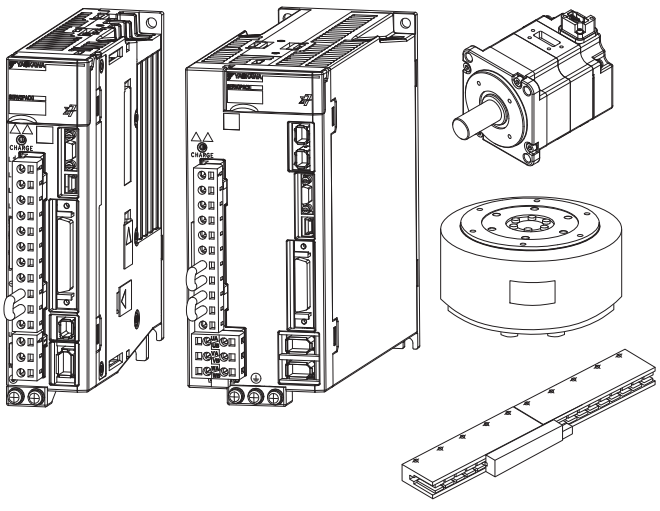
YASKAWA

Σ-7-Series AC Servo Drive
Peripheral Device
Selection Manual

SGD7S/SGD7W SERVOPACKs
SGM7J/SGM7A/SGM7P/SGM7G Rotary Servomotors
SGMCS/SGMCV Direct Drive Servomotors
SGLG/SGLF/SGLT/SGLC Linear Servomotors



MANUAL NO. SIEP S800001 32B

About this Manual

This manual provides information required to select cables, peripheral devices, and options for Σ-7-Series AC Servo Drives. It also describes the wiring materials that you can use to make your own cables.

Read and understand this manual to ensure correct usage of the Σ-7-Series AC Servo Drives.

Keep this manual in a safe place so that it can be referred to whenever necessary.

Outline of Manual

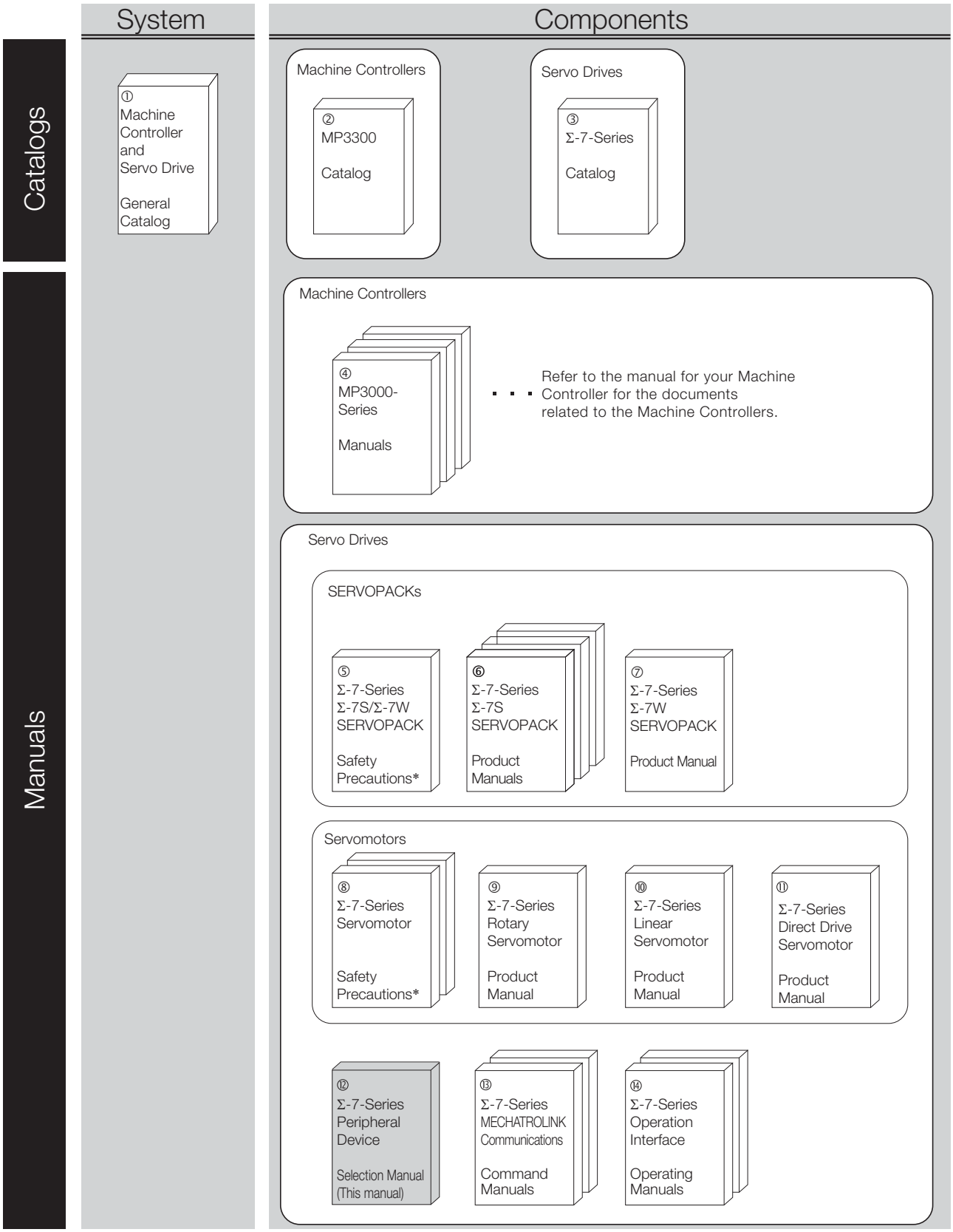
The contents of the chapters of this manual are described in the following table.

Refer to these chapters as required.

Chapter	Chapter Title	Contents
1	Peripheral Devices and System Configurations	This chapter provides system configuration diagrams of Servo Drives and peripheral devices. References are provided to detailed information.
2	Cables and User-Assembled Wiring Materials for SGM7J Rotary Servomotors	These chapters provide the following information. • Selection tables, specifications, and dimensional drawings for Servomotor Main Circuit Cables, Encoder Cables, and user-assembled wiring materials Note: References to detailed information are provided in the system configuration diagrams.
3	Cables and User-Assembled Wiring Materials for SGM7A Rotary Servomotors	
4	Cables and User-Assembled Wiring Materials for SGM7P Rotary Servomotors	
5	Cables and User-Assembled Wiring Materials for SGM7G Rotary Servomotors	
6	Cables and User-Assembled Wiring Materials for Direct Drive Servomotors	
7	Cables and User-Assembled Wiring Materials for Linear Servomotors	This chapter provides the following information. • Information on recommended Linear Encoders and connected system configurations • Selection tables, specifications, and dimensional drawings for Servomotor Main Circuit Cables, Linear Encoder Cables, Sensor Cables, and user-assembled wiring materials • Selection tables, specifications, and dimensional drawings for Serial Converter Units and Cables Note: References to detailed information are provided in the system configuration diagrams.
8	Cables and User-Assembled Wiring Materials for SERVOPACKs	This chapter provides selection tables, specifications, and dimensional drawings for SERVOPACK cables.
9	Option Modules	This chapter provides the specifications and dimensional drawings of Option Modules.
10	SERVOPACK Peripheral Devices	This chapter provides selection tables, specifications, and dimensional drawings for SERVOPACK peripheral devices.
11	Software	This chapter provides information on the SigmaWin+, Yaskawa's AC Servo Drive Engineering Tool.
12	Other Peripheral Devices and Options	This chapter provides information on surge absorbers and diodes for holding brake power supplies. It also provides information on the battery required to use an absolute encoder. And it provides information on the compatibility of cables for Σ-V-Series Servomotors and information on metal connectors.

Related Documents

The relationships between the documents that are related to the Servo Drives are shown in the following figure. The numbers in the figure correspond to the numbers in the table on the following pages. Refer to these documents as required.



* These documents are included with the product.

Classification	Document Name	Document No.	Description
① Machine Controller and Servo Drive General Catalog	Machine Controller and AC Servo Drive Solutions Catalog	KAEP S800001 22	Describes the features and applications of combinations of the MP3000 Machine Controllers and Σ-7-Series AC Servo Drives.
② MP3300 Catalog	Machine Controller MP3300	KAEP C880725 03	Provides detailed information on MP3300 Machine Controllers, including features and specifications.
③ Σ-7-Series Catalog	AC Servo Drives Σ-7 Series	KAEP S800001 23	Provides detailed information on Σ-7-Series AC Servo Drives, including features and specifications.
④ MP3000-Series Manuals	Machine Controller MP3000 Series MP3300 Product Manual	SIEP C880725 21	Describes the functions, specifications, operating methods, maintenance, inspections, and troubleshooting of the MP3000-series MP3300 Machine Controllers.
⑤ Σ-7-Series Σ-7S/Σ-7W SERVOPACK Safety Precautions	Σ-7-Series AC Servo Drive Σ-7S and Σ-7W SERVOPACK Safety Precautions	TOMP C710828 00	Provides detailed information for the safe usage of Σ-7-Series SERVOPACKs.
⑥ Σ-7-Series Σ-7S SERVOPACK Product Manuals	Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual	SIEP S800001 28	Provide detailed information on selecting Σ-7-Series SERVOPACKs and information on installing, connecting, setting, performing trial operation for, tuning, and monitoring the Servo Drives.
	Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with MECHATROLINK-II Communications References Product Manual	SIEP S800001 27	
	Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual	SIEP S800001 26	
⑦ Σ-7-Series Σ-7W SERVOPACK Product Manual	Σ-7-Series AC Servo Drive Σ-7W SERVOPACK with MECHATROLINK-III Communications References Product Manual	SIEP S800001 29	
⑧ Σ-7-Series Servomotor Safety Precautions	AC Servo Drive Rotary Servomotor Safety Precautions	TOBP C230260 00	Provides detailed information for the safe usage of Σ-7-Series Rotary Servomotors and Direct Drive Servomotors.
	AC Servomotor Linear Σ Series Safety Precautions	TOBP C230800 00	Provides detailed information for the safe usage of Σ-7-Series Linear Servomotors.

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Classification	Document Name	Document No.	Description
⑨ Σ-7-Series Rotary Servomotor Product Manual	Σ-7-Series AC Servo Drive Rotary Servomotor Product Manual	SIEP S800001 36	Provide detailed information on selecting, installing, and connecting the Σ-7-Series Servomotors.
⑩ Σ-7-Series Linear Servomotor Product Manual	Σ-7-Series AC Servo Drive Linear Servomotor Product Manual	SIEP S800001 37	
⑪ Σ-7-Series Direct Drive Servomotor Product Manual	Σ-7-Series AC Servo Drive Direct Drive Servomotor Product Manual	SIEP S800001 38	
⑫ Σ-7-Series Peripheral Device Selection Manual	Σ-7-Series AC Servo Drive Peripheral Device Selection Manual	This manual (SIEP S800001 32)	Describes the peripheral devices for a Σ-7-Series Servo System.
⑬ Σ-7-Series MECHATROLINK Communications Command Manuals	Σ-7-Series AC Servo Drive MECHATROLINK-II Communications Command Manual	SIEP S800001 30	Provides detailed information on the MECHATROLINK-II communications commands that are used for a Σ-7-Series Servo System.
	Σ-7-Series AC Servo Drive MECHATROLINK-III Communications Standard Servo Profile Command Manual	SIEP S800001 31	Provides detailed information on the MECHATROLINK-III communications standard servo profile commands that are used for a Σ-7-Series Servo System.
⑭ Σ-7-Series Operation Interface Operating Manuals	Σ-7-Series AC Servo Drive Digital Operator Operating Manual	SIEP S800001 33	Describes the operating procedures for a Digital Operator for a Σ-7-Series Servo System.
	AC Servo Drives Engineering Tool SigmaWin+ Online Manual Σ-7 Component	SIEP S800001 48	Provides detailed operating procedures for the SigmaWin+ Engineering Tool for a Σ-7-Series Servo System.

Using This Manual

◆ Technical Terms Used in This Manual

The following terms are used in this manual.

Term	Meaning
Servomotor	A Σ-7-Series Rotary Servomotor, Direct Drive Servomotor, or Linear Servomotor.
Rotary Servomotor	A Σ-7-Series Rotary Servomotor (SGM7J, SGM7A, SGM7P, or SGM7G).
Direct Drive Servomotor	A Direct Drive Servomotor (SGMCS or SGMCV).
Linear Servomotor	A Σ-7-Series Linear Servomotor (SGLG, SGLF, SGLT, or SGLC).
SERVOPACK	A Σ-7-Series amplifier
Servo Drive	The combination of a Servomotor and SERVOPACK.
Servo System	A servo control system that includes the combination of a Servo Drive with a host controller and peripheral devices.
Main Circuit Cable	One of the cables that connect to the main circuit terminals, including the Main Circuit Power Supply Cable, Control Power Supply Cable, and Servomotor Main Circuit Cable.
SigmaWin+	The Engineering Tool for setting up and tuning Servo Drives or a computer in which the Engineering Tool is installed.

◆ Trademarks

- MECHATROLINK is a trademark of the MECHATROLINK Members Association.
- Other product names and company names are the trademarks or registered trademarks of the respective company. “TM” and the ® mark do not appear with product or company names in this manual.

◆ Visual Aids

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

Indicates precautions or restrictions that must be observed.
Also indicates alarm displays and other precautions that will not result in machine damage.

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

Example Indicates operating or setting examples.

Information Indicates supplemental information to deepen understanding or useful information.

Safety Precautions

◆ Safety Information

To prevent personal injury and equipment damage in advance, the following signal words are used to indicate safety precautions in this document. The signal words are used to classify the hazards and the degree of damage or injury that may occur if a product is used incorrectly. Information marked as shown below is important for safety. Always read this information and heed the precautions that are provided.

⚠ DANGER

- Indicates precautions that, if not heeded, are likely to result in loss of life, serious injury, or fire.

⚠ WARNING

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

⚠ CAUTION

- Indicates precautions that, if not heeded, could result in relatively serious or minor injury, or in fire.

NOTICE

- Indicates precautions that, if not heeded, could result in property damage.

◆ Safety Precautions That Must Always Be Observed

■ General Precautions

⚠ DANGER

- Read and understand this manual to ensure the safe usage of the product.
- Keep this manual in a safe, convenient place so that it can be referred to whenever necessary. Make sure that it is delivered to the final user of the product.
- Do not remove covers, cables, connectors, or optional devices while power is being supplied to the SERVOPACK.
  There is a risk of electric shock, operational failure of the product, or burning.

⚠ WARNING

- Use a power supply with specifications (number of phases, voltage, frequency, and AC/DC type) that are appropriate for the product.
  There is a risk of burning, electric shock, or fire.

NOTICE

- In locations with poor power supply conditions, install the necessary protective devices (such as AC reactors) to ensure that the input power is supplied within the specified voltage range.
  There is a risk of damage to the SERVOPACK.
- Use a Noise Filter to minimize the effects of electromagnetic interference.
  Electronic devices used near the SERVOPACK may be affected by electromagnetic interference.
- Always install a surge absorber as a protective device between the brake power supply and Servomotor.
  There is a risk of damage to the Servomotor.

■ Wiring Precautions

⚠ DANGER

- Do not change any wiring while power is being supplied.
  There is a risk of electric shock or injury.

⚠ WARNING

- Wiring and inspections must be performed only by qualified engineers.
  There is a risk of electric shock or product failure.
- Check all wiring and power supplies carefully.
  Incorrect wiring or incorrect voltage application to the output circuits may cause short-circuit failures. If a short-circuit failure occurs as a result of any of these causes, the holding brake will not work. This could damage the machine or cause an accident that may result in death or injury.
- Connect the AC and DC power supplies to the specified SERVOPACK terminals.
  - Connect an AC power supply to the L1, L2, and L3 terminals and the L1C and L2C terminals on the SERVOPACK.
  - Connect a DC power supply to the B1/⊕ and ⊖2 terminals and the L1C and L2C terminals on the SERVOPACK.

  There is a risk of failure or fire.

⚠ CAUTION

- Wait for six minutes after turning OFF the power supply and then make sure that the CHARGE indicator is not lit before starting wiring or inspection work. Do not touch the power supply terminals while the CHARGE lamp is lit after turning OFF the power supply because high voltage may still remain in the SERVOPACK.
  There is a risk of electric shock.
- Observe the precautions and instructions for wiring and trial operation precisely as described in this document.
  Failures caused by incorrect wiring or incorrect voltage application in the brake circuit may cause the SERVOPACK to fail, damage the equipment, or cause an accident resulting in death or injury.
- Check the wiring to be sure it has been performed correctly.
  Connectors and pin layouts are sometimes different for different models. Always confirm the pin layouts in technical documents for your model before operation.
  There is a risk of failure or malfunction.
- Connect wires to power supply terminals and motor connection terminals securely with the specified methods and tightening torque.
  Insufficient tightening may cause wires and terminal blocks to generate heat due to faulty contact, possibly resulting in fire.
- Use shielded twisted-pair cables or screened unshielded multi-twisted-pair cables for I/O Signal Cables and Encoder Cables.
- Observe the following precautions when wiring the SERVOPACK's main circuit terminals.
  - Turn ON the power supply to the SERVOPACK only after all wiring, including the main circuit terminals, has been completed.
  - If a connector is used for the main circuit terminals, remove the main circuit connector from the SERVOPACK before you wire it.
  - Insert only one wire per insertion hole in the main circuit terminals.
  - When you insert a wire, make sure that the conductor wire (e.g., whiskers) does not come into contact with adjacent wires.
- Install molded-case circuit breakers and other safety measures to provide protection against short circuits in external wiring.
  There is a risk of fire or failure.

NOTICE

- Whenever possible, use the Cables specified by Yaskawa.
  If you use any other cables, confirm the rated current and application environment of your model and use the wiring materials specified by Yaskawa or equivalent materials.
- Securely tighten cable connector screws and lock mechanisms.
  Insufficient tightening may result in cable connectors falling off during operation.
- Do not bundle power lines (e.g., the Main Circuit Cable) and low-current lines (e.g., the I/O Signal Cables or Encoder Cables) together or run them through the same duct. If you do not place power lines and low-current lines in separate ducts, separate them by at least 30 cm.
  If the cables are too close to each other, malfunctions may occur due to noise affecting the low-current lines.
- Install a battery at either the host controller or on the Encoder Cable.
  If you install batteries both at the host controller and on the Encoder Cable at the same time, you will create a loop circuit between the batteries, resulting in a risk of damage or burning.
- When connecting a battery, connect the polarity correctly.
  There is a risk of battery rupture or encoder failure.

■ Disposal Precautions

- When disposing of the product, treat it as ordinary industrial waste. However, local ordinances and national laws must be observed. Implement all labeling and warnings as a final product as required.

■ General Precautions

- Figures provided in this document are typical examples or conceptual representations. There may be differences between them and actual wiring, circuits, and products.
- The products shown in illustrations in this document are sometimes shown without covers or protective guards. Always replace all covers and protective guards before you use the product.
- If you need a new copy of this document because it has been lost or damaged, contact your nearest Yaskawa representative or one of the offices listed on the back of this document.
- This document is subject to change without notice for product improvements, specifications changes, and improvements to the manual itself.
  We will update the document number of the document and issue revisions when changes are made.
- Any and all quality guarantees provided by Yaskawa are null and void if the customer modifies the product in any way. Yaskawa disavows any responsibility for damages or losses that are caused by modified products.

Warranty

◆ Details of Warranty

■ Warranty Period

The warranty period for a product that was purchased (hereinafter called the “delivered product”) is one year from the time of delivery to the location specified by the customer or 18 months from the time of shipment from the Yaskawa factory, whichever is sooner.

■ Warranty Scope

Yaskawa shall replace or repair a defective product free of charge if a defect attributable to Yaskawa occurs during the above warranty period.
This warranty does not cover defects caused by the delivered product reaching the end of its service life and replacement of parts that require replacement or that have a limited service life.

This warranty does not cover failures that result from any of the following causes.

- Improper handling, abuse, or use in unsuitable conditions or in environments not described in product catalogs or manuals, or in any separately agreed-upon specifications
- Causes not attributable to the delivered product itself
- Modifications or repairs not performed by Yaskawa
- Use of the delivered product in a manner in which it was not originally intended
- Causes that were not foreseeable with the scientific and technological understanding at the time of shipment from Yaskawa
- Events for which Yaskawa is not responsible, such as natural or human-made disasters

◆ Limitations of Liability

- Yaskawa shall in no event be responsible for any damage or loss of opportunity to the customer that arises due to failure of the delivered product.
- Yaskawa shall not be responsible for any programs (including parameter settings) or the results of program execution of the programs provided by the user or by a third party for use with programmable Yaskawa products.
- The information described in product catalogs or manuals is provided for the purpose of the customer purchasing the appropriate product for the intended application. The use thereof does not guarantee that there are no infringements of intellectual property rights or other proprietary rights of Yaskawa or third parties, nor does it construe a license.
- Yaskawa shall not be responsible for any damage arising from infringements of intellectual property rights or other proprietary rights of third parties as a result of using the information described in catalogs or manuals.

◆ Suitability for Use

- It is the customer's responsibility to confirm conformity with any standards, codes, or regulations that apply if the Yaskawa product is used in combination with any other products.
- The customer must confirm that the Yaskawa product is suitable for the systems, machines, and equipment used by the customer.
- Consult with Yaskawa to determine whether use in the following applications is acceptable. If use in the application is acceptable, use the product with extra allowance in ratings and specifications, and provide safety measures to minimize hazards in the event of failure.
  - Outdoor use, use involving potential chemical contamination or electrical interference, or use in conditions or environments not described in product catalogs or manuals
  - Nuclear energy control systems, combustion systems, railroad systems, aviation systems, vehicle systems, medical equipment, amusement machines, and installations subject to separate industry or government regulations
  - Systems, machines, and equipment that may present a risk to life or property
  - Systems that require a high degree of reliability, such as systems that supply gas, water, or electricity, or systems that operate continuously 24 hours a day
  - Other systems that require a similar high degree of safety
- Never use the product for an application involving serious risk to life or property without first ensuring that the system is designed to secure the required level of safety with risk warnings and redundancy, and that the Yaskawa product is properly rated and installed.
- The circuit examples and other application examples described in product catalogs and manuals are for reference. Check the functionality and safety of the actual devices and equipment to be used before using the product.
- Read and understand all use prohibitions and precautions, and operate the Yaskawa product correctly to prevent accidental harm to third parties.

◆ Specifications Change

The names, specifications, appearance, and accessories of products in product catalogs and manuals may be changed at any time based on improvements and other reasons. The next editions of the revised catalogs or manuals will be published with updated code numbers. Consult with your Yaskawa representative to confirm the actual specifications before purchasing a product.

Contents

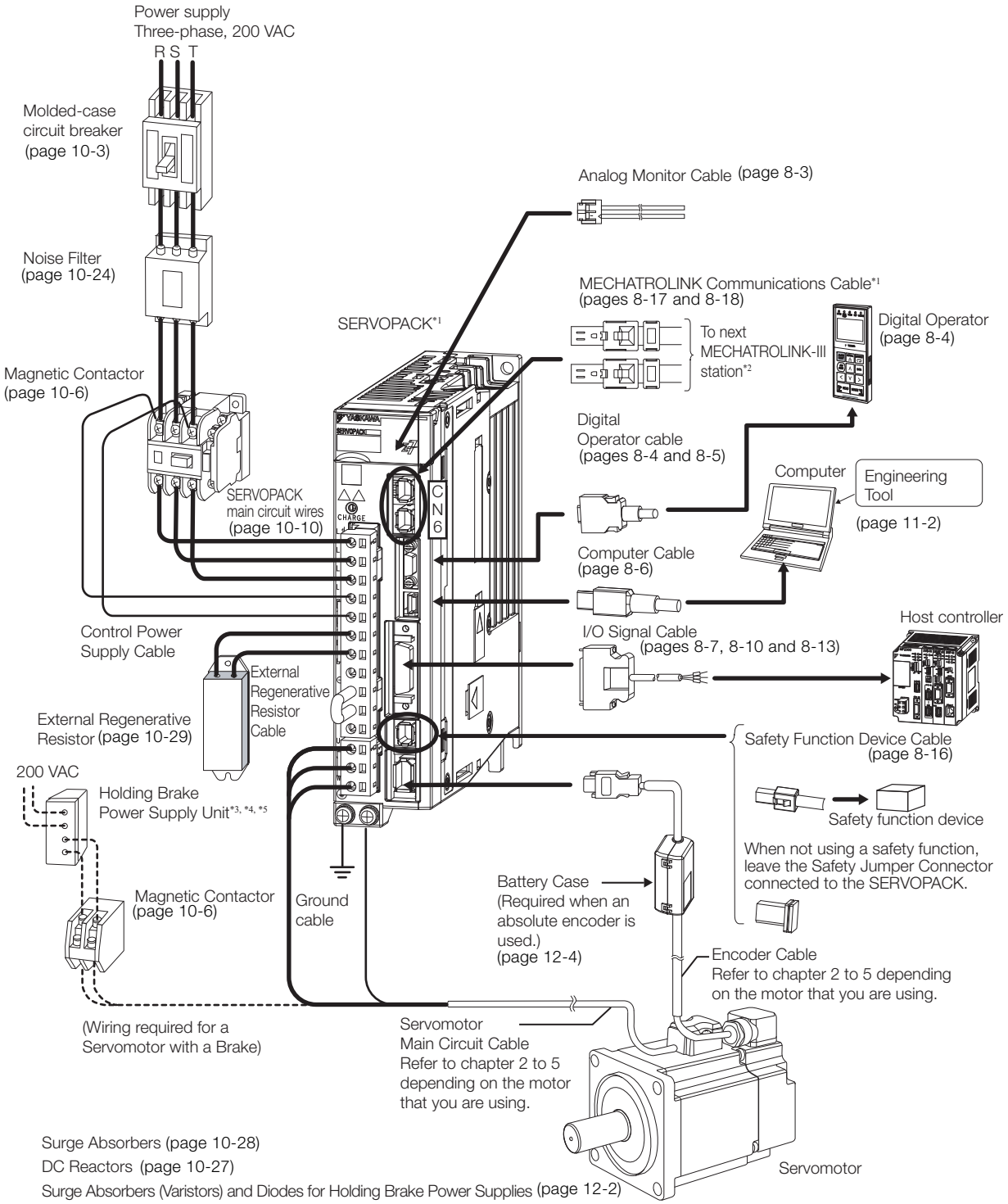
3 Cables and User-Assembled Wiring Materials for SGM7A Rotary Servomotors

4 Cables and User-Assembled Wiring Materials for SGM7P Rotary Servomotors

Peripheral Devices and System Configurations

1

1.1 Configuration with a Rotary Servomotor



*1. The peripheral devices are described using a MECHATROLINK-III Communications Reference SERVOPACK as an example. The shapes of the connectors may be different for other interfaces.

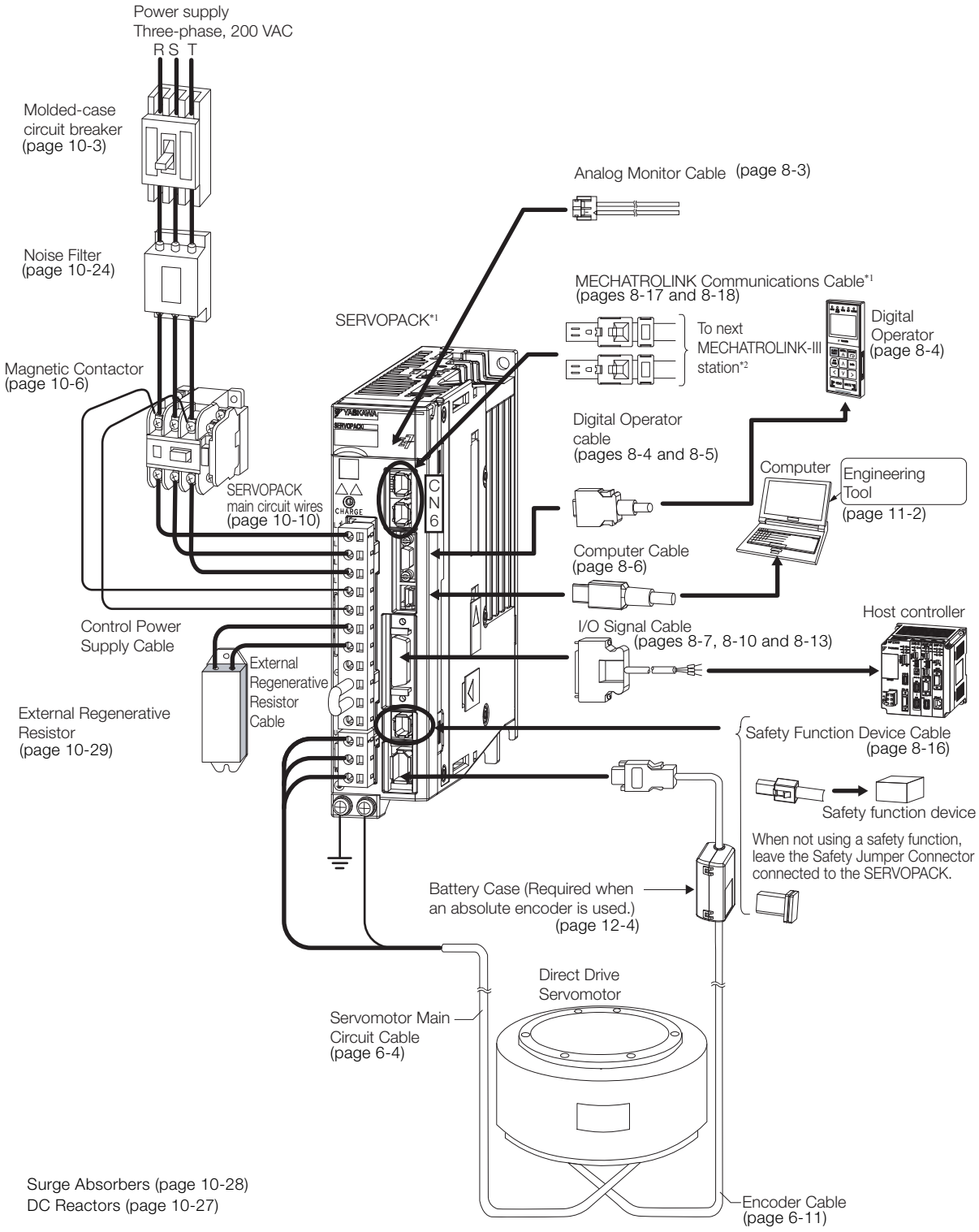
*2. The connected devices depend on the interface.
For MECHATROLINK-II communications references: Other MECHATROLINK-II stations
For analog voltage/pulse train references: There is no CN6 connector.

*3. A Holding Brake Power Supply Unit is required to use a Servomotor with a Holding Brake. Holding Brake Power Supply Units for 24 VDC are not provided by Yaskawa. Obtain these from other manufacturers.
Never connect Holding Brake Power Supply Units with different output voltages to a SERVOPACK. Overcurrent may result in burning in the brake.

*4. If you use a Servomotor with a Holding Brake, select a brake relay according to the power supply voltage and current of the brake. Yaskawa does not recommend any particular brake relays. Select an appropriate brake relay using the selection method of the brake relay manufacturer.

*5. The power supply for the holding brake is not provided by Yaskawa. Select a power supply based on the holding brake specifications. If you use a 24-V brake, install a separate power supply for the 24-VDC power supply from other power supplies, such as the one for the I/O signals of the CN1 connector. If the power supply is shared, the I/O signals may malfunction.

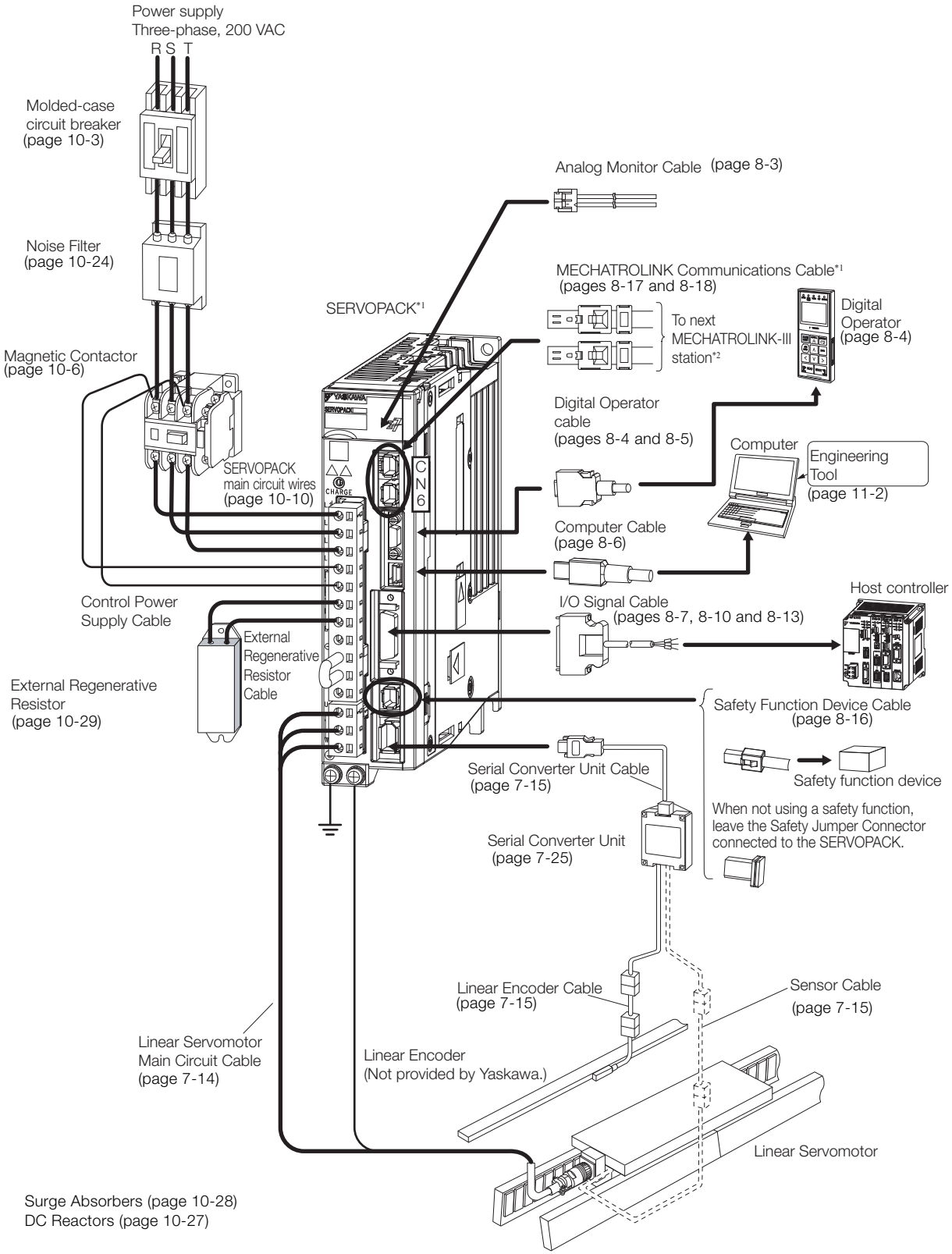
1.2 Configuration with a Direct Drive Servomotor



*1. The peripheral devices are described using a MECHATROLINK-III Communications Reference SERVOPACK as an example. The shapes of the connectors may be different for other interfaces.

*2. The connected devices depend on the interface.
For MECHATROLINK-II communications references: Other MECHATROLINK-II stations
For analog voltage/pulse train references: There is no CN6 connector.

1.3 Configuration with a Linear Servomotor



*1. The peripheral devices are described using a MECHATROLINK-III Communications Reference SERVOPACK as an example. The shapes of the connectors may be different for other interfaces.

*2. The connected devices depend on the interface.
For MECHATROLINK-II communications references: Other MECHATROLINK-II stations
For analog voltage/pulse train references: There is no CN6 connector.

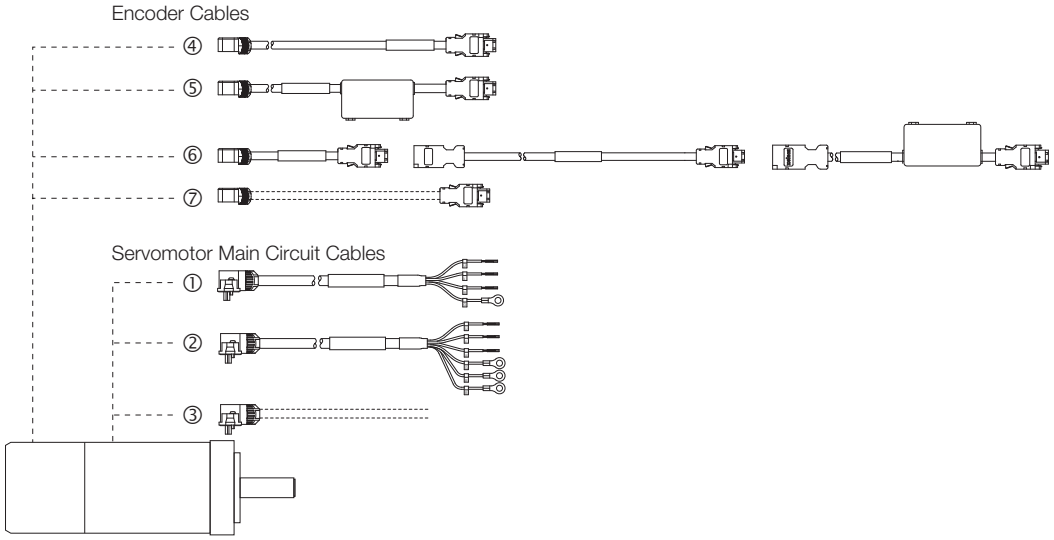
Cables and User-Assembled Wiring Materials for SGM7J Rotary Servomotors

2

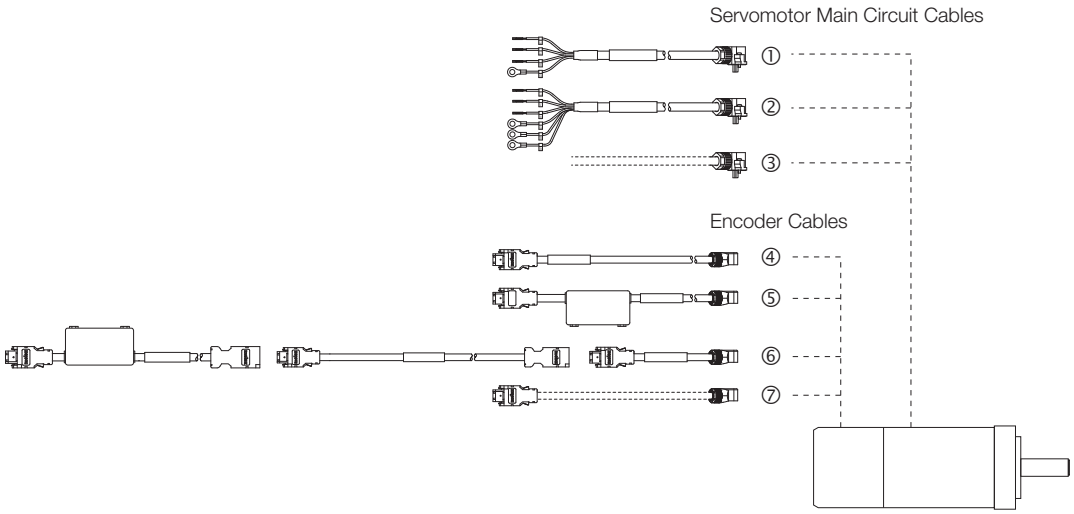
2.1 Cable Configurations

There are different order numbers for the Servomotor Main Circuit Cables and Encoder Cables depending on the cable installation direction. Confirm the order numbers before you order.

Cable Installed toward Load



Cable Installed away from Load



Note: If the Encoder Cable length exceeds 20 m, be sure to use a Relay Encoder Cable.

No.	Cable Type		Reference
①	Servomotor Main Circuit Cables for Servomotors without Holding Brakes		page 2-3
②	Servomotor Main Circuit Cables for Servomotors with Holding Brakes		page 2-4
③	User-Assembled Wiring Materials for Servomotor Main Circuit Cables	Connector Kits	page 2-5
		Cables without Connectors	page 2-8
④	Encoder Cables of 20 m or less for Incremental Encoders		page 2-10
⑤	Encoder Cables of 20 m or Less with Battery Cases for Absolute Encoders		page 2-11
⑥	Relay Encoder Cables of 30 m to 50 m		page 2-12
⑦	User-Assembled Wiring Materials for Encoder Cables	Connector Kits	page 2-14
		Cables without Connectors	page 2-14

2.2 Servomotor Main Circuit Cables

2.2.1 Servomotor Main Circuit Cables for Servomotors without Holding Brakes

Selection Table

Cable Direction	Servomotor Model	Length (L)	Order Number*1	
			Standard Cable	Flexible Cable*2, *3
Load side	SGM7J-A5 to -C2 50 W to 150 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, and 50 m	JZSP-C7M10F-□□-E	JZSP-C7M12F-□□-E
	SGM7J-02 to -06 200 W to 600 W		JZSP-C7M20F-□□-E	JZSP-C7M22F-□□-E
	SGM7J-08 750 W		JZSP-C7M30F-□□-E	JZSP-C7M32F-□□-E
Non-load side	SGM7J-A5 to -C2 50 W to 150 W		JZSP-C7M10G-□□-E	JZSP-C7M12G-□□-E
	SGM7J-02 to -06 200 W to 600 W		JZSP-C7M20G-□□-E	JZSP-C7M22G-□□-E
	SGM7J-08 750 W		JZSP-C7M30G-□□-E	JZSP-C7M32G-□□-E

*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, 20, 30, 40, or 50).

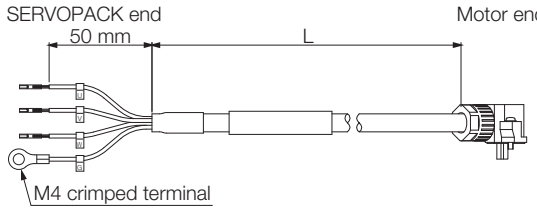
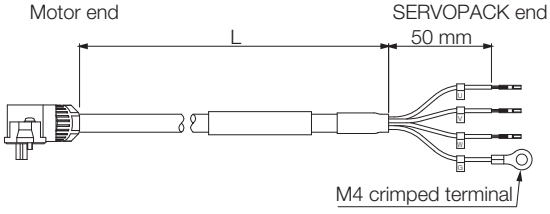
*2. Use Flexible Cables for moving parts of machines, such as robots.

*3. The recommended bending radius (R) is 90 mm or larger.

Note: If the length of the Servomotor Main Circuit Cable exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

External Dimensions

Note: Refer to *2.3.1 Servomotor Connector Kits* on page 2-5 and *2.3.2 Cables without Connectors* on page 2-8 for the connector manufacturers and order numbers.

Cable Installed away from Load	Cable Installed toward Load
	

Wiring Specifications

SERVOPACK Leads

Wire Color	Signal
Green/yellow	FG
Blue	Phase W
White	Phase V
Red	Phase U

Servomotor Connector

Signal	Pin
FG	1
Phase W	2
Phase V	3
Phase U	4
–	5
–	6

2.2.2 Servomotor Main Circuit Cables for Servomotors with Holding Brakes

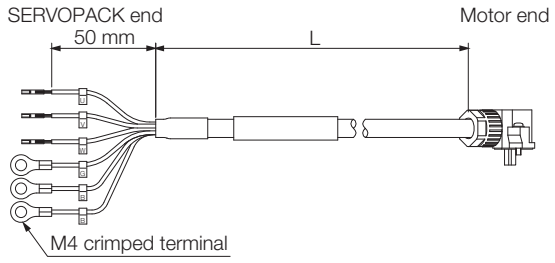
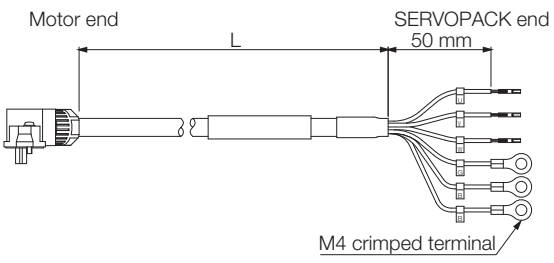
Selection Table

Cable Direction	Servomotor Model	Length (L)	Order Number*1	
			Standard Cable	Flexible Cable*2, *3
Load side	SGM7J-A5 to -C2 50 W to 150 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, and 50 m	JZSP-C7M13F-□□-E	JZSP-C7M14F-□□-E
	SGM7J-02 to -06 200 W to 600 W		JZSP-C7M23F-□□-E	JZSP-C7M24F-□□-E
	SGM7J-08 750 W		JZSP-C7M33F-□□-E	JZSP-C7M34F-□□-E
Non-load side	SGM7J-A5 to -C2 50 W to 150 W		JZSP-C7M13G-□□-E	JZSP-C7M14G-□□-E
	SGM7J-02 to -06 200 W to 600 W		JZSP-C7M23G-□□-E	JZSP-C7M24G-□□-E
	SGM7J-08 750 W		JZSP-C7M33G-□□-E	JZSP-C7M34G-□□-E

*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, 20, 30, 40, or 50).
*2. Use Flexible Cables for moving parts of machines, such as robots.
*3. The recommended bending radius (R) is 90 mm or larger.

Note: If the length of the Servomotor Main Circuit Cable exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

External Dimensions

Cable Installed away from Load	Cable Installed toward Load
	

Wiring Specifications

SERVOPACK Leads		Servomotor Connector	
Wire Color	Signal	Signal	Pin
Green/yellow	FG	FG	1
Blue	Phase W	Phase W	2
White	Phase V	Phase V	3
Red	Phase U	Phase U	4
Black	Brake	Brake	5
Black	Brake	Brake	6

Note: There is no polarity for the connection to the holding brake.

2.3 User-Assembled Wiring Materials for Servomotor Main Circuit Cables

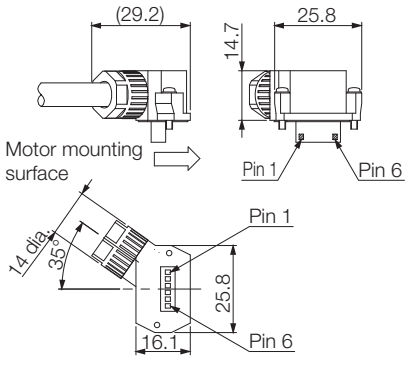
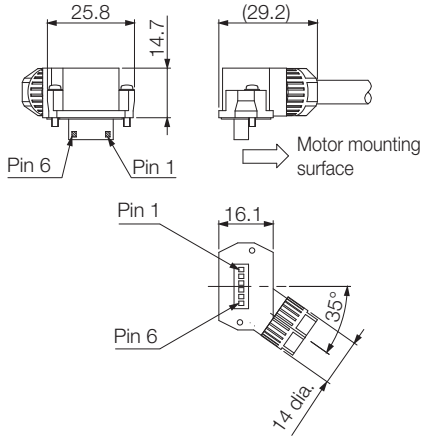
2.3.1 Servomotor Connector Kits

Selection Table

Servomotor Model	Servomotor Capacity	Order Number*
SGM7J-A5 to -C2	50 W to 150 W	JZSP-C7M9-1-E
SGM7J-02 to -06	200 W to 600 W	JZSP-C7M9-2-E
SGM7J-08	750 W	JZSP-C7M9-3-E

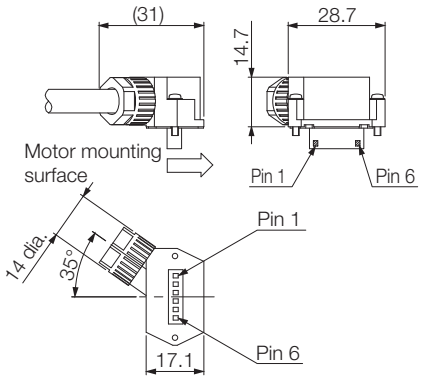
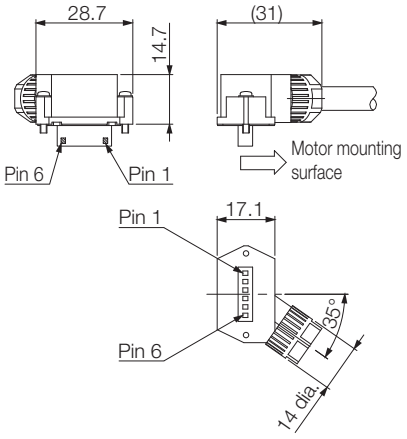
* Cables are not included. Purchase them separately.

◆ SGM7J-A5 to -C2 (for 50 W to 150 W)

Item		Description
Order Number		JZSP-C7M9-1-E
Manufacturer		J.S.T. Mfg. Co., Ltd.
User Instructions		JFA Connector J-1700
Compo-nents	Receptacle	J17S-06FMH-7KL-M-CF
	Contacts	SJ1F-01GF-P0.8
Applicable Wire Sizes		Power terminals: AWG20 Holding brake terminals: AWG20 to AWG24
Applicable Cable Diameter		7 mm ±0.3 mm
Outer Diameter of Insulating Sheath		1.11 mm to 1.53 mm
Mounting Screws		M2 pan-head screws
Crimp-ing Tool*	Hand Tool	YRS-8841
	Applicator	APLMK SJ1F/M01-08
External Dimensions [mm]		■ Cable on Non-load Side 
		■ Cable on Load Side 

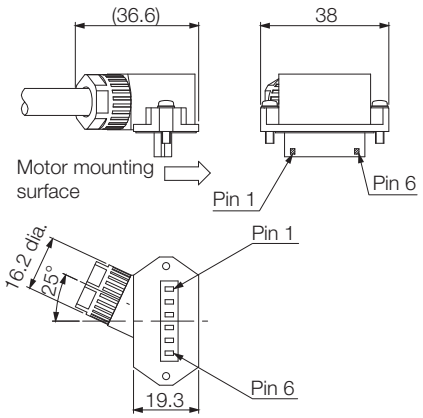
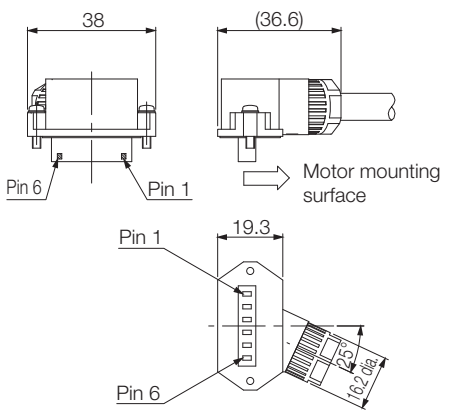
* A Crimping Tool is required. Contact the connector manufacturer for details.

◆ SGM7J-02 to -06 (for 200 W to 600 W)

Item		Description
Order Number		JZSP-C7M9-2-E
Manufacturer		J.S.T. Mfg. Co., Ltd.
User Instructions		JFA Connector J-2700
Compo-nents	Receptacle	J27S-06FMH-7KL-M-CF
	Contacts	SJ2F-01GF-P1.0
Applicable Wire Sizes		Power terminals: AWG20 Holding brake terminals: AWG20 to AWG24
Applicable Cable Diameter		7 mm ±0.3 mm
Outer Diameter of Insulating Sheath		1.11 mm to 1.53 mm
Mounting Screws		M2 pan-head screws
Crimp-ing Tool*	Hand Tool	YRS-8861
	Applicator	APLMK SJ2F/M01-10
External Dimensions [mm]		■ Cable on Non-load Side  ■ Cable on Load Side 

* A Crimping Tool is required. Contact the connector manufacturer for details.

◆ SGM7J-08 (for 750 W)

Item		Description
Order Number		JZSP-C7M9-3-E
Manufacturer		J.S.T. Mfg. Co., Ltd.
User Instructions		JFA Connector J-3700
Components	Receptacle	J37S-06FMH-8KL-M-CF
	Contacts	Power terminals: SJ3F-41GF-P1.8 Holding brake terminals: SJ3F-01GF-P1.8
Applicable Wire Sizes		Power terminals: AWG16 Holding brake terminals: AWG20 to AWG24
Applicable Cable Diameter		8 mm ±0.3 mm
Outer Diameter of Insulating Sheath		Power terminals: 1.53 mm to 2.5 mm Holding brake terminals: 1.11 mm to 1.86 mm
Mounting Screws		M2.5 pan-head screws
Crimping Tool*	Hand Tool	Power terminals: YRS-880 Holding brake terminals: YRS-881
	Applicator	Power terminals: APLMK SJ3F/M41-20 Holding brake terminals: APLMK SJ3F/M01-20
External Dimensions [mm]		■ Cable on Non-load Side  ■ Cable on Load Side 

* A Crimping Tool is required. Contact the connector manufacturer for details.

2.3.2 Cables without Connectors

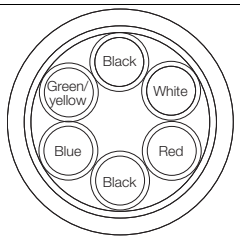
Selection Table

Servomotor Model	Servomotor Capacity	Order Number*1	
		Standard Cable	Flexible Cable*2, *3
SGM7J-A5 to -C2	50 W to 600 W	JZSP-CSM90-□□-E	JZSP-C7M29-□□-E
SGM7J-02 to -06			
SGM7J-08	750 W	JZSP-CSM91-□□-E	JZSP-CSM81-□□-E

*1. Replace the boxes (□□) in the order number with the cable length (05, 10, 15, 20, 30, 40, or 50).
*2. Use Flexible Cables for moving parts of machines, such as robots.
*3. The recommended bending radius (R) is 90 mm or larger.

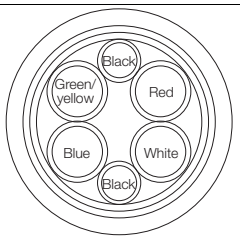
Note: If the length of the Servomotor Main Circuit Cable exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

◆ SGM7J-A5 to -06 (for 50 W to 600 W)

Item	Standard Cable	Flexible Cable
Order Number*	JZSP-CSM90-□□-E (maximum length: 50 m)	JZSP-C7M29-□□-E (maximum length: 50 m)
Specifications	UL2517 (rated temperature:105°C) AWG20 × 6C	UL2517 (rated temperature:105°C) AWG20 × 4C, AWG22 × 2C
	Power lines: AWG20 (0.52 mm^2) Outer diameter of insulating sheath: 1.53 mm	Power lines: AWG20 (0.52 mm^2) Outer diameter of insulating sheath: 1.37 mm
	Holding brake lines: AWG20 (0.52 mm^2) Outer diameter of insulating sheath: 1.53 mm	Holding brake lines: AWG22 (0.33 mm^2) Outer diameter of insulating sheath: 1.37 mm
Finished Diameter	7 mm ±0.3 mm	
Internal Structure and Lead Colors		

* Replace the boxes (□□) in the order number with the cable length (05, 10, 15, 20, 30, 40, or 50).

◆ SGM7J-08 (for 750 W)

Item	Standard Cable	Flexible Cable
Order Number*	JZSP-CSM91-□□-E (maximum length: 50 m)	JZSP-CSM81-□□-E (maximum length: 50 m)
Specifications	UL2517 (rated temperature:105°C) AWG16 × 4C, AWG20 × 2C	UL2517 (rated temperature:105°C) AWG16 × 4C, AWG22 × 2C
	Power lines: AWG16 (1.31 mm^2) Outer diameter of insulating sheath: 2.15 mm	Power lines: AWG16 (1.31 mm^2) Outer diameter of insulating sheath: 2.35 mm
	Holding brake lines: AWG20 (0.52 mm^2) Outer diameter of insulating sheath: 1.6 mm	Holding brake lines: AWG22 (0.33 mm^2) Outer diameter of insulating sheath: 1.37 mm
Finished Diameter	8 mm ±0.3 mm	
Internal Structure and Lead Colors		

* Replace the boxes (□□) in the order number with the cable length (05, 10, 15, 20, 30, 40, or 50).

2.4 Encoder Cables of 20 m or Less

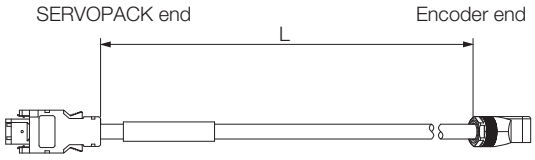
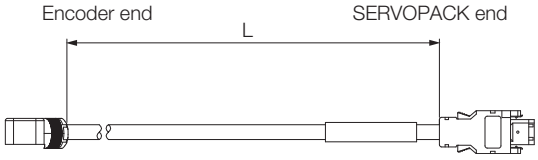
2.4.1 Encoder Cables for Incremental Encoders

Selection Table

Cable Direction	Servomotor Model	Length (L)	Order Number*1	
			Standard Cable	Flexible Cable*2, *3
Load side	All SGM7J models	3 m, 5 m, 10 m, 15 m, and 20 m	JZSP-C7PI0D-□□-E	JZSP-C7PI2D-□□-E
Non-load side			JZSP-C7PI0E-□□-E	JZSP-C7PI2E-□□-E

*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2. Use Flexible Cables for moving parts of machines, such as robots.
*3. The recommended bending radius (R) is 90 mm or larger.

External Dimensions

Cable Installed away from Load	Cable Installed toward Load
	

Wiring Specifications

Standard Cable

SERVOPACK end			Encoder (motor) end	
Pin	Signal		Pin	Wire Color
6	/PS		5	Light blue/white
5	PS		4	Light blue
4	BAT (-)		8	Orange/white
3	BAT (+)		9	Orange
2	PG 0V		3	Black
1	PG 5V		6	Red
Shell	FG	Shield wire	Shell	FG

Flexible Cable

SERVOPACK end			Encoder (motor) end	
Pin	Signal		Pin	Wire Color
6	/PS		5	Black/pink
5	PS		4	Red/pink
4	BAT (-)		8	Black/light blue
3	BAT (+)		9	Red/light blue
2	PG 0V		3	Light green
1	PG 5V		6	Orange
Shell	FG	Shield wire	Shell	FG

2.4.2 Encoder Cables for Absolute Encoders

These cables are equipped with a Battery Case. (A Battery is included.)

Note: If a battery is connected to the host controller, the Battery Case is not required. If so, use a cable for incremental encoders.

NOTICE

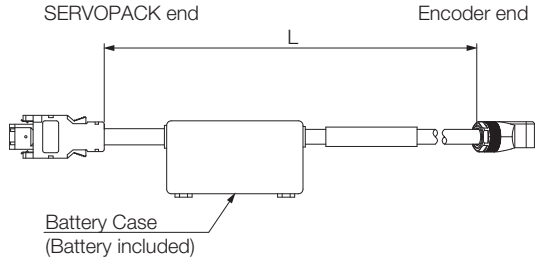
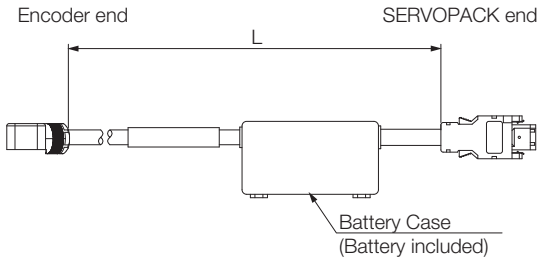
- **Install a battery at either the host controller or on the Encoder Cable.**
  If you install batteries both at the host controller and on the Encoder Cable at the same time, you will create a loop circuit between the batteries, resulting in a risk of damage or burning.

Selection Table

Cable Direction	Servomotor Model	Length (L)	Order Number*1	
			Standard Cable	Flexible Cable*2, *3
Load side	All SGM7J models	3 m, 5 m, 10 m, 15 m, and 20 m	JZSP-C7PA0D-□□-E	JZSP-C7PA2D-□□-E
Non-load side			JZSP-C7PA0E-□□-E	JZSP-C7PA2E-□□-E

*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2. Use Flexible Cables for moving parts of machines, such as robots.
*3. The recommended bending radius (R) is 90 mm or larger.

External Dimensions

Cable Installed away from Load	Cable Installed toward Load
	

Wiring Specifications

Standard Cable

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT (-)
3	BAT (+)
2	PG 0V
1	PG 5V
Shell	FG

Encoder (motor) end

Pin	Wire Color
5	Light blue/white
4	Light blue
8	Orange/white
9	Orange
3	Black
6	Red
Shell	FG

Shield wire

Battery Case

Pin	Signal
2	BAT (-)
1	BAT (+)

Flexible Cable

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT (-)
3	BAT (+)
2	PG 0V
1	PG 5V
Shell	FG

Encoder (motor) end

Pin	Wire Color
5	Black/pink
4	Red/pink
8	Black/light blue
9	Red/light blue
3	Light green
6	Orange
Shell	FG

Shield wire

Battery Case

Pin	Signal
2	BAT (-)
1	BAT (+)

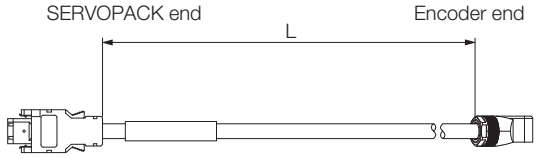
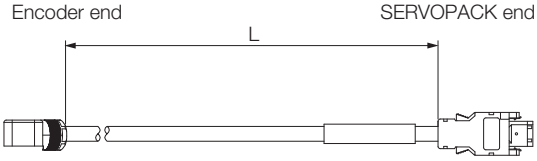
2.5 Relay Encoder Cables of 30 m to 50 m

2.5.1 Relay Encoder Cables for Motor End

Selection Table

Cable Direction	Specification	Length (L)	Order Number
Load side	For incremental or absolute encoder	0.3 m	JZSP-C7PRCD-E
Non-load side			JZSP-C7PRCE-E

External Dimensions

Cable Installed away from Load	Cable Installed toward Load
	

Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT (-)
3	BAT (+)
2	PG 0V
1	PG 5V
Shell	FG

Shield wire

Encoder (motor) end

Pin	Wire Color
5	Light blue/white
4	Light blue
8	Orange/white
9	Orange
3	Black
6	Red
Shell	FG

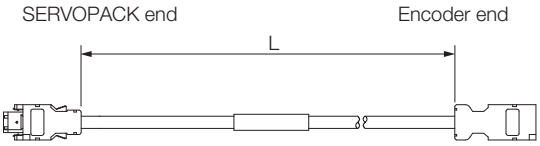
2.5.2 Relay Encoder Cables for SERVOPACK End

Selection Table

Specification	Length (L)	Order Number*
For incremental or absolute encoder	30 m, 40 m, and 50 m	JZSP-UCMP00-□□-E

* Replace the boxes (□□) in the order number with the cable length (30, 40, or 50).

External Dimensions



Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT (-)
3	BAT (+)
2	PG 0V
1	PG 5V
Shell	FG

Shield wire

Encoder (motor) end

Pin	Wire Color
6	Light blue/white
5	Light blue
4	Orange/white
3	Orange
2	Black
1	Red
Shell	FG

2.5.3 Relay Encoder Cables with Battery Case for SERVOPACK End

A Battery Case is required for a motor with an absolute encoder.

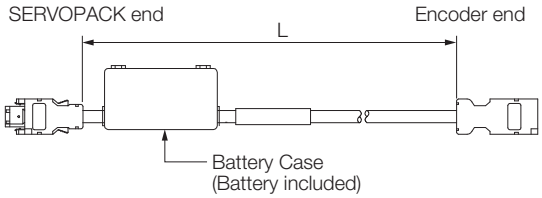
NOTICE

- Install a battery at either the host controller or on the Encoder Cable.
  If you install batteries both at the host controller and on the Encoder Cable at the same time, you will create a loop circuit between the batteries, resulting in a risk of damage or burning.

Selection Table

Length (L)	Order Number
0.3 m	JZSP-CSP12-E

External Dimensions



Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT (-)
3	BAT (+)
2	PG 0V
1	PG 5V
Shell	FG

Encoder (motor) end

Pin	Wire Color
6	Light blue/white
5	Light blue
4	Orange/white
3	Orange
2	Black
1	Red
Shell	FG

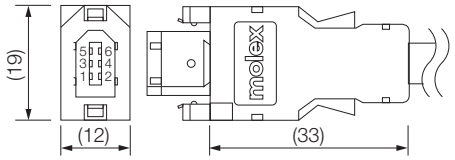
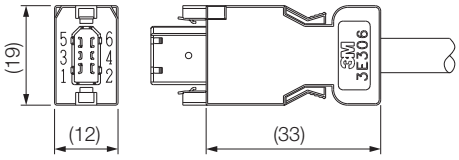
Shield wire

Battery Case

Pin	Signal
2	BAT (-)
1	BAT (+)

2.6 User-Assembled Wiring Materials for Encoder Cables

2.6.1 SERVOPACK Connector Kits

Type	Standard Connector Kit	Compatible Connector Kit*
Inquires	Yaskawa Controls Co., Ltd.	Sumitomo 3M Ltd.
Manufacturer	Molex Japan Co., Ltd.	
Order Number	JZSP-CMP9-1-E	
Specifications	55100-0670 (soldered) Product specifications: PS-54280	Receptacle: 3E206-0100 KV (soldered) Shell Kit: 3E306-3200-008 Product specifications: JNPS-1042 and JNPS-1043
External Dimensions [mm]		

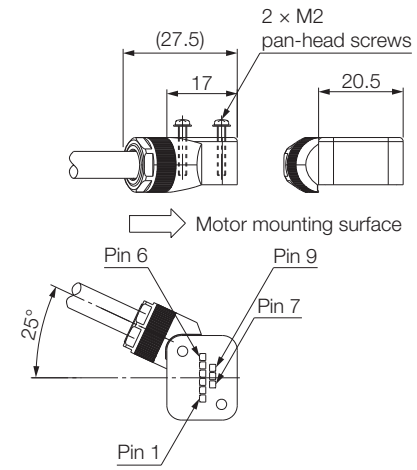
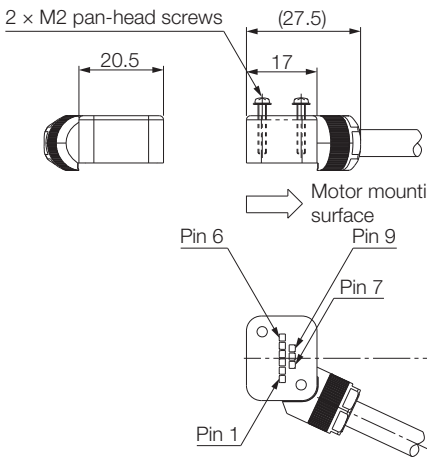
* This item is not available from Yaskawa Controls Co., Ltd. Order it directly from Sumitomo 3M Ltd.

Note: Cables are not included. Purchase them separately.

2.6.2 Encoder Connector Kits

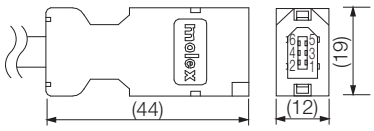
◆ Servomotor Connectors

Order Number		JZSP-C7P9-1-E
Manufacturer		Molex Japan Co., Ltd.
Components		504678-0070 Loose Connectors: 56161-8181 (crimped), Reeled: 56161-8081 (crimped)
Applicable Wire Sizes		AWG22 to AWG26
Applicable Cable Diameter		6.3 mm to 7.7 mm
Outer Diameter of Insulating Sheath		1.05 mm to 1.4 mm
Mounting Screws		M2 pan-head screws (two)
Application Specifications		AS-504682
Crimping Specifications		CS-56161
Crimping Tool*	Hand Tool	57175-5000
Shell Caulking Tool		57331-5100

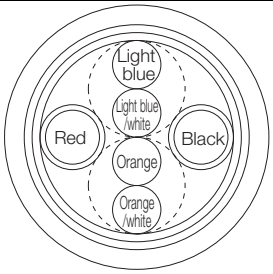
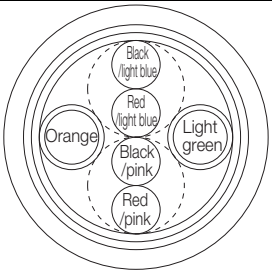
External Dimensions [mm]	■ Cable Installed away from Load 	■ Cable Installed toward Load 

* A Crimping Tool is required. When using other wire sizes, contact the connector manufacturer for crimping tools.

◆ Cable Relay Connectors

Order Number	JZSP-CMP9-2-E
Manufacturer	Molex Japan Co., Ltd.
Components	54280-0609 (soldered)
Product Specifications	PS-54280
External Dimensions [mm]	

2.6.3 Cables without Connectors

Item	Standard Cable	Flexible Cable
Order Number*	JZSP-CMP09-□□-E (maximum length: 20 m)	JZSP-CSP39-□□-E (maximum length: 20 m)
Specifications	UL20276 (rated temperature: 80°C) AWG22 × 2C + AWG24 × 2P	UL20276 (rated temperature: 80°C) AWG22 × 2C + AWG24 × 2P
	AWG22 (0.33 mm^2) Outer diameter of insulating sheath: 1.15 mm	AWG22 (0.33 mm^2) Outer diameter of insulating sheath: 1.35 mm
	AWG24 (0.20 mm^2) Outer diameter of insulating sheath: 1.09 mm	AWG24 (0.20 mm^2) Outer diameter of insulating sheath: 1.21 mm
Finished Diameter	6.5 mm	6.8 mm
Internal Structure and Lead Colors		

* Replace the boxes (□□) in the order number with the cable length (05, 10, 15, or 20).

