	16
30 kW	X010205	100% continuous	230	50/60	92	0.1	H	12
22 kW	X010204	100% continuous	230	50/60	77	0.14	H	12
18.5 kW	X010203	100% continuous	230	50/60	63	0.17	H	8
15 kW	X010202	100% continuous	230	50/60	46	0.21	H	8
11 kW	X10217	100% continuous	230	50/60	32	0.28	F	6
7.5 kW	X10216	100% continuous	230	50/60	23	0.41	F	4
5.5 kW	X10215	100% continuous	230	50/60	16	0.56	F	3
3.7 kW	X10214	100% continuous	230	50/60	10	0.84	F	2.5

■ Dimensions

Converter capacity	Reactor code	Diagram No.	Dimensions (mm)														
			A (Max.)	B	B1 (Max.)	B2	C1	C2	D	E	F	I	J	K	L	M	H
3.7 kW	X10214	1	120	71	45	35.5	95±3	25	40	50	105	2.3	M6	—	7	M4	20
5.5 kW	X10215	1	135	88	55	44	105±5	25	50	70	130	3.2	M6	—	7	M4	22
7.5 kW	X10216	1	130	98	65	49	105±5	36	50	80	130	3.2	M6	—	7	M5	22
11 kW	X10217	1	160	105	70	52.5	125±5	36	75	85	160	2.3	M6	—	7	M5	25
15 kW	X010202	1	180	100	80	50	150±5	40	75	80	180	2.3	M6	10	7	M6	25
18.5 kW	X010203	1	180	100	85	50	150±5	45	75	80	180	2.3	M6	10	7	M6	25
22 kW	X010204	1	210	102	90	51	170±5	45	75	80	205	3.2	M6	12	7	M6	25
30 kW	X010205	1	210	102	95	51	170±5	47	75	80	205	3.2	M6	12	7	M8	25
37 kW	X010201	2	210	116	230	—	175±5	130	75	95	205	2.3	M6	—	—	M10	25
45 kW	X010199	2	245	156	275	—	206±5	120	150	140	240	3.2	M8	—	—	M10	25

Diagram 1 (Converter capacity: 3.7 kW to 30 kW)

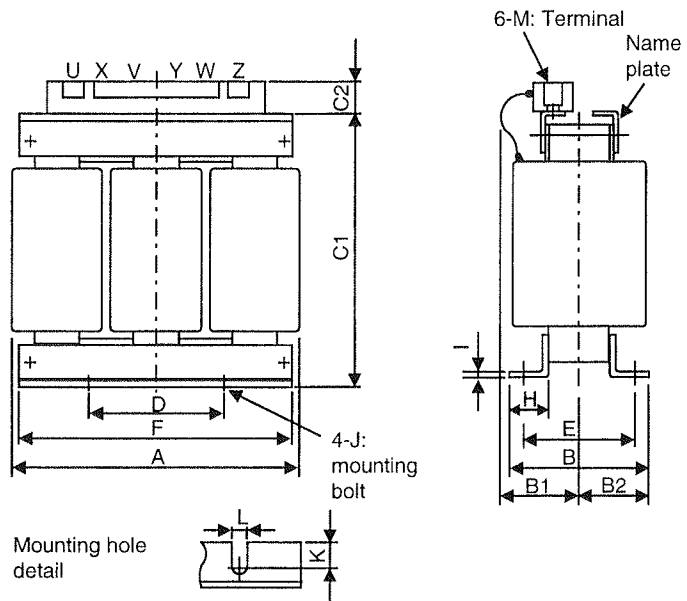
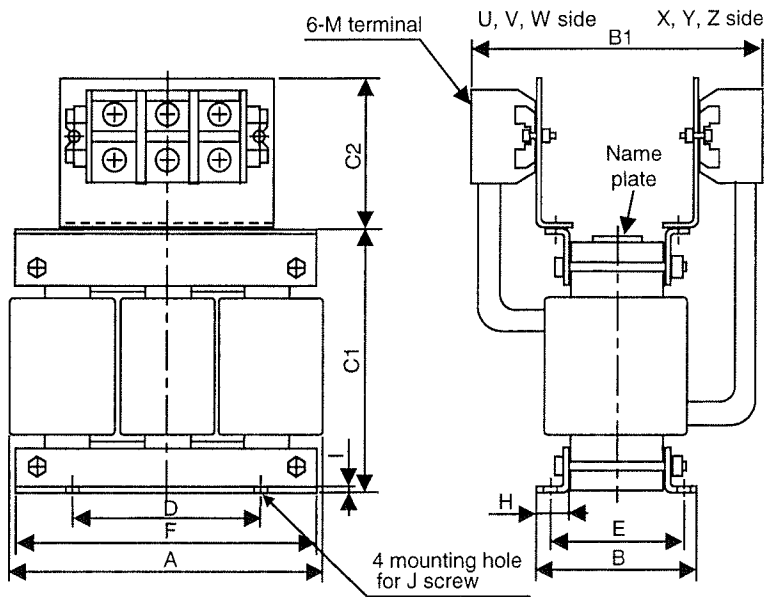
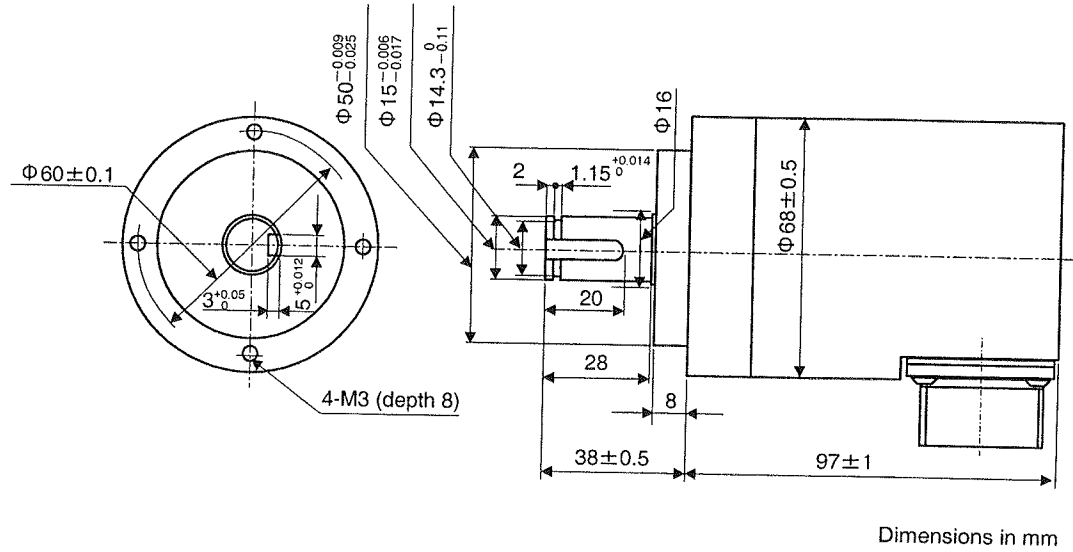


