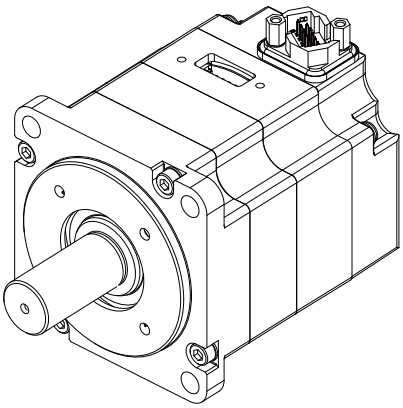
YASKAWA

Σ-X-Series AC Servo Drive

Rotary Servomotor

Product Manual

Model: SGMXJ/SGMXA/SGMXP/SGMXG



MANUAL NO. SIEP C230210 00G

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Preface and General Precautions

i.1 About this Manual

This manual provides the information needed for the selection, installation, connection, and maintenance of the rotary servomotor of the Σ-X-series AC servo drives.

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.

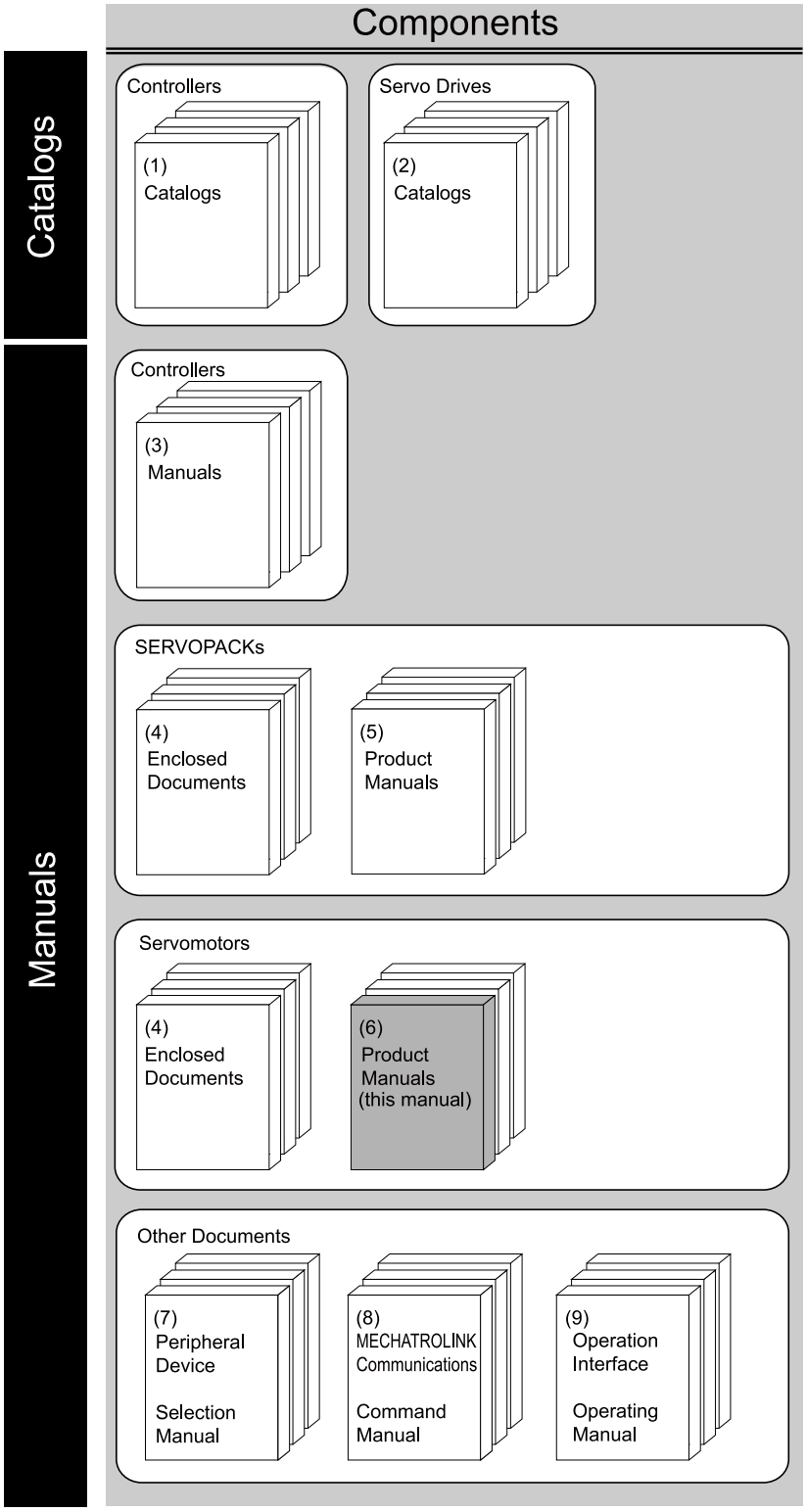
i.2 Outline of Manual

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	Basic Information on Servomotors	Provides basic information on rotary servomotors, including servomotor part names and combinations with SERVOPACKs.
2	Capacity Selection	Describes calculation methods to use when selecting servomotor capacities.
3	Specifications, Ratings, and External Dimensions of SGMXJ Servomotors	Describes how to interpret the model numbers of SGMXJ servomotors and gives their specifications, ratings, and external dimensions.
4	Specifications, Ratings, and External Dimensions of SGMXA Servomotors	Describes how to interpret the model numbers of SGMXA servomotors and gives their specifications, ratings, and external dimensions.
5	Specifications, Ratings, and External Dimensions of SGMXP Servomotors	Describes how to interpret the model numbers of SGMXP servomotors and gives their specifications, ratings, and external dimensions.
6	Specifications, Ratings, and External Dimensions of SGMXG Servomotors	Describes how to interpret the model numbers of SGMXG servomotors and gives their specifications, ratings, and external dimensions.
7	Servomotor Installation	Describes the installation conditions, procedures, and precautions for servomotors.
8	Connections between Servomotors and SERVOPACKs	Describes the cables that are used to connect the servomotors and SERVOPACKs and provides related precautions.
9	Maintenance and Inspection	Describes the maintenance, inspection, and disposal of a servomotor.
10	Appendices	Provide reference information on selecting servomotor capacity.

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.

(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.

(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.
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	Σ-X-series rotary servomotors
SERVOPACK	Σ-X-series servo amplifier
servo drive	The combination of a servomotor and SERVOPACK.
main circuit cable	One of the cables that connect to the SERVOPACK main circuit terminals, including the main circuit power supply cable, control power supply cable, and servomotor main circuit cable.
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.

i.4.2 Trademarks

- EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.
- QR code is a trademark of Denso Wave Inc.
- 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

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

⚠ WARNING

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

⚠ CAUTION

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

NOTICE

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

i.5.2 Safety Precautions That Must Always Be Observed

(1) General Precautions

⚠ DANGER

Read and understand this manual to ensure the safe usage of the product.

Keep this manual in a safe, convenient place so that it can be referred to whenever necessary. Make sure that it is delivered to the final user of the product.

Do not remove covers, cables, connectors, or optional devices while power is being supplied to the SERVOPACK.

There is a risk of electric shock, operational failure of the product, or burning.

⚠ WARNING

Connect the ground terminals on the SERVOPACK and servomotor to ground poles according to local electrical codes (100 Ω max. for a SERVOPACK with a 200-VAC power supply, and 10 Ω max. for a SERVOPACK with a 400-VAC power supply). In addition, a SERVOPACK with 400-VAC power supply input can be used only in a power system with neutral grounded. Make sure to connect the SERVOPACK to a power supply with neutral grounded.

There is a risk of electric shock or fire.

Do not attempt to disassemble, repair, or modify the product.

There is a risk of fire or failure. The warranty is void for the product if you disassemble, repair, or modify it.

⚠ CAUTION

The 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 burning.

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

There is a risk of failure, damage, or electric shock.

Do not 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 electric shock or fire.

NOTICE

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

Install external emergency stop circuits that shut OFF the power and stops operation immediately when an error occurs.

Before selecting a brake power supply for the servomotor with holding brake, be sure to check the supply voltage and capacity that matches the servomotor model from the manual or catalog. Also, be sure to always check the input voltage to the holding brake.

Before using, be sure to configure a protective circuit (surge absorber) between the brake power supply and servomotor.

There is a risk of damage to the servomotor.

The time until the holding brake is activated will vary depending on the type of protective circuit. Also, if multiple holding brakes are connected in parallel, the time required to brake will vary in the same way. For this reason, be sure to always check that time until the holding brake is activated in the actual equipment before running the servomotor.

Always use a servomotor and SERVOPACK in one of the specified combinations.

Do not touch a SERVOPACK or servomotor with wet hands.

There is a risk of product failure.

(2) Storage Precautions

⚠ CAUTION

Do not place an excessive load on the product. (Follow all instructions on the packages.)

There is a risk of injury or damage.

NOTICE

Do not install or store the product in any of the following locations.

- **Locations that are subject to direct sunlight**
- **Locations that are subject to surrounding temperatures that exceed product specifications**
- **Locations that are subject to relative humidities that exceed product specifications**
- **Locations that are subject to condensation as the result of extreme changes in temperature**
- **Locations that are subject to corrosive or flammable gases**
- **Locations that are near flammable materials**
- **Locations that are subject to dust, salts, or iron powder**
- **Locations that are subject to water, oil, or chemicals**
- **Locations that are subject to vibration or shock that exceeds product specifications**
- **Locations that are subject to radiation**

If you store or install the product in any of the above locations, the product may fail or be damaged.

An anti-rust coating was applied at shipping as an anti-corrosive treatment, but rust may still form on the motor shafts and bolts under certain storage conditions and storage periods. If storing for longer than six months, reapply anticorrosive coating to the machine machining surfaces, particularly the motor shaft and similar parts.

If you will store the product for an extended period of time, contact your Yaskawa representative.

(3) Transportation Precautions

⚠ CAUTION

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

Do not hold onto the cables or motor shaft when you move the servomotor.

There is a risk of broken cables, damage, or injury.

When you handle a SERVOPACK or servomotor, be careful of sharp parts, such as the corners.

There is a risk of injury.

Do not place an excessive load on the product. (Follow all instructions on the packages.)

There is a risk of injury or damage.

Use the eyebolts on the servomotor to move only the servomotor. Never use the eyebolts on the servomotor to move the servomotor while it is installed on the machine.

There is a risk of damage to the servomotor or injury.

If you move the servomotor while the cables are connected, always hold onto the main body of the servomotor.

If you lift the servomotor by the cables when you move it, the connectors may be damaged or the cables may be broken.

NOTICE

SERVOPACK or servomotor is a precision device. Do not drop it or subject it to strong shock.

There is a risk of failure or damage.

Do not subject connectors to shock.

There is a risk of faulty connections or damage.

NOTICE

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 the erosion of the capacitors.

Do not overtighten the eyebolts on a SERVOPACK or servomotor.

If you use a tool to overtighten the eyebolts, the tapped holes may be damaged.

(4) Installation Precautions

⚠ WARNING

To prevent electric shock, ground the servomotor securely.

⚠ CAUTION

For motors with shaft end key grooves, do not touch the key grooves with your bare hands.

There is a risk of injury.

Anchor the servomotor securely to the machine.

If the servomotor is not secured properly, the servomotor could separate from the machine during operation.

Install the servomotor or SERVOPACK in a way that will support the mass given in technical documents.

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

Installation directly onto or near flammable materials may result in fire.

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

There is a risk of failure, damage, or injury.

Do not allow any foreign matter to enter the SERVOPACK or servomotor.

There is a risk of failure or fire.

Implement safety measures, such as by installing covers, so that the rotating parts of the servomotor cannot be touched during operation.

Do not connect a servomotor with an absolute encoder or a servomotor with a batteryless absolute encoder in a location where there is a magnetic field with a magnetic flux density of 0.01 tesla (100 gauss) or higher.

NOTICE

Do not install or store the product in any of the following locations.

- **Locations that are subject to direct sunlight**
- **Locations that are subject to surrounding temperatures that exceed product specifications**
- **Locations that are subject to relative humidities that exceed product specifications**
- **Locations that are subject to condensation as the result of extreme changes in temperature**
- **Locations that are subject to corrosive or flammable gases**
- **Locations that are near flammable materials**
- **Locations that are subject to dust, salts, or iron powder**
- **Locations that are subject to water, oil, or chemicals**
- **Locations that are subject to vibration or shock that exceeds product specifications**
- **Locations that are subject to radiation**

If you store or install the product in any of the above locations, the product may fail or be damaged.

Use the product in an environment that is appropriate for the product specifications.

If you use the product in an environment that exceeds product specifications, the product may fail or be damaged.

SERVOPACK or servomotor is a precision device. Do not drop it or subject it to strong shock.

There is a risk of failure or damage.

Servomotors are precision devices. Do not subject the servomotor output shaft or servomotor body to strong shock.

Properly design the system so that the thrust and radial loads applied to the motor shaft during operation are within the tolerances given in the catalog.

When you attach the key to the motor shaft, do not subject the key groove to direct shock.

Do not allow any foreign matter to enter a SERVOPACK or a servomotor with a cooling fan and do not cover the outlet from the servomotor's cooling fan.

There is a risk of failure.

The servomotor can be installed either horizontally or vertically. When the servomotor includes an oil seal, if the output shaft is installed facing upwards, oil may enter inside the motor under certain operating conditions. If the shaft is installed facing upwards, be sure to carefully check the operating conditions.

For servomotors with an oil seal, use the oil seal in a lubricated state exposed only to splashing of oil.

If using in an environment where the oil seal would be below the oil surface, oil could enter the inside of the servomotor and cause the servomotor to fail.

The shaft opening section of the servomotor does not have a waterproof or oilproof structure, and so implement measures at the machine side so that water, cutting oil, and other substances will not get inside the servomotor.

There is a risk of failure.

If using for applications where the servomotor will be exposed to large amounts of water or oil droplets, implement measures to protect the servomotor such as by adding covers to shield from water or oil droplets to ensure that the servomotor is not exposed to large amounts of liquids.

In environments with large amounts of humidity or oil mist, install the servomotor so that the lead wires and connectors are facing downward, and provide a cable trap.

There is a risk of failure or fire due to deteriorated insulation, short-circuit, or other causes.

Mount the servomotor to the machine so that the cables and connectors are not subjected to stress.

NOTICE

Continuous operation in one direction, such as for a fan, may damage the bearings due to electrolytic corrosion. Contact your Yaskawa representative if you will use a servomotor for this type of application.

Using a servomotor for oscillating operation may reduce the service life of the bearings. (Oscillating operation is defined as a continuous forward-reverse operation within a 150° rotation angle of the motor shaft.) Rotate the servomotor one full turn or more at least once a day.

(5) Wiring Precautions

⚠ DANGER

Do not change any wiring while power is being supplied.

There is a risk of electric shock or injury.

⚠ WARNING

Wiring and inspections must be performed only by qualified engineers.

There is a risk of electric shock or product failure.

Check all wiring and power supplies carefully.

Incorrect wiring or incorrect voltage application to the output circuits may cause short-circuit failures. If a short-circuit failure occurs as a result of any of these causes, the holding brake will not work. This could damage the machine or cause an accident that may result in death or injury. There is also a risk that some parts damaged by the short-circuit failure may fall from the SERVOPACK.

⚠ CAUTION

Observe the precautions and instructions for wiring and trial operation precisely as described in this document.

Failures caused by incorrect wiring or incorrect voltage application in the brake circuit may cause the SERVOPACK to fail, damage the equipment, or cause an accident resulting in death or injury.

Check the wiring to be sure it has been performed correctly. Connectors and pin layouts are sometimes different for different models. Always confirm the pin layouts in technical documents for your model before operation.

There is a risk of failure or malfunction.

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.

Connect wires to main circuit terminals and motor connection terminals securely with the specified methods and tightening torque.

Insufficient tightening may cause wires and terminal blocks to generate heat due to faulty contact, possibly resulting in fire.

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

The maximum wiring length is 3 m for I/O signal cables and 50 m for servomotor main circuit cables and encoder cables. The maximum wiring length is 10 m for the control power supply cables (+24 V and 0 V) for SERVOPACKs with a 400-V power supply input.

⚠ CAUTION

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.**

Do not connect the servomotor directly to an industrial power supply.

Doing so will destroy the servomotor. You cannot operate a servomotor without a SERVOPACK that is designed for it.

Do not subject the cables to excessive bending stress or tension. The conductors in the encoder cable and servomotor main circuit cable are as thin as 0.2 mm^2 or 0.3 mm^2. Wire them so that they are not subjected to excessive stress.

If you secure the cables with cable ties, protect the cables with cushioning material.

If the cable will be bent repeatedly, e.g., if the servomotor will move in the machine, use flexible cables.

If you do not use flexible cables, the cables may break.

Before you connect the wires, make sure that there are no mistakes in the wiring.

Always use the connectors specified by Yaskawa and insert them correctly.

When you connect a connector, check it to make sure there is no foreign matter, such as metal clippings, inside.

The connectors are made of resin. To prevent damage, do not apply any strong impact.

Perform all wiring so that stress is not applied to the connectors.

The connectors may break if they are subjected to stress.

NOTICE

Whenever possible, use the cables specified by Yaskawa. If you use any other cables, confirm the rated current and application environment of your model and use the wiring materials specified by Yaskawa or equivalent materials.

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.

If the cables are too close to each other, malfunctions may occur due to noise affecting the low-current lines.

Before using a motor with a cooling fan, check the fan rotation direction after wiring the cooling fan.

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

If you install batteries both at the host controller and on the encoder cable at the same time, you will create a loop circuit between the batteries, resulting in a risk of damage or burning.

NOTICE

When connecting a battery, connect the polarity correctly.

There is a risk of battery rupture or encoder failure.

Always connect the servomotor main circuit cable before you connect the encoder cable.

If you connect the encoder cable first, the encoder may be damaged due to the difference in electrical potential from the FG.

Never touch the connector pins on the servomotor directly with your hands.

Particularly the encoder may be damaged by static electricity.

For the following servomotor models, use the screws to secure the connectors to the servomotor. Make sure that they are securely attached.

- **SGMXJ servomotors**
- **SGMXA servomotors（Up to 1.0 kW）**
- **SGMXP servomotors**

If they are not securely attached, the protective structure specifications may not be satisfied.

Do not remove rubber packings or O-rings. Also, make sure that rubber packings and O-rings do not come off.

If the rubber packings or O-rings are not securely attached, the protective structure specifications may not be satisfied.

Do not connect magnetic contactors, reactors, or other devices on the cables that connect the SERVOPACK and servomotor.

Failure to observe this caution may result in malfunction or damage.

(6) Operation Precautions

⚠ WARNING

Before starting operation with a machine connected, change the settings of the switches and parameters to match the machine.

Unexpected machine operation, failure, or personal injury may occur if operation is started before appropriate settings are made.

Do not radically change the settings of the parameters.

There is a risk of unstable operation, machine damage, or injury.

Install limit switches or stoppers at the ends of the moving parts of the machine to prevent unexpected accidents.

There is a risk of machine damage or injury.

For trial operation, securely mount the servomotor and disconnect it from the machine.

There is a risk of injury.

Forcing the motor to stop for overtravel is disabled when the Jog, Origin Search, or Easy FFT utility function is executed. Take necessary precautions.

There is a risk of machine damage or injury.

When an alarm occurs, the servomotor will coast to a stop or stop with the dynamic brake according to the SERVOPACK option and settings. The coasting distance will change with the moment of inertia of the load and the external dynamic brake resistance. Check the coasting distance during trial operation and implement suitable safety measures on the machine.

⚠ WARNING

Do not enter the machine's range of motion during operation.

There is a risk of injury.

Do not touch the moving parts of the servomotor or machine during operation.

There is a risk of injury.

⚠ CAUTION

Do not use the holding brake in the servomotor as a brake to stop the servomotor. The holding brake is used for holding the motor shaft in place, and it is not a stopping device for ensuring machine safety. Install a stopping device for ensuring safety on the machine side.

There is a risk of brake wear and failure, machine damage, or injury.

Before running the servomotor, supply power to the holding brake, and then release the holding brake.

For details, refer to the timechart in the manual.

Check that the holding brake operates correctly when conducting trial operation.

When overtravel occurs, the power to the motor is turned OFF and the brake is released. If you use the servomotor to drive a vertical load, set the servomotor to enter a zero-clamped state after the servomotor stops. Also, install safety devices (such as an external brake or counterweight) to prevent the moving parts of the machine from falling.

Always turn OFF the servo before you turn OFF the power supply. If you turn OFF the main circuit power or control power during operation before you turn OFF the servo, the servomotor will stop as follows:

- **If you turn OFF the main circuit power during operation without turning OFF the servo, the servomotor will stop abruptly with the dynamic brake.**
- **If you turn OFF the control power without turning OFF the servo, the stopping method that is used by the servomotor depends on the model of the SERVOPACK. For details, refer to the manual for the SERVOPACK.**

NOTICE

Be sure to measure the vibrations while the servomotor is installed in the machine, and check that the vibrations are within the tolerances.

If the vibrations are large, the servomotor could fail prematurely and bolts could be loosened.

When you adjust the gain during system commissioning, use a measuring instrument to monitor the torque waveform and speed waveform and confirm that there is no vibration.

If a high gain causes vibration, the servomotor will be damaged quickly.

An alarm or warning may occur if communications are performed with the host controller while the SigmaWin+ or digital operator is operating.

If an alarm or warning occurs, it may interrupt the current process and stop the system.

(7) Maintenance and Inspection Precautions

⚠ DANGER

Do not change any wiring while power is being supplied.

There is a risk of electric shock or injury.

⚠ WARNING

Wiring and inspections must be performed only by qualified engineers.

There is a risk of electric shock or product failure.

Before replacing the servomotor with holding brake, secure the machine side in place.

There is a risk of device damage or injury due to falling of a device.

⚠ CAUTION

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.

Replace the battery by following the correct procedure.

If the battery is removed while the control power of the SERVOPACK is OFF (including when the encoder cable is removed), the data stored in the absolute encoder will be lost, and the position may be shifted.

(8) Troubleshooting Precautions

⚠ WARNING

The product may suddenly start to operate when the power supply is recovered after a momentary power interruption. Design the machine to ensure human safety when operation restarts.

There is a risk of injury.

⚠ CAUTION

When an alarm occurs, remove the cause of the alarm and ensure safety. Then reset the alarm or turn the power OFF and ON again to restart operation.

There is a risk of injury or machine damage.

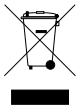
If the Servo ON signal is input to the SERVOPACK and an alarm is reset, the servomotor may suddenly restart operation. Confirm that the servo is OFF and ensure safety before you reset an alarm.

There is a risk of injury or machine damage.

The holding brake on a servomotor will not ensure safety if there is the possibility that an external force (including gravity) may move the current position and create a hazardous situation when power is interrupted or an error occurs. If an external force may cause movement, install an external braking mechanism that ensures safety.

(9) 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.



(10) 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.6 Warranty

i.6.1 Details of Warranty

(1) 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.

(2) 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

i.6.2 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.

i.6.3 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.

i.6.4 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.7 Compliance with UL Standards, EU Directives, and Other Safety Standards

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.7.1 North American Safety Standards (UL)

Product	Model	North American Safety Standards (UL File No.)
Rotary Servomotor	• SGMXA • SGMXJ • SGMXP • SGMXG	UL 1004-1 UL 1004-6 (E165827)

i.7.2 EU Directives

Product	Model	EU Directives	Harmonized Standards
Rotary Servomotor	• SGMXJ • SGMXA • SGMXP • SGMXG	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)
		Low Voltage Directive 2014/35/EU	EN 60034-1 EN 60034-5
		RoHS Directive 2011/65/EU (EU)2015/863	EN IEC 63000
		WEEE Directive 2012/19/EU	–

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.

i.7.3 Safety Standards

Product	Model	Designated Standards
Rotary Servomotor	• SGMXJ • SGMXA • SGMXG	IEC 61800-5-3:2021

Note:

The designated standard is a standard for encoders with functional safety that are built into the rotary servomotors.

i.7.4 UK Conformity Assessed (UKCA)

Product	Model	UK Regulations	Designated Standards
Rotary Servomotor	• SGMXJ • SGMXA • SGMXP • SGMXG	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)
		Electrical Equipment (Safety) Regulations S.I. 2016/1101	EN 600034-1 EN 600034-5
		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.

1

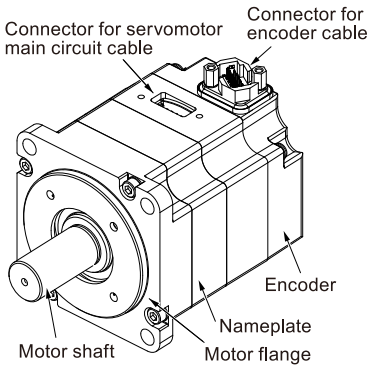
Basic Information on Servomotors

This chapter provides basic information on rotary servomotors, including servomotor part names and combinations with SERVOPACKs.

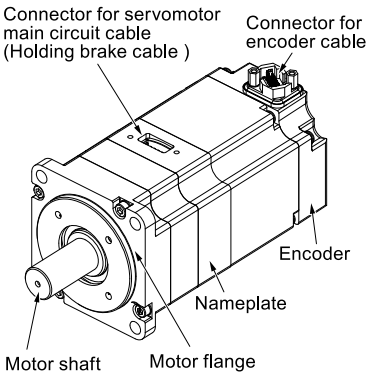
1.1 Servomotor Part Names

1.1.1 SGMXJ servomotors, SGMXA servomotors (Up to 1.0 kW), SGMXP servomotors (Up to 400 W)

- Standard Servomotors

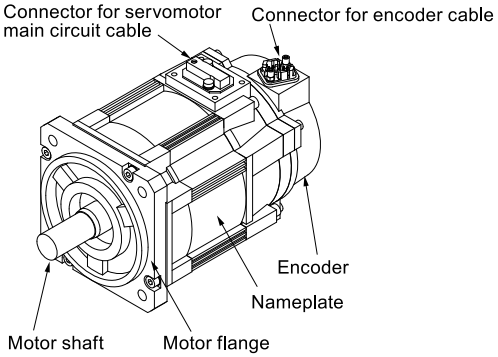


- Servomotors with Brakes

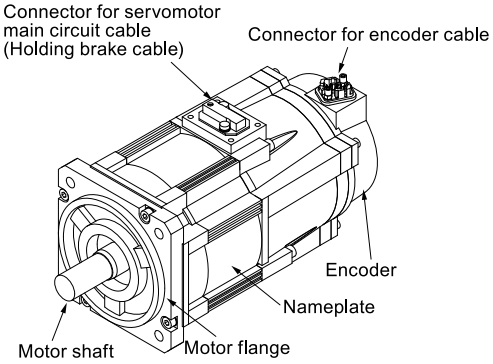


1.1.2 SGMXG Servomotors (Up to 450 W)

- Standard Servomotors

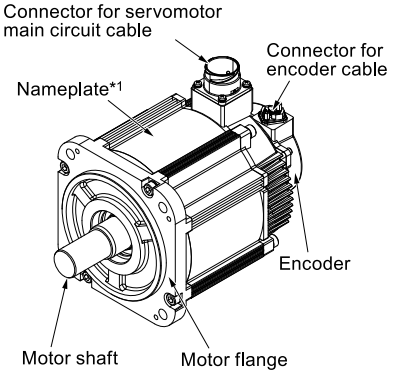


- Servomotors with Brakes

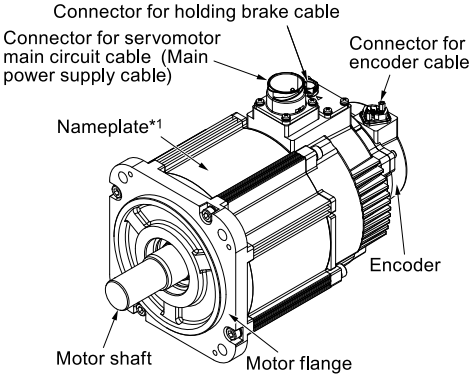


1.1.3 SGMXA (1.5 kW to 5.0 kW) and SGMXG (600 W or more) Servomotors

- Standard Servomotors

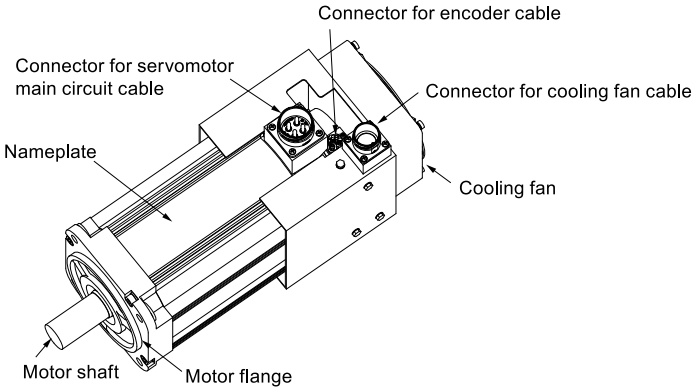


- Servomotors with Brakes



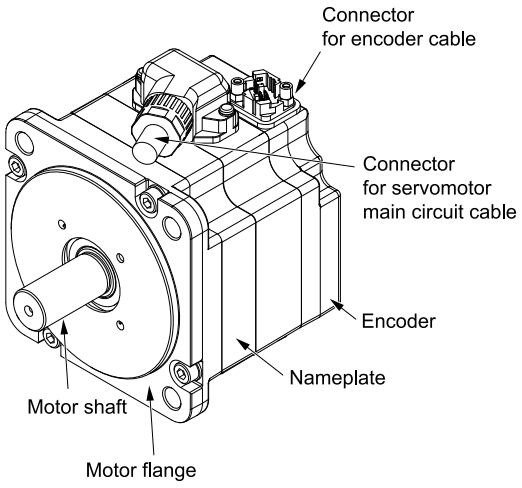
*1 The position of the nameplate depends on the model and motor output.

1.1.4 SGMXA Servomotors (7.0 kW)

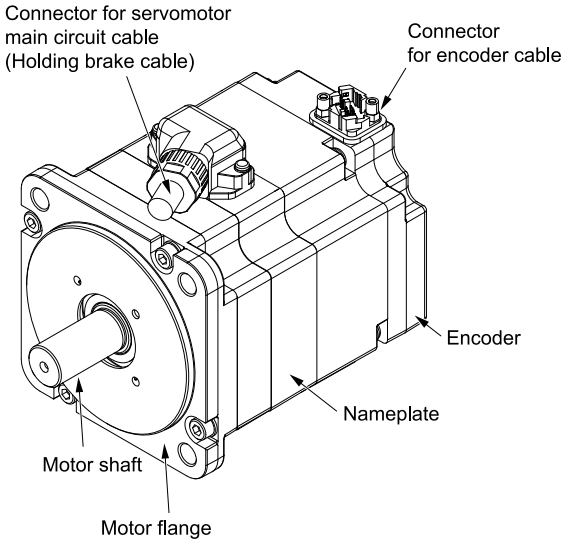


1.1.5 SGMXP Servomotors (200 W, 400 W) (400 V Specification)

· Standard Servomotors

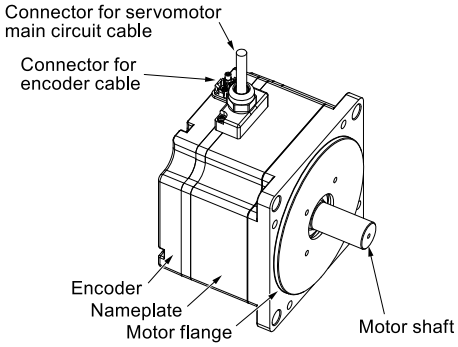


· Servomotor with Brakes

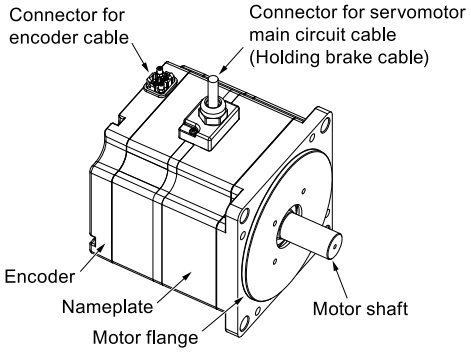


1.1.6 SGMXP Servomotors (750 W, 1.5 kW)

• Standard Servomotors



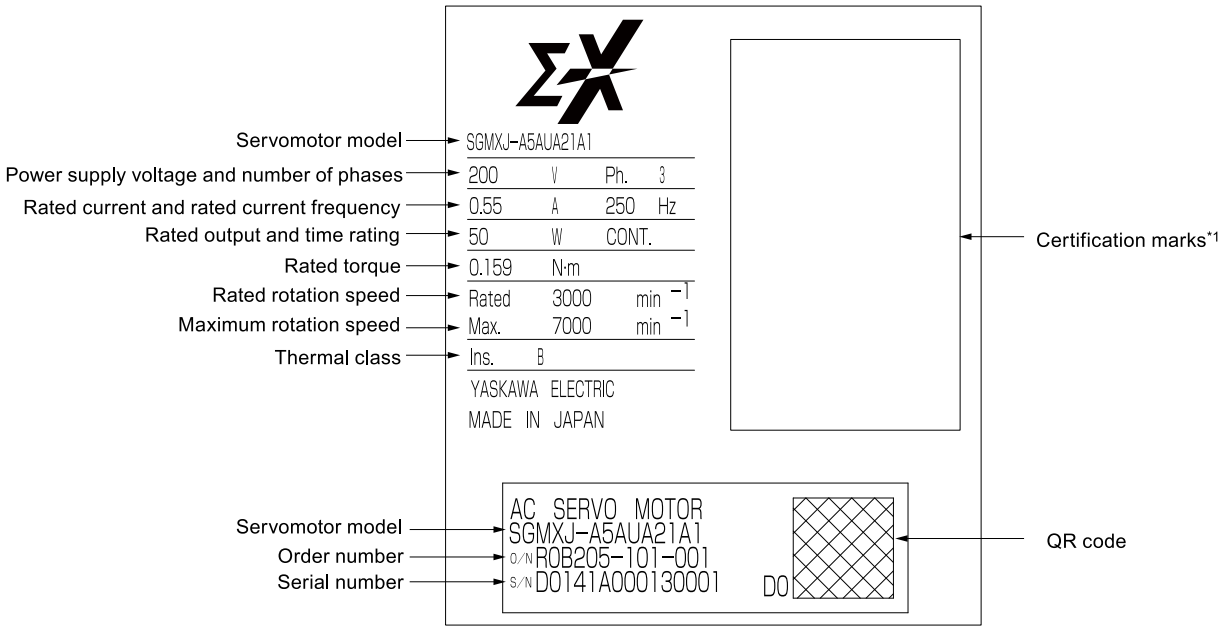
• Servomotors with Brakes



1.2 Interpreting the Nameplate

The nameplate is printed on the servomotor.

The layout of the nameplate depends somewhat on the model of the servomotor.



*1 Certification marks for the standards for which the product has been certified by certification bodies are shown on nameplate.

1.3 Outline of Model Designations

1.3.1 Servomotor

This section outlines the model numbers of Σ-X-series servomotors. For details, refer to the chapter for your type of servomotor.

SGM□□ - 01 A U A 2 1 A 1

Series | 1st+2nd digits | 3rd digit | 4th digit | 5th digit | 6th digit | 7th digit | 8th digit | 9th digit

Series Σ-X-Series Servomotors

Code	Specification	Reference
SGMXJ	Medium inertia, high speed	Chapter 3
SGMXA	Low inertia, high speed	Chapter 4
SGMXP	Medium inertia, flat	Chapter 5
SGMXG	Medium inertia, low speed, high torque	Chapter 6

1st+2nd digits Rated Output

3rd digit Power Supply Voltage

Code	Specification
A	AC 200 V
D	AC 400 V

4th digit Serial Encoder Specification

- 26-bit batteryless absolute encoder
- 26-bit absolute encoder

5th digit Design Revision Order

6th digit Shaft End Specification

- Straight without key (excluding SGMXG-30 to -1E)
- Straight without key, with tap (excluding SGMXG-30 to -1E)
- Straight with key and tap
- With two flat seats

7th digit Option Specification

- With holding brake (24 VDC)
- With oil seal

8th digit Destination

9th digit Ancillary Specification

Code	Specification
1	Standard
2	Compatible (200 VAC: Σ-7 compatible, 400 VAC: Σ-V compatible)
3*1	Standard (encoder with functional safety)

*1 The following models are not supported.

- Series: SGMXP, SGMXG (1000-min^{-1} specification, 400-V specification), SGMXA (400-V specification)
- Shaft end: With two flat seats
- Options: With holding brake, with oil seal

Contact your Yaskawa representative beforehand if you require a model with support for functional safety.

Important

Servomotors with Functional Safety

Servomotors with functional safety only operate in accordance with safety standard IEC 61800-5-3 if used in combination with an advanced safety module (ASM-X), a SERVOPACK, and the specified cables. Refer to the advanced safety module manual for details on the specifications of the advanced safety module.

Σ-X-Series Advanced Safety Module with Safety over EtherCAT (FSoE) Communications References Product Manual (Manual No.: SIEP C710812 25)

Σ-X-Series Advanced Safety Module Digital I/O Product Manual (Manual No.: SIEP C710812 26)

Only cables, connectors, and wiring materials described in the Peripheral Device Selection Manual can be used. Using components with a model number not described in the manual will result in non-compliance with safety standards, even if the specifications are the same.

Term

Standard specification :

Only cables that support Σ-LINK II can be used.

Σ-7 compatible specification :

Cables for the Σ-7-series servomotors can be used.

Σ-V Compatible Specification :

Cables for the Σ-V-series servomotors can be used.

1.3.2 SERVOPACKs

This section outlines the model numbers of Σ-X-series SERVOPACKs. For details, refer to the manual for your SERVOPACK.

- Σ-X-Series Σ-XS SERVOPACK with MECHATROLINK-4/III Communications References Product Manual (Manual No.: SIEP C710812 01)
- Σ-X-Series Σ-XS SERVOPACK with EtherCAT Communications References Product Manual (Manual No.: SIEP C710812 02)
- Σ-X-Series Σ-XS SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP C710812 03)
- Σ-X-Series Σ-XW SERVOPACK with MECHATROLINK-4/III Communications References Product Manual (Manual No.: SIEP C710812 04)
- Σ-X-Series Σ-XW SERVOPACK with EtherCAT Communications References Product Manual (Manual No.: SIEP C710812 05)

SGDX□ - R70 A 00 A 0001

Series | 1st+2nd+3rd digits | 4th digit | 5th+6th digits | 7th digit | 8th+9th+10th+11th digits

Series Σ-X-Series SERVOPACKs

Code	Specification
SGDXS	Single-axis SERVOPACKs
SGDXW	Two-axis SERVOPACKs

1st+2nd+3rd digits Maximum Applicable Motor Capacity

0.05 kW to 15 kW

4th digit Power Supply Voltage

Code	Specification
A	200 VAC
D	400 VAC

5th+6th digits Interface

- Analog voltage/pulse train reference
- MECHATROLINK-4/-III communications reference
- EtherCAT communications reference

7th digit Design Revision Order

8th+9th+10th+11th digits Options

- Rack-mounted installation
- Varnished

1.4 Combinations of Servomotors and SERVOPACKs

1.4.1 Servomotors with 200 V Specification

Rotary Servomotor Model		Capacity	SERVOPACK Model *1		
			SGDXS-	SGDXW-	SGDXT-
SGMXJ Servomotors (Medium Inertia, High Speed) 3000 min-1	SGMXJ-A5A	50 W	R70A	1R6A *2, 2R8A *2	1R6A *2, 2R8A *2
	SGMXJ-01A	100 W	R90A	1R6A *2, 2R8A *2	1R6A *2, 2R8A *2
	SGMXJ-C2A	150 W	1R6A	1R6A, 2R8A *2	1R6A, 2R8A *2
	SGMXJ-02A	200 W	1R6A	1R6A, 2R8A *2	1R6A, 2R8A *2
	SGMXJ-04A	400 W	2R8A	2R8A, 5R5A *2, 7R6A *2	2R8A
	SGMXJ-06A	600 W	5R5A	5R5A, 7R6A	–
	SGMXJ-08A	750 W	5R5A	5R5A, 7R6A	–
SGMXA Servomotors (Low Inertia, High Speed) 3000 min-1	SGMXA-A5A	50 W	R70A	1R6A *2, 2R8A *2	1R6A *2, 2R8A *2
	SGMXA-01A	100 W	R90A	1R6A *2, 2R8A *2	1R6A *2, 2R8A *2
	SGMXA-C2A	150 W	1R6A	1R6A, 2R8A *2	1R6A, 2R8A *2
	SGMXA-02A	200 W	1R6A	1R6A, 2R8A *2	1R6A, 2R8A *2
	SGMXA-04A	400 W	2R8A	2R8A, 5R5A *2, 7R6A *2	2R8A
	SGMXA-06A	600 W	5R5A	5R5A, 7R6A	–
	SGMXA-08A	750 W	5R5A	5R5A, 7R6A	–
	SGMXA-10A	1.0 kW	120A	–	–
	SGMXA-15A	1.5 kW	120A	–	–
	SGMXA-20A	2.0 kW	180A	–	–
	SGMXA-25A	2.5 kW	200A	–	–
	SGMXA-30A	3.0 kW	200A	–	–
	SGMXA-40A	4.0 kW	330A	–	–
	SGMXA-50A	5.0 kW	330A	–	–
	SGMXA-70A	7.0 kW	550A	–	–
SGMXP Servomotors (Medium Inertia, Flat) 3000 min-1	SGMXP-01A	100 W	R90A	1R6A *2, 2R8A *2	1R6A *2, 2R8A *2
	SGMXP-02A	200 W	2R8A	2R8A, 5R5A *2, 7R6A *2	2R8A
	SGMXP-04A	400 W	2R8A	2R8A, 5R5A *2, 7R6A *2	2R8A
	SGMXP-08A	750 W	5R5A	5R5A, 7R6A	–
	SGMXP-15A	1.5 kW	120A	–	–

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Continued from previous page.

Rotary Servomotor Model		Capacity	SERVOPACK Model *1		
			SGDXS-	SGDXW-	SGDXT-
SGMXG Servomotors (Medium Inertia, Low Speed, Large Torque) 1500 min-1	SGMXG-03A□A	300 W	3R8A	5R5A *2, 7R6A *2	–
	SGMXG-05A□A	450 W	3R8A	5R5A *2, 7R6A *2	–
	SGMXG-09A□A	850 W	7R6A (120A)	7R6A	–
	SGMXG-13A□A	1.3 kW	120A (180A)	–	–
	SGMXG-20A□A	1.8 kW	180A (200A)	–	–
	SGMXG-30A□A	2.9 kW *3	330A (470A)	–	–
	SGMXG-44A□A	4.4 kW	330A (550A)	–	–
	SGMXG-55A□A	5.5 kW	470A	–	–
	SGMXG-75A□A	7.5 kW	550A	–	–
	SGMXG-1AA□A	11 kW	590A	–	–
	SGMXG-1EA□A	15 kW	780A	–	–
SGMXG Servomotors (Medium Inertia, Low Speed, Large Torque) 1000 min-1	SGMXG-03A□B	300 W	3R8A	5R5A *2	–
	SGMXG-06A□B	600 W	5R5A	5R5A	–
	SGMXG-09A□B	900 W	7R6A	7R6A	–
	SGMXG-12A□B	1.2 kW	120A	–	–
	SGMXG-20A□B	2.0 kW	180A (200A)	–	–
	SGMXG-30A□B	3.0 kW	200A	–	–
	SGMXG-40A□B	4.0 kW	330A	–	–
	SGMXG-55A□B	5.5 kW	470A	–	–

*1 To increase the instantaneous maximum torque, use the SERVOPACK model in parentheses ( ).
*2 If you use a servomotor together with a Σ-XW SERVOPACK, the control gain may not increase as much as with a Σ-XS SERVOPACK and other performances may be lower than those achieved with a Σ-XS SERVOPACK.
*3 The rated output is 2.4 kW if you use the SGDXS-200A.

1.4.2 Servomotors with 400 V Specification

Rotary Servomotor Model		Capacity	SERVOPACK Model *1 SGDXS-
SGMXA Servomotors (Low Inertia, High Speed) 3000 min-1	SGMXA-15D	1.5 kW	5R4D
	SGMXA-20D	2.0 kW	8R4D
	SGMXA-25D	2.5 kW	120D
	SGMXA-30D	3.0 kW	120D
	SGMXA-40D	4.0 kW	170D
	SGMXA-50D	5.0 kW	170D
SGMXP Servomotors (Medium Inertia, Flat) 3000 min-1	SGMXP-02D	200 W	1R9D
	SGMXP-04D	400 W	1R9D
	SGMXP-08D	750 W	3R5D
	SGMXP-15D	1.5 kW	5R4D
SGMXG Servomotors (Medium Inertia, Low Speed, Large Torque) 1500 min-1	SGMXG-05D	450 W	1R9D
	SGMXG-09D	850 W	3R5D (5R4D)
	SGMXG-13D	1.3 kW	5R4D (8R4D)
	SGMXG-20D	1.8 kW	8R4D (120D)
	SGMXG-30D	2.9 kW	120D (210D)
	SGMXG-44D	4.4 kW	170D (260D)
	SGMXG-55D	5.5 kW	210D (370D)
	SGMXG-75D	7.5 kW	260D
	SGMXG-1AD	11 kW	280D
	SGMXG-1ED	15 kW	370D

*1 To increase the instantaneous maximum torque, use the SERVOPACK model in parentheses ( ).

2

Capacity Selection

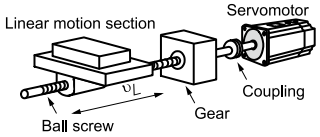
This chapter describes calculation methods to use when selecting servomotor capacities.

2.1 Selecting the Servomotor Capacity

Contact your Yaskawa representative for information on the servomotor capacity selection software.
Refer to the following selection examples to select servomotor capacities with manual calculations.

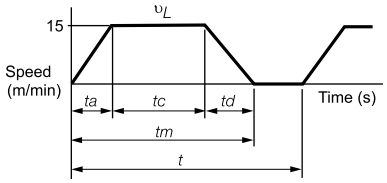
2.1.1 Capacity Selection Example for a Rotary Servomotor (Speed Control)

1. Machine Specifications



Item	Symbol	Value
Load Speed	υ_L	15 m/min
Linear Motion Section Mass	m	250 kg
Ball Screw Length	ℓ_B	1.0 m
Ball Screw Diameter	d_B	0.02 m
Ball Screw Lead	P_B	0.01 m
Ball Screw Material Density	ρ	7.87×10^3 kg/m^3
Gear Ratio	R	2 (gear ratio: 1/2)
External Force on Linear Motion Section	F	0 N
Gear and Coupling Moment of Inertia	J_G	0.40×10^{-4} kg·m^2
Number of Feeding Operations	n	40 rotations/min
Feeding Distance	ℓ	0.275 m
Feeding Time	tm	1.2 s max.
Friction Coefficient	μ	0.2
Mechanical Efficiency	η	0.9 (90%)

2. Operation Pattern



$$t = \frac{60}{n} = \frac{60}{40} = 1.5 \text{ (s)}$$

If $ta = td$,

$$ta = tm - \frac{60\ell}{\upsilon_L} = 1.2 - \frac{60 \times 0.275}{15} = 1.2 - 1.1 = 0.1 \text{ (s)}$$

$$tc = 1.2 - 0.1 \times 2 = 1.0 \text{ (s)}$$

3. Rotation Speed
   - Load Shaft Speed

     $$n_L = \frac{\upsilon_L}{P_B} = \frac{15}{0.01} = 1500 \text{ (min}^{-1}\text{)}$$

   - Motor Shaft Speed

     $n_M = n_L \cdot R = 1500 \times 2 = 3000 \text{ (min}^{-1}\text{)}$

4. Load Torque

$$T_L = \frac{(9.8 \cdot \mu \cdot m + F) \cdot P_B}{2\pi R \cdot \eta} = \frac{(9.8 \times 0.2 \times 250 + 0) \times 0.01}{2\pi \times 2 \times 0.9} = 0.43 \text{ (N·m)}$$

5. Load Moment of Inertia
   - Linear Motion Section

$$J_{L1} = m\left(\frac{P_B}{2\pi R}\right)^2 = 250 \times \left(\frac{0.01}{2\pi \times 2}\right)^2 = 1.58 \times 10^{-4}\ (\text{kg·m}^2)$$

- Ball Screw

$$J_B = \frac{\pi}{32}\rho \cdot \ell_B \cdot d_B{}^4 \cdot \frac{1}{R^2} = \frac{\pi}{32} \times 7.87 \times 10^3 \times 1.0 \times (0.02)^4 \cdot \frac{1}{2^2} = 0.31 \times 10^{-4}\ (\text{kg·m}^2)$$

- Coupling
  $J_G = 0.40 \times 10^{-4}(\text{kg·m}^2)$
- Load Moment of Inertia at Motor Shaft
  $J_L = J_{L1} + J_B + J_G = (1.58 + 0.31 + 0.40) \times 10^{-4} = 2.29 \times 10^{-4}(\text{kg·m}^2)$

6. Load Moving Power

$$P_O = \frac{2\pi n_M \cdot T_L}{60} = \frac{2\pi \times 3000 \times 0.43}{60} = 135\ (\text{W})$$

7. Load Acceleration Power

$$Pa = \left(\frac{2\pi}{60} n_M\right)^2 \frac{J_L}{ta} = \left(\frac{2\pi}{60} \times 3000\right)^2 \times \frac{2.29 \times 10^{-4}}{0.1} = 226\ (\text{W})$$

8. Servomotor Provisional Selection

   a. Selection Conditions

   - $T_L \leq$ Motor rated torque
   - $\frac{(Po + Pa)}{2}$ < Provisionally selected servomotor rated output < $(Po + Pa)$
   - $n_M \leq$ Motor rated speed
   - $J_L \leq$ Allowable load moment of inertia

   The following servomotor meets the selection conditions.

   - SGMXJ-02A servomotor

   b. Specifications of the Provisionally Selected Servomotor

Item	Value
Rated Output	200 (W)
Rated Rotation Speed	3000 (min^{-1})
Rated Torque	0.637 (N·m)
Instantaneous Maximum Torque	2.23 (N·m)
Rotor Moment of Inertia	0.263×10^{-4} (kg·m^2)
Allowable Load Moment of Inertia	$0.263 \times 10^{-4} \times 15 = 3.94 \times 10^{-4}$ (kg·m^2)

9. Verification of the Provisionally Selected Servomotor

- Verification of Required Acceleration Torque

$$T_P = \frac{2\pi n_M (J_M + J_L)}{60ta} + T_L = \frac{2\pi \times 3000 \times (0.263 + 2.29) \times 10^{-4}}{60 \times 0.1} + 0.43$$

$$\approx 1.23\ (\text{N·m}) < \text{Maximum instantaneous torque...Satisfactory}$$

- Verification of Required Deceleration Torque

$$T_S = \frac{2\pi n_M (J_M + J_L)}{60td} - T_L = \frac{2\pi \times 3000 \times (0.263 + 2.29) \times 10^{-4}}{60 \times 0.1} - 0.43$$

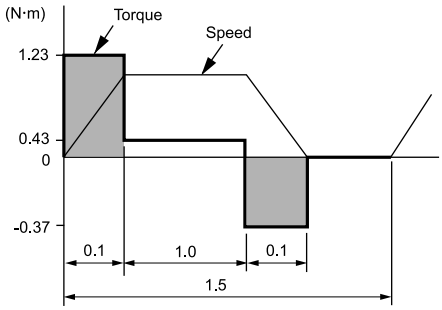
$$\approx 0.37\ (\text{N·m}) < \text{Maximum instantaneous torque...Satisfactory}$$

- Verification of Effective Torque Value

$$Trms = \sqrt{\frac{T_P{}^2 \cdot ta + T_L{}^2 \cdot tc + Ts^2 \cdot td}{t}} = \sqrt{\frac{(1.23)^2 \times 0.1 + (0.43)^2 \times 1.0 + (0.37)^2 \times 0.1}{1.5}}$$

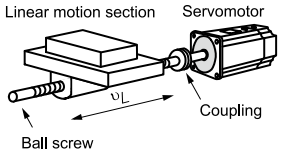
$$\approx 0.483\ (\text{N·m}) < \text{Rated torque...Satisfactory}$$

10. Selection Result
    It has been verified that the provisionally selected servomotor is applicable.
    The torque diagram is shown below.



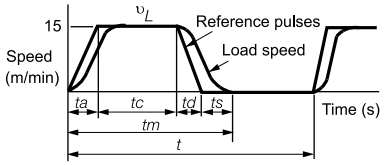
2.1.2 Capacity Selection Example for a Rotary Servomotor (Position Control)

1. Machine Specifications



Item	Symbol	Value
Load Speed	υ_L	15 m/min
Linear Motion Section Mass	m	80 kg
Ball Screw Length	ℓ_B	0.8 m
Ball Screw Diameter	d_B	0.016 m
Ball Screw Lead	P_B	0.005 m
Ball Screw Material Density	ρ	7.87×10^3 kg/m^3
External Force on Linear Motion Section	F	0 N
Coupling Mass	m_C	0.3 kg
Coupling Outer Diameter	d_C	0.03 m
Number of Feeding Operations	n	40 rotations/min
Feeding Distance	ℓ	0.25 m
Feeding Time	tm	1.2 s max.
Electrical Stopping Precision	δ	±0.01 mm
Friction Coefficient	μ	0.2
Mechanical Efficiency	η	0.9 (90%)

2. Speed Diagram



$$t = \frac{60}{n} = \frac{60}{40} = 1.5 \text{ (s)}$$

If $ta = td$, $ts = 0.1$ (s)

$$ta = tm - ts - \frac{60\ell}{\upsilon_L} = 1.2 - 0.1 - \frac{60 \times 0.25}{15} = 0.1 \text{ (s)}$$

$$tc = 1.2 - 0.1 - 0.1 \times 2 = 0.9 \text{ (s)}$$

3. Rotation Speed

- Load Shaft Speed

$$n_L = \frac{\upsilon_L}{P_B} = \frac{15}{0.005} = 3000\ (\text{min}^{-1})$$

- Motor Shaft Speed
  Direct coupling gear ratio 1/R = 1/1
  Therefore, $n_M = n_L \cdot R = 3000 \times 1 = 3000\ (\text{min}^{-1})$

4. Load Torque

$$T_L = \frac{(9.8\,\mu \cdot m + F) \cdot P_B}{2\pi R \cdot \eta} = \frac{(9.8 \times 0.2 \times 80 + 0) \times 0.005}{2\pi \times 1 \times 0.9} = 0.139\ (\text{N·m})$$

5. Load Moment of Inertia

- Linear Motion Section

$$J_{L1} = m\left(\frac{P_B}{2\pi R}\right)^2 = 80 \times \left(\frac{0.005}{2\pi \times 1}\right)^2 = 0.507 \times 10^{-4}\ (\text{kg·m}^2)$$

- Ball Screw

$$J_B = \frac{\pi}{32}\rho \cdot \ell_B \cdot d_B{}^4 = \frac{\pi}{32} \times 7.87 \times 10^3 \times 0.8 \times (0.016)^4 = 0.405 \times 10^{-4}\ (\text{kg·m}^2)$$

- Coupling

$$Jc = \frac{1}{8} m_C \cdot d_C{}^2 = \frac{1}{8} \times 0.3 \times (0.03)^2 = 0.338 \times 10^{-4}\ (\text{kg·m}^2)$$

- Load Moment of Inertia at Motor Shaft
  $J_L = J_{L1} + J_B + J_C = 1.25 \times 10^{-4}\ (\text{kg·m}^2)$

6. Load Moving Power

$$P_O = \frac{2\pi n_M \cdot T_L}{60} = \frac{2\pi \times 3000 \times 0.139}{60} = 43.7\ (\text{W})$$

7. Load Acceleration Power

$$Pa = \left(\frac{2\pi}{60} n_M\right)^2 \frac{J_L}{ta} = \left(\frac{2\pi}{60} \times 3000\right)^2 \times \frac{1.25 \times 10^{-4}}{0.1} = 123.4\ (\text{W})$$

8. Servomotor Provisional Selection

   a. Selection Conditions

   - $T_L \leq$ Motor rated torque
   - $\frac{(Po + Pa)}{2} <$ Provisionally selected servomotor rated output $< (Po + Pa)$
   - $n_M \leq$ Motor rated speed
   - $J_L \leq$ Allowable load moment of inertia

   The following servomotor meets the selection conditions.

   - SGMXJ-01A servomotor

   b. Specifications of the Provisionally Selected Servomotor

Item	Value
Rated Output	100 (W)
Rated Rotation Speed	3000 (min^{-1})
Rated Torque	0.318 (N·m)
Instantaneous Maximum Torque	1.11 (N·m)
Rotor Moment of Inertia	0.0669×10^{-4} (kg·m^2)
Allowable Load Moment of Inertia	$0.0659 \times 10^{-4} \times 35 = 2.31 \times 10^{-4}$ (kg·m^2)
Encoder Resolution	67108864 (pulses/rev) (26 bits)

9. Verification of the Provisionally Selected Servomotor

- Verification of Required Acceleration Torque

$$T_P = \frac{2\pi n_M (J_M + J_L)}{60ta} + T_L = \frac{2\pi \times 3000 \times (0.0659 + 1.25) \times 10^{-4}}{60 \times 0.1} + 0.139$$

$$\approx 0.552 \text{ (N·m)} < \text{Maximum instantaneous torque...Satisfactory}$$

- Verification of Required Deceleration Torque

$$T_S = \frac{2\pi n_M (J_M + J_L)}{60td} - T_L = \frac{2\pi \times 3000 \times (0.0659 + 1.25) \times 10^{-4}}{60 \times 0.1} - 0.139$$

$$\approx 0.274 \text{ (N·m)} < \text{Maximum instantaneous torque...Satisfactory}$$

- Verification of Effective Torque Value

$$Trms = \sqrt{\frac{T_P^2 \cdot ta + T_L^2 \cdot tc + Ts^2 \cdot td}{t}} = \sqrt{\frac{(0.552)^2 \times 0.1 + (0.139)^2 \times 0.9 + (0.274)^2 \times 0.1}{1.5}}$$

$$\approx 0.192 \text{ (N·m)} < \text{Rated torque...Satisfactory}$$

It has been verified that the provisionally selected servomotor is applicable in terms of capacity. Position control is considered next.

10. Positioning Resolution
The electrical stopping precision δ = ±0.01 mm, so the positioning resolution $\Delta\ell = 0.01$ mm.
The ball screw lead $P_B = 0.005$ m, so the number of pulses per motor rotation is calculated using the following formula.

$$\text{Number of pulses per rotation (pulses)} = \frac{P_B}{\Delta\ell} = \frac{5 \text{ mm/rev}}{0.01 \text{ mm}} = 500 \text{ (P/rev)} < \text{Encoder resolution〔67108864 (P/rev)〕}$$

The number of pulses per motor rotation is less than the encoder resolution (pulses/rev), so the provisionally selected servomotor can be used.

11. Reference Pulse Frequency
The load speed $\upsilon_L = 15$ m/min = 1000 × 15/60 mm/s and the positioning resolution (travel distance per pulse) = 0.01 mm/pulse, so the reference pulse frequency is calculated with the following formula.

$$vs = \frac{1000\ \upsilon_L}{60 \times \Delta\ell} = \frac{1000 \times 15}{60 \times 0.01} = 25{,}000 \text{ (pps)}$$

The reference pulse frequency is less than the maximum input pulse frequency *1, so the provisionally selected servomotor can be used.

*1 Refer to the specifications in the SERVOPACK manual for the maximum input pulse frequency.

It has been verified that the provisionally selected servomotor is applicable for position control.

3

Specifications, Ratings, and External Dimensions of SGMXJ Servomotors

This chapter describes how to interpret the model numbers of SGMXJ servomotors and gives their specifications, ratings, and external dimensions.

3.1 Model Designations

SGMXJ - 01 A U A 2 1 A 1

1st+2nd digits 3rd digit 4th digit 5th digit 6th digit 7th digit 8th digit 9th digit

Σ-X-Series
Servomotor
SGMXJ model

1st+2nd digits Rated Output

Code	Specification
A5	50 W
01	100 W
C2	150 W
02	200 W
04	400 W
06	600 W
08	750 W

3rd digit Power Supply Voltage

Code	Specification
A	200 VAC

4th digit Serial Encoder

Code	Specification
U	26-bit absolute encoder
W	26-bit batteryless absolute encoder

5th digit Design Revision Order

A

6th digit Shaft End

Code	Specification
2	Straight without key
6	Straight with key and tap
B	With two flat seats

7th digit Options

Code	Specification
1	Without options
C	With holding brake (24 VDC)
E	With oil seal With holding brake (24 VDC)
S	With oil seal

8th digit Destination

A

9th digit Ancillary Specification

Code	Specification
1	Standard
2*1	Compatible
3*2	Standard (encoder with functional safety)

*1 Cables for the Σ-7-series SGM7J servomotors can be used.

*2 The following models are not supported.

- Shaft end: With two flat seats
- Options: With holding brake, with oil seal

Contact your Yaskawa representative beforehand if you require a model with support for functional safety.

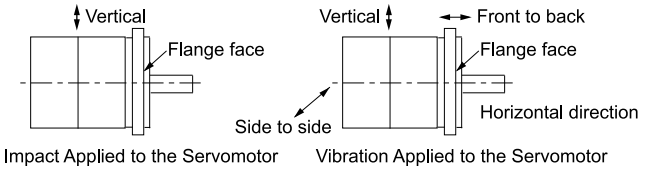
3.2 Specifications and Ratings

3.2.1 Specification

Voltage		200 V						
Model SGMXJ-		A5A	01A	C2A	02A	04A	06A	08A
Time Rating		Continuous						
Thermal Class		UL: B, CE: B						
Insulation Resistance		500 VDC, 10 MΩ min.						
Withstand Voltage		1,500 VAC for 1 minute						
Excitation		Permanent magnet						
Mounting		Flange-mounted						
Drive Method		Direct drive						
Rotation Direction		Counterclockwise (CCW) for forward reference when viewed from the load side						
Vibration Class *1		V15						
Environmental Conditions	Surrounding Air Temperature	0°C to 40°C (With derating, usage is possible between 40°C and 60°C.) *3						
	Surrounding Air Humidity	20% to 80% relative humidity (with no 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. • Must have an altitude of 1000 m or less. (With derating, usage is possible between 1000 m and 2000 m.) *3 • 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 +60°C (with no freezing) Storage humidity: 20% to 80% relative humidity (with no condensation)						
Impact Resistance *2	Impact Acceleration (at Flange)	490 m/s²						
	Number of Impacts	2 times						
Vibration Resistance *2	Vibration Acceleration (at Flange)	49 m/s²						
Applicable SERVOPACKs	SGDXS-	R70A	R90A	1R6A	1R6A	2R8A	5R5A	5R5A
	SGDXW-	1R6A *4, 2R8A *4	1R6A *4, 2R8A *4	1R6A, 2R8A *4	1R6A, 2R8A *4	2R8A, 5R5A *4, 7R6A *4	5R5A, 7R6A	5R5A, 7R6A
	SGDXT-	1R6A *4, 2R8A *4	1R6A *4, 2R8A *4	1R6A, 2R8A *4	1R6A, 2R8A *4	2R8A	-	-

*1 A vibration class of V15 indicates a vibration amplitude of 15 μm maximum on the servomotor without a load at the rated rotation speed.

*2 The given values are for when the servomotor 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 servomotor can withstand depends on the application. Always check the vibration acceleration that is applied to the servomotor with the actual equipment.



Impact Applied to the Servomotor Vibration Applied to the Servomotor

*3 Refer to the following section for the derating rates.
☞ *3.2.6 Derating Rates on page 57*

*4 If you use this combination, performance may not be as good, e.g., the control gain may not increase, in comparison with using a Σ-XS SERVOPACK.

3.2.2 Servomotor Ratings

Voltage			200 V						
Model SGMXJ-			A5A	01A	C2A	02A	04A	06A	08A
Rated Output *1		W	50	100	150	200	400	600	750
Rated Torque *1, *2		N·m	0.159	0.318	0.477	0.637	1.27	1.91	2.39
Instantaneous Maximum Torque *1		N·m	0.557	1.11	1.67	2.23	4.46	6.69	8.36
Rated Current *1		Arms	0.55	0.85	1.6	1.6	2.5	4.2	4.4
Instantaneous Maximum Current *1		Arms	2.0	3.1	5.7	5.8	9.3	15.3	16.9
Rated Rotation Speed *1		min^{-1}	3000						
Continuous Allowable Rotation Speed		min^{-1}	7000				6000		
Maximum Rotation Speed *1		min^{-1}	7000						
Torque Constant		N·m/Arms	0.316	0.413	0.321	0.444	0.544	0.493	0.584
Rotor Moment of Inertia	Without Holding Brakes	$\times 10^{-4}$ kg·m^2	0.0421	0.0669	0.0946	0.263	0.486	0.800	1.59
	With Holding Brakes		0.0501	0.0749	0.103	0.323	0.546	0.860	1.76
	Without Holding Brake and with Batteryless Absolute Encoder		0.0458	0.0706	0.0983	0.267	0.490	0.804	1.59
	With Holding Brake and Batteryless Encoder		0.0538	0.0786	0.107	0.327	0.550	0.864	1.76
Rated Power Rate *1	Without Holding Brakes	kW/s	6.00	15.1	24.0	15.4	33.1	45.6	35.9
	With Holding Brakes		5.04	13.5	22.1	12.5	29.5	42.4	32.4

Continued on next page.

Continued from previous page.

Voltage			200 V						
Model SGMXJ-			A5A	01A	C2A	02A	04A	06A	08A
Rated Angular Acceleration *1	Without Holding Brakes	rad/s²	37700	47500	50400	24200	26100	23800	15000
	With Holding Brakes		31700	42400	46400	19700	23200	22200	13500
Derating Rate for Servomotor with Oil Seal		%	80	90			95		
Heat Sink Size (aluminum) *3		mm	200 ×200 ×6		250 ×250 × 6				
Protective Structure *4			Totally enclosed, self-cooled, IP67						
Holding Brake Specifications *5	Rated Voltage	V	24 VDC ±10%						
	Capacity	W	5.5			6		6.5	
	Holding Torque	N·m	0.159	0.318	0.477	0.637	1.27	1.91	2.39
	Coil Resistance	Ω (at 20°C)	104.8 ±10%			96 ±10%		88.6 ±10%	
	Rated Current	A (at 20°C)	0.23			0.25		0.27	
	Time Required to Release Brake	ms	60					80	
	Time Required to Brake	ms	100						
Allowable Load Moment of Inertia (Rotor Moment of Inertia Ratio) *6	At 6000 min⁻¹		35 times	35 times	35 times	15 times	10 times	20 times	12 times
	At 7000 min⁻¹					10 times	5 times	15 times	8 times
	With External Regenerative Resistor and External Dynamic Brake Resistor *7	At 6000 min⁻¹	35 times	35 times	35 times	25 times	25 times	20 times	15 times
		At 7000 min⁻¹							
Allowable Shaft Loads *8	LF	mm	20			25			35
	Allowable Radial Load	N	78			245			392
	Allowable Thrust Load	N	54			74			147

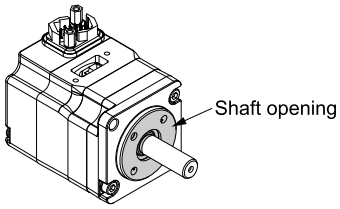
*1 These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. The values for other items are at 20°C. These are typical values.

*2 The rated torques are the continuous allowable torque values at a surrounding air temperature of 40°C with an aluminum heat sink of the dimensions given in the table.

*3 Refer to the following section for the relation between the heat sinks and derating rate.

☞ *(1) Servomotor Heat Dissipation Conditions on page 57*

*4 This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.



*5 Observe the following precautions if you use a servomotor with a holding brake.

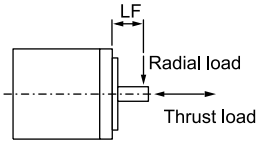
- The holding brake cannot be used to stop the servomotor.
- The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
- The 24-VDC power supply is not provided by Yaskawa.

*6 The rotor moment of inertia scaling factor is the value for a standard servomotor without a holding brake.

*7 To externally connect a dynamic brake resistor, select hardware option specification 0020 for the SERVOPACK.
However, you cannot externally connect a dynamic brake resistor if you use the following SERVOPACKs (maximum applicable motor capacity: 400 W).

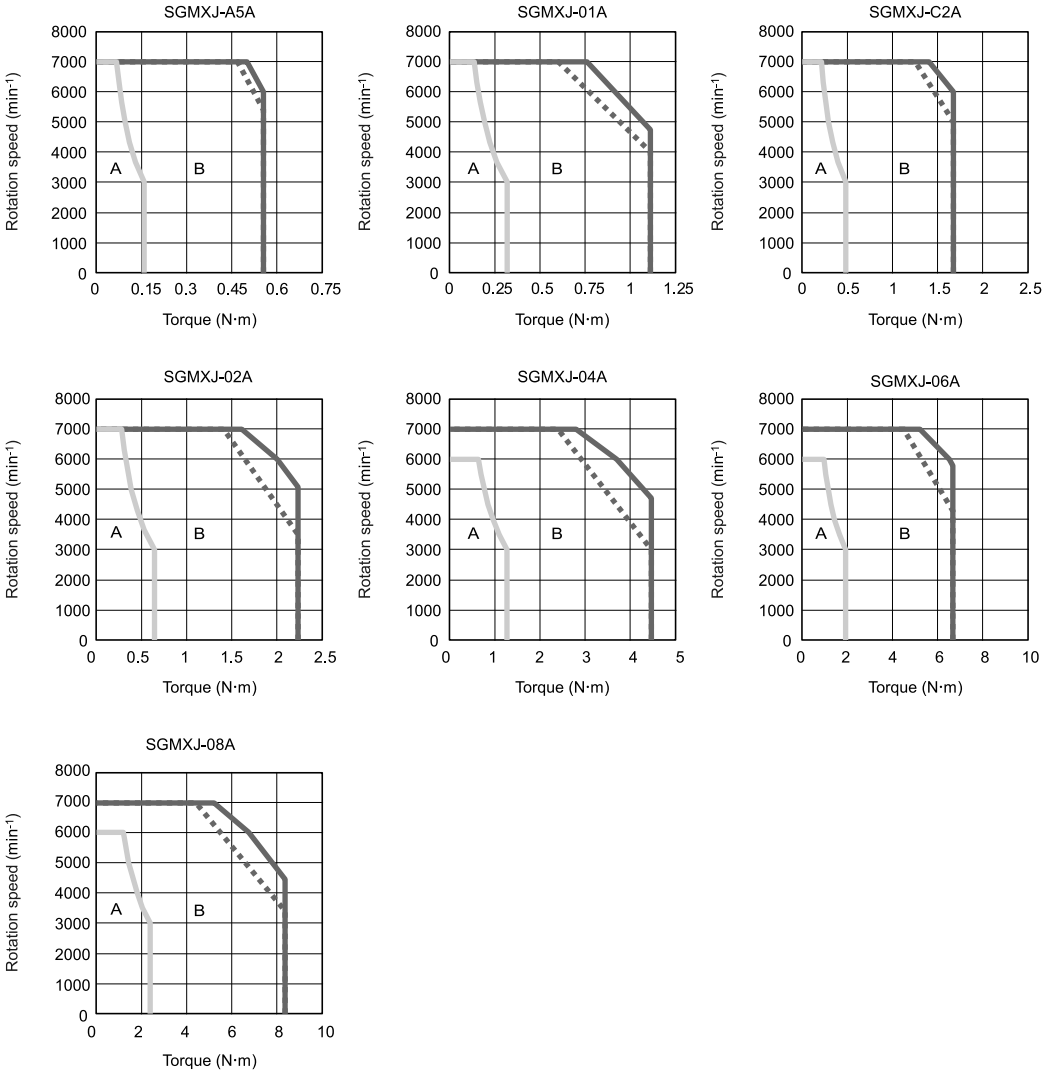
- SGDXS-R70A□□A0020 to -2R8A□□A0020
- SGDXW-1R6A□□A0020, -2R8A□□A0020
- SGDXT-1R6A□□A0020, -2R8A□□A0020

*8 Design the mechanical system so that the thrust and radial loads applied to the servomotor shaft end during operation do not exceed the values given in the table.



3.2.3 Torque-Rotation Speed Characteristics

A : Continuous duty zone ——— (solid lines): Three-phase, 200 V
B : Intermittent duty zone ····· (dotted lines): Single-phase, 200 V



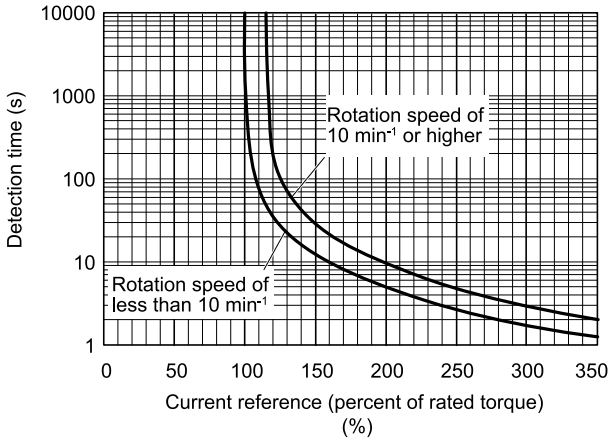
Note:

1. These values (typical values) are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective torque is within the allowable range for the rated torque, the servomotor can be used within the intermittent duty zone.
4. If you use a servomotor main circuit cable that exceeds 20 m, the intermittent duty zone in the torque-rotation speed characteristics will become smaller because the voltage drop increases.

3.2.4 Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions with a servomotor surrounding air temperature of 40° C.

For the overload detection level, priority is given to the lower of the detection levels in the overload protection characteristics of the connected SERVOPACK and servomotor.



Note:

The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher. Use the servomotor so that the effective torque remains within the continuous duty zone given in "*3.2.3 Torque-Rotation Speed Characteristics on page 55*".

3.2.5 Allowable Load Moment of Inertia

The allowable load moments of inertia (rotor moment of inertia ratios) for the servomotors are given in "*3.2.2 Servomotor Ratings on page 52*". The values are determined by the regenerative energy processing capacity of the SERVOPACK and are also affected by the drive conditions of the servomotor. Perform the required steps for each of the following cases.

(1) Exceeding the Allowable Load Moment of Inertia

Use one of the following measures to adjust the load moment of inertia to within the allowable value.

- Reduce the torque limit.
- Reduce the deceleration rate.
- Reduce the maximum rotation speed.

If the above steps are not possible, install an external regenerative resistor.

Information

An Overvoltage Alarm (A.400) is likely to occur during deceleration if the load moment of inertia exceeds the allowable load moment of inertia. SERVOPACKs with a built-in regenerative resistor may generate a Regenerative Overload Alarm (A.320).

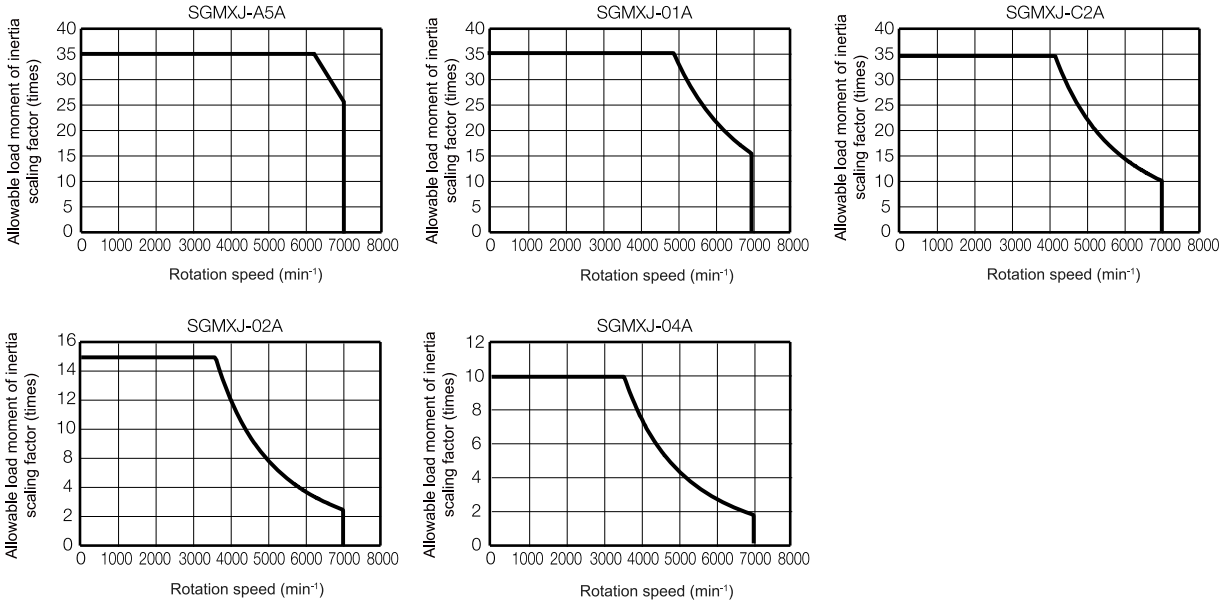
Refer to the following catalog for the regenerative power (W) that can be processed by the SERVOPACKs.

AC Servo Drives Σ-X Series (Document No.: KAEP C710812 03)

Install an external regenerative resistor when the built-in regenerative resistor cannot process all of the regenerative power.

(2) SERVOPACKs without Built-in Regenerative Resistors

The following graph shows the allowable load moment of inertia scaling factor of the rotation speed (reference values for deceleration operation at or above the rated torque). Application is possible without an external regenerative resistor within the allowable value.



Note:

Applicable SERVOPACK models: SGDXS-R70A, SGDXS-R90A, SGDXS-1R6A, and SGDXS-2R8A

(3) When an External Regenerative Resistor Is Required

Install the external regenerative resistor.

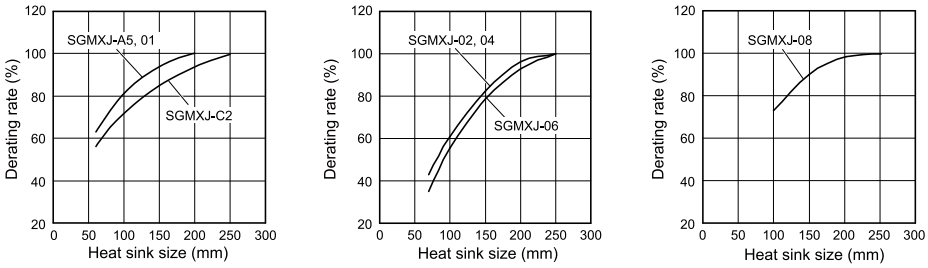
Refer to the following catalog for details on external regenerative resistors.

AC Servo Drives Σ-X Series (Document No.: KAEP C710812 03)

3.2.6 Derating Rates

(1) Servomotor Heat Dissipation Conditions

The servomotor ratings are the continuous allowable values at a surrounding air temperature of 40°C when a heat sink is installed on the servomotor. If the servomotor is mounted on a small device component, the servomotor temperature may rise considerably because the surface for heat dissipation becomes smaller. Refer to the following graphs for the relation between the heat sink size and derating rate.



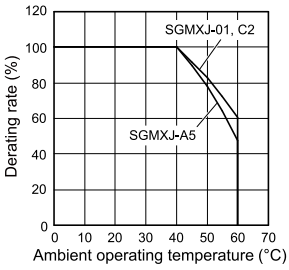
Important

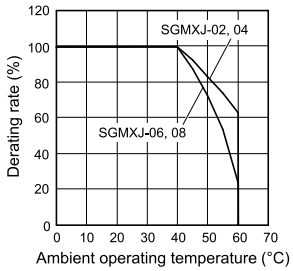
The actual temperature rise depends on the following conditions. Always check the servomotor temperature with the actual equipment.

- How the heat sink (the servomotor mounting section) is attached to the installation surface
- Status between heat sink and servomotor (sealant, reduction gear, etc.)
- What material is used for the servomotor mounting section
- Servomotor rotation speed

(2) Applications Where the Surrounding Air Temperature Exceeds 40°C

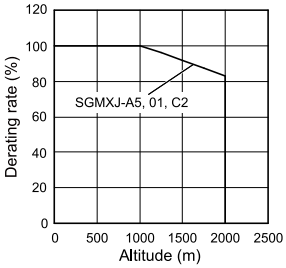
The servomotor ratings are the continuous allowable values at a surrounding air temperature of 40°C. If you use a servomotor at a surrounding air temperature that exceeds 40°C (60°C max.), apply a suitable derating rate from the following graphs.

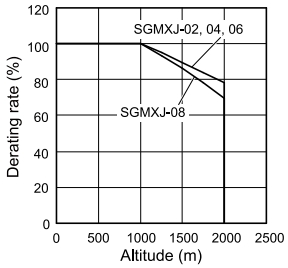




(3) Applications Where the Altitude Exceeds 1000 m

The servomotor ratings are the continuous allowable values at an altitude of 1000 m or less. If you use a servomotor at an altitude that exceeds 1000 m (2000 m max.), the heat dissipation effect of the air is reduced. Apply the appropriate derating rate from the following graphs.





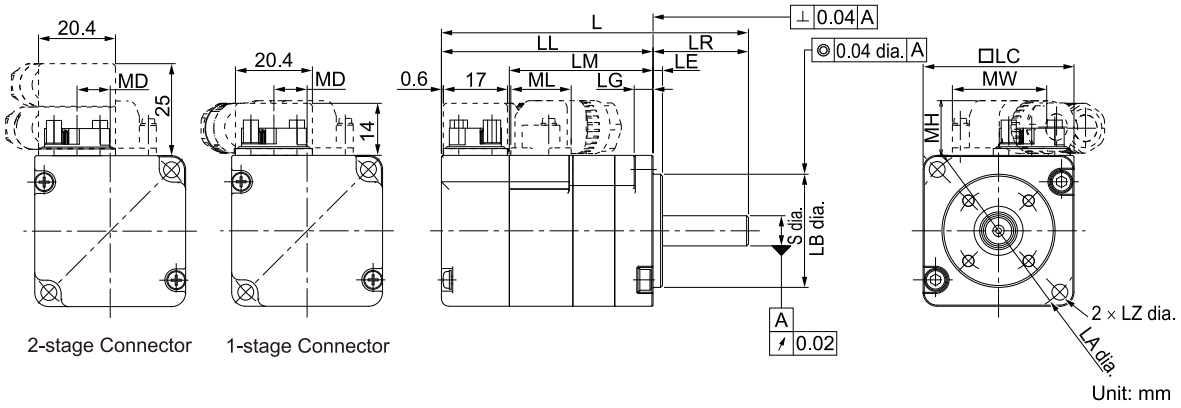
Note:

- When using servomotors with derating, change the detection timing of overload warning and overload alarm based on the overload detection level of the motor given in "*3.2.4 Servomotor Overload Protection Characteristics on page 55*".
- Use the combination of the SERVOPACK and servomotor so that the derating conditions are satisfied for both the SERVOPACK and servomotor.
- The derating rates are applicable only when the average rotation speed is less than or equal to the rated rotation speed. If the average rotation speed exceeds the rated rotation speed, consult with your Yaskawa representative.

3.3 External Dimensions

3.3.1 SGMXJ-A5 to -C2

(1) Standard Specification



Model SGMXJ-	L *1	LL *1	LM	Flange Dimensions						
				LR	LE	LG	LC	LA	LB	LZ
A5A□A2□A1	80.5 (121.0)	55.5 (96.0)	37.5	25	2.5	5	40	46	$30^{0}_{-0.021}$	4.3
01A□A2□A1	92.5 (133.0)	67.5 (108.0)	49.5	25	2.5	5	40	46	$30^{0}_{-0.021}$	4.3
C2A□A2□A1	104.5 (153.0)	79.5 (128.0)	61.5	25	2.5	5	40	46	$30^{0}_{-0.021}$	4.3

Model SGMXJ-	S	MD	MW	MH	ML	Approx. Mass [kg] *1
A5A□A2□A1	$8^{0}_{-0.009}$	8.4	25	14.5	16	0.3 (0.6)
01A□A2□A1	$8^{0}_{-0.009}$	8.4	25	14.5	16	0.4 (0.7)
C2A□A2□A1	$8^{0}_{-0.009}$	8.4	25	14.5	16	0.5 (0.8)

*1 For models that have a batteryless absolute encoder, L and LL are 7.5 mm greater and the approximate mass is 0.1 kg greater than the given value. Refer to the following section for the values for individual models.

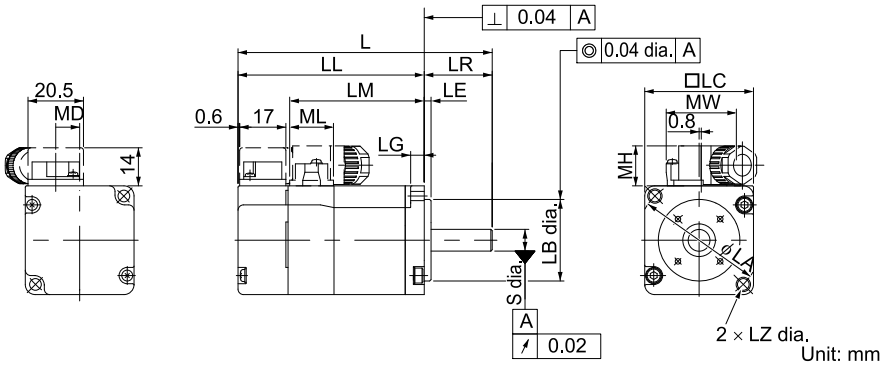
☞ *3.3.4 Dimensions of Servomotors with Batteryless Absolute Encoders on page 67*

Note:

1. The values in parentheses are for servomotors with holding brakes.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

☞ *(3) Shaft End Specification on page 60*
☞ *(4) Option Specification on page 60*

(2) Σ-7 Compatible Specification



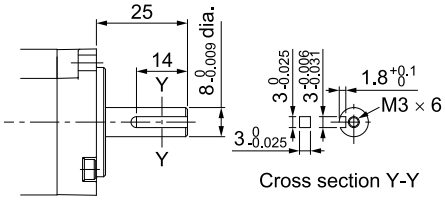
Model SGMXJ-	MD	MW	MH	ML
A5A□A2□A2	8.8	25.8	14.7	16.1
01A□A2□A2	8.8	25.8	14.7	16.1
C2A□A2□A2	8.8	25.8	14.7	16.1

Note:

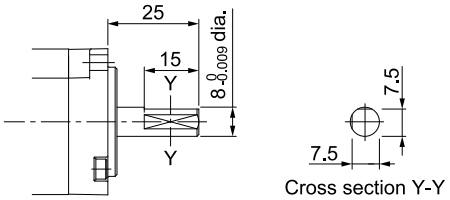
The dimensions for non-connector parts are identical to those for models with standard specifications.

(3) Shaft End Specification

- Straight with Key and Tap

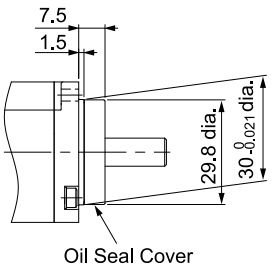


- With Two Flat Seats



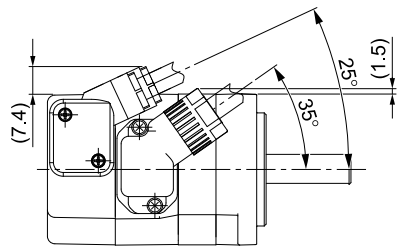
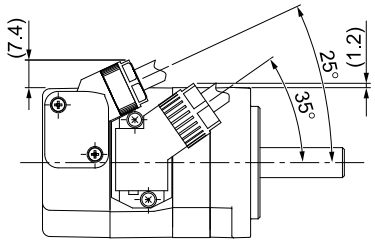
(4) Option Specification

- With Oil Seal

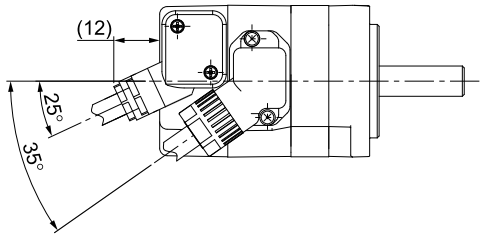
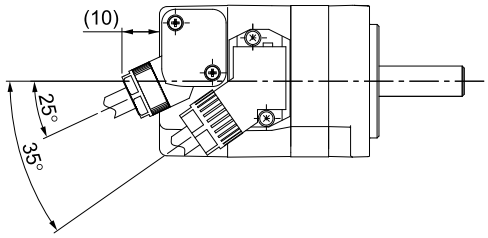


(5) Connector Mounting Dimensions

- Cable Installed on Load Side

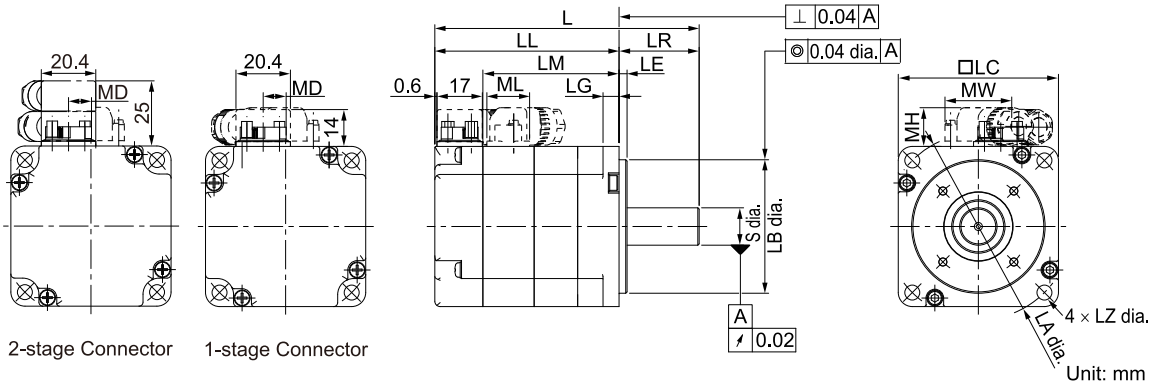
Standard Specification	Σ-7 Compatible Specification
	

- Cable Installed on Non-load Side

Standard Specification	Σ-7 Compatible Specification
	

3.3.2 SGMXJ-02 to -06

(1) Standard Specification



2-stage Connector 1-stage Connector

Model SGMXJ-	L *1	LL *1	LM	Flange Dimensions						
				LR	LE	LG	LC	LA	LB	LZ
02A□A2□A1	98.5 (139.0)	68.5 (109.0)	50.5	30	3	6	60	70	$50^{0}_{-0.025}$	5.5
04A□A2□A1	115 (155.5)	85 (125.5)	67	30	3	6	60	70	$50^{0}_{-0.025}$	5.5
06A□A2□A1	137 (191.0)	107 (161.0)	89	30	3	6	60	70	$50^{0}_{-0.025}$	5.5

Model SGMXJ-	S	MD	MW	MH	ML	Approx. Mass [kg] *1
02A□A2□A1	$14^{0}_{-0.011}$	8.4	25	14.5	16	0.8 (1.4)
04A□A2□A1	$14^{0}_{-0.011}$	8.4	25	14.5	16	1.1 (1.7)
06A□A2□A1	$14^{0}_{-0.011}$	8.4	25	14.5	16	1.6 (2.2)

*1 For models that have a batteryless absolute encoder, L and LL are 7.5 mm greater and the approximate mass is 0.1 kg greater than the given value. Refer to the following section for the values for individual models.

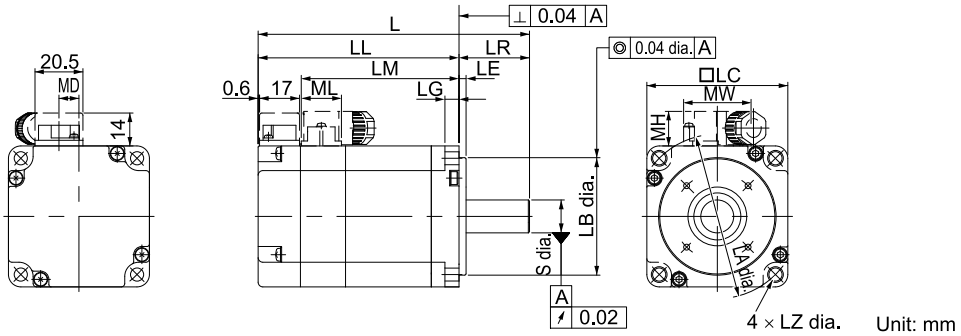
☞ *3.3.4 Dimensions of Servomotors with Batteryless Absolute Encoders on page 67*

Note:

1. The values in parentheses are for servomotors with holding brakes.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

☞ *(3) Shaft End Specification on page 63*
☞ *(4) Option Specification on page 63*

(2) Σ-7 Compatible Specification



Unit: mm

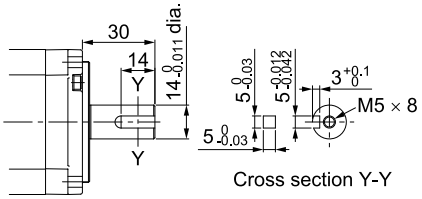
Model SGMXJ-	MD	MW	MH	ML
02A□A2□A2	8.5	28.7	14.7	17.1
04A□A2□A2	8.5	28.7	14.7	17.1
06A□A2□A2	8.5	28.7	14.7	17.1

Note:

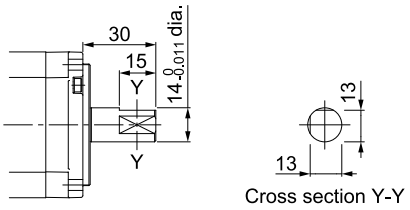
The dimensions for non-connector parts are identical to those for models with standard specifications.

