

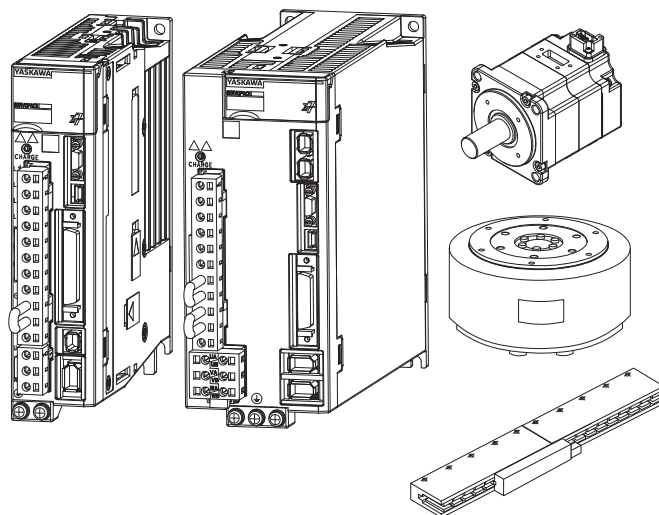
Σ-7-Series AC Servo Drive Peripheral Device Selection Manual

Applicable SERVOPACK Model: SGD7S, SGD7W, SGD7C

Applicable Rotary Servomotor Model: SGM7M, SGM7J, SGM7A, SGM7P, SGM7G, SGM7V

Applicable Direct Drive Servomotor Model: SGM7D, SGM7E, SGM7F, SGM7C, SGM7S

Applicable Linear Servomotor Model: SGLG, SGLF, SGLT



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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.

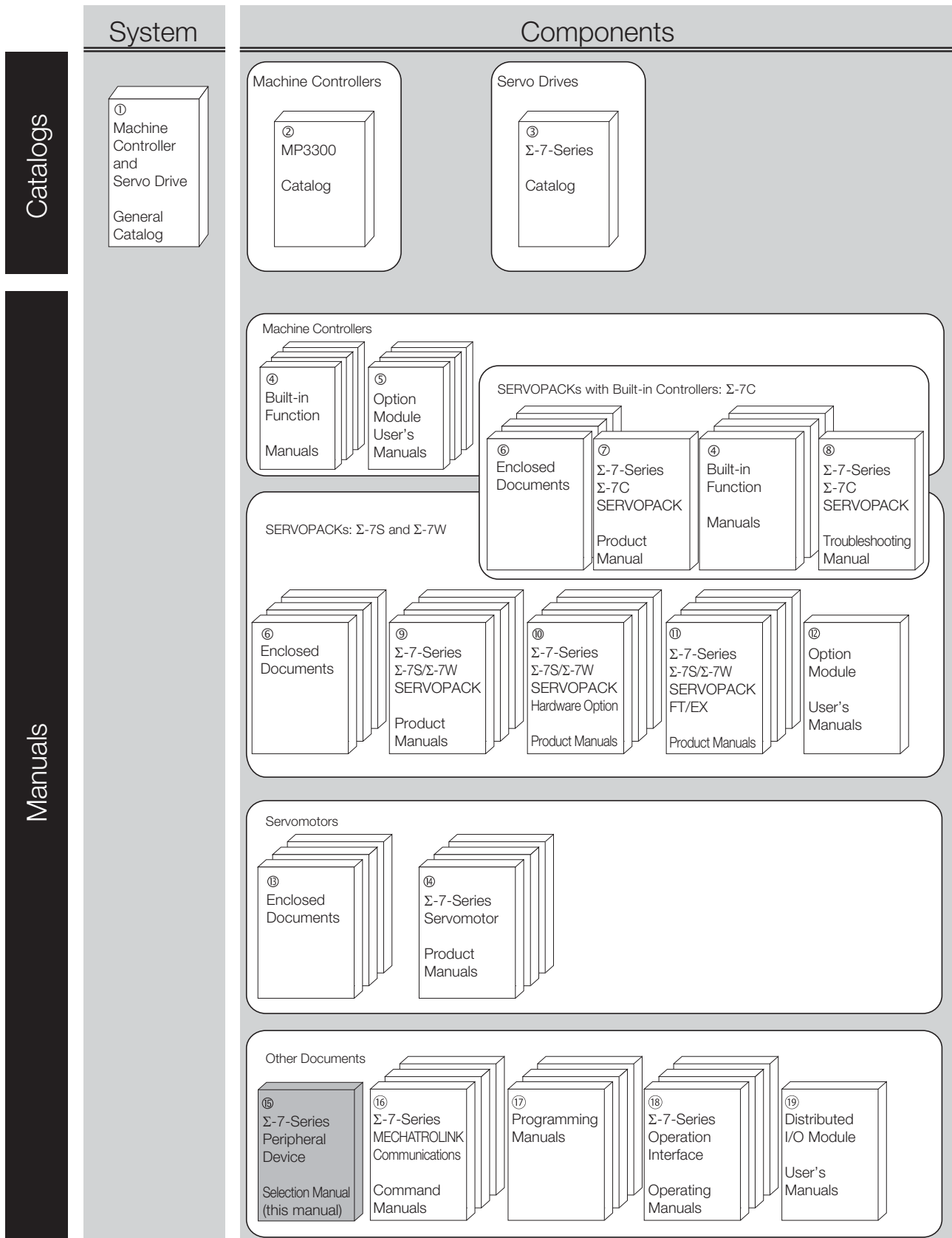
Outline of Manual

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 SGM7M Rotary Servomotors | <p>These chapters provide the following information.</p> <ul style="list-style-type: none"> • Selection tables, specifications, and dimensional drawings for Servomotor Main Circuit Cables, Encoder Cables, and user-assembled wiring materials <p>Note: References to detailed information are provided in the system configuration diagrams.</p> |
| 3 | Cables and User-Assembled Wiring Materials for SGM7J Rotary Servomotors | |
| 4 | Cables and User-Assembled Wiring Materials for SGM7A Rotary Servomotors | |
| 5 | Cables and User-Assembled Wiring Materials for SGM7P Rotary Servomotors | |
| 6 | Cables and User-Assembled Wiring Materials for SGM7G Rotary Servomotors | |
| 7 | Cables and User-Assembled Wiring Materials for SGMMV Rotary Servomotors | |
| 8 | Cables and User-Assembled Wiring Materials for Direct Drive Servomotors | |
| 9 | Cables and User-Assembled Wiring Materials for Linear Servomotors | |
| 10 | Cables and User-Assembled Wiring Materials for SERVOPACKs | This chapter provides selection tables, specifications, and dimensional drawings for SERVOPACK cables. |
| 11 | Option Modules | This chapter provides the specifications and dimensional drawings of Option Modules. |
| 12 | SERVOPACK Peripheral Devices | This chapter provides selection tables, specifications, and dimensional drawings for SERVOPACK peripheral devices. |
| 13 | Software | This chapter provides information on the SigmaWin+, Yaskawa's AC Servo Drive Engineering Tool, and MPE720, our System Integrated Engineering Tool. |
| 14 | 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.



| 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 application examples for combinations of MP3000-Series 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 Built-in Function Manuals | Σ -7-Series AC Servo Drive Σ -7C SERVOPACK Motion Control User's Manual | SIEP S800002 03 | Provides detailed information on the specifications, system configuration, and application methods of the Motion Control Function Modules (SVD, SVC4, and SVR4) for Σ -7-Series Σ -7C SERVOPACKs. |
| | Machine Controller MP3000 Series Communications User's Manual | SIEP C880725 12 | Provides detailed information on the specifications, system configuration, and communications connection methods for the Ethernet communications that are used with MP3000-Series Machine Controllers and Σ -7-Series Σ -7C SERVOPACKs. |
| ⑤ Option Module User's Manuals | Machine Controller MP2000 Series Communication Module User's Manual | SIEP C880700 04 | Provide detailed information on the specifications and communications methods for the Communications Modules that can be mounted to MP3000-Series Machine Controllers and Σ -7-Series Σ -7C SERVOPACKs. |
| | Machine Controller MP2000 Series 262IF-01 FL-net Communication Module User's Manual | SIEP C880700 36 | |
| | Machine Controller MP2000 Series 263IF-01 EtherNet/IP Communication Module User's Manual | SIEP C880700 39 | |
| | Machine Controller MP2000 Series I/O Module User's Manual | SIEP C880700 34 | Provide detailed information on the specifications and communications methods for the I/O Modules that can be mounted to MP3000-Series Machine Controllers and Σ -7-Series Σ -7C SERVOPACKs. |
| | Machine Controller MP2000 Series Analog Input/Analog Output Module AI-01/AO-01 User's Manual | SIEP C880700 26 | |
| | Machine Controller MP2000 Series Counter Module CNTR-01 User's Manual | SIEP C880700 27 | |

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| Classification | Document Name | Document No. | Description |
|--|--|-----------------|--|
| ⑥ Enclosed Documents | Σ-7-Series AC Servo Drive Σ-7S, Σ-7W, and Σ-7C SER- VOPACK Safety Precautions | TOMP C710828 00 | Provides detailed information for the safe usage of Σ-7-Series SERVOPACKS. |
| | Σ-V-Series/Σ-V-Series for Large-Capacity Models/ Σ-7-Series Safety Precautions Option Module | TOBP C720829 00 | Provides detailed information for the safe usage of Option Modules. |
| | Σ-V-Series/Σ-V-Series for Large-Capacity Models/ Σ-7-Series Installation Guide Command Option Module | TOBP C720829 01 | Provides detailed procedures for installing the Command Option Module in a SERVOPACK. |
| | Σ-V-Series/Σ-V-Series for Large-Capacity Models/ Σ-7-Series Installation Guide Fully-closed Module | TOBP C720829 03 | Provides detailed procedures for installing the Fully-closed Module in a SERVOPACK. |
| | Σ-V-Series/Σ-V-Series for Large-Capacity Models/ Σ-7-Series Installation Guide Safety Module | TOBP C720829 06 | Provides detailed procedures for installing the Safety Module in a SERVOPACK. |
| | Σ-V-Series/Σ-V-Series for Large-Capacity Models/ Σ-7-Series Installation Guide INDEXER Module | TOBP C720829 02 | Provides detailed procedures for installing the INDEXER Module in a SERVOPACK. |
| | Σ-V-Series/Σ-V-Series for Large-Capacity Models/ Σ-7-Series Installation Guide DeviceNet Module | TOBP C720829 07 | Provides detailed procedures for installing the DeviceNet Module in a SERVOPACK. |
| ⑦ Σ-7-Series Σ-7C SERVOPACK Product Manual | Σ-7-Series AC Servo Drive Σ-7C SERVOPACK Product Manual | SIEP S800002 04 | Provides detailed information on selecting Σ-7-Series Σ-7C SERVO- PACKS; installing, connecting, set- ting, testing in trial operation, and tuning Servo Drives; writing, moni- toring, and maintaining programs; and other information. |
| ⑧ Σ-7-Series Σ-7C SERVOPACK Troubleshooting Manual | Σ-7-Series AC Servo Drive Σ-7C SERVOPACK Troubleshooting Manual | SIEP S800002 07 | Provides detailed troubleshooting information for Σ-7-Series Σ-7C SERVOPACKS. |

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| Classification | Document Name | Document No. | Description |
|--|---|-----------------|--|
| ⑨ Σ-7-Series Σ-7S/Σ-7W SERVOPACK Product Manuals | Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with MECHATROLINK-4 Communications References Product Manual | SIEP S800002 31 | Provide detailed information on selecting Σ-7-Series Σ-7S and Σ-7W SERVOPACKs; installing, connecting, setting, testing in trial operation, tuning, monitoring, and maintaining Servo Drives; and other information. |
| | Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual | SIEP S800001 28 | |
| | 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 | |
| | Σ-7-Series AC Servo Drive Σ-7S SERVOPACK Command Option Attachable Type with INDEXER Module Product Manual | SIEP S800001 64 | |
| | Σ-7-Series AC Servo Drive Σ-7S SERVOPACK Command Option Attachable Type with DeviceNet Module Product Manual | SIEP S800001 70 | |
| | Σ-7-Series AC Servo Drive Σ-7W SERVOPACK with MECHATROLINK-III Communications References Product Manual | SIEP S800001 29 | |
| ⑩ Σ-7-Series Σ-7S/Σ-7W SERVOPACK with Hardware Option Specifications Product Manuals | Σ-7-Series AC Servo Drive Σ-7S/Σ-7W SERVOPACK with Hardware Option Specifica- tions Dynamic Brake Product Manual | SIEP S800001 73 | Provides detailed information on Hardware Options for Σ-7-Series SERVOPACKs. |
| | Σ-7-Series AC Servo Drive Σ-7W/Σ-7C SERVOPACK with Hardware Option Specifica- tions HWBB Function Product Manual | SIEP S800001 72 | |

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| Classification | Document Name | Document No. | Description |
|--|--|-----------------|--|
| ⑩ Σ-7-Series Σ-7S/Σ-7W SERVOPACK FT/EX Product Manuals | Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for Index- ing Application Product Manual | SIEP S800001 84 | Provides detailed information on the FT/EX Option for Σ-7-Series SERVOPACKS. |
| | Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for Track- ing Application Product Manual | SIEP S800001 89 | |
| | Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for Application with Special Motor, SGM7D Motor Product Manual | SIEP S800001 91 | |
| | Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for Press and Injection Molding Application Product Manual | SIEP S800001 94 | |
| | Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for Transfer and Alignment Application Product Manual | SIEP S800001 95 | |
| | Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for Torque/Force Assistance for Conveyance Application Product Manual | SIEP S800002 09 | |
| | Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for Cutting Application Feed Shaft Motor Product Manual | SIEP S800002 10 | |
| | Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for Three-Point Latching for Conveyance Application Product Manual | SIEP S800002 17 | |
| | Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for Semi-/Fully-Closed Loop Control Online Switching for Conveyance Application Product Manual | SIEP S800002 27 | |
| | Σ-7-Series AC Servo Drive Σ-7W SERVOPACK with FT/EX Specification for Gantry Applications Product Manual | SIEP S800002 29 | |

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| Classification | Document Name | Document No. | Description |
|--|---|----------------------------------|---|
| ⑫ Option Module User's Manual | AC Servo Drives Σ -V-Series/ Σ -V-Series for Large-Capacity Models/ Σ -7-Series User's Manual Safety Module | SIEP C720829 06 | Provides detailed information required for the design and maintenance of a Safety Module. |
| ⑬ Enclosed Documents | AC Servo Drive Rotary Servomotor Safety Precautions | TOBP C230260 00 | Provides detailed information for the safe usage of Rotary Servomotors and Direct Drive Servomotors. |
| | AC Servomotor Linear Σ Series Safety Precautions | TOBP C230800 00 | Provides detailed information for the safe usage of Linear Servomotors. |
| ⑭ Σ -7-Series Servomotor Product Manuals | 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. |
| | Σ -7-Series AC Servo Drive Linear Servomotor Product Manual | SIEP S800001 37 | |
| | Σ -7-Series AC Servo Drive Direct Drive Servomotor Product Manual | SIEP S800001 38 | |
| ⑮ Σ -7-Series Peripheral Device Selection Manual | Σ -7-Series AC Servo Drive Peripheral Device Selection Manual | This manual (SIEP S800001 32) | Provides the following information in detail for Σ -7-Series Servo Systems. <ul style="list-style-type: none"> • Cables: Models, dimensions, wiring materials, connector models, and connection specifications • Peripheral devices: Models, specifications, diagrams, and selection (calculation) methods |
| ⑯ 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. |
| | Σ -7-Series AC Servo Drive MECHATROLINK-4 Communications Standard Servo Profile Command Manual | SIEP S800002 32 | Provides detailed information on the MECHATROLINK-4 communications standard servo profile commands that are used for a Σ -7-Series Servo System. |
| ⑰ Programming Manuals | Machine Controller MP3000 Series Ladder Programming Manual | SIEP C880725 13 | Provides detailed information on the ladder programming specifications and instructions for MP3000-Series Machine Controllers and Σ -7-Series Σ -7C SERVOPACKS. |
| | Machine Controller MP3000 Series Motion Programming Manual | SIEP C880725 14 | Provides detailed information on the motion programming and sequence programming specifications and instructions for MP3000-Series Machine Controllers and Σ -7-Series Σ -7C SERVOPACKS. |

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| Classification | Document Name | Document No. | Description |
|---|---|-----------------|--|
| ¹⁸ Σ -7-Series Operation Interface Operating Manuals | Machine Controller MP2000/MP3000 Series Engineering Tool MPE720 Version 7 User's Manual | SIEP C880761 03 | Describes in detail how to operate MPE720 version 7. |
| | 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 Drive Engineering Tool SigmaWin+ Operation Manual | SIET S800001 34 | Provides detailed operating procedures for the SigmaWin+ Engineering Tool for a Σ -7-Series Servo System. |
| ¹⁹ Distributed I/O Module User's Manual | MECHATROLINK-III Compatible I/O Module User's Manual | SIEP C880781 04 | Describes the functions, specifications, operating methods, and MECHATROLINK-III communications for the Remote I/O Modules for MP2000/MP3000-Series Machine Controllers. |
| | MECHATROLINK-4 Compatible I/O Module User's Manual | SIEP C880782 01 | Describes the functions, specifications, operating methods, and MECHATROLINK-4 communications for the Remote I/O Modules for MP3000-Series Machine Controllers. |

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 Rotary Servomotor (SGM7M, SGM7J, SGM7A, SGM7P, SGM7G, or SGMMV). |
| Direct Drive Servomotor | A Direct Drive Servomotor (SGM7D, SGM7E, SGM7F, SGMCV, or SGMCS). |
| Linear Servomotor | A Σ -7-Series Linear Servomotor (SGLG, SGLF, or SGLT). |
| 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. |
| absolute encoder | The general term used for absolute encoders with batteries and batteryless absolute encoders. In cases where the general term causes confusion, the term "batteryless absolute encoder" may also be used. |

◆ Trademarks

- Ethernet is a registered trademark of the Xerox Corporation.
- EtherCAT is a registered trademark of Hans Beckhoff.
- EtherNet/IP is a registered trademark of ODVA (Open DeviceNet Vendor Association, Inc.).
- DeviceNet is a registered trademark of ODVA (Open DeviceNet Vendor Association, Inc.).
- 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.
- Do not attempt to disassemble, repair, or modify the product.
There is a risk of fire or failure.
The warranty is void for the product if you disassemble, repair, or modify it.



CAUTION

- The regenerative resistors, External Dynamic Brake Resistors, and other peripheral devices can be very hot while power is ON or soon after the power is turned OFF. Implement safety measures, such as installing covers, so that hands and parts such as cables do not come into contact with hot components.
There is a risk of burn injury.
- For a 24-VDC power supply, use a power supply device with double insulation or reinforced insulation.
There is a risk of electric shock.
- Do not damage, pull on, apply excessive force to, place heavy objects on, or pinch cables.
There is a risk of failure, damage, or electric shock.
- Do not use the product in an environment that is subject to water, corrosive gases, or flammable gases, or near flammable materials.
There is a risk of electric shock or fire.

NOTICE

- Do not attempt to use a peripheral device that is damaged or that has missing parts.
- Install external emergency stop circuits that shut OFF the power supply and stops operation immediately when an error occurs.
- 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 use peripheral devices in the specified combinations.
- Do not touch peripheral devices with wet hands.
There is a risk of product failure.

■ Storage Precautions

CAUTION

- Do not place an excessive load on the product during storage. (Follow all instructions on the packages.)
There is a risk of injury or damage.

NOTICE

- Do not install or store the product in any of the following locations.
 - Locations that are subject to direct sunlight
 - Locations that are subject to ambient temperatures that exceed product specifications
 - Locations that are subject to relative humidities that exceed product specifications
 - Locations that are subject to condensation as the result of extreme changes in temperature
 - Locations that are subject to corrosive or flammable gases
 - Locations that are near flammable materials
 - Locations that are subject to dust, salts, or iron powder
 - Locations that are subject to water, oil, or chemicals
 - Locations that are subject to vibration or shock that exceeds product specifications
 - Locations that are subject to radiation
- If you store or install the product in any of the above locations, the product may fail or be damaged.

■ Transportation Precautions

CAUTION

- Transport the product in a way that is suitable to the mass of the product.
- When you handle a peripheral device, be careful of sharp parts, such as the corners.
There is a risk of injury.
- Do not place an excessive load on the product during transportation. (Follow all instructions on the packages.)
There is a risk of injury or damage.

NOTICE

- Peripheral devices are precision devices. Do not drop it or subject it to strong shock.
There is a risk of failure or damage.
- Do not subject connectors to shock.
There is a risk of faulty connections or damage.
- If disinfectants or insecticides must be used to treat packing materials such as wooden frames, plywood, or pallets, the packing materials must be treated before the product is packaged, and methods other than fumigation must be used.
Example: Heat treatment, where materials are kiln-dried to a core temperature of 56°C for 30 minutes or more.
If the electronic products, which include stand-alone products and products installed in machines, are packed with fumigated wooden materials, the electrical components may be greatly damaged by the gases or fumes resulting from the fumigation process. In particular, disinfectants containing halogen, which includes chlorine, fluorine, bromine, or iodine can contribute to the erosion of the capacitors.

■ Installation Precautions



CAUTION

- Install a peripheral device in a way that will support the mass given in technical documents.
- Install SERVOPACKs, Servomotors, regenerative resistors, and External Dynamic Brake Resistors on nonflammable materials.
Installation directly onto or near flammable materials may result in fire.
- Install the SERVOPACK in the specified orientation.
There is a risk of fire or failure.
- Do not step on or place a heavy object on the product.
There is a risk of failure, damage, or injury.
- Do not allow any foreign matter to enter a peripheral device.
There is a risk of failure or fire.

NOTICE

- Do not install or store the product in any of the following locations.
 - Locations that are subject to direct sunlight
 - Locations that are subject to ambient temperatures that exceed product specifications
 - Locations that are subject to relative humidities that exceed product specifications
 - Locations that are subject to condensation as the result of extreme changes in temperature
 - Locations that are subject to corrosive or flammable gases
 - Locations that are near flammable materials
 - Locations that are subject to dust, salts, or iron powder
 - Locations that are subject to water, oil, or chemicals
 - Locations that are subject to vibration or shock that exceeds product specifications
 - Locations that are subject to radiation
- If you store or install the product in any of the above locations, the product may fail or be damaged.

■ 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.



CAUTION

- Wait for at least six minutes after turning OFF the power supply (with a SERVOPACK for a 100-VAC input, wait for at least nine minutes) 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.
- Check the wiring to be sure it has been performed correctly.
Always confirm the pin layouts and wiring methods in technical documents for your peripheral devices before operation.
There is a risk of failure or malfunction.
- Connect wires to your peripheral devices 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.
- The maximum wiring length is 3 m for I/O Signal Cables, and 50 m for Encoder Cables or Servomotor Main Circuit 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.

■ Maintenance and Inspection 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.



CAUTION

- Wait for at least six minutes after turning OFF the power supply (with a SERVOPACK for a 100-VAC input, wait for at least nine minutes) 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.

■ Disposal Precautions

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



■ 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.

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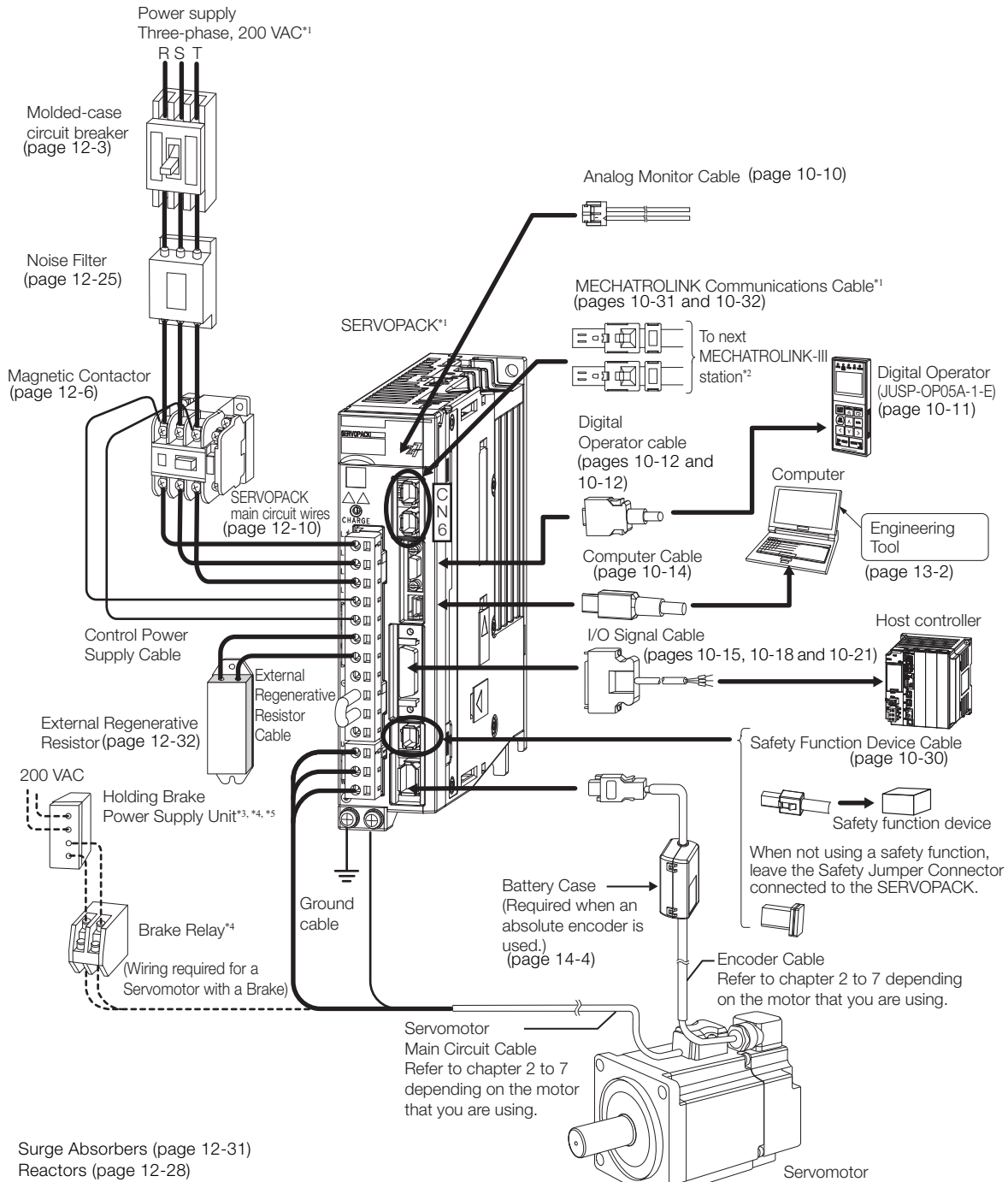
Revision History

Peripheral Devices and System Configurations

1

- 1.1** Configuration with a Rotary Servomotor . . 1-2
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- 1.3** Configuration with a Linear Servomotor . . . 1-4

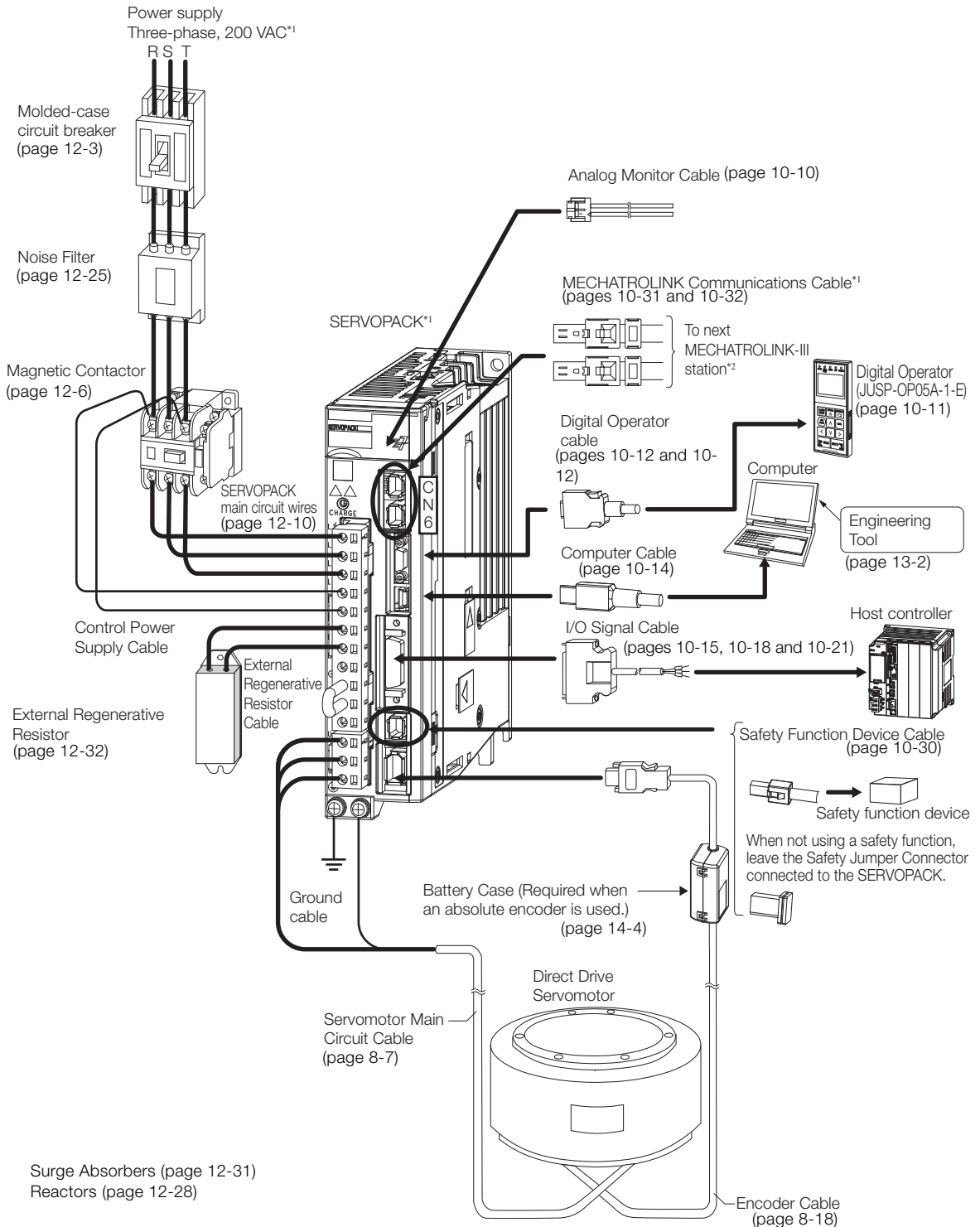
1.1 Configuration with a Rotary Servomotor



Surge Absorbers (page 12-31)
 Reactors (page 12-28)
 Surge Absorbers (Varistors) and Diodes for Holding Brake Power Supplies (page 14-2)

- *1. The peripheral devices are described using a MECHATROLINK-III Communications Reference SERVOPACK for a three-phase 200-VAC power supply input as an example. The shapes of the connectors and pin layout may be different for SERVOPACKs with other power supply input specifications and for other interfaces. Refer to the product manual for your SERVOPACK when using a SERVOPACK other than the above.
- *2. The connected devices depend on the interface.
 For MECHATROLINK-4 communications references: Other MECHATROLINK-4 stations
 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.

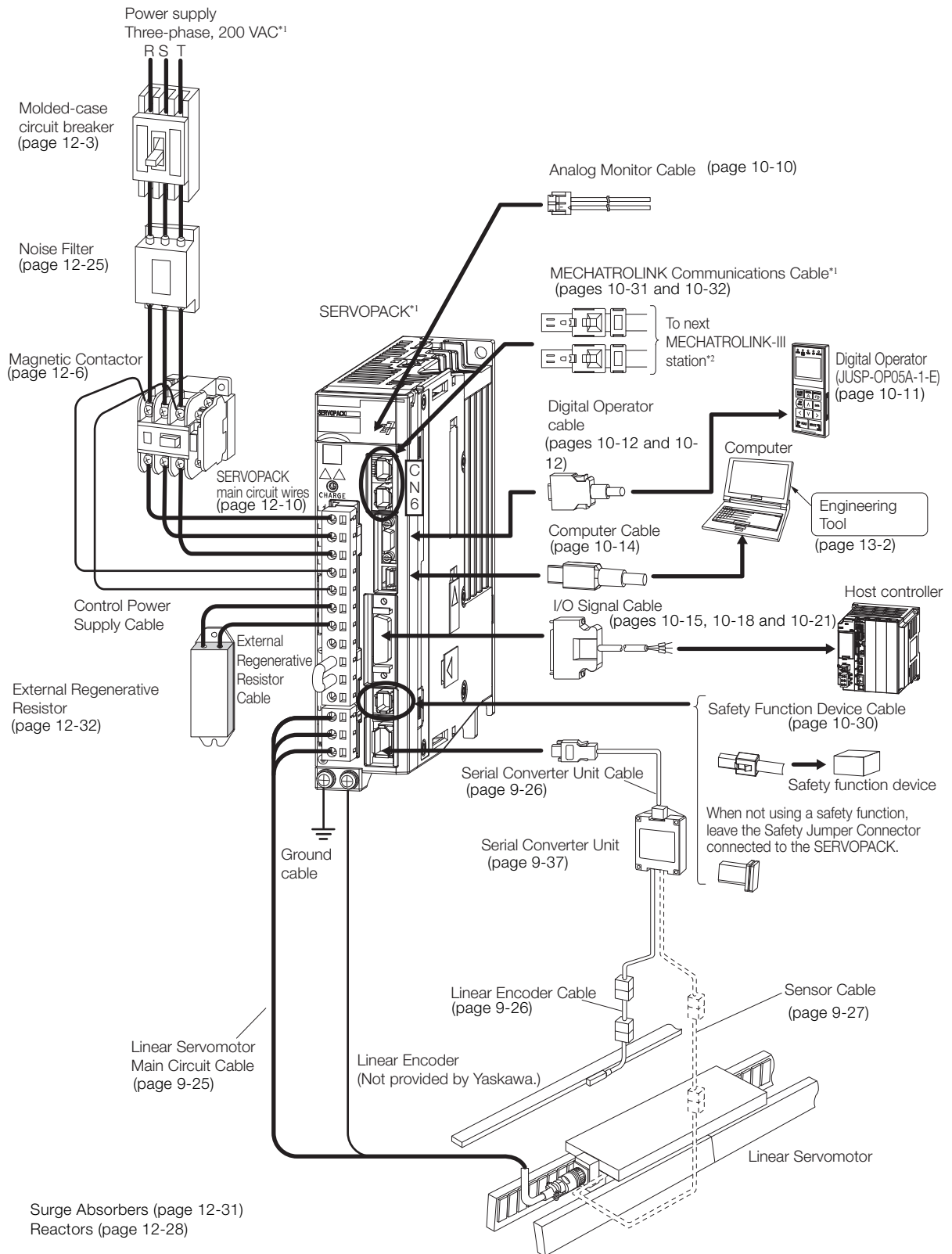
1.2 Configuration with a Direct Drive Servomotor



*1. The peripheral devices are described using a MECHATROLINK-III Communications Reference SERVOPACK for a three-phase 200-VAC power supply input as an example. The shapes of the connectors and pin layout may be different for SERVOPACKs with other power supply input specifications and for other interfaces. Refer to the product manual for your SERVOPACK when using a SERVOPACK other than the above.

*2. The connected devices depend on the interface.
 For MECHATROLINK-4 communications references: Other MECHATROLINK-4 stations
 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 for a three-phase 200-VAC power supply input as an example. The shapes of the connectors and pin layout may be different for SERVOPACKs with other power supply input specifications and for other interfaces. Refer to the product manual for your SERVOPACK when using a SERVOPACK other than the above.

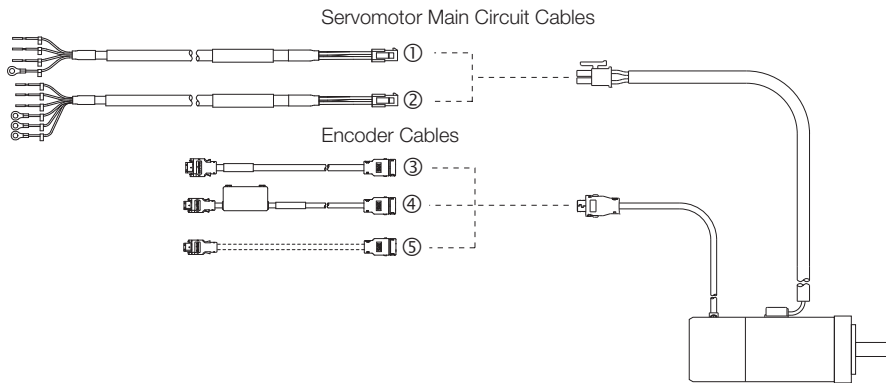
*2. The connected devices depend on the interface.
 For MECHATROLINK-4 communications references: Other MECHATROLINK-4 stations
 For MECHATROLINK-II communications references: Other MECHATROLINK-II stations
 For analog voltage/pulse train references: There is no CN6 connector.

Cables and User-Assembled Wiring Materials for SGM7M Rotary Servomotors

2

| | | |
|------------|---|------------|
| 2.1 | Cable Configurations | 2-2 |
| 2.2 | Servomotor Main Circuit Cables | 2-3 |
| 2.2.1 | Servomotor Main Circuit Cables for Servomotors without Holding Brakes | 2-3 |
| 2.2.2 | Servomotor Main Circuit Cables for Servomotors with Holding Brakes | 2-4 |
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2.1 Cable Configurations



| 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 | Encoder Cables for Incremental Encoders | page 2-5 | |
| ④ | Encoder Cables with Battery Cases for Absolute Encoders | page 2-6 | |
| ⑤ | User-Assembled Wiring Materials for Encoder Cables | Connector Kits | page 2-7 |
| | | Cables without Connectors | page 2-8 |

2.2 Servomotor Main Circuit Cables

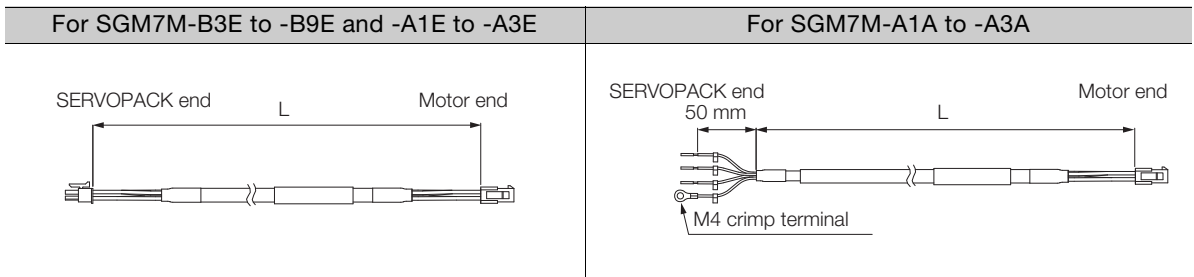
2.2.1 Servomotor Main Circuit Cables for Servomotors without Holding Brakes

Selection Table

| Servomotor Model | Length (L) | Order Number ^{*1} | |
|------------------------------------|-----------------------------------|----------------------------|----------------------------------|
| | | Standard Cable | Flexible Cable ^{*2, *3} |
| SGM7M-B3E to -B9E 3.3 W to 11 W | 3 m, 5 m, 10 m, 15 m, and 20 m | JZSP-CF1M00-□□-E | JZSP-CF1M20-□□-E |
| SGM7M-A1E to -A3E 11 W to 33 W | | JZSP-CF2M00-□□-E | JZSP-CF2M20-□□-E |
| SGM7M-A1A to -A3A 11 W to 33 W | | | |

- *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.

Appearance



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 |

2.2.2 Servomotor Main Circuit Cables for Servomotors with Holding Brakes

Selection Table

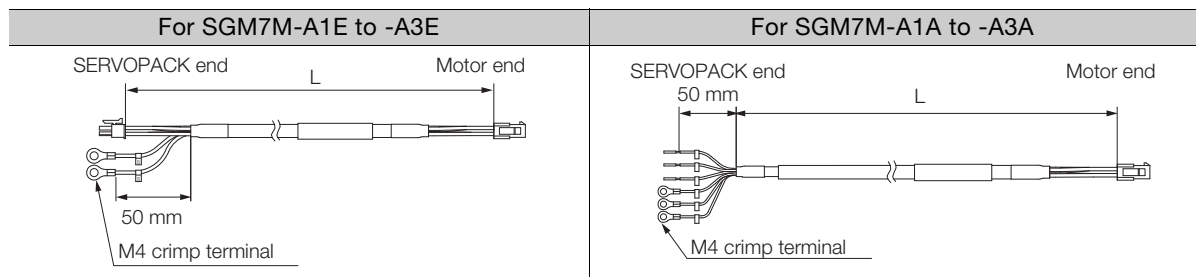
| Servomotor Model | Length (L) | Order Number*1 | |
|-----------------------------------|-----------------------------------|------------------|----------------------|
| | | Standard Cable | Flexible Cable*2, *3 |
| SGM7M-A1E to -A3E 11 W to 33 W | 3 m, 5 m, 10 m, 15 m, and 20 m | JZSP-CF1M10-□□-E | JZSP-CF1M30-□□-E |
| SGM7M-A1A to -A3A 11 W to 33 W | | JZSP-CF2M03-□□-E | JZSP-CF2M23-□□-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.

Appearance



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 |
| Black | Brake | Brake | 5 |
| Black | Brake | Brake | 6 |

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

2.3 Encoder Cables

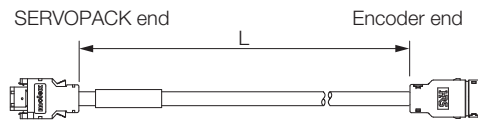
2.3.1 Encoder Cables for Incremental Encoders

Selection Table

| Servomotor Model | Length (L) | Order Number* ¹ | |
|------------------|--------------------------------|----------------------------|----------------------------------|
| | | Standard Cable | Flexible Cable* ^{2, *3} |
| All SGM7M models | 3 m, 5 m, 10 m, 15 m, and 20 m | JZSP-C7MP01-□□-E | JZSP-C7MP21-□□-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 46 mm or larger.

Appearance



Wiring Specifications

| Standard Cable | | | | | Flexible 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 | | | |

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

2.3.2 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

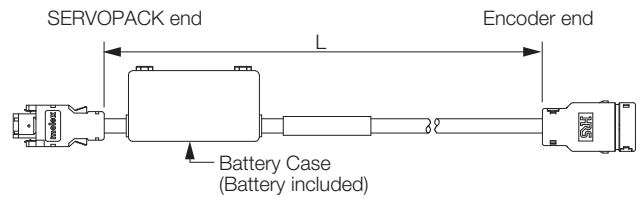
- Install a battery at either the host controller or on the Encoder Cable.
If you install batteries both at the host controller and on the Encoder Cable at the same time, you will create a loop circuit between the batteries, resulting in a risk of damage or burning.

Selection Table

| Servomotor Model | Length (L) | Order Number*1 | |
|------------------|--------------------------------|------------------|----------------------|
| | | Standard Cable | Flexible Cable*2, *3 |
| All SGM7M models | 3 m, 5 m, 10 m, 15 m, and 20 m | JZSP-C7MP19-□□-E | JZSP-C7MP29-□□-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 46 mm or larger.

Appearance



Wiring Specifications

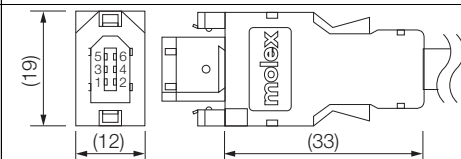
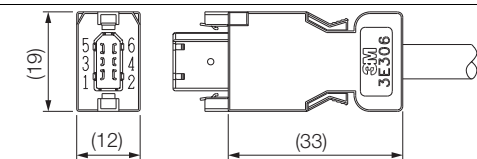
| Standard Cable | | | | Flexible Cable | | | | |
|----------------|--------|--|---------------------|------------------|---------------|--------|---------------------|------------------|
| SERVOPACK end | | | Encoder (motor) end | | SERVOPACK end | | Encoder (motor) end | |
| Pin | Signal | | Pin |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

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

2.4 User-Assembled Wiring Materials for Encoder Cables

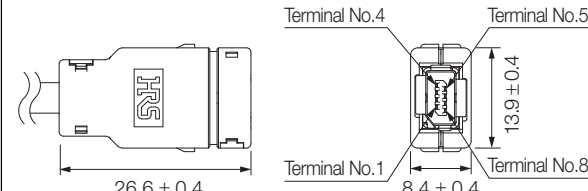
2.4.1 Connector Kits

SERVOPACK Connector Kits

| Type | Standard Cable | Compatible Connector Kit |
|--------------------------|---|--|
| Inquiries | Yaskawa representative | 3M Japan Limited |
| Manufacturer | Molex Incorporated | |
| 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] |  |  |

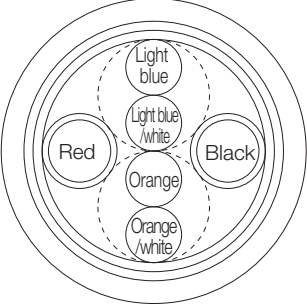
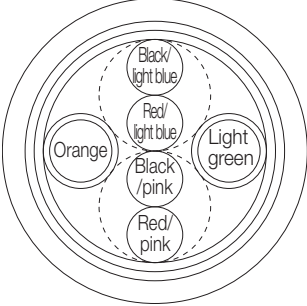
Note: Cables are not included. Purchase them separately.

Encoder Connector Kits

| | |
|--------------------------|--|
| Order Number | JZSP-C7MP9-2-E |
| Manufacturer | Hirose Electric Co., Ltd. |
| Components | IX40-A-8P-JC (7.1) |
| Product Specifications | SLC-129407 |
| External Dimensions [mm] |  |

2.4.2 Cables without Connectors

Encoder Cables

| 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).

2.5 Wiring Precautions

2.5.1 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.

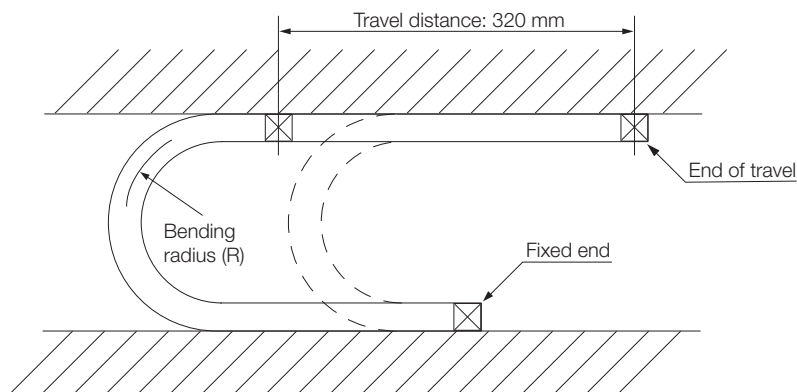
| Cable Diameter | Recommended Bending Radius [R] |
|----------------|--------------------------------|
| Less than 8 mm | 15 mm min. |
| 8 mm | 20 mm min. |
| Over 8 mm | Cable diameter × 3 mm min. |

2.5.2 Precautions for Flexible Cables

- The Flexible Cables have a service life of 10,000,000 operations minimum when used at the recommended bending radius (R) or larger under the following test conditions. The service life of a Flexible Cable is reference data under the following 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 lead wires are connected in series, 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 affect the performance of the cable sheathing occurs. Breaking of the shield wire is not considered.

- Straighten out the Flexible Cable when you connect it. If the cable is connected while it is twisted, it will break faster. Check the indication on the cable surface to make sure that the cable is not twisted.
- Do not secure the portions of the Flexible Cable that move. Stress will accumulate at the point that is secured, and the cable will break faster. Secure the cable in as few locations as possible.
- If a Flexible Cable is too long, looseness will cause it to break faster. If the Flexible Cable is too short, stress at the points where it is secured will cause it to break faster. Adjust the cable length to the optimum value.
- Do not allow Flexible Cables to interfere with each other. Interference will restrict the motion of the cables, causing them to break faster. Separate the cables sufficiently, or provide partitions between them when wiring.

Cables and User-Assembled Wiring Materials for SGM7J Rotary Servomotors

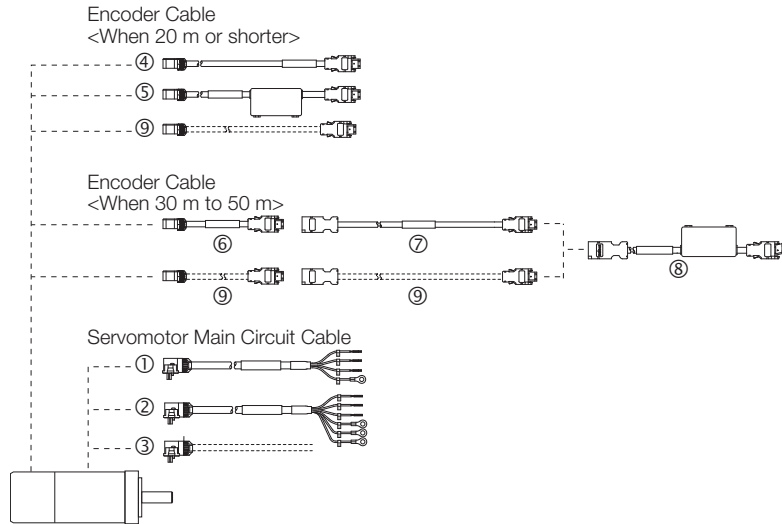
3

| | | |
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| 3.1 | Cable Configurations | 3-2 |
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| 3.6.3 | Encoder Connector Kits | 3-15 |
| 3.6.4 | Cables without Connectors | 3-16 |
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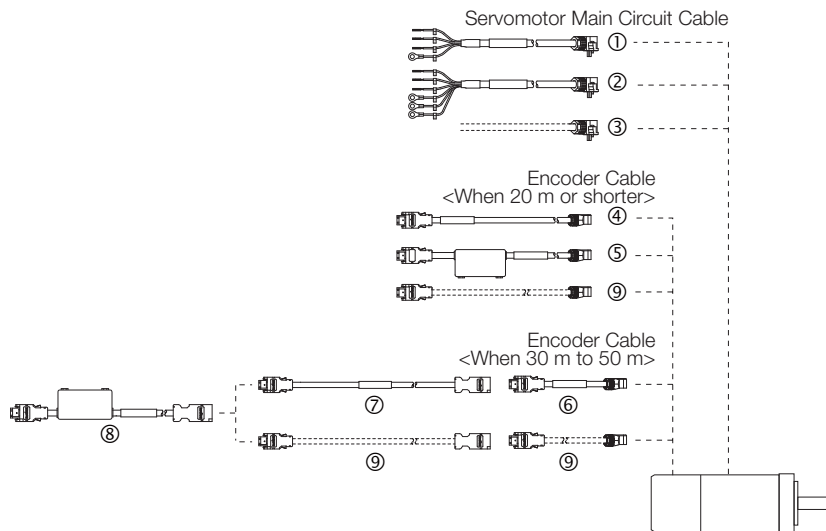
3.1 Cable Configurations

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 also connect Relay Encoder Cables as shown at ⑧ to ⑨ in the above diagram.

| No. | Cable Type | | Reference |
|-----|--|--|-----------|
| ① | Servomotor Main Circuit Cable | For Servomotors without Holding Brakes | page 3-3 |
| ② | | For Servomotors with Holding Brakes | page 3-4 |
| ③ | User-Assembled Wiring Materials for Servomotor Main Circuit Cables | Connector Kits | page 3-5 |
| | | Cables without Connectors | page 3-8 |
| ④ | Encoder Cables of 20 m or Less for Incremental Encoders or Batteryless Absolute Encoders | | page 3-10 |
| ⑤ | Encoder Cables of 20 m or Less with Battery Cases for Absolute Encoders*1 | | page 3-11 |
| ⑥ | Motor-End Relay Encoder Cables | | page 3-12 |
| ⑦ | SERVOPACK-End Relay Encoder Cables | | |
| ⑧ | Relay Encoder Cables with Battery Cases*2 | | |
| ⑨ | User-Assembled Wiring Materials for Encoder Cables | Connector Kits | page 3-14 |
| | | Cables without Connectors | page 3-15 |

*1. If a battery is connected to the host controller, the Battery Case is not required. Use an Encoder Cable for Incremental Encoders or Batteryless Absolute Encoders.

*2. This Cable is not required if you use a Servomotor with an Incremental Encoder, use a Servomotor with a Batteryless Absolute Encoder, or connect a battery to the host controller.

3.2 Servomotor Main Circuit Cables

3.2.1 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 |

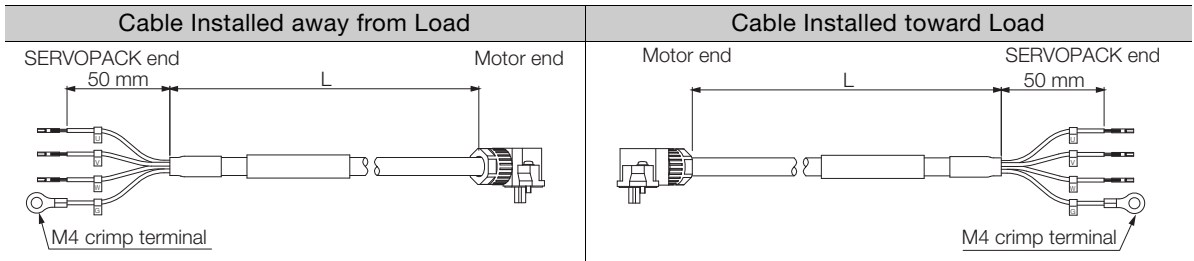
*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, 20, 30, 40, or 50).

*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.

Appearance



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 |
| | | - | 5 |
| | | - | 6 |

Cables and User-Assembled Wiring Materials for SGM7J Rotary Servomotors

3.2.2 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 |

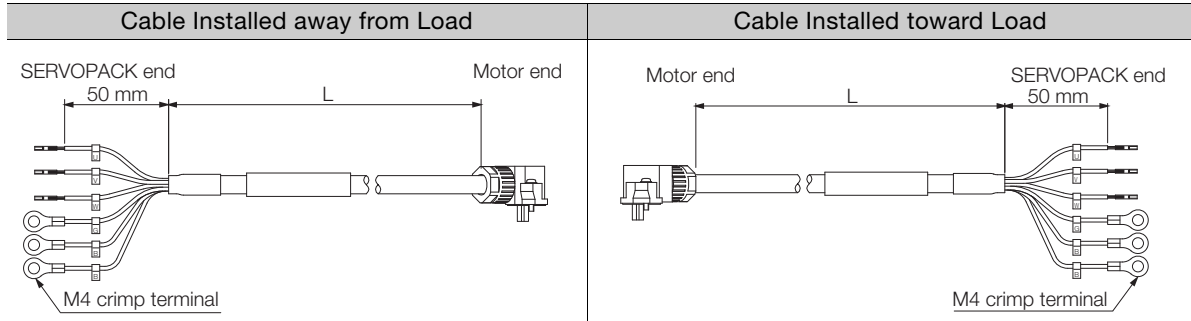
*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, 20, 30, 40, or 50).

*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.

Appearance



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.

3.3

User-Assembled Wiring Materials for Servomotor Main Circuit Cables

3.3.1 Servomotor Connector Kits

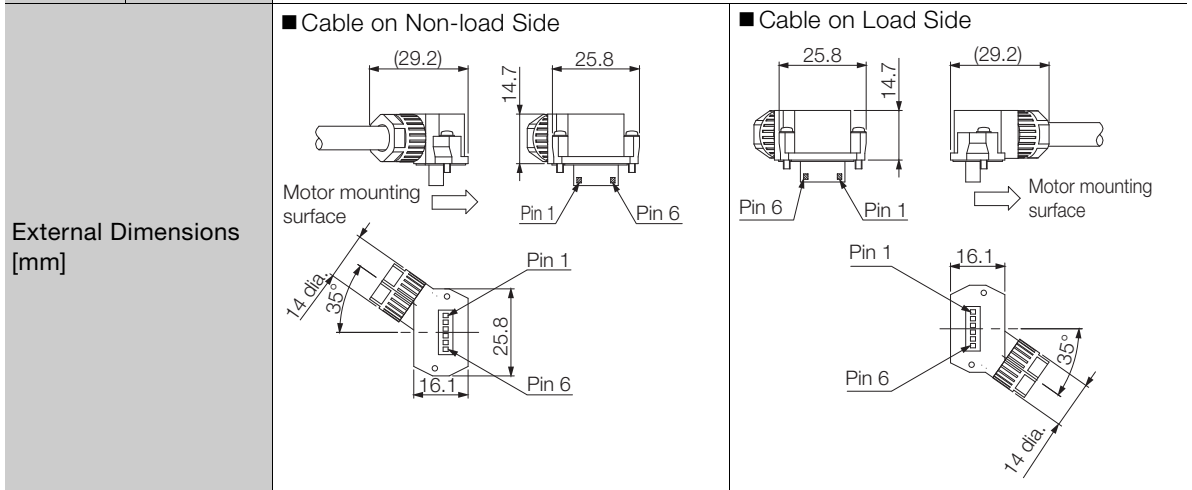
Selection Table

| 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 |
| Components | Receptacle |
| | Contacts |
| | J17S-06FMH-7KL-M-CF 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 |
| Crimping Tool* | Hand Tool |
| | Applicator |
| | YRS-8841 APLMK SJ1F/M01-08 |



* 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] | | <p>■ Cable on Non-load Side</p> |
| | | <p>■ Cable on Load Side</p> |

* 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: YRF-880 Holding brake terminals: YRF-881 |
| | Applicator | Power terminals: APLMK SJ3F/M41-20 Holding brake terminals: APLMK SJ3F/M01-20 |
| External Dimensions [mm] | | <div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>■ Cable on Non-load Side</p> </div> <div style="width: 48%;"> <p>■ Cable on Load Side</p> </div> </div> |

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

3.3.2 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 |

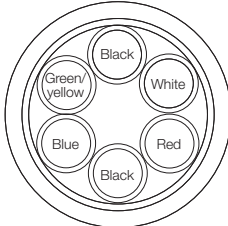
*1. Replace the boxes (□□) in the order number with the cable length (05, 10, 15, 20, 30, 40, or 50).

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

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

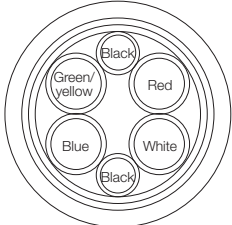
Note: If the length of the Servomotor Main Circuit Cable exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

◆ 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).

3.4 Encoder Cables of 20 m or Less

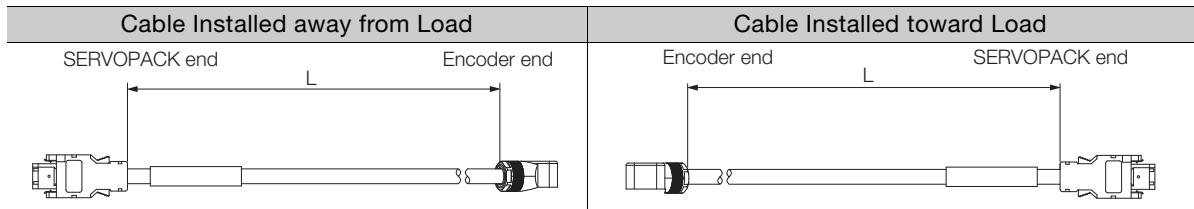
3.4.1 Encoder Cables for Incremental Encoders or Batteryless Absolute Encoders

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 46 mm or larger.

Appearance



Wiring Specifications

| Standard Cable | | | | | Flexible Cable | | | | |
|----------------|---------|-------------|---------------------|------------------|----------------|---------|--------|---------------------|--|
| SERVOPACK end | | | Encoder (motor) end | | SERVOPACK end | | | Encoder (motor) end | |
| Pin | Signal | | Pin | Wire Color | Pin | Signal | Pin | Wire Color | |
| 6 | /PS | | 5 | Light blue/white | 6 | /PS | 5 | Black/pink | |
| 5 | PS | | 4 | Light blue | 5 | PS | 4 | Red/pink | |
| 4 | BAT (-) | | 8 | Orange/white | 4 | BAT (-) | 8 | Black/light blue | |
| 3 | BAT (+) | | 9 | Orange | 3 | BAT (+) | 9 | Red/light blue | |
| 2 | PG 0 V | | 3 | Black | 2 | PG 0 V | 3 | Light green | |
| 1 | PG 5 V | 6 | Red | 1 | PG 5 V | 6 | Orange | | |
| Shell | FG | Shield wire | Shell | FG | Shell | FG | Shell | 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. Use an Encoder Cable for Incremental Encoders or Batteryless Absolute Encoders.

NOTICE

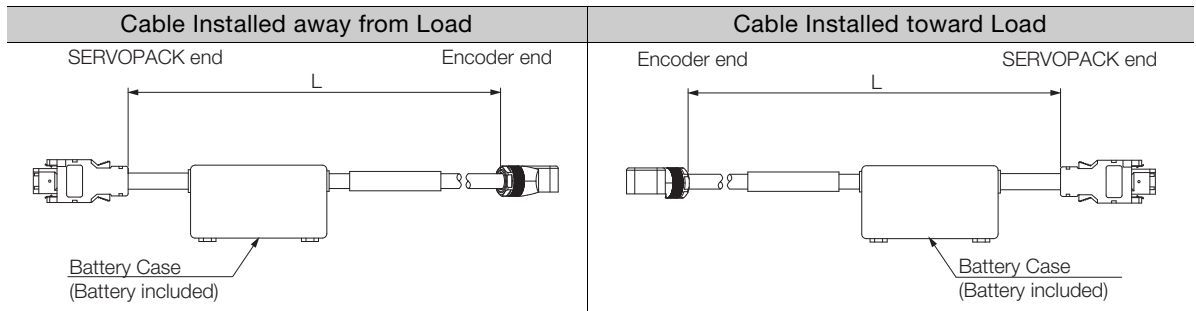
- Install a battery at either the host controller or on the Encoder Cable.
If you install batteries both at the host controller and on the Encoder Cable at the same time, you will create a loop circuit between the batteries, resulting in a risk of damage or burning.

Selection Table

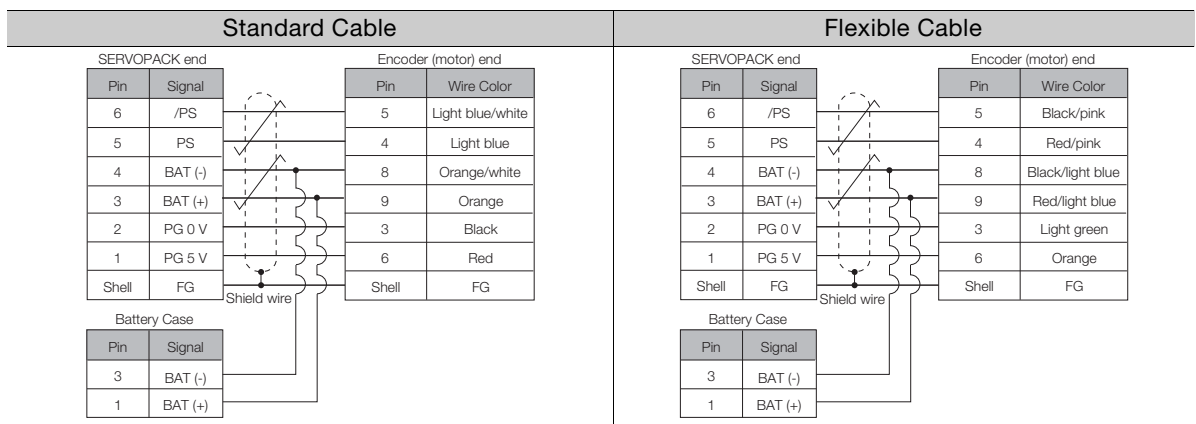
| Cable Direction | Servomotor Model | Length (L) | Order Number*1 | |
|-----------------|------------------|--------------------------------|------------------|----------------------|
| | | | Standard Cable | Flexible Cable*2, *3 |
| Load side | All SGM7J models | 3 m, 5 m, 10 m, 15 m, and 20 m | JZSP-C7PA0D-□□-E | 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 46 mm or larger.

Appearance



Wiring Specifications



3.5 Relay Encoder Cables of 30 m to 50 m

If the Encoder Cable length exceeds 20 m, be sure to also use a Motor-End Relay Encoder Cable and a SERVOPACK-End Relay Encoder Cable.

If you use a motor with an absolute encoder and a battery is not mounted to the host controller, also obtain a Relay Encoder Cable with a Battery Case in addition to the above two Cables.

NOTICE

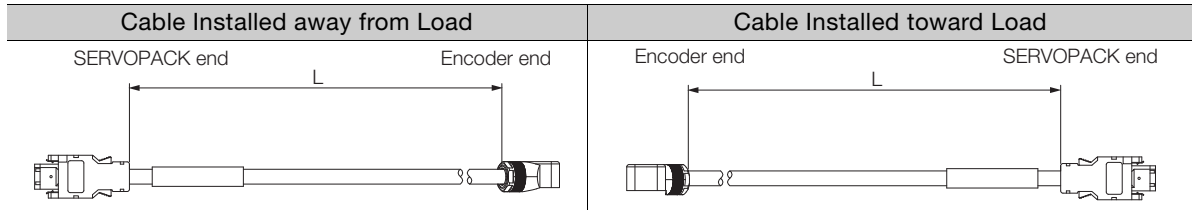
- Install a battery at either the host controller or on the Encoder Cable.
If you install batteries both at the host controller and on the Encoder Cable at the same time, you will create a loop circuit between the batteries, resulting in a risk of damage or burning.

3.5.1 Motor-End Relay Encoder Cables

Selection Table

| Cable Direction | Specification | Length (L) | Order Number |
|-----------------|---------------------------------|------------|---------------|
| Load side | Used for all types of encoders. | 0.3 m | JZSP-C7PRCD-E |
| Non-load side | | | JZSP-C7PRCE-E |

Appearance



Wiring Specifications

| 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 0 V | 3 | Black |
| 1 | PG 5 V | 6 | Red |
| Shell | FG | Shell | FG |

Shield wire

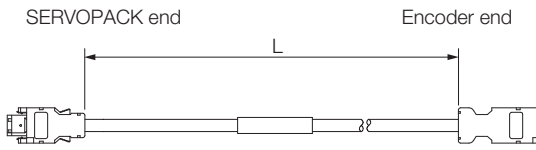
3.5.2 SERVOPACK-End Relay Encoder Cables

Selection Table

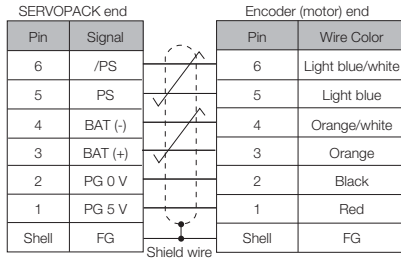
| Specification | Length (L) | Order Number* |
|---------------------------------|----------------------|------------------|
| Used for all types of encoders. | 30 m, 40 m, and 50 m | JZSP-UCMP00-□□-E |

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

Appearance



Wiring Specifications



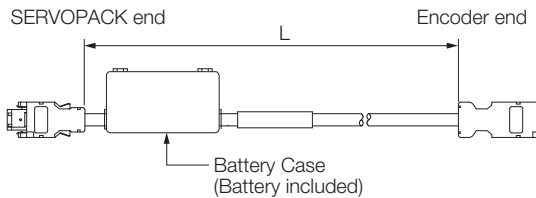
3.5.3 Relay Encoder Cables with Battery Cases

Note: This Cable is not required if you use a Servomotor with an Incremental Encoder, use a Servomotor with a Batteryless Absolute Encoder, or connect a battery to the host controller.

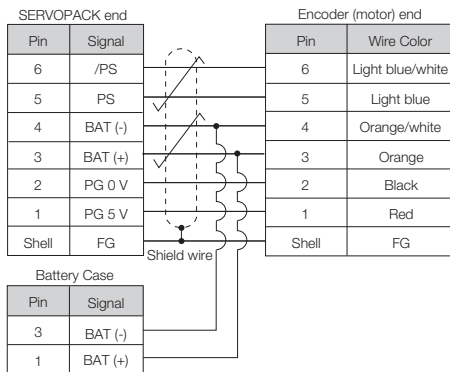
Selection Table

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

Appearance



Wiring Specifications




3.6 User-Assembled Wiring Materials for Encoder Cables

3.6.1 Precautions When Using Encoder Cables with a Wiring Length of 30 m to 50 m

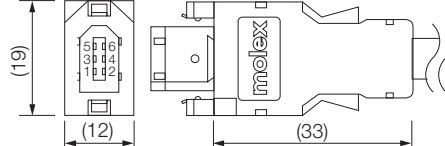
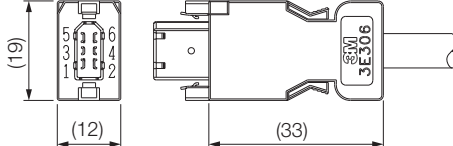
When using Encoder Cables with a wiring length of 30 m to 50 m, it is necessary to fabricate two different types of cables.

| Cables to be Fabricated | Connectors and Wire Materials Required for Fabrication | Reference Page | Remarks |
|-----------------------------------|--|---|-------------------------------------|
| Motor-End Relay Encoder Cable | SERVOPACK Connector | 3.6.2 <i>SERVOPACK Connector Kits</i> on page 3-14 | This cable should be 0.3 m or less. |
| | Servomotor Connector | 3.6.3 <i>Encoder Connector Kits</i> on page 3-15 | |
| | Encoder Cable (20 m or less) | 3.6.4 <i>Cables without Connectors</i> on page 3-16 | |
| SERVOPACK-End Relay Encoder Cable | SERVOPACK Connector | 3.6.2 <i>SERVOPACK Connector Kits</i> on page 3-14 | This cable should be 50 m or less. |
| | Cable Relay Connector | 3.6.3 <i>Encoder Connector Kits</i> on page 3-15 | |
| | Relay Encoder Cable (30 m to 50 m) | 3.6.4 <i>Cables without Connectors</i> on page 3-16 | |

Refer to the following section for details on the connection of the Relay Encoder Cable.

 3.1 *Cable Configurations* on page 3-2

3.6.2 SERVOPACK Connector Kits

| Type | Standard Connector Kit | Compatible Connector Kit |
|--------------------------|---|--|
| Inquires | Yaskawa representative | 3M Japan Limited |
| Manufacturer | Molex Incorporated | |
| 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] |  |  |

Note: Cables are not included. Purchase them separately.

3.6.3 Encoder Connector Kits

◆ Servomotor Connectors

| | | |
|-------------------------------------|---|--------------------------------------|
| Order Number | JZSP-C7P9-1-E | |
| Manufacturer | Molex Incorporated | |
| 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] | <p>■ Cable Installed away from Load</p> | <p>■ Cable Installed toward Load</p> |

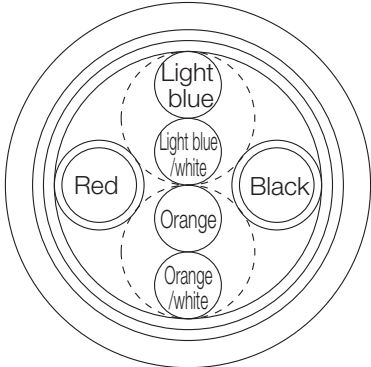
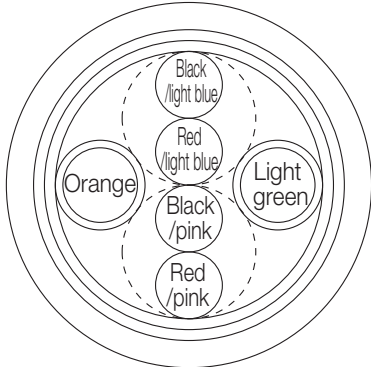
* A Crimping Tool is required. When using other wire sizes, contact the connector manufacturer for crimping tools.
 Note: Cables are not included. Purchase them separately.

◆ Cable Relay Connectors

| | |
|--------------------------|-----------------------|
| Order Number | JZSP-CMP9-2-E |
| Manufacturer | Molex Incorporated |
| Components | 54280-0609 (soldered) |
| Product Specifications | PS-54280 |
| External Dimensions [mm] | |

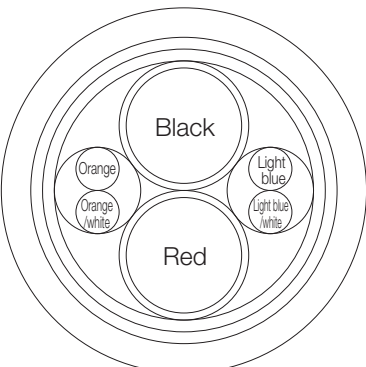
3.6.4 Cables without Connectors

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).

3.7 Wiring Precautions

The wiring precautions are the same as for SGM7M Rotary Servomotors. Refer to the following section.

 2.5 *Wiring Precautions* on page 2-9

Cables and User-Assembled Wiring Materials for SGM7A Rotary Servomotors

4

4.1 Cable Configurations 4-3

- 4.1.1 SGM7A-A5 to -10 (50 W to 1.0 kW) 4-3
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- 4.2.1 Servomotor Main Circuit Cables for Servomotors without Holding Brakes 4-5
- 4.2.2 Servomotor Main Circuit Cables for Servomotors with Holding Brakes 4-7

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- 4.3.1 Servomotor Connector Kits 4-11
- 4.3.2 Cables without Connectors 4-14

4.4 User-Assembled Wiring Materials for Servomotor Main Circuit Cables: SGM7A-15 to -70 . . 4-15

- 4.4.1 Connector Structures 4-15
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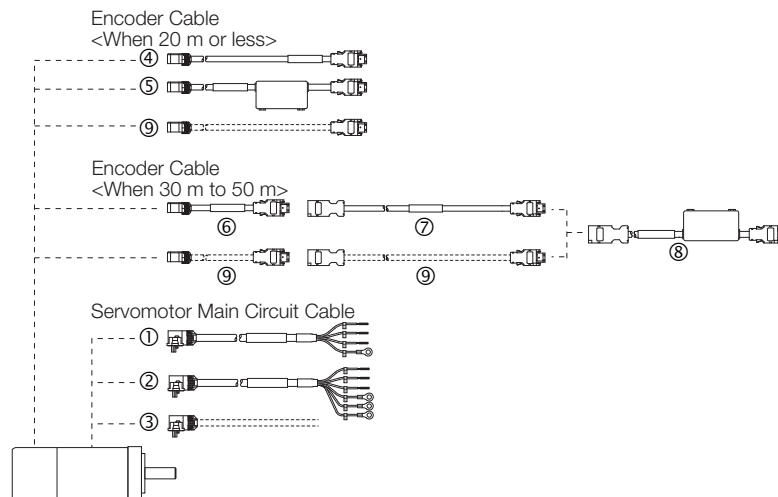
| | | |
|------------|---|-------------|
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4.1 Cable Configurations

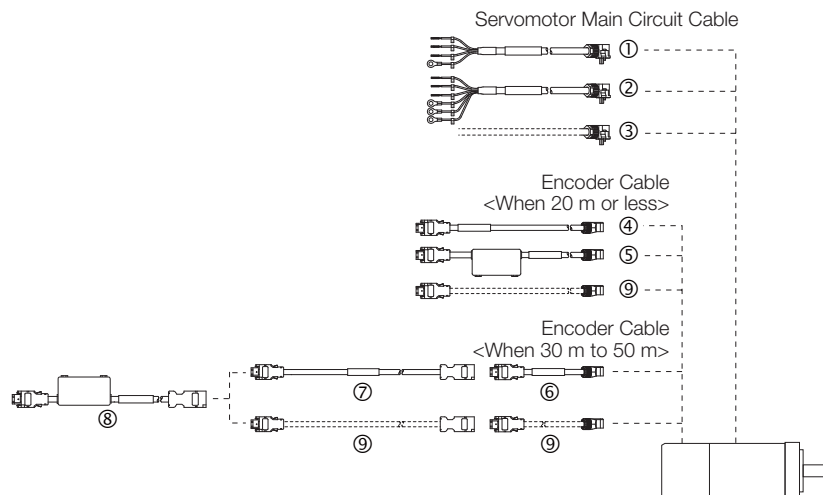
4.1.1 SGM7A-A5 to -10 (50 W to 1.0 kW)

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



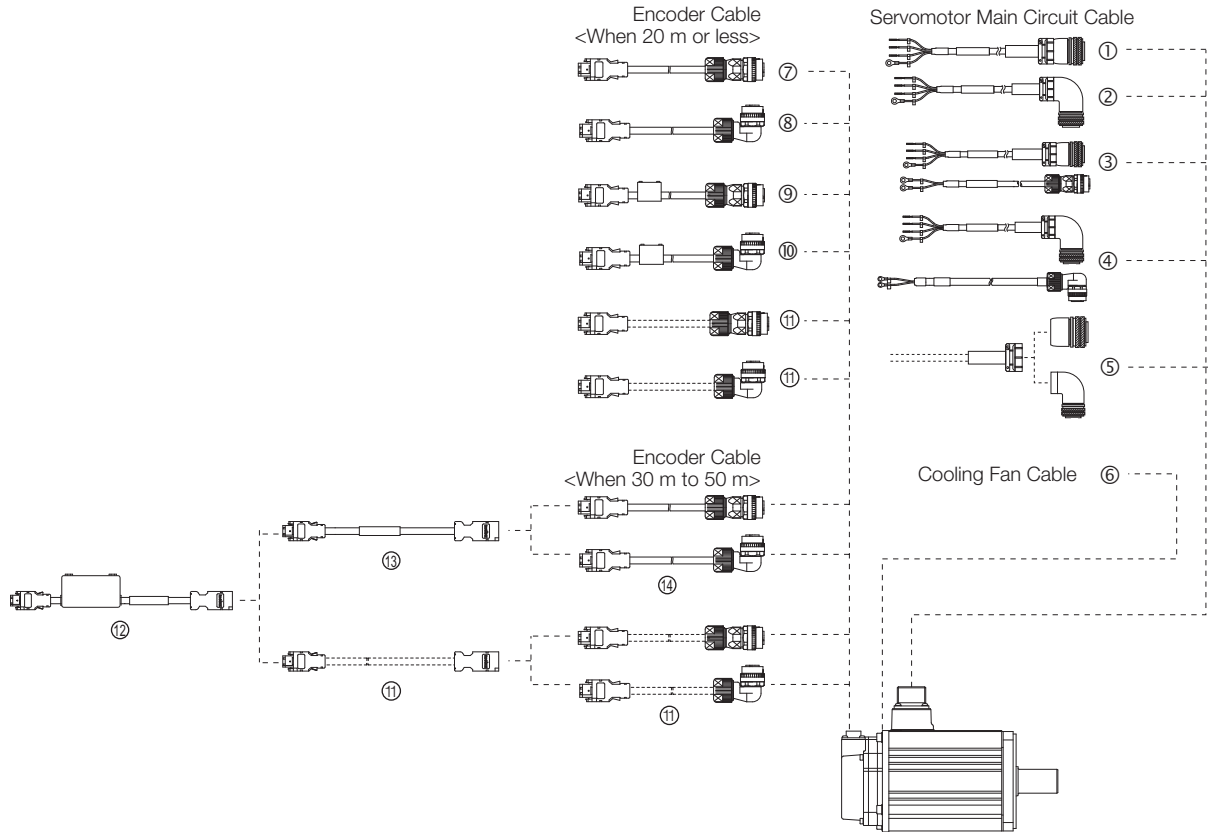
Note: If the Encoder Cable length exceeds 20 m, be sure to also connect Relay Encoder Cables as shown at ⑥ to ⑨ in the above diagram.

| No. | Cable Type | Reference |
|-----|--|--|
| ① | Servomotor Main Circuit Cables | For Servomotors without Holding Brakes |
| ② | | For Servomotors with Holding Brakes |
| ③ | User-Assembled Wiring Materials for Servomotor Main Circuit Cables | Connector Kits |
| | | Cables without Connectors |
| ④ | Encoder Cables of 20 m or Less for Incremental Encoders or Batteryless Absolute Encoders | page 4-23 |
| ⑤ | Encoder Cables of 20 m or Less with Battery Cases for Absolute Encoders*1 | page 4-25 |
| ⑥ | Motor-End Relay Encoder Cables | page 4-27 |
| ⑦ | SERVOPACK-End Relay Encoder Cables | |
| ⑧ | Relay Encoder Cables with Battery Cases*2 | |
| ⑨ | User-Assembled Wiring Materials for Encoder Cables | Connector Kits |
| | | Cables without Connectors |

*1. If a battery is connected to the host controller, the Battery Case is not required. Use an Encoder Cable for Incremental Encoders or Batteryless Absolute Encoders.

*2. This Cable is not required if you use a Servomotor with an Incremental Encoder, use a Servomotor with a Batteryless Absolute Encoder, or connect a battery to the host controller.

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



Note: If the Encoder Cable length exceeds 20 m, be sure to also connect Relay Encoder Cables as shown at ⑪ to ⑭ in the above diagram.

| No. | Cable Type | | Reference |
|-----|--|-----------------------------|-----------|
| ① | Servomotor Main Circuit Cables for Servomotors without Holding Brakes*1 | Straight Plug | page 4-5 |
| ② | | Right-Angle Plug*2 | |
| ③ | Servomotor Main Circuit Cables for Servomotors with Holding Brakes*1 | Straight Plug | page 4-7 |
| ④ | | Right-Angle Plug*2 | |
| ⑤ | User-Assembled Wiring Materials for Servomotor Main Circuit Cables | Connectors | page 4-15 |
| | | Cables without Connectors*3 | - |
| ⑥ | Cooling Fan Cable*4 | | page 4-18 |
| ⑦ | Encoder Cables of 20 m or Less for Incremental Encoders or Batteryless Absolute Encoders | Straight Plug | page 4-24 |
| ⑧ | | Right-Angle Plug | |
| ⑨ | Encoder Cables of 20 m or Less with Battery Cases for Absolute Encoders*5 | Straight Plug | page 4-26 |
| ⑩ | | Right-Angle Plug | |
| ⑪ | User-Assembled Wiring Materials for Encoder Cables | Connectors | page 4-30 |
| | | Cables without Connectors | page 4-33 |
| ⑫ | Relay Encoder Cables with Battery Cases*6 | | page 4-28 |
| ⑬ | SERVOPACK-End Relay Encoder Cables | | |
| ⑭ | Motor-End Relay Encoder Cables | | |

*1. Cables with connectors on both ends that are compliant with an IP67 protective structure and European Safety Standards are not available from Yaskawa. Fabricate the cables by yourself or consult your Yaskawa representative. To fabricate the cables, refer to the following section.

4.4 User-Assembled Wiring Materials for Servomotor Main Circuit Cables: SGM7A-15 to -70 on page 4-15

*2. The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

*3. 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.

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

*5. If a battery is connected to the host controller, the Battery Case is not required. Use an Encoder Cable for Incremental Encoders or Batteryless Absolute Encoders.

*6. This Cable is not required if you use a Servomotor with an Incremental Encoder, use a Servomotor with a Batteryless Absolute Encoder, or connect a battery to the host controller.

4.2

Servomotor Main Circuit Cables

4.2.1

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)

Note: Cables with connectors on both ends that are compliant with an IP67 protective structure and European Safety Standards are not available from Yaskawa. Fabricate the cables by yourself or consult your Yaskawa representative.

To fabricate the cables, refer to the following section.

 4.4 User-Assembled Wiring Materials for Servomotor Main Circuit Cables: SGM7A-15 to -70 on page 4-15

| 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*4 | | JZSP-UVA102-□□-E | JZSP-UVA122-□□-E |
| SGM7A-20 2.0 kW | Straight | | JZSP-UVA301-□□-E | JZSP-UVA321-□□-E |
| | Right-angle*4 | | JZSP-UVA302-□□-E | JZSP-UVA322-□□-E |
| SGM7A-25 2.5 kW | Straight | | JZSP-UVA501-□□-E | JZSP-UVA521-□□-E |
| | Right-angle*4 | | JZSP-UVA502-□□-E | JZSP-UVA522-□□-E |
| SGM7A-30 3.0 kW | Straight | | JZSP-UVA601-□□-E | JZSP-UVA621-□□-E |
| | Right-angle*4 | | 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*4 | | JZSP-UVA702-□□-E | JZSP-UVA722-□□-E |
| SGM7A-70*5 7.0 kW | Straight | | JZSP-UVA901-□□-E | JZSP-UVA921-□□-E |
| | Right-angle*4 | | 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. The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

4.2 Servomotor Main Circuit Cables

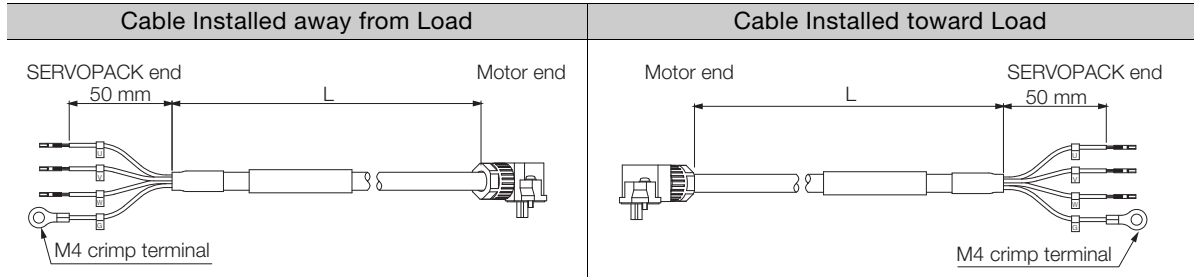
4.2.1 Servomotor Main Circuit Cables for Servomotors without Holding Brakes

*5. A cooling fan is built into the SGM7A-70 Servomotor only. Cooling fan cables are not available. Fabricate the cables by yourself or consult your Yaskawa representative.
Refer to the following section for the built-in cooling fan connector specifications that are required to select the cable.

 4.4.4 Built-in Cooling Fan Terminals on page 4-18

Appearance


◆ SGM7A-A5 to -10 (50 W to 1.0 kW)

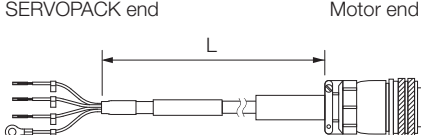
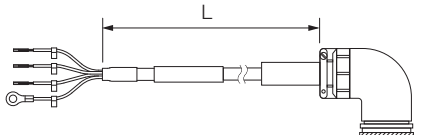
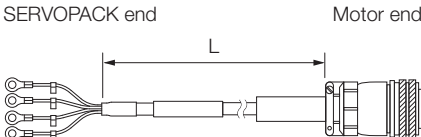
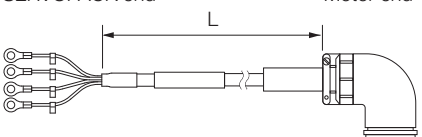


◆ SGM7A-15 to -70 (1.5 kW to 7.0 kW)

Note: Cables with connectors on both ends that are compliant with an IP67 protective structure and European Safety Standards are not available from Yaskawa. Fabricate the cables by yourself or consult your Yaskawa representative.