Cables and User-Assembled Wiring Materials for SGM7A Rotary Servomotors

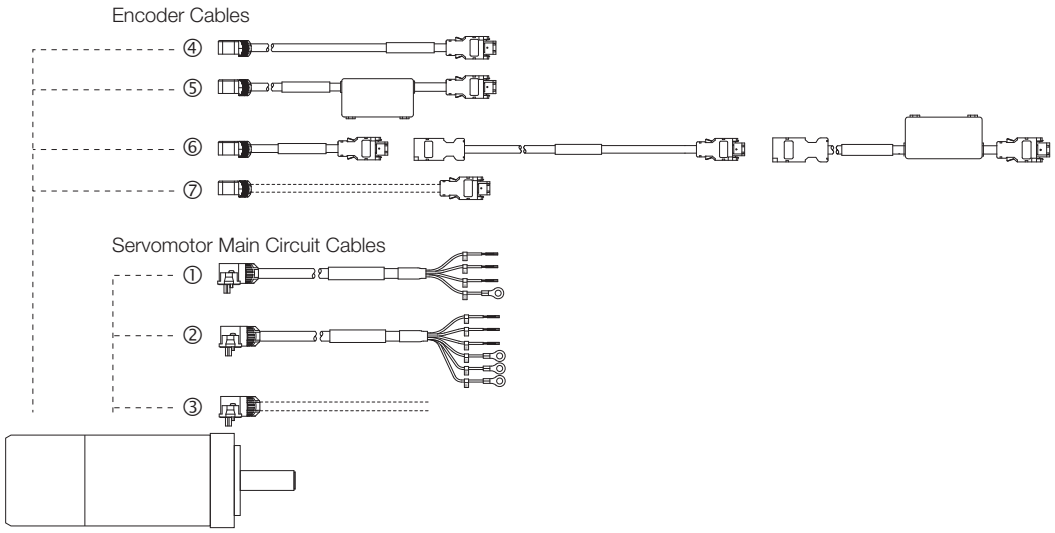
3

3.1 Cable Configurations

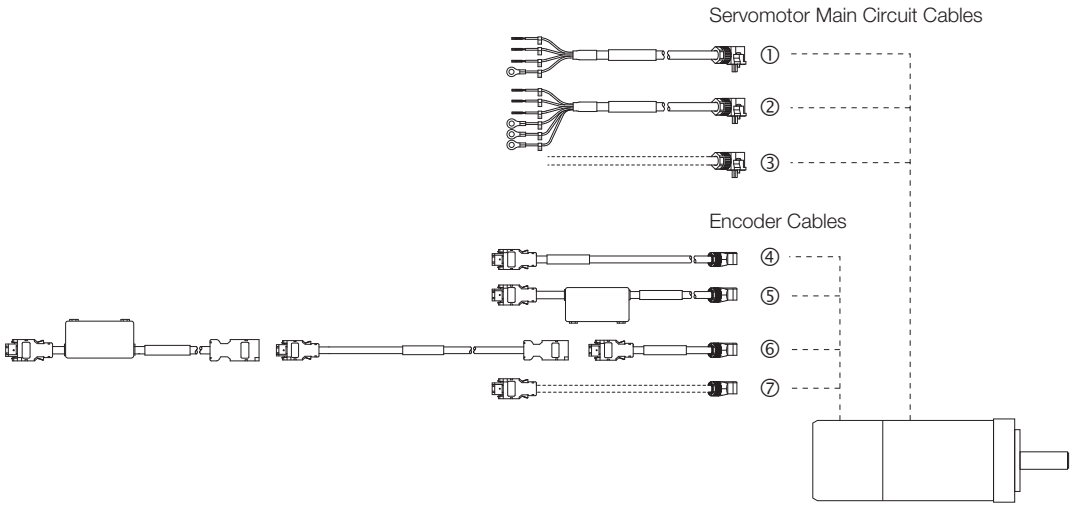
3.1.1 SGM7A-A5 to SGM7A-10 (50 W to 1.0 kW)

There are different order numbers for the Servomotor Main Circuit Cables and Encoder Cables depending on the cable installation direction. Confirm the order numbers before you order.

Cable Installed toward Load



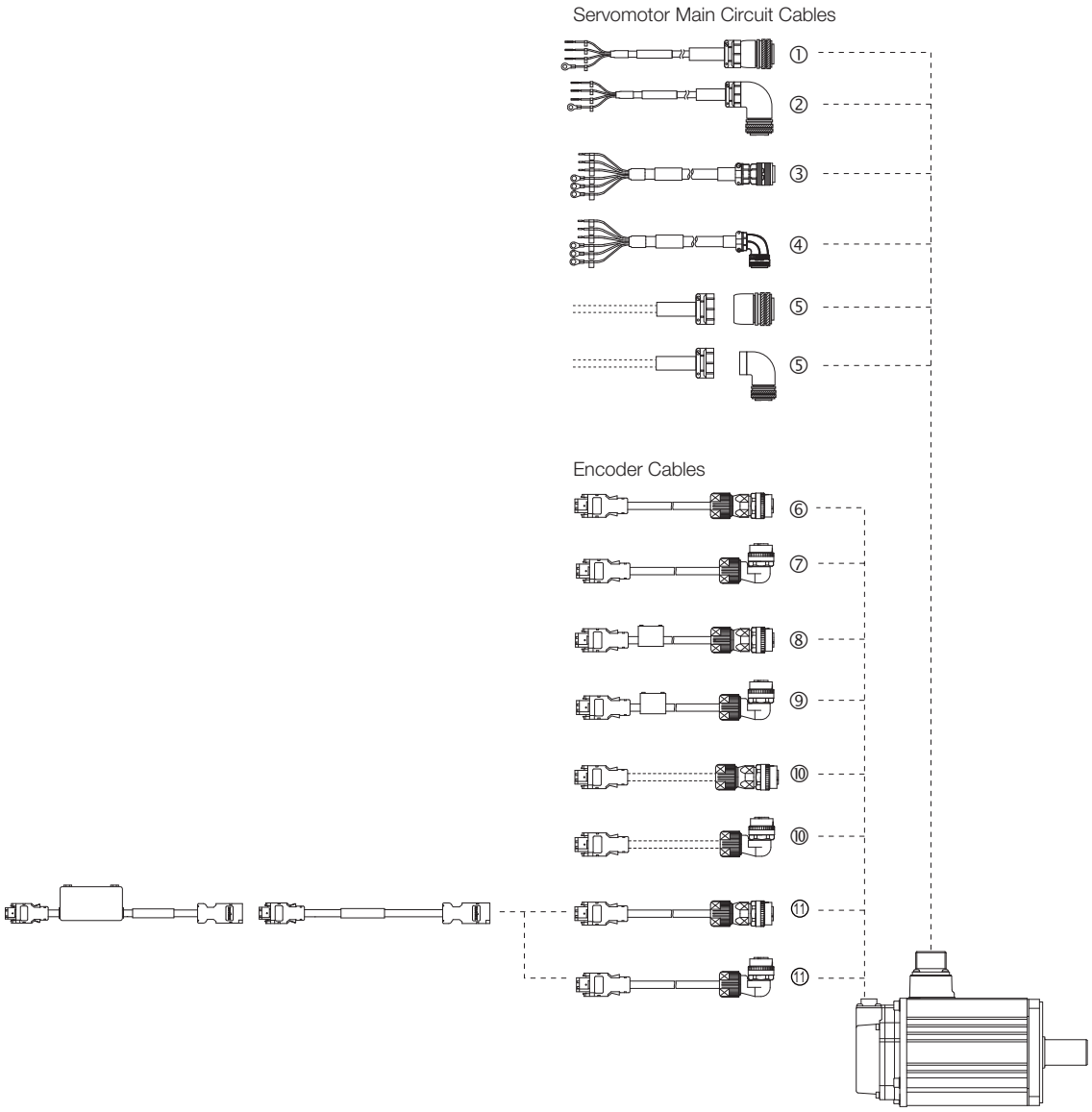
Cable Installed away from Load



Note: If the Encoder Cable length exceeds 20 m, be sure to use a Relay Encoder Cable.

No.	Cable Type		Reference
①	Servomotor Main Circuit Cables for Servomotors without Holding Brakes		page 3-6
②	Servomotor Main Circuit Cables for Servomotors with Holding Brakes		page 3-8
③	User-Assembled Wiring Materials for Servomotor Main Circuit Cables	Connector Kits	page 3-10
		Cables without Connectors	page 3-18
④	Encoder Cables of 20 m or less for Incremental Encoders		page 3-20
⑤	Encoder Cables of 20 m or Less with Battery Cases for Absolute Encoders		page 3-22
⑥	Relay Encoder Cables of 30 m to 50 m		page 3-24
⑦	User-Assembled Wiring Materials for Encoder Cables	Connector Kits	page 3-27
		Cables without Connectors	page 3-29

3.1.2 SGM7A-15 to SGM7A-70 (1.5 kW to 7.0 kW)



No.	Cable Type		Reference
①	Servomotor Main Circuit Cables with Straight Plugs for Servomotors without Holding Brakes		page 3-6
②	Servomotor Main Circuit Cables with Right-Angle Plugs for Servomotors without Holding Brakes		
③	Servomotor Main Circuit Cables with Straight Plugs for Servomotors with Holding Brakes		page 3-8
④	Servomotor Main Circuit Cables with Right-Angle Plugs for Servomotors with Holding Brakes		
⑤	User-Assembled Wiring Materials for Servomotor Main Circuit Cables	Connectors	page 3-13, page 3-16
		Cables without Connectors *	–
⑥	Encoder Cables of 20 m or less with Straight Plugs for Incremental Encoders		page 3-21
⑦	Encoder Cables of 20 m or less with Right-Angle Plugs for Incremental Encoders		
⑧	Encoder Cables of 20 m or Less with Straight Plugs and Battery Cases for Absolute Encoders		page 3-23
⑨	Encoder Cables of 20 m or Less with Right-Angle Plugs and Battery Cases for Absolute Encoders		

Continued on next page.

Continued from previous page.

No.	Cable Type		Reference
⑩	User-Assembled Wiring Materials for Encoder Cables	Connectors	page 3-27
		Cables without Connectors	page 3-29
⑪	Relay Encoder Cable of 30 m to 50 m		page 3-25

* Yaskawa does not specify what wiring materials to use for the Servomotor Main Circuit Cables. Use appropriate wiring materials for the current specifications and connectors.

3.2 Servomotor Main Circuit Cables

3.2.1 Servomotor Main Circuit Cables for Servomotors without Holding Brakes

Selection Table

◆ SGM7A-A5 to -10 (50 W to 1.0 kW)

Cable Direction	Servomotor Model	Length (L)	Order Number*1	
			Standard Cable	Flexible Cable*2, *3
Load side	SGM7A-A5 to -C2 50 W to 150 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, and 50 m	JZSP-C7M10F-□□-E	JZSP-C7M12F-□□-E
	SGM7A-02 to -06 200 W to 600 W		JZSP-C7M20F-□□-E	JZSP-C7M22F-□□-E
	SGM7A-08 or -10 750 W or 1.0 kW		JZSP-C7M30F-□□-E	JZSP-C7M32F-□□-E
Non-load side	SGM7A-A5 to -C2 50 W to 150 W		JZSP-C7M10G-□□-E	JZSP-C7M12G-□□-E
	SGM7A-02 to -06 200 W to 600 W		JZSP-C7M20G-□□-E	JZSP-C7M22G-□□-E
	SGM7A-08 or -10 750 W or 1.0 kW		JZSP-C7M30G-□□-E	JZSP-C7M32G-□□-E

*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, 20, 30, 40, or 50).
*2. Use Flexible Cables for moving parts of machines, such as robots.
*3. The recommended bending radius (R) is 90 mm or larger.

Note: If the length of the Servomotor Main Circuit Cable exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

◆ SGM7A-15 to -70 (1.5 kW to 7.0 kW)

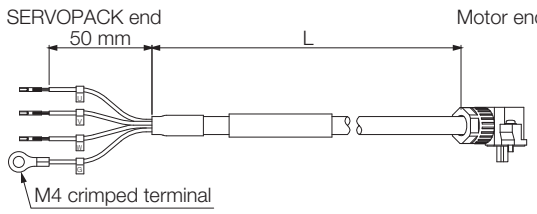
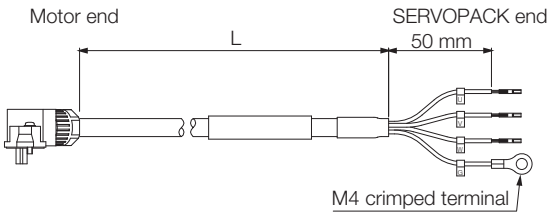
Servomotor Model	Connector Specifications	Length (L)	Order Number*1	
			Standard Cable	Flexible Cable*2, *3
SGM7A-15 1.5 kW	Straight	3 m, 5 m, 10 m, 15 m, and 20 m	JZSP-UVA101-□□-E	JZSP-UVA121-□□-E
	Right-angle		JZSP-UVA102-□□-E	JZSP-UVA122-□□-E
SGM7A-20 2.0 kW	Straight		JZSP-UVA301-□□-E	JZSP-UVA321-□□-E
	Right-angle		JZSP-UVA302-□□-E	JZSP-UVA322-□□-E
SGM7A-25 2.5 kW	Straight		JZSP-UVA501-□□-E	JZSP-UVA521-□□-E
	Right-angle		JZSP-UVA502-□□-E	JZSP-UVA522-□□-E
SGM7A-30 3.0 kW	Straight		JZSP-UVA601-□□-E	JZSP-UVA621-□□-E
	Right-angle		JZSP-UVA602-□□-E	JZSP-UVA622-□□-E
SGM7A-40 or -50 4.0 kW or 5.0 kW	Straight		JZSP-UVA701-□□-E	JZSP-UVA721-□□-E
	Right-angle		JZSP-UVA702-□□-E	JZSP-UVA722-□□-E
SGM7A-70*4 7.0 kW	Straight		JZSP-UVA901-□□-E	JZSP-UVA921-□□-E
	Right-angle		JZSP-UVA902-□□-E	JZSP-UVA922-□□-E

*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2. Use Flexible Cables for moving parts of machines, such as robots.
*3. The recommended bending radius (R) is 90 mm or larger.
*4. A cooling fan is built into the SGM7A-70 Servomotor. There is no specified cable to connect to the built-in cooling fan connector. Use appropriate wiring materials for the built-in cooling fan connector specifications. The cable is available from Yaskawa Controls Co., Ltd.
Refer to the following section for the built-in cooling fan connector specifications that are required to select the cable.
☞ *For Built-in Cooling Fan Connector* on page 3-14

External Dimensions

Note: Refer to *3.3 User-Assembled Wiring Materials for Servomotor Main Circuit Cables* on page 3-10 for the connector manufacturers and order numbers.

◆ SGM7A-A5 to -10 (50 W to 1.0 kW)

Cable Installed away from Load	Cable Installed toward Load
	

Wiring Specifications

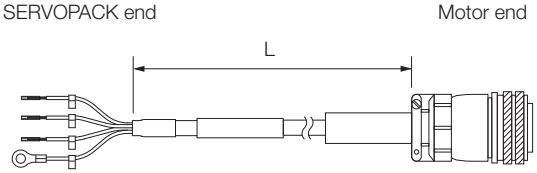
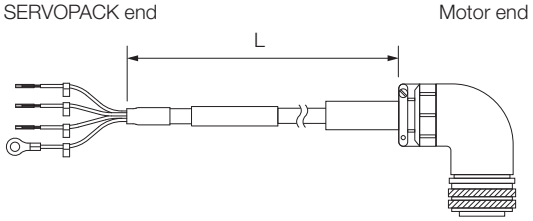
SERVOPACK Leads

Wire Color	Signal
Green/yellow	FG
Blue	Phase W
White	Phase V
Red	Phase U

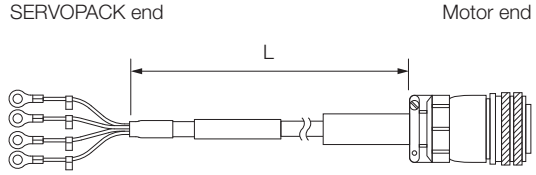
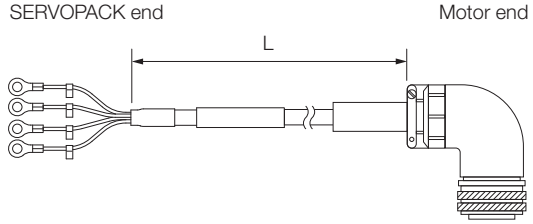
Servomotor Connector

Signal	Pin
FG	1
Phase W	2
Phase V	3
Phase U	4
–	5
–	6

◆ SGM7A-15 (1.5 kW)

Straight Connector	Right-Angle Connector
	

◆ SGM7A-20 to -70 (2.0 kW to 7.0 kW)

Straight Connector	Right-Angle Connector
	

Wiring Specifications

SERVOPACK Leads

Wire Color	Signal
Red	Phase U
White	Phase V
Blue	Phase W
Green/yellow	FG

Servomotor Connector

Signal	Pin
Phase U	A
Phase V	B
Phase W	C
FG	D

3.2.2 Servomotor Main Circuit Cables for Servomotors with Holding Brakes

Selection Table

◆ SGM7A-A5 to -10 (50 W to 1.0 kW)

Cable Direction	Servomotor Model	Length (L)	Order Number*1	
			Standard Cable	Flexible Cable*2, *3
Load side	SGM7A-A5 to -C2 50 W to 150 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, and 50 m	JZSP-C7M13F-□□-E	JZSP-C7M14F-□□-E
	SGM7A-02 to -06 200 W to 600 W		JZSP-C7M23F-□□-E	JZSP-C7M24F-□□-E
	SGM7A-08 or -10 750 W or 1.0 kW		JZSP-C7M33F-□□-E	JZSP-C7M34F-□□-E
Non-load side	SGM7A-A5 to -C2 50 W to 150 W		JZSP-C7M13G-□□-E	JZSP-C7M14G-□□-E
	SGM7A-02 to -06 200 W to 600 W		JZSP-C7M23G-□□-E	JZSP-C7M24G-□□-E
	SGM7A-08 or -10 750 W or 1.0 kW		JZSP-C7M33G-□□-E	JZSP-C7M34G-□□-E

*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, 20, 30, 40, or 50).
*2. Use Flexible Cables for moving parts of machines, such as robots.
*3. The recommended bending radius (R) is 90 mm or larger.

Note: If the length of the Servomotor Main Circuit Cable exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

◆ SGM7A-15 to -50 (1.5 kW to 5.0 kW)

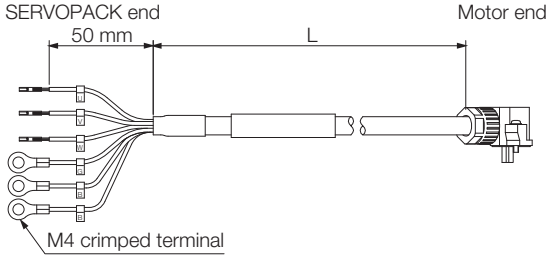
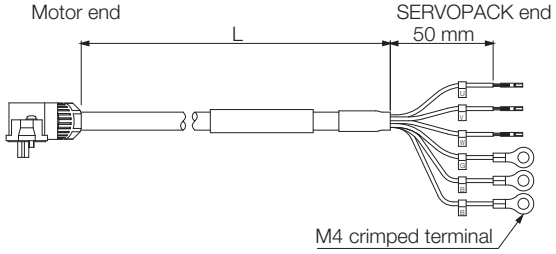
Servomotor Model	Connector Specifications	Length (L)	Order Number*1	
			Standard Cable	Flexible Cable*2, *3
SGM7A-15 1.5 kW	Straight	3 m, 5 m, 10 m, 15 m, and 20 m	JZSP-UVA151-□□-E	JZSP-UVA161-□□-E
	Right-angle		JZSP-UVA152-□□-E	JZSP-UVA162-□□-E
SGM7A-20 2.0 kW	Straight		JZSP-UVA351-□□-E	JZSP-UVA361-□□-E
	Right-angle		JZSP-UVA352-□□-E	JZSP-UVA362-□□-E
SGM7A-25 2.5 kW	Straight		JZSP-UVA551-□□-E	JZSP-UVA561-□□-E
	Right-angle		JZSP-UVA552-□□-E	JZSP-UVA562-□□-E
SGM7A-30 3.0 kW	Straight		JZSP-UVA651-□□-E	JZSP-UVA661-□□-E
	Right-angle		JZSP-UVA652-□□-E	JZSP-UVA662-□□-E
SGM7A-40 or -50 4.0 kW or 5.0 kW	Straight		JZSP-UVA751-□□-E	JZSP-UVA761-□□-E
	Right-angle		JZSP-UVA752-□□-E	JZSP-UVA762-□□-E

*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2. Use Flexible Cables for moving parts of machines, such as robots.
*3. The recommended bending radius (R) is 90 mm or larger.

External Dimensions

Note: Refer to *3.3 User-Assembled Wiring Materials for Servomotor Main Circuit Cables* on page 3-10 for the connector manufacturers and order numbers.

◆ SGM7A-A5 to -10 (50 W to 1.0 kW)

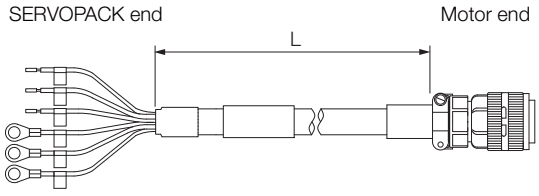
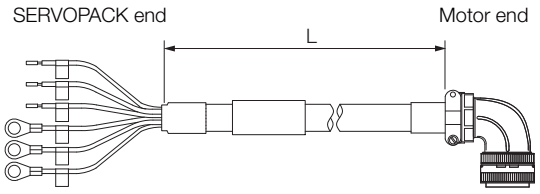
Cable Installed away from Load	Cable Installed toward Load
	

Wiring Specifications

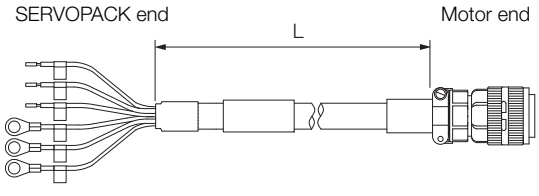
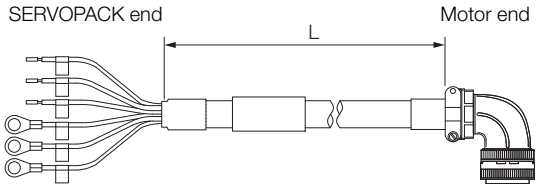
SERVOPACK Leads		Servomotor Connector	
Wire Color	Signal	Signal	Pin
Green/yellow	FG	FG	1
Blue	Phase W	Phase W	2
White	Phase V	Phase V	3
Red	Phase U	Phase U	4
Black	Brake	Brake	5
Black	Brake	Brake	6

Note: There is no polarity for the connection to the holding brake.

◆ SGM7A-15 (1.5 kW)

Straight Connector	Right-Angle Connector
	

◆ SGM7A-20 to -50 (2.0 kW to 5.0 kW)

Straight Connector	Right-Angle Connector
	

Wiring Specifications

SERVOPACK Leads		Servomotor Connector	
Wire Color	Signal	Signal	Pin
Red	Phase U	Phase U	A
White	Phase V	Phase V	B
Blue	Phase W	Phase W	C
Green/yellow	FG	FG	D
Black	Brake	Brake	E
Black	Brake	Brake	F
		–	G

Note: There is no polarity for the connection to the brake.

3.3 User-Assembled Wiring Materials for Servomotor Main Circuit Cables

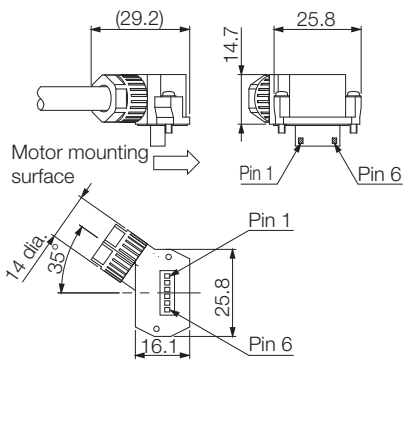
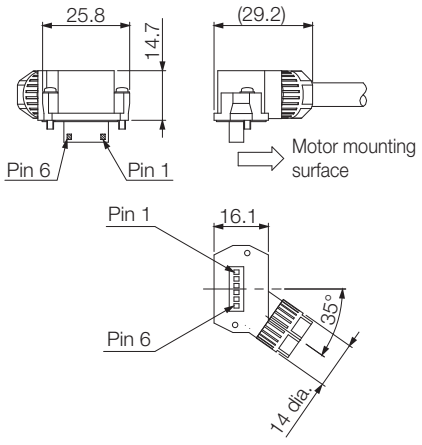
3.3.1 Servomotor Connector Kits for 50 W to 1.0 kW

Selection Table

Servomotor Model	Servomotor Capacity	Order Number*
SGM7A-A5 to -C2	50 W to 150 W	JZSP-C7M9-1-E
SGM7A-02 to -06	200 W to 600 W	JZSP-C7M9-2-E
SGM7A-08 or -10	750 W or 1.0 kW	JZSP-C7M9-3-E

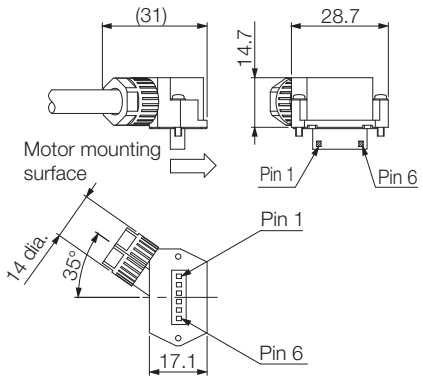
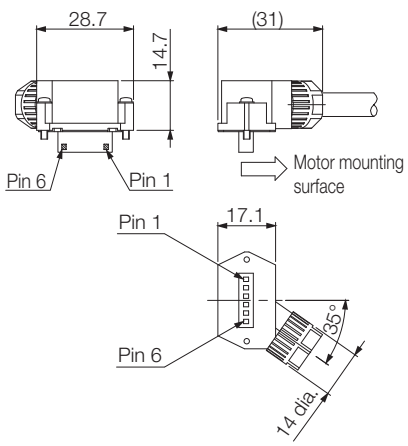
* Cables are not included. Purchase them separately.

◆ SGM7A-A5 to -C2 (50 W to 150 W)

Item		Description
Order Number		JZSP-C7M9-1-E
Manufacturer		J.S.T. Mfg. Co., Ltd.
User Instructions		JFA Connector J-1700
Compo-nents	Receptacle	J17S-06FMH-7KL-M-CF
	Contacts	SJ1F-01GF-P0.8
Applicable Wire Sizes		Power terminals: AWG20 Holding brake terminals: AWG20 to AWG24
Applicable Cable Diameter		7 mm ±0.3 mm
Outer Diameter of Insulating Sheath		1.11 mm to 1.53 mm
Mounting Screws		M2 pan-head screws
Crimp-ing Tool*	Hand Tool	YRS-8841
	Applicator	APLMK SJ1F/M01-08
External Dimensions [mm]		■ Cable on Non-load Side  ■ Cable on Load Side 

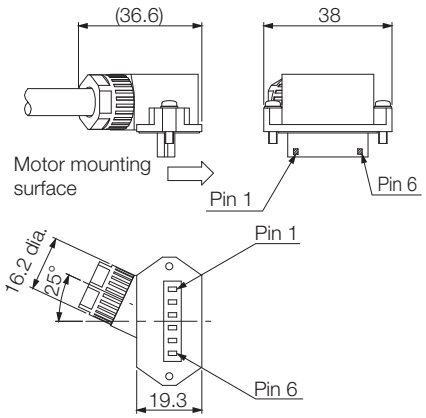
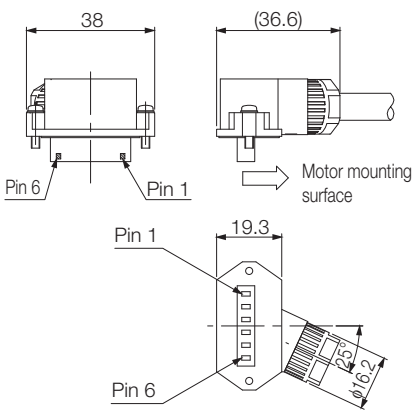
* A Crimping Tool is required. Contact the connector manufacturer for details.

◆ SGM7A-02 to -06 (200 W to 600 W)

Item		Description
Order Number		JZSP-C7M9-2-E
Manufacturer		J.S.T. Mfg. Co., Ltd.
User Instructions		JFA Connector J-2700
Components	Receptacle	J27S-06FMH-7KL-M-CF
	Contacts	SJ2F-01GF-P1.0
Applicable Wire Sizes		Power terminals: AWG20 Holding brake terminals: AWG20 to AWG24
Applicable Cable Diameter		7 mm ±0.3 mm
Outer Diameter of Insulating Sheath		1.11 mm to 1.53 mm
Mounting Screws		M2 pan-head screws
Crimping Tool*	Hand Tool	YRS-8861
	Applicator	APLMK SJ2F/M01-10
External Dimensions [mm]		■ Cable on Non-load Side 
		■ Cable on Load Side 

* A Crimping Tool is required. Contact the connector manufacturer for details.

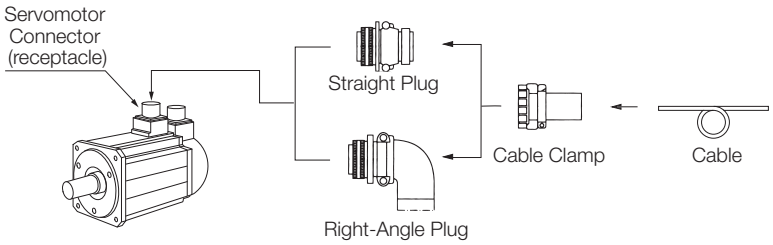
◆ SGM7A-08 or -10 (750 W or 1.0 kW)

Item		Description
Order Number		JZSP-C7M9-3-E
Manufacturer		J.S.T. Mfg. Co., Ltd.
User Instructions		JFA Connector J-3700
Compo-nents	Receptacle	J37S-06FMH-8KL-M-CF
	Contacts	Power terminals: SJ3F-41GF-P1.8 Holding brake terminals: SJ3F-01GF-P1.8
Applicable Wire Sizes		Power terminals: AWG16 Holding brake terminals: AWG20 to AWG24
Applicable Cable Diameter		8 mm ±0.3 mm
Outer Diameter of Insulating Sheath		Power terminals: 1.53 mm to 2.5 mm Holding brake terminals: 1.11 mm to 1.86 mm
Mounting Screws		M2.5 pan-head screws
Crimp-ing Tool*	Hand Tool	Power terminals: YRS-880 Holding brake terminals: YRS-881
	Applicator	Power terminals: APLMK SJ3F/M41-20 Holding brake terminals: APLMK SJ3F/M01-20
External Dimensions [mm]		■ Cable on Non-load Side  ■ Cable on Load Side 

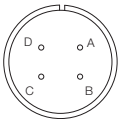
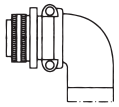
* A Crimping Tool is required. Contact the connector manufacturer for details.

3.3.2 Standard-Structure Servomotor Connectors for 1.5 kW to 7.0 kW

◆ Connector Structures



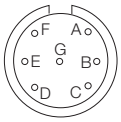
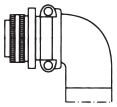
For Servomotors without Holding Brakes

Servomotor Model	Capacity	Servomotor Connector Model (Receptacle) 	Order Number			Manufacturer
			Straight Plug 	Right-Angle Plug 	Cable Clamp 	
SGM7A-15 SGM7A-20 SGM7A-25	1.5 kW to 2.5 kW	CE05-2A18-10PD-D (MS Connector model: MS3102A18-10P)	N/MS3106B18-10S	N/MS3108B18-10S	N/MS3057-10A	Japan Aviation Electronics Industry, Ltd.
SGM7A-30 SGM7A-40 SGM7A-50 SGM7A-70	3.0 kW to 7.0 kW	CE05-2A22-22PD-D (MS Connector model: MS3102A22-22P)	N/MS3106B22-22S	N/MS3108B22-22S	N/MS3057-12A	

Note: 1. Servomotor Connectors (receptacles) are compatible with MS Connectors. If you prepare your own cables, refer to the model number of MS connector in parentheses and select the appropriate plug.
2. Yaskawa does not specify what wiring materials to use. Use appropriate wiring materials for the current specifications and connectors.

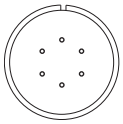
For Servomotors with Holding Brakes

For the SGM7A-15 to SGM7A-50, there is a brake terminal on the Servomotor Connector.

Servomotor Model	Capacity	Servomotor Connector Model (Receptacle) 	Order Number			Manufacturer
			Straight Plug 	Right-Angle Plug 	Cable Clamp 	
SGM7A-15 SGM7A-20 SGM7A-25	1.5 kW to 2.5 kW	JL04V-2E20-15PE-B-R (MS Connector model: MS3102A20-15P)	N/MS3106B20-15S	N/MS3108B20-15S	N/MS3057-12A	Japan Aviation Electronics Industry, Ltd.
SGM7A-30 SGM7A-40 SGM7A-50	3.0 kW to 5.0 kW	JL04V-2E24-10PE-B-R (MS Connector model: MS3102A24-10P)	N/MS3106B24-10S	N/MS3108B24-10S	N/MS3057-16A	

Note: 1. Servomotor Connectors (receptacles) are compatible with MS Connectors. If you prepare your own cables, refer to the model number of MS connector in parentheses and select the appropriate plug.
2. Yaskawa does not specify what wiring materials to use. Use appropriate wiring materials for the current specifications and connectors.

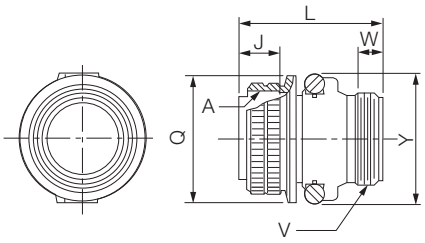
For Built-in Cooling Fan Connector

Servomotor Model	Capacity	Fan Connector Model (Receptacle) 	Order Number		Manufacturer
			Plug	Cable Clamp	Japan Aviation Electronics Industry, Ltd.
SGM7A-70	7.0 kW	MS3102A14S-6P	MS3108B14S-6S	MS3057-6A	

Note: Yaskawa does not specify what wiring materials to use. Use appropriate wiring materials for the current specifications and connectors.

External Dimensions

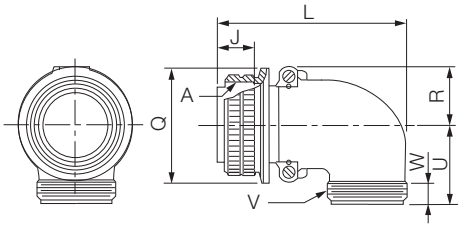
◆ Straight Plug: N/MS3106B□□-□□S



Unit: mm

Shell Size	Joint Thread A	Length of Joint J±0.12	Total Length L Max.	Joint Nut Outer Diameter Q $^{+0}_{-0.38}$ Dia.	Cable Clamp Mounting Thread V	Effective Thread Length W Min.	Maximum Width Y Max.
18	1-1/8-18UNEF	18.26	52.37	34.13	1-20UNEF	9.53	42
20	1-1/4-18UNEF	18.26	55.57	37.28	1-3/16-18UNEF	9.53	47
22	1-3/8-18UNEF	18.26	55.57	40.48	1-3/16-18UNEF	9.53	50
24	1-1/2-18UNEF	18.26	58.72	43.63	1-7/16-18UNEF	9.53	53

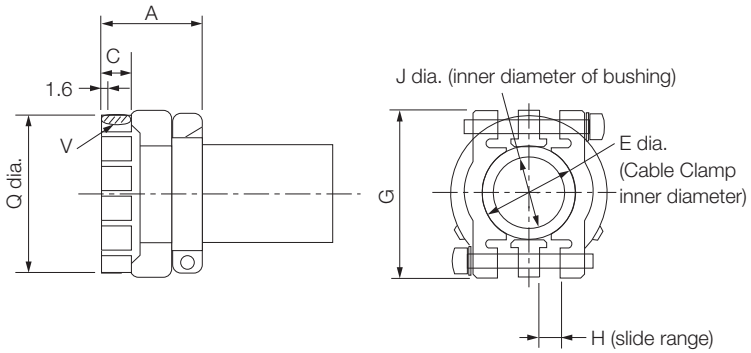
◆ Right-Angle Plug: N/MS3108B□□-□□S



Unit: mm

Shell Size	Joint Thread A	Length of Joint J±0.12	Total Length L Max.	Joint Nut Outer Diameter Q $^{+0}_{-0.38}$ Dia.	R ± 0.5	U ± 0.5	Cable Clamp Mounting Thread V	Effective Thread Length W Min.
18	1-1/8-18UNEF	18.26	68.27	34.13	20.5	30.2	1-20UNEF	9.53
20	1-1/4-18UNEF	18.26	76.98	37.28	22.5	33.3	1-3/16-18UNEF	9.53
22	1-3/8-18UNEF	18.26	76.98	40.48	24.1	33.3	1-3/16-18UNEF	9.53
24	1-1/2-18UNEF	18.26	86.51	43.63	25.6	36.5	1-7/16-18UNEF	9.53

◆ Cable Clamp: N/MS3057-□□A



Unit: mm

Part	Applicable Connector Shell Size	Total Length A ±0.7	Effective Thread Length C	E Dia.	G ±0.7	H	J Dia.	Mounting Thread V	Outer Diameter Q ±0.7 Dia.	Attached Bushing
N/MS3057-10A	18	23.8	10.3	15.9	31.7	3.2	14.3	1-20UNEF	30.1	AN3420-10
N/MS3057-12A	20, 22	23.8	10.3	19	37.3	4	15.9	1-3/16-18UNEF	35.0	AN3420-12
N/MS3057-16A	24	26.2	10.3	23.8	42.9	4.8	19.1	1-7/16-18UNEF	42.1	AN3420-16

Note: A rubber bushing is included.

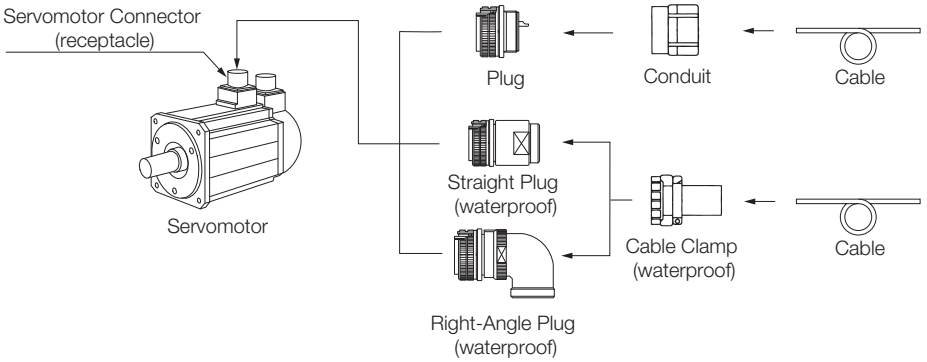
3.3.3 IP67-Structure/European-Safety-Standard-Compliant Servomotor Connectors for 1.5 kW to 7.0 kW

Cables with connectors on both ends that are compliant with an IP67 protective structure and European Safety Standards are not available from Yaskawa for SGM7A Servomotors. You must make such a cable yourself.

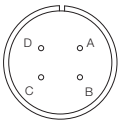
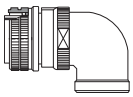
Use the Connectors specified by Yaskawa for these Servomotors. (These connectors are compliant with the standards.) Yaskawa does not specify what wiring materials to use.

For Servomotors without Holding Brakes

◆ Connector Structures

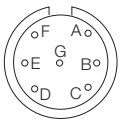
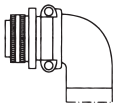


Note: For the conduit grounding, contact the manufacturer of the conduit.

Servomotor Model	Capacity	Servomotor Connector Model (Receptacle) 	Order Number: Plug Only 	Order Number: Straight Plug 	Order Number: Right-Angle Plug 	Order Number: Cable Clamp 	Applicable Cable Diameter (Reference Values) [mm]	Manufacturer
SGM7A-15 SGM7A-20 SGM7A-25	1.5 kW to 2.5 kW	CE05-2A18-10PD-D	CE05-6A18-10SD-D	CE05-6A18-10SD-D-BSS	CE05-8A18-10SD-D-BAS	CE3057-10A-1-D	10.5 to 14.1	DDK Ltd.
						CE3057-10A-2-D	8.5 to 11.0	
						CE3057-10A-3-D	6.5 to 8.7	
SGM7A-30 SGM7A-40 SGM7A-50 SGM7A-70	3.0 kW to 7.0 kW	CE05-2A22-22PD-D	CE05-6A22-22SD-D	CE05-6A22-22SD-D-BSS	CE05-8A22-22SD-D-BAS	CE3057-12A-1-D	12.5 to 16.0	DDK Ltd.
						CE3057-12A-2-D	9.5 to 13.0	
						CE3057-12A-3-D	6.8 to 10.0	
						CE3057-12A-4-D	14.5 to 17.0	

For Servomotors with Holding Brakes

For the SGM7A-15 to SGM7A-50, there is a brake terminal on the Servomotor Connector.

Servomotor Model	Capacity	Servomotor Connector Model (Receptacle) 	Order Number: Plug Only 	Order Number: Straight Plug 	Order Number: Right-Angle Plug 	Order Number: Cable Clamp 	Applicable Cable Diameter (Reference Values) [mm]	Manufacturer
SGM7A-15 SGM7A-20 SGM7A-25	1.5 kW to 2.5 kW	JL04V-2E20-15PE-B-R	JL04V-6A20-15SE-R	JL04V-6A20-15SE-EB-R	JL04V-8A20-15SE-EB-R	JL04-2022CK (09) -R	6.5 to 9.5	Japan Aviation Electronics Industry, Ltd.
						JL04-2022CK (12) -R	9.5 to 13.0	
						JL04-2022CK (14) -R	12.9 to 15.9	
SGM7A-30 SGM7A-40 SGM7A-50	3.0 kW to 5.0 kW	JL04V-2E24-10PE-B-R	JL04-6A24-10SE-R	JL04V-6A24-10SE-EB-R or JA06A-24-10S-J1-EB-R*	JL04V-8A24-10SE-EB-R or JA08A-24-10S-J1-EB-R*	JL04-2428CK (11) -R	9.0 to 12.0	
						JL04-2428CK (14) -R	12.0 to 15.0	
						JL04-2428CK (17) -R	15.0 to 18.0	
						JL04-2428CK (20) -R	18.0 to 20.0	

* These products are not compliant with European Safety Standards. They are compliant only with protective structure IP67.

For Built-in Cooling Fan Connector

A cooling fan is built into the SGM7A-70 Servomotor.

Refer to the following section for the built-in cooling fan connector specifications for the SGM7A-70 Servomotor.

☞ *For Built-in Cooling Fan Connector* on page 3-14

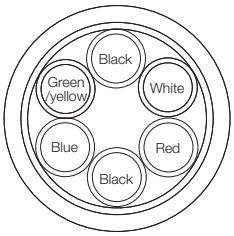
3.3.4 Cables without Connectors

Selection Table

Servomotor Model	Order Number*	
	Standard Cable	Flexible Cable
SGM7A-A5 to -C2 50 W to 150 W	JZSP-CSM90-□□-E	JZSP-C7M29-□□-E
SGM7A-02 to -06 200 W to 600 W		
SGM7A-08 or -10 750 W or 1.0 kW	JZSP-CSM91-□□-E	JZSP-CSM81-□□-E

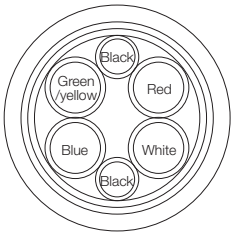
* Replace the boxes (□□) in the order number with the cable length (05, 10, 15, 20, 30, 40, or 50).

◆ SGM7A-A5 to -06 (50 W to 600 W)

Item	Standard Cable	Flexible Cable
Order Number*	JZSP-CSM90-□□-E (maximum length: 50 m)	JZSP-C7M29-□□-E (maximum length: 50 m)
Specifications	UL2517 (rated temperature:105°C) AWG20 × 6C	UL2517 (rated temperature:105°C) AWG20 × 4C, AWG22C × 2C
	Power lines: AWG20 (0.52 mm^2) Outer diameter of insulating sheath: 1.53 mm	Power lines: AWG20 (0.52 mm^2) Outer diameter of insulating sheath: 1.37 mm
	Holding brake lines: AWG20 (0.52 mm^2) Outer diameter of insulating sheath: 1.53 mm	Holding brake lines: AWG22 (0.33 mm^2) Outer diameter of insulating sheath: 1.37 mm
Finished Diameter	7 mm ±0.3 mm	
Internal Structure and Lead Colors		

* Replace the boxes (□□) in the order number with the cable length (05, 10, 15, 20, 30, 40, or 50).

◆ SGM7A-08 or -10 (750 W or 1.0 kW)

Item	Standard Cable	Flexible Cable
Order Number*	JZSP-CSM91-□□-E (maximum length: 50 m)	JZSP-CSM81-□□-E (maximum length: 50 m)
Specifications	UL2517 (rated temperature:105°C) AWG16 × 4C, AWG20 × 2C	UL2517 (rated temperature:105°C) AWG16 × 4C, AWG22 × 2C
	Power lines: AWG16 (1.31 mm^2) Outer diameter of insulating sheath: 2.15 mm	Power lines: AWG16 (1.31 mm^2) Outer diameter of insulating sheath: 2.35 mm
	Holding brake lines: AWG20 (0.52 mm^2) Outer diameter of insulating sheath: 1.6 mm	Holding brake lines: AWG22 (0.33 mm^2) Outer diameter of insulating sheath: 1.37 mm
Finished Diameter	8 mm ±0.3 mm	
Internal Structure and Lead Colors		

* Replace the boxes (□□) in the order number with the cable length (05, 10, 15, 20, 30, 40, or 50).

3.4 Encoder Cables of 20 m or Less

3.4.1 Encoder Cables for Incremental Encoders

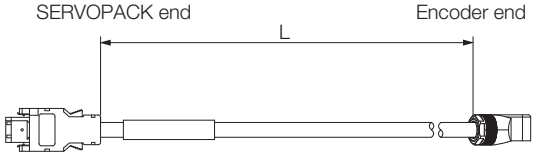
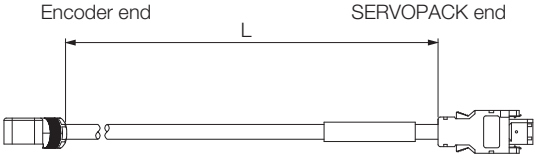
SGM7A-A5 to SGM7A-10 (50 W to 1.0 kW)

◆ Selection Table

Cable Direction	Servomotor Model	Length (L)	Order Number*1	
			Standard Cable	Flexible Cable*2, *3
Load side	SGM7A-A5 to -10 50 W to 1.0 kW	3 m, 5 m, 10 m, 15 m, and 20 m	JZSP-C7PI0D-□□-E	JZSP-C7PI2D-□□-E
Non-load side			JZSP-C7PI0E-□□-E	JZSP-C7PI2E-□□-E

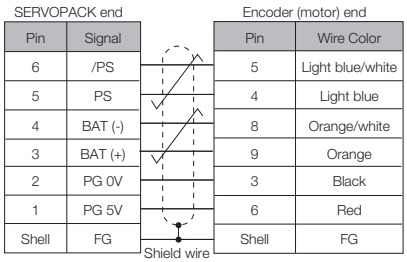
*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2. Use Flexible Cables for moving parts of machines, such as robots.
*3. The recommended bending radius (R) is 90 mm or larger.

◆ External Dimensions

Cable Installed away from Load	Cable Installed toward Load
	

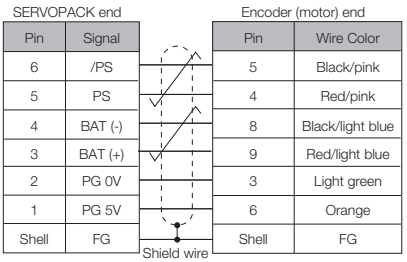
◆ Wiring Specifications

Standard Cable



SERVOPACK end			Encoder (motor) end	
Pin	Signal		Pin	Wire Color
6	/PS		5	Light blue/white
5	PS		4	Light blue
4	BAT (-)		8	Orange/white
3	BAT (+)		9	Orange
2	PG 0V		3	Black
1	PG 5V		6	Red
Shell	FG	Shield wire	Shell	FG

Flexible Cable



SERVOPACK end			Encoder (motor) end	
Pin	Signal		Pin	Wire Color
6	/PS		5	Black/pink
5	PS		4	Red/pink
4	BAT (-)		8	Black/light blue
3	BAT (+)		9	Red/light blue
2	PG 0V		3	Light green
1	PG 5V		6	Orange
Shell	FG	Shield wire	Shell	FG

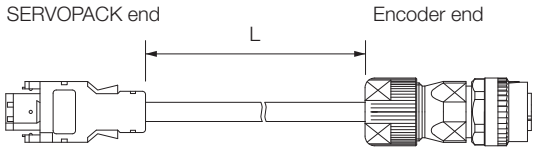
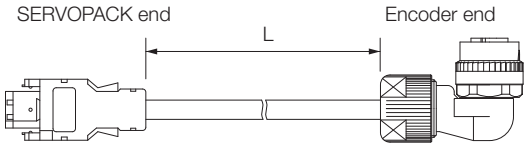
SGM7A-15 to SGM7A-70 (1.5 kW to 7.0 kW)

◆ Selection Table

Servomotor Model	Connector Specifications	Length (L)	Order Number*1	
			Standard Cable	Flexible Cable*2, *3
SGM7A-15 to -70 1.5 kW to 7.0 kW	Straight	3 m, 5 m, 10 m, 15 m, and 20 m	JZSP-CVP01-□□-E	JZSP-CVP11-□□-E
	Right-angle		JZSP-CVP02-□□-E	JZSP-CVP12-□□-E

*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2. Use Flexible Cables for moving parts of machines, such as robots.
*3. The recommended bending radius (R) is 90 mm or larger.

◆ External Dimensions

Straight Connector	Right-Angle Connector
	

◆ Wiring Specifications

Standard Cable

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT(-)
3	BAT(+)
2	PG 0V
1	PG 5V
Shell	FG

Shield wire

Encoder (motor) end

Pin	Wire Color
2	Light blue/white
1	Light blue
5	Orange/white
6	Orange
9	Black
4	Red
10	FG

Flexible Cable

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT(-)
3	BAT(+)
2	PG 0V
1	PG 5V
Shell	FG

Shield wire

Encoder (motor) end

Pin	Wire Color
2	Black/pink
1	Red/pink
5	Black/light blue
6	Red/light blue
9	Light green
4	Orange
10	FG

3.4.2 Encoder Cables for Absolute Encoders

These cables are equipped with a Battery Case. (A Battery is included.)

Note: If a battery is connected to the host controller, the Battery Case is not required. If so, use a cable for incremental encoders.

NOTICE

- **Install a battery at either the host controller or on the Encoder Cable.**
  If you install batteries both at the host controller and on the Encoder Cable at the same time, you will create a loop circuit between the batteries, resulting in a risk of damage or burning.

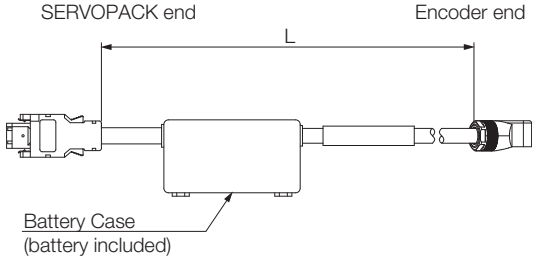
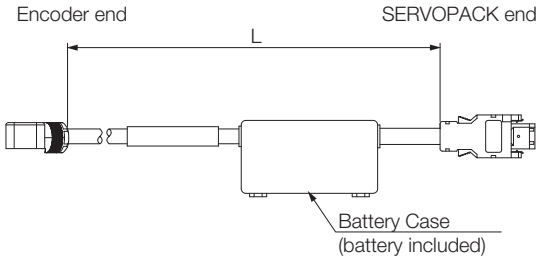
SGM7A-A5 to SGM7A-10 (50 W to 1.0 kW)

◆ Selection Table

Cable Direction	Servomotor Model	Length (L)	Order Number*1	
			Standard Cable	Flexible Cable*2, *3
Load side	SGM7A-A5 to -10 50 W to 1.0 kW	3 m, 5 m, 10 m, 15 m, and 20 m	JZSP-C7PA0D-□□-E	JZSP-C7PA2D-□□-E
Non-load side			JZSP-C7PA0E-□□-E	JZSP-C7PA2E-□□-E

*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2. Use Flexible Cables for moving parts of machines, such as robots.
*3. The recommended bending radius (R) is 90 mm or larger.

◆ External Dimensions

Cable Installed away from Load	Cable Installed toward Load
	

◆ Wiring Specifications

Standard Cable

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT (-)
3	BAT (+)
2	PG 0V
1	PG 5V
Shell	FG

Encoder (motor) end

Pin	Wire Color
5	Light blue/white
4	Light blue
8	Orange/white
9	Orange
3	Black
6	Red
Shell	FG

Shield wire

Battery Case

Pin	Signal
2	BAT (-)
1	BAT (+)

Flexible Cable

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT (-)
3	BAT (+)
2	PG 0V
1	PG 5V
Shell	FG

Encoder (motor) end

Pin	Wire Color
5	Black/pink
4	Red/pink
8	Black/light blue
9	Red/light blue
3	Light green
6	Orange
Shell	FG

Shield wire

Battery Case

Pin	Signal
2	BAT (-)
1	BAT (+)

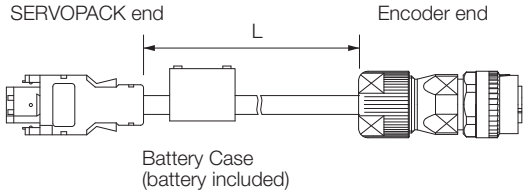
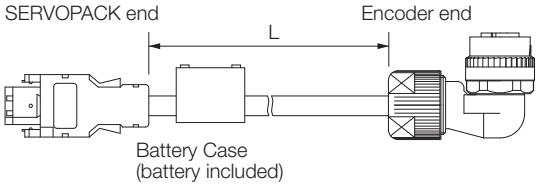
SGM7A-15 to SGM7A-70 (1.5 kW to 7.0 kW)

◆ Selection Table

Servomotor Model	Connector Specifications	Length (L)	Order Number*1	
			Standard Cable	Flexible Cable*2, *3
SGM7A-15 to -70 1.5 kW to 7.0 kW	Straight	3 m, 5 m, 10 m, 15 m, and 20 m	JZSP-CVP06-□□-E	JZSP-CVP26-□□-E
	Right-angle		JZSP-CVP07-□□-E	JZSP-CVP27-□□-E

*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2. Use Flexible Cables for moving parts of machines, such as robots.
*3. The recommended bending radius (R) is 90 mm or larger.

◆ External Dimensions

Straight Connector	Right-Angle Connector
	

◆ Wiring Specifications

Standard Cable

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT(-)
3	BAT(+)
2	PG 0V
1	PG 5V
Shell	FG

Encoder (motor) end

Pin	Wire Color
2	Light blue/white
1	Light blue
5	Orange/white
6	Orange
9	Black
4	Red
10	FG

Shield wire

Battery Case

Pin	Signal
2	BAT(-)
1	BAT(+)

Flexible Cable

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT(-)
3	BAT(+)
2	PG 0V
1	PG 5V
Shell	FG

Encoder (motor) end

Pin	Wire Color
2	Black/pink
1	Red/pink
5	Black/light blue
6	Red/light blue
9	Light green
4	Orange
10	FG

Shield wire

Battery Case

Pin	Signal
2	BAT(-)
1	BAT(+)

3.5 Relay Encoder Cable of 30 m to 50 m

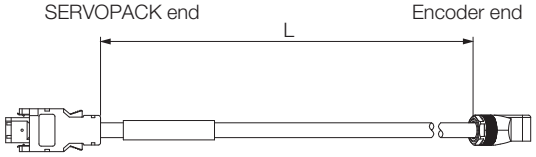
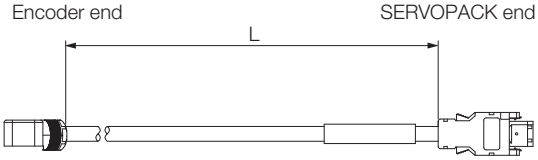
3.5.1 Relay Encoder Cables for Motor End

SGM7A-A5 to SGM7A-10 (50 W to 1.0 kW)

◆ Selection Table

Cable Direction	Specification	Length (L)	Order Number
Load side	For incremental or absolute encoder	0.3 m	JZSP-C7PRCD-E
Non-load side			JZSP-C7PRCE-E

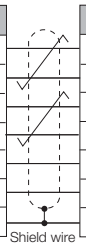
◆ External Dimensions

Cable Installed away from Load	Cable Installed toward Load
	

◆ Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT (-)
3	BAT (+)
2	PG 0V
1	PG 5V
Shell	FG



Encoder (motor) end

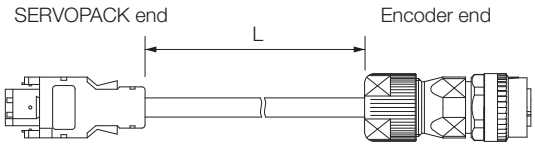
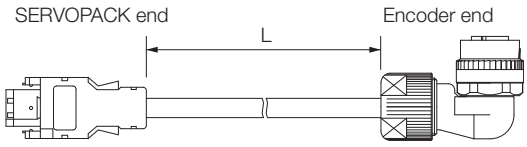
Pin	Wire Color
5	Light blue/white
4	Light blue
8	Orange/white
9	Orange
3	Black
6	Red
Shell	FG

SGM7A-15 to SGM7A-70 (1.5 kW to 7.0 kW)

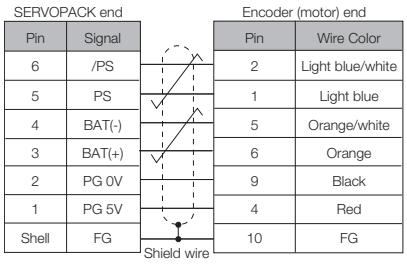
◆ Selection Table

Connector Specifications	Specification	Length (L)	Order Number
Straight Connector	For incremental or absolute encoder	0.3 m	JZSP-CVP01-E
Right-Angle Connector			JZSP-CVP02-E

◆ External Dimensions

Straight Connector	Right-Angle Connector
	

◆ Wiring Specifications



SERVOPACK end			Encoder (motor) end	
Pin	Signal		Pin	Wire Color
6	/PS		2	Light blue/white
5	PS		1	Light blue
4	BAT(-)		5	Orange/white
3	BAT(+)		6	Orange
2	PG 0V		9	Black
1	PG 5V		4	Red
Shell	FG	Shield wire	10	FG

Note: BAT(+) and BAT(-) are wired for an absolute encoder.

3.5.2 Relay Encoder Cables for SERVOPACK End

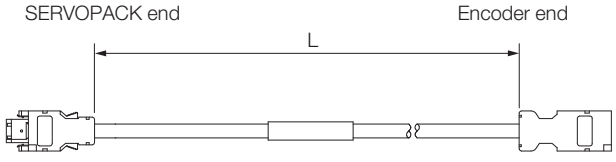
All Models

◆ Selection Table

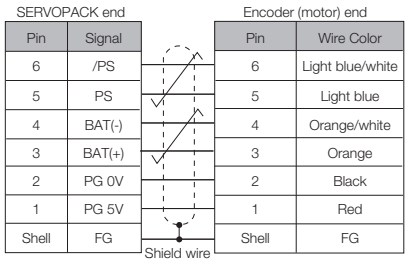
Specification	Length (L)	Order Number*
For incremental or absolute encoder	30 m, 40 m, and 50 m	JZSP-UCMP00-□□-E

* Replace the boxes (□□) in the order number with the cable length (30, 40, or 50).

◆ External Dimensions



◆ Wiring Specifications



SERVOPACK end			Encoder (motor) end	
Pin	Signal		Pin	Wire Color
6	/PS		6	Light blue/white
5	PS		5	Light blue
4	BAT(-)		4	Orange/white
3	BAT(+)		3	Orange
2	PG 0V		2	Black
1	PG 5V		1	Red
Shell	FG	Shield wire	Shell	FG

3.5.3 Relay Encoder Cables with Battery Case for SERVOPACK End

A Battery Case is required for a motor with an absolute encoder.

NOTICE

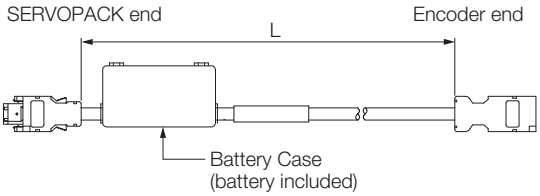
- **Install a battery at either the host controller or on the Encoder Cable.**
  If you install batteries both at the host controller and on the Encoder Cable at the same time, you will create a loop circuit between the batteries, resulting in a risk of damage or burning.

All Models

◆ Selection Table

Length (L)	Order Number
0.3 m	JZSP-CSP12-E

◆ External Dimensions



◆ Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT (-)
3	BAT (+)
2	PG 0V
1	PG 5V
Shell	FG

Encoder (motor) end

Pin	Wire Color
6	Light blue/white
5	Light blue
4	Orange/white
3	Orange
2	Black
1	Red
Shell	FG

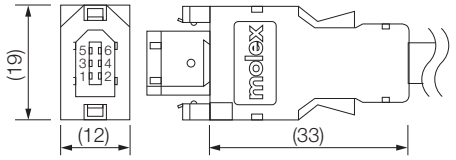
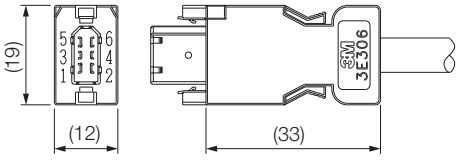
Shield wire

Battery Case

Pin	Signal
2	BAT (-)
1	BAT (+)

3.6 User-Assembled Wiring Materials for Encoder Cables

3.6.1 SERVOPACK Connector Kits

Type	Standard Connector Kit	Compatible Connector Kit *
Inquires	Yaskawa Controls Co., Ltd.	Sumitomo 3M Ltd.
Manufacturer	Molex Japan Co., Ltd.	
Order Number	JZSP-CMP9-1-E	
Specifications	55100-0670 (soldered) Product specifications: PS-54280	Receptacle: 3E206-0100 KV (soldered) Shell Kit: 3E306-3200-008 Product specifications: JNPS-1042 and JNPS-1043
External Dimensions [mm]		

* This item is not available from Yaskawa Controls Co., Ltd. Order it directly from Sumitomo 3M Ltd.

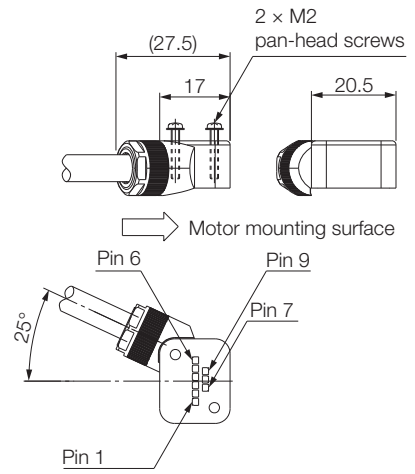
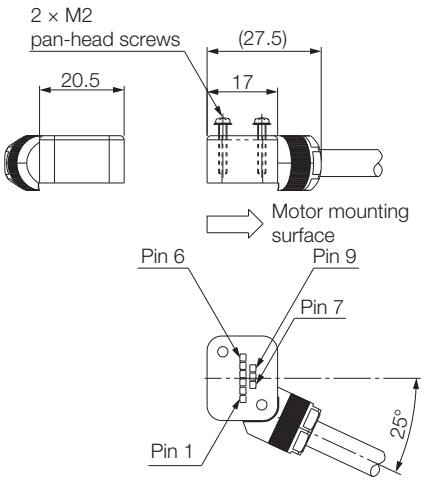
Note: Cables are not included. Purchase them separately.

3.6.2 Encoder Connector Kits

SGM7A-A5 to SGM7A-10 (50 W to 1.0 kW)

◆ Servomotor Connectors

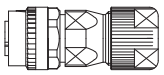
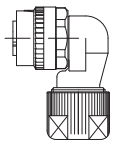
Order Number		JZSP-C7P9-1-E
Manufacturer		Molex Japan Co., Ltd.
Components		504678-0070 Loose Connectors: 56161-8181 (crimped), Reeled Connectors: 56161-8081 (crimped)
Applicable Wire Sizes		AWG22 to AWG26
Applicable Cable Diameter		6.3 mm to 7.7 mm
Outer Diameter of Insulating Sheath		1.05 mm to 1.4 mm
Mounting Screws		M2 pan-head screws (two)
Application Specifications		AS-504682
Crimping Specifications		CS-56161
Crimping Tool*	Hand Tool	57175-5000
Shell Caulking Tool		57331-5100

External Dimensions [mm]	■ Cable Installed away from Load 	■ Cable Installed toward Load 

* A Crimping Tool is required. When using other wire sizes, contact the connector manufacturer for crimping tools.

SGM7A-15 to SGM7A-70 (1.5 kW to 7.0 kW)

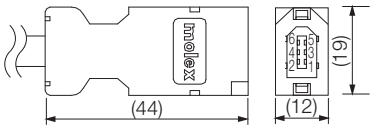
◆ IP67-Structure Servomotor Connectors

Type	Order Number	Specification	External Dimensions	Manufacturer
Straight Plug	JZSP-CVP9-1-E	• Plug: CM10-SP10S-M-D • Contacts: Crimped* CM10-#22SC(C4)-100 • Applicable cable diameter: 6.0 mm to 9.0 mm	 Accessories: Contacts	DDK Ltd.
	JZSP-CVP9-3-E	• Plug: CM10-SP10S-M-D • Contacts: Soldered CM10-#22SC(S1)-100 • Applicable cable diameter: 6.0 mm to 9.0 mm		
Right-Angle Plug	JZSP-CVP9-2-E	• Plug: CM10-AP10S-M-D • Contacts: Crimped* CM10-#22SC(C4)-100 • Applicable cable diameter: 6.0 mm to 9.0 mm	 Accessories: Contacts	
	JZSP-CVP9-4-E	• Plug: CM10-AP10S-M-D • Contacts: Soldered CM10-#22SC(S1)-100 • Applicable cable diameter: 6.0 mm to 9.0 mm		

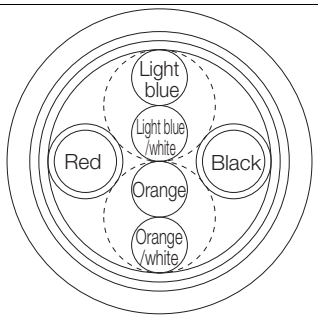
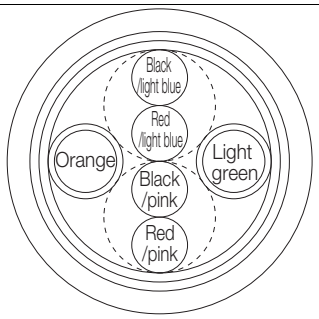
* A Crimping Tool is required. The following Crimping Tool is applicable to the Cables provided by Yaskawa. When using other wire sizes, contact the connector manufacturer for crimping tools.
Crimping Tool: 357J-52667T

All Models

◆ Cable Relay Connectors

Order Number	JZSP-CMP9-2-E
Manufacturer	Molex Japan Co., Ltd.
Components	54280-0609 (soldered)
Product Specifications	PS-54280
External Dimensions [mm]	

3.6.3 Cables without Connectors

Item	Standard Cable	Flexible Cable
Order Number*	JZSP-CMP09-□□-E (maximum length: 20 m)	JZSP-CSP39-□□-E (maximum length: 20 m)
Specifications	UL20276 (rated temperature: 80°C) AWG22 × 2C + AWG24 × 2P	UL20276 (rated temperature: 80°C) AWG22 × 2C + AWG24 × 2P
	AWG22 (0.33 mm^2) Outer diameter of insulating sheath: 1.15 mm	AWG22 (0.33 mm^2) Outer diameter of insulating sheath: 1.35 mm
	AWG24 (0.20 mm^2) Outer diameter of insulating sheath: 1.09 mm	AWG24 (0.20 mm^2) Outer diameter of insulating sheath: 1.21 mm
Finished Diameter	6.5 mm	6.8 mm
Internal Structure and Lead Colors		

* Replace the boxes (□□) in the order number with the cable length (05, 10, 15, or 20).

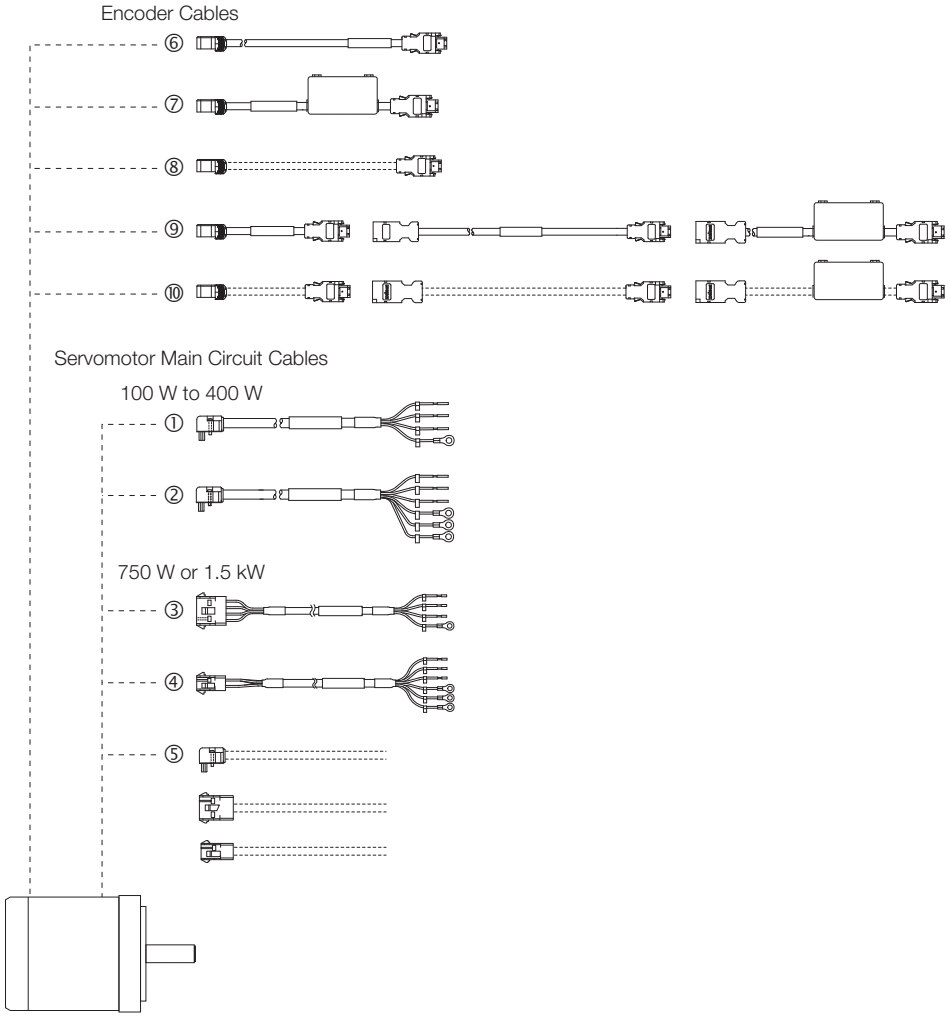
Cables and User-Assembled Wiring Materials for SGM7P Rotary Servomotors

4

4.1 Cable Configurations

Important

The Servomotor Main Circuit Cables and Encoder Cables are installed toward the load.
You cannot install these Cables away from the load.



Note: If the Encoder Cable length exceeds 20 m, be sure to use a Relay Encoder Cable.