Diagram 2 (Converter capacity: 37 kW, 45 kW)

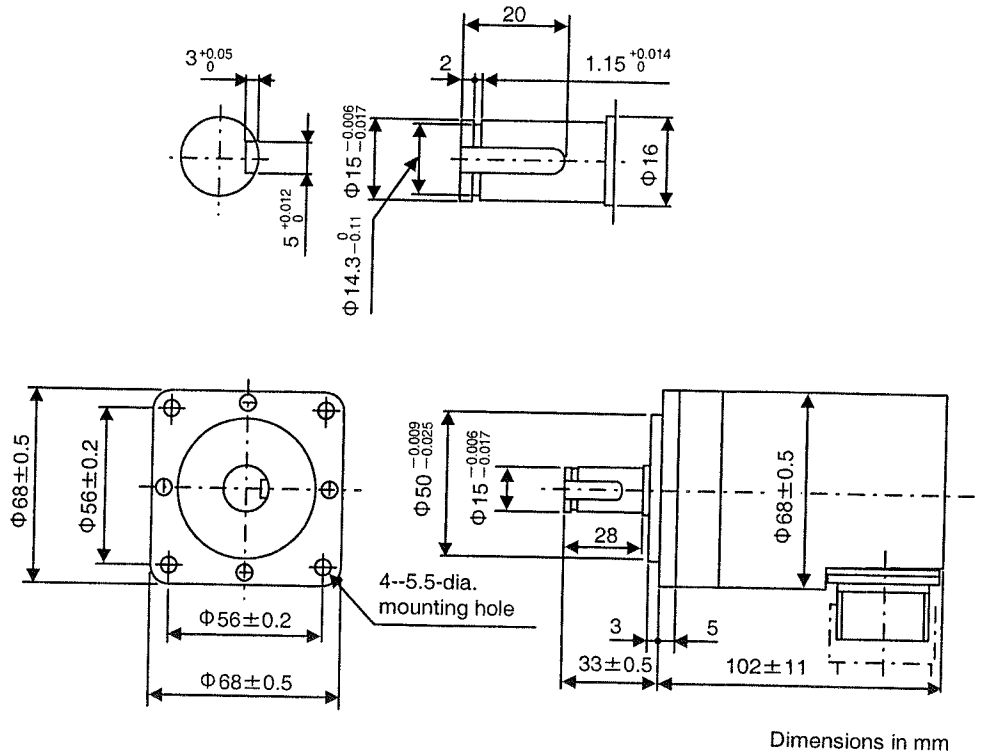


B.5 Pulse Generator for Spindle

■ NE-1024-2MD-11 (6000 min⁻¹)



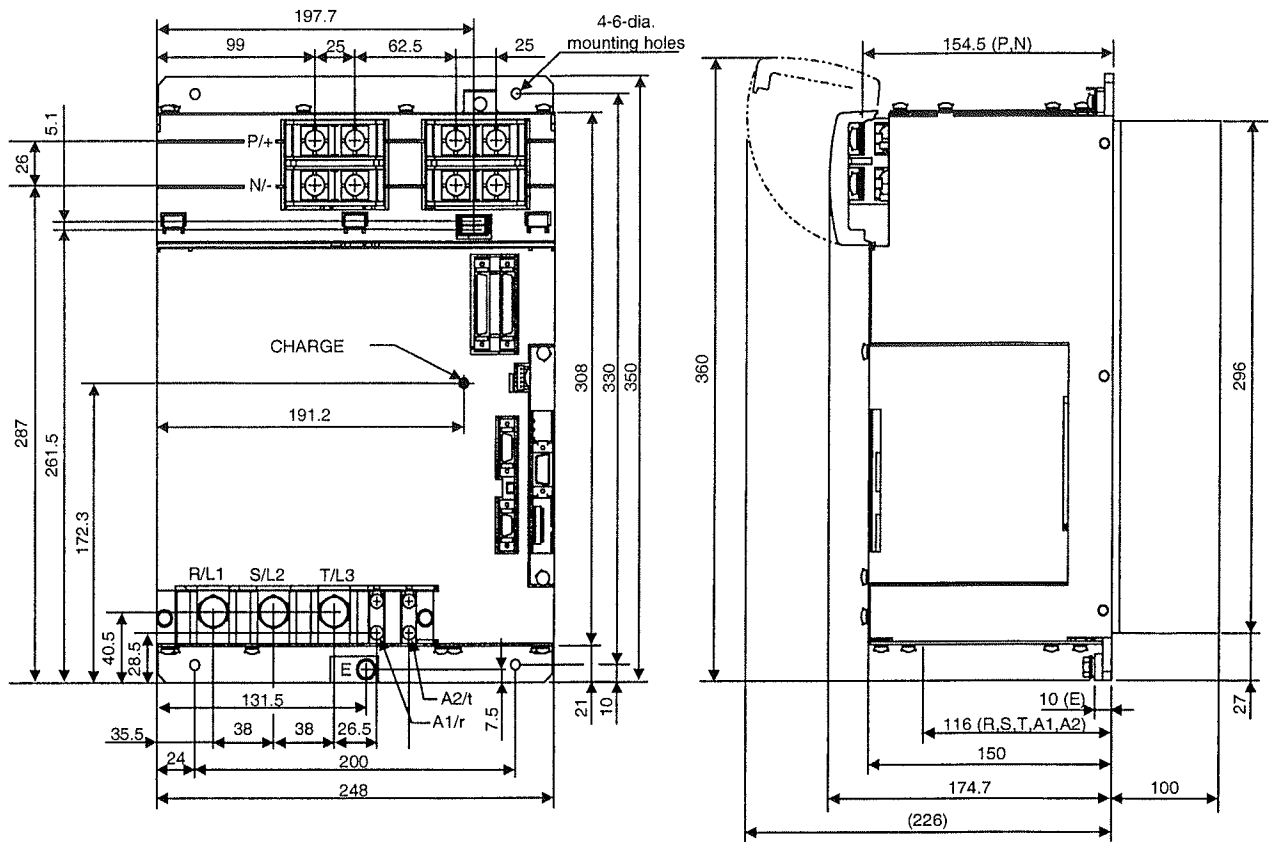
■ NE-1024-2MDF-068-11 (6000 min⁻¹) NE-1024-2MDF-068-12 (8000 min⁻¹)