(3) Shaft End Specification

- Straight with Key and Tap

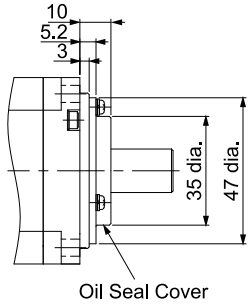


- With Two Flat Seats



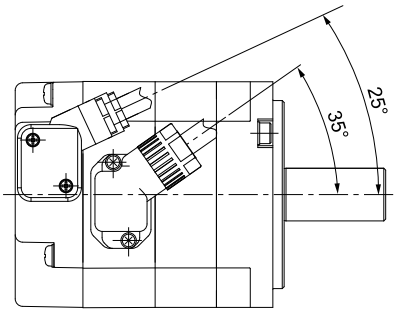
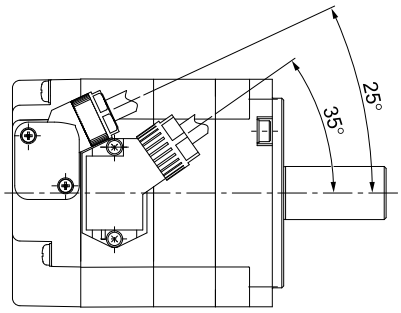
(4) Option Specification

- With Oil Seal

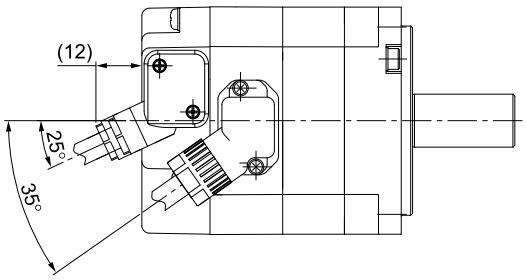
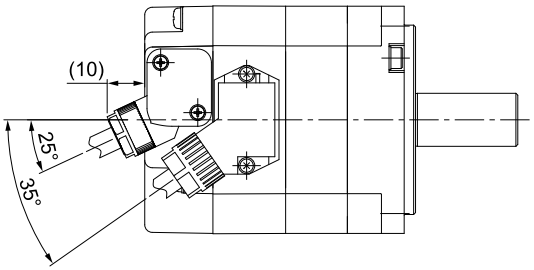


(5) Connector Mounting Dimensions

- Cable Installed on Load Side

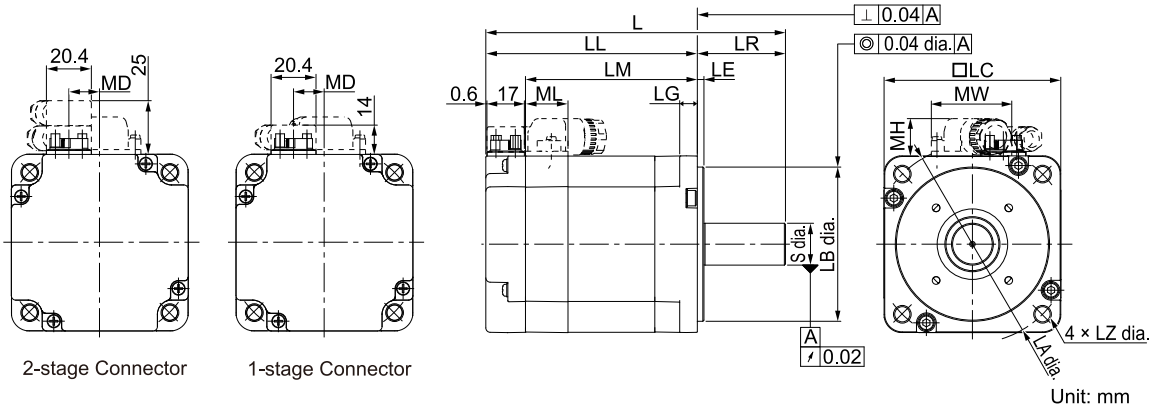
Standard Specification	Σ-7 Compatible Specification
	

- Cable Installed on Non-load Side

Standard Specification	Σ-7 Compatible Specification
	

3.3.3 SGMXJ-08

(1) Standard Specification



Model SGMXJ-	L *1	LL *1	LM	Flange Dimensions						
				LR	LE	LG	LC	LA	LB	LZ
08A□A2□A1	136 (183.0)	96 (143.0)	78	40	3	8	80	90	$70^{0}_{-0.030}$	7

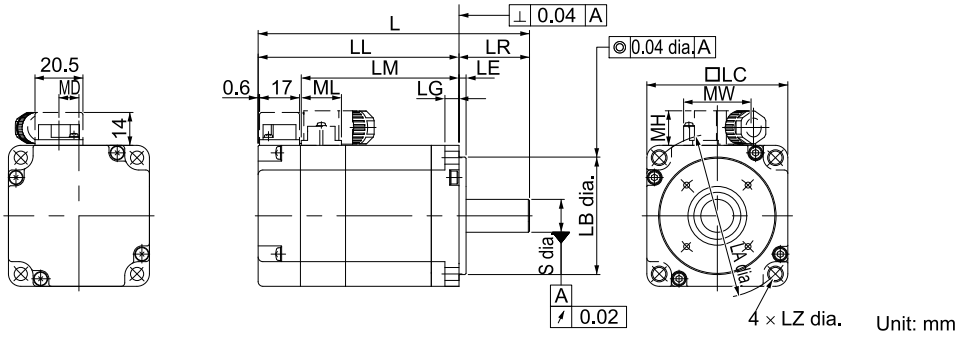
Model SGMXJ-	S	MD	MW	MH	ML	Approx. Mass *1 [kg]
08A□A2□A1	$19^{0}_{-0.013}$	14	37	17	19.3	2.2 (2.8)

*1 For models that have a batteryless absolute encoder, L and LL are +6.5 mm greater and the approximate mass is 0.1 kg greater than the given value. Refer to the following section for the values for individual models.
☞ *3.3.4 Dimensions of Servomotors with Batteryless Absolute Encoders on page 67*

Note:

1. The values in parentheses are for servomotors with holding brakes.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.
☞ *(3) Shaft End Specification on page 65*
☞ *(4) Option Specification on page 66*

(2) Σ-7 Compatible Specification



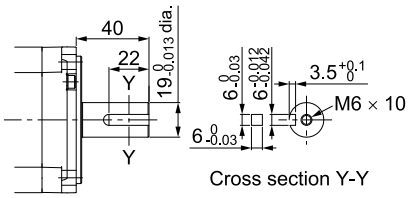
Model SGMXJ-	MD	MW	MH	ML
08A□A2□A2	14	38	17	19.3

Note:

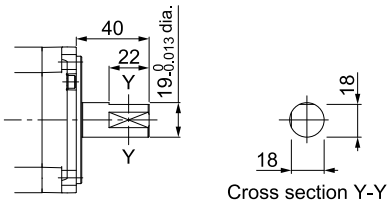
The dimensions for non-connector parts are identical to those for models with standard specifications.

(3) Shaft End Specification

- Straight with Key and Tap

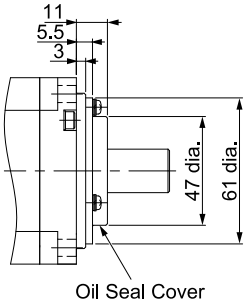


- With Two Flat Seats



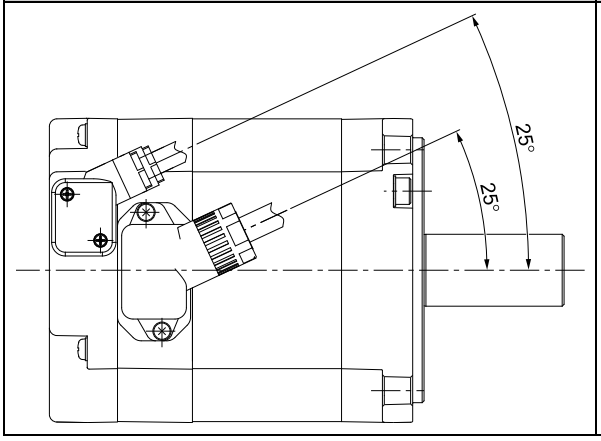
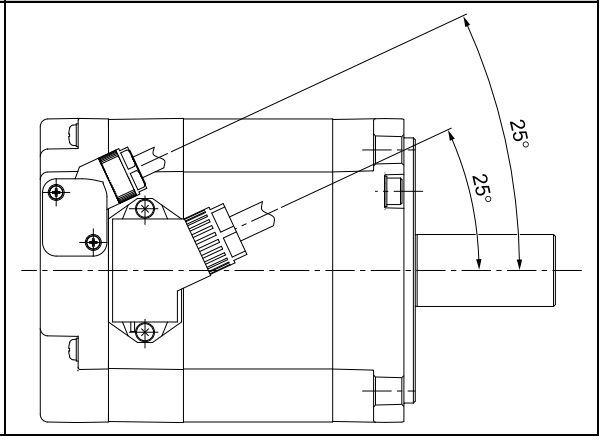
(4) Option Specification

- With Oil Seal

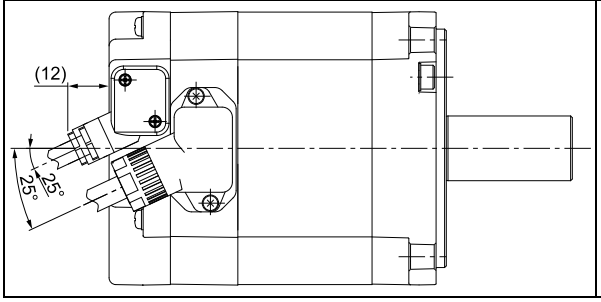
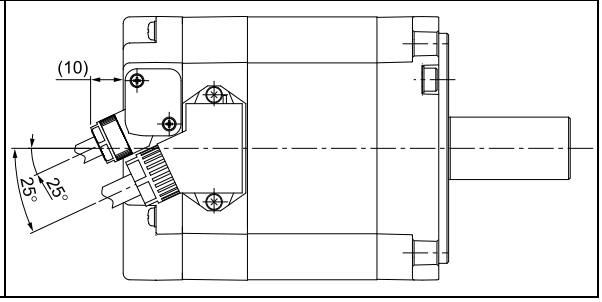


(5) Connector Mounting Dimensions

- Cable Installed on Load Side

Standard Specification	Σ-7 Compatible Specification
	

- Cable Installed on Non-load Side

Standard Specification	Σ-7 Compatible Specification
	

3.3.4 Dimensions of Servomotors with Batteryless Absolute Encoders

Model SGMXJ-	L	LL	Approx. Mass [kg]
A5AWA2□A1	88 (128.5)	63 (103.5)	0.4 (0.7)
01AWA2□A1	100 (140.5)	75 (115.5)	0.5 (0.8)
C2AWA2□A1	112 (160.5)	87 (135.5)	0.6 (0.9)
02AWA2□A1	106 (146.5)	76 (116.5)	0.9 (1.5)
04AWA2□A1	122.5 (163.0)	92.5 (133.0)	1.2 (1.8)
06AWA2□A1	144.5 (198.5)	114.5 (168.5)	1.7 (2.3)
08AWA2□A1	142.5 (189.5)	102.5 (149.5)	2.3 (2.9)

Note:

The values in parentheses are for servomotors with holding brakes.

4

Specifications, Ratings, and External Dimensions of SGMXA Servomotors

This chapter describes how to interpret the model numbers of SGMXA servomotors and gives their specifications, ratings, and external dimensions.

4.1 Model Designations

SGMXA - 01 A U A 2 1 A 1

1st+2nd digits 3rd digit 4th digit 5th digit 6th digit 7th digit 8th digit 9th digit

Σ-X-Series
Servomotor
SGMXA model

1st+2nd digits Rated Output

Code	Specification	Power Supply Voltage	
		200 VAC	400 VAC
A5	50 W	○	-
01	100 W	○	-
C2	150 W	○	-
02	200 W	○	-
04	400 W	○	-
06	600 W	○	-
08	750 W	○	-
10	1.0 kW	○	-
15	1.5 kW	○	○
20	2.0 kW	○	○
25	2.5 kW	○	○
30	3.0 kW	○	○
40	4.0 kW	○	○
50	5.0 kW	○	○
70	7.0 kW	○	-

3rd digit Power Supply Voltage

Code	Specification
A	AC 200 V
D	AC 400 V

4th digit Serial Encoder

Code	Specification
U	Design Revision Order
W	26-bit batteryless absolute encoder

5th digit Design Revision Order

A

6th digit Shaft End

Code	Specification
2	Straight without key
6	Straight with key and tap
B*1	With two flat seats

7th digit Options*2

Code	Specification
1	Without options
C	With holding brake (24 VDC)
E	With oil seal With holding brake (24 VDC)
S	With oil seal

8th digit Destination

A

9th digit Ancillary Specification

Code	Specification
1	Standard
2*3	Compatible
3*4	Standard (encoder with functional safety)

*1 Code B does not support models above 1.5 kW.
*2 SGMXA-70A has no models with holding brake.
*3 200 VAC: Σ-7 compatible specification: Cables for the Σ-7-series SGM7A servomotors can be used.
400 VAC: Σ-V compatible specification: Cables for the Σ-V-series SGMSV servomotors can be used.
*4 The following models are not supported.

- Power supply voltage: 400-V specification
- Shaft end: With two flat seats
- Options: With holding brake, with oil seal

Contact your Yaskawa representative beforehand if you require a model with support for functional safety.

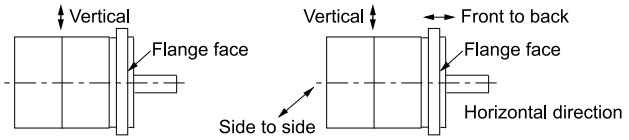
4.2 Specifications and Ratings (200 V Specification)

4.2.1 Specification

Voltage		200 V										
Model SGMXA-		A5A	01A	C2A, 02A	04A	06A, 08A	10A	15A	20A	25A, 30A	40A, 50A	70A
Time Rating		Continuous										
Thermal Class		UL: B, CE: B						UL: F, CE: F				
Insulation Resistance		500 VDC, 10 MΩ min.										
Withstand Voltage		1500 VAC for 1 minute										
Excitation		Permanent magnet										
Mounting		Flange-mounted										
Drive Method		Direct drive										
Rotation Direction		Counterclockwise (CCW) for forward reference when viewed from the load side										
Vibration Class *1		V15										
Environmental Conditions	Surrounding Air Temperature	0°C to 40°C (With derating, usage is possible between 40°C and 60°C.) *3										
	Surrounding Air Humidity	20% to 80% relative humidity (with no 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. • Must have an altitude of 1000 m or less. (With derating, usage is possible between 1000 m and 2000 m.) *3 • 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 +60°C (with no freezing) Storage humidity: 20% to 80% relative humidity (with no condensation)										
Impact Resistance *2	Impact Acceleration (at Flange)	490 m/s²										
	Number of Impacts	2 times										
Vibration Resistance *2	Vibration Acceleration (at Flange)	49 m/s²						49 m/s² (24.5 m/s² front to back)				14.7 m/s²
Applicable SERVOPACKs	SGDXS	R70A	R90A	1R6A	2R8A	5R5A	120A	120A	180A	200A	330A	550A
	SGDXW	1R6A *4, 2R8A *4	1R6A *4, 2R8A *4	1R6A, 2R8A *4	2R8A, 5R5A *4, 7R6A *4	5R5A, 7R6A	–	–	–	–	–	–
	SGDXT-	1R6A *4, 2R8A *4	1R6A *4, 2R8A *4	1R6A, 2R8A *4	2R8A	–	–	–	–	–	–	–

*1 A vibration class of V15 indicates a vibration amplitude of 15 μm maximum on the servomotor without a load at the rated rotation speed.

*2 The given values are for when the servomotor 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 servomotor can withstand depends on the application. Always check the vibration acceleration that is applied to the servomotor with the actual equipment.



Impact Applied to the Servomotor Vibration Applied to the Servomotor

*3 Refer to the following section for the derating rates.
☞ *4.2.6 Derating Rates on page 79*

*4 If you use this combination, performance may not be as good, e.g., the control gain may not increase, in comparison with using a Σ-XS SERVOPACK.

4.2.2 Servomotor Ratings

(1) SGMXA-A5 to -10

Voltage			200 V							
Model SGMXA-			A5A	01A	C2A	02A	04A	06A	08A	10A
Rated Output *1		W	50	100	150	200	400	600	750	1000
Rated Torque *1, *2		N·m	0.159	0.318	0.477	0.637	1.27	1.91	2.39	3.18
Instantaneous Maximum Torque *1		N·m	0.557	1.11	1.67	2.23	4.46	6.69	8.36	11.1
Rated Current *1		Arms	0.57	0.89	1.5	1.5	2.4	4.5	4.4	6.4
Instantaneous Maximum Current *1		Arms	2.1	3.2	5.6	5.9	9.3	16.9	16.8	23.2
Rated Rotation Speed *1		min^{-1}	3000							
Continuous Allowable Rotation Speed		min^{-1}	7000				6000			
Maximum Rotation Speed *1		min^{-1}	7000							
Torque Constant		N·m/Arms	0.304	0.384	0.332	0.458	0.576	0.456	0.584	0.541
Rotor Moment of Inertia	Without Holding Brakes	$\times 10^{-4}$ kg·m^2	0.0220	0.0340	0.0461	0.139	0.216	0.315	0.773	0.969
	With Holding Brakes		0.0300	0.0420	0.0541	0.199	0.276	0.375	0.943	1.14
	Without Holding Brake and with Batteryless Absolute Encoder		0.0257	0.0377	0.0498	0.143	0.220	0.319	0.777	0.973
	With Holding Brake and Batteryless Encoder		0.0337	0.0457	0.0578	0.203	0.280	0.379	0.947	1.14
Rated Power Rate *1	Without Holding Brakes	kW/s	11.5	29.7	49.4	29.1	74.7	116	73.7	104
	With Holding Brakes		8.42	24.1	42.1	20.4	58.5	97.3	60.4	88.8

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Voltage			200 V							
Model SGMXA-			A5A	01A	C2A	02A	04A	06A	08A	10A
Rated Angular Acceleration *1	Without Holding Brakes	rad/s²	72200	93500	103500	45700	58800	60600	30800	32800
	With Holding Brakes		53000	75700	88200	31900	46000	50900	25300	27900
Derating Rate for Servomotor with Oil Seal		%	80	90			95			
Heat Sink Size (aluminum) *3		mm	200 × 200 × 6		250 × 250 × 6			300 × 300 × 12 *9	250 × 250 × 6	300 × 300 × 12
Protective Structure *4			Totally enclosed, self-cooled, IP67							
Holding Brake Specifications *5	Rated Voltage	V	24 VDC±10%							
	Capacity	W	5.5			6		6.5		
	Holding Torque	N·m	0.159	0.318	0.477	0.637	1.27	1.91	2.39	3.18
	Coil Resistance	Ω (at 20°C)	104.8 ±10%			96 ±10%		88.6 ±10%		
	Rated Current	A (at 20°C)	0.23			0.25		0.27		
	Time Required to Release Brake	ms	60					80		
	Time Required to Brake	ms	100							
Allowable Load Moment of Inertia (Rotor Moment of Inertia Ratio) *6	At 6000 min⁻¹		40 times	40 times	40 times	30 times	20 times	20 times	20 times	20 times
	At 7000 min⁻¹					25 times	15 times	20 times	15 times	20 times
	With External Regenerative Resistor and External Dynamic Brake Resistor *7	At 6000 min⁻¹	40 times	40 times	40 times	30 times	20 times	20 times	20 times	30 times
		At 7000 min⁻¹								
Allowable Shaft Loads *8	LF	mm	20			25			35	
	Allowable Radial Load	N	78			245			392	
	Allowable Thrust Load	N	54			74			147	

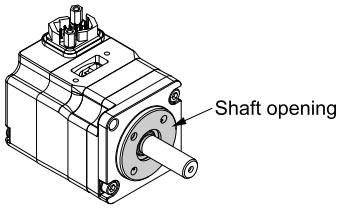
*1 These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. The values for other items are at 20°C. These are typical values.

*2 The rated torques are the continuous allowable torque values at a surrounding air temperature of 40°C with an aluminum heat sink of the dimensions given in the table.

*3 Refer to the following section for the relation between the heat sinks and derating rate.

☞ *(1) Servomotor Heat Dissipation Conditions on page 79*

*4 This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.



*5 Observe the following precautions if you use a servomotor with a holding brake.

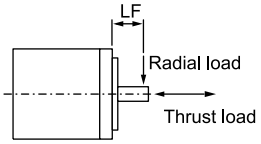
- The holding brake cannot be used to stop the servomotor.
- The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
- The 24-VDC power supply is not provided by Yaskawa.

*6 The rotor moment of inertia scaling factor is the value for a standard servomotor without a holding brake.

*7 To externally connect a dynamic brake resistor, select hardware option specification 0020 for the SERVOPACK.
However, you cannot externally connect a dynamic brake resistor if you use the following SERVOPACKs (maximum applicable motor capacity: 400 W).

- SGDXS-R70A□□A0020 to -2R8A□□A0020
- SGDXW-1R6A□□A0020, -2R8A□□A0020
- SGDXT-1R6A□□A0020, -2R8A□□A0020

*8 Design the mechanical system so that the thrust and radial loads applied to the servomotor shaft end during operation do not exceed the values given in the table.



*9 If the heat sink is 250 mm × 250 mm × 6 mm, the rated output is 550 W and the rated torque is 1.75 N·m. For details, refer to the following section.
☞ *(1) Servomotor Heat Dissipation Conditions on page 79*

(2) SGMXA-15 to -70

Voltage			200 V						
Model SGMXA-			15A	20A	25A	30A	40A	50A	70A
Rated Output *1		kW	1.5	2.0	2.5	3.0	4.0	5.0	7.0
Rated Torque *1, *2		N·m	4.90	6.36	7.96	9.80	12.6	15.8	22.3
Instantaneous Maximum Torque *1		N·m	14.7	19.1	23.9	29.4	37.8	47.6	54.0
Rated Current *1		Arms	9.3	12.1	15.6	17.9	25.4	27.6	38.3
Instantaneous Maximum Current *1		Arms	28	42	51	56	77	84	105
Rated Rotation Speed *1		min^{-1}	3000						
Continuous Allowable Rotation Speed		min^{-1}	6000		5000	6000		5000	6000
Maximum Rotation Speed *1		min^{-1}	6000 *3						
Torque Constant *1		N·m/Arms	0.590	0.561	0.538	0.582	0.519	0.604	0.604
Rotor Moment of Inertia *4	Without Holding Brakes	× 10^{-4} kg·m^2	2.00	2.47	3.19	7.00	9.60	12.3	12.3
	With Holding Brakes		2.25	2.72	3.44	9.20	11.8	14.5	–
Rated Power Rate *1	Without Holding Brakes	kW/s	120	164	199	137	165	203	404
	With Holding Brakes		107	149	184	104	134	172	–

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Voltage			200 V						
Model SGMXA-			15A	20A	25A	30A	40A	50A	70A
Rated Angular Acceleration *1	Without Holding Brakes	rad/s²	24500	25700	24900	14000	13100	12800	18100
	With Holding Brakes		21700	23300	23100	10600	10600	10800	–
Heat Sink Size (aluminum) *5		mm	300 × 300 × 12			400 × 400 × 20			
Protective Structure *6			Totally enclosed, self-cooled, IP67						Totally enclosed, forced ventilation (with fan), IP22
Holding Brake Specifications *7	Rated Voltage	V	24 VDC±10%						–
	Capacity	W	12			10			
	Holding Torque	N·m	7.84		10	20			
	Coil Resistance	Ω (at 20°C)	48			59			
	Rated Current	A (at 20°C)	0.5			0.41			
	Time Required to Release Brake	ms	170			100			
	Time Required to Brake	ms	80						
Allowable Load Moment of Inertia (Rotor Moment of Inertia Ratio) *8	Without External Devices		10 times			5 times			
	With External Regenerative Resistor and External Dynamic Brake Resistor *9		20 times			15 times			
Allowable Shaft Loads *10	LF	mm	45			63			
	Allowable Radial Load	N	686			980	1176		
	Allowable Thrust Load	N	196			392			

*1 These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C. These are typical values.

*2 The rated torques are the continuous allowable torque values at a surrounding air temperature of 40°C with an aluminum heat sink of the dimensions given in the table.

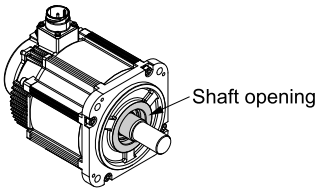
*3 For SGMXA-25A and -50A servomotors, the maximum rotation speed in the continuous duty zone is 5000 min^{-1}. Use the servomotor in a range where the average motor speed and effective torque stay in the continuous zone.

*4 The values for SGMXA-15A to -70A servomotors with batteryless absolute encoders (and holding brakes) are the same as those in the table.

*5 Refer to the following section for the relation between the heat sinks and derating rate.

☞ *(1) Servomotor Heat Dissipation Conditions on page 79*

*6 This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.



*7 Observe the following precautions if you use a servomotor with a holding brake.

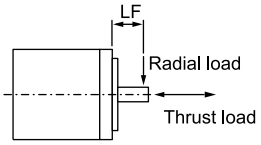
- The holding brake cannot be used to stop the servomotor.
- The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
- The 24-VDC power supply is not provided by Yaskawa.

*8 The rotor moment of inertia scaling factor is the value for a standard servomotor without a holding brake.

*9 To externally connect a dynamic brake resistor, select hardware option specification 0020 for the SERVOPACK.
However, you cannot externally connect a dynamic brake resistor if you use the following SERVOPACKs (maximum applicable motor capacity: 400 W).

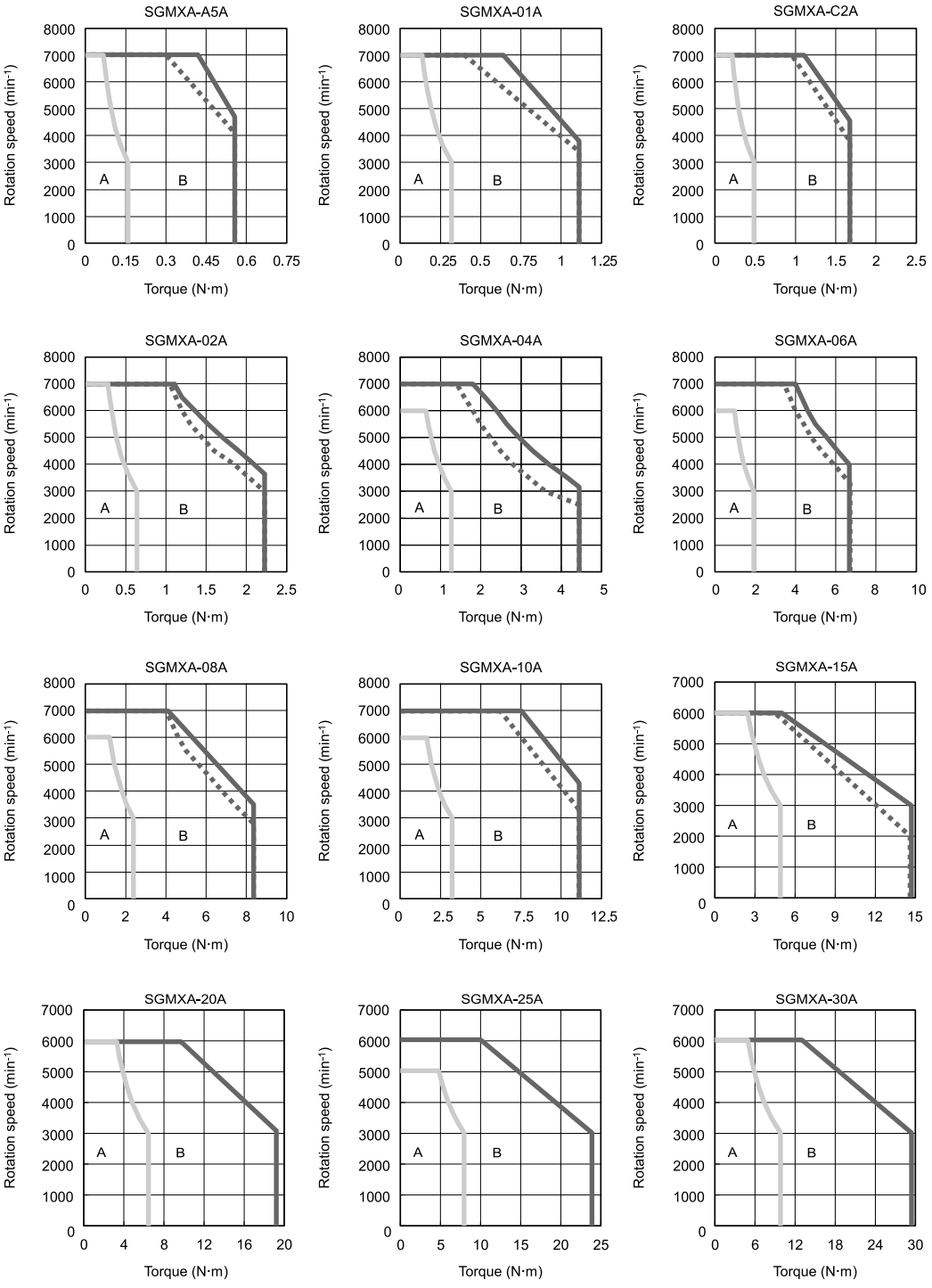
- SGDXS-R70A□□A0020 to -2R8A□□A0020
- SGDXW-1R6A□□A0020 to -2R8A□□A0020

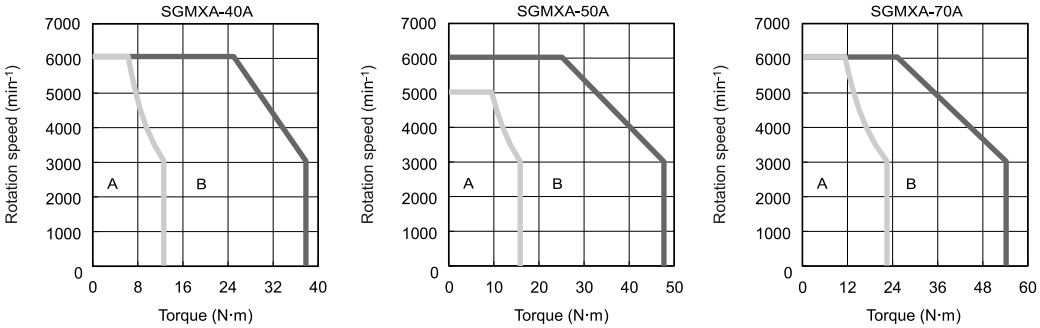
*10 Design the mechanical system so that the thrust and radial loads applied to the servomotor shaft end during operation do not exceed the values given in the table.



4.2.3 Torque-Rotation Speed Characteristics

A : Continuous duty zone ——— (solid lines): Three-phase, 200 V
B : Intermittent duty zone ····· (dotted lines): Single-phase, 200 V





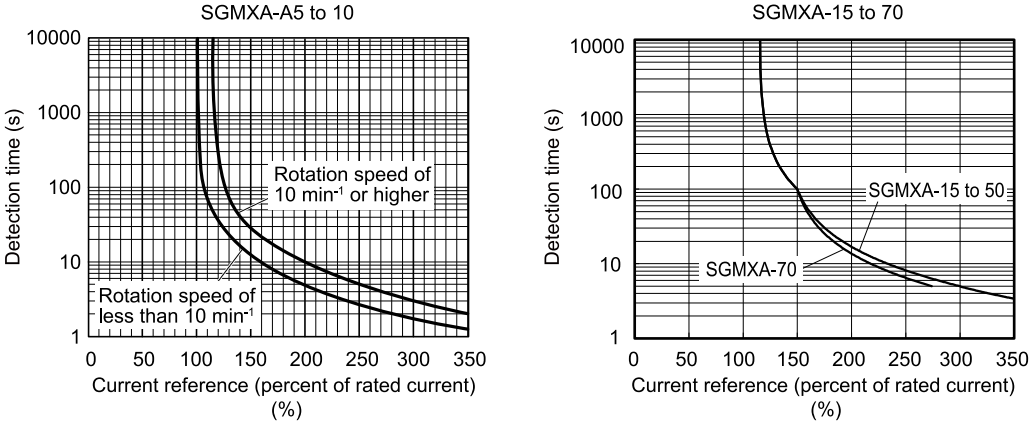
Note:

1. SGMXA-A5A to -10: These values (typical values) are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C.
   SGMXA-15A to -70: These values (typical values) are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective torque is within the allowable range for the rated torque, the servomotor can be used within the intermittent duty zone.
4. If you use a servomotor main circuit cable that exceeds 20 m, the intermittent duty zone in the torque-rotation speed characteristics will become smaller because the voltage drop increases.
5. The SGMXA-10A and -15A can use a single-phase power input in combination with the SGDXS-120A□□A0008.

4.2.4 Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions with a servomotor surrounding air temperature of 40° C.

For the overload detection level, priority is given to the lower of the detection levels in the overload protection characteristics of the connected SERVOPACK and servomotor.



Note:

The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.

Use the servomotor so that the effective torque remains within the continuous duty zone given in "*4.2.3 Torque-Rotation Speed Characteristics on page 77*".

4.2.5 Allowable Load Moment of Inertia

The allowable load moments of inertia (rotor moment of inertia ratios) for the servomotors are given in "*4.2.2 Servomotor Ratings on page 72*". The values are determined by the regenerative energy processing capacity of the SERVOPACK and are also affected by the drive conditions of the servomotor. Perform the required Steps for each of the following cases.

(1) Exceeding the Allowable Load Moment of Inertia

Use one of the following measures to adjust the load moment of inertia to within the allowable value.

- Reduce the torque limit.

- Reduce the deceleration rate.
- Reduce the maximum rotation speed.

If the above steps are not possible, install an external regenerative resistor.

Information

An Overvoltage Alarm (A.400) is likely to occur during deceleration if the load moment of inertia exceeds the allowable load moment of inertia. SERVOPACKs with a built-in regenerative resistor may generate a Regenerative Overload Alarm (A.320).

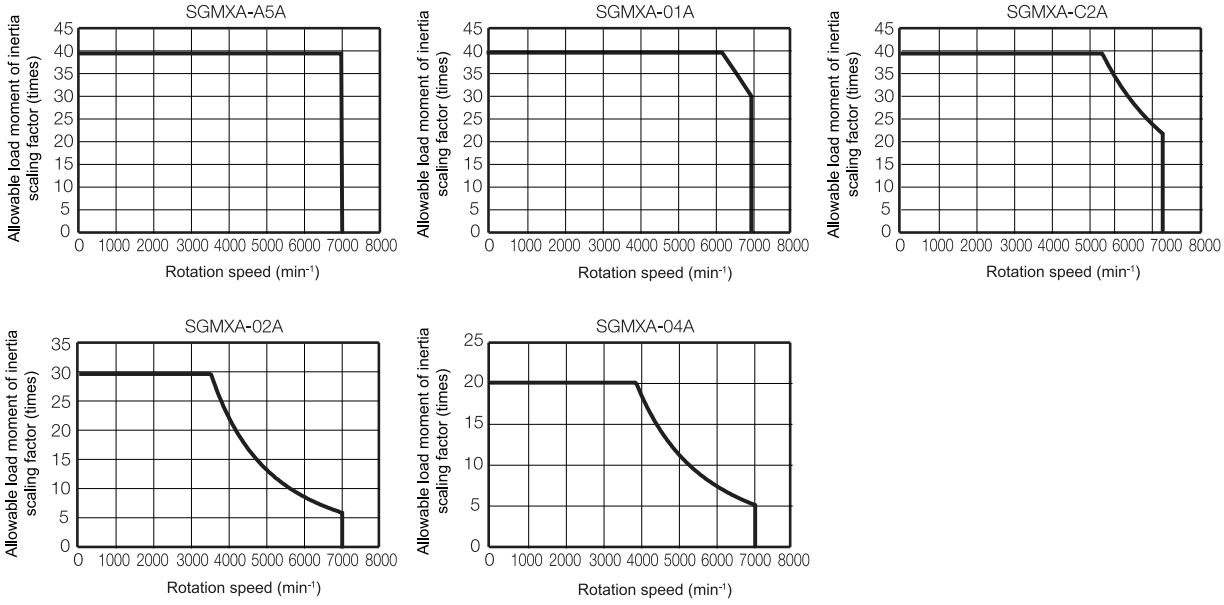
Refer to the following catalog for the regenerative power (W) that can be processed by the SERVOPACKs.

AC Servo Drives Σ-X Series (Document No.: KAEP C710812 03)

Install an external regenerative resistor when the built-in regenerative resistor cannot process all of the regenerative power.

(2) SERVOPACKs without Built-in Regenerative Resistors

The following graph shows the allowable load moment of inertia scaling factor of the rotation speed (reference values for deceleration operation at or above the rated torque). Application is possible without an external regenerative resistor within the allowable value.



Note:

Applicable SERVOPACK models: SGDXS-R70A, SGDXS-R90A, SGDXS-1R6A, and SGDXS-2R8A

(3) When an External Regenerative Resistor Is Required

Install the external regenerative resistor.

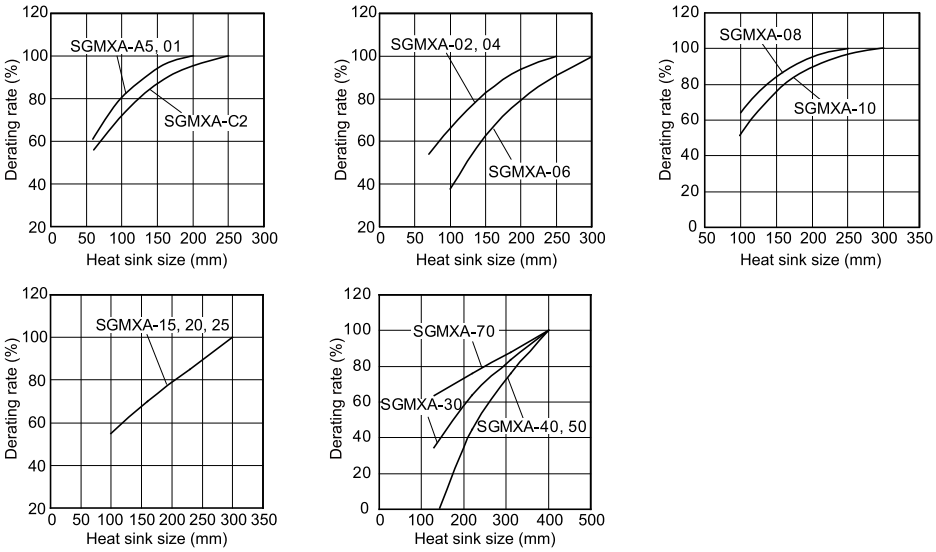
Refer to the following catalog for details on external regenerative resistors.

AC Servo Drives Σ-X Series (Document No.: KAEP C710812 03)

4.2.6 Derating Rates

(1) Servomotor Heat Dissipation Conditions

The servomotor ratings are the continuous allowable values at a surrounding air temperature of 40°C when a heat sink is installed on the servomotor. If the servomotor is mounted on a small device component, the servomotor temperature may rise considerably because the surface for heat dissipation becomes smaller. Refer to the following graphs for the relation between the heat sink size and derating rate.



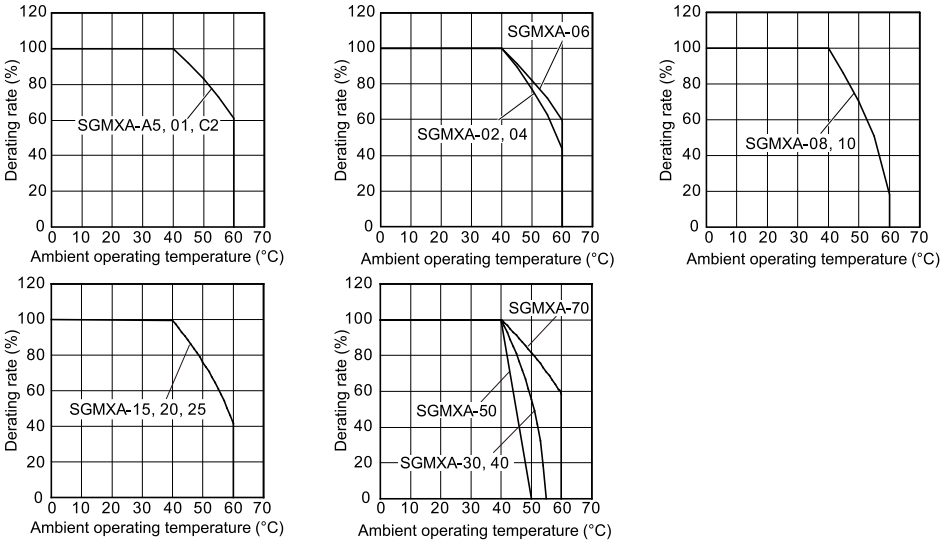
Important

The actual temperature rise depends on the following conditions. Always check the servomotor temperature with the actual equipment.

- How the heat sink (the servomotor mounting section) is attached to the installation surface
- Status between heat sink and servomotor (sealant, reduction gear, etc.)
- What material is used for the servomotor mounting section
- Servomotor rotation speed

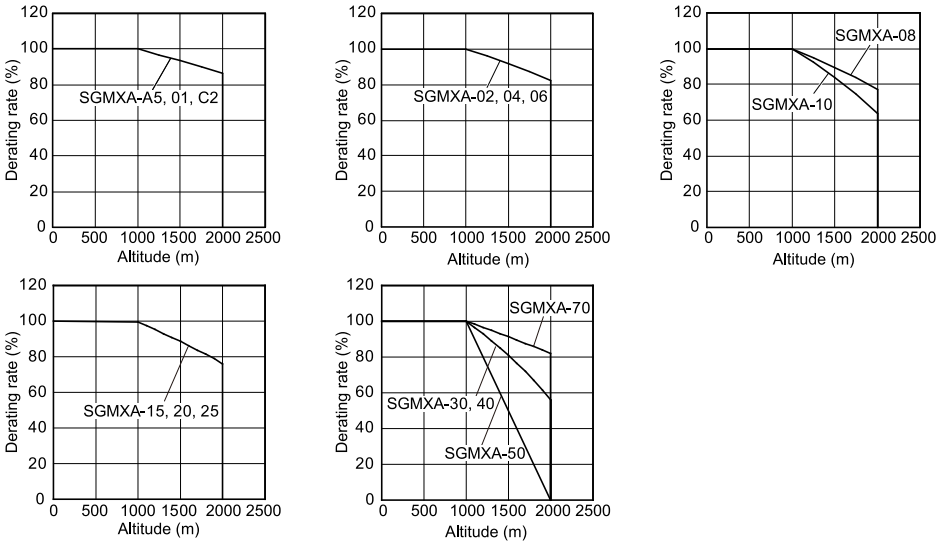
(2) Applications Where the Surrounding Air Temperature Exceeds 40°C

The servomotor ratings are the continuous allowable values at a surrounding air temperature of 40°C. If you use a servomotor at a surrounding air temperature that exceeds 40°C (60°C max.), apply a suitable derating rate from the following graphs.



(3) Applications Where the Altitude Exceeds 1000 m

The servomotor ratings are the continuous allowable values at an altitude of 1000 m or less. If you use a servomotor at an altitude that exceeds 1000 m (2000 m max.), the heat dissipation effect of the air is reduced. Apply the appropriate derating rate from the following graphs.



Note:

- When using servomotors with derating, change the detection timing of overload warning and overload alarm based on the overload detection level of the motor given in "*4.2.4 Servomotor Overload Protection Characteristics on page 78*".
- Use the combination of the SERVOPACK and servomotor so that the derating conditions are satisfied for both the SERVOPACK and servomotor.
- The derating rates are applicable only when the average rotation speed is less than or equal to the rated rotation speed. If the average rotation speed exceeds the rated rotation speed, consult with your Yaskawa representative.

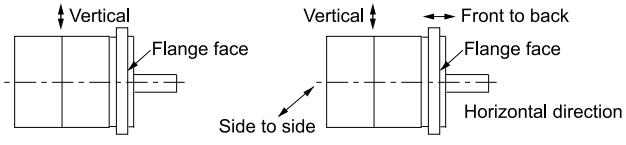
4.3 Specifications and Ratings (400 V Specification)

4.3.1 Specification

Voltage		400 V					
Model SGMXA-		15D	20D	25D	30D	40D	50D
Time Rating		Continuous					
Thermal Class		UL: F, CE: F					
Insulation Resistance		500 VDC, 10 MΩ min.					
Withstand Voltage		1,800 VAC for 1 minute, or 2,200 VAC for 1 second					
Excitation		Permanent magnet					
Mounting		Flange-mounted					
Drive Method		Direct drive					
Rotation Direction		Counterclockwise (CCW) for forward reference when viewed from the load side					
Vibration Class *1		V15					
Environmental Conditions	Surrounding Air Temperature	0°C to 40°C (With derating, usage is possible between 40°C and 60°C.) *3					
	Surrounding Air Humidity	20% to 80% relative humidity (with no 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. • Must have an altitude of 1000 m or less. (With derating, usage is possible between 1000 m and 2000 m.) *3 • 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 +60°C (with no freezing) Storage humidity: 20% to 80% relative humidity (with no condensation)					
Impact Resistance *2	Impact Acceleration (at Flange)	490 m/s²					
	Number of Impacts	2 times					
Vibration Resistance *2	Vibration Acceleration (at Flange)	49 m/s²					
Applicable SERVOPACKs	SGDXS	5R4D	8R4D	120D	120D	170D	170D

*1 A vibration class of V15 indicates a vibration amplitude of 15 μm maximum on the servomotor without a load at the rated rotation speed.

*2 The given values are for when the servomotor 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 servomotor can withstand depends on the application. Always check the vibration acceleration that is applied to the servomotor with the actual equipment.



Impact Applied to the Servomotor Vibration Applied to the Servomotor

*3 Refer to the following section for the derating rates.

☞ 4.3.6 Derating Rates on page 86

4.3.2 Servomotor Ratings

Voltage			400 V					
Model SGMXA-			15D	20D	25D	30D	40D	50D
Rated Output *1		W	1.5	2.0	2.5	3.0	4.0	5.0
Rated Torque *1, *2		N·m	4.90	6.36	7.96	9.80	12.6	15.8
Instantaneous Maximum Torque *1		N·m	14.7	19.1	23.9	29.4	37.8	47.6
Rated Current *1		Arms	4.5	5.9	7.4	8.9	12.5	13.8
Instantaneous Maximum Current *1		Arms	14	20	25	28	39	42
Rated Rotation Speed *1		min^{-1}	3000					
Continuous Allowable Rotation Speed		min^{-1}	6000		5000	6000		5000
Maximum Rotation Speed *1		min^{-1}	6000					
Torque Constant		N·m/Arms	1.23	1.18	1.15	1.16	1.06	1.21
Rotor Moment of Inertia *3	Without Holding Brakes	× 10^{-4} kg·m^2	2.00	2.47	3.19	7.00	9.60	12.3
	With Holding Brakes		2.25	2.72	3.44	9.20	11.8	14.5
Rated Power Rate *1	Without Holding Brakes	kW/s	120	164	199	137	165	203
	With Holding Brakes		107	149	184	104	135	172
Rated Angular Acceleration *1	Without Holding Brakes	rad/s^2	24500	25700	24900	14000	13100	12800
	With Holding Brakes		21700	23300	23100	10600	10600	10800
Heat Sink Size (aluminum) *4		mm	300 × 300 × 12			400 ×400 × 20		
Protective Structure *5			Totally enclosed, self-cooled, IP67					
Holding Brake Specifications *6	Rated Voltage	V	24 VDC±10%					
	Capacity	W	12			10		
	Holding Torque	N·m	7.84		10	20		
	Coil Resistance	Ω (at 20°C)	48			59		
	Rated Current	A (at 20°C)	0.5			0.41		
	Time Required to Release Brake	ms	170			100		
	Time Required to Brake	ms	80					

Continued on next page.

Continued from previous page.

Voltage			400 V					
Model SGMXA-			15D	20D	25D	30D	40D	50D
Allowable Load Moment of Inertia (Rotor Moment of Inertia Ratio) *7	Without External Devices		10 times			5 times		
	With External Regenerative Resistor and External Dynamic Brake Resistor *8		20 times			15 times		
Allowable Shaft Loads *9	LF	mm	45			63		
	Allowable Radial Load	N	686			980	1176	
	Allowable Thrust Load	N	196			392		

*1 These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C. These are typical values.

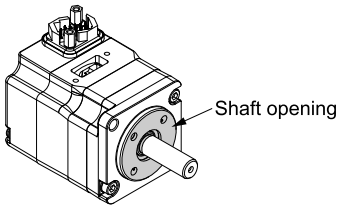
*2 The rated torques are the continuous allowable torque values at a surrounding air temperature of 40°C with an aluminum heat sink of the dimensions given in the table.

*3 The values for SGMXA-15D to -50D servomotors with batteryless absolute encoders (and holding brakes) are the same as those in the table.

*4 Refer to the following section for the relation between the heat sinks and derating rate.

☞ *(1) Servomotor Heat Dissipation Conditions on page 86*

*5 This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.



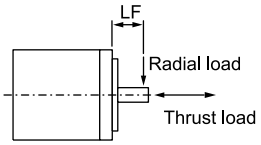
*6 Observe the following precautions if you use a servomotor with a holding brake.

- The holding brake cannot be used to stop the servomotor.
- The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
- The 24-VDC power supply is not provided by Yaskawa.

*7 The rotor moment of inertia scaling factor is the value for a standard servomotor without a holding brake.

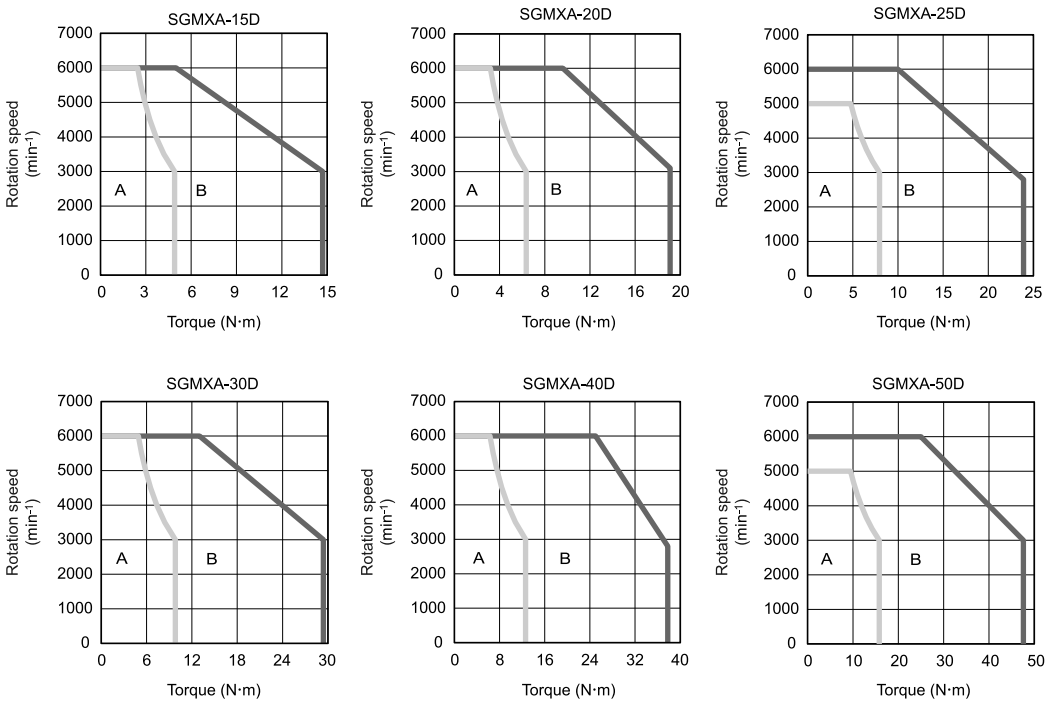
*8 To externally connect a dynamic brake resistor, select hardware option specification 0020 for the SERVOPACK.

*9 Design the mechanical system so that the thrust and radial loads applied to the servomotor shaft end during operation do not exceed the values given in the table.



4.3.3 Torque-Rotation Speed Characteristics

A : Continuous duty zone
B : Intermittent duty zone
(solid lines): Three-phase, 400 V



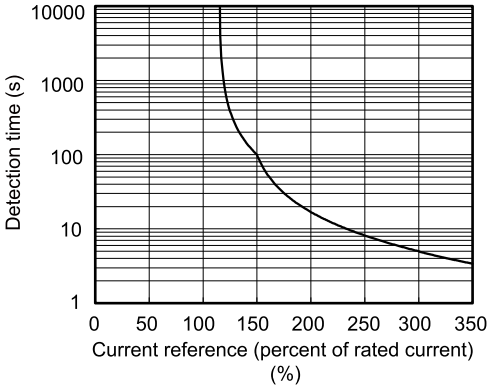
Note:

1. These values (typical values) are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20° C.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective torque is within the allowable range for the rated torque, the servomotor can be used within the intermittent duty zone.
4. If you use a servomotor main circuit cable that exceeds 20 m, the intermittent duty zone in the torque-rotation speed characteristics will become smaller because the voltage drop increases.

4.3.4 Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions with a servomotor surrounding air temperature of 40° C.

For the overload detection level, priority is given to the lower of the detection levels in the overload protection characteristics of the connected SERVOPACK and servomotor.



Note:

The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.

Use the servomotor so that the effective torque remains within the continuous duty zone given in "*4.3.3 Torque-Rotation Speed Characteristics on page 85*".

4.3.5 Allowable Load Moment of Inertia

The allowable load moments of inertia (rotor moment of inertia ratios) for the servomotors are given in "*4.3.2 Servomotor Ratings on page 83*". The values are determined by the regenerative energy processing capacity of the SERVOPACK and are also affected by the drive conditions of the servomotor. Perform the required steps for each of the following cases.

(1) Exceeding the Allowable Load Moment of Inertia

Use one of the following measures to adjust the load moment of inertia to within the allowable value.

- Reduce the torque limit.
- Reduce the deceleration rate.
- Reduce the maximum rotation speed.

If the above steps are not possible, install an external regenerative resistor.

Information

An Overvoltage Alarm (A.400) is likely to occur during deceleration if the load moment of inertia exceeds the allowable load moment of inertia. SERVOPACKs with a built-in regenerative resistor may generate a Regenerative Overload Alarm (A.320).

Refer to the following catalog for the regenerative power (W) that can be processed by the SERVOPACKs.

AC Servo Drives Σ-X Series (Document No.: KAEP C710812 03)

Install an external regenerative resistor when the built-in regenerative resistor cannot process all of the regenerative power.

(2) SERVOPACKs without Built-in Regenerative Resistors

The allowable load moments of inertia (rotor moment of inertia ratios) for the servomotors are given in "*4.3.2 Servomotor Ratings on page 83*". Application is possible without an external regenerative resistor if the multiplier for “Without External Devices” is within the allowable value. An external regenerative resistor is required if the multiplier is not within the allowable value.

(3) When an External Regenerative Resistor Is Required

Install the external regenerative resistor.

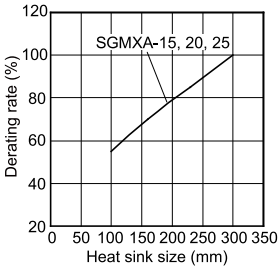
Refer to the following catalog for details on external regenerative resistors.

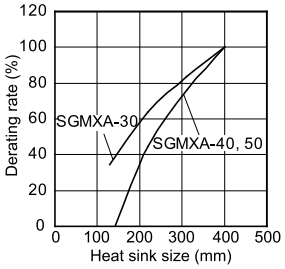
AC Servo Drives Σ-X Series (Document No.: KAEP C710812 03)

4.3.6 Derating Rates

(1) Servomotor Heat Dissipation Conditions

The servomotor ratings are the continuous allowable values at a surrounding air temperature of 40°C when a heat sink is installed on the servomotor. If the servomotor is mounted on a small device component, the servomotor temperature may rise considerably because the surface for heat dissipation becomes smaller. Refer to the following graphs for the relation between the heat sink size and derating rate.





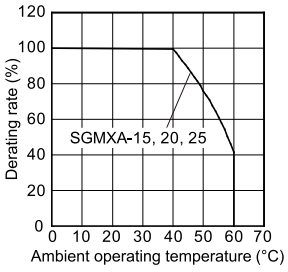
Important

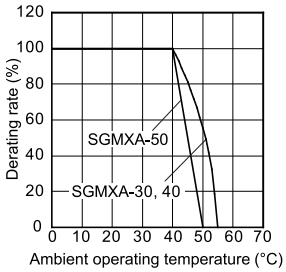
The actual temperature rise depends on the following conditions. Always check the servomotor temperature with the actual equipment.

- How the heat sink (the servomotor mounting section) is attached to the installation surface
- Status between heat sink and servomotor (sealant, reduction gear, etc.)
- What material is used for the servomotor mounting section
- Servomotor rotation speed

(2) Applications Where the Surrounding Air Temperature Exceeds 40°C

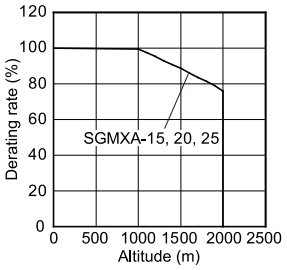
The servomotor ratings are the continuous allowable values at a surrounding air temperature of 40°C. If you use a servomotor at a surrounding air temperature that exceeds 40°C (60°C max.), apply a suitable derating rate from the following graphs.

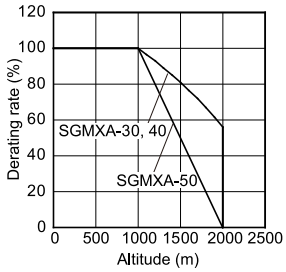




(3) Applications Where the Altitude Exceeds 1000 m

The servomotor ratings are the continuous allowable values at an altitude of 1000 m or less. If you use a servomotor at an altitude that exceeds 1000 m (2000 m max.), the heat dissipation effect of the air is reduced. Apply the appropriate derating rate from the following graphs.





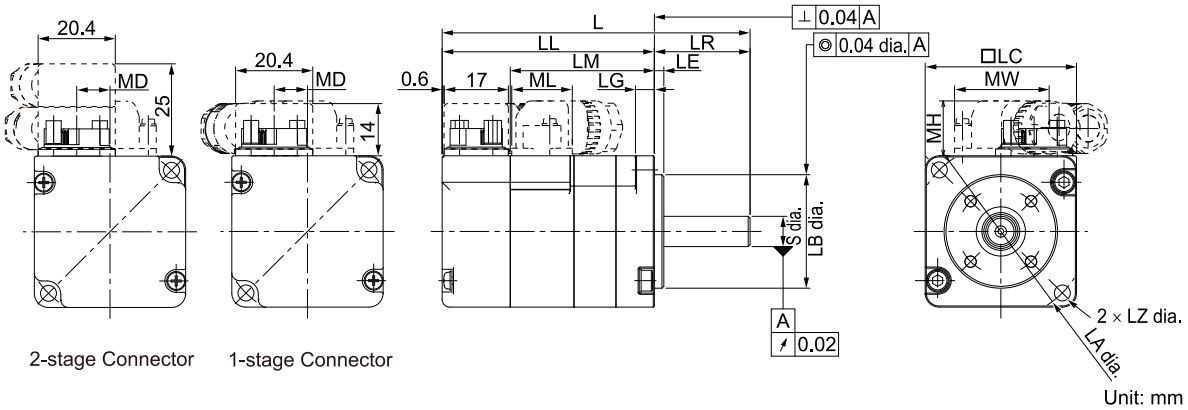
Note:

- When using servomotors with derating, change the detection timing of overload warning and overload alarm based on the overload detection level of the motor given in "*4.3.4 Servomotor Overload Protection Characteristics on page 85*".
- Use the combination of the SERVOPACK and servomotor so that the derating conditions are satisfied for both the SERVOPACK and servomotor.
- The derating rates are applicable only when the average rotation speed is less than or equal to the rated rotation speed. If the average rotation speed exceeds the rated rotation speed, consult with your Yaskawa representative.

4.4 External Dimensions (200 V Specification)

4.4.1 SGMXA-A5 to -C2

(1) Standard Specification



Model SGMXA-	L *1	LL *1	LM	Flange Dimensions						
				LR	LE	LG	LC	LA	LB	LZ
A5A□A2□A1	80.5 (121.0)	55.5 (96.0)	37.5	25	2.5	5	40	46	$30^{0}_{-0.021}$	4.3
01A□A2□A1	92.5 (133.0)	67.5 (108.0)	49.5	25	2.5	5	40	46	$30^{0}_{-0.021}$	4.3
C2A□A2□A1	104.5 (153.0)	79.5 (128.0)	61.5	25	2.5	5	40	46	$30^{0}_{-0.021}$	4.3

Model SGMXA-	S	MD	MW	MH	ML	Approx. Mass [kg] *1
A5A□A2□A1	$8^{0}_{-0.009}$	8.4	25	14.5	16	0.3 (0.6)
01A□A2□A1	$8^{0}_{-0.009}$	8.4	25	14.5	16	0.4 (0.7)
C2A□A2□A1	$8^{0}_{-0.009}$	8.4	25	14.5	16	0.5 (0.8)

*1 For models that have a batteryless absolute encoder, L and LL are 7.5 mm greater and the approximate mass is 0.1 kg greater than the given value. Refer to the following section for the values for individual models.

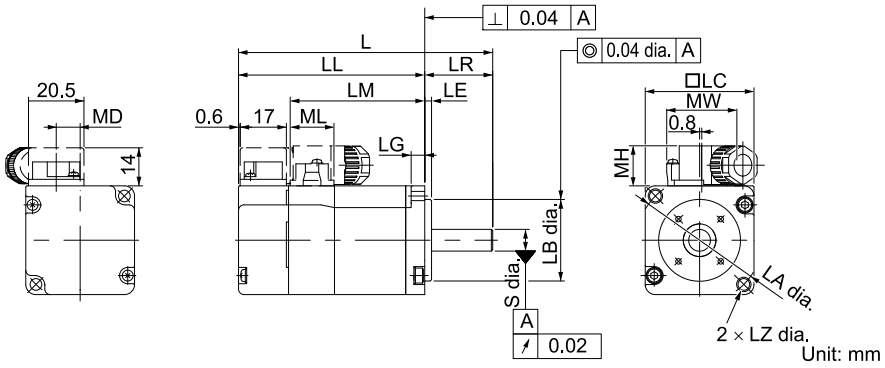
☞ *4.4.7 Dimensions of Servomotors with Batteryless Absolute Encoders on page 107*

Note:

1. The values in parentheses are for servomotors with holding brakes.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

☞ *(3) Shaft End Specification on page 89*
☞ *(4) Option Specification on page 89*

(2) Σ-7 Compatible Specification



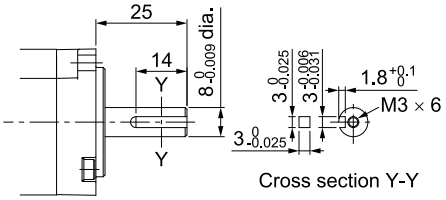
Model SGMXA-	MD	MW	MH	ML
A5A□A2□A2	8.8	25.8	14.7	16.1
01A□A2□A2	8.8	25.8	14.7	16.1
C2A□A2□A2	8.8	25.8	14.7	16.1

Note:

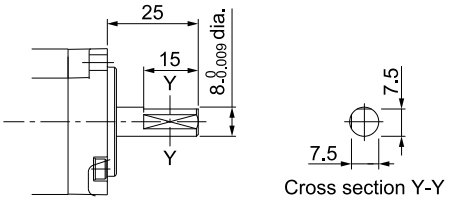
The dimensions for non-connector parts are identical to those for models with standard specifications.

(3) Shaft End Specification

- Straight with Key and Tap

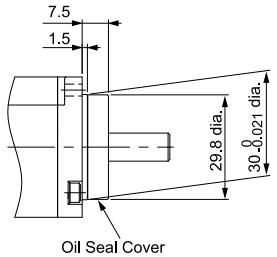


- With Two Flat Seats



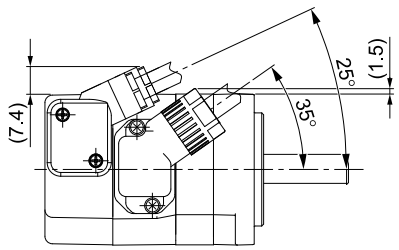
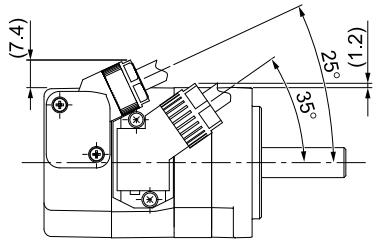
(4) Option Specification

- With Oil Seal

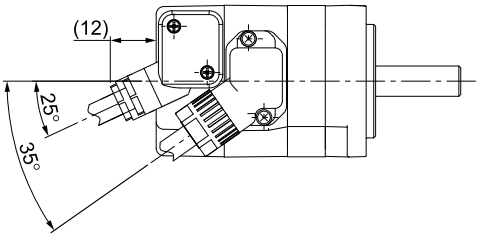
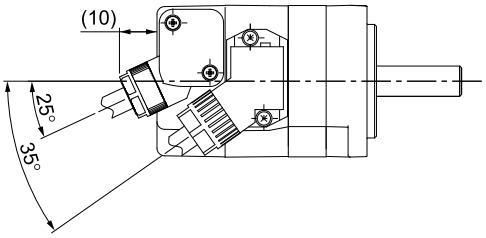


(5) Connector Mounting Dimensions

- Cable Installed on Load Side

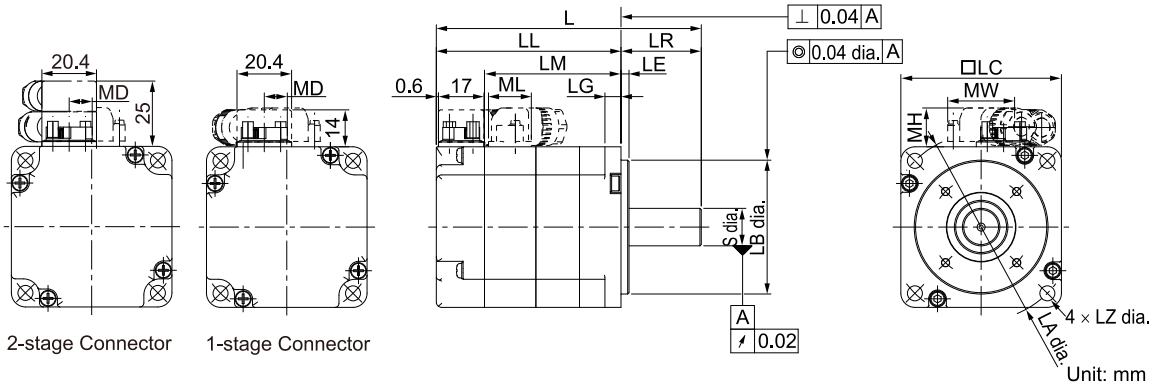
Standard Specification	Σ-7 Compatible Specification
	

- Cable Installed on Non-load Side

Standard Specification	Σ-7 Compatible Specification
	

4.4.2 SGMXA-02 to -06

(1) Standard Specification



Model SGMXA-	L *1	LL *1	LM	Flange Dimensions						
				LR	LE	LG	LC	LA	LB	LZ
02A□A2□A1	98.5 (139.0)	68.5 (109.0)	50.5	30	3	6	60	70	$50^{0}_{-0.025}$	5.5
04A□A2□A1	115 (155.5)	85 (125.5)	67	30	3	6	60	70	$50^{0}_{-0.025}$	5.5
06A□A2□A1	137 (191.0)	107 (161.0)	89	30	3	6	60	70	$50^{0}_{-0.025}$	5.5

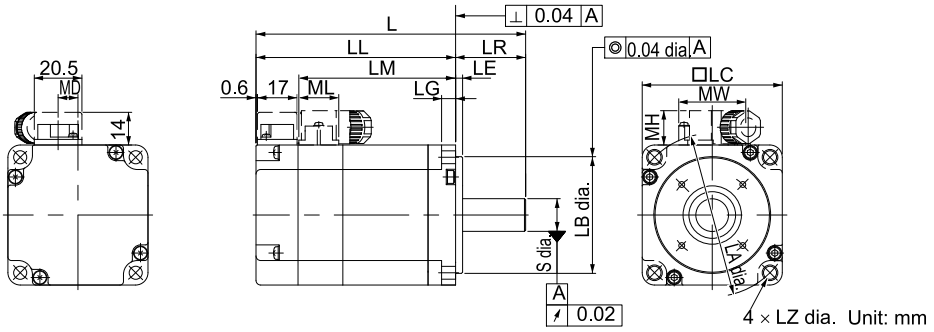
Model SGMXA-	S	MD	MW	MH	ML	Approx. Mass [kg] *1
02A□A2□A1	$14^{0}_{-0.011}$	8.4	25	14.5	16	0.8 (1.4)
04A□A2□A1	$14^{0}_{-0.011}$	8.4	25	14.5	16	1.2 (1.8)
06A□A2□A1	$14^{0}_{-0.011}$	8.4	25	14.5	16	1.6 (2.2)

*1 For models that have a batteryless absolute encoder, L and LL are 7.5 mm greater and the approximate mass is 0.1 kg greater than the given value. Refer to the following section for the values for individual models.
☞ *4.4.7 Dimensions of Servomotors with Batteryless Absolute Encoders on page 107*

Note:

1. The values in parentheses are for servomotors with holding brakes.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.
☞ *(3) Shaft End Specification on page 92*
☞ *(4) Option Specification on page 92*

(2) Σ-7 Compatible Specification



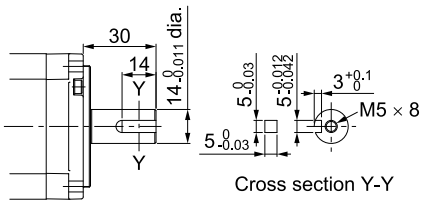
Model SGMXA-	MD	MW	MH	ML
02A□A2□A2	8.5	28.7	14.7	17.1
04A□A2□A2	8.5	28.7	14.7	17.1
06A□A2□A2	8.5	28.7	14.7	17.1

Note:

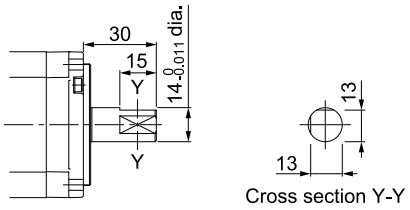
The dimensions for non-connector parts are identical to those for models with standard specifications.

(3) Shaft End Specification

- Straight with Key and Tap

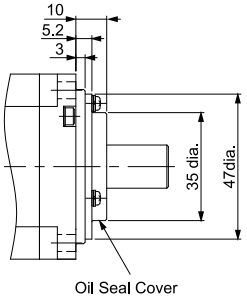


- With Two Flat Seats



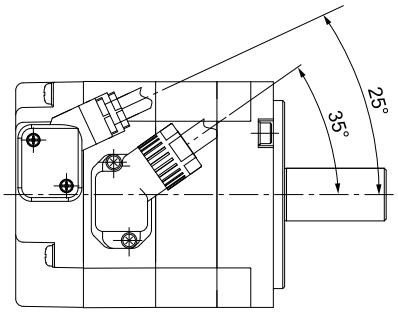
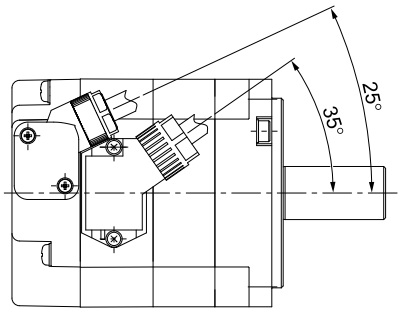
(4) Option Specification

- With Oil Seal

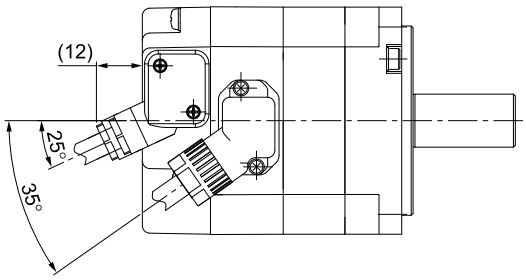
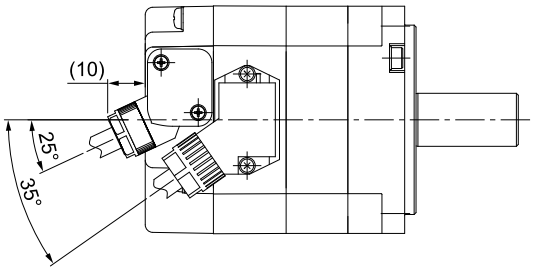


(5) Connector Mounting Dimensions

- Cable Installed on Load Side

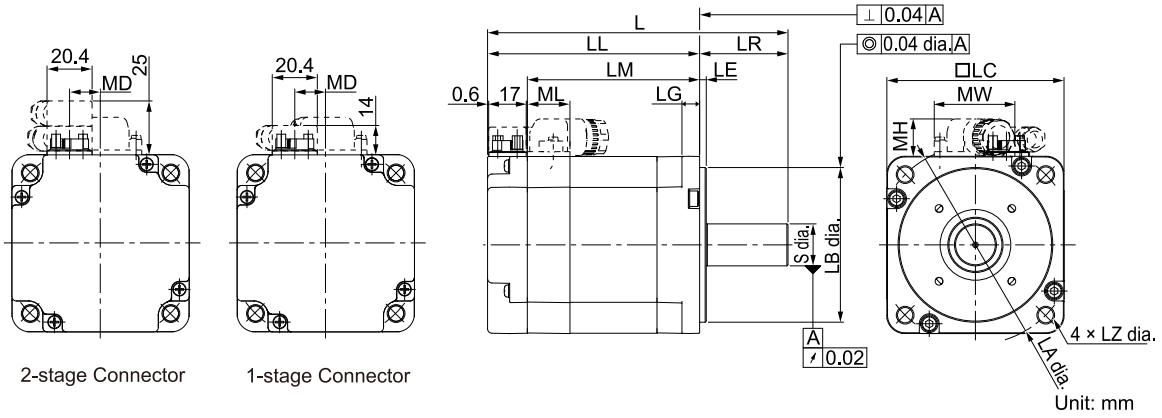
Standard Specification	Σ-7 Compatible Specification
	

- Cable Installed on Non-load Side

Standard Specification	Σ-7 Compatible Specification
	

4.4.3 SGMXA-08 and -10

(1) Standard Specification



Model SGMXA-	L *1	LL *1	LM	Flange Dimensions						
				LR	LE	LG	LC	LA	LB	LZ
08A□A2□A1	136 (183.0)	96 (143.0)	78	40	3	8	80	90	$70^{0}_{-0.030}$	7
10A□A2□A1	161 (208.0)	121 (168.0)	103	40	3	8	80	90	$70^{0}_{-0.030}$	7

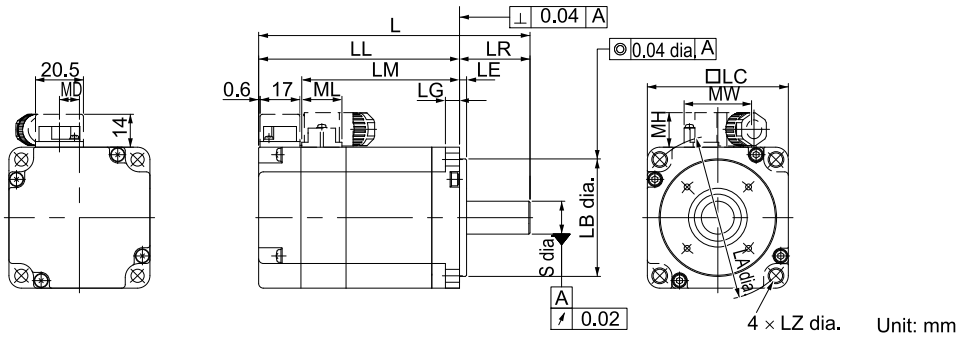
Model SGMXA-	S	MD	MW	MH	ML	Approx. Mass *1 [kg]
08A□A2□A1	$19^{0}_{-0.013}$	14	37	17	19.3	2.3 (2.9)
10A□A2□A1	$19^{0}_{-0.013}$	14	37	17	19.3	3.1 (3.7)

*1 For models that have a batteryless absolute encoder, L and LL are +6.5 mm greater and the approximate mass is 0.1 kg greater than the given value. Refer to the following section for the values for individual models.
☞ *4.4.7 Dimensions of Servomotors with Batteryless Absolute Encoders on page 107*

Note:

1. The values in parentheses are for servomotors with holding brakes.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.
☞ *(3) Shaft End Specification on page 95*
☞ *(4) Option Specification on page 95*

(2) Σ-7 Compatible Specification

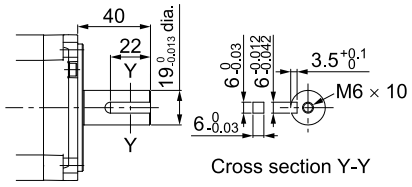


Model SGMXA-	MD	MW	MH	ML
08A□A2□A2	14	38	17	19.3
10A□A2□A2	14	38	17	19.3

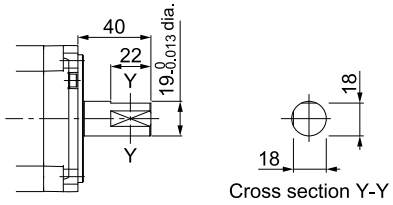
Note:
The dimensions for non-connector parts are identical to those for models with standard specifications.

(3) Shaft End Specification

- Straight with Key and Tap

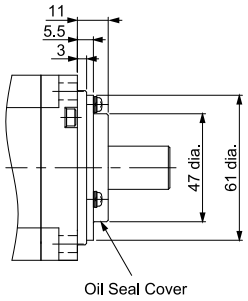


- With Two Flat Seats



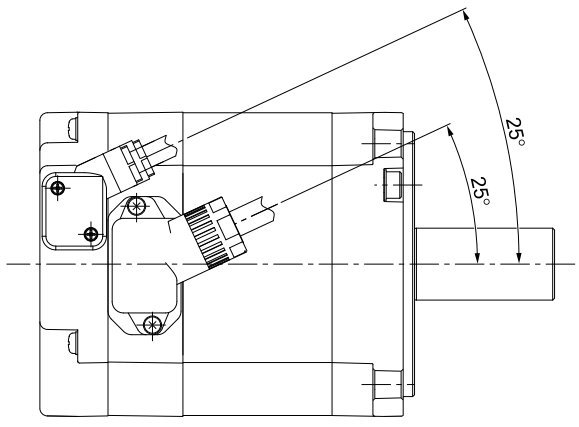
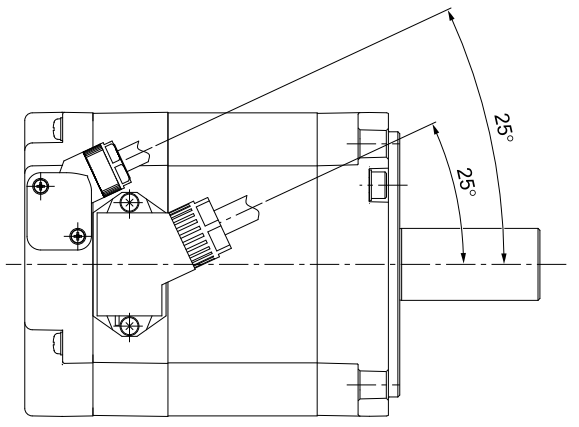
(4) Option Specification

- With Oil Seal

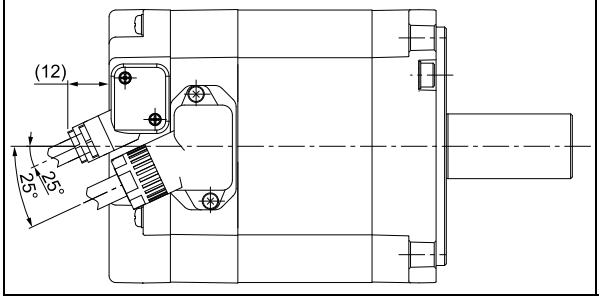
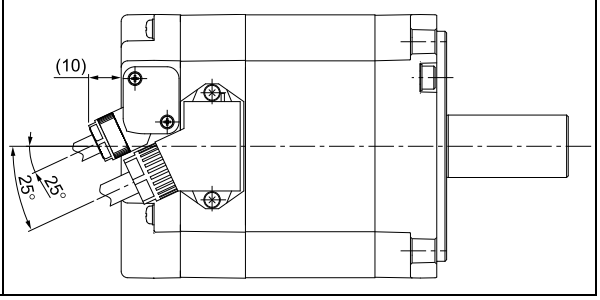


(5) Connector Mounting Dimensions

- Cable Installed on Load Side

Standard Specification	Σ-7 Compatible Specification
	

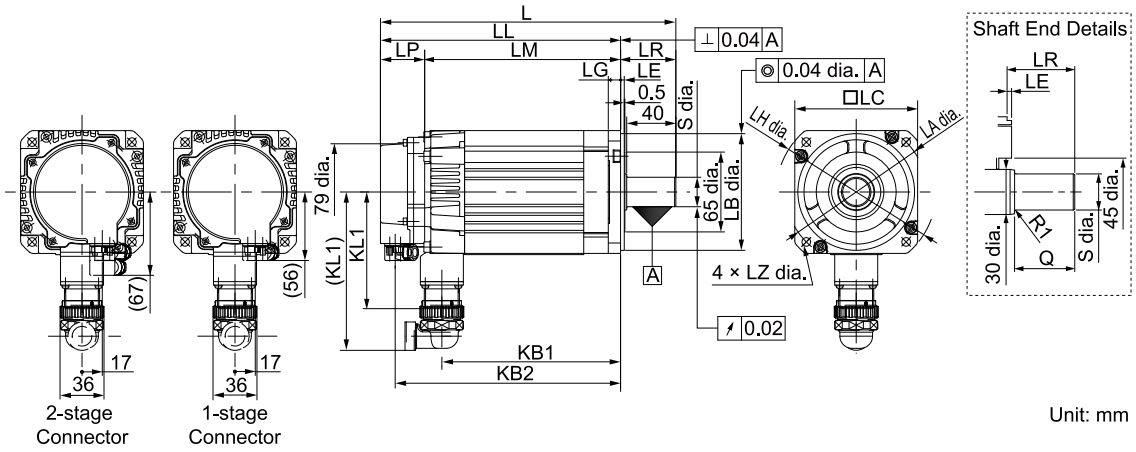
- Cable Installed on Non-load Side

Standard Specification	Σ-7 Compatible Specification
	

4.4.4 SGMXA-15 to -25

(1) Servomotors without Holding Brakes

(a) Standard Specification



Model SGMXA-	L *1	LL *1	LM	LP *1	LR	KB1	KB2 *1	KL1 (KL1 *2)
15A□A21A1	200	155	121	34	45	107	143	95 (129)
20A□A21A1	216	171	137	34	45	123	159	95 (129)
25A□A21A1	239	194	160	34	45	146	182	95 (129)

Model SGMXA-	Flange Dimensions							Shaft End Dimensions		Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	Q	
15A□A21A1	115	$95^{0}_{-0.035}$	100	3	10	130	7	$24^{0}_{-0.013}$	40	4.6
20A□A21A1	115	$95^{0}_{-0.035}$	100	3	10	130	7	$24^{0}_{-0.013}$	40	5.4
25A□A21A1	115	$95^{0}_{-0.035}$	100	3	10	130	7	$24^{0}_{-0.013}$	40	6.8

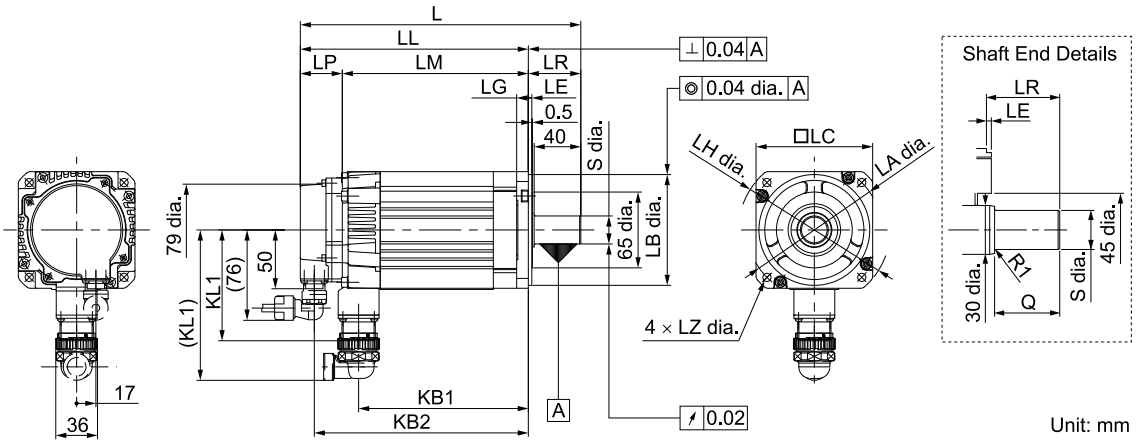
*1 For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the following section for the values for individual models.
☞ *4.4.7 Dimensions of Servomotors with Batteryless Absolute Encoders on page 107*

*2 These are the values when the flexible connectors are connected.

Note:

1. The dimensions are same for models with oil seals.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications.
☞ *(c) Shaft End Specification on page 97*

(b) Σ-7 Compatible Specification



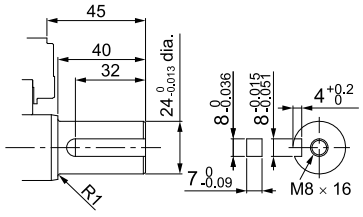
Note:

The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

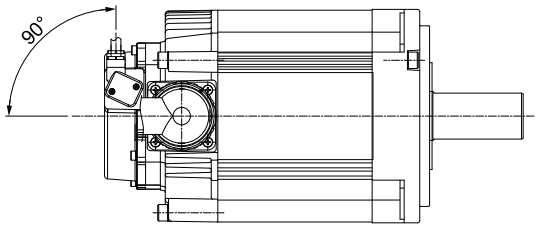
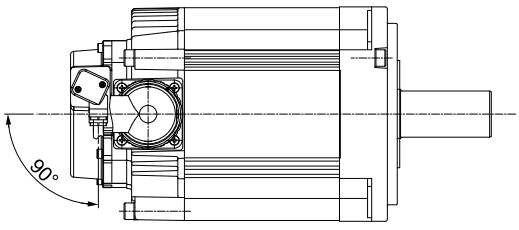
(c) Shaft End Specification

- Straight with Key and Tap



(d) Connector Specifications

- Encoder Connector (26-bit Encoder): Standard Specification
  The encoder cable is installed in the following direction.

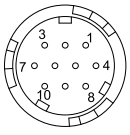
Cable Installed toward Left Side	Cable Installed toward Right Side
	

For details on selecting cables, refer to the following section and manual.

☞ *8.2 Cables for the SGMXA Servomotors on page 233*

Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

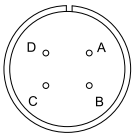
- Encoder Connector (26-bit Encoder): Σ-7 Compatible Specification



1	PS	6 *1	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5	BAT(-)	10	FG (frame ground)

*1 A battery is required only for an absolute encoder.
Receptacle: CMV1-R10P
Applicable plug (not provided by Yaskawa)
Plug: CM10-AP10S-□-D (R1) (right-angle type), CM10-SP10S-□-D (R1) (straight), CMV1-AP10S-□□ (right-angle type), CMV1-SP10S-□□ (straight), CMV1S-AP10S-□□ (right-angle type), CMV1S-SP10S-□□ (straight)
(□ varies depending on the applicable cable size.)
Manufacturer: DDK Ltd.

- Servomotor Connector: Same for both Standard Specifications and Σ-7 Compatible Specifications

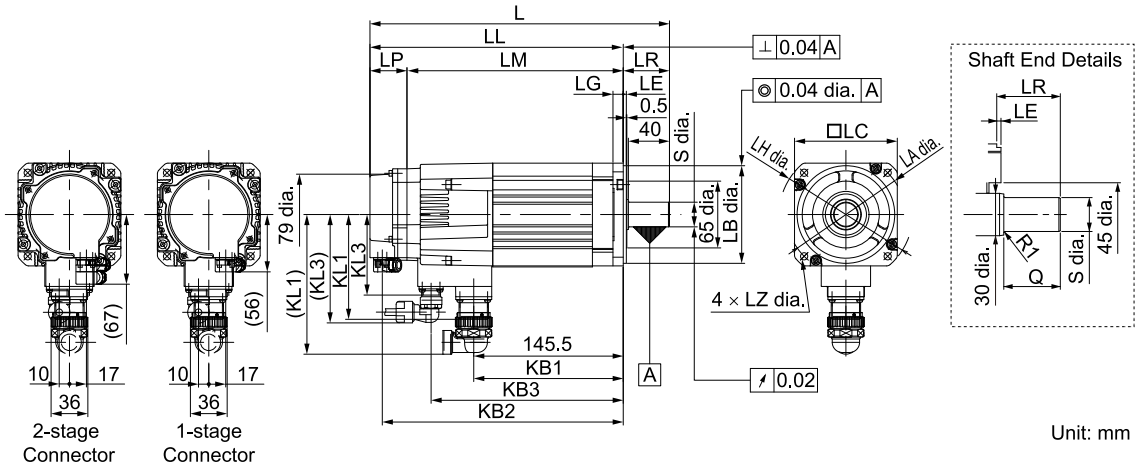


A	Phase U	C	Phase W
B	Phase V	D	FG (frame ground)

Manufacturer: Japan Aviation Electronics Industry, Ltd.

(2) Servomotors with Holding Brakes

(a) Standard Specification



Model SGMXA-	L *1	LL *1	LM	LP *1	LR	KB1	KB2 *1	KB3	KL1 (KL1 *2)	KL3 (KL3 *2)
15A□A2CA1	241	196	162	34	45	107	184	139	102 (136)	80 (105)
20A□A2CA1	257	212	178	34	45	123	200	155	102 (136)	80 (105)
25A□A2CA1	290	245	211	34	45	156	233	188	102 (136)	80 (105)

Model SGMXA-	Flange Dimensions							Shaft End Dimensions		Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	Q	
15A□A2CA1	115	$95^{0}_{-0.035}$	100	3	10	130	7	$24^{0}_{-0.013}$	40	6.0
20A□A2CA1	115	$95^{0}_{-0.035}$	100	3	10	130	7	$24^{0}_{-0.013}$	40	6.8
25A□A2CA1	115	$95^{0}_{-0.035}$	100	3	10	130	7	$24^{0}_{-0.013}$	40	8.7

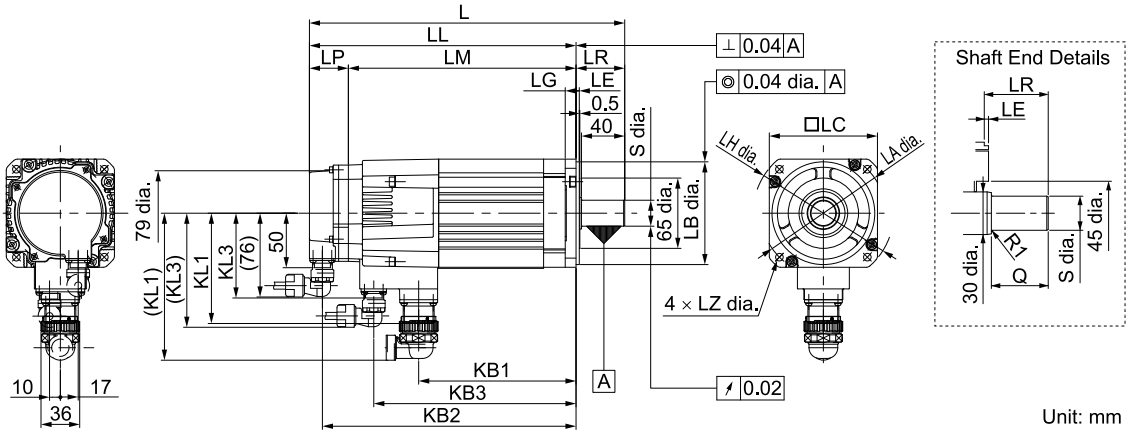
*1 For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the following section for the values for individual models.
☞ *4.4.7 Dimensions of Servomotors with Batteryless Absolute Encoders on page 107*

*2 These are the values when the flexible connectors are connected.