No.	Cable Type		Reference
①	Servomotor Main Circuit Cables for Servomotors without Holding Brakes, 100 W to 400 W		page 4-3
②	Servomotor Main Circuit Cables for Servomotors with Holding Brakes, 100 W to 400 W		page 4-4
③	Servomotor Main Circuit Cables for Servomotors without Holding Brakes, 750 W or 1.5 kW		page 4-3
④	Servomotor Main Circuit Cables for Servomotors with Holding Brakes, 750 W or 1.5 kW		page 4-4
⑤	User-Assembled Wiring Materials for Servomotor Main Circuit Cables	Connectors	page 4-5
		Cables without Connectors	page 4-7
⑥	Encoder Cables of 20 m or less for Incremental Encoders		page 4-8
⑦	Encoder Cables of 20 m or Less with Battery Cases for Absolute Encoders		page 4-9
⑧	User-Assembled Wiring Materials for Encoder Cables	Connectors	page 4-12
		Cables without Connectors	page 4-13
⑨	Relay Encoder Cables of 30 m to 50 m		page 4-10
⑩	User-Assembled Wiring Materials for Relay Encoder Cables of 30 m to 50 m	Connectors	page 4-12
		Cables without Connectors	page 4-13

4.2 Servomotor Main Circuit Cables

4.2.1 Servomotor Main Circuit Cables for Servomotors without Holding Brakes

Selection Table

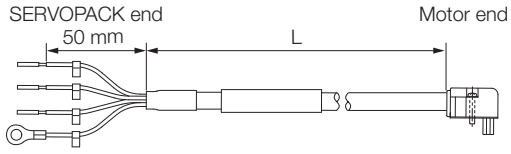
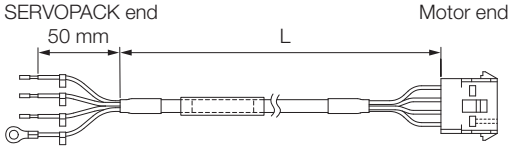
Servomotor Model	Length (L)	Order Number*1	
		Standard Cable	Flexible Cable*2, *3
SGM7P-01 100 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, and 50 m	JZSP-CSM01-□□-E	JZSP-CSM21-□□-E
SGM7P-02 or -04 200 W or 400 W		JZSP-CSM02-□□-E	JZSP-CSM22-□□-E
SGM7P-08 750 W		JZSP-CMM00-□□-E	JZSP-CMM01-□□-E
SGM7P-15 1.5 kW		JZSP-CMM20-□□-E	Note: Flexible Cables are not available.

*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, 20, 30, 40, or 50).
*2. Use Flexible Cables for moving parts of machines, such as robots.
*3. The recommended bending radius (R) is 90 mm or larger.

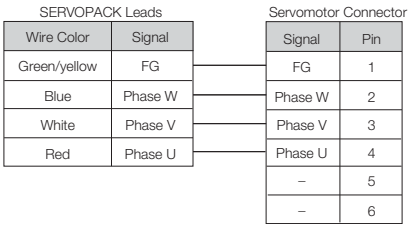
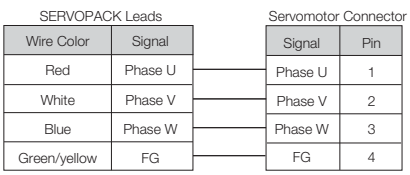
Note: If the length of the Servomotor Main Circuit Cable exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

External Dimensions

Note: Refer to *4.3.1 Servomotor Connector Kits* and *4.3.2 Cables without Connectors* for the connector and cable manufacturers, and for the order numbers.

For 100 W to 400 W	For 750 W or 1.5 kW
	

Wiring Specifications

For 100 W to 400 W	For 750 W or 1.5 kW
	

4.2.2 Servomotor Main Circuit Cables for Servomotors with Holding Brakes

Selection Table

Servomotor Model	Length (L)	Order Number*1	
		Standard Cable	Flexible Cable*2, *3
SGM7P-01 100 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, and 50 m	JZSP-CSM11-□□-E	JZSP-CSM31-□□-E
SGM7P-02 or -04 200 W or 400 W		JZSP-CSM12-□□-E	JZSP-CSM32-□□-E
SGM7P-08 750 W		JZSP-CMM10-□□-E	JZSP-CMM11-□□-E
SGM7P-15 1.5 kW		JZSP-CMM30-□□-E	Note: Flexible Cables are not available.

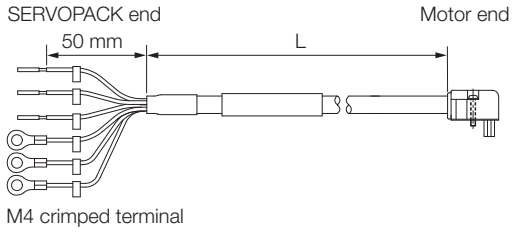
*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, 20, 30, 40, or 50).
*2. Use Flexible Cables for moving parts of machines, such as robots.
*3. The recommended bending radius (R) is 90 mm or larger.

Note: If the length of the Servomotor Main Circuit Cable exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

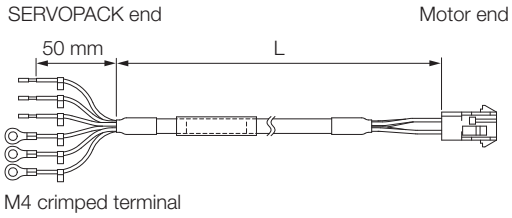
External Dimensions

Note: Refer to *4.3.1 Servomotor Connector Kits* and *4.3.2 Cables without Connectors* for the connector and cable manufacturers, and for the order numbers.

For 100 W to 400 W



For 750 W or 1.5 kW



Wiring Specifications

For 100 W to 400 W

SERVOPACK Leads			Servomotor Connector	
Wire Color	Signal		Signal	Pin
Green/yellow	FG		FG	1
Blue	Phase W		Phase W	2
White	Phase V		Phase V	3
Red	Phase U		Phase U	4
Black	Brake		Brake	5
Black	Brake		Brake	6

For 750 W or 1.5 kW

SERVOPACK Leads			Servomotor Connector	
Wire Color	Signal		Signal	Pin
Red	Phase U		Phase U	1
White	Phase V		Phase V	2
Blue	Phase W		Phase W	3
Green/yellow	FG		FG	4
Black	Brake		Brake	5
Black	Brake		Brake	6

Note: There is no polarity for the connection to the holding brake.

4.3 User-Assembled Wiring Materials for Servomotor Main Circuit Cables

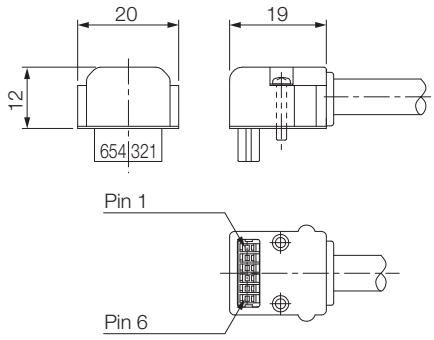
4.3.1 Servomotor Connector Kits

Selection Table

Servomotor Model	Servomotor Capacity	Order Number*
SGM7P-01	100 W	JZSP-CSM9-1-E
SGM7P-02 or -04	200 W or 400 W	JZSP-CSM9-2-E
SGM7P-08 or -15	750 W or 1.5 kW	Without Holding Brake: JZSP-CMM9-3-E
		With Holding Brake: JZSP-CSM9-5-E

* Cables are not included. Purchase them separately.

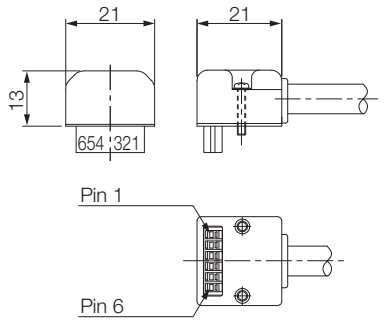
◆ SGM7P-01 (100 W)

Item		Description
Order Number		JZSP-CSM9-1-E
Manufacturer		J.S.T. Mfg. Co., Ltd.
User Instructions		JFA Connector J-1700
Components	Receptacle	J17-06FMH-7KL-1-CF
	Contacts	SJ1F-01GF-P0.8
Applicable Wire Sizes		AWG20 to AWG24
Applicable Cable Diameter		7 mm ±0.3 mm
Outer Diameter of Insulating Sheath		1.11 mm to 1.53 mm
Mounting Screws		M2 pan-head screws
Crimping Tool*	Hand Tool	YRS-8841
	Applicator	APLMK SJ1F/MO1-08
External Dimensions [mm]		

* A Crimping Tool is required. Contact the connector manufacturer for details.

Note: Cables are not included. Purchase them separately.

◆ SGM7P-02 or -04 (200 W or 400 W)

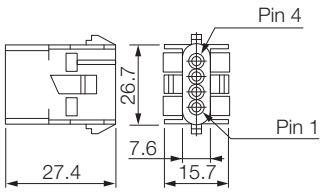
Item		Description
Order Number		JZSP-CSM9-2-E
Manufacturer		J.S.T. Mfg. Co., Ltd.
User Instructions		JFA Connector J-2700
Components	Receptacle	J27-06FMH-7KL-1-CF
	Contacts	SJ2F-01GF-P1.0
Applicable Wire Sizes		AWG20 to AWG24
Applicable Cable Diameter		7 mm ±0.3 mm
Outer Diameter of Insulating Sheath		1.11 mm to 1.53 mm
Mounting Screws		M2 pan-head screws
Crimping Tool*	Hand Tool	YRS-8861
	Applicator	APLMK SJ2F/MO1-10
External Dimensions [mm]		

* A Crimping Tool is required. Contact the connector manufacturer for details.

Note: Cables are not included. Purchase them separately.

◆ SGM7P-08 or -15 (750 W or 1.5 kW)

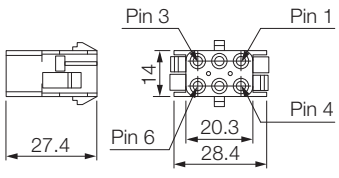
■ For Servomotors without Holding Brakes

Item		Description	External Dimensions [mm]
Manufacturer		Tyco Electronics Japan G.K.	
Order Number		JZSP-CMM9-3-E	
Components	Cap	350780-1	
	Socket	350550-6	
Applicable Wire Sizes		AWG20 to AWG14	
Crimping Tool*	Hand Tool	90296-2	

* A Crimping Tool is required. Contact the connector manufacturer for details.

Note: Cables are not included. Purchase them separately.

■ For Servomotors with Holding Brakes

Item		Description	External Dimensions [mm]
Manufacturer		Tyco Electronics Japan G.K.	
Order Number		JZSP-CSM9-5-E	
Components	Cap	350781-1	
	Socket	Power terminals: 350550-6 Holding brake terminals: 350689-3	
Applicable Wire Sizes		Power terminals: AWG20 to AWG14 Holding brake terminals: AWG24 to AWG18	
Crimping Tool*	Hand Tool	Power terminals: 90296-2 Holding brake terminals: 90300-2	

* A Crimping Tool is required. Contact the connector manufacturer for details.

Note: Cables are not included. Purchase them separately.

4.3.2 Cables without Connectors

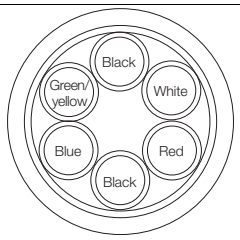
Selection Table

Servomotor Model	Servomotor Capacity	Order Number*1	
		Standard Cable	Flexible Cable*2, *3
SGM7P-01 to -04	100 W to 400 W	JZSP-CSM90-□□-E	JZSP-CSM80-□□-E
SGM7P-08 or -15	750 W or 1.5 kW	JZSP-CSM91-□□-E	JZSP-CSM81-□□-E

*1. Replace the boxes (□□) in the order number with the cable length (05, 10, 15, 20, 30, 40, or 50).
*2. Use Flexible Cables for moving parts of machines, such as robots.
*3. The recommended bending radius (R) is 90 mm or larger.

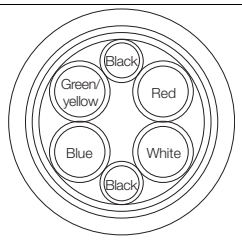
Note: If the length of the Servomotor Main Circuit Cable exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

◆ SGM7P-01 to -04 (100 W to 400 W)

Item	Standard Cable	Flexible Cable
Order Number*	JZSP-CSM90-□□-E (maximum length: 50 m)	JZSP-CSM80-□□-E (maximum length: 50 m)
Specifications	UL2517 (rated temperature: 105°C) AWG20 × 6C	UL2517 (rated temperature: 105°C) AWG22 × 6C
	Power lines: AWG20 (0.52 mm^2) Outer diameter of insulating sheath: 1.53 mm	Power lines: AWG22 (0.33 mm^2) Outer diameter of insulating sheath: 1.37 mm
	Holding brake lines: AWG20 (0.52 mm^2) Outer diameter of insulating sheath: 1.53 mm	Holding brake lines: AWG22 (0.33 mm^2) Outer diameter of insulating sheath: 1.37 mm
Finished Diameter	7 mm ±0.3 mm	
Internal Structure and Lead Colors		

* Replace the boxes (□□) in the order number with the cable length (05, 10, 15, 20, 30, 40, or 50).

◆ SGM7P-08 or -15 (750 W or 1.5 kW)

Item	Standard Cable	Flexible Cable
Order Number*	JZSP-CSM91-□□-E (maximum length: 50 m)	JZSP-CSM81-□□-E (maximum length: 50 m)
Specifications	UL2517 (rated temperature: 105°C) AWG16 × 4C or AWG20 × 2C	UL2517 (rated temperature: 105°C) AWG16 × 4C or AWG22 × 2C
	Power lines: AWG16 (1.31 mm^2) Outer diameter of insulating sheath: 2.15 mm	Power lines: AWG16 (1.31 mm^2) Outer diameter of insulating sheath: 2.35 mm
	Holding brake lines: AWG20 (0.52 mm^2) Outer diameter of insulating sheath: 1.6 mm	Holding brake lines: AWG22 (0.33 mm^2) Outer diameter of insulating sheath: 1.37 mm
Finished Diameter	8 mm ±0.3 mm	
Internal Structure and Lead Colors		

* Replace the boxes (□□) in the order number with the cable length (05, 10, 15, 20, 30, 40, or 50).

4.4 Encoder Cables of 20 m or Less

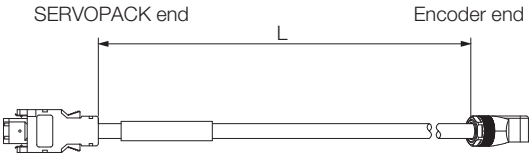
4.4.1 Encoder Cables for Incremental Encoders

Selection Table

Servomotor Model	Length (L)	Order Number*1	
		Standard Cable	Flexible Cable*2, *3
All SGM7P models	3 m, 5 m, 10 m, 15 m, or 20 m	JZSP-C7PI0D-□□-E	JZSP-C7PI2D-□□-E

*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2. Use Flexible Cables for moving parts of machines, such as robots.
*3. The recommended bending radius (R) is 90 mm or larger.

External Dimensions



Wiring Specifications

Standard Cable

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT (-)
3	BAT (+)
2	PG 0V
1	PG 5V
Shell	FG

Encoder (motor) end

Pin	Wire Color
5	Light blue/white
4	Light blue
8	Orange/white
9	Orange
3	Black
6	Red
Shell	FG

Shield wire

Flexible Cable

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT (-)
3	BAT (+)
2	PG 0V
1	PG 5V
Shell	FG

Encoder (motor) end

Pin	Wire Color
5	Black/pink
4	Red/pink
8	Black/light blue
9	Red/light blue
3	Light green
6	Orange
Shell	FG

Shield wire

4.4.2 Encoder Cables for Absolute Encoders

These cables are equipped with a Battery Case. (A Battery is included.)

Note: If a battery is connected to the host controller, the Battery Case is not required. If so, use a cable for incremental encoders.

NOTICE

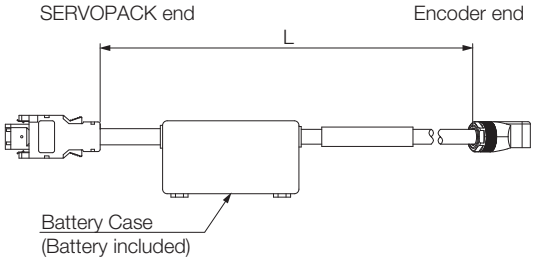
- **Install a battery at either the host controller or on the Encoder Cable.**
  If you install batteries both at the host controller and on the Encoder Cable at the same time, you will create a loop circuit between the batteries, resulting in a risk of damage or burning.

Selection Table

Servomotor Model	Length (L)	Order Number*1	
		Standard Cable	Flexible Cable*2, *3
All SGM7P models	3 m, 5 m, 10 m, 15 m, or 20 m	JZSP-C7PA0D-□□-E	JZSP-C7PA2D-□□-E

*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2. Use Flexible Cables for moving parts of machines, such as robots.
*3. The recommended bending radius (R) is 90 mm or larger.

External Dimensions



Wiring Specifications

Standard Cable

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT (-)
3	BAT (+)
2	PG 0V
1	PG 5V
Shell	FG

Encoder (motor) end

Pin	Wire Color
5	Light blue/white
4	Light blue
8	Orange/white
9	Orange
3	Black
6	Red
Shell	FG

Shield wire

Battery Case

Pin	Signal
2	BAT (-)
1	BAT (+)

Flexible Cable

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT (-)
3	BAT (+)
2	PG 0V
1	PG 5V
Shell	FG

Encoder (motor) end

Pin	Wire Color
5	Black/pink
4	Red/pink
8	Black/light blue
9	Red/light blue
3	Light green
6	Orange
Shell	FG

Shield wire

Battery Case

Pin	Signal
2	BAT (-)
1	BAT (+)

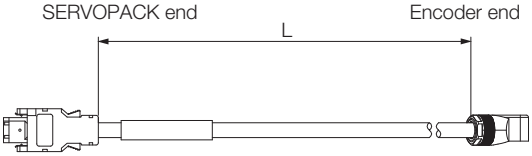
4.5 Relay Encoder Cable of 30 m to 50 m

4.5.1 Relay Encoder Cables for Motor End

Selection Table

Specification	Length (L)	Order Number
For incremental/absolute encoder	0.3 m	JZSP-C7PRCD-E

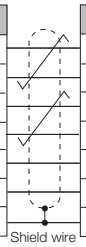
External Dimensions



Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT (-)
3	BAT (+)
2	PG 0V
1	PG 5V
Shell	FG



Encoder (motor) end

Pin	Wire Color
5	Light blue/white
4	Light blue
8	Orange/white
9	Orange
3	Black
6	Red
Shell	FG

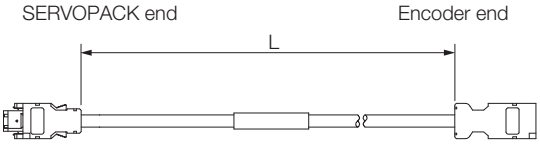
4.5.2 Relay Encoder Cables for SERVOPACK End

Selection Table

Specification	Length (L)	Order Number*
For incremental/absolute encoder	30 m, 40 m, or 50 m	JZSP-UCMP00-□□-E

* Replace the boxes (□□) in the order number with the cable length (30, 40, or 50).

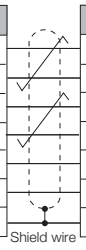
External Dimensions



Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT (-)
3	BAT (+)
2	PG 0V
1	PG 5V
Shell	FG



Encoder (motor) end

Pin	Wire Color
6	Light blue/white
5	Light blue
4	Orange/white
3	Orange
2	Black
1	Red
Shell	FG

4.5.3 Relay Encoder Cables with Battery Case for SERVOPACK End

A Battery Case is required for a motor with an absolute encoder.

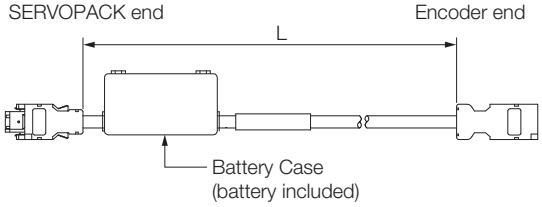
NOTICE

- Install a battery at either the host controller or on the Encoder Cable.
  If you install batteries both at the host controller and on the Encoder Cable at the same time, you will create a loop circuit between the batteries, resulting in a risk of damage or burning.

Selection Table

Length (L)	Order Number
0.3 m	JZSP-CSP12-E

External Dimensions



Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT (-)
3	BAT (+)
2	PG 0V
1	PG 5V
Shell	FG

Encoder (motor) end

Pin	Wire Color
6	Light blue/white
5	Light blue
4	Orange/white
3	Orange
2	Black
1	Red
Shell	FG

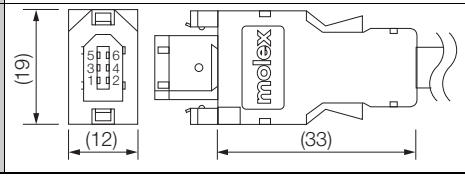
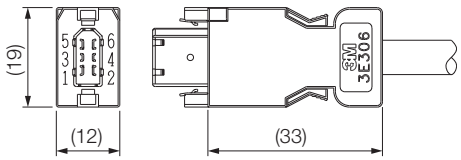
Shield wire

Battery Case

Pin	Signal
2	BAT (-)
1	BAT (+)

4.6 User-Assembled Wiring Materials for Encoder Cables

4.6.1 SERVOPACK Connector Kits

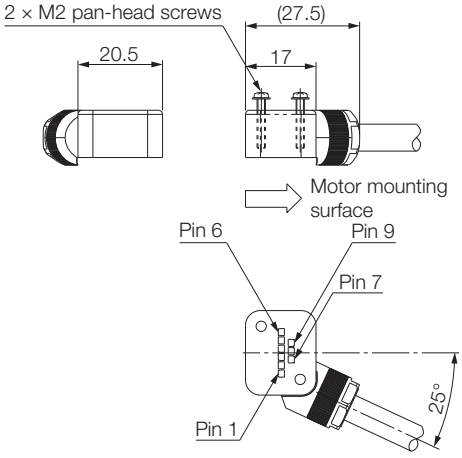
Type	Standard Connector Kit	Compatible Connector Kit*
Inquiries	Yaskawa Controls Co., Ltd.	Sumitomo 3M Ltd.
Manufacturer	Molex Japan Co., Ltd.	
Order Number	JZSP-CMP9-1-E	
Specifications	55100-0670 (soldered) Product specifications: PS-54280	Receptacle: 3E206-0100 KV (soldered) Shell Kit: 3E306-3200-008 Product specifications: JNPS-1042 and JNPS-1043
External Dimensions [mm]		

* This item is not available from Yaskawa Controls Co., Ltd. Order it directly from Sumitomo 3M Ltd.

Note: Cables are not included. Purchase them separately.

4.6.2 Encoder Connector Kits

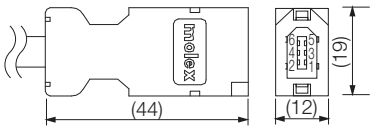
◆ Servomotor Connectors

Order Number		JZSP-C7P9-1-E
Manufacturer		Molex Japan Co., Ltd.
Components		504678-0070 Loose Connectors: 56161-8181 (crimped), Reeled: 56161-8081 (crimped)
Applicable Wire Sizes		AWG22 to AWG26
Applicable Cable Diameter		6.3 mm to 7.7 mm
Outer Diameter of Insulating Sheath		1.05 mm to 1.4 mm
Mounting Screws		M2 pan-head screws (two)
Application Specifications		AS-504682
Crimping Specifications		CS-56161
Crimping Tool*	Hand Tool	57175-5000
Shell Caulking Tool		57331-5100
External Dimensions [mm]		

* A Crimping Tool is required. When using other wire sizes, contact the connector manufacturer for crimping tools.

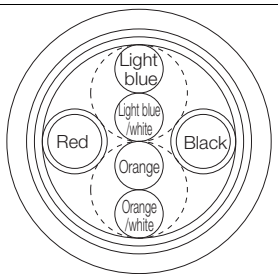
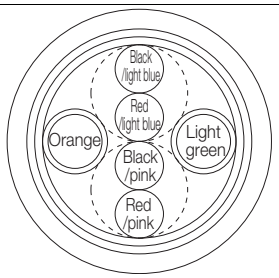
Note: Cables are not included. Purchase them separately.

◆ Cable Relay Connector

Order Number	JZSP-CMP9-2-E
Manufacturer	Molex Japan Co., Ltd.
Components	54280-0609 (soldered)
Product Specifications	PS-54280
External Dimensions [mm]	

Note: Cables are not included. Purchase them separately.

4.6.3 Cables without Connectors

Item	Standard Cable (20 m max.)	Flexible Cable (20 m max.)
Order Number*	JZSP-CMP09-□□-E	JZSP-CSP39-□□-E
Specifications	UL20276 (rated temperature: 80°C) AWG22 × 2C + AWG24 × 2P	UL20276 (rated temperature: 80°C) AWG22 × 2C + AWG24 × 2P
	AWG22 (0.33 mm^2) Outer diameter of insulating sheath: 1.15 mm	AWG22 (0.33 mm^2) Outer diameter of insulating sheath: 1.35 mm
	AWG24 (0.20 mm^2) Outer diameter of insulating sheath: 1.09 mm	AWG24 (0.20 mm^2) Outer diameter of insulating sheath: 1.21 mm
Finished Diameter	6.5 mm	6.8 mm
Internal Structure and Lead Colors		

* Replace the boxes (□□) in the order number with the cable length (05, 10, 15, or 20).

Cables and User-Assembled Wiring Materials for SGM7G Rotary Servomotors

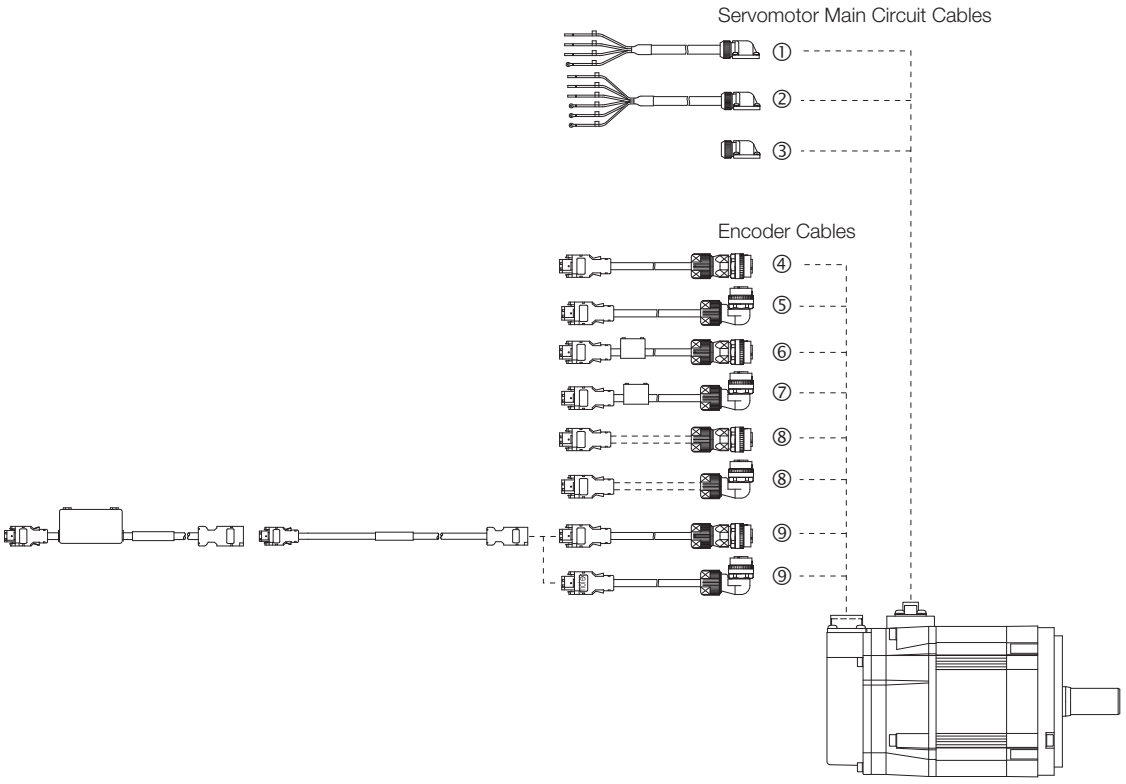
5

5.1 Cable Configurations

Important

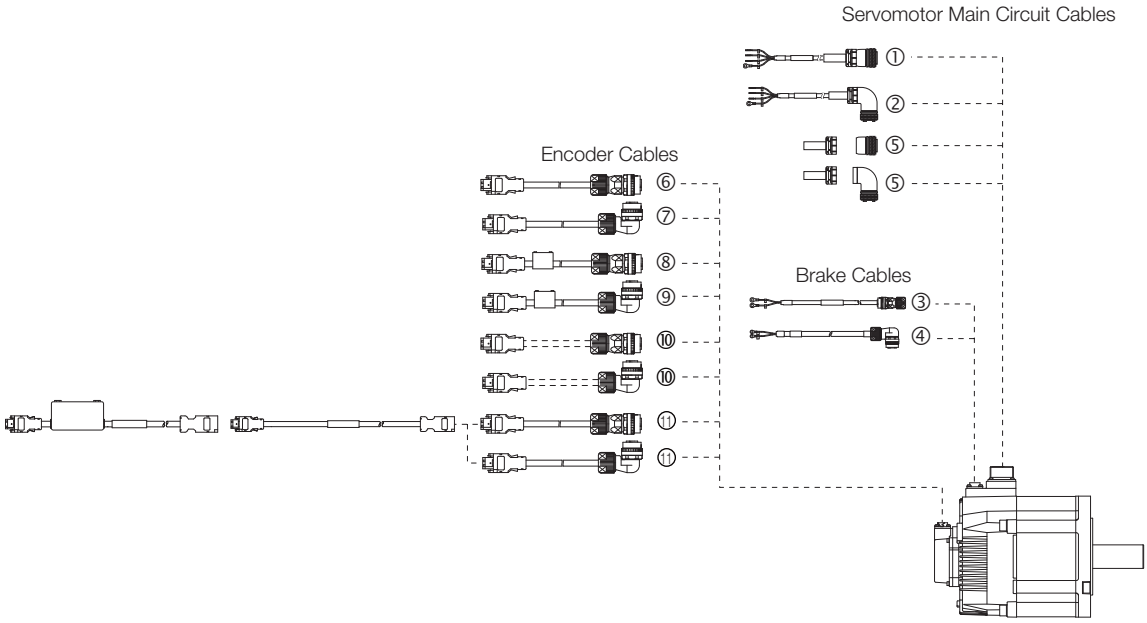
The Servomotor Main Circuit Cables and Encoder Cables are installed away from the load.
You cannot install these Cables toward the load.

5.1.1 SGM7G-03 to SGM7G-05 (300 W or 450 W)



No.	Cable Type		Reference
①	Servomotor Main Circuit Cables for Servomotors without Holding Brakes		page 5-5
②	Servomotor Main Circuit Cables for Servomotors with Holding Brakes		page 5-7
③	User-Assembled Wiring Materials for Servomotor Main Circuit Cables	Connectors	page 5-11
		Cables without Connectors	page 5-11
④	Encoder Cables of 20 m or less with Straight Plugs for Incremental Encoders		page 5-18
⑤	Encoder Cables of 20 m or less with Right-Angle Plugs for Incremental Encoders		
⑥	Encoder Cables of 20 m or Less with Straight Plugs and Battery Cases for Absolute Encoders		page 5-19
⑦	Encoder Cables of 20 m or Less with Right-Angle Plugs and Battery Cases for Absolute Encoders		
⑧	User-Assembled Wiring Materials for Encoder Cables	Connectors	page 5-22
		Cables without Connectors	page 5-23
⑨	Relay Encoder Cable of 30 m to 50 m		page 5-20

5.1.2 SGM7G-09 to SGM7G-1E (850 W to 15 kW)



No.	Cable Type		Reference
①	Servomotor Main Circuit Cables with Straight Plugs for Servomotors without Holding Brakes		page 5-5
②	Servomotor Main Circuit Cables with Right-Angle Plugs for Servomotors without Holding Brakes		
③	Holding Brake Cables with Straight Plugs		page 5-7
④	Holding Brake Cables with Right-Angle Plugs		
⑤	User-Assembled Wiring Materials for Servomotor Main Circuit Cables	Connectors	page 5-12, page 5-16
		Cables without Connectors*	–
⑥	Encoder Cables of 20 m or less with Straight Plugs for Incremental Encoders		page 5-18
⑦	Encoder Cables of 20 m or less with Right-Angle Plugs for Incremental Encoders		
⑧	Encoder Cables of 20 m or Less with Straight Plugs and Battery Cases for Absolute Encoders		page 5-19
⑨	Encoder Cables of 20 m or Less with Right-Angle Plugs and Battery Cases for Absolute Encoders		
⑩	User-Assembled Wiring Materials for Encoder Cables	Connectors	page 5-22
		Cables without Connectors	page 5-23
⑪	Relay Encoder Cable of 30 m to 50 m		page 5-20

* Yaskawa does not specify what wiring materials to use. Use appropriate wiring materials for the current specifications.

5.2 Servomotor Main Circuit Cables

5.2.1 Servomotor Main Circuit Cables for Servomotors without Holding Brakes

Selection Table

◆ SGM7G-03 or -05 (300 W or 450 W)

Servomotor Model	Length (L)	Order Number*1
		Flexible Cable*2, *3
SGM7G-03 or -05 300 W or 450 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, and 50 m	JZSP-CVM21-□□-E

*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, 20, 30, 40, or 50).
*2. Flexible cables are provided as a standard feature.
*3. The recommended bending radius (R) is 90 mm or larger.

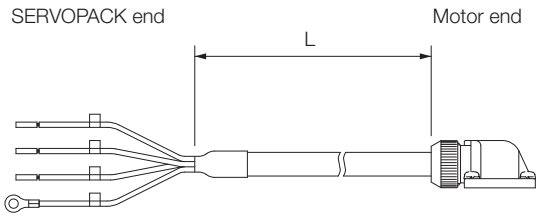
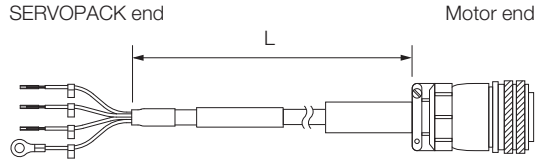
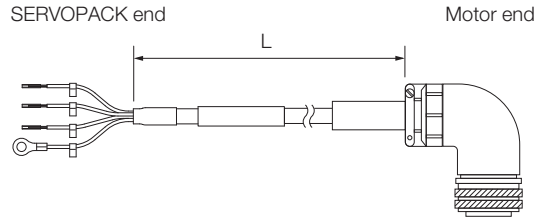
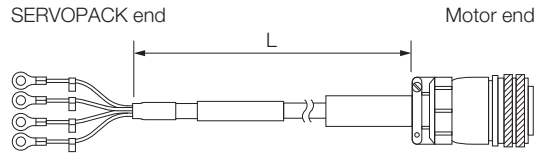
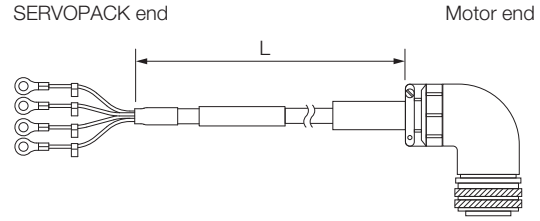
Note: If the length of the Servomotor Main Circuit Cable exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

◆ SGM7G-09 to -1E (850 W to 15 kW)

Servomotor Model	Connector Type	Length (L)	Order Number*1	
			Standard Cable	Flexible Cable*2, *3
SGM7G-09 or -13 850 W or 1.3 kW	MS connector, straight	3 m, 5 m, 10 m, 15 m, and 20 m	JZSP-UVA101-□□-E	JZSP-UVA121-□□-E
	MS connector, right-angle		JZSP-UVA102-□□-E	JZSP-UVA122-□□-E
SGM7G-20 1.8 kW	MS connector, straight		JZSP-UVA301-□□-E	JZSP-UVA321-□□-E
	MS connector, right-angle		JZSP-UVA302-□□-E	JZSP-UVA322-□□-E
SGM7G-30 or -44 2.9 kW or 4.4 kW	MS connector, straight		JZSP-UVA701-□□-E	JZSP-UVA721-□□-E
	MS connector, right-angle		JZSP-UVA702-□□-E	JZSP-UVA722-□□-E
SGM7G-55 or -75 5.5 kW or 7.5 kW	MS connector, straight		JZSP-UVAA01-□□-E	JZSP-UVAA21-□□-E
	MS connector, right-angle		JZSP-UVAA02-□□-E	JZSP-UVAA22-□□-E
SGM7G-1A or -1E 11 kW or 15 kW	MS connector, straight		JZSP-UVAB01-□□-E	JZSP-UVAB21-□□-E
	MS connector, right-angle		JZSP-UVAB02-□□-E	JZSP-UVAB22-□□-E

*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2. Use Flexible Cables for moving parts of machines, such as robots.
*3. The recommended bending radius (R) is 90 mm or larger.

External Dimensions

Servomotor Model	Connector Specifications	External Dimensions
SGM7G-03 or -05 300 W or 450 W	*1	
SGM7G-09 or -13 850 W or 1.3 kW	MS connector, straight*2	
	MS connector, right-angle*2	
SGM7G-20 to -1E 1.8 kW to 15 kW	MS connector, straight*2	
	MS connector, right-angle*2	

*1. Refer to *5.3.1 Servomotor Connector Kits for 300 W or 450 W* on page 5-11 for the connector manufacturers and order numbers.

*2. Refer to *5.3.3 Standard-Structure Servomotor Connectors for 850 W to 15 kW* on page 5-12 for the connector manufacturers and order numbers.

Wiring Specifications

300 W, 450 W

SERVOPACK Leads

Wire Color	Signal
Green/yellow	FG
Blue	Phase W
White	Phase V
Red	Phase U

Servomotor Connector

Signal	Pin
FG	PE
Phase W	1
Phase V	2
Phase U	3
–	4
–	5

850 W to 15 kW

SERVOPACK Leads

Wire Color	Signal
Red	Phase U
White	Phase V
Blue	Phase W
Green/yellow	FG

Servomotor Connector

Signal	Pin
Phase U	A
Phase V	B
Phase W	C
FG	D

5.2.2 Servomotor Main Circuit Cables for Servomotors with Holding Brakes

Selection Table

◆ SGM7G-03 or -05 (300 W or 450 W)

Servomotor Model	Length (L)	Order Number*1
		Flexible Cable*2, *3
SGM7G-03 or -05 300 W or 450 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, and 50 m	JZSP-CVM41-□□-E

*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, 20, 30, 40, or 50).
*2. Flexible cables are provided as a standard feature.
*3. The recommended bending radius (R) is 91 mm or larger.

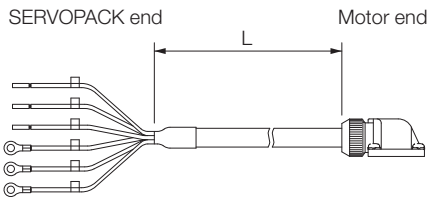
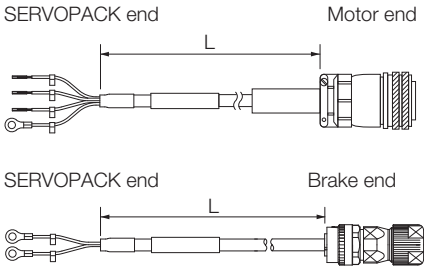
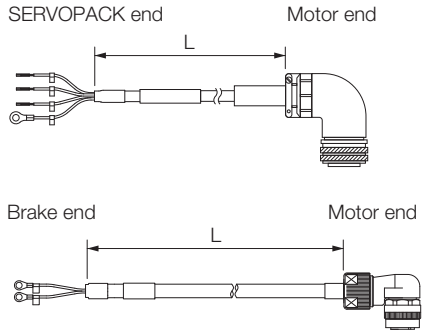
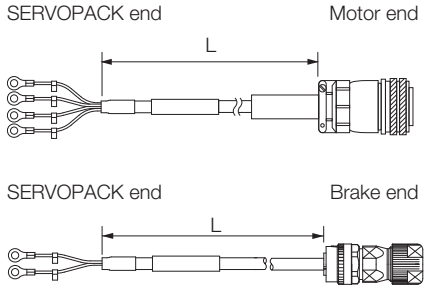
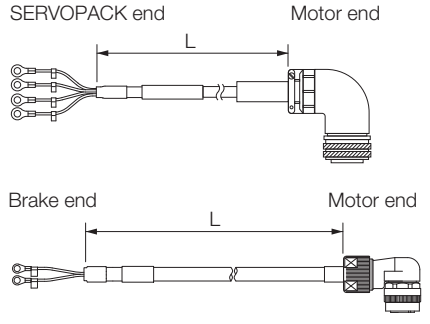
Note: If the length of the Servomotor Main Circuit Cable exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

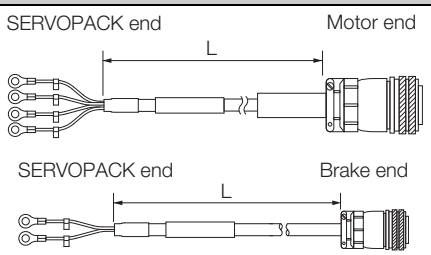
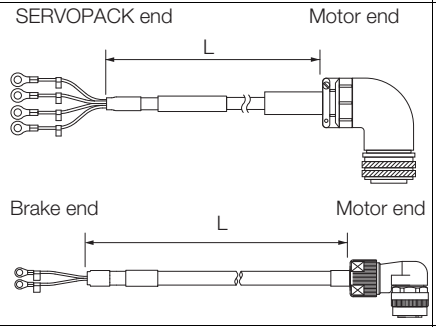
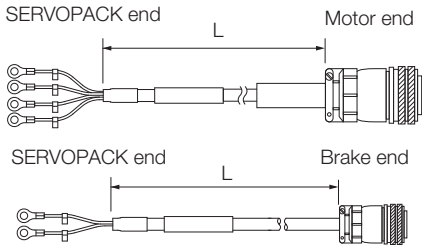
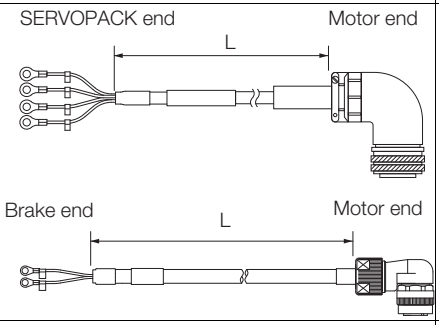
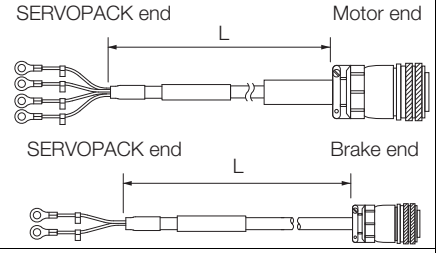
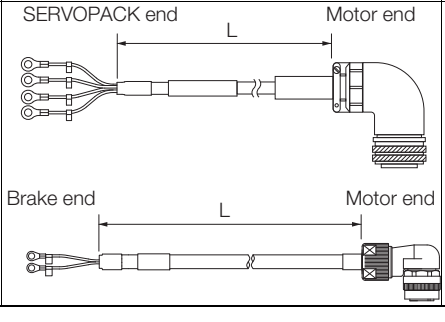
◆ SGM7G-09 to -1E (850 W to 15 kW)

Servomotor Model	Connector Specifications	Length (L)	Order Number*1, *2 Set of Two Cables (Main Power Supply Cable and Holding Brake Cable)	
			Standard Cable	Flexible Cable*3, *4
SGM7G-09 or -13 850 W or 1.3 kW	MS connector, straight	3 m, 5 m, 10 m, 15 m, and 20 m	JZSP-UVA131-□□-E	JZSP-UVA141-□□-E
	MS connector, right-angle		JZSP-UVA132-□□-E	JZSP-UVA142-□□-E
SGM7G-20 1.8 kW	MS connector, straight		JZSP-UVA331-□□-E	JZSP-UVA341-□□-E
	MS connector, right-angle		JZSP-UVA332-□□-E	JZSP-UVA342-□□-E
SGM7G-30 or -44 2.9 kW or 4.4 kW	MS connector, straight		JZSP-UVA731-□□-E	JZSP-UVA741-□□-E
	MS connector, right-angle		JZSP-UVA732-□□-E	JZSP-UVA742-□□-E
SGM7G-55 or -75 5.5 kW or 7.5 kW	MS connector, straight		JZSP-UVAA31-□□-E	JZSP-UVAA41-□□-E
	MS connector, right-angle		JZSP-UVAA32-□□-E	JZSP-UVAA42-□□-E
SGM7G-1A or -1E 11 kW or 15 kW	MS connector, straight		JZSP-UVAB31-□□-E	JZSP-UVAB41-□□-E
	MS connector, right-angle		JZSP-UVAB32-□□-E	JZSP-UVAB42-□□-E

*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2. Refer to *External Dimensions* on page 5-8 to obtain Main Circuit Power Supply Cables and Holding Brake Cables individually.
*3. Use Flexible Cables for moving parts of machines, such as robots.
*4. The recommended bending radius (R) is 92 mm or larger.

External Dimensions

Servomotor Model	Connector Type	External Dimensions	Individual Cable Order Numbers
SGM7G-03 or -05 300 W or 450 W	–		–
SGM7G-09 or -13 850 W or 1.3 kW	Straight		• Main Circuit Power Supply Cable Standard Cable: JZSP-UVA101-□□-E Flexible Cable: JZSP-UVA121-□□-E • Holding Brake Cable JZSP-CVB9-SMC3-E
	Right-angle		• Main Circuit Power Supply Cable Standard Cable: JZSP-UVA102-□□-E Flexible Cable: JZSP-UVA122-□□-E • Holding Brake Cable JZSP-CVB9-AMC3-E
SGM7G-20 1.8 kW	Straight		• Main Circuit Power Supply Cable Standard Cable: JZSP-UVA301-□□-E Flexible Cable: JZSP-UVA321-□□-E • Holding Brake Cable JZSP-CVB9-SMC3-E
	Right-angle		• Main Circuit Power Supply Cable Standard Cable: JZSP-UVA302-□□-E Flexible Cable: JZSP-UVA322-□□-E • Holding Brake Cable JZSP-CVB9-AMC3-E

Servomotor Model	Connector Type	External Dimensions	Individual Cable Order Numbers
SGM7G-30 or -44 2.9 kW or 4.4 kW	Straight		• Main Circuit Power Supply Cable Standard Cable: JZSP-UVA701-□□-E Flexible Cable: JZSP-UVA721-□□-E • Holding Brake Cable JZSP-CVB9-SMC3-E
	Right-angle		• Main Circuit Power Supply Cable Standard Cable: JZSP-UVA702-□□-E Flexible Cable: JZSP-UVA722-□□-E • Holding Brake Cable JZSP-CVB9-AMC3-E
SGM7G-55 or -75 5.5 kW or 7.5 kW	Straight		• Main Circuit Power Supply Cable Standard Cable: JZSP-UVAA01-□□-E Flexible Cable: JZSP-UVAA21-□□-E • Holding Brake Cable JZSP-CVB9-SMC3-E
	Right-angle		• Main Circuit Power Supply Cable Standard Cable: JZSP-UVAA02-□□-E Flexible Cable: JZSP-UVAA22-□□-E • Holding Brake Cable JZSP-CVB9-AMC3-E
SGM7G-1A or -1E 11 kW or 15 kW	Straight		• Main Circuit Power Supply Cable Standard Cable: JZSP-UVAB01-□□-E Flexible Cable: JZSP-UVAB21-□□-E • Holding Brake Cable JZSP-CVB9-SMC3-E
	Right-angle		• Main Circuit Power Supply Cable Standard Cable: JZSP-UVAB02-□□-E Flexible Cable: JZSP-UVAB22-□□-E • Holding Brake Cable JZSP-CVB9-AMC3-E

Wiring Specifications

For 300 W or 450 W

SERVOPACK Leads

Wire Color	Signal
Green/yellow	FG
Blue	Phase W
White	Phase V
Red	Phase U
Black	Brake
Black	Brake

Servomotor Connector

Signal	Pin
FG	PE
Phase W	1
Phase V	2
Phase U	3
Brake	4
Brake	5

For 850 W to 15 kW

SERVOPACK Leads

Wire Color	Signal
Red	Phase U
White	Phase V
Blue	Phase W
Green/yellow	FG
Black	Brake
Black	Brake

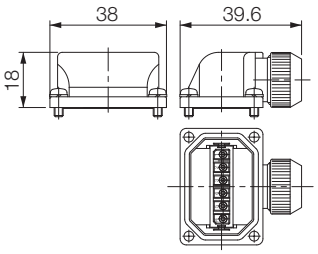
Servomotor Connector

Signal	Pin
Phase U	A
Phase V	B
Phase W	C
FG	D
Brake	1
Brake	2

Note: There is no polarity for the connection to the brake.

5.3 User-Assembled Wiring Materials for Servomotor Main Circuit Cables

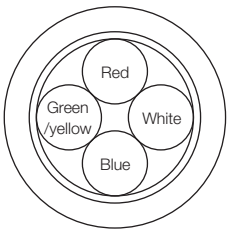
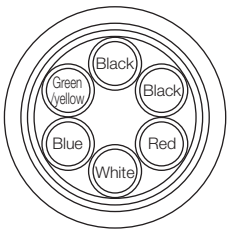
5.3.1 Servomotor Connector Kits for 300 W or 450 W

Item		Description	External Dimensions [mm]
Order Number		JZSP-CVM9-1-E	
Manufacturer		Japan Aviation Electronics Industry, Ltd.	
User Instructions		JAHL-50020	
Compo-nents	Plug	JNYFX06SJ3	
	Contacts	ST-TMH-S-C1B	
Applicable Wire Sizes		AWG18 to AWG22	
Applicable Cable Diameter		6.9 mm to 8.3 mm	
Outer Diameter of Insulating Sheath		1.3 mm to 1.8 mm	
Mounting Screws		M3 pan-head screws	
Crimping Tool*	Hand Tool	CT160-3-TMH5B	

* A Crimping Tool is required. Contact the connector manufacturer for details.

Note: Cables are not included. Purchase them separately.

5.3.2 Cables without Connectors for 300 W or 450 W

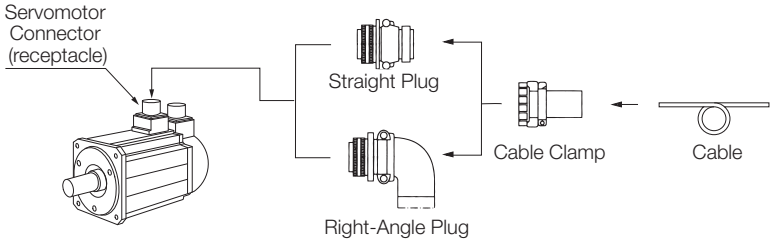
Item	For Servomotors without Holding Brakes (4 Wires)	For Servomotors with Holding Brakes (6 Wires)
Order Number*	JZSP-CVM29-□□-E (maximum length: 50 m)	JZSP-CVM49-□□-E (maximum length: 50 m)
Specifications	UL2586 (rated temperature:105°C) AWG20 × 4C	UL2586 (rated temperature:105°C) AWG20 × 6C
	Power lines: AWG20 (0.52 mm^2) Outer diameter of insulating sheath: 1.77 mm	Power lines: AWG20 (0.52 mm^2) Outer diameter of insulating sheath: 1.77 mm
	–	Holding brake lines: AWG20 (0.52 mm^2) Outer diameter of insulating sheath: 1.77 mm
Finished Diameter	7.3 mm ±0.3 mm	7.4 mm ±0.3 mm
Internal Structure and Lead Colors		

* Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, 20, 30, 40, or 50).

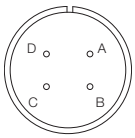
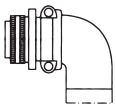
Note: These are Flexible Cables.

5.3.3 Standard-Structure Servomotor Connectors for 850 W to 15 kW

◆ Connector Structures



For Servomotors without Holding Brakes

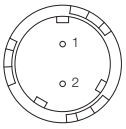
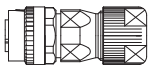
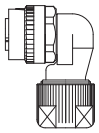
Servomotor Model	Capacity	Servomotor Connector Model (Receptacle) 	Order Number			Manufacturer
			Straight Plug 	Right-Angle Plug 	Cable Clamp 	
SGM7G-09 SGM7G-13 SGM7G-20	850 W to 1.8 kW	CE05-2A18-10PD-D (MS Connector model: MS3102A18-10P)	N/MS3106B18-10S	N/MS3108B18-10S	N/MS3057-10A	Japan Aviation Electronics Industry, Ltd.
SGM7G-30 SGM7G-44	2.9 kW to 4.4 kW	CE05-2A22-22PD-D (MS Connector model: MS3102A22-22P)	N/MS3106B22-22S	N/MS3108B22-22S	N/MS3057-12A	
SGM7G-55 SGM7G-75 SGM7G-1A SGM7G-1E	5.5 kW to 15 kW	CE05-2A32-17PD-D (MS Connector model: MS3102A32-17P)	N/MS3106B32-17S	N/MS3108B32-17S	N/MS3057-20A	

Note: 1. Servomotor Connectors (receptacles) are compatible with MS Connectors. If you prepare your own cables, refer to the model number of MS connector in parentheses and select the appropriate plug.
2. Yaskawa does not specify what wiring materials to use. Use appropriate wiring materials for the current specifications and connectors.

For Servomotors with Holding Brakes

A Servomotor Connector and Brake Power Supply Connector are required.

The Servomotor Connector is also used for Servomotors without Holding Brakes.

Servomotor Model	Capacity	Servomotor Connector Model (Receptacle) 	Order Number		Manufacturer
			Straight Plug 	Right-Angle Plug 	
SGM7G-09 SGM7G-13 SGM7G-20 SGM7G-30 SGM7G-40 SGM7G-55 SGM7G-75 SGM7G-1A SGM7G-1E	850 W to 15 kW	CM10-R2P-D	CM10-SP2S-S-D Applicable cable diameter: 4.0 mm to 6.0 mm	CM10-AP2S-S-D Applicable cable diameter: 4.0 mm to 6.0 mm	DDK Ltd.
			CM10-SP2S-M-D Applicable cable diameter: 6.0 mm to 9.0 mm	CM10-AP2S-M-D Applicable cable diameter: 6.0 mm to 9.0 mm	
			CM10-SP2S-L-D Applicable cable diameter: 9.0 mm to 11.6 mm	CM10-AP2S-L-D Applicable cable diameter: 9.0 mm to 11.6 mm	

Note: 1. Yaskawa does not specify what wiring materials to use. Use appropriate wiring materials for the current specifications and connectors.

2. Brake Power Supply Connector Kits are available from Yaskawa Controls Co., Ltd. Use the following model numbers.

JZSP-CVB9-SMS2-E

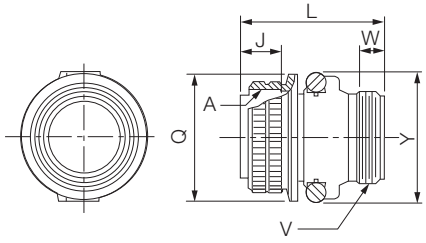
- Connector Shape
  - S: Straight plug
  - A: Right-angle plug
- Bush Size*1
  - S: S size (4.0 mm to 6.0 mm dia.)
  - M: M size (6.0 mm to 9.0 mm dia.)
  - L: L size (9.0 mm to 11.6 mm dia.)
- Contact Pin Type
  - S2: Soldered
  - C3: Crimped*2

*1. M-size Connector Kits are available as a standard products.

*2. A 357J-50448T Crimping Tool from DDK Ltd. is required.

External Dimensions

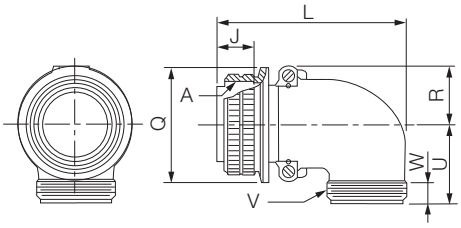
◆ Straight Plugs: N/MS3106B□□-□□S



Unit: mm

Part	Shell Size	Joint Thread A	Length of Joint J±0.12	Total Length L Max.	Joint Nut Outer Diameter Q $^{+0}_{-0.38}$ Dia.	Cable Clamp Mounting Thread V	Effective Thread Length W Min.	Maximum Width Y Max.
N/MS3106B□□-□□S	18	1-1/8-18UNEF	18.26	52.37	34.13	1-20UNEF	9.53	42
	22	1-3/8-18UNEF	18.26	55.57	40.48	1-3/16-18UNEF	9.53	50
	32	2-18UNS	18.26	61.92	56.33	1-3/4-18UNS	11.13	66

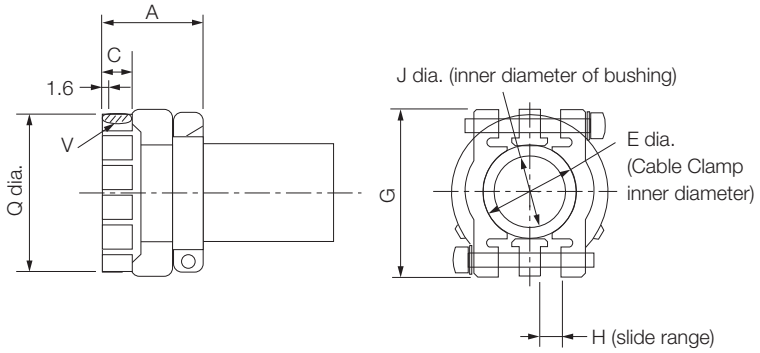
◆ Right-Angle Plug: N/MS3108B□□-□□S



Unit: mm

Part	Shell Size	Joint Thread A	Length of Joint J ±0.12	Total Length L Max.	Joint Nut Outer Diameter Q $^{+0}_{-0.38}$ Dia.	R ±0.5	U ±0.5	Cable Clamp Mounting Thread V	Effective Thread Length W Min.
N/MS3108B□□-□□S	18	1-1/8-18UNEF	18.26	68.27	34.13	20.5	30.2	1-20UNEF	9.53
	22	1-3/8-18UNEF	18.26	76.98	40.48	24.1	33.3	1-3/16-18UNEF	9.53
	32	2-18UNS	18.26	95.25	56.33	32.8	44.4	1-3/4-18UNS	11.13

◆ Cable Clamp: N/MS3057-□□A



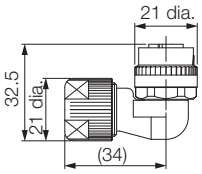
Unit: mm

Part	Applicable Connector Shell Size	Total Length A ±0.7	Effective Thread Length C	E Dia.	G ±0.7	H	J Dia.	Mounting Thread V	Outer Diameter Q ±0.7 Dia.	Attached Bushing
N/MS3057-10A	18	23.8	10.3	15.9	31.7	3.2	14.3	1-20UNEF	30.1	AN3420-10
N/MS3057-12A	20, 22	23.8	10.3	19	37.3	4	15.9	1-3/16-18UNEF	35.0	AN3420-12
N/MS3057-20A	32	27.8	11.9	31.7	51.6	6.3	23.8	1-3/4-18UNS	51.6	AN3420-20

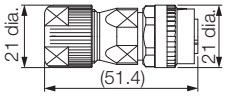
Note: A rubber bushing is included.

◆ Brake Power Supply Connector: CM10-□P2S-□-D

■ Right-Angle Plugs
(CM10-AP2S-□-D)



■ Straight Plugs
(CM10-SP2S-□-D)



[Unit: mm]

Item	Specification
Connector Models	• Straight Plug (CM10-SP2S-□-D) • Right-Angle Plug (CM10-AP2S-□-D)
Protective Structure	IP67
Manufacturer	DDK Ltd.
User Instructions	• Straight Plug (CM10-SP2S-□-D): TC-583 • Right-Angle Plug (CM10-AP2S-□-D): TC-573
Contact Models	■ Loose Contacts (100 per bag) • Crimped Contacts: CM10-#22SC(C3)-100 Wire size: AWG16 to AWG20, Outer diameter of insulating sheath: 1.87 mm to 2.45 mm Manual Crimping Tool: 357J-50448T • Soldered Contacts: CM10-#22SC(S2)-100 Wire size: AWG16 max. ■ Reeled Contacts (4,000 per reel) • Crimped Contacts: CM10-#22SC(C3)-4000 Wire size: AWG16 to AWG20, Outer diameter of insulating sheath: 1.87 mm to 2.45 mm Semi-automatic Crimping Tool: AP-A50541T (Set) AP-A50541T-1 (Applicator) Note: The Semi-automatic Tool Set includes the press and Applicator (crimper).

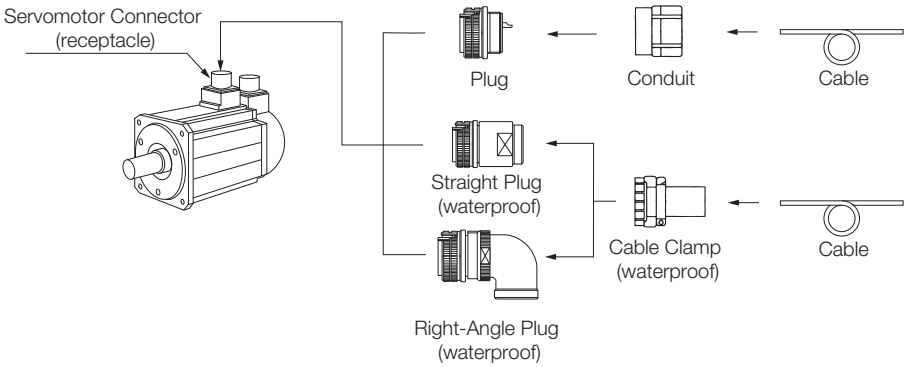
Note: Cables are not included. Purchase them separately.

5.3.4 IP67-Structure/European-Safety-Standard-Compliant Servomotor Connectors for 850 W to 15 kW

Cables with connectors on both ends that are compliant with an IP67 protective structure and European Safety Standards are not available from Yaskawa for SGM7G Servomotors. You must make such a cable yourself.

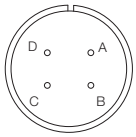
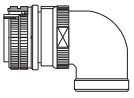
Use the Connectors specified by Yaskawa for these Servomotors. (These connectors are compliant with the standards.) Yaskawa does not specify what wiring materials to use.

Connector Structures



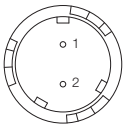
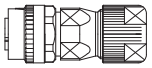
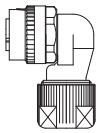
Note: For the conduit grounding, contact the manufacturer of the conduit.

For Servomotors without Holding Brakes

Servomotor Model	Capacity	Servomotor Connector Model (Receptacle) 	Order Number: Plug Only 	Order Number: Straight Plug 	Order Number: Right-Angle Plug 	Order Number: Cable Clamp 	Applicable Cable Diameter (Reference Values) [mm]	Manufacturer
SGM7G-09 SGM7G-13 SGM7G-20	850 W to 1.8 kW	CE05-2A18-10PD-D	CE05-6A18-10SD-D	CE05-6A18-10SD-D-BSS	CE05-8A18-10SD-D-BAS	CE3057-10A-1-D	10.5 to 14.1	DDK Ltd.
						CE3057-10A-2-D	8.5 to 11.0	
						CE3057-10A-3-D	6.5 to 8.7	
SGM7G-30 SGM7G-44	2.9 kW to 4.4 kW	CE05-2A22-22PD-D	CE05-6A22-22SD-D	CE05-6A22-22SD-D-BSS	CE05-8A22-22SD-D-BAS	CE3057-12A-1-D	12.5 to 16.0	
						CE3057-12A-2-D	9.5 to 13.0	
						CE3057-12A-3-D	6.8 to 10.0	
						CE3057-12A-4-D	14.5 to 17.0	
SGM7G-55 SGM7G-75 SGM7G-1A SGM7G-1E	5.5 kW to 15 kW	CE05-2A32-17PD-D	CE05-6A32-17SD-D	CE05-6A32-17SD-D-BSS	CE05-8A32-17SD-D-BAS	CE3057-20A-1-D	22 to 23.8	
						CE3057-20A-2-D	24 to 26.6	
						CE3057-20A-3-D	22 to 22.5	

For Servomotors with Holding Brakes

A Servomotor Connector and Brake Power Supply Connector are required. The Servomotor Connector is also used for Servomotors without Holding Brakes. For the SGM7G-15 to SGM7G-1E, there is a brake terminal on the Servomotor Connector.

Servomotor Model	Capacity	Servomotor Connector Model (Receptacle) 	Order Number		Manufacturer
			Straight Plug 	Right-Angle Plug 	
SGM7G-09 SGM7G-13 SGM7G-20 SGM7G-30 SGM7G-44 SGM7G-55 SGM7G-75 SGM7G-1A SGM7G-1E	850 W to 15 kW	CM10-R2P-D	CM10-SP2S-S-D Applicable cable diameter: 4.0 mm to 6.0 mm	CM10-AP2S-S-D Applicable cable diameter: 4.0 mm to 6.0 mm	DDK Ltd.
			CM10-SP2S-M-D Applicable cable diameter: 6.0 mm to 9.0 mm	CM10-AP2S-M-D Applicable cable diameter: 6.0 mm to 9.0 mm	
			CM10-SP2S-L-D Applicable cable diameter: 9.0 mm to 11.6 mm	CM10-AP2S-L-D Applicable cable diameter: 9.0 mm to 11.6 mm	

Note: 1. Yaskawa does not specify what wiring materials to use. Use appropriate wiring materials for the current specifications and connectors.

2. Brake Power Supply Connector Kits are available from Yaskawa Controls Co., Ltd. Use the following model numbers.

JZSP-CVB9-SMS2-E

- Connector Shape
  - S: Straight plug
  - A: Right-angle plug
- Bush Size*1
  - S: S size (4.0 mm to 6.0 mm dia.)
  - M: M size (6.0 mm to 9.0 mm dia.)
  - L: L size (9.0 mm to 11.6 mm dia.)
- Contact Pin Type
  - S2: Soldered
  - C3: Crimped*2

*1. M-size Connector Kits are available as a standard products.

*2. A 357J-50448T Crimping Tool from DDK Ltd. is required.

5.4 Encoder Cables of 20 m or Less

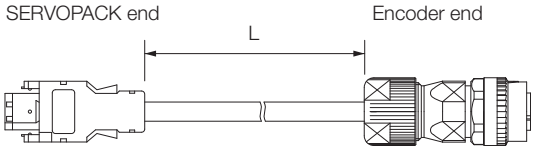
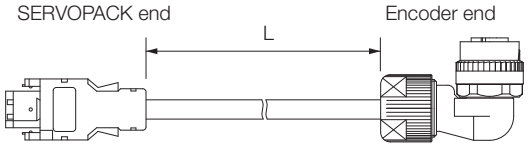
5.4.1 Encoder Cables for Incremental Encoders

Selection Table

Servomotor Model	Connector Specifications	Length (L)	Order Number*1	
			Standard Cable	Flexible Cable*2, *3
All SGM7G models	Straight	3 m, 5 m, 10 m, 15 m, and 20 m	JZSP-CVP01-□□-E	JZSP-CVP11-□□-E
	Right-angle		JZSP-CVP02-□□-E	JZSP-CVP12-□□-E

*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2. Use Flexible Cables for moving parts of machines, such as robots.
*3. The recommended bending radius (R) is 90 mm or larger.

External Dimensions

Straight Connector	Right-Angle Connector
	

Wiring Specifications

Standard Cable

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT(-)
3	BAT(+)
2	PG 0V
1	PG 5V
Shell	FG

Shield wire

Encoder (motor) end

Pin	Wire Color
2	Light blue/white
1	Light blue
5	Orange/white
6	Orange
9	Black
4	Red
10	FG

Flexible Cable

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT(-)
3	BAT(+)
2	PG 0V
1	PG 5V
Shell	FG

Shield wire

Encoder (motor) end

Pin	Wire Color
2	Black/pink
1	Red/pink
5	Black/light blue
6	Red/light blue
9	Light green
4	Orange
10	FG

5.4.2 Encoder Cables for Absolute Encoders

These cables are equipped with a Battery Case. (A Battery is included.)

Note: If a battery is connected to the host controller, the Battery Case is not required. If so, use a cable for incremental encoders.

NOTICE

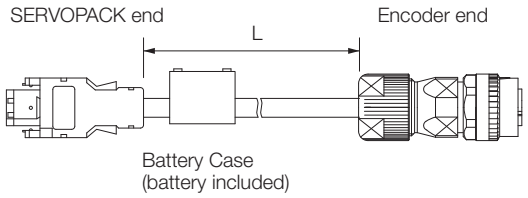
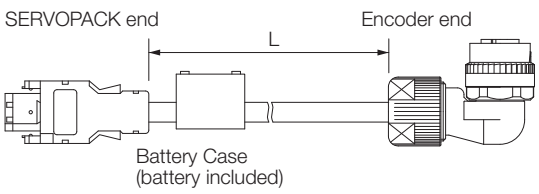
- **Install a battery at either the host controller or on the Encoder Cable.**
  If you install batteries both at the host controller and on the Encoder Cable at the same time, you will create a loop circuit between the batteries, resulting in a risk of damage or burning.

Selection Table

Servomotor Model	Connector Specifications	Length (L)	Order Number*1	
			Standard Cable	Flexible Cable*2, *3
SGM7G-09 to -1E 850 W to 15 kW	Straight	3 m, 5 m, 10 m, 15 m, and 20 m	JZSP-CVP06-□□-E	JZSP-CVP26-□□-E
	Right-angle		JZSP-CVP07-□□-E	JZSP-CVP27-□□-E

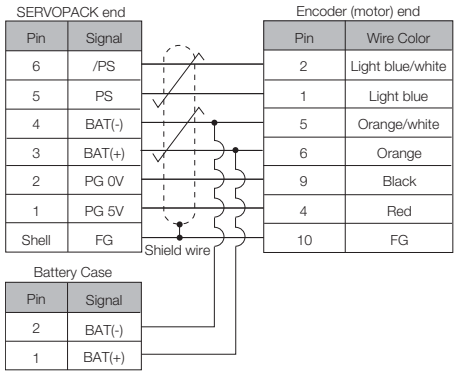
*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2. Use Flexible Cables for moving parts of machines, such as robots.
*3. The recommended bending radius (R) is 90 mm or larger.