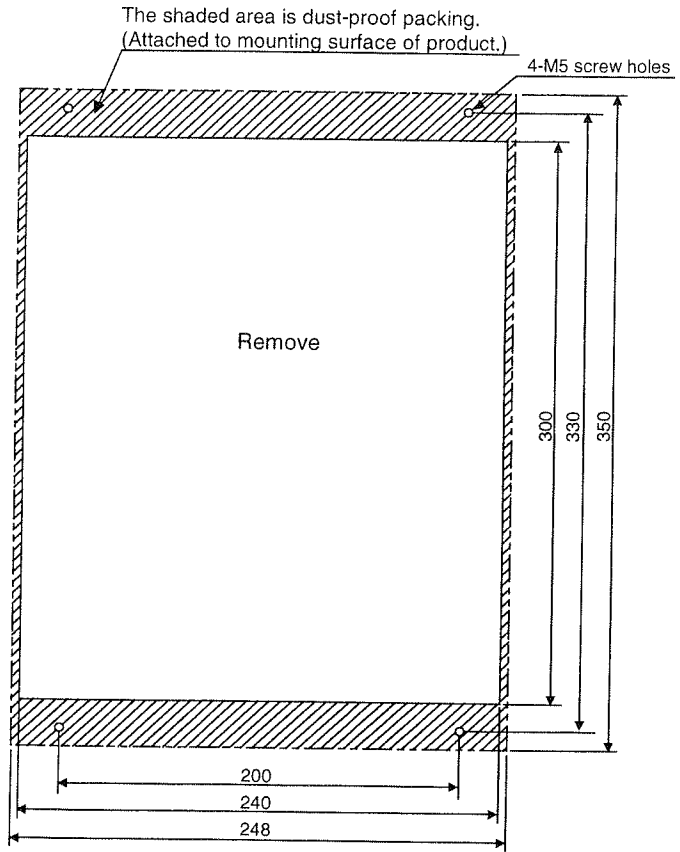
B.6 Converter

B.6.1 CIMR-MRXN2045, -MRXN2037 (45 kW, 37 kW)

