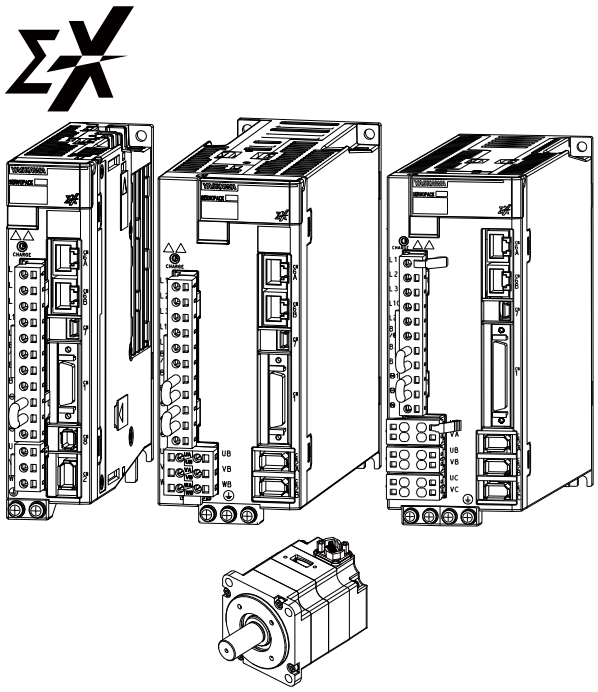
YASKAWA

Σ-X-Series AC Servo Drive

Peripheral Device

Selection Manual



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i.1 About this Manual

This manual provides information required to select cables, peripheral devices, and options for Σ-X-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-X-series AC servo drives. Keep this manual in a safe place so that it can be referred to whenever necessary.

i.2 Outline of Manual

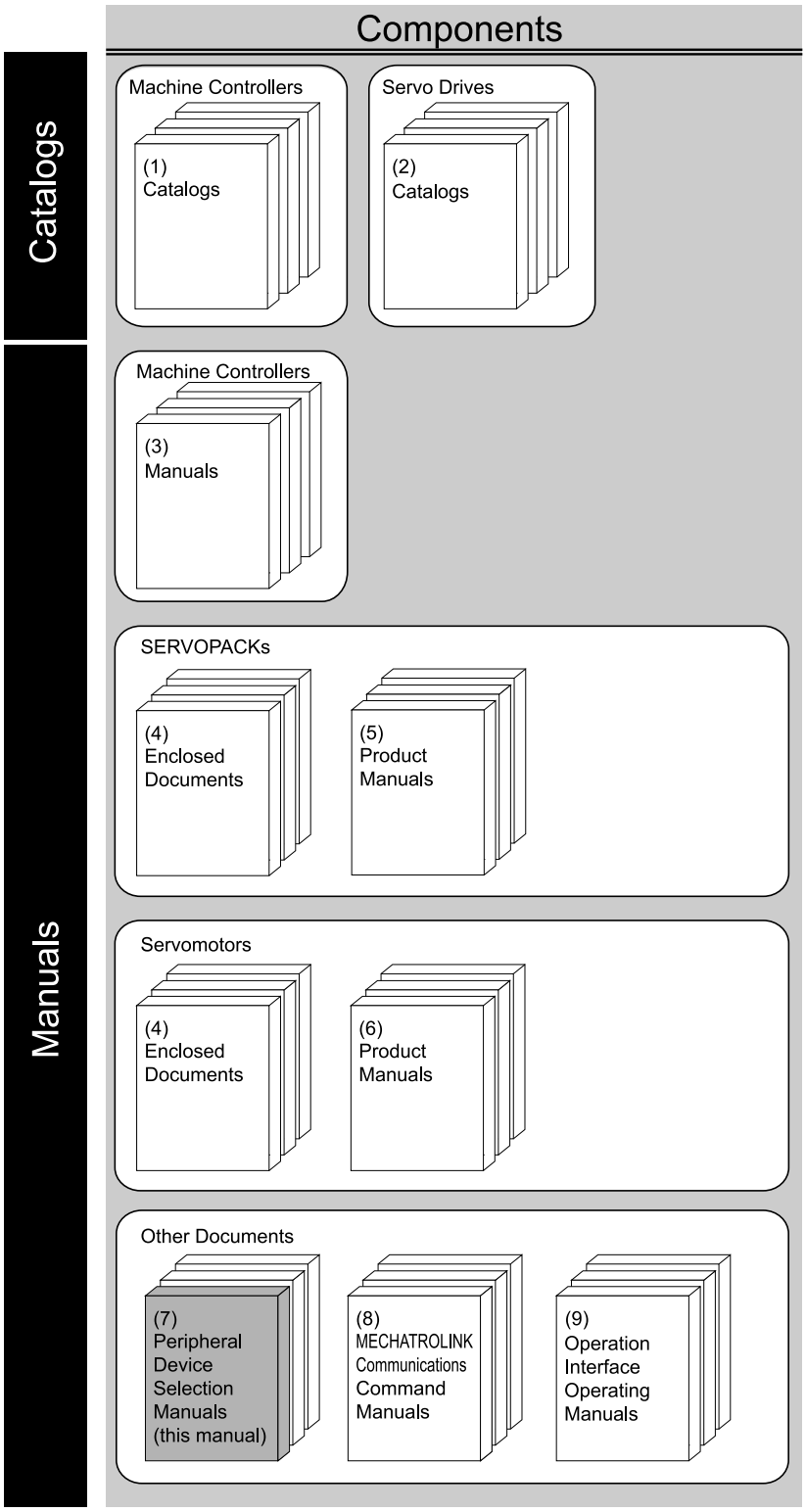
The contents of the chapters of this manual are described in the following table.

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 SGMXJ Rotary Servomotors	These chapters provide the following information. • Selection tables, specifications, and dimensional drawings for servomotor main circuit cables, encoder cables, and user-assembled wiring materials **Note:** References to detailed information are provided in the system configuration diagrams.
3	Cables and User-Assembled Wiring Materials for SGMXA Rotary Servomotors (200 V Specification)	
4	Cables and User-Assembled Wiring Materials for SGMXA Rotary Servomotors (400 V Specification)	
5	Cables and User-Assembled Wiring Materials for SGMXP Rotary Servomotors (200 V Specification)	
6	Cables and User-Assembled Wiring Materials for SGMXG Rotary Servomotors (1500-min^{-1}, 200 V Specification)	
7	Cables and User-Assembled Wiring Materials for SGMXG Rotary Servomotors (1500-min^{-1}, 400 V Specification)	
8	Cables and User-Assembled Wiring Materials for SGMXG Rotary Servomotors (1000-min^{-1} Specification)	
9	Cables and User-Assembled Wiring Materials for Direct Drive Servomotors	
10	Cables and User-Assembled Wiring Materials for Linear Servomotors	This chapter provides the following information. • Information on recommended linear encoders and connected system configurations • Selection tables, specifications, and dimensional drawings for servomotor main circuit cables, linear encoder cables, sensor cables, and user-assembled wiring materials • Selection tables, specifications, and dimensional drawings for serial converter units and cables **Note:** References to detailed information are provided in the system configuration diagrams.
11	Cables and User-Assembled Wiring Materials for SERVOPACKs	This chapter provides selection tables, specifications, and dimensional drawings for SERVOPACK cables.
12	Option Modules	This chapter provides the specifications and dimensional drawings of option modules.
13	Σ-LINK II-Related Devices	This chapter provides information on devices and cables related to Σ-LINK II.
14	SERVOPACK Peripheral Devices	This chapter provides selection tables, specifications, and dimensional drawings for SERVOPACK peripheral devices.
15	Software	This chapter provides information on the SigmaWin+, Yaskawa's AC servo drive engineering tool, and MPE720, our system integrated engineering tool.
16	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.

i.3 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.



i.3.1 Related Documents

(1) Machine Controllers Catalogs

You can check for products related to YASKAWA machine controllers. Refer to these documents as required.

(2) Servo Drives Catalogs

Document Name	Document No.	Description
AC Servo Drives Sigma-X Series	KAEP C710812 03	Provides detailed information on Σ-X-series AC servo drives, including features and specifications.

(3) Machine Controllers Manuals

The machine controller to use depends on the SERVOPACK that is used. Refer to the manual for the machine controller as required.

(4) Included Documents

Document Name	Document No.	Description
Σ-X-Series AC Servo Drive Σ-XS/Σ-XW SERVOPACK Safety Precautions	TOMP C710812 00	Provide detailed information for the safe usage of Σ-X-series SERVOPACKs.
Σ-X-Series AC Servo Drive Σ-XT SERVOPACK Safety Precautions	TOMP C710812 16	
Σ-X-Series AC Servo Drive Advanced Safety Module Safety Precautions	TOMP C710812 25	Provides detailed information for the safe usage of the advanced safety module.
Σ-X-Series AC Servo Drive Advanced Safety Module Installation Guide	TOMP C710812 26	Provides detailed procedures for installing the advanced safety module in a SERVOPACK.
Σ-X-Series AC Servo Drive Σ-LINK II Sensor Hub Instructions	TOMP C710812 06	Provides detailed information for the safe usage of the Σ-LINK II sensor hub, as well as specifications, installation, and connection information.
Σ-X-Series AC Servo Drive Σ-LINK II Booster Unit Instructions	TOMP C710812 08	Provides detailed information for the safe usage of the Σ-LINK II booster unit, as well as specifications, installation, and connection information.
Σ-V-Series/Σ-V-Series for Large-Capacity Models/Σ-7-Series/Σ-X-Series Installation Guide Fully-closed Module	TOBP C720829 03	Provides detailed procedures for installing the fully-closed module in a SERVOPACK.
AC Servo Drive Rotary Servomotor Safety Precautions	TOBP C230260 00	Provides detailed information for the safe usage of rotary servomotors and direct drive servomotors.
Σ-X-Series Rotary Feedback Unit Safety Precautions	TOBP C770100 00	Provides detailed information for the safe usage of the rotary feedback unit.

(5) SERVOPACK Product Manuals

Document Name	Document No.	Description
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with MECHATROLINK-4/III Communications References Product Manual	SIEP C710812 01	Provide detailed information on selecting Σ-X-series Σ-XS or Σ-XW SERVOPACKs; installing, connecting, setting, testing in trial operation, tuning, monitoring, and maintaining servo drives; and other information.
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with EtherCAT Communications References Product Manual	SIEP C710812 02	
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with Analog Voltage/Pulse Train References Product Manual	SIEP C710812 03	
Σ-X-Series AC Servo Drive Σ-XW SERVOPACK with MECHATROLINK-4/III Communications References Product Manual	SIEP C710812 04	
Σ-X-Series AC Servo Drive Σ-XW SERVOPACK with EtherCAT Communications References Product Manual	SIEP C710812 05	
Σ-X-Series AC Servo Drive Σ-XT SERVOPACK with MECHATROLINK-4/III Communications References Product Manual	SIEP C710812 16	Provide detailed information on selecting Σ-X-series Σ-XT SERVOPACKs; installing, connecting, setting, testing in trial operation, tuning, monitoring, and maintaining servo drives; and other information.
Σ-X-Series AC Servo Drive Σ-XT SERVOPACK with EtherCAT Communications References Product Manual	SIEP C710812 17	
Σ-X-Series AC Servo Drive Advanced Safety Module with Safety over EtherCAT (FSoE) Communications References Product Manual	SIEP C710812 25	Provide detailed information on selecting the advanced safety module; installing, connecting, setting, testing in trial operation, tuning, monitoring, and maintaining servo drives; and other information.
Σ-X-Series AC Servo Drive Advanced Safety Module Digital I/O Product Manual	SIEP C710812 26	
Σ-X-Series AC Servo Drive Σ-XW/Σ-XT SERVOPACK Hardware Option Specifications HWBB Function Product Manual	SIEP C710812 13	Provides information on servo drives equipped with the HWBB safety function (SGDXW-□□□□40□1000, SGDXW-□□□□A0□1000, SGDXT-□□□□40□1000, and SGDXT-□□□□A0□1000)). The differences in specifications from SERVOPACKs not equipped with the HWBB are given in this manual.
Σ-X-Series AC Servo Drive Σ-XS/Σ-XW/Σ-XT SERVOPACK Hardware Option Specifications Dynamic Brake Product Manual	SIEP C710812 14	Provides information on Σ-X-series AC servo drives (SGDX□-□□□□□□□0020) with the dynamic brake option. The differences in specifications from SERVOPACKs without the dynamic brake option are given in this manual.

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Document Name	Document No.	Description
Σ-X-Series AC Servo Drive Σ-XS/Σ-XW SERVOPACK with MECHATROLINK-4/III Communications References FT Specification for Gantry Applications Product Manual	SIEP C710812 19	Provide information on the gantry application function and torque/force assistance in the Σ-X-series Σ-XS/Σ-XW SERVOPACK.
Σ-X-Series AC Servo Drive Σ-XS/Σ-XW SERVOPACK with EtherCAT Communications References FT Specification for Gantry Applications Product Manual	SIEP C710812 20	
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with MECHATROLINK-4/III Communications References FT Specification for Press and Injection Molding Applications Product Manual	SIEP C710812 22	Provide information on the press and injection molding function in the Σ-X-series Σ-XS SERVOPACK.
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with EtherCAT Communications References FT Specification for Press and Injection Molding Applications Product Manual	SIEP C710812 23	
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with FT Specification Customized Sensing Data Function Option Product Manual	SIEP C710812 18	Provides information on the customized sensing data function in the Σ-X-series Σ-XS SERVOPACK.
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with FT Specification Customized Sensing Data Function Option (with Custom Motion Function) Product Manual	SIEP C710812 21	Provides information on the customized sensing data function (with custom motion function) in the Σ-X-series Σ-XS SERVOPACK.
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with FT Specification Customized Sensing Data Function Option (with Standalone Custom Motion Function) Product Manual	SIEP C710812 32	Provides information on the customized sensing data function (with standalone custom motion function) in the Σ-X-series Σ-XS SERVOPACK.
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with FT/EX Specification for Indexing Application Product Manual	SIEP C710812 34	Provides information on the Σ-X-series Σ-XS SERVOPACK for indexing applications.

(6) Servomotor Product Manuals

Document Name	Document No.	Description
Σ-X-Series AC Servo Drive Rotary Servomotor Product Manual	SIEP C230210 00	Provides detailed information on selecting, installing, and connecting the Σ-X-series servomotors.

(7) Peripheral Device Selection Manual

Document Name	Document No.	Description
Σ-X-Series AC Servo Drive Peripheral Device Selection Manual	SIEP C710812 12	Provides the following information in detail for Σ-X-series servo systems. • Cables: Models, dimensions, wiring materials, connector models, and connection specifications • Peripheral devices: Models, specifications, diagrams, and selection (calculation) methods

(8) MECHATROLINK Communications Command Manuals

Document Name	Document No.	Description
Σ-7/Σ-X-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/Σ-X-series servo system.
Σ-7/Σ-X-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/Σ-X-series servo system.

(9) Operation Interface Operating Manuals

Document Name	Document No.	Description
System Integrated Engineering Tool MPE720 Ver.7 User's Manual	SIEP C880761 03	Describes in detail how to operate MPE720 version 7.
AC Servo Drive Engineering Tool SigmaWin+ Application Editor Operation Manual	SIEP C710812 33	Describes the operating procedures for SigmaWin+ Application Editor.
Σ-7/Σ-X-Series AC Servo Drive Digital Operator Operating Manual	SIEP S800001 33	Describes the operating procedures for a digital operator for a Σ-7/Σ-X-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/Σ-X series servo system.

i.4 Using This Manual

i.4.1 Technical Terms Used in This Manual

The following terms are used in this manual.

Term	Meaning
Servomotor	A Σ-X-series rotary servomotor, direct drive servomotor, or linear servomotor
Rotary Servomotor	A generic term used for a Σ-X-series rotary servomotor (SGMXJ, SGMXA, SGMXP, or SGMXG)
Direct Drive Servomotor	A generic term used for a direct drive servomotor (SGM7D, SGM7E, or SGM7F)
Linear Servomotor	A generic term used for a Σ-7-series linear servomotor (SGLG, SGLF, SGLT).
SERVOPACK	Σ-X-series servo 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	A generic term used for an absolute encoder with a battery and a batteryless absolute encoder. If the explanation is difficult to understand, "batteryless absolute encoder" may also be used for clarity.
MDevice	An abbreviation for a Main Device.
SDevice	An abbreviation for a Subordinate Device.

i.4.2 Trademarks

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

i.4.3 Visual Aids

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

Important

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

Term

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

Information Indicates supplemental information to deepen understanding or useful information.

i.5 Safety Precautions

i.5.1 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

This signal word identifies a hazard that will cause serious injury or death if you do not prevent it.

⚠ WARNING

This signal word identifies a hazard that can cause death or serious injuries if you do not prevent it.

⚠ CAUTION

This signal word identifies a hazard that can cause moderate injuries if you do not prevent it.

NOTICE

This signal word identifies a property damage message that is not related to personal injury.

i.5.2 Safety Precautions That Must Always Be Observed

(1) General Precautions

⚠ DANGER

Make sure to observe all information related to safety contained in this manual.

If you fail to observe these warnings, there is a risk of equipment damage or product failure. There is also a risk of injury, fire, or electric shock that causes death or serious injury.

Yaskawa bears no responsibility to you or your customers for injuries and equipment damage that occur from failing to observe the warnings and precautions listed in this manual.

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.

Install and remove covers, cables, connectors, and optional devices when the power is turned OFF.

There is a risk of equipment damage or product failure. There is also a risk of fire or electric shock that causes death or serious injury. Additionally, there is a risk of death or serious injury due to unexpected machine operation.

⚠ WARNING

Use a power supply with specifications (number of phases, voltage, frequency, and AC/DC type) that are appropriate for the product. Always check the power supply specifications in the product manual for your SERVOPACK.

If you do not use the product with the correct power supply specifications, there is a risk of thermal damage, fire, or electric shock because of product overheating due to the application of high voltage or leakage current, and these may cause death or serious injury.

Do not modify or alter the product in any manner that is not described in this manual.

If you modify or alter the product, there is a risk of fire or electric shock that causes death or serious injury.

Repairs for product damage caused by modifying or altering the product in a manner not described in this manual are outside the scope of the Yaskawa warranty. Yaskawa bears no responsibility for product alterations performed by you or your customers.

For a 24-VDC power supply, use a power supply device with double insulation or reinforced insulation.

There is a risk of injury, fire, or electric shock that causes death or serious injury when a short circuit or ground fault occurs due to insulation deterioration in the device.

Do not damage, pull on, apply excessive force to, place heavy objects on, or pinch cables.

There is a risk of fire or electric shock due to cable failure or damage that causes death or serious injury.

Do not place the product in locations where it is subject to water, corrosive gases, flammable gases, potentially explosive atmospheres, or near flammable materials.

There is a risk of product failure. A fire or electric shock may also occur resulting in death or serious injury.

Install external emergency stop circuits that can turn OFF the power and stop operation immediately in case an error occurs.

There is a risk of equipment damage and death or serious injury due to unexpected machine operation.

Always use peripheral devices in the specified combinations.

There is a risk of product failure. There is also a risk of fire that causes death or serious injury. Additionally, there is a risk of death or serious injury due to unexpected machine operation.

Do not touch peripheral devices with wet hands.

There is a risk of product failure if a peripheral device gets wet. A fire or electric shock may also occur resulting in death or serious injury.

⚠ CAUTION

The SERVOPACK heat sinks, regenerative resistors, external dynamic brake resistors, servomotors, and other components 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 burns from touching hot components.

NOTICE

Do not attempt to use a SERVOPACK or servomotor that is damaged or that has missing parts.

There is a risk that the product may not function correctly.

In environments with unstable power supply, 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 product failure.

Minimize the effects of electromagnetic interference by connecting a device, such as a noise filter.

There is a risk of equipment or product malfunction.

(2) Storage Precautions

⚠ WARNING

Do not place an excessive load on the product. Follow the labels on the shipping box regarding product loading.

There is a risk of the product falling and causing product damage or failure. There is also a risk of death or serious injury.

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 surrounding air 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, there is a risk of product failure. A fire or electric shock may also occur resulting in death or serious injury.

(3) Transportation Precautions

⚠ WARNING

Transport the product in a way that is suitable to the mass of the product.

There is a risk of the product falling and causing product damage or failure. There is also a risk of death or serious injury.

Do not place an excessive load on the product. Follow the labels on the shipping box regarding product loading.

There is a risk of the product falling and causing product damage or failure. There is also a risk of death or serious injury.

⚠ CAUTION

When you handle peripheral devices, be careful of sharp edges, such as the corners.

There is a risk of injury.

NOTICE

Peripheral device are precision devices. Do not drop them or subject them to impact or excessive force.

There is a risk of product damage or failure.

Avoid applying mechanical shock or impact to connectors.

There is a risk of product damage or failure.

If disinfectants or insecticides must be used to treat packing materials such as wooden frames, plywood, or pallets, use a method other than fumigation.

For example, use heat sterilization (core temperature of 56°C or higher for 30 minutes or longer).

Treat the packing materials before the product is packaged instead of using a method that treats the entire packaged product.

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 product failure by corroding the insides of capacitors.

(4) Installation Precautions

⚠ WARNING

Install peripheral devices using mounting that can support their mass. Check the masses of peripheral devices in this manual, and install those devices by following the chapter related to installation in this manual.

In case of improper installation, there is a risk of a peripheral device falling and causing damage or failure to equipment and the product. There is also a risk of death or serious injury.

Install SERVOPACKs, servomotors, regenerative resistors, and external dynamic brake resistors on nonflammable materials.

Installation directly onto or near flammable materials may result in fire that causes death or serious injury.

Install the SERVOPACK in the specified orientation.

There is a risk of product failure if the SERVOPACK temperature and the temperature around the SERVOPACK locally exceed the surrounding air temperature range. There is also a risk of fire that causes death or serious injury.

Do not allow any foreign matter to enter peripheral devices.

There is a risk of product failure. There is also a risk of fire that causes death or serious injury.

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 surrounding air 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, there is a risk of product failure. A fire or electric shock may also occur resulting in death or serious injury.

⚠ CAUTION

Do not step on or place a heavy object on the product.

There is a risk of product damage or failure because the product cannot withstand the load.

(5) Wiring Precautions

⚠ DANGER

Do not change any wiring while power is being supplied.

There is a risk of equipment damage or product failure. There is also a risk of fire or electric shock that causes death or serious injury. Additionally, there is a risk of death or serious injury due to unexpected machine operation.

Wait for at least 20 minutes (or 100 minutes when using DC power supply input) after turning OFF the power and then make sure that the CHARGE indicator is not lit before starting wiring or inspection work. Do not touch the main circuit terminals while the CHARGE indicator is lit because high voltage may still remain in the SERVOPACK even after turning OFF the power.

There is a risk of electric shock that causes death or serious injury.

⚠ WARNING

Wiring and inspections must be performed only by qualified engineers.

If work is performed by a worker who is not a qualified engineer, there is a risk of fire or electric shock that causes death or serious injury.

Check all wiring and power supplies carefully.

Incorrect wiring or incorrect voltage application to the output circuits may cause short-circuit failures. If this failure occurs, there is a risk of fire that causes death or serious injury. There is also a risk of equipment and product damage because the holding brake may fail to operate properly.

Check the wiring to be sure it has been performed correctly. Connectors and pin layouts may vary depending on the model. Always confirm the pin layout examples in the chapter related to pin layouts in the product manual for your model.

If the wiring is not performed correctly, there is a risk of product failure. There is also a risk of fire or electric shock that causes death or serious injury. Additionally, there is a risk of death or serious injury due to unexpected machine operation.

Connect wires to your peripheral devices securely with the specified methods and tightening torque. Refer to "SERVOPACK Main Circuit Wires" in this manual for the specified methods and tightening torque.

Insufficient tightening may cause wires and terminal blocks to generate heat due to poor contact, possibly resulting in product failure. There is also a risk of fire that causes death or serious injury.

Make sure the cables do not exceed the following lengths:

- **I/O signal cable: 3 m max.**
- **Servomotor main circuit cable: 50 m max.**
- **Encoder cable: 50 m max.**
- **Control power supply cable for 400-V power supply input SERVOPACK (+24 V and 0 V): 10 m max.**

If a cable is longer than the specified length, there is a risk of equipment damage due to product malfunction that causes death or serious injury. There is also a risk of electric shock due to a short circuit or ground fault that causes death or serious injury.

⚠ WARNING

Observe the following precautions when wiring the SERVOPACK's main circuit terminals.

- **Turn ON the power 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 and cause a short-circuit.**

If the SERVOPACK power is turned ON with incorrect wiring, there is a risk of fire due to electric shock or product failure that causes death or serious injury.

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 electric shock due to product failure that causes death or serious injury.

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, and this may result in a fire from product failure or damage that causes death or serious injury.

When connecting a battery, connect the polarity correctly.

There is a risk of encoder failure if the battery ruptures and a risk of fire that causes death or serious injury.

⚠ CAUTION

Use shielded twisted-pair cables or shielded multi-core twisted-pair cables for I/O signal cables and encoder cables.

There is a risk of injury from product malfunction.

Select a cable that is appropriate for your servomotor model.

The cables are different between the standard specification and the Σ-7 compatible specification. Connecting the wrong cable could lead to a product failure.

NOTICE

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. Refer to this manual for Yaskawa-specified cables and wiring materials.

Be careful not to drop or lose screws when connecting and disconnecting the connectors.

When connecting and disconnecting a connector, make sure that the cable connector and the servomotor connector are parallel to each other.

If you connect or disconnect a connector at an angle or by twisting the connector, you may break the housing and bend or deform pins, causing a failure.

Securely tighten connector screws and lock mechanisms.

Insufficient tightening may result in 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.

There is a risk that the product may not function correctly due to the effects of noise on low-current lines.

(6) Maintenance and Inspection Precautions

⚠ DANGER

Do not change any wiring while power is being supplied.

There is a risk of equipment damage or product failure. There is also a risk of fire or electric shock that causes death or serious injury. Additionally, there is a risk of death or serious injury due to unexpected machine operation.

Wait for at least 20 minutes (or 100 minutes when using DC power supply input) after turning OFF the power and then make sure that the CHARGE indicator is not lit before starting wiring or inspection work. Do not touch the main circuit terminals while the CHARGE indicator is lit because high voltage may still remain in the SERVOPACK even after turning OFF the power.

There is a risk of electric shock that causes death or serious injury.

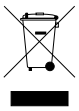
⚠ WARNING

Wiring and inspections must be performed only by qualified engineers.

If work is performed by a worker who is not a qualified engineer, there is a risk of fire or electric shock that causes death or serious injury.

(7) 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.



(8) General Precautions

- Figures provided in this manual 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 manual are sometimes shown with their covers or protective guards removed to illustrate detail. Always replace all covers and protective guards before you use the product.
- If you need a new copy of this manual because it has been lost or damaged, contact your nearest Yaskawa representative or one of the offices listed on the back of this manual.
- This manual is subject to change without notice for product improvements, specifications changes, and improvements to the manual itself. We will update the manual number of the manual 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.

i.5.3 Warranty

(1) Details of Warranty

(a) 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.

(b) 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

(2) 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.

(3) 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.

(4) 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.

i.6 Compliance with EU Directives and UKCA

Certification marks for the standards for which the product has been certified by certification bodies are shown on nameplate. Products that do not have the marks are not certified for the standards.

i.6.1 EU Directives

CE

Product	Model	EU Directives	Harmonized Standards
Rotary Feedback Unit	JZDP-FB	EMC Directive 2014/30/EU	EN 55011 group 1, class A EN 61000-6-2 EN 61000-6-4 EN 61800-3 (Category C2, Second environment)
		RoHS Directive 2011/65/EU (EU)2015/863	EN IEC 63000

Note:

- We declared the CE Marking based on the harmonized standards in the above table. These products complied with the corresponding IEC standards. Refer to the declaration of conformity for details.
- These products are for industrial use. In home environments, these products may cause electromagnetic interference and additional noise reduction measures may be necessary.
- Refer to the SERVOPACK product manuals for the EMC installation conditions.

i.6.2 UK Conformity Assessed (UKCA)

UK CA

Product	Model	UK Regulations	Designated Standards
Rotary Feedback Unit	JZDP-FB	Electromagnetic Compatibility Regulations S.I. 2016/1091	EN 55011 group 1, class A EN 61000-6-2 EN 61000-6-4 EN 61800-3 (Category C2, Second environment)
		RoHS Directive S.I. 2012/3032	EN IEC 63000

Note:

- We declared the UKCA marking based on the designated standards in the above table.
- These products are for industrial use. In home environments, these products may cause electromagnetic interference and additional noise reduction measures may be necessary.
- Refer to the SERVOPACK product manuals for the EMC installation conditions.

1

Peripheral Devices and System Configurations

1.1 Configuration with a Rotary Servomotor 36

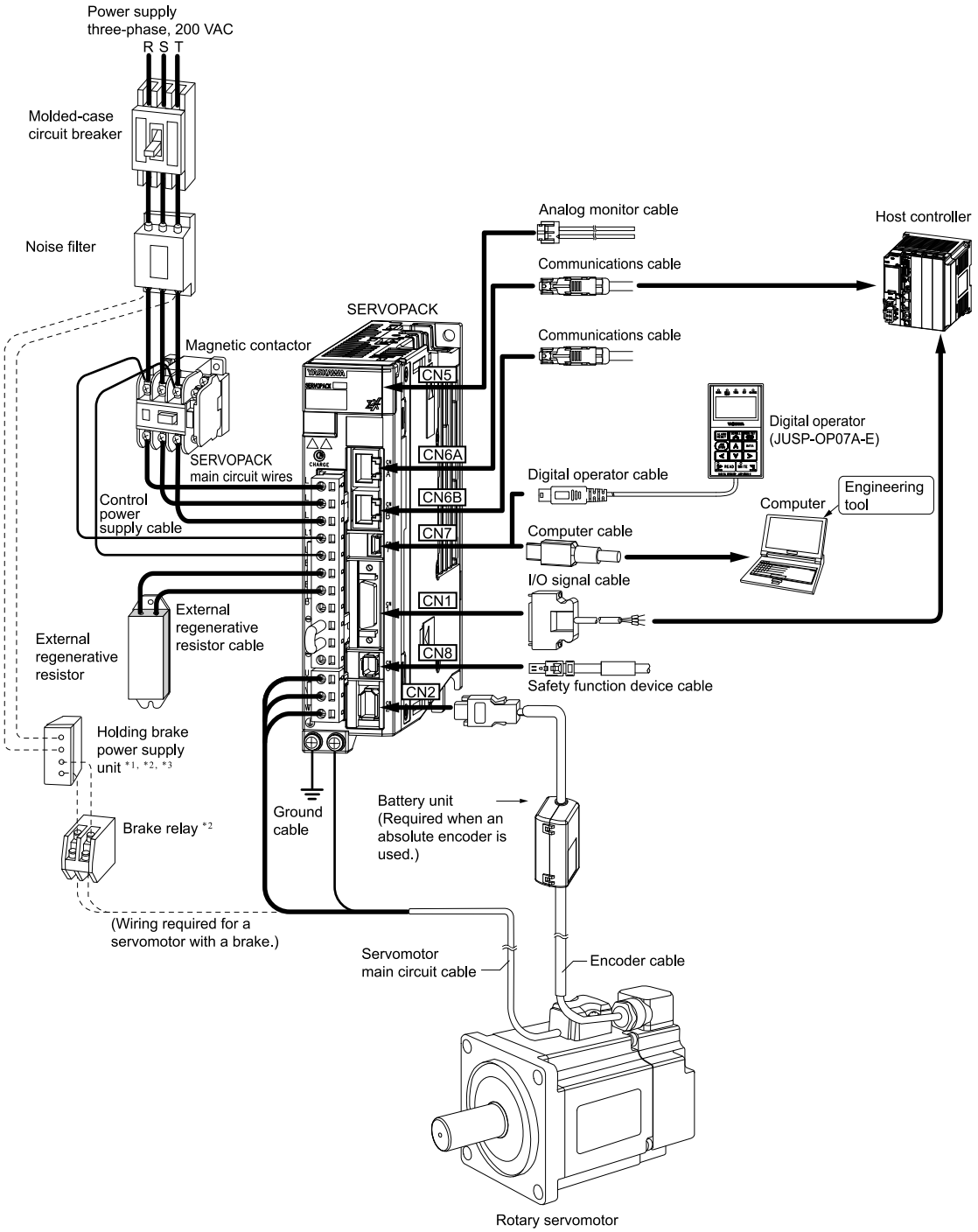
1.2 Configuration with a Direct Drive Servomotor 38

1.3 Configuration with a Linear Servomotor 40

1.1 Configuration with a Rotary Servomotor

The peripheral devices are described based on an example using a MECHATROLINK-4/III communications reference SERVOPACK with a three-phase 200-VAC power supply input. The shapes of the connectors and pin layout may be different for SERVOPACKs with other power supply input specifications and for other interfaces.

For this reason, refer to the product manual for the type of references used by your SERVOPACK.



*1 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.

*2 If you use a servomotor with a holding brake, select a brake relay according to the power supply voltage and current of the brake. Select an appropriate brake relay using the selection method of the brake relay manufacturer.

*3 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.

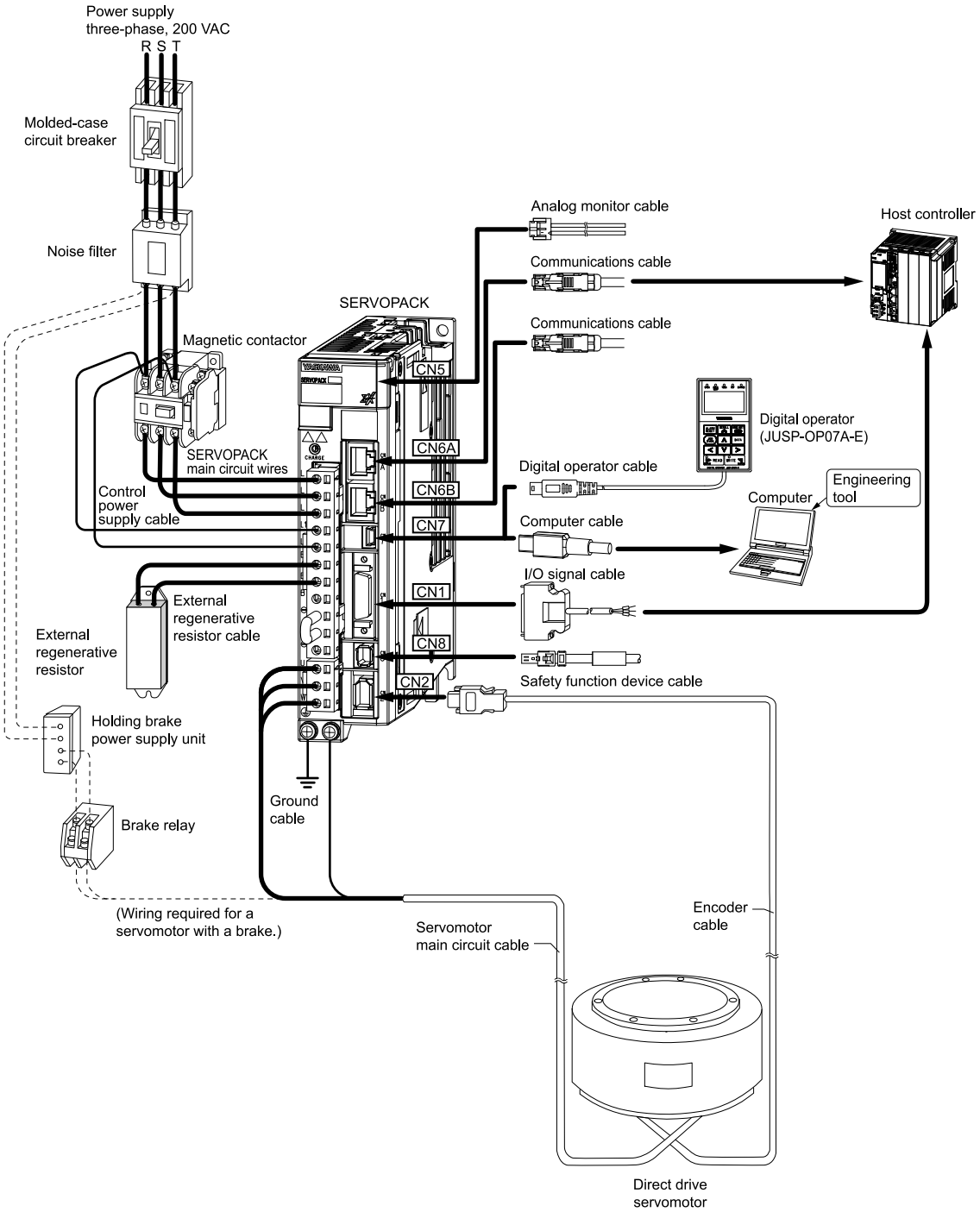
The references for each device are shown in the following table.

Item	Reference
Molded-Case Circuit Breaker	*14.1 Molded-Case Circuit Breakers and Fuses on page 475*
Noise Filter	*14.5 Noise Filter on page 511*
Magnetic Contactor	*14.2 Magnetic Contactors on page 481*
External Regenerative Resistor	*14.8 Regenerative Resistor on page 523*
SERVOPACK Main Circuit Wires	*14.3 SERVOPACK Main Circuit Wires on page 488*
Analog Monitor Cable	*11.2 Analog Monitor Cables on page 385*
Communications Cable	*11.6 MECHATROLINK Communications Cable on page 399* *11.7 EtherCAT Communications Cable on page 401*
Digital Operator Cable	The cable that connects the digital operator is integrated with the digital operator.
Computer Cable	*11.3 Computer Cable on page 386*
I/O Signal Cable	*11.4.1 For Σ-XS SERVOPACKs with Analog Voltage/Pulse Train Reference, Σ-XT SERVOPACKs with MECHATROLINK-4/III Communications Reference, and Σ-XT SERVOPACKs with EtherCAT Communications Reference on page 387* *11.4.2 For Σ-XS MECHATROLINK-4/III Communications Reference SERVOPACKs and EtherCAT Communications Reference SERVOPACKs on page 390* *11.4.3 For Σ-XW SERVOPACKs on page 394*
Safety Function Device Cable	*11.5 Safety Function Device Cable on page 397*
Servomotor Main Circuit Cables	Refer to one of the following chapters based on the motor that is used. *2 Cables and User-Assembled Wiring Materials for SGMXJ Rotary Servomotors on page 43* *3 Cables and User-Assembled Wiring Materials for SGMXA Rotary Servomotors (200 V Specification) on page 73* *4 Cables and User-Assembled Wiring Materials for SGMXA Rotary Servomotors (400 V Specification) on page 123* *5 Cables and User-Assembled Wiring Materials for SGMXP Rotary Servomotors (200 V Specification) on page 155* *6 Cables and User-Assembled Wiring Materials for SGMXG Rotary Servomotors (1500-min^{-1}, 200 V Specification) on page 191* *8 Cables and User-Assembled Wiring Materials for SGMXG Rotary Servomotors (1000-min^{-1} Specification) on page 269*
Encoder Cables	Refer to one of the following chapters based on the motor that is used. *2 Cables and User-Assembled Wiring Materials for SGMXJ Rotary Servomotors on page 43* *3 Cables and User-Assembled Wiring Materials for SGMXA Rotary Servomotors (200 V Specification) on page 73* *4 Cables and User-Assembled Wiring Materials for SGMXA Rotary Servomotors (400 V Specification) on page 123* *5 Cables and User-Assembled Wiring Materials for SGMXP Rotary Servomotors (200 V Specification) on page 155* *6 Cables and User-Assembled Wiring Materials for SGMXG Rotary Servomotors (1500-min^{-1}, 200 V Specification) on page 191* *8 Cables and User-Assembled Wiring Materials for SGMXG Rotary Servomotors (1000-min^{-1} Specification) on page 269*
Battery Unit	*16.2 Batteries for Servomotors with Absolute Encoders on page 563*
Digital Operator	*14.9 Digital Operators on page 549*
Engineering Tool	*15.2 SigmaWin+: AC Servo Drive Engineering Tool on page 554*
Surge Absorbers	*14.7 Surge Absorbers on page 522*
AC/DC Reactors	*14.6 AC/DC Reactors on page 518*
Surge Absorbers (Varistors), Diodes, and Brake Relays for Holding Brake Power Supplies	*16.1 Surge Absorbers (Varistors), Diodes, and Brake Relays for Holding Brake Power Supplies on page 560*

1.2 Configuration with a Direct Drive Servomotor

The peripheral devices are described based on an example using a MECHATROLINK-4/III communications reference SERVOPACK with a three-phase 200-VAC power supply input. The shapes of the connectors and pin layout may be different for SERVOPACKs with other power supply input specifications and for other interfaces.

For this reason, refer to the product manual for the type of references used by your SERVOPACK.



The references for each device are shown in the following table.

Item	Reference
Molded-Case Circuit Breaker	*14.1 Molded-Case Circuit Breakers and Fuses on page 475*
Noise Filter	*14.5 Noise Filter on page 511*
Magnetic Contactor	*14.2 Magnetic Contactors on page 481*
External Regenerative Resistor	*14.8 Regenerative Resistor on page 523*

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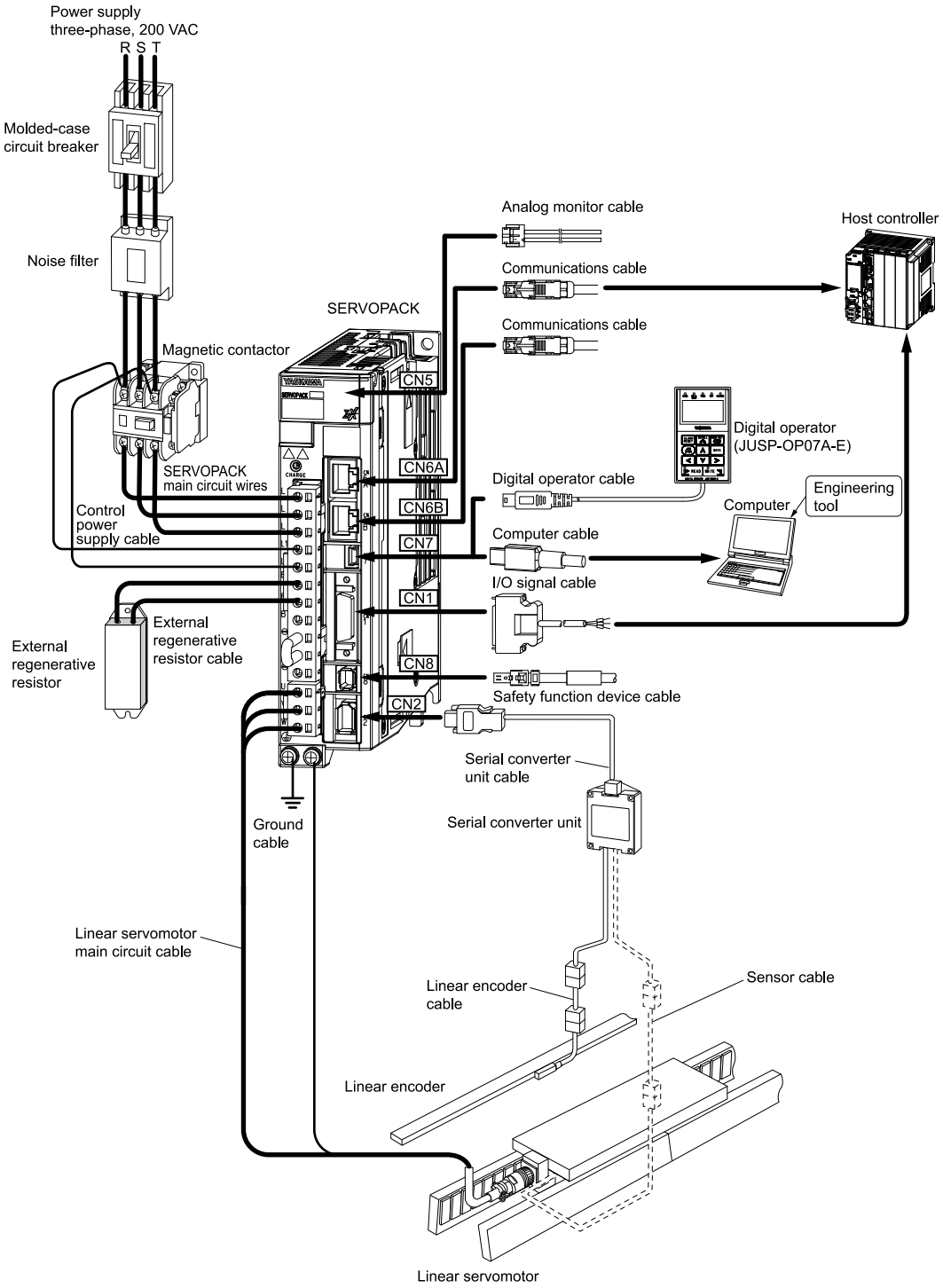
Item	Reference
SERVOPACK Main Circuit Wires	*14.3 SERVOPACK Main Circuit Wires on page 488*
Analog Monitor Cable	*11.2 Analog Monitor Cables on page 385*
Communications Cable	*11.6 MECHATROLINK Communications Cable on page 399* *11.7 EtherCAT Communications Cable on page 401*
Digital Operator Cable	The cable that connects the digital operator is integrated with the digital operator.
Computer Cable	*11.3 Computer Cable on page 386*
I/O Signal Cable	*11.4.1 For Σ-XS SERVOPACKs with Analog Voltage/Pulse Train Reference, Σ-XT SERVOPACKs with MECHATROLINK-4/III Communications Reference, and Σ-XT SERVOPACKs with EtherCAT Communications Reference on page 387* *11.4.2 For Σ-XS MECHATROLINK-4/III Communications Reference SERVOPACKs and EtherCAT Communications Reference SERVOPACKs on page 390* *11.4.3 For Σ-XW SERVOPACKs on page 394*
Safety Function Device Cable	*11.5 Safety Function Device Cable on page 397*
Servomotor Main Circuit Cables	*9.2 Servomotor Main Circuit Cables on page 313* *9.3 User-Assembled Wiring Materials for Servomotor Main Circuit Cables on page 317*
Encoder Cables	*9.4 Encoder Cables of 20 m or Less on page 322* *9.5 Relay Encoder Cable of 30 m to 50 m on page 328* *9.6 User-Assembled Wiring Materials for Encoder Cables on page 332*
Battery Unit	*16.2 Batteries for Servomotors with Absolute Encoders on page 563*
Digital Operator	*14.9 Digital Operators on page 549*
Engineering Tool	*15.2 SigmaWin+: AC Servo Drive Engineering Tool on page 554*
Surge Absorbers	*14.7 Surge Absorbers on page 522*
AC/DC Reactors	*14.6 AC/DC Reactors on page 518*

1.3 Configuration with a Linear Servomotor

The peripheral devices are described based on an example using a MECHATROLINK-4/III communications reference SERVOPACK with a three-phase 200-VAC power supply input. The shapes of the connectors and pin layout may be different for SERVOPACKs with other power supply input specifications and for other interfaces.

For this reason, refer to the product manual for the type of references used by your SERVOPACK.



The references for each device are shown in the following table.

Item	Reference
Molded-Case Circuit Breaker	*14.1 Molded-Case Circuit Breakers and Fuses on page 475*
Noise Filter	*14.5 Noise Filter on page 511*
Magnetic Contactor	*14.2 Magnetic Contactors on page 481*

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Item	Reference
External Regenerative Resistor	*14.8 Regenerative Resistor on page 523*
SERVOPACK Main Circuit Wires	*14.3 SERVOPACK Main Circuit Wires on page 488*
Analog Monitor Cable	*11.2 Analog Monitor Cables on page 385*
Communications Cable	*11.6 MECHATROLINK Communications Cable on page 399* *11.7 EtherCAT Communications Cable on page 401*
Digital Operator Cable	The cable that connects the digital operator is integrated with the digital operator.
Computer Cable	*11.3 Computer Cable on page 386*
I/O Signal Cable	*11.4.1 For Σ-XS SERVOPACKs with Analog Voltage/Pulse Train Reference, Σ-XT SERVOPACKs with MECHATROLINK-4/III Communications Reference, and Σ-XT SERVOPACKs with EtherCAT Communications Reference on page 387* *11.4.2 For Σ-XS MECHATROLINK-4/III Communications Reference SERVOPACKs and EtherCAT Communications Reference SERVOPACKs on page 390* *11.4.3 For Σ-XW SERVOPACKs on page 394*
Safety Function Device Cable	*11.5 Safety Function Device Cable on page 397*
Linear Servomotor Main Circuit Cable	*10.3.1 Servomotor Main Circuit Cables on page 357*
Linear Encoder Cables	*10.3.2 Linear Encoder Cables on page 358*
Serial Converter Unit Cables	*10.3.3 Serial Converter Unit Cables on page 359*
Serial Converter Unit	*10.4 Serial Converter Unit on page 369*
Sensor Cable	*10.3.4 Sensor Cables on page 359*
Digital Operator	*14.9 Digital Operators on page 549*
Engineering Tool	*15.2 SigmaWin+: AC Servo Drive Engineering Tool on page 554*
Surge Absorbers	*14.7 Surge Absorbers on page 522*
AC/DC Reactors	*14.6 AC/DC Reactors on page 518*

2

Cables and User-Assembled Wiring Materials for SGMXJ Rotary Servomotors

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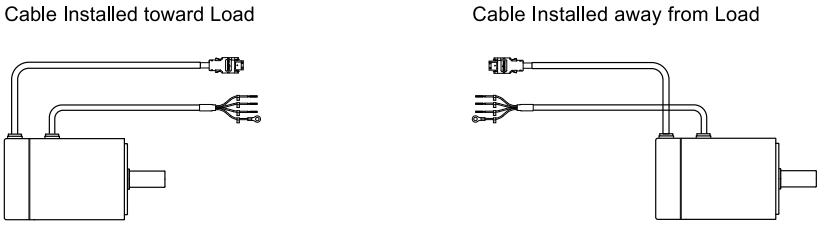
2.1 Cable Configurations

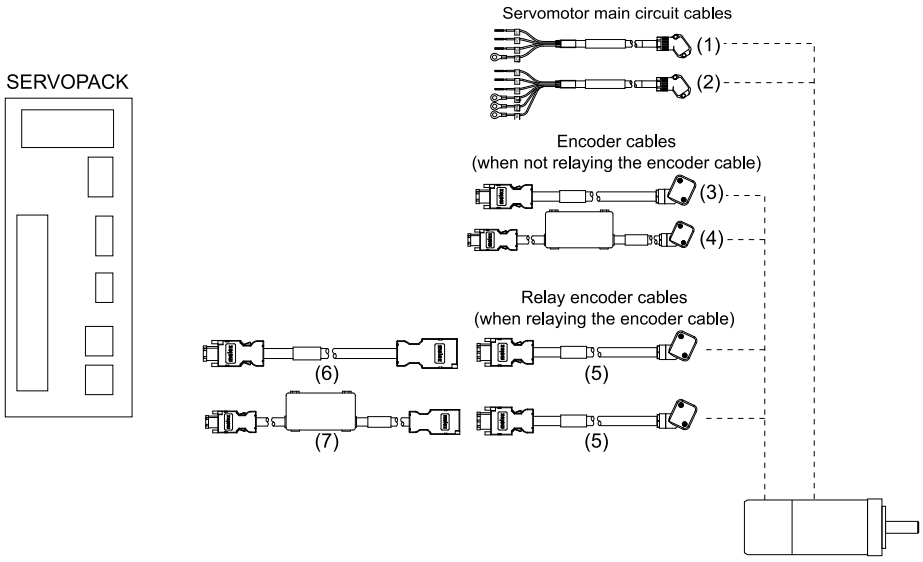
2.1.1 For Standard Specification Servomotors

The following diagram shows the device configuration when the cable installation direction is on the non-load side.

Important

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.





Note:

When you will relay the encoder cable, connect the cables by combining the encoder cable and the encoder cable with connectors on both ends as shown in (5) to (7) in the figure above.

No.	Cable Type				Reference
(1), (2)	Servomotor main circuit cables	Finished product	For servomotors without holding brakes		47
			For servomotors with holding brakes		48
		Fabrication	Connector kits		51
			Cables without connectors		56
(3), (4)	Encoder cables (when not relaying the encoder cable)	Finished product	For batteryless absolute encoders		58
			For absolute encoders *1		59
		Fabrication			69
(5) to (7)	Encoder cables (when relaying the encoder cable)	Finished product	-		62
			Connectors on both ends	For batteryless absolute encoders	63
				For absolute encoders *1	64
		Fabrication			69

*1 In the following cases, use an encoder cable for batteryless absolute encoders.

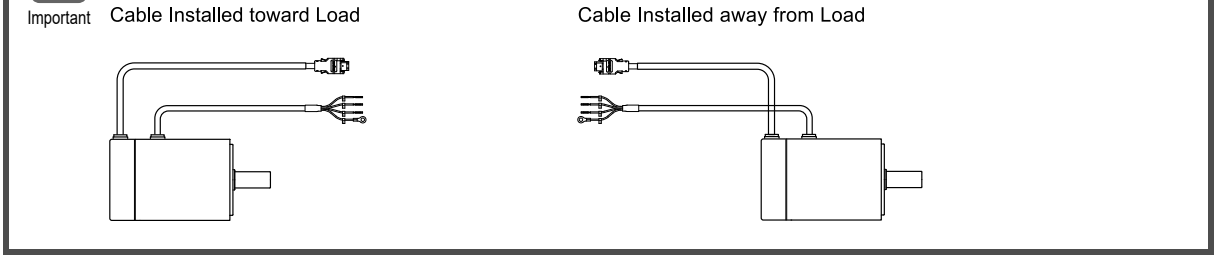
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

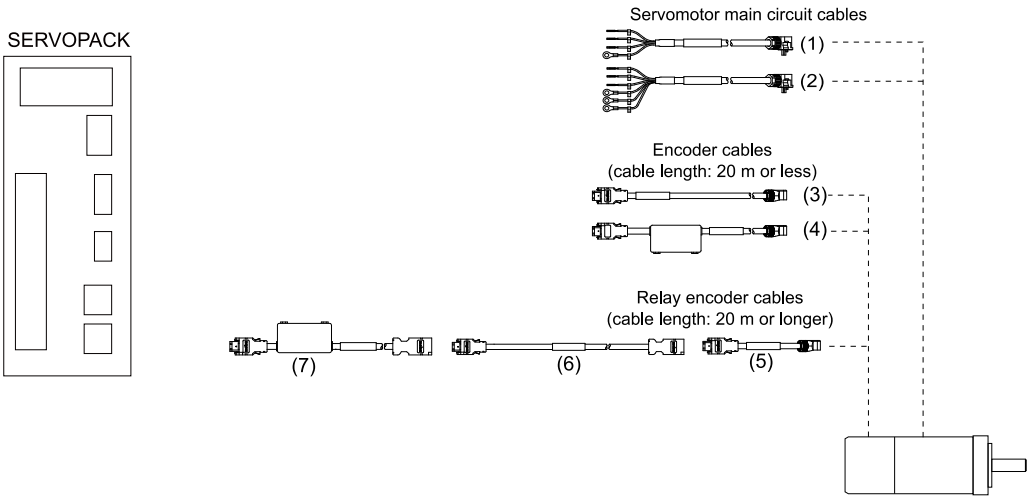
Information The cables described in this chapter are used to connect a SERVOPACK to a single servomotor.
Refer to the following chapter for the cables required when connecting the SERVOPACK to multiple devices.
☞ 13 Σ-LINK II-Related Devices on page 417

2.1.2 For Σ-7 Compatible Specification Servomotors

The following diagram shows the device configuration when the cable installation direction is on the non-load side.

Important 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.





Note:
If the encoder cable length exceeds 20 m, connect by combining the following cables as shown in (5) to (7) in the above figure.
• Relay encoder cables
• Relay encoder cables with connectors on both ends
• Relay encoder cables with connectors on both ends and battery unit

No.	Cable Type			Reference
(1), (2)	Servomotor main circuit cables	Finished product	For servomotors without holding brakes	49
			For servomotors with holding brakes	50
		Fabrication	Connector kits	53
			Cables without connectors	56
(3), (4)	Encoder cables of 20 m or less	Finished product	For batteryless absolute encoders	60
			For absolute encoders *1	61
		Fabrication		69

Continued on next page.

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No.	Cable Type				Reference
(5) to (7)	Relay encoder cables (when exceeds 20 m)	Finished product	-		66
			Connectors on both ends	–	67
				With battery units *2	68
		Fabrication			69

*1 In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

*2 In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

2.2 Servomotor Main Circuit Cables

The servomotor main circuit cable for the standard specification servomotor is different than the one for the Σ-7 compatible specification servomotor.

2.2.1 For Standard Specification Servomotors

There are two types of servomotor main circuit cables that are used with standard specification servomotors: One for servomotors without holding brakes and one for servomotors with holding brakes.

(1) For Servomotors without Holding Brakes

(a) Selection Table

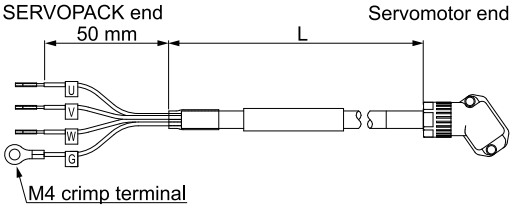
Cable Direction	Servomotor Model	Length (L)	Order Number *1	
			Standard Cable	Flexible Cable *2 *3
Load side	SGMXJ-A5 to 06 50 W to 600 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JWSP-XMA5NS1-□□	JWSP-XMA5NF1-□□
	SGMXJ-08 750 W		JWSP-XM08NS1-□□	JWSP-XM08NF1-□□
Non-load side	SGMXJ-A5 to 06 50 W to 600 W		JWSP-XMA5NS2-□□	JWSP-XMA5NF2-□□
	SGMXJ-08 750 W		JWSP-XM08NS2-□□	JWSP-XM08NF2-□□

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

(b) Appearance



(c) Wiring Specifications

SERVOPACK leads

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

Servomotor main circuit cable connector

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

(2) For Servomotors with Holding Brakes

(a) Selection Table

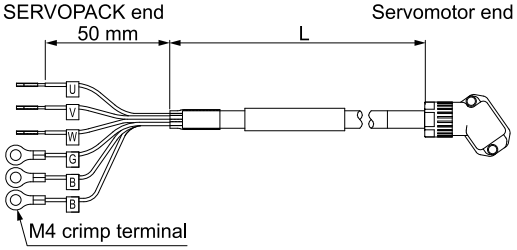
Cable Direction	Servomotor Model	Length (L)	Order Number *1	
			Standard Cable	Flexible Cable *2 *3
Load side	SGMXJ-A5 to 06 50 W to 600 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JWSP-XMA5BS1-□□	JWSP-XMA5BF1-□□
	SGMXJ-08 750 W		JWSP-XM08BS1-□□	JWSP-XM08BF1-□□
Non-load side	SGMXJ-A5 to 06 50 W to 600 W		JWSP-XMA5BS2-□□	JWSP-XMA5BF2-□□
	SGMXJ-08 750 W		JWSP-XM08BS2-□□	JWSP-XM08BF2-□□

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

(b) Appearance



(c) Wiring Specifications

SERVOPACK leads — Servomotor main circuit cable connector

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

Note:

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

2.2.2 For Σ-7 Compatible Specification Servomotors

There are two types of servomotor main circuit cables that are used with Σ-7 compatible specification servomotors: One for servomotors without holding brakes and one for servomotors with holding brakes.

(1) For Servomotors without Holding Brakes

(a) Selection Table

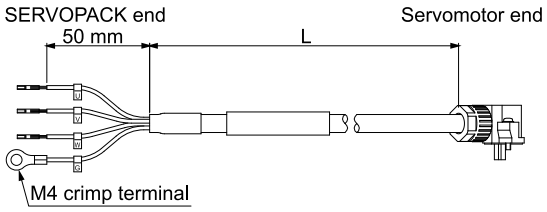
Cable Direction	Servomotor Model	Length (L)	Order Number *1	
			Standard Cable	Flexible Cable *2 *3
Load side	SGMXJ-A5 to C2 50 W to 150 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JZSP-C7M10F-□□□-E	JZSP-C7M12F-□□□-E
	SGMXJ-02 to 06 200 W to 600 W		JZSP-C7M20F-□□□-E	JZSP-C7M22F-□□□-E
	SGMXJ-08 750 W		JZSP-C7M30F-□□□-E	JZSP-C7M32F-□□□-E
Non-load side	SGMXJ-A5 to C2 50 W to 150 W		JZSP-C7M10G-□□□-E	JZSP-C7M12G-□□□-E
	SGMXJ-02 to 06 200 W to 600 W		JZSP-C7M20G-□□□-E	JZSP-C7M22G-□□□-E
	SGMXJ-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-rotation speed characteristics will become smaller because the voltage drop increases.

(b) Appearance



(c) Wiring Specifications

SERVOPACK leads

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

Servomotor main circuit cable connector

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

(2) For Servomotors with Holding Brakes

(a) Selection Table

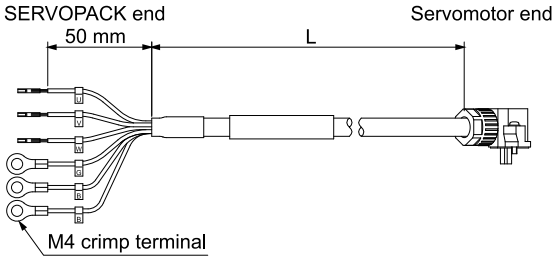
Cable Direction	Servomotor Model	Length (L)	Order Number *1	
			Standard Cable	Flexible Cable *2 *3
Load side	SGMXJ-A5 to C2 50 W to 150 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JZSP-C7M13F-□□□-E	JZSP-C7M14F-□□□-E
	SGMXJ-02 to 06 200 W to 600 W		JZSP-C7M23F-□□□-E	JZSP-C7M24F-□□□-E
	SGMXJ-08 750 W		JZSP-C7M33F-□□□-E	JZSP-C7M34F-□□□-E
Non-load side	SGMXJ-A5 to C2 50 W to 150 W		JZSP-C7M13G-□□□-E	JZSP-C7M14G-□□□-E
	SGMXJ-02 to 06 200 W to 600 W		JZSP-C7M23G-□□□-E	JZSP-C7M24G-□□□-E
	SGMXJ-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-rotation speed characteristics will become smaller because the voltage drop increases.

(b) Appearance



(c) Wiring Specifications

SERVOPACK leads — Servomotor main circuit cable connector

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

Note:

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

2.3 User-Assembled Wiring Materials for Servomotor Main Circuit Cables

2.3.1 Servomotor Main Circuit Cable Connector Kits

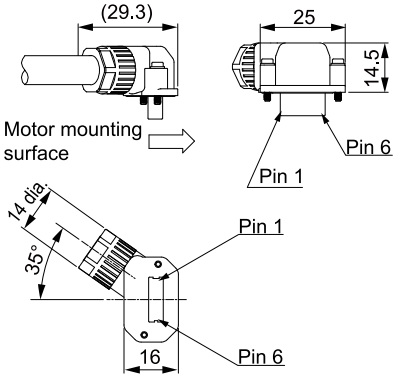
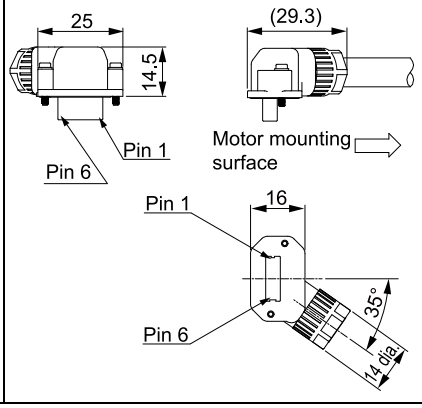
(1) For Standard Specification Servomotors

(a) Selection Table

Servomotor Model	Servomotor Capacity	Order Number *1
SGMXJ-A5 to 06	50 W to 600 W	JWSP-XMA5CN00
SGMXJ-08	750 W	JWSP-XM08CN00

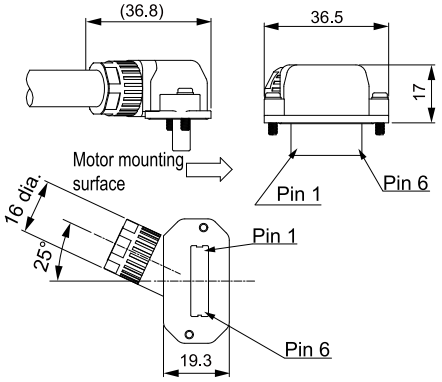
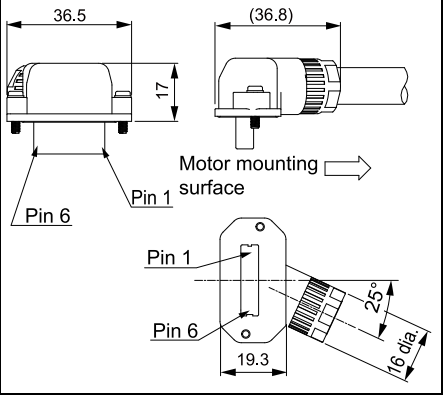
*1 Cables are not included. Purchase them separately.

◆ **SGMXJ-A5 to 06 (50 W to 600 W)**

Item		Description
Order Number		JWSP-XMA5CN00
Manufacturer		TE Connectivity Japan G.K.
Instructions		408-78180
Components	Receptacle	2352404-1
	Contacts	2352413-1
Applicable Wire Sizes		AWG20 to AWG24
Applicable Cable Diameter		7.0 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	2386880-1
	Applicator	2837730-1
External Dimensions [mm]		■ Cable on Non-Load Side  ■ Cable on Load Side 

*1 A crimping tool is required. Contact the connector manufacturer for details.

◆ SGMXJ-08 (for 750 W)

Item		Description
Order Number		JWSP-XM08CN00
Manufacturer		TE Connectivity Japan G.K.
Instructions		408-78180
Components	Receptacle	2352416-1
	Contacts	2352424-1
Applicable Wire Sizes		AWG16 to AWG20
Applicable Cable Diameter		8.0 mm ± 0.3 mm
Outer Diameter of Insulating Sheath		1.53 mm to 2.50 mm
Mounting Screws		M2.5 pan-head screws
Crimping Tool *1	Hand Tool	2386890-1
	Applicator	2837731-1
External Dimensions [mm]		■ Cable on Non-Load Side  ■ Cable on Load Side 

*1 A crimping tool is required. Contact the connector manufacturer for details.

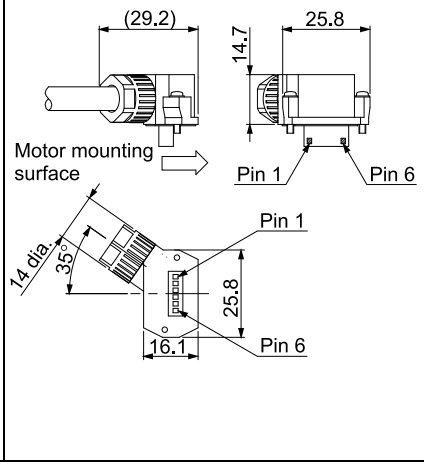
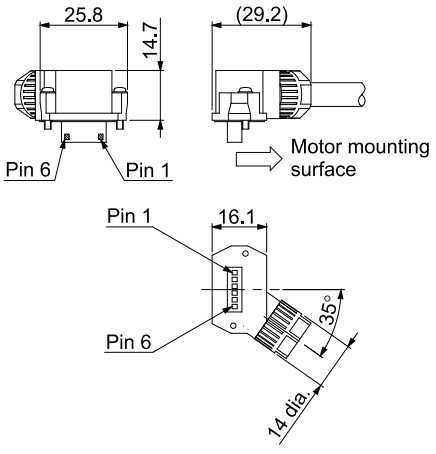
(2) For Σ-7 Compatible Specification Servomotors

(a) Selection Table

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

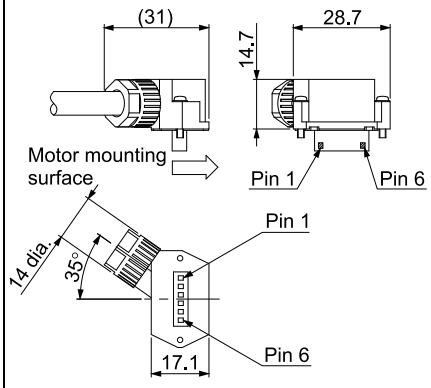
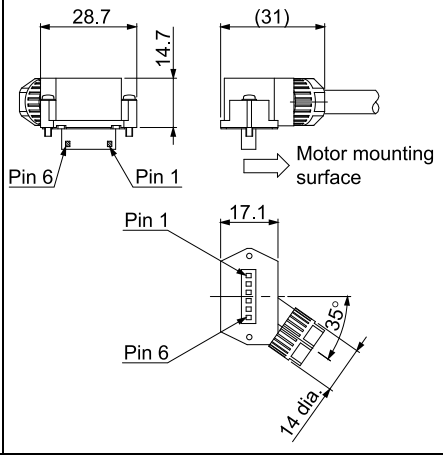
*1 Cables are not included. Purchase them separately.

◆ SGMXJ-A5 to C2 (50 W to 150 W)

Item		Description
Order Number		JZSP-C7M9-1-E
Manufacturer		J.S.T. Mfg. Co., Ltd.
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 *1	Hand Tool	YRS-8841
	Applicator	APLMK SJ1F/M01-08
External Dimensions [mm]		■ Cable on Non-Load Side 
		■ Cable on Load Side 

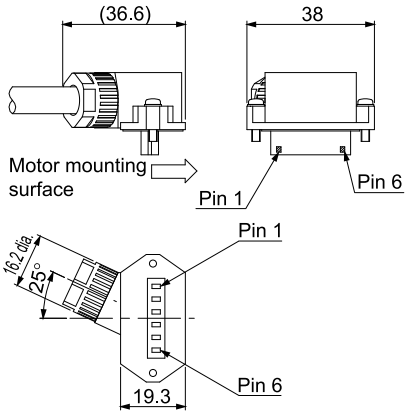
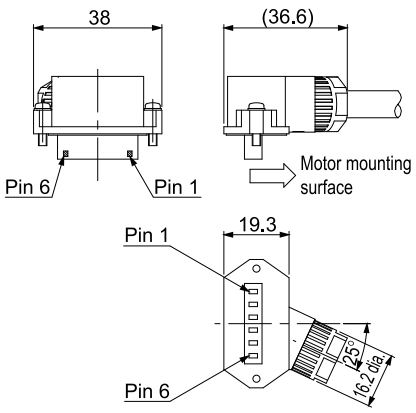
*1 A crimping tool is required. Contact the connector manufacturer for details.

◆ SGMXJ-02 to 06 (200 W to 600 W)

Item		Description
Order Number		JZSP-C7M9-2-E
Manufacturer		J.S.T. Mfg. Co., Ltd.
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 Insulat-ing Sheath		1.11 mm to 1.53 mm
Mounting Screws		M2 pan-head screws
Crimping Tool *1	Hand Tool	YRS-8861
	Applicator	APLMK SJ2F/M01-10
External Dimensions [mm]		■ Cable on Non-Load Side  ■ Cable on Load Side 

*1 A crimping tool is required. Contact the connector manufacturer for details.

◆ SGMXJ-08 (750 W)

Item		Description
Order Number		JZSP-C7M9-3-E
Manufacturer		J.S.T. Mfg. Co., Ltd.
Instructions		JFA Connector J-3700
Compo-nents	Receptacle	J37S-06FMH-8KL-M-CF
	Contacts	Power terminals: SJ3F-41GF-P1.8 Holding brake terminals: SJ3F-01GF-P1.8
Applicable Wire Sizes		Power terminals: AWG16 Holding brake terminals: AWG20 to AWG24
Applicable Cable Diameter		8 mm ±0.3 mm
Outer Diameter of Insu-lating 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 *1	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]		■ Cable on Non-Load Side 
		■ Cable on Load Side 

*1 A crimping tool is required. Contact the connector manufacturer for details.

2.3.2 Cables without Connectors

The cable wire material is the same for the standard specification servomotor and the Σ-7 compatible specification servomotor.

(1) Selection Table

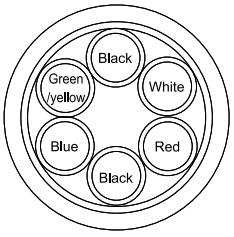
Servomotor Model	Servomotor Capacity	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
SGMXJ-A5 to C2	50 W to 600 W	JZSP-CSM90-□□-E	JZSP-C7M29-□□-E
SGMXJ-02 to 06			
SGMXJ-08	750 W	JZSP-CSM91-□□-E	JZSP-CSM81-□□-E

*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:

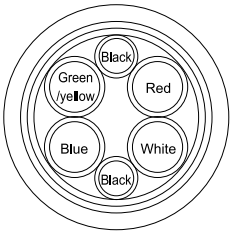
If the length of the servomotor main circuit cable exceeds 20 m, the intermittent duty zone in the torque-rotation speed characteristics will become smaller because the voltage drop increases.

(a) SGMXJ-A5 to 06 (50 W to 600 W)

Item	Standard Cable	Flexible Cable
Order Number *1	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		

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

(b) SGMXJ-08 (750 W)

Item	Standard Cable	Flexible Cable
Order Number *1	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		

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

2.4 Encoder Cables (When Not Relaying the Encoder Cable)

The encoder cable for the standard specification servomotor is different than that for the Σ-7 compatible specification servomotor.

2.4.1 For Standard Specification Servomotors

There are two types of encoder cables that are used with standard specification servomotors: One for batteryless absolute encoders and one for absolute encoders.

(1) Encoder Cables for Batteryless Absolute Encoders

(a) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Load side	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JWSP-XP2IS1-□□	JWSP-XP2IF1-□□
Non-load side		JWSP-XP2IS2-□□	JWSP-XP2IF2-□□

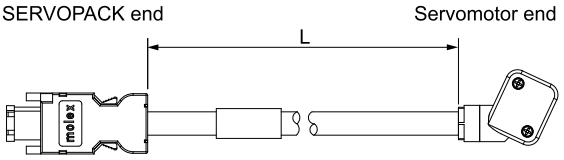
*1 Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, 20, 30, 40, or 50).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.

Note:

The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.

You cannot relay cables by connecting JZSP-UCMP00-□□-E or JZSP-CSP12-E cables.

(b) Appearance



(c) Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Shield wire

Servomotor end

Pin	Wire Color
5	Light blue
4	Red
7	Gray
3	Brown
6	Black
2	Orange
8	–
9	–
Shell	FG

(2) For Absolute Encoders

These cables are equipped with a battery unit. (A battery is included.)

Note:

In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

(a) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Load side	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JWSP-XP2AS1-□□	JWSP-XP2AF1-□□
Non-load side		JWSP-XP2AS2-□□	JWSP-XP2AF2-□□

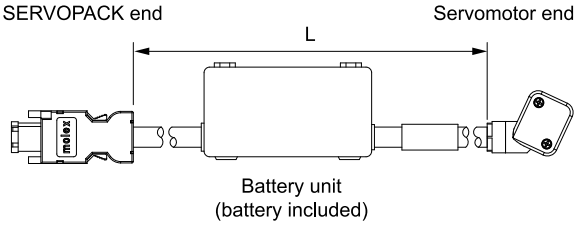
*1 Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, 20, 30, 40, or 50).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.

Note:

The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.

You cannot relay cables by connecting JZSP-UCMP00-□□-E or JZSP-CSP12-E cables.

(b) Appearance



(c) Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Servomotor end

Pin	Wire Color
5	Light blue
4	Red
7	Gray
3	Brown
6	Black
2	Orange
8	–
9	–
Shell	FG

Shield wire

Battery unit

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

2.4.2 Servomotors with Σ-7 Compatible Specifications (20 m or Less)

There are two types of encoder cables that are used with Σ-7 compatible specification servomotors: One for batteryless absolute encoders and one for absolute encoders.

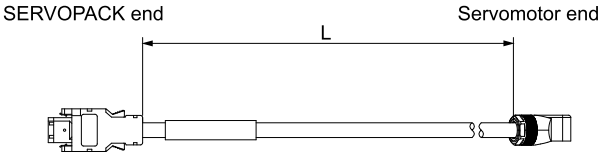
(1) For batteryless absolute encoders

(a) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Load side	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.

(b) Appearance



(c) Wiring Specifications

Standard Cable

SERVOPACK end			Servomotor 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	Shield wire	Shell	FG

Flexible Cable

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

(2) For Absolute Encoders

These cables are equipped with a battery unit. (A battery is included.)

Note:

In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

Install a battery at either the host controller or on the encoder cable.

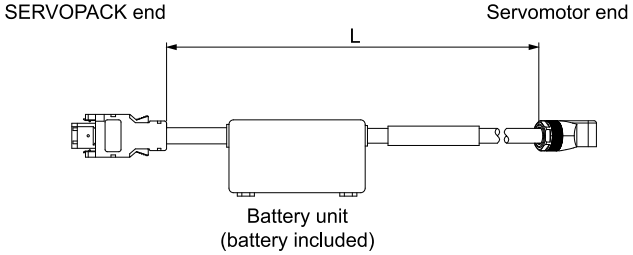
If you install batteries both at the host controller and on the encoder cable at the same time, you will create a loop circuit between the batteries, and this may result in a fire from product failure or damage that causes death or serious injury.

(a) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Load side	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 larger.

(b) Appearance



(c) Wiring Specifications

Standard Cable

SERVOPACK end

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

Servomotor end

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

Shield wire

Battery unit

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

Flexible Cable

SERVOPACK end

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

Servomotor end

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

Shield wire

Battery unit

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

2.5 Encoder Cables (When Relaying the Encoder Cable)

The encoder cable for relaying for the standard specification servomotor is different than that for the Σ-7 compatible specification servomotor.

2.5.1 For Standard Specification Servomotors

When you will relay the encoder cable, connect the cables by combining an encoder cable and an encoder cable with connectors on both ends.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

(1) Encoder Cables

(a) Selection Table

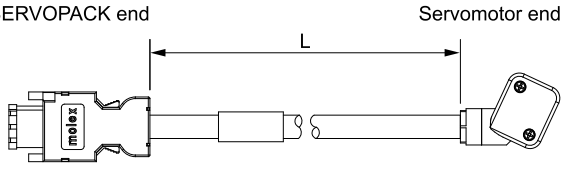
Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Load side	0.3 m, 1 m, 3 m, 5 m, 10 m, 15 m, 20 m, 25 m, 30 m, 40 m, 50 m	JWSP-XP3IS1-□□	JWSP-XP3IF1-□□
Non-load side		JWSP-XP3IS2-□□	JWSP-XP3IF2-□□

*1 Replace the boxes (□□) in the order number with the cable length (00P3, 01, 03, 05, 10, 15, 20, 25, 30, 40, or 50).
*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. When you will relay the encoder cable, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
2. The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.
   You cannot relay cables by combining JZSP-UCMP00-□□-E and JZSP-CSP12-E cables with JWSP-XP1□□□-□□, JWSP-XP2□□□-□□, and JWSP-XP4□□□-□□ cables.

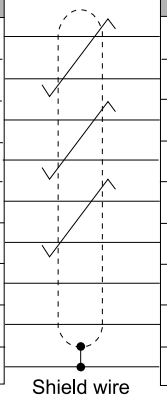
(b) Appearance



(c) Wiring Specifications

SERVOPACK end

Pin	Signal
8	/PS2
7	PS2
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG



Servomotor end

Pin	Wire Color
9	White
8	Yellow
5	Light blue
4	Red
7	Gray
3	Brown
6	Black
2	Orange
Shell	FG

(2) Encoder Cables with Connectors on Both Ends

There are two types of encoder cables with connectors on both ends: One for batteryless absolute encoders and one for absolute encoders.

(a) For Batteryless Absolute Encoders

◆ Selection Table

Length (L)	Order Number *1*	
	Standard Cable	Flexible Cable *2 *3
0.3 m, 3 m, 5 m, 10 m, 15 m, 20 m, 25 m	JWSP-XP1IS0-□□	JWSP-XP1IF0-□□

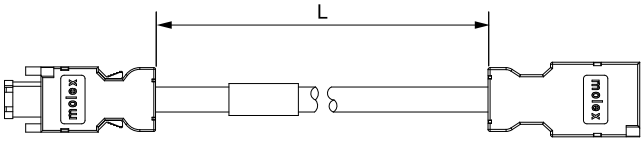
*1 Replace the boxes (□□) in the order number with the cable length (00P3, 03, 05, 10, 15, 20, or 25).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.

Note:

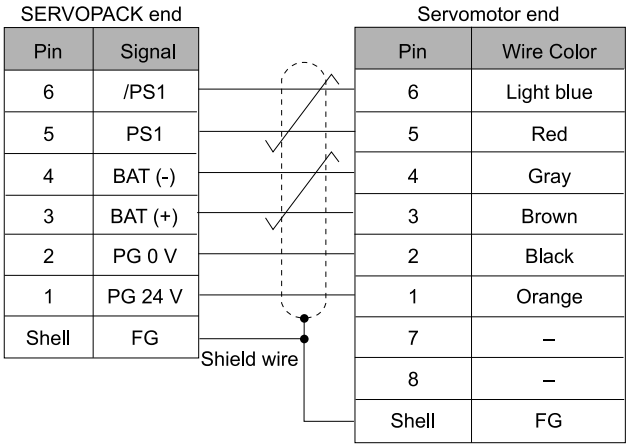
1. When you will relay the encoder cable, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
2. The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.
   You cannot relay cables by combining JZSP-UCMP00-□□-E and JZSP-CSP12-E cables with JWSP-XP1□□□-□□, JWSP-XP2□□□-□□, and JWSP-XP4□□□-□□ cables.

◆ Appearance

SERVOPACK end Servomotor end



◆ Wiring Specifications



SERVOPACK end		Servomotor end	
Pin	Signal	Pin	Wire Color
6	/PS1	6	Light blue
5	PS1	5	Red
4	BAT (-)	4	Gray
3	BAT (+)	3	Brown
2	PG 0 V	2	Black
1	PG 24 V	1	Orange
Shell	FG	7	–
		8	–
		Shell	FG

(b) For Absolute Encoders

These cables are equipped with a battery unit. (A battery is included.)

Note:

In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

◆ Selection Table

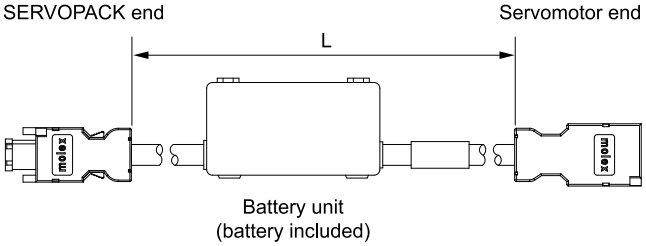
Length (L)	Order Number *1	
	Standard Cable	Flexible Cable *2 *3
0.3 m, 3 m, 5 m, 10 m, 15 m, 20 m, and 25 m	JWSP-XP1AS0-□□	JWSP-XP1AF0-□□

*1 Replace the boxes (□□) in the order number with the cable length (00P3, 03, 05, 10, 15, 20, or 25).
*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. When you will relay the encoder cable, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
2. The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.
   You cannot relay cables by combining JZSP-UCMP00-□□-E and JZSP-CSP12-E cables with JWSP-XP1□□□-□□, JWSP-XP2□□□-□□, and JWSP-XP4□□□-□□ cables.

◆ Appearance



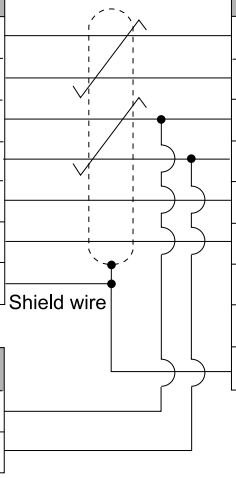
◆ Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Battery unit

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



Servomotor end

Pin	Wire Color
6	Light blue
5	Red
4	Gray
3	Brown
2	Black
1	Orange
7	–
8	–
Shell	FG

2.5.2 Servomotors with Σ-7 Compatible Specifications (When Exceeding 20 m)

If the encoder cable length exceeds 20 m, use by combining the following cables.

- Relay encoder cables
- Relay encoder cables with connectors on both ends
- Relay encoder cables with connectors on both ends and battery unit *1

*1 In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

Install a battery at either the host controller or on the encoder cable.

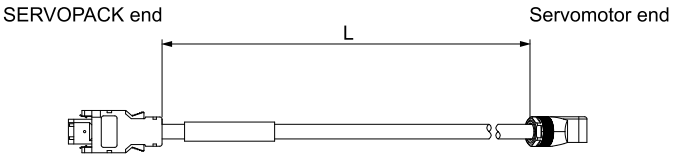
If you install batteries both at the host controller and on the encoder cable at the same time, you will create a loop circuit between the batteries, and this may result in a fire from product failure or damage that causes death or serious injury.

(1) Relay Encoder Cables

(a) 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

(b) Appearance



(c) Wiring Specifications

SERVOPACK end

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

Servomotor end

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

Shield wire

(2) Relay Encoder Cables with Connectors on Both Ends

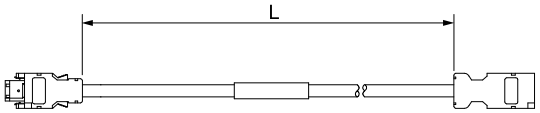
(a) Selection Table

Specification	Length (L)	Order Number *1
Used for all types of encoders	30 m, 40 m, 50 m	JZSP-UCMP00-□□-E

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

(b) Appearance

SERVOPACK end Servomotor end



(c) Wiring Specifications

SERVOPACK end

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

Shield wire

Servomotor end

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

(3) Relay Encoder Cables with Connectors on Both Ends and Battery Unit

Note:

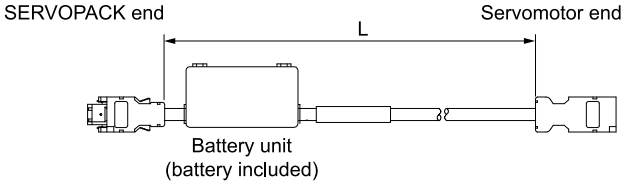
In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

(a) Selection Table

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

(b) Appearance



(c) Wiring Specifications

SERVOPACK end

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

Servomotor end

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

Shield wire

Battery unit

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

2.6 User-Assembled Wiring Materials for Encoder Cables

The wiring materials for user-assembled encoder cables described in this section are used for Σ-7 compatible specification servomotors.

Refer to the following section for details on the user-assembled wiring materials for encoder cables of standard specification servomotors.

☞ *13.6 User-Assembled Wiring Materials for Encoder Cables on page 464*

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

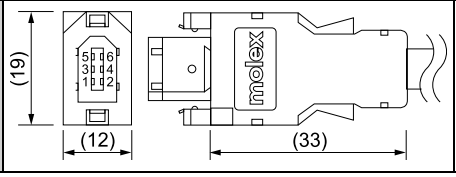
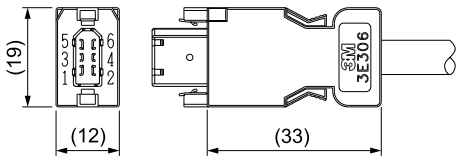
When using encoder cables with a wiring length of 30 m to 50 m, it is necessary to fabricate two different types of cables.

Cables to Be Fabricated	Connectors and Wire Materials Required for Fabrication	Reference	Remarks
Motor-End Relay Encoder Cables	SERVOPACK connector	*2.6.2 SERVOPACK Connector Kits on page 69*	This cable should be 0.3 m or less.
	Servomotor connectors	*2.6.3 Encoder Cable Connector Kits on page 70*	
	Encoder cables of 20 m or less	*2.6.4 Cables without Connectors on page 71*	
SERVOPACK-End Relay Encoder Cables	SERVOPACK connector	*2.6.2 SERVOPACK Connector Kits on page 69*	This cable should be 50 m or less.
	Cable relay connectors	*2.6.3 Encoder Cable Connector Kits on page 70*	
	Relay encoder cable of 30 m to 50 m	*2.6.4 Cables without Connectors on page 71*	

Refer to the following section for details on the connection of the relay encoder cable.

☞ *2.1.2 For Σ-7 Compatible Specification Servomotors on page 45*

2.6.2 SERVOPACK Connector Kits

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

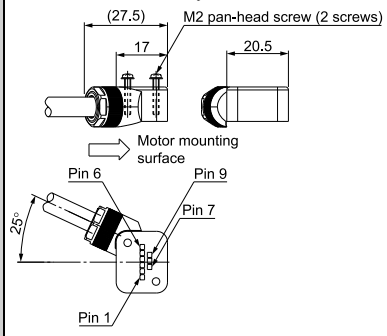
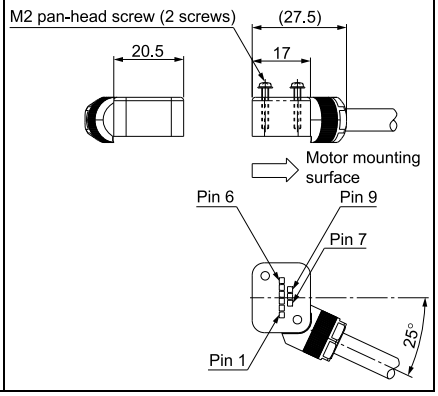
*1 For details, consult your Yaskawa representative. The tool is not provided by Yaskawa.

Note:

Cables are not included. Purchase them separately.

2.6.3 Encoder Cable Connector Kits

(1) Servomotor Connectors

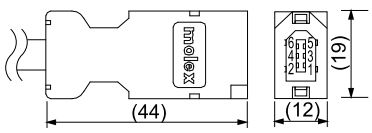
Order Number		JZSP-C7P9-1-E
Manufacturer		Molex Japan Co., Ltd.
Components		504678-0070 Loose connectors: 56161-8181 (crimped), Reeled: 56161-8081 (crimped)
Applicable Wire Sizes		AWG22 to AWG26
Applicable Cable Diameter		6.3 mm to 7.7 mm
Outer Diameter of Insulating Sheath		1.05 mm to 1.4 mm
Mounting Screws		M2 pan-head screws (two)
Application Specifications		AS-504682
Crimping Specifications		CS-56161
Crimping Tool *1	**Hand Tool**	638235100
Shell Caulking Tool	**Hand Tool**	57331-5100
	Hand Press	57331-5200
External Dimensions [mm]		■ Cable Installed away from Load  ■ Cable Installed toward Load 

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

Note:

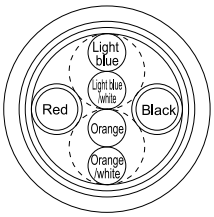
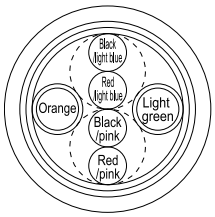
Cables are not included. Purchase them separately.

(2) Cable Relay Connectors

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

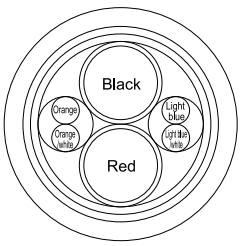
2.6.4 Cables without Connectors

(1) Encoder Cables of 20 m or Less

Item	Standard Cable	Flexible Cable
Order Number *1	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 mm²) Outer diameter of insulating sheath: 1.15 mm	AWG22 (0.33 mm²) Outer diameter of insulating sheath: 1.35 mm
	AWG24 (0.20 mm²) Outer diameter of insulating sheath: 1.09 mm	AWG24 (0.20 mm²) Outer diameter of insulating sheath: 1.21 mm
Finished Diameter	6.5 mm	6.8 mm
Internal Structure and Lead Colors		

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

(2) Relay Encoder Cable of 30 m to 50 m

Item	Standard Cable
Order Number *1	JZSP-CMP19-□□-E (maximum length: 50 m)
Specifications	UL20276 (rated temperature: 80°C) AWG16 × 2C + AWG26 × 2P
	AWG16 (1.31 mm²) Outer diameter of insulating sheath: 2.0 mm
	AWG26 (0.13 mm²) Outer diameter of insulating sheath: 0.91 mm
Finished Diameter	6.8 mm
Internal Structure and Lead Colors	

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

2.7 Wiring Precautions

2.7.1 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.

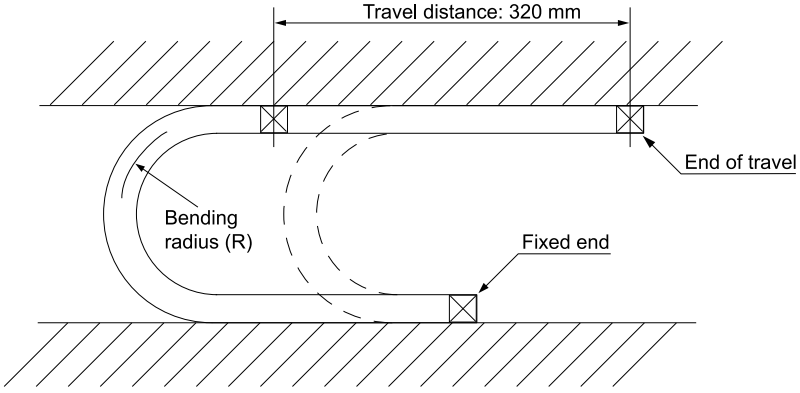
Cable Diameter	Recommended Bending Radius (R)
Less than 8 mm	15 mm min.
8 mm	20 mm min.
Over 8 mm	Cable diameter × 3 mm min.

2.7.2 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) as listed in each selection table 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 affects the performance of the cable sheathing occurs.

- 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.
- If a flexible cable is used in a fixed position, the recommended bending radius is the same as for standard cables. Perform all wiring so that stress is not applied to the cables.

3

Cables and User-Assembled Wiring Materials for SGMXA Rotary Servomotors (200 V Specification)

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3.1 Cable Configurations

3.1.1 For Standard Specification Servomotors

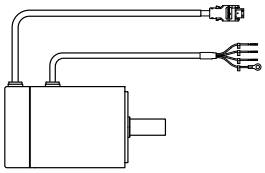
(1) SGMXA-A5 to -10 (50 W to 1.0 kW)

The following diagram shows the device configuration when the cable installation direction is on the non-load side.

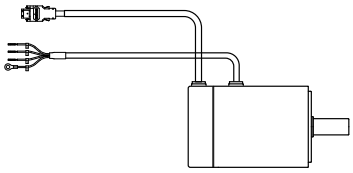
Important

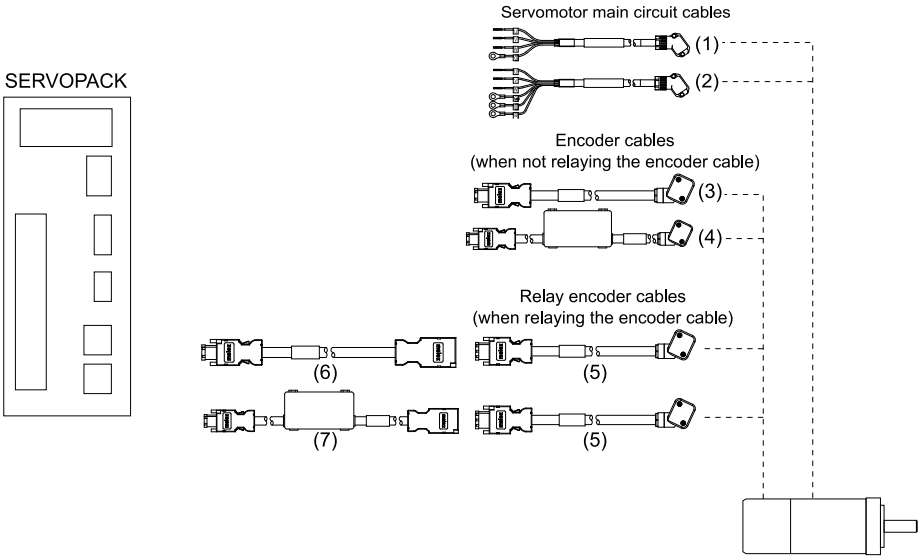
There are different order numbers for the servomotor main circuit cables and encoder cables depending on the cable installation direction. Confirm the order numbers before you order.

Cable Installed toward Load



Cable Installed away from Load





Note:

When you will relay the encoder cable, connect the cables by combining the encoder cable and the encoder cable with connectors on both ends as shown in (5) to (7) in the figure above.

No.	Cable Type				Reference
(1), (2)	Servomotor main circuit cables	Finished product	For servomotors without holding brakes		80
			For servomotors with holding brakes		82
		Fabrication	Connector kits		89
			Cables without connectors		94
(3), (4)	Encoder cables (when not relaying the encoder cable)	Finished product	For batteryless absolute encoders		104
			For absolute encoders *1		105
		Fabrication			118
(5) to (7)	Relay encoder cables (when relaying the encoder cable)	Finished product	-		110
			Connectors on both ends	For batteryless absolute encoders	111
				For absolute encoders *1	112
		Fabrication			118

*1 In the following cases, use an encoder cable for batteryless absolute encoders.

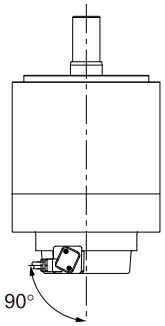
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

Information The cables described in this chapter are used to connect a SERVOPACK to a single servomotor.
Refer to the following chapter for the cables required when connecting the SERVOPACK to multiple devices.
☞ *13 Σ-LINK II-Related Devices on page 417*

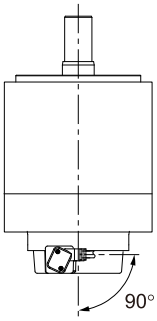
(2) SGMXA-15 to -70 (1.5 kW to 7.0 kW)

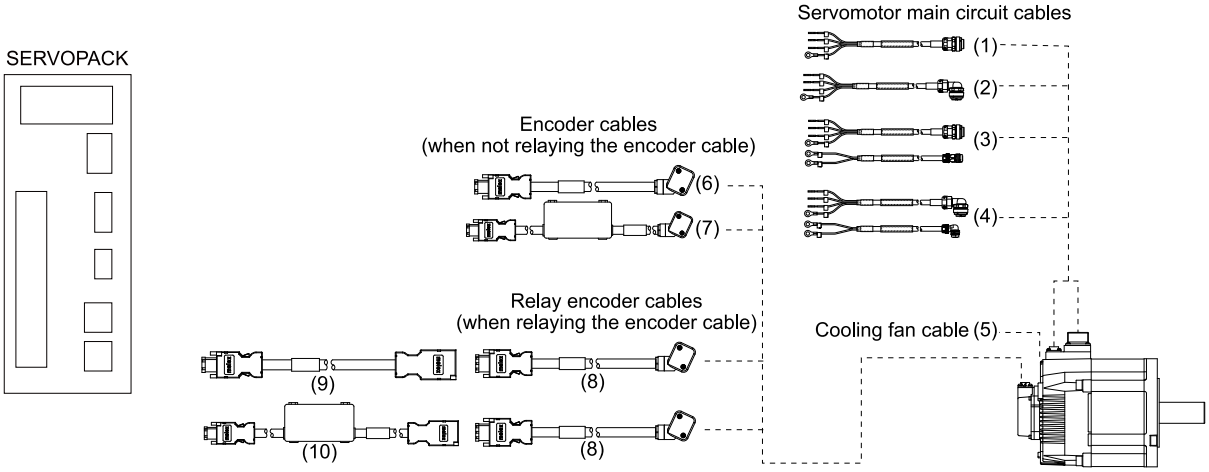
Important There are different order numbers for encoder cables depending on the cable installation direction. Confirm the order numbers before you order.

Left-side cable installation type



Right-side cable installation type





Note:
When you will relay the encoder cable, connect the cables by combining the encoder cable and the encoder cable with connectors on both ends as shown in (8) to (10) in the figure above.

No.	Cable Type				Reference
(1) to (4)	Servomotor main circuit cables *1	Finished product	For servomotors without holding brakes	Straight plug	80
				Right-Angle Plug *2	
			For servomotors with holding brakes	Straight plug	82
				Right-Angle Plug *2	
		Fabrication	Connectors		96
			Cables without connectors *3		-
(5)	Cooling fan cable *4				100
(6), (7)	Encoder cables (when not relaying the encoder cable)	Finished product	For batteryless absolute encoders		104
			For absolute encoders *5		105
		Fabrication			118

Continued on next page.

Continued from previous page.

No.	Cable Type				Reference
(8) to (10)	Encoder cables (when relaying the encoder cable)	Finished product	-		110
			Connectors on both ends	For batteryless absolute encoders	111
				For absolute encoders *5	112
		Fabrication			118

*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.
☞ *3.4 User-Assembled Wiring Materials for Servomotor Main Circuit Cables (SGMXA-15 to 70) on page 96*

*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 Only the SGMXA-70 servomotor has a built-in cooling fan. 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 In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

Information The cables described in this chapter are used to connect a SERVOPACK to a single servomotor.
Refer to the following chapter for the cables required when connecting the SERVOPACK to multiple devices.
☞ *13 Σ-LINK II-Related Devices on page 417*

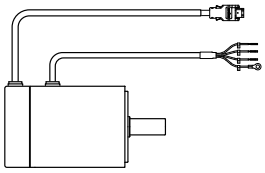
3.1.2 For Σ-7 Compatible Specification Servomotors

(1) SGMXA-A5 to -10 (50 W to 1.0 kW)

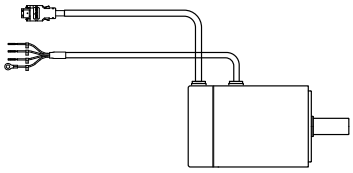
The following diagram shows the device configuration when the cable installation direction is on the non-load side.

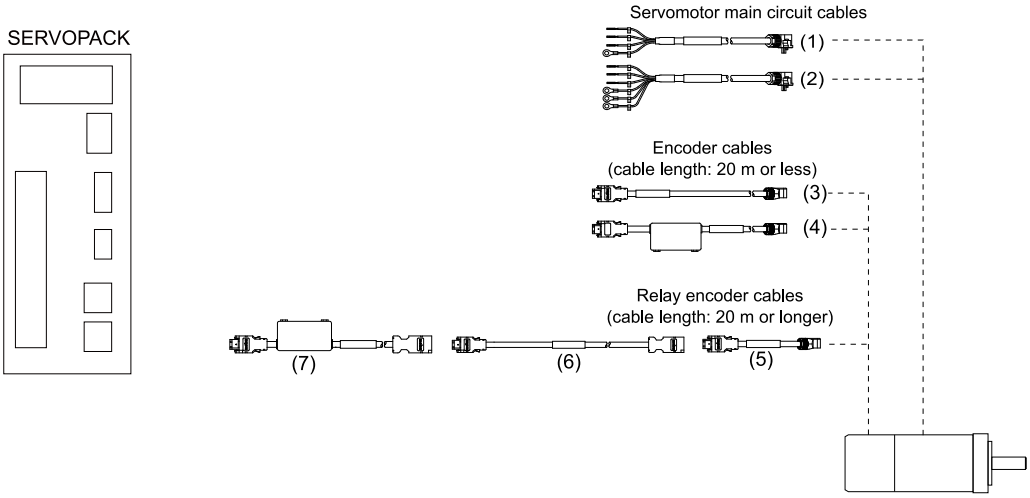
Important There are different order numbers for the servomotor main circuit cables and encoder cables depending on the cable installation direction. Confirm the order numbers before you order.

Cable Installed toward Load



Cable Installed away from Load





Note:

If the encoder cable length exceeds 20 m, connect by combining the following cables as shown in (5) to (7) in the above figure.

- Relay encoder cables
- Relay encoder cables with connectors on both ends
- Relay encoder cables with connectors on both ends and battery unit

No.	Cable Type				Reference
(1), (2)	Servomotor main circuit cables	Finished product	For servomotors without holding brakes		86
			For servomotors with holding brakes		87
		Fabrication	Connector kits		91
			Cables without connectors		94
(3), (4)	Encoder cables of 20 m or less	Finished product	For batteryless absolute encoders		106
			For absolute encoders *1		108
		Fabrication			118
(5) to (7)	Relay encoder cables (when exceeds 20 m)	Finished product	-		114
			Connectors on both ends	–	116
				With battery units *2	117
		Fabrication			118

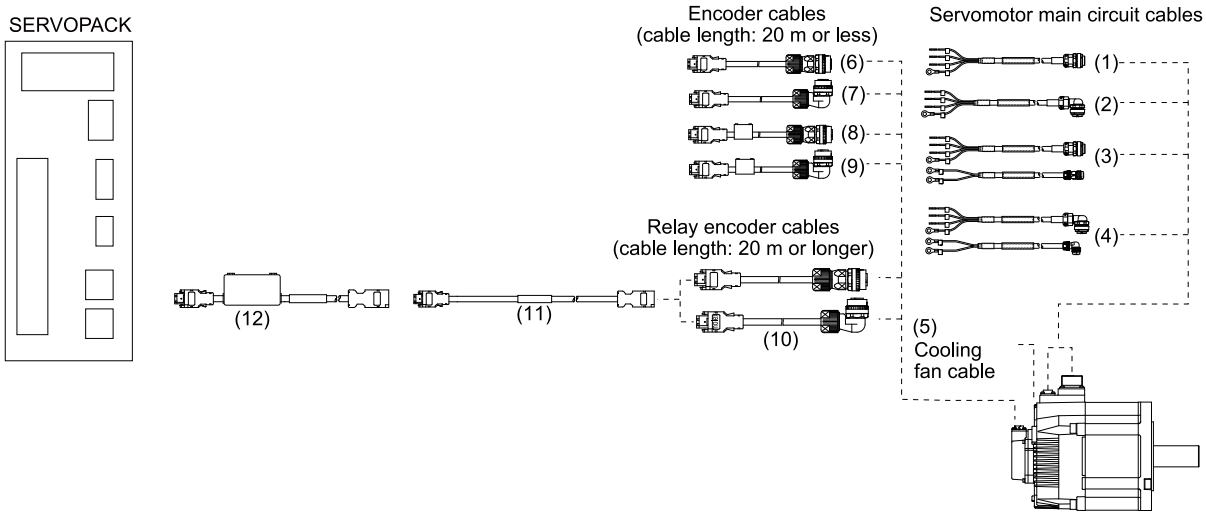
*1 In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

*2 In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

(2) SGMXA-15 to -70 (1.5 kW to 7.0 kW)



Note:

If the encoder cable length exceeds 20 m, connect by combining the following cables as shown in (10) to (12) in the above figure.

- Relay encoder cables
- Relay encoder cables with connectors on both ends
- Relay encoder cables with connectors on both ends and battery unit

No.	Cable Type				Reference
(1) to (4)	Servomotor main circuit cables *1	Finished product	For servomotors without holding brakes	Straight plug	86
				Right-Angle Plug *2	
			For servomotors with holding brakes	Straight plug	87
				Right-Angle Plug *2	
		Fabrication	Connectors		96
			Cables without connectors *3		-
(5)	Cooling fan cable *4				100
(6) to (9)	Encoder cables of 20 m or less	Finished product	For batteryless absolute encoders	Straight plug	106
				Right-Angle Plug *2	
			For absolute encoders *5	Straight plug	108
				Right-Angle Plug *2	
		Fabrication			118
(10) to (12)	Relay encoder cables (when exceeds 20 m)	Finished product	Straight plug		114
			Right-Angle Plug *2		
			Connectors on both ends	–	116
				With battery units *6	117
		Fabrication			118

*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.

☞ *3.4 User-Assembled Wiring Materials for Servomotor Main Circuit Cables (SGMXA-15 to 70) on page 96*

*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 Only the SGMXA-70 servomotor has a built-in cooling fan. 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 In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

*6 In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

3.2 Servomotor Main Circuit Cables

The servomotor main circuit cable for SGMXA-A5 to 10 servomotors is same as that for the standard specification servomotor and the Σ-7 compatible specification servomotor.

The servomotor main circuit cable for SGMXA-15 to 70 servomotors is the same as that for the standard specification servomotor and the Σ-7 compatible specification servomotor.

Information SGMXA-15 to 70 servomotors can also use the same cables as Σ-7 series rotary servomotors. However, when using a product that conforms to the IP67 degree of protection, use the cables described in this manual. Refer to the following manual for information on the Σ-7-series for rotary servomotor cables.

Σ-7-Series Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

3.2.1 For Standard Specification Servomotors

There are two types of servomotor main circuit cables that are used with standard specification servomotors: One for servomotors without holding brakes and one for servomotors with holding brakes.

(1) For Servomotors without Holding Brakes

(a) Selection Table

◆ **SGMXA-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	SGMXA-A5 to 06 50 W to 600 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JWSP-XMA5NS1-□□	JWSP-XMA5NF1-□□
	SGMXA-08, 10 750 W, 1.0 kW		JWSP-XM08NS1-□□	JWSP-XM08NF1-□□
Non-load side	SGMXA-A5 to 06 50 W to 600 W		JWSP-XMA5NS2-□□	JWSP-XMA5NF2-□□
	SGMXA-08, 10 750 W, 1.0 kW		JWSP-XM08NS2-□□	JWSP-XM08NF2-□□

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

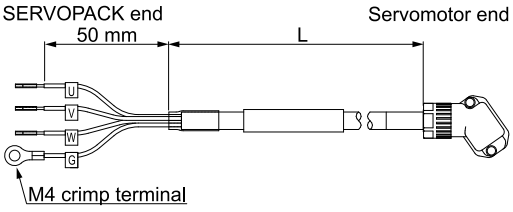
◆ SGMXA-15 to -70 (1.5 kW to 7.0 kW)

Connector Specifications	Servomotor Model	Length (L)	Order Number *1	
			Standard Cable	Flexible Cable *2 *3
Straight plug	SGMXA-15 1.5 kW	3 m, 5 m, 10 m, 15 m, 20 m	JWSP-XM15NSS-□□	JWSP-XM15NFS-□□
	SGMXA-20, -25 2.0 kW, 2.5 kW		JWSP-XM20NSS-□□	JWSP-XM20NFS-□□
	SGMXA-30 3.0 kW		JWSP-XM30NSS-□□	JWSP-XM30NFS-□□
	SGMXA-40, -50 4.0 kW, 5.0 kW		JWSP-XM40NSS-□□	JWSP-XM40NFS-□□
	SGMXA-70 7.0 kW		–	JWSP-XM70NFS-□□
Right-angle plug *4	SGMXA-15 1.5 kW		JWSP-XM15NSL-□□	JWSP-XM15NFL-□□
	SGMXA-20, -25 2.0 kW, 2.5 kW		JWSP-XM20NSL-□□	JWSP-XM20NFL-□□
	SGMXA-30 3.0 kW		JWSP-XM30NSL-□□	JWSP-XM30NFL-□□
	SGMXA-40, -50 4.0 kW, 5.0 kW		JWSP-XM40NSL-□□	JWSP-XM40NFL-□□
	SGMXA-70 7.0 kW		–	JWSP-XM70NFL-□□

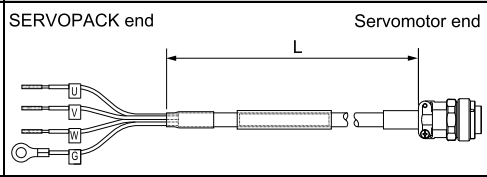
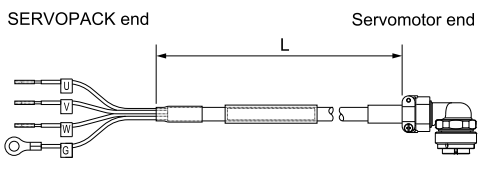
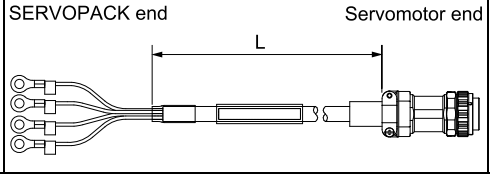
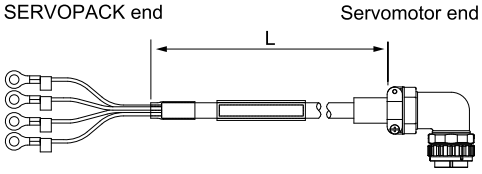
*1 Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 90 mm or larger.
*4 The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

(b) Appearance

◆ SGMXA-A5 to -10 (50 W to 1.0 kW)



◆ SGMXA-15 to -70 (1.5 kW to 7.0 kW)

Servomotor Model	Straight Plug Connector	Right-Angle Plug Connector *1
SGMXA-15 1.5 kW		
SGMXA-20 to -70 2.0 kW to 7.0 kW		

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

(c) Wiring Specifications

◆ SGMXA-A5 to -10 (50 W to 1.0 kW)

SERVOPACK leads

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

Servomotor main circuit cable connector

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

◆ SGMXA-15 to -70 (1.5 kW to 7.0 kW)

Standard Cable

SERVOPACK leads

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

Servomotor connector

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

Flexible Cable

SERVOPACK leads

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

Servomotor connector

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

(2) For Servomotors with Holding Brakes

(a) Selection Table

◆ SGMXA-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	SGMXA-A5 to 06 50 W to 600 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JWSP-XMA5BS1-□□	JWSP-XMA5BF1-□□
	SGMXA-08, 10 750 W, 1.0 kW		JWSP-XM08BS1-□□	JWSP-XM08BF1-□□
Non-load side	SGMXA-A5 to 06 50 W to 600 W		JWSP-XMA5BS2-□□	JWSP-XMA5BF2-□□
	SGMXA-08, 10 750 W, 1.0 kW		JWSP-XM08BS2-□□	JWSP-XM08BF2-□□

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

◆ SGMXA-15 to -50 (1.5 kW to 5.0 kW)

Connector Specifications	Servomotor Model	Length (L)	Order Number *1, *2	
			Standard Cable	Flexible Cable *3 *4
Straight plug	SGMXA-15 1.5 kW	3 m, 5 m, 10 m, 15 m, 20 m	JWSP-XM15BSS-□□	JWSP-XM15BFS-□□
	SGMXA-20, -25 2.0 kW, 2.5 kW		JWSP-XM20BSS-□□	JWSP-XM20BFS-□□
	SGMXA-30 3.0 kW		JWSP-XM30BSS-□□	JWSP-XM30BFS-□□
	SGMXA-40, -50 4.0 kW, 5.0 kW		JWSP-XM40BSS-□□	JWSP-XM40BFS-□□
Right-angle plug *5	SGMXA-15 1.5 kW		JWSP-XM15BSL-□□	JWSP-XM15BFL-□□
	SGMXA-20, -25 2.0 kW, 2.5 kW		JWSP-XM20BSL-□□	JWSP-XM20BFL-□□
	SGMXA-30 3.0 kW		JWSP-XM30BSL-□□	JWSP-XM30BFL-□□
	SGMXA-40, -50 4.0 kW, 5.0 kW		JWSP-XM40BSL-□□	JWSP-XM40BFL-□□

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

*2 These are the order numbers for two-cable sets (main power supply cable + holding brake cable).
To order the cables separately, the order number for a single main power supply cable is identical to that for the cable for servomotors without holding brakes.
The order numbers for single cables for servomotors with holding brakes are as follows. A flexible cable is provided for this cable as standard.

- Straight plug: JWSP-XB0FS-□□
- Right-angle plug: JWSP-XB0FL-□□

Note:

If you prefer a cable length from 20 m to 50 m, specify the length by taking into account the following operating conditions.

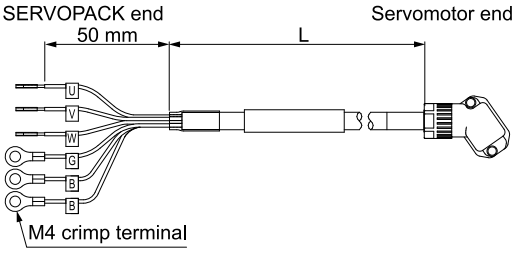
*3 Use flexible cables for moving parts of machines, such as robots.

*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.

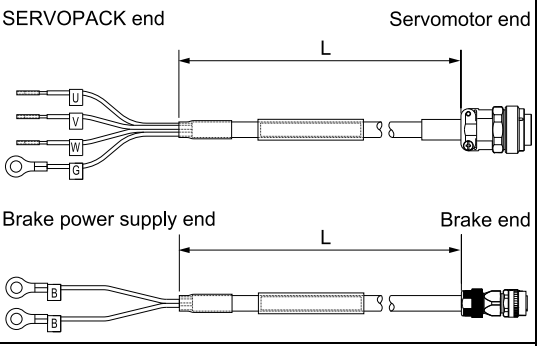
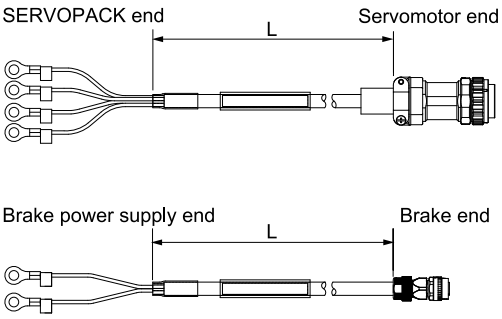
(b) Appearance

◆ SGMXA-A5 to -10 (50 W to 1.0 kW)



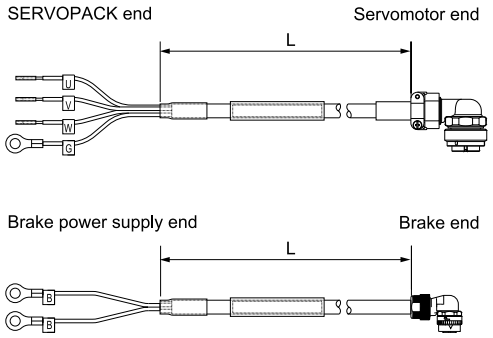
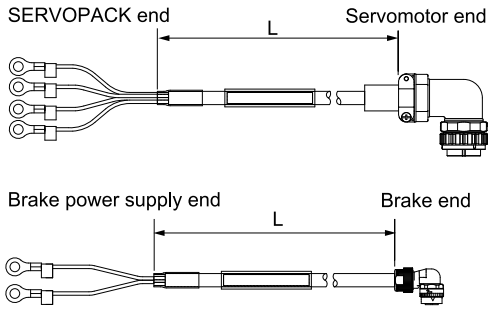
◆ SGMXA-15 to -50 (1.5 kW to 5.0 kW)

- Straight Plug

Servomotor Model	Order Numbers of Main Power Supply Cable and Holding Brake Cable	Individual Cable Order Numbers *1	Appearance
SGMXA-15 1.5 kW	Standard cable: JWSP-XM15BSS-□□ Flexible cable: JWSP-XM15BFS-□□	– Main circuit power supply cable Standard cable: JWSP-XM15NSS-□□ Flexible cable: JWSP-XM15NFS-□□ – Holding brake cable JWSP-XB0FS-□□	
SGMXA-20, -25 2.0 kW, 2.5 kW	Standard cable: JWSP-XM20BSS-□□ Flexible cable: JWSP-XM20BFS-□□	– Main circuit power supply cable Standard cable: JWSP-XM20NSS-□□ Flexible cable: JWSP-XM20NFS-□□ – Holding brake cable JWSP-XB0FS-□□	
SGMXA-30 3.0 kW	Standard cable: JWSP-XM30BSS-□□ Flexible cable: JWSP-XM30BFS-□□	– Main circuit power supply cable Standard cable: JWSP-XM30NSS-□□ Flexible cable: JWSP-XM30NFS-□□ – Holding brake cable JWSP-XB0FS-□□	
SGMXA-40, -50 4.0 kW, 5.0 kW	Standard cable: JWSP-XM40BSS-□□ Flexible cable: JWSP-XM40BFS-□□	– Main circuit power supply cable Standard cable: JWSP-XM40NSS-□□ Flexible cable: JWSP-XM40NFS-□□ – Holding brake cable JWSP-XB0FS-□□	

*1 Flexible cables are provided as a standard for holding brake cables.

- Right-Angle Plug
  The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

Servomotor Model	Order Numbers of Main Power Supply Cable and Holding Brake Cable	Individual Cable Order Numbers *1	Appearance
SGMXA-15 1.5 kW	Standard cable: JWSP-XM15BSL-□□ Flexible cable: JWSP-XM15BFL-□□	– Main circuit power supply cable Standard cable: JWSP-XM15NSL-□□ Flexible cable: JWSP-XM15NFL-□□ – Holding brake cable JWSP-XB0FL-□□	
SGMXA-20, -25 2.0 kW, 2.5 kW	Standard cable: JWSP-XM20BSL-□□ Flexible cable: JWSP-XM20BFL-□□	– Main circuit power supply cable Standard cable: JWSP-XM20NSL-□□ Flexible cable: JWSP-XM20NFL-□□ – Holding brake cable JWSP-XB0FL-□□	
SGMXA-30 3.0 kW	Standard cable: JWSP-XM30BSL-□□ Flexible cable: JWSP-XM30BFL-□□	– Main circuit power supply cable Standard cable: JWSP-XM30NSL-□□ Flexible cable: JWSP-XM30NFL-□□ – Holding brake cable JWSP-XB0FL-□□	
SGMXA-40, -50 4.0 kW, 5.0 kW	Standard cable: JWSP-XM40BSL-□□ Flexible cable: JWSP-XM40BFL-□□	– Main circuit power supply cable Standard cable: JWSP-XM40NSL-□□ Flexible cable: JWSP-XM40NFL-□□ – Holding brake cable JWSP-XB0FL-□□	

*1 Flexible cables are provided as a standard for holding brake cables.

(c) Wiring Specifications

◆ SGMXA-A5 to -10 (50 W to 1.0 kW)

SERVOPACK leads

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

Servomotor main circuit cable connector

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

Note:

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

◆ SGMXA-15 to -50 (1.5 kW to 5.0 kW)

Standard Cable

SERVOPACK leads

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

Servomotor connector

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

Flexible Cable

SERVOPACK leads

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

Servomotor connector

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

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

3.2.2 For Σ-7 Compatible Specification Servomotors

There are two types of servomotor main circuit cables that are used for SGMXA-A5 to 10 servomotors with the Σ-7 compatible specification: One for servomotors without holding brakes and one for servomotors with holding brakes.

The servomotor main circuit cable for SGMXA-15 to 70 servomotors is same as that for the standard specification servomotor and the Σ-7 compatible specification servomotor.

Information SGMXA-15 to 70 servomotors can also use the same cables as Σ-7 series rotary servomotors. However, when using a product that conforms to the IP67 degree of protection, use the cables described in this manual. Refer to the following manual for information on the Σ-7-series for rotary servomotor cables.

Σ-7-Series Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

(1) For Servomotors without Holding Brakes

(a) Selection Table

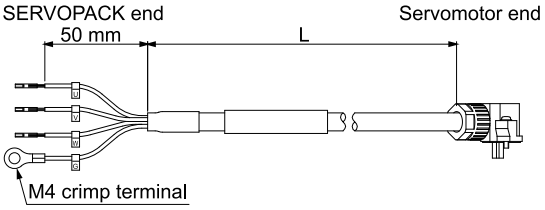
Cable Direction	Servomotor Model	Length (L)	Order Number *1	
			Standard Cable	Flexible Cable *2 *3
Load side	SGMXA-A5 to C2 50 W to 150 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JZSP-C7M10F-□□-E	JZSP-C7M12F-□□-E
	SGMXA-02 to 06 200 W to 600 W		JZSP-C7M20F-□□-E	JZSP-C7M22F-□□-E
	SGMXA-08, 10 750 W, 1.0 kW		JZSP-C7M30F-□□-E	JZSP-C7M32F-□□-E
Non-load side	SGMXA-A5 to C2 50 W to 150 W		JZSP-C7M10G-□□-E	JZSP-C7M12G-□□-E
	SGMXA-02 to 06 200 W to 600 W		JZSP-C7M20G-□□-E	JZSP-C7M22G-□□-E
	SGMXA-08, 10 750 W, 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-rotation speed characteristics will become smaller because the voltage drop increases.

(b) Appearance



(c) Wiring Specifications

SERVOPACK leads

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

Servomotor main circuit cable connector

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

(2) For Servomotors with Holding Brakes

(a) Selection Table

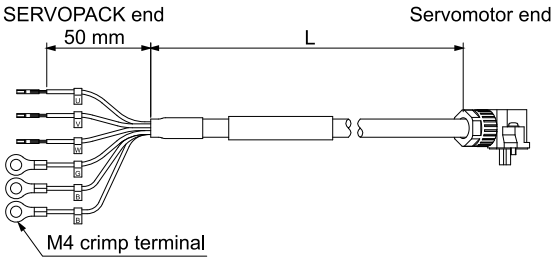
Cable Direction	Servomotor Model	Length (L)	Order Number *1	
			Standard Cable	Flexible Cable *2 *3
Load side	SGMXA-A5 to -C2 50 W to 150 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JZSP-C7M13F-□□-E	JZSP-C7M14F-□□-E
	SGMXA-02 to -06 200 W to 600 W		JZSP-C7M23F-□□-E	JZSP-C7M24F-□□-E
	SGMXA-08, -10 750 W, 1.0 kW		JZSP-C7M33F-□□-E	JZSP-C7M34F-□□-E
Non-load side	SGMXA-A5 to -C2 50 W to 150 W		JZSP-C7M13G-□□-E	JZSP-C7M14G-□□-E
	SGMXA-02 to -06 200 W to 600 W		JZSP-C7M23G-□□-E	JZSP-C7M24G-□□-E
	SGMXA-08, -10 750 W, 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-rotation speed characteristics will become smaller because the voltage drop increases.

(b) Appearance



(c) Wiring Specifications

SERVOPACK leads | Servomotor main circuit cable 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 (SGMXA-A5 to 10)

3.3.1 Servomotor Main Circuit Cable Connector Kits

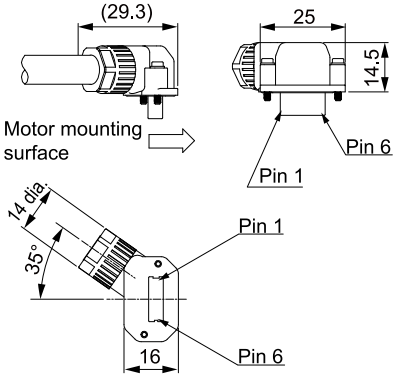
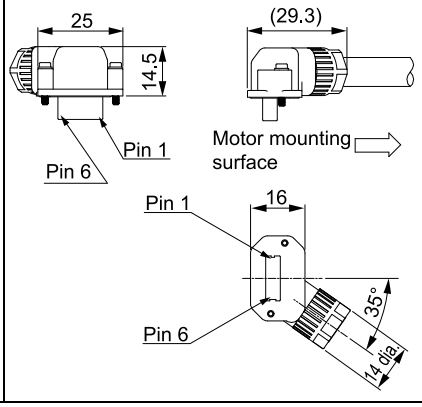
(1) For Standard Specification Servomotors

(a) Selection Table

Servomotor Model	Servomotor Capacity	Order Number *1
SGMXA-A5 to 06	50 W to 600 W	JWSP-XMA5CN00
SGMXA-08, -10	750 W, 1.0 kW	JWSP-XM08CN00

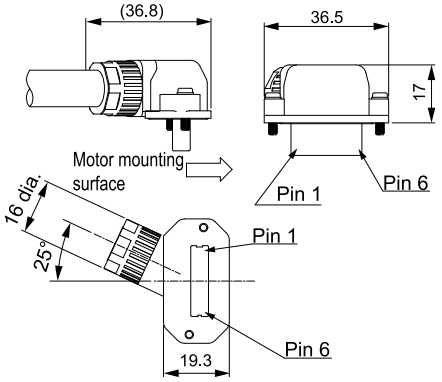
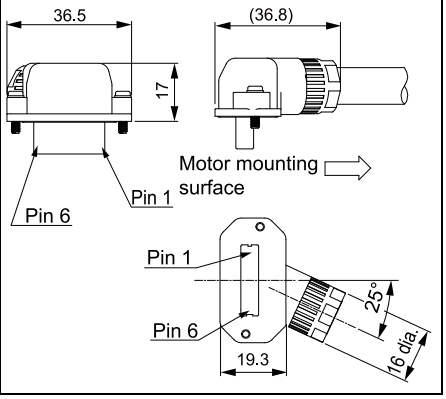
*1 Cables are not included. Purchase them separately.

◆ **SGMXA-A5 to -06 (50 W to 600 W)**

Item		Description
Order Number		JWSP-XMA5CN00
Manufacturer		TE Connectivity Japan G.K.
Instructions		408-78180
Components	Receptacle	2352404-1
	Contacts	2352413-1
Applicable Wire Sizes		AWG20 to AWG24
Applicable Cable Diameter		7.0 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	2386880-1
	Applicator	2837730-1
External Dimensions [mm]		■ Cable on Non-load Side  ■ Cable on Load Side 

*1 A crimping tool is required. Contact the connector manufacturer for details.

◆ SGMXA-08, -10 (750 W, 1.0 kW)

Item		Description
Order Number		JWSP-XM08CN00
Manufacturer		TE Connectivity Japan G.K.
Instructions		408-78180
Components	Receptacle	2352416-1
	Contacts	2352424-1
Applicable Wire Sizes		AWG16 to AWG20
Applicable Cable Diameter		8.0 mm ± 0.3 mm
Outer Diameter of Insulating Sheath		1.53 mm to 2.50 mm
Mounting Screws		M2.5 pan-head screws
Crimping Tool *1	Hand Tool	2386890-1
	Applicator	2837731-1
External Dimensions [mm]		■ Cable on Non-load Side 
		■ Cable on Load Side 

*1 A crimping tool is required. Contact the connector manufacturer for details.

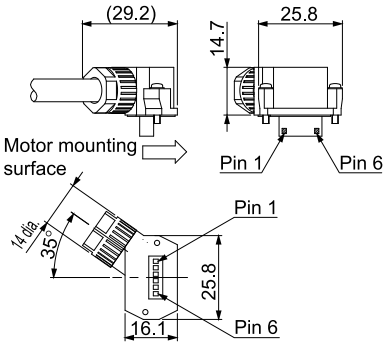
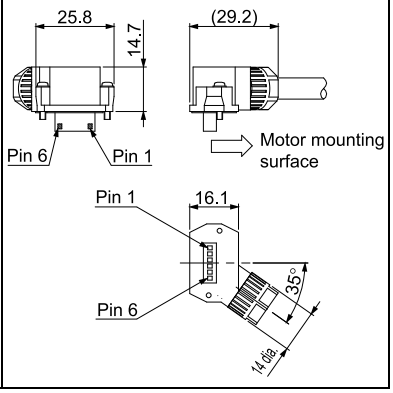
(2) For Σ-7 Compatible Specification Servomotors

(a) Selection Table

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

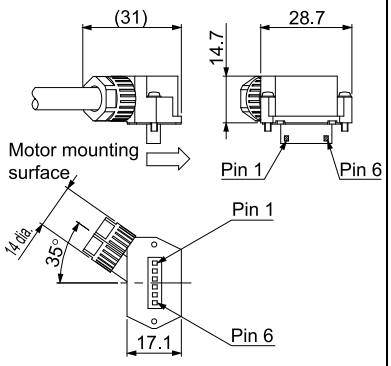
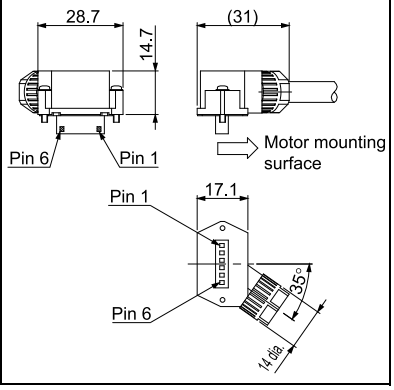
*1 Cables are not included. Purchase them separately.

◆ SGMXA-A5 to -C2 (50 W to 150 W)

Item		Description
Order Number		JZSP-C7M9-1-E
Manufacturer		J.S.T. Mfg. Co., Ltd.
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 *1	Hand Tool	YRS-8841
	Applicator	APLMK SJ1F/M01-08
External Dimensions [mm]		■ Cable on Non-Load Side  ■ Cable on Load Side 

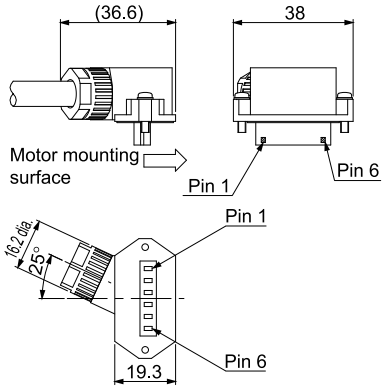
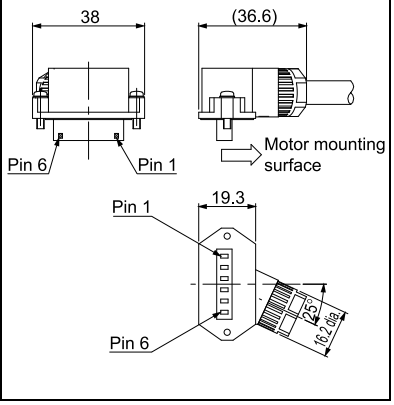
*1 A crimping tool is required. Contact the connector manufacturer for details.