External Dimensions

Straight Connector	Right-Angle Connector
	

Wiring Specifications

Standard Cable

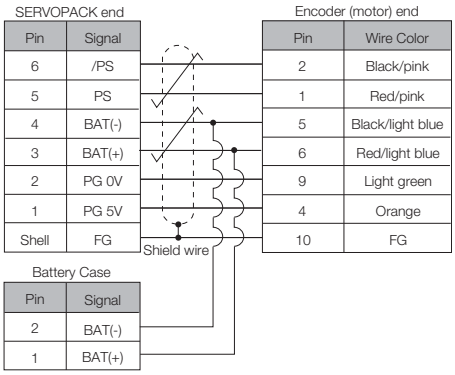


Pin	Signal
6	/PS
5	PS
4	BAT(-)
3	BAT(+)
2	PG 0V
1	PG 5V
Shell	FG

Pin	Wire Color
2	Light blue/white
1	Light blue
5	Orange/white
6	Orange
9	Black
4	Red
10	FG

Pin	Signal
2	BAT(-)
1	BAT(+)

Flexible Cable



Pin	Signal
6	/PS
5	PS
4	BAT(-)
3	BAT(+)
2	PG 0V
1	PG 5V
Shell	FG

Pin	Wire Color
2	Black/pink
1	Red/pink
5	Black/light blue
6	Red/light blue
9	Light green
4	Orange
10	FG

Pin	Signal
2	BAT(-)
1	BAT(+)

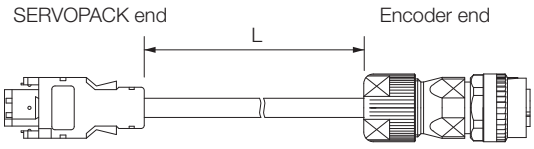
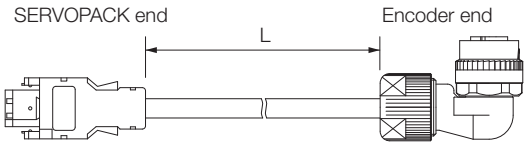
5.5 Relay Encoder Cables of 30 m to 50 m

5.5.1 Relay Encoder Cables for Motor End

Selection Table

Connector Specifications	Specification	Length (L)	Order Number
Straight Connector	For incremental or absolute encoder	0.3 m	JZSP-CVP01-E
Right-Angle Connector			JZSP-CVP02-E

External Dimensions

Straight Connector	Right-Angle Connector
	

Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT(-)
3	BAT(+)
2	PG 0V
1	PG 5V
Shell	FG

Shield wire

Encoder (motor) end

Pin	Wire Color
2	Light blue/white
1	Light blue
5	Orange/white
6	Orange
9	Black
4	Red
10	FG

Note: BAT(+) and BAT(-) are wired for an absolute encoder.

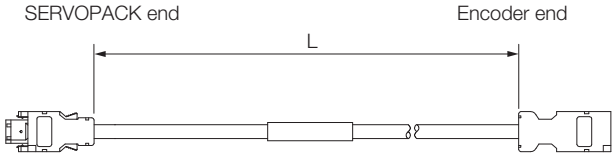
5.5.2 Relay Encoder Cables for SERVOPACK End

Selection Table

Specification	Length (L)	Order Number*
For incremental or absolute encoder	30 m, 40 m, and 50 m	JZSP-UCMP00-□□-E

* Replace the boxes (□□) in the order number with the cable length (30, 40, or 50).

External Dimensions



Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT(-)
3	BAT(+)
2	PG 0V
1	PG 5V
Shell	FG

Shield wire

Encoder (motor) end

Pin	Wire Color
6	Light blue/white
5	Light blue
4	Orange/white
3	Orange
2	Black
1	Red
Shell	FG

5.5.3 Relay Encoder Cables with Battery Case for SERVOPACK End

A Battery Case is required for a motor with an absolute encoder.

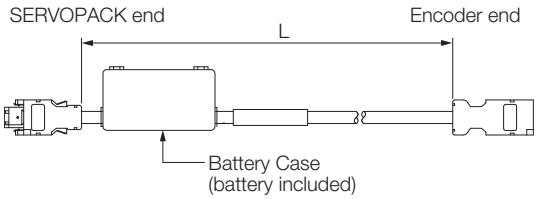
NOTICE

- Install a battery at either the host controller or on the Encoder Cable.
  If you install batteries both at the host controller and on the Encoder Cable at the same time, you will create a loop circuit between the batteries, resulting in a risk of damage or burning.

Selection Table

Length (L)	Order Number
0.3 m	JZSP-CSP12-E

External Dimensions



Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT(-)
3	BAT(+)
2	PG 0V
1	PG 5V
Shell	FG

Shield wire

Encoder (motor) end

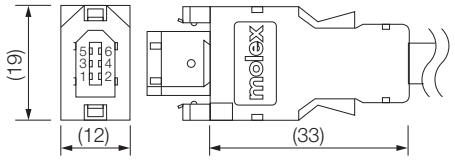
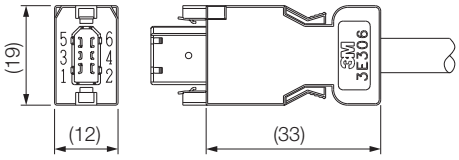
Pin	Wire Color
6	Light blue/white
5	Light blue
4	Orange/white
3	Orange
2	Black
1	Red
Shell	FG

Battery Case

Pin	Signal
2	BAT(-)
1	BAT(+)

5.6 User-Assembled Wiring Materials for Encoder Cables

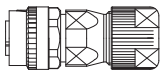
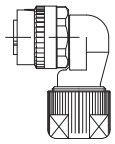
5.6.1 SERVOPACK Connector Kits

Type	Standard Connector Kit	Compatible Connector Kit*
Inquires	Yaskawa Controls Co., Ltd.	Sumitomo 3M Ltd.
Manufacturer	Molex Japan Co., Ltd.	
Order Number	JZSP-CMP9-1-E	
Specifications	55100-0670 (soldered) Product specifications: PS-54280	Receptacle: 3E206-0100 KV (soldered) Shell Kit: 3E306-3200-008 Product specifications: JNPS-1042 and JNPS-1043
External Dimensions [mm]		

* This item is not available from Yaskawa Controls Co., Ltd. Order it directly from Sumitomo 3M Ltd.

Note: Cables are not included. Purchase them separately.

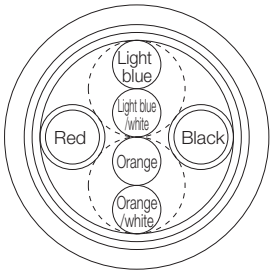
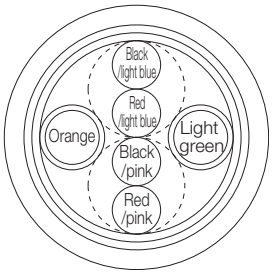
5.6.2 IP67-Structure Encoder Connector Kits

Type	Order Number	Specification	External Dimensions	Manufacturer
Straight Plug	JZSP-CVP9-1-E	• Plug: CM10-SP10S-M-D • Contacts: Crimped* CM10-#22SC(C4)-100 • Applicable cable diameter: 6.0 mm to 9.0 mm	 Accessories: Contacts	DDK Ltd.
	JZSP-CVP9-3-E	• Plug: CM10-SP10S-M-D • Contacts: Soldered CM10-#22SC(S1)-100 • Applicable cable diameter: 6.0 mm to 9.0 mm		
Right-Angle Plug	JZSP-CVP9-2-E	• Plug: CM10-AP10S-M-D • Contacts: Crimped* CM10-#22SC(C4)-100 • Applicable cable diameter: 6.0 mm to 9.0 mm	 Accessories: Contacts	
	JZSP-CVP9-4-E	• Plug: CM10-AP10S-M-D • Contacts: Soldered CM10-#22SC(S1)-100 • Applicable cable diameter: 6.0 mm to 9.0 mm		

* A Crimping Tool is required. The following Crimping Tool is applicable to the Cables provided by Yaskawa. When using other wire sizes, contact the connector manufacturer for crimping tools.
Crimping Tool: 357J-52667T

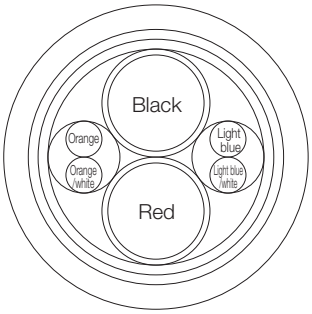
5.6.3 Cables without Connectors

Encoder Cables of 20 m or Less

Item	Standard Cable	Flexible Cable
Order Number*	JZSP-CMP09-□□-E (maximum length: 20 m)	JZSP-CSP39-□□-E (maximum length: 20 m)
Specifications	UL20276 (rated temperature: 80°C) AWG22 × 2C + AWG24 × 2P	UL20276 (rated temperature: 80°C) AWG22 × 2C + AWG24 × 2P
	AWG22 (0.33 mm^2) Outer diameter of insulating sheath: 1.15 mm	AWG22 (0.33 mm^2) Outer diameter of insulating sheath: 1.35 mm
	AWG24 (0.20 mm^2) Outer diameter of insulating sheath: 1.09 mm	AWG24 (0.20 mm^2) Outer diameter of insulating sheath: 1.21 mm
Finished Diameter	6.5 mm	6.8 mm
Internal Structure and Lead Colors		

* Replace the boxes (□□) in the order number with the cable length (05, 10, 15, or 20).

Relay Encoder Cable of 30 m to 50 m

Item	Standard Cable
Order Number*	JZSP-CMP19-□□-E (maximum length: 50 m)
Specifications	UL20276 (rated temperature: 80°C) AWG16 × 2C + AWG26 × 2P
	AWG16 (1.31 mm^2) Outer diameter of insulating sheath: 2.0 mm
	AWG26 (0.13 mm^2) Outer diameter of insulating sheath: 0.91 mm
Finished Diameter	6.8 mm
Internal Structure and Lead Colors	

* Replace the boxes (□□) in the order number with the cable length (30, 40, or 50).

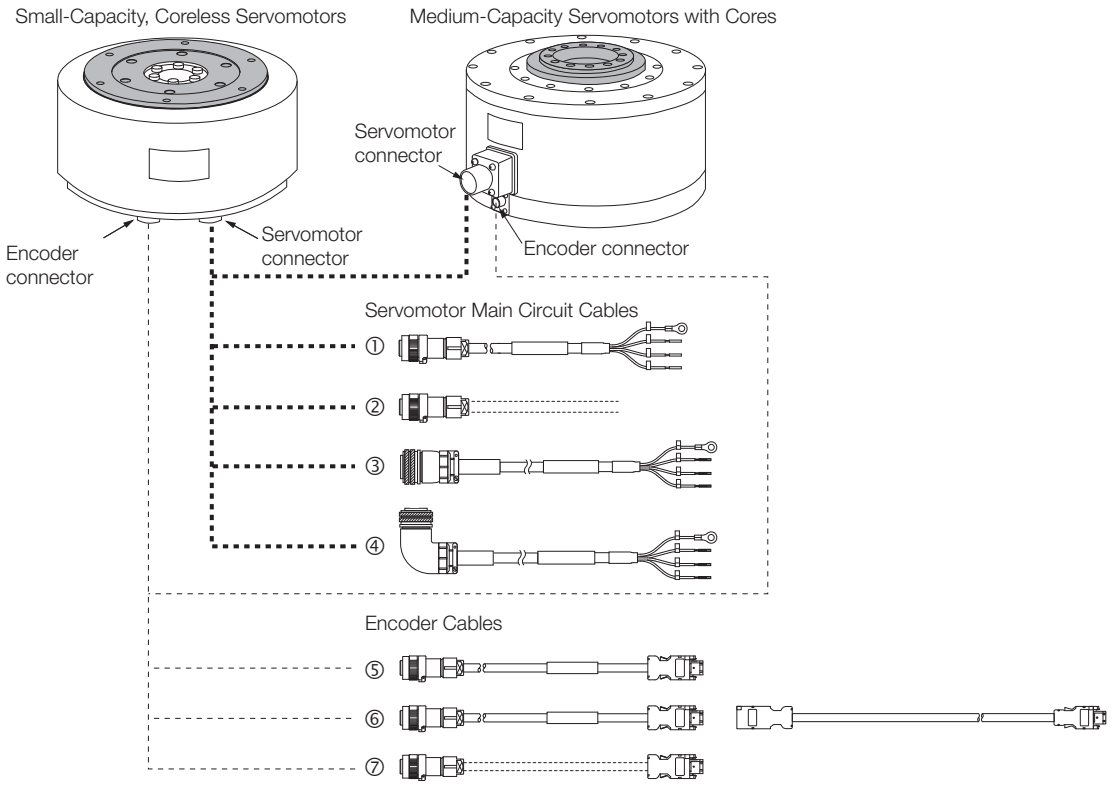
Cables and User-Assembled Wiring Materials for Direct Drive Servomotors

6

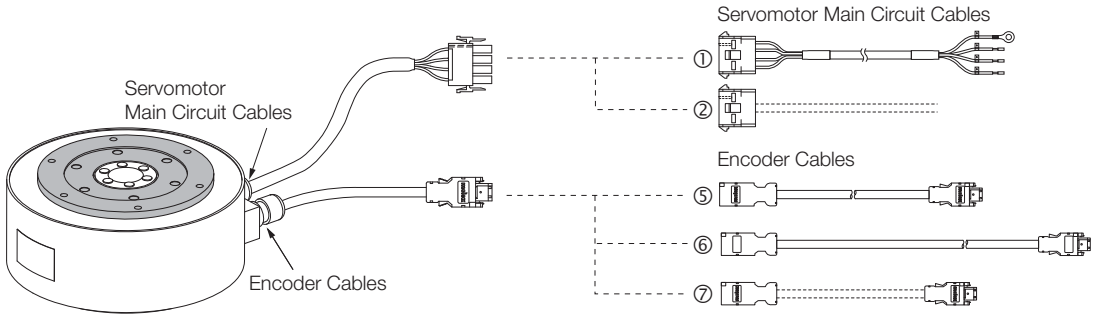
6.1 Cable Configurations

6.1.1 SGMCS Servomotors

Flange Specification 1 or 3



Flange Specification 4

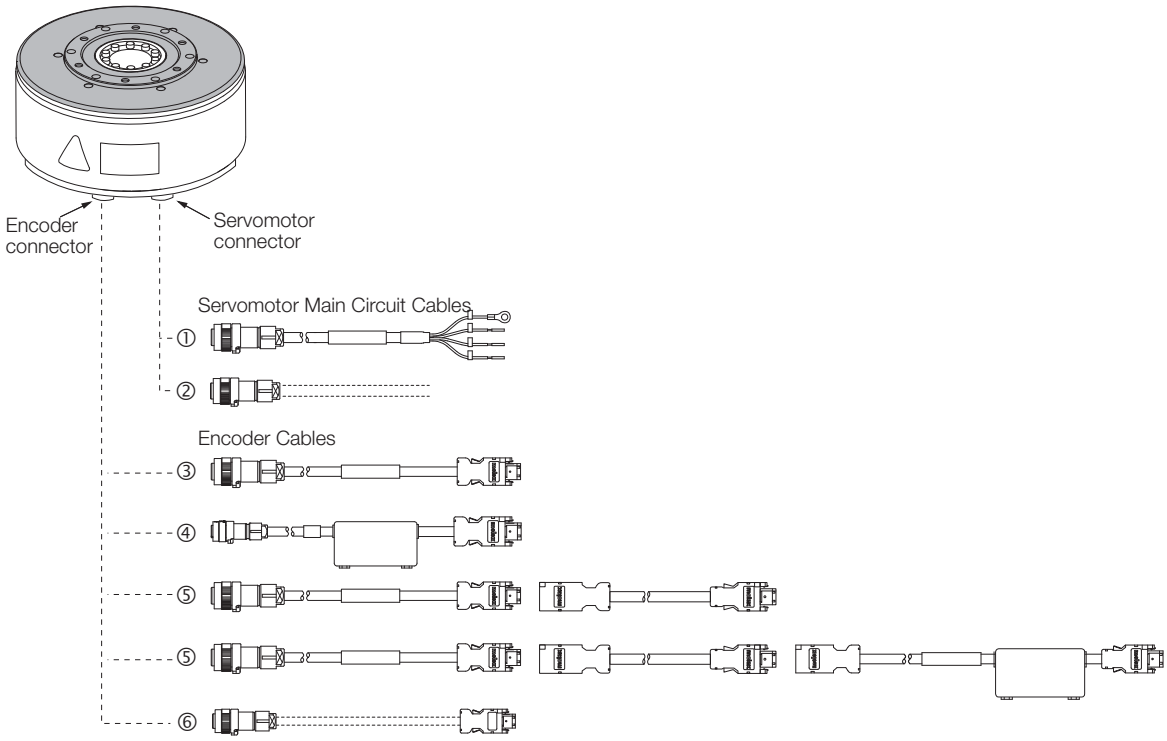


No.	Cable Type		Reference
①	Servomotor Main Circuit Cables		6-4
②	User-Assembled Wiring Materials for Servomotor Main Circuit Cables	Connectors	6-7
		Cables without Connectors	6-10
③	Servomotor Main Circuit Cables with Straight Plugs		6-4
④	Servomotor Main Circuit Cables with Right-Angle Plugs		
⑤	Encoder Cables of 20 m or Less		6-11
⑥	Relay Encoder Cable of 30 m to 50 m		6-16
⑦	User-Assembled Wiring Materials for Encoder Cables	Connectors	6-19
		Cables without Connectors	6-20

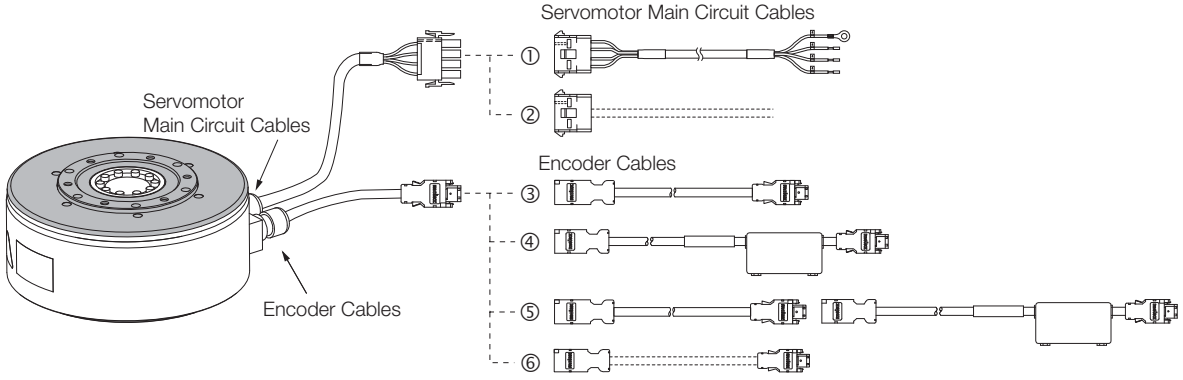
Note: The maximum wiring length is 50 m for Servomotor Main Circuit Cables and Encoder Cables.

6.1.2 SGMCV Servomotors

Flange Specification 1



Flange Specification 4



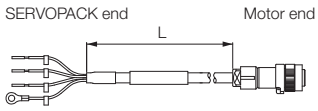
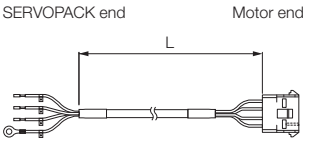
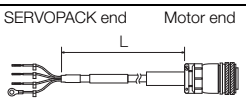
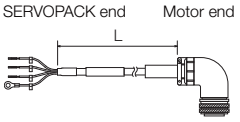
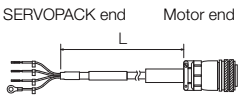
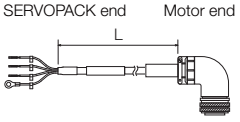
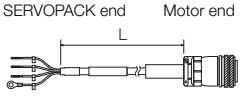
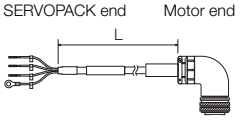
No.	Cable Type		Reference
①	Servomotor Main Circuit Cables		6-6
②	User-Assembled Wiring Materials for Servomotor Main Circuit Cables	Connectors	6-7
		Cables without Connectors	6-10
③	Encoder Cables of 20 m or Less		6-12
④	Encoder Cables of 20 m or Less with Battery Cases		
⑤	Relay Encoder Cable of 30 m to 50 m		6-17
⑥	User-Assembled Wiring Materials for Encoder Cables	Connectors	6-19
		Cables without Connectors	6-20

Note: The maximum wiring length is 50 m for Servomotor Main Circuit Cables and Encoder Cables.

6.2 Servomotor Main Circuit Cables

6.2.1 SGMCS Servomotor Main Circuit Cables

Selection Table

Servomotor Model	Flange Specification Code (6th Digit in Model Number)	Connector Type	Length (L)	Order Number*1		Appearance
				Standard Cable	Flexible Cable*2, *3	
SGMCS-□□B SGMCS-□□C SGMCS-□□D SGMCS-□□E	1 Non-load side installation	–	3 m, 5 m, 10 m, 15 m, and 20 m	JZSP-CMM60-□□-E	JZSP-CSM60-□□-E	
	4 Non-load side installation (with cable on side)			JZSP-CMM00-□□-E	JZSP-CMM01-□□-E	
SGMCS-□□M SGMCS-□□N □□: 45 □□: 80	1 Load side installation and 3 Non-load side installation	Straight		JZSP-USA101-□□-E	JZSP-USA121-□□-E	
		Right-angle		JZSP-USA102-□□-E	JZSP-USA122-□□-E	
SGMCS-□□M SGMCS-□□N □□: 1A		Straight		JZSP-USA301-□□-E	JZSP-USA321-□□-E	
		Right-angle		JZSP-USA302-□□-E	JZSP-USA322-□□-E	
SGMCS-□□M SGMCS-□□N □□: 1E □□: 2Z		Straight		JZSP-USA501-□□-E	JZSP-USA521-□□-E	
		Right-angle		JZSP-USA502-□□-E	JZSP-USA522-□□-E	

*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2. Use Flexible Cables for moving parts of machines, such as robots.
*3. The recommended bending radius of the Flexible Cables are given in the following table.

Order Number	Recommended Bending Radius (R)	Order Number	Recommended Bending Radius (R)
JZSP-CSM60-□□-E	55 mm min.	JZSP-USA321-□□-E	113 mm min.
JZSP-CMM01-□□-E		JZSP-USA322-□□-E	
JZSP-USA121-□□-E	96 mm min.	JZSP-USA521-□□-E	150 mm min.
JZSP-USA122-□□-E		JZSP-USA522-□□-E	

Note: 1. Refer to *6.3.1 SGMCS Small-Capacity, Coreless Servomotor and SGMCV Servomotor Connector Kits* on page 6-7 and *6.3.2 SGMCS Medium-Capacity, Servomotor with Core Connector Kits* on page 6-8 for the connector specifications, manufacturers, and order numbers.
2. Refer to *6.3.3 Cables without Connectors* on page 6-10 for the specifications and order numbers for Cables without Connectors.

Wiring Specifications

◆ JZSP-C□M□□-□□-E (Standard/Flexible Cables)

SERVOPACK end		Motor end	
Wire Color	Signal	Signal	Pin
Red	Phase U	Phase U	1
White	Phase V	Phase V	2
Blue	Phase W	Phase W	3
Green/(yellow)	FG	FG	4

◆ JZSP-USA10□-□□-E, JZSP-USA30□-□□-E, and JZSP-USA50□-□□-E (Standard Cables)

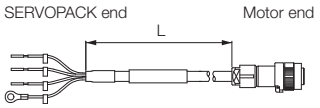
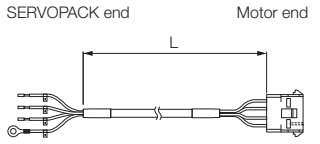
SERVOPACK end		Motor end	
Wire Color	Signal	Signal	Pin
Red	U	U	A
White	V	V	B
Black	W	W	C
Green	FG	FG	D

◆ JZSP-USA12□-□□-E, JZSP-USA32□-□□-E, and JZSP-USA52□-□□-E (Flexible Cables)

SERVOPACK end		Motor end	
Wire Color	Signal	Signal	Pin
Red	U	U	A
White	V	V	B
Blue	W	W	C
Green/yellow	FG	FG	D

6.2.2 SGMCV Servomotor Main Circuit Cables

Selection Table

Servomotor Model	Flange Specification Code (6th Digit in Model Number)	Length (L)	Order Number*1		Appearance
			Standard Cable	Flexible Cable*2, *3	
SGMCV-□□B SGMCV-□□C	1 Non-load side installation	3 m, 5 m, 10 m, 15 m, and 20 m	JZSP-CMM60-□□-E	JZSP-C7MDN23-□□-E	
	4 Non-load side installation (with cable on side)		JZSP-CMM00-□□-E	JZSP-C7MDS23-□□-E	

*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2. Use Flexible Cables for moving parts of machines, such as robots.
*3. The recommended bending radius (R) is 90 mm or larger.

Note: 1. Refer to *6.3.1 SGMCS Small-Capacity, Coreless Servomotor and SGMCV Servomotor Connector Kits* on page 6-7 for the connector specifications, manufacturers, and order numbers.
2. Refer to *6.3.3 Cables without Connectors* on page 6-10 for the specifications and order numbers for Cables without Connectors.

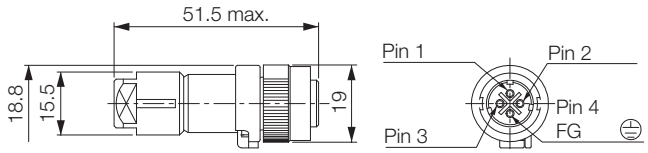
Wiring Specifications

SERVOPACK end		Motor end	
Wire Color	Signal	Signal	Pin
Red	Phase U	Phase U	1
White	Phase V	Phase V	2
Blue	Phase W	Phase W	3
Green/(yellow)	FG	FG	4

6.3 User-Assembled Wiring Materials for Servomotor Main Circuit Cables

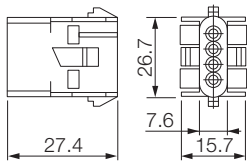
6.3.1 SGMCS Small-Capacity, Coreless Servomotor and SGMCV Servomotor Connector Kits

Connectors for Flange Specification 1 (for Standard or Flexible Cables)

Item	Description	External Dimensions [mm]
Manufacturer	Japan Aviation Electronics Industry, Ltd.	
Order Number	JN1DS04FK1 (soldered)	
Applicable Cable Diameter	5.7 mm to 7.3 mm	

Note: 1. This item is not available from Yaskawa Controls Co., Ltd. Order it directly from Japan Aviation Electronics Industry, Ltd.
2. Cables are not included. Purchase them separately.

Connector Kits for Flange Specification 4 (for Standard or Flexible Cables)

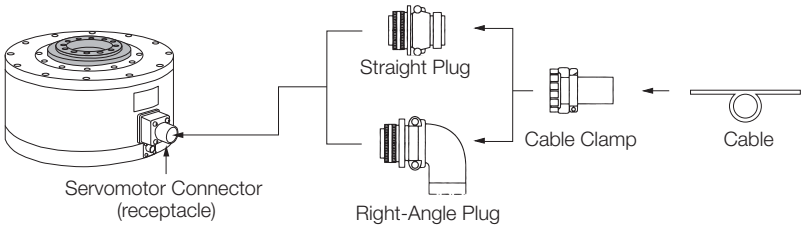
Item		Description	External Dimensions [mm]
Manufacturer		Tyco Electronics Japan G.K.	
Order Number		JZSP-CMM9-3-E	
Components	Cap	350780-1	
	Socket	Reeled Sockets: 350570-3, Loose Sockets: 350689-3	
Applicable Wire Sizes		AWG20 to AWG14	
Crimping Tool*	Hand Tool	90296-2	

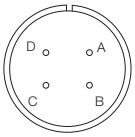
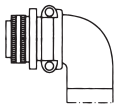
* A Crimping Tool is required. Contact the connector manufacturer for details.

Note: Cables are not included. Purchase them separately.

6.3.2 SGMCS Medium-Capacity, Servomotor with Core Connector Kits

Connector Configurations

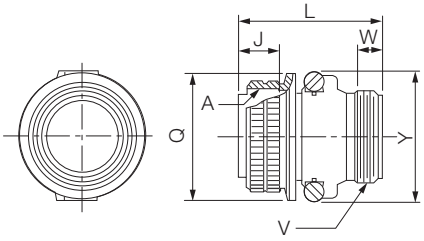


Servomotor Model	Servomotor Connector Model (Receptacle) 	Order Number			Manufacturer
		Straight Plug 	Right-Angle Plug 	Cable Clamp 	Japan Aviation Electronics Industry, Ltd.
SGMCS-□□M SGMCS-□□N	CE05-2A18-10PD-D (MS Connector model: MS3102A18-10P)	N/MS3106B18-10S	N/MS3108B18-10S	N/MS3057-10A	

Note: 1. Servomotor Connectors (receptacles) are compatible with MS Connectors. If you prepare your own cables, refer to the connector number in parentheses for the model number of the MS connector and select the appropriate plug.
2. Yaskawa does not specify what wiring materials to use. Use appropriate wiring materials for the current specifications and connectors.

External Dimensions

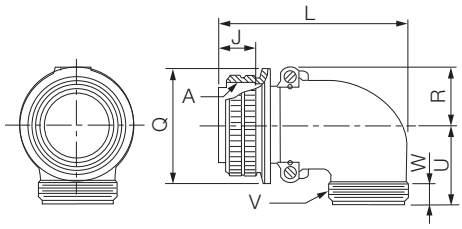
◆ Straight Plugs: N/MS3106B18-10S



Unit: mm

Part	Shell Size	Joint Thread A	Length of Joint J ±0.12	Total Length L Max.	Joint Nut Outer Diameter Q $^{+0}_{-0.38}$ Dia.	Cable Clamp Mounting Thread V	Effective Thread Length W Min.	Maximum Width Y Max.
N/MS3106B18-10S	18	1-1/8-18UNEF	18.26	52.37	34.13	1-20UNEF	9.53	42

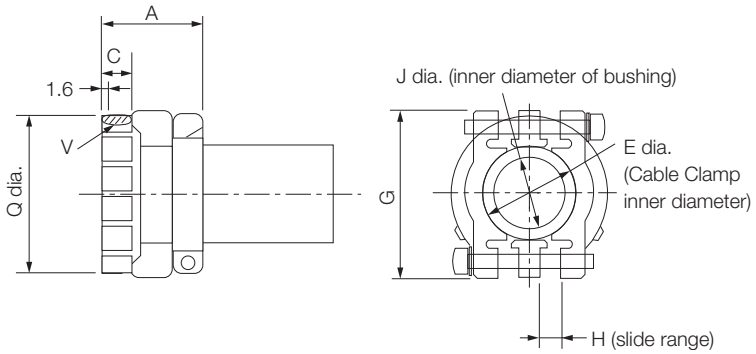
◆ Right-Angle Plug: N/MS3108B18-10S



Unit: mm

Part	Shell Size	Joint Thread A	Length of Joint J ±0.12	Total Length L Max.	Joint Nut Outer Diameter Q $^{+0}_{-0.38}$ Dia.	R ± 0.5	U ± 0.5	Cable Clamp Mounting Thread V	Effec-tive Thread Length W Min.
N/MS3108B18-10S	18	1-1/8-18UNEF	18.26	68.27	34.13	20.5	30.2	1-20UNEF	9.53

◆ Cable Clamp: N/MS3057-10A



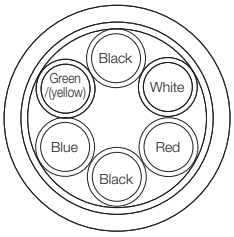
Unit: mm

Part	Appli-cable Con-nector Shell Size	Total Length A ±0.7	Effec-tive Thread Length C	E Dia.	G ±0.7	H	J Dia.	Mounting Thread V	Outer Diame-ter Q ±0.7 Dia.	Attached Bushing
N/MS3057-10A	18	23.8	10.3	15.9	31.7	3.2	14.3	1-20UNEF	30.1	AN3420-10

Note: A rubber bushing is included.

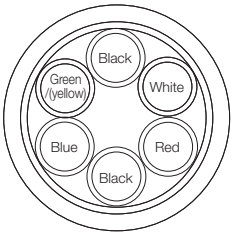
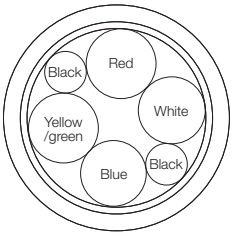
6.3.3 Cables without Connectors

SGMCS Main Circuit Cables

Item	Standard Cable	Flexible Cable
Order Number*	JZSP-CSM90-□□-E	JZSP-CSM80-□□-E
Specifications	UL2517 (rated temperature: 105°C) AWG20 × 6C	UL2517 (rated temperature: 105°C) AWG20 × 4C, AWG22C
	AWG20 (0.52 mm^2) Outer diameter of insulating sheath: 1.53 mm	AWG20 (0.52 mm^2) Outer diameter of insulating sheath: 1.37 mm
Finished Diameter	7 mm ±0.3 mm	
Internal Structure and Lead Colors		

* Replace the boxes (□□) in the order number with the cable length (05, 10, 15, 20, or 50).

SGMCV Main Circuit Cables

Item	Standard Cable	Flexible Cable
Order Number*	JZSP-CSM90-□□-E	JZSP-C7M29-□□-E
Specifications	UL2517 (rated temperature: 105°C) AWG20 × 6C	UL2517 (rated temperature: 105°C) AWG20 × 4C, AWG22C × 2C
	AWG20 (0.52 mm^2) Outer diameter of insulating sheath: 1.53 mm	AWG20 (0.52 mm^2) Outer diameter of insulating sheath: 1.37 mm
Finished Diameter	7 mm ±0.3 mm	7 mm ±0.2 mm
Internal Structure and Lead Colors		

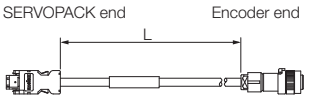
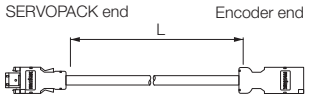
* Replace the boxes (□□) in the order number with the cable length (05, 10, 15, 20, or 50).

6.4 Encoder Cables of 20 m or Less

6.4.1 SGMCS Encoder Cables

You can use the cables in the following table for either SGMCS 20-bit absolute encoders (without multiturn data) or 20-bit incremental encoders.

Selection Table

Servomotor Model	Flange Specification Code (6th Digit in the Model Number)	Length (L)	Order Number*1		Appearance
			Standard Cable	Flexible Cable*2, *3	
SGMCS-□□B SGMCS-□□C SGMCS-□□D SGMCS-□□E	1 Non-load side installation	3 m, 5 m, 10 m, 15 m, and 20 m	JZSP-CMP60-□□-E	JZSP-CSP60-□□-E	
SGMCS-□□M SGMCS-□□N	1 Load side installation				
SGMCS-□□M SGMCS-□□N	3 Non-load side installation				
SGMCS-□□B SGMCS-□□C SGMCS-□□D SGMCS-□□E	4 Non-load side installation (with cable on side)		JZSP-CMP00-□□-E	JZSP-CMP10-□□-E	

*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).

*2. Use Flexible Cables for moving parts of machines, such as robots.

*3. The recommended bending radius (R) is 68 mm or larger.

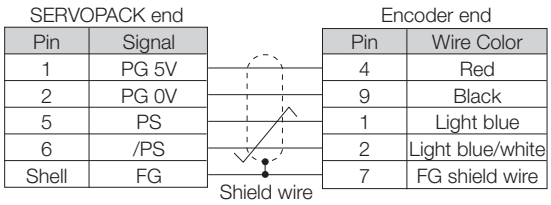
Note: 1. Refer to *6.6.1 SERVOPACK Connector Kits* on page 6-19 and *6.6.2 Encoder Connector Kits* on page 6-19 for the connector specifications, manufacturers, and order numbers.

2. Refer to *6.6.3 Cables without Connectors* on page 6-20 for the specifications and order numbers for Cables without Connectors.

Wiring Specifications

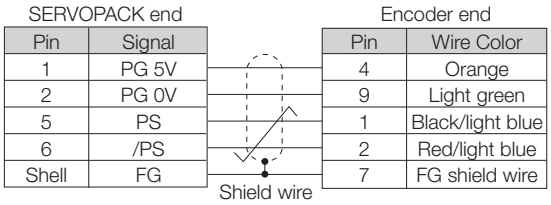
◆ JZSP-CMP60-□□-E (Standard Cables) and JZSP-CSP60-□□-E (Flexible Cables)

Standard Cable



SERVOPACK end		Encoder end	
Pin	Signal	Pin	Wire Color
1	PG 5V	4	Red
2	PG 0V	9	Black
5	PS	1	Light blue
6	/PS	2	Light blue/white
Shell	FG	7	FG shield wire

Flexible Cable

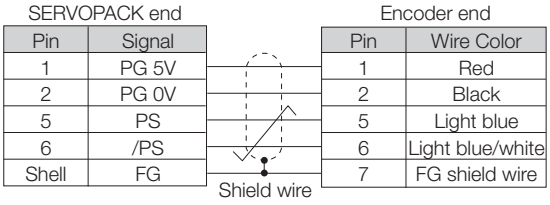


SERVOPACK end		Encoder end	
Pin	Signal	Pin	Wire Color
1	PG 5V	4	Orange
2	PG 0V	9	Light green
5	PS	1	Black/light blue
6	/PS	2	Red/light blue
Shell	FG	7	FG shield wire

Note: Always connect the shield wire from the Encoder Cable to the connector case (shell).

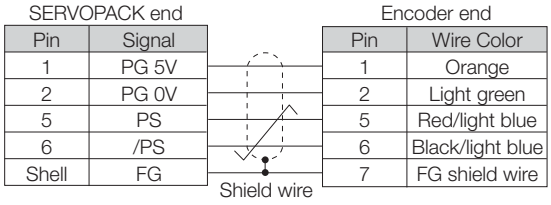
◆ JZSP-CMP00-□□-E (Standard Cables) and JZSP-CMP10-□□-E (Flexible Cables)

Standard Cable



SERVOPACK end		Encoder end	
Pin	Signal	Pin	Wire Color
1	PG 5V	1	Red
2	PG 0V	2	Black
5	PS	5	Light blue
6	/PS	6	Light blue/white
Shell	FG	7	FG shield wire

Flexible Cable



SERVOPACK end		Encoder end	
Pin	Signal	Pin	Wire Color
1	PG 5V	1	Orange
2	PG 0V	2	Light green
5	PS	5	Red/light blue
6	/PS	6	Black/light blue
Shell	FG	7	FG shield wire

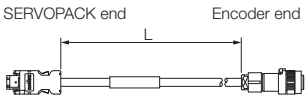
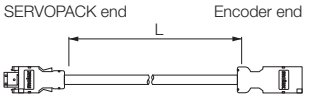
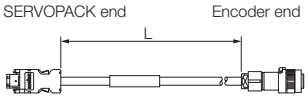
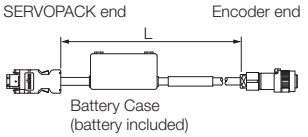
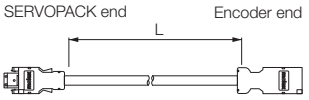
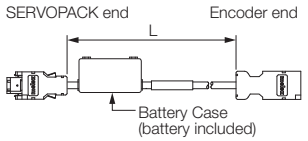
Note: Always connect the shield wire from the Encoder Cable to the connector case (shell).

6.4.2 SGMCV Encoder Cables

NOTICE

- Install a battery at either the host controller or on the Encoder Cable.
  If you install batteries both at the host controller and on the Encoder Cable at the same time, you will create a loop circuit between the batteries, resulting in a risk of damage or burning.

Selection Table

Servomotor Model	Serial Encoder Specification	Flange Specification Code (6th Digit in the Model Number)	Length (L)	Order Number*1		Appearance
				Standard Cable	Flexible Cable*2, *3	
SGMCV-□□BE SGMCV-□□CE	For single-turn absolute encoder: Without Battery Case	1 Non-load side installation	3 m, 5 m, 10 m, 15 m, and 20 m	JZSP-CMP60-□□-E	JZSP-CSP60-□□-E	
SGMCV-□□BE SGMCV-□□CE		4 Non-load side installation (with cable on side)		JZSP-CMP00-□□-E	JZSP-CMP10-□□-E	
SGMCV-□□BI SGMCV-□□CI	For multi-turn absolute encoder: Without Battery Case*4	1 Non-load side installation		JZSP-C7PI00-□□-E	JZSP-C7PI20-□□-E	
	For multi-turn absolute encoder: With Battery Case			JZSP-C7PA00-□□-E	JZSP-C7PA20-□□-E	
SGMCV-□□BI SGMCV-□□CI	For multi-turn absolute encoder: Without Battery Case*4	4 Non-load side installation (with cable on side)		JZSP-CMP00-□□-E	JZSP-CMP10-□□-E	
	For multi-turn absolute encoder: With Battery Case			JZSP-CSP19-□□-E	JZSP-CSP29-□□-E	

*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).

*2. Use Flexible Cables for moving parts of machines, such as robots.

*3. The recommended bending radius (R) is 68 mm or larger.

*4. Use one of these Cables if a battery is installed at the host controller.

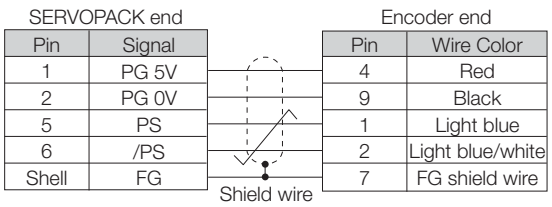
Note: 1. Refer to *6.6.1 SERVOPACK Connector Kits* on page 6-19 for the connector specifications, manufacturers, and order numbers. Refer to *6.6.2 Encoder Connector Kits* on page 6-19.

2. Refer to *6.6.3 Cables without Connectors* on page 6-20 for the specifications and order numbers for Cables without Connectors.

Wiring Specifications

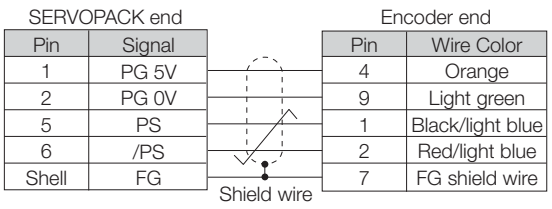
◆ JZSP-CMP60-□□-E (Standard Cables) and JZSP-CSP60-□□-E (Flexible Cables)

Standard Cable



SERVOPACK end		Encoder end	
Pin	Signal	Pin	Wire Color
1	PG 5V	4	Red
2	PG 0V	9	Black
5	PS	1	Light blue
6	/PS	2	Light blue/white
Shell	FG	7	FG shield wire

Flexible Cable

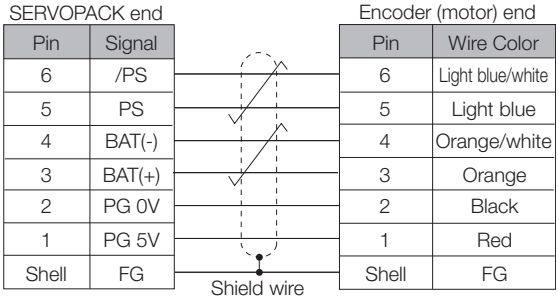


SERVOPACK end		Encoder end	
Pin	Signal	Pin	Wire Color
1	PG 5V	4	Orange
2	PG 0V	9	Light green
5	PS	1	Black/light blue
6	/PS	2	Red/light blue
Shell	FG	7	FG shield wire

Note: Always connect the shield wire from the Encoder Cable to the connector case (shell).

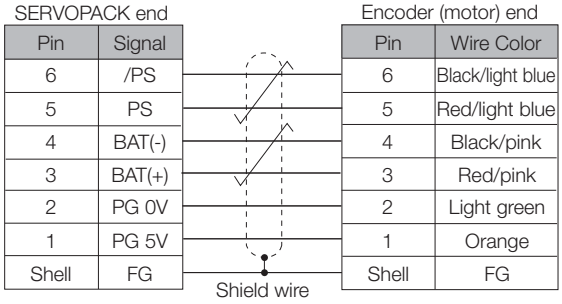
◆ JZSP-CMP00-□□-E (Standard Cables) and JZSP-CMP10-□□-E (Flexible Cables)

Standard Cable



SERVOPACK end		Encoder (motor) end	
Pin	Signal	Pin	Wire Color
6	/PS	6	Light blue/white
5	PS	5	Light blue
4	BAT(-)	4	Orange/white
3	BAT(+)	3	Orange
2	PG 0V	2	Black
1	PG 5V	1	Red
Shell	FG	Shell	FG

Flexible Cable

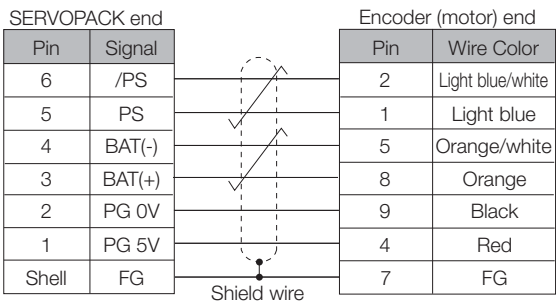


SERVOPACK end		Encoder (motor) end	
Pin	Signal	Pin	Wire Color
6	/PS	6	Black/light blue
5	PS	5	Red/light blue
4	BAT(-)	4	Black/pink
3	BAT(+)	3	Red/pink
2	PG 0V	2	Light green
1	PG 5V	1	Orange
Shell	FG	Shell	FG

Note: Always connect the shield wire from the Encoder Cable to the connector case (shell).

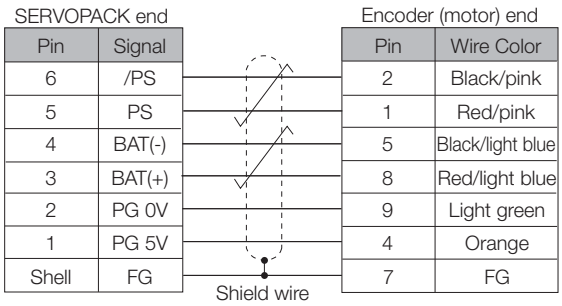
◆ JZSP-C7PI00-□□-E (Standard Cables) and JZSP-C7PI20-□□-E (Flexible Cables)

Standard Cable



SERVOPACK end		Encoder (motor) end	
Pin	Signal	Pin	Wire Color
6	/PS	2	Light blue/white
5	PS	1	Light blue
4	BAT(-)	5	Orange/white
3	BAT(+)	8	Orange
2	PG 0V	9	Black
1	PG 5V	4	Red
Shell	FG	7	FG

Flexible Cable

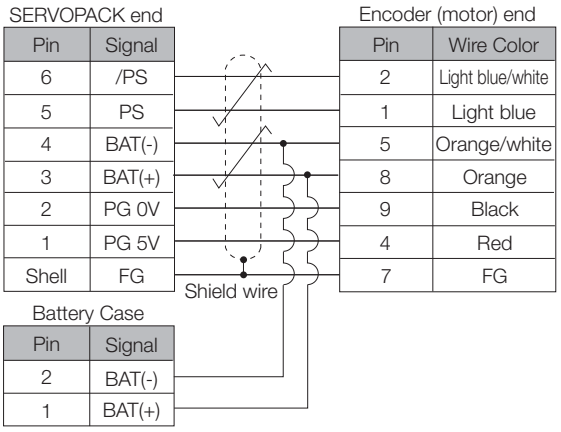


SERVOPACK end		Encoder (motor) end	
Pin	Signal	Pin	Wire Color
6	/PS	2	Black/pink
5	PS	1	Red/pink
4	BAT(-)	5	Black/light blue
3	BAT(+)	8	Red/light blue
2	PG 0V	9	Light green
1	PG 5V	4	Orange
Shell	FG	7	FG

Note: Always connect the shield wire from the Encoder Cable to the connector case (shell).

◆ JZSP-C7PA00-□□-E (Standard Cables) and JZSP-C7PA20-□□-E (Flexible Cables)

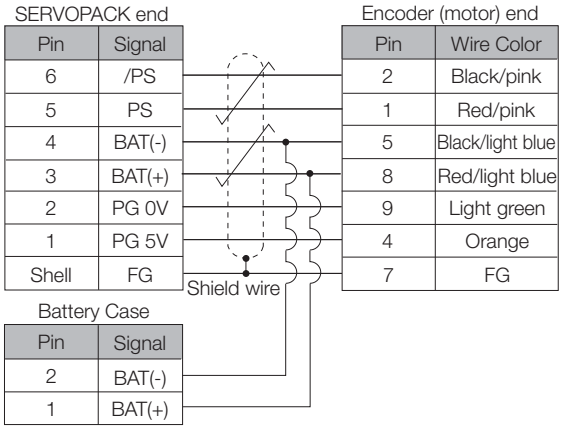
Standard Cable



SERVOPACK end		Encoder (motor) end	
Pin	Signal	Pin	Wire Color
6	/PS	2	Light blue/white
5	PS	1	Light blue
4	BAT(-)	5	Orange/white
3	BAT(+)	8	Orange
2	PG 0V	9	Black
1	PG 5V	4	Red
Shell	FG	7	FG

Battery Case	
Pin	Signal
2	BAT(-)
1	BAT(+)

Flexible Cable



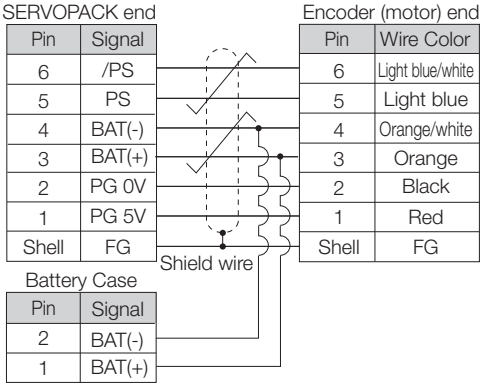
SERVOPACK end		Encoder (motor) end	
Pin	Signal	Pin	Wire Color
6	/PS	2	Black/pink
5	PS	1	Red/pink
4	BAT(-)	5	Black/light blue
3	BAT(+)	8	Red/light blue
2	PG 0V	9	Light green
1	PG 5V	4	Orange
Shell	FG	7	FG

Battery Case	
Pin	Signal
2	BAT(-)
1	BAT(+)

Note: Always connect the shield wire from the Encoder Cable to the connector case (shell).

◆ JZSP-CSP19-□□-E (Standard Cables) and JZSP-CSP29-□□-E (Flexible Cables)

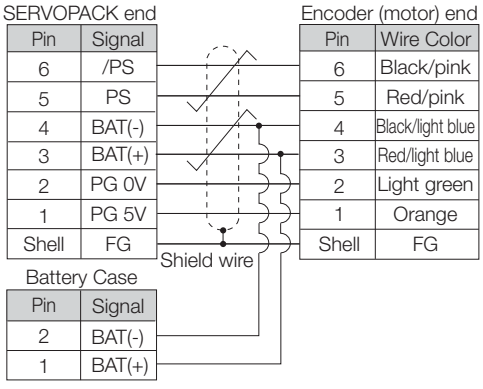
Standard Cable



SERVOPACK end		Encoder (motor) end	
Pin	Signal	Pin	Wire Color
6	/PS	6	Light blue/white
5	PS	5	Light blue
4	BAT(-)	4	Orange/white
3	BAT(+)	3	Orange
2	PG 0V	2	Black
1	PG 5V	1	Red
Shell	FG	Shell	FG

Battery Case	
Pin	Signal
2	BAT(-)
1	BAT(+)

Flexible Cable



SERVOPACK end		Encoder (motor) end	
Pin	Signal	Pin	Wire Color
6	/PS	6	Black/pink
5	PS	5	Red/pink
4	BAT(-)	4	Black/light blue
3	BAT(+)	3	Red/light blue
2	PG 0V	2	Light green
1	PG 5V	1	Orange
Shell	FG	Shell	FG

Battery Case	
Pin	Signal
2	BAT(-)
1	BAT(+)

Note: Always connect the shield wire from the Encoder Cable to the connector case (shell).

6.5 Relay Encoder Cable of 30 m to 50 m

6.5.1 SGMCS Encoder Cables

You can use the cables in the following table for either SGMCS 20-bit absolute encoders (without multiturn data) or 20-bit incremental encoders.

Selection Table

Servomotor Model	Flange Specification Code (6th Digit in the Model Number)	Flange Specification	Relay Encoder Cable Order Number*1, *2	
			JZSP-CSP15-E	JZSP-UCMP00-□□-E
SGMCS-□□B □□C □□D □□E □□M □□N	1 or 3	Non-load side installation	Required.	Required.
		Load side installation		
	4	Non-load side installation (with cable on side)	Not required.	Required.

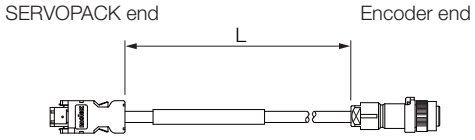
*1. Replace the boxes (□□) in the order number with the cable length (30, 40, or 50).
*2. Flexible cables are not available.

Relay Encoder Cables for Motor End

◆ Selection Table

Specification	Length (L)	Order Number
For incremental/absolute encoder	0.3 m	JZSP-CSP15-E

◆ External Dimensions



◆ Wiring Specifications

SERVOPACK end

Pin	Signal
1	PG 5V
2	PG 0V
5	PS
6	/PS
Shell	FG

Encoder end

Pin	Wire Color
4	Red
9	Black
1	Light blue
2	Light blue/white
7	FG shield wire

Shield wire

Note: Always connect the shield wire from the Encoder Cable to the connector case (shell).

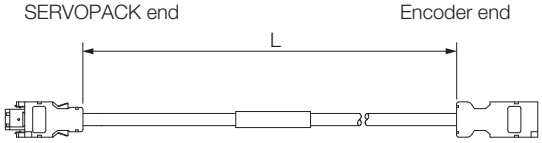
Relay Encoder Cables for SERVOPACK End

◆ Selection Table

Specification	Length (L)	Order Number*
For incremental/absolute encoder	30 m, 40 m, and 50 m	JZSP-UCMP00-□□-E

* Replace the boxes (□□) in the order number with the cable length (30, 40, or 50).

◆ External Dimensions



◆ Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT (-)
3	BAT (+)
2	PG 0V
1	PG 5V
Shell	FG

Shield wire

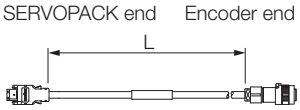
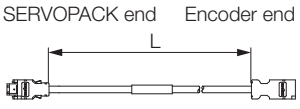
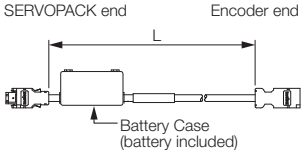
Encoder (motor) end

Pin	Wire Color
6	Light blue/white
5	Light blue
4	Orange/white
3	Orange
2	Black
1	Red
Shell	FG

Note: Always connect the shield wire from the Encoder Cable to the connector case (shell).

6.5.2 SGMCV Encoder Cables

Selection Table

Servomotor Model	Flange Specification Code (6th Digit in the Model Number)	Name	Length (L)	Order Number*1	Appearance
SGMCV-□□BE SGMCV-□□BI SGMCV-□□CE SGMCV-□□CI	1	Encoder-end Cable (for single-turn/multi-turn absolute encoder)	0.3 m	JZSP-C7PRC0-E	
SGMCV-□□BE SGMCV-□□BI SGMCV-□□CE SGMCV-□□CI	1 or 4	Cable with Connectors on Both Ends (for single-turn/multiturn absolute encoder)	30 m, 40 m, and 50 m	JZSP-UCMP00-□□-E	
SGMCV-□□BI SGMCV-□□CI		Cable with a Battery Case (for multiturn absolute encoder)*2	0.3 m	JZSP-CSP12-E	

*1. Replace the boxes (□□) in the order number with the cable length (30, 40, or 50).
*2. This Cable is not required if a battery is connected to the host controller.

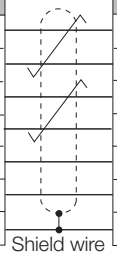
Note: Flexible cables are not available.

Wiring Specifications

◆ JZSP-C7PRC0-E

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT(-)
3	BAT(+)
2	PG 0V
1	PG 5V
Shell	FG



Encoder (motor) end

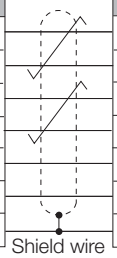
Pin	Wire Color
2	Light blue/white
1	Light blue
5	Orange/white
8	Orange
9	Black
4	Red
7	FG

Note: Always connect the shield wire from the Encoder Cable to the connector case (shell).

◆ JZSP-UCMP00-□□-E

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT(-)
3	BAT(+)
2	PG 0V
1	PG 5V
Shell	FG



Encoder (motor) end

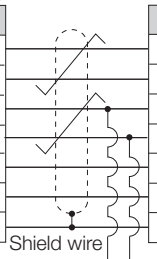
Pin	Wire Color
6	Light blue/white
5	Light blue
4	Orange/white
3	Orange
2	Black
1	Red
Shell	FG

Note: Always connect the shield wire from the Encoder Cable to the connector case (shell).

◆ JZSP-CSP12-E

SERVOPACK end

Pin	Signal
6	/PS
5	PS
4	BAT(-)
3	BAT(+)
2	PG 0V
1	PG 5V
Shell	FG



Encoder (motor) end

Pin	Wire Color
6	Light blue/white
5	Light blue
4	Orange/white
3	Orange
2	Black
1	Red
Shell	FG

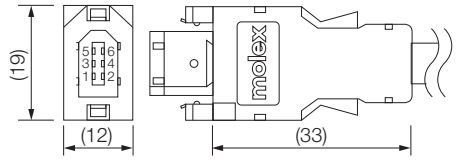
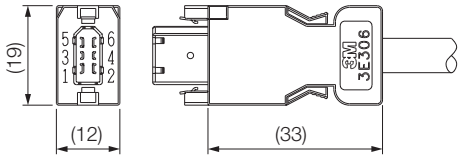
Battery Case

Pin	Signal
2	BAT(-)
1	BAT(+)

Note: Always connect the shield wire from the Encoder Cable to the connector case (shell).

6.6 User-Assembled Wiring Materials for Encoder Cables

6.6.1 SERVOPACK Connector Kits

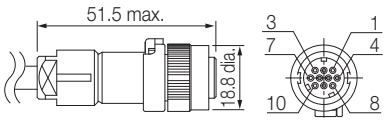
Type	Standard Connector Kit	Compatible Connector Kit*
Inquires	Yaskawa Controls Co., Ltd.	Sumitomo 3M Ltd.
Manufacturer	Molex Japan Co., Ltd.	
Order Number	JZSP-CMP9-1-E	
Specifications	55100-0670 (soldered) Product specifications: PS-54280	Receptacle: 3E206-0100 KV (soldered) Shell Kit: 3E306-3200-008 Product specifications: JNPS-1042 and JNPS-1043
External Dimensions [mm]		

* This item is not available from Yaskawa Controls Co., Ltd. Order it directly from Sumitomo 3M Ltd.

Note: Cables are not included. Purchase them separately.

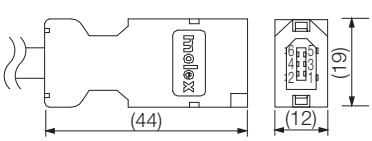
6.6.2 Encoder Connector Kits

Flange Specification 1 or 3

Manufacturer		Japan Aviation Electronics Industry, Ltd.
Order Number	Straight Plug	JN1DS10SL1 (crimped)
	Socket Contacts	JN1-22-22S-PKG100
Applicable Wire Sizes		AWG21 to AWG25
Applicable Cable Diameter		5.7 mm to 7.3 mm
Outer Diameter of Insulating Sheath		0.8 mm to 1.5 mm
Crimping Tool	Hand Tool	CT150-2-JN
External Dimensions [mm]		

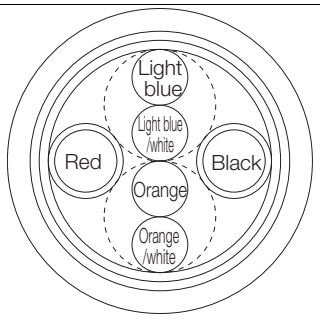
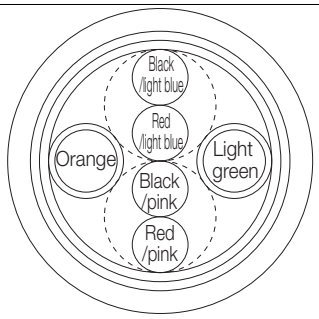
Note: This item is not available from Yaskawa Controls Co., Ltd. Order it directly from Japan Aviation Electronics Industry, Ltd. The tool is not provided by Yaskawa.

Flange Specification 4

Manufacturer	Molex Japan Co., Ltd.
Order Number	JZSP-CMP9-2-E
Specifications	54280-0609 (soldered) Product specifications: PS-54280
External Dimensions [mm]	

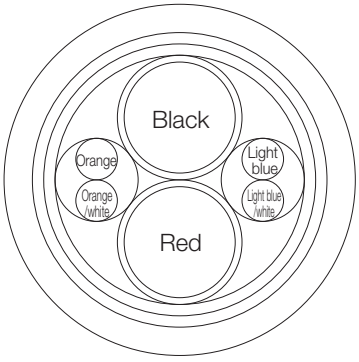
6.6.3 Cables without Connectors

Encoder Cables of 20 m or Less

Item	Standard Cable	Flexible Cable
Order Number*	JZSP-CMP09-□□-E	JZSP-CSP39-□□-E
Specifications	UL20276 (rated temperature: 80°C) AWG22 × 2C + AWG24 × 2P	UL20276 (rated temperature: 80°C) AWG22 × 2C + AWG24 × 2P
	AWG22 (0.33 mm^2) Outer diameter of insulating sheath: 1.15 mm	AWG22 (0.33 mm^2) Outer diameter of insulating sheath: 1.35 mm
	AWG24 (0.20 mm^2) Outer diameter of insulating sheath: 1.09 mm	AWG24 (0.20 mm^2) Outer diameter of insulating sheath: 1.21 mm
Finished Diameter	6.5 mm	6.8 mm
Internal Structure and Lead Colors		

* Replace the boxes (□□) in the order number with the cable length (05, 10, 15, or 20).

Relay Encoder Cable of 30 m to 50 m

Item	Standard Cable
Order Number*	JZSP-CMP19-□□-E
Specifications	UL20276 (rated temperature: 80°C) AWG16 × 2C + AWG26 × 2P
	AWG16 (1.31 mm^2) Outer diameter of insulating sheath: 2.0 mm
	AWG26 (0.13 mm^2) Outer diameter of insulating sheath: 0.91 mm
Finished Diameter	6.8 mm
Internal Structure and Lead Colors	

* Replace the boxes (□□) in the order number with the cable length (30, 40, or 50).

Cables and User-Assembled Wiring Materials for Linear Servomotors

7

7.1 Recommended Linear Encoders

7.1.1 Incremental Linear Encoders

Output Signal	Manufacturer	Linear Encoder Type	Model			Linear Encoder Pitch [μm]	Resolution [nm]	Maximum Speed *3 [m/s]	Support for Polarity Sensor Input	Application to Linear Servomotors	Application to Fully-Closed Loop Control
			Scale	Sensor Head	Relay Device between SERVOPACK and Linear Encoder						
1 Vp-p Analog Voltage *1	Heidenhain Corporation	Exposed	LIDA48□		JZDP-H003/-H006*5	20	78.1	5	✓	✓	✓
					JZDP-J003/-J006*5		4.9	2	✓	✓	–
			LIF48□		JZDP-H003/-H006*5	4	15.6	1	✓	✓	✓
					JZDP-J003/-J006*5		1.0	0.4	✓	*8	–
	Renishaw plc*4	Exposed	RGS20	RGH22B	JZDP-H005/-H008*5	20	78.1	5	✓	✓	✓
					JZDP-J005/-J008*5		4.9	2	✓	✓	–
Encoder for Yaskawa's Serial Interface*2	Magnescale Co., Ltd.	Exposed	SL7□0	PL101-RY*6		800	97.7	5	–	✓	✓
				PL101	MJ620-T13*7				✓	✓	–
		Sealed	SR75-□□□□□LF		–	80	9.8	3.33	–	✓	✓
			SR75-□□□□□MF		–	80	78.1	3.33	–	✓	✓
			SR85-□□□□□LF		–	80	9.8	3.33	–	✓	✓
			SR85-□□□□□MF		–	80	78.1	3.33	–	✓	✓

*1. You must also use a Yaskawa Serial Converter Unit. The output signal will be multiplied by 8 bits (256 divisions) or 12 bits (4,096 divisions) in the Serial Converter Unit.

*2. The multiplier (number of divisions) depends on the Linear Encoder. Also, you must write the Servomotor constant file to the Linear Encoder in advance.

*3. The maximum speeds given in the above table are the maximum applicable speeds of the encoders when combined with a Yaskawa SERVOPACK.
The actual speed will be restricted by either the maximum speed of the Linear Servomotor or the maximum speed of the Linear Encoder (given above).

*4. If you use the origin signals with a Linear Encoder from Renishaw plc, the origin may sometimes be falsely detected.
If that occurs, use the BID/DIR signal to output the origin signal only in one direction.

*5. These are the models of Serial Converter Units.

*6. This is the model of the Sensor Head with Interpolator.

*7. This is the model of the Interpolator.

*8. Contact your Yaskawa representative.

Note: Confirm detailed specifications, such as the tolerances, dimensions, and operating environment, with the manufacturer of the Linear Encoder before you use it.

7.1.2 Absolute Linear Encoders

Output Signal	Manufacturer	Linear Encoder Type	Model			Linear Encoder Pitch [µm]	Resolution [nm]	Maximum Speed *2 [m/s]	Support for Polarity Sensor Input	Application to Linear Servomotors	Application to Fully-Closed Loop Control
			Scale	Sensor Head	Relay Device between SERVOPACK and Linear Encoder						
Encoder for Yaskawa's Serial Interface*1	Magnescale Co., Ltd.	Sealed	SR77-□□□□□LF		–	80	9.8	3.33	–	✓	✓
			SR77-□□□□□MF		–	80	78.1	3.33	–	✓	✓
			SR87-□□□□□LF		–	80	9.8	3.33	–	✓	✓
			SR87-□□□□□MF		–	80	78.1	3.33	–	✓	✓
	Mitutoyo Corporation	Exposed	ST781A		–	256	500	5	–	✓	✓
			ST782A		–	256	500	5	–	✓	✓
			ST783A		–	51.2	100	5	–	✓	✓
			ST784A		–	51.2	100	5	–	✓	✓
			ST788A		–	51.2	100	5	–	✓	✓
			ST789A*3		–	25.6	50	5	–	✓	✓
	Heidenhain Corporation	Exposed	LIC4100 Series		EIB3391Y*4	–	5	5	–	✓	✓

*1. The multiplier (number of divisions) depends on the Linear Encoder. Also, you must write the Servomotor constant file to the Linear Encoder in advance.

*2. The maximum speeds given in the above table are the maximum applicable speeds of the encoders when combined with a Yaskawa SERVOPACK.
The actual speed will be restricted by either the maximum speed of the Linear Servomotor or the maximum speed of the Linear Encoder (given above).

*3. Contact Mitutoyo Corporation for details on the Linear Encoders.

*4. This is the model of the Interpolator.

Note: Confirm detailed specifications, such as the tolerances, dimensions, and operating environment, with the manufacturer of the Linear Encoder before you use it.

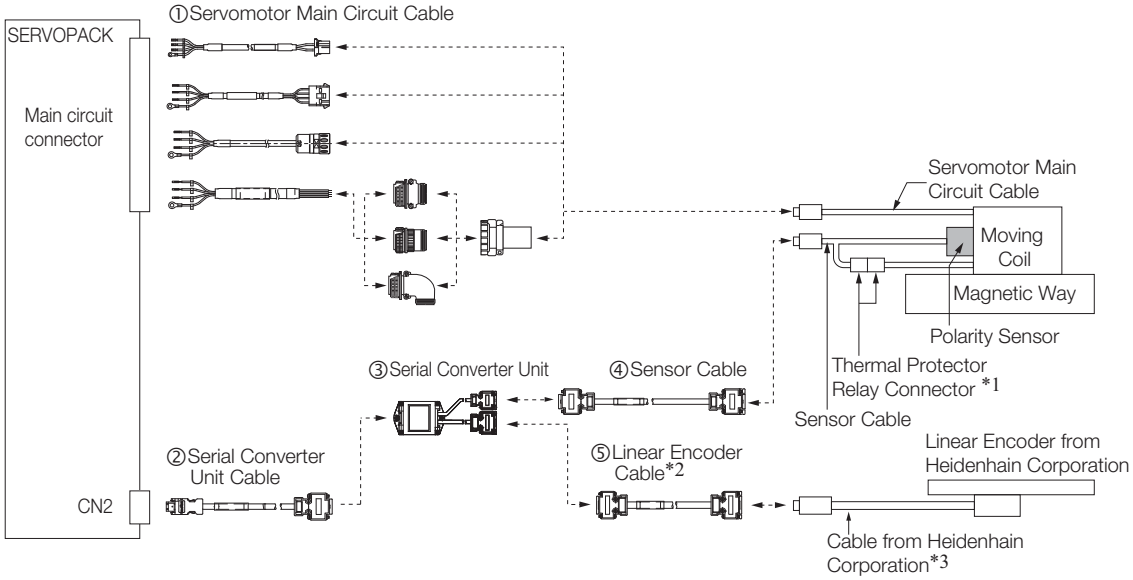
7.2 Cable Configurations

7.2.1 Connections to Linear Encoder from Heidenhain Corporation

Connections for a 1 Vp-p Analog Voltage Output Signal

You must make the connections through a Yaskawa Serial Converter Unit. The output signal will be multiplied by 8 bits (256 divisions) or 12 bits (4,096 divisions) in the Serial Converter Unit.

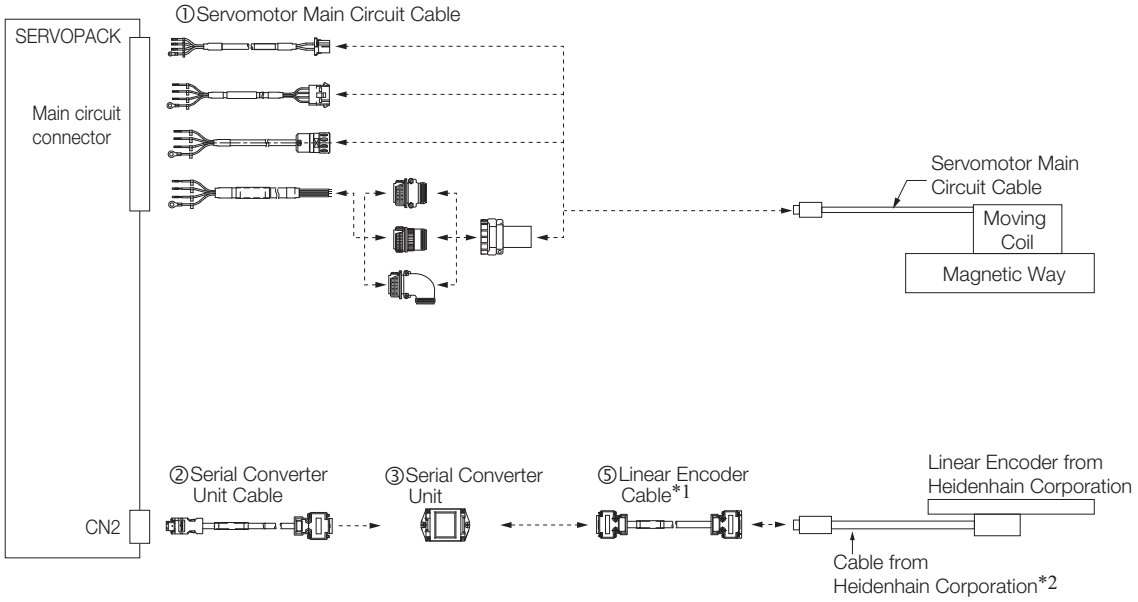
◆ Connecting to a Linear Servomotor with a Polarity Sensor



*1. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.
*2. When using a JZDP-J00□-□□□ Serial Converter Unit, do not use a Yaskawa Linear Encoder Cable that is longer than 3 m.
*3. Contact Heidenhain Corporation for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Heidenhain Corporation.