■ Dimension Diagram

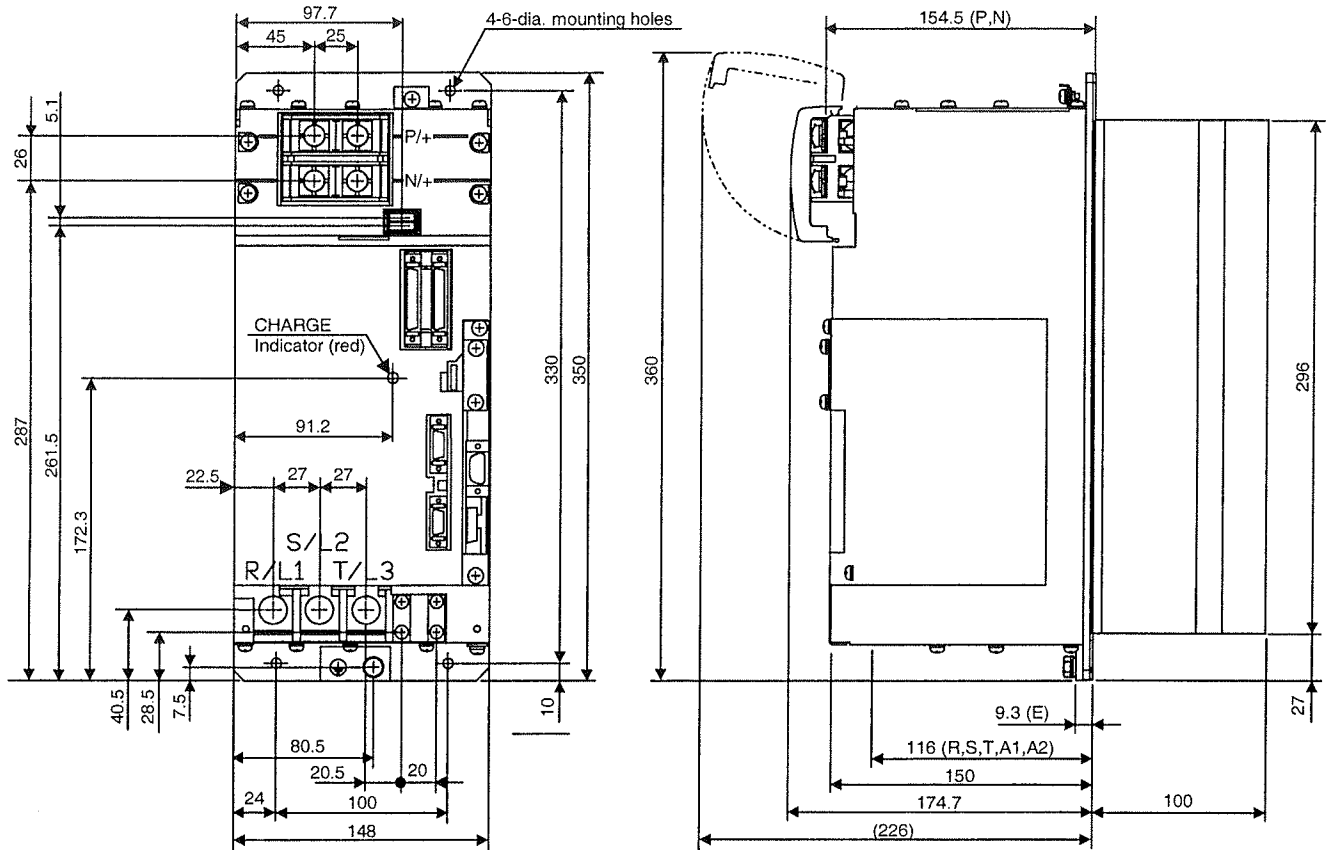


■ Panel-cut

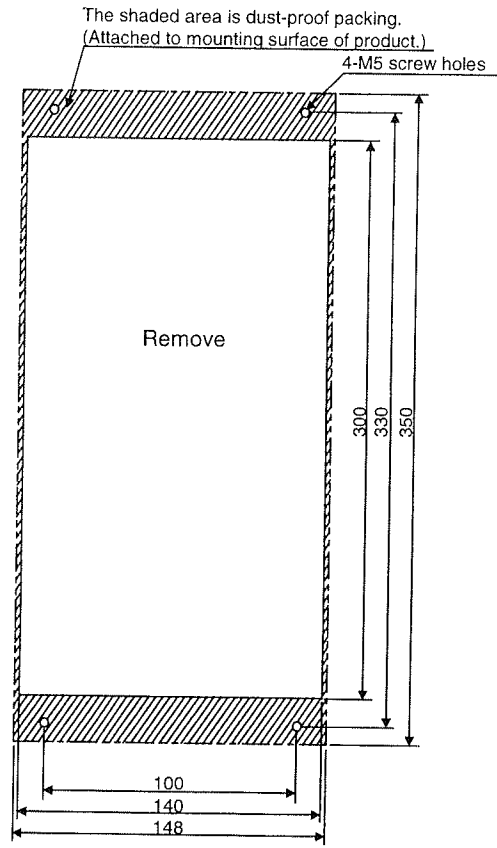


B.6.2 CIMR-MRXN2015, -MRXN2018, -MRXN2022, -MRXN2030 (15 kW to 30 kW)