◆ SGMXA-02 to -06 (200 W to 600 W)

Item		Description
Order Number		JZSP-C7M9-2-E
Manufacturer		J.S.T. Mfg. Co., Ltd.
Instructions		JFA Connector J-2700
Components	Receptacle	J27S-06FMH-7KL-M-CF
	Contacts	SJ2F-01GF-P1.0
Applicable Wire Sizes		Power terminals: AWG20 Holding brake terminals: AWG20 to AWG24
Applicable Cable Diameter		7 mm ±0.3 mm
Outer Diameter of Insulating Sheath		1.11 mm to 1.53 mm
Mounting Screws		M2 pan-head screws
Crimping Tool *1	Hand Tool	YRS-8861
	Applicator	APLMK SJ2F/M01-10
External Dimensions [mm]		■ Cable on Non-Load Side 
		■ Cable on Load Side 

*1 A crimping tool is required. Contact the connector manufacturer for details.

◆ SGMXA-08, -10 (750 W, 1.0 kW)

Item		Description
Order Number		JZSP-C7M9-3-E
Manufacturer		J.S.T. Mfg. Co., Ltd.
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 *1	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]		■ Cable on Non-Load Side  ■ Cable on Load Side 

*1 A crimping tool is required. Contact the connector manufacturer for details.

3.3.2 Cables without Connectors

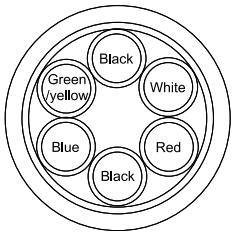
The cable wire material is the same for the standard specification servomotor and the Σ-7 compatible specification servomotor.

(1) Selection Table

Servomotor Model	Order Number *1	
	Standard Cable	Flexible Cable
SGMXA-A5 to -C2 50 W to 150 W	JZSP-CSM90-□□-E	JZSP-C7M29-□□-E
SGMXA-02 to -06 200 W to 600 W		
SGMXA-08, -10 750 W, 1.0 kW	JZSP-CSM91-□□-E	JZSP-CSM81-□□-E

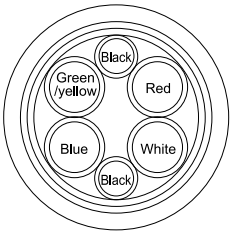
*1 Replace the boxes (□□) in the order number with the cable length (05, 10, 15, 20, 30, 40, or 50).

(a) SGMXA-A5 to -06 (50 W to 600 W)

Item	Standard Cable	Flexible Cable
Order Number *1	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		

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

(b) SGMXA-08 or -10 (750 W or 1.0 kW)

Item	Standard Cable	Flexible Cable
Order Number *1	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		

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

3.4 User-Assembled Wiring Materials for Servomotor Main Circuit Cables (SGMXA-15 to 70)

The servomotor main circuit cable for the standard specification servomotor is same as that for the Σ-7 compatible specification servomotor.

If you need standard-structure servomotor connectors, consult your Yaskawa representative.

To fabricate the cables, refer to this section.

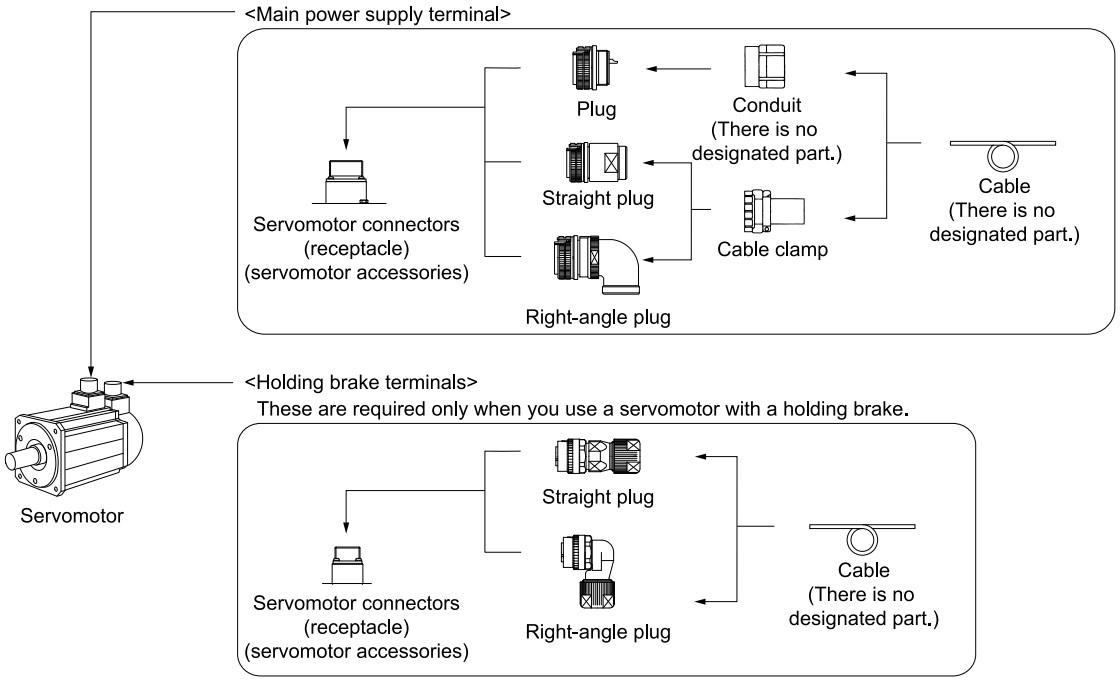
To purchase cables with connectors, refer to the following section.

☞ *3.2 Servomotor Main Circuit Cables on page 80*

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.

3.4.1 Connector Configurations



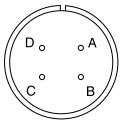
The references for each terminal are shown in the following table.

Item	Reference
Main Power Supply Terminal	☞ *3.4.2 Main Power Supply Terminal on page 96*
Holding Brake Terminals	☞ *3.4.3 Holding Brake Terminals on page 98*

3.4.2 Main Power Supply Terminal

(1) Servomotor Connector (Receptacle)

This connector is an accessory to the servomotor.

Servomotor Model	Capacity	Servomotor Connector Models	Connector Surface
SGMXA-15 SGMXA-20 SGMXA-25	1.5 kW to 2.5 kW	JL10-2E18-10PCE (MS connector model: MS3102A18-10P)	
SGMXA-30 SGMXA-40 SGMXA-50 SGMXA-70	3.0 kW to 7.0 kW	JL10-2E22-22PCE (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.

(2) 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.

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

Servomotor Model	Capacity	Order Number			Manufacturer
		Plug		Cable Clamp	
SGMXA-15 SGMXA-20 SGMXA-25	1.5 kW to 2.5 kW	Straight	D/MS3106B18-10S	D/MS3057-10A	Fujikura Ltd.
			N/MS3106B18-10S	N/MS3057-10A	Japan Aviation Electronics Industry, Ltd.
		Right-angle	D/MS3108B18-10S	D/MS3057-10A	Fujikura Ltd.
			N/MS3108B18-10S	N/MS3057-10A	Japan Aviation Electronics Industry, Ltd.
SGMXA-30 SGMXA-40 SGMXA-50 SGMXA-70	3.0 kW to 7.0 kW	Straight	D/MS3106B22-22S	D/MS3057-12A	Fujikura Ltd.
			N/MS3106B22-22S	N/MS3057-12A	Japan Aviation Electronics Industry, Ltd.
		Right-angle	D/MS3108B22-22S	D/MS3057-12A	Fujikura Ltd.
			N/MS3108B22-22S	N/MS3057-12A	Japan Aviation Electronics Industry, Ltd.

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

Servomotor Model	Capacity	Order Number			Manufacturer
		Plug *1		Cable Clamp *2 *3	
SGMXA-15 SGMXA-20 SGMXA-25	1.5 kW to 2.5 kW	Single	JL10-6A18-10SE (One-touch mating) JL04V-6A18-10SE (Screw mating)	Not required.	Japan Aviation Electronics Industry, Ltd.
		Straight	JL10-6A18-10SE-EB (One-touch mating) JL04V-6A18-10SE-EB (Screw mating)	JL04-18CK(07)-RK JL04-18CK(10)-R JL04-18CK(13)-R	
		Right-angle	JL10-8A18-10SE-EB (One-touch mating) JL04V-8A18-10SE-EBH (Screw mating)	JL04-18CK(07)-RK JL04-18CK(10)-R JL04-18CK(13)-R	
SGMXA-30 SGMXA-40 SGMXA-50 SGMXA-70	3.0 kW to 7.0 kW	Single	JL10-6A22-22SE (One-touch mating) JL04V-6A22-22SE (Screw mating)	Not required.	
		Straight	JL10-6A22-22SE-EB1 (One-touch mating) JL04V-6A22-22SE-EB1 (Screw mating)	JL04-2428CK(11)-R JL04-2428CK(14)-R JL04-2428CK(17)-R JL04-2428CK(20)-R	
		Right-angle	JL10-8A22-22SE-EB1 (One-touch mating) JL04V-8A22-22SE-EB1H (Screw mating)	JL04-2428CK(11)-R JL04-2428CK(14)-R JL04-2428CK(17)-R JL04-2428CK(20)-R	

*1 If there is concern about the effect of vibrations on the equipment, use of the JL04V (screw mating) is recommended.
*2 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.
*3 The applicable cable diameters of the cable clamps are as follows.

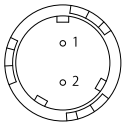
Order Number	Applicable Cable Diameter [mm]
JL04-18CK(07)-RK	5 to 8
JL04-18CK(10)-R	8 to 11
JL04-18CK(13)-R	11 to 14.1
JL04-2428CK(11)-R	9 to 12
JL04-2428CK(14)-R	12 to 15
JL04-2428CK(17)-R	15 to 18
JL04-2428CK(20)-R	18 to 20

3.4.3 Holding Brake Terminals

These are required only when you use a servomotor with a holding brake.

(1) Servomotor Connector (Receptacle)

This connector is an accessory to the servomotor.

Servomotor Model	Capacity	Servomotor Connector Models	Connector Surface
SGMXA-15 SGMXA-20 SGMXA-25 SGMXA-30 SGMXA-40 SGMXA-50	1.5 kW to 5.0 kW	CMV1Y-R2P-0(F)	

(2) Cable-Side Connectors (Plug)

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

Servomotor Model	Capacity	Order Number *1 *2		Applicable Cable Diameter (Reference)	Manufacturer
SGMXA-15 SGMXA-20 SGMXA-25 SGMXA-30 SGMXA-40 SGMXA-50	1.5 kW to 5.0 kW	Straight	CMV1-SP2S-S (One-touch mating) CMV1S-SP2S-S (Screw mating)	4.0 mm to 6.0 mm	Fujikura Ltd.
			CMV1-SP2S-M1 (One-touch mating) CMV1S-SP2S-M1 (Screw mating)	5.5 mm to 7.5 mm	
			CMV1-SP2S-M2 (One-touch mating) CMV1S-SP2S-M2 (Screw mating)	7.0 mm to 9.0 mm	
			CMV1-SP2S-L (One-touch mating) CMV1S-SP2S-L (Screw mating)	9.0 mm to 11.6 mm	
		Right-angle	CMV1-AP2S-S (One-touch mating) CMV1S-AP2S-S (Screw mating)	4.0 mm to 6.0 mm	
			CMV1-AP2S-M1 (One-touch mating) CMV1S-AP2S-M1 (Screw mating)	5.5 mm to 7.5 mm	
			CMV1-AP2S-M2 (One-touch mating) CMV1S-AP2S-M2 (Screw mating)	7.0 mm to 9.0 mm	
			CMV1-AP2S-L (One-touch mating) CMV1S-AP2S-L (Screw mating)	9.0 mm to 11.6 mm	

*1 If there is concern about the effect of vibrations on the equipment, use of the CMV1S (screw mating) is recommended.

*2 This order number is compatible with the CM10 series order number used in the Σ-7 series.
For details on the CM10 series order numbers, refer to the following manual.

Σ-7-Series Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

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

JZSP-CVB9-S M S2-E

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

*1 Crimping tool: A 357J-53164T from Fujikura Ltd. is required.

• Other connector specifications

Item	Specification
Contact Models	■ Loose Contacts (100 per bag) – Crimped contacts: CMV1-#22BSC-C3-100 Wire size: AWG16 to AWG20, outer diameter of insulating sheath: 1.87 mm to 2.45 mm Manual crimping tool: 357J-53164T – Soldered contacts: CMV1-#22BSC-S2-100 Wire size: AWG16 max., outer diameter of insulating sheath: 3 mm max. ■ Reeled Contacts (4,000 per reel) Crimped contacts: CMV1-#22BSC-C3-4000 Wire size: AWG16 to AWG20, outer diameter of insulating sheath: 1.87 mm to 2.45 mm Semi-automatic crimping tool: AP-A53210T-A (set), AP-A53210T (applicator) **Note:** The semi-automatic tool set includes the press and applicator (crimper).

Note:

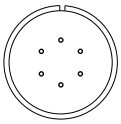
Purchase the contact pins separately. Consider the wiring type and the applicable wire size when you select the contact pins.

3.4.4 Built-In Cooling Fan Terminals

These are required only when you use a servomotor with a built-in cooling fan. Only the SGMXA-70 servomotor has a built-in cooling fan.

(1) Servomotor Connector (Receptacle)

This connector is an accessory to the servomotor.

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

(2) Cable-Side Connectors (Plug)

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

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

Information Use cable wiring materials that meet the following cooling fan specifications.

• Single-phase, 200 VAC
• 50 Hz / 60Hz
• 17 W / 15 W
• 0.11 A / 0.09 A

3.4.5 Connector External Dimensions

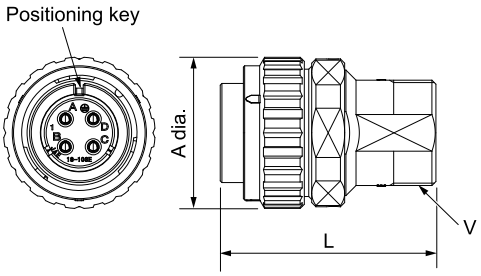
The external dimensions of connectors compliant with an IP67 protective structure and European safety standard compliant type are shown below.

Select the connector model by referring to the following sections for information on the standard environment type connector.

☞ *(a) Standard Environment Type: Cable-Side Connectors (Plug) on page 97*

(1) Main Power Supply Terminal

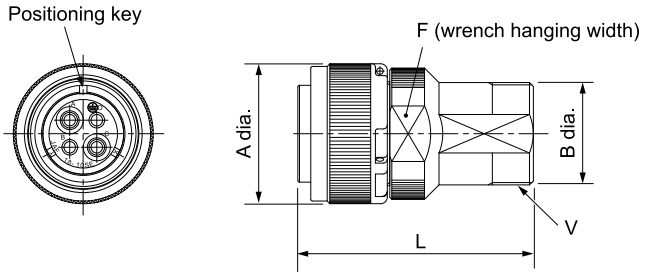
(a) Straight Plug: One-Touch Mating (from Japan Aviation Electronics Industry, Ltd.)



Unit: mm

Model	Shell Size	Connecting Nut Outer Diameter A ± 0.8 Dia.	Total Length L ± 0.8	Cable Clamp Mounting Screws V
JL10-6A18-10SE-EB	18	35.85	51.05	1-20UNEF-2A
JL10-6A22-22SE-EB1	22	42.2	74.35	1-7/16-18UNEF-2A

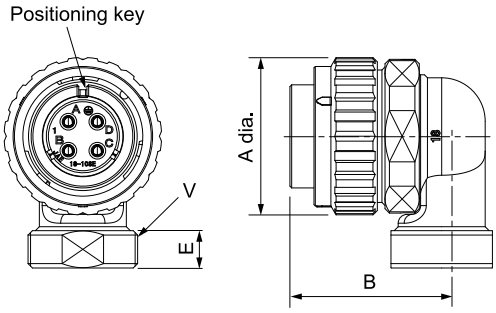
(b) Straight Plug: Screw Mating (from Japan Aviation Electronics Industry, Ltd.)



Unit: mm

Model	Shell Size	Connecting Nut Outer Diameter A ± 0.8 Dia.	B Dia.	Total Length L ± 0.8	F ± 0.5	Cable Clamp Mounting Screws V
JL04V-6A18-10SE-EB	18	34.1	25	57.4	29	1-20UNEF-2A
JL04V-6A22-22SE-EB1	22	40.5	36.4	66.4	35	1-7/16-18UNEF-2A

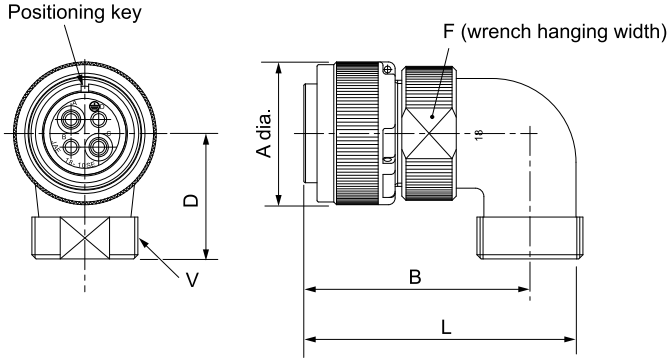
(c) Right-Angle Plug: One-Touch Mating (from Japan Aviation Electronics Industry, Ltd.)



Unit: mm

Model	Shell Size	Connecting Nut Outer Diameter A ± 0.8 Dia.	B ± 0.8	E ± 0.5	Cable Clamp Mounting Screws V
JL10-8A18-10SE-EB	18	35.85	34.55	8.5	1-20UNEF-2A
JL10-8A22-22SE-EB1	22	42.2	51.6	10	1-7/16-18UNEF-2A

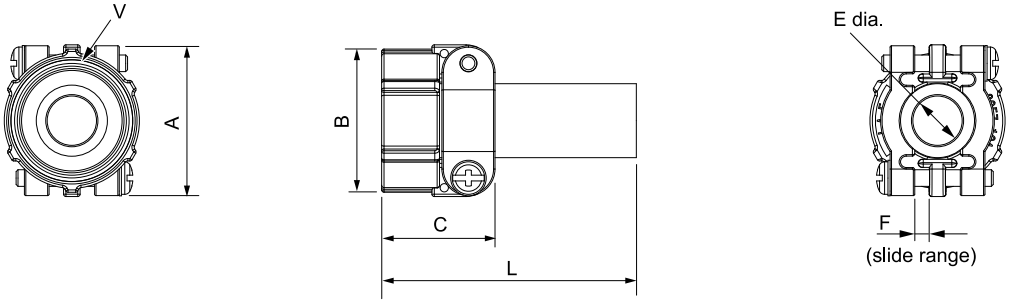
(d) Right-Angle Plug: Screw Mating (from Japan Aviation Electronics Industry, Ltd.)



Unit: mm

Model	Shell Size	Connecting Nut Outer Diameter A ± 0.8 Dia.	B ± 0.8	Total Length L ± 0.8	D ± 0.8	F ± 0.5	Cable Clamp Mounting Screws V
JL04V-8A18-10SE-EBH	18	34.1	54	65.6	30	32	1-20UNEF-2A
JL04V-8A22-22SE-EB1H	22	40.5	59	76.2	42	38	1-7/16-18UNEF-2A

(e) Cable Clamp (from Japan Aviation Electronics Industry, Ltd.)

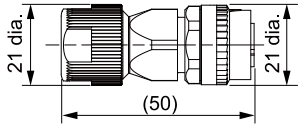
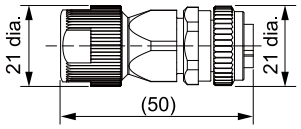


Unit: mm

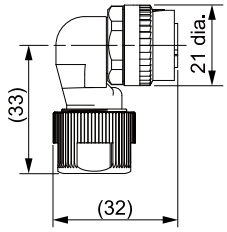
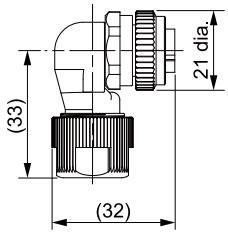
Model	A ± 0.8 Dia.	Outer Diameter B ± 0.8	C ± 0.3	Total Length L ± 0.3	Bushing Inner Diameter E ± 0.3 Dia.	F	Mounting Screws V	Applicable Cable Diameter (Reference)
JL04-18CK(07)-RK	31.8	30.2	24.1	53.8	8	3.2	1-20UNEF-2B	5 to 8
JL04-18CK(10)-R					11			8 to 11
JL04-18CK(13)-R					14.1			11 to 14.1
JL04-2428CK(11)-R	42.9	42.1	26.2	56.2	12	4.8	1-7/16-18UNEF-2B	9 to 12
JL04-2428CK(14)-R					15			12 to 15
JL04-2428CK(17)-R					18			15 to 18
JL04-2428CK(20)-R					21			18 to 20

(2) Holding Brake Terminals (from Fujikura Ltd.)

- Straight plug

CMV1-SP2S-□□ (One-touch mating)	CMV1S-SP2S-□□S (Screw mating)
	

- Right-angle plug

CMV1-AP2S-□□ (One-touch mating)	CMV1S-AP2S-□□ (Screw mating)
	

3.5 Encoder Cables (When Not Relaying the Encoder Cable)

The encoder cable for the standard specification servomotor is different than that for the Σ-7 compatible specification servomotor.

3.5.1 For Standard Specification Servomotors

There are two types of encoder cables that are used with standard specification servomotors: One for batteryless absolute encoders and one for absolute encoders.

(1) Encoder Cables for Batteryless Absolute Encoders

(a) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
SGMXA-A5 to -10: Load side SGMXA-15 to -50: Left side *4	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JWSP-XP2IS1-□□	JWSP-XP2IF1-□□
SGMXA-A5 to -10: Non-load side SGMXA-15 to -70: Right side		JWSP-XP2IS2-□□	JWSP-XP2IF2-□□

*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 46 mm or larger.
*4 An encoder cable installed toward the left side cannot be used for the SGMXA-70 (7.0 kW). Use an encoder cable installed toward the right side.

Note:

The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.

You cannot relay cables by connecting JZSP-UCMP00-□□-E or JZSP-CSP12-E cables.

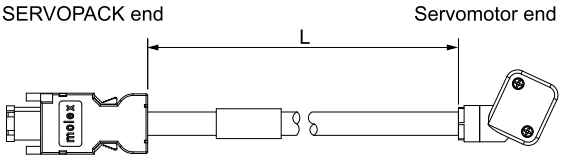
Information

A cable installation direction on the right side or left side refers to the cable installation direction when viewed from the connector side with the shaft at the top.

Refer to the following section for details on the cable installation direction.

☞ *(2) SGMXA-15 to -70 (1.5 kW to 7.0 kW) on page 76*

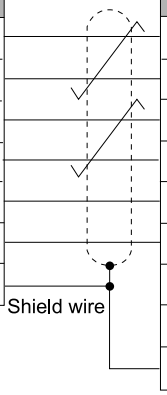
(b) Appearance



(c) Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG



Servomotor end

Pin	Wire Color
5	Light blue
4	Red
7	Gray
3	Brown
6	Black
2	Orange
8	–
9	–
Shell	FG

(2) For Absolute Encoders

These cables are equipped with a battery unit. (A battery is included.)

Note:

In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

(a) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
SGMXA-A5 to -10: Load side SGMXA-15 to -50: Left side *4	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JWSP-XP2AS1-□□	JWSP-XP2AF1-□□
SGMXA-A5 to -10: Non-load side SGMXA-15 to -70: Right side		JWSP-XP2AS2-□□	JWSP-XP2AF2-□□

*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 46 mm or larger.
*4 An encoder cable installed toward the left side cannot be used for the SGMXA-70 (7.0 kW). Use an encoder cable installed toward the right side.

Note:

The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.

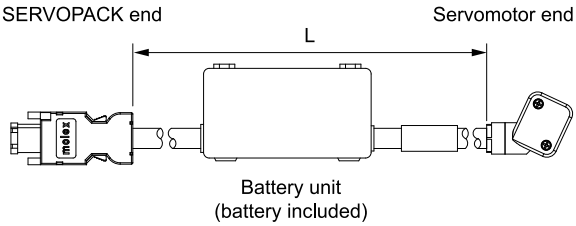
You cannot relay cables by connecting JZSP-UCMP00-□□-E or JZSP-CSP12-E cables.

Information A cable installation direction on the right side or left side refers to the cable installation direction when viewed from the connector side with the shaft at the top.

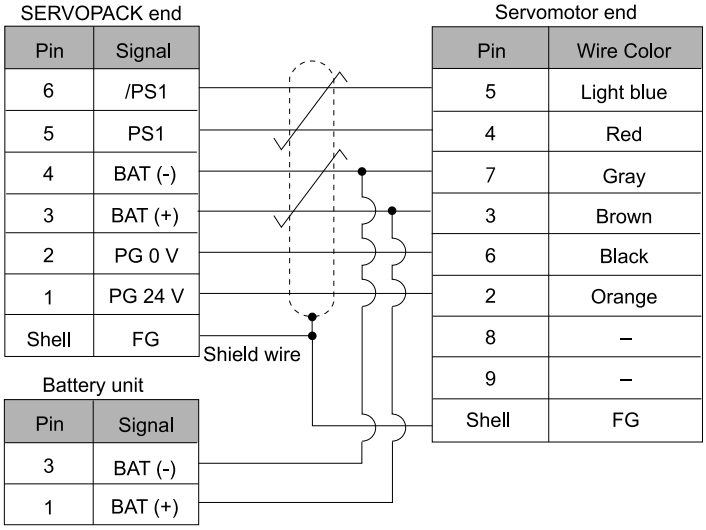
Refer to the following section for details on the cable installation direction.

☞ *(2) SGMXA-15 to -70 (1.5 kW to 7.0 kW) on page 76*

(b) Appearance



(c) Wiring Specifications



3.5.2 Servomotors with Σ-7 Compatible Specifications (20 m or Less)

There are two types of encoder cables that are used with Σ-7 compatible specification servomotors: One for batteryless absolute encoders and one for absolute encoders.

(1) Encoder Cables for Batteryless Absolute Encoders

(a) Selection Table

◆ **SGMXA-A5 to -10 (50 W to 1.0 kW)**

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Load side	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.

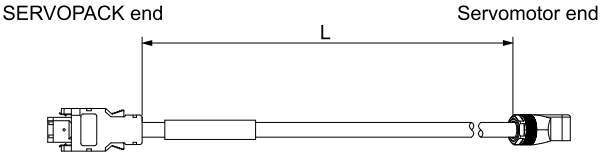
◆ **SGMXA-15 to -70 (1.5 kW to 7.0 kW)**

Connector Specifications	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Straight plug	3 m, 5 m, 10 m, 15 m, 20 m	JWSP-XPISS-□□	JWSP-XPIFS-□□
Right-angle plug *4 *5		JWSP-XPISL-□□	JWSP-XPIFL-□□

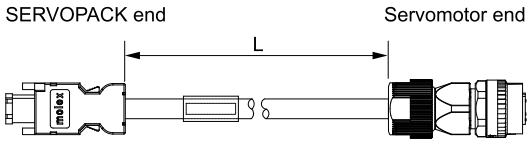
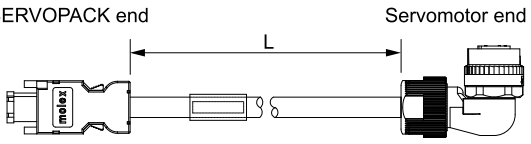
*1 Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.
*4 The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.
*5 An encoder cable with a right-angle plug cannot be used for the SGMXA-70 (7.0 kW). Use an encoder cable with a straight plug.

(b) Appearance

◆ SGMXA-A5 to -10 (50 W to 1.0 kW)



◆ SGMXA-15 to -70 (1.5 kW to 7.0 kW)

Straight Plug Connector	Right-Angle Plug Connector *1
	

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

(c) Wiring Specifications

◆ SGMXA-A5 to -10 (50 W to 1.0 kW)

Standard Cable

SERVOPACK end			Servomotor 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	Shield wire	Shell	FG

Flexible Cable

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

◆ SGMXA-15 to -70 (1.5 kW to 7.0 kW)

Standard Cable

SERVOPACK end			Servomotor 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	Shield wire	10	FG

Flexible Cable

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

(2) For Absolute Encoders

These cables are equipped with a battery unit. (A battery is included.)

Note:

In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

(a) Selection Table

◆ SGMXA-A5 to -10 (50 W to 1.0 kW)

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Load side	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 larger.

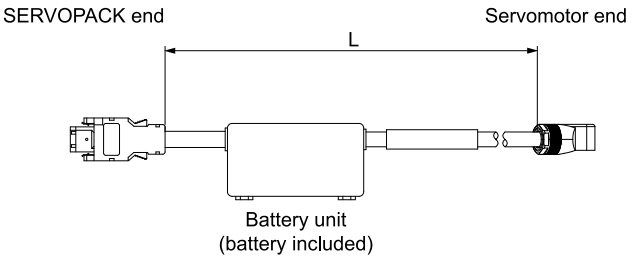
◆ SGMXA-15 to -70 (1.5 kW to 7.0 kW)

Connector Specifications	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Straight plug	3 m, 5 m, 10 m, 15 m, 20 m	JWSP-XPASS-□□	JWSP-XPAFS-□□
Right-angle plug *4 *5		JWSP-XPASL-□□	JWSP-XPAFL-□□

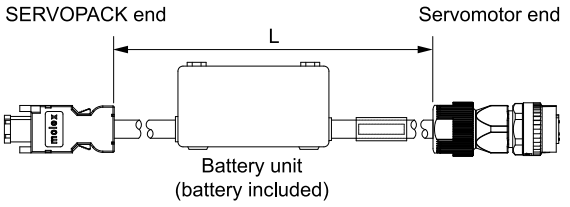
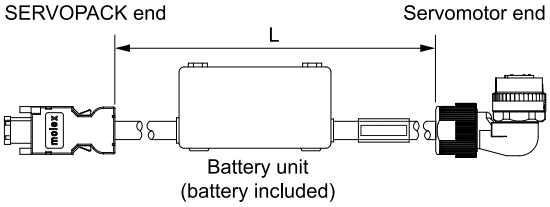
*1 Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.
*4 The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.
*5 An encoder cable with a right-angle plug cannot be used for the SGMXA-70 (7.0 kW). Use an encoder cable with a straight plug.

(b) Appearance

◆ SGMXA-A5 to -10 (50 W to 1.0 kW)



◆ SGMXA-15 to -70 (1.5 kW to 7.0 kW)

Straight Plug Connector	Right-Angle Plug Connector *1
	

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

(c) Wiring Specifications

◆ SGMXA-A5 to -10 (50 W to 1.0 kW)

Standard Cable

SERVOPACK end

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

Servomotor end

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

Shield wire

Battery unit

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

Flexible Cable

SERVOPACK end

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

Servomotor end

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

Shield wire

Battery unit

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

◆ SGMXA-15 to -70 (1.5 kW to 7.0 kW)

Standard Cable

SERVOPACK end

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

Servomotor end

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

Shield wire

Battery unit

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

Flexible Cable

SERVOPACK end

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

Servomotor end

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

Shield wire

Battery unit

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

3.6 Encoder Cables (When Relaying the Encoder Cable)

The encoder cable for relaying for the standard specification servomotor is different than that for the Σ-7 compatible specification servomotor.

3.6.1 For Standard Specification Servomotors

When you will relay the encoder cable, connect the cables by combining an encoder cable and an encoder cable with connectors on both ends.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

(1) Encoder Cables

(a) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
SGMXA-A5 to -10: Load side SGMXA-15 to -50: Left side *4	0.3 m, 1 m, 3 m, 5 m, 10 m, 15 m, 20 m, 25 m, 30 m, 40 m, 50 m	JWSP-XP3IS1-□□	JWSP-XP3IF1-□□
SGMXA-A5 to -10: Non-load side SGMXA-15 to -70: Right side		JWSP-XP3IS2-□□	JWSP-XP3IF2-□□

*1 Replace the boxes (□□) in the order number with the cable length (00P3, 01, 03, 05, 10, 15, 20, 25, 30, 40, or 50).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.
*4 An encoder cable installed toward the left side cannot be used for the SGMXA-70 (7.0 kW). Use an encoder cable installed toward the right side.

Note:

1. When you will relay the encoder cable, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
2. The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.
   You cannot relay cables by combining JZSP-UCMP00-□□-E and JZSP-CSP12-E cables with JWSP-XP1□□□-□□, JWSP-XP2□□□-□□, and JWSP-XP4□□□-□□ cables.

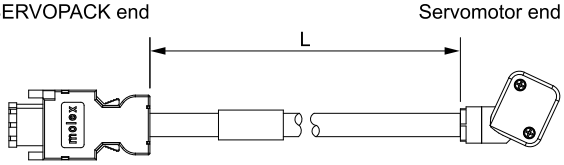
Information

A cable installation direction on the right side or left side refers to the cable installation direction when viewed from the connector side with the shaft at the top.

Refer to the following section for details on the cable installation direction.

☞ *(2) SGMXA-15 to -70 (1.5 kW to 7.0 kW) on page 76*

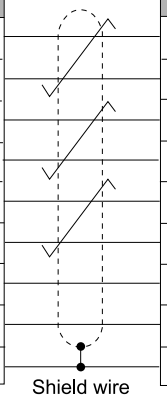
(b) Appearance



(c) Wiring Specifications

SERVOPACK end

Pin	Signal
8	/PS2
7	PS2
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG



Servomotor end

Pin	Wire Color
9	White
8	Yellow
5	Light blue
4	Red
7	Gray
3	Brown
6	Black
2	Orange
Shell	FG

(2) Encoder Cables with Connectors on Both Ends

There are two types of encoder cables with connectors on both ends: One for batteryless absolute encoders and one for absolute encoders.

(a) For Batteryless Absolute Encoders

◆ Selection Table

Length (L)	Order Number *1*	
	Standard Cable	Flexible Cable *2 *3
0.3 m, 3 m, 5 m, 10 m, 15 m, 20 m, 25 m	JWSP-XP1IS0-□□	JWSP-XP1IF0-□□

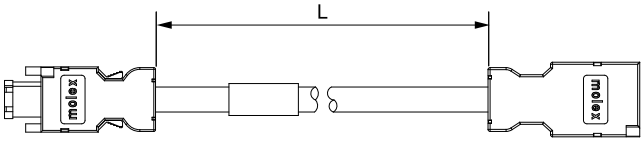
*1 Replace the boxes (□□) in the order number with the cable length (00P3, 03, 05, 10, 15, 20, or 25).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.

Note:

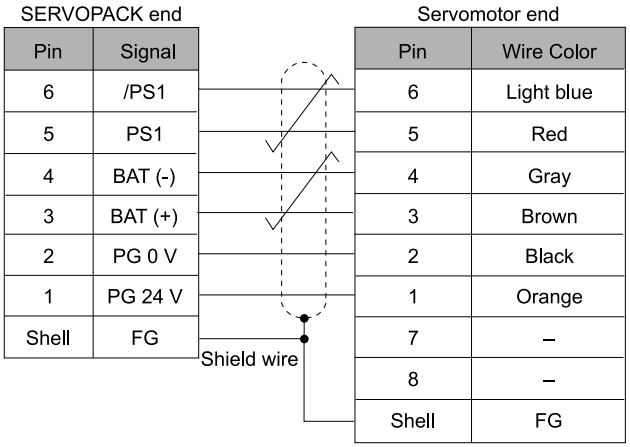
1. When you will relay the encoder cable, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
2. The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.
   You cannot relay cables by combining JZSP-UCMP00-□□-E and JZSP-CSP12-E cables with JWSP-XP1□□□-□□, JWSP-XP2□□□-□□, and JWSP-XP4□□□-□□ cables.

◆ Appearance

SERVOPACK end Servomotor end



◆ Wiring Specifications



Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Pin	Wire Color
6	Light blue
5	Red
4	Gray
3	Brown
2	Black
1	Orange
7	–
8	–
Shell	FG

(b) For Absolute Encoders

These cables are equipped with a battery unit. (A battery is included.)

Note:

In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

◆ Selection Table

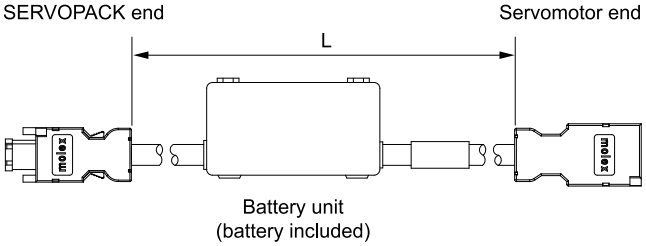
Length (L)	Order Number *1	
	Standard Cable	Flexible Cable *2 *3
0.3 m, 3 m, 5 m, 10 m, 15 m, 20 m, and 25 m	JWSP-XP1AS0-□□	JWSP-XP1AF0-□□

*1 Replace the boxes (□□) in the order number with the cable length (00P3, 03, 05, 10, 15, 20, or 25).
*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. When you will relay the encoder cable, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
2. The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.
   You cannot relay cables by combining JZSP-UCMP00-□□-E and JZSP-CSP12-E cables with JWSP-XP1□□□-□□, JWSP-XP2□□□-□□, and JWSP-XP4□□□-□□ cables.

◆ Appearance



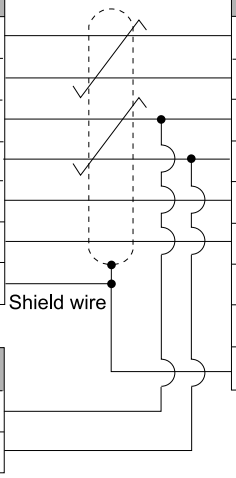
◆ Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Battery unit

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



Servomotor end

Pin	Wire Color
6	Light blue
5	Red
4	Gray
3	Brown
2	Black
1	Orange
7	–
8	–
Shell	FG

3.6.2 Servomotors with Σ-7 Compatible Specifications (When Exceeding 20 m)

If the encoder cable length exceeds 20 m, use by combining the following cables.

- Relay encoder cables
- Relay encoder cables with connectors on both ends
- Relay encoder cables with connectors on both ends and battery unit *1

*1 In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

(1) Relay Encoder Cables

(a) Selection Table

◆ **SGMXA-A5 to -10 (50 W to 1.0 kW)**

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

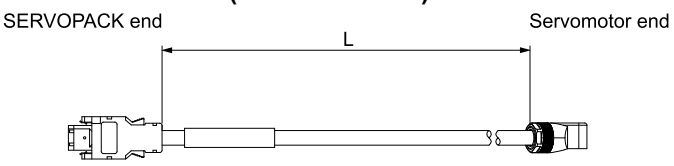
◆ **SGMXA-15 to -70 (1.5 kW to 7.0 kW)**

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

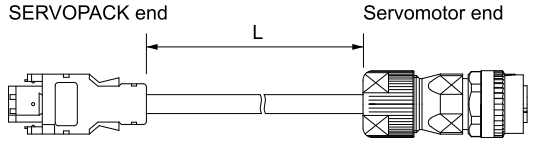
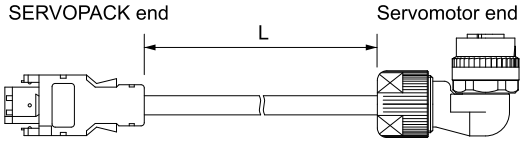
*1 The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.
*2 An encoder cable with a right-angle plug cannot be used for the SGMXA-70 (7.0 kW). Use an encoder cable with a straight plug.

(b) Appearance

◆ **SGMXA-A5 to -10 (50 W to 1.0 kW)**



◆ SGMXA-15 to -70 (1.5 kW to 7.0 kW)

Straight Plug Connector	Right-Angle Plug Connector *1
	

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

(c) Wiring Specifications

◆ SGMXA-A5 to -10 (50 W to 1.0 kW)

SERVOPACK end

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

Shield wire

Servomotor end

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

◆ SGMXA-15 to -70 (1.5 kW to 7.0 kW)

SERVOPACK end

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

Shield wire

Servomotor end

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

Note:

BAT (+) and BAT (-) are wired when using an absolute encoder.

(2) Relay Encoder Cables with Connectors on Both Ends

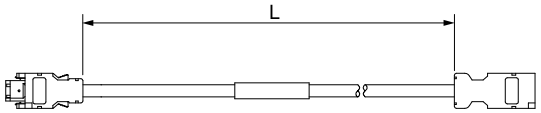
(a) Selection Table

Specification	Length (L)	Order Number *1
Used for all types of encoders	30 m, 40 m, 50 m	JZSP-UCMP00-□□-E

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

(b) Appearance

SERVOPACK end Servomotor end



(c) Wiring Specifications

SERVOPACK end Servomotor 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

(3) Relay Encoder Cables with Connectors on Both Ends and Battery Unit

Note:

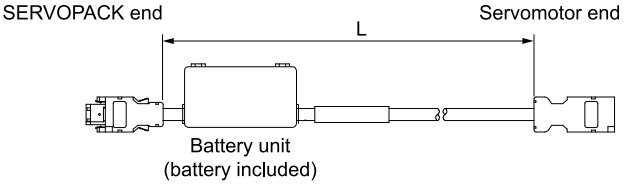
In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

(a) Selection Table

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

(b) Appearance



(c) Wiring Specifications

SERVOPACK end

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

Servomotor end

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

Shield wire

Battery unit

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

3.7 User-Assembled Wiring Materials for Encoder Cables

The wiring materials for user-assembled encoder cables described in this section are used for Σ-7 compatible specification servomotors.

Refer to the following section for details on the user-assembled wiring materials for encoder cables of standard specification servomotors.

☞ *13.6 User-Assembled Wiring Materials for Encoder Cables on page 464*

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

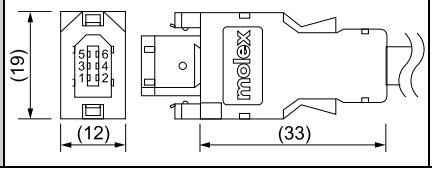
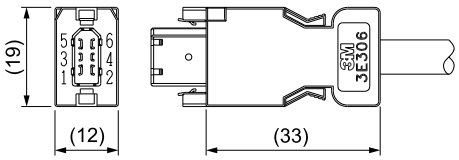
When using encoder cables with a wiring length of 30 m to 50 m, it is necessary to fabricate two different types of cables.

Cables to Be Fabricated	Connectors and Wire Materials Required for Fabrication	Reference	Remarks
Motor-End Relay Encoder Cables	SERVOPACK connector	☞ *3.7.2 SERVOPACK Connector Kits on page 118*	This cable should be 0.3 m or less.
	Servomotor connectors	☞ *3.7.3 Encoder Cable Connector Kits on page 119*	
	Encoder cables of 20 m or less	☞ *3.7.4 Cables without Connectors on page 120*	
SERVOPACK-End Relay Encoder Cables	SERVOPACK connector	☞ *3.7.2 SERVOPACK Connector Kits on page 118*	This cable should be 50 m or less.
	Cable relay connectors	☞ *3.7.3 Encoder Cable Connector Kits on page 119*	
	Relay encoder cable of 30 m to 50 m	☞ *3.7.4 Cables without Connectors on page 120*	

Refer to the following section for details on the connection of the relay encoder cable.

☞ *3.6.2 Servomotors with Σ-7 Compatible Specifications (When Exceeding 20 m) on page 114*

3.7.2 SERVOPACK Connector Kits

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

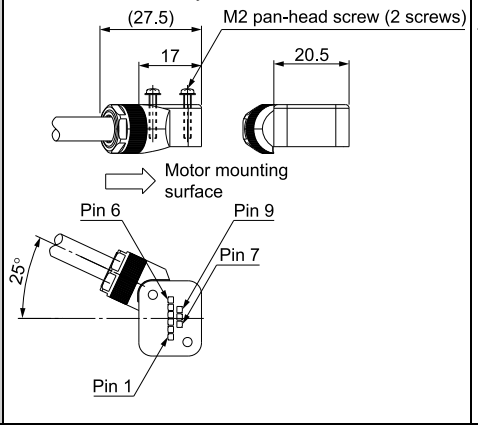
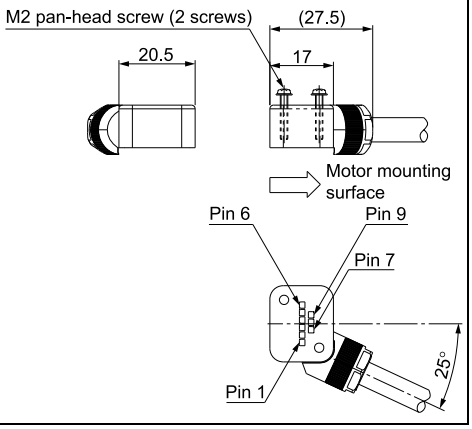
*1 For details, consult your Yaskawa representative. The tool is not provided by Yaskawa.

Note:
Cables are not included. Purchase them separately.

3.7.3 Encoder Cable Connector Kits

(1) Servomotor Connectors

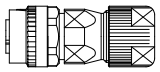
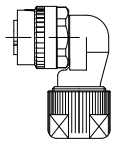
(a) SGMXA-A5 to -10 (50 W to 1.0 kW)

Order Number		JZSP-C7P9-1-E
Manufacturer		Molex Japan Co., Ltd.
Components		504678-0070 Loose connectors: 56161-8181 (crimped), Reeled: 56161-8081 (crimped)
Applicable Wire Sizes		AWG22 to AWG26
Applicable Cable Diameter		6.3 mm to 7.7 mm
Outer Diameter of Insulating Sheath		1.05 mm to 1.4 mm
Mounting Screws		M2 pan-head screws (two)
Application Specifications		AS-504682
Crimping Specifications		CS-56161
Crimping Tool *1	Hand Tool	638235100
Shell Caulking Tool	Hand Tool	57331-5100
	Hand Press	57331-5200
External Dimensions [mm]		■ Cable Installed away from Load  ■ Cable Installed toward Load 

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

(b) SGMXA-15 to -70 (1.5 kW to 7.0 kW)

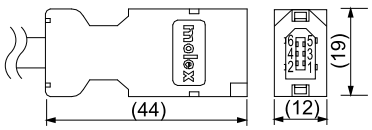
The SGMXA-15 to -70 servomotor connector is compliant with an IP67 protective structure.

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

*1 A crimping tool is required. The model number of the special crimping tool for cables without connectors available from Yaskawa is 357J-52667T. When using other wire sizes, contact the connector manufacturer for crimping tools.

*2 A right-angle type connector cannot be used for the connector on the encoder end of the SGMXA-70 (7.0 kW). Use a straight type connector.

(2) Cable Relay Connectors

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

3.7.4 Cables without Connectors

(1) Encoder Cables of 20 m or Less

Item	Standard Cable	Flexible Cable
Order Number *1	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

Continued on next page.

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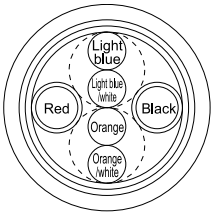
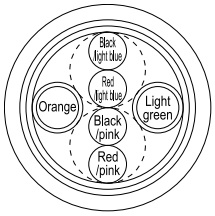
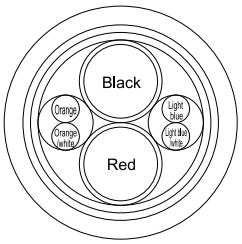
Item	Standard Cable	Flexible Cable
Finished Diameter	6.5 mm	6.8 mm
Internal Structure and Lead Colors		

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

(2) Relay Encoder Cable of 30 m to 50 m

Item	Standard Cable
Order Number *1	JZSP-CMP19-□□-E (maximum length: 50 m)
Specifications	UL20276 (rated temperature: 80°C) AWG16 × 2C + AWG26 × 2P
	AWG16 (1.31 mm²) Outer diameter of insulating sheath: 2.0 mm
	AWG26 (0.13 mm²) Outer diameter of insulating sheath: 0.91 mm
Finished Diameter	6.8 mm
Internal Structure and Lead Colors	

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

3.8 Wiring Precautions

3.8.1 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.

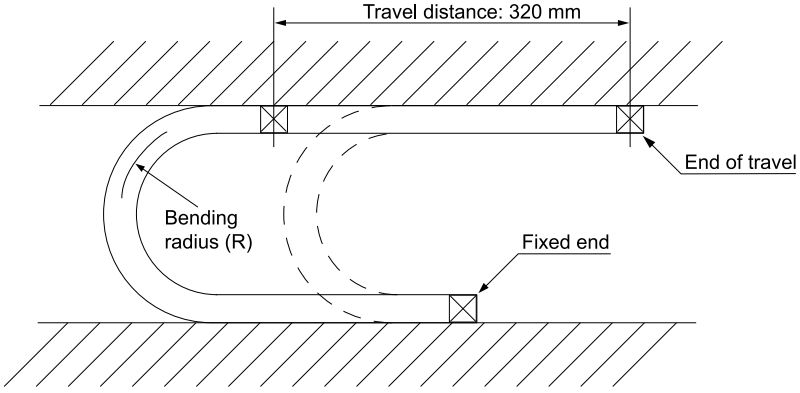
Cable Diameter	Recommended Bending Radius (R)
Less than 8 mm	15 mm min.
8 mm	20 mm min.
Over 8 mm	Cable diameter × 3 mm min.

3.8.2 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) as listed in each selection table 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 affects the performance of the cable sheathing occurs.

- 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.
- If a flexible cable is used in a fixed position, the recommended bending radius is the same as for standard cables. Perform all wiring so that stress is not applied to the cables.

4

Cables and User-Assembled Wiring Materials for SGMXA Rotary Servomotors (400 V Specification)

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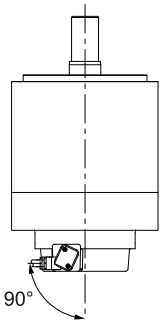
4.1 Device Configuration Diagrams

4.1.1 For Standard Specification Servomotors

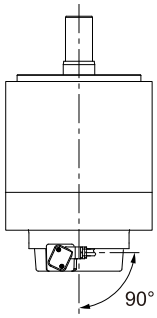
Important

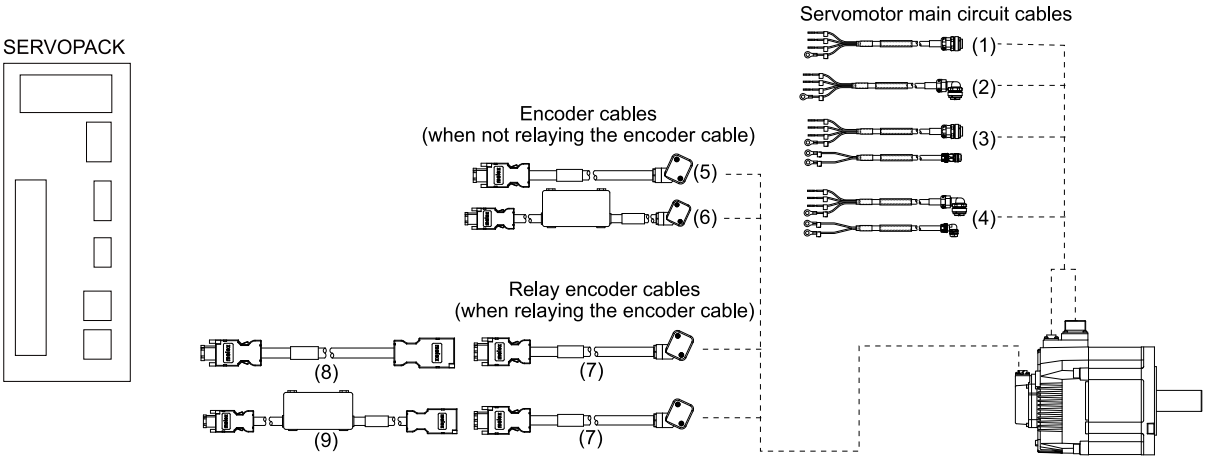
There are different order numbers for encoder cables depending on the cable installation direction. Confirm the order numbers before you order.

Left-side cable installation type



Right-side cable installation type





Note:

When you will relay the encoder cable, connect the cables by combining the encoder cable and the encoder cable with connectors on both ends as shown in (7) to (9) in the figure above.

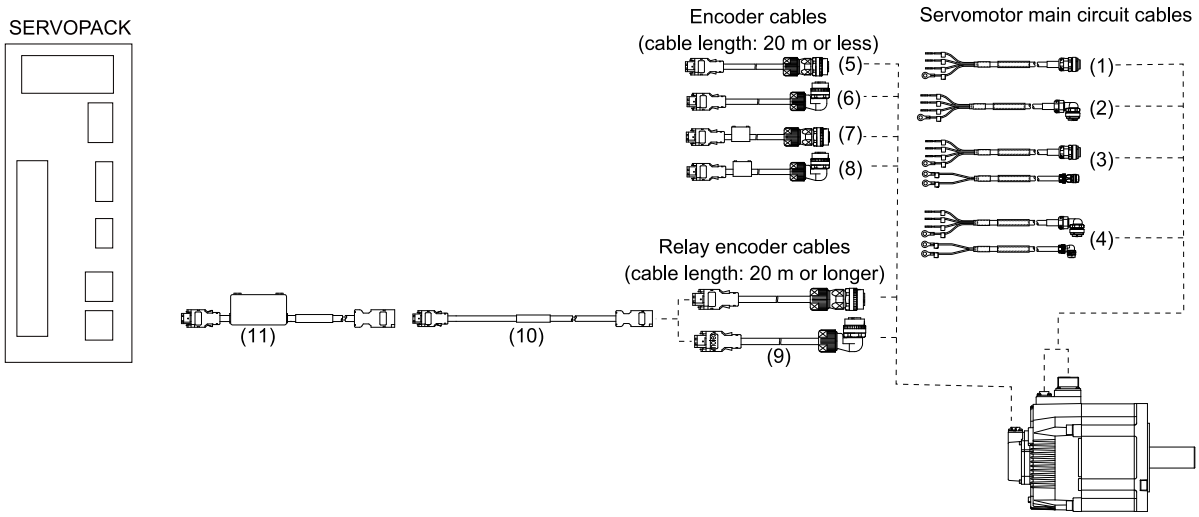
No.	Cable Type				Reference
(1) to (4)	Servomotor main circuit cables *1	Finished product	For servomotors without holding brakes	Straight plug	128
				Right-angle plug *2	
			For servomotors with holding brakes	Straight plug	129
				Right-angle plug *2	
		Fabrication	Connectors		132
			Cables without connectors *3		-
(5), (6)	Encoder cables (when not relaying the encoder cable)	Finished product	For batteryless absolute encoders		139
			For absolute encoders *4		140
		Fabrication			150
(7) to (9)	Encoder cables (when relaying the encoder cable)	Finished product	-		144
			Connectors on both ends	For batteryless absolute encoders	145
				For absolute encoders *4	146
		Fabrication			150

*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.
☞ *4.3 User-Assembled Wiring Materials for Servomotor Main Circuit Cables on page 132*
*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 In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

Information The cables described in this chapter are used to connect a SERVOPACK to a single servomotor.
Refer to the following chapter for the cables required when connecting the SERVOPACK to multiple devices.
☞ *13 Σ-LINK II-Related Devices on page 417*

4.1.2 For Σ-V Compatible Specification Servomotors



Note:
If the encoder cable length exceeds 20 m, connect by combining the following cables as shown in (9) to (11) in the above figure.
• Relay encoder cables
• Relay encoder cables with connectors on both ends
• Relay encoder cables with connectors on both ends and battery unit

No.	Cable Type				Reference
(1) to (4)	Servomotor main circuit cables *1	Finished product	For servomotors without holding brakes	Straight plug	128
				Right-angle plug *2	
			For servomotors with holding brakes	Straight plug	129
				Right-angle plug *2	
		Fabrication	Connectors		132
			Cables without connectors *3		-
(5) to (8)	Encoder cables of 20 m or less	Finished product	For batteryless absolute encoders	Straight plug	141
				Right-angle plug *2	
			For absolute encoders *4	Straight plug	142
				Right-angle plug *2	
		Fabrication			150

Continued on next page.

Continued from previous page.

No.	Cable Type				Reference
(9) to (11)	Relay encoder cables (when exceeds 20 m)	Finished product	Straight plug		147
			Right-angle plug *2		
			Connectors on both ends	–	148
				With battery units *5	149
		Fabrication			150

*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.

☞ *4.3 User-Assembled Wiring Materials for Servomotor Main Circuit Cables on page 132*

*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 In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

*5 In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

4.2 Servomotor Main Circuit Cables

The servomotor main circuit cable for the standard specification servomotor is same as that for the Σ-V compatible specification servomotor.

There are two types of servomotor main circuit cables: One for servomotors without holding brakes and one for servomotors with holding brakes.

Information

SGMXA-15 to 50 servomotors can also use the same cables as Σ-V series rotary servomotors. However, when using a product that conforms to the IP67 degree of protection, use the cables described in this manual. The equivalent model to the Σ-X series SGMXA rotary servomotors is the Σ-V series SGMSV rotary servomotors. Refer to the following catalog for information on the Σ-V-series for rotary servomotor cables.

Σ-V-Series General Catalog (Manual No.: KAEP S800000 42)

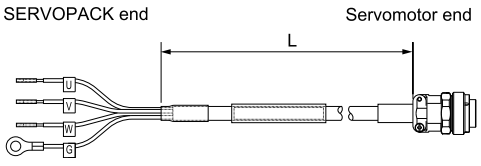
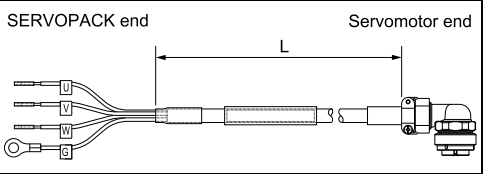
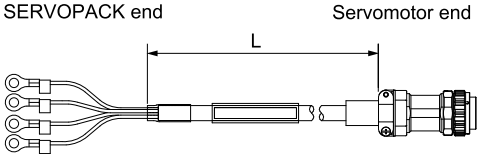
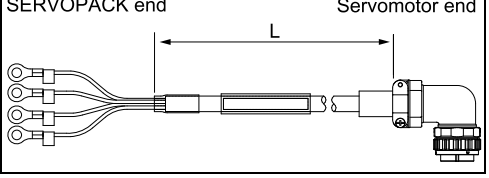
4.2.1 For servomotors without holding brakes

(1) Selection Table

Connector Specifications	Servomotor Model	Length (L)	Order Number *1	
			Standard Cable	Flexible Cable *2 *3
Straight plug	SGMXA-15 1.5 kW	3 m, 5 m, 10 m, 15 m, 20 m	JWSP-XM15NSS-□□	JWSP-XM15NFS-□□
	SGMXA-20, -25 2.0 kW, 2.5 kW		JWSP-XM20NSS-□□	JWSP-XM20NFS-□□
	SGMXA-30, -40, -50 3.0 kW, 4.0 kW, 5.0 kW		JWSP-XM30NSS-□□	JWSP-XM30NFS-□□
Right-angle plug *4	SGMXA-15 1.5 kW		JWSP-XM15NSL-□□	JWSP-XM15NFL-□□
	SGMXA-20, -25 2.0 kW, 2.5 kW		JWSP-XM20NSL-□□	JWSP-XM20NFL-□□
	SGMXA-30, -40, -50 3.0 kW, 4.0 kW, 5.0 kW		JWSP-XM30NSL-□□	JWSP-XM30NFL-□□

*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.

(2) Appearance

Servomotor Model	Straight Plug Connector	Right-Angle Plug *1
SGMXA-15 1.5 kW		
SGMXA-20 to -50 2.0 kW to 5.0 kW		

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

(3) Wiring Specifications

Standard Cable

SERVOPACK leads		Servomotor connector	
Wire Color	Signal	Signal	Pin
Green	FG	FG	D
Red	Phase U	Phase U	A
White	Phase V	Phase V	B
Black	Phase W	Phase W	C

Flexible Cable

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

4.2.2 For servomotors with holding brakes

(1) Selection Table

Connector Specifications	Servomotor Model	Length (L)	Order Number *1, *2	
			Standard Cable	Flexible Cable *3 *4
Straight plug	SGMXA-15 1.5 kW	3 m, 5 m, 10 m, 15 m, 20 m	JWSP-XM15BSS-□□	JWSP-XM15BFS-□□
	SGMXA-20, -25 2.0 kW, 2.5 kW		JWSP-XM20BSS-□□	JWSP-XM20BFS-□□
	SGMXA-30, -40, -50 3.0 kW, 4.0 kW, 5.0 kW		JWSP-XM30BSS-□□	JWSP-XM30BFS-□□
Right-angle plug *5	SGMXA-15 1.5 kW		JWSP-XM15BSL-□□	JWSP-XM15BFL-□□
	SGMXA-20, -25 2.0 kW, 2.5 kW		JWSP-XM20BSL-□□	JWSP-XM20BFL-□□
	SGMXA-30, -40, -50 3.0 kW, 4.0 kW, 5.0 kW		JWSP-XM30BSL-□□	JWSP-XM30BFL-□□

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

*2 These are the order numbers for two-cable sets (main power supply cable + holding brake cable).
To order the cables separately, the order number for a single main power supply cable is identical to that for the cable for servomotors without holding brakes.
The order numbers for single cables for servomotors with holding brakes are as follows. A flexible cable is provided for this cable as standard.

- Straight plug: JWSP-XB0FS-□□
- Right-angle plug: JWSP-XB0FL-□□

Note:

If you prefer a cable length from 20 m to 50 m, specify the length by taking into account the following operating conditions.

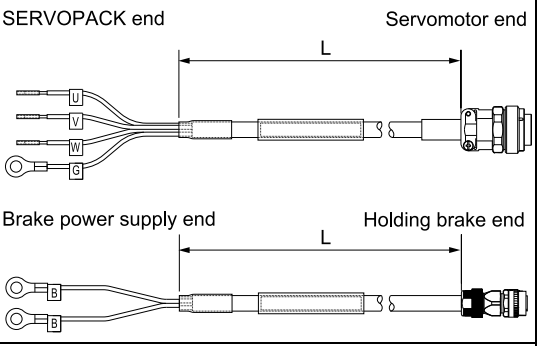
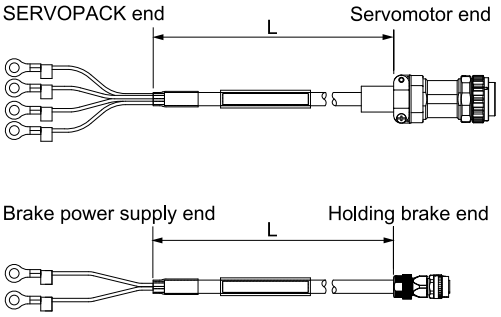
*3 Use flexible cables for moving parts of machines, such as robots.

*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.

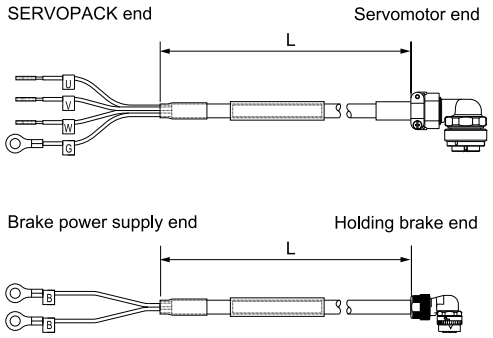
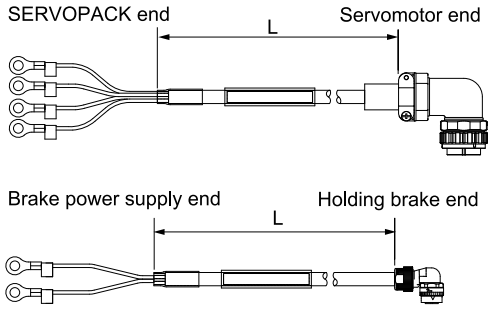
(2) Appearance

- Straight Plug

Servomotor Model	Order Numbers of Main Power Supply Cable and Holding Brake Cable	Individual Cable Order Numbers *1	Appearance
SGMXA-15 1.5 kW	Standard cable: JWSP-XM15BSS-□□ Flexible cable: JWSP-XM15BFS-□□	– Main circuit power supply cable Standard cable: JWSP-XM15NSS-□□ Flexible cable: JWSP-XM15NFS-□□ – Holding brake cable JWSP-XB0FS-□□	
SGMXA-20, -25 2.0 kW, 2.5 kW	Standard cable: JWSP-XM20BSS-□□ Flexible cable: JWSP-XM20BFS-□□	– Main circuit power supply cable Standard cable: JWSP-XM20NSS-□□ Flexible cable: JWSP-XM20NFS-□□ – Holding brake cable JWSP-XB0FS-□□	
SGMXA-30, -40, -50 3.0 kW, 4.0 kW, 5.0 kW	Standard cable: JWSP-XM30BSS-□□ Flexible cable: JWSP-XM30BFS-□□	– Main circuit power supply cable Standard cable: JWSP-XM30NSS-□□ Flexible cable: JWSP-XM30NFS-□□ – Holding brake cable JWSP-XB0FS-□□	

*1 Flexible cables are provided as a standard for holding brake cables.

- Right-Angle Plug
  The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

Servomotor Model	Order Numbers of Main Power Supply Cable and Holding Brake Cable	Individual Cable Order Numbers *1	Appearance
SGMXA-15 1.5 kW	Standard cable: JWSP-XM15BSL-□□ Flexible cable: JWSP-XM15BFL-□□	– Main circuit power supply cable Standard cable: JWSP-XM15NSL-□□ Flexible cable: JWSP-XM15NFL-□□ – Holding brake cable JWSP-XB0FL-□□	
SGMXA-20, -25 2.0 kW, 2.5 kW	Standard cable: JWSP-XM20BSL-□□ Flexible cable: JWSP-XM20BFL-□□	– Main circuit power supply cable Standard cable: JWSP-XM20NSL-□□ Flexible cable: JWSP-XM20NFL-□□ – Holding brake cable JWSP-XB0FL-□□	
SGMXA-30, -40, -50 3.0 kW, 4.0 kW, 5.0 kW	Standard cable: JWSP-XM30BSL-□□ Flexible cable: JWSP-XM30BFL-□□	– Main circuit power supply cable Standard cable: JWSP-XM30NSL-□□ Flexible cable: JWSP-XM30NFL-□□ – Holding brake cable JWSP-XB0FL-□□	

*1 Flexible cables are provided as a standard for holding brake cables.

(3) Wiring Specifications

Standard Cable

SERVOPACK leads

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

Servomotor connector

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

Flexible Cable

SERVOPACK leads

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

Servomotor connector

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

The servomotor main circuit cable for the standard specification servomotor is same as that for the Σ-V compatible specification servomotor.

If you need standard-structure servomotor connectors, consult your Yaskawa representative.

To fabricate the cables, refer to this section.

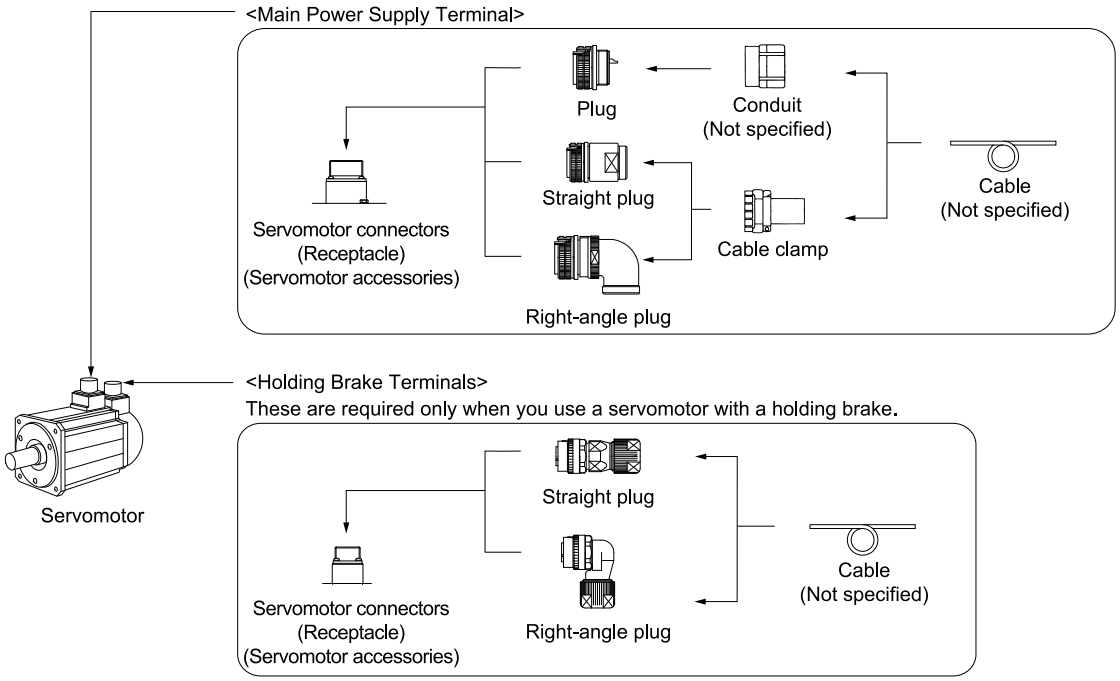
To purchase cables with connectors, refer to the following section.

☞ *4.2 Servomotor Main Circuit Cables on page 128*

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.

4.3.1 Connector Configurations



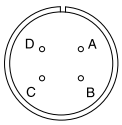
The references for each terminal are shown in the following table.

Item	Reference
Main Power Supply Terminal	☞ *4.3.2 Main Power Supply Terminal on page 132*
Holding Brake Terminals	☞ *4.3.3 Holding Brake Terminals on page 134*

4.3.2 Main Power Supply Terminal

(1) Servomotor Connector (Receptacle)

This connector is an accessory to the servomotor.

Servomotor Model	Capacity	Servomotor Connector Models	Connector Surface
SGMXA-15 SGMXA-20 SGMXA-25	1.5 kW to 2.5 kW	JL10-2E18-10PCE (MS connector model: MS3102A18-10P)	
SGMXA-30 SGMXA-40 SGMXA-50	3.0 kW to 5.0 kW	JL10-2E22-22PCE (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.

(2) 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.

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

Servomotor Model	Capacity	Order Number			Manufacturer
		Plug		Cable Clamp	
SGMXA-15 SGMXA-20 SGMXA-25	1.5 kW to 2.5 kW	Straight	D/MS3106B18-10S	D/MS3057-10A	Fujikura Ltd.
			N/MS3106B18-10S	N/MS3057-10A	Japan Aviation Electronics Industry, Ltd.
		Right-angle	D/MS3108B18-10S	D/MS3057-10A	Fujikura Ltd.
			N/MS3108B18-10S	N/MS3057-10A	Japan Aviation Electronics Industry, Ltd.
SGMXA-30 SGMXA-40 SGMXA-50	3.0 kW to 5.0 kW	Straight	D/MS3106B22-22S	D/MS3057-12A	Fujikura Ltd.
			N/MS3106B22-22S	N/MS3057-12A	Japan Aviation Electronics Industry, Ltd.
		Right-angle	D/MS3108B22-22S	D/MS3057-12A	Fujikura Ltd.
			N/MS3108B22-22S	N/MS3057-12A	Japan Aviation Electronics Industry, Ltd.

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

Servomotor Model	Capacity	Order Number			Manufacturer
		Plug *1*		Cable Clamp *2 *3*	
SGMXA-15 SGMXA-20 SGMXA-25	1.5 kW to 2.5 kW	Single	JL10-6A18-10SE (One-touch mating) JL04V-6A18-10SE (Screw mating)	Not required.	Japan Aviation Electronics Industry, Ltd.
		Straight	JL10-6A18-10SE-EB (One-touch mating) JL04V-6A18-10SE-EB (Screw mating)	JL04-18CK(07)-RK JL04-18CK(10)-R JL04-18CK(13)-R	
		Right-angle	JL10-8A18-10SE-EB (One-touch mating) JL04V-8A18-10SE-EBH (Screw mating)	JL04-18CK(07)-RK JL04-18CK(10)-R JL04-18CK(13)-R	
SGMXA-30 SGMXA-40 SGMXA-50	3.0 kW to 5.0 kW	Single	JL10-6A22-22SE (One-touch mating) JL04V-6A22-22SE (Screw mating)	Not required.	
		Straight	JL10-6A22-22SE-EB1 (One-touch mating) JL04V-6A22-22SE-EB1 (Screw mating)	JL04-2428CK(11)-R JL04-2428CK(14)-R JL04-2428CK(17)-R JL04-2428CK(20)-R	
		Right-angle	JL10-8A22-22SE-EB1 (One-touch mating) JL04V-8A22-22SE-EB1H (Screw mating)	JL04-2428CK(11)-R JL04-2428CK(14)-R JL04-2428CK(17)-R JL04-2428CK(20)-R	

*1 If there is concern about the effect of vibrations on the equipment, use of the JL04V (screw mating) is recommended.
*2 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.
*3 The applicable cable diameters of the cable clamps are as follows.

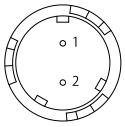
Order Number	Applicable Cable Diameter [mm]
JL04-18CK(07)-RK	5 to 8
JL04-18CK(10)-R	8 to 11
JL04-18CK(13)-R	11 to 14.1
JL04-2428CK(11)-R	9 to 12
JL04-2428CK(14)-R	12 to 15
JL04-2428CK(17)-R	15 to 18
JL04-2428CK(20)-R	18 to 20

4.3.3 Holding Brake Terminals

These are required only when you use a servomotor with a holding brake.

(1) Servomotor Connector (Receptacle)

This connector is an accessory to the servomotor.

Servomotor Model	Capacity	Servomotor Connector Models	Connector Surface
SGMXA-15 SGMXA-20 SGMXA-25 SGMXA-30 SGMXA-40 SGMXA-50	1.5 kW to 5.0 kW	CMV1Y-R2P-0(F)	

(2) Cable-Side Connectors (Plug)

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

Servomotor Model	Capacity	Order Number *1 *2		Applicable Cable Diameter (Reference)	Manufacturer
SGMXA-15 SGMXA-20 SGMXA-25 SGMXA-30 SGMXA-40 SGMXA-50	1.5 kW to 5.0 kW	Straight	CMV1-SP2S-S (One-touch mating) CMV1S-SP2S-S (Screw mating)	4.0 mm to 6.0 mm	Fujikura Ltd.
			CMV1-SP2S-M1 (One-touch mating) CMV1S-SP2S-M1 (Screw mating)	5.5 mm to 7.5 mm	
			CMV1-SP2S-M2 (One-touch mating) CMV1S-SP2S-M2 (Screw mating)	7.0 mm to 9.0 mm	
			CMV1-SP2S-L (One-touch mating) CMV1S-SP2S-L (Screw mating)	9.0 mm to 11.6 mm	
		Right-angle	CMV1-AP2S-S (One-touch mating) CMV1S-AP2S-S (Screw mating)	4.0 mm to 6.0 mm	
			CMV1-AP2S-M1 (One-touch mating) CMV1S-AP2S-M1 (Screw mating)	5.5 mm to 7.5 mm	
			CMV1-AP2S-M2 (One-touch mating) CMV1S-AP2S-M2 (Screw mating)	7.0 mm to 9.0 mm	
			CMV1-AP2S-L (One-touch mating) CMV1S-AP2S-L (Screw mating)	9.0 mm to 11.6 mm	

*1 If there is concern about the effect of vibrations on the equipment, use of the CMV1S (screw mating) is recommended.

*2 This order number is compatible with the CM10 series order number used in the Σ-V series.
For details on the CM10 series order numbers, refer to the following catalog.

Σ-V-Series General Catalog (Manual No.: KAEP S800000 42)

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

JZSP-CVB9-S M S2-E

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

*1 Crimping tool: A 357J-53164T from Fujikura Ltd. is required.

• Other connector specifications

Item	Specification
Contact Models	■ Loose Contacts (100 per bag) – Crimped contacts: CMV1-#22BSC-C3-100 Wire size: AWG16 to AWG20, outer diameter of insulating sheath: 1.87 mm to 2.45 mm Manual crimping tool: 357J-53164T – Soldered contacts: CMV1-#22BSC-S2-100 Wire size: AWG16 max., outer diameter of insulating sheath: 3 mm max. ■ Reeled Contacts (4,000 per reel) Crimped contacts: CMV1-#22BSC-C3-4000 Wire size: AWG16 to AWG20, outer diameter of insulating sheath: 1.87 mm to 2.45 mm Semi-automatic crimping tool: AP-A53210T-A (set), AP-A53210T (applicator) **Note:** The semi-automatic tool set includes the press and applicator (crimper).

Note:

Purchase the contact pins separately. Consider the wiring type and the applicable wire size when you select the contact pins.

4.3.4 Connector External Dimensions

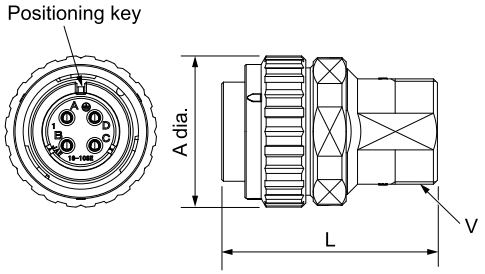
The external dimensions of connectors compliant with an IP67 protective structure and European safety standard compliant type are shown below.

Select the connector model by referring to the following sections for information on the standard environment type connector.

☞ *(a) Standard Environment Type: Cable-Side Connectors (Plug) on page 133*

(1) Main Power Supply Terminal

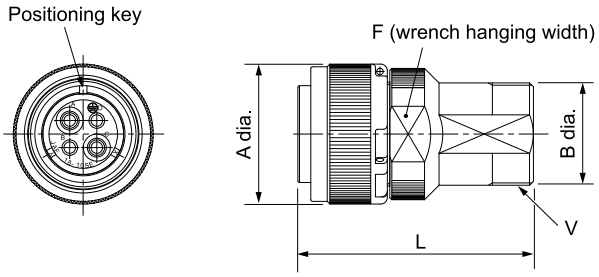
(a) Straight Plug: One-Touch Mating (from Japan Aviation Electronics Industry, Ltd.)



Unit: mm

Model	Shell Size	Connecting Nut Outer Diameter A ± 0.8 Dia.	Total Length L ± 0.8	Cable Clamp Mounting Screws V
JL10-6A18-10SE-EB	18	35.85	51.05	1-20UNEF-2A
JL10-6A22-22SE-EB1	22	42.2	74.35	1-7/16-18UNEF-2A

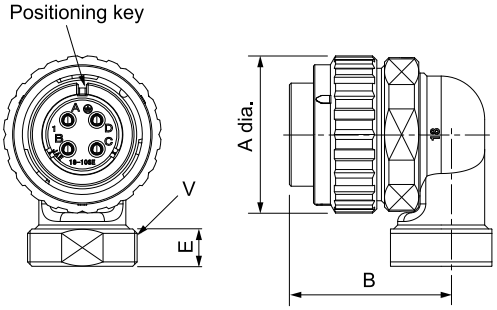
(b) Straight Plug: Screw Mating (from Japan Aviation Electronics Industry, Ltd.)



Unit: mm

Model	Shell Size	Connecting Nut Outer Diameter A ± 0.8 Dia.	B Dia.	Total Length L ± 0.8	F ± 0.5	Cable Clamp Mounting Screws V
JL04V-6A18-10SE-EB	18	34.1	25	57.4	29	1-20UNEF-2A
JL04V-6A22-22SE-EB1	22	40.5	36.4	66.4	35	1-7/16-18UNEF-2A

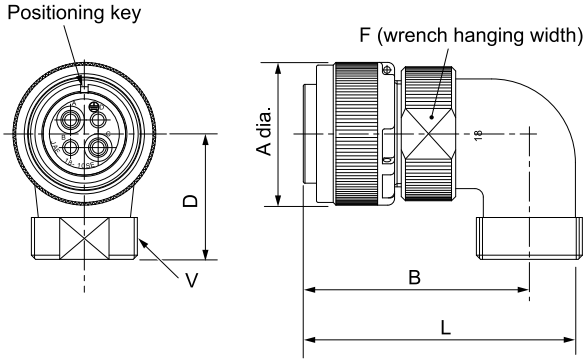
(c) Right-Angle Plug: One-Touch Mating (from Japan Aviation Electronics Industry, Ltd.)



Unit: mm

Model	Shell Size	Connecting Nut Outer Diameter A ± 0.8 Dia.	B ± 0.8	E ± 0.5	Cable Clamp Mounting Screws V
JL10-8A18-10SE-EB	18	35.85	34.55	8.5	1-20UNEF-2A
JL10-8A22-22SE-EB1	22	42.2	51.6	10	1-7/16-18UNEF-2A

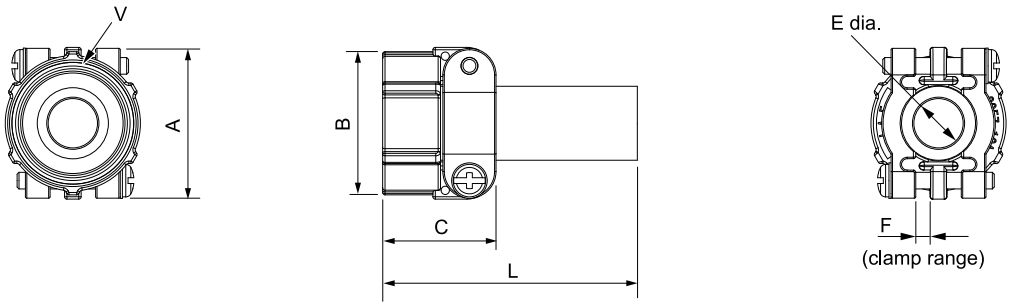
(d) Right-Angle Plug: Screw Mating (from Japan Aviation Electronics Industry, Ltd.)



Unit: mm

Model	Shell Size	Connecting Nut Outer Diameter A ± 0.8 Dia.	B ± 0.8	Total Length L ± 0.8	D ± 0.8	F ± 0.5	Cable Clamp Mounting Screws V
JL04V-8A18-10SE-EBH	18	34.1	54	65.6	30	32	1-20UNEF-2A
JL04V-8A22-22SE-EB1H	22	40.5	59	76.2	42	38	1-7/16-18UNEF-2A

(e) Cable Clamp (from Japan Aviation Electronics Industry, Ltd.)

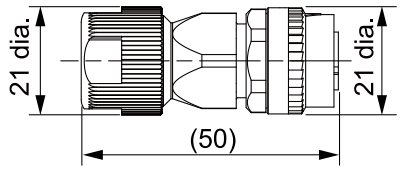
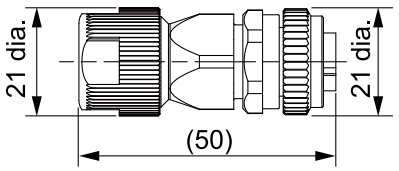


Unit: mm

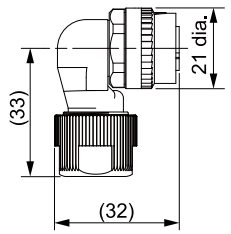
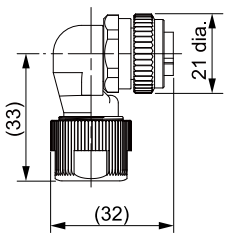
Model	A ± 0.8	Outer Diameter B ± 0.8	C ± 0.3	Total Length L ± 0.3	Bushing Inner Diameter E ± 0.3 dia.	F	Mounting Screws V	Applicable Cable Diameter (Reference)
JL04-18CK(07)-RK	31.8	30.2	24.1	53.8	8	3.2	1-20UNEF-2B	5 to 8
JL04-18CK(10)-R					11			8 to 11
JL04-18CK(13)-R					14.1			11 to 14.1
JL04-2428CK(11)-R	42.9	42.1	26.2	56.2	12	4.8	1-7/16-18UNEF-2B	9 to 12
JL04-2428CK(14)-R					15			12 to 15
JL04-2428CK(17)-R					18			15 to 18
JL04-2428CK(20)-R					21			18 to 20

(2) Holding Brake Terminals (from Fujikura Ltd.)

- Straight plug

CMV1-SP2S-□□ (One-touch mating)	CMV1S-SP2S-□□S (Screw mating)
	

- Right-angle plug

CMV1-AP2S-□□ (One-touch mating)	CMV1S-AP2S-□□ (Screw mating)
	

4.4 Encoder Cables (When Not Relaying the Encoder Cable)

The encoder cable for the standard specification servomotor is different than that for the Σ-V compatible specification servomotor.

4.4.1 For Standard Specification Servomotors

There are two types of encoder cables that are used with standard specification servomotors: One for batteryless absolute encoders and one for absolute encoders.

(1) For Batteryless Absolute Encoders

(a) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Left side	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JWSP-XP2IS1-□□	JWSP-XP2IF1-□□
Right side		JWSP-XP2IS2-□□	JWSP-XP2IF2-□□

*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 46 mm or larger.

Note:

The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.

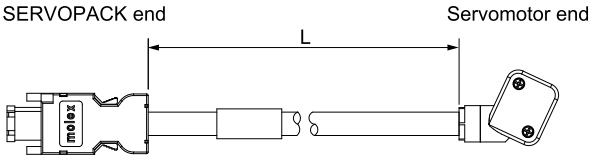
You cannot relay cables by connecting JZSP-UCMP00-□□-E or JZSP-CSP12-E cables.

Information A cable installation direction on the right side or left side refers to the cable installation direction when viewed from the connector side with the shaft at the top.

Refer to the following section for details on the cable installation direction.

☞ *4.1.1 For Standard Specification Servomotors on page 125*

(b) Appearance



(c) Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Shield wire

Servomotor end

Pin	Wire Color
5	Light blue
4	Red
7	Gray
3	Brown
6	Black
2	Orange
8	–
9	–
Shell	FG

(2) For Absolute Encoders

These cables are equipped with a battery unit. (A battery is included.)

Note:

In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

(a) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Left side	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JWSP-XP2AS1-□□	JWSP-XP2AF1-□□
Right side		JWSP-XP2AS2-□□	JWSP-XP2AF2-□□

*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 46 mm or larger.

Note:

The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.

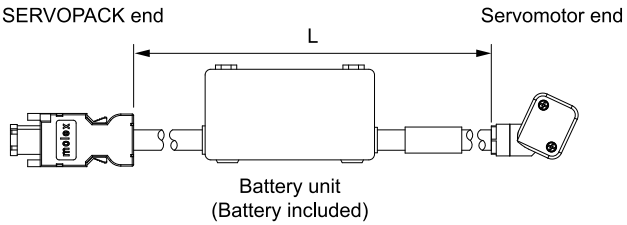
You cannot relay cables by connecting JZSP-UCMP00-□□-E or JZSP-CSP12-E cables.

Information A cable installation direction on the right side or left side refers to the cable installation direction when viewed from the connector side with the shaft at the top.

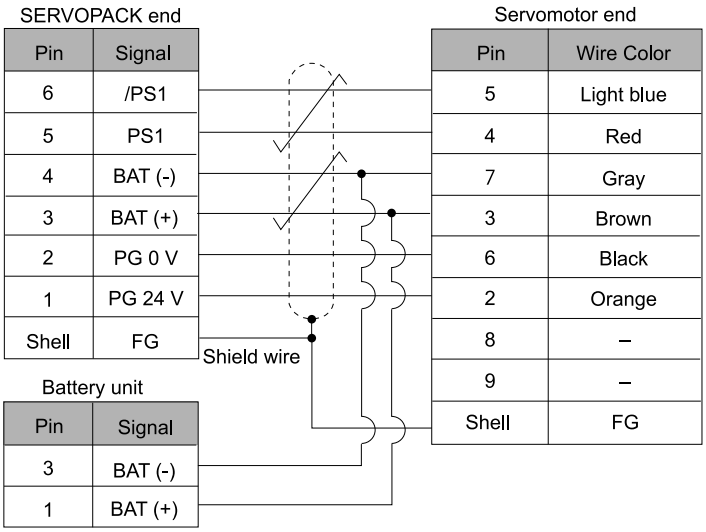
Refer to the following section for details on the cable installation direction.

☞ *4.1.1 For Standard Specification Servomotors on page 125*

(b) Appearance



(c) Wiring Specifications



Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Pin	Wire Color
5	Light blue
4	Red
7	Gray
3	Brown
6	Black
2	Orange
8	–
9	–
Shell	FG

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

4.4.2 Servomotors with Σ-V Compatible Specifications (20 m or Less)

There are two types of encoder cables that are used with Σ-V compatible specification servomotors: One for batteryless absolute encoders and one for absolute encoders.

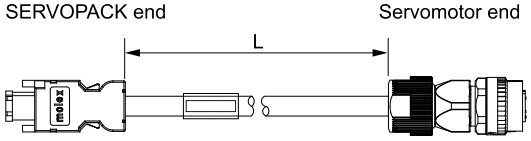
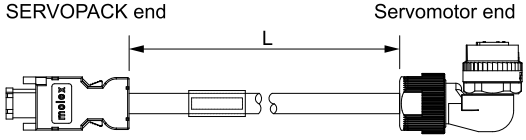
(1) For Batteryless Absolute Encoders

(a) Selection Table

Connector Specifications	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Straight plug	3 m, 5 m, 10 m, 15 m, 20 m	JWSP-XPISS-□□	JWSP-XPIFS-□□
Right-angle plug *4		JWSP-XPISL-□□	JWSP-XPIFL-□□

*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.

(b) Appearance

Straight Plug Connector	Right-Angle Plug *1
	

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

(c) Wiring Specifications

Standard Cable

SERVOPACK end			Servomotor 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	Shield wire	10	FG

Flexible Cable

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

(2) For Absolute Encoders

These cables are equipped with a battery unit. (A battery is included.)

Note:

In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

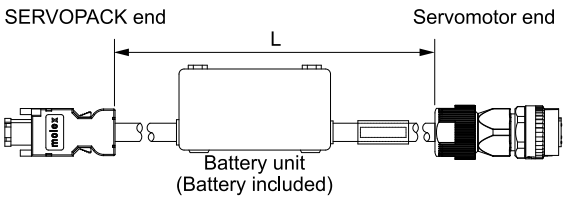
(a) Selection Table

Connector Specifications	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Straight plug	3 m, 5 m, 10 m, 15 m, 20 m	JWSP-XPASS-□□	JWSP-XPAFS-□□
Right-angle plug *4		JWSP-XPASL-□□	JWSP-XPAFL-□□

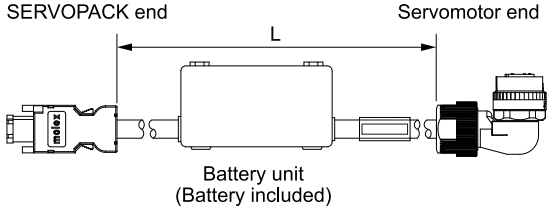
*1 Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.
*4 The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

(b) Appearance

Straight Plug Connector



Right-Angle Plug *1



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

(c) Wiring Specifications

Standard Cable

SERVOPACK end

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

Servomotor end

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

Shield wire

Battery unit

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

Flexible Cable

SERVOPACK end

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

Servomotor end

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

Shield wire

Battery unit

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

4.5 Encoder Cables (When Relaying the Encoder Cable)

The encoder cable for relaying for the standard specification servomotor is different than that for the Σ-V compatible specification servomotor.

4.5.1 For Standard Specification Servomotors

When you will relay the encoder cable, connect the cables by combining an encoder cable and an encoder cable with connectors on both ends.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

(1) Encoder Cables

(a) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Left side	0.3 m, 1 m, 3 m, 5 m, 10 m, 15 m, 20 m, 25 m, 30 m, 40 m, 50 m	JWSP-XP3IS1-□□	JWSP-XP3IF1-□□
Right side		JWSP-XP3IS2-□□	JWSP-XP3IF2-□□

*1 Replace the boxes (□□) in the order number with the cable length (00P3, 01, 03, 05, 10, 15, 20, 25, 30, 40, or 50).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.

Note:

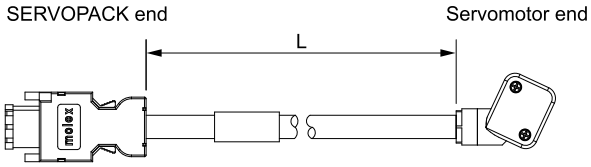
1. When you will relay the encoder cable, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
2. The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.
   You cannot relay cables by combining JZSP-UCMP00-□□-E and JZSP-CSP12-E cables with JWSP-XP1□□□-□□, JWSP-XP2□□□-□□, and JWSP-XP4□□□-□□ cables.

Information A cable installation direction on the right side or left side refers to the cable installation direction when viewed from the connector side with the shaft at the top.

Refer to the following section for details on the cable installation direction.

☞ *4.1.1 For Standard Specification Servomotors on page 125*

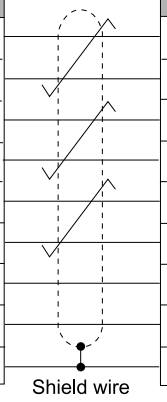
(b) Appearance



(c) Wiring Specifications

SERVOPACK end

Pin	Signal
8	/PS2
7	PS2
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG



Servomotor end

Pin	Wire Color
9	White
8	Yellow
5	Light blue
4	Red
7	Gray
3	Brown
6	Black
2	Orange
Shell	FG

(2) Encoder Cables with Connectors on Both Ends

There are two types of encoder cables with connectors on both ends: One for batteryless absolute encoders and one for absolute encoders.

(a) For Batteryless Absolute Encoders

◆ Selection Table

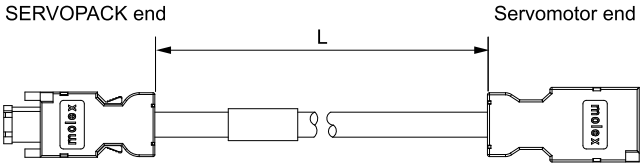
Length (L)	Order Number *1	
	Standard Cable	Flexible Cable *2 *3
0.3 m, 3 m, 5 m, 10 m, 15 m, 20 m, and 25 m	JWSP-XP1IS0-□□	JWSP-XP1IF0-□□

*1 Replace the boxes (□□) in the order number with the cable length (00P3, 03, 05, 10, 15, 20, or 25).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.

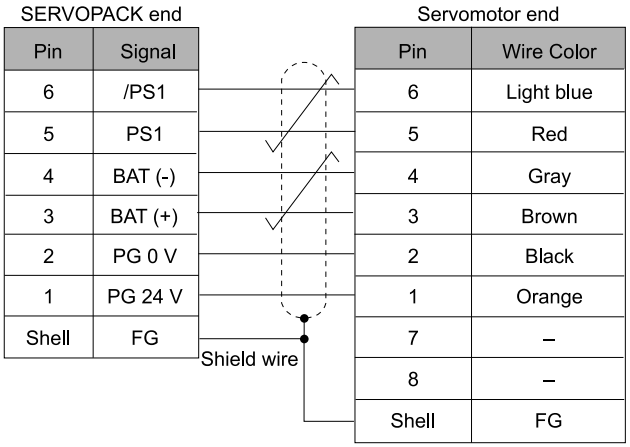
Note:

1. When you will relay the encoder cable, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
2. The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.
   You cannot relay cables by combining JZSP-UCMP00-□□-E and JZSP-CSP12-E cables with JWSP-XP1□□□-□□, JWSP-XP2□□□-□□, and JWSP-XP4□□□-□□ cables.

◆ Appearance



◆ Wiring Specifications



Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Pin	Wire Color
6	Light blue
5	Red
4	Gray
3	Brown
2	Black
1	Orange
7	–
8	–
Shell	FG

(b) For Absolute Encoders

These cables are equipped with a battery unit. (A battery is included.)

Note:

In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

◆ Selection Table

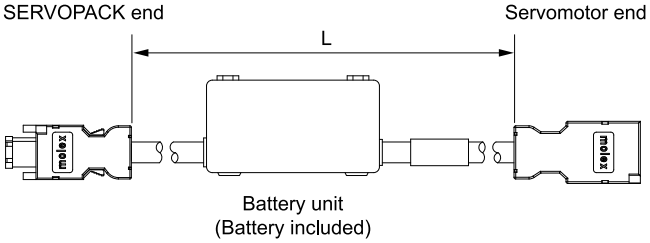
Length (L)	Order Number *1	
	Standard Cable	Flexible Cable *2 *3
0.3 m, 3 m, 5 m, 10 m, 15 m, 20 m, and 25 m	JWSP-XP1AS0-□□	JWSP-XP1AF0-□□

*1 Replace the boxes (□□) in the order number with the cable length (00P3, 03, 05, 10, 15, 20, or 25).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.

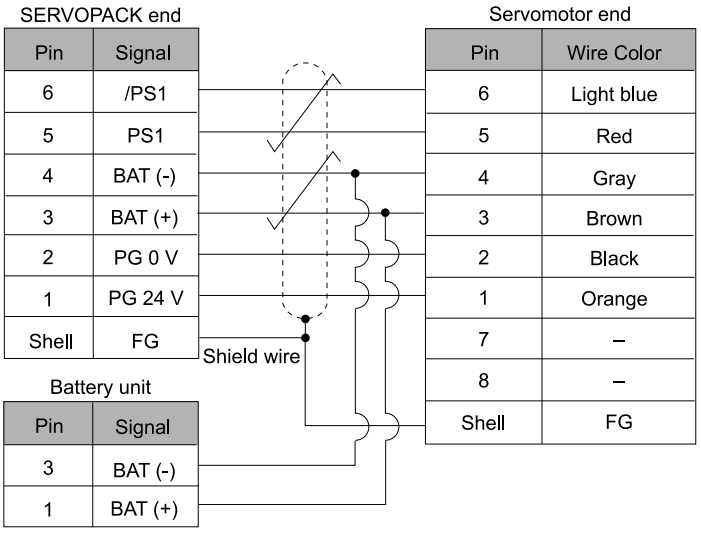
Note:

1. When you will relay the encoder cable, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
2. The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.
   You cannot relay cables by combining JZSP-UCMP00-□□-E and JZSP-CSP12-E cables with JWSP-XP1□□□-□□, JWSP-XP2□□□-□□, and JWSP-XP4□□□-□□ cables.

◆ Appearance



◆ **Wiring Specifications**



4.5.2 Servomotors with Σ-V Compatible Specifications (When Exceeding 20 m)

If the encoder cable length exceeds 20 m, use by combining the following cables.

- Relay encoder cables
- Relay encoder cables with connectors on both ends
- Relay encoder cables with connectors on both ends and battery unit *1

*1 In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

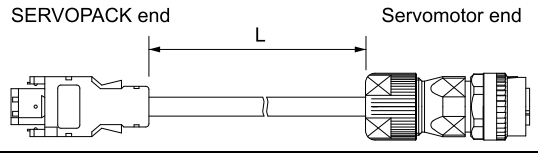
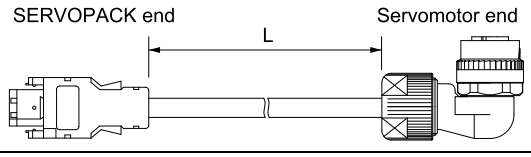
(1) Relay encoder cables

(a) Selection Table

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

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

(b) Appearance

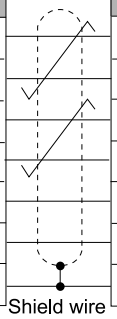
Straight Plug Connector	Right-Angle Plug Connector *1
	

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

(c) Wiring Specifications

SERVOPACK end

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



Servomotor end

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

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

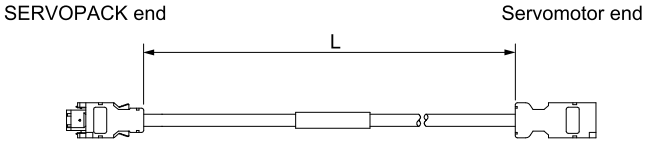
(2) Relay encoder cables with connectors on both ends

(a) Selection Table

Specification	Length (L)	Order Number *1
Used for all types of encoders	30 m, 40 m, and 50 m	JZSP-UCMP00-□□-E

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

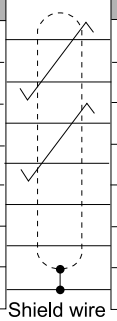
(b) Appearance



(c) Wiring Specifications

SERVOPACK end

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



Servomotor end

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

(3) Relay Encoder Cables with Connectors on Both Ends and Battery Unit

Note:

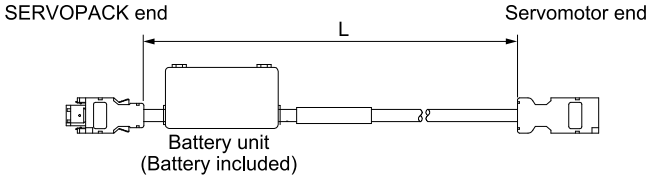
In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

(a) Selection Table

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

(b) Appearance



(c) Wiring Specifications

SERVOPACK end

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

Shield wire

Servomotor end

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

Battery unit

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

4.6 User-Assembled Wiring Materials for Encoder Cables

The wiring materials for user-assembled encoder cables described in this section are used for Σ-V compatible specification servomotors.

Refer to the following section for details on the user-assembled wiring materials for encoder cables of standard specification servomotors.

☞ *13.6 User-Assembled Wiring Materials for Encoder Cables on page 464*

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

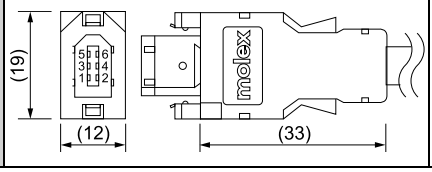
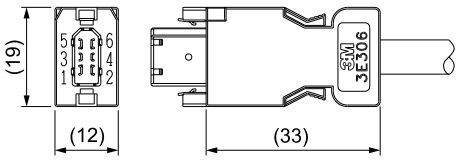
When using encoder cables with a wiring length of 30 m to 50 m, it is necessary to fabricate two different types of cables.

Cables to Be Fabricated	Connectors and Wire Materials Required for Fabrication	Reference	Remarks
Motor-End Relay Encoder Cables	SERVOPACK Connector	☞ *4.6.2 SERVOPACK Connector Kits on page 150*	This cable should be 0.3 m or less.
	Servomotor connectors	☞ *4.6.3 Encoder Cable Connector Kits on page 151*	
	Encoder cables of 20 m or less	☞ *4.6.4 Cables without Connectors on page 152*	
SERVOPACK-End Relay Encoder Cables	SERVOPACK connector	☞ *4.6.2 SERVOPACK Connector Kits on page 150*	This cable should be 50 m or less.
	Cable relay connectors	☞ *4.6.3 Encoder Cable Connector Kits on page 151*	
	Relay encoder cable of 30 m to 50 m	☞ *4.6.4 Cables without Connectors on page 152*	

Refer to the following section for details on the connection of the relay encoder cable.

☞ *4.5.2 Servomotors with Σ-V Compatible Specifications (When Exceeding 20 m) on page 147*

4.6.2 SERVOPACK Connector Kits

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

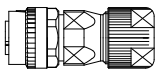
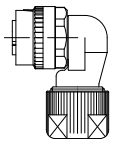
*1 For details, consult your Yaskawa representative. The tool is not provided by Yaskawa.

Note:
Cables are not included. Purchase them separately.

4.6.3 Encoder Cable Connector Kits

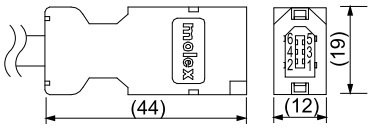
(1) Servomotor Connectors

The servomotor connector is compliant with an IP67 protective structure.

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

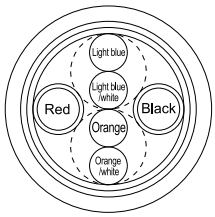
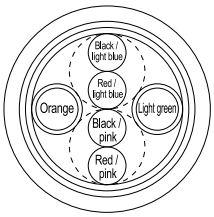
*1 A crimping tool is required. The model number of the special crimping tool for cables without connectors available from Yaskawa is 357J-52667T. When using other wire sizes, contact the connector manufacturer for crimping tools.

(2) Cable Relay Connectors

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

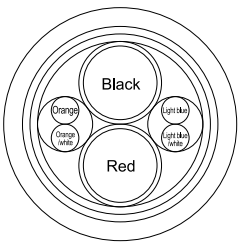
4.6.4 Cables without Connectors

(1) Encoder Cables of 20 m or Less

Item	Standard Type	Flexible Type
Order Number *1	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 mm²) Outer diameter of insulating sheath: 1.15 mm	AWG22 (0.33 mm²) Outer diameter of insulating sheath: 1.35 mm
	AWG24 (0.20 mm²) Outer diameter of insulating sheath: 1.09 mm	AWG24 (0.20 mm²) Outer diameter of insulating sheath: 1.21 mm
Finished Diameter	6.5 mm	6.8 mm
Internal Structure and Lead Colors		

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

(2) Relay Encoder Cable (30 m to 50 m)

Item	Standard Type
Order Number *1	JZSP-CMP19-□□-E (maximum length: 50 m)
Specifications	UL20276 (rated temperature: 80°C) AWG16 × 2C + AWG26 × 2P
	AWG16 (1.31 mm²) Outer diameter of insulating sheath: 2.0 mm
	AWG26 (0.13 mm²) Outer diameter of insulating sheath: 0.91 mm
Finished Diameter	6.8 mm
Internal Structure and Lead Colors	

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

4.7 Wiring Precautions

4.7.1 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.

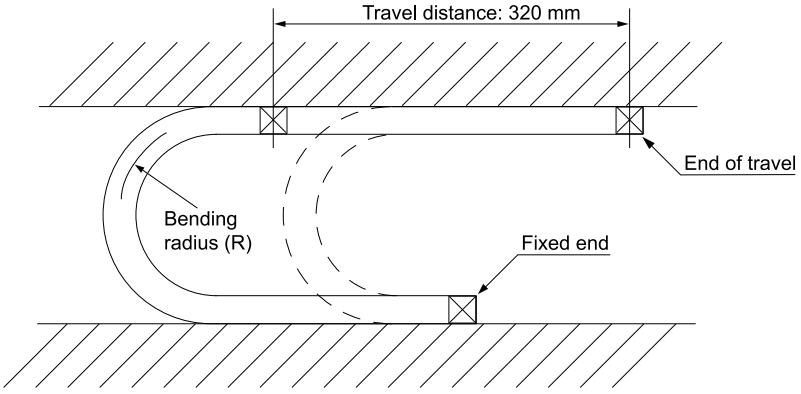
Cable Diameter	Recommended Bending Radius (R)
Less than 8 mm	15 mm min.
8 mm	20 mm min.
Over 8 mm	Cable diameter × 3 mm min.

4.7.2 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) as listed in each selection table 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 affects the performance of the cable sheathing occurs.

- 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.
- If a flexible cable is used in a fixed position, the recommended bending radius is the same as for standard cables. Perform all wiring so that stress is not applied to the cables.

5

Cables and User-Assembled Wiring Materials for SGMXP Rotary Servomotors (200 V Specification)

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5.1 Device Configuration Diagrams

5.1.1 For Standard Specification Servomotors

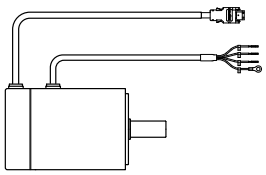
(1) SGMXP-01, -02, 04

The following diagram shows the device configuration when the cable installation direction is on the non-load side.

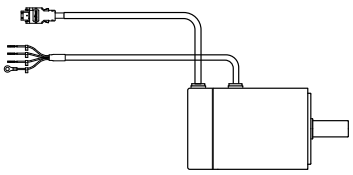
Important

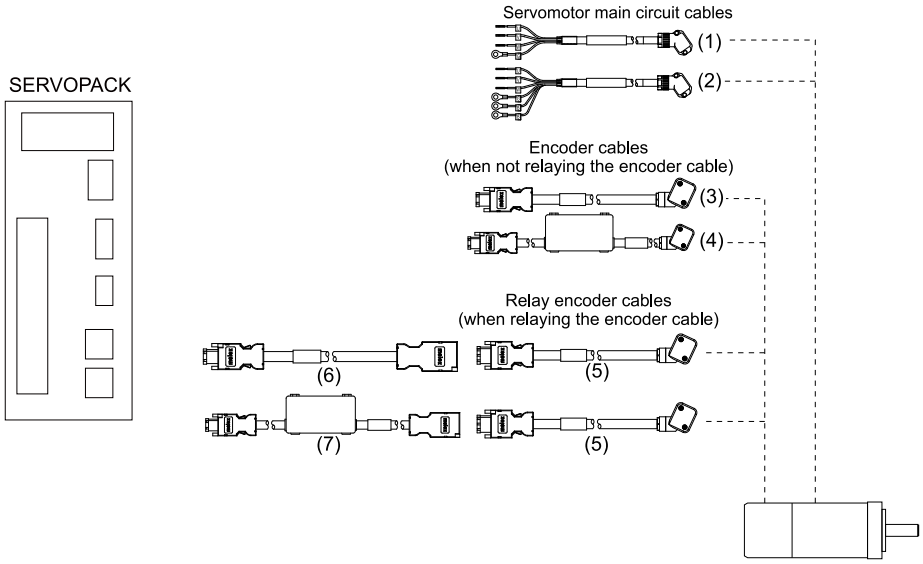
There are different order numbers for the servomotor main circuit cables and encoder cables depending on the cable installation direction. Confirm the order numbers before you order.

Cable Installed toward Load



Cable Installed away from Load





Note:

When you will relay the encoder cable, connect the cables by combining the encoder cable and the encoder cable with connectors on both ends as shown in (5) to (7) in the figure above.

No.	Cable Type				Reference
(1), (2)	Servomotor main circuit cables	Finished product	For servomotors without holding brakes		161
			For servomotors with holding brakes		163
		Fabrication	Connector kits		167
			Cables without connectors		171
(3), (4)	Encoder cables (when not relaying the encoder cable)	Finished product	For batteryless absolute encoders		173
			For absolute encoders *1		174
		Fabrication			186
(5) to (7)	Encoder cables (when relaying the encoder cable)	Finished product	-		179
			Connectors on both ends	For batteryless absolute encoders	180
				For absolute encoders *1	181
		Fabrication			186

*1 In the following cases, use an encoder cable for batteryless absolute encoders.

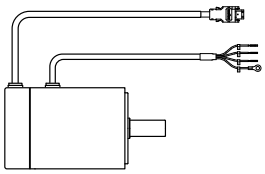
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

Information The cables described in this chapter are used to connect a SERVOPACK to a single servomotor.
Refer to the following chapter for the cables required when connecting the SERVOPACK to multiple devices.
☞ 13 Σ-LINK II-Related Devices on page 417

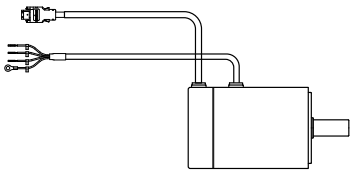
(2) SGMXP-08, -15

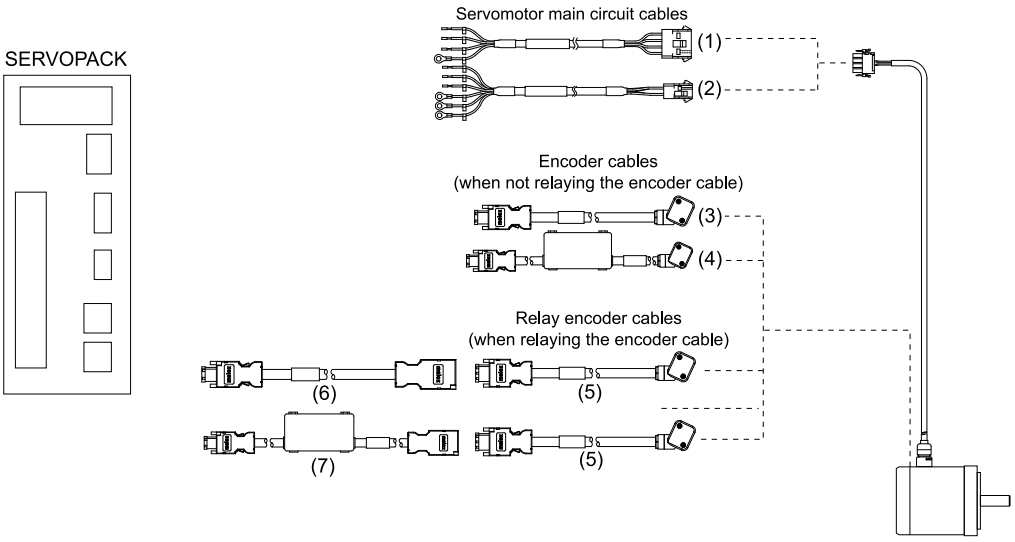
Important There are different order numbers for encoder cables depending on the cable installation direction. Confirm the order numbers before you order.

Cable Installed toward Load



Cable Installed away from Load





Note:
When you will relay the encoder cable, connect the cables by combining the encoder cable and the encoder cable with connectors on both ends as shown in (5) to (7) in the figure above.

No.	Cable Type				Reference
(1), (2)	Servomotor main circuit cables	Finished product	For servomotors without holding brakes		161
			For servomotors with holding brakes		163
		Fabrication	Connector kits		167
			Cables without connectors		171
(3), (4)	Encoder cables (when not relaying the encoder cable)	Finished product	For batteryless absolute encoders		173
			For absolute encoders *1		174
		Fabrication			186
(5) to (7)	Encoder cables (when relaying the encoder cable)	Finished product	-		179
			Connectors on both ends	For batteryless absolute encoders	180
				For absolute encoders *1	181
		Fabrication			186

*1 In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

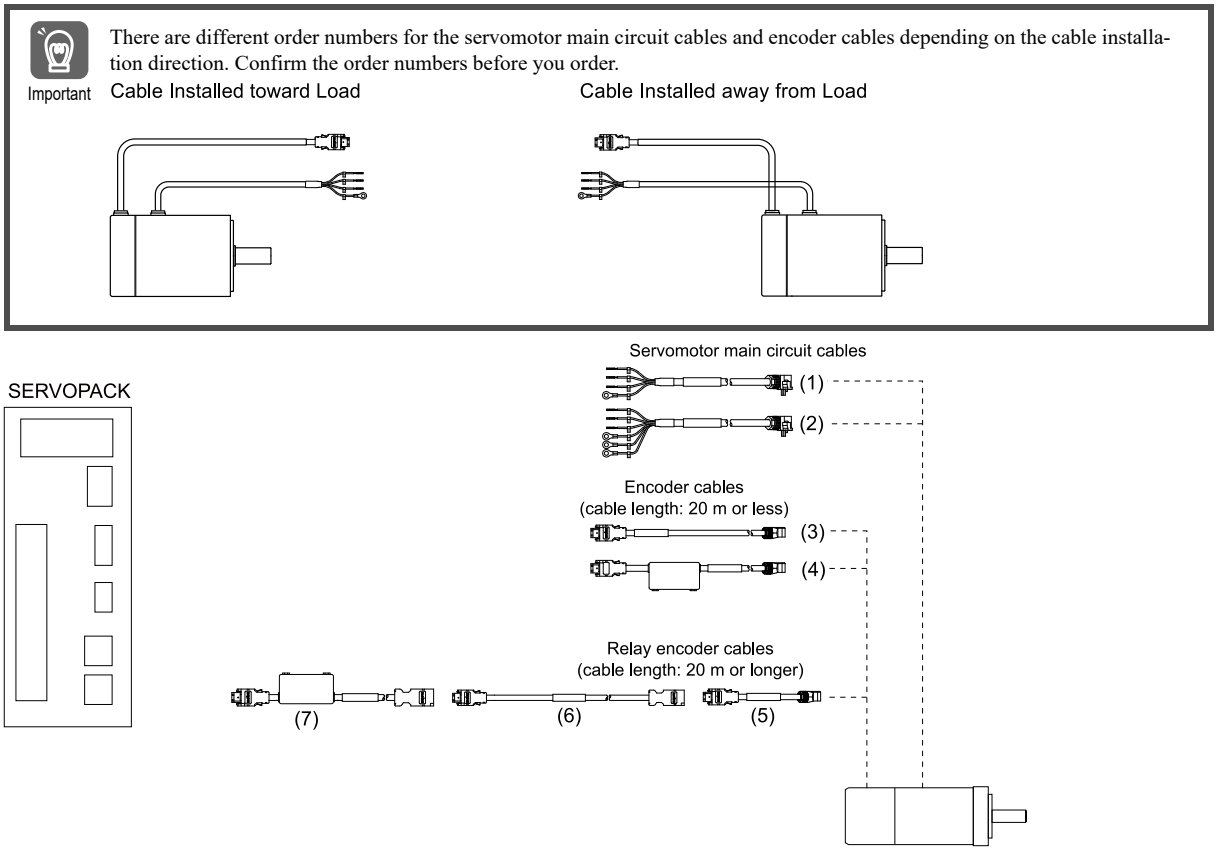
Information The cables described in this chapter are used to connect a SERVOPACK to a single servomotor.
Refer to the following chapter for the cables required when connecting the SERVOPACK to multiple devices.
☞ *13 Σ-LINK II-Related Devices on page 417*

5.1.2 For Σ-7 Compatible Specification Servomotors

(1) SGMXP-01, -02, 04

The following diagram shows the device configuration when the cable installation direction is on the non-load side.

Important 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.



Note:
If the encoder cable length exceeds 20 m, connect by combining the following cables as shown in (5) to (7) in the above figure.
- Relay encoder cables
- Relay encoder cables with connectors on both ends
- Relay encoder cables with connectors on both ends and battery unit

No.	Cable Type			Reference
(1), (2)	Servomotor main circuit cables	Finished product	For servomotors without holding brakes	165
			For servomotors with holding brakes	166
		Fabrication	Connector kits	169
			Cables without connectors	171
(3), (4)	Encoder cables of 20 m or less	Finished product	For batteryless absolute encoders	175
			For absolute encoders *1	177
		Fabrication		186

Continued on next page.

Continued from previous page.

No.	Cable Type				Reference
(5) to (7)	Relay encoder cables (when exceeds 20 m)	Finished product	-		183
			Connectors on both ends	–	184
				With battery units *2	185
		Fabrication			186

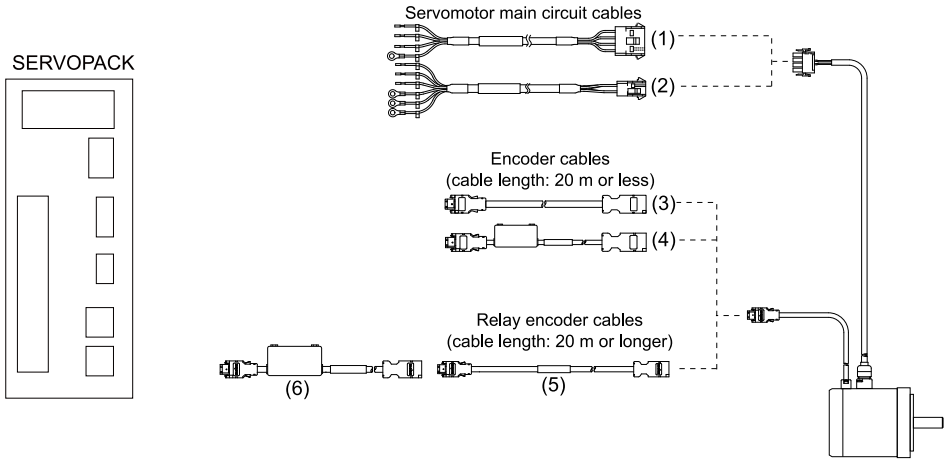
*1 In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

*2 In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

(2) SGMXP-08, -15



Note:

If the encoder cable length exceeds 20 m, connect by combining the following cables as shown in (5) to (6) in the above figure.

- Relay encoder cables with connectors on both ends
- Relay encoder cables with connectors on both ends and battery unit

No.	Cable Type				Reference
(1), (2)	Servomotor main circuit cables	Finished product	For servomotors without holding brakes		165
			For servomotors with holding brakes		166
		Fabrication	Connector kits		169
			Cables without connectors		171
(3), (4)	Encoder cables of 20 m or less	Finished product	For batteryless absolute encoders		175
			For absolute encoders *1		177
		Fabrication			186
(5), (6)	Relay encoder cables (when exceeds 20 m)	Finished product	Connectors on both ends	–	184
				With battery units *2	185
		Fabrication			186

*1 In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

*2 In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

5.2 Servomotor Main Circuit Cables

The servomotor main circuit cable for SGMXP-01 to -04 servomotors is same as that for the standard specification servomotor and the Σ-7 compatible specification servomotor.

The servomotor main circuit cable for SGMXP-08 and -15 servomotors is same as that for the standard specification servomotor and the Σ-7 compatible specification servomotor.

5.2.1 For Standard Specification Servomotors

There are two types of servomotor main circuit cables that are used with standard specification servomotors: One for servomotors without holding brakes and one for servomotors with holding brakes.

(1) For Servomotors without Holding Brakes

(a) Selection Table

◆ **SGMXP-01 to -04 (100 W to 400 W)**

Cable Direction	Servomotor Model	Length (L)	Order Number *1	
			Standard Cable	Flexible Cable *2 *3
Load side	SGMXP-01 to 04 100 W to 400 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JWSP-XMA5NS1-□□	JWSP-XMA5NF1-□□
Non-load side	SGMXP-01 to 04 100 W to 400 W		JWSP-XMA5NS2-□□	JWSP-XMA5NF2-□□

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

◆ **SGMXP-08 (750 W)**

Servomotor Model	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
SGMXP-08 750 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JZSP-CMM00-□□-E	JZSP-CMM01-□□-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-rotation speed characteristics will become smaller because the voltage drop increases.

◆ **SGMXP-15 (1.5 kW)**

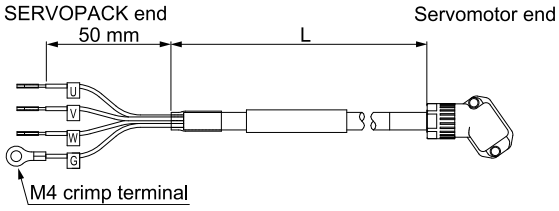
Servomotor Model	Length (L)	Order Number *1
SGMXP-15 1.5 kW	3 m, 5 m, 10 m, 15 m, 20 m	JZSP-CMM20-□□-E

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

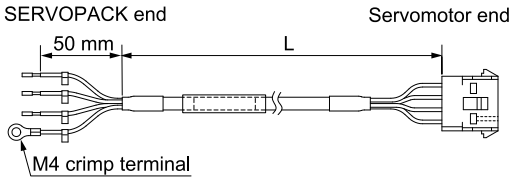
Note:
Flexible cables are not available.

(b) Appearance

◆ SGMXP-01 to -04 (100 W to 400 W)



◆ SGMXP-08, -15 (750 W, 1.5 kW)



(c) Wiring Specifications

◆ SGMXP-01 to -04 (100 W to 400 W)

SERVOPACK leads		Servomotor connector	
Wire Color	Signal	Signal	Pin
Green/yellow	FG	FG	1
Blue	Phase W	Phase W	2
White	Phase V	Phase V	3
Red	Phase U	Phase U	4
		–	5
		–	6

◆ SGMXP-08, -15 (750 W, 1.5 kW)

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

(2) For Servomotors with Holding Brakes

(a) Selection Table

◆ SGMXP-01 to -04 (100 W to 400 W)

Cable Direction	Servomotor Model	Length (L)	Order Number *1	
			Standard Cable	Flexible Cable *2 *3
Load side	SGMXP-01 to 04 100 W to 400 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JWSP-XMA5BS1-□□	JWSP-XMA5BF1-□□
Non-load side	SGMXP-01 to 04 100 W to 400 W		JWSP-XMA5BS2-□□	JWSP-XMA5BF2-□□

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

◆ SGMXP-08 (750 W)

Servomotor Model	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
SGMXP-08 750 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JZSP-CMM10-□□-E	JZSP-CMM11-□□-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-rotation speed characteristics will become smaller because the voltage drop increases.

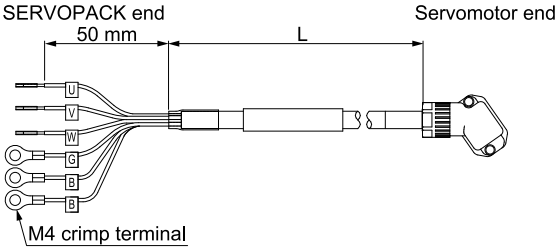
◆ SGMXP-15 (1.5 kW)

Servomotor Model	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable
SGMXP-15 1.5 kW	3 m, 5 m, 10 m, 15 m, 20 m	JZSP-CMM30-□□-E	-

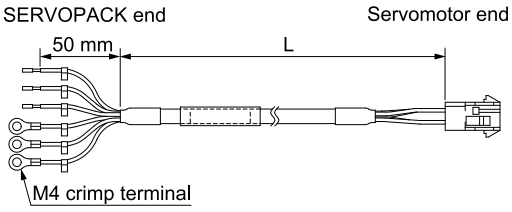
*1 Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).

(b) Appearance

◆ SGMXP-01 to -04 (100 W to 400 W)



◆ SGMXP-08, -15 (750 W, 1.5 kW)



(c) Wiring Specifications

◆ SGMXP-01 to -04 (100 W to 400 W)

SERVOPACK leads

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

Servomotor connector

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

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

◆ SGMXP-08, -15 (750 W, 1.5 kW)

SERVOPACK leads

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

Servomotor connector

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

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

5.2.2 For Σ-7 Compatible Specification Servomotors

There are two types of servomotor main circuit cables that are used with Σ-7 compatible specification servomotors: One for servomotors without holding brakes and one for servomotors with holding brakes.

The servomotor main circuit cable for SGMXP-08 and -15 servomotors is same as that for the standard specification servomotor and the Σ-7 compatible specification servomotor.

Refer to the following section for information on SGMXP-08 and -15 servomotor main circuit cables.

☞ *5.2.1 For Standard Specification Servomotors on page 161*

(1) For Servomotors without Holding Brakes

(a) Selection Table

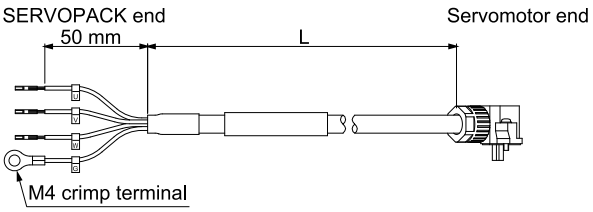
Cable Direction	Servomotor Model	Length (L)	Order Number *1*	
			Standard Cable	Flexible Cable *2 *3
Load side	SGMXP-01 100 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JZSP-C7M10F-□□-E	JZSP-C7M12F-□□-E
	SGMXP-02, -04 200 W, 400 W		JZSP-C7M20F-□□-E	JZSP-C7M22F-□□-E
Non-load side	SGMXP-01 100 W		JZSP-C7M10G-□□-E	JZSP-C7M12G-□□-E
	SGMXP-02, -04 200 W, 400 W		JZSP-C7M20G-□□-E	JZSP-C7M22G-□□-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-rotation speed characteristics will become smaller because the voltage drop increases.

(b) Appearance



(c) Wiring Specifications

SERVOPACK leads

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

Servomotor connector

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

(2) For Servomotors with Holding Brakes

(a) Selection Table

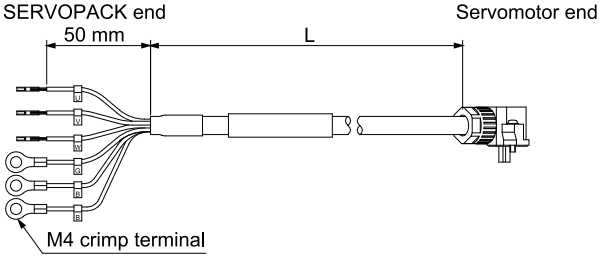
Cable Direction	Servomotor Model	Length (L)	Order Number *1	
			Standard Cable	Flexible Cable *2 *3
Load side	SGMXP-01 100 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JZSP-C7M13F-□□□-E	JZSP-C7M14F-□□-E
	SGMXP-02, -04 200 W, 400 W		JZSP-C7M23F-□□-E	JZSP-C7M24F-□□-E
Non-load side	SGMXP-01 100 W		JZSP-C7M13G-□□-E	JZSP-C7M14G-□□-E
	SGMXP-02, -04 200 W, 400 W		JZSP-C7M23G-□□-E	JZSP-C7M24G-□□-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-rotation speed characteristics will become smaller because the voltage drop increases.

(b) Appearance



(c) 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.

5.3 User-Assembled Wiring Materials for Servomotor Main Circuit Cables

5.3.1 Servomotor Main Circuit Cable Connector Kits

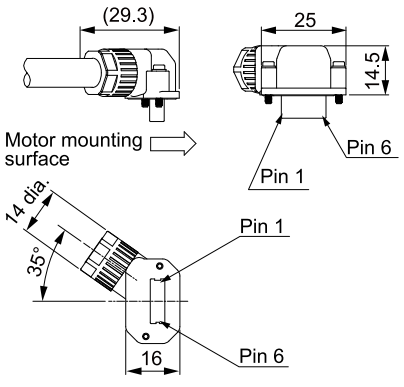
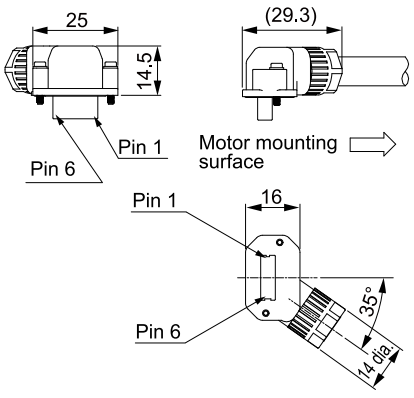
(1) For Standard Specification Servomotors

(a) Selection Table

Servomotor Model	Servomotor Capacity	Order Number *1
SGMXP-01 to -04	100 W to 400 W	JWSP-XMA5CN00
SGMXP-08, -15	750 W, 1.5 kW	Without holding brakes: JZSP-CMM9-3-E
		With holding brakes: JZSP-CSM9-5-E

*1 Cables are not included. Purchase them separately.

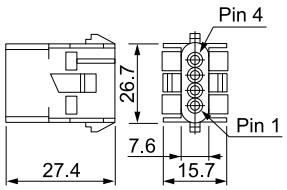
◆ **SGMXP-01 to -04 (100 W to 400 W)**

Item		Description
Order Number		JWSP-XMA5CN00
Manufacturer		TE Connectivity Japan G.K.
Instructions		408-78180
Components	Receptacle	2352404-1
	Contacts	2352413-1
Applicable Wire Sizes		AWG20 to AWG24
Applicable Cable Diameter		7.0 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	2386880-1
	Applicator	2837730-1
External Dimensions [mm]		■ Cable on Non-load Side  ■ Cable on Load Side 

*1 A crimping tool is required. Contact the connector manufacturer for details.

◆ **SGMXP-08, -15 (750 W, 1.5 kW)**

- For servomotors without holding brakes

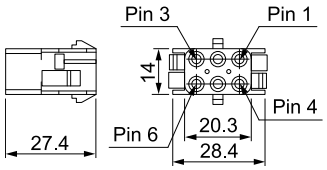
Item		Description	External Dimensions [mm]
Manufacturer		TE Connectivity Japan G.K.	
Order Number		JZSP-CMM9-3-E	
Components	Cap	350780-1	
	Socket	350550-6	
Applicable Wire Sizes		AWG20 to AWG14	
Crimping Tool *1	Hand Tool	90296-2	

*1 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		TE Connectivity 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 *1	Hand Tool	Power terminals: 90296-2 Holding brake terminals: 90300-2	

*1 A crimping tool is required. Contact the connector manufacturer for details.

Note:

Cables are not included. Purchase them separately.