To fabricate the cables, refer to the following section.

 4.4 User-Assembled Wiring Materials for Servomotor Main Circuit Cables: SGM7A-15 to -70 on page 4-15

| Servomotor Model | Straight Connector | Right-Angle Connector* |
|-------------------------------------|---|--|
| SGM7A-15 1.5 kW |  |  |
| SGM7A-20 to -70 2.0 kW to 7.0 kW |  |  |

* The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

Wiring Specifications

| SGM7A-A5 to -10 (50 W to 1.0 kW) | | | | SGM7A-15 to -70 (1.5 kW to 7.0 kW) | | | |
|----------------------------------|---------|----------------------|-----|------------------------------------|---------|----------------------|-----|
| SERVOPACK Leads | | Servomotor Connector | | SERVOPACK Leads | | Servomotor Connector | |
| Wire Color | Signal | Signal | Pin | Wire Color | Signal | Signal | Pin |
| Green/yellow | FG | FG | 1 | Red | Phase U | Phase U | A |
| Blue | Phase W | Phase W | 2 | White | Phase V | Phase V | B |
| White | Phase V | Phase V | 3 | Black or blue | Phase W | Phase W | C |
| Red | Phase U | Phase U | 4 | Green or green/yellow | FG | FG | D |
| | | - | 5 | | | | |
| | | - | 6 | | | | |

4.2.2 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)

Note: Cables with connectors on both ends that are compliant with an IP67 protective structure and European Safety Standards are not available from Yaskawa. Fabricate the cables by yourself or consult your Yaskawa representative.


To fabricate the cables, refer to the following section.

 **4.4 User-Assembled Wiring Materials for Servomotor Main Circuit Cables: SGM7A-15 to -70 on page 4-15**

| 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} |
| SGM7A-15 1.5 kW | Straight | 3 m, 5 m, 10 m, 15 m, and 20 m | JZSP-UVA131-□□-E | JZSP-UVA141-□□-E |
| | Right-angle ^{*5} | | JZSP-UVA132-□□-E | JZSP-UVA142-□□-E |
| SGM7A-20 2.0 kW | Straight | | JZSP-UVA331-□□-E | JZSP-UVA341-□□-E |
| | Right-angle ^{*5} | | JZSP-UVA332-□□-E | JZSP-UVA342-□□-E |
| SGM7A-25 2.5 kW | Straight | | JZSP-U7A551-□□-E | JZSP-U7A561-□□-E |
| | Right-angle ^{*5} | | JZSP-U7A552-□□-E | JZSP-U7A562-□□-E |
| SGM7A-30 3.0 kW | Straight | | JZSP-UVA631-□□-E | JZSP-UVA641-□□-E |
| | Right-angle ^{*5} | | JZSP-UVA632-□□-E | JZSP-UVA642-□□-E |
| SGM7A-40 or -50 4.0 kW or 5.0 kW | Straight | | JZSP-UVA731-□□-E | JZSP-UVA741-□□-E |
| | Right-angle ^{*5} | | JZSP-UVA732-□□-E | JZSP-UVA742-□□-E |

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

*2. Refer to the following section to obtain Main Circuit Power Supply Cables and Holding Brake Cables individually.

 **Appearance on page 4-8**

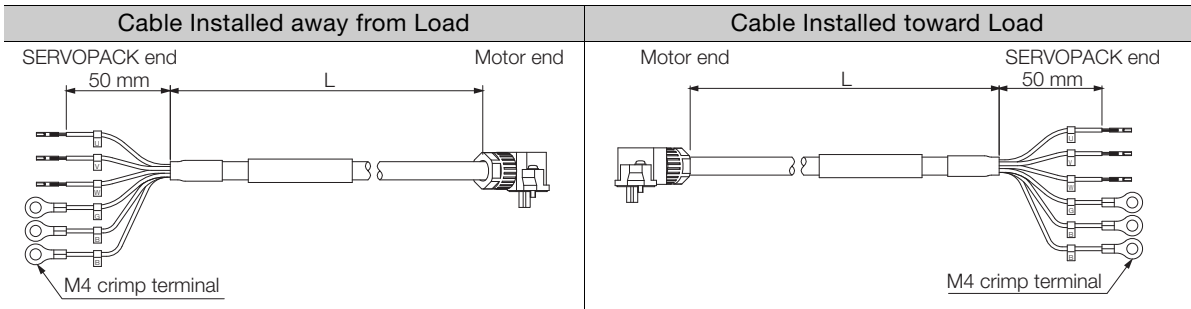
*3. Use Flexible Cables for moving parts of machines, such as robots.

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

*5. The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

Appearance

◆ SGM7A-A5 to -10 (50 W to 1.0 kW)



◆ SGM7A-15 to -50 (for 1.5 kW to 5.0 kW)

| Servomotor Model | Connector Type | Appearance | Order Numbers of Main Power Supply Cable and Holding Brake Cable | Individual Cable Order Numbers |
|--------------------|---------------------------|------------|--|---|
| SGM7A-15 1.5 kW | Straight | | Standard Cable: JZSP-UVA131-□□-E Flexible Cable: JZSP-UVA141-□□-E | <ul style="list-style-type: none"> Main Circuit Power Supply Cable Standard Cable: JZSP-UVA101-□□-E Flexible Cable: JZSP-UVA121-□□-E Holding Brake Cable*² JZSP-U7B23-□□-E |
| | Right-angle* ¹ | | Standard Cable: JZSP-UVA132-□□-E Flexible Cable: JZSP-UVA142-□□-E | <ul style="list-style-type: none"> Main Circuit Power Supply Cable Standard Cable: JZSP-UVA102-□□-E Flexible Cable: JZSP-UVA122-□□-E Holding Brake Cable*² JZSP-U7B24-□□-E |

Continued on next page.

*1. The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

*2. Flexible Cables are provided as a standard feature.

4.2.2 Servomotor Main Circuit Cables for Servomotors with Holding Brakes

Continued from previous page.

| Servomotor Model | Connector Type | Appearance | Order Numbers of Main Power Supply Cable and Holding Brake Cable | Individual Cable Order Numbers |
|--------------------|---------------------------|------------|--|---|
| SGM7A-20 2.0 kW | Straight | | Standard Cable: JZSP-UVA331-□□-E Flexible Cable: JZSP-UVA341-□□-E | <ul style="list-style-type: none"> Main Circuit Power Supply Cable Standard Cable: JZSP-UVA301-□□-E Flexible Cable: JZSP-UVA321-□□-E Holding Brake Cable*² JZSP-U7B23-□□-E |
| | Right-angle* ¹ | | Standard Cable: JZSP-UVA332-□□-E Flexible Cable: JZSP-UVA342-□□-E | <ul style="list-style-type: none"> Main Circuit Power Supply Cable Standard Cable: JZSP-UVA302-□□-E Flexible Cable: JZSP-UVA322-□□-E Holding Brake Cable*² JZSP-U7B24-□□-E |
| SGM7A-25 2.5 kW | Straight | | Standard Cable: JZSP-U7A551-□□-E Flexible Cable: JZSP-U7A561-□□-E | <ul style="list-style-type: none"> Main Circuit Power Supply Cable Standard Cable: JZSP-U7A501-□□-E Flexible Cable: JZSP-U7A521-□□-E Holding Brake Cable*² JZSP-U7B23-□□-E |
| | Right-angle* ¹ | | Standard Cable: JZSP-U7A552-□□-E Flexible Cable: JZSP-U7A562-□□-E | <ul style="list-style-type: none"> Main Circuit Power Supply Cable Standard Cable: JZSP-U7A502-□□-E Flexible Cable: JZSP-U7A522-□□-E Holding Brake Cable*² JZSP-U7B24-□□-E |

Continued on next page.

*1. The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

*2. Flexible Cables are provided as a standard feature.

4.2 Servomotor Main Circuit Cables

4.2.2 Servomotor Main Circuit Cables for Servomotors with Holding Brakes

Continued from previous page.

| Servomotor Model | Connector Type | Appearance | Order Numbers of Main Power Supply Cable and Holding Brake Cable | Individual Cable Order Numbers |
|------------------------------------|---------------------------|------------|--|---|
| SGM7A-30 3.0 kW | Straight | | Standard Cable: JZSP-UVA631-□□-E Flexible Cable: JZSP-UVA641-□□-E | <ul style="list-style-type: none"> Main Circuit Power Supply Cable Standard Cable: JZSP-UVA601-□□-E Flexible Cable: JZSP-UVA621-□□-E Holding Brake Cable*² JZSP-U7B23-□□-E |
| | Right-angle* ¹ | | Standard Cable: JZSP-UVA632-□□-E Flexible Cable: JZSP-UVA642-□□-E | <ul style="list-style-type: none"> Main Circuit Power Supply Cable Standard Cable: JZSP-UVA602-□□-E Flexible Cable: JZSP-UVA622-□□-E Holding Brake Cable*² JZSP-U7B24-□□-E |
| SGM7A-40, -50 4.0 kW, 5.0 kW | Straight | | Standard Cable: JZSP-UVA731-□□-E Flexible Cable: JZSP-UVA741-□□-E | <ul style="list-style-type: none"> Main Circuit Power Supply Cable Standard Cable: JZSP-UVA701-□□-E Flexible Cable: JZSP-UVA721-□□-E Holding Brake Cable*² JZSP-U7B23-□□-E |
| | Right-angle* ¹ | | Standard Cable: JZSP-UVA732-□□-E Flexible Cable: JZSP-UVA742-□□-E | <ul style="list-style-type: none"> Main Circuit Power Supply Cable Standard Cable: JZSP-UVA702-□□-E Flexible Cable: JZSP-UVA722-□□-E Holding Brake Cable*² JZSP-U7B24-□□-E |

*1. The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

*2. Flexible Cables are provided as a standard feature.

Wiring Specifications

| SGM7A-A5 to -10 (50 W to 1.0 kW) | | | | SGM7A-15 to -50 (1.5 kW to 5.0 kW) | | | |
|----------------------------------|---------|----------------------|-----|------------------------------------|---------|----------------------|-----|
| SERVOPACK Leads | | Servomotor Connector | | SERVOPACK Leads | | Servomotor Connector | |
| Wire Color | Signal | Signal | Pin | Wire Color | Signal | Signal | Pin |
| Green/yellow | FG | FG | 1 | Red | Phase U | Phase U | A |
| Blue | Phase W | Phase W | 2 | White | Phase V | Phase V | B |
| White | Phase V | Phase V | 3 | Black or blue | Phase W | Phase W | C |
| Red | Phase U | Phase U | 4 | Green or green/yellow | FG | FG | D |
| Black | Brake | Brake | 5 | Black | Brake | Brake | 1 |
| Black | Brake | Brake | 6 | White | Brake | Brake | 2 |

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

4.3 User-Assembled Wiring Materials for Servomotor Main Circuit Cables: SGM7A-A5 to -10

4.3.1 Servomotor Connector Kits

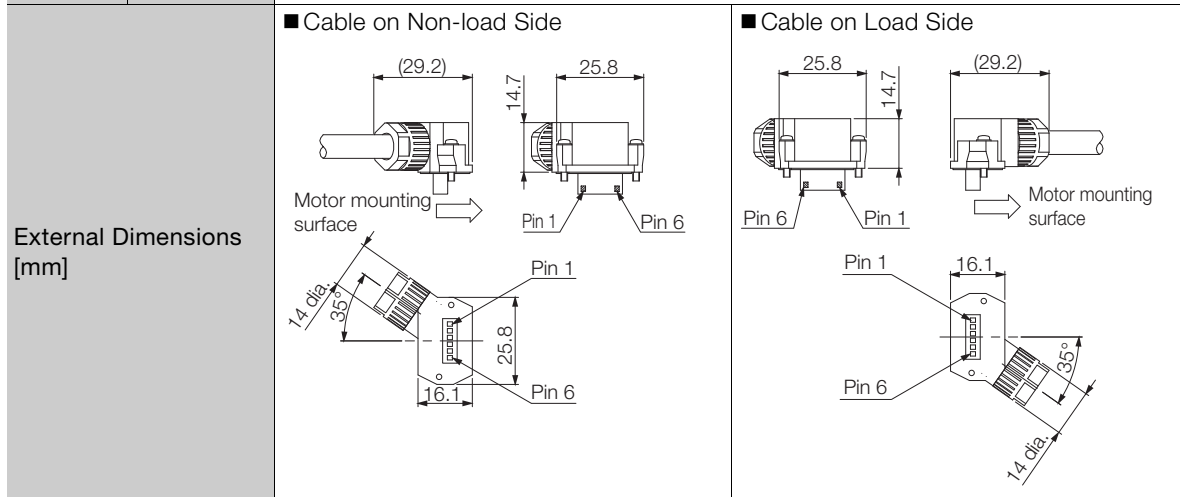
Selection Table

| 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 |
| Components | 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 |
| Crimping Tool* | Hand Tool | YRS-8841 |
| | Applicator | APLMK SJ1F/M01-08 |



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

4.3.1 Servomotor Connector Kits

◆ 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 |
| 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] | | <p>■ Cable on Non-load Side</p> |
| | | <p>■ Cable on Load Side</p> |

* 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 |
| 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: YRF-880 Holding brake terminals: YRF-881 |
| | Applicator | Power terminals: APLMK SJ3F/M41-20 Holding brake terminals: APLMK SJ3F/M01-20 |
| External Dimensions [mm] | | <div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>■ Cable on Non-load Side</p> </div> <div style="width: 48%;"> <p>■ Cable on Load Side</p> </div> </div> |

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

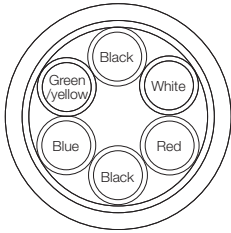
4.3.2 Cables without Connectors

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 |

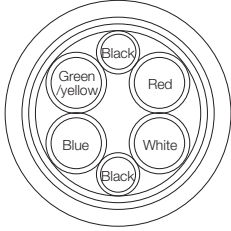
* Replace the boxes (□□) in the order number with the cable length (05, 10, 15, 20, 30, 40, or 50).

◆ 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).

4.4

User-Assembled Wiring Materials for Servomotor Main Circuit Cables: SGM7A-15 to -70

If you need standard-structure Servomotor connectors, consult your Yaskawa representative. To fabricate the cables, refer to this section.

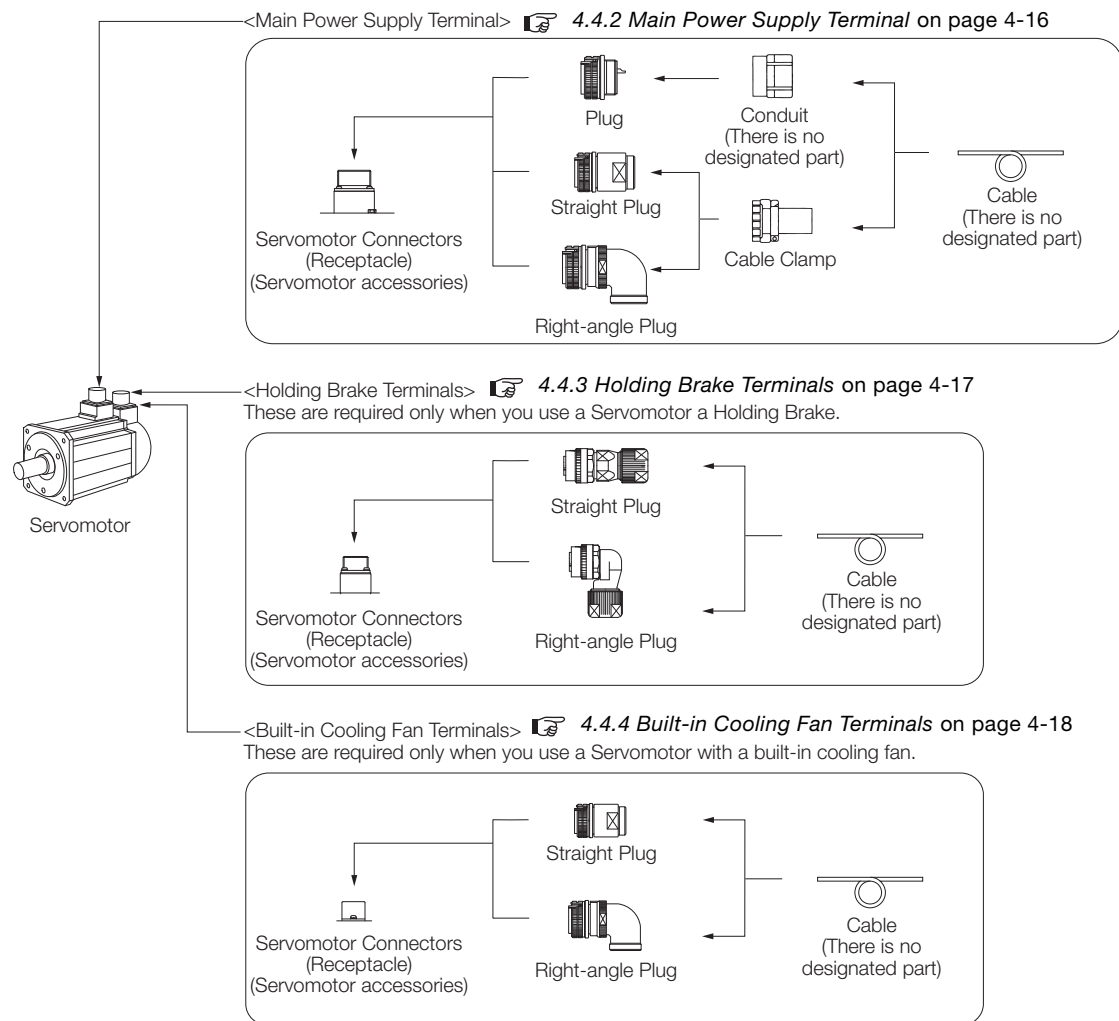
To purchase cables with connectors, refer to the following section.

4.2 Servomotor Main Circuit Cables on page 4-5

If you need Servomotor connectors on both ends that are compliant with an IP67 protective structure and European Safety Standards, fabricate the cables by yourself or consult your Yaskawa representative. To fabricate the cables, refer to this section.

When you fabricate the cables, Yaskawa does not specify what wiring materials to use. Therefore, use appropriate wiring materials for your connectors and the electrical specifications.

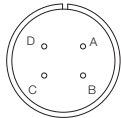
4.4.1 Connector Structures



4.4.2 Main Power Supply Terminal

Servomotor Connector (Receptacle)

This connector is an accessory to the Servomotor.

| Servomotor Model | Capacity | Servomotor Connector Models | Connector Surface |
|--|------------------|---|---|
| SGM7A-15 SGM7A-20 SGM7A-25 | 1.5 kW to 2.5 kW | CE05-2A18-10PD-D (MS Connector model: MS3102A18-10P) |  |
| SGM7A-30 SGM7A-40 SGM7A-50 SGM7A-70 | 3.0 kW to 7.0 kW | CE05-2A22-22PD-D (MS Connector model: MS3102A22-22P) | |

Note: Servomotor Connectors (receptacle) are compatible with MS Connectors. To use a plug not specified by Yaskawa, select an appropriate plug with reference to the MS connector model number in the parentheses.

Cable-Side Connectors (Plug)

Cable-side connectors (plug) are available in the standard environment type and the type compliant with an IP67 protective structure and European Safety Standards and in the straight and right-angle shapes.

◆ Standard Environment Type: Cable-Side Connectors (Plug)

| Servomotor Model | Capacity | Order Numbers | | Manufacturer | |
|--|------------------|---------------|----------------------|----------------|---|
| | | Plug | Cable Clamp | | |
| SGM7A-15 SGM7A-20 SGM7A-25 | 1.5 kW to 2.5 kW | Straight | CE05-6A18-10SD-D-BSS | CE3057-10A-□-D | DDK Ltd. |
| | | | N/MS3106B18-10S | N/MS3057-10A | Japan Aviation Electronics Industry, Ltd. |
| | | Right-angle | CE05-8A18-10SD-D-BAS | CE3057-10A-□-D | DDK Ltd. |
| | | | 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 | Straight | CE05-6A22-22SD-D-BSS | CE3057-12A-□-D | DDK Ltd. |
| | | | N/MS3106B22-22S | N/MS3057-12A | Japan Aviation Electronics Industry, Ltd. |
| | | Right-angle | CE05-8A22-22SD-D-BAS | CE3057-12A-□-D | DDK Ltd. |
| | | | N/MS3108B22-22S | N/MS3057-12A | Japan Aviation Electronics Industry, Ltd. |

◆ Type Compliant with an IP67 Protective Structure and European Safety Standards: Cable-Side Connectors (Plug)

| Servomotor Model | Capacity | Order Numbers | | | Manufacturer |
|--|------------------|---------------|----------------------|----------------|--|
| | | Plug | | Cable Clamp | |
| SGM7A-15 SGM7A-20 SGM7A-25 | 1.5 kW to 2.5 kW | Single | CE05-6A18-10SD-D* | * | |
| | | Straight | CE05-6A18-10SD-D-BSS | Order Numbers | Applicable Cable Diameter (Reference) [mm] |
| | | | | CE3057-10A-1-D | 10.5 to 14.1 |
| | | | | CE3057-10A-2-D | 8.5 to 11.0 |
| | | Right-angle | CE05-8A18-10SD-D-BAS | CE3057-10A-3-D | 6.5 to 8.7 |
| | | | | DDK Ltd. | |
| SGM7A-30 SGM7A-40 SGM7A-50 SGM7A-70 | 3.0 kW to 7.0 kW | Single | CE05-6A22-22SD-D* | * | |
| | | Straight | CE05-6A22-22SD-D-BSS | Order Numbers | Applicable Cable Diameter (Reference) [mm] |
| | | | | CE3057-12A-1-D | 12.5 to 16.0 |
| | | | | CE3057-12A-2-D | 9.5 to 13.0 |
| | | Right-angle | CE05-8A22-22SD-D-BAS | CE3057-12A-3-D | 6.8 to 10.0 |
| | | | | CE3057-12A-7-D | 14.5 to 17.0 |
| | | | | DDK Ltd. | |

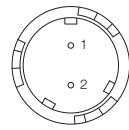
* Using a single plug does not require a Cable Clamp. However, a conduit is required instead of a Cable Clamp. Yaskawa does not specify a specific conduit. For the conduit grounding, contact the manufacturer of the conduit.

4.4.3 Holding Brake Terminals

These are required only when you use a Servomotor with a Holding Brake.

Servomotor Connector (Receptacle)

This connector is an accessory to the Servomotor.

| Servomotor Model | Capacity | Servomotor Connector Models | Connector Surface |
|--|------------------|-----------------------------|---|
| SGM7A-15 SGM7A-20 SGM7A-25 SGM7A-30 SGM7A-40 SGM7A-50 | 1.5 kW to 5.0 kW | CM10-R2P-D |  |

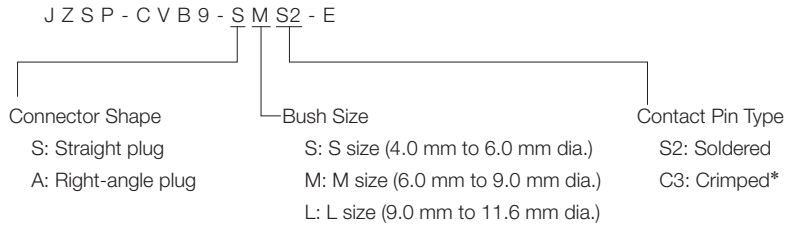
Cable-Side Connectors (Plug)

Cable-side connectors (plug) are compliant with an IP67 protective structure and European Safety Standards. They are available in the straight and right-angle shapes.

| Servomotor Model | Capacity | Order Numbers | | Applicable Cable Diameter (Reference) | Manufacturer |
|--|------------------|---------------|---------------|---------------------------------------|--------------|
| SGM7A-15 SGM7A-20 SGM7A-25 SGM7A-30 SGM7A-40 SGM7A-50 | 1.5 kW to 5.0 kW | Straight | CM10-SP2S-S-D | 4.0 mm to 6.0 mm | DDK Ltd. |
| | | | CM10-SP2S-M-D | 6.0 mm to 9.0 mm | |
| | | | CM10-SP2S-L-D | 9.0 mm to 11.6 mm | |
| | | Right-angle | CM10-AP2S-S-D | 4.0 mm to 6.0 mm | |
| | | | CM10-AP2S-M-D | 6.0 mm to 9.0 mm | |
| | | | CM10-AP2S-L-D | 9.0 mm to 11.6 mm | |

4.4.4 Built-in Cooling Fan Terminals

Information When consulting with your Yaskawa representative, refer to the following order number format.



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

Information Other connector specifications

| Item | Specifications |
|-------------------|---|
| User Instructions | <ul style="list-style-type: none"> • Straight Plug (CM10-SP2S-□-D): TC-583 • Right-Angle Plug (CM10-AP2S-□-D): TC-573 |
| Contact Models | <ul style="list-style-type: none"> ■ 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) <p>Note: The Semi-automatic Tool Set includes the press and Applicator (crimper).</p> |

4.4.4 Built-in Cooling Fan Terminals

These are required only when you use a Servomotor with a built-in cooling fan. A cooling fan is built into the SGM7A-70 Servomotor only.

Servomotor Connector (Receptacle)

This connector is an accessory to the Servomotor.

| Servomotor Model | Capacity | Servomotor Connector Models | Connector Surface |
|------------------|----------|-----------------------------|-------------------|
| SGM7A-70 | 7.0 kW | MS3102A14S-6P | |

Cable-Side Connectors (Plug)

Cable-side connectors (plug) are compliant with an IP67 protective structure and European Safety Standards.

| Servomotor Model | Capacity | Order Numbers | | Manufacturer |
|------------------|----------|---------------|-------------|---|
| | | Plug | Cable Clamp | |
| SGM7A-70 | 7.0 kW | MS3108B14S-6S | MS3057-6A | Japan Aviation Electronics Industry, Ltd. |

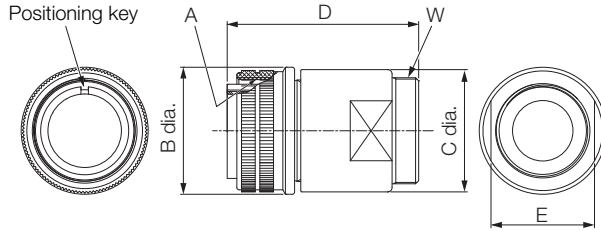
Information Prepare wiring materials that are appropriate for the following cooling fan specifications.

- Single-phase 200 V
- 50/60 Hz
- 17/15 W
- 0.11/0.09 A

4.4.5 Connector External Dimensions

Main Power Supply Terminal

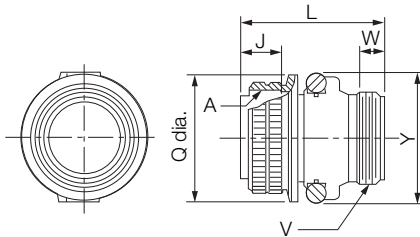
◆ Straight Plug: CE05-6A□□-□□SD-D-BSS (from DDK Ltd.)



Unit: mm

| Model | Shell Size | Joint Thread A | Joint Nut Outer Diameter B $^{+0}_{-0.38}$ Dia. | Max. Diameter C ± 0.8 Dia. | Total Length D Max. | Spanner Fitting Width Across Flat E | Cable Clamp Mounting Thread W |
|----------------------|------------|-----------------|---|--------------------------------|---------------------|-------------------------------------|-------------------------------|
| CE05-6A18-10SD-D-BSS | 18 | 1-1/8-18UNEF-2B | 34.13 | 32.1 | 57 | 26.7 | 1-20UNEF-2A |
| CE05-6A22-22SD-D-BSS | 22 | 1-3/8-18UNEF-2B | 40.48 | 38.3 | 61 | 32.4 | 1-3/16-18UNEF-2A |

◆ Straight Plug: N/MS3106B□□-□□S (from Japan Aviation Electronics Industry, Ltd.)

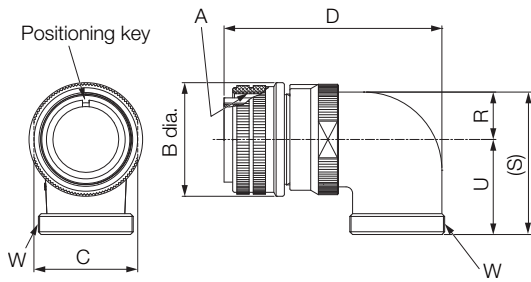


Unit: mm

| Model | 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 |
| N/MS3106B22-22S | 22 | 1-3/8-18UNEF | 18.26 | 55.57 | 40.48 | 1-3/16-18UNEF | 9.53 | 50 |

4.4.5 Connector External Dimensions

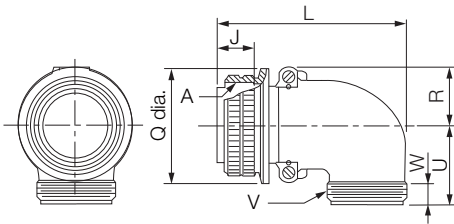
◆ Right-Angle Plug: CE05-8A□□-□□SD-D-BAS (from DDK Ltd.)



Unit: mm

| Model | Shell Size | Joint Thread A | Joint Nut Outer Diameter B ⁺⁰ _{-0.38} Dia. | Spanner Fitting Width Across Flat C | Total Length D Max. | Cable Clamp Mounting Thread W | R ± 0.7 | U ± 0.7 | (S) ± 1 |
|----------------------|------------|-----------------|--|-------------------------------------|---------------------|-------------------------------|---------|---------|---------|
| CE05-8A18-10SD-D-BAS | 18 | 1-1/8-18UNEF-2B | 34.13 | 30.0 | 69.5 | 1-20UNEF-2A | 13.2 | 30.2 | 43.4 |
| CE05-8A22-22SD-D-BAS | 22 | 1-3/8-18UNEF-2B | 40.48 | 36.2 | 75.5 | 1-3/16-18UNEF-2A | 16.3 | 33.3 | 49.6 |

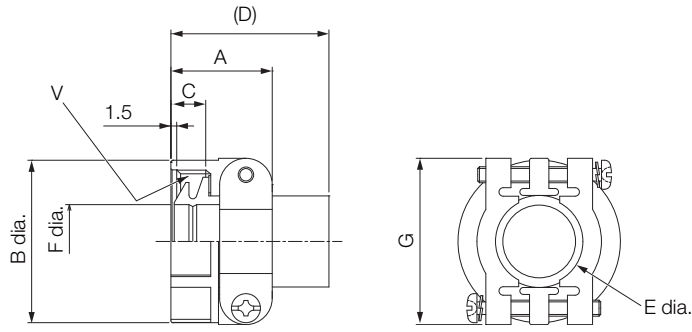
◆ Right-Angle Plug: N/MS3108B□□-□□S (from Japan Aviation Electronics Industry, Ltd.)



Unit: mm

| Model | 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/MS3108B18-10S | 18 | 1-1/8-18UNEF | 18.26 | 68.27 | 34.13 | 20.5 | 30.2 | 1-20UNEF | 9.53 |
| N/MS3108B22-22S | 22 | 1-3/8-18UNEF | 18.26 | 76.98 | 40.48 | 24.1 | 33.3 | 1-3/16-18UNEF | 9.53 |

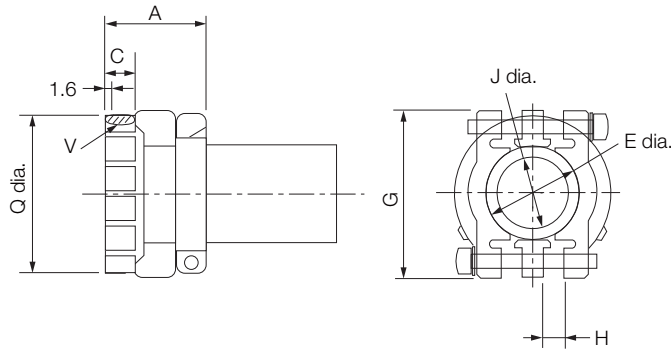
◆ Cable Clamp: CE3057-□□A-□-D (from DDK Ltd.)



Unit: mm

| Model | Applicable Connector Shell Size | Total Length A ± 0.7 | Outer Diameter B Dia. | Effective Thread Length C | (D) | Bushing Outer Diameter E Dia. | Bushing Inner Diameter F Dia. | G ± 0.7 | Mounting Thread V | Attached Bushing | Applicable Cable Diameter (Reference) |
|----------------|---------------------------------|----------------------|-----------------------|---------------------------|--------|-------------------------------|-------------------------------|---------|-------------------|------------------|---------------------------------------|
| CE3057-10A-1-D | 18 | 23.83 | 30.1 | 10.31 | (41.3) | 15.8 | 14.1 | 31.7 | 1-20UNEF-2B | CE3420-10-1 | 10.5 to 14.1 |
| CE3057-10A-2-D | | | | | | | 11 | | | CE3420-10-2 | 8.5 to 11.0 |
| CE3057-10A-3-D | | | | | | | 8.7 | | | CE3420-10-3 | 6.5 to 8.7 |
| CE3057-12A-1-D | 22 | 23.83 | 35 | 10.31 | (41.3) | 19.0 | 16 | 37.3 | 1-3/16-18UNEF-2B | CE3420-12-1 | 12.5 to 16.0 |
| CE3057-12A-2-D | | | | | | | 13 | | | CE3420-12-2 | 9.5 to 13.0 |
| CE3057-12A-3-D | | | | | | | 10 | | | CE3420-12-3 | 6.8 to 10.0 |
| CE3057-12A-7-D | | | | | | | 17 | | | CE3420-12-7 | 14.5 to 17.0 |

◆ Cable Clamp: N/MS3057-□□A (from Japan Aviation Electronics Industry, Ltd.)



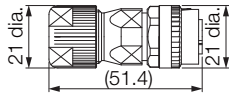
Unit: mm

| Model | Applicable Connector Shell Size | Total Length A ± 0.7 | Effective Thread Length C | Cable Clamp Inner Diameter E Dia. | G ± 0.7 | Slide Range H | Bushing Inner Diameter 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 | 22 | 23.8 | 10.3 | 19 | 37.3 | 4 | 15.9 | 1-3/16-18UNEF | 35.0 | AN3420-12 |

Note: A rubber bushing is included.

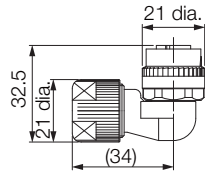
Holding Brake Terminals

◆ Straight Plug: CM10-SP2S-□-D



Unit: mm

◆ Right-Angle Plug: CM10-AP2S-□-D



Unit: mm

4.5 Encoder Cables of 20 m or Less

4.5.1 Encoder Cables for Incremental Encoders or Batteryless Absolute Encoders

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

◆ Selection Table

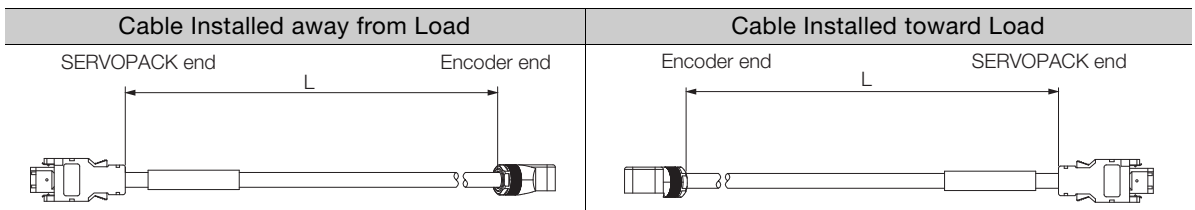
| Cable Direction | Servomotor Model | Length (L) | Order Number* ¹ | |
|-----------------|-----------------------------------|-----------------------------------|----------------------------|----------------------------------|
| | | | Standard Cable | Flexible Cable* ^{2, *3} |
| Load side | SGM7A-A5 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 46 mm or larger.

◆ External Dimensions



◆ Wiring Specifications

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

SGM7A-15 to -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*4, *5 | | JZSP-CVP02-□□-E | JZSP-CVP12-□□-E |

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

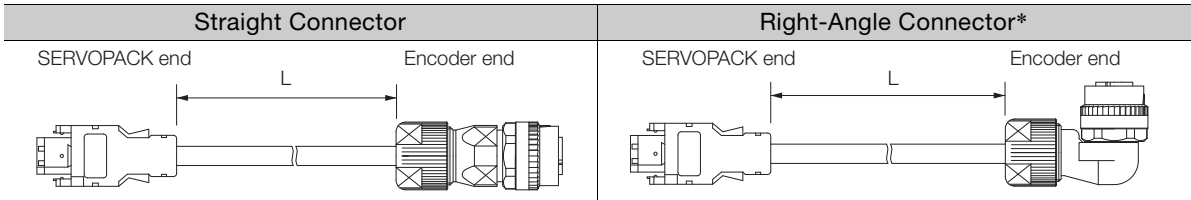
*2. Use Flexible Cables for moving parts of machines, such as robots.

*3. The recommended bending radius (R) is 46 mm or larger.

*4. The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

*5. An Encoder Cable with a Right-angle Connector cannot be used with the SGM7A-70 (7.0 kW). Use an Encoder Cable with a Straight Connector.

◆ Appearance



* The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

◆ Wiring Specifications

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

4.5.2 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. Use an Encoder Cable for Incremental Encoders or Batteryless Absolute 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 -10 (50 W to 1.0 kW)

◆ Selection Table

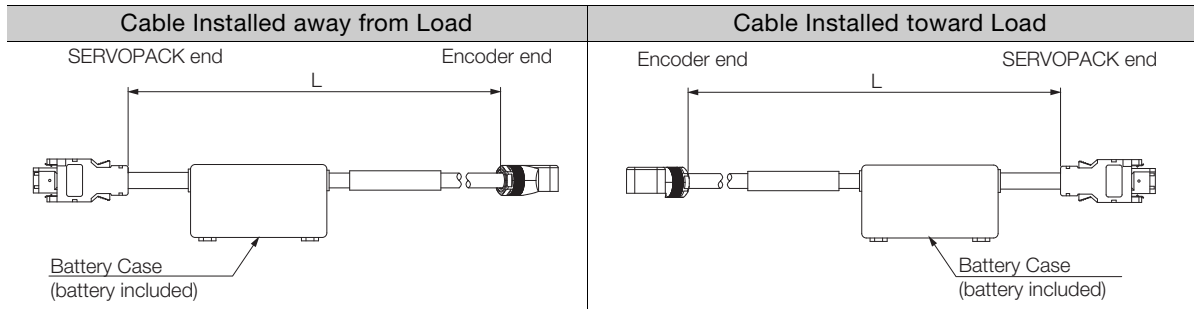
| Cable Direction | Servomotor Model | Length (L) | Order Number*1 | |
|-----------------|-----------------------------------|-----------------------------------|------------------|----------------------|
| | | | Standard Cable | Flexible Cable*2, *3 |
| Load side | SGM7A-A5 to -10 50 W to 1.0 kW | 3 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).

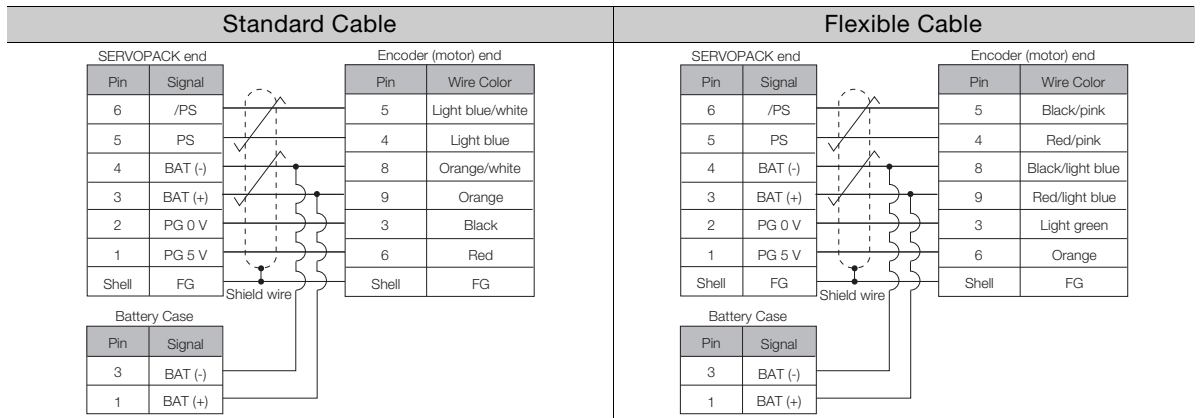
*2. Use Flexible Cables for moving parts of machines, such as robots.

*3. The recommended bending radius (R) is 46 mm or larger.

◆ External Dimensions



◆ Wiring Specifications



SGM7A-15 to -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*4, *5 | | JZSP-CVP07-□□-E | JZSP-CVP27-□□-E |

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

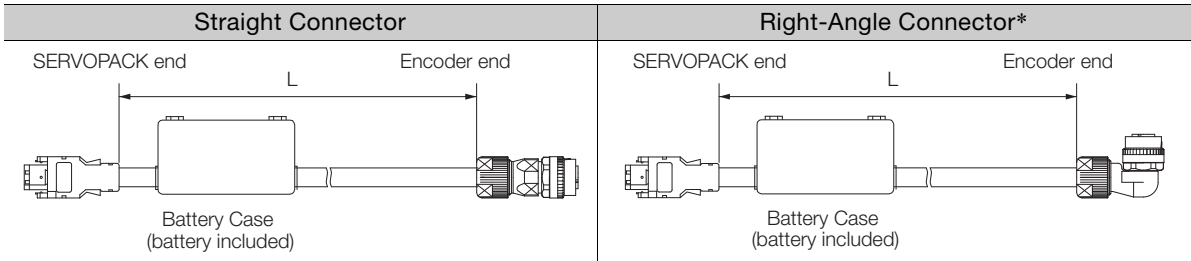
*2. Use Flexible Cables for moving parts of machines, such as robots.

*3. The recommended bending radius (R) is 46 mm or larger.

*4. The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

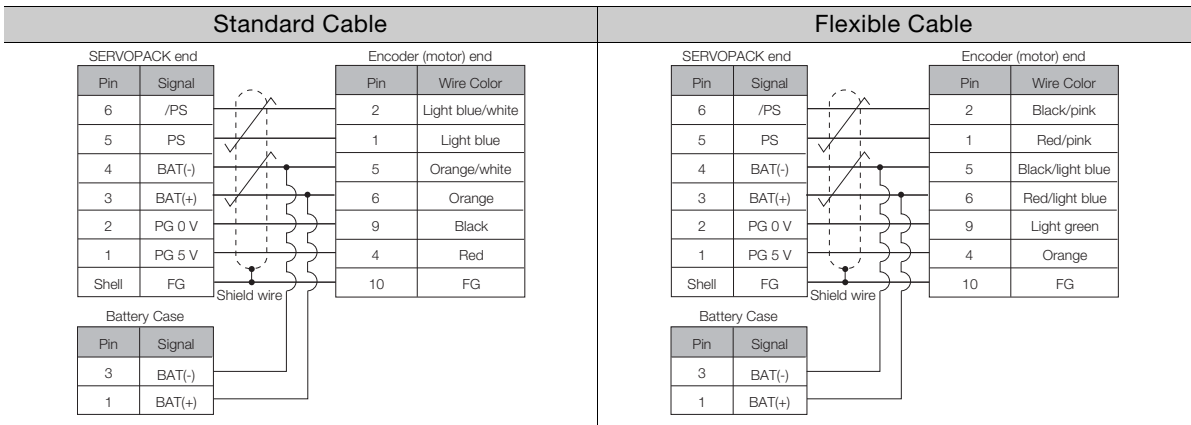
*5. An Encoder Cable with a Right-angle Connector cannot be used with the SGM7A-70 (7.0 kW). Use an Encoder Cable with a Straight Connector.

◆ Appearance



* The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

◆ Wiring Specifications



4.6 Relay Encoder Cable of 30 m to 50 m

If the Encoder Cable length exceeds 20 m, be sure to also use a Motor-End Relay Encoder Cable and a SERVOPACK-End Relay Encoder Cable.

If you use a motor with an absolute encoder and a battery is not mounted to the host controller, also obtain a Relay Encoder Cable with a Battery Case in addition to the above two 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.

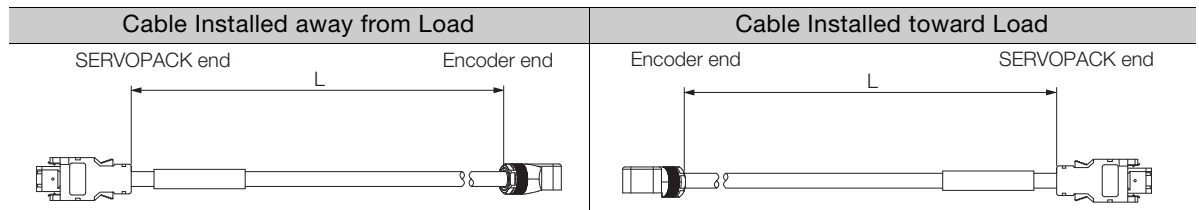
4.6.1 Motor-End Relay Encoder Cables

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

◆ Selection Table

| Cable Direction | Specification | Length (L) | Order Number |
|-----------------|---------------------------------|------------|---------------|
| Load side | Used for all types of encoders. | 0.3 m | JZSP-C7PRCD-E |
| Non-load side | | | JZSP-C7PRCE-E |

◆ Appearance



◆ Wiring Specifications

| 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 0 V | 3 | Black |
| 1 | PG 5 V | 6 | Red |
| Shell | FG | Shell | FG |

Shield wire

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

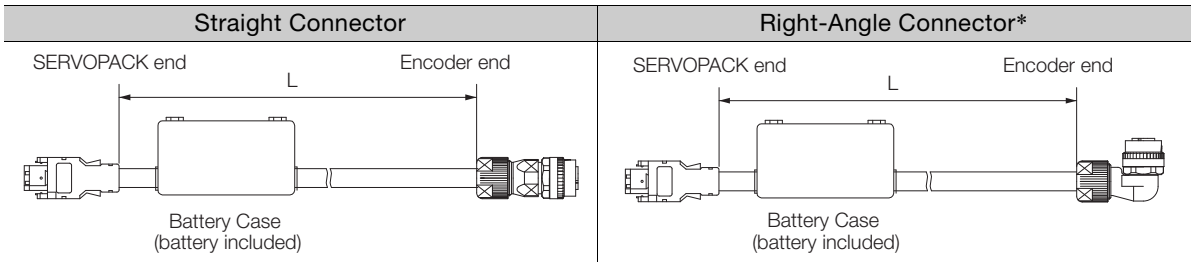
◆ Selection Table

| Connector Specifications | Specification | Length (L) | Order Number |
|-----------------------------|---------------------------------|------------|--------------|
| Straight Connector | Used for all types of encoders. | 0.3 m | JZSP-CVP01-E |
| Right-Angle Connector*1, *2 | | | JZSP-CVP02-E |

*1. The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

*2. An Encoder Cable with a Right-angle Connector cannot be used with the SGM7A-70 (7.0 kW). Use an Encoder Cable with a Straight Connector.

◆ Appearance



* The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

◆ 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 0 V | 9 | Black |
| 1 | PG 5 V | 4 | Red |
| Shell | FG | 10 | FG |

Shield wire

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

4.6.2 SERVOPACK-End Relay Encoder Cables

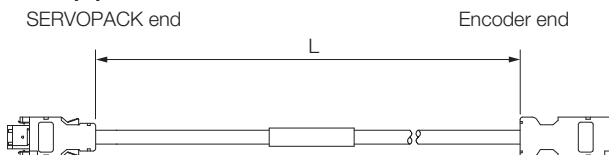
All Models

◆ Selection Table

| Specification | Length (L) | Order Number* |
|---------------------------------|----------------------|------------------|
| Used for all types of encoders. | 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).

◆ Appearance



◆ 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 0 V | 2 | Black |
| 1 | PG 5 V | 1 | Red |
| Shell | FG | Shell | FG |

4.6.3 Relay Encoder Cables with Battery Cases

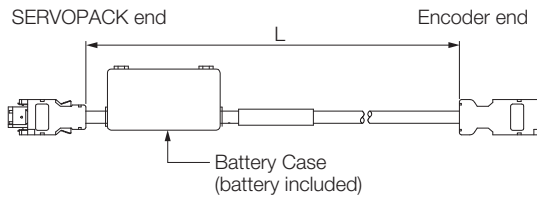
Note: This Cable is not required if you use a Servomotor with an Incremental Encoder, use a Servomotor with a Batteryless Absolute Encoder, or connect a battery to the host controller.

All Models

◆ Selection Table

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

◆ Appearance



◆ 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 0 V | 2 | Black |
| 1 | PG 5 V | 1 | Red |
| Shell | FG | Shell | FG |

| Battery Case | |
|--------------|---------|
| Pin | Signal |
| 3 | BAT (-) |
| 1 | BAT (+) |


4.7 User-Assembled Wiring Materials for Encoder Cables

4.7.1 Precautions When Using Encoder Cables with a Wiring Length of 30 m to 50 m

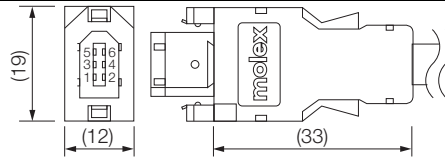
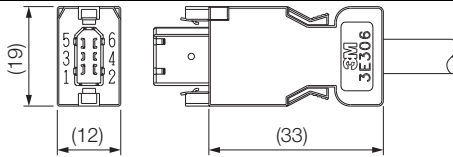
When using Encoder Cables with a wiring length of 30 m to 50 m, it is necessary to fabricate two different types of cables.

| Cables to be Fabricated | Connectors and Wire Materials Required for Fabrication | Reference Page | Remarks |
|-----------------------------------|--|---|-------------------------------------|
| Motor-End Relay Encoder Cable | SERVOPACK Connector | 4.7.2 <i>SERVOPACK Connector Kits</i> on page 4-30 | This cable should be 0.3 m or less. |
| | Servomotor Connector | 4.7.3 <i>Encoder Connector Kits</i> on page 4-31 | |
| | Encoder Cables of 20 m or Less | 4.7.4 <i>Cables without Connectors</i> on page 4-33 | |
| SERVOPACK-End Relay Encoder Cable | SERVOPACK Connector | 4.7.2 <i>SERVOPACK Connector Kits</i> on page 4-30 | This cable should be 50 m or less. |
| | Cable Relay Connector | 4.7.3 <i>Encoder Connector Kits</i> on page 4-31 | |
| | Relay Encoder Cable (30 m to 50 m) | 4.7.4 <i>Cables without Connectors</i> on page 4-33 | |

Refer to the following section for details on the connection of the Relay Encoder Cable.

 4.1 *Cable Configurations* on page 4-3

4.7.2 SERVOPACK Connector Kits

| Type | Standard Connector Kit | Compatible Connector Kit |
|--------------------------|---|--|
| Inquires | Yaskawa representative | 3M Japan Limited |
| Manufacturer | Molex Incorporated | |
| 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] |  |  |

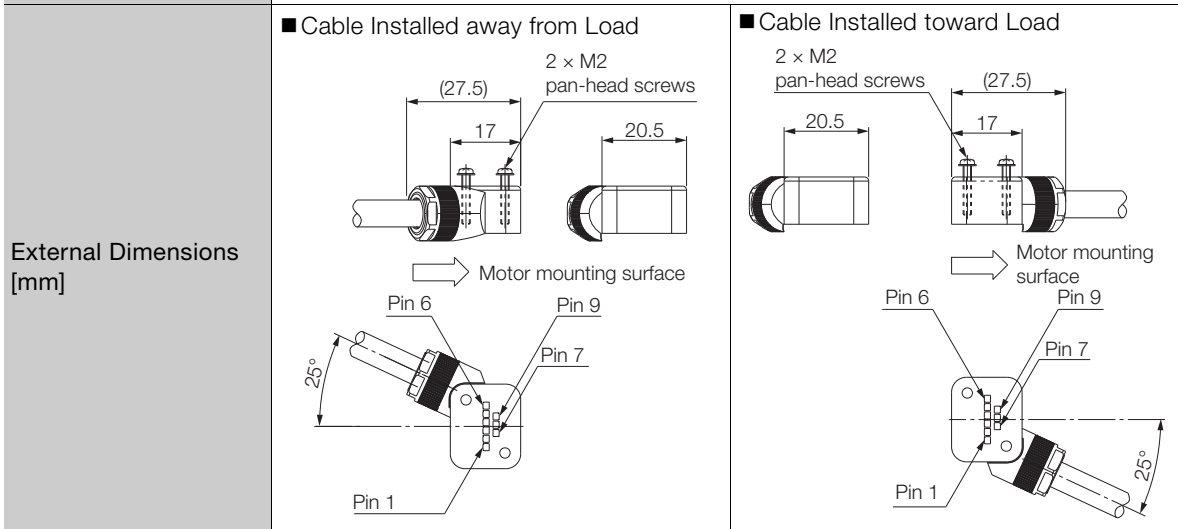
Note: Cables are not included. Purchase them separately.

4.7.3 Encoder Connector Kits

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

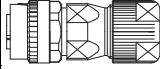
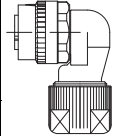
◆ Servomotor Connectors

| | |
|-------------------------------------|--|
| Order Number | JZSP-C7P9-1-E |
| Manufacturer | Molex Incorporated |
| 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 |
| Hand Tool | 57175-5000 |
| Shell Caulking Tool | 57331-5100 |



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

◆ IP67-Structure Servomotor Connectors

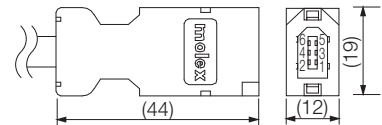
| Type | Order Number | Specification | External Dimensions | Manufacturer |
|--------------------|---------------|--|---|--------------|
| Straight Plug | JZSP-CVP9-1-E | <ul style="list-style-type: none"> Plug: CM10-SP10S-M-D Contacts: Crimped*1 CM10-#22SC(C4)-100 Applicable cable diameter: 6.0 mm to 9.0 mm |  Accessories: Contacts | DDK Ltd. |
| | JZSP-CVP9-3-E | <ul style="list-style-type: none"> Plug: CM10-SP10S-M-D Contacts: Soldered CM10-#22SC(S1)-100 Applicable cable diameter: 6.0 mm to 9.0 mm | | |
| Right-Angle Plug*2 | JZSP-CVP9-2-E | <ul style="list-style-type: none"> Plug: CM10-AP10S-M-D Contacts: Crimped*1 CM10-#22SC(C4)-100 Applicable cable diameter: 6.0 mm to 9.0 mm |  Accessories: Contacts | |
| | JZSP-CVP9-4-E | <ul style="list-style-type: none"> Plug: CM10-AP10S-M-D Contacts: Soldered CM10-#22SC(S1)-100 Applicable cable diameter: 6.0 mm to 9.0 mm | | |

*1. 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

*2. A Right-Angle Connector cannot be used for the encoder connector of the SGM7A-70 (7.0 kW). Use a Straight Connector.

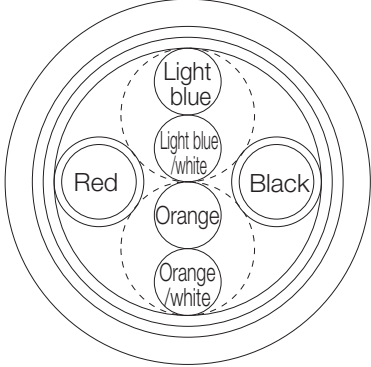
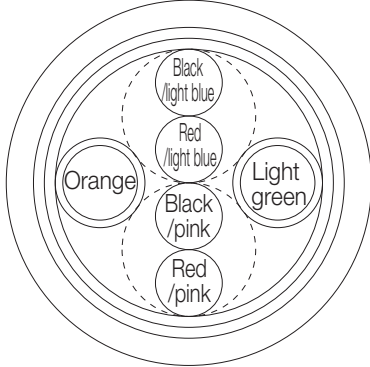
All Models

◆ Cable Relay Connectors

| | |
|--------------------------|---|
| Order Number | JZSP-CMP9-2-E |
| Manufacturer | Molex Incorporated |
| Components | 54280-0609 (soldered) |
| Product Specifications | PS-54280 |
| External Dimensions [mm] |  |

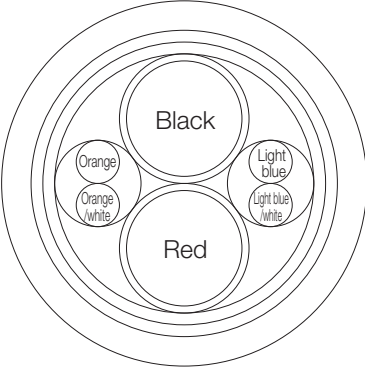
4.7.4 Cables without Connectors

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).

4.8 Wiring Precautions

The wiring precautions are the same as for SGM7M Rotary Servomotors. Refer to the following section.

 *2.5 Wiring Precautions* on page 2-9

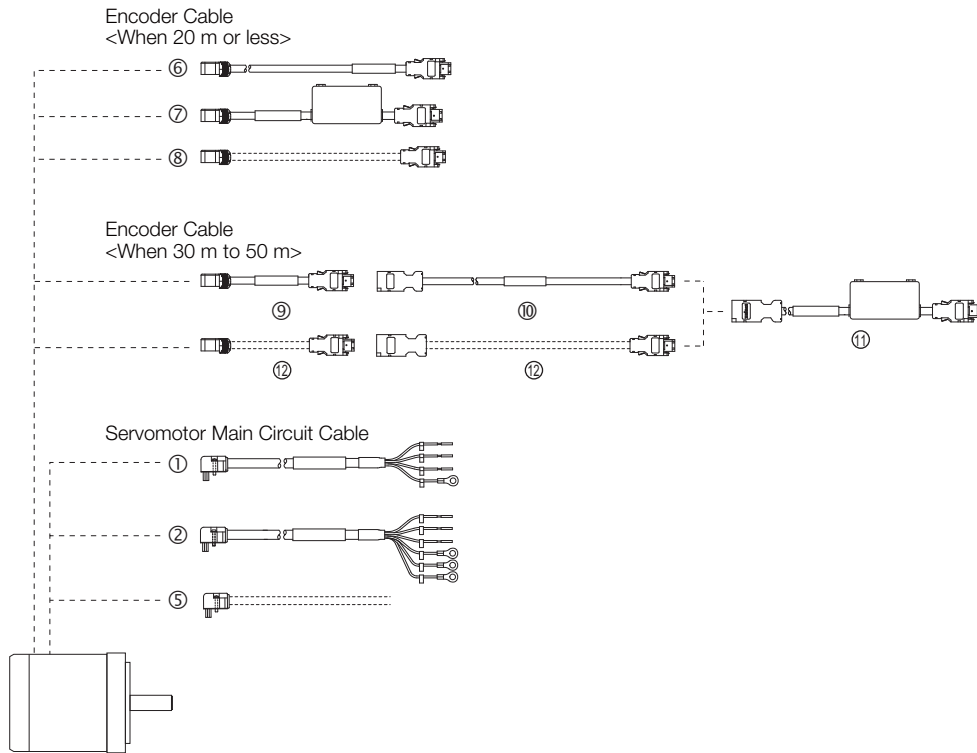
Cables and User-Assembled Wiring Materials for SGM7P Rotary Servomotors

5

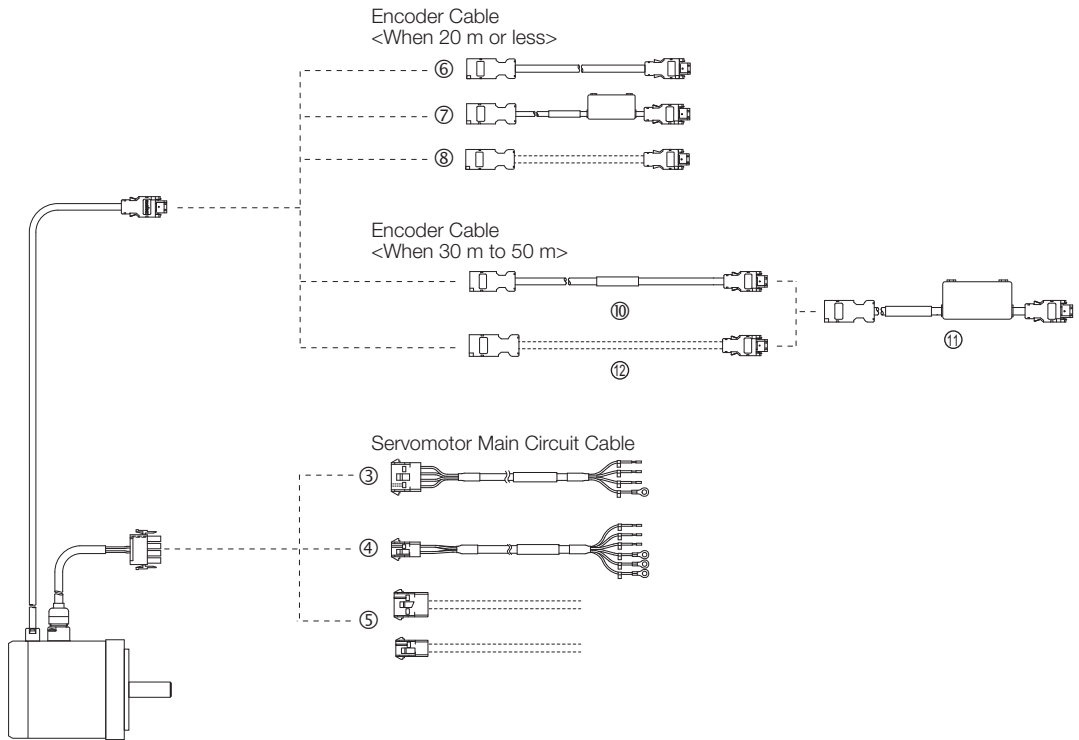
| | | |
|------------|--|-------------|
| 5.1 | Cable Configurations | 5-2 |
| 5.2 | Servomotor Main Circuit Cables | 5-4 |
| 5.2.1 | Servomotor Main Circuit Cables for Servomotors without Holding Brakes | 5-4 |
| 5.2.2 | Servomotor Main Circuit Cables for Servomotors with Holding Brakes | 5-5 |
| 5.3 | User-Assembled Wiring Materials for Servomotor Main Circuit Cables . . | 5-6 |
| 5.3.1 | Servomotor Connector Kits | 5-6 |
| 5.3.2 | Cables without Connectors | 5-8 |
| 5.4 | Encoder Cables of 20 m or Less | 5-9 |
| 5.4.1 | Encoder Cables for Incremental Encoders or Batteryless Absolute Encoders | 5-9 |
| 5.4.2 | Encoder Cables for Absolute Encoders | 5-11 |
| 5.5 | Relay Encoder Cable of 30 m to 50 m | 5-13 |
| 5.5.1 | Motor-End Relay Encoder Cables | 5-13 |
| 5.5.2 | SERVOPACK-End Relay Encoder Cables | 5-13 |
| 5.5.3 | Relay Encoder Cables with Battery Cases | 5-14 |
| 5.6 | User-Assembled Wiring Materials for Encoder Cables . . | 5-15 |
| 5.6.1 | Precautions When Using Encoder Cables with a Wiring Length of 30 m to 50 m | 5-15 |
| 5.6.2 | SERVOPACK Connector Kits | 5-15 |
| 5.6.3 | Encoder Connector Kits | 5-16 |
| 5.6.4 | Cables without Connectors | 5-17 |
| 5.7 | Wiring Precautions | 5-18 |

5.1 Cable Configurations

- SGM7P-01 to -04 (for 100 W to 400 W)



- SGM7P-08, -15 (for 750 W, 1.5 kW)



Note: If the Encoder Cable length exceeds 20 m, be sure to also connect Relay Encoder Cables as shown at ⑩ to ⑫ in the above diagram.

| No. | Cable Type | Reference | |
|-----|--|--|-----------|
| ① | Servomotor Main Circuit Cables | For Servomotors without Holding Brakes, 100 W to 400 W* ¹ | page 5-4 |
| ② | | For Servomotors with Holding Brakes, 100 W to 400 W* ¹ | page 5-5 |
| ③ | | For Servomotors without Holding Brakes, 750 W or 1.5 kW | page 5-4 |
| ④ | | For Servomotors with Holding Brakes, 750 W or 1.5 kW | page 5-5 |
| ⑤ | User-Assembled Wiring Materials for Servomotor Main Circuit Cables | Connectors | page 5-6 |
| | | Cables without Connectors | page 5-8 |
| ⑥ | Encoder Cables of 20 m or Less for Incremental Encoders or Batteryless Absolute Encoders | page 5-9 | |
| ⑦ | Encoder Cables of 20 m or Less with Battery Cases for Absolute Encoders* ² | page 5-11 | |
| ⑧ | User-Assembled Wiring Materials for Encoder Cables | Connectors | page 5-15 |
| | | Cables without Connectors | page 5-17 |
| ⑨ | Motor-End Relay Encoder Cables | page 5-12 | |
| ⑩ | SERVOPACK-End Relay Encoder Cables | | |
| ⑪ | Relay Encoder Cables with Battery Cases* ³ | | |
| ⑫ | User-Assembled Wiring Materials for Relay Encoder Cables of 30 m to 50 m | Connectors | page 5-15 |
| | | Cables without Connectors | page 5-17 |

*1. The lead installation direction is toward the load. Any other lead installation direction is not allowed.

*2. If a battery is connected to the host controller, the Battery Case is not required. Use an Encoder Cable for Incremental Encoders or Batteryless Absolute Encoders.

*3. This Cable is not required if you use a Servomotor with an Incremental Encoder, use a Servomotor with a Batteryless Absolute Encoder, or connect a battery to the host controller.

5.2 Servomotor Main Circuit Cables

5.2.1 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*4 | JZSP-CSM21-□□-E*4 |
| SGM7P-02 or -04 200 W or 400 W | | JZSP-CSM02-□□-E*4 | JZSP-CSM22-□□-E*4 |
| 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).

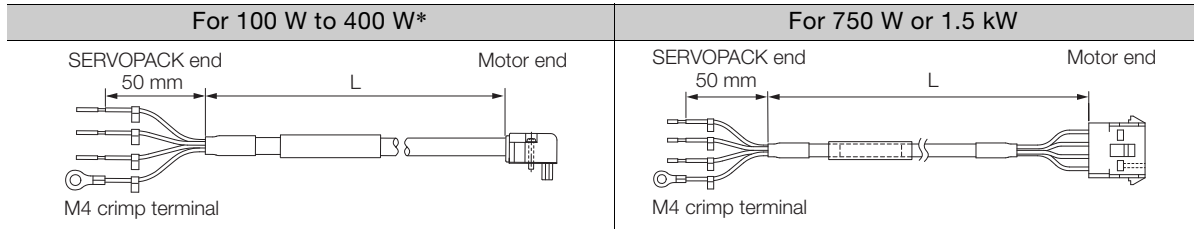
*2. Use Flexible Cables for moving parts of machines, such as robots.

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

*4. The lead installation direction is toward the load. Any other lead installation direction is not allowed.

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.

Appearance



* The lead installation direction is toward the load. Any other lead installation direction is not allowed.

Wiring Specifications

| For 100 W to 400 W | | | | For 750 W or 1.5 kW | | | |
|--------------------|---------|----------------------|-----|---------------------|---------|----------------------|-----|
| SERVOPACK Leads | | Servomotor Connector | | SERVOPACK Leads | | Servomotor Connector | |
| Wire Color | Signal | Signal | Pin | Wire Color | Signal | Signal | Pin |
| Green/yellow | FG | FG | 1 | Red | Phase U | Phase U | 1 |
| Blue | Phase W | Phase W | 2 | White | Phase V | Phase V | 2 |
| White | Phase V | Phase V | 3 | Blue | Phase W | Phase W | 3 |
| Red | Phase U | Phase U | 4 | Green/yellow | FG | FG | 4 |
| | | - | 5 | | | | |
| | | - | 6 | | | | |

5.2.2 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* ⁴ | JZSP-CSM31-□□-E* ⁴ |
| SGM7P-02 or -04 200 W or 400 W | | JZSP-CSM12-□□-E* ⁴ | JZSP-CSM32-□□-E* ⁴ |
| 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).

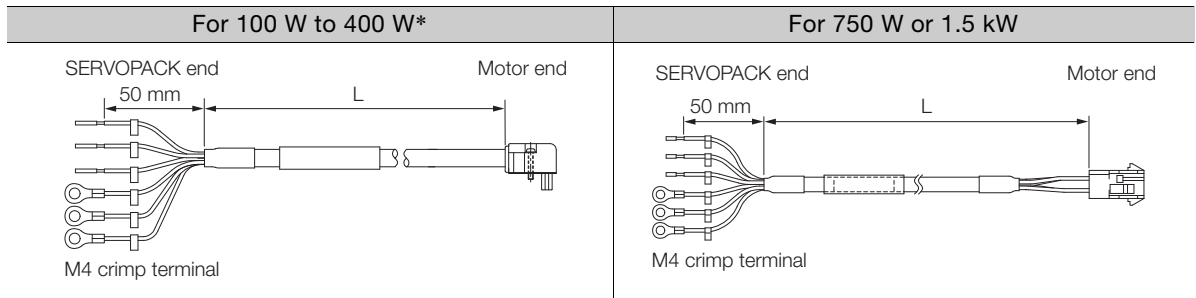
*2. Use Flexible Cables for moving parts of machines, such as robots.

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

*4. The lead installation direction is toward the load. Any other lead installation direction is not allowed.

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.

Appearance



* The lead installation direction is toward the load. Any other lead installation direction is not allowed.

Wiring Specifications

| For 100 W to 400 W | | | | For 750 W or 1.5 kW | | | |
|--------------------|---------|----------------------|-----|---------------------|---------|----------------------|-----|
| SERVOPACK Leads | | Servomotor Connector | | SERVOPACK Leads | | Servomotor Connector | |
| Wire Color | Signal | Signal | Pin | Wire Color | Signal | Signal | Pin |
| Green/yellow | FG | FG | 1 | Red | Phase U | Phase U | 1 |
| Blue | Phase W | Phase W | 2 | White | Phase V | Phase V | 2 |
| White | Phase V | Phase V | 3 | Blue | Phase W | Phase W | 3 |
| Red | Phase U | Phase U | 4 | Green/yellow | FG | FG | 4 |
| Black | Brake | Brake | 5 | Black | Brake | Brake | 5 |
| Black | Brake | Brake | 6 | Black | Brake | Brake | 6 |

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

5.3 User-Assembled Wiring Materials for Servomotor Main Circuit Cables

5.3.1 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-1M-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*1 | Hand Tool | YRS-8841 |
| | Applicator | APLMK SJ1F/MO1-08 |
| External Dimensions [mm] | | <p>■ Cable Installed toward Load*2</p> |

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

*2. The lead installation direction is toward the load. Any other lead installation direction is not allowed.

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-1M-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*1 | Hand Tool | YRS-8861 |
| | Applicator | APLMK SJ2F/MO1-10 |
| External Dimensions [mm] | | <p>■ Cable Installed toward Load*2</p> |

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

*2. The lead installation direction is toward the load. Any other lead installation direction is not allowed.

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.

5.3.2 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 |

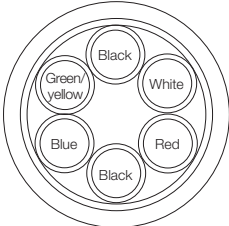
*1. Replace the boxes (□□) in the order number with the cable length (05, 10, 15, 20, 30, 40, or 50).

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

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

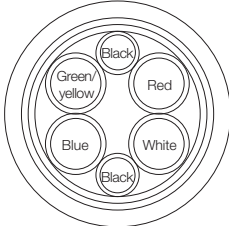
Note: If the length of the Servomotor Main Circuit Cable exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

◆ 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).

5.4 Encoder Cables of 20 m or Less

5.4.1 Encoder Cables for Incremental Encoders or Batteryless Absolute Encoders

SGM7P-01 to -04 (for 100 W to 400 W)

◆ Selection Table

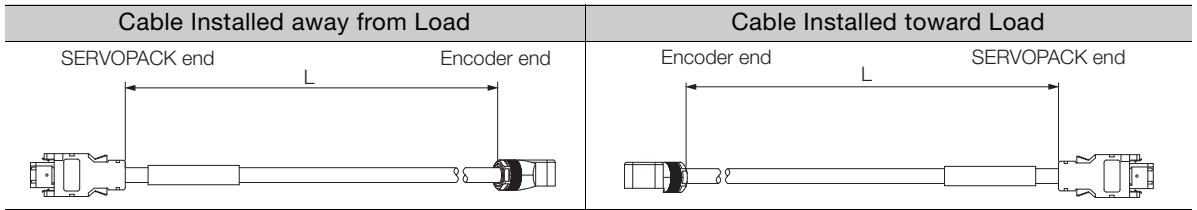
| Cable Direction | Servomotor Model | Length (L) | Order Number*1 | |
|-----------------|-----------------------------------|-------------------------------|------------------|----------------------|
| | | | Standard Cable | Flexible Cable*2, *3 |
| Load side | SGM7P-01 to -04 100 W to 400 W | 3 m, 5 m, 10 m, 15 m, 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 46 mm or larger.

◆ Appearance



◆ Wiring Specifications

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

SGM7P-08 or -15 (750 W or 1,500 W)

◆ Selection Table

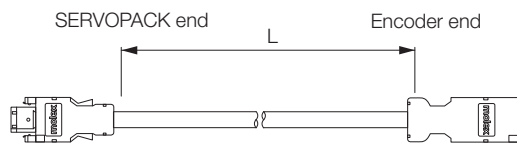
| Servomotor Model | Length (L) | Order Number*1 | |
|-------------------------------------|-------------------------------|-----------------|----------------------|
| | | Standard Cable | Flexible Cable*2, *3 |
| SGM7P-08 or -15 750 W or 1,500 W | 3 m, 5 m, 10 m, 15 m, or 20 m | JZSP-CMP00-□□-E | JZSP-CMP10-□□-E |

*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 46 mm or larger.

◆ Appearance



◆ Wiring Specifications

| Standard Cable | | | | | Flexible Cable | | | | |
|----------------|--------|---------------------|------------------|-------|----------------|-------|---------------------|-------|------------------|
| SERVOPACK end | | Encoder (motor) end | | | SERVOPACK end | | Encoder (motor) end | | |
| Pin | Signal | Pin | Wire Color | Pin | Signal | Pin | Wire Color | Pin | Wire Color |
| 6 | /PS | 6 | Light blue/white | 6 | /PS | 6 | Black/light blue | 6 | Black/light blue |
| 5 | PS | 5 | Light blue | 5 | PS | 5 | Red/light blue | 5 | Red/light blue |
| 4 | BAT(-) | 4 | Orange/white | 4 | BAT(-) | 4 | Black/pink | 4 | Black/pink |
| 3 | BAT(+) | 3 | Orange | 3 | BAT(+) | 3 | Red/pink | 3 | Red/pink |
| 2 | PG 0 V | 2 | Black | 2 | PG 0 V | 2 | Light green | 2 | Light green |
| 1 | PG 5 V | 1 | Red | 1 | PG 5 V | 1 | Orange | 1 | Orange |
| Shell | FG | Shell | FG | Shell | FG | Shell | FG | Shell | 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. Use an Encoder Cable for Incremental Encoders or Batteryless Absolute 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.

SGM7P-01 to -04 (for 100 W to 400 W)

◆ Selection Table

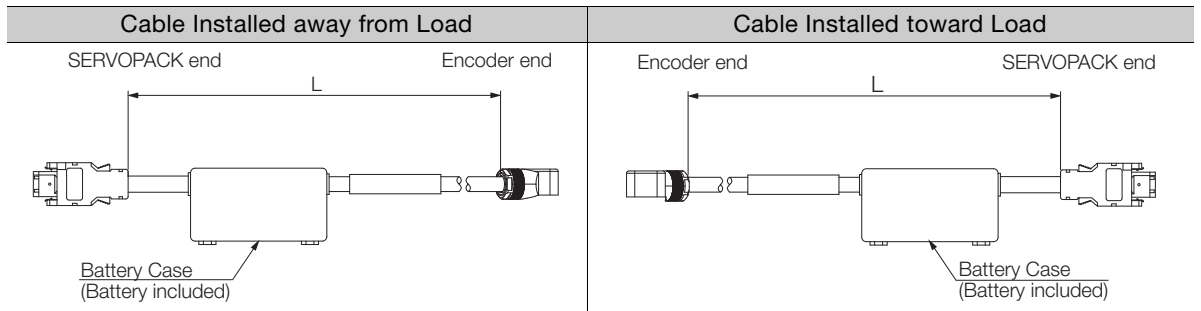
| Cable Direction | Servomotor Model | Length (L) | Order Number*1 | |
|-----------------|-----------------------------------|-------------------------------|------------------|----------------------|
| | | | Standard Cable | Flexible Cable*2, *3 |
| Load side | SGM7P-01 to -04 100 W to 400 W | 3 m, 5 m, 10 m, 15 m, 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).

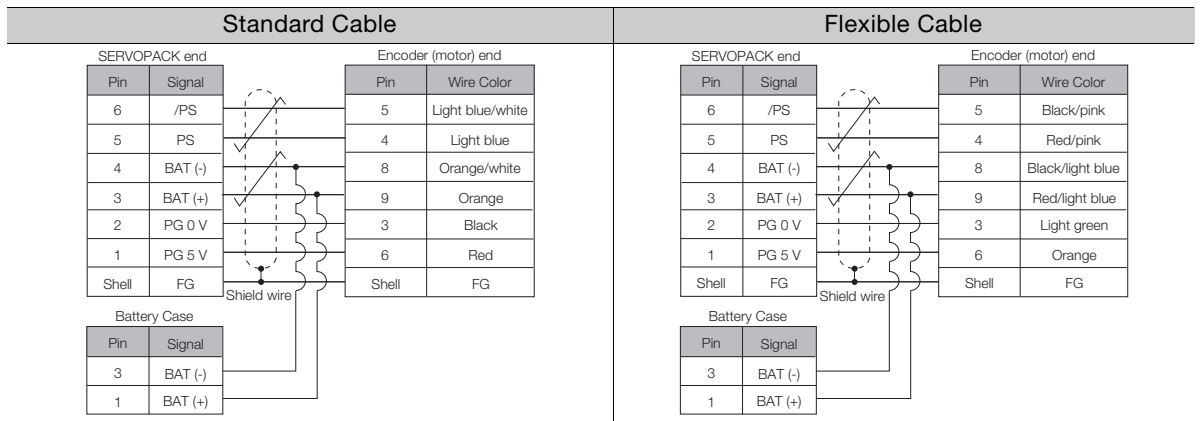
*2. Use Flexible Cables for moving parts of machines, such as robots.

*3. The recommended bending radius (R) is 46 mm or large.

◆ Appearance



◆ Wiring Specifications



Cables and User-Assembled Wiring Materials for SGM7P Rotary Servomotors

SGM7P-08 or -15 (750 W or 1,500 W)

◆ Selection Table

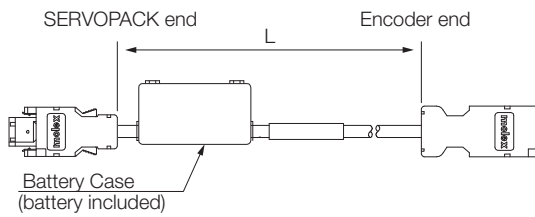
| Servomotor Model | Length (L) | Order Number* ¹ | |
|-------------------------------------|----------------------------------|----------------------------|----------------------------------|
| | | Standard Cable | Flexible Cable* ^{2, *3} |
| SGM7P-08 or -15 750 W or 1,500 W | 3 m, 5 m, 10 m, 15 m, or 20 m | 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 46 mm or larger.

◆ Appearance



◆ Wiring Specifications

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

5.5

Relay Encoder Cable of 30 m to 50 m

If the Encoder Cable length exceeds 20 m, be sure to also use a Motor-End Relay Encoder Cable and a SERVOPACK-End Relay Encoder Cable.

If you use a motor with an absolute encoder and a battery is not mounted to the host controller, also obtain a Relay Encoder Cable with a Battery Case in addition to the above two 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.

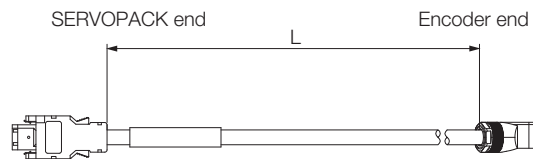
5.5.1

Motor-End Relay Encoder Cables

Selection Table

| Specification | Length (L) | Order Number |
|---------------------------------|------------|---------------|
| Used for all types of encoders. | 0.3 m | JZSP-C7PRCD-E |

Appearance



Wiring Specifications

| 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 0 V | 3 | Black |
| 1 | PG 5 V | 6 | Red |
| Shell | FG | Shell | FG |

Shield wire

5.5.2

SERVOPACK-End Relay Encoder Cables

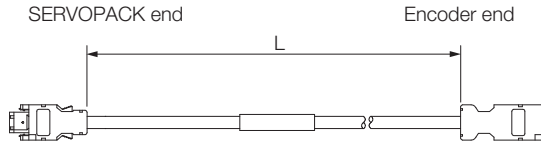
Selection Table

| Specification | Length (L) | Order Number* |
|---------------------------------|---------------------|------------------|
| Used for all types of encoders. | 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).

5.5.3 Relay Encoder Cables with Battery Cases

Appearance



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 0 V | 2 | Black |
| 1 | PG 5 V | 1 | Red |
| Shell | FG | Shell | FG |

Shield wire

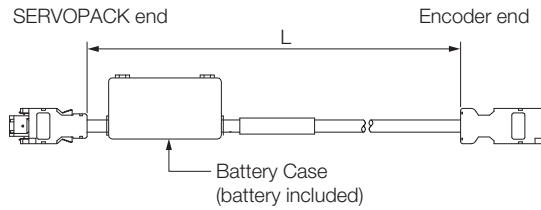
5.5.3 Relay Encoder Cables with Battery Cases

Note: This Cable is not required if you use a Servomotor with an Incremental Encoder, use a Servomotor with a Batteryless Absolute Encoder, or connect a battery to the host controller.

Selection Table

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

Appearance



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 0 V | 2 | Black |
| 1 | PG 5 V | 1 | Red |
| Shell | FG | Shell | FG |

Shield wire

| Battery Case | |
|--------------|---------|
| Pin | Signal |
| 3 | BAT (-) |
| 1 | BAT (+) |


5.6 User-Assembled Wiring Materials for Encoder Cables

5.6.1 Precautions When Using Encoder Cables with a Wiring Length of 30 m to 50 m

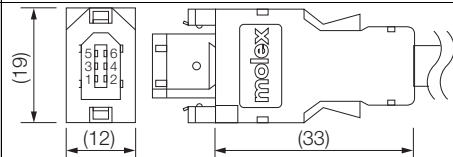
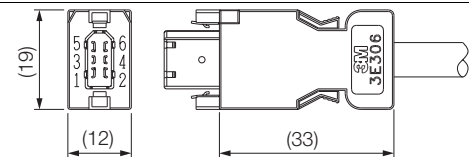
When using Encoder Cables with a wiring length of 30 m to 50 m, it is necessary to fabricate different types of cables depending on the Servomotor model.

| Cables to be Fabricated | Servomotor Model SGM7P | | Connectors and Wire Materials Required for Fabrication | Reference Page | Remarks |
|-----------------------------------|------------------------|--------------------------|--|---|-------------------------------------|
| | -01 to -04 | -08, -15 | | | |
| Motor-End Relay Encoder Cable | Fabrication required | Fabrication not required | SERVOPACK Connector | 5.6.2 <i>SERVOPACK Connector Kits</i> on page 5-15 | This cable should be 0.3 m or less. |
| | | | Servomotor Connector | 5.6.3 <i>Encoder Connector Kits</i> on page 5-16 | |
| | | | Encoder Cable (20 m or less) | 5.6.4 <i>Cables without Connectors</i> on page 5-17 | |
| SERVOPACK-End Relay Encoder Cable | Fabrication required | Fabrication required | SERVOPACK Connector | 5.6.2 <i>SERVOPACK Connector Kits</i> on page 5-15 | This cable should be 50 m or less. |
| | | | Cable Relay Connector | 5.6.3 <i>Encoder Connector Kits</i> on page 5-16 | |
| | | | Relay Encoder Cable (30 m to 50 m) | 5.6.4 <i>Cables without Connectors</i> on page 5-17 | |

Refer to the following section for details on the connection of the Relay Encoder Cable.

 5.1 *Cable Configurations* on page 5-2

5.6.2 SERVOPACK Connector Kits

| Type | Standard Connector Kit | Compatible Connector Kit |
|--------------------------|---|--|
| Inquiries | Yaskawa representative | 3M Japan Limited |
| Manufacturer | Molex Incorporated | |
| 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] |  |  |

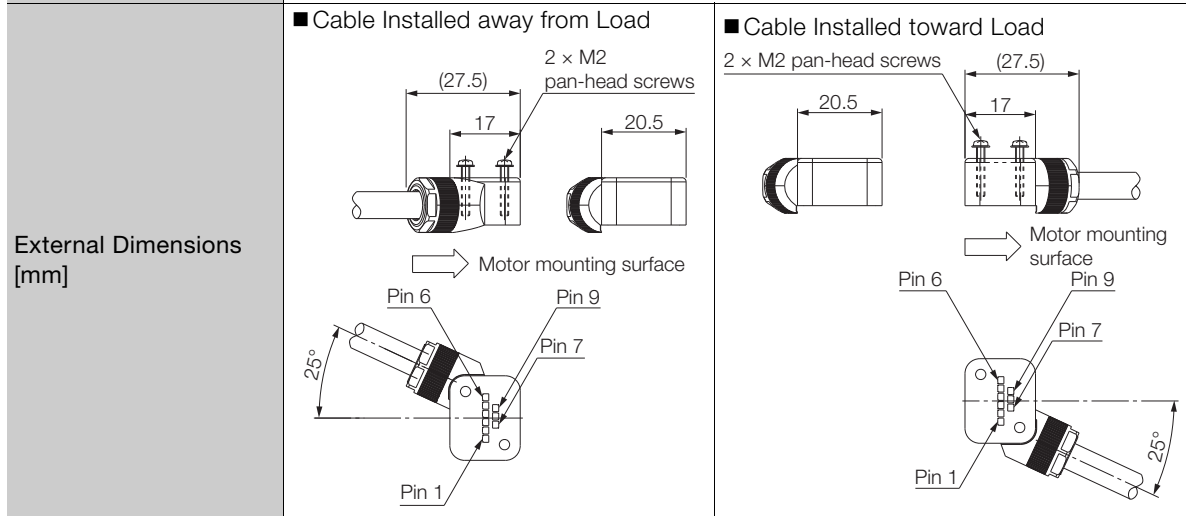
Note: Cables are not included. Purchase them separately.