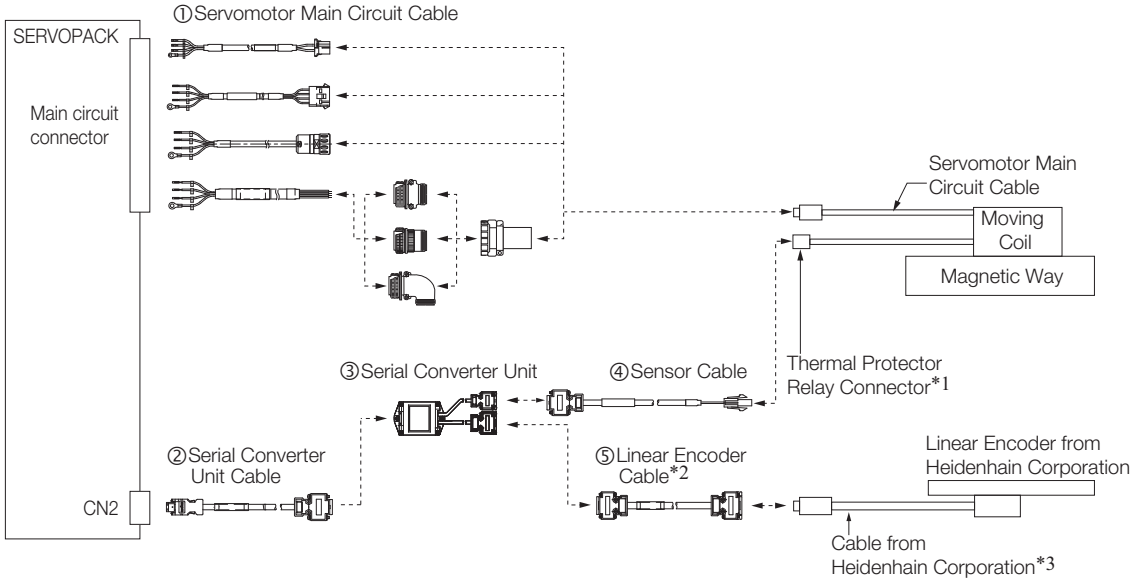
◆ Connecting to a Linear Servomotor without a Polarity Sensor

■ Servomotors Other Than the SGLFW2



*1. When using a JZDP-J00□-□□□ Serial Converter Unit, do not use a Yaskawa Linear Encoder Cable that is longer than 3 m.
*2. Contact Heidenhain Corporation for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Heidenhain Corporation.

■ SGLFW2 Servomotors



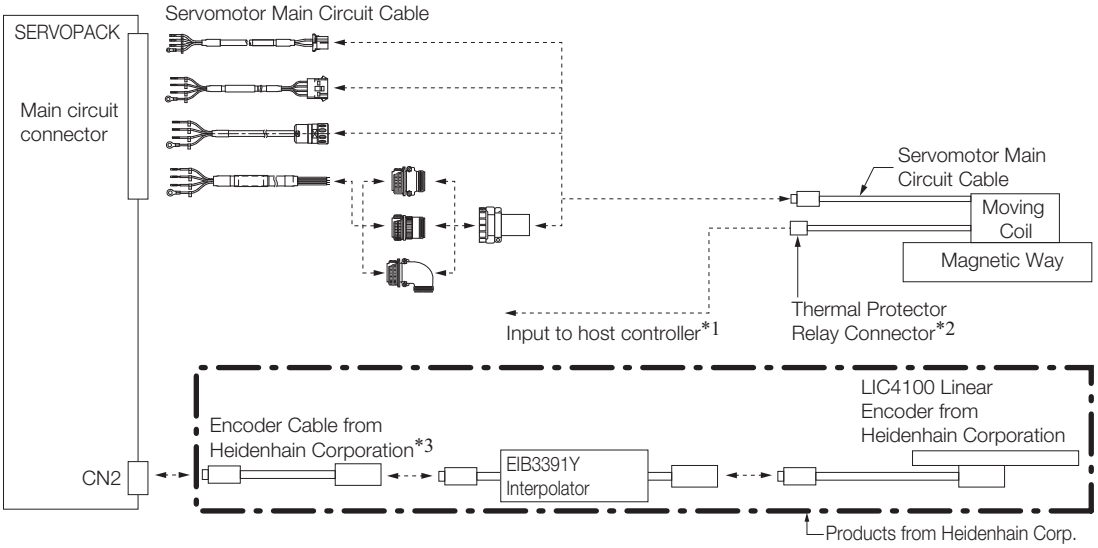
*1. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.
*2. When using a JZDP-J00□-□□□ Serial Converter Unit, do not use a Yaskawa Linear Encoder Cable that is longer than 3 m.
*3. Contact Heidenhain Corporation for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Heidenhain Corporation.

No.	Cable Type	Reference
①	Servomotor Main Circuit Cable	page 7-14
②	Serial Converter Unit Cable	page 7-15
③	Serial Converter Unit	page 7-25
④	Sensor Cable	page 7-15
⑤	Linear Encoder Cable	page 7-15

LIC4100 Linear Encoder with EIB3391Y Interpolator

Important

1. You cannot use an LIC4100 Linear Encoder together with a Linear Servomotor with a Polarity Sensor.
2. If you use an SGLFW2 Servomotor, input the thermal protector signal from the Linear Servomotor to the host controller. The thermal protector signal is closed when the temperature is normal and open when the thermal protector is activated. Do not exceed 5 A or 250 V.



*1. Cables to connect to the host controller are not provided by Yaskawa.
Refer to the following section for information on connector models.
☞ *JZSP-CL2TH00-□□-E Sensor Cables* on page 7-23

*2. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.

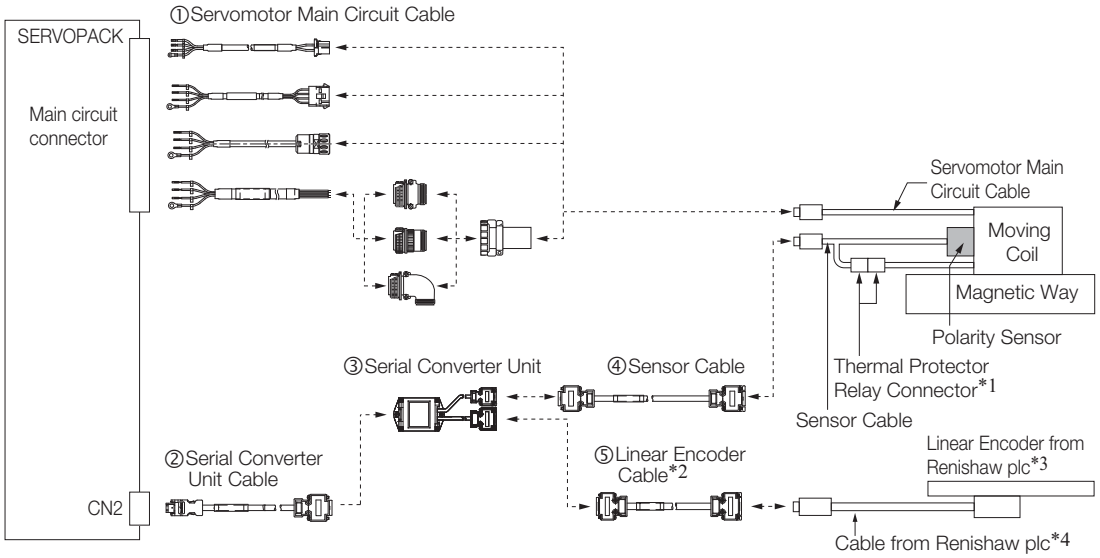
*3. Use an Encoder Cable from Heidenhain Corporation. Contact Heidenhain Corporation for detailed Encoder Cable specifications.

7.2.2 Connections to Linear Encoder from Renishaw plc

Connections for a 1 Vp-p Analog Voltage Output Signal

You must make the connections through a Yaskawa Serial Converter Unit. The output signal will be multiplied by 8 bits (256 divisions) or 12 bits (4,096 divisions) in the Serial Converter Unit.

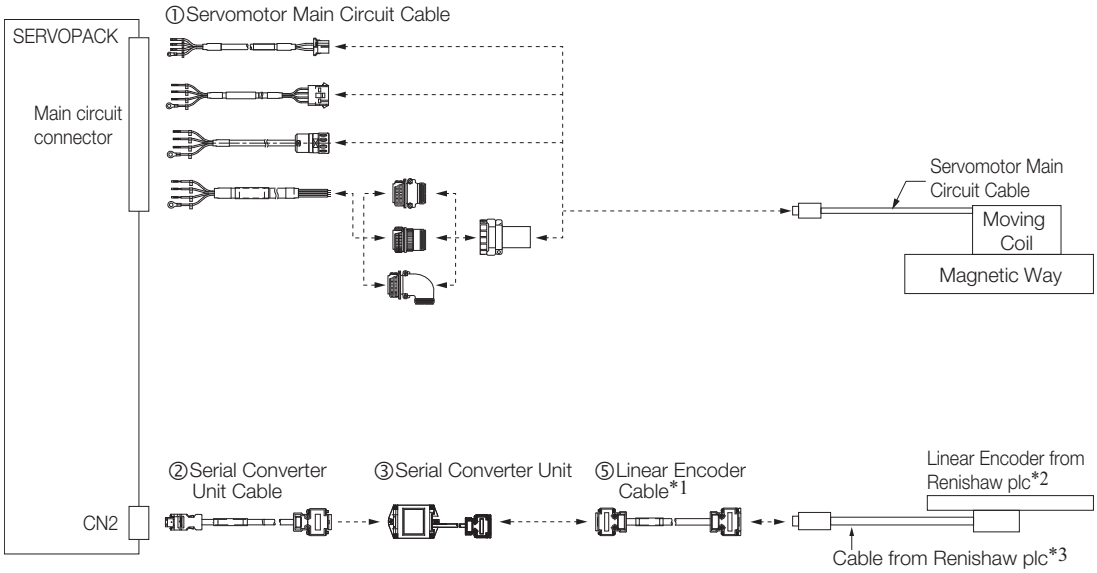
◆ Connecting to a Linear Servomotor with a Polarity Sensor



*1. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.
*2. When using a JZDP-J00□-□□□ Serial Converter Unit, do not use a Yaskawa Linear Encoder Cable that is longer than 3 m.
*3. If you use the origin signals with a Linear Encoder from Renishaw plc, the origin may sometimes be falsely detected.
If that occurs, use the BID/DIR signal to output the origin signal only in one direction.
*4. Contact Renishaw plc for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Renishaw plc. However, the BID and DIR signals are not connected.

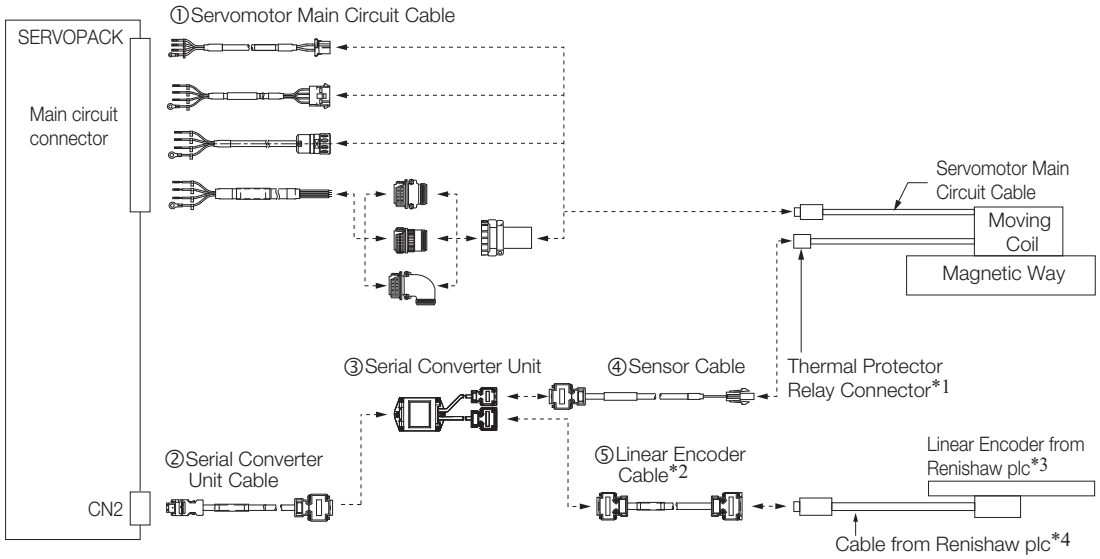
◆ Connecting to a Linear Servomotor without a Polarity Sensor

■ Servomotors Other Than the SGLFW2



*1. When using a JZDP-J00□-□□□ Serial Converter Unit, do not use a Yaskawa Linear Encoder Cable that is longer than 3 m.
*2. If you use the origin signals with a Linear Encoder from Renishaw plc, the origin may sometimes be falsely detected.
If that occurs, use the BID/DIR signal to output the origin signal only in one direction.
*3. Contact Renishaw plc for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Renishaw plc. However, the BID and DIR signals are not connected.

■ SGLFW2 Servomotors



*1. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.
*2. When using a JZDP-J00□-□□□ Serial Converter Unit, do not use a Yaskawa Linear Encoder Cable that is longer than 3 m.
*3. If you use the origin signals with a Linear Encoder from Renishaw PLC, the origin may sometimes be falsely detected.
If that occurs, use the BID/DIR signal to output the origin signal only in one direction.
*4. Contact Renishaw PLC for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Renishaw PLC. However, the BID and DIR signals are not connected.

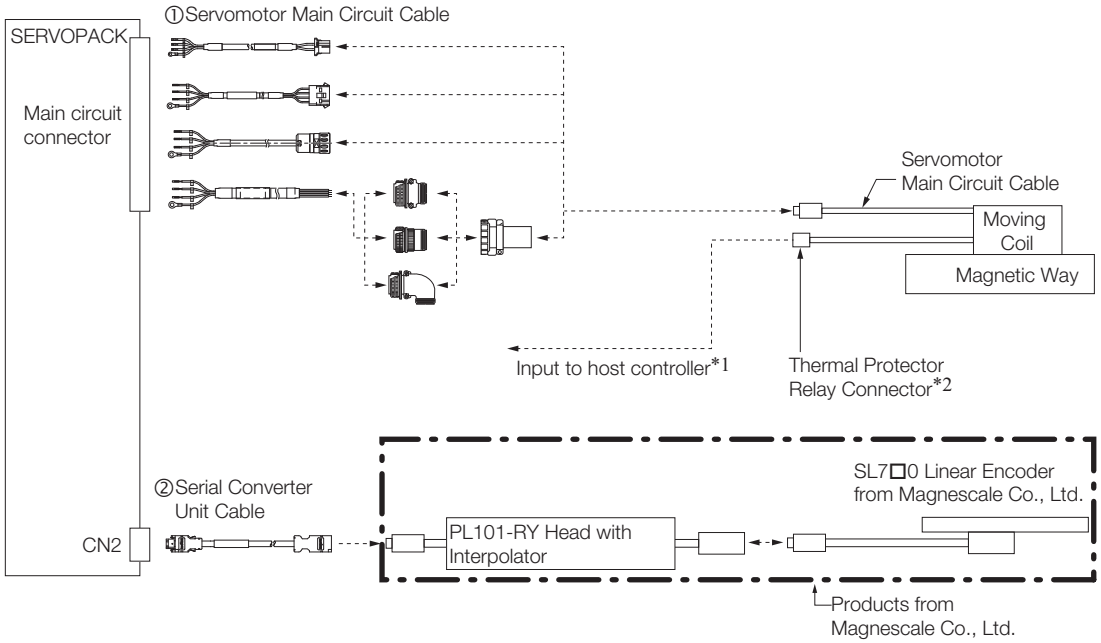
No.	Cable Type	Reference
①	Servomotor Main Circuit Cable	page 7-14
②	Serial Converter Unit Cable	page 7-15
③	Serial Converter Unit	page 7-25
④	Sensor Cable	page 7-15
⑤	Linear Encoder Cable	page 7-15

7.2.3 Connections to Linear Encoder from Magnescale Co., Ltd.

SL7□0 Linear Encoder and PL101-RY Sensor Head with Interpolator

Important

1. You cannot use a PL101-RY Sensor Head with an Interpolator together with a Linear Servomotor with a Polarity Sensor.
2. If you use an SGLFW2 Servomotor, input the thermal protector signal from the Linear Servomotor to the host controller. The thermal protector signal is closed when the temperature is normal and open when the thermal protector is activated. Do not exceed 5 A or 250 V.



*1. Cables to connect to the host controller are not provided by Yaskawa.
Refer to the following section for information on connector models.
☞ *JZSP-CL2TH00-□□-E Sensor Cables* on page 7-23

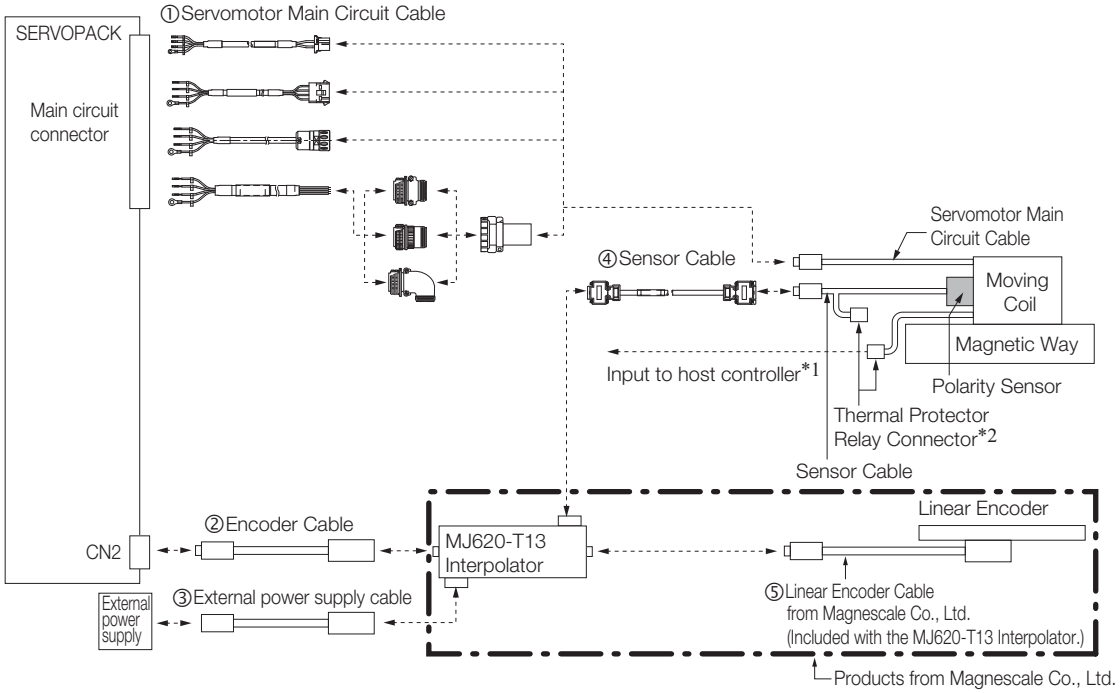
*2. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.

No.	Cable Type	Reference
①	Servomotor Main Circuit Cables	page 7-14
②	Serial Converter Unit Cables	page 7-15

SL7□0 Linear Encoder, PL101 Sensor Head, and MJ620-T13 Interpolator

Important

1. A 5-VDC power supply is required for the MJ620-T13. (The 5-VDC power supply is not provided by Yaskawa.)
2. Refer to the MJ620-T13 specifications from Magnescale Co., Ltd. for the current consumption of the MJ620-T13.
3. If you use an SGLFW2 Servomotor, remove the thermal protector relay connector and input the thermal protector signal from the Linear Servomotor to the host controller. The thermal protector signal is closed when the temperature is normal and open when the thermal protector is activated. Do not exceed 5 A or 250 V.



*1. Cables to connect to the host controller are not provided by Yaskawa.
Refer to the following section for information on connector models.
☞ *JZSP-CL2TH00-□□-E Sensor Cables* on page 7-23

*2. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.

No.	Cable Type		Reference
①	Servomotor Main Circuit Cable		page 7-14
②	Encoder Cable	These cables are not provided by Yaskawa.	page 7-11
③	External power supply cable		page 7-11
④	Sensor Cable		page 7-15
⑤	Linear Encoder Cable	Use the cables that come with the MJ620-T13 Interpolator. For details, refer to the specifications for the MJ620-T13 Interpolator.	–

◆ Encoder Cables

These cables are not provided by Yaskawa. Use a shielded cable. Refer to the following tables for the pin layouts.

■ SERVOPACK End of Cable (CN2)

- Plug Connector: 55100-0670 (Molex Japan Co., Ltd)
- Connector order number: JZSP-CMP9-1-E (SERVOPACK Connector Kit)

Pin	Signal	Function
1	–	–
2	PG0 V	Encoder power supply 0 V
3	–	–
4	–	–
5	PS	Serial data
6	/PS	
Shell	Shield	–

■ MJ620-T13 End of Cable

For details, refer to the specifications for the MJ620-T13 from Magnescale Co., Ltd..

- Receptacle: PCR-E20LMD+ (Honda Tsushin Kogyo Co., Ltd.)
- Plug: PCR-E20FS+ (Honda Tsushin Kogyo Co., Ltd.)
- Shell: PCS-E20L□ (Honda Tsushin Kogyo Co., Ltd.)

Pin	Signal	Function	Pin	Signal	Function
1	Do not connect.	–	12	0 V	0 V
2	Do not connect.	–	13	Do not connect.	–
3	Do not connect.	–	14	0 V	0 V
4	Do not connect.	–	15	Do not connect.	–
5	SD	Serial data	16	0 V	0 V
6	/SD		17	Do not connect.	–
7	Do not connect.	–	18	Do not connect.	–
8	Do not connect.	–	19	Do not connect.	–
9	Do not connect.	–	20	Do not connect.	–
10	Do not connect.	–	Shell	Shield	–
11	Do not connect.	–			

■ Cables without Connectors

Name	Length (L)	Order Number		Reference
		Standard Cable	Flexible Cable	
Cables without Connectors	5 m	JZSP-CMP09-05-E	JZSP-CSP39-05-E	page 5-23
	10 m	JZSP-CMP09-10-E	JZSP-CSP39-10-E	
	15 m	JZSP-CMP09-15-E	JZSP-CSP39-15-E	
	20 m	JZSP-CMP09-20-E	JZSP-CSP39-20-E	

Note: We recommend that you use Flexible Cables.

◆ External Power Supply Cables

This cable is not provided by Yaskawa. Refer to the table on the right for the pin layout.

For details, refer to the specifications for the MJ620-T13 from Magnescale Co., Ltd..

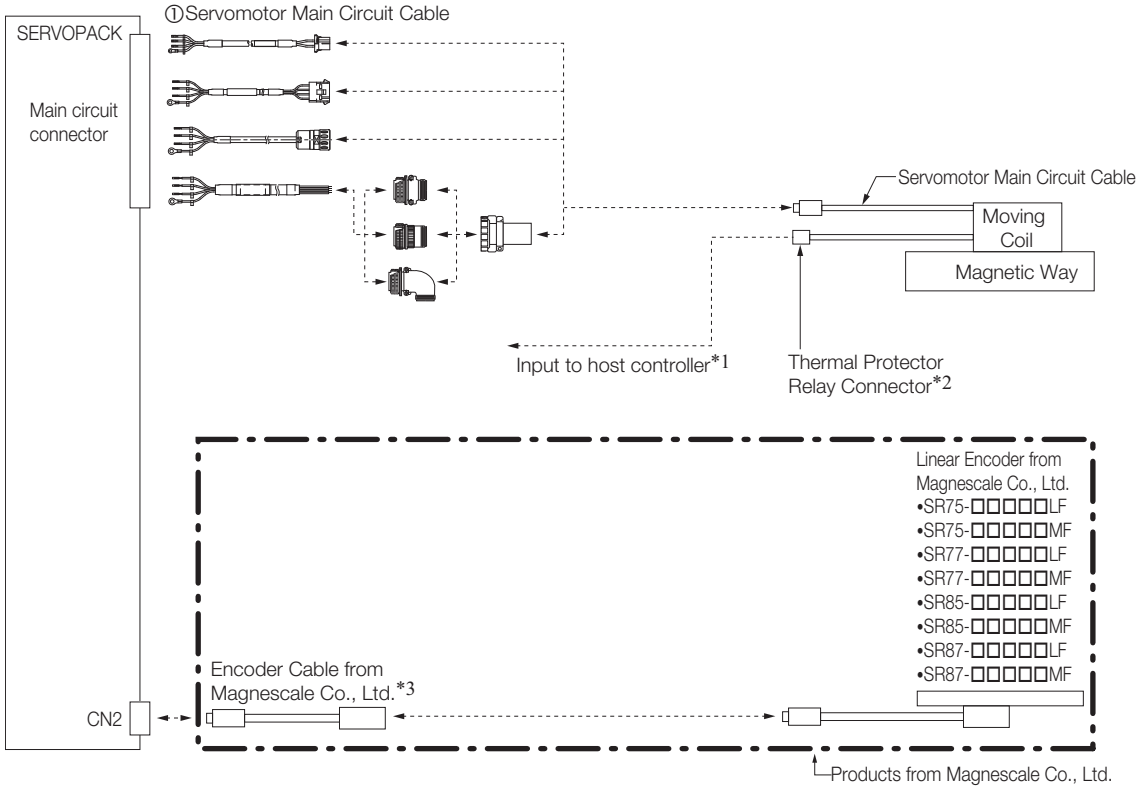
- Connector Header: MC1.5/2-GF-3.81 (Phoenix Contact)
- Connector Plug: MC1.5/2-STF-3.81 (Phoenix Contact)

Pin	Signal	Function
1	+5 V	+5 V
2	0 V	0 V

SR-75, SR-77, SR-85, and SR-87 Linear Encoders

Important

1. You cannot use an SR-75, SR-77, SR-85, or SR-87 Linear Encoder with a Linear Servomotor with a Polarity Sensor.
2. If you use an SGLFW2 Servomotor, input the thermal protector signal from the Linear Servomotor to the host controller. The thermal protector signal is closed when the temperature is normal and open when the thermal protector is activated. Do not exceed 5 A or 250 V.



*1. Cables to connect to the host controller are not provided by Yaskawa.
Refer to the following section for information on connector models.
☞ *JZSP-CL2TH00-□□-E Sensor Cables* on page 7-23

*2. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.

*3. To connect the SERVOPACK and Linear Encoder, use a CH33-xx□□G Cable from Magnescale Co., Ltd. (This Cable has connectors designed for use with Yaskawa products.)

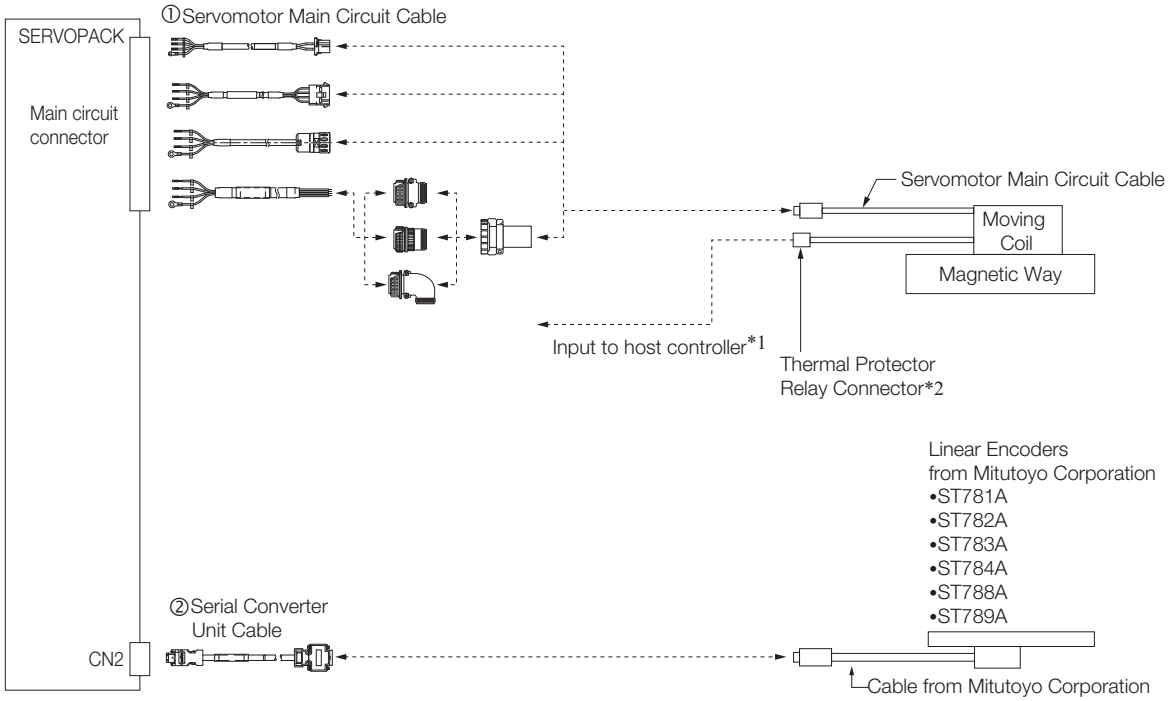
No.	Cable Type	Reference
①	Servomotor Main Circuit Cables	page 7-14

7.2.4 Connections to Linear Encoders from Mitutoyo Corporation

SL78□A Linear Encoders

Important

1. You cannot use a SL78□A Linear Encoder together with a Linear Servomotor with a Polarity Sensor.
2. If you use an SGLFW2 Servomotor, input the thermal protector signal from the Linear Servomotor to the host controller. The thermal protector signal is closed when the temperature is normal and open when the thermal protector is activated. Do not exceed 5 A or 250 V.



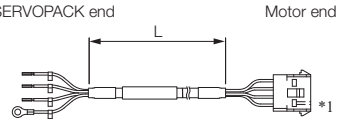
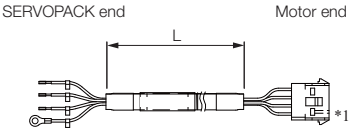
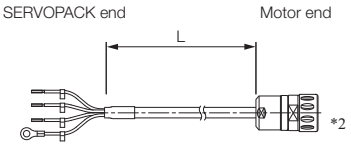
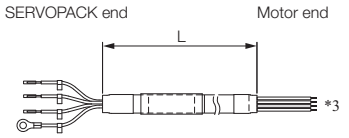
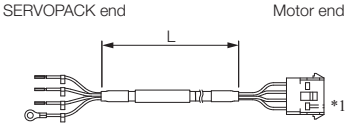
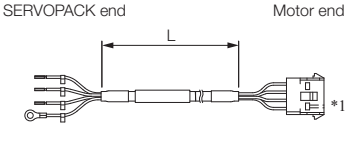
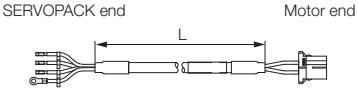
*1. Cables to connect to the host controller are not provided by Yaskawa.
Refer to the following section for information on connector models.
☞ *JZSP-CL2TH00-□□-E Sensor Cables* on page 7-23

*2. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.

No.	Cable Type	Reference
①	Servomotor Main Circuit Cables	page 7-14
②	Serial Converter Unit Cables	page 7-15

7.3 Cable Selection Table

7.3.1 Servomotor Main Circuit Cables

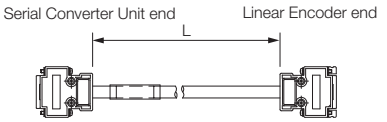
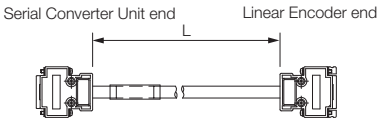
Servomotor Model	Length (L)	Order Number	Appearance	Details
SGLGW-30A, -40A, or -60A SGLFW-20A or -35A SGLC (all models)	1 m	JZSP-CLN11-01-E		page 7-16
	3 m	JZSP-CLN11-03-E		
	5 m	JZSP-CLN11-05-E		
	10 m	JZSP-CLN11-10-E		
	15 m	JZSP-CLN11-15-E		
	20 m	JZSP-CLN11-20-E		
SGLGW-90A SGLFW-50A or -1ZA SGLTW-20A or -35A	1 m	JZSP-CLN21-01-E		page 7-17
	3 m	JZSP-CLN21-03-E		
	5 m	JZSP-CLN21-05-E		
	10 m	JZSP-CLN21-10-E		
	15 m	JZSP-CLN21-15-E		
	20 m	JZSP-CLN21-20-E		
SGLGW-30A□□□□□D -40A□□□□□D -60A□□□□□D SGLFW-□□A□□□□□D SGLTW-□□A□□□□□D	1 m	JZSP-CLN14-01-E		page 7-17
	3 m	JZSP-CLN14-03-E		
	5 m	JZSP-CLN14-05-E		
	10 m	JZSP-CLN14-10-E		
	15 m	JZSP-CLN14-15-E		
	20 m	JZSP-CLN14-20-E		
SGLTW-40A□□□B□ -80A□□□B□	1 m	JZSP-CLN39-01-E		page 7-17
	3 m	JZSP-CLN39-03-E		
	5 m	JZSP-CLN39-05-E		
	10 m	JZSP-CLN39-10-E		
	15 m	JZSP-CLN39-15-E		
	20 m	JZSP-CLN39-20-E		
SGLFW2-30A070A□ SGLFW2-30A070A□L SGLFW2-30A120A□ SGLFW2-30A120A□L SGLFW2-30A230A□ SGLFW2-30A230A□L	1 m	JZSP-CL2N703-01-E		page 7-19
	3 m	JZSP-CL2N703-03-E		
	5 m	JZSP-CL2N703-05-E		
	10 m	JZSP-CL2N703-10-E		
	15 m	JZSP-CL2N703-15-E		
	20 m	JZSP-CL2N703-20-E		
SGLFW2-45A200A□ SGLFW2-45A200A□L SGLFW2-45A380A□ SGLFW2-45A380A□L	1 m	JZSP-CL2N603-01-E		page 7-19
	3 m	JZSP-CL2N603-03-E		
	5 m	JZSP-CL2N603-05-E		
	10 m	JZSP-CL2N603-10-E		
	15 m	JZSP-CL2N603-15-E		
	20 m	JZSP-CL2N603-20-E		
SGLFW2-90A200A□ SGLFW2-90A380A□ SGLFW2-90A560A□ SGLFW2-1DA380A□ SGLFW2-1DA560A□	1 m	JZSP-CL2N503-01-E		page 7-20
	3 m	JZSP-CL2N503-03-E		
	5 m	JZSP-CL2N503-05-E		
	10 m	JZSP-CL2N503-10-E		
	15 m	JZSP-CL2N503-15-E		
	20 m	JZSP-CL2N503-20-E		

Note: Estimates are available for models other than those listed above (SGLFW2-90A□□□A□L and SGLFW2-1D□□□A□L).

*1. Connector from Tyco Electronics Japan G.K.

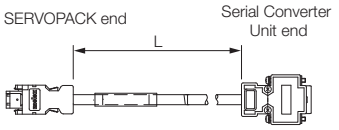
*2. Connector from Interconnectron GmbH
*3. A connector is not provided on the Linear Servomotor end. Obtain a connector according to your specifications. Refer to ◆ *JZSP-CLN39 Cable Connectors* on page 7-18 for information on connectors.

7.3.2 Linear Encoder Cables

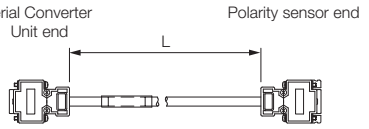
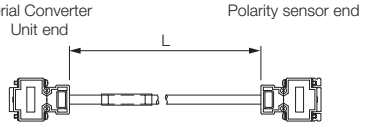
Name	Servomotor Model	Length (L)*	Order Number	Appearance	Details
For Linear Encoder from Renishaw plc	All models	1 m	JZSP-CLL00-01-E		page 7-20
		3 m	JZSP-CLL00-03-E		
		5 m	JZSP-CLL00-05-E		
		10 m	JZSP-CLL00-10-E		
		15 m	JZSP-CLL00-15-E		
For Linear Encoder from Heidenhain Corporation		1 m	JZSP-CLL30-01-E		page 7-21
		3 m	JZSP-CLL30-03-E		
		5 m	JZSP-CLL30-05-E		
		10 m	JZSP-CLL30-10-E		
		15 m	JZSP-CLL30-15-E		

* When using a JZDP-J00□-□□□-E Serial Converter Unit, do not exceed a cable length of 3 m.

7.3.3 Serial Converter Unit Cables

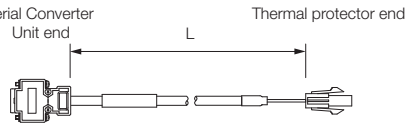
Servomotor Model	Length (L)	Order Number	Appearance	Details
All models	1 m	JZSP-CLP70-01-E		page 7-21
	3 m	JZSP-CLP70-03-E		
	5 m	JZSP-CLP70-05-E		
	10 m	JZSP-CLP70-10-E		
	15 m	JZSP-CLP70-15-E		
	20 m	JZSP-CLP70-20-E		

7.3.4 Sensor Cables

Servomotor Model	Length (L)	Order Number	Appearance	Details
SGLGW-□□A SGLFW-□□A SGLTW-□□A SGLCW-□□A	1 m	JZSP-CLL10-01-E		page 7-22
	3 m	JZSP-CLL10-03-E		
	5 m	JZSP-CLL10-05-E		
	10 m	JZSP-CLL10-10-E		
	15 m	JZSP-CLL10-15-E		
SGLFW2- □□A□□□AS□ (with Polarity Sensor)	1 m	JZSP-CL2L100-01-E		page 7-22
	3 m	JZSP-CL2L100-03-E		
	5 m	JZSP-CL2L100-05-E		
	10 m	JZSP-CL2L100-10-E		
	15 m	JZSP-CL2L100-15-E		

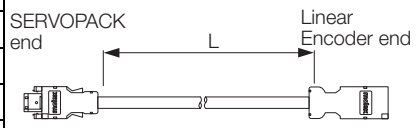
Continued on next page.

Continued from previous page.

Servomotor Model	Length (L)	Order Number	Appearance	Details
SGLFW2-□□A□□□ AT□ (without Polarity Sensor)	1 m	JZSP-CL2TH00-01-E		page 7-23
	3 m	JZSP-CL2TH00-03-E		
	5 m	JZSP-CL2TH00-05-E		
	10 m	JZSP-CL2TH00-10-E		
	15 m	JZSP-CL2TH00-15-E		

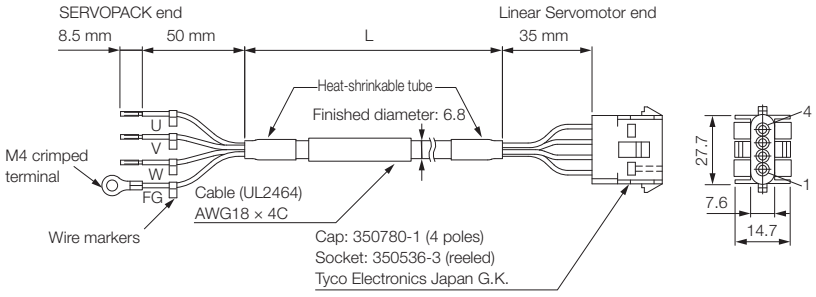
7.3.5 Encoder Cables

The cables in the following table can be used either for Absolute Linear Encoders or Incremental Linear Encoders.

Servomotor Model	Length (L)	Order Number		Appearance	Details
		Standard Cable	Flexible Cable		
All models	3 m	JZSP-CMP00-03-E	JZSP-CMP10-03-E		page 7-23
	5 m	JZSP-CMP00-05-E	JZSP-CMP10-05-E		
	10 m	JZSP-CMP00-10-E	JZSP-CMP10-10-E		
	15 m	JZSP-CMP00-15-E	JZSP-CMP10-15-E		
	20 m	JZSP-CMP00-20-E	JZSP-CMP10-20-E		

7.3.6 Cable Dimensional Drawings and Wiring Specifications

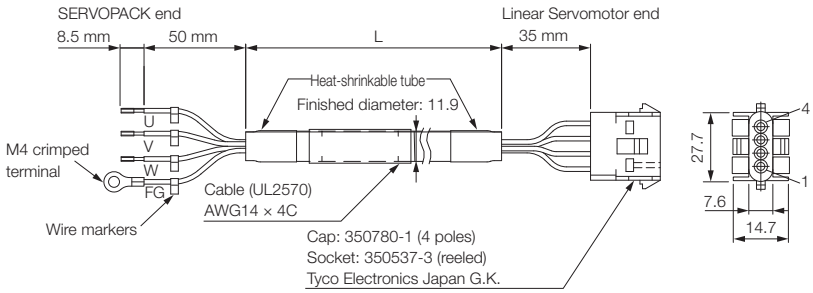
JZSP-CLN11-□□-E Servomotor Main Circuit Cables



- Wiring Specifications

SERVOPACK Leads		Servomotor Connector	
Wire Color	Signal	Signal	Pin
Red	Phase U	Phase U	1
White	Phase V	Phase V	2
Blue	Phase W	Phase W	3
Green/yellow	FG	FG	4

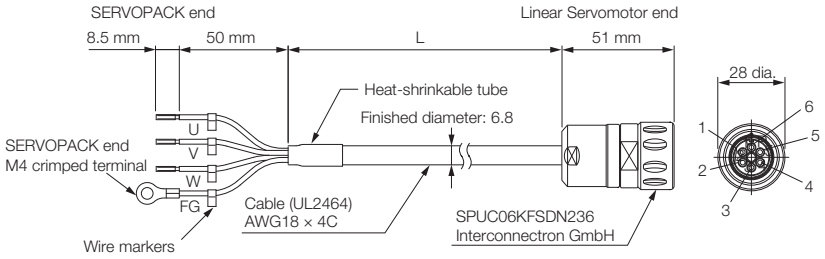
JZSP-CLN21-□□-E Servomotor Main Circuit Cables



- Wiring Specifications

SERVOPACK Leads		Servomotor Connector	
Wire Color	Signal	Signal	Pin
Red	Phase U	Phase U	1
White	Phase V	Phase V	2
Blue	Phase W	Phase W	3
Green/yellow	FG	FG	4

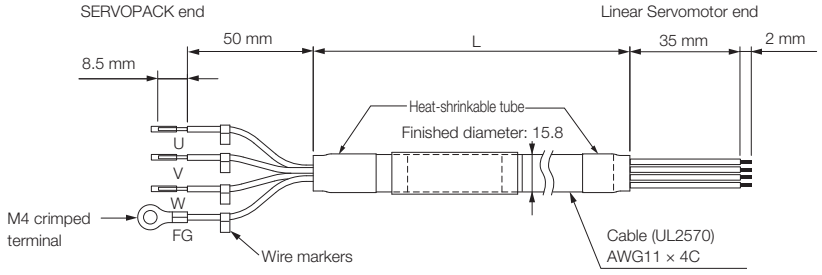
JZSP-CLN14-□□-E Servomotor Main Circuit Cables



- Wiring Specifications

SERVOPACK Leads		Servomotor Connector	
Wire Color	Signal	Signal	Pin
Black (white 1)	Phase U	Phase U	1
Black (white 2)	Phase V	Phase V	2
Black (white 3)	Phase W	Phase W	3
Green/yellow	FG	–	4
		–	5
		FG	6

JZSP-CLN39-□□-E Servomotor Main Circuit Cables



- Wiring Specifications

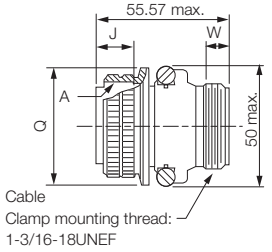
SERVOPACK Leads		Servomotor connector	
Wire Color	Signal	Signal	Pin
Red	Phase U	Phase U	A
White	Phase V	Phase V	B
Blue	Phase W	Phase W	C
Green/yellow	FG	FG	D

◆ JZSP-CLN39 Cable Connectors

Applicable Servomotor	Connector Provided with Servomotor	Plug		Cable Clamp
		Straight	Right-Angle	
SGLTW-40 or -80	MS3102A22-22P	MS3106B22-22S or MS3106A22-22S	MS3108B22-22S	MS3057-12A

■ MS3106B22-2S: Straight Plug with Two-Piece Shell

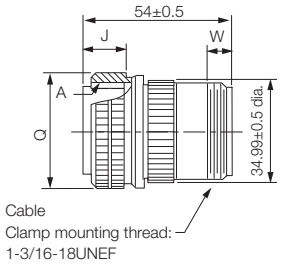
Unit: mm



Shell Size	Joint Thread A	Length of Joint J ±0.12	Joint Nut Outer Diameter Q $^{+0}_{-0.38}$ Dia.	Effective Thread Length W Min.
22	1-3/8-18UNEF	18.26	40.48	9.53

■ MS3106A22-2S: Straight Plug with Solid Shell

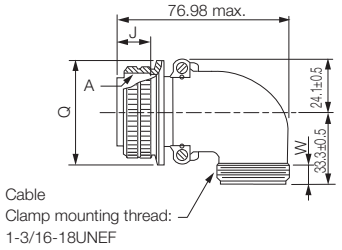
Unit: mm



Shell Size	Joint Thread A	Length of Joint J ±0.12	Joint Nut Outer Diameter Q $^{+0}_{-0.38}$ Dia.	Effective Thread Length W Min.
22	1-3/8-18UNEF	18.26	40.48	9.53

■ MS3108B22-2S: Right-Angle Plug with Two-Piece Shell

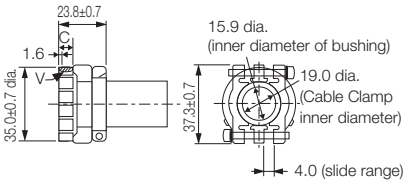
Unit: mm



Shell Size	Joint Thread A	Length of Joint J ±0.12	Joint Nut Outer Diameter Q $^{+0}_{-0.38}$ Dia.	Effective Thread Length W Min.
22	1-3/8-18UNEF	18.26	40.48	9.53

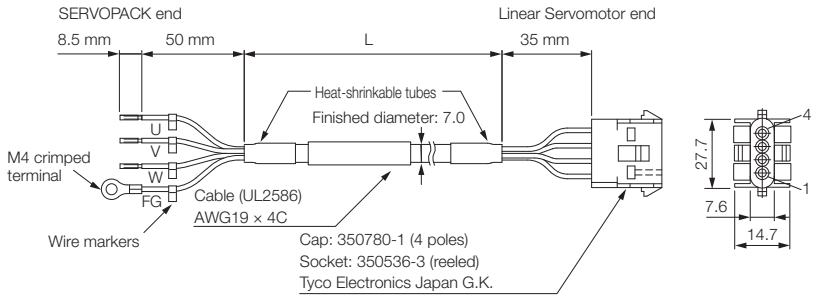
■ MS3057-12A: Cable Clamp with Rubber Bushing

Unit: mm



Applicable Connector Shell Size	Effective Thread Length C	Mounting Thread V	Attached Bushing
20.22	10.3	1-3/16-18UNEF	AN3420-12

JZSP-CL2N703-□□-E Servomotor Main Circuit Cables



- Wiring Specifications

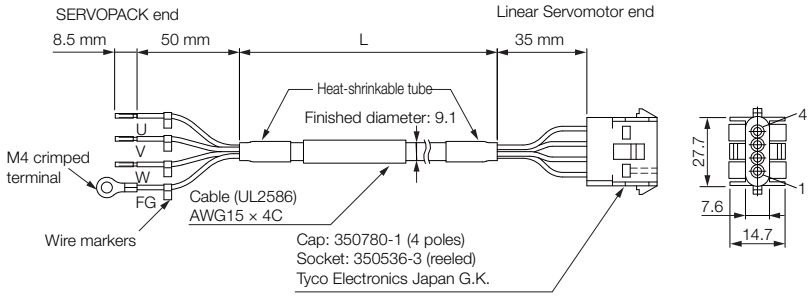
SERVOPACK Leads

Wire Color	Signal
Red	Phase U
White	Phase V
Black	Phase W
Green	FG

Servomotor connector

Signal	Pin
Phase U	1
Phase V	2
Phase W	3
FG	4

JZSP-CL2N603-□□-E Servomotor Main Circuit Cables



- Wiring Specifications

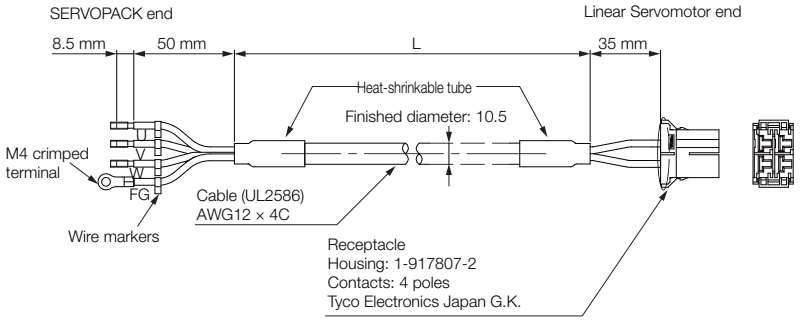
SERVOPACK Leads

Wire Color	Signal
Red	Phase U
White	Phase V
Black	Phase W
Green	FG

Servomotor connector

Signal	Pin
Phase U	1
Phase V	2
Phase W	3
FG	4

JZSP-CL2N503-□□-E Servomotor Main Circuit Cables



- Wiring Specifications

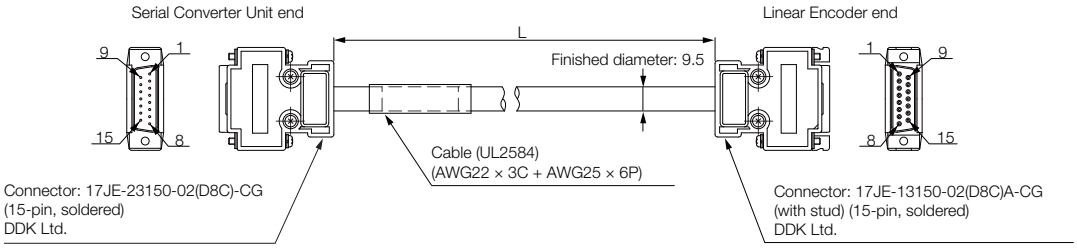
SERVOPACK Leads

Wire Color	Signal
Red	Phase U
White	Phase V
Black	Phase W
Green	FG

Servomotor Connector

Signal	Pin
Phase U	A1
Phase V	A2
Phase W	B1
FG	B2

JZSP-CLL00-□□-E Linear Encoder Cables



- Wiring Specifications

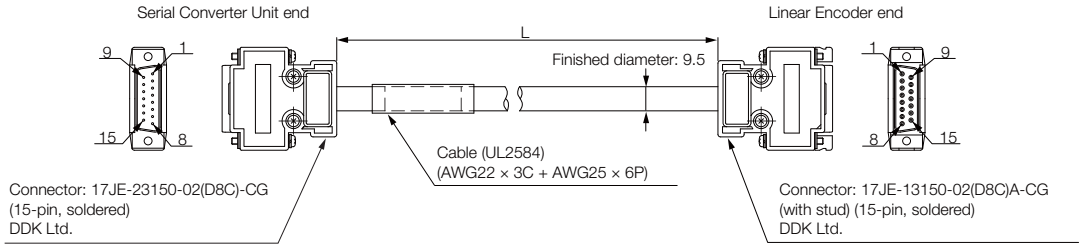
Serial Converter Unit end

Pin	Signal
1	/Cos (V1-)
2	/Sin (V2-)
3	Ref (V0+)
4	+5 V
5	5 Vs
6	BID
7	Vx
8	Vq
9	Cos (V1+)
10	Sin (V2+)
11	/Ref (V0+)
12	0 V
13	0 Vs
14	DIR
15	Inner shield
Case	Shield

Linear Encoder end

Pin	Signal
1	/Cos (V1-)
2	/Sin (V2-)
3	Ref (V0+)
4	+5 V
5	5 Vs
6	BID
7	Vx
8	Vq
9	Cos (V1+)
10	Sin (V2+)
11	/Ref (V0-)
12	0 V
13	0 Vs
14	DIR
15	Inner shield
Case	Shield

JZSP-CLL30-□□-E Linear Encoder Cables



- Wiring Specifications

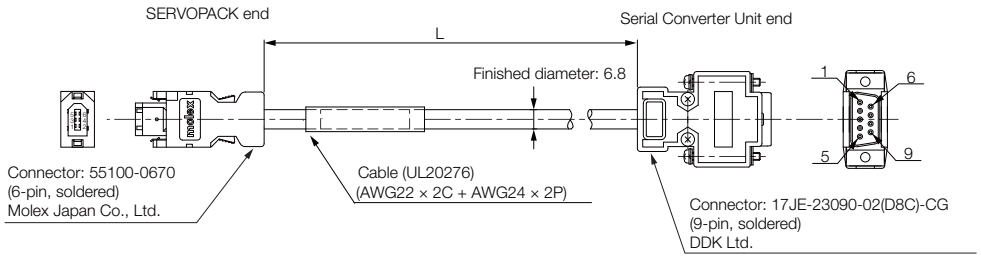
Serial Converter Unit end

Pin	Signal
1	Cos (A+)
2	0 V
3	Sin (B+)
4	+5 V
5	–
6	–
7	/Ref (R-)
8	–
9	/Cos (A-)
10	0 Vs
11	/Sin (B-)
12	5 Vs
13	–
14	Ref (R+)
15	–
Case	Shield

Linear Encoder end

Pin	Signal
1	Cos (A+)
2	0 V
3	Sin (B+)
4	+5 V
5	–
6	–
7	/Ref (R-)
8	–
9	/Cos (A-)
10	0 Vs
11	/Sin (B-)
12	5 Vs
13	–
14	Ref (R+)
15	–
Case	Shield

JZSP-CLP70-□□-E



- Wiring Specifications

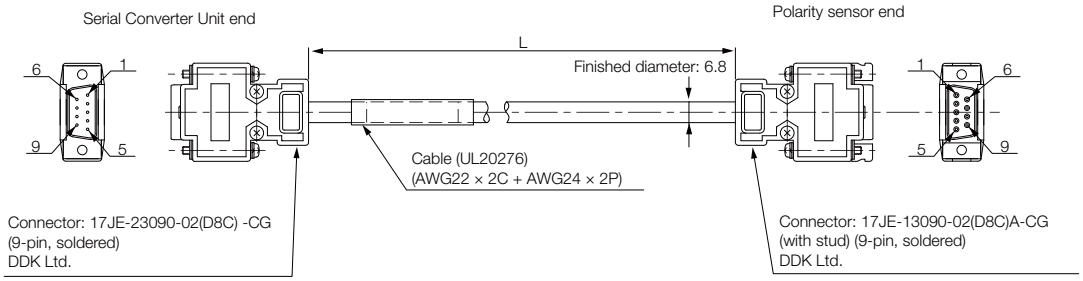
SERVOPACK end

Pin	Signal	Wire Color
1	PG5 V	Orange
2	PG0 V	Green
3	–	–
4	–	–
5	PS	Light blue/red
6	/PS	Light blue/black
Shell	Shield	–

Serial Converter Unit end

Pin	Signal	Wire Color
1	+5 V	Orange
5	0 V	Green
3	–	–
4	–	–
2	Phase-S output	Light blue/red
6	/Phase-S output	Light blue/black
Case	Shield	–
7	–	–
8	–	–
9	–	–

JZSP-CLL10-□□-E Sensor Cables



- Wiring Specifications

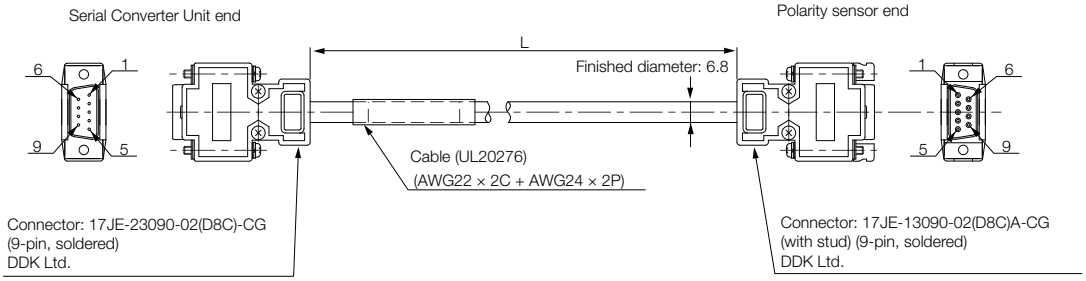
Serial Converter Unit end

Pin	Signal
1	+5 V
2	Phase-U input
3	Phase-V input
4	Phase-W input
5	0 V
6	–
7	–
8	–
9	–
Case	Shield

Polarity sensor end

Pin	Signal
1	+5 V
2	Phase-U input
3	Phase-V input
4	Phase-W input
5	0 V
6	–
7	–
8	–
9	–
Case	Shield

JZSP-CL2L100-□□-E Sensor Cables



- Wiring Specifications

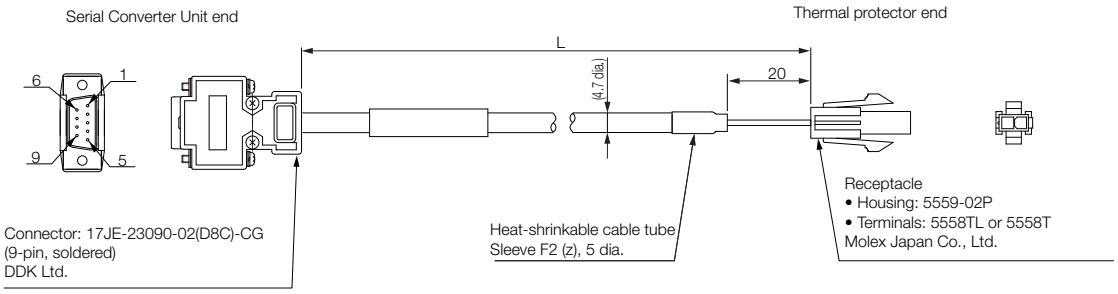
Serial Converter Unit end

Pin	Signal
1	+5 V
2	Phase-U input
3	Phase-V input
4	Phase-W input
5	0 V
6	–
7	–
8	–
9	Thermal protector input
Case	Shield

Polarity sensor end

Pin	Signal
1	+5 V
2	Phase-U input
3	Phase-V input
4	Phase-W input
5	0 V
6	–
7	–
8	–
9	Thermal protector input
Case	Shield

JZSP-CL2TH00-□□-E Sensor Cables



• Wiring Specifications

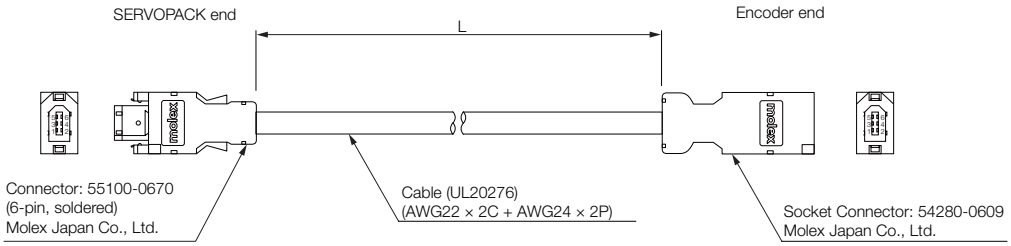
Serial Converter Unit end

Pin	Signal
1	+5V, T.P.
2	–
3	–
4	–
5	–
6	–
7	–
8	–
9	T.P.

Thermal protector end

Pin	Signal
1	+5V, T.P.
2	T.P.

Encoder Cables JZSP-CMP00-□□-E (Standard Cables) and JZSP-CMP10-□□-E (Flexible Cables)



• Wiring Specifications

Standard Cable

SERVOPACK end

Pin	Signal
1	PG 5V
2	PG 0V
5	PS
6	/PS
Shell	FG

Shield wire

Encoder end

Pin	Wire Color
1	Red
2	Black
5	Light blue
6	Light blue/white
7	FG shield wire

Flexible Cable

SERVOPACK end

Pin	Signal
1	PG 5V
2	PG 0V
5	PS
6	/PS
Shell	FG

Shield wire

Encoder end

Pin	Wire Color
1	Orange
2	Light green
5	Red/light blue
6	Black/light blue
7	FG shield wire

Note: Always connect the shield wire from the Encoder Cable to the connector case (shell).

Precautions for Standard Cables

• Do not use standard cables in applications that require a high degree of flexibility, such as twisting and turning, or in which the cables themselves must move. When you use Standard Cables, observe the recommended bending radius given in the following table and perform all wiring so that stress is not applied to the cables. Use the cables so that they are not repeatedly bent.

Cable Diameter	Recommended Bending Radius [R]
Less than 8 mm	15 mm min.
8 mm	20 mm min.
Over 8 mm	Cable diameter × 3 mm min.

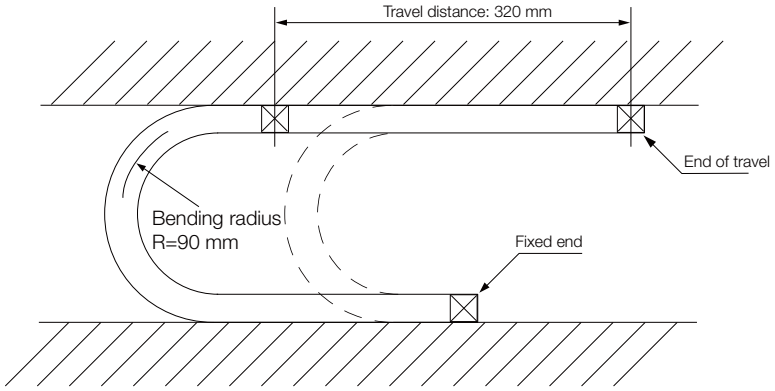
Flexible Cable Service Life Characteristics

The Flexible Cables have a service life of 10,000,000 operations minimum when used at the recommended bending radius and under the following test conditions. The following table gives the recommended bending radius R for each Cable.

Type	Model	Recommended Bending Radius [mm]
Linear Servomotor Main Circuit Cable	JZSP-CLN11-□□-E	35
	JZSP-CLN21-□□-E	38
	JZSP-CLN39-□□-E	50
	JZSP-CLN14-□□-E	35
Linear Encoder Cable	JZSP-CLL00-□□-E	57
	JZSP-CLL30-□□-E	
Sensor Cable	JZSP-CLL10-□□-E	46
	JZDP-CL2L100-□□-E	
	JZSP-CL2TH00-□□-E	
Serial Converter Unit Cable	JZSP-CLP70-□□-E	
Cables with Connectors on Both Ends (for incremental/absolute encoder)	JZSP-CMP10-□□-E	90
Cables without Connectors	JZSP-CSP39-□□-E	

Precautions for Flexible Cables

- The Flexible Cables have a service life of 10,000,000 operations minimum when used at the recommended bending radius of 90 mm or larger under the following test conditions. The service life of a Flexible Cable is reference data under special test conditions. The service life of a Flexible Cable greatly depends on the amount of mechanical shock, how the cable is attached, and how the cable is secured.
  Test Conditions
  - One end of the cable is repeatedly moved forward and backward for 320 mm using the test equipment shown in the following figure.
  - The fixed end is connected to a non-moving part, the moving end is connected to the moving part, and the number of cable return operations until a lead wire breaks are counted. One round trip is counted as one bend.



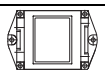
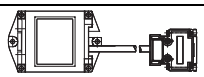
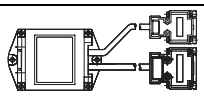
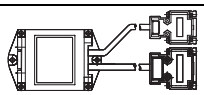
Note: The service life of a Flexible Cable indicates the number of bends while the lead wires are electrically charged for which no cracks or damage that affects the performance of the cable sheathing occurs. Breaking of the shield wire is not considered.

7.4 Serial Converter Unit

7.4.1 Selection Table

Model Designations

JZDP - □00□ - □□□

Serial Converter Unit Model				
Code	Appearance	Applicable Linear Encoder	Polarity Sensor	Thermal Protector
H003 J003		From Heidenhain Corp.	None	None
H005 J005		From Renishaw plc	None	None
H006 J006		From Heidenhain Corp.	Yes	Yes
H008 J008		From Renishaw plc	Yes	Yes

Applicable Linear Servomotor					
Servomotor Model		Code	Servomotor Model		Code
SGLGW- (coreless models) For Standard-force Magnetic Way	30A050C	250	SGLTW- (models with T-type iron cores)	20A170A	011
	30A080C	251		20A320A	012
	40A140C	252		20A460A	013
	40A253C	253		35A170A	014
	40A365C	254		35A320A	015
	60A140C	258		35A460A	016
	60A253C	259		35A170H	105
	60A365C	260		35A320H	106
	90A200C	264		50A170H	108
	90A370C	265		50A320H	109
	90A535C	266		40A400B	185
SGLGW- + SGLGM-□-M (coreless models) For High-force Magnetic Way	40A140C	255		40A600B	186
	40A253C	256		80A400B	187
	40A365C	257		80A600B	188
	60A140C	261	SGLC - (cylinder type)	D16A085AP	354
	60A253C	262		D16A115AP	373
	60A365C	263		D16A145AP	356
SGLFW- (models with F-type iron cores)	20A090A	017		D20A100AP	357
	20A120A	018		D20A135AP	358
	35A120A	019		D20A170AP	359
	35A230A	020		D25A125AP	360
	50A200B	181		D25A170AP	374
	50A380B	182		D25A215AP	362
	1ZA200B	183		D32A165AP	363
	1ZA380B	184		D32A225AP	364
SGLFW2	30A070A	628		D32A285AP	365
	30A120A	629			
	30A230A	630			
	45A200A	631			
	45A380A	632			
	90A200A	633			
	90A380A	634			
	90A560A	648			
	1DA380A	649			
	1DA560A	650			

Note: Contact your Yaskawa representative for information on the water cooling specifications of the SGLFW2.

7.4.2 Characteristics and Specifications

Item		JZDP-H00□-□□□	JZDP-J00□-□□□
Electrical Specifications	Power Supply Voltage	+5.0 V ±5%, ripple content: 5% max.	
	Current Consumption*1	120 mA Typ, 160 mA max.	
	Signal Resolution	1/256 pitch of input two-phase sine wave	1/4,096 pitch of input two-phase sine wave
	Maximum Response Frequency	250 kHz	100 kHz
	Analog Input Signals*2 (cos, sin, and Ref)	Differential input amplitude: 0.4 V to 1.2 V Input signal level: 1.5 V to 3.5 V	
	Polarity Sensor Input Signal	CMOS level	
	Thermal Protector Input Signal	Connect the thermal protector built into the Linear Servomotor *3	
	Output Signals	Position data, polarity sensor information, and alarms	
	Output Method	Serial data transmission	
	Output Circuit	Balanced transceiver (SN75LBC176 or the equivalent), internal terminating resistance: 120 Ω	
Mechanical Characteristics	Approximate Mass	150 g	
	Vibration Resistance	98 m/s^2 max. (10 Hz to 2,500 Hz) in three directions	
	Shock Resistance	980 m/s^2, (11 ms) two times in three directions	
Environment	Operating Temperature Range	0°C to 55°C	
	Storage Temperature Range	-20°C to 80°C	
	Humidity Range	20% to 90% relative humidity (with no condensation)	

*1. The current consumptions of the Linear Encoder and the polarity sensor are not included in this value.
The current consumption of the polarity sensor is approximately 40 mA. Confirm the current consumption of the Linear Encoder that you will use and make sure that the current capacity of the SERVOPACK is not exceeded.

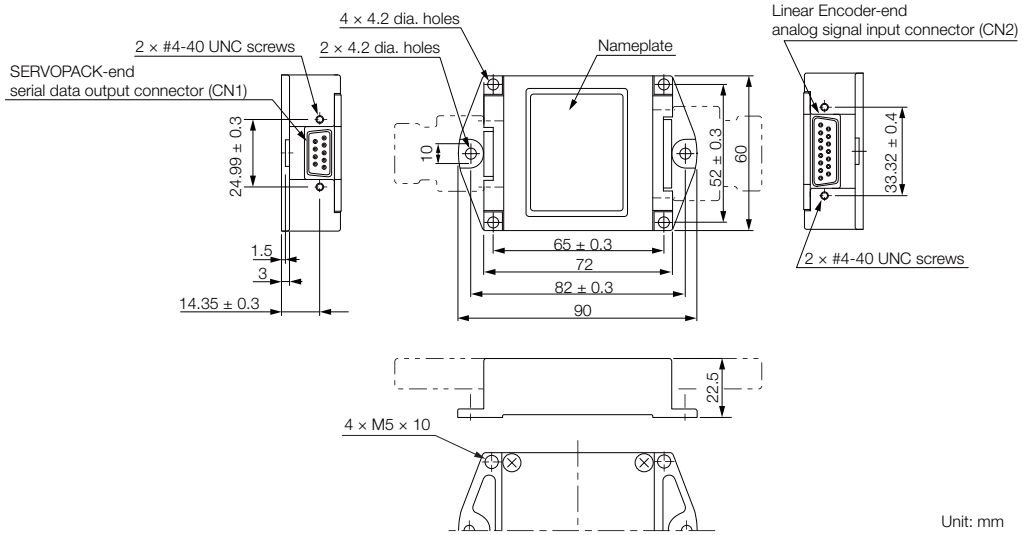
*2. If you input an out-of-range value, the correct position information will not be output. Also, the device may be damaged.

*3. Only SGLFW2 Servomotors come equipped with thermal protectors.

7.4.3 External Dimensions

Serial Converter Unit without Polarity Sensor Cable (for Linear Encoder from Heidenhain Corporation)

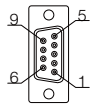
◆ Model: JZDP-□003-□□□



Unit: mm

Pin	Signal
1	+ 5 V
2	Phase-S output
3	Not used
4	Not used
5	0 V
6	/Phase-S output
7	Not used
8	Not used
9	Not used
Case	Shield

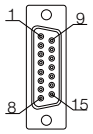
CN1
SERVOPACK-end
serial data outputs



17-Series Connector:
17LE-13090-27-FA
from DDK Ltd.
(Socket)

Pin	Signal
1	cos input (A+)
2	0 V
3	sin input (B+)
4	+ 5 V
5	Not used
6	Not used
7	/Ref input (R-)
8	Not used
9	/cos input (A-)
10	0 V sensor
11	/sin input (B-)
12	5 V sensor
13	Not used
14	Ref input (R+)
15	Not used
Case	Shield

CN2
Linear Encoder-end
analog signal inputs

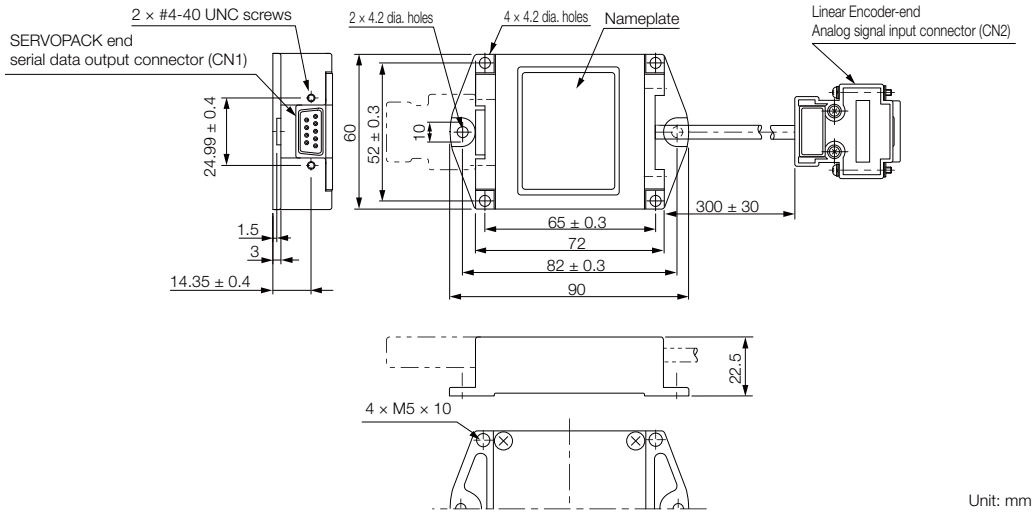


17-Series Connector:
17LE-13150-27-FA
from DDK Ltd.
(Socket)

Note: 1. Do not connect the unused pins.
2. Contact Heidenhain Corporation for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Heidenhain Corporation.