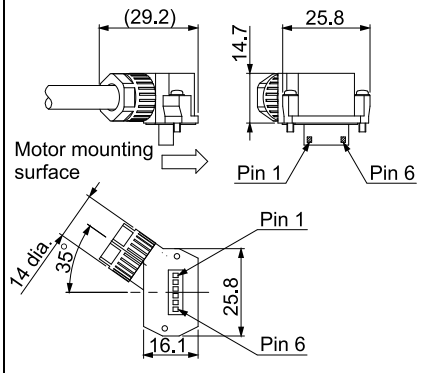
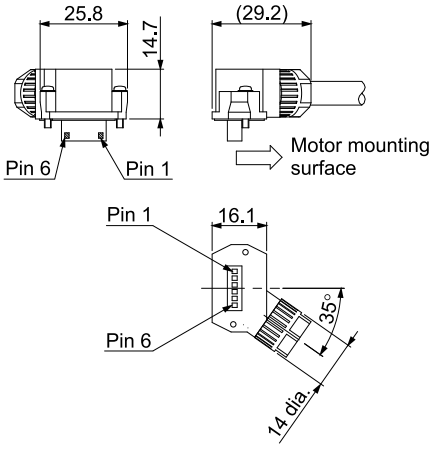
(2) For Σ-7 Compatible Specification Servomotors

(a) Selection Table

Servomotor Model	Servomotor Capacity	Order Number *1
SGMXP-01	100 W	JZSP-C7M9-1-E
SGMXP-02, -04	200 W, 400 W	JZSP-C7M9-2-E
SGMXP-08, -15	750 W, 1.5 kW	Without holding brakes: JZSP-CMM9-3-E
		With holding brakes: JZSP-CSM9-5-E

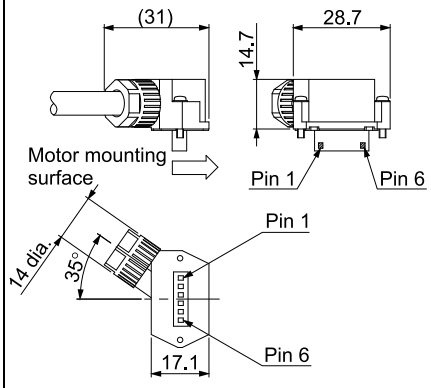
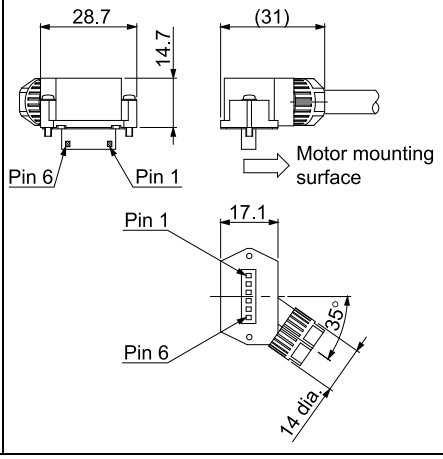
*1 Cables are not included. Purchase them separately.

◆ SGMXP-01 (100 W)

Item		Description
Order Number		JZSP-C7M9-1-E
Manufacturer		J.S.T. Mfg. Co., Ltd.
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 *1	Hand Tool	YRS-8841
	Applicator	APLMK SJ1F/M01-08
External Dimensions [mm]		■ Cable on Non-Load Side 
		■ Cable on Load Side 

*1 A crimping tool is required. Contact the connector manufacturer for details.

◆ SGMXP-02 to -04 (200 W to 400 W)

Item		Description
Order Number		JZSP-C7M9-2-E
Manufacturer		J.S.T. Mfg. Co., Ltd.
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 Insulat-ing Sheath		1.11 mm to 1.53 mm
Mounting Screws		M2 pan-head screws
Crimping Tool *1	Hand Tool	YRS-8861
	Applicator	APLMK SJ2F/M01-10
External Dimensions [mm]		■ Cable on Non-load Side  ■ Cable on Load Side 

*1 A crimping tool is required. Contact the connector manufacturer for details.

◆ SGMXP-08, -15 (750 W, 1.5 kW)

The servomotor main circuit cable connector kit for the standard specification servomotor is same as that for the Σ-7 compatible specification servomotor.

Refer to the following section for information on the connector kit for SGMXP-08 and -15 servomotor main circuit cables.

☞ ◆ *SGMXP-08, -15 (750 W, 1.5 kW) on page 167*

5.3.2 Cables without Connectors

The cable wire material is the same for the standard specification servomotor and the Σ-7 compatible specification servomotor.

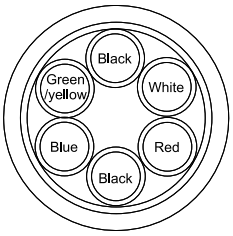
(1) Selection Table

Servomotor Model	Servomotor Capacity	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
SGMXP-01 to -04	100 W to 400 W	JZSP-CSM90-□□-E	JZSP-C7M29-□□-E
SGMXP-08, -15	750 W, 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-rotation speed characteristics will become smaller because the voltage drop increases.

(a) SGMXP-01 to -04 (100 W to 400 W)

Item	Standard Cable	Flexible Cable
Order Number *1	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 mm²) Outer diameter of insulating sheath: 1.53 mm	Power lines: AWG20 (0.52 mm²) Outer diameter of insulating sheath: 1.37 mm
	Holding brake lines: AWG20 (0.52 mm²) Outer diameter of insulating sheath: 1.53 mm	Holding brake lines: AWG22 (0.33 mm²) Outer diameter of insulating sheath: 1.37 mm
Finished Diameter	7 mm ±0.3 mm	
Internal Structure and Lead Colors		

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

(b) SGMXP-08, -15 (750 W, 1.5 kW)

Item	Standard Cable	Flexible Cable
Order Number *1	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 mm²) Outer diameter of insulating sheath: 2.15 mm	Power lines: AWG16 (1.31 mm²) Outer diameter of insulating sheath: 2.35 mm
	Holding brake lines: AWG20 (0.52 mm²) Outer diameter of insulating sheath: 1.6 mm	Holding brake lines: AWG22 (0.33 mm²) Outer diameter of insulating sheath: 1.37 mm

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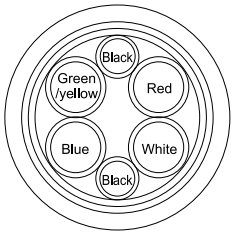
Item	Standard Cable	Flexible Cable
Finished Diameter	8 mm ±0.3 mm	
Internal Structure and Lead Colors		

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

5.4 Encoder Cables (When Not Relaying the Encoder Cable)

The encoder cable for the standard specification servomotor is different than that for the Σ-7 compatible specification servomotor.

5.4.1 For Standard Specification Servomotors

There are two types of encoder cables that are used with standard specification servomotors: One for batteryless absolute encoders and one for absolute encoders.

(1) For Batteryless Absolute Encoders

(a) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Load side	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JWSP-XP2IS1-□□	JWSP-XP2IF1-□□
Non-load side		JWSP-XP2IS2-□□	JWSP-XP2IF2-□□

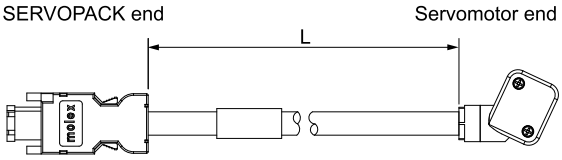
*1 Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, 20, 30, 40, or 50).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.

Note:

The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.

You cannot relay cables by connecting JZSP-UCMP00-□□-E or JZSP-CSP12-E cables.

(b) Appearance



(c) Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Shield wire

Servomotor end

Pin	Wire Color
5	Light blue
4	Red
7	Gray
3	Brown
6	Black
2	Orange
8	–
9	–
Shell	FG

(2) For absolute encoders

These cables are equipped with a battery unit. (A battery is included.)

Note:

In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

(a) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Load side	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JWSP-XP2AS1-□□	JWSP-XP2AF1-□□
Non-load side		JWSP-XP2AS2-□□	JWSP-XP2AF2-□□

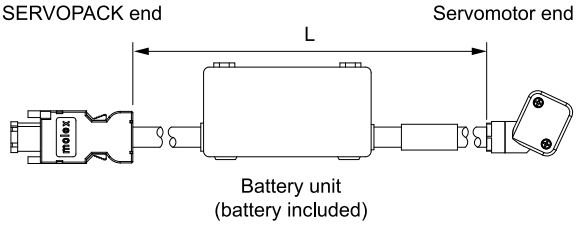
*1 Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, 20, 30, 40, or 50).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.

Note:

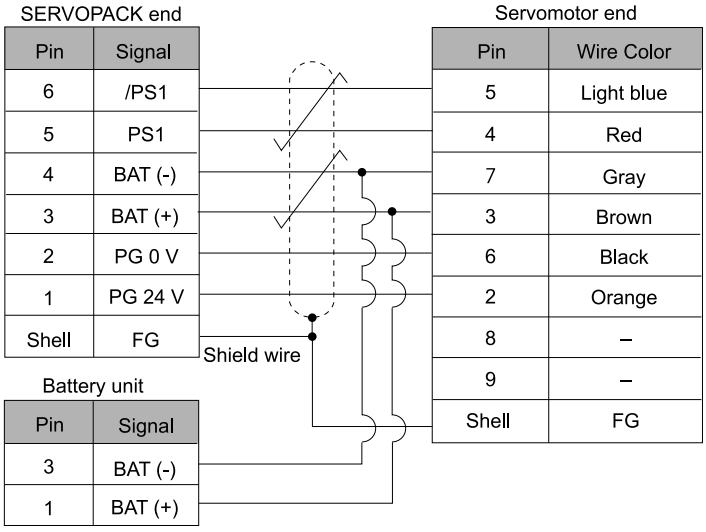
The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.

You cannot relay cables by connecting JZSP-UCMP00-□□-E or JZSP-CSP12-E cables.

(b) Appearance



(c) Wiring Specifications



5.4.2 Servomotors with Σ-7 Compatible Specifications (20 m or Less)

There are two types of encoder cables that are used with Σ-7 compatible specification servomotors: One for batteryless absolute encoders and one for absolute encoders.

(1) For Batteryless Absolute Encoders

(a) Selection Table

◆ **SGMXP-01 to -04 (100 W to 400 W)**

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Load side	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.

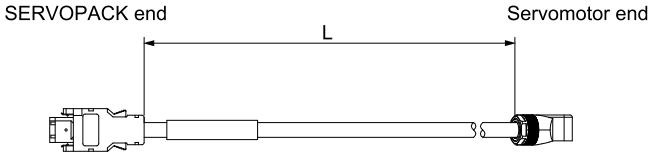
◆ **SGMXP-08, -15 (750 W, 1.5 kW)**

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Load side	3 m, 5 m, 10 m, 15 m, 20 m	JZSP-CMP00-□□-E	JZSP-CMP10-□□-E

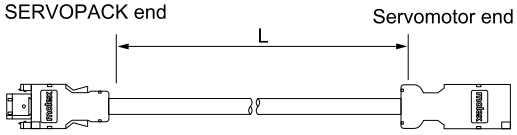
*1 Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.

(b) Appearance

◆ **SGMXP-01 to -04 (100 W to 400 W)**



◆ **SGMXP-08, -15 (750 W, 1.5 kW)**



(c) Wiring Specifications

◆ SGMXP-01 to -04 (100 W to 400 W)

Standard Cable

SERVOPACK end			Servomotor 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	Shield wire	Shell	FG

Flexible Cable

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

◆ SGMXP-08, -15 (750 W, 1.5 kW)

Standard Cable

SERVOPACK end			Servomotor 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	Shield wire	Shell	FG

Flexible Cable

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

(2) For absolute encoders

These cables are equipped with a battery unit. (A battery is included.)

Note:

In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

(a) Selection Table

◆ SGMXP-01 to -04 (100 W to 400 W)

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Load side	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 larger.

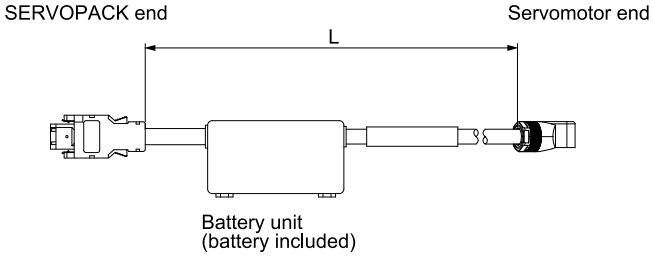
◆ SGMXP-08, -15 (750 W, 1.5 kW)

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Load side	3 m, 5 m, 10 m, 15 m, 20 m	JZSP-CSP19-□□-E	JZSP-CSP29-□□-E

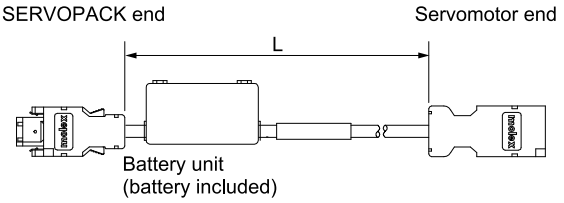
*1 Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.

(b) Appearance

◆ SGMXP-01 to -04 (100 W to 400 W)



◆ SGMXP-08, -15 (750 W, 1.5 kW)



(c) Wiring Specifications

◆ SGMXP-01 to -04 (100 W to 400 W)

Standard Cable

SERVOPACK end

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

Servomotor end

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

Shield wire

Battery unit

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

Flexible Cable

SERVOPACK end

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

Servomotor end

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

Shield wire

Battery unit

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

◆ SGMXP-08, -15 (750 W, 1.5 kW)

Standard Cable

SERVOPACK end

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

Servomotor end

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

Shield wire

Battery unit

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

Flexible Cable

SERVOPACK end

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

Servomotor end

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

Shield wire

Battery unit

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

5.5 Encoder Cables (When Relaying the Encoder Cable)

The encoder cable for relaying for the standard specification servomotor is different than that for the Σ-7 compatible specification servomotor.

5.5.1 For Standard Specification Servomotors

When you will relay the encoder cable, connect the cables by combining an encoder cable and an encoder cable with connectors on both ends.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

(1) Encoder Cables

(a) Selection Table

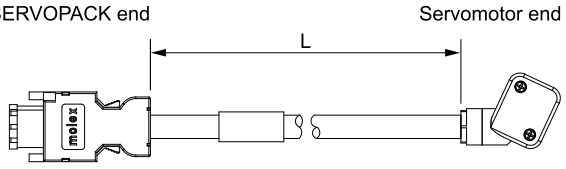
Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Load side	0.3 m, 1 m, 3 m, 5 m, 10 m, 15 m, 20 m, 25 m, 30 m, 40 m, 50 m	JWSP-XP3IS1-□□	JWSP-XP3IF1-□□
Non-load side		JWSP-XP3IS2-□□	JWSP-XP3IF2-□□

*1 Replace the boxes (□□) in the order number with the cable length (00P3, 01, 03, 05, 10, 15, 20, 25, 30, 40, or 50).
*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. When you will relay the encoder cable, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
2. The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.
   You cannot relay cables by combining JZSP-UCMP00-□□-E and JZSP-CSP12-E cables with JWSP-XP1□□□-□□, JWSP-XP2□□□-□□, and JWSP-XP4□□□-□□ cables.

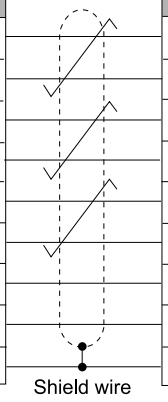
(b) Appearance



(c) Wiring Specifications

SERVOPACK end

Pin	Signal
8	/PS2
7	PS2
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG



Servomotor end

Pin	Wire Color
9	White
8	Yellow
5	Light blue
4	Red
7	Gray
3	Brown
6	Black
2	Orange
Shell	FG

(2) Encoder Cables with Connectors on Both Ends

There are two types of encoder cables with connectors on both ends: One for batteryless absolute encoders and one for absolute encoders.

(a) For Batteryless Absolute Encoders

◆ Selection Table

Length (L)	Order Number *1*	
	Standard Cable	Flexible Cable *2 *3
0.3 m, 3 m, 5 m, 10 m, 15 m, 20 m, 25 m	JWSP-XP1IS0-□□	JWSP-XP1IF0-□□

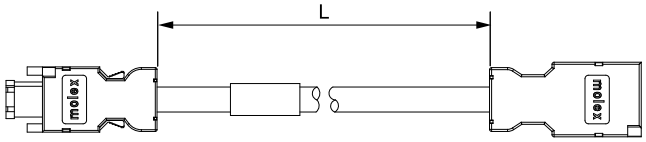
*1 Replace the boxes (□□) in the order number with the cable length (00P3, 03, 05, 10, 15, 20, or 25).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.

Note:

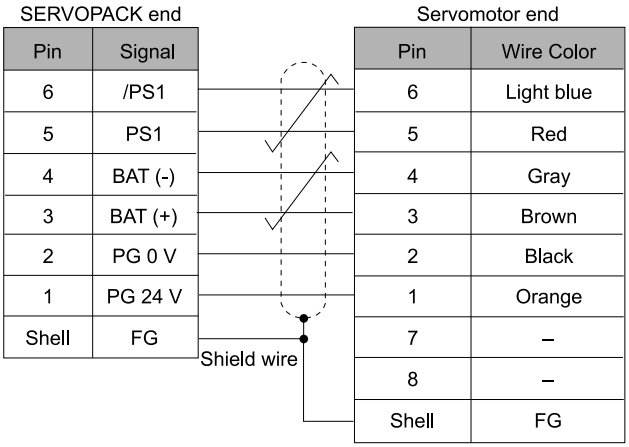
1. When you will relay the encoder cable, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
2. The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.
   You cannot relay cables by combining JZSP-UCMP00-□□-E and JZSP-CSP12-E cables with JWSP-XP1□□□-□□, JWSP-XP2□□□-□□, and JWSP-XP4□□□-□□ cables.

◆ Appearance

SERVOPACK end Servomotor end



◆ Wiring Specifications



Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Pin	Wire Color
6	Light blue
5	Red
4	Gray
3	Brown
2	Black
1	Orange
7	–
8	–
Shell	FG

(b) For absolute encoders

These cables are equipped with a battery unit. (A battery is included.)

Note:

In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

◆ Selection Table

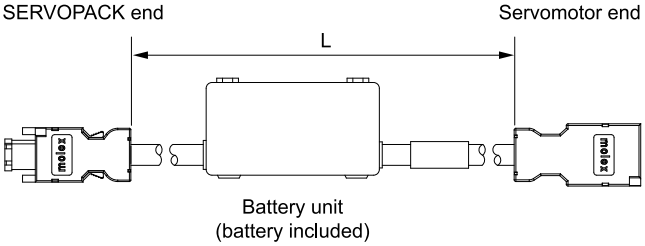
Length (L)	Order Number *1	
	Standard Cable	Flexible Cable *2 *3
0.3 m, 3 m, 5 m, 10 m, 15 m, 20 m, and 25 m	JWSP-XP1AS0-□□	JWSP-XP1AF0-□□

*1 Replace the boxes (□□) in the order number with the cable length (00P3, 03, 05, 10, 15, 20, or 25).
*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. When you will relay the encoder cable, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
2. The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.
   You cannot relay cables by combining JZSP-UCMP00-□□-E and JZSP-CSP12-E cables with JWSP-XP1□□□-□□, JWSP-XP2□□□-□□, and JWSP-XP4□□□-□□ cables.

◆ Appearance



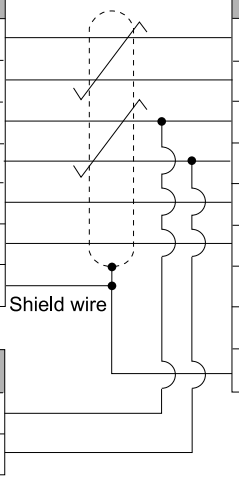
◆ Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Battery unit

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



Servomotor end

Pin	Wire Color
6	Light blue
5	Red
4	Gray
3	Brown
2	Black
1	Orange
7	–
8	–
Shell	FG

5.5.2 Servomotors with Σ-7 Compatible Specifications (When Exceeding 20 m)

If the encoder cable length exceeds 20 m, use by combining the following cables.

- Relay encoder cable (required for SGMXP-01 to -04 only)
- Relay encoder cables with connectors on both ends
- Relay encoder cables with connectors on both ends and battery unit *1

*1 In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

Install a battery at either the host controller or on the encoder cable.

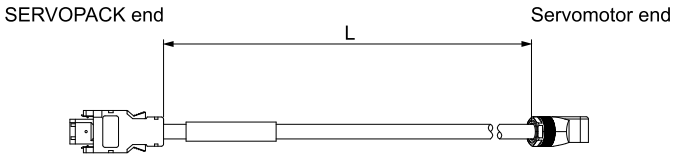
If you install batteries both at the host controller and on the encoder cable at the same time, you will create a loop circuit between the batteries, and this may result in a fire from product failure or damage that causes death or serious injury.

(1) Relay Encoder Cables

(a) Selection Table

Cable Direction	Servomotor Model	Length (L)	Order Number
Load side	SGMXP-01 to 04 100 W to 400 W	0.3 m	JZSP-C7PRCD-E
Non-load side			JZSP-C7PRCE-E

(b) Appearance



(c) Wiring Specifications

SERVOPACK end			Servomotor 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	Shield wire	Shell	FG

(2) Relay Encoder Cables with Connectors on Both Ends

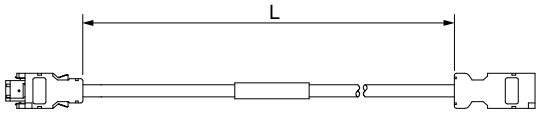
(a) Selection Table

Specification	Length (L)	Order Number *1
Used for all types of encoders	30 m, 40 m, 50 m	JZSP-UCMP00-□□-E

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

(b) Appearance

SERVOPACK end Servomotor end



(c) Wiring Specifications

SERVOPACK end

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

Shield wire

Servomotor end

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

(3) Relay Encoder Cables with Connectors on Both Ends and Battery Unit

Note:

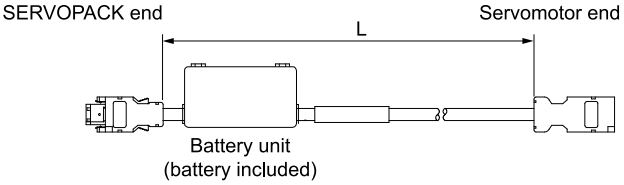
In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

(a) Selection Table

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

(b) Appearance



(c) Wiring Specifications

SERVOPACK end

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

Servomotor end

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

Shield wire

Battery unit

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

5.6 User-Assembled Wiring Materials for Encoder Cables

The wiring materials for user-assembled encoder cables described in this section are used for Σ-7 compatible specification servomotors.

Refer to the following section for details on the user-assembled wiring materials for encoder cables of standard specification servomotors.

☞ *13.6 User-Assembled Wiring Materials for Encoder Cables on page 464*

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 two different types of cables.

Cables to Be Fabricated	Servomotor Model SGMXP		Connectors and Wire Materials Required for Fabrication	Reference	Remarks
	-01 to -04	-08, -15			
Motor-End Relay Encoder Cables	Fabrication required.	Fabrication not required.	SERVOPACK connector	☞ *5.6.2 SERVOPACK Connector Kits on page 186*	This cable should be 0.3 m or less.
			Servomotor connectors	☞ *5.6.3 Encoder Cable Connector Kits on page 187*	
			Encoder cables of 20 m or less	☞ *5.6.4 Cables without Connectors on page 188*	
SERVOPACK-End Relay Encoder Cables	Fabrication required.	Fabrication required.	SERVOPACK connector	☞ *5.6.2 SERVOPACK Connector Kits on page 186*	This cable should be 50 m or less.
			Cable relay connectors	☞ *5.6.3 Encoder Cable Connector Kits on page 187*	
			Relay encoder cable of 30 m to 50 m	☞ *5.6.4 Cables without Connectors on page 188*	

Refer to the following section for details on the connection of the relay encoder cable.

☞ *5.5.2 Servomotors with Σ-7 Compatible Specifications (When Exceeding 20 m) on page 183*

5.6.2 SERVOPACK Connector Kits

Type	Standard Cable	Compatible Connector Kit *1*
Inquiries	Yaskawa representative	3M Japan Limited
Manufacturer	Molex Japan Co., Ltd.	
Order Number	JZSP-CMP9-1-E	

Continued on next page.

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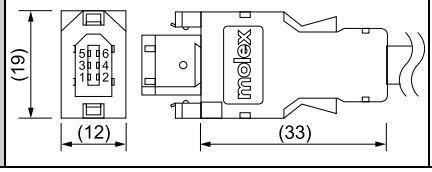
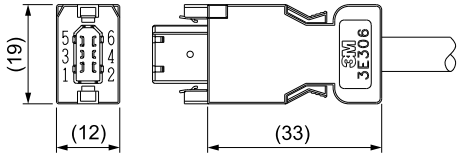
Specifications	55100-0670 (soldered) Product specifications: PS-54280	Receptacle: 3E206-0100 KV (soldered) Shell kit: 3E306-3200-008 Product specifications: JNPS-1042, JNPS-1043
External Dimensions [mm]		

*1 For details, consult your Yaskawa representative. The tool is not provided by Yaskawa.

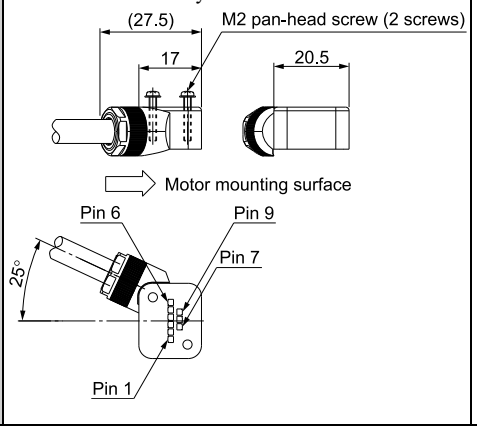
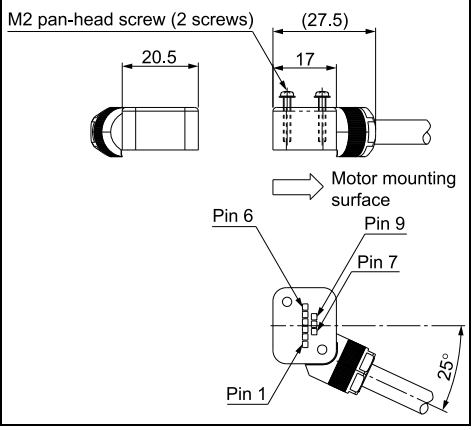
Note:

Cables are not included. Purchase them separately.

5.6.3 Encoder Cable Connector Kits

(1) SGMXP-01 to -04 (100 W to 400 W)

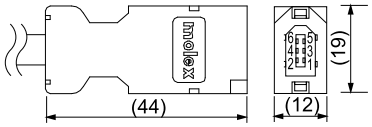
(a) Servomotor Connectors

Order Number		JZSP-C7P9-1-E
Manufacturer		Molex Japan Co., Ltd.
Components		504678-0070 Loose connectors: 56161-8181 (crimped), Reeled: 56161-8081 (crimped)
Applicable Wire Sizes		AWG22 to AWG26
Applicable Cable Diameter		6.3 mm to 7.7 mm
Outer Diameter of Insulating Sheath		1.05 mm to 1.4 mm
Mounting Screws		M2 pan-head screws (two)
Application Specifications		AS-504682
Crimping Specifications		CS-56161
Crimping Tool *1	Hand Tool	638235100
Shell Caulking Tool	Hand Tool	57331-5100
	Hand Press	57331-5200
External Dimensions [mm]	■ Cable Installed away from Load 	■ Cable Installed toward Load 

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

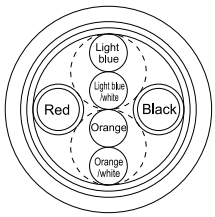
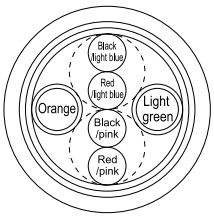
(2) All Models

(a) Cable Relay Connectors

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

5.6.4 Cables without Connectors

(1) Encoder Cables of 20 m or Less

Item	Standard Cable	Flexible Cable
Order Number *1	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 mm²) Outer diameter of insulating sheath: 1.15 mm	AWG22 (0.33 mm²) Outer diameter of insulating sheath: 1.35 mm
	AWG24 (0.20 mm²) Outer diameter of insulating sheath: 1.09 mm	AWG24 (0.20 mm²) Outer diameter of insulating sheath: 1.21 mm
Finished Diameter	6.5 mm	6.8 mm
Internal Structure and Lead Colors		

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

(2) Relay Encoder Cable of 30 m to 50 m

Item	Standard Cable
Order Number *1	JZSP-CMP19-□□-E (maximum length: 50 m)
Specifications	UL20276 (rated temperature: 80°C) AWG16 × 2C + AWG26 × 2P
	AWG16 (1.31 mm²) Outer diameter of insulating sheath: 2.0 mm
	AWG26 (0.13 mm²) Outer diameter of insulating sheath: 0.91 mm

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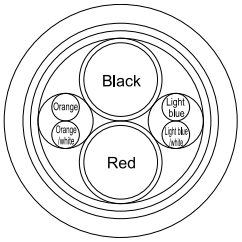
Item	Standard Cable
Finished Diameter	6.8 mm
Internal Structure and Lead Colors	

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

5.7 Wiring Precautions

5.7.1 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.

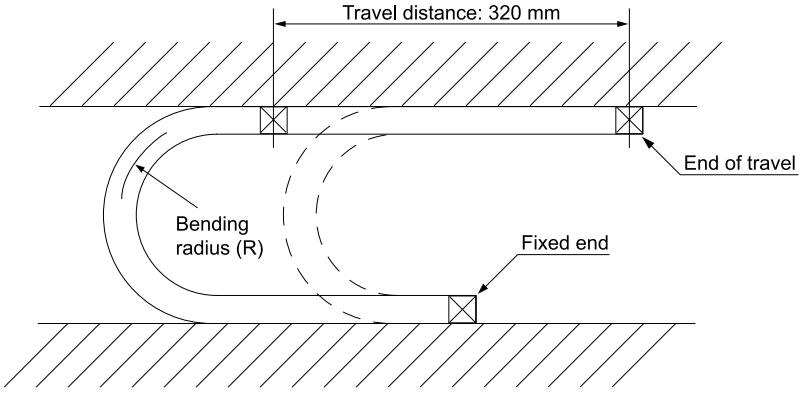
Cable Diameter	Recommended Bending Radius (R)
Less than 8 mm	15 mm min.
8 mm	20 mm min.
Over 8 mm	Cable diameter × 3 mm min.

5.7.2 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) as listed in each selection table 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 affects the performance of the cable sheathing occurs.

- 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.
- If a flexible cable is used in a fixed position, the recommended bending radius is the same as for standard cables. Perform all wiring so that stress is not applied to the cables.

6

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6.1 Cable Configurations

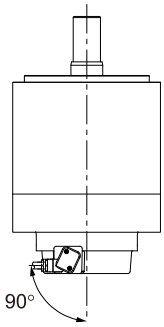
6.1.1 For Standard Specification Servomotors

(1) SGMXG-03A□A, -05A□A (300 W, 450 W)

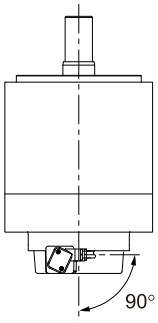
Important

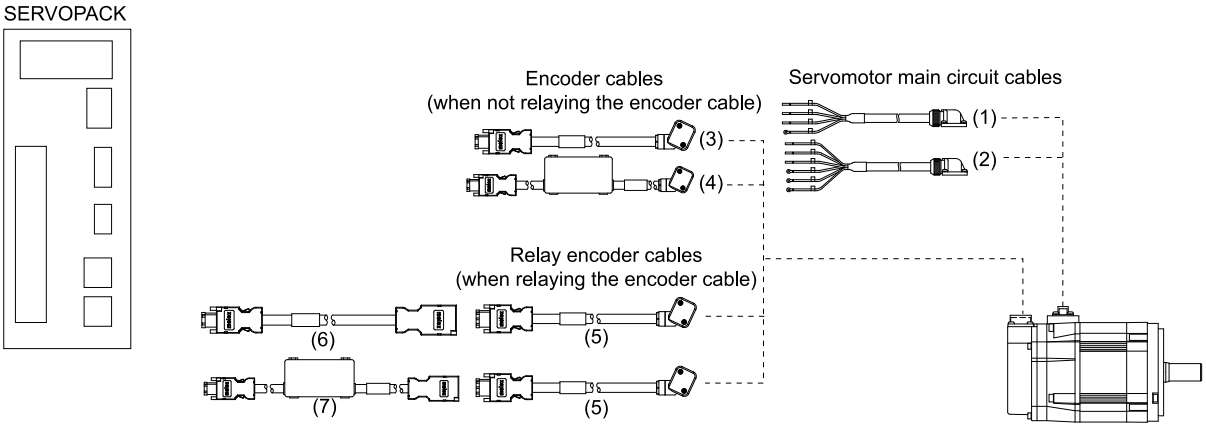
There are different order numbers for encoder cables depending on the cable installation direction. Confirm the order numbers before you order.

Left-side cable installation type



Right-side cable installation type





Note:

When you will relay the encoder cable, connect the cables by combining the encoder cable and the encoder cable with connectors on both ends as shown in (5) to (7) in the figure above.

No.	Cable Type				Reference
(1), (2)	Servomotor main circuit cables *1	Finished product	For servomotors without holding brakes		198
			For servomotors with holding brakes		201
		Fabrication	Connectors		207
			Cables without connectors		207
(3), (4)	Encoder cables (when not relaying the encoder cable)	Finished product	For batteryless absolute encoders		216
			For absolute encoders *2		217
		Fabrication			464
(5) to (7)	Encoder cables (when relaying the encoder cable)	Finished product	–		221
			Connectors on both ends	For batteryless absolute encoders	222
				For absolute encoders *2	223
		Fabrication			464

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

*2 In the following cases, use an encoder cable for batteryless absolute encoders.

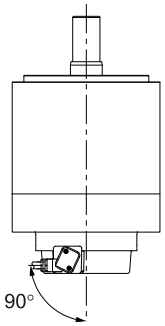
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

Information The cables described in this chapter are used to connect a SERVOPACK to a single servomotor.
Refer to the following chapter for the cables required when connecting the SERVOPACK to multiple devices.
☞ *13 Σ-LINK II-Related Devices on page 417*

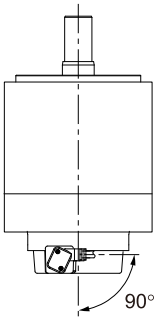
(2) SGMXG-09A□A to -1EA□A (850 W, 15 kW)

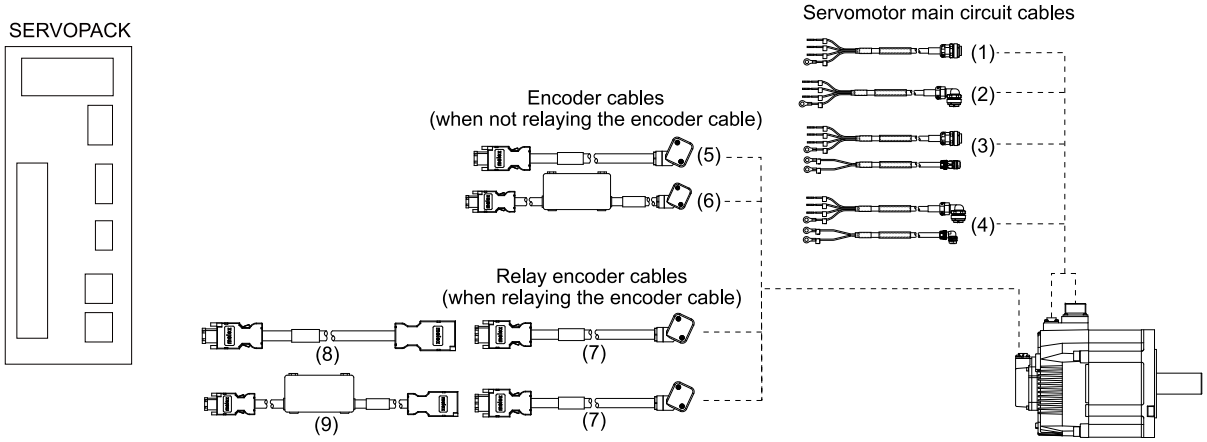
Important There are different order numbers for encoder cables depending on the cable installation direction. Confirm the order numbers before you order.

Left-side cable installation type



Right-side cable installation type





Note:
When you will relay the encoder cable, connect the cables by combining the encoder cable and the encoder cable with connectors on both ends as shown in (7) to (9) in the figure above.

No.	Cable Type				Reference
(1) to (4)	Servomotor main circuit cables *1	Finished product	For servomotors without holding brakes	Straight plug	198
				Right-angle plug *2	
			For servomotors with holding brakes	Straight plug	201
				Right-angle plug *2	
		Fabrication	Connectors		208
			Cables without connectors *3		–
(5), (6)	Encoder cables (when not relaying the encoder cable)	Finished product	For batteryless absolute encoders		216
			For absolute encoders *4		217
		Fabrication			464

Continued on next page.

Continued from previous page.

No.	Cable Type				Reference
(7) to (9)	Encoder cables (when relaying the encoder cable)	Finished product	–		221
			Connectors on both ends	For batteryless absolute encoders	222
				For absolute encoders *4	223
		Fabrication			464

*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: SGMXG-09A□A to -1EA□A on page 208*

*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 In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

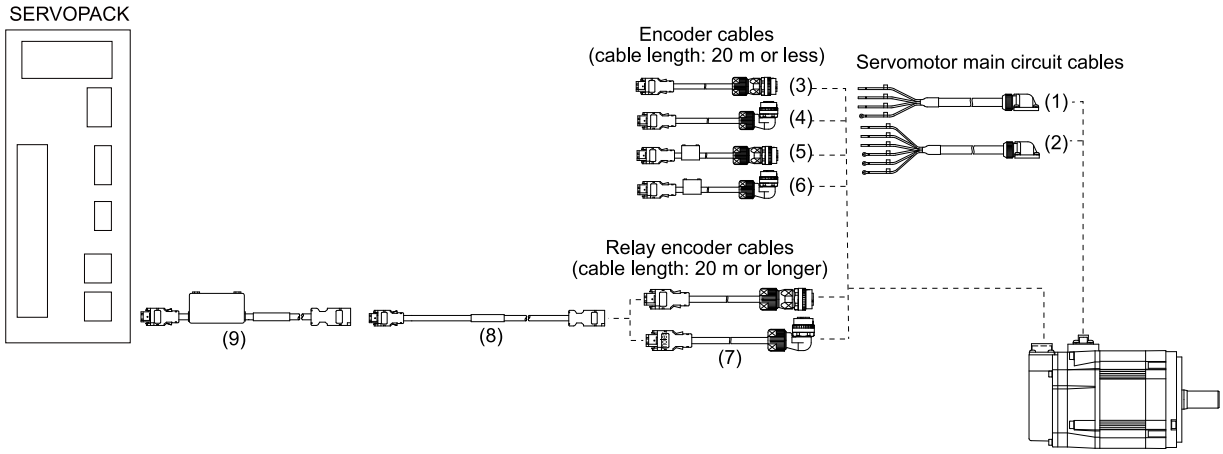
Information The cables described in this chapter are used to connect a SERVOPACK to a single servomotor.

Refer to the following chapter for the cables required when connecting the SERVOPACK to multiple devices.

☞ *13 Σ-LINK II-Related Devices on page 417*

6.1.2 For Σ-7 Compatible Specification Servomotors

(1) SGMXG-03A□A, -05A□A (300 W, 450 W)



Note:

If the encoder cable length exceeds 20 m, connect by combining the following cables as shown in (7) to (9) in the above figure.

- Relay encoder cables
- Relay encoder cables with connectors on both ends
- Relay encoder cables with connectors on both ends and battery unit

No.	Cable Type				Reference
(1), (2)	Servomotor main circuit cables *1	Finished product	For servomotors without holding brakes		198
			For servomotors with holding brakes		201
		Fabrication	Connectors		207
			Cables without connectors		207
(3) to (6)	Encoder cables of 20 m or less	Finished product	For batteryless absolute encoders	Straight plug	218
				Right-angle plug *2	
			For absolute encoders *3	Straight plug	220
				Right-angle plug *2	
		Fabrication			228
(7) to (9)	Relay encoder cables (when exceeds 20 m)	Finished product	Straight plug		224
			Right-angle plug *2		
			Connectors on both ends	–	226
				With battery units *4	227
		Fabrication			228

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

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

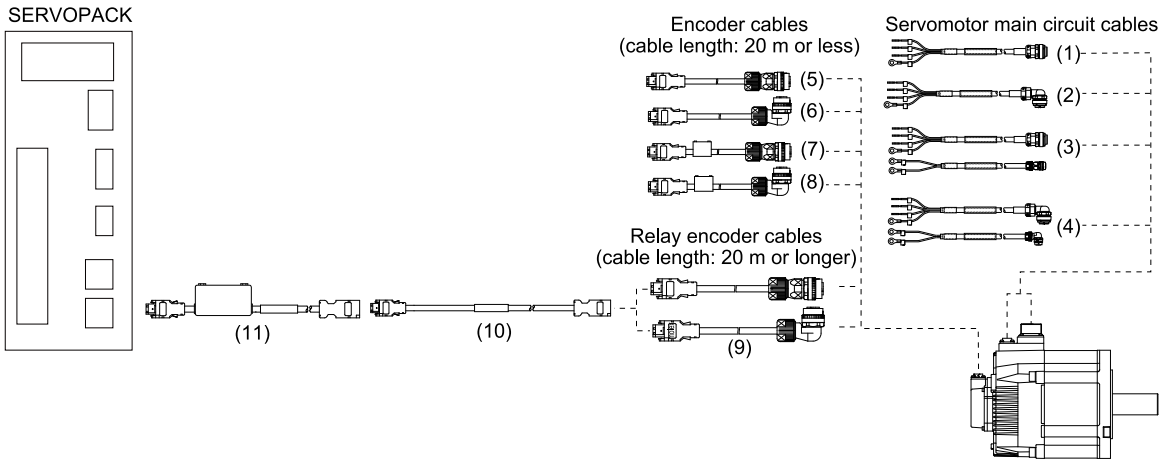
*3 In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

*4 In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

(2) SGMXG-09A□A to -1EA□A (850 W, 15 kW)



Note:

If the encoder cable length exceeds 20 m, connect by combining the following cables as shown in (9) to (11) in the above figure.

- Relay encoder cables
- Relay encoder cables with connectors on both ends
- Relay encoder cables with connectors on both ends and battery unit

No.	Cable Type				Reference
(1) to (4)	Servomotor main circuit cables *1	Finished product	For servomotors without holding brakes	Straight plug	198
				Right-angle plug *2	
			For servomotors with holding brakes	Straight plug	201
				Right-angle plug *2	
		Fabrication	Connectors		208
			Cables without connectors *3		–
(5) to (8)	Encoder cables of 20 m or less	Finished product	For batteryless absolute encoders	Straight plug	218
				Right-angle plug *2	
			For absolute encoders *4	Straight plug	220
				Right-angle plug *2	
		Fabrication			228
(9) to (11)	Relay encoder cables (when exceeds 20 m)	Finished product	Straight plug		224
			Right-angle plug *2		
			Connectors on both ends	–	226
				With battery units *5	227
		Fabrication			228

*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: SGMXG-09A□A to -1EA□A on page 208*

*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 In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

*5 In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

6.2 Servomotor Main Circuit Cables

The servomotor main circuit cable for the standard specification servomotor is same as that for the Σ-7 compatible specification servomotor.

There are two types of servomotor main circuit cables: One for servomotors without holding brakes and one for servomotors with holding brakes.

Information SGMXG servomotors can also use the same cables as Σ-7 series rotary servomotors. However, when using a product that conforms to the IP67 degree of protection, use the cables described in this manual. Refer to the following manual for information on the Σ-7-series for rotary servomotor cables.

Σ-7-Series Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

6.2.1 For Servomotors without Holding Brakes

(1) Selection Table

(a) SGMXG-03A□A, -05A□A (300 W, 450 W)

Servomotor Model	Length (L)	Order Number *1
		Standard (Flexible) Type *2
SGMXG-03A□A, -05A□A 300 W, 450 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 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 A flexible cable is provided for this cable as standard. 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 other lead installation directions.

Note:

If the length of the servomotor main circuit cable exceeds 20 m, the intermittent duty zone in the torque-rotation speed characteristics will become smaller because the voltage drop increases.

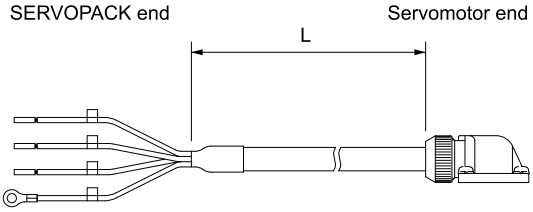
(b) SGMXG-09A□A to 1EA□A (850 W to 15 kW)

Connector Specifications	Servomotor Model	Length (L)	Order Number *1	
			Standard Cable	Flexible Cable *2 *3
Straight Plug	SGMXG-09A□A, -13A□A 850 W, 1.3 kW	3 m, 5 m, 10 m, 15 m, 20 m	JWSP-XM15NSS-□□	JWSP-XM15NFS-□□
	SGMXG-20A□A 1.8 kW		JWSP-XM20NSS-□□	JWSP-XM20NFS-□□
	SGMXG-30A□A 2.9 kW (when used in combination with the SGDXS-200A)		JWSP-XM30NSS-□□	JWSP-XM30NFS-□□
	SGMXG-30A□A, -44A□A 2.9 kW, 4.4 kW		JWSP-XM40NSS-□□	JWSP-XM40NFS-□□
	SGMXG-55A□A, -75A□A 5.5 kW, 7.5 kW		JWSP-XM55NSS-□□	JWSP-XM55NFS-□□
	SGMXG-1AA□A, -1EA□A 11 kW, 15 kW		–	JWSP-XM1ANFS-□□
Right-Angle Plug *4	SGMXG-09A□A, -13A□A 850 W, 1.3 kW		JWSP-XM15NSL-□□	JWSP-XM15NFL-□□
	SGMXG-20A□A 1.8 kW		JWSP-XM20NSL-□□	JWSP-XM20NFL-□□
	SGMXG-30A□A 2.9 kW (when used in combination with the SGDXS-200A)		JWSP-XM30NSL-□□	JWSP-XM30NFL-□□
	SGMXG-30A□A, -44A□A 2.9 kW, 4.4 kW		JWSP-XM40NSL-□□	JWSP-XM40NFL-□□
	SGMXG-55A□A, -75A□A 5.5 kW, 7.5 kW		JWSP-XM55NSL-□□	JWSP-XM55NFL-□□
	SGMXG-1AA□A, -1EA□A 11 kW, 15 kW		–	JWSP-XM1ANFL-□□

*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.

(2) Appearance

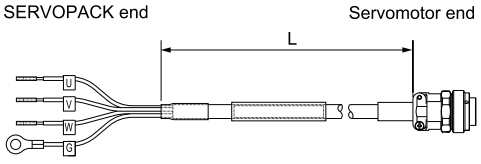
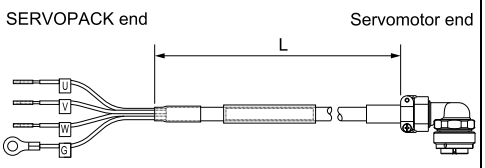
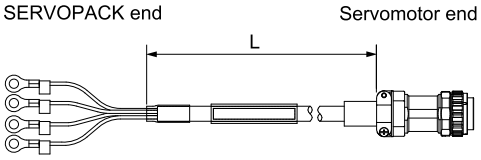
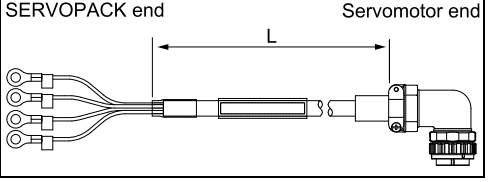
(a) SGMXG-03A□A, -05A□A (300 W, 450 W)



Note:

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

(b) SGMXG-09A□A to 1EA□A (850 W to 15 kW)

Servomotor Model	Straight Plug Connector	Right-Angle Plug *1
SGMXG-09A□A, -13A□A 850 W, 1.3 kW		
SGMXG-20A□A to -1EA□A 1.8 kW, 15 kW		

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

(3) Wiring Specifications

(a) SGMXG-03A□A, -05A□A (300 W, 450 W)

SERVOPACK leads

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

Servomotor connector

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

(b) SGMXG-09A□A to 1EA□A (850 W to 15 kW)

Standard Cable

SERVOPACK leads

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

Servomotor main circuit cable connector

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

Flexible Cable

SERVOPACK leads

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

Servomotor main circuit cable connector

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

6.2.2 For Servomotors with Holding Brakes

(1) Selection Table

(a) SGMXG-03A□A, -05A□A (300 W, 450 W)

Servomotor Model	Length (L)	Order Number *1
		Flexible Cable *2
SGMXG-03A□A, -05A□A 300 W, 450 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 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 A flexible cable is provided for this cable as standard. 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 other lead installation directions.

Note:

If the length of the servomotor main circuit cable exceeds 20 m, the intermittent duty zone in the torque-rotation speed characteristics will become smaller because the voltage drop increases.

(b) SGMXG-09A□A to 1EA□A (850 W to 15 kW)

Connector Specifications	Servomotor Model	Length (L)	Order Number *1 *2	
			Standard Cable	Flexible Cable *3 *4
Straight Plug	SGMXG-09A□A, -13A□A 850 W, 1.3 kW	3 m, 5 m, 10 m, 15 m, 20 m	JWSP-XM15BSS-□□	JWSP-XM15BFS-□□
	SGMXG-20A□A 1.8 kW		JWSP-XM20BSS-□□	JWSP-XM20BFS-□□
	SGMXG-30A□A 2.9 kW (when used in combination with the SGDXS-200A)		JWSP-XM30BSS-□□	JWSP-XM30BFS-□□
	SGMXG-30A□A, -44A□A 2.9 kW, 4.4 kW		JWSP-XM40BSS-□□	JWSP-XM40BFS-□□
	SGMXG-55A□A, -75A□A 5.5 kW, 7.5 kW		JWSP-XM55BSS-□□	JWSP-XM55BFS-□□
	SGMXG-1AA□A, -1EA□A 11 kW, 15 kW		–	JWSP-XM1ABFS-□□
Right-Angle Plug *5	SGMXG-09A□A, -13A□A 850 W, 1.3 kW		JWSP-XM15BSL-□□	JWSP-XM15BFL-□□
	SGMXG-20A□A 1.8 kW		JWSP-XM20BSL-□□	JWSP-XM20BFL-□□
	SGMXG-30A□A 2.9 kW (when used in combination with the SGDXS-200A)		JWSP-XM30BSL-□□	JWSP-XM30BFL-□□
	SGMXG-30A□A, -44A□A 2.9 kW, 4.4 kW		JWSP-XM40BSL-□□	JWSP-XM40BFL-□□
	SGMXG-55A□A, -75A□A 5.5 kW, 7.5 kW		JWSP-XM55BSL-□□	JWSP-XM55BFL-□□
	SGMXG-1AA□A, -1EA□A 11 kW, 15 kW		–	JWSP-XM1ABFL-□□

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

*2 These are the order numbers for two-cable sets (main power supply cable + holding brake cable).
To order the cables separately, the order number for a single main power supply cable is identical to that for the cable for servomotors without holding brakes.
The order numbers for single cables for servomotors with holding brakes are as follows. A flexible cable is provided for this cable as standard.

- Straight plug: JWSP-XB0FS-□□
- Right-angle plug: JWSP-XB0FL-□□

Note:

If you prefer a cable length from 20 m to 50 m, specify the length by taking into account the following operating conditions.

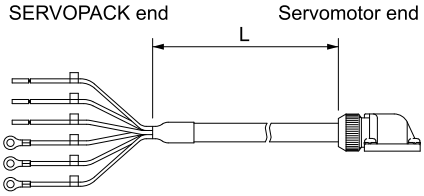
*3 Use flexible cables for moving parts of machines, such as robots.

*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.

(2) Appearance

(a) SGMXG-03A□A, -05A□A (300 W, 450 W)

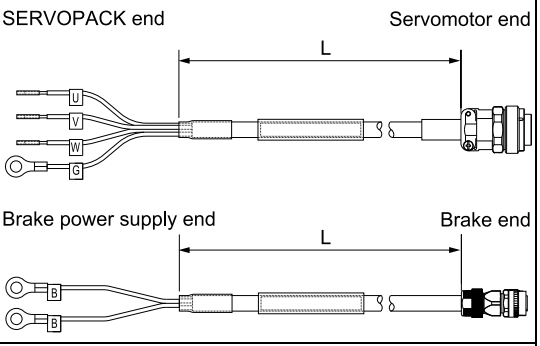
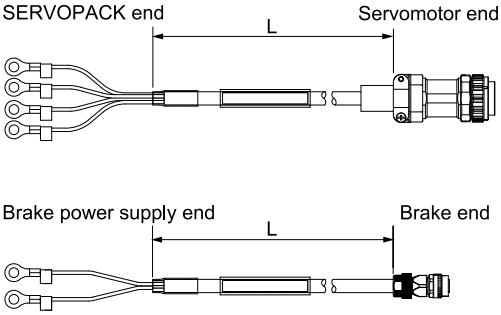


Note:

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

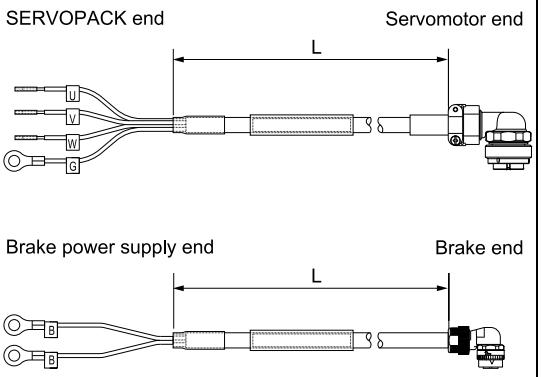
(b) SGMXG-09A□A to 1EA□A (850 W to 15 kW)

- Straight Plug

Servomotor Model	Order Numbers of Main Power Supply Cable and Holding Brake Cable	Individual Cable Order Numbers *1	Appearance
SGMXG-09A□A, -13A□A 850 W, 1.3 kW	Standard cable: JWSP-XM15BSS-□□ Flexible cable: JWSP-XM15BFS-□□	– Main circuit power supply cable Standard cable: JWSP-XM15NSS-□□ Flexible cable: JWSP-XM15NFS-□□ – Holding brake cable JWSP-XB0FS-□□	
SGMXG-20A□A 1.8 kW	Standard cable: JWSP-XM20BSS-□□ Flexible cable: JWSP-XM20BFS-□□	– Main circuit power supply cable Standard cable: JWSP-XM20NSS-□□ Flexible cable: JWSP-XM20NFS-□□ – Holding brake cable JWSP-XB0FS-□□	
SGMXG-30A□A 2.9 kW (when used in combination with the SGDXS-200A)	Standard cable: JWSP-XM30BSS-□□ Flexible cable: JWSP-XM30BFS-□□	– Main circuit power supply cable Standard cable: JWSP-XM30NSS-□□ Flexible cable: JWSP-XM30NFS-□□ – Holding brake cable JWSP-XB0FS-□□	
SGMXG-30A□A, -44A□A 2.9 kW, 4.4 kW	Standard cable: JWSP-XM40BSS-□□ Flexible cable: JWSP-XM40BFS-□□	– Main circuit power supply cable Standard cable: JWSP-XM40NSS-□□ Flexible cable: JWSP-XM40NFS-□□ – Holding brake cable JWSP-XB0FS-□□	
SGMXG-55A□A, -75A□A 5.5 kW, 7.5 kW	Standard cable: JWSP-XM55BSS-□□ Flexible cable: JWSP-XM55BFS-□□	– Main circuit power supply cable Standard cable: JWSP-XM55NSS-□□ Flexible cable: JWSP-XM55NFS-□□ – Holding brake cable JWSP-XB0FS-□□	
SGMXG-1AA□A, -1EA□A 11 kW, 15 kW	Flexible cable: JWSP-XM1ABFS-□□	– Main circuit power supply cable Flexible cable: JWSP-XM1ANFS-□□ – Holding brake cable JWSP-XB0FS-□□	

*1 Flexible cables are provided as a standard for holding brake cables.

- Right-Angle Plug
  The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

Servomotor Model	Order Numbers of Main Power Supply Cable and Holding Brake Cable	Individual Cable Order Numbers *1	Appearance
SGMXG-09A□A, -13A□A 850 W, 1.3 kW	Standard cable: JWSP-XM15BSL-□□ Flexible cable: JWSP-XM15BFL-□□	– Main circuit power supply cable Standard cable: JWSP-XM15NSL-□□ Flexible cable: JWSP-XM15NFL-□□ – Holding brake cable JWSP-XB0FL-□□	
SGMXG-20A□A 1.8 kW	Standard cable: JWSP-XM20BSL-□□ Flexible cable: JWSP-XM20BFL-□□	– Main circuit power supply cable Standard cable: JWSP-XM20NSL-□□ Flexible cable: JWSP-XM20NFL-□□ – Holding brake cable JWSP-XB0FL-□□	
SGMXG-30A□A 2.9 kW (when used in combination with the SGDXS-200A)	Standard cable: JWSP-XM30BSL-□□ Flexible cable: JWSP-XM30BFL-□□	– Main circuit power supply cable Standard cable: JWSP-XM30NSL-□□ Flexible cable: JWSP-XM30NFL-□□ – Holding brake cable JWSP-XB0FL-□□	
SGMXG-30A□A, -44A□A 2.9 kW, 4.4 kW	Standard cable: JWSP-XM40BSL-□□ Flexible cable: JWSP-XM40BFL-□□	– Main circuit power supply cable Standard cable: JWSP-XM40NSL-□□ Flexible cable: JWSP-XM40NFL-□□ – Holding brake cable JWSP-XB0FL-□□	
SGMXG-55A□A, -75A□A 5.5 kW, 7.5 kW	Standard cable: JWSP-XM55BSL-□□ Flexible cable: JWSP-XM55BFL-□□	– Main circuit power supply cable Standard cable: JWSP-XM55NSL-□□ Flexible cable: JWSP-XM55NFL-□□ – Holding brake cable JWSP-XB0FL-□□	
SGMXG-1AA□A, -1EA□A 11 kW, 15 kW	Flexible cable: JWSP-XM1ABFL-□□	– Main circuit power supply cable Flexible cable: JWSP-XM1ANFL-□□ – Holding brake cable JWSP-XB0FL-□□	

*1 Flexible cables are provided as a standard for holding brake cables.

(3) Wiring Specifications

(a) SGMXG-03A□A, -05A□A (300 W, 450 W)

SERVOPACK leads

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

Servomotor connector

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

Note:

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

(b) SGMXG-09A□A to 1EA□A (850 W to 15 kW)

Standard Type

SERVOPACK leads

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

Servomotor main circuit cable connector

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

Flexible Type

SERVOPACK leads

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

Servomotor main circuit cable connector

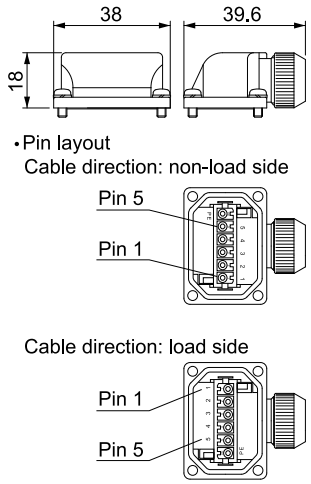
Signal	Pin
FG	D
Phase U	A
Phase V	B
Phase W	C
Brake	1
Brake	2

Note:

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

6.3 User-Assembled Wiring Materials for Servomotor Main Circuit Cables: SGMXG-03A□A, -05A□A

6.3.1 Servomotor Connector Kits

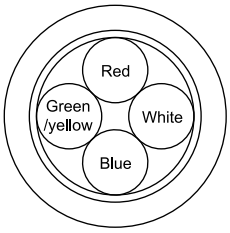
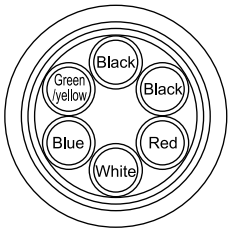
Item		Description	External Dimensions [mm]
Order Number		JZSP-CVM9-1-E	
Manufacturer		Japan Aviation Electronics Industry, Ltd.	
Instructions		JAHL-50020	
Components	Plug	JNYFX06SJ3	
	Contacts	ST-TMH-S-C1B	
Applicable Wire Sizes		AWG18 to AWG22	
Applicable Cable Diameter		6.9 mm to 8.3 mm	
Outer Diameter of Insulating Sheath		1.3 mm to 1.8 mm	
Mounting Screws		M3 pan-head screws	
Crimping Tool *1	Hand Tool	CT170-14-TMH5B	

*1 A crimping tool is required. Contact the connector manufacturer for details.

Note:

Cables are not included. Purchase them separately.

6.3.2 Cables without Connectors

Item	For Servomotors without Holding Brakes (4 Leads)	For Servomotors with Holding Brakes (6 Leads)
Order Number *1	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 mm²) Outer diameter of insulating sheath: 1.77 mm	Power lines: AWG20 (0.52 mm²) Outer diameter of insulating sheath: 1.77 mm
	-	Holding brake lines: AWG20 (0.52 mm²) 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		

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

Note:

Flexible type wiring materials.

6.4 User-Assembled Wiring Materials for Servomotor Main Circuit Cables: SGMXG-09A□A to -1EA□A

The servomotor main circuit cable for the standard specification servomotor is same as that for the Σ-7 compatible specification servomotor.

If you need standard-structure servomotor connectors, consult your Yaskawa representative.

To fabricate the cables, refer to this section.

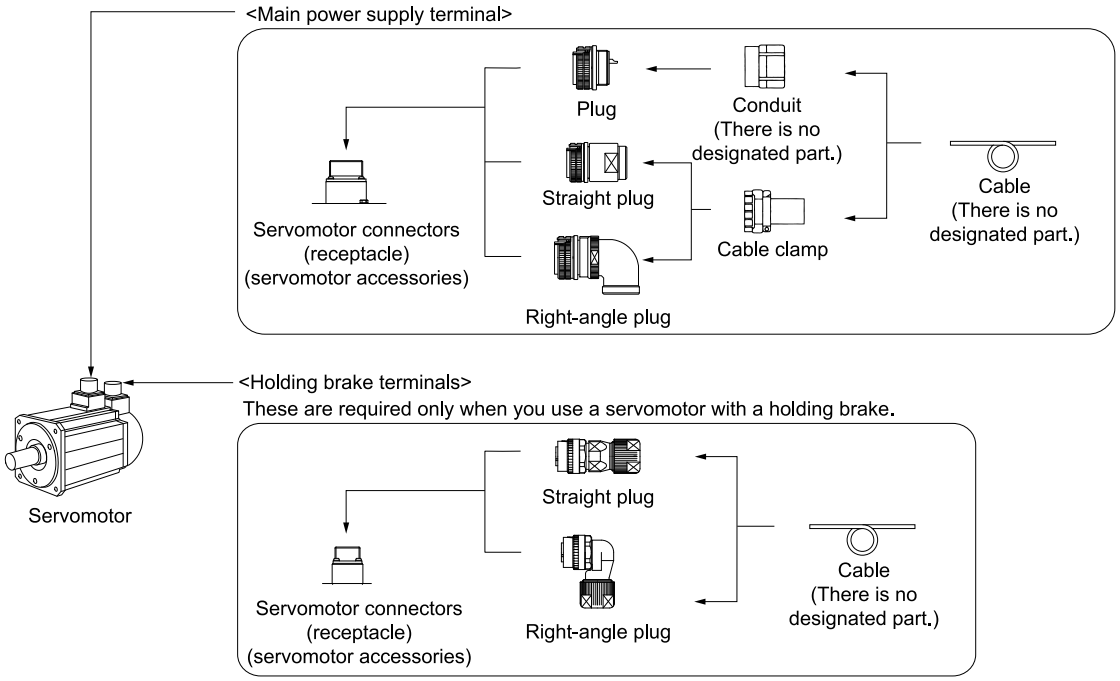
To purchase cables with connectors, refer to the following section.

☞ *6.2 Servomotor Main Circuit Cables on page 198*

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 Configurations



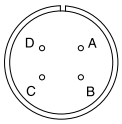
The references for each terminal are shown in the following table.

Item	Reference
Main Power Supply Terminal	☞ *6.4.2 Main Power Supply Terminal on page 209*
Holding Brake Terminals	☞ *6.4.3 Holding Brake Terminals on page 211*

6.4.2 Main Power Supply Terminal

(1) Servomotor Connector (Receptacle)

This connector is an accessory to the servomotor.

Servomotor Model	Capacity	Servomotor Connector Models	Connector Surface
SGMXG-09A□A SGMXG-13A□A SGMXG-20A□A	850 W to 1.8 kW	JL10-2E18-10PCE (MS connector model: MS3102A18-10P)	
SGMXG-30A□A SGMXG-44A□A	2.9 kW to 4.4 kW	JL10-2E22-22PCE (MS connector model: MS3102A22-22P)	
SGMXG-55A□A SGMXG-75A□A SGMXG-1AA□A SGMXG-1EA□A	5.5 kW to 15 kW	JL10-2E32-17PCE (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.

(2) 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.

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

Servomotor Model	Capacity	Order Number			Manufacturer
		Plug		Cable Clamp	
SGMXG-09A□A SGMXG-13A□A SGMXG-20A□A	850 W to 1.8 kW	Straight	D/MS3106B18-10S	D/MS3057-10A	Fujikura Ltd.
			N/MS3106B18-10S	N/MS3057-10A	Japan Aviation Electronics Industry, Ltd.
		Right-angle	D/MS3108B18-10S	D/MS3057-10A	Fujikura Ltd.
			N/MS3108B18-10S	N/MS3057-10A	Japan Aviation Electronics Industry, Ltd.
SGMXG-30A□A SGMXG-44A□A	2.9 kW to 4.4 kW	Straight	D/MS3106B22-22S	D/MS3057-12A	Fujikura Ltd.
			N/MS3106B22-22S	N/MS3057-12A	Japan Aviation Electronics Industry, Ltd.
		Right-angle	D/MS3108B22-22S	D/MS3057-12A	Fujikura Ltd.
			N/MS3108B22-22S	N/MS3057-12A	Japan Aviation Electronics Industry, Ltd.
SGMXG-55A□A SGMXG-75A□A SGMXG-1AA□A SGMXG-1EA□A	5.5 kW to 15 kW	Straight	D/MS3106B32-17S	D/MS3057-20A	Fujikura Ltd.
			N/MS3106B32-17S	N/MS3057-20A	Japan Aviation Electronics Industry, Ltd.
		Right-angle	D/MS3108B32-17S	D/MS3057-20A	Fujikura Ltd.
			N/MS3108B32-17S	N/MS3057-20A	Japan Aviation Electronics Industry, Ltd.

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

Servomotor Model	Capacity	Order Number			Manufacturer
		Plug *1		Cable Clamp *2 *3	
SGMXG-09A□A SGMXG-13A□A SGMXG-20A□A	850 W to 1.8 kW	Single	JL10-6A18-10SE (One-touch mating) JL04V-6A18-10SE (Screw mating)	Not required.	Japan Aviation Electronics Industry, Ltd.
		Straight	JL10-6A18-10SE-EB (One-touch mating) JL04V-6A18-10SE-EB (Screw mating)	JL04-18CK(07)-RK JL04-18CK(10)-R JL04-18CK(13)-R	
		Right-angle	JL10-8A18-10SE-EB (One-touch mating) JL04V-8A18-10SE-EBH (Screw mating)	JL04-18CK(07)-RK JL04-18CK(10)-R JL04-18CK(13)-R	
SGMXG-30A□A SGMXG-44A□A	2.9 kW to 4.4 kW	Single	JL10-6A22-22SE (One-touch mating) JL04V-6A22-22SE (Screw mating)	Not required.	
		Straight	JL10-6A22-22SE-EB1 (One-touch mating) JL04V-6A22-22SE-EB1 (Screw mating)	JL04-2428CK(11)-R JL04-2428CK(14)-R JL04-2428CK(17)-R JL04-2428CK(20)-R	
		Right-angle	JL10-8A22-22SE-EB1 (One-touch mating) JL04V-8A22-22SE-EB1H (Screw mating)	JL04-2428CK(11)-R JL04-2428CK(14)-R JL04-2428CK(17)-R JL04-2428CK(20)-R	
SGMXG-55A□A SGMXG-75A□A SGMXG-1AA□A SGMXG-1EA□A	5.5 kW to 15 kW	Single	JL10-6A32-17SE (One-touch mating) JL04V-6A32-17SE (Screw mating)	Not required.	
		Straight	JL10-6A32-17SE-EB (One-touch mating) JL04V-6A32-17SE-EB (Screw mating)	JL04-32CK(24)-RK	
		Right-angle	JL10-8A32-17SE-EB (One-touch mating) Contact the manufacturer for screw mating types.	JL04-32CK(24)-RK	

*1 If there is concern about the effect of vibrations on the equipment, use of the JL04V (screw mating) is recommended.
*2 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.
*3 The applicable cable diameters of the cable clamps are as follows.

Order Number	Applicable Cable Diameter [mm]
JL04-18CK(07)-RK	5 to 8
JL04-18CK(10)-R	8 to 11
JL04-18CK(13)-R	11 to 14.1
JL04-2428CK(11)-R	9 to 12
JL04-2428CK(14)-R	12 to 15

Continued on next page.

Continued from previous page.

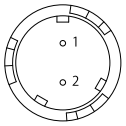
Order Number	Applicable Cable Diameter [mm]
JL04-2428CK(17)-R	15 to 18
JL04-2428CK(20)-R	18 to 20
JL04-32CK(24)-RK	22 to 25

6.4.3 Holding Brake Terminals

These are required only when you use a servomotor with a holding brake.

(1) Servomotor Connector (Receptacle)

This connector is an accessory to the servomotor.

Servomotor Model	Capacity	Servomotor Connector Models	Connector Surface
SGMXG-09A□A SGMXG-13A□A SGMXG-20A□A SGMXG-30A□A SGMXG-44A□A SGMXG-55A□A SGMXG-75A□A SGMXG-1AA□A SGMXG-1EA□A	850 W to 15 kW	CMV1Y-R2P-0(F)	

(2) Cable-Side Connectors (Plug)

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

Servomotor Model	Capacity	Order Number *1 *2		Applicable Cable Diameter (Reference)	Manufacturer
SGMXG-09A□A SGMXG-13A□A SGMXG-20A□A SGMXG-30A□A SGMXG-44A□A SGMXG-55A□A SGMXG-75A□A SGMXG-1AA□A SGMXG-1EA□A	850 W to 15 kW	Straight	CMV1-SP2S-S (One-touch mating) CMV1S-SP2S-S (Screw mating)	4.0 mm to 6.0 mm	Fujikura Ltd.
			CMV1-SP2S-M1 (One-touch mating) CMV1S-SP2S-M1 (Screw mating)	5.5 mm to 7.5 mm	
			CMV1-SP2S-M2 (One-touch mating) CMV1S-SP2S-M2 (Screw mating)	7.0 mm to 9.0 mm	
			CMV1-SP2S-L (One-touch mating) CMV1S-SP2S-L (Screw mating)	9.0 mm to 11.6 mm	
		Right-angle	CMV1-AP2S-S (One-touch mating) CMV1S-AP2S-S (Screw mating)	4.0 mm to 6.0 mm	
			CMV1-AP2S-M1 (One-touch mating) CMV1S-AP2S-M1 (Screw mating)	5.5 mm to 7.5 mm	
			CMV1-AP2S-M2 (One-touch mating) CMV1S-AP2S-M2 (Screw mating)	7.0 mm to 9.0 mm	
			CMV1-AP2S-L (One-touch mating) CMV1S-AP2S-L (Screw mating)	9.0 mm to 11.6 mm	

*1 If there is concern about the effect of vibrations on the equipment, use of the CMV1S (screw mating) is recommended.

*2 This order number is compatible with the CM10 series order number used in the Σ-7 series.
For details on the CM10 series order numbers, refer to the following manual.

Σ-7-Series Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

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

JZSP-CVB9-S M S2-E

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

*1 Crimping tool: A 357J-53164T from Fujikura Ltd. is required.

• Other connector specifications

Item	Specification
Contact Models	■ Loose Contacts (100 per bag) – Crimped contacts: CMV1-#22BSC-C3-100 Wire size: AWG16 to AWG20, outer diameter of insulating sheath: 1.87 mm to 2.45 mm Manual crimping tool: 357J-53164T – Soldered contacts: CMV1-#22BSC-S2-100 Wire size: AWG16 max., outer diameter of insulating sheath: 3 mm max. ■ Reeled Contacts (4,000 per reel) Crimped contacts: CMV1-#22BSC-C3-4000 Wire size: AWG16 to AWG20, outer diameter of insulating sheath: 1.87 mm to 2.45 mm Semi-automatic crimping tool: AP-A53210T-A (set), AP-A53210T (applicator) **Note:** The semi-automatic tool set includes the press and applicator (crimper).

Note:

Purchase the contact pins separately. Consider the wiring type and the applicable wire size when you select the contact pins.

6.4.4 Connector External Dimensions

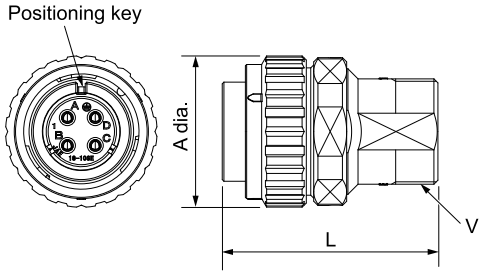
The external dimensions of connectors compliant with an IP67 protective structure and European safety standard compliant type are shown below.

Select the connector model by referring to the following sections for information on the standard environment type connector.

☞ *(a) Standard Environment Type: Cable-Side Connectors (Plug) on page 209*

(1) Main Power Supply Terminal

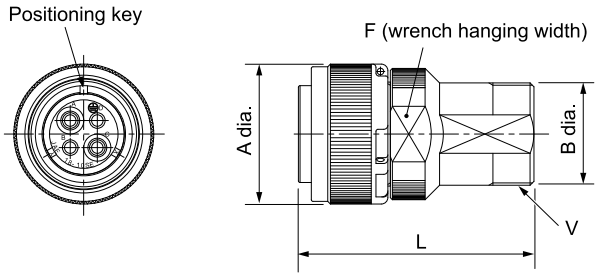
(a) Straight Plug: One-Touch Mating (from Japan Aviation Electronics Industry, Ltd.)



Unit: mm

Model	Shell Size	Connecting Nut Outer Diameter A ± 0.8 Dia.	Total Length L ± 0.8	Cable Clamp Mounting Screws V
JL10-6A18-10SE-EB	18	35.85	51.05	1-20UNEF-2A
JL10-6A22-22SE-EB1	22	42.2	74.35	1-7/16-18UNEF-2A
JL10-6A32-17SE-EB	32	58.6	99.6	1-3/4-18UNS-2A

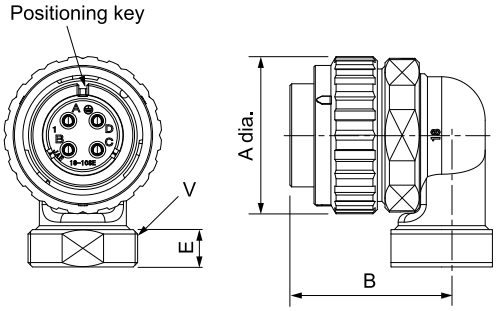
(b) Straight Plug: Screw Mating (from Japan Aviation Electronics Industry, Ltd.)



Unit: mm

Model	Shell Size	Connecting Nut Outer Diameter A ± 0.8 Dia.	B Dia.	Total Length L ± 0.8	F ± 0.5	Cable Clamp Mounting Screws V
JL04V-6A18-10SE-EB	18	34.1	25	57.4	29	1-20UNEF-2A
JL04V-6A22-22SE-EB1	22	40.5	36.4	78	35	1-7/16-18UNEF-2A
JL04V-6A32-17SE-EB	32	56.3	44	105.9	51	1-3/4-18UNS-2A

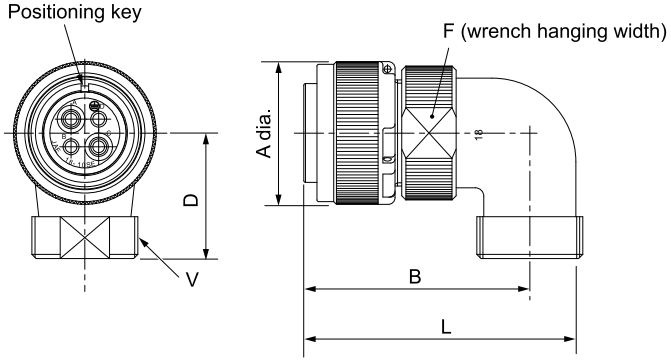
(c) Right-Angle Plug: One-Touch Mating (from Japan Aviation Electronics Industry, Ltd.)



Unit: mm

Model	Shell Size	Connecting Nut Outer Diameter A ± 0.8 Dia.	B ± 0.8	E ± 0.5	Cable Clamp Mounting Screws V
JL10-8A18-10SE-EB	18	35.85	34.55	8.5	1-20UNEF-2A
JL10-8A22-22SE-EB1	22	42.2	51.6	10	1-7/16-18UNEF-2A
JL10-8A32-17SE-EB	32	58.6	66.9	10	1-3/4-18UNS-2A

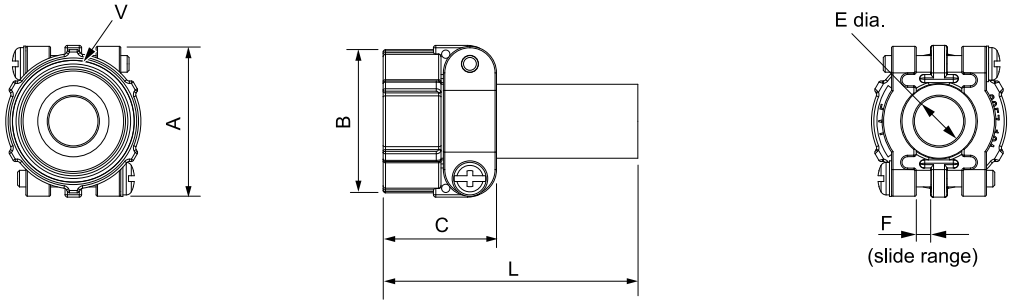
(d) Right-Angle Plug: Screw Mating (from Japan Aviation Electronics Industry, Ltd.)



Unit: mm

Model	Shell Size	Connecting Nut Outer Diameter A ± 0.8 Dia.	B ± 0.8	Total Length L ± 0.8	D ± 0.8	F ± 0.5	Cable Clamp Mounting Screws V
JL04V-8A18-10SE-EBH	18	34.1	54	65.6	30	32	1-20UNEF-2A
JL04V-8A22-22SE-EB1H	22	40.5	59	76.2	42	38	1-7/16-18UNEF-2A

(e) Cable Clamp (from Japan Aviation Electronics Industry, Ltd.)

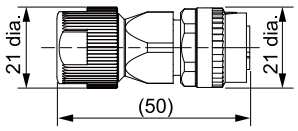
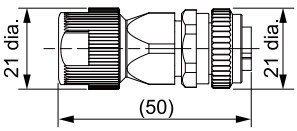


Unit: mm

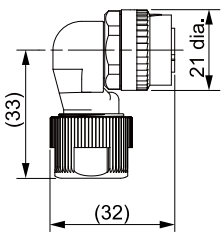
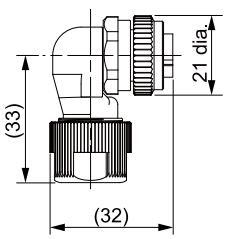
Model	A ± 0.8	Outer Diameter B ± 0.8	C ± 0.3	Total Length L ± 0.3	Bushing Inner Diameter E ± 0.3 Dia.	F	Mounting Screws V	Applicable Cable Diameter (Reference)
JL04-18CK(07)-RK	31.8	30.2	24.1	53.8	8	3.2	1-20UNEF-2B	5 to 8
JL04-18CK(10)-R					11			8 to 11
JL04-18CK(13)-R					14.1			11 to 14.1
JL04-2428CK(11)-R	42.9	42.1	26.2	56.2	12	4.8	1-7/16-18UNEF-2B	9 to 12
JL04-2428CK(14)-R					15			12 to 15
JL04-2428CK(17)-R					18			15 to 18
JL04-2428CK(20)-R					21			18 to 20
JL04-32CK(24)-RK	51.6	51.6	27.8	57.8	25	6.4	1-3/4-18UNS-2B	22 to 25

(2) Holding Brake Terminals (from Fujikura Ltd.)

- Straight Plug

CMV1-SP2S-□□ (One-touch mating)	CMV1S-SP2S-□□S (Screw mating)
	

- Right-Angle Plug

CMV1-AP2S-□□ (One-touch mating)	CMV1S-AP2S-□□ (Screw mating)
	

6.5 Encoder Cables (When Not Relaying the Encoder Cable)

The encoder cable for the standard specification servomotor is different than that for the Σ-7 compatible specification servomotor.

6.5.1 For Standard Specification Servomotors

There are two types of encoder cables that are used with standard specification servomotors: One for batteryless absolute encoders and one for absolute encoders.

(1) For Batteryless Absolute Encoders

(a) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Left side	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JWSP-XP2IS1-□□	JWSP-XP2IF1-□□
Right side		JWSP-XP2IS2-□□	JWSP-XP2IF2-□□

*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 46 mm or larger.

Note:

The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.

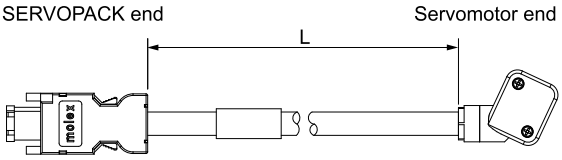
You cannot relay cables by connecting JZSP-UCMP00-□□-E or JZSP-CSP12-E cables.

Information A cable installation direction on the right side or left side refers to the cable installation direction when viewed from the connector side with the shaft at the top.

Refer to the following section for details on the cable installation direction.

☞ *6.1.1 For Standard Specification Servomotors on page 193*

(b) Appearance



(c) Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Shield wire

Servomotor end

Pin	Wire Color
5	Light blue
4	Red
7	Gray
3	Brown
6	Black
2	Orange
8	–
9	–
Shell	FG

(2) For Absolute Encoders

These cables are equipped with a battery unit. (A battery is included.)

Note:

In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

(a) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Left side	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JWSP-XP2AS1-□□	JWSP-XP2AF1-□□
Right side		JWSP-XP2AS2-□□	JWSP-XP2AF2-□□

*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 46 mm or larger.

Note:

The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.

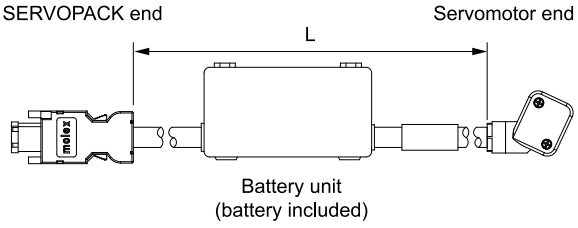
You cannot relay cables by connecting JZSP-UCMP00-□□-E or JZSP-CSP12-E cables.

Information A cable installation direction on the right side or left side refers to the cable installation direction when viewed from the connector side with the shaft at the top.

Refer to the following section for details on the cable installation direction.

☞ *6.1.1 For Standard Specification Servomotors on page 193*

(b) Appearance



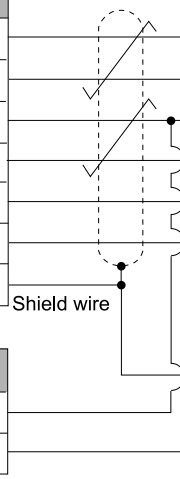
(c) Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Battery unit

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



Servomotor end

Pin	Wire Color
5	Light blue
4	Red
7	Gray
3	Brown
6	Black
2	Orange
8	–
9	–
Shell	FG

6.5.2 Servomotors with Σ-7 Compatible Specifications (20 m or Less)

There are two types of encoder cables that are used with Σ-7 compatible specification servomotors: One for batteryless absolute encoders and one for absolute encoders.

Information Σ-7 compatible specification servomotors can also use the same cables as Σ-7 series rotary servomotors. Refer to the following manual for information on the Σ-7-series for rotary servomotor cables.

Σ-7-Series Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

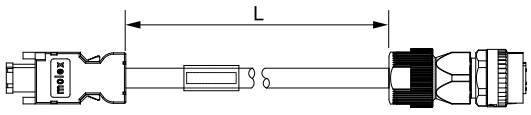
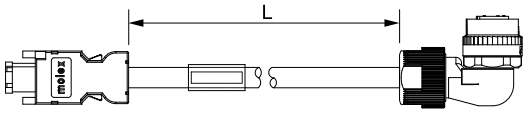
(1) Encoder Cables for Batteryless Absolute Encoders

(a) Selection Table

Connector Specifications	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Straight plug	3 m, 5 m, 10 m, 15 m, 20 m	JWSP-XPISS-□□	JWSP-XPIFS-□□
Right-angle plug *4		JWSP-XPISL-□□	JWSP-XPIFL-□□

*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.

(b) Appearance

Straight Plug	Right-Angle Plug *1
SERVOPACK end Servomotor end	SERVOPACK end Servomotor end
	

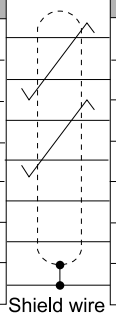
*1 The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

(c) Wiring Specifications

Standard Cable

SERVOPACK end

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



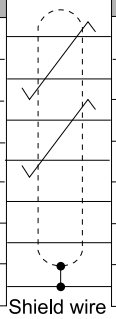
Servomotor end

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

Flexible Cable

SERVOPACK end

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



Servomotor end

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

(2) For Absolute Encoders

These cables are equipped with a battery unit. (A battery is included.)

Note:

In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

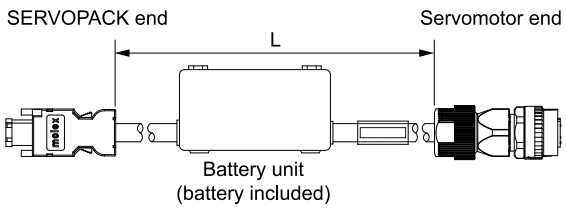
(a) Selection Table

Connector Specifications	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Straight plug	3 m, 5 m, 10 m, 15 m, 20 m	JWSP-XPASS-□□	JWSP-XPAFS-□□
Right-angle plug *4		JWSP-XPASL-□□	JWSP-XPAFL-□□

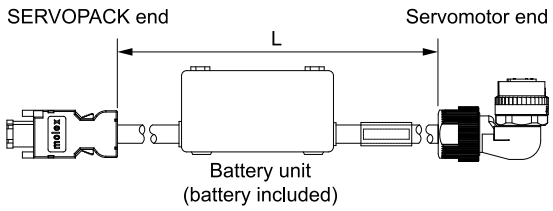
*1 Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.
*4 The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

(b) Appearance

Straight Plug



Right-Angle Plug *1



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

(c) Wiring Specifications

Standard Cable

SERVOPACK end

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

Servomotor end

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

Shield wire

Battery unit

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

Flexible Cable

SERVOPACK end

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

Servomotor end

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

Shield wire

Battery unit

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

6.6 Encoder Cables (When Relaying the Encoder Cable)

The encoder cable for relaying for the standard specification servomotor is different than that for the Σ-7 compatible specification servomotor.

6.6.1 For Standard Specification Servomotors

When you will relay the encoder cable, connect the cables by combining an encoder cable and an encoder cable with connectors on both ends.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

(1) Encoder Cables

(a) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Left side	0.3 m, 1 m, 3 m, 5 m, 10 m, 15 m, 20 m, 25 m, 30 m, 40 m, 50 m	JWSP-XP3IS1-□□	JWSP-XP3IF1-□□
Right side		JWSP-XP3IS2-□□	JWSP-XP3IF2-□□

*1 Replace the boxes (□□) in the order number with the cable length (00P3, 01, 03, 05, 10, 15, 20, 25, 30, 40, or 50).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.

Note:

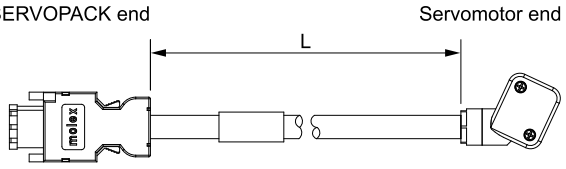
1. When you will relay the encoder cable, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
2. The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.
   You cannot relay cables by combining JZSP-UCMP00-□□-E and JZSP-CSP12-E cables with JWSP-XP1□□□-□□, JWSP-XP2□□□-□□, and JWSP-XP4□□□-□□ cables.

Information A cable installation direction on the right side or left side refers to the cable installation direction when viewed from the connector side with the shaft at the top.

Refer to the following section for details on the cable installation direction.

☞ *6.1.1 For Standard Specification Servomotors on page 193*

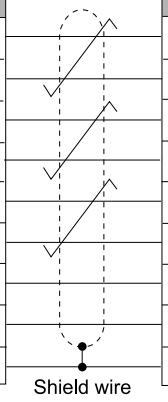
(b) Appearance



(c) Wiring Specifications

SERVOPACK end

Pin	Signal
8	/PS2
7	PS2
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG



Servomotor end

Pin	Wire Color
9	White
8	Yellow
5	Light blue
4	Red
7	Gray
3	Brown
6	Black
2	Orange
Shell	FG

(2) Encoder Cables with Connectors on Both Ends

There are two types of encoder cables with connectors on both ends: One for batteryless absolute encoders and one for absolute encoders.

(a) For Batteryless Absolute Encoders

◆ Selection Table

Length (L)	Order Number *1*	
	Standard Cable	Flexible Cable *2 *3
0.3 m, 3 m, 5 m, 10 m, 15 m, 20 m, 25 m	JWSP-XP1IS0-□□	JWSP-XP1IF0-□□

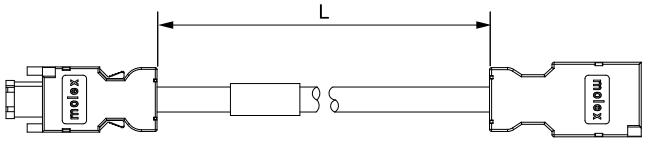
*1 Replace the boxes (□□) in the order number with the cable length (00P3, 03, 05, 10, 15, 20, or 25).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.

Note:

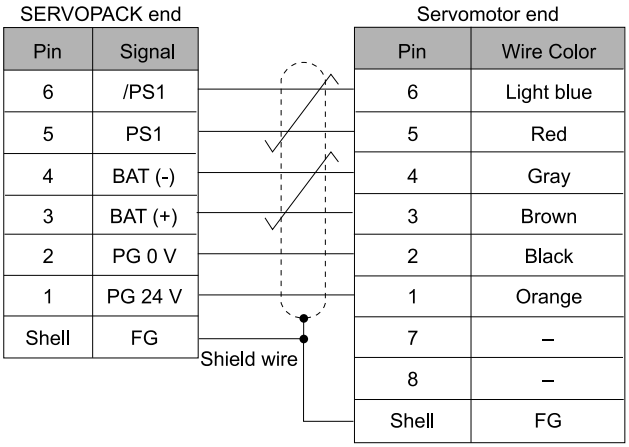
1. When you will relay the encoder cable, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
2. The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.
   You cannot relay cables by combining JZSP-UCMP00-□□-E and JZSP-CSP12-E cables with JWSP-XP1□□□-□□, JWSP-XP2□□□-□□, and JWSP-XP4□□□-□□ cables.

◆ Appearance

SERVOPACK end Servomotor end



◆ Wiring Specifications



Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Pin	Wire Color
6	Light blue
5	Red
4	Gray
3	Brown
2	Black
1	Orange
7	–
8	–
Shell	FG

(b) For Absolute Encoders

These cables are equipped with a battery unit. (A battery is included.)

Note:

In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

◆ Selection Table

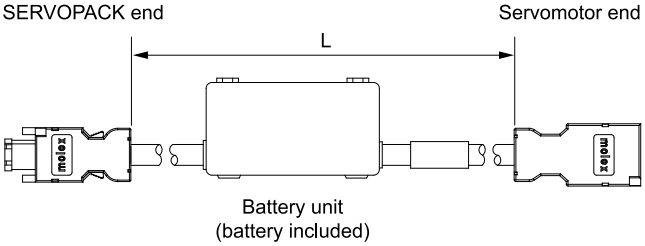
Length (L)	Order Number *1	
	Standard Cable	Flexible Cable *2 *3
0.3 m, 3 m, 5 m, 10 m, 15 m, 20 m, and 25 m	JWSP-XP1AS0-□□	JWSP-XP1AF0-□□

*1 Replace the boxes (□□) in the order number with the cable length (00P3, 03, 05, 10, 15, 20, or 25).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.

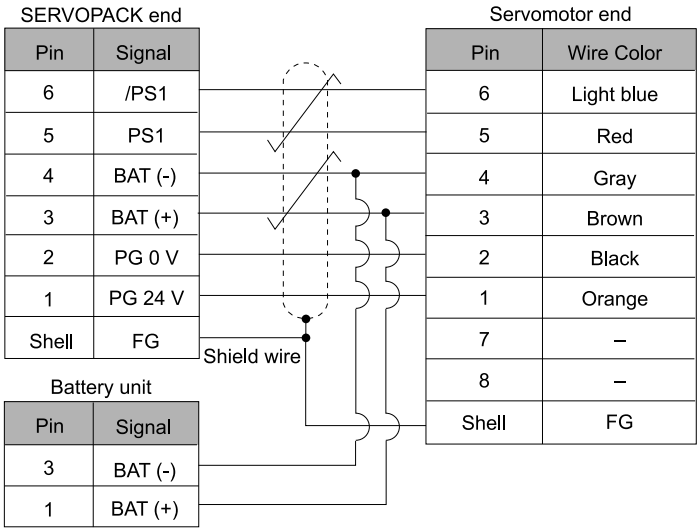
Note:

1. When you will relay the encoder cable, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
2. The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.
   You cannot relay cables by combining JZSP-UCMP00-□□-E and JZSP-CSP12-E cables with JWSP-XP1□□□-□□, JWSP-XP2□□□-□□, and JWSP-XP4□□□-□□ cables.

◆ Appearance



◆ Wiring Specifications



6.6.2 Servomotors with Σ-7 Compatible Specifications (When Exceeding 20 m)

If the encoder cable length exceeds 20 m, use by combining the following cables.

- Relay encoder cables
- Relay encoder cables with connectors on both ends
- Relay encoder cables with connectors on both ends and battery unit *1

*1 In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

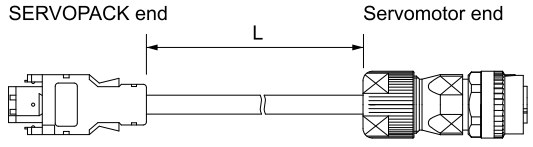
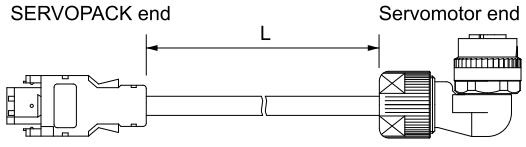
(1) Relay Encoder Cables

(a) Selection Table

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

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

(b) Appearance

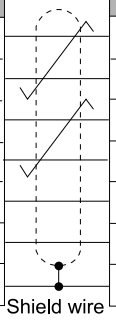
Straight Plug	Right-Angle Plug *1
	

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

(c) Wiring Specifications

SERVOPACK end

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



Servomotor end

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

Note:

BAT (+) and BAT (-) are wired when using an absolute encoder.

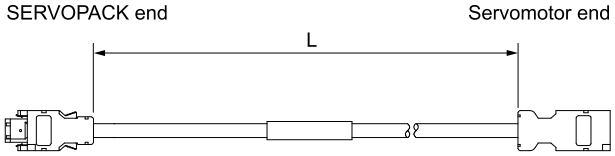
(2) Relay Encoder Cables with Connectors on Both Ends

(a) Selection Table

Specification	Length (L)	Order Number *1
Used for all types of encoders	30 m, 40 m, 50 m	JZSP-UCMP00-□□-E

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

(b) Appearance



(c) Wiring Specifications

SERVOPACK end

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

Shield wire

Servomotor end

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

(3) Relay Encoder Cables with Connectors on Both Ends and Battery Unit

Note:

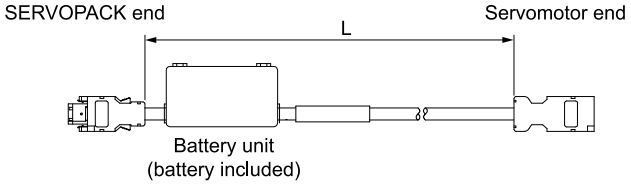
In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

(a) Selection Table

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

(b) Appearance



(c) Wiring Specifications

SERVOPACK end

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

Servomotor end

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

Shield wire

Battery unit

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

6.7 User-Assembled Wiring Materials for Encoder Cables

The wiring materials for user-assembled encoder cables described in this section are used for Σ-7 compatible specification servomotors.

Refer to the following section for details on the user-assembled wiring materials for encoder cables of standard specification servomotors.

☞ *13.6 User-Assembled Wiring Materials for Encoder Cables on page 464*

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

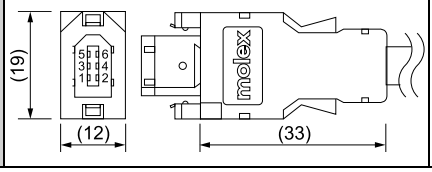
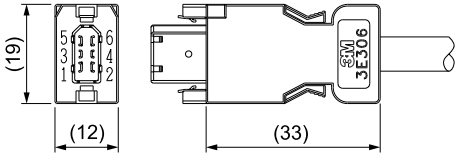
When using encoder cables with a wiring length of 30 m to 50 m, it is necessary to fabricate two different types of cables.

Cables to Be Fabricated	Connectors and Wire Materials Required for Fabrication	Reference	Remarks
Motor-End Relay Encoder Cables	SERVOPACK connector	☞ *6.7.2 SERVOPACK Connector Kits on page 228*	This cable should be 0.3 m or less.
	Servomotor connectors	☞ *6.7.3 Encoder Cable Connector Kits on page 229*	
	Encoder cables of 20 m or less	☞ *6.7.4 Cables without Connectors on page 230*	
SERVOPACK-End Relay Encoder Cables	SERVOPACK connector	☞ *6.7.2 SERVOPACK Connector Kits on page 228*	This cable should be 50 m or less.
	Cable relay connectors	☞ *6.7.3 Encoder Cable Connector Kits on page 229*	
	Relay encoder cable of 30 m to 50 m	☞ *6.7.4 Cables without Connectors on page 230*	

Refer to the following section for details on the connection of the relay encoder cable.

☞ *6.6.2 Servomotors with Σ-7 Compatible Specifications (When Exceeding 20 m) on page 224*

6.7.2 SERVOPACK Connector Kits

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

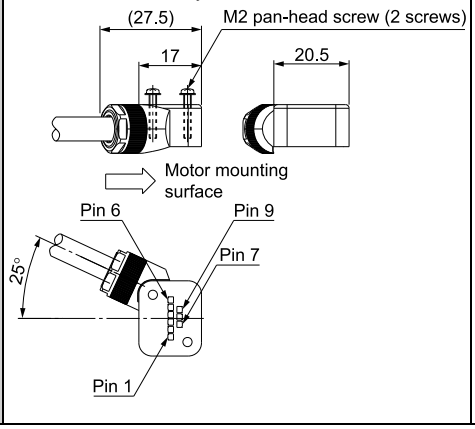
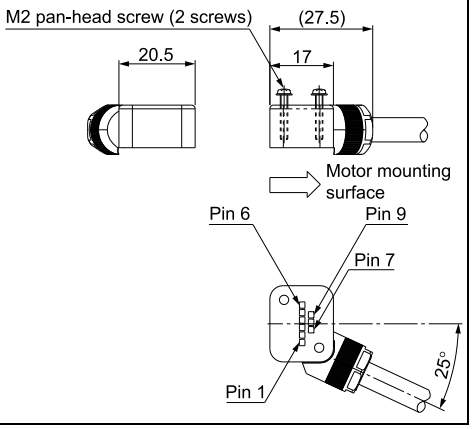
*1 For details, consult your Yaskawa representative. The tool is not provided by Yaskawa.

Note:
Cables are not included. Purchase them separately.

6.7.3 Encoder Cable Connector Kits

(1) Servomotor Connectors

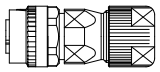
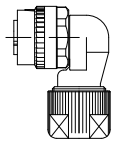
(a) SGMXG-03, -05 (300 W, 450 W)

Order Number		JZSP-C7P9-1-E
Manufacturer		Molex Japan Co., Ltd.
Components		504678-0070 Loose connectors: 56161-8181 (crimped), Reeled: 56161-8081 (crimped)
Applicable Wire Sizes		AWG22 to AWG26
Applicable Cable Diameter		6.3 mm to 7.7 mm
Outer Diameter of Insulating Sheath		1.05 mm to 1.4 mm
Mounting Screws		M2 pan-head screws (two)
Application Specifications		AS-504682
Crimping Specifications		CS-56161
Crimping Tool *1	Hand Tool	638235100
Shell Caulking Tool	Hand Tool	57331-5100
	Hand Press	57331-5200
External Dimensions [mm]		■ Cable Installed away from Load  ■ Cable Installed toward Load 

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

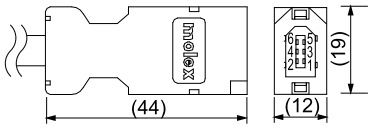
(b) SGMXG-09 to -1E (850 W, 15 kW)

The SGMXG-09 to -1E servomotor connector is compliant with an IP67 protective structure.

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

*1 A crimping tool is required. The model number of the special crimping tool for cables without connectors available from Yaskawa is 357J-52667T. When using other wire sizes, contact the connector manufacturer for crimping tools.

(2) Cable Relay Connectors

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

6.7.4 Cables without Connectors

(1) Encoder cables of 20 m or less

Item	Standard Cable	Flexible Cable
Order Number *1	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

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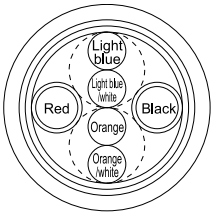
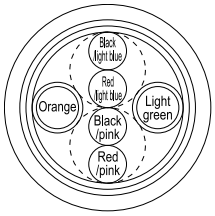
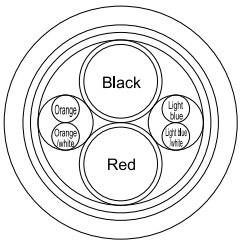
Item	Standard Cable	Flexible Cable
Finished Diameter	6.5 mm	6.8 mm
Internal Structure and Lead Colors		

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

(2) Relay Encoder Cable of 30 m to 50 m

Item	Standard Cable
Order Number *1	JZSP-CMP19-□□-E (maximum length: 50 m)
Specifications	UL20276 (rated temperature: 80°C) AWG16 × 2C + AWG26 × 2P
	AWG16 (1.31 mm²) Outer diameter of insulating sheath: 2.0 mm
	AWG26 (0.13 mm²) Outer diameter of insulating sheath: 0.91 mm
Finished Diameter	6.8 mm
Internal Structure and Lead Colors	

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

6.8 Wiring Precautions

6.8.1 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.

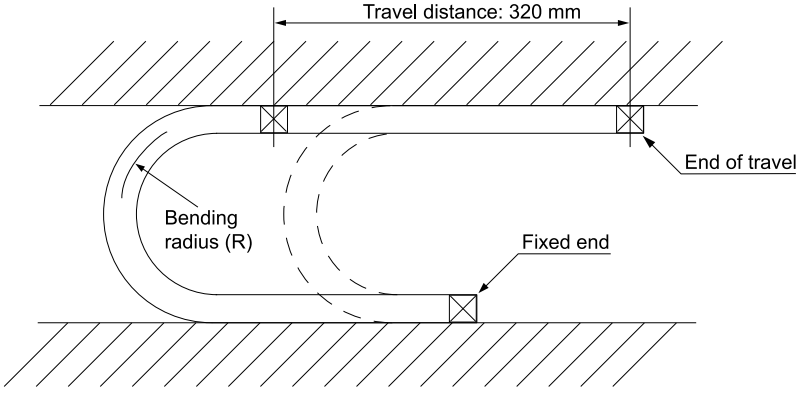
Cable Diameter	Recommended Bending Radius (R)
Less than 8 mm	15 mm min.
8 mm	20 mm min.
Over 8 mm	Cable diameter × 3 mm min.

6.8.2 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) as listed in each selection table 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 affects the performance of the cable sheathing occurs.

- 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.
- If a flexible cable is used in a fixed position, the recommended bending radius is the same as for standard cables. Perform all wiring so that stress is not applied to the cables.

7

Cables and User-Assembled Wiring Materials for SGMXG Rotary Servomotors (1500-min^{-1}, 400 V Specification)

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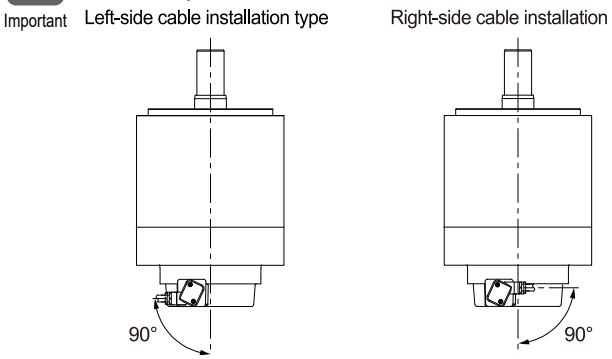
7.1 Device Configuration Diagrams

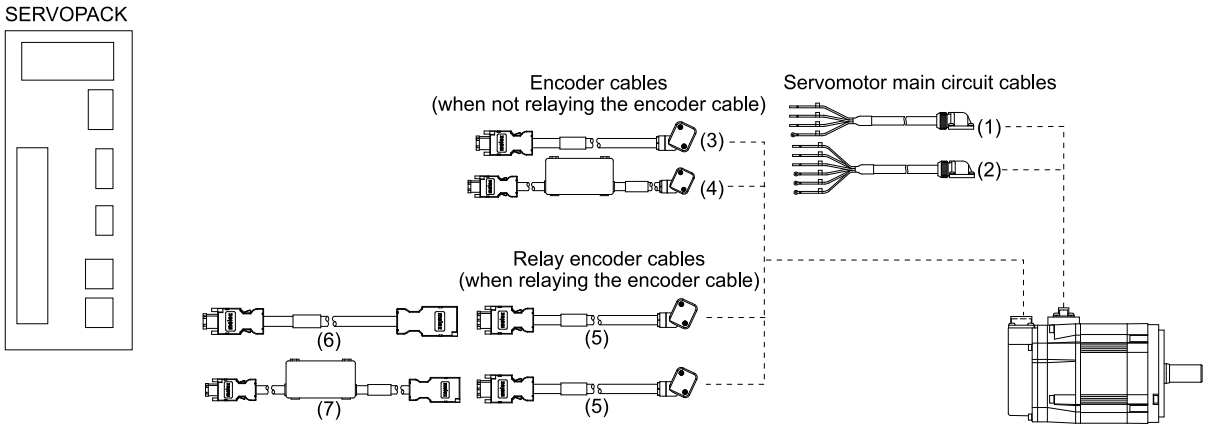
7.1.1 For Standard Specification Servomotors

(1) SGMXG-05D□A (450 W)

Important

There are different order numbers for encoder cables depending on the cable installation direction. Confirm the order numbers before you order.





Note:

When you will relay the encoder cable, connect the cables by combining the encoder cable and the encoder cable with connectors on both ends as shown in (5) to (7) in the figure above.

No.	Cable Type				Reference
(1), (2)	Servomotor main circuit cables *1	Finished product	For servomotors without holding brakes		239
			For servomotors with holding brakes		241
		Fabrication	Connectors		246
			Cables without connectors		246
(3), (4)	Encoder cables (when not relaying the encoder cable)	Finished product	For batteryless absolute encoders		255
			For absolute encoders *2		256
		Fabrication			-
(5) to (7)	Encoder cables (when relaying the encoder cable)	Finished product	-		260
			Connectors on both ends	For batteryless absolute encoders	261
				For absolute encoders *2	262
		Fabrication			-

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

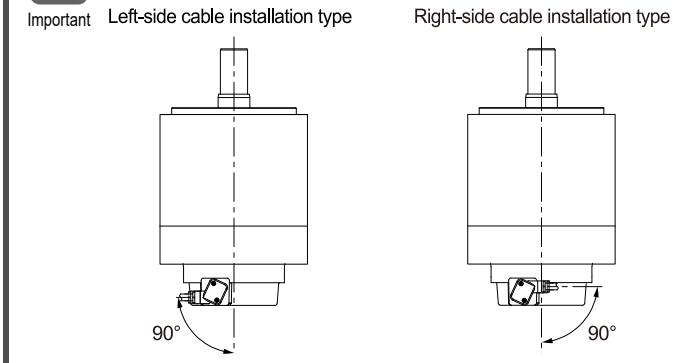
*2 In the following cases, use an encoder cable for batteryless absolute encoders.

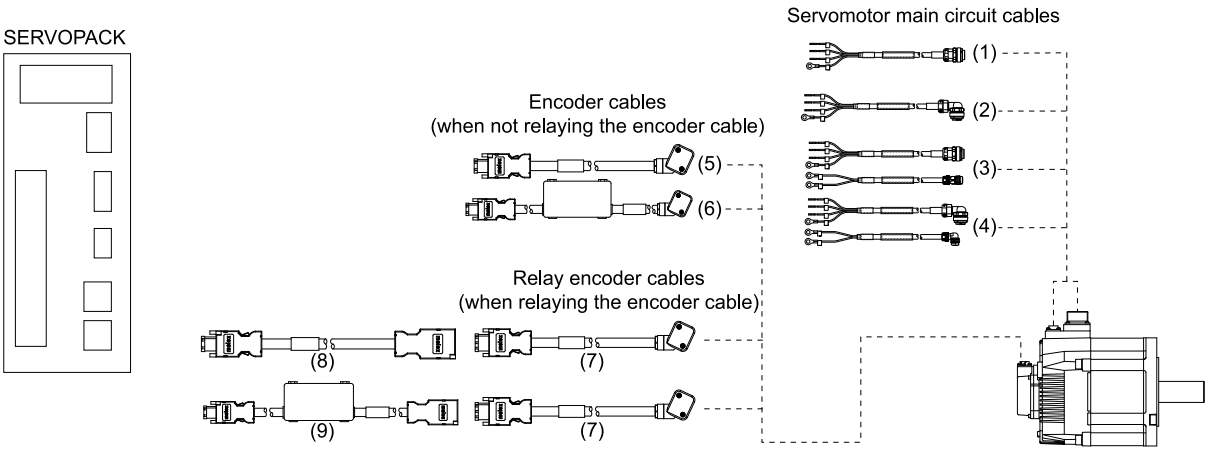
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

Information The cables described in this chapter are used to connect a SERVOPACK to a single servomotor.
Refer to the following chapter for the cables required when connecting the SERVOPACK to multiple devices.
☞ 13 Σ-LINK II-Related Devices on page 417

(2) SGMXG-09D□A to -1ED□A (850 W, 15 kW)

Important There are different order numbers for encoder cables depending on the cable installation direction. Confirm the order numbers before you order.





Note:
When you will relay the encoder cable, connect the cables by combining the encoder cable and the encoder cable with connectors on both ends as shown in (7) to (9) in the figure above.

No.	Cable Type				Reference
(1) to (4)	Servomotor main circuit cables *1	Finished product	For servomotors without holding brakes	Straight plug	239
				Right-angle plug *2	
			For servomotors with holding brakes	Straight plug	241
				Right-angle plug *2	
		Fabrication	Connectors		247
			Cables without connectors *3		-
(5), (6)	Encoder cables (when not relaying the encoder cable)	Finished product	For batteryless absolute encoders		255
			For absolute encoders *4		256
		Fabrication			-

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No.	Cable Type				Reference
(7) to (9)	Encoder cables (when relaying the encoder cable)	Finished product	-		260
			Connectors on both ends	For batteryless absolute encoders	261
				For absolute encoders *4	262
		Fabrication			-

*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.
☞ *7.2 Servomotor Main Circuit Cables on page 239*

*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.

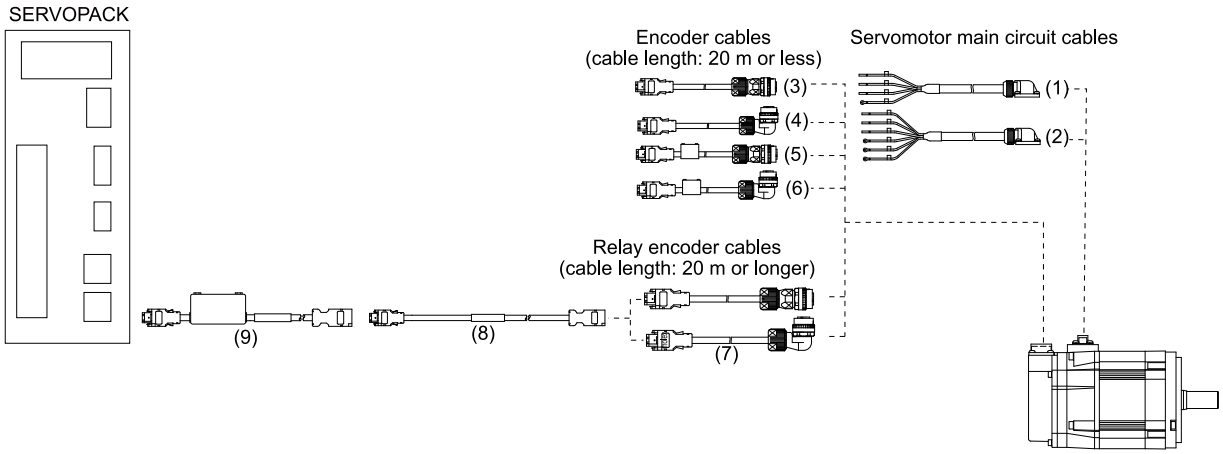
*4 In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

Information The cables described in this chapter are used to connect a SERVOPACK to a single servomotor.
☞ *13 Σ-LINK II-Related Devices on page 417*

7.1.2 For Σ-V Compatible Specification Servomotors

(1) SGMXG-05D□A (450 W)



Note:

If the encoder cable length exceeds 20 m, connect by combining the following cables as shown in (7) to (9) in the above figure.

- Relay encoder cables
- Relay encoder cables with connectors on both ends
- Relay encoder cables with connectors on both ends and battery unit

No.	Cable Type				Reference
(1), (2)	Servomotor main circuit cables *1	Finished product	For servomotors without holding brakes		239
			For servomotors with holding brakes		241
		Fabrication	Connectors		246
			Cables without connectors		246
(3) to (6)	Encoder cables of 20 m or less	Finished product	For batteryless absolute encoders	Straight plug	257
				Right-angle plug *2	
			For absolute encoders *3	Straight plug	259
				Right-angle plug *2	
		Fabrication			-
(7) to (9)	Relay encoder cables (when exceeds 20 m)	Finished product	Straight plug		264
			Right-angle plug *2		
			Connectors on both ends	–	265
				With battery units *4	266
		Fabrication			-

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

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

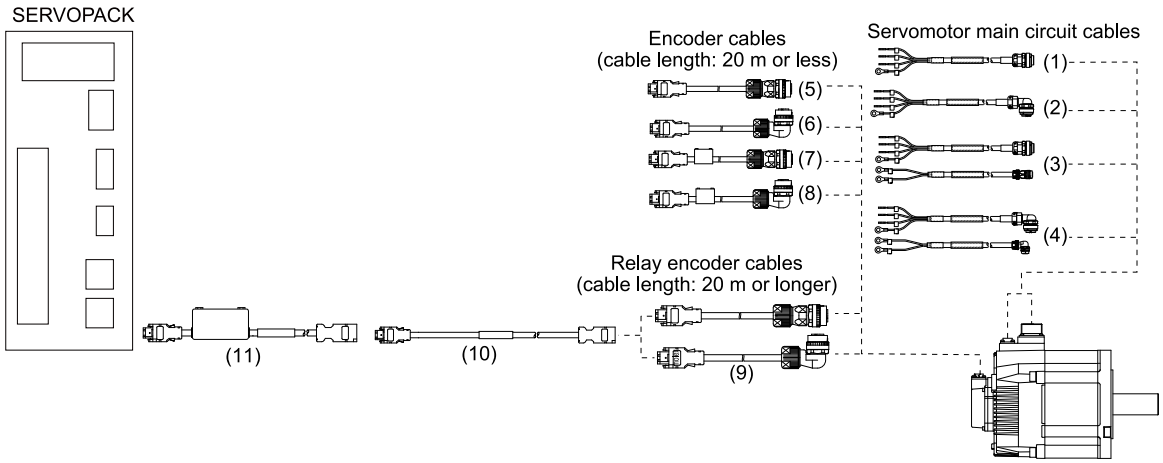
*3 In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

*4 In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

(2) SGMXG-09D□A to -1ED□A (850 W, 15 kW)



Note:

If the encoder cable length exceeds 20 m, connect by combining the following cables as shown in (9) to (11) in the above figure.

- Relay encoder cables
- Relay encoder cables with connectors on both ends
- Relay encoder cables with connectors on both ends and battery unit

No.	Cable Type				Reference
(1) to (4)	Servomotor main circuit cables *1	Finished product	For servomotors without holding brakes	Straight plug	239
				Right-angle plug *2	
			For servomotors with holding brakes	Straight plug	241
				Right-angle plug *2	
		Fabrication	Connectors		247
			Cables without connectors *3		-
(5) to (8)	Encoder cables of 20 m or less	Finished product	For batteryless absolute encoders	Straight plug	257
				Right-angle plug *2	
			For absolute encoders *4	Straight plug	259
				Right-angle plug *2	
		Fabrication			-
(9) to (11)	Relay encoder cables (when exceeds 20 m)	Finished product	Straight plug		264
			Right-angle plug *2		
			Connectors on both ends	–	265
				With battery units *5	266
		Fabrication			-

*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.

☞ *7.2 Servomotor Main Circuit Cables on page 239*

*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 In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

*5 In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

7.2 Servomotor Main Circuit Cables

The servomotor main circuit cable for the standard specification servomotor is same as that for the Σ-V compatible specification servomotor.

There are two types of servomotor main circuit cables: One for servomotors without holding brakes and one for servomotors with holding brakes.

Information SGMXG servomotors can also use the same cables as Σ-V series rotary servomotors. However, when using a product that conforms to the IP67 degree of protection, use the cables described in this manual. Refer to the following catalog for information on the Σ-V-series for rotary servomotor cables.

Σ-V-Series General Catalog (Manual No.: KAEP S800000 42)

7.2.1 For Servomotors without Holding Brakes

(1) Selection Table

(a) SGMXG-05D□A (450 W)

Servomotor Model	Length (L)	Order Number *1
		Standard (Flexible) Type *2
SGMXG -05D□A 450 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 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 A flexible cable is provided for this cable as standard. 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 other lead installation directions.

Note:

If the length of the servomotor main circuit cable exceeds 20 m, the intermittent duty zone in the torque-rotation speed characteristics will become smaller because the voltage drop increases.

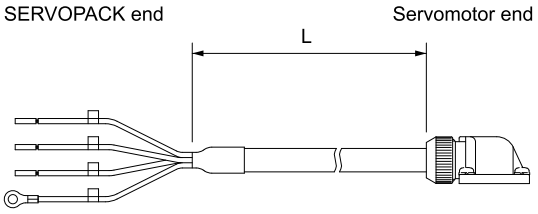
(b) SGMXG-09D□A to 1ED□A (850 W to 15 kW)

Connector Specifications	Servomotor Model	Length (L)	Order Number *1	
			Standard Cable	Flexible Cable *2 *3
Straight plug	SGMXG-09D□A, -13D□A 850 W, 1.3 kW	3 m, 5 m, 10 m, 15 m, 20 m	JWSP-XM15NSS-□□	JWSP-XM15NFS-□□
	SGMXG-20D□A 1.8 kW		JWSP-XM20NSS-□□	JWSP-XM20NFS-□□
	SGMXG-30D□A, -44D□A 2.9 kW, 4.4 kW		JWSP-XM30NSS-□□	JWSP-XM30NFS-□□
	SGMXG-55D□A, -75D□A 5.5 kW, 7.5 kW		JWSP-XM5BNSS-□□	JWSP-XM5BNFS-□□
	SGMXG-1AD□A, -1ED□A 11 kW, 15 kW		–	JWSP-XM1ANFS-□□
Right-angle plug *4	SGMXG- 09D□A, -13D□A 850 W, 1.3 kW		JWSP-XM15NSL-□□	JWSP-XM15NFL-□□
	SGMXG-20D□A 1.8 kW		JWSP-XM20NSL-□□	JWSP-XM20NFL-□□
	SGMXG-30D□A, -44D□A 2.9 kW, 4.4 kW		JWSP-XM30NSL-□□	JWSP-XM30NFL-□□
	SGMXG-55D□A, -75D□A 5.5 kW, 7.5 kW		JWSP-XM5BNSL-□□	JWSP-XM5BNFL-□□
	SGMXG-1AD□D, -1ED□A 11 kW, 15 kW		–	JWSP-XM1ANFL-□□

*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.

(2) Appearance

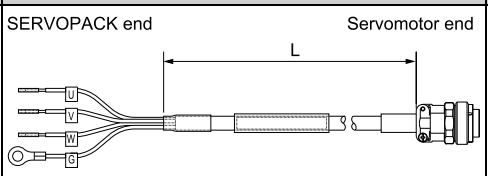
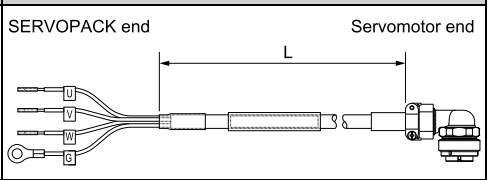
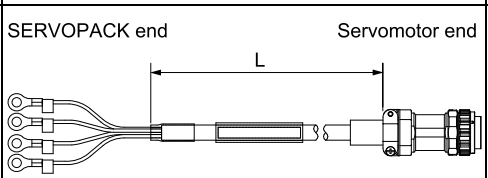
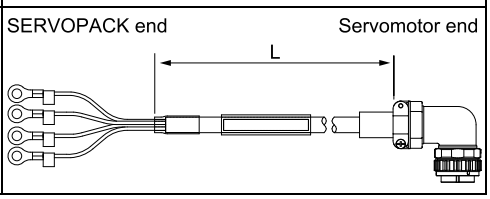
(a) SGMXG-05D□A (450 W)



Note:

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

(b) SGMXG-09D□A to 1ED□A (850 W to 15 kW)

Servomotor Model	Straight Plug Connector	Right-Angle Plug *1
SGMXG-09D□A, -13D□A 850 W, 1.3 kW		
SGMXG-20D□A to -1ED□A 1.8 kW, 15 kW		

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

(3) Wiring Specifications

(a) SGMXG-05D□A (450 W)

SERVOPACK Leads — Servomotor main circuit cable connector

Wiring Color	Signal	Signal	Pin
Green/yellow	FG	FG	PE
–	–	–	5
–	–	–	4
Red	Phase U	Phase U	3
White	Phase V	Phase V	2
Blue	Phase W	Phase W	1

(b) SGMXG-09D□A to 1ED□A (850 W to 15 kW)

Standard Cable

SERVOPACK leads — Servomotor main circuit cable connector

Wiring Color	Signal	Signal	Pin
Green	FG	FG	D
Red	Phase U	Phase U	A
White	Phase V	Phase V	B
Black	Phase W	Phase W	C

Flexible Cable

SERVOPACK leads — Servomotor main circuit cable connector

Wiring Color	Signal	Signal	Pin
Green/yellow	FG	FG	D
Red	Phase U	Phase U	A
White	Phase V	Phase V	B
Black	Phase W	Phase W	C

7.2.2 For Servomotors with Holding Brakes

(1) Selection Table

(a) SGMXG-05D□A (450 W)

Servomotor Model	Length (L)	Order Number *1
		Flexible Cable *2
SGMXG-05D□A 450 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 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 A flexible cable is provided for this cable as standard. 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 other lead installation directions.

Note:

If the length of the servomotor main circuit cable exceeds 20 m, the intermittent duty zone in the torque-rotation speed characteristics will become smaller because the voltage drop increases.

(b) SGMXG-09D□A to 1ED□A (850 W to 15 kW)

Connector Specifications	Servomotor Model	Length (L)	Order Number *1, *2	
			Standard Cable	Flexible Cable *3 *4
Straight plug	SGMXG- 09D□A, -13D□A 850 W, 1.3 kW	3 m, 5 m, 10 m, 15 m, 20 m	JWSP-XM15BSS-□□	JWSP-XM15BFS-□□
	SGMXG-20D□A 1.8 kW		JWSP-XM20BSS-□□	JWSP-XM20BFS-□□
	SGMXG-30D□A, -44D□A 2.9 kW, 4.4 kW		JWSP-XM30BSS-□□	JWSP-XM30BFS-□□
	SGMXG-55D□A, -75D□A 5.5 kW, 7.5 kW		JWSP-XM5BBSS-□□	JWSP-XM5BBFS-□□
	SGMXG-1AD□A, -1ED□A 11 kW, 15 kW		–	JWSP-XM1ABFS-□□
Right-angle plug *5	SGMXG- 09D□A, -13D□A 850 W, 1.3 kW		JWSP-XM15BSL-□□	JWSP-XM15BFL-□□
	SGMXG-20D□A 1.8 kW		JWSP-XM20BSL-□□	JWSP-XM20BFL-□□
	SGMXG-30D□A, -44D□A 2.9 kW, 4.4 kW		JWSP-XM30BSL-□□	JWSP-XM30BFL-□□
	SGMXG-55D□A, -75D□A 5.5 kW, 7.5 kW		JWSP-XM5BBSL-□□	JWSP-XM5BBFL-□□
	SGMXG-1AD□A, -1ED□A 11 kW, 15 kW		–	JWSP-XM1ABFL-□□

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

*2 These are the order numbers for two-cable sets (main power supply cable + holding brake cable).
To order the cables separately, the order number for a single main power supply cable is identical to that for the cable for servomotors without holding brakes.
The order numbers for single cables for servomotors with holding brakes are as follows. A flexible cable is provided for this cable as standard.

- Straight plug: JWSP-XB0FS-□□
- Right-angle plug: JWSP-XB0FL-□□

Note:

If you prefer a cable length from 20 m to 50 m, specify the length by taking into account the following operating conditions.

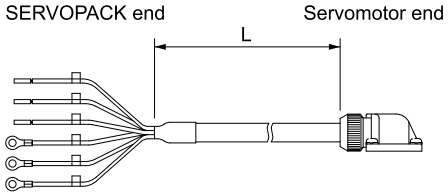
*3 Use flexible cables for moving parts of machines, such as robots.

*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.

(2) Appearance

(a) SGMXG-05D□A (450 W)

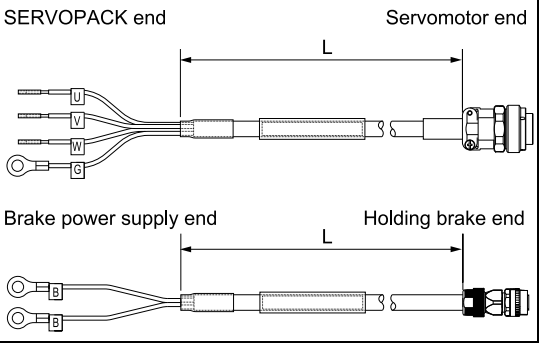
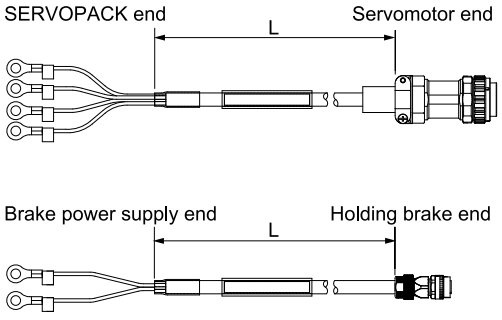


Note:

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

(b) SGMXG-09D□A to 1ED□A (850 W to 15 kW)

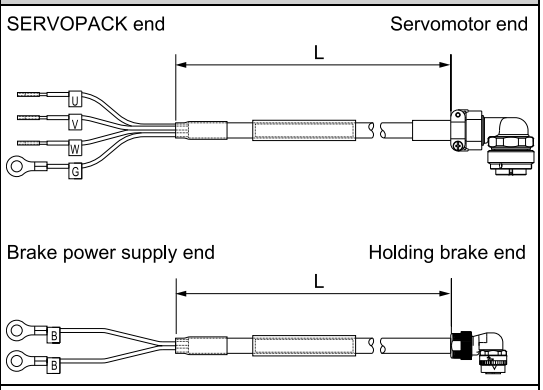
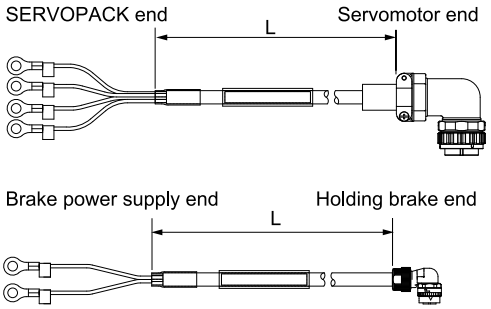
- Straight Plug

Servomotor Model	Order Numbers of Main Power Supply Cable and Holding Brake Cable	Individual Cable Order Numbers *1	Appearance
SGMXG-09D□A, -13D□A 850 W, 1.3 kW	Standard cable: JWSP-XM15BSS-□□ Flexible cable: JWSP-XM15BFS-□□	– Main circuit power supply cable Standard cable: JWSP-XM15NSS-□□ Flexible cable: JWSP-XM15NFS-□□ – Holding brake cable JWSP-XB0FS-□□	
SGMXG-20D□A 1.8 kW	Standard cable: JWSP-XM20BSS-□□ Flexible cable: JWSP-XM20BFS-□□	– Main circuit power supply cable Standard cable: JWSP-XM20NSS-□□ Flexible cable: JWSP-XM20NFS-□□ – Holding brake cable JWSP-XB0FS-□□	
SGMXG-30D□A, -44D□A 2.9 kW, 4.4 kW	Standard cable: JWSP-XM30BSS-□□ Flexible cable: JWSP-XM30BFS-□□	– Main circuit power supply cable Standard cable: JWSP-XM30NSS-□□ Flexible cable: JWSP-XM30NFS-□□ – Holding brake cable JWSP-XB0FS-□□	
SGMXG-55D□A, -75D□A 5.5 kW, 7.5 kW	Standard cable: JWSP-XM5BBSS-□□ Flexible cable: JWSP-XM5BBFS-□□	– Main circuit power supply cable Standard cable: JWSP-XM5BNSS-□□ Flexible cable: JWSP-XM5BNFS-□□ – Holding brake cable JWSP-XB0FS-□□	
SGMXG-1AD□A, -1ED□A 11 kW, 15 kW	Flexible cable: JWSP-XM1ABFS-□□	– Main circuit power supply cable Flexible cable: JWSP-XM1ANFS-□□ – Holding brake cable JWSP-XB0FS-□□	

*1 Flexible cables are provided as a standard for holding brake cables.

- Right-Angle Plug

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

Servomotor Model	Order Numbers of Main Power Supply Cable and Holding Brake Cable	Individual Cable Order Numbers *1	Appearance
SGMXG-09D□A, -13D□A 850 W, 1.3 kW	Standard cable: JWSP-XM15BSL-□□ Flexible cable: JWSP-XM15BFL-□□	– Main circuit power supply cable Standard cable: JWSP-XM15NSL-□□ Flexible cable: JWSP-XM15NFL-□□ – Holding brake cable JWSP-XB0FL-□□	
SGMXG-20D□A 1.8 kW	Standard cable: JWSP-XM20BSL-□□ Flexible cable: JWSP-XM20BFL-□□	– Main circuit power supply cable Standard cable: JWSP-XM20NSL-□□ Flexible cable: JWSP-XM20NFL-□□ – Holding brake cable JWSP-XB0FL-□□	
SGMXG-30D□A, -44D□A 2.9 kW, 4.4 kW	Standard cable: JWSP-XM30BSL-□□ Flexible cable: JWSP-XM30BFL-□□	– Main circuit power supply cable Standard cable: JWSP-XM30NSL-□□ Flexible cable: JWSP-XM30NFL-□□ – Holding brake cable JWSP-XB0FL-□□	
SGMXG-55D□A, -75D□A 5.5 kW, 7.5 kW	Standard cable: JWSP-XM5BBSL-□□ Flexible cable: JWSP-XM5BBFL-□□	– Main circuit power supply cable Standard cable: JWSP-XM5BNSL-□□ Flexible cable: JWSP-XM5BNFL-□□ – Holding brake cable JWSP-XB0FL-□□	
SGMXG-1AD□A, -1ED□A 11 kW, 15 kW	Flexible cable: JWSP-XM1ABFL-□□	– Main circuit power supply cable Flexible cable: JWSP-XM1ANFL-□□ – Holding brake cable JWSP-XB0FL-□□	

*1 Flexible cables are provided as a standard for holding brake cables.