5.6.3 Encoder Connector Kits

SGM7P-01 to -04 (100 W to 400 W)

◆ Servomotor Connectors

| | | |
|-------------------------------------|---|------------|
| Order Number | JZSP-C7P9-1-E | |
| Manufacturer | Molex Incorporated | |
| 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 | |



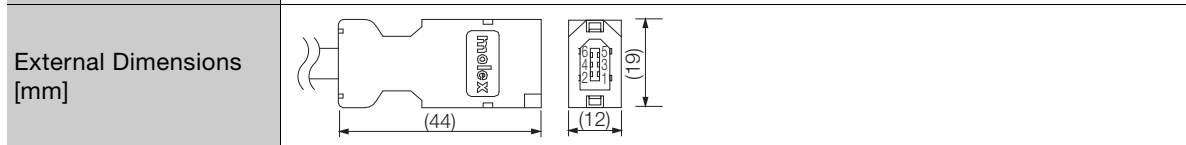
* A Crimping Tool is required. When using other wire sizes, contact the connector manufacturer for crimping tools.

Note: Cables are not included. Purchase them separately.

All models

◆ Cable Relay Connector

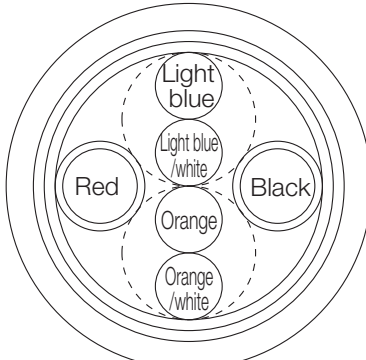
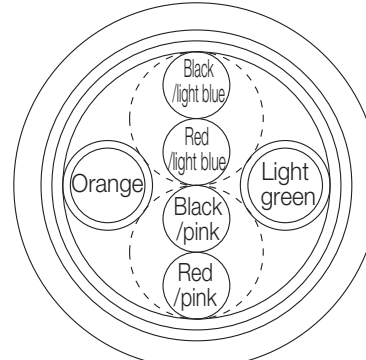
| | |
|------------------------|-----------------------|
| Order Number | JZSP-CMP9-2-E |
| Manufacturer | Molex Incorporated |
| Components | 54280-0609 (soldered) |
| Product Specifications | PS-54280 |



Note: Cables are not included. Purchase them separately.

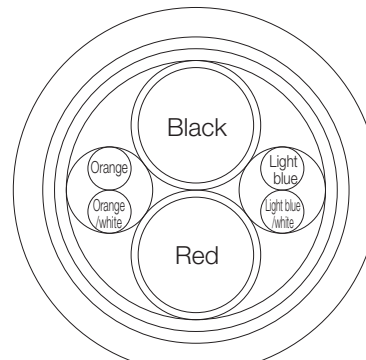
5.6.4 Cables without Connectors

Encoder Cables of 20 m or Less

| 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).


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).

5.7 Wiring Precautions

The wiring precautions are the same as for SGM7M Rotary Servomotors. Refer to the following section.

 *2.5 Wiring Precautions* on page 2-9

Cables and User-Assembled Wiring Materials for SGM7G Rotary Servomotors

6

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| 6.1 | Cable Configurations | 6-3 |
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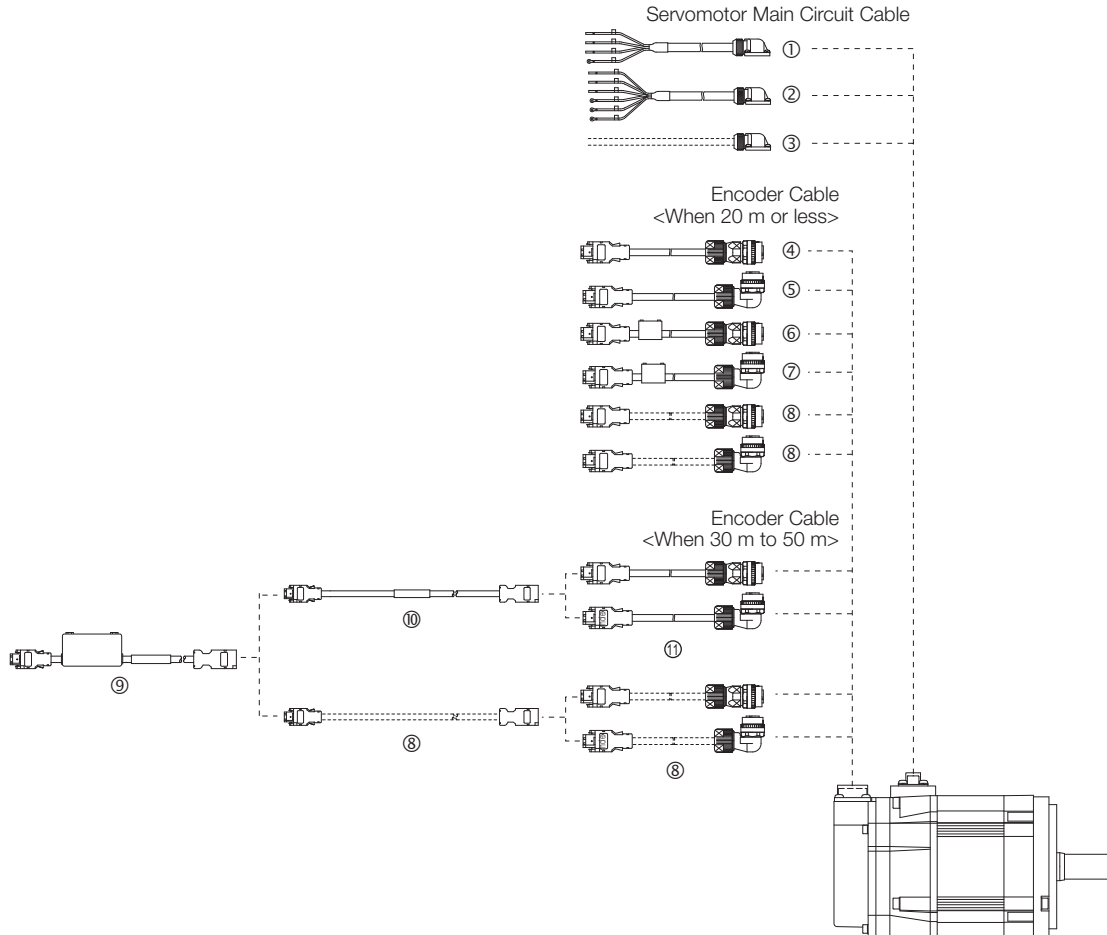
6.7 **User-Assembled Wiring Materials for Encoder Cables . . 6-24**

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Wiring Length of 30 m to 50 m 6-24
- 6.7.2 SERVOPACK Connector Kits 6-24
- 6.7.3 Encoder Connector Kits 6-25
- 6.7.4 Cables without Connectors 6-26

6.8 **Wiring Precautions 6-27**

6.1 Cable Configurations

6.1.1 SGM7G-03 and -05 (300 W and 450 W)



Note: If the Encoder Cable length exceeds 20 m, be sure to also connect Relay Encoder Cables as shown at ⑧ to ⑪ in the above diagram.

| No. | Cable Type | Reference |
|-----|--|--|
| ① | Servomotor Main Circuit Cables* ¹ | For Servomotors without Holding Brakes |
| ② | | For Servomotors with Holding Brakes |
| ③ | User-Assembled Wiring Materials for Servomotor Main Circuit Cables* ¹ | Connectors |
| | | Cables without Connectors |
| ④ | Encoder Cables of 20 m or Less for Incremental Encoders or Batteryless Absolute Encoders | Straight Plug |
| ⑤ | | Right-Angle Plug* ² |
| ⑥ | Encoder Cables of 20 m or Less with Battery Cases for Absolute Encoders* ³ | Straight Plug |
| ⑦ | | Right-Angle Plug* ² |
| ⑧ | User-Assembled Wiring Materials for Encoder Cables | Connectors |
| | | Cables without Connectors |
| ⑨ | Relay Encoder Cables with Battery Cases* ⁴ | page 6-22 |
| ⑩ | SERVOPACK-End Relay Encoder Cables | |
| ⑪ | Motor-End Relay Encoder Cables | |

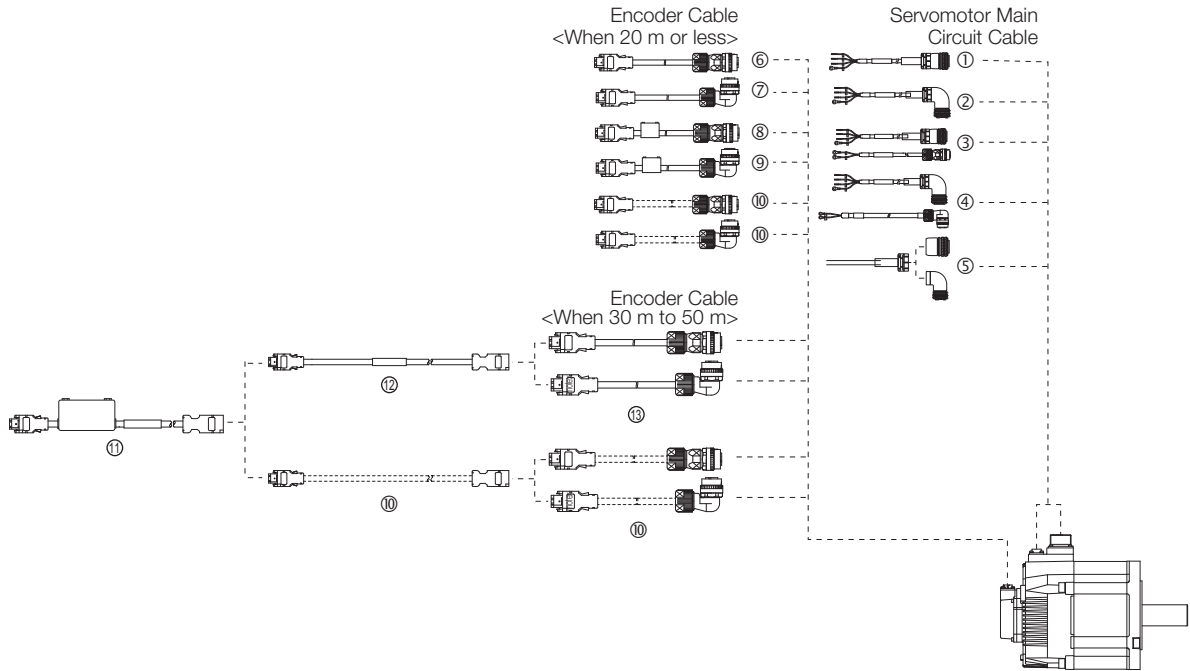
*1. The lead installation direction is away from the load. Consult your Yaskawa representative for lead installation toward the load.

*2. The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

*3. If a battery is connected to the host controller, the Battery Case is not required. Use an Encoder Cable for Incremental Encoders or Batteryless Absolute Encoders.

*4. This Cable is not required if you use a Servomotor with an Incremental Encoder, use a Servomotor with a Batteryless Absolute Encoder, or connect a battery to the host controller.

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



Note: If the Encoder Cable length exceeds 20 m, be sure to also connect Relay Encoder Cables as shown at ⑩ to ⑬ in the above diagram.

| No. | Cable Type | | Reference |
|-----|--|-----------------------------|-----------|
| ① | Servomotor Main Circuit Cables for Servomotors without Holding Brakes*1 | Straight Plug | page 6-5 |
| ② | | Right-Angle Plug*2 | |
| ③ | Servomotor Main Circuit Cables for Servomotors with Holding Brakes*1 | Straight Plug | page 6-7 |
| ④ | | Right-Angle Plug*2 | |
| ⑤ | User-Assembled Wiring Materials for Servomotor Main Circuit Cables | Connectors | page 6-12 |
| | | Cables without Connectors*3 | - |
| ⑥ | Encoder Cables of 20 m or Less for Incremental Encoders or Batteryless Absolute Encoders | Straight Plug | page 6-20 |
| ⑦ | | Right-Angle Plug | |
| ⑧ | Encoder Cables of 20 m or Less with Battery Cases for Absolute Encoders*4 | Straight Plug | page 6-21 |
| ⑨ | | Right-Angle Plug | |
| ⑩ | User-Assembled Wiring Materials for Encoder Cables | Connectors | page 6-24 |
| | | Cables without Connectors | page 6-26 |
| ⑪ | Relay Encoder Cables with Battery Cases*5 | | page 6-22 |
| ⑫ | SERVOPACK-End Relay Encoder Cables | | |
| ⑬ | Motor-End Relay Encoder Cables | | |

*1. Cables with connectors on both ends that are compliant with an IP67 protective structure and European Safety Standards are not available from Yaskawa. Fabricate the cables by yourself or consult your Yaskawa representative. To fabricate the cables, refer to the following section.

6.4 User-Assembled Wiring Materials for Servomotor Main Circuit Cables: SGM7G-09 to -1E on page 6-12

*2. The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

*3. 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.

*4. If a battery is connected to the host controller, the Battery Case is not required. Use an Encoder Cable for Incremental Encoders or Batteryless Absolute Encoders.

*5. This Cable is not required if you use a Servomotor with an Incremental Encoder, use a Servomotor with a Batteryless Absolute Encoder, or connect a battery to the host controller.

6.2 Servomotor Main Circuit Cables

6.2.1 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 |
|-----------------------------------|---|---|
| | | Standard (Flexible) Cable* ² |
| 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* ³ |

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

*2. These Standard Cables are Flexible Cables. The recommended bending radius (R) is 90 mm or larger.

*3. The lead installation direction is away from the load. Consult your Yaskawa representative for lead installation toward the load.

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)

Note: Cables with connectors on both ends that are compliant with an IP67 protective structure and European Safety Standards are not available from Yaskawa. Fabricate the cables by yourself or consult your Yaskawa representative.

To fabricate the cables, refer to the following section.

 6.4 User-Assembled Wiring Materials for Servomotor Main Circuit Cables: SGM7G-09 to -1E on page 6-12

| 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 | Straight | 3 m, 5 m, 10 m, 15 m, and 20 m | JZSP-UVA101-□□-E | JZSP-UVA121-□□-E |
| | Right-angle* ⁴ | | JZSP-UVA102-□□-E | JZSP-UVA122-□□-E |
| SGM7G-20 1.8 kW | Straight | | JZSP-UVA301-□□-E | JZSP-UVA321-□□-E |
| | Right-angle* ⁴ | | JZSP-UVA302-□□-E | JZSP-UVA322-□□-E |
| SGM7G-30 2.4 kW (When used in combination with the SGD7S-200A) | Straight | | JZSP-UVA601-□□-E | JZSP-UVA621-□□-E |
| | Right-angle* ⁴ | | JZSP-UVA602-□□-E | JZSP-UVA622-□□-E |
| SGM7G-30 or -44 2.9 kW or 4.4 kW | Straight | | JZSP-UVA701-□□-E | JZSP-UVA721-□□-E |
| | Right-angle* ⁴ | | JZSP-UVA702-□□-E | JZSP-UVA722-□□-E |
| SGM7G-55 or -75 5.5 kW or 7.5 kW | Straight | | JZSP-UVAA01-□□-E | JZSP-UVAA21-□□-E |
| | Right-angle* ⁴ | | JZSP-UVAA02-□□-E | JZSP-UVAA22-□□-E |
| SGM7G-1A or -1E 11 kW or 15 kW | Straight | | JZSP-UVAB01-□□-E | JZSP-UVAB21-□□-E |
| | Right-angle* ⁴ | | JZSP-UVAB02-□□-E | JZSP-UVAB22-□□-E |

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

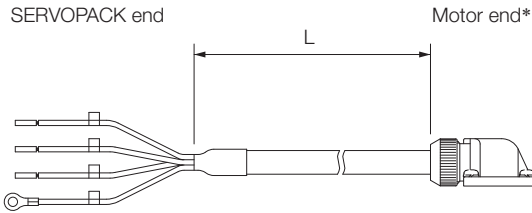
*2. Use Flexible Cables for moving parts of machines, such as robots.

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

*4. The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

Appearance

◆ SGM7G-03 and -05 (for 300 W and 450 W)



* The lead installation direction is away from the load. Consult your Yaskawa representative for lead installation toward the load.

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

Note: Cables with connectors on both ends that are compliant with an IP67 protective structure and European Safety Standards are not available from Yaskawa. Fabricate the cables by yourself or consult your Yaskawa representative.

To fabricate the cables, refer to the following section.

🔧 6.4 User-Assembled Wiring Materials for Servomotor Main Circuit Cables: SGM7G-09 to -1E on page 6-12

| Servomotor Model | Straight Connector | Right-Angle Connector* |
|-----------------------------------|--------------------|------------------------|
| SGM7G-09, -13 850 W, 1.3 kW | | |
| SGM7G-20 to 1E 1.8 kW to 15 kW | | |

* The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

Wiring Specifications

| SGM7G-03 and -05 (for 300 W and 450 W) | | | | SGM7G-09 to -1E (for 850 W to 15 kW) | | | |
|--|---------|----------------------|-----|--------------------------------------|---------|----------------------|-----|
| SERVOPACK Leads | | Servomotor Connector | | SERVOPACK Leads | | Servomotor Connector | |
| Wire Color | Signal | Signal | Pin | Wire Color | Signal | Signal | Pin |
| Green/yellow | FG | FG | PE | Red | Phase U | Phase U | A |
| - | - | - | 5 | White | Phase V | Phase V | B |
| - | - | - | 4 | Black or blue | Phase W | Phase W | C |
| Red | Phase U | Phase U | 3 | Green or green/yellow | FG | FG | D |
| White | Phase V | Phase V | 2 | | | | |
| Blue | Phase W | Phase W | 1 | | | | |

6.2.2 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 |
|-----------------------------------|---|---|
| | | Standard (Flexible) Cable* ² |
| 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* ³ |

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

*2. These Standard Cables are Flexible Cables. The recommended bending radius (R) is 90 mm or larger.

*3. The lead installation direction is away from the load. Consult your Yaskawa representative for lead installation toward the load.

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)

Note: Cables with connectors on both ends that are compliant with an IP67 protective structure and European Safety Standards are not available from Yaskawa. Fabricate the cables by yourself or consult your Yaskawa representative.


To fabricate the cables, refer to the following section.

 **6.4 User-Assembled Wiring Materials for Servomotor Main Circuit Cables: SGM7G-09 to -1E on page 6-12**

| 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 | Straight | 3 m, 5 m, 10 m, 15 m, and 20 m | JZSP-UVA131-□□-E | JZSP-UVA141-□□-E |
| | Right-angle* ⁵ | | JZSP-UVA132-□□-E | JZSP-UVA142-□□-E |
| SGM7G-20 1.8 kW | Straight | | JZSP-UVA331-□□-E | JZSP-UVA341-□□-E |
| | Right-angle* ⁵ | | JZSP-UVA332-□□-E | JZSP-UVA342-□□-E |
| SGM7G-30 2.4 kW (When used in combination with the SGD7S-200A) | Straight | | JZSP-UVA631-□□-E | JZSP-UVA641-□□-E |
| | Right-angle* ⁵ | | JZSP-UVA632-□□-E | JZSP-UVA642-□□-E |
| SGM7G-30 or -44 2.9 kW or 4.4 kW | Straight | | JZSP-UVA731-□□-E | JZSP-UVA741-□□-E |
| | Right-angle* ⁵ | | JZSP-UVA732-□□-E | JZSP-UVA742-□□-E |
| SGM7G-55 or -75 5.5 kW or 7.5 kW | Straight | | JZSP-UVAA31-□□-E | JZSP-UVAA41-□□-E |
| | Right-angle* ⁵ | | JZSP-UVAA32-□□-E | JZSP-UVAA42-□□-E |
| SGM7G-1A or -1E 11 kW or 15 kW | Straight | | JZSP-UVAB31-□□-E | JZSP-UVAB41-□□-E |
| | Right-angle* ⁵ | | 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 the following section to obtain Main Circuit Power Supply Cables and Holding Brake Cables individually.

 **Appearance on page 6-8**

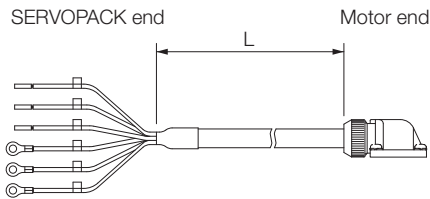
*3. Use Flexible Cables for moving parts of machines, such as robots.

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

*5. The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

Appearance

◆ SGM7G-03 and -05 (for 300 W and 450 W)



* The lead installation direction is away from the load. Consult your Yaskawa representative for lead installation toward the load.

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

| Servomotor Model | Connector Type | Appearance | Order Numbers of Main Power Supply Cable and Holding Brake Cable | Individual Cable Order Numbers |
|------------------------------------|---------------------------|---|--|---|
| SGM7G-09 or -13 850 W or 1.3 kW | Straight | <p>SERVOPACK end Motor end L Brake power supply end Brake end</p> | Standard Cable: JZSP-UVA131-□□-E Flexible Cable: JZSP-UVA141-□□-E | <ul style="list-style-type: none"> Main Circuit Power Supply Cable Standard Cable: JZSP-UVA101-□□-E Flexible Cable: JZSP-UVA121-□□-E Holding Brake Cable*² JZSP-U7B23-□□-E |
| | Right-angle* ¹ | <p>SERVOPACK end Motor end L Brake power supply end Brake end</p> | Standard Cable: JZSP-UVA132-□□-E Flexible Cable: JZSP-UVA142-□□-E | <ul style="list-style-type: none"> Main Circuit Power Supply Cable Standard Cable: JZSP-UVA102-□□-E Flexible Cable: JZSP-UVA122-□□-E Holding Brake Cable*² JZSP-U7B24-□□-E |
| SGM7G-20 1.8 kW | Straight | <p>SERVOPACK end Motor end L Brake power supply end Brake end</p> | Standard Cable: JZSP-UVA331-□□-E Flexible Cable: JZSP-UVA341-□□-E | <ul style="list-style-type: none"> Main Circuit Power Supply Cable Standard Cable: JZSP-UVA301-□□-E Flexible Cable: JZSP-UVA321-□□-E Holding Brake Cable*² JZSP-U7B23-□□-E |
| | Right-angle* ¹ | <p>SERVOPACK end Motor end L Brake power supply end Brake end</p> | Standard Cable: JZSP-UVA332-□□-E Flexible Cable: JZSP-UVA342-□□-E | <ul style="list-style-type: none"> Main Circuit Power Supply Cable Standard Cable: JZSP-UVA302-□□-E Flexible Cable: JZSP-UVA322-□□-E Holding Brake Cable*² JZSP-U7B24-□□-E |

Continued on next page.

*1. The lead installation direction is away from the load. Consult your Yaskawa representative for other lead directions.

*2. Flexible Cables are provided as a standard feature.

6.2.2 Servomotor Main Circuit Cables for Servomotors with Holding Brakes

Continued from previous page.

| Servomotor Model | Connector Type | Appearance | Order Numbers of Main Power Supply Cable and Holding Brake Cable | Individual Cable Order Numbers |
|--|---------------------------|------------|--|---|
| SGM7G-30 2.4 kW (When used in combination with the SGD7S-200A) | Straight | | Standard Cable: JZSP-UVA631-□□-E Flexible Cable: JZSP-UVA641-□□-E | <ul style="list-style-type: none"> Main Circuit Power Supply Cable Standard Cable: JZSP-UVA601-□□-E Flexible Cable: JZSP-UVA621-□□-E Holding Brake Cable*² JZSP-U7B23-□□-E |
| | Right-angle* ¹ | | Standard Cable: JZSP-UVA632-□□-E Flexible Cable: JZSP-UVA642-□□-E | <ul style="list-style-type: none"> Main Circuit Power Supply Cable Standard Cable: JZSP-UVA602-□□-E Flexible Cable: JZSP-UVA622-□□-E Holding Brake Cable*² JZSP-U7B24-□□-E |
| SGM7G-30 or -44 2.9 kW or 4.4 kW | Straight | | Standard Cable: JZSP-UVA731-□□-E Flexible Cable: JZSP-UVA741-□□-E | <ul style="list-style-type: none"> Main Circuit Power Supply Cable Standard Cable: JZSP-UVA701-□□-E Flexible Cable: JZSP-UVA721-□□-E Holding Brake Cable*² JZSP-U7B23-□□-E |
| | Right-angle* ¹ | | Standard Cable: JZSP-UVA732-□□-E Flexible Cable: JZSP-UVA742-□□-E | <ul style="list-style-type: none"> Main Circuit Power Supply Cable Standard Cable: JZSP-UVA702-□□-E Flexible Cable: JZSP-UVA722-□□-E Holding Brake Cable*² JZSP-U7B24-□□-E |

Continued on next page.

*1. The lead installation direction is away from the load. Consult your Yaskawa representative for other lead directions.

*2. Flexible Cables are provided as a standard feature.

Continued from previous page.

| Servomotor Model | Connector Type | Appearance | Order Numbers of Main Power Supply Cable and Holding Brake Cable | Individual Cable Order Numbers |
|-------------------------------------|---------------------------|------------|--|---|
| SGM7G-55 or -75 5.5 kW or 7.5 kW | Straight | | Standard Cable: JZSP-UVAA31-□□-E Flexible Cable: JZSP-UVAA41-□□-E | <ul style="list-style-type: none"> Main Circuit Power Supply Cable Standard Cable: JZSP-UVAA01-□□-E Flexible Cable: JZSP-UVAA21-□□-E Holding Brake Cable*² JZSP-U7B23-□□-E |
| | Right-angle* ¹ | | Standard Cable: JZSP-UVAA32-□□-E Flexible Cable: JZSP-UVAA42-□□-E | <ul style="list-style-type: none"> Main Circuit Power Supply Cable Standard Cable: JZSP-UVAA02-□□-E Flexible Cable: JZSP-UVAA22-□□-E Holding Brake Cable*² JZSP-U7B24-□□-E |
| SGM7G-1A or -1E 11 kW or 15 kW | Straight | | Standard Cable: JZSP-UVAB31-□□-E Flexible Cable: JZSP-UVAB41-□□-E | <ul style="list-style-type: none"> Main Circuit Power Supply Cable Standard Cable: JZSP-UVAB01-□□-E Flexible Cable: JZSP-UVAB21-□□-E Holding Brake Cable*² JZSP-U7B23-□□-E |
| | Right-angle* ¹ | | Standard Cable: JZSP-UVAB32-□□-E Flexible Cable: JZSP-UVAB42-□□-E | <ul style="list-style-type: none"> Main Circuit Power Supply Cable Standard Cable: JZSP-UVAB02-□□-E Flexible Cable: JZSP-UVAB22-□□-E Holding Brake Cable*² JZSP-U7B24-□□-E |

*1. The lead installation direction is away from the load. Consult your Yaskawa representative for other lead directions.

*2. Flexible Cables are provided as a standard feature.

Wiring Specifications

| SGM7G-03 and -05 (for 300 W and 450 W) | | | | SGM7G-09 to -1E (for 850 W to 15 kW) | | | |
|--|---------|----------------------|-----|--------------------------------------|---------|----------------------|-----|
| SERVOPACK Leads | | Servomotor Connector | | SERVOPACK Leads | | Servomotor Connector | |
| Wire Color | Signal | Signal | Pin | Wire Color | Signal | Signal | Pin |
| Green/yellow | FG | FG | PE | Red | Phase U | Phase U | A |
| Black | Brake | Brake | 5 | White | Phase V | Phase V | B |
| Black | Brake | Brake | 4 | Black or blue | Phase W | Phase W | C |
| Red | Phase U | Phase U | 3 | Green or green/yellow | FG | FG | D |
| White | Phase V | Phase V | 2 | | | | |
| Blue | Phase W | Phase W | 1 | Black | Brake | Brake | 1 |
| | | | | White | Brake | Brake | 2 |

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

6.3

User-Assembled Wiring Materials for Servomotor Main Circuit Cables: SGM7G-03, -05

6.3.1 Servomotor Connector Kits

| Item | | Description | External Dimensions [mm] |
|-------------------------------------|-----------|---|---|
| Order Number | | JZSP-CVM9-1-E | <p>• Pin layout For cable installed away from load</p> <p>For cable installed toward load</p> |
| Manufacturer | | Japan Aviation Electronics Industry, Ltd. | |
| User Instructions | | J AHL-50020 | |
| Components | 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 | CT170-14-TMH5B | |

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

Note: Cables are not included. Purchase them separately.

6.3.2 Wiring Materials

| 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 | 7.3 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.

6.4 User-Assembled Wiring Materials for Servomotor Main Circuit Cables: SGM7G-09 to -1E

If you need standard-structure Servomotor connectors, consult your Yaskawa representative. To fabricate the cables, refer to this section.

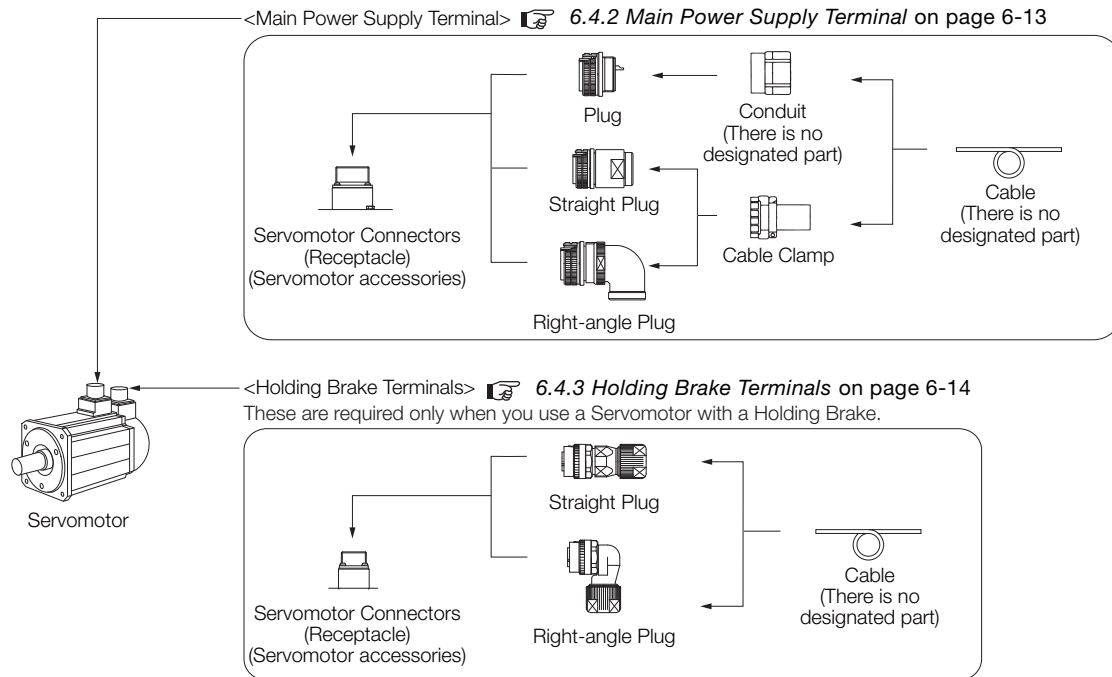
To purchase cables with connectors, refer to the following section.

 6.2 Servomotor Main Circuit Cables on page 6-5

If you need Servomotor connectors on both ends that are compliant with an IP67 protective structure and European Safety Standards, fabricate the cables by yourself or consult your Yaskawa representative. To fabricate the cables, refer to this section.

When you fabricate the cables, Yaskawa does not specify what wiring materials to use. Therefore, use appropriate wiring materials for your connectors and the electrical specifications.

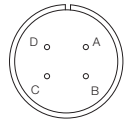
6.4.1 Connector Structures



6.4.2 Main Power Supply Terminal

Servomotor Connector (Receptacle)

This connector is an accessory to the Servomotor.

| Servomotor Model | Capacity | Servomotor Connector Models | Connector Surface |
|--|------------------|---|---|
| SGM7G-09 SGM7G-13 SGM7G-20 | 850 W to 1.8 kW | CE05-2A18-10PD-D (MS Connector model: MS3102A18-10P) |  |
| SGM7G-30 SGM7G-44 | 2.9 kW to 4.4 kW | CE05-2A22-22PD-D (MS Connector model: MS3102A22-22P) | |
| SGM7G-55 SGM7G-75 SGM7G-1A SGM7G-1E | 5.5 kW to 15 kW | CE05-2A32-17PD-D (MS Connector model: MS3102A32-17P) | |

Note: Servomotor Connectors (receptacle) are compatible with MS Connectors. To use a plug not specified by Yaskawa, select an appropriate plug with reference to the MS connector model number in the parentheses.

Cable-Side Connectors (Plug)

Cable-side connectors (plug) are available in the standard environment type and the type compliant with an IP67 protective structure and European Safety Standards and in the straight and right-angle shapes.

◆ Standard Environment Type: Cable-Side Connectors (Plug)

| Servomotor Model | Capacity | Order Numbers | | Manufacturer | |
|--|------------------|---------------|----------------------|----------------|---|
| | | Plug | Cable Clamp | | |
| SGM7G-09 SGM7G-13 SGM7G-20 | 850 W to 1.8 kW | Straight | CE05-6A18-10SD-D-BSS | CE3057-10A-□-D | DDK Ltd. |
| | | | N/MS3106B18-10S | N/MS3057-10A | Japan Aviation Electronics Industry, Ltd. |
| | | Right-angle | CE05-8A18-10SD-D-BAS | CE3057-10A-□-D | DDK Ltd. |
| | | | N/MS3108B18-10S | N/MS3057-10A | Japan Aviation Electronics Industry, Ltd. |
| SGM7G-30 SGM7G-44 | 2.9 kW to 4.4 kW | Straight | CE05-6A22-22SD-D-BSS | CE3057-12A-□-D | DDK Ltd. |
| | | | N/MS3106B22-22S | N/MS3057-12A | Japan Aviation Electronics Industry, Ltd. |
| | | Right-angle | CE05-8A22-22SD-D-BAS | CE3057-12A-□-D | DDK Ltd. |
| | | | N/MS3108B22-22S | N/MS3057-12A | Japan Aviation Electronics Industry, Ltd. |
| SGM7G-55 SGM7G-75 SGM7G-1A SGM7G-1E | 5.5 kW to 15 kW | Straight | CE05-6A32-17SD-D-BSS | CE3057-20A-□-D | DDK Ltd. |
| | | | N/MS3106B32-17S | N/MS3057-20A | Japan Aviation Electronics Industry, Ltd. |
| | | Right-angle | CE05-8A32-17SD-D-BAS | CE3057-20A-□-D | DDK Ltd. |
| | | | N/MS3108B32-17S | N/MS3057-20A | Japan Aviation Electronics Industry, Ltd. |

6.4.3 Holding Brake Terminals

◆ Type Compliant with an IP67 Protective Structure and European Safety Standards: Cable-Side Connectors (Plug)

| Servomotor Model | Capacity | Order Numbers | | | | Manufacturer |
|--|------------------|---------------|----------------------|----------------|--|--------------|
| | | Plug | | Cable Clamp | | |
| SGM7G-09 SGM7G-13 SGM7G-20 | 850 W to 1.8 kW | Single | CE05-6A18-10SD-D* | * | | DDK Ltd. |
| | | Straight | CE05-6A18-10SD-D-BSS | Order Numbers | Applicable Cable Diameter (Reference) [mm] | |
| | | | | CE3057-10A-1-D | 10.5 to 14.1 | |
| | | Right-angle | CE05-8A18-10SD-D-BAS | 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 | Single | CE05-6A22-22SD-D* | * | | |
| | | Straight | CE05-6A22-22SD-D-BSS | Order Numbers | Applicable Cable Diameter (Reference) [mm] | |
| | | | | CE3057-12A-1-D | 12.5 to 16.0 | |
| | | Right-angle | CE05-8A22-22SD-D-BAS | CE3057-12A-2-D | 9.5 to 13.0 | |
| CE3057-12A-3-D | 6.8 to 10.0 | | | | | |
| CE3057-12A-7-D | 14.5 to 17.0 | | | | | |
| SGM7G-55 SGM7G-75 SGM7G-1A SGM7G-1E | 5.5 kW to 15 kW | Single | CE05-6A32-17SD-D* | * | | |
| | | Straight | CE05-6A32-17SD-D-BSS | Order Numbers | Applicable Cable Diameter (Reference) [mm] | |
| | | | | CE3057-20A-1-D | 22 to 23.8 | |
| | | Right-angle | CE05-8A32-17SD-D-BAS | CE3057-20A-2-D | 24 to 26.6 | |
| CE3057-20A-3-D | 22 to 22.5 | | | | | |

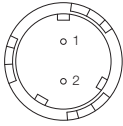
* Using a single plug does not require a Cable Clamp. However, a conduit is required instead of a Cable Clamp. Yaskawa does not specify a specific conduit. For the conduit grounding, contact the manufacturer of the conduit.

6.4.3 Holding Brake Terminals

These are required only when you use a Servomotor with a Holding Brake.

Servomotor Connector (Receptacle)

This connector is an accessory to the Servomotor.

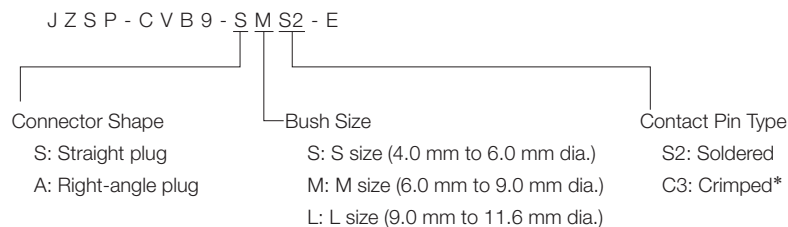
| Servomotor Model | Capacity | Servomotor Connector Models | Connector Surface |
|--|----------------|-----------------------------|---|
| SGM7G-09 SGM7G-13 SGM7G-20 SGM7G-30 SGM7G-44 SGM7G-55 SGM7G-75 SGM7G-1A SGM7G-1E | 850 W to 15 kW | CM10-R2P-D |  |

Cable-Side Connectors (Plug)

Cable-side connectors (plug) are compliant with an IP67 protective structure and European Safety Standards. They are available in the straight and right-angle shapes.

| Servomotor Model | Capacity | Order Numbers | | Applicable Cable Diameter (Reference) | Manufacturer |
|------------------|----------------|---------------|---------------|---------------------------------------|--------------|
| SGM7G-09 | 850 W to 15 kW | Straight | CM10-SP2S-S-D | 4.0 mm to 6.0 mm | DDK Ltd. |
| SGM7G-13 | | | CM10-SP2S-M-D | 6.0 mm to 9.0 mm | |
| SGM7G-20 | | | CM10-SP2S-L-D | 9.0 mm to 11.6 mm | |
| SGM7G-30 | | Right-angle | CM10-AP2S-S-D | 4.0 mm to 6.0 mm | |
| SGM7G-44 | | | CM10-AP2S-M-D | 6.0 mm to 9.0 mm | |
| SGM7G-55 | | | CM10-AP2S-L-D | 9.0 mm to 11.6 mm | |
| SGM7G-75 | | | | | |
| SGM7G-1A | | | | | |
| SGM7G-1E | | | | | |

Information When consulting with your Yaskawa representative, refer to the following order number format.



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

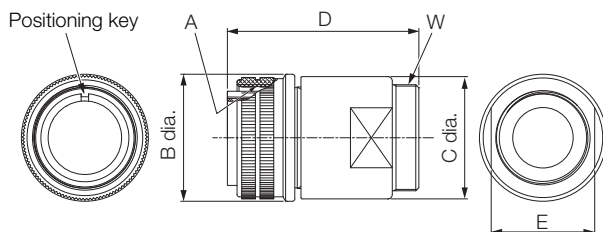
Information Other connector specifications

| Item | Specifications |
|-------------------|---|
| User Instructions | <ul style="list-style-type: none"> • Straight Plug (CM10-SP2S-□-D): TC-583 • Right-Angle plug (CM10-AP2S-□-D): TC-573 |
| Contact Models | <ul style="list-style-type: none"> ■ 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) <p>Note: The Semi-automatic Tool Set includes the press and Applicator (crimper).</p> |

6.4.4 Connector External Dimensions

Main Power Supply Terminal

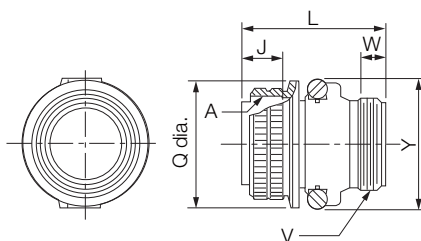
◆ Straight Plug: CE05-6A□□-□□SD-D-BSS (from DDK Ltd.)



Unit: mm

| Model | Shell Size | Joint Thread A | Joint Nut Outer Diameter B $+0_{-0.38}$ Dia. | Max. Diameter C ± 0.8 Dia. | Total Length D Max. | Spanner Fitting Width Across Flat E | Cable Clamp Mounting Thread W |
|----------------------|------------|-----------------|--|--------------------------------|---------------------|-------------------------------------|-------------------------------|
| CE05-6A18-10SD-D-BSS | 18 | 1-1/8-18UNEF-2B | 34.13 | 32.1 | 57 | 26.7 | 1-20UNEF-2A |
| CE05-6A22-22SD-D-BSS | 22 | 1-3/8-18UNEF-2B | 40.48 | 38.3 | 61 | 32.4 | 1-3/16-18UNEF-2A |
| CE05-6A32-17SD-D-BSS | 32 | 2 18UNS-2B | 56.33 | 54.2 | 79 | 47.3 | 1-3/4-18UNS-2A |

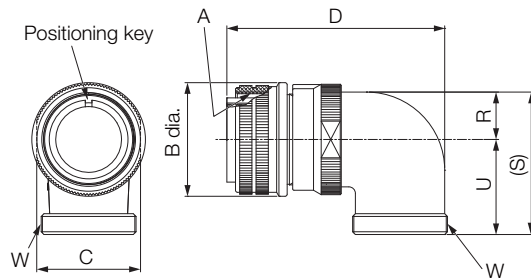
◆ Straight Plug: N/MS3106B□□-□□S (from Japan Aviation Electronics Industry, Ltd.)



Unit: mm

| Model | 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 |
| N/MS3106B22-22S | 22 | 1-3/8-18UNEF | 18.26 | 55.57 | 40.48 | 1-3/16-18UNEF | 9.53 | 50 |
| N/MS3106B32-17S | 32 | 2-18UNS | 18.26 | 61.92 | 56.33 | 1-3/4-18UNS | 11.13 | 66 |

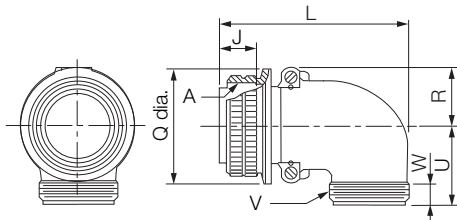
◆ Right-Angle Plug: CE05-8A□□-□□SD-D-BAS (from DDK Ltd.)



Unit: mm

| Model | Shell Size | Joint Thread A | Joint Nut Outer Diameter B ⁺⁰ _{-0.38} Dia. | Spanner Fitting Width Across Flat C | Total Length D Max. | Cable Clamp Mounting Thread W | R ± 0.7 | U ± 0.7 | (S) ± 1 |
|----------------------|------------|-----------------|--|-------------------------------------|---------------------|-------------------------------|---------|---------|---------|
| CE05-8A18-10SD-D-BAS | 18 | 1-1/8-18UNEF-2B | 34.13 | 30.0 | 69.5 | 1-20UNEF-2A | 13.2 | 30.2 | 43.4 |
| CE05-8A22-22SD-D-BAS | 22 | 1-3/8-18UNEF-2B | 40.48 | 36.2 | 75.5 | 1-3/16-18UNEF-2A | 16.3 | 33.3 | 49.6 |
| CE05-8A32-17SD-D-BAS | 32 | 2-18UNS-2B | 56.33 | 52.8 | 93.5 | 1-3/4-18UNS-2A | 24.6 | 44.5 | 69.1 |

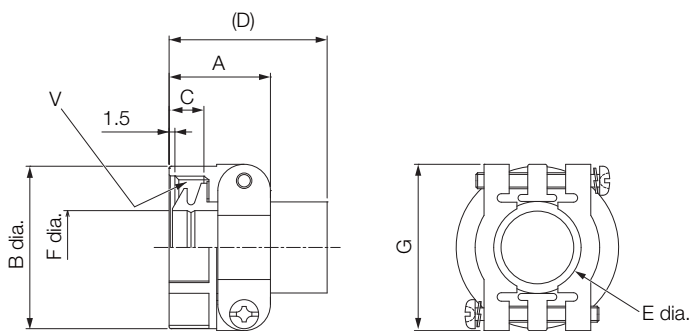
◆ Right-Angle Plug: N/MS3108B□□-□□S (from Japan Aviation Electronics Industry, Ltd.)



Unit: mm

| Model | 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/MS3108B18-10S | 18 | 1-1/8-18UNEF | 18.26 | 68.27 | 34.13 | 20.5 | 30.2 | 1-20UNEF | 9.53 |
| N/MS3108B22-22S | 22 | 1-3/8-18UNEF | 18.26 | 76.98 | 40.48 | 24.1 | 33.3 | 1-3/16-18UNEF | 9.53 |
| N/MS3108B32-17S | 32 | 2-18UNS | 18.26 | 95.25 | 56.33 | 32.8 | 44.4 | 1-3/4-18UNS | 11.13 |

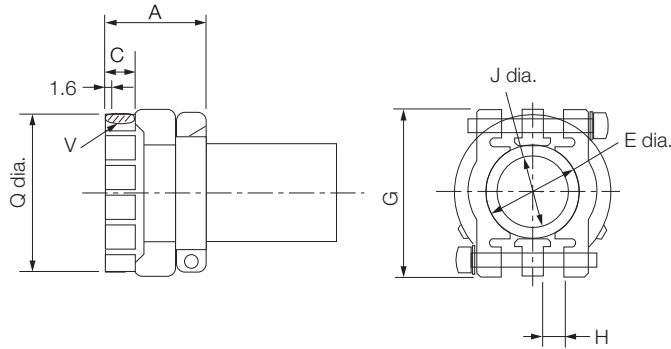
◆ Cable Clamp: CE3057-□□A-□-D (from DDK Ltd.)



Unit: mm

| Model | Applicable Connector Shell Size | Total Length A ± 0.7 | Outer Diameter B Dia. | Effective Thread Length C | (D) | Bushing Outer Diameter E Dia. | Bushing Inner Diameter F Dia. | G ± 0.7 | Mounting Thread V | Attached Bushing | Applicable Cable Diameter (Reference) |
|----------------|---------------------------------|----------------------|-----------------------|---------------------------|--------|-------------------------------|-------------------------------|---------|-------------------|------------------|---------------------------------------|
| CE3057-10A-1-D | 18 | 23.83 | 30.1 | 10.31 | (41.3) | 15.8 | 14.1 | 31.7 | 1-20UNEF-2B | CE3420-10-1 | 10.5 to 14.1 |
| CE3057-10A-2-D | | | | | | | 11 | | | CE3420-10-2 | 8.5 to 11.0 |
| CE3057-10A-3-D | | | | | | | 8.7 | | | CE3420-10-3 | 6.5 to 8.7 |
| CE3057-12A-1-D | 22 | 23.83 | 35 | 10.31 | (41.3) | 19.0 | 16 | 37.3 | 1-3/16-18UNEF-2B | CE3420-12-1 | 12.5 to 16.0 |
| CE3057-12A-2-D | | | | | | | 13 | | | CE3420-12-2 | 9.5 to 13.0 |
| CE3057-12A-3-D | | | | | | | 10 | | | CE3420-12-3 | 6.8 to 10.0 |
| CE3057-12A-7-D | | | | | | | 17 | | | CE3420-12-7 | 14.5 to 17.0 |
| CE3057-20A-1-D | 32 | 27.79 | 51.6 | 11.91 | (43.0) | 32.0 | 23.8 | 51.6 | 1-3/4-18UNS-2B | CE3420-20-1 | 22.0 to 23.8 |
| CE3057-20A-2-D | | | | | | | 26.6 | | | CE3420-20-2 | 24.0 to 26.6 |
| CE3057-20A-3-D | | | | | | | 22.5 | | | CE3420-20-3 | 21.0 to 22.5 |

◆ Cable Clamp: N/MS3057-□□A (from Japan Aviation Electronics Industry, Ltd.)



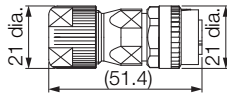
Unit: mm

| Model | Applicable Connector Shell Size | Total Length A ± 0.7 | Effective Thread Length C | Cable Clamp Inner Diameter E Dia. | G ± 0.7 | Slide Range H | Bushing Inner Diameter 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 | 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.

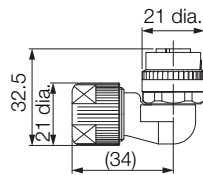
Holding Brake Terminals

◆ Straight Plug: CM10-SP2S-□-D



Unit: mm

◆ Right-Angle Plug: CM10-AP2S-□-D



Unit: mm

6.5 Encoder Cables of 20 m or Less

6.5.1 Encoder Cables for Incremental Encoders or Batteryless Absolute 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* ⁴ | | JZSP-CVP02-□□-E | JZSP-CVP12-□□-E |

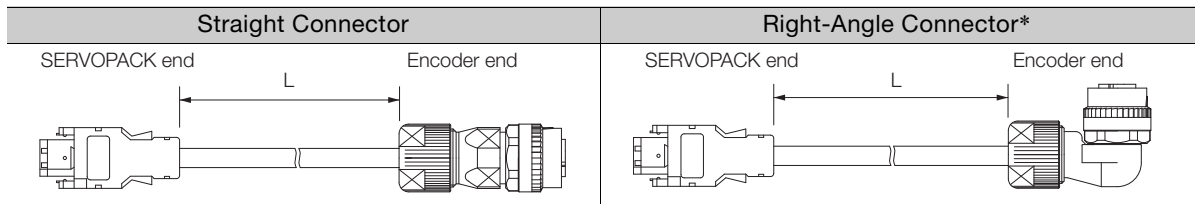
*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).

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

*3. The recommended bending radius (R) is 46 mm or larger.

*4. The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

Appearance



* The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

Wiring Specifications

| Standard Cable | | | | Flexible Cable | | | |
|----------------|--------|---------------------|------------------|----------------|--------|---------------------|------------------|
| SERVOPACK end | | Encoder (motor) end | | SERVOPACK end | | Encoder (motor) end | |
| Pin | Signal | Pin | Wire Color | Pin | Signal | Pin | Wire Color |
| 6 | /PS | 2 | Light blue/white | 6 | /PS | 2 | Black/pink |
| 5 | PS | 1 | Light blue | 5 | PS | 1 | Red/pink |
| 4 | BAT(-) | 5 | Orange/white | 4 | BAT(-) | 5 | Black/light blue |
| 3 | BAT(+) | 6 | Orange | 3 | BAT(+) | 6 | Red/light blue |
| 2 | PG 0 V | 9 | Black | 2 | PG 0 V | 9 | Light green |
| 1 | PG 5 V | 4 | Red | 1 | PG 5 V | 4 | Orange |
| Shell | FG | 10 | FG | Shell | FG | 10 | FG |

6.5.2 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. Use an Encoder Cable for Incremental Encoders or Batteryless Absolute 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} |
| All SGM7G models | Straight | 3 m, 5 m, 10 m, 15 m, and 20 m | JZSP-CVP06-□□-E | JZSP-CVP26-□□-E |
| | Right-angle* ⁴ | | JZSP-CVP07-□□-E | JZSP-CVP27-□□-E |

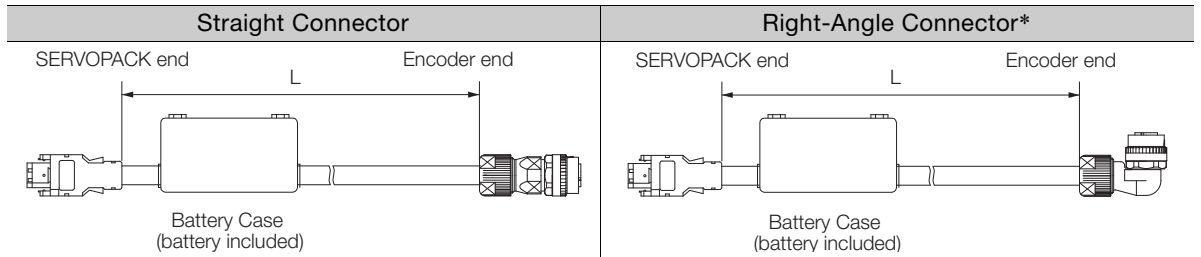
*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).

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

*3. The recommended bending radius (R) is 46 mm or larger.

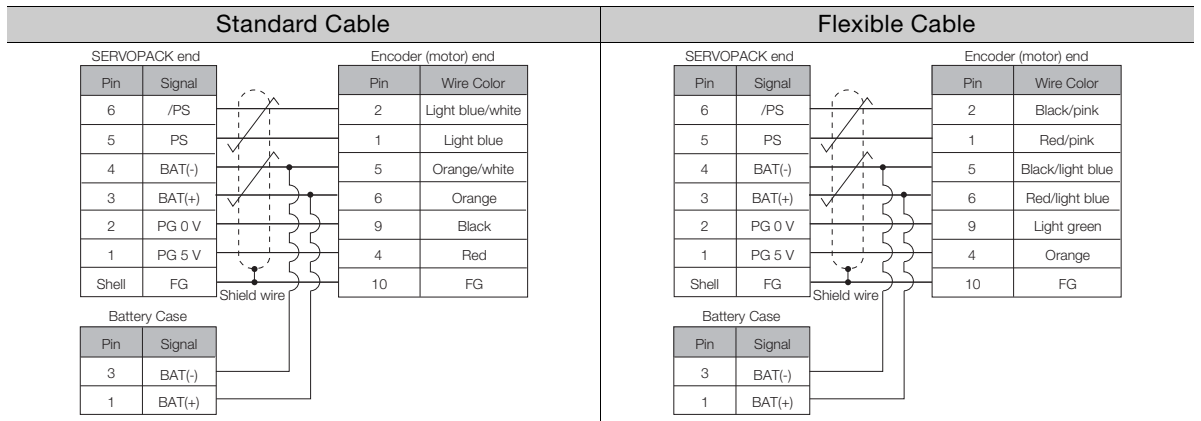
*4. The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

Appearance



* The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

Wiring Specifications



6.6 Relay Encoder Cables of 30 m to 50 m

If the Encoder Cable length exceeds 20 m, be sure to also use a Motor-End Relay Encoder Cable and a SERVOPACK-End Relay Encoder Cable.

If you use a motor with an absolute encoder and a battery is not mounted to the host controller, also obtain a Relay Encoder Cable with a Battery Case in addition to the above two 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.

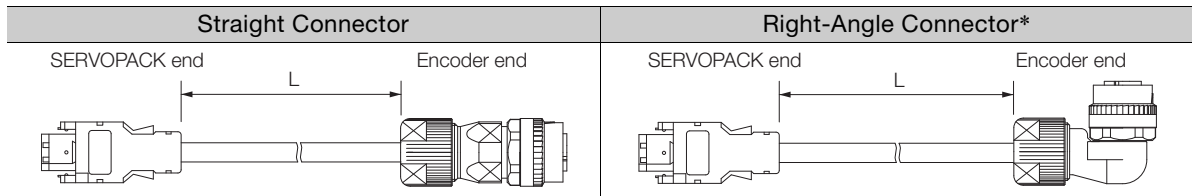
6.6.1 Motor-End Relay Encoder Cables

Selection Table

| Connector Specifications | Specification | Length (L) | Order Number |
|--------------------------|---------------------------------|------------|--------------|
| Straight Connector | Used for all types of encoders. | 0.3 m | JZSP-CVP01-E |
| Right-Angle Connector* | | | JZSP-CVP02-E |

* The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

Appearance



* The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

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 0 V | 9 | Black |
| 1 | PG 5 V | 4 | Red |
| Shell | FG | 10 | FG |

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

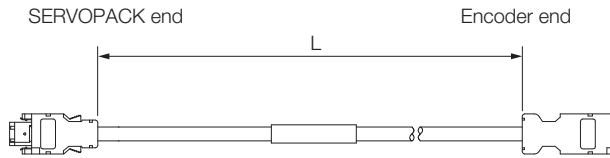
6.6.2 SERVOPACK-End Relay Encoder Cables

Selection Table

| Specification | Length (L) | Order Number* |
|---------------------------------|----------------------|------------------|
| Used for all types of encoders. | 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).

Appearance



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 0 V | 2 | Black |
| 1 | PG 5 V | 1 | Red |
| Shell | FG | Shell | FG |

Shield wire

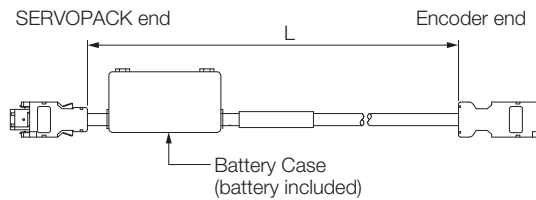
6.6.3 Relay Encoder Cables with Battery Cases

Note: This Cable is not required if you use a Servomotor with an Incremental Encoder, use a Servomotor with a Batteryless Absolute Encoder, or connect a battery to the host controller.

Selection Table

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

Appearance



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 0 V | 2 | Black |
| 1 | PG 5 V | 1 | Red |
| Shell | FG | Shell | FG |

Shield wire

| Battery Case | |
|--------------|--------|
| Pin | Signal |
| 3 | BAT(-) |
| 1 | BAT(+) |


6.7 User-Assembled Wiring Materials for Encoder Cables

6.7.1 Precautions When Using Encoder Cables with a Wiring Length of 30 m to 50 m

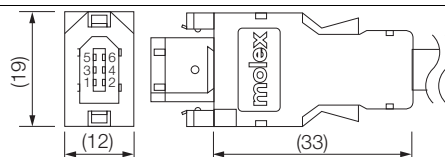
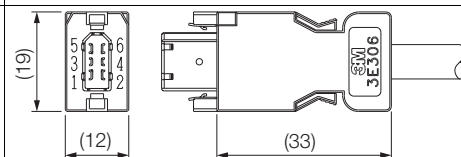
When using Encoder Cables with a wiring length of 30 m to 50 m, it is necessary to fabricate two different types of cables.

| Cables to be Fabricated | Connectors and Wire Materials Required for Fabrication | Reference Page | Remarks |
|-----------------------------------|--|---|-------------------------------------|
| Motor-End Relay Encoder Cable | SERVOPACK Connector | 6.7.2 <i>SERVOPACK Connector Kits</i> on page 6-24 | This cable should be 0.3 m or less. |
| | Servomotor Connector | 6.7.3 <i>Encoder Connector Kits</i> on page 6-25 | |
| | Encoder Cable (20 m or less) | 6.7.4 <i>Cables without Connectors</i> on page 6-26 | |
| SERVOPACK-End Relay Encoder Cable | SERVOPACK Connector | 6.7.2 <i>SERVOPACK Connector Kits</i> on page 6-24 | This cable should be 50 m or less. |
| | Cable Relay Connector | 6.7.3 <i>Encoder Connector Kits</i> on page 6-25 | |
| | Relay Encoder Cable (30 m to 50 m) | 6.7.4 <i>Cables without Connectors</i> on page 6-26 | |

Refer to the following section for details on the connection of the Relay Encoder Cable.

 6.1 *Cable Configurations* on page 6-3

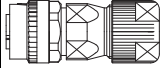
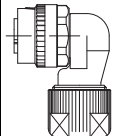
6.7.2 SERVOPACK Connector Kits

| Type | Standard Connector Kit | Compatible Connector Kit |
|--------------------------|---|--|
| Inquires | Yaskawa representative | 3M Japan Limited |
| Manufacturer | Molex Incorporated | |
| 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] |  |  |

Note: Cables are not included. Purchase them separately.

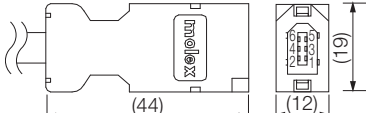
6.7.3 Encoder Connector Kits

IP67-Structure Servomotor Connectors

| Type | Order Number | Specification | External Dimensions | Manufacturer |
|------------------|---------------|---|--|--------------|
| Straight Plug | JZSP-CVP9-1-E | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Plug: CM10-AP10S-M-D Contacts: Soldered CM10-#22SC(S1)-100 Applicable cable diameter: 6.0 mm to 9.0 mm | | |

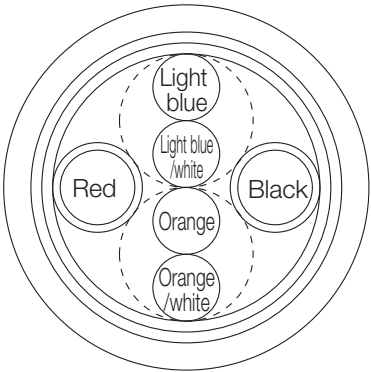
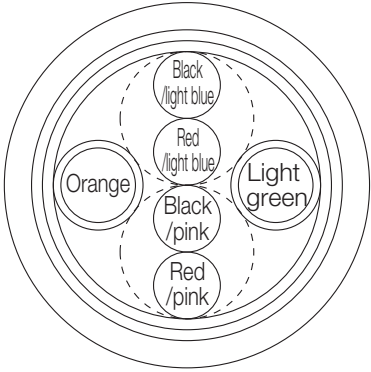
* A Crimping Tool is required. The following Crimping Tool is applicable to the Cables provided by Yaskawa. When using other wire sizes, contact the connector manufacturer for crimping tools.
 Crimping Tool: 357J-52667T

Cable Relay Connectors

| | |
|--------------------------|---|
| Order Number | JZSP-CMP9-2-E |
| Manufacturer | Molex Incorporated |
| Components | 54280-0609 (soldered) |
| Product Specifications | PS-54280 |
| External Dimensions [mm] |  |

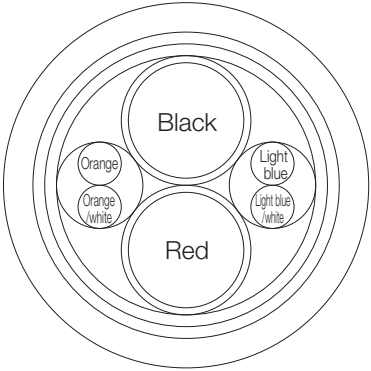
6.7.4 Cables without Connectors

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).

6.8 Wiring Precautions

The wiring precautions are the same as for SGM7M Rotary Servomotors. Refer to the following section.

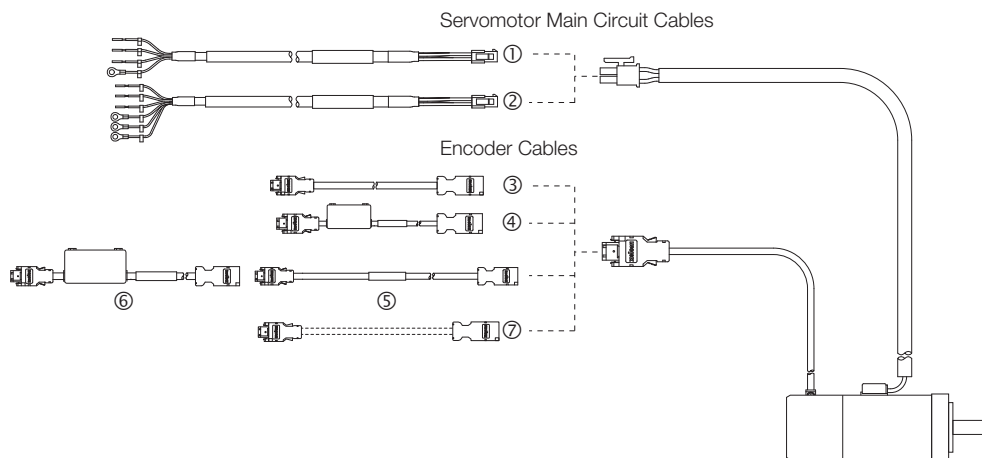
 2.5 *Wiring Precautions* on page 2-9

Cables and User-Assembled Wiring Materials for SGMMV Rotary Servomotors



| | | |
|------------|---|-------------|
| 7.1 | Cable Configurations | 7-2 |
| 7.2 | Servomotor Main Circuit Cables | 7-3 |
| 7.2.1 | Servomotor Main Circuit Cables for Servomotors without Holding Brakes | 7-3 |
| 7.2.2 | Servomotor Main Circuit Cables for Servomotors with Holding Brakes | 7-4 |
| 7.3 | Encoder Cables of 20 m or Less | 7-5 |
| 7.3.1 | Encoder Cables for Incremental Encoders | 7-5 |
| 7.3.2 | Encoder Cables for Absolute Encoders | 7-6 |
| 7.4 | Relay Encoder Cable of 30 m to 50 m | 7-7 |
| 7.4.1 | Relay Encoder Cables | 7-7 |
| 7.4.2 | Relay Encoder Cables with Battery Cases | 7-8 |
| 7.5 | User-Assembled Wiring Materials for Encoder Cables | 7-9 |
| 7.5.1 | Connector Kits | 7-9 |
| 7.5.2 | Cables without Connectors | 7-10 |
| 7.6 | Wiring Precautions | 7-11 |

7.1 Cable Configurations



| No. | Cable Type | Reference | |
|-----|---|---------------------------|-----------|
| ① | Servomotor Main Circuit Cables for Servomotors without Holding Brakes | page 7-3 | |
| ② | Servomotor Main Circuit Cables for Servomotors with Holding Brakes | page 7-4 | |
| ③ | Encoder Cables of 20 m or less for Incremental Encoders | page 7-5 | |
| ④ | Encoder Cables of 20 m or less with Battery Cases for Absolute Encoders | page 7-6 | |
| ⑤ | Relay Encoder Cables of 30 m to 50 m | page 7-7 | |
| ⑥ | Relay Encoder Cables with a Battery Case | | |
| ⑦ | User-Assembled Wiring Materials for Encoder Cables | Connector Kits | page 7-9 |
| | | Cables without Connectors | page 7-10 |

7.2 Servomotor Main Circuit Cables

7.2.1 Servomotor Main Circuit Cables for Servomotors without Holding Brakes

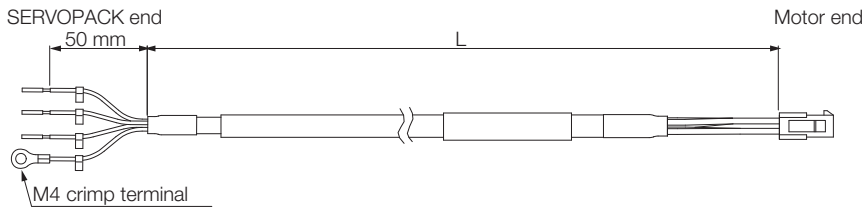
Selection Table

| Servomotor Model | Length (L) | Order Number ^{*1} | |
|---------------------------------|---|----------------------------|----------------------------------|
| | | Standard Cable | Flexible Cable ^{*2, *3} |
| SGMMV-A1 to -A3 10 W to 30 W | 3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, and 50 m | JZSP-CF2M00-□□-E | JZSP-CF2M20-□□-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.

Appearance



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 |

7.2.2 Servomotor Main Circuit Cables for Servomotors with Holding Brakes

Selection Table

| Servomotor Model | Length (L) | Order Number ^{*1} | |
|---------------------------------|---|----------------------------|----------------------------------|
| | | Standard Cable | Flexible Cable ^{*2, *3} |
| SGMMV-A1 to -A3 10 W to 30 W | 3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, and 50 m | JZSP-CF2M03-□□-E | JZSP-CF2M23-□□-E |

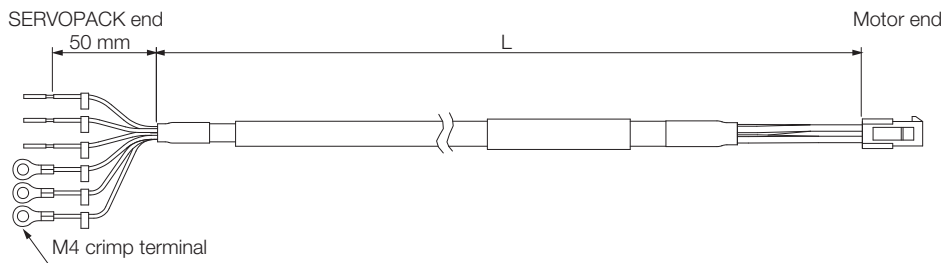
*1. Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, 20, 30, 40, or 50).

*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-speed characteristics will become smaller because the voltage drop increases.

Appearance



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 |
| Black | Brake | Brake | 5 |
| Black | Brake | Brake | 6 |

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

7.3 Encoder Cables of 20 m or Less

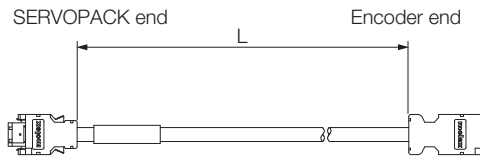
7.3.1 Encoder Cables for Incremental Encoders

Selection Table

| Servomotor Model | Length (L) | Order Number* ¹ | |
|---------------------------------|-----------------------------------|----------------------------|----------------------------------|
| | | Standard Cable | Flexible Cable* ^{2, *3} |
| SGMMV-A1 to -A3 10 W to 30 W | 3 m, 5 m, 10 m, 15 m, and 20 m | 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 46 mm or larger.

Appearance



Wiring Specifications

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

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

7.3.2 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

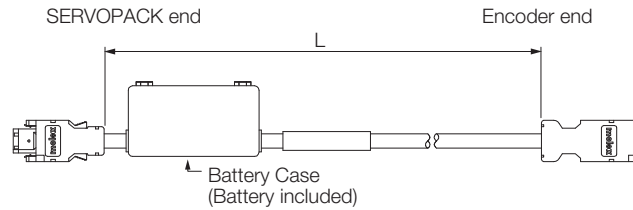
| Servomotor Model | Length (L) | Order Number*1 | |
|---------------------------------|-----------------------------------|-----------------|----------------------|
| | | Standard Cable | Flexible Cable*2, *3 |
| SGMMV-A1 to -A3 10 W to 30 W | 3 m, 5 m, 10 m, 15 m, and 20 m | JZSP-CSP19-□□-E | JZSP-CSP29-□□-E |

*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 46 mm or larger.

Appearance



Wiring Specifications

| Standard Cable | | | | Flexible Cable | | | | | | | | | | | | | | | | | | | |
|--|--------|---------------------|------------------|----------------|--------|---------------------|------------------|---|--------|---|--------|--|--|--|--|--------------|--|-----|--------|---|--------|---|--------|
| SERVOPACK end | | Encoder (motor) end | | SERVOPACK end | | Encoder (motor) end | | | | | | | | | | | | | | | | | |
| Pin | Signal | Pin | Wire Color | Pin | Signal | Pin | Wire Color | | | | | | | | | | | | | | | | |
| 6 | /PS | 6 | Light blue/white | 6 | /PS | 6 | Black/pink | | | | | | | | | | | | | | | | |
| 5 | PS | 5 | Light blue | 5 | PS | 5 | Red/pink | | | | | | | | | | | | | | | | |
| 4 | BAT(-) | 4 | Orange/white | 4 | BAT(-) | 4 | Black/light blue | | | | | | | | | | | | | | | | |
| 3 | BAT(+) | 3 | Orange | 3 | BAT(+) | 3 | Red/light blue | | | | | | | | | | | | | | | | |
| 2 | PG 0 V | 2 | Black | 2 | PG 0 V | 2 | Light green | | | | | | | | | | | | | | | | |
| 1 | PG 5 V | 1 | Red | 1 | PG 5 V | 1 | Orange | | | | | | | | | | | | | | | | |
| Shell | FG | Shell | FG | Shell | FG | Shell | FG | | | | | | | | | | | | | | | | |
| <table border="1" style="margin-top: 10px;"> <thead> <tr> <th colspan="2">Battery Case</th> </tr> <tr> <th>Pin</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>BAT(-)</td> </tr> <tr> <td>1</td> <td>BAT(+)</td> </tr> </tbody> </table> | | | | Battery Case | | Pin | Signal | 3 | BAT(-) | 1 | BAT(+) | <table border="1" style="margin-top: 10px;"> <thead> <tr> <th colspan="2">Battery Case</th> </tr> <tr> <th>Pin</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>BAT(-)</td> </tr> <tr> <td>1</td> <td>BAT(+)</td> </tr> </tbody> </table> | | | | Battery Case | | Pin | Signal | 3 | BAT(-) | 1 | BAT(+) |
| Battery Case | | | | | | | | | | | | | | | | | | | | | | | |
| Pin | Signal | | | | | | | | | | | | | | | | | | | | | | |
| 3 | BAT(-) | | | | | | | | | | | | | | | | | | | | | | |
| 1 | BAT(+) | | | | | | | | | | | | | | | | | | | | | | |
| Battery Case | | | | | | | | | | | | | | | | | | | | | | | |
| Pin | Signal | | | | | | | | | | | | | | | | | | | | | | |
| 3 | BAT(-) | | | | | | | | | | | | | | | | | | | | | | |
| 1 | BAT(+) | | | | | | | | | | | | | | | | | | | | | | |

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

7.4 Relay Encoder Cable of 30 m to 50 m

If you use a motor with an absolute encoder and a battery is not mounted to the host controller, also obtain a Relay Encoder Cable with a Battery Case in addition to the normal Relay Encoder Cable.

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.

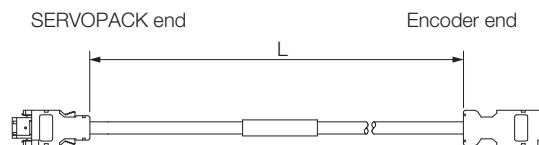
7.4.1 Relay Encoder Cables

Selection Table

| Specifications | 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).

Appearance



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 0 V | 2 | Black |
| 1 | PG 5 V | 1 | Red |
| Shell | FG | Shell | FG |

Shield wire

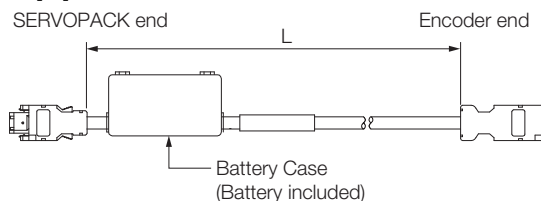
7.4.2 Relay Encoder Cables with Battery Cases

Note: This Cable is not required if you use a Servomotor with an Incremental Encoder or connect a battery to the host controller.

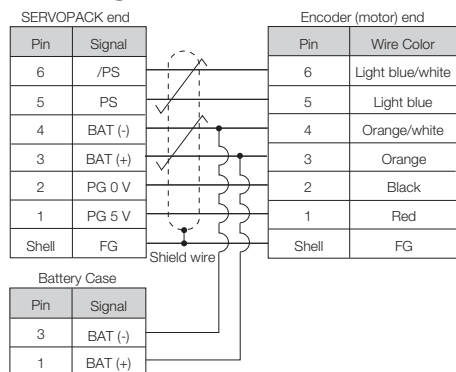
Selection Table

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

Appearance



Wiring Specifications



7.5 User-Assembled Wiring Materials for Encoder Cables

7.5.1 Connector Kits

SERVOPACK Connector Kits

| Type | Standard Cable | Compatible Connector Kit |
|--------------------------|---|--|
| Inquiries | Yaskawa representative | 3M Japan Limited |
| Manufacturer | Molex Incorporated | |
| 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] | | |

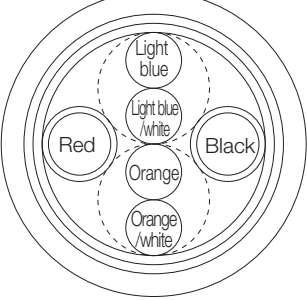
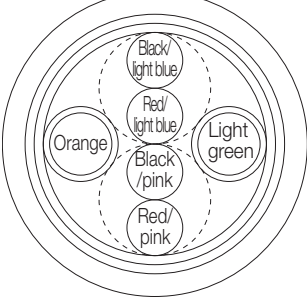
Note: Cables are not included. Purchase them separately.

Encoder Connector Kits

| | |
|--------------------------|-----------------------|
| Order Number | JZSP-CMP9-2-E |
| Manufacturer | Molex Incorporated |
| Components | 54280-0609 (soldered) |
| Product Specifications | PS-54280 |
| External Dimensions [mm] | |

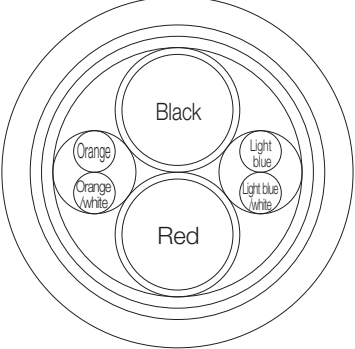
7.5.2 Cables without Connectors

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).

7.6 Wiring Precautions

The wiring precautions are the same as for SGM7M Rotary Servomotors. Refer to the following section.

 2.5 *Wiring Precautions* on page 2-9

Cables and User-Assembled Wiring Materials for Direct Drive Servomotors

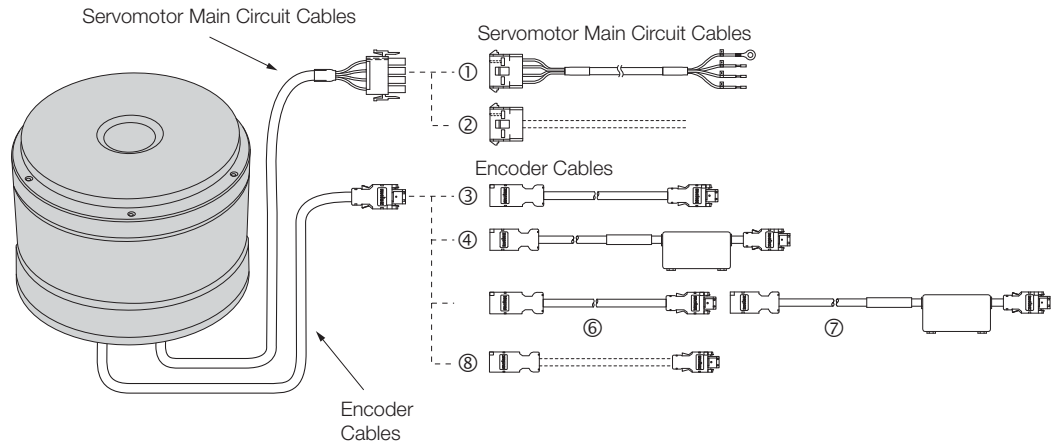
8

| | | |
|------------|---|-------------|
| 8.1 | Cable Configurations | 8-3 |
| 8.1.1 | SGM7D Servomotors | 8-3 |
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| 8.2 | Servomotor Main Circuit Cables | 8-7 |
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| 8.5 | Relay Encoder Cable of 30 m to 50 m | 8-29 |
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| | | |
|------------|---|-------------|
| 8.6 | User-Assembled Wiring Materials for Encoder Cables . . | 8-39 |
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| 8.6.3 | Cables without Connectors | 8-40 |
| 8.7 | Wiring Precautions | 8-41 |

8.1 Cable Configurations

8.1.1 SGM7D Servomotors

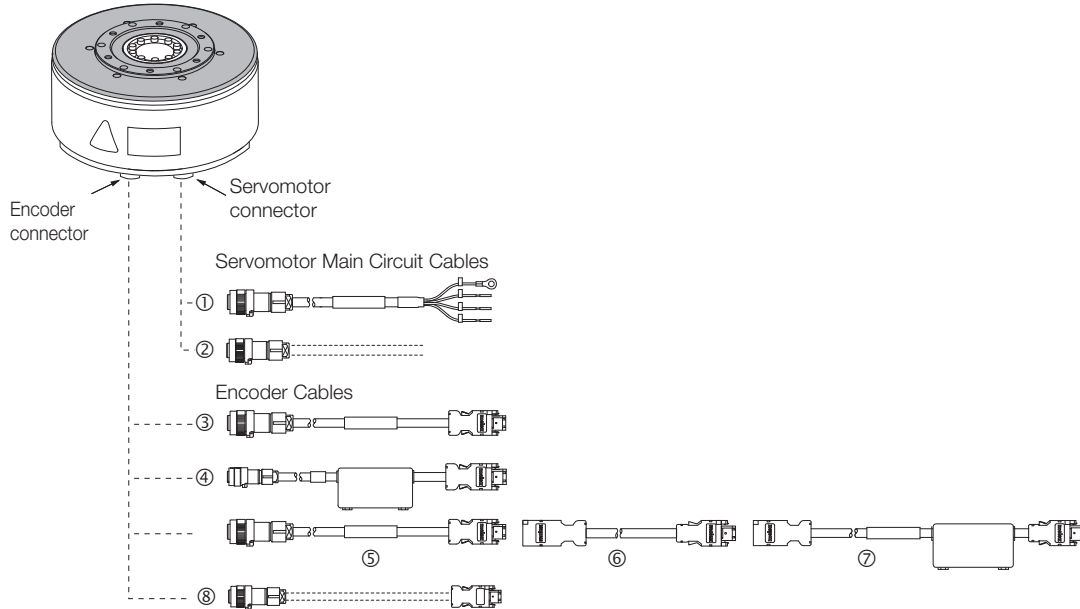


| No. | Cable Type | | Reference |
|-----|--|---------------------------|-----------|
| ① | Servomotor Main Circuit Cables | | page 8-7 |
| ② | User-Assembled Wiring Materials for Servomotor Main Circuit Cables | Connectors | page 8-12 |
| | | Cables without Connectors | page 8-16 |
| ③ | Encoder Cables of 20 m or Less | | page 8-18 |
| ④ | Encoder Cables of 20 m or Less with Battery Cases | | |
| ⑥ | Relay Encoder Cables | | page 8-29 |
| ⑦ | Relay Encoder Cables with a Battery Case | | |
| ⑧ | User-Assembled Wiring Materials for Encoder Cables | Connectors | page 8-39 |
| | | Cables without Connectors | page 8-40 |

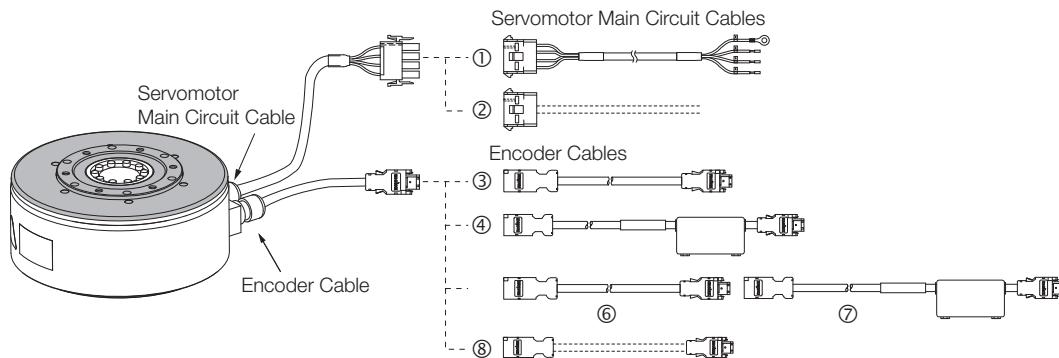
Note: 1. The maximum wiring length is 50 m for Servomotor Main Circuit Cables and Encoder Cables.
 2. If the Encoder Cable length exceeds 20 m, be sure to also connect Relay Cables as shown at ⑥ and ⑦ in the above diagram.

8.1.2 SGM7E Motors and SGM7F-□□A to -□□D Motors

Flange Specification 1



Flange Specification 4



| No. | Cable Type | | Reference |
|-----|--|---------------------------|-----------|
| ① | Servomotor Main Circuit Cables | | page 8-8 |
| ② | User-Assembled Wiring Materials for Servomotor Main Circuit Cables | Connectors | page 8-13 |
| | | Cables without Connectors | page 8-17 |
| ③ | Encoder Cables of 20 m or Less | | page 8-20 |
| ④ | Encoder Cables of 20 m or Less with Battery Cases | | |
| ⑤ | Motor-End Relay Encoder Cables | | page 8-31 |
| ⑥ | SERVOPACK-End Relay Encoder Cables | | |
| ⑦ | Relay Encoder Cables with a Battery Case | | |
| ⑧ | User-Assembled Wiring Materials for Encoder Cables | Connectors | page 8-39 |
| | | Cables without Connectors | page 8-40 |

Note: 1. The maximum wiring length is 50 m for Servomotor Main Circuit Cables and Encoder Cables.

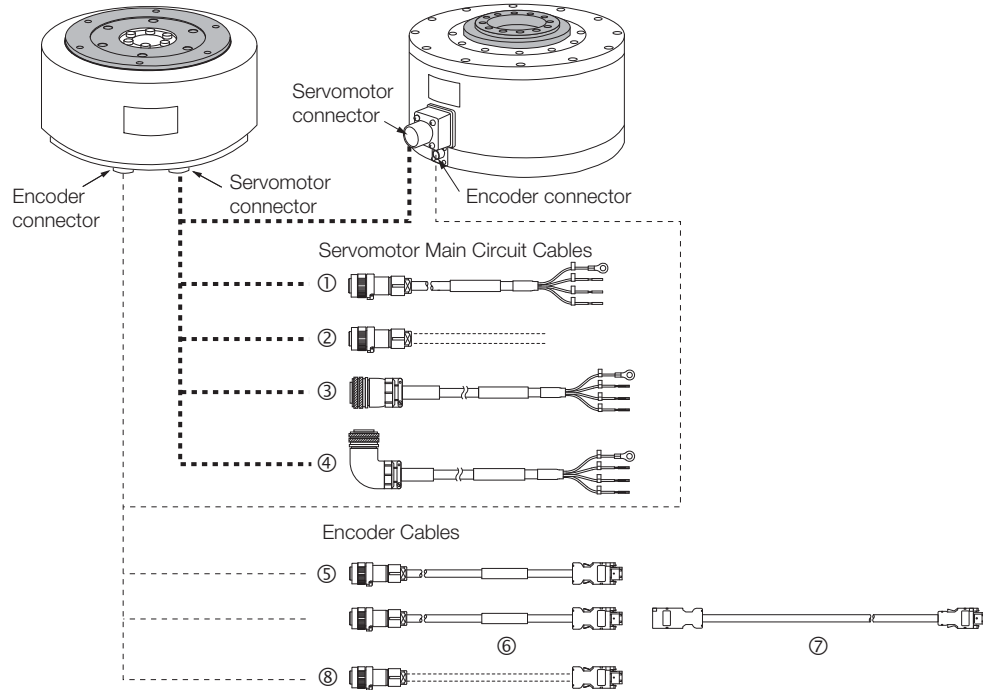
2. If the Encoder Cable length exceeds 20 m, be sure to also connect Relay Encoder Cables as shown in the above diagram, at ⑤ to ⑦ for flange specification 1 and at ⑥ and ⑦ for flange specification 4.