Serial Converter Unit without Polarity Sensor Cable (for Linear Encoder from Renishaw plc)

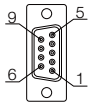
◆ Model: JZDP-□005-□□□



Unit: mm

Pin	Signal
1	+ 5 V
2	Phase-S output
3	Not used
4	Not used
5	0 V
6	/Phase-S output
7	Not used
8	Not used
9	Not used
Case	Shield

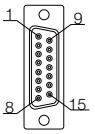
CN1
SERVOPACK-end
serial data outputs



17-Series Connector:
17LE-13090-27-FA
from DDK Ltd.
(Socket)

Pin	Signal
1	cos input (V1-)
2	sin input (V2-)
3	Ref input (V0+)
4	+ 5 V
5	5 Vs
6	Not used
7	Not used
8	Not used
9	cos input (V1+)
10	sin input (V2+)
11	/Ref input (V0-)
12	0 V
13	0 Vs
14	Not used
15	Inner shield (0 V)
Case	Shield

CN2
Linear Encoder-end
analog signal inputs

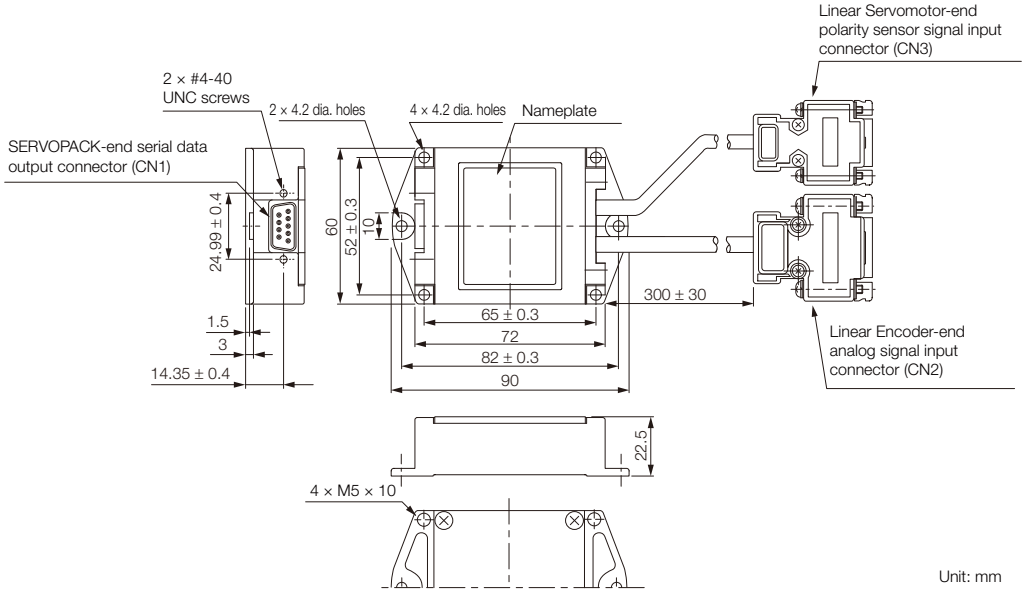


17-Series Connector:
17JE-13150-02 (D8C) A-CG
from DDK Ltd.
(Socket)

Note: 1. Do not connect the unused pins.
2. Contact Renishaw plc for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Renishaw plc. However, the BID and DIR signals are not connected.
3. Use the Linear Encoder connector to change the origin position specifications of the Linear Encoder.

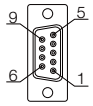
Serial Converter Unit with Polarity Sensor Cable (for Linear Encoder from Heidenhain Corporation)

◆ Model: JZDP-□006-□□□



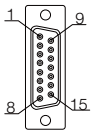
Unit: mm

CN1
SERVOPACK-end serial data outputs



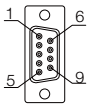
17-Series Connector:
17LE-13090-27-FA
from DDK Ltd.
(Socket)

CN2
Linear Encoder-end analog signal inputs



17-Series Connector:
17JE-13150-02 (D8C) A-CG
from DDK Ltd.
(Socket)

CN3
Linear Servomotor-end polarity sensor signal input



17-Series Connector:
17JE-13090-02 (D8C) A-CG
from DDK Ltd.

Pin	Signal
1	+ 5 V
2	Phase-S output
3	Not used
4	Not used
5	0 V
6	/Phase-S output
7	Not used
8	Not used
9	Not used
Case	Shield

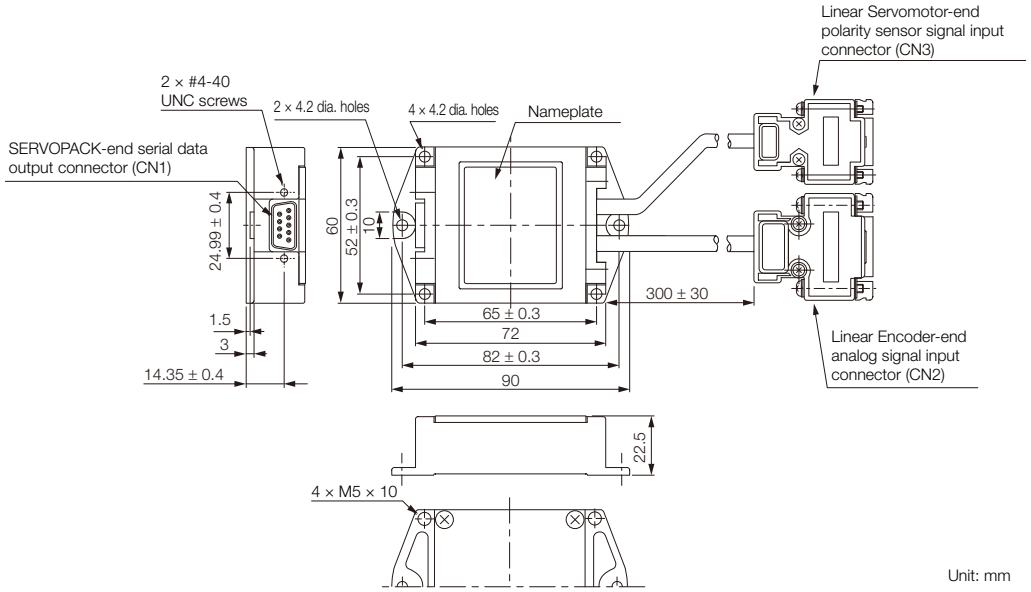
Pin	Signal	Pin	Signal
1	cos input (A+)	9	/cos input (A-)
2	0 V	10	0 V sensor
3	sin input (B+)	11	/sin input (B-)
4	+ 5 V	12	5 V sensor
5	Not used	13	Not used
6	Not used	14	Ref input (R+)
7	/Ref input (R-)	15	Not used
8	Not used	Case	Shield

Pin	Signal
1	+5 V
2	Phase-U input
3	Phase-V input
4	Phase-W input
5	0 V
6	Not used
7	Not used
8	Not used
9	Thermal protector input
Case	Shield

Note: 1. Do not connect the unused pins.
2. Contact Heidenhain Corporation for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Heidenhain Corporation.
3. The phase U, V, and W inputs are internally pulled up with 10 kΩ.

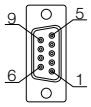
Serial Converter Unit with Polarity Sensor Cable (for Linear Encoder from Renishaw plc)

◆ Model: JZDP-□008-□□□



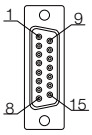
Unit: mm

CN1
SERVOPACK-end serial data outputs



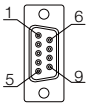
17-Series Connector:
17LE-13090-27-FA
from DDK Ltd.
(Socket)

CN2
Linear Encoder-end analog signal inputs



17-Series Connector:
17JE-13150-02 (D8C) A-CG
from DDK Ltd.
(Socket)

CN3
Linear Servomotor-end polarity sensor signal input



17-Series Connector:
17JE-13090-02 (D8C) A-CG
from DDK Ltd.

Pin	Signal
1	+ 5 V
2	Phase-S output
3	Not used
4	Not used
5	0 V
6	/Phase-S output
7	Not used
8	Not used
9	Not used
Case	Shield

Pin	Signal	Pin	Signal
1	/cos input (V1-)	9	cos input (V1+)
2	/sin input (V2-)	10	sin input (V2+)
3	Ref input (V0+)	11	/Ref input (V0-)
4	+ 5 V	12	0 V
5	5 Vs	13	0 Vs
6	Not used	14	Not used
7	Not used	15	Inner shield
8	Not used	Case	Shield

Pin	Signal
1	+ 5 V
2	Phase-U input
3	Phase-V input
4	Phase-W input
5	0 V
6	Not used
7	Not used
8	Not used
9	Thermal protector input
Case	Shield

Note: 1. Do not connect the unused pins.
2. Contact Renishaw plc for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Renishaw plc. However, the BID and DIR signals are not connected.
3. Use the Linear Encoder connector to change the origin position specifications of the Linear Encoder.
4. The phase U, V, and W inputs are internally pulled up with 10 kΩ.

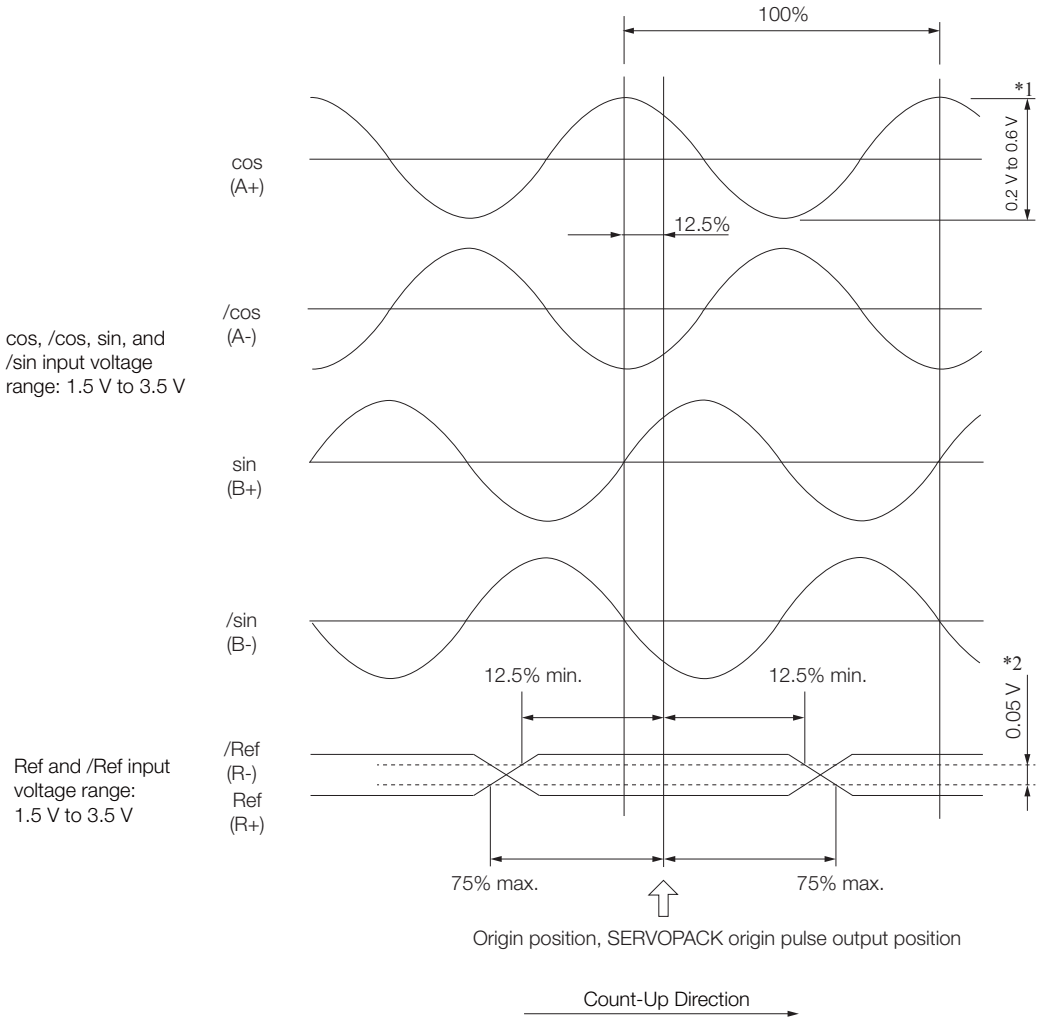
7.4.4 Analog Signal Input Timing

Input the analog signals with the timing shown in the following figure.

The /cos and /sin signals are the differential signals when the cos and sin signals are shifted 180°. The specifications of the cos, /cos, sin, and /sin signals are identical except for the phases.

The Ref and /Ref signals are input to the comparator. Input a signal that will exceed the hysteresis of the comparator (i.e., the broken lines in the following figure).

When they are crossed, the output data will be counted up.



*1. If the analog signal amplitude declines to approximately 0.35 V because of the differential amplitude, the Serial Converter Unit will output an alarm.

*2. This is the hysteresis width.

Important

Application Precautions

1. Never perform insulation resistance or withstand voltage tests.
2. When analog signals are input to the Serial Converter Unit, they are very weak signals, and therefore noise influence on the analog signals affects the Unit's ability to output correct position information. Keep the analog signal cable as short as possible and implement proper shielding.
3. Use the Serial Converter Unit in a location without gases such as H_2S.
4. Do not replace the Unit while power is being supplied. There is a risk of device damage.
5. If you use more than one axis, use a shielded cable for each axis.
   Do not use one shielded cable for multiple axes.
6. If you use any Linear Encoder other than a recommended Linear Encoder, evaluate the system in advance before you use it.

Cables and User-Assembled Wiring Materials for SERVOPACKs

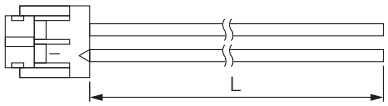
8

8.1 Analog Monitor Cables

Selection Table

Order Number	Length (L)	Inquires
JZSP-CA01-E	1 m	Yaskawa Controls Co., Ltd.

Dimensional Drawing



- Wire size: AWG24
- Socket model: DF11-4DS-2C (Hirose Electric Co., Ltd.)
- Contacts model: DF11-2428SCF (Hirose Electric Co., Ltd.)

Wiring Specifications

Pin	Signal	Wire Color	Monitor Contents
1	Analog monitor 2	Red	Select the signal to monitor by setting Pn007 = n.□□XX (Analog Monitor 2 Signal Selection).
2	Analog monitor 1	White	Select the signal to monitor by setting Pn006 = n.□□XX (Analog Monitor 1 Signal Selection).
3	GND (0 V)	Black	Signal ground
4	GND (0 V)	Black	Signal ground

8.2 Digital Operator

8.2.1 Digital Operator

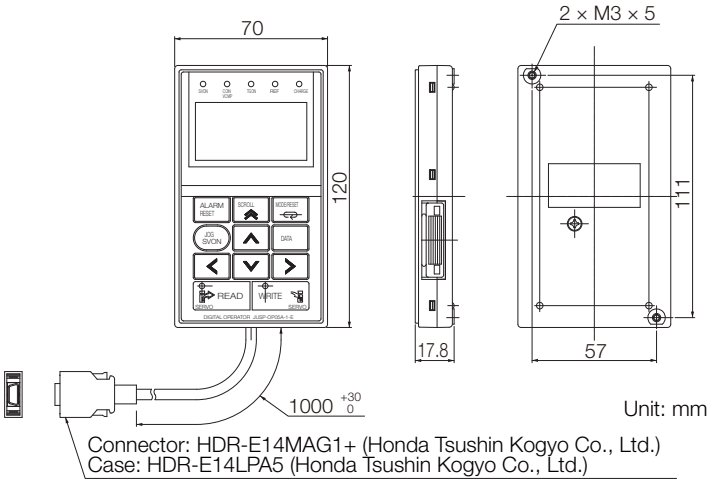
Main Functions

- Changing and accessing the settings of parameters in the SERVOPACK
- Reading, writing, and verifying the settings of parameters in the SERVOPACK
- Operating the SERVOPACK
- Adjustment with SERVOPACK utility functions
- Monitoring the operating conditions of the SERVOPACK

Selection Table

Order Number	Accessories	Inquires
JUSP-OP05A-1-E	Cable (1 m)	Yaskawa Controls Co., Ltd.

Dimensional Drawing



Important

Use the Yaskawa-specified cables.
Operation will not be dependable due to low noise resistance with any other cable.

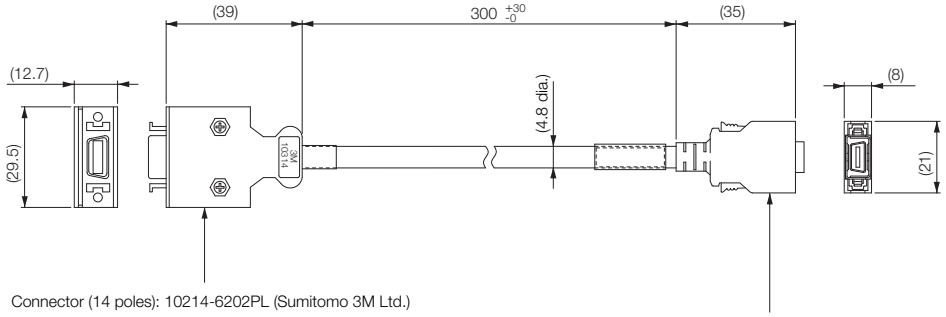
8.2.2 Digital Operator Relay Cable (for Σ-III-Series Digital Operators)

This Converter Cable is required to use the Σ-III-series Digital Operator (JUSP-OP05A) for Σ-7-series SERVOPACKs.

Selection Table

Order Number	Length (L)	Inquires
JZSP-CVS05-A3-E	0.3 m	Yaskawa Controls Co., Ltd.

Dimensional Drawing



Unit: mm

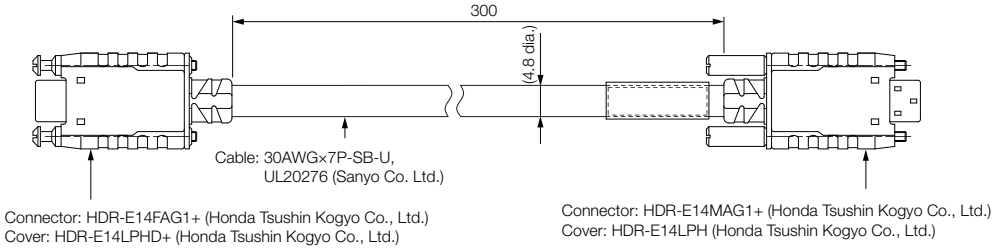
8.2.3 Digital Operator Relay Cable with Lock Screws

This Converter Cable is required to prevent the cable from disconnecting from the Digital Operator.

Selection Table

Order Number	Length (L)	Inquires
JZSP-CVS07-A3-E	0.3 m	Yaskawa Controls Co., Ltd.

Dimensional Drawing



Unit: mm

8.3 Computer Cable

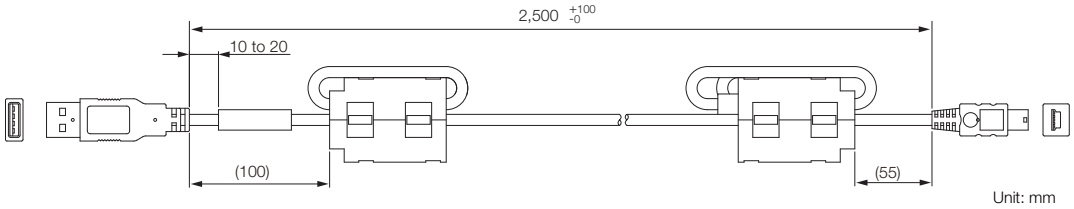
Important

Use the Yaskawa-specified cable for the Computer Cable. Operation will not be dependable with any other cable.

Selection Table

Order Number	Length (L)	Inquires
JZSP-CVS06-02-E	2.5 m	Yaskawa Controls Co., Ltd.

Dimensional Drawing



Unit: mm

8.4 I/O Signal Cables for Σ-7S Analog Voltage/Pulse Train Reference SERVOPACKs

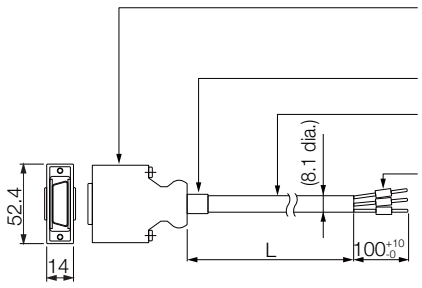
Use these Cables to connect I/O signals to Σ-7S Analog Voltage/Pulse Train Reference SERVOPACKs.

8.4.1 Cable with Loose Wires at One End

Selection Table

Order Number	Length (L)	Inquires
JZSP-CSI01-1-E	1 m	Yaskawa Controls Co., Ltd.
JZSP-CSI01-2-E	2 m	
JZSP-CSI01-3-E	3 m	

Dimensional Drawing



Unit: mm

Wiring Specifications

SERVOPACK end

Pin	Signal	Wire Color	Markings Color	Markings Qty
1	SG	Orange	Red	1
3	PL1	Orange	Black	1
2	SG	Gray	Red	1
4	SEN	Gray	Black	1
5	V-REF	White	Red	1
6	SG	White	Black	1
7	PULS	Yellow	Red	1
8	/PULS	Yellow	Black	1
9	T-REF	Pink	Red	1
10	SG	Pink	Black	1
11	SIGN	Orange	Red	2
12	/SIGN	Orange	Black	2
13	PL2	Gray	Red	2
14	/CLR	White	Red	2
15	CLR	White	Black	2
16	-	Gray	Black	2
17	-	Yellow	Red	2
18	PL3	Yellow	Black	2
19	PCO	Pink	Red	2
20	/PCO	Pink	Black	2
21	BAT+	Orange	Red	3
22	BAT-	Orange	Black	3
23	-	Gray	Red	3
24	-	Gray	Black	3
25	/V-CMP+	White	Red	3
26	/V-CMP-	White	Black	3
27	/TGON+	Yellow	Red	3
28	/TGON-	Yellow	Black	3
29	/S-RDY+	Pink	Red	3
30	/S-RDY-	Pink	Black	3
31	ALM+	Orange	Red	4
32	ALM-	Orange	Black	4
33	PAO	Gray	Red	4
34	/PAO	Gray	Black	4
35	PBO	White	Red	4
36	/PBO	White	Black	4
37	ALO1	Yellow	Red	4
38	ALO2	Yellow	Black	4
39	ALO3	Pink	Red	4
40	/S-ON	Pink	Black	4
41	/P-CON	Orange	Red	5
42	P-OT	Orange	Black	5
43	N-OT	Gray	Red	5
44	/ALM-RST	Gray	Black	5
45	/P-CL	White	Red	5
46	/N-CL	White	Black	5
47	+24VIN	Yellow	Red	5
48	PSO	Pink	Red	5
49	/PSO	Pink	Black	5
50	TH	Yellow	Black	5
Case	Shield			

Host controller end

Wire Marker No.
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: Represents twisted-pair wires.

8.4.2 Connector Kits

Selection Table

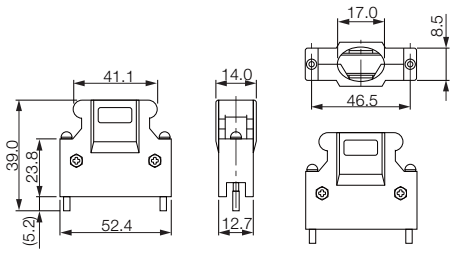
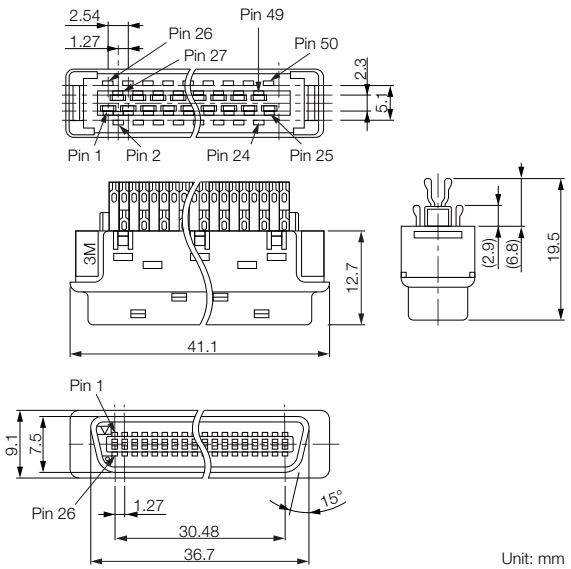
Connector Kit Order Number	Case		Connectors	
	Model	Qty	Model	Qty
JZSP-CSI9-1-E	10350-52Z0-008 (Sumitomo 3M Ltd.)	1 set	10150-3000PE (soldered) (Sumitomo 3M Ltd.)	1

◆ Wire Sizes

Item	Specification
Applicable Wires	AWG24, 26, 28, 30
Cable Finished Diameter	16 mm max.

Note: Use a twisted-pair or screened twisted-pair cable.

Dimensional Drawings

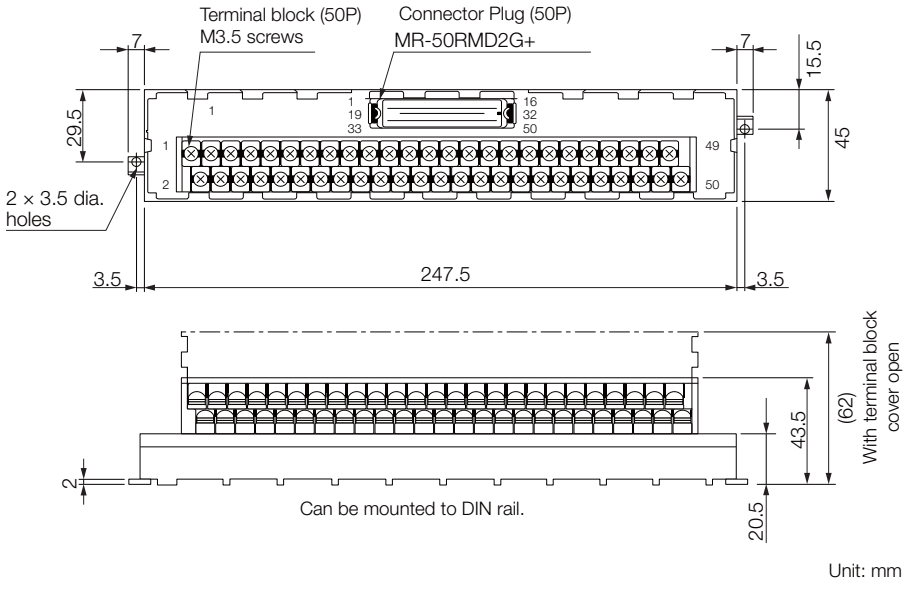
Case	Connectors
	

8.4.3 Connector-Terminal Block Converter Unit

Selection Table

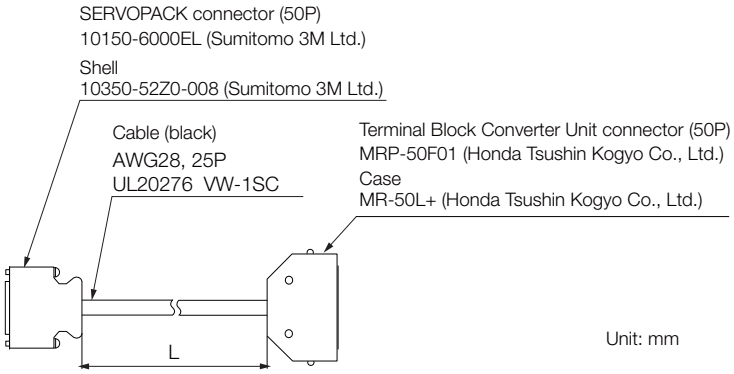
Order Number	Length of Enclosed Cable (L)	Inquires
JUSP-TA50PG-E	0.5 m	Yaskawa Controls Co., Ltd.
JUSP-TA50PG-1-E	1 m	
JUSP-TA50PG-2-E	2 m	

Dimensional Drawing



Unit: mm

Dimensional Drawing of Enclosed Cable



Unit: mm

Note: The same pin numbers are used for the SERVOPACK connector and the terminal block. To assemble your own cables, refer to *8.4.1 Cable with Loose Wires at One End* on page 8-7 for the wiring specifications.

8.5 I/O Signal Cables for Σ-7S MECHATROLINK Communications Reference SERVOPACKs

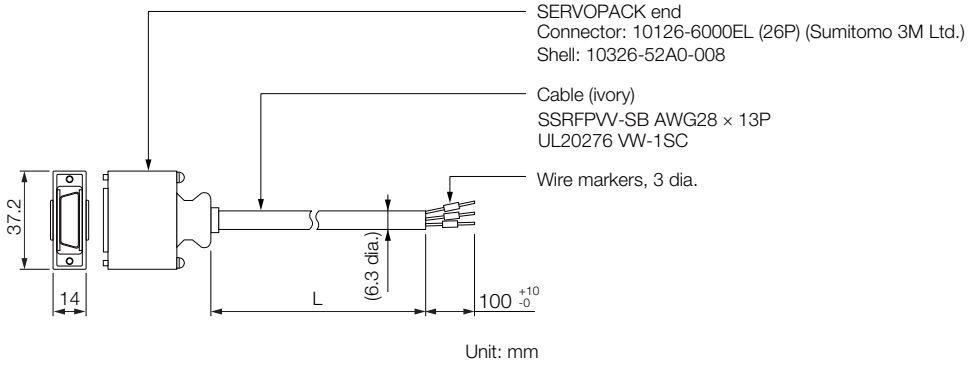
Use these Cables to connect I/O signals to Σ-7S MECHATROLINK-II or MECHATROLINK-III Communications Reference SERVOPACKs.

8.5.1 Cable with Loose Wires at One End

Selection Table

Order Number	Length (L)	Inquires
JZSP-CSI02-1-E	1 m	Yaskawa Controls Co., Ltd.
JZSP-CSI02-2-E	2 m	
JZSP-CSI02-3-E	3 m	

Dimensional Drawing



Unit: mm

Wiring Specifications

SERVOPACK end

Pin	Signal	Wire Color	Markings Color	Markings Qty
1	/BK+ (/SO1+)	Blue	Red	1
2	/BK- (/SO1-)	Blue	Black	1
3	ALM+	Pink	Red	1
4	ALM-	Pink	Black	1
5	TH	Green	Red	1
6	+24VIN	Green	Black	1
7	P-OT	Orange	Red	1
8	N-OT	Orange	Black	1
9	/DEC	Gray	Red	1
10	/EXT1	Gray	Black	1
11	/EXT2	Blue	Red	2
12	/EXT3	Blue	Black	2
13	/SI0	Pink	Red	2
14	BAT+	Green	Red	2
15	BAT-	Green	Black	2
16	SG	Pink	Black	2
17	PAO	Orange	Red	2
18	/PAO	Orange	Black	2
19	PBO	Gray	Red	2
20	/PBO	Gray	Black	2
21	PCO	Blue	Red	3
22	/PCO	Blue	Black	3
23	/SO2+	Pink	Red	3
24	/SO2-	Pink	Black	3
25	/SO3+	Green	Red	3
26	/SO3-	Green	Black	3

Host controller end

Wire Marker No.
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: Represents twisted-pair wires.

8.5.2 Connector Kits

Selection Table

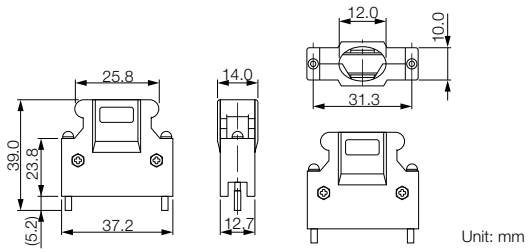
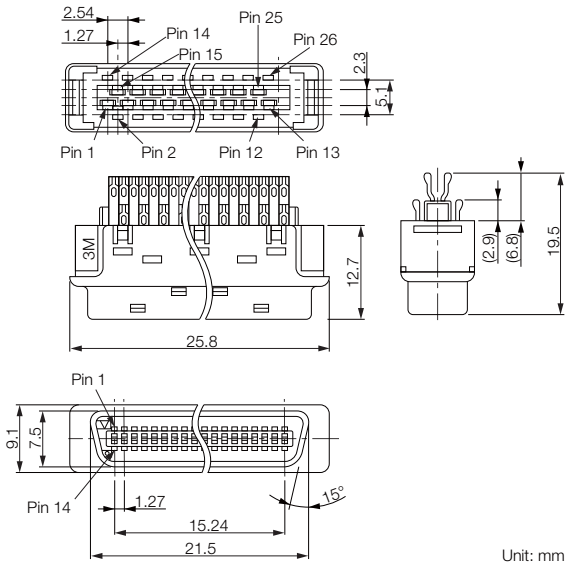
Connector Kit Order Number	Case		Connectors	
	Model	Qty	Model	Qty
JZSP-CSI9-2-E	10326-52A0-008 (Sumitomo 3M Ltd.)	1 set	10126-3000PE (soldered) (Sumitomo 3M Ltd.)	1

• Wire Sizes

Item	Specification
Applicable Wires	AWG24, 26, 28, 30
Cable Finished Diameter	16 mm max.

Note: Use a twisted-pair or screened twisted-pair cable.

Dimensional Drawings

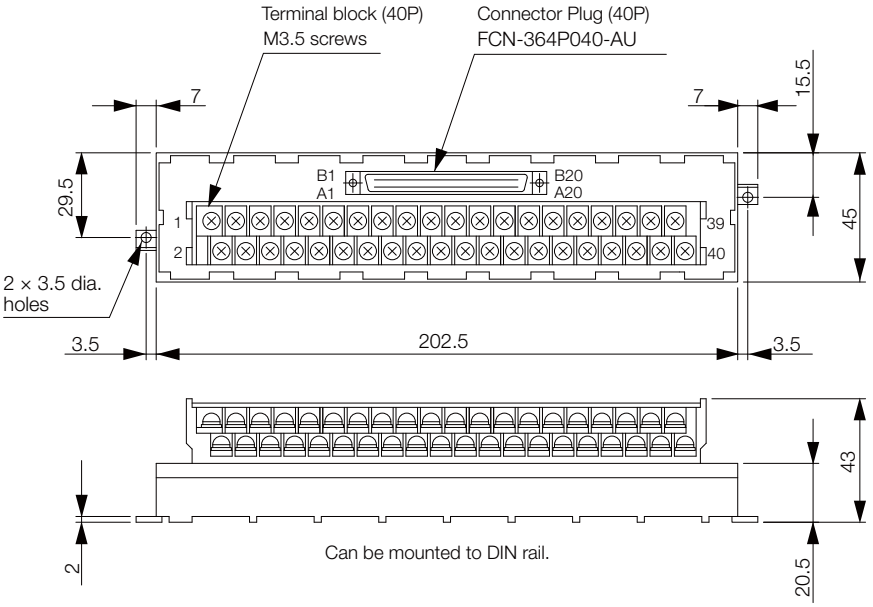
Case	Connectors
	

8.5.3 Connector-Terminal Block Converter Unit

Selection Table

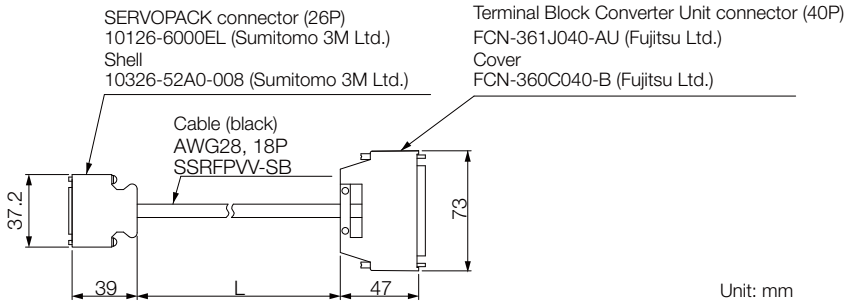
Order Number	Length of Enclosed Cable (L)	Inquires
JUSP-TA26P-E	0.5 m	Yaskawa Controls Co., Ltd.
JUSP-TA26P-1-E	1 m	
JUSP-TA26P-2-E	2 m	

Dimensional Drawing



Unit: mm

Dimensional Drawing of Enclosed Cable



Unit: mm

Note: The same pin numbers are used for the SERVOPACK connector and the terminal block. Pins 1 to 26 are wired. Do not connect pins 27 and higher.
To assemble your own cables, refer to *8.5.1 Cable with Loose Wires at One End* on page 8-10 for the wiring specifications.

8.6 I/O Signal Cables for Σ-7W SERVOPACKs

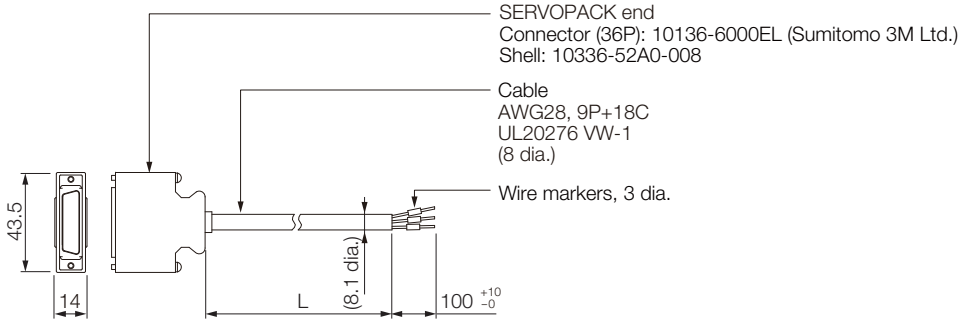
Use these Cables to connect I/O signals to Σ-7W MECHATROLINK-III Communications Reference SERVOPACKs.

8.6.1 Cable with Loose Wires at One End

Selection Table

Order Number	Length (L)	Inquires
JZSP-CSI03-1-E	1 m	Yaskawa Controls Co., Ltd.
JZSP-CSI03-2-E	2 m	
JZSP-CSI03-3-E	3 m	

Dimensional Drawing



Unit: mm

Wiring Specifications

SERVOPACK end

Pin	Signal	Wire Color	Markings Color	Markings Qty
1	+24VIN	Orange	Red	1
2	Reserved.	–	–	–
3	/SI01	Gray	Red	1
4	/SI02	–	–	–
5	/SI03	White	Red	1
6	/SI04	–	–	–
7	/SI05	Yellow	Red	1
8	/SI06	–	–	–
9	/SI11	Pink	Red	1
10	/SI12	–	–	–
11	/SI13	Orange	Red	2
12	/SI14	–	–	–
13	/SI15	Gray	Red	2
14	/SI16	White	Red	2
15	SG	Yellow	Red	2
16	SG	Pink	Red	2
17	BATA+	Orange	Red	3
18	BATA-	Gray	Red	3
19	ALMA+	White	Red	3
20	ALMA-	White	Black	3
21	ALMB+	Yellow	Red	3
22	ALMB-	Yellow	Black	3
23	/SO1+	Pink	Red	3
24	/SO1-	Pink	Black	3
25	/SO2+	Orange	Red	4
26	/SO2-	Orange	Black	4
27	/SO3+	Gray	Red	4
28	/SO3-	Gray	Black	4
29	/SO4+	White	Red	4
30	/SO4-	White	Black	4
31	/SO5+	Yellow	Red	4
32	/SO5-	Yellow	Black	4
33	THA	Pink	Red	4
34	THB	Pink	Black	4
35	BATB+	Orange	Red	Continuous dots
36	BATB-	Orange	Black	Continuous dots
Case	Shield	–	–	–

Host controller end

Wire Marker No.
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: Represents twisted-pair wires.

8.6.2 Connector Kits

Selection Table

Connector Kit Order Number	Case		Connectors	
	Model	Qty	Model	Qty
DP9420007-E	10336-52A0-008 (Sumitomo 3M Ltd.)	1 set	10136-3000PE (soldered) (Sumitomo 3M Ltd.)	1

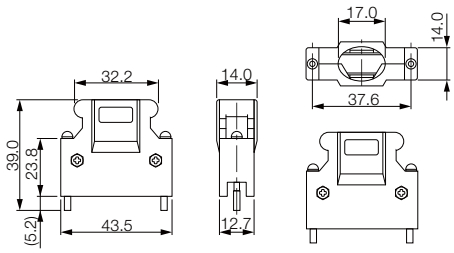
- Wire Sizes

Item	Specification
Applicable Wires	AWG24, 26, 28, 30
Cable Finished Diameter	16 mm max.

Note: Use a twisted-pair or screened twisted-pair cable.

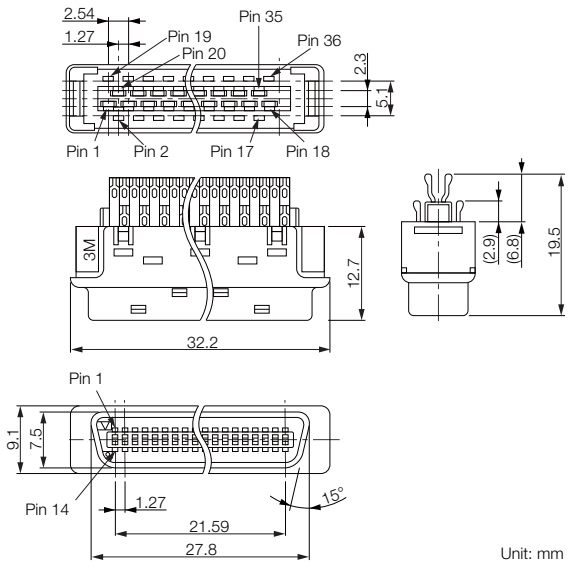
Dimensional Drawings

Case



Unit: mm

Connectors



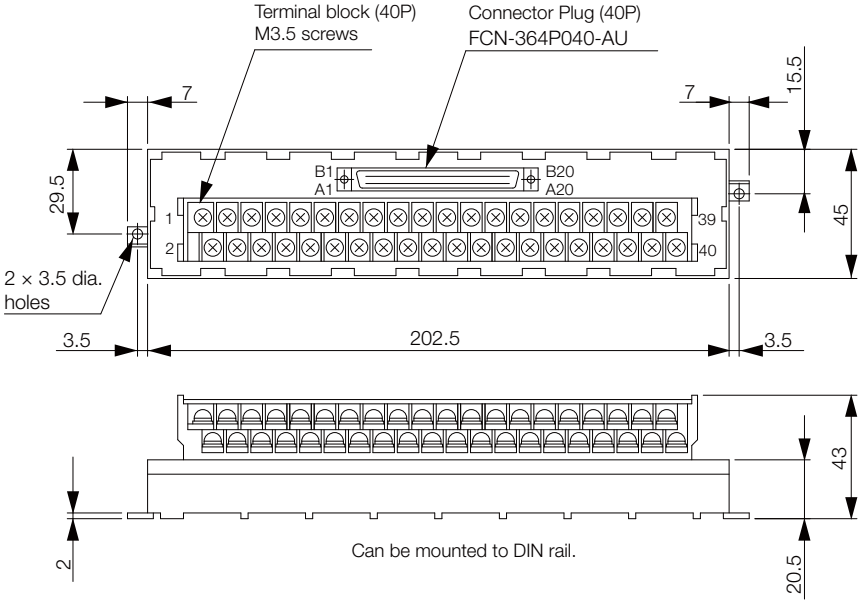
Unit: mm

8.6.3 Connector-Terminal Block Converter Unit

Selection Table

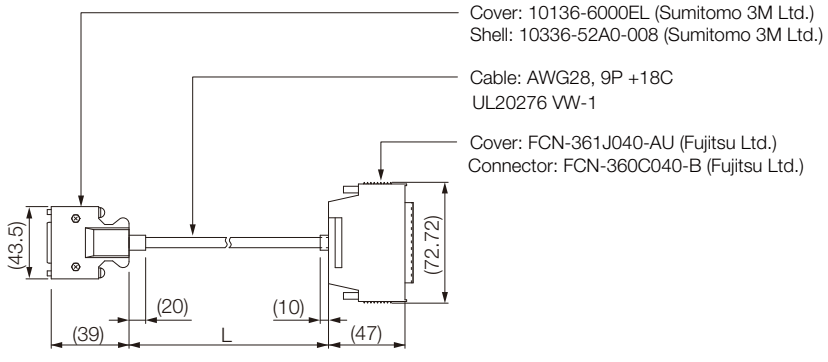
Order Number	Length of Enclosed Cable (L)	Inquires
JUSP-TA36P-E	0.5 m	Yaskawa Controls Co., Ltd.
JUSP-TA36P-1-E	1 m	
JUSP-TA36P-2-E	2 m	

Dimensional Drawing



Unit: mm

Dimensional Drawing of Enclosed Cable



Unit: mm

Note: The same pin numbers are used for the SERVOPACK connector and the terminal block. Pins 1 to 36 are wired. Do not connect pins 37 and higher.
To assemble your own cables, refer to *8.6.1 Cable with Loose Wires at One End* on page 8-13 for the wiring specifications.

8.7 Safety Function Device Cable

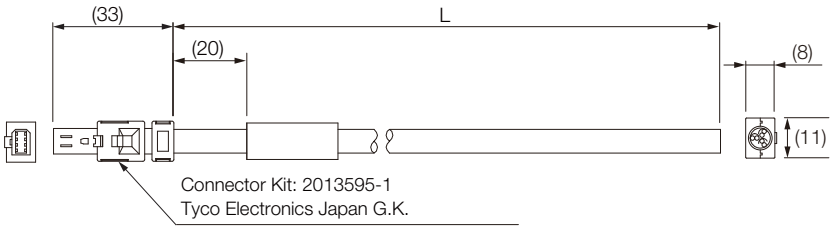
8.7.1 Cables with Connectors

Selection Table

Order Number	Length (L)	Inquires
JZSP-CVH03-01-E	1 m	Yaskawa Controls Co., Ltd.
JZSP-CVH03-03-E	3 m	

Note: When using safety functions, connect this Cable to the safety function devices.
When not using safety functions, connect the enclosed Safety Jumper Connector to the SERVOPACK.

Dimensional Drawing



Wiring Specifications

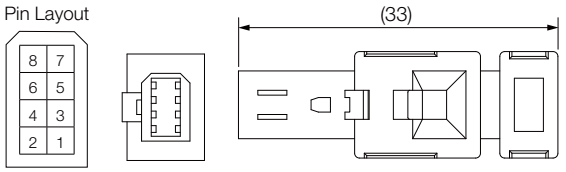
Pin	Signal	Lead Color	Markings
1	Not connected	–	–
2	Not connected	–	–
3	/HWBB1-	White	Black
4	/HWBB1+	White	Red
5	/HWBB2-	Light gray	Black
6	/HWBB2+	Light gray	Red
7	EDM1-	Orange	Black
8	EDM1+	Orange	Red

8.7.2 Connector Kits

Selection Table

Order Number	Product Name	Inquires
2013595-1	INDUSTRIAL MINI I/O D-SHAPE TYPE1 PLUG CONNECTOR KIT	Tyco Electronics Japan G.K.

Dimensional Drawing



8.8 MECHATROLINK-II Communications Cable

Important

Use the Yaskawa-specified cables for the MECHATROLINK Communications Cables. Operation will not be dependable due to low noise resistance with any other cable.

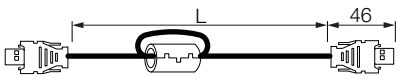
Selection Table

Type	Length (L)	Cable Characteristic	Order Number *1	Inquires
Cables with Connectors on Both Ends and No Ferrite Cores	0.5 m, 1 m, 2 m, 3 m, 4 m, 5 m, 6 m, 10 m, 20 m, 30 m, 40 m, and 50 m	Standard Cable	JEPMC-W6002-□□-E (□□: A5/01/03/04/05/06/10/20/30/40/50)	Yaskawa Controls Co., Ltd.
	5 m, 10 m, and 15 m	Flexible Cable*2	JEPMC-W6005-□□-E (□□: 05/10/15)	
Cables with Connectors on Both Ends and Ferrite Cores	0.5 m, 1 m, 3 m, 5 m, 10 m, 20 m, 30 m, 40 m, and 50 m	Standard Cable	JEPMC-W6003-□□-E (□□: A5/01/03/05/10/20/30/40/50)	
	5 m, 10 m, and 15 m	Flexible Cable*2	JEPMC-W6006-□□-E (□□: 05/10/15)	
Terminators	–	–	JEPMC-W6022-E	

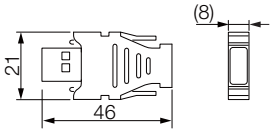
*1. Replace the boxes (□□) in the order number with the code for the cable length.
*2. The recommended bending radius (R) is 19.2 mm or larger.

External Dimensions

◆ Cable with Connectors on Both Ends

Cables without Ferrite Cores	Cables with Ferrite Cores
 Unit: mm	 Unit: mm

◆ Terminators



Unit: mm

8.9 MECHATROLINK-III Communications Cable

Important

Use the Yaskawa-specified cables for the MECHATROLINK Communications Cables. Operation will not be dependable due to low noise resistance with any other cable.

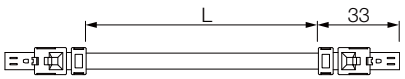
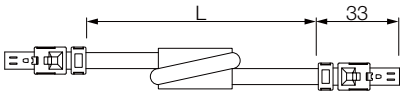
Selection Table

Type	Length (L)	Order Number*	Inquires
Cables with Connectors on Both Ends and No Ferrite Cores	0.2 m, 0.5 m, 1 m, 2 m, 3 m, 4 m, 5 m, 10 m, 20 m, 30 m, and 50 m	JEPMC-W6012-□□-E (□□: A2/A5/01/02/03/04/05/10/20/30/50)	Yaskawa Controls Co., Ltd.
Cables with Connectors on Both Ends and Ferrite Cores	10 m, 20 m, 30 m, and 50 m	JEPMC-W6013-□□-E (□□: 10/20/30/50)	
Cable with Loose Wires at One End	0.5 m, 1 m, 3 m, 5 m, 10 m, 30 m, and 50 m	JEPMC-W6014-□□-E (□□: A5/01/03/05/10/30/50)	

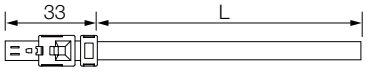
* Replace the boxes (□□) in the order number with the code for the cable length.

External Dimensions

◆ Cables with Connectors on Both Ends

Cables without Ferrite Cores	Cables with Ferrite Cores
 Unit: mm	 Unit: mm

◆ Cable with Loose Wires at One End



Unit: mm

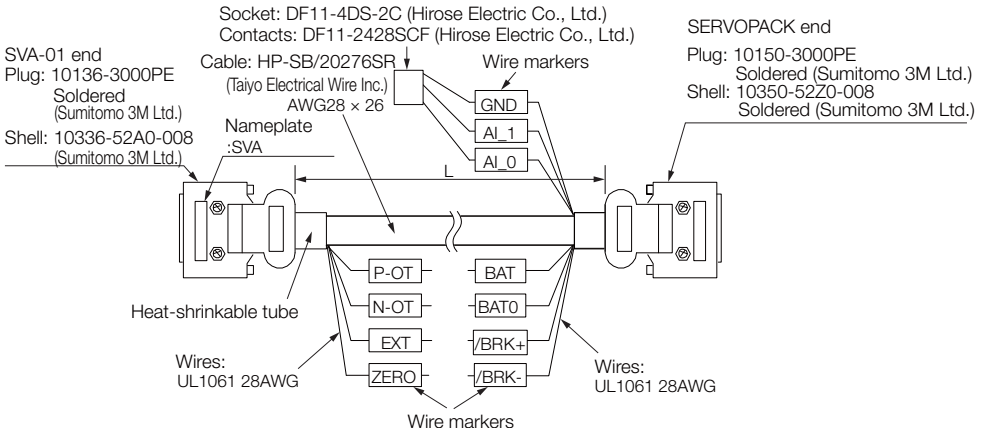
8.10 Cables to Connect to MP3000/MP2000-Series Machine Controllers

8.10.1 Cables to Connect to SVA-01 Analog Output Motion Modules

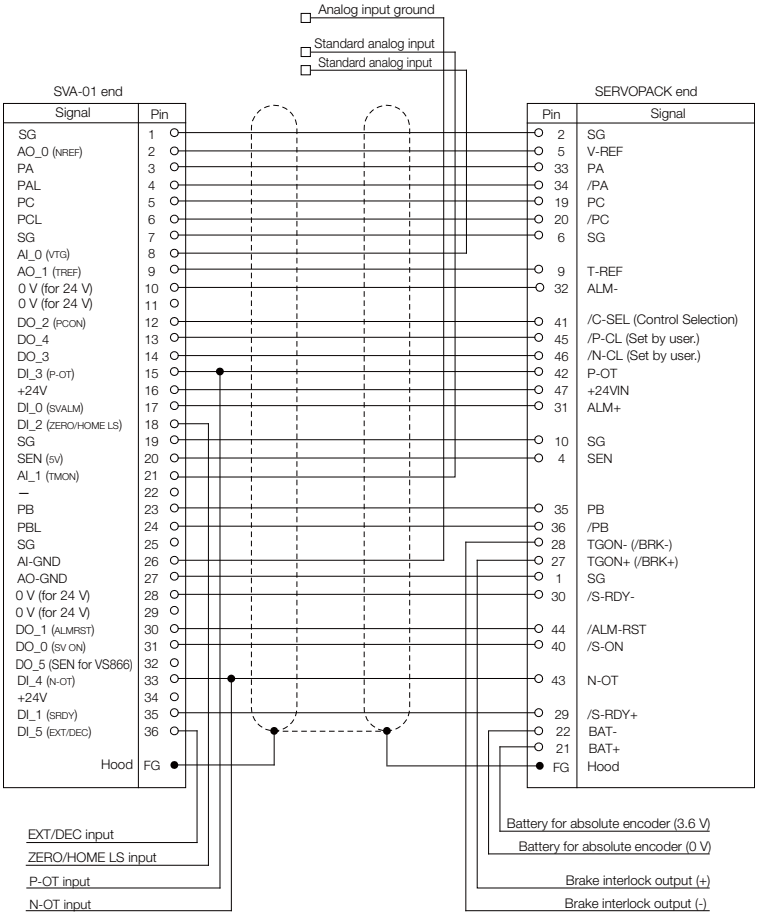
Selection Table

Order Number	Length (L)	Inquires
JEPMC-W2040-A5	0.5 m	Yaskawa Controls Co., Ltd.
JEPMC-W2040-01	1 m	
JEPMC-W2040-03	3 m	

External Dimensions



Wiring Specifications



Option Modules

9

9.1 Feedback Option Modules

9.1.1 Fully-Closed Modules

You can perform fully-closed loop control by combining a Fully-Closed Module and SERVOPACK.
Fully-closed loop control is used to perform high-accuracy, high-response position control by using a position feedback signal from a Linear Encoder or Absolute Rotary Encoder mounted to the machine. To perform fully-closed loop control, a Fully-Closed Module and SERVOPACK are required.

Recommended Encoders

◆ Linear Encoders

Refer to the following section for the recommended Linear Encoder models and specifications.
☞ *7.1 Recommended Linear Encoders* on page 7-2

◆ Rotary Encoders

■ Absolute Rotary Encoders

Output Signal	Manufacturer	Rotary Encoder Type	Model		Resolution Bits	Maximum Speed* [min^{-1}]
			Scale	Sensor Head		
Encoder for Yaskawa's Serial Interface	Magnescale Co., Ltd.	Sealed	RU77-4096ADF		20	2000
			RU77-4096AFFT01		22	2000

* The maximum speeds given in the above table are the maximum applicable speeds of the encoders when combined with a Yaskawa SERVOPACK.
The actual speed will be restricted by either the maximum speed of the Rotary Servomotor or the maximum speed of the Rotary Encoder (given above).

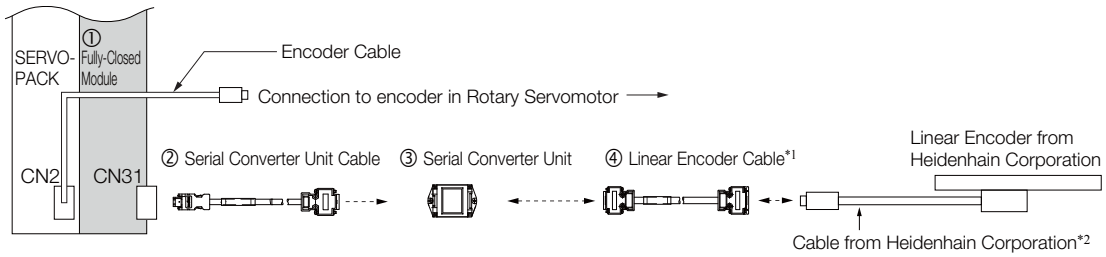
Note: Confirm detailed specifications, such as the tolerances, dimensions, and operating environment, with the manufacturer of the Rotary Encoder before you use it.

Equipment Configurations

◆ Connections to Linear Encoder from Heidenhain Corporation

■ Connections for a 1 Vp-p Analog Voltage Output Signal

You must make the connections through a Yaskawa Serial Converter Unit. The output signal will be multiplied by 8 bits (256 divisions) in the Serial Converter Unit.



*1. When using a JZDP-J00□-□□□ Serial Converter Unit, do not use a Yaskawa Linear Encoder Cable that is longer than 3 m.

*2. Contact Heidenhain Corporation for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Heidenhain Corporation.

No.	Item	Model	Reference
①	Fully-Closed Module (Purchased as a set with the SERVOPACK)	Without options: SGD7S□□□□□□0A000□□1*1 With options: SGD7S□□□□□□0A■■■□□1*1 Note: When a hardware option is mounted, ■■■ is replaced with a three-digit number that specifies the type of option.	–
	Fully-Closed Module (Purchased alone)	Fully-Closed Module*2 SGDV-OFA01A	9-6
		Option Case Kit*3 SGDV-OZA01A	9-7
②	Serial Converter Unit Cable	JZSP-CLP70-□□-E	7-15
③	Serial Converter Unit	JZDP-H003-000	7-25
④	Linear Encoder Cable	JZSP-CLL30-□□-E	7-15

*1. The model number of a set that includes the SERVOPACK and an Option Module is not hyphenated after "SGD7S."

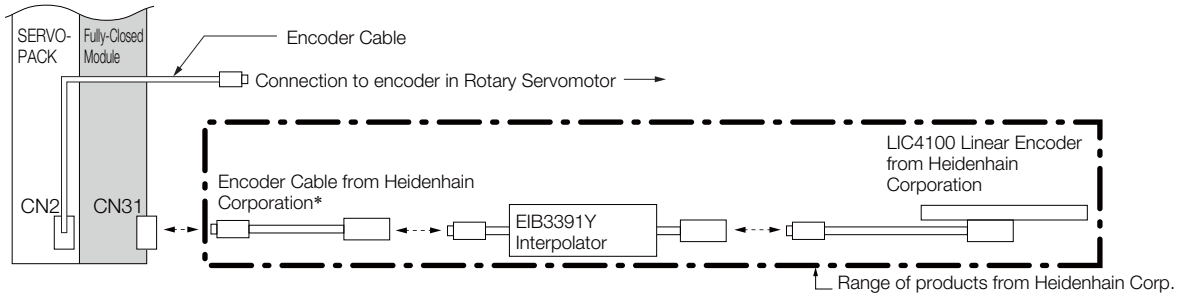
*2. When ordering a SERVOPACK and a Fully-Closed Module separately, use this Fully-Closed Module model number.

*3. One Option Case Kit is required for each SERVOPACK.
The set includes the module cover, PCB mounting plate, and two mounting screws.

Note: 1. Refer to *7.1 Recommended Linear Encoders* on page 7-2 for a list of recommended Linear Encoders.
2. Refer to *7.4 Serial Converter Unit* on page 7-25 for Serial Converter Unit specifications.
3. Refer to the chapter for your Rotary Servomotor for information on Servomotor Main Circuit Cables and Encoder Cables.
4. If you purchase a Fully-Closed Module by itself, refer to the following manual for the method to mount it to the SERVOPACK.
📖 Σ-V Series/Σ-V Series for Large-Capacity Models Installation Guide Fully-Closed Module (Manual No.: TOBP C20829 03)

■ Connections When Using a Yaskawa Serial Interface for the Output Signals

• LIC4100 Linear Encoder with EIB3391Y Interpolator

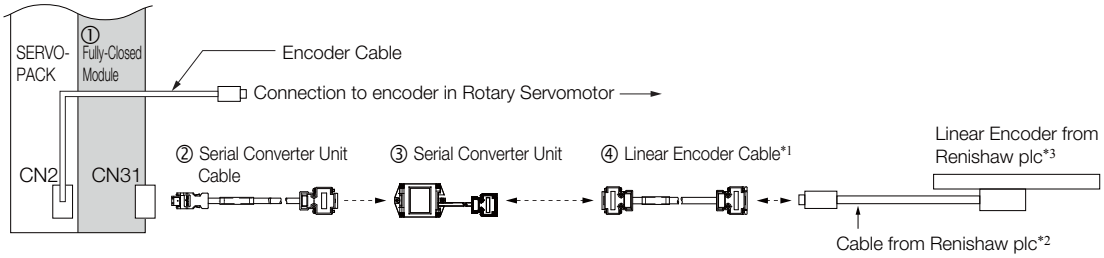


* Use an Encoder Cable from Heidenhain Corporation. Contact Heidenhain Corporation for detailed Encoder Cable specifications.

◆ Connections to Linear Encoder from Renishaw plc

■ Connections for a 1 Vp-p Analog Voltage Output Signal

You must make the connections through a Yaskawa Serial Converter Unit. The output signal will be multiplied by 8 bits (256 divisions) in the Serial Converter Unit.



*1. When using a JZDP-J00□-□□□ Serial Converter Unit, do not use a Yaskawa Linear Encoder Cable that is longer than 3 m.

*2. Contact Renishaw plc for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Renishaw plc. However, the BID and DIR signals are not connected.

*3. If you use the origin signals with a Linear Encoder from Renishaw plc, the origin may sometimes be falsely detected.
If that occurs, use the BID/DIR signal to output the origin signal only in one direction.

No.	Item	Model	Reference
①	Fully-Closed Module (Purchased as a set with the SERVOPACK)	Without options: SGD7S□□□□□□0A000□□1*1 With options: SGD7S□□□□□□0A■■■□□1*1 Note: When a hardware option is mounted, ■■■ is replaced with a three-digit number that specifies the type of option.	–
	Fully-Closed Module (Purchased alone)	Fully-Closed Module*2 SGDV-OFA01A	9-6
		Option Case Kit*3 SGDV-OZA01A	9-7
②	Serial Converter Unit Cable	JZSP-CLP70-□□-E	7-15
③	Serial Converter Unit	JZSP-H005-000	7-25
④	Linear Encoder Cable	JZSP-CLL00-□□-E	7-15

*1. The model number of a set that includes the SERVOPACK and an Option Module is not hyphenated after "SGD7S."

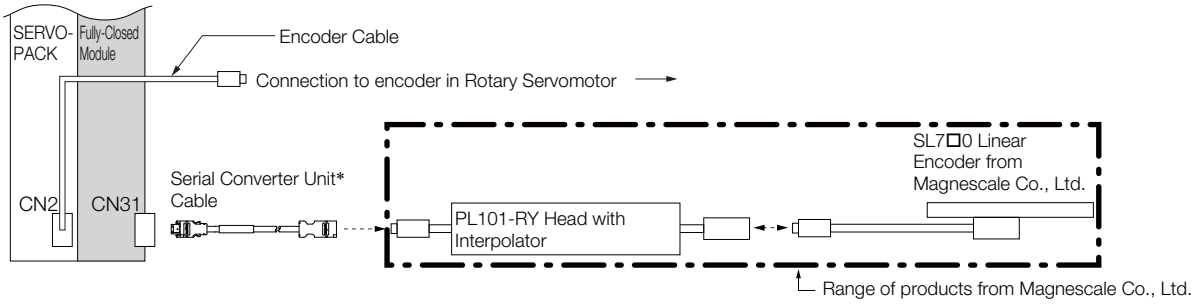
*2. When ordering a SERVOPACK and a Fully-Closed Module separately, use this Fully-Closed Module model number.

*3. One Option Case Kit is required for each SERVOPACK.
The set include the module cover, PCB mounting plate, and two mounting screws.

Note: 1. Refer to *7.1 Recommended Linear Encoders* on page 7-2 for a list of recommended Linear Encoders.
2. Refer to *7.4 Serial Converter Unit* on page 7-25 for Serial Converter Unit specifications.
3. Refer to the chapter for your Rotary Servomotor for information on Servomotor Main Circuit Cables and Encoder Cables.
4. If you purchase a Fully-Closed Module by itself, refer to the following manual for the method to mount it to the SERVOPACK.
📖 Σ-V Series/Σ-V Series for Large-Capacity Models Installation Guide Fully-Closed Module (Manual No.: TOBP C20829 03)

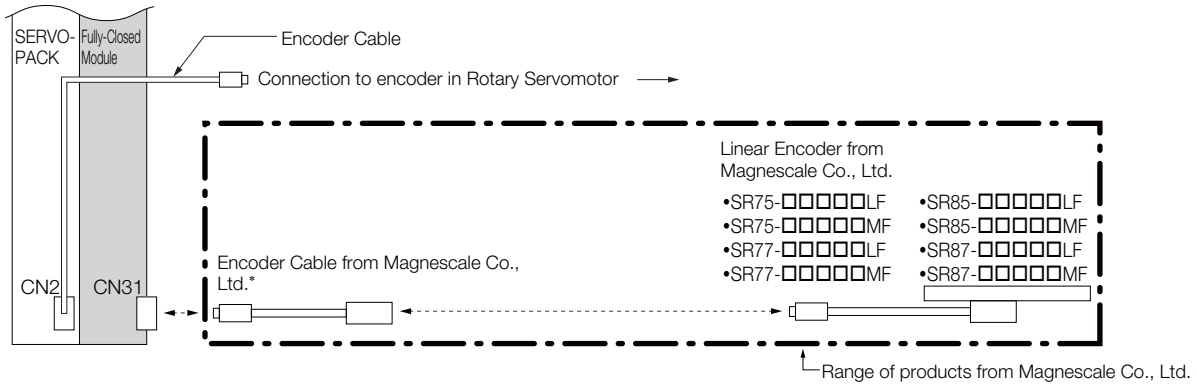
◆ Connections to Linear Encoder from Magnescale Co., Ltd.

■ SL7□0 Linear Encoder and PL101-RY Sensor Head with Interpolator



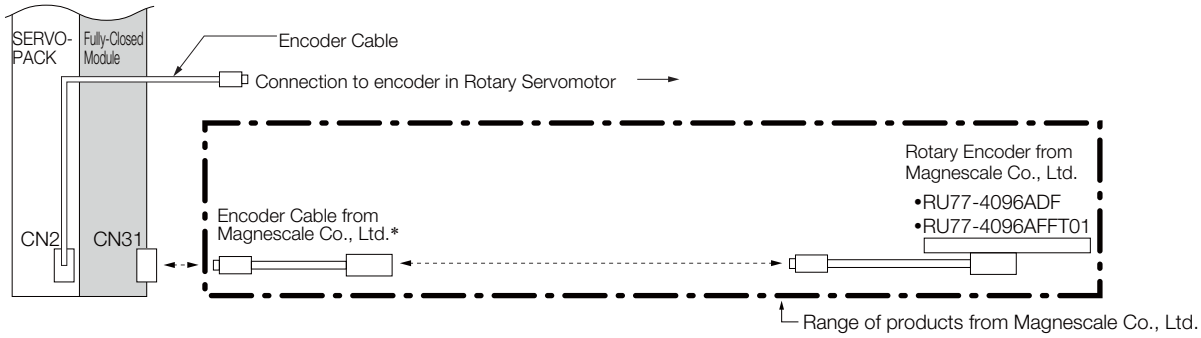
* Refer to *7.3.3 Serial Converter Unit Cables* on page 7-15 for information on the Cables to connect the Fully-Closed Module to the Linear Encoder.

■ SR-75, SR-77, SR-85, and SR-87 Linear Encoders



* To connect the SERVOPACK and Linear Encoder, use a CH33-xx□□G Cable from Magnescale Co., Ltd. (This Cable has connectors designed for use with Yaskawa products.)

■ RU77-4096ADF/RU77-4096AFFT01 Absolute Rotary Encoders

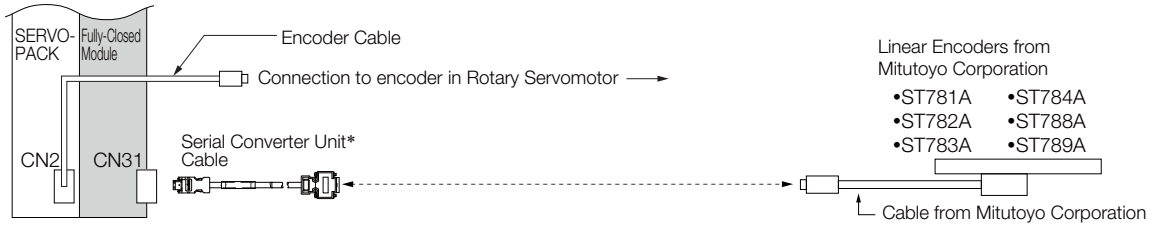


* To connect the SERVOPACK and Rotary Encoder, use a CE28-Series Extension Cable for RU77 from Magnescale Co., Ltd.

Note: The RU77 is a single-turn Absolute Rotary Encoder.