(3) Wiring Specifications

(a) SGMXG-05D□A (450 W)

SERVOPACK leads		Servomotor main circuit cable connector	
Wiring Color	Signal	Signal	Pin
Green/yellow	FG	FG	PE
Black	Brake	Brake	5
Black	Brake	Brake	4
Red	Phase U	Phase U	3
White	Phase V	Phase V	2
Blue	Phase W	Phase W	1

Note:

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

(b) SGMXG-09D□A to 1ED□A (850 W to 15 kW)

Standard Type

SERVOPACK leads		Servomotor main circuit cable connector	
Wiring Color	Signal	Signal	Pin
Green	FG	FG	D
Red	Phase U	Phase U	A
White	Phase V	Phase V	B
Black	Phase W	Phase W	C
Black	Brake	Brake	1
White	Brake	Brake	2

Flexible Type

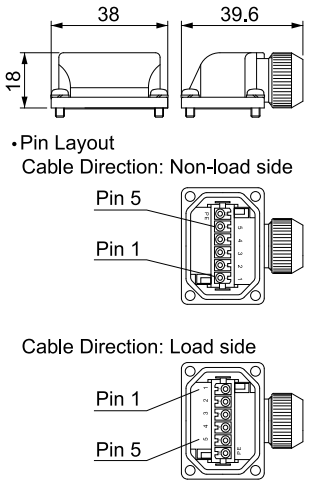
SERVOPACK leads		Servomotor main circuit cable connector	
Wiring Color	Signal	Signal	Pin
Green/yellow	FG	FG	D
Red	Phase U	Phase U	A
White	Phase V	Phase V	B
Black	Phase W	Phase W	C
Black	Brake	Brake	1
White	Brake	Brake	2

Note:

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

7.3 User-Assembled Wiring Materials for Servomotor Main Circuit Cables: SGMXG-05D□A

7.3.1 Servomotor Connector Kits

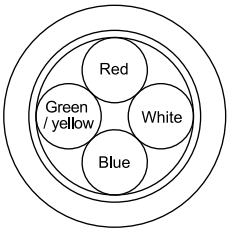
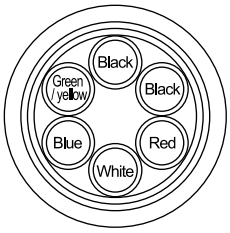
Item		Description	External Dimensions [mm]
Order Number		JZSP-CVM9-1-E	
Manufacturer		Japan Aviation Electronics Industry, Ltd.	
Instructions		JAHL-50020	
Components	Plug	JNYFX06SJ3	
	Contacts	ST-TMH-S-C1B	
Applicable Wire Sizes		AWG18 to AWG22	
Applicable Cable Diameter		6.9 mm to 8.3 mm	
Outer Diameter of Insulating Sheath		1.3 mm to 1.8 mm	
Mounting Screws		M3 pan-head screws	
Crimping Tool *1	Hand Tool	CT170-14-TMH5B	

*1 A crimping tool is required. Contact the connector manufacturer for details.

Note:

Cables are not included. Purchase them separately.

7.3.2 Cables without Connectors

Item	For Servomotors without Holding Brakes (4 Leads)	For Servomotors with Holding Brakes (6 Leads)
Order Number *1	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 mm²) Outer diameter of insulating sheath: 1.77 mm	Power lines: AWG20 (0.52 mm²) Outer diameter of insulating sheath: 1.77 mm
	-	Holding brake lines: AWG20 (0.52 mm²) 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		

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

Note:

Flexible type wiring materials.

7.4 User-Assembled Wiring Materials for Servomotor Main Circuit Cables: SGMXG-09D□A to -1ED□A

The servomotor main circuit cable for the standard specification servomotor is same as that for the Σ-V compatible specification servomotor.

If you need standard-structure servomotor connectors, consult your Yaskawa representative.

To fabricate the cables, refer to this section.

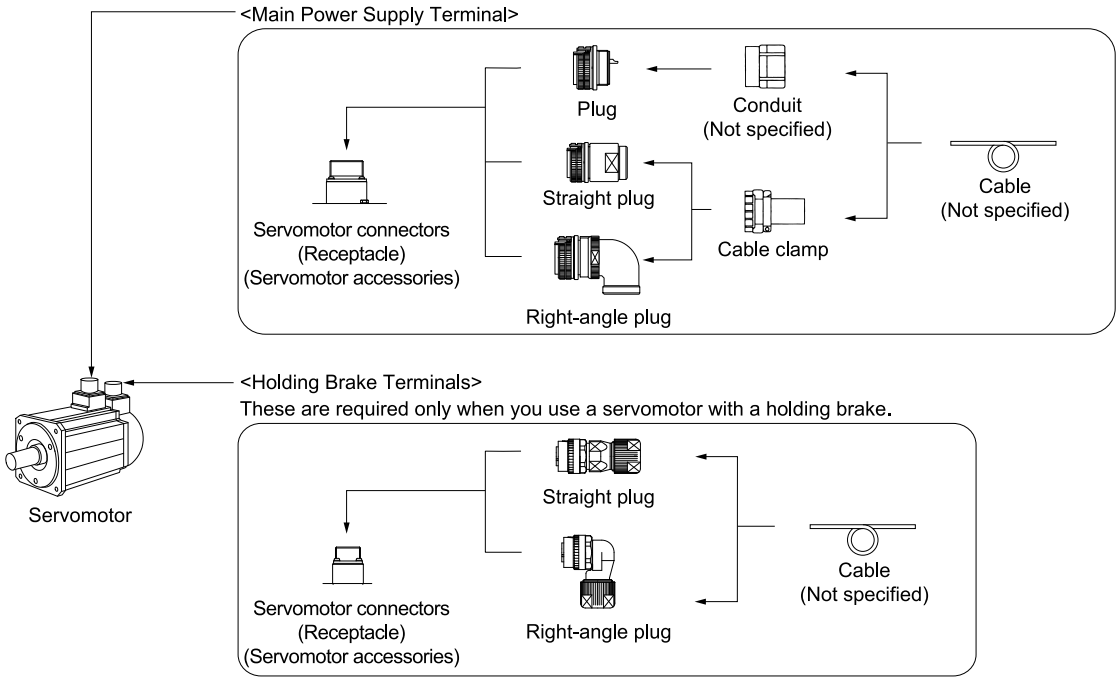
To purchase cables with connectors, refer to the following section.

☞ *7.2 Servomotor Main Circuit Cables on page 239*

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.

7.4.1 Connector Configurations



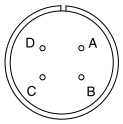
The references for each terminal are shown in the following table.

Item	Reference
Main Power Supply Terminal	☞ *7.4.2 Main Power Supply Terminal on page 248*
Holding Brake Terminals	☞ *7.4.3 Holding Brake Terminals on page 250*

7.4.2 Main Power Supply Terminal

(1) Servomotor Connector (Receptacle)

This connector is an accessory to the servomotor.

Servomotor Model	Capacity	Servomotor Connector Models	Connector Surface
SGMXG-09D□A SGMXG-13D□A SGMXG-20D□A	850 W to 1.8 kW	JL10-2E18-10PCE (MS connector model: MS3102A18-10P)	
SGMXG-30D□A SGMXG-44D□A	2.9 kW to 4.4 kW	JL10-2E22-22PCE (MS connector model: MS3102A22-22P)	
SGMXG-55D□A SGMXG-75D□A SGMXG-1AD□A SGMXG-1ED□A	5.5 kW to 15 kW	JL10-2E32-17PCE (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.

(2) 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.

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

Servomotor Model	Capacity	Order Number			Manufacturer
		Plug		Cable Clamp	
SGMXG-09D□A SGMXG-13D□A SGMXG-20D□A	850 W to 1.8 kW	Straight	D/MS3106B18-10S	D/MS3057-10A	Fujikura Ltd.
			N/MS3106B18-10S	N/MS3057-10A	Japan Aviation Electronics Industry, Ltd.
		Right-angle	D/MS3108B18-10S	D/MS3057-10A	Fujikura Ltd.
			N/MS3108B18-10S	N/MS3057-10A	Japan Aviation Electronics Industry, Ltd.
SGMXG-30D□A SGMXG-44D□A	2.9 kW to 4.4 kW	Straight	D/MS3106B22-22S	D/MS3057-12A	Fujikura Ltd.
			N/MS3106B22-22S	N/MS3057-12A	Japan Aviation Electronics Industry, Ltd.
		Right-angle	D/MS3108B22-22S	D/MS3057-12A	Fujikura Ltd.
			N/MS3108B22-22S	N/MS3057-12A	Japan Aviation Electronics Industry, Ltd.
SGMXG-55D□A SGMXG-75D□A SGMXG-1AD□A SGMXG-1ED□A	5.5 kW to 15 kW	Straight	D/MS3106B32-17S	D/MS3057-20A	Fujikura Ltd.
			N/MS3106B32-17S	N/MS3057-20A	Japan Aviation Electronics Industry, Ltd.
		Right-angle	D/MS3108B32-17S	D/MS3057-20A	Fujikura Ltd.
			N/MS3108B32-17S	N/MS3057-20A	Japan Aviation Electronics Industry, Ltd.

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

Servomotor Model	Capacity	Order Number			Manufacturer
		Plug *1		Cable Clamp *2 *3	
SGMXG-09D□A SGMXG-13D□A SGMXG-20D□A	850 W to 1.8 kW	Single	JL10-6A18-10SE (One-touch mating) JL04V-6A18-10SE (Screw mating)	Not required.	Japan Aviation Electronics Industry, Ltd.
		Straight	JL10-6A18-10SE-EB (One-touch mating) JL04V-6A18-10SE-EB (Screw mating)	JL04-18CK(07)-RK JL04-18CK(10)-R JL04-18CK(13)-R	
		Right-angle	JL10-8A18-10SE-EB (One-touch mating) JL04V-8A18-10SE-EBH (Screw mating)	JL04-18CK(07)-RK JL04-18CK(10)-R JL04-18CK(13)-R	
SGMXG-30D□A SGMXG-44D□A	2.9 kW to 4.4 kW	Single	JL10-6A22-22SE (One-touch mating) JL04V-6A22-22SE (Screw mating)	Not required.	
		Straight	JL10-6A22-22SE-EB1 (One-touch mating) JL04V-6A22-22SE-EB1 (Screw mating)	JL04-2428CK(11)-R JL04-2428CK(14)-R JL04-2428CK(17)-R JL04-2428CK(20)-R	
		Right-angle	JL10-8A22-22SE-EB1 (One-touch mating) JL04V-8A22-22SE-EB1H (Screw mating)	JL04-2428CK(11)-R JL04-2428CK(14)-R JL04-2428CK(17)-R JL04-2428CK(20)-R	
SGMXG-55D□A SGMXG-75D□A SGMXG-1AD□A SGMXG-1ED□A	5.5 kW to 15 kW	Single	JL10-6A32-17SE (One-touch mating) JL04V-6A32-17SE (Screw mating)	Not required.	
		Straight	JL10-6A32-17SE-EB (One-touch mating) JL04V-6A32-17SE-EB (Screw mating)	JL04-32CK(24)-RK	
		Right-angle	JL10-8A32-17SE-EB (One-touch mating) Contact the manufacturer for screw mating types.	JL04-32CK(24)-RK	

*1 If there is concern about the effect of vibrations on the equipment, use of the JL04V (screw mating) is recommended.
*2 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.
*3 The applicable cable diameters of the cable clamps are as follows.

Order Number	Applicable Cable Diameter [mm]
JL04-18CK(07)-RK	5 to 8
JL04-18CK(10)-R	8 to 11
JL04-18CK(13)-R	11 to 14.1
JL04-2428CK(11)-R	9 to 12
JL04-2428CK(14)-R	12 to 15

Continued on next page.

Continued from previous page.

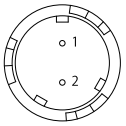
Order Number	Applicable Cable Diameter [mm]
JL04-2428CK(17)-R	15 to 18
JL04-2428CK(20)-R	18 to 20
JL04-32CK(24)-RK	22 to 25

7.4.3 Holding Brake Terminals

These are required only when you use a servomotor with a holding brake.

(1) Servomotor Connector (Receptacle)

This connector is an accessory to the servomotor.

Servomotor Model	Capacity	Servomotor Connector Models	Connector Surface
SGMXG-09D□A SGMXG-13D□A SGMXG-20D□A SGMXG-30D□A SGMXG-44D□A SGMXG-55D□A SGMXG-75D□A SGMXG-1AD□A SGMXG-1ED□A	850 W to 15 kW	CMV1Y-R2P-0(F)	

(2) Cable-Side Connectors (Plug)

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

Servomotor Model	Capacity	Order Number *1 *2		Applicable Cable Diameter (Reference)	Manufacturer
SGMXG-09D□A SGMXG-13D□A SGMXG-20D□A SGMXG-30D□A SGMXG-44D□A SGMXG-55D□A SGMXG-75D□A SGMXG-1AD□A SGMXG-1ED□A	850 W to 15 kW	Straight	CMV1-SP2S-S (One-touch mating) CMV1S-SP2S-S (Screw mating)	4.0 mm to 6.0 mm	Fujikura Ltd.
			CMV1-SP2S-M1 (One-touch mating) CMV1S-SP2S-M1 (Screw mating)	5.5 mm to 7.5 mm	
			CMV1-SP2S-M2 (One-touch mating) CMV1S-SP2S-M2 (Screw mating)	7.0 mm to 9.0 mm	
			CMV1-SP2S-L (One-touch mating) CMV1S-SP2S-L (Screw mating)	9.0 mm to 11.6 mm	
		Right-angle	CMV1-AP2S-S (One-touch mating) CMV1S-AP2S-S (Screw mating)	4.0 mm to 6.0 mm	
			CMV1-AP2S-M1 (One-touch mating) CMV1S-AP2S-M1 (Screw mating)	5.5 mm to 7.5 mm	
			CMV1-AP2S-M2 (One-touch mating) CMV1S-AP2S-M2 (Screw mating)	7.0 mm to 9.0 mm	
			CMV1-AP2S-L (One-touch mating) CMV1S-AP2S-L (Screw mating)	9.0 mm to 11.6 mm	

*1 If there is concern about the effect of vibrations on the equipment, use of the CMV1S (screw mating) is recommended.

*2 This order number is compatible with the CM10 series order number used in the Σ-V series.
For details on the CM10 series order numbers, refer to the following catalog.

Σ-V-Series General Catalog (Manual No.: KAEP S800000 42)

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

JZSP-CVB9-S M S2-E

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

*1 Crimping tool: A 357J-53164T from Fujikura Ltd. is required.

• Other connector specifications

Item	Specification
Contact Models	■ Loose Contacts (100 per bag) – Crimped contacts: CMV1-#22BSC-C3-100 Wire size: AWG16 to AWG20, outer diameter of insulating sheath: 1.87 mm to 2.45 mm Manual crimping tool: 357J-53164T – Soldered contacts: CMV1-#22BSC-S2-100 Wire size: AWG16 max., outer diameter of insulating sheath: 3 mm max. ■ Reeled Contacts (4,000 per reel) Crimped contacts: CMV1-#22BSC-C3-4000 Wire size: AWG16 to AWG20, outer diameter of insulating sheath: 1.87 mm to 2.45 mm Semi-automatic crimping tool: AP-A53210T-A (set), AP-A53210T (applicator) **Note:** The semi-automatic tool set includes the press and applicator (crimper).

Note:

Purchase the contact pins separately. Consider the wiring type and the applicable wire size when you select the contact pins.

7.4.4 Connector External Dimensions

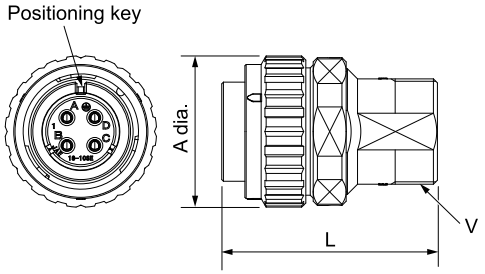
The external dimensions of connectors compliant with an IP67 protective structure and European safety standard compliant type are shown below.

Select the connector model by referring to the following sections for information on the standard environment type connector.

☞ *(a) Standard Environment Type: Cable-Side Connectors (Plug) on page 248*

(1) Main Power Supply Terminal

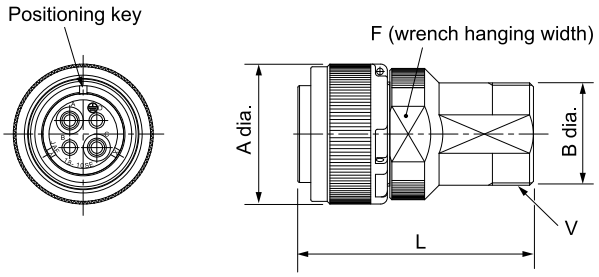
(a) Straight Plug: One-Touch Mating (from Japan Aviation Electronics Industry, Ltd.)



Unit: mm

Model	Shell Size	Connecting Nut Outer Diameter A ± 0.8 Dia.	Total Length L ± 0.8	Cable Clamp Mounting Screws V
JL10-6A18-10SE-EB	18	35.85	51.05	1-20UNEF-2A
JL10-6A22-22SE-EB1	22	42.2	74.35	1-7/16-18UNEF-2A
JL10-6A32-17SE-EB	32	58.6	99.6	1-3/4-18UNS-2A

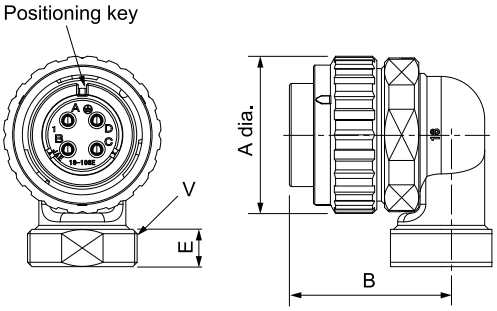
(b) Straight Plug: Screw Mating (from Japan Aviation Electronics Industry, Ltd.)



Unit: mm

Model	Shell Size	Connecting Nut Outer Diameter A ± 0.8 Dia.	B Dia.	Total Length L ± 0.8	F ± 0.5	Cable Clamp Mounting Screws V
JL04V-6A18-10SE-EB	18	34.1	25	57.4	29	1-20UNEF-2A
JL04V-6A22-22SE-EB1	22	40.5	36.4	78	35	1-7/16-18UNEF-2A
JL04V-6A32-17SE-EB	32	56.3	44	105.9	51	1-3/4-18UNS-2A

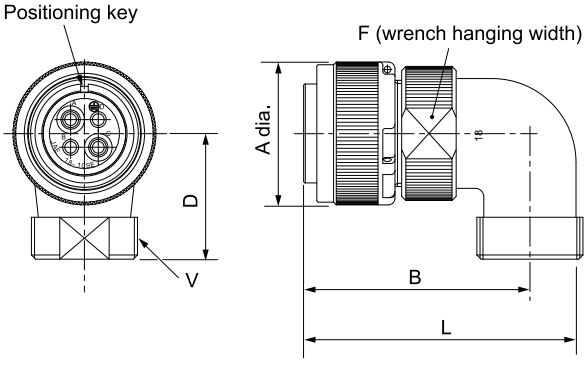
(c) Right-Angle Plug: One-Touch Mating (from Japan Aviation Electronics Industry, Ltd.)



Unit: mm

Model	Shell Size	Connecting Nut Outer Diameter A ± 0.8 Dia.	B ± 0.8	E ± 0.5	Cable Clamp Mounting Screws V
JL10-8A18-10SE-EB	18	35.85	34.55	8.5	1-20UNEF-2A
JL10-8A22-22SE-EB1	22	42.2	51.6	10	1-7/16-18UNEF-2A
JL10-8A32-17SE-EB	32	58.6	66.9	10	1-3/4-18UNS-2A

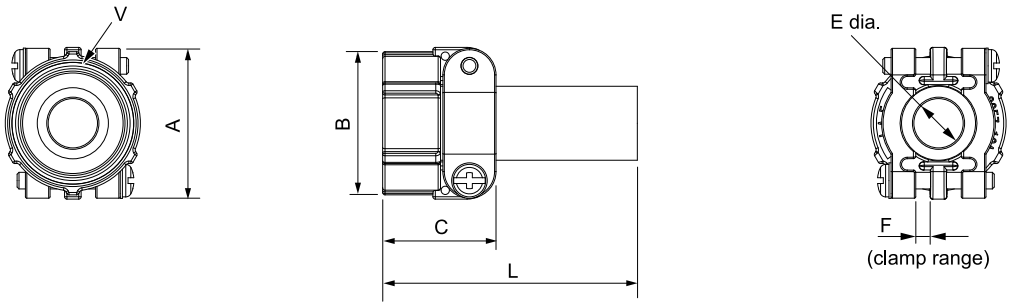
(d) Right-Angle Plug: Screw Mating (from Japan Aviation Electronics Industry, Ltd.)



Unit: mm

Model	Shell Size	Connecting Nut Outer Diameter A ± 0.8 Dia.	B ± 0.8	Total Length L ± 0.8	D ± 0.8	F ± 0.5	Cable Clamp Mounting Screws V
JL04V-8A18-10SE-EBH	18	34.1	54	65.6	30	32	1-20UNEF-2A
JL04V-8A22-22SE-EB1H	22	40.5	59	76.2	42	38	1-7/16-18UNEF-2A

(e) Cable Clamp (from Japan Aviation Electronics Industry, Ltd.)

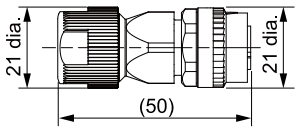
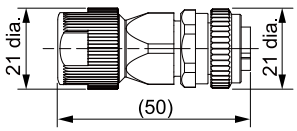


Unit: mm

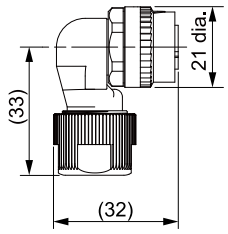
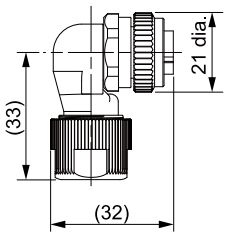
Model	A ± 0.8	Outer Diameter B ± 0.8	C ± 0.3	Total Length L ± 0.3	Bushing Inner Diameter E ± 0.3 dia.	F	Mounting Screws V	Applicable Cable Diameter (Reference)
JL04-18CK(07)-RK	31.8	30.2	24.1	53.8	8	3.2	1-20UNEF-2B	5 to 8
JL04-18CK(10)-R					11			8 to 11
JL04-18CK(13)-R					14.1			11 to 14.1
JL04-2428CK(11)-R	42.9	42.1	26.2	56.2	12	4.8	1-7/16-18UNEF-2B	9 to 12
JL04-2428CK(14)-R					15			12 to 15
JL04-2428CK(17)-R					18			15 to 18
JL04-2428CK(20)-R					21			18 to 20
JL04-32CK(24)-RK	51.6	51.6	27.8	57.8	25	6.4	1-3/4-18UNS-2B	22 to 25

(2) Holding Brake Terminals (from Fujikura Ltd.)

- Straight plug

CMV1-SP2S-□□ (One-touch mating)	CMV1S-SP2S-□□S (Screw mating)
	

- Right-angle plug

CMV1-AP2S-□□ (One-touch mating)	CMV1S-AP2S-□□ (Screw mating)
	

7.5 Encoder Cables (When Not Relaying the Encoder Cable)

The encoder cable for the standard specification servomotor is different than that for the Σ-V compatible specification servomotor.

7.5.1 For Standard Specification Servomotors

There are two types of encoder cables that are used with standard specification servomotors: One for batteryless absolute encoders and one for absolute encoders.

(1) For Batteryless Absolute Encoders

(a) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Left side	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JWSP-XP2IS1-□□	JWSP-XP2IF1-□□
Right side		JWSP-XP2IS2-□□	JWSP-XP2IF2-□□

*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 46 mm or larger.

Note:

The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.

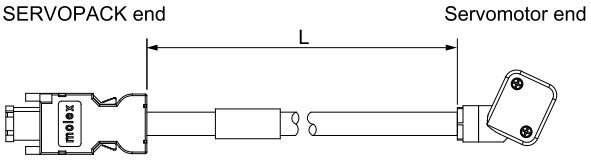
You cannot relay cables by connecting JZSP-UCMP00-□□-E or JZSP-CSP12-E cables.

Information A cable installation direction on the right side or left side refers to the cable installation direction when viewed from the connector side with the shaft at the top.

Refer to the following section for details on the cable installation direction.

☞ *7.1.1 For Standard Specification Servomotors on page 234*

(b) Appearance



(c) Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Shield wire

Servomotor end

Pin	Wire Color
5	Light blue
4	Red
7	Gray
3	Brown
6	Black
2	Orange
8	–
9	–
Shell	FG

(2) For absolute encoders

These cables are equipped with a battery unit. (A battery is included.)

Note:

In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

(a) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Left side	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JWSP-XP2AS1-□□	JWSP-XP2AF1-□□
Right side		JWSP-XP2AS2-□□	JWSP-XP2AF2-□□

*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 46 mm or larger.

Note:

The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.

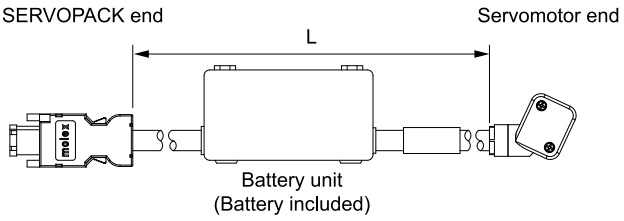
You cannot relay cables by connecting JZSP-UCMP00-□□-E or JZSP-CSP12-E cables.

Information A cable installation direction on the right side or left side refers to the cable installation direction when viewed from the connector side with the shaft at the top.

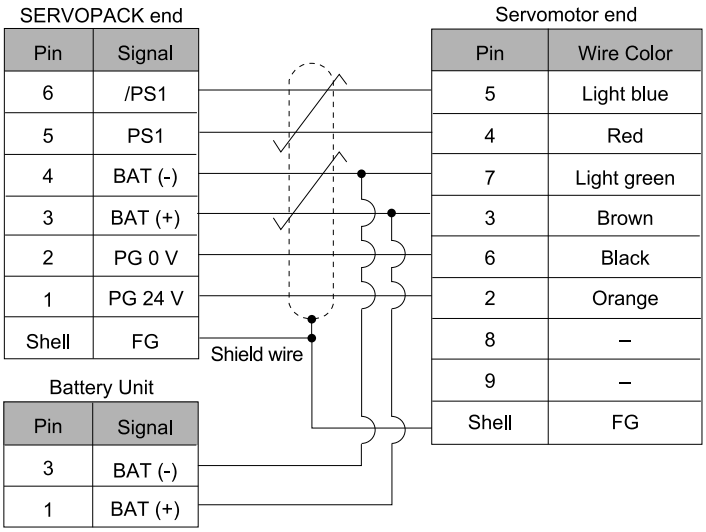
Refer to the following section for details on the cable installation direction.

☞ *7.1.1 For Standard Specification Servomotors on page 234*

(b) Appearance



(c) Wiring Specifications



Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Pin	Wire Color
5	Light blue
4	Red
7	Light green
3	Brown
6	Black
2	Orange
8	–
9	–
Shell	FG

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

7.5.2 Servomotors with Σ-V Compatible Specifications (20 m or Less)

There are two types of encoder cables that are used with Σ-V compatible specification servomotors: One for batteryless absolute encoders and one for absolute encoders.

Information Σ-V compatible specification servomotors can also use the same cables as Σ-V series rotary servomotors. Refer to the following catalog for information on the Σ-V-series for rotary servomotor cables.

Σ-V-Series General Catalog (Manual No.: KAEP S800000 42)

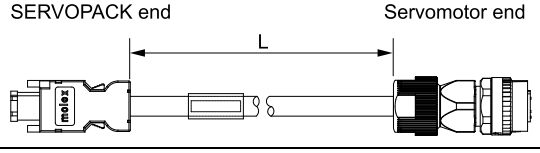
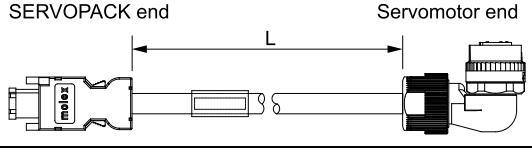
(1) For Batteryless Absolute Encoders

(a) Selection Table

Connector Specifications	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Straight Plug	3 m, 5 m, 10 m, 15 m, 20 m	JWSP-XPISS-□□	JWSP-XPIFS-□□
Right-angle plug *4		JWSP-XPISL-□□	JWSP-XPIFL-□□

*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.

(b) Appearance

Straight Plug	Right-Angle Plug *1
	

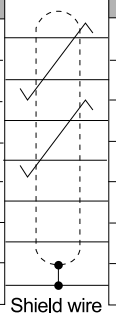
*1 The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

(c) Wiring Specifications

Standard Cable

SERVOPACK end

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



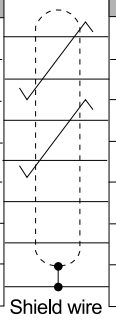
Servomotor end

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

Flexible Cable

SERVOPACK end

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



Servomotor end

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

(2) For absolute encoders

These cables are equipped with a battery unit. (A battery is included.)

Note:

In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

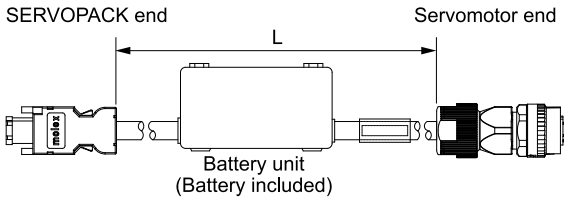
(a) Selection Table

Connector Specifications	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Straight Plug	3 m, 5 m, 10 m, 15 m, 20 m	JWSP-XPASS-□□	JWSP-XPAFS-□□
Right-angle plug *4		JWSP-XPASL-□□	JWSP-XPAFL-□□

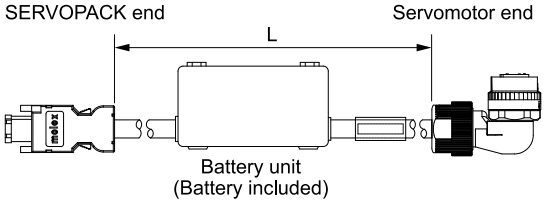
*1 Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.
*4 The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

(b) Appearance

Straight Plug



Right-Angle Plug *1



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

(c) Wiring Specifications

Standard Cable

SERVOPACK end

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

Servomotor end

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

Shield wire

Battery Unit

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

Flexible Cable

SERVOPACK end

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

Servomotor end

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

Shield wire

Battery Unit

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

7.6 Encoder Cables (When Relaying the Encoder Cable)

The encoder cable for relaying for the standard specification servomotor is different than that for the Σ-V compatible specification servomotor.

7.6.1 For Standard Specification Servomotors

When you will relay the encoder cable, connect the cables by combining an encoder cable and an encoder cable with connectors on both ends.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

(1) Encoder Cables

(a) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Left side	0.3 m, 1 m, 3 m, 5 m, 10 m, 15 m, 20 m, 25 m, 30 m, 40 m, 50 m	JWSP-XP3IS1-□□	JWSP-XP3IF1-□□
Right side		JWSP-XP3IS2-□□	JWSP-XP3IF2-□□

*1 Replace the boxes (□□) in the order number with the cable length (00P3, 01, 03, 05, 10, 15, 20, 25, 30, 40, or 50).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.

Note:

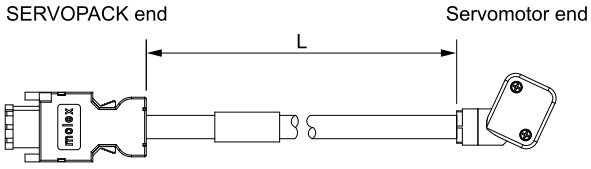
1. When you will relay the encoder cable, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
2. The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.
   You cannot relay cables by combining JZSP-UCMP00-□□-E and JZSP-CSP12-E cables with JWSP-XP1□□□-□□, JWSP-XP2□□□-□□, and JWSP-XP4□□□-□□ cables.

Information A cable installation direction on the right side or left side refers to the cable installation direction when viewed from the connector side with the shaft at the top.

Refer to the following section for details on the cable installation direction.

☞ *7.1.1 For Standard Specification Servomotors on page 234*

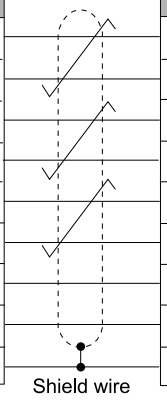
(b) Appearance



(c) Wiring Specifications

SERVOPACK end

Pin	Signal
8	/PS2
7	PS2
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG



Servomotor end

Pin	Wire Color
9	White
8	Yellow
5	Light blue
4	Red
7	Gray
3	Brown
6	Black
2	Orange
Shell	FG

(2) Encoder Cables with Connectors on Both Ends

There are two types of encoder cables with connectors on both ends: One for batteryless absolute encoders and one for absolute encoders.

(a) For Batteryless Absolute Encoders

◆ Selection Table

Length (L)	Order Number *1*	
	Standard Cable	Flexible Cable *2 *3
0.3 m, 3 m, 5 m, 10 m, 15 m, 20 m, and 25 m	JWSP-XP1IS0-□□	JWSP-XP1IF0-□□

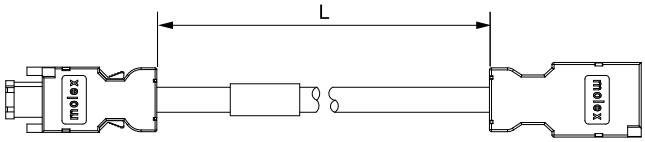
*1 Replace the boxes (□□) in the order number with the cable length (00P3, 03, 05, 10, 15, 20, or 25).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.

Note:

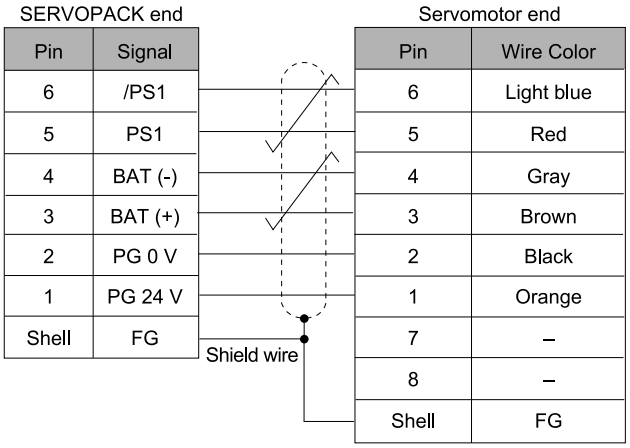
1. When you will relay the encoder cable, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
2. The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.
   You cannot relay cables by combining JZSP-UCMP00-□□-E and JZSP-CSP12-E cables with JWSP-XP1□□□-□□, JWSP-XP2□□□-□□, and JWSP-XP4□□□-□□ cables.

◆ Appearance

SERVOPACK end Servomotor end



◆ Wiring Specifications



Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Pin	Wire Color
6	Light blue
5	Red
4	Gray
3	Brown
2	Black
1	Orange
7	–
8	–
Shell	FG

(b) For absolute encoders

These cables are equipped with a battery unit. (A battery is included.)

Note:

In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

◆ Selection Table

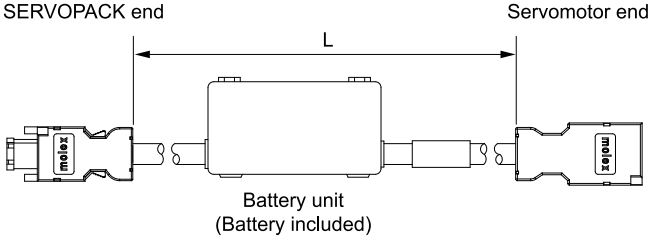
Length (L)	Order Number *1	
	Standard Cable	Flexible Cable *2 *3
0.3 m, 3 m, 5 m, 10 m, 15 m, 20 m, and 25 m	JWSP-XP1AS0-□□	JWSP-XP1AF0-□□

*1 Replace the boxes (□□) in the order number with the cable length (00P3, 03, 05, 10, 15, 20, or 25).
*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. When you will relay the encoder cable, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
2. The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.
   You cannot relay cables by combining JZSP-UCMP00-□□-E and JZSP-CSP12-E cables with JWSP-XP1□□□-□□, JWSP-XP2□□□-□□, and JWSP-XP4□□□-□□ cables.

◆ Appearance



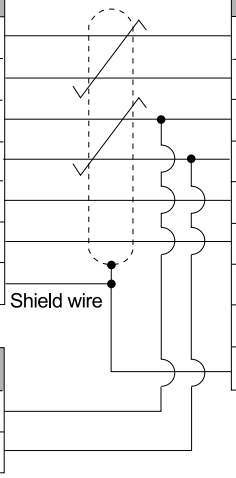
◆ Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Battery Unit

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



Servomotor end

Pin	Wire Color
6	Light blue
5	Red
4	Gray
3	Brown
2	Black
1	Orange
7	–
8	–
Shell	FG

7.6.2 Servomotors with Σ-V Compatible Specifications (When Exceeding 20 m)

If the encoder cable length exceeds 20 m, use by combining the following cables.

- Relay encoder cables
- Relay encoder cables with connectors on both ends
- Relay encoder cables with connectors on both ends and battery unit *1

*1 In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

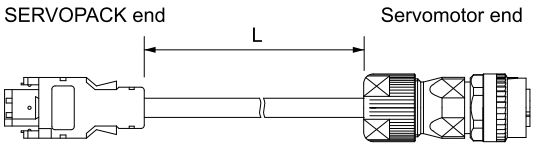
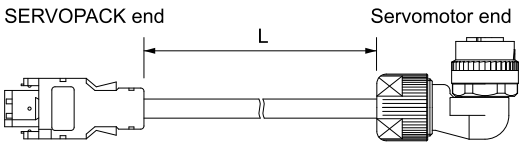
(1) Relay Encoder Cables

(a) Selection Table

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

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

(b) Appearance

Straight Plug	Right-Angle Plug *1
	

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

(c) Wiring Specifications

SERVOPACK end			Servomotor 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	Shield wire	10	FG

Note:

BAT (+) and BAT (-) are wired when using an absolute encoder.

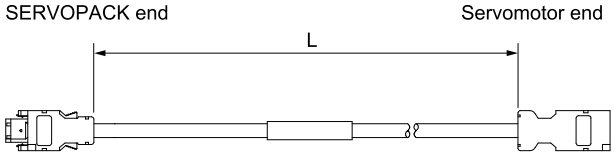
(2) Relay Encoder Cables with Connectors on Both Ends

(a) Selection Table

Specification	Length (L)	Order Number *1
Used for all types of encoders	30 m, 40 m, and 50 m	JZSP-UCMP00-□□-E

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

(b) Appearance



(c) Wiring Specifications

SERVOPACK end

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

Shield wire

Servomotor end

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

(3) Relay Encoder Cables with Connectors on Both Ends and Battery Unit

Note:

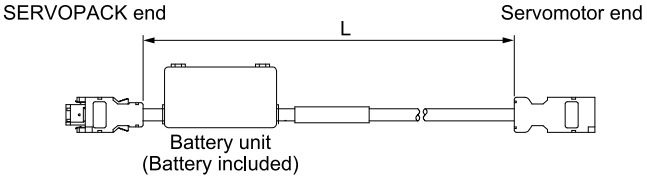
In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

(a) Selection Table

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

(b) Appearance



(c) Wiring Specifications

SERVOPACK end

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

Servomotor end

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

Shield wire

Battery Unit

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

7.7 Wiring Precautions

7.7.1 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.

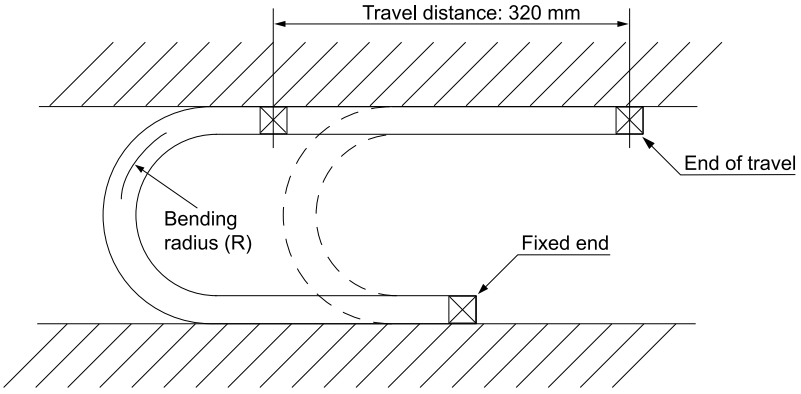
Cable Diameter	Recommended Bending Radius (R)
Less than 8 mm	15 mm min.
8 mm	20 mm min.
Over 8 mm	Cable diameter × 3 mm min.

7.7.2 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) as listed in each selection table 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 affects the performance of the cable sheathing occurs.

- 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.
- If a flexible cable is used in a fixed position, the recommended bending radius is the same as for standard cables. Perform all wiring so that stress is not applied to the cables.

8

Cables and User-Assembled Wiring Materials for SGMXG Rotary Servomotors (1000-min^{-1} Specification)

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8.1 Device Configuration Diagrams

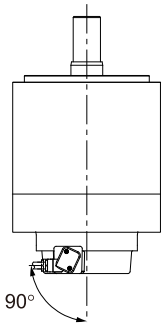
8.1.1 For Standard Specification Servomotors

(1) SGMXG-03A□B (300 W)

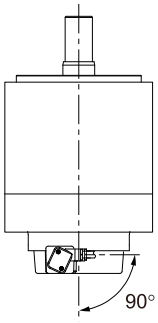
Important

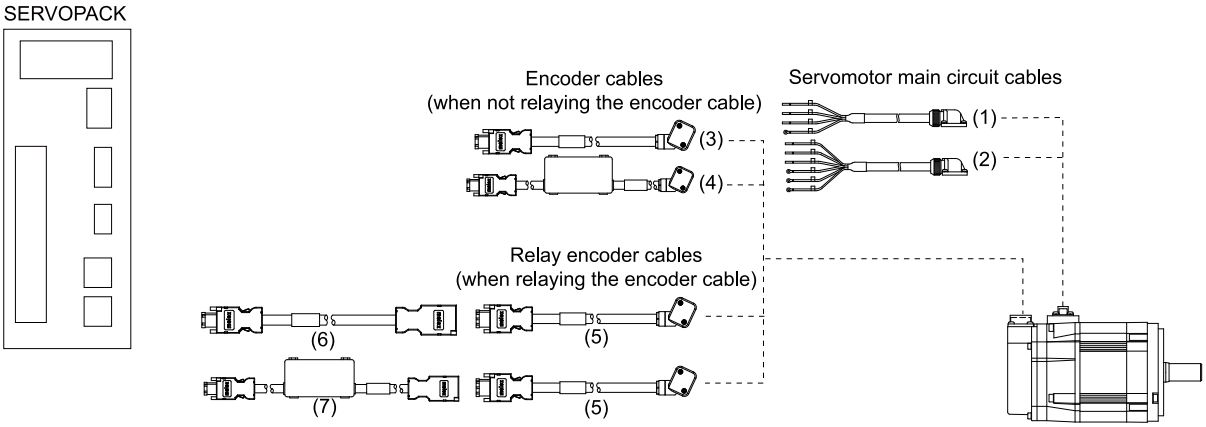
There are different order numbers for encoder cables depending on the cable installation direction. Confirm the order numbers before you order.

Left-side cable installation type



Right-side cable installation type





Note:

When you will relay the encoder cable, connect the cables by combining the encoder cable and the encoder cable with connectors on both ends as shown in (5) to (7) in the figure above.

No.	Cable Type				Reference
(1), (2)	Servomotor main circuit cables *1	Finished product	For servomotors without holding brakes		276
			For servomotors with holding brakes		278
		Fabrication	Connectors		283
			Cables without connectors		283
(3), (4)	Encoder cables (when not relaying the encoder cable)	Finished product	For batteryless absolute encoders		292
			For absolute encoders *2		292
		Fabrication			464
(5) to (7)	Encoder cables (when relaying the encoder cable)	Finished product	–		297
			Connectors on both ends	For batteryless absolute encoders	298
				For absolute encoders *2	299
		Fabrication			464

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

*2 In the following cases, use an encoder cable for batteryless absolute encoders.

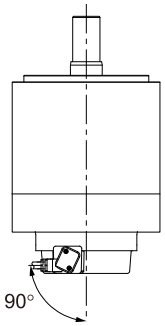
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

Information The cables described in this chapter are used to connect a SERVOPACK to a single servomotor.
Refer to the following chapter for the cables required when connecting the SERVOPACK to multiple devices.
☞ 13 Σ-LINK II-Related Devices on page 417

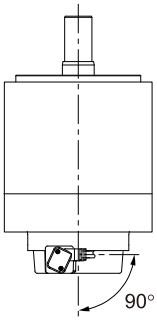
(2) SGMXG-06A□B to -55A□B (600 W to 5.5 kW)

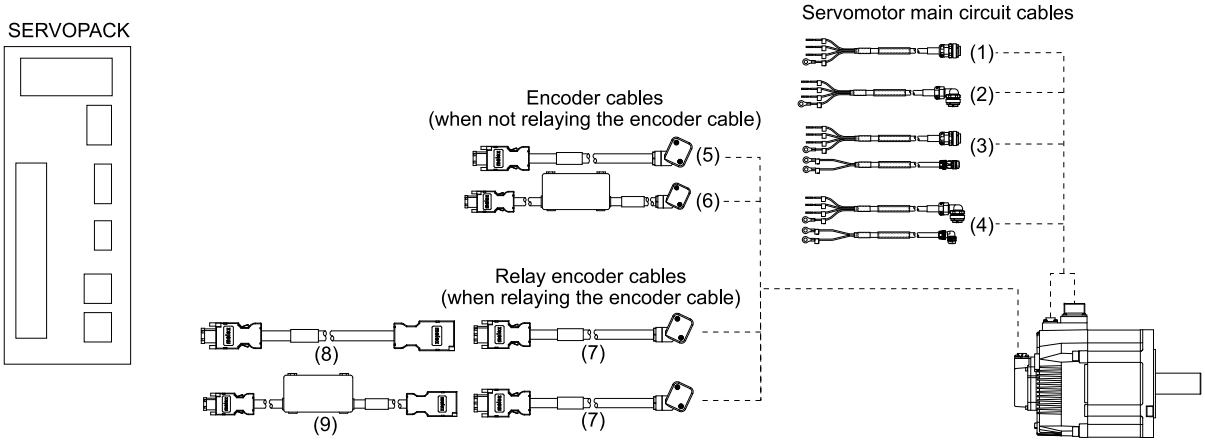
Important There are different order numbers for encoder cables depending on the cable installation direction. Confirm the order numbers before you order.

Left-side cable installation type



Right-side cable installation type





Note:
When you will relay the encoder cable, connect the cables by combining the encoder cable and the encoder cable with connectors on both ends as shown in (7) to (9) in the figure above.

No.	Cable Type				Reference
(1) to (4)	Servomotor main circuit cables *1	Finished product	For servomotors without holding brakes	Straight plug	276
				Right-angle plug *2	
			For servomotors with holding brakes	Straight plug	278
				Right-angle plug *2	
		Fabrication	Connectors		284
			Cables without connectors *3		-
(5), (6)	Encoder cables (when not relaying the encoder cable)	Finished product	For batteryless absolute encoders		292
			For absolute encoders *4		292
		Fabrication			464

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No.	Cable Type				Reference
(7) to (9)	Encoder cables (when relaying the encoder cable)	Finished product	–		297
			Connectors on both ends	For batteryless absolute encoders	298
				For absolute encoders *4	299
		Fabrication			464

*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.
☞ 8.4 User-Assembled Wiring Materials for Servomotor Main Circuit Cables: SGMXG-06A□B to -55A□B on page 284

*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 In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

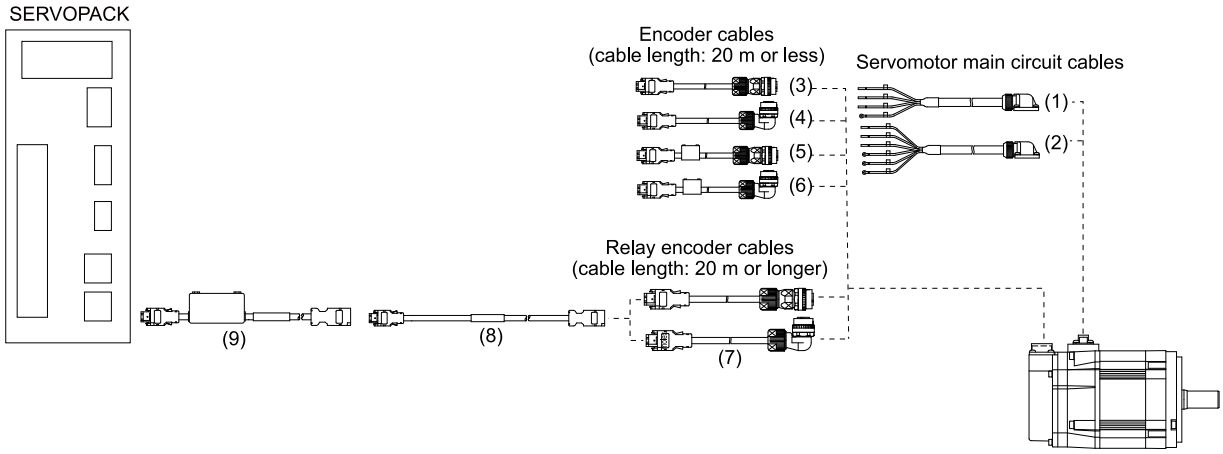
Information The cables described in this chapter are used to connect a SERVOPACK to a single servomotor.

Refer to the following chapter for the cables required when connecting the SERVOPACK to multiple devices.

☞ 13 Σ-LINK II-Related Devices on page 417

8.1.2 For Σ-7 Compatible Specification Servomotors

(1) SGMXG-03A□B (300 W)



Note:

If the encoder cable length exceeds 20 m, connect by combining the following cables as shown in (7) to (9) in the above figure.

- Relay encoder cables
- Relay encoder cables with connectors on both ends
- Relay encoder cables with connectors on both ends and battery unit

No.	Cable Type				Reference
(1), (2)	Servomotor main circuit cables *1	Finished product	For servomotors without holding brakes		276
			For servomotors with holding brakes		278
		Fabrication	Connectors		283
			Cables without connectors		283
(3) to (6)	Encoder cables of 20 m or less	Finished product	For batteryless absolute encoders	Straight plug	294
				Right-angle plug *2	
			For absolute encoders *3	Straight plug	296
				Right-angle plug *2	
		Fabrication			304
(7) to (9)	Relay encoder cables (when exceeds 20 m)	Finished product	Straight plug		301
			Right-angle plug *2		
			Connectors on both ends	–	302
				With battery units *4	303
		Fabrication			304

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

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

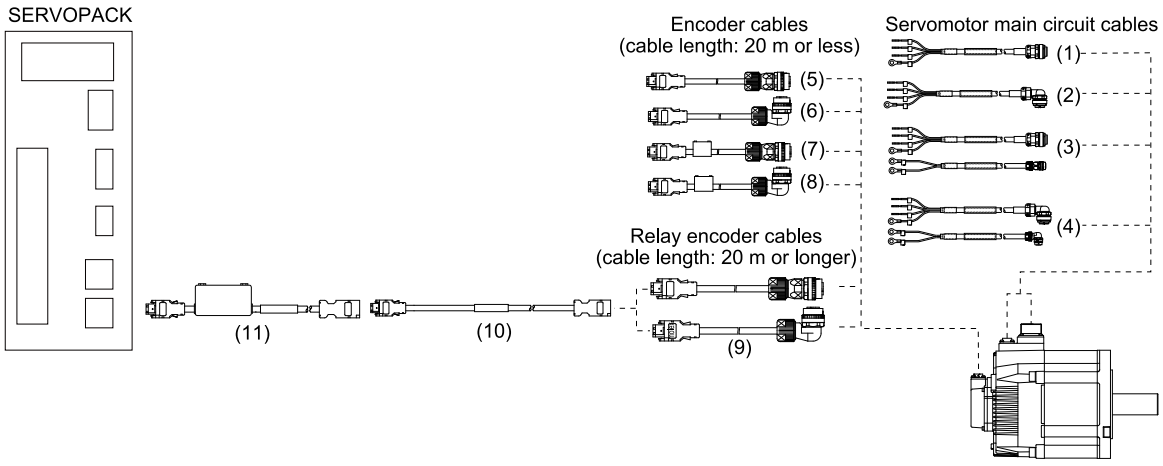
*3 In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

*4 In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

(2) SGMXG-06A□B to -55A□B (600 W to 5.5 kW)



Note:

If the encoder cable length exceeds 20 m, connect by combining the following cables as shown in (9) to (11) in the above figure.

- Relay encoder cables
- Relay encoder cables with connectors on both ends
- Relay encoder cables with connectors on both ends and battery unit

No.	Cable Type				Reference
(1) to (4)	Servomotor main circuit cables *1	Finished product	For servomotors without holding brakes	Straight plug	276
				Right-angle plug *2	
			For servomotors with holding brakes	Straight plug	278
				Right-angle plug *2	
		Fabrication	Connectors		284
			Cables without connectors *3		-
(5) to (8)	Encoder cables of 20 m or less	Finished product	For batteryless absolute encoders	Straight plug	294
				Right-angle plug *2	
			For absolute encoders *4	Straight plug	296
				Right-angle plug *2	
		Fabrication			304
(9) to (11)	Relay encoder cables (when exceeds 20 m)	Finished product	Straight plug		301
			Right-angle plug *2		
			Connectors on both ends	–	302
				With battery units *5	303
		Fabrication			304

*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.

☞ *8.4 User-Assembled Wiring Materials for Servomotor Main Circuit Cables: SGMXG-06A□B to -55A□B on page 284*

*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 In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

*5 In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

8.2 Servomotor Main Circuit Cables

The servomotor main circuit cable for the standard specification servomotor is same as that for the Σ-7 compatible specification servomotor.

There are two types of servomotor main circuit cables: One for servomotors without holding brakes and one for servomotors with holding brakes.

Information SGMXG servomotors can also use the same cables as Σ-7 series rotary servomotors. However, when using a product that conforms to the IP67 degree of protection, use the cables described in this manual. Refer to the following manual for information on the Σ-7-series for rotary servomotor cables.

Σ-7-Series Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

8.2.1 For Servomotors without Holding Brakes

(1) Selection Table

(a) SGMXG-03A□B (300 W)

Servomotor Model	Length (L)	Order Number *1
		Standard (Flexible) Type *2
SGMXG-03A□B 300 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 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 A flexible cable is provided for this cable as standard. 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 other lead installation directions.

Note:

If the length of the servomotor main circuit cable exceeds 20 m, the intermittent duty zone in the torque-rotation speed characteristics will become smaller because the voltage drop increases.

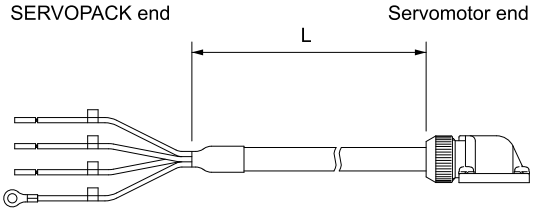
(b) SGMXG-06A□B to 55A□B (600 W to 5.5 kW)

Connector Specifications	Servomotor Model	Length (L)	Order Number *1	
			Standard Cable	Flexible Cable *2 *3
Straight plug	SGMXG-06A□B, -09A□B, -12A□B 600 W, 900 W, 1.2 kW	3 m, 5 m, 10 m, 15 m, 20 m	JWSP-XM15NSS-□□	JWSP-XM15NFS-□□
	SGMXG-20A□B, -30A□B 2.0 kW, 3.0 kW		JWSP-XM30NSS-□□	JWSP-XM30NFS-□□
	SGMXG-40A□B 4.0 kW		JWSP-XM4ANSS-□□	JWSP-XM4ANFS-□□
	SGMXG-55A□B 5.5 kW		JWSP-XM55NSS-□□	JWSP-XM55NFS-□□
Right-angle plug *4	SGMXG-06A□B, -09A□B, -12A□B 600 W, 900 W, 1.2 kW		JWSP-XM15NSL-□□	JWSP-XM15NFL-□□
	SGMXG-20A□B, -30A□B 2.0 kW, 3.0 kW		JWSP-XM30NSL-□□	JWSP-XM30NFL-□□
	SGMXG-40A□B 4.0 kW		JWSP-XM4ANSL-□□	JWSP-XM4ANFL-□□
	SGMXG-55A□B 5.5 kW		JWSP-XM55NSL-□□	JWSP-XM55NFL-□□

*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.

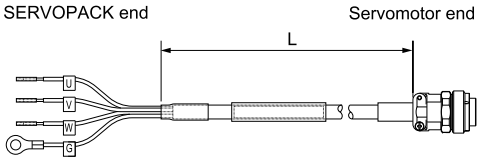
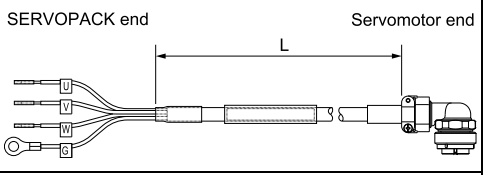
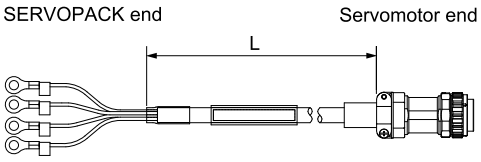
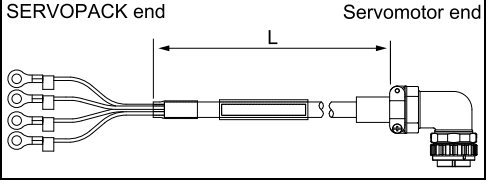
(2) Appearance

(a) SGMXG-03A□B (300 W)



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

(b) SGMXG-06A□B to 55A□B (600 W to 5.5 kW)

Servomotor Model	Straight Plug Connector	Right-Angle Plug *1
SGMXG-06A□B, -09A□B 600 W, 900 W		
SGMXG-12A□B to -55A□B 1.2 kW to 5.5 kW		

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

(3) Wiring Specifications

(a) SGMXG-03A□B (300 W)

SERVOPACK leads / Servomotor connector

Wire Color	Signal	Signal	Pin
Green/yellow	FG	FG	PE
–	–	–	5
–	–	–	4
Red	Phase U	Phase U	3
White	Phase V	Phase V	2
Blue	Phase W	Phase W	1

(b) SGMXG-06A□B to 55A□B (600 W to 5.5 kW)

Standard Cable

SERVOPACK leads / Servomotor main circuit cable connector

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

Flexible Cable

SERVOPACK leads / Servomotor main circuit cable connector

Wire Color	Signal	Signal	Pin
Green/yellow	FG	FG	D
Red	Phase U	Phase U	A
White	Phase V	Phase V	B
Black	Phase W	Phase W	C

8.2.2 For Servomotors with Holding Brakes

(1) Selection Table

(a) SGMXG-03A□B (300 W)

Servomotor Model	Length (L)	Order Number *1
		Flexible Cable *2
SGMXG-03A□B 300 W	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 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 A flexible cable is provided for this cable as standard. 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 other lead installation directions.

Note:

If the length of the servomotor main circuit cable exceeds 20 m, the intermittent duty zone in the torque-rotation speed characteristics will become smaller because the voltage drop increases.

(b) SGMXG-06A□B to 55A□B (600 W to 5.5 kW)

Connector Specifications	Servomotor Model	Length (L)	Order Number *1 *2	
			Standard Cable	Flexible Cable *3 *4
Straight plug	SGMXG-06A□B, -09A□B, -12A□B 600 W, 900 W, 1.2 kW	3 m, 5 m, 10 m, 15 m, 20 m	JWSP-XM15BSS-□□	JWSP-XM15BFS-□□
	SGMXG-20A□B, -30A□B 2.0 kW, 3.0 kW		JWSP-XM30BSS-□□	JWSP-XM30BFS-□□
	SGMXG-40A□B 4.0 kW		JWSP-XM4ABSS-□□	JWSP-XM4ABFS-□□
	SGMXG-55A□B 5.5 kW		JWSP-XM55BSS-□□	JWSP-XM55BFS-□□
Right-angle plug *5	SGMXG-06A□B, -09A□B, -12A□B 600 W, 900 W, 1.2 kW		JWSP-XM15BSL-□□	JWSP-XM15BFL-□□
	SGMXG-20A□B, -30A□B 2.0 kW, 3.0 kW		JWSP-XM30BSL-□□	JWSP-XM30BFL-□□
	SGMXG-40A□B 4.0 kW		JWSP-XM4ABSL-□□	JWSP-XM4ABFL-□□
	SGMXG-55A□B 5.5 kW		JWSP-XM55BSL-□□	JWSP-XM55BFL-□□

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

*2 These are the order numbers for two-cable sets (main power supply cable + holding brake cable).
To order the cables separately, the order number for a single main power supply cable is identical to that for the cable for servomotors without holding brakes.
The order numbers for single cables for servomotors with holding brakes are as follows. A flexible cable is provided for this cable as standard.

- Straight plug: JWSP-XB0FS-□□
- Right-angle plug: JWSP-XB0FL-□□

Note:

If you prefer a cable length from 20 m to 50 m, specify the length by taking into account the following operating conditions.

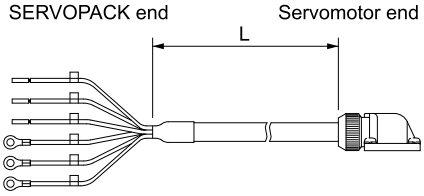
*3 Use flexible cables for moving parts of machines, such as robots.

*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.

(2) Appearance

(a) SGMXG-03A□B (300 W)

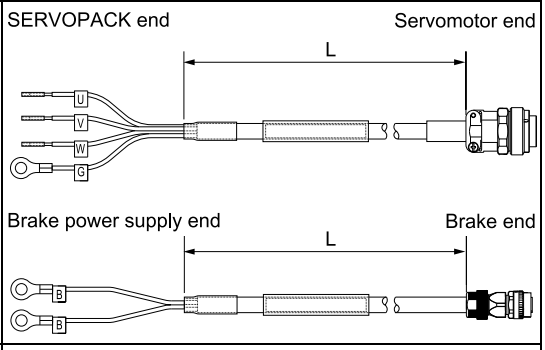
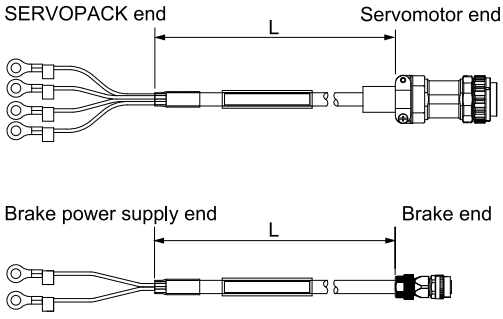


Note:

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

(b) SGMXG-06A□B to 55A□B (600 W to 5.5 kW)

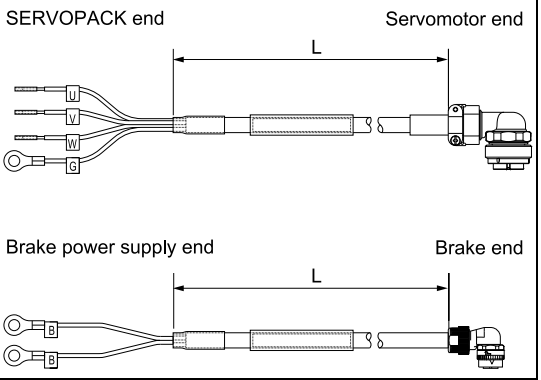
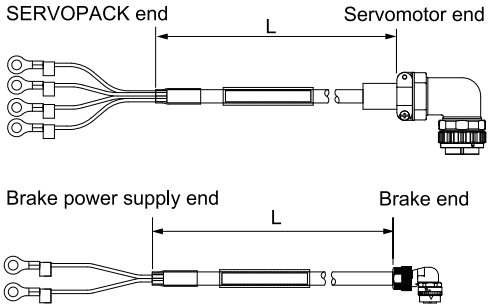
- Straight plug

Servomotor Model	Order Numbers of Main Power Supply Cable and Holding Brake Cable	Individual Cable Order Numbers *1	Appearance
SGMXG-06A□B, -09A□B 600 W, 900 W	Standard cable: JWSP-XM15BSS-□□ Flexible cable: JWSP-XM15BFS-□□	– Main circuit power supply cable Standard cable: JWSP-XM15NSS-□□ Flexible cable: JWSP-XM15NFS-□□ – Holding brake cable JWSP-XB0FS-□□	
SGMXG-12A□B 1.2 kW	Standard cable: JWSP-XM15BSS-□□ Flexible cable: JWSP-XM15BFS-□□	– Main circuit power supply cable Standard cable: JWSP-XM15NSS-□□ Flexible cable: JWSP-XM15NFS-□□ – Holding brake cable JWSP-XB0FS-□□	
SGMXG-20A□B 2.0 kW (when used in combination with the SGDXS-200A)	Standard cable: JWSP-XM30BSS-□□ Flexible cable: JWSP-XM30BFS-□□	– Main circuit power supply cable Standard cable: JWSP-XM30NSS-□□ Flexible cable: JWSP-XM30NFS-□□ – Holding brake cable JWSP-XB0FS-□□	
SGMXG-20A□B, -30A□B 2.0 kW, 3.0 kW	Standard cable: JWSP-XM30BSS-□□ Flexible cable: JWSP-XM30BFS-□□	– Main circuit power supply cable Standard cable: JWSP-XM30NSS-□□ Flexible cable: JWSP-XM30NFS-□□ – Holding brake cable JWSP-XB0FS-□□	
SGMXG-40A□B 4.0 kW	Standard cable: JWSP-XM4ABSS-□□ Flexible cable: JWSP-XM4ABFS-□□	– Main circuit power supply cable Standard cable: JWSP-XM4ANSS-□□ Flexible cable: JWSP-XM4ANFS-□□ – Holding brake cable JWSP-XB0FS-□□	
SGMXG-55A□B 5.5 kW	Standard cable: JWSP-XM55BSS-□□ Flexible cable: JWSP-XM55BFS-□□	– Main circuit power supply cable Standard cable: JWSP-XM55NSS-□□ Flexible cable: JWSP-XM55NFS-□□ – Holding brake cable JWSP-XB0FS-□□	

*1 Flexible cables are provided as a standard for holding brake cables.

- Right-Angle Plug

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

Servomotor Model	Order Numbers of Main Power Supply Cable and Holding Brake Cable	Individual Cable Order Numbers *1	Appearance
SGMXG-06A□B, -09A□B 600 W, 900 W	Standard cable: JWSP-XM15BSL-□□ Flexible cable: JWSP-XM15BFL-□□	– Main circuit power supply cable Standard cable: JWSP-XM15NSL-□□ Flexible cable: JWSP-XM15NFL-□□ – Holding brake cable JWSP-XB0FL-□□	
SGMXG-12A□B 1.2 kW	Standard cable: JWSP-XM15BSL-□□ Flexible cable: JWSP-XM15BFL-□□	– Main circuit power supply cable Standard cable: JWSP-XM15NSL-□□ Flexible cable: JWSP-XM15NFL-□□ – Holding brake cable JWSP-XB0FL-□□	
SGMXG-20A□B 2.0 kW (when used in combination with the SGDXS-200A)	Standard cable: JWSP-XM30BSL-□□ Flexible cable: JWSP-XM30BFL-□□	– Main circuit power supply cable Standard cable: JWSP-XM30NSL-□□ Flexible cable: JWSP-XM30NFL-□□ – Holding brake cable JWSP-XB0FL-□□	
SGMXG-20A□B, -30A□B 2.0 kW, 3.0 kW	Standard cable: JWSP-XM30BSL-□□ Flexible cable: JWSP-XM30BFL-□□	– Main circuit power supply cable Standard cable: JWSP-XM30NSL-□□ Flexible cable: JWSP-XM30NFL-□□ – Holding brake cable JWSP-XB0FL-□□	
SGMXG-40A□B 4.0 kW	Standard cable: JWSP-XM4ABSL-□□ Flexible cable: JWSP-XM4ABFL-□□	– Main circuit power supply cable Standard cable: JWSP-XM4ANSL-□□ Flexible cable: JWSP-XM4ANFL-□□ – Holding brake cable JWSP-XB0FL-□□	
SGMXG-55A□B 5.5 kW	Standard cable: JWSP-XM55BSL-□□ Flexible cable: JWSP-XM55BFL-□□	– Main circuit power supply cable Standard cable: JWSP-XM55NSL-□□ Flexible cable: JWSP-XM55NFL-□□ – Holding brake cable JWSP-XB0FL-□□	

*1 Flexible cables are provided as a standard for holding brake cables.

(3) Wiring Specifications

(a) SGMXG-03A□B (300 W)

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

Note:

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

(b) SGMXG-06A□B to 55A□B (600 W to 5.5 kW)

Standard Cable

SERVOPACK leads		Servomotor main circuit cable connector	
Wire Color	Signal	Signal	Pin
Green	FG	FG	D
Red	Phase U	Phase U	A
White	Phase V	Phase V	B
Black	Phase W	Phase W	C
Black	Brake	Brake	1
White	Brake	Brake	2

Flexible Cable

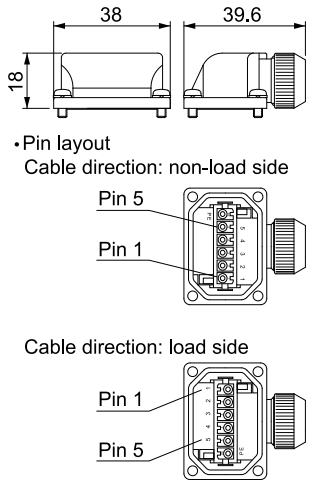
SERVOPACK leads		Servomotor main circuit cable connector	
Wire Color	Signal	Signal	Pin
Green/yellow	FG	FG	D
Red	Phase U	Phase U	A
White	Phase V	Phase V	B
Black	Phase W	Phase W	C
Black	Brake	Brake	1
White	Brake	Brake	2

Note:

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

8.3 User-Assembled Wiring Materials for Servomotor Main Circuit Cables: SGMXG-03A□B

8.3.1 Servomotor Connector Kits

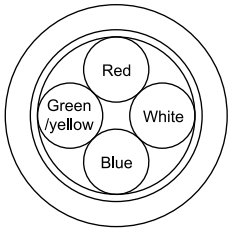
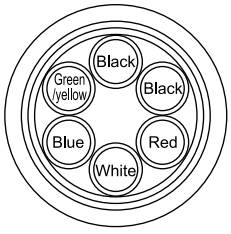
Item		Description	External Dimensions [mm]
Order Number		JZSP-CVM9-1-E	
Manufacturer		Japan Aviation Electronics Industry, Ltd.	
Instructions		JAHL-50020	
Components	Plug	JNYFX06SJ3	
	Contacts	ST-TMH-S-C1B	
Applicable Wire Sizes		AWG18 to AWG22	
Applicable Cable Diameter		6.9 mm to 8.3 mm	
Outer Diameter of Insulating Sheath		1.3 mm to 1.8 mm	
Mounting Screws		M3 pan-head screws	
Crimping Tool *1	Hand Tool	CT170-14-TMH5B	

*1 A crimping tool is required. Contact the connector manufacturer for details.

Note:

Cables are not included. Purchase them separately.

8.3.2 Cables without Connectors

Item	For Servomotors without Holding Brakes (4 Leads)	For Servomotors with Holding Brakes (6 Leads)
Order Number *1	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		

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

Note:

Flexible type wiring materials.

8.4 User-Assembled Wiring Materials for Servomotor Main Circuit Cables: SGMXG-06A□B to -55A□B

The servomotor main circuit cable for the standard specification servomotor is same as that for the Σ-7 compatible specification servomotor.

If you need standard-structure servomotor connectors, consult your Yaskawa representative.

To fabricate the cables, refer to this section.

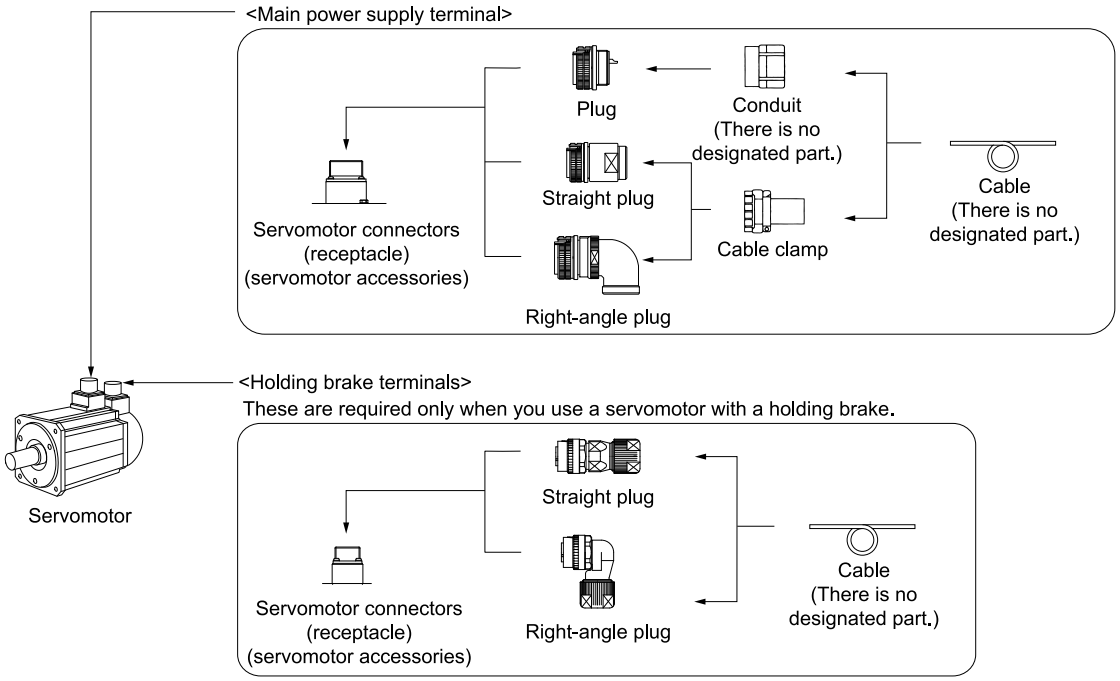
To purchase cables with connectors, refer to the following section.

☞ *8.2 Servomotor Main Circuit Cables on page 276*

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.

8.4.1 Connector Configurations



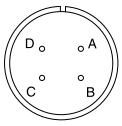
The references for each terminal are shown in the following table.

Item	Reference
Main Power Supply Terminal	☞ *8.4.2 Main Power Supply Terminal on page 284*
Holding Brake Terminals	☞ *8.4.3 Holding Brake Terminals on page 287*

8.4.2 Main Power Supply Terminal

(1) Servomotor Connector (Receptacle)

This connector is an accessory to the servomotor.

Servomotor Model	Capacity	Servomotor Connector Models	Connector Surface
SGMXG-06A□B SGMXG-09A□B SGMXG-12A□B	600 W to 1.2 kW	JL10-2E18-10PCE (MS connector model: MS3102A18-10P)	
SGMXG-20A□B SGMXG-30A□B	2.0 kW to 3.0 kW	JL10-2E22-22PCE (MS connector model: MS3102A22-22P)	
SGMXG-40A□B SGMXG-55A□B	4.0 kW to 5.5 kW	JL10-2E32-17PCE (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.

(2) 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.

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

Servomotor Model	Capacity	Order Number			Manufacturer
		Plug		Cable Clamp	
SGMXG-06A□B SGMXG-09A□B SGMXG-12A□B	600 W to 1.2 kW	Straight	D/MS3106B18-10S	D/MS3057-10A	Fujikura Ltd.
			N/MS3106B18-10S	N/MS3057-10A	Japan Aviation Electronics Industry, Ltd.
		Right-angle	D/MS3108B18-10S	D/MS3057-10A	Fujikura Ltd.
			N/MS3108B18-10S	N/MS3057-10A	Japan Aviation Electronics Industry, Ltd.
SGMXG-20A□B SGMXG-30A□B	2.0 kW to 3.0 kW	Straight	D/MS3106B22-22S	D/MS3057-12A	Fujikura Ltd.
			N/MS3106B22-22S	N/MS3057-12A	Japan Aviation Electronics Industry, Ltd.
		Right-angle	D/MS3108B22-22S	D/MS3057-12A	Fujikura Ltd.
			N/MS3108B22-22S	N/MS3057-12A	Japan Aviation Electronics Industry, Ltd.
SGMXG-40A□B SGMXG-55A□B	4.0 kW to 5.5 kW	Straight	D/MS3106B32-17S	D/MS3057-20A	Fujikura Ltd.
			N/MS3106B32-17S	N/MS3057-20A	Japan Aviation Electronics Industry, Ltd.
		Right-angle	D/MS3108B32-17S	D/MS3057-20A	Fujikura Ltd.
			N/MS3108B32-17S	N/MS3057-20A	Japan Aviation Electronics Industry, Ltd.

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

Servomotor Model	Capacity	Order Number			Manufacturer
		Plug *1		Cable Clamp *2 *3	
SGMXG-06A□B SGMXG-09A□B SGMXG-12A□B	600 W to 1.2 kW	Single	JL10-6A18-10SE (One-touch mating) JL04V-6A18-10SE (Screw mating)	Not required.	Japan Aviation Electronics Industry, Ltd.
		Straight	JL10-6A18-10SE-EB (One-touch mating) JL04V-6A18-10SE-EB (Screw mating)	JL04-18CK(07)-RK JL04-18CK(10)-R JL04-18CK(13)-R	
		Right-angle	JL10-8A18-10SE-EB (One-touch mating) JL04V-8A18-10SE-EBH (Screw mating)	JL04-18CK(07)-RK JL04-18CK(10)-R JL04-18CK(13)-R	
SGMXG-20A□B SGMXG-30A□B	2.0 kW to 3.0 kW	Single	JL10-6A22-22SE (One-touch mating) JL04V-6A22-22SE (Screw mating)	Not required.	
		Straight	JL10-6A22-22SE-EB1 (One-touch mating) JL04V-6A22-22SE-EB1 (Screw mating)	JL04-2428CK(11)-R JL04-2428CK(14)-R JL04-2428CK(17)-R JL04-2428CK(20)-R	
		Right-angle	JL10-8A22-22SE-EB1 (One-touch mating) JL04V-8A22-22SE-EB1H (Screw mating)	JL04-2428CK(11)-R JL04-2428CK(14)-R JL04-2428CK(17)-R JL04-2428CK(20)-R	
SGMXG-40A□B SGMXG-55A□B	4.0 kW to 5.5 kW	Single	JL10-6A32-17SE (One-touch mating) JL04V-6A32-17SE (Screw mating)	Not required.	
		Straight	JL10-6A32-17SE-EB (One-touch mating) JL04V-6A32-17SE-EB (Screw mating)	JL04-32CK(24)-RK	
		Right-angle	JL10-8A32-17SE-EB (One-touch mating) Contact the manufacturer for screw mating types.	JL04-32CK(24)-RK	

*1 If there is concern about the effect of vibrations on the equipment, use of the JL04V (screw mating) is recommended.
*2 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.
*3 The applicable cable diameters of the cable clamps are as follows.

Order Number	Applicable Cable Diameter [mm]
JL04-18CK(07)-RK	5 to 8
JL04-18CK(10)-R	8 to 11
JL04-18CK(13)-R	11 to 14.1
JL04-2428CK(11)-R	9 to 12
JL04-2428CK(14)-R	12 to 15

Continued on next page.

Continued from previous page.

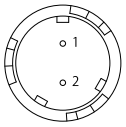
Order Number	Applicable Cable Diameter [mm]
JL04-2428CK(17)-R	15 to 18
JL04-2428CK(20)-R	18 to 20
JL04-32CK(24)-RK	22 to 25

8.4.3 Holding Brake Terminals

These are required only when you use a servomotor with a holding brake.

(1) Servomotor Connector (Receptacle)

This connector is an accessory to the servomotor.

Servomotor Model	Capacity	Servomotor Connector Models	Connector Surface
SGMXG-06A□B SGMXG-09A□B SGMXG-12A□B SGMXG-20A□B SGMXG-30A□B SGMXG-40A□B SGMXG-55A□B	600 W to 5.5 kW	CMV1Y-R2P-0(F)	

(2) Cable-Side Connectors (Plug)

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

Servomotor Model	Capacity	Order Number *1 *2		Applicable Cable Diameter (Reference)	Manufacturer
SGMXG-06A□B SGMXG-09A□B SGMXG-12A□B SGMXG-20A□B SGMXG-30A□B SGMXG-40A□B SGMXG-55A□B	600 W to 5.5 kW	Straight	CMV1-SP2S-S (One-touch mating) CMV1S-SP2S-S (Screw mating)	4.0 mm to 6.0 mm	Fujikura Ltd.
			CMV1-SP2S-M1 (One-touch mating) CMV1S-SP2S-M1 (Screw mating)	5.5 mm to 7.5 mm	
			CMV1-SP2S-M2 (One-touch mating) CMV1S-SP2S-M2 (Screw mating)	7.0 mm to 9.0 mm	
			CMV1-SP2S-L (One-touch mating) CMV1S-SP2S-L (Screw mating)	9.0 mm to 11.6 mm	
		Right-angle	CMV1-AP2S-S (One-touch mating) CMV1S-AP2S-S (Screw mating)	4.0 mm to 6.0 mm	
			CMV1-AP2S-M1 (One-touch mating) CMV1S-AP2S-M1 (Screw mating)	5.5 mm to 7.5 mm	
			CMV1-AP2S-M2 (One-touch mating) CMV1S-AP2S-M2 (Screw mating)	7.0 mm to 9.0 mm	
			CMV1-AP2S-L (One-touch mating) CMV1S-AP2S-L (Screw mating)	9.0 mm to 11.6 mm	

*1 If there is concern about the effect of vibrations on the equipment, use of the CMV1S (screw mating) is recommended.

*2 This order number is compatible with the CM10 series order number used in the Σ-7 series.
For details on the CM10 series order numbers, refer to the following manual.

Σ-7-Series Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

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

JZSP-CVB9-S M S2-E

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

*1 Crimping tool: A 357J-53164T from Fujikura Ltd. is required.

• Other connector specifications

Item	Specification
Contact Models	■ Loose Contacts (100 per bag) – Crimped contacts: CMV1-#22BSC-C3-100 Wire size: AWG16 to AWG20, outer diameter of insulating sheath: 1.87 mm to 2.45 mm Manual crimping tool: 357J-53164T – Soldered contacts: CMV1-#22BSC-S2-100 Wire size: AWG16 max., outer diameter of insulating sheath: 3 mm max. ■ Reeled Contacts (4,000 per reel) Crimped contacts: CMV1-#22BSC-C3-4000 Wire size: AWG16 to AWG20, outer diameter of insulating sheath: 1.87 mm to 2.45 mm Semi-automatic crimping tool: AP-A53210T-A (set), AP-A53210T (applicator) **Note:** The semi-automatic tool set includes the press and applicator (crimper).

Note:

Purchase the contact pins separately. Consider the wiring type and the applicable wire size when you select the contact pins.

8.4.4 Connector External Dimensions

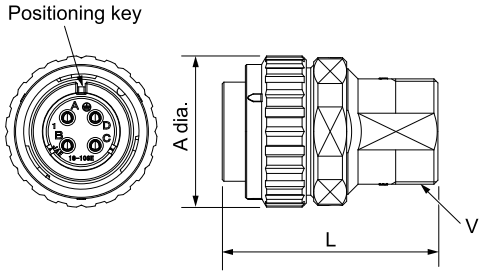
The external dimensions of connectors compliant with an IP67 protective structure and European safety standard compliant type are shown below.

Select the connector model by referring to the following sections for information on the standard environment type connector.

☞ *(a) Standard Environment Type: Cable-Side Connectors (Plug) on page 285*

(1) Main Power Supply Terminal

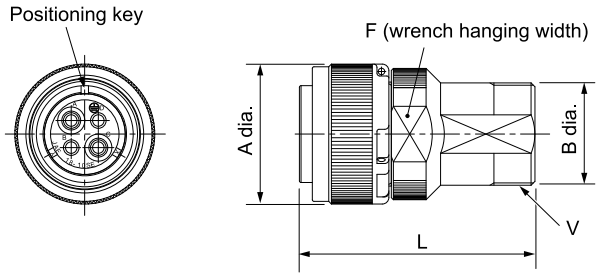
(a) Straight Plug: One-Touch Mating (from Japan Aviation Electronics Industry, Ltd.)



Unit: mm

Model	Shell Size	Connecting Nut Outer Diameter A ± 0.8 Dia.	Total Length L ± 0.8	Cable Clamp Mounting Screws V
JL10-6A18-10SE-EB	18	35.85	51.05	1-20UNEF-2A
JL10-6A22-22SE-EB1	22	42.2	74.35	1-7/16-18UNEF-2A
JL10-6A32-17SE-EB	32	58.6	99.6	1-3/4-18UNS-2A

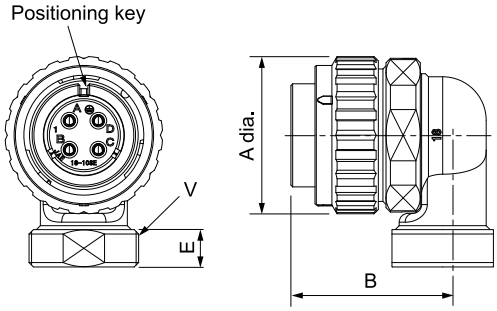
(b) Straight Plug: Screw Mating (from Japan Aviation Electronics Industry, Ltd.)



Unit: mm

Model	Shell Size	Connecting Nut Outer Diameter A ± 0.8 Dia.	B Dia.	Total Length L ± 0.8	F ± 0.5	Cable Clamp Mounting Screws V
JL04V-6A18-10SE-EB	18	34.1	25	57.4	29	1-20UNEF-2A
JL04V-6A22-22SE-EB1	22	40.5	36.4	78	35	1-7/16-18UNEF-2A
JL04V-6A32-17SE-EB	32	56.3	44	105.9	51	1-3/4-18UNS-2A

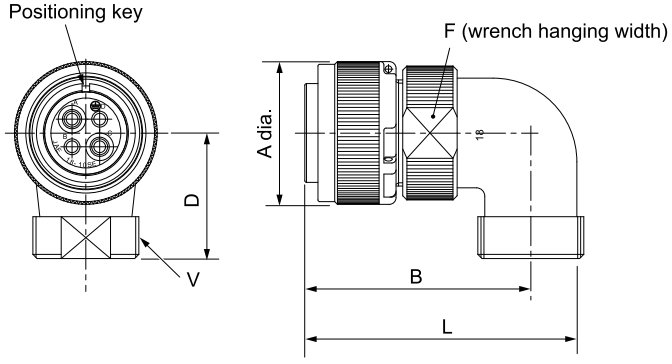
(c) Right-Angle Plug: One-Touch Mating (from Japan Aviation Electronics Industry, Ltd.)



Unit: mm

Model	Shell Size	Connecting Nut Outer Diameter A ± 0.8 Dia.	B ± 0.8	E ± 0.5	Cable Clamp Mounting Screws V
JL10-8A18-10SE-EB	18	35.85	34.55	8.5	1-20UNEF-2A
JL10-8A22-22SE-EB1	22	42.2	51.6	10	1-7/16-18UNEF-2A
JL10-8A32-17SE-EB	32	58.6	66.9	10	1-3/4-18UNS-2A

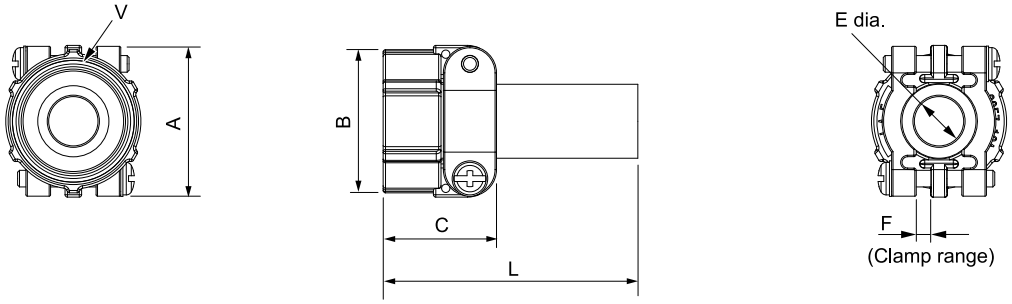
(d) Right-Angle Plug: Screw Mating (from Japan Aviation Electronics Industry, Ltd.)



Unit: mm

Model	Shell Size	Connecting Nut Outer Diameter A ± 0.8 Dia.	B ± 0.8	Total Length L ± 0.8	D ± 0.8	F ± 0.5	Cable Clamp Mounting Screws V
JL04V-8A18-10SE-EBH	18	34.1	54	65.6	30	32	1-20UNEF-2A
JL04V-8A22-22SE-EB1H	22	40.5	59	76.2	42	38	1-7/16-18UNEF-2A

(e) Cable Clamp (from Japan Aviation Electronics Industry, Ltd.)

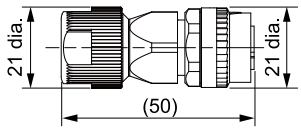
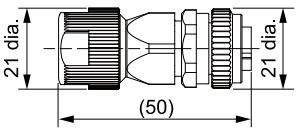


Unit: mm

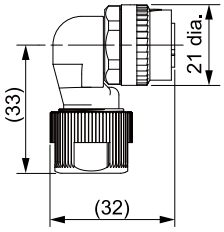
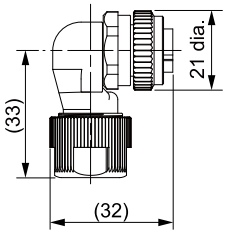
Model	A ± 0.8 Dia.	Outer Diameter B ± 0.8	C ± 0.3	Total Length L ± 0.3	Bushing Inner Diameter E ± 0.3 Dia.	F	Mounting Screws V	Applicable Cable Diameter (Reference)
JL04-18CK(07)-RK	31.8	30.2	24.1	53.8	8	3.2	1-20UNEF-2B	5 to 8
JL04-18CK(10)-R					11			8 to 11
JL04-18CK(13)-R					14.1			11 to 14.1
JL04-2428CK(11)-R	42.9	42.1	26.2	56.2	12	4.8	1-7/16-18UNEF-2B	9 to 12
JL04-2428CK(14)-R					15			12 to 15
JL04-2428CK(17)-R					18			15 to 18
JL04-2428CK(20)-R					21			18 to 20
JL04-32CK(24)-RK	51.6	51.6	27.8	57.8	25	6.4	1-3/4-18UNS-2B	22 to 25

(2) Holding Brake Terminals (from Fujikura Ltd.)

- Straight plug

CMV1-SP2S-□□ (One-touch mating)	CMV1S-SP2S-□□S (Screw mating)
	

- Right-angle plug

CMV1-AP2S-□□ (One-touch mating)	CMV1S-AP2S-□□ (Screw mating)
	

8.5 Encoder Cables (When Not Relaying the Encoder Cable)

The encoder cable for the standard specification servomotor is different than that for the Σ-7 compatible specification servomotor.

8.5.1 For Standard Specification Servomotors

There are two types of encoder cables that are used with standard specification servomotors: One for batteryless absolute encoders and one for absolute encoders.

(1) For Batteryless Absolute Encoders

(a) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Left side	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JWSP-XP2IS1-□□	JWSP-XP2IF1-□□
Right side		JWSP-XP2IS2-□□	JWSP-XP2IF2-□□

*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 46 mm or larger.

Note:

The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.

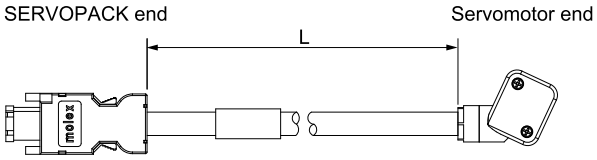
You cannot relay cables by connecting JZSP-UCMP00-□□-E or JZSP-CSP12-E cables.

Information A cable installation direction on the right side or left side refers to the cable installation direction when viewed from the connector side with the shaft at the top.

Refer to the following section for details on the cable installation direction.

☞ *8.1.1 For Standard Specification Servomotors on page 271*

(b) Appearance



(c) Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Shield wire

Servomotor end

Pin	Wire Color
5	Light blue
4	Red
7	Gray
3	Brown
6	Black
2	Orange
8	–
9	–
Shell	FG

(2) For absolute encoders

These cables are equipped with a battery unit. (A battery is included.)

Note:

In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

(a) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Left side	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JWSP-XP2AS1-□□	JWSP-XP2AF1-□□
Right side		JWSP-XP2AS2-□□	JWSP-XP2AF2-□□

*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 46 mm or larger.

Note:

The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.

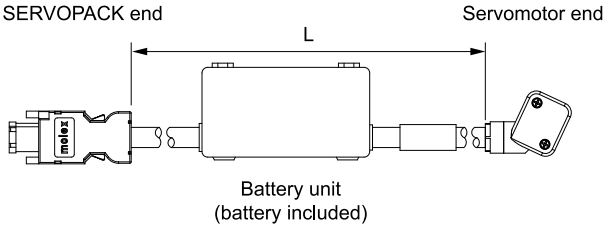
You cannot relay cables by connecting JZSP-UCMP00-□□-E or JZSP-CSP12-E cables.

Information A cable installation direction on the right side or left side refers to the cable installation direction when viewed from the connector side with the shaft at the top.

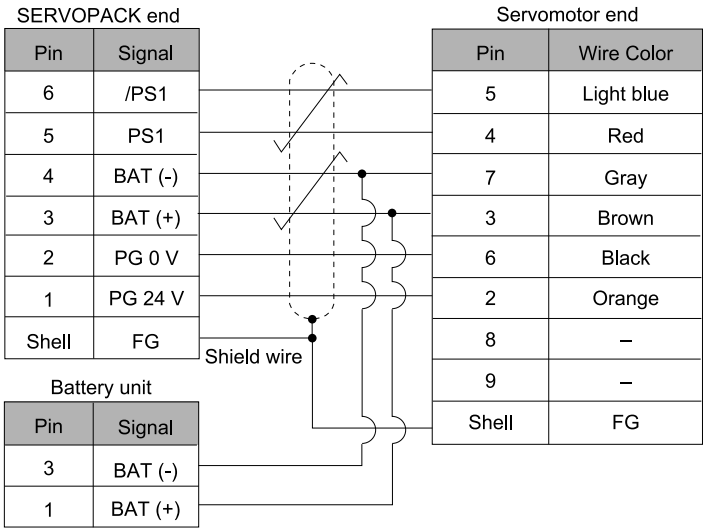
Refer to the following section for details on the cable installation direction.

☞ *8.1.1 For Standard Specification Servomotors on page 271*

(b) Appearance



(c) Wiring Specifications



8.5.2 Servomotors with Σ-7 Compatible Specifications (20 m or Less)

There are two types of encoder cables that are used with Σ-7 compatible specification servomotors: One for batteryless absolute encoders and one for absolute encoders.

Information Σ-7 compatible specification servomotors can also use the same cables as Σ-7 series rotary servomotors. Refer to the following manual for information on the Σ-7-series for rotary servomotor cables.

Σ-7-Series Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

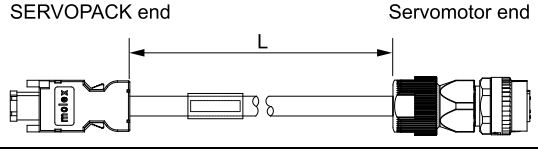
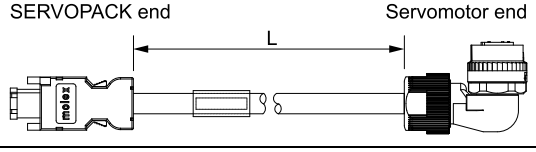
(1) For Batteryless Absolute Encoders

(a) Selection Table

Connector Specifications	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Straight plug	3 m, 5 m, 10 m, 15 m, 20 m	JWSP-XPISS-□□	JWSP-XPIFS-□□
Right-angle plug *4		JWSP-XPISL-□□	JWSP-XPIFL-□□

*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.

(b) Appearance

Straight Plug	Right-Angle Plug *1
	

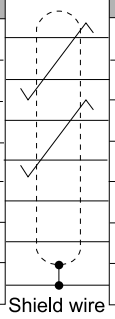
*1 The lead installation direction is away from the load. Consult your Yaskawa representative for other lead installation directions.

(c) Wiring Specifications

Standard Cable

SERVOPACK end

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



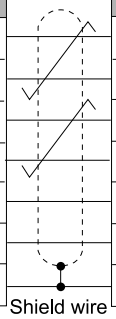
Servomotor end

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

Flexible Cable

SERVOPACK end

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



Servomotor end

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

(2) For absolute encoders

These cables are equipped with a battery unit. (A battery is included.)

Note:

In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

Install a battery at either the host controller or on the encoder cable.

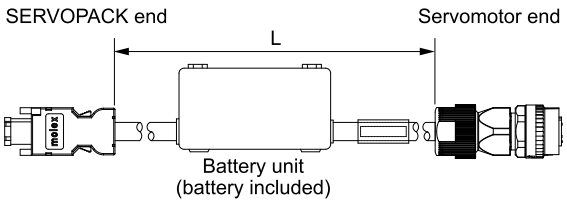
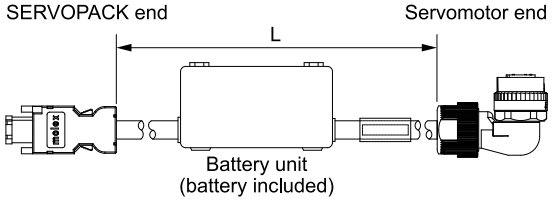
If you install batteries both at the host controller and on the encoder cable at the same time, you will create a loop circuit between the batteries, and this may result in a fire from product failure or damage that causes death or serious injury.

(a) Selection Table

Connector Specifications	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Straight plug	3 m, 5 m, 10 m, 15 m, 20 m	JWSP-XPASS-□□	JWSP-XPAFS-□□
Right-angle plug *4		JWSP-XPASL-□□	JWSP-XPAFL-□□

*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.

(b) Appearance

Straight Plug	Right-Angle Plug *1
	

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

(c) Wiring Specifications

Standard Cable

SERVOPACK end

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

Servomotor end

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

Shield wire

Battery unit

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

Flexible Cable

SERVOPACK end

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

Servomotor end

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

Shield wire

Battery unit

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

8.6 Encoder Cables (When Relaying the Encoder Cable)

The encoder cable for relaying for the standard specification servomotor is different than that for the Σ-7 compatible specification servomotor.

8.6.1 For Standard Specification Servomotors

When you will relay the encoder cable, connect the cables by combining an encoder cable and an encoder cable with connectors on both ends.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

(1) Encoder Cables

(a) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
Left side	0.3 m, 1 m, 3 m, 5 m, 10 m, 15 m, 20 m, 25 m, 30 m, 40 m, 50 m	JWSP-XP3IS1-□□	JWSP-XP3IF1-□□
Right side		JWSP-XP3IS2-□□	JWSP-XP3IF2-□□

*1 Replace the boxes (□□) in the order number with the cable length (00P3, 01, 03, 05, 10, 15, 20, 25, 30, 40, or 50).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.

Note:

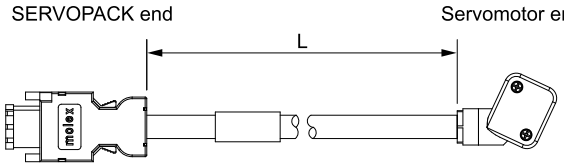
1. When you will relay the encoder cable, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
2. The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.
   You cannot relay cables by combining JZSP-UCMP00-□□-E and JZSP-CSP12-E cables with JWSP-XP1□□□-□□, JWSP-XP2□□□-□□, and JWSP-XP4□□□-□□ cables.

Information A cable installation direction on the right side or left side refers to the cable installation direction when viewed from the connector side with the shaft at the top.

Refer to the following section for details on the cable installation direction.

☞ *8.1.1 For Standard Specification Servomotors on page 271*

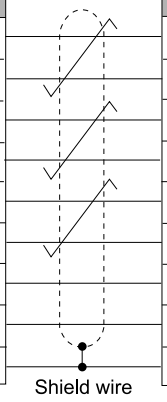
(b) Appearance



(c) Wiring Specifications

SERVOPACK end

Pin	Signal
8	/PS2
7	PS2
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG



Servomotor end

Pin	Wire Color
9	White
8	Yellow
5	Light blue
4	Red
7	Gray
3	Brown
6	Black
2	Orange
Shell	FG

(2) Encoder Cables with Connectors on Both Ends

There are two types of encoder cables with connectors on both ends: One for batteryless absolute encoders and one for absolute encoders.

(a) For Batteryless Absolute Encoders

◆ Selection Table

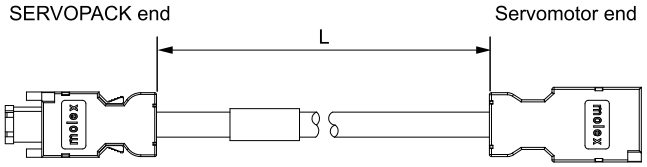
Length (L)	Order Number *1	
	Standard Cable	Flexible Cable *2 *3
0.3 m, 3 m, 5 m, 10 m, 15 m, 20 m, and 25 m	JWSP-XP1IS0-□□	JWSP-XP1IF0-□□

*1 Replace the boxes (□□) in the order number with the cable length (00P3, 03, 05, 10, 15, 20, or 25).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.

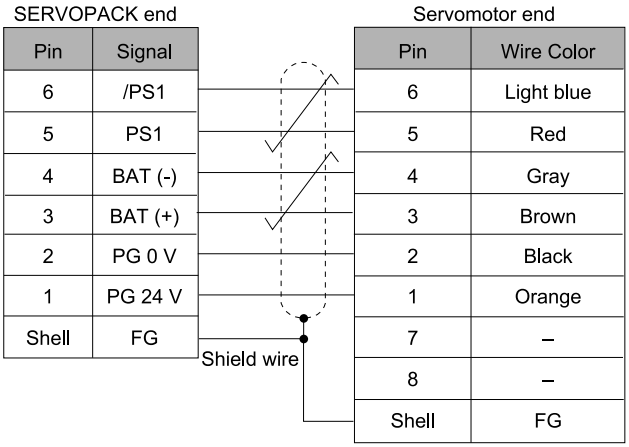
Note:

1. When you will relay the encoder cable, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
2. The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.
   You cannot relay cables by combining JZSP-UCMP00-□□-E and JZSP-CSP12-E cables with JWSP-XP1□□□-□□, JWSP-XP2□□□-□□, and JWSP-XP4□□□-□□ cables.

◆ Appearance



◆ Wiring Specifications



Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Pin	Wire Color
6	Light blue
5	Red
4	Gray
3	Brown
2	Black
1	Orange
7	–
8	–
Shell	FG

(b) For absolute encoders

These cables are equipped with a battery unit. (A battery is included.)

Note:

In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

◆ Selection Table

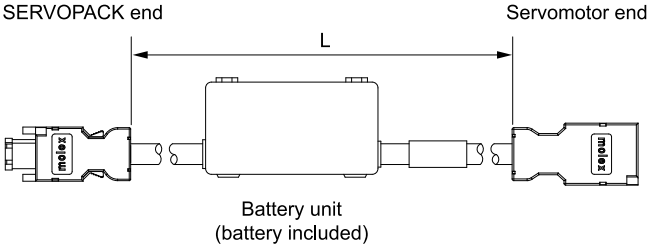
Length (L)	Order Number *1	
	Standard Cable	Flexible Cable *2 *3
0.3 m, 3 m, 5 m, 10 m, 15 m, 20 m, and 25 m	JWSP-XP1AS0-□□	JWSP-XP1AF0-□□

*1 Replace the boxes (□□) in the order number with the cable length (00P3, 03, 05, 10, 15, 20, or 25).
*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. When you will relay the encoder cable, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
2. The precautions when moving from the Σ-V/Σ-7 series to the Σ-X series are listed below.
   You cannot relay cables by combining JZSP-UCMP00-□□-E and JZSP-CSP12-E cables with JWSP-XP1□□□-□□, JWSP-XP2□□□-□□, and JWSP-XP4□□□-□□ cables.

◆ Appearance



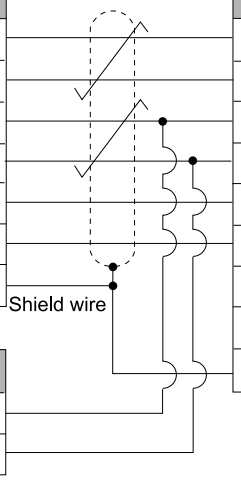
◆ Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Battery unit

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



Servomotor end

Pin	Wire Color
6	Light blue
5	Red
4	Gray
3	Brown
2	Black
1	Orange
7	–
8	–
Shell	FG

8.6.2 Servomotors with Σ-7 Compatible Specifications (When Exceeding 20 m)

If the encoder cable length exceeds 20 m, use by combining the following cables.

- Relay encoder cables
- Relay encoder cables with connectors on both ends
- Relay encoder cables with connectors on both ends and battery unit *1

*1 In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

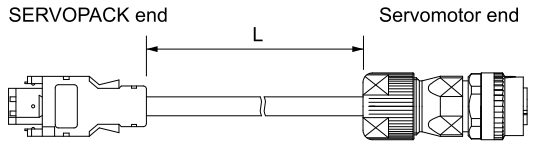
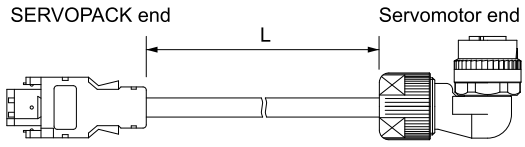
(1) Relay Encoder Cables

(a) Selection Table

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

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

(b) Appearance

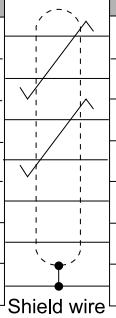
Straight Plug	Right-Angle Plug *1
	

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

(c) Wiring Specifications

SERVOPACK end

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



Servomotor end

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

Note:

BAT (+) and BAT (-) are wired when using an absolute encoder.

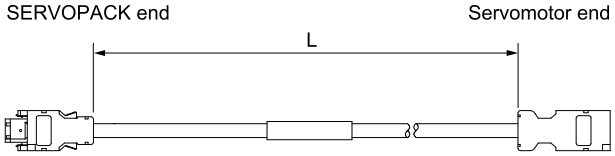
(2) Relay Encoder Cables with Connectors on Both Ends

(a) Selection Table

Specification	Length (L)	Order Number *1
Used for all types of encoders.	30 m, 40 m, and 50 m	JZSP-UCMP00-□□-E

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

(b) Appearance



(c) Wiring Specifications

SERVOPACK end

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

Shield wire

Servomotor end

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

(3) Relay Encoder Cables with Connectors on Both Ends and Battery Unit

Note:

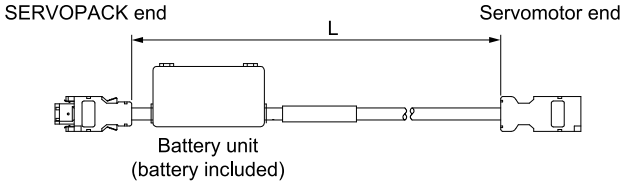
In the following cases, these cables are not required.

- When using a servomotor equipped with a batteryless absolute encoder.
- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

(a) Selection Table

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

(b) Appearance



(c) Wiring Specifications

SERVOPACK end

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

Shield wire

Servomotor end

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

Battery unit

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

8.7 User-Assembled Wiring Materials for Encoder Cables

The wiring materials for user-assembled encoder cables described in this section are used for Σ-7 compatible specification servomotors.

Refer to the following section for details on the user-assembled wiring materials for encoder cables of standard specification servomotors.

☞ *13.6 User-Assembled Wiring Materials for Encoder Cables on page 464*

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

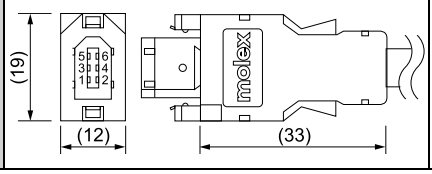
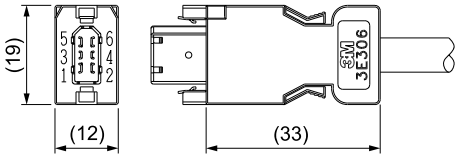
When using encoder cables with a wiring length of 30 m to 50 m, it is necessary to fabricate two different types of cables.

Cables to Be Fabricated	Connectors and Wire Materials Required for Fabrication	Reference	Remarks
Motor-End Relay Encoder Cables	SERVOPACK connector	☞ *8.7.2 SERVOPACK Connector Kits on page 304*	This cable should be 0.3 m or less.
	Servomotor connectors	☞ *8.7.3 Encoder Cable Connector Kits on page 305*	
	Encoder cables of 20 m or less	☞ *8.7.4 Cables without Connectors on page 306*	
SERVOPACK-End Relay Encoder Cables	SERVOPACK connector	☞ *8.7.2 SERVOPACK Connector Kits on page 304*	This cable should be 50 m or less.
	Cable relay connectors	☞ *8.7.3 Encoder Cable Connector Kits on page 305*	
	Relay encoder cable of 30 m to 50 m	☞ *8.7.4 Cables without Connectors on page 306*	

Refer to the following section for details on the connection of the relay encoder cable.

☞ *8.6.2 Servomotors with Σ-7 Compatible Specifications (When Exceeding 20 m) on page 301*

8.7.2 SERVOPACK Connector Kits

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

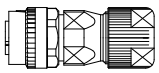
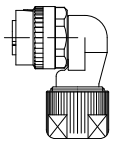
*1 For details, consult your Yaskawa representative. The tool is not provided by Yaskawa.

Note:
Cables are not included. Purchase them separately.

8.7.3 Encoder Cable Connector Kits

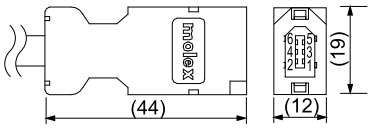
(1) Servomotor Connectors

The SGMXG-03 to -55 servomotor connector is compliant with an IP67 protective structure.

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

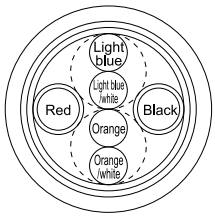
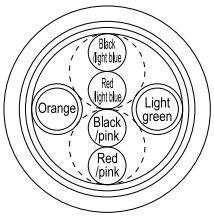
*1 A crimping tool is required. The model number of the special crimping tool for cables without connectors available from Yaskawa is 357J-52667T. When using other wire sizes, contact the connector manufacturer for crimping tools.

(2) Cable Relay Connectors

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

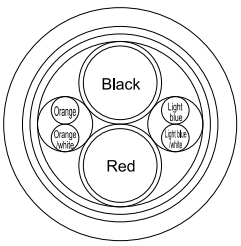
8.7.4 Cables without Connectors

(1) Encoder cables of 20 m or less

Item	Standard Cable	Flexible Cable
Order Number *1	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 mm²) Outer diameter of insulating sheath: 1.15 mm	AWG22 (0.33 mm²) Outer diameter of insulating sheath: 1.35 mm
	AWG24 (0.20 mm²) Outer diameter of insulating sheath: 1.09 mm	AWG24 (0.20 mm²) Outer diameter of insulating sheath: 1.21 mm
Finished Diameter	6.5 mm	6.8 mm
Internal Structure and Lead Colors		

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

(2) Relay Encoder Cable of 30 m to 50 m

Item	Standard Cable
Order Number *1	JZSP-CMP19-□□-E (maximum length: 50 m)
Specifications	UL20276 (rated temperature: 80°C) AWG16 × 2C + AWG26 × 2P
	AWG16 (1.31 mm²) Outer diameter of insulating sheath: 2.0 mm
	AWG26 (0.13 mm²) Outer diameter of insulating sheath: 0.91 mm
Finished Diameter	6.8 mm
Internal Structure and Lead Colors	

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

8.8 Wiring Precautions

8.8.1 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.

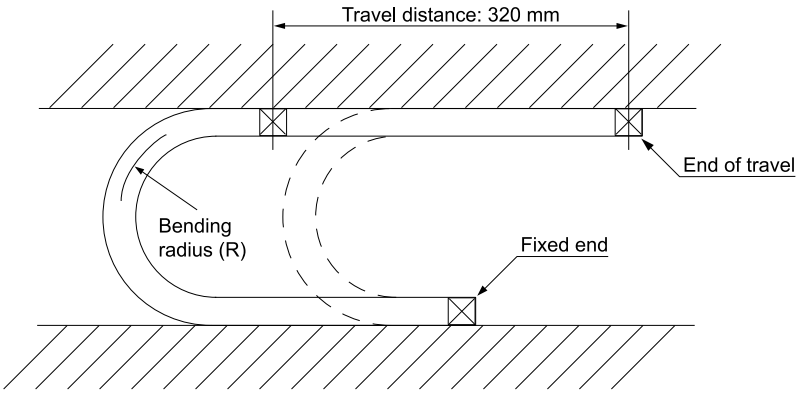
Cable Diameter	Recommended Bending Radius (R)
Less than 8 mm	15 mm min.
8 mm	20 mm min.
Over 8 mm	Cable diameter × 3 mm min.

8.8.2 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) as listed in each selection table 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 affects the performance of the cable sheathing occurs.

- 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.
- If a flexible cable is used in a fixed position, the recommended bending radius is the same as for standard cables. Perform all wiring so that stress is not applied to the cables.

9

Cables and User-Assembled Wiring Materials for Direct Drive Servomotors

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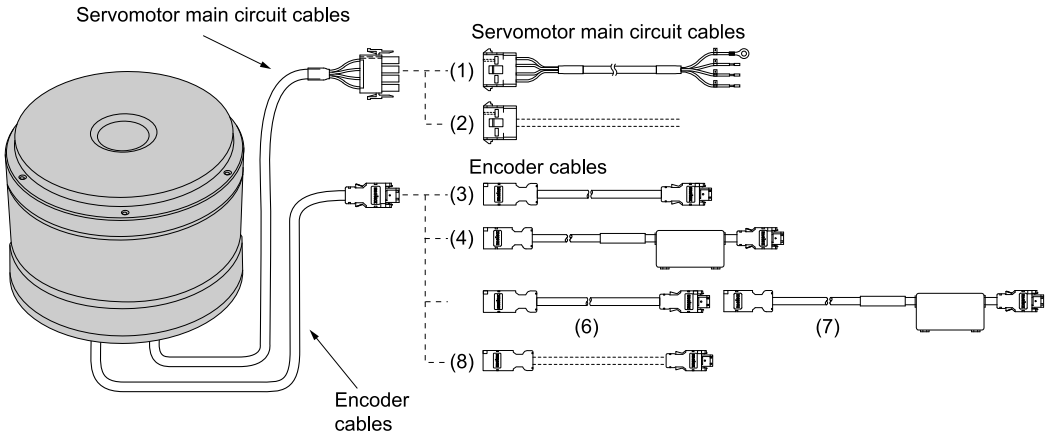
9.1 Cable Configurations

9.1.1 SGM7D Servomotors



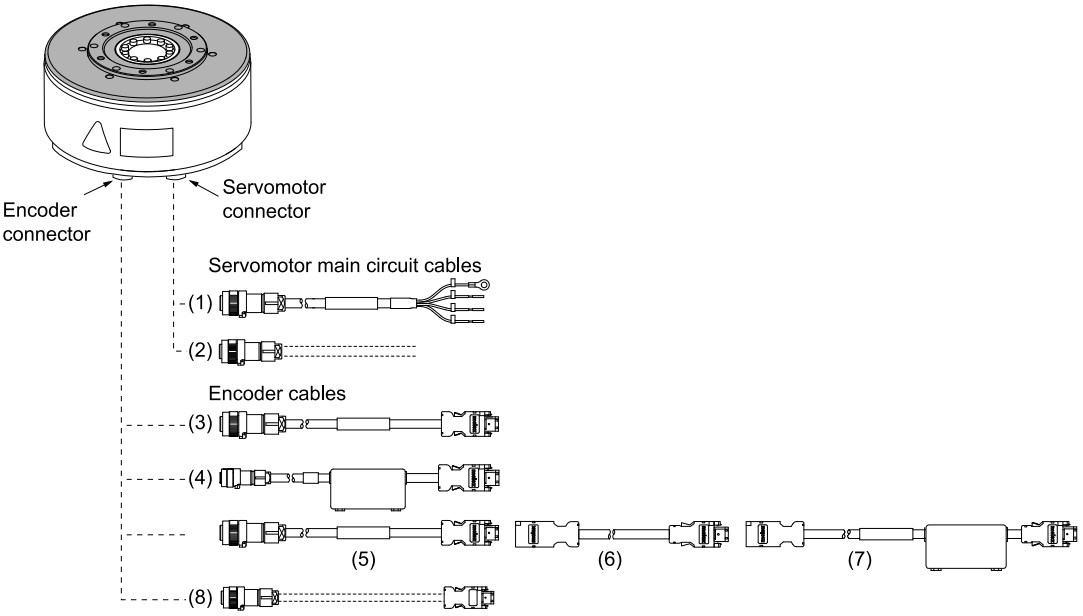
No.	Cable Type		Reference
(1)	Servomotor Main Circuit Cables		313
(2)	User-Assembled Wiring Materials for Servomotor Main Circuit Cables	Connectors	317
		Cables without connectors	320
(3)	Encoder Cables of 20 m or Less		322
(4)	Encoder Cables of 20 m or Less with Battery Units		
(6)	Relay Encoder Cables		328
(7)	Relay Encoder Cables with Battery Units		
(8)	User-Assembled Wiring Materials for Encoder Cables	Connectors	332
		Cables without connectors	333

Note:

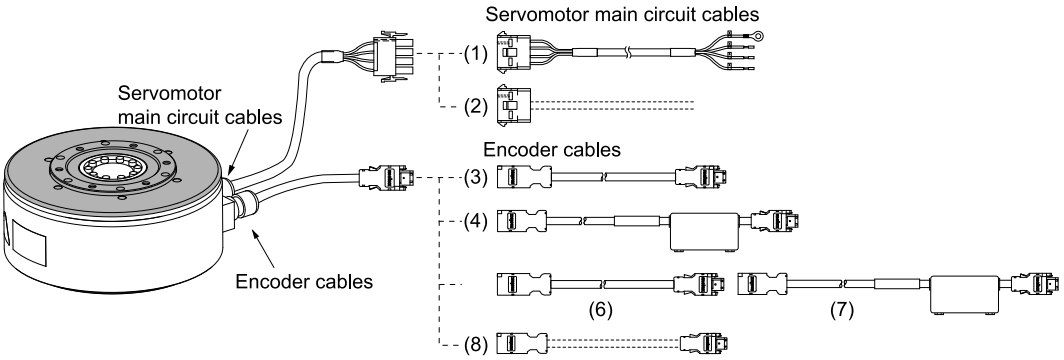
1. The maximum wiring length is 50 m for the servomotor main circuit cables and the encoder cables.
2. If the encoder cable length exceeds 20 m, connect by combining the relay cables as shown in (6) to (7) in the above figure.

9.1.2 SGM7E Servomotors and SGM7F-□□A to -□□D Servomotors

(1) Flange Specification 1



(2) Flange Specification 4



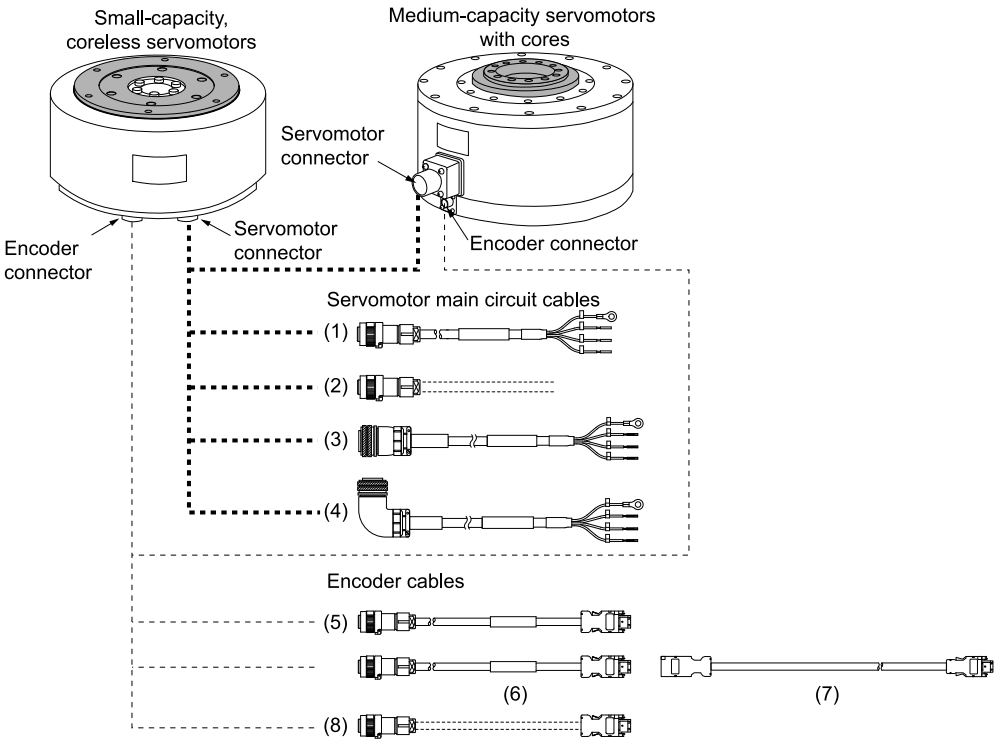
No.	Cable Type		Reference
(1)	Servomotor Main Circuit Cables		314
(2)	User-Assembled Wiring Materials for Servomotor Main Circuit Cables	Connectors	317
		Cables without connectors	321
(3)	Encoder Cables of 20 m or Less		324
(4)	Encoder Cables of 20 m or Less with Battery Units		
(5)	Motor-End Relay Encoder Cables		329
(6)	SERVOPACK-End Relay Encoder Cables		
(7)	Relay Encoder Cables with Battery Units		
(8)	User-Assembled Wiring Materials for Encoder Cables	Connectors	332
		Cables without connectors	333

Note:

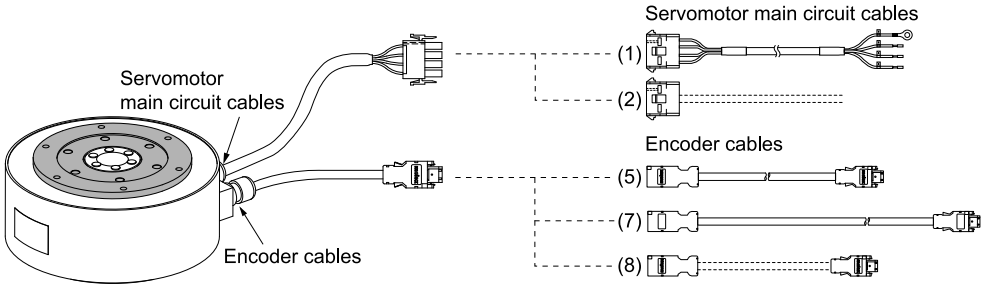
1. The maximum wiring length is 50 m for the servomotor main circuit cables and the encoder cables.
2. If the encoder cable length exceeds 20 m, connect by combining the relay cables as shown in (5) to (7) in the above figure for models with flange specification 1 and the relay cables as shown in (6) to (7) in the above figure for models with flange specification 4.

9.1.3 SGM7F-□□M and -□□N Servomotors

(1) Flange Specification 1 or 3



(2) Flange Specification 4



No.	Cable Type		Reference
(1)	Servomotor Main Circuit Cables		315
(2)	User-Assembled Wiring Materials for Servomotor Main Circuit Cables	Connectors	317
		Cables without connectors	321
(3)	Servomotor Main Circuit Cable (Straight Plug)		315
(4)	Servomotor Main Circuit Cable (Right-Angle Plug)		
(5)	Encoder Cables of 20 m or Less		324
(6)	Motor-End Relay Encoder Cables		329
(7)	SERVOPACK-End Relay Encoder Cables		
(8)	User-Assembled Wiring Materials for Encoder Cables	Connectors	332
		Cables without connectors	333

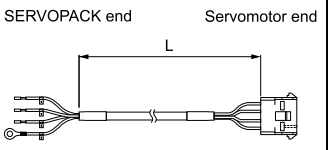
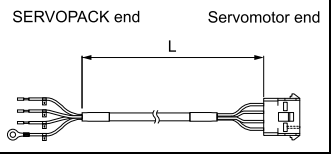
Note:

1. The maximum wiring length is 50 m for the servomotor main circuit cables and the encoder cables.
2. In models with flange specification 1 or 3, if the encoder cable length exceeds 20 m, connect by combining the relay cables as shown in (6) to (7) in the above figure.

9.2 Servomotor Main Circuit Cables

9.2.1 Main Circuit Cables for SGM7D Servomotors

(1) 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 SGM7D-□□L	3 m, 5 m, 10 m, 15 m, 20 m	JZSP-CMM00-□□-E	JZSP-C7DM21-□□-E	
SGM7D-01G, -05G SGM7D-□□H SGM7D-□□K		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:

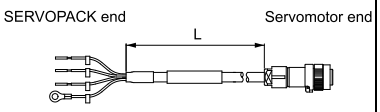
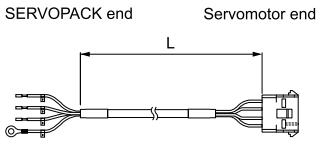
1. Refer to the following section for information on the specifications, manufacturers, and order numbers for connectors.
☞ *(1) SGM7D Servomotors on page 317*
2. Refer to the following section for information on the specifications and order numbers for cable wiring materials.
☞ *(1) SGM7D Main Circuit Cables on page 320*

(2) Wiring Specifications

SERVOPACK end			Servomotor 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

9.2.2 Main Circuit Cables for SGM7E Servomotors and SGM7F-□□A to -□□D Servomotors

(1) 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, 20 m	JZSP-CMM60-□□-E	JZSP-C7MDN23-□□-E	
	4 Non-load side installation (lead installation direction to 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:

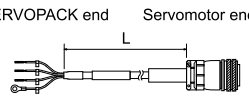
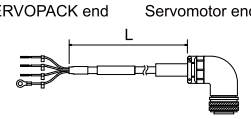
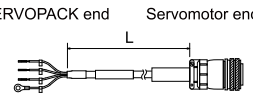
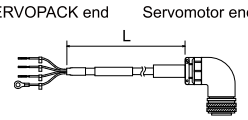
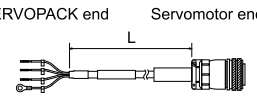
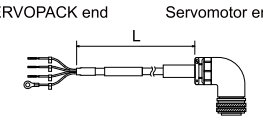
1. Refer to the following section for information on the specifications, manufacturers, and order numbers for connectors.
   ☞ *(2) SGM7E and SGM7F-□□A to -□□D Servomotors on page 317*
2. Refer to the following section for information on the specifications and order numbers for cable wiring materials.
   ☞ *(2) SGM7E Main Circuit Cables on page 321*
   ☞ *(3) Main Circuit Cables for SGM7F-□□A to -□□D Servomotors on page 321*

(2) Wiring Specifications

SERVOPACK end		Servomotor 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

9.2.3 Main Circuit Cables for SGM7F-□□M and -□□N Servomotors

(1) 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	
SGM7F-□□M, SGM7F-□□N □□: 45 □□: 80	1 Load side installation and 3 Non-load side installation	Straight	3 m, 5 m, 10 m, 15 m, 20 m	JZSP-USA101-□□-E	JZSP-USA121-□□-E	
		Right-angle		JZSP-USA102-□□-E	JZSP-USA122-□□-E	
SGM7F-□□M, SGM7F-□□N □□: 1A		Straight		JZSP-USA301-□□-E	JZSP-USA321-□□-E	
		Right-angle		JZSP-USA302-□□-E	JZSP-USA322-□□-E	
SGM7F-□□M, SGM7F-□□N □□: 1E □□: 2Z		Straight		JZSP-USA501-□□-E	JZSP-USA521-□□-E	
		Right-angle		JZSP-USA502-□□-E	JZSP-USA522-□□-E	

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

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

Note:

1. Refer to the following section for information on the specifications, manufacturers, and order numbers for connectors.
   ☞ *(2) SGM7E and SGM7F-□□A to -□□D Servomotors on page 317*
   ☞ *(3) SGM7F-□□M and -□□N on page 318*
2. Refer to the following section for information on the specifications and order numbers for cable wiring materials.
   ☞ *(2) SGM7E Main Circuit Cables on page 321*
   Yaskawa does not specify what cable wiring materials to use for SGM7F-□□M and SGM7F-□□N. Use appropriate wiring materials for the electrical current specifications and connectors.

(2) Wiring Specifications

(a) JZSP-C□M□□-□□-E (standard cables or flexible cables)

SERVOPACK end		Servomotor 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

(b) JZSP-USA10□-□□-E, JZSP-USA30□-□□-E, and JZSP-USA50□-□□-E (standard cables)

SERVOPACK end		Servomotor 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

(c) JZSP-USA12□-□□-E, JZSP-USA32□-□□-E, and JZSP-USA52□-□□-E (flexible cables)

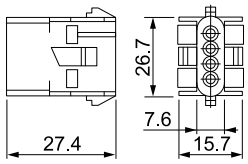
SERVOPACK end		Servomotor end	
Wire Color	Signal	Signal	Pin
Red	Phase U	Phase U	A
White	Phase V	Phase V	B
Blue	Phase W	Phase W	C
Green/yellow	FG	FG	D

9.3 User-Assembled Wiring Materials for Servomotor Main Circuit Cables

9.3.1 Servomotor Main Circuit Cable Connector Kits

(1) SGM7D Servomotors

(a) SGM7D-01G, -05G, -□□H, and -□□K (for Standard or Flexible Cables)

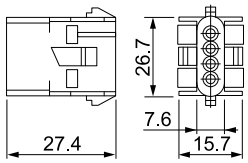
Item		Description	External Dimensions [mm]
Manufacturer		TE Connectivity Japan G.K.	
Order Number		JZSP-CMM9-3-E	
Components	Cap	350780-1	
	Socket	Reeled sockets: 350570-3, Loose sockets: 350689-3	
Applicable Wire Sizes		AWG18 to AWG24	
Crimping Tool *1	Hand Tool	91510-1	

*1 A crimping tool is required. Contact the connector manufacturer for details.

Note:

Cables are not included. Purchase them separately.

(b) SGM7D-□□F, -□□G (Excluding -01G and -05G), -□□I, -□□J, and -□□L (for Standard or Flexible Cables)

Item		Description	External Dimensions [mm]
Manufacturer		TE Connectivity 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 *1	Hand Tool	91500-1	

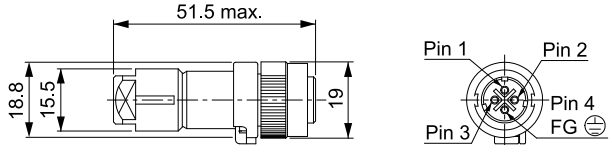
*1 A crimping tool is required. Contact the connector manufacturer for details.

Note:

Cables are not included. Purchase them separately.

(2) SGM7E and SGM7F-□□A to -□□D Servomotors

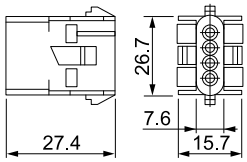
(a) Connector Kits for Flange Specification 1 (for standard or flexible cables)

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

Note:

1. For details, consult your Yaskawa representative.
2. Cables are not included. Purchase them separately.

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

Item		Description	External Dimensions [mm]
Manufacturer		TE Connectivity 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 *1	Hand Tool	91510-1	

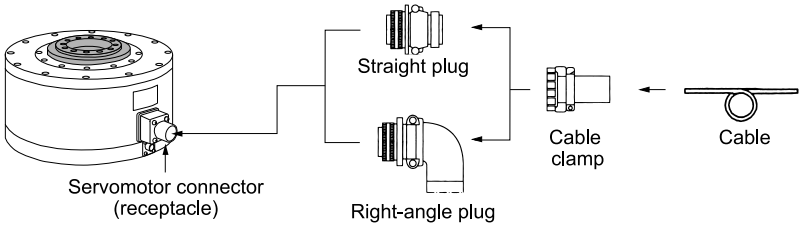
*1 A crimping tool is required. Contact the connector manufacturer for details.

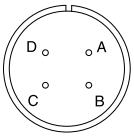
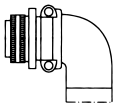
Note:

Cables are not included. Purchase them separately.