8.1.3 SGM7F-□□M and -□□N Motors and SGMCS Motors

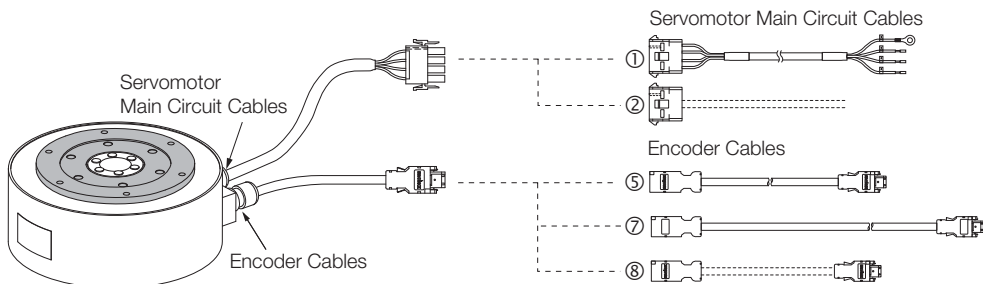
Flange Specification 1 or 3

Small-Capacity, Coreless Servomotors

Medium-Capacity Servomotors with Cores



Flange Specification 4



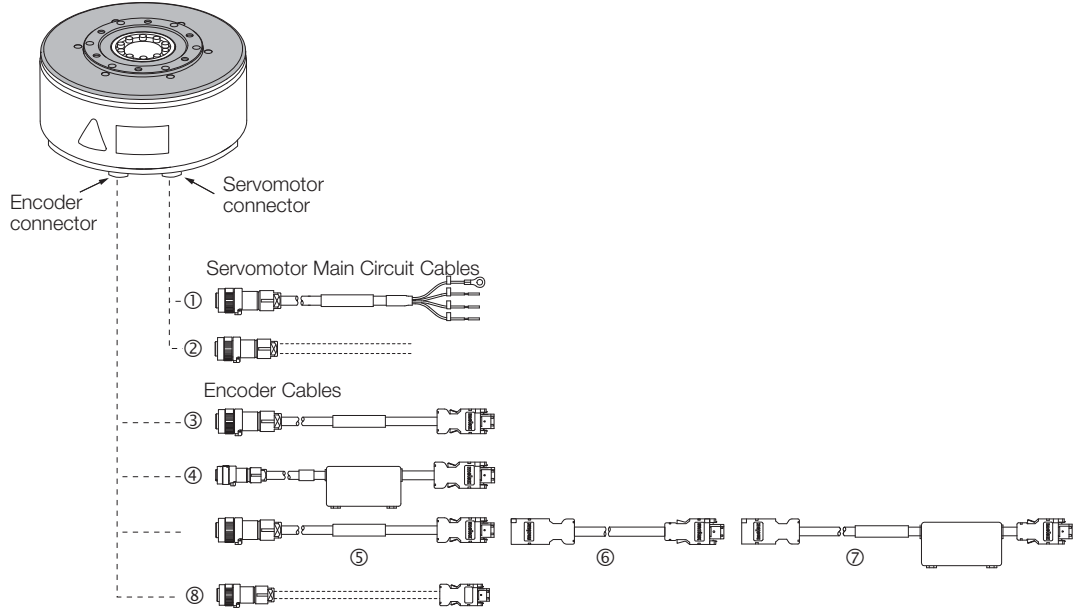
| No. | Cable Type | | Reference |
|-----|--|---------------------------|-----------|
| ① | Servomotor Main Circuit Cables | | page 8-9 |
| ② | User-Assembled Wiring Materials for Servomotor Main Circuit Cables | Connectors | page 8-13 |
| | | Cables without Connectors | page 8-17 |
| ③ | Servomotor Main Circuit Cables with Straight Plugs | | page 8-9 |
| ④ | Servomotor Main Circuit Cables with Right-Angle Plugs | | page 8-9 |
| ⑤ | Encoder Cables of 20 m or Less | | page 8-27 |
| ⑥ | Motor-End Relay Encoder Cables | | page 8-37 |
| ⑦ | SERVOPACK-End Relay Encoder Cables | | page 8-37 |
| ⑧ | User-Assembled Wiring Materials for Encoder Cables | Connectors | page 8-39 |
| | | Cables without Connectors | page 8-40 |

Note: 1. The maximum wiring length is 50 m for Servomotor Main Circuit Cables and Encoder Cables.

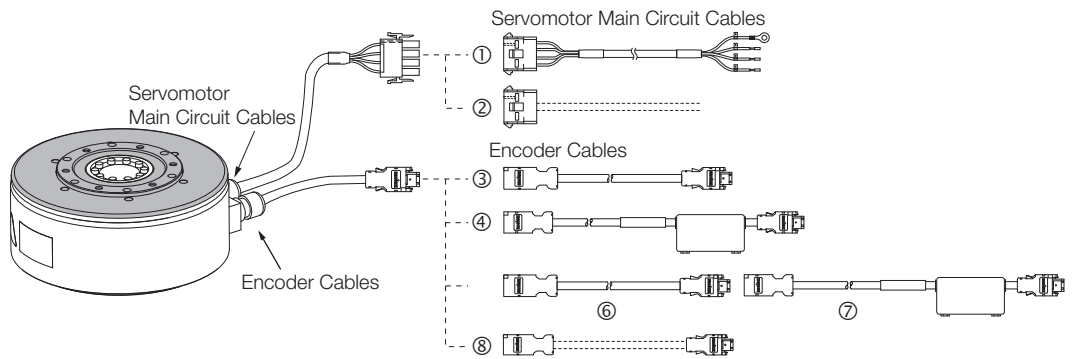
2. If the Encoder Cable length exceeds 20 m for flange specifications 1 or 3, be sure to also connect Relay Encoder Cables as shown at ⑥ and ⑦ in the above diagram.

8.1.4 SGMCV Servomotors

Flange Specification 1



Flange Specification 4



| No. | Cable Type | | Reference |
|-----|--|---------------------------|-----------|
| ① | Servomotor Main Circuit Cables | | page 8-11 |
| ② | User-Assembled Wiring Materials for Servomotor Main Circuit Cables | Connectors | page 8-13 |
| | | Cables without Connectors | page 8-17 |
| ③ | Encoder Cables of 20 m or Less | | page 8-24 |
| ④ | Encoder Cables of 20 m or Less with Battery Cases | | |
| ⑤ | Motor-End Relay Encoder Cables | | page 8-34 |
| ⑥ | SERVOPACK-End Relay Encoder Cables | | |
| ⑦ | Relay Encoder Cables with a Battery Case | | |
| ⑧ | User-Assembled Wiring Materials for Encoder Cables | Connectors | page 8-39 |
| | | Cables without Connectors | page 8-40 |

Note: 1. The maximum wiring length is 50 m for Servomotor Main Circuit Cables and Encoder Cables.
 2. If the Encoder Cable length exceeds 20 m, be sure to also connect Relay Encoder Cables as shown in the above diagram, at ⑤ to ⑦ for flange specification 1 and at ⑥ and ⑦ for flange specification 4.

8.2 Servomotor Main Circuit Cables

8.2.1 SGM7D Servomotor Main Circuit Cables

Selection Table

| Servomotor Model | Length (L) | Order Number*1 | | Appearance |
|--|---|-----------------|--------------------|------------|
| | | Standard Cable | Flexible Cable*2*3 | |
| SGM7D-□□F, SGM7D-08G to -45G, SGM7D-□□I, SGM7D-□□J, or SGM7D-□□L | 3 m, 5 m, 10 m, 15 m, and 20 m | JZSP-CMM00-□□-E | JZSP-C7DM21-□□-E | |
| SGM7D-01G, SGM7D-05G, SGM7D-□□H, or SGM7D-□□K | 3 m, 5 m, 10 m, 15 m, and 20 m | JZSP-CMM00-□□-E | JZSP-CMM01-□□-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 the following section for information on connector specifications, manufacturers, and order numbers.

SGM7D Servomotors on page 8-12

2. Refer to the following section for information on wiring material specifications and order numbers.

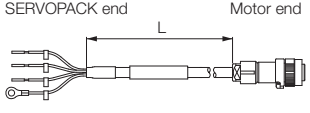
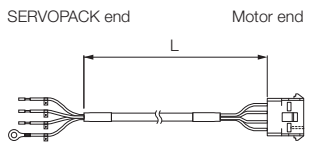
SGM7D Main Circuit Cables on page 8-16

Wiring Specifications

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

8.2.2 Main Circuit Cables for SGM7E and SGM7F-□□A to -□□D Motors

Selection Table


| Servomotor Model | Flange Specification Code (6th Digit in Model Number) | Length (L) | Order Number*1 | | Appearance |
|-----------------------------------|---|---|-----------------|----------------------|---|
| | | | Standard Cable | Flexible Cable*2, *3 | |
| SGM7E-□□□ SGM7F-□□A to -□□D | 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 the following section for information on connector specifications, manufacturers, and order numbers.

 SGM7E Servomotors, SGM7F-□□A to -□□D Servomotors, SGMCV Servomotors, and SGMCS Small-Capacity, Coreless Servomotor on page 8-13

2. Refer to the following section for information on wiring material specifications and order numbers.

 Main Circuit Cables for SGM7E Servomotors and SGMCS Small-Capacity, Coreless Servomotors on page 8-17

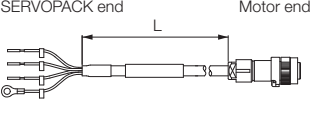
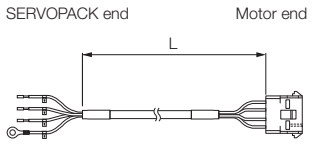

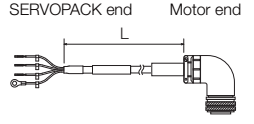
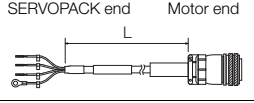
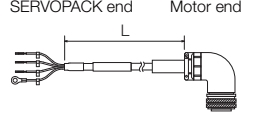
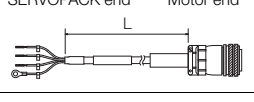
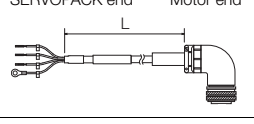
 Main Circuit Cables for SGM7F-□□A to -□□D Servomotors and SGMCV Servomotors on page 8-17

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 |

8.2.3 Main Circuit Cables for SGM7F-□□M, -□□N, and SGMCS Motors

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 |  |
| SGM7F-□□M SGM7F-□□N 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 |  |
| SGM7F-□□M SGM7F-□□N SGMCS-□□M SGMCS-□□N □□: 1A | 1 Load side installation and 3 Non-load side installation | Straight | | JZSP-USA301-□□-E | JZSP-USA321-□□-E |  |
| | | Right-angle | | JZSP-USA302-□□-E | JZSP-USA322-□□-E |  |
| SGM7F-□□M SGM7F-□□N SGMCS-□□M SGMCS-□□N □□: 1E □□: 2Z | 1 Load side installation and 3 Non-load side installation | 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 | |


8.2.3 Main Circuit Cables for SGM7F-□□M, -□□N, and SGMCS Motors

Note: 1. Refer to the following section for information on connector specifications, manufacturers, and order numbers.

 SGM7E Servomotors, SGM7F-□□A to -□□D Servomotors, SGMCV Servomotors, and SGMCS Small-Capacity, Coreless Servomotor on page 8-13

 SGM7F-□□M or -□□N Servomotors and SGMCS Medium-Capacity Servomotors with Cores on page 8-14

2. Refer to the following section for information on wiring material specifications and order numbers.

 Main Circuit Cables for SGM7E Servomotors and SGMCS Small-Capacity, Coreless Servomotors on page 8-17

Yaskawa does not specify what wiring materials to use for SGM7F-□□M and -□□N Servomotors and SGMCS Medium-Capacity Servomotors with Cores. Use appropriate wiring materials for the current specifications and 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)

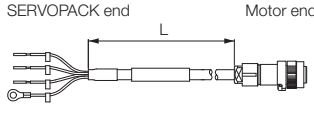
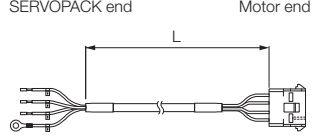
| SERVOPACK end | | Motor end | |
|---------------|---------|-----------|-----|
| Wire Color | Signal | Signal | Pin |
| Red | Phase U | Phase U | A |
| White | Phase V | Phase V | B |
| Black | Phase W | Phase W | C |
| Green | FG | FG | D |

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

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

8.2.4 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} | |
| SGM7E-□□B SGM7E-□□C SGM7E-□□D | 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) | 3 m, 5 m, 10 m, 15 m, and 20 m | 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 the following section for information on connector specifications, manufacturers, and order numbers.

 *SGM7E Servomotors, SGM7F-□□A to -□□D Servomotors, SGMCV Servomotors, and SGMCS Small-Capacity, Coreless Servomotor on page 8-13*

2. Refer to the following section for information on wiring material specifications and order numbers.

 *Main Circuit Cables for SGM7F-□□A to -□□D Servomotors and SGMCV Servomotors on page 8-17*

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 |

8.3 User-Assembled Wiring Materials for Servomotor Main Circuit Cables

8.3.1 Servomotor Connector Kits

SGM7D Servomotors

◆ SGM7D-01G, -05G, -□□H, and -□□K
(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 | | AWG18 to AWG24 | |
| Crimping Tool* | Hand Tool | 91510-1 | |

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

Note: Cables are not included. Purchase them separately.

◆ SGM7D-□□F, -□□G (Excluding -01G and -05G), -□□I, -□□J,
and -□□L (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: 350536-3, Loose Sockets: 350550-3 | |
| Applicable Wire Sizes | | AWG14 to AWG20 | |
| Crimping Tool* | Hand Tool | 91500-1 | |

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

Note: Cables are not included. Purchase them separately.

SGM7E Servomotors, SGM7F-□□A to -□□D Servomotors, SGMCV Servomotors, and SGMCS Small-Capacity, Core-less Servomotor

◆ 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: Cables are not included. Purchase them separately.

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

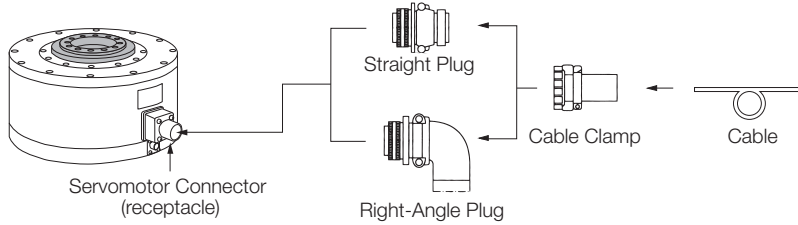
| Item | Description | External Dimensions [mm] | |
|-----------------------|-----------------------------|--------------------------|--|
| Manufacturer | Tyco Electronics Japan G.K. | | |
| Order Number | JZSP-CMM9-3-E | | |
| Components | Cap | | 350780-1 |
| | Socket | | Reeled Sockets: 350570-3, Loose Sockets: 350689-3 |
| Applicable Wire Sizes | AWG18 to AWG24 | | |
| Crimping Tool* | Hand Tool | | 91510-1 |

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

Note: Cables are not included. Purchase them separately.

SGM7F-□□M or -□□N Servomotors and SGMCS Medium-Capacity Servomotors with Cores

◆ Connector Configurations



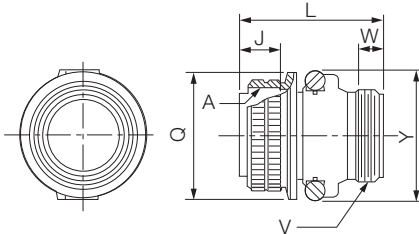
| Servomotor Model | Servomotor Connector Model (Receptacle) | Order Number | | | Manufacturer |
|------------------------|--|-----------------|-----------------|--------------|---|
| | | | | | |
| SGMCS-□□M SGMCS-□□N | CE05-2A18-10PD-D (MS Connector model: MS3102A18-10P) | N/MS3106B18-10S | N/MS3108B18-10S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

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

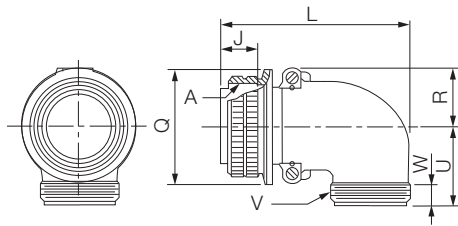
■ Straight Plugs: N/MS3106B18-10S



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 |

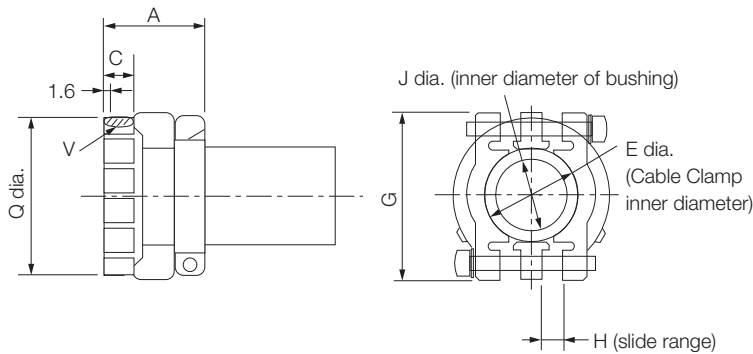
■ Right-Angle Plug: N/MS3108B18-10S



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 | Effective 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

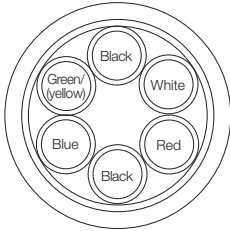
| Part | Applicable Connector Shell Size | Total Length A ± 0.7 | Effective Thread Length C | E Dia. | G ± 0.7 | H | J Dia. | Mounting Thread V | Outer Diameter Q ± 0.7 Dia. | Attached Bushing |
|--------------|---------------------------------|--------------------------|---------------------------|--------|-------------|-----|--------|-------------------|---------------------------------|------------------|
| N/MS3057-10A | 18 | 23.8 | 10.3 | 15.9 | 31.7 | 3.2 | 14.3 | 1-20UNEF | 30.1 | AN3420-10 |

Note: A rubber bushing is included.

8.3.2 Cables without Connectors

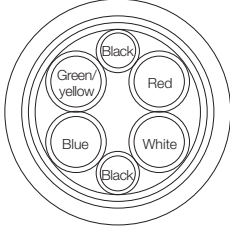
SGM7D Main Circuit Cables

◆ SGM7D-01G, -05G, -□□H, and -□□K

| 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) AWG22 × 6C |
| | AWG20 (0.52 mm ²) Outer diameter of insulating sheath: 1.53 mm | 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 |  | |

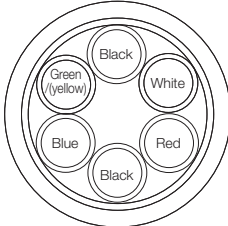
* Replace the boxes (□□) in the order number with the cable length (05, 10, 15, 20, or 50).

◆ SGM7D-□□F, -□□G (Excluding -01G and -05G), -□□I, -□□J, and -□□L

| Item | Standard Cable | Flexible Cable |
|------------------------------------|---|---|
| Order Number* | JZSP-CSM91-□□-E | JZSP-CSM81-□□-E |
| 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 |
| Finished Diameter | 8 mm ± 0.3 mm | |
| Internal Structure and Lead Colors |  | |

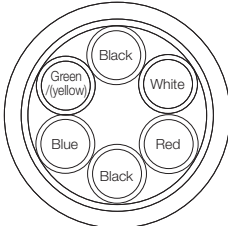
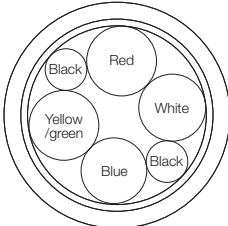
* Replace the boxes (□□) in the order number with the cable length (05, 10, 15, 20, or 50).

Main Circuit Cables for SGM7E Servomotors and SGMCS Small-Capacity, Coreless Servomotors

| 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) AWG22 × 6C |
| | AWG20 (0.52 mm ²) Outer diameter of insulating sheath: 1.53 mm | 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, or 50).

Main Circuit Cables for SGM7F-□□A to -□□D Servomotors and SGMCV Servomotors

| 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).

8.4 Encoder Cables of 20 m or Less

8.4.1 SGM7D 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 | Length (L) | Order Number*1 | | Appearance |
|------------------|---|---|---------------------|----------------------|------------|
| | | | Standard Cable | Flexible Cable*2, *3 | |
| SGM7D | For incremental encoder: Without Battery Case | 3 m, 5 m, 10 m, 15 m, and 20 m | JZSP-CMP00- □□-E | JZSP-CMP10- □□-E | |
| | For multiturn absolute encoder: Without Battery Case*4 | | JZSP-CMP00- □□-E | JZSP-CMP10- □□-E | |
| | For multiturn 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 46 mm or larger.

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

Note: 1. Refer to the following section for information on connector specifications, manufacturers, and order numbers.

8.6.1 *SERVOPACK Connector Kits* on page 8-39

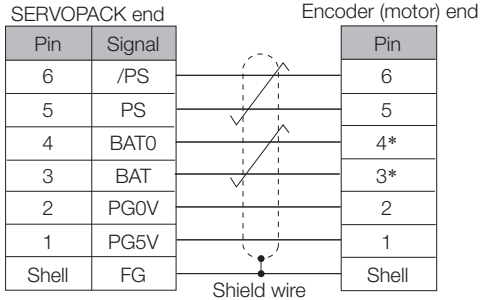
8.6.2 *Encoder Connector Kits* on page 8-39

2. Refer to the following section for information on wiring material specifications and order numbers.

8.6.3 *Cables without Connectors* on page 8-40

Wiring Specifications

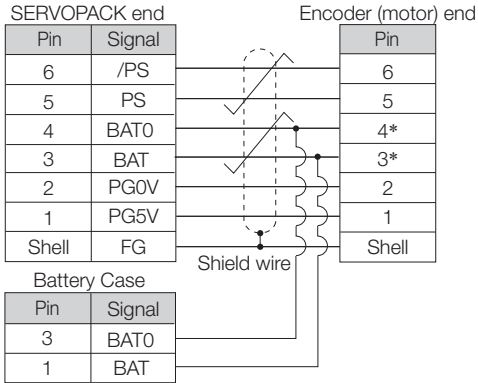
◆ JZSP-CMP00-□□-E (Standard Cables) and JZSP-CMP10-□□-E (Flexible Cables)



* A battery is required only for a multiturn absolute encoder.

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)



* A battery is required only for a multiturn absolute encoder.

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

8.4.2 Encoder Cables for SGM7E and SGM7F Servomotors

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

◆ SGM7E and SGM7F-□□A to -□□D

| Servomotor Model | Serial Encoder Specification | Flange Specification Code (6th Digit in Model Number) | Length (L) | Order Number*1 | | Appearance |
|-----------------------------------|----------------------------------|---|---|------------------|----------------------|------------|
| | | | | Standard Cable | Flexible Cable*2, *3 | |
| SGM7E-□□□F SGM7F-□□AF to -□□DF | For incremental encoder | 1 Non-load side installation | 3 m, 5 m, 10 m, 15 m, and 20 m | JZSP-CMP60-□□-E | JZSP-CSP60-□□-E | |
| | | 4 Non-load side installation (with cable on side) | | JZSP-CMP00-□□-E | JZSP-CMP10-□□-E | |
| SGM7E-□□□7 SGM7F-□□A7 to -□□D7 | For multi-turn absolute encoder: | 1 Non-load side installation | | JZSP-C7PI00-□□-E | JZSP-C7PI20-□□-E | |
| | | | | JZSP-C7PA00-□□-E | JZSP-C7PA20-□□-E | |
| | | 4 Non-load side installation (with cable on side) | | JZSP-CMP00-□□-E | JZSP-CMP10-□□-E | |
| | | | | 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 46 mm or larger.

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

Note: 1. Refer to the following section for information on connector specifications, manufacturers, and order numbers.

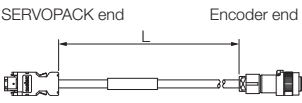
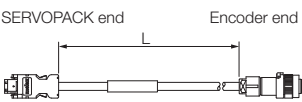
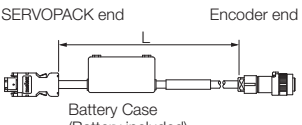
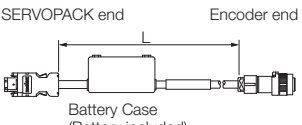
 8.6.1 *SERVOPACK Connector Kits* on page 8-39

 8.6.2 *Encoder Connector Kits* on page 8-39

2. Refer to the following section for information on wiring material specifications and order numbers.

 8.6.3 *Cables without Connectors* on page 8-40

◆ SGM7F-□□M and -□□N

| Servomotor Model | Serial Encoder Specification | Flange Specification Code (6th Digit in Model Number) | Length (L) | Order Number* ¹ | | Appearance |
|----------------------|---|--|---|----------------------------|----------------------------------|---|
| | | | | Standard Cable | Flexible Cable* ^{2, *3} | |
| SGM7F-□□MF and -□□NF | For incremental encoder | 1 Load side installation or 3 Non-load side installation | 3 m, 5 m, 10 m, 15 m, and 20 m | JZSP-CMP60-□□-E | JZSP-CSP60-□□-E |  |
| | | 1 Load side installation or 3 Non-load side installation | | JZSP-C7PI00-□□-E | JZSP-C7PI20-□□-E |  |
| SGM7F-□□M7 and -□□N7 | For multi-turn absolute encoder: Without Battery Case* ⁴ | 1 Load side installation or 3 Non-load side installation | 3 m, 5 m, 10 m, 15 m, and 20 m | JZSP-C7PA00-□□-E | JZSP-C7PA20-□□-E |  |
| | For multi-turn absolute encoder: With Battery Case | 1 Load side installation or 3 Non-load side installation | | JZSP-C7PA00-□□-E | JZSP-C7PA20-□□-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 46 mm or larger.


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

Note: 1. Refer to the following section for information on connector specifications, manufacturers, and order numbers.

 8.6.1 *SERVOPACK Connector Kits* on page 8-39

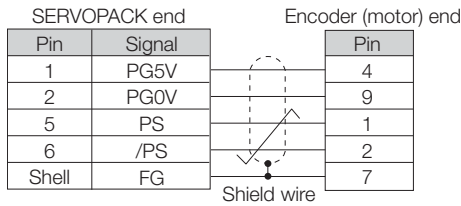
 8.6.2 *Encoder Connector Kits* on page 8-39

2. Refer to the following section for information on wiring material specifications and order numbers.

 8.6.3 *Cables without Connectors* on page 8-40

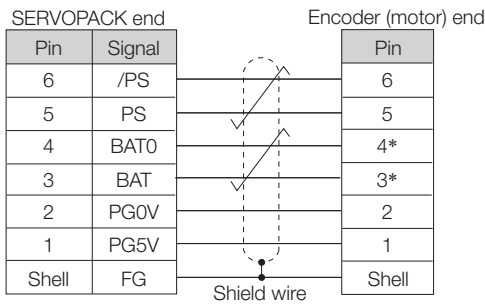
Wiring Specifications

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



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

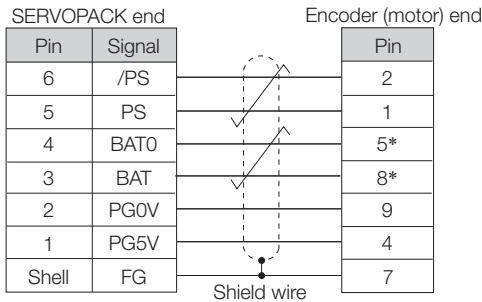
◆ JZSP-CMP00-□□-E (Standard Cables) and JZSP-CMP10-□□-E (Flexible Cables)



* A battery is required only for a multiturn absolute encoder.

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

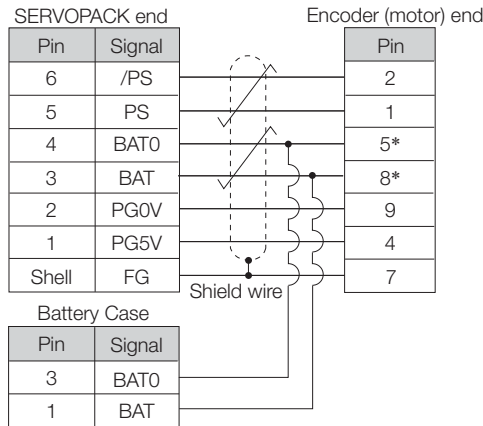
◆ JZSP-C7PI00-□□-E (Standard Cables) and JZSP-C7PI20-□□-E (Flexible Cables)



* A battery is required only for a multiturn absolute encoder.

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

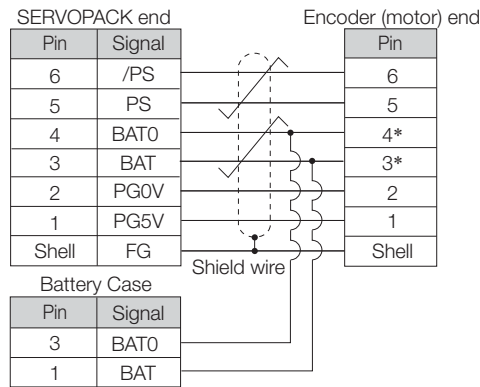
◆ JZSP-C7PA00-□□-E (Standard Cables) and JZSP-C7PA20-□□-E (Flexible Cables)



* A battery is required only for a multiturn absolute encoder.

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)



* A battery is required only for a multiturn absolute encoder.

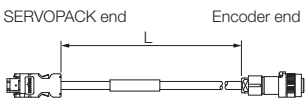
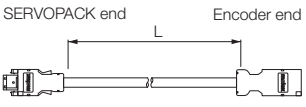
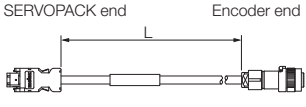
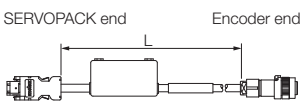
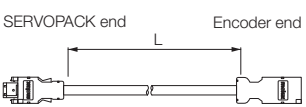
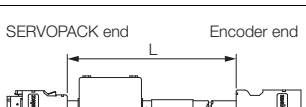
Note: Always connect the shield wire from the Encoder Cable to the connector case (shell).

8.4.3 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 | |
| SGMCM- □□□E | 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 |  |
| | | 4 Non-load side installation (with cable on side) | | JZSP-CMP00- □□-E | JZSP-CMP10- □□-E |  |
| SGMCM- □□□I | For multi-turn absolute encoder: Without Battery Case*4 | 1 Non-load side installation | | JZSP-C7PI00- □□-E | JZSP-C7PI20- □□-E |  |
| | | | | JZSP-C7PA00- □□-E | JZSP-C7PA20- □□-E |  |
| | For multi-turn absolute encoder: Without Battery Case*4 | 4 Non-load side installation (with cable on side) | | JZSP-CMP00- □□-E | JZSP-CMP10- □□-E |  |
| | | | | 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 46 mm or larger.


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

Note: 1. Refer to the following section for information on connector specifications, manufacturers, and order numbers.

 8.6.1 SERVOPACK Connector Kits on page 8-39

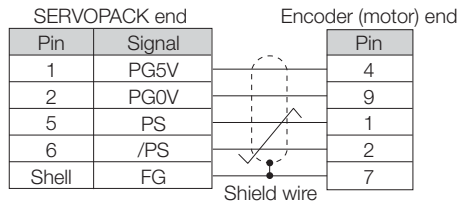
 8.6.2 Encoder Connector Kits on page 8-39

2. Refer to the following section for information on wiring material specifications and order numbers.

 8.6.3 Cables without Connectors on page 8-40

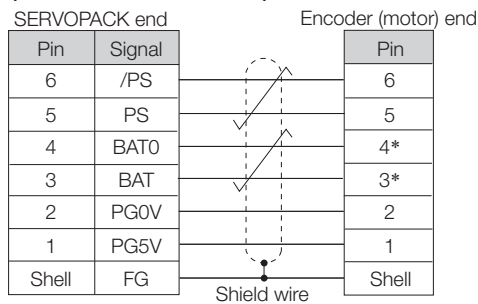
Wiring Specifications

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



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

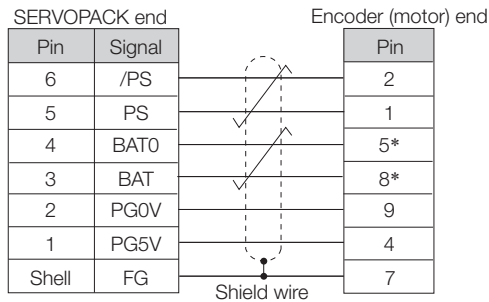
◆ JZSP-CMP00-□□-E (Standard Cables) and JZSP-CMP10-□□-E (Flexible Cables)



* A battery is required only for a multiturn absolute encoder.

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

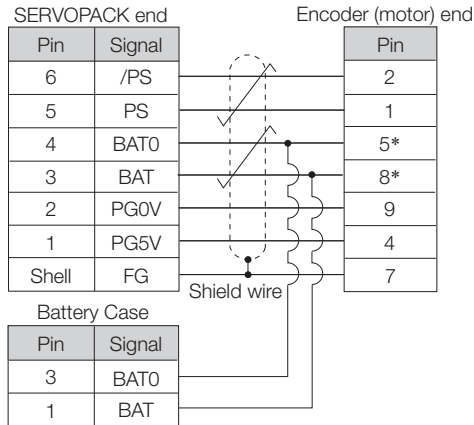
◆ JZSP-C7PI00-□□-E (Standard Cables) and JZSP-C7PI20-□□-E (Flexible Cables)



* A battery is required only for a multiturn absolute encoder.

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

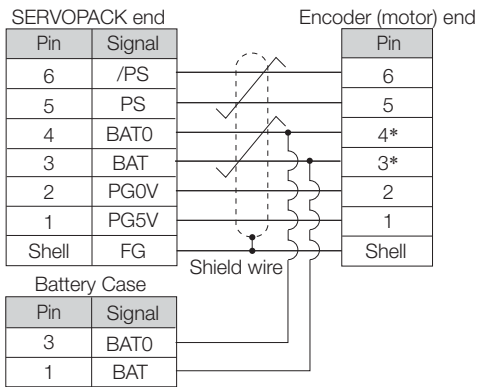
◆ JZSP-C7PA00-□□-E (Standard Cables) and JZSP-C7PA20-□□-E (Flexible Cables)



* A battery is required only for a multiturn absolute encoder.

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)



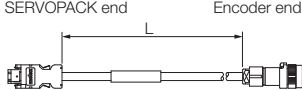
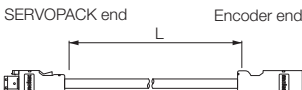
* A battery is required only for a multiturn absolute encoder.

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

8.4.4 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 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 46 mm or larger.

Note: 1. Refer to the following section for information on connector specifications, manufacturers, and order numbers.

 8.6.1 *SERVOPACK Connector Kits* on page 8-39

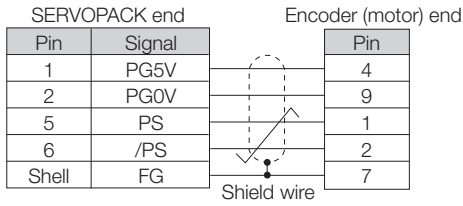
 8.6.2 *Encoder Connector Kits* on page 8-39

2. Refer to the following section for information on wiring material specifications and order numbers.

 8.6.3 *Cables without Connectors* on page 8-40

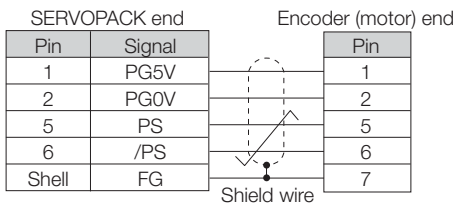
Wiring Specifications

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



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)



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

8.5 Relay Encoder Cable of 30 m to 50 m

If the Encoder Cable length exceeds 20 m, Relay Encoder Cables are used. Select the combination of Cables to use according to your system.

8.5.1 SGM7D Encoder Cables

If a battery is not mounted to the host controller, also obtain a Relay Encoder Cable with a Battery Case in addition to the Relay Encoder Cable.

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.

Relay Encoder Cables

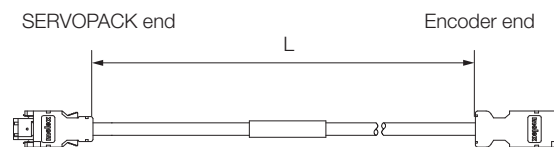
◆ Selection Table

| Specification | Length (L) | Order Number* |
|---|---------------------|------------------|
| For incremental or multiturn 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).

Note: Flexible cables are not available.

◆ Appearance



◆ Wiring Specifications

| SERVOPACK end | | Encoder (motor) end | |
|---------------|--------|---------------------|--------|
| Pin | Signal | Pin | Signal |
| 6 | /PS | 6 | |
| 5 | PS | 5 | |
| 4 | BAT0 | 4* | |
| 3 | BAT | 3* | |
| 2 | PGOV | 2 | |
| 1 | PG5V | 1 | |
| Shell | FG | Shell | |

Shield wire

* A battery is required only for a multiturn absolute encoder.

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

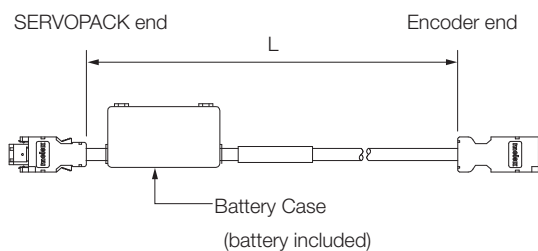
Relay Encoder Cables with a Battery Case

◆ Selection Table

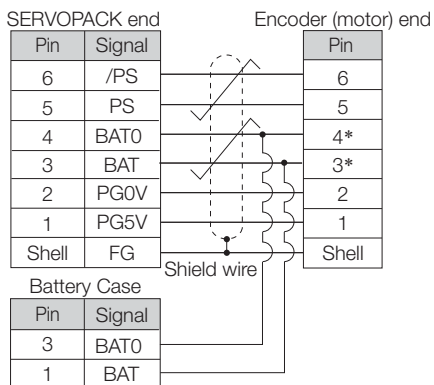
| Specification | Length (L) | Order Number |
|--------------------------------|------------|--------------|
| For multiturn absolute encoder | 0.3 m | JZSP-CSP12-E |

Note: Flexible cables are not available.

◆ Appearance



◆ Wiring Specifications



* A battery is required only for a multiturn absolute encoder.

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

8.5.2 Encoder Cables for SGM7E and SGM7F Servomotors

For flange specification 1 or 3, use a Motor-End Relay Encoder Cable and a SERVOPACK-End Relay Encoder Cable. For flange specification 4, use only a SERVOPACK-End Relay Encoder Cable.

If a battery is not mounted to the host controller, also obtain a Relay Encoder Cable with a Battery Case in addition to the above 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.

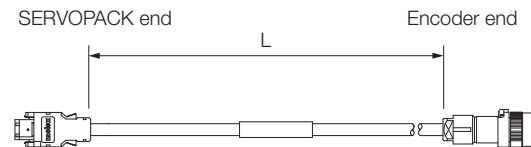
Motor-End Relay Encoder Cables

◆ Selection Table

| Specification | Length (L) | Order Number |
|---|------------|---------------|
| For incremental or multiturn absolute encoder | 0.3 m | JZSP-C7PRC0-E |

Note: Flexible cables are not available.

◆ Appearance



◆ Wiring Specifications

| SERVOPACK end | | Encoder (motor) end | |
|---------------|--------|---------------------|-----|
| Pin | Signal | | Pin |
| 6 | /PS | | 2 |
| 5 | PS | | 1 |
| 4 | BAT0 | | 5* |
| 3 | BAT | | 8* |
| 2 | PG0V | | 9 |
| 1 | PG5V | | 4 |
| Shell | FG | | 7 |

* A battery is required only for a multiturn absolute encoder.

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

SERVOPACK-End Relay Encoder Cables

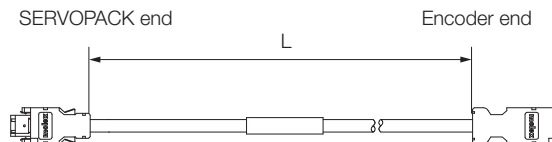
◆ Selection Table

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

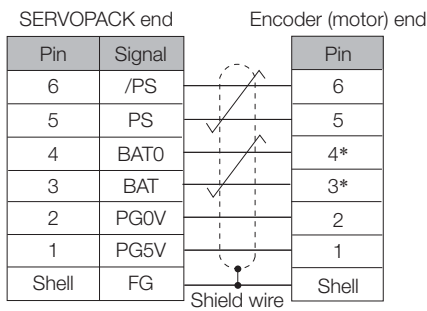
* Replace the boxes (□□) in the order number with the cable length (30, 40, or 50).

Note: Flexible cables are not available.

◆ Appearance



◆ Wiring Specifications



* A battery is required only for a multiturn absolute encoder.

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

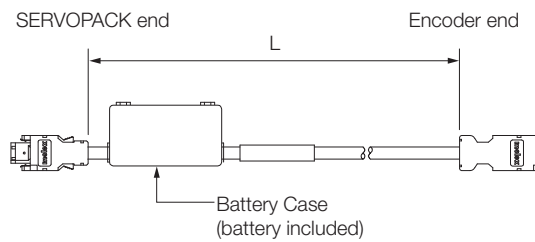
Relay Encoder Cables with a Battery Case

◆ Selection Table

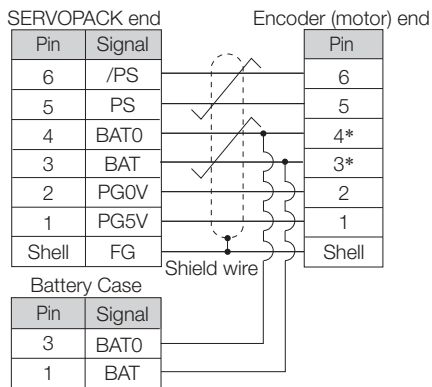
| Specification | Length (L) | Order Number |
|---|------------|--------------|
| For incremental or multiturn absolute encoder | 0.3 m | JZSP-CSP12-E |

Note: Flexible cables are not available.

◆ Appearance



◆ Wiring Specifications



* A battery is required only for a multiturn absolute encoder.

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

8.5.3 SGMCV Encoder Cables

For flange specification 1, use a Motor-End Relay Encoder Cable and a SERVOPACK-End Relay Encoder Cable. For flange specification 4, use only a SERVOPACK-End Relay Encoder Cable.

If a battery is not mounted to the host controller, also obtain a Relay Encoder Cable with a Battery Case in addition to the above 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.

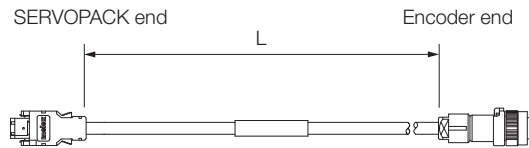
Motor-End Relay Encoder Cables

◆ Selection Table

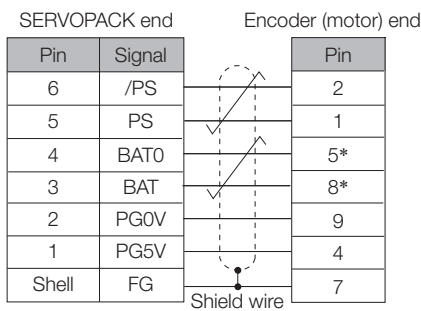
| Specification | Length (L) | Order Number |
|---|------------|---------------|
| For single-turn or multiturn absolute encoder | 0.3 m | JZSP-C7PRC0-E |

Note: Flexible cables are not available.

◆ Appearance



◆ Wiring Specifications



* A battery is required only for a multiturn absolute encoder.

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

SERVOPACK-End Relay Encoder Cables

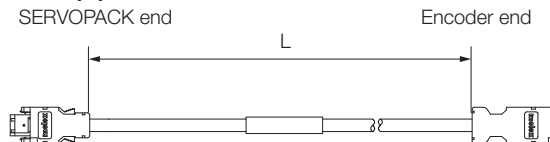
◆ Selection Table

| Specification | Length (L) | Order Number* |
|---|---------------------|------------------|
| For single-turn or multiturn 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).

Note: Flexible cables are not available.

◆ Appearance



◆ Wiring Specifications

| SERVOPACK end | | Encoder (motor) end | |
|---------------|--------|---------------------|-------|
| Pin | Signal | | Pin |
| 6 | /PS | | 6 |
| 5 | PS | | 5 |
| 4 | BAT0 | | 4* |
| 3 | BAT | | 3* |
| 2 | PG0V | | 2 |
| 1 | PG5V | | 1 |
| Shell | FG | Shield wire | Shell |

* A battery is required only for a multiturn absolute encoder.

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

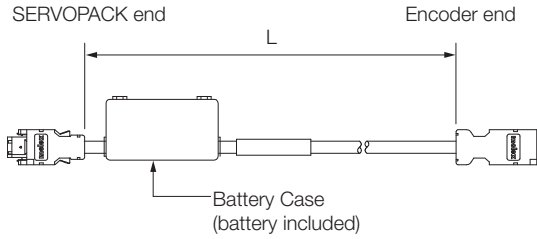
Relay Encoder Cables with a Battery Case

◆ Selection Table

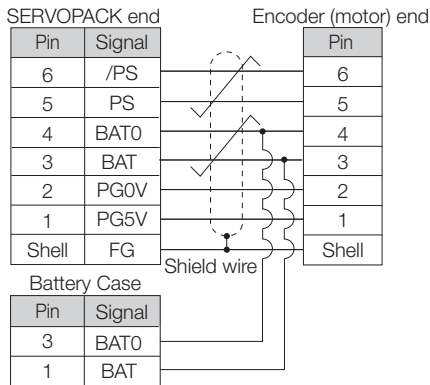
| Specification | Length (L) | Order Number |
|--------------------------------|------------|--------------|
| For multiturn absolute encoder | 0.3 m | JZSP-CSP12-E |

Note: Flexible cables are not available.

◆ Appearance



◆ Wiring Specifications



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

8.5.4 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 SGMCS-□□C SGMCS-□□D SGMCS-□□E SGMCS-□□M SGMCS-□□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).

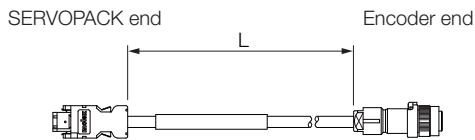
*2. Flexible cables are not available.

Motor-End Relay Encoder Cables

◆ Selection Table

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

◆ Appearance



◆ Wiring Specifications

| SERVOPACK end | | Encoder (motor) end | |
|---------------|--------|---------------------|--------|
| Pin | Signal | Pin | Signal |
| 1 | PG5V | 4 | |
| 2 | PG0V | 9 | |
| 5 | PS | 1 | |
| 6 | /PS | 2 | |
| Shell | FG | 7 | |

Shield wire

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

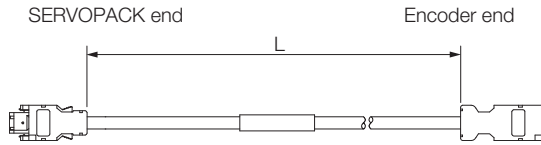
SERVOPACK-End Relay Encoder Cables

◆ Selection Table

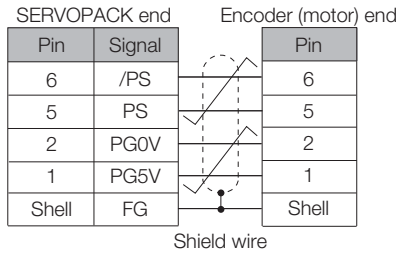
| Specification | Length (L) | Order Number* |
|-------------------------------------|----------------------|------------------|
| For incremental or absolute encoder | 30 m, 40 m, and 50 m | JZSP-UCMP00-□□-E |

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

◆ Appearance



◆ Wiring Specifications

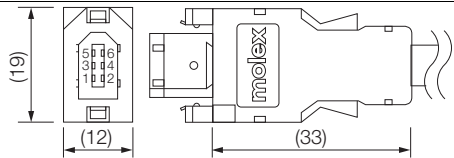
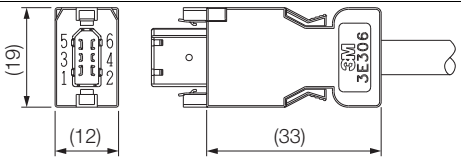


Note: Always connect the shield wire from the Encoder Cable to the connector case (shell).

8.6

User-Assembled Wiring Materials for Encoder Cables

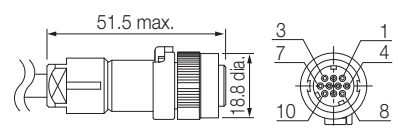
8.6.1 SERVOPACK Connector Kits

| Type | Standard Connector Kit | Compatible Connector Kit |
|--------------------------|---|--|
| Inquires | Yaskawa representative | |
| Manufacturer | Molex Incorporated | 3M Japan Limited |
| 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] |  |  |

Note: Cables are not included. Purchase them separately.

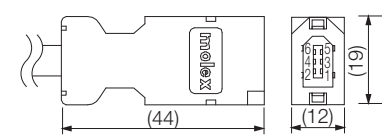
8.6.2 Encoder Connector Kits

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] |  | |

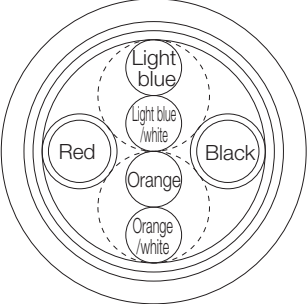
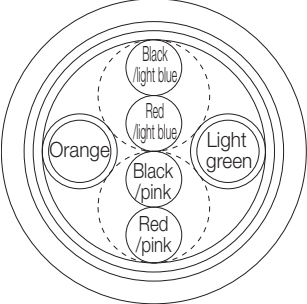
Note: The tool is not provided by Yaskawa.

Flange Specification 4 or 5

| | | |
|--------------------------|--|--|
| Manufacturer | Molex Incorporated | |
| Order Number | JZSP-CMP9-2-E | |
| Specifications | 54280-0609 (soldered) Product specifications: PS-54280 | |
| External Dimensions [mm] |  | |

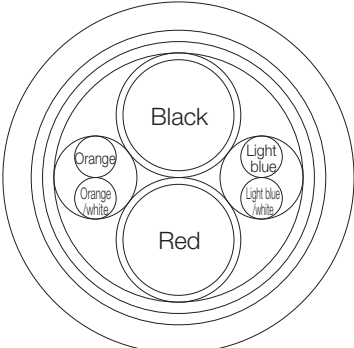
8.6.3 Cables without Connectors

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).

8.7 Wiring Precautions

The wiring precautions are the same as for SGM7M Rotary Servomotors. Refer to the following section.

 2.5 *Wiring Precautions* on page 2-9

Cables and User-Assembled Wiring Materials for Linear Servomotors

9

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9.1

Recommended Linear Encoders

9.1.1 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 | Dr. JOHANNES HEIDENHAIN GmbH | Exposed | LIDA48□ | | JZDP-H003/-H006* ₅ | 20 | 78.1 | 5 | ✓ | ✓ | ✓ |
| | | | | | JZDP-J003/-J006* ₅ | | 4.9 | 2 | ✓ | ✓ | * ₈ |
| | | | LIF48□ | | JZDP-H003/-H006* ₅ | 4 | 15.6 | 1 | ✓ | ✓ | ✓ |
| | | | | | JZDP-J003/-J006* ₅ | | 1.0 | 0.4 | ✓ | * ₈ | * ₈ |
| Renishaw plc* ₄ | Exposed | RGS20 | RGH22B | JZDP-H005/-H008* ₅ | 20 | 78.1 | 5 | ✓ | ✓ | ✓ | |
| | | | | JZDP-J005/-J008* ₅ | | 4.9 | 2 | ✓ | ✓ | * ₈ | |
| Encoder for Yaskawa's Serial Interface* ₂ | Magnescale Co., Ltd. | Exposed | SL7□0 | PL101-RY* ₆ | | 800 | 97.7 | 10 | – | ✓ | ✓ |
| | | | | PL101 | MJ620-T13* ₇ | | | | ✓ | ✓ | * ₈ |
| | | | SQ10 | PQ10 | MQ10-FLA | 400 | 48.83 | 3 | – | ✓ | ✓ |
| | | | | | MQ10-GLA | | | | ✓ | ✓ | – |
| | 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 | – | ✓ | ✓ | |
| Canon Precision Inc. | Exposed | PS90-20160 glass | PH03-36110 | – | 128 | 62.5 | 12.8 | – | ✓ | ✓ | |
| | | PS04-30110 SUS | PH03-36120 | – | 128 | 62.5 | 12.8 | – | ✓ | ✓ | |

✓: Applicable

*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.

9.1.2 Absolute Linear Encoders

| Output Signal | Manufacturer | Linear Encoder Type | Model | | | Linear Encoder Pitch* ¹ [μm] | Resolution [nm] | Maximum Speed* ² [m/s] | Support for Polarity Sensor Input | Application to Linear Servo-motors | Application to Fully-Closed Loop Control |
|--|------------------------------|---------------------|------------------------------|-------------|---|--|-----------------|--------------------------------------|-----------------------------------|------------------------------------|--|
| | | | Scale | Sensor Head | Relay Device between SERVOPACK and Linear Encoder | | | | | | |
| Encoder for Yaskawa's Serial Interface* ³ | Magnescale Co., Ltd. | Exposed | SQ47- □□□□S□F□□□ | - | - | 20.48 | 5 | 3.33 | - | ✓ | ✓ |
| | | | SQ47- □□□□T□F□□□ | | | | | | | | |
| | | | SQ47- □□□□A□F□□□ | - | - | 40.96 | 10 | 3.33 | - | ✓ | ✓ |
| | | | SQ47- □□□□F□F□□□ | | | | | | | | |
| | | | SQ57- □□□□S□F□□□ | - | - | 20.48 | 5 | 3.33 | - | ✓ | ✓ |
| | | | SQ57- □□□□T□F□□□ | | | | | | | | |
| | | | SQ57- □□□□A□F□□□ | - | - | 40.96 | 10 | 3.33 | - | ✓ | ✓ |
| | | | SQ57- □□□□F□F□□□ | | | | | | | | |
| | | 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* ⁴ | - | - | 25.6 | 50 | 5 | - | ✓ | ✓ |
| | | | ST1381 | - | - | 5.12 | 10 | 8 | - | ✓ | ✓ |
| | ST1382 | - | - | 0.512 | 1 | 3.6* ⁵ | - | ✓ | ✓ | | |
| | Dr. JOHANNES HEIDENHAIN GmbH | Exposed | LIC4100 Series* ⁶ | - | EIB3391Y | 20.48 | 5 | 10 | - | ✓ | ✓ |
| | | | LIC2100 Series* ⁶ | - | EIB3391Y | 204.8 | 50 | 10 | - | ✓ | ✓ |
| | | | | - | EIB3391Y | 409.6 | 100 | 10 | - | ✓ | ✓ |
| | | | LIC4190 Series | - | - | 40.96 | 10 | 10 | - | ✓ | ✓ |
| | | | | - | - | 20.48 | 5 | 10 | - | ✓ | ✓ |
| | | | LIC2190 Series | - | - | 4.096 | 1 | 10 | - | ✓ | ✓ |
| | | - | | - | 409.6 | 100 | 10 | - | ✓ | ✓ | |
| | | Sealed | LC115 | - | EIB3391Y | 40.96 | 10 | 3 | - | ✓ | ✓ |
| LC415 | | | - | EIB3391Y | 40.96 | 10 | 3 | - | ✓ | ✓ | |
| RSF Elektronik GmbH | | Exposed | MC15Y Series | - | - | 409.6 | 100 | 10 | - | ✓ | ✓ |
| | - | | | - | 204.8 | 50 | 10 | - | ✓ | ✓ | |

Continued on next page.

Continued from previous page.

| Output Signal | Manufacturer | Linear Encoder Type | Model | | | Linear Encoder Pitch* ¹ [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* ³ | Renishaw plc | Exposed | EL36Y□□050F□□□ | | – | 12.8 | 50 | 100 | – | ✓ | ✓ |
| | | | EL36Y□□100F□□□ | | – | 25.6 | 100 | 100 | – | ✓ | ✓ |
| | | | EL36Y□□500F□□□ | | – | 128 | 500 | 100 | – | ✓ | ✓ |
| | | | RL36Y□□050□□□ | | – | 12.8 | 50 | 100 | – | ✓ | ✓ |
| | | | RL36Y□□001□□□ | | – | 0.256 | 1 | 3.6 | – | ✓ | ✓ |
| | RLS d.o.o. | Exposed | LA11YA Series | | – | 2,000 | 976.5 | 7.00 | – | ✓ | ✓ |
| | | | | | – | 2,000 | 488.2 | 3.65 | – | ✓ | ✓ |
| | | | | | – | 2,000 | 244.1 | 1.82 | – | ✓ | ✓ |
| | Fagor Automation S. Coop. | Exposed | L2AK208 | | – | 20 | 78.1 | 8.0 | – | ✓ | ✓ |
| | | | | | L2AK211 | | – | 20 | 9.8 | 8.0 | – |
| | | Sealed | LAK209 | | – | 40 | 78.1 | 3.0 | – | ✓ | ✓ |
| | | | LAK212 | | – | 40 | 9.8 | 3.0 | – | ✓ | ✓ |
| | | | S2AK208 | | – | 20 | 78.1 | 3.0 | – | ✓ | ✓ |
| | | | SV2AK208 | | – | 20 | 78.1 | 3.0 | – | ✓ | ✓ |
| | | | G2AK208 | | – | 20 | 78.1 | 3.0 | – | ✓ | ✓ |
| | | | S2AK211 | | – | 20 | 9.8 | 3.0 | – | ✓ | ✓ |
| | | | SV2AK211 | | – | 20 | 9.8 | 3.0 | – | ✓ | ✓ |
| G2AK211 | | – | 20 | 9.8 | 3.0 | – | ✓ | ✓ | | | |
| Canon Precision Inc. | Exposed | PS90-20160 glass | PH03-36E00 | – | 128 | 62.5 | 12.8 | – | ✓ | ✓ | |

✓: Applicable

*1. These are reference values for setting SERVOPACK parameters. Contact the manufacturer for actual linear encoder scale pitches.

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

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

*5. The speed is restricted for some SERVOPACKs.

*6. Sales of the interface unit EIB3391Y with the LIC4100 and LIC2100 series have ended due to the release of the LIC4190 and LIC2190 series.

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

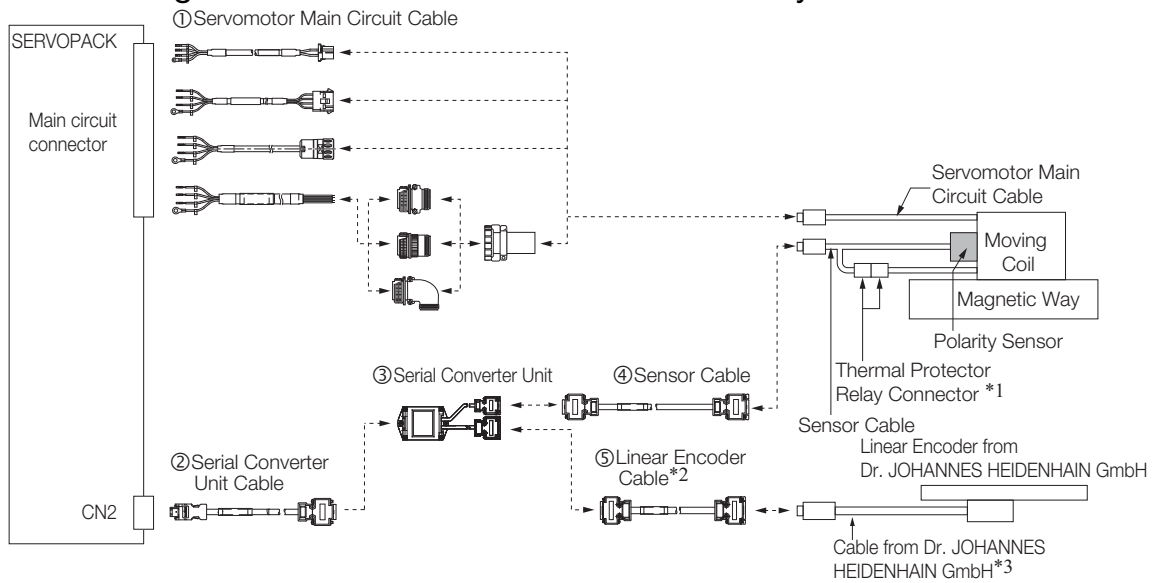
9.2 Cable Configurations

9.2.1 Connections to Linear Encoder from Dr. JOHANNES HEIDENHAIN GmbH

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

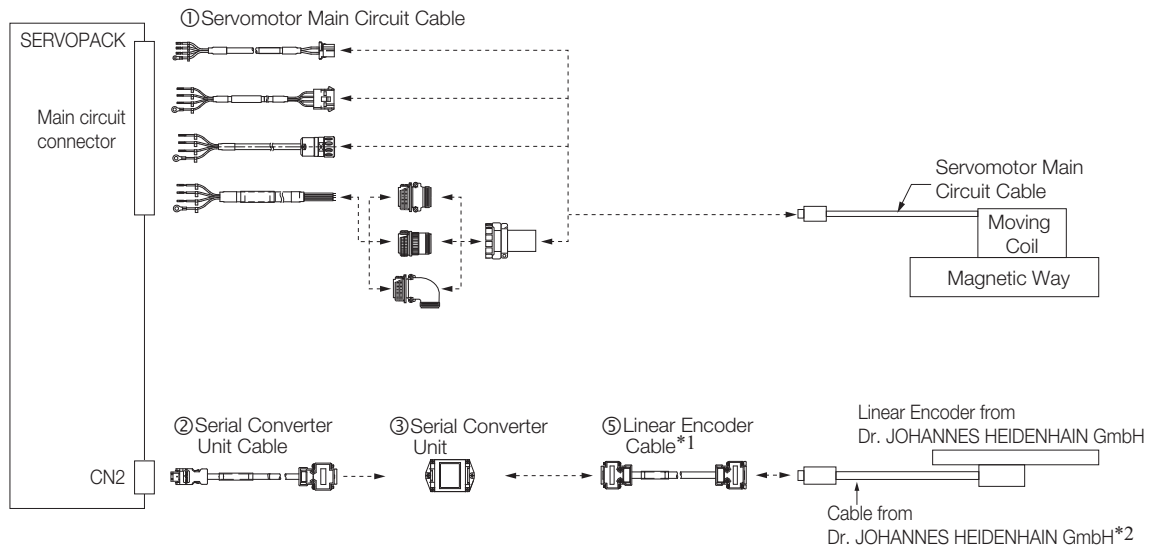


- *1. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.
- *2. When using a JZDP-J00□-□□□ Serial Converter Unit, do not use a Yaskawa Linear Encoder Cable that is longer than 3 m.
- *3. Contact Dr. JOHANNES HEIDENHAIN GmbH for details on cables (analog 1 Vp-p output, D-sub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

| No. | Cable Type | Reference |
|-----|-------------------------------|-----------|
| ① | Servomotor Main Circuit Cable | page 9-25 |
| ② | Serial Converter Unit Cable | page 9-26 |
| ③ | Serial Converter Unit | page 9-37 |
| ④ | Sensor Cable | page 9-27 |
| ⑤ | Linear Encoder Cable | page 9-26 |

◆ Connecting to a Linear Servomotor without a Polarity Sensor

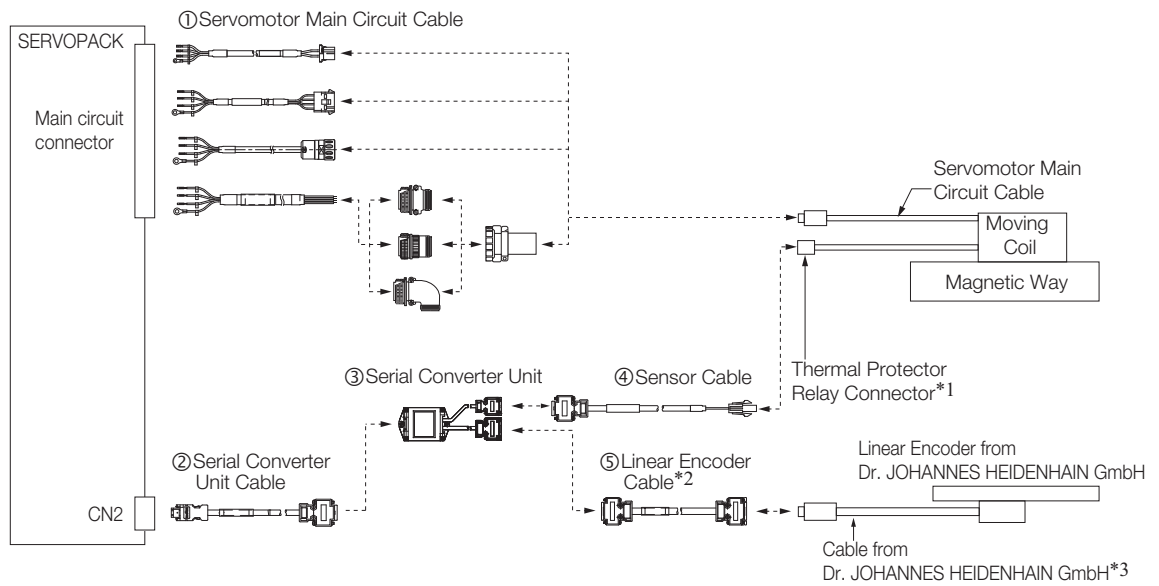
■ Servomotors Other Than the SGLFW2



*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 Dr. JOHANNES HEIDENHAIN GmbH for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Dr. JOHANNES HEIDENHAIN GmbH.

■ 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 Dr. JOHANNES HEIDENHAIN GmbH for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Dr. JOHANNES HEIDENHAIN GmbH.

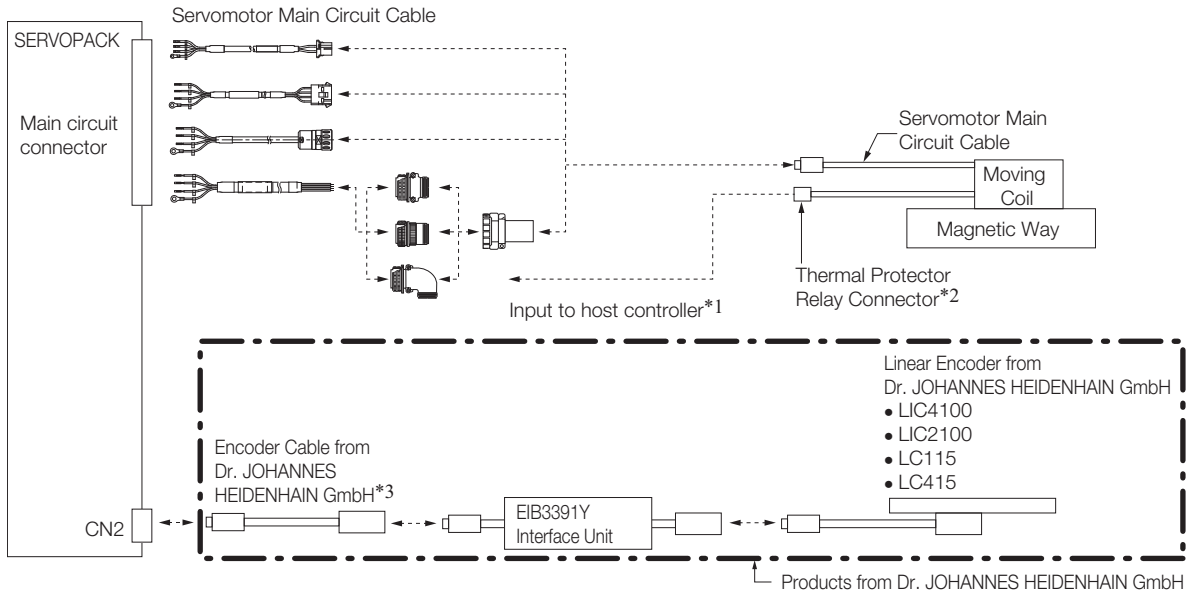
| No. | Cable Type | Reference |
|-----|-------------------------------|-----------|
| ① | Servomotor Main Circuit Cable | page 9-25 |
| ② | Serial Converter Unit Cable | page 9-26 |
| ③ | Serial Converter Unit | page 9-37 |
| ④ | Sensor Cable | page 9-27 |
| ⑤ | Linear Encoder Cable | page 9-26 |

LIC4100, LIC2100, LC115, or LC415 Linear Encoder with EIB3391Y Interface Unit




Important

1. You cannot use an LIC4100, LIC2100, LC115, or LC415 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 3 A or 30 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 9-35

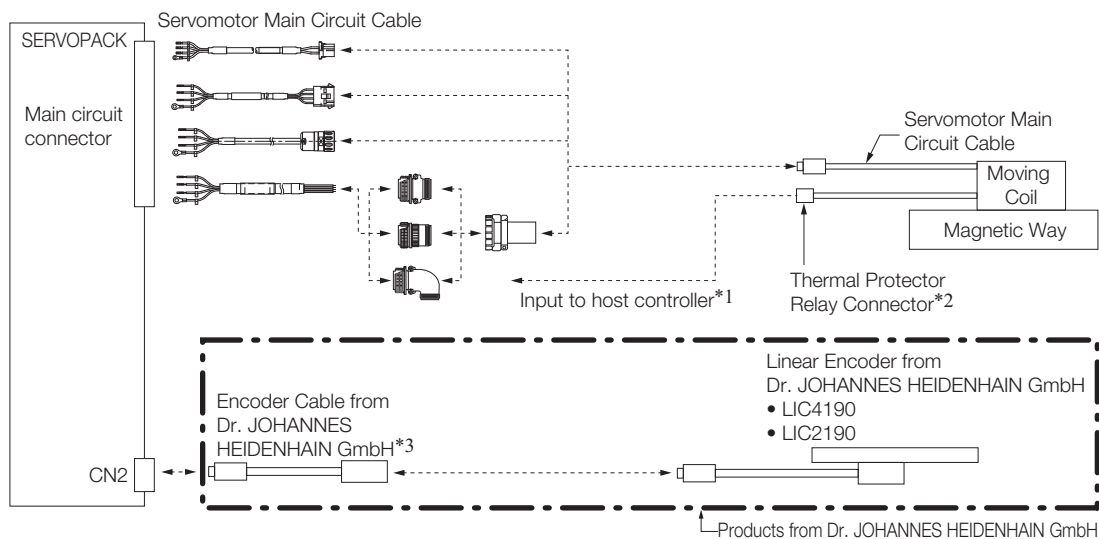
*2. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.

*3. Use an Encoder Cable from Dr. JOHANNES HEIDENHAIN GmbH. Contact Dr. JOHANNES HEIDENHAIN GmbH for detailed Encoder Cable specifications.

LIC4190 or LIC2190 Linear Encoder




1. You cannot use an LIC4190 or LIC2190 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 3 A or 30 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 9-35

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

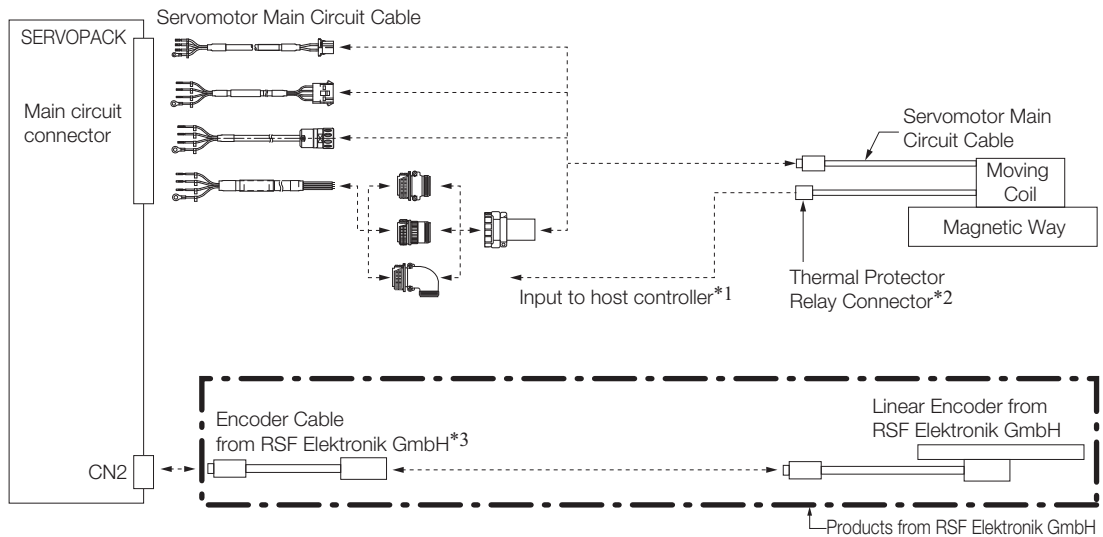
*3. Use an Encoder Cable from Dr. JOHANNES HEIDENHAIN GmbH. Contact Dr. JOHANNES HEIDENHAIN GmbH for detailed Encoder Cable specifications.


9.2.2 Connections to Linear Encoder from RSF Elektronik GmbH



Important

1. You cannot use a Linear Encoder from RSF Elektronik GmbH 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 3 A or 30 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 9-35

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

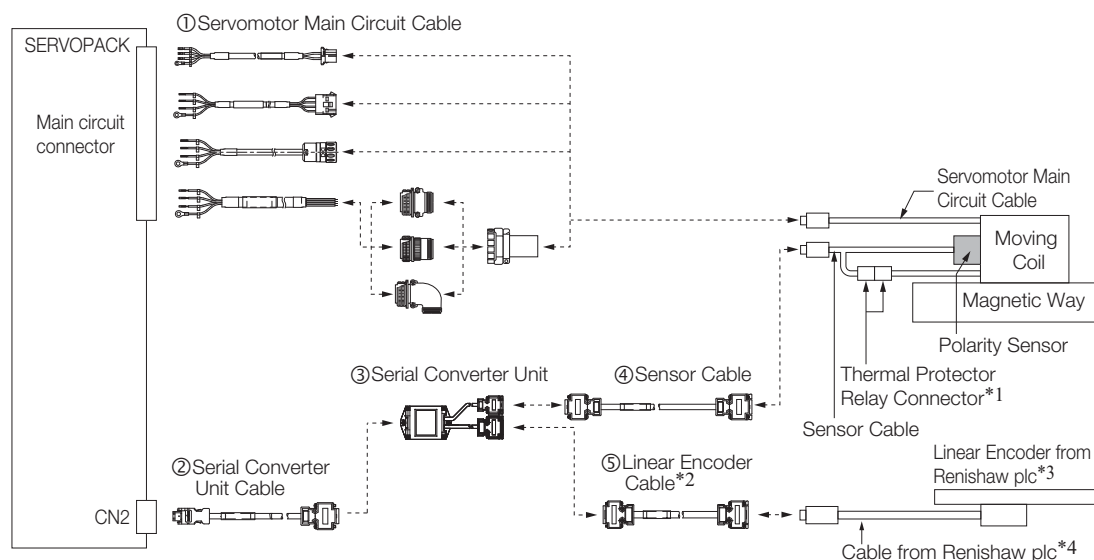
*3. Use an Encoder Cable from RSF Elektronik GmbH. Contact Dr. JOHANNES HEIDENHAIN GmbH for detailed Encoder Cable specifications.

9.2.3 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.

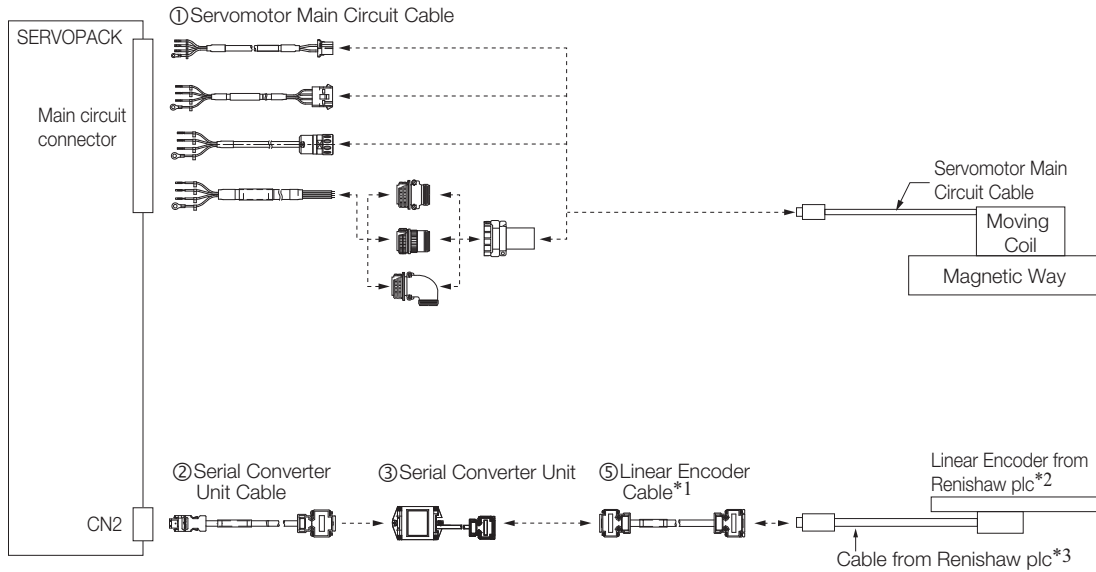
If that occurs, use the BID/DIR signal to output the origin signal only in one direction.

*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.

| No. | Cable Type | Reference |
|-----|-------------------------------|-----------|
| ① | Servomotor Main Circuit Cable | page 9-25 |
| ② | Serial Converter Unit Cable | page 9-26 |
| ③ | Serial Converter Unit | page 9-37 |
| ④ | Sensor Cable | page 9-27 |
| ⑤ | Linear Encoder Cable | page 9-26 |

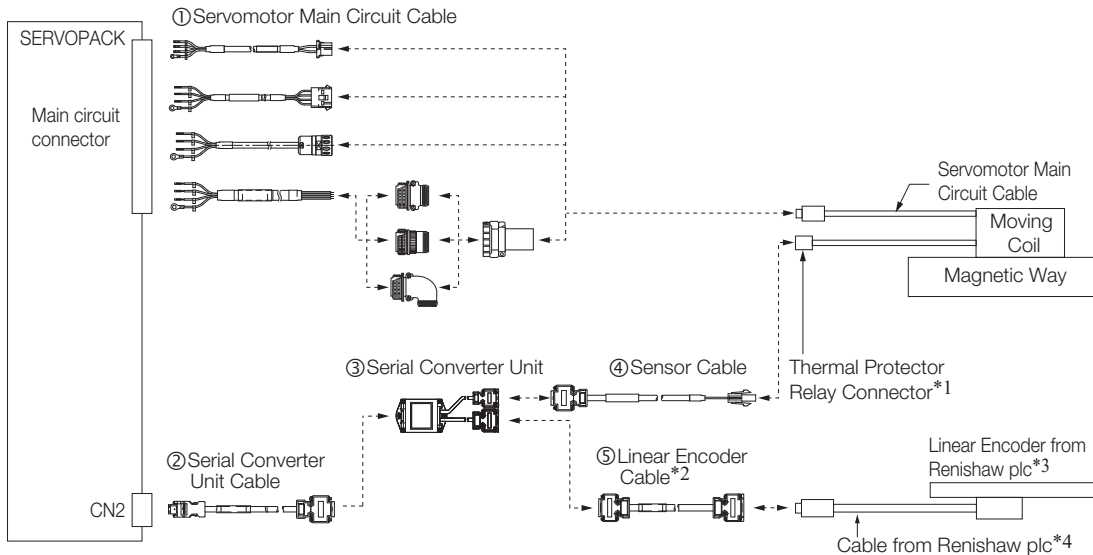
◆ Connecting to a Linear Servomotor without a Polarity Sensor

■ 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



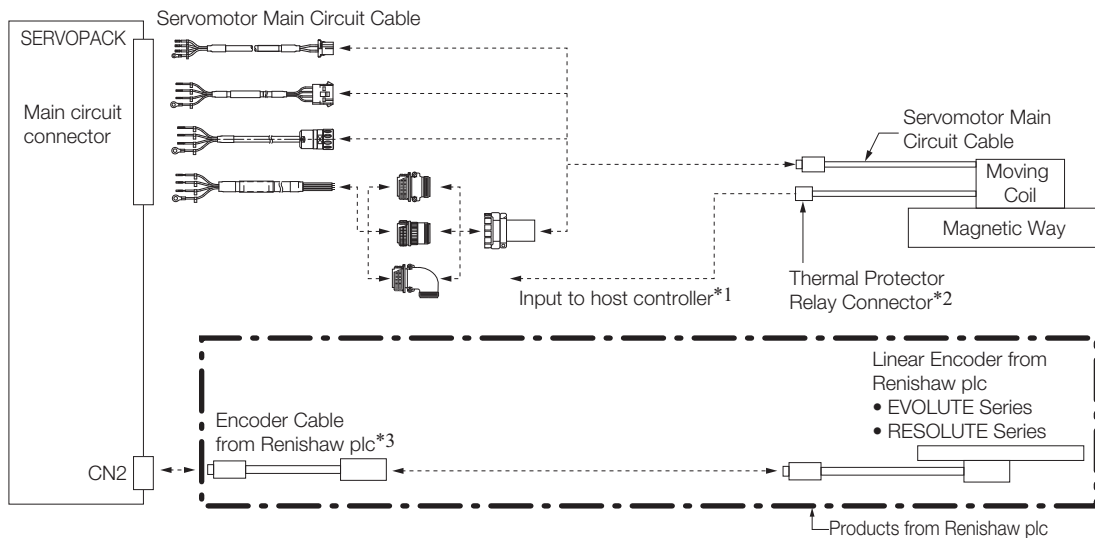
- *1. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.
- *2. When using a JZDP-J00□-□□□ Serial Converter Unit, do not use a Yaskawa Linear Encoder Cable that is longer than 3 m.
- *3. If you use the origin signals with a Linear Encoder from Renishaw plc, the origin may sometimes 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 9-25 |
| ② | Serial Converter Unit Cable | page 9-26 |
| ③ | Serial Converter Unit | page 9-37 |
| ④ | Sensor Cable | page 9-27 |
| ⑤ | Linear Encoder Cable | page 9-26 |


EVOLUTE-Series Linear Encoder (Model: EL36Y□□□□□□□□□□), RESOLUTE-Series Linear Encoder (Model: RL36Y□□□□□□□□□□)



1. You cannot use an EVOLUTE-Series or RESOLUTE-Series 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 3 A or 30 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-D/E Sensor Cables* on page 9-35

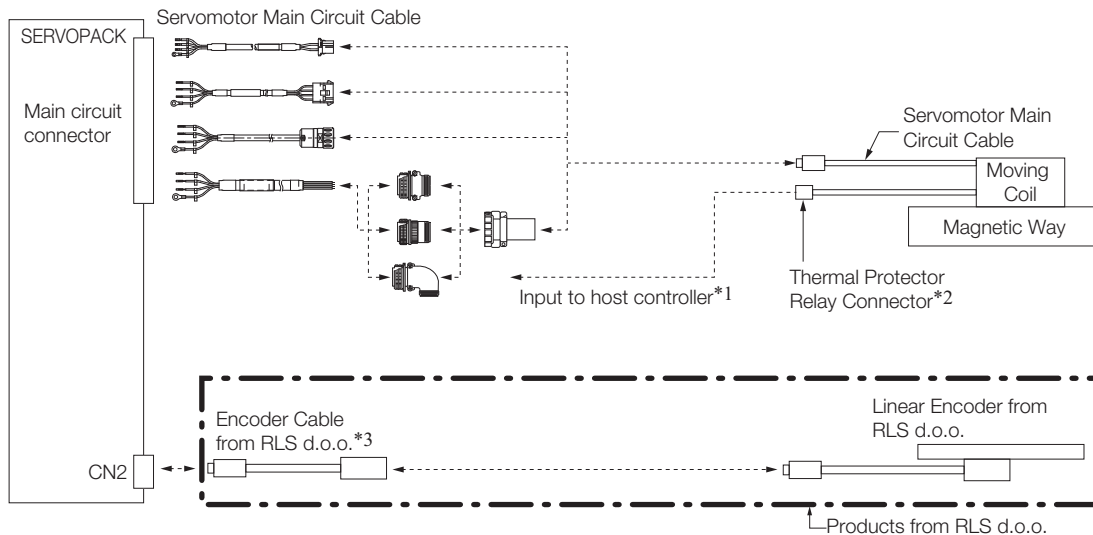
*2. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.

*3. Use an Encoder Cable from Renishaw plc. Contact Renishaw plc for detailed Encoder Cable specifications.