Note:

1. The dimensions are same for models with oil seals.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications.
☞ *(c) Shaft End Specification on page 99*

(b) Σ-7 Compatible Specification



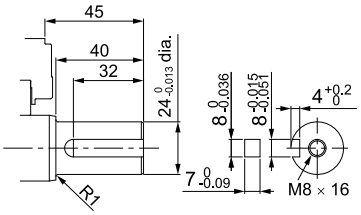
Note:

The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

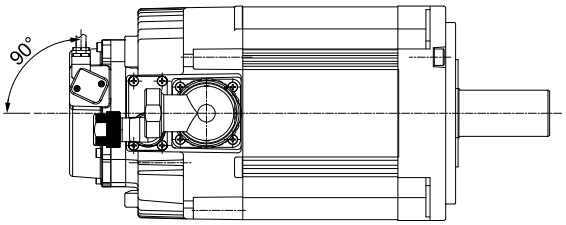
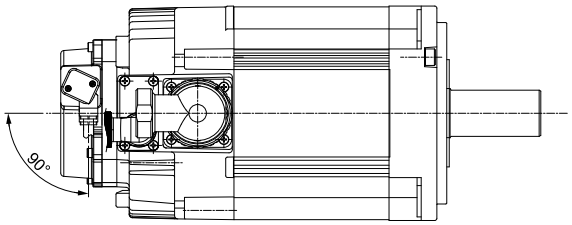
(c) Shaft End Specification

- Straight with Key and Tap



(d) Connector Specifications

- Encoder Connector (26-bit Encoder): Standard Specification
  The encoder cable is installed in the following direction.

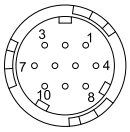
Cable Installed toward Left Side	Cable Installed toward Right Side
	

For details on selecting cables, refer to the following section and manual.

☞ *8.2 Cables for the SGMXA Servomotors on page 233*

🕮 Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

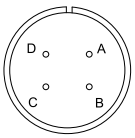
- Encoder Connector (26-bit Encoder): Σ-7 Compatible Specification



1	PS	6 *1	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5	BAT(-)	10	FG (frame ground)

*1 A battery is required only for an absolute encoder.
Receptacle: CMV1-R10P
Applicable plug (not provided by Yaskawa)
Plug: CM10-AP10S-□-D (R1) (right-angle type), CM10-SP10S-□-D (R1) (straight), CMV1-AP10S-□□ (right-angle type), CMV1-SP10S-□□ (straight), CMV1S-AP10S-□□ (right-angle type), CMV1S-SP10S-□□ (straight)
(□ varies depending on the applicable cable size.)
Manufacturer: DDK Ltd.

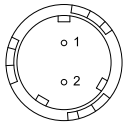
- Servomotor Connector: Same for both Standard Specifications and Σ-7 Compatible Specifications



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

Manufacturer: Japan Aviation Electronics Industry, Ltd.

- Brake Connector: Same for both Standard Specifications and Σ-7 Compatible Specifications



1	Brake terminal
2	Brake terminal

Note:

There is no voltage polarity for the brake terminals.

Receptacle: CMV1-R2P-D

Applicable plug (not provided by Yaskawa)

Plug: CM10-AP2S-□-D (right-angle type), CM10-SP2S-□-D (straight), CMV1-AP2S-□-D (right-angle type), CMV1-SP2S-□-D (straight), CMV1S-AP2S-□-D (right-angle type), CMV1S-SP2S-□-D (straight)

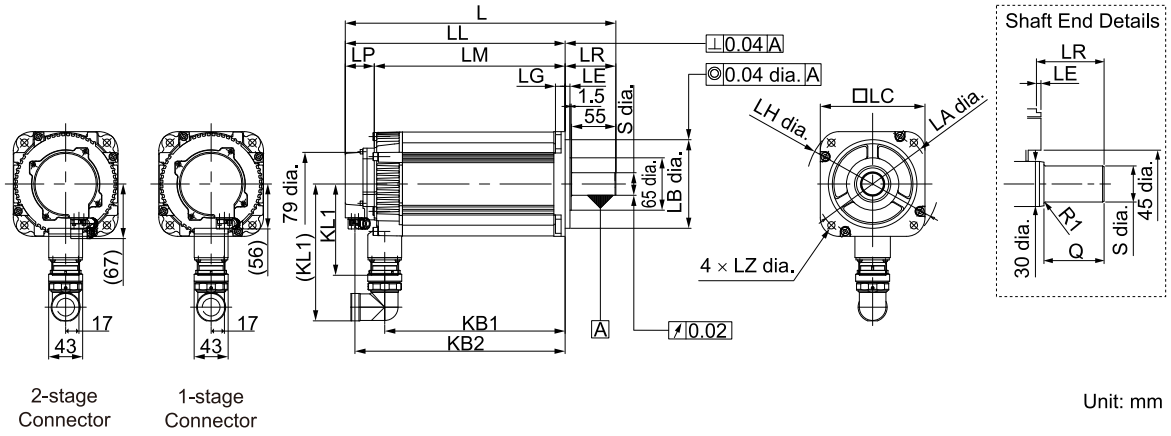
(□ varies depending on the applicable cable size.)

Manufacturer: DDK Ltd.

4.4.5 SGMXA-30 to -50

(1) Servomotors without Holding Brakes

(a) Standard Specification



Unit: mm

Model SGMXA-	L *1	LL *1	LM	LP *1	LR	KB1	KB2 *1	KL1 (KL1 *2)
30A□A21A1	255	192	158	34	63	145	180	114 (170)
40A□A21A1	294	231	197	34	63	184	219	114 (170)
50A□A21A1	334	271	237	34	63	224	259	114 (170)

Model SGMXA-	Flange Dimensions							Shaft End Dimensions		Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	Q	
30A□A21A1	145	$110^{0}_{-0.035}$	130	6	12	165	9	$28^{0}_{-0.013}$	55	10.5
40A□A21A1	145	$110^{0}_{-0.035}$	130	6	12	165	9	$28^{0}_{-0.013}$	55	13.5
50A□A21A1	145	$110^{0}_{-0.035}$	130	6	12	165	9	$28^{0}_{-0.013}$	55	16.5

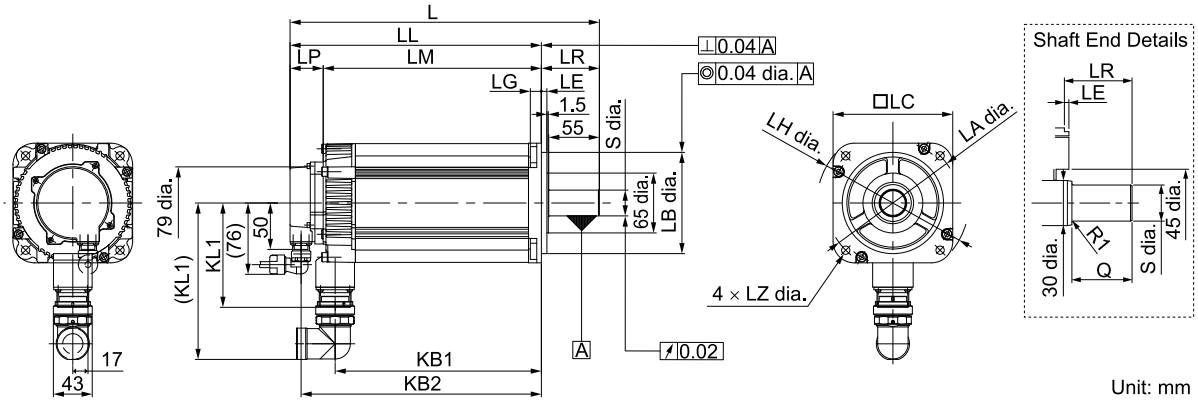
*1 For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are +8 mm greater than the given value. Refer to the following section for the values for individual models.
☞ *4.4.7 Dimensions of Servomotors with Batteryless Absolute Encoders on page 107*

*2 These are reference dimensions when the JL10 connector (flexible type) is connected.

Note:

1. The dimensions are same for models with oil seals.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications.
☞ *(c) Shaft End Specification on page 101*

(b) Σ-7 Compatible Specification



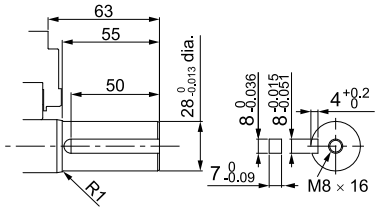
Note:

The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

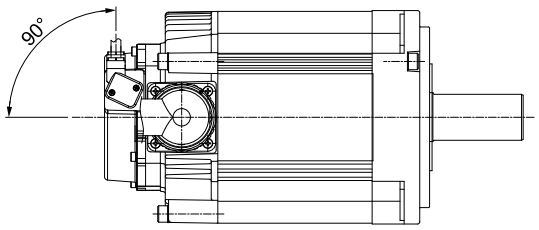
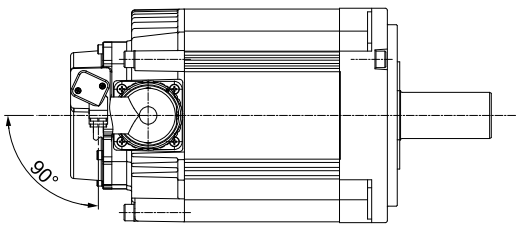
(c) Shaft End Specification

- Straight with Key and Tap



(d) Connector Specifications

- Encoder Connector (26-bit Encoder): Standard Specification
  The encoder cable is installed in the following direction.

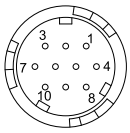
Cable Installed toward Left Side	Cable Installed toward Right Side
	

For details on selecting cables, refer to the following section and manual.

☞ *8.2 Cables for the SGMXA Servomotors on page 233*

🕮 Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

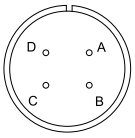
- Encoder Connector (26-bit Encoder): Σ-7 Compatible Specification



1	PS	6 *1	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5	BAT(-)	10	FG (frame ground)

*1 A battery is required only for an absolute encoder.
Receptacle: CMV1-R10P
Applicable plug (not provided by Yaskawa)
Plug: CM10-AP10S-□-D (R1) (right-angle type), CM10-SP10S-□-D (R1) (straight), CMV1-AP10S-□□ (right-angle type), CMV1-SP10S-□□ (straight), CMV1S-AP10S-□□ (right-angle type), CMV1S-SP10S-□□ (straight)
(□ varies depending on the applicable cable size.)
Manufacturer: DDK Ltd.

- Servomotor Connector: Same for both Standard Specifications and Σ-7 Compatible Specifications

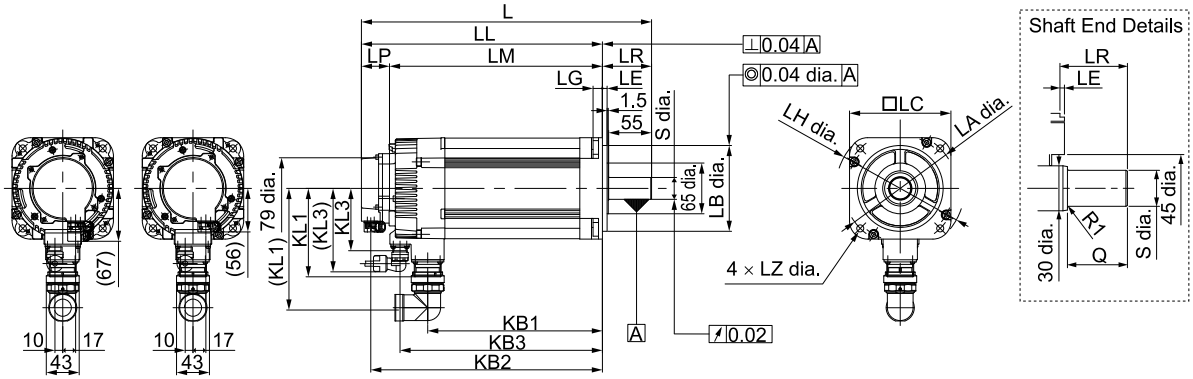


A	Phase U	C	Phase W
B	Phase V	D	FG (frame ground)

Manufacturer: Japan Aviation Electronics Industry, Ltd.

(2) Servomotors with Holding Brakes

(a) Standard Specification



Model SGMXA-	L *1	LL *1	LM	LP *1	LR	KB1	KB2 *1	KB3	KL1 (KL1 *2)	KL3 (KL3 *2)
30A□A2CA1	291	228	194	34	63	145	216	181	114 (170)	81 (106)
40A□A2CA1	330	267	233	34	63	184	255	220	114 (170)	81 (106)
50A□A2CA1	370	307	273	34	63	224	295	260	114 (170)	81 (106)

Model SGMXA-	Flange Dimensions							Shaft End Dimensions		Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	Q	
30A□A2CA1	145	$110^{0}_{-0.035}$	130	6	12	165	9	$28^{0}_{-0.013}$	55	13
40A□A2CA1	145	$110^{0}_{-0.035}$	130	6	12	165	9	$28^{0}_{-0.013}$	55	16
50A□A2CA1	145	$110^{0}_{-0.035}$	130	6	12	165	9	$28^{0}_{-0.013}$	55	19

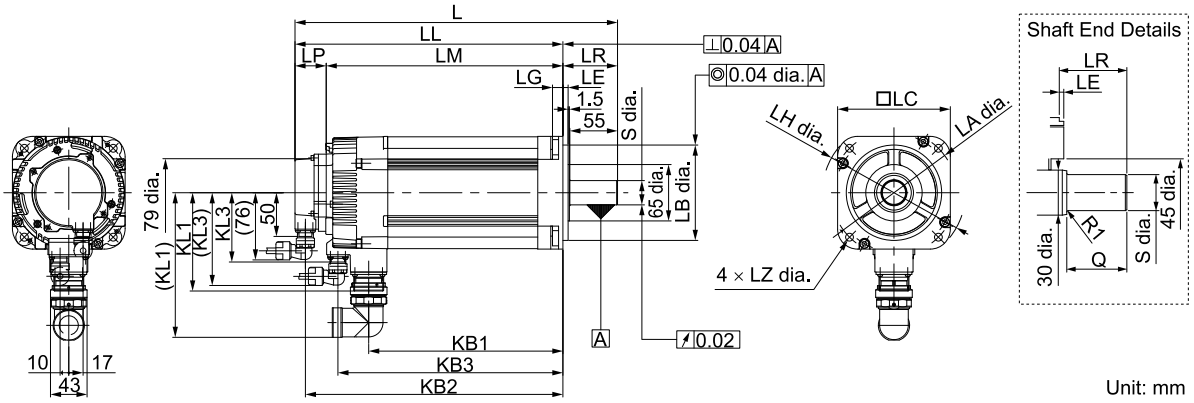
*1 For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are +8 mm greater than the given value. Refer to the following section for the values for individual models.
☞ *4.4.7 Dimensions of Servomotors with Batteryless Absolute Encoders on page 107*

*2 These are reference dimensions when the JL10 connector (flexible type) is connected.

Note:

1. The dimensions are same for models with oil seals.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications.
☞ *(c) Shaft End Specification on page 103*

(b) Σ-7 Compatible Specification



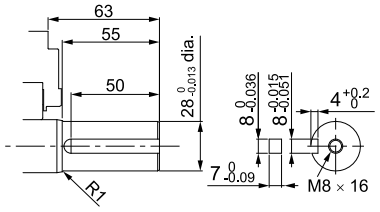
Note:

The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

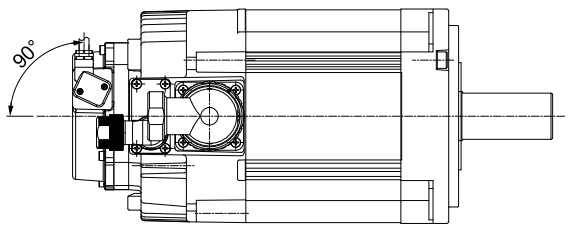
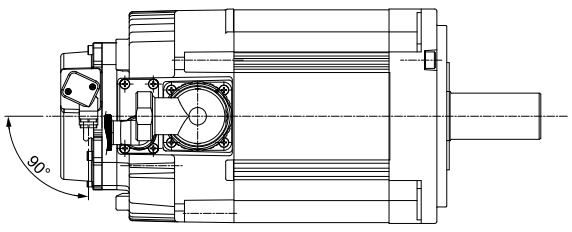
(c) Shaft End Specification

- Straight with Key and Tap



(d) Connector Specifications

- Encoder Connector (26-bit Encoder): Standard Specification
  The encoder cable is installed in the following direction.

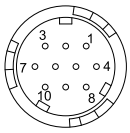
Cable Installed toward Left Side	Cable Installed toward Right Side
	

For details on selecting cables, refer to the following section and manual.

☞ *8.2 Cables for the SGMXA Servomotors on page 233*

🕮 Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

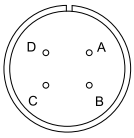
- Encoder Connector (26-bit Encoder): Σ-7 Compatible Specification



1	PS	6 *1	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5	BAT(-)	10	FG (frame ground)

*1 A battery is required only for an absolute encoder.
Receptacle: CMV1-R10P
Applicable plug (not provided by Yaskawa)
Plug: CM10-AP10S-□-D (R1) (right-angle type), CM10-SP10S-□-D (R1) (straight), CMV1-AP10S-□□ (right-angle type), CMV1-SP10S-□□ (straight), CMV1S-AP10S-□□ (right-angle type), CMV1S-SP10S-□□ (straight)
(□ varies depending on the applicable cable size.)
Manufacturer: DDK Ltd.

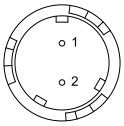
- Servomotor Connector: Same for both Standard Specifications and Σ-7 Compatible Specifications



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

Manufacturer: Japan Aviation Electronics Industry, Ltd.

- Brake Connector: Same for both Standard Specifications and Σ-7 Compatible Specifications



1	Brake terminal
2	Brake terminal

Note:

There is no voltage polarity for the brake terminals.

Receptacle: CMV1-R2P-D

Applicable plug (not provided by Yaskawa)

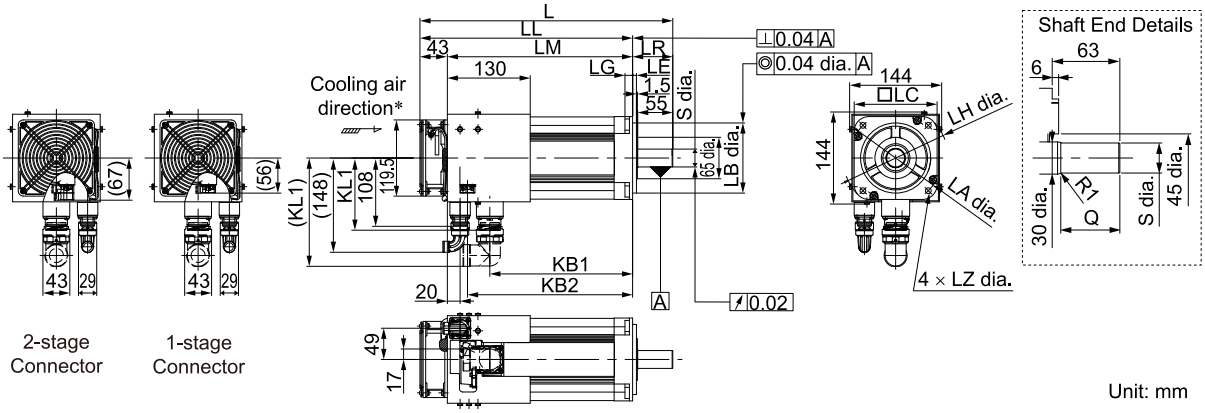
Plug: CM10-AP2S-□-D (right-angle type), CM10-SP2S-□-D (straight), CMV1-AP2S-□-D (right-angle type), CMV1-SP2S-□-D (straight), CMV1S-AP2S-□-D (right-angle type), CMV1S-SP2S-□-D (straight)

(□ varies depending on the applicable cable size.)

Manufacturer: DDK Ltd.

4.4.6 SGMXA-70 (Without Holding Brakes)

(1) Standard Specification



Note:

Mount the servomotor 70 mm or more from walls, machines, and other objects to ensure sufficient cooling air.

Model SGMXA-	L	LL	LM	LR	KB1	KB2 *1	KL1 (KL1)
70A□A21A1	397	334	291	63	224	259	114 (170)

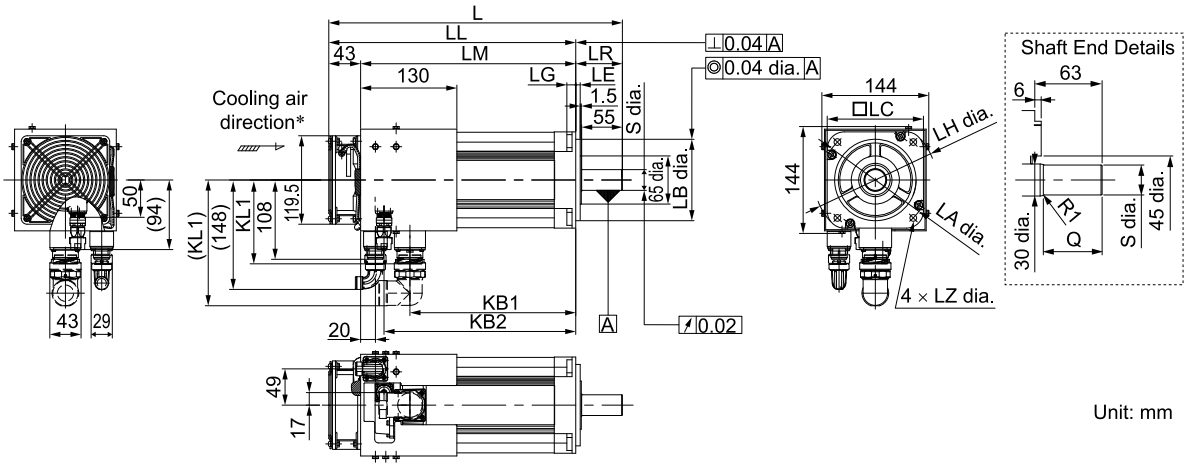
Model SGMXA-	Flange Dimensions							Shaft End Dimensions		Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	Q	
70A□A21A1	145	$110^{0}_{-0.035}$	130	6	12	165	9	$28^{0}_{-0.013}$	55	18.5

*1 For models that have a batteryless absolute encoder, KB2 is +8 mm greater than the given value. Refer to the following section for the values for individual models.
☞ *4.4.7 Dimensions of Servomotors with Batteryless Absolute Encoders on page 107*

Note:

1. The dimensions are same for models with oil seals.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications.
☞ *(4) Shaft End Specification on page 105*

(2) Σ-7 Compatible Specification



Unit: mm

Note:

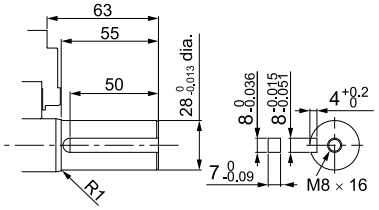
1. Mount the servomotor 70 mm or more from walls, machines, and other objects to ensure sufficient cooling air.
2. The difference from the model with standard specifications is the shape of the encoder cable connector.
The dimensions for non-connector parts are identical to those for models with standard specifications.

(3) Cooling Fan Specifications

- Single-phase 220 VAC
- 50/60 Hz
- 17/15 W
- 0.11/0.09 A

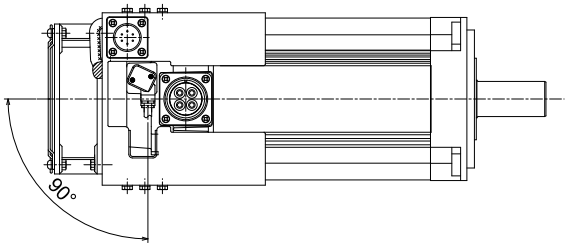
(4) Shaft End Specification

- Straight with Key and Tap



(5) Connector Specifications

- Encoder Connector (26-bit Encoder): Standard Specification
  The encoder cable is installed in the following direction.

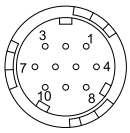


For details on selecting cables, refer to the following section and manual.

☞ *8.2 Cables for the SGMXA Servomotors on page 233*

Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

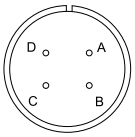
- Encoder Connector (26-bit Encoder): Σ-7 Compatible Specification



1	PS	6 *1	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5	BAT(-)	10	FG (frame ground)

*1 A battery is required only for an absolute encoder.
Receptacle: CMV1-R10P
Applicable plug (not provided by Yaskawa)
Plug: CM10-AP10S-□-D (R1) (right-angle type), CM10-SP10S-□-D (R1) (straight), CMV1-AP10S-□□ (right-angle type), CMV1-SP10S-□□ (straight), CMV1S-AP10S-□□ (right-angle type), CMV1S-SP10S-□□ (straight)
(□ varies depending on the applicable cable size.)
Manufacturer: DDK Ltd.

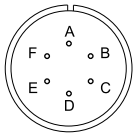
- Servomotor Connector: Same for both Standard Specifications and Σ-7 Compatible Specifications



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

Manufacturer: Japan Aviation Electronics Industry, Ltd.

- Fan Connector



A	Fan motor	D	–
B	Fan motor	E	–
C	–	F	FG (frame ground)

Receptacle: MS3102A14S-6P
Applicable plug (not provided by Yaskawa)
Plug: MS3108B14S-6S
Cable clamp: MS3057-6A
Manufacturer: Japan Aviation Electronics Industry, Ltd.

Note:

The motor connector (receptacle) complies with RoHS Directives.

Contact each connector manufacturer for customer-prepared cable connectors that comply with RoHS Directives.

4.4.7 Dimensions of Servomotors with Batteryless Absolute Encoders

Model SGMXA-	L	LL	LP	KB2	Approx. Mass [kg]
A5AWA□□□□	88 (128.5)	63 (103.5)	–	–	0.4 (0.7)
01AWA□□□□	100 (140.5)	75 (115.5)	–	–	0.5 (0.8)
C2AWA□□□□	112 (160.5)	87 (135.5)	–	–	0.6 (0.9)
02AWA□□□□	106 (146.5)	76 (116.5)	–	–	0.9 (1.5)
04AWA□□□□	122.5 (163.0)	92.5 (133.0)	–	–	1.3 (1.9)
06AWA□□□□	144.5 (198.5)	114.5 (168.5)	–	–	1.7 (2.3)
08AWA□□□□	142.5 (189.5)	102.5 (149.5)	–	–	2.4 (3.0)
10AWA□□□□	167.5 (214.5)	127.5 (174.5)	–	–	3.2 (3.8)
15AWA□□□□	208 (249)	163 (204)	42 (42)	151 (192)	4.6 (6.0)
20AWA□□□□	224 (265)	179 (220)	42 (42)	167 (208)	5.4 (6.8)
25AWA□□□□	247 (298)	202 (253)	42 (42)	190 (241)	6.8 (8.7)
30AWA□□□□	263 (299)	200 (236)	42 (42)	188 (224)	10.5 (13)
40AWA□□□□	302 (338)	239 (275)	42 (42)	227 (263)	13.5 (16)
50AWA□□□□	342 (378)	279 (315)	42 (42)	267 (303)	16.5 (19)
70AWA□□□□	397	334	–	269	18.5

Note:

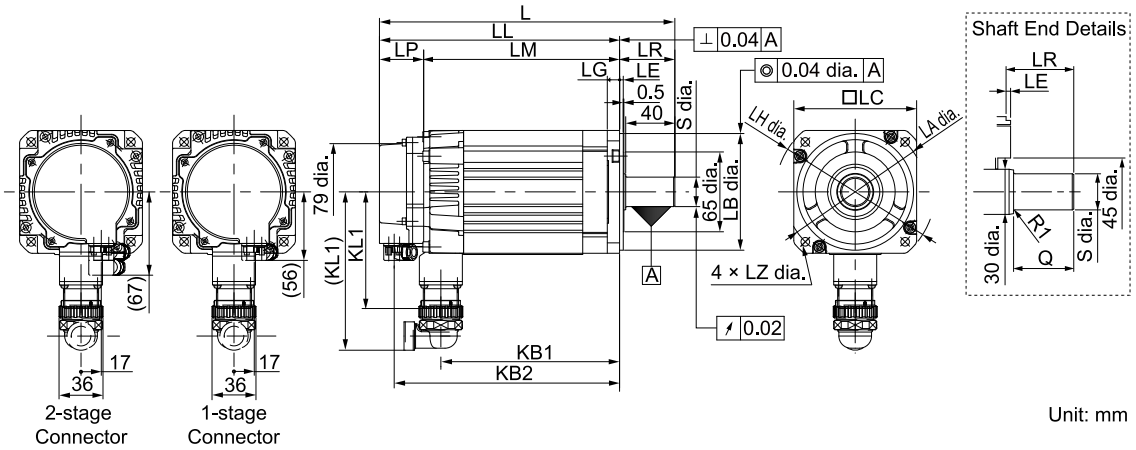
The values in parentheses are for servomotors with holding brakes.

4.5 External Dimensions (400 V Specification)

4.5.1 SGMXA-15 to -25

(1) Servomotors without Holding Brakes

(a) Standard Specification



Model SGMXA-	L *1	LL *1	LM	LP *1	LR	KB1	KB2 *1	KL1 (KL1 *2)
15D□A□1□□	200	155	121	34	45	107	143	95 (129)
20D□A□1□□	216	171	137	34	45	123	159	95 (129)
25D□A□1□□	239	194	160	34	45	146	182	95 (129)

Model SGMXA-	Flange Dimensions							Shaft End Dimensions		Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	Q	
15D□A□1□□	115	$95^{0}_{-0.035}$	100	3	10	130	7	$24^{0}_{-0.013}$	40	4.6
20D□A□1□□	115	$95^{0}_{-0.035}$	100	3	10	130	7	$24^{0}_{-0.013}$	40	5.4
25D□A□1□□	115	$95^{0}_{-0.035}$	100	3	10	130	7	$24^{0}_{-0.013}$	40	6.8

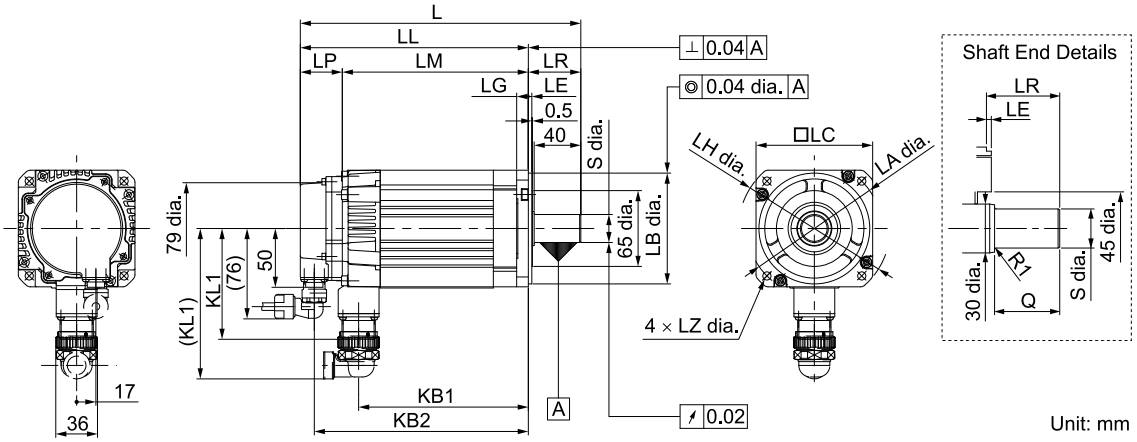
*1 For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are +8 mm greater than the given value. Refer to the following section for the values for individual models.
☞ *4.5.3 Dimensions of Servomotors with Batteryless Absolute Encoders on page 116*

*2 These are the values when the flexible connectors are connected.

Note:

1. The dimensions are same for models with oil seals.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications.
☞ *(c) Shaft End Specification on page 109*

(b) Σ-V Compatible Specification



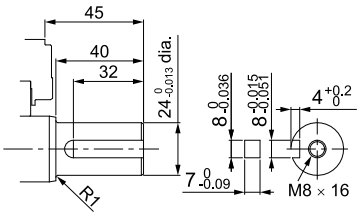
Note:

The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

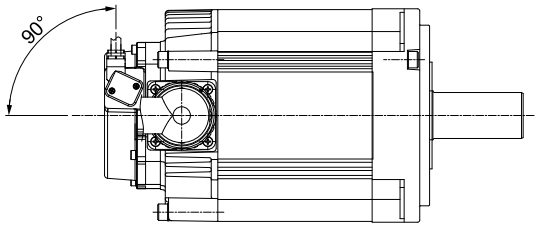
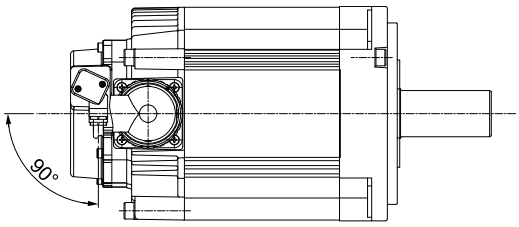
(c) Shaft End Specification

- Straight with Key and Tap



(d) Connector Specifications

- Encoder Connector (26-bit Encoder): Standard Specification
  The encoder cable is installed in the following direction.

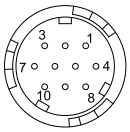
Cable Installed toward Left Side	Cable Installed toward Right Side
	

For details on selecting cables, refer to the following section and manual.

☞ *8.2 Cables for the SGMXA Servomotors on page 233*

🕮 Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

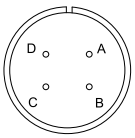
- Encoder Connector (26-bit Encoder): Σ-V Compatible Specification



1	PS	6 *1	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5	BAT(-)	10	FG (frame ground)

*1 A battery is required only for an absolute encoder.
Receptacle: CMV1-R10P
Applicable plug (not provided by Yaskawa)
Plug: CM10-AP10S-□-D (R1) (right-angle type), CM10-SP10S-□-D (R1) (straight), CMV1-AP10S-□□ (right-angle type), CMV1-SP10S-□□ (straight), CMV1S-AP10S-□□ (right-angle type), CMV1S-SP10S-□□ (straight)
(□ varies depending on the applicable cable size.)
Manufacturer: DDK Ltd.

- Servomotor Connector: Same for both Standard Specifications and Σ-V Compatible Specifications

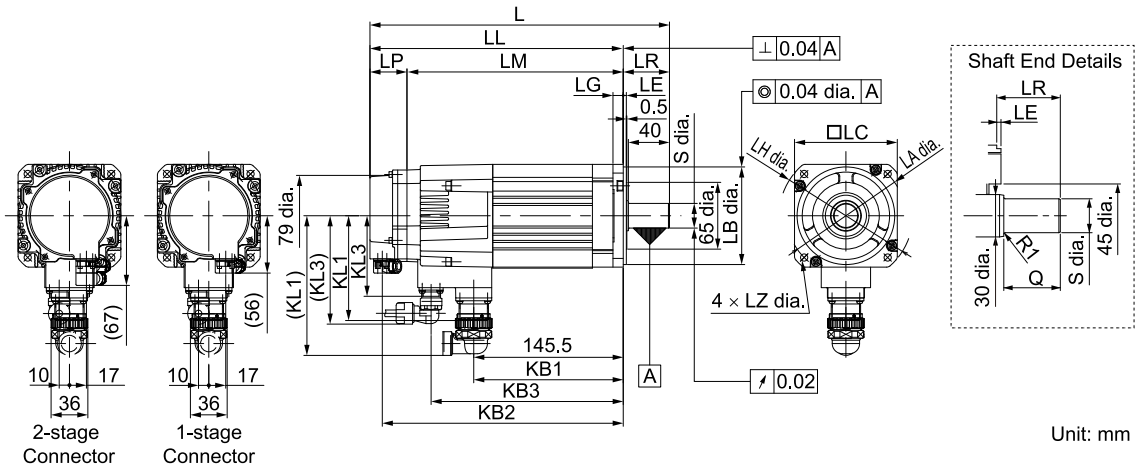


A	Phase U	C	Phase W
B	Phase V	D	FG (frame ground)

Manufacturer: Japan Aviation Electronics Industry, Ltd.

(2) Servomotors with Holding Brakes

(a) Standard Specification



Model SGMXA-	L *1	LL *1	LM	LP *1	LR	KB1	KB2 *1	KB3	KL1 (KL1 *2)	KL3 (KL3 *2)
15D□A□1□□	241	196	162	34	45	107	184	139	102 (136)	80 (105)
20D□A□1□□	257	212	178	34	45	123	200	155	102 (136)	80 (105)
25D□A□1□□	290	245	211	34	45	156	233	188	102 (136)	80 (105)

Model SGMXA-	Flange Dimensions							Shaft End Dimensions		Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	Q	
15D□A□1□□	115	$95^{0}_{-0.035}$	100	3	10	130	7	$24^{0}_{-0.013}$	40	6.0
20D□A□1□□	115	$95^{0}_{-0.035}$	100	3	10	130	7	$24^{0}_{-0.013}$	40	6.8
25D□A□1□□	115	$95^{0}_{-0.035}$	100	3	10	130	7	$24^{0}_{-0.013}$	40	8.7

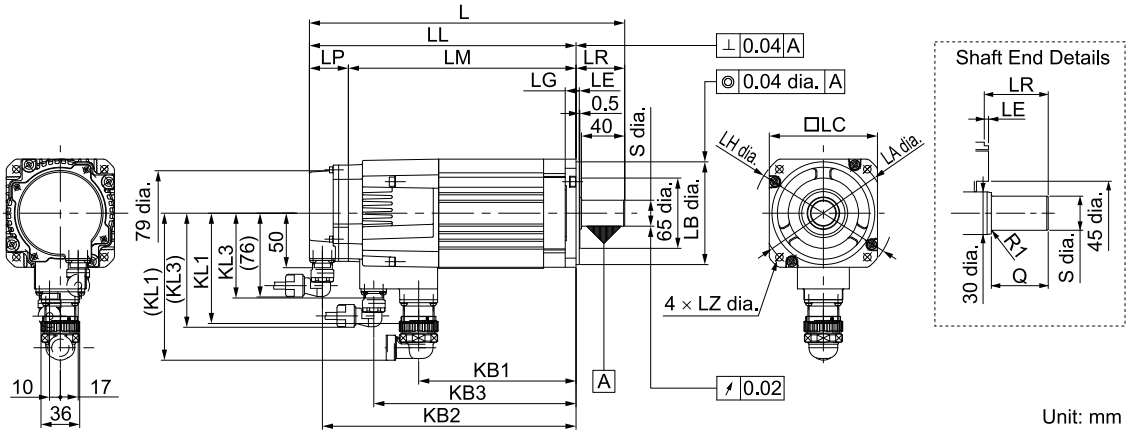
*1 For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are +8 mm greater than the given value. Refer to the following section for the values for individual models.
☞ *4.5.3 Dimensions of Servomotors with Batteryless Absolute Encoders on page 116*

*2 These are the values when the flexible connectors are connected.

Note:

1. The dimensions are same for models with oil seals.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications.
☞ *(c) Shaft End Specification on page 111*

(b) Σ-V Compatible Specification



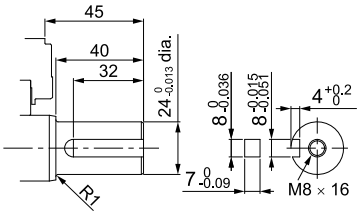
Note:

The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

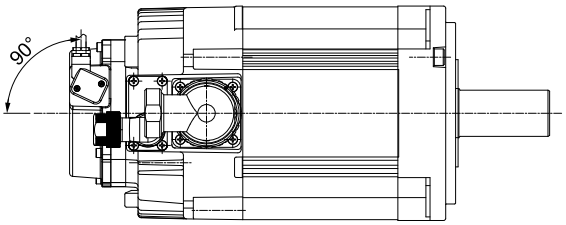
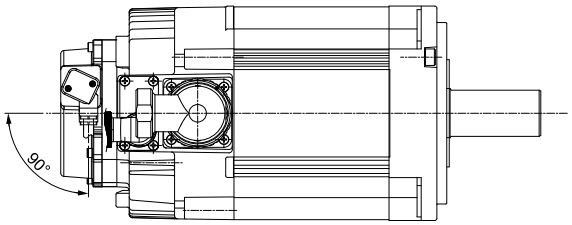
(c) Shaft End Specification

- Straight with Key and Tap



(d) Connector Specifications

- Encoder Connector (26-bit Encoder): Standard Specification
  The encoder cable is installed in the following direction.

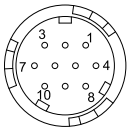
Cable Installed toward Left Side	Cable Installed toward Right Side
	

For details on selecting cables, refer to the following section and manual.

☞ *8.2 Cables for the SGMXA Servomotors on page 233*

🕮 Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

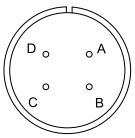
- Encoder Connector (26-bit Encoder): Σ-V Compatible Specification



1	PS	6 *1	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5	BAT(-)	10	FG (frame ground)

*1 A battery is required only for an absolute encoder.
Receptacle: CMV1-R10P
Applicable plug (not provided by Yaskawa)
Plug: CM10-AP10S-□-D (R1) (right-angle type), CM10-SP10S-□-D (R1) (straight), CMV1-AP10S-□□ (right-angle type), CMV1-SP10S-□□ (straight), CMV1S-AP10S-□□ (right-angle type), CMV1S-SP10S-□□ (straight)
(□ varies depending on the applicable cable size.)
Manufacturer: DDK Ltd.

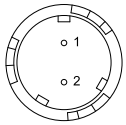
- Servomotor Connector: Same for both Standard Specifications and Σ-V Compatible Specifications



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

Manufacturer: Japan Aviation Electronics Industry, Ltd.

- Brake Connector: Same for both Standard Specifications and Σ-V Compatible Specifications



1	Brake terminal
2	Brake terminal

Note:

There is no voltage polarity for the brake terminals.

Receptacle: CMV1-R2P-D

Applicable plug (not provided by Yaskawa)

Plug: CM10-AP2S-□-D (right-angle type), CM10-SP2S-□-D (straight), CMV1-AP2S-□-D (right-angle type), CMV1-SP2S-□-D (straight), CMV1S-AP2S-□-D (right-angle type), CMV1S-SP2S-□-D (straight)

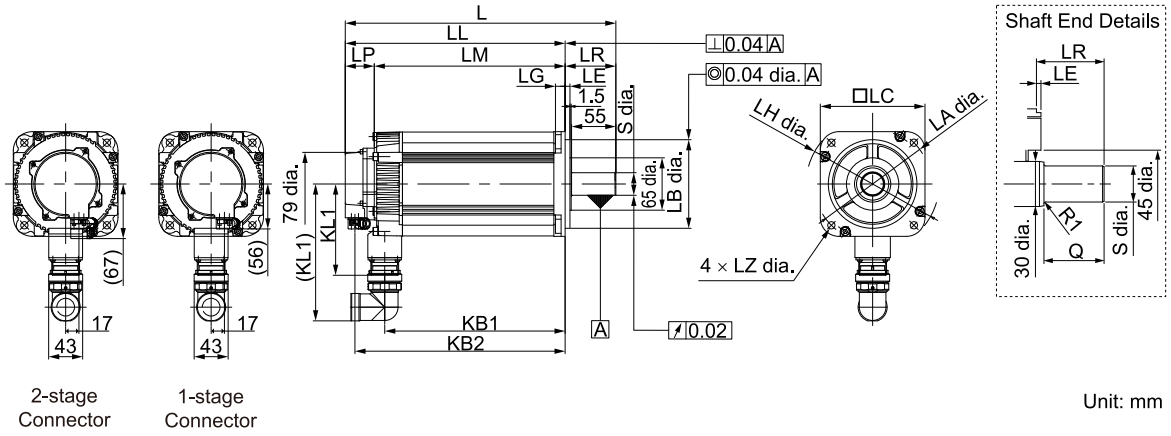
(□ varies depending on the applicable cable size.)

Manufacturer: DDK Ltd.

4.5.2 SGMXA-30 to -50

(1) Servomotors without Holding Brakes

(a) Standard Specification



Unit: mm

Model SGMXA-	L *1	LL *1	LM	LP *1	LR	KB1	KB2 *1	KL1 (KL1 *2)
30D□A□1□□	255	192	158	34	63	145	180	114 (170)
40D□A□1□□	294	231	197	34	63	184	219	114 (170)
50D□A□1□□	334	271	237	34	63	224	259	114 (170)

Model SGMXA-	Flange Dimensions							Shaft End Dimensions		Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	Q	
30D□A□1□□	145	$110^{0}_{-0.035}$	130	6	12	165	9	$28^{0}_{-0.013}$	55	10.5
40D□A□1□□	145	$110^{0}_{-0.035}$	130	6	12	165	9	$28^{0}_{-0.013}$	55	13.5
50D□A□1□□	145	$110^{0}_{-0.035}$	130	6	12	165	9	$28^{0}_{-0.013}$	55	16.5

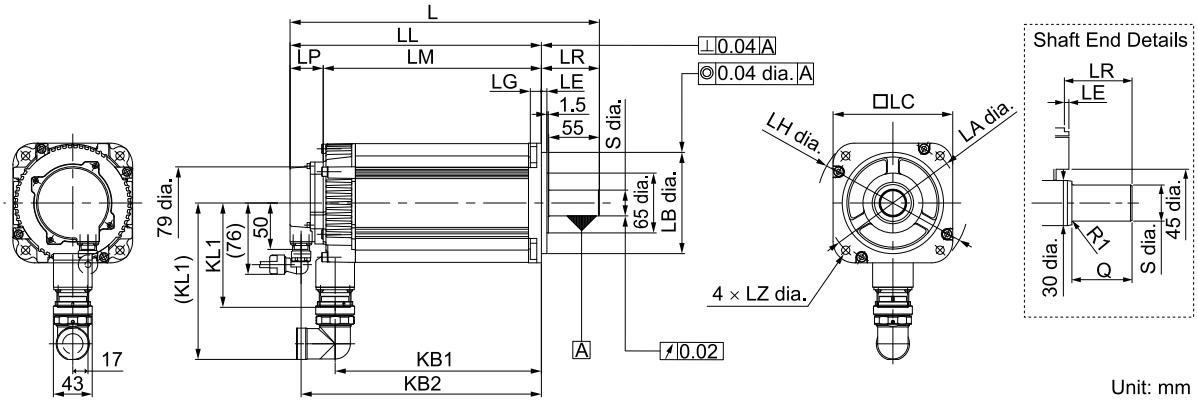
*1 For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are +8 mm greater than the given value. Refer to the following section for the values for individual models.
☞ *4.5.3 Dimensions of Servomotors with Batteryless Absolute Encoders on page 116*

*2 These are reference dimensions when the JL10 connector (flexible type) is connected.

Note:

1. The dimensions are same for models with oil seals.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications.
☞ *(c) Shaft End Specification on page 113*

(b) Σ-V Compatible Specification



Unit: mm

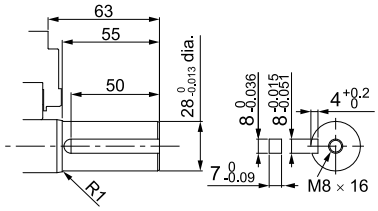
Note:

The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

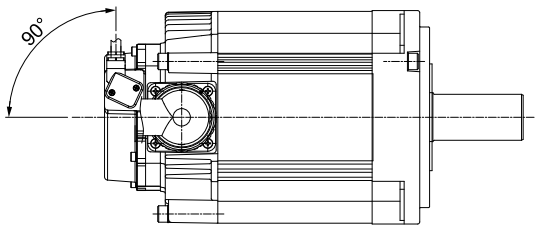
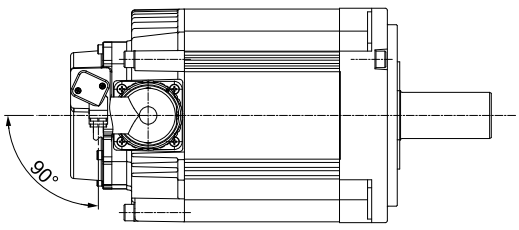
(c) Shaft End Specification

- Straight with Key and Tap



(d) Connector Specifications

- Encoder Connector (26-bit Encoder): Standard Specification
  The encoder cable is installed in the following direction.

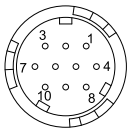
Cable Installed toward Left Side	Cable Installed toward Right Side
	

For details on selecting cables, refer to the following section and manual.

☞ *8.2 Cables for the SGMXA Servomotors on page 233*

🕮 Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

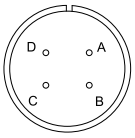
- Encoder Connector (26-bit Encoder): Σ-V Compatible Specification



1	PS	6 *1	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5	BAT(-)	10	FG (frame ground)

*1 A battery is required only for an absolute encoder.
Receptacle: CMV1-R10P
Applicable plug (not provided by Yaskawa)
Plug: CM10-AP10S-□-D (R1) (right-angle type), CM10-SP10S-□-D (R1) (straight), CMV1-AP10S-□□ (right-angle type), CMV1-SP10S-□□ (straight), CMV1S-AP10S-□□ (right-angle type), CMV1S-SP10S-□□ (straight)
(□ varies depending on the applicable cable size.)
Manufacturer: DDK Ltd.

- Servomotor Connector: Same for both Standard Specifications and Σ-V Compatible Specifications

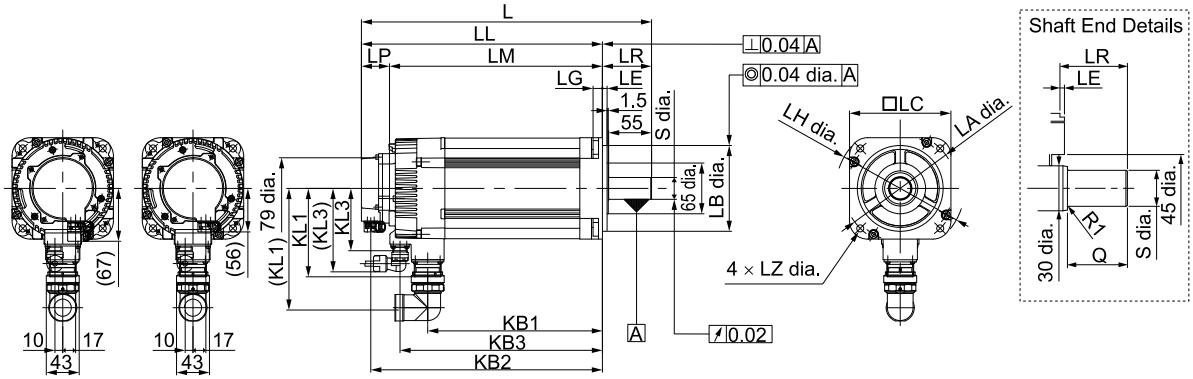


A	Phase U	C	Phase W
B	Phase V	D	FG (frame ground)

Manufacturer: Japan Aviation Electronics Industry, Ltd.

(2) Servomotors with Holding Brakes

(a) Standard Specification



Unit: mm

Model SGMXA-	L *1	LL *1	LM	LP *1	LR	KB1	KB2 *1	KB3	KL1 (KL1 *2)	KL3 (KL3 *2)
30D□A□C□□	291	228	194	34	63	145	216	181	114 (170)	81 (106)
40D□A□C□□	330	267	233	34	63	184	255	220	114 (170)	81 (106)
50D□A□C□□	370	307	273	34	63	224	295	260	114 (170)	81 (106)

Model SGMXA-	Flange Dimensions							Shaft End Dimensions		Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	Q	
30D□A□C□□	145	$110^{0}_{-0.035}$	130	6	12	165	9	$28^{0}_{-0.013}$	55	13
40D□A□C□□	145	$110^{0}_{-0.035}$	130	6	12	165	9	$28^{0}_{-0.013}$	55	16
50D□A□C□□	145	$110^{0}_{-0.035}$	130	6	12	165	9	$28^{0}_{-0.013}$	55	19

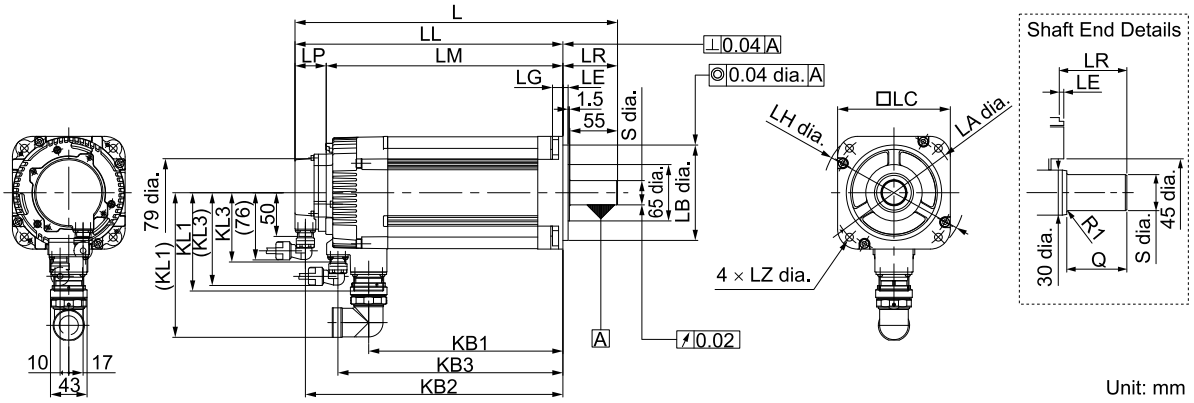
*1 For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are +8 mm greater than the given value. Refer to the following section for the values for individual models.
☞ *4.5.3 Dimensions of Servomotors with Batteryless Absolute Encoders on page 116*

*2 These are reference dimensions when the JL10 connector (flexible type) is connected.

Note:

1. The dimensions are same for models with oil seals.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications.
☞ *(c) Shaft End Specification on page 115*

(b) Σ-V Compatible Specification



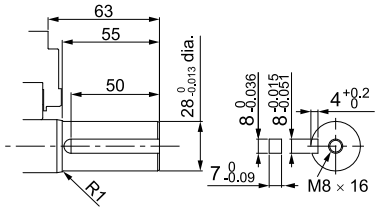
Note:

The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

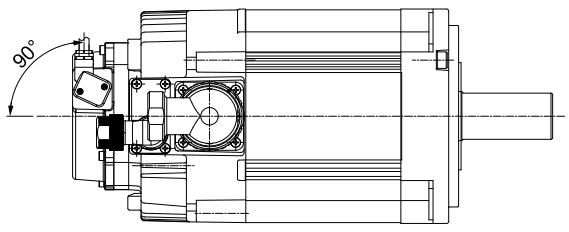
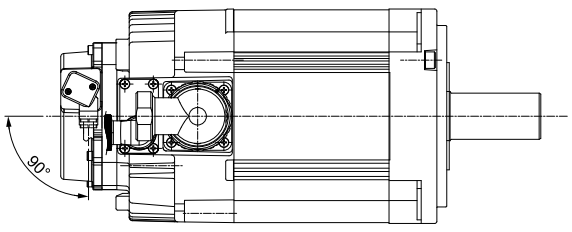
(c) Shaft End Specification

- Straight with Key and Tap



(d) Connector Specifications

- Encoder Connector (26-bit Encoder): Standard Specification
  The encoder cable is installed in the following direction.

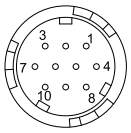
Cable Installed toward Left Side	Cable Installed toward Right Side
	

For details on selecting cables, refer to the following section and manual.

☞ *8.2 Cables for the SGMXA Servomotors on page 233*

🕮 Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

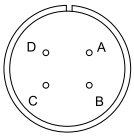
- Encoder Connector (26-bit Encoder): Σ-V Compatible Specification



1	PS	6 *1	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5	BAT(-)	10	FG (frame ground)

*1 A battery is required only for an absolute encoder.
Receptacle: CMV1-R10P
Applicable plug (not provided by Yaskawa)
Plug: CM10-AP10S-□-D (R1) (right-angle type), CM10-SP10S-□-D (R1) (straight), CMV1-AP10S-□□ (right-angle type), CMV1-SP10S-□□ (straight), CMV1S-AP10S-□□ (right-angle type), CMV1S-SP10S-□□ (straight)
(□ varies depending on the applicable cable size.)
Manufacturer: DDK Ltd.

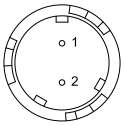
- Servomotor Connector: Same for both Standard Specifications and Σ-V Compatible Specifications



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

Manufacturer: Japan Aviation Electronics Industry, Ltd.

- Brake Connector: Same for both Standard Specifications and Σ-V Compatible Specifications



1	Brake terminal
2	Brake terminal

Note:

There is no voltage polarity for the brake terminals.

Receptacle: CMV1-R2P-D

Applicable plug (not provided by Yaskawa)

Plug: CM10-AP2S-□-D (right-angle type), CM10-SP2S-□-D (straight), CMV1-AP2S-□-D (right-angle type), CMV1-SP2S-□-D (straight), CMV1S-AP2S-□-D (right-angle type), CMV1S-SP2S-□-D (straight)

(□ varies depending on the applicable cable size.)

Manufacturer: DDK Ltd.

4.5.3 Dimensions of Servomotors with Batteryless Absolute Encoders

Model SGMXA-	L	LL	LP	KB2	Approx. Mass [kg]
15DWA□□□□	208 (249)	163 (204)	42 (42)	151 (192)	4.6 (6.0)
20DWA□□□□	224 (265)	179 (220)	42 (42)	167 (208)	5.4 (6.8)
25DWA□□□□	247 (298)	202 (253)	42 (42)	190 (241)	6.8 (8.7)
30DWA□□□□	263 (299)	200 (236)	42 (42)	188 (224)	10.5 (13)
40DWA□□□□	302 (338)	239 (275)	42 (42)	227 (263)	13.5 (16)
50DWA□□□□	342 (378)	279 (315)	42 (42)	267 (303)	16.5 (19)

Note:

The values in parentheses are for servomotors with holding brakes.

5

Specifications, Ratings, and External Dimensions of SGMXP Servomotors

Describes how to interpret the model numbers of SGMXP servomotors and gives their specifications, ratings, and external dimensions.

5.1 Model Designations

SGMXP - 01 A U A 2 1 A 1

1st+2nd digits | 3rd digit | 4th digit | 5th digit | 6th digit | 7th digit | 8th digit | 9th digit

Σ-X-Series
Servomotor
SGMXP model

1st+2nd digits Rated Output

Code	Specification	Power Supply Voltage	
		200 VAC	400 VAC
01	100 W	○	-
02	200 W	○	○
04	400 W	○	○
08	750 W	○	○
15	1.5 kW	○	○

3rd digit Power Supply Voltage

Code	Specification
A	200 VAC
D	400 VAC

4th digit Serial Encoder

Code	Specification
U	26-bit absolute encoder
W	26-bit batteryless absolute encoder

5th digit Design Revision Order

A

6th digit Shaft End

Code	Specification
2	Straight without key
6	Straight with key and tap

7th digit Options

Code	Specification
1	Without options
C	With holding brake (24 VDC)
E	With oil seal With holding brake (24 VDC)
S	With oil seal

8th digit Destination

A

9th digit Ancillary Specification

Code	Specification
1	Standard
2*1	Compatible

*1 200 VAC: Σ-7 compatible specification: Cables for the Σ-7-series SGM7P servomotors can be used.
400 VAC: Σ-V compatible specification: Cables for the Σ-V-series SGMEV servomotors can be used.

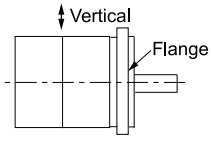
5.2 Specifications and Ratings (200 V Specification)

5.2.1 Specification

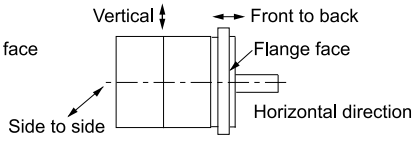
Voltage		200 V				
Model SGMXP-		01A	02A	04A	08A	15A
Time Rating		Continuous				
Thermal Class		UL: B, CE: B				
Insulation Resistance		500 VDC, 10 MΩ min.				
Withstand Voltage		1,500 VAC for 1 minute				
Excitation		Permanent magnet				
Mounting		Flange-mounted				
Drive Method		Direct drive				
Rotation Direction		Counterclockwise (CCW) for forward reference when viewed from the load side				
Vibration Class *1		V15				
Environmental Conditions	Surrounding Air Temperature	0°C to 40°C (60°C max.) *3				
	Surrounding Air Humidity	20% to 80% relative humidity (with no 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. • Must have an altitude of 1000 m or less. (With derating, usage is possible between 1000 m and 2000 m.) *3 • 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 +60°C (with no freezing) Storage humidity: 20% to 80% relative humidity (with no condensation)				
Impact Resistance *2	Impact Acceleration (at Flange)	490 m/s²				
	Number of Impacts	2 times				
Vibration Resistance *2	Vibration Acceleration (at Flange)	49 m/s²				
Applicable SERVOPACKs	SGDXS	R90A	2R8A	2R8A	5R5A	120A
	SGDXW	1R6A *4, 2R8A *4	2R8A, 5R5A *4, 7R6A *4	2R8A, 5R5A *4, 7R6A *4	5R5A, 7R6A	–
	SGDXT-	1R6A *4, 2R8A *4	2R8A	2R8A	–	–

*1 A vibration class of V15 indicates a vibration amplitude of 15 μm maximum on the servomotor without a load at the rated rotation speed.

*2 The given values are for when the servomotor 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 servomotor can withstand depends on the application. Always check the vibration acceleration that is applied to the servomotor with the actual equipment.



Impact Applied to the Servomotor



Vibration Applied to the Servomotor

*3 Refer to the following section for the derating rates.
☞ 5.2.6 Derating Rates on page 124

*4 If you use this combination, performance may not be as good, e.g., the control gain may not increase, in comparison with using a Σ-XS SERVOPACK.

5.2.2 Servomotor Ratings

Voltage			200 V				
Model SGMXP-			01A	02A	04A	08A	15A
Rated Output *1		W	100	200	400	750	1500
Rated Torque *1, *2		N·m	0.318	0.637	1.27	2.39	4.77
Instantaneous Maximum Torque *1		N·m	1.11	2.23	4.46	7.16	14.3
Rated Current *1		Arms	0.76	1.5	2.4	5.4	9.2
Instantaneous Maximum Current *1		Arms	3.2	5.9	9.3	16.5	28.0
Rated Rotation Speed *1		min^{-1}	3000				
Continuous Allowable Rotation Speed		min^{-1}	7000		6000		
Maximum Rotation Speed *1		min^{-1}	7000				
Torque Constant		N·m/Arms	0.453	0.467	0.587	0.476	0.559
Rotor Moment of Inertia	Without Holding Brakes	$\times 10^{-4}$ kg·m²	0.0594	0.263	0.409	2.10	4.02
	With Holding Brakes		0.0922	0.423	0.569	2.98	4.90
	Without Holding Brake and with Batteryless Absolute Encoder		0.0631	0.267	0.413	2.10	4.02
	With Holding Brake and Batteryless Encoder		0.0959	0.427	0.573	2.98	4.90
Rated Power Rate *1	Without Holding Brakes	kW/s	17.0	15.4	39.4	27.1	56.5
	With Holding Brakes		8.5	9.6	28.3	19.2	46.5
Rated Angular Acceleration *1	Without Holding Brakes	rad/s^2	53500	24200	31000	11300	11800
	With Holding Brakes		26600	15000	22300	8000	9700
Derating Rate for Servomotor with Oil Seal		%	90		95		
Heat Sink Size (aluminum) *3		mm	250 × 250 × 6			300 × 300 × 12	
Protective Structure *4			Totally enclosed, self-cooled, IP67				
Holding Brake Specifications *5	Rated Voltage	V	24 VDC±10%				
	Capacity	W	6	7.4		7.5	
	Holding Torque	N·m	0.318	0.637	1.27	2.39	4.77
	Coil Resistance	Ω (at 20°C)	96	77.8		76.8	
	Rated Current	A (at 20°C)	0.25	0.31			
	Time Required to Release Brake	ms	80				
	Time Required to Brake	ms	100				
Allowable Load Moment of Inertia (Rotor Moment of Inertia Ratio) *6	At 6000 min^{-1}		25 times	15 times	10 times	5 times	
	At 7000 min^{-1}		25 times	10 times	6 times	5 times	
	With External Regenerative Resistor and External Dynamic Brake Resistor *7	At 6000 min^{-1}	25 times	15 times	10 times	5 times	
		At 7000 min^{-1}					

Continued on next page.

Continued from previous page.

Voltage			200 V				
Model SGMXP-			01A	02A	04A	08A	15A
Allowable Shaft Loads *8	LF	mm	20	25		35	
	Allowable Radial Load	N	78	245		392	490
	Allowable Thrust Load	N	49	68		74	147

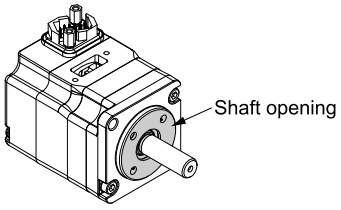
*1 These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. The values for other items are at 20°C. These are typical values.

*2 The rated torques are the continuous allowable torque values at a surrounding air temperature of 40°C with an aluminum heat sink of the dimensions given in the table.

*3 Refer to the following section for the relation between the heat sinks and derating rate.

☞ *(1) Servomotor Heat Dissipation Conditions on page 124*

*4 This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.



*5 Observe the following precautions if you use a servomotor with a holding brake.

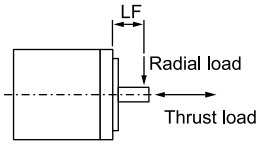
- The holding brake cannot be used to stop the servomotor.
- The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
- The 24-VDC power supply is not provided by Yaskawa.

*6 The rotor moment of inertia scaling factor is the value for a standard servomotor without a holding brake.

*7 To externally connect a dynamic brake resistor, select hardware option specification 0020 for the SERVOPACK.
However, you cannot externally connect a dynamic brake resistor if you use the following SERVOPACKs (maximum applicable motor capacity: 400 W).

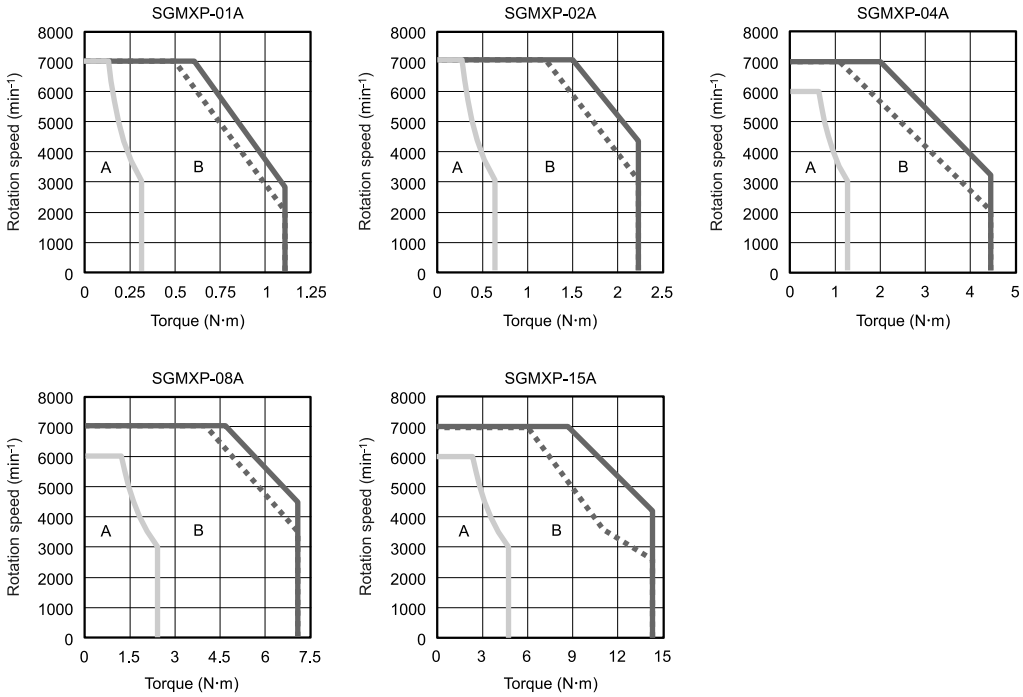
- SGDXS-R70A□□A0020 to -2R8A□□A0020
- SGDXW-1R6A□□A0020, -2R8A□□A0020
- SGDXT-1R6A□□A0020, -2R8A□□A0020

*8 Design the mechanical system so that the thrust and radial loads applied to the servomotor shaft end during operation do not exceed the values given in the table.



5.2.3 Torque-Rotation Speed Characteristics

A : Continuous duty zone ——— (solid lines): Three-phase, 200 V
B : Intermittent duty zone ····· (dotted lines): Single-phase, 200 V



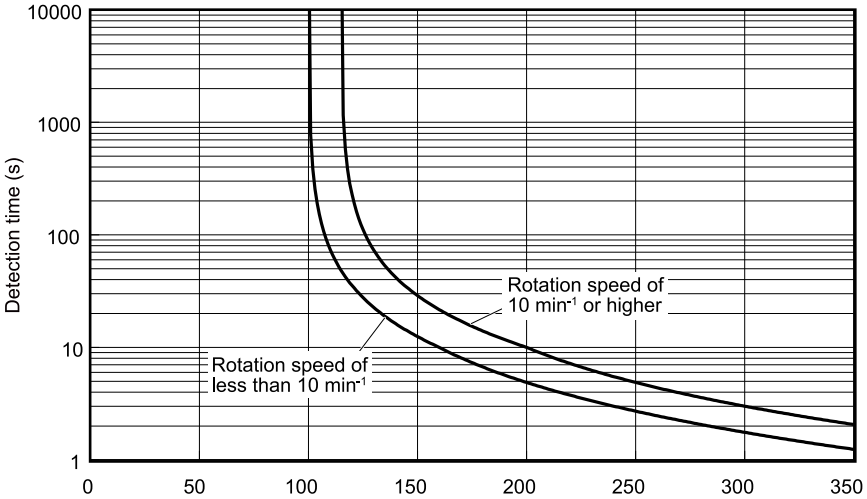
Note:

- These values (typical values) are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100° C.
- The characteristics in the intermittent duty zone depend on the power supply voltage.
- If the effective torque is within the allowable range for the rated torque, the servomotor can be used within the intermittent duty zone.
- If you use a servomotor main circuit cable that exceeds 20 m, the intermittent duty zone in the torque-rotation speed characteristics will become smaller because the voltage drop increases.
- The SGMXP-15A can use a single-phase power input in combination with the SGDXS-120A□□A0008.

5.2.4 Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions with a servomotor surrounding air temperature of 40° C.

For the overload detection level, priority is given to the lower of the detection levels in the overload protection characteristics of the connected SERVOPACK and servomotor.



Note:

The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.

Use the servomotor so that the effective torque remains within the continuous duty zone given in "*5.2.3 Torque-Rotation Speed Characteristics on page 122*".

5.2.5 Allowable Load Moment of Inertia

The allowable load moments of inertia (rotor moment of inertia ratios) for the servomotors are given in "*5.2.2 Servomotor Ratings on page 120*". The values are determined by the regenerative energy processing capacity of the SERVOPACK and are also affected by the drive conditions of the servomotor. Perform the required steps for each of the following cases.

(1) Exceeding the Allowable Load Moment of Inertia

Use one of the following measures to adjust the load moment of inertia to within the allowable value.

- Reduce the torque limit.
- Reduce the deceleration rate.
- Reduce the maximum rotation speed.

If the above steps are not possible, install an external regenerative resistor.

Information

An Overvoltage Alarm (A.400) is likely to occur during deceleration if the load moment of inertia exceeds the allowable load moment of inertia. SERVOPACKs with a built-in regenerative resistor may generate a Regenerative Overload Alarm (A.320).

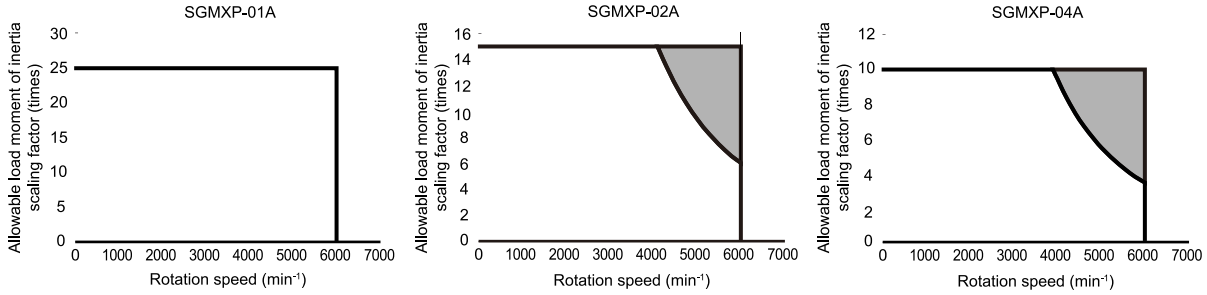
Refer to the following catalog for the regenerative power (W) that can be processed by the SERVOPACKs.

AC Servo Drives Σ-X Series (Document No.: KAEP C710812 03)

Install an external regenerative resistor when the built-in regenerative resistor cannot process all of the regenerative power.

(2) SERVOPACKs without Built-in Regenerative Resistors

The following graph shows the allowable load moment of inertia scaling factor of the rotation speed (reference values for deceleration operation at or above the rated torque). Application is possible without an external regenerative resistor within the allowable value. However, an external regenerative resistor is required in the shaded areas of the graphs.



Note:

Applicable SERVOPACK models: SGDXS-R70A, SGDXS-R90A, SGDXS-1R6A, and SGDXS-2R8A

(3) When an External Regenerative Resistor Is Required

Install the external regenerative resistor.

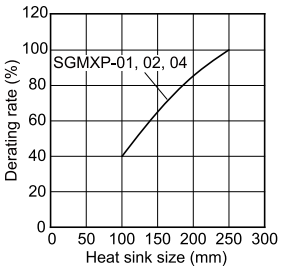
Refer to the following catalog for details on external regenerative resistors.

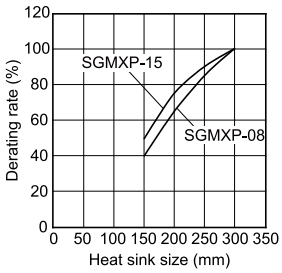
AC Servo Drives Σ-X Series (Document No.: KAEP C710812 03)

5.2.6 Derating Rates

(1) Servomotor Heat Dissipation Conditions

The servomotor ratings are the continuous allowable values when a heat sink is installed on the servomotor. If the servomotor is mounted on a small device component, the servomotor temperature may rise considerably because the surface for heat dissipation becomes smaller. Refer to the following graphs for the relation between the heat sink size and derating rate.





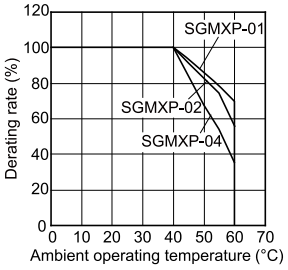
Important

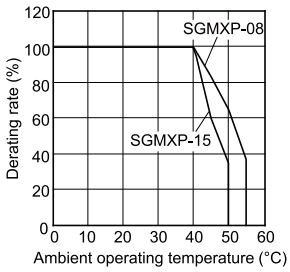
The actual temperature rise depends on the following conditions. Always check the servomotor temperature with the actual equipment.

- How the heat sink (the servomotor mounting section) is attached to the installation surface
- Status between heat sink and servomotor (sealant, reduction gear, etc.)
- What material is used for the servomotor mounting section
- Servomotor rotation speed

(2) Servomotor Derating Rates for Surrounding Air Temperature

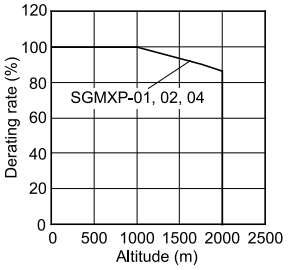
Apply a suitable derating rate from the following graphs according to the surrounding air temperature of the servomotor (60°C max.).

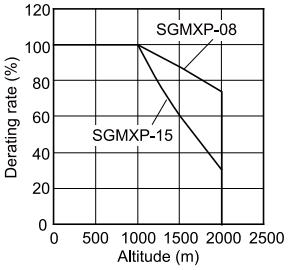




(3) Applications Where the Altitude Exceeds 1000 m

The servomotor ratings are the continuous allowable values at an altitude of 1000 m or less. If you use a servomotor at an altitude that exceeds 1000 m (2000 m max.), the heat dissipation effect of the air is reduced. Apply the appropriate derating rate from the following graphs.





Note:

- When using servomotors with derating, change the detection timing of overload warning and overload alarm based on the overload detection level of the motor given in "*5.2.4 Servomotor Overload Protection Characteristics on page 122*".
- Use the combination of the SERVOPACK and servomotor so that the derating conditions are satisfied for both the SERVOPACK and servomotor.
- The derating rates are applicable only when the average rotation speed is less than or equal to the rated rotation speed. If the average rotation speed exceeds the rated rotation speed, consult with your Yaskawa representative.

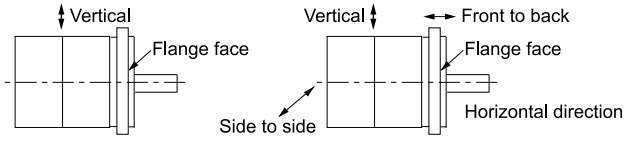
5.3 Specifications and Ratings (400 V Specification)

5.3.1 Specification

Voltage		400 V			
Model SGMXP-		02D	04D	08D	15D
Time Rating		Continuous			
Thermal Class		UL: B, CE: B			
Insulation Resistance		500 VDC, 10 MΩ min.			
Withstand Voltage		1,800 VAC for 1 minute, or 2,200 VAC for 1 second			
Excitation		Permanent magnet			
Mounting		Flange-mounted			
Drive Method		Direct drive			
Rotation Direction		Counterclockwise (CCW) for forward reference when viewed from the load side			
Vibration Class *1		V15			
Environmental Conditions	Surrounding Air Temperature	0°C to 40°C (60°C max.) *3			
	Surrounding Air Humidity	20% to 80% relative humidity (with no 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. • Must have an altitude of 1000 m or less. (With derating, usage is possible between 1000 m and 2000 m.) *3 • 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 +60°C (with no freezing) Storage humidity: 20% to 80% relative humidity (with no condensation)			
Impact Resistance *2	Impact Acceleration (at Flange)	490 m/s²			
	Number of Impacts	2 times			
Vibration Resistance *2	Vibration Acceleration (at Flange)	49 m/s²			
Applicable SERVOPACKs	SGDXS	1R9D	1R9D	3R5D	5R4D

*1 A vibration class of V15 indicates a vibration amplitude of 15 μm maximum on the servomotor without a load at the rated rotation speed.

*2 The given values are for when the servomotor 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 servomotor can withstand depends on the application. Always check the vibration acceleration that is applied to the servomotor with the actual equipment.



Impact Applied to the Servomotor Vibration Applied to the Servomotor

*3 Refer to the following section for the derating rates.

☞ 5.3.6 Derating Rates on page 129

5.3.2 Servomotor Ratings

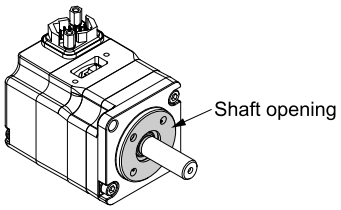
Voltage			400 V			
Model SGMXP-			02D	04D	08D	15D
Rated Output *1		W	200	400	750	1500
Rated Torque *1, *2		N·m	0.637	1.27	2.39	4.77
Instantaneous Maximum Torque *1		N·m	2.23	4.46	7.16	14.3
Rated Current *1		Arms	1.07	1.20	2.6	4.5
Instantaneous Maximum Current *1		Arms	4.17	4.67	7.8	14.0
Rated Rotation Speed *1		min^{-1}	3000			
Continuous Allowable Rotation Speed		min^{-1}	7000	6000		
Maximum Rotation Speed *1		min^{-1}	7000			
Torque Constant		N·m/Arms	0.656	1.18	0.99	1.13
Rotor Moment of Inertia	Without Holding Brakes	$\times 10^{-4}$ kg·m^2	0.263	0.409	2.10	4.02
	With Holding Brakes		0.403	0.548	2.98	4.90
	Without Holding Brake and with Batteryless Absolute Encoder		0.267	0.413	2.10	4.02
	With Holding Brake and Batteryless Encoder		0.407	0.552	2.98	4.90
Rated Power Rate *1	Without Holding Brakes	kW/s	15.4	39.4	27.1	56.5
	With Holding Brakes		9.6	28.3	19.2	46.5
Rated Angular Acceleration *1	Without Holding Brakes	rad/s^2	24200	31000	11300	11800
	With Holding Brakes		15000	22300	8000	9700
Derating Rate for Servomotor with Oil Seal		%	90	95		
Heat Sink Size (aluminum) *3		mm	250 × 250 × 6		300 × 300 × 12	
Protective Structure *4			Totally enclosed, self-cooled, IP67			
Holding Brake Specifications *5	Rated Voltage	V	24 VDC±10%			
	Capacity	W	7.4		7.5	
	Holding Torque	N·m	0.637	1.27	2.39	4.77
	Coil Resistance	Ω (at 20°C)	77.8		76.8	
	Rated Current	A (at 20°C)	0.31			
	Time Required to Release Brake	ms	80			
	Time Required to Brake	ms	100			
Allowable Load Moment of Inertia (Rotor Moment of Inertia Ratio) *6	At 6000 min^{-1}		15 times	10 times	5 times	
	At 7000 min^{-1}		10 times	6 times	5 times	
	With External Regenerative Resistor and External Dynamic Brake Resistor *7	At 6000 min^{-1}	15 times	10 times	5 times	
		At 7000 min^{-1}				
Allowable Shaft Loads *8	LF	mm	25		35	
	Allowable Radial Load	N	245		392	490
	Allowable Thrust Load	N	68		74	147

*1 These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C. These are typical values.

*2 The rated torques are the continuous allowable torque values at a surrounding air temperature of 40°C with an aluminum heat sink of the dimensions given in the table.

*3 Refer to the following section for the relation between the heat sinks and derating rate.
☞ *(1) Servomotor Heat Dissipation Conditions on page 129*

*4 This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.



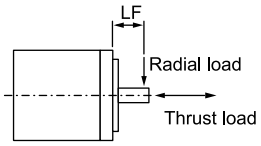
*5 Observe the following precautions if you use a servomotor with a holding brake.

- The holding brake cannot be used to stop the servomotor.
- The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
- The 24-VDC power supply is not provided by Yaskawa.

*6 The rotor moment of inertia scaling factor is the value for a standard servomotor without a holding brake.

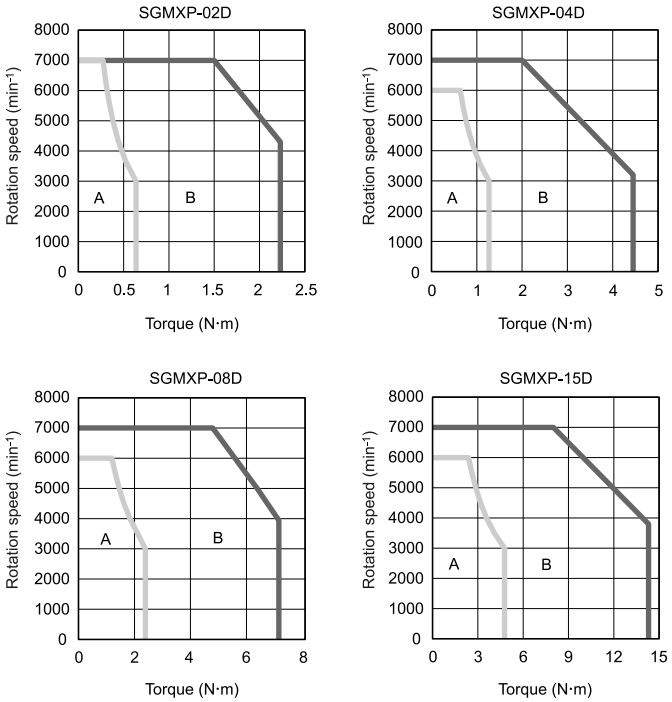
*7 To externally connect a dynamic brake resistor, select hardware option specification 0020 for the SERVOPACK.
However, you cannot externally connect a dynamic brake resistor if you use SERVOPACK SGDXS-1R9D.

*8 Design the mechanical system so that the thrust and radial loads applied to the servomotor shaft end during operation do not exceed the values given in the table.



5.3.3 Torque-Rotation Speed Characteristics

A : Continuous duty zone ——— (solid lines): Three-phase, 400 V
B : Intermittent duty zone



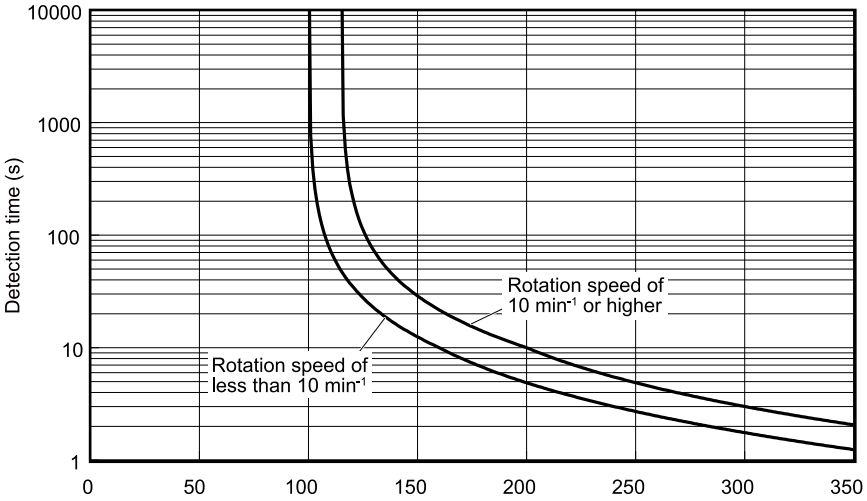
Note:

- These values (typical values) are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100° C.
- The characteristics in the intermittent duty zone depend on the power supply voltage.
- If the effective torque is within the allowable range for the rated torque, the servomotor can be used within the intermittent duty zone.
- If you use a servomotor main circuit cable that exceeds 20 m, the intermittent duty zone in the torque-rotation speed characteristics will become smaller because the voltage drop increases.

5.3.4 Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions with a servomotor surrounding air temperature of 40° C.

For the overload detection level, priority is given to the lower of the detection levels in the overload protection characteristics of the connected SERVOPACK and servomotor.



Note:

The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.

Use the servomotor so that the effective torque remains within the continuous duty zone given in "*5.3.3 Torque-Rotation Speed Characteristics on page 127*".

5.3.5 Allowable Load Moment of Inertia

The allowable load moments of inertia (rotor moment of inertia ratios) for the servomotors are given in "*5.3.2 Servomotor Ratings on page 126*". The values are determined by the regenerative energy processing capacity of the SERVOPACK and are also affected by the drive conditions of the servomotor. Perform the required steps for each of the following cases.

(1) Exceeding the Allowable Load Moment of Inertia

Use one of the following measures to adjust the load moment of inertia to within the allowable value.

- Reduce the torque limit.
- Reduce the deceleration rate.
- Reduce the maximum rotation speed.

If the above steps are not possible, install an external regenerative resistor.

Information

An Overvoltage Alarm (A.400) is likely to occur during deceleration if the load moment of inertia exceeds the allowable load moment of inertia. SERVOPACKs with a built-in regenerative resistor may generate a Regenerative Overload Alarm (A.320).

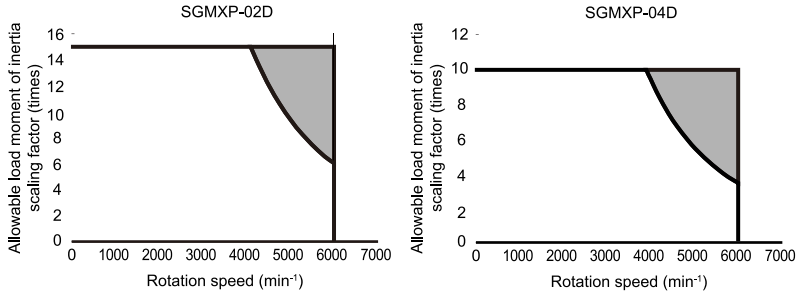
Refer to the following catalog for the regenerative power (W) that can be processed by the SERVOPACKs.

AC Servo Drives Σ-X Series (Document No.: KAEP C710812 03)

Install an external regenerative resistor when the built-in regenerative resistor cannot process all of the regenerative power.

(2) SERVOPACKs without Built-in Regenerative Resistors

The following graph shows the allowable load moment of inertia scaling factor of the rotation speed (reference values for deceleration operation at or above the rated torque). Application is possible without an external regenerative resistor within the allowable value. However, an external regenerative resistor is required in the shaded areas of the graphs.



Note:

Applicable SERVOPACK model: SGDXS-1R9D

(3) When an External Regenerative Resistor Is Required

Install the external regenerative resistor.

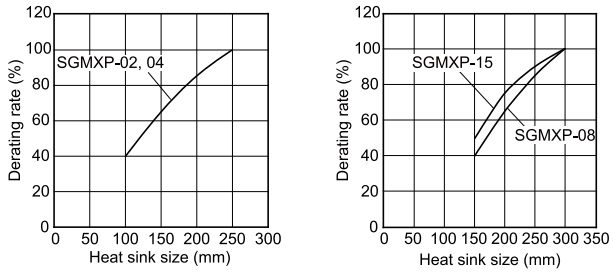
Refer to the following catalog for details on external regenerative resistors.

AC Servo Drives Σ-X Series (Document No.: KAEP C710812 03)

5.3.6 Derating Rates

(1) Servomotor Heat Dissipation Conditions

The servomotor ratings are the continuous allowable values when a heat sink is installed on the servomotor. If the servomotor is mounted on a small device component, the servomotor temperature may rise considerably because the surface for heat dissipation becomes smaller. Refer to the following graphs for the relation between the heat sink size and derating rate.



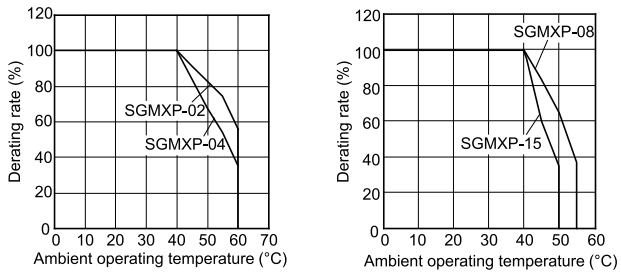
Important

The actual temperature rise depends on the following conditions. Always check the servomotor temperature with the actual equipment.

- How the heat sink (the servomotor mounting section) is attached to the installation surface
- Status between heat sink and servomotor (sealant, reduction gear, etc.)
- What material is used for the servomotor mounting section
- Servomotor rotation speed

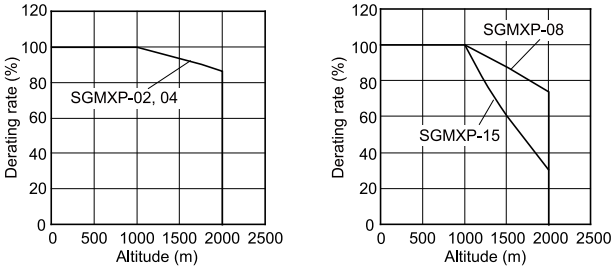
(2) Servomotor Derating Rates for Surrounding Air Temperature

Apply a suitable derating rate from the following graphs according to the surrounding air temperature of the servomotor (60°C max.).



(3) Applications Where the Altitude Exceeds 1000 m

The servomotor ratings are the continuous allowable values at an altitude of 1000 m or less. If you use a servomotor at an altitude that exceeds 1000 m (2000 m max.), the heat dissipation effect of the air is reduced. Apply the appropriate derating rate from the following graphs.



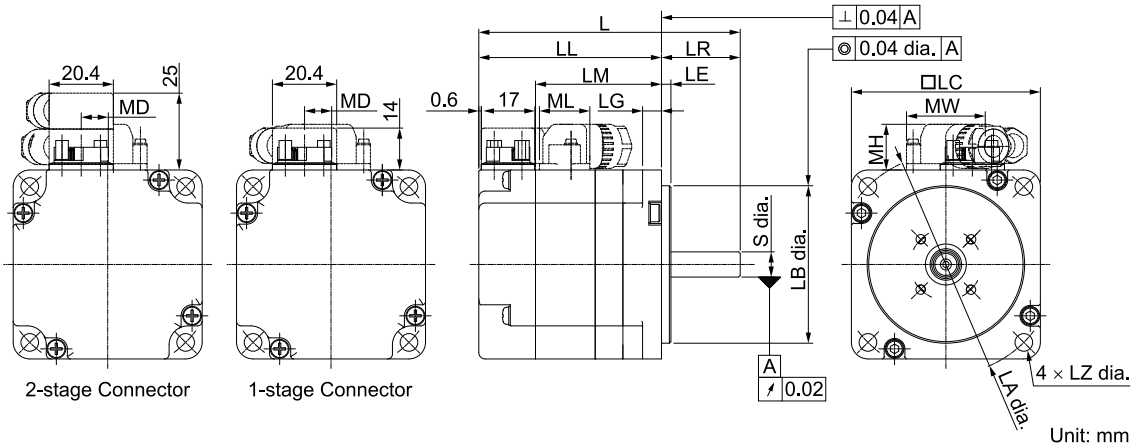
Note:

- When using servomotors with derating, change the detection timing of overload warning and overload alarm based on the overload detection level of the motor given in "*5.3.4 Servomotor Overload Protection Characteristics on page 128*".
- Use the combination of the SERVOPACK and servomotor so that the derating conditions are satisfied for both the SERVOPACK and servomotor.
- The derating rates are applicable only when the average rotation speed is less than or equal to the rated rotation speed. If the average rotation speed exceeds the rated rotation speed, consult with your Yaskawa representative.