◆ Connections to Linear Encoders from Mitutoyo Corporation

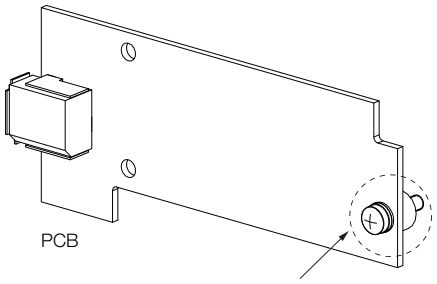
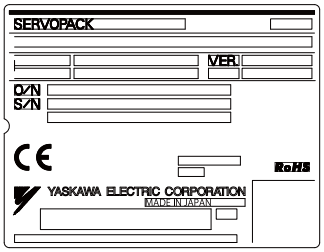
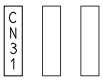
■ ST78□A Linear Encoders



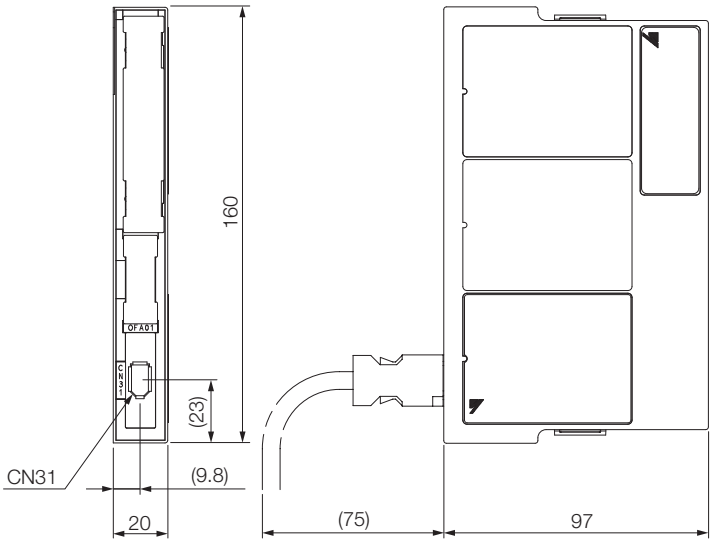
* Refer to *7.3.3 Serial Converter Unit Cables* on page 7-15 for information on the cables to connect the Fully-Closed Module to the Linear Encoder.

Accessories

If you purchase a Fully-Closed Module by itself, the following accessories will be packed with it.

Order Number	SGDV-OFA01A
Acces-sories	 This mounting screw is attached in advance.  PCB set screws (two)  Ratings nameplate  Model number nameplate  Device label nameplates

External Dimensions



Unit: mm
Approx. mass: 0.1 kg

◆ Connectors

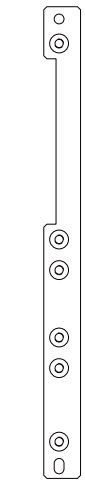
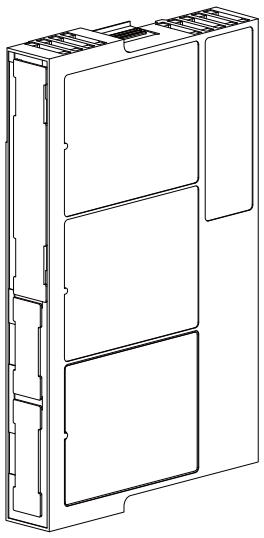
Device Label	Model	Number of Pins	Manufacturer
CN31	3E106-0220KV	6	Sumitomo 3M Ltd.

Note: The above connectors or their equivalents are used for the Fully-Closed Module.

9.2 Option Case Kit

If you purchase the Option Module and SERVOPACK separately, one Option Case Kit is required for each SERVOPACK.

The following accessories are packed with the Option Case Kit.

Order Number	SGDV-OZA01A
Accessories	 PCB mounting plate  Mounting plate set screws (two)  Module cover

SERVOPACK Peripheral Devices

10

10.1 Molded-Case Circuit Breakers and Fuses

10.1.1 Using an AC Power Supply

Use a molded-case circuit breaker and fuse to protect the power supply line. They protect the power line by shutting OFF the circuit when overcurrent is detected. Select these devices based on the information in the following tables.

Note: The following tables provide the net values of the current capacity and inrush current. Select a fuse and a molded-case circuit breaker that meet the following conditions.
- Main circuit and control circuit: No breaking at three times the current value given in the table for 5 s.
- Inrush current: No breaking at the current value given in the table for 20 ms.

Σ-7S SERVOPACKs

Main Circuit Power Supply	Maximum Applicable Motor Capacity [kW]	SERVOPACK Model: SGD7S-	Power Supply Capacity per SERVOPACK [kVA]*	Current Capacity		Inrush Current		Rated Voltage	
				Main Circuit [Arms]*	Control Power Supply [Arms]	Main Circuit [A0-p]	Control Power Supply [A0-p]	Fuse [V]	MCCB [V]
Three-phase, 200 VAC	0.05	R70A	0.2	0.4	0.2	34	34	250	240
	0.1	R90A	0.3	0.8					
	0.2	1R6A	0.5	1.3					
	0.4	2R8A	1.0	2.5					
	0.5	3R8A	1.3	3.0					
	0.75	5R5A	1.6	4.1					
	1.0	7R6A	2.3	5.7					
	1.5	120A	3.2	7.3					
	2.0	180A	4.0	10	0.25				
	3.0	200A	5.9	15					
	5.0	330A	7.5	25	0.3	68			
	6.0	470A	10.7	29					
	7.5	550A	14.6	37					
	11	590A	21.7	54	0.4	114			
	15	780A	29.6	73					
Single-phase, 200 VAC	0.05	R70A	0.2	0.8	0.2	34			
	0.1	R90A	0.3	1.6					
	0.2	1R6A	0.6	2.4					
	0.4	2R8A	1.2	5.0					
	0.75	5R5A	1.9	8.7					

* This is the net value at the rated load.

Σ-7W SERVOPACKs

Main Circuit Power Supply	Maximum Applicable Motor Capacity [kW]	SERVOPACK Model: SGD7W-	Power Supply Capacity per SERVOPACK [kVA]*1	Current Capacity		Inrush Current		Rated Voltage	
				Main Circuit [Arms]*1	Control Power Supply [Arms]	Main Circuit [A0-p]	Control Power Supply [A0-p]	Fuse [V]	MCCB [V]
Three-phase, 200 VAC	0.2	1R6A	1.0	2.5	0.25	34	34	250	240
	0.4	2R8A	1.9	4.7					
	0.75	5R5A	3.2	7.8					
	1.0	7R6A	4.5	11					
Single-phase, 200 VAC	0.2	1R6A	1.3	5.5					
	0.4	2R8A	2.4	11					
	0.75	5R5A*2	2.7	12					

*1. This is the net value at the rated load.

*2. If you use the SGD7W-5R5A with a single-phase 200-VAC power supply input, derate the load ratio to 65%. An example is given below.
If the load ratio of the first axis is 90%, use a load ratio of 40% for the second axis so that average load ratio for both axes is 65%. ((90% + 40%)/2 = 65%)

10.1.2 Using a DC Power Supply

This section gives the power supply specifications for using a DC power supply input. Use the Fuses given in the following tables to protect the power supply line and SERVOPACK. They protect the power line by shutting OFF the circuit when overcurrent is detected.

Note: The following tables provide the net values of the current capacity and inrush current.

Σ-7S SERVOPACKs

Main Circuit Power Supply	SERVOPACK Model: SGD7S-	Power Supply Capacity per SERVOPACK [kVA]*1	Current Capacity		Inrush Current		External Fuse		
			Main Circuit [Arms]*1	Control Power Supply [Arms]	Main Circuit [A0-p]	Control Power Supply [A0-p]	Order Number*2	Current Rating [A]	Voltage Rating [Vdc]
270 VDC	R70A	0.2	0.5	0.2	34	34	3,5URGJ17/16UL	16	400
	R90A	0.3	1.0						
	1R6A	0.5	1.5						
	2R8A	1.0	3.0				3,5URGJ17/20UL	20	
	3R8A	1.3	3.8	0.2			3,5URGJ17/40UL	40	
	5R5A	1.6	4.9						
	7R6A	2.3	6.9						
	120A	3.2	11	0.2					
	180A	4.0	14	0.25			3,5URGJ17/63UL	63	
	200A	5.9	20						
	330A	7.5	34	0.3	68*3 (5 Ω external)		3,5URGJ17/100UL	100	
	470A	10.7	36				3,5URGJ23/160UL	160	
	550A	14.6	48						
	590A	21.7	68	0.4	114*3 (3 Ω external)		3,5URGJ23/200UL	200	
	780A	29.6	92						

*1. This is the net value at the rated load.

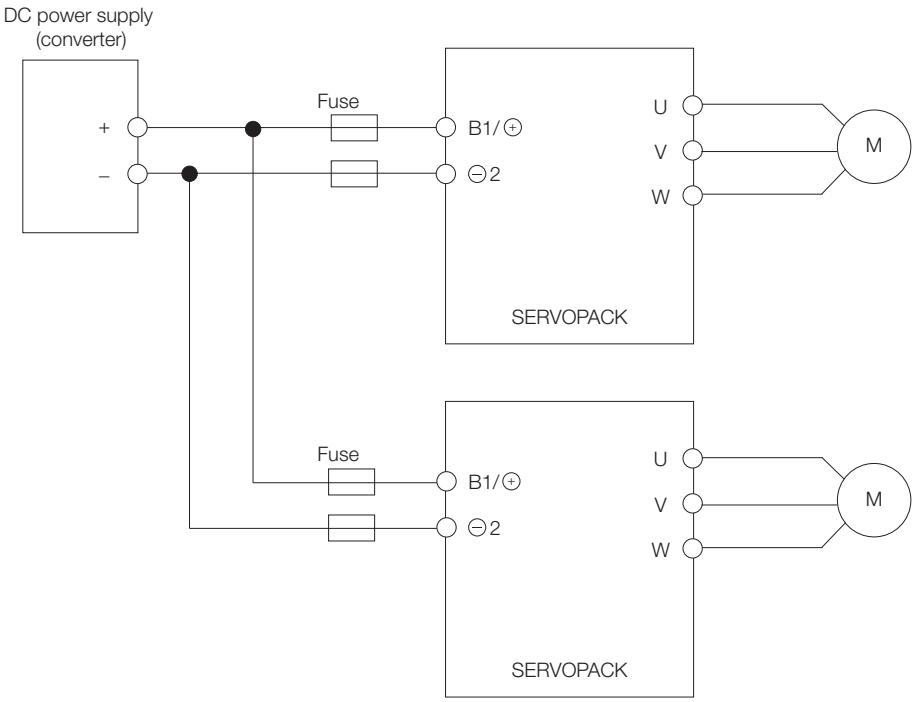
*2. These Fuses are manufactured by MERSEN Japan.

*3. If you use a DC power supply input with any of the following SERVOPACKs, externally connect an inrush current limiting circuit and use the power ON and OFF sequences recommended by Yaskawa: SGD7S-330A, -470A, -550A, -590A, or -780A.
There is a risk of equipment damage.
For information on the power ON and OFF sequences, refer to the product manual for the type of references used by your SERVOPACK.

Σ-7W SERVOPACKs

Main Circuit Power Supply	SERVOPACK Model: SGD7W-	Power Supply Capacity per SERVOPACK [kVA]*1	Current Capacity		Inrush Current		External Fuse		
			Main Circuit [Arms]*1	Control Power Supply [Arms]	Main Circuit [A0-p]	Control Power Supply [A0-p]	Order Number*2	Current Rating [A]	Voltage Rating [Vdc]
270 VDC	1R6A	1	3.0	0.25	34	34	3,5URGJ17/40UL	40	400
	2R8A	1.9	5.8						
	5R5A	3.2	9.7				3,5URGJ17/63UL	63	
	7R6A	4.5	14						

*1. This is the net value at the rated load.
*2. These Fuses are manufactured by MERSEN Japan.



Note: If you connect more than one SERVOPACK to the same DC power supply, connect Fuses for each SERVOPACK.

10.2 Magnetic Contactors

Use a Magnetic Contactor when you configure an external AC power supply sequence.

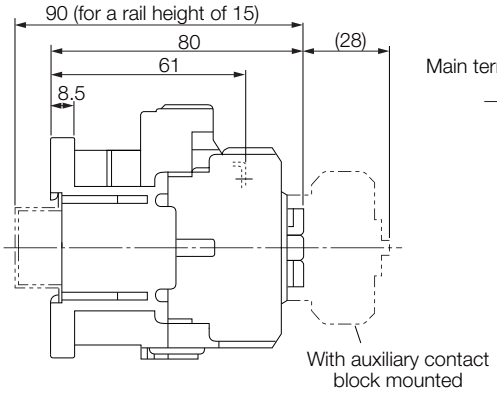
Note: Always attach a Surge Absorber (e.g., a Surge Absorber unit) to the excitation coil of the magnetic contactor.

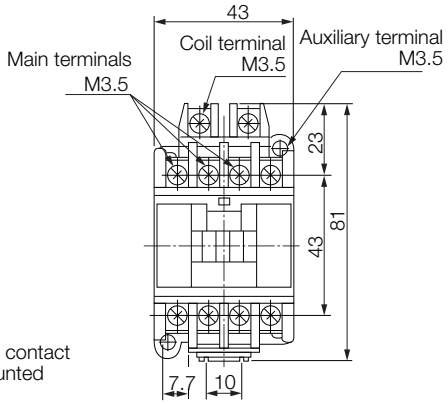
Selection Table

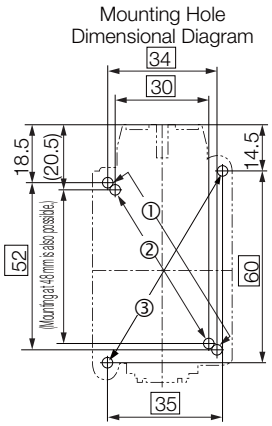
Main Circuit Power Supply	SERVOPACK			Order Number	Inquires
	Maximum Applicable Motor Capacity [kW]	Model SGD7S-	Model SGD7W-		
Three-phase, 200 VAC	0.05	R70A	–	SC-03	Fuji Electric FA Components & Systems Co., Ltd.
	0.1	R90A	–		
	0.2	1R6A	–		
	0.4	2R8A	1R6A		
	0.5	3R8A	–		
	0.75	5R5A	2R8A	SC-4-1	
	1.0	7R6A	–		
	1.5	120A	5R5A		
	2.0	180A	7R6A	SC-5-1	
	3.0	200A	–		
	5.0	330A	–	SC-N1	
	6.0	470A	–		
	7.5	550A	–	SC-N2	
	11	590A	–	SC-N2S	
	15	780A	–	SC-N3	
Single-phase, 200 VAC	0.05	R70A	–	SC-03	
	0.1	R90A	–		
	0.2	1R6A	–		
	0.4	2R8A	1R6A		
	0.75	5R5A	2R8A	SC-4-1	
	1.5	–	5R5A	SC-5-1	

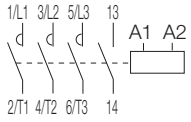
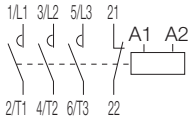
External Dimensions

◆ Model: SC-03





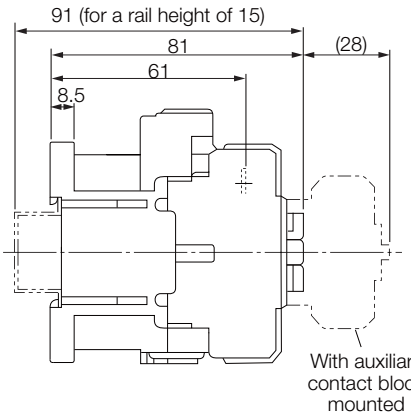


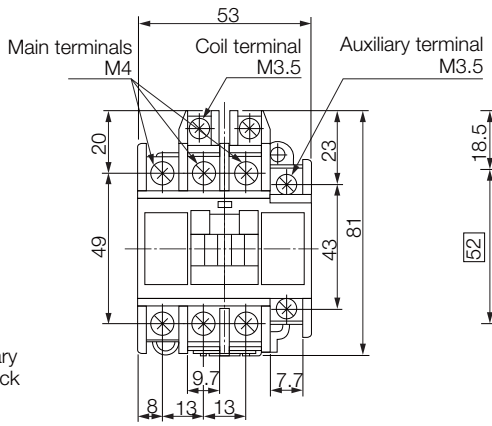
Auxiliary Contacts	Contact Structure
1NO	
1NC	

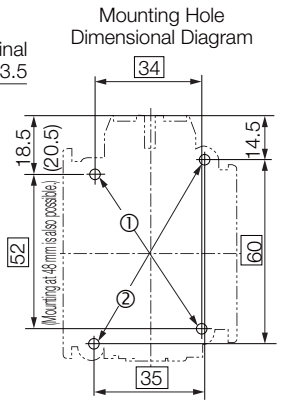
- You can use any of the following three mounting methods.
  ①: 34 × (48 to) 52
  ②: 30 × 48
  ③: 35 × 60
- Mounting screws: 2 × M4
  Use two mounting holes in diagonally opposing corners to mount the Magnetic Contactor.

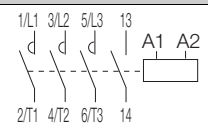
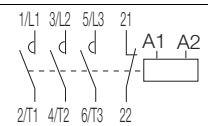
Unit: mm
Approx. mass: 0.32 kg

◆ Model: SC-4-1





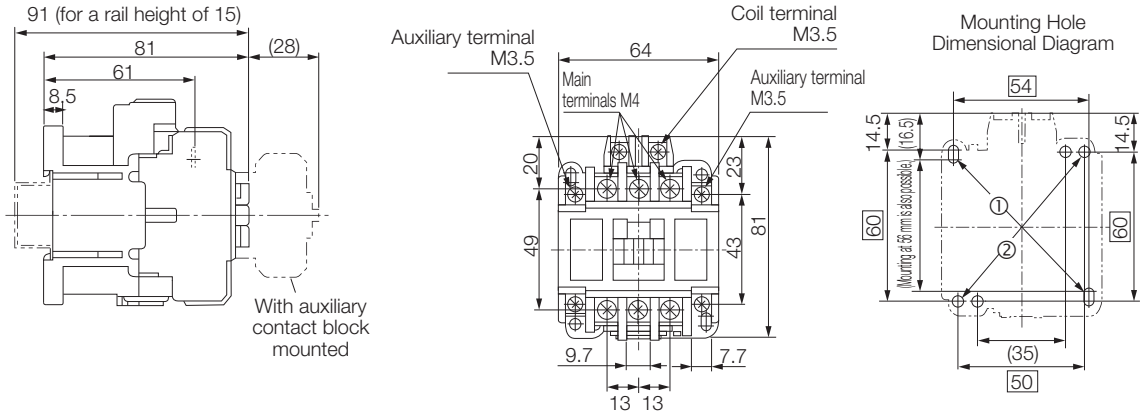


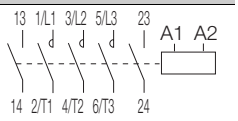
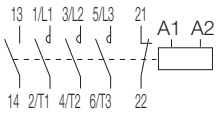
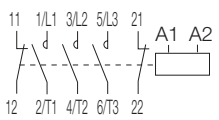
Auxiliary Contacts	Contact Structure
1NO	
1NC	

- You can use either of the following two mounting methods.
  ①: 34 × (48 to) 52
  ②: 35 × 60
- Mounting screws: 2 × M4
  Use two mounting holes in diagonally opposing corners to mount the Magnetic Contactor.

Unit: mm
Approx. mass: 0.36 kg

◆ Model: SC-5-1

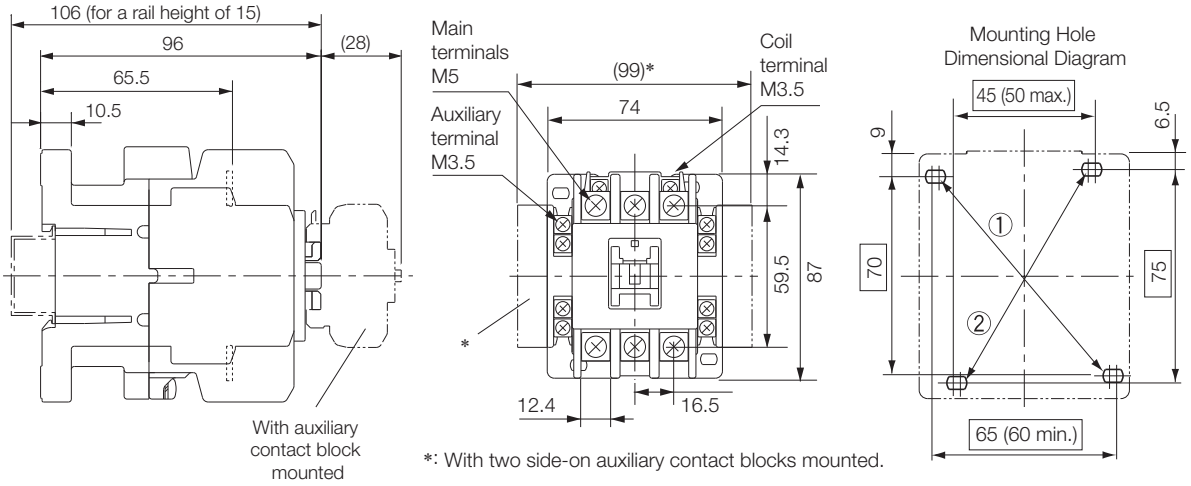


Auxiliary Contacts	Contact Structure
2NO	
1NO/1NC	
2NC	

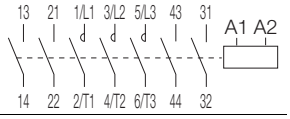
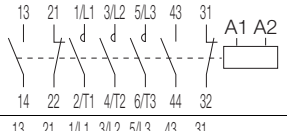
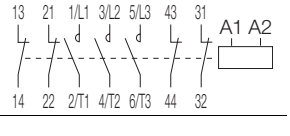
- You can use either of the following two mounting methods.
  ①: 54 × (56 to) 60
  ②: 50 × 60
- Mounting screws: 2 × M4
  Use two mounting holes in diagonally opposing corners to mount the Magnetic Contactor.

Unit: mm
Approx. mass: 0.38 kg

◆ Model: SC-N1 or SC-N2



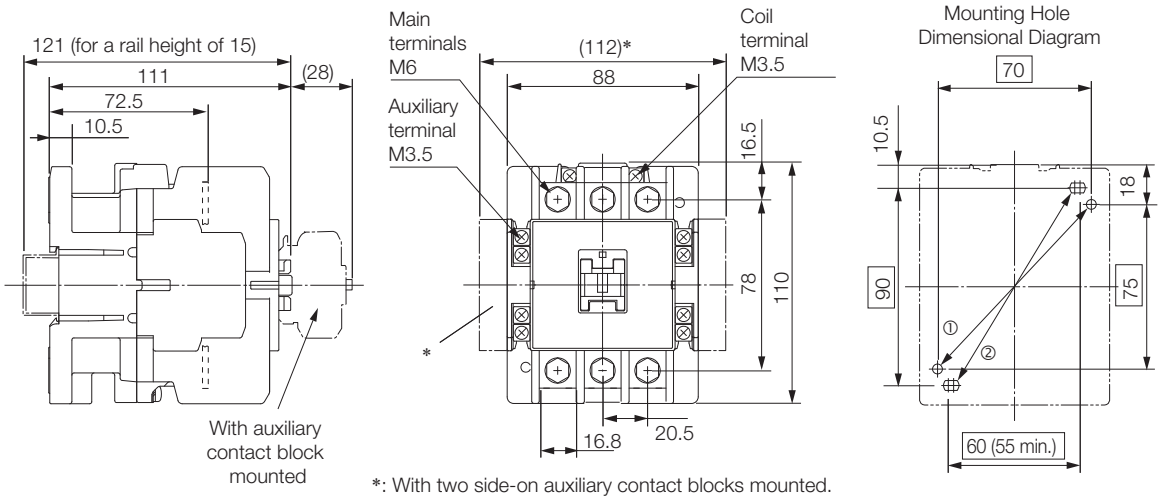
*: With two side-on auxiliary contact blocks mounted.

Auxiliary Contacts	Contact Structure
4NO	
2NO/2NC	
4NC	

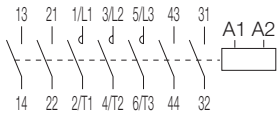
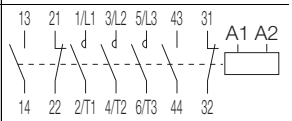
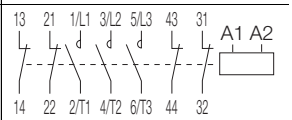
- You can use either of the following two mounting methods.
  ①: 70 × 75
  ②: (55 to) 65 × 90
- Mounting screws: 2 × M4
  Use two mounting holes in diagonally opposing corners to mount the Magnetic Contactor.

Unit: mm
Approx. mass: 0.59 kg

◆ Model: SC-N2S or SC-N3



*: With two side-on auxiliary contact blocks mounted.

Auxiliary Contacts	Contact Structure
4NO	
2NO/2NC	
4NC	

- You can use either of the following two mounting methods.
  ①: 70 × 75
  ②: (55 to) 60 × 90
- Mounting screws: 2 × M4
  Use two mounting holes in diagonally opposing corners to mount the Magnetic Contactor.

Unit: mm
Approx. mass: 1.1 kg

10.3 SERVOPACK Main Circuit Wires

This section describes the main circuit wires for SERVOPACKs.

Important

These specifications are based on IEC/EN 61800-5-1, UL 61800-5-1, and CSA C22.2 No.274.
1. To comply with UL standards, use UL-compliant wires.
2. Use copper wires with a rated temperature of 75° or higher.
3. Use wires with a rated withstand voltage of 300 V or higher.

Note: To use 600-V heat-resistant polyvinyl chloride-insulated wire (HIV), use the following table as reference for the applicable wires.
- The specified wire sizes are for three bundled leads when the rated current is applied with a surrounding air temperature of 40°C.
- Select the wires according to the surrounding air temperature.

10.3.1 Three-Phase, 200-VAC Wires for Σ-7S SERVOPACKs

SERVOPACK Model: SGD7S-	Terminal Symbols		Wire Size	Screw Size	Tightening Torque [N·m]
R70A	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm^2)	–	–
	Servomotor Main Circuit Cables*	U, V, W			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4
R90A	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm^2)	–	–
	Servomotor Main Circuit Cables*	U, V, W			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4
1R6A	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm^2)	–	–
	Servomotor Main Circuit Cables*	U, V, W			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4
2R8A	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm^2)	–	–
	Servomotor Main Circuit Cables*	U, V, W			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4

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SERVOPACK Model: SGD7S-	Terminal Symbols		Wire Size	Screw Size	Tightening Torque [N·m]
3R8A	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm^2)	–	–
	Servomotor Main Circuit Cables*	U, V, W			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4
5R5A	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm^2)	–	–
	Servomotor Main Circuit Cables*	U, V, W			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4
7R6A	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm^2)	–	–
	Servomotor Main Circuit Cables*	U, V, W			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4

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SERVOPACK Model: SGD7S-	Terminal Symbols		Wire Size	Screw Size	Tightening Torque [N·m]
120A	Main Circuit Power Supply Cables	L1, L2, L3	AWG14 (2.0 mm^2)	–	–
	Servomotor Main Circuit Cables*	U, V, W			
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)		
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4
180A	Main Circuit Power Supply Cables	L1, L2, L3	AWG14 (2.0 mm^2)		
	Servomotor Main Circuit Cables*	U, V, W	AWG10 (5.5 mm^2)		
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)		
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger		
200A	Main Circuit Power Supply Cables	L1, L2, L3	AWG12 (3.5 mm^2)		
	Servomotor Main Circuit Cables*	U, V, W	AWG10 (5.5 mm^2)		
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)		
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger		
330A	Main Circuit Power Supply Cables	L1, L2, L3	AWG8 (8.0 mm^2)		
	Servomotor Main Circuit Cables*	U, V, W			
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)		
	External Regenerative Resistor Cables	B1/⊕, B2	AWG14 (2.0 mm^2)		
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger		
470A	Main Circuit Power Supply Cables	L1, L2, L3	AWG8 (8.0 mm^2)	M5	2.2 to 2.4
	Servomotor Main Circuit Cables*	U, V, W	AWG6 (14 mm^2)		
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)		
	External Regenerative Resistor Cables	B1/⊕, B2	AWG14 (2.0 mm^2)		
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger		
550A	Main Circuit Power Supply Cables	L1, L2, L3	AWG8 (8.0 mm^2)		
	Servomotor Main Circuit Cables*	U, V, W	AWG4 (22 mm^2)		
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)		
	External Regenerative Resistor Cables	B1/⊕, B2	AWG10 (5.5 mm^2)		
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger		

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SERVOPACK Model: SGD7S-	Terminal Symbols		Wire Size	Screw Size	Tightening Torque [N·m]
590A	Main Circuit Power Supply Cables	L1, L2, L3	AWG4 (22 mm^2)	M6	2.7 to 3.0
	Servomotor Main Circuit Cables*	U, V, W			
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)		
	External Regenerative Resistor Cables	B1/⊕, B2	AWG10 (5.5 mm^2)		
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger		
780A	Main Circuit Power Supply Cables	L1, L2, L3	AWG3 (30 mm^2)		
	Servomotor Main Circuit Cables*	U, V, W			
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)		
	External Regenerative Resistor Cables	B1/⊕, B2	AWG8 (8.0 mm^2)		
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger		

* If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

10.3.2 Single-Phase, 200-VAC Wires for Σ-7S SERVOPACKs

SERVOPACK Model: SGD7S-	Terminal Symbols		Wire Size	Screw Size	Tightening Torque [N·m]
R70A	Main Circuit Power Supply Cables	L1, L2	AWG16 (1.25 mm^2)	–	–
	Servomotor Main Circuit Cables*	U, V, W			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4
R90A	Main Circuit Power Supply Cables	L1, L2	AWG16 (1.25 mm^2)	–	–
	Servomotor Main Circuit Cables*	U, V, W			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4

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SERVOPACK Model: SGD7S-	Terminal Symbols		Wire Size	Screw Size	Tightening Torque [N·m]
1R6A	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm^2)	–	–
	Servomotor Main Circuit Cables*	U, V, W			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4
2R8A	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm^2)	–	–
	Servomotor Main Circuit Cables*	U, V, W			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4
5R5A	Main Circuit Power Supply Cables	L1, L2, L3	AWG14 (2.0 mm^2)	–	–
	Servomotor Main Circuit Cables*	U, V, W	AWG16 (1.25 mm^2)		
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4

* If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

10.3.3 DC Power Supply Wires for Σ-7S SERVOPACKs

SERVOPACK Model: SGD7S-	Terminal Symbols*1		Wire Size	Screw Size	Tightening Torque [N·m]
R70A	Servomotor Main Circuit Cables	U, V, W*2	AWG16 (1.25 mm^2)	–	–
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)	–	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG16 (1.25 mm^2)	–	–
	Ground Cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4
R90A	Servomotor Main Circuit Cables	U, V, W*2	AWG16 (1.25 mm^2)	–	–
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)	–	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG16 (1.25 mm^2)	–	–
	Ground Cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4

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SERVOPACK Model: SGD7S-	Terminal Symbols[*1]		Wire Size	Screw Size	Tightening Torque [N·m]
1R6A	Servomotor Main Circuit Cables	U, V, W[*2]	AWG16 (1.25 mm^2)	–	–
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)	–	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG16 (1.25 mm^2)	–	–
	Ground Cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4
2R8A	Servomotor Main Circuit Cables	U, V, W[*2]	AWG16 (1.25 mm^2)	–	–
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)	–	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG16 (1.25 mm^2)	–	–
	Ground Cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4
3R8A	Servomotor Main Circuit Cables	U, V, W[*2]	AWG16 (1.25 mm^2)	–	–
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)	–	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG16 (1.25 mm^2)	–	–
	Ground Cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4
5R5A	Servomotor Main Circuit Cables	U, V, W[*2]	AWG16 (1.25 mm^2)	–	–
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)	–	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG16 (1.25 mm^2)	–	–
	Ground Cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4
7R6A	Servomotor Main Circuit Cables	U, V, W[*2]	AWG16 (1.25 mm^2)	–	–
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)	–	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG16 (1.25 mm^2)	–	–
	Ground Cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4
120A	Servomotor Main Circuit Cables	U, V, W[*2]	AWG14 (2.0 mm^2)	–	–
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)	–	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG14 (2.0 mm^2)	–	–
	Ground Cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4
180A	Servomotor Main Circuit Cables	U, V, W[*2]	AWG10 (5.5 mm^2)	M4	1.2 to 1.4
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)	M4	1.2 to 1.4
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG10 (5.5 mm^2)	M4	1.2 to 1.4
	Ground Cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4

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SERVOPACK Model: SGD7S-	Terminal Symbols[*1]		Wire Size	Screw Size	Tightening Torque [N·m]
200A	Servomotor Main Circuit Cables	U, V, W[*2]	AWG10 (5.5 mm^2)	M4	1.2 to 1.4
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)	M4	1.2 to 1.4
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG10 (5.5 mm^2)	M4	1.2 to 1.4
	Ground Cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4
330A	Servomotor Main Circuit Cables	U, V, W	AWG8 (8.0 mm^2)	M4	1.2 to 1.4
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)	M4	1.2 to 1.4
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG8 (8.0 mm^2)	M4	1.2 to 1.4
	Ground Cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4
470A	Servomotor Main Circuit Cables	U, V, W	AWG6 (14 mm^2)	M5	2.2 to 2.4
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)	M5	2.2 to 2.4
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG8 (8.0 mm^2)	M5	2.2 to 2.4
	Ground Cable	⏚	AWG14 (2.0 mm^2) or larger	M5	2.2 to 2.4
550A	Servomotor Main Circuit Cables	U, V, W	AWG4 (22 mm^2)	M5	2.2 to 2.4
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)	M5	2.2 to 2.4
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG6 (14 mm^2)	M5	2.2 to 2.4
	Ground Cable	⏚	AWG14 (2.0 mm^2) or larger	M5	2.2 to 2.4
590A	Servomotor Main Circuit Cables	U, V, W	AWG4 (22 mm^2)	M6	2.7 to 3.0
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)	M6	2.7 to 3.0
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG3 (30 mm^2)	M6	2.7 to 3.0
	Ground Cable	⏚	AWG14 (2.0 mm^2) or larger	M6	2.7 to 3.0
780A	Servomotor Main Circuit Cables	U, V, W	AWG3 (30 mm^2)	M6	2.7 to 3.0
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)	M6	2.7 to 3.0
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG3 (30 mm^2)	M6	2.7 to 3.0
	Ground Cable	⏚	AWG14 (2.0 mm^2) or larger	M6	2.7 to 3.0

*1. Do not wire the following terminals: L1, L2, L3, B2, B3, ⊖1, and ⊖ terminals.
*2. If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

10.3.4 Three-Phase, 200-VAC Wires for Σ-7W SERVOPACKs

SERVOPACK Model: SGD7W-	Terminal Symbols		Wire Size	Screw Size	Tightening Torque [N·m]
1R6A	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm^2)	–	–
	Servomotor Main Circuit Cables*	UA, VA, WA, UB, VB, WB			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4
2R8A	Main Circuit Power Supply Cables	L1, L2, L3	AWG14 (2.0 mm^2)	–	–
	Servomotor Main Circuit Cables*	UA, VA, WA, UB, VB, WB	AWG16 (1.25 mm^2)		
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4
5R5A	Main Circuit Power Supply Cables	L1, L2, L3	AWG14 (2.0 mm^2)	–	–
	Servomotor Main Circuit Cables*	UA, VA, WA, UB, VB, WB	AWG16 (1.25 mm^2)		
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2	AWG14 (2.0 mm^2)		
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4
7R6A	Main Circuit Power Supply Cables	L1, L2, L3	AWG14 (2.0 mm^2)	–	–
	Servomotor Main Circuit Cables*	UA, VA, WA, UB, VB, WB	AWG16 (1.25 mm^2)		
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2	AWG14 (2.0 mm^2)		
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4

* If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

10.3.5 Single-Phase, 200-VAC Wires for Σ-7W SERVOPACKs

SERVOPACK Model: SGD7W-	Terminal Symbols		Wire Size	Screw Size	Tightening Torque [N·m]
1R6A	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm^2)	–	–
	Servomotor Main Circuit Cables*	UA, VA, WA, UB, VB, WB			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4
2R8A	Main Circuit Power Supply Cables	L1, L2, L3	AWG14 (2.0 mm^2)	–	–
	Servomotor Main Circuit Cables*	UA, VA, WA, UB, VB, WB	AWG16 (1.25 mm^2)		
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4
5R5A	Main Circuit Power Supply Cables	L1, L2, L3	AWG14 (2.0 mm^2)	–	–
	Servomotor Main Circuit Cables*	UA, VA, WA, UB, VB, WB	AWG16 (1.25 mm^2)		
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2	AWG14 (2.0 mm^2)		
	Ground cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4

* If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

10.3.6 DC Power Supply Wires for Σ-7W SERVOPACKs

SERVOPACK Model: SGD7W-	Terminal Symbols*1		Wire Size	Screw Size	Tightening Torque [N·m]
1R6A	Servomotor Main Circuit Cables	UA, VA, WA, UB, VB, WB*2	AWG16 (1.25 mm^2)	–	–
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)	–	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG16 (1.25 mm^2)	–	–
	Ground Cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4

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SERVOPACK Model: SGD7W-	Terminal Symbols[*1]		Wire Size	Screw Size	Tightening Torque [N·m]
2R8A	Servomotor Main Circuit Cables	UA, VA, WA, UB, VB, WB[*2]	AWG16 (1.25 mm^2)	–	–
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)	–	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG16 (1.25 mm^2)	–	–
	Ground Cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4
5R5A	Servomotor Main Circuit Cables	UA, VA, WA, UB, VB, WB[*2]	AWG16 (1.25 mm^2)	–	–
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)	–	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG14 (2.0 mm^2)	–	–
	Ground Cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4
7R6A	Servomotor Main Circuit Cables	UA, VA, WA, UB, VB, WB[*2]	AWG16 (1.25 mm^2)	–	–
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)	–	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG14 (2.0mm^2)	–	–
	Ground Cable	⏚	AWG14 (2.0 mm^2) or larger	M4	1.2 to 1.4

*1. Do not wire the following terminals: L1, L2, L3, B2, B3, ⊖1, and ⊖ terminals.
*2. If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

10.3.7 Wire Types

The following table shows the wire sizes and allowable currents for three bundled leads.

HIV Specifications*		Allowable Current at Surrounding Air Temperatures [Arms]		
Nominal Cross-Sectional Area [mm^2]	Configuration [Wires/mm^2]	30°C	40°C	50°C
0.9	7/0.4	15	13	11
1.25	7/0.45	16	14	12
2.0	7/0.6	23	20	17
3.5	7/0.8	32	28	24
5.5	7/1.0	42	37	31
8.0	7/1.2	52	46	39
14.0	7/1.6	75	67	56
22.0	7/2.0	98	87	73
38.0	7/2.6	138	122	103

* This is reference data based on JIS C3317 600-V-grade heat-resistant polyvinyl chloride-insulated wires (HIV).

10.4 Crimp Terminals and Insulating Sleeves

If you use crimp terminals for wiring, use insulating sleeves. Do not allow the crimp terminals to come close to adjacent terminals or the case.

To comply with UL standards, you must use UL-compliant closed-loop crimp terminals and insulating sleeves for the main circuit terminals. Use the tool recommended by the crimp terminal manufacturer to attach the crimp terminals.

The following tables give the recommended tightening torques, closed-loop crimp terminals, and insulating sleeves in sets. Use the set that is suitable for your model and wire size.

10.4.1 Σ-7S SERVOPACKs with Three-Phase, 200-VAC or DC Power Supplies

SERVOPACK Model: SGD7S-	Main Circuit Terminals	Screw Size	Tightening Torque [N·m]	Crimp Terminal Horizontal Width	Recommended Wire Size	Crimp Terminal Model (From J.S.T. Mfg. Co., Ltd.)	Crimping Tool (From J.S.T. Mfg. Co., Ltd.)	Die (From J.S.T. Mfg. Co., Ltd.)	Insulating Sleeve Model (Tokyo Dip Co., Ltd.)
R70A, R90A,1R6A, 2R8A, 3R8A, 5R5A, 7R6A, or 120A	Connector	–							
	⏚	M4	1.2 to 1.4	10 mm max.	AWG14 (2.0 mm^2)	R2-4	YHT-2210	–	–
180A or 200A	Terminal block	M4	1.2 to 1.4	7.7 mm max.	AWG10 (5.5 mm^2)	5.5-S4	YHT-2210	–	TP-005
					AWG14 (2.0 mm^2)	2-M4		–	TP-003
					AWG16 (1.25 mm^2)			–	
	⏚	M4	1.2 to 1.4	10 mm max.	AWG14 (2.0 mm^2)	R2-4	YHT-2210	–	–
330A	Terminal block	M4	1.2 to 1.4	9.9 mm max.	AWG8 (8.0 mm^2)	8-4NS	YPT-60N	TD-121 TD-111	TP-008
					AWG14 (2.0 mm^2)	R2-4	YHT-2210	–	TP-003
					AWG16 (1.25 mm^2)			–	
	⏚	M4	1.2 to 1.4	10 mm max.	AWG14 (2.0 mm^2)	R2-4	YHT-2210	–	–

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SERVOPACK Model: SGD7S-	Main Circuit Terminals	Screw Size	Tightening Torque [N·m]	Crimp Terminal Horizontal Width	Recommended Wire Size	Crimp Terminal Model (From J.S.T. Mfg. Co., Ltd.)	Crimping Tool	Die	Insulating Sleeve Model (Tokyo Dip Co., Ltd.)
470A or 550A	Terminal block	M5	2.2 to 2.4	13 mm max.	AWG4 (22 mm^2)	22-S5	YPT-60N	TD-123 TD-112	TP-022
					AWG6 (14 mm^2)	R14-5		TD-122 TD-111	TP-014
					AWG8 (8.0 mm^2)	R8-5		TD-121 TD-111	TP-008
					AWG10 (5.5 mm^2)	R5.5-5	YHT-2210	–	TP-005
					AWG14 (2.0 mm^2)	R2-5		–	TP-003
					AWG16 (1.25 mm^2)			–	
	⏚	M5	2.2 to 2.4	12 mm max.	AWG14 (2.0 mm^2)	R2-5	YHT-2210	–	–
590A or 780A	Terminal block	M6	2.7 to 3.0	18 mm max.	AWG3 (30 mm^2)	38-S6	YPT-60N	TD-124 TD-112	TP-038
					AWG4 (22 mm^2)	R22-6		TD-123 TD-112	TP-022
					AWG8 (8.0 mm^2)	R8-6		TD-121 TD-111	TP-008
					AWG10 (5.5 mm^2)	R5.5-6	YHT-2210	–	TP-005
					AWG14 (2.0 mm^2)	R2-6		–	TP-003
					AWG16 (1.25 mm^2)			–	
	⏚	M6	2.7 to 3.0	12 mm max.	AWG14 (2.0 mm^2)	R2-6	YHT-2210	–	–

10.4.2 Σ-7S SERVOPACKs with Single-Phase, 200-VAC

SERVOPACK Model: SGD7S-	Main Circuit Terminals	Screw Size	Tightening Torque [N·m]	Crimp Terminal Horizontal Width	Recommended Wire Size	Crimp Terminal Model (From J.S.T. Mfg. Co., Ltd.)	Crimping Tool	Die	Insulating Sleeve Model (Tokyo Dip Co., Ltd.)
R70A, R90A,1R6A, 2R8A, 5R5A, or 120A	Connector	–							
	⏚	M4	1.2 to 1.4	10 mm max.	AWG14 (2.0 mm^2)	R2-4	YHT-2210	–	–

10.4.3 Σ-7W SERVOPACKs with Three-Phase, 200-VAC or DC Power Supplies

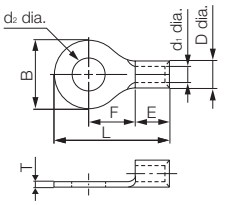
SERVOPACK Model: SGD7W-	Main Circuit Terminals	Screw Size	Tightening Torque [N·m]	Crimp Terminal Horizontal Width	Recommended Wire Size	Crimp Terminal Model	Crimping Tool	Die	Insulating Sleeve Model
						(From J.S.T. Mfg. Co., Ltd.)			(Tokyo Dip Co., Ltd.)
1R6A, 2R8A, 5R5A, or 7R6A	Connector	–							
	⏚	M4	1.2 to 1.4	10 mm max.	AWG14 (2.0 mm^2)	R2-4	YHT-2210	–	–

10.4.4 Σ-7W SERVOPACKs with Single-Phase, 200-VAC

SERVOPACK Model: SGD7W-	Main Circuit Terminals	Screw Size	Tightening Torque [N·m]	Crimp Terminal Horizontal Width	Recommended Wire Size	Crimp Terminal Model	Crimping Tool	Die	Insulating Sleeve Model
						(From J.S.T. Mfg. Co., Ltd.)			(Tokyo Dip Co., Ltd.)
1R6A, 2R8A, or 5R5A	Connector	–							
	⏚	M4	1.2 to 1.4	10 mm max.	AWG14 (2.0 mm^2)	R2-4	YHT-2210	–	–

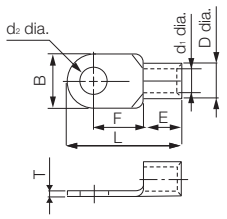
Crimp Terminal Dimensional Drawings

◆ Crimp Terminal Model: 2-M4, R2-4, R2-5, R2-6, 5.5-S4, R5.5-5, or R5.5-6



Crimp Terminal Model	Dimensions (mm)							
	d_2 dia.	B	L	F	E	D dia.	d_1 dia.	T
2-M4	4.3	6.6	14.4	6.3	4.8	4.1	2.3	0.8
R2-4		8.5	16.8	7.8				
R2-5	5.3	9.5	16.8	7.3				
R2-6	6.4	12.0	21.8	11.0				
5.5-S4	4.3	7.2	15.7	5.9	6.2	5.6	3.4	1.0
R5.5-5	5.3	9.5	19.8	8.3	6.8			
R5.5-6	6.4	12.0	25.8	13.0				

◆ Crimp Terminal Model: 8-4NS, R8-5, R8-6, R14-5, 22-S5, R22-6, or 38-S6



Crimp Terminal Model	Dimensions (mm)							
	d_2 dia.	B	L	F	E	D dia.	d_1 dia.	T
8-4NS	4.3	8.0	21.8	9.3	8.5	7.1	4.5	1.2
R8-5	5.3	12.0	23.8					
R8-6	6.4							
R14-5	5.3		29.8	13.3	10.5	9.0	5.8	1.5
22-S5			30.0	12.0	12.0	11.5	7.7	1.8
R22-6	6.4	16.5	33.7	13.5				
38-S6		15.5	38.0	16.0	14.0	13.3	9.4	

10.5 Noise Filter

Noise Filters are used to reduce external noise that can enter on the power supply line or conductive noise from the SERVOPACK.

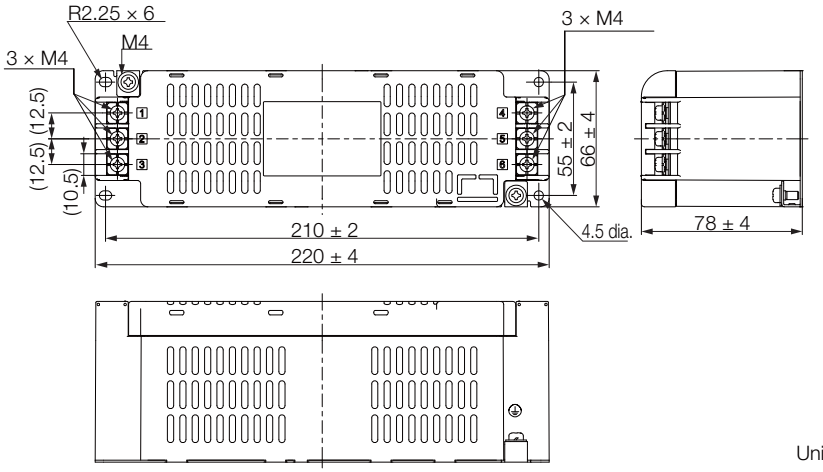
Some Noise Filters have large leakage currents. The grounding conditions also affect the amount of the leakage current. If necessary, select an appropriate leakage detector or leakage breaker taking into account the grounding conditions and the leakage current from the Noise Filter.

Selection Table

Main Circuit Power Supply	SERVOPACK			Order Number	Specification	Mass	Leakage Current	Manufacturer	Inquires
	Maximum Applicable Motor Capacity [kW]	Model SGD7S-	Model SGD7W-						
Three-phase, 200 VAC	0.05	R70A	–	HF3010C-SZC	Three-phase, 500 VAC, 10 A	1.0 kg	4 mA 200 VAC /60 Hz	Soshin Electric Co., Ltd.	Yaskawa Controls Co., Ltd.
	0.1	R90A	–						
	0.2	1R6A	–						
	0.4	2R8A	1R6A						
	0.5	3R8A	–						
	0.75	5R5A	2R8A	HF3020C-SZC	Three-phase, 500 VAC, 20 A	1.4 kg			
	1.0	7R6A	–						
	1.5	120A	5R5A						
	2.0	180A	7R6A						
	3.0	200A	–	HF3030C-SZC	Three-phase, 500 VAC, 30 A	1.4 kg			
	5.0	330A	–	HF3050C-SZC -47EDD	Three-phase, 500 VAC, 50 A	2.0 kg	8 mA 200 VAC /60 Hz		
	6.0	470A	–						
	7.5	550A	–	HF3060C-SZC	Three-phase, 500 VAC, 60 A	2.1 kg	4 mA 200 VAC /60 Hz		
	11	590A	–	HF3100C-SZC	Three-phase, 500 VAC, 100 A	5.8 kg			
	15	780A	–						
Single-phase, 200 VAC	0.05	R70A	–	HF2010A-UPF	Single-phase 250 VAC, 10 A	0.5 kg	1.2 mA 250 VAC /60 Hz		
	0.1	R90A	–						
	0.2	1R6A	–						
	0.4	2R8A	1R6A						
	0.75	5R5A	2R8A	HF2020A-UPF -2BB	Single-phase 250 VAC, 20 A	0.8 kg	3 mA 250 VAC /60 Hz		
	1.5	–	5R5A	HF2030A-UPF -2BB	Single-phase 250 VAC, 30 A	0.8 kg			

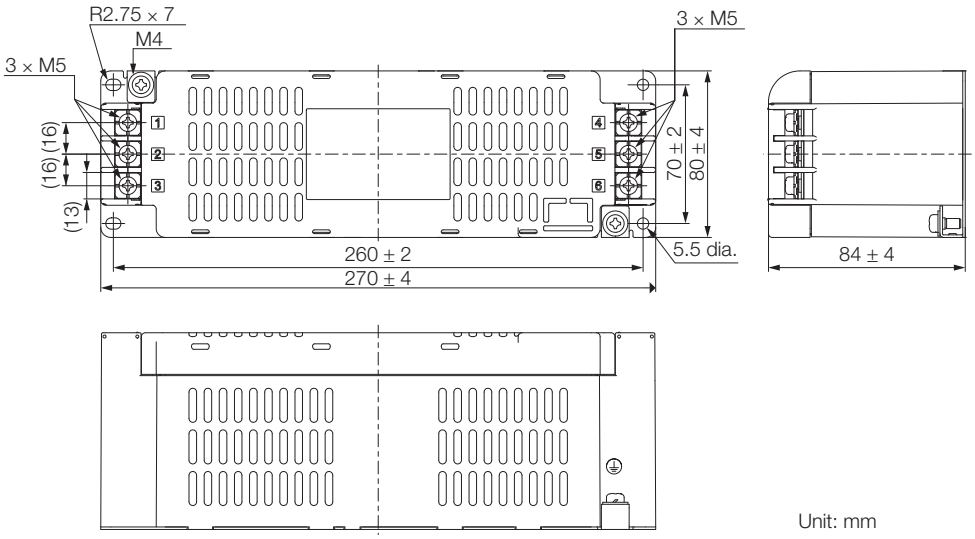
External Dimensions

◆ Model: HF3010C-SZC, HF3020C-SZC, or HF3030C-SZC



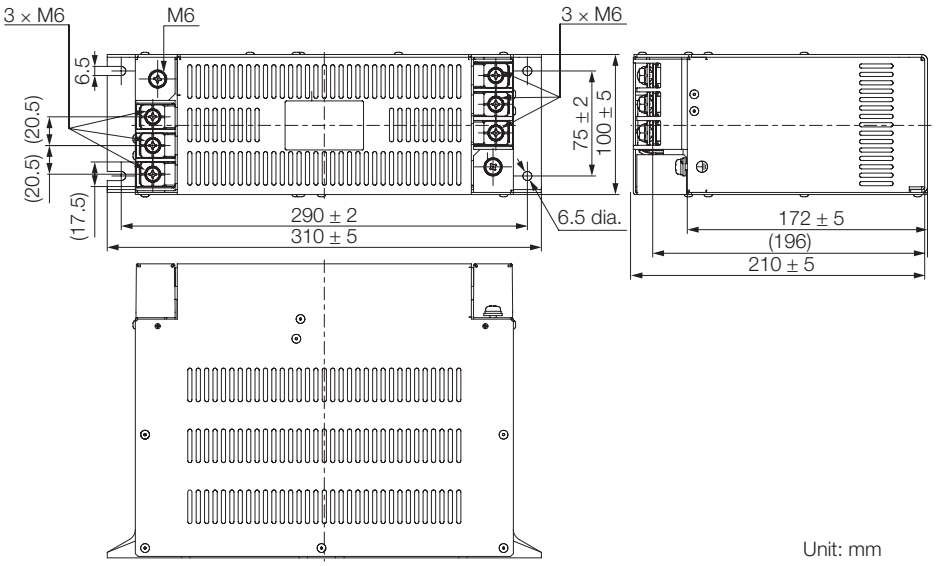
Unit: mm

◆ Model: HF3050C-SZC-47EDD or HF3060C-SZC



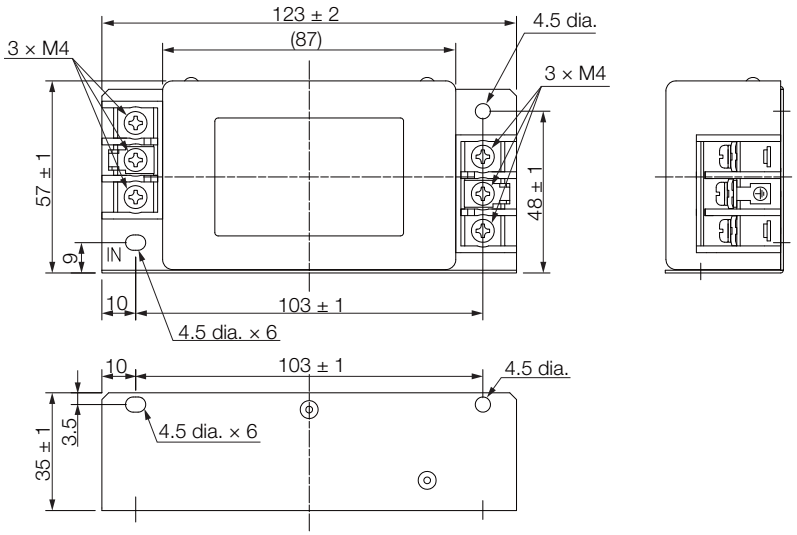
Unit: mm

◆ Model: HF3100C-SZC



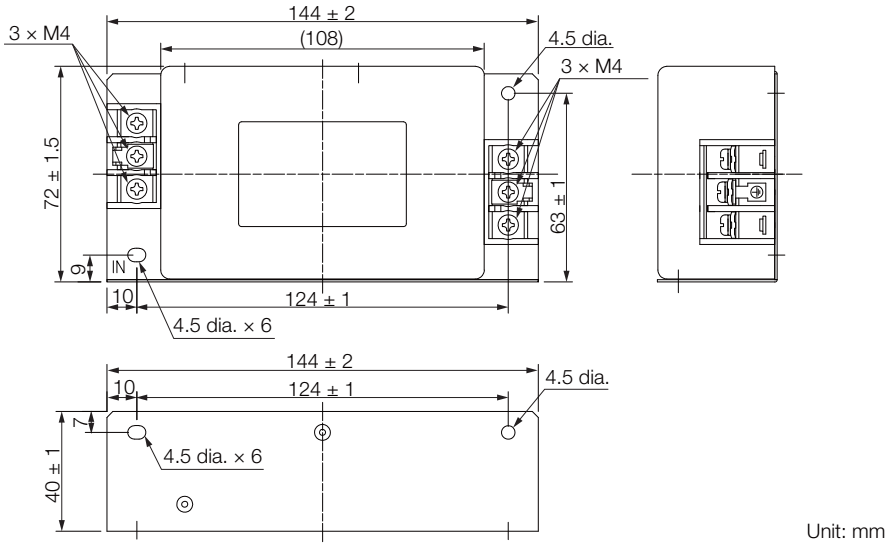
Unit: mm

◆ Model: HF2010A-UPF



Unit: mm

◆ Model: HF2020A-UPF-2BB or HF2030A-UPF-2BB



Unit: mm

10.6 DC Reactors

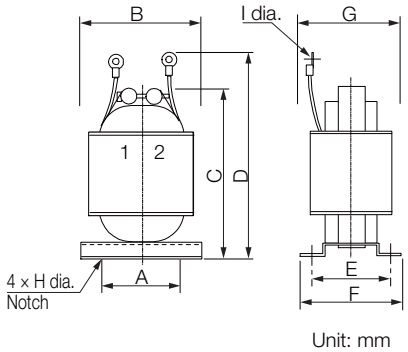
DC Reactors are used when it is necessary to suppress power supply harmonic waves.

Selection Table

Main Circuit Power Supply	SERVOPACK			Order Number*	Inductance [mH]	Rated Current [Arms]	Inquires	Mass	Terminal Screw Size	Wire Size
	Maximum Applicable Motor Capacity [kW]	Model SGD7S-	Model SGD7W-							
Three-phase, 200 VAC	0.05	R70A	–	X5061	2.0	4.8	Yaskawa Controls Co., Ltd.	0.5 kg	M4	AWG16 (1.25 mm^2)
	0.1	R90A	–							
	0.2	1R6A	–							
	0.4	2R8A	1R6A							
	0.5	3R8A	–							
	0.75	5R5A	2R8A							
	1.0	7R6A	–							
	1.5	120A	5R5A	X5060	1.5	8.8		1.0 kg	M4	AWG14 (2.0 mm^2)
	2.0	180A	7R6A							AWG10 (5.5 mm^2)
	3.0	200A	–	X5059	1.0	14.0		1.1 kg	M5	
	5.0	330A	–	X5068	0.47	26.8		1.9 kg	M6	AWG8 (8.0 mm^2)
Single-phase, 200 VAC	0.05	R70A	–	X5071	40.0	0.85		0.5 kg	M4	AWG16 (1.25 mm^2)
	0.1	R90A	–							
	0.2	1R6A	–	X5070	20.0	1.65		0.8 kg	M4	
	0.4	2R8A	1R6A	X5069	10.0	3.3		1.0 kg	M4	
	0.75	5R5A	2R8A	X5079	4.0	5.3		1.2 kg	M4	
	1.5	–	5R5A	X5078	2.5	10.5		2.0 kg	M5	AWG14 (2.0 mm^2)

* The last digit of an RoHS-compliant serial number is R. Consult with Yaskawa Controls Co., Ltd. for RoHS-compliant reactors.

External Dimensions



Unit: mm

DC Reactor Order Number	External Dimensions [mm]									Approx. Mass [kg]
	A	B	C	D	E	F	G	H	I	
X5059	50	74	125	140	35	45	60	5	5.3	1.1
X5060	40	59	105	140	35	45	60	5	5.3	1.1
X5061	35	52	80	95	35	45	50	4	4.3	0.5
X5068	50	74	125	155	53	66	75	5	6.4	1.9
X5069	40	59	105	125	45	60	65	4	4.3	1.0
X5070	40	59	100	120	35	45	50	4	4.3	0.8
X5071	35	52	80	95	30	40	45	4	4.3	0.5
X5078	50	74	125	155	60	70	80	5	5.3	2.0
X5079	50	74	125	140	35	45	60	5	4.3	1.2

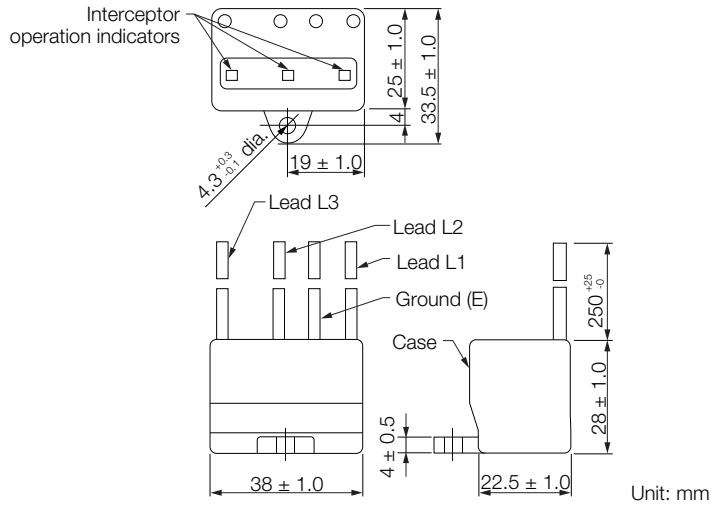
10.7 Surge Absorbers

A Surge Absorber absorbs lightning surge voltages and other abnormal voltages from the power supply input line to prevent faulty operation in or damage to electronic circuits.

Selection Table

Main Circuit Power Supply	SERVOPACK Model: SGD7S-, SGD7W-	Order Number (Recommended Product)	Manufacturer	Inquires
Three-phase, 200 VAC	□□□A	LT-C32G801WS	Soshin Electric Co., Ltd.	Yaskawa Controls Co., Ltd.
Single-phase, 200 VAC		LT-C12G801WS		

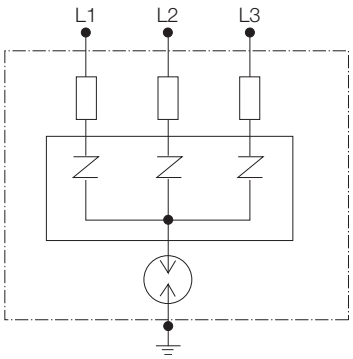
External Dimensions



* The LT-C12G801WS does not have lead L2.

Note: The wire size for all of the leads (L1, L2, and L3) and the ground wire (E) is AWG16 (UL1015).

Internal Cables Connections



10.8 Regenerative Resistor

If the regenerative power exceeds the amount that can be absorbed by charging the smoothing capacitor, a regenerative resistor is used.

10.8.1 Regenerative Power and Regenerative Resistance

The rotational energy of a driven machine such as a Servomotor that is returned to the SERVOPACK is called regenerative power. The regenerative power is absorbed by charging a smoothing capacitor. When the regenerative power exceeds the capacity of the capacitor, it is consumed by a regenerative resistor. (This is called resistance regeneration.)

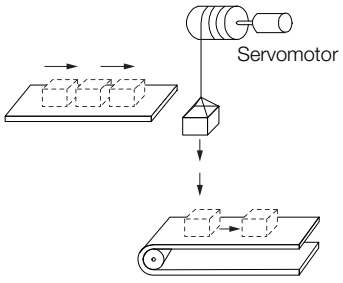
The Servomotor is driven in a regeneration state in the following circumstances:

- While decelerating to a stop during acceleration/deceleration operation.
- While performing continuous downward operation on a vertical axis.
- During continuous operation in which the Servomotor is rotated by the load (i.e., a negative load).

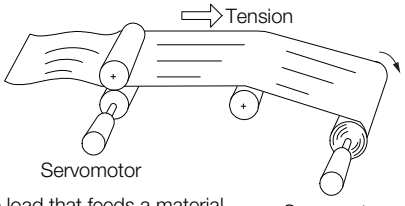
Important

You cannot use the resistance regeneration provided by the SERVOPACK for continuous regeneration. For continuous operation with a negative load, you must design a system that also includes a Power Regenerative Converter or Power Regenerative Unit (for example, Yaskawa model D1000 or R1000). If regenerative power is not appropriately processed, the regenerative energy from the load will exceed the allowable range and damage the SERVOPACK.
Examples of negative loads are shown below.

- Motor Drive to Lower Objects without a Counterweight



- Motor Drive for Feeding



Negative load that feeds a material at a constant speed under tension

10.8.2 Types of Regenerative Resistors

The following regenerative resistors can be used.

- Built-in regenerative resistor: A regenerative resistor that is built into the SERVOPACK. Not all SERVOPACKs have built-in regenerative resistors.
- External Regenerative Resistor: A regenerative resistor that is connected externally to SERVOPACK. These resistors are used when the smoothing capacitor and built-in regenerative resistor in the SERVOPACK cannot consume all of the regenerative power.

Note: If you use an External Regenerative Resistor, you must change the setting of Pn600 (Regenerative Resistor Capacity) and Pn603 (Regenerative Resistance).

10.8.3 Selection Table

SERVOPACK Model		Built-In Regenerative Resistor	External Regenerative Resistor	Description
SGD7S-	SGD7W-			
R70A, R90A, 1R6A, or 2R8A	–	Not provided	Basically not required	There is no built-in regenerative resistor, but normally an External Regenerative Resistor is not required. Install an External Regenerative Resistor when the smoothing capacitor in the SERVOPACK cannot consume all the regenerative power.
3R8A, 5R5A, 7R6A, 120A,180A, 200A, or 330A	1R6A, 2R8A, 5R5A, or 7R6A	Standard feature	Basically not required	A built-in regenerative resistor is provided as a standard feature. Install an External Regenerative Resistor when the built-in regenerative resistor cannot process all of the regenerative power.
470A, 550A, 590A, or 780A	–	Not provided	Required.	A built-in regenerative resistor is not provided. An External Regenerative Resistor is required. If the External Regenerative Resistor is not connected to the SERVOPACK, a Regeneration Alarm (A.300) will occur.

10.8.4 Specifications of Built-in Regenerative Resistors in SERVOPACKs

The following table gives the specifications of the built-in regenerative resistors in the SERVOPACKs and the amount of regenerative power (average values) that they can process.

SERVOPACK Model		Built-In Regenerative Resistor		Regenerative Power Processing Capacity of Built-in Regenerative Resistor [W]	Minimum Allowable Resistance [Ω]
SGD7S-	SGD7W-	Resistance [Ω]	Capacity [W]		
R70A, R90A, 1R6A, or 2R8A	–	–	–	–	40
3R8A, 5R5A, or 7R6A	1R6A or 2R8A	40	40	8	40
120A	–	20	60	10	20
180A or 200A	5R5A or 7R6A	12	60	16	12
330A	–	8	180	36	8
470A	–	(6.25)*1	(880)*1	(180)*1	5.8
550A, 590A, or 780A	–	(3.13)*2	(1760)*2	(350)*2	2.9

*1. Values in parentheses are for the optional JUSP-RA04-E Regenerative Resistor Unit.
*2. Values in parentheses are for the optional JUSP-RA05-E Regenerative Resistor Unit.

10.8.5 Specifications and Dimensions of External Regenerative Resistors

Selection Table

Model	Specification	Mass	Wire Size	Manufacturer	Inquiries
RH120	70 W, 1 Ω to 100 Ω	282 g	AWG16 (1.25 mm^2)	Iwaki Musen Kenkyusho Co., Ltd.	Yaskawa Controls Co., Ltd.
RH150	90 W, 1 Ω to 100 Ω	412 g	AWG16 (1.25 mm^2)		
RH220	120 W, 1 Ω to 100 Ω	500 g	AWG16 (1.25 mm^2)		
RH220B	120 W, 1 Ω to 100 Ω	495 g	AWG14 (2.0 mm^2)		
RH300C	200 W, 1 Ω to 10 kΩ	850 g	AWG14 (2.0 mm^2)		
RH500	300 W, 10 Ω to 30 Ω	1.4 kg	AWG14 (2.0 mm^2)		

Note: 1. Consult Yaskawa Controls Co., Ltd. if you require a RoHS-compliant resistor.
2. Consult your Yaskawa representative for the model numbers and specifications of External Regenerative Resistor with Thermal Protectors.

RH120 (Model) 10 Ω (Resistance) J

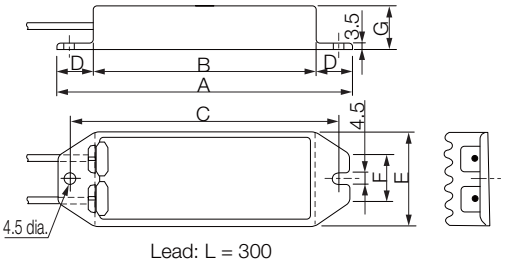
Resistance Tolerance	
Code	Specification
K	±10%
J	±5%
H	±3%

Specification

Item	Specification
Resistance Tolerance	K: ±10%, J: ±5%, H: ±3%
Temperature Resistance Characteristics	At less than 20 Ω: ±400 PPM/°C, At 20 Ω or higher: ±260 PPM/°C
Withstand Voltage	2,000 VAC/1 min, ΔR: ±(0.1% + 0.05 Ω)
Insulation Resistance	500 VDC, 20 MΩ min.
Short-Duration Overload	10 times the rated power applied for 5 s: ΔR: ±(2% + 0.05 Ω)
Service Life	1,000 hours at ratings, 90 min ON, 30 min OFF: ΔR: ±(5% + 0.05 Ω)
Flame Resistance	There must be no ignition when 10 times the rated power is applied for 1 min.
Surrounding Air Temperature Range	-25°C to 150°C

External Dimensions

◆ Model: RH120, RH150, or RH220

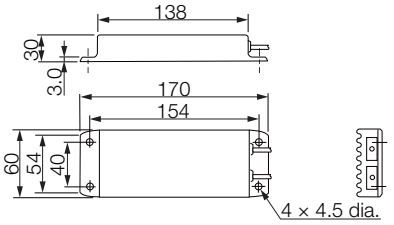


Lead: L = 300

Model	Rated Power	Resistance Range	Wire Size
RH120	70 W	1 Ω to 100 Ω	AWG16 (1.25 mm²)
RH150	90 W		
RH220	120 W		

External Dimensions (Unit: mm)							Mass
A	B	C	D	E	F	G	
182	150	172	16	42	22	20	282 g
212	180	202	16	44	24	30	412 g
230	200	220	15	60	24	20	500 g

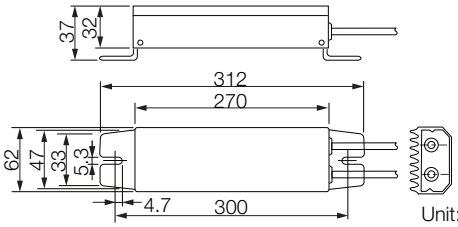
◆ Model: RH220B



Unit: mm

Lead: L = 500
Rated power: 120 W
Resistance range: 1 Ω to 100 Ω
Wire size: AWG14 (2.0 mm²)
Mass: 495 g

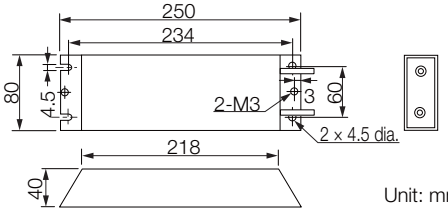
◆ Model: RH300C



Unit: mm

Lead: L = 300
Rated power: 200 W
Resistance range: 1 Ω to 10 kΩ
Wire size: AWG14 (2.0 mm²)
Mass: 850 g

◆ Model: RH500



Unit: mm

Lead: L = 450
Rated power: 300 W
Resistance range: 10 Ω to 30 Ω
Wire size: AWG14 (2.0 mm²)
Mass: 1.4 kg

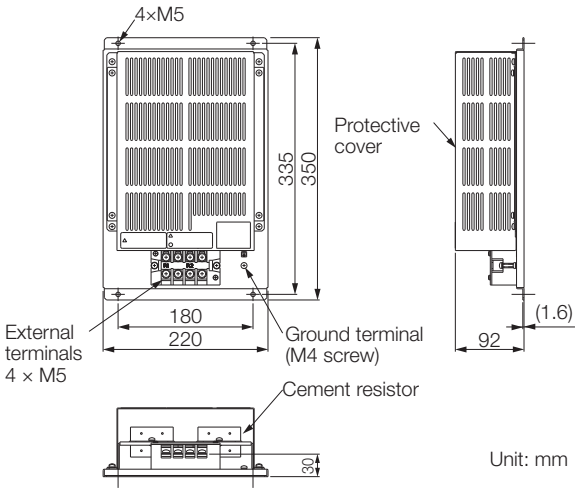
Regenerative Resistor Units

SERVOPACK Model: SGD7S-	Regenerative Resistor Unit Model	Specification	Allowable Power Loss
470A	JUSP-RA04-E	6.25 Ω, 880 W	180 W
550A, 590A, or 780A	JUSP-RA05-E	3.13 Ω, 1760 W	350 W

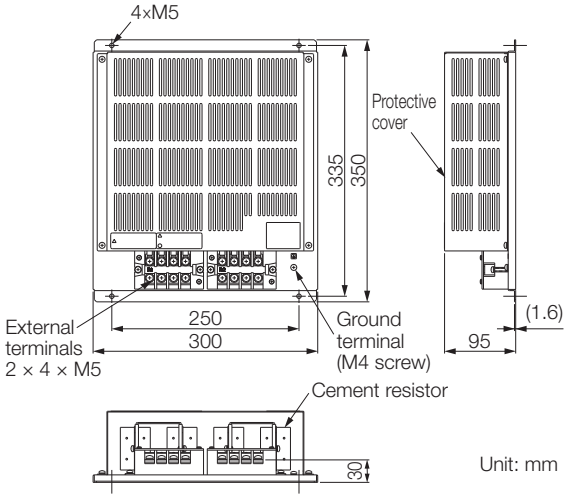
Note: If you use only the above Regenerative Resistor Units, you do not need to change the setting of Pn600 (Regenerative Resistor Capacity) or Pn603 (Regenerative Resistance).