9.2.4 Connections to Linear Encoder from RLS d.o.o.



1. You cannot use a Linear Encoder from RLS d.o.o. 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 3 A or 30 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 9-35

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

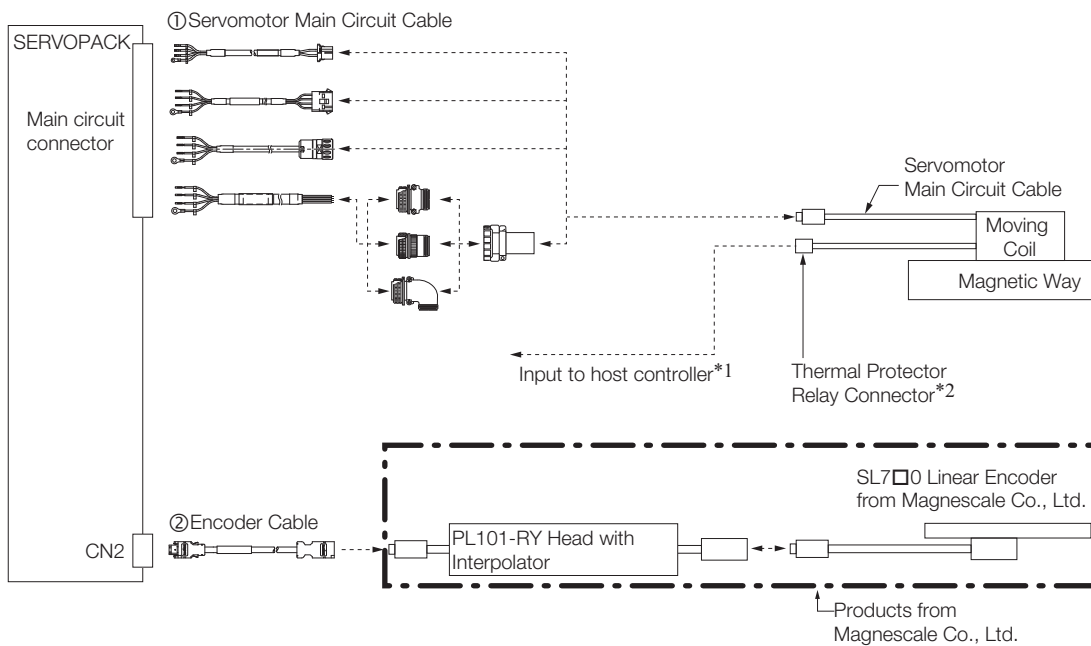
*3. Use an Encoder Cable from RLS d.o.o. Contact RLS d.o.o. or Renishaw plc for detailed Encoder Cable specifications.

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

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



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 3 A or 30 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 9-35

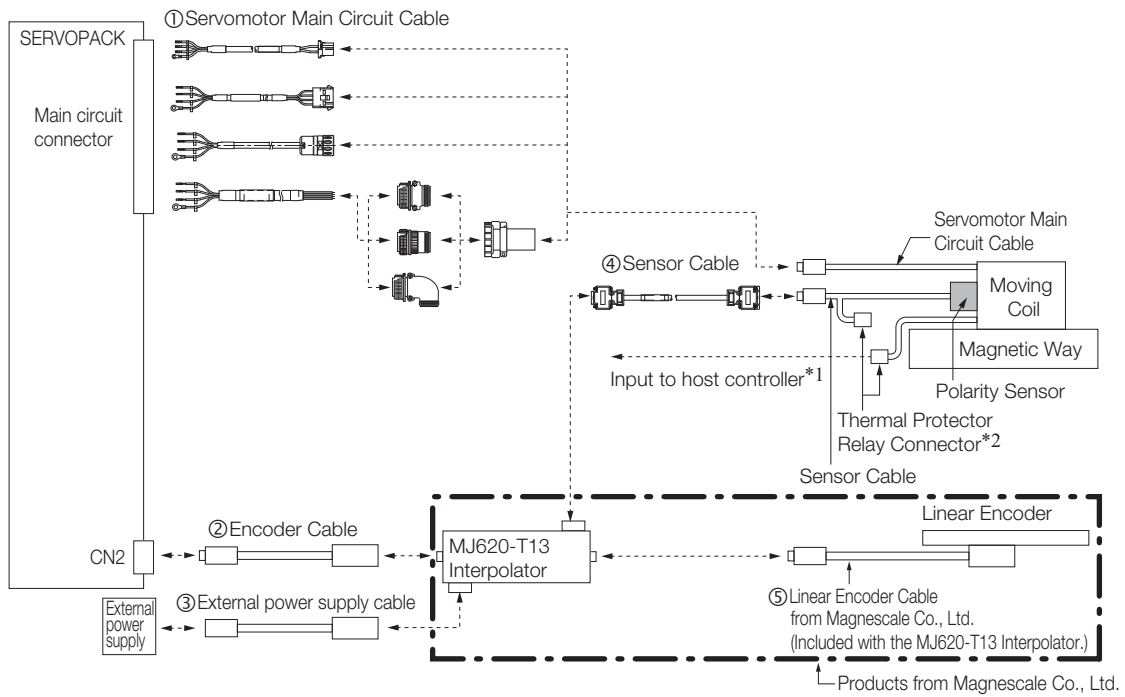
*2. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.

| No. | Cable Type | Reference |
|-----|--------------------------------|-----------|
| ① | Servomotor Main Circuit Cables | page 9-25 |
| ② | Encoder Cable | page 9-27 |

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 3 A or 30 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 9-35

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

| No. | Cable Type | Reference |
|-----|-------------------------------|--|
| ① | Servomotor Main Circuit Cable | page 9-25 |
| ② | Encoder Cable | These cables are not provided by Yaskawa. |
| ③ | External power supply cable | |
| ④ | Sensor Cable | page 9-27 |
| 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 Incorporated)
- Connector order number: JZSP-CMP9-1-E (SERVOPACK Connector Kit)

| Pin | Signal | Function |
|-------|--------|---------------------------|
| 1 | PG5 V | Encoder power supply +5 V |
| 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 6-26 |
| | 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)

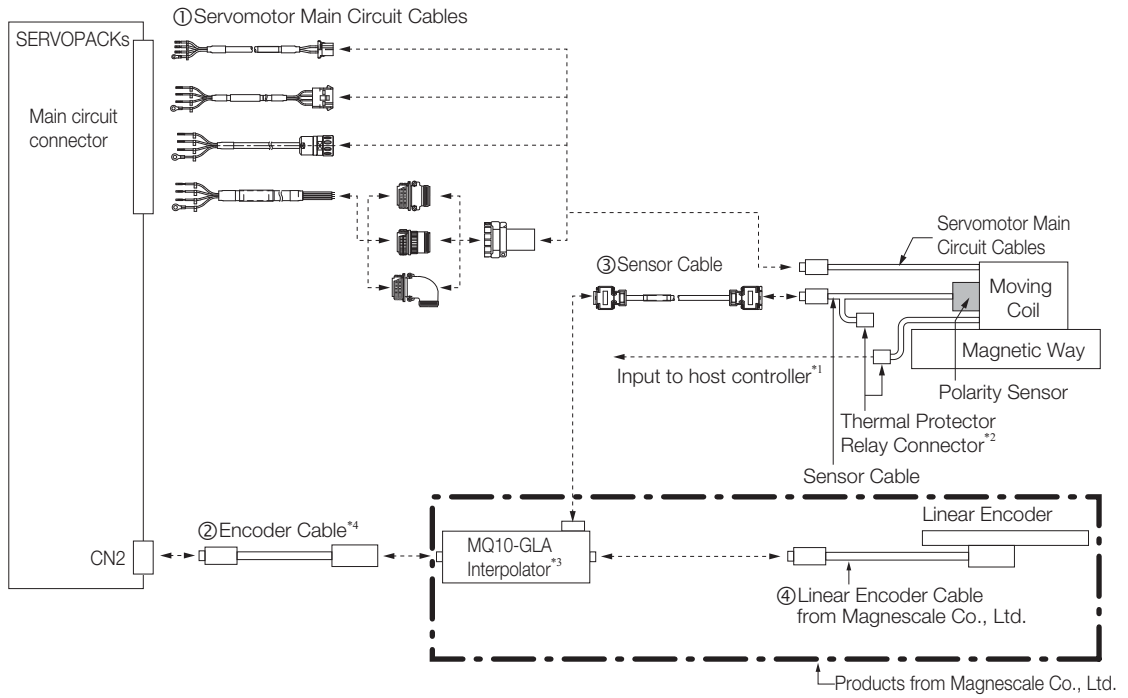
| Pin | Signal | Function |
|-----|--------|----------|
| 1 | +5 V | +5 V |
| 2 | 0 V | 0 V |


SmartSCALE Linear Encoder (SQ10 Scale +MQ10-□LA Interpolator)



Important

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 3 A or 30 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 9-35
- *2. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.
- *3. The above diagram shows the connections when a MQ10-GLA Interpolator (equipped with an electromagnetic sensor input) is used.
- *4. The maximum length of the Encoder Cable is 15 m.

| No. | Cable Type | Reference |
|-----|--------------------------------|---|
| ① | Servomotor Main Circuit Cables | page 9-25 |
| ② | Encoder Cable | This cable is not provided by Yaskawa. page 9-19 |
| ③ | Sensor Cable | page 9-27 |
| ④ | Linear Encoder Cables | Use the cables that come with the MQ10-□LA Interpolator. For details, refer to the specifications for the MQ10-□LA Interpolator. - |

◆ Encoder Cables

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

■ SERVOPACK (CN2) End of Cable

- Plug Connector: 55100-0670 (Molex Incorporated)
- Connector order number: JZSP-CMP9-1-E (SERVOPACK Connector Kit)

| Pin | Signal | Function |
|-------|--------|---------------------------|
| 1 | PG5 V | Encoder power supply +5 V |
| 2 | PG0 V | Encoder power supply 0 V |
| 3 | – | – |
| 4 | – | – |
| 5 | PS | Serial data |
| 6 | /PS | |
| Shell | Shield | – |

■ MQ10-□LA End of Cable


For details, refer to the specifications for the MQ10-□LA from Magnescale Co., Ltd..

■ 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 6-26 |
| | 10 m | JZSP-CMP09-10-E | JZSP-CSP39-10-E | |
| | 15 m | JZSP-CMP09-15-E | JZSP-CSP39-15-E | |

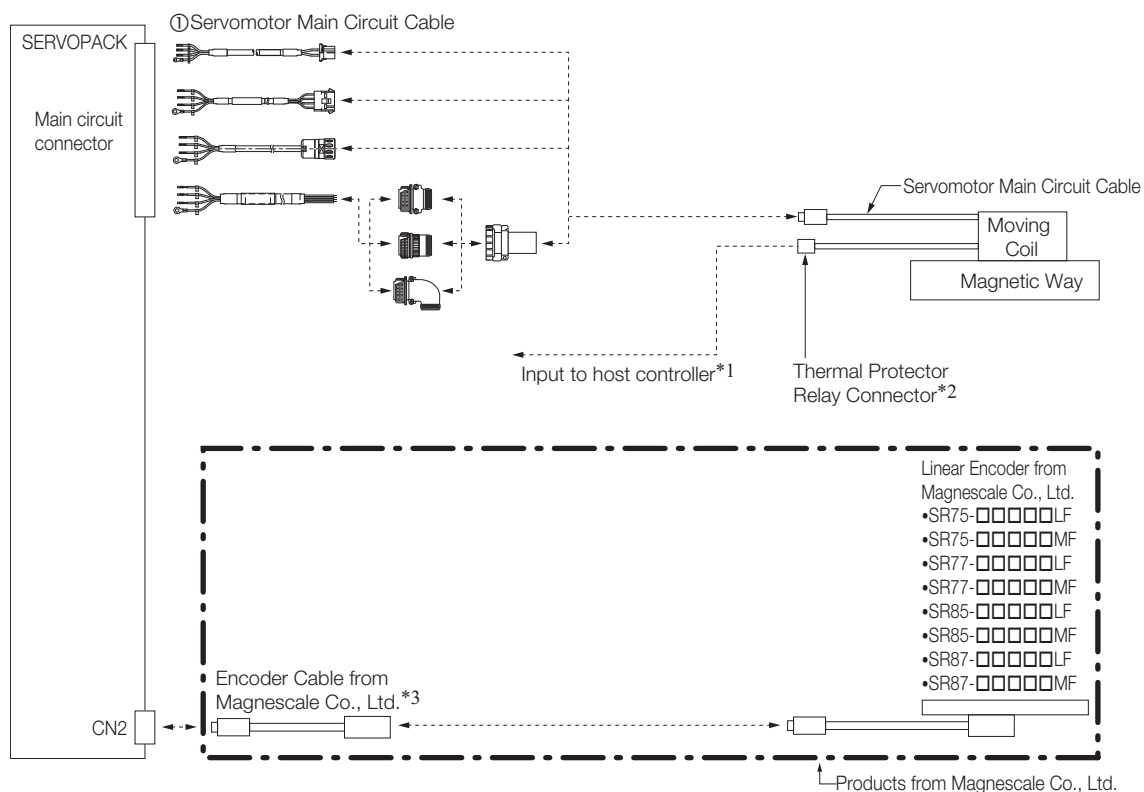
Note: We recommend that you use Flexible Cables.

SR-75, SR-77, SR-85, or 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 3 A or 30 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 9-35

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

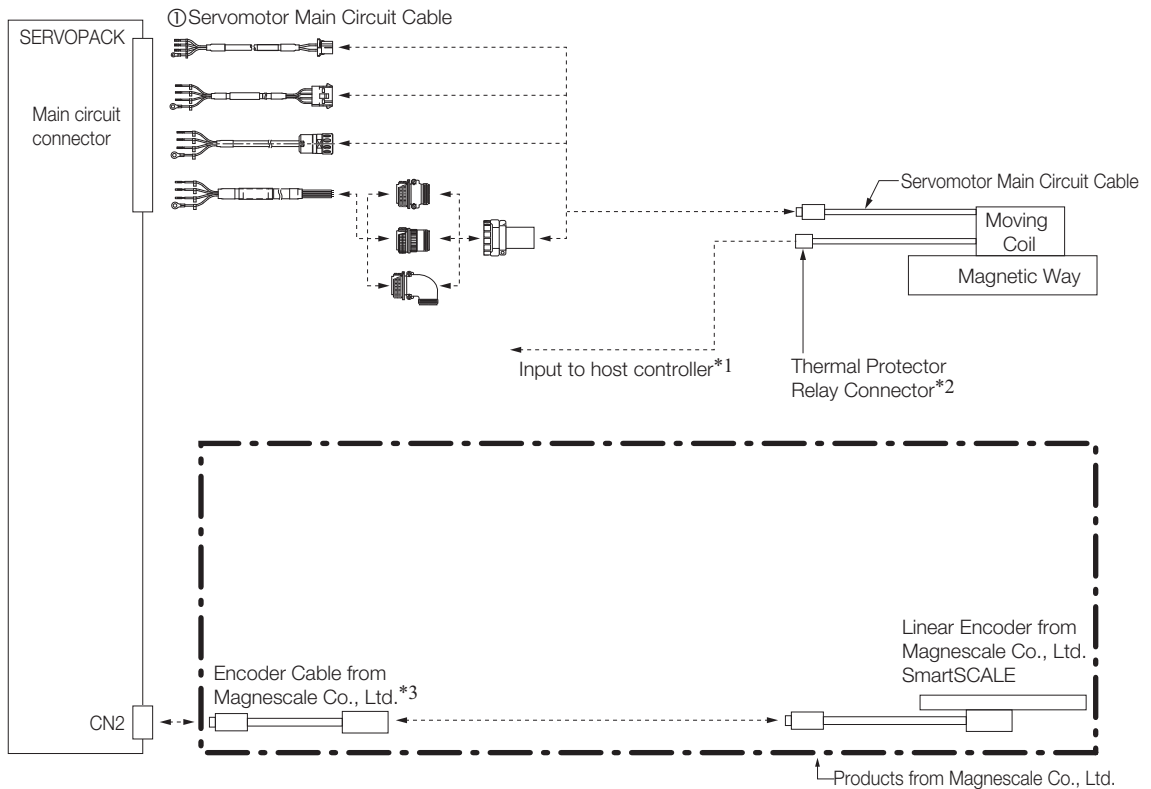
*3. Use an Encoder Cable from Magnescale Co., Ltd.. Contact Magnescale Co., Ltd. for details on Encoder Cable specifications.

| No. | Cable Type | Reference |
|-----|--------------------------------|-----------|
| ① | Servomotor Main Circuit Cables | page 9-25 |

SmartSCALE Linear Encoder (SQ47/SQ57)



1. You cannot use an SQ47 or SQ57 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 3 A or 30 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 9-35

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

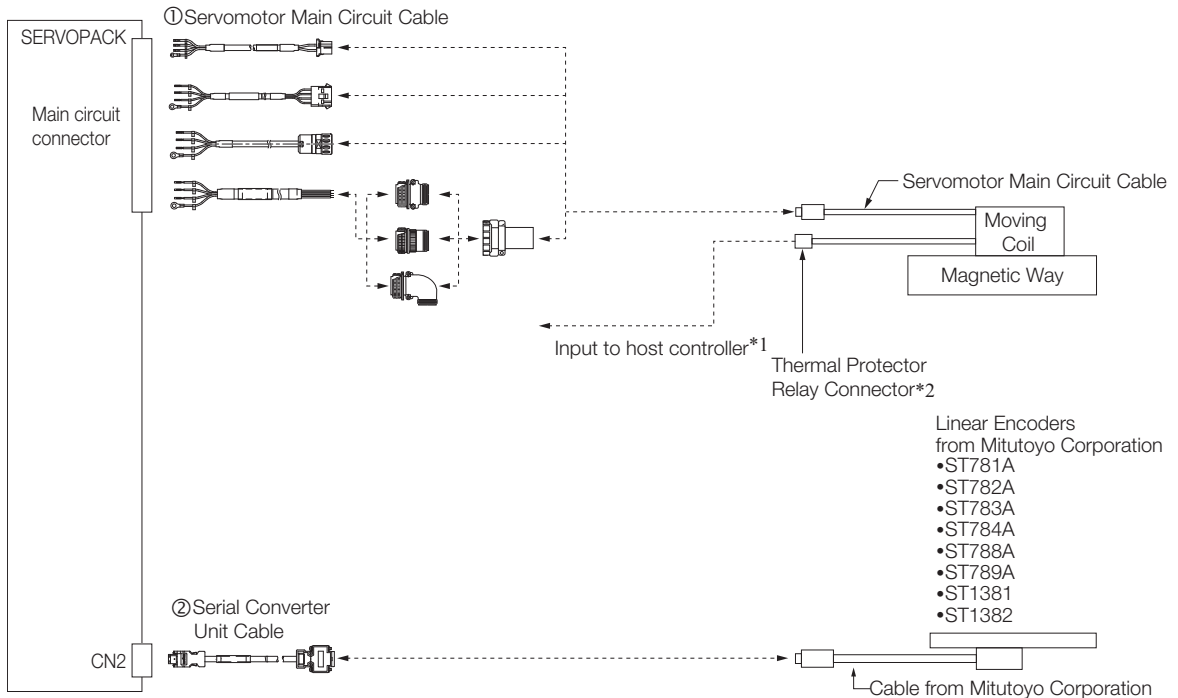
*3. Use an Encoder Cable from Magnescale Co., Ltd.. Contact Magnescale Co., Ltd. for details on Encoder Cable specifications.

| No. | Cable Type | Reference |
|-----|--------------------------------|-----------|
| ① | Servomotor Main Circuit Cables | page 9-25 |

9.2.6 Connections to Linear Encoders from Mitutoyo Corporation



1. You cannot use an ST78□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 3 A or 30 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 9-35

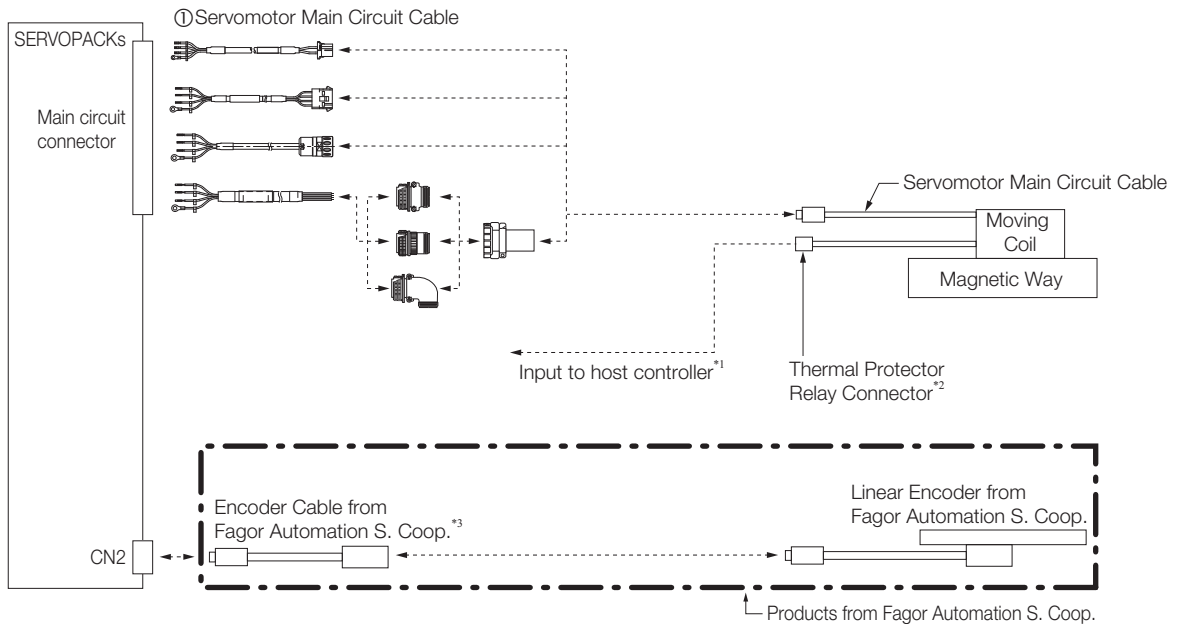
*2. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.

| No. | Cable Type | Reference |
|-----|--------------------------------|-----------|
| ① | Servomotor Main Circuit Cables | page 9-25 |
| ② | Serial Converter Unit Cables | page 9-26 |

9.2.7 Connections to Linear Encoder from Fagor Automation S. Coop.



1. You cannot use an Linear Encoder from Fagor Automation S. Coop. 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 3 A or 30 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 9-35

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

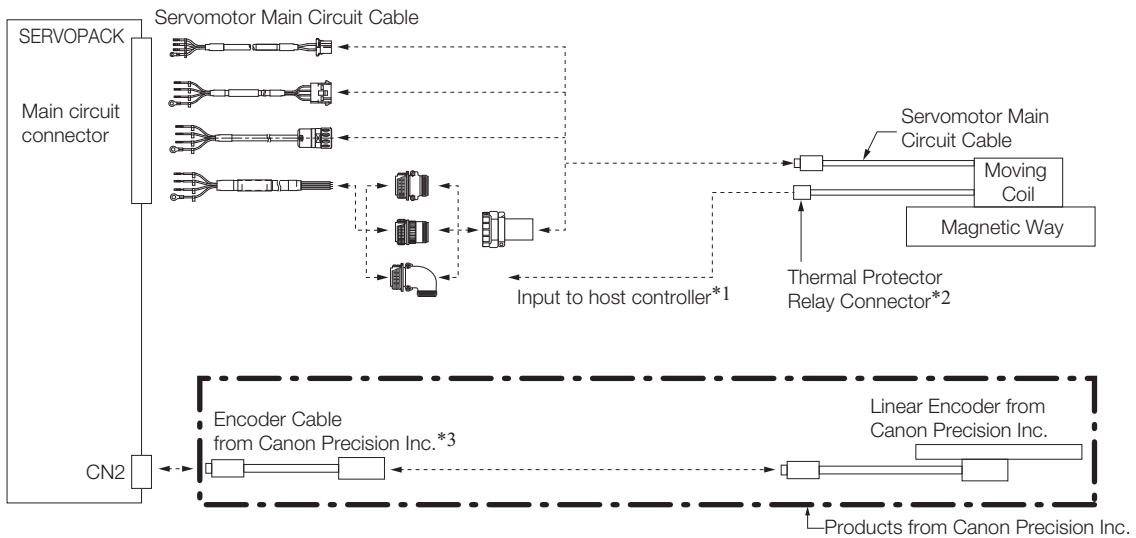
*3. Use Encoder Cables from Fagor Automation S. Coop. For detailed specifications of the Encoder Cables, consult Fagor Automation S. Coop. or its sales representative.

| No. | Cable Type | Reference |
|-----|-------------------------------|-----------|
| ① | Servomotor Main Circuit Cable | page 9-25 |


9.2.8 Connections to Linear Encoder from Canon Precision Inc.



1. You cannot use a Linear Encoder from Canon Precision Inc. 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 3 A or 30 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 9-35

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

*3. Use an Encoder Cable from Canon Precision Inc. Contact Canon Precision Inc. for detailed Encoder Cable specifications.

9.3 Cable Selection Table

9.3.1 Servomotor Main Circuit Cables

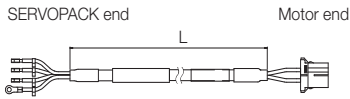
| Servomotor Model | Length (L) | Order Number | Appearance | Details |
|---|------------|-------------------|------------|-----------|
| SGLGW-30A, -40A, or -60A SGLFW-20A or -35A | 1 m | JZSP-CLN11-01-E | | page 9-28 |
| | 3 m | JZSP-CLN11-03-E | | |
| | 5 m | JZSP-CLN11-05-E | | |
| | 10 m | JZSP-CLN11-10-E | | |
| | 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 9-28 |
| | 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□□□□□□□□ -40A□□□□□□□□ -60A□□□□□□□□ SGLFW-□□A□□□□□□□□ SGLTW-□□A□□□□□□□□ | 1 m | JZSP-CLN14-01-E | | page 9-29 |
| | 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 9-29 |
| | 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 | | |
| SGLFW2-90A200A□ SGLFW2-90A380A□ | 1 m | JZSP-CL2N803-01-E | | page 9-30 |
| | 3 m | JZSP-CL2N803-03-E | | |
| | 5 m | JZSP-CL2N803-05-E | | |
| | 10 m | JZSP-CL2N803-10-E | | |
| | 15 m | JZSP-CL2N803-15-E | | |
| | 20 m | JZSP-CL2N803-20-E | | |
| SGLFW2-30A070A□ SGLFW2-30A120A□ SGLFW2-30A230A□ | 1 m | JZSP-CL2N703-01-E | | page 9-30 |
| | 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□ SGLFW2-45A380A□ | 1 m | JZSP-CL2N603-01-E | | page 9-31 |
| | 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 | | |

Continued on next page.

9.3 Cable Selection Table

9.3.2 Linear Encoder Cables

Continued from previous page.


| Servomotor Model | Length (L) | Order Number | Appearance | Details |
|---|------------|-------------------|--|-----------|
| SGLFW2-90A560A□ SGLFW2-1DA380A□ SGLFW2-1DA560A□ | 1 m | JZSP-CL2N503-01-E |  | page 9-32 |
| | 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 (SGLFW2-90A380A□L, SGLFW2-90A560A□L, and SGLFW2-1D□□□A□L).

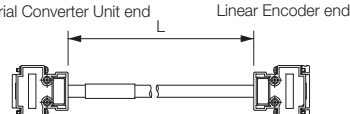
*1. Connector from Tyco Electronics Japan G.K.

*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 the following section for information on connectors.

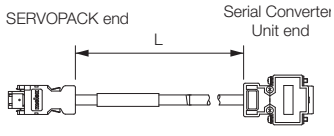
 **JZSP-CLN39 Cable Connectors** on page 9-29

9.3.2 Linear Encoder Cables

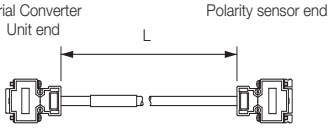
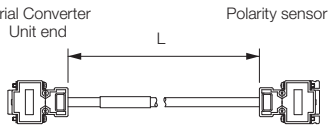
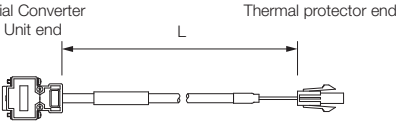
| Name | Servomotor Model | Length (L)* | Order Number | Appearance | Details |
|--|------------------|-------------|-----------------|--|-----------|
| For Linear Encoder from Renishaw plc | All models | 1 m | JZSP-CLL00-01-E |  | page 9-32 |
| | | 3 m | JZSP-CLL00-03-E | | |
| | | 5 m | JZSP-CLL00-05-E | | |
| | | 10 m | JZSP-CLL00-10-E | | |
| | | 15 m | JZSP-CLL00-15-E | | |
| For Linear Encoder from Dr. JOHANNES HEIDENHAIN GmbH | | 1 m | JZSP-CLL30-01-E | | |
| | | 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.

9.3.3 Serial Converter Unit Cables

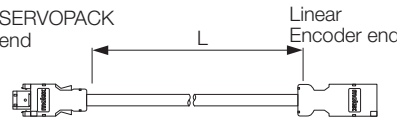
| Servomotor Model | Length (L) | Order Number | Appearance | Details |
|------------------|------------|-----------------|--|-----------|
| All models | 1 m | JZSP-CLP70-01-E |  | page 9-33 |
| | 3 m | JZSP-CLP70-03-E | | |
| | 5 m | JZSP-CLP70-05-E | | |
| | 10 m | JZSP-CLP70-10-E | | |
| | 15 m | JZSP-CLP70-15-E | | |
| | 20 m | JZSP-CLP70-20-E | | |

9.3.4 Sensor Cables

| Servomotor Model | Length (L) | Order Number | Appearance | Details |
|---|------------|-------------------|---|-----------|
| SGLGW-□□A SGLFW-□□A SGLTW-□□A | 1 m | JZSP-CLL10-01-E |  | page 9-34 |
| | 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 9-34 |
| | 3 m | JZSP-CL2L100-03-E | | |
| | 5 m | JZSP-CL2L100-05-E | | |
| | 10 m | JZSP-CL2L100-10-E | | |
| | 15 m | JZSP-CL2L100-15-E | | |
| SGLFW2-□□A□□□ AT□ (without Polarity Sensor) | 1 m | JZSP-CL2TH00-01-E |  | page 9-35 |
| | 3 m | JZSP-CL2TH00-03-E | | |
| | 5 m | JZSP-CL2TH00-05-E | | |
| | 10 m | JZSP-CL2TH00-10-E | | |
| | 15 m | JZSP-CL2TH00-15-E | | |

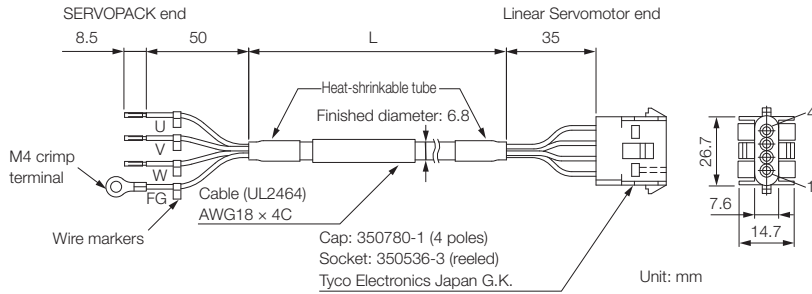
9.3.5 Encoder Cables

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 9-35 |
| | 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 | | |

9.3.6 Cable Dimensional Drawings and Wiring Specifications

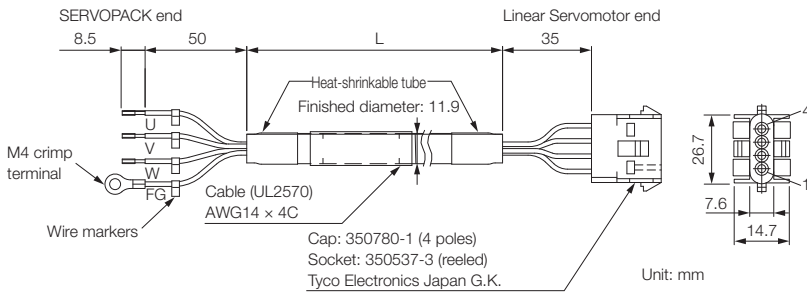
JZSP-CLN11-□□-E Servomotor Main Circuit Cables



• 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 |

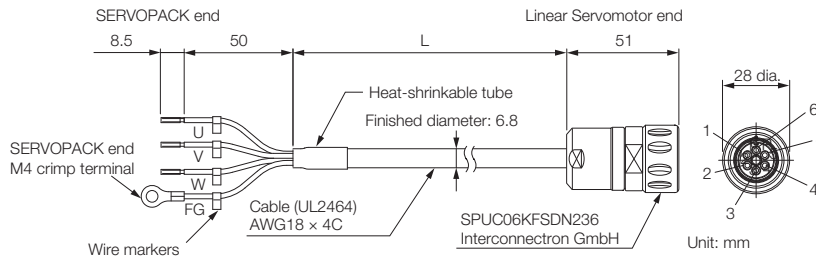
JZSP-CLN21-□□-E Servomotor Main Circuit Cables



• 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 |

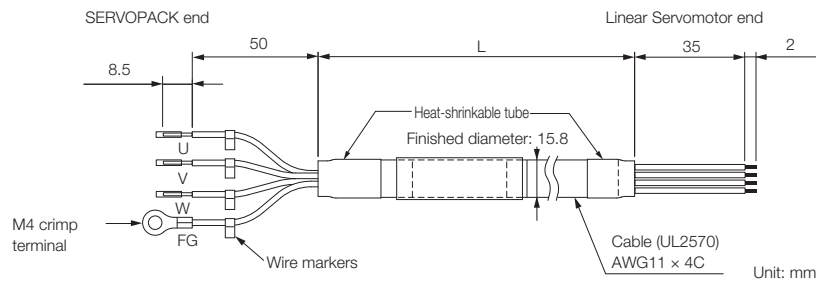
JZSP-CLN14-□□-E Servomotor Main Circuit Cables



• 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

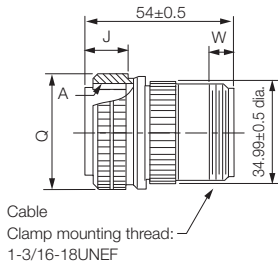
Unit: mm

| 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 |

Cable Clamp mounting thread: 1-3/16-18UNEF

■ MS3106A22-2S: Straight Plug with Solid Shell

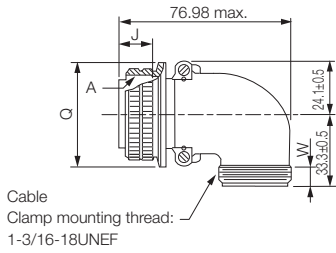
Unit: mm



| 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

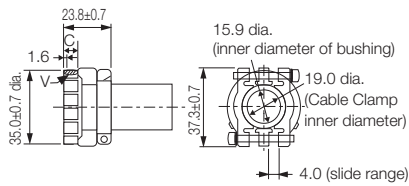
Unit: mm



| 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 |

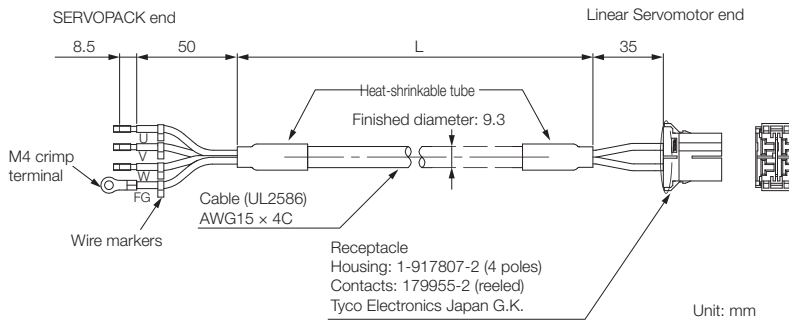
■ MS3057-12A: Cable Clamp with Rubber Bushing

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 |

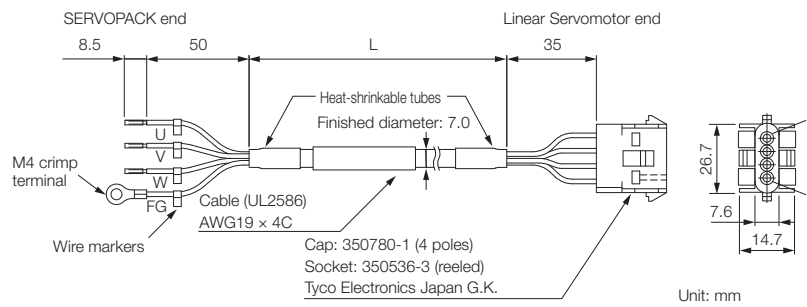
JZSP-CL2N803-□□-E Servomotor Main Circuit Cables



• Wiring Specifications

| SERVOPACK Leads | | Servomotor Connector | |
|-----------------|---------|----------------------|-----|
| Wire Color | Signal | Signal | Pin |
| Red | Phase U | Phase U | A1 |
| White | Phase V | Phase V | A2 |
| Black | Phase W | Phase W | B1 |
| Green | FG | FG | B2 |

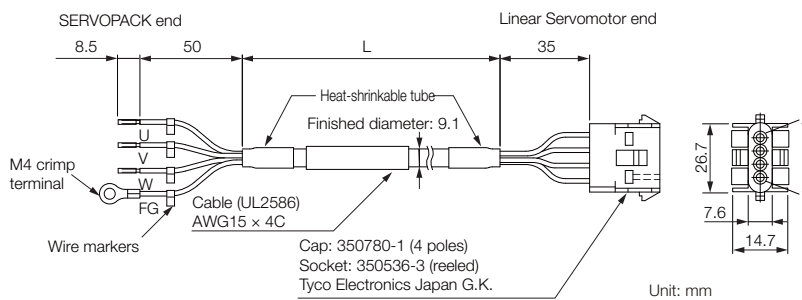
JZSP-CL2N703-□□-E Servomotor Main Circuit Cables



• Wiring Specifications

| SERVOPACK Leads | | Servomotor connector | |
|-----------------|---------|----------------------|-----|
| Wire Color | Signal | Signal | Pin |
| Red | Phase U | Phase U | 1 |
| White | Phase V | Phase V | 2 |
| Black | Phase W | Phase W | 3 |
| Green | FG | FG | 4 |

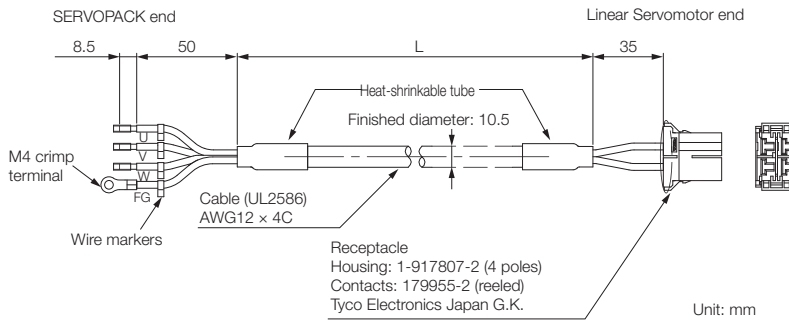
JZSP-CL2N603-□□-E Servomotor Main Circuit Cables



• Wiring Specifications

| SERVOPACK Leads | | Servomotor connector | |
|-----------------|---------|----------------------|-----|
| Wire Color | Signal | Signal | Pin |
| Red | Phase U | Phase U | 1 |
| White | Phase V | Phase V | 2 |
| Black | Phase W | Phase W | 3 |
| Green | FG | FG | 4 |

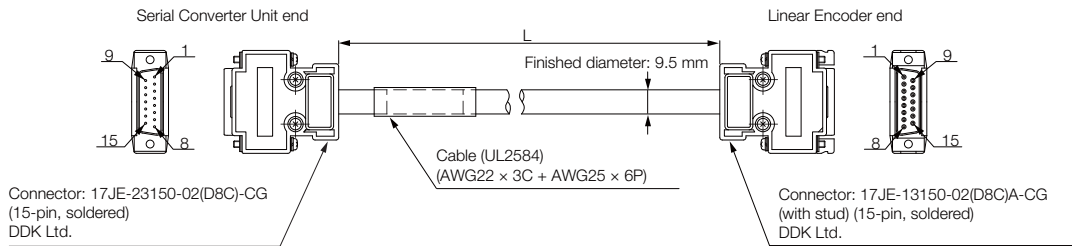
JZSP-CL2N503-□□-E Servomotor Main Circuit Cables



• Wiring Specifications

| SERVOPACK Leads | | Servomotor Connector | |
|-----------------|---------|----------------------|-----|
| Wire Color | Signal | Signal | Pin |
| Red | Phase U | Phase U | A1 |
| White | Phase V | Phase V | A2 |
| Black | Phase W | Phase W | B1 |
| Green | FG | FG | B2 |

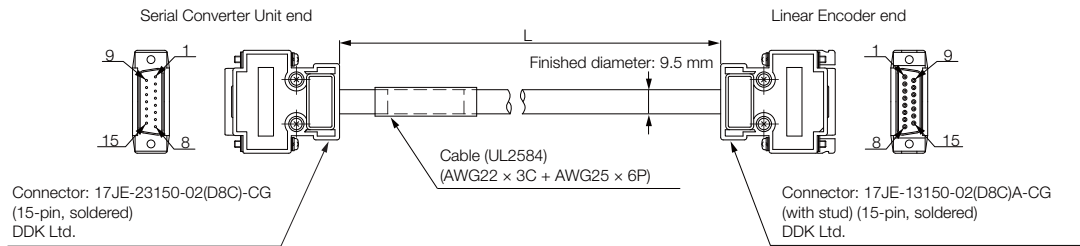
JZSP-CLL00-□□-E Linear Encoder Cables



• Wiring Specifications

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

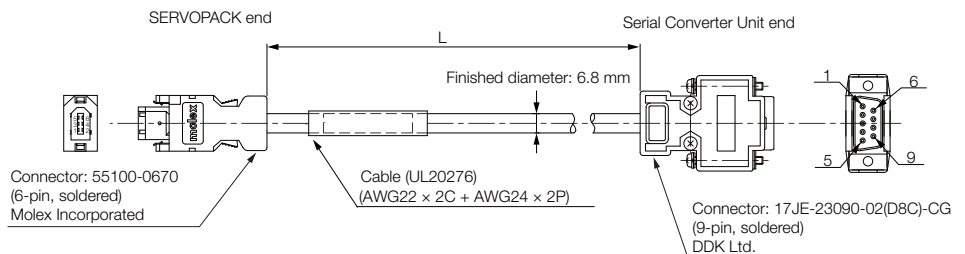
JZSP-CLL30-□□-E Linear Encoder Cables



• Wiring Specifications

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

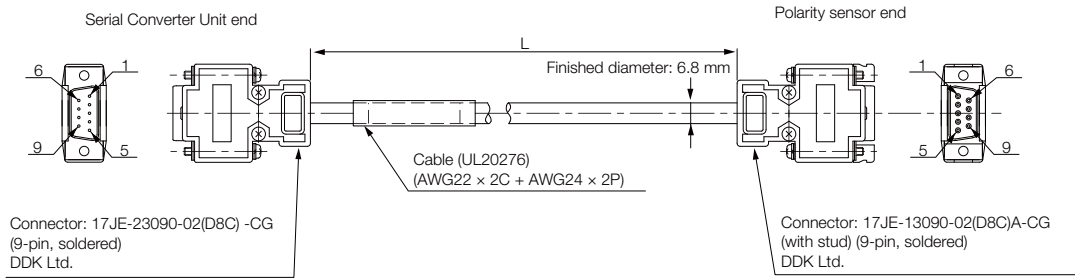
JZSP-CLP70-□□-E Serial Converter Unit Cables



• Wiring Specifications

| SERVOPACK end | | | Serial Converter Unit end | | |
|---------------|--------|------------------|---------------------------|-----------------|------------------|
| Pin | Signal | Wire Color | Pin | Signal | Wire Color |
| 1 | PG5 V | Orange | 1 | +5 V | Orange |
| 2 | PG0 V | Green | 5 | 0 V | Green |
| 3 | - | - | 3 | - | - |
| 4 | - | - | 4 | - | - |
| 5 | PS | Light blue/red | 2 | Phase-S output | Light blue/red |
| 6 | /PS | Light blue/black | 6 | /Phase-S output | Light blue/black |
| Shell | Shield | - | Case | Shield | - |
| | | | 7 | - | - |
| | | | 8 | - | - |
| | | | 9 | - | - |

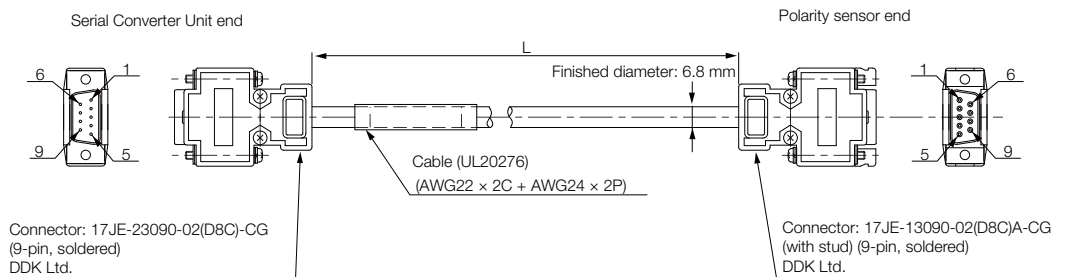
JZSP-CLL10-□□-E Sensor Cables



• Wiring Specifications

| Serial Converter Unit end | | Polarity sensor end | |
|---------------------------|---------------|---------------------|---------------|
| Pin | Signal | Pin | Signal |
| 1 | +5 V | 1 | +5 V |
| 2 | Phase-U input | 2 | Phase-U input |
| 3 | Phase-V input | 3 | Phase-V input |
| 4 | Phase-W input | 4 | Phase-W input |
| 5 | 0 V | 5 | 0 V |
| 6 | - | 6 | - |
| 7 | - | 7 | - |
| 8 | - | 8 | - |
| 9 | - | 9 | - |
| Case | Shield | Case | Shield |

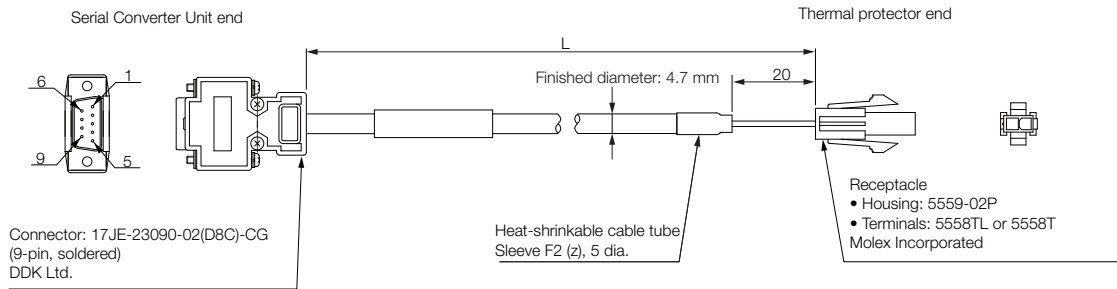
JZSP-CL2L100-□□-E Sensor Cables



• Wiring Specifications

| Serial Converter Unit end | | Polarity sensor end | |
|---------------------------|-------------------------|---------------------|-------------------------|
| Pin | Signal | Pin | Signal |
| 1 | +5 V, Thermal Protector | 1 | +5 V, Thermal Protector |
| 2 | Phase-U input | 2 | Phase-U input |
| 3 | Phase-V input | 3 | Phase-V input |
| 4 | Phase-W input | 4 | Phase-W input |
| 5 | 0 V | 5 | 0 V |
| 6 | - | 6 | - |
| 7 | - | 7 | - |
| 8 | - | 8 | - |
| 9 | Thermal Protector | 9 | Thermal Protector |
| Case | Shield | Case | Shield |

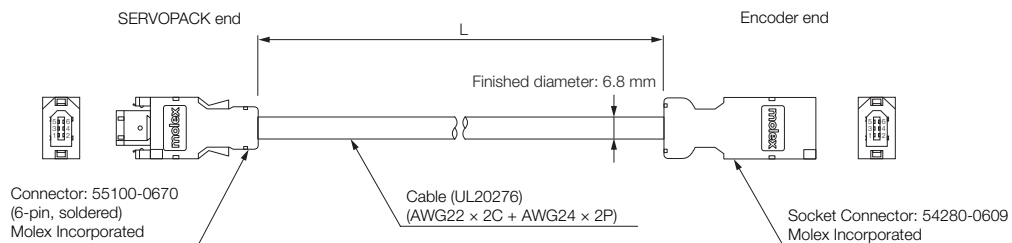
JZSP-CL2TH00-□□-E Sensor Cables



• Wiring Specifications

| Serial Converter Unit end | | Thermal protector end | |
|---------------------------|-------------------------|-----------------------|-------------------------|
| Pin | Signal | Pin | Signal |
| 1 | +5 V, Thermal Protector | 1 | +5 V, Thermal Protector |
| 2 | - | 2 | Thermal Protector |
| 3 | - | | |
| 4 | - | | |
| 5 | - | | |
| 6 | - | | |
| 7 | - | | |
| 8 | - | | |
| 9 | Thermal Protector | | |

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



• Wiring Specifications

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

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

9.3.7 Wiring Precautions

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.

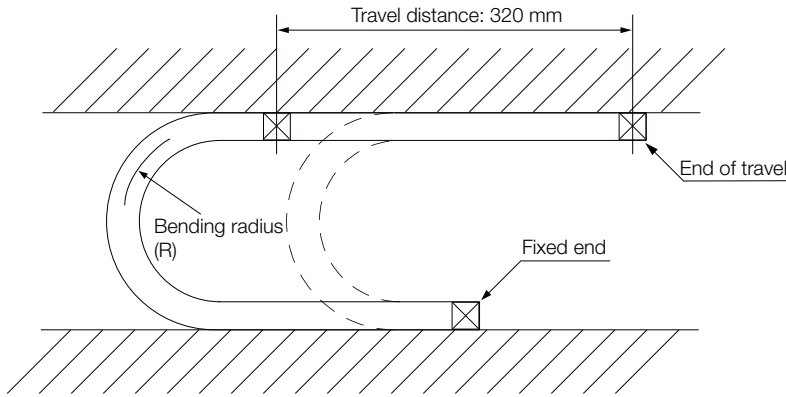
| Cable Diameter | Recommended Bending Radius (R) |
|----------------|--------------------------------|
| Less than 8 mm | 15 mm min. |
| 8 mm | 20 mm min. |
| Over 8 mm | Cable diameter × 3 mm min. |

Precautions for Flexible Cables

The Flexible Cables have a service life of 10,000,000 operations minimum when used at the recommended bending radius (R) or larger under the following test conditions. The service life of a Flexible Cable is reference data under the following 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.

◆ Recommended Cable Bending Radii

| Type | Model | Recommended Bending Radius (R) [mm] |
|---|-------------------|-------------------------------------|
| Linear Servomotor Main Circuit Cable | JZSP-CLN11-□□-E | 35 |
| | JZSP-CLN21-□□-E | 75 |
| | JZSP-CLN39-□□-E | 100 |
| | JZSP-CLN14-□□-E | 35 |
| | JZSP-CL2N803-□□-E | 70 |
| | JZSP-CL2N703-□□-E | 50 |
| | JZSP-CL2N603-□□-E | 60 |
| | JZSP-CL2N503-□□-E | 70 |
| Linear Encoder Cable | JZSP-CLL00-□□-E | 57 |
| | JZSP-CLL30-□□-E | |
| Sensor Cable | JZSP-CLL10-□□-E | 46 |
| | JZDP-CL2L100-□□-E | |
| Serial Converter Unit Cable | JZSP-CL2TH00-□□-E | 46 |
| Cables with Connectors on Both Ends (for incremental or absolute encoder) | JZSP-CLP70-□□-E | |
| Cables without Connectors | JZSP-CMP10-□□-E | |
| | JZSP-CSP39-□□-E | |

9.4 Serial Converter Unit

9.4.1 Selection Table

Order Numbers

Use the following tables to select the Serial Converter Unit.

JZDP - □00□ - □□□

| Serial Converter Unit Model | | | | | Applicable Linear Servomotors | | | | | |
|-----------------------------|------------|-----------------------------------|-----------------|-------------------|---|-----------|------------------|--|---------|-----|
| Code | Appearance | Applicable Linear Encoder | Polarity Sensor | Thermal Protector | Servomotor Model | Code | Servomotor Model | Code | | |
| H003 J003 | | From Dr. JOHANNES HEIDENHAIN GmbH | Not provided | Not provided | SGLGW- (coreless models) For Standard-Force Magnetic Way | 30A050C | 250 | SGLFW (models with F-type iron cores) | 20A090A | 017 |
| | | | | | | 30A080C | 251 | | 20A120A | 018 |
| | | | | | | 40A140C | 252 | | 35A120A | 019 |
| | | | | | | 40A253C | 253 | | 35A230A | 020 |
| 40A365C | 254 | 50A200B | 181 | | | | | | | |
| 60A140C | 258 | 50A380B | 182 | | | | | | | |
| 60A253C | 259 | 1ZA200B | 183 | | | | | | | |
| 60A365C | 260 | 1ZA380B | 184 | | | | | | | |
| 90A200C | 264 | 20A170A | 011 | | | | | | | |
| 90A370C | 265 | 20A320A | 012 | | | | | | | |
| 90A535C | 266 | 20A460A | 013 | | | | | | | |
| H005 J005 | | From Renishaw plc | Not provided | Not provided | SGLGW- + SGLGM- □-M (coreless models) For High-Force Magnetic Way | 40A140C | 255 | SGLTW- (models with T-type iron cores) | 35A170A | 014 |
| | | | | | | 40A253C | 256 | | 35A320A | 015 |
| | | | | | | 40A365C | 257 | | 35A460A | 016 |
| | | | | | | 60A140C | 261 | | 35A170H | 105 |
| | | | | | | 60A253C | 262 | | 35A320H | 106 |
| | | | | | | 60A365C | 263 | | 50A170H | 108 |
| H006 J006 | | From Dr. JOHANNES HEIDENHAIN GmbH | Provided | Provided | SGLFW2 (models with F-type iron cores) | 30A070A | 628 | 50A320H | 109 | |
| | | | | | | 30A120A | 629 | 40A400B | 185 | |
| | | | | | | 30A230A | 630 | 40A600B | 186 | |
| | | | | | | 45A200A | 631 | 80A400B | 187 | |
| | | | | | | 45A380A | 632 | 80A600B | 188 | |
| | | | | | | 90A200A□1 | 633 | | | |
| | | | | | | 90A380A□1 | 634 | | | |
| | | | | | | 90A560A□1 | 648 | | | |
| | | | | | | 1DA380A□1 | 649 | | | |
| | | | | | | 1DA560A□1 | 650 | | | |
| | | | | | | 90A200A□L | 699 | | | |
| | | | | | | 90A380A□L | 700 | | | |
| 90A560A□L | 701 | | | | | | | | | |
| 1DA380A□L | 702 | | | | | | | | | |
| 1DA560A□L | 703 | | | | | | | | | |
| H008 J008 | | From Renishaw plc | Provided | Provided | | | | | | |

Cables and User-Assembled Wiring Materials for Linear Servomotors

9.4.2 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.

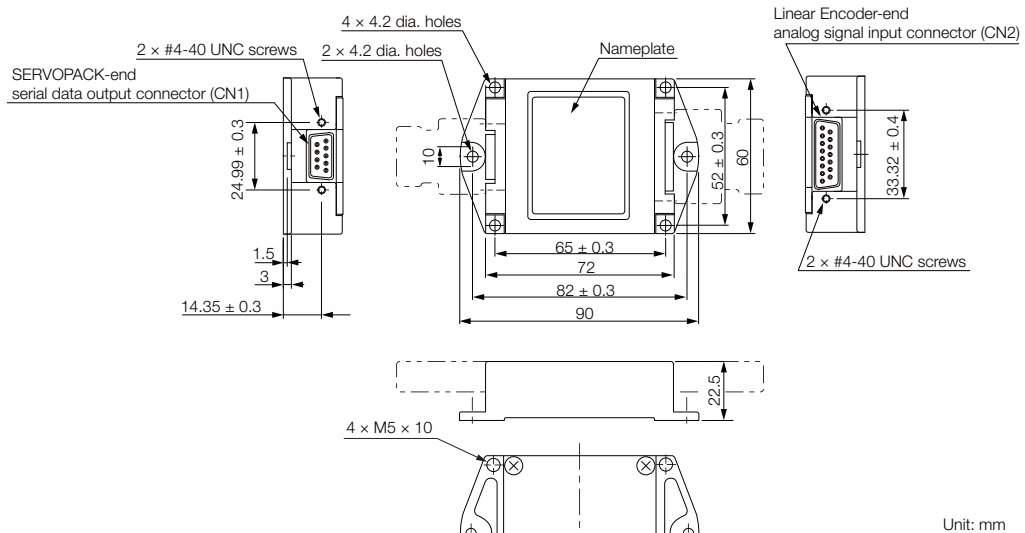
*2. If you input an out-of-range value, the correct position information will not be output. Also, the device may be damaged.

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

9.4.3 External Dimensions

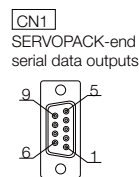
Serial Converter Unit without Polarity Sensor Cable (for Linear Encoder from Dr. JOHANNES HEIDENHAIN GmbH)

◆ Model: JZDP-□003-□□□



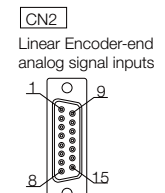
Unit: mm

| 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 |



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 |



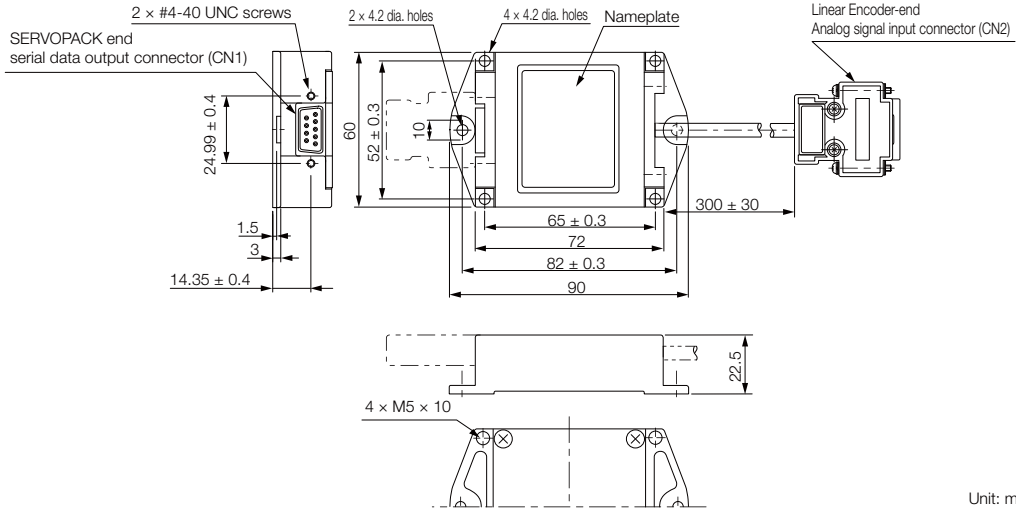
17-Series Connector:
17LE-13150-27-FA
from DDK Ltd.
(Socket)

Note: 1. Do not connect the unused pins.

2. Contact Dr. JOHANNES HEIDENHAIN GmbH for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Dr. JOHANNES HEIDENHAIN GmbH.

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

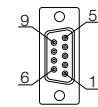
◆ Model: JZDP-□005-□□□



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 |

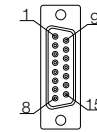
CN1
SERVOPACK-end
serial data outputs



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

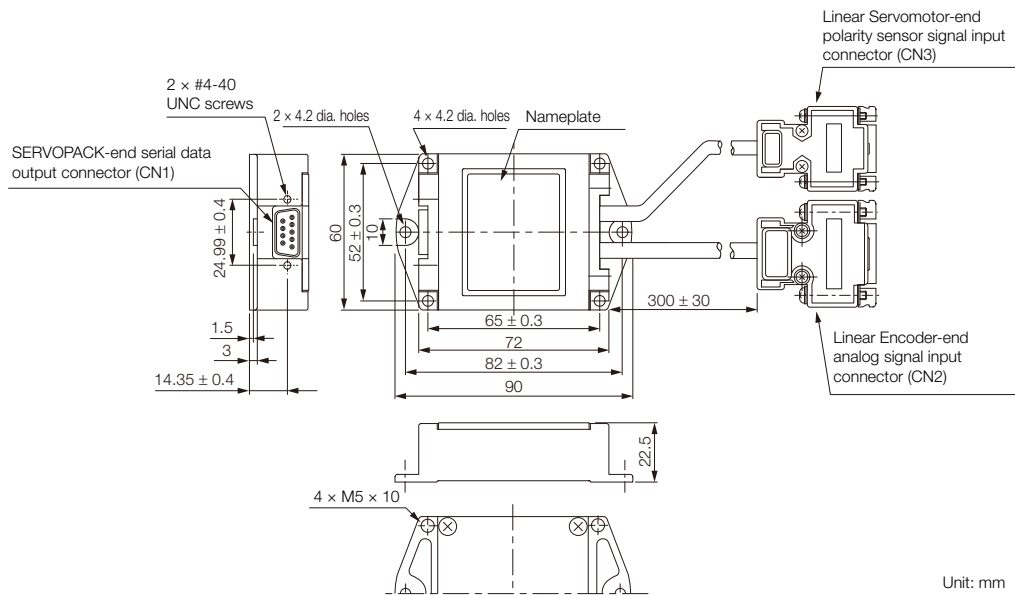


17-Series Connector:
17JE-13150-02 (D8C) A-CG
from DDK Ltd.
(Socket)

- 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.

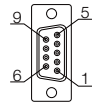
Serial Converter Unit with Polarity Sensor Cable (for Linear Encoder from Dr. JOHANNES HEIDENHAIN GmbH)

◆ Model: JZDP-□006-□□□



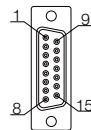
Unit: mm

CN1
SERVOPACK-end serial data outputs



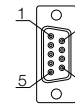
17-Series Connector:
17LE-13090-27-FA
from DDK Ltd.
(Socket)

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 |

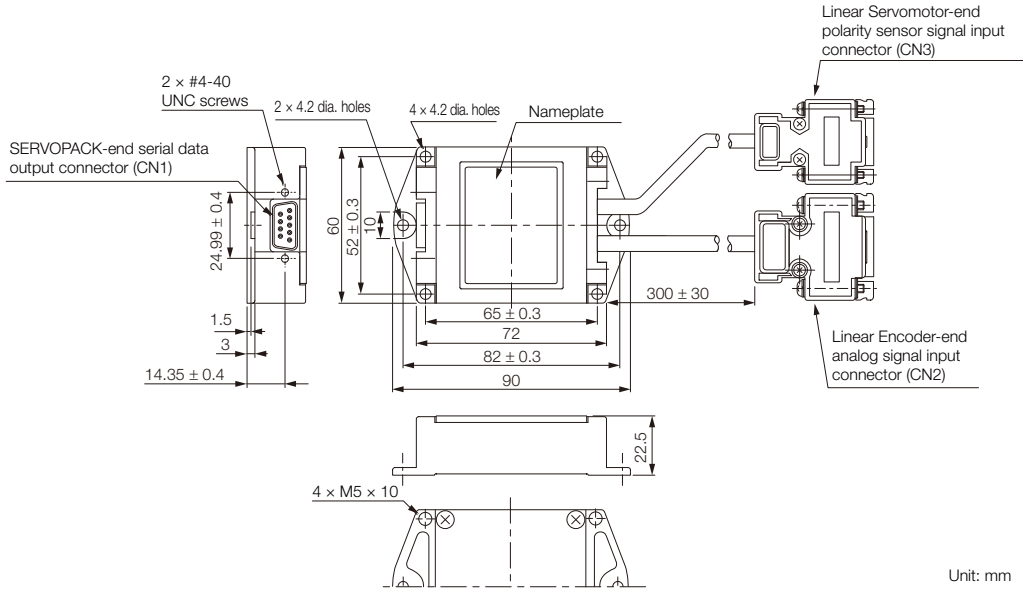
Note: 1. Do not connect the unused pins.

2. Contact Dr. JOHANNES HEIDENHAIN GmbH for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Dr. JOHANNES HEIDENHAIN GmbH.

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)

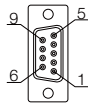
◆ Model: JZDP-□008-□□□



Unit: mm

CN1

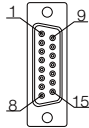
SERVOPACK-end serial data outputs



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

CN2

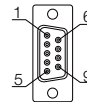
Linear Encoder-end analog signal inputs



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.

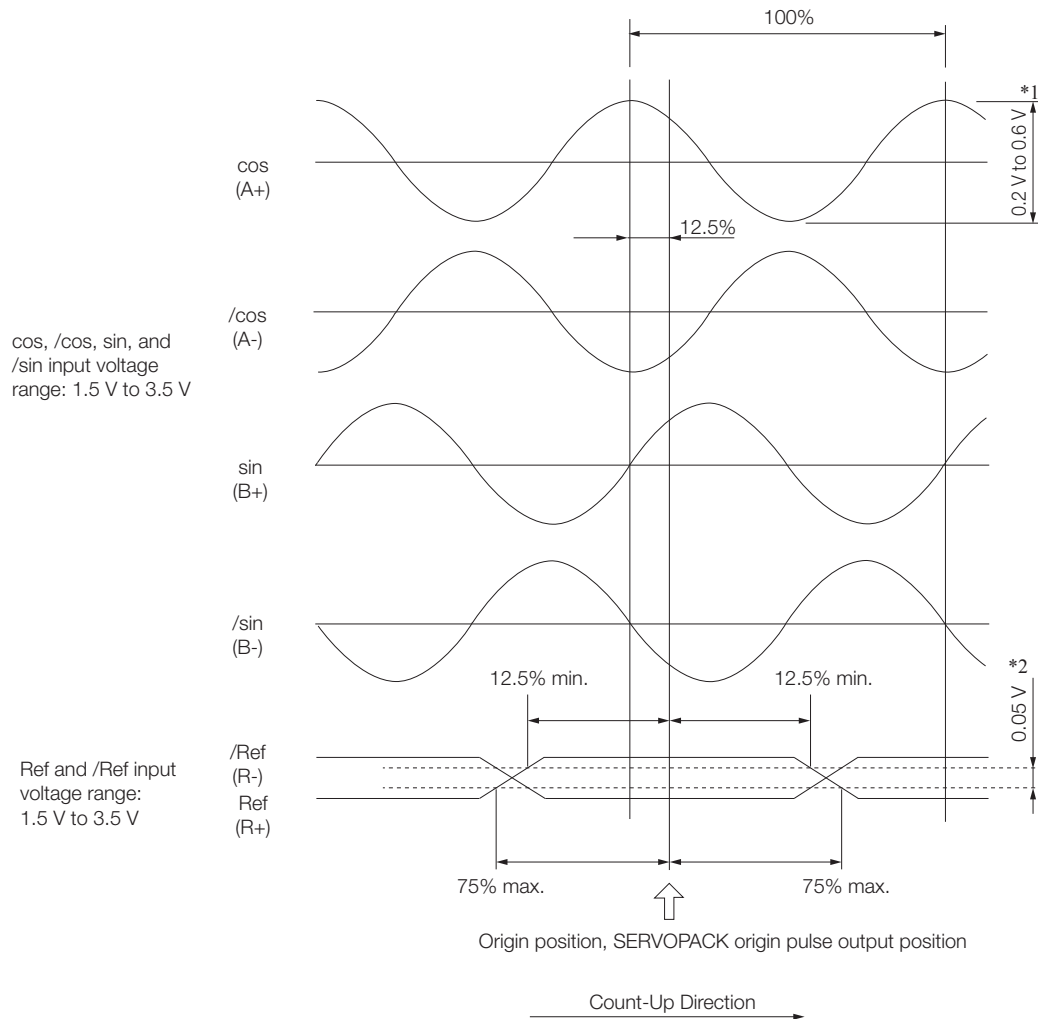
9.4.4 Analog Signal Input Timing

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 H₂S.
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

10

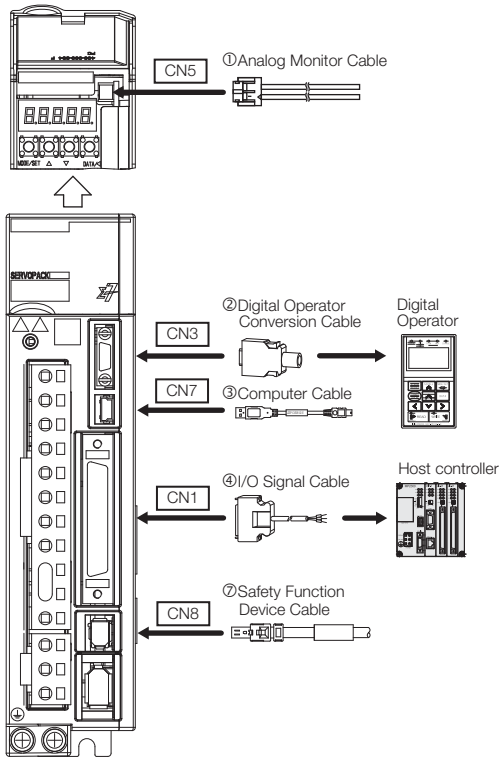
| | | |
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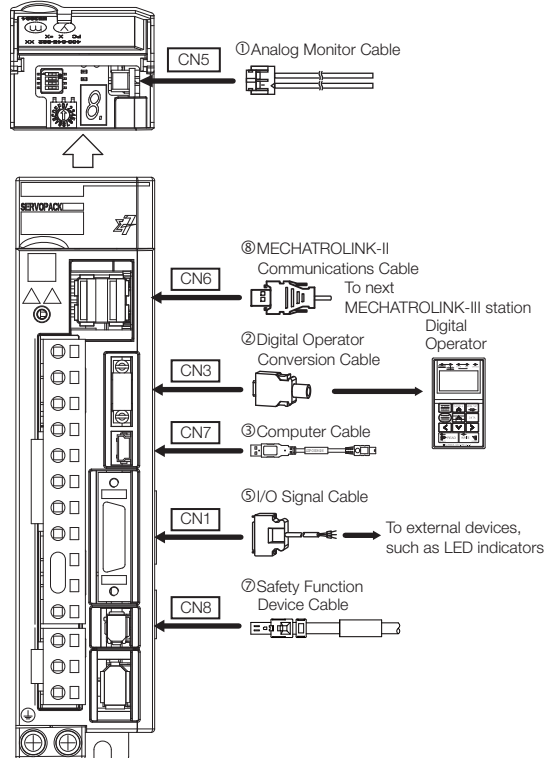
10.1 System Configuration Diagrams and Selection Tables

10.1.1 Cable Configurations

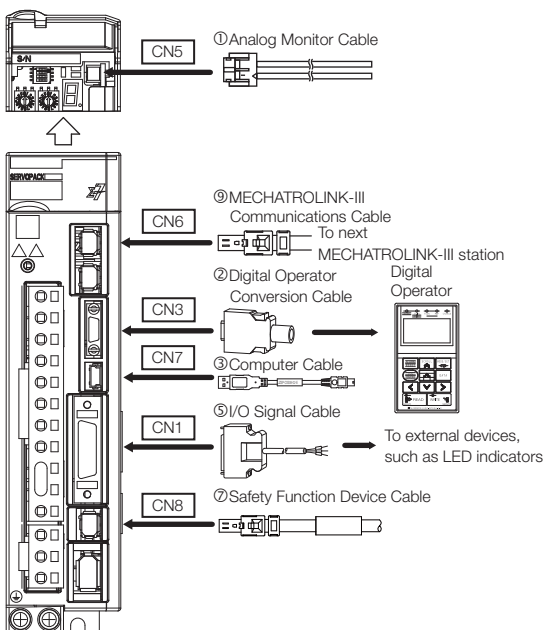
■ Σ -7S (Single Axis) SERVOPACKs with Analog Voltage/Pulse Train Reference



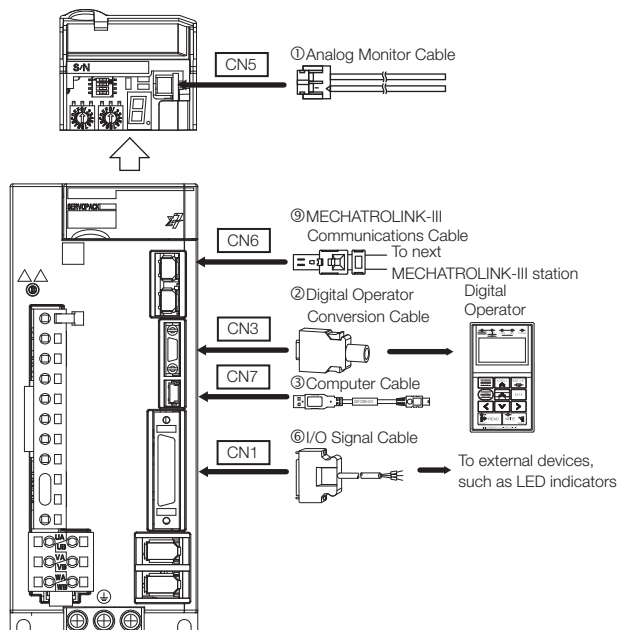
■ Σ -7S (Single Axis) SERVOPACKs with MECHATROLINK-II Communications Reference



■ Σ -7S (Single Axis) SERVOPACKs with MECHATROLINK-III Communications Reference



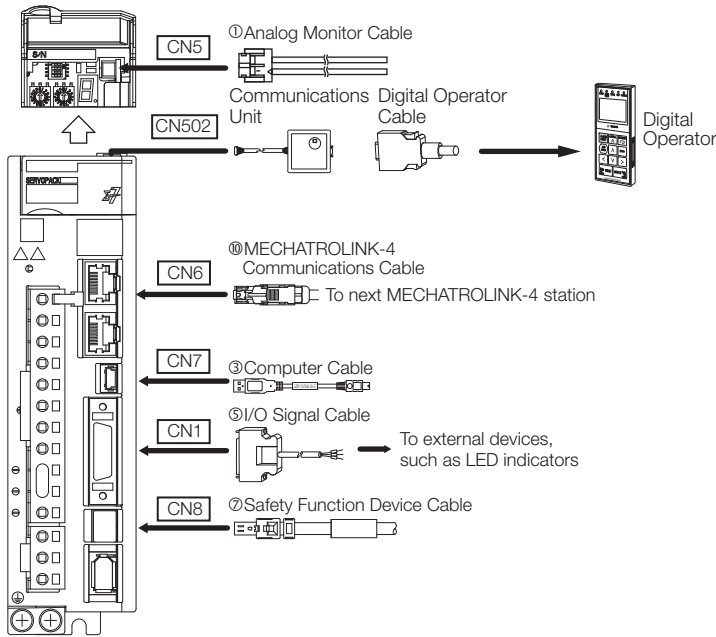
■ Σ -7W (Two Axes) SERVOPACKs with MECHATROLINK-III Communications Reference



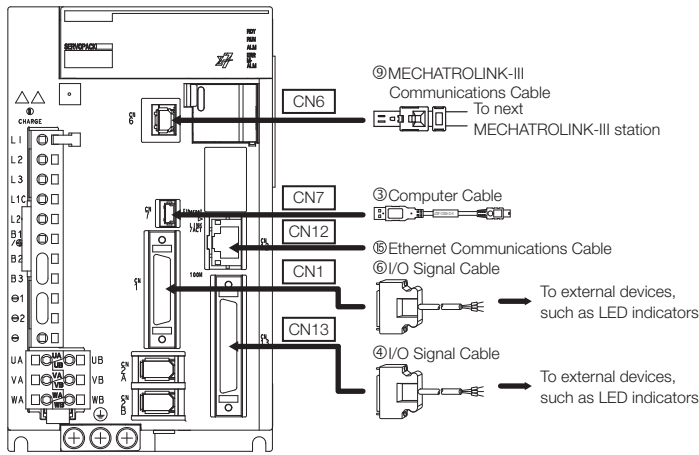
10.1 System Configuration Diagrams and Selection Tables

10.1.1 Cable Configurations

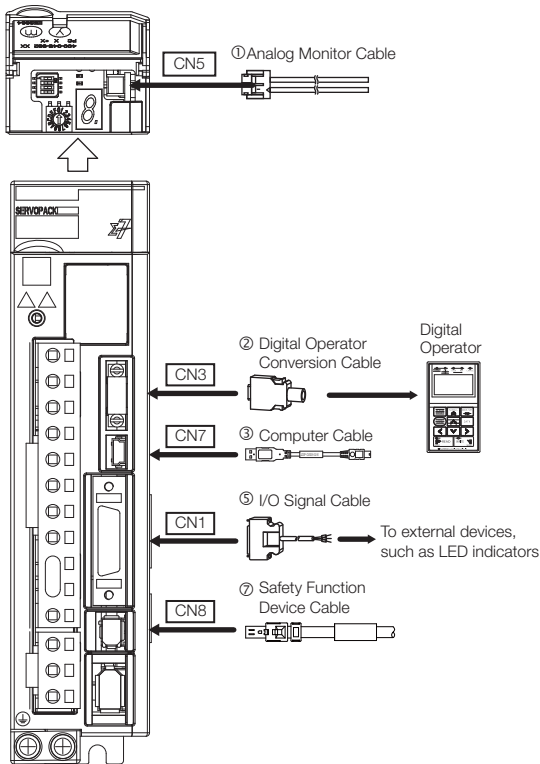
■ Σ -7S (Single Axis) SERVOPACKs with MECHATROLINK-4 Communications Reference



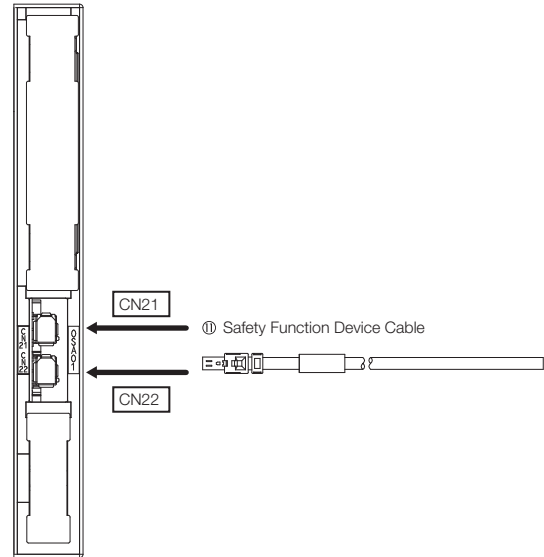
■ Σ -7C (Two Axes with Built-in Controller) SERVOPACKs with Bus Connection Reference



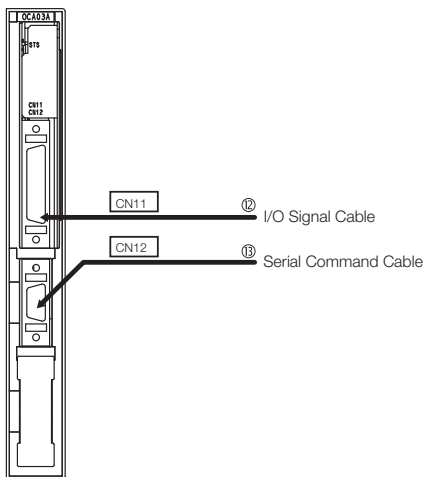
■ Σ -7S (Single Axis) Command Option Attachable-Type SERVOPACKs



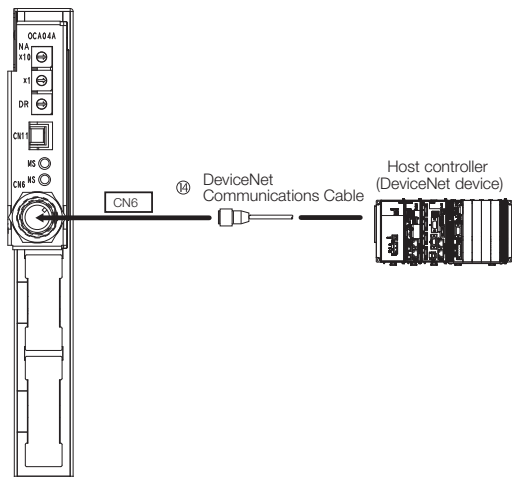
■ Option Module: Safety Module




■ Command Option Module: INDEXER Module



■ Command Option Module: DeviceNet Module


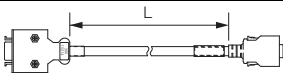
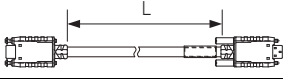
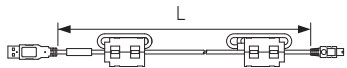

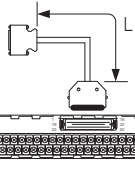
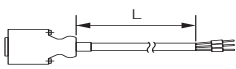

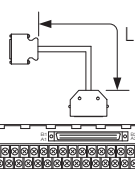
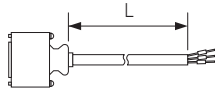


10.1.2 Selection Table




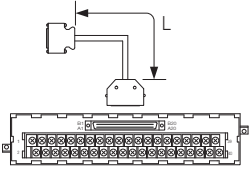
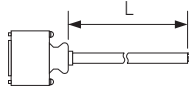
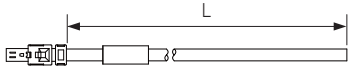
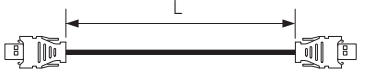
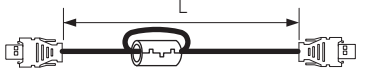

Important

1. Use the cable specified by Yaskawa for the Computer Cable. Operation may not be dependable with any other cable.
2. Use the cable specified by Yaskawa for the MECHATROLINK Communications Cables. Operation may not be dependable due to low noise resistance with any other cable.

| Code | Name | Length (L) | Order Number | Appearance | |
|------|----------------------------------|--|-------------------|---|---|
| ① | Analog Monitor Cable | 1 m | JZSP-CA01-E |  | |
| ② | Digital Operator Converter Cable | 0.3 m | JZSP-CVS05-A3-E*1 |  | |
| | | | JZSP-CVS07-A3-E*2 |  | |
| ③ | Computer Cable | 2.5 m | JZSP-CVS06-02-E |  | |
| ④ | I/O Signal Cables | Soldered Connector Kit | | JZSP-CSI9-1-E |  |
| | | Connector-Terminal Block Converter Unit (with cable) | 0.5 m | JUSP-TA50PG-E |  |
| | | | 1 m | JUSP-TA50PG-1-E | |
| | | | 2 m | JUSP-TA50PG-2-E | |
| | | Cable with Loose Wires at One End (loose wires on peripheral device end) | 1 m | JZSP-CSI01-1-E |  |
| | | | 2 m | JZSP-CSI01-2-E | |
| | | | 3 m | JZSP-CSI01-3-E | |
| ⑤ | I/O Signal Cables | Soldered Connector Kit | | JZSP-CSI9-2-E |  |
| | | Connector-Terminal Block Converter Unit (with cable) | 0.5 m | JUSP-TA26P-E |  |
| | | | 1 m | JUSP-TA26P-1-E | |
| | | | 2 m | JUSP-TA26P-2-E | |
| | | Cable with Loose Wires at One End (loose wires on peripheral device end) | 1 m | JZSP-CSI02-1-E |  |
| | | | 2 m | JZSP-CSI02-2-E | |
| | | | 3 m | JZSP-CSI02-3-E | |

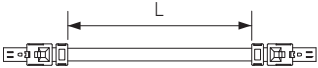
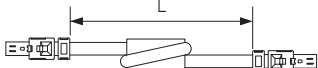
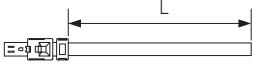
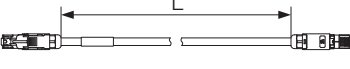
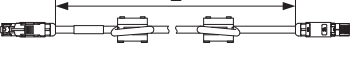
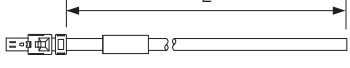
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| Code | Name | Length (L) | Order Number | Appearance | | |
|------|--|--|---|---|---|---|
| ⑥ | I/O Signal Cables | Soldered Connector Kit | DP9420007-E |  | | |
| | | Connector-Terminal Block Converter Unit (with cable) | 0.5 m | JUSP-TA36P-E |  | |
| | | | 1 m | JUSP-TA36P-1-E | | |
| | | | 2 m | JUSP-TA36P-2-E | | |
| | | Cable with Loose Wires at One End (loose wires on peripheral device end) | 1 m | JZSP-CSI03-1-E |  | |
| | | | 2 m | JZSP-CSI03-2-E | | |
| | | | 3 m | JZSP-CSI03-3-E | | |
| ⑦ | Safety Function Device Cable | Cables with Connectors*3 | 1 m | JZSP-CVH03-01-E |  | |
| | | | 3 m | JZSP-CVH03-03-E | | |
| | | Connector Kit*4 | Contact Tyco Electronics Japan G.K. Product name: Industrial Mini I/O D-shape Type 1 Plug Connector Kit Model number: 2013595-1 | | | |
| ⑧ | MECHA-TROLINK-II Communications Cables | Cables with Connectors on Both Ends | 0.5 m | JEPMC-W6002-A5-E |  | |
| | | | 1 m | JEPMC-W6002-01-E | | |
| | | | 3 m | JEPMC-W6002-03-E | | |
| | | | 5 m | JEPMC-W6002-05-E | | |
| | | | 10 m | JEPMC-W6002-10-E | | |
| | | | 20 m | JEPMC-W6002-20-E | | |
| | | | 30 m | JEPMC-W6002-30-E | | |
| | | | 40 m | JEPMC-W6002-40-E | | |
| | | | 50 m | JEPMC-W6002-50-E | | |
| | | Cables with Connectors on Both Ends (with ferrite cores) | 0.5 m | JEPMC-W6003-A5-E |  | |
| | | | 1 m | JEPMC-W6003-01-E | | |
| | | | 3 m | JEPMC-W6003-03-E | | |
| | | | 5 m | JEPMC-W6003-05-E | | |
| | | | 10 m | JEPMC-W6003-10-E | | |
| | | | 20 m | JEPMC-W6003-20-E | | |
| | | | 30 m | JEPMC-W6003-30-E | | |
| | | | 40 m | JEPMC-W6003-40-E | | |
| | | 50 m | JEPMC-W6003-50-E | | | |
| | | Terminators | | | JEPMC-W6022-E |  |

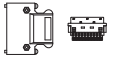
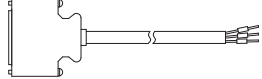
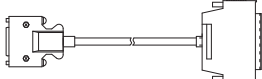
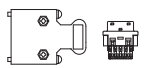
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| Code | Name | Length (L) | Order Number | Appearance | | |
|------|---|--|--------------------------------------|---|---|---|
| ⑨ | MECHA-TROLINK-III Communications Cables | Cables with Connectors on Both Ends | 0.2 m | JEPMC-W6012-A2-E |  | |
| | | | 0.5 m | JEPMC-W6012-A5-E | | |
| | | | 1 m | JEPMC-W6012-01-E | | |
| | | | 2 m | JEPMC-W6012-02-E | | |
| | | | 3 m | JEPMC-W6012-03-E | | |
| | | | 4 m | JEPMC-W6012-04-E | | |
| | | | 5 m | JEPMC-W6012-05-E | | |
| | | | 10 m | JEPMC-W6012-10-E | | |
| | | | 20 m | JEPMC-W6012-20-E | | |
| | | | 30 m | JEPMC-W6012-30-E | | |
| | | | 50 m | JEPMC-W6012-50-E | | |
| | | Cables with Connectors on Both Ends (with core) | 10 m | JEPMC-W6013-10-E |  | |
| | | | 20 m | JEPMC-W6013-20-E | | |
| | | | 30 m | JEPMC-W6013-30-E | | |
| | | | 50 m | JEPMC-W6013-50-E | | |
| | | Cable with Loose Wires at One End | 0.5 m | JEPMC-W6014-A5-E |  | |
| | | | 1 m | JEPMC-W6014-01-E | | |
| | | | 3 m | JEPMC-W6014-03-E | | |
| | | | 5 m | JEPMC-W6014-05-E | | |
| 10 m | JEPMC-W6014-10-E | | | | | |
| 30 m | JEPMC-W6014-30-E | | | | | |
| 50 m | JEPMC-W6014-50-E | | | | | |
| ⑩ | MECHATRO LINK-4 Communications Cables | Cables with Connectors on Both Ends | 0.2 m | JZSP-CM3RRM0-00P2-E |  | |
| | | | 0.5 m | JZSP-CM3RRM0-00P5-E | | |
| | | | 1 m | JZSP-CM3RRM0-01-E | | |
| | | | 2 m | JZSP-CM3RRM0-02-E | | |
| | | | 3 m | JZSP-CM3RRM0-03-E | | |
| | | | 4 m | JZSP-CM3RRM0-04-E | | |
| | | | 5 m | JZSP-CM3RRM0-05-E | | |
| | | | 10 m | JZSP-CM3RRM0-10-E | | |
| | | | 30 m | JZSP-CM3RR00-30-E | | |
| | | Cables with Connectors on Both Ends (with ferrite cores) | 0.3 m | JZSP-CM3RRM1-00P3-E |  | |
| | | | 3 m | JZSP-CM3RRM1-03-E | | |
| | | | 10 m | JZSP-CM3RRM1-10-E | | |
| | | | 20 m | JZSP-CM3RR01-20-E | | |
| | | | 30 m | JZSP-CM3RR01-30-E | | |
| | | | 50 m | JZSP-CM3RR01-50-E | | |
| | | Safety Function Device Cables | Cables with Connectors* ³ | 1 m | JZSP-CVH03-01-E |  |
| | | | | 3 m | JZSP-CVH03-03-E | |
| | | | Connector Kit* ⁴ | Contact Tyco Electronics Japan G.K. Product name: Industrial Mini I/O D-shape Type 1 Plug Connector Kit Model number: 2013595-1 | | |

Continued on next page.