5.4 External Dimensions (200 V Specification)

5.4.1 SGMXP-01 to -04

(1) Standard Specification



Model SGMXP-	L *1	LL *1	LM	Flange Dimensions						
				LR	LE	LG	LC	LA	LB	LZ
01A□A2□A1	83 (113.0)	58 (88.0)	40	25	3	6	60	70	$50^{0}_{-0.025}$	5.5
02A□A2□A1	95 (126.5)	65 (96.5)	47	30	3	8	80	90	$70^{0}_{-0.030}$	7
04A□A2□A1	105 (136.5)	75 (106.5)	57	30	3	8	80	90	$70^{0}_{-0.030}$	7

Model SGMXP-	S	MD	MW	MH	ML	Approx. Mass [kg] *1
01A□A2□A1	$8^{0}_{-0.009}$	8.4	25	14.5	16	0.4 (0.7)
02A□A2□A1	$14^{0}_{-0.011}$	14	25	14.5	16	1.1 (1.8)
04A□A2□A1	$14^{0}_{-0.011}$	14	25	14.5	16	1.4 (2.1)

*1 For models that have a batteryless absolute encoder, L and LL for the SGMXP-01A are 7.5 mm greater, L and LL for the SGMXP-02A and -04A are 6.5 mm greater, and the approximate mass of the SGMXP-01A, -02A, and -04A is 0.1 kg greater than the given value. Refer to the following section for the values for individual models.

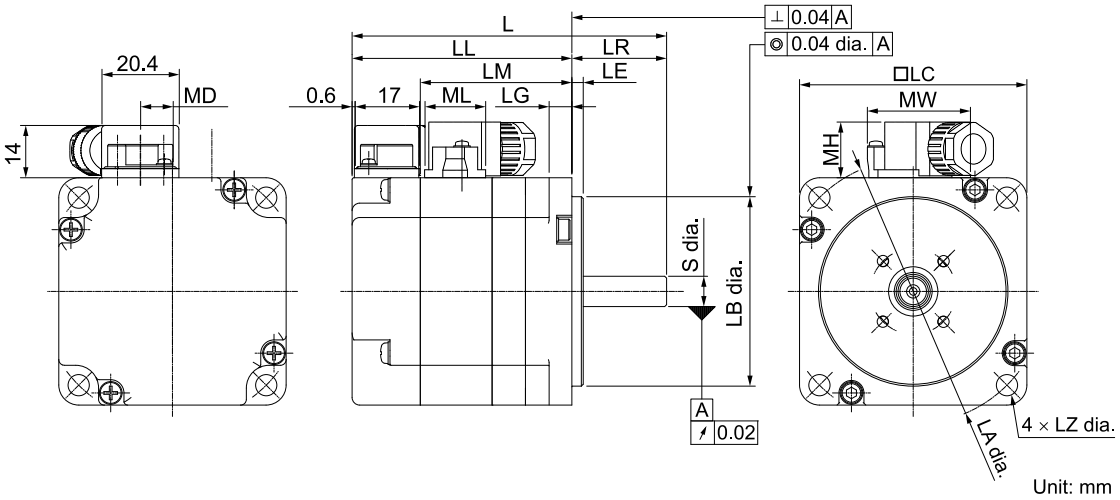
☞ *5.4.3 Dimensions of Servomotors with Batteryless Absolute Encoders on page 135*

Note:

1. The values in parentheses are for servomotors with holding brakes.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

☞ *(3) Shaft End Specification on page 132*
☞ *(4) Option Specification on page 132*

(2) Σ-7 Compatible Specification

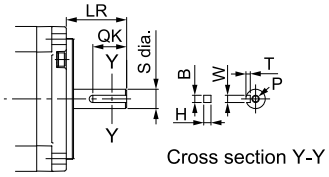


Model SGMXP-	MD	MW	MH	ML
01A□A2□A2	8.5	25.8	14.7	16.1
02A□A2□A2	14	28.7	14.7	17.1
04A□A2□A2	14	28.7	14.7	17.1

Note:
The dimensions for non-connector parts are identical to those for models with standard specifications.

(3) Shaft End Specification

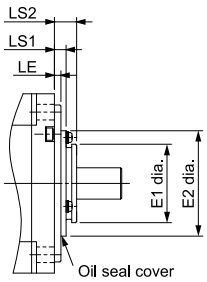
- Straight with Key and Tap



Model SGMXP-	LR	QK	S	B	H	W	T	P
01A□A61□□	25	14	$8^{0}_{-0.009}$	$3^{0}_{-0.025}$	$3^{0}_{-0.025}$	$3^{-0.006}_{-0.031}$	$1.8^{+0.1}_{0}$	M3 × 6
02A□A61□□	30	14	$14^{0}_{-0.011}$	$5^{0}_{-0.030}$	$5^{0}_{-0.030}$	$5^{-0.012}_{-0.042}$	$3^{+0.1}_{0}$	M5 × 8
04A□A61□□	30	14	$14^{0}_{-0.011}$	$5^{0}_{-0.030}$	$5^{0}_{-0.030}$	$5^{-0.012}_{-0.042}$	$3^{+0.1}_{0}$	M5 × 8

(4) Option Specification

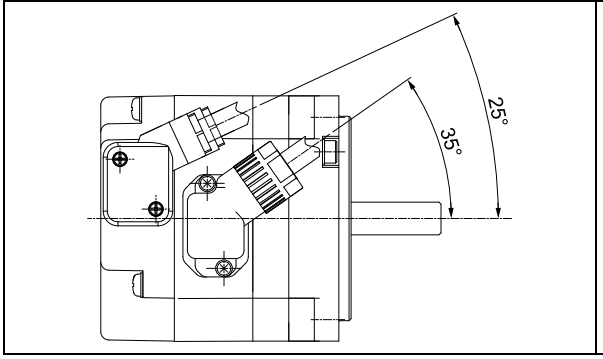
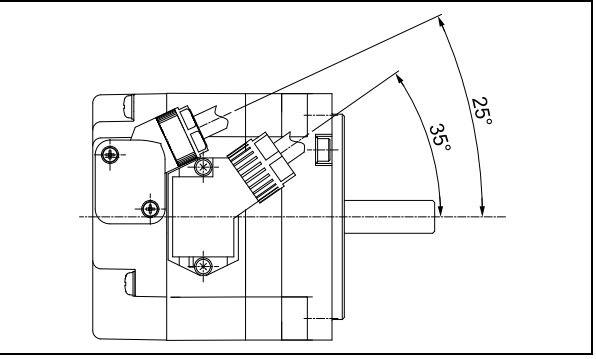
- With Oil Seal



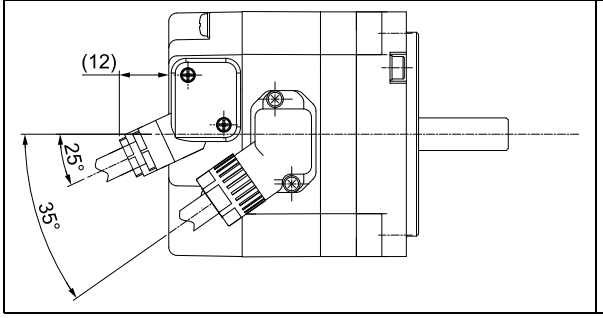
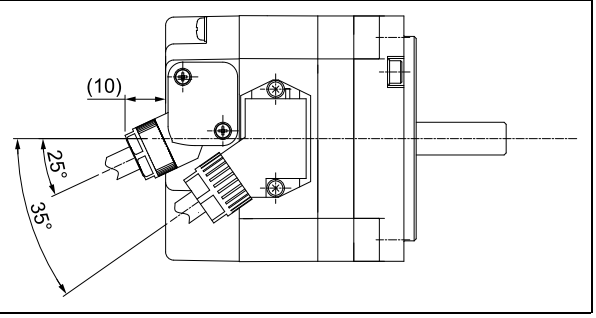
Model SGMXP-	E1	E2	LS1	LS2	LE
01A□A□S□□	22	38	3.5	7	3
02A□A□S□□	35	47	5.2	10	3
04A□A□S□□					

(5) Connector Mounting Dimensions

- Cable Installed on Load Side

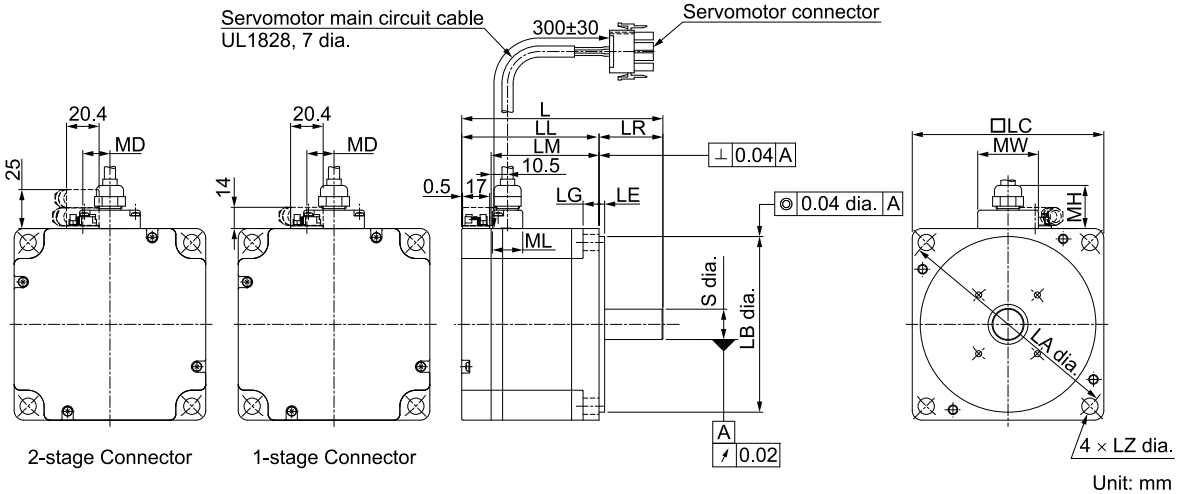
Standard Specification	Σ-7 Compatible Specification
	

- Cable Installed on Non-load Side

Standard Specification	Σ-7 Compatible Specification
	

5.4.2 SGMXP-08, -15

(1) Standard Specification



Model SGMXP-	L *1	LL *1	LM	Flange Dimensions						
				LR	LE	LG	LC	LA	LB	LZ
08A□A2□A1	126.5 (160.0)	86.5 (120.0)	67.6	40	3.5	10	120	145	$110^{0}_{-0.035}$	10.2
15A□A2□A1	154.5 (188.0)	114.5 (148.0)	95.6	40	3.5	10	120	145	$110^{0}_{-0.035}$	10.2

Model SGMXP-	S	MD	MW	MH	ML	Approx. Mass [kg] *1
08A□A2□A1	$19^{0}_{-0.013}$	17	38	28	19 (25.5)	4.2 (5.9)
15A□A2□A1	$19^{0}_{-0.013}$	17	38	28	19 (25.5)	6.6 (8.2)

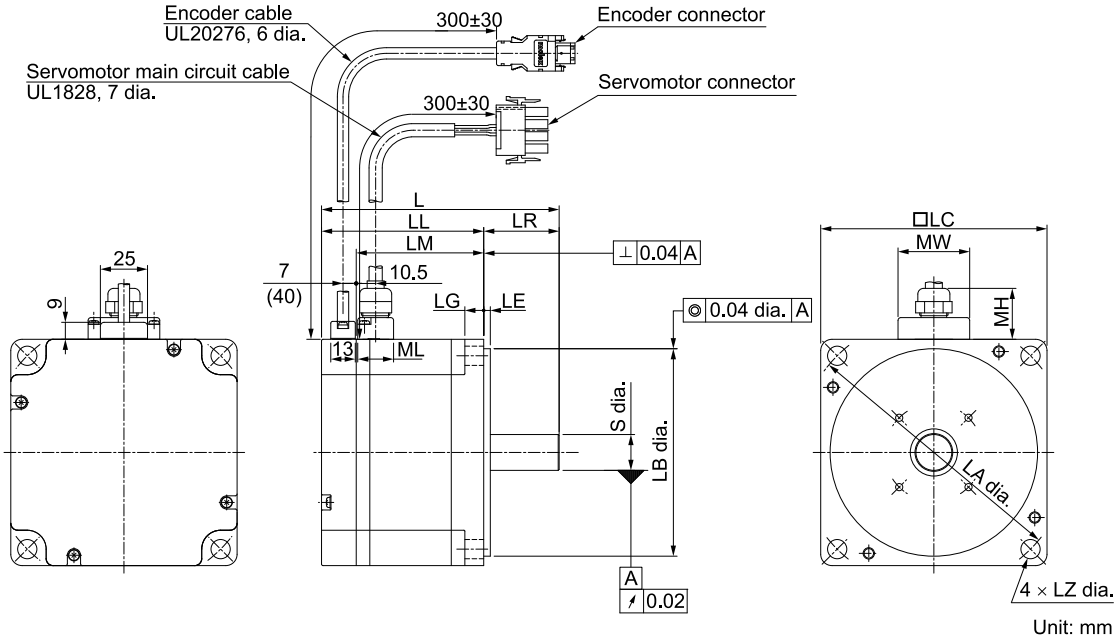
*1 For models that have a batteryless absolute encoder, L and LL are +8 mm greater and the approximate mass is 0.1 kg greater than the given value. Refer to the following section for the values for individual models.
☞ 5.4.3 Dimensions of Servomotors with Batteryless Absolute Encoders on page 135

*2 These are the values when the flexible connectors are connected.

Note:

1. The values in parentheses are for servomotors with holding brakes.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.
☞ (3) Shaft End Specification on page 132
☞ (4) Option Specification on page 134

(2) Σ-7 Compatible Specification



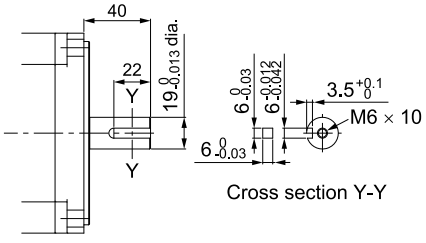
Note:

The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

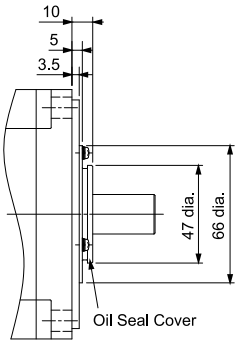
(3) Shaft End Specification

- Straight with Key and Tap

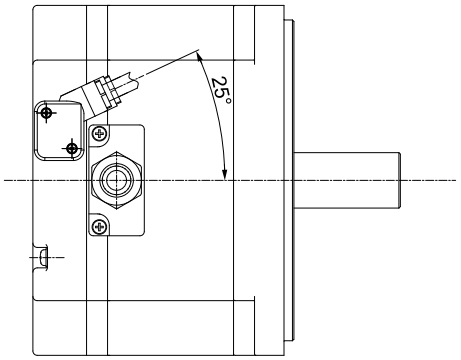
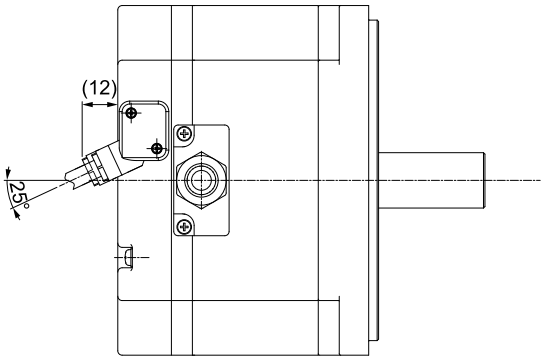


(4) Option Specification

- With Oil Seal



(5) Connector Mounting Dimensions

Cable Installed on Load Side	Cable Installed on Non-load Side
	

5.4.3 Dimensions of Servomotors with Batteryless Absolute Encoders

Model SGMXP-	L	LL	Approx. Mass [kg]
01AWA2□A□	90.5 (120.5)	65.5 (95.5)	0.5 (0.8)
02AWA2□A□	101.5 (133)	71.5 (103)	1.2 (1.9)
04AWA2□A□	111.5 (143)	81.5 (113)	1.5 (2.2)
08AWA2□A□	134.5 (168)	94.5 (128)	4.3 (6)
15AWA2□A□	162.5 (196)	122.5 (156)	6.7 (8.3)

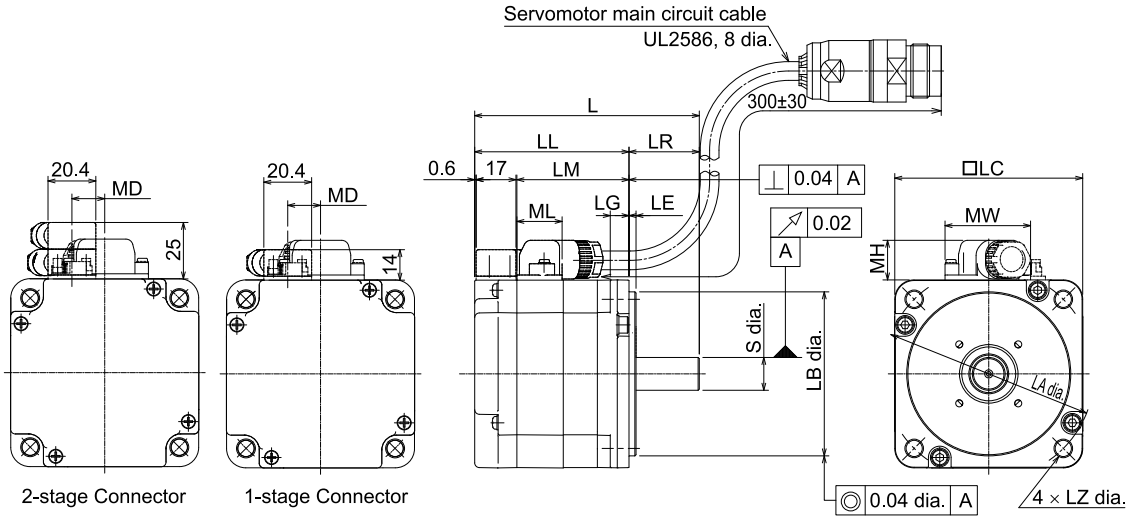
Note:

The values in parentheses are for servomotors with holding brakes.

5.5 External Dimensions (400 V Specification)

5.5.1 SGMXP-02, -04

(1) Standard Specification



Unit: mm

Model SGMXP-	L *1	LL *1	LM	Flange Dimensions						
				LR	LE	LG	LC	LA	LB	LZ
02D□A2□A1	96 (126.5)	66 (96.5)	48	30	3	8	80	90	$70^{0}_{-0.030}$	7
04D□A2□A1	106 (136.5)	76 (106.5)	58	30	3	8	80	90	$70^{0}_{-0.030}$	7

Model SGMXP-	S	MD	MW	MH	ML	Approx. Mass [kg] *1
02D□A2□A1	$14^{0}_{-0.011}$	14	36.5	17	19.3	1.3 (1.9)
04D□A2□A1	$14^{0}_{-0.011}$	14	36.5	17	19.3	1.6 (2.2)

*1 For models that have a batteryless absolute encoder, L and LL are +6.5 mm greater and the approximate mass is 0.1 kg greater than the given value. Refer to the following section for the values for individual models.

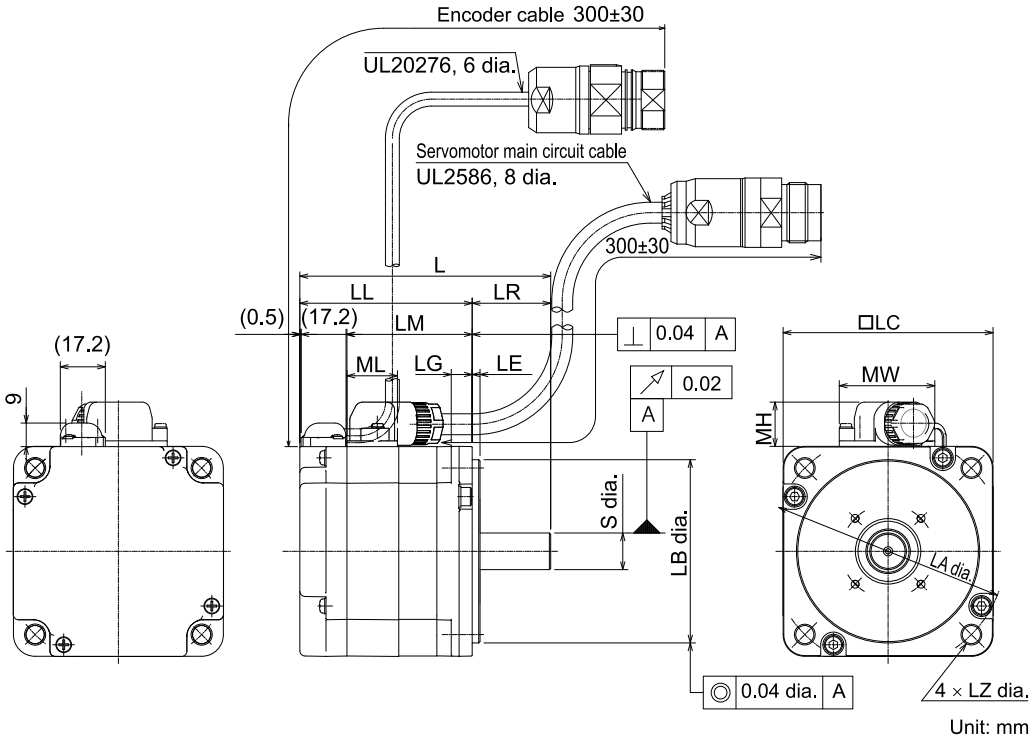
☞ *5.5.3 Dimensions of Servomotors with Batteryless Absolute Encoders on page 141*

Note:

1. The values in parentheses are for servomotors with holding brakes.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

☞ *(3) Shaft End Specification on page 137*
☞ *(4) Option Specification on page 137*

(2) Σ-V Compatible Specification



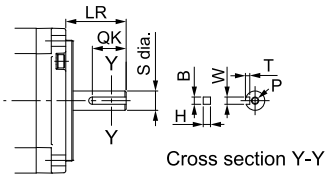
Note:

The dimensions for non-connector parts are identical to those for models with standard specifications.

The approx. mass is +0.1 kg compared to the standard model.

(3) Shaft End Specification

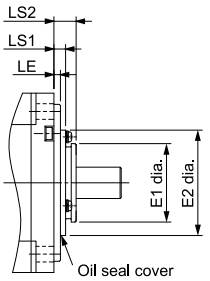
- Straight with Key and Tap



Model SGMXP-	LR	QK	S	B	H	W	T	P
02D□A61□□	30	14	$14^{0}_{-0.011}$	$5^{0}_{-0.030}$	$5^{0}_{-0.030}$	$5^{-0.012}_{-0.042}$	$3^{+0.1}_{0}$	M5 × 8
04D□A61□□	30	14	$14^{0}_{-0.011}$	$5^{0}_{-0.030}$	$5^{0}_{-0.030}$	$5^{-0.012}_{-0.042}$	$3^{+0.1}_{0}$	M5 × 8

(4) Option Specification

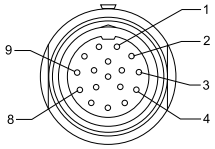
- With Oil Seal



Model SGMXP-	E1	E2	LS1	LS2	LE
02D□A□S□□	35	47	5.2	10	3
04D□A□S□□					

(5) Connector Specifications

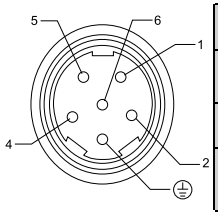
- Encoder Connector (26-bit Encoder): Σ-V Compatible Specification



1 *1	0BAT	8	PG5V
2 *1	BAT	9	PG0V
3	PS	10 to 17	–
4	/PS	Connector Case	FG (frame ground)
5 to 7	–		

*1 A battery is required only for a 26-bit absolute encoder.
Applicable plug (not provided by Yaskawa)
Plug: SPNA17HFRBN□□□
Manufacturer: Smith Interconnect

- Servomotor Connector: Same for both Standard Specifications and Σ-V Compatible Specifications

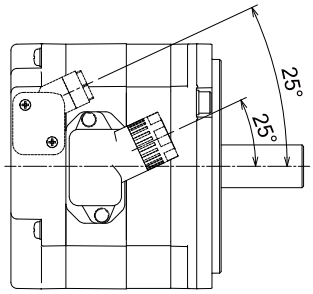
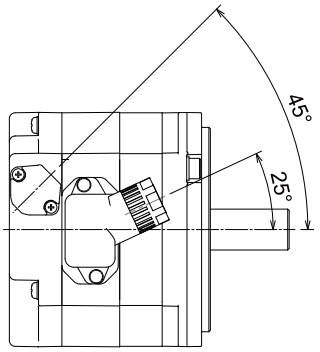


1	Phase U	6 *1	Brake terminal
2	Phase V	⏚	FG (frame ground)
4	Phase W	Connector Case	FG (frame ground)
5 *1	Brake terminal		

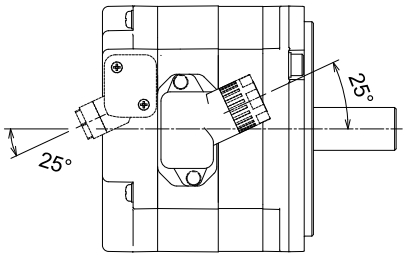
*1 Only for servomotors with holding brakes. There is no voltage polarity for the brake terminals.
Applicable plug (not provided by Yaskawa)
Plug: LPNA06BFRDN□□□
Manufacturer: Smith Interconnect

(6) Connector Mounting Dimensions

- Cable Installed on Load Side

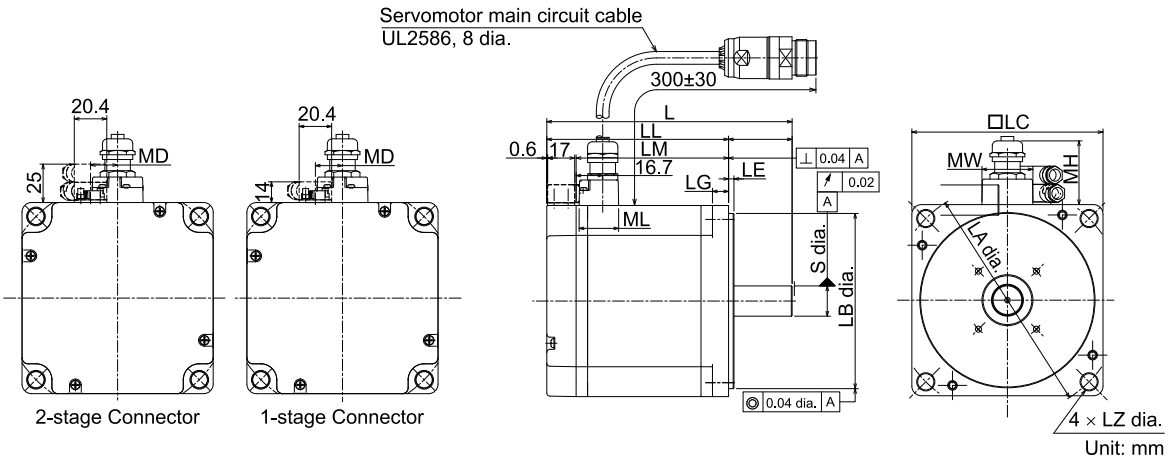
Standard Specification	Σ-V Compatible Specification
	

- Cable Installed on Non-load Side

Standard Specification	Σ-V Compatible Specification
	None

5.5.2 SGMXP-08, -15

(1) Standard Specification



Model SGMXP-	L *1	LL *1	LM	Flange Dimensions						
				LR	LE	LG	LC	LA	LB	LZ
08D□A2□A1	126.5 (160.0)	86.5 (120.0)	67.6	40	3.5	10	120	145	$110^{0}_{-0.035}$	10.2
15D□A2□A1	154.5 (188.0)	114.5 (148.0)	95.6	40	3.5	10	120	145	$110^{0}_{-0.035}$	10.2

Model SGMXP-	S	MD	MW	MH	ML	Approx. Mass [kg] *1
08D□A2□A1	$19^{0}_{-0.013}$	17	38	28	25 (40)	4.2 (5.9)
15D□A2□A1	$19^{0}_{-0.013}$	17	38	28	25 (40)	6.6 (8.2)

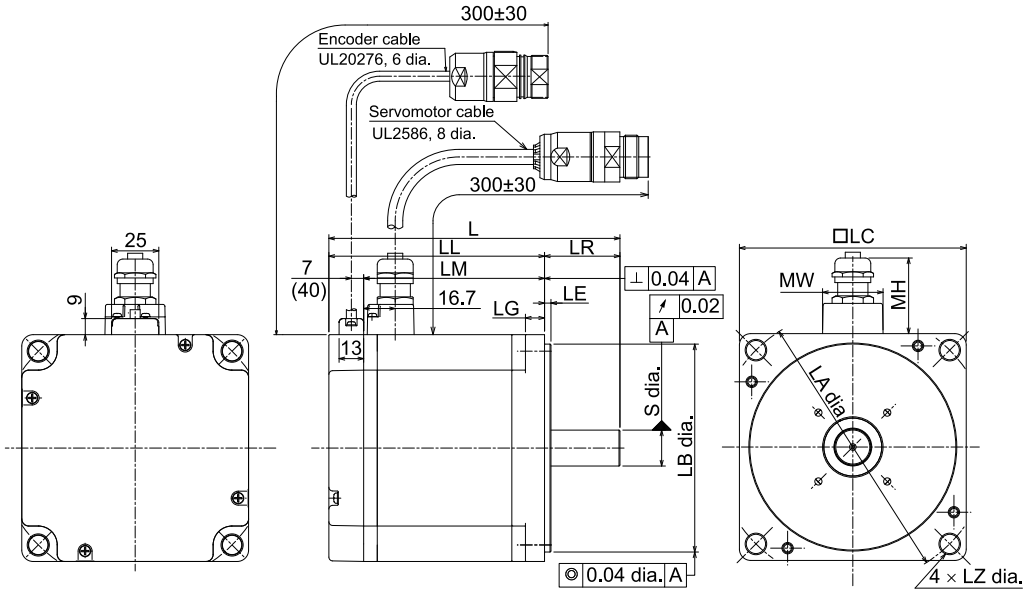
*1 For models that have a batteryless absolute encoder, L and LL are +8 mm greater and the approximate mass is 0.1 kg greater than the given value. Refer to the following section for the values for individual models.
☞ *5.5.3 Dimensions of Servomotors with Batteryless Absolute Encoders on page 141*

*2 These are the values when the flexible connectors are connected.

Note:

1. The values in parentheses are for servomotors with holding brakes.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.
☞ *(3) Shaft End Specification on page 140*
☞ *(4) Option Specification on page 140*

(2) Σ-V Compatible Specification



Note:

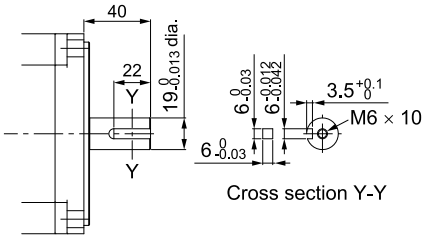
The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

The approx. mass is +0.1 kg compared to the standard model.

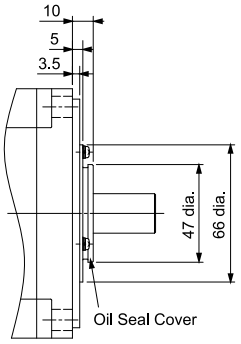
(3) Shaft End Specification

- Straight with Key and Tap



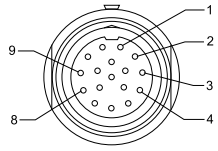
(4) Option Specification

- With Oil Seal



(5) Connector Specifications

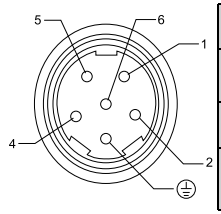
- Encoder Connector (26-bit Encoder): Σ-V Compatible Specification



1 *1	0BAT	8	PG5V
2 *1	BAT	9	PG0V
3	PS	10 to 17	–
4	/PS	Connector Case	FG (frame ground)
5 to 7	–		

*1 A battery is required only for a 26-bit absolute encoder.
Applicable plug (not provided by Yaskawa)
Plug: SPNA17HFRBN□□□
Manufacturer: Smith Interconnect

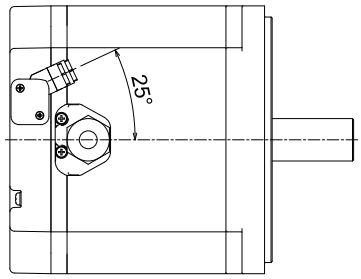
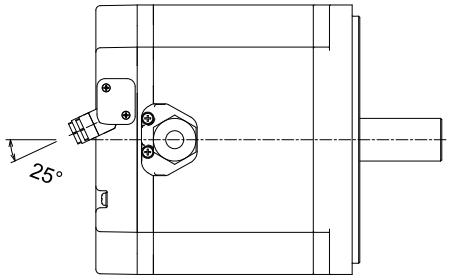
- Servomotor Connector: Same for both Standard Specifications and Σ-V Compatible Specifications



1	Phase U	6 *1	Brake terminal
2	Phase V	⏚	FG (frame ground)
4	Phase W	Connector Case	FG (frame ground)
5 *1	Brake terminal		

*1 Only for servomotors with holding brakes. There is no voltage polarity for the brake terminals.
Applicable plug (not provided by Yaskawa)
Plug: LPNA06BFRDN□□□
Manufacturer: Smith Interconnect

(6) Connector Mounting Dimensions

Cable Installed on Load Side	Cable Installed on Non-load Side
	

5.5.3 Dimensions of Servomotors with Batteryless Absolute Encoders

Model SGMXP-	L	LL	Approx. Mass [kg]
02DWA2□A□	102.5 (133)	72.5 (103)	1.4 (2.0)
04DWA2□A□	112.5 (143)	82.5 (113)	1.7 (2.3)
08DWA2□A□	134.5 (168)	94.5 (128)	4.3 (6.0)
15DWA2□A□	162.5 (196)	122.5 (156)	6.7 (8.3)

Note:
The values in parentheses are for servomotors with holding brakes.

6

Specifications, Ratings, and External Dimensions of SGMXG Servomotors

This chapter describes how to interpret the model numbers of SGMXG servomotors and gives their specifications, ratings, and external dimensions.

6.1 Model Designations

SGMXG - 09 A U A 2 1 A 1

1st+2nd digits | 3rd digit | 4th digit | 5th digit | 6th digit | 7th digit | 8th digit | 9th digit

Σ-X-Series
Servomotor
SGMXG model

1st+2nd digits Rated Output

1500-min^{-1} Specification

Code	Specification	Power Supply Voltage	
		200 VAC	400 VAC
03	300 W	○	-
05	450 W	○	○
09	850 W	○	○
13	1.3 kW	○	○
20	1.8 kW	○	○
30	2.9 kW	○	○
44	4.4 kW	○	○
55	5.5 kW	○	○
75	7.5 kW	○	○
1A	11 kW	○	○
1E	15 kW	○	○

1000-min^{-1} Specification

Code	Specification	Power Supply Voltage	
		200 VAC	400 VAC
03	300 W	○	-
06	600 W	○	-
09	900 W	○	-
12	1.2 kW	○	-
20	2.0 kW	○	-
30	3.0 kW	○	-
40	4.0 kW	○	-
55	5.5 kW	○	-

3rd digit Power Supply Voltage

Code	Specification
A	200 VAC
D	400 VAC

4th digit Serial Encoder

Code	Specification
U	26-bit absolute encoder
W	26-bit batteryless absolute encoder

5th digit Design Revision Order

Code	Specification
A	1500-min^{-1} specification
B	1000-min^{-1} specification

6th digit Shaft End

Code	Specification
2	Straight without key (SGMXG-03□□A to 20□□A) (SGMXG-03A□B to 12A□B)
6	Straight with key and tap
8	Straight without key, with tap (SGMXG-30□□A to 1E□□A) (SGMXG-20A□B to 55A□B)

7th digit Options

Code	Specification
1	Without options
C	With holding brake (24 VDC)
E	With oil seal With holding brake (24 VDC)
S	With oil seal

8th digit Destination

A

9th digit Ancillary Specification

Code	Specification
1	Standard
2*1	Compatible
3*2	Standard (encoder with functional safety)

*1 200 VAC: Σ-7 compatible specification: Cables for the Σ-7-series SGM7G servomotors can be used.
400 VAC: Σ-V compatible specification: Cables for the Σ-V-series SGMGV servomotors can be used.

*2 The following models are not supported.

- Rotation: 1000-min^{-1} specification
- Power supply voltage: 400-V specification
- Options: With holding brake, with oil seal

Contact your Yaskawa representative beforehand if you require a model with support for functional safety.

Note:

The rated output is 2.4 kW if you combine the SGMXG-30A□A with the SGDXS-200A.

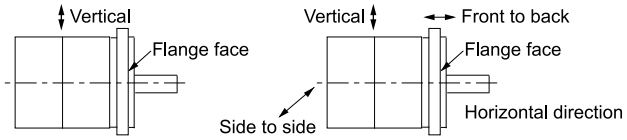
6.2 Specifications and Ratings (200 V, 1500-min-1 Specification)

6.2.1 Specification

Voltage		200 V									
Model SGMXG-		03A□A 05A□A	09A□A	13A□A	20A□A	30A□A	44A□A	55A□A	75A□A	1AA□A	1EA□A
Time Rating		Continuous									
Thermal Class		UL: F, CE: F									
Insulation Resistance		500 VDC, 10 MΩ min.									
Withstand Voltage		1,500 VAC for 1 minute									
Excitation		Permanent magnet									
Mounting		Flange-mounted									
Drive Method		Direct drive									
Rotation Direction		Counterclockwise (CCW) for forward reference when viewed from the load side									
Vibration Class *1		V15									
Environmental Conditions	Surrounding Air Temperature	0°C to 40°C (60°C max.) *3									
	Surrounding Air Humidity	20% to 80% relative humidity (with no 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. • Must have an altitude of 1000 m or less. (With derating, usage is possible between 1000 m and 2000 m.) *3 • 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 +60°C (with no freezing) Storage humidity: 20% to 80% relative humidity (with no condensation)									
Impact Resistance *2	Impact Acceleration (at Flange)	490 m/s²									
	Number of Impacts	2 times									
Vibration Resistance *2	Vibration Acceleration (at Flange)	49 m/s² (24.5 m/s² front to back)						24.5 m/s²			
Applicable SERVOPACKs *4	SGDXS	3R8A	7R6A (120A) *4	120A (180A) *4	180A (200A) *4	330A (470A) *4	330A (550A) *4	470A (780A) *4	550A	590A	780A
	SGDXW	5R5A *5, 7R6A *5	7R6A	–							

*1 A vibration class of V15 indicates a vibration amplitude of 15 μm maximum on the servomotor without a load at the rated rotation speed.

*2 The given values are for when the servomotor 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 servomotor can withstand depends on the application. Always check the vibration acceleration that is applied to the servomotor with the actual equipment.



Impact Applied to the Servomotor Vibration Applied to the Servomotor

*3 Refer to the following section for the derating rates.
☞ 6.2.7 Derating Rates on page 154

*4 To increase the instantaneous maximum torque, use the SERVOPACK model in parentheses ( ).
Refer to the following section for the instantaneous maximum torque for individual SERVOPACK models.
☞ 6.2.2 Servomotor Ratings (SGMXG-03A□A to -20A□A) on page 147
☞ 6.2.3 Servomotor Ratings (SGMXG-30A□A to -1EA□A) on page 149
☞ 6.2.4 Torque-Rotation Speed Characteristics on page 151

*5 If you use a servomotor together with a Σ-XW SERVOPACK, the control gain may not increase as much as with a Σ-XS SERVOPACK and other performances may be lower than those achieved with a Σ-XS SERVOPACK.

6.2.2 Servomotor Ratings (SGMXG-03A□A to -20A□A)

Voltage			200 V				
Model SGMXG-			03A□A	05A□A	09A□A	13A□A	20A□A
Rated Output *1		kW	0.3	0.45	0.85	1.3	1.8
Rated Torque *1, *2		N·m	1.96	2.86	5.39	8.34	11.5
Instantaneous Maximum Torque *1		N·m	5.88	8.92	14.2 20.0 *3	23.3 30.0 *4	28.7 35.4 *5
Rated Current *1		Arms	2.8	3.8	6.9	10.7	16.7
Instantaneous Maximum Current *1		Arms	8.0	11	17 28 *3	28 40 *4	42 56 *5
Rated Rotation Speed *1		min-1	1500				
Continuous Allowable Rotation Speed		min-1	4000				3000
Maximum Rotation Speed *1		min-1	4000				
Torque Constant *1		N·m/Arms	0.776	0.854	0.859	0.891	0.748
Rotor Moment of Inertia *6	Without Holding Brakes	×10-4 kg·m2	2.48	3.33	13.9	19.9	26.0
	With Holding Brakes		2.73	3.58	16.0	22.0	28.1
Rated Power Rate *1	Without Holding Brakes	kW/s	15.5	24.6	20.9	35.0	50.9
	With holding brakes		14.1	22.9	18.2	31.6	47.1
Rated Angular Acceleration *1	Without Holding Brakes	rad/s2	7900	8590	3880	4190	4420
	With Holding Brakes		7180	7990	3370	3790	4090
Heat Sink Size *7		mm	250 ×250 × 6 (aluminum)		400 × 400 × 20 (steel)		
Protective Structure *8			Totally enclosed, self-cooled, IP67				

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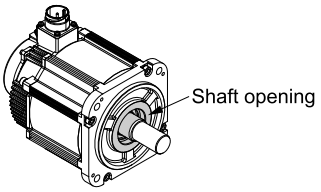
Voltage			200 V				
Model SGMXG-			03A□A	05A□A	09A□A	13A□A	20A□A
Holding Brake Specification *9	Rated Voltage	V	24 VDC $^{+10\%}_{0}$				
	Capacity	W	10				
	Holding Torque	N·m	4.5		12.7	19.6	
	Coil Resistance	Ω (at 20°C)	56		59		
	Rated Current	A (at 20°C)	0.43		0.41		
	Time Required to Release Brake	ms	100				
	Time Required to Brake	ms	80				
Allowable Load Moment of Inertia (Rotor Moment of Inertia Ratio) *10	At 3000 min-1		15 times		5 times		
	At 4000 min-1		8.4 times		2 times		5 times
	With External Regenerative Resistor and External Dynamic Brake Resistor *11	At 3000 min-1	15 times		10 times		
		At 4000 min-1	8.4 times		8 times	9 times	7 times
Allowable Shaft Loads *12	LF	mm	40		58		
	Allowable Radial Load	N	490			686	980
	Allowable Thrust Load	N	98			343	392

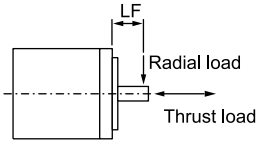
*1 These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C. These are typical values.
*2 The rated torques are the continuous allowable torque values with an aluminum or steel heat sink of the dimensions given in the table.
*3 This is the value if you combine with the SERVOPACK SGDXS-120A.
*4 This is the value if you combine with the SERVOPACK SGDXS-180A.
*5 This is the value if you combine with the SERVOPACK SGDXS-200A.
*6 The values for the servomotors with batteryless absolute encoders (and holding brakes) are the same as those in the table.
*7 Refer to the following section for the relation between the heat sinks and derating rate.
☞ *(1) Servomotor Heat Dissipation Conditions on page 154*
*8 This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.



*9 Observe the following precautions if you use a servomotor with a holding brake.

- The holding brake cannot be used to stop the servomotor.
- The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
- The 24-VDC power supply is not provided by Yaskawa.

*10 The rotor moment of inertia scaling factor is the value for a standard servomotor without a holding brake.
*11 To externally connect a dynamic brake resistor, select hardware option specification 0020 for the SERVOPACK.
*12 Design the mechanical system so that the thrust and radial loads applied to the servomotor shaft end during operation do not exceed the values given in the table.



6.2.3 Servomotor Ratings (SGMXG-30A□A to -1EA□A)

Voltage			200 V						
Model SGMXG-			30A□A	30A□A *3	44A□A	55A□A	75A□A	1AA□A	1EA□A
Rated Output *1		kW	2.9	(2.4)	4.4	5.5	7.5	11	15
Rated Torque *1, *2		N·m	18.6	(15.1)	28.4	35.0	48.0	70.0	95.4
Instantaneous Maximum Torque *1		N·m	54.0 66.8 *4	(45.1)	71.6 95.6 *5	102 134 *6	119	175	224
Rated Current *1		Arms	24.5	(19.6)	32.9	37.2	54.7	58.6	74.0
Instantaneous Maximum Current *1		Arms	71 92 *4	(56)	84 115 *5	110 149 *6	130	140	170
Rated Rotation Speed *1		min-1	1500						
Continuous Allowable Rotation Speed		min-1	3000					2000	
Maximum Rotation Speed *1		min-1	4000					3000	
Torque Constant *1		N·m/Arms	0.826		0.932	1.02	0.957	1.38	1.44
Rotor Moment of Inertia *7	Without Holding Brakes	×10-4 kg·m2	46.0		67.5	89.0	125	242	303
	With Holding Brakes		53.9		75.4	96.9	133	261	341
Rated Power Rate *1	Without Holding Brakes	kW/s	75.2	(49.6)	119	138	184	202	300
	With Holding Brakes		64.2	(42.3)	107	126	173	188	267
Rated Angular Acceleration *1	Without Holding Brakes	rad/s2	4040	(3280)	4210	3930	3840	2890	3150
	With Holding Brakes		3450	(2800)	3770	3610	3610	2680	2800
Heat Sink Size *8		mm	550 × 550 × 30 (steel)					650 ×650 × 35 (steel)	
Protective Structure *9			Totally enclosed, self-cooled, IP67						
Holding Brake Specification *10	Rated Voltage	V	24 VDC +10% 0						
	Capacity	W	18.5			25		32	35
	Holding Torque	N·m	43.1			72.6		84.3	114.6
	Coil Resistance	Ω (at 20° C)	31			23		18	17
	Rated Current	A (at 20° C)	0.77			1.05		1.33	1.46
	Time Required to Release Brake	ms	170						250
	Time Required to Brake	ms	100			80			

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Voltage			200 V						
Model SGMXG-			30A□A	30A□A *3	44A□A	55A□A	75A□A	1AA□A	1EA□A
Allowable Load Moment of Inertia (Rotor Moment of Inertia Ratio) *11	At 2000 min-1		–					5 times	
	At 3000 min-1		5 times	3 times	5 times	5 times	5 times	2.2 times	1.5 times
	At 4000 min-1		4 times	2.2 times	2.4 times	3.5 times	2.2 times	–	
	With External Regenerative Resistor and External Dynamic Brake Resistor *12	At 2000 min-1	–					10 times	
		At 3000 min-1	10 times	7 times	10 times	10 times	10 times	4 times	2 times
		At 4000 min-1	5 times	4 times	5 times	5 times	4 times	–	
Allowable Shaft Loads *13	LF	mm	79			113		116	
	Allowable Radial Load	N	1470			1764			4998
	Allowable Thrust Load	N	490			588			2156

*1 These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C. These are typical values.

*2 The rated torques are the continuous allowable torque values with an aluminum or steel heat sink of the dimensions given in the table.

*3 This is the value if you combine with the SERVOPACK SGDXS-200A.
The output of the servomotor will be limited by the rated current and maximum current of the SERVOPACK that is used. The load ratio is calculated based on the servomotor's rated current of 24.5 Arms. Use the servomotor with a load ratio of 80% or less.

*4 This is the value if you combine with the SERVOPACK SGDXS-470A.

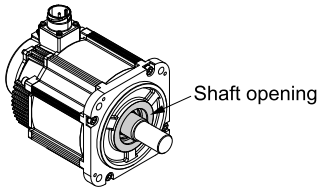
*5 This is the value if you combine with the SERVOPACK SGDXS-550A.

*6 This is the value if you combine with the SERVOPACK SGDXS-780A.

*7 The values for the servomotors with batteryless absolute encoders (and holding brakes) are the same as those in the table.

*8 Refer to the following section for the relation between the heat sinks and derating rate.
☞ *(1) Servomotor Heat Dissipation Conditions on page 154*

*9 This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.



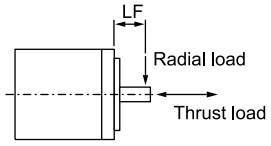
*10 Observe the following precautions if you use a servomotor with a holding brake.

- The holding brake cannot be used to stop the servomotor.
- The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
- The 24-VDC power supply is not provided by Yaskawa.

*11 The rotor moment of inertia scaling factor is the value for a standard servomotor without a holding brake.

*12 To externally connect a dynamic brake resistor, select hardware option specification 0020 for the SERVOPACK.

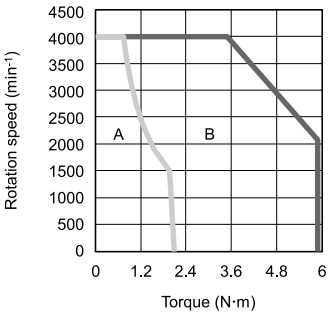
*13 Design the mechanical system so that the thrust and radial loads applied to the servomotor shaft end during operation do not exceed the values given in the table.



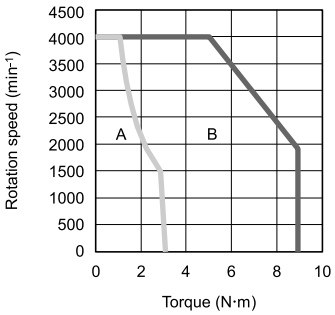
6.2.4 Torque-Rotation Speed Characteristics

A : Continuous duty zone ——— (solid lines): Three-phase, 200 V
B : Intermittent duty zone ····· (dotted lines): Single-phase, 200 V

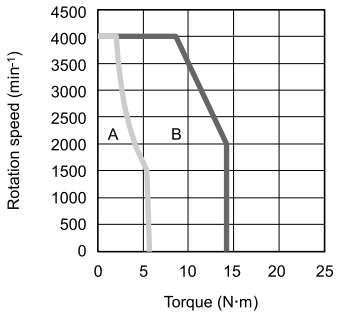
SGMXG-03A□A



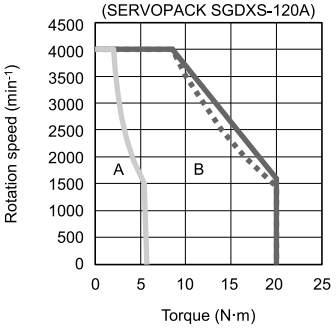
SGMXG-05A□A



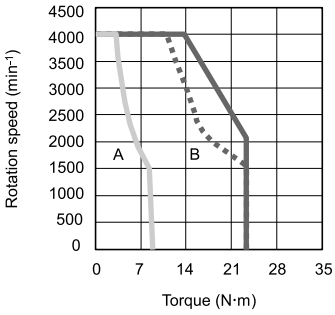
SGMXG-09A□A



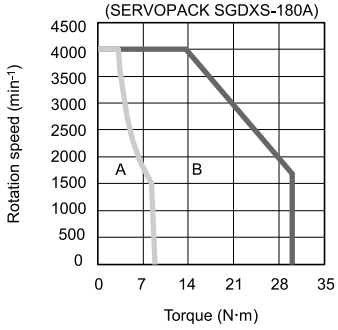
SGMXG-09A□A
(SERVOPACK SGDXS-120A)



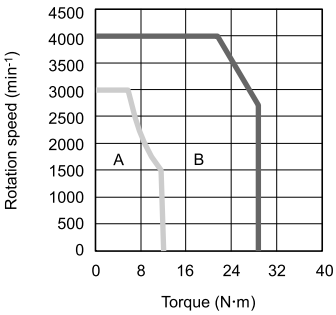
SGMXG-13A□A



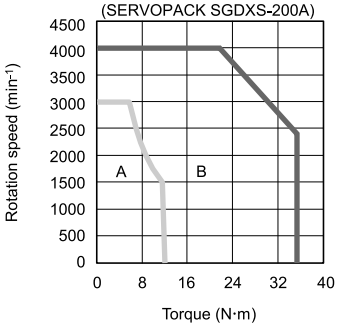
SGMXG-13A□A
(SERVOPACK SGDXS-180A)



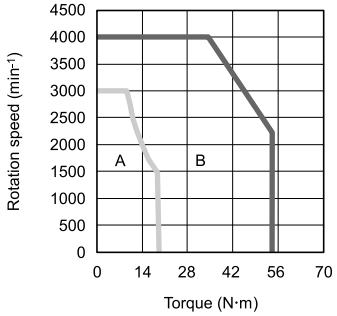
SGMXG-20A□A



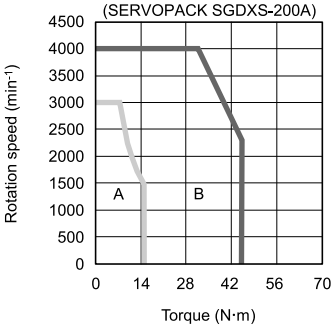
SGMXG-20A□A
(SERVOPACK SGDXS-200A)



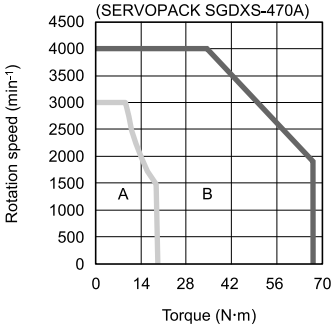
SGMXG-30A□A

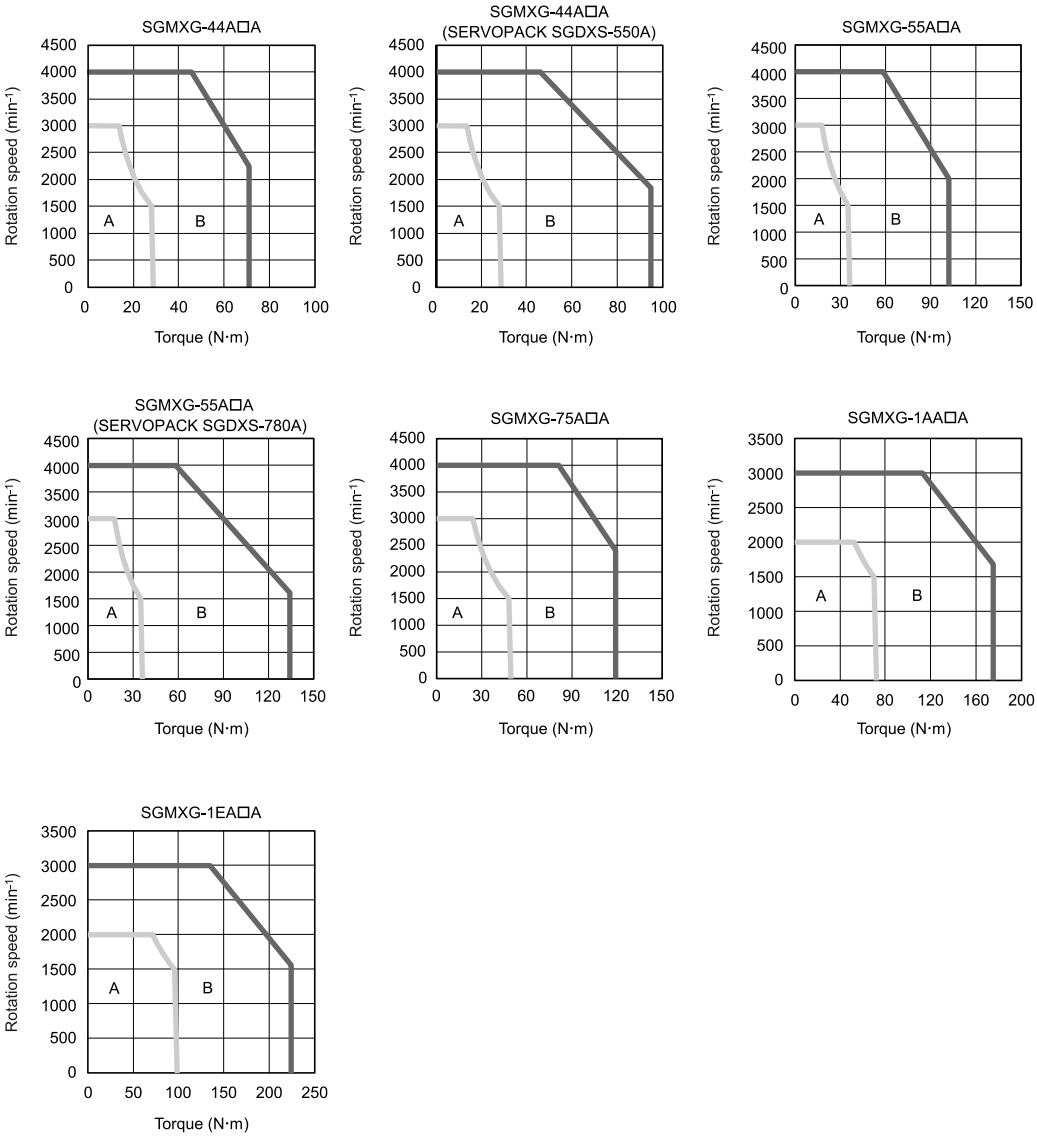


SGMXG-30A□A
(SERVOPACK SGDXS-200A)



SGMXG-30A□A
(SERVOPACK SGDXS-470A)





Note:

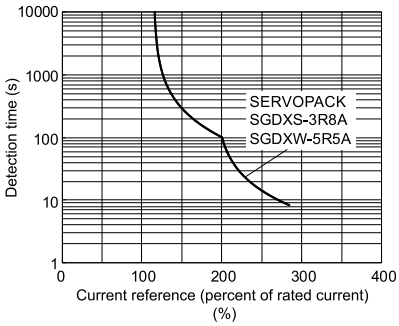
- These values (typical values) are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C.
- The characteristics in the intermittent duty zone depend on the power supply voltage.
- If the effective torque is within the allowable range for the rated torque, the servomotor can be used within the intermittent duty zone.
- If you use a servomotor main circuit cable that exceeds 20 m, the intermittent duty zone in the torque-rotation speed characteristics will become smaller because the voltage drop increases.
- The SGMXG-09A□A and -13A□A can use a single-phase power input in combination with the SGDXS-120A□□A0008.

6.2.5 Servomotor Overload Protection Characteristics

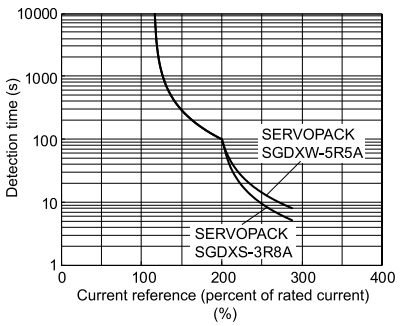
The overload detection level is set for hot start conditions with a servomotor surrounding air temperature of 40° C.

For the overload detection level, priority is given to the lower of the detection levels in the overload protection characteristics of the connected SERVOPACK and servomotor.

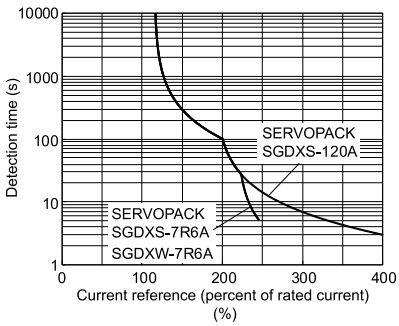
SGMXG-03A□A



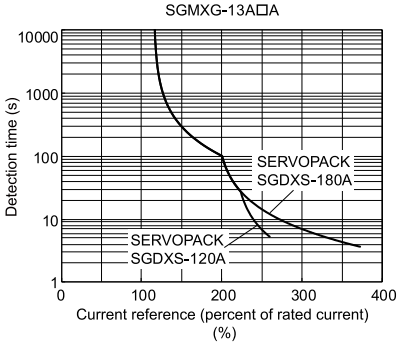
SGMXG-05□A



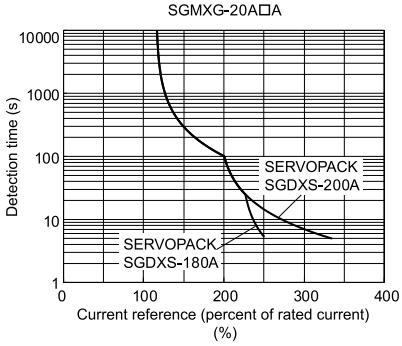
SGMXG-09□A



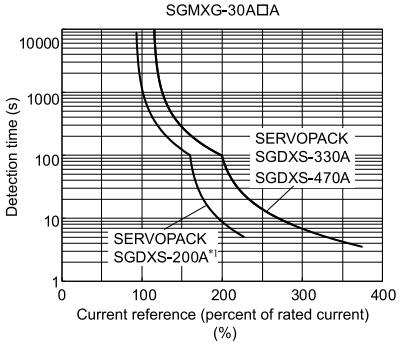
SGMXG-13A□A



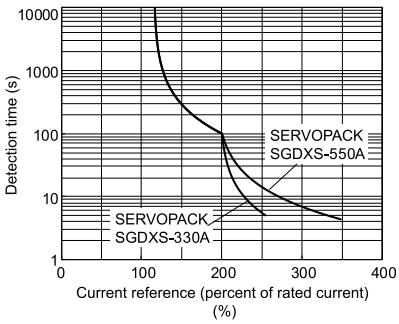
SGMXG-20A□A



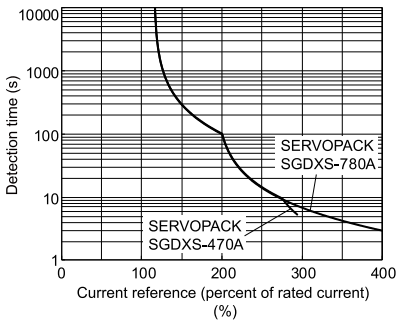
SGMXG-30A□A



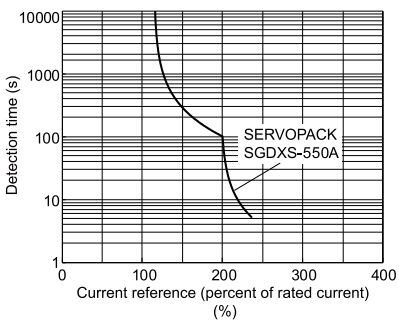
SGMXG-44A□A



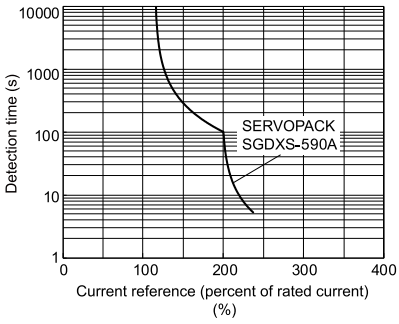
SGMXG-55A□A



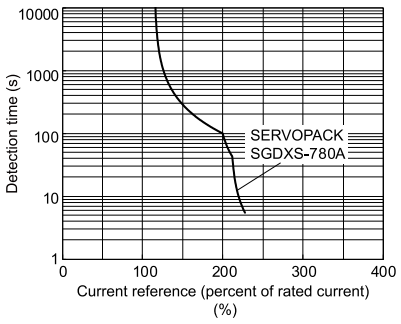
SGMXG-75A□A



SGMXG-1AA□A



SGMXG-1EA□A



*1 The current reference is calculated based on the servomotor's rated current of 24.5 Arms.

Note:

- The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
  Use the servomotor so that the effective torque remains within the continuous duty zone given in "*6.2.4 Torque-Rotation Speed Characteristics on page 151*".
- The value for the instantaneous maximum current / rated current (%) for each servomotor is taken as the current reference maximum value.

6.2.6 Allowable Load Moment of Inertia

The allowable load moments of inertia (rotor moment of inertia ratios) for the servomotors are given in "*6.2.2 Servomotor Ratings (SGMXG-03A□A to -20A□A) on page 147*" and "*6.2.3 Servomotor Ratings (SGMXG-30A□A to -1EA□A) on page 149*". The values are determined by the regenerative energy processing

capacity of the SERVOPACK and are also affected by the drive conditions of the servomotor. Perform the required steps for each of the following cases.

(1) Exceeding the Allowable Load Moment of Inertia

Use one of the following measures to adjust the load moment of inertia to within the allowable value.

- Reduce the torque limit.
- Reduce the deceleration rate.
- Reduce the maximum rotation speed.

If the above steps are not possible, install an external regenerative resistor.

Information An Overvoltage Alarm (A.400) is likely to occur during deceleration if the load moment of inertia exceeds the allowable load moment of inertia. SERVOPACKs with a built-in regenerative resistor may generate a Regenerative Overload Alarm (A.320).

Refer to the following catalog for the regenerative power (W) that can be processed by the SERVOPACKs.

AC Servo Drives Σ-X Series (Document No.: KAEP C710812 03)

Install an external regenerative resistor when the built-in regenerative resistor cannot process all of the regenerative power.

(2) When an External Regenerative Resistor Is Required

Install the external regenerative resistor.

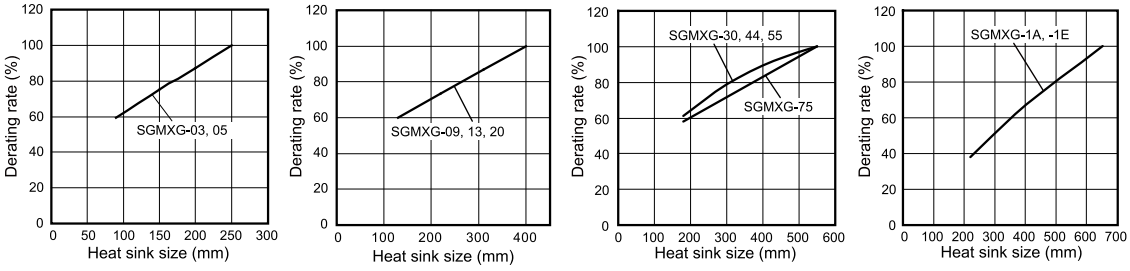
Refer to the following catalog for details on external regenerative resistors.

AC Servo Drives Σ-X Series (Document No.: KAEP C710812 03)

6.2.7 Derating Rates

(1) Servomotor Heat Dissipation Conditions

The servomotor ratings are the continuous allowable values when a heat sink is installed on the servomotor. If the servomotor is mounted on a small device component, the servomotor temperature may rise considerably because the surface for heat dissipation becomes smaller. Refer to the following graphs for the relation between the heat sink size and derating rate.

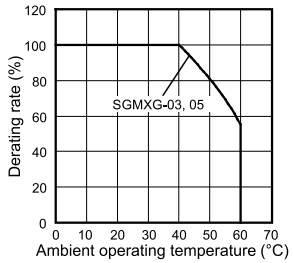


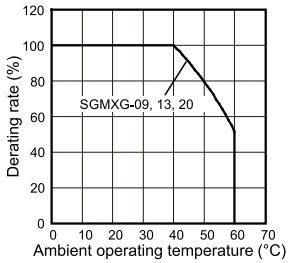
Important
The actual temperature rise depends on the following conditions. Always check the servomotor temperature with the actual equipment.

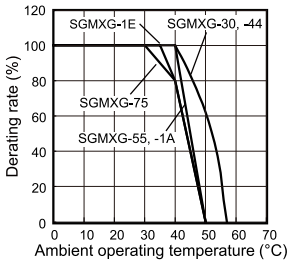
- How the heat sink (the servomotor mounting section) is attached to the installation surface
- Status between heat sink and servomotor (sealant, reduction gear, etc.)
- What material is used for the servomotor mounting section
- Servomotor rotation speed

(2) Servomotor Derating Rates for Surrounding Air Temperature

Apply a suitable derating rate from the following graphs according to the surrounding air temperature of the servomotor (60°C max.).

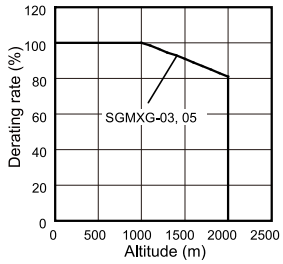


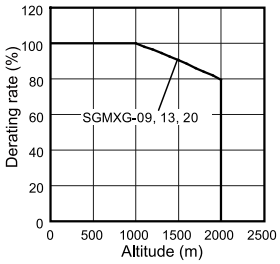


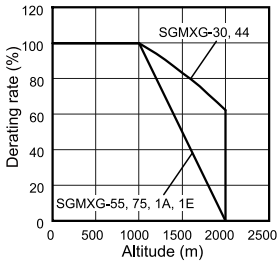


(3) Applications Where the Altitude Exceeds 1000 m

The servomotor ratings are the continuous allowable values at an altitude of 1000 m or less. If you use a servomotor at an altitude that exceeds 1000 m (2000 m max.), the heat dissipation effect of the air is reduced. Apply the appropriate derating rate from the following graphs.







Note:

- When using servomotors with derating, change the detection timing of overload warning and overload alarm based on the overload detection level of the motor given in "*6.2.5 Servomotor Overload Protection Characteristics on page 152*".
- Use the combination of the SERVOPACK and servomotor so that the derating conditions are satisfied for both the SERVOPACK and servomotor.
- The derating rates are applicable only when the average rotation speed is less than or equal to the rated rotation speed. If the average rotation speed exceeds the rated rotation speed, consult with your Yaskawa representative.

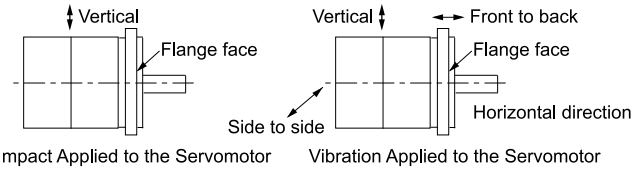
6.3 Specifications and Ratings (200 V, 1000-min-1 Specification)

6.3.1 Specification

Voltage		200 V							
Model SGMXG-		03A□B	06A□B	09A□B	12A□B	20A□B	30A□B	40A□B	55A□B
Time Rating		Continuous							
Thermal Class		UL: F, CE: F							
Insulation Resistance		500 VDC, 10 MΩ min.							
Withstand Voltage		1,500 VAC for 1 minute							
Excitation		Permanent magnet							
Mounting		Flange-mounted							
Drive Method		Direct drive							
Rotation Direction		Counterclockwise (CCW) for forward reference when viewed from the load side							
Vibration Class *1		V15							
Environ-mental Conditions	Surrounding Air Temperature	0°C to 40°C (60°C max.) *3							
	Surrounding Air Humidity	20% to 80% relative humidity (with no 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. • Must have an altitude of 1000 m or less. (With derating, usage is possible between 1000 m and 2000 m.) *3 • 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 +60°C (with no freezing) Storage humidity: 20% to 80% relative humidity (with no condensation)							
Impact Resistance *2	Impact Acceleration (at Flange)	490 m/s²							
	Number of Impacts	2 times							
Vibration Resistance *2	Vibration Acceleration (at Flange)	49 m/s² (24.5 m/s² front to back)						24.5 m/s²	
Applicable SERVO-PACKs	SGDXS	3R8A	5R5A	7R6A	120A	180A (200A) *4	200A	330A	470A
	SGDXW	5R5A *5	5R5A	7R6A	–				

*1 A vibration class of V15 indicates a vibration amplitude of 15 μm maximum on the servomotor without a load at the rated rotation speed.

*2 The given values are for when the servomotor 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 servomotor can withstand depends on the application. Always check the vibration acceleration that is applied to the servomotor with the actual equipment.



Impact Applied to the Servomotor Vibration Applied to the Servomotor

*3 Refer to the following section for the derating rates.
☞ 6.2.7 Derating Rates on page 154

*4 To increase the instantaneous maximum torque, use the SERVOPACK model in parentheses ( ).
Refer to the following section for the instantaneous maximum torque for individual SERVOPACK models.
☞ 6.3.2 Servomotor Ratings on page 157
☞ 6.3.3 Torque-Rotation Speed Characteristics on page 159

*5 If you use a servomotor together with a Σ-XW SERVOPACK, the control gain may not increase as much as with a Σ-XS SERVOPACK and other performances may be lower than those achieved with a Σ-XS SERVOPACK.

6.3.2 Servomotor Ratings

Voltage			200 V							
Model SGMXG-			03A□B	06A□B	09A□B	12A□B	20A□B	30A□B	40A□B	55A□B
Rated Output *1		kW	0.3	0.6	0.9	1.2	2.0	3.0	4.0	5.5
Rated Torque *1, *2		N·m	2.86	5.68	8.62	11.5	19.1	28.4	38.2	52.6
Instantaneous Maximum Torque *1		N·m	7.17	20.2	24.5	33.5	58 67 *3	86	121	169
Rated Current *1		Arms	3.0	4.4	5.7	9.2	12.7	17.7	24.9	32.2
Instantaneous Maximum Current *1		Arms	7.3	16.9	17	28	42 50.6 *3	56	82	110
Rated Rotation Speed *1		min-1	1000							
Continuous Allowable Rotation Speed *1		min-1	2000							
Maximum Rotation Speed *1		min-1	2000							
Torque Constant *1		N·m/Arms	1.05	1.41	1.64	1.36	1.57	1.7	1.65	1.71
Rotor Moment of Inertia *4	Without Holding Brakes	×10-4 kg·m2	3.33	13.9	19.9	26	46	67.5	89	125
	With Holding Brakes		3.58	16	22	28.1	53.9	75.4	96.9	133
Rated Power Rate *1	Without Holding Brakes	kW/s	24.6	23.2	37.3	50.9	79.3	119	164	221
	With Holding Brakes		22.9	20.2	33.8	47.1	67.7	107	150.6	208
Rated Angular Acceleration *1	Without Holding Brakes	rad/s2	8590	4090	4330	4420	4150	4210	4290	4210
	With Holding Brakes		7990	3550	3920	4090	3540	3770	3940	3950
Heat Sink Size *5		mm	250 ×250 × 6 (alumi-num)	400 × 400 × 20 (steel)			550 × 550 × 30 (steel)			
Protective Structure *6			Totally enclosed, self-cooled, IP67							

Continued on next page.

Continued from previous page.

Voltage			200 V							
Model SGMXG-			03A□B	06A□B	09A□B	12A□B	20A□B	30A□B	40A□B	55A□B
Holding Brake Specification *7	Rated Voltage	V	24 VDC $^{+10\%}_{0}$							
	Capacity	W	10				18.5		25	
	Holding Torque	N·m	4.5	12.7	19.6		43.1		72.6	
	Coil Resistance	Ω (at 20° C)	56	59			31		23	
	Rated Current	A (at 20° C)	0.43	0.41			0.77		1.05	
	Time Required to Release Brake	ms	100				170			
	Time Required to Brake	ms	80				100		80	
Allowable Load Moment of Inertia (Rotor Moment of Inertia Ratio) *8	Without External Devices		18 times	11 times	7.5 times	8.3 times	11 times	7.3 times	8.3 times	10 times
	With External Regenerative Resistor and External Dynamic Brake Resistor *9		18 times	11 times	18 times	18 times	13 times	12 times	16 times	14 times
Allowable Shaft Loads *10	LF		40	58			79		113	
	Allowable Radial Load	N	490		686	980	1470		1764	
	Allowable Thrust Load	N	98		343	392	490		588	

*1 These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C. These are typical values.

*2 The rated torques are the continuous allowable torque values with an aluminum or steel heat sink of the dimensions given in the table.

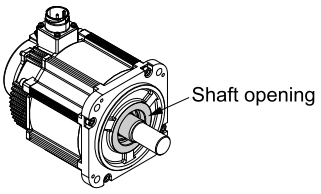
*3 This is the value if you combine with the SERVOPACK SGDXS-200A.

*4 The values for the servomotors with batteryless absolute encoders (and holding brakes) are the same as those in the table.

*5 Refer to the following section for the relation between the heat sinks and derating rate.

☞ *(1) Servomotor Heat Dissipation Conditions on page 154*

*6 This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.



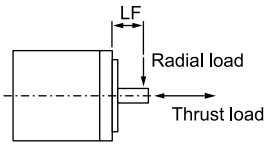
*7 Observe the following precautions if you use a servomotor with a holding brake.

- The holding brake cannot be used to stop the servomotor.
- The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
- The 24-VDC power supply is not provided by Yaskawa.

*8 The rotor moment of inertia scaling factor is the value for a standard servomotor without a holding brake.

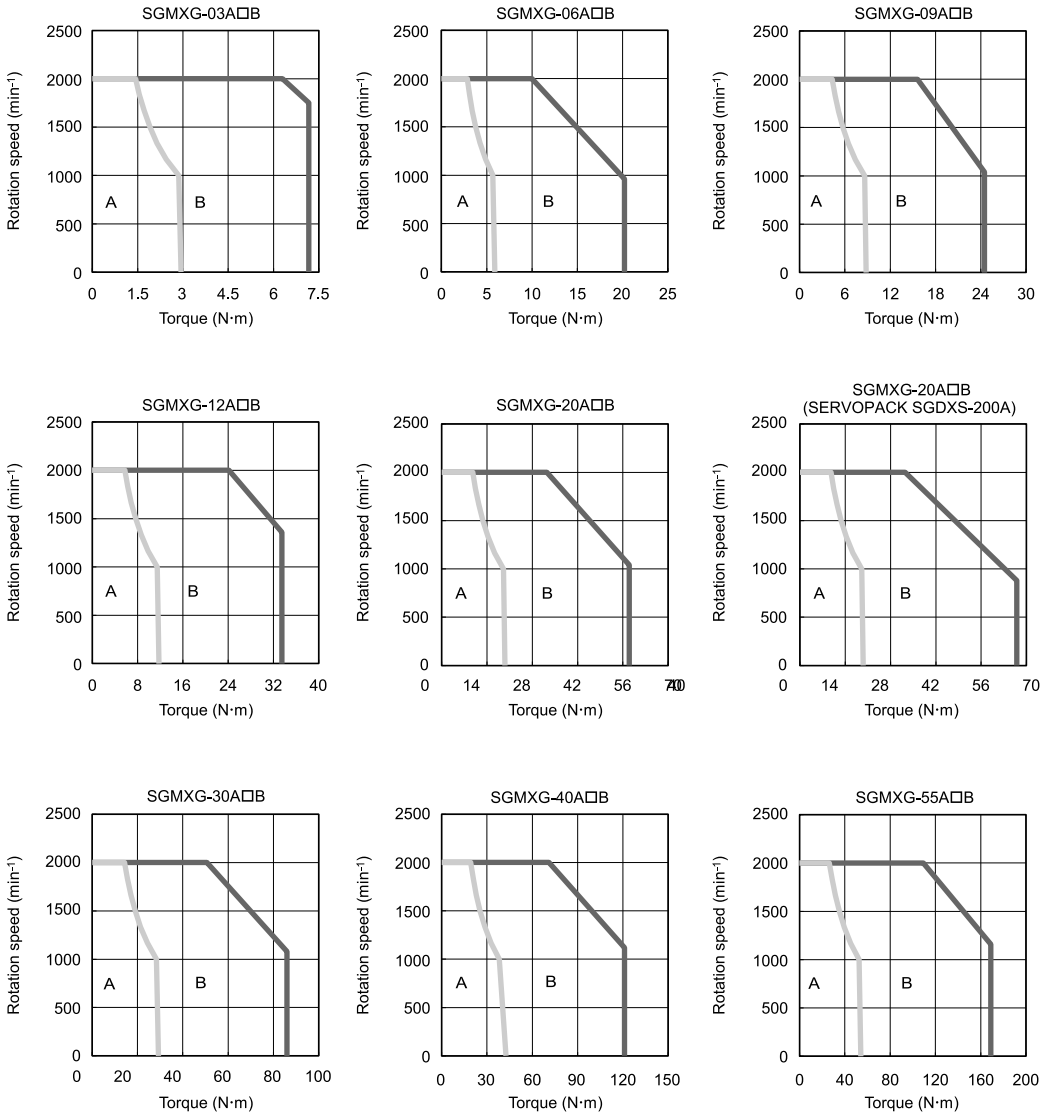
*9 To externally connect a dynamic brake resistor, select hardware option specification 0020 for the SERVOPACK.

*10 Design the mechanical system so that the thrust and radial loads applied to the servomotor shaft end during operation do not exceed the values given in the table.



6.3.3 Torque-Rotation Speed Characteristics

A : Continuous duty zone ——— (solid lines): Three-phase, 200 V
B : Intermittent duty zone ····· (dotted lines): Single-phase, 200 V



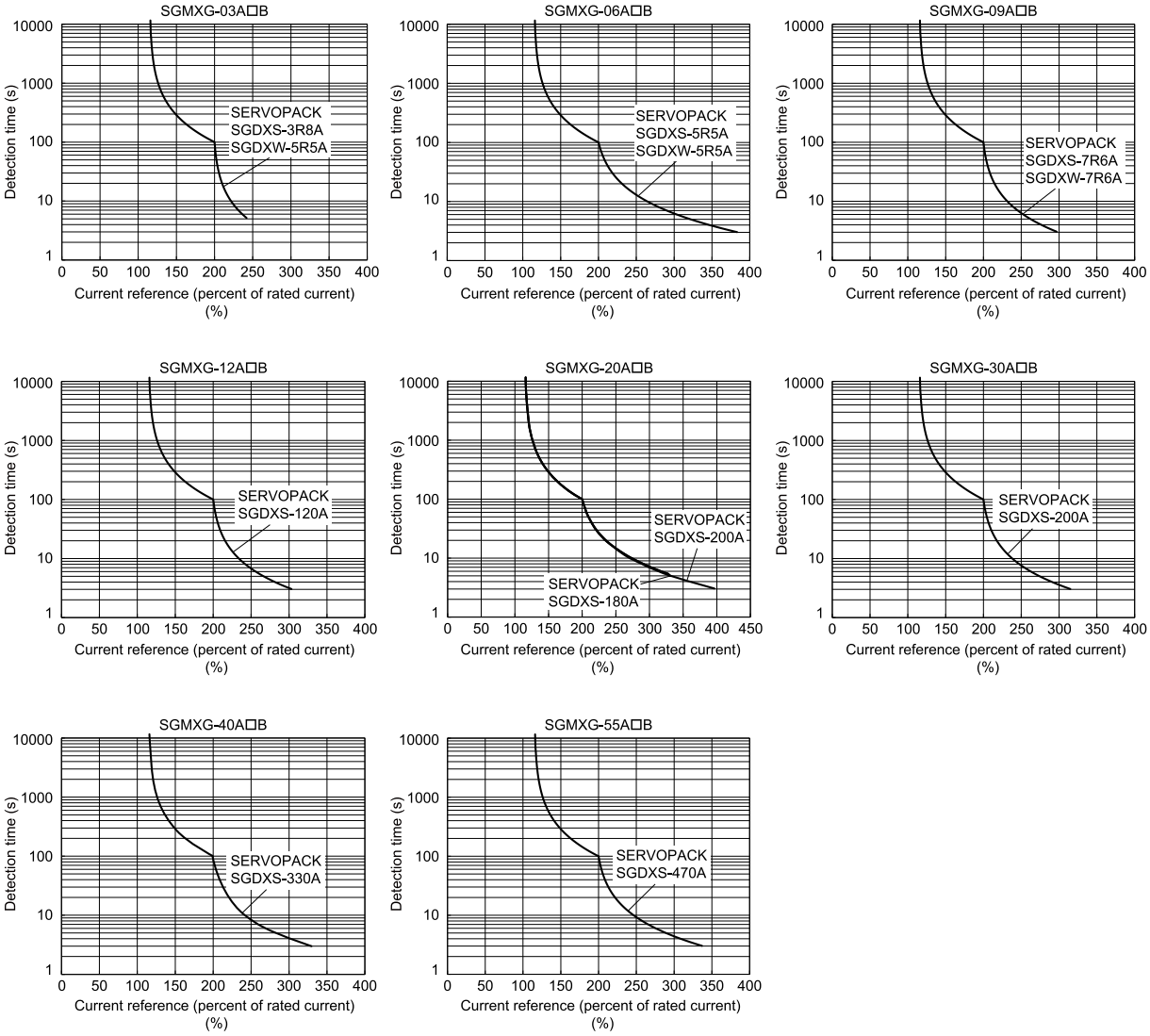
Note:

- These values (typical values) are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C.
- The characteristics in the intermittent duty zone depend on the power supply voltage.
- If the effective torque is within the allowable range for the rated torque, the servomotor can be used within the intermittent duty zone.
- If you use a servomotor main circuit cable that exceeds 20 m, the intermittent duty zone in the torque-rotation speed characteristics will become smaller because the voltage drop increases.

6.3.4 Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions with a servomotor surrounding air temperature of 40° C.

For the overload detection level, priority is given to the lower of the detection levels in the overload protection characteristics of the connected SERVOPACK and servomotor.



Note:

- The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
  Use the servomotor so that the effective torque remains within the continuous duty zone given in "*6.3.3 Torque-Rotation Speed Characteristics on page 159*".
- The value for the instantaneous maximum current / rated current (%) for each servomotor is taken as the current reference maximum value.

6.3.5 Allowable Load Moment of Inertia

The allowable load moments of inertia (rotor moment of inertia ratios) for the servomotors are given in "*6.3.2 Servomotor Ratings on page 157*". The values are determined by the regenerative energy processing capacity of the SERVOPACK and are also affected by the drive conditions of the servomotor. Perform the required steps for each of the following cases.

(1) Exceeding the Allowable Load Moment of Inertia

Use one of the following measures to adjust the load moment of inertia to within the allowable value.

- Reduce the torque limit.
- Reduce the deceleration rate.
- Reduce the maximum rotation speed.

If the above steps are not possible, install an external regenerative resistor.

Information An Overvoltage Alarm (A.400) is likely to occur during deceleration if the load moment of inertia exceeds the allowable load moment of inertia. SERVOPACKs with a built-in regenerative resistor may generate a Regenerative Overload Alarm (A.320).

Refer to the following catalog for the regenerative power (W) that can be processed by the SERVOPACKs.

AC Servo Drives Σ-X Series (Document No.: KAEP C710812 03)

Install an external regenerative resistor when the built-in regenerative resistor cannot process all of the regenerative power.

(2) When an External Regenerative Resistor Is Required

Install the external regenerative resistor.

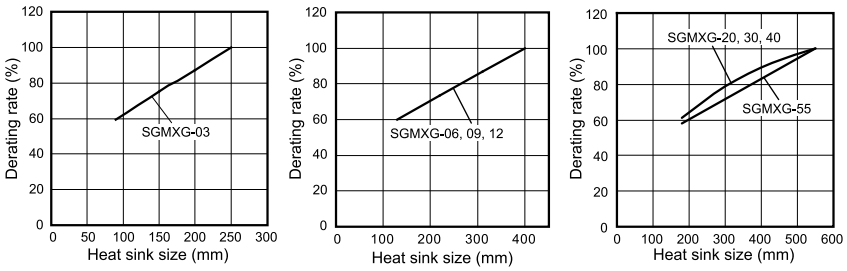
Refer to the following catalog for details on external regenerative resistors.

AC Servo Drives Σ-X Series (Document No.: KAEP C710812 03)

6.3.6 Derating Rates

(1) Servomotor Heat Dissipation Conditions

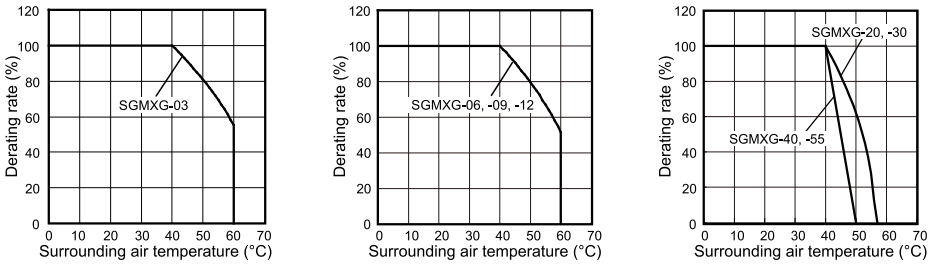
The servomotor ratings are the continuous allowable values when a heat sink is installed on the servomotor. If the servomotor is mounted on a small device component, the servomotor temperature may rise considerably because the surface for heat dissipation becomes smaller. Refer to the following graphs for the relation between the heat sink size and derating rate.



Important
- The actual temperature rise depends on the following conditions. Always check the servomotor temperature with the actual equipment.
- How the heat sink (the servomotor mounting section) is attached to the installation surface
- Status between heat sink and servomotor (sealant, reduction gear, etc.)
- What material is used for the servomotor mounting section
- Servomotor rotation speed

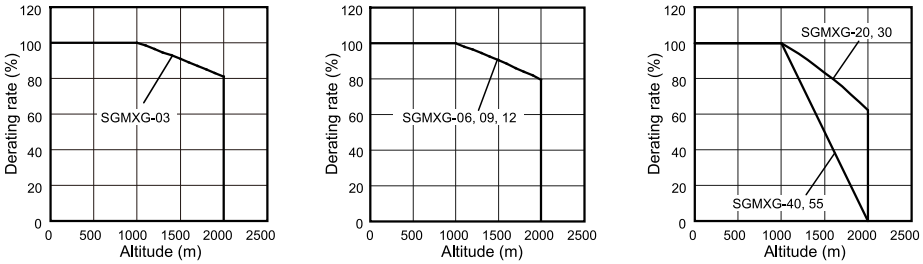
(2) Servomotor Derating Rates for Surrounding Air Temperature

Apply a suitable derating rate from the following graphs according to the surrounding air temperature of the servomotor (60°C max.).



(3) Applications Where the Altitude Exceeds 1000 m

The servomotor ratings are the continuous allowable values at an altitude of 1000 m or less. If you use a servomotor at an altitude that exceeds 1000 m (2000 m max.), the heat dissipation effect of the air is reduced. Apply the appropriate derating rate from the following graphs.



Note:

- When using servomotors with derating, change the detection timing of overload warning and overload alarm based on the overload detection level of the motor given in "*6.3.4 Servomotor Overload Protection Characteristics on page 159*".
- Use the combination of the SERVOPACK and servomotor so that the derating conditions are satisfied for both the SERVOPACK and servomotor.
- The derating rates are applicable only when the average rotation speed is less than or equal to the rated rotation speed. If the average rotation speed exceeds the rated rotation speed, consult with your Yaskawa representative.

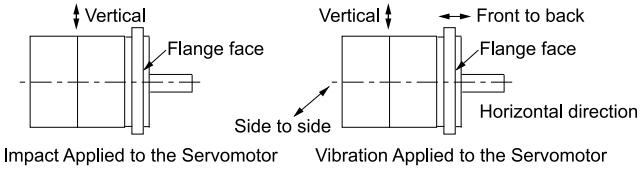
6.4 Specifications and Ratings (400 V, 1500-min-1 Specification)

6.4.1 Specification

Voltage		400 V									
Model SGMXG-		05D□A	09D□A	13D□A	20D□A	30D□A	44D□A	55D□A	75D□A	1AD□A	1ED□A
Time Rating		Continuous									
Thermal Class		UL: F, CE: F									
Insulation Resistance		500 VDC, 10 MΩ min.									
Withstand Voltage		1,800 VAC for 1 minute, or 2,200 VAC for 1 second									
Excitation		Permanent magnet									
Mounting		Flange-mounted									
Drive Method		Direct drive									
Rotation Direction		Counterclockwise (CCW) for forward reference when viewed from the load side									
Vibration Class *1		V15									
Environmental Conditions	Surrounding Air Temperature	0°C to 40°C (60°C max.) *3									
	Surrounding Air Humidity	20% to 80% relative humidity (with no 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. • Must have an altitude of 1000 m or less. (With derating, usage is possible between 1000 m and 2000 m.) *3 • 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 +60°C (with no freezing) Storage humidity: 20% to 80% relative humidity (with no condensation)									
Impact Resistance *2	Impact Acceleration (at Flange)	490 m/s²									
	Number of Impacts	2 times									
Vibration Resistance *2	Vibration Acceleration (at Flange)	49 m/s² (24.5 m/s² front to back)						24.5 m/s²			
Applicable SERVOPACKs *4	SGDXS	1R9D	3R5D (5R4D) *4	5R4D (8R4D) *4	8R4D (120D) *4	120D (210A) *4	170D (260D) *4	210D (370D) *4	260D	280D	370D

*1 A vibration class of V15 indicates a vibration amplitude of 15 μm maximum on the servomotor without a load at the rated rotation speed.