◆ External Dimensions

■ JUSP-RA04-E



■ JUSP-RA05-E



10.8.6 Selecting External Regenerative Resistor

You can use one of two methods to manually calculate whether an External Regenerative Resistor is required. Refer to the following sections.

☞ *Simple Calculation* on page 10-33
☞ *Calculating the Regenerative Energy* on page 10-38

Simple Calculation

When driving a Servomotor with a horizontal shaft, check if an External Regenerative Resistor is required using the following calculation method. The calculation method depends on the model of the SERVOPACK.

◆ SERVOPACK Models SGD7S-R70A, -R90A, -1R6A, and -2R8A

Regenerative resistors are not built into the above SERVOPACKs. The total amount of energy that can be charged in the capacitors is given in the following table.

If the rotational energy (E_S) of the Servomotor and load exceeds the processable regenerative energy, then connect an External Regenerative Resistor.

Applicable SERVOPACK		Processable Regenerative Energy (Joules)	Remarks
SGD7S-	R70A, R90A, 1R6A	24.2	Value when main circuit input voltage is 200 VAC
	2R8A	31.7	

Calculate the rotational energy (E_S) of the servo system with the following equation:

$E_S = J \times (n_M)^2/182$ (Joules)

- $J = J_M + J_L$
- J_M: Servomotor moment of inertia (kg·m^2)
- J_L: Load moment of inertia at motor shaft (kg·m^2)
- n_M: Servomotor operating motor speed (min^{-1})

◆ SERVOPACK Model: SGD7S-3R8A, -5R5A, -7R6A, -120A, -180A, -200A, -330A, -470A, -550A, -590A, or -780A SGD7W-1R6A, -2R8A, -5R5A, or -7R6A

These SERVOPACKs have built-in regenerative resistors. The allowable frequencies for regenerative operation of the Servomotor without a load in acceleration/deceleration operation during an operation cycle from 0 (min^{-1}) to the maximum motor speed and back to 0, are listed in the following table. Convert the data into the values for the actual motor speed and load moment of inertia to determine whether an External Regenerative Resistor is required.

■ Rotary Servomotors

Servomotor Model		Allowable Frequencies in Regenerative Operation (Rotations/Min)	
		SERVOPACK Model: SGD7S	SERVOPACK Model: SGD7W (Simultaneous Operation of Two Axes)
SGM7J-	A5A	–	300
	01A	–	180
	C2A	–	130
	02A	–	46
	04A	–	25
	06A	30	30
	08A	15	15
SGM7A-	A5A	–	560
	01A	–	360
	C2A	–	260
	02A	–	87
	04A	–	56
	06A	77	77
	08A	31	31
	10A	31	–
	15A	15	–
	20A	19	–
	25A	15	–
	30A	6.9	–
	40A	11	–
	50A	8.8	–
	70A	86	–

Servomotor Model		Allowable Frequencies in Regenerative Operation (Rotations/Min)	
		SERVOPACK Model: SGD7S	SERVOPACK Model: SGD7W (Simultaneous Operation of Two Axes)
SGM7P-	01A	–	200
	02A	–	46
	04A	–	29
	08A	11	11
	15A	7.5	–
SGM7G-	03A	39	39
	05A	29	29
	09A	6.9	6.9
	13A	6.1	–
	20A	7.4	–
	30A	9.5	–
	44A	6.4	–
	55A	24	–
	75A	34	–
	1AA	39	–
	1EA	31	–

■ Direct Drive Servomotors

Servomotor Model		Allowable Frequencies in Regenerative Operation (Rotations/Min)	
		SERVOPACK Model: SGD7S	SERVOPACK Model: SGD7W (Simultaneous Operation of Two Axes)
SGMCS-	02B	–	62
	05B	–	34
	07B	–	22
	04C	–	22
	08D	–	6.1
	10C	–	19
	14C	–	22
	17D	–	7
	25D	–	9.3
	16E	3.7	3.7
	35E	9.7	9.7
	45M	25	25
	80M	19	–
	80N	8.9	–
	1AM	22	–
	1EN	11	–
	2ZN	9.1	–

Servomotor Model		Allowable Frequencies in Regenerative Operation (Rotations/Min)	
		SERVOPACK Model: SGD7S	SERVOPACK Model: SGD7W (Simultaneous Operation of Two Axes)
SGMCV-	04B	–	75
	08C	–	21
	10B	–	48
	14B	65	65
	17C	30	30
	25C	31	31

■ Linear Servomotors

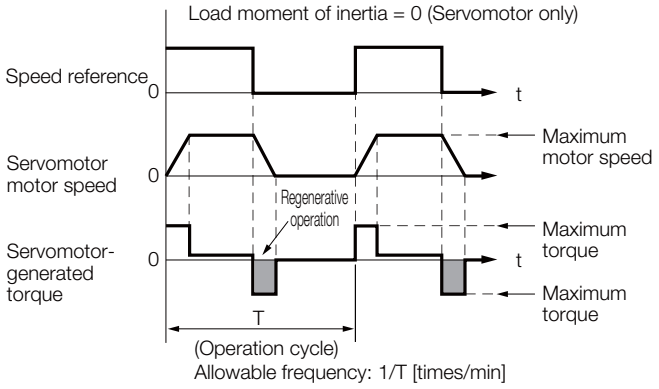
Servomotor Model		Allowable Frequencies in Regenerative Operation (Rotations/Min)	
		SERVOPACK Model: SGD7S	SERVOPACK Model: SGD7W (Simultaneous Operation of Two Axes)
SGLGW- Using a Standard-Force Magnetic Way	30A050C	–	190
	30A080C	–	120
	40A140C	–	56
	40A253C	–	32
	40A365C	–	22
	60A140C	–	49
	60A253C	–	27
	60A365C	37	37
	90A200C	34	–
	90A370C	33	–
	90A535C	24	–
SGLGW- Using a High-Force Magnetic Way	40A140C	–	80
	40A253C	–	45
	40A365C	62	62
	60A140C	–	64
	60A253C	71	71
	60A365C	49	49
SGLFW-	20A090A	–	27
	20A120A	–	21
	35A120A	–	14
	35A230A	16	16
	50A200B	10	10
	50A380B	6.9	–
	1ZA200B	7.8	–
	1ZA380B	6.6	–

Servomotor Model		Allowable Frequencies in Regenerative Operation (Rotations/Min)	
		SERVOPACK Model: SGD7S	SERVOPACK Model: SGD7W (Simultaneous Operation of Two Axes)
SGLFW2-	30A070A	–	38
	30A120A	–	21
	30A230A	22	11
	45A200A	16	16
	45A380A	10*1	–
		17*2	–
	90A200A	14	–
	90A380A	11	–
	90A560A	18	–
	1DA380A	21	–
	1DA560A	32	–
SGLTW-	20A170A	15	15
	20A320A	8.3	8.3
	20A460A	7.1	–
	35A170A	10	10
	35A170H	8.5	8.5
	35A320A	7	–
	35A320H	5.9	–
	35A460A	7.6	–
	40A400B	13	–
	40A600B	19	–
	50A170H	15	15
	50A320H	11	–
	80A400B	28	–
	80A600B	180	–

*1. This value is in combination with the SGD7S-120A.
*2. This value is in combination with the SGD7S-180A.

■ Cylinder-type Servomotors

Servomotor Model		Allowable Frequencies in Regenerative Operation (Rotations/Min)	
		SERVOPACK Model: SGD7S	SERVOPACK Model: SGD7W (Simultaneous Operation of Two Axes)
SGLC-	D16A085A	–	100
	D16A115A	–	75
	D16A145A	–	60
	D20A100A	–	50
	D20A135A	–	37
	D20A170A	–	30
	D25A125A	–	30
	D25A170A	–	21
	D25A215A	33	33
	D32A165A	–	16
	D32A225A	24	24
	D32A285A	18	18



Operating Conditions for Calculating the Allowable Regenerative Frequency

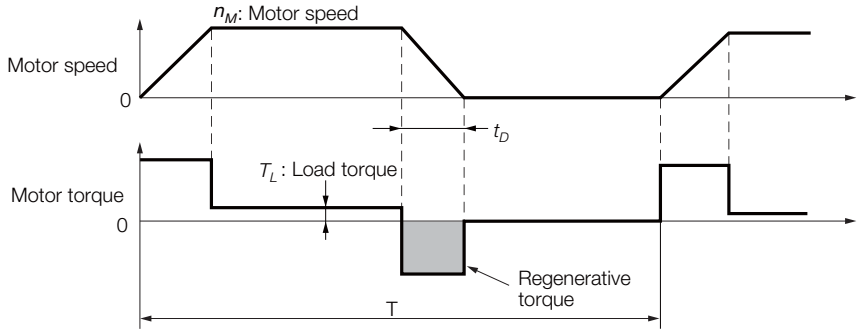
Use the following equation to calculate the allowable frequency for regenerative operation.

$$\text{Allowable frequency} = \frac{\text{Allowable frequency for regenerative operation for Servomotor without load}}{(1+n)} \times \left(\frac{\text{Maximum motor speed}}{\text{Operating motor speed}}\right)^2 \text{(time/min)}$$

- $n = J_L/J_M$
- J_M: Servomotor moment of inertia (kg·m^2)
- J_L: Load moment of inertia at motor shaft (kg·m^2)

Calculating the Regenerative Energy

This section shows how to calculate the regenerative resistor capacity for the acceleration/deceleration operation shown in the following figure.



- Calculation Procedure for Regenerative Resistor Capacity

Step	Item	Symbol	Formula
1	Calculate the rotational energy of the Servomotor.	E_S	$E_S = Jn_M^2/182$
2	Calculate the energy consumed by load loss during the deceleration period	E_L	$E_L = (\pi/60)\, n_M T_L t_D$ Note: If the load loss is unknown, calculate the value with E_L set to 0.
3	Calculate the energy lost from Servomotor winding resistance.	E_M	(Value calculated from the graphs in ◆ *Servomotor Winding Resistance Loss* on page 10-40) × t_D
4	Calculate the energy that can be absorbed by the SERVOPACK.	E_C	Calculate from the graphs in ◆ *SERVOPACK-absorbable Energy* on page 10-39
5	Calculate the energy consumed by the regenerative resistor.	E_K	$E_K = E_S - (E_L + E_M + E_C)$ $E_K = E_S - (E_L + E_M + E_C) + E_G$* Note: Use this formula if there will be continuous periods of regenerative operation, such as for a vertical axis.
6	Calculate the required regenerative resistor capacity (W).	W_K	$W_K = E_K/(0.2 \times T)$

* E_G (joules): Energy for continuous period of regenerative operation
$E_G = (2\pi/60)\, n_{MG} T_G t_G$
  - T_G : Servomotor's generated torque in continuous period of regenerative operation (N·m)
  - n_{MG} : Servomotor's motor speed for same operation period as above (min^{-1})
  - t_G : Same operation period as above (s)

Note: 1. The 0.2 in the equation for calculating W_K is the value when the regenerative resistor's utilized load ratio is 20%.
2. The units for the various symbols are given in the following table.

Symbol	Description
E_S to E_K	Energy in joules (J)
W_K	Required regenerative resistor capacity (W)
J	= $J_M + J_L$ ($kg·m^2$)
n_M	Servomotor motor speed (min^{-1})

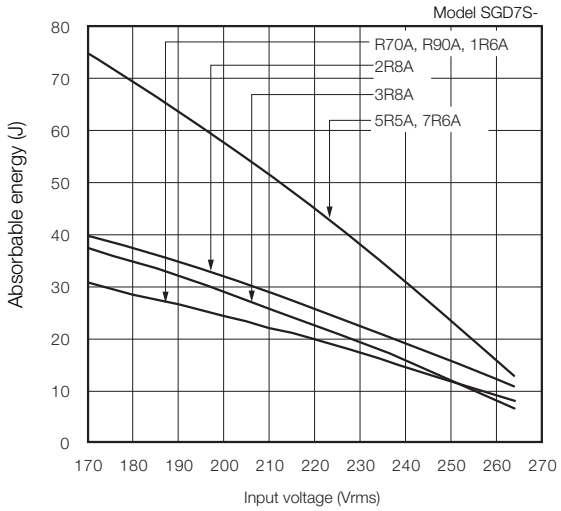
Symbol	Description
T_L	Load torque (N·m)
t_D	Deceleration stopping time (s)
T	Servomotor repeat operation cycle (s)

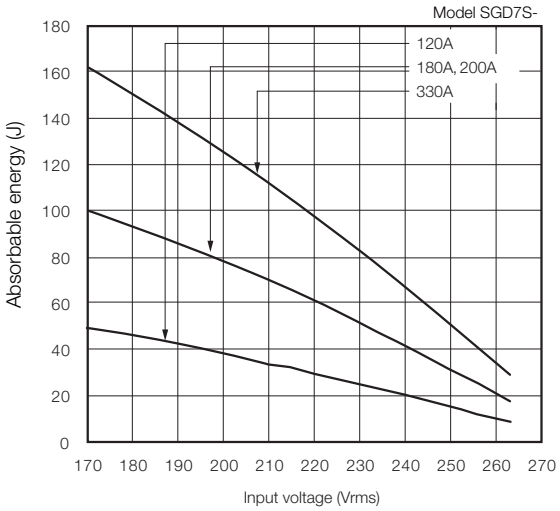
If the value of W_K does not exceed the capacity of the built-in regenerative resistor of the SERVOPACK, an External Regenerative Resistor is not required. For details on the built-in regenerative resisters, refer to the SERVOPACK specifications. If the value of W_K exceeds the capacity of the built-in regenerative resistor, install an External Regenerative Resistor with a capacity equal to the value for W calculated above.

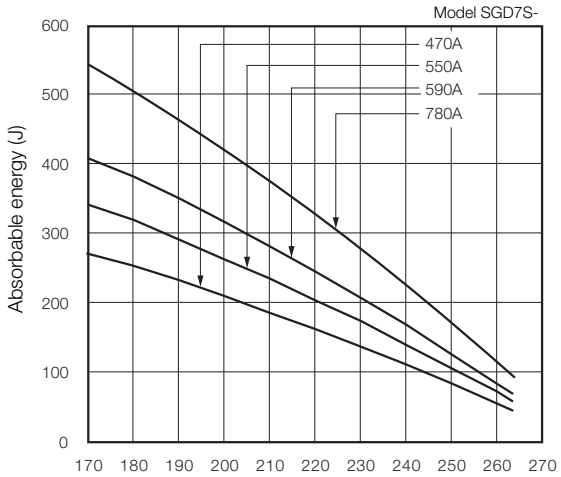
◆ SERVOPACK-absorbable Energy

The following figures show the relationship between the SERVOPACK's input power supply voltage and its absorbable energy.

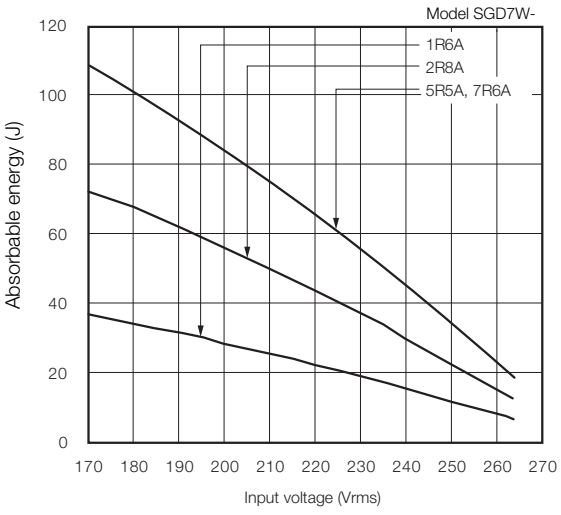
■ Σ-7S SERVOPACKs







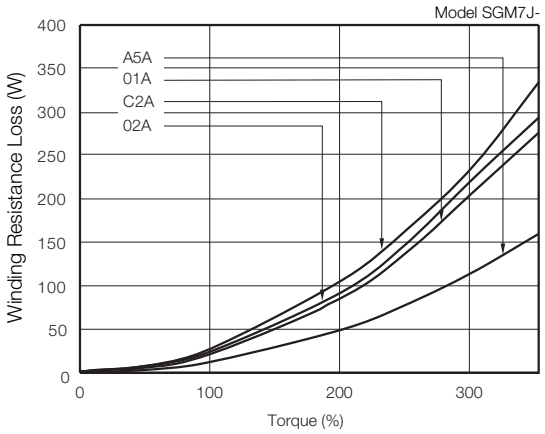
■ Σ-7W SERVOPACKs

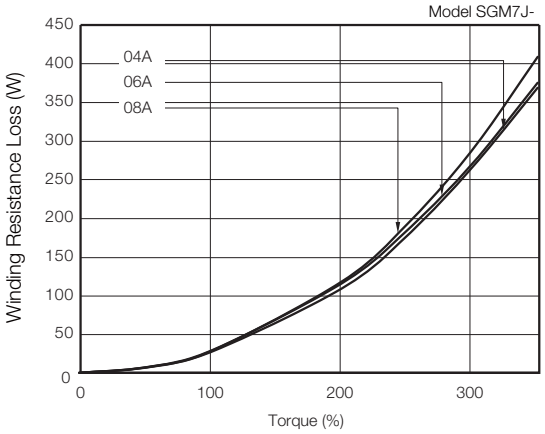


◆ Servomotor Winding Resistance Loss

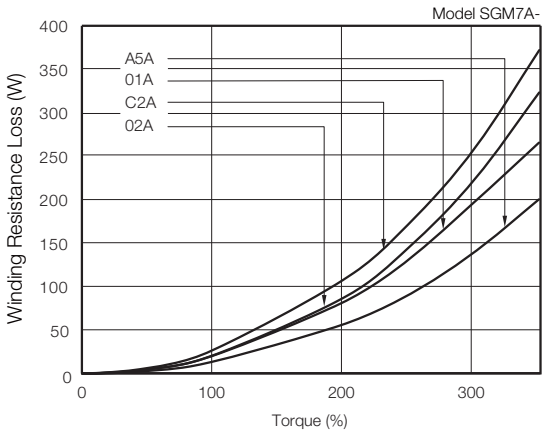
The following figures show the relationship for each Servomotor between the Servomotor's generated torque and the winding resistance loss.

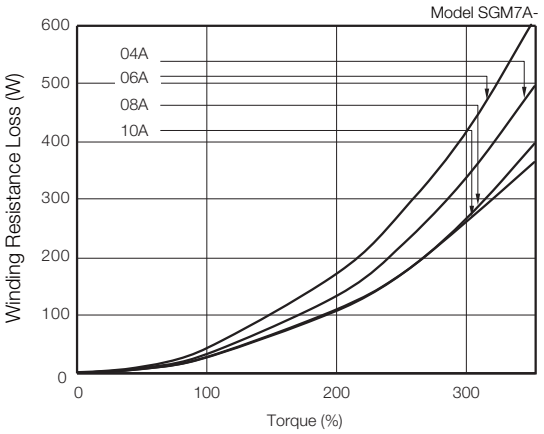
■ SGM7J Rotary Servomotors

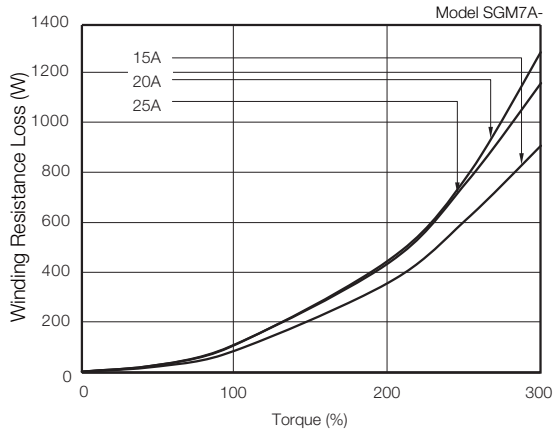


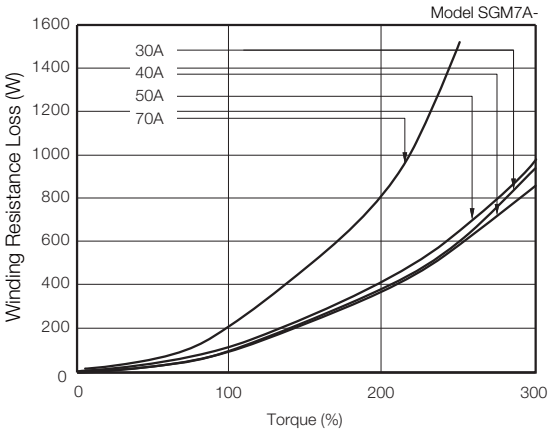


■ SGM7A Rotary Servomotors

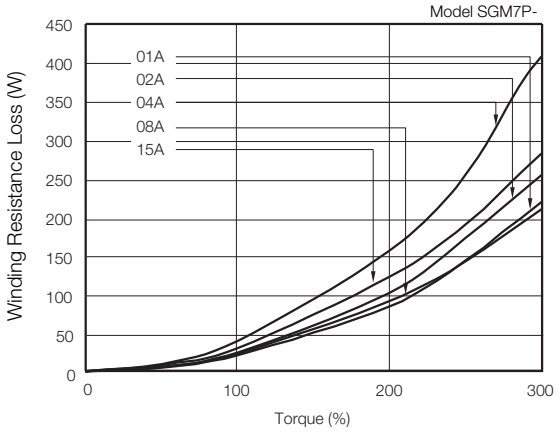




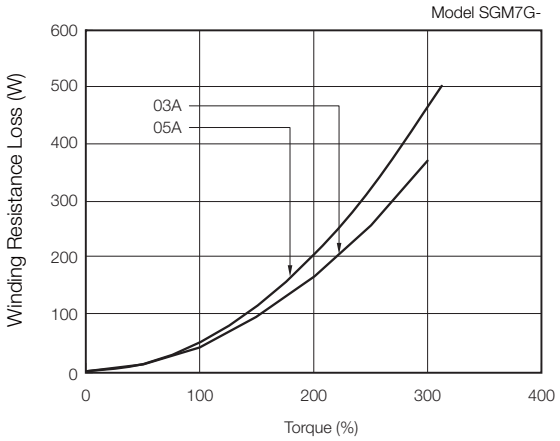


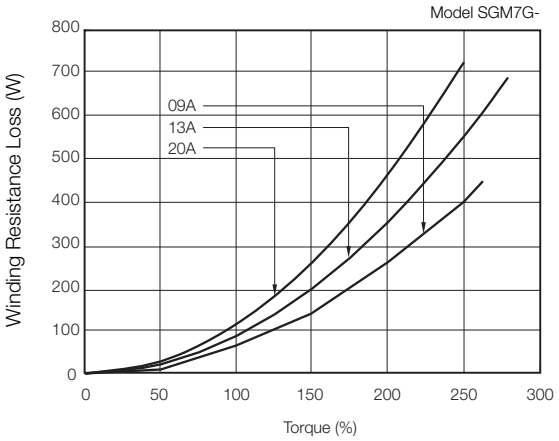


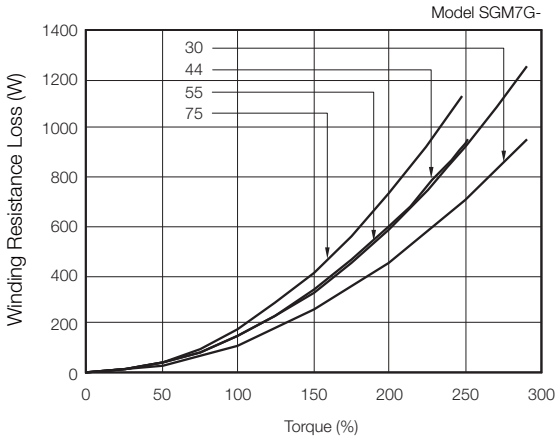
■ SGM7P Rotary Servomotors

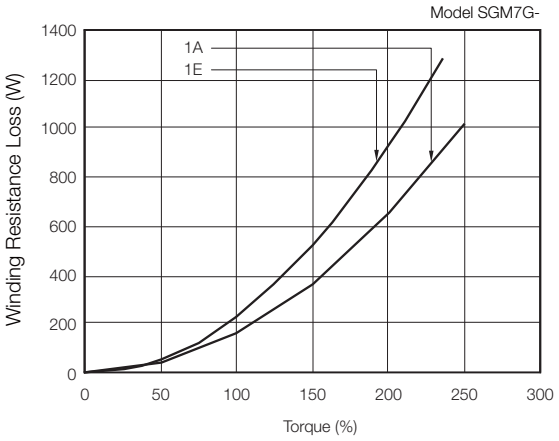


■ SGM7G Rotary Servomotors

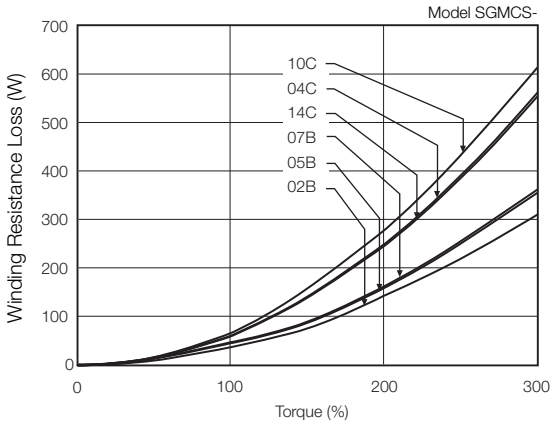


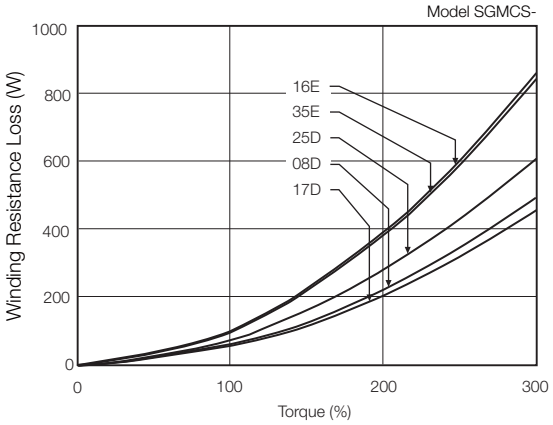


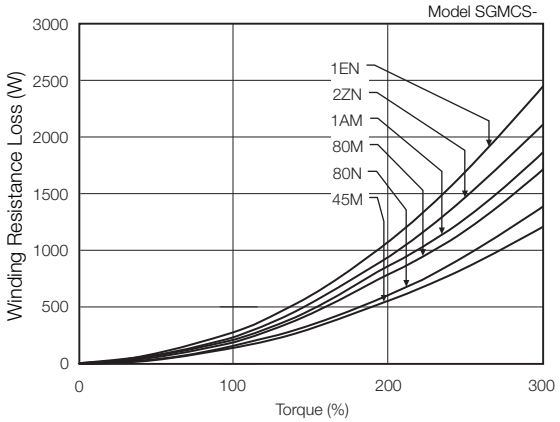




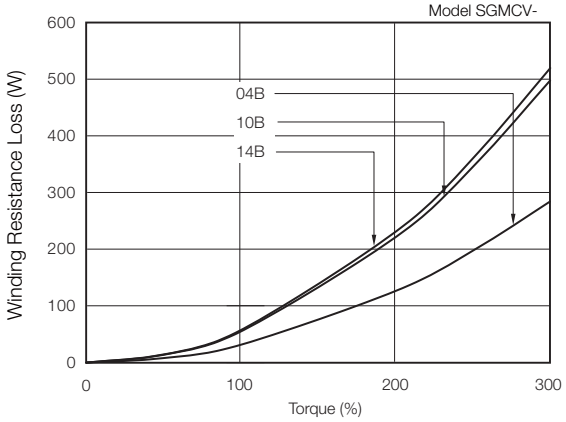
■ SGMCS Direct Drive Servomotors

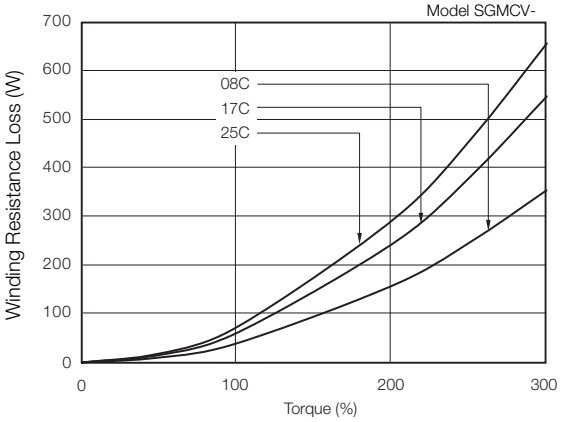




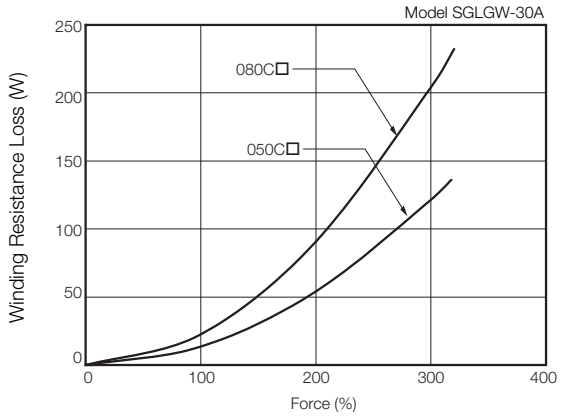


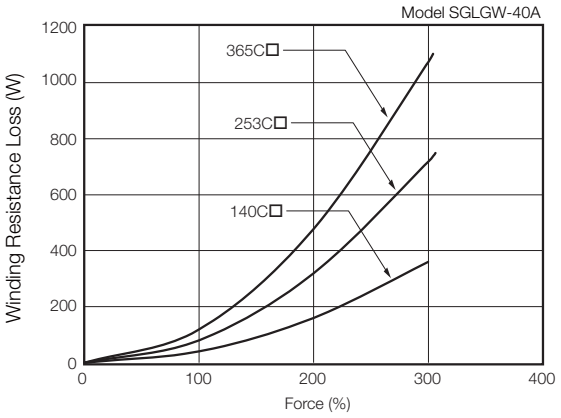
■ SGMCV Direct Drive Servomotors

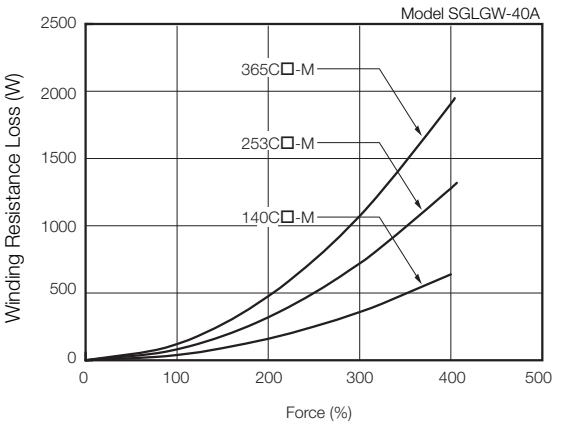


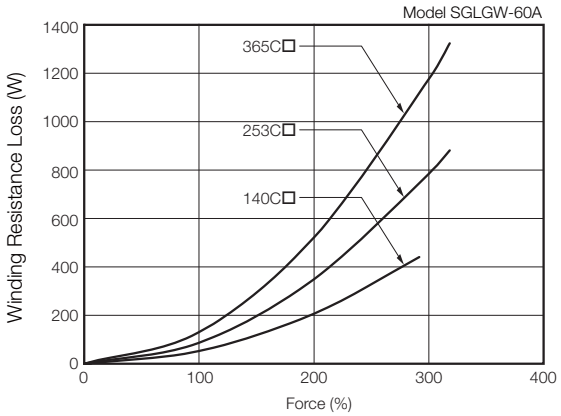


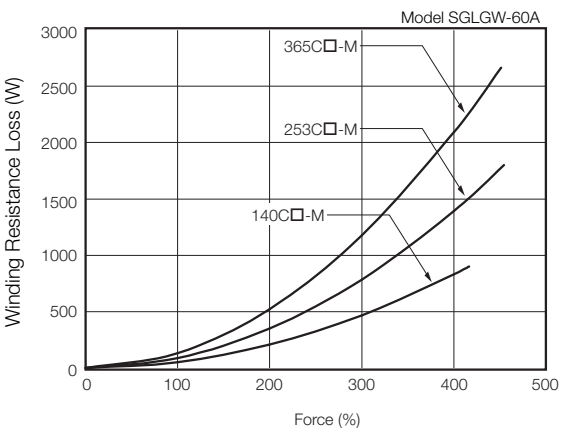
■ SGLGW Linear Servomotors

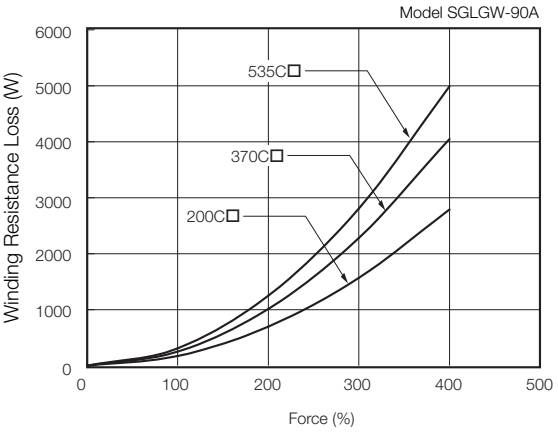




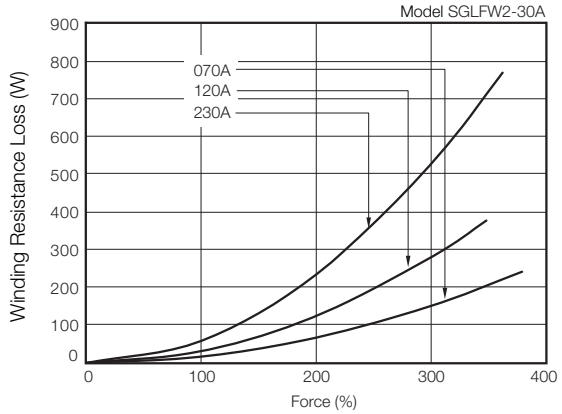


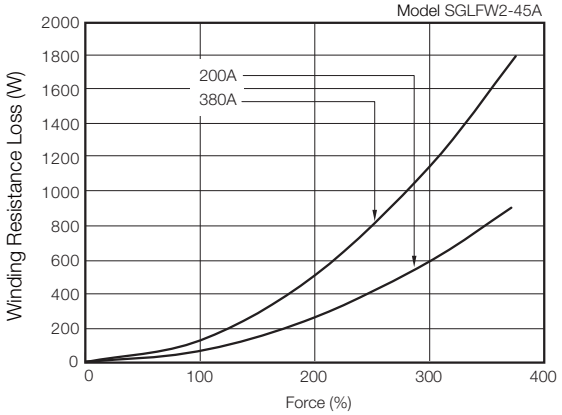


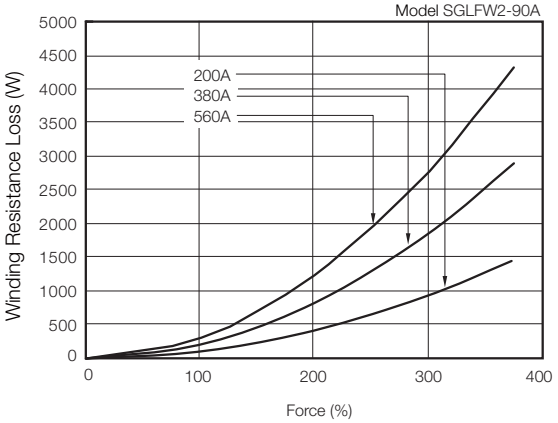


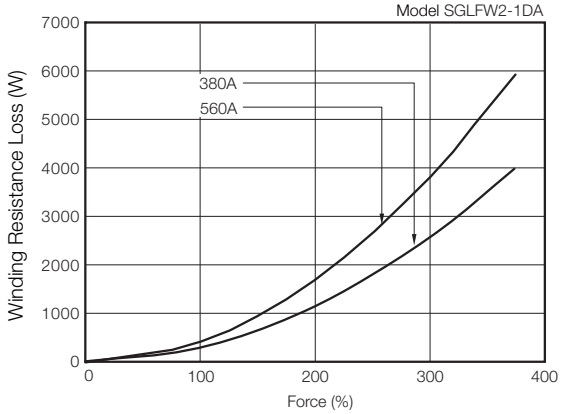


■ SGLFW2 Linear Servomotors

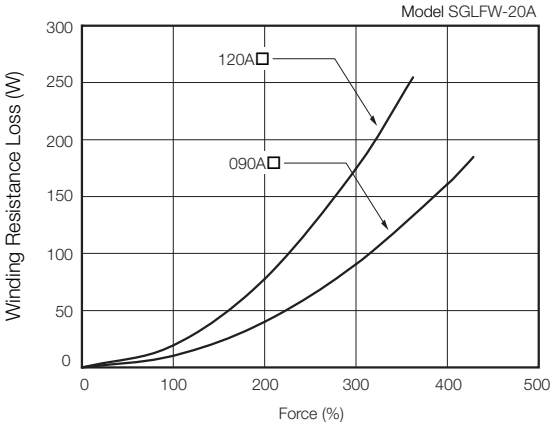


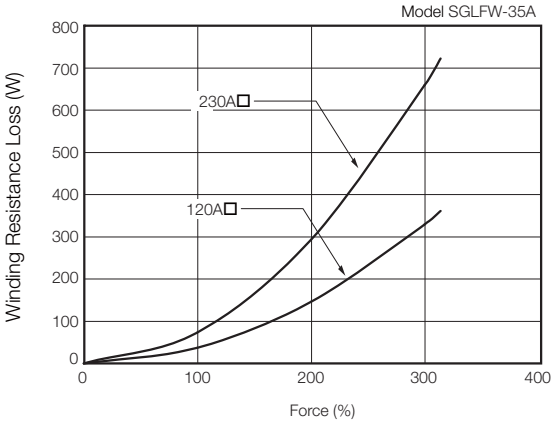


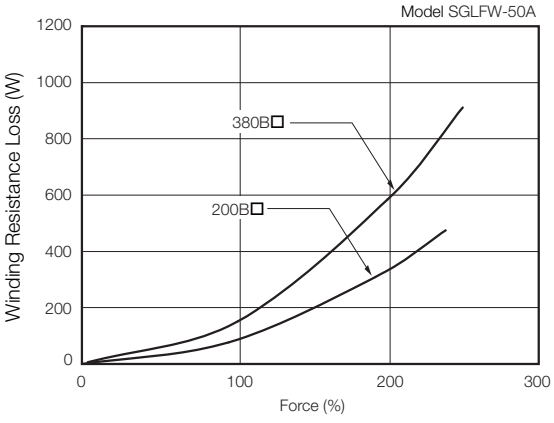


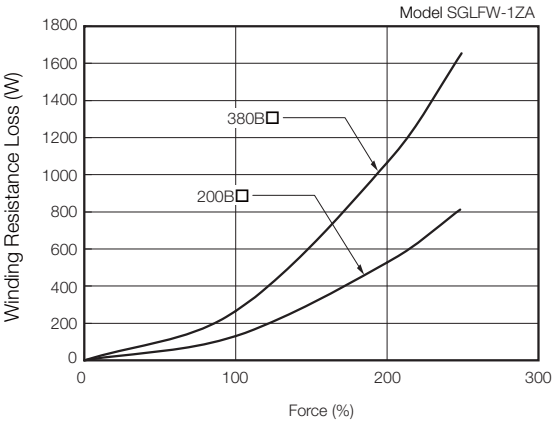


■ SGLFW Linear Servomotors

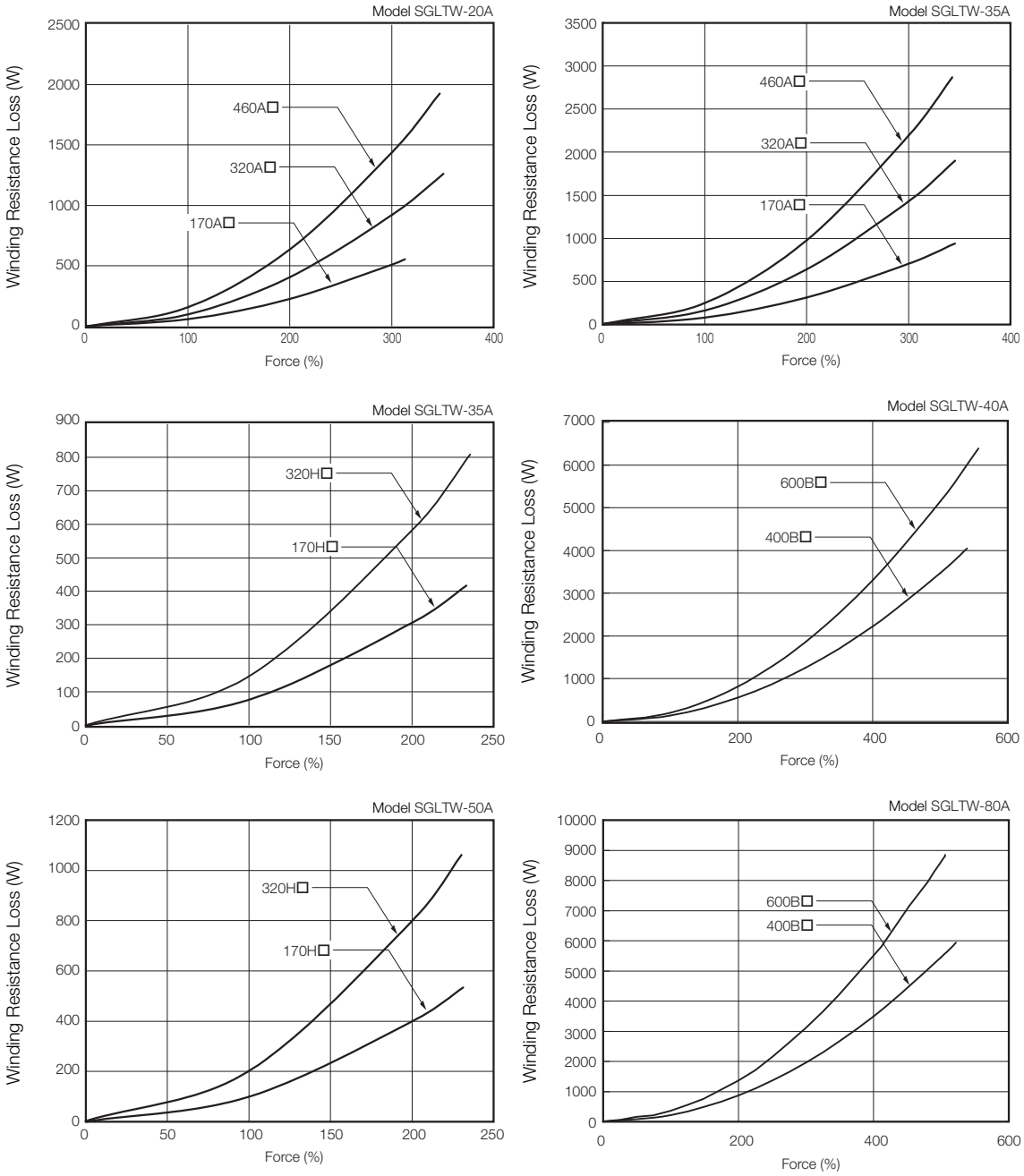




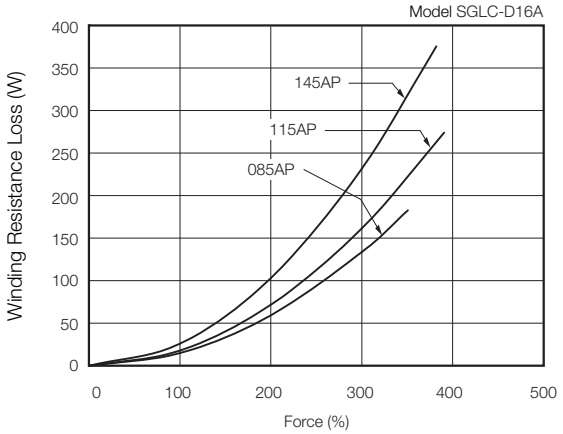


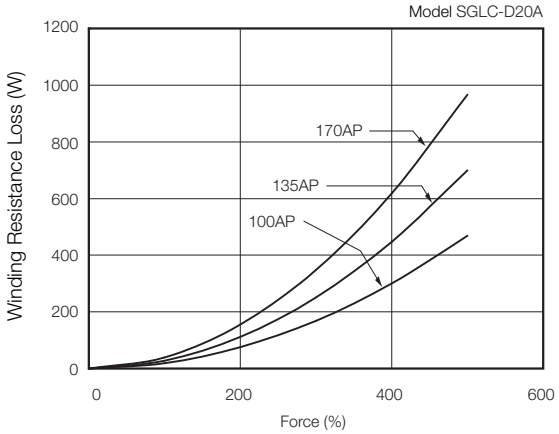


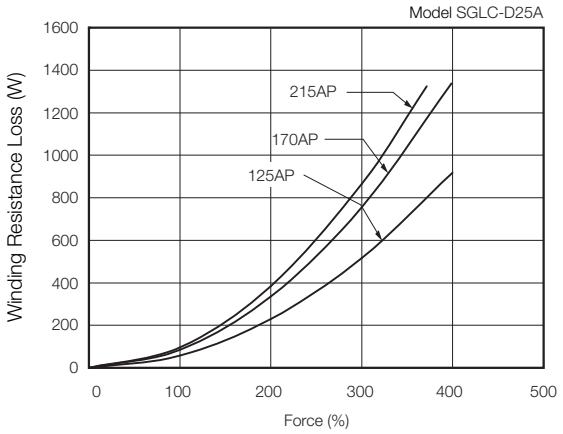
■ SGLTW Linear Servomotors

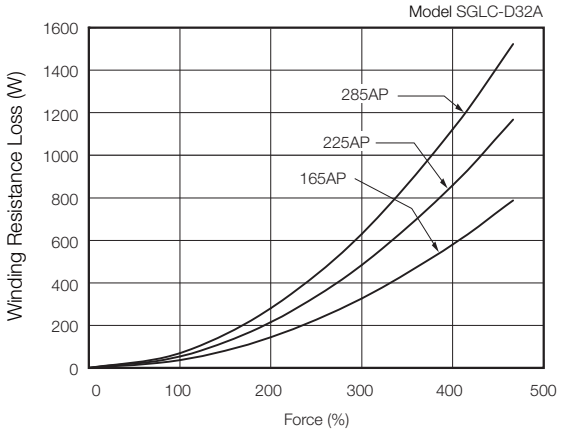


■ SGLC Linear Servomotors









10.9 Inrush Current Suppression Devices

Inrush current suppression devices prevent equipment from being damaged by inrush current.

They are used only when using a SERVOPACK of 5 kW or higher (SGD7S-330A, -470A, -550A, -590A, or -780A) with a DC power supply input.

Selection Table

◆ External Inrush Current Suppression Resistors

Main Circuit Power Supply	SERVOPACK Model: SGD7S-	External Inrush Current Suppression Resistor			Manufacturer	Inquiries
		Order Number	Resistance [Ω]	Rated Power [W]		
270 VDC	330A	RH120-5ΩJ	5	70	Iwaki Musen Kenkyusho Co., Ltd.	Yaskawa Controls Co.,Ltd.
	470A					
	550A					
	590A	RH120-3ΩJ	3			
	780A					

◆ Inrush Current Suppression Resistor Short Relays

Main Circuit Power Supply	SERVOPACK Model: SGD7S-	Main Circuit DC Current [Arms]	Contact Specification	Recommended Inrush Current Suppression Resistor Short Relay			Manufacturer
				Model	Voltage Rating [Vdc]	Current Rating [A]	
270 VDC	330A	34	NO	G9EA-1-B	400	60	OMRON Corporation
	470A	36					
	550A	48		G9EA-1-B-CA		100	
	590A	68		G9EA-1-B-CA*1 G9EC-1-B*2		200	
	780A	92					

*1. Connect two Relays in parallel. Also, maintain the same resistance between the DC power supply and SERVOPACK for the wiring for each Relay.

*2. This Relay is applicable only when the temperature of the Relay installation environment is 50°C or less.

Software

11

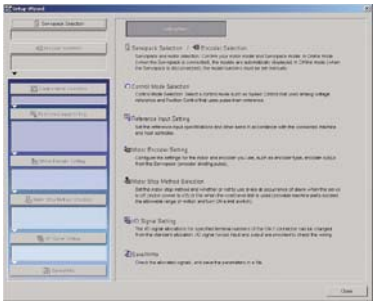
11.1 SigmaWin+: AC Servo Drive Engineering Tool

The SigmaWin+ Engineering Tool is used to set up and optimally tune Yaskawa Σ-series Servo Drives.

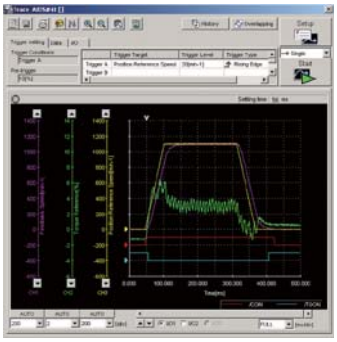
Features

- Sets parameters with a wizard.
- Displays SERVOPACK data on a computer just like on a oscilloscope.
- Estimates moments of inertia and measure vibration frequencies.
- Displays alarms and provides alarm diagnostics.

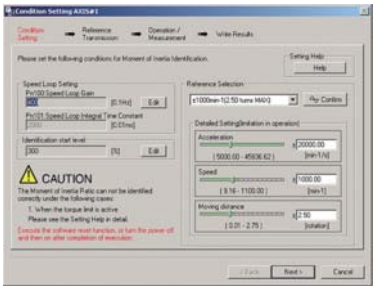
Setting Parameters with a Wizard



Displaying SERVOPACK Data on a Computer Just Like on an Oscilloscope.



Estimating Moments of Inertia and Measuring Vibration Frequencies



Displaying Alarms and Alarm Diagnostics

System Requirements

Item	System Requirement
Supported Languages	English and Japanese
OS	Windows XP, Windows Vista, or Windows 7 (32-bit or 64-bit edition)
CPU	Pentium 200 MHz min.
Memory	64 MB min. (96 MB or greater recommended)
Available Hard Disk Space	For Standard Setup: 350 MB min. (400 MB or greater recommended for installation)

Other Peripheral Devices and Options

12

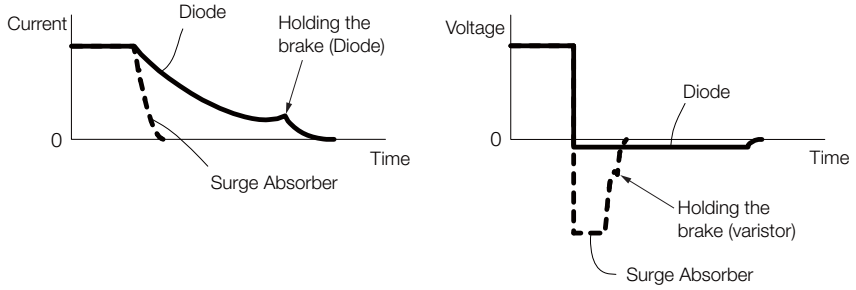
12.1 Surge Absorbers (Varistors) and Diodes for Holding Brake Power Supplies

Surge Absorbers (varistors) and Diodes for holding brake power supplies help prevent damage to brake coils caused by voltage surges.

If you use a Servomotor with a Holding Brake and switch the brake power supply circuit on the DC side, connect a Surge Absorber (varistor) or Diode that is suitable for the brake power supply voltage and current.

Note

- When you select a Surge Absorber, varistor, or Diode for your application, consider the service life and test all operations, including the brake timing, before you use the Servomotor.
- If you connect an SSR (i.e., a semiconductor relay) to switch the brake circuit, use a Diode.
- If you connect a Diode, more time is required to brake than with a Surge Absorber. (Refer to the following figure.) If you use a diode, consider this in the application.



Surge Absorbers (Varistors) for Holding Brake Power Supplies

Use the following table as reference in selecting a Surge Absorber. Elements were selected for a Surge Absorber surrounding air temperature range of -20°C to 60°C and an ON/OFF switching frequency of 10 times or less per minute. The information in this table is for reference only, and does not ensure operation in combination with the holding brake.

Holding Brake Power Supply Voltage		24 VDC	
Manufacturer		Nippon Chemi-Con Corporation	Semitec Corporation
		Order Number	
Brake Rated Current	1 A max.	TNR5V121K	Z5D121
	2 A max.	TNR7V121K	Z7D121
	4 A max.	TNR10V121K	Z10D121
	8 A max.	TNR14V121K	Z15D121

Diodes for Holding Brake Power Supplies

Select a Diode for the holding brake power supply with a rated current that is greater than that of the holding brake and with the recommended withstand voltage given in the following table.

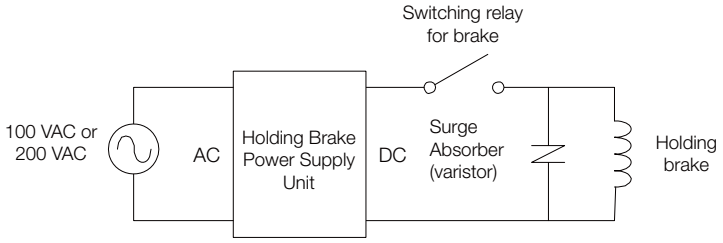
Diodes are not provided by Yaskawa.

Holding Brake Power Supply Unit Specifications		Withstand Voltage
Rated Output Voltage	Input Voltage	
24 VDC	200 V	100 V to 200 V

Circuit Diagrams

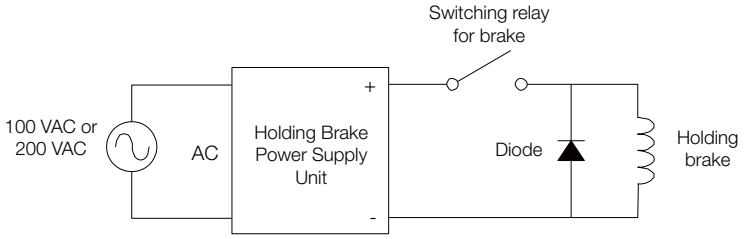
◆ Circuit for a Surge Absorber (Varistor)

A Surge Absorber (varistor) has no polarity.



◆ Circuit for a Diode

A Diode has polarity. Refer to the following figure for connections.



Note

Holding Brake Power Supply Units are not provided by Yaskawa.

12.2 Batteries for Servomotors with Absolute Encoders

If you use an absolute encoder, you can use an Encoder Cable with a Battery Case connected to it to supply power and retain the absolute position data.

You can also retain the absolute position data by supplying power from a battery on the host controller.

The Battery Case is sold as a replacement part for the Battery Case that is included with an Absolute Encoder Cable.

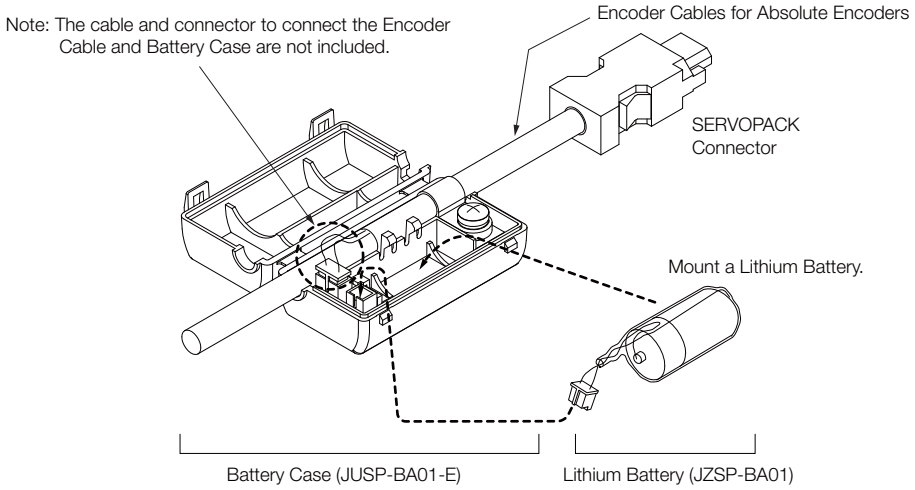
12.2.1 Batteries for Encoder Cables

◆ Selection Table

Name	Order Number	Remarks
Battery Case (case only)	JUSP-BA01-E	The Encoder Cable and Battery are not included. (This is a replacement part for a damaged Battery Case.)
Lithium Battery	JZSP-BA01	This is a special battery that is mounted into the Battery Case.

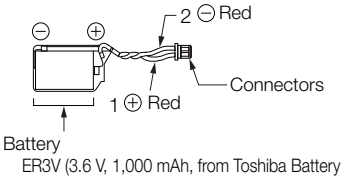
Important

1. You cannot attach the Battery Case to an Incremental Encoder Cable.
2. Install the Battery Case where the surrounding air temperature is between -5°C and 60°C.



◆ Mounting a Battery in the Battery Case

Obtain a Lithium Battery (JZSP-BA01) and mount it in the Battery Case.

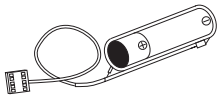


ER3V (3.6 V, 1,000 mAh, from Toshiba Battery Co., Ltd.)

12.2.2 Batteries for Host Controllers

Use a battery that meets the specifications of the host controller.

Use the recommended Battery given in the following table or the equivalent.



◆ Selection Table

Order Number	Specification	Manufacturer	Inquires
ER6VC3N	3.6 V, 2,000 mAh	Toshiba Battery Co., Ltd.	Yaskawa Controls Co., Ltd.

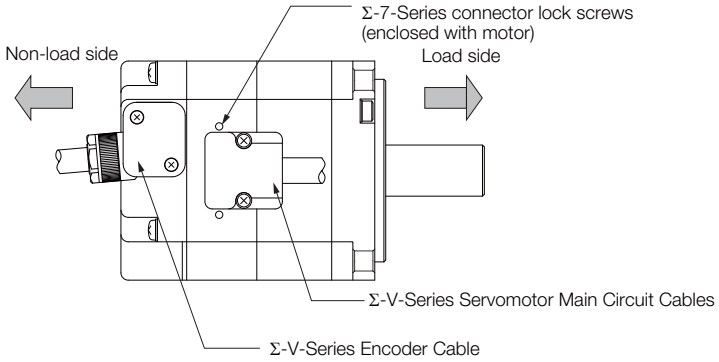
12.3 Precautions for Connecting a Σ-V-Series Cable to a Σ-7-Series Servomotor

If you already have Σ-V-Series Servomotor Main Circuit Cables or Encoder Cables, you can use them with SGM7J or SGM7A-A5 to SGM7A-10 Servomotors. Before you do, read this section for information on cable connection conditions and the shapes of the cables that can be connected.

12.3.1 Restrictions in Using Σ-V-Series Cables

The protective structure will be IP65 if you connect Σ-V-Series Cables (Servomotor Main Circuit Cables or Encoder Cables) to Σ-7-Series Servomotors.

The connector lock screws on the Servomotor Main Circuit Cable that is enclosed with the Servomotor will be exposed, but the protective structure will be maintained.

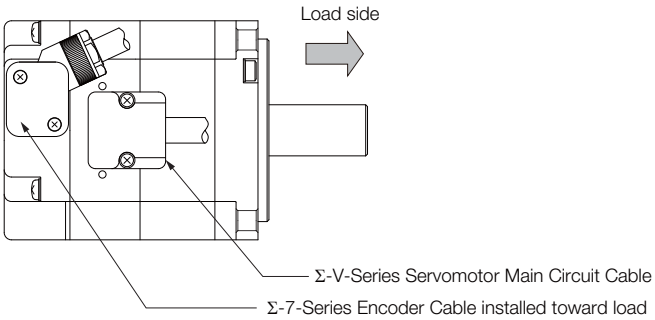


12.3.2 Precautions When the Encoder Cable Is Installed toward the Load Side

You cannot install a Σ-V-Series Encoder Cable toward the load side.

If you need to install the Cables as shown in the following figure, use a Σ-7-Series JZSPC7P□□D-□□-E Encoder Cable (cable installed toward the load).

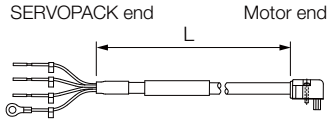
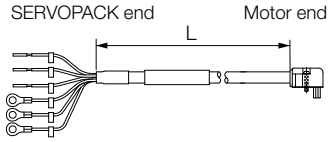
Note: For information on Encoder Cables for SGM7J Servomotors, refer to *2.4 Encoder Cables of 20 m or Less* on page 2-10. For information on Encoder Cables for SGM7A Servomotors, refer to *3.4 Encoder Cables of 20 m or Less* on page 3-20.



12.3.3 Cables That Connect to Σ-7-Series Servomotors

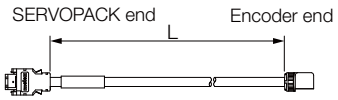
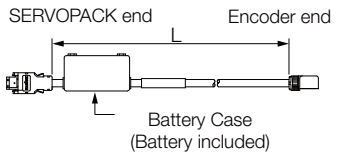
The following tables list the Cables that you can connect to Σ-7-Series SGM7J and SGM7A Servomotors.

Servomotor Main Circuit Cables

Name	Servomotor Model	Order Number*		Appearance
		Standard Cable	Flexible Cable	
For Servomotors without Holding Brakes	SGM7J-A5 to -C2 SGM7A-A5 to -C2 50 W to 150 W	JZSP-CSM01-□□-E	JZSP-CSM21-□□-E	
	SGM7J-02 to -06 SGM7A-02 to -06 200 W to 600 W	JZSP-CSM02-□□-E	JZSP-CSM22-□□-E	
	SGM7J-08 750 W SGM7A-08 or -10 750 W or 1.0 kW	JZSP-CSM03-□□-E	JZSP-CSM23-□□-E	
For Servomotors with Holding Brakes	SGM7J-A5 to -C2 SGM7A-A5 to -C2 50 W to 150 W	JZSP-CSM11-□□-E	JZSP-CSM31-□□-E	
	SGM7J-02 to -06 SGM7A-02 to -06 200 W to 600 W	JZSP-CSM12-□□-E	JZSP-CSM32-□□-E	
	SGM7J-08 750 W SGM7A-08 or -10 750 W or 1.0 kW	JZSP-CSM13-□□-E	JZSP-CSM33-□□-E	

* Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, 20, 30, 40, or 50).

Encoder Cables

Name	Servomotor Model	Order Number*		Appearance
		Standard Cable	Flexible Cable	
Encoder Cables for Incremental Encoders	SGM7J (all models) SGM7A (SGM7A-A5 to -10)	JZSP-CSP01-□□-E	JZSP-CSP21-□□-E	
Encoder Cables for Absolute Encoders		JZSP-CSP05-□□-E	JZSP-CSP25-□□-E	

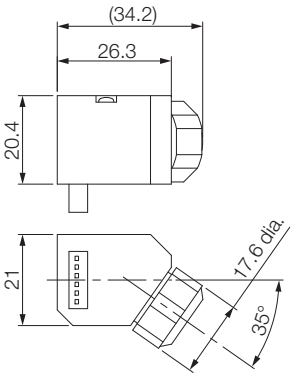
* Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).

12.4 Optional Metal Connectors for Servomotor Main Circuit Cables

Servomotor Main Circuit Connectors with aluminum housings are available as options. You can use them for SGM7J and SGM7A Servomotors. If you use shielded cables with main circuit connectors that have aluminum housings, you can shield the cable and connector housing.

Note: 1. The connectors have an IP65 protective structure.
2. The cable installation direction is toward the load. Metal connectors are not available for connecting the cable toward the non-load side.
3. The Metal Connectors are not available from Yaskawa Controls Co., Ltd. Order them directly from J.S.T. Mfg. Co., Ltd.

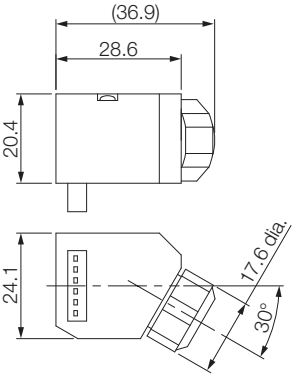
12.4.1 SGM7J and SGM7A (50 W to 150 W)

Item		Description	External Dimensions [mm]
Applicable Servomotors		SGM7J-A5A, -01A, or -C2A SGM7A-A5A, -01A, or -C2A	
Manufacturer		J.S.T. Mfg. Co., Ltd.	
Order Number	Receptacle	J17M-06FMH-7KL-M	
	Contacts	SJ1F-01GF-P0.8	
Applicable Wire Sizes		Power terminals: AWG20 Holding brake terminals: AWG20 to AWG24	
Outer Diameter of Insulating Sheath		1.11 mm to 1.53 mm	
Mounting Screws		M2 pan-head screws	
Applicable Cable Diameter		7 mm ±0.3 mm	
User Instructions		JFA Connector J-1700M	
Crimping Tool*	Hand Tool	YRS-884	
	Applicator	APLMK SJ1F/M01-08	

* A Crimping Tool is required. Contact the connector manufacturer for details.

Note: Cables are not included. Purchase them separately.

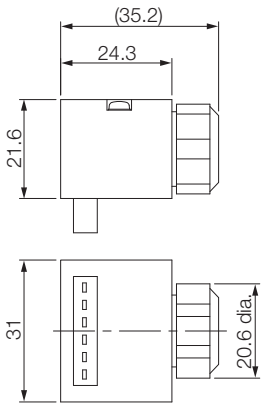
12.4.2 SGM7J and SGM7A (200 W to 600 W)

Item		Description	External Dimensions [mm]
Applicable Servomotors		SGM7J-02A, -04A, or -06A SGM7A-02A, -04A, or -06A	
Manufacturer		J.S.T. Mfg. Co., Ltd.	
Order Number	Receptacle	J27M-06FMH-7KL-M	
	Contacts	SJ2F-01GF-P1.0	
Applicable Wire Sizes		Power terminals: AWG20 Holding brake terminals: AWG20 to AWG24	
Outer Diameter of Insulating Sheath		1.11 mm to 1.53 mm	
Mounting Screws		M2 pan-head screws	
Applicable Cable Diameter		7 mm ±0.3 mm	
User Instructions		JFA Connector J-2700M	
Crimping Tool*	Hand Tool	YRS-8861	
	Applicator	APLMK SJ2F/M01-10	

* A Crimping Tool is required. Contact the connector manufacturer for details.

Note: Cables are not included. Purchase them separately.

12.4.3 SGM7J and SGM7A (750 W and 1.0 kW)

Item		Description		External Dimensions [mm]
Applicable Servomotors		SGM7J-08A SGM7A-08A or -10A		
Manufacturer		J.S.T. Mfg. Co., Ltd.		
Order Number	Receptacle	J37M-06FMH-8KL-ML		
	Contacts	Power terminals: SJ3F-41GF-P1.8	Holding brake terminals: SJ3F-01GF-P1.8	
Applicable Wire Sizes		AWG16	AWG20 to AWG24	
Outer Diameter of Insulating Sheath		1.53 mm to 2.5 mm	1.11 mm to 1.86 mm	
Mounting Screws		M2.5 pan-head screws		
Applicable Cable Diameter		8 mm ±0.3 mm		
User Instructions		JFA Connector J-3700M		
Crimping Tool*	Hand Tool	Power terminals: YRS-880 Holding brake terminals: YRS-881		
	Applicator	Power terminals: APLMK SJ3F/M41-20 Holding brake terminals: APLMK SJ3F/M01-20		

* A Crimping Tool is required. Contact the connector manufacturer for details.

Note: Cables are not included. Purchase them separately.

Revision History

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

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August 2014	◇1	All chapters	Corrected mistakes and made changes to some parts.
		Preface, 10.8.6, Chapter 11	Deletion: Information on SigmaJunmaSize+
		Chapter 3	Addition: Information on SGM7A-40, -50, and -70
		Chapter 4	Newly added.
		Chapter 5	Addition: Information on SGM7G-30, -44, -55, -75, -1A, and -1E
		10.1.2	Addition: Power supply specifications for using a DC power supply
		10.4	Addition: Information on crimp terminals and insulating sleeves
		10.8.5	Addition: Information on Regenerative Resistor Units
		10.9	Addition: Information on inrush current suppression devices
May 2014	–	–	First edition

Σ-7-Series AC Servo Drive

Peripheral Device
Selection Manual

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