Continued from previous page.

| Code | Name | | Length (L) | Order Number | Appearance |
|------|--------------------------------|---------------------------------------|------------|---|---|
| ⑫ | I/O Signal Cables | Connector Kit | | DP9420007-E |  |
| | | Cables with Loose Wires at One End | 1 m | JZSP-CVI01-1-E |  |
| | | | 2 m | JZSP-CVI01-2-E | |
| | | | 3 m | JZSP-CVI01-3-E | |
| | | Cables with Terminal Block on One End | 0.5 m | JUSP-TA36V-E |  |
| | | | 1 m | JUSP-TA36V-1-E | |
| 2 m | JUSP-TA36V-2-E | | | | |
| ⑬ | Serial Command Cable | Connector Kit*4 | | JZSP-CHI9-1 | Contact your Yaskawa representative for the cable.  |
| ⑭ | DeviceNet Communications Cable | | | The communications cable must be an ODVA-Compliant DeviceNet communications cable. We recommend the following Cable. OMRON DCA1-5CN02F1 Cable with Connectors or the equivalent. | |
| ⑮ | Ethernet Communications Cable | | | Use a commercially available cable that satisfies the following conditions. <ul style="list-style-type: none"> • Ethernet type: 100Base-TX • Category 5 or higher • Twisted-pair cable with RJ-45 connector | |

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

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

*3. When using safety functions, connect this Cable to the safety function devices.
When not using safety functions, connect the enclosed Safety Jumper Connector (JZSP-CVH05-E) to the SERVOPACK.

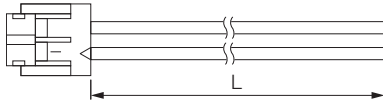
*4. Use the Connector Kit when you make cables yourself.

10.2 Analog Monitor Cables

Selection Table

| Order Number | Length (L) | Inquires |
|--------------|------------|------------------------|
| JZSP-CA01-E | 1 m | Yaskawa representative |

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 |

10.3 Digital Operator

A Digital Operator is used to display and set parameters in a SERVOPACK.

You can use the following two types of Digital Operators with Σ -7-Series SERVOPACKs.

- Digital Operator for Σ -V-Series and Σ -7-Series SERVOPACKs: JUSP-OP05A-1-E
- Digital Operators for Σ -III-Series SERVOPACKs: JUSP-OP05A and JUSP-OP05A-E



Important

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

10.3.1 Digital Operator for Σ -7-Series SERVOPACKs: JUSP-OP05A-1-E

To use the Digital Operator for Σ -7-Series SERVOPACKs (JUSP-OP05A-1-E), connect it to the CN3 connector on the SERVOPACK.

Main Functions

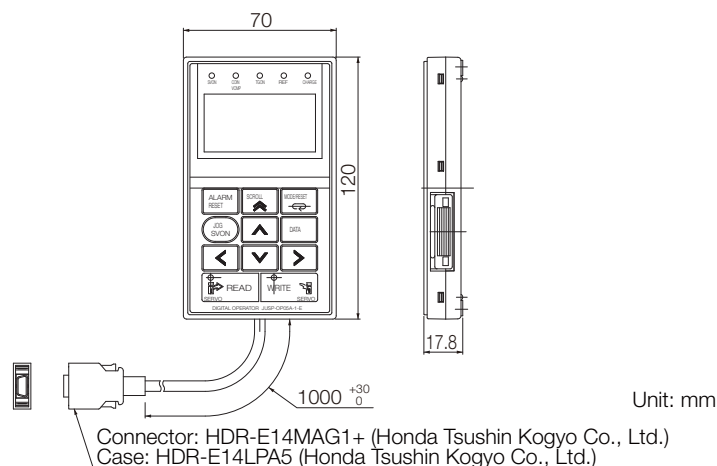
- Changing and accessing the settings of parameters in the SERVOPACK
- Reading, writing, and verifying the settings of parameters in the SERVOPACK
- Operating the SERVOPACK
- Adjustment with SERVOPACK utility functions
- Monitoring the operating conditions of the SERVOPACK

Selection Table

| Order Number | Accessories | Inquiries |
|----------------|-------------|------------------------|
| JUSP-OP05A-1-E | Cable (1 m) | Yaskawa representative |

Dimensional Drawing

- JUSP-OP05A-1-E



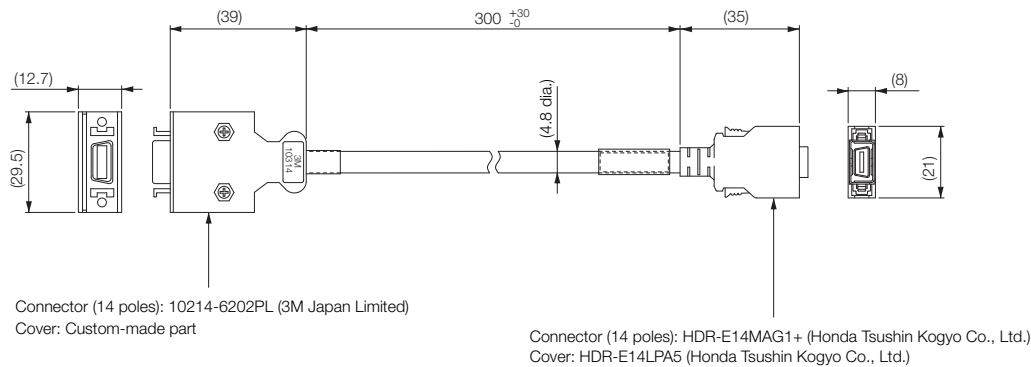
10.3.2 Digital Operator Conversion Cable (for Σ -III-Series Digital Operators)

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

Selection Table

| Order Number | Length (L) | Inquires |
|-----------------|------------|------------------------|
| JZSP-CVS05-A3-E | 0.3 m | Yaskawa representative |

Dimensional Drawing



Unit: mm

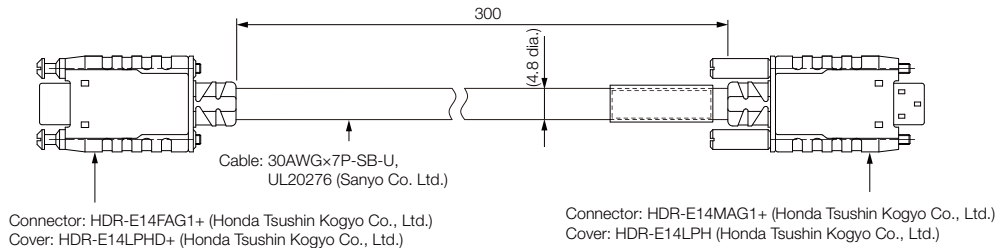
10.3.3 Digital Operator Conversion Cable with Lock Screws

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 representative |

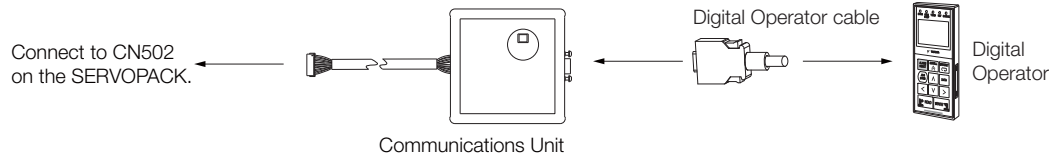
Dimensional Drawing



Unit: mm

10.3.4 Communications Unit


To connect the Digital Operator to a SERVOPACK with MECHATROLINK-4 Communications References, connect the Digital Operator to CN502 on the SERVOPACK. A JUSP-JC001-1 Communications Unit is required to make the connection.



Communications Unit

| Item | Description |
|---------------------|--|
| Inquiries | Your Yaskawa representative |
| Order Number | JUSP-JC001-1 |
| External Dimensions | |
| | <p>Approx. mass: 0.08 kg Unit: mm</p> |

10.4 Computer Cable

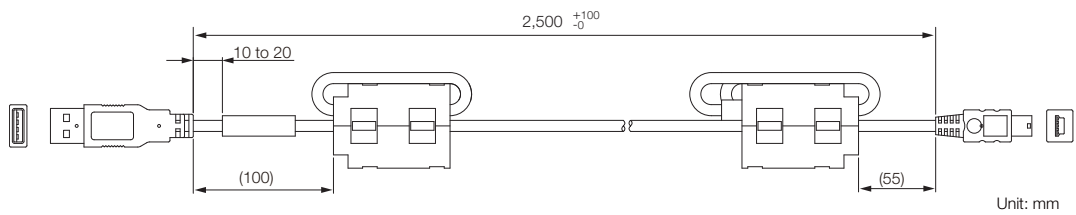


Important Use the Yaskawa-specified cable for the Computer Cable. Operation will not be dependable with any other cable.

Selection Table

| Order Number | Length (L) | Inquires |
|-----------------|------------|------------------------|
| JZSP-CVS06-02-E | 2.5 m | Yaskawa representative |

Dimensional Drawing



10.5 I/O Signal Cables for SERVOPACKs

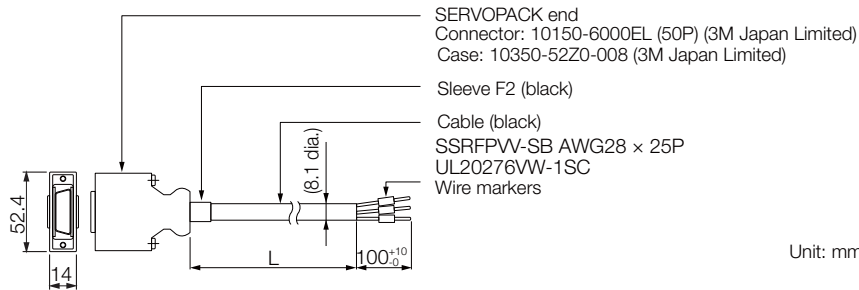
10.5.1 For Σ -7S Analog Voltage/Pulse Train Reference SERVO-PACKs

Cable with Loose Wires at One End

◆ Selection Table

| Order Number | Length (L) | Inquires |
|----------------|------------|------------------------|
| JZSP-CSI01-1-E | 1 m | Yaskawa representative |
| JZSP-CSI01-2-E | 2 m | |
| JZSP-CSI01-3-E | 3 m | |

◆ Dimensional Drawing



◆ Wiring Specifications

| Pin | Signal* | SERVOPACK end | | Markings | | Host controller end | Wire Marker No. |
|------|------------------------------|---------------|-------|----------|-------|---------------------|-----------------|
| | | Wire Color | Color | Qty | Color | | |
| 1 | SG | Orange | Red | 1 | | | 1 |
| 3 | PL1 | Orange | Black | 1 | | | 3 |
| 2 | SG | Gray | Red | 1 | | | 2 |
| 4 | SEN | Gray | Black | 1 | | | 4 |
| 5 | V-REF | White | Red | 1 | | | 5 |
| 6 | SG | White | Black | 1 | | | 6 |
| 7 | PULS | Yellow | Red | 1 | | | 7 |
| 8 | /PULS | Yellow | Black | 1 | | | 8 |
| 9 | T-REF | Pink | Red | 1 | | | 9 |
| 10 | SG | Pink | Black | 1 | | | 10 |
| 11 | SIGN | Orange | Red | 2 | | | 11 |
| 12 | /SIGN | Orange | Black | 2 | | | 12 |
| 13 | PL2 | Gray | Red | 2 | | | 13 |
| 14 | /CLR | White | Red | 2 | | | 14 |
| 15 | CLR | White | Black | 2 | | | 15 |
| 16 | - | Gray | Black | 2 | | | 16 |
| 17 | - | Yellow | Red | 2 | | | 17 |
| 18 | PL3 | Yellow | Black | 2 | | | 18 |
| 19 | PCO | Pink | Red | 2 | | | 19 |
| 20 | /PCO | Pink | Black | 2 | | | 20 |
| 21 | BAT+ | Orange | Red | 3 | | | 21 |
| 22 | BAT- | Orange | Black | 3 | | | 22 |
| 23 | - | Gray | Red | 3 | | | 23 |
| 24 | - | Gray | Black | 3 | | | 24 |
| 25 | /SO1+ (/V-CMP+ or /COIN+) | White | Red | 3 | | | 25 |
| 26 | /SO1- (/V-CMP- or /COIN-) | White | Black | 3 | | | 26 |
| 27 | /SO2+ (/TGON+) | Yellow | Red | 3 | | | 27 |
| 28 | /SO2- (/TGON-) | Yellow | Black | 3 | | | 28 |
| 29 | /SO3+ (/S-RDY+) | Pink | Red | 3 | | | 29 |
| 30 | /SO3- (/S-RDY-) | Pink | Black | 3 | | | 30 |
| 31 | ALM+ | Orange | Red | 4 | | | 31 |
| 32 | ALM- | Orange | Black | 4 | | | 32 |
| 33 | PAO | Gray | Red | 4 | | | 33 |
| 34 | /PAO | Gray | Black | 4 | | | 34 |
| 35 | PBO | White | Red | 4 | | | 35 |
| 36 | /PBO | White | Black | 4 | | | 36 |
| 37 | ALO1 | Yellow | Red | 4 | | | 37 |
| 38 | ALO2 | Yellow | Black | 4 | | | 38 |
| 39 | ALO3 | Pink | Red | 4 | | | 39 |
| 40 | /SI0 (/S-ON) | Pink | Black | 4 | | | 40 |
| 41 | /SI3 (/P-CON) | Orange | Red | 5 | | | 41 |
| 42 | /SI1 (/P-OT) | Orange | Black | 5 | | | 42 |
| 43 | /SI2 (/N-OT) | Gray | Red | 5 | | | 43 |
| 44 | /SI4 (/ALM-RST) | Gray | Black | 5 | | | 44 |
| 45 | /SI5 (/P-CL) | White | Red | 5 | | | 45 |
| 46 | /SI6 (/N-CL) | White | Black | 5 | | | 46 |
| 47 | +24VIN | Yellow | Red | 5 | | | 47 |
| 48 | PSO | Pink | Red | 5 | | | 48 |
| 49 | /PSO | Pink | Black | 5 | | | 49 |
| 50 | TH | Yellow | Black | 5 | | | 50 |
| Case | Shield | | | | | | |

▲ Represents twisted-pair

* The signals to use differ depending on the control method. For details, refer to the manual for your SERVOPACK.

Connector Kits

◆ Selection Table

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

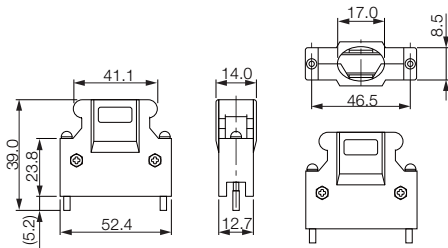
■ Wire Sizes

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

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

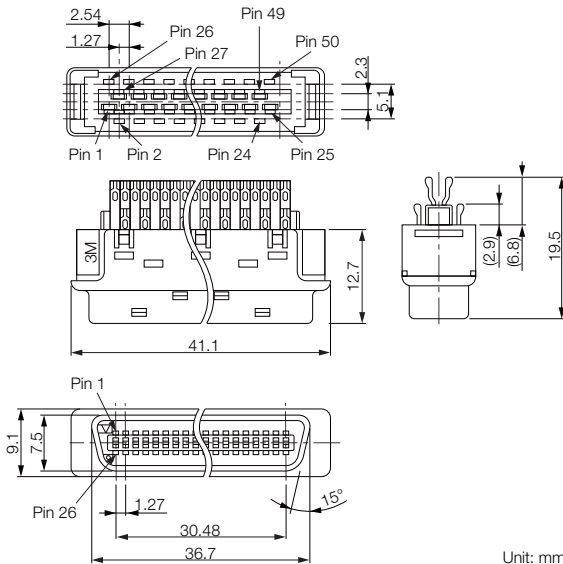
◆ Dimensional Drawings

■ Case



Unit: mm

■ Connectors



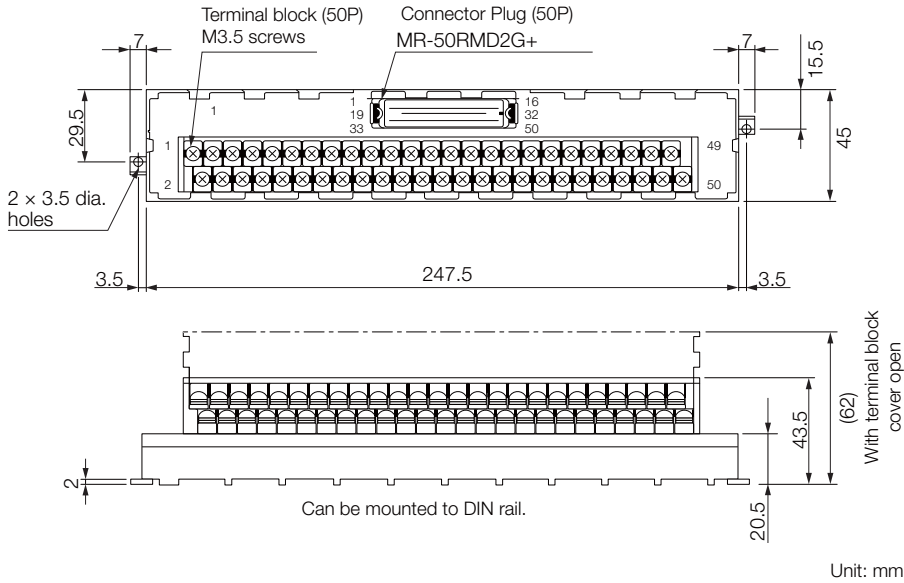
Unit: mm

Connector-Terminal Block Converter Unit

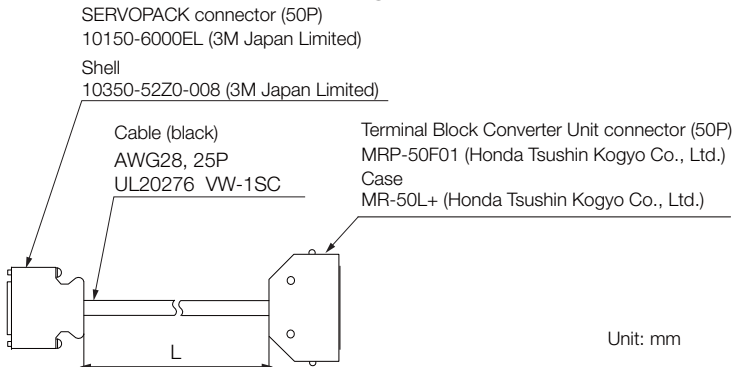
◆ Selection Table

| Order Number | Length of Enclosed Cable (L) | Inquires |
|-----------------|------------------------------|------------------------|
| JUSP-TA50PG-E | 0.5 m | Yaskawa representative |
| JUSP-TA50PG-1-E | 1 m | |
| JUSP-TA50PG-2-E | 2 m | |

◆ Dimensional Drawing



◆ Dimensional Drawing of Enclosed Cable



Note: The same pin numbers are used for the SERVOPACK connector and the terminal block. To assemble your own cables, refer to the following section for the wiring specifications.

◆ **Wiring Specifications** on page 10-15

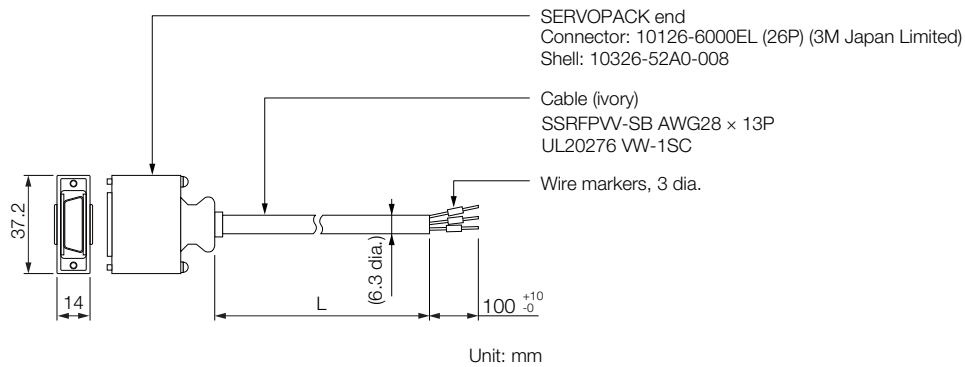
10.5.2 For Σ -7S MECHATROLINK-II/-III Communications Reference or Command Option Attachable-Type SERVO-PACKS

Cable with Loose Wires at One End

◆ Selection Table

| Order Number | Length (L) | Inquires |
|----------------|------------|------------------------|
| JZSP-CSI02-1-E | 1 m | Yaskawa representative |
| JZSP-CSI02-2-E | 2 m | |
| JZSP-CSI02-3-E | 3 m | |

◆ Dimensional Drawing



◆ Wiring Specifications

| Pin | Signal* | Wire Color | Markings | | Wire Marker No. |
|-----|--------------|------------|----------|-----|-----------------|
| | | | Color | Qty | |
| 1 | /SO1+ (/BK+) | Blue | Red | 1 | 1 |
| 2 | /SO1- (/BK-) | Blue | Black | 1 | 2 |
| 3 | ALM+ | Pink | Red | 1 | 3 |
| 4 | ALM- | Pink | Black | 1 | 4 |
| 5 | TH | Green | Red | 1 | 5 |
| 6 | +24VIN | Green | Black | 1 | 6 |
| 7 | /SI1 (P-OT) | Orange | Red | 1 | 7 |
| 8 | /SI2 (N-OT) | Orange | Black | 1 | 8 |
| 9 | /SI3 (/DEC) | Gray | Red | 1 | 9 |
| 10 | /SI4 (/EXT1) | Gray | Black | 1 | 10 |
| 11 | /SI5 (/EXT2) | Blue | Red | 2 | 11 |
| 12 | /SI6 (/EXT3) | Blue | Black | 2 | 12 |
| 13 | /SI0 | Pink | Red | 2 | 13 |
| 14 | BAT+ | Green | Red | 2 | 14 |
| 15 | BAT- | Green | Black | 2 | 15 |
| 16 | SG | Pink | Black | 2 | 16 |
| 17 | PAO | Orange | Red | 2 | 17 |
| 18 | /PAO | Orange | Black | 2 | 18 |
| 19 | PBO | Gray | Red | 2 | 19 |
| 20 | /PBO | Gray | Black | 2 | 20 |
| 21 | PCO | Blue | Red | 3 | 21 |
| 22 | /PCO | Blue | Black | 3 | 22 |
| 23 | /SO2+ | Pink | Red | 3 | 23 |
| 24 | /SO2- | Pink | Black | 3 | 24 |
| 25 | /SO3+ | Green | Red | 3 | 25 |
| 26 | /SO3- | Green | Black | 3 | 26 |

∩ : Represents twisted-pair wires.

* These are the signal names in MECHATROLINK-II/-III Communications Reference SERVOPACK. For the signal names in the Command Option Attachable-Type SERVOPACK, refer to the manual for your SERVOPACK.

Connector Kits

◆ Selection Table

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

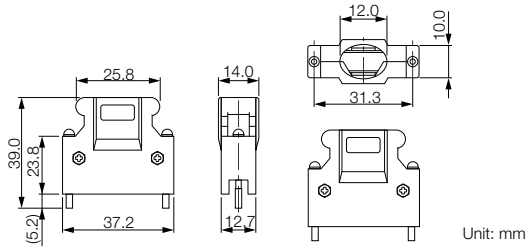
• Wire Sizes

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

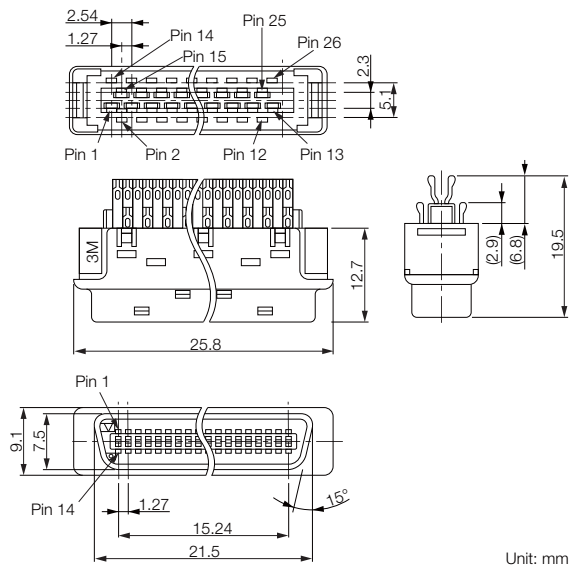
Note: Use a twisted-pair or screened twisted-pair cable.

◆ Dimensional Drawings

■ Case



■ Connectors

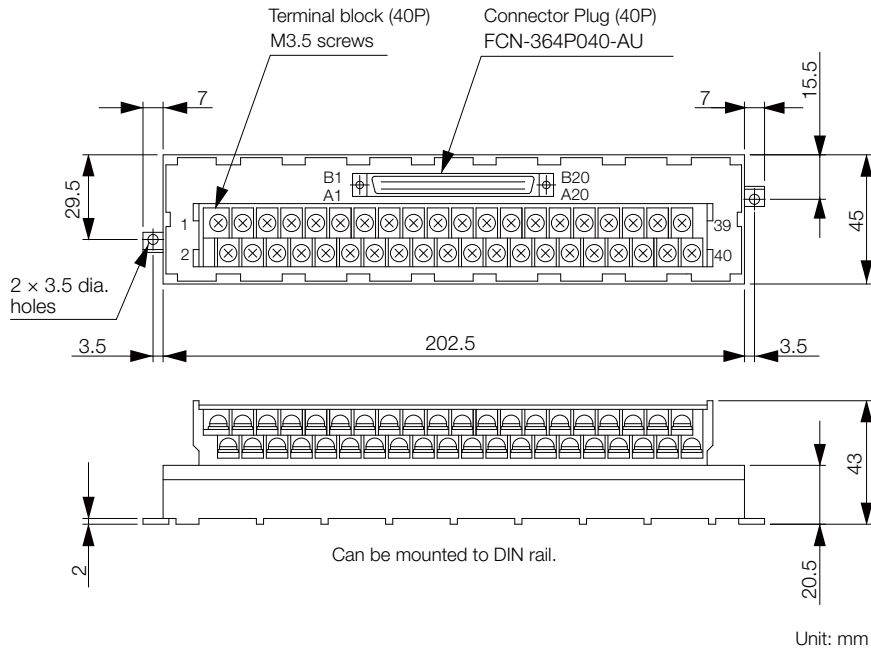


Connector-Terminal Block Converter Unit

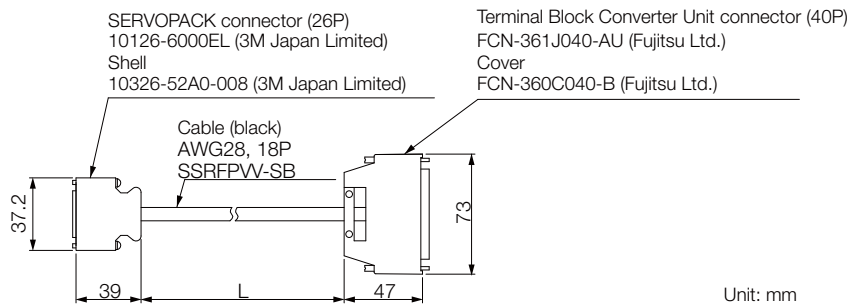
◆ Selection Table

| Order Number | Length of Enclosed Cable (L) | Inquires |
|----------------|------------------------------|------------------------|
| JUSP-TA26P-E | 0.5 m | Yaskawa representative |
| JUSP-TA26P-1-E | 1 m | |
| JUSP-TA26P-2-E | 2 m | |

◆ Dimensional Drawing



◆ Dimensional Drawing of Enclosed Cable



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 the following section for the wiring specifications.

👉 ◆ *Wiring Specifications* on page 10-18

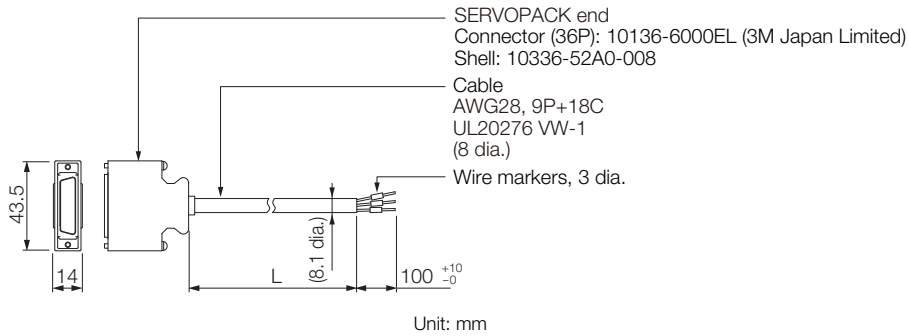
10.5.3 For Σ-7W SERVOPACKs

Cable with Loose Wires at One End

◆ Selection Table

| Order Number | Length (L) | Inquires |
|----------------|------------|------------------------|
| JZSP-CSI03-1-E | 1 m | Yaskawa representative |
| JZSP-CSI03-2-E | 2 m | |
| JZSP-CSI03-3-E | 3 m | |

◆ Dimensional Drawing



◆ Wiring Specifications

| Pin | Signal | Wire Color | Markings | | Host controller end | Wire Marker No. |
|------|-----------------|------------|----------|-----------------|---------------------|-----------------|
| | | | Color | Qty | | |
| 1 | +24VIN | Orange | Black | 3 | | 1 |
| 2 | - | Gray | Black | 3 | | 2 |
| 3 | /SI01 (P-OT_A) | White | Black | 3 | | 3 |
| 4 | /SI02 (N-OT_A) | Yellow | Black | 3 | | 4 |
| 5 | /SI03 (/DEC_A) | Pink | Black | 3 | | 5 |
| 6 | /SI04 (/EXT_A1) | Orange | Black | 4 | | 6 |
| 7 | /SI05 (/EXT_A2) | Gray | Black | 4 | | 7 |
| 8 | /SI06 (/EXT_A3) | White | Black | 4 | | 8 |
| 9 | /SI07 (P-OT_B) | Yellow | Black | 4 | | 9 |
| 10 | /SI08 (N-OT_B) | Pink | Black | 4 | | 10 |
| 11 | /SI09 (/DEC_B) | Orange | Black | Continuous dots | | 11 |
| 12 | /SI10 (/EXT_B1) | Gray | Black | Continuous dots | | 12 |
| 13 | /SI11 (/EXT_B2) | White | Black | Continuous dots | | 13 |
| 14 | /SI12 (/EXT_B3) | Yellow | Black | Continuous dots | | 14 |
| 15 | SG | Pink | Black | Continuous dots | | 15 |
| 16 | SG | Orange | Black | Dashes | | 16 |
| 17 | BAT_A+ | Orange | Black | 1 | | 17 |
| 18 | BAT_A- | Orange | Red | 1 | | 18 |
| 19 | ALM_A+ | Gray | Black | 1 | | 19 |
| 20 | ALM_A- | Gray | Red | 1 | | 20 |
| 21 | ALM_B+ | White | Black | 1 | | 21 |
| 22 | ALM_B- | White | Red | 1 | | 22 |
| 23 | /SO1+ (/BK_A+) | Yellow | Black | 1 | | 23 |
| 24 | /SO1- (/BK_A-) | Yellow | Red | 1 | | 24 |
| 25 | /SO2+ (/BK_B+) | Pink | Black | 1 | | 25 |
| 26 | /SO2- (/BK_B-) | Pink | Red | 1 | | 26 |
| 27 | /SO3+ | Orange | Black | 2 | | 27 |
| 28 | /SO3- | Orange | Red | 2 | | 28 |
| 29 | /SO4+ | Gray | Black | 2 | | 29 |
| 30 | /SO4- | Gray | Red | 2 | | 30 |
| 31 | /SO5+ | White | Black | 2 | | 31 |
| 32 | /SO5- | White | Red | 2 | | 32 |
| 33 | TH_A | Gray | Black | Dashes | | 33 |
| 34 | TH_B | White | Black | Dashes | | 34 |
| 35 | BAT_B+ | Yellow | Black | 2 | | 35 |
| 36 | BAT_B- | Yellow | Red | 2 | | 36 |
| Case | Shield | - | - | - | | |

⚡ : Represents twisted-pair wires.

Connector Kits

◆ Selection Table

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

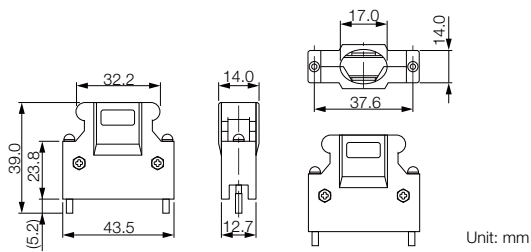
• Wire Sizes

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

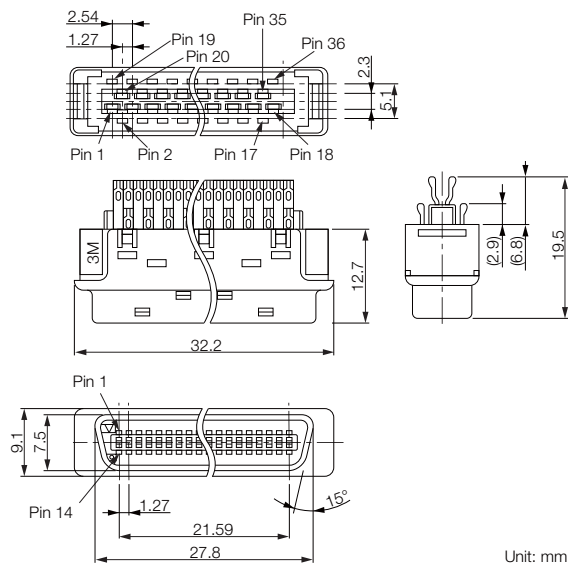
Note: Use a twisted-pair or screened twisted-pair cable.

◆ Dimensional Drawings

■ Case



■ Connectors

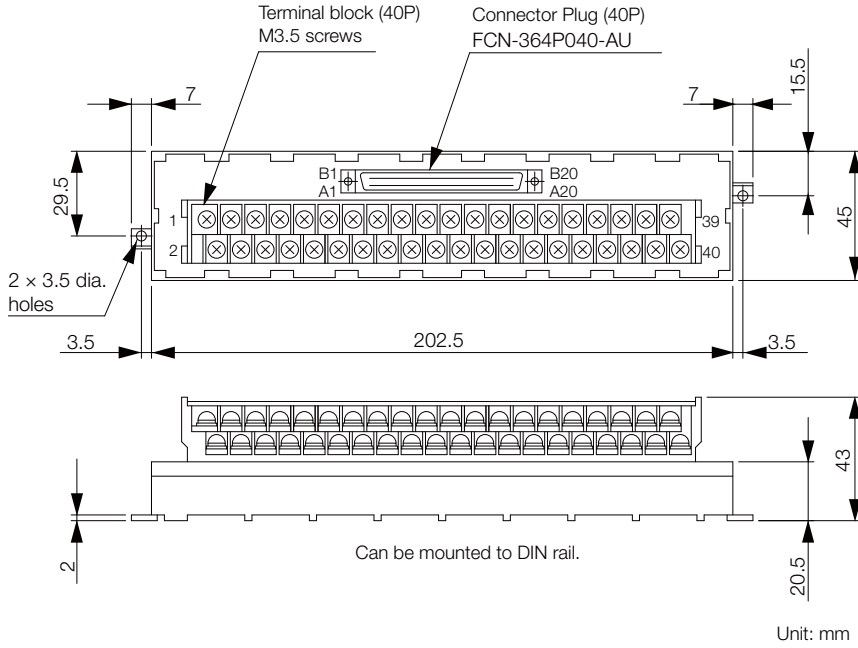


Connector-Terminal Block Converter Unit

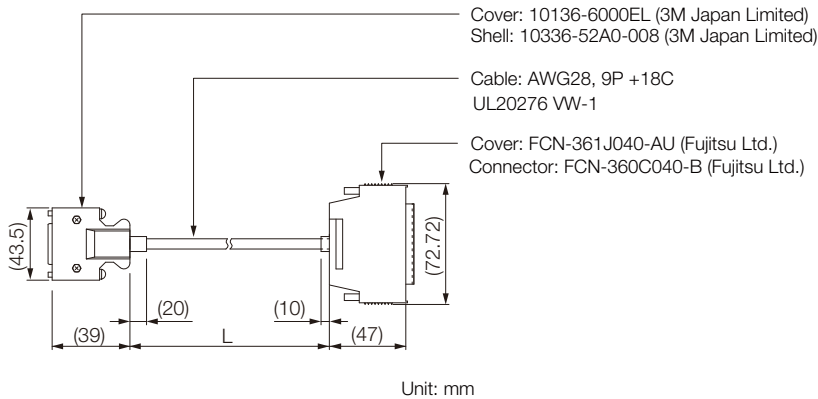
◆ Selection Table

| Order Number | Length of Enclosed Cable (L) | Inquires |
|----------------|------------------------------|------------------------|
| JUSP-TA36P-E | 0.5 m | Yaskawa representative |
| JUSP-TA36P-1-E | 1 m | |
| JUSP-TA36P-2-E | 2 m | |

◆ Dimensional Drawing



◆ Dimensional Drawing of Enclosed Cable



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 the following section for the wiring specifications.

◆ Wiring Specifications on page 10-21

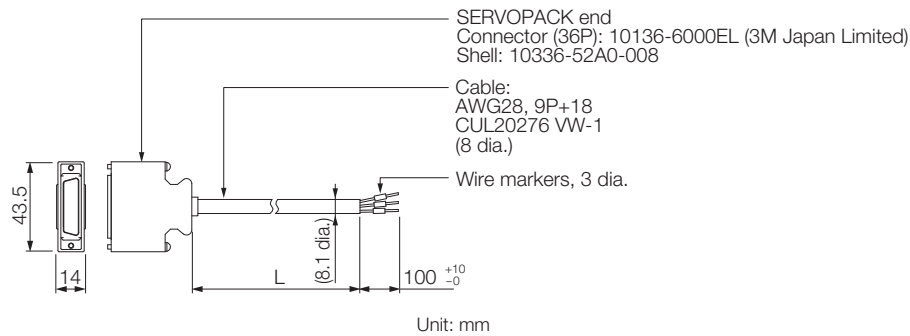
10.5.4 For Servo Section of Σ-7C SERVOPACKS

Cables with Loose Wires at One End

◆ Selection Table

| Order Number | Length (L) | Inquiries |
|----------------|------------|------------------------|
| JZSP-CSI03-1-E | 1 m | Yaskawa representative |
| JZSP-CSI03-2-E | 2 m | |
| JZSP-CSI03-3-E | 3 m | |

◆ Dimensional Drawing



◆ Wiring Specifications

| Pin | Signal | Wire Color | Markings | | Host controller end | Wire Marker No. |
|------|-----------------|------------|----------|-----------------|---------------------|-----------------|
| | | | Color | Qty | | |
| 1 | +24VIN | Orange | Black | 3 | | 1 |
| 2 | - | Gray | Black | 3 | | 2 |
| 3 | /SI01 (P-OT_A) | White | Black | 3 | | 3 |
| 4 | /SI02 (N-OT_A) | Yellow | Black | 3 | | 4 |
| 5 | /SI03 (/DEC_A) | Pink | Black | 3 | | 5 |
| 6 | /SI04 (/EXT_A1) | Orange | Black | 4 | | 6 |
| 7 | /SI05 (/EXT_A2) | Gray | Black | 4 | | 7 |
| 8 | /SI06 (/EXT_A3) | White | Black | 4 | | 8 |
| 9 | /SI07 (P-OT_B) | Yellow | Black | 4 | | 9 |
| 10 | /SI08 (N-OT_B) | Pink | Black | 4 | | 10 |
| 11 | /SI09 (/DEC_B) | Orange | Black | Continuous dots | | 11 |
| 12 | /SI10 (/EXT_B1) | Gray | Black | Continuous dots | | 12 |
| 13 | /SI11 (/EXT_B2) | White | Black | Continuous dots | | 13 |
| 14 | /SI12 (/EXT_B3) | Yellow | Black | Continuous dots | | 14 |
| 15 | SG | Pink | Black | Continuous dots | | 15 |
| 16 | SG | Orange | Black | Dashes | | 16 |
| 17 | BAT_A+ | Orange | Black | 1 | | 17 |
| 18 | BAT_A- | Orange | Red | 1 | | 18 |
| 19 | ALM_A+ | Gray | Black | 1 | | 19 |
| 20 | ALM_A- | Gray | Red | 1 | | 20 |
| 21 | ALM_B+ | White | Black | 1 | | 21 |
| 22 | ALM_B- | White | Red | 1 | | 22 |
| 23 | /SO1+ (/BK_A+) | Yellow | Black | 1 | | 23 |
| 24 | /SO1- (/BK_A-) | Yellow | Red | 1 | | 24 |
| 25 | /SO2+ (/BK_B+) | Pink | Black | 1 | | 25 |
| 26 | /SO2- (/BK_B-) | Pink | Red | 1 | | 26 |
| 27 | /SO3+ | Orange | Black | 2 | | 27 |
| 28 | /SO3- | Orange | Red | 2 | | 28 |
| 29 | /SO4+ | Gray | Black | 2 | | 29 |
| 30 | /SO4- | Gray | Red | 2 | | 30 |
| 31 | /SO5+ | White | Black | 2 | | 31 |
| 32 | /SO5- | White | Red | 2 | | 32 |
| 33 | TH_A | Gray | Black | Dashes | | 33 |
| 34 | TH_B | White | Black | Dashes | | 34 |
| 35 | BAT_B+ | Yellow | Black | 2 | | 35 |
| 36 | BAT_B- | Yellow | Red | 2 | | 36 |
| Case | Shield | - | - | - | | |

△ : Represents twisted-pair wires.

Connector Kits

◆ Selection Table

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

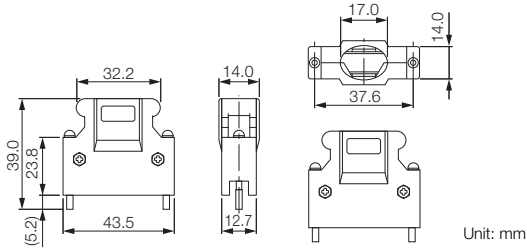
• Wire Sizes

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

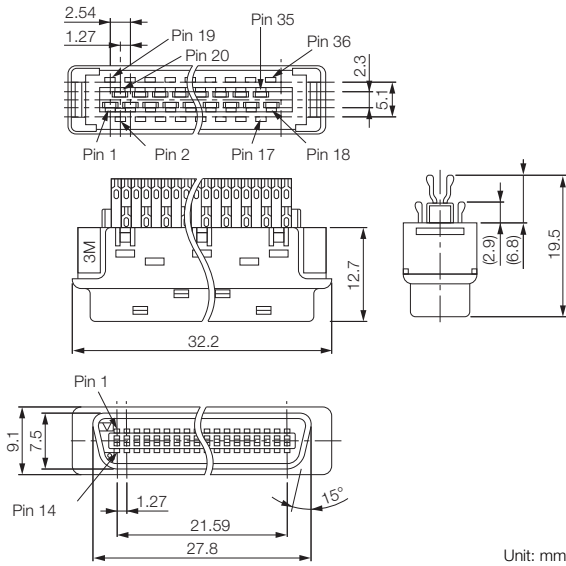
Note: Use a twisted-pair or screened twisted-pair cable.

◆ Dimensional Drawings

■ Case



■ Connectors

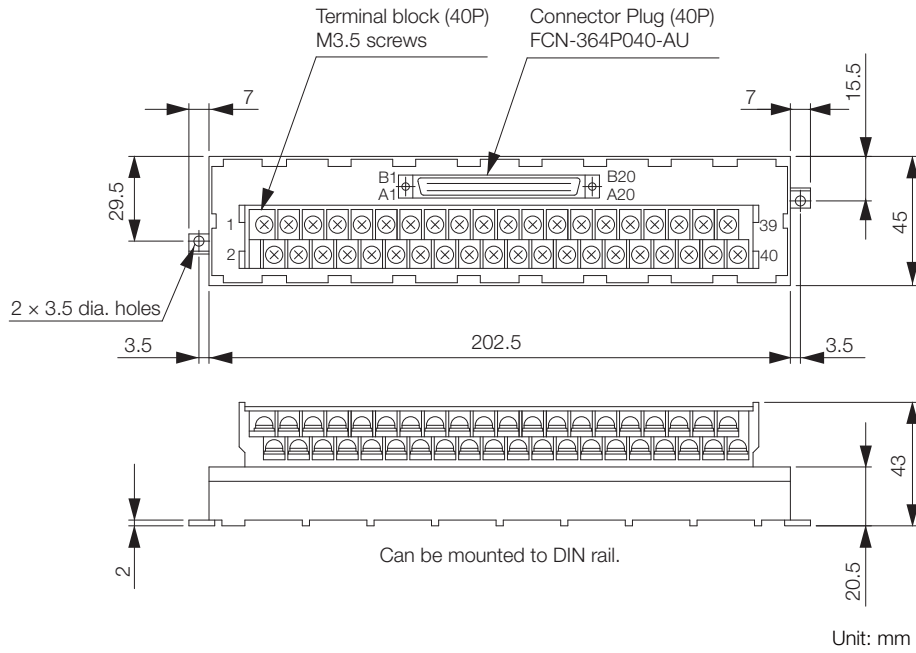


Connector-Terminal Block Converter Unit

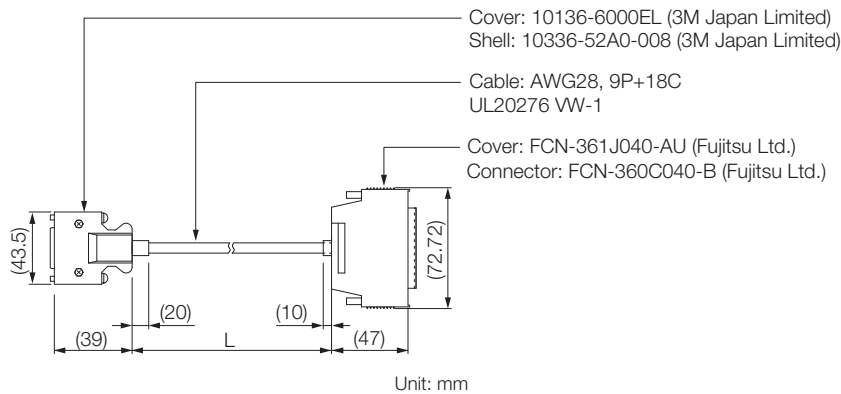
◆ Selection Table

| Order Number | Length of Enclosed Cable (L) | Inquiries |
|----------------|------------------------------|------------------------|
| JUSP-TA36P-E | 0.5 m | Yaskawa representative |
| JUSP-TA36P-1-E | 1 m | |
| JUSP-TA36P-2-E | 2 m | |

◆ Dimensional Drawing



◆ Dimensional Drawing of Enclosed Cable



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 the following section for the wiring specifications.

◆ Wiring Specifications on page 10-24

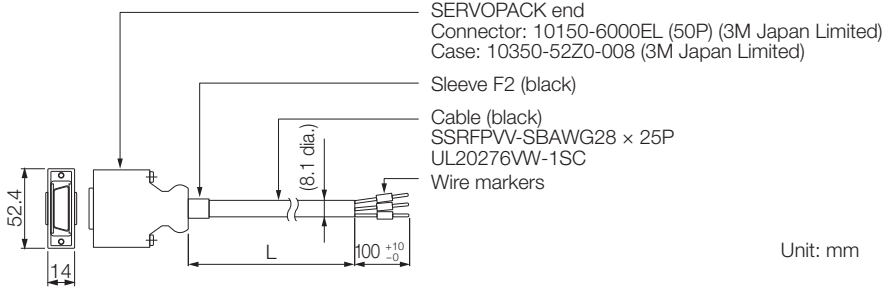
10.5.5 For Controller Section of Σ-7C SERVOPACKs

Cable with Loose Wires at One End

◆ Selection Table

| Order Number | Length (L) | Inquiries |
|----------------|------------|------------------------|
| JZSP-CSI01-1-E | 1 m | Yaskawa representative |
| JZSP-CSI01-2-E | 2 m | |
| JZSP-CSI01-3-E | 3 m | |

◆ Dimensional Drawing



◆ Wiring Specifications

| Pin | Signal | SERVOPACK end | | | Host controller end | Wire Marker No. |
|------|----------|---------------|-------|-----|---------------------|-----------------|
| | | Wire Color | Color | Qty | | |
| 1 | PA+ | Orange | Red | 1 | 1 | 1 |
| 3 | GND | Orange | Black | 1 | 3 | 3 |
| 2 | PA- | Gray | Red | 1 | 2 | 2 |
| 4 | PLIN | Gray | Black | 1 | 4 | 4 |
| 5 | PLCOM24V | White | Red | 1 | 5 | 5 |
| 6 | DO_GND1 | White | Black | 1 | 6 | 6 |
| 7 | DO_24V1 | Yellow | Red | 1 | 7 | 7 |
| 8 | DO_00 | Yellow | Black | 1 | 8 | 8 |
| 9 | DO_02 | Pink | Red | 1 | 9 | 9 |
| 10 | DO_04 | Pink | Black | 1 | 10 | 10 |
| 11 | DO_06 | Orange | Red | 2 | 11 | 11 |
| 12 | DO_GND2 | Orange | Black | 2 | 12 | 12 |
| 13 | DO_08 | Gray | Red | 2 | 13 | 13 |
| 14 | DO_10 | White | Red | 2 | 14 | 14 |
| 15 | DO_12 | White | Black | 2 | 15 | 15 |
| 16 | DO_14 | Gray | Black | 2 | 16 | 16 |
| 17 | DI_00 | Yellow | Red | 2 | 17 | 17 |
| 18 | DI_02 | Yellow | Black | 2 | 18 | 18 |
| 19 | DI_04 | Pink | Red | 2 | 19 | 19 |
| 20 | DI_06 | Pink | Black | 2 | 20 | 20 |
| 21 | DI_08 | Orange | Red | 3 | 21 | 21 |
| 22 | DI_10 | Orange | Black | 3 | 22 | 22 |
| 23 | DI_12 | Gray | Red | 3 | 23 | 23 |
| 24 | DI_14 | Gray | Black | 3 | 24 | 24 |
| 25 | DI_COM1 | White | Red | 3 | 25 | 25 |
| 26 | PB+ | White | Black | 3 | 26 | 26 |
| 27 | PB- | Yellow | Red | 3 | 27 | 27 |
| 28 | GND | Yellow | Black | 3 | 28 | 28 |
| 29 | PLCOM5V | Pink | Red | 3 | 29 | 29 |
| 30 | PLCOM12V | Pink | Black | 3 | 30 | 30 |
| 31 | DO_GND1 | Orange | Red | 4 | 31 | 31 |
| 32 | DO_01 | Orange | Black | 4 | 32 | 32 |
| 33 | DO_03 | Gray | Red | 4 | 33 | 33 |
| 34 | DO_05 | Gray | Black | 4 | 34 | 34 |
| 35 | DO_07 | White | Red | 4 | 35 | 35 |
| 36 | DO_GND2 | White | Black | 4 | 36 | 36 |
| 37 | DO_24V2 | Yellow | Red | 4 | 37 | 37 |
| 38 | DO_09 | Yellow | Black | 4 | 38 | 38 |
| 39 | DO_11 | Pink | Red | 4 | 39 | 39 |
| 40 | DO_13 | Pink | Black | 4 | 40 | 40 |
| 41 | DO_15 | Orange | Red | 5 | 41 | 41 |
| 42 | DI_01 | Orange | Black | 5 | 42 | 42 |
| 43 | DI_03 | Gray | Red | 5 | 43 | 43 |
| 44 | DI_05 | Gray | Black | 5 | 44 | 44 |
| 45 | DI_07 | White | Red | 5 | 45 | 45 |
| 46 | DI_09 | White | Black | 5 | 46 | 46 |
| 47 | DI_11 | Yellow | Red | 5 | 47 | 47 |
| 48 | DI_13 | Pink | Red | 5 | 48 | 48 |
| 49 | DI_15 | Pink | Black | 5 | 49 | 49 |
| 50 | DI_COM2 | Yellow | Black | 5 | 50 | 50 |
| Case | | Shield | | | | |

⚡ : Represents twisted-pair wires.

Connector Kits

◆ Selection Table

| Connector Kit Order Number | Case | | Connectors | |
|----------------------------|--------------------------------------|-------|---|-----|
| | Model | Qty | Model | Qty |
| JZSP-CS19-1-E | 10350-52Z0-008 (3M Japan Limited) | 1 set | 10150-3000PE (soldered) (3M Japan Limited) | 1 |

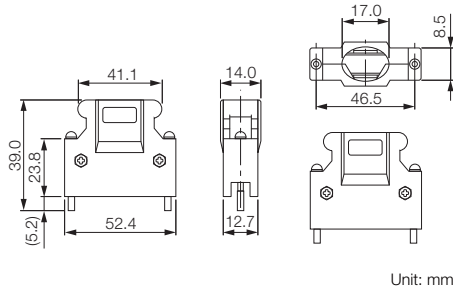
■ Wire Sizes

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

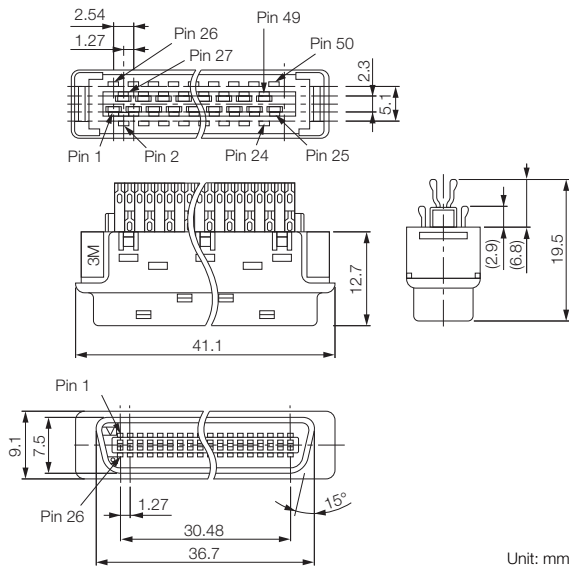
Note: Use a twisted-pair or screened twisted-pair cable.

◆ Dimensional Drawings

■ Case



■ Connectors

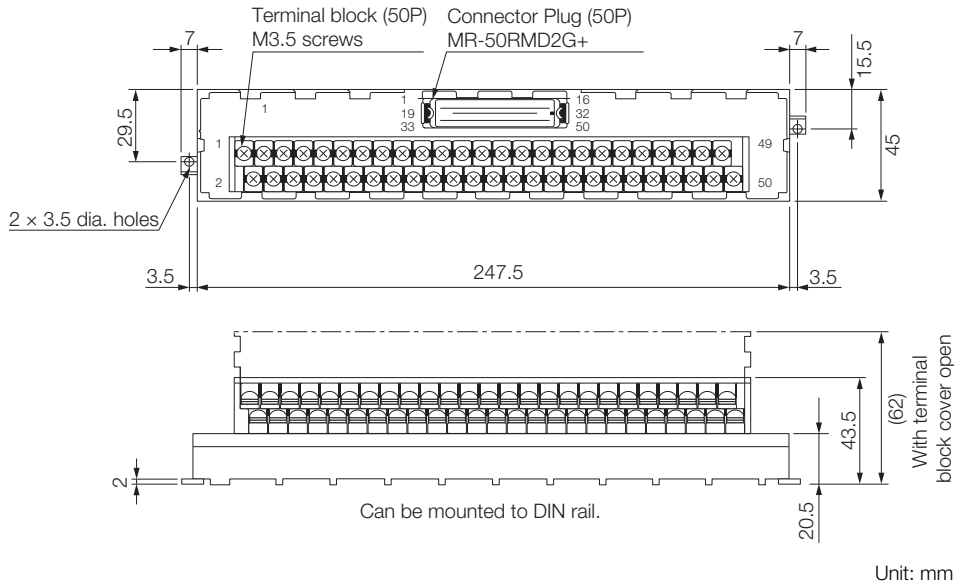


Connector-Terminal Block Converter Unit

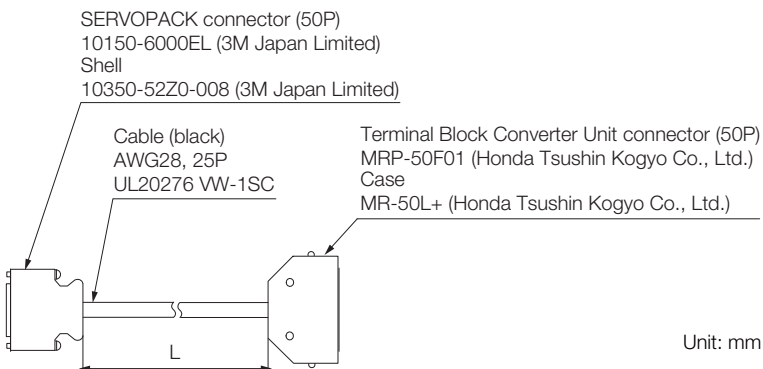
◆ Selection Table

| Order Number | Length of Enclosed Cable (L) | Inquiries |
|-----------------|------------------------------|------------------------|
| JUSP-TA50PG-E | 0.5 m | Yaskawa representative |
| JUSP-TA50PG-1-E | 1 m | |
| JUSP-TA50PG-2-E | 2 m | |

◆ Dimensional Drawing



◆ Dimensional Drawing of Enclosed Cable



Note: The same pin numbers are used for the SERVOPACK connector and the terminal block. To assemble your own cables, refer to the following section for the wiring specifications.

◆ **Wiring Specifications** on page 10-27

10.6 Safety Function Device Cable

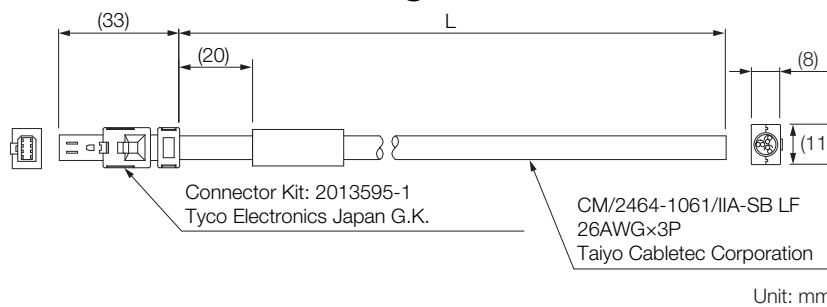
10.6.1 Cables with Connectors

Selection Table

| Order Number | Length (L) | Inquires |
|-----------------|------------|------------------------|
| JZSP-CVH03-01-E | 1 m | Yaskawa representative |
| 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

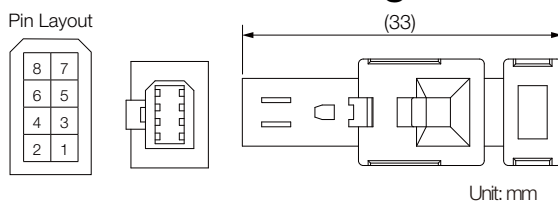
| Pin | Signal | Lead Color | Markings |
|-----|---------------|------------|----------|
| 1 | Not connected | - | - |
| 2 | Not connected | - | - |
| 3 | /HWBB1- | White | Black |
| 4 | /HWBB1+ | White | Red |
| 5 | /HWBB2- | Light gray | Black |
| 6 | /HWBB2+ | Light gray | Red |
| 7 | EDM1- | Orange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

10.6.2 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



10.7 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.

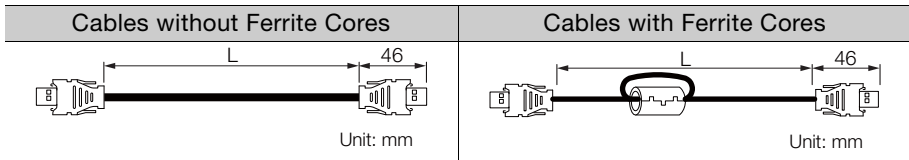
Selection Table

| 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 representative |
| | 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 | |

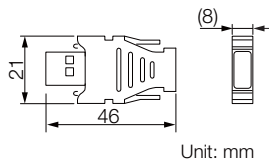
*1. Replace the boxes (□□) in the order number with the code for the cable length.
 *2. The recommended bending radius (R) is 19.2 mm or larger.

External Dimensions


◆ Cable with Connectors on Both Ends



◆ Terminators



10.8 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.

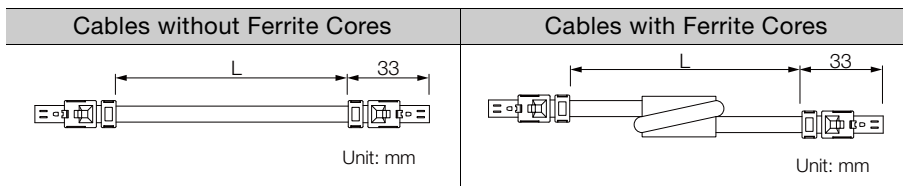
Selection Table

| 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 representative |
| 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) | |

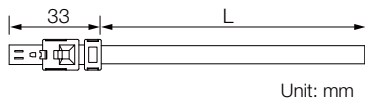
* Replace the boxes (□□) in the order number with the code for the cable length.

External Dimensions


◆ Cables with Connectors on Both Ends



◆ Cable with Loose Wires at One End



10.9 MECHATROLINK-4 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.

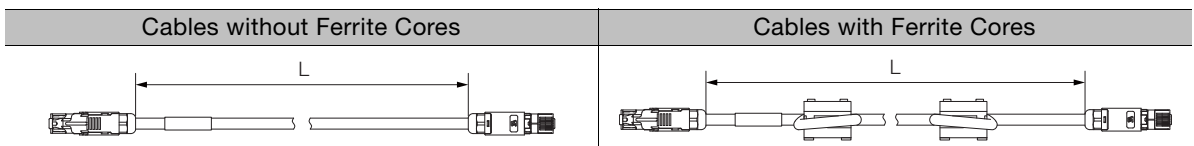
Selection Table

| Type | Length (L) | Order Number* | Inquiries |
|--|---|--|------------------------|
| 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 | JZSP-CM3RRM0-□□-E (□□: 00P2/00P5/01/02/03/04/05/10) | Yaskawa representative |
| | 20 m, 30 m | JZSP-CM3RR00-□□-E (□□: 20/30) | |
| Cables with Connectors on Both Ends and Ferrite Cores | 0.3 m, 3 m, 10 m | JZSP-CM3RRM1-□□-E (□□: 00P3/03/10) | |
| | 20 m, 30 m, 50 m | JZSP-CM3RR01-□□-E (□□: 20/30/50) | |

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

External Dimensions

◆ Cables with Connectors on Both Ends



Cables and User-Assembled Wiring Materials for SERVOPACKs

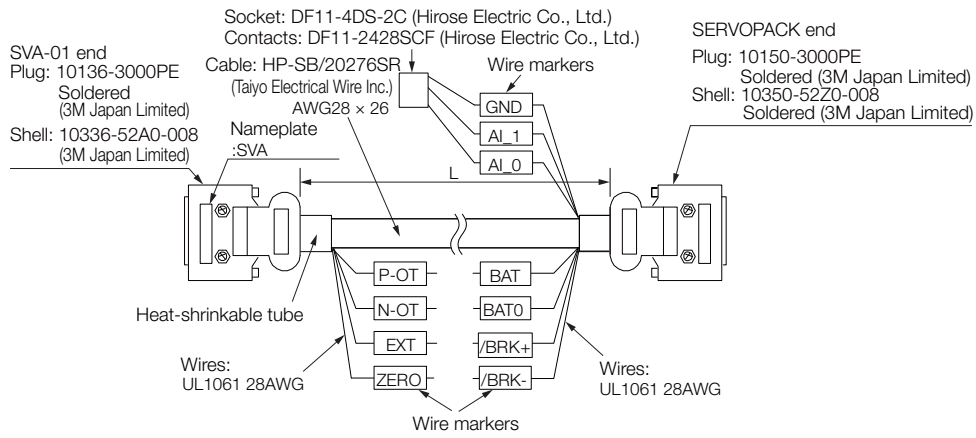
10.10 Cables to Connect to MP3000/MP2000-Series Machine Controllers

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

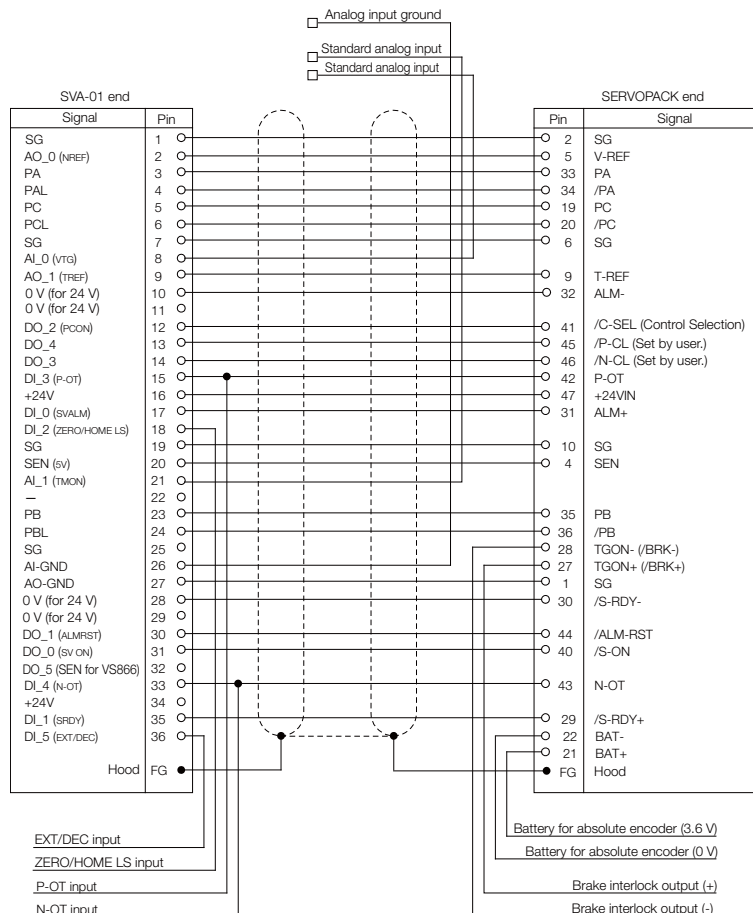
Selection Table

| Order Number | Length (L) | Inquires |
|----------------|------------|------------------------|
| JEPMC-W2040-A5 | 0.5 m | Yaskawa representative |
| JEPMC-W2040-01 | 1 m | |
| JEPMC-W2040-03 | 3 m | |

External Dimensions



Wiring Specifications



10.11 I/O Signal Cables for INDEXER Modules

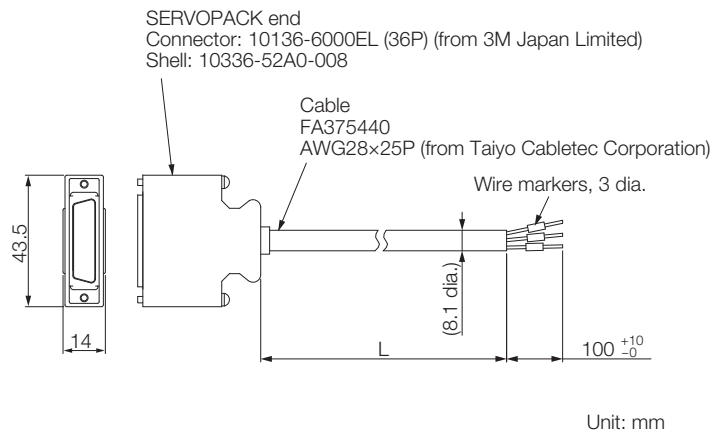
Use these Cables to connect INDEXER Modules to host controllers.

10.11.1 Cables with Loose Wires at One End

Selection Table

| Order Number | Length (L) | Inquiries |
|----------------|------------|------------------------|
| JZSP-CVI01-1-E | 1 m | Yaskawa representative |
| JZSP-CVI01-2-E | 2 m | |
| JZSP-CVI01-3-E | 3 m | |

Dimensional Drawing



Wiring Specifications

| Pin | SERVOPACK end | | Wire Color | Markings | | Wire Marker No. |
|------|---------------|-------|------------|----------|-----------------|-----------------|
| | MODE0 | MODE1 | | Color | Qty | |
| 1 | +24V/COM | | Orange | Red | 1 | 1 |
| 2 | - | | - | - | - | - |
| 3 | /MODE 0/1 | | Gray | Red | 1 | 3 |
| 4 | - | | - | - | - | - |
| 5 | /START-STOP | /HOME | White | Red | 1 | 5 |
| 6 | - | | - | - | - | - |
| 7 | /PGMRES | /JOGP | Yellow | Red | 1 | 7 |
| 8 | - | | - | - | - | - |
| 9 | /SEL0 | /JOGN | Pink | Red | 1 | 9 |
| 10 | - | | - | - | - | - |
| 11 | /SEL1 | /JOG0 | Orange | Red | 2 | 11 |
| 12 | - | | - | - | - | - |
| 13 | /SEL2 | /JOG1 | Gray | Red | 2 | 13 |
| 14 | /SEL5 | | White | Red | 2 | 14 |
| 15 | /SEL3 | /JOG2 | Yellow | Red | 2 | 15 |
| 16 | /SEL6 | | Pink | Red | 2 | 16 |
| 17 | /SEL4 | /JOG3 | Orange | Red | 3 | 17 |
| 18 | /SEL7 | | Gray | Red | 3 | 18 |
| 19 | /INPOSITION+ | | White | Red | 3 | 19 |
| 20 | /INPOSITION- | | White | Black | 3 | 20 |
| 21 | /POUT0+ | | Yellow | Red | 3 | 21 |
| 22 | /POUT0- | | Yellow | Black | 3 | 22 |
| 23 | /POUT1+ | | Pink | Red | 3 | 23 |
| 24 | /POUT1- | | Pink | Black | 3 | 24 |
| 25 | /POUT2+ | | Orange | Red | 4 | 25 |
| 26 | /POUT2- | | Orange | Black | 4 | 26 |
| 27 | /POUT3+ | | Gray | Red | 4 | 27 |
| 28 | /POUT3- | | Gray | Black | 4 | 28 |
| 29 | /POUT4+ | | White | Red | 4 | 29 |
| 30 | /POUT4- | | White | Black | 4 | 30 |
| 31 | /POUT5+ | | Yellow | Red | 4 | 31 |
| 32 | /POUT5- | | Yellow | Black | 4 | 32 |
| 33 | /POUT6+ | | Pink | Red | 4 | 33 |
| 34 | /POUT6- | | Pink | Black | 4 | 34 |
| 35 | /POUT7+ | | Orange | Red | Continuous dots | 35 |
| 36 | /POUT7- | | Orange | Black | Continuous dots | 36 |
| Case | Shield | | - | - | - | - |

⚡: Represents twisted-pair wires.

10.11.2 Connector Kits

Selection Table

| Connector Kit Order Number | Case | | Connector | |
|----------------------------|-----------------|-------|--------------------------|-----|
| | Model | Qty | Model | Qty |
| DP9420007-E | 10336-52A0-008* | 1 set | 10136-3000PE* (soldered) | 1 |

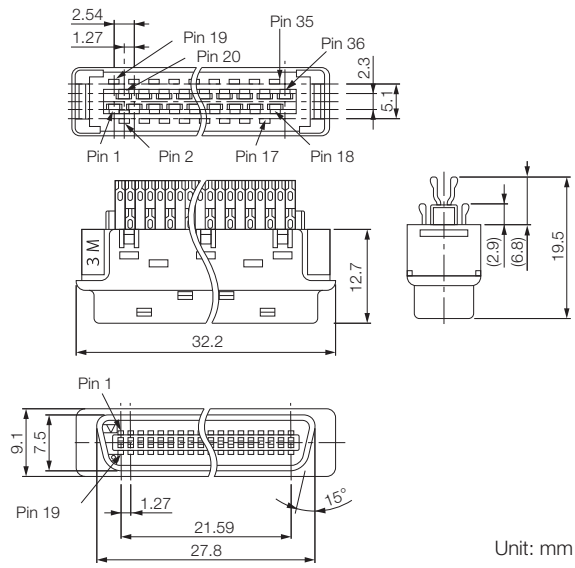
* From 3M Japan Limited

- Wire Sizes

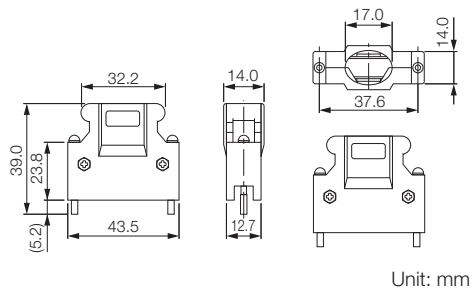
| Item | Specification |
|-------------------------|--|
| Cable | Use a twisted-pair or screened twisted-pair cable. |
| Applicable Wires | AWG24, AWG26, AWG28, or AWG30 |
| Cable Finished Diameter | 16 mm max. |

Dimensional Drawings

◆ Connector



◆ Case



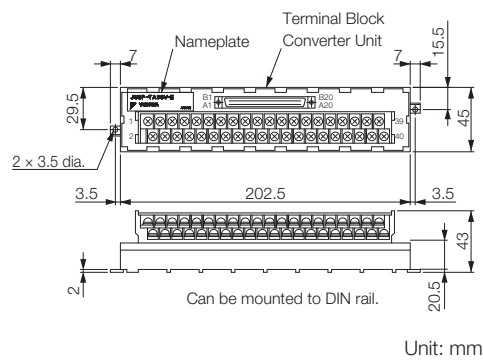
10.11.3 Cables with Terminal Block on One End

Selection Table

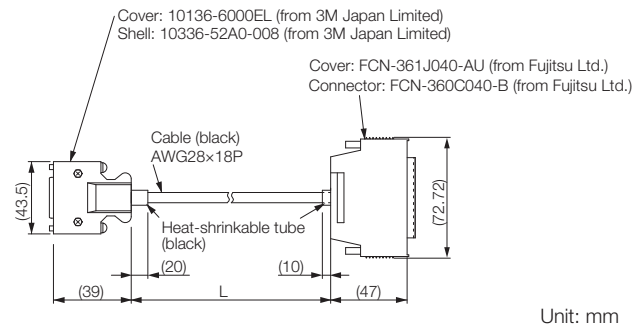
| Order Number | Length of Enclosed Cable (L) | Approx. Mass | Inquiries |
|----------------|------------------------------|--------------|------------------------|
| JUSP-TA36V-E | 0.5 m | 100 g | Yaskawa representative |
| JUSP-TA36V-1-E | 1 m | 200 g | |
| JUSP-TA36V-2-E | 2 m | 400 g | |

Dimensional Drawings

◆ Terminal Block



◆ Enclosed Cable



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 the following section for the wiring specifications.
 10.11.1 Cables with Loose Wires at One End on page 10-35

10.12 Serial Command Cables (Connector Kit Only)

Use these Cables to connect INDEXER Modules to host controllers. The Connector Kit that is used is given below. Consult your Yaskawa representative for the cable.

Selection Table

| Connector Kit Model Number | Case | | Connector | |
|----------------------------|-----------------|-------|--------------------------|-----|
| | Model | Qty | Model | Qty |
| JZSP-CHI9-1 | 10314-52A0-008* | 1 set | 10114-3000PE* (soldered) | 1 |

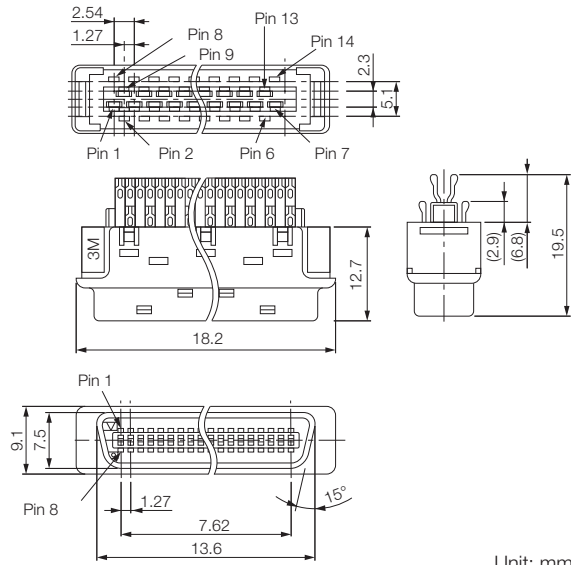
* From 3M Japan Limited

• Wire Sizes

| Item | Specification |
|-------------------------|--|
| Cable | Use a twisted-pair or screened twisted-pair cable. |
| Applicable Wires | AWG24, AWG26, AWG28, or AWG30 |
| Cable Finished Diameter | 16 mm max. |

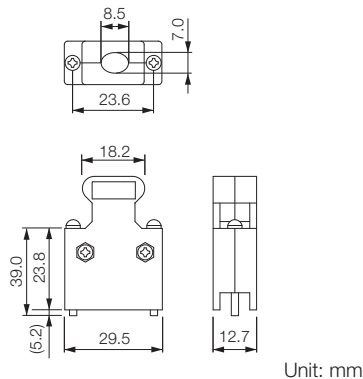
Dimensional Drawings

◆ Connector



Unit: mm

◆ Case



Unit: mm

10.13 DeviceNet Communications Cable

The communications cable must be an ODVA-Compliant DeviceNet communications cable. We recommend the following Cable.

OMRON DCA1-5CN02F1 Cable with Connectors or the equivalent.

Option Modules



11


| | | |
|-------------|------------------------------------|--------------|
| 11.1 | Feedback Option Modules | 11-2 |
| 11.1.1 | Fully-Closed Modules | 11-2 |
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| 11.2.3 | External Dimensions | 11-13 |
| 11.3 | Option Case Kit | 11-14 |

11.1 Feedback Option Modules

11.1.1 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.



Important

1. One Option Case Kit is required for each SERVOPACK.
Option Case Kit model: SGDV-OZA01A
2. Refer to the following catalog when using these Command Option Modules with Fully-Closed Module.
 - INDEXER Module
 - DeviceNet Module

 AC Servo Drives Σ -7 Series (Catalog No.: KAEP S800001 23)
3. Fully-Closed Module cannot be used with Safety Modules.

Basic Specifications

| Item | | Specification | |
|----------------------|-----------------------------|--|---|
| Operating Conditions | Surrounding Air Temperature | 0 to +55°C | |
| | Storage Temperature | -20°C to +85°C | |
| | Surrounding Air Humidity | 90% relative humidity max. | There must be no freezing or condensation. |
| | Storage Humidity | 90% relative humidity max. | |
| | Vibration Resistance | 4.9 m/s ² | |
| | Shock Resistance | 19.6 m/s ² | |
| | Degree of Protection | IP10 | <ul style="list-style-type: none"> • Must be no corrosive or flammable gases. • Must be no exposure to water, oil, or chemicals. • Must be no dust, salts, or iron dust. |
| | Pollution Degree | 2 | |
| | Altitude | 1,000 m max. | |
| | Others | Do not use the SERVOPACK in the following locations: Locations subject to static electricity noise, strong electromagnetic/magnetic fields, or radioactivity | |

Pin Arrangement of External Encoder Connector (CN31)

The following table lists the signal names and functions.

| Pin No. | Signal | Function |
|---------|--------|---------------------------|
| 1 | PG5V | Encoder power supply +5 V |
| 2 | PG0V | Encoder power supply 0 V |
| 3 | – | – |
| 4 | – | – |
| 5 | PS | Serial data (+) |
| 6 | /PS | Serial data (-) |
| Shell | Shield | – |

Recommended Encoders

◆ Linear Encoders

Refer to the following section for the recommended Linear Encoder models and specifications.

☞ 9.1 Recommended Linear Encoders on page 9-3

◆ Rotary Encoders

■ Absolute Rotary Encoders

The following Absolute Rotary Encoders are for fully-closed control. Do not use it to control the motor.

| Output Signal | Manufacturer | Rotary Encoder Type | Model | | | Resolution Bits | Maximum Speed* ¹ [min ⁻¹] |
|--|------------------------------|---------------------|--------------------------------|-------------|---|-----------------|--|
| | | | Scale | Sensor Head | Relay Device between Fully-Closed Module and Rotary Encoder | | |
| Encoder for Yaskawa's Serial Interface | Magnescape Co., Ltd. | Sealed | RU77-4096ADF* ² | | – | 20 | 2000 |
| | | | RU77-4096AFFT01* ² | | – | 22 | 2000 |
| | Dr. JOHANNES HEIDENHAIN GmbH | Exposed | ECA4412* ² | EIB3391Y | | 27 | 1600 |
| | | | | EIB3391Y | | 28 | 800 |
| | | | | EIB3391Y | | 29 | 400 |
| | Dr. JOHANNES HEIDENHAIN GmbH | Sealed | RCN2310* ² | EIB3391Y | | 26 | 3000 |
| | | | | EIB3391Y | | 28 | 800 |
| | | | | EIB3391Y | | 29 | 400 |
| | | | | EIB3391Y | | 26 | 3000 |
| | | | | EIB3391Y | | 28 | 800 |
| | Renishaw PLC | Exposed | RA23Y-□□□□□□□□□□* ² | | – | 23 | 14600 |
| | | | RA26Y-□□□□□□□□□□* ² | | – | 26 | 3250 |
| | | | RA30Y-□□□□□□□□□□* ² | | – | 30 | 200 |

*1. 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).

*2. This is a single-turn absolute encoder.

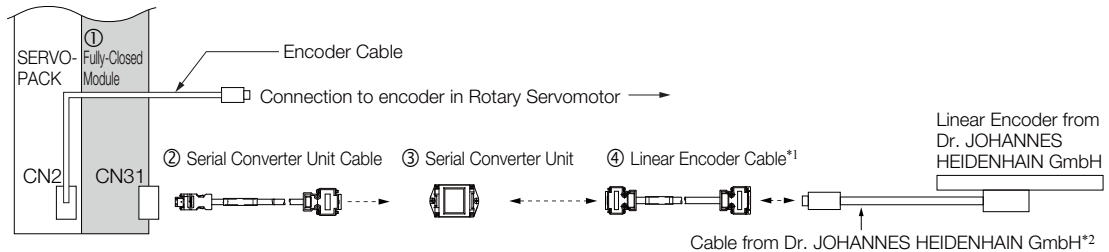
Note: Confirm detailed specifications, such as the tolerances, dimensions, and operating environment, with the manufacturer of the Rotary Encoder before you use it.

Equipment Configurations

◆ Connections to Linear Encoder from Dr. JOHANNES HEIDENHAIN GmbH

■ 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 Dr. JOHANNES HEIDENHAIN GmbH for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Dr. JOHANNES HEIDENHAIN GmbH.

| 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 Option Case Kit*3 SGDV-OZA01A | 11-10 11-14 |
| ② | Serial Converter Unit Cable | JZSP-CLP70-□□-E | 9-26 |
| ③ | Serial Converter Unit | JZDP-H003-000 | 9-37 |
| ④ | Linear Encoder Cable | JZSP-CLL30-□□-E | 9-26 |

*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 the following section for a table of the recommended Linear Encoders.

📖 9.1 Recommended Linear Encoders on page 9-3

2. Refer to the following section for the specifications of the Serial Converter Unit.

📖 9.4 Serial Converter Unit on page 9-37

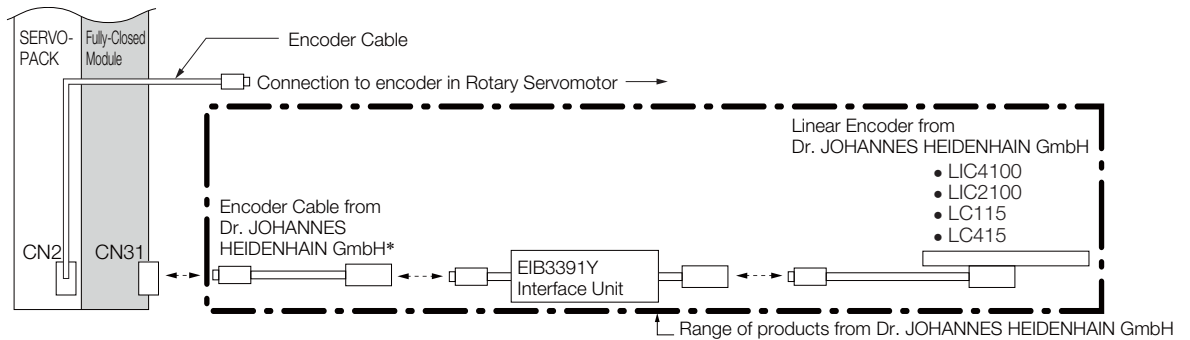
3. Refer to the chapter for your Rotary Servomotor for information on Servomotor Main Circuit Cables and Encoder Cables.