*2 The given values are for when the servomotor 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 servomotor can withstand depends on the application. Always check the vibration acceleration that is applied to the servomotor with the actual equipment.



Impact Applied to the Servomotor Vibration Applied to the Servomotor

*3 Refer to the following section for the derating rates.
☞ 6.4.7 Derating Rates on page 170

*4 To increase the instantaneous maximum torque, use the SERVOPACK model in parentheses ( ).
Refer to the following section for the instantaneous maximum torque for individual SERVOPACK models.
☞ 6.4.2 Servomotor Ratings (SGMXG-05D□A to -30D□A) on page 164
☞ 6.4.3 Servomotor Ratings (SGMXG-44D□A to -1ED□A) on page 165
☞ 6.4.4 Torque-Rotation Speed Characteristics on page 168

6.4.2 Servomotor Ratings (SGMXG-05D□A to -30D□A)

Voltage			400 V				
Model SGMXG-			05D□A	09D□A	13D□A	20D□A	30D□A
Rated Output *1		kW	0.45	0.85	1.3	1.8	2.9
Rated Torque *1, *2		N·m	2.86	5.39	8.34	11.5	18.6
Instantaneous Maximum Torque *1		N·m	8.92	14.2 20.0 *3	23.3 30.0 *4	28.7 35.4 *5	45.1 66.8 *6
Rated Current *1		Arms	1.9	3.5	5.4	8.4	11.9
Instantaneous Maximum Current *1		Arms	5.5	8.5 14 *3	14 20 *4	21 28 *5	28 45 *6
Rated Rotation Speed *1		min-1	1500				
Continuous Allowable Rotation Speed		min-1	4000			3000	
Maximum Rotation Speed *1		min-1	4000				
Torque Constant *1		N·m/Arms	1.71	1.72	1.78	1.50	1.69
Rotor Moment of Inertia *7	Without Holding Brakes	×10-4 kg·m2	3.33	13.9	19.9	26.0	46.0
	With Holding Brakes		3.58	16.0	22.0	28.1	53.9
Rated Power Rate *1	Without Holding Brakes	kW/s	24.6	20.9	35.0	50.9	75.2
	With Holding Brakes		22.9	18.2	31.6	47.1	64.2
Rated Angular Acceleration *1	Without Holding Brakes	rad/s2	8590	3880	4190	4420	4040
	With Holding Brakes		7990	3370	3790	4090	3450
Heat Sink Size *8		mm	250 ×250 × 6 (aluminum)	400 × 400 × 20 (steel)			550 ×550 × 30 (steel)
Protective Structure *9			Totally enclosed, self-cooled, IP67				
Holding Brake Specification *10	Rated Voltage	V	24 VDC +10% 0				
	Capacity	W	10				18.5
	Holding Torque	N·m	4.5	12.7	19.6		43.1
	Coil Resistance	Ω (at 20°C)	56	59			31
	Rated Current	A (at 20°C)	0.43	0.41			0.77
	Time Required to Release Brake	ms	100				170
	Time Required to Brake	ms	80				100
Allowable Load Moment of Inertia (Rotor Moment of Inertia Ratio) *11	At 3000 min-1		15 times	5 times			
	At 4000 min-1		8.4 times	2 times		5 times	2.2 times
	With External Regenerative Resistor and External Dynamic Brake Resistor *12	At 3000 min-1	15 times	10 times			
		At 4000 min-1	8.4 times	8 times	9 times	7 times	5 times

Continued on next page.

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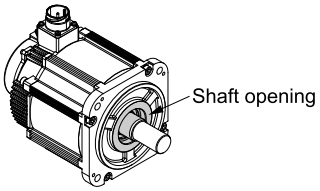
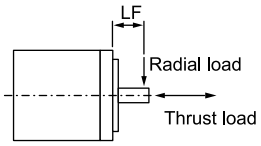
Voltage			400 V				
Model SGMXG-			05D□A	09D□A	13D□A	20D□A	30D□A
Allowable Shaft Loads *13	LF	mm	40	58			79
	Allowable Radial Load	N	490		686	980	1470
	Allowable Thrust Load	N	98		343	392	490

*1 These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C. These are typical values.
*2 The rated torques are the continuous allowable torque values with an aluminum or steel heat sink of the dimensions given in the table.
*3 This is the value if you combine with the SERVOPACK SGDXS-5R4D.
*4 This is the value if you combine with the SERVOPACK SGDXS-8R4D.
*5 This is the value if you combine with the SERVOPACK SGDXS-120D.
*6 This is the value if you combine with the SERVOPACK SGDXS-210D.
*7 The values for the servomotors with batteryless absolute encoders (and holding brakes) are the same as those in the table.
*8 Refer to the following section for the relation between the heat sinks and derating rate.
☞ *(1) Servomotor Heat Dissipation Conditions on page 170*
*9 This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.



*10 Observe the following precautions if you use a servomotor with a holding brake.
- The holding brake cannot be used to stop the servomotor.
- The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
- The 24-VDC power supply is not provided by Yaskawa.

*11 The rotor moment of inertia scaling factor is the value for a standard servomotor without a holding brake.
*12 To externally connect a dynamic brake resistor, select hardware option specification 0020 for the SERVOPACK.
*13 Design the mechanical system so that the thrust and radial loads applied to the servomotor shaft end during operation do not exceed the values given in the table.



6.4.3 Servomotor Ratings (SGMXG-44D□A to -1ED□A)

Voltage		400 V				
Model SGMXG-		44D□A	55D□A	75D□A	1AD□A	1ED□A
Rated Output *1	kW	4.4	5.5	7.5	11	15
Rated Torque *1, *2	N·m	28.4	35.0	48.0	70.0	95.4
Instantaneous Maximum Torque *1	N·m	71.6 95.6 *3	102 134 *4	119	175	224
Rated Current *1	Arms	16.0	18.6	25.7	28.1	37.0
Instantaneous Maximum Current *1	Arms	41 56 *3	55 75 *4	63	70	85
Rated Rotation Speed *1	min-1	1500				
Continuous Allowable Rotation Speed	min-1	3000			2000	
Maximum Rotation Speed *1	min-1	4000			3000	
Torque Constant *1	N·m/Arms	1.92	2.05	1.97	2.76	2.86

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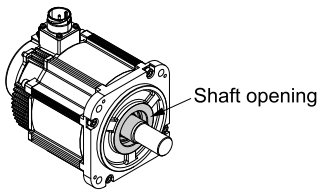
Voltage			400 V				
Model SGMXG-			44D□A	55D□A	75D□A	1AD□A	1ED□A
Rotor Moment of Inertia *5	Without Holding Brakes	×10^{-4} kg·m^2	67.5	89.0	125	242	303
	With Holding Brakes		75.4	96.9	133	261	341
Rated Power Rate *1	Without Holding Brakes	kW/s	119	138	184	202	300
	With Holding Brakes		107	126	173	188	267
Rated Angular Acceleration *1	Without Holding Brakes	rad/s^2	4210	3930	3840	2890	3150
	With Holding Brakes		3770	3610	3610	2680	2800
Heat Sink Size *6		mm	550 × 550 × 30 (steel)			650 ×650 × 35 (steel)	
Protective Structure *7			Totally enclosed, self-cooled, IP67				
Holding Brake Specification *8	Rated Voltage	V	24 VDC $^{+10\%}_{0}$				
	Capacity	W	18.5	25		32	35
	Holding Torque	N·m	43.1	72.6		84.3	114.6
	Coil Resistance	Ω (at 20°C)	31	23		18	17
	Rated Current	A (at 20°C)	0.77	1.05		1.33	1.46
	Time Required to Release Brake	ms	170				250
	Time Required to Brake	ms	100	80			
Allowable Load Moment of Inertia (Rotor Moment of Inertia Ratio) *9	At 2000 min^{-1}		–			5 times	
	At 3000 min^{-1}		5 times			2.2 times	1.5 times
	At 4000 min^{-1}		2.4 times	3.5 times	2.2 times	–	
	With External Regenerative Resistor and External Dynamic Brake Resistor *10	At 2000 min^{-1}	–			10 times	
		At 3000 min^{-1}	10 times			4 times	2 times
		At 4000 min^{-1}	5 times		4 times	–	
Allowable Shaft Loads *11	LF	mm	79	113		116	
	Allowable Radial Load	N	1470	1764			4998
	Allowable Thrust Load	N	490	588			2156

*1 These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C. These are typical values.
*2 The rated torques are the continuous allowable torque values with an aluminum or steel heat sink of the dimensions given in the table.
*3 This is the value if you combine with the SERVOPACK SGDXS-260D.
*4 This is the value if you combine with the SERVOPACK SGDXS-370D.
*5 The values for the servomotors with batteryless absolute encoders (and holding brakes) are the same as those in the table.
*6 Refer to the following section for the relation between the heat sinks and derating rate.
☞ *(1) Servomotor Heat Dissipation Conditions on page 170*
*7 This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.



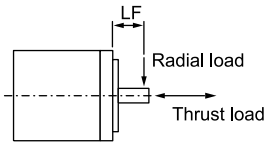
*8 Observe the following precautions if you use a servomotor with a holding brake.

- The holding brake cannot be used to stop the servomotor.
- The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
- The 24-VDC power supply is not provided by Yaskawa.

*9 The rotor moment of inertia scaling factor is the value for a standard servomotor without a holding brake.

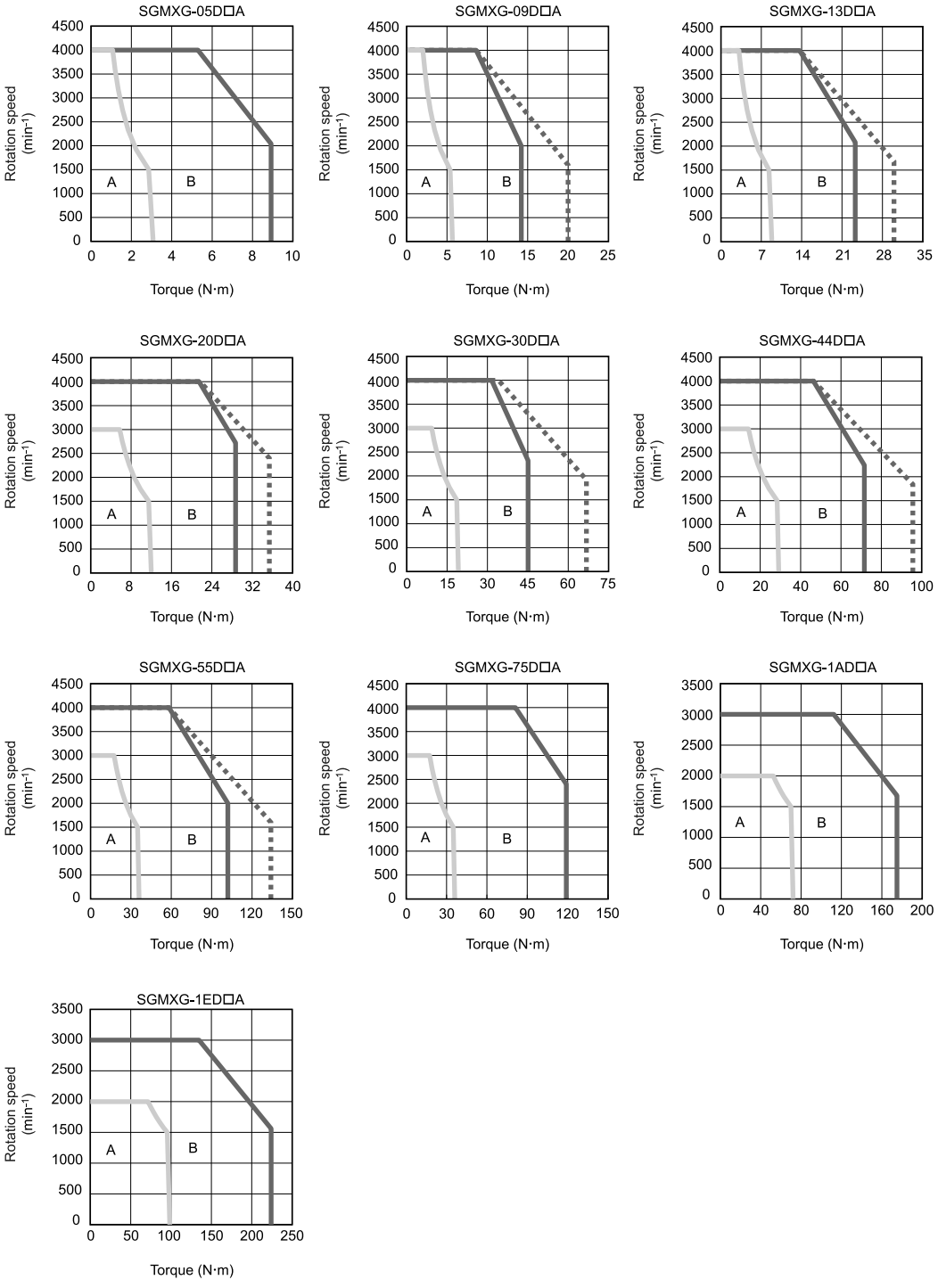
*10 To externally connect a dynamic brake resistor, select hardware option specification 0020 for the SERVOPACK.

*11 Design the mechanical system so that the thrust and radial loads applied to the servomotor shaft end during operation do not exceed the values given in the table.



6.4.4 Torque-Rotation Speed Characteristics

A : Continuous duty zone
B : Intermittent duty zone
(solid lines): Three-phase, 400 V
(dotted lines): Three-phase 400 V (with changed SERVOPACK combination (refer to chapters 6.2.2 and 6.2.3))



Note:

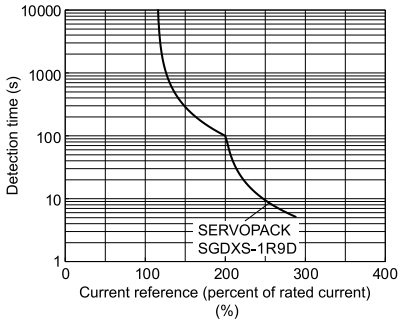
- These values (typical values) are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C.
- The characteristics in the intermittent duty zone depend on the power supply voltage.
- If the effective torque is within the allowable range for the rated torque, the servomotor can be used within the intermittent duty zone.
- If you use a servomotor main circuit cable that exceeds 20 m, the intermittent duty zone in the torque-rotation speed characteristics will become smaller because the voltage drop increases.

6.4.5 Servomotor Overload Protection Characteristics

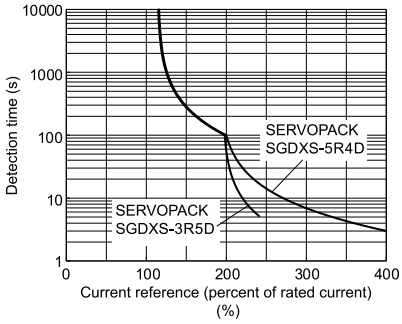
The overload detection level is set for hot start conditions with a servomotor surrounding air temperature of 40° C.

For the overload detection level, priority is given to the lower of the detection levels in the overload protection characteristics of the connected SERVOPACK and servomotor.

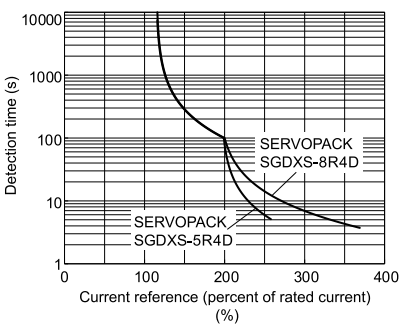
SGMXG-05D□A



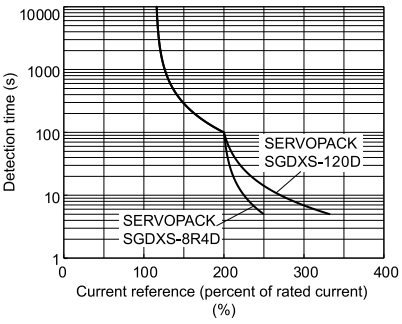
SGMXG-09D□A



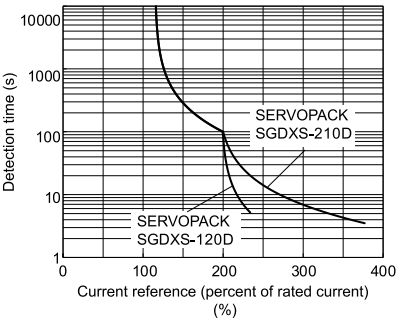
SGMXG-13D□A



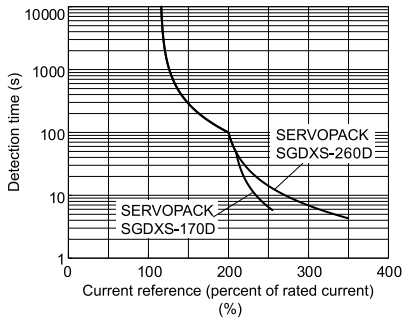
SGMXG-20D□A



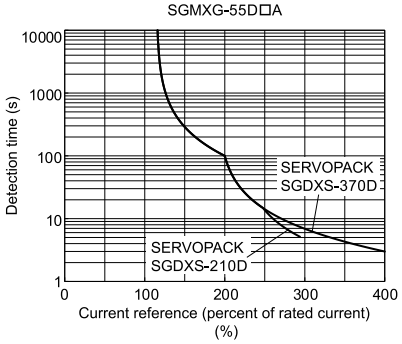
SGMXG-30D□A



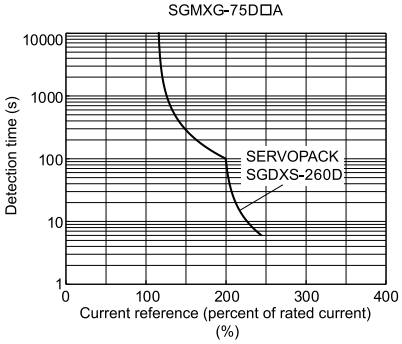
SGMXG-44D□A



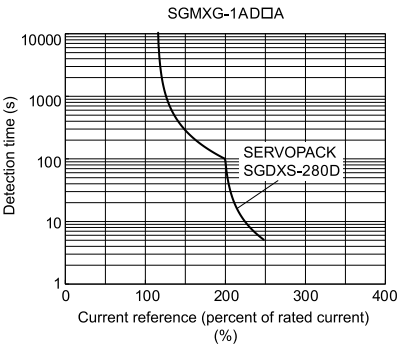
SGMXG-55D□A



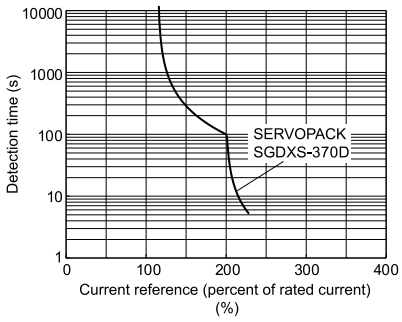
SGMXG-75D□A



SGMXG-1AD□A



SGMXG-1ED□A



Note:

- The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
  Use the servomotor so that the effective torque remains within the continuous duty zone given in "*6.4.4 Torque-Rotation Speed Characteristics on page 168*".
- The value for the instantaneous maximum current / rated current (%) for each servomotor is taken as the current reference maximum value.

6.4.6 Allowable Load Moment of Inertia

The allowable load moments of inertia (rotor moment of inertia ratios) for the servomotors are given in "*6.4.2 Servomotor Ratings (SGMXG-05D□A to -30D□A) on page 164*, *6.4.3 Servomotor Ratings (SGMXG-44D□A to -1ED□A) on page 165*". The values are determined by the regenerative energy processing capacity of the SERVOPACK and are also affected by the drive conditions of the servomotor. Perform the required steps for each of the following cases.

(1) Exceeding the Allowable Load Moment of Inertia

Use one of the following measures to adjust the load moment of inertia to within the allowable value.

- Reduce the torque limit.
- Reduce the deceleration rate.
- Reduce the maximum rotation speed.

If the above steps are not possible, install an external regenerative resistor.

Information

An Overvoltage Alarm (A.400) is likely to occur during deceleration if the load moment of inertia exceeds the allowable load moment of inertia. SERVOPACKs with a built-in regenerative resistor may generate a Regenerative Overload Alarm (A.320).

Refer to the following catalog for the regenerative power (W) that can be processed by the SERVOPACKs.

AC Servo Drives Σ-X Series (Document No.: KAEP C710812 03)

Install an external regenerative resistor when the built-in regenerative resistor cannot process all of the regenerative power.

(2) When an External Regenerative Resistor Is Required

Install the external regenerative resistor.

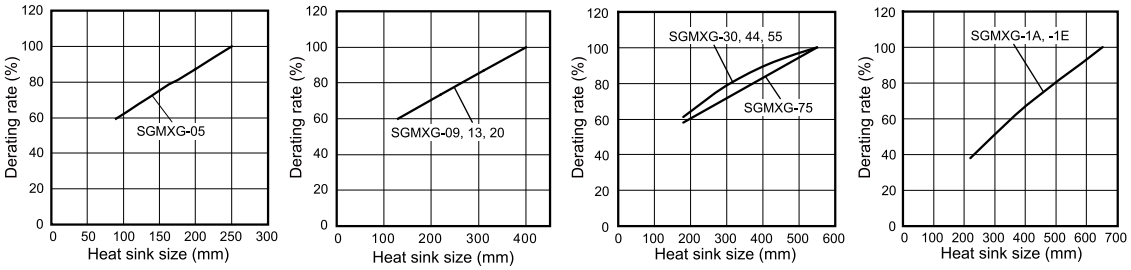
Refer to the following catalog for details on external regenerative resistors.

AC Servo Drives Σ-X Series (Document No.: KAEP C710812 03)

6.4.7 Derating Rates

(1) Servomotor Heat Dissipation Conditions

The servomotor ratings are the continuous allowable values when a heat sink is installed on the servomotor. If the servomotor is mounted on a small device component, the servomotor temperature may rise considerably because the surface for heat dissipation becomes smaller. Refer to the following graphs for the relation between the heat sink size and derating rate.



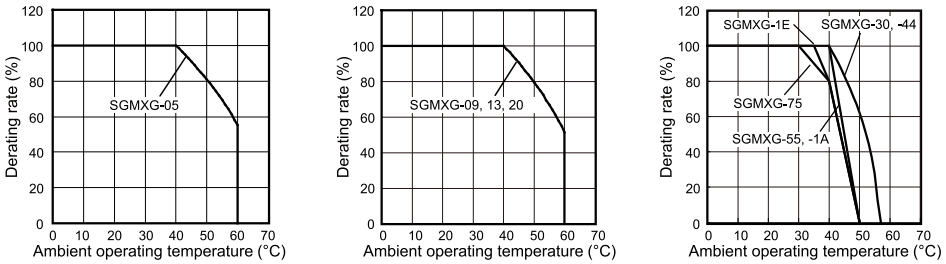
Important

The actual temperature rise depends on the following conditions. Always check the servomotor temperature with the actual equipment.

- How the heat sink (the servomotor mounting section) is attached to the installation surface
- Status between heat sink and servomotor (sealant, reduction gear, etc.)
- What material is used for the servomotor mounting section
- Servomotor rotation speed

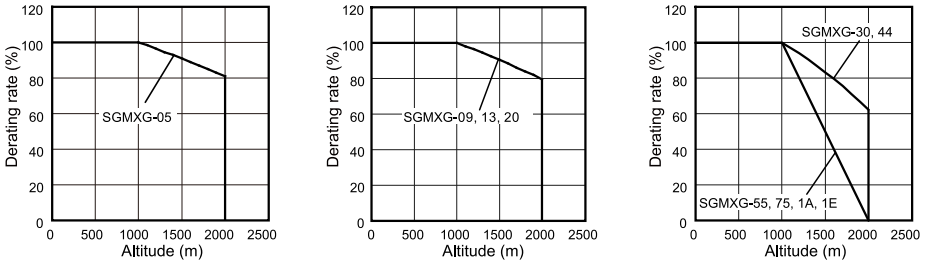
(2) Servomotor Derating Rates for Surrounding Air Temperature

Apply a suitable derating rate from the following graphs according to the surrounding air temperature of the servomotor (60°C max.).



(3) Applications Where the Altitude Exceeds 1000 m

The servomotor ratings are the continuous allowable values at an altitude of 1000 m or less. If you use a servomotor at an altitude that exceeds 1000 m (2000 m max.), the heat dissipation effect of the air is reduced. Apply the appropriate derating rate from the following graphs.



Note:

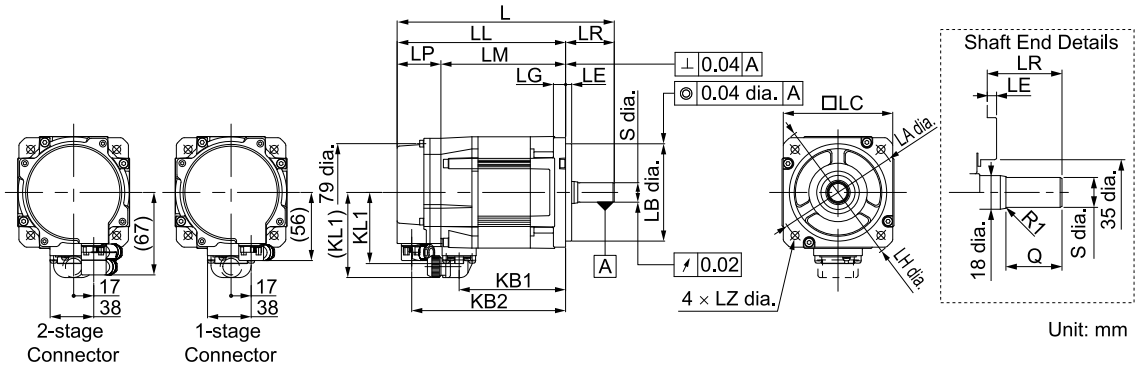
- When using servomotors with derating, change the detection timing of overload warning and overload alarm based on the overload detection level of the motor given in "*6.4.5 Servomotor Overload Protection Characteristics on page 169*".
- Use the combination of the SERVOPACK and servomotor so that the derating conditions are satisfied for both the SERVOPACK and servomotor.
- The derating rates are applicable only when the average rotation speed is less than or equal to the rated rotation speed. If the average rotation speed exceeds the rated rotation speed, consult with your Yaskawa representative.

6.5 External Dimensions (200 V Specification)

6.5.1 SGMXG-03A□A, -05A□A, -03A□B

(1) Servomotors without Holding Brakes

(a) Standard Specification



Model SGMXG-	L *1	LL *1	LM	LP *1	LR	KB1	KB2 *1	KL1 (KL1)
03A□A21A1	164	124	90	34	40	75	112	59 (70)
05A□A21A1	177	137	103	34	40	88	125	59 (70)
03A□B21A1	177	137	103	34	40	88	125	59 (70)

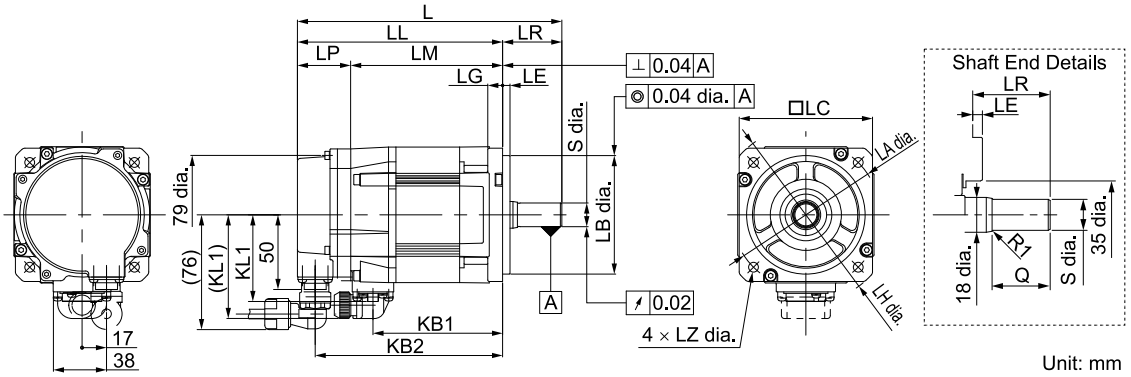
Model SGMXG-	Flange Dimensions							Shaft End Dimensions		Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	Q	
03A□A21A1	100	$80^{0}_{-0.030}$	90	5	10	120	6.6	$16^{0}_{-0.011}$	30	2.6
05A□A21A1	100	$80^{0}_{-0.030}$	90	5	10	120	6.6	$16^{0}_{-0.011}$	30	3.2
03A□B21A1	100	$80^{0}_{-0.030}$	90	5	10	120	6.6	$16^{0}_{-0.011}$	30	3.2

*1 For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the following section for the values for individual models.
☞ *6.5.5 Dimensions of Servomotors with Batteryless Absolute Encoders on page 190*

Note:

1. The dimensions are same for models with oil seals.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications.
☞ *(c) Shaft End Specification on page 173*

(b) Σ-7 Compatible Specification



Unit: mm

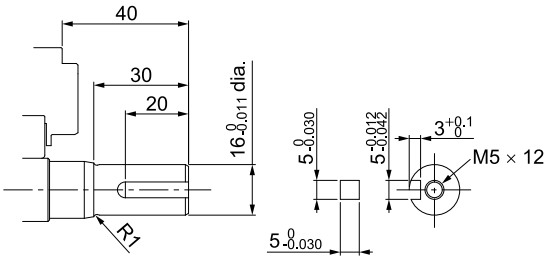
Note:

The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

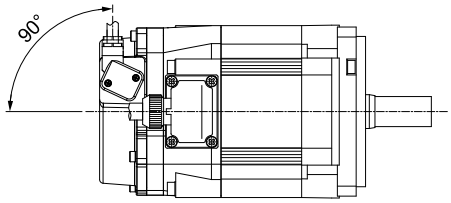
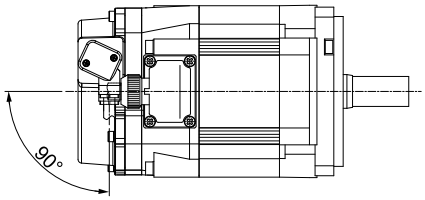
(c) Shaft End Specification

- Straight with Key and Tap



(d) Connector Specifications

- Encoder Connector (26-bit Encoder): Standard Specification
  The encoder cable is installed in the following direction.

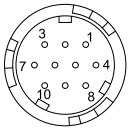
Cable Installed toward Left Side	Cable Installed toward Right Side
	

For details on selecting cables, refer to the following section and manual.

☞ *8.5 Cables for the SGMXG Servomotors on page 269*

🕮 Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

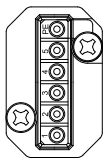
- Encoder Connector (26-bit Encoder): Σ-7 Compatible Specification



1	PS	6 *1	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5	BAT(-)	10	FG (frame ground)

*1 A battery is required only for an absolute encoder.
Receptacle: CMV1-R10P
Applicable plug (not provided by Yaskawa)
Plug: CM10-AP10S-□-D (R1) (right-angle type), CM10-SP10S-□-D (R1) (straight), CMV1-AP10S-□□ (right-angle type), CMV1-SP10S-□□ (straight), CMV1S-AP10S-□□ (right-angle type), CMV1S-SP10S-□□ (straight)
(□ varies depending on the applicable cable size.)
Manufacturer: DDK Ltd.

- Servomotor Connector: Same for both Standard Specifications and Σ-7 Compatible Specifications

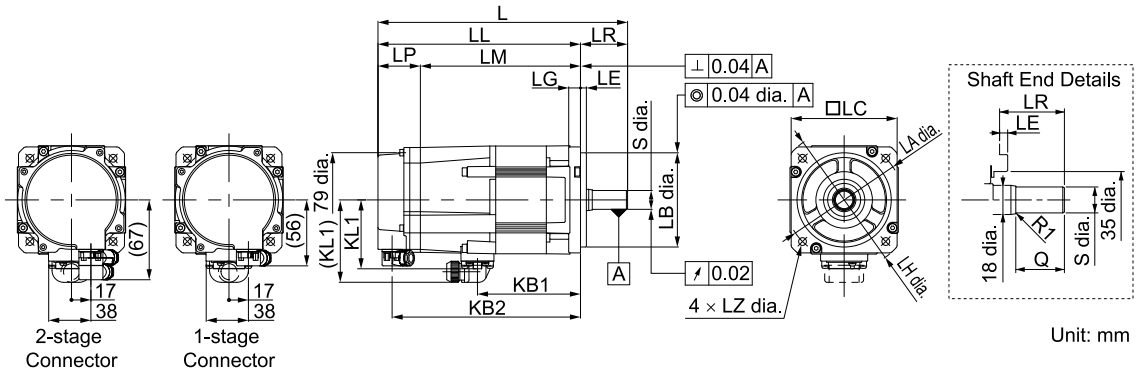


PE	FG (frame ground)	3	Phase U
5	–	2	Phase V
4	–	1	Phase W

Manufacturer: Japan Aviation Electronics Industry, Ltd.

(2) Servomotors with Holding Brakes

(a) Standard Specification



Model SGMXG-	L *1	LL *1	LM	LP *1	LR	KB1	KB2 *1	KL1 (KL1)
03A□A2CA1	197	157	123	34	40	75	145	59 (70)
05A□A2CA1	210	170	136	34	40	88	158	59 (70)
03A□B2CA1	210	170	136	34	40	88	158	59 (70)

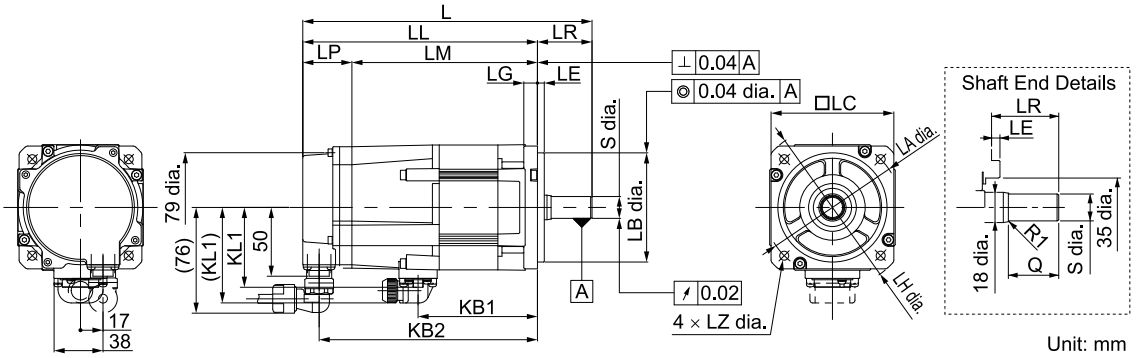
Model SGMXG-	Flange Dimensions							Shaft End Dimensions		Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	Q	
03A□A2CA1	100	$80^{0}_{-0.030}$	90	5	10	120	6.6	$16^{0}_{-0.011}$	30	3.6
05A□A2CA1	100	$80^{0}_{-0.030}$	90	5	10	120	6.6	$16^{0}_{-0.011}$	30	4.2
03A□B2CA1	100	$80^{0}_{-0.030}$	90	5	10	120	6.6	$16^{0}_{-0.011}$	30	4.2

*1 For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the following section for the values for individual models.
☞ *6.5.5 Dimensions of Servomotors with Batteryless Absolute Encoders on page 190*

Note:

1. The dimensions are same for models with oil seals.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications.
☞ *(c) Shaft End Specification on page 175*

(b) Σ-7 Compatible Specification



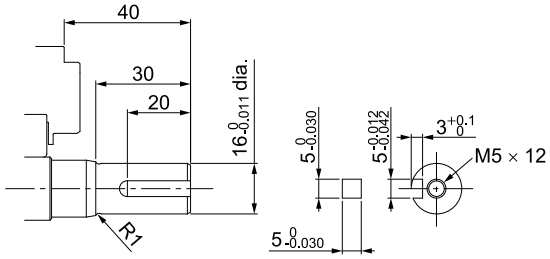
Note:

The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

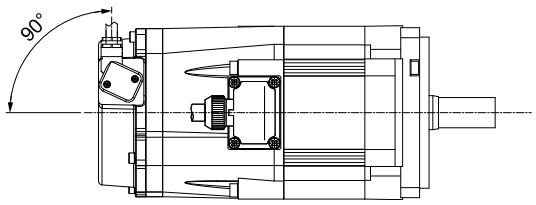
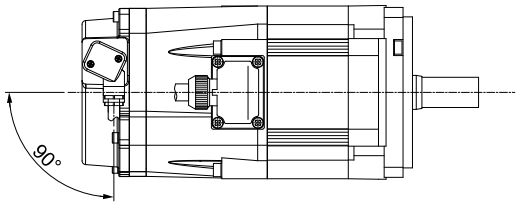
(c) Shaft End Specification

- Straight with Key and Tap



(d) Connector Specifications

- Encoder Connector (26-bit Encoder): Standard Specification
  The encoder cable is installed in the following direction.

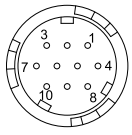
Cable Installed toward Left Side	Cable Installed toward Right Side
	

For details on selecting cables, refer to the following section and manual.

☞ *8.5 Cables for the SGMXG Servomotors on page 269*

🕮 Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

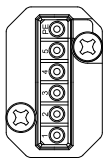
- Encoder Connector (26-bit Encoder): Σ-7 Compatible Specification



1	PS	6 *1	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5	BAT(-)	10	FG (frame ground)

*1 A battery is required only for an absolute encoder.
Receptacle: CMV1-R10P
Applicable plug (not provided by Yaskawa)
Plug: CM10-AP10S-□-D (R1) (right-angle type), CM10-SP10S-□-D (R1) (straight), CMV1-AP10S-□□ (right-angle type), CMV1-SP10S-□□ (straight), CMV1S-AP10S-□□ (right-angle type), CMV1S-SP10S-□□ (straight)
(□ varies depending on the applicable cable size.)
Manufacturer: DDK Ltd.

- Servomotor Connector: Same for both Standard Specifications and Σ-7 Compatible Specifications



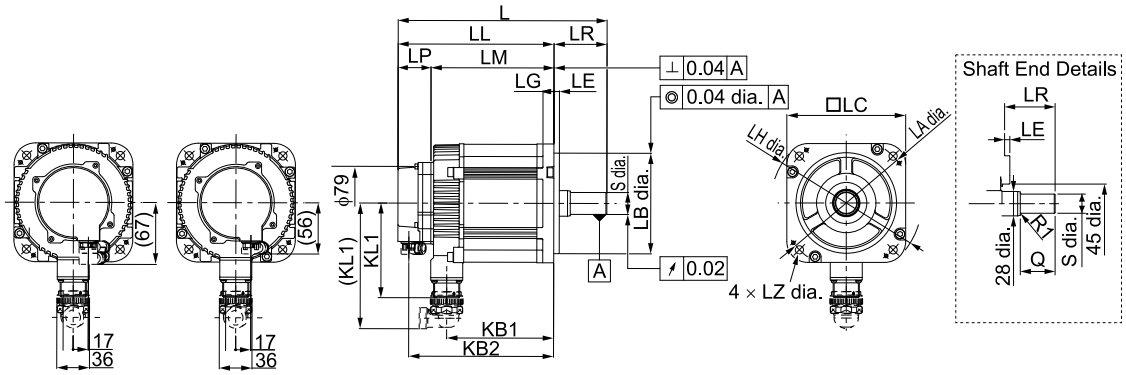
PE	FG (frame ground)	3	Phase U
5	Brake terminal	2	Phase V
4	Brake terminal	1	Phase W

Manufacturer: Japan Aviation Electronics Industry, Ltd.

6.5.2 SGMXG-09A□A to -20A□A, -06A□B to -12A□B

(1) Servomotors without Holding Brakes

(a) Standard Specification



Model SGMXG-	L *1	LL *1	LM	LP *1	LR	KB1	KB2 *1	KL1 (KL1 *2)
09A□A21A1	193	135	101	34	58	83	123	104 (138)
13A□A21A1	209	151	117	34	58	99	139	104 (138)
20A□A21A1	227	169	135	34	58	117	157	104 (138)
06A□B21A1	193	135	101	34	58	83	123	104 (138)
09A□B21A1	209	151	117	34	58	99	139	104 (138)
12A□B21A1	227	169	135	34	58	117	157	104 (138)

Model SGMXG-	Flange Dimensions							Shaft End Dimensions		Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	Q	
09A□A21A1	145	$110^{0}_{-0.035}$	130	6	12	165	9	$24^{0}_{-0.013}$	40	5.5
13A□A21A1	145	$110^{0}_{-0.035}$	130	6	12	165	9	$24^{0}_{-0.013}$	40	7.1
20A□A21A1	145	$110^{0}_{-0.035}$	130	6	12	165	9	$24^{0}_{-0.013}$	40	8.6
06A□B21A1	145	$110^{0}_{-0.035}$	130	6	12	165	9	$24^{0}_{-0.013}$	40	5.5
09A□B21A1	145	$110^{0}_{-0.035}$	130	6	12	165	9	$24^{0}_{-0.013}$	40	7.1
12A□B21A1	145	$110^{0}_{-0.035}$	130	6	12	165	9	$24^{0}_{-0.013}$	40	8.6

*1 For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the following section for the values for individual models.

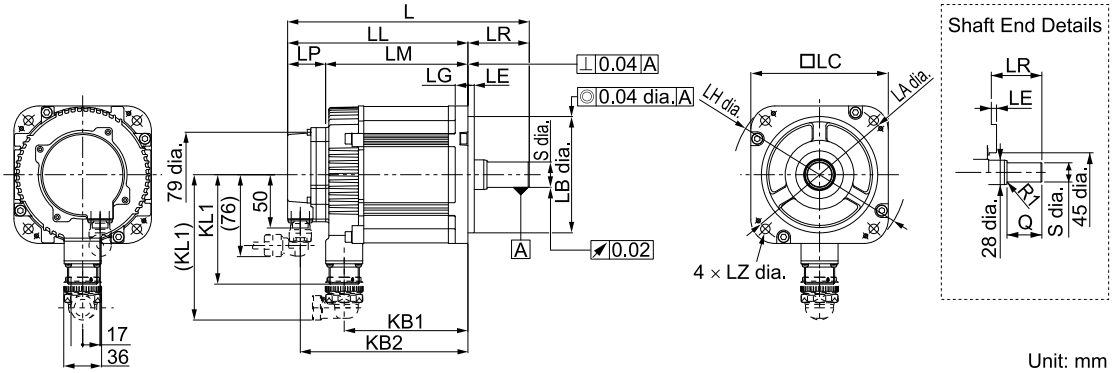
☞ *6.5.5 Dimensions of Servomotors with Batteryless Absolute Encoders on page 190*

*2 These are the values when the flexible connectors are connected.

Note:

1. The dimensions are same for models with oil seals.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications.
☞ *(c) Shaft End Specification on page 177*

(b) Σ-7 Compatible Specification



Unit: mm

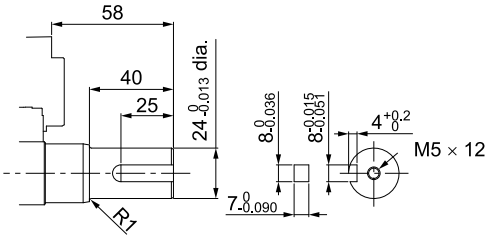
Note:

The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

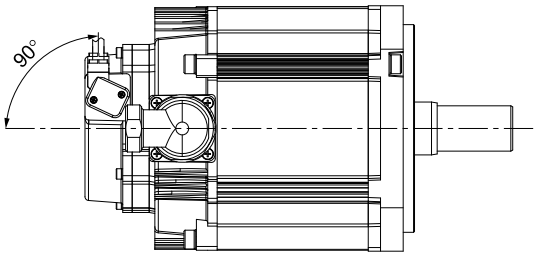
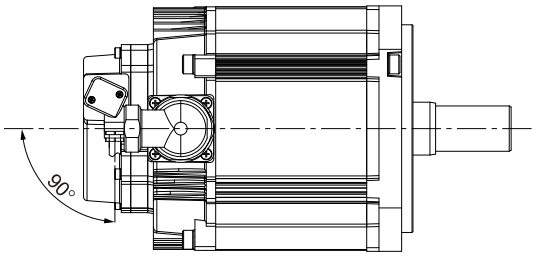
(c) Shaft End Specification

- Straight with Key and Tap



(d) Connector Specifications

- Encoder Connector (26-bit Encoder): Standard Specification
  The encoder cable is installed in the following direction.

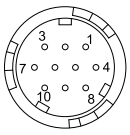
Cable Installed toward Left Side	Cable Installed toward Right Side
	

For details on selecting cables, refer to the following section and manual.

☞ *8.5 Cables for the SGMXG Servomotors on page 269*

Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

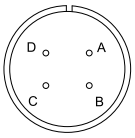
- Encoder Connector (26-bit Encoder): Σ-7 Compatible Specification



1	PS	6 *1	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5	BAT(-)	10	FG (frame ground)

*1 A battery is required only for an absolute encoder.
Receptacle: CMV1-R10P
Applicable plug (not provided by Yaskawa)
Plug: CM10-AP10S-□-D (R1) (right-angle type), CM10-SP10S-□-D (R1) (straight), CMV1-AP10S-□□ (right-angle type), CMV1-SP10S-□□ (straight), CMV1S-AP10S-□□ (right-angle type), CMV1S-SP10S-□□ (straight)
(□ varies depending on the applicable cable size.)
Manufacturer: DDK Ltd.

- Servomotor Connector: Same for both Standard Specifications and Σ-7 Compatible Specifications

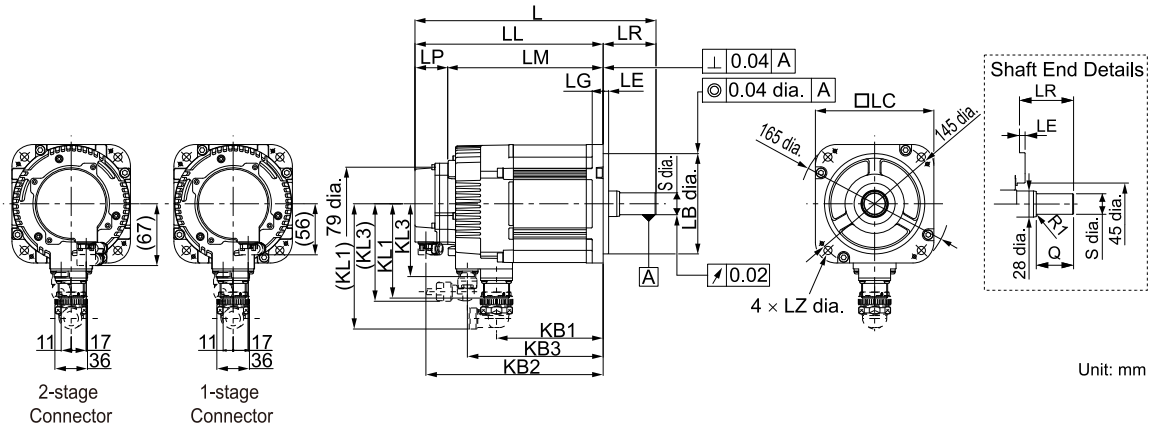


A	Phase U	C	Phase W
B	Phase V	D	FG (frame ground)

Manufacturer: Japan Aviation Electronics Industry, Ltd.

(2) Servomotors with Holding Brakes

(a) Standard Specification



Model SGMXG-	L *1	LL *1	LM	LP *1	LR	KB1	KB2 *1	KB3	KL1 (KL1 *2)	KL3 (KL3 *2)
09A□A2CA1	229	171	137	34	58	83	159	115	104 (138)	81 (106)
13A□A2CA1	245	187	153	34	58	99	175	131	104 (138)	81 (106)
20A□A2CA1	263	205	171	34	58	117	193	149	104 (138)	81 (106)
06A□B2CA1	229	171	137	34	58	83	159	115	104 (138)	81 (106)
09A□B2CA1	245	187	153	34	58	99	175	131	104 (138)	81 (106)
12A□B2CA1	263	205	171	34	58	117	193	149	104 (138)	81 (106)

Model SGMXG-	Flange Dimensions							Shaft End Dimensions		Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	Q	
09A□A2CA1	145	$110^{0}_{-0.035}$	130	6	12	165	9	$24^{0}_{-0.013}$	40	7.5
13A□A2CA1	145	$110^{0}_{-0.035}$	130	6	12	165	9	$24^{0}_{-0.013}$	40	9.0
20A□A2CA1	145	$110^{0}_{-0.035}$	130	6	12	165	9	$24^{0}_{-0.013}$	40	11.0
06A□B2CA1	145	$110^{0}_{-0.035}$	130	6	12	165	9	$24^{0}_{-0.013}$	40	7.5

Continued on next page.

Continued from previous page.

Model SGMXG-	Flange Dimensions							Shaft End Dimensions		Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	Q	
09A□B2CA1	145	$110^{0}_{-0.035}$	130	6	12	165	9	$24^{0}_{-0.013}$	40	9.0
12A□B2CA1	145	$110^{0}_{-0.035}$	130	6	12	165	9	$24^{0}_{-0.013}$	40	11.0

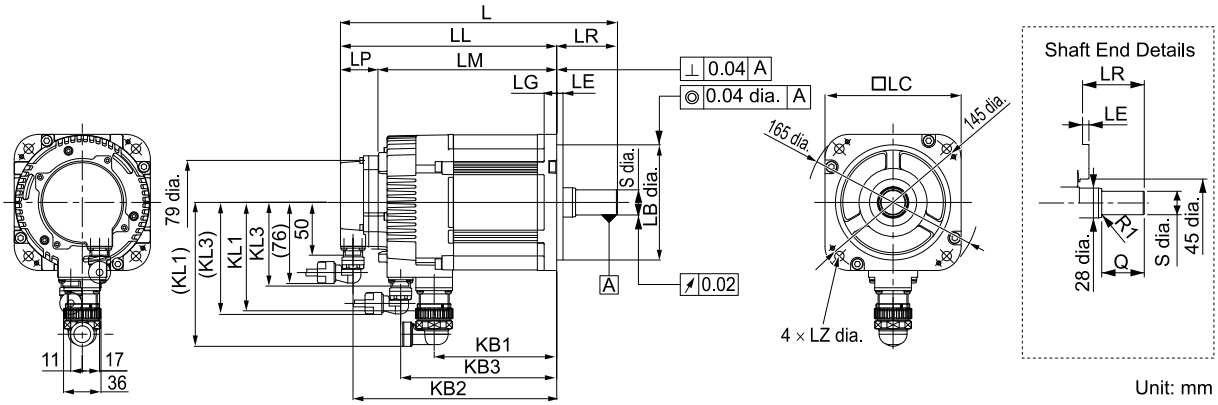
*1 For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the following section for the values for individual models.
☞ *6.5.5 Dimensions of Servomotors with Batteryless Absolute Encoders on page 190*

*2 These are the values when the flexible connectors are connected.

Note:

1. The dimensions are same for models with oil seals.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications.
☞ *(c) Shaft End Specification on page 179*

(b) Σ-7 Compatible Specification



Unit: mm

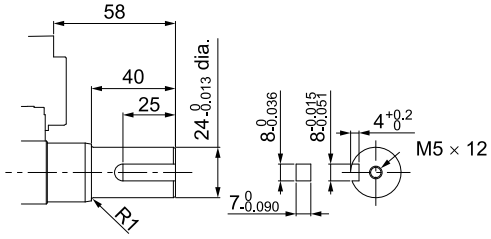
Note:

The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

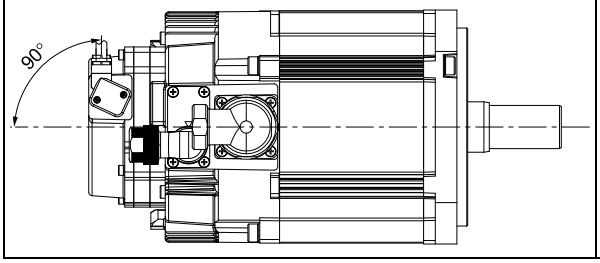
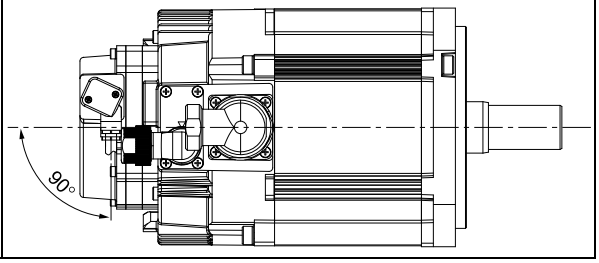
(c) Shaft End Specification

- Straight with Key and Tap



(d) Connector Specifications

- Encoder Connector (26-bit Encoder): Standard Specification
  The encoder cable is installed in the following direction.

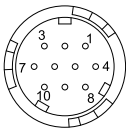
Cable Installed toward Left Side	Cable Installed toward Right Side
	

For details on selecting cables, refer to the following section and manual.

☞ *8.5 Cables for the SGMXG Servomotors on page 269*

🕮 Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

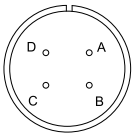
- Encoder Connector (26-bit Encoder): Σ-7 Compatible Specification



1	PS	6 *1	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5	BAT(-)	10	FG (frame ground)

*1 A battery is required only for an absolute encoder.
Receptacle: CMV1-R10P
Applicable plug (not provided by Yaskawa)
Plug: CM10-AP10S-□-D (R1) (right-angle type), CM10-SP10S-□-D (R1) (straight), CMV1-AP10S-□□ (right-angle type), CMV1-SP10S-□□ (straight), CMV1S-AP10S-□□ (right-angle type), CMV1S-SP10S-□□ (straight)
(□ varies depending on the applicable cable size.)
Manufacturer: DDK Ltd.

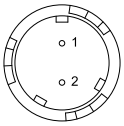
- Servomotor Connector: Same for both Standard Specifications and Σ-7 Compatible Specifications



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

Manufacturer: Japan Aviation Electronics Industry, Ltd.

- Brake Connector: Same for both Standard Specifications and Σ-7 Compatible Specifications



1	Brake terminal
2	Brake terminal

Note:

There is no voltage polarity for the brake terminals.

Receptacle: CMV1Y-R2P-0(F)

Applicable plug (not provided by Yaskawa)

Plug: CM10-AP2S-□-D (R1) (right-angle type), CM10-SP2S-□-D (R1) (straight), CMV1-AP2S-□□ (right-angle type), CMV1-SP2S-□□ (straight), CMV1S-AP2S-□□ (right-angle type), CMV1S-SP2S-□□ (straight)

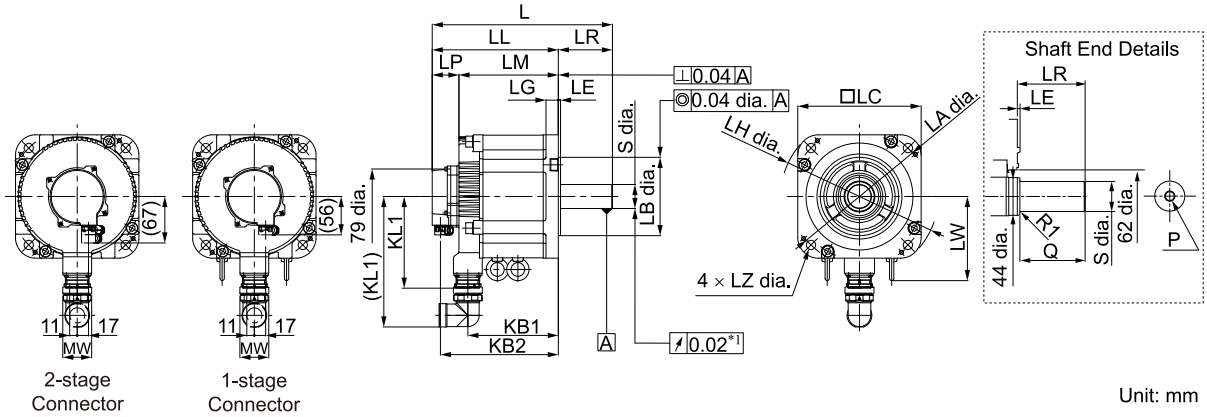
(□ varies depending on the applicable cable size.)

Manufacturer: DDK Ltd.

6.5.3 SGMXG-30A□A to -75A□A, -20A□B to -55A□B

(1) Servomotors without Holding Brakes

(a) Standard Specification



Unit: mm

*1 This is 0.04 for the SGMXG-55A□A, -75A□A, -40A□B, and -55A□B.

Model SGMXG-	L *1	LL *1	LM	LP *1	LR	KB1	KB2 *1	LW	KL1 (KL1 *2)	MW
30A□A81A1	237	158	124	34	79	108	146	–	134 (190)	43
44A□A81A1	261	182	148	34	79	132	170	–	134 (190)	
55A□A81A1	332	219	185	34	113	163	207	123	145 (221)	59
75A□A81A1	378	265	231	34	113	209	253	123	145 (221)	
20A□B81A1	237	158	124	34	79	108	146	–	134 (190)	43
30A□B81A1	261	182	148	34	79	132	170	–	134 (190)	
40A□B81A1	332	219	185	34	113	163	207	123	145 (221)	59
55A□B81A1	378	265	231	34	113	209	253	123	145 (221)	

Model SGMXG-	Flange Dimensions							Shaft End Dimensions			Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	Q	P	
30A□A81A1	200	$114.3^{0}_{-0.025}$	180	3.2	18	230	13.5	$35^{+0.01}_{0}$	76	M12 × 25	13.5
44A□A81A1	200	$114.3^{0}_{-0.025}$	180	3.2	18	230	13.5	$35^{+0.01}_{0}$	76		17.5
55A□A81A1	200	$114.3^{0}_{-0.025}$	180	3.2	18	230	13.5	$42^{0}_{-0.016}$	110	M16 × 32	21.5
75A□A81A1	200	$114.3^{0}_{-0.025}$	180	3.2	18	230	13.5	$42^{0}_{-0.016}$	110		29.5
20A□B81A1	200	$114.3^{0}_{-0.025}$	180	3.2	18	230	13.5	$35^{+0.01}_{0}$	76	M12 × 25	13.5
30A□B81A1	200	$114.3^{0}_{-0.025}$	180	3.2	18	230	13.5	$35^{+0.01}_{0}$	76		17.5
40A□B81A1	200	$114.3^{0}_{-0.025}$	180	3.2	18	230	13.5	$42^{0}_{-0.016}$	110	M16 × 32	21.5
55A□B81A1	200	$114.3^{0}_{-0.025}$	180	3.2	18	230	13.5	$42^{0}_{-0.016}$	110		29.5

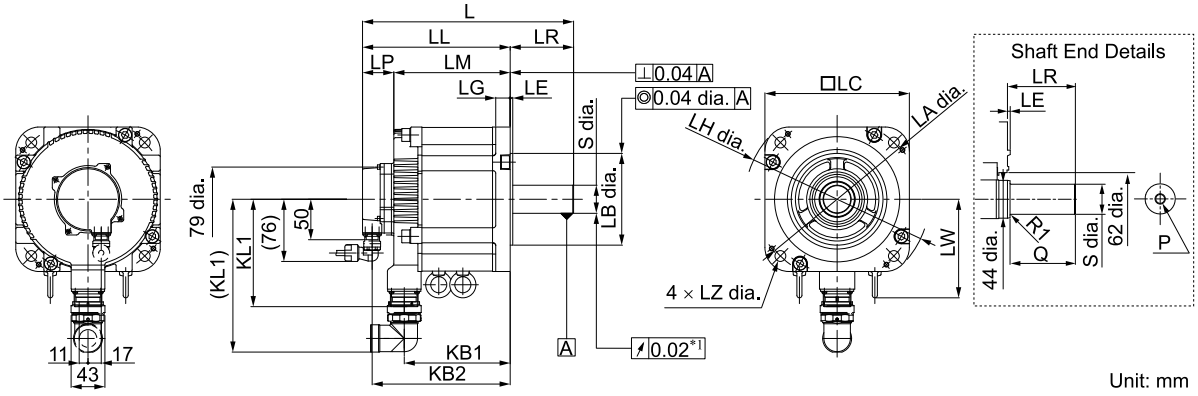
*1 For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the following section for the values for individual models.
☞ *6.5.5 Dimensions of Servomotors with Batteryless Absolute Encoders on page 190*

*2 These are the values when the flexible connectors are connected.

Note:

1. The dimensions are same for models with oil seals.
2. The values for the shaft end are for a straight shaft without key and with tap. Refer to the information given below for other shaft end specifications.
☞ *(c) Shaft End Specification on page 182*

(b) Σ-7 Compatible Specification



Unit: mm

*1 This is 0.04 for the SGMXG-55A□A, -75A□A, -40A□B, and -55A□B.

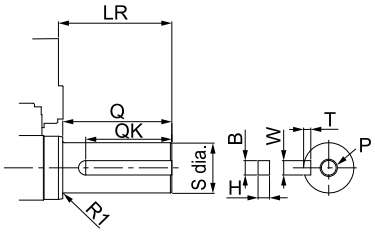
Note:

The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

(c) Shaft End Specification

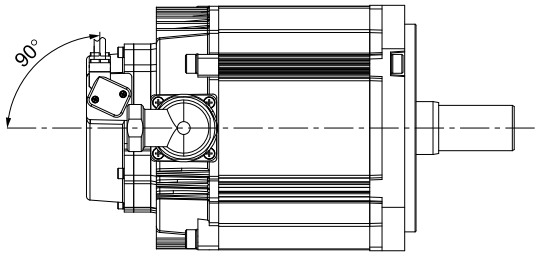
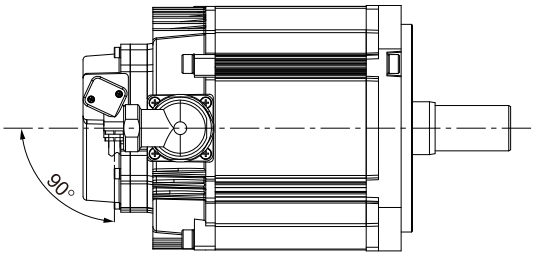
- Straight with Key and Tap



Model SGMXG-	LR	Q	QK	S	B	H	W	T	P
30A□A61□□	79	76	60	$35^{+0.01}_{0}$	$10^{0}_{-0.036}$	$8^{0}_{-0.090}$	$10^{-0.015}_{-0.051}$	$5^{+0.2}_{0}$	M12 × 25
44A□A61□□	79	76	60	$35^{+0.01}_{0}$	$10^{0}_{-0.036}$	$8^{0}_{-0.090}$	$10^{-0.015}_{-0.051}$	$5^{+0.2}_{0}$	
55A□A61□□	113	110	90	$42^{0}_{-0.016}$	$12^{0}_{-0.043}$	$8^{0}_{-0.090}$	$12^{-0.018}_{-0.061}$	$5^{+0.2}_{0}$	M16 × 32
75A□A61□□	113	110	90	$42^{0}_{-0.016}$	$12^{0}_{-0.043}$	$8^{0}_{-0.090}$	$12^{-0.018}_{-0.061}$	$5^{+0.2}_{0}$	
20A□B61□□	79	76	60	$35^{+0.01}_{0}$	$10^{0}_{-0.036}$	$8^{0}_{-0.090}$	$10^{-0.015}_{-0.051}$	$5^{+0.2}_{0}$	M12 × 25
30A□B61□□	79	76	60	$35^{+0.01}_{0}$	$10^{0}_{-0.036}$	$8^{0}_{-0.090}$	$10^{-0.015}_{-0.051}$	$5^{+0.2}_{0}$	
40A□B61□□	113	110	90	$42^{0}_{-0.016}$	$12^{0}_{-0.043}$	$8^{0}_{-0.090}$	$12^{-0.018}_{-0.061}$	$5^{+0.2}_{0}$	M16 × 32
55A□B61□□	113	110	90	$42^{0}_{-0.016}$	$12^{0}_{-0.043}$	$8^{0}_{-0.090}$	$12^{-0.018}_{-0.061}$	$5^{+0.2}_{0}$	

(d) Connector Specifications

- Encoder Connector (26-bit Encoder): Standard Specification
  The encoder cable is installed in the following direction.

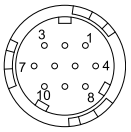
Cable Installed toward Left Side	Cable Installed toward Right Side
	

For details on selecting cables, refer to the following section and manual.

☞ *8.5 Cables for the SGMXG Servomotors on page 269*

🕮 Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

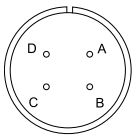
- Encoder Connector (26-bit Encoder): Σ-7 Compatible Specification



1	PS	6 *1	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5	BAT(-)	10	FG (frame ground)

*1 A battery is required only for an absolute encoder.
Receptacle: CMV1-R10P
Applicable plug (not provided by Yaskawa)
Plug: CM10-AP10S-□-D (R1) (right-angle type), CM10-SP10S-□-D (R1) (straight), CMV1-AP10S-□□ (right-angle type), CMV1-SP10S-□□ (straight), CMV1S-AP10S-□□ (right-angle type), CMV1S-SP10S-□□ (straight)
(□ varies depending on the applicable cable size.)
Manufacturer: DDK Ltd.

- Servomotor Connector: Same for both Standard Specifications and Σ-7 Compatible Specifications

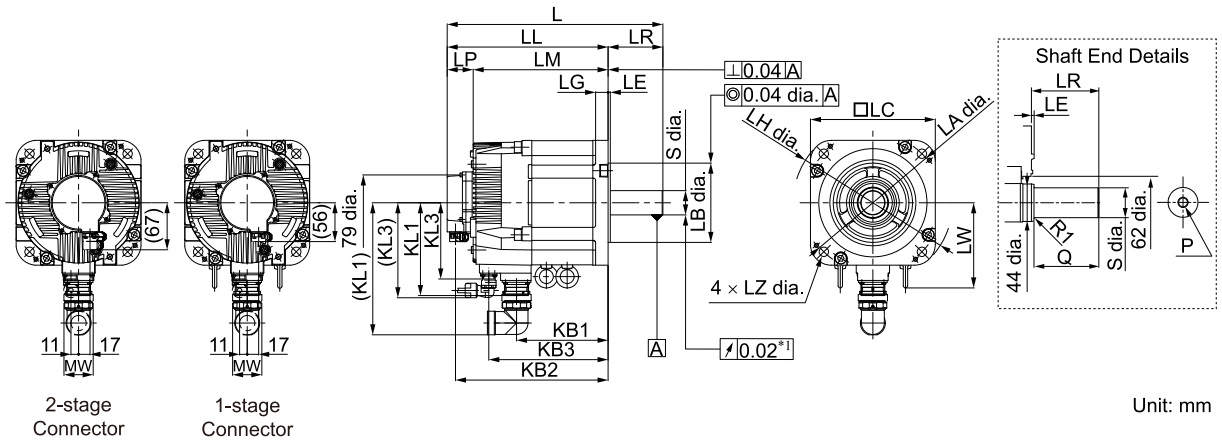


A	Phase U	C	Phase W
B	Phase V	D	FG (frame ground)

Manufacturer: Japan Aviation Electronics Industry, Ltd.

(2) Servomotors with Holding Brakes

(a) Standard Specification



*1 This is 0.04 for the SGMXG-55A□A, -75A□A, -40A□B, and -55A□B.

Model SGMXG-	L *1	LL *1	LM	LP *1	LR	KB1	KB2 *1	KB3	LW	KL1 (KL1 *2)	KL3 (KL3 *2)	MW
30A□A8CA1	287	208	174	34	79	108	196	150	–	134 (190)	111 (136)	43
44A□A8CA1	311	232	198	34	79	132	220	174	–	134 (190)	111 (136)	
55A□A8CA1	376	263	229	34	113	163	251	205	123	145 (221)	111 (136)	59
75A□A8CA1	422	309	275	34	113	209	297	251	123	145 (221)	111 (136)	
20A□B8CA1	287	208	174	34	79	108	196	150	–	134 (190)	111 (136)	43
30A□B8CA1	311	232	198	34	79	132	220	174	–	134 (190)	111 (136)	
40A□B8CA1	376	263	229	34	113	163	251	205	123	145 (221)	111 (136)	59
55A□B8CA1	422	309	275	34	113	209	297	251	123	145 (221)	111 (136)	

Model SGMXG-	Flange Dimensions							Shaft End Dimensions			Appro-x. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	Q	P	
30A□A8CA1	200	$114.3^{0}_{-0.025}$	180	3.2	18	230	13.5	$35^{+0.01}_{0}$	76	M12 × 25	19.5
44A□A8CA1	200	$114.3^{0}_{-0.025}$	180	3.2	18	230	13.5	$35^{+0.01}_{0}$	76		23.5
55A□A8CA1	200	$114.3^{0}_{-0.025}$	180	3.2	18	230	13.5	$42^{0}_{-0.016}$	110	M16 × 32	27.5
75A□A8CA1	200	$114.3^{0}_{-0.025}$	180	3.2	18	230	13.5	$42^{0}_{-0.016}$	110		35.0

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Model SGMXG-	Flange Dimensions							Shaft End Dimensions			Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	Q	P	
20A□B8CA1	200	$114.3^{0}_{-0.025}$	180	3.2	18	230	13.5	$35^{+0.01}_{0}$	76	M12 × 25	19.5
30A□B8CA1	200	$114.3^{0}_{-0.025}$	180	3.2	18	230	13.5	$35^{+0.01}_{0}$	76		23.5
40A□B8CA1	200	$114.3^{0}_{-0.025}$	180	3.2	18	230	13.5	$42^{0}_{-0.016}$	110	M16 × 32	27.5
55A□B8CA1	200	$114.3^{0}_{-0.025}$	180	3.2	18	230	13.5	$42^{0}_{-0.016}$	110		35.0

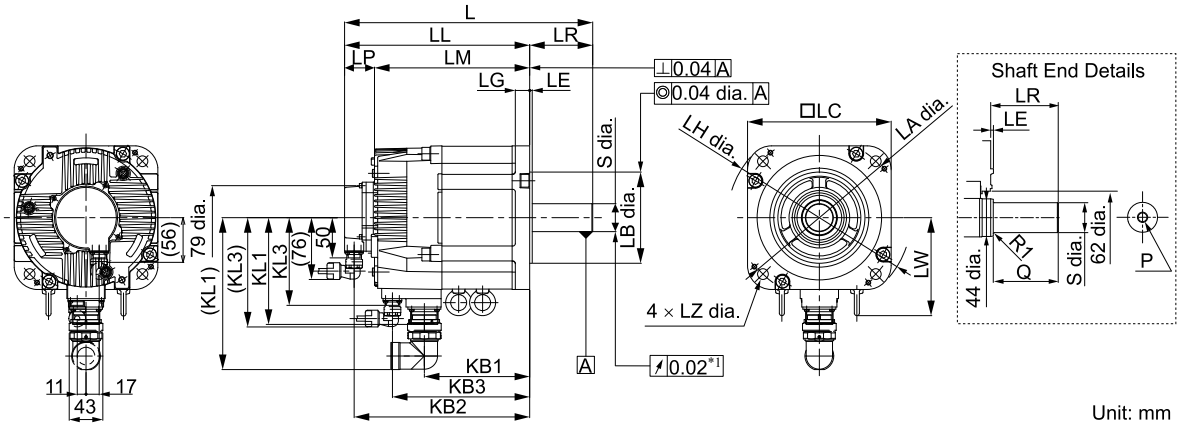
*1 For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the following section for the values for individual models.
☞ *6.5.5 Dimensions of Servomotors with Batteryless Absolute Encoders on page 190*

*2 These are the values when the flexible connectors are connected.

Note:

1. The dimensions are same for models with oil seals.
2. The values for the shaft end are for a straight shaft without key and with tap. Refer to the information given below for other shaft end specifications.
☞ *(c) Shaft End Specification on page 184*

(b) Σ-7 Compatible Specification



*1 This is 0.04 for the SGMXG-55A□A, -75A□A, -40A□B, and -55A□B.

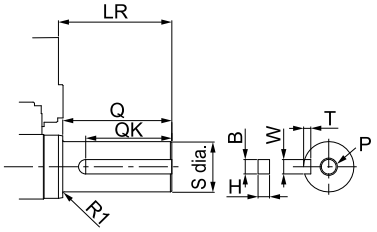
Note:

The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

(c) Shaft End Specification

- Straight with Key and Tap



Model SGMXG-	LR	Q	QK	S	B	H	W	T	P
30A□A6C□□	79	76	60	$35^{+0.01}_{0}$	$10^{0}_{-0.036}$	$8^{0}_{-0.090}$	$10^{-0.015}_{-0.051}$	$5^{+0.2}_{0}$	M12 × 25
44A□A6C□□	79	76	60	$35^{+0.01}_{0}$	$10^{0}_{-0.036}$	$8^{0}_{-0.090}$	$10^{-0.015}_{-0.051}$	$5^{+0.2}_{0}$	
55A□A6C□□	113	110	90	$42^{0}_{-0.016}$	$12^{0}_{-0.043}$	$8^{0}_{-0.090}$	$12^{-0.018}_{-0.061}$	$5^{+0.2}_{0}$	M16 × 32
75A□A6C□□	113	110	90	$42^{0}_{-0.016}$	$12^{0}_{-0.043}$	$8^{0}_{-0.090}$	$12^{-0.018}_{-0.061}$	$5^{+0.2}_{0}$	

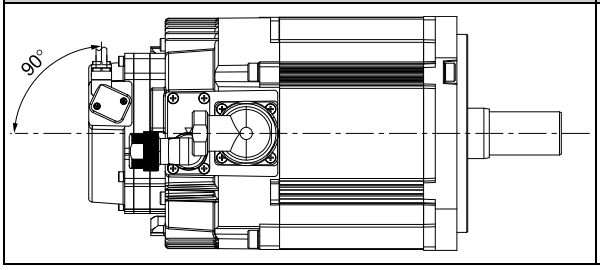
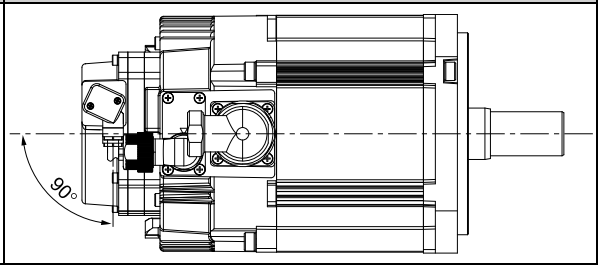
Continued on next page.

Continued from previous page.

Model SGMXG-	LR	Q	QK	S	B	H	W	T	P
20A□B6C□□	79	76	60	$35^{+0.01}_{0}$	$10^{0}_{-0.036}$	$8^{0}_{-0.090}$	$10^{-0.015}_{-0.051}$	$5^{+0.2}_{0}$	M12 × 25
30A□B6C□□	79	76	60	$35^{+0.01}_{0}$	$10^{0}_{-0.036}$	$8^{0}_{-0.090}$	$10^{-0.015}_{-0.051}$	$5^{+0.2}_{0}$	
40A□B6C□□	113	110	90	$42^{0}_{-0.016}$	$12^{0}_{-0.043}$	$8^{0}_{-0.090}$	$12^{-0.018}_{-0.061}$	$5^{+0.2}_{0}$	M16 × 32
55A□B6C□□	113	110	90	$42^{0}_{-0.016}$	$12^{0}_{-0.043}$	$8^{0}_{-0.090}$	$12^{-0.018}_{-0.061}$	$5^{+0.2}_{0}$	

(d) Connector Specifications

- Encoder Connector (26-bit Encoder): Standard Specification
  The encoder cable is installed in the following direction.

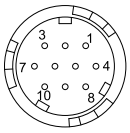
Cable Installed toward Left Side	Cable Installed toward Right Side
	

For details on selecting cables, refer to the following section and manual.

☞ *8.5 Cables for the SGMXG Servomotors on page 269*

🕮 Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

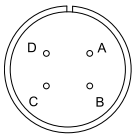
- Encoder Connector (26-bit Encoder): Σ-7 Compatible Specification



1	PS	6 *1	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5	BAT(-)	10	FG (frame ground)

*1 A battery is required only for an absolute encoder.
Receptacle: CMV1-R10P
Applicable plug (not provided by Yaskawa)
Plug: CM10-AP10S-□-D (R1) (right-angle type), CM10-SP10S-□-D (R1) (straight), CMV1-AP10S-□□ (right-angle type), CMV1-SP10S-□□ (straight), CMV1S-AP10S-□□ (right-angle type), CMV1S-SP10S-□□ (straight)
(□ varies depending on the applicable cable size.)
Manufacturer: DDK Ltd.

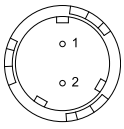
- Servomotor Connector: Same for both Standard Specifications and Σ-7 Compatible Specifications



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

Manufacturer: Japan Aviation Electronics Industry, Ltd.

- Brake Connector: Same for both Standard Specifications and Σ-7 Compatible Specifications



1	Brake terminal
2	Brake terminal

Note:

There is no voltage polarity for the brake terminals.

Receptacle: CMV1Y-R2P-0(F)

Applicable plug (not provided by Yaskawa)

Plug: CM10-AP2S-□-D (R1) (right-angle type), CM10-SP2S-□-D (R1) (straight), CMV1-AP2S-□□ (right-angle type), CMV1-SP2S-□□ (straight), CMV1S-AP2S-□□ (right-angle type), CMV1S-SP2S-□□ (straight)

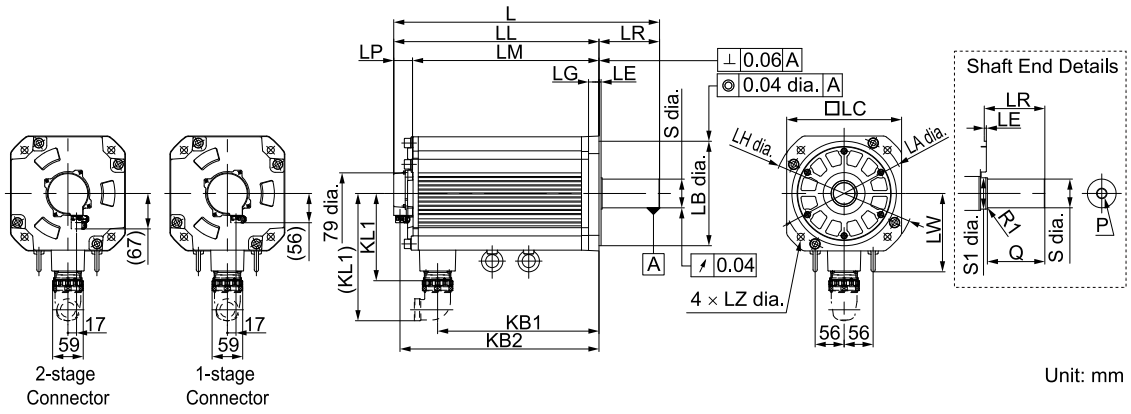
(□ varies depending on the applicable cable size.)

Manufacturer: DDK Ltd.

6.5.4 SGMXG-1A, -1E

(1) Servomotors without Holding Brakes

(a) Standard Specification



Model SGMXG-	L *1	LL *1	LM	LP *1	LR	KB1	KB2 *1	LW	KL1 (KL1 *2)
1AA□A81A1	445	329	295	34	116	247	317	150	168 (245)
1EA□A81A1	507	391	357	34	116	309	379	150	168 (245)

Model SGMXG-	Flange Dimensions							Shaft End Dimensions				Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	S1	Q	P	
1AA□A81A1	235	$200^{0}_{-0.046}$	220	4	20	270	13.5	$42^{0}_{-0.016}$	50	110	M16 × 32	57
1EA□A81A1	235	$200^{0}_{-0.046}$	220	4	20	270	13.5	$55^{+0.030}_{+0.011}$	60	110	M20 × 40	67

*1 For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the following section for the values for individual models.

☞ *6.5.5 Dimensions of Servomotors with Batteryless Absolute Encoders on page 190*

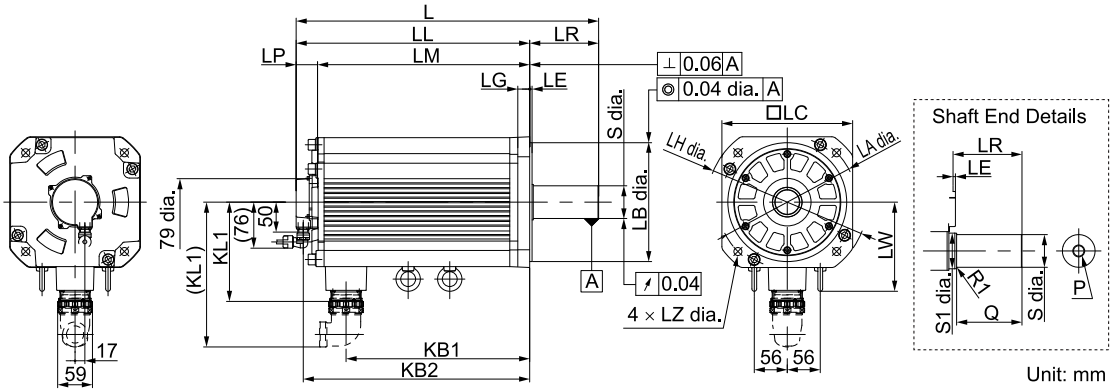
*2 These are the values when the flexible connectors are connected.

Note:

1. The dimensions are same for models with oil seals.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications.

☞ *(c) Shaft End Specification on page 187*

(b) Σ-7 Compatible Specification



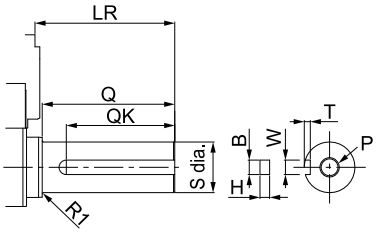
Note:

The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

(c) Shaft End Specification

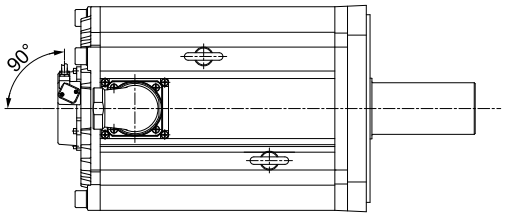
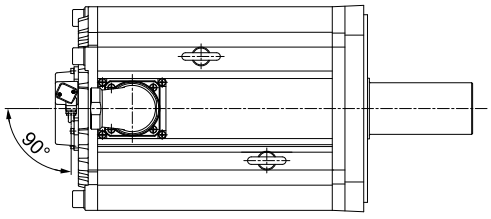
- Straight with Key and Tap



Model SGMXG-	LR	Q	QK	S	B	H	W	T	P
1AA□A61□□	116	110	90	$42^{0}_{-0.016}$	$12^{0}_{-0.043}$	$8^{0}_{-0.090}$	$12^{-0.018}_{-0.061}$	$5^{+0.2}_{0}$	M16 × 32
1EA□A61□□	116	110	90	$55^{+0.030}_{+0.011}$	$16^{0}_{-0.043}$	$10^{0}_{-0.090}$	$16^{-0.018}_{-0.061}$	$6^{+0.2}_{0}$	M20 × 40

(d) Connector Specifications

- Encoder Connector (26-bit Encoder): Standard Specification
  The encoder cable is installed in the following direction.

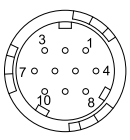
Cable Installed toward Left Side	Cable Installed toward Right Side
	

For details on selecting cables, refer to the following section and manual.

☞ *8.5 Cables for the SGMXG Servomotors on page 269*

🕮 Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

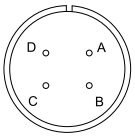
- Encoder Connector (26-bit Encoder): Σ-7 Compatible Specification



1	PS	6 *1	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5	BAT(-)	10	FG (frame ground)

*1 A battery is required only for an absolute encoder.
Receptacle: CMV1-R10P
Applicable plug (not provided by Yaskawa)
Plug: CM10-AP10S-□-D (R1) (right-angle type), CM10-SP10S-□-D (R1) (straight), CMV1-AP10S-□□ (right-angle type), CMV1-SP10S-□□ (straight), CMV1S-AP10S-□□ (right-angle type), CMV1S-SP10S-□□ (straight)
(□ varies depending on the applicable cable size.)
Manufacturer: DDK Ltd.

- Servomotor Connector: Same for both Standard Specifications and Σ-7 Compatible Specifications

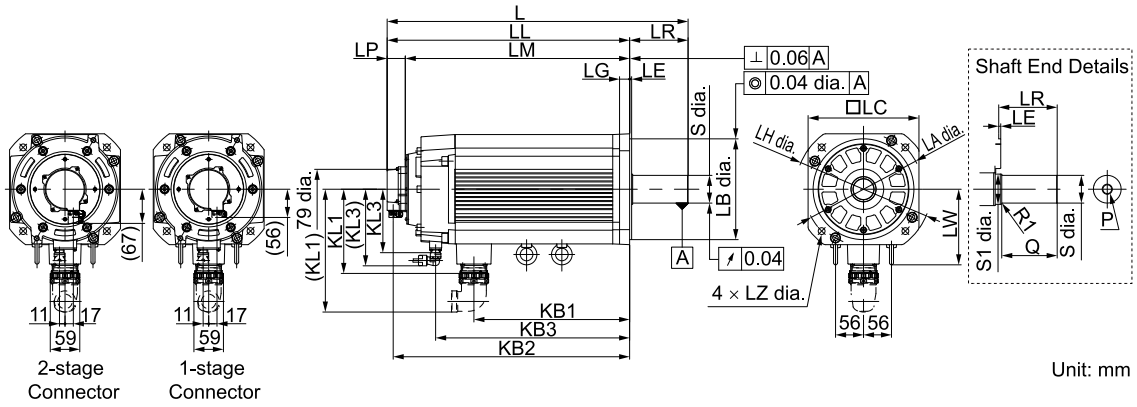


A	Phase U	C	Phase W
B	Phase V	D	FG (frame ground)

Manufacturer: Japan Aviation Electronics Industry, Ltd.

(2) Servomotors with Holding Brakes

(a) Standard Specification



Model SGMXG-	L *1	LL *1	LM	LP *1	LR	KB1	KB2 *1	KB3	LW	KL1 (KL1 *2)	KL3 (KL3 *2)
1AA□A8CA1	496	380	346	34	116	247	368	315	150	168 (245)	126 (151)
1EA□A8CA1	596	480	446	34	116	309	468	385	150	168 (245)	126 (151)

Model SGMXG-	Flange Dimensions							Shaft End Dimensions				Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	S1	Q	P	
1AA□A8CA1	235	$200^{0}_{-0.046}$	220	4	20	270	13.5	$42^{0}_{-0.016}$	50	110	M16 × 32	65
1EA□A8CA1	235	$200^{0}_{-0.046}$	220	4	20	270	13.5	$55^{+0.030}_{+0.011}$	60	110	M20 × 40	85

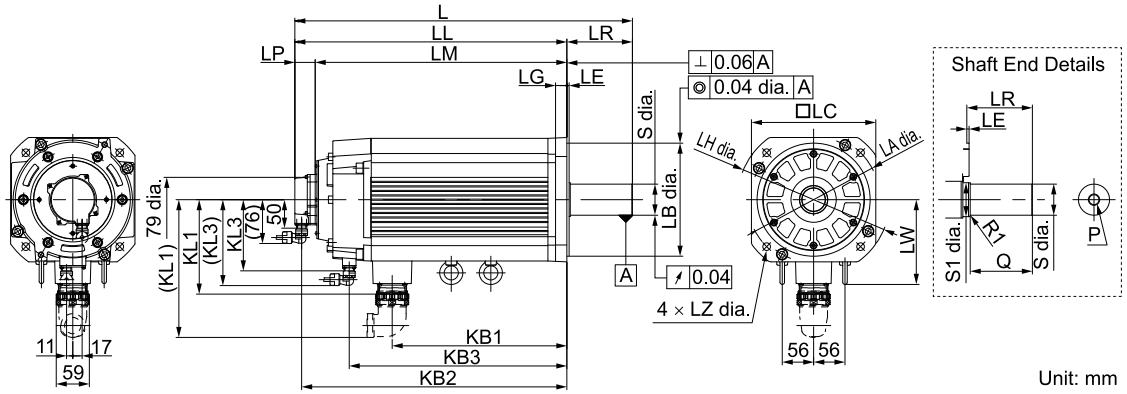
*1 For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the following section for the values for individual models.
☞ *6.5.5 Dimensions of Servomotors with Batteryless Absolute Encoders on page 190*

*2 These are the values when the flexible connectors are connected.

Note:

1. The dimensions are same for models with oil seals.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications.
☞ *(c) Shaft End Specification on page 189*

(b) Σ-7 Compatible Specification



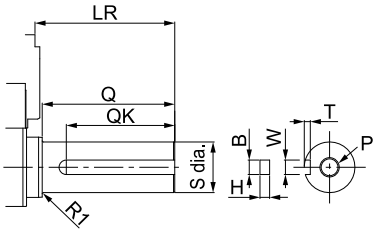
Note:

The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

(c) Shaft End Specification

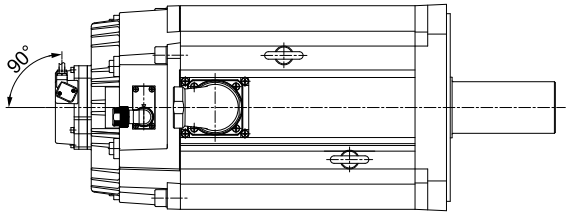
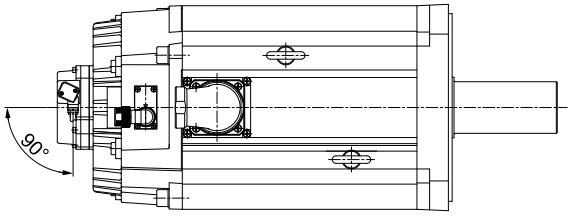
- Straight with Key and Tap



Model SGMXG-	LR	Q	QK	S	B	H	W	T	P
1AA□A6C□□	116	110	90	$42^{0}_{-0.016}$	$12^{0}_{-0.043}$	$8^{0}_{-0.090}$	$12^{-0.018}_{-0.061}$	$5^{+0.2}_{0}$	M16 × 32
1EA□A6C□□	116	110	90	$55^{+0.030}_{+0.011}$	$16^{0}_{-0.043}$	$10^{0}_{-0.090}$	$16^{-0.018}_{-0.061}$	$6^{+0.2}_{0}$	M20 × 40

(d) Connector Specifications

- Encoder Connector (26-bit Encoder): Standard Specification
  The encoder cable is installed in the following direction.

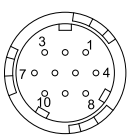
Cable Installed toward Left Side	Cable Installed toward Right Side
	

For details on selecting cables, refer to the following section and manual.

☞ *8.5 Cables for the SGMXG Servomotors on page 269*

🕮 Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

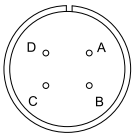
- Encoder Connector (26-bit Encoder): Σ-7 Compatible Specification



1	PS	6 *1	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5	BAT(-)	10	FG (frame ground)

*1 A battery is required only for an absolute encoder.
Receptacle: CMV1-R10P
Applicable plug (not provided by Yaskawa)
Plug: CM10-AP10S-□-D (R1) (right-angle type), CM10-SP10S-□-D (R1) (straight), CMV1-AP10S-□□ (right-angle type), CMV1-SP10S-□□ (straight), CMV1S-AP10S-□□ (right-angle type), CMV1S-SP10S-□□ (straight)
(□ varies depending on the applicable cable size.)
Manufacturer: DDK Ltd.

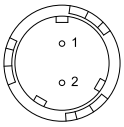
- Servomotor Connector: Same for both Standard Specifications and Σ-7 Compatible Specifications



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

Manufacturer: Japan Aviation Electronics Industry, Ltd.

- Brake Connector: Same for both Standard Specifications and Σ-7 Compatible Specifications



1	Brake terminal
2	Brake terminal

Note:

There is no voltage polarity for the brake terminals.

Receptacle: CMV1Y-R2P-0(F)

Applicable plug (not provided by Yaskawa)

Plug: CM10-AP2S-□-D (R1) (right-angle type), CM10-SP2S-□-D (R1) (straight), CMV1-AP2S-□□ (right-angle type), CMV1-SP2S-□□ (straight), CMV1S-AP2S-□□ (right-angle type), CMV1S-SP2S-□□ (straight)

(□ varies depending on the applicable cable size.)

Manufacturer: DDK Ltd.

6.5.5 Dimensions of Servomotors with Batteryless Absolute Encoders

(1) 1500-min-1 Specification

Model SGMXG-	L	LL	LP	KB2
03AWA□□A□	172 (205)	132 (165)	42 (42)	120 (153)
05AWA□□A□	185 (218)	145 (178)	42 (42)	133 (166)
09AWA□□A□	201 (237)	143 (179)	42 (42)	131 (167)
13AWA□□A□	217 (253)	159 (195)	42 (42)	147 (183)
20AWA□□A□	235 (271)	177 (213)	42 (42)	165 (201)
30AWA□□A□	245 (295)	166 (216)	42 (42)	154 (204)
44AWA□□A□	269 (319)	190 (240)	42 (42)	178 (228)
55AWA□□A□	340 (384)	227 (271)	42 (42)	215 (259)
75AWA□□A□	386 (430)	273 (317)	42 (42)	261 (305)
1AAWA□□A□	453 (504)	337 (388)	42 (42)	325 (376)
1EAWA□□A□	515 (604)	399 (488)	42 (42)	387 (476)

Note:

The values in parentheses are for servomotors with holding brakes.