■ Dimension Diagram

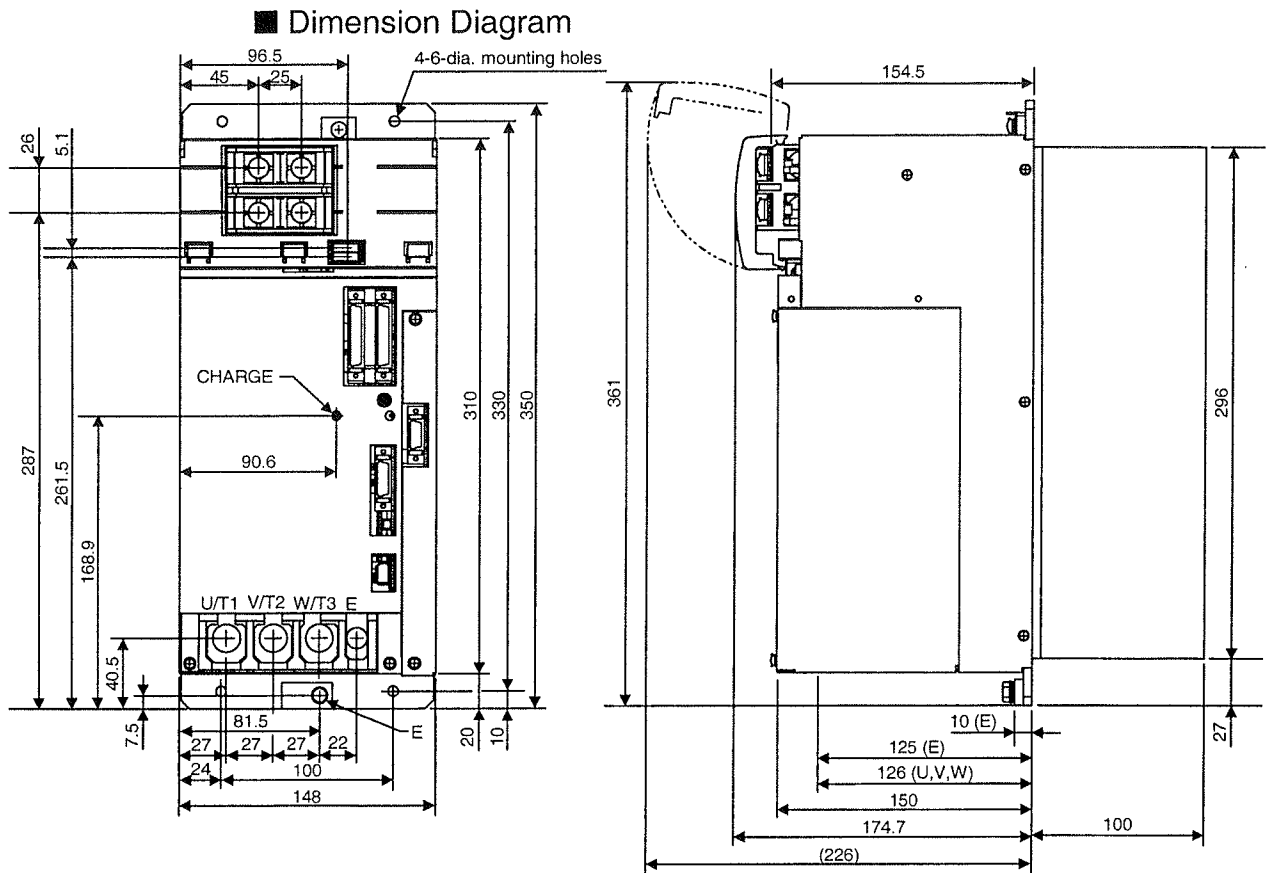


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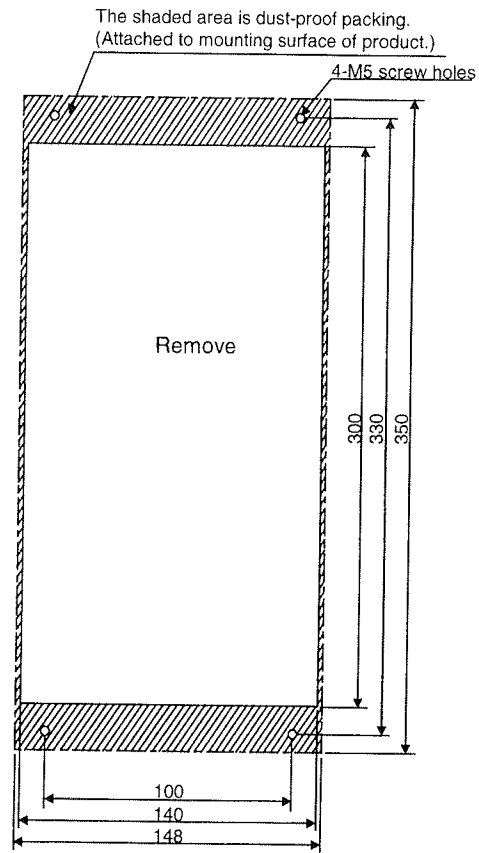


B.7 Inverter

B.7.1 CIMR-MXN2030, -MXN2015, -MXN2018, -MXN202 (15 kW to 30 kW)



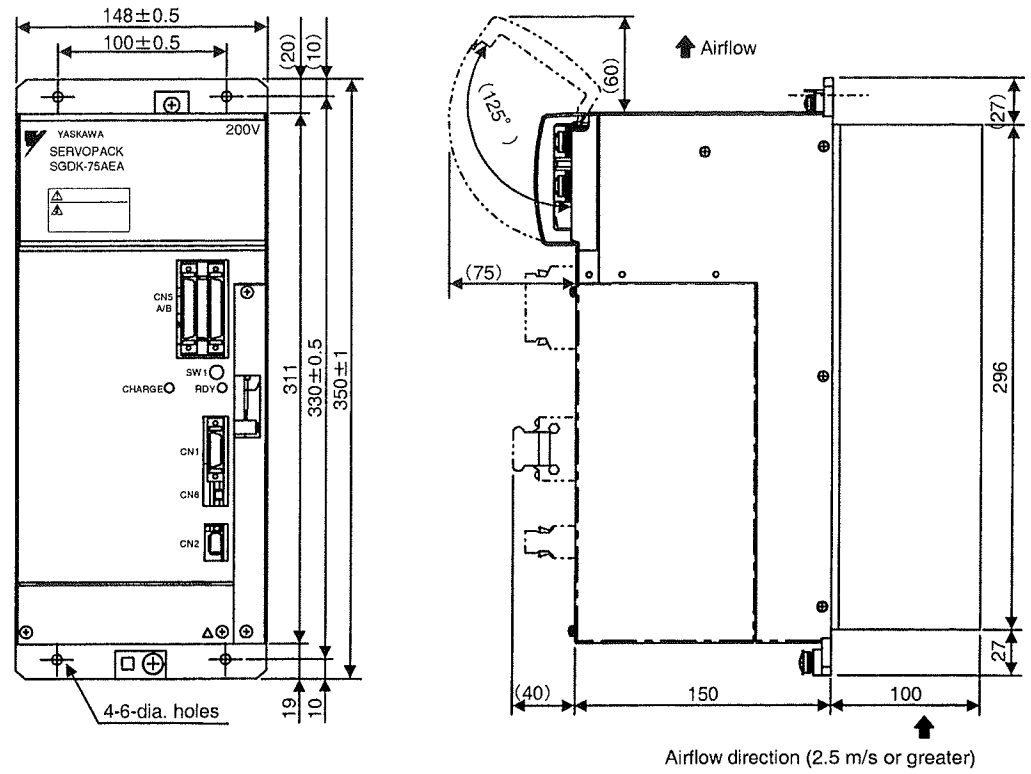
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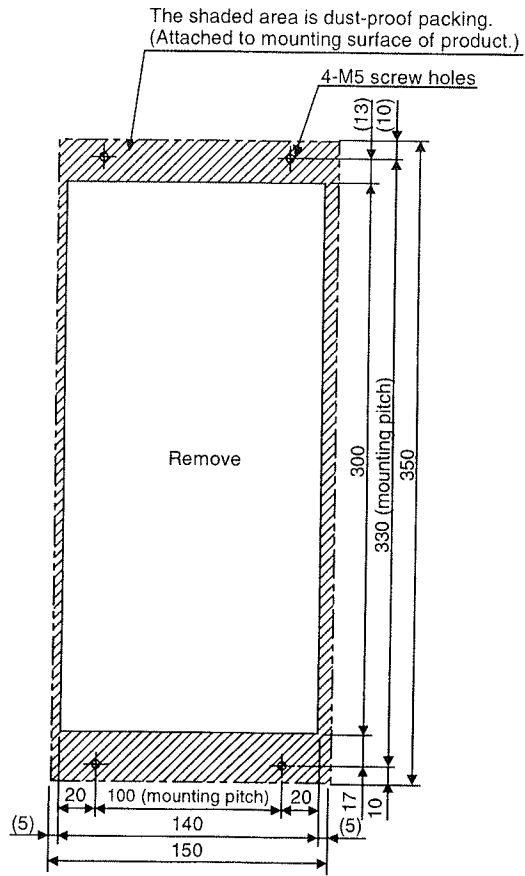
B.8 1-Axis Servo Unit

B.8.1 SGDK-75AEA, -60AEA (7.5 kW, 6.0 kW)