(3) SGM7F-□□M and -□□N

(a) Connector Configurations



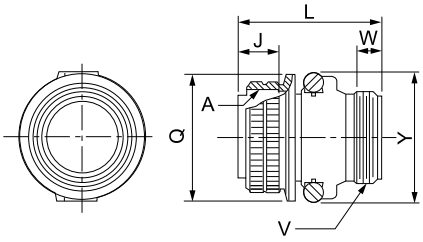
Servomotor Model	Servomotor Connector Model (Receptacle) 	Order Number			Manufacturer
		Straight Plug	Right-Angle 	Cable Clamp	
SGM7F-□□M SGM7F-□□N	CE05-2A18-10PD-D (MS connector model: MS3102A18-10P)	N/MS3106B18 -10S	N/MS3108B18 -10S	N/MS3057 -10A	Japan Aviation Electronics Industry, Ltd.

Note:

1. Servomotor connectors (receptacle) 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.

(b) External Dimensions

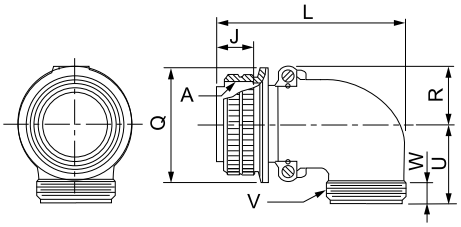
◆ Straight Plug: N/MS3106B18-10S



Unit: mm

Part	Shell Size	Joint Thread A	Length of Joint J ±0.12	Total Length L Max.	Connecting Nut Outer Diameter $Q^{+0}_{-0.38}$ dia.	Cable Clamp Mounting Screws 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

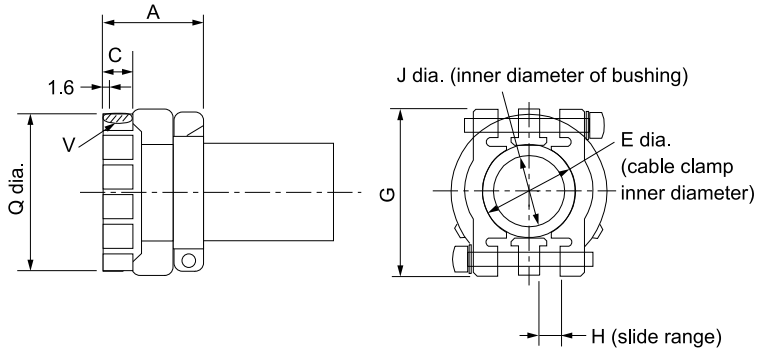
◆ Right-Angle Plug: N/MS3108B18-10S



Unit: mm

Part	Shell Size	Joint Thread A	Length of Joint J ±0.12	Total Length L Max.	Connecting Nut Outer Diameter $Q^{+0}_{-0.38}$ dia.	R ±0.5	U ±0.5	Cable Clamp Mounting Screws 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

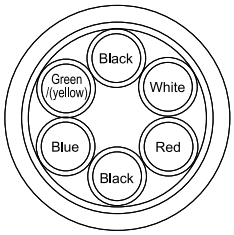
Part	Applicable Connector Shell Size	Total Length A ±0.7	Effective Thread Length C	E dia.	G ±0.7	H	J dia.	Mounting Screws V	Outer Diameter Q ±0.7 dia.	Attached Bushing
N/MS3057-10A	18	23.8	10.3	15.9	31.7	3.2	14.3	1-20UNEF	30.1	AN3420-10

Note:
A rubber bushing is included.

9.3.2 Cables without Connectors

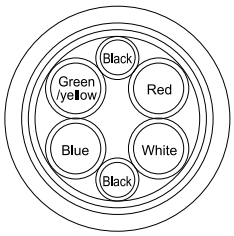
(1) SGM7D Main Circuit Cables

(a) SGM7D-01G, -05G, -□□H, and -□□K

Item	Standard Cable	Flexible Cable
Order Number *1	JZSP-CSM90-□□-E	JZSP-CSM80-□□-E
Specifications	UL2517 (rated temperature: 105°C) AWG20 × 6C	UL2517 (rated temperature: 105°C) AWG22 × 6C
	AWG20 (0.52 mm²) Outer diameter of insulating sheath: 1.53 mm	AWG22 (0.33 mm²) Outer diameter of insulating sheath: 1.37 mm
Finished Diameter	7 mm ±0.3 mm	
Internal Structure and Lead Colors		

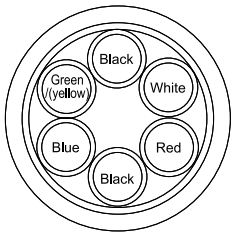
*1 Replace the boxes (□□) in the order number with the cable length (05, 10, 15, 20, or 50).

(b) SGM7D-□□F, -□□G (excluding -01G and -05G), -□□I, -□□J, and -□□L

Item	Standard Cable	Flexible Cable
Order Number *1	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 mm²) Outer diameter of insulating sheath: 2.15 mm	Power lines: AWG16 (1.31 mm²) Outer diameter of insulating sheath: 2.35 mm
Finished Diameter	8 mm ±0.3 mm	
Internal Structure and Lead Colors		

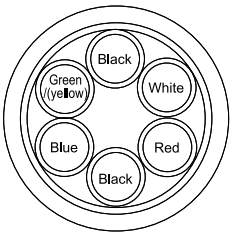
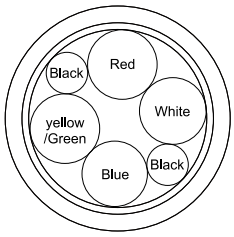
*1 Replace the boxes (□□) in the order number with the cable length (05, 10, 15, 20, or 50).

(2) SGM7E Main Circuit Cables

Item	Standard Cable	Flexible Cable
Order Number *1	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		

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

(3) Main Circuit Cables for SGM7F-□□A to -□□D Servomotors

Item	Standard Cable	Flexible Cable
Order Number *1	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		

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

9.4 Encoder Cables of 20 m or Less

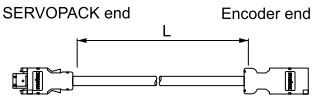
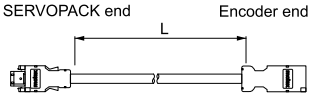
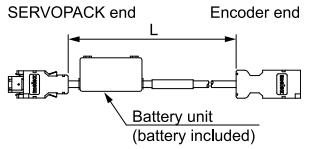
9.4.1 SGM7D Encoder Cables

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

(1) 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 unit	3 m, 5 m, 10 m, 15 m, 20 m	JZSP-CMP00-□□-E	JZSP-CMP10-□□-E	
	For multiturn absolute encoder: without battery unit *4*		JZSP-CMP00-□□-E	JZSP-CMP10-□□-E	
	For multiturn absolute encoder: with battery unit		JZSP-CSP19-□□-E	JZSP-CSP29-□□-E	

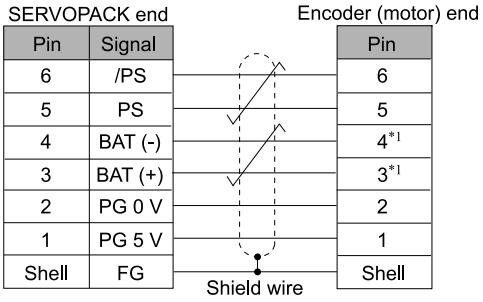
*1 Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.
*4 Use one of these cables if a battery is installed at the host controller.

Note:

1. Refer to the following section for information on the specifications, manufacturers, and order numbers for connectors.
   ☞ *9.6.1 SERVOPACK Connector Kits on page 332*
   ☞ *9.6.2 Encoder Cable Connector Kits on page 332*
2. Refer to the following section for information on the specifications and order numbers for cable wiring materials.
   ☞ *9.6.3 Cables without Connectors on page 333*

(2) Wiring Specifications

(a) JZSP-CMP00-□□-E (standard cables) and JZSP-CMP10-□□-E (flexible cables)



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

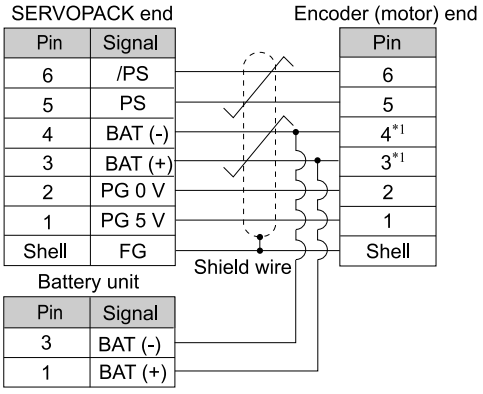
Pin
6
5
4*1
3*1
2
1
Shell

*1 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).

(b) JZSP-CSP19-□□-E (standard cables) and JZSP-CSP29-□□-E (flexible cables)



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

Pin
6
5
4*1
3*1
2
1
Shell

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

*1 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).

9.4.2 SGM7E and SGM7F Encoder Cables

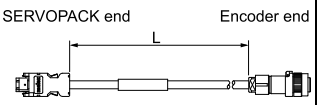
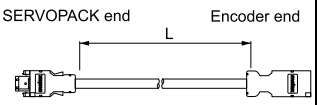
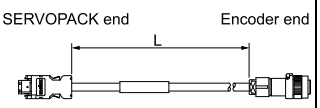
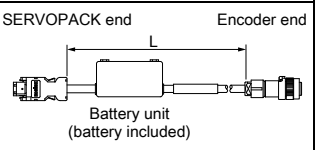
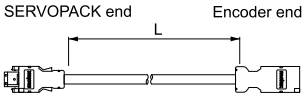
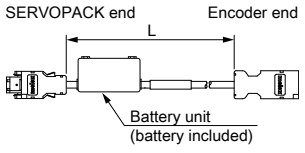
⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

(1) Selection Table

(a) SGM7E and SGM7F-□□A to -□□D Servomotors

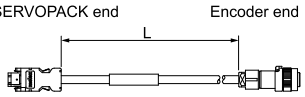
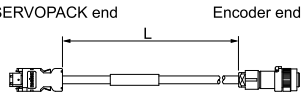
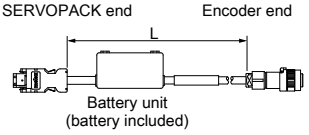
Servomotor Model	Serial Encoder Specification	Flange Specification Code (6th Digit in Model Number)	Length (L)	Order Number *1*		Appearance
				Standard Cable	Flexible Cable *2* *3*	
SGM7E -□□□F SGM7F -□□AF to -□□DF	For incremental encoder	1 Non-load side installation	3 m, 5 m, 10 m, 15 m, 20 m	JZSP-CMP60-□□-E	JZSP-CSP60-□□-E	
		4 Non-load side installation (Lead installation direction to side)		JZSP-CMP00-□□-E	JZSP-CMP10-□□-E	
SGM7E -□□□7 SGM7F -□□A7 to -□□D7	For multiturn absolute encoder: without battery unit *4*	1 Non-load side installation		JZSP-C7PI00-□□-E	JZSP-C7PI20-□□-E	
	For multiturn absolute encoder: with battery unit			JZSP-C7PA00-□□-E	JZSP-C7PA20-□□-E	
	For multiturn absolute encoder: without battery unit *4*	4 Cable drawn to non-load side (Lead installation direction to side)		JZSP-CMP00-□□-E	JZSP-CMP10-□□-E	
	For multiturn absolute encoder: with battery unit			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 the specifications, manufacturers, and order numbers for connectors.
   ☞ *9.6.1 SERVOPACK Connector Kits on page 332*
   ☞ *9.6.2 Encoder Cable Connector Kits on page 332*
2. Refer to the following section for information on the specifications and order numbers for cable wiring materials.
   ☞ *9.6.3 Cables without Connectors on page 333*

(b) 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, -□□NF	For incremental encoder	1 Cable drawn to load side or 3 Non-load side installation	3 m, 5 m, 10 m, 15 m, 20 m	JZSP-CMP60-□□-E	JZSP-CSP60-□□-E	
SGM7F-□□M7, -□□N7	For multiturn absolute encoder: without battery unit *4*	1 Cable drawn to load side or 3 Non-load side installation		JZSP-C7PI00-□□-E	JZSP-C7PI20-□□-E	
	For multiturn absolute encoder: with battery unit			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:

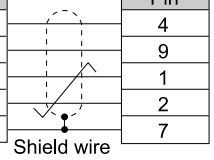
1. Refer to the following section for information on the specifications, manufacturers, and order numbers for connectors.
   ☞ *9.6.1 SERVOPACK Connector Kits on page 332*
   ☞ *9.6.2 Encoder Cable Connector Kits on page 332*
2. Refer to the following section for information on the specifications and order numbers for cable wiring materials.
   ☞ *9.6.3 Cables without Connectors on page 333*

(2) Wiring Specifications

(a) JZSP-CMP60-□□-E (standard cables) and JZSP-CSP60-□□-E (flexible cables)

SERVOPACK end

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



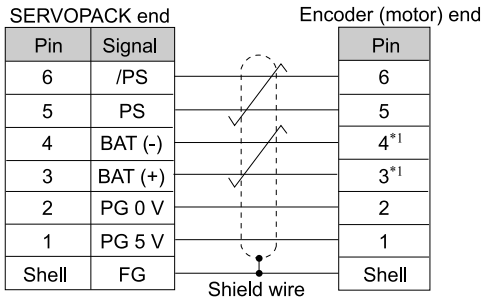
Encoder (motor) end

Pin
4
9
1
2
7

Note:

Always connect the shield wire from the encoder cable to the connector case (shell).

(b) JZSP-CMP00-□□-E (standard cables) and JZSP-CMP10-□□-E (flexible cables)

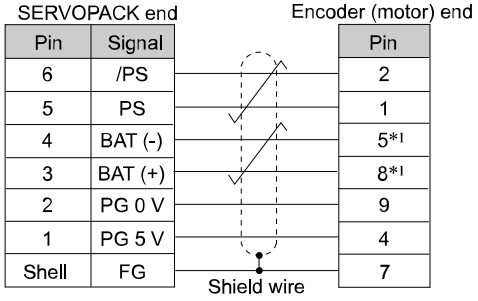


*1 A battery is required only for a multiturn absolute encoder.

Note:

Always connect the shield wire from the encoder cable to the connector case (shell).

(c) JZSP-C7PI00-□□-E (standard cables) and JZSP-C7PI20-□□-E (flexible cables)

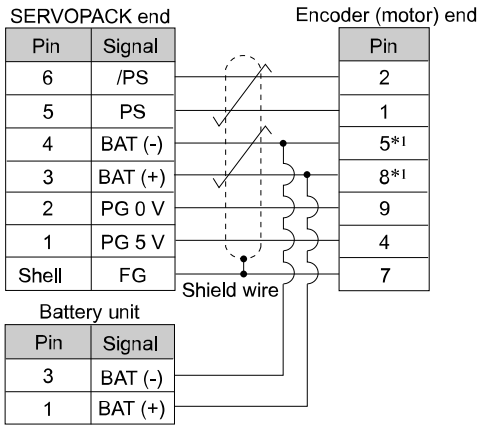


*1 A battery is required only for a multiturn absolute encoder.

Note:

Always connect the shield wire from the encoder cable to the connector case (shell).

(d) JZSP-C7PA00-□□-E (standard cables) and JZSP-C7PA20-□□-E (flexible cables)

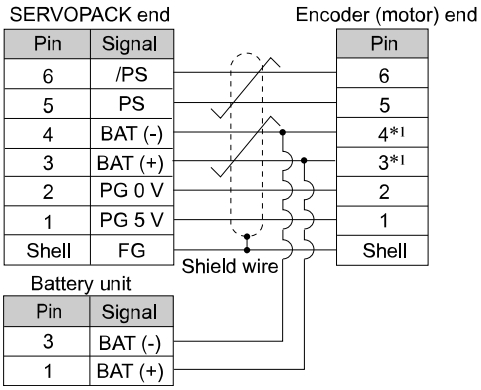


*1 A battery is required only for a multiturn absolute encoder.

Note:

Always connect the shield wire from the encoder cable to the connector case (shell).

(e) JZSP-CSP19-□□-E (standard cables) and JZSP-CSP29-□□-E (flexible cables)



*1 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).

9.5 Relay Encoder Cable of 30 m to 50 m

If the encoder cable length exceeds 20 m, use a relay encoder cable. Select a cable to use in combination based on your system.

9.5.1 SGM7D Encoder Cables

If a battery is not mounted to the host controller, also obtain a relay encoder cable with a battery unit in addition to the relay encoder cable.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

(1) Relay Encoder Cables

(a) Selection Table

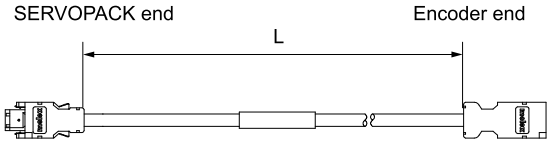
Specification	Length (L)	Order Number *1
For incremental or multiturn absolute encoder	30 m, 40 m, 50 m	JZSP-UCMP00-□□-E

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

Note:

Flexible cables are not available.

(b) Appearance



(c) Wiring Specifications

SERVOPACK end

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

Encoder (motor) end

Pin
6
5
4*1
3*1
2
1
Shell

Shield wire

*1 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).

(2) Relay Encoder Cables with Battery Units

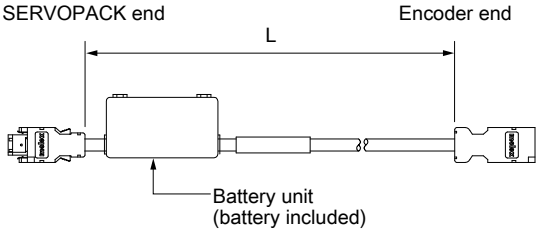
(a) Selection Table

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

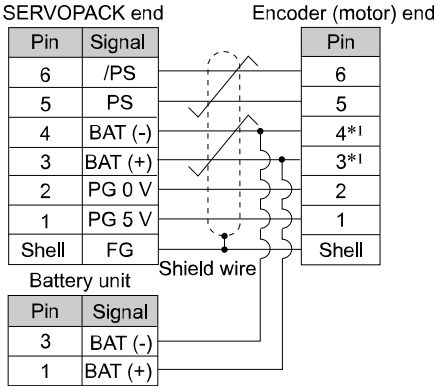
Note:

Flexible cables are not available.

(b) Appearance



(c) Wiring Specifications



*1 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).

9.5.2 SGM7E and SGM7F Encoder Cables

For models with flange specification 1 or 3, use by combining a motor-end relay encoder cable and a SERVOPACK-end relay encoder cable. For models with flange specification 4, use a SERVOPACK-end relay cable only.

Also, if a battery is not mounted to the host controller, also obtain an encoder cable with a battery unit in addition to the cables above.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

(1) Motor-End Relay Encoder Cables

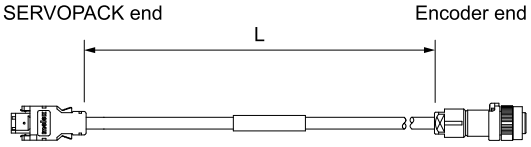
(a) Selection Table

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

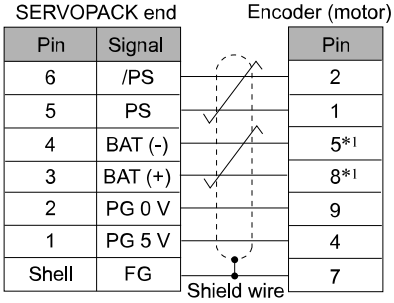
Note:

Flexible cables are not available.

(b) Appearance



(c) Wiring Specifications



*1 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).

(2) SERVOPACK-End Relay Encoder Cables

(a) Selection Table

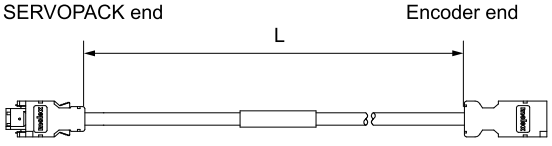
Specification	Length (L)	Order Number *1
For incremental or multiturn absolute encoder	30 m, 40 m, 50 m	JZSP-UCMP00-□□-E

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

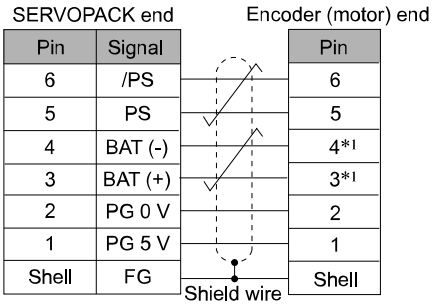
Note:

Flexible cables are not available.

(b) Appearance



(c) Wiring Specifications



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

Pin
6
5
4*1
3*1
2
1
Shell

*1 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).

(3) Relay Encoder Cables with Battery Units

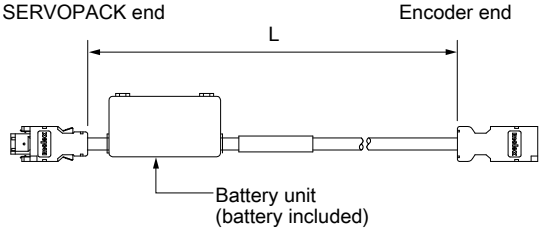
(a) Selection Table

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

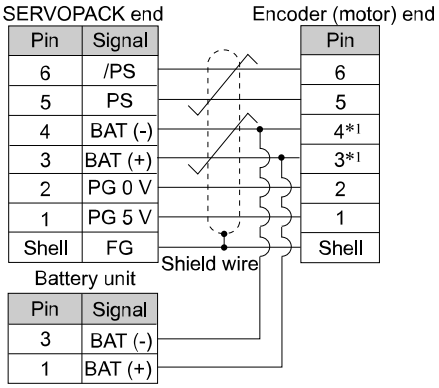
Note:

Flexible cables are not available.

(b) Appearance



(c) Wiring Specifications



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

Pin
6
5
4*1
3*1
2
1
Shell

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

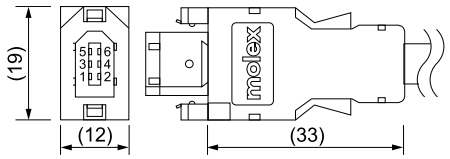
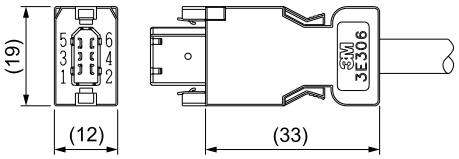
*1 A battery is required only for a multiturn absolute encoder.

Note:

Always connect the shield wire from the encoder cable to the connector case (shell).

9.6 User-Assembled Wiring Materials for Encoder Cables

9.6.1 SERVOPACK Connector Kits

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

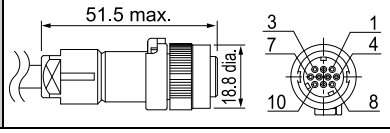
*1 For details, consult your Yaskawa representative. The tool is not provided by Yaskawa.

Note:

Cables are not included. Purchase them separately.

9.6.2 Encoder Cable Connector Kits

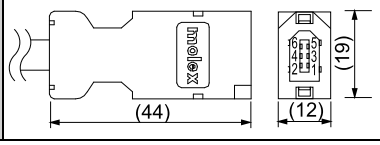
(1) Connector Kits for Flange Specification 1 or 3

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:

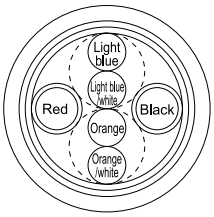
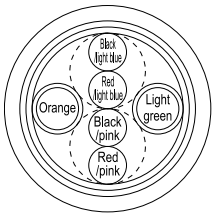
For details, consult your Yaskawa representative. The tool is not provided by Yaskawa.

(2) Connector Kits for Flange Specification 4 or 5

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

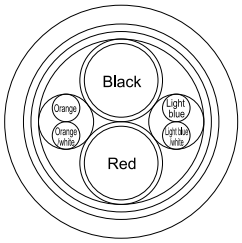
9.6.3 Cables without Connectors

(1) Encoder cables of 20 m or less

Item	Standard Type	Flexible Type
Order Number *1	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		

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

(2) Relay Encoder Cable of 30 m to 50 m

Item	Standard Type
Order Number *1	JZSP-CMP19-□□-E
Specifications	UL20276 (rated temperature: 80°C) AWG16 × 2C + AWG26 × 2P
	AWG16 (1.31 mm²) Outer diameter of insulating sheath: 2.0 mm
	AWG26 (0.13 mm²) Outer diameter of insulating sheath: 0.91 mm
Finished Diameter	6.8 mm
Internal Structure and Lead Colors	

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

9.7 Wiring Precautions

9.7.1 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.

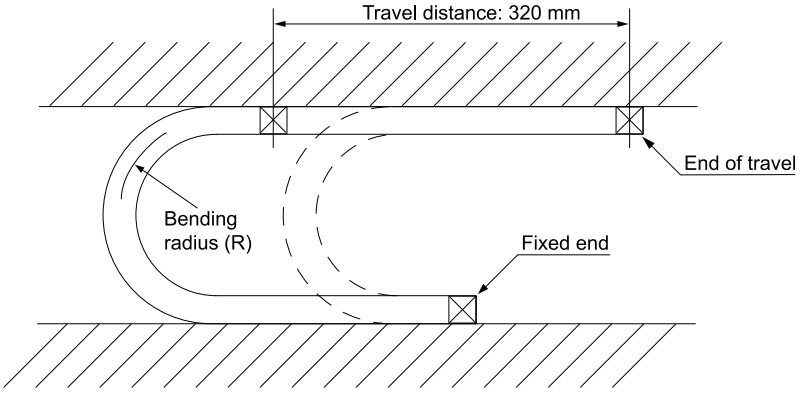
Cable Diameter	Recommended Bending Radius (R)
Less than 8 mm	15 mm min.
8 mm	20 mm min.
Over 8 mm	Cable diameter × 3 mm min.

9.7.2 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) as listed in each selection table 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 affects the performance of the cable sheathing occurs.

- 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.
- If a flexible cable is used in a fixed position, the recommended bending radius is the same as for standard cables. Perform all wiring so that stress is not applied to the cables.

10

Cables and User-Assembled Wiring Materials for Linear Servomotors

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10.1 Recommended Linear Encoders

10.1.1 Incremental Linear Encoders

Output Signals	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						
1Vp-p Analog voltage *1	Dr. JOHANNES HEIDENHAIN GmbH	Exposed	LIDA48□		JZDP-H003/-H006 *4	20	78.1	5	○	○	○
					JZDP-J003/-J006 *4		4.9	2	○	○	*6
			LIF48□		JZDP-H003/-H006 *4	4	15.6	1	○	○	○
					JZDP-J003/-J006 *4		1.0	0.4	○	*6	*6
	Renishaw PLC	Exposed	TONiC Series (Only Ti0000A00V)		JZDP-H005/-H008 *4	20	78.1	5	○	○	○
					JZDP-J005/-J008 *4		4.9	2			
Encoder for Yaskawa's Serial Interface *2	Magnescale Co., Ltd.	Exposed	SL7□0	PL101-RY *5		800	97.7	10	–	○	○
			SQ10	PQ10	MQ10-FLA	400	48.83	3	–	○	○
					MQ10-GLA				○	○	–

*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 This is the model of the serial converter unit.

*5 This is the model of the sensor head with interpolator.

*6 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.

10.1.2 Absolute Linear Encoders

The output signal is compatible with the Yaskawa serial interface. The multiplier (number of divisions) depends on the linear encoder. Also, you must write the servomotor constant file to the linear encoder in advance.

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						
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	SR27A-□□□SAF□□□		–	40.96	10	3.33	–	○	○
		SR27A-□□□SBF□□□		–	204.8	50	3.33	–	○	○
		SR27A-□□□SLF□□□		–	80	9.8	3.33	–	○	○
		SR27A-□□□SMF□□□		–	80	78.1	3.33	–	○	○
Mitutoyo Corporation	Exposed	ST781A		–	256	500	5	–	○	○
		ST782A		–	256	500	5	–	○	○
		ST783A		–	51.2	100	5	–	○	○
		ST784A		–	51.2	100	5	–	○	○
		ST788A		–	51.2	100	5	–	○	○
		ST789A *3		–	25.6	50	5	–	○	○
		ST1381		–	5.12	10	8	–	○	○
		ST1382		–	0.512	1	3.6 *4	–	○	○
	Sealed	AT1383A		–	25.6	50	3	–	○	○
		AT1384A		–	5.12	10	3	–	○	○
		AT1387A		–	0.512	1	3	–	○	○
Dr. JOHANNES HEIDENHAIN GmbH	Exposed	LIC4190 Series		–	40.96	10	10	–	○	○
				–	20.48	5	10	–	○	○
				–	4.096	1	10	–	○	○
		LIC3190 Series		–	409.6	100	10	–	○	○
				–	40.96	10	10	–	○	○
		LIC2190 Series		–	409.6	100	10	–	○	○
				–	204.8	50	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.

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						
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	–	○	○
	Enclosed	FORTiS Series		–	12.8	50	4	–	○	○
				–	2.56	10	4	–	○	○
				–	0.256	1	3.6	–	○	○
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	–	○	○

*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 Contact Mitutoyo Corporation for details on the linear encoders.
*4 The speed is restricted for some SERVOPACKs.

Note:

Confirm detailed specifications, such as the tolerances, dimensions, and operating environment, with the manufacturer of the linear encoder before you use it.

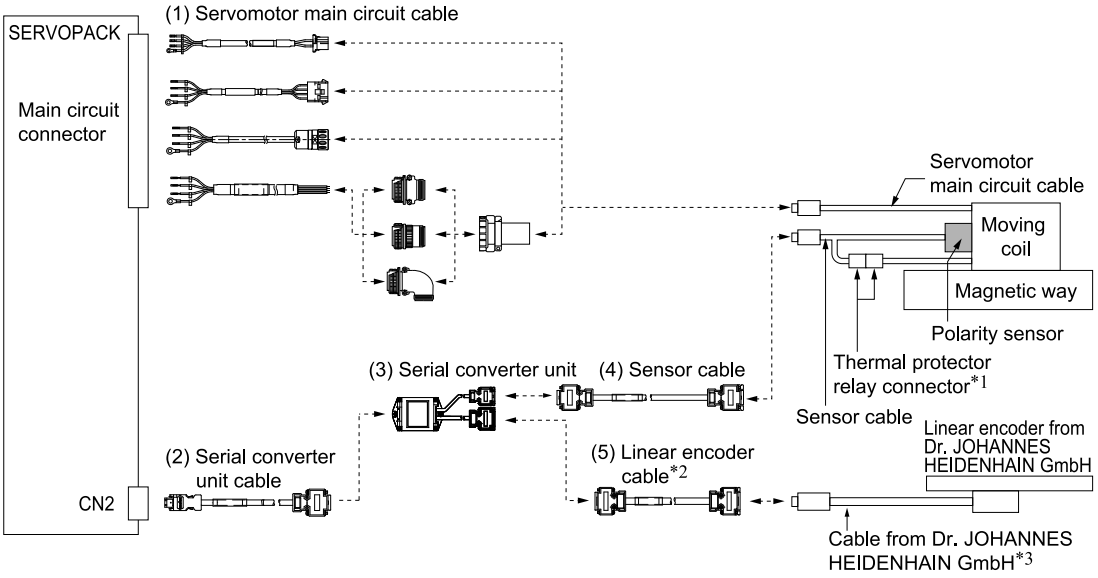
10.2 Cable Configurations

10.2.1 Connections to Linear Encoder from Dr. JOHANNES HEIDENHAIN GmbH

(1) 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.

(a) Connecting to a Linear Servomotor with a Polarity Sensor

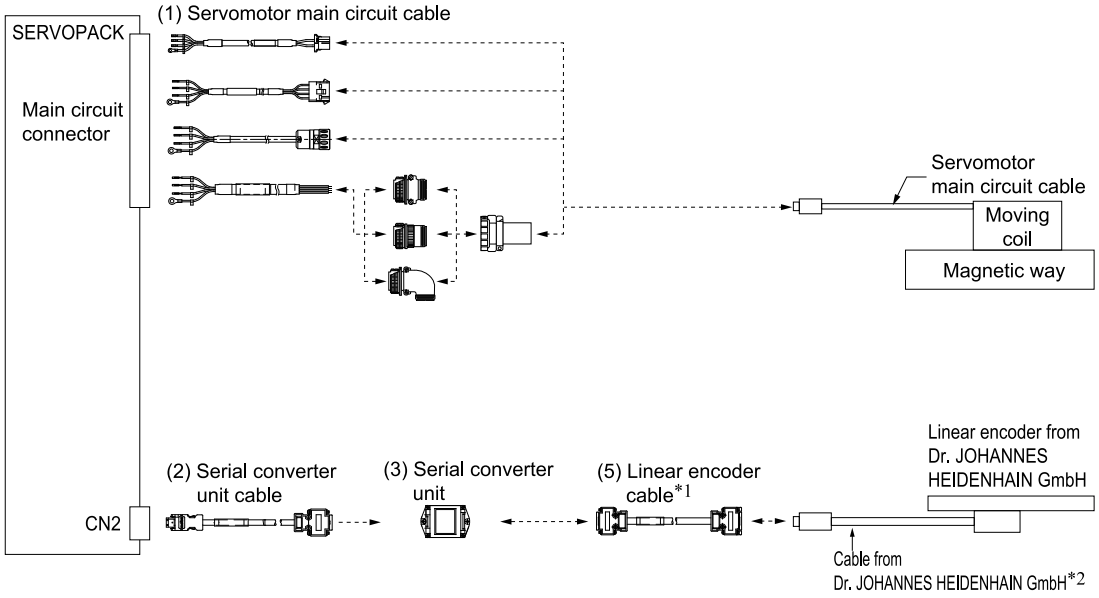


*1 Only SGLFW2 servomotors come equipped with thermal protector relay connectors.
*2 When using a JZDP-J00□-□□□ serial converter unit, do not use a Yaskawa linear encoder cable that is longer than 3 m.
*3 Contact Dr. JOHANNES HEIDENHAIN GmbH for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Dr. JOHANNES HEIDENHAIN GmbH.

No.	Cable Type	Reference
(1)	Servomotor Main Circuit Cables	357
(2)	Serial Converter Unit Cables	359
(3)	Serial Converter Unit	369
(4)	Sensor Cables	359
(5)	Linear Encoder Cables	358

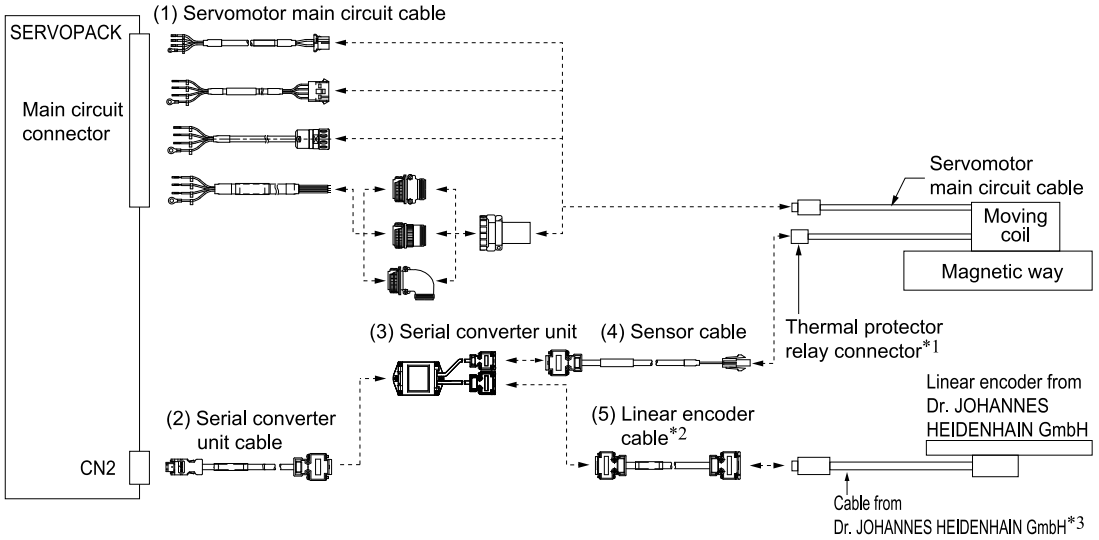
(b) Connecting to a Linear Servomotor without a Polarity Sensor

◆ 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



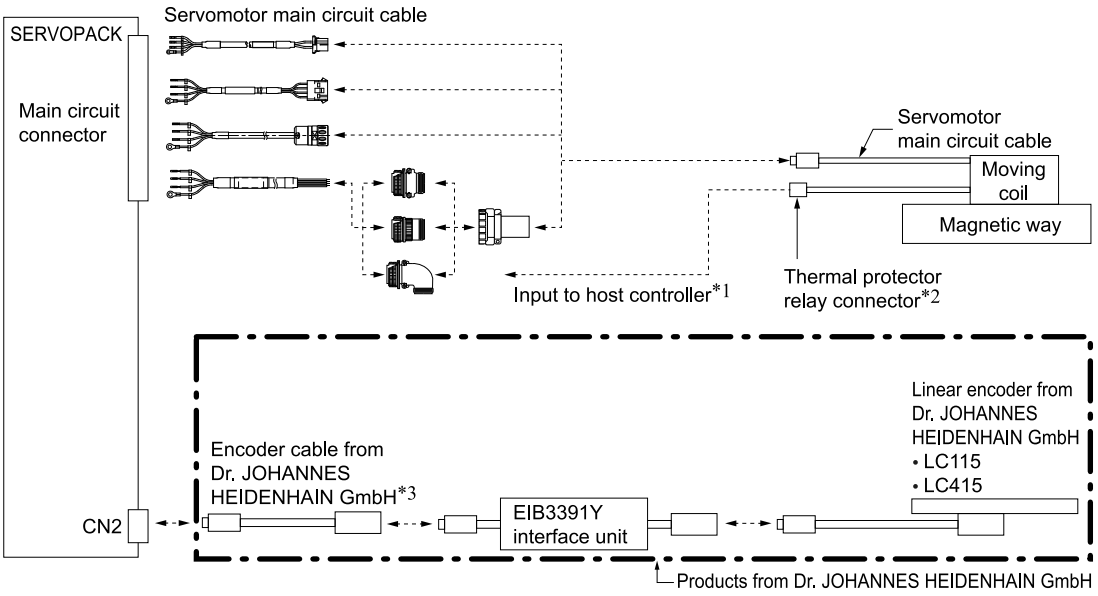
*1 Only SGLFW2 servomotors come equipped with thermal protector relay connectors.
*2 When using a JZDP-J00□-□□□ serial converter unit, do not use a Yaskawa linear encoder cable that is longer than 3 m.
*3 Contact Dr. JOHANNES HEIDENHAIN GmbH for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Dr. JOHANNES HEIDENHAIN GmbH.

No.	Cable Type	Reference
(1)	Servomotor Main Circuit Cables	357
(2)	Serial Converter Unit Cables	359
(3)	Serial Converter Unit	369
(4)	Sensor Cables	359
(5)	Linear Encoder Cables	358

(2) LC115 or LC415 Linear Encoder with EIB3391Y Interface Unit

Important

1. You cannot use an 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.
☞ *(14) JZSP-CL2TH00-□□-E Sensor Cables on page 366*

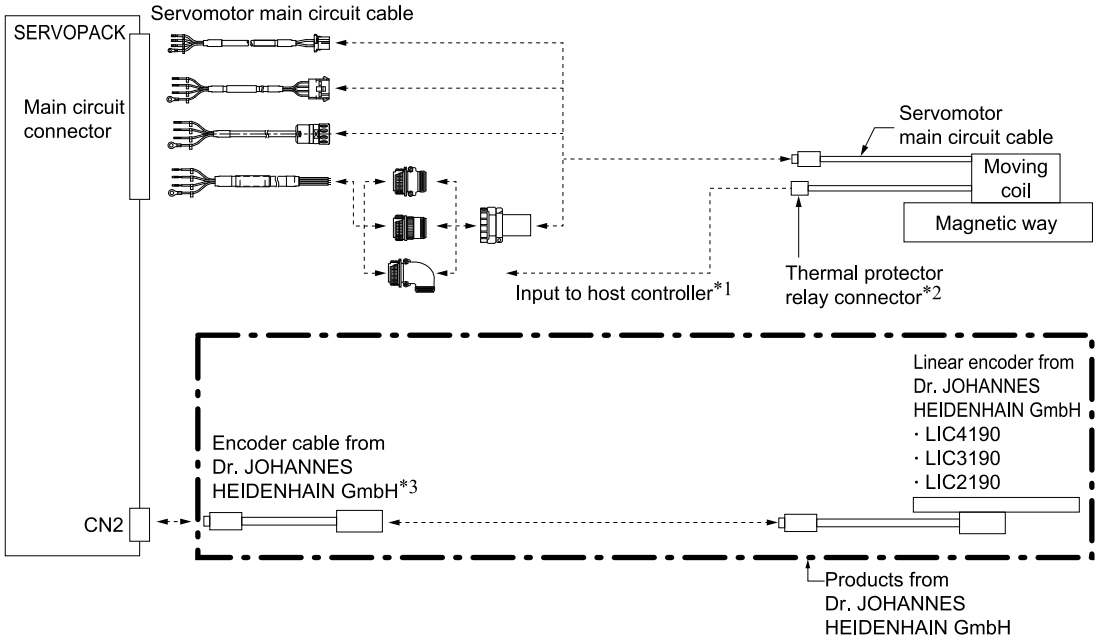
*2 Only SGLFW2 servomotors come equipped with thermal protector relay connectors.

*3 Use an encoder cable from Dr. JOHANNES HEIDENHAIN GmbH. Contact Dr. JOHANNES HEIDENHAIN GmbH for detailed encoder cable specifications.

(3) Linear Encoder LIC4190/LIC3190/LIC2190

Important

1. You cannot use an LIC4190, LIC3190, 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.
☞ *(14) JZSP-CL2TH00-□□-E Sensor Cables on page 366*

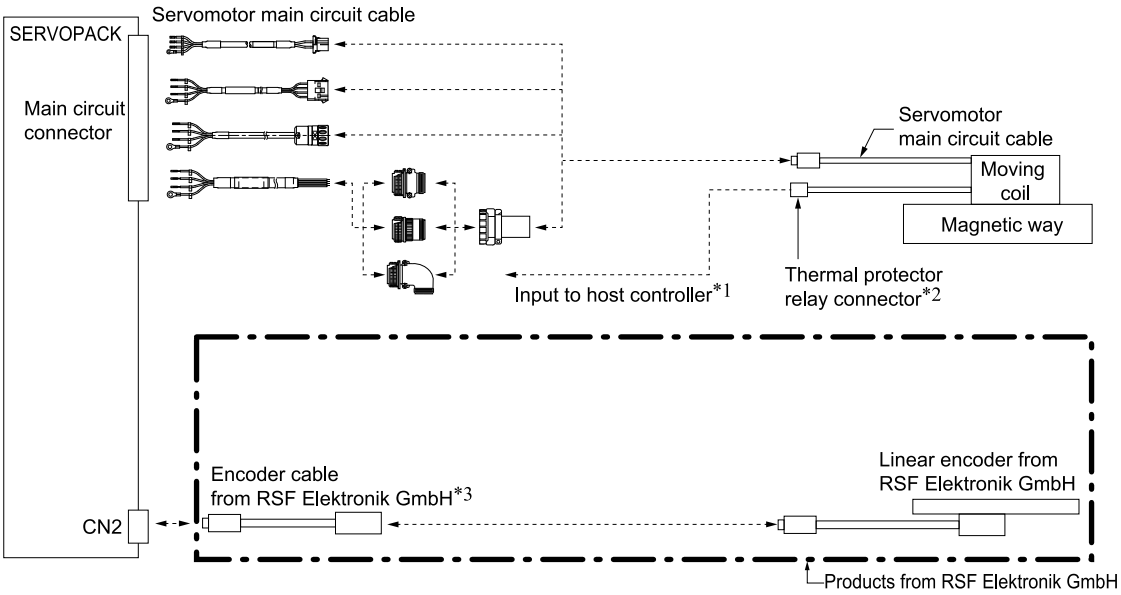
*2 Only SGLFW2 servomotors come equipped with thermal protector relay connectors.

*3 Use an encoder cable from Dr. JOHANNES HEIDENHAIN GmbH. Contact Dr. JOHANNES HEIDENHAIN GmbH for detailed encoder cable specifications.

10.2.2 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.
☞ *(14) JZSP-CL2TH00-□□-E Sensor Cables on page 366*

*2 Only SGLFW2 servomotors come equipped with thermal protector relay connectors.

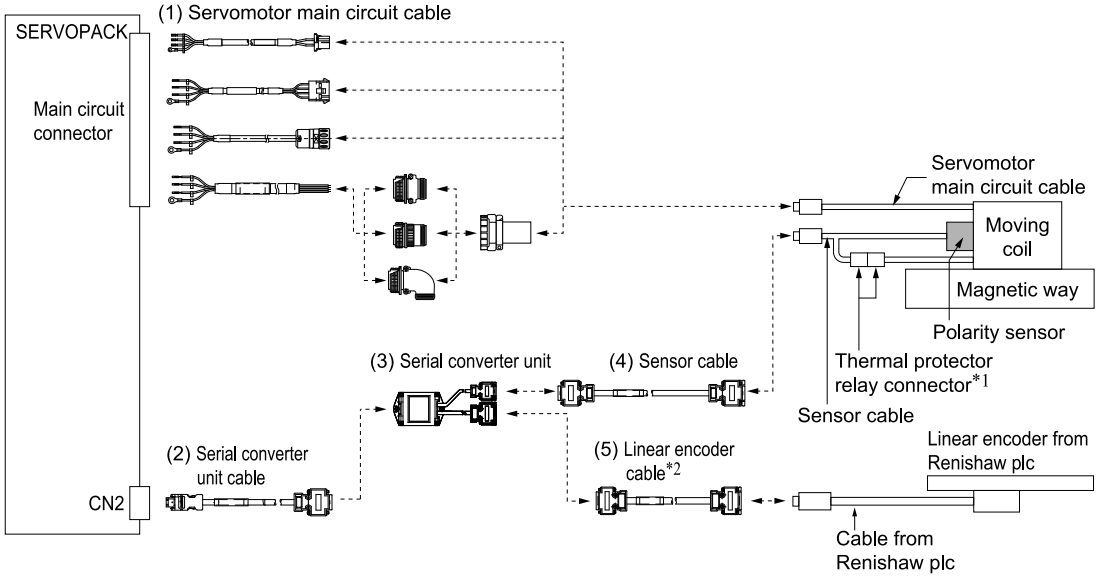
*3 Use an encoder cable from RSF Elektronik GmbH. Contact Dr. JOHANNES HEIDENHAIN GmbH for detailed encoder cable specifications.

10.2.3 Connections to Linear Encoder from Renishaw plc

(1) 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.

(a) Connecting to a Linear Servomotor with a Polarity Sensor

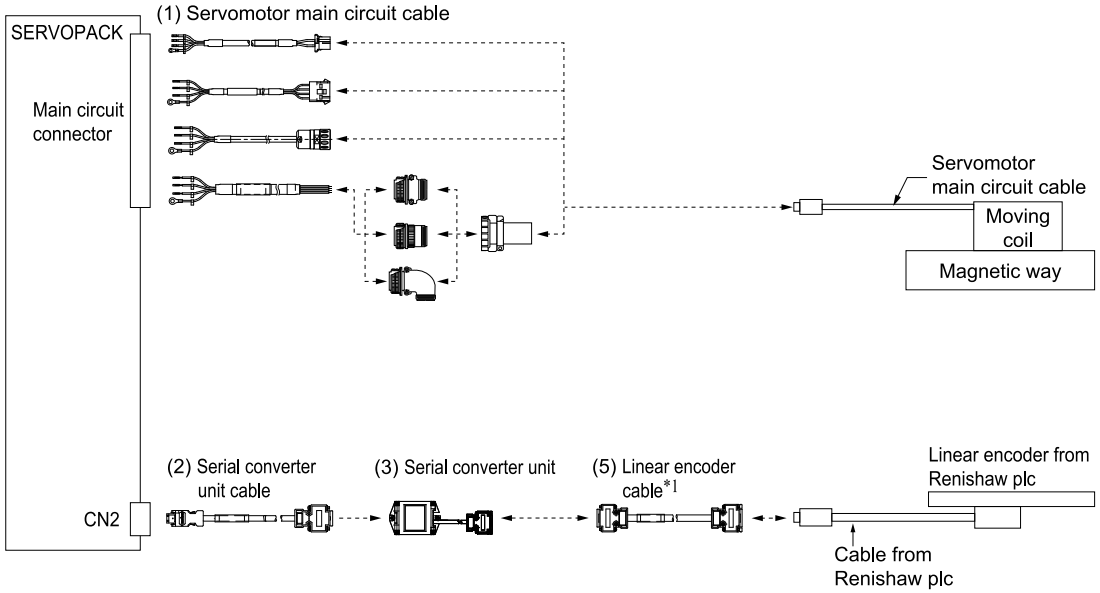


*1 Only SGLFW2 servomotors come equipped with thermal protector relay connectors.
*2 When using a JZDP-J00□-□□□ serial converter unit, do not use a Yaskawa linear encoder cable that is longer than 3 m.

No.	Cable Type	Reference
(1)	Servomotor Main Circuit Cables	357
(2)	Serial Converter Unit Cables	359
(3)	Serial Converter Unit	369
(4)	Sensor cable	359
(5)	Linear Encoder Cables	358

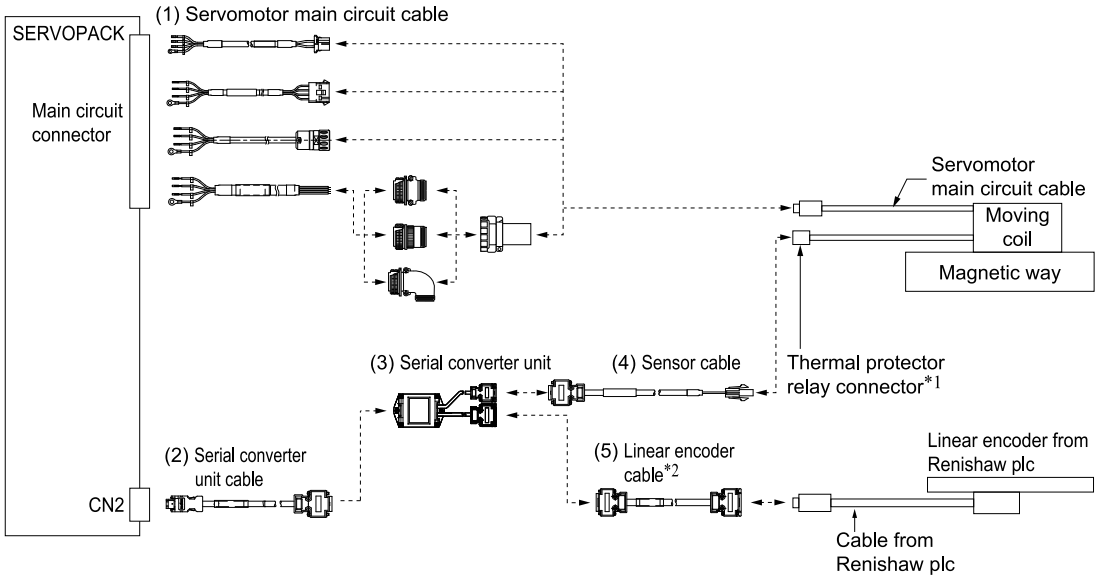
(b) Connecting to a Linear Servomotor without a Polarity Sensor

◆ 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.

◆ SGLFW2 Servomotors



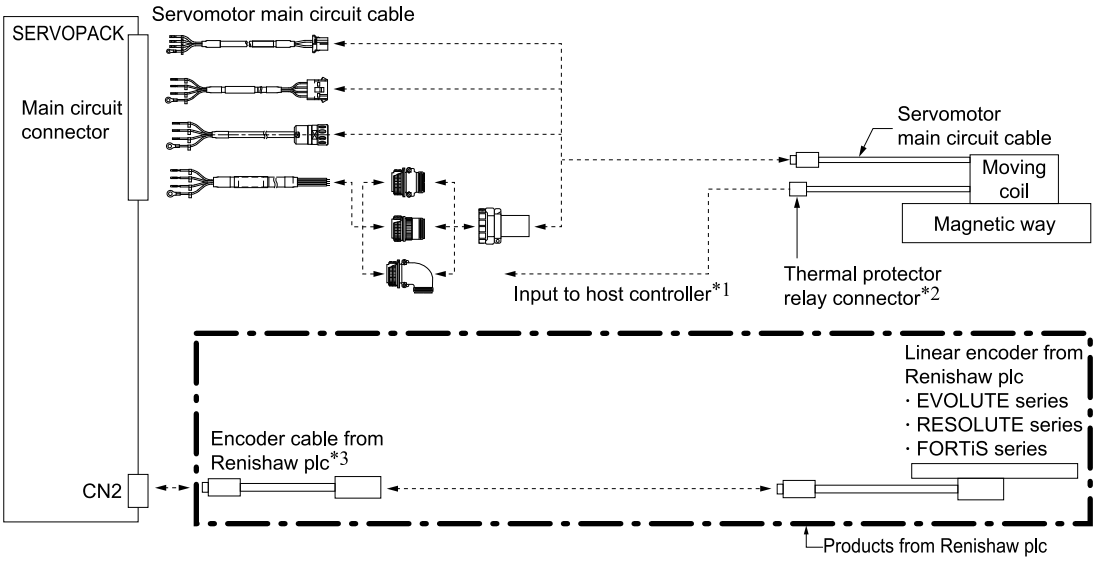
*1 Only SGLFW2 servomotors come equipped with thermal protector relay connectors.
*2 When using a JZDP-J00□-□□□ serial converter unit, do not use a Yaskawa linear encoder cable that is longer than 3 m.

No.	Cable Type	Reference
(1)	Servomotor Main Circuit Cables	357
(2)	Serial Converter Unit Cables	359
(3)	Serial Converter Unit	369
(4)	Sensor cable	359
(5)	Linear Encoder Cables	358

(c) EVOLUTE-Series Linear Encoder (model: EL36Y□□□□□□□□□), RESOLUTE-Series Linear Encoder (model: RL36Y□□□□□□□□), FORTiS-Series Linear Encoder

Important

1. You cannot use an EVOLUTE-series, RESOLUTE-series, or FORTiS-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.
☞ *(14) JZSP-CL2TH00-□□-E Sensor Cables on page 366*

*2 Only SGLFW2 servomotors come equipped with thermal protector relay connectors.

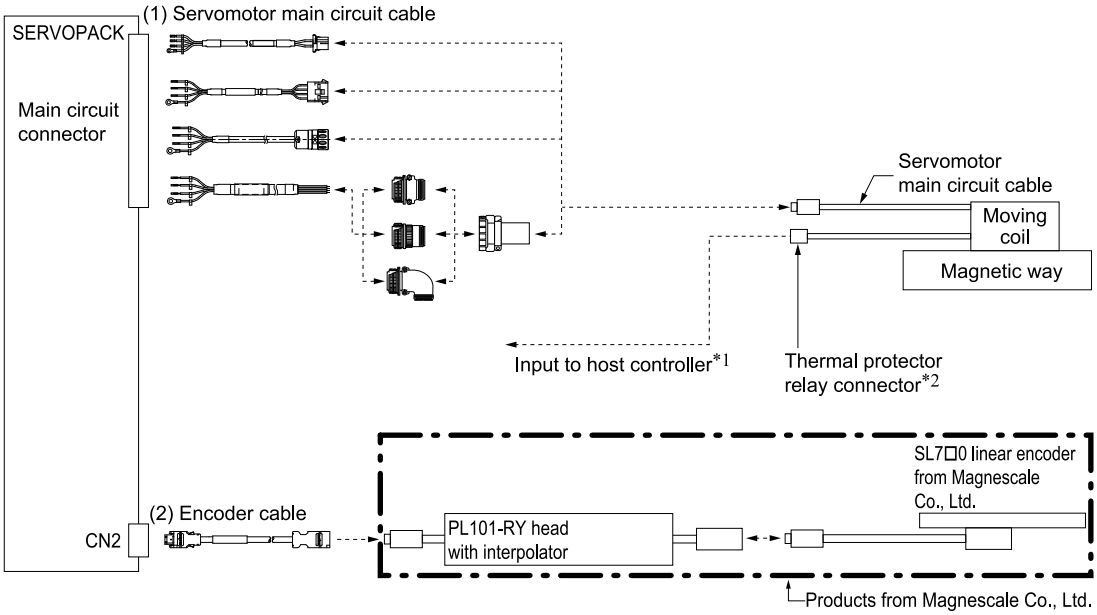
*3 Use an encoder cable from Renishaw plc. Contact Renishaw plc for detailed encoder cable specifications.

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

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

Important

1. You cannot use a PL101-RY sensor head with an interpolator together with a linear servomotor with a polarity sensor.
2. If you use an SGLFW2 servomotor, input the thermal protector signal from the linear servomotor to the host controller. The thermal protector signal is closed when the temperature is normal and open when the thermal protector is activated. Do not exceed 3 A or 30 V.



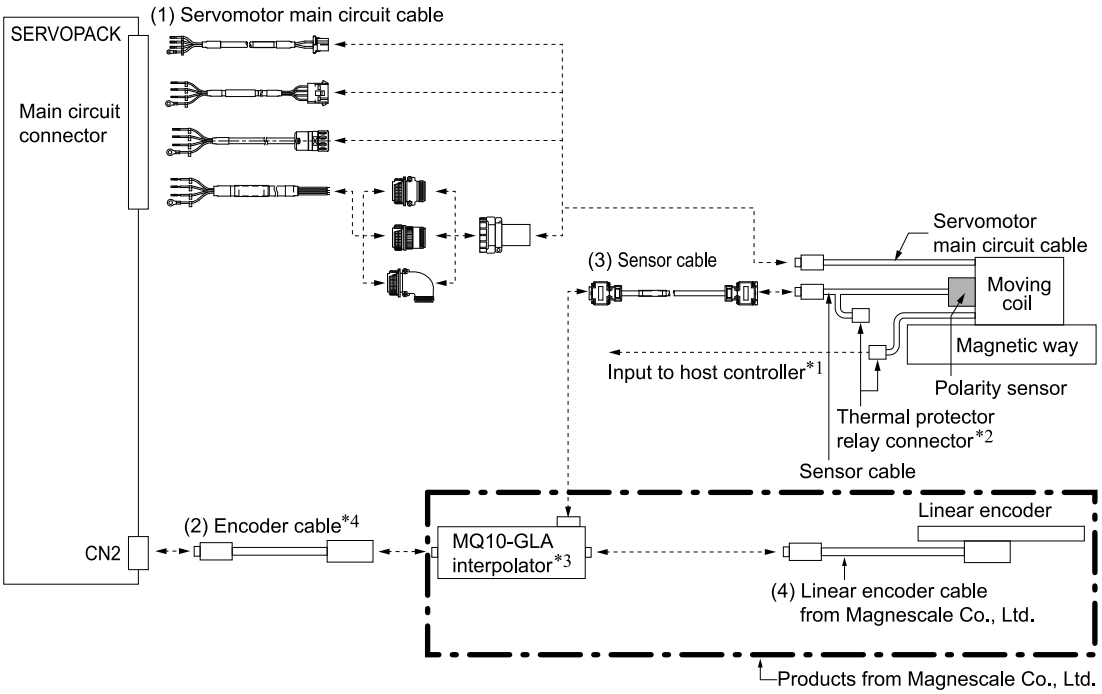
*1 Cables to connect to the host controller are not provided by Yaskawa.
Refer to the following section for information on connector models.
☞ *(14) JZSP-CL2TH00-□□-E Sensor Cables on page 366*

*2 Only SGLFW2 servomotors come equipped with thermal protector relay connectors.

No.	Cable Type	Reference
(1)	Servomotor Main Circuit Cables	357
(2)	Encoder Cables	360

(2) SmartSCALE Linear Encoder (SQ10 Scale and 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.
☞ *(14) JZSP-CL2TH00-□□-E Sensor Cables on page 366*

*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		357
(2)	Encoder Cables	These cables are not provided by Yaskawa.	352
(3)	Sensor Cables		359
(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.	–

(a) Encoder Cables

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

◆ SERVOPACK End of Cable (CN2)

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

Pin No.	Signal	Function
1	PG 5 V	Encoder power supply +5 V
2	PG 0 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	71
	10 m	JZSP-CMP09-10-E	JZSP-CSP39-10-E	
	15 m	JZSP-CMP09-15-E	JZSP-CSP39-15-E	

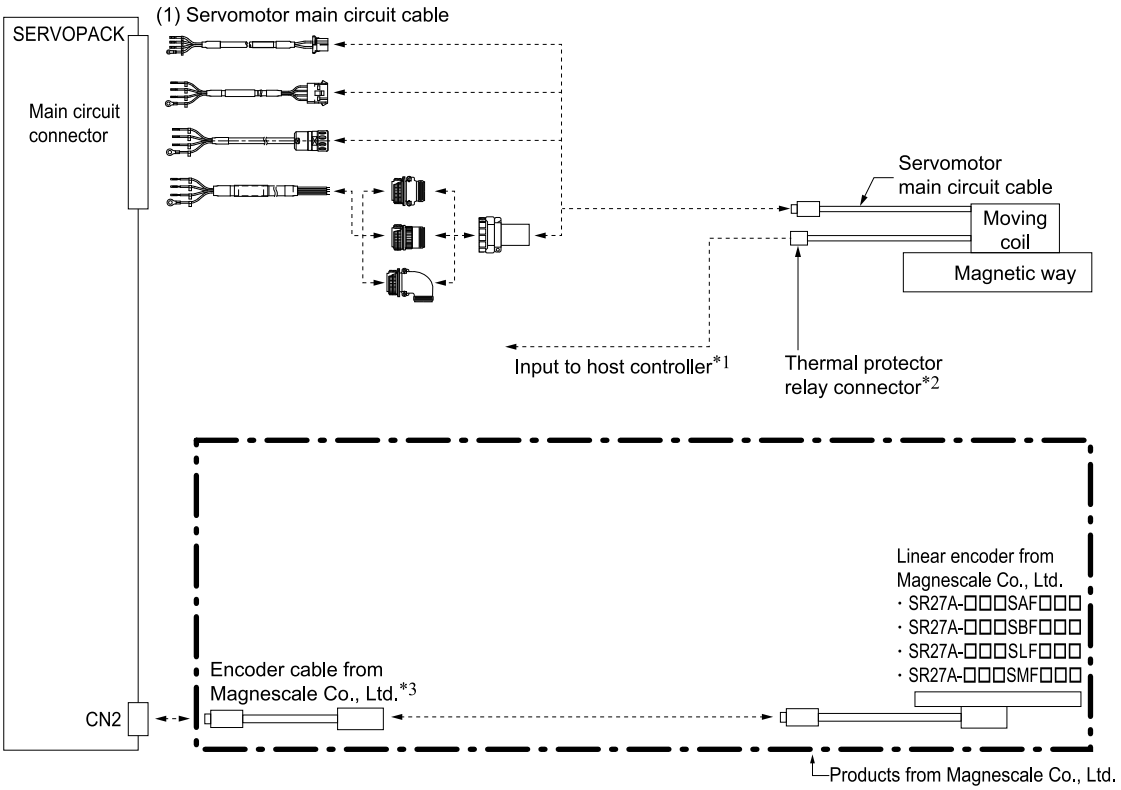
Note:

We recommend that you use flexible cables.

(3) Linear Encoder SR27A

Important

1. You cannot use an SR27A 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.
☞ *(14) JZSP-CL2TH00-□□-E Sensor Cables on page 366*

*2 Only SGLFW2 servomotors come equipped with thermal protector relay connectors.

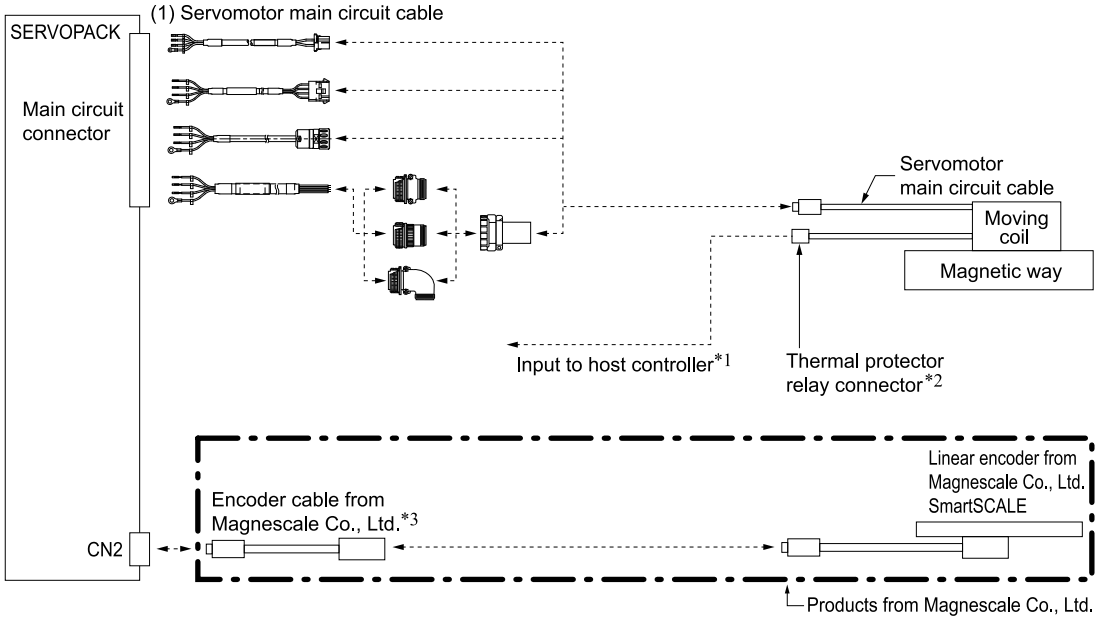
*3 Use an encoder cable from Magnescale Co., Ltd.. Contact Magnescale Co., Ltd. for details on encoder cable specifications.

No.	Cable Type	Reference
(1)	Servomotor Main Circuit Cables	357

(4) SmartSCALE Linear Encoder (SQ47 or SQ57)

Important

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.
☞ *(14) JZSP-CL2TH00-□□-E Sensor Cables on page 366*

*2 Only SGLFW2 servomotors come equipped with thermal protector relay connectors.

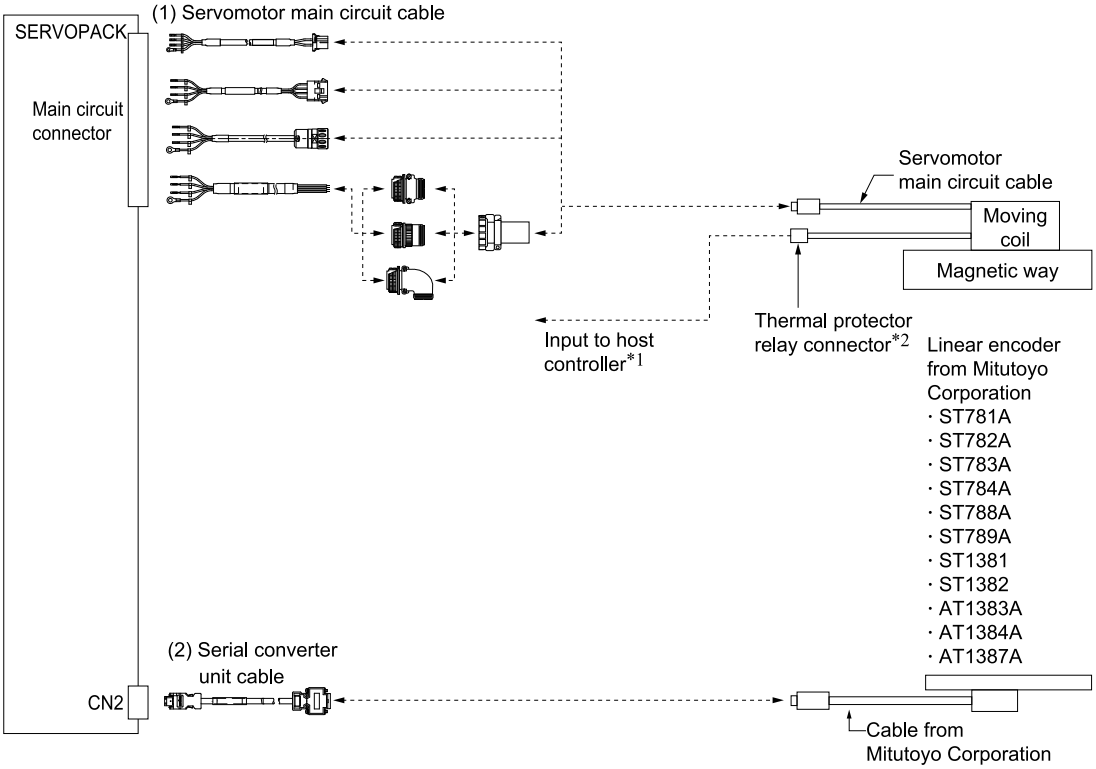
*3 Use an encoder cable from Magnescale Co., Ltd.. Contact Magnescale Co., Ltd. for details on encoder cable specifications.

No.	Cable Type	Reference
(1)	Servomotor Main Circuit Cables	357

10.2.5 Connections to Linear Encoders from Mitutoyo Corporation

Important

1. You cannot use a Mitutoyo 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.
☞ *(14) JZSP-CL2TH00-□□-E Sensor Cables on page 366*

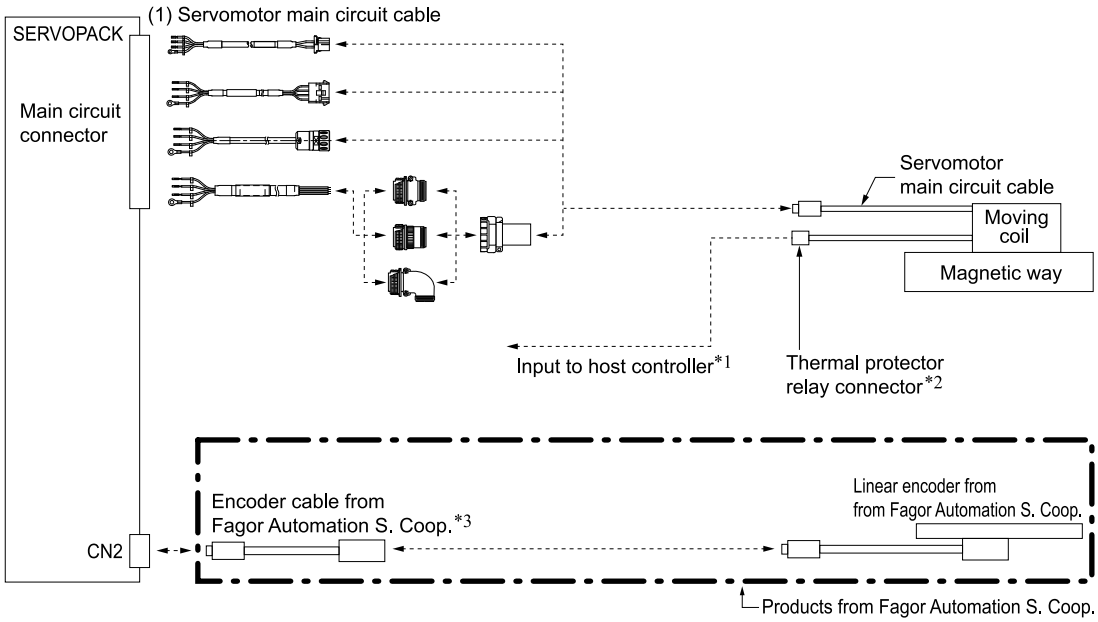
*2 Only SGLFW2 servomotors come equipped with thermal protector relay connectors.

No.	Cable Type	Reference
(1)	Servomotor Main Circuit Cables	357
(2)	Serial Converter Unit Cables	359

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

Important

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.
☞ *(14) JZSP-CL2TH00-□□-E Sensor Cables on page 366*

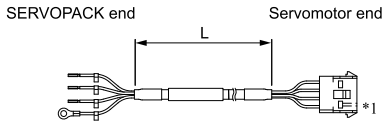
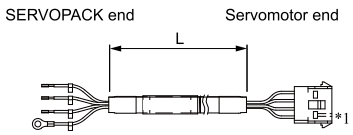
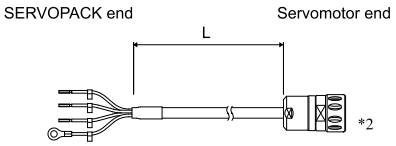
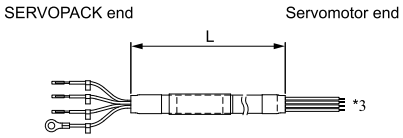
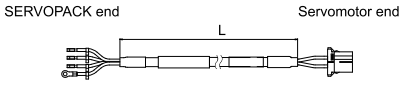
*2 Only SGLFW2 servomotors come equipped with thermal protector relay connectors.

*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 Cables	357

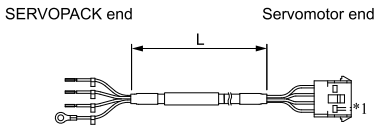
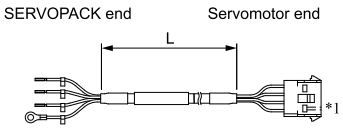
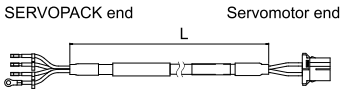
10.3 Cable Selection Table

10.3.1 Servomotor Main Circuit Cables

Servomotor Model	Length (L)	Order Number	Appearance	Details
SGLGW-30A, -40A, -60A	1 m	JZSP-CLN11-01-E		360
	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 SGLTW-20A, -35A	1 m	JZSP-CLN21-01-E		360
	3 m	JZSP-CLN21-03-E		
	5 m	JZSP-CLN21-05-E		
	10 m	JZSP-CLN21-10-E		
	15 m	JZSP-CLN21-15-E		
	20 m	JZSP-CLN21-20-E		
SGLGW-30A□□□□□D SGLGW-40A□□□□□D SGLGW-60A□□□□□D SGLTW-□□A□□□□□D	1 m	JZSP-CLN14-01-E		361
	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□ SGLTW-80A□□□B□	1 m	JZSP-CLN39-01-E		361
	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		362
	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		

Continued on next page.

Continued from previous page.

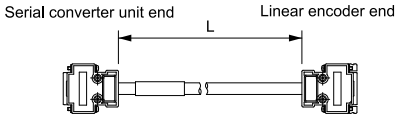
Servomotor Model	Length (L)	Order Number	Appearance	Details
SGLFW2-30A070A□ SGLFW2-30A120A□ SGLFW2-30A230A□	1 m	JZSP-CL2N703-01-E		363
	3 m	JZSP-CL2N703-03-E		
	5 m	JZSP-CL2N703-05-E		
	10 m	JZSP-CL2N703-10-E		
	15 m	JZSP-CL2N703-15-E		
	20 m	JZSP-CL2N703-20-E		
SGLFW2-45A200A□ SGLFW2-45A380A□	1 m	JZSP-CL2N603-01-E		363
	3 m	JZSP-CL2N603-03-E		
	5 m	JZSP-CL2N603-05-E		
	10 m	JZSP-CL2N603-10-E		
	15 m	JZSP-CL2N603-15-E		
	20 m	JZSP-CL2N603-20-E		
SGLFW2-90A560A□ SGLFW2-1DA380A□ SGLFW2-1DA560A□	1 m	JZSP-CL2N503-01-E		363
	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).

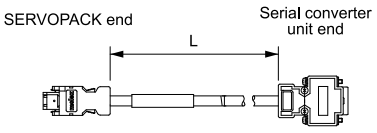
*1 Connector from TE Connectivity Japan G.K.
*2 Connector from Hypertac GmbH
*3 A connector is not provided on the linear servomotor end. Obtain a connector according to your specifications. Refer to the following section for information on connector models.
☞ *(a) JZSP-CLN39 Cable Connectors on page 361*

10.3.2 Linear Encoder Cables

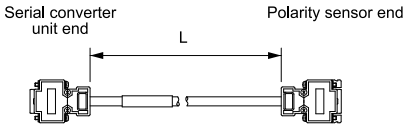
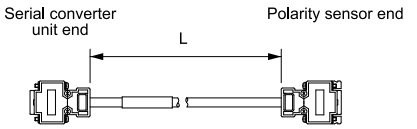
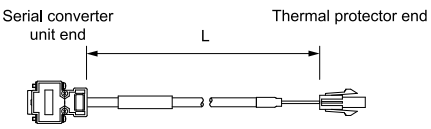
Name	Servomotor Model	Length (L) *1	Order Number	Appearance	Details
For linear encoder from Renishaw plc	All models	1 m	JZSP-CLL00-01-E		364
		3 m	JZSP-CLL00-03-E		
		5 m	JZSP-CLL00-05-E		
		10 m	JZSP-CLL00-10-E		
		15 m	JZSP-CLL00-15-E		
For linear encoder from Dr. JOHANNES HEIDENHAIN GmbH		1 m	JZSP-CLL30-01-E		
		3 m	JZSP-CLL30-03-E		
		5 m	JZSP-CLL30-05-E		
		10 m	JZSP-CLL30-10-E		
		15 m	JZSP-CLL30-15-E		

*1 When using a JZDP-J00□-□□□-E serial converter unit, do not exceed a cable length of 3 m.

10.3.3 Serial Converter Unit Cables

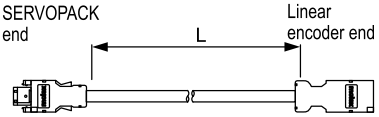
Servomotor Model	Length (L)	Order Number	Appearance	Details
All models	1 m	JZSP-CLP70-01-E		365
	3 m	JZSP-CLP70-03-E		
	5 m	JZSP-CLP70-05-E		
	10 m	JZSP-CLP70-10-E		
	15 m	JZSP-CLP70-15-E		
	20 m	JZSP-CLP70-20-E		

10.3.4 Sensor Cables

Servomotor Model	Length (L)	Order Number	Appearance	Details
SGLGW-□□A SGLTW-□□A	1 m	JZSP-CLL10-01-E		365
	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		366
	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		366
	3 m	JZSP-CL2TH00-03-E		
	5 m	JZSP-CL2TH00-05-E		
	10 m	JZSP-CL2TH00-10-E		
	15 m	JZSP-CL2TH00-15-E		

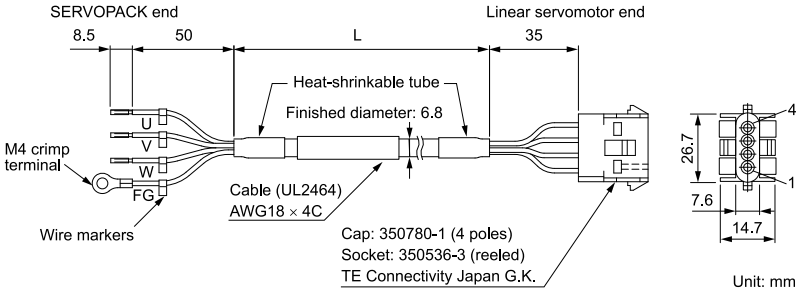
10.3.5 Encoder Cables

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		367
	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		

10.3.6 Cable Dimensional Drawings and Wiring Specifications

(1) JZSP-CLN11-□□-E Servomotor Main Circuit Cables

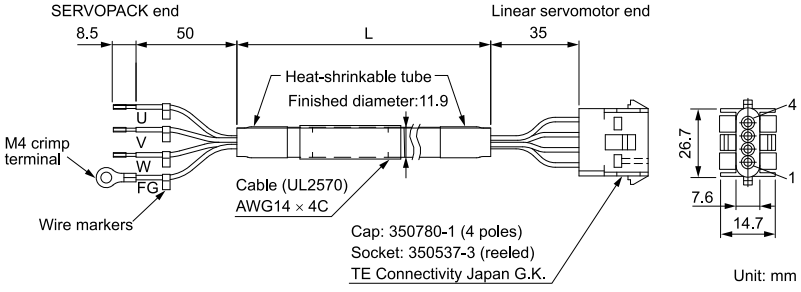


- Wiring Specifications

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

(2) JZSP-CLN21-□□-E Servomotor Main Circuit Cables

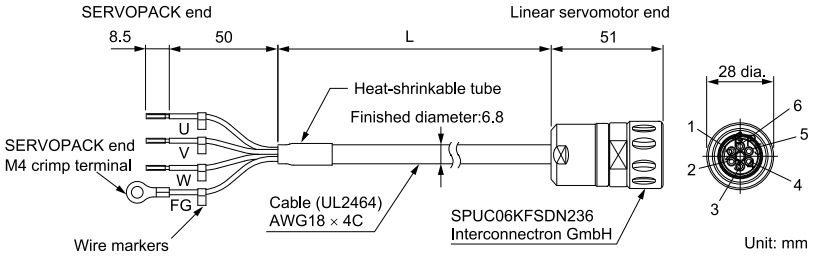


- Wiring Specifications

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

(3) JZSP-CLN14-□□-E Servomotor Main Circuit Cables

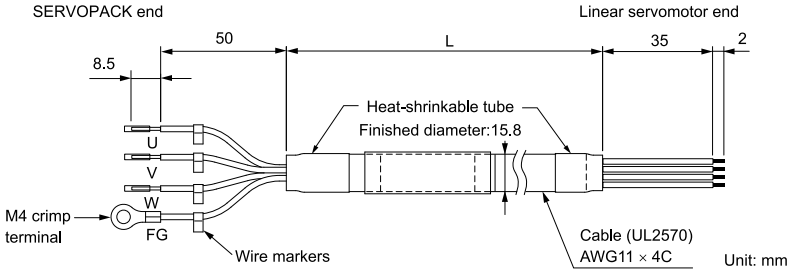


• Wiring Specifications

SERVOPACK leads / Servomotor connector

Wire Color	Pin	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

(4) JZSP-CLN39-□□-E Servomotor Main Circuit Cables



• Wiring Specifications

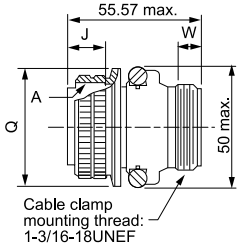
SERVOPACK leads / Servomotor connector

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

(a) 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

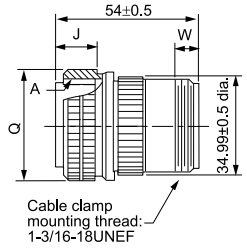
◆ **MS3106B22-22S: Straight Plug with Two-Piece Shell**



Unit: mm

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

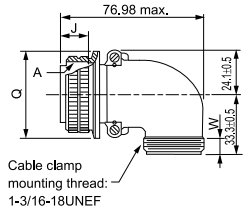
◆ MS3106A22-22S: Straight Plug with Solid Shell



Unit: mm

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

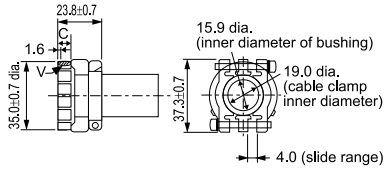
◆ MS3108B22-22S: Right-Angle Plug with Two-Piece Shell



Unit: mm

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

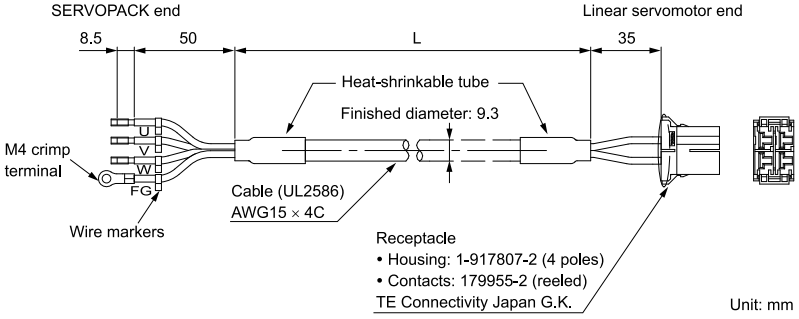
◆ MS3057-12A: Cable Clamp with Rubber Bushing



Unit: mm

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

(5) JZSP-CL2N803-□□-E Servomotor Main Circuit Cables

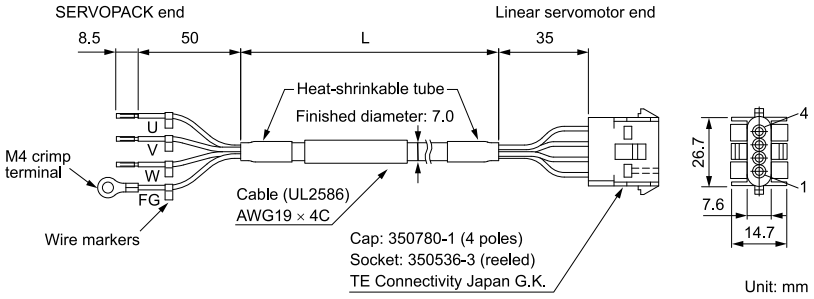


- Wiring Specifications

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

(6) JZSP-CL2N703-□□-E Servomotor Main Circuit Cables

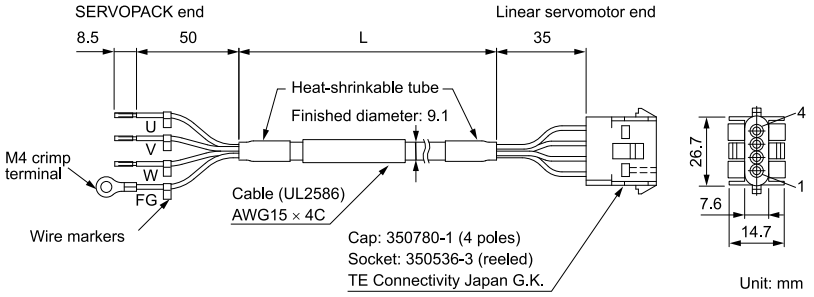


- Wiring Specifications

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

(7) JZSP-CL2N603-□□-E Servomotor Main Circuit Cables

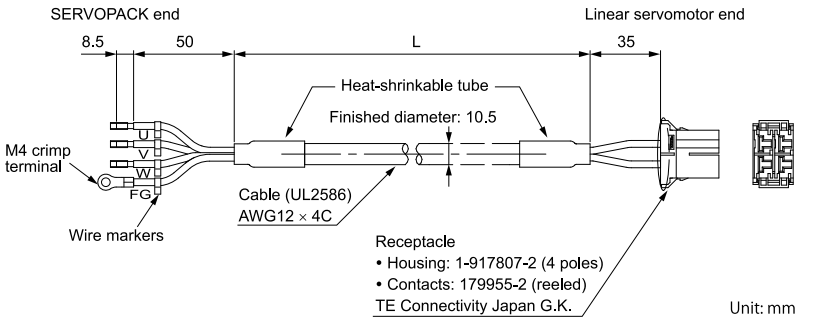


- Wiring Specifications

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

(8) JZSP-CL2N503-□□-E Servomotor Main Circuit Cables

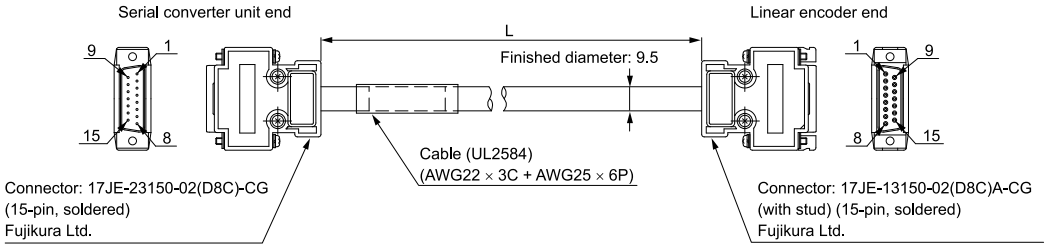


- Wiring Specifications

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

(9) JZSP-CLL00-□□-E Linear Encoder Cables



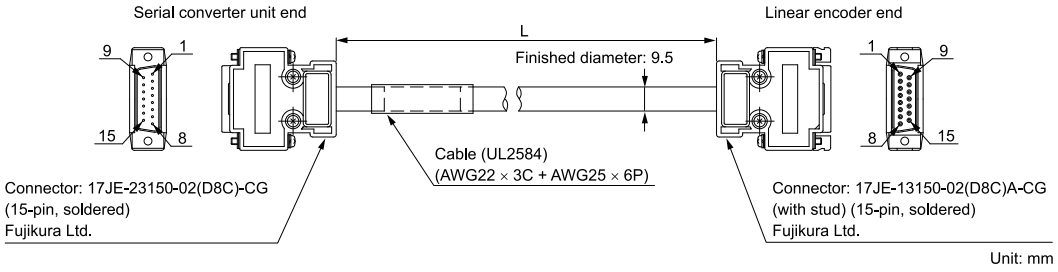
Unit: mm

- 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

(10) JZSP-CLL30-□□-E Linear Encoder Cables



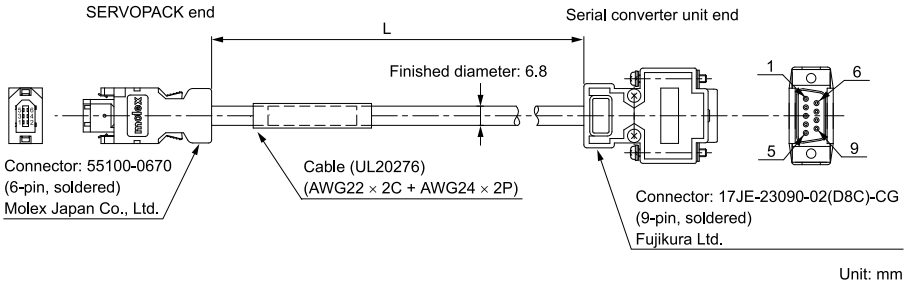
Unit: mm

- 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

(11) JZSP-CLP70-□□-E Serial Converter Unit Cables



Unit: mm

- Wiring Specifications

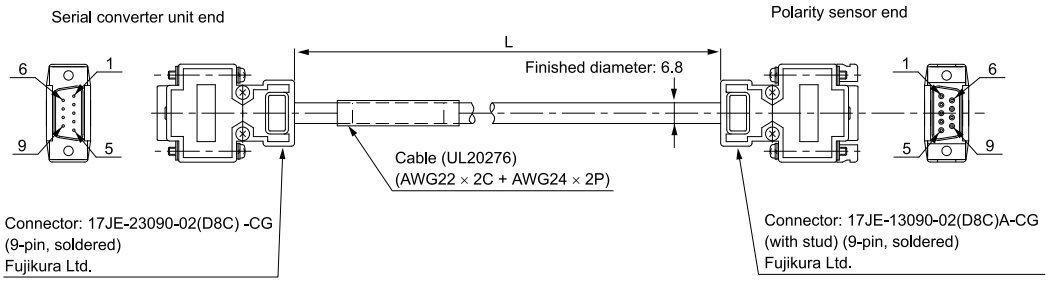
SERVOPACK end

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

Serial converter unit end

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

(12) JZSP-CLL10-□□-E Sensor Cables



Unit: mm

- Wiring Specifications

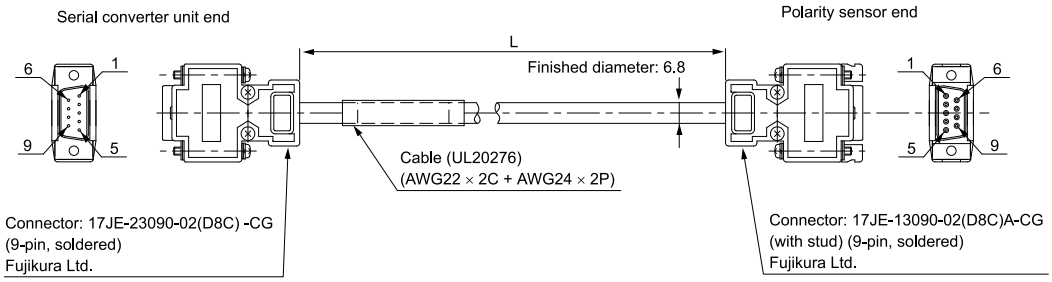
Serial converter unit end

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

Polarity sensor end

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

(13) JZSP-CL2L100-□□-E Sensor Cables



Unit: mm

- Wiring Specifications

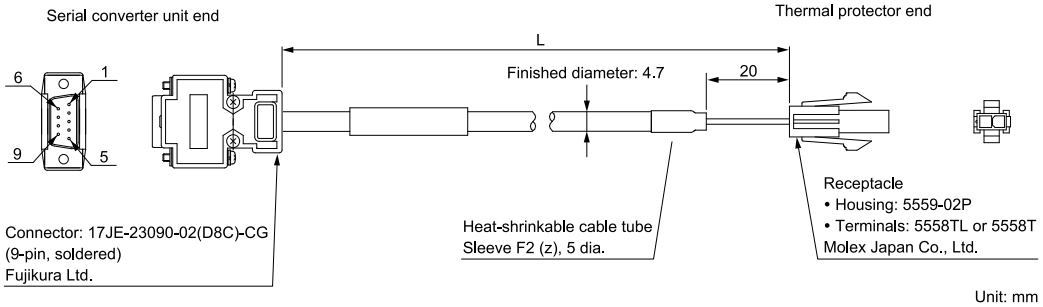
Serial converter unit end

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

Polarity sensor end

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

(14) JZSP-CL2TH00-□□-E Sensor Cables



Unit: mm

- Wiring Specifications

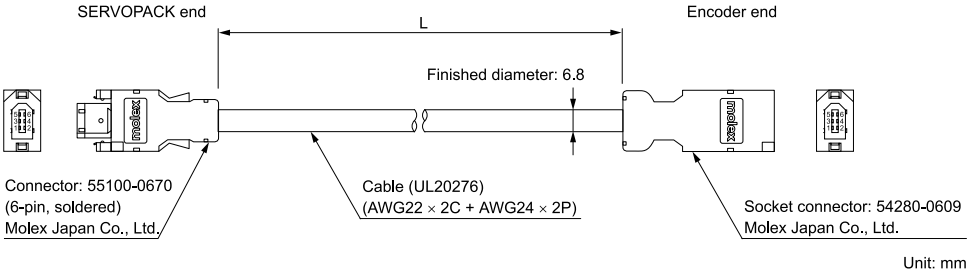
Serial converter unit end

Pin	Signal
1	+5V, Thermal protector
2	–
3	–
4	–
5	–
6	–
7	–
8	–
9	Thermal protector

Thermal protector end

Pin	Signal
1	+5V, Thermal protector
2	Thermal protector

(15) Encoder Cables: JZSP-CMP00-□□-E (standard cables) and JZSP-CMP10-□□-E (flexible cables)



- Wiring Specifications

Standard Cable

SERVOPACK end

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

Shield wire

Encoder end

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

Flexible Cable

SERVOPACK end

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

Shield wire

Encoder end

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

Note:

Always connect the shield wire from the encoder cable to the connector case (shell).

10.3.7 Wiring Precautions

(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.

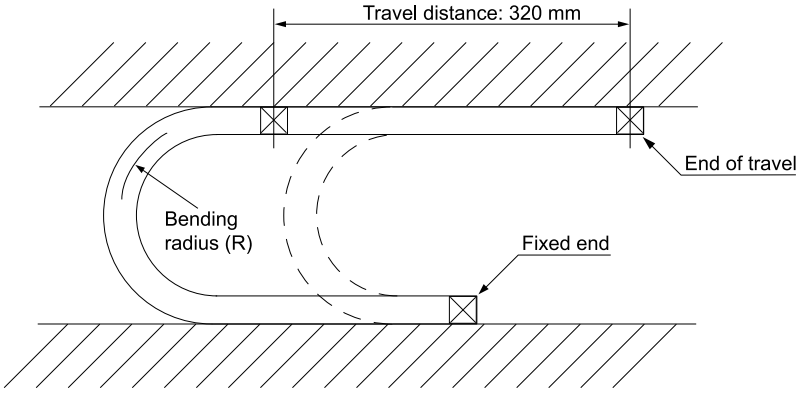
Cable Diameter	Recommended Bending Radius (R)
Less than 8 mm	15 mm min.
8 mm	20 mm min.
Over 8 mm	Cable diameter × 3 mm min.

(2) 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.

(a) 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.

(b) Recommended Cable Bending Radius

Type	Model	Recommended Bending Radius (R) [mm]
Linear Servomotor Main Circuit Cables	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 Cables	JZSP-CLL00-□□-E	57
	JZSP-CLL30-□□-E	
Sensor Cables	JZSP-CLL10-□□-E	46
	JZSP-CL2L100-□□-E	
	JZSP-CL2TH00-□□-E	
Serial Converter Unit Cables	JZSP-CLP70-□□-E	
Cables with Connectors on Both Ends (For Incremental or Absolute Encoder)	JZSP-CMP10-□□-E	46
Cables without Connectors	JZSP-CSP39-□□-E	

10.4 Serial Converter Unit

10.4.1 Selection Table

(1) Order Number

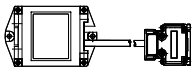
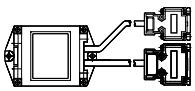
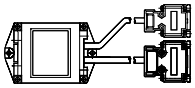
Use the following tables to select the serial converter unit.

JZDP - □00□ - □□□*1

Applicable Linear Servomotors

Serial Converter Unit Model

*1 When connecting to a fully-closed module, select JZDP-□00□-000.

Serial Converter Unit Model				
Symbol	Appearance	Applicable Linear Encoder	Polarity Sensor	Thermal Protector
H003 J003		From Dr. JOHANNES HEIDENHAIN GmbH	Not provided.	Not provided.
H005 J005		From Renishaw PLC	Not provided.	Not provided.
H006 J006		From Dr. JOHANNES HEIDENHAIN GmbH	Provided	Provided
H008 J008		From Renishaw PLC	Provided	Provided

Applicable Linear Servomotors		
Servomotor Model		Code
SGLGW- (Coreless models) For Standard-Force Magnetic Way	30A050C	250
	30A080C	251
	40A140C	252
	40A253C	253
	40A365C	254
	60A140C	258
	60A253C	259
	60A365C	260
	90A200C	264
	90A370C	265
	90A535C	266
SGLGW- + SGLGM - □-M (Coreless models) For High-Force Magnetic Way	40A140C	255
	40A253C	256
	40A365C	257
	60A140C	261
	60A253C	262
	60A365C	263

Continued on next page.

Continued from previous page.

Applicable Linear Servomotors		
SGLFW2 (With F-type Iron Cores)	30A070A	628
	30A120A	629
	30A230A	630
	45A200A	631
	45A380A	632
	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
SGLTW- (Models with T-Type Iron Cores)	20A170A	011
	20A320A	012
	20A460A	013
	35A170A	014
	35A320A	015
	35A460A	016
	35A170H	105
	35A320H	106
	50A170H	108
	50A320H	109
	40A400B	185
	40A600B	186
	80A400B	187
	80A600B	188

10.4.2 Characteristics and Specifications

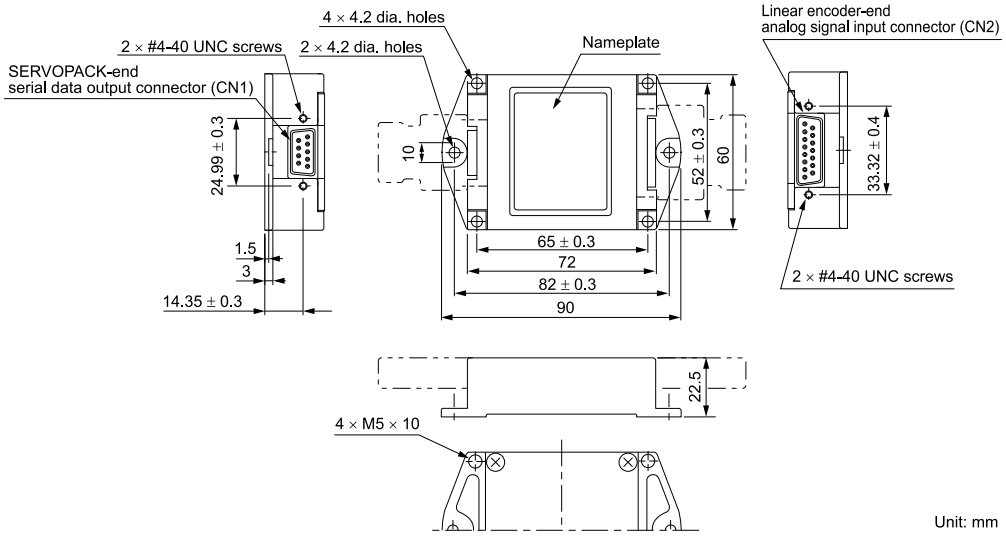
Item		JZDP-H00□-□□□	JZDP-J00□-□□□
Electrical Characteristics	Power Supply Voltage	+5.0 V ±5%, ripple content: 5% max.	
	Current Consumption *1	120 mA Typ, 160 mA max.	
	Signal Resolution	1/256 pitch of input two-phase sine wave	1/4096 pitch of input two-phase sine wave
	Maximum Response Frequency	250 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	Approx. Mass	150 g	
	Vibration Resistance	98 m/s max.^{2}(10 Hz to 2,500 Hz) in three directions	
	Impact Resistance	980 m/s^2, (11 ms) two times in three directions	
Environment	Surrounding Air Temperature	0°C to 55°C	
	Storage Temperature	-20°C to 80°C	
	Surrounding Air Humidity/Storage Humidity	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.

10.4.3 External Dimensions

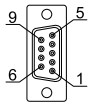
(1) Serial Converter Unit without Polarity Sensor Cable (for linear encoder from Dr. JOHANNES HEIDENHAIN GmbH)

(a) Model: JZDP-□003-□□□



Pin No.	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

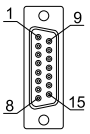
CN1
SERVOPACK-end
serial data outputs



17-series connector:
17LE-13090-27-FA
(socket)
from Fujikura Ltd.

Pin No.	Signal
1	cos input (A+)
2	0 V
3	sin input (B+)
4	+ 5 V
5	Not used
6	Not used
7	/Ref input (R-)
8	Not used
9	/cos input (A-)
10	0 V sensor
11	/sin input (B-)
12	5 V sensor
13	Not used
14	Ref input (R+)
15	Not used
Case	Shield

CN2
Linear encoder-end
analog signal inputs



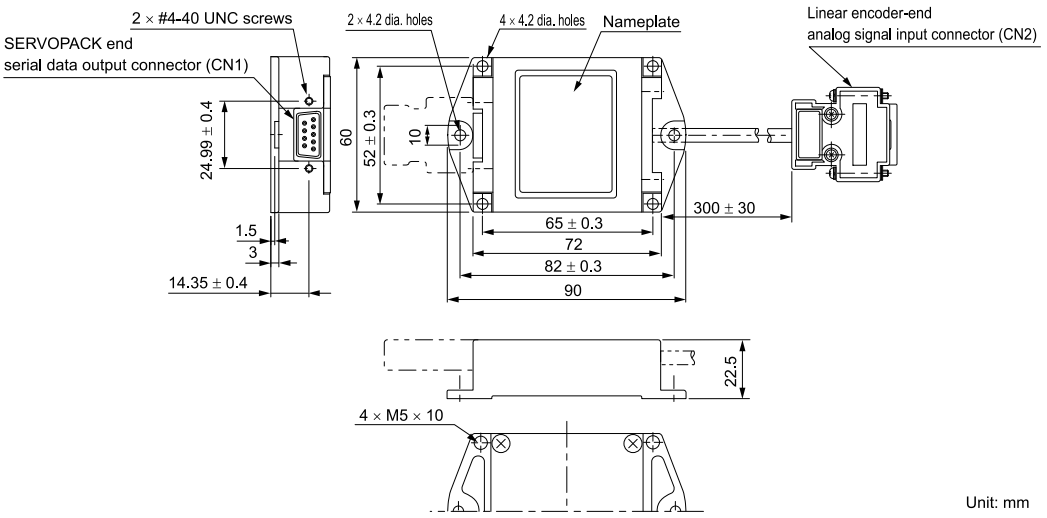
17-series connector:
17LE-13150-27-FA
(socket)
from Fujikura Ltd.

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.

(2) Serial Converter Unit without Polarity Sensor Cable (for linear encoder from Renishaw plc)

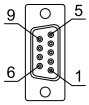
(a) Model: JZDP-□005-□□□



Unit: mm

Pin No.	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

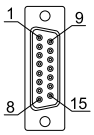
CN1
SERVOPACK-end
serial data outputs



17-series connector:
17LE-13090-27-FA
(socket)
from Fujikura Ltd.

Pin No.	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



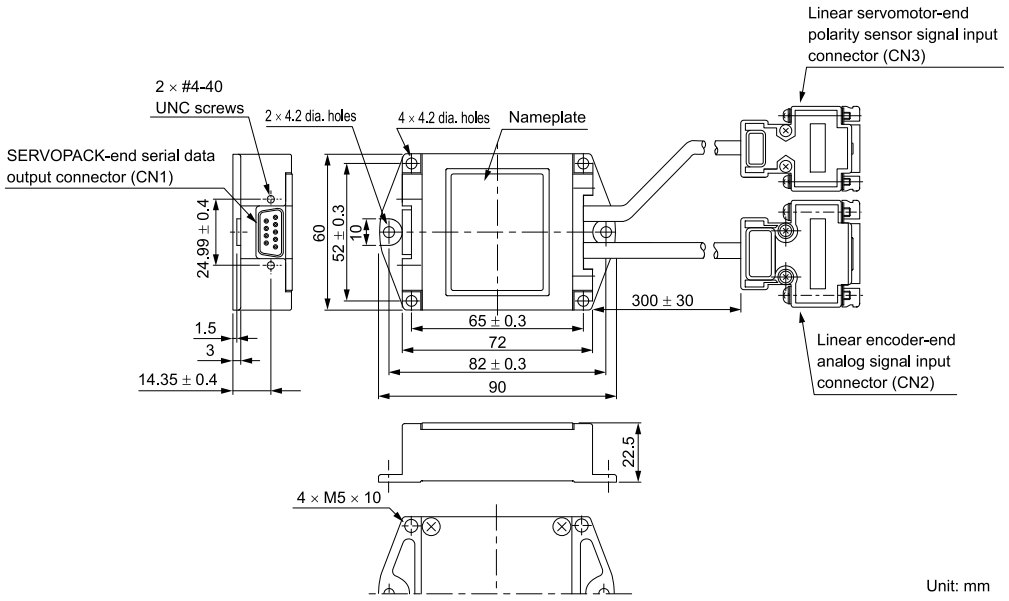
17-series connector:
17JE-13150-02 (D8C) A-CG
(socket)
from Fujikura Ltd.

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.

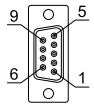
(3) Serial Converter Unit with Polarity Sensor Cable (for linear encoder from Dr. JOHANNES HEIDENHAIN GmbH)

(a) Model: JZDP-□006-□□□



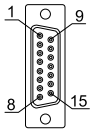
Unit: mm

CN1
SERVOPACK-end
serial data outputs



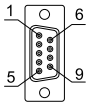
17-series connector:
17LE-13090-27-FA
(socket)
from Fujikura Ltd.

CN2
Linear encoder-end
analog signal inputs



17-series connector:
17JE-13150-02 (D8C) A-CG
(socket)
from Fujikura Ltd.

CN3
Linear servomotor-end
polarity sensor signal input



17-series connector:
17JE-13090-02 (D8C) A-CG
from Fujikura Ltd.

Pin No.	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 No.	Signal	Pin No.	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

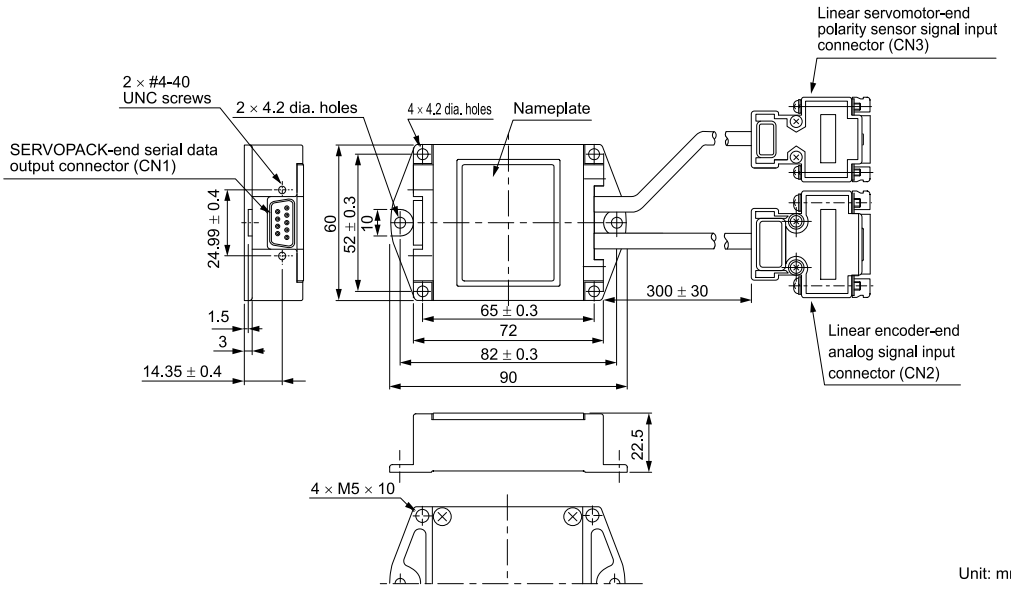
Pin No.	Signal
1	+5 V
2	Phase-U input
3	Phase-V input
4	Phase-W input
5	0 V
6	Not used
7	Not used
8	Not used
9	Thermal protector input
Case	Shield

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.

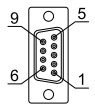
(4) Serial Converter Unit with Polarity Sensor Cable (for linear encoder from Renishaw plc)

(a) Model: JZDP-□008-□□□



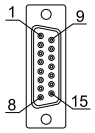
Unit: mm

CN1
SERVOPACK-end serial data outputs



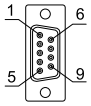
17-series connector:
17LE-13090-27-FA
(socket)
from Fujikura Ltd.

CN2
Linear encoder-end analog signal inputs



17-series connector:
17JE-13150-02 (D8C) A-CG
(socket)
from Fujikura Ltd.

CN3
Linear servomotor-end polarity sensor signal input



17-series connector:
17JE-13090-02 (D8C) A-CG
from Fujikura Ltd.

Pin No.	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 No.	Signal	Pin No.	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 No.	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.

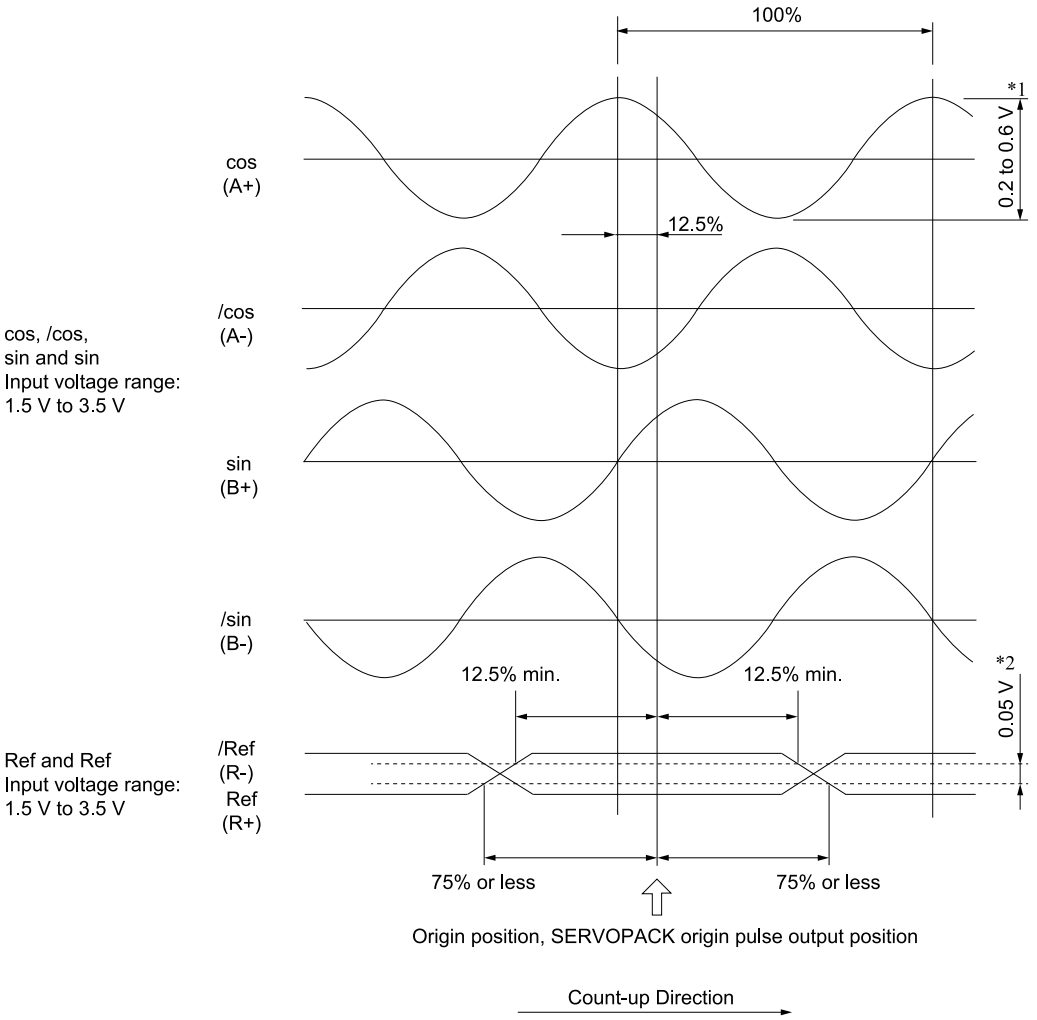
10.4.4 Analog Signal Input Timing

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

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

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

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



*1 If the analog signal amplitude declines to approximately 0.35 V because of the differential amplitude, the serial converter unit will output an alarm.

*2 This is the hysteresis width.

Important

Application Precautions

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

11

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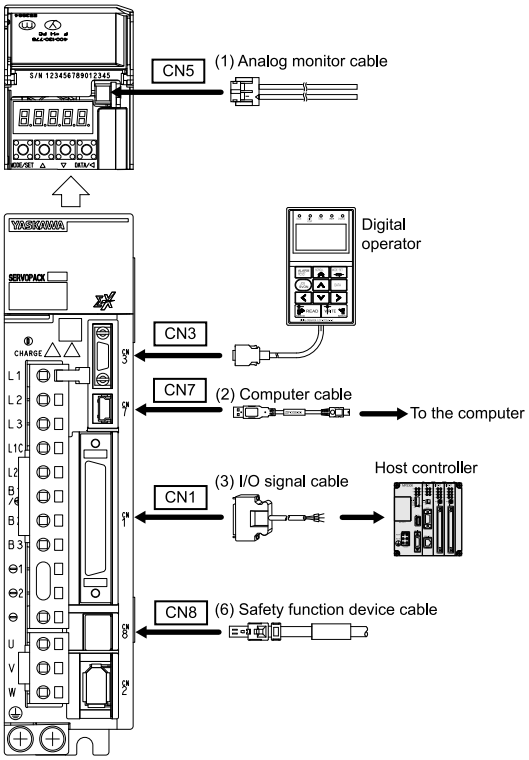
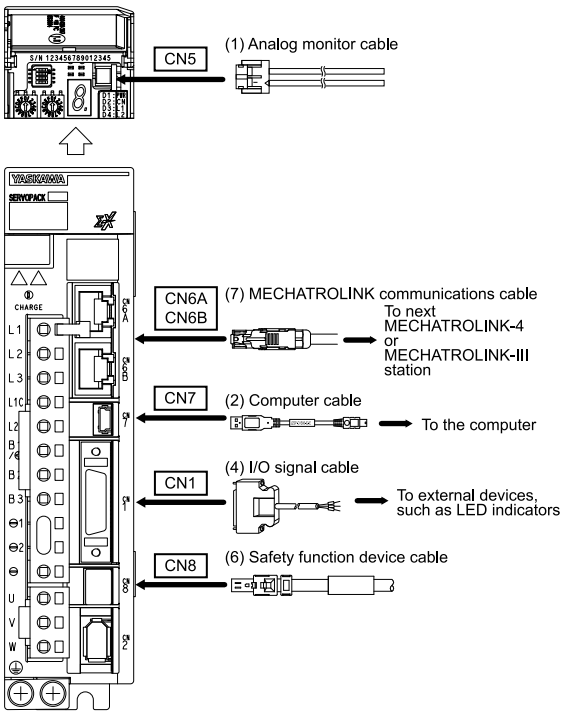
11.1 System Configuration Diagrams and Selection Tables

11.1.1 Device Configuration Diagrams

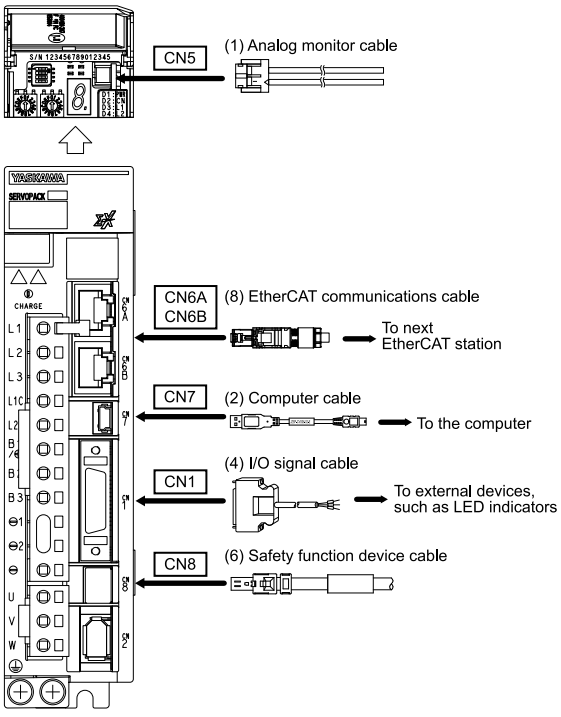
■ Σ-XS SERVOPACKs with Analog Voltage/Pulse Train Reference



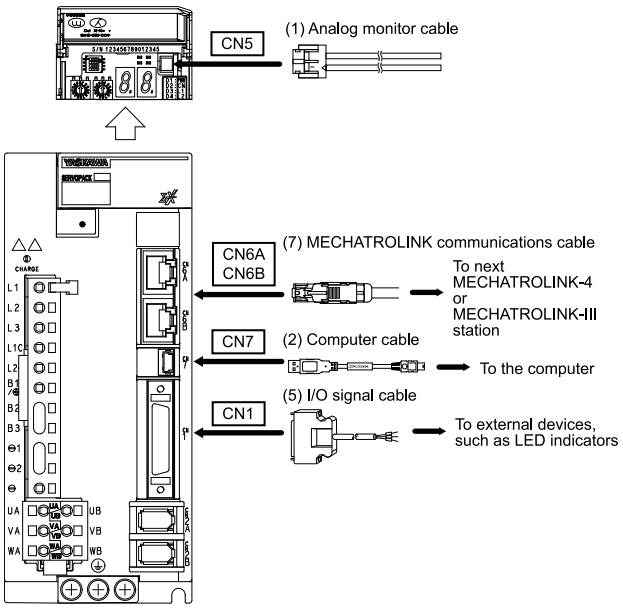
■ Σ-XS SERVOPACKs with MECHATORLINK-4/III Communications Reference



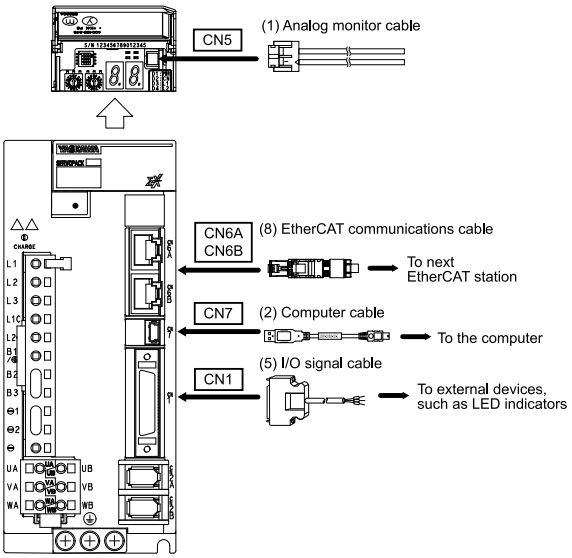
■ Σ-XS SERVOPACKs with EtherCAT Communications Reference



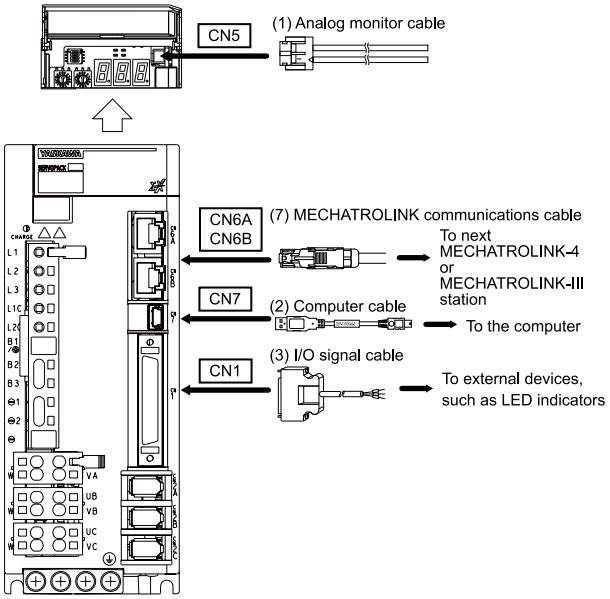
■ Σ-XW SERVOPACKs with MECHATORLINK-4/III Communications Reference



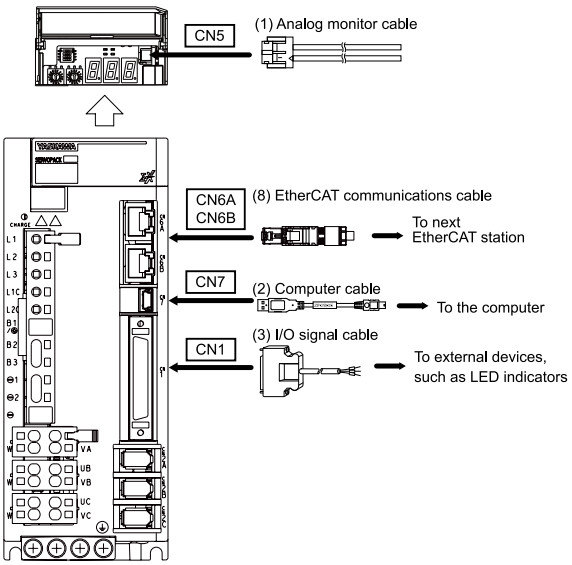
■ Σ-XW SERVOPACKs with EtherCAT Communications Reference



■ Σ-XT SERVOPACKs with MECHATORLINK-4/III Communications Reference



■ Σ-XT SERVOPACKs with EtherCAT Communications Reference



11.1.2 Selection Table

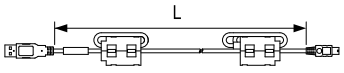
- (1) Analog Monitor Cable

Length (L)	Order Number	Appearance
1 m	JZSP-CA01-E	

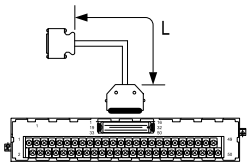
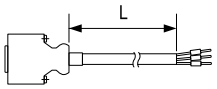
- (2) Computer Cable

Important

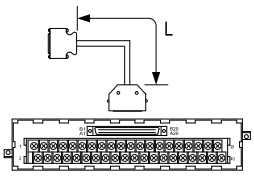
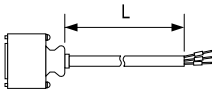
Use the Yaskawa-specified cable for the computer cable. Operation will not be dependable with any other cable.

Length (L)	Order Number	Appearance
2.5 m	JZSP-CVS06-02-E	

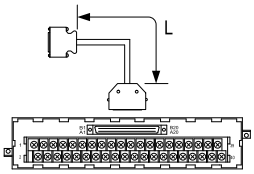
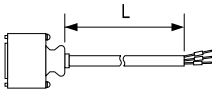
- (3) I/O Signal Cables for Σ-XS SERVOPACKs with Analog Voltage/Pulse Train Reference, Σ-XT SERVOPACKs with MECHATROLINK-4/III Communications Reference, and Σ-XT SERVOPACKs with EtherCAT Communications Reference

Name	Length (L)	Order Number	Appearance
Connector kits (soldered)	–	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	
Cables 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	

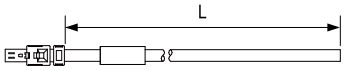
- (4) I/O Signal Cables for Σ-XS SERVOPACKs with MECHATROLINK-4/III Communications Reference and EtherCAT Communications Reference

Name	Length (L)	Order Number	Appearance
Connector kits (soldered)	–	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	
Cables 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	

- (5) I/O Signal Cables for Σ-XW SERVOPACKs with MECHATROLINK-4/III Communications Reference and EtherCAT Communications Reference

Name	Length (L)	Order Number	Appearance
Connector kits (soldered)	–	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	
Cables 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	

- (6) Safety Function Device Cable

Name	Length (L)	Order Number	Appearance
Cables with Connectors *1	1 m	JZSP-CVH03-01-E	
	3 m	JZSP-CVH03-03-E	
Connector kits *2	–	Manufacturer: TE Connectivity Japan G.K. Inquiries: Global Electronics Corporation Product name: Industrial Mini I/O D-Shape Type 1 Plug Connector Kit Model number: 2013595-1	

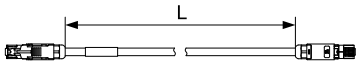
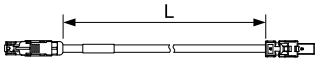
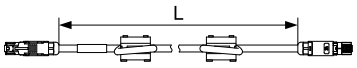
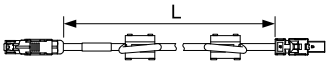
*1 When using safety functions, connect this cable to the safety function devices.
When not using safety functions, connect the enclosed safety jumper connector (JZSP-CVH05-E) to the SERVOPACK.
*2 Use the connector kit when you make cables yourself.

- (7) MECHATROLINK Communications Cables

Important

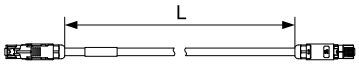
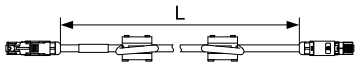
Use the Yaskawa-specified cables for the MECHATROLINK communications cables. Operation will not be dependable due to low noise resistance with any other cable.

The MECHATROLINK cable has connectors on both ends.

Type		Length (L)	Order Number	Appearance
Cables without Ferrite Cores	RJ-45 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	
		20 m	JZSP-CM3RR00-20-E	
		30 m	JZSP-CM3RR00-30-E	
	RJ-45 connector on one end Industrial mini I/O (IMI) connector on one end *1	0.2 m	JZSP-CM3RMM0-00P2-E	
		0.5 m	JZSP-CM3RMM0-00P5-E	
		1 m	JZSP-CM3RMM0-01-E	
		2 m	JZSP-CM3RMM0-02-E	
		3 m	JZSP-CM3RMM0-03-E	
		4 m	JZSP-CM3RMM0-04-E	
		5 m	JZSP-CM3RMM0-05-E	
		10 m	JZSP-CM3RMM0-10-E	
		20 m	JZSP-CM3RM00-20-E	
		30 m	JZSP-CM3RM00-30-E	
Cables with Ferrite Cores	RJ-45 connectors on both ends	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	
	RJ-45 connector on one end Industrial mini I/O (IMI) connector on one end *1	0.3 m	JZSP-CM3RMM1-00P3-E	
		3 m	JZSP-CM3RMM1-03-E	
		10 m	JZSP-CM3RMM1-10-E	
		20 m	JZSP-CM3RM01-20-E	
		30 m	JZSP-CM3RM01-30-E	
		50 m	JZSP-CM3RM01-50-E	

*1 This is used when connecting to MECHATROLINK-III compliant products such as the Σ-7 series SERVOPACK MECHATROLINK-III communications reference (SGD7□-□□□□20□) products and the MP3000 series of machine controllers.

- (8) EtherCAT Communications Cables

Type		Length (L)	Order Number	Appearance
Cables without Ferrite Cores	RJ-45 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	
		20 m	JZSP-CM3RR00-20-E	
		30 m	JZSP-CM3RR00-30-E	
Cables with Ferrite Cores	RJ-45 connectors on both ends	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	

The Ethernet cables with the following specifications can also be used to make the connections.

- Shielded: S/STP or S/UTP
- Category: CAT5e or better
- Length: 50 m max. (between nodes)

We recommend the following cable and connector.

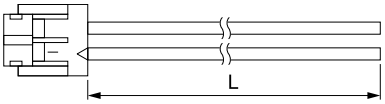
Item	Manufacturer	Model
Ethernet Cable	Beckhoff	ZB9020
RJ-45 Connector	Beckhoff	ZS1090-0003

11.2 Analog Monitor Cables

11.2.1 Selection Table

Order Number	Length (L)
JZSP-CA01-E	1 m

11.2.2 Dimensional Drawing



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

11.2.3 Wiring Specifications

Pin No.	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

11.3 Computer Cable

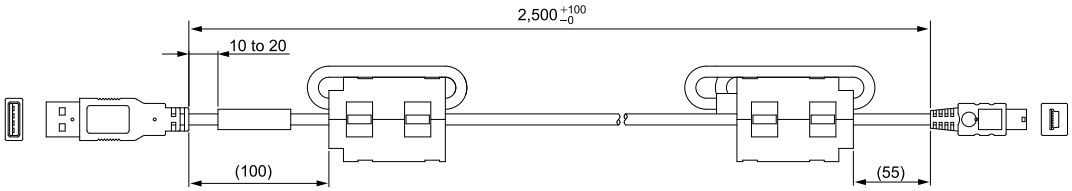
Important

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

11.3.1 Selection Table

Order Number	Length (L)
JZSP-CVS06-02-E	2.5 m

11.3.2 Dimensional Drawing



11.4 I/O Signal Cables for SERVOPACKs

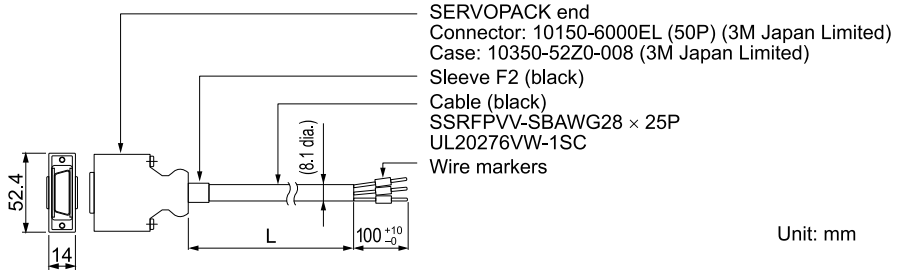
11.4.1 For Σ-XS SERVOPACKs with Analog Voltage/Pulse Train Reference, Σ-XT SERVOPACKs with MECHATROLINK-4/III Communications Reference, and Σ-XT SERVOPACKs with EtherCAT Communications Reference

(1) Cables with Loose Wires at One End

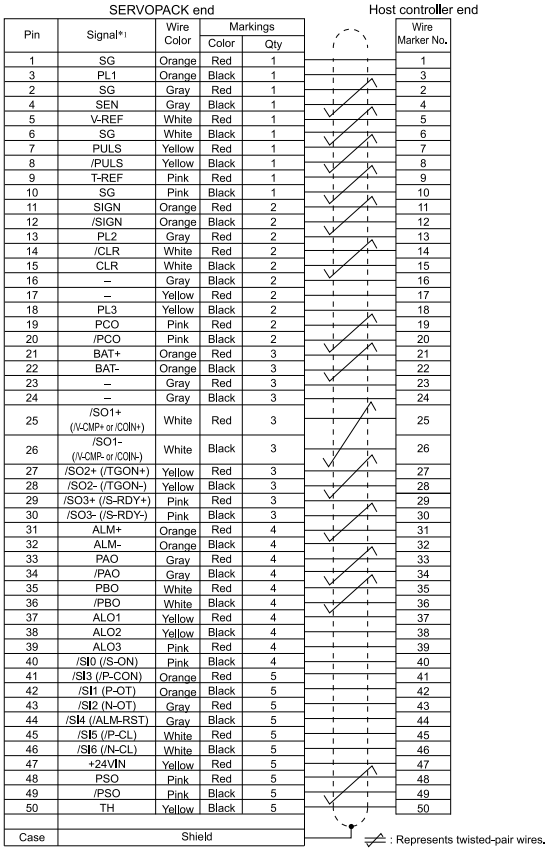
(a) Selection Table

Order Number	Length (L)
JZSP-CSI01-1-E	1 m
JZSP-CSI01-2-E	2 m
JZSP-CSI01-3-E	3 m

(b) Dimensional Drawing



(c) Wiring Specifications



SERVOPACK end					Host controller end
Pin	Signal*1	Wire Color	Markings		Wire Marker No.
			Color	Qty	
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 wires.