(2) 1000-min-1 Specification

Model SGMXG-	L	LL	LP	KB2
03AWB□□A□	185 (218)	145 (178)	42 (42)	133 (166)
06AWB□□A□	201 (237)	143 (179)	42 (42)	131 (167)
09AWB□□A□	217 (253)	159 (195)	42 (42)	147 (183)
12AWB□□A□	235 (271)	177 (213)	42 (42)	165 (201)
20AWB□□A□	245 (295)	166 (216)	42 (42)	154 (204)
30AWB□□A□	269 (319)	190 (240)	42 (42)	178 (228)
40AWB□□A□	340 (384)	227 (271)	42 (42)	215 (259)
55AWB□□A□	386 (430)	273 (317)	42 (42)	261 (305)

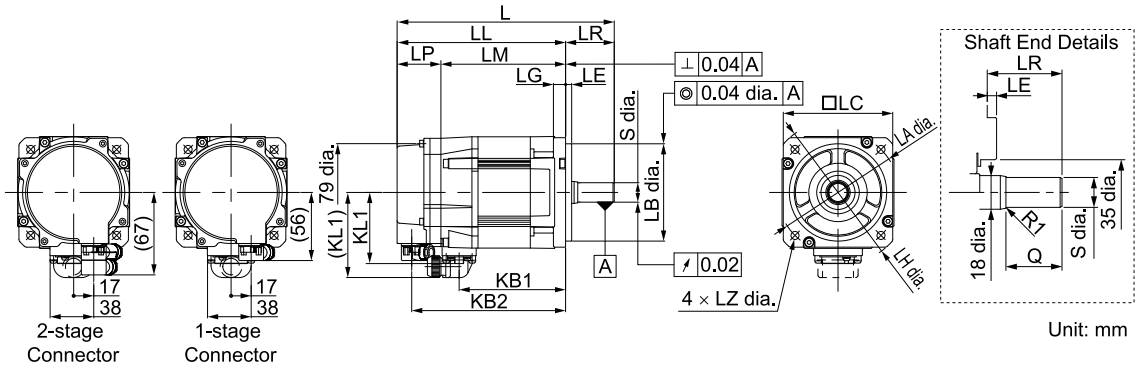
Note:
The values in parentheses are for servomotors with holding brakes.

6.6 External Dimensions (400 V Specification)

6.6.1 SGMXG-05D□A

(1) Servomotors without Holding Brakes

(a) Standard Specification



Model SGMXG-	L *1	LL *1	LM	LP *1	LR	KB1	KB2 *1	KL1
05D□A21A1	177	137	103	34	40	88	125	70

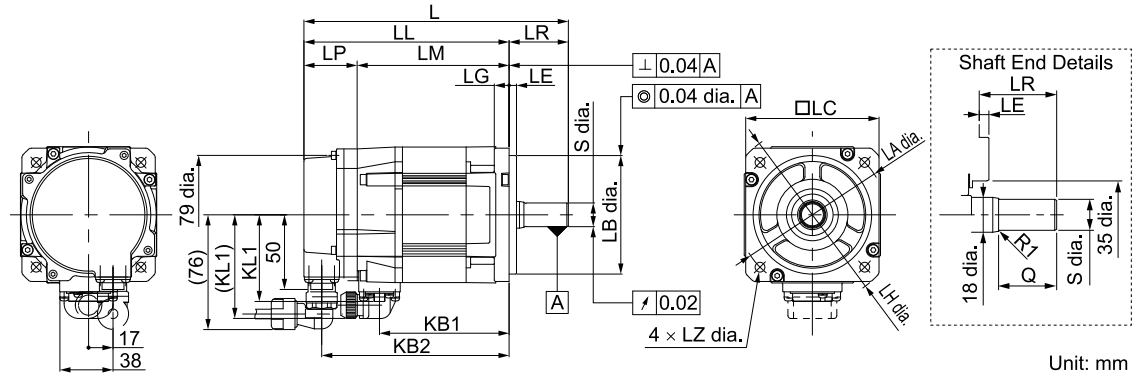
Model SGMXG-	Flange Dimensions							Shaft End Dimensions		Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	Q	
05D□A21A1	100	$80^{0}_{-0.030}$	90	5	10	120	6.6	$16^{0}_{-0.011}$	30	3.2

*1 For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the following section for the values for individual models.
☞ *6.6.5 Dimensions of Servomotors with Batteryless Absolute Encoders on page 208*

Note:

1. The dimensions are same for models with oil seals.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications.
☞ *(c) Shaft End Specification on page 193*

(b) Σ-V Compatible Specification



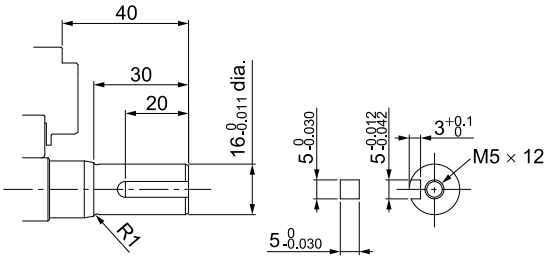
Note:

The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

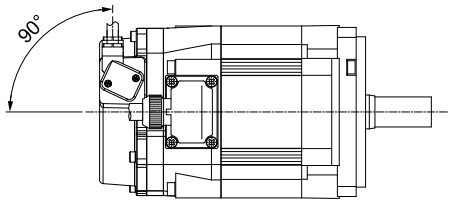
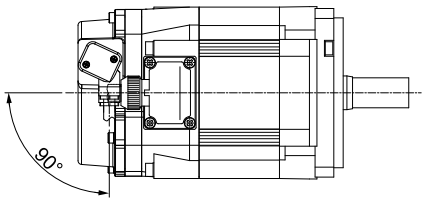
(c) Shaft End Specification

- Straight with Key and Tap



(d) Connector Specifications

- Encoder Connector (26-bit Encoder): Standard Specification
  The encoder cable is installed in the following direction.

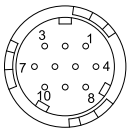
Cable Installed toward Left Side	Cable Installed toward Right Side
	

For details on selecting cables, refer to the following section and manual.

☞ *8.5 Cables for the SGMXG Servomotors on page 269*

🕮 Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

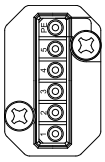
- Encoder Connector (26-bit Encoder): Σ-V Compatible Specification



1	PS	6 *1	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5	BAT(-)	10	FG (frame ground)

*1 A battery is required only for an absolute encoder.
Receptacle: CMV1-R10P
Applicable plug (not provided by Yaskawa)
Plug: CM10-AP10S-□-D (R1) (right-angle type), CM10-SP10S-□-D (R1) (straight), CMV1-AP10S-□□ (right-angle type), CMV1-SP10S-□□ (straight), CMV1S-AP10S-□□ (right-angle type), CMV1S-SP10S-□□ (straight)
(□ varies depending on the applicable cable size.)
Manufacturer: DDK Ltd.

- Servomotor Connector: Same for both Standard Specifications and Σ-V Compatible Specifications

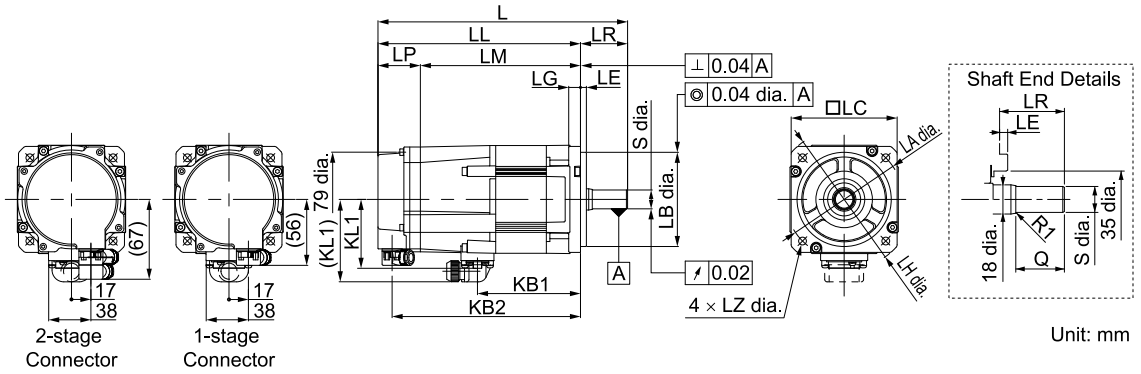


PE	FG (frame ground)	3	Phase U
5	–	2	Phase V
4	–	1	Phase W

Manufacturer: Japan Aviation Electronics Industry, Ltd.

(2) Servomotors with Holding Brakes

(a) Standard Specification



Model SGMXG-	L *1	LL *1	LM	LP *1	LR	KB1	KB2 *1	KL1
05D□A2CA1	210	170	136	34	40	88	158	70

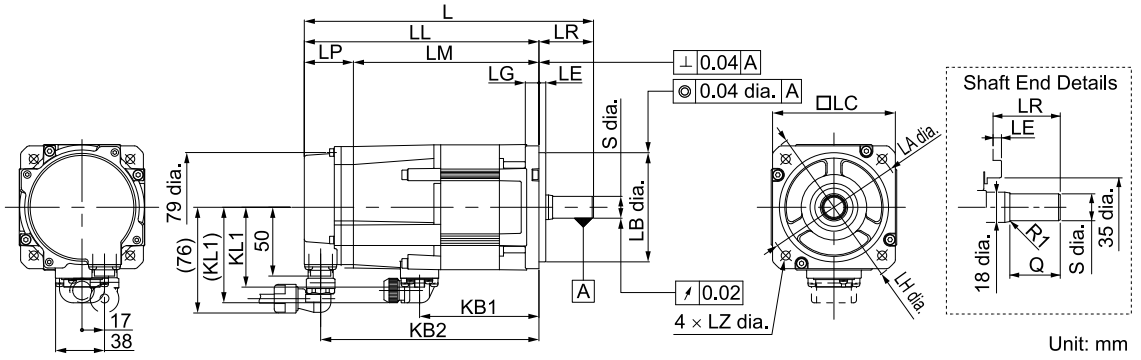
Model SGMXG-	Flange Dimensions							Shaft End Dimensions		Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	Q	
05D□A2CA1	100	$80^{0}_{-0.030}$	90	5	10	120	6.6	$16^{0}_{-0.011}$	30	4.2

*1 For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the following section for the values for individual models.
☞ *6.6.5 Dimensions of Servomotors with Batteryless Absolute Encoders on page 208*

Note:

1. The dimensions are same for models with oil seals.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications.
☞ *(c) Shaft End Specification on page 194*

(b) Σ-V Compatible Specification



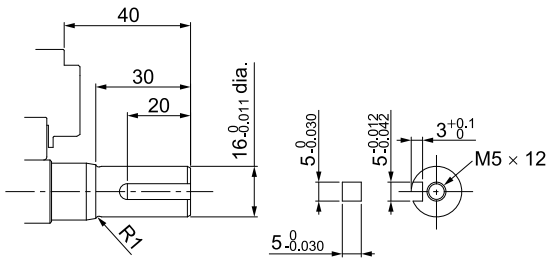
Note:

The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

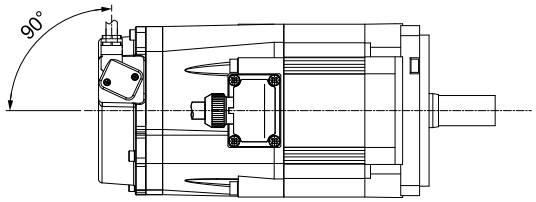
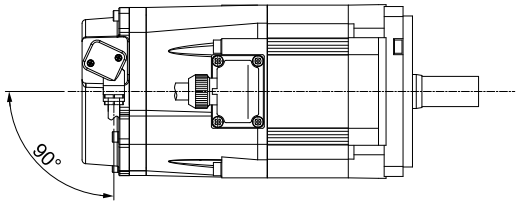
(c) Shaft End Specification

- Straight with Key and Tap



(d) Connector Specifications

- Encoder Connector (26-bit Encoder): Standard Specification
  The encoder cable is installed in the following direction.

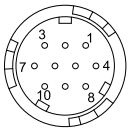
Cable Installed toward Left Side	Cable Installed toward Right Side
	

For details on selecting cables, refer to the following section and manual.

☞ *8.5 Cables for the SGMXG Servomotors on page 269*

🕮 Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

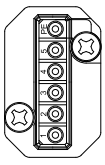
- Encoder Connector (26-bit Encoder): Σ-V Compatible Specification



1	PS	6 *1	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5	BAT(-)	10	FG (frame ground)

*1 A battery is required only for an absolute encoder.
Receptacle: CMV1-R10P
Applicable plug (not provided by Yaskawa)
Plug: CM10-AP10S-□-D (R1) (right-angle type), CM10-SP10S-□-D (R1) (straight), CMV1-AP10S-□□ (right-angle type), CMV1-SP10S-□□ (straight), CMV1S-AP10S-□□ (right-angle type), CMV1S-SP10S-□□ (straight)
(□ varies depending on the applicable cable size.)
Manufacturer: DDK Ltd.

- Servomotor Connector: Same for both Standard Specifications and Σ-V Compatible Specifications



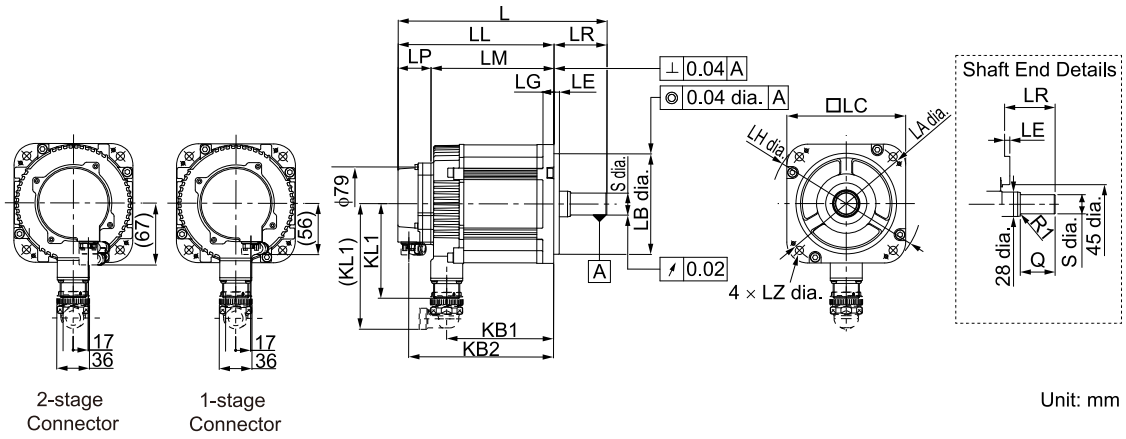
PE	FG (frame ground)	3	Phase U
5	Brake terminal	2	Phase V
4	Brake terminal	1	Phase W

Manufacturer: Japan Aviation Electronics Industry, Ltd.

6.6.2 SGMXG-09D□A to -20D□A

(1) Servomotors without Holding Brakes

(a) Standard Specification



Model SGMXG-	L *1	LL *1	LM	LP *1	LR	KB1	KB2 *1	KL1
09D□A21A1	193	135	101	34	58	83	123	138
13D□A21A1	209	151	117	34	58	99	139	138
20D□A21A1	227	169	135	34	58	117	157	138

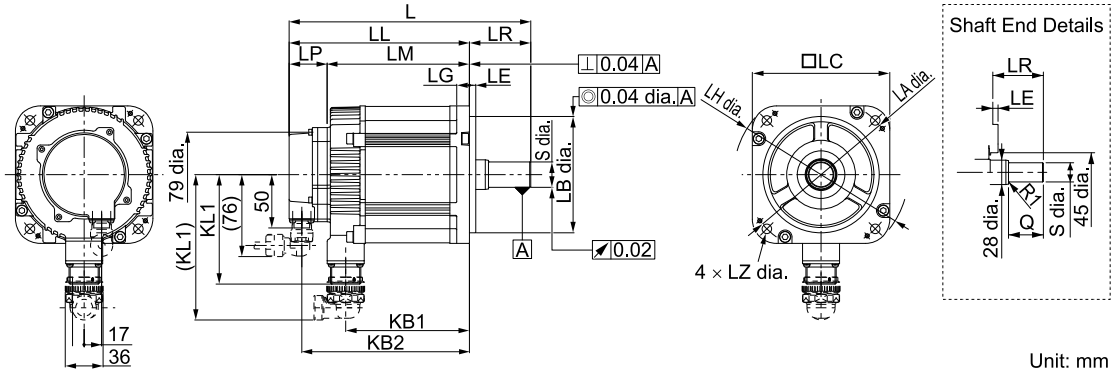
Model SGMXG-	Flange Dimensions							Shaft End Dimensions		Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	Q	
09D□A21A1	145	$110^{0}_{-0.035}$	130	6	12	165	9	$24^{0}_{-0.013}$	40	5.5
13D□A21A1	145	$110^{0}_{-0.035}$	130	6	12	165	9	$24^{0}_{-0.013}$	40	7.1
20D□A21A1	145	$110^{0}_{-0.035}$	130	6	12	165	9	$24^{0}_{-0.013}$	40	8.6

*1 For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the following section for the values for individual models.
☞ *6.6.5 Dimensions of Servomotors with Batteryless Absolute Encoders on page 208*

Note:

1. The dimensions are same for models with oil seals.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications.
☞ *(c) Shaft End Specification on page 197*

(b) Σ-V Compatible Specification



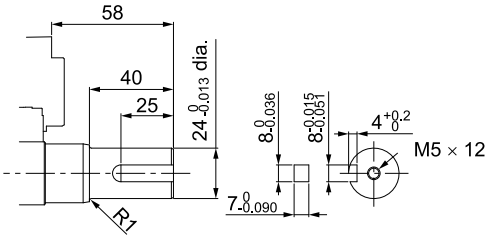
Note:

The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

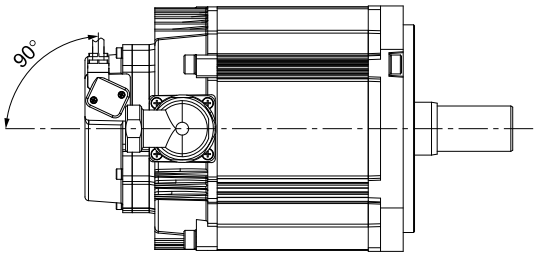
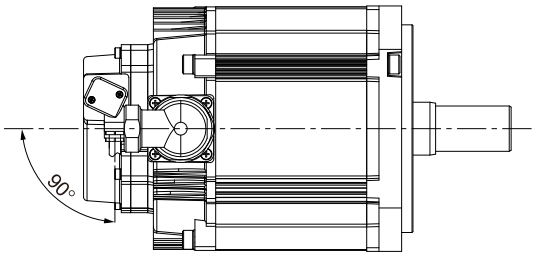
(c) Shaft End Specification

- Straight with Key and Tap



(d) Connector Specifications

- Encoder Connector (26-bit Encoder): Standard Specification
  The encoder cable is installed in the following direction.

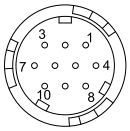
Cable Installed toward Left Side	Cable Installed toward Right Side
	

For details on selecting cables, refer to the following section and manual.

☞ *8.5 Cables for the SGMXG Servomotors on page 269*

🕮 Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

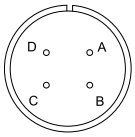
- Encoder Connector (26-bit Encoder): Σ-V Compatible Specification



1	PS	6 *1	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5	BAT(-)	10	FG (frame ground)

*1 A battery is required only for an absolute encoder.
Receptacle: CMV1-R10P
Applicable plug (not provided by Yaskawa)
Plug: CM10-AP10S-□-D (R1) (right-angle type), CM10-SP10S-□-D (R1) (straight), CMV1-AP10S-□□ (right-angle type), CMV1-SP10S-□□ (straight), CMV1S-AP10S-□□ (right-angle type), CMV1S-SP10S-□□ (straight)
(□ varies depending on the applicable cable size.)
Manufacturer: DDK Ltd.

- Servomotor Connector: Same for both Standard Specifications and Σ-V Compatible Specifications

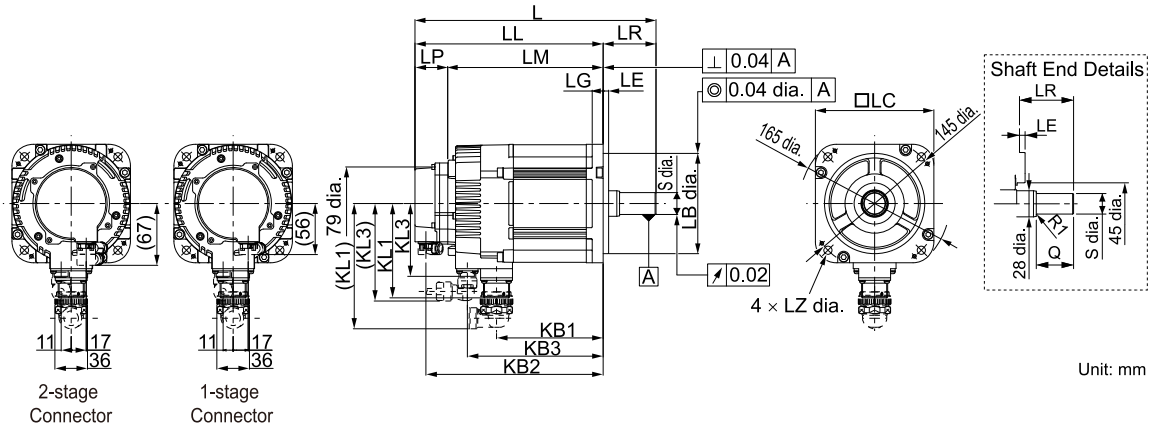


A	Phase U	C	Phase W
B	Phase V	D	FG (frame ground)

Manufacturer: Japan Aviation Electronics Industry, Ltd.

(2) Servomotors with Holding Brakes

(a) Standard Specification



Model SGMXG-	L *1	LL *1	LM	LP *1	LR	KB1	KB2 *1	KB3	KL1	KL3
09D□A2CA1	229	171	137	34	58	83	159	115	138	106
13D□A2CA1	245	187	153	34	58	99	175	131	138	106
20D□A2CA1	263	205	171	34	58	117	193	149	138	106

Model SGMXG-	Flange Dimensions							Shaft End Dimensions		Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	Q	
09D□A2CA1	145	$110^{0}_{-0.035}$	130	6	12	165	9	$24^{0}_{-0.013}$	40	7.5
13D□A2CA1	145	$110^{0}_{-0.035}$	130	6	12	165	9	$24^{0}_{-0.013}$	40	9.0
20D□A2CA1	145	$110^{0}_{-0.035}$	130	6	12	165	9	$24^{0}_{-0.013}$	40	11.0

*1 For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the following section for the values for individual models.

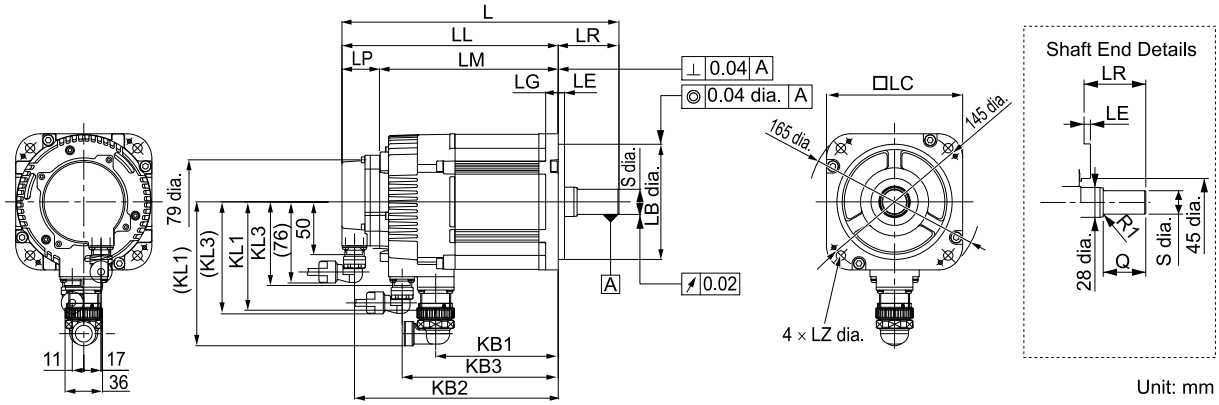
☞ *6.6.5 Dimensions of Servomotors with Batteryless Absolute Encoders on page 208*

Note:

1. The dimensions are same for models with oil seals.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications.

☞ *(c) Shaft End Specification on page 199*

(b) Σ-V Compatible Specification



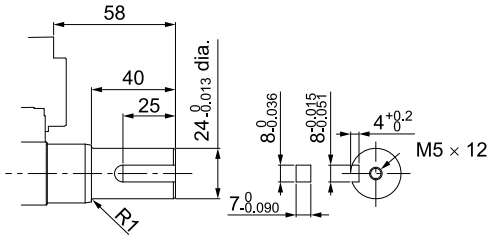
Note:

The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

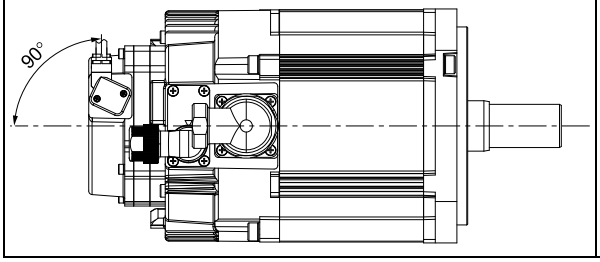
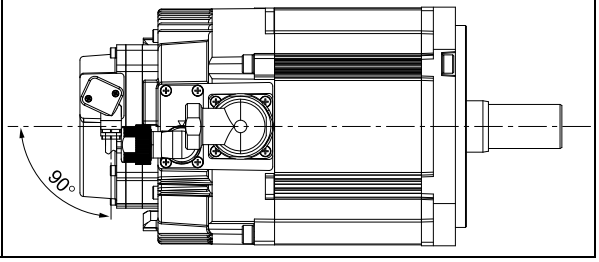
(c) Shaft End Specification

- Straight with Key and Tap



(d) Connector Specifications

- Encoder Connector (26-bit Encoder): Standard Specification
  The encoder cable is installed in the following direction.

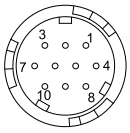
Cable Installed toward Left Side	Cable Installed toward Right Side
	

For details on selecting cables, refer to the following section and manual.

☞ *8.5 Cables for the SGMXG Servomotors on page 269*

🕮 Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

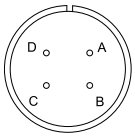
- Encoder Connector (26-bit Encoder): Σ-V Compatible Specification



1	PS	6 *1	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5	BAT(-)	10	FG (frame ground)

*1 A battery is required only for an absolute encoder.
Receptacle: CMV1-R10P
Applicable plug (not provided by Yaskawa)
Plug: CM10-AP10S-□-D (R1) (right-angle type), CM10-SP10S-□-D (R1) (straight), CMV1-AP10S-□□ (right-angle type), CMV1-SP10S-□□ (straight), CMV1S-AP10S-□□ (right-angle type), CMV1S-SP10S-□□ (straight)
(□ varies depending on the applicable cable size.)
Manufacturer: DDK Ltd.

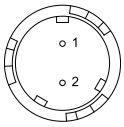
- Servomotor Connector: Same for both Standard Specifications and Σ-V Compatible Specifications



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

Manufacturer: Japan Aviation Electronics Industry, Ltd.

- Brake Connector: Same for both Standard Specifications and Σ-V Compatible Specifications



1	Brake terminal
2	Brake terminal

Note:

There is no voltage polarity for the brake terminals.

Receptacle: CMV1Y-R2P-0(F)

Applicable plug (not provided by Yaskawa)

Plug: CM10-AP2S-□-D (R1) (right-angle type), CM10-SP2S-□-D (R1) (straight), CMV1-AP2S-□□ (right-angle type), CMV1-SP2S-□□ (straight), CMV1S-AP2S-□□ (right-angle type), CMV1S-SP2S-□□ (straight)

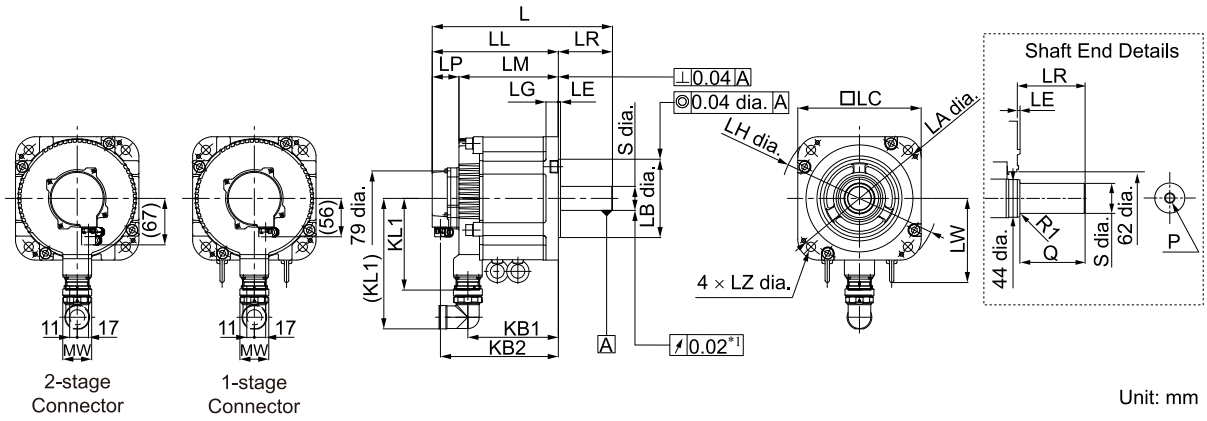
(□ varies depending on the applicable cable size.)

Manufacturer: DDK Ltd.

6.6.3 SGMXG-30D□A to -75D□A

(1) Servomotors without Holding Brakes

(a) Standard Specification



Unit: mm

*1 This is 0.04 for the SGMXG-55D, -75D.

Model SGMXG-	L *1	LL *1	LM	LP *1	LR	KB1	KB2 *1	LW	KL1	MW
30D□A81A1	237	158	124	34	79	108	146	–	190	43
44D□A81A1	261	182	148	34	79	132	170	–	190	
55D□A81A1	332	219	185	34	113	163	207	123	221	59
75D□A81A1	378	265	231	34	113	209	253	123	221	

Model SGMXG-	Flange Dimensions							Shaft End Dimensions			Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	Q	P	
30D□A81A1	200	$114.3^{0}_{-0.025}$	180	3.2	18	230	13.5	$35^{+0.01}_{0}$	76	M12 × 25L	13.5
44D□A81A1	200	$114.3^{0}_{-0.025}$	180	3.2	18	230	13.5	$35^{+0.01}_{0}$	76		17.5
55D□A81A1	200	$114.3^{0}_{-0.025}$	180	3.2	18	230	13.5	$42^{0}_{-0.016}$	110	M16 × 32L	21.5
75D□A81A1	200	$114.3^{0}_{-0.025}$	180	3.2	18	230	13.5	$42^{0}_{-0.016}$	110		29.5

*1 For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the following section for the values for individual models.

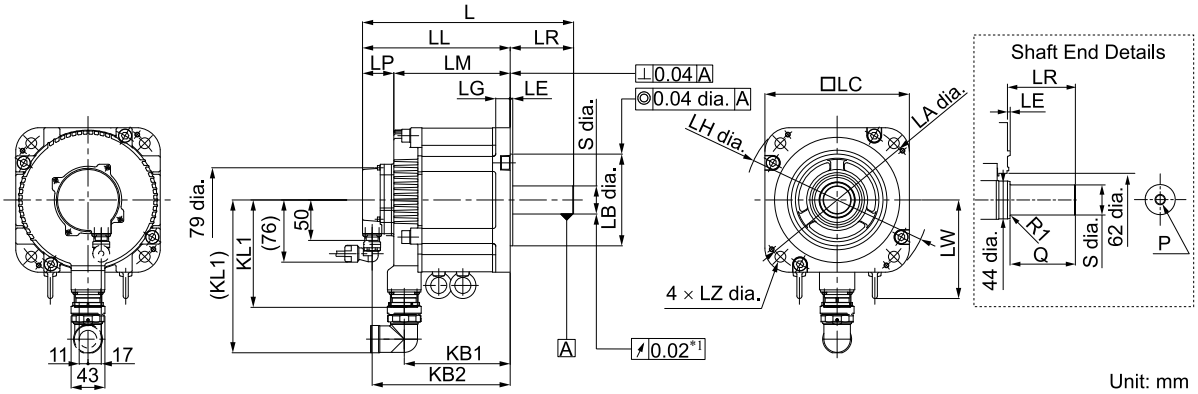
☞ *6.6.5 Dimensions of Servomotors with Batteryless Absolute Encoders on page 208*

Note:

1. The dimensions are same for models with oil seals.
2. The values for the shaft end are for a straight shaft without key and with tap. Refer to the information given below for other shaft end specifications.

☞ *(c) Shaft End Specification on page 201*

(b) Σ-V compatible specification



*1 This is 0.04 for the SGMXG-55D, -75D.

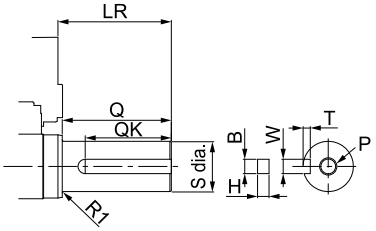
Note:

The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

(c) Shaft End Specification

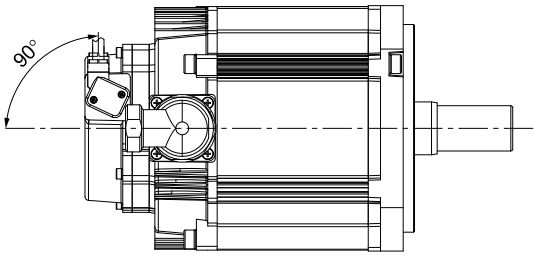
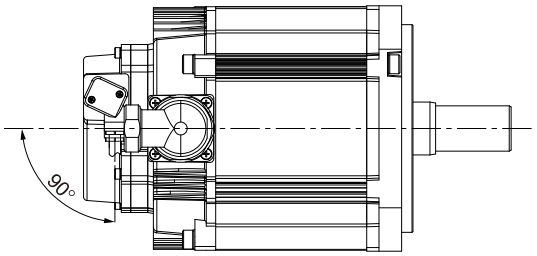
- Straight with Key and Tap



Model SGMXG-	LR	Q	QK	S	B	H	W	T	P
30D□A61□□	79	76	60	$35^{+0.01}_{0}$	$10^{0}_{-0.036}$	$8^{0}_{-0.090}$	$10^{-0.015}_{-0.051}$	$5^{+0.2}_{0}$	M12 × 25
44D□A61□□	79	76	60	$35^{+0.01}_{0}$	$10^{0}_{-0.036}$	$8^{0}_{-0.090}$	$10^{-0.015}_{-0.051}$	$5^{+0.2}_{0}$	
55D□A61□□	113	110	90	$42^{0}_{-0.016}$	$12^{0}_{-0.043}$	$8^{0}_{-0.090}$	$12^{-0.018}_{-0.061}$	$5^{+0.2}_{0}$	M16 × 32
75D□A61□□	113	110	90	$42^{0}_{-0.016}$	$12^{0}_{-0.043}$	$8^{0}_{-0.090}$	$12^{-0.018}_{-0.061}$	$5^{+0.2}_{0}$	

(d) Connector Specifications

- Encoder Connector (26-bit Encoder): Standard Specification
  The encoder cable is installed in the following direction.

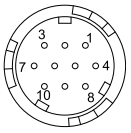
Cable Installed toward Left Side	Cable Installed toward Right Side
	

For details on selecting cables, refer to the following section and manual.

☞ *8.5 Cables for the SGMXG Servomotors on page 269*

🕮 Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

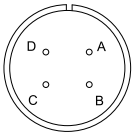
- Encoder Connector (26-bit Encoder): Σ-V Compatible Specification



1	PS	6 *1	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5	BAT(-)	10	FG (frame ground)

*1 A battery is required only for an absolute encoder.
Receptacle: CMV1-R10P
Applicable plug (not provided by Yaskawa)
Plug: CM10-AP10S-□-D (R1) (right-angle type), CM10-SP10S-□-D (R1) (straight), CMV1-AP10S-□□ (right-angle type), CMV1-SP10S-□□ (straight), CMV1S-AP10S-□□ (right-angle type), CMV1S-SP10S-□□ (straight)
(□ varies depending on the applicable cable size.)
Manufacturer: DDK Ltd.

- Servomotor Connector: Same for both Standard Specifications and Σ-V Compatible Specifications

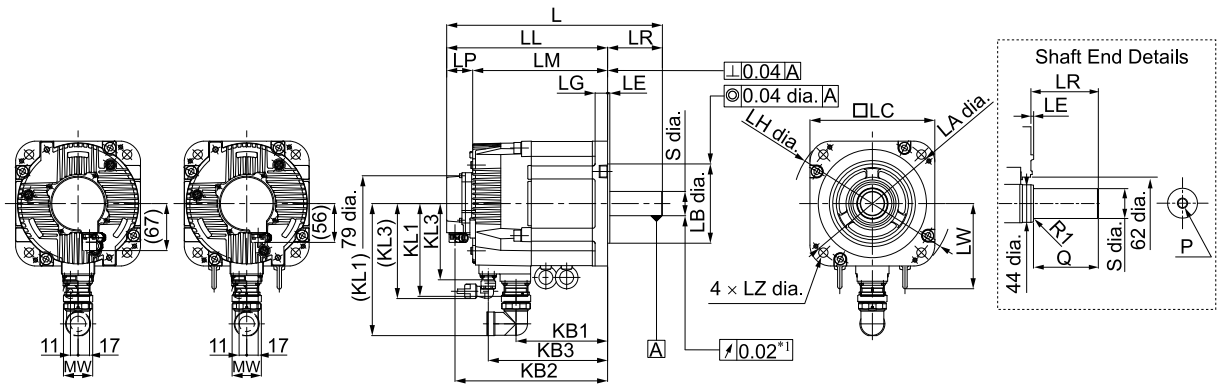


A	Phase U	C	Phase W
B	Phase V	D	FG (frame ground)

Manufacturer: Japan Aviation Electronics Industry, Ltd.

(2) Servomotors with Holding Brakes

(a) Standard Specification



*1 This is 0.04 for the SGMXG-55D, -75D.

Model SGMXG-	L *1	LL *1	LM	LP *1	LR	KB1	KB2 *1	KB3	LW	KL1	KL3	MW
30D□A8CA1	287	208	174	34	79	108	196	150	–	190	136	43
44D□A8CA1	311	232	198	34	79	132	220	174	–	190	136	
55D□A8CA1	376	263	229	34	113	163	251	205	123	221	136	59
75D□A8CA1	422	309	275	34	113	209	297	251	123	221	136	

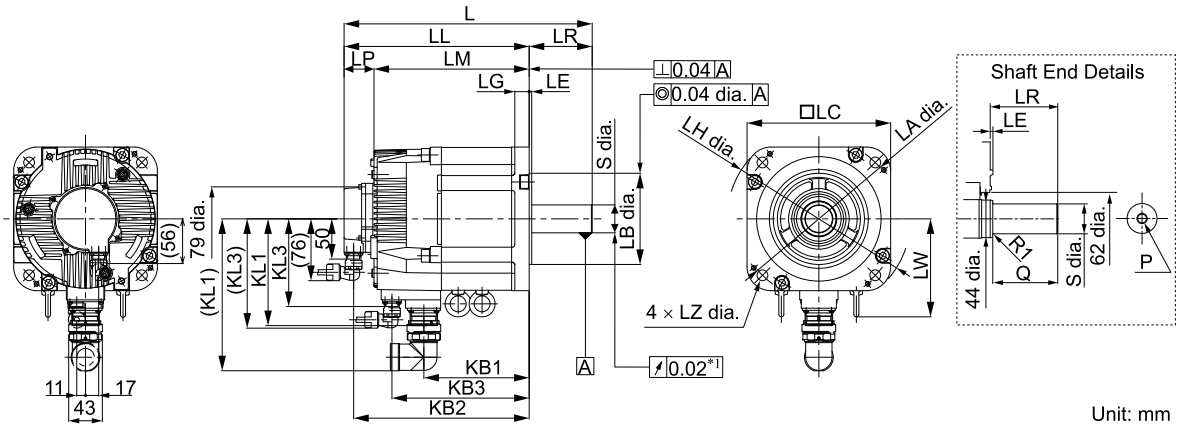
Model SGMXG-	Flange Dimensions							Shaft End Dimensions			Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	Q	P	
30D□A8CA1	200	$114.3^{0}_{-0.025}$	180	3.2	18	230	13.5	$35^{+0.01}_{0}$	76	M12 × 25L	19.5
44D□A8CA1	200	$114.3^{0}_{-0.025}$	180	3.2	18	230	13.5	$35^{+0.01}_{0}$	76		23.5
55D□A8CA1	200	$114.3^{0}_{-0.025}$	180	3.2	18	230	13.5	$42^{0}_{-0.016}$	110	M16 × 32L	27.5
75D□A8CA1	200	$114.3^{0}_{-0.025}$	180	3.2	18	230	13.5	$42^{0}_{-0.016}$	110		35.0

*1 For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the following section for the values for individual models.
☞ 6.6.5 Dimensions of Servomotors with Batteryless Absolute Encoders on page 208

Note:

1. The dimensions are same for models with oil seals.
2. The values for the shaft end are for a straight shaft without key and with tap. Refer to the information given below for other shaft end specifications.
☞ *(c) Shaft End Specification on page 203*

(b) Σ-V compatible specification



Unit: mm

*1 This is 0.04 for the SGMXG-55D, -75D.

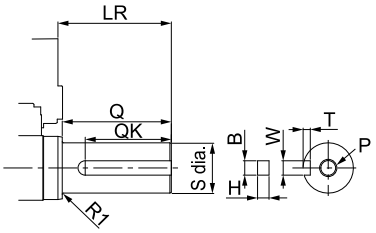
Note:

The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

(c) Shaft End Specification

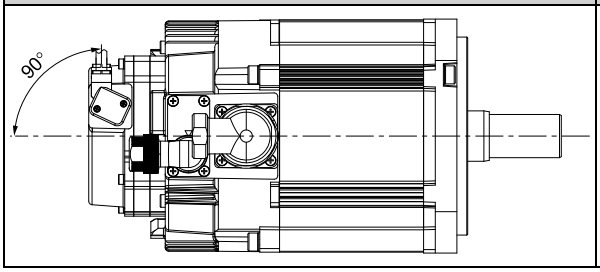
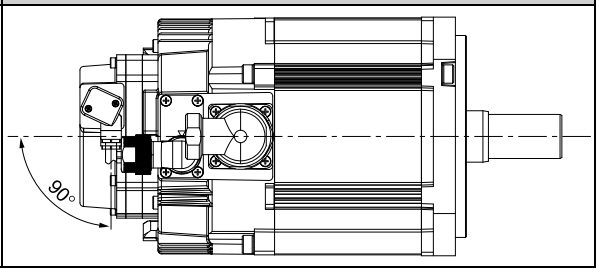
- Straight with Key and Tap



Model SGMXG-	LR	Q	QK	S	B	H	W	T	P
30D□A6C□□	79	76	60	$35^{+0.01}_{0}$	$10^{0}_{-0.036}$	$8^{0}_{-0.090}$	$10^{-0.015}_{-0.051}$	$5^{+0.2}_{0}$	M12 × 25
44D□A6C□□	79	76	60	$35^{+0.01}_{0}$	$10^{0}_{-0.036}$	$8^{0}_{-0.090}$	$10^{-0.015}_{-0.051}$	$5^{+0.2}_{0}$	
55D□A6C□□	113	110	90	$42^{0}_{-0.016}$	$12^{0}_{-0.043}$	$8^{0}_{-0.090}$	$12^{-0.018}_{-0.061}$	$5^{+0.2}_{0}$	M16 × 32
75D□A6C□□	113	110	90	$42^{0}_{-0.016}$	$12^{0}_{-0.043}$	$8^{0}_{-0.090}$	$12^{-0.018}_{-0.061}$	$5^{+0.2}_{0}$	

(d) Connector Specifications

- Encoder Connector (26-bit Encoder): Standard Specification
  The encoder cable is installed in the following direction.

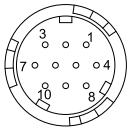
Cable Installed toward Left Side	Cable Installed toward Right Side
	

For details on selecting cables, refer to the following section and manual.

☞ *8.5 Cables for the SGMXG Servomotors on page 269*

🕮 Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

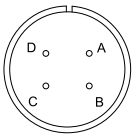
- Encoder Connector (26-bit Encoder): Σ-V Compatible Specification



1	PS	6 *1	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5	BAT(-)	10	FG (frame ground)

*1 A battery is required only for an absolute encoder.
Receptacle: CMV1-R10P
Applicable plug (not provided by Yaskawa)
Plug: CM10-AP10S-□-D (R1) (right-angle type), CM10-SP10S-□-D (R1) (straight), CMV1-AP10S-□□ (right-angle type), CMV1-SP10S-□□ (straight), CMV1S-AP10S-□□ (right-angle type), CMV1S-SP10S-□□ (straight)
(□ varies depending on the applicable cable size.)
Manufacturer: DDK Ltd.

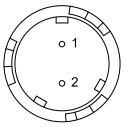
- Servomotor Connector: Same for both Standard Specifications and Σ-V Compatible Specifications



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

Manufacturer: Japan Aviation Electronics Industry, Ltd.

- Brake Connector: Same for both Standard Specifications and Σ-V Compatible Specifications



1	Brake terminal
2	Brake terminal

Note:

There is no voltage polarity for the brake terminals.

Receptacle: CMV1Y-R2P-0(F)

Applicable plug (not provided by Yaskawa)

Plug: CM10-AP2S-□-D (R1) (right-angle type), CM10-SP2S-□-D (R1) (straight), CMV1-AP2S-□□ (right-angle type), CMV1-SP2S-□□ (straight), CMV1S-AP2S-□□ (right-angle type), CMV1S-SP2S-□□ (straight)

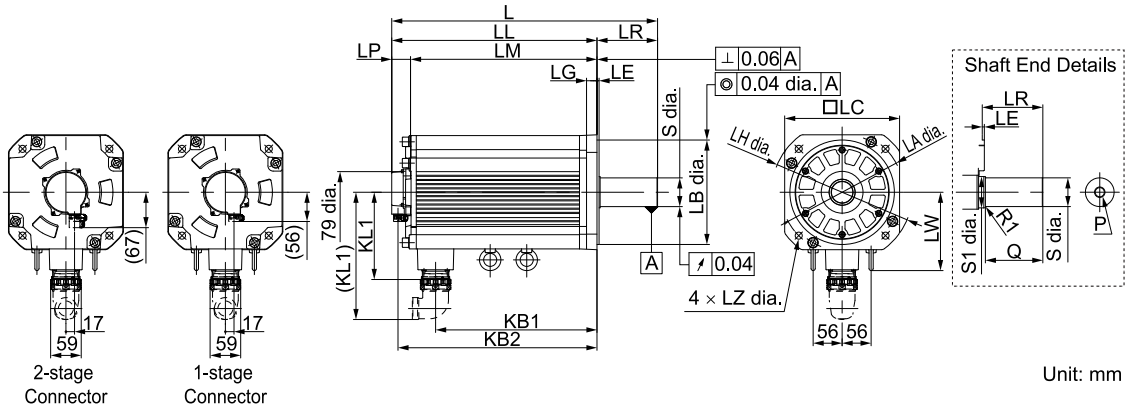
(□ varies depending on the applicable cable size.)

Manufacturer: DDK Ltd.

6.6.4 SGMXG-1A, -1E

(1) Servomotors without Holding Brakes

(a) Standard Specification



Model SGMXG-	L *1	LL *1	LM	LP *1	LR	KB1	KB2 *1	LW	KL1
1AD□A81A1	445	329	295	34	116	247	317	150	245
1ED□A81A1	507	391	357	34	116	309	379	150	245

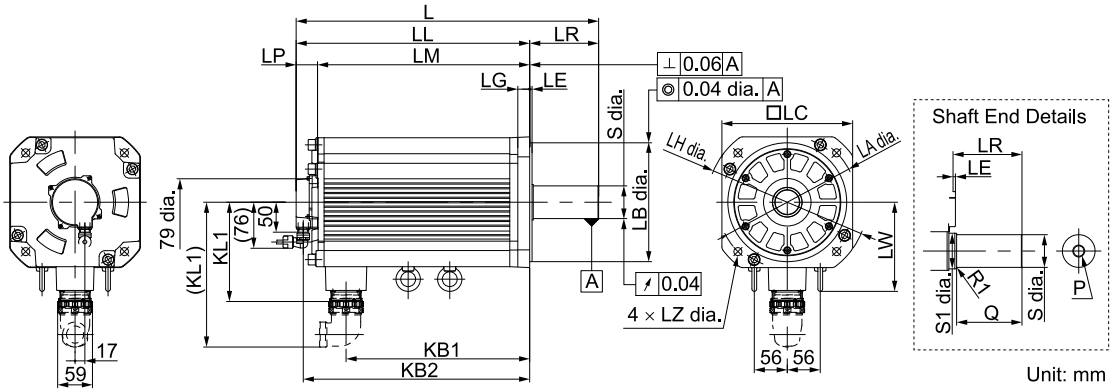
Model SGMXG-	Flange Dimensions							Shaft End Dimensions				Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	S1	Q	P	
1AD□A81A1	235	$200^{0}_{-0.046}$	220	4	20	270	13.5	$42^{0}_{-0.016}$	50	110	M16 × 32	57
1ED□A81A1	235	$200^{0}_{-0.046}$	220	4	20	270	13.5	$55^{+0.030}_{+0.011}$	60	110	M20 × 40	67

*1 For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the following section for the values for individual models.
☞ *6.6.5 Dimensions of Servomotors with Batteryless Absolute Encoders on page 208*

Note:

1. The dimensions are same for models with oil seals.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications.
☞ *(c) Shaft End Specification on page 205*

(b) Σ-V Compatible Specification



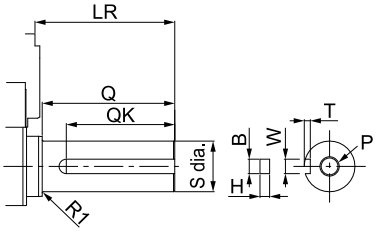
Note:

The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

(c) Shaft End Specification

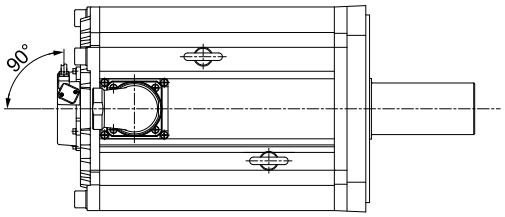
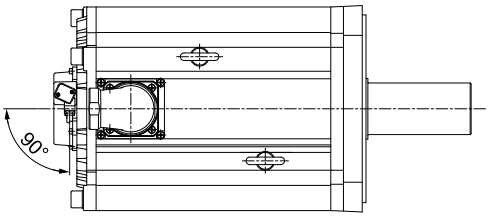
- Straight with Key and Tap



Model SGMXG-	LR	Q	QK	S	B	H	W	T	P
1AD□A61□□	116	110	90	$42^{0}_{-0.016}$	$12^{0}_{-0.043}$	$8^{0}_{-0.090}$	$12^{-0.018}_{-0.061}$	$5^{+0.2}_{0}$	M16 × 32
1ED□A61□□	116	110	90	$55^{+0.030}_{+0.011}$	$16^{0}_{-0.043}$	$10^{0}_{-0.090}$	$16^{-0.018}_{-0.061}$	$6^{+0.2}_{0}$	M20 × 40

(d) Connector Specifications

- Encoder Connector (26-bit Encoder): Standard Specification
  The encoder cable is installed in the following direction.

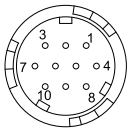
Cable Installed toward Left Side	Cable Installed toward Right Side
	

For details on selecting cables, refer to the following section and manual.

☞ *8.5 Cables for the SGMXG Servomotors on page 269*

🕮 Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

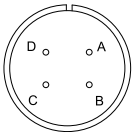
- Encoder Connector (26-bit Encoder): Σ-V Compatible Specification



1	PS	6 *1	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5	BAT(-)	10	FG (frame ground)

*1 A battery is required only for an absolute encoder.
Receptacle: CMV1-R10P
Applicable plug (not provided by Yaskawa)
Plug: CM10-AP10S-□-D (R1) (right-angle type), CM10-SP10S-□-D (R1) (straight), CMV1-AP10S-□□ (right-angle type), CMV1-SP10S-□□ (straight), CMV1S-AP10S-□□ (right-angle type), CMV1S-SP10S-□□ (straight)
(□ varies depending on the applicable cable size.)
Manufacturer: DDK Ltd.

- Servomotor Connector: Same for both Standard Specifications and Σ-V Compatible Specifications

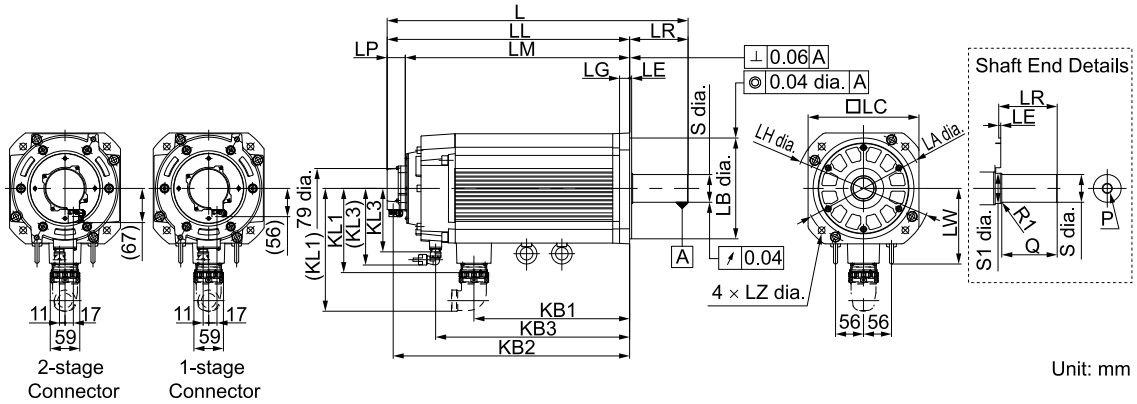


A	Phase U	C	Phase W
B	Phase V	D	FG (frame ground)

Manufacturer: Japan Aviation Electronics Industry, Ltd.

(2) Servomotors with Holding Brakes

(a) Standard Specification



Model SGMXG-	L *1	LL *1	LM	LP *1	LR	KB1	KB2 *1	KB3	LW	KL1	KL3
1AD□A8CA1	496	380	346	34	116	247	368	315	150	245	151
1ED□A8CA1	596	480	446	34	116	309	468	385	150	245	151

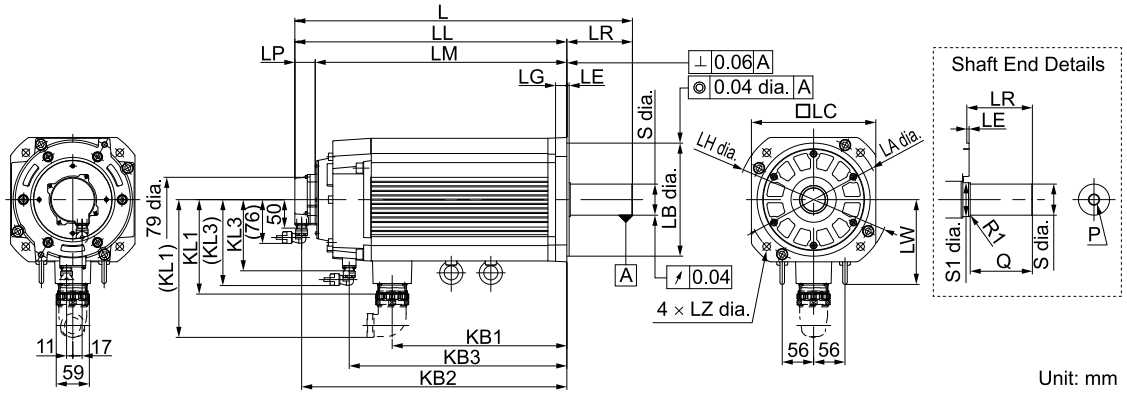
Model SGMXG-	Flange Dimensions							Shaft End Dimensions				Approx. Mass [kg]
	LA	LB	LC	LE	LG	LH	LZ	S	S1	Q	P	
1AD□A8CA1	235	$200^{0}_{-0.046}$	220	4	20	270	13.5	$42^{0}_{-0.016}$	50	110	M16 × 32	65
1ED□A8CA1	235	$200^{0}_{-0.046}$	220	4	20	270	13.5	$55^{+0.030}_{+0.011}$	60	110	M20 × 40	79

*1 For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the following section for the values for individual models.
☞ *6.6.5 Dimensions of Servomotors with Batteryless Absolute Encoders on page 208*

Note:

1. The dimensions are same for models with oil seals.
2. The values for a straight shaft end without key specification are given. Refer to the information given below for other shaft end specifications.
☞ *(c) Shaft End Specification on page 207*

(b) Σ-V Compatible Specification



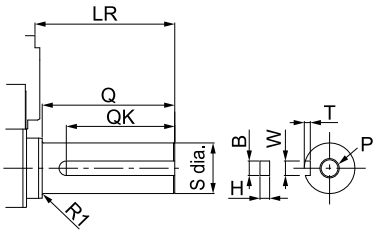
Note:

The difference from the model with standard specifications is the shape of the encoder cable connector.

The dimensions for non-connector parts are identical to those for models with standard specifications.

(c) Shaft End Specification

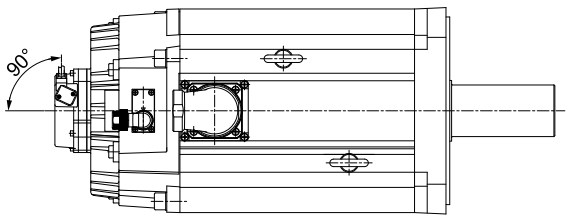
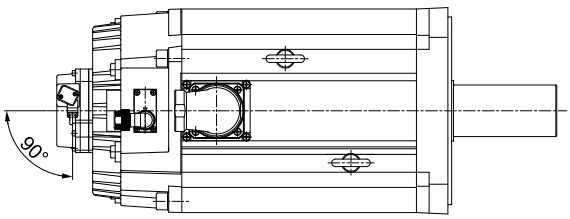
- Straight with Key and Tap



Model SGMXG-	LR	Q	QK	S	B	H	W	T	P
1AD□A6C□□	116	110	90	$42^{0}_{-0.016}$	$12^{0}_{-0.043}$	$8^{0}_{-0.090}$	$12^{-0.018}_{-0.061}$	$5^{+0.2}_{0}$	M16 × 32
1ED□A6C□□	116	110	90	$55^{+0.030}_{+0.011}$	$16^{0}_{-0.043}$	$10^{0}_{-0.090}$	$16^{-0.018}_{-0.061}$	$6^{+0.2}_{0}$	M20 × 40

(d) Connector Specifications

- Encoder Connector (26-bit Encoder): Standard Specification
  The encoder cable is installed in the following direction.

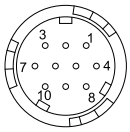
Cable Installed toward Left Side	Cable Installed toward Right Side
	

For details on selecting cables, refer to the following section and manual.

☞ *8.5 Cables for the SGMXG Servomotors on page 269*

🕮 Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

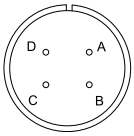
- Encoder Connector (26-bit Encoder): Σ-V Compatible Specification



1	PS	6 *1	BAT(+)
2	/PS	7	–
3	–	8	–
4	PG5V	9	PG0V
5	BAT(-)	10	FG (frame ground)

*1 A battery is required only for an absolute encoder.
Receptacle: CMV1-R10P
Applicable plug (not provided by Yaskawa)
Plug: CM10-AP10S-□-D (R1) (right-angle type), CM10-SP10S-□-D (R1) (straight), CMV1-AP10S-□□ (right-angle type), CMV1-SP10S-□□ (straight), CMV1S-AP10S-□□ (right-angle type), CMV1S-SP10S-□□ (straight)
(□ varies depending on the applicable cable size.)
Manufacturer: DDK Ltd.

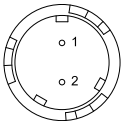
- Servomotor Connector: Same for both Standard Specifications and Σ-V Compatible Specifications



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

Manufacturer: Japan Aviation Electronics Industry, Ltd.

- Brake Connector: Same for both Standard Specifications and Σ-V Compatible Specifications



1	Brake terminal
2	Brake terminal

Note:

There is no voltage polarity for the brake terminals.

Receptacle: CMV1Y-R2P-0(F)

Applicable plug (not provided by Yaskawa)

Plug: CM10-AP2S-□-D (R1) (right-angle type), CM10-SP2S-□-D (R1) (straight), CMV1-AP2S-□□ (right-angle type), CMV1-SP2S-□□ (straight), CMV1S-AP2S-□□ (right-angle type), CMV1S-SP2S-□□ (straight)

(□ varies depending on the applicable cable size.)

Manufacturer: DDK Ltd.

6.6.5 Dimensions of Servomotors with Batteryless Absolute Encoders

Model SGMXG-	L	LL	LP	KB2
05DWA□□A□	185 (218)	145 (178)	42 (42)	133 (166)
09DWA□□A□	201 (237)	143 (179)	42 (42)	131 (167)
13DWA□□A□	217 (253)	159 (195)	42 (42)	147 (183)

Continued on next page.

Continued from previous page.

Model SGMXG-	L	LL	LP	KB2
20DWA□□A□	235 (271)	177 (213)	42 (42)	165 (201)
30DWA□□A□	245 (295)	166 (216)	42 (42)	154 (204)
44DWA□□A□	269 (319)	190 (240)	42 (42)	178 (228)
55DWA□□A□	340 (384)	227 (271)	42 (42)	215 (259)
75DWA□□A□	386 (430)	273 (317)	42 (42)	261 (305)
1ADWA□□A□	453 (504)	337 (388)	42 (42)	325 (376)
1EDWA□□A□	515 (604)	399 (488)	42 (42)	387 (476)

Note:

The values in parentheses are for servomotors with holding brakes.

7

Servomotor Installation

This chapter describes the installation conditions, procedures, and precautions for servomotors.

7.1 Installation Conditions

The service life of a servomotor will be shortened or unexpected problems will occur if the servomotor is installed incorrectly or in an inappropriate environment or location. Always observe the following installation instructions.

7.1.1 Installation Precautions

Refer to the following section for the installation precautions.

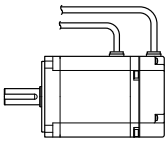
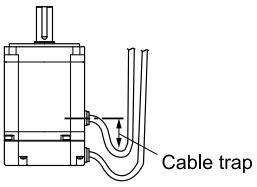
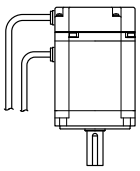
☞ *i.5 Safety Precautions on page 18*

7.1.2 Installation Environment

Refer to the specifications for each type of servomotor for the mechanical specifications, protective structure, and installation environment related to servomotor installation.

7.1.3 Installation Orientation

You can install the servomotor either horizontally or vertically.

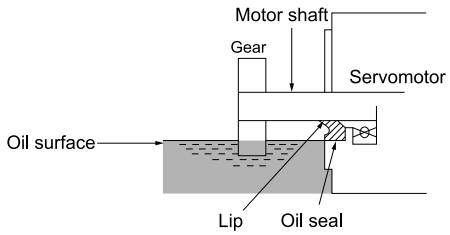
Installation Orientation		Figure	Precautions
Horizontal			If you are using a servomotor with an oil seal, refer to the following section as well. ☞ *7.1.4 Using Servomotors with Oil Seals on page 212*
Vertical	Shaft end up		• You cannot use a servomotor with an oil seal in this orientation. • Provide a cable trap so that water drops will not run into the servomotor. • Implement countermeasures in the machine so that oil, e.g., from a gear box, does not enter the servomotor.
	Shaft end down		If you are using a servomotor with an oil seal, refer to the following section as well. ☞ *7.1.4 Using Servomotors with Oil Seals on page 212*

Information If you attach a gear to the servomotor, observe the installation orientation specified by the manufacturer of the gear.

7.1.4 Using Servomotors with Oil Seals

This section gives the operating conditions for using servomotors with oil seals.

- Keep the oil surface below the oil seal lip.



- Use the oil seal in favorably lubricated condition with only splashing of oil.
  If the lubrication state is poor, the oil seal may wear out prematurely.
- Do not allow oil to collect in the oil seal lip.
- Do not use the servomotor where the oil seal would be below the oil surface. If you do, oil will enter the servomotor, which may damage the servomotor.

7.1.5 Using Servomotors with Holding Brakes

This section gives precautions for using servomotors with holding brakes

- The holding brakes have a limited service life. Although the quality and reliability of a holding brake has been sufficiently confirmed, stress factors, such as emergency braking, can result in problems in the holding operation. In applications in which safety is a concern, such as for a load falling on a vertical axis, determine if safety measures are required on the machine, such as adding a redundant fall-prevention mechanism.
- For a servomotor with a holding brake, there is a small amount of rotational play in the motor shaft (1.5° max. initially) because of the backlash in the holding brake, even when the brake power is OFF.
- For a servomotor with a holding brake, the brake's rotating disc may sometimes generate murmur from friction during acceleration, stopping, and low-speed operation.
- If a servomotor with a holding brake performs oscillating operation that does not involve continuous operation, the service life of the holding brake may decrease. For this reason, periodically perform continuous operation, such as by running the motor shaft at the rated speed. Contact your Yaskawa representative if you will use a servomotor in an application that is not suited to continuous operation.

7.2 Coupling to the Machine

You can couple the servomotor to the machine with either a coupling or a belt.

Use the following procedures.

7.2.1 Using a Coupling

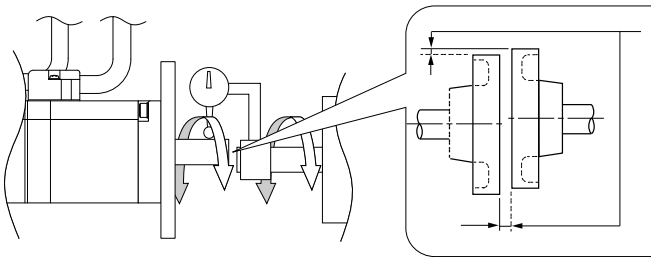
Important
- Use a flexible coupling that is designed for servomotors. We recommend that you use a double-spring coupling, which provides some tolerance in eccentricity and deflection.
- Select a suitable size of coupling for the operating conditions. An inappropriate coupling may cause damage.

1. **Wipe off all of the anticorrosive coating from the motor shaft.**
2. **If you are using a servomotor with a key, attach the key enclosed with the servomotor or the specified size of key to the shaft.**

Important
- When you attach the key to the motor shaft, do not subject the key groove or shaft to direct shock.
- The key groove on the motor shaft uses the fastening type described in JIS B 1301-1996 to prevent fretting wear. When you insert the key, adjust the gap between the key and the key groove in some manner, such as by buffing the key. If the key dimensions are outside the tolerances, there is a risk of key or key groove deformation.

3. **Confirm that the centering accuracy is within the specified range using a dial gauge or other means.**

   If a dial gauge is not available, slide the coupling along both shafts and make adjustments so that it does not catch.

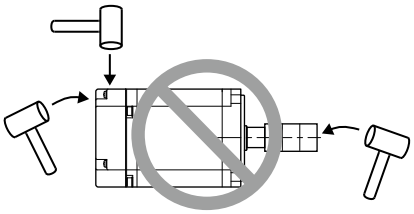


・Centering Accuracy
Measure this distance at four different positions on the circumference. The difference between the maximum and minimum measurements must be 0.03 mm or less.
Even within this range, make adjustments to increase centering accuracy as much as possible.

Note:
When making the measurements, turn the coupling and motor shaft together.

4. **Align the shaft of the servomotor with the shaft of the machine, and then connect the shafts with the coupling.**

Important
- When you couple the shafts, make sure that the required centering accuracy is achieved. Vibration will damage the bearings and encoders if the shafts are not properly centered.
- When you attach the coupling, do not subject the shaft to direct shock. Also, do not subject the area around the encoder to shock. Shock may damage the encoder.



- If the coupling makes any abnormal noise, center the shafts again until the noise is eliminated.
- Make sure that the thrust load and radial load are within specifications. Refer to the specifications for each type of servomotor for the thrust load and radial load.

7.2.2 Using a Belt

Important

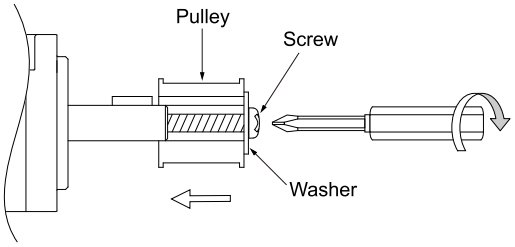
Select a coupling belt that is suitable for the allowable radial load of the servomotor and the servomotor output. When the servomotor accelerates or decelerates, the counterforce from the acceleration/deceleration torque adds tension to the initial belt tension. Take this additional tension into consideration when you select the coupling belt.

1. **Wipe off all of the anticorrosive coating from the motor shaft.**
2. **If you are using a servomotor with a key, attach the key enclosed with the servomotor or the specified size of key to the shaft.**

Important

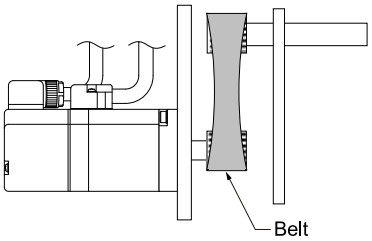
When you attach the key to the motor shaft, do not subject the key groove or shaft to direct shock.

3. **If you need to attach a pulley to the servomotor with a key, use a screwdriver to tighten the screw in the end of the motor shaft to press in and attach the pulley.**



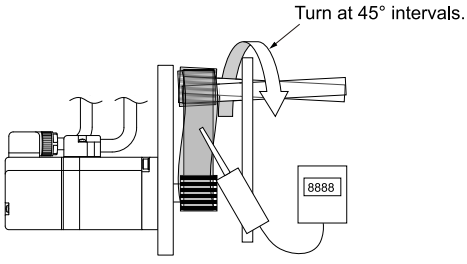
4. **Couple the servomotor to the machine with a belt.**

When you attach the belt, adjust the belt tension so that the allowable radial load given in the servomotor specifications is not exceeded. For details, refer to the catalog of the belt manufacturer.



Important

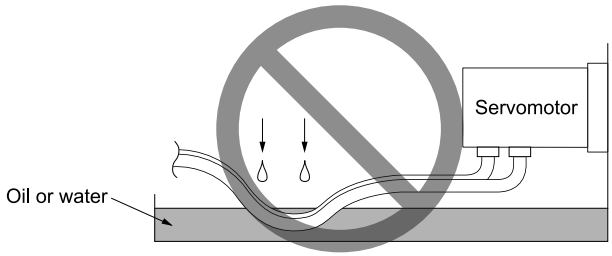
Adjust the belt tension to adjust the radial load. Measure the belt tension at 45° intervals of the machine shaft. Turn the shaft and take measurements with a belt tension meter at each point.



7.3 Oil and Water Countermeasures

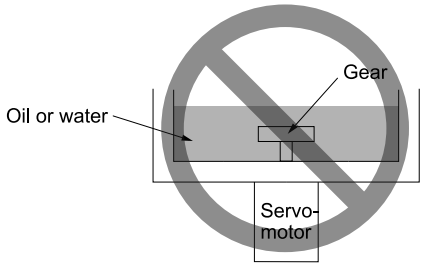
Observe the following instructions so that water, oil, or other foreign matter will not enter the servomotor.

- Do not allow the cables to be in oil or water.



If contact with oil or water is unavoidable, use oil-resistant cables. Oil-resistant cables are not provided by Yaskawa.

- If you install the servomotor with the end of the shaft facing up, do not use the servomotor where oil or water from the machine, a gear box, or other source would come into contact with the servomotor.



If contact with oil or water is unavoidable, implement countermeasures in the machine so that oil or water from the gear box does not enter the servomotor.

- Do not use the servomotor where it would come into contact with cutting oil.
  Depending on the type of cutting oil, sealing materials, packing, cables, nameplate, or other parts may be adversely affected.
- Do not use the servomotor where it would be continuously in contact with oil mist, water vapor, oil, water, or grease.
  If usage under the above conditions is unavoidable, implement countermeasures in the machine to protect against dirt and water.

7.4 Servomotor Temperature Increase

This section describes measures to suppress temperature increases in the servomotor.

- When you install the servomotor, observe the cooling conditions (heat sink sizes) that are given in the specifications for each type of servomotor.
  The servomotor generates heat when it operates. The heat generated by the servomotor radiates to the heat sink through the motor mounting surface. Therefore, if the surface area of the heat sink is too small, the temperature of the servomotor may increase abnormally.
- If the operating environment makes it difficult to use a large heat sink, or if the surrounding air temperature or altitude given in the specifications is exceeded, implement the following measures.
  - Derate the servomotor.
    Refer to the specifications for each type of servomotor for information on derating.
    Consider derating when you select the capacity of the servomotor.
  - Use external forced-air cooling for the servomotor with a cooling fan or other means.


Important

- Do not place packing or any other insulating material between the servomotor and heat sink. Doing so will cause the motor temperature to increase, affect resistance to noise, and may cause motor failure.
- When using forced-air cooling, cool the entire servomotor.
  If only the encoder is cooled, there is a risk that alarms related to temperature will no longer occur, which may cause motor failure.

8

Connections between Servomotors and SERVOPACKs

This chapter describes the cables that are used to connect one servomotor to the SERVOPACK and provides related precautions.

8.1 Cables for the SGMXJ Servomotors

Information Refer to the following manual for details on connecting multiple devices to the SERVOPACK.

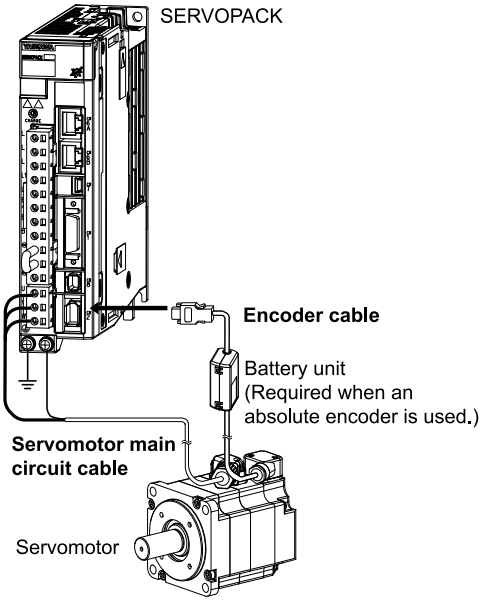
Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

8.1.1 System Configurations

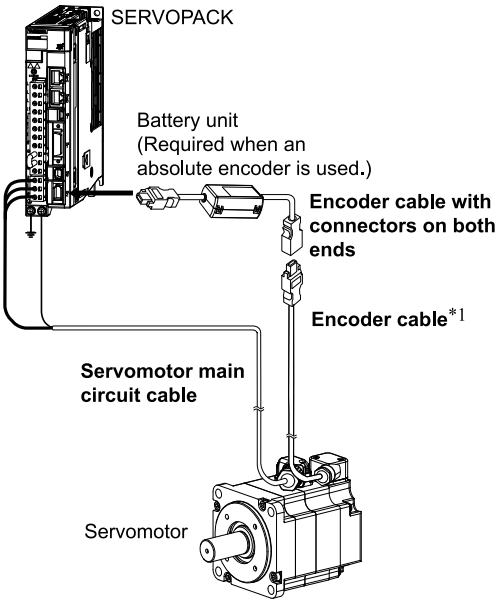
(1) Servomotors with Standard Specifications

The cables shown below are required to connect a servomotor to a SERVOPACK.

When Not Relaying the Encoder Cable



When Relaying the Encoder Cable



*1 The JZSP-UCMP00-□□-E and JZSP-CSP12-E cannot be connected at the same time.

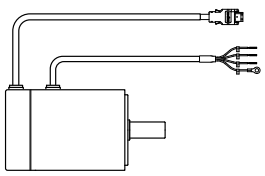
Note:

1. The encoder cable to use depends on whether the encoder cable will be relayed.
2. When you will relay the encoder cable, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
3. If you use a servomotor main circuit cable that exceeds 20 m, the intermittent duty zone in the torque-rotation speed characteristics will become smaller because the voltage drop increases.
   Refer to the following section for the intermittent duty zone.
   3.2.3 Torque-Rotation Speed Characteristics on page 55
4. Refer to the following manual for the following information.
   - Cable dimensional drawings and wiring specifications
   - Order numbers and specifications of individual connectors for cables
   - Order numbers and specifications for wiring materials

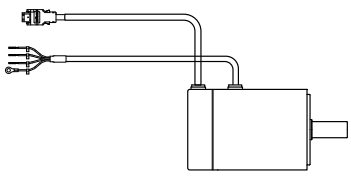
   Σ-X-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

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



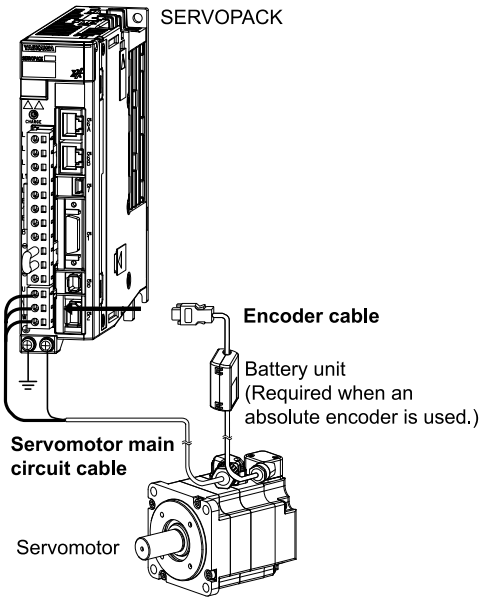
Cable Installed away from Load



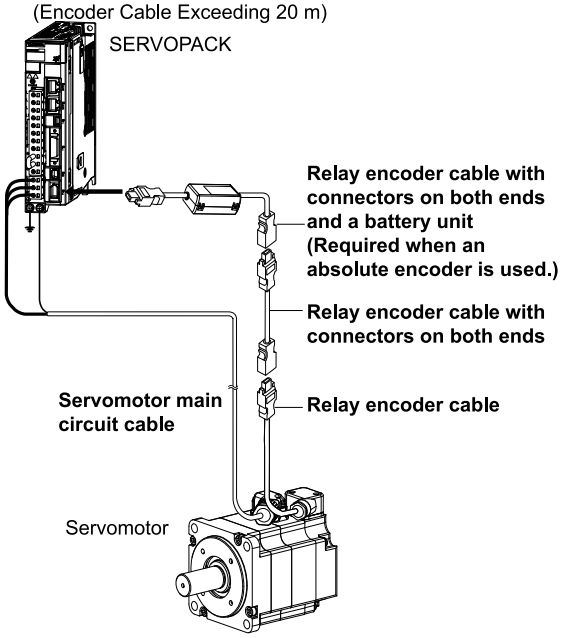
(2) Servomotors with Σ-7 Compatible Specifications

The cables shown below are required to connect a servomotor to a SERVOPACK.

When Not Relaying the Encoder Cable
(Encoder Cable Less Than 20 m)



When Relaying the Encoder Cable
(Encoder Cable Exceeding 20 m)



Note:

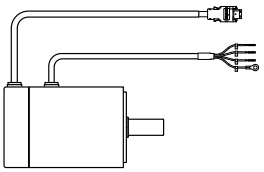
1. The encoder cable to use depends on whether the encoder cable will be relayed. Be sure to use the relay encoder cable with connectors at both ends in combination with the relay encoder cable as shown in the illustration at the upper right.
2. If you use a servomotor main circuit cable that exceeds 20 m, the intermittent duty zone in the torque-rotation speed characteristics will become smaller because the voltage drop increases.
   Refer to the following section for the intermittent duty zone.
   ☞ *3.2.3 Torque-Rotation Speed Characteristics on page 55*
3. Refer to the following manual for the following information.
   - Cable dimensional drawings and wiring specifications
   - Order numbers and specifications of individual connectors for cables
   - Order numbers and specifications for wiring materials

   📖 Σ-X-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

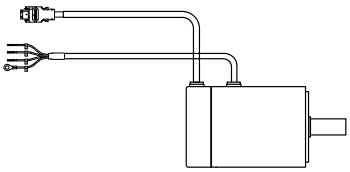
Important

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



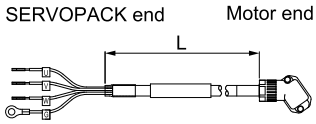
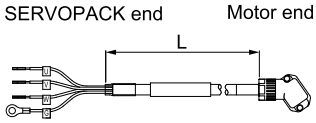
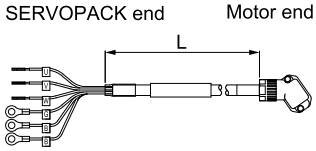
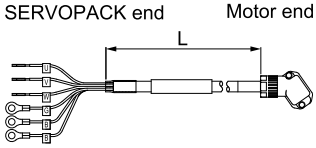
8.1.2 Servomotor Main Circuit Cables

This section provides information on selecting a servomotor main circuit cable. Refer to the following manual for detailed information on cables and for the wiring materials to make your own cables.

Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

(1) Servomotors with Standard Specifications

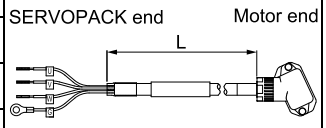
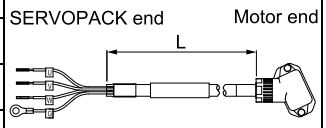
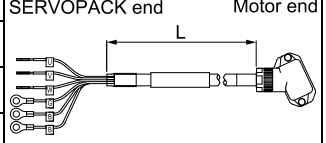
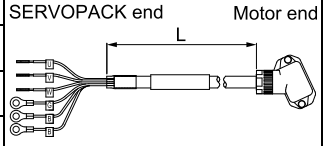
(a) SGMXJ-A5 to -06 (50 to 600 W)

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
For servomotors without holding brakes Cable installed toward load	3 m	JWSP-XMA5NS1-03	JWSP-XMA5NF1-03	
	5 m	JWSP-XMA5NS1-05	JWSP-XMA5NF1-05	
	10 m	JWSP-XMA5NS1-10	JWSP-XMA5NF1-10	
	15 m	JWSP-XMA5NS1-15	JWSP-XMA5NF1-15	
	20 m	JWSP-XMA5NS1-20	JWSP-XMA5NF1-20	
	30 m	JWSP-XMA5NS1-30	JWSP-XMA5NF1-30	
	40 m	JWSP-XMA5NS1-40	JWSP-XMA5NF1-40	
	50 m	JWSP-XMA5NS1-50	JWSP-XMA5NF1-50	
For servomotors without holding brakes Cable installed away from load	3 m	JWSP-XMA5NS2-03	JWSP-XMA5NF2-03	
	5 m	JWSP-XMA5NS2-05	JWSP-XMA5NF2-05	
	10 m	JWSP-XMA5NS2-10	JWSP-XMA5NF2-10	
	15 m	JWSP-XMA5NS2-15	JWSP-XMA5NF2-15	
	20 m	JWSP-XMA5NS2-20	JWSP-XMA5NF2-20	
	30 m	JWSP-XMA5NS2-30	JWSP-XMA5NF2-30	
	40 m	JWSP-XMA5NS2-40	JWSP-XMA5NF2-40	
	50 m	JWSP-XMA5NS2-50	JWSP-XMA5NF2-50	
For servomotors with holding brakes Cable installed toward load	3 m	JWSP-XMA5BS1-03	JWSP-XMA5BF1-03	
	5 m	JWSP-XMA5BS1-05	JWSP-XMA5BF1-05	
	10 m	JWSP-XMA5BS1-10	JWSP-XMA5BF1-10	
	15 m	JWSP-XMA5BS1-15	JWSP-XMA5BF1-15	
	20 m	JWSP-XMA5BS1-20	JWSP-XMA5BF1-20	
	30 m	JWSP-XMA5BS1-30	JWSP-XMA5BF1-30	
	40 m	JWSP-XMA5BS1-40	JWSP-XMA5BF1-40	
	50 m	JWSP-XMA5BS1-50	JWSP-XMA5BF1-50	
For servomotors with holding brakes Cable installed away from load	3 m	JWSP-XMA5BS2-03	JWSP-XMA5BF2-03	
	5 m	JWSP-XMA5BS2-05	JWSP-XMA5BF2-05	
	10 m	JWSP-XMA5BS2-10	JWSP-XMA5BF2-10	
	15 m	JWSP-XMA5BS2-15	JWSP-XMA5BF2-15	
	20 m	JWSP-XMA5BS2-20	JWSP-XMA5BF2-20	
	30 m	JWSP-XMA5BS2-30	JWSP-XMA5BF2-30	
	40 m	JWSP-XMA5BS2-40	JWSP-XMA5BF2-40	
	50 m	JWSP-XMA5BS2-50	JWSP-XMA5BF2-50	

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

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

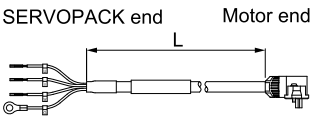
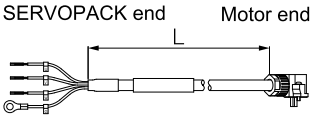
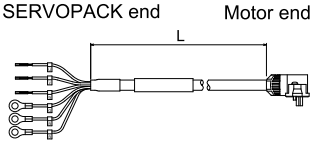
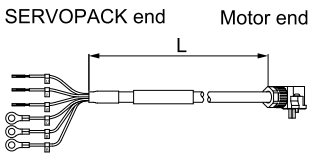
(b) SGMXJ-08 (750 W)

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
For servomotors without holding brakes Cable installed toward load	3 m	JWSP-XM08NS1-03	JWSP-XM08NF1-03	
	5 m	JWSP-XM08NS1-05	JWSP-XM08NF1-05	
	10 m	JWSP-XM08NS1-10	JWSP-XM08NF1-10	
	15 m	JWSP-XM08NS1-15	JWSP-XM08NF1-15	
	20 m	JWSP-XM08NS1-20	JWSP-XM08NF1-20	
	30 m	JWSP-XM08NS1-30	JWSP-XM08NF1-30	
	40 m	JWSP-XM08NS1-40	JWSP-XM08NF1-40	
	50 m	JWSP-XM08NS1-50	JWSP-XM08NF1-50	
For servomotors without holding brakes Cable installed away from load	3 m	JWSP-XM08NS2-03	JWSP-XM08NF2-03	
	5 m	JWSP-XM08NS2-05	JWSP-XM08NF2-05	
	10 m	JWSP-XM08NS2-10	JWSP-XM08NF2-10	
	15 m	JWSP-XM08NS2-15	JWSP-XM08NF2-15	
	20 m	JWSP-XM08NS2-20	JWSP-XM08NF2-20	
	30 m	JWSP-XM08NS2-30	JWSP-XM08NF2-30	
	40 m	JWSP-XM08NS2-40	JWSP-XM08NF2-40	
	50 m	JWSP-XM08NS2-50	JWSP-XM08NF2-50	
For servomotors with holding brakes Cable installed toward load	3 m	JWSP-XM08BS1-03	JWSP-XM08BF1-03	
	5 m	JWSP-XM08BS1-05	JWSP-XM08BF1-05	
	10 m	JWSP-XM08BS1-10	JWSP-XM08BF1-10	
	15 m	JWSP-XM08BS1-15	JWSP-XM08BF1-15	
	20 m	JWSP-XM08BS1-20	JWSP-XM08BF1-20	
	30 m	JWSP-XM08BS1-30	JWSP-XM08BF1-30	
	40 m	JWSP-XM08BS1-40	JWSP-XM08BF1-40	
	50 m	JWSP-XM08BS1-50	JWSP-XM08BF1-50	
For servomotors with holding brakes Cable installed away from load	3 m	JWSP-XM08BS2-03	JWSP-XM08BF2-03	
	5 m	JWSP-XM08BS2-05	JWSP-XM08BF2-05	
	10 m	JWSP-XM08BS2-10	JWSP-XM08BF2-10	
	15 m	JWSP-XM08BS2-15	JWSP-XM08BF2-15	
	20 m	JWSP-XM08BS2-20	JWSP-XM08BF2-20	
	30 m	JWSP-XM08BS2-30	JWSP-XM08BF2-30	
	40 m	JWSP-XM08BS2-40	JWSP-XM08BF2-40	
	50 m	JWSP-XM08BS2-50	JWSP-XM08BF2-50	

*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 90 mm or larger.

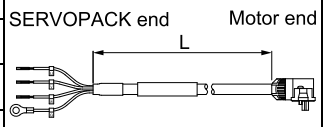
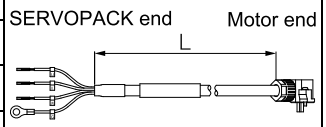
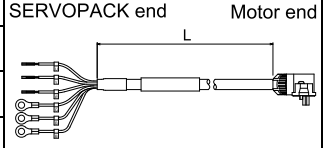
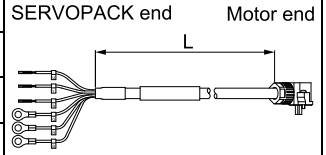
(2) Servomotors with Σ-7 Compatible Specifications

(a) SGMXJ-A5 to -C2 (50 to 150 W)

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
For servomotors without holding brakes Cable installed toward load	3 m	JZSP-C7M10F-03-E	JZSP-C7M12F-03-E	
	5 m	JZSP-C7M10F-05-E	JZSP-C7M12F-05-E	
	10 m	JZSP-C7M10F-10-E	JZSP-C7M12F-10-E	
	15 m	JZSP-C7M10F-15-E	JZSP-C7M12F-15-E	
	20 m	JZSP-C7M10F-20-E	JZSP-C7M12F-20-E	
	30 m	JZSP-C7M10F-30-E	JZSP-C7M12F-30-E	
	40 m	JZSP-C7M10F-40-E	JZSP-C7M12F-40-E	
	50 m	JZSP-C7M10F-50-E	JZSP-C7M12F-50-E	
For servomotors without holding brakes Cable installed away from load	3 m	JZSP-C7M10G-03-E	JZSP-C7M12G-03-E	
	5 m	JZSP-C7M10G-05-E	JZSP-C7M12G-05-E	
	10 m	JZSP-C7M10G-10-E	JZSP-C7M12G-10-E	
	15 m	JZSP-C7M10G-15-E	JZSP-C7M12G-15-E	
	20 m	JZSP-C7M10G-20-E	JZSP-C7M12G-20-E	
	30 m	JZSP-C7M10G-30-E	JZSP-C7M12G-30-E	
	40 m	JZSP-C7M10G-40-E	JZSP-C7M12G-40-E	
	50 m	JZSP-C7M10G-50-E	JZSP-C7M12G-50-E	
For servomotors with holding brakes Cable installed toward load	3 m	JZSP-C7M13F-03-E	JZSP-C7M14F-03-E	
	5 m	JZSP-C7M13F-05-E	JZSP-C7M14F-05-E	
	10 m	JZSP-C7M13F-10-E	JZSP-C7M14F-10-E	
	15 m	JZSP-C7M13F-15-E	JZSP-C7M14F-15-E	
	20 m	JZSP-C7M13F-20-E	JZSP-C7M14F-20-E	
	30 m	JZSP-C7M13F-30-E	JZSP-C7M14F-30-E	
	40 m	JZSP-C7M13F-40-E	JZSP-C7M14F-40-E	
	50 m	JZSP-C7M13F-50-E	JZSP-C7M14F-50-E	
For servomotors with holding brakes Cable installed away from load	3 m	JZSP-C7M13G-03-E	JZSP-C7M14G-03-E	
	5 m	JZSP-C7M13G-05-E	JZSP-C7M14G-05-E	
	10 m	JZSP-C7M13G-10-E	JZSP-C7M14G-10-E	
	15 m	JZSP-C7M13G-15-E	JZSP-C7M14G-15-E	
	20 m	JZSP-C7M13G-20-E	JZSP-C7M14G-20-E	
	30 m	JZSP-C7M13G-30-E	JZSP-C7M14G-30-E	
	40 m	JZSP-C7M13G-40-E	JZSP-C7M14G-40-E	
	50 m	JZSP-C7M13G-50-E	JZSP-C7M14G-50-E	

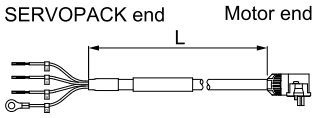
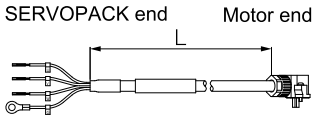
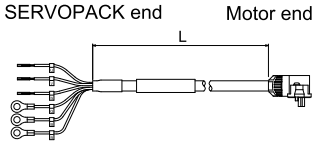
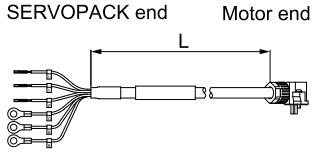
*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 90 mm or larger.