■ Dimension Diagram

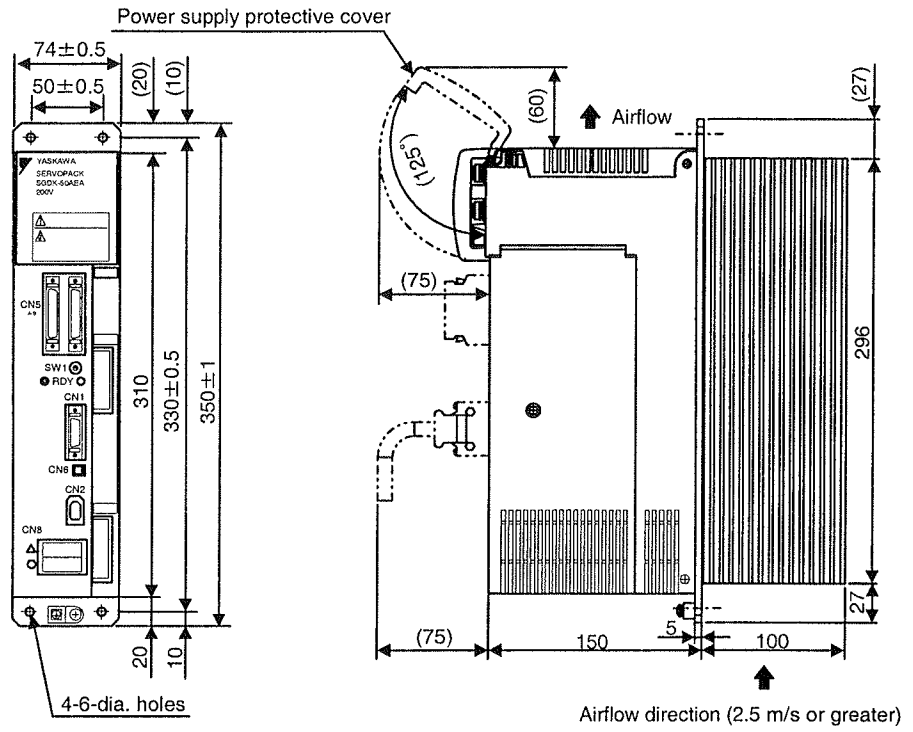


■ Panel-cut



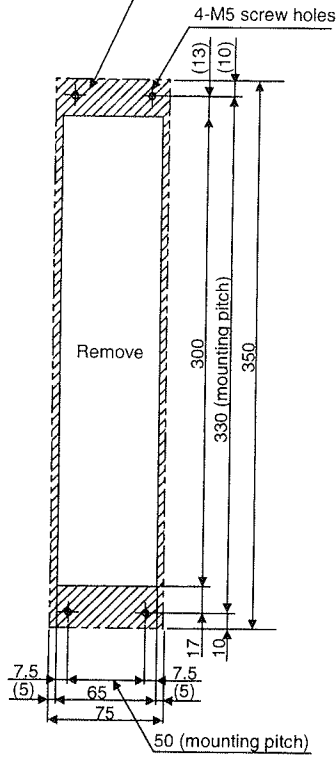
B.8.2 SGDK-50AEA (5 kW)

■ Dimension Diagram



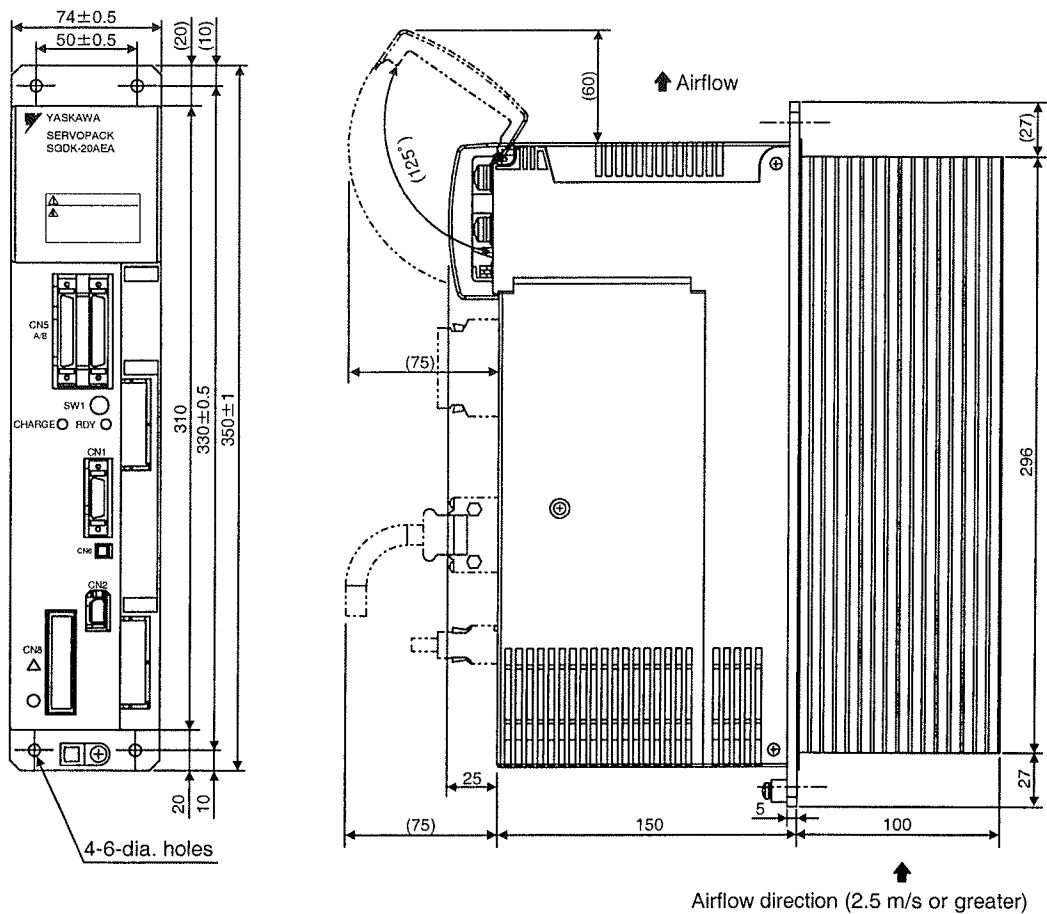
■ Panel-cut

The shaded area is dust-proof packing.
(Attached to mounting surface of product.)