*1 The analog voltage/pulse train reference signal names are shown here, but the signals to use differ depending on the control method. For details, refer to the manual for your SERVOPACK.

(2) Connector Kits

(a) Selection Table

Connector Kits 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 Size

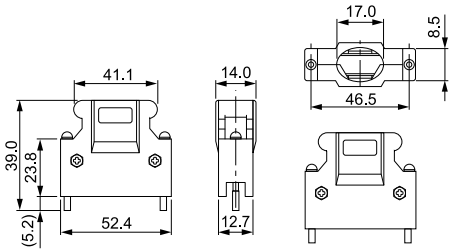
Item	Specification
Applicable Wires	AWG24, 26, 28, 30
Cable Finished Diameter	16 mm max.

Note:

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

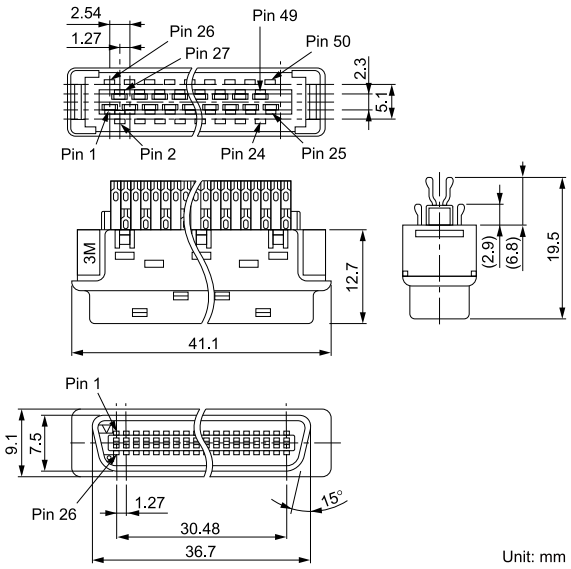
(b) Dimensional Drawing

◆ **Case**



Unit: mm

◆ **Connectors**



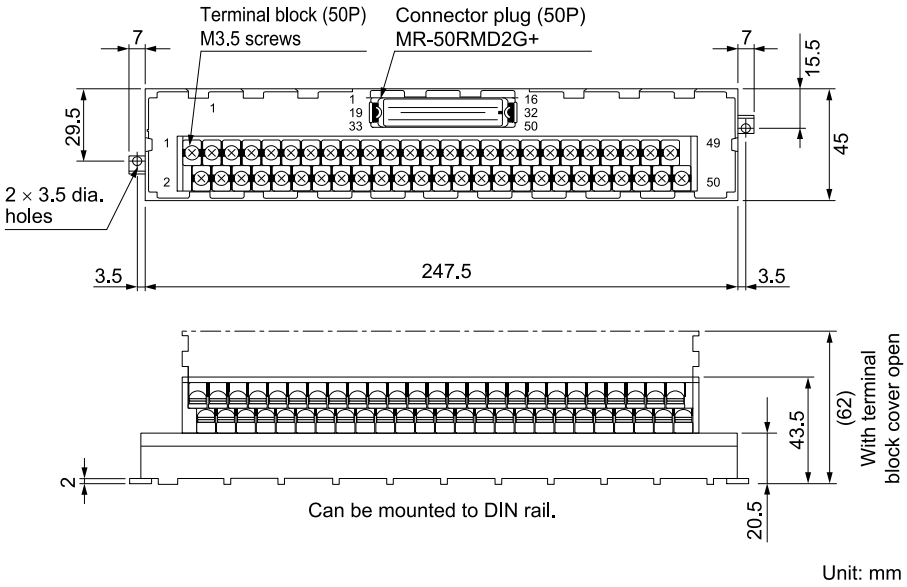
Unit: mm

(3) Connector-Terminal Block Converter Unit

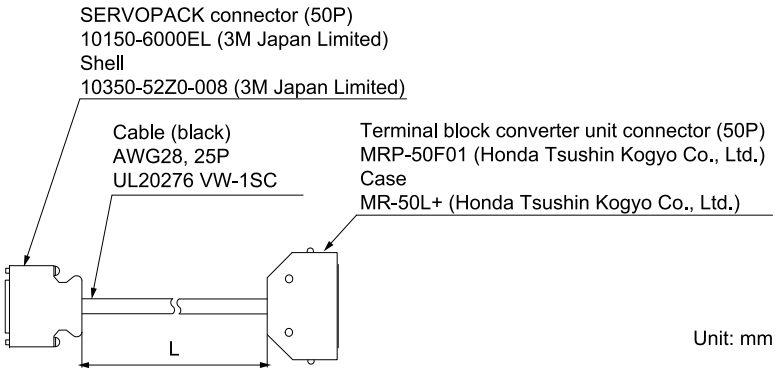
(a) Selection Table

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

(b) Dimensional Drawing



(c) Dimensional Drawings 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.

☞ *(c) Wiring Specifications on page 388*

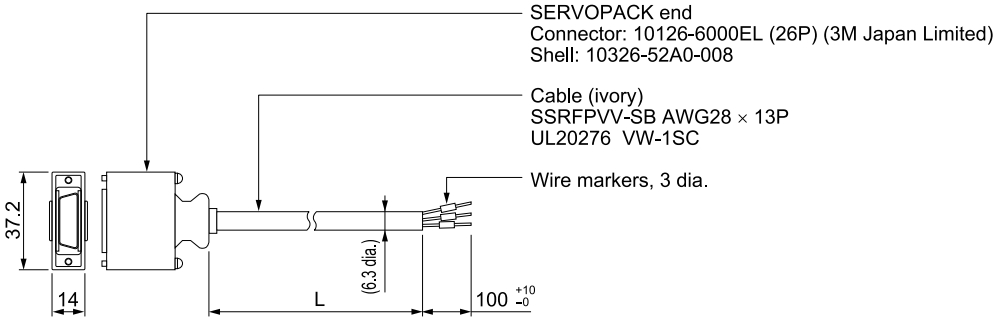
11.4.2 For Σ-XS MECHATROLINK-4/III Communications Reference SERVOPACKs and EtherCAT Communications Reference SERVOPACKs

(1) Cables with Loose Wires at One End

(a) Selection Table

Order Number	Length (L)
JZSP-CSI02-1-E	1 m
JZSP-CSI02-2-E	2 m
JZSP-CSI02-3-E	3 m

(b) Dimensional Drawing



Unit: mm

(c) Wiring Specifications

SERVOPACK end

Pin	Signal*1	Wire Color	Markings	
			Color	Qty
1	/SO1+ (/BK+)	Blue	Red	1
2	/SO1- (/BK-)	Blue	Black	1
3	ALM+	Pink	Red	1
4	ALM-	Pink	Black	1
5	TH	Green	Red	1
6	+24VIN	Green	Black	1
7	/SI1 (P-OT)	Orange	Red	1
8	/SI2 (N-OT)	Orange	Black	1
9	/SI3 (/DEC)	Gray	Red	1
10	/SI4 (/EXT1)	Gray	Black	1
11	/SI5 (/EXT2)	Blue	Red	2
12	/SI6 (/EXT3)	Blue	Black	2
13	/SI0	Pink	Red	2
14	BAT+	Green	Red	2
15	BAT-	Green	Black	2
16	SG	Pink	Black	2
17	PAO	Orange	Red	2
18	/PAO	Orange	Black	2
19	PBO	Gray	Red	2
20	/PBO	Gray	Black	2
21	PCO	Blue	Red	3
22	/PCO	Blue	Black	3
23	/SO2+	Pink	Red	3
24	/SO2-	Pink	Black	3
25	/SO3+	Green	Red	3
26	/SO3-	Green	Black	3

Host controller end

Wire Marker No.
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26

: Represents twisted-pair wires.

*1 The MECHATROLINK-4/III communications reference signal names are shown here, but the signals to use differ depending on the control method. For details, refer to the manual for your SERVOPACK.

(2) Connector Kits

(a) Selection Table

Connector Kits 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

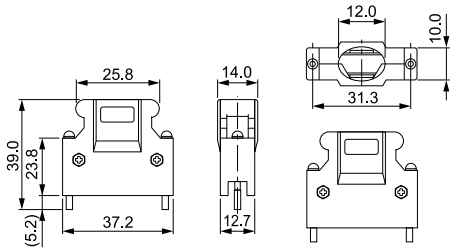
- Wire Size

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

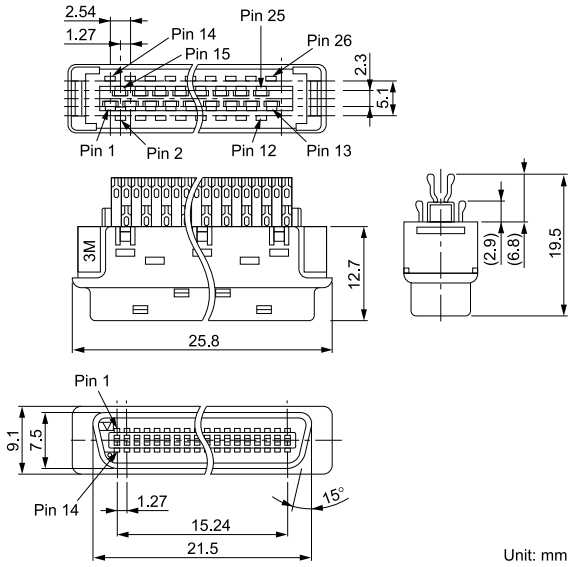
Note:
Use a twisted-pair or screened twisted-pair cable.

(b) Dimensional Drawing

◆ Case



◆ Connectors

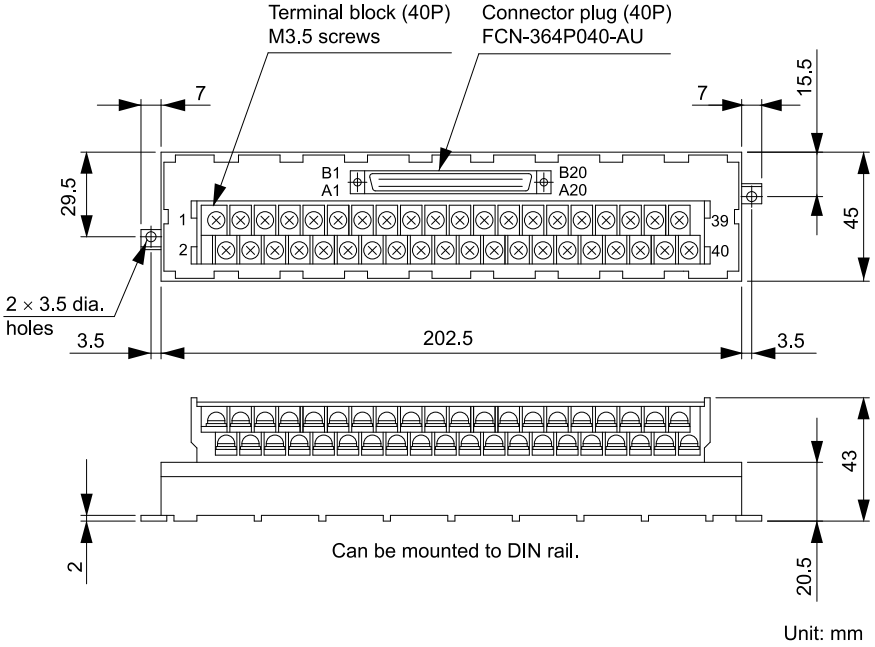


(3) Connector-Terminal Block Converter Unit

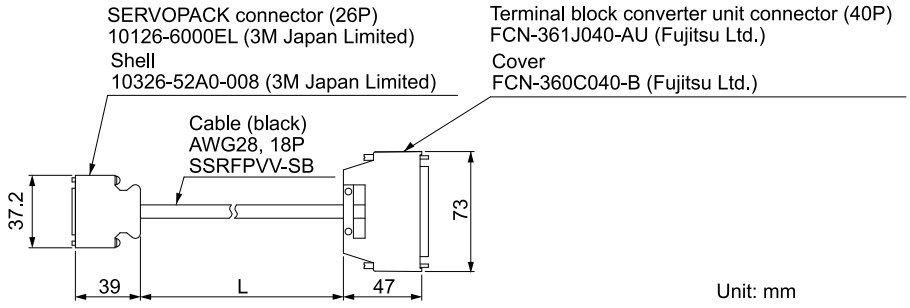
(a) Selection Table

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

(b) Dimensional Drawing



(c) Dimensional Drawings 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.

☞ *(c) Wiring Specifications on page 391*

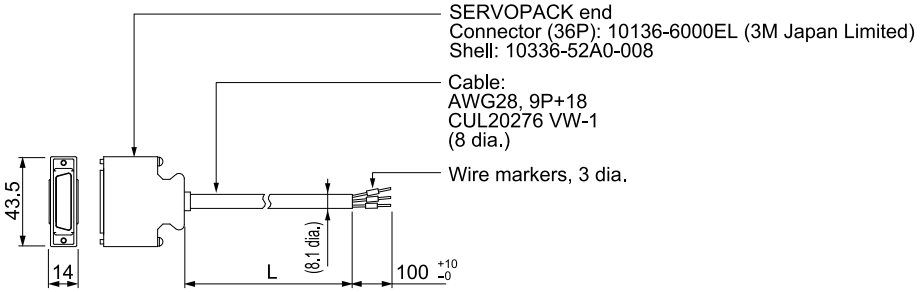
11.4.3 For Σ-XW SERVOPACKs

(1) Cables with Loose Wires at One End

(a) Selection Table

Order Number	Length (L)
JZSP-CSI03-1-E	1 m
JZSP-CSI03-2-E	2 m
JZSP-CSI03-3-E	3 m

(b) Dimensional Drawing



Unit: mm

(c) Wiring Specifications

SERVOPACK end

Pin	Signal*1	Wire Color	Markings	
			Color	Qty
1	+24VIN	Orange	Black	3
2	–	Gray	Black	3
3	/SI01 (P-OT_A)	White	Black	3
4	/SI02 (N-OT_A)	Yellow	Black	3
5	/SI03 (/DEC_A)	Pink	Black	3
6	/SI04 (/EXT_A1)	Orange	Black	4
7	/SI05 (/EXT_A2)	Gray	Black	4
8	/SI06 (/EXT_A3)	White	Black	4
9	/SI07 (P-OT_B)	Yellow	Black	4
10	/SI08 (N-OT_B)	Pink	Black	4
11	/SI09 (/DEC_B)	Orange	Black	Continuous dots
12	/SI10 (/EXT_B1)	Gray	Black	Continuous dots
13	/SI11 (/EXT_B2)	White	Black	Continuous dots
14	/SI12 (/EXT_B3)	Yellow	Black	Continuous dots
15	SG	Pink	Black	Continuous dots
16	SG	Orange	Black	Dashes
17	BAT_A+	Orange	Black	1
18	BAT_A-	Orange	Red	1
19	ALM_A+	Gray	Black	1
20	ALM_A-	Gray	Red	1
21	ALM_B+	White	Black	1
22	ALM_B-	White	Red	1
23	/SO1+ (/BK_A+)	Yellow	Black	1
24	/SO1- (/BK_A-)	Yellow	Red	1
25	/SO2+ (/BK_B+)	Pink	Black	1
26	/SO2- (/BK_B-)	Pink	Red	1
27	/SO3+	Orange	Black	2
28	/SO3-	Orange	Red	2
29	/SO4+	Gray	Black	2
30	/SO4-	Gray	Red	2
31	/SO5+	White	Black	2
32	/SO5-	White	Red	2
33	TH_A	Gray	Black	Dashes
34	TH_B	White	Black	Dashes
35	BAT_B+	Yellow	Black	2
36	BAT_B-	Yellow	Red	2
Case	Shield	–	–	–

Host controller end

Wire Marker No.
1
2
3
4
5
6
7
8
9
10
11
12
13
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16
17
18
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31
32
33
34
35
36

: Represents twisted-pair wires.

*1 The MECHATROLINK-4/III communications reference signal names are shown here, but the signals to use differ depending on the control method. For details, refer to the manual for your SERVOPACK.

(2) Connector Kits

(a) Selection Table

Connector Kits 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

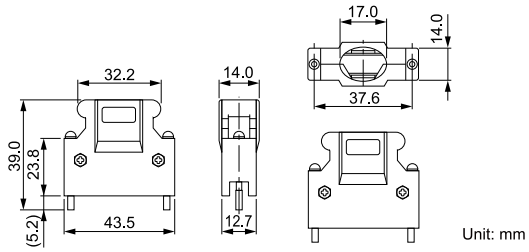
- Wire Size

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

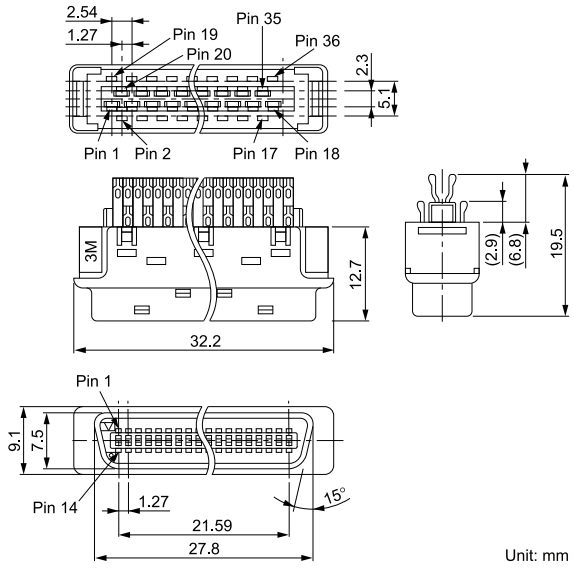
Note:
Use a twisted-pair or screened twisted-pair cable.

(b) Dimensional Drawing

◆ Case



◆ Connectors

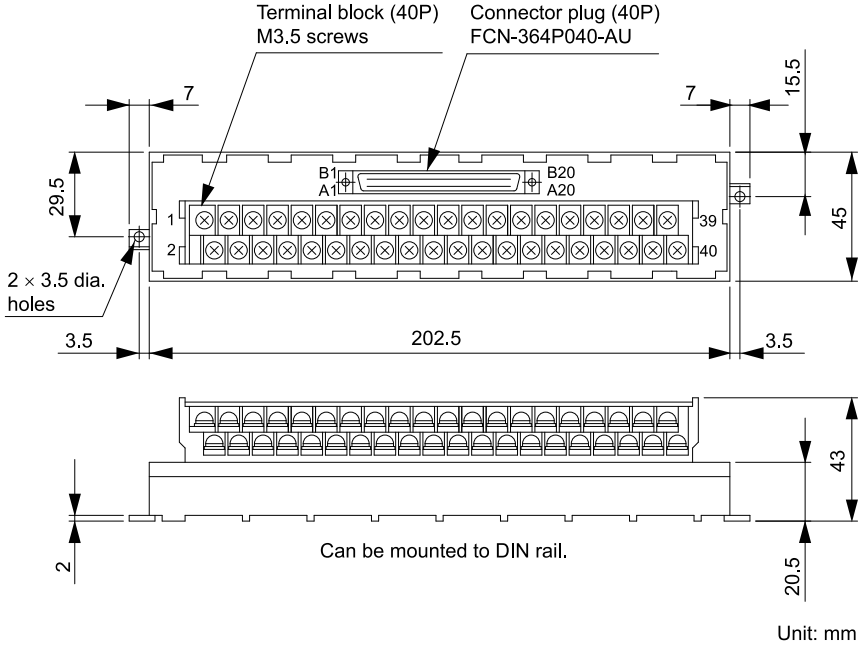


(3) Connector-Terminal Block Converter Unit

(a) Selection Table

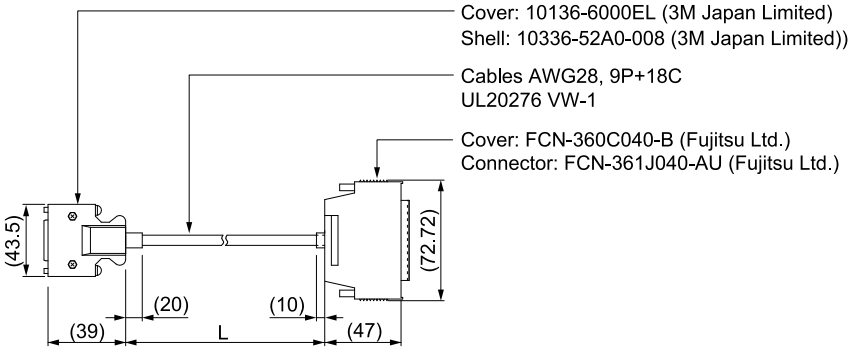
Order Number	Length of Enclosed Cable (L)
JUSP-TA36P-E	0.5 m
JUSP-TA36P-1-E	1 m
JUSP-TA36P-2-E	2 m

(b) Dimensional Drawing



Unit: mm

(c) Dimensional Drawings of Enclosed Cable



Unit: mm

Note:

The same pin numbers are used for the SERVOPACK connector and the terminal block. Pins 1 to 36 are wired. Do not connect pins 37 and higher.

To assemble your own cables, refer to the following section for the wiring specifications.

☞ *(c) Wiring Specifications on page 394*

11.5 Safety Function Device Cable

11.5.1 Cables with Connectors

(1) Selection Table

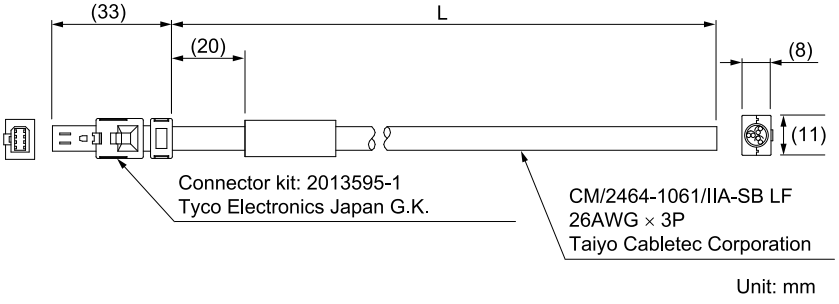
Order Number	Length (L)
JZSP-CVH03-01-E	1 m
JZSP-CVH03-03-E	3 m

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.

(2) Dimensional Drawing



(3) Wiring Specifications

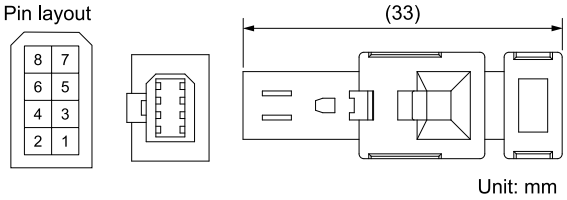
Pin No.	Signal	Lead Color	Markings
1	Not connected	-	-
2	Not connected	-	-
3	/HWBB1-	White	Black
4	/HWBB1+	White	Red
5	/HWBB2-	Light gray	Black
6	/HWBB2+	Light gray	Red
7	EDM1-	Orange	Black
8	EDM1+	Orange	Red

11.5.2 Connector Kits

(1) Selection Table

Order Number	Name	Manufacturer	Inquiries
2013595-1	Industrial Mini I/O D-Shape Type 1 Plug Connector Kit	TE Connectivity Japan G.K.	Global Electronics Corporation

(2) Dimensional Drawing



Unit: mm

11.6 MECHATROLINK 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.

11.6.1 Selection Table

- Cables without Ferrite Cores

Type	Length (L)	Order Number
RJ-45 connectors on both ends	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, or 10)
	20 m, 30 m	JZSP-CM3RR00-□□□-E (□□: 20 or 30)
RJ-45 connector on one end Industrial mini I/O (IMI) connector on one end *1	0.2 m, 0.5 m, 1 m, 2 m, 3 m, 4 m, 5 m, 10 m	JZSP-CM3RMM0-□□-E (□□: 00P2, 00P5, 01, 02, 03, 04, 05, or 10)
	20 m, 30 m	JZSP-CM3RM00-□□□-E (□□: 20 or 30)

*1 This is used when connecting to MECHATROLINK-III compliant products such as the Σ-7 series SERVOPACK MECHATROLINK-III communications reference (SGD7□-□□□□20□) products and the MP3000 series of machine controllers.

- Cables with Ferrite Cores

Type	Length (L)	Order Number
RJ-45 connectors on both ends	0.3 m, 3 m, 10 m	JZSP-CM3RRM1-□□-E (□□: 00P3, 03, or 10)
	20 m, 30 m, 50 m	JZSP-CM3RR01-□□-E (□□: 20, 30, or 50)
RJ-45 connector on one end Industrial mini I/O (IMI) connector on one end *1	0.3 m, 3 m, 10 m	JZSP-CM3RMM1-□□-E (□□: 00P3, 03, or 10)
	20 m, 30 m, 50 m	JZSP-CM3RM01-□□-E (□□: 20, 30, or 50)

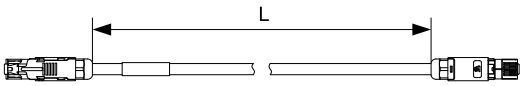
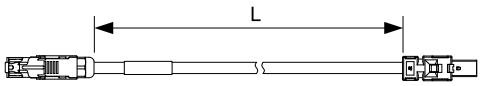
*1 This is used when connecting to MECHATROLINK-III compliant products such as the Σ-7 series SERVOPACK MECHATROLINK-III communications reference (SGD7□-□□□□20□) products and the MP3000 series of machine controllers.

Note:

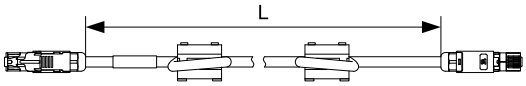
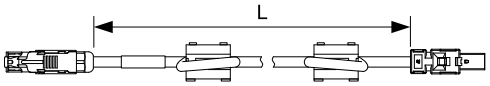
Replace the boxes (□□) in the order number with the cable length.

11.6.2 External Dimensions

- Cables without Ferrite Cores

RJ-45 Connectors on Both Ends	RJ-45 Connector on One End Industrial Mini I/O (IMI) Connector on One End
	

- Cables with Ferrite Cores

RJ-45 Connectors on Both Ends	RJ-45 Connector on One End Industrial Mini I/O (IMI) Connector on One End
	

11.7 EtherCAT Communications Cable

11.7.1 Selection Table

- Cables without Ferrite Cores

Type	Length (L)	Order Number
RJ-45 connectors on both ends	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, or 10)
	20 m, 30 m	JZSP-CM3RR00-□□□-E (□□: 20 or 30)

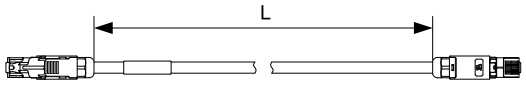
- Cables with Ferrite Cores

Type	Length (L)	Order Number
RJ-45 connectors on both ends	0.3 m, 3 m, 10 m	JZSP-CM3RRM1-□□-E (□□: 00P3, 03, or 10)
	20 m, 30 m, 50 m	JZSP-CM3RR01-□□-E (□□: 20, 30, or 50)

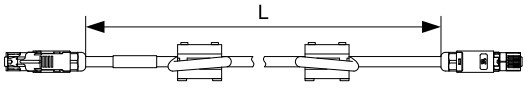
Note:
Replace the boxes (□□) in the order number with the cable length.

11.7.2 External Dimensions

- Cables without Ferrite Cores

RJ-45 Connectors on Both Ends


- Cables with Ferrite Cores

RJ-45 Connectors on Both Ends


11.7.3 Cables to Be Fabricated

The Ethernet cables with the following specifications can also be used to make the connections.

- Shielded: S/STP or S/UTP
- Category: CAT5e or better
- Length: 50 m max. (between nodes)

We recommend the following cable and connector.

Item	Manufacturer	Model
Ethernet Cable	Beckhoff	ZB9020
RJ-45 Connector	Beckhoff	ZS1090-0003

11.7.4 Wiring Specifications

Pin No.	Signal	Remarks
1	TD+	Send data
2	TD–	
3	RD+	Receive data
4	–	N.C *1
5	–	N.C *1
6	RD–	Receive data
7	–	N.C *1
8	–	N.C *1

*1 These pins are not connected to any signals.

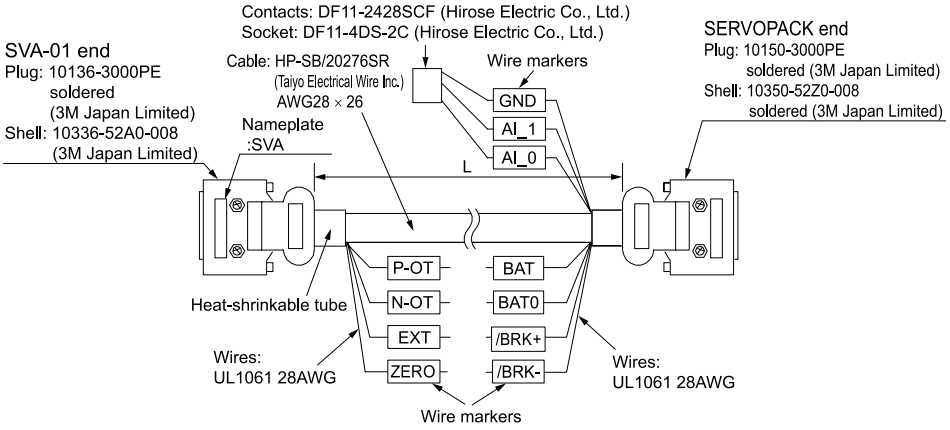
11.8 Cables to Connect to MP3000/MP2000-Series Machine Controllers

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

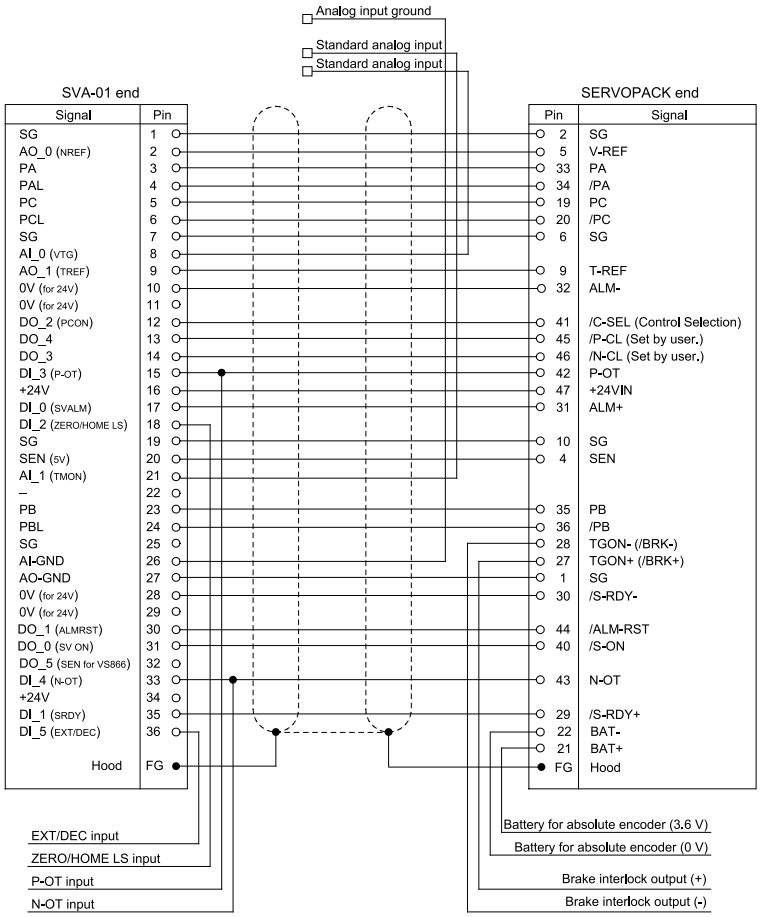
(1) Selection Table

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

(2) External Dimensions



(3) Wiring Specifications



Note:

This diagram shows the wiring methods for the Σ-XS SERVOPACK with analog voltage/pulse train references.

12

Option Modules

12.1 Feedback Option Modules 406
12.1.1 Fully-Closed Modules 406
12.2 Advanced Safety Module 414
12.2.1 Specifications 414
12.2.2 External Dimensions 415
12.2.3 I/O Connector 415
12.3 Option Case Kit 416

12.1 Feedback Option Modules

12.1.1 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.

Important
- One option case kit is required for each SERVOPACK.
  Option case kit model: SGDXS-OZA01A
- Fully-closed modules do not support Σ-LINKII-related devices.

(1) 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	
	Impact Resistance	19.6 m/s^2	
	Degree of Protection	IP10	• 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 junction box in the following locations: Locations subject to static electricity noise, strong electromagnetic/magnetic fields, or radioactivity	

(2) 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	–

(3) Recommended Encoders

- Linear encoders
  Refer to the following section for the recommended linear encoder models and specifications.
  ☞ *10.1 Recommended Linear Encoders on page 338*
- Rotary Encoders
  - Absolute Rotary Encoders
    The following absolute rotary encoders are for fully-closed control. Do not use it to control the motor.

Output Signals	Manufacturer	Rotary Encoder Type	Model			Resolution Bits	Maximum Motor Speed *1 min^{-1}
			Scale	Sensor Head	Relay Device between Fully-Closed Module and Rotary Encoder		
Encoder for Yaskawa's Serial Interface	Magnescale 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
		Sealed	RCN2310 *2		EIB3391Y	26	3000
			RCN5510 *2		EIB3391Y	28	800
			RCN8310 *2		EIB3391Y	29	400
			ROC2310 *2		EIB3391Y	26	3000
			ROC7310 *2		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:

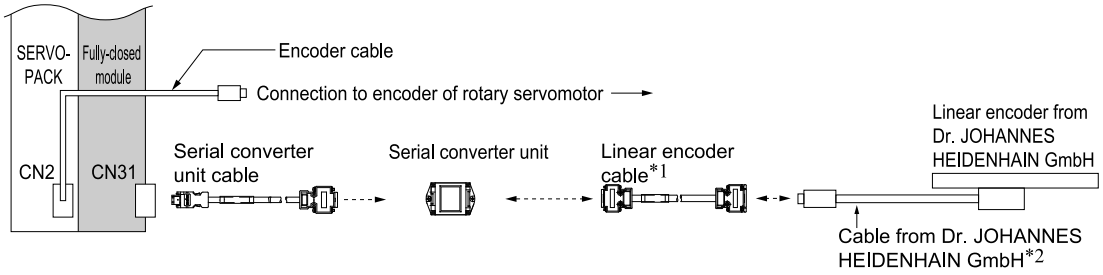
Confirm detailed specifications, such as the tolerances, dimensions, and operating environment, with the manufacturer of the rotary encoder before you use it.

(4) Equipment Configurations

(a) 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.

Item	Model	Reference
Fully-Closed Modules (Purchased as a set with the SERVOPACK)	Without options: SGDXS□□□□□0A000□□1 *1* With options: SGDXS□□□□□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 Modules (Purchased alone)	Fully-Closed Modules *2* SGDV-OFA01A	413
	Option Case Kit *3* SGDXS-OZA01A	416
Serial Converter Unit Cables	JZSP-CLP70-□□-E	359
Serial Converter Unit	JZDP-H003-□□□	369
Linear Encoder Cables	JZSP-CLL30-□□-E	358

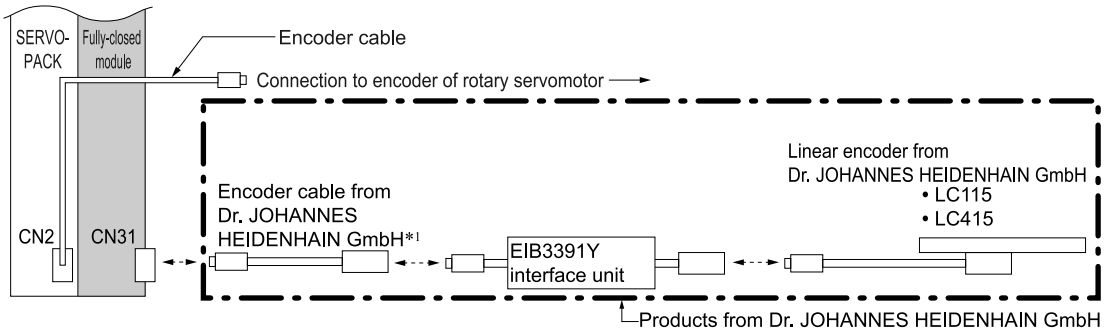
*1 The model number of a set that includes the SERVOPACK and an option module is not hyphenated after "SGDXS."
*2 When ordering a SERVOPACK and a fully-closed module separately, use this fully-closed module model number.
*3 One option case kit is required for each SERVOPACK. The set includes the module cover, PCB mounting plate, and two mounting screws.

Note:

1. Refer to the following section for a table of the recommended linear encoders.
   ☞ *10.1 Recommended Linear Encoders on page 338*
2. Refer to the following section for the specifications of the serial converter unit.
   ☞ *10.4 Serial Converter Unit on page 369*
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/Σ-X-Series Installation Guide Fully-Closed Module (Manual No.: TOBP C720829 03)

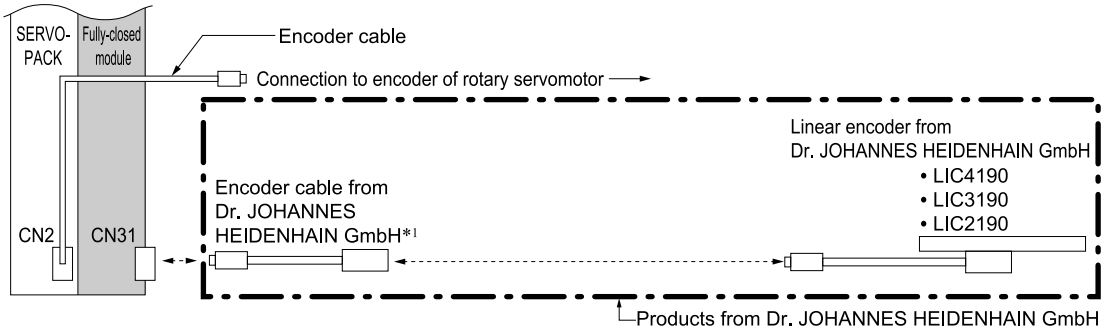
◆ Connections When Using a Yaskawa Serial Interface for the Output Signals

- LC115 or LC415 Linear Encoder with EIB3391Y Interface Unit



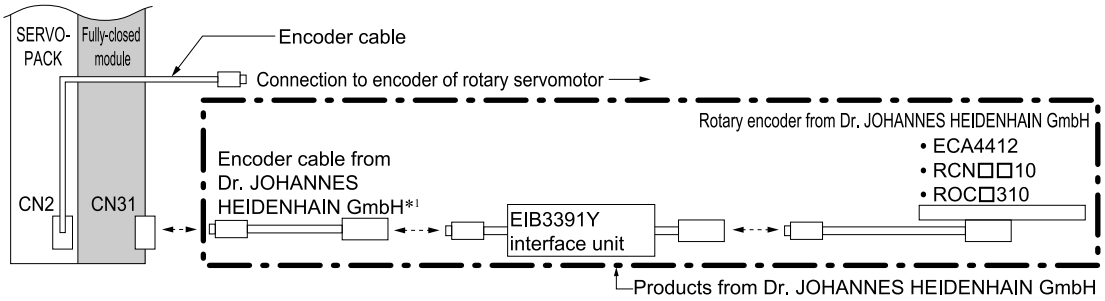
*1 Use an encoder cable from Dr. JOHANNES HEIDENHAIN GmbH. Contact Dr. JOHANNES HEIDENHAIN GmbH for detailed encoder cable specifications.

- LIC4190, LIC3190, or LIC2190 Linear Encoders



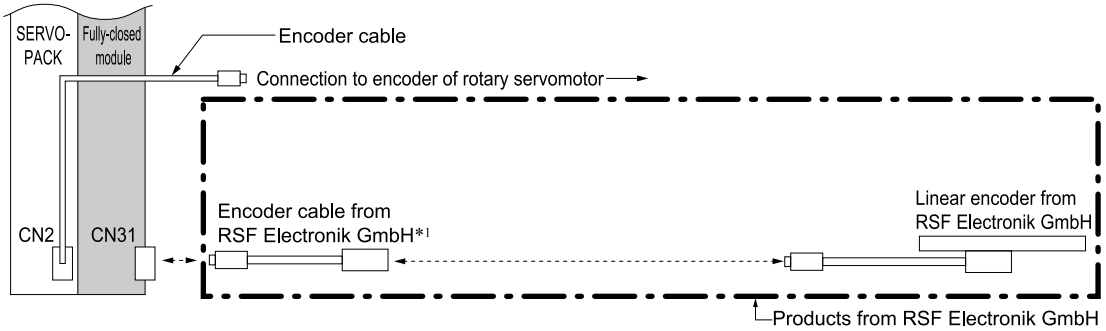
*1 Use an encoder cable from Dr. JOHANNES HEIDENHAIN GmbH. Contact Dr. JOHANNES HEIDENHAIN GmbH for detailed encoder cable specifications.

- ECA4412, RCN□□10, or ROC□310 Rotary Encoder with EIB3391Y Interface Unit



*1 Use an encoder cable from Dr. JOHANNES HEIDENHAIN GmbH. Contact Dr. JOHANNES HEIDENHAIN GmbH for detailed encoder cable specifications.

(b) Connections to Linear Encoder from RSF Elektronik GmbH

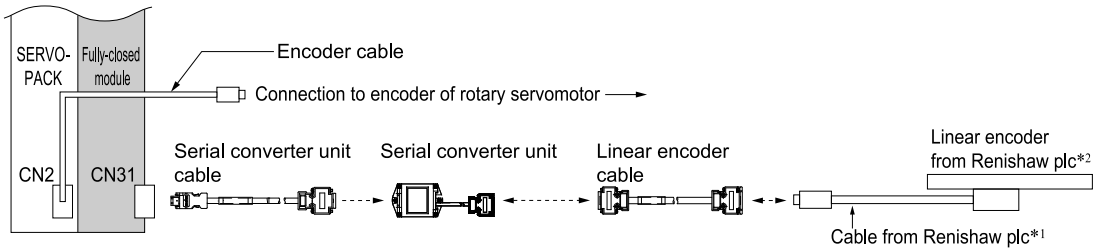


*1 Use an encoder cable from RSF Elektronik GmbH. Contact Dr. JOHANNES HEIDENHAIN GmbH for detailed encoder cable specifications.

(c) 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.

Item	Model	Reference
Fully-Closed Modules (purchased as a set with the SERVOPACK)	Without options: SGDXS□□□□□0A000□□1 *1* With options: SGDXS□□□□□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 Modules (purchased alone)	Fully-closed modules *2* SGDV-OFA01A	413
	Option case kit *3* SGDXS-OZA01A	416
Serial Converter Unit Cables	JZSP-CLP70-□□-E	359
Serial Converter Unit	JZDP-H005-□□□	371
Linear Encoder Cables	JZSP-CLL00-□□-E	358

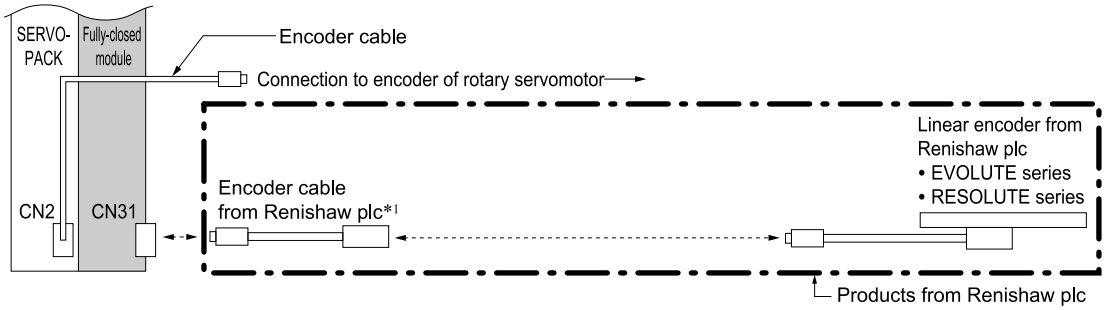
*1 The model number of a set that includes the SERVOPACK and an option module is not hyphenated after "SGDXS."
*2 When ordering a SERVOPACK and a fully-closed module separately, use this fully-closed module model number.
*3 One option case kit is required for each SERVOPACK. The set includes the module cover, PCB mounting plate, and two mounting screws.

Note:

1. Refer to the following section for a table of the recommended linear encoders.
   ☞ *10.1 Recommended Linear Encoders on page 338*
2. Refer to the following section for the specifications of the serial converter unit.
   ☞ *10.4 Serial Converter Unit on page 369*
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/Σ-X-Series Installation Guide Fully-Closed Module (Manual No.: TOBP C720829 03)

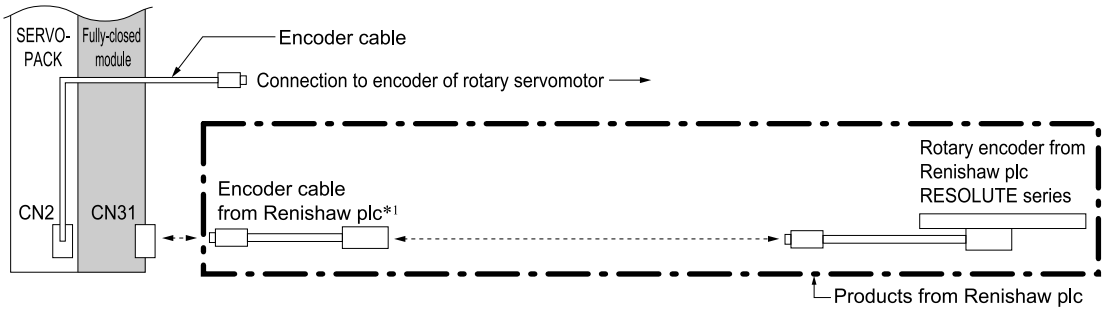
◆ Connections When Using a Yaskawa Serial Interface for the Output Signals

- EVOLUTE-Series or RESOLUTE-Series Linear Encoder



*1 Use an encoder cable from Renishaw plc. Contact Renishaw plc for detailed encoder cable specifications.

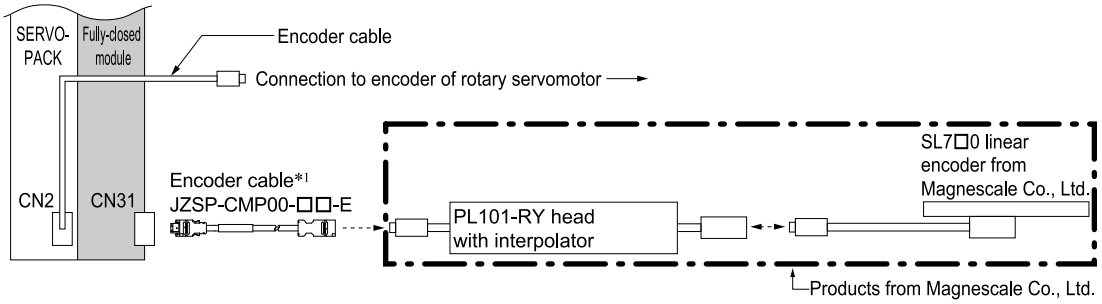
- RESOLUTE-Series Rotary Encoder



*1 Use an encoder cable from Renishaw plc. Contact Renishaw plc for detailed encoder cable specifications.

(d) Connections to Linear Encoder from Magnescale Co., Ltd.

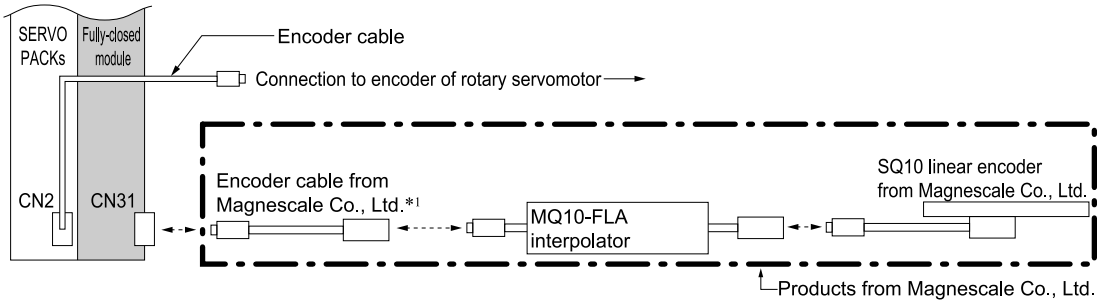
- SL7□0 Linear Encoder and PL101-RY Sensor Head with Interpolator



*1 Refer to the following section for details on encoder cables.

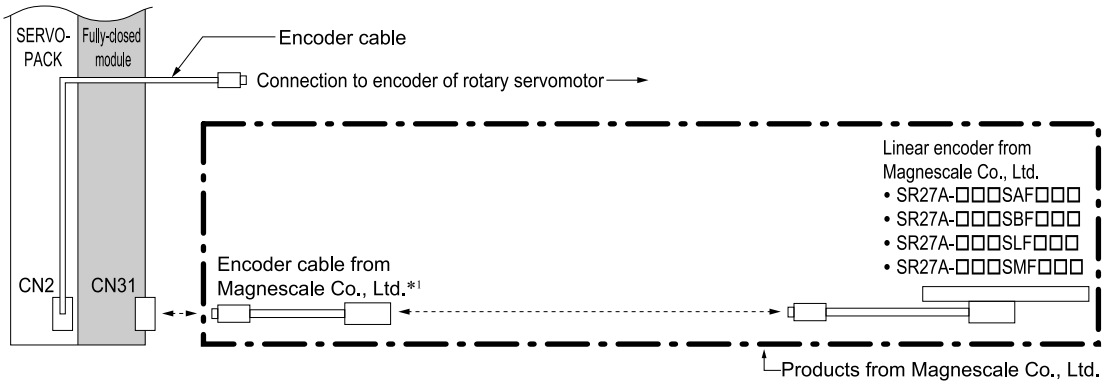
☞ *10.3.5 Encoder Cables on page 360*

- SmartSCALE Linear Encoder (SQ10 Scale and MQ10-FLA Interpolator)



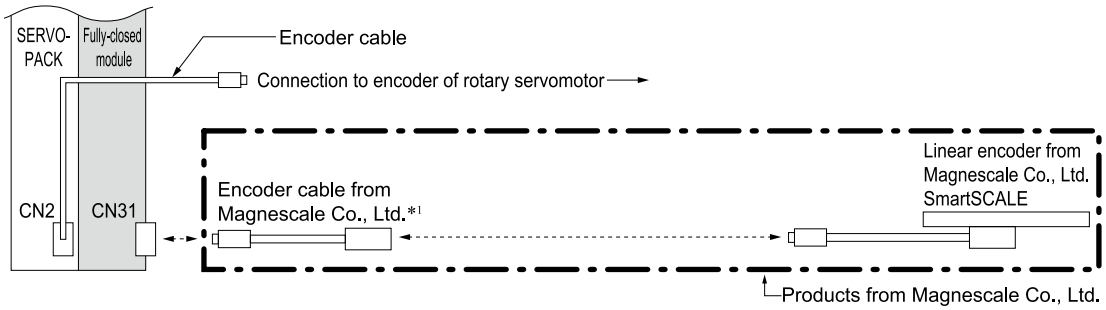
*1 Use an encoder cable from Magnescale Co., Ltd.. The maximum length of the encoder cable is 15 m. Contact Magnescale Co., Ltd. for specifications other than the cable length.

- SR27A Linear Encoder



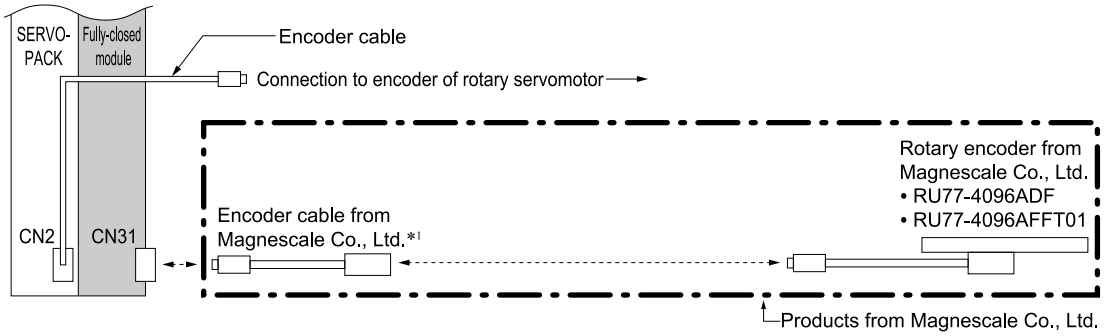
*1 Use a CH33-xx□□G cable from Magnescale Co., Ltd. (This cable has connectors designed for use with Yaskawa products.)

- SmartSCALE Linear Encoder (SQ47 or SQ57)



*1 Use an encoder cable from Magnescale Co., Ltd.. Contact Magnescale Co., Ltd. for details on encoder cable specifications.

- RU77-4096ADF or RU77-4096AFFT01 Absolute Rotary Encoders

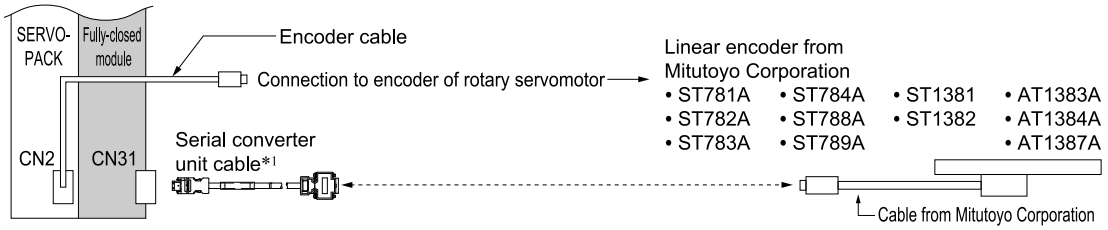


*1 Use a CE28-series extension cable for RU77 encoder from Magnescale Co., Ltd.

Note:

The RU77 is a single-turn absolute rotary encoder.

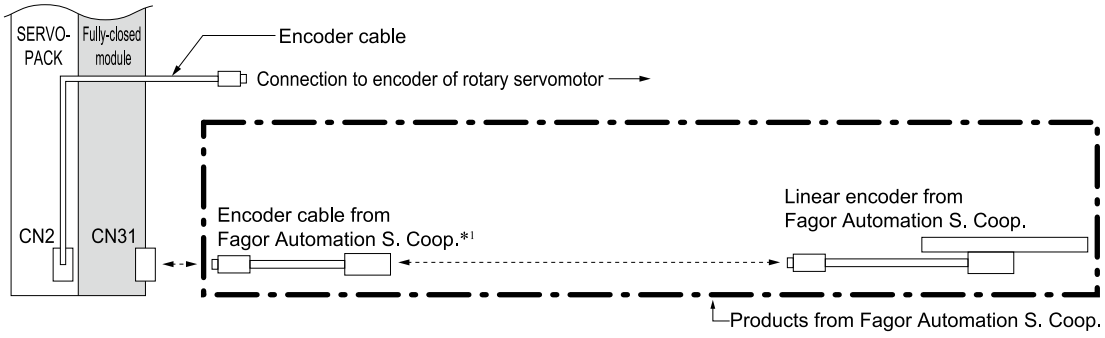
(e) Connections to Linear Encoders from Mitutoyo Corporation



*1 Refer to the following section for details on serial converter unit cables.

☞ *10.3.3 Serial Converter Unit Cables on page 359*

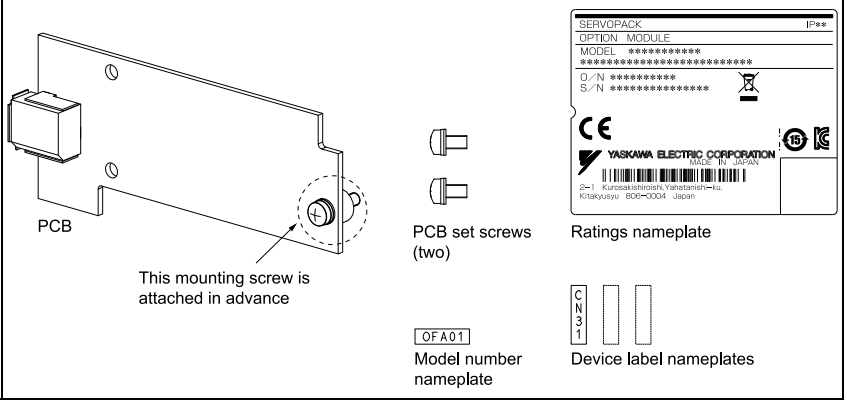
(f) Connections to Linear Encoder from Fagor Automation S. Coop.



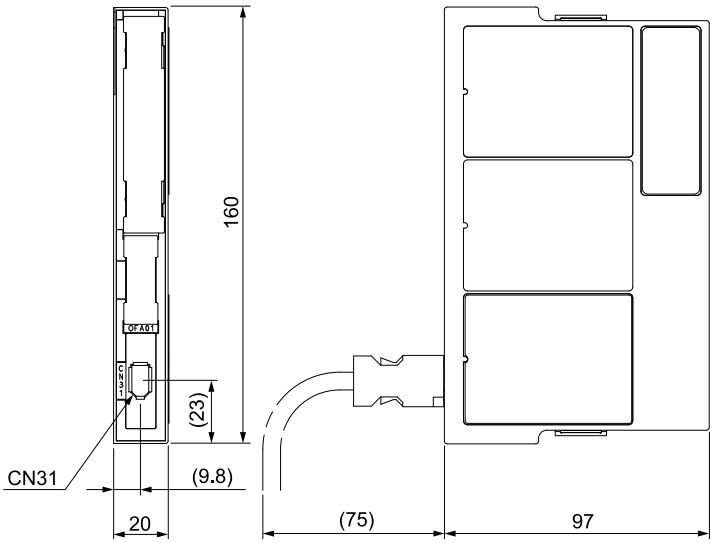
*1 Use encoder cables from Fagor Automation S. Coop. For detailed specifications of the encoder cables, consult Fagor Automation S. Coop. or its sales representative.

(5) Accessories

If you purchase a fully-closed module by itself, the following accessories will be packed with it.

Order Number	SGDV-OFA01A
Accessories	

(6) External Dimensions



Unit: mm
Approx. mass: 0.1 kg

(a) 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 SERVOPACKs.

12.2 Advanced Safety Module

The advanced safety module (ASM-X) is a safety option module for Σ-X-series SERVOPACKs that is equipped with safety functions to monitor the position, speed, and acceleration of a servomotor. Its key features are listed below.

- A maximum of 10 *1 safety functions can be executed at the same time, which allows executing different types of safety functions at the same time, and switching the monitoring threshold between safety functions of the same type.
  *1 Eleven safety functions can be executed when the HWBB in the SERVOPACK is used at the same time.
- There are safe output signals that can control the power supply for the brake in the servomotor when combined with safety relays.
- The safety functions in the ASM-X can be started using FSoE communications.

Important

One option case kit is required for each SERVOPACK.
Option case kit model: SGDXS-OZA01A

12.2.1 Specifications

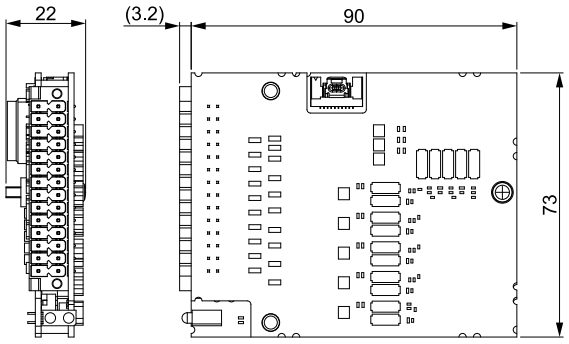
(1) Environmental Conditions

Item	Specification
Surrounding Air Temperature	-5°C to 60°C
Storage Temperature	-20°C to 85°C
Surrounding Air Humidity	95% relative humidity max. (with no freezing or condensation)
Storage Humidity	95% relative humidity max. (with no freezing or condensation)
Vibration Resistance	When there is continuous vibration: 10 Hz to 55 Hz, acceleration amplitude 5.9 m/s^2 (0.6G)
Impact Resistance	19.6 m/s^2
Degree of Protection	When combined with the following SERVOPACK models IP20: SGDXS-R70A, -90A, -1R6A, -2R8A, -3R8A, -5R5A, -7R6A, -120A IP10: SGDXS-180A, -200A, -330A, -470A, -550A, -590A, -780A, -□□□D
Pollution Degree	2 • Must be no corrosive or flammable gases. • Must be no exposure to water, oil, or chemicals. • Must be no dust, salts, or iron dust. Gas resistance: 3C2 (IEC 60721-3-3) Dust resistance: 3S2 (IEC 60721-3-3)
Altitude	2000 m max.
Others	Do not use the SERVOPACK in the following locations: Locations subject to static electricity noise, strong electro-magnetic/magnetic fields, or radioactivity

12.2.2 External Dimensions

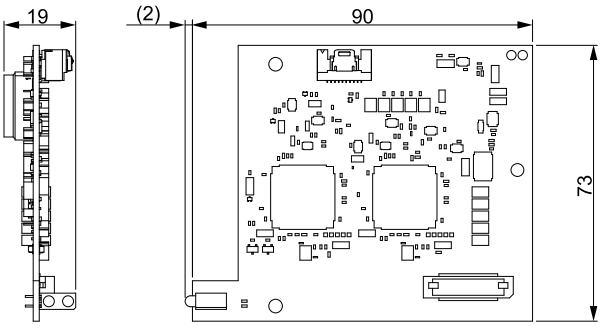
(1) ASM-X Single

SGDXS-OSA01A/SGDXS-OSAA1A



Unit: mm

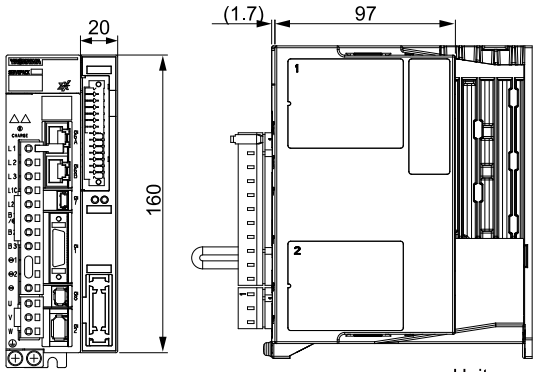
SGDXS-OSAA0A



Unit: mm

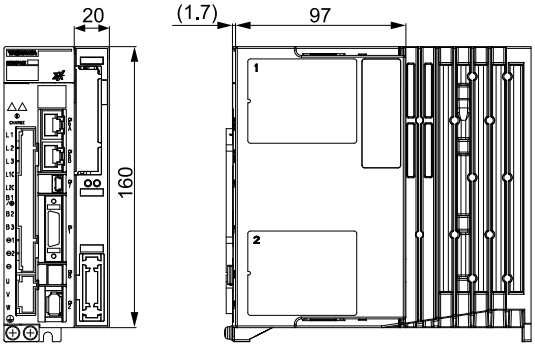
(2) When ASM-X is Mounted to a SERVOPACK

SGDXS-OSA01A/SGDXS-OSAA1A



Unit: mm

SGDXS-OSAA0A



Unit: mm

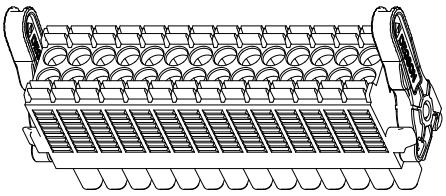
12.2.3 I/O Connector

Name: Plug

Model: 15EDGKNHG-3.5-28P-14-00A(H)

Manufacturer: NINGBO DEGSON ELECTRICAL CO., LTD.

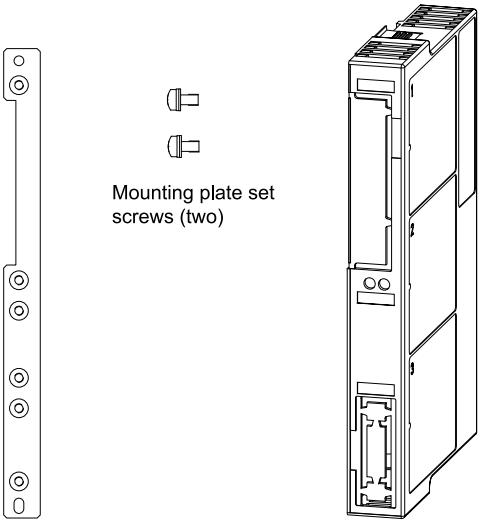
Number of pins: 28



12.3 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	SGDXS-OZA01A
Accessories	 PCB mounting plate　　Module cover

13

Σ-LINK II-Related Devices

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13.1 Equipment Configurations

Many types of connection methods are available for Σ-LINK II-related devices. An example of a device configuration diagram for each type is shown below.

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Information
- Σ-7 compatible specification servomotors do not support Σ-LINK II communication. The servomotors described in this chapter are Σ-X standard specification servomotors.
- There are several types of device configuration diagrams besides those shown in this section, and the cables used vary depending on the connected devices.
  Refer to the following section for details on the cables used.
  ☞ *13.5.1 Cable List on page 447*

13.1.1 Number of Connections of Σ-LINK II-Related Devices

(1) Directly Connecting Σ-LINK II Devices to the SERVOPACK

The number of connections depends on the node configuration. The number of connections in each node configuration is shown below.

Note:
There can be a maximum of only one relay between cables.

(a) When Using a Σ-XS SERVOPACK

- When Not Connecting a Rotary Feedback Unit

Node Configuration			
Connector Name	Servomotor	Sensor Hub	
		Digital I/O Type	Analog Input Type
CN2	1	–	1
	1	1	–
	1	1	1
	1	2	–

- When Connecting 1 Rotary Feedback Unit

Node Configuration				
Connector Name	Servomotor	Rotary Feedback Unit	Sensor Hub	
			Digital I/O Type	Analog Input Type
CN2	1	1	–	1
	1	1	1	–

(b) When Using a Σ-XW SERVOPACK

- When Connecting 2 Servomotors to 1 Port or Connecting 2 Servomotors and a Sensor Hub (Digital I/O Type) to 1 Port

Node Configuration			
Connector Name	Servomotor	Sensor Hub	
		Digital I/O Type	Analog Input Type
CN2A	2	–	–
	2	1	–
CN2B	–	1	–
	–	–	1
	–	2	–
	–	1	1
	–	3	–
	–	2	1

Note:

You can swap the connections to CN2A and CN2B.

- When Connecting 2 Servomotors and a Sensor Hub (Analog Input Type) to 1 Port

Node Configuration			
Connector Name	Servomotor	Sensor Hub	
		Digital I/O Type	Analog Input Type
CN2A	2	–	1
CN2B	–	1	–
	–	–	1
	–	2	–
	–	1	1
	–	3	–

Note:

You can swap the connections to CN2A and CN2B.

- When Connecting 1 Servomotor to Each Port

Node Configuration			
Connector Name	Servomotor	Sensor Hub	
		Digital I/O Type	Analog Input Type
CN2A	1	–	–
	1	1	–
	1	–	1
	1	2	–
	1	1	1
CN2B	1	–	–
	1	1	–
	1	–	1
	1	2	–

Note:

You can swap the connections to CN2A and CN2B.

- When Connecting 2 Servomotors and 1 Rotary Feedback Unit to 1 Port

Node Configuration				
Connector Name	Servomotor	Rotary Feedback Unit	Sensor Hub	
			Digital I/O Type	Analog Input Type
CN2A	2	1	–	–
CN2B	–	–	1	–
	–	–	–	1
	–	–	2	–
	–	–	1	1
	–	–	3	–
	–	–	2	1

Note:
You can swap the connections to CN2A and CN2B.

- When Connecting 1 Servomotor to Each Port and 1 Rotary Feedback Unit to 1 Port

Node Configuration				
Connector Name	Servomotor	Rotary Feedback Unit	Sensor Hub	
			Digital I/O Type	Analog Input Type
CN2A	1	1	–	–
	1	1	1	–
	1	1	–	1
CN2B	1	–	–	–
	1	–	1	–
	1	–	2	–

Note:
You can swap the connections to CN2A and CN2B.

- When Connecting 1 Servomotor and 1 Rotary Feedback Unit to Each Port

Node Configuration				
Connector Name	Servomotor	Rotary Feedback Unit	Sensor Hub	
			Digital I/O Type	Analog Input Type
CN2A	1	1	–	–
	1	1	1	–
	1	1	–	1
CN2B	1	1	–	–
	1	1	1	–

Note:
You can swap the connections to CN2A and CN2B.

(c) When Using a Σ-XT SERVOPACK

- When Connecting 3 Servomotors to 1 Port

Node Configuration			
Connector Name	Servomotor	Sensor Hub	
		Digital I/O Type	Analog Input Type
CN2A	3	–	
CN2B	–	–	
CN2C	–	1	

Note:
You can swap the connections to CN2A, CN2B, and CN2C.

- When Connecting 2 Servomotors to 1 Port or Connecting 2 Servomotors and a Sensor Hub to 1 Port

Node Configuration			
Connector Name	Servomotor	Sensor Hub	
		Digital I/O Type	Analog Input Type
CN2A	2	–	
	2	1 *1	–
CN2B	–	–	
CN2C	1	1 *1	

*1 Cannot be configured at the same time.

Note:
You can swap the connections to CN2A, CN2B, and CN2C.

- When Connecting 1 Servomotor to Each Port

Node Configuration			
Connector Name	Servomotor	Sensor Hub	
		Digital I/O Type	Analog Input Type
CN2A	1	–	
	1	1	
CN2B	1	–	
CN2C	1	–	

Note:
You can swap the connections to CN2A, CN2B, and CN2C.

- When Connecting 3 Servomotors and 1 Rotary Feedback Unit to 1 Port

Node Configuration				
Connector Name	Servomotor	Rotary Feedback Unit	Sensor Hub	
			Digital I/O Type	Analog Input Type
CN2A	3	–	–	–
CN2B	–	1	–	–
CN2C	–	–	–	–

Note:
You can swap the connections to CN2A, CN2B, and CN2C.

- When Connecting 2 Servomotors and 1 Rotary Feedback Unit to 1 Port

Node Configuration				
Connector Name	Servomotor	Rotary Feedback Unit	Sensor Hub	
			Digital I/O Type	Analog Input Type
CN2A	2	–	–	–
	2	1 *1	–	–
CN2B	–	–	–	–
CN2C	1	1 *1	–	–

*1 Cannot be configured at the same time.

Note:

You can swap the connections to CN2A, CN2B, and CN2C.

- When Connecting 1 Servomotor to Each Port and 1 Rotary Feedback Unit to 1 Port

Node Configuration				
Connector Name	Servomotor	Rotary Feedback Unit	Sensor Hub	
			Digital I/O Type	Analog Input Type
CN2A	1	1	–	–
CN2B	1	–	–	–
CN2C	1	–	–	–

Note:

You can swap the connections to CN2A, CN2B, and CN2C.

(2) Connecting Σ-LINK II Devices to the SERVOPACK through the Booster Unit

When supplying power to Σ-LINK II devices by using a booster unit, the combinations of configurable devices can be increased over the configuration when Σ-LINK II devices are directly connected to the SERVOPACK. The additional connection configurations are given next.

(a) When Using a Booster Unit with a Σ-XS SERVOPACK

You can connect a maximum of three nodes including one servomotor regardless of the types of nodes (sensor hub: digital I/O type or analog input type) you will connect.

(b) When Using a Booster Unit with a Σ-XW SERVOPACK

You can connect a maximum of three nodes including a servomotor to one connector on the SERVOPACK side, regardless of the types of nodes you will connect.

You can connect a maximum of six nodes in total to CN2A and CN2B.

Information A booster unit is required for each SERVOPACK connector.
You can also use a booster unit for either CN2A or CN2B only.

(c) When Using a Booster Unit with a Σ-XT SERVOPACK

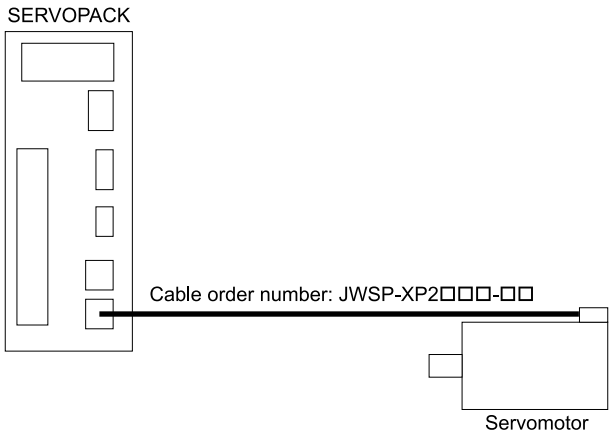
You can connect a maximum of three nodes including a servomotor to one connector on the SERVOPACK side, regardless of the types of nodes you will connect.

You can connect a maximum of four nodes in total to CN2A, CN2B, and CN2C.

Information A booster unit is required for each SERVOPACK connector.
You can also use a booster unit for only the desired connectors: CN2A, CN2B, and/or CN2C.

13.1.2 Connecting the SERVOPACK with a Single Servomotor

When connecting the SERVOPACK with a single servomotor, connect in the following way.

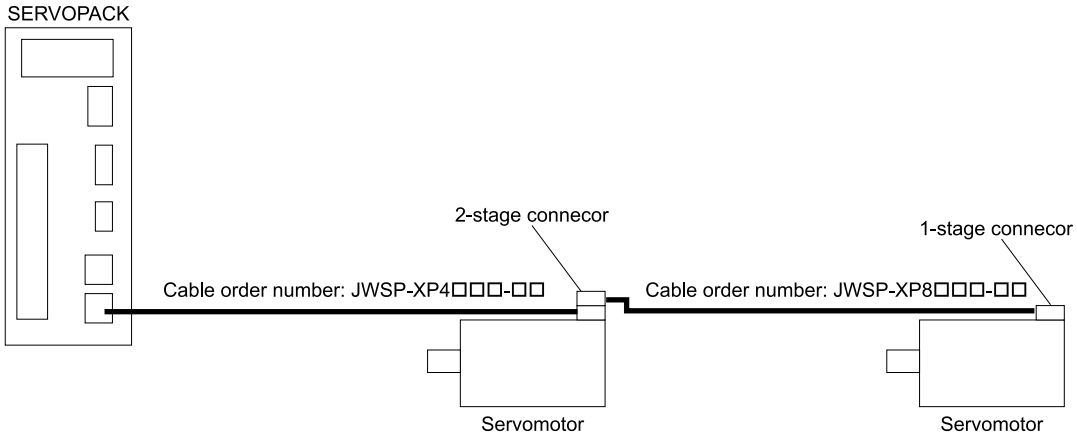


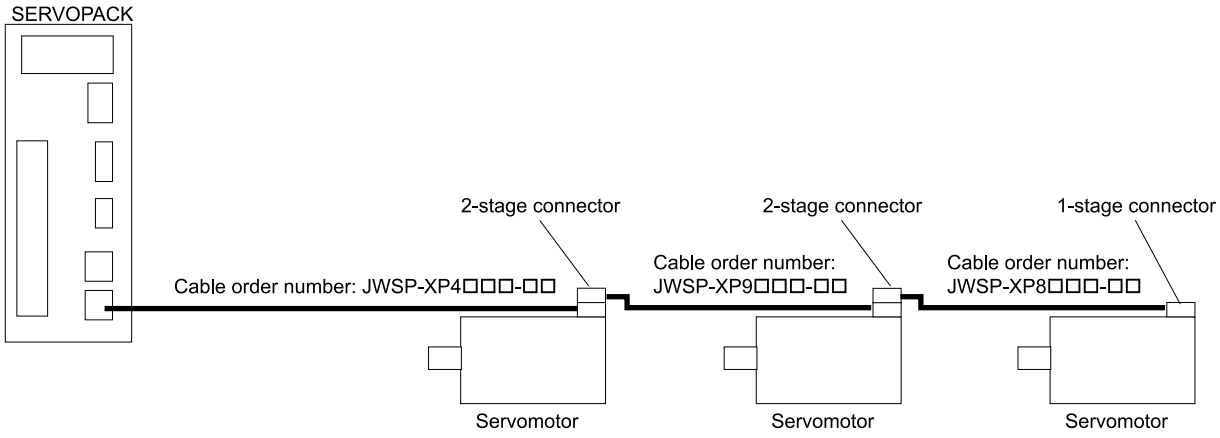
13.1.3 Connecting the SERVOPACK to Multiple Devices in a Daisy-Chain Connection

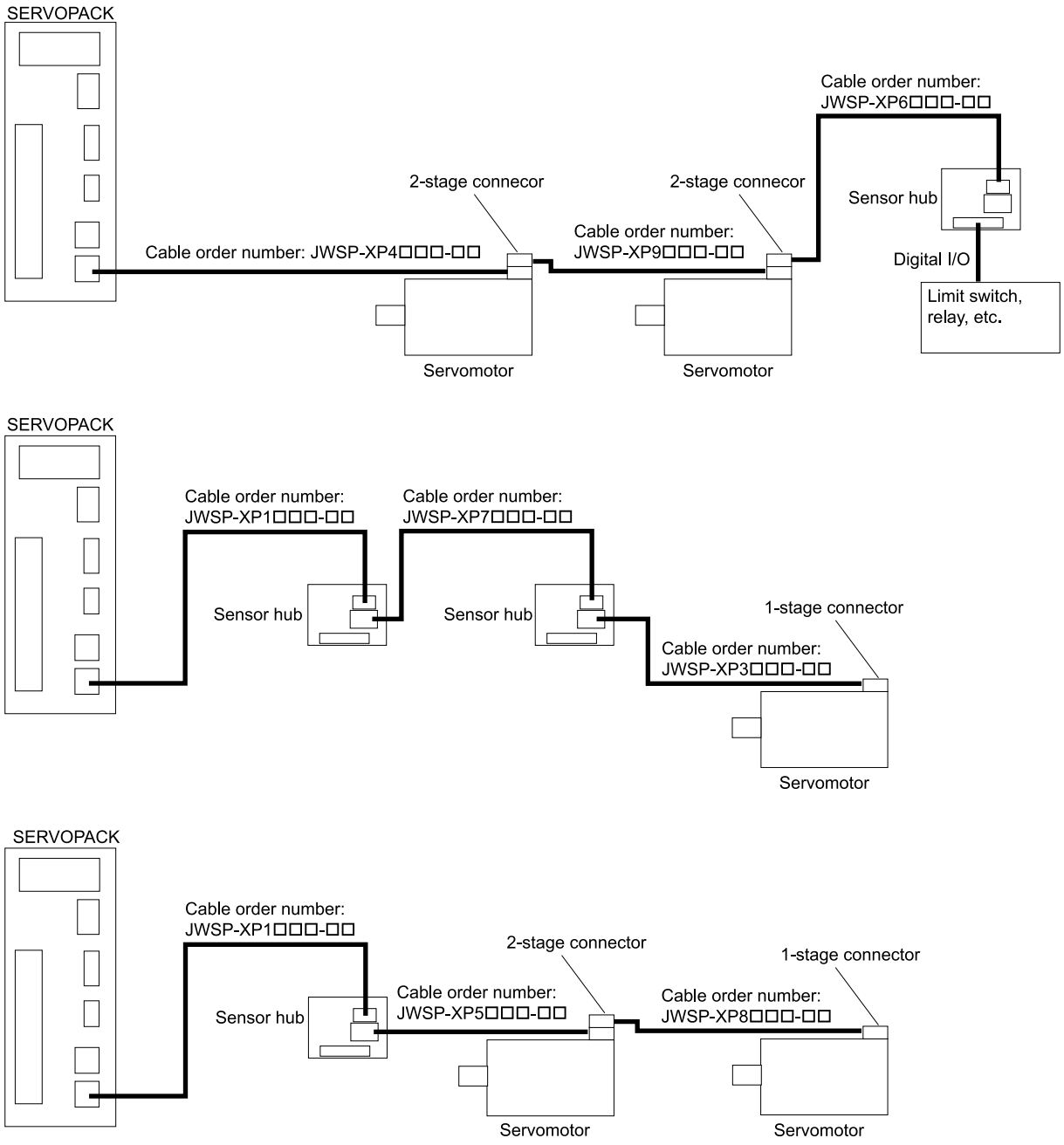
When connecting the SERVOPACK to multiple devices in a daisy-chain connection, use the two-stage connector of the servomotor or the communications expansion connector of the sensor hub to make connections in the following way.

Note:

- Only Σ-XW and Σ-XT SERVOPACKs can connect two servomotors.
- Only Σ-XT SERVOPACK can connect three servomotors.
- Connect only one analog input sensor hub per system.
- When you will use a Σ-X SERVOPACK as the MDevice and you want to expand the Σ-LINK II communications cable between node and the total length of wiring, connect a booster unit between the SERVOPACK and devices.





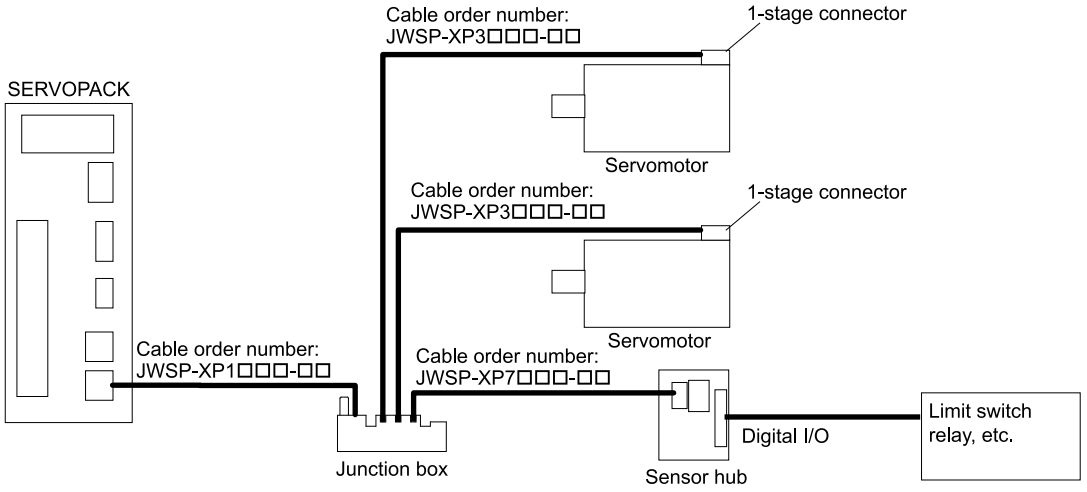


13.1.4 Connecting the SERVOPACK to Multiple Devices in a Star Connection

When connecting the SERVOPACK to multiple devices in a star connection, use the junction box and connect in the following way.

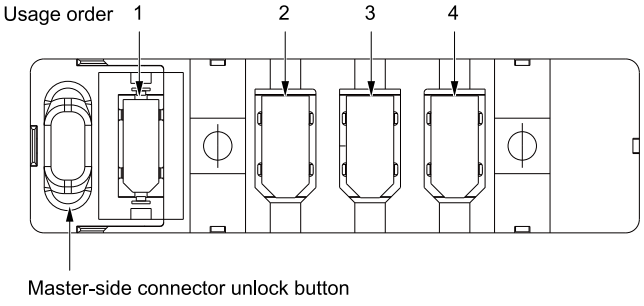
Note:

- Only Σ-XW SERVOPACK can connect two servomotors.
- Only Σ-XT SERVOPACK can connect three servomotors.
- Connect only one analog input sensor hub per system.
- When you will use a Σ-X SERVOPACK as the MDevice and you want to expand the Σ-LINK II communications cable between node and the total length of wiring, connect a booster unit between the SERVOPACK and devices.



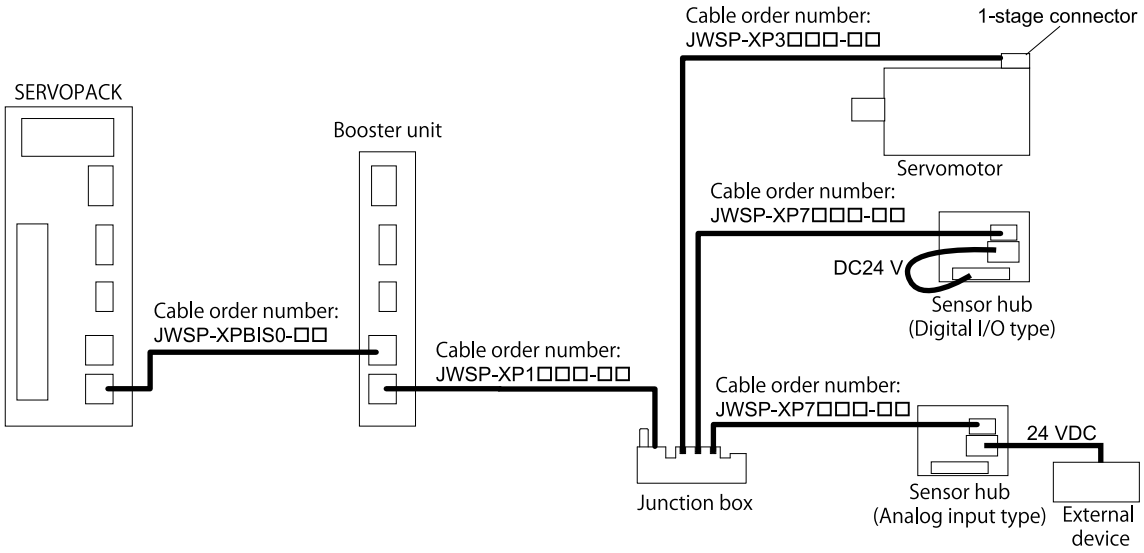
Important

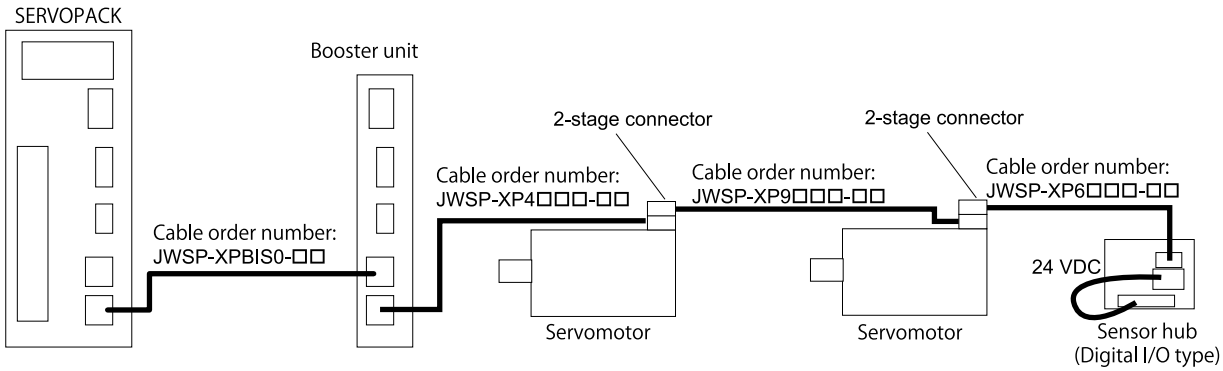
Use the junction boxes in order, starting with the one immediately next to the host controller-side connector unlock button. If there is an empty connector, the Σ-LINK II device connected behind the empty connector will not be recognized by the Σ-LINK II device on the host controller side.



13.1.5 Using the Booster Unit for Connections

When you will extend the length of the Σ-LINK II cables by using a booster unit, make the connections as shown below.





13.1.6 Relaying the Cable

Examples of the cables when using a daisy-chain connection are shown below.

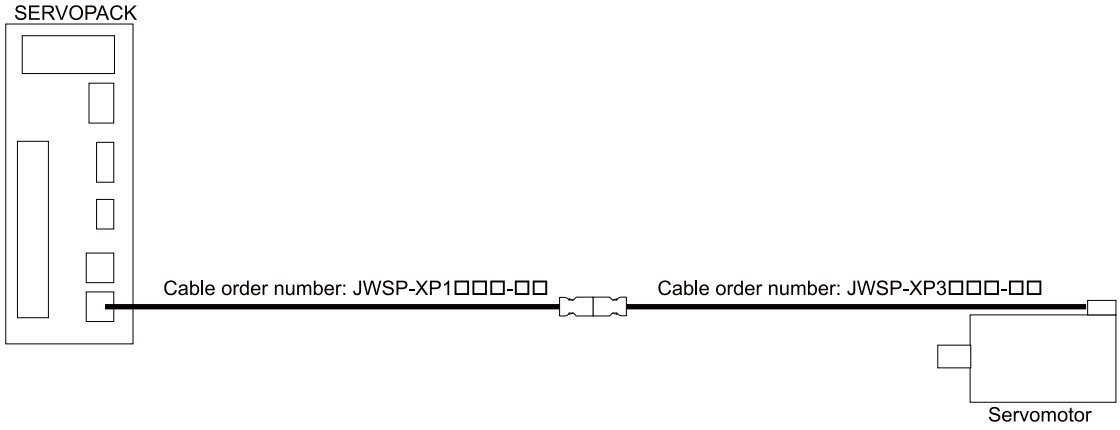
When using a star connection and when making connections by using a booster unit, substitute the cables with an understanding of the combinations of cables that can be used for relaying.

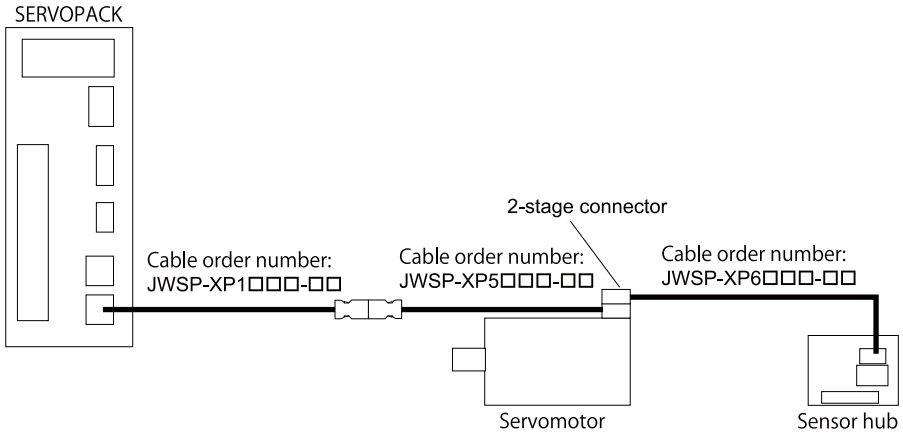
The combinations of cables that can be used for relaying are given below.

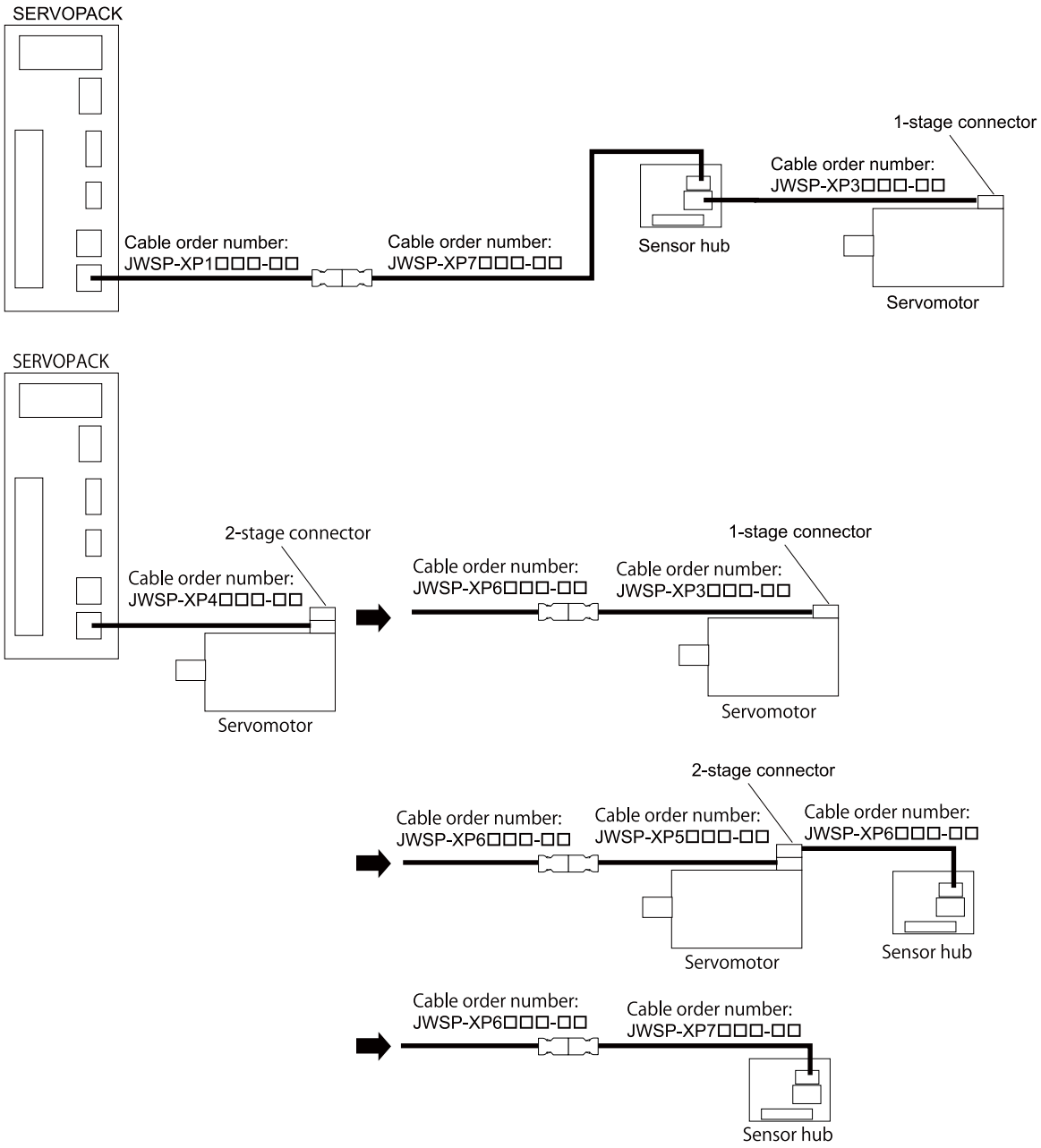
Upstream Side	Downstream Side
JWSP-XP1□□□-□□	• JWSP-XP3□□□-□□ • JWSP-XP5□□□-□□ • JWSP-XP7□□□-□□
JWSP-XP6□□□-□□	
JWSP-XP7□□□-□□	

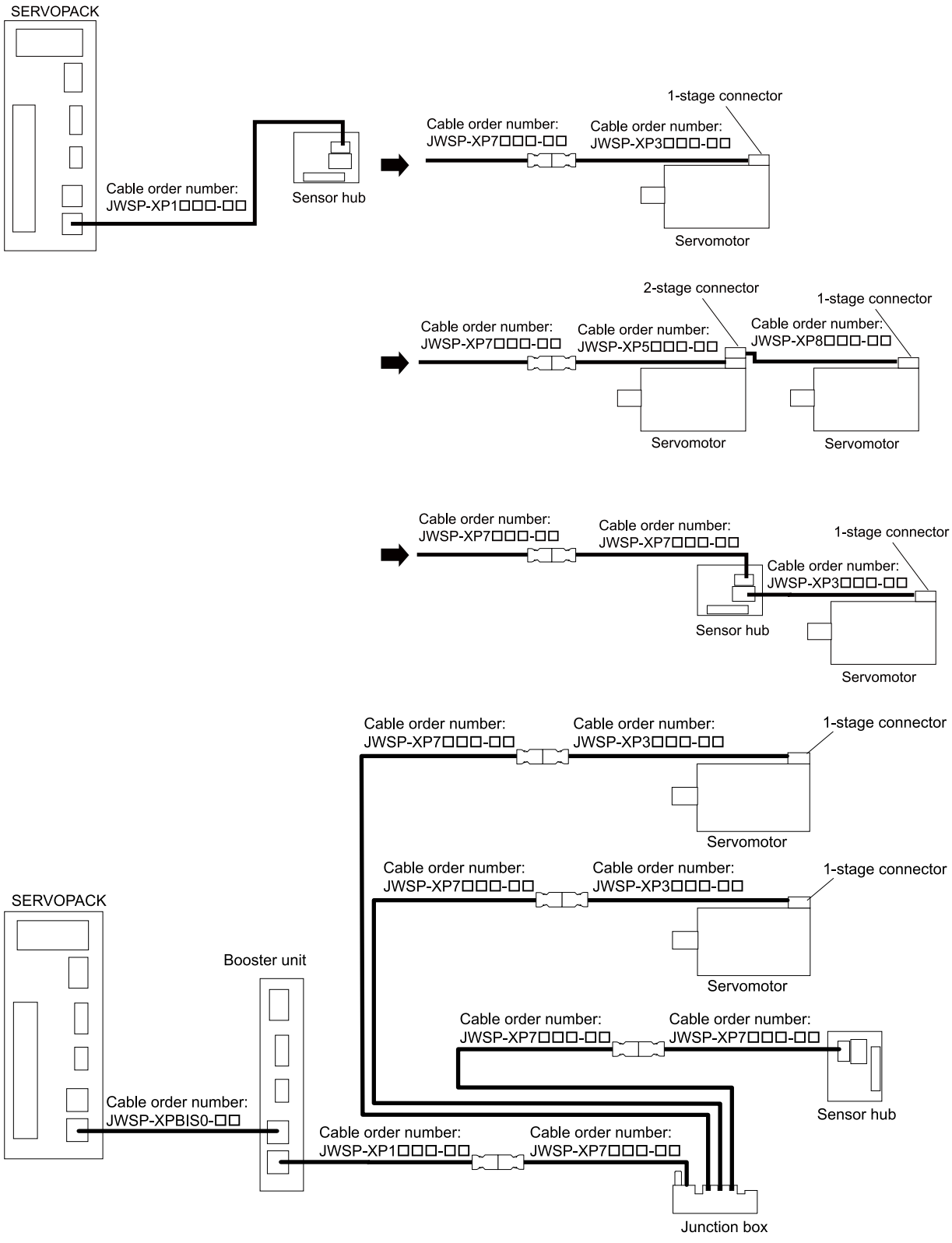
Note:

When supplying power to Σ-LINK II devices from the SERVOPACK, there can be a maximum of only one relay between cables.






SERVOPACK
Cable order number:
JWSP-XP1□□□-□□
Cable order number:
JWSP-XP7□□□-□□
Sensor hub
1-stage connector
Cable order number:
JWSP-XP3□□□-□□
Servomotor
SERVOPACK
2-stage connector
Cable order number:
JWSP-XP4□□□-□□
Servomotor
Cable order number:
JWSP-XP6□□□-□□
1-stage connector
Cable order number:
JWSP-XP3□□□-□□
Servomotor
2-stage connector
Cable order number:
JWSP-XP6□□□-□□
Cable order number:
JWSP-XP5□□□-□□
Cable order number:
JWSP-XP6□□□-□□
Servomotor
Sensor hub
Cable order number:
JWSP-XP6□□□-□□
Cable order number:
JWSP-XP7□□□-□□
Sensor hub



13.1.7 Cable Length and Output Current

The cable length depends on the device to which power will be supplied, the node type, and the connection configuration. Select cables based on the cable length for the relevant configuration.

(1) Supplying Power to Σ-LINK II Devices from the SERVOPACK

(a) Cable Length

The cable lengths when supplying power to Σ-LINK II devices from the SERVOPACK depend on the node configuration. The cable lengths in each node configuration are given below.

Note:

• There can be a maximum of only one relay between cables.

• If the cable lengths in the following table will be exceeded, use a booster unit.

- When Using a Σ-XS SERVOPACK and Not Connecting a Rotary Feedback Unit

Node Configuration			Daisy-Chain Connection	Star Connection	
Servomotor	Sensor Hub		Between SERVOPACK and Node Between Node and Node [m]	Between SERVOPACK and Junction Box [m]	Between Junction Box and Node [m]
	Digital I/O Type	Analog Input Type			
1	–	1	5	5	5
1	1	–	20	20	20
1	1	1	3	3	5
1	2	–	10	15	10

- When Using a Σ-XS SERVOPACK and Connecting 1 Rotary Feedback Unit

Node Configuration					Daisy-Chain Connection	Star Connection	
Connector Name	Servomotor	Rotary Feedback Unit	Sensor Hub		Between SERVOPACK and Node Between Node and Node [m]	Between SERVOPACK and Junction Box [m]	Between Junction Box and Node [m]
			Digital I/O Type	Analog Input Type			
CN2	1	1	1	–	5	10	15
	1	1	–	1	3	3	3

- When Using a Σ-XW SERVOPACK and Connecting 2 Servomotors to 1 Port or Connecting 2 Servomotors and a Sensor Hub (Digital I/O Type) to 1 Port

Node Configuration				Daisy-Chain Connection	Star Connection	
Connector Name	Servomotor	Sensor Hub		Between SERVOPACK and Node Between Node and Node [m]	Between SERVOPACK and Junction Box [m]	Between Junction Box and Node [m]
		Digital I/O Type	Analog Input Type			
CN2A	2	–	–	15	15	15
	2	1	–	5	10	15
CN2B	–	1	–	50	–	–
	–	–	1	20	–	–
	–	2	–	30	25	25
	–	1	1	5	5	5
	–	3	–	15	20	25
	–	2	1	3	3	5

Note:

You can swap the connections to CN2A and CN2B.

- When Using a Σ-XW SERVOPACK and Connecting 2 Servomotors and a Sensor Hub (Analog Input Type) to 1 Port

Node Configuration				Daisy-Chain Connection	Star Connection	
Connector Name	Servomotor	Sensor Hub		Between SERVOPACK and Node Between Node and Node [m]	Between SERVOPACK and Junction Box [m]	Between Junction Box and Node [m]
		Digital I/O Type	Analog Input Type			
CN2A	2	–	1	3	3	3
CN2B	–	1	–	50	–	–
	–	–	1	20	–	–
	–	2	–	30	25	25
	–	1	1	5	5	5
	–	3	–	15	20	25

Note:

You can swap the connections to CN2A and CN2B.

- When Using a Σ-XW SERVOPACK and Connecting 1 Servomotor to Each Port

Node Configuration				Daisy-Chain Connection	Star Connection	
Connector Name	Servomotor	Sensor Hub		Between SERVOPACK and Node Between Node and Node [m]	Between SERVOPACK and Junction Box [m]	Between Junction Box and Node [m]
		Digital I/O Type	Analog Input Type			
CN2A	1	–	–	50	–	–
	1	1	–	20	20	20
	1	–	1	5	5	5
	1	2	–	10	15	10
	1	1	1	3	3	5
CN2B	1	–	–	50	–	–
	1	1	–	20	20	20
	1	–	1	5	5	5
	1	2	–	10	15	10

Note:

You can swap the connections to CN2A and CN2B.

- When Using a Σ-XW SERVOPACK and Connecting 2 Servomotors and 1 Rotary Feedback Unit to 1 Port

Node Configuration					Daisy-Chain Connection	Star Connection	
Connector Name	Servomotor	Rotary Feedback Unit	Sensor Hub		Between SERVOPACK and Node Between Node and Node [m]	Between SERVOPACK and Junction Box [m]	Between Junction Box and Node [m]
			Digital I/O Type	Analog Input Type			
CN2A	2	1	–	–	5	10	10
CN2B	–	–	1	–	50	–	–
	–	–	–	1	20	–	–
	–	–	2	–	30	25	25
	–	–	1	1	5	5	5
	–	–	3	–	15	20	25
	–	–	2	1	3	3	5

Note:

You can swap the connections to CN2A and CN2B.

- When Using a Σ-XW SERVOPACK and Connecting 1 Servomotor to Each Port and 1 Rotary Feedback Unit to 1 Port

Node Configuration					Daisy-Chain Connection	Star Connection	
Connector Name	Servomotor	Rotary Feedback Unit	Sensor Hub		Between SERVOPACK and Node Between Node and Node [m]	Between SERVOPACK and Junction Box [m]	Between Junction Box and Node [m]
			Digital I/O Type	Analog Input Type			
CN2A	1	1	–	–	15	15	15
	1	1	1	–	5	10	15
	1	1	–	1	3	3	3
CN2B	1	–	–	–	50	–	–
	1	–	1	–	20	20	20
	1	–	2	–	10	15	10

Note:

You can swap the connections to CN2A and CN2B.

- When Using a Σ-XW SERVOPACK and Connecting 1 Servomotor and 1 Rotary Feedback Unit to Each Port

Node Configuration					Daisy-Chain Connection	Star Connection	
Connector Name	Servomotor	Rotary Feedback Unit	Sensor Hub		Between SERVOPACK and Node Between Node and Node [m]	Between SERVOPACK and Junction Box [m]	Between Junction Box and Node [m]
			Digital I/O Type	Analog Input Type			
CN2A	1	1	–	–	15	15	15
	1	1	1	–	5	10	15
	1	1	–	1	3	3	3
CN2B	1	1	–	–	15	15	15
	1	1	1	–	5	10	15

Note:

You can swap the connections to CN2A and CN2B.

- When Using a Σ-XT SERVOPACK and Connecting 3 Servomotors to 1 Port and a Sensor Hub to 1 Port

Node Configuration				Daisy-Chain Connection	Star Connection	
Connector Name	Servomotor	Sensor Hub		Between SERVOPACK and Node Between Node and Node [m]	Between SERVOPACK and Junction Box [m]	Between Junction Box and Node [m]
		Digital I/O Type	Analog Input Type			
CN2A	3	–	–	5	10	10
CN2B	–	1	–	50	–	–
	–	–	1	20	–	–
CN2C	–	–	–	–	–	–

Note:

You can swap the connections to CN2A, CN2B, and CN2C.

- When Using a Σ-XT SERVOPACK and Connecting 2 Servomotor to 1 Port

Node Configuration				Daisy-Chain Connection	Star Connection	
Connector Name	Servomotor	Sensor Hub		Between SERVOPACK and Node Between Node and Node [m]	Between SERVOPACK and Junction Box [m]	Between Junction Box and Node [m]
		Digital I/O Type	Analog Input Type			
CN2A	2	–	–	15	15	15
	2	1	–	5	10	15
CN2B	–	–	–	–	–	–
CN2C	1	–	–	50	–	–

Note:

You can swap the connections to CN2A, CN2B, and CN2C.

- When Using a Σ-XT SERVOPACK and Connecting 1 Servomotor to Each Port

Node Configuration				Daisy-Chain Connection	Star Connection	
Connector Name	Servomotor	Sensor Hub		Between SERVOPACK and Node Between Node and Node [m]	Between SERVOPACK and Junction Box [m]	Between Junction Box and Node [m]
		Digital I/O Type	Analog Input Type			
CN2A	1	–	–	50	–	–
	1	1	–	20	20	20
	1	–	1	5	5	5
CN2B	1	–	–	50	–	–
CN2C	1	–	–	50	–	–

Note:

You can swap the connections to CN2A, CN2B, and CN2C.

- When Using a Σ-XT SERVOPACK and Connecting 3 Servomotors and 1 Rotary Feedback Unit to 1 Port

Node Configuration					Daisy-Chain Connection	Star Connection	
Connector Name	Servomotor	Rotary Feedback Unit	Sensor Hub		Between SERVOPACK and Node Between Node and Node [m]	Between SERVOPACK and Junction Box [m]	Between Junction Box and Node [m]
			Digital I/O Type	Analog Input Type			
CN2A	3	–	–	–	5	10	10
CN2B	–	1	–	–	50	–	–
CN2C	–	–	–	–	–	–	–

Note:

You can swap the connections to CN2A, CN2B, and CN2C.

- When Using a Σ-XT SERVOPACK and Connecting 2 Servomotors and 1 Rotary Feedback Unit to 1 Port

Node Configuration					Daisy-Chain Connection	Star Connection	
Connector Name	Servomotor	Rotary Feedback Unit	Sensor Hub		Between SERVOPACK and Node Between Node and Node [m]	Between SERVOPACK and Junction Box [m]	Between Junction Box and Node [m]
			Digital I/O Type	Analog Input Type			
CN2A	2	–	–	–	15	15	15
	2	1 *1	–	–	5	10	10
CN2B	–	–	–	–	–	–	–
CN2C	1	1 *1	–	–	15	15	15

*1 Cannot be configured at the same time.

Note:

You can swap the connections to CN2A, CN2B, and CN2C.

- When Using a Σ-XT SERVOPACK and Connecting 1 Servomotor to Each Port and 1 Rotary Feedback Unit to 1 Port

Node Configuration					Daisy-Chain Connection	Star Connection	
Connector Name	Servomotor	Rotary Feedback Unit	Sensor Hub		Between SERVOPACK and Node Between Node and Node [m]	Between SERVOPACK and Junction Box [m]	Between Junction Box and Node [m]
			Digital I/O Type	Analog Input Type			
CN2A	1	1	–	–	15	15	15
CN2B	1	–	–	–	50	–	–
CN2C	1	–	–	–	50	–	–

Note:

You can swap the connections to CN2A, CN2B, and CN2C.

(b) Output Current

When power is supplied from the SERVOPACK, power cannot be supplied to external devices.

(2) Supplying Power to Σ-LINK II Devices from the Booster Unit

The maximum cable length when supplying 24-V power to nodes using the booster unit and the output current when supplying power to external devices are given below.

(a) Cable Length

The cable lengths are given below.

- Star Connection
  25 m or less from the booster unit to the junction box and between each node from the junction box
- Daisy-Chain Connection
  - When supplying power to Σ-LINK II devices from the booster unit:
    50 m or less from the booster unit to a node and between each node
  - When supply power from the booster unit to the digital outputs of the sensor hub or external devices connected to the sensor hub:
    15 m or less between each Σ-LINK II device (encoder and sensor hub) after the booster unit

Note:

If the above cable lengths will be exceeded, contact your Yaskawa representative.

(b) Output Current

When using a booster unit, power can be supplied to the digital outputs of the sensor hub or external devices connected to the sensor hub.

When supplying operating power to the digital outputs of the sensor hub and external devices, the output current that can be supplied to the external devices depends on the number of connected Σ-LINK II devices. Use the devices according to the allowable output current values given in the following table.

Note:

If the output current will exceed the above values, contact your Yaskawa representative.

Equipment Configuration			Allowable Output Current
Σ-X-Series Servomotor	Sensor Hub (Digital I/O Type) JUSP-SL2HD440□A	Sensor Hub (Analog Input Type) JUSP-SL2HA400□A	
2	1	0	350mA
2	0	1	300mA
1	1	0	400mA
1	2	0	400mA

Continued on next page.

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Equipment Configuration			Allowable Output Current
Σ-X-Series Servomotor	Sensor Hub (Digital I/O Type) JUSP-SL2HD440□A	Sensor Hub (Analog Input Type) JUSP-SL2HA400□A	
1	0	1	350mA
1	0	2	250mA
1	1	1	300mA
0	1	0	450mA
0	0	1	400mA
0	1	1	350mA

Refer to the following manual for details.

Σ-X-Series Σ-LINK II Booster Unit Instructions (Manual No.: TOMP C710812 08)

13.2 Sensor Hub

Use a sensor hub when connecting a commercially available analog or digital sensor.
The sensor hub is counted as a node in Σ-LINK II communications.

13.2.1 Interpreting Model Numbers

JUSP - SL2 H D4400 A A 1

- SL2: Peripheral Device That Supports Σ-LINK II
- H: 1st digit
- D4400: 2nd to 6th digit
- A: 7th digit
- A: 8th digit
- 1: 9th digit

Digit	Item	Symbol	Specification
1st digit	Device Type	H	Σ-LINK II Sensor Hub
2nd to 6th digit	Interface	D4400	4 digital inputs (combined sink/source), 4 digital outputs (sink)
		D4401	4 digital inputs (combined sink/source), 4 digital outputs (source)
		A4000	4 analog inputs (4 voltage inputs)
		A4001	4 analog inputs (2 voltage inputs, 2 current inputs)
7th digit	Custom Specifications	A	Standard specification
8th digit	Design Revision Order	A	First release product
9th digit	Options	Not provided.	No options (specification: with connector cover)
		1	With options (specification: no connector cover)

13.2.2 Environmental Conditions

Item	Specification
Surrounding Air Temperature	-5°C to 60°C
Storage Temperature	-20°C to 85°C
Surrounding Air Humidity	5% to 95% relative humidity max. (with no freezing or condensation)
Storage Humidity	5% to 95% relative humidity max. (with no freezing or condensation)
Degree of Protection	IP20
Pollution Degree	2 • Must be no corrosive or flammable gases. • Must be no exposure to water, oil, or chemicals. • Must be no dust, salts, or iron powder.
Altitude	2000 m max.
Vibration Resistance	When there is continuous vibration: 10 Hz to 55 Hz, acceleration amplitude: 49 m/s^2 (5 G) (When not using the connector cover: 1 G)
Shock Resistance	Acceleration amplitude: 490 m/s^2 (50 G) (When not using the connector cover: 15 G)
Ground	Functional ground only
Others	Do not use the sensor hub in the following locations: Locations subject to static electricity noise, strong electromagnetic/magnetic fields, or radioactivity.

13.2.3 I/O Signal

(1) Digital I/O Type

Item		Specification	
Model		With Cover (Standard): JUSP-SL2HD4400AA No Cover (Option): JUSP-SL2HD4400AA1	With Cover (Standard): JUSP-SL2HD4401AA No Cover (Option): JUSP-SL2HD4401AA1
Power Supply	Input Voltage *1	5 VDC to 24 VDC (4.0 V to 27.6 V)	
	Internal Power Consumption	0.4 W (for 5-V input) 0.53 W (for 24-V input)	
	Output Voltage *2	5 VDC to 24 VDC (4.0 V to 27.6 V) / 1.5 A max.	
I/O Signal	Digital Input	Number of inputs: 4 (insulated high-speed inputs) Input type: Combined sink/source Input voltage: 24 VDC (19.2 V to 28.8 V) ON voltage: 15.0 V OFF voltage: 8.0 V Number of commons: 1 (input)	
	Digital Output	Number of outputs: 4 (insulated outputs) Output type: Sink output Maximum voltage: 27.6 VDC Maximum current: 500 mA/ch Number of commons: 1 (output)	Number of outputs: 4 (insulated outputs) Output type: Source output Maximum voltage: 27.6 VDC Maximum current: 500 mA/ch Number of commons: 1 (output)

*1 This power supply is provided from a SERVOPACK (Σ-X Series) or Σ-LINK II host controller through the communications connector (CN1). This power supply cannot be directly wired to the sensor hub.

*2 This power supply is output through the communications expansion connector (CN2). This power supply cannot be directly wired to the sensor hub.

(2) Analog Input Type

Item		Specification	
Model		With Cover (Standard): JUSP-SL2HA4000AA No Cover (Option): JUSP-SL2HA4000AA1	With Cover (Standard): JUSP-SL2HA4001AA No Cover (Option): JUSP-SL2HA4001AA1
Power Supply	Input Voltage *1	5 VDC to 24 VDC (4.0 V to 27.6 V)	
	Internal Power Consumption	1.8 W (for 5-V input) 1.9 W (for 24-V input)	1.7 W (for 5-V input) 1.8 W (for 24-V input)
	Output Voltage *2	5 VDC to 24 VDC (4.0 V to 27.6 V) / 1.5 A max.	
Voltage Input		Number of inputs: 4	Number of input points: 2
		Input voltage: ±12 VDC Guaranteed linearity: ±12 V Maximum input: ±15 V Single ended input Offset error: 30 mV or less Input impedance: 30 kΩ Resolution: 16 bits (15 bits when using 0 to +12 V)	

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Item	Specification	
Current Input	Not applicable	Number of input points: 2 Input range: 0 mA to 20 mA Guaranteed linearity: 0 mA to 20 mA Maximum input: ±25 mA Offset error: 0.05 mA or less Input impedance: 200 Ω Resolution: 15 bits
Accuracy *3	Gain error: 1.5% or less Rate of change for temperature: 0.1% or less (within surrounding air temperature only)	
Σ-LINK II Communications	62.5 µs, 125 µs, 250 µs, 500 µs, 1.0 ms	
Data Updating Period	62.5 µs min.	
Input Filter Delay	0.1 ms or less	
Isolation	Non-isolated between channels Between input connectors and power supply: Isolated by digital isolator	
Input Conversion Time	0.2 ms or less (arrival time at Σ-LINK II MDevice)	

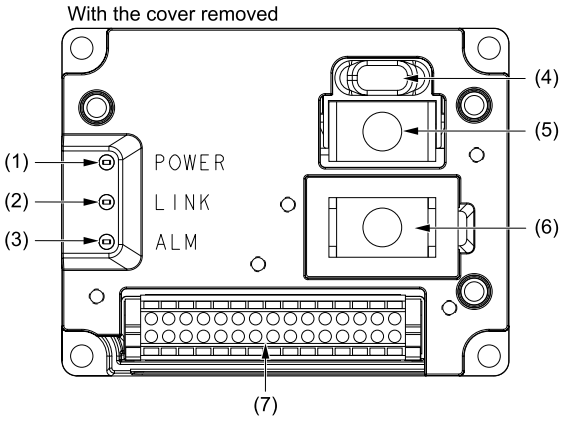
*1 This power supply is provided from a SERVOPACK (Σ-X Series) or Σ-LINK II host controller through the communications connector (CN1). This power supply cannot be directly wired to the sensor hub.
*2 This power supply is output through the communications expansion connector (CN2). This power supply cannot be directly wired to the sensor hub.
*3 Accuracy for full scale.

Note:

When you will use an analog input type sensor hub by supplying power from the SERVOPACK, you can connect only one sensor hub to one Σ-LINK II communications system. You can connect a maximum of three sensor hubs when using a booster unit.

13.2.4 Appearance and Part Names

The following figure shows the appearance and part names for the sensor hub.



No.	Name	Description
(1)	POWER (green)	Lit when power is being supplied.
(2)	LINK (green)	Lit while connected to the host controller. Flashing: Start of communications Lit: Connection established
(3)	ALM (orange)	Lit while an alarm is displayed. Lit: Device-specific alarm Flashing (0.1-s interval): System error
(4)	Communications Connector (CN1) Unlock Button	This button unlocks the communications connector (CN1) lock.

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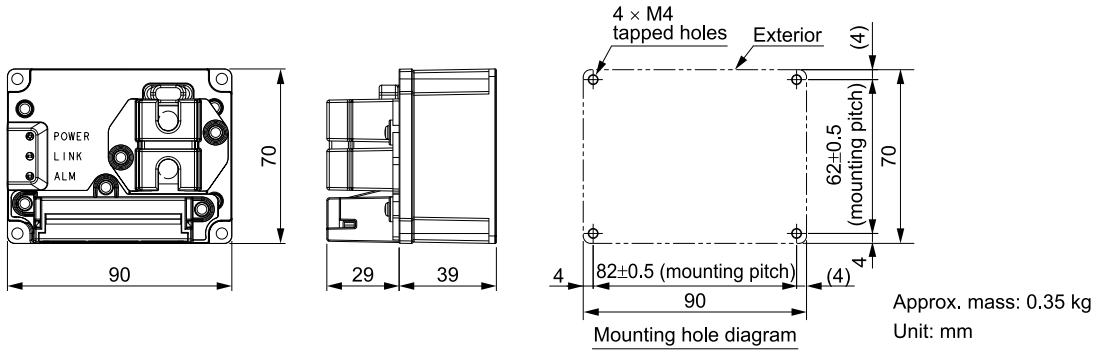
No.	Name	Description
(5)	Communications Connector (CN1)	This connector is used to connect Σ-LINK II upstream devices.
(6)	Communications Expansion Connector (CN2)	This connector is used to connect Σ-LINK II downstream devices.
(7)	I/O Connection Terminal Block (CN3)	The terminal block for connecting external devices, such as sensors (e.g., limit switches) and relays.

13.2.5 External Dimensions

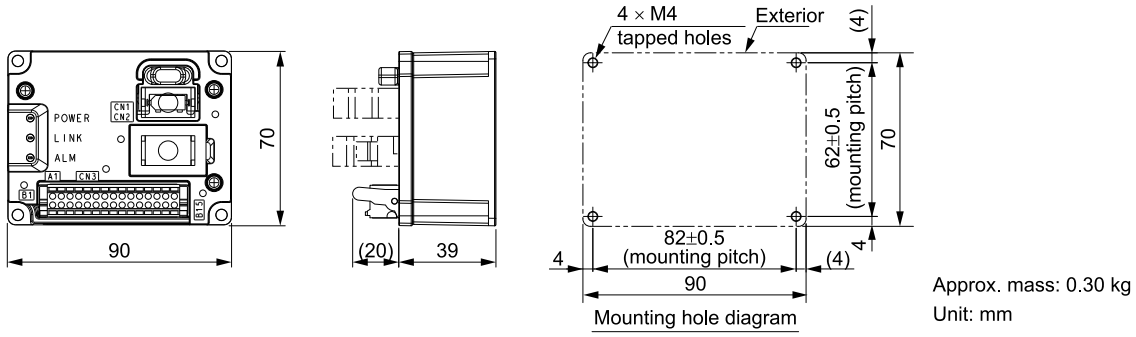
The dimensions of the sensor hub are given in the following figure.

- With Cover (Standard)



Approx. mass: 0.35 kg
Unit: mm

- No Cover (Option)



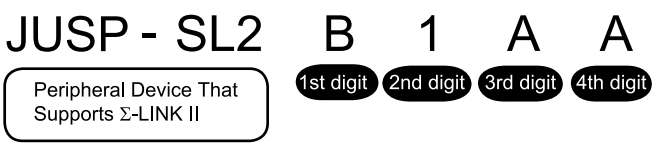
Approx. mass: 0.30 kg
Unit: mm

13.3 Booster unit

Use a booster unit when you will use a Σ-X SERVOPACK as the MDevice and you want to expand the Σ-LINK II communications cable between node and the total length of wiring.

Not counted as a node in Σ-LINK II communications.

13.3.1 Interpreting Model Numbers



Digit	Item	Symbol	Specification
1st digit	Device Type	B	Σ-LINK II booster unit
2nd digit	Number of Σ-LINK II circuits	1	1
3rd digit	Custom Specifications	A	Standard specification
4th digit	Design Revision Order	A	First release product

13.3.2 Environmental Conditions

Item	Specification
Surrounding Air Temperature	-5°C to 60°C
Storage Temperature	-20°C to 85°C
Surrounding Air Humidity	5% to 95% relative humidity max. (with no freezing or condensation)
Storage Humidity	5% to 95% relative humidity max. (with no freezing or condensation)
Degree of Protection	IP20
Pollution Degree	2 • Must be no corrosive or flammable gases. • Must be no exposure to water, oil, or chemicals. • Must be no dust, salts, or metal powder.
Altitude	2000 m max.
Vibration Resistance	When there is continuous vibration: 10 Hz to 55 Hz, acceleration amplitude: 5.9 m/s^2 (0.6 G)
Impact Resistance	Acceleration amplitude: 147 m/s^2 (15 G)
Ground	Functional ground only
Others	Do not use this product in the following locations: Locations subject to static electricity noise, strong electric/magnetic fields, or radiation.

13.3.3 I/O Specifications

Item		Specification
Power Supply	Input Voltage	5 VDC to 24 VDC (4.0 V to 27.6 V) / 0.3 W (max) *1
		24 VDC ±15% / 0.56 A (max) *2
	Output Voltage	24 VDC ±15% / 0.5 A (max) *3

*1 Power is supplied from a SERVOPACK (Σ-X series) or Σ-LINK II host controller via the upstream communications connector (CN1). This power supply cannot be directly wired to the booster unit.

*2 This power supply provides power to the booster unit and Σ-LINK II downstream devices. Separately obtain a commercially available AC/DC power supply. Refer to the following section for details.

☞ (1) External 24-VDC Power Supply on page 442

*3 Power is output via the downstream communications expansion connector (CN2). This power supply is used as output to Σ-LINK II downstream devices.

(1) External 24-VDC Power Supply

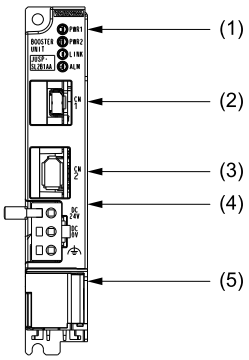
The external 24-VDC power supply connected to the booster unit to supply power to Σ-LINK II downstream devices must meet one of the following conditions.

- Use a class 2 power supply (compliance standard: UL 1310).
- Connect to a circuit with a maximum voltage of 30 Vrms and a peak voltage of 42.4 V that uses a UL 5085-3 (previous standard: UL 1585)-compliant class 2 transformer as a power supply.
- Use an isolated power supply with a maximum voltage of 30 Vrms and a peak voltage of 42.4 V that is isolated by double or reinforced insulation.

13.3.4 Appearance and Part Names

The following figure shows the appearance and part names of the booster unit.

Standard



No.	Name	Description
(1)	PWR1 (green)	Lit while the power supply is being input from the upstream side.
	PWR2 (green)	Lit while the power supply is being input from the downstream side.
	LINK (green)	Flashes while communicating with the host controller.
	ALM (orange)	Lit when there is an internal circuit error.
(2)	Upstream communications connector (CN1)	This connector is used to connect Σ-LINK II upstream devices.
(3)	Downstream communications connector (CN2)	This connector is used to connect Σ-LINK II downstream devices.

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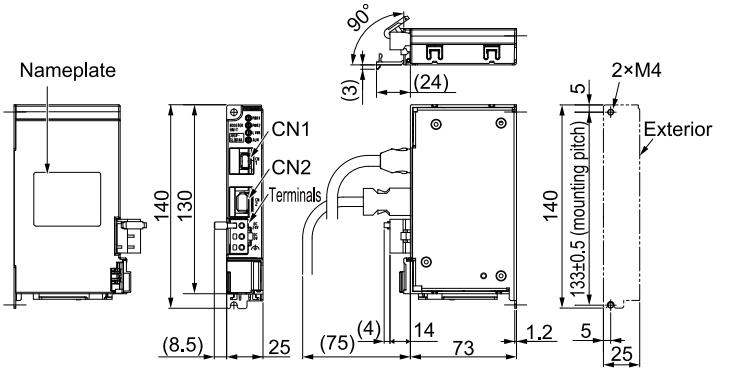
No.	Name		Description
(4)	External 24-VDC power supply connection terminal		–
		24 VDC	This terminal is used to connect the external 24-VDC power supply.
		0 VDC	
		⏚ (Ground terminal)	The functional ground terminal. Connect this terminal for stable device operation.
(5)	Cover		Do not use. Do not open the cover.

13.3.5 External Dimensions

The external dimensions of the booster unit are given in the following figures.



Mounting Hole Diagram

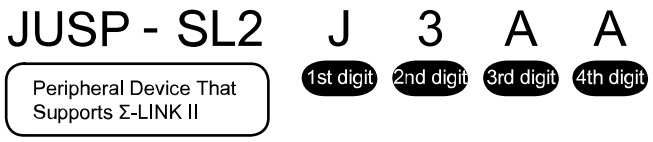
Approx. mass: 0.25 kg

Unit: mm

13.4 Junction Box

Use when connecting Σ-LINK II-related devices with a star connection.
Not counted as a node in Σ-LINK II communications.

13.4.1 Interpreting Model Numbers



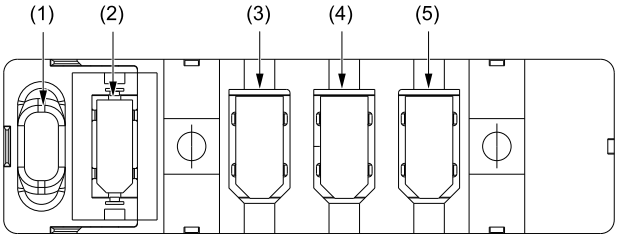
Digit	Item	Symbol	Specification
1st digit	Device Type	J	Σ-LINK II junction box
2nd digit	Number of Junctions	3	Three junctions
3rd digit	Custom Specifications	A	Standard specification
4th digit	Design Revision Order	A	First release product

13.4.2 Specification

Item	Specification	
Model	JUSP-SL2J3AA	
Number of Input Ports	1	
Number of Output Ports	3	
Surrounding Air Temperature	-5°C to +60°C	
Storage Temperature	-20°C to +85°C	
Surrounding Air Humidity	5% to 95% relative humidity max.	There must be no freezing or condensation.
Storage Humidity	5% to 95% relative humidity max.	
Vibration Resistance	Acceleration amplitude: 5.9 m/s^2 (0.6 G)	
Impact Resistance	Acceleration amplitude: 147 m/s^2 (15 G)	
Degree of Protection	IP20	• 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	2000 m max.	
Overvoltage Category	I	
Others	Do not use the junction box in the following locations: Locations subject to static electricity noise, strong electromagnetic/magnetic fields, or radioactivity	

13.4.3 Appearance and Part Names

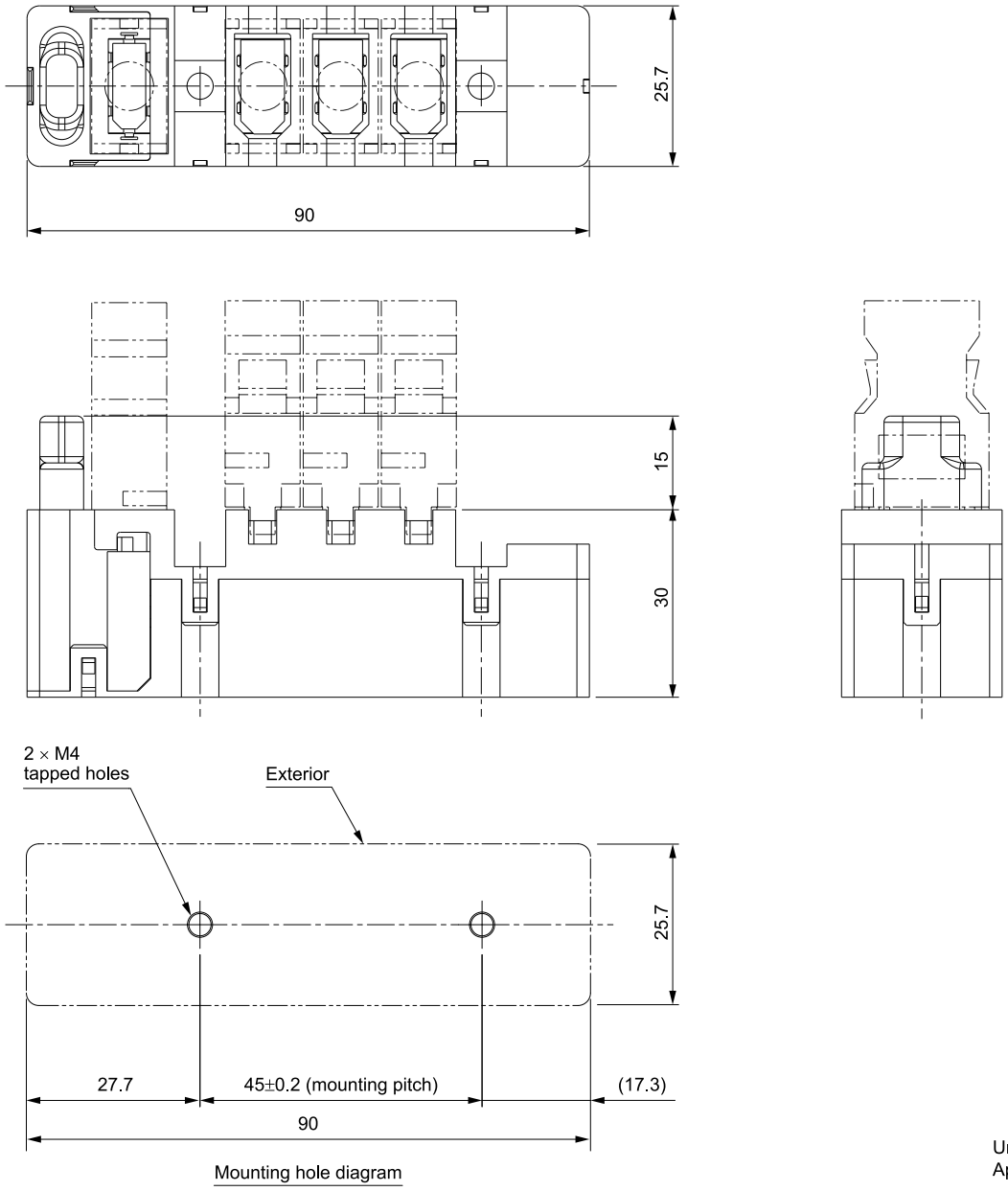
The following figure shows the appearance and part names for the junction box.