(b) SGMXJ-02 to -06 (200 to 600 W)

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
For servomotors without holding brakes Cable installed toward load	3 m	JZSP-C7M20F-03-E	JZSP-C7M22F-03-E	
	5 m	JZSP-C7M20F-05-E	JZSP-C7M22F-05-E	
	10 m	JZSP-C7M20F-10-E	JZSP-C7M22F-10-E	
	15 m	JZSP-C7M20F-15-E	JZSP-C7M22F-15-E	
	20 m	JZSP-C7M20F-20-E	JZSP-C7M22F-20-E	
	30 m	JZSP-C7M20F-30-E	JZSP-C7M22F-30-E	
	40 m	JZSP-C7M20F-40-E	JZSP-C7M22F-40-E	
	50 m	JZSP-C7M20F-50-E	JZSP-C7M22F-50-E	
For servomotors without holding brakes Cable installed away from load	3 m	JZSP-C7M20G-03-E	JZSP-C7M22G-03-E	
	5 m	JZSP-C7M20G-05-E	JZSP-C7M22G-05-E	
	10 m	JZSP-C7M20G-10-E	JZSP-C7M22G-10-E	
	15 m	JZSP-C7M20G-15-E	JZSP-C7M22G-15-E	
	20 m	JZSP-C7M20G-20-E	JZSP-C7M22G-20-E	
	30 m	JZSP-C7M20G-30-E	JZSP-C7M22G-30-E	
	40 m	JZSP-C7M20G-40-E	JZSP-C7M22G-40-E	
	50 m	JZSP-C7M20G-50-E	JZSP-C7M22G-50-E	
For servomotors with holding brakes Cable installed toward load	3 m	JZSP-C7M23F-03-E	JZSP-C7M24F-03-E	
	5 m	JZSP-C7M23F-05-E	JZSP-C7M24F-05-E	
	10 m	JZSP-C7M23F-10-E	JZSP-C7M24F-10-E	
	15 m	JZSP-C7M23F-15-E	JZSP-C7M24F-15-E	
	20 m	JZSP-C7M23F-20-E	JZSP-C7M24F-20-E	
	30 m	JZSP-C7M23F-30-E	JZSP-C7M24F-30-E	
	40 m	JZSP-C7M23F-40-E	JZSP-C7M24F-40-E	
	50 m	JZSP-C7M23F-50-E	JZSP-C7M24F-50-E	
For servomotors with holding brakes Cable installed away from load	3 m	JZSP-C7M23G-03-E	JZSP-C7M24G-03-E	
	5 m	JZSP-C7M23G-05-E	JZSP-C7M24G-05-E	
	10 m	JZSP-C7M23G-10-E	JZSP-C7M24G-10-E	
	15 m	JZSP-C7M23G-15-E	JZSP-C7M24G-15-E	
	20 m	JZSP-C7M23G-20-E	JZSP-C7M24G-20-E	
	30 m	JZSP-C7M23G-30-E	JZSP-C7M24G-30-E	
	40 m	JZSP-C7M23G-40-E	JZSP-C7M24G-40-E	
	50 m	JZSP-C7M23G-50-E	JZSP-C7M24G-50-E	

*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 90 mm or larger.

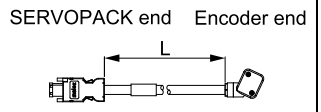
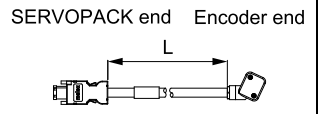
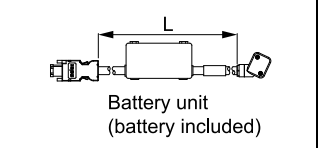
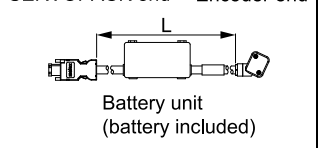
(c) SGMXJ-08 (750 W)

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
For servomotors without holding brakes Cable installed toward load	3 m	JZSP-C7M30F-03-E	JZSP-C7M32F-03-E	
	5 m	JZSP-C7M30F-05-E	JZSP-C7M32F-05-E	
	10 m	JZSP-C7M30F-10-E	JZSP-C7M32F-10-E	
	15 m	JZSP-C7M30F-15-E	JZSP-C7M32F-15-E	
	20 m	JZSP-C7M30F-20-E	JZSP-C7M32F-20-E	
	30 m	JZSP-C7M30F-30-E	JZSP-C7M32F-30-E	
	40 m	JZSP-C7M30F-40-E	JZSP-C7M32F-40-E	
	50 m	JZSP-C7M30F-50-E	JZSP-C7M32F-50-E	
For servomotors without holding brakes Cable installed away from load	3 m	JZSP-C7M30G-03-E	JZSP-C7M32G-03-E	
	5 m	JZSP-C7M30G-05-E	JZSP-C7M32G-05-E	
	10 m	JZSP-C7M30G-10-E	JZSP-C7M32G-10-E	
	15 m	JZSP-C7M30G-15-E	JZSP-C7M32G-15-E	
	20 m	JZSP-C7M30G-20-E	JZSP-C7M32G-20-E	
	30 m	JZSP-C7M30G-30-E	JZSP-C7M32G-30-E	
	40 m	JZSP-C7M30G-40-E	JZSP-C7M32G-40-E	
	50 m	JZSP-C7M30G-50-E	JZSP-C7M32G-50-E	
For servomotors with holding brakes Cable installed toward load	3 m	JZSP-C7M33F-03-E	JZSP-C7M34F-03-E	
	5 m	JZSP-C7M33F-05-E	JZSP-C7M34F-05-E	
	10 m	JZSP-C7M33F-10-E	JZSP-C7M34F-10-E	
	15 m	JZSP-C7M33F-15-E	JZSP-C7M34F-15-E	
	20 m	JZSP-C7M33F-20-E	JZSP-C7M34F-20-E	
	30 m	JZSP-C7M33F-30-E	JZSP-C7M34F-30-E	
	40 m	JZSP-C7M33F-40-E	JZSP-C7M34F-40-E	
	50 m	JZSP-C7M33F-50-E	JZSP-C7M34F-50-E	
For servomotors with holding brakes Cable installed away from load	3 m	JZSP-C7M33G-03-E	JZSP-C7M34G-03-E	
	5 m	JZSP-C7M33G-05-E	JZSP-C7M34G-05-E	
	10 m	JZSP-C7M33G-10-E	JZSP-C7M34G-10-E	
	15 m	JZSP-C7M33G-15-E	JZSP-C7M34G-15-E	
	20 m	JZSP-C7M33G-20-E	JZSP-C7M34G-20-E	
	30 m	JZSP-C7M33G-30-E	JZSP-C7M34G-30-E	
	40 m	JZSP-C7M33G-40-E	JZSP-C7M34G-40-E	
	50 m	JZSP-C7M33G-50-E	JZSP-C7M34G-50-E	

*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 90 mm or larger.

8.1.3 Encoder Cables (When Not Relaying the Encoder Cable)

(1) Servomotors with Standard Specifications

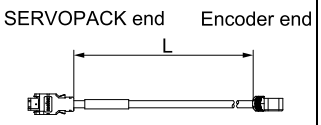
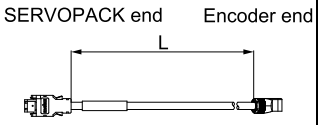
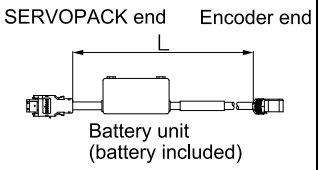
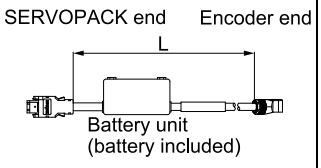
Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
For batteryless absolute encoder Cable installed toward load	3 m	JWSP-XP2IS1-03	JWSP-XP2IF1-03	
	5 m	JWSP-XP2IS1-05	JWSP-XP2IF1-05	
	10 m	JWSP-XP2IS1-10	JWSP-XP2IF1-10	
	15 m	JWSP-XP2IS1-15	JWSP-XP2IF1-15	
	20 m	JWSP-XP2IS1-20	JWSP-XP2IF1-20	
	30 m	JWSP-XP2IS1-30	JWSP-XP2IF1-30	
	40 m	JWSP-XP2IS1-40	JWSP-XP2IF1-40	
	50 m	JWSP-XP2IS1-50	JWSP-XP2IF1-50	
For batteryless absolute encoder Cable installed away from load	3 m	JWSP-XP2IS2-03	JWSP-XP2IF2-03	
	5 m	JWSP-XP2IS2-05	JWSP-XP2IF2-05	
	10 m	JWSP-XP2IS2-10	JWSP-XP2IF2-10	
	15 m	JWSP-XP2IS2-15	JWSP-XP2IF2-15	
	20 m	JWSP-XP2IS2-20	JWSP-XP2IF2-20	
	30 m	JWSP-XP2IS2-30	JWSP-XP2IF2-30	
	40 m	JWSP-XP2IS2-40	JWSP-XP2IF2-40	
	50 m	JWSP-XP2IS2-50	JWSP-XP2IF2-50	
For absolute encoder: With battery unit *3 Cable installed toward load	3 m	JWSP-XP2AS1-03	JWSP-XP2AF1-03	
	5 m	JWSP-XP2AS1-05	JWSP-XP2AF1-05	
	10 m	JWSP-XP2AS1-10	JWSP-XP2AF1-10	
	15 m	JWSP-XP2AS1-15	JWSP-XP2AF1-15	
	20 m	JWSP-XP2AS1-20	JWSP-XP2AF1-20	
	30 m	JWSP-XP2AS1-30	JWSP-XP2AF1-30	
	40 m	JWSP-XP2AS1-40	JWSP-XP2AF1-40	
	50 m	JWSP-XP2AS1-50	JWSP-XP2AF1-50	
For absolute encoder: With battery unit *3 Cable installed away from load	3 m	JWSP-XP2AS2-03	JWSP-XP2AF2-03	
	5 m	JWSP-XP2AS2-05	JWSP-XP2AF2-05	
	10 m	JWSP-XP2AS2-10	JWSP-XP2AF2-10	
	15 m	JWSP-XP2AS2-15	JWSP-XP2AF2-15	
	20 m	JWSP-XP2AS2-20	JWSP-XP2AF2-20	
	30 m	JWSP-XP2AS2-30	JWSP-XP2AF2-30	
	40 m	JWSP-XP2AS2-40	JWSP-XP2AF2-40	
	50 m	JWSP-XP2AS2-50	JWSP-XP2AF2-50	

*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 46 mm or larger.
*3 If a battery is connected to the host controller, the battery unit is not required.

Note:

Do not use these cables as relay cables.

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

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
For batteryless absolute encoder Cable installed toward load	3 m	JZSP-C7PI0D-03-E	JZSP-C7PI2D-03-E	
	5 m	JZSP-C7PI0D-05-E	JZSP-C7PI2D-05-E	
	10 m	JZSP-C7PI0D-10-E	JZSP-C7PI2D-10-E	
	15 m	JZSP-C7PI0D-15-E	JZSP-C7PI2D-15-E	
	20 m	JZSP-C7PI0D-20-E	JZSP-C7PI2D-20-E	
For batteryless absolute encoder Cable installed away from load	3 m	JZSP-C7PI0E-03-E	JZSP-C7PI2E-03-E	
	5 m	JZSP-C7PI0E-05-E	JZSP-C7PI2E-05-E	
	10 m	JZSP-C7PI0E-10-E	JZSP-C7PI2E-10-E	
	15 m	JZSP-C7PI0E-15-E	JZSP-C7PI2E-15-E	
	20 m	JZSP-C7PI0E-20-E	JZSP-C7PI2E-20-E	
For absolute encoder: With battery unit *3 Cable installed toward load	3 m	JZSP-C7PA0D-03-E	JZSP-C7PA2D-03-E	
	5 m	JZSP-C7PA0D-05-E	JZSP-C7PA2D-05-E	
	10 m	JZSP-C7PA0D-10-E	JZSP-C7PA2D-10-E	
	15 m	JZSP-C7PA0D-15-E	JZSP-C7PA2D-15-E	
	20 m	JZSP-C7PA0D-20-E	JZSP-C7PA2D-20-E	
For absolute encoder: With battery unit *3 Cable installed away from load	3 m	JZSP-C7PA0E-03-E	JZSP-C7PA2E-03-E	
	5 m	JZSP-C7PA0E-05-E	JZSP-C7PA2E-05-E	
	10 m	JZSP-C7PA0E-10-E	JZSP-C7PA2E-10-E	
	15 m	JZSP-C7PA0E-15-E	JZSP-C7PA2E-15-E	
	20 m	JZSP-C7PA0E-20-E	JZSP-C7PA2E-20-E	

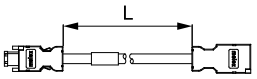
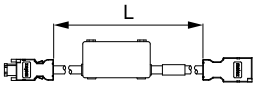
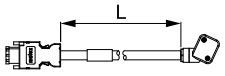
*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 46 mm or larger.
*3 If a battery is connected to the host controller, the battery unit is not required.

8.1.4 Encoder Cables (When Relaying the Encoder Cable)

(1) Servomotors with Standard Specifications

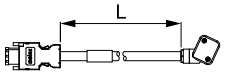
When you will relay the encoder cable, use the following configuration.

Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
Encoder cable with connectors on both ends For batteryless absolute encoder *3	0.3 m	JWSP-XP1IS0-00P3	JWSP-XP1IF0-00P3	SERVOPACK end Encoder end 
	3 m	JWSP-XP1IS0-03	JWSP-XP1IF0-03	
	5 m	JWSP-XP1IS0-05	JWSP-XP1IF0-05	
	10 m	JWSP-XP1IS0-10	JWSP-XP1IF0-10	
	15 m	JWSP-XP1IS0-15	JWSP-XP1IF0-15	
	20 m	JWSP-XP1IS0-20	JWSP-XP1IF0-20	
	25 m	JWSP-XP1IS0-25	JWSP-XP1IF0-25	
Encoder cable with connectors on both ends For absolute encoder: With battery unit *3 *4	0.3 m	JWSP-XP1AS0-00P3	JWSP-XP1AF0-00P3	SERVOPACK end Encoder end 
	3 m	JWSP-XP1AS0-03	JWSP-XP1AF0-03	
	5 m	JWSP-XP1AS0-05	JWSP-XP1AF0-05	
	10 m	JWSP-XP1AS0-10	JWSP-XP1AF0-10	
	15 m	JWSP-XP1AS0-15	JWSP-XP1AF0-15	
	20 m	JWSP-XP1AS0-20	JWSP-XP1AF0-20	
	25 m	JWSP-XP1AS0-25	JWSP-XP1AF0-25	
Encoder cable Cable installed toward load	0.3 m	JWSP-XP3IS1-00P3	JWSP-XP3IF1-00P3	SERVOPACK end Encoder end 
	1 m	JWSP-XP3IS1-01	JWSP-XP3IF1-01	
	3 m	JWSP-XP3IS1-03	JWSP-XP3IF1-03	
	5 m	JWSP-XP3IS1-05	JWSP-XP3IF1-05	
	10 m	JWSP-XP3IS1-10	JWSP-XP3IF1-10	
	15 m	JWSP-XP3IS1-15	JWSP-XP3IF1-15	
	20 m	JWSP-XP3IS1-20	JWSP-XP3IF1-20	
	25 m	JWSP-XP3IS1-25	JWSP-XP3IF1-25	
	30 m	JWSP-XP3IS1-30	JWSP-XP3IF1-30	
	40 m	JWSP-XP3IS1-40	JWSP-XP3IF1-40	
	50 m	JWSP-XP3IS1-50	JWSP-XP3IF1-50	

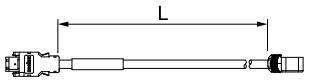
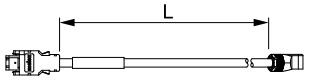
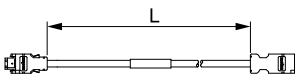
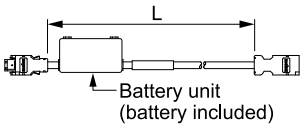
Continued on next page.

Continued from previous page.

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
Encoder cable Cable installed away from load	0.3 m	JWSP-XP3IS2-00P3	JWSP-XP3IF2-00P3	SERVOPACK end Encoder end 
	1 m	JWSP-XP3IS2-01	JWSP-XP3IF2-01	
	3 m	JWSP-XP3IS2-03	JWSP-XP3IF2-03	
	5 m	JWSP-XP3IS2-05	JWSP-XP3IF2-05	
	10 m	JWSP-XP3IS2-10	JWSP-XP3IF2-10	
	15 m	JWSP-XP3IS2-15	JWSP-XP3IF2-15	
	20 m	JWSP-XP3IS2-20	JWSP-XP3IF2-20	
	25 m	JWSP-XP3IS2-25	JWSP-XP3IF2-25	
	30 m	JWSP-XP3IS2-30	JWSP-XP3IF2-30	
	40 m	JWSP-XP3IS2-40	JWSP-XP3IF2-40	
	50 m	JWSP-XP3IS2-50	JWSP-XP3IF2-50	

*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 46 mm or larger.
*3 The JZSP-UCMP00-□□-E and JZSP-CSP12-E cannot be connected at the same time.
*4 If a battery is connected to the host controller, the battery unit is not required.

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

Name	Length (L)	Order Number	Appearance
Relay encoder cable (for all types of encoders) Cable installed toward load	0.3 m	JZSP-C7PRCD-E	SERVOPACK end Encoder end 
Relay encoder cable (for all types of encoders) Cable installed away from load	0.3 m	JZSP-C7PRCE-E	SERVOPACK end Encoder end 
Relay encoder cable with connectors on both ends (for all types of encoders)	30 m	JZSP-UCMP00-30-E	SERVOPACK end Encoder end 
	40 m	JZSP-UCMP00-40-E	
	50 m	JZSP-UCMP00-50-E	
Relay encoder cable with connectors on both ends and battery unit (Required only when an absolute encoder is used. *1)	0.3 m	JZSP-CSP12-E	SERVOPACK end Encoder end 

*1 This cable is not required if you use a servomotor with a batteryless absolute encoder, and you connect a battery to the host controller.

8.2 Cables for the SGMXA Servomotors

Information Refer to the following manual for details on connecting multiple devices to the SERVOPACK.

Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

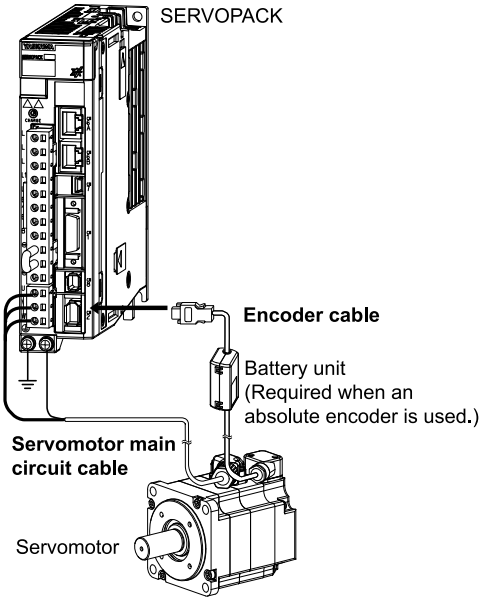
8.2.1 System Configurations

(1) Servomotors with Standard Specifications

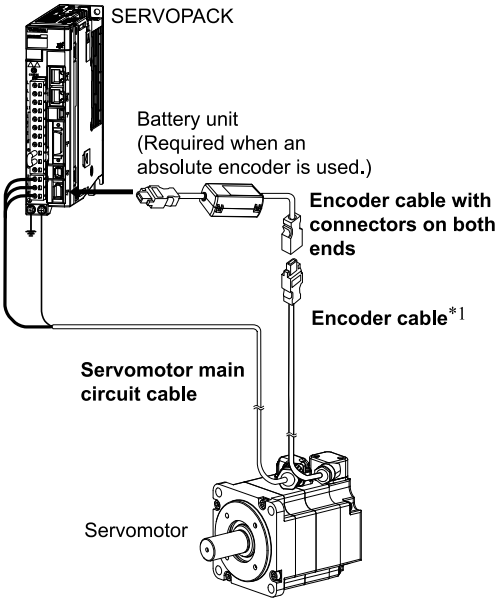
The cables shown below are required to connect a servomotor to a SERVOPACK.

- SGMXA-A5 to -10

When Not Relaying the Encoder Cable

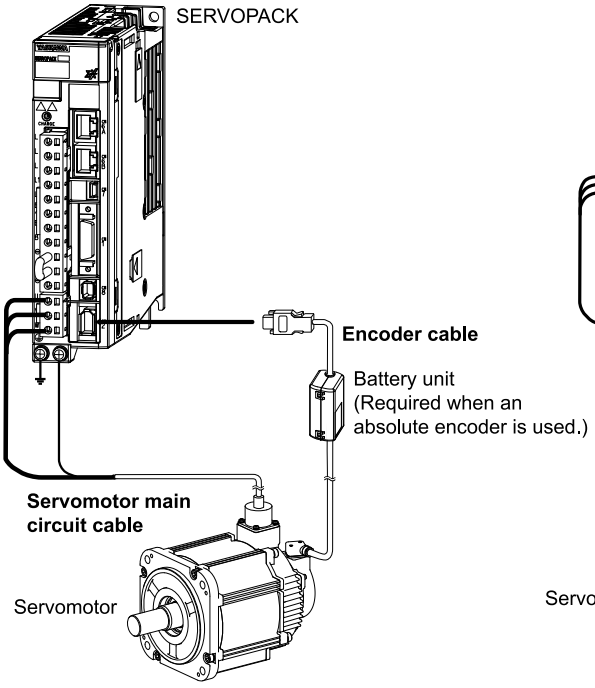


When Relaying the Encoder Cable

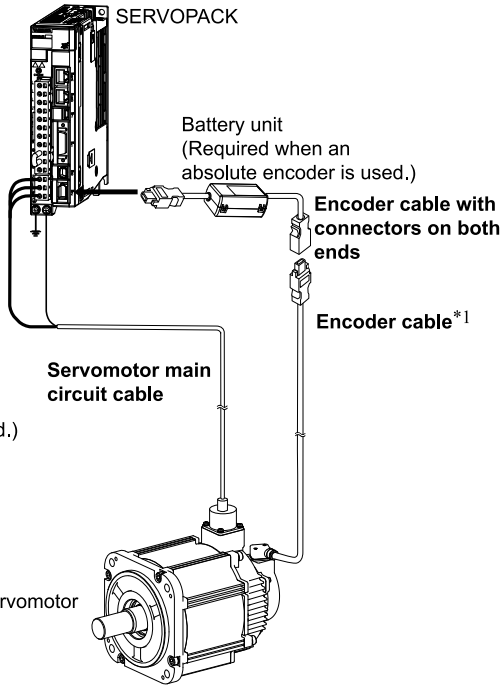


- SGMXA-15 to -70

When Not Relaying the Encoder Cable



When Relaying the Encoder Cable



*1 The JZSP-UCMP00-□□-E and JZSP-CSP12-E cannot be connected at the same time.

Note:

1. The encoder cable to use depends on whether the encoder cable will be relayed.
2. When you will relay the encoder cable, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
3. If you use a servomotor main circuit cable that exceeds 20 m, the intermittent duty zone in the torque-rotation speed characteristics will become smaller because the voltage drop increases.
   Refer to the following section for the intermittent duty zone.
   ☞ *4.2.3 Torque-Rotation Speed Characteristics on page 77*
4. Refer to the following manual for the following information.
   - Cable dimensional drawings and wiring specifications
   - Order numbers and specifications of individual connectors for cables
   - Order numbers and specifications for wiring materials

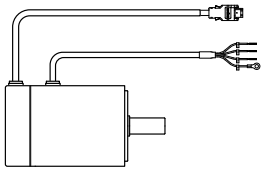
   Σ-X-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

Important

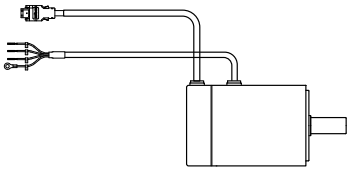
There are different order numbers for the servomotor main circuit cables and encoder cables depending on the cable installation direction. Confirm the order numbers before you order.

- SGMXA-A5 to -10

Cable Installed toward Load

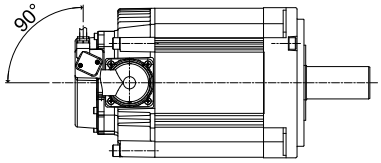


Cable Installed away from Load

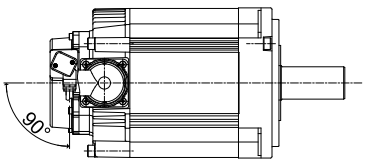


- SGMXA-15 to -70

Cable Installed on Left Side



Cable Installed on Right Side

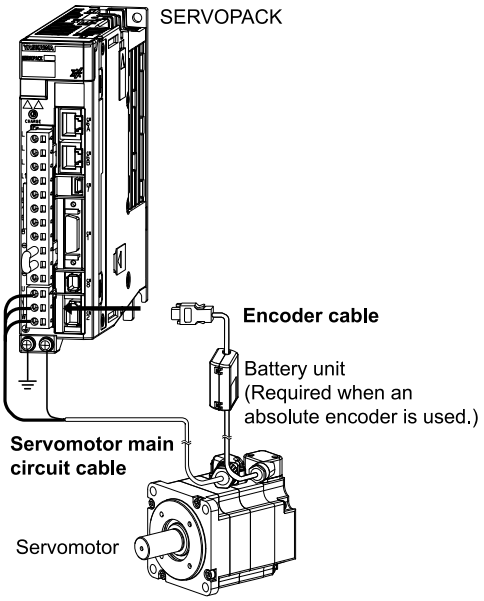


(2) Servomotors with Σ-V or Σ-7 Compatible Specifications

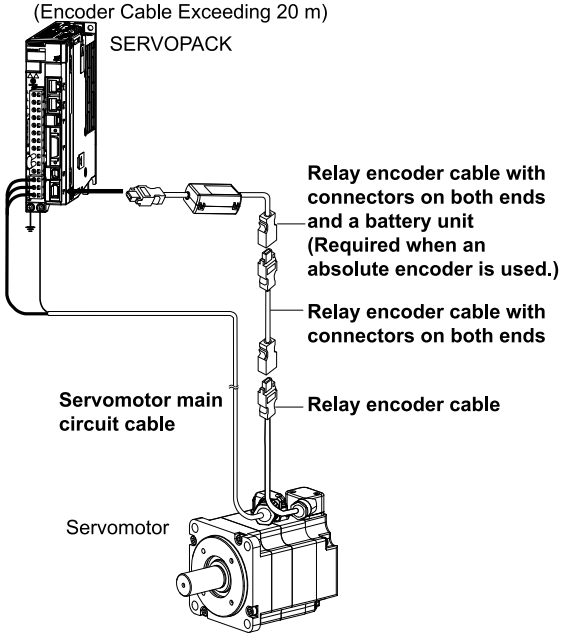
The cables shown below are required to connect a servomotor to a SERVOPACK.

- SGMXA-A5 to -10

When Not Relaying the Encoder Cable
(Encoder Cable Less Than 20 m)

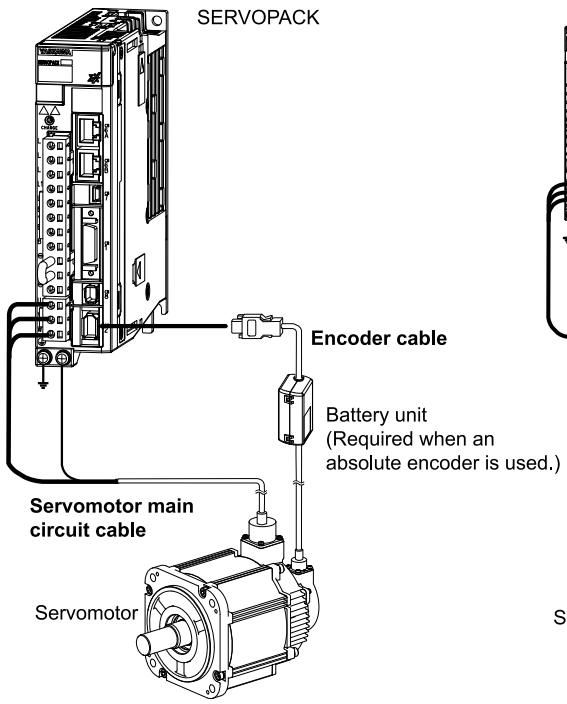


When Relaying the Encoder Cable
(Encoder Cable Exceeding 20 m)

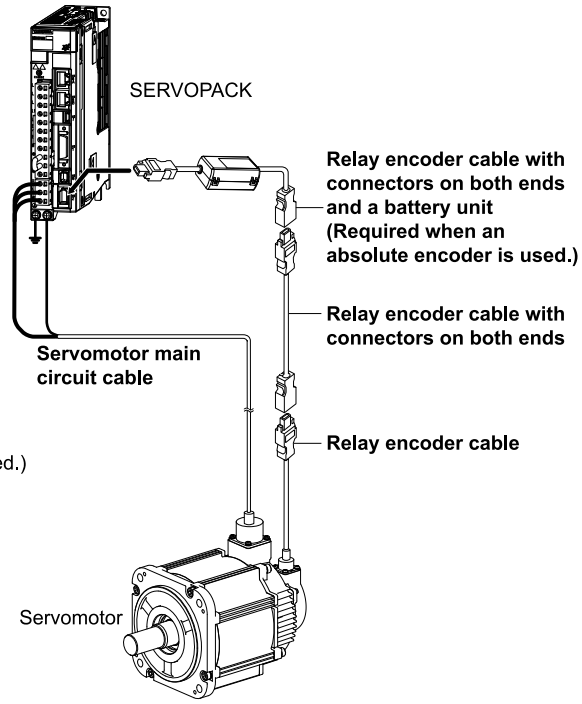


- SGMXA-15 to -70

When Not Relaying the Encoder Cable
(Encoder Cable Less Than 20 m)



When Relaying the Encoder Cable
(Encoder Cable Exceeding 20 m)



Note:

1. The encoder cable to use depends on whether the encoder cable will be relayed.
2. If you use a servomotor main circuit cable that exceeds 20 m, the intermittent duty zone in the torque-rotation speed characteristics will become smaller because the voltage drop increases.
   Refer to the following section for the intermittent duty zone.
   ☞ *4.2.3 Torque-Rotation Speed Characteristics on page 77*
3. Refer to the following manual for the following information.
   - Cable dimensional drawings and wiring specifications
   - Order numbers and specifications of individual connectors for cables
   - Order numbers and specifications for wiring materials

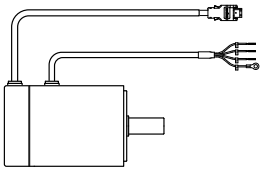
   🕮 Σ-X-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

Important

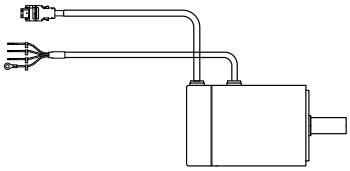
There are different order numbers for the servomotor main circuit cables and encoder cables depending on the cable installation direction. Confirm the order numbers before you order.

- SGMXA-A5 to -10

Cable Installed toward Load

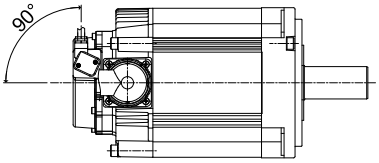


Cable Installed away from Load

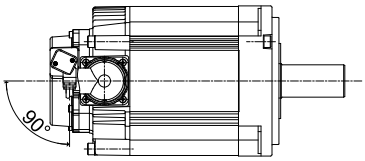


- SGMXA-15 to -70

Cable Installed on Left Side



Cable Installed on Right Side



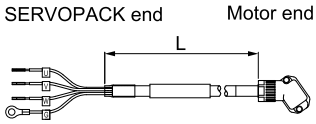
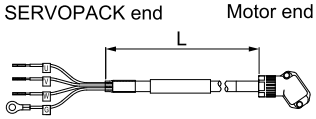
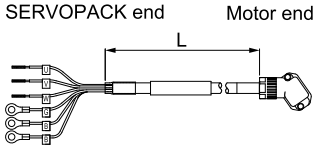
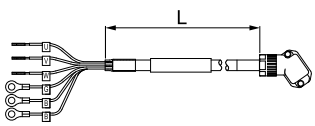
8.2.2 Servomotor Main Circuit Cables

This section provides information on selecting a servomotor main circuit cable. Refer to the following manual for detailed information on cables and for the wiring materials to make your own cables.

Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

(1) Servomotors with Standard Specifications

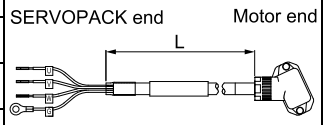
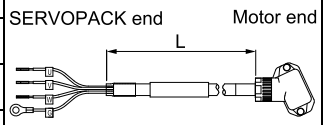
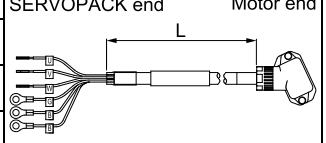
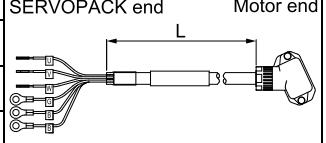
(a) SGMXA-A5 to -06 (50 to 600 W)

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
For servomotors without holding brakes Cable installed toward load	3 m	JWSP-XMA5NS1-03	JWSP-XMA5NF1-03	
	5 m	JWSP-XMA5NS1-05	JWSP-XMA5NF1-05	
	10 m	JWSP-XMA5NS1-10	JWSP-XMA5NF1-10	
	15 m	JWSP-XMA5NS1-15	JWSP-XMA5NF1-15	
	20 m	JWSP-XMA5NS1-20	JWSP-XMA5NF1-20	
	30 m	JWSP-XMA5NS1-30	JWSP-XMA5NF1-30	
	40 m	JWSP-XMA5NS1-40	JWSP-XMA5NF1-40	
	50 m	JWSP-XMA5NS1-50	JWSP-XMA5NF1-50	
For servomotors without holding brakes Cable installed away from load	3 m	JWSP-XMA5NS2-03	JWSP-XMA5NF2-03	
	5 m	JWSP-XMA5NS2-05	JWSP-XMA5NF2-05	
	10 m	JWSP-XMA5NS2-10	JWSP-XMA5NF2-10	
	15 m	JWSP-XMA5NS2-15	JWSP-XMA5NF2-15	
	20 m	JWSP-XMA5NS2-20	JWSP-XMA5NF2-20	
	30 m	JWSP-XMA5NS2-30	JWSP-XMA5NF2-30	
	40 m	JWSP-XMA5NS2-40	JWSP-XMA5NF2-40	
	50 m	JWSP-XMA5NS2-50	JWSP-XMA5NF2-50	
For servomotors with holding brakes Cable installed toward load	3 m	JWSP-XMA5BS1-03	JWSP-XMA5BF1-03	
	5 m	JWSP-XMA5BS1-05	JWSP-XMA5BF1-05	
	10 m	JWSP-XMA5BS1-10	JWSP-XMA5BF1-10	
	15 m	JWSP-XMA5BS1-15	JWSP-XMA5BF1-15	
	20 m	JWSP-XMA5BS1-20	JWSP-XMA5BF1-20	
	30 m	JWSP-XMA5BS1-30	JWSP-XMA5BF1-30	
	40 m	JWSP-XMA5BS1-40	JWSP-XMA5BF1-40	
	50 m	JWSP-XMA5BS1-50	JWSP-XMA5BF1-50	
For servomotors with holding brakes Cable installed away from load	3 m	JWSP-XMA5BS2-03	JWSP-XMA5BF2-03	
	5 m	JWSP-XMA5BS2-05	JWSP-XMA5BF2-05	
	10 m	JWSP-XMA5BS2-10	JWSP-XMA5BF2-10	
	15 m	JWSP-XMA5BS2-15	JWSP-XMA5BF2-15	
	20 m	JWSP-XMA5BS2-20	JWSP-XMA5BF2-20	
	30 m	JWSP-XMA5BS2-30	JWSP-XMA5BF2-30	
	40 m	JWSP-XMA5BS2-40	JWSP-XMA5BF2-40	
	50 m	JWSP-XMA5BS2-50	JWSP-XMA5BF2-50	

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

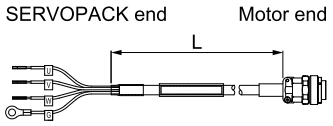
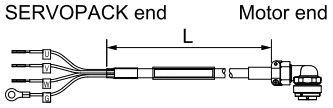
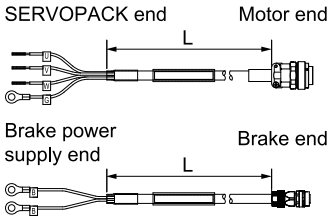
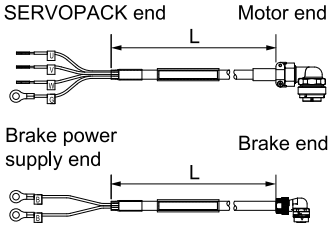
*2 The recommended bending radius (R) is 90 mm or larger.

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

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2*	
For servomotors without holding brakes Cable installed toward load	3 m	JWSP-XM08NS1-03	JWSP-XM08NF1-03	
	5 m	JWSP-XM08NS1-05	JWSP-XM08NF1-05	
	10 m	JWSP-XM08NS1-10	JWSP-XM08NF1-10	
	15 m	JWSP-XM08NS1-15	JWSP-XM08NF1-15	
	20 m	JWSP-XM08NS1-20	JWSP-XM08NF1-20	
	30 m	JWSP-XM08NS1-30	JWSP-XM08NF1-30	
	40 m	JWSP-XM08NS1-40	JWSP-XM08NF1-40	
	50 m	JWSP-XM08NS1-50	JWSP-XM08NF1-50	
For servomotors without holding brakes Cable installed away from load	3 m	JWSP-XM08NS2-03	JWSP-XM08NF2-03	
	5 m	JWSP-XM08NS2-05	JWSP-XM08NF2-05	
	10 m	JWSP-XM08NS2-10	JWSP-XM08NF2-10	
	15 m	JWSP-XM08NS2-15	JWSP-XM08NF2-15	
	20 m	JWSP-XM08NS2-20	JWSP-XM08NF2-20	
	30 m	JWSP-XM08NS2-30	JWSP-XM08NF2-30	
	40 m	JWSP-XM08NS2-40	JWSP-XM08NF2-40	
	50 m	JWSP-XM08NS2-50	JWSP-XM08NF2-50	
For servomotors with holding brakes Cable installed toward load	3 m	JWSP-XM08BS1-03	JWSP-XM08BF1-03	
	5 m	JWSP-XM08BS1-05	JWSP-XM08BF1-05	
	10 m	JWSP-XM08BS1-10	JWSP-XM08BF1-10	
	15 m	JWSP-XM08BS1-15	JWSP-XM08BF1-15	
	20 m	JWSP-XM08BS1-20	JWSP-XM08BF1-20	
	30 m	JWSP-XM08BS1-30	JWSP-XM08BF1-30	
	40 m	JWSP-XM08BS1-40	JWSP-XM08BF1-40	
	50 m	JWSP-XM08BS1-50	JWSP-XM08BF1-50	
For servomotors with holding brakes Cable installed away from load	3 m	JWSP-XM08BS2-03	JWSP-XM08BF2-03	
	5 m	JWSP-XM08BS2-05	JWSP-XM08BF2-05	
	10 m	JWSP-XM08BS2-10	JWSP-XM08BF2-10	
	15 m	JWSP-XM08BS2-15	JWSP-XM08BF2-15	
	20 m	JWSP-XM08BS2-20	JWSP-XM08BF2-20	
	30 m	JWSP-XM08BS2-30	JWSP-XM08BF2-30	
	40 m	JWSP-XM08BS2-40	JWSP-XM08BF2-40	
	50 m	JWSP-XM08BS2-50	JWSP-XM08BF2-50	

*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 90 mm or larger.

(c) SGMXA-15 (1.5 kW)

Name	Connector Specifications	Length (L)	Order Number		Appearance
			Standard Cable	Flexible Cable *1 *2	
For servomotors without holding brakes	Straight Plug	3 m	JWSP-XM15NSS-03	JWSP-XM15NFS-03	
		5 m	JWSP-XM15NSS-05	JWSP-XM15NFS-05	
		10 m	JWSP-XM15NSS-10	JWSP-XM15NFS-10	
		15 m	JWSP-XM15NSS-15	JWSP-XM15NFS-15	
		20 m	JWSP-XM15NSS-20	JWSP-XM15NFS-20	
	Right-angle Plug *3	3 m	JWSP-XM15NSL-03	JWSP-XM15NFL-03	
		5 m	JWSP-XM15NSL-05	JWSP-XM15NFL-05	
		10 m	JWSP-XM15NSL-10	JWSP-XM15NFL-10	
		15 m	JWSP-XM15NSL-15	JWSP-XM15NFL-15	
		20 m	JWSP-XM15NSL-20	JWSP-XM15NFL-20	
For servomotors with holding brakes (Set of two cables *4)	Straight Plug	3 m	JWSP-XM15BSS-03	JWSP-XM15BFS-03	
		5 m	JWSP-XM15BSS-05	JWSP-XM15BFS-05	
		10 m	JWSP-XM15BSS-10	JWSP-XM15BFS-10	
		15 m	JWSP-XM15BSS-15	JWSP-XM15BFS-15	
		20 m	JWSP-XM15BSS-20	JWSP-XM15BFS-20	
	Right-angle Plug *3	3 m	JWSP-XM15BSL-03	JWSP-XM15BFL-03	
		5 m	JWSP-XM15BSL-05	JWSP-XM15BFL-05	
		10 m	JWSP-XM15BSL-10	JWSP-XM15BFL-10	
		15 m	JWSP-XM15BSL-15	JWSP-XM15BFL-15	
		20 m	JWSP-XM15BSL-20	JWSP-XM15BFL-20	

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

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

*3 The lead installation direction is the non-load side. Contact your Yaskawa representative if you require the leads to be installed in another direction.

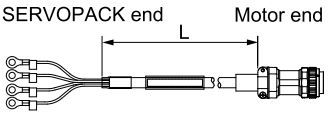
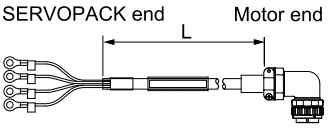
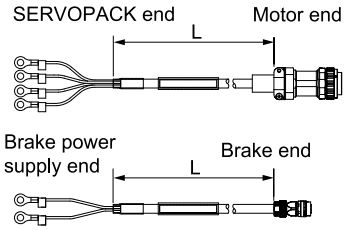
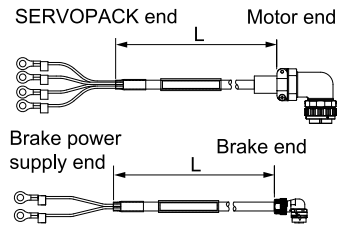
*4 This order number is for a set of two cables (main power supply cable and holding brake cable).
When you purchase them separately, the order numbers for main power supply cables are the same as for a servomotor without a holding brake.
The following order numbers are for a holding brake cable. These standard cables are flexible cables.

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

Note:

If you need a cable with a length of 20 m to 50 m, consider the operating conditions and contact your Yaskawa representative with your preferred length.

(d) SGMXA-20, -25 (2.0 kW, 2.5 kW)

Name	Connector Specifications	Length (L)	Order Number		Appearance
			Standard Cable	Flexible Cable *1 *2	
For servomotors without holding brakes	Straight Plug	3 m	JWSP-XM20NSS-03	JWSP-XM20NFS-03	
		5 m	JWSP-XM20NSS-05	JWSP-XM20NFS-05	
		10 m	JWSP-XM20NSS-10	JWSP-XM20NFS-10	
		15 m	JWSP-XM20NSS-15	JWSP-XM20NFS-15	
		20 m	JWSP-XM20NSS-20	JWSP-XM20NFS-20	
	Right-angle Plug *3	3 m	JWSP-XM20NSL-03	JWSP-XM20NFL-03	
		5 m	JWSP-XM20NSL-05	JWSP-XM20NFL-05	
		10 m	JWSP-XM20NSL-10	JWSP-XM20NFL-10	
		15 m	JWSP-XM20NSL-15	JWSP-XM20NFL-15	
		20 m	JWSP-XM20NSL-20	JWSP-XM20NFL-20	
For servomotors with holding brakes (Set of two cables *4)	Straight Plug	3 m	JWSP-XM20BSS-03	JWSP-XM20BFS-03	
		5 m	JWSP-XM20BSS-05	JWSP-XM20BFS-05	
		10 m	JWSP-XM20BSS-10	JWSP-XM20BFS-10	
		15 m	JWSP-XM20BSS-15	JWSP-XM20BFS-15	
		20 m	JWSP-XM20BSS-20	JWSP-XM20BFS-20	
	Right-angle Plug *3	3 m	JWSP-XM20BSL-03	JWSP-XM20BFL-03	
		5 m	JWSP-XM20BSL-05	JWSP-XM20BFL-05	
		10 m	JWSP-XM20BSL-10	JWSP-XM20BFL-10	
		15 m	JWSP-XM20BSL-15	JWSP-XM20BFL-15	
		20 m	JWSP-XM20BSL-20	JWSP-XM20BFL-20	

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

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

*3 The lead installation direction is the non-load side. Contact your Yaskawa representative if you require the leads to be installed in another direction.

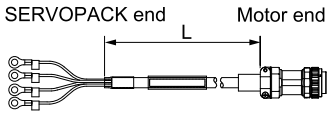
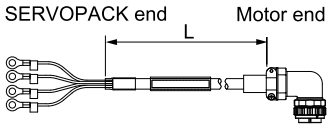
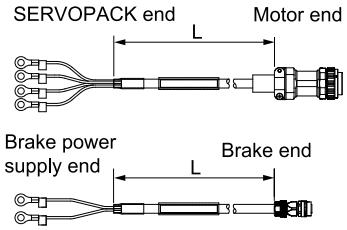
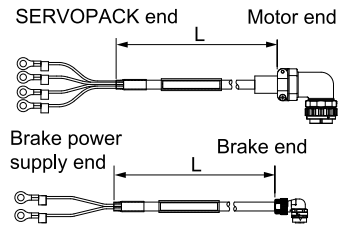
*4 This order number is for a set of two cables (main power supply cable and holding brake cable).
When you purchase them separately, the order numbers for main power supply cables are the same as for a servomotor without a holding brake.
The following order numbers are for a holding brake cable. These standard cables are flexible cables.

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

Note:

If you need a cable with a length of 20 m to 50 m, consider the operating conditions and contact your Yaskawa representative with your preferred length.

(e) SGMXA-30 (3.0 kW)

Name	Connector Specifications	Length (L)	Order Number		Appearance
			Standard Cable	Flexible Cable *1 *2	
For servomotors without holding brakes	Straight Plug	3 m	JWSP-XM30NSS-03	JWSP-XM30NFS-03	
		5 m	JWSP-XM30NSS-05	JWSP-XM30NFS-05	
		10 m	JWSP-XM30NSS-10	JWSP-XM30NFS-10	
		15 m	JWSP-XM30NSS-15	JWSP-XM30NFS-15	
		20 m	JWSP-XM30NSS-20	JWSP-XM30NFS-20	
	Right-angle Plug *3	3 m	JWSP-XM30NSL-03	JWSP-XM30NFL-03	
		5 m	JWSP-XM30NSL-05	JWSP-XM30NFL-05	
		10 m	JWSP-XM30NSL-10	JWSP-XM30NFL-10	
		15 m	JWSP-XM30NSL-15	JWSP-XM30NFL-15	
		20 m	JWSP-XM30NSL-20	JWSP-XM30NFL-20	
For servomotors with holding brakes (Set of two cables *4)	Straight Plug	3 m	JWSP-XM30BSS-03	JWSP-XM30BFS-03	
		5 m	JWSP-XM30BSS-05	JWSP-XM30BFS-05	
		10 m	JWSP-XM30BSS-10	JWSP-XM30BFS-10	
		15 m	JWSP-XM30BSS-15	JWSP-XM30BFS-15	
		20 m	JWSP-XM30BSS-20	JWSP-XM30BFS-20	
	Right-angle Plug *3	3 m	JWSP-XM30BSL-03	JWSP-XM30BFL-03	
		5 m	JWSP-XM30BSL-05	JWSP-XM30BFL-05	
		10 m	JWSP-XM30BSL-10	JWSP-XM30BFL-10	
		15 m	JWSP-XM30BSL-15	JWSP-XM30BFL-15	
		20 m	JWSP-XM30BSL-20	JWSP-XM30BFL-20	

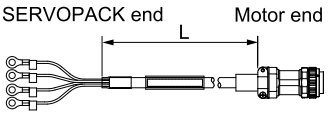
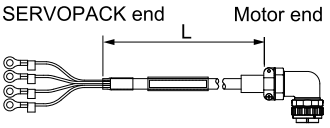
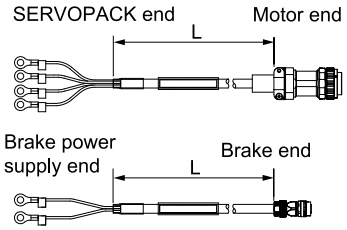
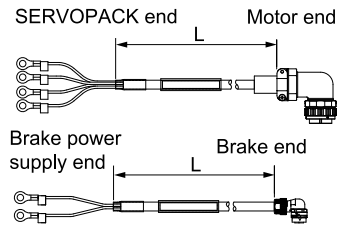
*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 90 mm or larger.
*3 The lead installation direction is the non-load side. Contact your Yaskawa representative if you require the leads to be installed in another direction.
*4 This order number is for a set of two cables (main power supply cable and holding brake cable).
When you purchase them separately, the order numbers for main power supply cables are the same as for a servomotor without a holding brake.
The following order numbers are for a holding brake cable. These standard cables are flexible cables.

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

Note:

If you need a cable with a length of 20 m to 50 m, consider the operating conditions and contact your Yaskawa representative with your preferred length.

(f) SGMXA-40, -50 (4.0 kW, 5.0 kW)

Name	Connector Specifications	Length (L)	Order Number		Appearance
			Standard Cable	Flexible Cable *1 *2	
For servomotors without holding brakes	Straight Plug	3 m	JWSP-XM40NSS-03	JWSP-XM40NFS-03	
		5 m	JWSP-XM40NSS-05	JWSP-XM40NFS-05	
		10 m	JWSP-XM40NSS-10	JWSP-XM40NFS-10	
		15 m	JWSP-XM40NSS-15	JWSP-XM40NFS-15	
		20 m	JWSP-XM40NSS-20	JWSP-XM40NFS-20	
	Right-angle Plug *3	3 m	JWSP-XM40NSL-03	JWSP-XM40NFL-03	
		5 m	JWSP-XM40NSL-05	JWSP-XM40NFL-05	
		10 m	JWSP-XM40NSL-10	JWSP-XM40NFL-10	
		15 m	JWSP-XM40NSL-15	JWSP-XM40NFL-15	
		20 m	JWSP-XM40NSL-20	JWSP-XM40NFL-20	
For servomotors with holding brakes (Set of two cables *4)	Straight Plug	3 m	JWSP-XM40BSS-03	JWSP-XM40BFS-03	
		5 m	JWSP-XM40BSS-05	JWSP-XM40BFS-05	
		10 m	JWSP-XM40BSS-10	JWSP-XM40BFS-10	
		15 m	JWSP-XM40BSS-15	JWSP-XM40BFS-15	
		20 m	JWSP-XM40BSS-20	JWSP-XM40BFS-20	
	Right-angle Plug *3	3 m	JWSP-XM40BSL-03	JWSP-XM40BFL-03	
		5 m	JWSP-XM40BSL-05	JWSP-XM40BFL-05	
		10 m	JWSP-XM40BSL-10	JWSP-XM40BFL-10	
		15 m	JWSP-XM40BSL-15	JWSP-XM40BFL-15	
		20 m	JWSP-XM40BSL-20	JWSP-XM40BFL-20	

*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 90 mm or larger.
*3 The lead installation direction is the non-load side. Contact your Yaskawa representative if you require the leads to be installed in another direction.
*4 This order number is for a set of two cables (main power supply cable and holding brake cable).
When you purchase them separately, the order numbers for main power supply cables are the same as for a servomotor without a holding brake.
The following order numbers are for a holding brake cable. These standard cables are flexible cables.

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

Note:

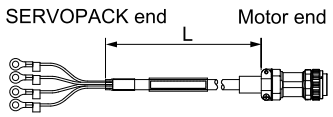
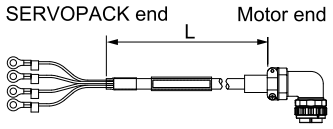
If you need a cable with a length of 20 m to 50 m, consider the operating conditions and contact your Yaskawa representative with your preferred length.

(g) SGMXA-70 (7.0 kW)

The SGMXA-70 servomotor has a built-in cooling fan. Yaskawa does not specify the cable to connect to the connector on the built-in cooling fan side. Use appropriate wiring materials for the specifications of the connector on the built-in cooling fan side.

Refer to the following manual for the specifications of the connector on the built-in cooling fan side required for selecting cables.

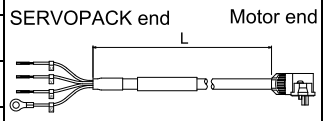
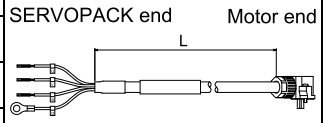
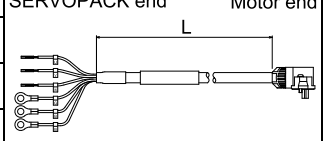
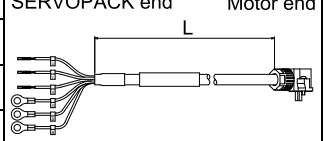
Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

Name	Connector Specifications	Length (L)	Order Number *1	Appearance
For servomotors without holding brakes	Straight Plug	3 m	JWSP-XM70NFS-03	
		5 m	JWSP-XM70NFS-05	
		10 m	JWSP-XM70NFS-10	
		15 m	JWSP-XM70NFS-15	
		20 m	JWSP-XM70NFS-20	
	Right-angle Plug *2	3 m	JWSP-XM70NFL-03	
		5 m	JWSP-XM70NFL-05	
		10 m	JWSP-XM70NFL-10	
		15 m	JWSP-XM70NFL-15	
		20 m	JWSP-XM70NFL-20	

*1 These standard cables are flexible cables. The recommended bending radius (R) is 90 mm or larger.
*2 The lead installation direction is the non-load side. Contact your Yaskawa representative if you require the leads to be installed in another direction.

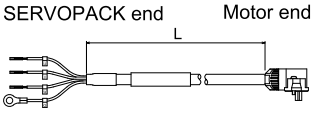
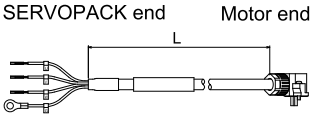
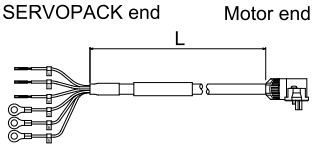
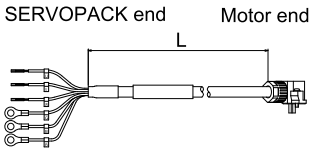
(2) Servomotors with Σ-V or Σ-7 Compatible Specifications

(a) SGMXA-A5 to -C2 (50 W to 150 W)

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
For servomotors without holding brakes Cable installed toward load	3 m	JZSP-C7M10F-03-E	JZSP-C7M12F-03-E	
	5 m	JZSP-C7M10F-05-E	JZSP-C7M12F-05-E	
	10 m	JZSP-C7M10F-10-E	JZSP-C7M12F-10-E	
	15 m	JZSP-C7M10F-15-E	JZSP-C7M12F-15-E	
	20 m	JZSP-C7M10F-20-E	JZSP-C7M12F-20-E	
	30 m	JZSP-C7M10F-30-E	JZSP-C7M12F-30-E	
	40 m	JZSP-C7M10F-40-E	JZSP-C7M12F-40-E	
	50 m	JZSP-C7M10F-50-E	JZSP-C7M12F-50-E	
For servomotors without holding brakes Cable installed away from load	3 m	JZSP-C7M10G-03-E	JZSP-C7M12G-03-E	
	5 m	JZSP-C7M10G-05-E	JZSP-C7M12G-05-E	
	10 m	JZSP-C7M10G-10-E	JZSP-C7M12G-10-E	
	15 m	JZSP-C7M10G-15-E	JZSP-C7M12G-15-E	
	20 m	JZSP-C7M10G-20-E	JZSP-C7M12G-20-E	
	30 m	JZSP-C7M10G-30-E	JZSP-C7M12G-30-E	
	40 m	JZSP-C7M10G-40-E	JZSP-C7M12G-40-E	
	50 m	JZSP-C7M10G-50-E	JZSP-C7M12G-50-E	
For servomotors with holding brakes Cable installed toward load	3 m	JZSP-C7M13F-03-E	JZSP-C7M14F-03-E	
	5 m	JZSP-C7M13F-05-E	JZSP-C7M14F-05-E	
	10 m	JZSP-C7M13F-10-E	JZSP-C7M14F-10-E	
	15 m	JZSP-C7M13F-15-E	JZSP-C7M14F-15-E	
	20 m	JZSP-C7M13F-20-E	JZSP-C7M14F-20-E	
	30 m	JZSP-C7M13F-30-E	JZSP-C7M14F-30-E	
	40 m	JZSP-C7M13F-40-E	JZSP-C7M14F-40-E	
	50 m	JZSP-C7M13F-50-E	JZSP-C7M14F-50-E	
For servomotors with holding brakes Cable installed away from load	3 m	JZSP-C7M13G-03-E	JZSP-C7M14G-03-E	
	5 m	JZSP-C7M13G-05-E	JZSP-C7M14G-05-E	
	10 m	JZSP-C7M13G-10-E	JZSP-C7M14G-10-E	
	15 m	JZSP-C7M13G-15-E	JZSP-C7M14G-15-E	
	20 m	JZSP-C7M13G-20-E	JZSP-C7M14G-20-E	
	30 m	JZSP-C7M13G-30-E	JZSP-C7M14G-30-E	
	40 m	JZSP-C7M13G-40-E	JZSP-C7M14G-40-E	
	50 m	JZSP-C7M13G-50-E	JZSP-C7M14G-50-E	

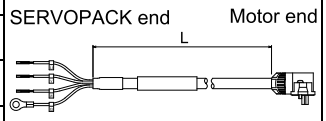
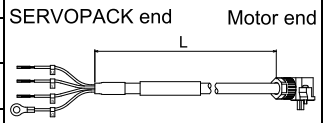
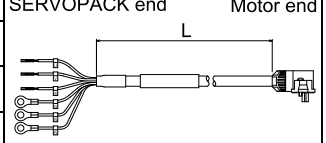
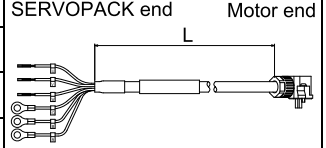
*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 90 mm or larger.

(b) SGMXA-02 to -06 (200 W to 600 W)

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
For servomotors without holding brakes Cable installed toward load	3 m	JZSP-C7M20F-03-E	JZSP-C7M22F-03-E	
	5 m	JZSP-C7M20F-05-E	JZSP-C7M22F-05-E	
	10 m	JZSP-C7M20F-10-E	JZSP-C7M22F-10-E	
	15 m	JZSP-C7M20F-15-E	JZSP-C7M22F-15-E	
	20 m	JZSP-C7M20F-20-E	JZSP-C7M22F-20-E	
	30 m	JZSP-C7M20F-30-E	JZSP-C7M22F-30-E	
	40 m	JZSP-C7M20F-40-E	JZSP-C7M22F-40-E	
	50 m	JZSP-C7M20F-50-E	JZSP-C7M22F-50-E	
For servomotors without holding brakes Cable installed away from load	3 m	JZSP-C7M20G-03-E	JZSP-C7M22G-03-E	
	5 m	JZSP-C7M20G-05-E	JZSP-C7M22G-05-E	
	10 m	JZSP-C7M20G-10-E	JZSP-C7M22G-10-E	
	15 m	JZSP-C7M20G-15-E	JZSP-C7M22G-15-E	
	20 m	JZSP-C7M20G-20-E	JZSP-C7M22G-20-E	
	30 m	JZSP-C7M20G-30-E	JZSP-C7M22G-30-E	
	40 m	JZSP-C7M20G-40-E	JZSP-C7M22G-40-E	
	50 m	JZSP-C7M20G-50-E	JZSP-C7M22G-50-E	
For servomotors with holding brakes Cable installed toward load	3 m	JZSP-C7M23F-03-E	JZSP-C7M24F-03-E	
	5 m	JZSP-C7M23F-05-E	JZSP-C7M24F-05-E	
	10 m	JZSP-C7M23F-10-E	JZSP-C7M24F-10-E	
	15 m	JZSP-C7M23F-15-E	JZSP-C7M24F-15-E	
	20 m	JZSP-C7M23F-20-E	JZSP-C7M24F-20-E	
	30 m	JZSP-C7M23F-30-E	JZSP-C7M24F-30-E	
	40 m	JZSP-C7M23F-40-E	JZSP-C7M24F-40-E	
	50 m	JZSP-C7M23F-50-E	JZSP-C7M24F-50-E	
For servomotors with holding brakes Cable installed away from load	3 m	JZSP-C7M23G-03-E	JZSP-C7M24G-03-E	
	5 m	JZSP-C7M23G-05-E	JZSP-C7M24G-05-E	
	10 m	JZSP-C7M23G-10-E	JZSP-C7M24G-10-E	
	15 m	JZSP-C7M23G-15-E	JZSP-C7M24G-15-E	
	20 m	JZSP-C7M23G-20-E	JZSP-C7M24G-20-E	
	30 m	JZSP-C7M23G-30-E	JZSP-C7M24G-30-E	
	40 m	JZSP-C7M23G-40-E	JZSP-C7M24G-40-E	
	50 m	JZSP-C7M23G-50-E	JZSP-C7M24G-50-E	

*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 90 mm or larger.

(c) SGMXA-08, -10 (750 W, 1.0 kW)

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
For servomotors without holding brakes Cable installed toward load	3 m	JZSP-C7M30F-03-E	JZSP-C7M32F-03-E	
	5 m	JZSP-C7M30F-05-E	JZSP-C7M32F-05-E	
	10 m	JZSP-C7M30F-10-E	JZSP-C7M32F-10-E	
	15 m	JZSP-C7M30F-15-E	JZSP-C7M32F-15-E	
	20 m	JZSP-C7M30F-20-E	JZSP-C7M32F-20-E	
	30 m	JZSP-C7M30F-30-E	JZSP-C7M32F-30-E	
	40 m	JZSP-C7M30F-40-E	JZSP-C7M32F-40-E	
	50 m	JZSP-C7M30F-50-E	JZSP-C7M32F-50-E	
For servomotors without holding brakes Cable installed away from load	3 m	JZSP-C7M30G-03-E	JZSP-C7M32G-03-E	
	5 m	JZSP-C7M30G-05-E	JZSP-C7M32G-05-E	
	10 m	JZSP-C7M30G-10-E	JZSP-C7M32G-10-E	
	15 m	JZSP-C7M30G-15-E	JZSP-C7M32G-15-E	
	20 m	JZSP-C7M30G-20-E	JZSP-C7M32G-20-E	
	30 m	JZSP-C7M30G-30-E	JZSP-C7M32G-30-E	
	40 m	JZSP-C7M30G-40-E	JZSP-C7M32G-40-E	
	50 m	JZSP-C7M30G-50-E	JZSP-C7M32G-50-E	
For servomotors with holding brakes Cable installed toward load	3 m	JZSP-C7M33F-03-E	JZSP-C7M34F-03-E	
	5 m	JZSP-C7M33F-05-E	JZSP-C7M34F-05-E	
	10 m	JZSP-C7M33F-10-E	JZSP-C7M34F-10-E	
	15 m	JZSP-C7M33F-15-E	JZSP-C7M34F-15-E	
	20 m	JZSP-C7M33F-20-E	JZSP-C7M34F-20-E	
	30 m	JZSP-C7M33F-30-E	JZSP-C7M34F-30-E	
	40 m	JZSP-C7M33F-40-E	JZSP-C7M34F-40-E	
	50 m	JZSP-C7M33F-50-E	JZSP-C7M34F-50-E	
For servomotors with holding brakes Cable installed away from load	3 m	JZSP-C7M33G-03-E	JZSP-C7M34G-03-E	
	5 m	JZSP-C7M33G-05-E	JZSP-C7M34G-05-E	
	10 m	JZSP-C7M33G-10-E	JZSP-C7M34G-10-E	
	15 m	JZSP-C7M33G-15-E	JZSP-C7M34G-15-E	
	20 m	JZSP-C7M33G-20-E	JZSP-C7M34G-20-E	
	30 m	JZSP-C7M33G-30-E	JZSP-C7M34G-30-E	
	40 m	JZSP-C7M33G-40-E	JZSP-C7M34G-40-E	
	50 m	JZSP-C7M33G-50-E	JZSP-C7M34G-50-E	

*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 90 mm or larger.

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

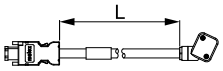
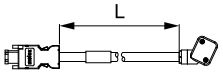
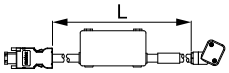
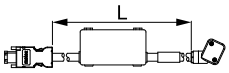
The servomotor main circuit cable for SGMXA-15 to -70 servomotors is same as that for the standard specification servomotor and the Σ-V or Σ-7 compatible specification servomotor.

Information Σ-V or 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)

8.2.3 Encoder Cables (When Not Relaying the Encoder Cable)

(1) Servomotors with Standard Specifications

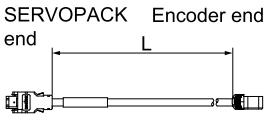
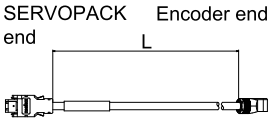
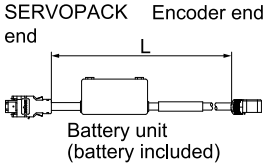
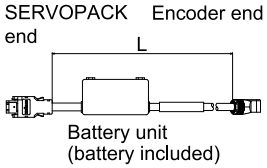
Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
For batteryless absolute encoder SGMXA-A5 to -10: Cable installed toward load SGMXA-15 to -50: Cable installed toward left side *3	3 m	JWSP-XP2IS1-03	JWSP-XP2IF1-03	SERVOPACK end Encoder end 
	5 m	JWSP-XP2IS1-05	JWSP-XP2IF1-05	
	10 m	JWSP-XP2IS1-10	JWSP-XP2IF1-10	
	15 m	JWSP-XP2IS1-15	JWSP-XP2IF1-15	
	20 m	JWSP-XP2IS1-20	JWSP-XP2IF1-20	
	30 m	JWSP-XP2IS1-30	JWSP-XP2IF1-30	
	40 m	JWSP-XP2IS1-40	JWSP-XP2IF1-40	
	50 m	JWSP-XP2IS1-50	JWSP-XP2IF1-50	
For batteryless absolute encoder SGMXA-A5 to -10: Cable installed away from load SGMXA-15 to -70: Cable installed toward right side	3 m	JWSP-XP2IS2-03	JWSP-XP2IF2-03	SERVOPACK end Encoder end 
	5 m	JWSP-XP2IS2-05	JWSP-XP2IF2-05	
	10 m	JWSP-XP2IS2-10	JWSP-XP2IF2-10	
	15 m	JWSP-XP2IS2-15	JWSP-XP2IF2-15	
	20 m	JWSP-XP2IS2-20	JWSP-XP2IF2-20	
	30 m	JWSP-XP2IS2-30	JWSP-XP2IF2-30	
	40 m	JWSP-XP2IS2-40	JWSP-XP2IF2-40	
	50 m	JWSP-XP2IS2-50	JWSP-XP2IF2-50	
For absolute encoder: With battery unit *4 SGMXA-A5 to -10: Cable installed toward load SGMXA-15 to -50: Cable installed toward left side *3	3 m	JWSP-XP2AS1-03	JWSP-XP2AF1-03	SERVOPACK end Encoder end  Battery unit (battery included)
	5 m	JWSP-XP2AS1-05	JWSP-XP2AF1-05	
	10 m	JWSP-XP2AS1-10	JWSP-XP2AF1-10	
	15 m	JWSP-XP2AS1-15	JWSP-XP2AF1-15	
	20 m	JWSP-XP2AS1-20	JWSP-XP2AF1-20	
	30 m	JWSP-XP2AS1-30	JWSP-XP2AF1-30	
	40 m	JWSP-XP2AS1-40	JWSP-XP2AF1-40	
	50 m	JWSP-XP2AS1-50	JWSP-XP2AF1-50	
For absolute encoder: With battery unit *4 SGMXA-A5 to -10: Cable installed away from load SGMXA-15 to -70: Cable installed toward right side	3 m	JWSP-XP2AS2-03	JWSP-XP2AF2-03	SERVOPACK end Encoder end  Battery unit (battery included)
	5 m	JWSP-XP2AS2-05	JWSP-XP2AF2-05	
	10 m	JWSP-XP2AS2-10	JWSP-XP2AF2-10	
	15 m	JWSP-XP2AS2-15	JWSP-XP2AF2-15	
	20 m	JWSP-XP2AS2-20	JWSP-XP2AF2-20	
	30 m	JWSP-XP2AS2-30	JWSP-XP2AF2-30	
	40 m	JWSP-XP2AS2-40	JWSP-XP2AF2-40	
	50 m	JWSP-XP2AS2-50	JWSP-XP2AF2-50	

*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 46 mm or larger.
*3 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.
*4 If a battery is connected to the host controller, the battery unit is not required.

Note:
Do not use these cables as relay cables.

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

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

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
For batteryless absolute encoder Cable installed toward load	3 m	JZSP-C7PI0D-03-E	JZSP-C7PI2D-03-E	
	5 m	JZSP-C7PI0D-05-E	JZSP-C7PI2D-05-E	
	10 m	JZSP-C7PI0D-10-E	JZSP-C7PI2D-10-E	
	15 m	JZSP-C7PI0D-15-E	JZSP-C7PI2D-15-E	
	20 m	JZSP-C7PI0D-20-E	JZSP-C7PI2D-20-E	
For batteryless absolute encoder Cable installed away from load	3 m	JZSP-C7PI0E-03-E	JZSP-C7PI2E-03-E	
	5 m	JZSP-C7PI0E-05-E	JZSP-C7PI2E-05-E	
	10 m	JZSP-C7PI0E-10-E	JZSP-C7PI2E-10-E	
	15 m	JZSP-C7PI0E-15-E	JZSP-C7PI2E-15-E	
	20 m	JZSP-C7PI0E-20-E	JZSP-C7PI2E-20-E	
For absolute encoder: With battery unit *3 Cable installed toward load	3 m	JZSP-C7PA0D-03-E	JZSP-C7PA2D-03-E	
	5 m	JZSP-C7PA0D-05-E	JZSP-C7PA2D-05-E	
	10 m	JZSP-C7PA0D-10-E	JZSP-C7PA2D-10-E	
	15 m	JZSP-C7PA0D-15-E	JZSP-C7PA2D-15-E	
	20 m	JZSP-C7PA0D-20-E	JZSP-C7PA2D-20-E	
For absolute encoder: With battery unit *3 Cable installed away from load	3 m	JZSP-C7PA0E-03-E	JZSP-C7PA2E-03-E	
	5 m	JZSP-C7PA0E-05-E	JZSP-C7PA2E-05-E	
	10 m	JZSP-C7PA0E-10-E	JZSP-C7PA2E-10-E	
	15 m	JZSP-C7PA0E-15-E	JZSP-C7PA2E-15-E	
	20 m	JZSP-C7PA0E-20-E	JZSP-C7PA2E-20-E	

*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 46 mm or larger.
*3 If a battery is connected to the host controller, the battery unit is not required.

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

Information SGMXA-15 to -70 servomotors with the Σ-V or Σ-7 compatible specification 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)

Name	Connector Specifications	Length (L)	Order Number		Appearance
			Standard Cable	Flexible Cable *1 *2*	
For batteryless absolute encoder	Straight Plug	3 m	JWSP-XPISS-03	JWSP-XPIFS-03	SERVOPACK end Encoder end L
		5 m	JWSP-XPISS-05	JWSP-XPIFS-05	
		10 m	JWSP-XPISS-10	JWSP-XPIFS-10	
		15 m	JWSP-XPISS-15	JWSP-XPIFS-15	
		20 m	JWSP-XPISS-20	JWSP-XPIFS-20	
	Right-angle Plug *4 *5*	3 m	JWSP-XPISL-03	JWSP-XPIFL-03	SERVOPACK end Encoder end L
		5 m	JWSP-XPISL-05	JWSP-XPIFL-05	
		10 m	JWSP-XPISL-10	JWSP-XPIFL-10	
		15 m	JWSP-XPISL-15	JWSP-XPIFL-15	
		20 m	JWSP-XPISL-20	JWSP-XPIFL-20	
For absolute encoder: With battery unit *3*	Straight Plug	3 m	JWSP-XPASS-03	JWSP-XPAFS-03	SERVOPACK end Encoder end L Battery unit (battery included)
		5 m	JWSP-XPASS-05	JWSP-XPAFS-05	
		10 m	JWSP-XPASS-10	JWSP-XPAFS-10	
		15 m	JWSP-XPASS-15	JWSP-XPAFS-15	
		20 m	JWSP-XPASS-20	JWSP-XPAFS-20	
	Right-angle Plug *4 *5*	3 m	JWSP-XPASL-03	JWSP-XPAFL-03	SERVOPACK end Encoder end L Battery unit (battery included)
		5 m	JWSP-XPASL-05	JWSP-XPAFL-05	
		10 m	JWSP-XPASL-10	JWSP-XPAFL-10	
		15 m	JWSP-XPASL-15	JWSP-XPAFL-15	
		20 m	JWSP-XPASL-20	JWSP-XPAFL-20	

*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 46 mm or larger.
*3 If a battery is connected to the host controller, the battery unit is not required.
*4 The lead installation direction is the non-load side. Contact your Yaskawa representative if you require the leads to be installed in another direction.
*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.

8.2.4 Encoder Cables (When Relaying the Encoder Cable)

(1) Servomotors with Standard Specifications

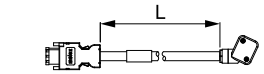
When you will relay the encoder cable, use the following configuration.

Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
Encoder cable with connectors on both ends For batteryless absolute encoder *3	0.3 m	JWSP-XP1IS0-00P3	JWSP-XP1IF0-00P3	SERVOPACK end Encoder end L
	3 m	JWSP-XP1IS0-03	JWSP-XP1IF0-03	
	5 m	JWSP-XP1IS0-05	JWSP-XP1IF0-05	
	10 m	JWSP-XP1IS0-10	JWSP-XP1IF0-10	
	15 m	JWSP-XP1IS0-15	JWSP-XP1IF0-15	
	20 m	JWSP-XP1IS0-20	JWSP-XP1IF0-20	
	25 m	JWSP-XP1IS0-25	JWSP-XP1IF0-25	
Encoder cable with connectors on both ends For absolute encoder: With battery unit *3 *4	0.3 m	JWSP-XP1AS0-00P3	JWSP-XP1AF0-00P3	SERVOPACK end Encoder end L Battery unit (battery included)
	3 m	JWSP-XP1AS0-03	JWSP-XP1AF0-03	
	5 m	JWSP-XP1AS0-05	JWSP-XP1AF0-05	
	10 m	JWSP-XP1AS0-10	JWSP-XP1AF0-10	
	15 m	JWSP-XP1AS0-15	JWSP-XP1AF0-15	
	20 m	JWSP-XP1AS0-20	JWSP-XP1AF0-20	
	25 m	JWSP-XP1AS0-25	JWSP-XP1AF0-25	
Encoder Cables SGMXA-A5 to -10: Cable installed toward load SGMXA-15 to -50: Cable installed toward left side *5	0.3 m	JWSP-XP3IS1-00P3	JWSP-XP3IF1-00P3	SERVOPACK end Encoder end L
	1 m	JWSP-XP3IS1-01	JWSP-XP3IF1-01	
	3 m	JWSP-XP3IS1-03	JWSP-XP3IF1-03	
	5 m	JWSP-XP3IS1-05	JWSP-XP3IF1-05	
	10 m	JWSP-XP3IS1-10	JWSP-XP3IF1-10	
	15 m	JWSP-XP3IS1-15	JWSP-XP3IF1-15	
	20 m	JWSP-XP3IS1-20	JWSP-XP3IF1-20	
	25 m	JWSP-XP3IS1-25	JWSP-XP3IF1-25	
	30 m	JWSP-XP3IS1-30	JWSP-XP3IF1-30	
	40 m	JWSP-XP3IS1-40	JWSP-XP3IF1-40	
	50 m	JWSP-XP3IS1-50	JWSP-XP3IF1-50	

Continued on next page.

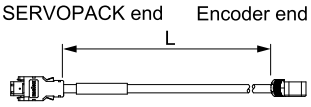
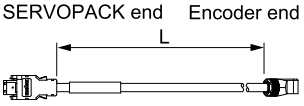
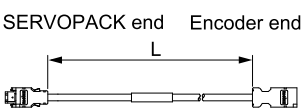
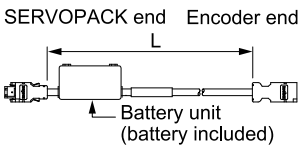
Continued from previous page.

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
Encoder Cables SGMXA-A5 to -10: Cable installed away from load SGMXA-15 to -70: Cable installed toward right side	0.3 m	JWSP-XP3IS2-00P3	JWSP-XP3IF2-00P3	
	1 m	JWSP-XP3IS2-01	JWSP-XP3IF2-01	
	3 m	JWSP-XP3IS2-03	JWSP-XP3IF2-03	
	5 m	JWSP-XP3IS2-05	JWSP-XP3IF2-05	
	10 m	JWSP-XP3IS2-10	JWSP-XP3IF2-10	
	15 m	JWSP-XP3IS2-15	JWSP-XP3IF2-15	
	20 m	JWSP-XP3IS2-20	JWSP-XP3IF2-20	
	25 m	JWSP-XP3IS2-25	JWSP-XP3IF2-25	
	30 m	JWSP-XP3IS2-30	JWSP-XP3IF2-30	
	40 m	JWSP-XP3IS2-40	JWSP-XP3IF2-40	
	50 m	JWSP-XP3IS2-50	JWSP-XP3IF2-50	

*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 46 mm or larger.
*3 The JZSP-UCMP00-□□-E and JZSP-CSP12-E cannot be connected at the same time.
*4 If a battery is connected to the host controller, the battery unit is not required.
*5 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.

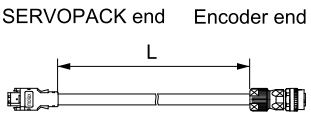
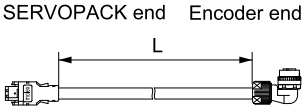
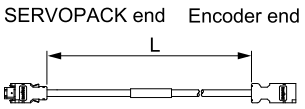
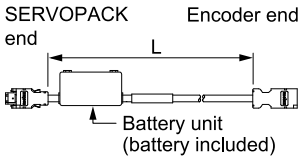
(2) Servomotors with Σ-V or Σ-7 Compatible Specifications (When Exceeding 20 m)

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

Name	Length (L)	Order Number	Appearance
Relay encoder cable (for all types of encoders) Cable installed toward load	0.3 m	JZSP-C7PRCD-E	
Relay encoder cable (for all types of encoders) Cable installed away from load	0.3 m	JZSP-C7PRCE-E	
Relay encoder cable with connectors on both ends (for all types of encoders)	30 m	JZSP-UCMP00-30-E	
	40 m	JZSP-UCMP00-40-E	
	50 m	JZSP-UCMP00-50-E	
Relay encoder cables with connectors on both ends and battery unit (Required only when an absolute encoder is used *1.)	0.3 m	JZSP-CSP12-E	

*1 This cable is not required if you use a servomotor with a batteryless absolute encoder, and you connect a battery to the host controller.

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

Name	Length (L)	Order Number	Appearance
Relay encoder cable (for all types of encoders) *1 *2	0.3 m	JZSP-CVP01-E	
		JZSP-CVP02-E	
Relay encoder cable with connectors on both ends (for all types of encoders)	30 m	JZSP-UCMP00-30-E	
	40 m	JZSP-UCMP00-40-E	
	50 m	JZSP-UCMP00-50-E	
Relay encoder cable with connectors on both ends and battery unit (Required only when an absolute encoder is used. *3)	0.3 m	JZSP-CSP12-E	

*1 The lead installation direction of the right-angle plug connector is the non-load side. Contact your Yaskawa representative if you require the leads to be installed in another direction.

*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.

*3 This cable is not required if you use a servomotor with a batteryless absolute encoder, and you connect a battery to the host controller.

8.3 Cables for the 200 V SGMXP Servomotors

Information Refer to the following manual when making connections between multiple devices and the SERVOPACK.

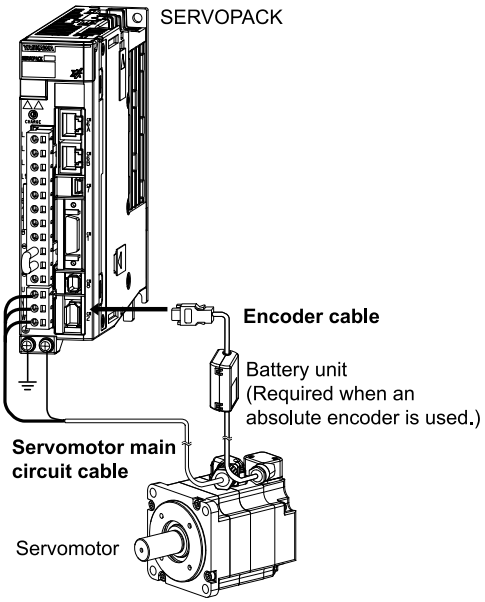
Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

8.3.1 System Configurations

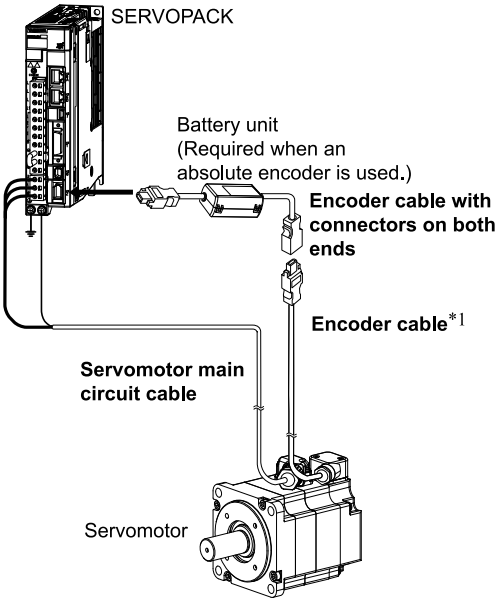
(1) Servomotors with Standard Specifications

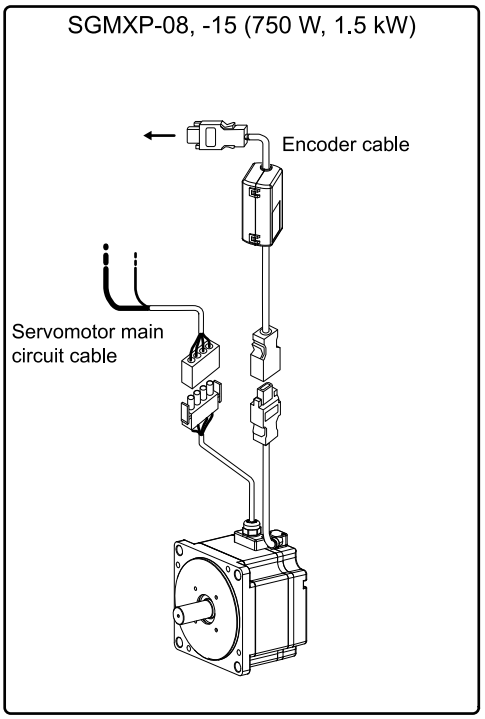
The cables shown below are required to connect a servomotor to a SERVOPACK.

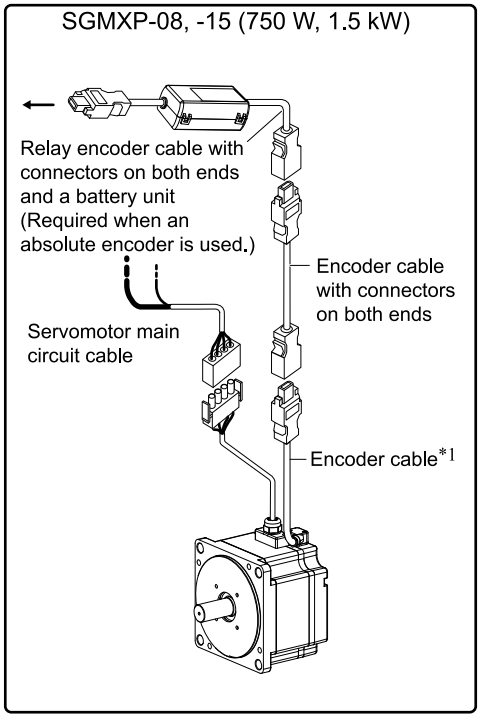
When Not Relaying the Encoder Cable



When Relaying the Encoder Cable







*1 The JZSP-UCMP00-□□-E and JZSP-CSP12-E cannot be connected at the same time.

Note:

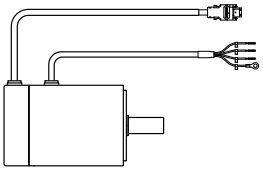
1. The encoder cable to use depends on whether the encoder cable will be relayed.
2. When you will relay the encoder cable for the SGMXP-01 to -04 servomotor, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
3. If you use a servomotor main circuit cable that exceeds 20 m, the intermittent duty zone in the torque-rotation speed characteristics will become smaller because the voltage drop increases.
   Refer to the following section for the intermittent duty zone.
   ☞ *5.2.3 Torque-Rotation Speed Characteristics on page 122*
4. Refer to the following manual for the following information.
   - Cable dimensional drawings and wiring specifications
   - Order numbers and specifications of individual connectors for cables
   - Order numbers and specifications for wiring materials

   Σ-X-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

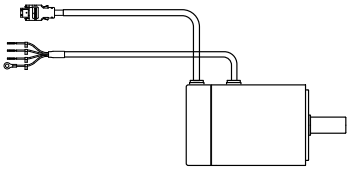
Important

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



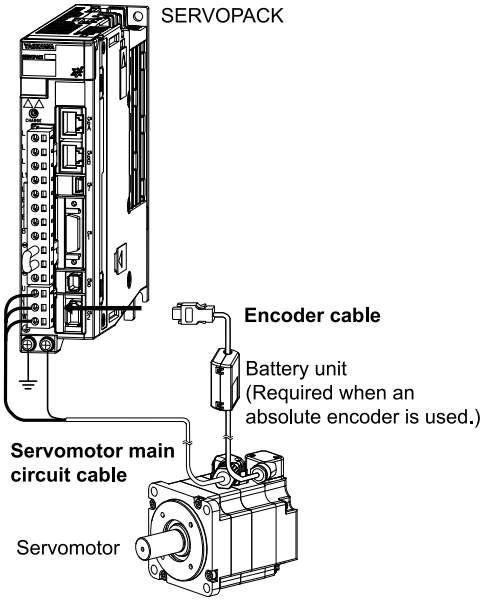
Cable Installed away from Load



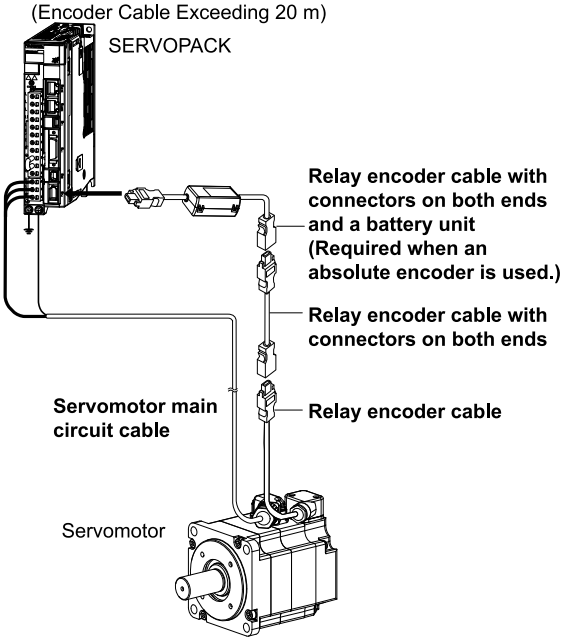
(2) Servomotors with Σ-7 Compatible Specifications

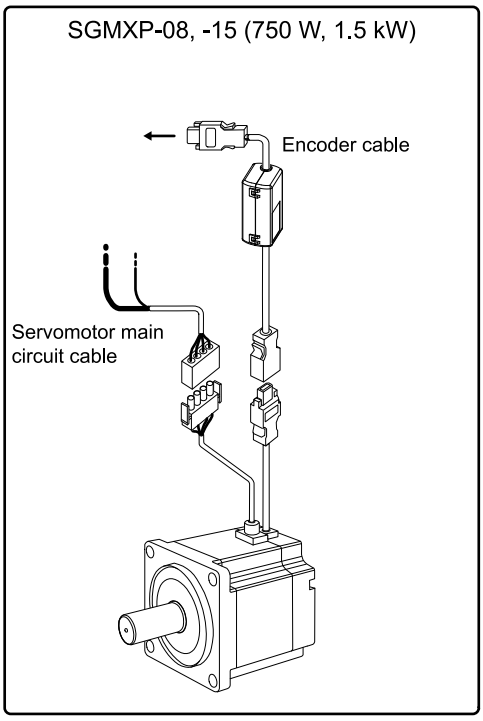
The cables shown below are required to connect a servomotor to a SERVOPACK.

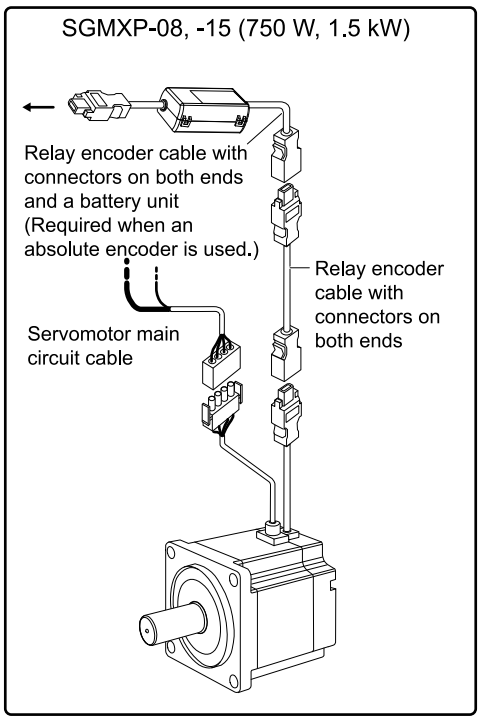
When Not Relaying the Encoder Cable
(Encoder Cable Less Than 20 m)



When Relaying the Encoder Cable
(Encoder Cable Exceeding 20 m)







Note:

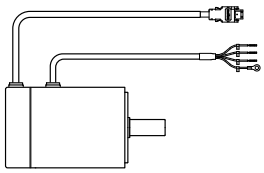
1. The encoder cable to use depends on whether the encoder cable will be relayed.
2. If you use a servomotor main circuit cable that exceeds 20 m, the intermittent duty zone in the torque-rotation speed characteristics will become smaller because the voltage drop increases.
   Refer to the following section for the intermittent duty zone.
   ☞ *5.2.3 Torque-Rotation Speed Characteristics on page 122*
3. Refer to the following manual for the following information.
   - Cable dimensional drawings and wiring specifications
   - Order numbers and specifications of individual connectors for cables
   - Order numbers and specifications for wiring materials

   🕮 Σ-X-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

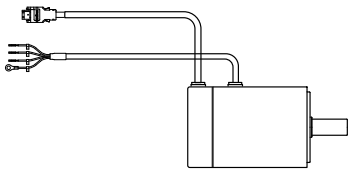
Important

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



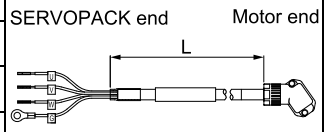
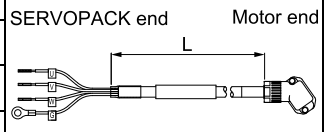
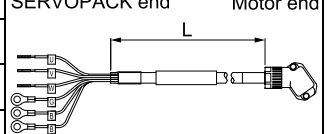
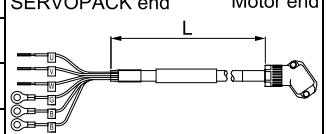
8.3.2 Servomotor Main Circuit Cables

This section provides information on selecting a servomotor main circuit cable. Refer to the following manual for detailed information on cables and for the wiring materials to make your own cables.