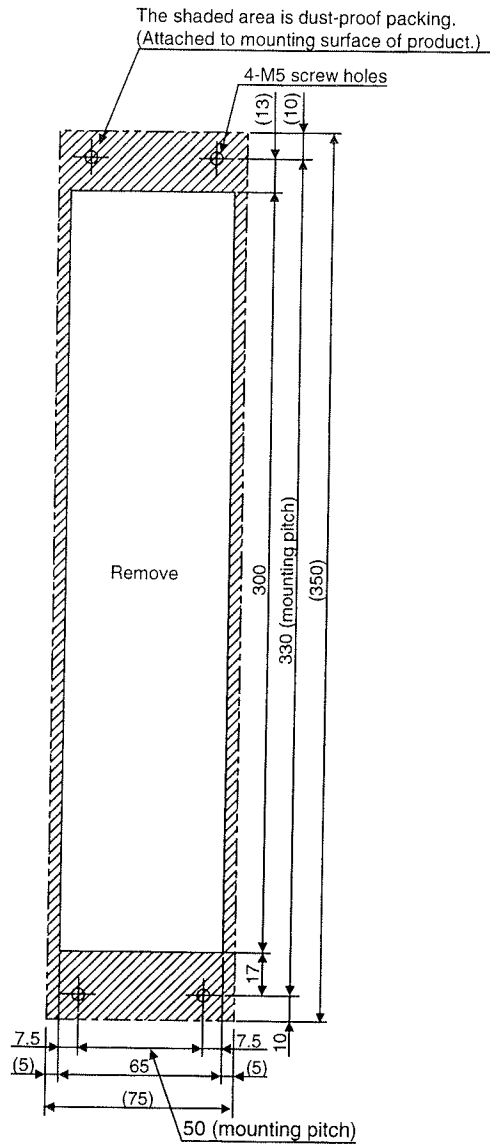


B.8.3 SGDK-30AEA, -20AEA, -15AEA, -10AEA, -05AEA
(3.0 kW to 0.5 kW)

■ Dimension Diagram



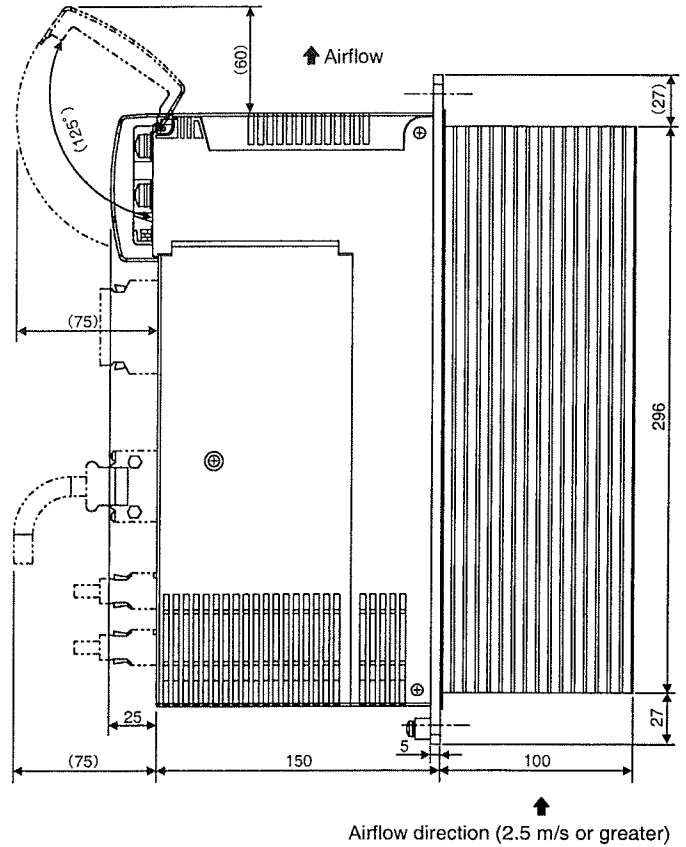
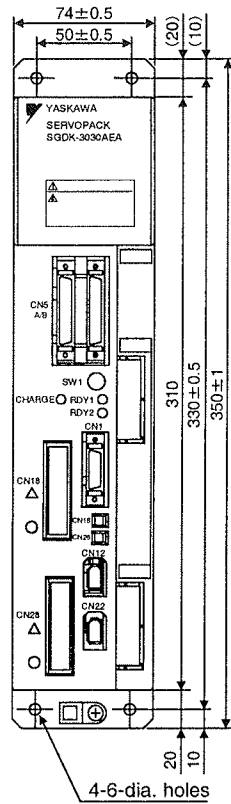
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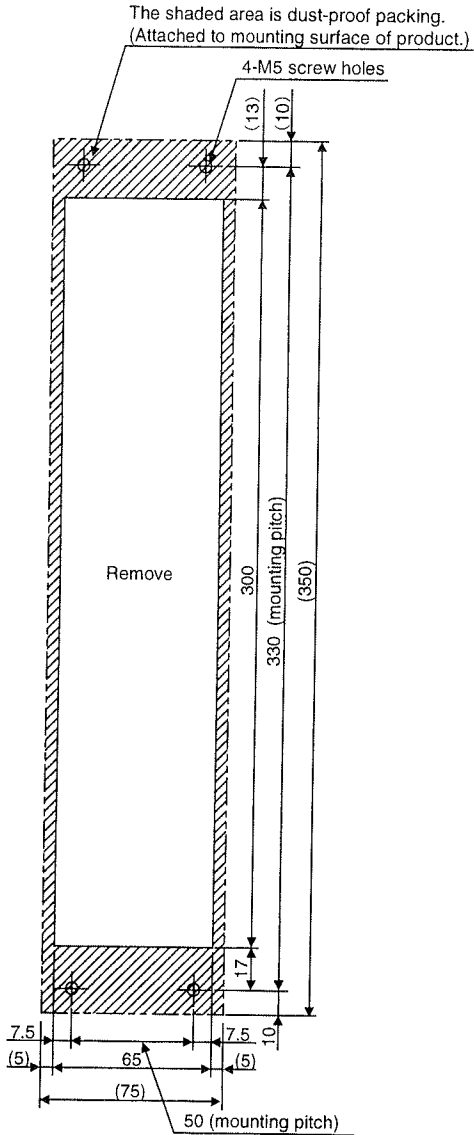
B.9 2-Axis Servo Unit