No.	Name	Description
(1)	Upstream connector unlock button	This button unlocks the upstream connector lock.
(2)	Upstream connector	This connector is used to connect with Σ-LINK II upstream devices.
(3)	Downstream connector 1	This connector is used to connect with Σ-LINK II downstream devices. Use the connectors in order, starting with connector 1. If there is an empty connector, the Σ-LINK II device connected behind the empty connector will not be recognized by the Σ-LINK II device on the host controller side.
(4)	Downstream connector 2	
(5)	Downstream connector 3	

13.4.4 External Dimensions

The dimensions of the junction box are given in the following figure.



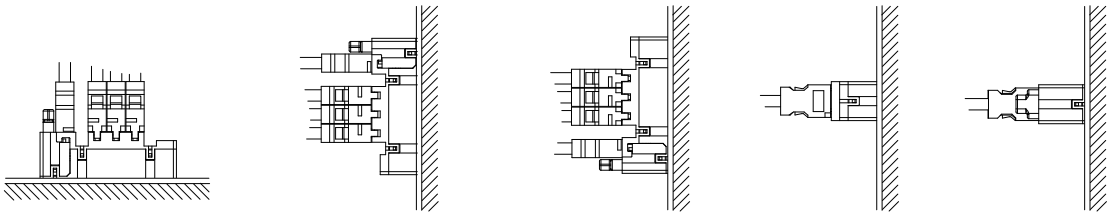
Mounting hole diagram

Unit: mm
Approx. mass: 0.1 kg

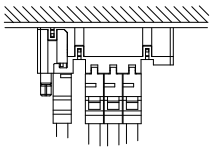
13.4.5 Mounting Direction

Mount the junction box so that the cable will not point downward.

- Correct



- Incorrect



13.5 Σ-LINK II Communications Cable

13.5.1 Cable List

Cables used in the connection of Σ-LINK II-related devices differ in the following ways depending on if they are being used with target devices connected on the upstream side or the downstream side and depending on the cables.

Upstream side	Downstream side	Model	Reference
SERVOPACK	Servomotor (1-stage connector)	JWSP-XP2□□□-□□	447
	Servomotor, rotary feedback unit (lower stage of 2-stage connector)	JWSP-XP4□□□-□□	451
	Sensor hub, junction box, relay cable	JWSP-XP1□□□-□□	454
	Booster unit	JWSP-XPBIS0-□□	456
Servomotor (upper stage of 2-stage connector)	Servomotor, rotary feedback unit (1-stage connector)	JWSP-XP8□□□-□□	457
	Servomotor, rotary feedback unit (lower stage of 2-stage connector)	JWSP-XP9□□□-□□	458
	Sensor hub, junction box, relay cable	JWSP-XP6□□□-□□	459
Sensor hub, junction box, relay cable	Servomotor, rotary feedback unit (1-stage connector)	JWSP-XP3□□□-□□	460
	Servomotor, rotary feedback unit (lower stage of 2-stage connector)	JWSP-XP5□□□-□□	461
	Sensor hub, junction box, relay cable	JWSP-XP7□□□-□□	462
Booster unit	Servomotor, rotary feedback unit (lower stage of 2-stage connector)	JWSP-XP4□□□-□□	462
	Sensor hub, junction box, relay cable	JWSP-XP1□□□-□□	463

Note:

When supplying power to Σ-LINK II devices from the SERVOPACK, there can be a maximum of only one relay between cables.

Information

There are two types of connectors that connect to the servomotor: 1-stage connectors and 2-stage connectors.

A 1-stage connector is used when there is no device to be connected downstream from the servomotor.

A 2-stage connector is used when there is a device to be connected downstream from the servomotor.

13.5.2 SERVOPACK ⇔ Servomotor (1-Stage Connector)

There are two types of cables that are used to connect the SERVOPACK with servomotors: One for batteryless absolute encoders and one for absolute encoders.

Information

The same cable is used as the cable between the booster unit and servomotor (1-stage connector).

(1) Encoder Cables for batteryless absolute encoders

(a) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
SGMXJ, SGMXA-A5 to -10, SGMXP: Load side SGMXA-15 to -50, SGMXG: Left side *4	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JWSP-XP2IS1-□□	JWSP-XP2IF1-□□
SGMXJ, SGMXA-A5 to -10, SGMXP: Non-load side SGMXA-15 to -70, SGMXG: Right side		JWSP-XP2IS2-□□	JWSP-XP2IF2-□□

*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 46 mm or larger.
*4 An encoder cable installed toward the left side cannot be used for the SGMXA-70 (7.0 kW). Use an encoder cable installed toward the right side.

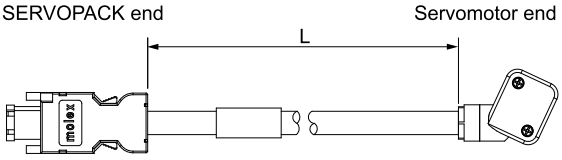
Note:

The JZSP-UCMP00-□□-E and JZSP-CSP12-E cables cannot be connected.

Information A cable installation direction on the right side or left side refers to the cable installation direction when viewed from the connector side with the shaft at the top.

For details on cable installation direction, refer to the device configuration diagram of the servomotor being used.

(b) Appearance



(c) Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Shield wire

Servomotor end

Pin	Wire Color
5	Light blue
4	Red
7	Gray
3	Brown
6	Black
2	Orange
8	–
9	–
Shell	FG

(2) Encoder Cables for Absolute Encoders

These cables are equipped with a battery unit. (A battery is included.)

Note:

If a battery is connected to the host controller, the battery unit is not required. Use an encoder cable for batteryless absolute encoders.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

(a) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
SGMXJ, SGMXA-A5 to -10, SGMXP: Load side SGMXA-15 to -50, SGMXG: Left side *4	3 m, 5 m, 10 m, 15 m, 20 m, 30 m, 40 m, 50 m	JWSP-XP2AS1-□□	JWSP-XP2AF1-□□
SGMXJ, SGMXA-A5 to -10, SGMXP: Non-load side SGMXA-15 to -70, SGMXG: Right side		JWSP-XP2AS2-□□	JWSP-XP2AF2-□□

*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 46 mm or larger.
*4 An encoder cable installed toward the left side cannot be used for the SGMXA-70 (7.0 kW). Use an encoder cable installed toward the right side.

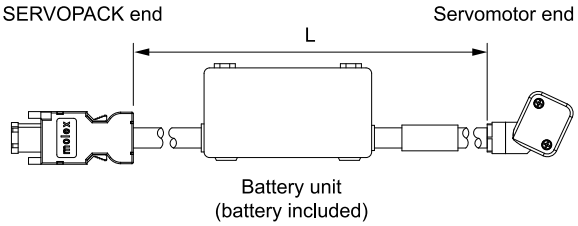
Note:

The JZSP-UCMP00-□□-E and JZSP-CSP12-E cables cannot be connected.

Information A cable installation direction on the right side or left side refers to the cable installation direction when viewed from the connector side with the shaft at the top.

For details on cable installation direction, refer to the device configuration diagram of the servomotor being used.

(b) Appearance



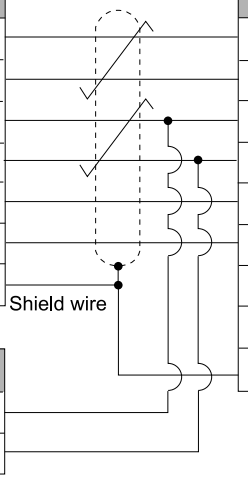
(c) Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Battery unit

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



Servomotor end

Pin	Wire Color
5	Light blue
4	Red
7	Gray
3	Brown
6	Black
2	Orange
8	–
9	–
Shell	FG

13.5.3 SERVOPACK ⇔ Servomotor, Rotary Feedback Unit (Lower Stage of 2-Stage Connector)

There are two types of cables that are used to connect the SERVOPACK with servomotors and rotary feedback units: One for batteryless absolute encoders and one for absolute encoders.

Information The same cable is used as the cable between the booster unit and servomotor, rotary feedback unit (lower stage of 2-stage connector).

(1) Encoder Cables for Batteryless Absolute Encoders

(a) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
SGMXJ, SGMXA-A5 to -10, SGMXP: Load side SGMXA-15 to -50, SGMXG: Left side *4	3 m, 5 m, 10 m, 15 m, 20 m	JWSP-XP4IS1-□□	JWSP-XP4IF1-□□
SGMXJ, SGMXA-A5 to -10, SGMXP: Non-load side SGMXA-15 to -70, SGMXG: Right side		JWSP-XP4IS2-□□	JWSP-XP4IF2-□□

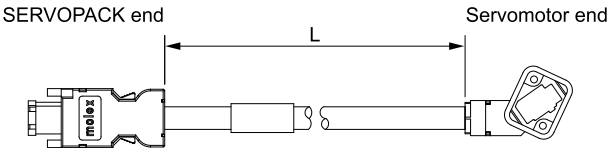
*1 Replace the boxes (□□) in the order number with the cable length (03, 05, 10, 15, or 20).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.
*4 An encoder cable installed toward the left side cannot be used for the SGMXA-70 (7.0 kW). Use an encoder cable installed toward the right side.

Note:
The JZSP-UCMP00-□□-E and JZSP-CSP12-E cables cannot be connected.

Information A cable installation direction on the right side or left side refers to the cable installation direction when viewed from the connector side with the shaft at the top.

For details on cable installation direction, refer to the device configuration diagram of the servomotor being used.

(b) Appearance



(c) Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Shield wire

Servomotor end

Pin	Wire Color
5	Light blue
4	Red
7	Gray
3	Brown
6	Black
2	Orange
8	—
9	—
Shell	FG

(2) For Absolute Encoders

These cables are equipped with a battery unit. (A battery is included.)

Note:

If a battery is connected to the host controller, the battery unit is not required. Use an encoder cable for batteryless absolute encoders.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

(a) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
SGMXJ, SGMXA-A5 to -10, SGMXP: Load side SGMXA-15 to -50, SGMXG: Left side *4	3 m, 5 m, 10 m, 15 m, 20 m	JWSP-XP4AS1-□□	JWSP-XP4AF1-□□
SGMXJ, SGMXA-A5 to -10, SGMXP: Non-load side SGMXA-15 to -70, SGMXG: Right side		JWSP-XP4AS2-□□	JWSP-XP4AF2-□□

*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 An encoder cable installed toward the left side cannot be used for the SGMXA-70 (7.0 kW). Use an encoder cable installed toward the right side.

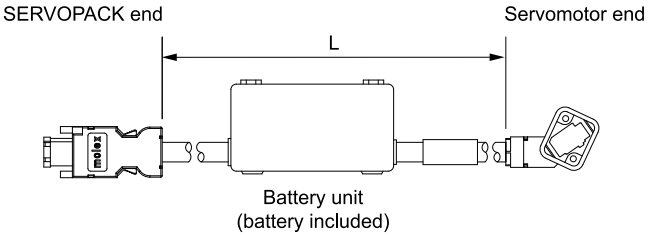
Note:

The JZSP-UCMP00-□□-E and JZSP-CSP12-E cables cannot be connected.

Information A cable installation direction on the right side or left side refers to the cable installation direction when viewed from the connector side with the shaft at the top.

For details on cable installation direction, refer to the device configuration diagram of the servomotor being used.

(b) Appearance



Note:

The above figure shows the case when the cable is installed on the non-load side.

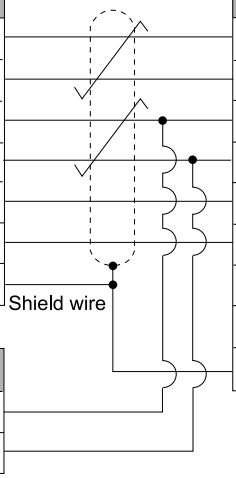
(c) Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Battery unit

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



Servomotor end

Pin	Wire Color
5	Light blue
4	Red
7	Gray
3	Brown
6	Black
2	Orange
8	–
9	–
Shell	FG

13.5.4 SERVOPACK ⇔ Sensor Hub, Junction Box, Relay Cable

There are two types of cables that are used to connect the SERVOPACK with the sensor hub, with the junction box, or with the relay cable: One for batteryless absolute encoders and one for absolute encoders.

Information The same cable is used as the cable between the booster unit and sensor hub, junction box, or relay cable.

(1) Encoder Cables for Batteryless Absolute Encoders

(a) Selection Table

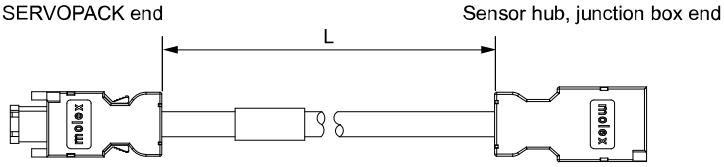
Length (L)	Order Number *1	
	Standard Cable	Flexible Cable *2 *3
0.3 m, 3 m, 5 m, 10 m, 15 m, 20 m, 25 m	JWSP-XP1IS0-□□	JWSP-XP1IF0-□□

*1 Replace the boxes (□□) in the order number with the cable length (00P3, 03, 05, 10, 15, 20, or 25).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.

Note:

The JZSP-UCMP00-□□-E and JZSP-CSP12-E cables cannot be connected.

(b) Appearance



(c) Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Shield wire

Sensor hub, junction box end

Pin	Wire Color
6	Light blue
5	Red
4	Gray
3	Brown
2	Black
1	Orange
7	–
8	–
Shell	FG

(2) For Absolute Encoders

These cables are equipped with a battery unit. (A battery is included.)

Note:

In the following cases, use an encoder cable for batteryless absolute encoders.

- When connecting a battery to the host controller.
- When using an absolute encoder as an incremental encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

(a) Selection Table

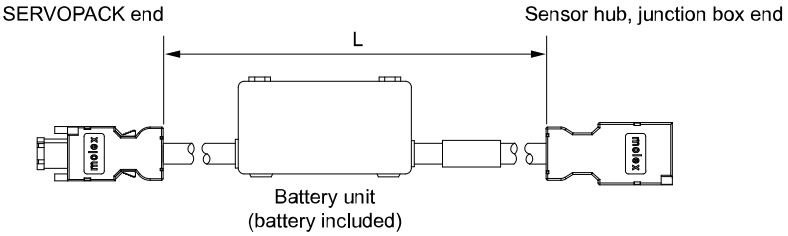
Length (L)	Order Number *1	
	Standard Cable	Flexible Cable *2 *3
0.3 m, 3 m, 5 m, 10 m, 15 m, 20 m, 25 m	JWSP-XP1AS0-□□	JWSP-XP1AF0-□□

*1 Replace the boxes (□□) in the order number with the cable length (00P3, 03, 05, 10, 15, 20, or 25).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.

Note:

The JZSP-UCMP00-□□-E and JZSP-CSP12-E cables cannot be connected.

(b) Appearance



(c) Wiring Specifications

SERVOPACK end

Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Shield wire

Battery unit

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

Sensor hub, junction box end

Pin	Wire Color
6	Light blue
5	Red
4	Gray
3	Brown
2	Black
1	Orange
7	–
8	–
Shell	FG

13.5.5 SERVOPACK ⇔ Booster Unit

(1) Selection Table

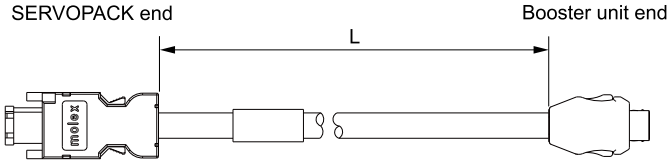
Length (L)	Order Number *1
0.3 m, 1 m, 3 m	JWSP-XPBIS0-□□

*1 Replace the boxes (□□) in the order number with the cable length (00P3, 01, or 03).

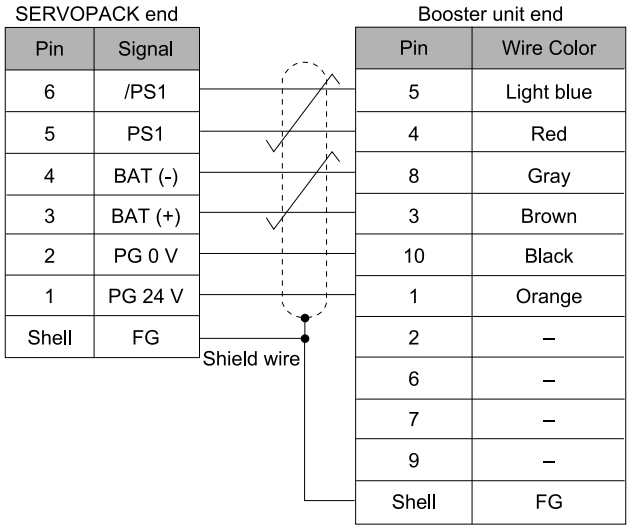
Note:

The JZSP-UCMP00-□□-E and JZSP-CSP12-E cables cannot be connected.

(2) Appearance



(3) Wiring Specifications



Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Pin	Wire Color
5	Light blue
4	Red
8	Gray
3	Brown
10	Black
1	Orange
2	–
6	–
7	–
9	–
Shell	FG

13.5.6 Servomotor (Upper Stage of 2-Stage Connector) ⇔ Servomotor, Rotary Feedback Unit (1-Stage Connector)

(1) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
SGMXJ, SGMXA-A5 to -10, SGMXP: Load side SGMXA-15 to -50, SGMXG: Left side *4	0.3 m, 1 m, 3 m, 5 m, 10 m	JWSP-XP8IS1-□□	JWSP-XP8IF1-□□
SGMXJ, SGMXA-A5 to -10, SGMXP: Non-load side SGMXA-15 to -70, SGMXG: Right side		JWSP-XP8IS2-□□	JWSP-XP8IF2-□□

*1 Replace the boxes (□□) in the order number with the cable length (00P3, 01, 03, 05, or 10).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.
*4 An encoder cable installed toward the left side cannot be used for the SGMXA-70 (7.0 kW). Use an encoder cable installed toward the right side.

Note:

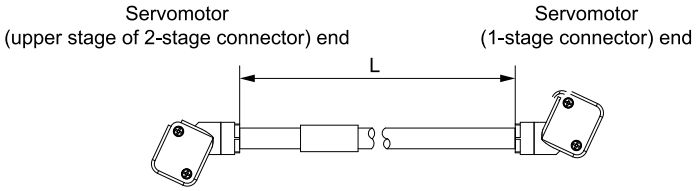
When you connect a cable to the upper stage of the 2-stage connector on the SGMXG-03 or -05, an encoder cable installed toward the left side is recommended.

If you connect an encoder cable installed toward the right side, use a cable installed toward the load side for the main circuit cable.

Information A cable installation direction on the right side or left side refers to the cable installation direction when viewed from the connector side with the shaft at the top.

For details on cable installation direction, refer to the device configuration diagram of the servomotor being used.

(2) Appearance



(3) Wiring Specifications

Servomotor (upper stage of 2-stage connector) end

Pin	Signal
9	/PS2
8	PS2
7	BAT (-)
3	BAT (+)
6	PG 0 V
2	PG 24 V
4	–
5	–
Shell	FG

Shield wire

Servomotor (1-stage connector) end

Pin	Wire Color
5	Light blue
4	Red
7	Gray
3	Brown
6	Black
2	Orange
8	–
9	–
Shell	FG

13.5.7 Servomotor (Upper Stage of 2-Stage Connector) ⇔ Servomotor, Rotary Feedback Unit (Lower Stage of 2-Stage Connector)

(1) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
SGMXJ, SGMXA-A5 to -10, SGMXP: Load side SGMXA-15 to -50, SGMXG: Left side *4	0.3 m, 1 m, 3 m, 5 m, 10 m	JWSP-XP9IS1-□□	JWSP-XP9IF1-□□
SGMXJ, SGMXA-A5 to -10, SGMXP: Non-load side SGMXA-15 to -70, SGMXG: Right side		JWSP-XP9IS2-□□	JWSP-XP9IF2-□□

*1 Replace the boxes (□□) in the order number with the cable length (00P3, 01, 03, 05, or 10).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.
*4 An encoder cable installed toward the left side cannot be used for the SGMXA-70 (7.0 kW). Use an encoder cable installed toward the right side.

Note:

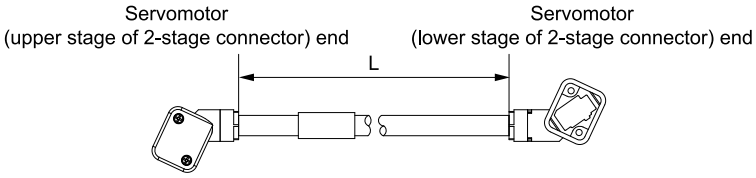
When you connect a cable to the upper stage of the 2-stage connector on the SGMXG-03 or -05, an encoder cable installed toward the left side is recommended.

If you connect an encoder cable installed toward the right side, use a cable installed toward the load side for the main circuit cable.

Information A cable installation direction on the right side or left side refers to the cable installation direction when viewed from the connector side with the shaft at the top.

For details on cable installation direction, refer to the device configuration diagram of the servomotor being used.

(2) Appearance



(3) Wiring Specifications

Servomotor (upper stage of 2-stage connector) end

Pin	Signal
9	/PS2
8	PS2
7	BAT (-)
3	BAT (+)
6	PG 0 V
2	PG 24 V
4	–
5	–
Shell	FG

Shield wire

Servomotor (lower stage of 2-stage connector) end

Pin	Wire Color
5	Light blue
4	Red
7	Gray
3	Brown
6	Black
2	Orange
8	–
9	–
Shell	FG

13.5.8 Servomotor (Upper Stage of 2-Stage Connector) ⇔ Sensor Hub, Junction Box, Relay Cable

(1) Selection Table

Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
SGMXJ, SGMXA-A5 to -10, SGMXP: Load side SGMXA-15 to -50, SGMXG: Left side *4	0.3 m, 1 m, 3 m, 5 m, 10 m	JWSP-XP6IS1-□□	JWSP-XP6IF1-□□
SGMXJ, SGMXA-A5 to -10, SGMXP: Non-load side SGMXA-15 to -70, SGMXG: Right side		JWSP-XP6IS2-□□	JWSP-XP6IF2-□□

*1 Replace the boxes (□□) in the order number with the cable length (00P3, 01, 03, 05, or 10).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.
*4 An encoder cable installed toward the left side cannot be used for the SGMXA-70 (7.0 kW). Use an encoder cable installed toward the right side.

Note:

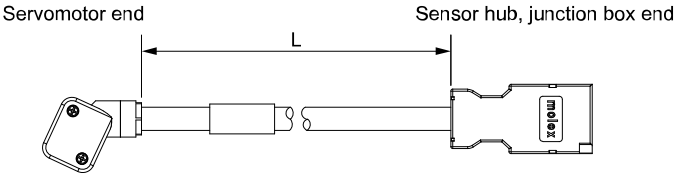
When you connect a cable to the upper stage of the 2-stage connector on the SGMXG-03 or -05, an encoder cable installed toward the left side is recommended.

If you connect an encoder cable installed toward the right side, use a cable installed toward the load side for the main circuit cable.

Information A cable installation direction on the right side or left side refers to the cable installation direction when viewed from the connector side with the shaft at the top.

For details on cable installation direction, refer to the device configuration diagram of the servomotor being used.

(2) Appearance



(3) Wiring Specifications

Servomotor end

Pin	Signal
9	/PS2
8	PS2
7	BAT (-)
3	BAT (+)
6	PG 0 V
2	PG 24 V
4	–
5	–
Shell	FG

Shield wire

Sensor hub, junction box end

Pin	Wire Color
6	Light blue
5	Red
4	Gray
3	Brown
2	Black
1	Orange
7	–
8	–
Shell	FG

13.5.9 Sensor Hub, Junction Box, Relay Cable ⇔ Servomotor, Rotary Feedback Unit (1-Stage Connector)

(1) Selection Table

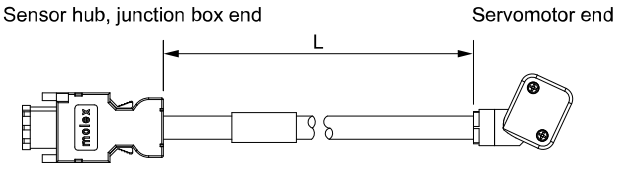
Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
SGMXJ, SGMXA-A5 to -10, SGMXP: Load side SGMXA-15 to -50, SGMXG: Left side *4	0.3 m, 1 m, 3 m, 5 m, 10 m, 15 m, 20 m, 25 m, 30 m, 40 m, 50 m	JWSP-XP3IS1-□□	JWSP-XP3IF1-□□
SGMXJ, SGMXA-A5 to -10, SGMXP: Non-load side SGMXA-15 to -70, SGMXG: Right side		JWSP-XP3IS2-□□	JWSP-XP3IF2-□□

*1 Replace the boxes (□□) in the order number with the cable length (00P3, 01, 03, 05, 10, 15, 20, 25, 30, 40, or 50).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.
*4 An encoder cable installed toward the left side cannot be used for the SGMXA-70 (7.0 kW). Use an encoder cable installed toward the right side.

Information A cable installation direction on the right side or left side refers to the cable installation direction when viewed from the connector side with the shaft at the top.

For details on cable installation direction, refer to the device configuration diagram of the servomotor being used.

(2) Appearance



(3) Wiring Specifications

Sensor hub, junction box end

Pin	Signal
8	/PS2
7	PS2
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Servomotor end

Pin	Wire Color
9	White
8	Yellow
5	Light blue
4	Red
7	Gray
3	Brown
6	Black
2	Orange
Shell	FG

Shield wire

13.5.10 Sensor Hub, Junction Box, Relay Cable ⇔ Servomotor, Rotary Feedback Unit (Lower Stage of 2-Stage Connector)

(1) Selection Table

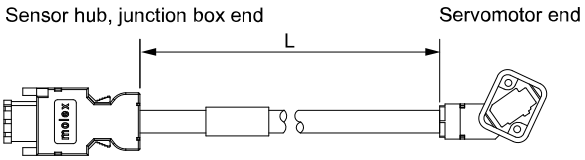
Cable Direction	Length (L)	Order Number *1	
		Standard Cable	Flexible Cable *2 *3
SGMXJ, SGMXA-A5 to -10, SGMXP: Load side SGMXA-15 to -50, SGMXG: Left side *4	0.3 m, 1 m, 3 m, 5 m, 10 m	JWSP-XP5IS1-□□	JWSP-XP5IF1-□□
SGMXJ, SGMXA-A5 to -10, SGMXP: Non-load side SGMXA-15 to -70, SGMXG: Right side		JWSP-XP5IS2-□□	JWSP-XP5IF2-□□

*1 Replace the boxes (□□) in the order number with the cable length (00P3, 01, 03, 05, or 10).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.
*4 An encoder cable installed toward the left side cannot be used for the SGMXA-70 (7.0 kW). Use an encoder cable installed toward the right side.

Information A cable installation direction on the right side or left side refers to the cable installation direction when viewed from the connector side with the shaft at the top.

For details on cable installation direction, refer to the device configuration diagram of the servomotor being used.

(2) Appearance



(3) Wiring Specifications

Sensor hub, junction box end

Pin	Signal
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
7	–
8	–
Shell	FG

Servomotor end

Pin	Wire Color
5	Light blue
4	Red
7	Gray
3	Brown
6	Black
2	Orange
8	–
9	–
Shell	FG

Shield wire

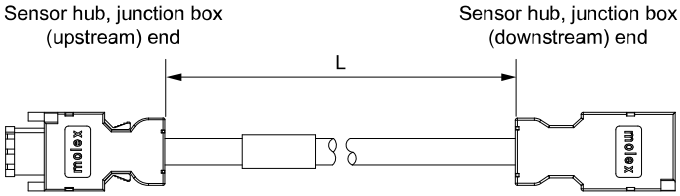
13.5.11 Sensor Hub, Junction Box, Relay Cable ⇔ Sensor Hub, Junction Box

(1) Selection Table

Length (L)	Order Number *1	
	Standard Cable	Flexible Cable *2 *3
0.3 m, 1 m, 3 m, 5 m, 10 m, 15 m, 20 m, 25 m, 30 m, 40 m, 50 m	JWSP-XP7IS0-□□	JWSP-XP7IF0-□□

*1 Replace the boxes (□□) in the order number with the cable length (00P3, 01, 03, 05, 10, 15, 20, 25, 30, 40, or 50).
*2 Use flexible cables for moving parts of machines, such as robots.
*3 The recommended bending radius (R) is 46 mm or larger.

(2) Appearance



(3) Wiring Specifications

Sensor hub, junction box (upstream) end

Pin	Signal
8	/PS2
7	PS2
6	/PS1
5	PS1
4	BAT (-)
3	BAT (+)
2	PG 0 V
1	PG 24 V
Shell	FG

Shield wire

Sensor hub, junction box (downstream) end

Pin	Wire Color
8	White
7	Yellow
6	Light blue
5	Red
4	Gray
3	Brown
2	Black
1	Orange
Shell	FG

13.5.12 Booster Unit ⇔ Servomotor, Rotary Feedback Unit (Lower Stage of 2-Stage Connector)

This cable is the same as the cable between the SERVOPACK and servomotor, rotary feedback unit (lower stage of 2-stage connector).

If an absolute encoder will be used, make sure to connect an absolute encoder cable. This is because power is not supplied to the booster unit, even if a battery is connected to the host controller.

Refer to the following section for details on the cables.

☞ *13.5.3 SERVOPACK ⇔ Servomotor, Rotary Feedback Unit (Lower Stage of 2-Stage Connector) on page 451*

13.5.13 Booster Unit ⇔ Sensor Hub, Junction Box

This cable is the same as the cable between the SERVOPACK and sensor hub, junction box, or relay cable.

If an absolute encoder is included in the connected nodes, make sure to connect an absolute encoder cable. This is because power is not supplied to the booster unit, even if a battery is connected to the host controller.

Refer to the following section for details on the cables.

☞ *13.5.4 SERVOPACK ⇔ Sensor Hub, Junction Box, Relay Cable on page 454*

13.6 User-Assembled Wiring Materials for Encoder Cables

13.6.1 For Standard Specification Servomotors

(1) Connector and Cable List

Cables used in the connection of Σ-LINK II-related devices differ in the following ways depending on if they are being used with target devices connected on the upstream side or the downstream side and depending on the cables.

Upstream Side		Downstream Side		
Applicable Device	**Model**	**Applicable Device**	**Model**	**Cables without Connectors**
SERVOPACK	JZSP-CMP9-1-E	Servomotor (1-stage connector)	JWSP-XPCN0US	JWSP-XPCB□6-□□ (6 conductors)
		Servomotor (lower stage of 2-stage connector)	JWSP-XPCN0LW	JWSP-XPCB□6-□□ (6 conductors)
		Sensor hub Junction box Relay cable	JWSP-XPCN0S8	JWSP-XPCB□6-□□ (6 conductors)
Servomotor (upper stage of 2-stage connector)	JWSP-XPCN0UL	Servomotor (1-stage connector)	JWSP-XPCN0US	JWSP-XPCB□6-□□ (6 conductors)
		Servomotor (lower stage of 2-stage connector)	JWSP-XPCN0LW	JWSP-XPCB□6-□□ (6 conductors)
		Sensor hub Junction box Relay cable	JWSP-XPCN0S8	JWSP-XPCB□6-□□ (6 conductors)
Sensor hub Junction box Relay cable	JWSP-XPCN0P8	Servomotor (1-stage connector)	JWSP-XPCN0US	JWSP-XPCB□8-□□ (8 conductors)
		Servomotor (lower stage of 2-stage connector)	JWSP-XPCN0LW	JWSP-XPCB□6-□□ (6 conductors)
		Sensor hub Junction box Relay cable	JWSP-XPCN0S8	JWSP-XPCB□8-□□ (8 conductors)

Note:

When you will relay the encoder cable, use the following configuration.

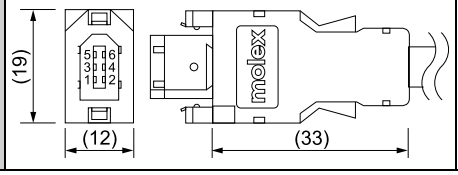
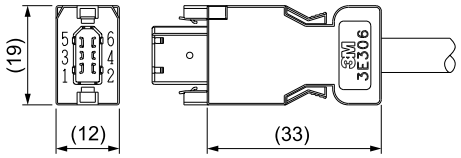
Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m max.

Information There are two types of connectors that connect to the servomotor: 1-stage connectors and 2-stage connectors.

A 1-stage connector is used when there is no device to be connected downstream from the servomotor.

A 2-stage connector is used when there is a device to be connected downstream from the servomotor.

(2) SERVOPACK Connector Kits

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

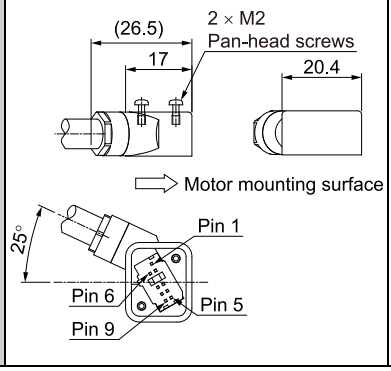
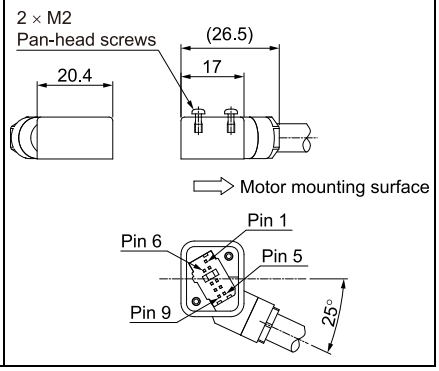
*1 For details, consult your Yaskawa representative. The tool is not provided by Yaskawa.

Note:

Cables are not included. Purchase them separately.

(3) Encoder Cable Connector Kits

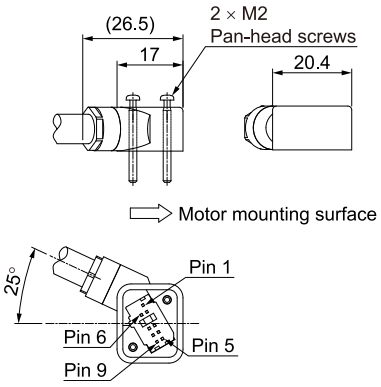
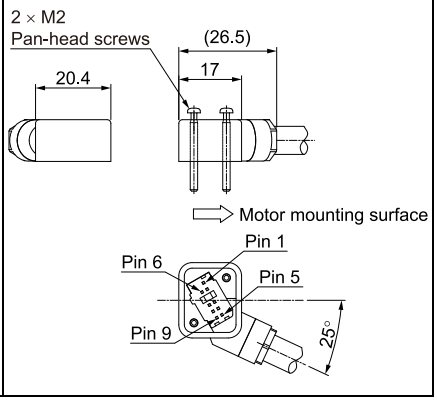
(a) Servomotor Connectors (1-Stage Connector)

Order Number		JWSP-XPCN0US
Manufacturer		Molex Japan Co., Ltd.
Components		2077521002 2077525110 [AWG20 reeled], 2077525210 [AWG26 reeled] (crimped)
Applicable Wire Sizes		AWG20, AWG26
Applicable Cable Diameter		6.9 mm to 7.5 mm
Outer Diameter of Insulating Sheath		AWG20: 1.10 mm to 1.48 mm AWG26: 0.70 mm to 1.10 mm
Mounting Screws		M2 pan-head screws (two)
Application Specifications		2077520000-AS
Crimping Specifications		2077525110 [AWG20 reeled]: 2117393702ATS 2077525210 [AWG26 reeled]: 2117393701ATS
Crimping Tool *1	Applicator	2077525110 [AWG20 reeled]: 211739-3702 2077525210 [AWG26 reeled]: 211739-3701
Shell Crimping Specifications		2117425500ATS
Shell Crimping Applicator		211742-5500
External Dimensions [mm]		■ Cable installed away from load, right side cable installation  ■ Cable installed toward load, left side cable installation 

*1 A crimping tool with applicator is required for terminal crimping and shell crimping. Contact the connector manufacturer for details.

Note:
Cables are not included. Purchase them separately.

(b) Servomotor Connectors (Upper Stage of 2-Stage Connector)

Order Number		JWSP-XPCN0UL
Manufacturer		Molex Japan Co., Ltd.
Components		2077521001 2077525110 [AWG20 reeled], 2077525210 [AWG26 reeled] (crimped)
Applicable Wire Sizes		AWG20, AWG26
Applicable Cable Diameter		6.9 mm to 7.5 mm
Outer Diameter of Insulating Sheath		AWG20: 1.10 mm to 1.48 mm AWG26: 0.70 mm to 1.10 mm
Mounting Screws		M2 pan-head screws (two)
Application Specifications		2077520000-AS
Crimping Specifications		2077525110 [AWG20 reeled]: 2117393702ATS 2077525210 [AWG26 reeled]: 2117393701ATS
Crimping Tool *1	**Applicator**	2077525110 [AWG20 reeled]: 211739-3702 2077525210 [AWG26 reeled]: 211739-3701
Shell Crimping Specifications		2117425500ATS
Shell Crimping Applicator		211742-5500
External Dimensions [mm]		■ Cable installed away from load, right side cable installation  ■ Cable installed toward load, left side cable installation 

*1 A crimping tool with applicator is required for terminal crimping and shell crimping. Contact the connector manufacturer for details.

Note:
Cables are not included. Purchase them separately.

(c) Servomotor Connectors (Lower Stage of 2-Stage Connector)

Order Number	JWSP-XPCN0LW
Manufacturer	Molex Japan Co., Ltd.
Components	2077531000 2077535110 [AWG20 reeled], 2077535210 [AWG26 reeled] (crimped)
Applicable Wire Sizes	AWG20, AWG26
Applicable Cable Diameter	6.9 mm to 7.5 mm

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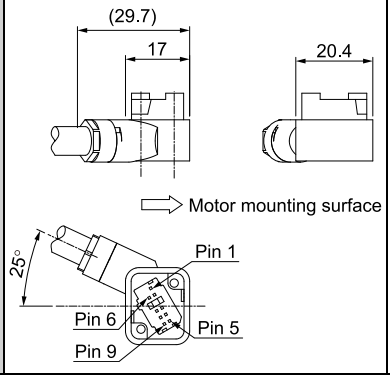
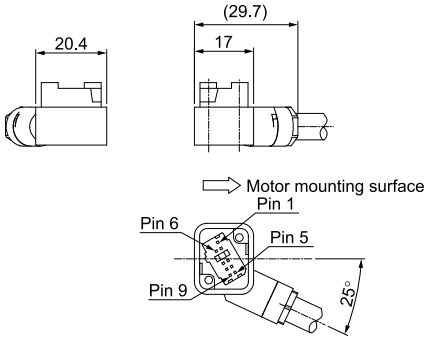
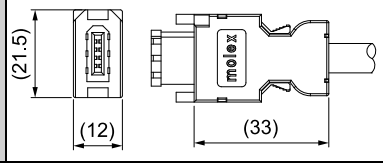
Outer Diameter of Insulating Sheath		AWG20: 1.10 mm to 1.48 mm AWG26: 0.70 mm to 1.10 mm	
Mounting Screws		M2 pan-head screws (two)	
Application Specifications		2077530000-AS	
Crimping Specifications		2077535110 [AWG20 reeled]: 2117403702ATS 2077535210 [AWG26 reeled]: 2117403701ATS	
Crimping Tool **1*	**Applicator**	2077535110 [AWG20 reeled]: 211740-3702 2077535210 [AWG26 reeled]: 211740-3701	
Shell Crimping Specifications		2117425600ATS	
Shell Crimping Applicator		211742-5600	
External Dimensions [mm]		■ Cable installed away from load, right side cable installation 	■ Cable installed toward load, left side cable installation 

*1 A crimping tool with applicator is required for terminal crimping and shell crimping. Contact the connector manufacturer for details.

Note:

Cables are not included. Purchase them separately.

(d) Cable Relay Connectors (SERVOPACK Side)

Order Number	JWSP-XPCN0P8
Manufacturer	Molex Japan Co., Ltd.
Components	55100-0870 (soldered)
Product Specifications	PS-54280-005
External Dimensions [mm]	

(e) Cable Relay Connectors (Servomotor Side)

Order Number	JWSP-XPCN0S8
Manufacturer	Molex Japan Co., Ltd.
Components	54280-0809 (soldered)

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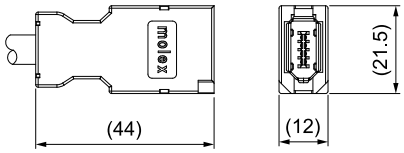
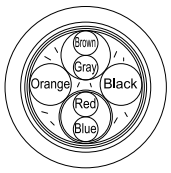
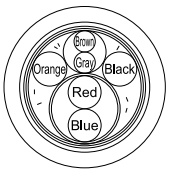
Product Specifications	PS-54280-005
External Dimensions [mm]	

(4) Cables without Connectors

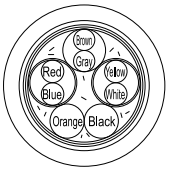
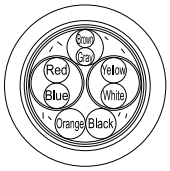
The wiring materials of this cable are exclusively for use in combination with the connector kit listed in this chapter. They cannot be used with the ∑-7 compatible specification servomotor.

(a) Encoder Cable (with 6 Conductors)

Item		Standard Cable	Flexible Cable
Order Number *1		JWSP-XPCBS6-□□	JWSP-XPCBF6-□□
Specifications		UL20276 (rated temperature: 80°C) AWG20 × 2C + AWG26 × 1P + AWG26 × 1P	UL20276 (rated temperature: 80°C) AWG20 × 2C + AWG26 × 1P + AWG26 × 1P
		AWG20 (0.53 mm²) Outer diameter of insulating sheath: 1.55 mm	AWG20 (0.55 mm²) Outer diameter of insulating sheath: 1.37 mm
		AWG26 (0.14 mm²) Outer diameter of insulating sheath: 0.88 mm	AWG26 (0.17 mm²) Outer diameter of insulating sheath: 0.93 mm
		AWG26 (0.14 mm²) Outer diameter of insulating sheath: 0.98 mm	AWG26 (0.17 mm²) Outer diameter of insulating sheath: 1.33 mm
Finished Diameter		7.2 mm	7.2 mm
Internal Structure and Lead Colors			
Characteristic Impedance		120 Ω ±10%	120 Ω ±10%
Attenuation	**1 MHz**	-1.16 dB/50 m min.	-1.16 dB/50 m min.
	4 MHz	-2.55 dB/50 m min.	-2.55 dB/50 m min.
	8 MHz	-4.05 dB/50 m min.	-4.05 dB/50 m min.
	10 MHz	-4.68 dB/50 m min.	-4.68 dB/50 m min.
	16 MHz	-6.17 dB/50 m min.	-6.17 dB/50 m min.
	20 MHz	-6.97 dB/50 m min.	-6.97 dB/50 m min.
	25 MHz	-7.85 dB/50 m min.	-7.85 dB/50 m min.
	31.25 MHz	-8.84 dB/50 m min.	-8.84 dB/50 m min.
	62.5 MHz	-12.97 dB/50 m min.	-12.97 dB/50 m min.
	100 MHz	-17.17 dB/50 m min.	-17.17 dB/50 m min.

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

(b) Encoder Cable (with 8 Conductors)

Item		Standard Cable	Flexible Cable
Order Number *1		JWSP-XPCBS8-□□	JWSP-XPCBF8-□□
Specifications		UL20276 (rated temperature: 80°C) AWG20 × 2C + AWG26 × 1P + AWG26 × 2P	UL20276 (rated temperature: 80°C) AWG20 × 2C + AWG26 × 1P + AWG26 × 2P
		AWG20 (0.53 mm²) Outer diameter of insulating sheath: 1.55 mm	AWG20 (0.53 mm²) Outer diameter of insulating sheath: 1.37 mm
		AWG26 (0.14 mm²) Outer diameter of insulating sheath: 0.88 mm	AWG26 (0.14 mm²) Outer diameter of insulating sheath: 0.83 mm
		AWG26 (0.14 mm²) Outer diameter of insulating sheath: 0.98 mm	AWG26 (0.14 mm²) Outer diameter of insulating sheath: 1.33 mm
Finished Diameter		7.2 mm	7.2 mm
Internal Structure and Lead Colors			
Characteristic Impedance		120 Ω ±10%	120 Ω ±10%
Attenuation	**1 MHz**	-1.16 dB/50 m min.	-1.16 dB/50 m min.
	4 MHz	-2.55 dB/50 m min.	-2.55 dB/50 m min.
	8 MHz	-4.05 dB/50 m min.	-4.05 dB/50 m min.
	10 MHz	-4.68 dB/50 m min.	-4.68 dB/50 m min.
	16 MHz	-6.17 dB/50 m min.	-6.17 dB/50 m min.
	20 MHz	-6.97 dB/50 m min.	-6.97 dB/50 m min.
	25 MHz	-7.85 dB/50 m min.	-7.85 dB/50 m min.
	31.25 MHz	-8.84 dB/50 m min.	-8.84 dB/50 m min.
	62.5 MHz	-12.97 dB/50 m min.	-12.97 dB/50 m min.
	100 MHz	-17.17 dB/50 m min.	-17.17 dB/50 m min.

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

13.7 Rotary Feedback Unit

Mount to the machine to detect the rotational angle used for fully-closed loop control.

The rotary feedback unit is counted as a node in Σ-LINK II communications.

NOTICE

If a rotary feedback unit will be used, a Σ-X standard specification servomotor with Σ-LINK II support and a communications cable are required.

Important

Fully-closed modules can not be connected because they do not support Σ-LINK II-related devices.

13.7.1 Interpreting Model Numbers

Digit	Item	Symbol	Specification
1st to 7th digits	Device Type	JZDP-FB	Rotary Feedback Unit
8th digit	Communications Format	N	Σ-LINK II communications supported
9th to 11th digits	Encoder Model	X00	26-bit absolute encoder
		X01	26-bit compact batteryless absolute encoder

13.7.2 Specifications and Ratings

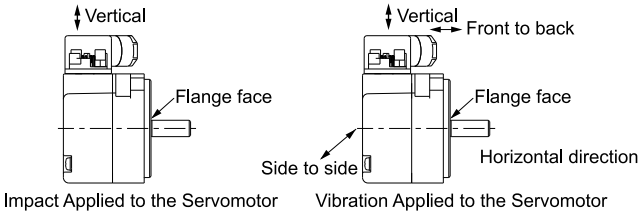
Item		Specification
Mounting		Flange-mounted
Drive Method		Direct drive
Rotation Direction		The counterclockwise (CCW) direction as viewed from the flange side is the forward direction.
Allowable Maximum Rotation Speed		7000 min^{-1}
Degree of Protection		IP50 equivalent (excluding shaft opening)
Environmental Conditions	Surrounding Air Temperature	0°C to 85°C
	Surrounding Air Humidity	20% to 90% relative humidity (with no freezing or condensation)
	Installation Site	• Must be indoors and free of corrosive and explosive gases. • Must be well-ventilated and free of dust and moisture. • Must facilitate inspection and cleaning. • Altitude: 2000 m max. • Must be free of strong magnetic fields.
	Storage Environment	Store the servomotor in the following environment if you store it with the power cable disconnected. • Storage temperature: -20°C to 85°C (with no freezing) • Storage humidity: 20% to 90% relative humidity (with no condensation)
Vibration Resistance *1	Vibration Acceleration (at Flange)	98 m/s^2 max.

Continued on next page.

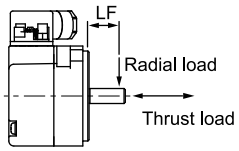
Continued from previous page.

Item		Specification
Impact Resistance *1	Impact Acceleration (at Flange)	490 m/s^2 max.
	Number of Impacts	2 time
Rotor Moment of Inertia	X00	8.56 × 10^{-7} kg·m^2
	X01	8.88 × 10^{-7} kg·m^2
Allowable Shaft Loads *2	LF	17 mm
	Allowable Radial Load	29.4N
	Allowable Thrust Load	9.8N

*1 The given values are for when the rotary feedback unit shaft is mounted horizontally and impact or vibration is applied in the directions shown in the following figures. The strength of the vibration that the rotary feedback unit can withstand depends on the application. Always check the vibration acceleration that is applied to the servomotor with the actual equipment.

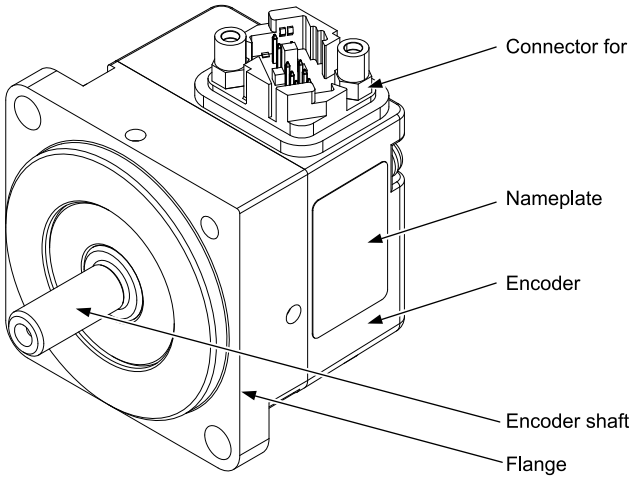


*2 Design the mechanical system so that the thrust and radial loads applied to the rotary feedback unit do not exceed the values given in the table.

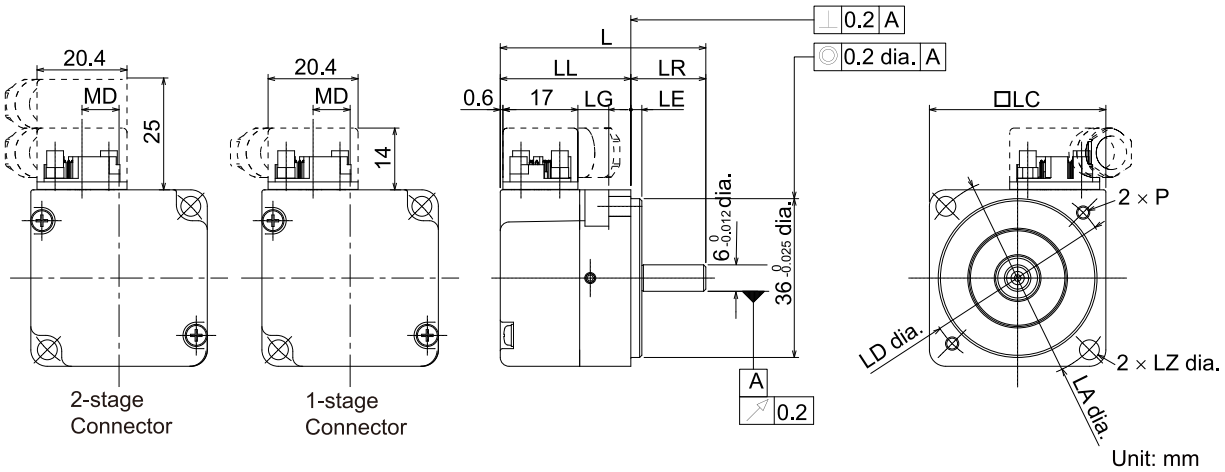


13.7.3 Appearance and Part Names

The following figure shows the appearance and part names for the rotary feedback unit.



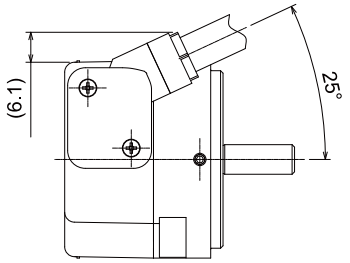
13.7.4 External Dimensions



Model JZDP-FB	L	LL	Flange Dimensions								MD	MH	Appr-ox. Mass [g]
			LR	LE	LG	LC	LA	LZ	LD	P			
NX00-□□	46.6	29.6	17	2.5	5	40	42	4.5	42	M3 × 6L	8.4	14	116.7
NX01-□□	46.6	29.6	17	2.5	5	40	42	4.5	42	M3 × 6L	8.4	14	122.6

13.7.5 Connector Mounting Dimensions

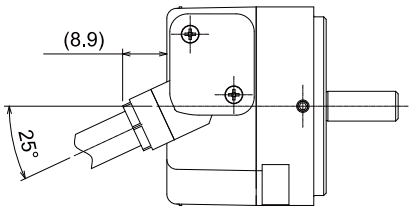
- Cable Installed on Load Side



Note:

If the height of the mounting target is higher than the connector mounting surface of the rotary feedback unit, the cable and the mounting target may interfere with each other. In such cases, use the connector type with cable installed on non-load side.

- Cable Installed on Non-load Side



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14.1 Molded-Case Circuit Breakers and Fuses

14.1.1 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.

(1) Σ-XS SERVOPACKs for Use with Three-Phase, 200-VAC or Single-Phase, 200-VAC

Main Circuit Power Supply	Maximum Applicable Motor Capacity [kW]	SERVOPACK Model: SGDXS-	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	0.05	R70A	0.2	0.4	0.2	29	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		34			
	0.75	5R5A	1.6	4.1					
	1.0	7R6A	2.3	5.7					
	1.5	120A	3.2	7.3					
	2.0	180A	4.0	10	0.25				
	3.0	200A	5.9	15					
	5.0	330A	7.5	25	0.3	68			
	6.0	470A	10.7	29					
	7.5	550A	14.6	37					
	11	590A	21.7	54	0.4	114			
	15	780A	29.6	73					
Single-phase, 200 VAC	0.05	R70A	0.2	0.8	0.2	29			
	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		34			
	1.5	120A □□□ 0008	4.0	16	0.25				

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

(2) Σ-XW SERVOPACKs for Use with Three-Phase, 200-VAC or Single-Phase, 200-VAC

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

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

*2 If you use the SGDXW-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%)

(3) Σ-XT SERVOPACKs for Use with Three-Phase, 200-VAC or Single-Phase, 200-VAC

Main Circuit Power Supply	Maximum Applicable Motor Capacity (each axis) [kW]	SERVOPACK Model: SGDXT-	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	1.5	3.9	0.3	34	57	250	240
	0.4	2R8A	3.0	7.5					
Single-phase, 200 VAC	0.2	1R6A	1.8	7.2					
	0.4	2R8A *2	3.6	12					

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

*2 If you use the servomotor with a single-phase supply input, derate the total continuous output of the motor using the following equation: maximum applicable motor capacity × number of axes × 65%.
Example: When using the SGDXT-2R8A SERVOPACK, the total continuous output of the motor must be 0.78 kW or less (0.4 kW × 3 axes × 65% = 0.78 kW). When operating the first axis at an output of 0.4 kW and the second axis at 0.2 kW, the output of the third axis must be 0.18 kW or less.

(4) Σ-XS SERVOPACKs for Use with Three-Phase, 400-VAC

Main Circuit Power Supply	Maximum Applicable Motor Capacity [kW]	SERVOPACK Model: SGDXS-	Power Supply Capacity per SERVOPACK [kVA] *1	Current Capacity		Inrush Current		Rated Voltage	
				Main Circuit [Arms] *1	Control Power Supply [A]	Main Circuit [A0-p]	Control Power Supply [A0-p]	Fuse [V]	MCCB [V]
Three-phase, 400 VAC	0.5	1R9D	1.1	1.4	1.2	19	–	600	480
	1.0	3R5D	2.3	2.9		19	–		
	1.5	5R4D	3.5	4.3		19	–		
	2.0	8R4D	4.5	5.8	1.6	38	–		
	3.0	120D	7.1	8.6		38	–		
	5.0	170D	11.7	14.5		38	–		
	6.0	210D	12.4	17.4	1.7	34	–		
	7.5	260D	14.4	21.7		34	–		
	11	280D	21.9	31.8		68	–		
	15	370D	30.6	43.4		68	–		

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

14.1.2 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.

The SGDXS-□□□D does not require external fuses as its built-in fuse functions even with DC power input. However, if external fuses are required for compliance with safety standards or other requirements, use external fuses that meet those requirements.

Note:

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

(1) Σ-XS SERVOPACKs for Use with 270-VDC Power Supply Input

Main Circuit Power Supply	SERVOPACK Model: SGDXS-	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	29	34	3,5URG-J17/16UL	16	400
	R90A	0.3	1.0						
	1R6A	0.5	1.5						
	2R8A	1.0	3.0				3,5URG-J17/20UL	20	
	3R8A	1.3	3.8	0.2	34		3,5URG-J17/40UL	40	
	5R5A	1.6	4.9						
	7R6A	2.3	6.9						
	120A	3.2	11	0.2					
	120A □□□ 0008			0.25			3,5URG-J17/63UL	63	
	180A	4.0	14						
	200A	5.9	20						
	330A	7.5	34	0.3	68 *3 (External 5 Ω)		3,5URG-J17/100UL	100	
	470A	10.7	36				3,5URG-J23/160UL	160	
	550A	14.6	48						
	590A	21.7	68	0.4	114 *3 (External 3 Ω)		3,5URG-J23/200UL	200	
	780A	29.6	92						

*1 This is the net value at the rated load.
*2 These fuses are manufactured by Mersen Japan.
*3 If you use a DC power supply input with any of the following SERVOPACKs, externally connect an inrush current limiting circuit and use the power ON and OFF sequences recommended by Yaskawa: SGDXS-330A, -470A, -550A, -590A, and -780A.
There is a risk of equipment damage.
Refer to the manual for your SERVOPACK for the power ON and OFF sequences.

(2) Σ-XW SERVOPACKs for Use with 270-VDC Power Supply Input

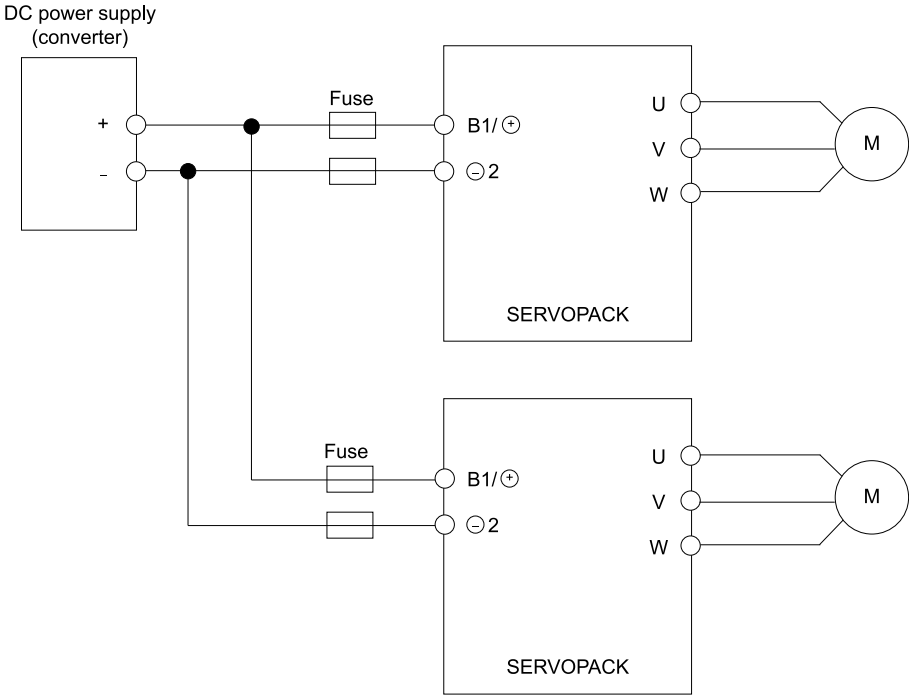
Main Circuit Power Supply	SERVOPACK Model: SGDXW-	Power Supply Capacity per SERVOPACK [kVA] *1	Current Capacity		Inrush Current		External Fuse		
			Main Circuit [Arms] *1	Control Power Supply [Arms]	Main Circuit [A0-p]	Control Power Supply [A0-p]	Order Number *2	Current Rating [A]	Voltage Rating [Vdc]
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.

(3) Σ-XT SERVOPACKs for Use with 270-VDC Power Supply Input

Main Circuit Power Supply	SERVOPACK Model: SGDXT-	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	1.8	4.5	0.3	34	57	3,5URG-J17/40UL	40	400
	2R8A	3.0	9.0						

*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.

(4) Σ-XS SERVOPACKs for Use with 540-VDC Power Supply Input

Important

If you use a DC power supply input, externally connect an inrush current limiting circuit and use the power ON and OFF sequences recommended by Yaskawa.

For details, refer to "4. Wiring and Connecting SERVOPACKs" in your SERVOPACK product manual.

Main Circuit Power Supply	SERVOPACK Model: SGDXS-	Power Supply Capacity per SERVOPACK [kVA] *1	Current Capacity		Inrush Current	
			Main Circuit [Arms] *1	Control Power Supply [A]	Main Circuit [A0-p] *2	Control Power Supply [A0-p]
540 VDC	1R9D	1.1	2	1.2	19 (External 36 Ω *3)	-
	3R5D	2.3	3			–
	5R4D	3.5	5.5			–
	8R4D	4.5	6.8	1.6	38 (External 18 Ω *3)	-
	120D	7.1	11			–
	170D	11.7	18			–
	210D	12.4	19.6	1.7	34 (External 20 Ω *3)	-
	260D	14.4	26.2			–
	280D	21.9	38.3		68 (External 10 Ω *3)	-
	370D	30.6	47.6			–

*1 This is the net value at the rated load.
*2 This is the value when the listed value of the external inrush current limiting resistor is used.
*3 This is the value of the external inrush current limiting resistor.

14.2 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.

14.2.1 Selection Table

(1) Σ-XS SERVOPACKs for Use with Three-Phase, 200-VAC or Single-Phase, 200-VAC

Main Circuit Power Supply	SERVOPACK		Order Number	Manufacturer
	Maximum Applicable Motor Capacity [kW]	Model SGDXS-		
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		
	2.0	180A	SC-5-1	
	3.0	200A		
	5.0	330A	SC-N1	
	6.0	470A		
	7.5	550A	SC-N2	
	11	590A	SC-N2S	
	15	780A	SC-N3	
Single-phase, 200 VAC	0.05	R70A	SC-03	
	0.1	R90A		
	0.2	1R6A		
	0.4	2R8A		
	0.75	5R5A	SC-4-1	
	1.5	120A□□□0008	SC-5-1	

(2) Σ-XW SERVOPACKs for Use with Three-Phase, 200-VAC or Single-Phase, 200-VAC

Main Circuit Power Supply	SERVOPACK		Order Number	Manufacturer
	Maximum Applicable Motor Capacity [kW]	Model SGDXW-		
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	

(3) Σ-XT SERVOPACKs for Use with Three-Phase, 200-VAC or Single-Phase, 200-VAC

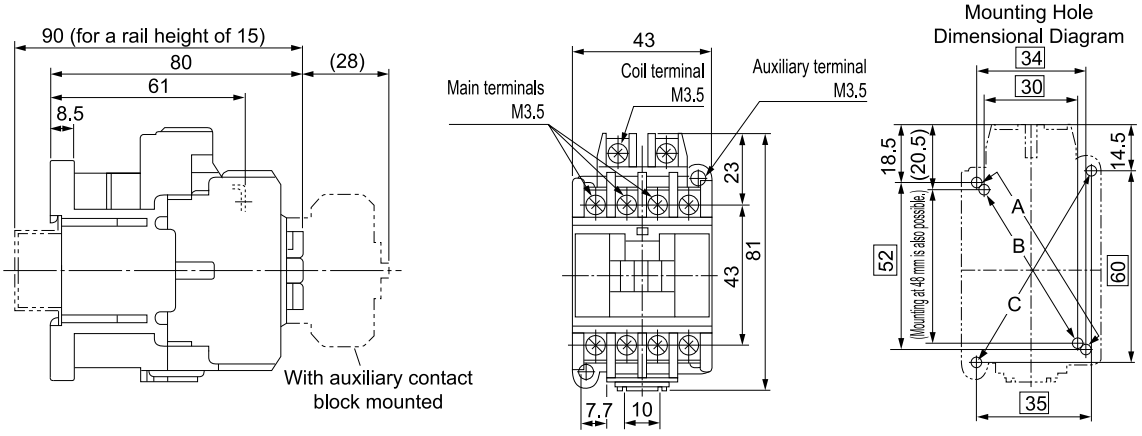
Main Circuit Power Supply	SERVOPACK		Order Number	Manufacturer
	Maximum Applicable Motor Capacity [kW]	Model SGDXT-		
Three-phase, 200 VAC	0.2	1R6A	SC-4-1	Fuji Electric FA Components & Systems Co., Ltd.
	0.4	2R8A		
Single-phase, 200 VAC	0.2	1R6A		
	0.4	2R8A	SC-5-1	

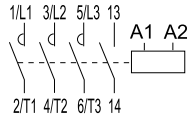
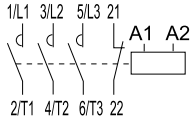
(4) Σ-XS SERVOPACKs for Use with Three-Phase, 400-VAC

Main Circuit Power Supply	SERVOPACK		Order Number	Manufacturer
	Maximum Applicable Motor Capacity [kW]	Model SGDXS-		
Three-phase, 400 VAC	0.5	1R9D	SC-4-1/G	Fuji Electric FA Components & Systems Co., Ltd.
	1.0	3R5D		
	1.5	5R4D		
	2.0	8R4D	SC-5-1/G	
	3.0	120D		
	5.0	170D	SC-N1/G	
	6.0	210D		
	7.5	260D		
	11	280D	SC-N2S/G	
	15	370D		

14.2.2 External Dimensions

(1) Model: SC-03



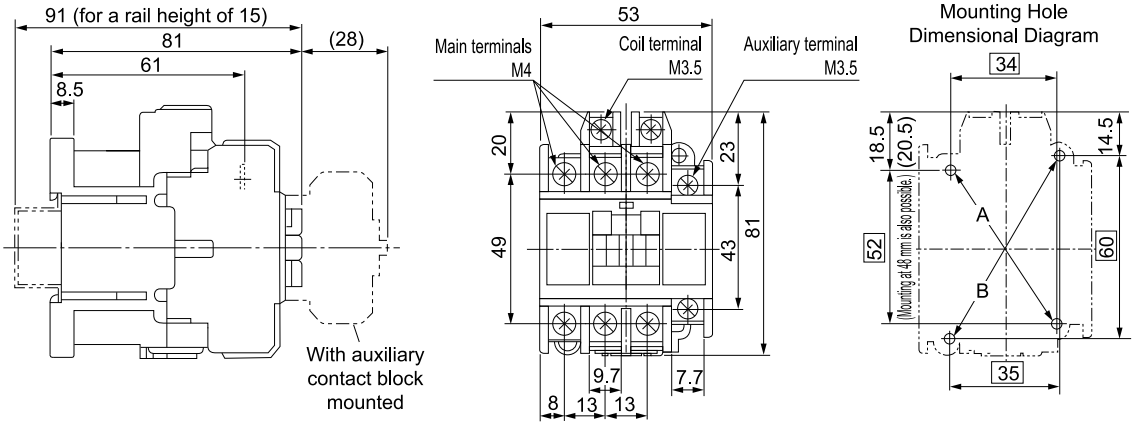
Auxiliary Contacts	Contact Structure
1a	
1b	

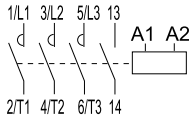
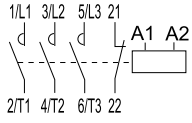
- You can use any of the following three mounting methods.
  A : 34 × (48 to) 52
  B : 30× 48
  C : 35× 60
- Mounting screws: 2 × M4
  Use two mounting holes in diagonally opposing corners to mount the magnetic contactor.

Unit: mm

Approx. mass: 0.32 kg

(2) Model: SC-4-1



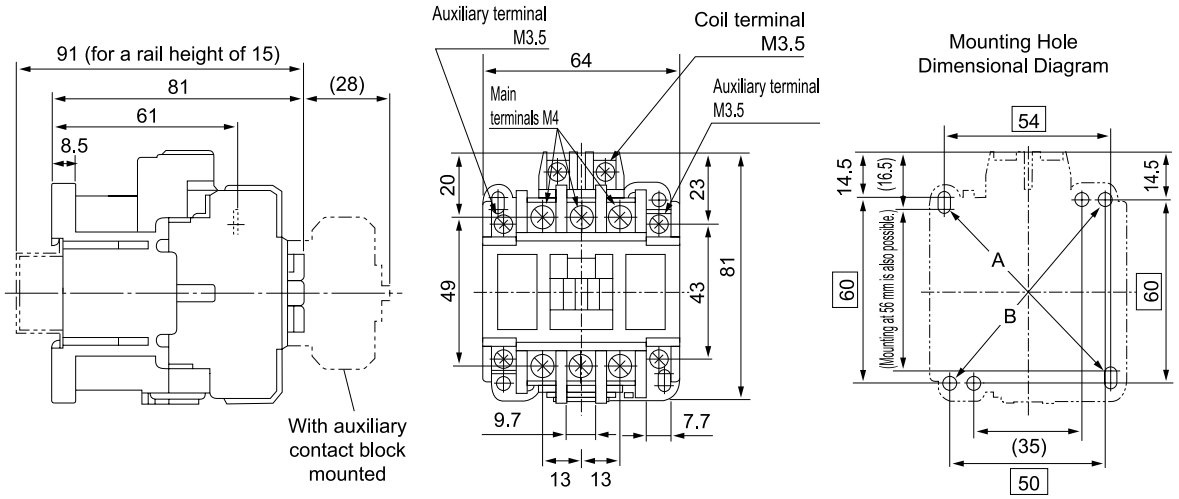
Auxiliary Contacts	Contact Structure
1a	
1b	

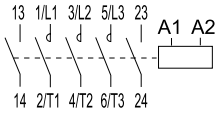
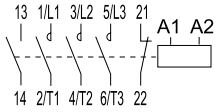
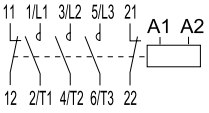
- You can use any of the following two mounting methods.
  A : 34 × (48 to) 52
  B : 35× 60
- Mounting screws: 2 × M4
  Use two mounting holes in diagonally opposing corners to mount the magnetic contactor.

Unit: mm

Approx. mass: 0.36 kg

(3) Model: SC-5-1



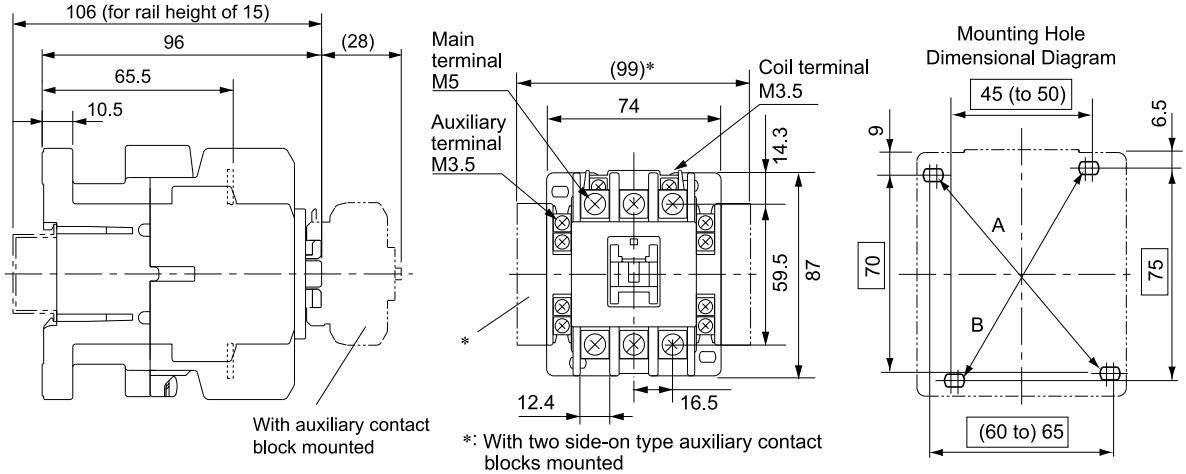
Auxiliary Contacts	Contact Structure
2a	
1a1b	
2b	

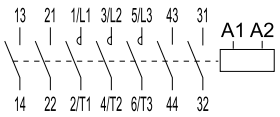
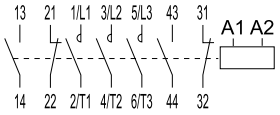
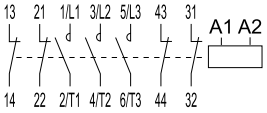
- You can use any of the following two mounting methods.
  A : 54 × (56 to) 60
  B : 50× 60
- Mounting screws: 2 × M4
  Use two mounting holes in diagonally opposing corners to mount the magnetic contactor.

Unit: mm

Approx. mass: 0.38 kg

(4) Model: SC-N1, SC-N2



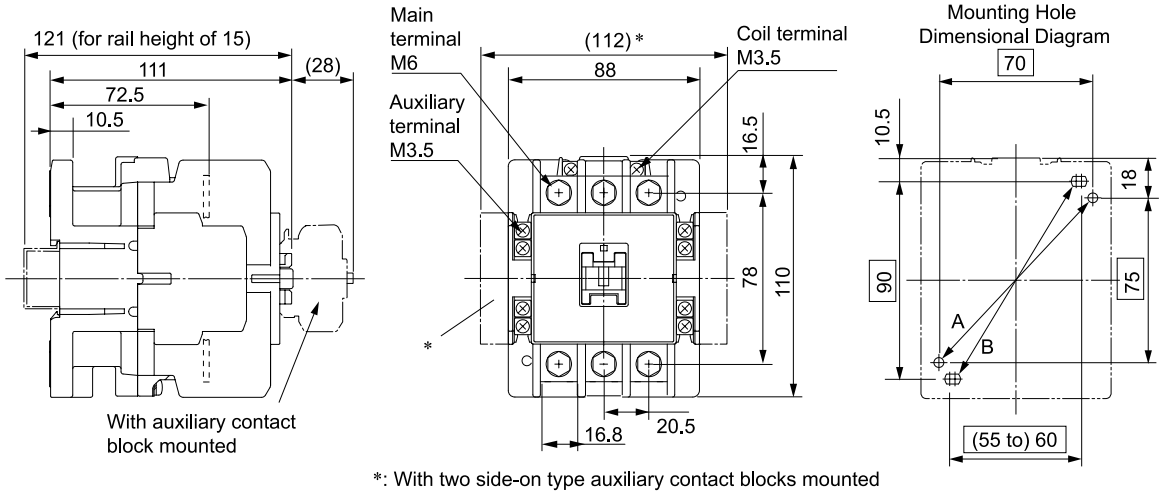
Auxiliary Contacts	Contact Structure
4a	
2a2b	
4b	

- You can use any of the following two mounting methods.
  A: 70 × 75
  B: (55 to) 65 × 90
- Mounting screws: 2 × M4
  Use two mounting holes in diagonally opposing corners to mount the magnetic contactor.

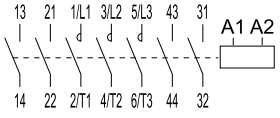
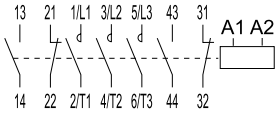
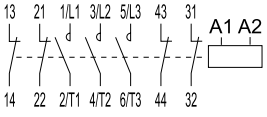
Unit: mm

Approx. mass: 0.59 kg

(5) Model: SC-N2S, SC-N3



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

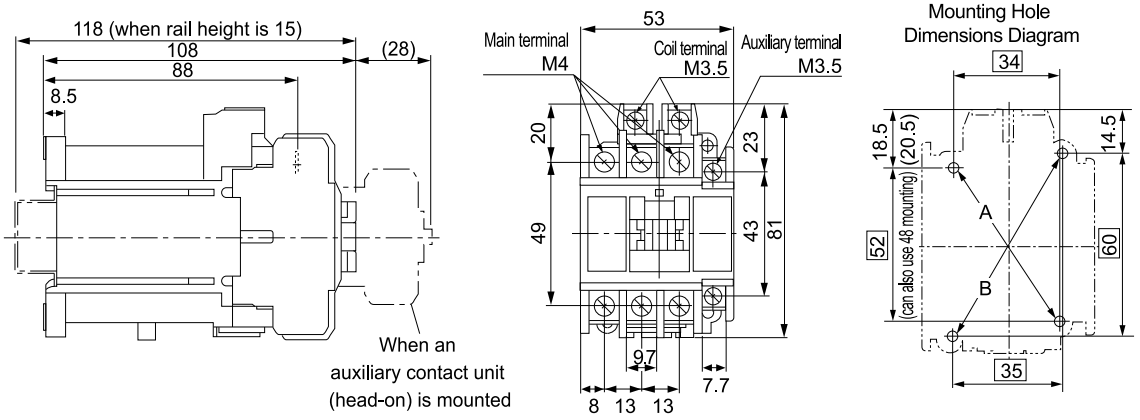
Auxiliary Contacts	Contact Structure
4a	
2a2b	
4b	

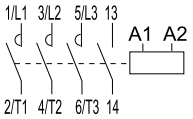
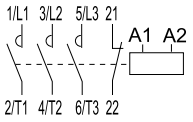
- You can use any of the following two mounting methods.
  A: 70 × 75
  B: (55 to) 60 × 90
- Mounting screws: 2 × M4
  Use two mounting holes in diagonally opposing corners to mount the magnetic contactor.

Unit: mm

Approx. mass: 1.1 kg

(6) Model: SC-4-1/G



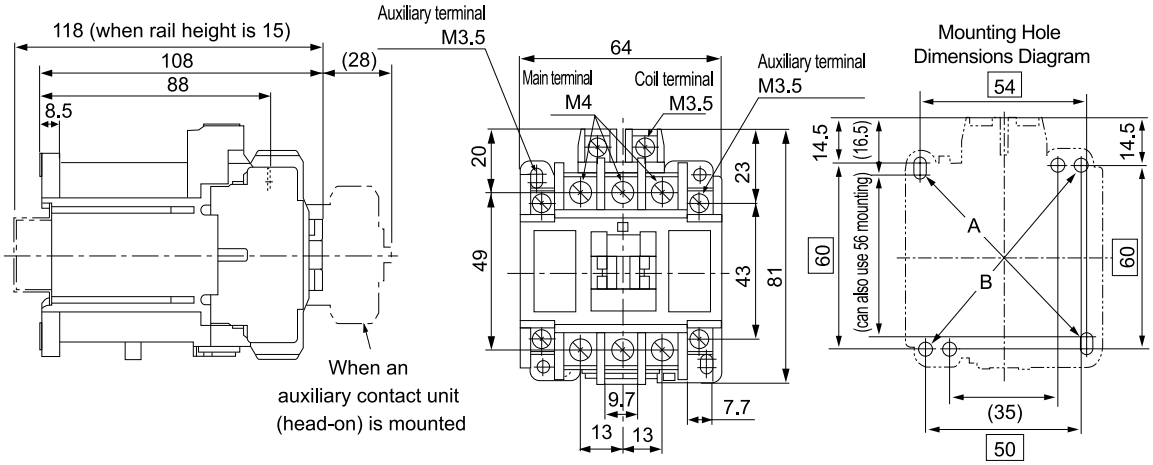
Auxiliary Contacts	Contact Structure
1a	
1b	

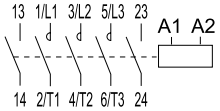
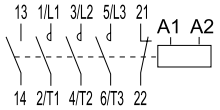
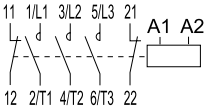
- You can use any of the following two mounting methods.
  A : 34 × (48 to) 52
  B : 35× 60
- Mounting screws: 2 × M4
  Use two mounting holes in diagonally opposing corners to mount the magnetic contactor.

Unit: mm

Approx. mass: 0.6 kg

(7) Model: SC-5-1/G



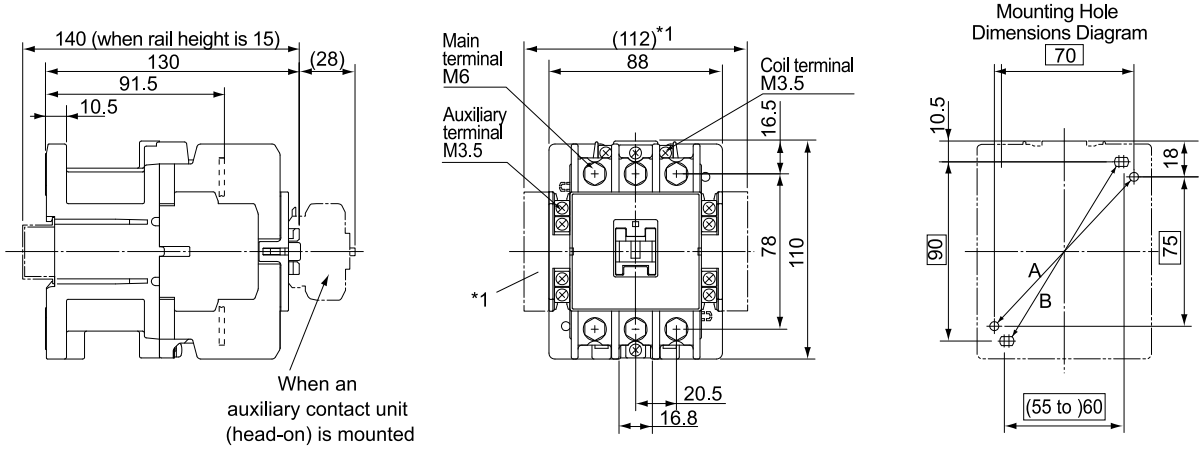
Auxiliary Contacts	Contact Structure
2a	
1a1b	
2b	

- You can use any of the following two mounting methods.
  A : 54 × (56 to) 60
  B : 50× 60
- Mounting screws: 2 × M4
  Use two mounting holes in diagonally opposing corners to mount the magnetic contactor.

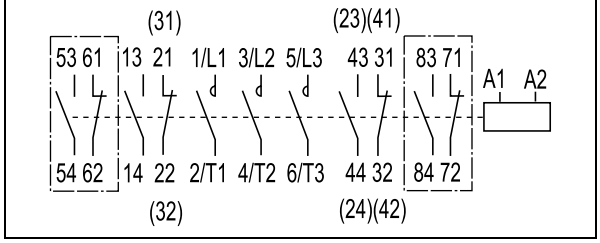
Unit: mm

Approx. mass: 0.62 kg

(8) Model: SC-N2S/G



Contact Structure



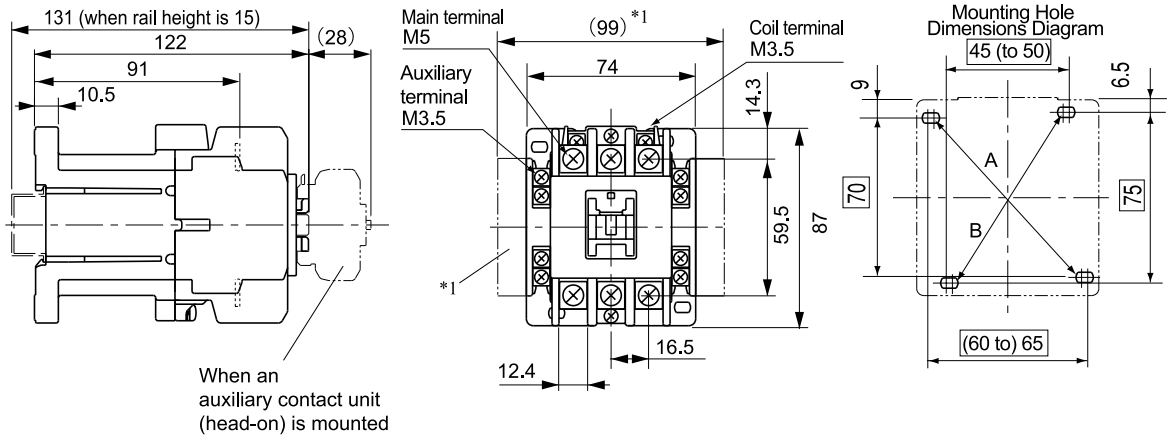
- You can use any of the following two mounting methods.
  A: 70 × 75
  B: (55 to) 65 × 90
- Mounting screws: 2 × M4
  Use two mounting holes in diagonally opposing corners to mount the magnetic contactor.

Unit: mm

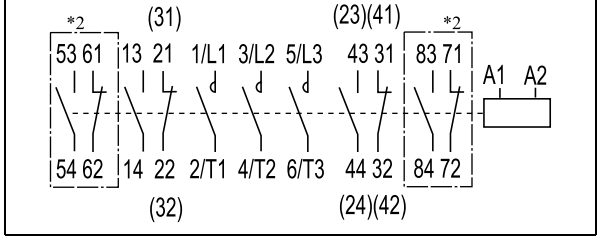
Approx. mass: 1.4 kg

*1 When two side-on auxiliary contact units are installed

(9) Model: SC-N1/G



Contact Structure



- You can use any of the following two mounting methods.
  A: 70 × 75
  B: (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: 0.82 kg

*1 When two side-on auxiliary contact units are installed
*2 In the case of auxiliary contact 4a4b

Note:

The terminal numbers for auxiliary contacts are different from the previous version. The terminal numbers in parentheses are the previous numbers.

14.3 SERVOPACK Main Circuit Wires

This section describes the main circuit wires for SERVOPACKs.

Important

These specifications are based on IEC/EN 61800-5-1, UL 61800-5-1, and CSA C22.2 No.274.

1. To comply with UL standards, use UL-compliant wires.
2. Use copper wires with a rated temperature of 75°C or higher.
3. Use wires with a rated withstand voltage of 300 V or higher.

⚠ CAUTION

If there are separate safety regulations for equipment with a high-current protective grounding conductor, select the wire according to the minimum size for the protective grounding conductor specified in those regulations.

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.

14.3.1 Σ-XS SERVOPACKs for Use with Three-Phase, 200-VAC Power Supplies

SERVOPACK Model: SGDXS-	Terminal Symbols		Wire Size	Screw Size	Tightening Torque [N·m]
R70A	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm²)	–	–
	Servomotor Main Circuit Cables *1	U, V, W			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground Cable	⏚	AWG14 (2.0 mm²) or larger	M4	1.2 to 1.4
R90A	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm²)	–	–
	Servomotor Main Circuit Cables *1	U, V, W			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground Cable	⏚	AWG14 (2.0 mm²) or larger	M4	1.2 to 1.4

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SERVOPACK Model: SGDXS-	Terminal Symbols		Wire Size	Screw Size	Tightening Torque [N·m]
1R6A	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm²)	–	–
	Servomotor Main Circuit Cables *1	U, V, W			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground Cable	⏚	AWG14 (2.0 mm²) or larger	M4	1.2 to 1.4
2R8A	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm²)	–	–
	Servomotor Main Circuit Cables *1	U, V, W			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground Cable	⏚	AWG14 (2.0 mm²) or larger	M4	1.2 to 1.4
3R8A	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm²)	–	–
	Servomotor Main Circuit Cables *1	U, V, W			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground Cable	⏚	AWG14 (2.0 mm²) or larger	M4	1.2 to 1.4
5R5A	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm²)	–	–
	Servomotor Main Circuit Cables *1	U, V, W			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground Cable	⏚	AWG14 (2.0 mm²) or larger	M4	1.2 to 1.4
7R6A	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm²)	–	–
	Servomotor Main Circuit Cables *1	U, V, W			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground Cable	⏚	AWG14 (2.0 mm²) or larger	M4	1.2 to 1.4

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SERVOPACK Model: SGDXS-	Terminal Symbols		Wire Size	Screw Size	Tightening Torque [N·m]
120A	Main Circuit Power Supply Cables	L1, L2, L3	AWG14 (2.0 mm²)	–	–
	Servomotor Main Circuit Cables *1	U, V, W			
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm²)		
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground Cable	⏚	AWG14 (2.0 mm²) or larger	M4	1.2 to 1.4
180A	Main Circuit Power Supply Cables	L1, L2, L3	AWG14 (2.0 mm²)	M4	1.0 to 1.2
	Servomotor Main Circuit Cables *1	U, V, W	AWG10 (5.5 mm²)		
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm²)		
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground Cable	⏚	AWG14 (2.0 mm²) or larger	M4	1.2 to 1.4
200A	Main Circuit Power Supply Cables	L1, L2, L3	AWG12 (3.5 mm²)	M4	1.0 to 1.2
	Servomotor Main Circuit Cables *1	U, V, W	AWG10 (5.5 mm²)		
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm²)		
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground Cable	⏚	AWG14 (2.0 mm²) or larger	M4	1.2 to 1.4
330A	Main Circuit Power Supply Cables	L1, L2, L3	AWG8 (8.0 mm²)	M4	1.0 to 1.2
	Servomotor Main Circuit Cables *1	U, V, W			
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm²)		
	External Regenerative Resistor Cables	B1/⊕, B2	AWG14 (2.0 mm²)		
	Ground Cable	⏚	AWG14 (2.0 mm²) or larger	M4	1.2 to 1.4

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SERVOPACK Model: SGDXS-	Terminal Symbols		Wire Size	Screw Size	Tightening Torque [N·m]
470A	Main Circuit Power Supply Cables	L1, L2, L3	AWG8 (8.0 mm^2)	M5	2.2 to 2.4
	Servomotor Main Circuit Cables *1	U, V, W	AWG6 (14 mm^2)		
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm^2)		
	External Regenerative Resistor Cables	B1/⊕, B2	AWG14 (2.0 mm^2)		
	Ground Cable	⏚	AWG14 (2.0 mm^2) or larger		
550A	Main Circuit Power Supply Cables	L1, L2, L3	AWG8 (8.0 mm^2)		
	Servomotor Main Circuit Cables *1	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 *1	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		
780A	Main Circuit Power Supply Cables	L1, L2, L3	AWG3 (30 mm^2)		
	Servomotor Main Circuit Cables *1	U, V, W	AWG3 (30 mm^2)		
	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		

*1 If you do not use the recommended servomotor main circuit cable, use this table to select wires.

14.3.2 Σ-XS SERVOPACKs with Single-Phase, 200-VAC

SERVOPACK Model: SGDXS-	Terminal Symbols		Wire Size	Screw Size	Tightening Torque [N·m]
R70A	Main Circuit Power Supply Cables	L1, L2	AWG16 (1.25 mm²)	–	–
	Servomotor Main Circuit Cables *1	U, V, W			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground Cable	⏚	AWG14 (2.0 mm²) or larger	M4	1.2 to 1.4
R90A	Main Circuit Power Supply Cables	L1, L2	AWG16 (1.25 mm²)	–	–
	Servomotor Main Circuit Cables *1	U, V, W			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground Cable	⏚	AWG14 (2.0 mm²) or larger	M4	1.2 to 1.4
1R6A	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm²)	–	–
	Servomotor Main Circuit Cables *1	U, V, W			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground Cable	⏚	AWG14 (2.0 mm²) or larger	M4	1.2 to 1.4
2R8A	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm²)	–	–
	Servomotor Main Circuit Cables *1	U, V, W			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground Cable	⏚	AWG14 (2.0 mm²) or larger	M4	1.2 to 1.4
5R5A	Main Circuit Power Supply Cables	L1, L2, L3	AWG14 (2.0 mm²)	–	–
	Servomotor Main Circuit Cables *1	U, V, W	AWG16 (1.25 mm²)		
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground Cable	⏚	AWG14 (2.0 mm²) or larger	M4	1.2 to 1.4

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SERVOPACK Model: SGDXS-	Terminal Symbols		Wire Size	Screw Size	Tightening Torque [N·m]
120A□□□0008	Main Circuit Power Supply Cables	L1, L2	AWG14 (2.0 mm²)	M4	1.0 to 1.2
	Servomotor Main Circuit Cables *1	U, V, W			
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm²)		
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground Cable	⏚	AWG14 (2.0 mm²) or larger		1.2 to 1.4

*1 If you do not use the recommended servomotor main circuit cable, use this table to select wires.

14.3.3 Σ-XS SERVOPACKs for Use with 270-VDC Power Supply Input

SERVOPACK Model: SGDXS-	Terminal Symbols *1		Wire Size	Screw Size	Tightening Torque [N·m]
R70A	Servomotor Main Circuit Cables *2	U, V, W	AWG16 (1.25 mm²)	-	–
	Control Power Supply Cable	L1C, L2C	AWG16 (1.25 mm²)	-	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG16 (1.25 mm²)	-	–
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	M4	1.2 to 1.4
R90A	Servomotor Main Circuit Cables *2	U, V, W	AWG16 (1.25 mm²)	-	–
	Control Power Supply Cable	L1C, L2C	AWG16 (1.25 mm²)	-	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG16 (1.25 mm²)	-	–
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	M4	1.2 to 1.4
1R6A	Servomotor Main Circuit Cables *2	U, V, W *2	AWG16 (1.25 mm²)	-	–
	Control Power Supply Cable	L1C, L2C	AWG16 (1.25 mm²)	-	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG16 (1.25 mm²)	-	–
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	M4	1.2 to 1.4
2R8A	Servomotor Main Circuit Cables *2	U, V, W	AWG16 (1.25 mm²)	-	–
	Control Power Supply Cable	L1C, L2C	AWG16 (1.25 mm²)	-	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG16 (1.25 mm²)	-	–
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	M4	1.2 to 1.4

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SERVOPACK Model: SGDXS-	Terminal Symbols *1		Wire Size	Screw Size	Tightening Torque [N·m]
3R8A	Servomotor Main Circuit Cables *2	U, V, W	AWG16 (1.25 mm²)	-	–
	Control Power Supply Cable	L1C, L2C	AWG16 (1.25 mm²)	-	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG16 (1.25 mm²)	-	–
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	M4	1.2 to 1.4
5R5A	Servomotor Main Circuit Cables *2	U, V, W	AWG16 (1.25 mm²)	-	–
	Control Power Supply Cable	L1C, L2C	AWG16 (1.25 mm²)	-	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG16 (1.25 mm²)	-	–
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	M4	1.2 to 1.4
7R6A	Servomotor Main Circuit Cables *2	U, V, W	AWG16 (1.25 mm²)	-	–
	Control Power Supply Cable	L1C, L2C	AWG16 (1.25 mm²)	-	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG16 (1.25 mm²)	-	–
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	M4	1.2 to 1.4
120A (Three-phase 200-VAC input)	Servomotor Main Circuit Cables *2	U, V, W	AWG14 (2.0 mm²)	-	–
	Control Power Supply Cable	L1C, L2C	AWG16 (1.25 mm²)	-	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG14 (2.0 mm²)	-	–
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	M4	1.2 to 1.4
120A□□□0008 (Single-phase 200-VAC input)	Servomotor Main Circuit Cables *2	U, V, W	AWG14 (2.0 mm²)	M4	1.0 to 1.2
	Control Power Supply Cable	L1C, L2C	AWG16 (1.25 mm²)	M4	1.0 to 1.2
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG14 (2.0 mm²)	M4	1.0 to 1.2
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	M4	1.2 to 1.4
180A	Servomotor Main Circuit Cables *2	U, V, W	AWG10 (5.5 mm²)	M4	1.0 to 1.2
	Control Power Supply Cable	L1C, L2C	AWG16 (1.25 mm²)	M4	1.0 to 1.2
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG10 (5.5 mm²)	M4	1.0 to 1.2
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	M4	1.2 to 1.4

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SERVOPACK Model: SGDXS-	Terminal Symbols *1		Wire Size	Screw Size	Tightening Torque [N·m]
200A	Servomotor Main Circuit Cables *2	U, V, W	AWG10 (5.5 mm²)	M4	1.0 to 1.2
	Control Power Supply Cable	L1C, L2C	AWG16 (1.25 mm²)	M4	1.0 to 1.2
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG10 (5.5 mm²)	M4	1.0 to 1.2
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	M4	1.2 to 1.4
330A	Servomotor Main Circuit Cables *2	U, V, W	AWG8 (8.0 mm²)	M4	1.0 to 1.2
	Control Power Supply Cable	L1C, L2C	AWG16 (1.25 mm²)	M4	1.0 to 1.2
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG8 (8.0 mm²)	M4	1.0 to 1.2
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	M4	1.2 to 1.4
470A	Servomotor Main Circuit Cables *2	U, V, W	AWG6 (14 mm²)	M5	2.2 to 2.4
	Control Power Supply Cable	L1C, L2C	AWG16 (1.25 mm²)	M5	2.2 to 2.4
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG8 (8.0 mm²)	M5	2.2 to 2.4
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	M5	2.2 to 2.4
550A	Servomotor Main Circuit Cables *2	U, V, W	AWG4 (22 mm²)	M5	2.2 to 2.4
	Control Power Supply Cable	L1C, L2C	AWG16 (1.25 mm²)	M5	2.2 to 2.4
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG6 (14 mm²)	M5	2.2 to 2.4
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	M5	2.2 to 2.4
590A	Servomotor Main Circuit Cables *2	U, V, W	AWG4 (22 mm²)	M6	2.7 to 3.0
	Control Power Supply Cable	L1C, L2C	AWG16 (1.25 mm²)	M6	2.7 to 3.0
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG3 (30 mm²)	M6	2.7 to 3.0
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	M6	2.7 to 3.0
780A	Servomotor Main Circuit Cables *2	U, V, W	AWG3 (30 mm²)	M6	2.7 to 3.0
	Control Power Supply Cable	L1C, L2C	AWG16 (1.25 mm²)	M6	2.7 to 3.0
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG3 (30 mm²)	M6	2.7 to 3.0
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	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.

14.3.4 Three-Phase, 200-VAC Wires for Σ-XW SERVOPACKs

SERVO-PACK Model: SGDXW-	Terminal Symbols		Wire Size	Screw Size	Tightening Torque [N·m]
1R6A	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm²)	–	–
	Servomotor Main Circuit Cables *1	UA, VA, WA, UB, VB, WB			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground Cable	⏚	AWG14 (2.0 mm²) or larger	M4	1.2 to 1.4
2R8A	Main Circuit Power Supply Cables	L1, L2, L3	AWG14 (2.0 mm²)	–	–
	Servomotor Main Circuit Cables *1	UA, VA, WA, UB, VB, WB	AWG16 (1.25 mm²)		
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground Cable	⏚	AWG14 (2.0 mm²) or larger	M4	1.2 to 1.4
5R5A	Main Circuit Power Supply Cables	L1, L2, L3	AWG14 (2.0 mm²)	–	–
	Servomotor Main Circuit Cables *1	UA, VA, WA, UB, VB, WB	AWG16 (1.25 mm²)		
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2	AWG14 (2.0 mm²)		
	Ground Cable	⏚	AWG14 (2.0 mm²) or larger	M4	1.2 to 1.4
7R6A	Main Circuit Power Supply Cables	L1, L2, L3	AWG14 (2.0 mm²)	–	–
	Servomotor Main Circuit Cables *1	UA, VA, WA, UB, VB, WB	AWG16 (1.25 mm²)		
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2	AWG14 (2.0 mm²)		
	Ground Cable	⏚	AWG14 (2.0 mm²) or larger	M4	1.2 to 1.4

*1 If you do not use the recommended servomotor main circuit cable, use this table to select wires.

14.3.5 Σ-XW SERVOPACKs with Single-Phase, 200-VAC

SERVOPACK Model: SGDXW-	Terminal Symbols		Wire Size	Screw Size	Tightening Torque [N·m]
1R6A	Main Circuit Power Supply Cables	L1, L2	AWG16 (1.25 mm²)	–	–
	Servomotor Main Circuit Cables *1	UA, VA, WA, UB, VB, WB			
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground Cable	⏚	AWG14 (2.0 mm²)以上	M4	1.2 to 1.4
2R8A	Main Circuit Power Supply Cables	L1, L2	AWG14 (2.0 mm²)	–	–
	Servomotor Main Circuit Cables *1	UA, VA, WA, UB, VB, WB	AWG16 (1.25 mm²)		
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2			
	Ground Cable	⏚	AWG14 (2.0 mm²)以上	M4	1.2 to 1.4
5R5A	Main Circuit Power Supply Cables	L1, L2	AWG14 (2.0 mm²)	–	–
	Servomotor Main Circuit Cables *1	UA, VA, WA, UB, VB, WB	AWG16 (1.25 mm²)		
	Control Power Supply Cables	L1C, L2C			
	External Regenerative Resistor Cables	B1/⊕, B2	AWG14 (2.0 mm²)		
	Ground Cable	⏚	AWG14 (2.0 mm²)以上	M4	1.2 to 1.4

*1 If you do not use the recommended servomotor main circuit cable, use this table to select wires.

14.3.6 Σ-XW SERVOPACKs for Use with 270-VDC Power Supply Input

SERVOPACK Model: SGDXW-	Terminal Symbols *1		Wire Size	Screw Size	Tightening Torque [N·m]
1R6A	Servomotor Main Circuit Cables *2	UA, VA, WA, UB, VB, WB	AWG16 (1.25 mm²)	-	–
	Control Power Supply Cable	L1C, L2C	AWG16 (1.25 mm²)	-	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG16 (1.25 mm²)	-	–
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	M4	1.2 to 1.4
2R8A	Servomotor Main Circuit Cables *2	UA, VA, WA, UB, VB, WB	AWG16 (1.25 mm²)	-	–
	Control Power Supply Cable	L1C, L2C	AWG16 (1.25 mm²)	-	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG16 (1.25 mm²)	-	–
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	M4	1.2 to 1.4
5R5A	Servomotor Main Circuit Cables *2	UA, VA, WA, UB, VB, WB	AWG16 (1.25 mm²)	-	–
	Control Power Supply Cable	L1C, L2C	AWG16 (1.25 mm²)	-	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG14 (2.0 mm²)	-	–
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	M4	1.2 to 1.4
7R6A	Servomotor Main Circuit Cables *2	UA, VA, WA, UB, VB, WB	AWG16 (1.25 mm²)	-	–
	Control Power Supply Cable	L1C, L2C	AWG16 (1.25 mm²)	-	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG14 (2.0mm²)	-	–
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	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.

14.3.7 Σ-XT SERVOPACKs for Use with Three-Phase, 200-VAC Power Supplies

SERVOPACK Model: SGDXT-	Terminal Symbols		Wire Size	Screw Size	Tightening Torque [N·m]
1R6A	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm²)	–	–
	Servomotor Main Circuit Cables *1	UA, VA, WA, UB, VB, WB, UC, VC, WC	AWG16 (1.25 mm²)	–	–
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm²)	–	–
	External Regenerative Resistor Cables	B1/⊕, B2	AWG16 (1.25 mm²)	–	–
	Ground Cable	⏚	AWG14 (2.0 mm²) or larger	M4	1.2 to 1.4
2R8A	Main Circuit Power Supply Cables	L1, L2, L3	AWG14 (2.0 mm²)	–	–
	Servomotor Main Circuit Cables *1	UA, VA, WA, UB, VB, WB, UC, VC, WC	AWG16 (1.25 mm²)	–	–
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm²)	–	–
	External Regenerative Resistor Cables	B1/⊕, B2	AWG16 (1.25 mm²)	–	–
	Ground Cable	⏚	AWG14 (2.0 mm²) or larger	M4	1.2 to 1.4

*1 If you do not use the recommended servomotor main circuit cable, use this table to select wires.

14.3.8 Σ-XT SERVOPACKs for Use with Single-Phase, 200-VAC Power Supplies

SERVOPACK Model SGDXT-	Terminal Symbols		Wire Size	Screw Size	Tightening Torque [N·m]
1R6A	Main Circuit Power Supply Cables	L1, L2	AWG16 (1.25 mm²)	–	–
	Servomotor Main Circuit Cables *1	UA, VA, WA, UB, VB, WB, UC, VC, WC	AWG16 (1.25 mm²)	–	–
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm²)	–	–
	External Regenerative Resistor Cables	B1/⊕, B2	AWG16 (1.25 mm²)	–	–
	Ground Cable	⏚	AWG14 (2.0 mm²) or larger	M4	1.2 to 1.4
2R8A	Main Circuit Power Supply Cables	L1, L2	AWG14 (2.0 mm²)	–	–
	Servomotor Main Circuit Cables *1	UA, VA, WA, UB, VB, WB, UC, VC, WC	AWG16 (1.25 mm²)	–	–
	Control Power Supply Cables	L1C, L2C	AWG16 (1.25 mm²)	–	–
	External Regenerative Resistor Cables	B1/⊕, B2	AWG16 (1.25 mm²)	–	–
	Ground Cable	⏚	AWG14 (2.0 mm²) or larger	M4	1.2 to 1.4

*1 If you do not use the recommended servomotor main circuit cable, use this table to select wires.

14.3.9 Σ-XT SERVOPACKs for Use with 270-VDC Power Supply Input

SERVOPACK Model: SGDXT-	Terminal Symbols *1		Wire Size	Screw Size	Tightening Torque [N·m]
1R6A	Servomotor Main Circuit Cables *2	UA, VA, WA, UB, VB, WB, UC, VC, WC	AWG16 (1.25 mm²)	-	–
	Control Power Supply Cable	L1C, L2C	AWG16 (1.25 mm²)	-	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG16 (1.25 mm²)	-	–
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	M4	1.2 to 1.4
2R8A	Servomotor Main Circuit Cables *2	UA, VA, WA, UB, VB, WB, UC, VC, WC	AWG16 (1.25 mm²)	-	–
	Control Power Supply Cable	L1C, L2C	AWG16 (1.25 mm²)	-	–
	Main Circuit Power Supply Cables	B1/⊕, ⊖2	AWG16 (1.25 mm²)	-	–
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	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.

14.3.10 Σ-XS SERVOPACKs for Use with Three-Phase, 400-VAC

SERVOPACK Model: SGDXS-	Terminal Symbols		Wire Size	Screw Size	Tightening Torque [N·m]
1R9D	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm²)	-	–
	Servomotor Main Circuit Cables *1	U, V, W	AWG16 (1.25 mm²)	-	–
	Control Power Supply Cable	24 V, 0 V	AWG16 (1.25 mm²)	-	–
	External Regenerative Resistor Cables	B1/⊕, B2	AWG16 (1.25 mm²)	-	–
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	M4	1.2 to 1.4
3R5D	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm²)	-	–
	Servomotor Main Circuit Cables *1	U, V, W	AWG16 (1.25 mm²)	-	–
	Control Power Supply Cable	24 V, 0 V	AWG16 (1.25 mm²)	-	–
	External Regenerative Resistor Cables	B1/⊕, B2	AWG16 (1.25 mm²)	-	–
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	M4	1.2 to 1.4
5R4D	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm²)	-	–
	Servomotor Main Circuit Cables *1	U, V, W	AWG16 (1.25 mm²)	-	–
	Control Power Supply Cable	24 V, 0 V	AWG16 (1.25 mm²)	-	–
	External Regenerative Resistor Cables	B1/⊕, B2	AWG16 (1.25 mm²)	-	–
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	M4	1.2 to 1.4
8R4D	Main Circuit Power Supply Cables	L1, L2, L3	AWG16 (1.25 mm²)	M4	1.4
	Servomotor Main Circuit Cables *1	U, V, W	AWG14 (2.0 mm²)	M4	1.4
	Control Power Supply Cable	24 V, 0 V	AWG16 (1.25 mm²)	M4	1.4
	External Regenerative Resistor Cables	B1/⊕, B2	AWG16 (1.25 mm²)	M4	1.4
	Ground Cable	⏚	AWG14 (2.0 mm²) or more *2	M4	1.2 to 1.4
120D	Main Circuit Power Supply Cables	L1, L2, L3	AWG14 (2.0 mm²)	M4	1.4
	Servomotor Main Circuit Cables *1	U, V, W	AWG14 (2.0 mm²)	M4	1.4
	Control Power Supply Cable	24 V, 0 V	AWG16 (1.25 mm²)	M4	1.4
	External Regenerative Resistor Cables	B1/⊕, B2	AWG16 (1.25 mm²)	M4	1.4
	Ground Cable	⏚	AWG14 (2.0 mm²) or more *2	M4	1.2 to 1.4

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SERVOPACK Model: SGDXS-	Terminal Symbols		Wire Size	Screw Size	Tightening Torque [N·m]
170D	Main Circuit Power Supply Cables	L1, L2, L3	AWG12 (3.5 mm²)	M4	1.4
	Servomotor Main Circuit Cables *1	U, V, W	AWG10 (5.5 mm²)	M4	1.4
	Control Power Supply Cable	24 V, 0 V	AWG16 (1.25 mm²)	M4	1.4
	External Regenerative Resistor Cables	B1/⊕, B2	AWG14 (2.0 mm²)	M4	1.4
	Ground Cable	⏚	AWG14 (2.0 mm²) or more *2	M4	1.2 to 1.4
210D	Main Circuit Power Supply Cables	L1, L2, L3	AWG10 (5.5 mm²)	M6	5
	Servomotor Main Circuit Cables *1	U, V, W	AWG10 (5.5 mm²)	M6	5
	Control Power Supply Cable	24 V, 0 V	AWG16 (1.25 mm²)	M4	1.4
	External Regenerative Resistor Cables	B1/⊕, B2	AWG12 (3.5 mm²)	M6	5
	Ground Cable	⏚	AWG14 (2.0 mm²) or more *2	M6	2.7 to 3
260D	Main Circuit Power Supply Cables	L1, L2, L3	AWG10 (5.5 mm²)	M6	5
	Servomotor Main Circuit Cables *1	U, V, W	AWG8 (8.0 mm²)	M6	5
	Control Power Supply Cable	24 V, 0 V	AWG16 (1.25 mm²)	M4	1.4
	External Regenerative Resistor Cables	B1/⊕, B2	AWG10 (5.5 mm²)	M6	5
	Ground Cable	⏚	AWG14 (2.0 mm²) or more *2	M6	2.7 to 3
280D	Main Circuit Power Supply Cables	L1, L2, L3	AWG8 (8.0 mm²)	M6	5
	Servomotor Main Circuit Cables *1	U, V, W	AWG8 (8.0 mm²)	M6	5
	Control Power Supply Cable	24 V, 0 V	AWG16 (1.25 mm²)	M4	1.4
	External Regenerative Resistor Cables	B1/⊕, B2	AWG10 (5.5 mm²)	M6	5
	Ground Cable	⏚	AWG14 (2.0 mm²) or more *2	M6	2.7 to 3
370D	Main Circuit Power Supply Cables	L1, L2, L3	AWG6 (14 mm²)	M6	5
	Servomotor Main Circuit Cables *1	U, V, W	AWG6 (14 mm²)	M6	5
	Control Power Supply Cable	24 V, 0 V	AWG16 (1.25 mm²)	M4	1.4
	External Regenerative Resistor Cables	B1/⊕, B2	AWG8 (8.0 mm²)	M6	5
	Ground Cable	⏚	AWG14 (2.0 mm²) or more *2	M6	2.7 to 3

*1 If you do not use the recommended servomotor main circuit cable, use this table to select wires.
*2 The power-side protective ground wire size should be AWG7 (10 mm²) or more.

14.3.11 Σ-XS SERVOPACKs for Use with 540-VDC Power Supply Input

SERVOPACK Model: SGDXS-	Terminal Symbols *1		Wire Size	Screw Size	Tightening Torque [N·m]
1R9D	Servomotor Main Circuit Cables *2	U, V, W	AWG16 (1.25 mm²)	-	-
	Control Power Supply Cable	24 V, 0 V	AWG16 (1.25 mm²)	-	-
	External Regenerative Resistor Cables	B1/⊕, ⊖2	AWG16 (1.25 mm²)	-	-
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	M4	1.2 to 1.4
3R5D	Servomotor Main Circuit Cables *2	U, V, W	AWG16 (1.25 mm²)	-	-
	Control Power Supply Cable	24 V, 0 V	AWG16 (1.25 mm²)	-	-
	External Regenerative Resistor Cables	B1/⊕, ⊖2	AWG16 (1.25 mm²)	-	-
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	M4	1.2 to 1.4
5R4D	Servomotor Main Circuit Cables *2	U, V, W	AWG16 (1.25 mm²)	-	-
	Control Power Supply Cable	24 V, 0 V	AWG16 (1.25 mm²)	-	-
	External Regenerative Resistor Cables	B1/⊕, ⊖2	AWG16 (1.25 mm²)	-	-
	Ground Cable	⏚	AWG14 (2.0 mm²) or more	M4	1.2 to 1.4
8R4D	Servomotor Main Circuit Cables *2	U, V, W	AWG14 (2.0 mm²)	M4	1.4
	Control Power Supply Cable	24 V, 0 V	AWG16 (1.25 mm²)	M4	1.4
	External Regenerative Resistor Cables	B1/⊕, ⊖2	AWG16 (1.25 mm²)	M4	1.4
	Ground Cable	⏚	AWG14 (2.0 mm²) or more *3	M4	1.2 to 1.4
120D	Servomotor Main Circuit Cables *2	U, V, W	AWG14 (2.0 mm²)	M4	1.4
	Control Power Supply Cable	24 V, 0 V	AWG16 (1.25 mm²)	M4	1.4
	External Regenerative Resistor Cables	B1/⊕, ⊖2	AWG14 (2.0 mm²)	M4	1.4
	Ground Cable	⏚	AWG14 (2.0 mm²) or more *3	M4	1.2 to 1.4
170D	Servomotor Main Circuit Cables *2	U, V, W	AWG10 (5.5 mm²)	M4	1.4
	Control Power Supply Cable	24 V, 0 V	AWG16 (1.25 mm²)	M4	1.4
	External Regenerative Resistor Cables	B1/⊕, ⊖2	AWG10 (5.5 mm²)	M4	1.4
	Ground Cable	⏚	AWG14 (2.0 mm²) or more *3	M4	1.2 to 1.4

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SERVOPACK Model: SGDXS-	Terminal Symbols *1		Wire Size	Screw Size	Tightening Torque [N·m]
210D	Servomotor Main Circuit Cables *2	U, V, W	AWG10 (5.5 mm²)	M6	5
	Control Power Supply Cable	24 V, 0 V	AWG16 (1.25 mm²)	M4	1.4
	External Regenerative Resistor Cables	B1/⊕, ⊖2	AWG10 (5.5 mm²)	M6	5
	Ground Cable	⏚	AWG14 (2.0 mm²) or more *3	M6	2.7 to 3
260D	Servomotor Main Circuit Cables *2	U, V, W	AWG8 (8 mm²)	M6	5
	Control Power Supply Cable	24 V, 0 V	AWG16 (1.25 mm²)	M4	1.4
	External Regenerative Resistor Cables	B1/⊕, ⊖2	AWG8 (8 mm²)	M6	5
	Ground Cable	⏚	AWG14 (2.0 mm²) or more *3	M6	2.7 to 3
280D	Servomotor Main Circuit Cables *2	U, V, W	AWG8 (8.0 mm²)	M6	5
	Control Power Supply Cable	24 V, 0 V	AWG16 (1.25 mm²)	M4	1.4
	External Regenerative Resistor Cables	B1/⊕, ⊖2	AWG8 (8.0 mm²)	M6	5
	Ground Cable	⏚	AWG14 (2.0 mm²) or more *3	M6	2.7 to 3
370D	Servomotor Main Circuit Cables *2	U, V, W	AWG6 (14 mm²)	M6	5
	Control Power Supply Cable	24 V, 0 V	AWG16 (1.25 mm²)	M4	1.4
	External Regenerative Resistor Cables	B1/⊕, ⊖2	AWG6 (14 mm²)	M6	5
	Ground Cable	⏚	AWG14 (2.0 mm²) or more *3	M6	2.7 to 3

*1 Do not wire the following terminals: L1, L2, L3, B2, B3, ⊖ 1 terminals.
*2 If you do not use the recommended servomotor main circuit cable, use this table to select wires.
*3 The power-side protective ground wire size should be AWG7 (10 mm²) or more.

14.3.12 Wire Types

The following table shows the wire sizes and allowable currents for three bundled leads.

HIV Specifications *1		Allowable Current at Surrounding Air Temperatures [Arms]		
Nominal Cross-Sectional Area [mm²]	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

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HIV Specifications *1		Allowable Current at Surrounding Air Temperatures [Arms]		
Nominal Cross-Sectional Area [mm²]	Configuration [Wires/mm]	30°C	40°C	50°C
14.0	7/1.6	75	67	56
22.0	7/2.0	98	87	73
38.0	7/2.6	138	122	103

*1 This is reference data based on JIS C3317 600-V-grade heat-resistant polyvinyl chloride-insulated wires (HIV).

14.4 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.

14.4.1 Σ-XS SERVOPACKs for Use with Three-Phase, 200-VAC or 270-VDC Power Supply Input

SERVOPACK Model: SGDXS-	Main Circuit Terminals	Screw Size	Tightening Torque [N·m]	Crimp Terminal Horizontal Width	Recommended Wire Size	Crimp Terminal Model *1	Crimping Tool *1	Die *1	Insulating Sleeve Model *2
R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A, 120A	Connectors	–							
	⏚	M4	1.2 to 1.4	10 mm max.	AWG14 (2.0 mm²)	R2-4	YHT-2210	–	–
180A, 200A	Terminal block	M4	1.0 to 1.2	7.7 mm max.	AWG10 (5.5 mm²)	5.5-S4	YHT-2210	–	TP-005
					AWG14 (2.0 mm²)	2-M4		–	TP-003
					AWG16 (1.25 mm²)			-	
	⏚	M4	1.2 to 1.4	10 mm max.	AWG14 (2.0 mm²)	R2-4	YHT-2210	–	–
330A	Terminal block	M4	1.0 to 1.2	9.9 mm max.	AWG8 (8.0 mm²)	8-4NS	YPT-60N	TD-121 TD-111	TP-008
					AWG14 (2.0 mm²)	R2-4	YHT-2210	–	TP-003
					AWG16 (1.25 mm²)			–	
	⏚	M4	1.2 to 1.4	10 mm max.	AWG14 (2.0 mm²)	R2-4	YHT-2210	–	–
470A, 550A	Terminal block	M5	2.2 to 2.4	13 mm max.	AWG4 (22 mm²)	22-S5	YPT-60N	TD-123 TD-112	TP-022
					AWG6 (14 mm²)	R14-5		TD-122 TD-111	TP-014
					AWG8 (8.0 mm²)	R8-5		TD-121 TD-111	TP-008
					AWG10 (5.5 mm²)	R5.5-5	YHT-2210	–	TP-005
					AWG14 (2.0 mm²)	R2-5		–	TP-003
					AWG16 (1.25 mm²)			–	
	⏚	M5	2.2 to 2.4	12 mm max.	AWG14 (2.0 mm²)	R2-5	YHT-2210	–	–

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SERVOPACK Model: SGDXS-	Main Circuit Terminals	Screw Size	Tightening Torque [N·m]	Crimp Terminal Horizontal Width	Recommended Wire Size	Crimp Terminal Model *1	Crimping Tool *1	Die *1	Insulating Sleeve Model *2
590A, 780A	Terminal block	M6	2.7 to 3.0	18 mm max.	AWG3 (30 mm²)	38-S6	YPT-60N	TD-124 TD-112	TP-038
					AWG4 (22 mm²)	R22-6		TD-123 TD-112	TP-022
					AWG8 (8.0 mm²)	R8-6		TD-121 TD-111	TP-008
					AWG10 (5.5 mm²)	R5.5-6	YHT-2210	–	TP-005
					AWG14 (2.0 mm²)	R2-6		–	TP-003
					AWG16 (1.25 mm²)			–	
	⏚	M6	2.7 to 3.0	12 mm max.	AWG14 (2.0 mm²)	R2-6	YHT-2210	–	–

*1 Manufactured by J.S.T. Mfg. Co., Ltd..
*2 Manufactured by Tokyo Dip Co., Ltd..

14.4.2 Σ-XS SERVOPACKs for Use with Single-Phase, 200-VAC

SERVOPACK Model: SGDXS-	Main Circuit Terminals	Screw Size	Tightening Torque [N·m]	Crimp Terminal Horizontal Width	Recommended Wire Size	Crimp Terminal Model *1	Crimping Tool *1	Die *1	Insulating Sleeve Model *2
R70A, R90A, 1R6A, 2R8A, 5R5A, 120A □□□ 0008	Connectors	-							
	⏚	M4	1.2 to 1.4	10 mm max.	AWG14 (2.0 mm²)	R2-4	YHT-2210	–	–

*1 Manufactured by J.S.T. Mfg. Co., Ltd..
*2 Manufactured by Tokyo Dip Co., Ltd..

14.4.3 Σ-XW SERVOPACKs for Use with Three-Phase, 200-VAC or 270-VDC Power Supply Input

SERVOPACK Model: SGDXW-	Main Circuit Terminals	Screw Size	Tightening Torque [N·m]	Crimp Terminal Horizontal Width	Recommended Wire Size	Crimp Terminal Model *1	Crimping Tool *1	Die *1	Insulating Sleeve Model *2
1R6A, 2R8A, 5R5A, 7R6A	Connectors	–							
	⏚	M4	1.2 to 1.4	10 mm max.	AWG14 (2.0 mm²)	R2-4	YHT-2210	–	–

*1 Manufactured by J.S.T. Mfg. Co., Ltd..
*2 Manufactured by Tokyo Dip Co., Ltd..

14.4.4 Σ-XW SERVOPACKs for Use with Single-Phase, 200-VAC

SERVOPACK Model: SGDXW-	Main Circuit Terminals	Screw Size	Tightening Torque [N·m]	Crimp Terminal Horizontal Width	Recommended Wire Size	Crimp Terminal Model *1	Crimping Tool *1	Die *1	Insulating Sleeve Model *2
1R6A, 2R8A, 5R5A	Connectors	–							
	⏚	M4	1.2 to 1.4	10 mm max.	AWG14 (2.0 mm²)	R2-4	YHT-2210	–	–

*1 Manufactured by J.S.T. Mfg. Co., Ltd..
*2 Manufactured by Tokyo Dip Co., Ltd..

14.4.5 Σ-XT SERVOPACKs for Use with Three-Phase, 200-VAC, Single-Phase, 200-VAC or 270-VDC Power Supply Input

SERVOPACK Model: SGDXT-	Main Circuit Terminals	Screw Size	Tightening Torque [N·m]	Crimp Terminal Horizontal Width	Recommended Wire Size	Crimp Terminal Model *1	Crimping Tool *1	Die *1	Insulating Sleeve Model *2
1R6A or 2R8A	Connectors	–							
	⏚	M4	1.2 to 1.4	10 mm max.	AWG14 (2.0 mm²)	R2-4	YHT-2210	–	–

*1 Manufactured by J.S.T. Mfg. Co., Ltd..
*2 Manufactured by Tokyo Dip Co., Ltd..

14.4.6 Σ-XS SERVOPACKs for Use with Three-Phase, 400-VAC or 540-VDC Power Supply Input

SERVOPACK Model SGDXS-	Main Circuit Terminals	Screw Size	Tightening Torque [N·m]	Crimp Terminal Horizontal Width	Recommended Wire Size	Crimp Terminal Model *1	Crimping Tool *1	Die *1	Insulating Sleeve Model *2
1R9D, 3R5D, 5R4D	Connectors	–							
	⏚	M4	1.2 to 1.4	10 mm max.	AWG14 (2.0 mm²)	R2-4	YHT-2210	–	–
8R4D, 120D, 170D	Terminal block	M4	1.4	10 mm max.	AWG10 (5.5 mm²)	R5.5-4	YHT-2210	–	TP-005
					AWG12 (3.5 mm²)				
					AWG14 (2.0 mm²)	R2-4			TP-003
					AWG16 (1.25 mm²)	R1.25-4			
	⏚	M4	1.2 to 1.4	10 mm max.	AWG14 (2.0 mm²)	R2-4	YHT-2210	–	TP-003
					AWG7 (10 mm²)	8-4NS	YPT-60N	TD-122 TD-111	TP-008

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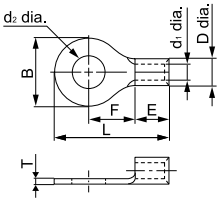
SERVO-PACK Model SGDXS-	Main Circuit Terminals	Screw Size	Tightening Torque [N·m]	Crimp Terminal Horizontal Width	Recommended Wire Size	Crimp Terminal Model *1	Crimping Tool *1	Die *1	Insulating Sleeve Model *2
210D, 260D, 280D, 370D	Terminal block	M6	5	17 mm max.	AWG6 (14 mm²)	R14-6	YPT-60N	TD-122 TD-111	TP-014
					AWG8 (8.0 mm²)	R8-6		TD-121 TD-111	TP-008
					AWG10 (5.5 mm²)	R5.5-6	YHT-2210	–	TP-005
					AWG12 (3.5 mm²)				
		M4	1.4	8.6 mm max.	AWG16 (1.25 mm²)	R1.25-4	YHT-2210	-	TP-003
	⏚	M6	2.7 to 3	17 mm max.	AWG7 (10 mm²)	R8-6	YPT-60N	TD-121 TD-111	TP-008
					AWG6 (14 mm²)	R14-6		TD-122 TD-111	TP-014
				12 mm max.	AWG14 (2.0 mm²)	R2-6	YHT-2210	-	-

*1 Manufactured by J.S.T. Mfg. Co., Ltd..
*2 Manufactured by Tokyo Dip Co., Ltd..

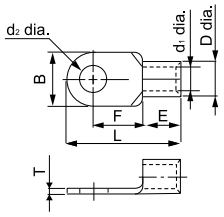
14.4.7 Crimp Terminal Dimensional Drawings

(1) Crimp Terminal Model: R1.25-4, 2-M4, R2-4, R2-5, R2-6, 5.5-S4, R5.5-5, R5.5-6



Crimp Terminal Model	Dimensions (mm)							
	d_2 dia.	B	L	F	E	D dia.	d_1 dia.	T
R1.25-4	4.3	8.0	15.8	7.0	4.8	3.4	1.7	0.8
2-M4		6.6	14.4	6.3		4.1	2.3	
R2-4		8.5	16.8	7.8				
R2-5	5.3	9.5	16.8	7.3				
R2-6	6.4	12.0	21.8	11.0				
5.5-S4	4.3	7.2	15.7	5.9	6.2	5.6	3.4	1.0
R5.5-5	5.3	9.5	19.8	8.3	6.8			
R5.5-6	6.4	12.0	25.8	13.0				

(2) Crimp Terminal Model: 8-4NS, R8-5, R8-6, R14-5, R14-6, 22-S5, R22-6, 38-S6



Crimp Terminal Model	Dimensions (mm)							
	d_2 dia.	B	L	F	E	D dia.	d_1 dia.	T
8-4NS	4.3	8.0	21.8	9.3	8.5	7.1	4.5	1.2
R8-5	5.3	12.0	23.8					
R8-6	6.4							
R14-5	5.3		29.8	13.3	10.5	9.0	5.8	1.5
R14-6	6.4							
22-S5	5.3		30.0	12.0	12.0	11.5	7.7	1.8
R22-6	6.4	16.5	33.7	13.5				
38-S6		15.5	38.0	16.0	14.0	13.3	9.4	

14.5 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 circuit breaker taking into account the grounding conditions and the leakage current from the noise filter.