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/ Σ -7 Series Installation Guide Fully-Closed Module (Document No.: TOBP C720829 03)

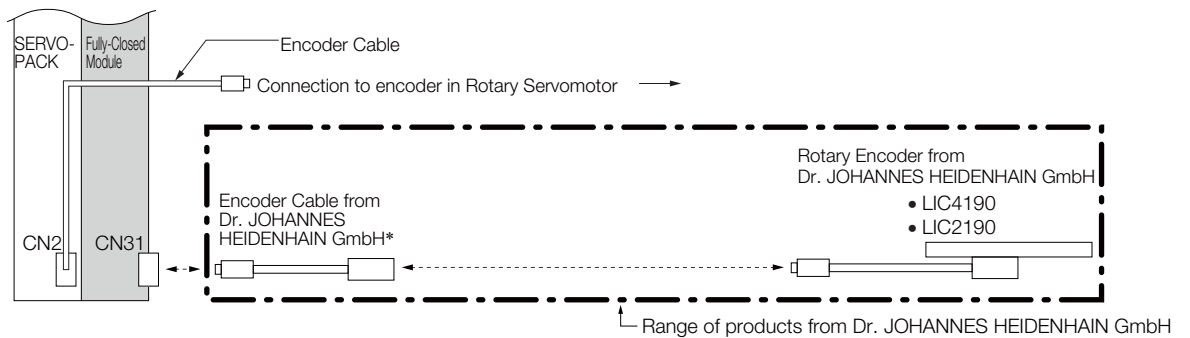
■ Connections When Using a Yaskawa Serial Interface for the Output Signals

• LIC4100/LIC2100/LC115/LC415 Linear Encoder with EIB3391Y Interface Unit



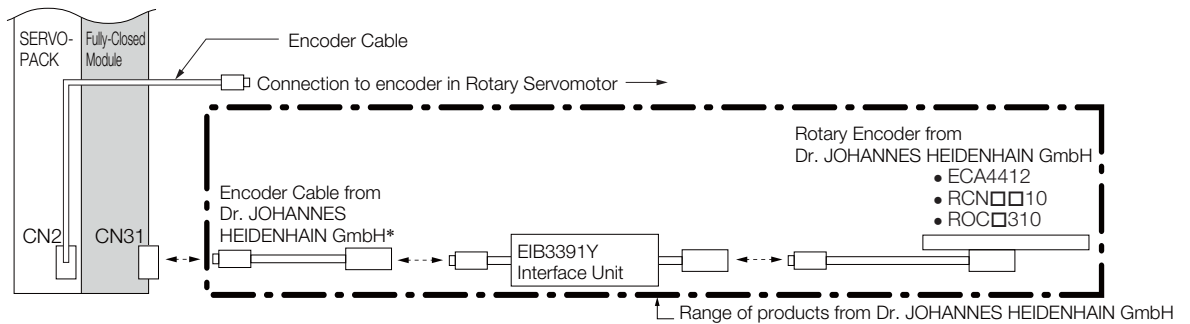
* Use an Encoder Cable from Dr. JOHANNES HEIDENHAIN GmbH. Contact Dr. JOHANNES HEIDENHAIN GmbH for detailed Encoder Cable specifications.

• LIC4190/ LIC2190 Linear Encoder



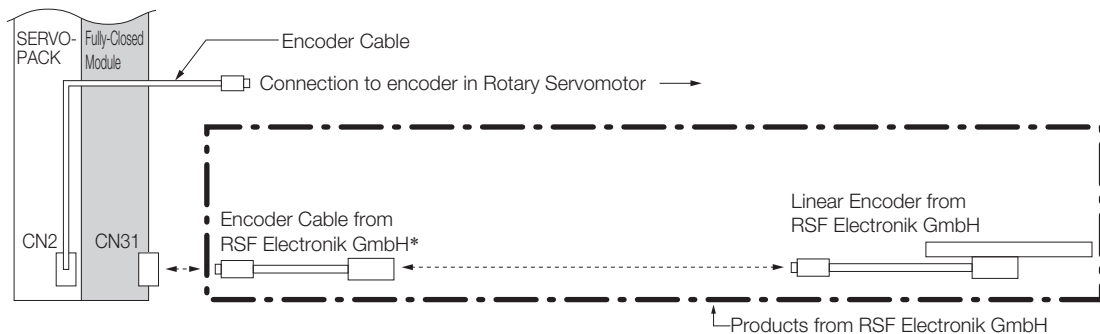
* Use an Encoder Cable from Dr. JOHANNES HEIDENHAIN GmbH. Contact Dr. JOHANNES HEIDENHAIN GmbH for detailed Encoder Cable specifications.

• ECA4412/RCN□□10/ROC□310 Rotary Encoder with EIB3391Y Interface Unit



* Use an Encoder Cable from Dr. JOHANNES HEIDENHAIN GmbH. Contact Dr. JOHANNES HEIDENHAIN GmbH for detailed Encoder Cable specifications.

◆ Connections to Linear Encoder from RSF Elektronik GmbH

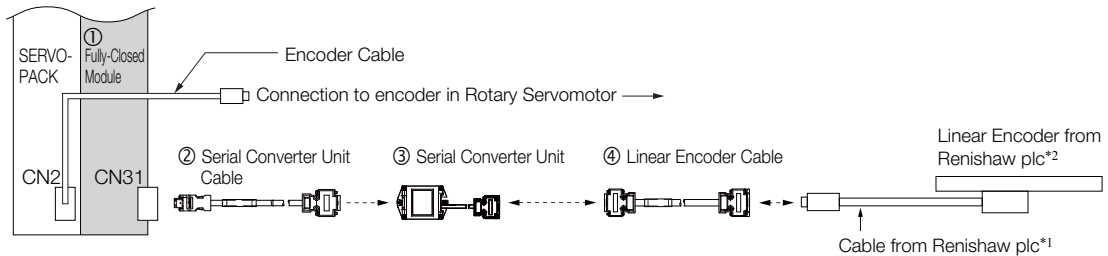


* Use an Encoder Cable from RSF Elektronik GmbH. Contact Dr. JOHANNES HEIDENHAIN GmbH for detailed Encoder Cable specifications.

◆ 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. 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.

*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.

| 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 Option Case Kit*3 SGDV-OZA01A | 11-10 11-14 |
| ② | Serial Converter Unit Cable | JZSP-CLP70-□□-E | 9-26 |
| ③ | Serial Converter Unit | JZSP-H005-000 | 9-37 |
| ④ | Linear Encoder Cable | JZSP-CLL00-□□-E | 9-26 |

*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 the following section for a table of the recommended Linear Encoders.

9.1 Recommended Linear Encoders on page 9-3

2. Refer to the following section for the specifications of the Serial Converter Unit.

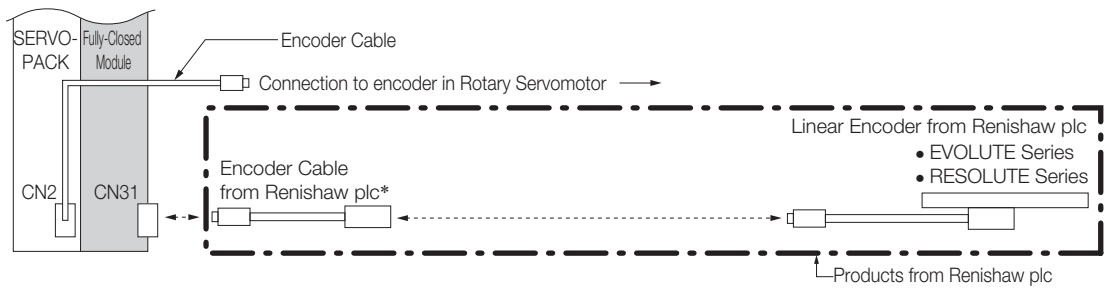
9.4 Serial Converter Unit on page 9-37

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.

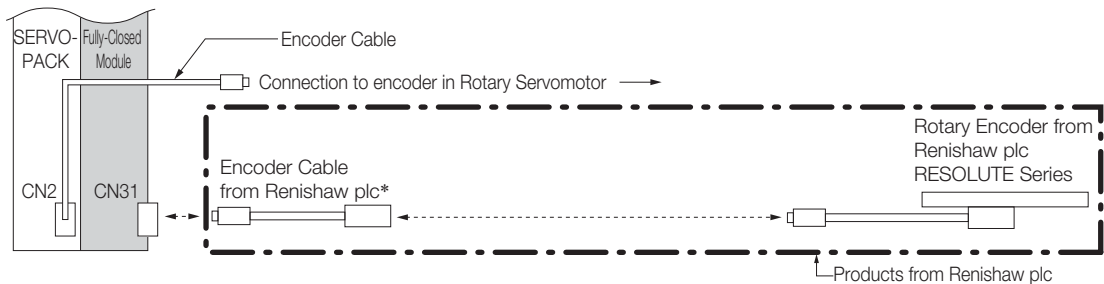
Σ-V Series/Σ-V Series for Large-Capacity Models/Σ-7 Series Installation Guide Fully-Closed Module (Document No.: TOBPC720829 03)

■ Connections When Using a Yaskawa Serial Interface for the Output Signals
 • EVOLUTE-Series or RESOLUTE-Series Linear Encoder



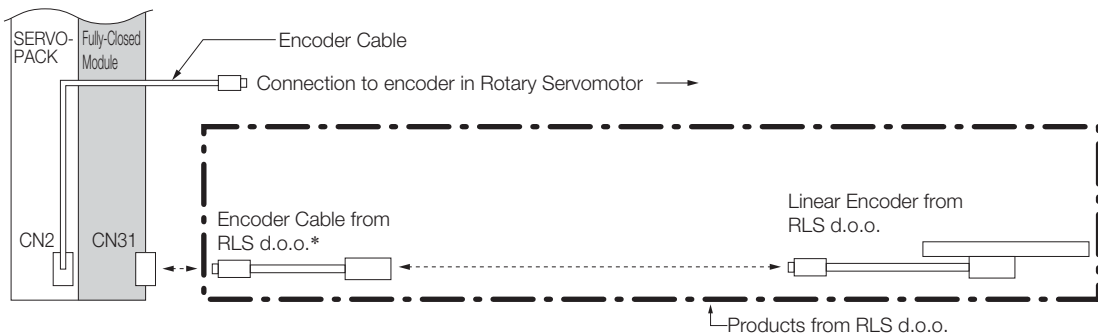
* Use an Encoder Cable from Renishaw plc. Contact Renishaw plc for detailed Encoder Cable specifications.

• RESOLUTE-Series Rotary Encoder



* Use an Encoder Cable from Renishaw plc. Contact Renishaw plc for detailed Encoder Cable specifications.

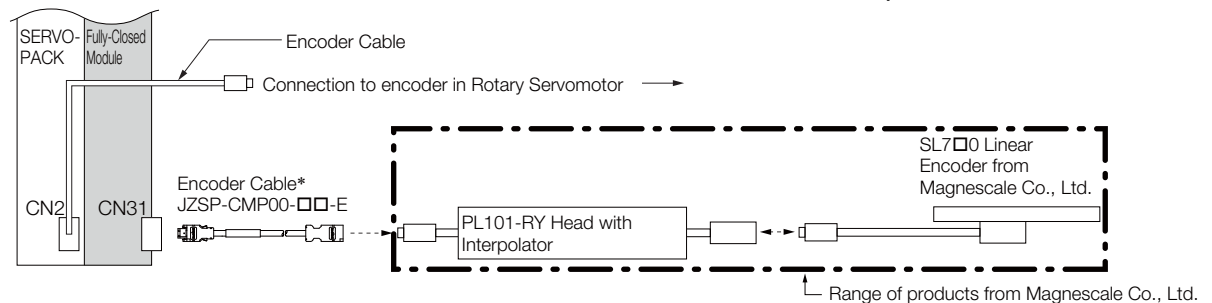
◆ Connections to Linear Encoder from RLS d.o.o.



* Use Ean Encoder Cable from RLS d.o.o. For detailed specifications of the Encoder Cables, consult RLS d.o.o. or Renishaw plc.

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

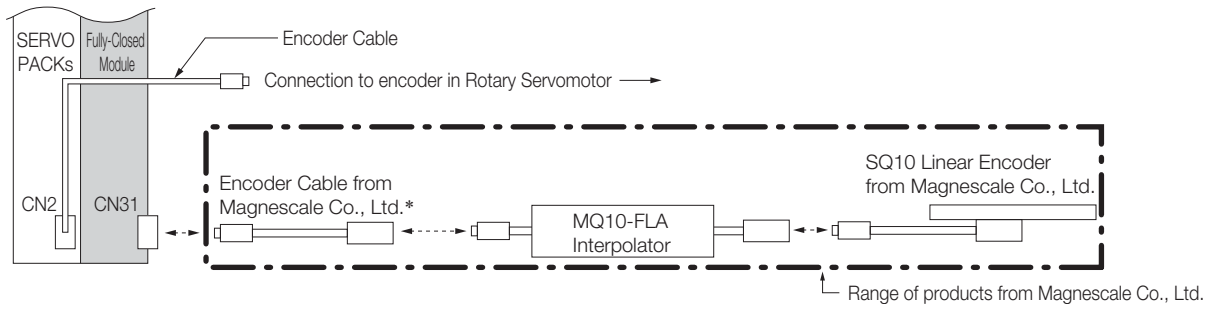
■ SL7□0 Linear Encoder and PL101-RY Sensor Head with Interpolator



* Refer to the following section for details on Encoder Cables.

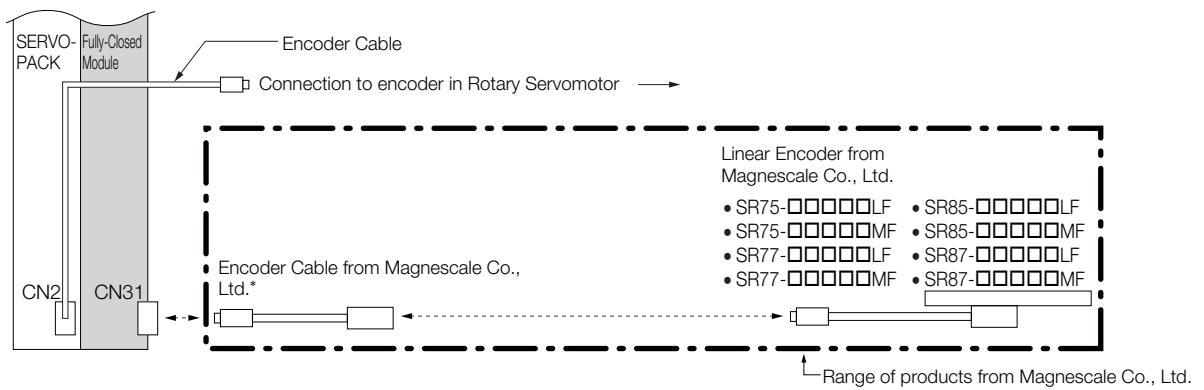
📖 9.3.5 Encoder Cables on page 9-27

■ SmartSCALE Linear Encoder (SQ10 Scale +MQ10-FLA Interpolator)



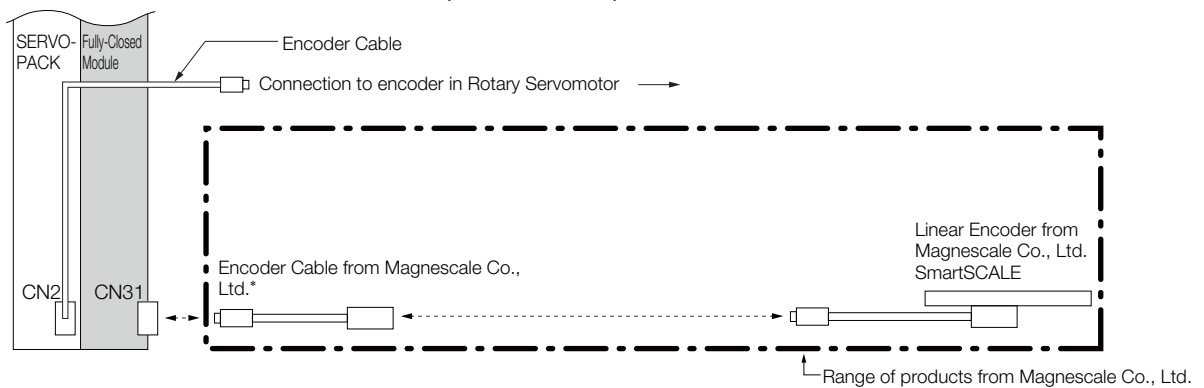
* Use an Encoder Cable from Magnescale Co., Ltd. The maximum length of the Encoder Cable is 15 m. Contact Magnescale Co., Ltd. for specifications other than the cable length.

■ SR-75/SR-77/SR-85/SR-87 Linear Encoders



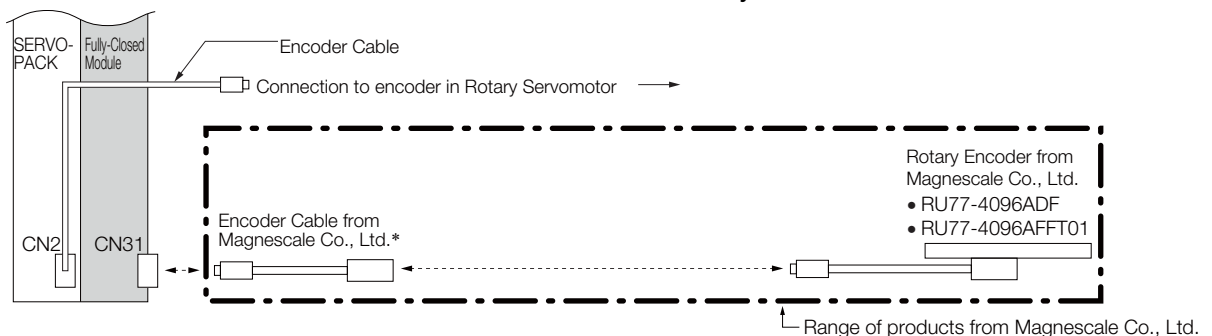
* Use a CH33-xx□□□ Cable from Magnescale Co., Ltd. (This Cable has connectors designed for use with Yaskawa products.)

■ SmartSCALE Linear Encoder (SQ47/SQ57)



* Use an Encoder Cable from Magnescale Co., Ltd.. Contact Magnescale Co., Ltd. for details on Encoder Cable specifications.

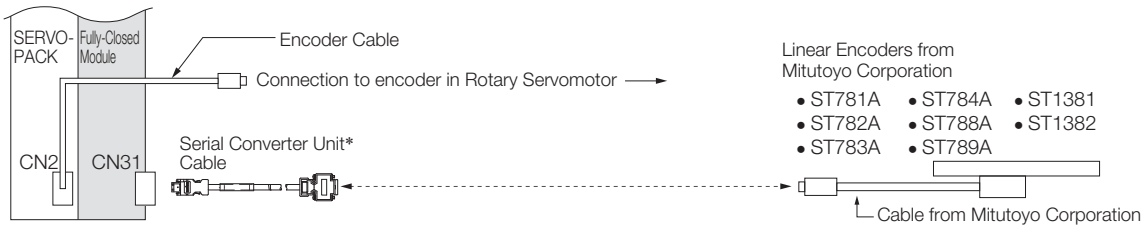
■ RU77-4096ADF/RU77-4096AFFT01 Absolute Rotary Encoders



* Use a CE28-Series Extension Cable for RU77 Encoder from Magnescale Co., Ltd.

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

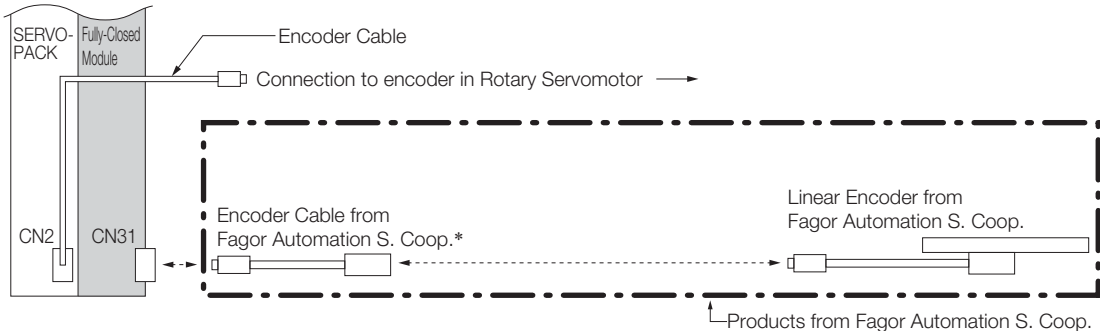
◆ Connections to Linear Encoders from Mitutoyo Corporation



* Refer to the following section for details on Serial Converter Unit Cables.

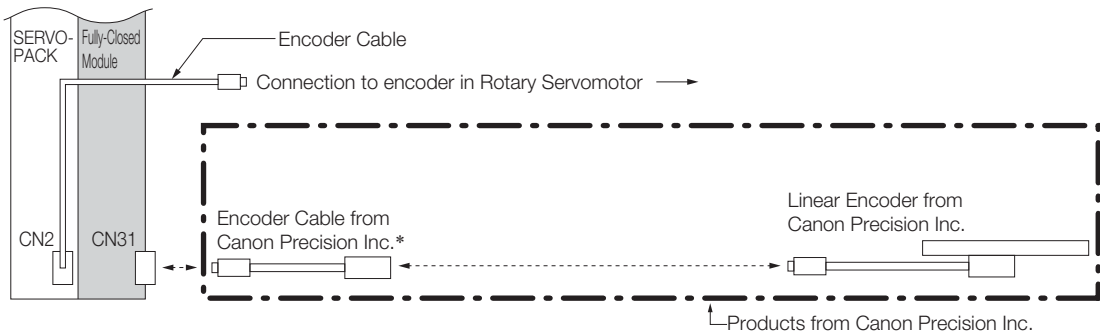
📖 9.3.3 Serial Converter Unit Cables on page 9-26

◆ Connections to Linear Encoder from Fagor Automation S. Coop.



* Use Encoder Cables from Fagor Automation S. Coop. For detailed specifications of the Encoder Cables, consult Fagor Automation S. Coop. or its sales representative.

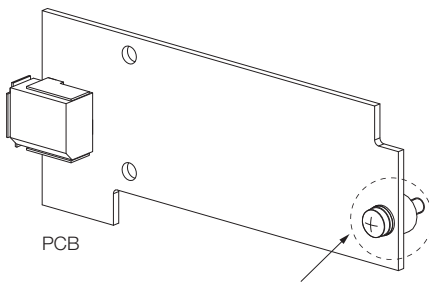

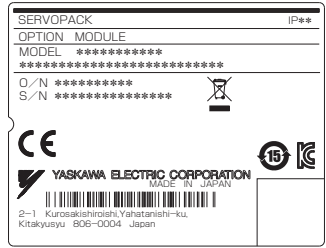
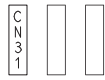
◆ Connections to Linear Encoder from Canon Precision Inc.



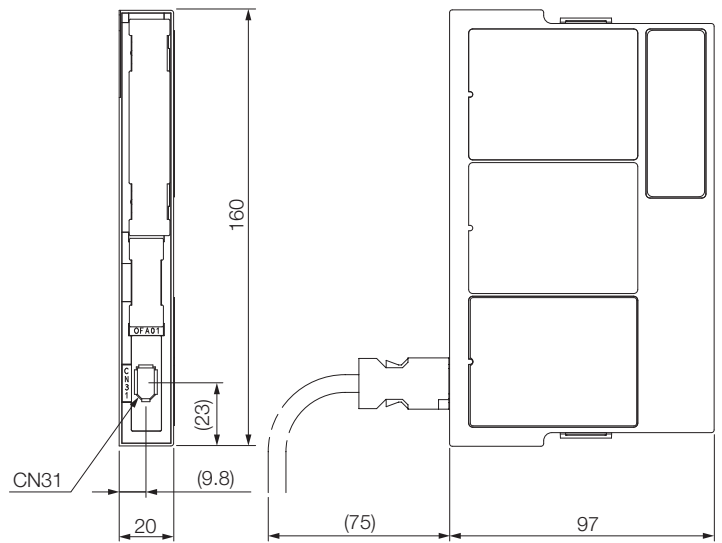
* Use Encoder Cables from Canon Precision Inc. For detailed specifications of the Encoder Cables, consult Canon Precision Inc. or its sales representative.

Accessories

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

| Order Number | SGDV-OFA01A |
|--------------|--|
| Accessories |  <p>PCB</p> <p>PCB set screws (two)</p>  <p>Model number nameplate</p>  <p>Ratings nameplate</p>  <p>Device label nameplates</p> |

External Dimensions



Unit: mm
Approx. mass: 0.1 kg

◆ Connectors

| Device Label | Model | Number of Pins | Manufacturer |
|--------------|--------------|----------------|------------------|
| CN31 | 3E106-0220KV | 6 | 3M Japan Limited |

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

11.2 Safety Module

This Safety Module implements safety functions that conform to EN ISO 13849-1 (the harmonized EU Machinery Directive) and are specified in the individual IEC 61800-5-2 standard. You can combine it with an SGD7S SERVOPACK to design optimum safety in a machine system according to industry needs.



Important

1. One Option Case Kit is required for each SERVOPACK.
Option Case Kit model: SGDV-OZA01A
2. INDEXER Modules, DeviceNet Modules, and Fully-Closed Modules cannot be used with Safety Modules.
3. The encoders without Yaskawa's serial converter units cannot be connected to SERVOPACKs with a Safety Module.

11.2.1 Applicable Standards and Functions

Applicable Safety Standards

| Safety Standard | Applicable Standard | Applicable Products | |
|---------------------|--|---------------------|---------------------------|
| | | SERVOPACK | SERVOPACK + Safety Module |
| Safety of Machinery | EN ISO 13849-1:2015 IEC 60204-1 | ✓ | ✓ |
| Functional Safety | IEC 61508 Series IEC 62061 IEC 61800-5-2 | ✓ | ✓ |
| EMC | IEC 61326-3-1 | ✓ | ✓ |

✓: Applicable

Support for Functions Defined in IEC61800-5-2

Safety functions are implemented by using the hard wire base block (HWBB) in the SERVOPACK.

| Safety Function | Description | Applicable Products | |
|--|--|---------------------|---------------------------|
| | | SERVOPACK | SERVOPACK + Safety Module |
| Safe BaseBlock Function (SBB function) | This safety function is equivalent to an STO function. (It shuts OFF the power supply from the SERVOPACK to the motor.) | ✓ | ✓ |
| Safe BaseBlock with Delay Function (SBB-D function) | This safety function is equivalent to an SS1 function. (It monitors the deceleration operation of the motor for the specified time and then shuts OFF the power supply from the SERVOPACK to the motor.) | – | ✓ |
| Safe Position Monitor with Delay Function (SPM-D function) | This safety function is equivalent to an SS2 function. (It monitors the deceleration operation of the motor for the specified time and then monitors the position after the motor stops.) | – | ✓ |

✓: Applicable

Continued on next page.

Continued from previous page.

| Safety Function | Description | Applicable Products | |
|---|---|---------------------|---------------------------|
| | | SERVOPACK | SERVOPACK + Safety Module |
| Safely Limit Speed with Delay Function (SLS-D function) | This safety function is equivalent to an SLS function. (It monitors the deceleration operation of the motor for the specified time and then monitors the speed of the motor to confirm that it remains in the allowable range.) | - | ✓ |

✓: Applicable

11.2.2 Specifications

Basic Specifications

| Item | | Specification | |
|----------------------|-----------------------------|---|---|
| Operating Conditions | Surrounding Air Temperature | 0°C to +55°C | |
| | Storage Temperature | -20°C to +85°C | |
| | Surrounding Air Humidity | 90% relative humidity max. | There must be no freezing or condensation. |
| | Storage Humidity | 90% relative humidity max. | |
| | Vibration Resistance | 4.9 m/s ² | |
| | Shock Resistance | 19.6 m/s ² | |
| | Degree of Protection | IP10 | <ul style="list-style-type: none"> • Must be no corrosive or flammable gases. • Must be no exposure to water, oil, or chemicals. • Must be no dust, salts, or iron dust. |
| | Pollution Degree | 2 | |
| | Altitude | 1000 m max. | |
| | Others | Do not use the SERVOPACK in the following locations: Locations subject to static electricity noise, strong electromagnetic/magnetic fields, or radioactivity | |

Compliance with UL Standards, EU Directives, and Other Safety Standards (in Combination with SERVOPACK)

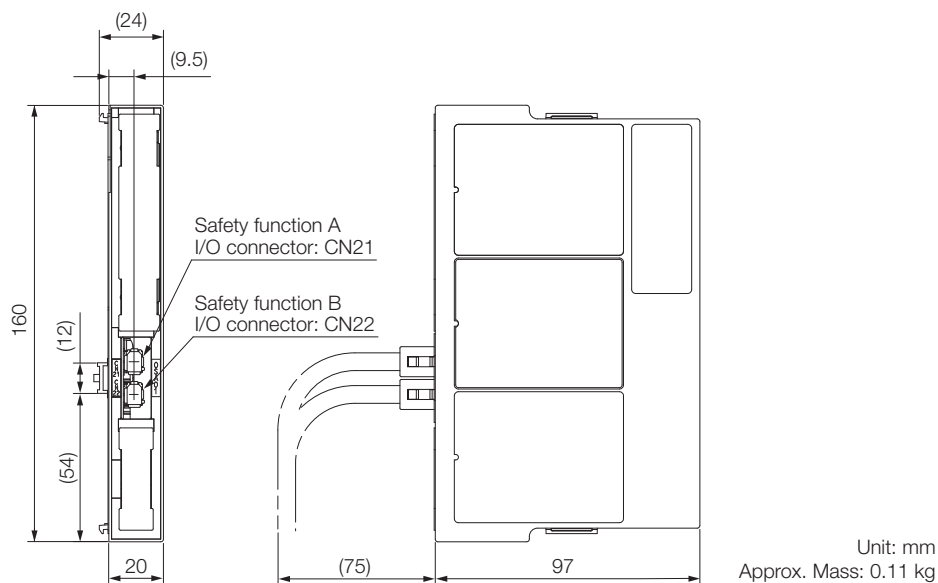
| Item | | Specification |
|--------------------------------------|----------------------------------|--|
| North American Safety Standards (UL) | | UL61800-5-1 (E147823), CSA C22.2 No.274 |
| EU Directives | Machinery Directive 2006/42/EC | EN ISO13849-1: 2015 |
| | EMC Directive 2014/30/EU | EN 55011 group1 classA EN 61000-6-2 EN 61000-6-4 EN 61800-3 (Category C2, Second Environment) |
| | Low Voltage Directive 2014/35/EU | EN 50178 EN 61800-5-1 |
| | RoHS Directive 2011/65/EU | EN 50581 |

Continued on next page.

Continued from previous page.

| Item | | Specification | |
|------------------|--|--|-----------------|
| Safety Standards | Safety of Machinery | EN ISO13849-1: 2015 IEC 60204-1 | |
| | Functional Safety | IEC 61508 series IEC 62061 IEC 61800-5-2 | |
| | EMC | IEC 61326-3-1 | |
| Safety Function | | IEC 61800-5-2 | IEC 60204-1 |
| | | Safe Torque Off (STO) | Stop Category 0 |
| | | Safe Stop 1 (SS1) | Stop Category 1 |
| | | Safe Stop 2 (SS2) | Stop Category 2 |
| | | Safely-Limited Speed (SLS) | |
| | Number of Blocks | 2 | |
| | Safety Function A | Input signals: 2 channels (redundant signals), output signals: 1 channel | |
| | Safety Function B | Input signals: 2 channels (redundant signals), output signals: 1 channel | |
| Safe Performance | | | |
| | Safety Integrity Level | SIL2, SILCL2 | |
| | Probability of Dangerous Failure per Hour | PFH = 8.0×10^{-9} [1/h] (SBB) PFH = 3.4×10^{-8} [1/h] (SBB-D, SPM-D, SLS-D) | |
| | Category | Cat3 | |
| | Performance Level | PLd (Category 2) | |
| | Mean Time to Dangerous Failure of Each Channel | MTTFd: High | |
| | Average Diagnostic Coverage | DCavg: Medium | |
| | Proof Test Interval | 10 years | |

11.2.3 External Dimensions



Connectors

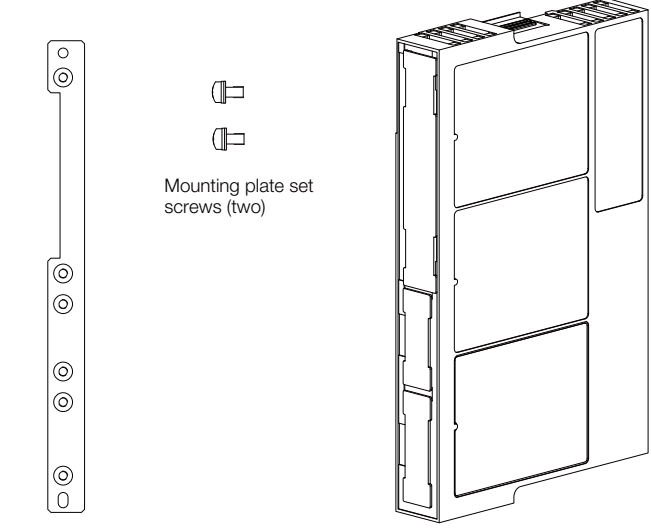
| Device Label | Model | Number of Pins | Manufacturer |
|--------------|-----------|----------------|-----------------------------|
| CN21 | 1981080-1 | 8 | Tyco Electronics Japan G.K. |
| CN22 | 1981080-1 | 8 | Tyco Electronics Japan G.K. |

Note: 1. The above connectors or their equivalents are used for SERVOPACKs.
2. Refer to the user's manual of the Safety Module for installation standards.

11.3 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 |  <p>The diagram shows three components: a vertical PCB mounting plate with six circular holes, two screws with hexagonal heads, and a rectangular module cover with a latch on the right side.</p> <p>PCB mounting plate</p> <p>Mounting plate set screws (two)</p> <p>Module cover</p> |

SERVOPACK Peripheral Devices

12

12.1 Molded-Case Circuit Breakers and Fuses . . 12-3

- 12.1.1 Using an AC Power Supply 12-3
- 12.1.2 Using a DC Power Supply 12-4

12.2 Magnetic Contactors 12-6

12.3 SERVOPACK Main Circuit Wires 12-10

- 12.3.1 Three-Phase, 200-VAC Wires for Σ -7S
SERVOPACKs 12-10
- 12.3.2 Single-Phase, 200-VAC Wires for Σ -7S
SERVOPACKs 12-13
- 12.3.3 Single-Phase, 100-VAC Wires for Σ -7S
SERVOPACKs 12-14
- 12.3.4 DC Power Supply Wires for Σ -7S
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12.1 Molded-Case Circuit Breakers and Fuses

12.1.1 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 | 0.25 | | | | |
| | 2.0 | 180A | 4.0 | 10 | | | | | |
| | 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 | 0.4 | 114 | | | |
| | 11 | 590A | 21.7 | 54 | | | | | |
| 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 | | | | | |
| | 1.5 | 120A□□□008 | 4.0 | 16 | 0.25 | | | | |
| Single-phase, 100 VAC | 0.05 | R70F | 0.2 | 1.5 | 0.38 | | | | |
| | 0.1 | R90F | 0.3 | 2.5 | | | | | |
| | 0.2 | 2R1F | 0.6 | 5 | | | | | |
| | 0.4 | 2R8F | 1.4 | 10 | | | | | |

* This is the net value at the rated load.

Σ-7W SERVOPACKs and Σ-7C SERVOPACKs

| Main Circuit Power Supply | Maximum Applicable Motor Capacity [kW] | SERVOPACK Model: SGD7W-SGD7C- | 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 | 0.25 | 34 | 34 | 250 | 240 |
| | 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 or SGD7C-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%)

12.1.2 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 | | | | | | | |
| | 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 | | | 0.25 | 3,5URGJ17/63UL | | 63 |
| | 120A□□□□008 | | | | | | | | | |
| | 180A | | | 4.0 | | | | | | |
| | 200A | 5.9 | 20 | 0.3 | | | 68 ^{*3} (5 Ω external) | 3,5URGJ17/100UL | | 100 |
| | 330A | 7.5 | 34 | | | | | | | |
| | 470A | 10.7 | 36 | | | | | | | |
| | 550A | 14.6 | 48 | | | | | | | |
| 590A | 21.7 | 68 | 0.4 | 114 ^{*3} (3 Ω external) | 3,5URGJ23/160UL | 160 | | | | |
| 780A | 29.6 | 92 | | | | | 3,5URGJ23/200UL | 200 | | |

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

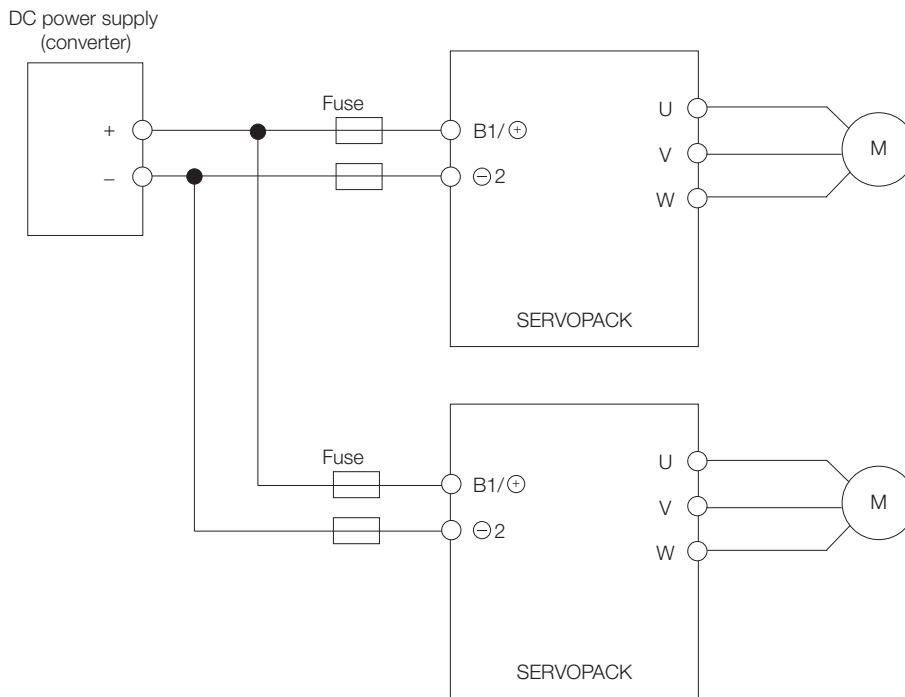
*2. These Fuses are manufactured by MERSEN Japan.

*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.

12.2 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. Consult Fuji Electric FA Components & Systems Co., Ltd. for details.

Selection Table

◆ Σ-7S SERVOPACKs

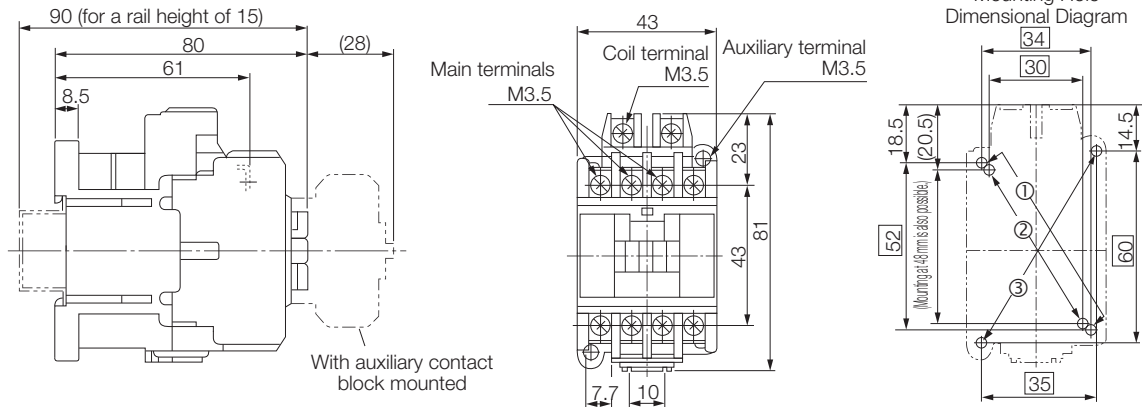
| Main Circuit Power Supply | SERVOPACK | | Order Number | Inquiries |
|---------------------------|--|--------------|--------------|---|
| | Maximum Applicable Motor Capacity [kW] | Model SGD7S- | | |
| Three-phase, 200 VAC | 0.05 | R70A | SC-03 | Fuji Electric FA Components & Systems Co., Ltd. |
| | 0.1 | R90A | | |
| | 0.2 | 1R6A | | |
| | 0.4 | 2R8A | | |
| | 0.5 | 3R8A | | |
| | 0.75 | 5R5A | SC-4-1 | |
| | 1.0 | 7R6A | | |
| | 1.5 | 120A | SC-5-1 | |
| | 2.0 | 180A | | |
| | 3.0 | 200A | SC-N1 | |
| | 5.0 | 330A | | |
| | 6.0 | 470A | SC-N2 | |
| | 7.5 | 550A | SC-N2S | |
| 11 | 590A | SC-N3 | | |
| Single-phase, 200 VAC | 0.05 | R70A | SC-03 | |
| | 0.1 | R90A | | |
| | 0.2 | 1R6A | | |
| | 0.4 | 2R8A | | |
| | 0.75 | 5R5A | SC-4-1 | |
| | 1.5 | 120A□□□008 | SC-5-1 | |
| Single-phase, 100 VAC | 0.05 | R70F | SC-03 | |
| | 0.1 | R90F | | |
| | 0.2 | 2R1F | SC-4-1 | |
| | 0.4 | 2R8F | | |

◆ Σ-7W SERVOPACKs and Σ-7C SERVOPACKs

| Main Circuit Power Supply | SERVOPACK | | Order Number | Inquiries |
|---------------------------|--|--------------------|--------------|---|
| | Maximum Applicable Motor Capacity [kW] | Model SGD7W-SGD7C- | | |
| Three-phase, 200 VAC | 0.2 | 1R6A | SC-03 | Fuji Electric FA Components & Systems Co., Ltd. |
| | 0.75 | 2R8A | SC-4-1 | |
| | 0.75 | 5R5A | | |
| | 1.0 | 7R6A | SC-5-1 | |
| Single-phase, 200 VAC | 0.2 | 1R6A | SC-03 | |
| | 0.4 | 2R8A | SC-4-1 | |
| | 0.75 | 5R5A | SC-5-1 | |

External Dimensions

◆ Model: SC-03

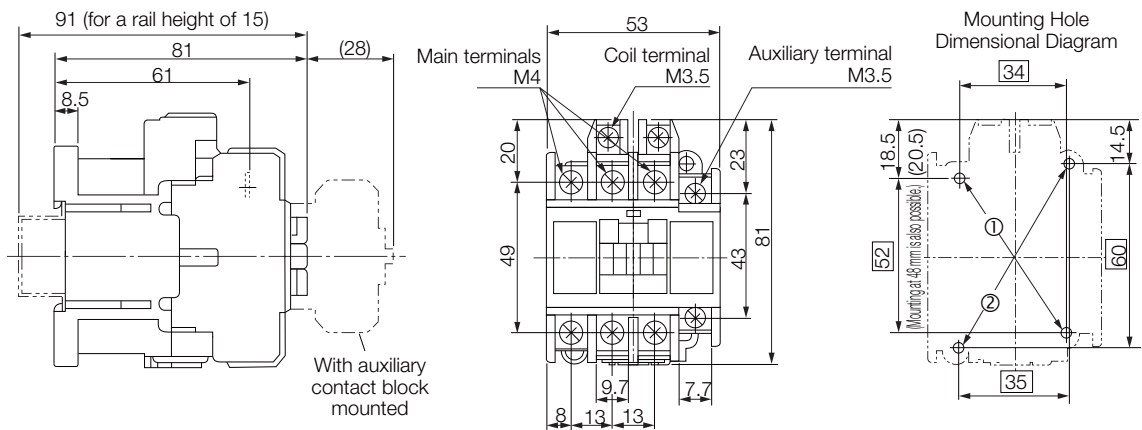


| Auxiliary Contacts | Contact Structure |
|--------------------|-------------------|
| 1NO | |
| 1NC | |

- 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

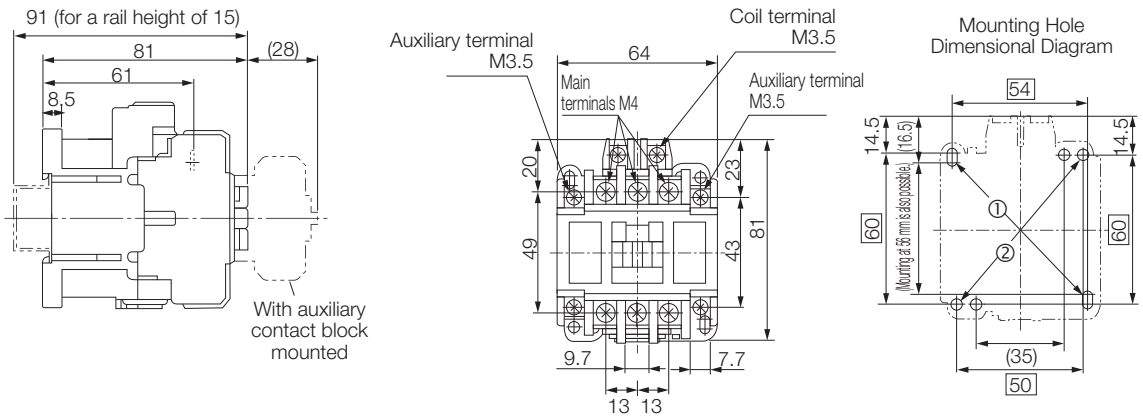


| Auxiliary Contacts | Contact Structure |
|--------------------|-------------------|
| 1NO | |
| 1NC | |

- 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

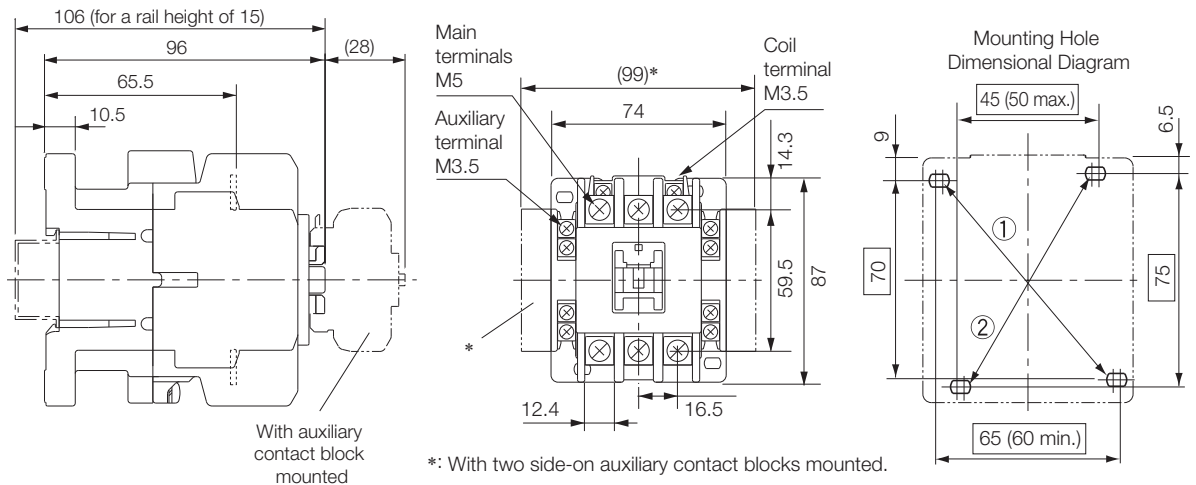


| Auxiliary Contacts | Contact Structure |
|--------------------|-------------------|
| 2NO | |
| 1NO/1NC | |
| 2NC | |

- 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

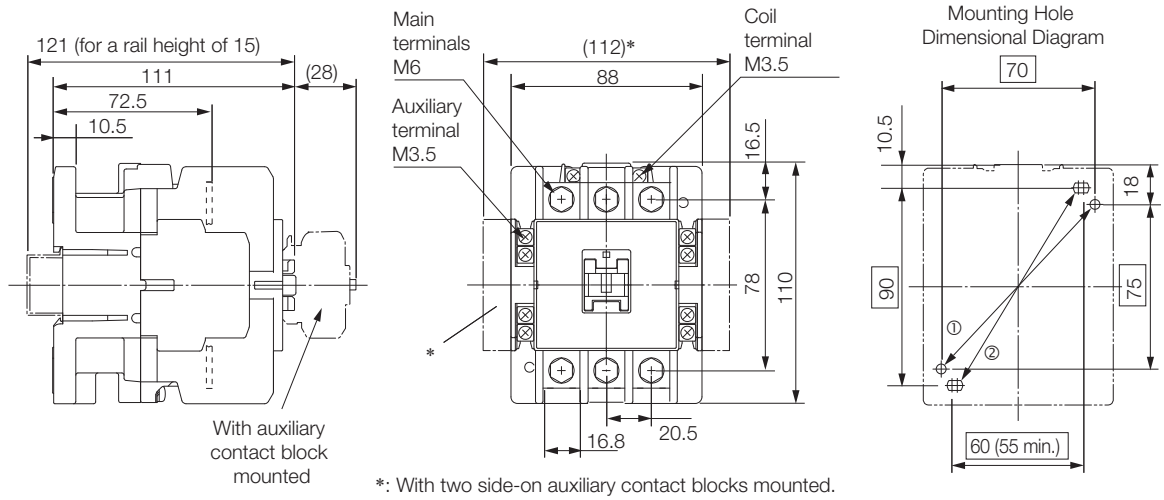


| Auxiliary Contacts | Contact Structure |
|--------------------|-------------------|
| 4NO | |
| 2NO/2NC | |
| 4NC | |

- 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




| 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

12.3 SERVOPACK Main Circuit Wires

This section describes the main circuit wires for SERVOPACKs.



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.

12.3.1 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 |

Continued on next page.

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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 |
| 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) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cables* | U, V, W | AWG10 (5.5 mm ²) | | |
| | Control Power Supply Cables | L1C, L2C | AWG16 (1.25 mm ²) | M4 | 1.0 to 1.2 |
| | External Regenerative Resistor Cables | B1/⊕, B2 | | | |
| | Ground cable | ⊕ | AWG14 (2.0 mm ²) or larger | M4 | 1.2 to 1.4 |
| 200A | Main Circuit Power Supply Cables | L1, L2, L3 | AWG12 (3.5 mm ²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cables* | U, V, W | AWG10 (5.5 mm ²) | | |
| | Control Power Supply Cables | L1C, L2C | AWG16 (1.25 mm ²) | M4 | 1.0 to 1.2 |
| | External Regenerative Resistor Cables | B1/⊕, B2 | | | |
| | Ground cable | ⊕ | AWG14 (2.0 mm ²) or larger | M4 | 1.2 to 1.4 |

Continued on next page.

12.3 SERVOPACK Main Circuit Wires

12.3.1 Three-Phase, 200-VAC Wires for Σ -7S SERVOPACKS

Continued from previous page.

| SERVOPACK Model: SGD7S- | Terminal Symbols | | Wire Size | Screw Size | Tightening Torque [N·m] |
|-------------------------|---------------------------------------|------------|--|------------|-------------------------|
| 330A | Main Circuit Power Supply Cables | L1, L2, L3 | AWG8 (8.0 mm ²) | M4 | 1.0 to 1.2 |
| | 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) | M5 | 2.2 to 2.4 |
| | 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 | | |
| 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) | 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 | 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.

12.3.2 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 |
| 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 |

Continued on next page.

12.3 SERVOPACK Main Circuit Wires

12.3.3 Single-Phase, 100-VAC Wires for Σ -7S SERVOPACKs

Continued from previous page.

| SERVOPACK Model: SGD7S- | Terminal Symbols | | Wire Size | Screw Size | Tightening Torque [N·m] |
|-------------------------|---------------------------------------|----------|--|------------|-------------------------|
| 120A□□□008 | Main Circuit Power Supply Cables | L1, L2 | AWG14 (2.0 mm ²) | M4 | 1.0 to 1.2 |
| | 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 | | 1.2 to 1.4 |

* If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

12.3.3 Single-Phase, 100-VAC Wires for Σ -7S SERVOPACKs

| SERVOPACK Model: SGD7S- | Terminal Symbols | | Wire Size | Screw Size | Tightening Torque [N·m] |
|-------------------------|---------------------------------------|----------|--|------------|-------------------------|
| R70F | 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 |
| R90F | 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 |
| 2R1F | 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 |
| 2R8F | Main Circuit Power Supply Cables | L1, L2 | 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.

12.3.4 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 |
| 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 |

Continued on next page.

12.3 SERVOPACK Main Circuit Wires

12.3.4 DC Power Supply Wires for Σ-7S SERVOPACKs

Continued from previous page.

| SERVOPACK Model: SGD7S- | Terminal Symbols*1 | | Wire Size | Screw Size | Tightening Torque [N·m] |
|--|----------------------------------|-----------|--|------------|-------------------------|
| 120A (three-phase, 200-VAC input) | 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 |
| 120A□□□008 (single-phase, 200-VAC input) | Servomotor Main Circuit Cables | U, V, W*2 | AWG14 (2.0 mm ²) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cables | L1C, L2C | AWG16 (1.25 mm ²) | M4 | 1.0 to 1.2 |
| | Main Circuit Power Supply Cables | B1/⊕, ⊖2 | AWG14 (2.0 mm ²) | M4 | 1.0 to 1.2 |
| | 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 | 1.0 to 1.2 |
| | Control Power Supply Cables | L1C, L2C | AWG16 (1.25 mm ²) | M4 | 1.0 to 1.2 |
| | Main Circuit Power Supply Cables | B1/⊕, ⊖2 | AWG10 (5.5 mm ²) | M4 | 1.0 to 1.2 |
| | Ground Cable | ⊕ | AWG14 (2.0 mm ²) or larger | M4 | 1.2 to 1.4 |
| 200A | Servomotor Main Circuit Cables | U, V, W*2 | AWG10 (5.5 mm ²) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cables | L1C, L2C | AWG16 (1.25 mm ²) | M4 | 1.0 to 1.2 |
| | Main Circuit Power Supply Cables | B1/⊕, ⊖2 | AWG10 (5.5 mm ²) | M4 | 1.0 to 1.2 |
| | 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 | 1.0 to 1.2 |
| | Control Power Supply Cables | L1C, L2C | AWG16 (1.25 mm ²) | M4 | 1.0 to 1.2 |
| | Main Circuit Power Supply Cables | B1/⊕, ⊖2 | AWG8 (8.0 mm ²) | M4 | 1.0 to 1.2 |
| | 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 |

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| SERVOPACK Model: SGD7S- | Terminal Symbols* ¹ | | Wire Size | Screw Size | Tightening Torque [N·m] |
|-------------------------|----------------------------------|----------|--|------------|-------------------------|
| 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.

12.3.5 Three-Phase, 200-VAC Wires for Σ -7W SERVOPACKs and Σ -7C SERVOPACKs

| SERVOPACK Model: SGD7W- SGD7C- | 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.

12.3.6 Single-Phase, 200-VAC Wires for Σ -7W SERVOPACKs and Σ -7C SERVOPACKs

| SERVOPACK Model: SGD7W-SGD7C- | 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.

12.3.7 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.

12.3.8 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] | 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).





12.4 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.

12.4.1 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 | Crimping Tool | Die | Insulating Sleeve Model |
|---|---|------------|-------------------------|---------------------------------|-------------------------------|------------------------------|---------------|------------------|-------------------------|
| | | | | | | (From J.S.T. Mfg. Co., Ltd.) | | | (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 | 1.0 to 1.2 | 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 | 1.0 to 1.2 | 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 | - | - |
| 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 | - | - |

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12.4 Crimp Terminals and Insulating Sleeves

12.4.2 Σ-7S SERVOPACKs with Single-Phase, 200-VAC

Continued from previous page.

| SERVOPACK Model: SGD7S- | 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.) |
| 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 | – | – | |


12.4.2 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 | Crimping Tool | Die | Insulating Sleeve Model |
|---------------------------------|------------------------|------------|-------------------------|---------------------------------|-------------------------------|------------------------------|---------------|-----|-------------------------|
| | | | | | | (From J.S.T. Mfg. Co., Ltd.) | | | (Tokyo Dip Co., Ltd.) |
| R70A, R90A, 1R6A, 2R8A, or 5R5A | Connector | | | | | – | | | |
| | ⊕ | M4 | 1.2 to 1.4 | 10 mm max. | AWG14 (2.0 mm ²) | R2-4 | YHT-2210 | – | – |
| 120A□□□008 | Terminal block | M4 | 1.0 to 1.2 | 7.7 mm max. | AWG14 (2.0 mm ²) | 2-M4 | 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 | – | – |


12.4.3 Σ-7S SERVOPACKs with Single-Phase, 100-VAC

| SERVOPACK Model: SGD7S- | 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.) |
| R70F, R90F, 2R1F, or 2R8F | Connector | | | | | – | | | |
| | ⊕ | M4 | 1.2 to 1.4 | 10 mm max. | AWG14 (2.0 mm ²) | R2-4 | YHT-2210 | – | – |

12.4.4 Σ -7W SERVOPACKs with Three-Phase, 200-VAC or DC Power Supplies and Σ -7C SERVOPACKs with Three-Phase, 200-VAC

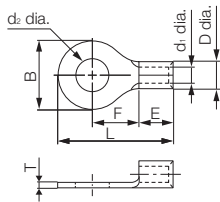
| SERVOPACK Model: SGD7W- SGD7C- | Main Circuit Terminals | Screw Size | Tightening Torque [N·m] | Crimp Terminal Horizontal Width | Recommended Wire Size | Crimp Terminal Model | Crimping Tool | Die | Insulating Sleeve Model |
|--------------------------------------|---|------------|-------------------------|---------------------------------|------------------------------|------------------------------|---------------|-----|-------------------------|
| | | | | | | (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 | - | - |

12.4.5 Σ -7W SERVOPACKs and Σ -7C SERVOPACKs with Single-Phase, 200-VAC

| SERVOPACK Model: SGD7W- SGD7C- | 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 | - | - |

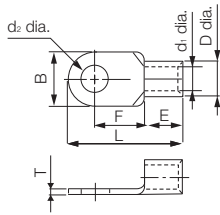
Crimp Terminal Dimensional Drawings

- ◆ 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 | | 9.5 | 16.8 | 7.3 | | | | |
| R2-6 | 6.4 | 12.0 | 21.8 | 11.0 | 6.2 | 5.6 | 3.4 | 1.0 |
| 5.5-S4 | 4.3 | 7.2 | 15.7 | 5.9 | | | | |
| R5.5-5 | 5.3 | 9.5 | 19.8 | 8.3 | | | | |
| R5.5-6 | 6.4 | 12.0 | 25.8 | 13.0 | 6.8 | | | |

◆ 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 | | 29.8 | 13.3 | 10.5 | 9.0 | 5.8 | 1.5 |
| R14-5 | 5.3 | | 30.0 | 12.0 | 12.0 | 11.5 | 7.7 | 1.8 |
| 22-S5 | 6.4 | 16.5 | 33.7 | 13.5 | | | | |
| R22-6 | | 15.5 | 38.0 | 16.0 | 14.0 | 13.3 | 9.4 | |
| 38-S6 | | | | | | | | |

12.5 Noise Filter

Noise Filters are used to reduce external noise that can enter on the power supply line or conductive noise from the SERVOPACK.



Important

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 earth leakage breaker taking into account the grounding conditions and the leakage current from the Noise Filter.

Selection Table

◆ Σ-7S SERVOPACKs

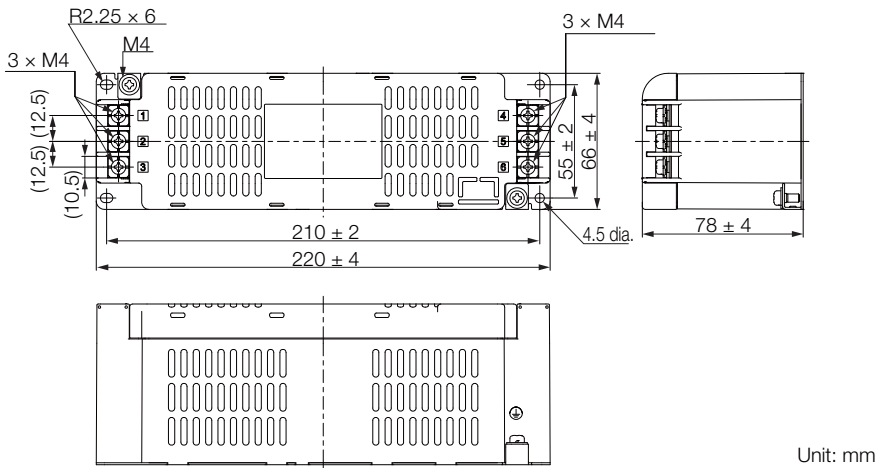
| Main Circuit Power Supply | SERVOPACK | | Order Number | Specification | Mass | Leakage Current | Manufacturer | Inquires |
|---------------------------|--|-----------------|----------------------------|-----------------------------|--------|-----------------------------|---------------------------|------------------------|
| | Maximum Applicable Motor Capacity [kW] | Model SGD7S- | | | | | | |
| 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 representative |
| | 0.1 | R90A | | | | | | |
| | 0.2 | 1R6A | | | | | | |
| | 0.4 | 2R8A | | | | | | |
| | 0.5 | 3R8A | | | | | | |
| | 0.75 | 5R5A | HF3020C-SZC | Three-phase, 500 VAC, 20 A | 1.4 kg | | | |
| | 1.0 | 7R6A | | | | | | |
| | 1.5 | 120A | | | | | | |
| | 2.0 | 180A | HF3030C-SZC | Three-phase, 500 VAC, 30 A | 1.4 kg | | | |
| | 3.0 | 200A | | | | | | |
| | 5.0 | 330A | HF3050C-SZC-47EDD | Three-phase, 500 VAC, 50 A | 2.0 kg | | | |
| | 6.0 | 470A | | | | | | |
| | 7.5 | 550A | HF3060C-SZC | Three-phase, 500 VAC, 60 A | 2.1 kg | | | |
| | 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 | | | | | | |
| | 0.75 | 5R5A | HF2020A-UPF-2BB | Single-phase 250 VAC, 20 A | 0.8 kg | | | |
| 1.5 | 120A□□008 | HF2030A-UPF-2BB | Single-phase 250 VAC, 30 A | 0.8 kg | | | | |
| Single-phase, 100 VAC | 0.05 | R70F | HF2010A-UPF | Single-phase 250 VAC, 10 A | 0.5 kg | 1.2 mA 250 VAC /60 Hz | | |
| | 0.1 | R90F | | | | | | |
| | 0.2 | 2R1F | | | | | | |
| | 0.4 | 2R8F | HF2020A-UPF | Single-phase 250 VAC, 20 A | 0.8 kg | | | |

◆ Σ-7W SERVOPACKs and Σ-7C SERVOPACKs

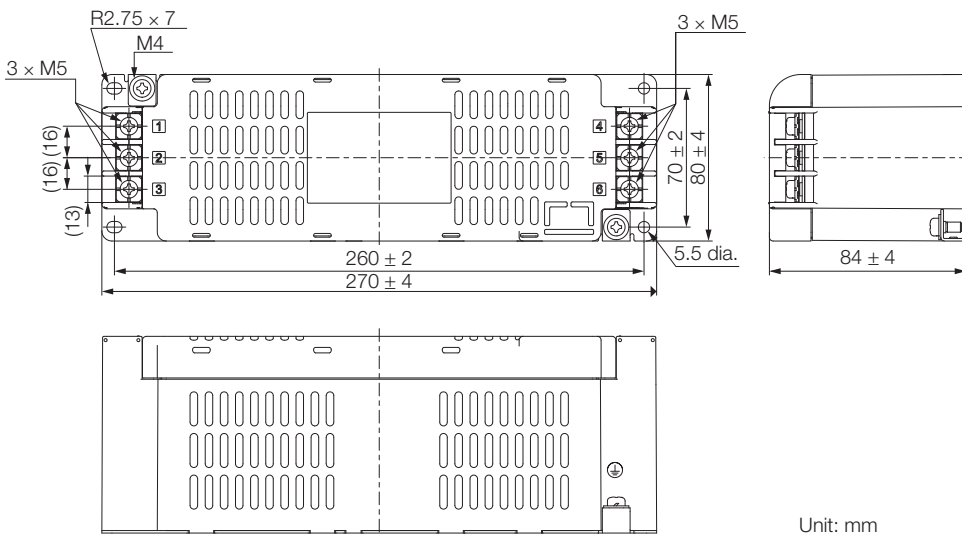
| Main Circuit Power Supply | SERVOPACK | | Order Number | Specification | Mass | Leakage Current | Manufacturer | Inquiries |
|---------------------------|--|--------------------|-----------------|----------------------------|--------|--------------------------|---------------------------|------------------------|
| | Maximum Applicable Motor Capacity [kW] | Model SGD7W-SGD7C- | | | | | | |
| Three-phase, 200 VAC | 0.2 | 1R6A | HF3010C-SZC | Three-phase, 500 VAC, 10 A | 1.0 kg | 4 mA 200 VAC /60 Hz | Soshin Electric Co., Ltd. | Yaskawa representative |
| | 0.4 | 2R8A | HF3020C-SZC | Three-phase, 500 VAC, 20 A | 1.4 kg | | | |
| | 0.75 | 5R5A | | | | | | |
| | 1.0 | 7R6A | | | | | | |
| Single-phase, 200 VAC | 0.2 | 1R6A | HF2010A-UPF | Single-phase 250 VAC, 10 A | 0.5 kg | 1.2 mA 250 VAC /60 Hz | Soshin Electric Co., Ltd. | Yaskawa representative |
| | 0.4 | 2R8A | HF2020A-UPF-2BB | Single-phase 250 VAC, 20 A | 0.8 kg | 3 mA 250 VAC /60 Hz | | |
| | 0.75 | 5R5A | HF2030A-UPF-2BB | Single-phase 250 VAC, 30 A | 0.8 kg | | | |

External Dimensions

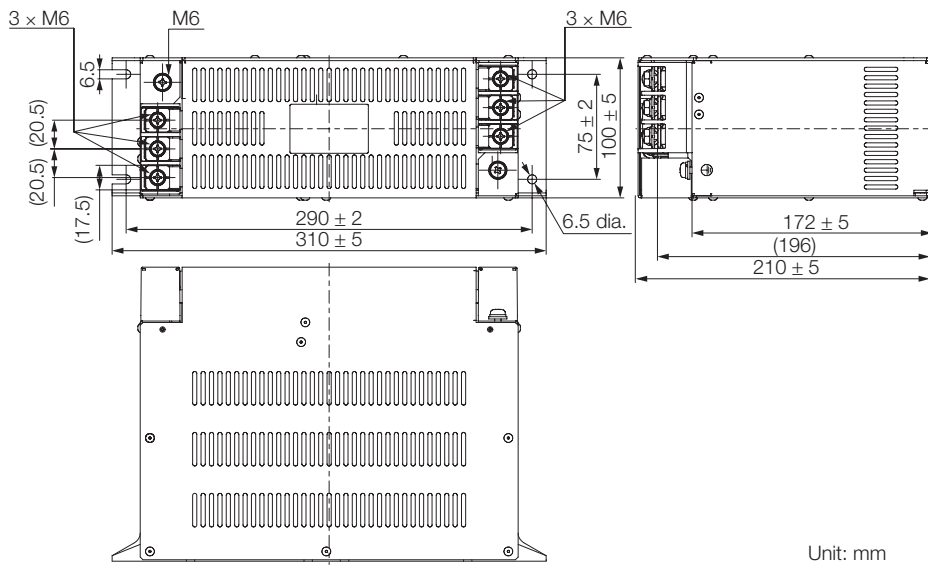
◆ Model: HF3010C-SZC, HF3020C-SZC, or HF3030C-SZC



◆ Model: HF3050C-SZC-47EDD or HF3060C-SZC

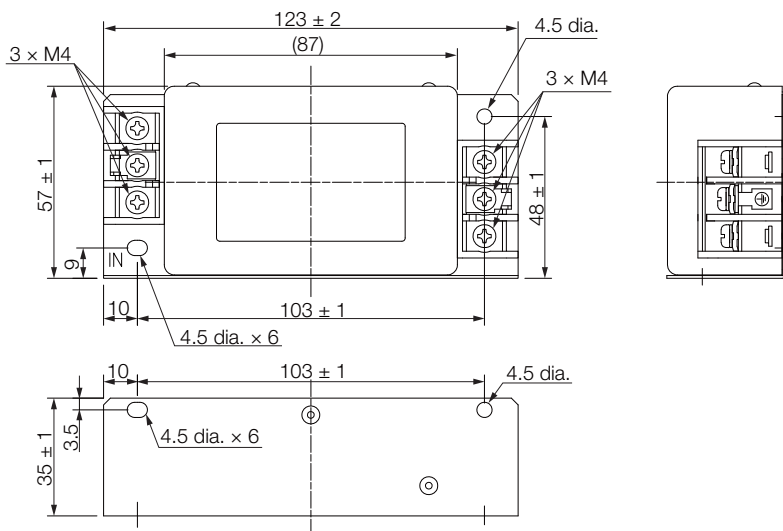


◆ Model: HF3100C-SZC



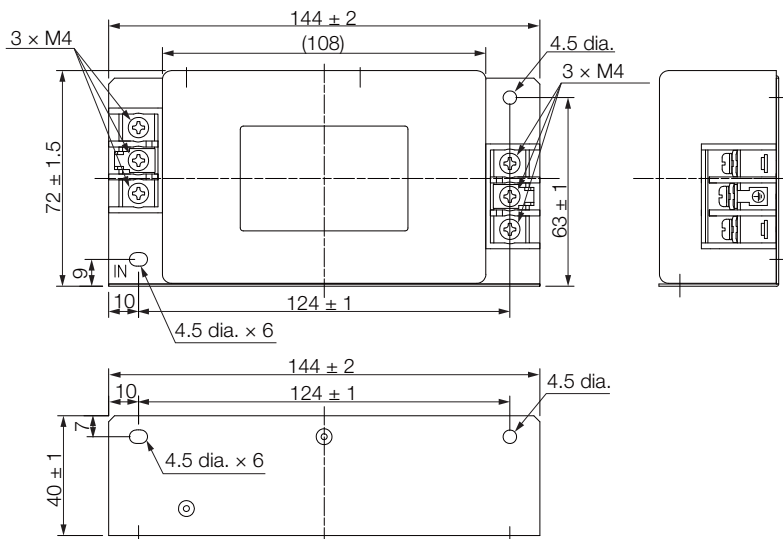
Unit: mm

◆ Model: HF2010A-UPF



Unit: mm

◆ Model: HF2020A-UPF, HF2020A-UPF-2BB, or HF2030A-UPF-2BB



Unit: mm

12.6 AC/DC Reactors

Use the Reactors listed in the following tables if harmonic suppression is required.

12.6.1 Using a Three-Phase, 200-VAC Power Supply Input

Selection Table

◆ Σ-7S SERVOPACKs

| SERVOPACK | | DC Reactor | | | | | | |
|--|--------------|--------------|-----------------|----------------------|--------|---------------------|----------------------------------|------------------------|
| Maximum Applicable Motor Capacity [kW] | Model SGD7S- | Order Number | Inductance [mH] | Rated Current [Arms] | Mass | Terminal Screw Size | Wire Size | Inquiries |
| 0.05 | R70A | X5061 | 2.0 | 4.8 | 0.5 kg | M4 | AWG16 (1.25 mm ²) | Yaskawa representative |
| 0.1 | R90A | | | | | | | |
| 0.2 | 1R6A | | | | | | | |
| 0.4 | 2R8A | | | | | | | |
| 0.5 | 3R8A | | | | | | | |
| 0.75 | 5R5A | | | | | | | |
| 1.0 | 7R6A | | | | | | | |
| 1.5 | 120A | X5060 | 1.5 | 8.8 | 1.0 kg | M4 | AWG14 (2.0 mm ²) | |
| 2.0 | 180A | X5059 | 1.0 | 14.0 | 1.1 kg | M5 | AWG10 (5.5 mm ²) | |
| 3.0 | 200A | | | | | | | |
| 5.0 | 330A | X5068 | 0.47 | 26.8 | 1.9 kg | M6 | AWG8 (8.0 mm ²) | |
| 6.0 | 470A | X008025 | 0.49 | 28.3 | 2.6 kg | M6 | AWG8 (8.0 mm ²) | |
| 7.5 | 550A | X008026 | 0.43 | 35.5 | 2.9 kg | M6 | AWG6 (14.0 mm ²) | |
| 11 | 590A | X008027 | 0.32 | 49.7 | 3.5 kg | M6 | AWG3 | |
| 15 | 780A | X008028 | 0.26 | 72.6 | 4.0 kg | M6 | (30.0 mm ²) | |

◆ Σ-7W SERVOPACKs and Σ-7C SERVOPACKs

| SERVOPACK | | DC Reactor | | | | | | |
|--|--------------------|--------------|-----------------|----------------------|--------|---------------------|----------------------------------|------------------------|
| Maximum Applicable Motor Capacity [kW] | Model SGD7W-SGD7C- | Order Number | Inductance [mH] | Rated Current [Arms] | Mass | Terminal Screw Size | Wire Size | Inquiries |
| 0.2 | 1R6A | X5061 | 2.0 | 4.8 | 0.5 kg | M4 | AWG16 (1.25 mm ²) | Yaskawa representative |
| 0.4 | 2R8A | | | | | | | |
| 0.75 | 5R5A | X5060 | 1.5 | 8.8 | 1.0 kg | M4 | AWG14 (2.0 mm ²) | |
| 1.0 | 7R6A | | | | | | AWG10 (5.5 mm ²) | |

12.6.2 Using a Single-Phase, 200-VAC Power Supply Input

Selection Table

◆ Σ -7S SERVOPACKs

| SERVOPACK | | DC Reactor | | | | | | |
|--|----------------|--------------|-----------------|----------------------|--------|---------------------|----------------------------------|------------------------|
| Maximum Applicable Motor Capacity [kW] | Model SGD7S- | Order Number | Inductance [mH] | Rated Current [Arms] | Mass | Terminal Screw Size | Wire Size | Inquiries |
| 0.05 | R70A | X5071 | 40.0 | 0.85 | 0.5 kg | M4 | AWG16 (1.25 mm ²) | Yaskawa representative |
| 0.1 | R90A | | | | | | | |
| 0.2 | 1R6A | X5070 | 20.0 | 1.65 | 0.8 kg | M4 | | |
| 0.4 | 2R8A | X5069 | 10.0 | 3.3 | 1.0 kg | M4 | | |
| 0.75 | 5R5A | X5079 | 4.0 | 5.3 | 1.2 kg | M4 | | |
| 1.5 | 120A□□□ 008 | X5078 | 2.5 | 10.5 | 2.0 kg | M5 | AWG14 (2.0 mm ²) | |

◆ Σ -7W SERVOPACKs and Σ -7C SERVOPACKs

| SERVOPACK | | DC Reactor | | | | | | |
|--|--------------|--------------|-----------------|----------------------|--------|---------------------|----------------------------------|------------------------|
| Maximum Applicable Motor Capacity [kW] | Model SGD7S- | Order Number | Inductance [mH] | Rated Current [Arms] | Mass | Terminal Screw Size | Wire Size | Inquiries |
| 0.2 | 1R6A | X5069 | 10.0 | 3.3 | 1.0 kg | M4 | AWG16 (1.25 mm ²) | Yaskawa representative |
| 0.4 | 2R8A | X5079 | 4.0 | 5.3 | 1.2 kg | M4 | | |
| 0.75 | 5R5A | X5078 | 2.5 | 10.5 | 2.0 kg | M5 | AWG14 (2.0 mm ²) | |

12.6.3 Using a Single-Phase, 100-VAC Power Supply Input

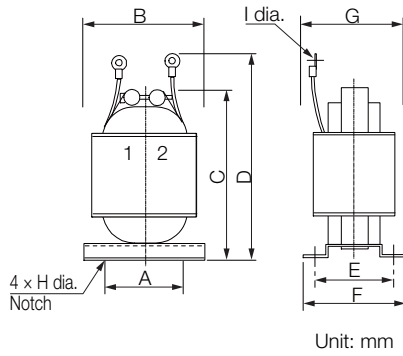
Selection Table

◆ Σ -7S SERVOPACKs

| SERVOPACK | | AC Reactor | | | | | | |
|--|--------------|--------------|-----------------|----------------------|--------|---------------------|----------------------------------|------------------------|
| Maximum Applicable Motor Capacity [kW] | Model SGD7S- | Order Number | Inductance [mH] | Rated Current [Arms] | Mass | Terminal Screw Size | Wire Size | Inquiries |
| 0.05 | R70F | X5053 | 20.0 | 2.0 | 0.6 kg | M4 | AWG16 (1.25 mm ²) | Yaskawa representative |
| 0.1 | R90F | | | | | | | |
| 0.2 | 2R1F | X5054 | 5.0 | 3.0 | 0.4 kg | M4 | | |
| 0.4 | 2R8F | X5056 | 2.0 | 5.0 | 0.4 kg | M4 | | |

12.6.4 External Dimensions

External Dimensions



| AC/DC Reactor Order Number | External Dimensions [mm] | | | | | | | | | Approx. Mass [kg] |
|----------------------------|--------------------------|----|-----|-----|----|----|-----|-----|-----|-------------------|
| | A | B | C | D | E | F | G | H | I | |
| X5053 | 35 | 52 | 90 | 105 | 35 | 45 | 50 | 4 | 4.3 | 0.6 |
| X5054 | 35 | 52 | 80 | 95 | 30 | 40 | 45 | 4 | 4.5 | 0.4 |
| X5056 | 35 | 52 | 80 | 95 | 30 | 40 | 45 | 4 | 4.3 | 0.4 |
| X5059 | 50 | 74 | 125 | 140 | 35 | 45 | 60 | 5 | 5.3 | 1.1 |
| X5060 | 40 | 59 | 105 | 125 | 45 | 60 | 65 | 4 | 4.3 | 1.0 |
| 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 |
| X008025 | 75 | 95 | 155 | 225 | 55 | 70 | 76 | 4.5 | 6.4 | 2.6 |
| X008026 | 75 | 95 | 155 | 225 | 60 | 75 | 81 | 4.5 | 6.4 | 2.9 |
| X008027 | 75 | 95 | 155 | 215 | 70 | 85 | 91 | 4.5 | 6.4 | 3.5 |
| X008028 | 75 | 95 | 160 | 225 | 80 | 95 | 101 | 4.5 | 6.4 | 4.0 |

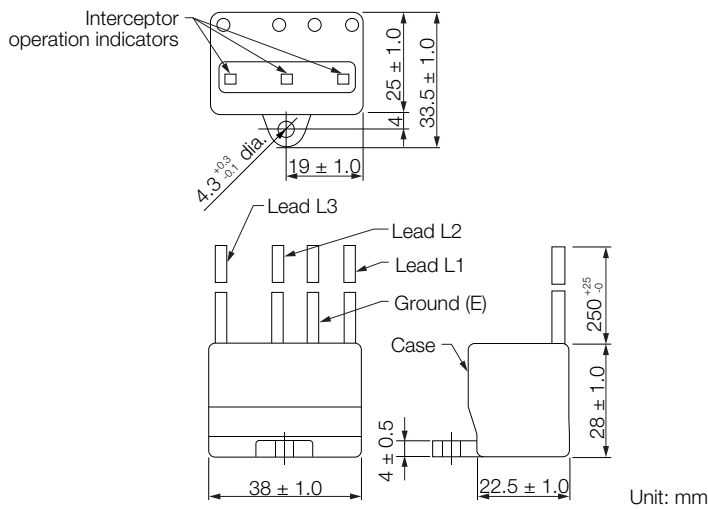
12.7 Surge Absorbers

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: | | Order Number (Recommended Product) | Manufacturer | Inquires |
|---------------------------|------------------|--------------|------------------------------------|---------------------------|------------------------|
| | SGD7S- | SGD7W-SGD7C- | | | |
| Three-phase, 200 VAC | □□□A | □□□A | LT-C32G801WS | Soshin Electric Co., Ltd. | Yaskawa representative |
| Single-phase, 200 VAC | | | LT-C12G801WS | | |
| Single-phase, 100 VAC | □□□F | - | | | |

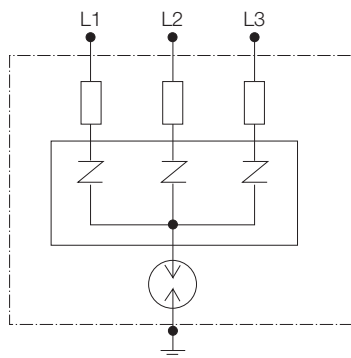
External Dimensions



* 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



12.8 Regenerative Resistor

If the regenerative power exceeds the amount that can be absorbed by charging the smoothing capacitor, a regenerative resistor is used.

12.8.1 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:

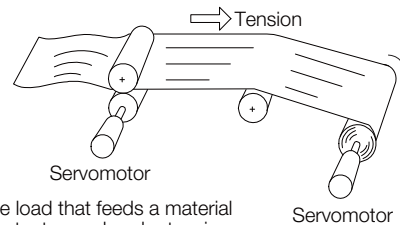
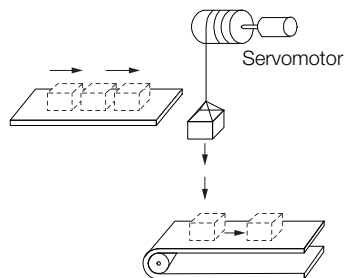
- While decelerating to a stop during acceleration/deceleration operation.
- While performing continuous downward operation on a vertical axis.
- During continuous operation in which the Servomotor is rotated by the load (i.e., a negative load).



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

12.8.2 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).


12.8.3 Selection Table

| SERVOPACK Model | | Built-In Regenerative Resistor | External Regenerative Resistor | Description |
|---|---------------------------|--------------------------------|--------------------------------|--|
| SGD7S- | SGD7W-SGD7C- | | | |
| R70A, R90A, 1R6A, 2R8A, R70F, R90F, 2R1F, or 2R8F | – | 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* ¹ | 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.* ² | 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. |

*1. Refer to the following section for the specifications of built-in regenerative resistors.

 12.8.4 Specifications of Built-in Regenerative Resistors in SERVOPACKs on page 12-33

*2. Regenerative Resistor Units are available. Refer to the following section for details.

 Regenerative Resistor Units on page 12-36

12.8.4 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-SGD7C- | Resistance [Ω] | Capacity [W] | | |
| R70A, R90A, 1R6A, 2R8A, R70F, R90F, 2R1F, or 2R8F | – | – | – | – | 40 |
| 3R8A, 5R5A, or 7R6A | 1R6A or 2R8A | 40 | 40 | 8 | 40 |
| 120A | – | 20 | 60 | 12 | 20 |
| 120A□□□008, 180A, or 200A | 5R5A or 7R6A | 12 | 60 | 12 | 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 |

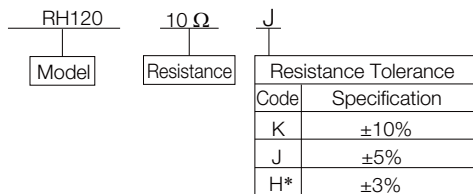
*1. Values in parentheses are for the optional JUSP-RA04-E Regenerative Resistor Unit.

*2. Values in parentheses are for the optional JUSP-RA05-E Regenerative Resistor Unit.

12.8.5 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 representative |
| RH150 | 90 W, 1 Ω to 100 Ω | 412 g | AWG14 (2.0 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) | | |
| RH450 | 150 W, 1 Ω to 100 Ω | 880 g | AWG14 (2.0 mm ²) | | |
| RH450FY | 150 W, 2 Ω to 100 Ω | 1.3 kg | AWG14 (2.0 mm ²) | | |
| RH500 | 300 W, 2 Ω to 50 Ω | 1.4 kg | AWG14 (2.0 mm ²) | | |



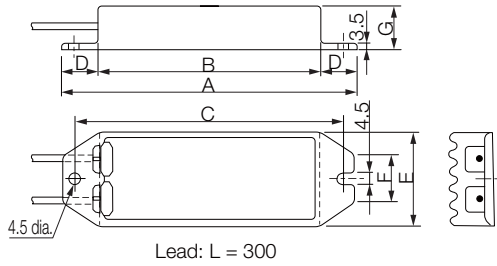
* An External Regenerative Resistor with resistance tolerance H (±3%) is not available for the RH450FY.