B.9.1 SGDK-3030AEA, -2020AEA, -1515AEA, -1010AEA, -0505AEA (3 kW, 2 kW, 1.5 kW, 1 kW, 0.5 kW)

■ Dimension Diagram



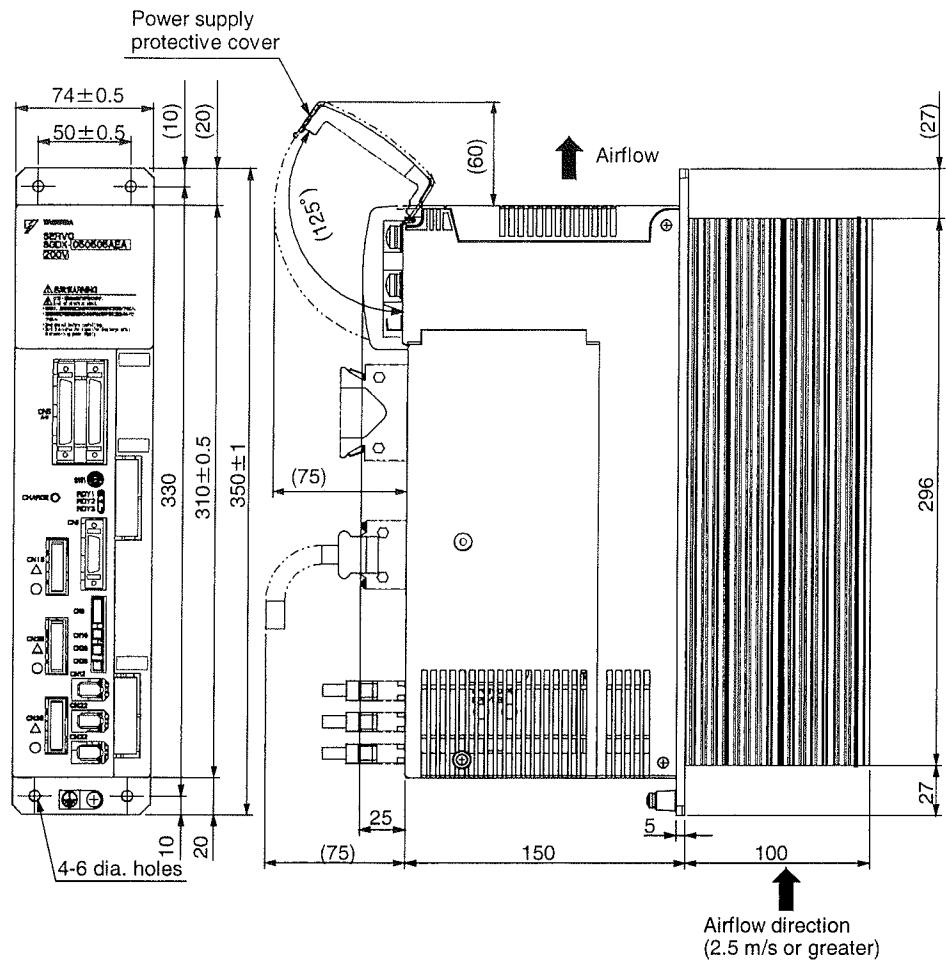
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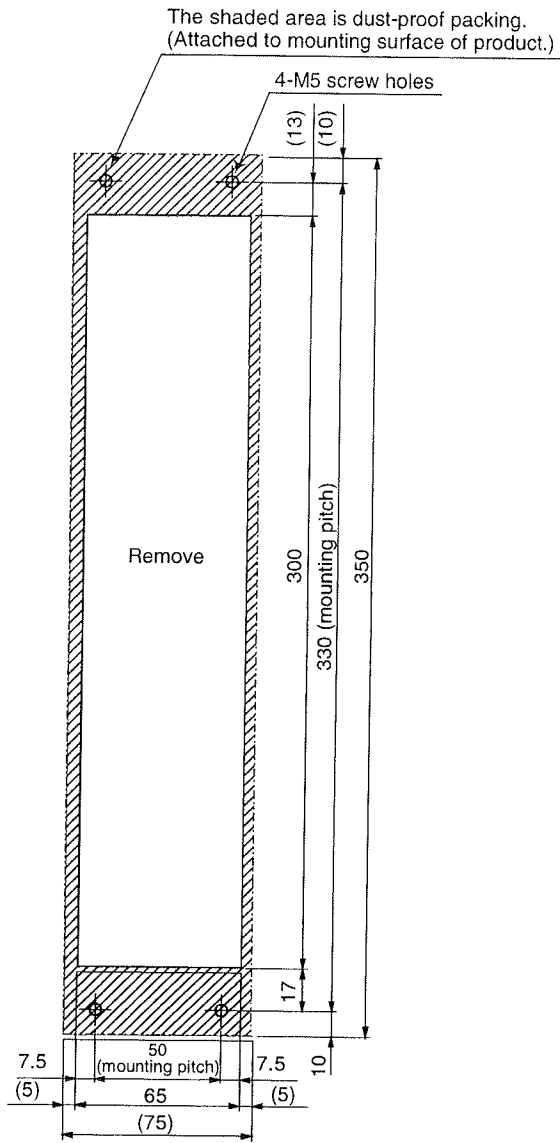
B.10 3-Axis Servo Unit

B.10.1 SGDK-101010AEA, -050505AEA (1 kW, 0.5 kW)

■ Dimension Diagram



■ Panel-cut



Drive Unit for Machine Tools

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Specifications are subject to change without notice for ongoing product modifications and improvements.

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