14.5.1 Selection Table

(1) Σ-XS SERVOPACKs for Use with Three-Phase, 200-VAC or Single-Phase, 200-VAC

Main Circuit Power Supply	SERVOPACK		Order Number	Specification	Mass	Leakage Current	Manufacturer	Inquiries
	Maximum Applicable Motor Capacity [kW]	Model SGDXS-						
Three-phase, 200 VAC	0.05	R70A	HF3010C-SZC	Three-phase, 500 VAC, 10A	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						
	3.0	200A	HF3030C-SZC	Three-phase, 500 VAC, 30 A	1.4 kg			
	5.0	330A	HF3050C-SZC-47EDD	Three-phase, 500 VAC, 50 A	2.0 kg	8 mA 200 VAC/60 Hz		
	6.0	470A						
	7.5	550A	HF3060C-SZC	Three-phase, 500 VAC, 60 A	2.1 kg	4 mA 200 VAC/60 Hz		
	11	590A	HF3100C-SZC	Three-phase, 500 VAC, 100 A	5.8 kg			
	15	780A						
Single-phase, 200 VAC	0.05	R70A	HF2010A-UPF	Single-phase, 250 VAC, 10 A	0.5 kg	1.2mA 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	3 mA 250 VAC/60 Hz		
	1.5	120A□□□00-08	HF2030A-UPF-2BB	Single-phase, 250 VAC, 30 A	0.8 kg			

(2) Σ-XW SERVOPACKs for Use with Three-Phase, 200-VAC or Single-Phase, 200-VAC

Main Circuit Power Supply	SERVOPACK		Order Number	Specification	Mass	Leakage Current	Manufacturer	Inquiries
	Maximum Applicable Motor Capacity [kW]	Model SGDXW-						
Three-phase, 200 VAC	0.2	1R6A	HF3010C-SZC	Three-phase, 500 VAC, 10A	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	1.2mA 250 VAC/60 Hz		
	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			

(3) Σ-XT SERVOPACKs for Use with Three-Phase, 200-VAC or Single-Phase, 200-VAC

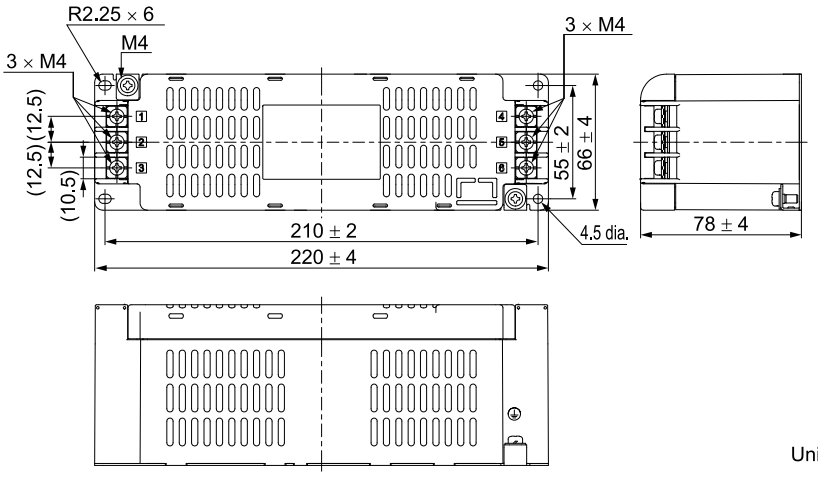
Main Circuit Power Supply	SERVOPACK		Order Number	Specification	Mass	Leakage Current	Manufacturer	Inquiries
	Maximum Applicable Motor Capacity [kW]	Model SGDXT-						
Three-phase, 200 VAC	0.2	1R6A	HF3020C-SZC	Three-phase, 500 VAC, 20 A	1.4 kg	4 mA 200 VAC/60 Hz	Soshin Electric Co., Ltd.	Yaskawa representative
	0.4	2R8A						
Single-phase, 200 VAC	0.2	1R6A	HF2020A-UPF-2BB	Single-phase, 250 VAC, 20 A	0.8 kg	3 mA 250 VAC/60 Hz		
	0.4	2R8A	HF2030A-UPF-2BB	Single-phase, 250 VAC, 30 A	0.8 kg			

(4) Σ-XS SERVOPACKs for Use with Three-Phase, 400-VAC

Main Circuit Power Supply	SERVOPACK		Order Number	Specification	Mass	Leakage Current	Manufacturer	Inquiries
	Maximum Applicable Motor Capacity [kW]	Model SGDXS-						
Three-phase, 400 VAC	0.5	1R9D	FN3288-10-44-C21-R65	Three-phase, 480 VAC, 10 A	0.8 kg	0.4 mA 530 VAC/50 Hz	Schaffner EMC Co., Ltd.	Yaskawa representative
	1.0	3R5D						
	1.5	5R4D						
	2.0	8R4D	FN3288-16-44-C17-R65	Three-phase, 480 VAC, 16 A	1.0 kg	0.1 mA 530 VAC/50 Hz		
	3.0	120D						
	5.0	170D	FN3120H-50-53	Three-phase, 480 VAC, 50 A	2.7 kg	10.5 mA 520 VAC/50 Hz		
	6.0	210D	HF3050C-UQC	Three-phase, 480 VAC, 50 A	4.0 kg	10 mA 400 VAC/50 Hz	Soshin Electric Co., Ltd.	
	7.5	260D						
	11	280D	HF3080C-UQB	Three-phase, 480 VAC, 80 A	9.0 kg			
	15	370D						

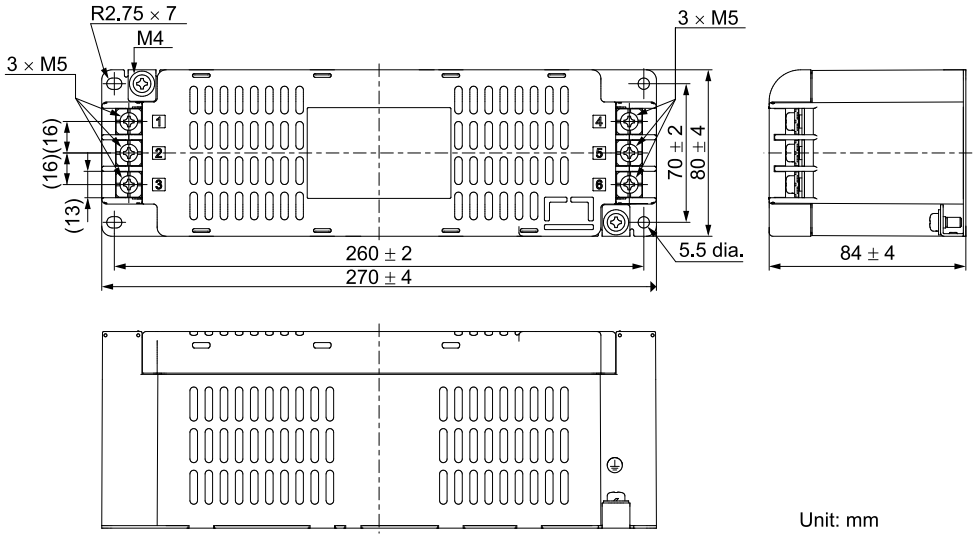
14.5.2 External Dimensions

(1) Model: HF3010C-SZC, HF3020C-SZC, HF3030C-SZC



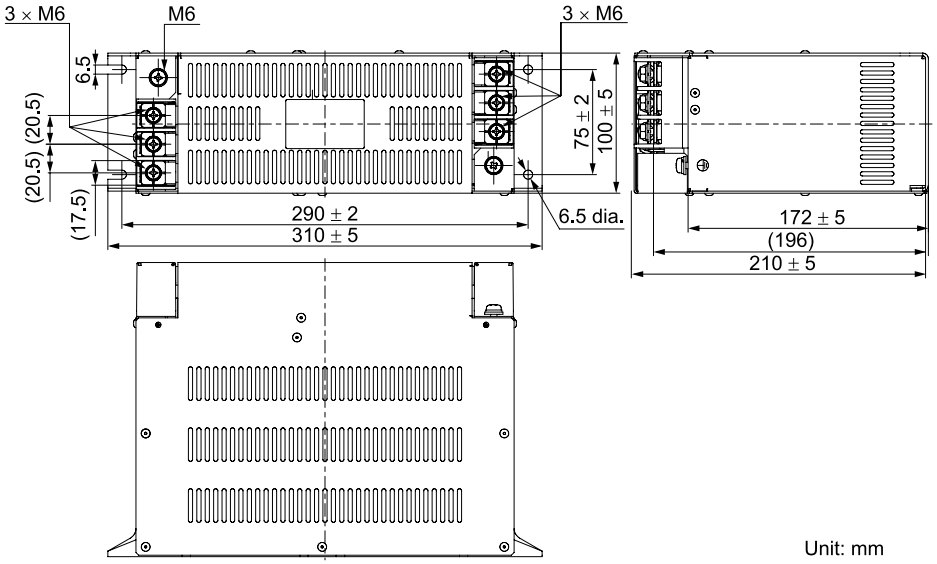
Unit: mm

(2) Model: HF3050C-SZC-47EDD, HF3060C-SZC



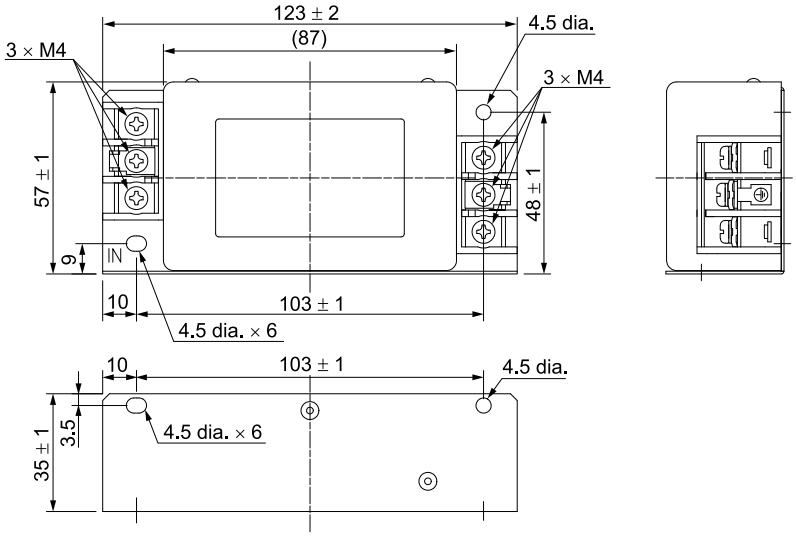
Unit: mm

(3) Model: HF3100C-SZC



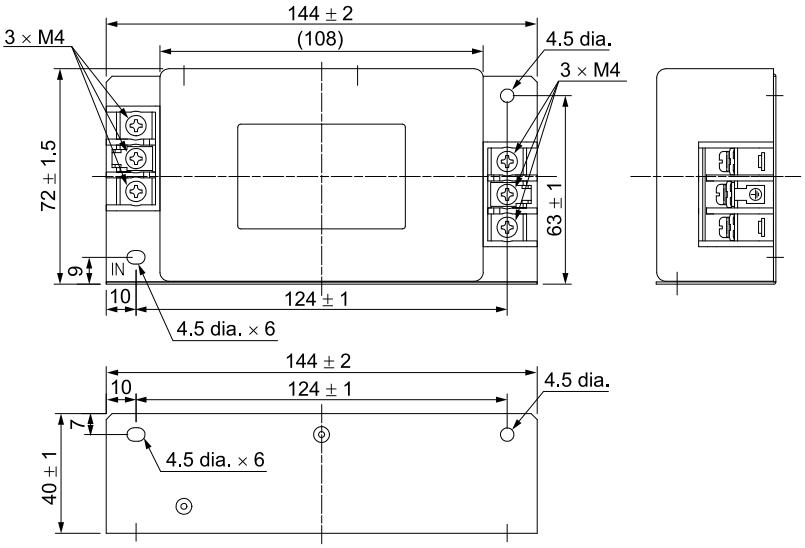
Unit: mm

(4) Model: HF2010A-UPF



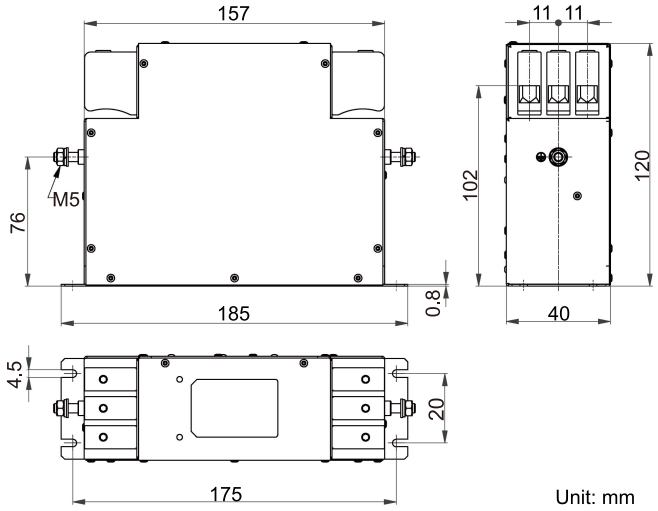
Unit: mm

(5) Model: HF2020A-UPF-2BB, HF2030A-UPF-2BB



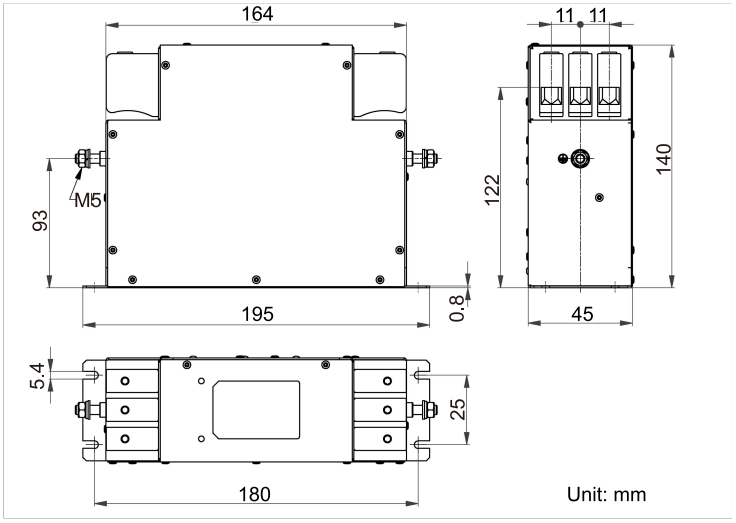
Unit: mm

(6) Model: FN3288-10-44-C21-R65



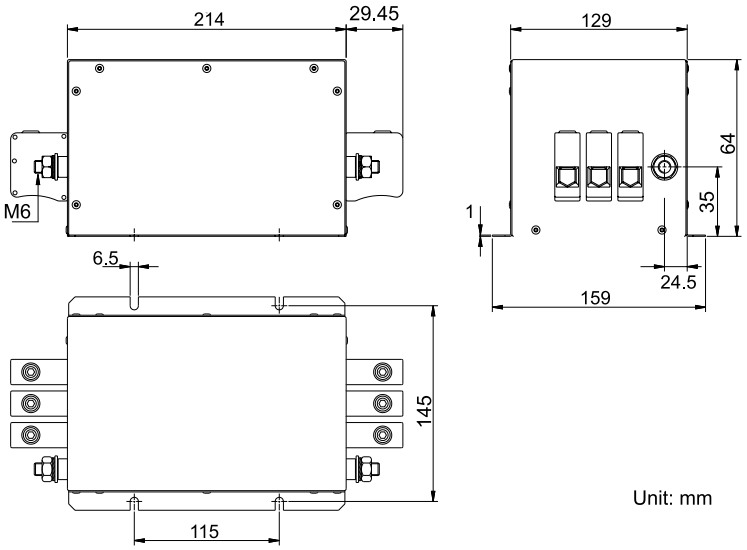
Unit: mm

(7) Model: FN3288-16-44-C17-R65



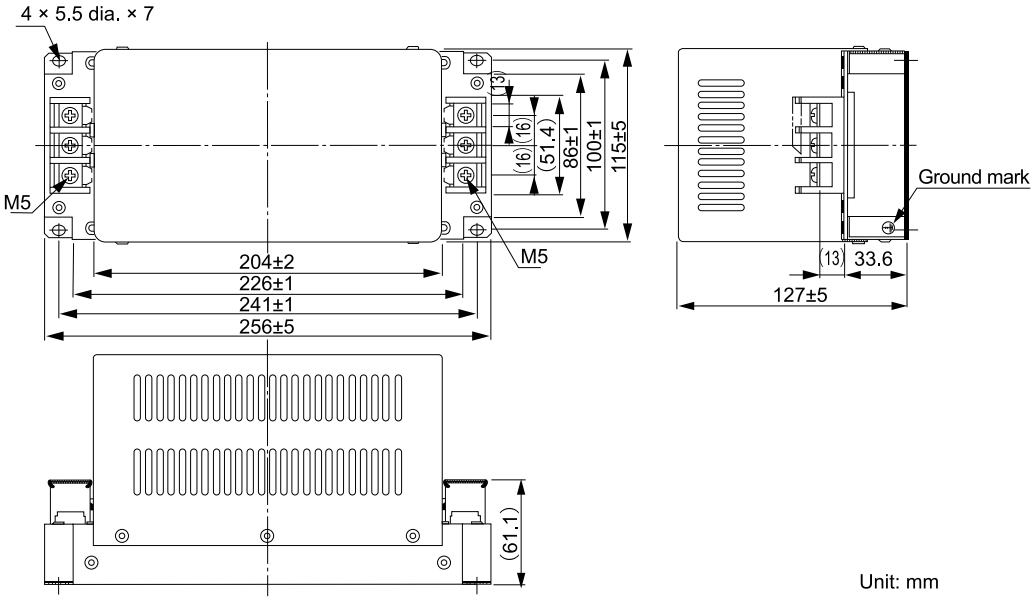
Unit: mm

(8) Model: FN3120H-50-53



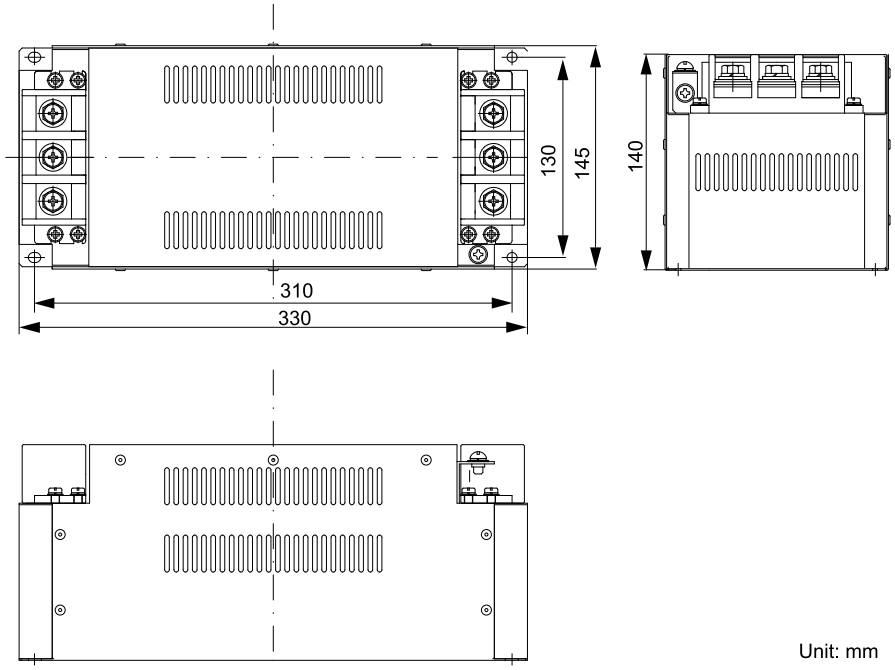
Unit: mm

(9) Model: HF3050C-UQC



Unit: mm

(10) Model: HF3080C-UQB



Unit: mm

14.6 AC/DC Reactors

Use the Reactors listed in the following tables if harmonic suppression is required.

14.6.1 Selection Table

(1) Σ-XS SERVOPACKs for Use with Three-Phase, 200-VAC

SERVOPACK		DC Reactors				
Maximum Applicable Motor Capacity [kW]	Model SGDXS-	Order Number	Inductance [mH]	Rated Current [Arms]	Mass	Terminal Screw Size
0.05	R70A	X5061	2.0	4.8	0.5 kg	M4
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
2.0	180A					
3.0	200A	X5059	1.0	14.0	1.1 kg	M5
5.0	330A	X5068	0.47	26.8	1.9 kg	M6
6.0	470A	X008025	0.49	28.3	2.6 kg	M6
7.5	550A	X008026	0.43	35.5	2.9 kg	M6
11	590A	X008027	0.32	49.7	3.5 kg	M6
15	780A	X008028	0.26	72.6	4.0 kg	M6

(2) Σ-XS SERVOPACKs for Use with Single-Phase, 200-VAC

SERVOPACK		DC Reactors				
Maximum Applicable Motor Capacity [kW]	Model SGDXS-	Order Number	Inductance [mH]	Rated Current [Arms]	Mass	Terminal Screw Size
0.05	R70A	X5071	40.0	0.85	0.5 kg	M4
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□□□0008	X5078	2.5	10.5	2.0 kg	M5

(3) Σ-XW SERVOPACKs for Use with Three-Phase, 200-VAC

SERVOPACK		DC Reactors				
Maximum Applicable Motor Capacity [kW]	Model SGDXW-	Order Number	Inductance [mH]	Rated Current [Arms]	Mass	Terminal Screw Size
0.2	1R6A	X5061	2.0	4.8	0.5 kg	M4
0.4	2R8A					
0.75	5R5A	X5060	1.5	8.8	1.0 kg	M4
1.0	7R6A					

(4) Σ-XW SERVOPACKs for Use with Single-Phase, 200-VAC

SERVOPACK		DC Reactors				
Maximum Applicable Motor Capacity [kW]	Model SGDXW-	Order Number	Inductance [mH]	Rated Current [Arms]	Mass	Terminal Screw Size
0.2	1R6A	X5069	10.0	3.3	1.0 kg	M4
0.4	2R8A	X5079	4.0	5.3	1.2 kg	M4
0.75	5R5A	X5078	2.5	10.5	2.0 kg	M5

(5) Σ-XT SERVOPACKs for Use with Three-Phase, 200-VAC

SERVOPACKs		DC Reactors				
Maximum Applicable Motor Capacity [kW]	Model SGDXT-	Order Number	Inductance [mH]	Rated Current [Arms]	Mass	Terminal Screw Size
0.2	1R6A	X5061	2.0	4.8	0.5 kg	M4
0.4	2R8A	X5060	1.5	8.8	1.0 kg	M4

(6) Σ-XT SERVOPACKs for Use with Single-Phase, 200-VAC

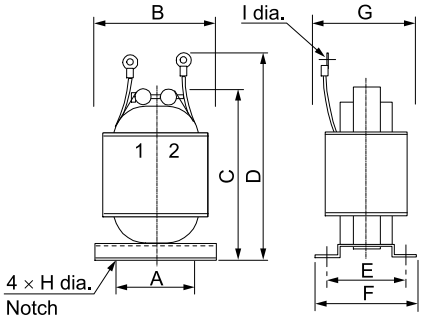
SERVOPACKs		DC Reactors				
Maximum Applicable Motor Capacity [kW]	Model SGDXT-	Order Number	Inductance [mH]	Rated Current [Arms]	Mass	Terminal Screw Size
0.2	1R6A	X5079	4.0	5.3	1.2 kg	M4
0.4	2R8A	X5078	2.5	10.5	2.0 kg	M5

(7) Σ-XS SERVOPACKs for Use with Three-Phase, 400-VAC

SERVOPACKs		DC Reactors				
Maximum Applicable Motor Capacity [kW] *1	Model SGDXS-	Order Number	Inductance [mH]	Rated Current [Arms]	Mass	Terminal Screw Size
0.5	1R9D	X5074	4.7	4.7	0.3 kg	M4
1.0	3R5D	X5075	3.3	4.5	0.9 kg	M4
1.5	5R4D					
2.0	8R4D	X5076	2.2	8.6	1.1 kg	M4
3.0	120D					
5.0	170D	X5077	1.5	14.1	1.9 kg	M5

*1 DC reactors of 6 kW or more are in preparation.

14.6.2 External Dimensions



Unit: mm

AC/DC Reactors Order Number	External Dimensions [mm]									Approx. mass [kg]
	A	B	C	D	E	F	G	H	I	
X5059	50	74	125	140	35	45	60	5	5.3	1.1
X5060	40	59	105	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
X5074	30	47	70	85	28	38	45	4	4.3	0.3
X5075	40	59	100	120	40	50	55	4	4.3	0.9
X5076	50	74	125	140	35	45	60	5	4.3	1.1
X5077	50	74	125	155	53	66	75	5	5.3	1.9
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

Continued on next page.

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AC/DC Reactors Order Number	External Dimensions [mm]									Approx. mass [kg]
	A	B	C	D	E	F	G	H	I	
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

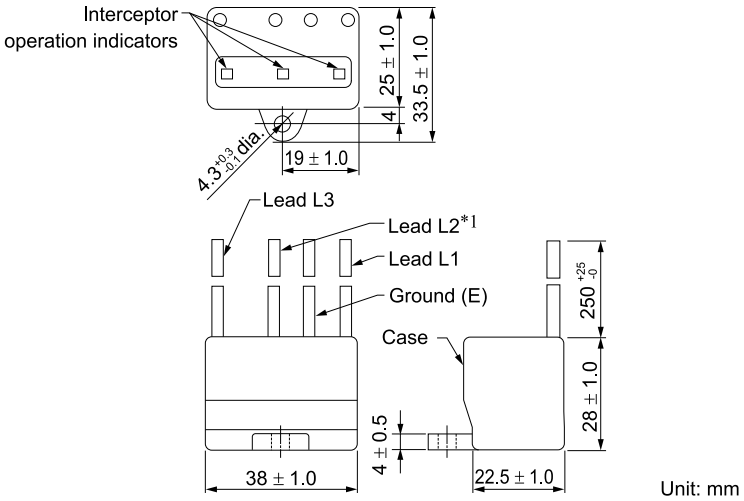
14.7 Surge Absorbers

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.

14.7.1 Selection Table

Main Circuit Power Supply	SERVOPACK Model: SGDXS- SGDXW- SGDXT-	Order Number (Recommended Product)	Manufacturer	Inquiries
Three-phase, 200 VAC	□□□A	LT-C32G801WS	Soshin Electric Co., Ltd.	Yaskawa representative
Single-phase, 200 VAC		LT-C12G801WS		
Three-phase, 400 VAC	□□□D	LT-C35G102WS		

14.7.2 External Dimensions

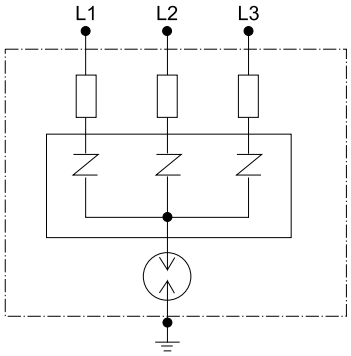


*1 The LT-C12G801WS does not have lead L2.

Note:

The wire size for all of the leads (L1, L2, and L3) and the ground wire (E) is AWG16 (UL1015).

14.7.3 Internal Cables Connections



14.8 Regenerative Resistor

If the regenerative power exceeds the amount that can be absorbed by charging the smoothing capacitor, a regenerative resistor is used.

14.8.1 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:

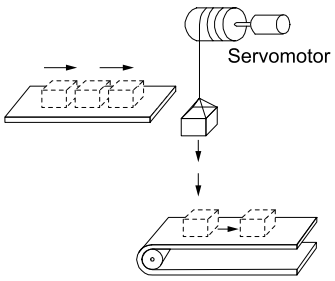
- While decelerating to a stop during acceleration/deceleration operation.
- While performing continuous downward operation on a vertical axis.
- During continuous operation in which the servomotor is rotated by the load (i.e., a negative load).

Important

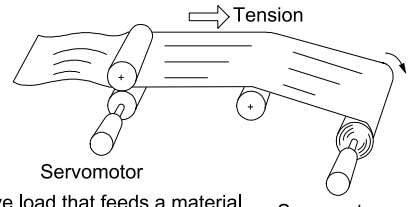
You cannot use the resistance regeneration provided by the SERVOPACK for continuous regeneration. For continuous operation with a negative load, you must design a system that also includes a power regenerative converter or power regenerative unit. If regenerative power is not appropriately processed, 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

14.8.2 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.
  They are used when calculations using Yaskawa's SigmaSize+, an AC servo capacity selection program, have shown that regenerative resistance is required.

  Note:

  • Contact your Yaskawa representative for information on SigmaSize+.

  • If you use an external regenerative resistor, you must change the setting of SERVOPACK parameters Pn600 (regenerative resistor capacity) and Pn603 (regenerative resistance).

14.8.3 Selection Table

SERVOPACK Model			Built-In Regenerative Resistor	External Regenerative Resistor	Description
SGDXS-	SGDXW-	SGDXT-			
R70A, R90A, 1R6A, or 2R8A	–	–	Not provided.	Basically not required.	There is no built-in regenerative resistor, but normally an external regenerative resistor is not required. Install an external regenerative resistor when the smoothing capacitor in the SERVOPACK cannot consume all the regenerative power. *1
3R8A, 5R5A, 7R6A, 120A, 180A, 200A, 330A, 1R9D, 3R5D, 5R4D, 8R4D, 120D, 170D	1R6A, 2R8A, 5R5A, 7R6A	1R6A or 2R8A	Standard feature *2	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. *1
470A, 550A, 590A, 780A, 210D, 260D, 280D, 370D	-	–	Not provided.	Required. *3	There is no built-in regenerative resistor. An external regenerative resistor is required. If an external regenerative resistor is not connected, Regeneration Error [A.300] will be displayed.

*1 Use Yaskawa's SigmaSize+, an AC servo capacity selection program, to select an external regenerative resistor. Contact your Yaskawa representative for information on SigmaSize+.

*2 Refer to the following section for the specifications of built-in regenerative resistors.
☞ *14.8.4 Specifications of Built-in Regenerative Resistors in SERVOPACKs on page 524*

*3 Regenerative resistor units are available from Yaskawa. For details, refer to the following section.
☞ *(4) Regenerative Resistor Unit on page 527*

14.8.4 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]
SGDXS-	Resistance [Ω]	Capacity [W]		
R70A, R90A, 1R6A, or 2R8A	–	–	–	40
3R8A, 5R5A, or 7R6A	35	60	15	35
120A	20	60	30	20
180A	12	60	30	12
200A	10	60	30	10
330A	6	180	36	6
470A	(5) *1	(880) *1	(180) *1	5
550A, 590A, 780A	(3.13) *2	(1760) *2	(350) *2	2.9
1R9D, 3R5D, or 5R4D	56	70	14	56
8R4D or 120D	33	180	28	33
170D	22		36	22
210D or 260D	(12) *3	(880) *3	(180) *3	12
280D or 370D	(10) *4	(1760) *4	(350) *4	10

*1 The values in parentheses ( ) are for the optional JUSP-RA29-E regenerative resistor unit.
*2 The values in parentheses ( ) are for the optional JUSP-RA05-E regenerative resistor unit.
*3 The values in parentheses ( ) are for the optional JUSP-RA30-E regenerative resistor unit.
*4 The values in parentheses ( ) are for the optional JUSP-RA31-E regenerative resistor unit.

SERVOPACK Model:	Built-In Regenerative Resistor		Regenerative Power Processing Capacity of Built-in Regenerative Resistor [W]	Minimum Allowable Resistance [Ω]
SGDXW-	Resistance [Ω]	Capacity [W]		
1R6A or 2R8A	35	60	20	35
5R5A or 7R6A	12	70	25	12

SERVOPACK Model	Built-in Regenerative Resistor		Regenerative Power Processing Capacity of Built-in Regenerative Resistor [W]	Minimum Allowable Resistance [Ω]
SGDXT-	Resistance [Ω]	Capacity [W]		
1R6A or 2R8A	12	70	14	12

14.8.5 Specifications and Dimensions of External Regenerative Resistors

(1) Selection Table

Model	Specification	Mass	Wire Size	Manufacturer
RH120	70 W, 1 Ω to 100 Ω	282 g	AWG16 (1.25 mm^2)	Iwaki Musen Kenkyusho Co., Ltd.
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)	

RH120 (Model) 10Ω (Resistance) J (Resistance Tolerance)

Code	Specification
K	±10%
J	±5%
H*1	±3%

*1 An external regenerative resistor with resistance tolerance H (±3%) is not available for the RH450FY.

(2) 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.

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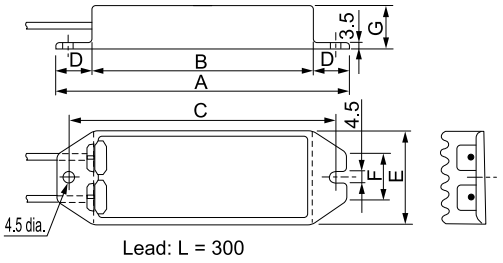
Item	Specification
Short-Duration Overload	10 times the rated power applied for 5 s: ΔR: ±(2% + 0.05 Ω)
Service Life	1,000 hours at ratings, 90 min ON, 30 min OFF: ΔR: ±(5% + 0.05 Ω)
Flame Resistance	There must be no ignition when 10 times the rated power is applied for 1 min.
Surrounding Air Temperature Range	-25°C to 150°C

(3) External Dimensions

(a) Model: RH120, 150, 220

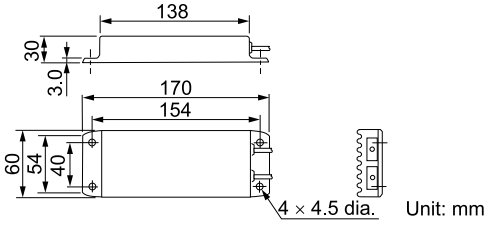


Lead: L = 300

Model	Rated Power	Resistance Range	Wire Size
RH120	70 W	1 Ω to 100 Ω	AWG16 (1.25 mm²)
RH150	90 W		AWG14 (2.0 mm²)
RH220	120 W		AWG16 (1.25 mm²)

External Dimensions [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

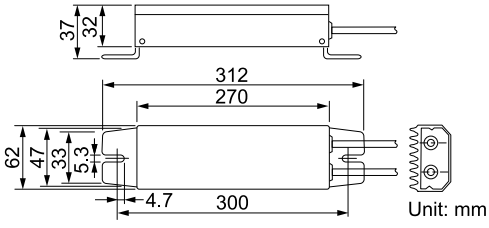
(b) Model: RH220B



Unit: mm

Lead: L = 500
Rated power: 120 W
Resistance range: 1 Ω to 100 Ω
Wire size: AWG14 (2.0 mm²)
Mass: 495 g

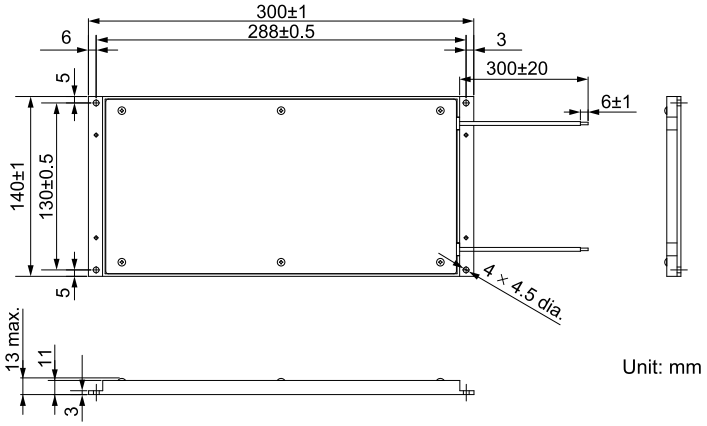
(c) Model: RH300C



Unit: mm

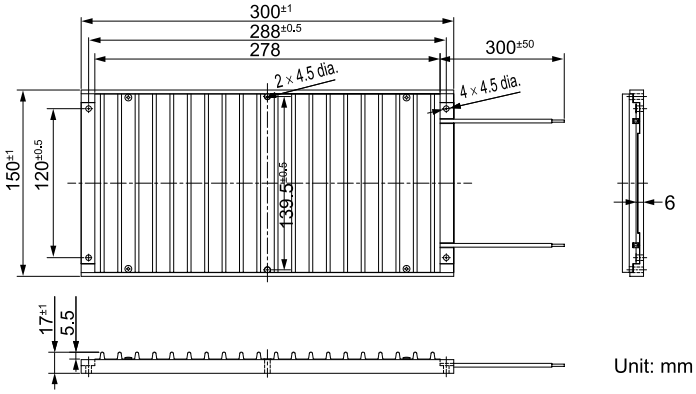
Lead: L = 300
Rated power: 200 W
Resistance range: 1 Ω to 10 kΩ
Wire size: AWG14 (2.0 mm²)
Mass: 850 g

(d) Model: RH450



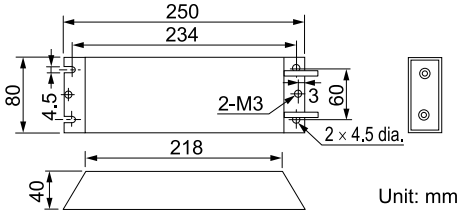
Lead: L = 300
Rated power: 150 W
Resistance range: 1 Ω to 100 Ω
Wire size: AWG14 (2.0 mm²)
Mass: 880 g

(e) Model: RH450FY



Lead: L = 300
Rated power: 150 W
Resistance range: 2 Ω to 100 Ω
Wire size: AWG14 (2.0 mm²)
Mass: 1.3 kg

(f) Model: RH500



Lead: L = 450
Rated power: 300 W
Resistance range: 2 Ω to 50 Ω
Wire size: AWG14 (2.0 mm²)
Mass: 1.4 kg

(4) Regenerative Resistor Unit

Refer to the following table for the specifications of regenerative resistor units.

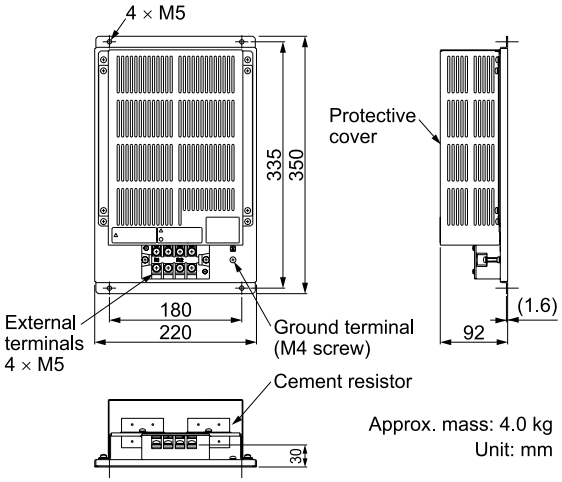
You do not need to change the setting of Pn600 (Regenerative Resistor Capacity) and Pn603 (Regenerative Resistance) when you use a regenerative resistor unit.

SERVOPACK Model: SGDXS-	Regenerative Resistor Unit Model	Specification	Allowable Power Loss
470A *1*	JUSP-RA29-E	5 Ω, 880 W	180 W
550A, 590A, 780A	JUSP-RA05-E	3.13 Ω, 1760 W	350 W
210D, 260D	JUSP-RA30-E	12 Ω, 880 W	180 W
280D, 370D	JUSP-RA31-E	10 Ω, 1760 W	350 W

*1 When replacing from Σ-7 etc., if you use the servomotor at rotation speeds below the maximum rotation speed of the Σ-7 servomotor, JUSP-RA04-E (6.25 Ω, 880 W) can be used. You need to change the setting of Pn603 (Regenerative Resistance) when you use JUSP-RA04-E (6.25 Ω, 880 W).

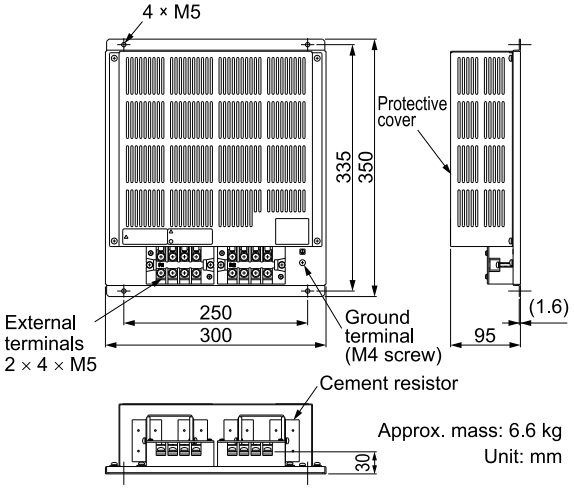
(a) External Dimensions

◆ JUSP-RA29-E



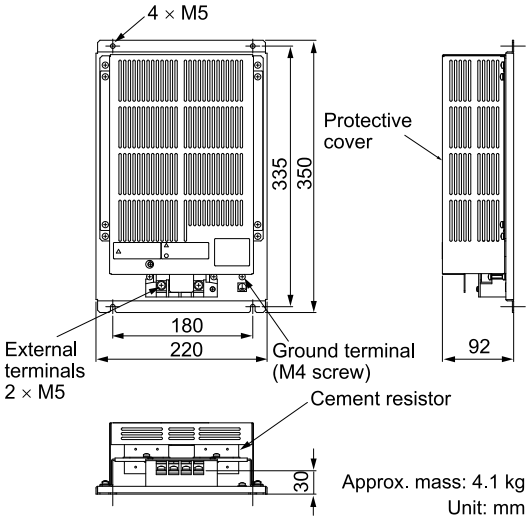
Approx. mass: 4.0 kg
Unit: mm

◆ JUSP-RA05-E



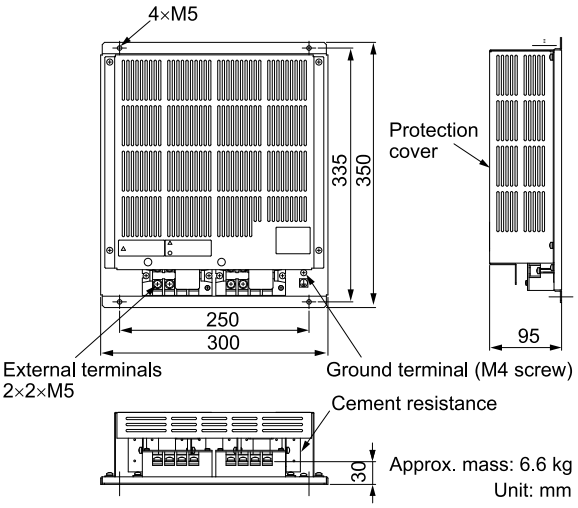
Approx. mass: 6.6 kg
Unit: mm

◆ JUSP-RA30-E



Approx. mass: 4.1 kg
Unit: mm

◆ **JUSP-RA31-E**



14.8.6 Selecting External Regenerative Resistor

You can use one of three methods to determine whether an external regenerative resistor is required.

☞ *(1) Calculating With Yaskawa's Support Tool SigmaSize+: AC Servo Capacity Selection Program on page 529*

☞ *(2) Simple Calculation on page 529*

☞ *(3) Calculating the Regenerative Energy on page 535*

(1) Calculating With Yaskawa's Support Tool SigmaSize+: AC Servo Capacity Selection Program

Using Yaskawa's support tool SigmaSize+, an AC servo capacity selection program, will allow you to use a wizard to calculate and select if external regenerative resistors are required or not.

Contact your Yaskawa representative for information on SigmaSize+.

(2) 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.

(a) SERVOPACK Models: SGDXS-R70A, -R90A, -1R6A, -2R8A,

Regenerative resistors are not built into the above SERVOPACKs. The total amount of energy that can be charged in the capacitors is given in the following table.

If the rotational energy (E_S) of the servomotor and load exceeds the processable regenerative energy, then connect an external regenerative resistor.

Applicable SERVOPACK		Processable Regenerative Energy (Joules)	Remarks
SGDXS-	R70A, R90A, 1R6A	24.2	Value when main circuit input voltage is 200 VAC
	2R8A	32.6	

Calculate the rotational energy (E_S) of the servo system with the following equation:

$E_S = J \times (n_M)^2/182$ (Joules)

- $J = J_M + J_L$
- J_M: Servomotor moment of inertia (kg·m^2)
- J_L: Load moment of inertia at motor shaft (kg·m^2)
- n_M: Servomotor operating motor speed (min^{-1})

(b) For SERVOPACK Models: SGDXS-3R8A, -5R5A, -7R6A, -120A, -180A, -200A, -330A, -470A, -550A, -590A, -780A, -1R9D, -3R5D, -5R4D, -5R4D, -120D, -170D, -210D, -260D, -280D, -370D, SGDXW-1R6A, -2R8A, -5R5A, -7R6A, SGDXT-1R6A, -2R8A

For the above SERVOPACK models, an external regenerative resistor may be required depending on the allowable frequency for regenerative operation. (For SGDXS-470A, -550A, -590A, -780A, it is assumed that a regenerative resistor unit is connected.)

Use the following equation to calculate the allowable frequency for regenerative operation.

$$\text{Allowable frequency} = \frac{\text{Allowable frequency for regenerative operation for servomotor without load}}{(1+n)} \times \left(\frac{\text{Maximum motor speed}}{\text{Operating motor speed}}\right)^2 \text{(time/min)}$$

- $n = J_L/J_M$
- J_M: Servomotor moment of inertia (kg·m^2)
- J_L: Load moment of inertia at motor shaft (kg·m^2)

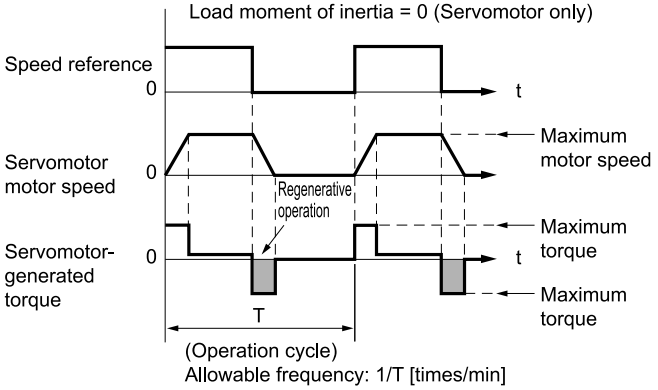
The allowable frequency for regenerative operation for a servomotor without load is explained below.

The operating conditions are acceleration and deceleration in an operation cycle with motor speed: 0 → specified motor speed → 0 (min^{-1}) as shown in the graph.

If the frequency (1/T) of the operation cycle is greater than the allowable frequency of the calculated result, an external regenerative resistor is required.

Finally, 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.

If the specified motor speed is not designated, calculate by using the specified motor speed = maximum motor speed.



Operating Conditions for Calculating the Allowable Regenerative Frequency

Information **Allowable frequency for regenerative operation by a single servomotor without a load (described later)**

For SGDXS-470A, -550A, -590A, -780A, -210D, -260D, -280D, -370D, the values listed are with the optional regenerative resistor unit connected. Refer to the following sections for details on regenerative resistor unit.

☞ *(4) Regenerative Resistor Unit on page 527*

◆ Rotary Servomotors

- SGMXJ Servomotors

Servomotor Model SGMXJ-	Specified Motor Speed	Allowable Frequency for Regenerative Operation for Servomotor Without Load (count/min)		
		Single-axis Operation	Simultaneous Operation of Two Axes	Simultaneous Operation of Three Axes
A5A	6000	–	300	300
01A	6000	–	180	180
C2A	6000	–	130	130
02A	6000	–	46	46
04A	6000	–	25	25
06A	6000	30	30	–
08A	6000	15	15	–

- SGMXA Servomotors

Servomotor Model SGMXA-	Specified Motor Speed	Allowable Frequency for Regenerative Operation for Servomotor Without Load (count/min)		
		Single-axis Operation	Simultaneous Operation of Two Axes	Simultaneous Operation of Three Axes
A5A	6000	–	560	560
01A	6000	–	360	360
C2A	6000	–	260	260
02A	6000	–	87	87
04A	6000	–	56	56
06A	6000	77	77	–
08A	6000	31	31	–
10A	6000	31	–	–
15A	6000	15	–	–
20A	6000	19	–	–
25A	6000	15	–	–
30A	6000	6.9	–	–
40A	6000	11	–	–
50A	6000	8.8	–	–
70A	6000	86	–	–
15D	6000	21	–	–
20D	6000	34	–	–
25D	6000	26	–	–
30D	6000	12	–	–
40D	6000	11	–	–
50D	6000	8.8	–	–

- SGMXP Servomotors

Servomotor Model SGMXP-	Specified Motor Speed	Allowable Frequency for Regenerative Operation for Servomotor Without Load (count/min)		
		Single-axis Operation	Simultaneous Operation of Two Axes	Simultaneous Operation of Three Axes
01A	6000	–	200	200
02A	6000	–	46	46
04A	6000	–	29	29
08A	6000	11	11	–
15A	6000	7.5	–	–
02D	6000	160	–	–
04D	6000	100	–	–
08D	6000	20	–	–
15D	6000	10	–	–

- SGMXG Servomotors

Servomotor Model SGMXG-	Specified Motor Speed	Allowable Frequency for Regenerative Operation for Servomotor Without Load (count/min)	
		Single-axis Operation	Simultaneous Operation of Two Axes
03A	3000	39	39
05A	3000	29	29
09A	3000	6.9	6.9
13A	3000	6.1	–
20A	3000	7.4	–
30A	3000	9.5	–
44A	3000	6.4	–
55A	3000	24	–
75A	3000	34	–
1AA	2000	39	–
1EA	2000	31	–
05D	3000	51	–
09D	3000	12	–
13D	3000	8.5	–
20D	3000	13	–
30D	3000	7.4	–
44D	3000	6.4	–
55D	3000	24	–
75D	3000	17	–
1AD	2000	39	–
1ED	2000	31	–

◆ Direct Drive Servomotors

- SGM7D Servomotors

Servomotor Model SGM7D-	Allowable Frequency for Regenerative Operation for Servomotor Without Load (count/min)	
	Single-axis Operation	Simultaneous Operation of Two Axes
01G	–	–
1AF	120	–
1CI	74	–
1ZI	91	–
02K	–	–
03H	–	–
05G	–	–
06J	350	–
06L	–	–
07K	–	–
08G	430	–
08K	–	–
09J	250	–

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Servomotor Model SGM7D-	Allowable Frequency for Regenerative Operation for Servomotor Without Load (count/min)	
	Single-axis Operation	Simultaneous Operation of Two Axes
09J	–	–
12L	–	–
18G	350	–
18J	210	–
20J	200	–
24G	270	–
28I	52	–
2BI	89	–
2DI	110	–
30F	210	–
30L	63	–
38J	150	–
34G	220	–
45G	190	–
58F	170	–
70I	100	–
90F	140	–

- SGM7E Servomotors

Servomotor Model SGM7E-	Allowable Frequency for Regenerative Operation for Servomotor Without Load (count/min)	
	Single-axis Operation	Simultaneous Operation of Two Axes
02B	–	62
05B	–	34
07B	–	22
04C	–	22
08D	–	6.1
10C	–	19
14C	–	22
17D	–	7
25D	–	9.3
16E	3.7	3.7
35E	9.7	9.7

- SGM7F Servomotors

Servomotor Model SGM7F-	Allowable Frequency for Regenerative Operation for Servomotor Without Load (count/min)	
	Single-axis Operation	Simultaneous Operation of Two Axes
02A	–	150
05A	–	83
07A	–	62

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Servomotor Model SGM7F-	Allowable Frequency for Regenerative Operation for Servomotor Without Load (count/min)	
	Single-axis Operation	Simultaneous Operation of Two Axes
04B	–	75
08C	–	21
10B	–	48
14B	65	65
16D	13	13
17C	30	30
25C	31	31
35D	19	19
45M	25	25
80M	19	–
1AM	8.9	–
80N	22	–
1EN	11	–
2ZN	9.1	–

◆ Linear Servomotors

- SGLGW Servomotors

Servomotor Model SGLGW-		Allowable Frequency for Regenerative Operation for Servomotor without Load (count/min)	
		Single-Axis Operation	Simultaneous Operation of Two Axes
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	–
Using a High-Force Magnetic Way	40A140C	–	80
	40A253C	–	45
	40A365C	62	62
	60A140C	–	64
	60A253C	71	71
	60A365C	49	49

- SGLFW2 Servomotors

Servomotor Model SGLFW2-	Allowable Frequency for Regenerative Operation for Servomotor without Load (count/min)	
	Single-Axis Operation	Simultaneous Operation of Two Axes
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	–

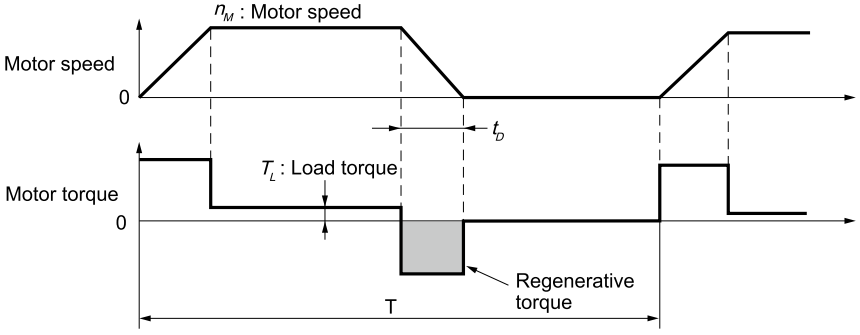
*1 This value is in combination with the SGDXS-120A.
*2 This value is in combination with the SGDXS-180A.

- SGLTW Servomotors

Servomotor Model SGLTW-	Allowable Frequency for Regenerative Operation for Servomotor without Load (count/min)	
	Single-Axis Operation	Simultaneous Operation of Two Axes
20A170A	15	15
20A320A	8.3	8.3
20A460A	7.1	–
35A170A	10	10
35A170H	8.5	8.5
35A320A	7	–
35A320H	5.9	–
35A460A	7.6	–
40A400B	13	–
40A600B	19	–
50A170H	15	15
50A320H	11	11

(3) 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	$E_L = (\pi/60)\, n_M T_L t_D$
3	Calculate the energy lost from servomotor winding resistance.	E_M	(Value calculated from the graphs in *(b) Servomotor Winding Resistance Loss on page 538*) × t_D
4	Calculate the energy that can be absorbed by the SERVOPACK.	E_C	Calculate from the graphs in *(a) SERVOPACK-absorbable Energy on page 536*
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.

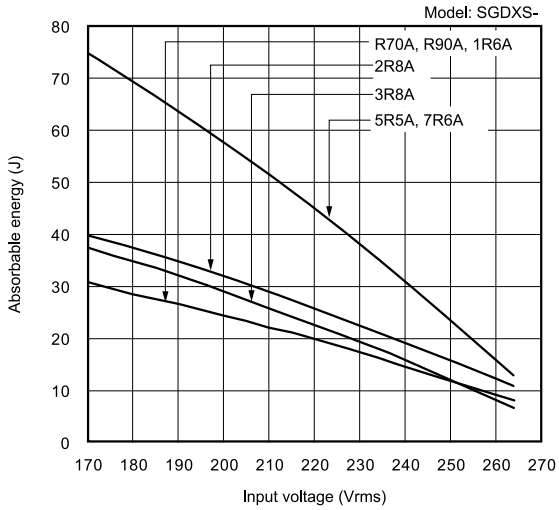
Symbol	Description
E_S to E_K	Energy in joules (J)
W_K	Required regenerative resistor capacity (W)
J	$= J_M + J_L$ (kg·m^2)
n_M	Servomotor motor speed (min^{-1})
T_L	Load torque (N·m)
t_D	Deceleration stopping time (s)
T	Servomotor repeat operation cycle (s)

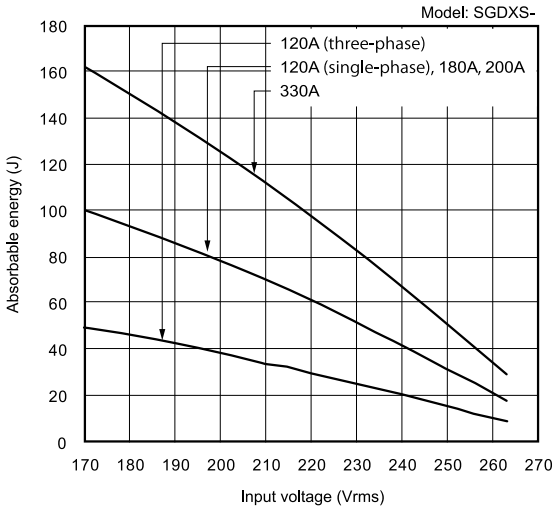
If the value of W_K does not exceed the capacity of the built-in regenerative resistor of the SERVOPACK, an external regenerative resistor is not required. For details on the built-in regenerative resisters, refer to the SERVOPACK specifications. If the value of W_K exceeds the capacity of the built-in regenerative resistor, install an external regenerative resistor with a capacity equal to the value for W calculated above.

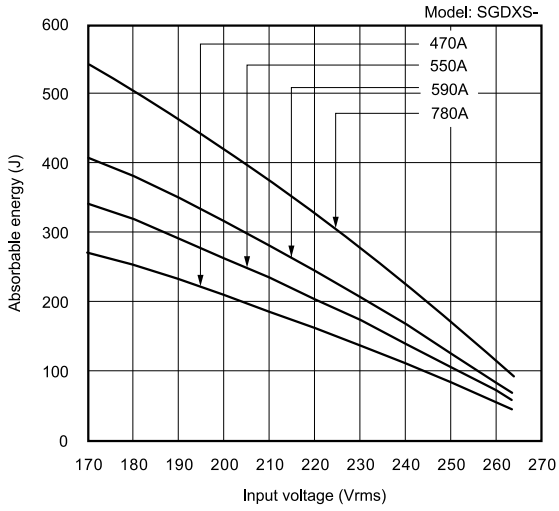
(a) SERVOPACK-absorbable Energy

The following figures show the relationship between the SERVOPACK's input power supply voltage and its absorbable energy.

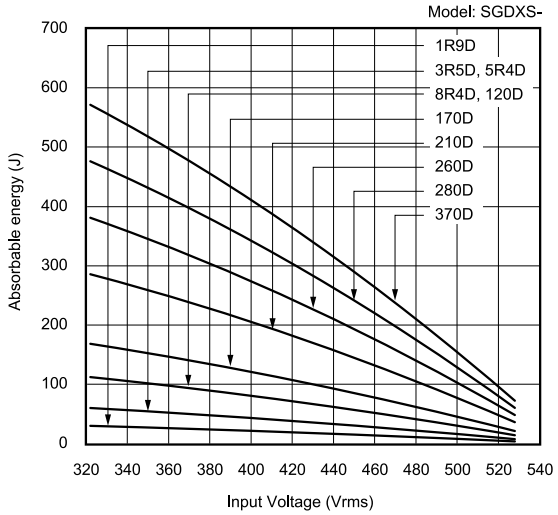
◆ Σ-XS SERVOPACKs (200 V Specification)



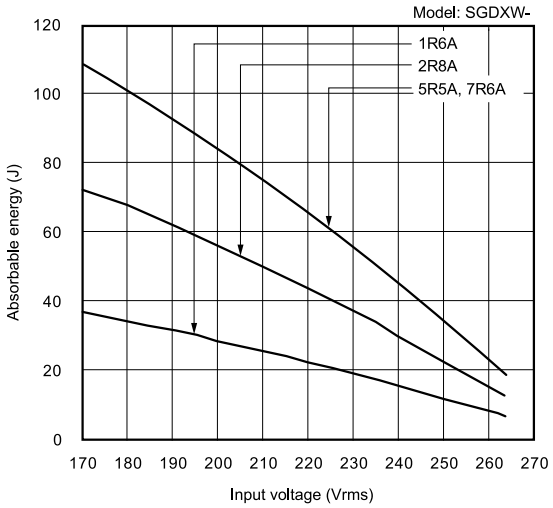




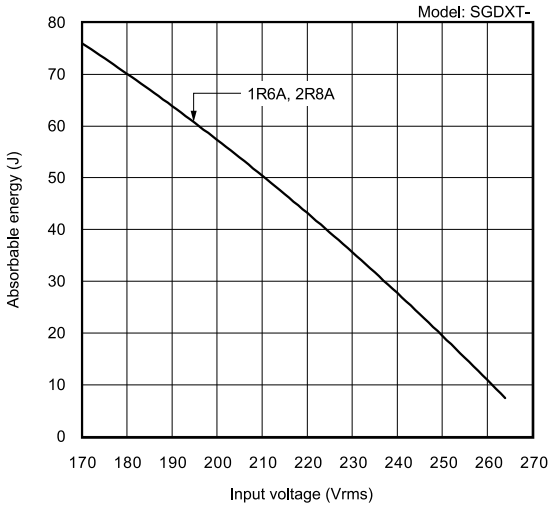
◆ Σ-XS SERVOPACKs (400 V Specification)



◆ **Σ-XW SERVOPACKs (200 V Specification)**



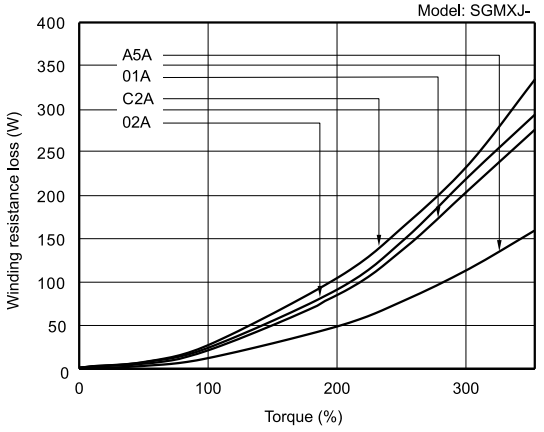
◆ **Σ-XT SERVOPACKs (200 V Specification)**

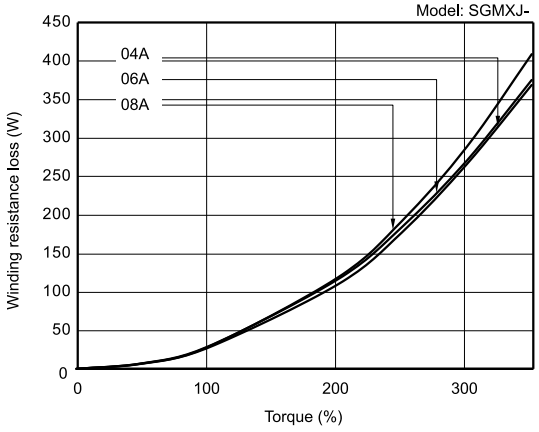


(b) Servomotor Winding Resistance Loss

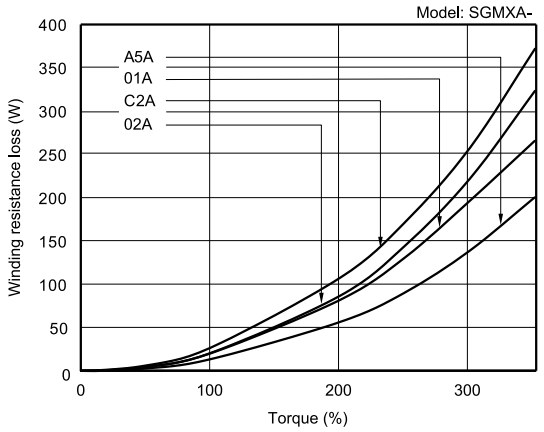
The following figures show the relationship for each servomotor between the servomotor's generated torque and the winding resistance loss.

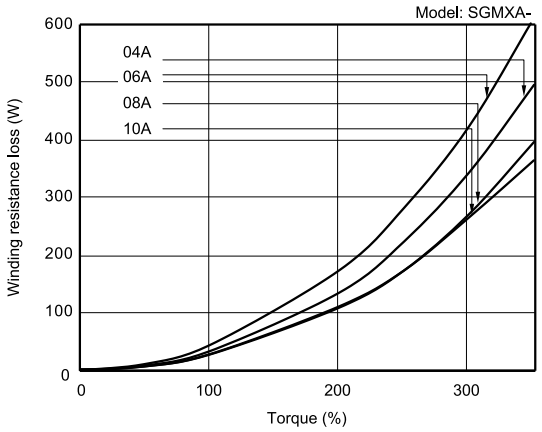
◆ **SGMXJ Rotary Servomotors (200 V Specification)**

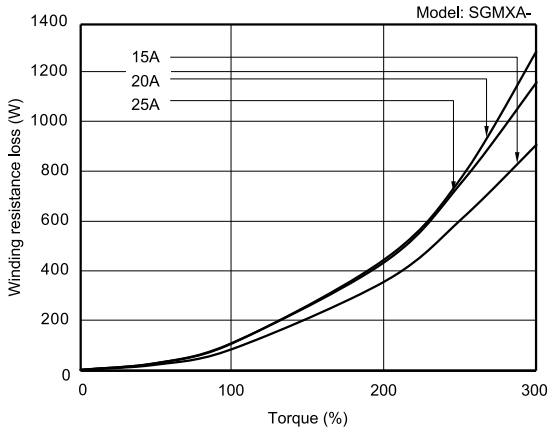


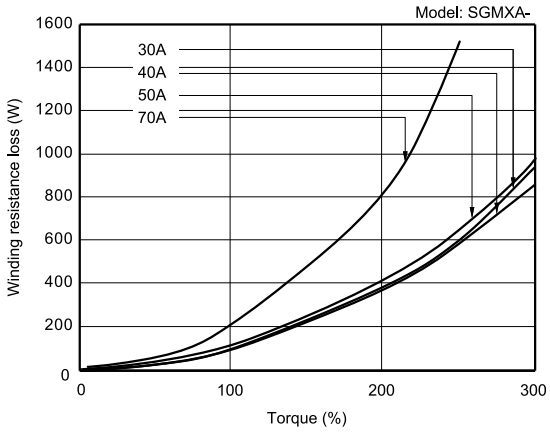


◆ SGMXA Rotary Servomotors (200 V Specification)

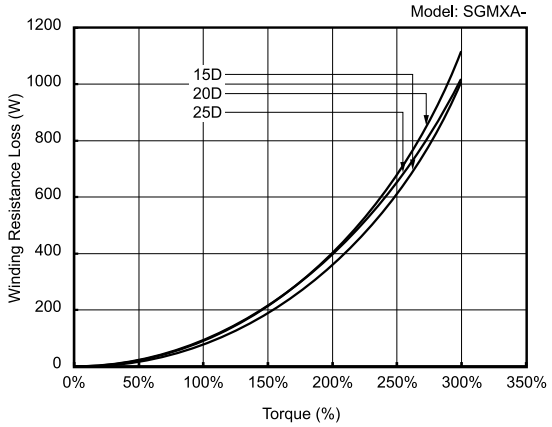


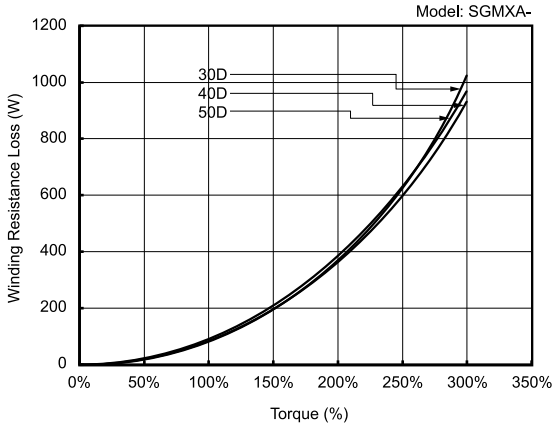




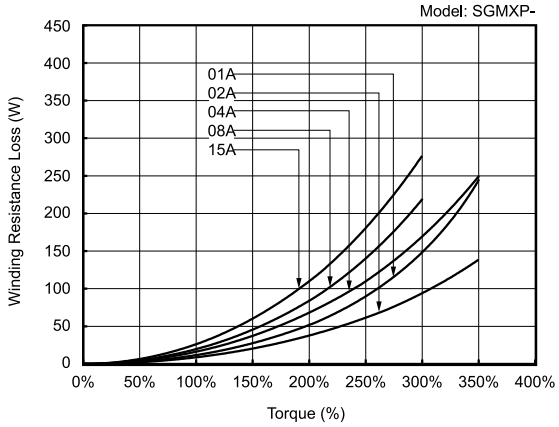


◆ SGMXA Rotary Servomotors (400 V Specification)

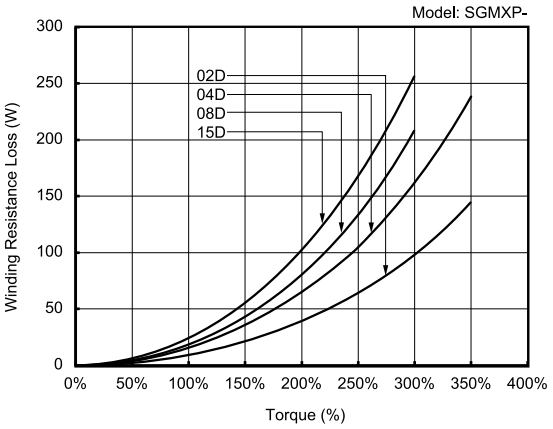




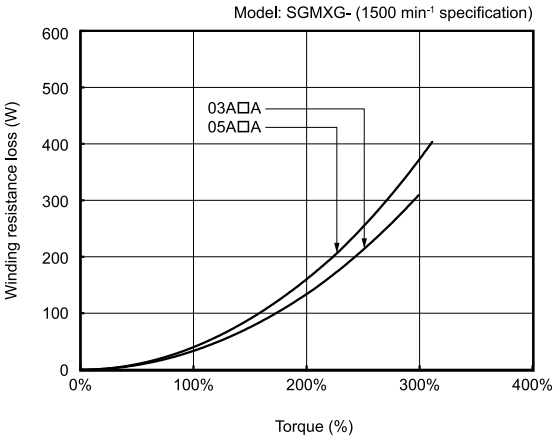
◆ SGMXP Rotary Servomotors (200 V Specification)

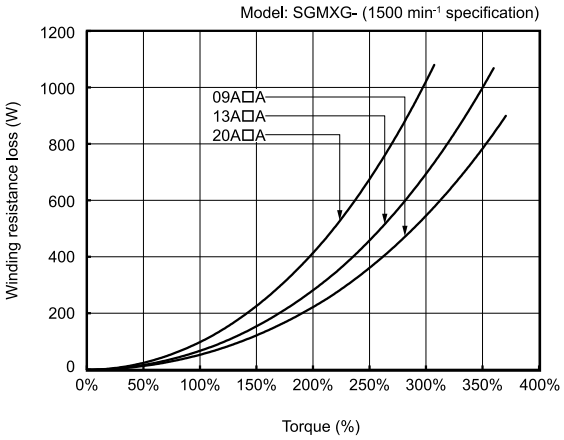


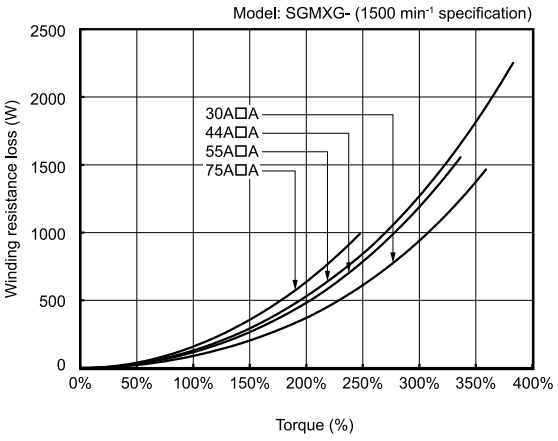
◆ SGMXP Rotary Servomotors (400 V Specification)

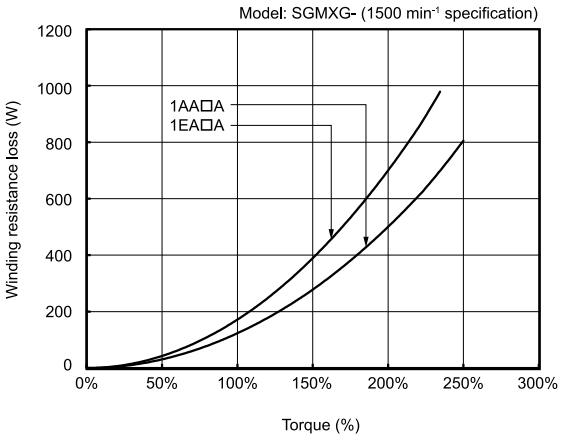


◆ SGMXG Rotary Servomotors (1500-min^{-1} Specification, 200 V Specification)

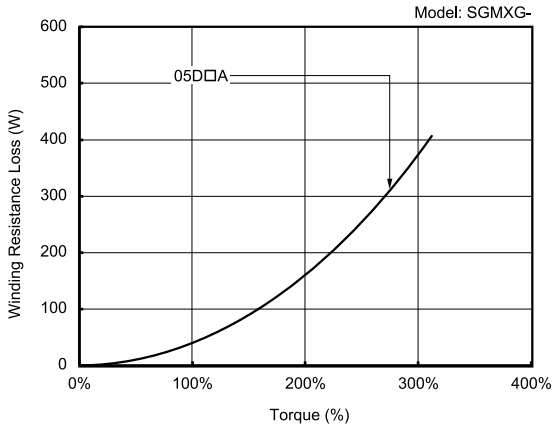


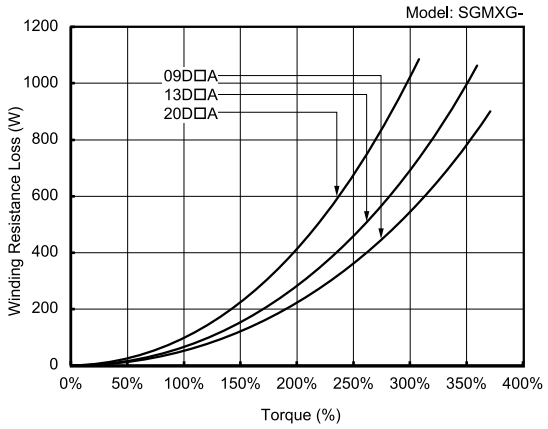


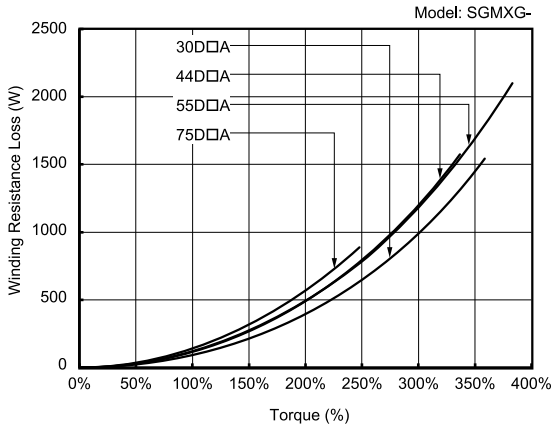


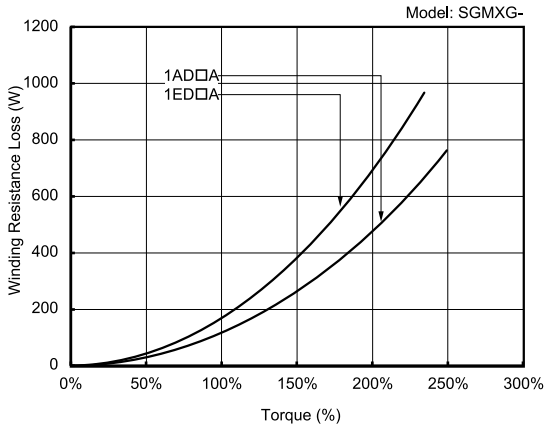


◆ SGMXG Rotary Servomotors (1500-min^{-1} Specification, 400 V Specification)

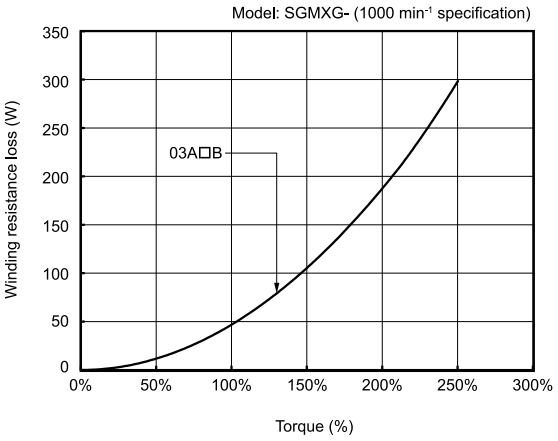


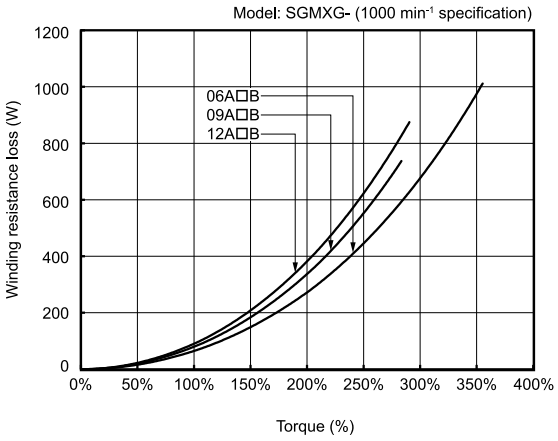


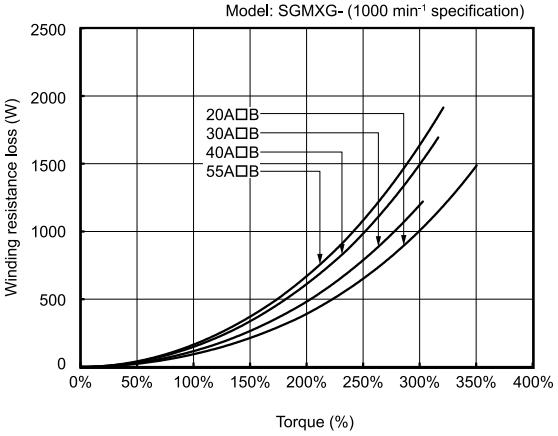




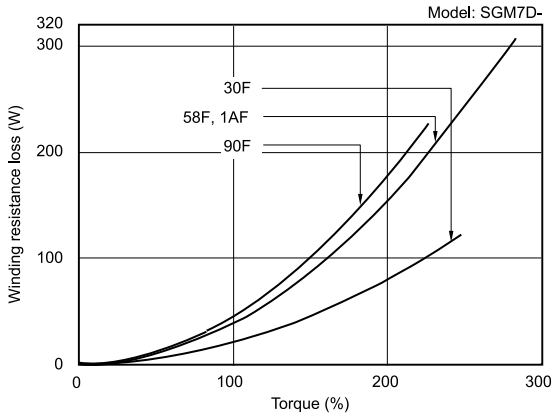
◆ SGMXG Rotary Servomotors (1000-min^{-1} Specification, 200 V Specification)

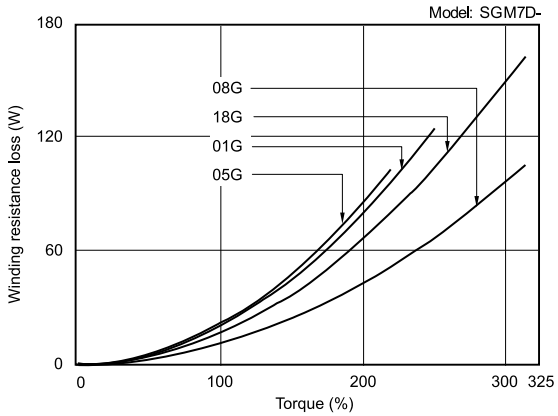


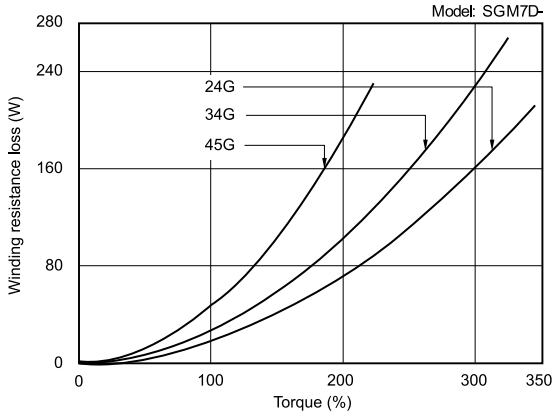


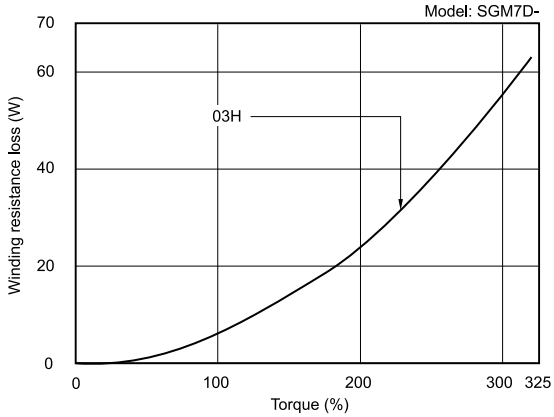


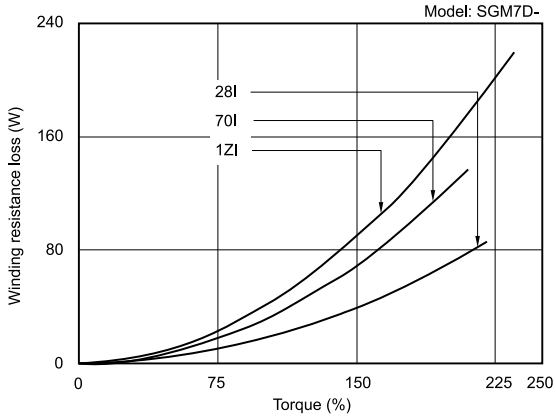
◆ SGM7D Direct Drive Servomotors

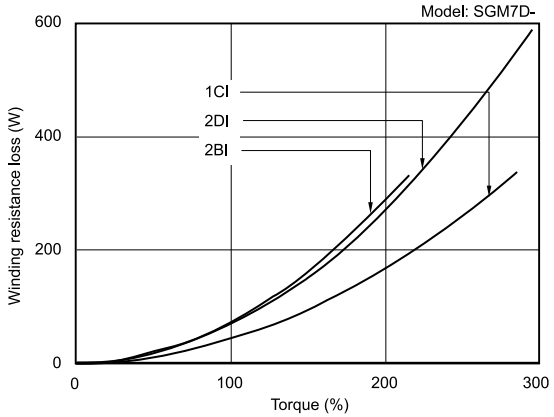


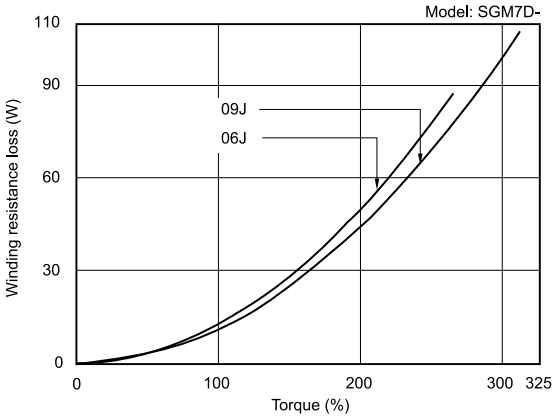


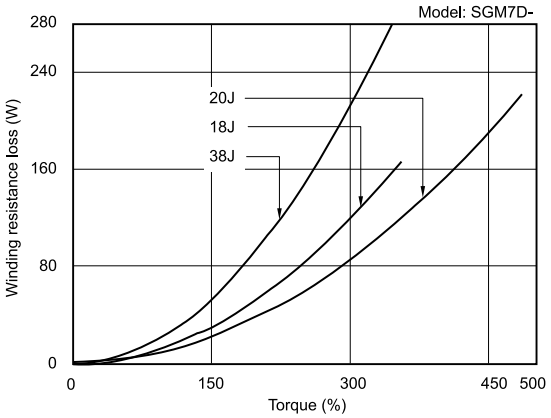


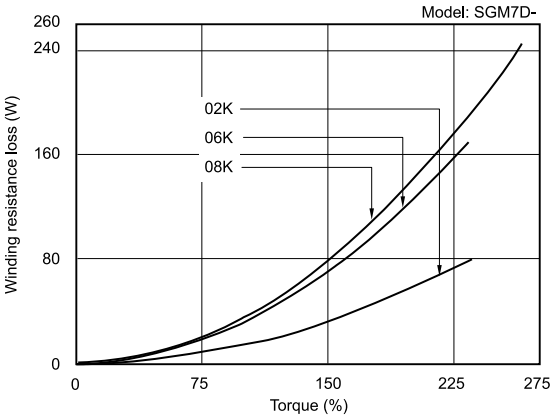


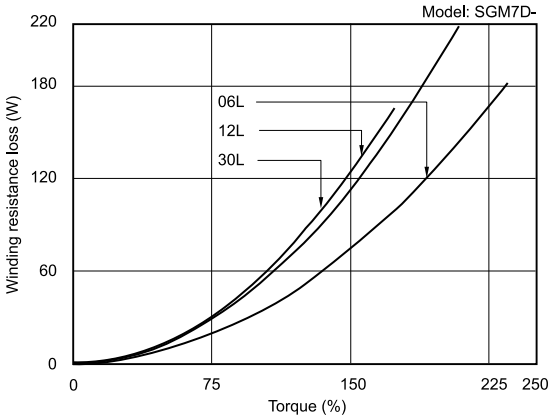




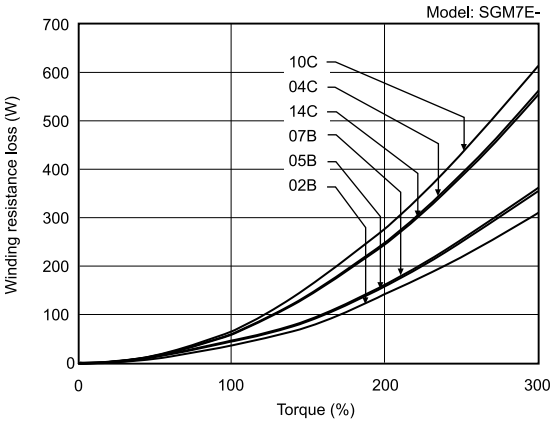


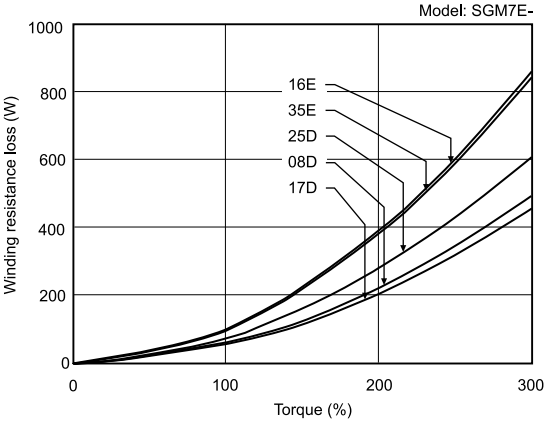




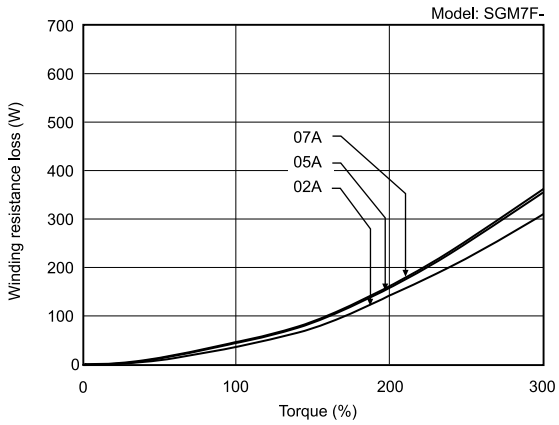


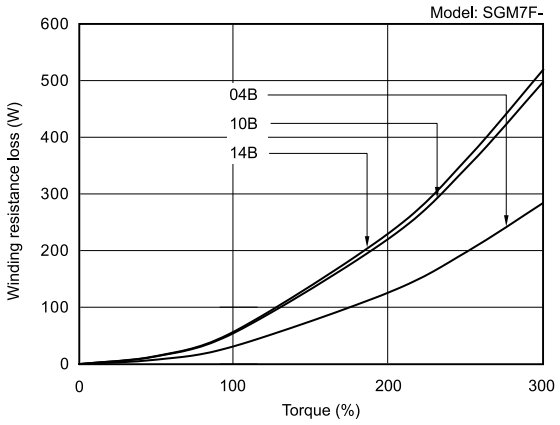
◆ SGM7E Direct Drive Servomotors

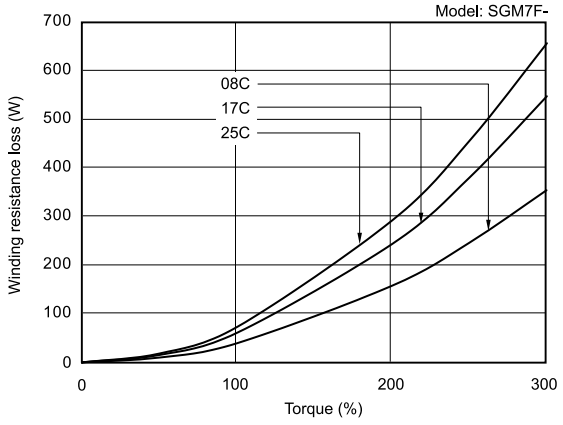


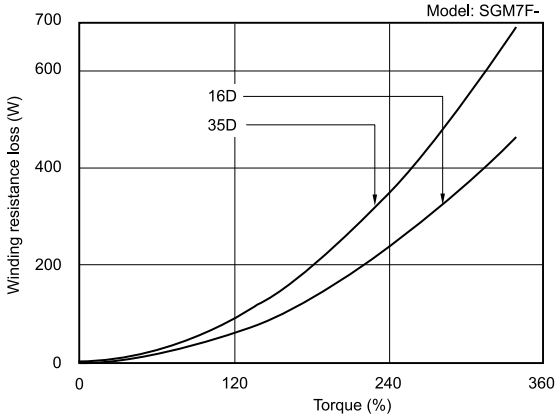


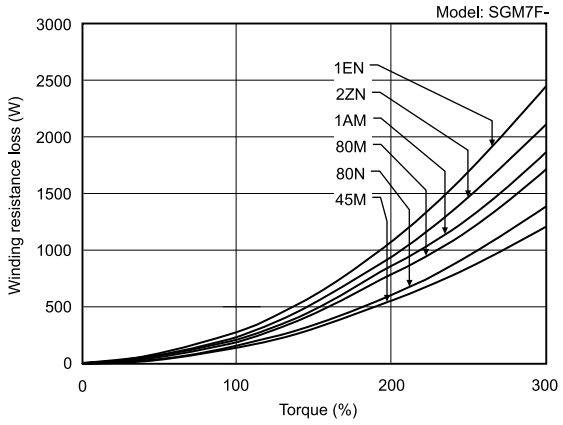
◆ SGM7F Direct Drive Servomotors



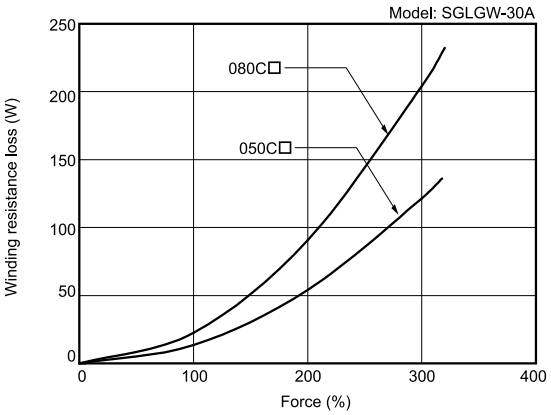


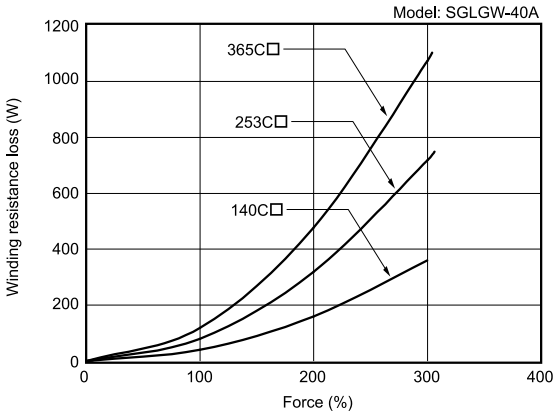


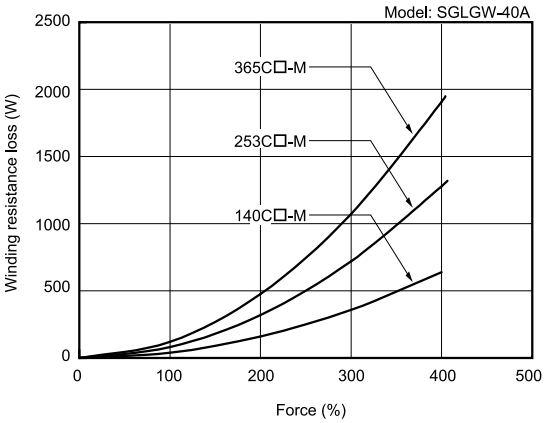


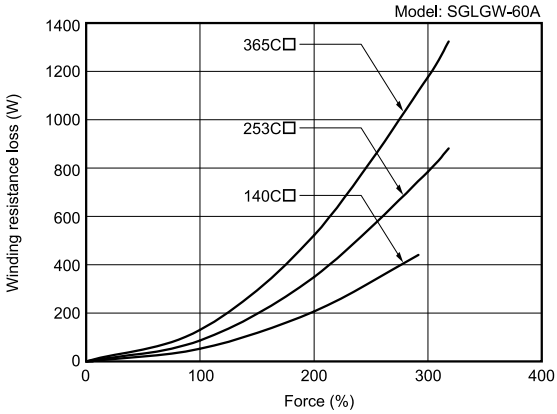


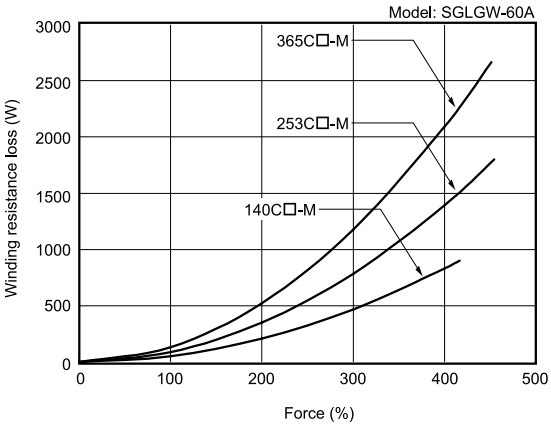
◆ SGLGW Linear Servomotors

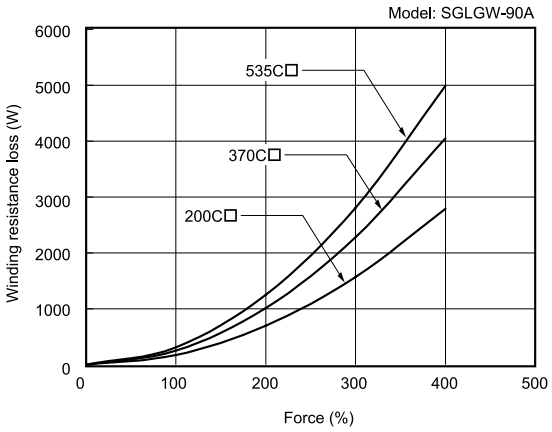




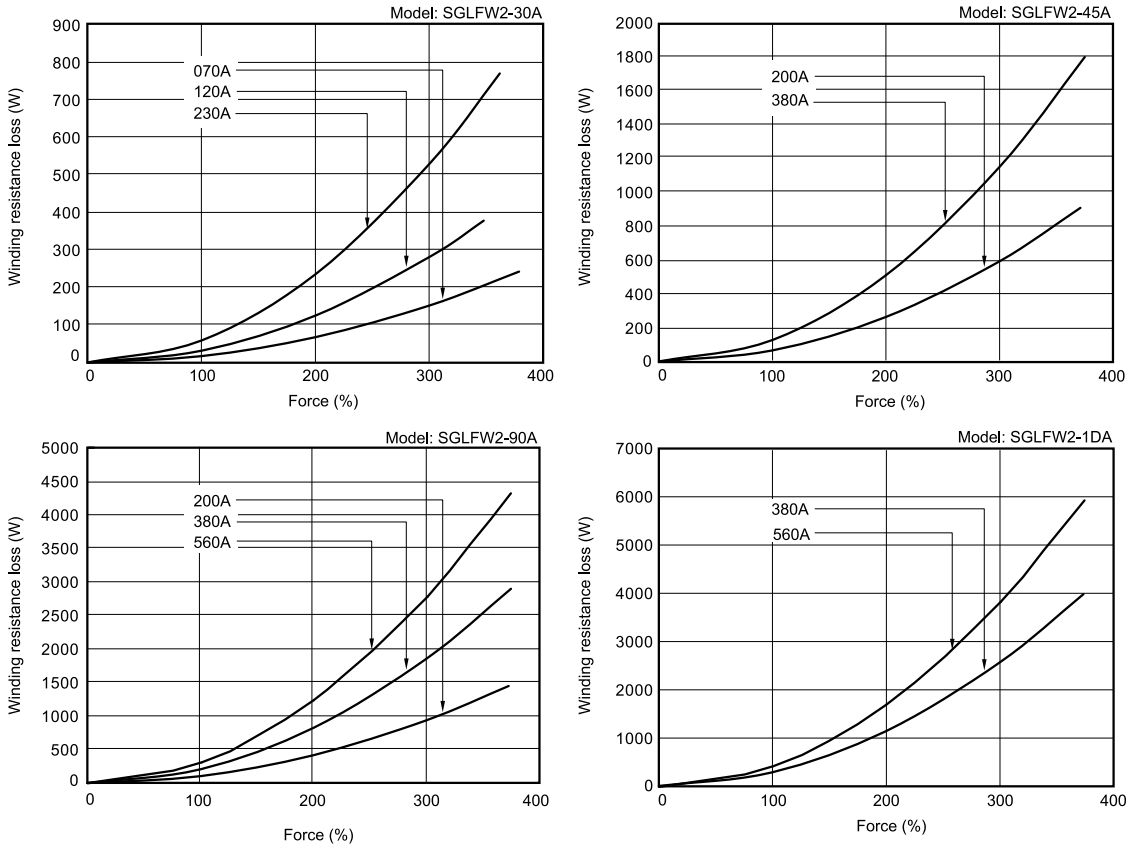




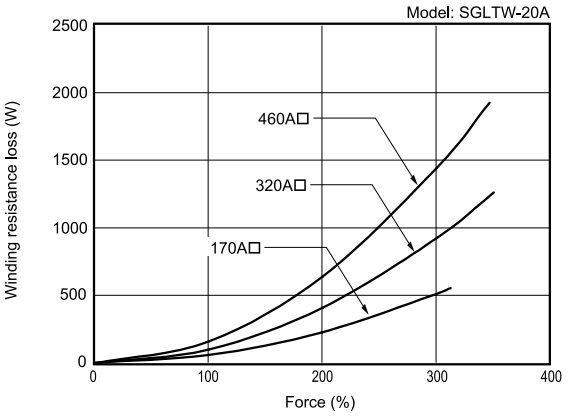


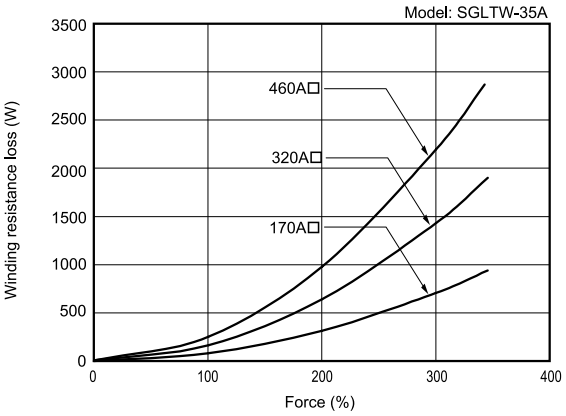


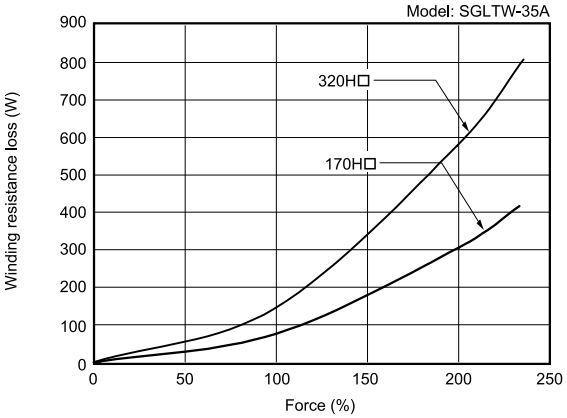
◆ SGLFW2 Linear Servomotors

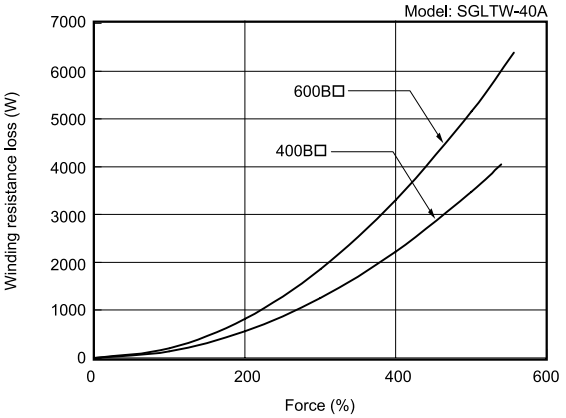


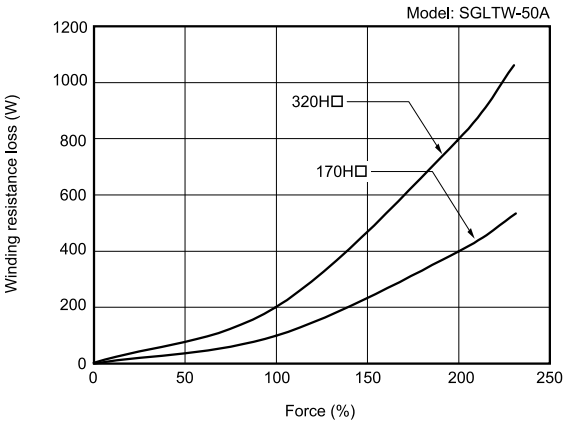
◆ SGLTW Linear Servomotors

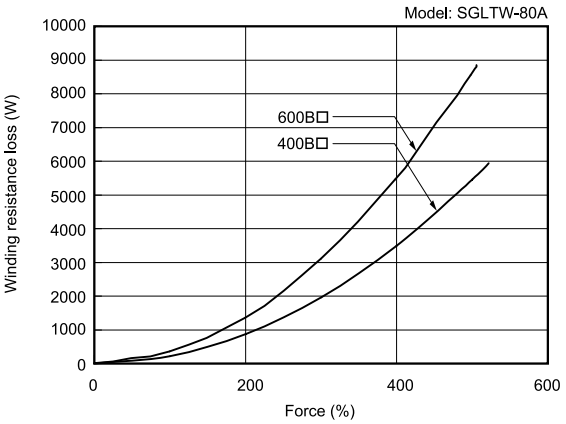












14.9 Digital Operators

A digital operator is used to display and set parameters in a SERVOPACK, and its main functions are as follows.

- 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

There are two types of digital operators.

- JUSP-OP07A-E
- JUSP-OP05A-1-E (can be used with analog voltage/pulse train reference SERVOPACKs only)

Information The JUSP-OP05A-1-E and JUSP-OP07A-E cannot be connected at the same time.

Important The digital operator is used for test operation and maintenance. It is not intended to be installed into equipment and used continuously together with the SERVOPACK.

14.9.1 Type: JUSP-OP07A-E

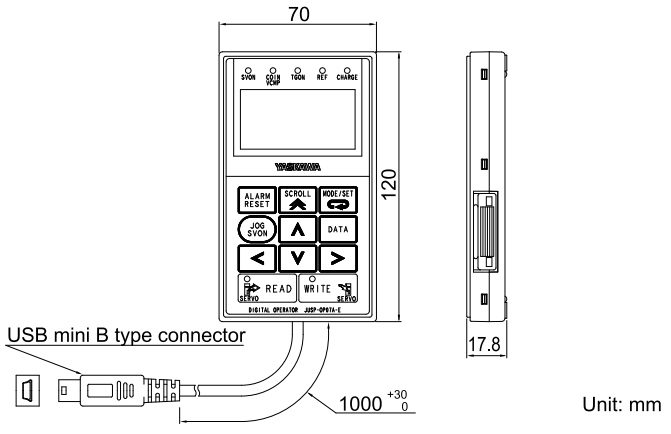
The JUSP-OP07A-E is used by connecting to the CN7 connector on the SERVOPACK.

Information If it is used in an environment with high levels of noise, implement noise countermeasures such as inserting a ferrite core.

(1) Selection Table

Order Number	Accessories
JUSP-OP07A-E	Connection cable (1 m)

(2) Dimensional Drawing



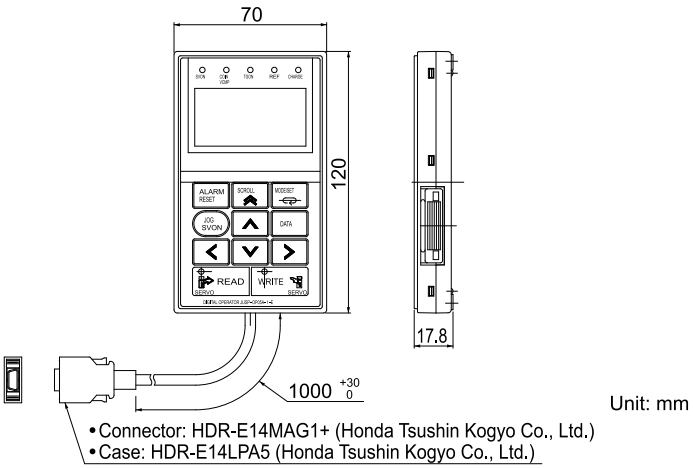
14.9.2 Type: JUSP-OP05A-1-E

The JUSP-OP05A-1-E is used by connecting to the Σ-XS SERVOPACK analog voltage/pulse train reference connector (CN3).

(1) Selection Table

Order Number	Accessories
JUSP-OP05A-1-E	Connection cable (1 m)

(2) Dimensional Drawing



Unit: mm

- Connector: HDR-E14MAG1+ (Honda Tsushin Kogyo Co., Ltd.)
- Case: HDR-E14LPA5 (Honda Tsushin Kogyo Co., Ltd.)

15

Software

15.1 SigmaSize+: AC Servo Capacity Selection Program 552
15.1.1 Features 552
15.1.2 System Requirements 553

15.2 SigmaWin+: AC Servo Drive Engineering Tool 554
15.2.1 Features 554

15.3 MPE720: System Integrated Engineering Tool 556
15.3.1 Features 556
15.3.2 System Requirements 557

15.1 SigmaSize+: AC Servo Capacity Selection Program

You can use the SigmaSize+ to select servomotors and SERVOPACKs. Applicable to all standard servo products sold by Yaskawa.

You can also calculate whether an external regenerative resistor is required and select one.

Note:

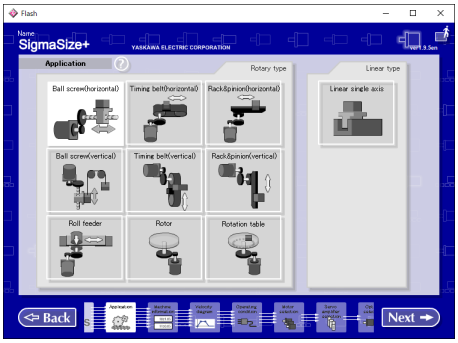
Contact your Yaskawa representative for information on SigmaSize+.

15.1.1 Features

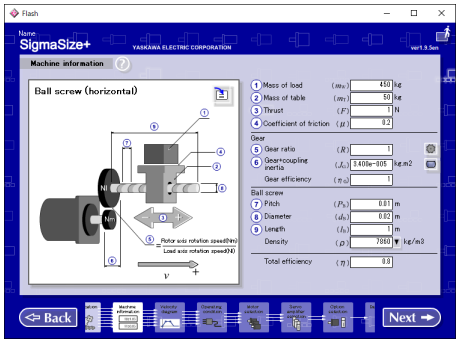
- Provides a vast amount of new product information.
- Lets you select servo products with a wizard.
- You can access and reuse previously entered data.

(1) Examples of the Servo Selection Interface

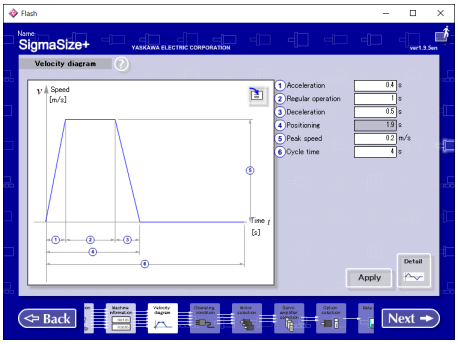
Mechanism Selection



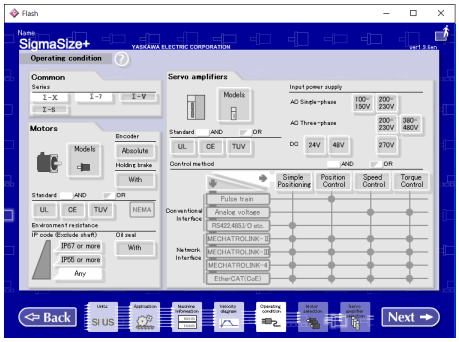
Machine Specification Entry



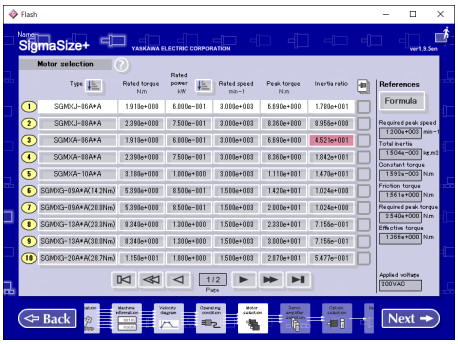
Speed Diagram Entry



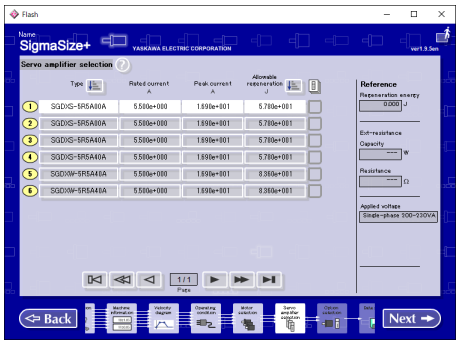
Operating Conditions Selection



Servomotor Selection



SERVOPACK Selection



15.1.2 System Requirements

Item	System Requirements
Browser used to display Help	Internet Explorer 10 or higher
OS	Windows Vista or Windows 7 (32-bit or 64-bit edition)
CPU	Pentium 200 MHz min.
Memory	64 MB min. (96 MB or greater recommended)
Available Hard Disk Space	20 MB min.

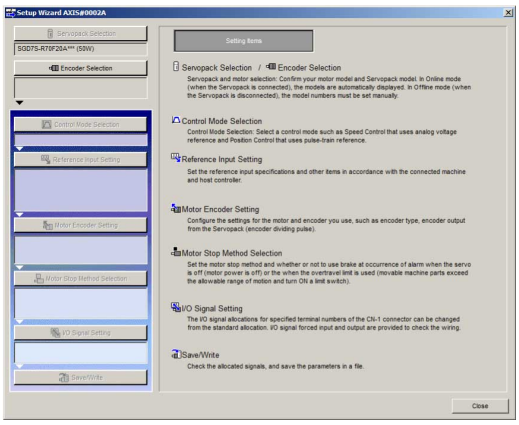
15.2 SigmaWin+: AC Servo Drive Engineering Tool

The SigmaWin+ engineering tool is used to set up and optimally tune Yaskawa Σ-series servo drives.

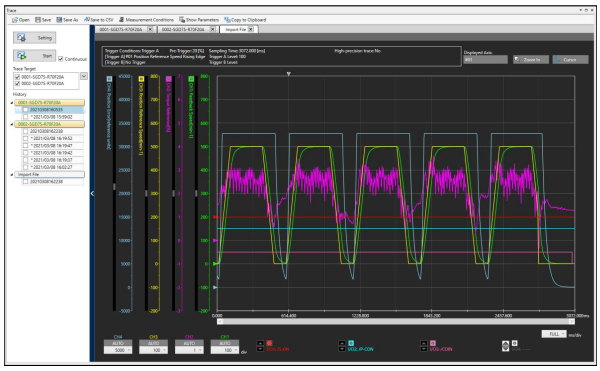
15.2.1 Features

- Sets parameters with a wizard.
- Displays SERVOPACK data on a computer just like on a oscilloscope.
- Estimates moments of inertia and measure vibration frequencies.
- Displays alarms and provides alarm diagnostics.

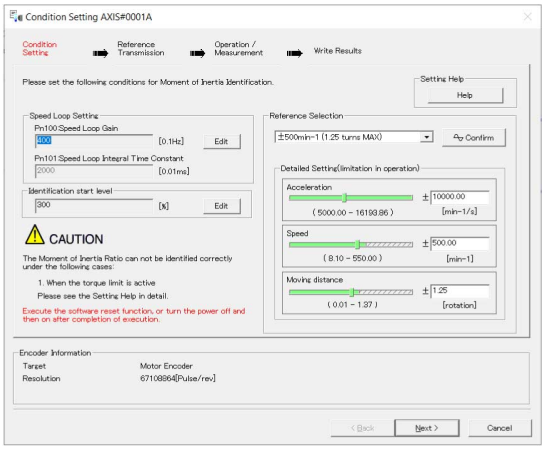
Sets parameters with a wizard.



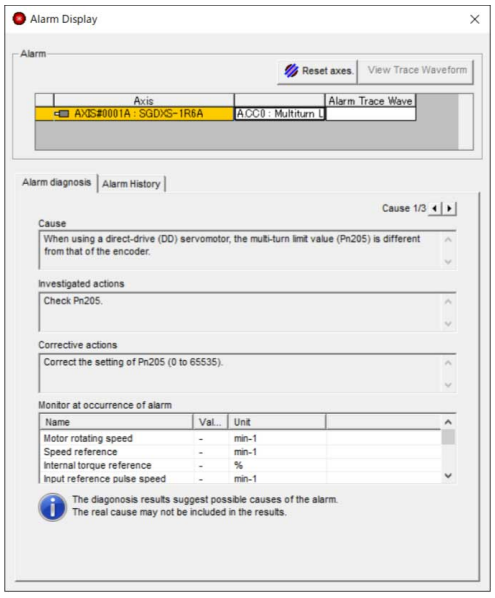
Displays SERVOPACK data on a computer just like on a oscilloscope.



Estimates moments of inertia and measure vibration frequencies.



Displays alarms and provides alarm diagnostics.



(1) System Requirements

Item	System Requirements
Version	7
Supported Languages	Japanese, English, and Chinese (simplified)
OS	Windows 10, Windows 8.1, Windows 8, or Windows 7 (32-bit or 64-bit edition)

Continued on next page.

Continued from previous page.

Item	System Requirements
Software Environment	Microsoft .NET Framework 4.5, .NET Framework 4.6
CPU	1 GHz min. (recommended)
Memory	1 GB min. (recommended)
Available Hard Disk Space	500 MB min.
Browser used to display Help	Internet Explorer 9 or higher

15.3 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.

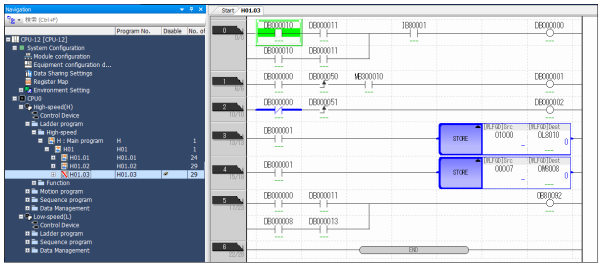
15.3.1 Features

(1) Performing Adjustment and Maintenance for All Equipment Drive Devices

MPE720 version 7 connected to the YRM-X or MP series enables one-stop setup, adjustment, and maintenance of AC servo drives, inverters, and I/O devices connected to the network. This eliminates the need change the connections, which improves efficiency.

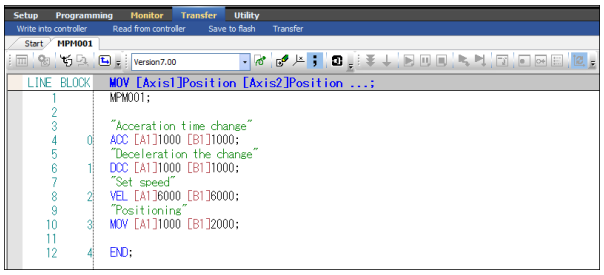
(2) Greater Efficiency with the Best Programming Method

Ladder 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.

Motion Programming



- 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.

15.3.2 System Requirements

Item	Specification
CPU	1 GHz or more recommended (manufactured by Intel or other companies)
Memory Capacity	1 GB or more recommended *1
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	CD Drive
1 (only for installation)	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

*1 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.

16

Other Peripheral Devices and Options

16.1 Surge Absorbers (Varistors), Diodes, and Brake Relays for Holding Brake Power Supplies 560

16.1.1 Surge Absorbers (Varistors) for Holding Brake Power Supplies 560

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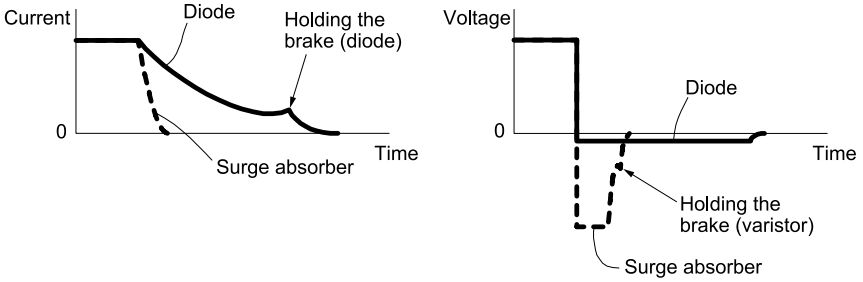
16.1 Surge Absorbers (Varistors), Diodes, and Brake Relays for Holding Brake Power Supplies

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:

1. 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.
2. If you connect an SSR (i.e., a semiconductor relay) to switch the brake circuit, use a diode.
3. 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.



16.1.1 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.	TND05V-121KB00AAA0	Z5D121
	2 A max.	TND07V-121KB00AAA0	Z7D121
	4 A max.	TND10V-121KB00AAA0	Z10D121
	8 A max.	TND14V-121KB00AAA0	Z15D121

16.1.2 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.

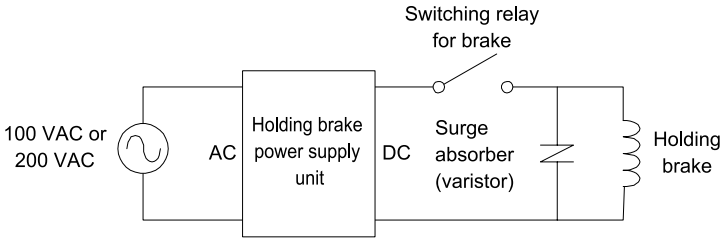
Diodes are not provided by Yaskawa.

Holding Brake Power Supply Unit Specifications		Withstand Voltage
Rated Output Voltage	Input Voltage	
24 VDC	200 V	100 V to 200 V

16.1.3 Circuit Diagrams

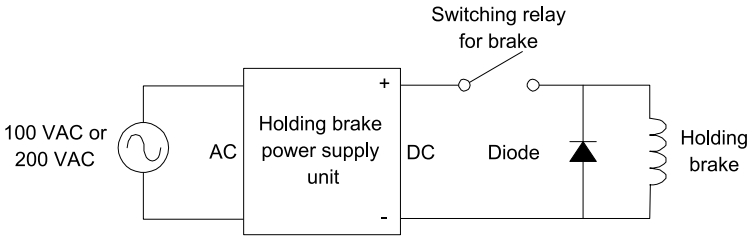
(1) Circuit for a Surge Absorber (varistor)

A surge absorber (varistor) has no polarity.



(2) Circuit for a Diode

A Diode has polarity. Refer to the following figure for connections.



Note:

Holding brake power supply units are not provided by Yaskawa.

16.1.4 Brake Relays

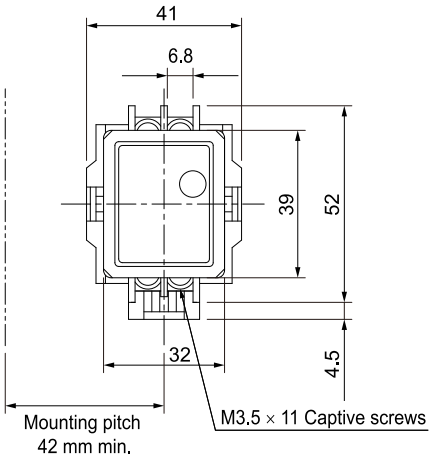
Brake relays are not provided by Yaskawa.

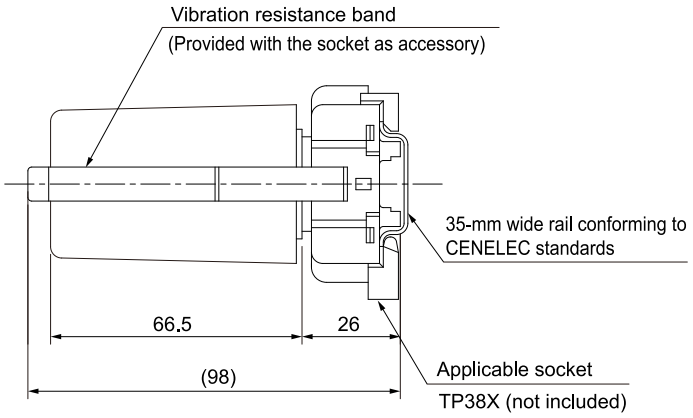
(1) Specification

Manufactured by BESTACT SOLUTIONS INC.

Item		Specification
Order Number		F2PE20/D24
Contact	Structure	2a
	Contact resistance	500 mΩ max.
	Rated operating voltage/current	110 VDC, 0.5 A (L/R=100 ms)/220 VAC, 1.0 A (inductive load)
	Rated insulation voltage	250 VAC
	Minimum operating voltage/current	24 VDC, 1 mA
Time	Operation	5 ms or less
	Recovery	3 ms or less
Contact life	Mechanical	100 million cycles or more
	Electrical life	3 million cycles are more (24 VDC, 0.5 A, L/R=10 ms)
Other	Failure rate (λ_{60})	4.6×10^{-9}(/cycle) or less
	Approx. mass	140 g
	Surrounding air temperature	-10°C to +60°C
	Connection method	External connection socket (TP38X)

(2) External Dimensions





16.2 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 unit is not required if you use a servomotor with a batteryless absolute encoder.

⚠ WARNING

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, and this may result in a fire from product failure or damage that causes death or serious injury.

When connecting a battery, connect the polarity correctly.

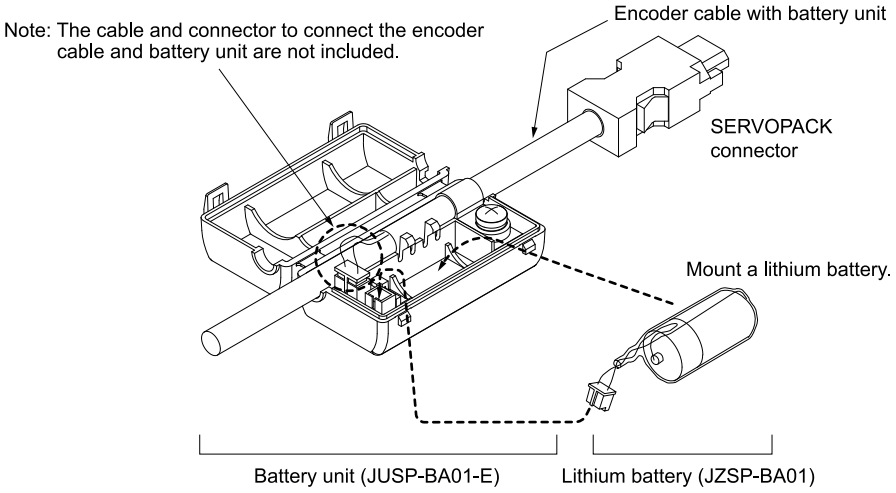
There is a risk of encoder failure if the battery ruptures and a risk of fire that causes death or serious injury.

16.2.1 Using Encoder Cables with Battery Units

A battery unit is attached to an encoder cable with a battery unit. To replace the battery, obtain a lithium battery (JZSP-BA01) and mount it in the battery unit.

Important

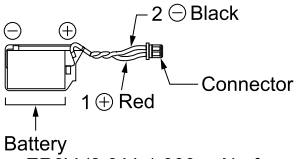
1. You cannot attach the battery unit to encoder cables for incremental encoders or batteryless absolute encoders.
2. Install the battery unit where the surrounding air temperature is between -5°C and 60°C.



(1) Selection Table

Name	Order Number	Remarks
Battery Unit (case only)	JUSP-BA01-E	The encoder cable and battery are not included. (This is a replacement part for a damaged battery unit.)
Lithium Battery	JZSP-BA01	This is a special battery that is mounted into the battery case.

(2) Lithium Battery Dimensional Drawing

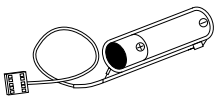


ER3V (3.6 V, 1,000 mAh, from Toshiba Battery Co., Ltd.)

16.2.2 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.



(1) Selection Table

Order Number	Specification	Manufacturer
ER6VC3N	3.6 V, 2000 mAh	Toshiba Battery Co., Ltd.

16.3 Precautions for Connecting a Σ-V-Series Cable to a Σ-X-Series Servomotor

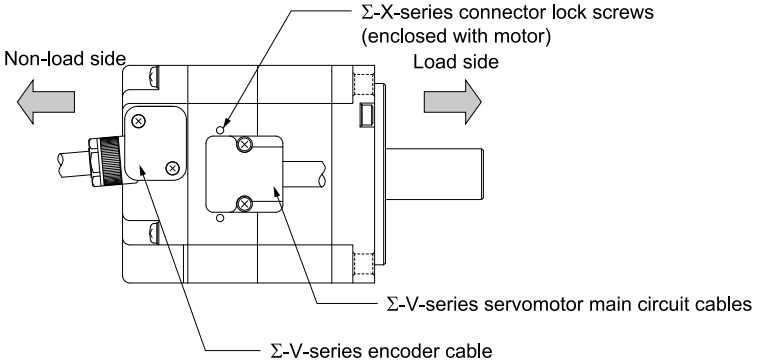
If you already have Σ-V-series servomotor main circuit cables or encoder cables, you can use them to connect with Σ-7 compatible specification servomotors. Before you do, read this section for information on cable connection conditions and the shapes of the cables that can be connected.

- Read this section for details on the cable connection conditions and the shapes of the cables that can be connected for the SGMXJ servomotors, SGMXA servomotors (SGMXA-A5 to SGMXA-A10), and SGMXP servomotors (SGMXP-01 to SGMXP-04: 200 V specification).
- The cables for SGMXP servomotors (SGMXP-08 and SGMXP-15: 200 V specification) are identical to those for Σ-7 compatible specification servomotors. For details, refer to the following section.
  ☞ *5.2 Servomotor Main Circuit Cables on page 161*
- When using connectors in compliance with IP67 and European Safety Standards for the SGMXA servomotors (SGMXA-15 to SGMXA-70) and SGMXG servomotors, use the plugs and cable clamps for the user-assembled wiring materials for servomotor main circuit cables described in the following sections.
  - SGMXA servomotor (SGMXA-15 to 70) "*3.4 User-Assembled Wiring Materials for Servomotor Main Circuit Cables (SGMXA-15 to 70) on page 96*"
  - SGMXG (1500-min^{-1} specification) "*6.3 User-Assembled Wiring Materials for Servomotor Main Circuit Cables: SGMXG-03A□A, -05A□A on page 207*"
  - SGMXG (1000-min^{-1} specification) "*8.3 User-Assembled Wiring Materials for Servomotor Main Circuit Cables: SGMXG-03A□B on page 283*"

16.3.1 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-X-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.



16.3.2 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 compatible specification JZSPC7P□□D-□□-E encoder cable (cable installed toward the load).

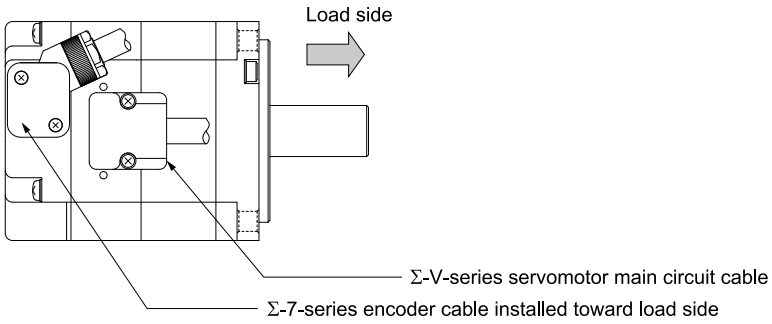
Note:

Refer to the following section for information on encoder cables for SGMXJ servomotors.

☞ *2.4 Encoder Cables (When Not Relaying the Encoder Cable) on page 58*

Refer to the following section for information on encoder cables for SGMXA servomotors.

☞ *3.5 Encoder Cables (When Not Relaying the Encoder Cable) on page 104*



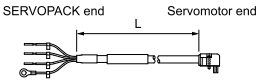
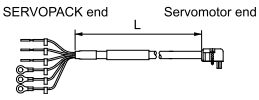
16.3.3 Σ-V Cables That Connect to Σ-X-Series Servomotors

The following tables list the cables that can be connected to the Σ-7 compatible specification servomotors (SGMXJ servomotors, SGMXA servomotors (SGMXA-A5 to SGMXA-A10), and SGMXP servomotors (SGMXP-01 to SGMXP-04: 200 V specification)).

- The cables for SGMXP servomotors (SGMXP-08 and SGMXP-15: 200 V specification) are identical to those for Σ-7 compatible specification servomotors. For details, refer to the following section.
  ☞ *5.2 Servomotor Main Circuit Cables on page 161*
- SGMXA servomotors (SGMXA-15 to SGMXA-70) and SGMXG servomotors use the same cables and connectors as the Σ-7 servomotors, so refer to the following manual.

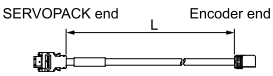
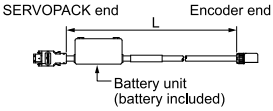
  🕮 Σ-7-Series Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

(1) Servomotor Main Circuit Cables

Name	Servomotor Model	Order Number *1		Appearance
		Standard Cable	Flexible Cable	
For Servomotors without Holding Brakes	SGMXJ-A5 to -C2 SGMXA-A5 to -C2 SGMXP-01 50 W to 150 W	JZSP-CSM01-□□-E	JZSP-CSM21-□□-E	
	SGMXJ-02 to -06 SGMXA-02 to -06 SGMXP-02 or -04 200 W to 600 W	JZSP-CSM02-□□-E	JZSP-CSM22-□□-E	
	SGMXJ-08 750 W SGMXA-08 or -10 750 W, 1.0 kW	JZSP-CSM03-□□-E	JZSP-CSM23-□□-E	
For Servomotors with Holding Brakes	SGMXJ-A5 to -C2 SGMXA-A5 to -C2 SGMXP-01 50 W to 150 W	JZSP-CSM11-□□-E	JZSP-CSM31-□□-E	
	SGMXJ-02 to -06 SGMXA-02 to -06 SGMXP-02 or -04 200 W to 600 W	JZSP-CSM12-□□-E	JZSP-CSM32-□□-E	
	SGMXJ-08 750 W SGMXA-08 or -10 750 W, 1.0 kW	JZSP-CSM13-□□-E	JZSP-CSM33-□□-E	

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

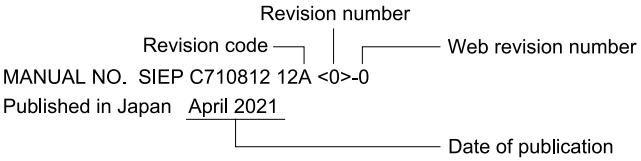
(2) Encoder Cables

Name	Servomotor Model	Order Number *1		Appearance
		Standard Cable	Flexible Cable	
Encoder Cables for Batteryless Absolute Encoders	SGMXJ servomotor SGMXA servomotor (SGMXA-A5 to -10) SGMXP servomotor (SGMXP-01 to -04)	JZSP-CSP01-□□-E	JZSP-CSP21-□□-E	
Encoder Cables for Absolute Encoders		JZSP-CSP05-□□-E	JZSP-CSP25-□□-E	

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

Revision History

The date of publication, revision code, revision number, and web revision number are given at the bottom right of the back cover. Refer to the following example.



Date of Publication	Rev. Code	Rev. No.	Web Rev. No.	Section	Revised Contents
November 2025	K	<10>	0	All chapters	Partly revised.
				6.7, 8.7	Addition: Information on user-assembled wiring materials for encoder cables
				13.7	Addition: Information on rotary feedback unit
June 2025	J	<9>	0	4.2, 7.2	Deletion: Information on the main circuit cables for servomotors with the 400-V specification
				3.4.3, 4.3.3, 7.4.3, 8.4.3	Addition: Information on the pins used for the servomotor connectors
				Back cover	Revision: Address
April 2025	I	<8>	0	All chapters	Partly revised.
					Addition: Information on Σ-XS SERVOPACK 400V specification (SGDXS-□□□D), rotary servomotor 400V specification (SGMXA-15 to -50, SGMXP-02 to -15, SGMXG-05 to -1E)
June 2024	H	<7>	0	Chapters 2 to 8, 10	Partly revised.
				14.4	Deletion: Metal Connectors for Servomotor Main Circuit Cables
November 2023	G	<6>	0	All chapters	Partly revised.
				Chapter 6	Addition: Information on SGMXG 1000-min^{-1} specification
				11.6	Addition: Information on wiring materials and stand-alone sales of encoder cables
				14.1.4	Addition: Information on brake relays
September 2022	F	<5>	0	All chapters	Addition: Information on Σ-XT SERVOPACK
May 2022	E	<4>	0	All chapters	• Addition: Information on SGMXA-15 to 70, SGMXP, SGMXG-03, -05, -1A, -1E • Addition: Information on SGDXS-550A, -780A
				Chapter 9	Addition: Information on booster unit
				Back cover	Revision: Address
January 2022	D	<3>	0	Chapter 9	Addition: Information on analog sensor hub
				All chapters	Partly revised.
				Back cover	Revision: Address
September 2021	C	<2>	0	4.2.1 (1), 4.2.2 (1), (2)	Revision: Information on SGMXG-30
August 2021	B	<1>	0	Chapter 1, 4, 7, 10 to 13	• Addition: Information on SGMXG-30, -44, -55, -75 • Addition: Information on SGDXS-330, -470, -550, -120A□□□0008 • Addition: Information on SGDX□-□□□AA0 • Partly revised.
April 2021	A	<0>	0	–	First edition

Σ-X-Series AC Servo Drive

Peripheral Device

Selection Manual

IRUMA BUSINESS CENTER (SOLUTION CENTER)
480, Kamifujisawa, Iruma, Saitama, 358-8555, Japan
Phone: +81-4-2962-5151 Fax: +81-4-2962-6138
www.yaskawa.co.jp

YASKAWA AMERICA, INC.
2121, Norman Drive South, Waukegan, IL 60085, U.S.A.
Phone: +1-800-YASKAWA (927-5292) or +1-847-887-7000 Fax: +1-847-887-7310
www.yaskawa.com

YASKAWA ELÉTRICO DO BRASIL LTDA.
777, Avenida Piraporinha, Diadema, São Paulo, 09950-000, Brasil
Phone: +55-11-3585-1100 Fax: +55-11-3585-1187
www.yaskawa.com.br

YASKAWA EUROPE GmbH
Philipp-Reis-Str. 6, 65795 Hattersheim am Main, Germany
Phone: +49-6196-569-300
www.yaskawa.eu.com E-mail: support@yaskawa.eu

YASKAWA ELECTRIC KOREA CORPORATION
6F, 112, LS-ro, Dongan-gu, Anyang-si, Gyeonggi-do, Korea
Phone: +82-31-8015-4224 Fax: +82-31-8015-5034
www.yaskawa.co.kr

YASKAWA ASIA PACIFIC PTE. LTD.
30A, Kallang Place, #06-01, 339213, Singapore
Phone: +65-6282-3003 Fax: +65-6289-3003
www.yaskawa.com.sg

YASKAWA ELECTRIC (THAILAND) CO., LTD.
59, 1F-5F, Flourish Building, Soi Ratchadapisek 18, Ratchadapisek Road, Huaykwang, Bangkok, 10310, Thailand
Phone: +66-2-017-0099 Fax: +66-2-017-0799
www.yaskawa.co.th

YASKAWA ELECTRIC (CHINA) CO., LTD.
22F, Link Square 1, No.222, Hubin Road, Shanghai, 200021, China
Phone: +86-21-5385-2200 Fax: +86-21-5385-3299
www.yaskawa.com.cn

YASKAWA ELECTRIC (CHINA) CO., LTD. BEIJING OFFICE
Room 1011, Tower W3 Oriental Plaza, No.1, East Chang An Avenue,
Dong Cheng District, Beijing, 100738, China
Phone: +86-10-8518-4086 Fax: +86-10-8518-4082

YASKAWA ELECTRIC TAIWAN CORPORATION
12F, No. 207, Section 3, Beishin Road, Shindian District, New Taipei City 23143, Taiwan
Phone: +886-2-8913-1333 Fax: +886-2-8913-1513 or +886-2-8913-1519
www.yaskawa.com.tw

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In the event that the end user of this product is to be the military and said product is to be employed in any weapons systems or the manufacture thereof, the export will fall under the relevant regulations as stipulated in the Foreign Exchange and Foreign Trade Act. Therefore, be sure to follow all procedures and submit all relevant documentation according to any and all rules, regulations and laws that may apply.

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

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