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

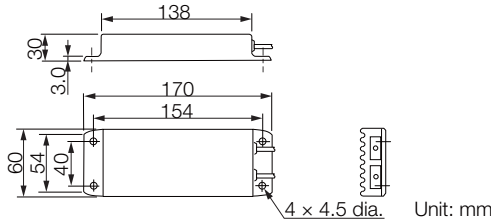
◆ Model: RH120, RH150, or RH220



| Model | Rated Power | Resistance Range | Wire Size |
|-------|-------------|------------------|-------------------------------|
| RH120 | 70 W | 1 Ω to 100 Ω | AWG16 (1.25 mm ²) |
| RH150 | 90 W | | AWG14 (2.0 mm ²) |
| RH220 | 120 W | | AWG16 (1.25 mm ²) |

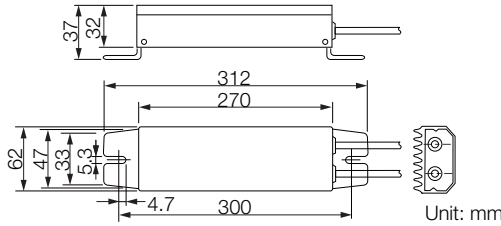
| External Dimensions (Unit: mm) | | | | | | | Mass |
|--------------------------------|-----|-----|----|----|----|----|-------|
| A | B | C | D | E | F | G | |
| 182 | 150 | 172 | 16 | 42 | 22 | 20 | 282 g |
| 212 | 180 | 202 | 16 | 44 | 24 | 30 | 412 g |
| 230 | 200 | 220 | 15 | 60 | 24 | 20 | 500 g |

◆ Model: RH220B



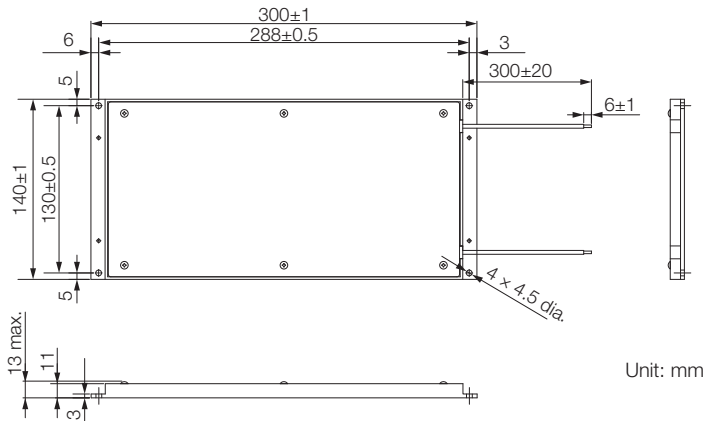
Lead: L = 500
 Rated power: 120 W
 Resistance range: 1 Ω to 100 Ω
 Wire size: AWG14 (2.0 mm²)
 Mass: 495 g

◆ Model: RH300C



Lead: L = 300
 Rated power: 200 W
 Resistance range: 1 Ω to 10 kΩ
 Wire size: AWG14 (2.0 mm²)
 Mass: 850 g

◆ Model: RH450

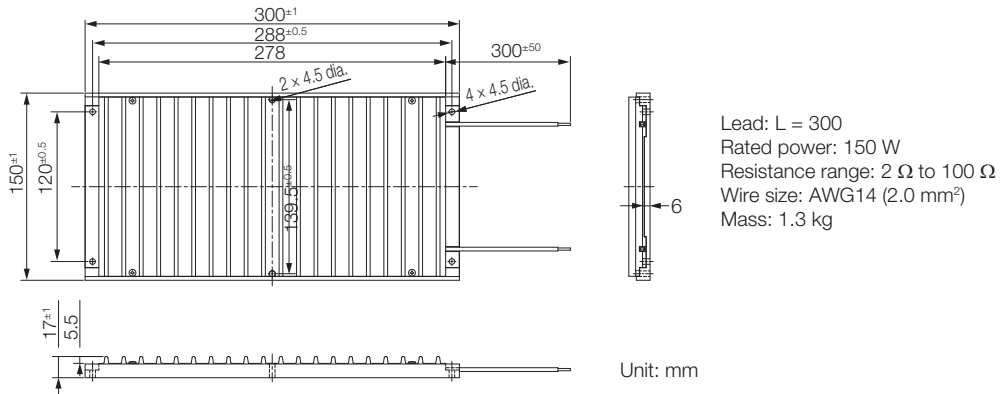


Lead: L = 300
 Rated power: 150 W
 Resistance range: 1 Ω to 100 Ω
 Wire size: AWG14 (2.0 mm²)
 Mass: 880 g

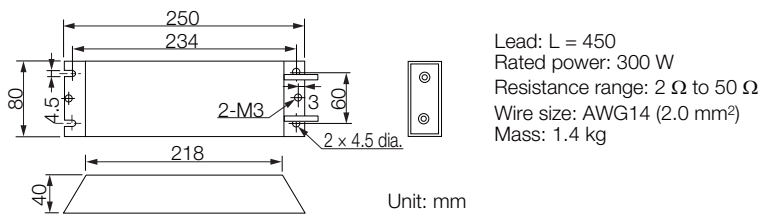
12.8 Regenerative Resistor

12.8.5 Specifications and Dimensions of External Regenerative Resistors

◆ Model: RH450FY



◆ Model: RH500



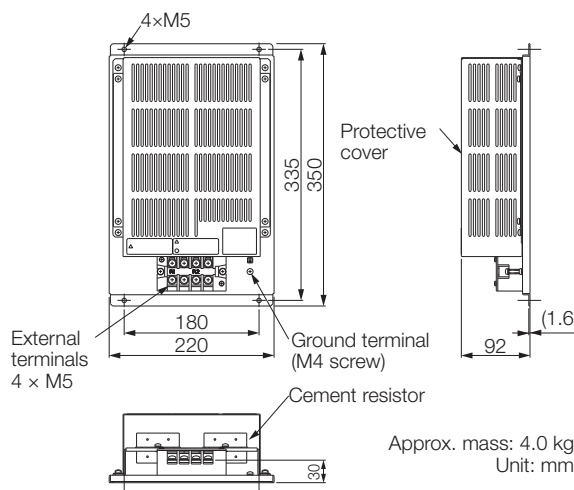
Regenerative Resistor Units

| 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 |

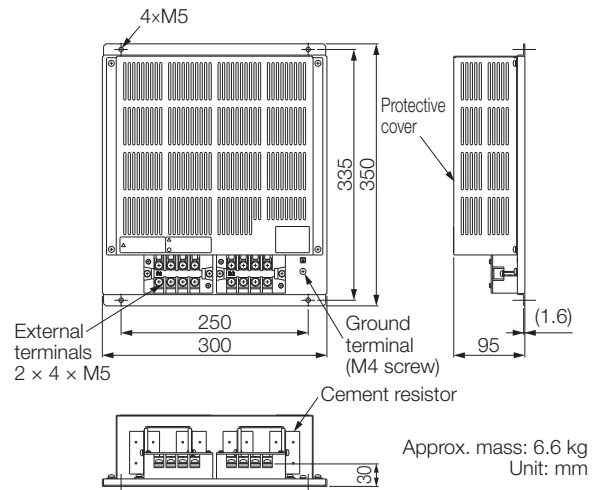
Note: If you use only the above Regenerative Resistor Units, you do not need to change the setting of Pn600 (Regenerative Resistor Capacity) or Pn603 (Regenerative Resistance).

◆ External Dimensions

■ JUSP-RA04-E





■ JUSP-RA05-E



12.8.6 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 12-37

 *Calculating the Regenerative Energy* on page 12-42

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, -2R8A, -R70F, -R90F, -2R1F, and -2R8F

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 | |
| | R70F, R90F, 2R1F | 28.6 | Value when main circuit input voltage is 100 VAC |
| | 2R8F | 48.4 | |

Calculate the rotational energy (E_S) of the servo system with the following equation:

$$E_S = J \times (n_M)^2 / 182 \text{ (Joules)}$$

- $J = J_M + J_L$
- J_M : Servomotor moment of inertia ($\text{kg}\cdot\text{m}^2$)
- J_L : Load moment of inertia at motor shaft ($\text{kg}\cdot\text{m}^2$)
- 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
SGD7C-1R6A, -2R8A, -5R5A, or -7R6A

The above SERVOPACKs require regenerative resistors. Regenerative resistors are built into all of the SERVOPACKs in advance except for the SGD7S-470A, -550A, -590A, and -780A. If you use the SGD7S-470A, -550A, -590A, or -780A, always provide an external regenerative resistor. Refer to the following section for details.

📖 12.8.3 Selection Table on page 12-33

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 below. For the SGD7S-470A, -550A, -590A, and -780A, the allowable frequencies are given for when a Regenerative Resistor Unit is connected. Refer to the following section for details on Regenerative Resistor Units.

📖 Regenerative Resistor Units on page 12-36

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) | | Servomotor Model | | Allowable Frequencies in Regenerative Operation (Rotations/Min) | |
|------------------|-----|---|--|------------------|-----|---|--|
| | | SERVOPACK Model: SGD7S | SERVOPACK Model: SGD7W or SGD7C (Simultaneous Operation of Two Axes) | | | SERVOPACK Model: SGD7S | SERVOPACK Model: SGD7W or SGD7C (Simultaneous Operation of Two Axes) |
| SGM7M- | A1A | - | - | SGM7P- | 01A | - | 200 |
| | A2A | - | - | | 02A | - | 46 |
| | A3A | - | - | | 04A | - | 29 |
| SGM7J- | A5A | - | 300 | | 08A | 11 | 11 |
| | 01A | - | 180 | | 15A | 7.5 | - |
| | C2A | - | 130 | SGM7G- | 03A | 39 | 39 |
| | 02A | - | 46 | | 05A | 29 | 29 |
| | 04A | - | 25 | | 09A | 6.9 | 6.9 |
| | 06A | 30 | 30 | | 13A | 6.1 | - |
| 08A | 15 | 15 | 20A | | 7.4 | - | |
| SGM7A- | A5A | - | 560 | | 30A | 9.5 | - |
| | 01A | - | 360 | | 44A | 6.4 | - |
| | C2A | - | 260 | | 55A | 24 | - |
| | 02A | - | 87 | 75A | 34 | - | |
| | 04A | - | 56 | 1AA | 39 | - | |
| | 06A | 77 | 77 | 1EA | 31 | - | |
| | 08A | 31 | 31 | SGMMV- | A1A | - | - |
| | 10A | 31 | - | | A2A | - | - |
| | 15A | 15 | - | | A3A | - | - |
| | 20A | 19 | - | | | | |
| | 25A | 15 | - | | | | |
| | 30A | 6.9 | - | | | | |
| | 40A | 11 | - | | | | |
| 50A | 8.8 | - | | | | | |
| 70A | 86 | - | | | | | |

■ Direct Drive Servomotors

| Servomotor Model | | Allowable Frequencies in Regenerative Operation (Rotations/Min) | | Servomotor Model | | Allowable Frequencies in Regenerative Operation (Rotations/Min) | | |
|------------------|-----|---|--|------------------|--------|---|--|----|
| | | SERVOPACK Model: SGD7S | SERVOPACK Model: SGD7W or SGD7C (Simultaneous Operation of Two Axes) | | | SERVOPACK Model: SGD7S | SERVOPACK Model: SGD7W or SGD7C (Simultaneous Operation of Two Axes) | |
| SGM7D- | 01G | - | - | SGM7F- | 02A | - | 150 | |
| | 1AF | 120 | - | | 05A | - | 83 | |
| | 1CI | 74 | - | | 07A | - | 62 | |
| | 1ZI | 91 | - | | 04B | - | 75 | |
| | 02K | - | - | | 08C | - | 21 | |
| | 03H | - | - | | 10B | - | 48 | |
| | 05G | - | - | | 14B | 65 | 65 | |
| | 06J | 350 | - | | 16D | 13 | 13 | |
| | 06L | - | - | | 17C | 30 | 30 | |
| | 07K | - | - | | 25C | 31 | 31 | |
| | 08G | 430 | - | | 35D | 19 | 19 | |
| | 08K | - | - | | 45M | 25 | 25 | |
| | 09J | 250 | - | | 80M | 19 | - | |
| | 12L | - | - | | 1AM | 8.9 | - | |
| | 18G | 350 | - | | 80N | 22 | - | |
| | 18J | 210 | - | | 1EN | 11 | - | |
| | 20J | 200 | - | | 2ZN | 9.1 | - | |
| | 24G | 270 | - | | SGM7E- | 04B | - | 75 |
| | 28I | 52 | - | | | 08C | - | 21 |
| | 2BI | 89 | - | | | 10B | - | 48 |
| | 2DI | 110 | - | | | 14B | 65 | 65 |
| | 30F | 210 | - | | | 16D | 13 | 13 |
| | 30L | 63 | - | | | 17C | 30 | 30 |
| | 38J | 150 | - | | | 25C | 31 | 31 |
| | 34G | 220 | - | | 35D | 19 | 19 | |
| | 45G | 190 | - | | SGM7E- | 02B | - | 62 |
| 58F | 170 | - | 05B | - | | 34 | | |
| 70I | 100 | - | 07B | - | | 22 | | |
| 90F | 140 | - | 04C | - | | 22 | | |
| SGM7E- | 02B | - | 62 | 08D | | - | 6.1 | |
| | 05B | - | 34 | 10C | | - | 19 | |
| | 07B | - | 22 | 14C | | - | 22 | |
| | 04C | - | 22 | 17D | | - | 7 | |
| | 08D | - | 6.1 | 25D | | - | 9.3 | |
| | 10C | - | 19 | 16E | | 3.7 | 3.7 | |
| | 14C | - | 22 | 35E | | 9.7 | 9.7 | |
| | 17D | - | 7 | 45M | | 25 | 25 | |
| | 25D | - | 9.3 | 80M | | 19 | - | |
| | 16E | 3.7 | 3.7 | 80N | | 8.9 | - | |
| | 35E | 9.7 | 9.7 | 1AM | 22 | - | | |
| SGM7E- | | | | 1EN | 11 | - | | |
| | | | | 2ZN | 9.1 | - | | |
| | | | | | | | | |
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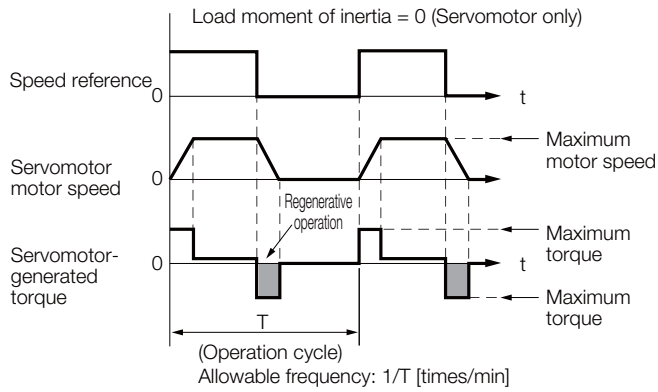
■ Linear Servomotors

| Servomotor Model | | Allowable Frequencies in Regenerative Operation (Rotations/Min) | |
|---|---------|---|--|
| | | SERVO-PACK Model: SGD7S | SERVOPACK Model: SGD7W or SGD7C (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 |
| 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 | - | |

| Servomotor Model | | Allowable Frequencies in Regenerative Operation (Rotations/Min) | |
|------------------|---------|---|--|
| | | SERVOPACK Model: SGD7S | SERVOPACK Model: SGD7W or SGD7C (Simultaneous Operation of Two Axes) |
| SGLFW- | 20A090A | - | 27 |
| | 20A120A | - | 21 |
| | 35A120A | - | 14 |
| | 35A230A | 16 | 16 |
| | 50A200B | 10 | 10 |
| | 50A380B | 6.9 | - |
| | 1ZA200B | 7.8 | - |
| | 1ZA380B | 6.6 | - |
| 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 | |

*1. This value is in combination with the SGD7S-120A.

*2. This value is in combination with the SGD7S-180A.



Operating Conditions for Calculating the Allowable Regenerative Frequency

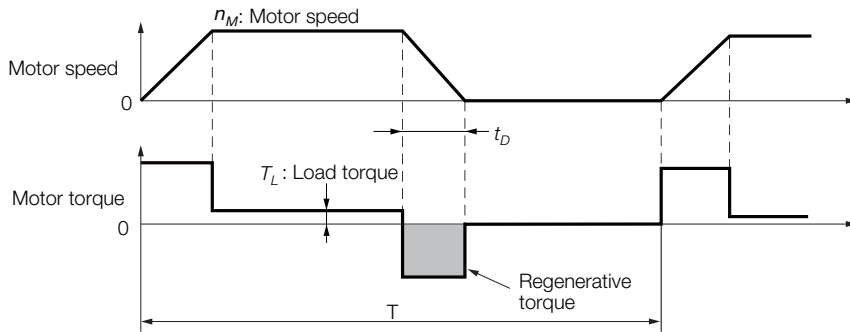
Use the following equation to calculate the allowable frequency for regenerative operation.

$$\text{Allowable frequency} = \frac{\text{Allowable frequency for regenerative operation for Servomotor without load}}{(1+n)} \times \left(\frac{\text{Maximum motor speed}}{\text{Operating motor speed}} \right)^2 \text{ (time/min)}$$

- $n = J_L/J_M$
- J_M : Servomotor moment of inertia ($\text{kg}\cdot\text{m}^2$)
- J_L : Load moment of inertia at motor shaft ($\text{kg}\cdot\text{m}^2$)

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 12-44) $\times t_D$ |
| 4 | Calculate the energy that can be absorbed by the SERVOPACK. | E_C | Calculate from the graphs in ◆ SERVOPACK-absorbable Energy on page 12-43 |
| 5 | Calculate the energy consumed by the regenerative resistor. | E_K | $E_K = E_S - (E_L + E_M + E_C)$ |
| 6 | Calculate the required regenerative resistor capacity (W). | W_K | $W_K = E_K/(0.2 \times T)$ |

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.

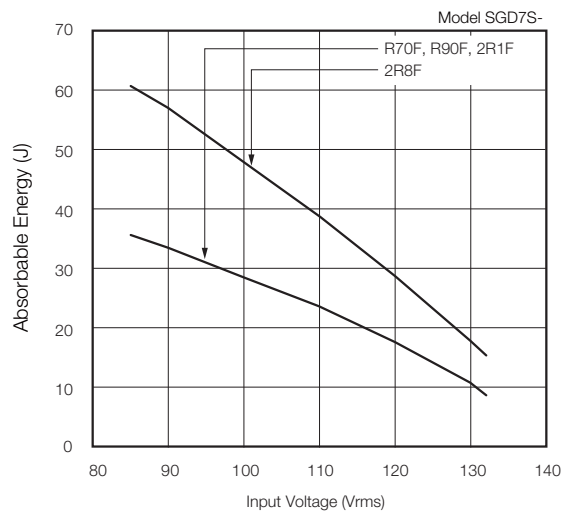
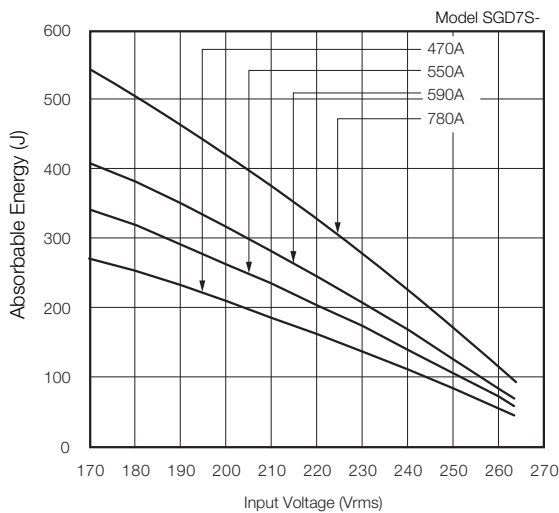
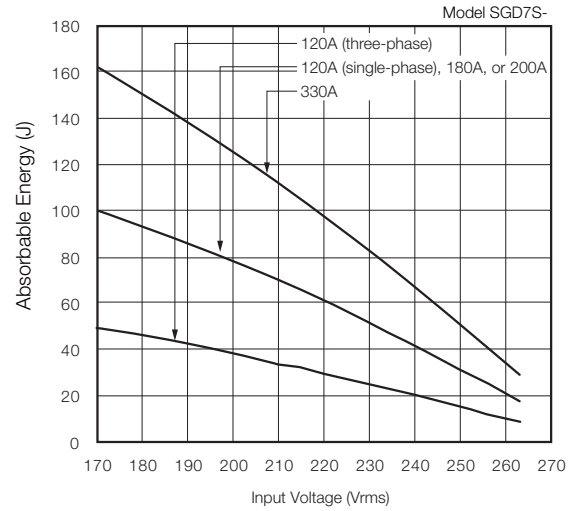
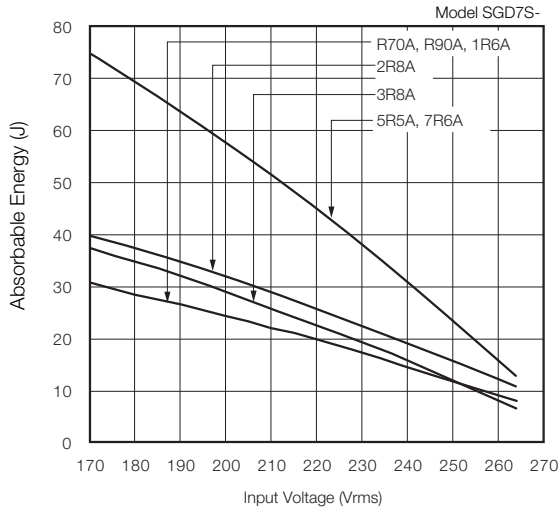
| Symbol | Description | Symbol | Description |
|----------------|---|--------|---------------------------------------|
| E_S to E_K | Energy in joules (J) | T_L | Load torque (N·m) |
| W_K | Required regenerative resistor capacity (W) | t_D | Deceleration stopping time (s) |
| J | $= J_M + J_L$ (kg·m ²) | T | Servomotor repeat operation cycle (s) |
| n_M | Servomotor motor speed (min ⁻¹) | | |

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 resistors, 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.

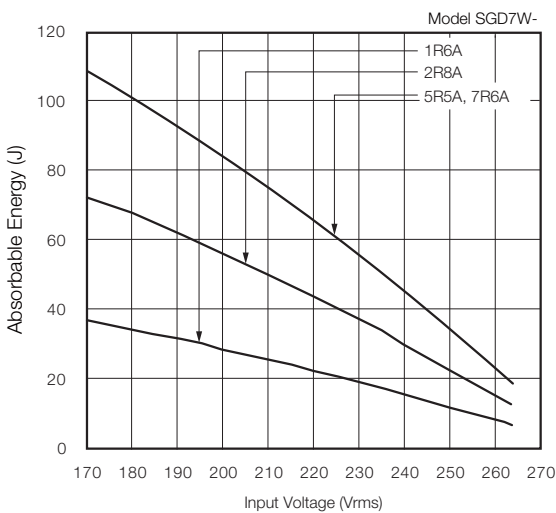
◆ **SERVOPACK-absorbable Energy**

The following figures show the relationship between the SERVOPACK's input power supply voltage and its absorbable energy.

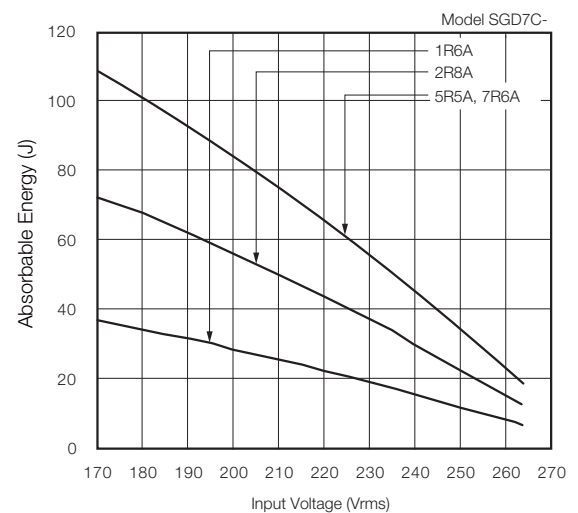
■ **Σ-7S SERVOPACKs**



■ **Σ-7W SERVOPACKs**



■ **Σ-7C SERVOPACKs**



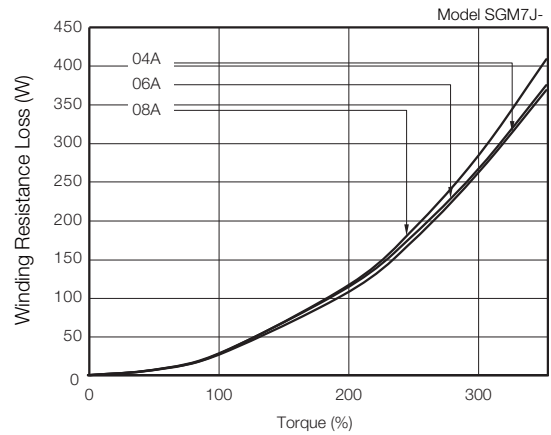
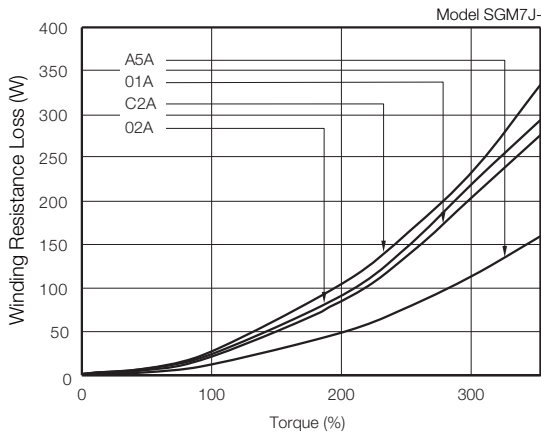
◆ Servomotor Winding Resistance Loss

The following figures show the relationship for each Servomotor between the Servomotor's generated torque and the winding resistance loss.

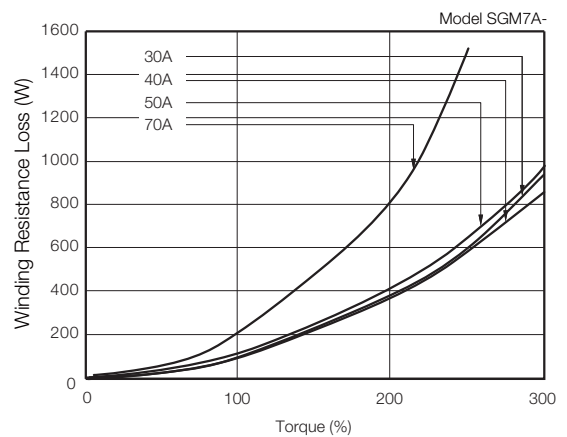
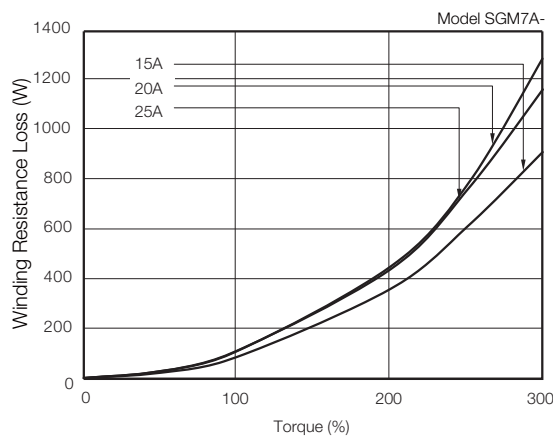
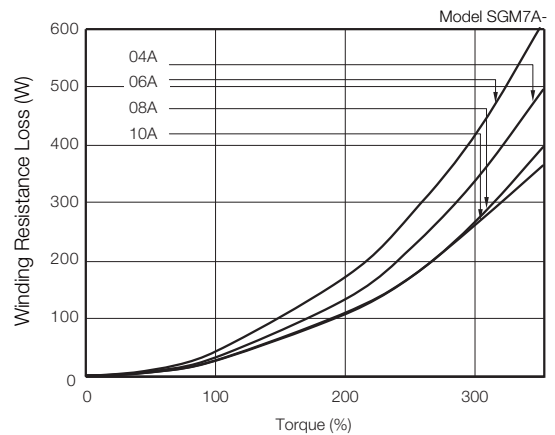
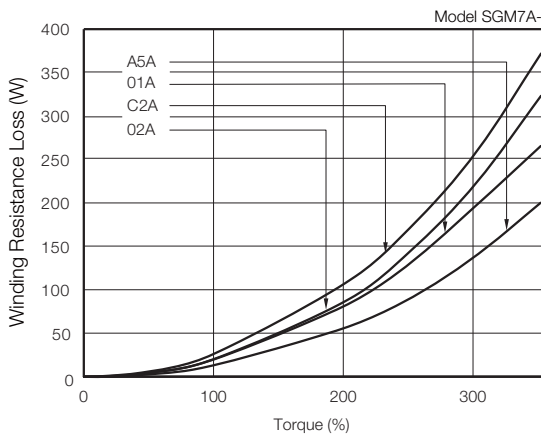
■ SGM7M Rotary Servomotors

Contact your Yaskawa representative for information on SGM7M Servomotors.

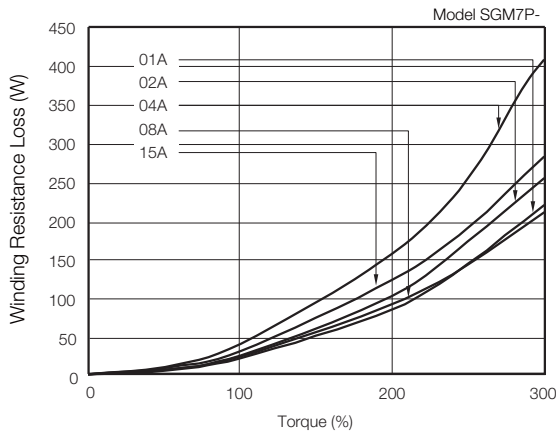
■ SGM7J Rotary Servomotors



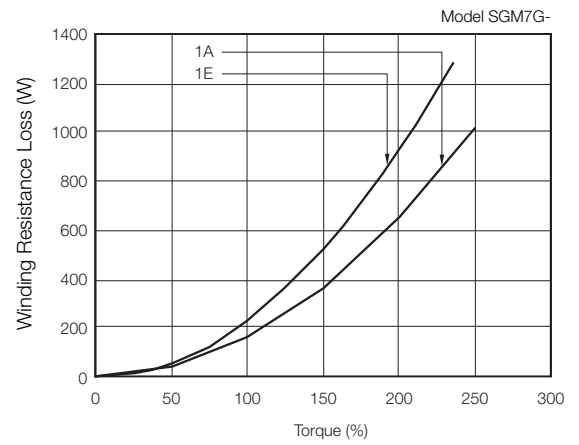
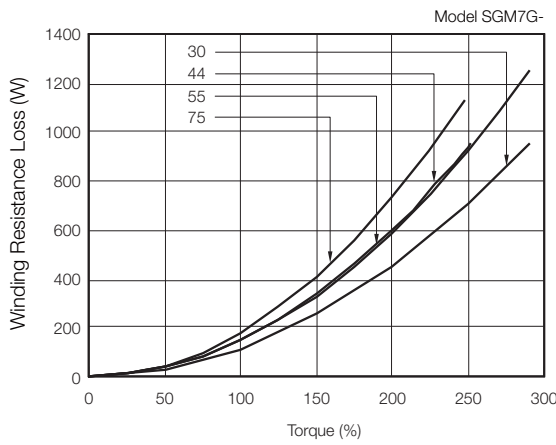
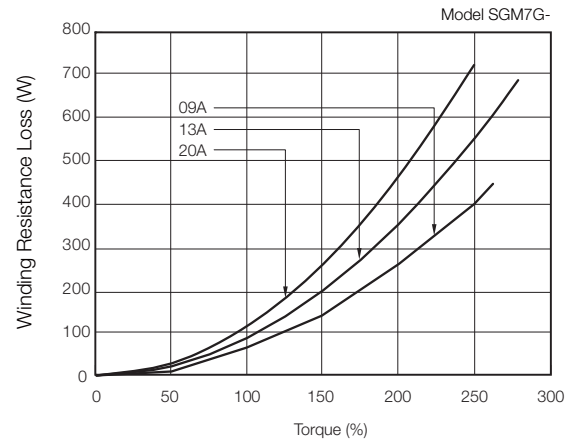
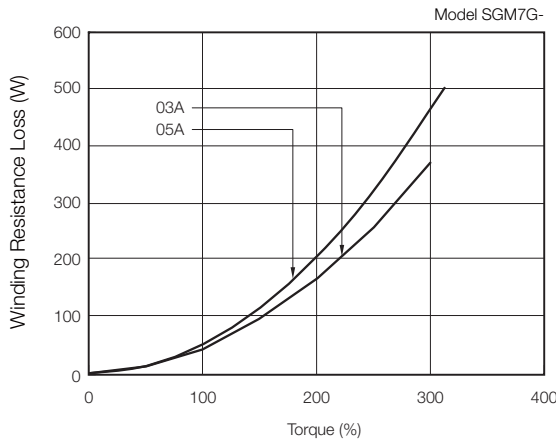
■ SGM7A Rotary Servomotors



■ SGM7P Rotary Servomotors



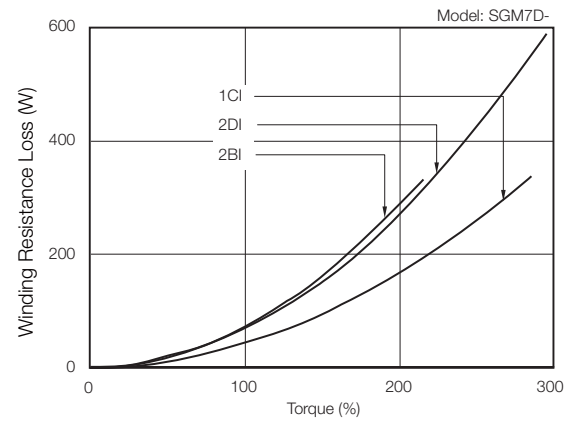
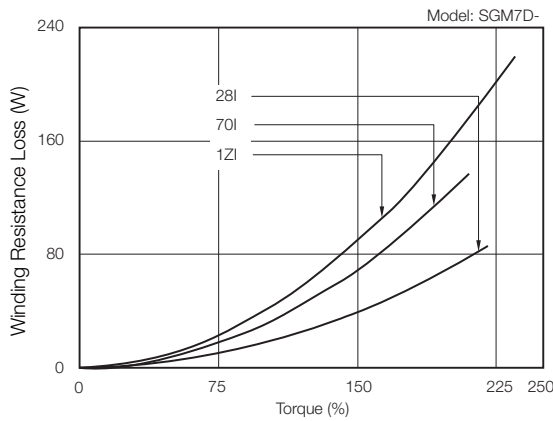
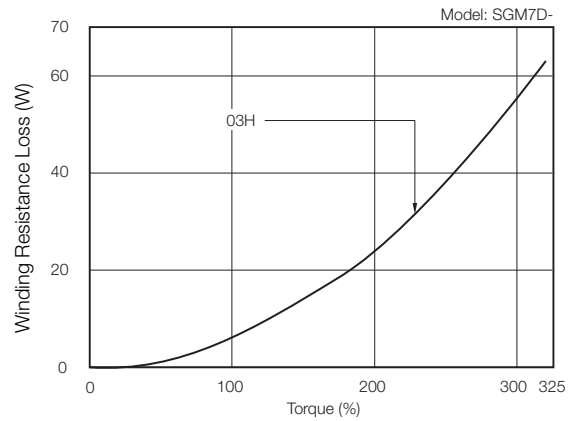
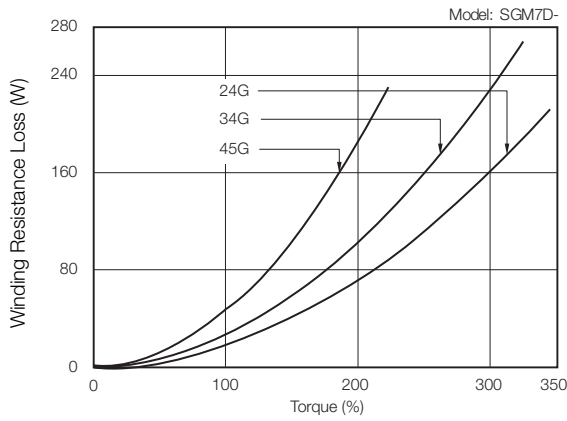
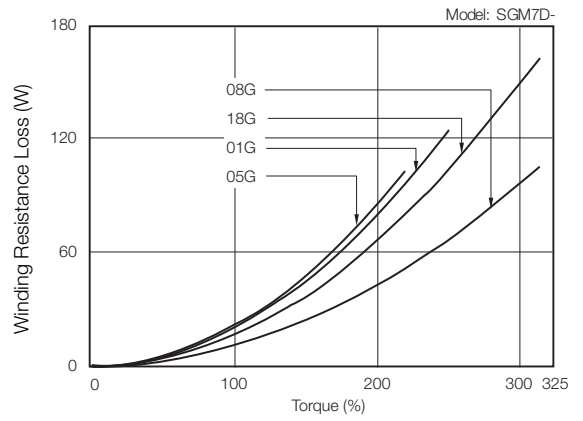
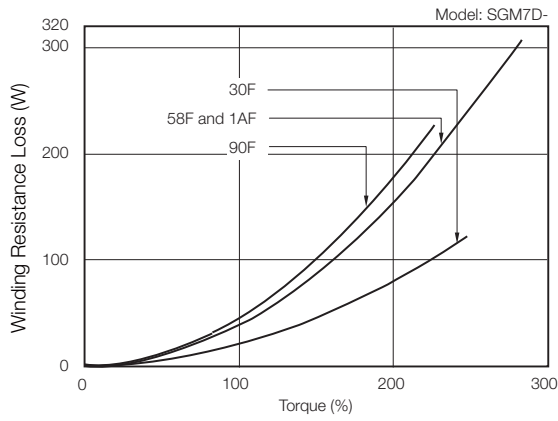
■ SGM7G Rotary Servomotors



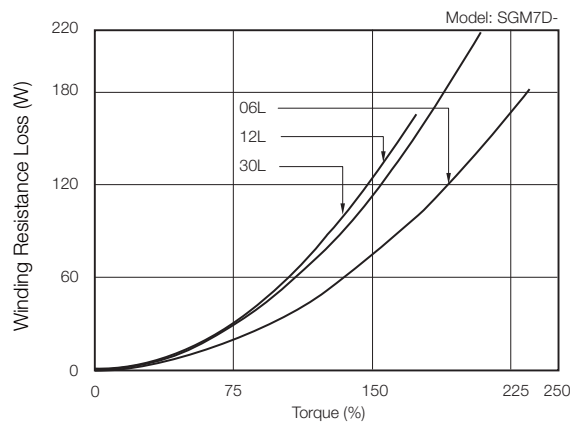
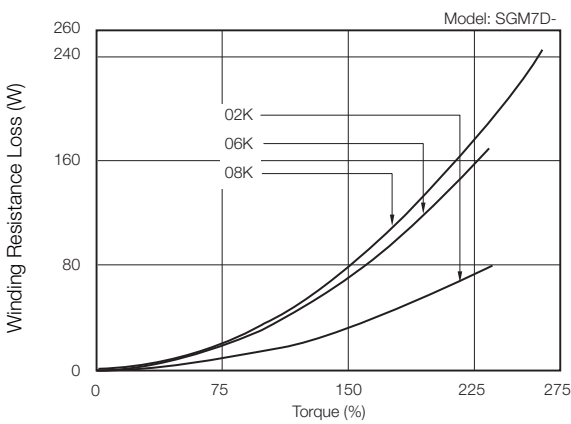
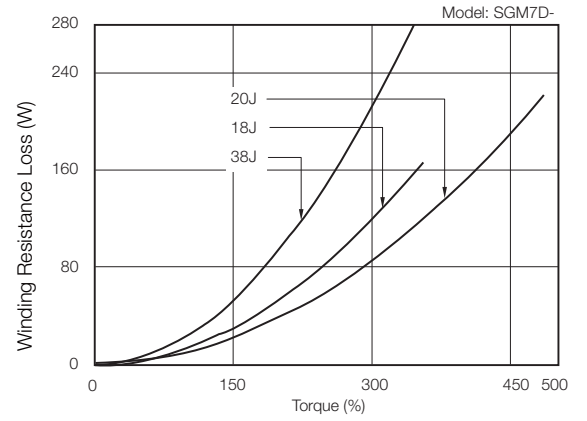
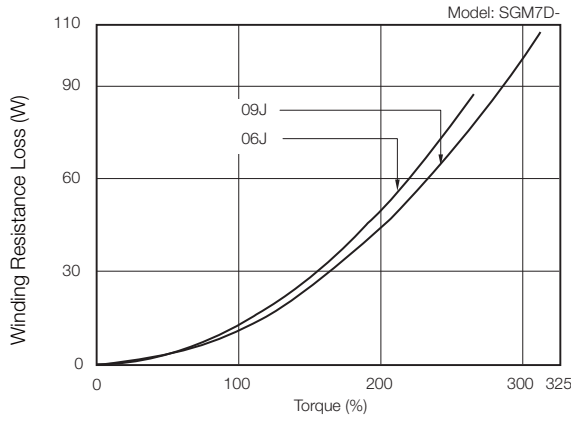
■ SGMMV Rotary Servomotors

Contact your Yaskawa representative for information on SGMMV Servomotors.

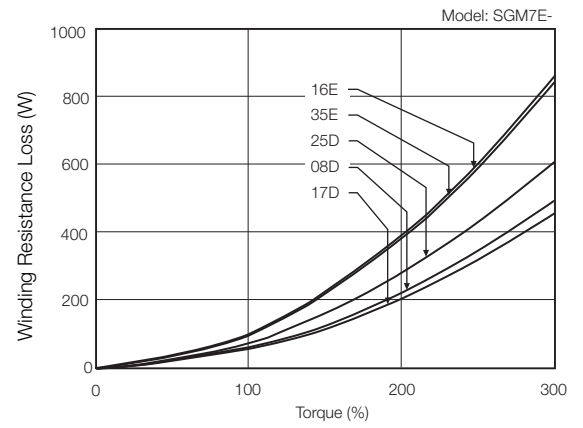
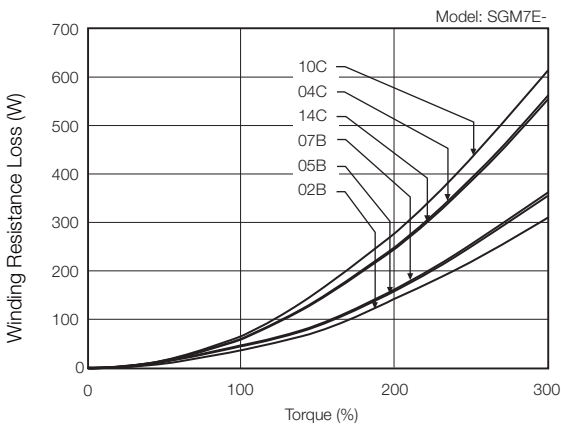
■ SGM7D Direct Drive Servomotors



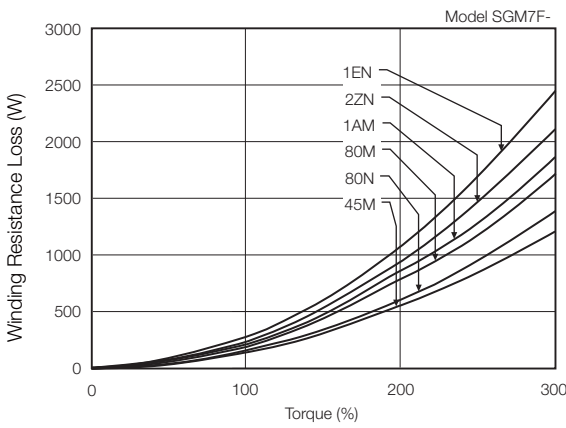
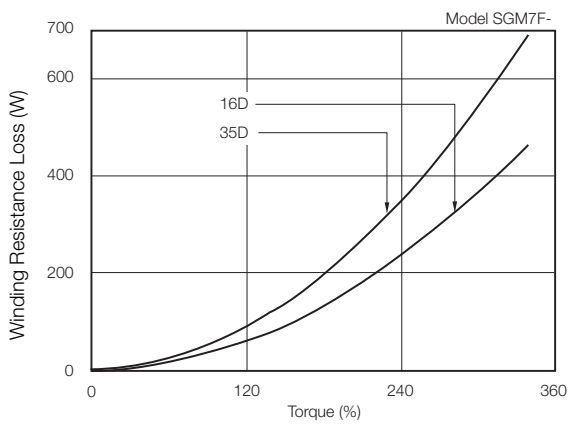
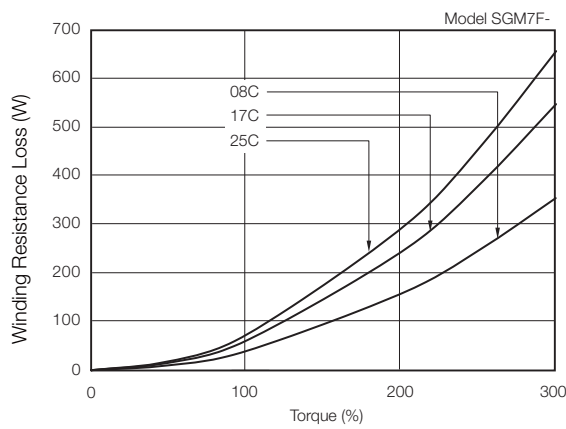
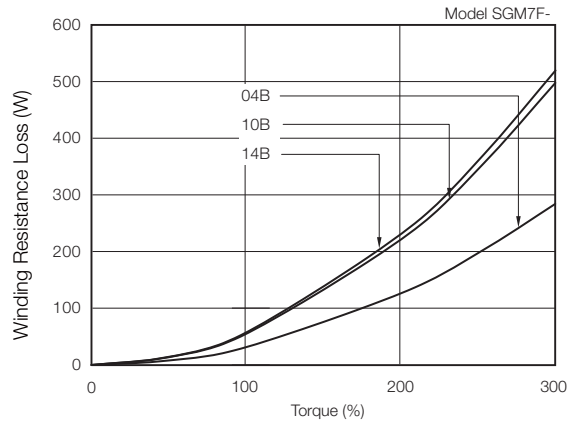
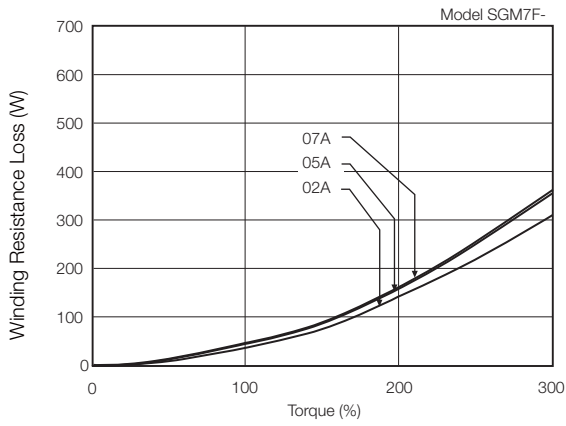
12.8.6 Selecting External Regenerative Resistor



■ SGM7E Direct Drive Servomotors

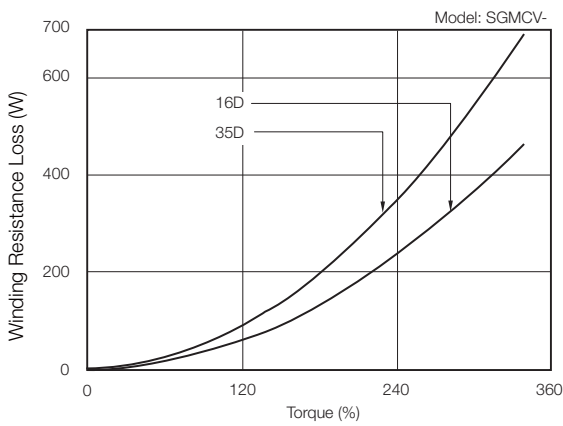
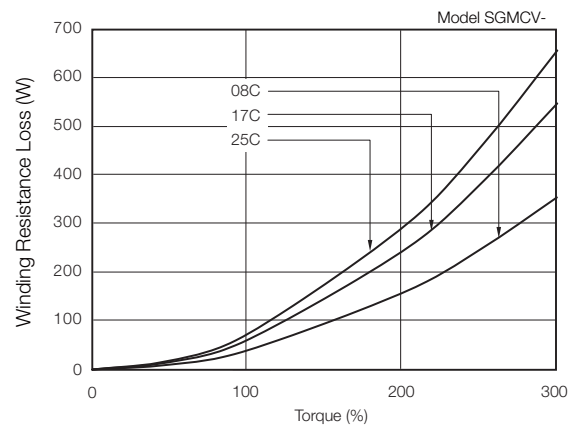
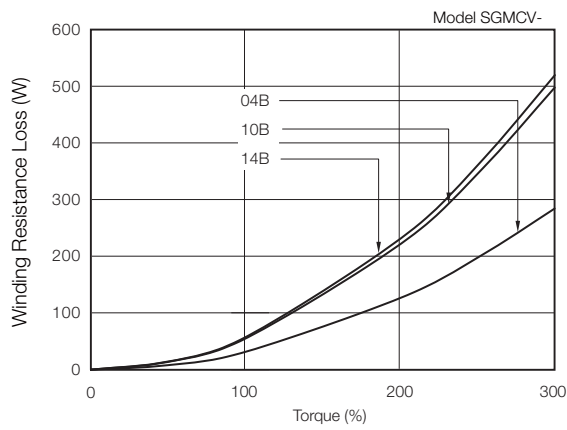


■ SGM7F Direct Drive Servomotors

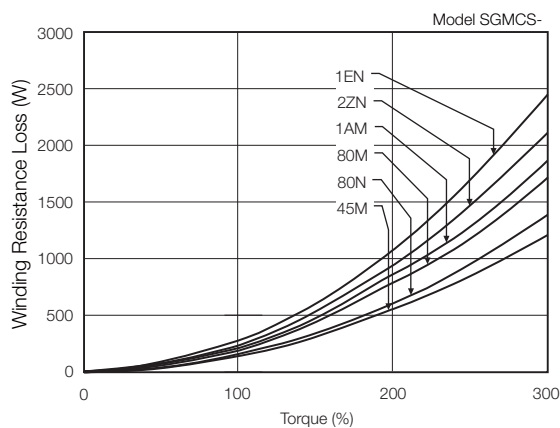
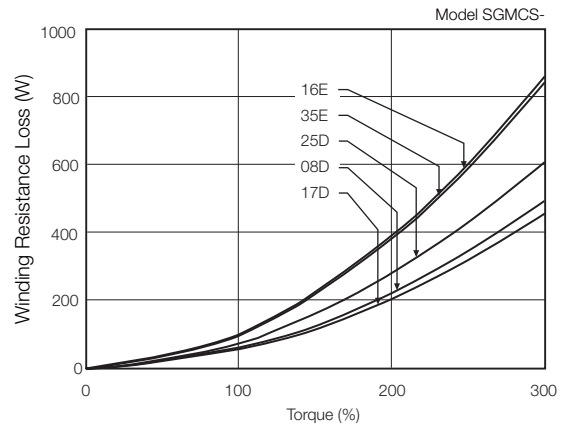
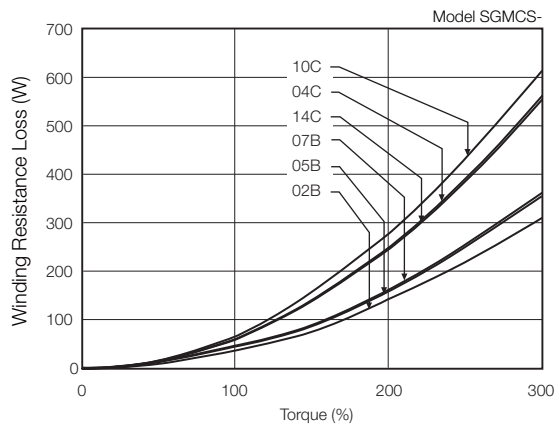


Note: Contact your Yaskawa representative for information on SGM7F-□□□ Servomotors.

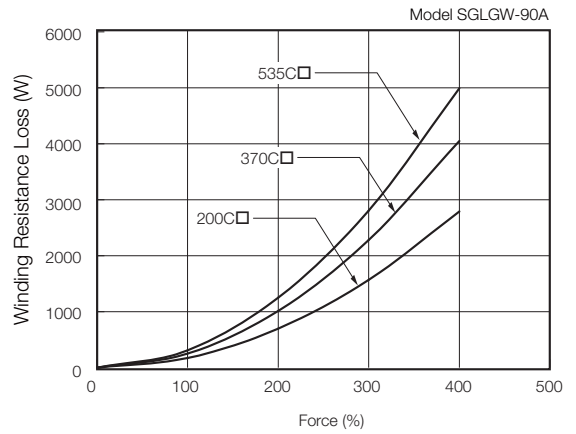
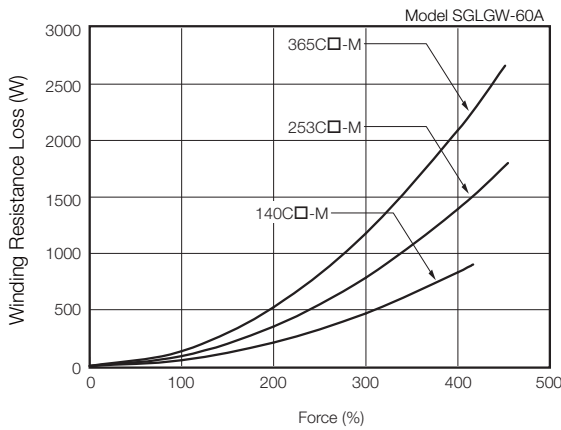
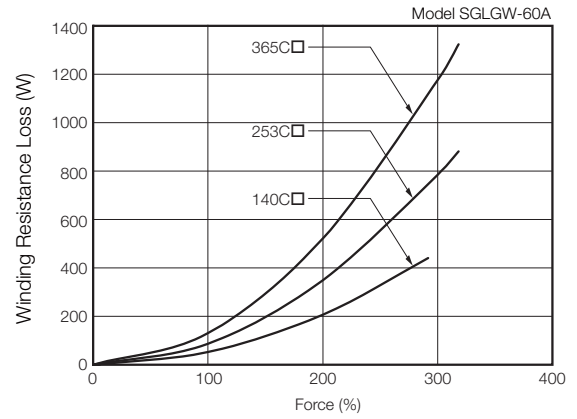
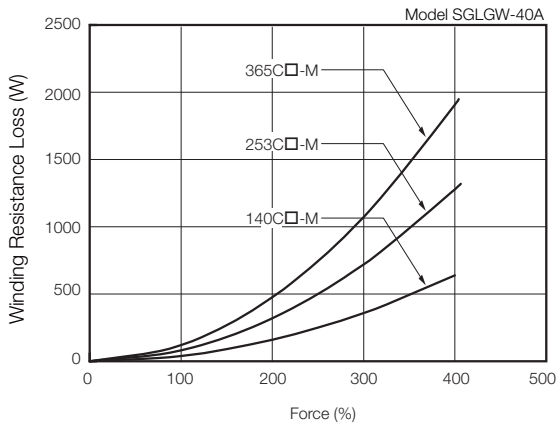
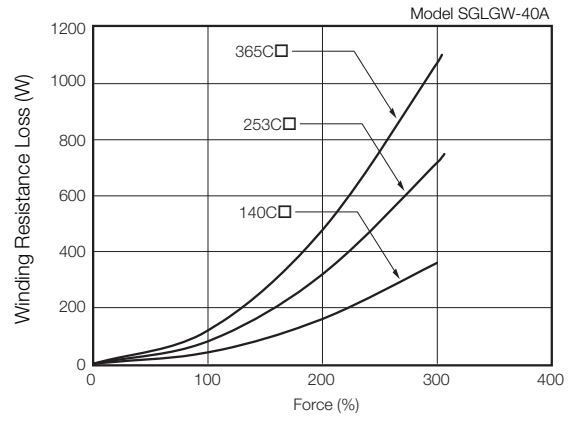
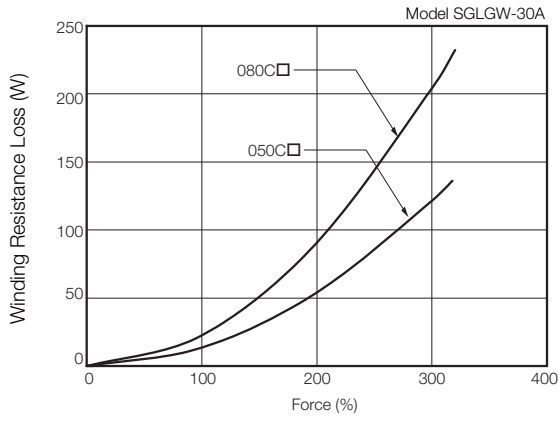
■ SGMCV Direct Drive Servomotors



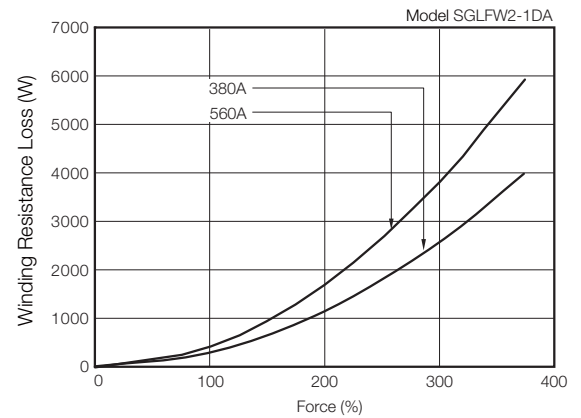
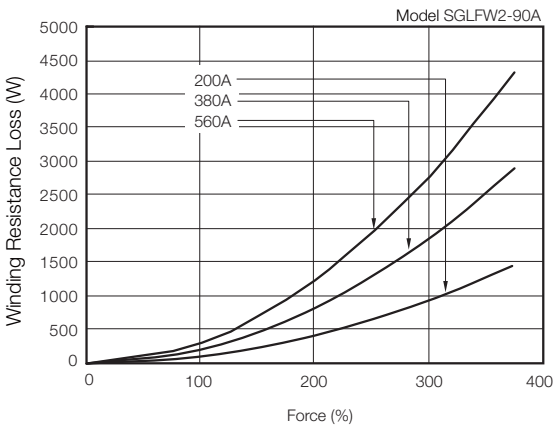
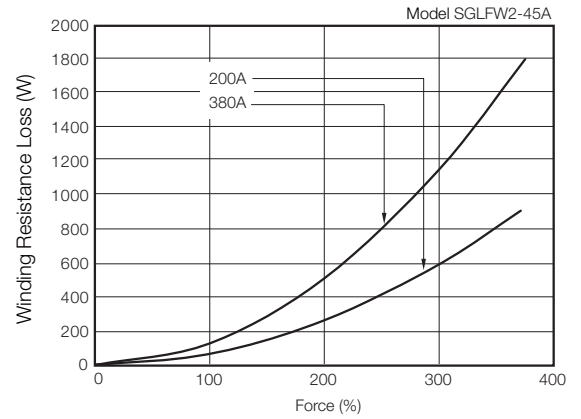
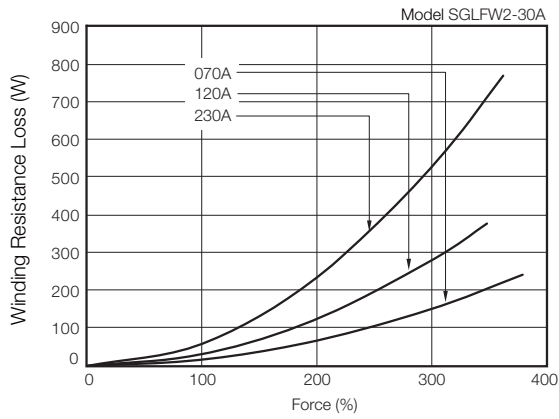
■ SGMCS Direct Drive Servomotors



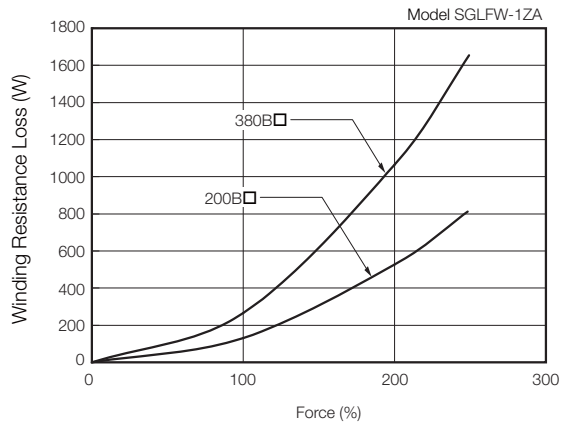
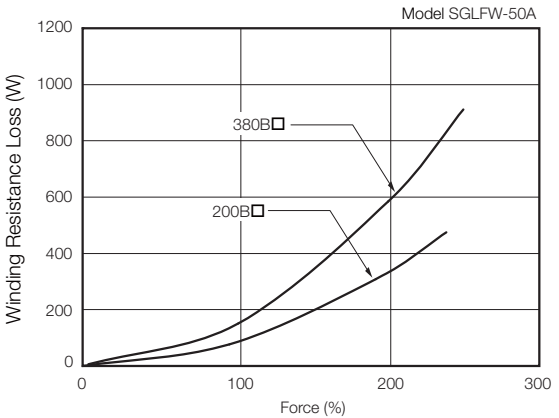
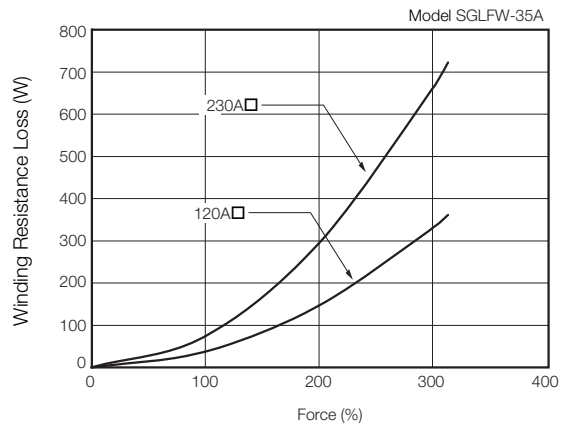
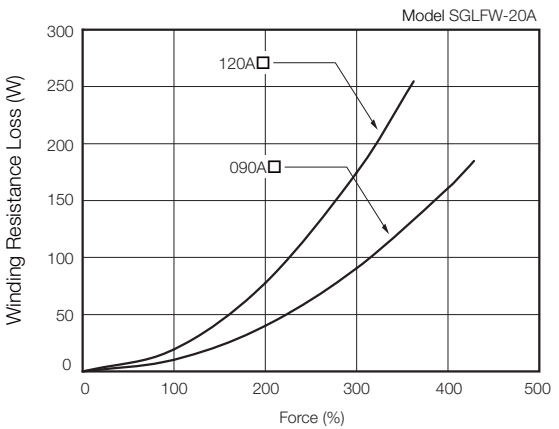
■ SGLGW Linear Servomotors



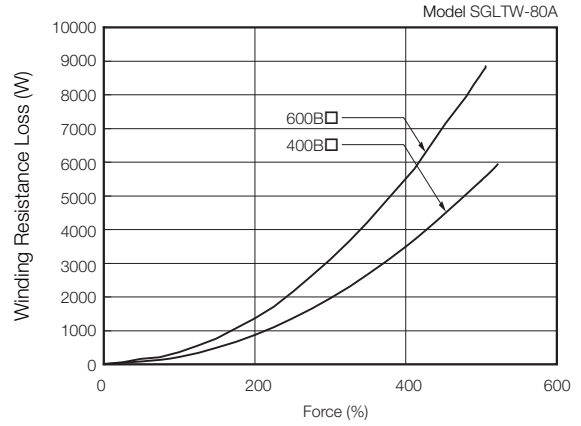
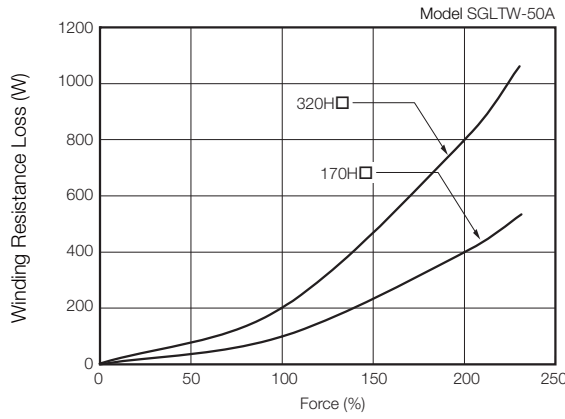
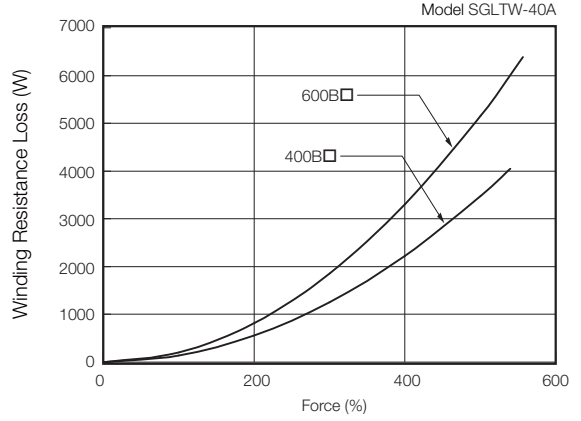
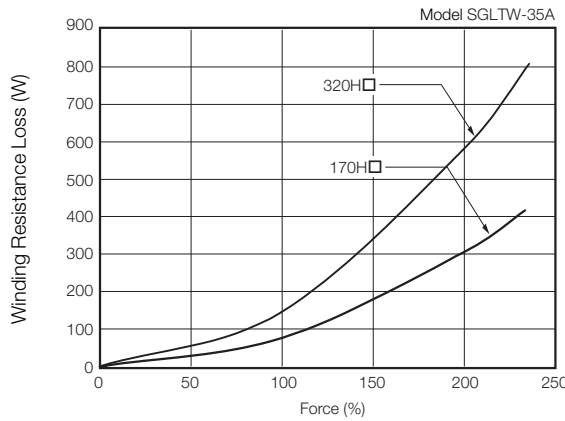
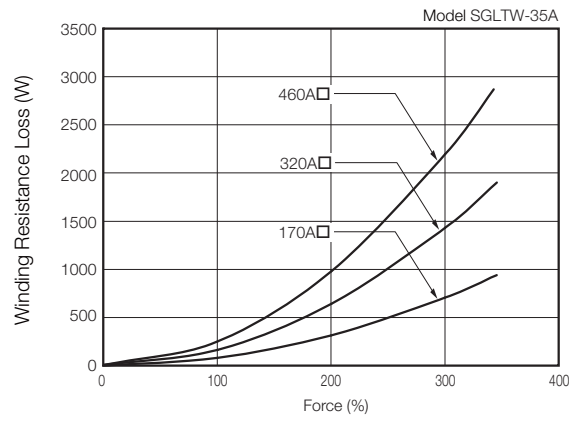
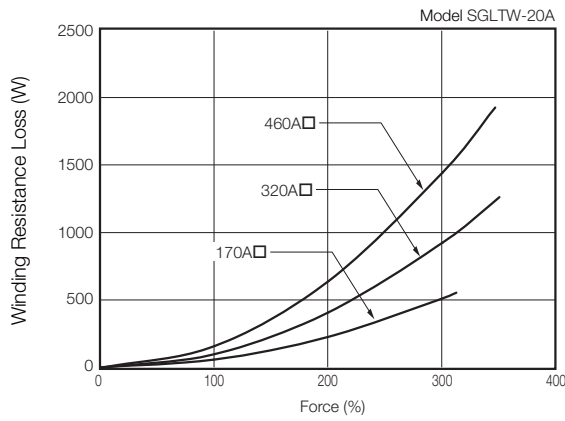
■ SGLFW2 Linear Servomotors



■ SGLFW Linear Servomotors



■ SGLTW Linear Servomotors



12.9 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 | RH120-5 Ω J | 5 | 70 | Iwaki Musen Kenkyusho Co., Ltd. | Yaskawa representative |
| | 470A | | | | | |
| | 550A | | | | | |
| | 590A | RH120-3 Ω J | 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 | | G9EA-1-B-CA | | 100 | |
| | 550A | 48 | | G9EA-1-B-CA* ¹ | | 200 | |
| | 590A | 68 | | G9EC-1-B* ² | | | |
| | 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

13

13.1 SigmaWin+: AC Servo Drive Engineering Tool . . 13-2

13.2 MPE720: System Integrated Engineering Tool . . 13-3

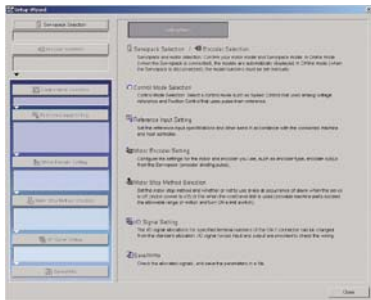
13.1 SigmaWin+: AC Servo Drive Engineering Tool

The SigmaWin+ Engineering Tool is used to set up and optimally tune Yaskawa Σ -series Servo Drives.

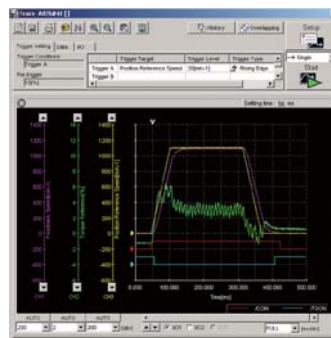
Features

- Sets parameters with a wizard.
- Displays SERVOPACK data on a computer just like on an oscilloscope.
- Estimates moments of inertia and measure vibration frequencies.
- Displays alarms and provides alarm diagnostics.

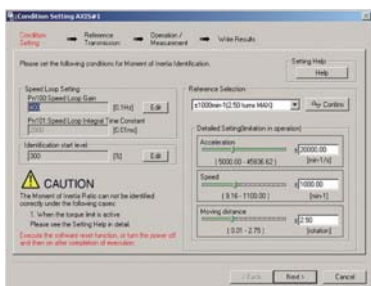
Setting Parameters with a Wizard



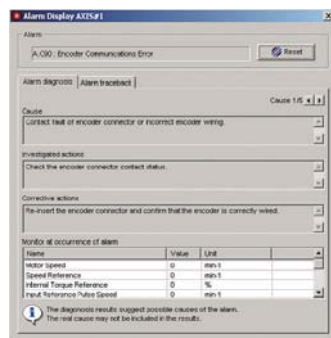
Displaying SERVOPACK Data on a Computer Just Like on an Oscilloscope.



Estimating Moments of Inertia and Measuring Vibration Frequencies



Displaying Alarms and Alarm Diagnostics



System Requirements

| Item | System Requirement | |
|------------------------------|--|---|
| | Ver.5 | Ver.7 |
| Supported Languages | English and Japanese | Japanese, English, and Chinese (simplified) |
| OS | Windows XP, Windows Vista, or Windows 7 (32-bit or 64-bit edition) | Windows 10, Windows 8.1, Windows 8, or Windows 7 (32-bit or 64-bit edition) |
| Software Environment | - | Microsoft .NET Framework 4.5, .NET Framework 4.6 |
| CPU | Pentium 200 MHz min. | 1 GHz min. (recommended) |
| Memory | 64 MB min. (96 MB or greater recommended) | 1 GB min. (recommended) |
| Available Hard Disk Space | For Standard Setup: 350 MB min. (400 MB or greater recommended for installation) | 500 MB min. |
| Browser used to display Help | - | Internet Explorer 9 or higher |

13.2 MPE720: System Integrated Engineering Tool

MPE720 version 7 is a system integrated Engineering Tool that provides the complete development functionality to set up, adjust, program, maintain, and inspect not only Controller programs but also all of the devices necessary to design machine installations, including Servo Drives, AC Drives, and Distributed I/O Devices.

It is installed in a PC and operated on a PC interface through a connection between the PC and Machine Controller.

Features

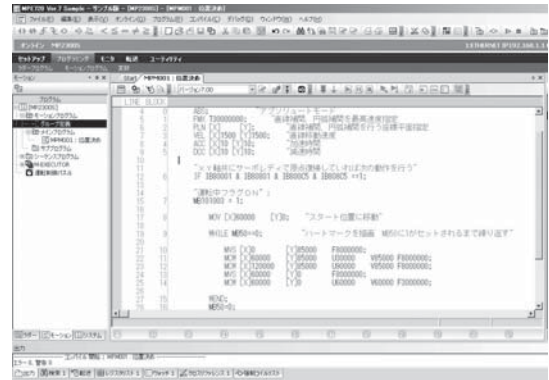
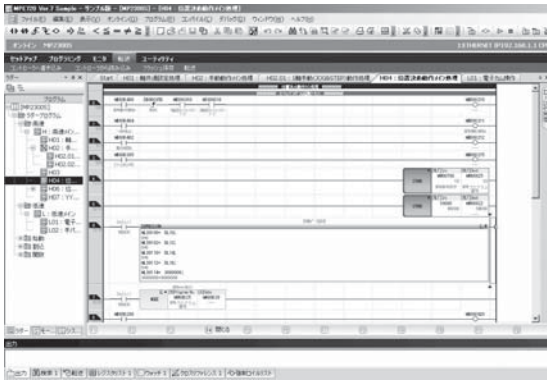
◆ Complete Adjustment and Maintenance of Equipment Drive Devices

MPE720 version 7 connected to a Σ -7C SERVOPACK or MP-Series Machine Controller can be used to set up, adjust, and maintain AC Servo Drives, AC Drives, and I/O Devices connected to a network. There is no need to change connections, which increases efficiency.

◆ Greater Efficiency with the Best Programming Method

Ladder Programming

Motion Programming



- The new user interface lets just about anyone easily use the MPE720.
- An improved EXPRESSION instruction simplifies programming calculation in ladder diagrams.
- Support is provided for all types of control, including position, speed, torque, and phase control.
- Positioning and interpolation can be programmed with one instruction.
- Programs can be very easily edited using expressions in a text format.
- New variable programming can provide PC-like programming.

System Requirements

| Item | Specification |
|---------------------------|--|
| CPU | 1 GHz or more recommended (manufactured by Intel or other companies) |
| Memory Capacity | 1 GB or more recommended* |
| Available Hard Disk Space | 700 MB or more (includes standard workspace memory after installation of MPE720) |
| Display Resolution | 1,280 × 800 pixels or more recommended |
| CD Drive | 1 (only for installation) |
| Communications Ports | RS-232C, Ethernet, MP2100 bus, and USB |
| OS | Windows 10, Windows 8, Windows 8.1, or Windows 7 (32-bit or 64-bit) |
| .NET Environment | .NET Framework 4.5 |
| Supported Languages | English and Japanese |

* Expand memory if other application programs are run simultaneously with MPE720 on the same computer. Performance may be slow due to the use of memory by multiple application programs that are run simultaneously.

Other Peripheral Devices and Options


14

- 14.1** Surge Absorbers (Varistors) and Diodes for Holding Brake Power Supplies .. 14-2
- 14.2** Batteries for Servomotors with Absolute Encoders .. 14-4
 - 14.2.1 Using Encoder Cables with Battery Cases 14-4
 - 14.2.2 When Installing a Battery on the Host Controller . . 14-5
- 14.3** Precautions for Connecting a Σ -V-Series Cable to a Σ -7-Series Servomotor .. 14-6
 - 14.3.1 Restrictions in Using Σ -V-Series Cables 14-6
 - 14.3.2 Precautions When the Encoder Cable Is Installed toward the Load Side 14-6
 - 14.3.3 Cables That Connect to Σ -7-Series Servomotors 14-7
- 14.4** Optional Metal Connectors for Servomotor Main Circuit Cables .. 14-8
 - 14.4.1 SGM7J and SGM7A (50 W to 150 W) 14-8
 - 14.4.2 SGM7J and SGM7A (200 W to 600 W) 14-8
 - 14.4.3 SGM7J and SGM7A (750 W and 1.0 kW) 14-9

14.1 Surge Absorbers (Varistors) and Diodes for Holding Brake Power Supplies

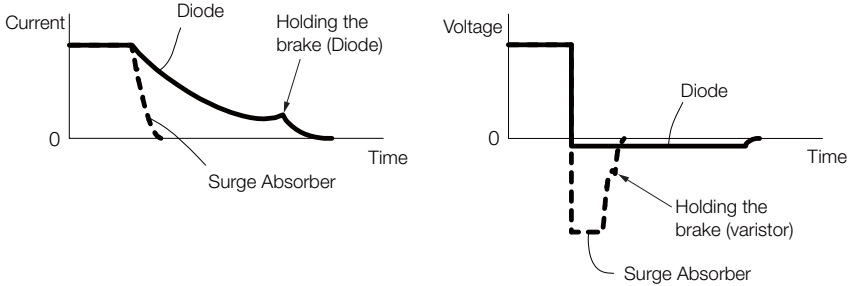
Surge Absorbers (varistors) and Diodes for holding brake power supplies help prevent damage to brake coils caused by voltage surges.

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.



The figure contains two graphs. The left graph plots Current vs. Time. It shows two curves: a solid line for 'Diode' and a dashed line for 'Surge Absorber'. Both start at a constant current level. When the current begins to drop, the 'Surge Absorber' curve drops more sharply to zero, while the 'Diode' curve decays more gradually. A label 'Holding the brake (Diode)' points to the tail of the diode curve. The right graph plots Voltage vs. Time. It shows two curves: a solid line for 'Diode' and a dashed line for 'Surge Absorber'. Both start at a constant voltage level. When the voltage begins to drop, the 'Surge Absorber' curve drops more sharply to zero, while the 'Diode' curve decays more gradually. A label 'Holding the brake (varistor)' points to the tail of the varistor curve.

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.

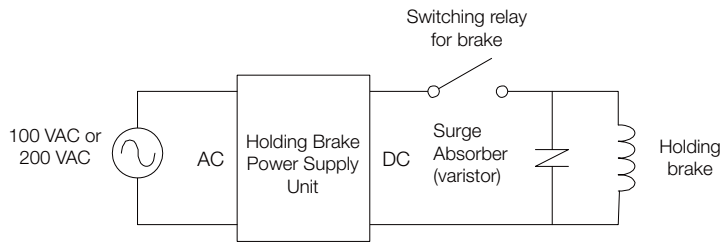
Diodes are not provided by Yaskawa.

| Holding Brake Power Supply Unit Specifications | | Withstand Voltage |
|--|---------------|-------------------|
| Rated Output Voltage | Input Voltage | |
| 24 VDC | 200 V | 100 V to 200 V |

Circuit Diagrams

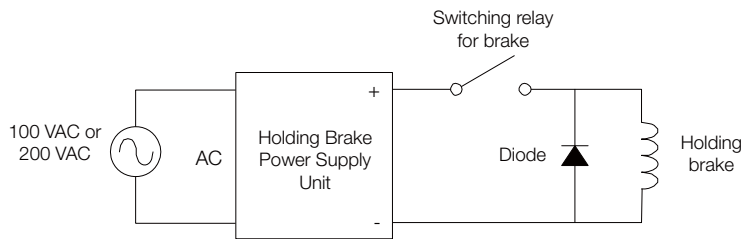
◆ Circuit for a Surge Absorber (Varistor)

A Surge Absorber (varistor) has no polarity.



◆ Circuit for a Diode

A Diode has polarity. Refer to the following figure for connections.



Holding Brake Power Supply Units are not provided by Yaskawa.

Note

14.2 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.

Note: A Battery Case is not required if you use a Servomotor with a Batteryless 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.
- **When connecting a battery, connect the polarity correctly.**
There is a risk of battery rupture or encoder failure.

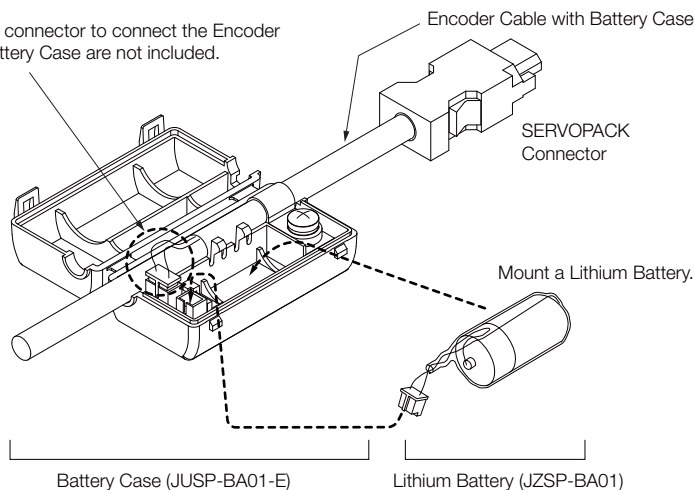
14.2.1 Using Encoder Cables with Battery Cases

A Battery Case is attached to an Encoder Cable with a Battery Case. To replace the battery, obtain a Lithium Battery (JZSP-BA01) and mount it in the Battery Case.



1. You cannot attach the Battery Case to Encoder Cables for Incremental Encoders or Batteryless Absolute Encoders.
2. Install the Battery Case where the surrounding air temperature is between -5°C and 60°C.

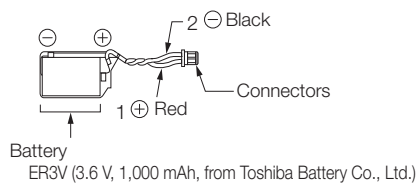
Note: The cable and connector to connect the Encoder Cable and Battery Case are not included.



◆ Selection Table

| Name | Order Number | Remarks |
|--------------------------|--------------|--|
| Battery Case (case only) | JZSP-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. |

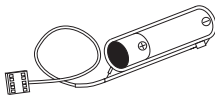
◆ Lithium Battery Dimensional Drawing



14.2.2 When Installing a Battery on the Host Controller

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 representative |

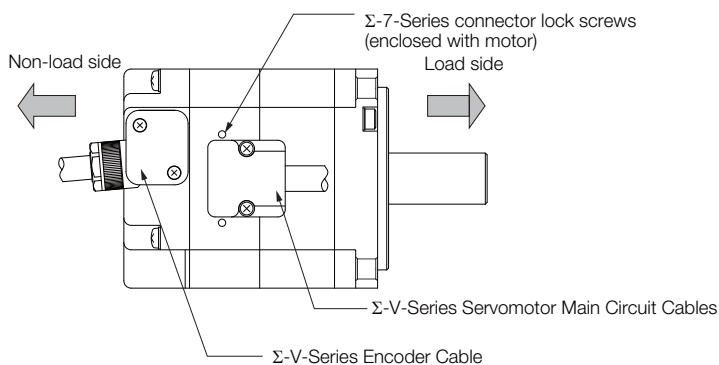
14.3 Precautions for Connecting a Σ -V-Series Cable to a Σ -7-Series Servomotor

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.

14.3.1 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.



14.3.2 Precautions When the Encoder Cable Is Installed toward the Load Side

You cannot install a Σ -V-Series Encoder Cable toward the load side.

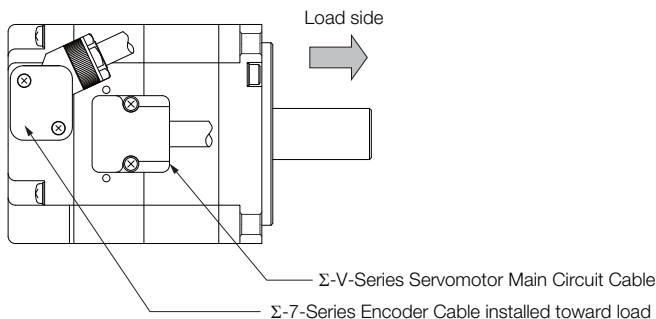
If you need to install the Cables as shown in the following figure, use a Σ -7-Series JZSPC7P□□D-□□-E Encoder Cable (cable installed toward the load).

Note: Refer to the following section for information on Encoder Cables for SGM7J Servomotors.

3.4 Encoder Cables of 20 m or Less on page 3-10

Refer to the following section for information on Encoder Cables for SGM7A Servomotors.

4.5 Encoder Cables of 20 m or Less on page 4-23



14.3.3 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 or Batteryless Absolute 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).

14.4 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.

14.4.1 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-8841 | |
| | Applicator | APLMK SJ1F/M01-08 | |

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

Note: Cables are not included. Purchase them separately.

14.4.2 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.

14.4.3 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: YRF-880 Holding brake terminals: YRF-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.

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The date of publication, revision number, and web revision number are given at the bottom right of the back cover. Refer to the following example.

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| | | | 10.5, 10.10.1 | Revision: Signal names in the wiring specifications |
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| | | | 6.3.1 | Revision: Information on external dimensions of Servomotor connector kits |
| February 2018 | | 0 | All chapters | Addition: Information on SGM7M Rotary Servomotors |
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| | | | 8.1.2, 8.2.3, 10.1.1 | Addition: Information on SQ47 and SQ57 Linear Encoder from Magnescale Co., Ltd. |
| | | | 8.1.2, 8.2.1, 10.1.1 | Addition: Information on LIC2100-series and LC415 Linear Encoder from Dr. JOHANNES HEIDENHAIN GmbH |
| | | | 8.1.2, 8.2.2, 10.1.1 | Addition: Information on RESOLUTE-series Linear Encoder from Renishaw plc |
| | | | 10.1.1 | Addition: Basic specifications |
| | | | | Addition: Pin arrangement of External Encoder Connector |
| | | | | Addition: Information on ECA4412 and ROC□310 Rotary Encoder from Dr. JOHANNES HEIDENHAIN GmbH |
| | | | Back cover | Addition: Information on RESOLUTE-series Rotary Encoder from Renishaw plc |
| Back cover | Revision: Address | | | |

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| | | | All chapters | Revision: Information on Relay Encoder Cables with a Battery Case |
| | | | Chapters 3 to 6 and 13 | Addition: Information on batteryless absolute encoders |
| | | | 5.3.1 | Revision: Receptacle model number |
| | | | Chapter 7 | Revision: Revision to order of contents |
| | | | 7.4, 7.5 | Deletion: Wire colors in connection specifications |
| | | | 8.2.2 | Addition: EVOLUTE-series Linear Encoders from Renishaw plc |
| | | | 8.2.3, 10.1.1 | Revision: Encoder Cable |
| | | | 8.4.1 | Addition: SGLFW2 with water-cooled specification |
| | | | 10.1.1 | Addition: Absolute Rotary Encoders from Dr. JOHANNES HEIDENHAIN GmbH (Models: RCN□□10) |
| | | | 11.8.5 | Addition: RH450 |
| | | | | Revision: RH450FY specifications |
| | | | 12.1 | Revision: System requirements |
| 12.2 | Addition: MPE720 System Integrated Engineering Tool | | | |
| Back cover | Revision: Address | | | |
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| | | | All chapters | Addition: Information on Σ -7C SERVOPACKs |
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| | | | 8.1, 8.2.1, 8.2.3, 10.1.1 | Addition: Information on SmartSCALE Linear Encoder from Magnescale Co., Ltd. and LC115 Linear Encoder from Dr. JOHANNES HEIDENHAIN GmbH |
| | | | 11.8.6 | Addition: Information on allowable frequency for regenerative operation for SGMMV Servomotors |
| | | | | Revision: Information on allowable frequency for regenerative operation for SGM7D Servomotors |
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| | | | 8.5.3 | Revision: Description of wiring specifications |
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| | | | 4.4.2 | Addition: Information on Encoder Cables for Incremental Encoders SGM7P-08 and SGM7P-15 on Servomotors |
| | | | 5.2 | Addition: Information on SGM7G-30 Servomotor |
| | | | Chapter 7 and 9.1 | Revision: Information on Linear Encoders from Mitutoyo Corporation |
| | | | 8.1, 8.2, 8.13, 8.14, 8.15, and 9.2 | Newly added. |
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| | | | Chapter 3 | Addition: Information on SGM7A-40, -50, and -70 |
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| | | | 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 |
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Σ-7-Series AC Servo Drive Peripheral Device Selection Manual

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