🕮 Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

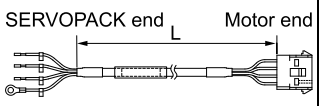
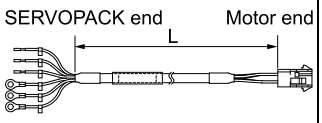
(1) Servomotors with Standard Specifications

(a) SGMXP-01 to -04 (100 to 400 W)

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
For servomotors without holding brakes Cable installed toward load	3 m	JWSP-XMA5NS1-03	JWSP-XMA5NF1-03	
	5 m	JWSP-XMA5NS1-05	JWSP-XMA5NF1-05	
	10 m	JWSP-XMA5NS1-10	JWSP-XMA5NF1-10	
	15 m	JWSP-XMA5NS1-15	JWSP-XMA5NF1-15	
	20 m	JWSP-XMA5NS1-20	JWSP-XMA5NF1-20	
	30 m	JWSP-XMA5NS1-30	JWSP-XMA5NF1-30	
	40 m	JWSP-XMA5NS1-40	JWSP-XMA5NF1-40	
	50 m	JWSP-XMA5NS1-50	JWSP-XMA5NF1-50	
For servomotors without holding brakes Cable installed away from load	3 m	JWSP-XMA5NS2-03	JWSP-XMA5NF2-03	
	5 m	JWSP-XMA5NS2-05	JWSP-XMA5NF2-05	
	10 m	JWSP-XMA5NS2-10	JWSP-XMA5NF2-10	
	15 m	JWSP-XMA5NS2-15	JWSP-XMA5NF2-15	
	20 m	JWSP-XMA5NS2-20	JWSP-XMA5NF2-20	
	30 m	JWSP-XMA5NS2-30	JWSP-XMA5NF2-30	
	40 m	JWSP-XMA5NS2-40	JWSP-XMA5NF2-40	
	50 m	JWSP-XMA5NS2-50	JWSP-XMA5NF2-50	
For servomotors with holding brakes Cable installed toward load	3 m	JWSP-XMA5BS1-03	JWSP-XMA5BF1-03	
	5 m	JWSP-XMA5BS1-05	JWSP-XMA5BF1-05	
	10 m	JWSP-XMA5BS1-10	JWSP-XMA5BF1-10	
	15 m	JWSP-XMA5BS1-15	JWSP-XMA5BF1-15	
	20 m	JWSP-XMA5BS1-20	JWSP-XMA5BF1-20	
	30 m	JWSP-XMA5BS1-30	JWSP-XMA5BF1-30	
	40 m	JWSP-XMA5BS1-40	JWSP-XMA5BF1-40	
	50 m	JWSP-XMA5BS1-50	JWSP-XMA5BF1-50	
For servomotors with holding brakes Cable installed away from load	3 m	JWSP-XMA5BS2-03	JWSP-XMA5BF2-03	
	5 m	JWSP-XMA5BS2-05	JWSP-XMA5BF2-05	
	10 m	JWSP-XMA5BS2-10	JWSP-XMA5BF2-10	
	15 m	JWSP-XMA5BS2-15	JWSP-XMA5BF2-15	
	20 m	JWSP-XMA5BS2-20	JWSP-XMA5BF2-20	
	30 m	JWSP-XMA5BS2-30	JWSP-XMA5BF2-30	
	40 m	JWSP-XMA5BS2-40	JWSP-XMA5BF2-40	
	50 m	JWSP-XMA5BS2-50	JWSP-XMA5BF2-50	

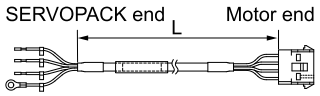
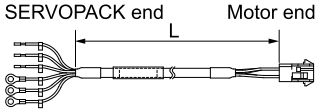
*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 90 mm or larger.

(b) SGMXP-08 (750 W)

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
For servomotors without holding brakes	3 m	JZSP-CMM00-03-E	JZSP-CMM01-03-E	
	5 m	JZSP-CMM00-05-E	JZSP-CMM01-05-E	
	10 m	JZSP-CMM00-10-E	JZSP-CMM01-10-E	
	15 m	JZSP-CMM00-15-E	JZSP-CMM01-15-E	
	20 m	JZSP-CMM00-20-E	JZSP-CMM01-20-E	
	30 m	JZSP-CMM00-30-E	JZSP-CMM01-30-E	
	40 m	JZSP-CMM00-40-E	JZSP-CMM01-40-E	
	50 m	JZSP-CMM00-50-E	JZSP-CMM01-50-E	
For servomotors with holding brakes	3 m	JZSP-CMM10-03-E	JZSP-CMM11-03-E	
	5 m	JZSP-CMM10-05-E	JZSP-CMM11-05-E	
	10 m	JZSP-CMM10-10-E	JZSP-CMM11-10-E	
	15 m	JZSP-CMM10-15-E	JZSP-CMM11-15-E	
	20 m	JZSP-CMM10-20-E	JZSP-CMM11-20-E	
	30 m	JZSP-CMM10-30-E	JZSP-CMM11-30-E	
	40 m	JZSP-CMM10-40-E	JZSP-CMM11-40-E	
	50 m	JZSP-CMM10-50-E	JZSP-CMM11-50-E	

*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 90 mm or larger.

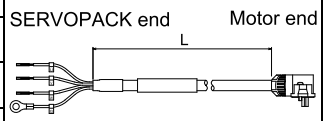
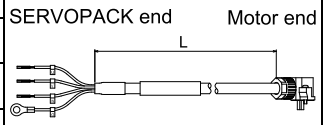
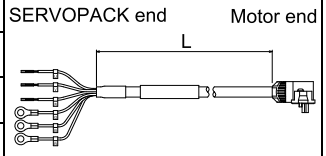
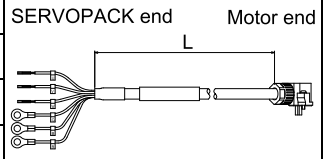
(c) SGMXP-15 (1.5 kW)

Name	Length (L)	Order Number	Appearance
For servomotors without holding brakes	3 m	JZSP-CMM20-03-E	
	5 m	JZSP-CMM20-05-E	
	10 m	JZSP-CMM20-10-E	
	15 m	JZSP-CMM20-15-E	
	20 m	JZSP-CMM20-20-E	
For servomotors with holding brakes	3 m	JZSP-CMM30-03-E	
	5 m	JZSP-CMM30-05-E	
	10 m	JZSP-CMM30-10-E	
	15 m	JZSP-CMM30-15-E	
	20 m	JZSP-CMM30-20-E	

Note:
Flexible cables are not available.

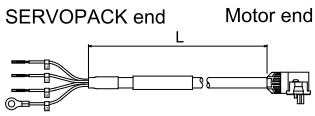
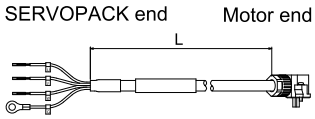
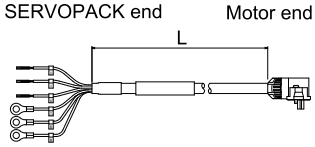
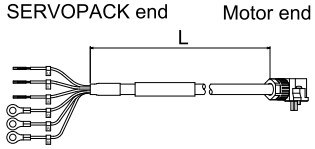
(2) Servomotors with Σ-7 Compatible Specifications

(a) SGMXP-01 (100 W)

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
For servomotors without holding brakes Cable installed toward load	3 m	JZSP-C7M10F-03-E	JZSP-C7M12F-03-E	
	5 m	JZSP-C7M10F-05-E	JZSP-C7M12F-05-E	
	10 m	JZSP-C7M10F-10-E	JZSP-C7M12F-10-E	
	15 m	JZSP-C7M10F-15-E	JZSP-C7M12F-15-E	
	20 m	JZSP-C7M10F-20-E	JZSP-C7M12F-20-E	
	30 m	JZSP-C7M10F-30-E	JZSP-C7M12F-30-E	
	40 m	JZSP-C7M10F-40-E	JZSP-C7M12F-40-E	
	50 m	JZSP-C7M10F-50-E	JZSP-C7M12F-50-E	
For servomotors without holding brakes Cable installed away from load	3 m	JZSP-C7M10G-03-E	JZSP-C7M12G-03-E	
	5 m	JZSP-C7M10G-05-E	JZSP-C7M12G-05-E	
	10 m	JZSP-C7M10G-10-E	JZSP-C7M12G-10-E	
	15 m	JZSP-C7M10G-15-E	JZSP-C7M12G-15-E	
	20 m	JZSP-C7M10G-20-E	JZSP-C7M12G-20-E	
	30 m	JZSP-C7M10G-30-E	JZSP-C7M12G-30-E	
	40 m	JZSP-C7M10G-40-E	JZSP-C7M12G-40-E	
	50 m	JZSP-C7M10G-50-E	JZSP-C7M12G-50-E	
For servomotors with holding brakes Cable installed toward load	3 m	JZSP-C7M13F-03-E	JZSP-C7M14F-03-E	
	5 m	JZSP-C7M13F-05-E	JZSP-C7M14F-05-E	
	10 m	JZSP-C7M13F-10-E	JZSP-C7M14F-10-E	
	15 m	JZSP-C7M13F-15-E	JZSP-C7M14F-15-E	
	20 m	JZSP-C7M13F-20-E	JZSP-C7M14F-20-E	
	30 m	JZSP-C7M13F-30-E	JZSP-C7M14F-30-E	
	40 m	JZSP-C7M13F-40-E	JZSP-C7M14F-40-E	
	50 m	JZSP-C7M13F-50-E	JZSP-C7M14F-50-E	
For servomotors with holding brakes Cable installed away from load	3 m	JZSP-C7M13G-03-E	JZSP-C7M14G-03-E	
	5 m	JZSP-C7M13G-05-E	JZSP-C7M14G-05-E	
	10 m	JZSP-C7M13G-10-E	JZSP-C7M14G-10-E	
	15 m	JZSP-C7M13G-15-E	JZSP-C7M14G-15-E	
	20 m	JZSP-C7M13G-20-E	JZSP-C7M14G-20-E	
	30 m	JZSP-C7M13G-30-E	JZSP-C7M14G-30-E	
	40 m	JZSP-C7M13G-40-E	JZSP-C7M14G-40-E	
	50 m	JZSP-C7M13G-50-E	JZSP-C7M14G-50-E	

*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 90 mm or larger.

(b) SGMXP-02 to -04 (200 to 400 W)

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
For servomotors without holding brakes Cable installed toward load	3 m	JZSP-C7M20F-03-E	JZSP-C7M22F-03-E	
	5 m	JZSP-C7M20F-05-E	JZSP-C7M22F-05-E	
	10 m	JZSP-C7M20F-10-E	JZSP-C7M22F-10-E	
	15 m	JZSP-C7M20F-15-E	JZSP-C7M22F-15-E	
	20 m	JZSP-C7M20F-20-E	JZSP-C7M22F-20-E	
	30 m	JZSP-C7M20F-30-E	JZSP-C7M22F-30-E	
	40 m	JZSP-C7M20F-40-E	JZSP-C7M22F-40-E	
	50 m	JZSP-C7M20F-50-E	JZSP-C7M22F-50-E	
For servomotors without holding brakes Cable installed away from load	3 m	JZSP-C7M20G-03-E	JZSP-C7M22G-03-E	
	5 m	JZSP-C7M20G-05-E	JZSP-C7M22G-05-E	
	10 m	JZSP-C7M20G-10-E	JZSP-C7M22G-10-E	
	15 m	JZSP-C7M20G-15-E	JZSP-C7M22G-15-E	
	20 m	JZSP-C7M20G-20-E	JZSP-C7M22G-20-E	
	30 m	JZSP-C7M20G-30-E	JZSP-C7M22G-30-E	
	40 m	JZSP-C7M20G-40-E	JZSP-C7M22G-40-E	
	50 m	JZSP-C7M20G-50-E	JZSP-C7M22G-50-E	
For servomotors with holding brakes Cable installed toward load	3 m	JZSP-C7M23F-03-E	JZSP-C7M24F-03-E	
	5 m	JZSP-C7M23F-05-E	JZSP-C7M24F-05-E	
	10 m	JZSP-C7M23F-10-E	JZSP-C7M24F-10-E	
	15 m	JZSP-C7M23F-15-E	JZSP-C7M24F-15-E	
	20 m	JZSP-C7M23F-20-E	JZSP-C7M24F-20-E	
	30 m	JZSP-C7M23F-30-E	JZSP-C7M24F-30-E	
	40 m	JZSP-C7M23F-40-E	JZSP-C7M24F-40-E	
	50 m	JZSP-C7M23F-50-E	JZSP-C7M24F-50-E	
For servomotors with holding brakes Cable installed away from load	3 m	JZSP-C7M23G-03-E	JZSP-C7M24G-03-E	
	5 m	JZSP-C7M23G-05-E	JZSP-C7M24G-05-E	
	10 m	JZSP-C7M23G-10-E	JZSP-C7M24G-10-E	
	15 m	JZSP-C7M23G-15-E	JZSP-C7M24G-15-E	
	20 m	JZSP-C7M23G-20-E	JZSP-C7M24G-20-E	
	30 m	JZSP-C7M23G-30-E	JZSP-C7M24G-30-E	
	40 m	JZSP-C7M23G-40-E	JZSP-C7M24G-40-E	
	50 m	JZSP-C7M23G-50-E	JZSP-C7M24G-50-E	

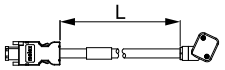
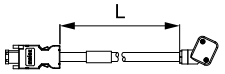
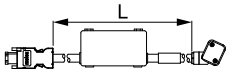
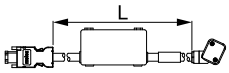
*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 90 mm or larger.

(c) SGMXP-08, -15 (750 W, 1.5 kW)

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

8.3.3 Encoder Cables (When Not Relaying the Encoder Cable)

(1) Servomotors with Standard Specifications

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
For batteryless absolute encoder Cable installed toward load	3 m	JWSP-XP2IS1-03	JWSP-XP2IF1-03	SERVOPACK end Encoder end 
	5 m	JWSP-XP2IS1-05	JWSP-XP2IF1-05	
	10 m	JWSP-XP2IS1-10	JWSP-XP2IF1-10	
	15 m	JWSP-XP2IS1-15	JWSP-XP2IF1-15	
	20 m	JWSP-XP2IS1-20	JWSP-XP2IF1-20	
	30 m	JWSP-XP2IS1-30	JWSP-XP2IF1-30	
	40 m	JWSP-XP2IS1-40	JWSP-XP2IF1-40	
	50 m	JWSP-XP2IS1-50	JWSP-XP2IF1-50	
For batteryless absolute encoder Cable installed away from load	3 m	JWSP-XP2IS2-03	JWSP-XP2IF2-03	SERVOPACK end Encoder end 
	5 m	JWSP-XP2IS2-05	JWSP-XP2IF2-05	
	10 m	JWSP-XP2IS2-10	JWSP-XP2IF2-10	
	15 m	JWSP-XP2IS2-15	JWSP-XP2IF2-15	
	20 m	JWSP-XP2IS2-20	JWSP-XP2IF2-20	
	30 m	JWSP-XP2IS2-30	JWSP-XP2IF2-30	
	40 m	JWSP-XP2IS2-40	JWSP-XP2IF2-40	
	50 m	JWSP-XP2IS2-50	JWSP-XP2IF2-50	
For absolute encoder: With battery unit *3 Cable installed toward load	3 m	JWSP-XP2AS1-03	JWSP-XP2AF1-03	SERVOPACK end Encoder end  Battery unit (battery included)
	5 m	JWSP-XP2AS1-05	JWSP-XP2AF1-05	
	10 m	JWSP-XP2AS1-10	JWSP-XP2AF1-10	
	15 m	JWSP-XP2AS1-15	JWSP-XP2AF1-15	
	20 m	JWSP-XP2AS1-20	JWSP-XP2AF1-20	
	30 m	JWSP-XP2AS1-30	JWSP-XP2AF1-30	
	40 m	JWSP-XP2AS1-40	JWSP-XP2AF1-40	
	50 m	JWSP-XP2AS1-50	JWSP-XP2AF1-50	
For absolute encoder: With battery unit *3 Cable installed away from load	3 m	JWSP-XP2AS2-03	JWSP-XP2AF2-03	SERVOPACK end Encoder end  Battery unit (battery included)
	5 m	JWSP-XP2AS2-05	JWSP-XP2AF2-05	
	10 m	JWSP-XP2AS2-10	JWSP-XP2AF2-10	
	15 m	JWSP-XP2AS2-15	JWSP-XP2AF2-15	
	20 m	JWSP-XP2AS2-20	JWSP-XP2AF2-20	
	30 m	JWSP-XP2AS2-30	JWSP-XP2AF2-30	
	40 m	JWSP-XP2AS2-40	JWSP-XP2AF2-40	
	50 m	JWSP-XP2AS2-50	JWSP-XP2AF2-50	

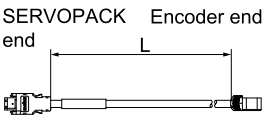
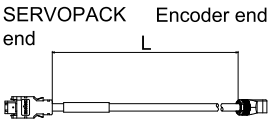
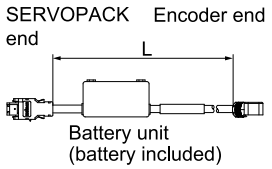
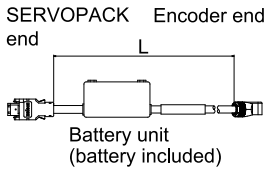
*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 46 mm or larger.
*3 If a battery is connected to the host controller, the battery unit is not required.

Note:

Do not use these cables as relay cables.

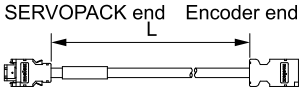
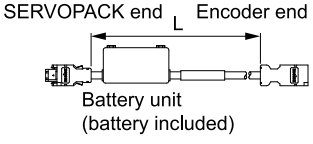
(2) Servomotors with Σ-7 Compatible Specifications (20 m or Less)

(a) SGMXP-01 to -04 (100 to 400 W)

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
For batteryless absolute encoder Cable installed toward load	3 m	JZSP-C7PI0D-03-E	JZSP-C7PI2D-03-E	
	5 m	JZSP-C7PI0D-05-E	JZSP-C7PI2D-05-E	
	10 m	JZSP-C7PI0D-10-E	JZSP-C7PI2D-10-E	
	15 m	JZSP-C7PI0D-15-E	JZSP-C7PI2D-15-E	
	20 m	JZSP-C7PI0D-20-E	JZSP-C7PI2D-20-E	
For batteryless absolute encoder Cable installed away from load	3 m	JZSP-C7PI0E-03-E	JZSP-C7PI2E-03-E	
	5 m	JZSP-C7PI0E-05-E	JZSP-C7PI2E-05-E	
	10 m	JZSP-C7PI0E-10-E	JZSP-C7PI2E-10-E	
	15 m	JZSP-C7PI0E-15-E	JZSP-C7PI2E-15-E	
	20 m	JZSP-C7PI0E-20-E	JZSP-C7PI2E-20-E	
For absolute encoder: With battery unit *3 Cable installed toward load	3 m	JZSP-C7PA0D-03-E	JZSP-C7PA2D-03-E	
	5 m	JZSP-C7PA0D-05-E	JZSP-C7PA2D-05-E	
	10 m	JZSP-C7PA0D-10-E	JZSP-C7PA2D-10-E	
	15 m	JZSP-C7PA0D-15-E	JZSP-C7PA2D-15-E	
	20 m	JZSP-C7PA0D-20-E	JZSP-C7PA2D-20-E	
For absolute encoder: With battery unit *3 Cable installed away from load	3 m	JZSP-C7PA0E-03-E	JZSP-C7PA2E-03-E	
	5 m	JZSP-C7PA0E-05-E	JZSP-C7PA2E-05-E	
	10 m	JZSP-C7PA0E-10-E	JZSP-C7PA2E-10-E	
	15 m	JZSP-C7PA0E-15-E	JZSP-C7PA2E-15-E	
	20 m	JZSP-C7PA0E-20-E	JZSP-C7PA2E-20-E	

*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 46 mm or larger.
*3 If a battery is connected to the host controller, the battery unit is not required.

(b) SGMXP-08, -15 (750 W, 1.5 kW)

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
For batteryless absolute encoder	3 m	JZSP-CMP00-03-E	JZSP-CMP10-03-E	
	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	
For absolute encoder: With battery unit *3	3 m	JZSP-CSP19-03-E	JZSP-CSP29-03-E	
	5 m	JZSP-CSP19-05-E	JZSP-CSP29-05-E	
	10 m	JZSP-CSP19-10-E	JZSP-CSP29-10-E	
	15 m	JZSP-CSP19-15-E	JZSP-CSP29-15-E	
	20 m	JZSP-CSP19-20-E	JZSP-CSP29-20-E	

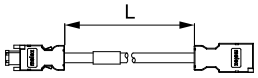
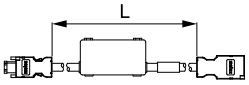
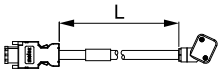
*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 46 mm or larger.
*3 If a battery is connected to the host controller, the battery unit is not required.

8.3.4 Encoder Cables (When Relaying the Encoder Cable)

(1) Servomotors with Standard Specifications

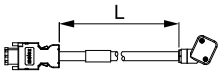
When you will relay the encoder cable, use the following configuration.

Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
Encoder cable with connectors on both ends For batteryless absolute encoder *3	0.3 m	JWSP-XP1IS0-00P3	JWSP-XP1IF0-00P3	SERVOPACK end Encoder end L 
	3 m	JWSP-XP1IS0-03	JWSP-XP1IF0-03	
	5 m	JWSP-XP1IS0-05	JWSP-XP1IF0-05	
	10 m	JWSP-XP1IS0-10	JWSP-XP1IF0-10	
	15 m	JWSP-XP1IS0-15	JWSP-XP1IF0-15	
	20 m	JWSP-XP1IS0-20	JWSP-XP1IF0-20	
	25 m	JWSP-XP1IS0-25	JWSP-XP1IF0-25	
Encoder cable with connectors on both ends For absolute encoder: With battery unit *3 *4	0.3 m	JWSP-XP1AS0-00P3	JWSP-XP1AF0-00P3	SERVOPACK end Encoder end L  Battery unit (battery included)
	3 m	JWSP-XP1AS0-03	JWSP-XP1AF0-03	
	5 m	JWSP-XP1AS0-05	JWSP-XP1AF0-05	
	10 m	JWSP-XP1AS0-10	JWSP-XP1AF0-10	
	15 m	JWSP-XP1AS0-15	JWSP-XP1AF0-15	
	20 m	JWSP-XP1AS0-20	JWSP-XP1AF0-20	
	25 m	JWSP-XP1AS0-25	JWSP-XP1AF0-25	
Encoder Cables Cable installed toward load	0.3 m	JWSP-XP3IS1-00P3	JWSP-XP3IF1-00P3	SERVOPACK end Encoder end L 
	1 m	JWSP-XP3IS1-01	JWSP-XP3IF1-01	
	3 m	JWSP-XP3IS1-03	JWSP-XP3IF1-03	
	5 m	JWSP-XP3IS1-05	JWSP-XP3IF1-05	
	10 m	JWSP-XP3IS1-10	JWSP-XP3IF1-10	
	15 m	JWSP-XP3IS1-15	JWSP-XP3IF1-15	
	20 m	JWSP-XP3IS1-20	JWSP-XP3IF1-20	
	25 m	JWSP-XP3IS1-25	JWSP-XP3IF1-25	
	30 m	JWSP-XP3IS1-30	JWSP-XP3IF1-30	
	40 m	JWSP-XP3IS1-40	JWSP-XP3IF1-40	
	50 m	JWSP-XP3IS1-50	JWSP-XP3IF1-50	

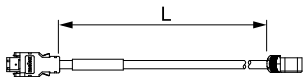
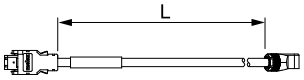
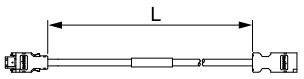
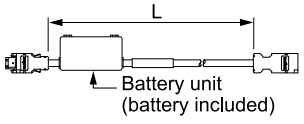
Continued on next page.

Continued from previous page.

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
Encoder Cables Cable installed away from load	0.3 m	JWSP-XP3IS2-00P3	JWSP-XP3IF2-00P3	SERVOPACK end Encoder end 
	1 m	JWSP-XP3IS2-01	JWSP-XP3IF2-01	
	3 m	JWSP-XP3IS2-03	JWSP-XP3IF2-03	
	5 m	JWSP-XP3IS2-05	JWSP-XP3IF2-05	
	10 m	JWSP-XP3IS2-10	JWSP-XP3IF2-10	
	15 m	JWSP-XP3IS2-15	JWSP-XP3IF2-15	
	20 m	JWSP-XP3IS2-20	JWSP-XP3IF2-20	
	25 m	JWSP-XP3IS2-25	JWSP-XP3IF2-25	
	30 m	JWSP-XP3IS2-30	JWSP-XP3IF2-30	
	40 m	JWSP-XP3IS2-40	JWSP-XP3IF2-40	
	50 m	JWSP-XP3IS2-50	JWSP-XP3IF2-50	

*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 46 mm or larger.
*3 The JZSP-UCMP00-□□-E and JZSP-CSP12-E cannot be connected at the same time.
*4 If a battery is connected to the host controller, the battery unit is not required.

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

Name	Length (L)	Order Number	Appearance
Relay encoder cable SGMXP-01 to -04: Cable installed toward load	0.3 m	JZSP-C7PRCD-E	SERVOPACK end Encoder end 
Relay encoder cable SGMXP-01 to -04: Cable installed away from load	0.3 m	JZSP-C7PRCE-E	SERVOPACK end Encoder end 
Relay encoder cable with connectors on both ends (for all types of encoders)	30 m	JZSP-UCMP00-30-E	SERVOPACK end Encoder end 
	40 m	JZSP-UCMP00-40-E	
	50 m	JZSP-UCMP00-50-E	
Relay encoder cables with connectors on both ends and battery unit (Required only when an absolute encoder is used. *1)	0.3 m	JZSP-CSP12-E	SERVOPACK end Encoder end 

*1 This cable is not required if you use a servomotor with a batteryless absolute encoder, and you connect a battery to the host controller.

8.4 Cables for the 400 V SGMXP Servomotors

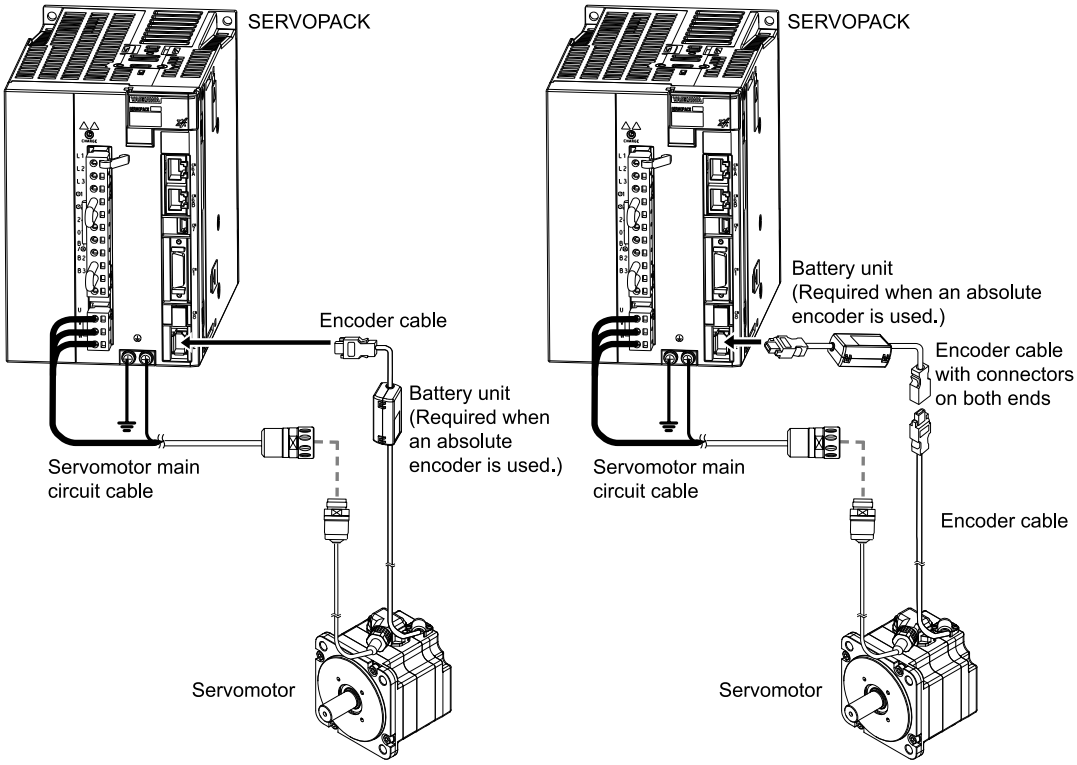
Information Refer to the following manual when making connections between multiple devices and the SERVOPACK.

Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

8.4.1 System Configurations

(1) Servomotors with Standard Specifications

The cables shown below are required to connect a servomotor to a SERVOPACK.

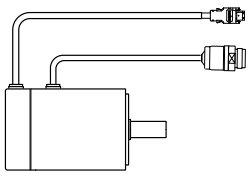


Note:

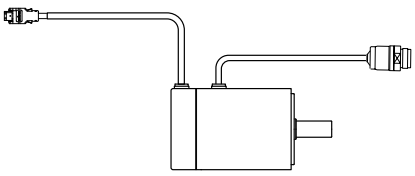
1. The encoder cable to use depends on whether the encoder cable will be relayed.
2. When you will relay the encoder cable for the SGMXP-02 to -04 servomotor, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
3. If you use a servomotor main circuit cable that exceeds 20 m, the intermittent duty zone in the torque-rotation speed characteristics will become smaller because the voltage drop increases.
   Refer to the following section for the intermittent duty zone.
   ☞ *5.3.3 Torque-Rotation Speed Characteristics on page 127*

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

Cable Installed toward Load

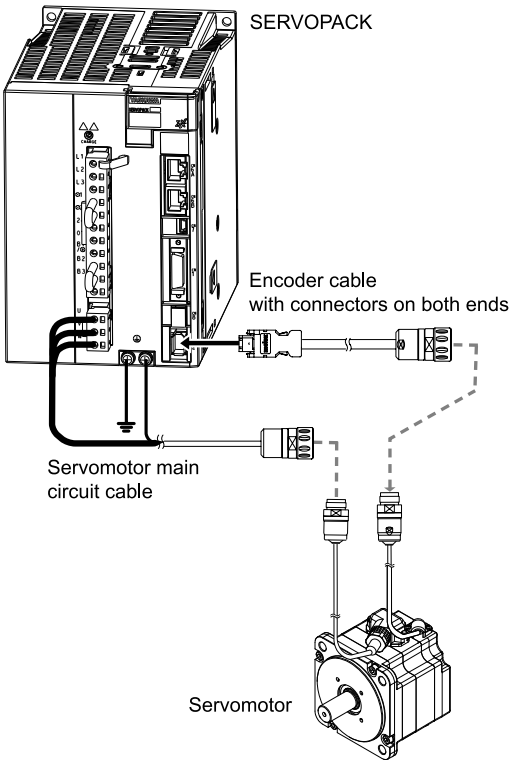


Cable Installed away from Load



(2) Servomotors with Σ-V Compatible Specifications

The cables shown below are required to connect a servomotor to a SERVOPACK.



Note:

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

Refer to the following section for the intermittent duty zone.

☞ *5.3.3 Torque-Rotation Speed Characteristics on page 127*

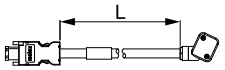
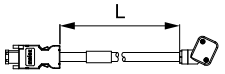
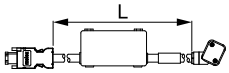
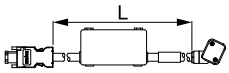
8.4.2 Servomotor Main Circuit Cables

Main circuit cables for the Σ-V-series SGMEV (400 V) servomotors can be used.

Cables are not provided by Yaskawa.

8.4.3 Encoder Cables (When Not Relaying the Encoder Cable)

(1) Servomotors with Standard Specifications

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
For batteryless absolute encoder Cable installed toward load	3 m	JWSP-XP2IS1-03	JWSP-XP2IF1-03	SERVOPACK end Encoder end 
	5 m	JWSP-XP2IS1-05	JWSP-XP2IF1-05	
	10 m	JWSP-XP2IS1-10	JWSP-XP2IF1-10	
	15 m	JWSP-XP2IS1-15	JWSP-XP2IF1-15	
	20 m	JWSP-XP2IS1-20	JWSP-XP2IF1-20	
	30 m	JWSP-XP2IS1-30	JWSP-XP2IF1-30	
	40 m	JWSP-XP2IS1-40	JWSP-XP2IF1-40	
	50 m	JWSP-XP2IS1-50	JWSP-XP2IF1-50	
For batteryless absolute encoder Cable installed away from load	3 m	JWSP-XP2IS2-03	JWSP-XP2IF2-03	SERVOPACK end Encoder end 
	5 m	JWSP-XP2IS2-05	JWSP-XP2IF2-05	
	10 m	JWSP-XP2IS2-10	JWSP-XP2IF2-10	
	15 m	JWSP-XP2IS2-15	JWSP-XP2IF2-15	
	20 m	JWSP-XP2IS2-20	JWSP-XP2IF2-20	
	30 m	JWSP-XP2IS2-30	JWSP-XP2IF2-30	
	40 m	JWSP-XP2IS2-40	JWSP-XP2IF2-40	
	50 m	JWSP-XP2IS2-50	JWSP-XP2IF2-50	
For absolute encoder: With battery unit *3 Cable installed toward load	3 m	JWSP-XP2AS1-03	JWSP-XP2AF1-03	SERVOPACK end Encoder end  Battery unit (battery included)
	5 m	JWSP-XP2AS1-05	JWSP-XP2AF1-05	
	10 m	JWSP-XP2AS1-10	JWSP-XP2AF1-10	
	15 m	JWSP-XP2AS1-15	JWSP-XP2AF1-15	
	20 m	JWSP-XP2AS1-20	JWSP-XP2AF1-20	
	30 m	JWSP-XP2AS1-30	JWSP-XP2AF1-30	
	40 m	JWSP-XP2AS1-40	JWSP-XP2AF1-40	
	50 m	JWSP-XP2AS1-50	JWSP-XP2AF1-50	
For absolute encoder: With battery unit *3 Cable installed away from load	3 m	JWSP-XP2AS2-03	JWSP-XP2AF2-03	SERVOPACK end Encoder end  Battery unit (battery included)
	5 m	JWSP-XP2AS2-05	JWSP-XP2AF2-05	
	10 m	JWSP-XP2AS2-10	JWSP-XP2AF2-10	
	15 m	JWSP-XP2AS2-15	JWSP-XP2AF2-15	
	20 m	JWSP-XP2AS2-20	JWSP-XP2AF2-20	
	30 m	JWSP-XP2AS2-30	JWSP-XP2AF2-30	
	40 m	JWSP-XP2AS2-40	JWSP-XP2AF2-40	
	50 m	JWSP-XP2AS2-50	JWSP-XP2AF2-50	

*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 46 mm or larger.
*3 If a battery is connected to the host controller, the battery unit is not required.

Note:

Do not use these cables as relay cables.

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

Cables for the Σ-V-series SGMEV (400 V) servomotors can be used.

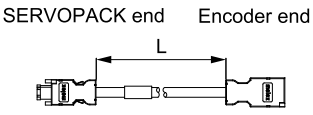
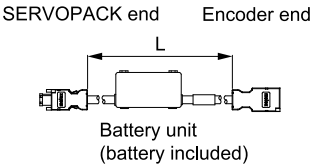
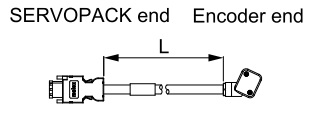
Cables are not provided by Yaskawa.

8.4.4 Encoder Cables (When Relaying the Encoder Cable)

(1) Servomotors with Standard Specifications

When you will relay the encoder cable, use the following configuration.

Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
Encoder cable with connectors on both ends For batteryless absolute encoder *3	0.3 m	JWSP-XP1IS0-00P3	JWSP-XP1IF0-00P3	
	3 m	JWSP-XP1IS0-03	JWSP-XP1IF0-03	
	5 m	JWSP-XP1IS0-05	JWSP-XP1IF0-05	
	10 m	JWSP-XP1IS0-10	JWSP-XP1IF0-10	
	15 m	JWSP-XP1IS0-15	JWSP-XP1IF0-15	
	20 m	JWSP-XP1IS0-20	JWSP-XP1IF0-20	
	25 m	JWSP-XP1IS0-25	JWSP-XP1IF0-25	
Encoder cable with connectors on both ends For absolute encoder: With battery unit *3 *4	0.3 m	JWSP-XP1AS0-00P3	JWSP-XP1AF0-00P3	
	3 m	JWSP-XP1AS0-03	JWSP-XP1AF0-03	
	5 m	JWSP-XP1AS0-05	JWSP-XP1AF0-05	
	10 m	JWSP-XP1AS0-10	JWSP-XP1AF0-10	
	15 m	JWSP-XP1AS0-15	JWSP-XP1AF0-15	
	20 m	JWSP-XP1AS0-20	JWSP-XP1AF0-20	
	25 m	JWSP-XP1AS0-25	JWSP-XP1AF0-25	
Encoder Cables Cable installed toward load	0.3 m	JWSP-XP3IS1-00P3	JWSP-XP3IF1-00P3	
	1 m	JWSP-XP3IS1-01	JWSP-XP3IF1-01	
	3 m	JWSP-XP3IS1-03	JWSP-XP3IF1-03	
	5 m	JWSP-XP3IS1-05	JWSP-XP3IF1-05	
	10 m	JWSP-XP3IS1-10	JWSP-XP3IF1-10	
	15 m	JWSP-XP3IS1-15	JWSP-XP3IF1-15	
	20 m	JWSP-XP3IS1-20	JWSP-XP3IF1-20	
	25 m	JWSP-XP3IS1-25	JWSP-XP3IF1-25	
	30 m	JWSP-XP3IS1-30	JWSP-XP3IF1-30	
	40 m	JWSP-XP3IS1-40	JWSP-XP3IF1-40	
	50 m	JWSP-XP3IS1-50	JWSP-XP3IF1-50	

Continued on next page.

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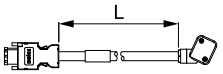
Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
Encoder Cables Cable installed away from load	0.3 m	JWSP-XP3IS2-00P3	JWSP-XP3IF2-00P3	SERVOPACK end Encoder end 
	1 m	JWSP-XP3IS2-01	JWSP-XP3IF2-01	
	3 m	JWSP-XP3IS2-03	JWSP-XP3IF2-03	
	5 m	JWSP-XP3IS2-05	JWSP-XP3IF2-05	
	10 m	JWSP-XP3IS2-10	JWSP-XP3IF2-10	
	15 m	JWSP-XP3IS2-15	JWSP-XP3IF2-15	
	20 m	JWSP-XP3IS2-20	JWSP-XP3IF2-20	
	25 m	JWSP-XP3IS2-25	JWSP-XP3IF2-25	
	30 m	JWSP-XP3IS2-30	JWSP-XP3IF2-30	
	40 m	JWSP-XP3IS2-40	JWSP-XP3IF2-40	
	50 m	JWSP-XP3IS2-50	JWSP-XP3IF2-50	

*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 46 mm or larger.
*3 The JZSP-UCMP00-□□-E and JZSP-CSP12-E cannot be connected at the same time.
*4 If a battery is connected to the host controller, the battery unit is not required.

8.5 Cables for the SGMXG Servomotors

Information Refer to the following manual for details on connecting multiple devices to the SERVOPACK.

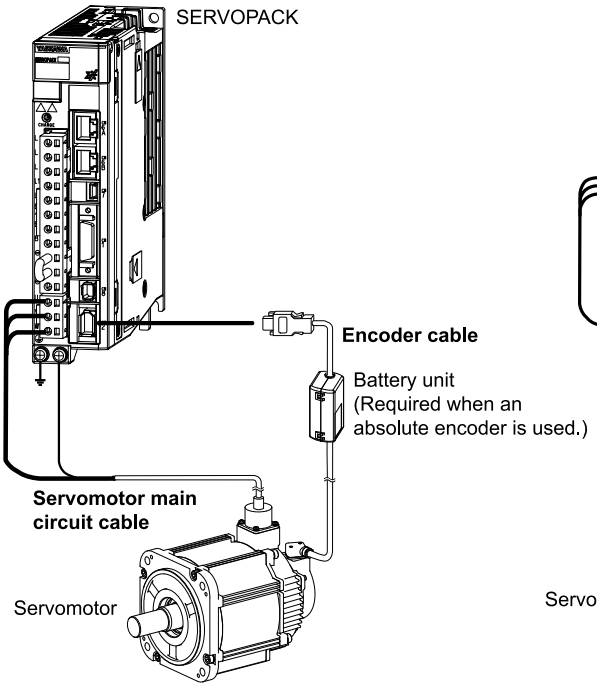
Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

8.5.1 System Configurations

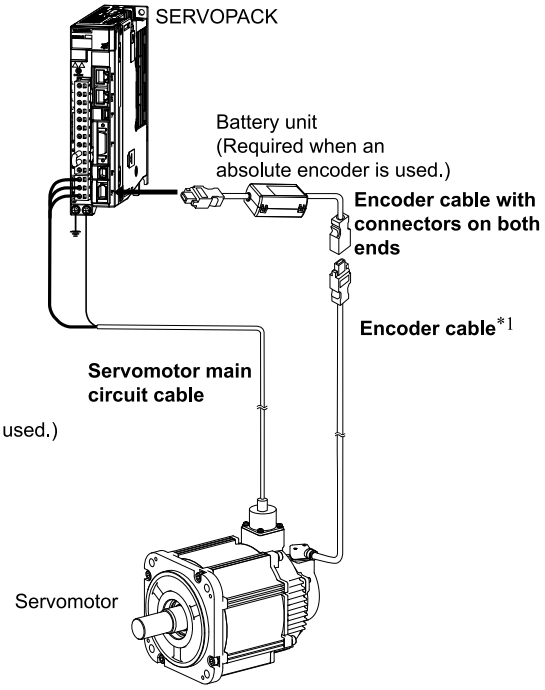
(1) Servomotors with Standard Specifications

The cables shown below are required to connect a servomotor to a SERVOPACK.

When Not Relaying the Encoder Cable



When Relaying the Encoder Cable



*1 The JZSP-UCMP00-□□-E and JZSP-CSP12-E cannot be connected at the same time.

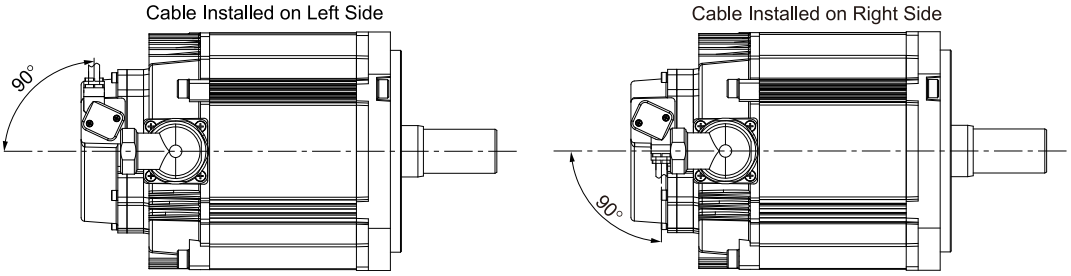
Note:

1. Cables with connectors on both ends that are compliant with an IP67 protective structure and European Safety Standards are not available from Yaskawa for the SGMXG servomotors. You must make such a cable yourself. Use the connectors specified by Yaskawa for these servomotors. (These connectors are compliant with the standards.) Yaskawa does not specify what wiring materials to use. Use appropriate wiring materials for the current specifications and connectors.
2. The encoder cable to use depends on whether the encoder cable will be relayed.
3. When you will relay the encoder cable, use the following configuration.
   Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m
4. If you use a servomotor main circuit cable that exceeds 20 m, the intermittent duty zone in the torque-rotation speed characteristics will become smaller because the voltage drop increases.
   Refer to the following section for the intermittent duty zone.
   6.2.4 Torque-Rotation Speed Characteristics on page 151
   6.3.3 Torque-Rotation Speed Characteristics on page 159
5. Refer to the following manual for the following information.
   - Cable dimensional drawings and wiring specifications
   - Order numbers and specifications of individual connectors for cables
   - Order numbers and specifications for wiring materials

   Σ-X-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

Important

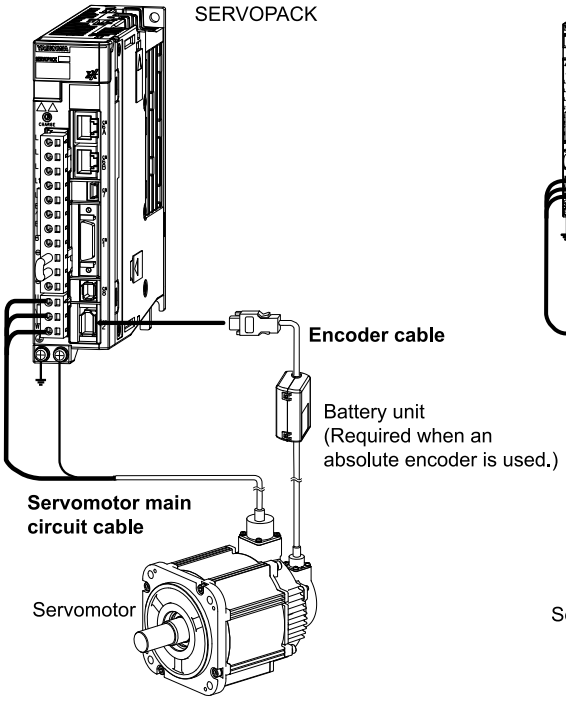
There are different order numbers for the encoder cables depending on the cable installation direction. Confirm the order numbers before you order.



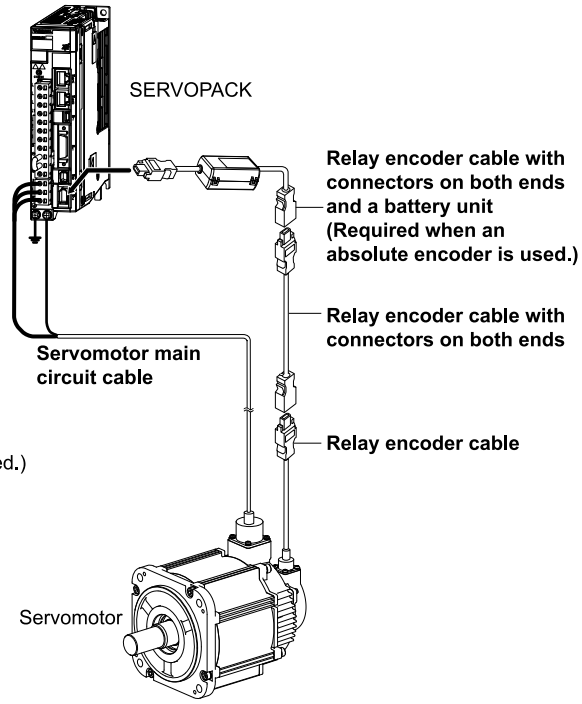
(2) Servomotors with Σ-V or Σ-7 Compatible Specifications

The cables shown below are required to connect a servomotor to a SERVOPACK.

When Not Relaying the Encoder Cable
(Encoder Cable Less Than 20 m)



When Relaying the Encoder Cable
(Encoder Cable Exceeding 20 m)



Note:

1. Cables with connectors on both ends that are compliant with an IP67 protective structure and European Safety Standards are not available from Yaskawa for the SGMXG servomotors. You must make such a cable yourself. Use the connectors specified by Yaskawa for these servomotors. (These connectors are compliant with the standards.) Yaskawa does not specify what wiring materials to use. Use appropriate wiring materials for the current specifications and connectors.
2. The encoder cable to use depends on whether the encoder cable will be relayed.
3. If you use a servomotor main circuit cable that exceeds 20 m, the intermittent duty zone in the torque-rotation speed characteristics will become smaller because the voltage drop increases.
   Refer to the following section for the intermittent duty zone.
   ☞ *6.2.4 Torque-Rotation Speed Characteristics on page 151*
   ☞ *6.3.3 Torque-Rotation Speed Characteristics on page 159*
4. Refer to the following manual for the following information.
   - Cable dimensional drawings and wiring specifications
   - Order numbers and specifications of individual connectors for cables
   - Order numbers and specifications for wiring materials

   🕮 Σ-X-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

8.5.2 Servomotor Main Circuit Cables

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

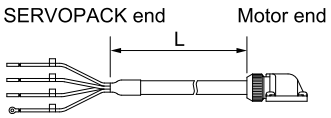
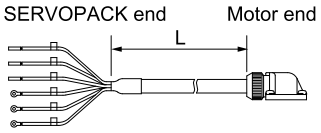
Information Σ-V or Σ-7 compatible specification servomotors can also use the same cables as Σ-7 series rotary servomotors. Refer to the following manual for information on the Σ-7-series for rotary servomotor cables.

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

This section provides information on selecting a servomotor main circuit cable. Refer to the following manual for detailed information on cables and for the wiring materials to make your own cables.

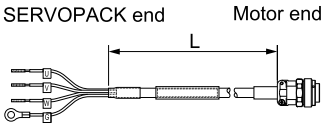
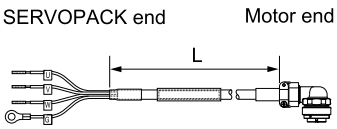
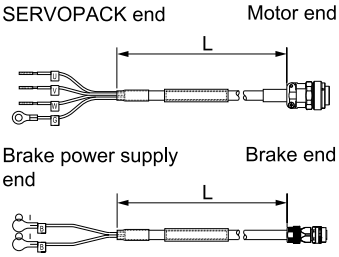
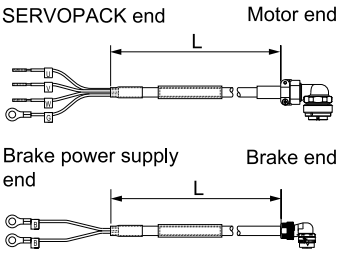
Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)

(1) SGMXG-03A□A, -05□□A (300 W, 450 W), -03A□B (300 W)

Name	Length (L)	Order Number *1	Appearance
For servomotors without holding brakes	3 m	JZSP-CVM21-03-E	
	5 m	JZSP-CVM21-05-E	
	10 m	JZSP-CVM21-10-E	
	15 m	JZSP-CVM21-15-E	
	20 m	JZSP-CVM21-20-E	
	30 m	JZSP-CVM21-30-E	
	40 m	JZSP-CVM21-40-E	
	50 m	JZSP-CVM21-50-E	
For servomotors with holding brakes	3 m	JZSP-CVM41-03-E	
	5 m	JZSP-CVM41-05-E	
	10 m	JZSP-CVM41-10-E	
	15 m	JZSP-CVM41-15-E	
	20 m	JZSP-CVM41-20-E	
	30 m	JZSP-CVM41-30-E	
	40 m	JZSP-CVM41-40-E	
	50 m	JZSP-CVM41-50-E	

*1 These standard cables are flexible cables. The recommended bending radius (R) is 90 mm or larger.

(2) SGMXG-09□□A, -13□□A (850 W, 1.3 kW), -06A□B, -09A□B (600 W, 900 W)

Name	Connector Specifications	Length (L)	Order Number		Appearance
			Standard Cable	Flexible Cable *1 *2	
For servomotors without holding brakes	Straight Plug	3 m	JWSP-XM15NSS-03	JWSP-XM15NFS-03	
		5 m	JWSP-XM15NSS-05	JWSP-XM15NFS-05	
		10 m	JWSP-XM15NSS-10	JWSP-XM15NFS-10	
		15 m	JWSP-XM15NSS-15	JWSP-XM15NFS-15	
		20 m	JWSP-XM15NSS-20	JWSP-XM15NFS-20	
	Right-angle Plug *3	3 m	JWSP-XM15NSL-03	JWSP-XM15NFL-03	
		5 m	JWSP-XM15NSL-05	JWSP-XM15NFL-05	
		10 m	JWSP-XM15NSL-10	JWSP-XM15NFL-10	
		15 m	JWSP-XM15NSL-15	JWSP-XM15NFL-15	
		20 m	JWSP-XM15NSL-20	JWSP-XM15NFL-20	
For servomotors with holding brakes (Set of two cables *4)	Straight Plug	3 m	JWSP-XM15BSS-03	JWSP-XM15BFS-03	
		5 m	JWSP-XM15BSS-05	JWSP-XM15BFS-05	
		10 m	JWSP-XM15BSS-10	JWSP-XM15BFS-10	
		15 m	JWSP-XM15BSS-15	JWSP-XM15BFS-15	
		20 m	JWSP-XM15BSS-20	JWSP-XM15BFS-20	
	Right-angle Plug *3	3 m	JWSP-XM15BSL-03	JWSP-XM15BFL-03	
		5 m	JWSP-XM15BSL-05	JWSP-XM15BFL-05	
		10 m	JWSP-XM15BSL-10	JWSP-XM15BFL-10	
		15 m	JWSP-XM15BSL-15	JWSP-XM15BFL-15	
		20 m	JWSP-XM15BSL-20	JWSP-XM15BFL-20	

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

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

*3 The lead installation direction is the non-load side. Contact your Yaskawa representative if you require the leads to be installed in another direction.

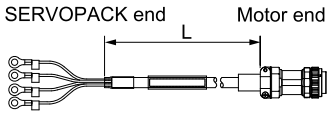
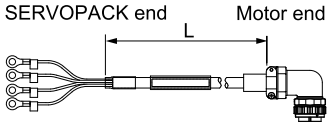
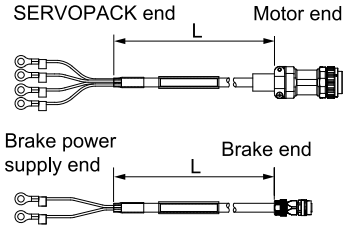
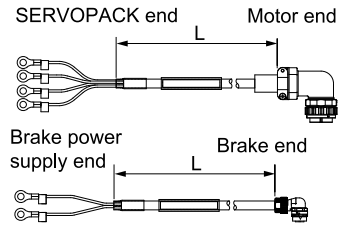
*4 This order number is for a set of two cables (main power supply cable and holding brake cable).
When you purchase them separately, the order numbers for main power supply cables are the same as for a servomotor without a holding brake.
The following order numbers are for a holding brake cable. These standard cables are flexible cables.

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

Note:

If you need a cable with a length of 20 m to 50 m, consider the operating conditions and contact your Yaskawa representative with your preferred length.

(3) SGMXG-20□□A (1.8 kW), -12A□B (1.2 kW)

Name	Connector Specifications	Length (L)	Order Number		Appearance
			Standard Cable	Flexible Cable *1 *2	
For servomotors without holding brakes	Straight Plug	3 m	JWSP-XM20NSS-03	JWSP-XM20NFS-03	
		5 m	JWSP-XM20NSS-05	JWSP-XM20NFS-05	
		10 m	JWSP-XM20NSS-10	JWSP-XM20NFS-10	
		15 m	JWSP-XM20NSS-15	JWSP-XM20NFS-15	
		20 m	JWSP-XM20NSS-20	JWSP-XM20NFS-20	
	Right-angle Plug *3	3 m	JWSP-XM20NSL-03	JWSP-XM20NFL-03	
		5 m	JWSP-XM20NSL-05	JWSP-XM20NFL-05	
		10 m	JWSP-XM20NSL-10	JWSP-XM20NFL-10	
		15 m	JWSP-XM20NSL-15	JWSP-XM20NFL-15	
		20 m	JWSP-XM20NSL-20	JWSP-XM20NFL-20	
For servomotors with holding brakes (Set of two cables *4)	Straight Plug	3 m	JWSP-XM20BSS-03	JWSP-XM20BFS-03	
		5 m	JWSP-XM20BSS-05	JWSP-XM20BFS-05	
		10 m	JWSP-XM20BSS-10	JWSP-XM20BFS-10	
		15 m	JWSP-XM20BSS-15	JWSP-XM20BFS-15	
		20 m	JWSP-XM20BSS-20	JWSP-XM20BFS-20	
	Right-angle Plug *3	3 m	JWSP-XM20BSL-03	JWSP-XM20BFL-03	
		5 m	JWSP-XM20BSL-05	JWSP-XM20BFL-05	
		10 m	JWSP-XM20BSL-10	JWSP-XM20BFL-10	
		15 m	JWSP-XM20BSL-15	JWSP-XM20BFL-15	
		20 m	JWSP-XM20BSL-20	JWSP-XM20BFL-20	

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

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

*3 The lead installation direction is the non-load side. Contact your Yaskawa representative if you require the leads to be installed in another direction.

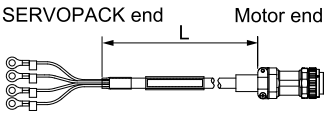
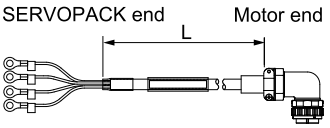
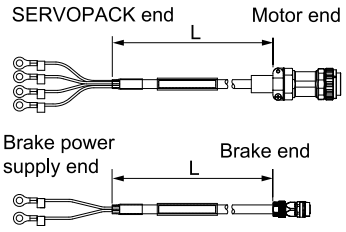
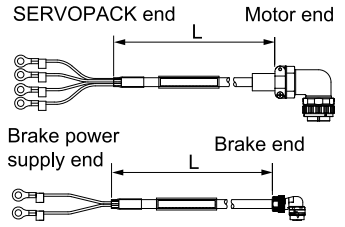
*4 This order number is for a set of two cables (main power supply cable and holding brake cable).
When you purchase them separately, the order numbers for main power supply cables are the same as for a servomotor without a holding brake.
The following order numbers are for a holding brake cable. These standard cables are flexible cables.

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

Note:

If you need a cable with a length of 20 m to 50 m, consider the operating conditions and contact your Yaskawa representative with your preferred length.

(4) SGMXG-30□□A (2.9 kW, when used in combination with the SGDXS-200A), -20A□B, -30A□B (2.0 kW, 3.0 kW)

Name	Connector Specifications	Length (L)	Order Number		Appearance
			Standard Cable	Flexible Cable *1 *2	
For servomotors without holding brakes	Straight Plug	3 m	JWSP-XM30NSS-03	JWSP-XM30NFS-03	
		5 m	JWSP-XM30NSS-05	JWSP-XM30NFS-05	
		10 m	JWSP-XM30NSS-10	JWSP-XM30NFS-10	
		15 m	JWSP-XM30NSS-15	JWSP-XM30NFS-15	
		20 m	JWSP-XM30NSS-20	JWSP-XM30NFS-20	
	Right-angle Plug *3	3 m	JWSP-XM30NSL-03	JWSP-XM30NFL-03	
		5 m	JWSP-XM30NSL-05	JWSP-XM30NFL-05	
		10 m	JWSP-XM30NSL-10	JWSP-XM30NFL-10	
		15 m	JWSP-XM30NSL-15	JWSP-XM30NFL-15	
		20 m	JWSP-XM30NSL-20	JWSP-XM30NFL-20	
For servomotors with holding brakes (Set of two cables *4)	Straight Plug	3 m	JWSP-XM30BSS-03	JWSP-XM30BFS-03	
		5 m	JWSP-XM30BSS-05	JWSP-XM30BFS-05	
		10 m	JWSP-XM30BSS-10	JWSP-XM30BFS-10	
		15 m	JWSP-XM30BSS-15	JWSP-XM30BFS-15	
		20 m	JWSP-XM30BSS-20	JWSP-XM30BFS-20	
	Right-angle Plug *3	3 m	JWSP-XM30BSL-03	JWSP-XM30BFL-03	
		5 m	JWSP-XM30BSL-05	JWSP-XM30BFL-05	
		10 m	JWSP-XM30BSL-10	JWSP-XM30BFL-10	
		15 m	JWSP-XM30BSL-15	JWSP-XM30BFL-15	
		20 m	JWSP-XM30BSL-20	JWSP-XM30BFL-20	

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

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

*3 The lead installation direction is the non-load side. Contact your Yaskawa representative if you require the leads to be installed in another direction.

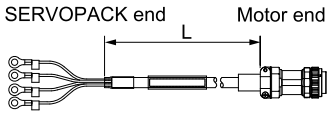
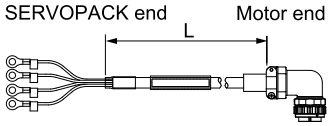
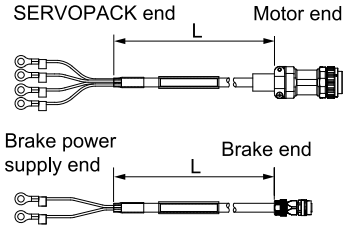
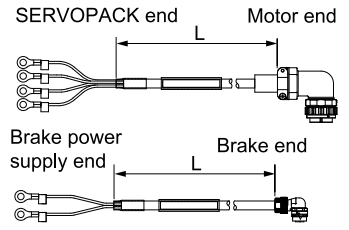
*4 This order number is for a set of two cables (main power supply cable and holding brake cable).
When you purchase them separately, the order numbers for main power supply cables are the same as for a servomotor without a holding brake.
The following order numbers are for a holding brake cable. These standard cables are flexible cables.

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

Note:

If you need a cable with a length of 20 m to 50 m, consider the operating conditions and contact your Yaskawa representative with your preferred length.

(5) SGMXG-30□□A, -44□□A (2.9 kW, 4.4 kW)

Name	Connector Specifications	Length (L)	Order Number		Appearance
			Standard Cable	Flexible Cable *1 *2	
For servomotors without holding brakes	Straight Plug	3 m	JWSP-XM40NSS-03	JWSP-XM40NFS-03	
		5 m	JWSP-XM40NSS-05	JWSP-XM40NFS-05	
		10 m	JWSP-XM40NSS-10	JWSP-XM40NFS-10	
		15 m	JWSP-XM40NSS-15	JWSP-XM40NFS-15	
		20 m	JWSP-XM40NSS-20	JWSP-XM40NFS-20	
	Right-angle Plug *3	3 m	JWSP-XM40NSL-03	JWSP-XM40NFL-03	
		5 m	JWSP-XM40NSL-05	JWSP-XM40NFL-05	
		10 m	JWSP-XM40NSL-10	JWSP-XM40NFL-10	
		15 m	JWSP-XM40NSL-15	JWSP-XM40NFL-15	
		20 m	JWSP-XM40NSL-20	JWSP-XM40NFL-20	
For servomotors with holding brakes (Set of two cables *4)	Straight Plug	3 m	JWSP-XM40BSS-03	JWSP-XM40BFS-03	
		5 m	JWSP-XM40BSS-05	JWSP-XM40BFS-05	
		10 m	JWSP-XM40BSS-10	JWSP-XM40BFS-10	
		15 m	JWSP-XM40BSS-15	JWSP-XM40BFS-15	
		20 m	JWSP-XM40BSS-20	JWSP-XM40BFS-20	
	Right-angle Plug *3	3 m	JWSP-XM40BSL-03	JWSP-XM40BFL-03	
		5 m	JWSP-XM40BSL-05	JWSP-XM40BFL-05	
		10 m	JWSP-XM40BSL-10	JWSP-XM40BFL-10	
		15 m	JWSP-XM40BSL-15	JWSP-XM40BFL-15	
		20 m	JWSP-XM40BSL-20	JWSP-XM40BFL-20	

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

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

*3 The lead installation direction is the non-load side. Contact your Yaskawa representative if you require the leads to be installed in another direction.

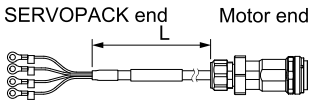
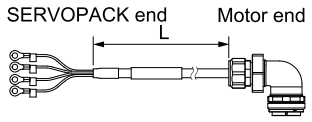
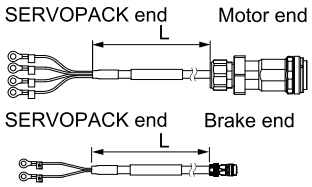
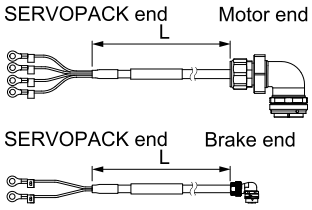
*4 This order number is for a set of two cables (main power supply cable and holding brake cable).
When you purchase them separately, the order numbers for main power supply cables are the same as for a servomotor without a holding brake.
The following order numbers are for a holding brake cable. These standard cables are flexible cables.

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

Note:

If you need a cable with a length of 20 m to 50 m, consider the operating conditions and contact your Yaskawa representative with your preferred length.

(6) SGMXG-40A□B (4.0 kW)

Name	Connector Specifications	Length (L)	Order Number		Appearance
			Standard Cable	Flexible Cable *1 *2	
For servomotors without holding brakes	Straight Plug	3 m	JWSP-XM4ANSS-03	JWSP-XM4ANFS-03	
		5 m	JWSP-XM4ANSS-05	JWSP-XM4ANFS-05	
		10 m	JWSP-XM4ANSS-10	JWSP-XM4ANFS-10	
		15 m	JWSP-XM4ANSS-15	JWSP-XM4ANFS-15	
		20 m	JWSP-XM4ANSS-20	JWSP-XM4ANFS-20	
	Right-angle Plug *3	3 m	JWSP-XM4ANSL-03	JWSP-XM4ANFL-03	
		5 m	JWSP-XM4ANSL-05	JWSP-XM4ANFL-05	
		10 m	JWSP-XM4ANSL-10	JWSP-XM4ANFL-10	
		15 m	JWSP-XM4ANSL-15	JWSP-XM4ANFL-15	
		20 m	JWSP-XM4ANSL-20	JWSP-XM4ANFL-20	
For servomotors with holding brakes (Set of two cables *4)	Straight Plug	3 m	JWSP-XM4ABSS-03	JWSP-XM4ABFS-03	
		5 m	JWSP-XM4ABSS-05	JWSP-XM4ABFS-05	
		10 m	JWSP-XM4ABSS-10	JWSP-XM4ABFS-10	
		15 m	JWSP-XM4ABSS-15	JWSP-XM4ABFS-15	
		20 m	JWSP-XM4ABSS-20	JWSP-XM4ABFS-20	
	Right-angle Plug *3	3 m	JWSP-XM4ABSL-03	JWSP-XM4ABFL-03	
		5 m	JWSP-XM4ABSL-05	JWSP-XM4ABFL-05	
		10 m	JWSP-XM4ABSL-10	JWSP-XM4ABFL-10	
		15 m	JWSP-XM4ABSL-15	JWSP-XM4ABFL-15	
		20 m	JWSP-XM4ABSL-20	JWSP-XM4ABFL-20	

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

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

*3 The lead installation direction is the non-load side. Contact your Yaskawa representative if you require the leads to be installed in another direction.

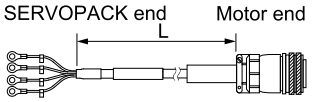
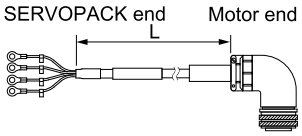
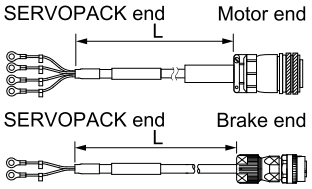
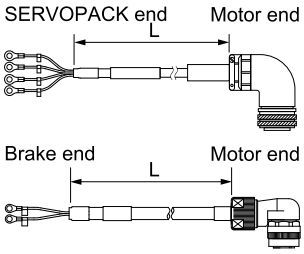
*4 This order number is for a set of two cables (main power supply cable and holding brake cable).
When you purchase them separately, the order numbers for main power supply cables are the same as for a servomotor without a holding brake.
The following order numbers are for a holding brake cable. These standard cables are flexible cables.

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

Note:

If you need a cable with a length of 20 m to 50 m, consider the operating conditions and contact your Yaskawa representative with your preferred length.

(7) SGMXG-55□□A, -75□□A (5.5 kW, 7.5 kW), -55A□B (5.5 kW)

Name	Connector Specifications	Length (L)	Order Number		Appearance
			Standard Cable	Flexible Cable *1 *2	
For servomotors without holding brakes	Straight Plug	3 m	JWSP-XM55NSS-03	JWSP-XM55NFS-03	
		5 m	JWSP-XM55NSS-05	JWSP-XM55NFS-05	
		10 m	JWSP-XM55NSS-10	JWSP-XM55NFS-10	
		15 m	JWSP-XM55NSS-15	JWSP-XM55NFS-15	
		20 m	JWSP-XM55NSS-20	JWSP-XM55NFS-20	
	Right-angle Plug *3	3 m	JWSP-XM55NSL-03	JWSP-XM55NFL-03	
		5 m	JWSP-XM55NSL-05	JWSP-XM55NFL-05	
		10 m	JWSP-XM55NSL-10	JWSP-XM55NFL-10	
		15 m	JWSP-XM55NSL-15	JWSP-XM55NFL-15	
		20 m	JWSP-XM55NSL-20	JWSP-XM55NFL-20	
For servomotors with holding brakes (Set of two cables *4)	Straight Plug	3 m	JWSP-XM55BSS-03	JWSP-XM55BFS-03	
		5 m	JWSP-XM55BSS-05	JWSP-XM55BFS-05	
		10 m	JWSP-XM55BSS-10	JWSP-XM55BFS-10	
		15 m	JWSP-XM55BSS-15	JWSP-XM55BFS-15	
		20 m	JWSP-XM55BSS-20	JWSP-XM55BFS-20	
	Right-angle Plug *3	3 m	JWSP-XM55BSL-03	JWSP-XM55BFL-03	
		5 m	JWSP-XM55BSL-05	JWSP-XM55BFL-05	
		10 m	JWSP-XM55BSL-10	JWSP-XM55BFL-10	
		15 m	JWSP-XM55BSL-15	JWSP-XM55BFL-15	
		20 m	JWSP-XM55BSL-20	JWSP-XM55BFL-20	

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

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

*3 The lead installation direction is the non-load side. Contact your Yaskawa representative if you require the leads to be installed in another direction.

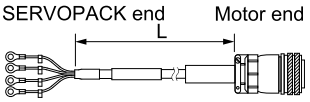
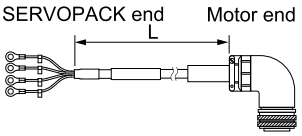
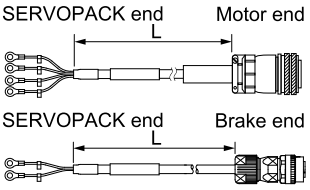
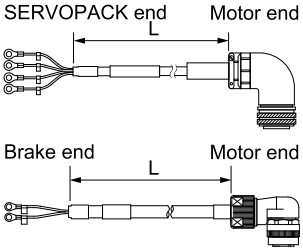
*4 This order number is for a set of two cables (main power supply cable and holding brake cable).
When you purchase them separately, the order numbers for main power supply cables are the same as for a servomotor without a holding brake.
The following order numbers are for a holding brake cable. These standard cables are flexible cables.

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

Note:

If you need a cable with a length of 20 m to 50 m, consider the operating conditions and contact your Yaskawa representative with your preferred length.

(8) SGMXG-1A, -1E (11 kW, 15 kW)

Name	Connector Specifications	Length (L)	Order Number *1	Appearance
For servomotors without holding brakes	Straight Plug	3 m	JWSP-XM1ANFS-03	
		5 m	JWSP-XM1ANFS-05	
		10 m	JWSP-XM1ANFS-10	
		15 m	JWSP-XM1ANFS-15	
		20 m	JWSP-XM1ANFS-20	
	Right-angle Plug *2	3 m	JWSP-XM1ANFL-03	
		5 m	JWSP-XM1ANFL-05	
		10 m	JWSP-XM1ANFL-10	
		15 m	JWSP-XM1ANFL-15	
		20 m	JWSP-XM1ANFL-20	
For servomotors with holding brakes (Set of two cables *3)	Straight Plug	3 m	JWSP-XM1ABFS-03	
		5 m	JWSP-XM1ABFS-05	
		10 m	JWSP-XM1ABFS-10	
		15 m	JWSP-XM1ABFS-15	
		20 m	JWSP-XM1ABFS-20	
	Right-angle Plug *2	3 m	JWSP-XM1ABFL-03	
		5 m	JWSP-XM1ABFL-05	
		10 m	JWSP-XM1ABFL-10	
		15 m	JWSP-XM1ABFL-15	
		20 m	JWSP-XM1ABFL-20	

*1 These standard cables are flexible cables. The recommended bending radius (R) is 90 mm or larger.

*2 The lead installation direction is the non-load side. Contact your Yaskawa representative if you require the leads to be installed in another direction.

*3 This order number is for a set of two cables (main power supply cable and holding brake cable).
When you purchase them separately, the order numbers for main power supply cables are the same as for a servomotor without a holding brake.
The following order numbers are for a holding brake cable. These standard cables are flexible cables.

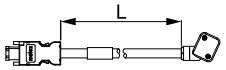
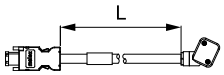
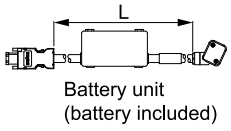
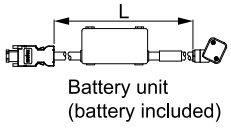
- Straight Plug: JWSP-XB0FS-□□
- Right-angle Plug: JWSP-XB0FL-□□

Note:

If you need a cable with a length of 20 m to 50 m, consider the operating conditions and contact your Yaskawa representative with your preferred length.

8.5.3 Encoder Cables (When Not Relaying the Encoder Cable)

(1) Servomotors with Standard Specifications

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
For batteryless absolute encoder Cable installed toward left side	3 m	JWSP-XP2IS1-03	JWSP-XP2IF1-03	SERVOPACK end Encoder end 
	5 m	JWSP-XP2IS1-05	JWSP-XP2IF1-05	
	10 m	JWSP-XP2IS1-10	JWSP-XP2IF1-10	
	15 m	JWSP-XP2IS1-15	JWSP-XP2IF1-15	
	20 m	JWSP-XP2IS1-20	JWSP-XP2IF1-20	
	30 m	JWSP-XP2IS1-30	JWSP-XP2IF1-30	
	40 m	JWSP-XP2IS1-40	JWSP-XP2IF1-40	
	50 m	JWSP-XP2IS1-50	JWSP-XP2IF1-50	
For batteryless absolute encoder Cable installed toward right side	3 m	JWSP-XP2IS2-03	JWSP-XP2IF2-03	SERVOPACK end Encoder end 
	5 m	JWSP-XP2IS2-05	JWSP-XP2IF2-05	
	10 m	JWSP-XP2IS2-10	JWSP-XP2IF2-10	
	15 m	JWSP-XP2IS2-15	JWSP-XP2IF2-15	
	20 m	JWSP-XP2IS2-20	JWSP-XP2IF2-20	
	30 m	JWSP-XP2IS2-30	JWSP-XP2IF2-30	
	40 m	JWSP-XP2IS2-40	JWSP-XP2IF2-40	
	50 m	JWSP-XP2IS2-50	JWSP-XP2IF2-50	
For absolute encoder: With battery unit *3 Cable installed toward left side	3 m	JWSP-XP2AS1-03	JWSP-XP2AF1-03	SERVOPACK end Encoder end 
	5 m	JWSP-XP2AS1-05	JWSP-XP2AF1-05	
	10 m	JWSP-XP2AS1-10	JWSP-XP2AF1-10	
	15 m	JWSP-XP2AS1-15	JWSP-XP2AF1-15	
	20 m	JWSP-XP2AS1-20	JWSP-XP2AF1-20	
	30 m	JWSP-XP2AS1-30	JWSP-XP2AF1-30	
	40 m	JWSP-XP2AS1-40	JWSP-XP2AF1-40	
	50 m	JWSP-XP2AS1-50	JWSP-XP2AF1-50	
For absolute encoder: With battery unit *3 Cable installed toward right side	3 m	JWSP-XP2AS2-03	JWSP-XP2AF2-03	SERVOPACK end Encoder end 
	5 m	JWSP-XP2AS2-05	JWSP-XP2AF2-05	
	10 m	JWSP-XP2AS2-10	JWSP-XP2AF2-10	
	15 m	JWSP-XP2AS2-15	JWSP-XP2AF2-15	
	20 m	JWSP-XP2AS2-20	JWSP-XP2AF2-20	
	30 m	JWSP-XP2AS2-30	JWSP-XP2AF2-30	
	40 m	JWSP-XP2AS2-40	JWSP-XP2AF2-40	
	50 m	JWSP-XP2AS2-50	JWSP-XP2AF2-50	

*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 46 mm or larger.
*3 If a battery is connected to the host controller, the battery unit is not required.

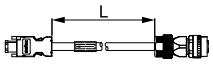
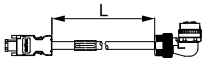
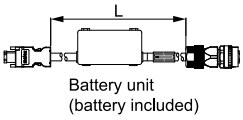
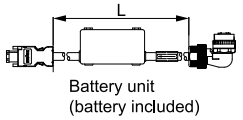
Note:

Do not use these cables as relay cables.

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

Information Σ-V or 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)

Name	Connector Specifications	Length (L)	Order Number		Appearance
			Standard Cable	Flexible Cable *1 *2	
For batteryless absolute encoder	Straight Plug	3 m	JWSP-XPISS-03	JWSP-XPIFS-03	SERVOPACK end Encoder end 
		5 m	JWSP-XPISS-05	JWSP-XPIFS-05	
		10 m	JWSP-XPISS-10	JWSP-XPIFS-10	
		15 m	JWSP-XPISS-15	JWSP-XPIFS-15	
		20 m	JWSP-XPISS-20	JWSP-XPIFS-20	
	Right-angle Plug *4	3 m	JWSP-XPISL-03	JWSP-XPIFL-03	SERVOPACK end Encoder end 
		5 m	JWSP-XPISL-05	JWSP-XPIFL-05	
		10 m	JWSP-XPISL-10	JWSP-XPIFL-10	
		15 m	JWSP-XPISL-15	JWSP-XPIFL-15	
		20 m	JWSP-XPISL-20	JWSP-XPIFL-20	
For absolute encoder: With battery unit *3	Straight Plug	3 m	JWSP-XPASS-03	JWSP-XPAFS-03	SERVOPACK end Encoder end 
		5 m	JWSP-XPASS-05	JWSP-XPAFS-05	
		10 m	JWSP-XPASS-10	JWSP-XPAFS-10	
		15 m	JWSP-XPASS-15	JWSP-XPAFS-15	
		20 m	JWSP-XPASS-20	JWSP-XPAFS-20	
	Right-angle Plug *4	3 m	JWSP-XPASL-03	JWSP-XPAFL-03	SERVOPACK end Encoder end 
		5 m	JWSP-XPASL-05	JWSP-XPAFL-05	
		10 m	JWSP-XPASL-10	JWSP-XPAFL-10	
		15 m	JWSP-XPASL-15	JWSP-XPAFL-15	
		20 m	JWSP-XPASL-20	JWSP-XPAFL-20	

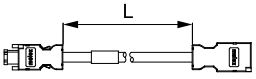
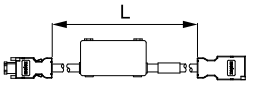
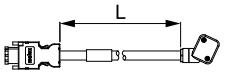
*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 46 mm or larger.
*3 If a battery is connected to the host controller, the battery unit is not required.
*4 The lead installation direction is the non-load side. Contact your Yaskawa representative if you require the leads to be installed in another direction.

8.5.4 Encoder Cables (When Relaying the Encoder Cable)

(1) Servomotors with Standard Specifications

When you will relay the encoder cable, use the following configuration.

Cables: 2 cables, cable relay point: 1 location, combined cable length: 50 m

Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
Encoder cable with connectors on both ends For batteryless absolute encoder *3	0.3 m	JWSP-XP1IS0-00P3	JWSP-XP1IF0-00P3	SERVOPACK end Encoder end 
	3 m	JWSP-XP1IS0-03	JWSP-XP1IF0-03	
	5 m	JWSP-XP1IS0-05	JWSP-XP1IF0-05	
	10 m	JWSP-XP1IS0-10	JWSP-XP1IF0-10	
	15 m	JWSP-XP1IS0-15	JWSP-XP1IF0-15	
	20 m	JWSP-XP1IS0-20	JWSP-XP1IF0-20	
	25 m	JWSP-XP1IS0-25	JWSP-XP1IF0-25	
Encoder cable with connectors on both ends For absolute encoder: With battery unit *3 *4	0.3 m	JWSP-XP1AS0-00P3	JWSP-XP1AF0-00P3	SERVOPACK end Encoder end 
	3 m	JWSP-XP1AS0-03	JWSP-XP1AF0-03	
	5 m	JWSP-XP1AS0-05	JWSP-XP1AF0-05	
	10 m	JWSP-XP1AS0-10	JWSP-XP1AF0-10	
	15 m	JWSP-XP1AS0-15	JWSP-XP1AF0-15	
	20 m	JWSP-XP1AS0-20	JWSP-XP1AF0-20	
	25 m	JWSP-XP1AS0-25	JWSP-XP1AF0-25	
Encoder Cables Cable installed toward left side	0.3 m	JWSP-XP3IS1-00P3	JWSP-XP3IF1-00P3	SERVOPACK end Encoder end 
	1 m	JWSP-XP3IS1-01	JWSP-XP3IF1-01	
	3 m	JWSP-XP3IS1-03	JWSP-XP3IF1-03	
	5 m	JWSP-XP3IS1-05	JWSP-XP3IF1-05	
	10 m	JWSP-XP3IS1-10	JWSP-XP3IF1-10	
	15 m	JWSP-XP3IS1-15	JWSP-XP3IF1-15	
	20 m	JWSP-XP3IS1-20	JWSP-XP3IF1-20	
	25 m	JWSP-XP3IS1-25	JWSP-XP3IF1-25	
	30 m	JWSP-XP3IS1-30	JWSP-XP3IF1-30	
	40 m	JWSP-XP3IS1-40	JWSP-XP3IF1-40	
	50 m	JWSP-XP3IS1-50	JWSP-XP3IF1-50	

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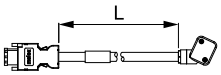
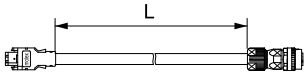
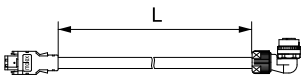
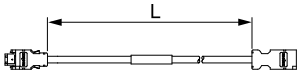
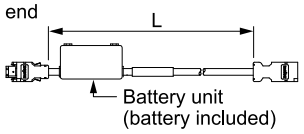
Name	Length (L)	Order Number		Appearance
		Standard Cable	Flexible Cable *1 *2	
Encoder Cables Cable installed toward right side	0.3 m	JWSP-XP3IS2-00P3	JWSP-XP3IF2-00P3	SERVOPACK end Encoder end 
	1 m	JWSP-XP3IS2-01	JWSP-XP3IF2-01	
	3 m	JWSP-XP3IS2-03	JWSP-XP3IF2-03	
	5 m	JWSP-XP3IS2-05	JWSP-XP3IF2-05	
	10 m	JWSP-XP3IS2-10	JWSP-XP3IF2-10	
	15 m	JWSP-XP3IS2-15	JWSP-XP3IF2-15	
	20 m	JWSP-XP3IS2-20	JWSP-XP3IF2-20	
	25 m	JWSP-XP3IS2-25	JWSP-XP3IF2-25	
	30 m	JWSP-XP3IS2-30	JWSP-XP3IF2-30	
	40 m	JWSP-XP3IS2-40	JWSP-XP3IF2-40	
	50 m	JWSP-XP3IS2-50	JWSP-XP3IF2-50	

*1 Use flexible cables for moving parts of machines, such as robots.
*2 The recommended bending radius (R) is 46 mm or larger.
*3 The JZSP-UCMP00-□□-E and JZSP-CSP12-E cannot be connected at the same time.
*4 If a battery is connected to the host controller, the battery unit is not required.

(2) Servomotors with Σ-V or Σ-7 Compatible Specifications (When Exceeding 20 m)

Name	Length (L)	Order Number	Appearance
Relay encoder cable (for all types of encoders) *1	0.3 m	JZSP-CVP01-E	SERVOPACK end Encoder end 
		JZSP-CVP02-E	SERVOPACK end Encoder end 
Relay encoder cable with connectors on both ends (for all types of encoders)	30 m	JZSP-UCMP00-30-E	SERVOPACK end Encoder end 
	40 m	JZSP-UCMP00-40-E	
	50 m	JZSP-UCMP00-50-E	
Relay encoder cable with connectors on both ends and battery unit (Required only when an absolute encoder is used. *2)	0.3 m	JZSP-CSP12-E	SERVOPACK end Encoder end 

*1 The lead installation direction of the right-angle plug connector is the non-load side. Contact your Yaskawa representative if you require the leads to be installed in another direction.
*2 This cable is not required if you use a servomotor with a batteryless absolute encoder, and you connect a battery to the host controller.

8.6 Wiring Servomotors and SERVOPACKs

8.6.1 Wiring Precautions

⚠ CAUTION

Do not connect the servomotor directly to an industrial power supply. Doing so will destroy the servomotor. You cannot operate a servomotor without a SERVOPACK that is designed for it.

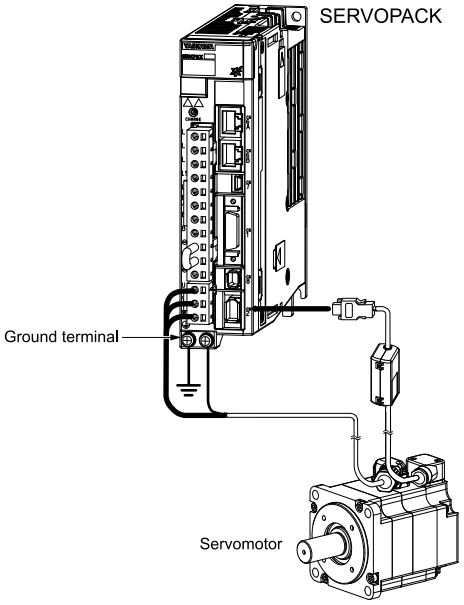
(1) General Precautions

Refer to the following section for the wiring precautions.

☞ *i.5 Safety Precautions on page 18*

(2) Grounding Precautions

The ground terminal on the SERVOPACK is used to ground the servomotor.



(3) 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.

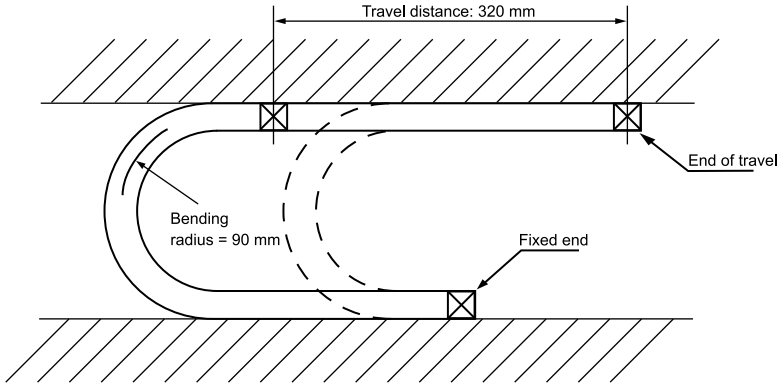
(4) Precautions for Flexible Cables

- The flexible cables have a service life of 10,000,000 operations minimum when used at the recommended bending radius of 90 mm or larger under the following test conditions. The service life of a flexible cable is

reference data under special test conditions. The service life of a flexible cable greatly depends on the amount of mechanical shock, how the cable is attached, and how the cable is secured.
Test Conditions

– One end of the cable is repeatedly moved forward and backward for 320 mm using the test equipment shown in the following figure.

– The cores are connected in series, and the number of cable bends until a core breaks is counted. One round trip is counted as one bend.



Note:

The service life of a flexible cable indicates the number of bends while the cores are electrically charged for which no cracks or damage that affects the performance of the cable sheathing occurs. This does not take into account breaking of the shield wire.

- 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. It 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.

8.6.2 Wiring Procedure

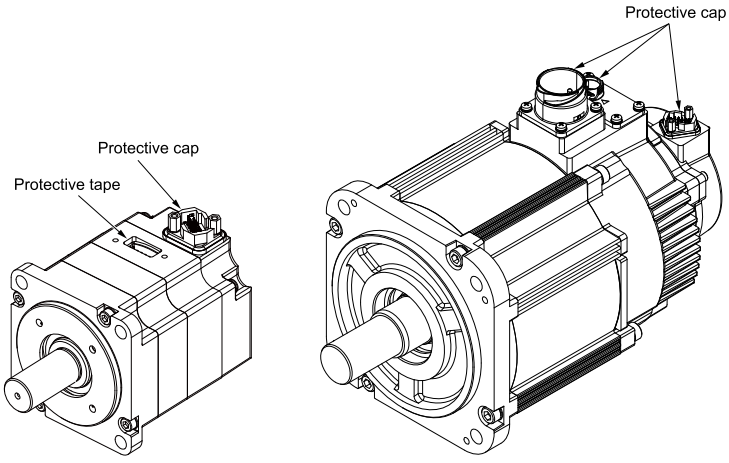
This manual provides the wiring procedure only for the servomotors.

Refer to the SERVOPACK manual for information on wiring the SERVOPACKs.

(1) Wiring the Servomotor Main Circuit Cables

1. **Remove the protective cap and protective tape from the servomotor connectors.**

Information
- Some models of servomotors do not have protective tape.
- The number of connectors depends on the model of the servomotor.



2. **Attach the servomotor main circuit cable and tighten the screws.**

   Pay attention to the orientation of the cable (i.e., load or non-load side) when you attach it.

   Information There are two servomotor main circuit cables for the SGMXG-09A□A to -1EA□A and -06A□B to -55A□B servomotors with holding brakes (the main power supply cable and the holding brake cable). Attach both of them.

   Refer to the following table for the tightening torque.

Servomotor Model	Tightening Torque
SGMXJ-A5 to -06	0.15 N·m
SGMXJ-08	0.33 N·m
SGMXA-A5 to -06	0.15 N·m
SGMXA-08 to -10	0.33 N·m
SGMXP-01 to -04	0.15 N·m
SGMXG-03A□A, -05A□A, -03A□B	0.44 N·m

This concludes the procedure.

(2) When Not Relaying the Encoder Cable

Attach the encoder cable and tighten the screws. Pay attention to the orientation of the cable (i.e., load or non-load side) when you attach it.

The tightening torque for SGMXJ servomotors, SGMXA servomotors (up to 1.0 kW), SGMXP servomotors (up to 400 W) is 0.15 N·m.

(3) When Relaying the Encoder Cable

(a) Servomotors with Standard Specifications

1. **Attach the encoder cable and tighten the screws. Pay attention to the orientation of the cable (SGMXJ servomotors, SGMXA-A5 to 10 servomotors, and SGMXP servomotors: load or non-load side; SGMXA-15 to -70 servomotors and SGMXG servomotors: right or left side) when you attach it.**

   The tightening torque for SGMXJ servomotors, SGMXA servomotors (up to 1.0 kW), SGMXP servomotors (up to 400 W) is 0.15 N·m.

2. **Connect the encoder cable with connectors on both ends to the encoder cable.**

This concludes the procedure.

(b) Servomotors with Σ-7 Compatible Specifications

1. **Attach the relay encoder cable and tighten the screws. Pay attention to the orientation of the cable (SGMXJ servomotors, SGMXA-A5 to -10 servomotors, and SGMXP servomotors: load or non-load side) when you attach it.**

   The tightening torque for SGMXJ servomotors, SGMXA servomotors (up to 1.0 kW), SGMXP servomotors (up to 400 W) is 0.15 N·m.

2. **Connect the relay encoder cable with connectors on both ends to the relay encoder cable.**

3. **As necessary, connect the relay encoder cable with connectors on both ends and a battery unit to the relay encoder cable with connectors on both ends.**

This concludes the procedure.

9

Maintenance and Inspection

This chapter describes the maintenance, inspection, and disposal of a servomotor.

9.1 Periodic Inspections

⚠ WARNING

Wiring and inspections must be performed only by qualified engineers.

There is a risk of electric shock or product failure.

⚠ CAUTION

Wait for at least 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.

Contact your Yaskawa representative for help with failures, repairs, or part replacement.

The following table gives the periodic inspection items for a servomotor. The inspection periods given in the table are guidelines. Determine the optimum inspection periods based on the application conditions and environment.

Item	Inspection Period	Basic Inspection and Maintenance Procedure	Remarks
Check the coupling between the servomotor and the machine.	Before starting operation	• Make sure that there are no loose mounting screws between the servomotor and machine. • Make sure that there is no looseness in the coupling between the servomotor and machine. • Make sure that there is no misalignment.	–
Check for vibration and noise.	Daily	Inspect by touching and by listening.	There should be no more vibration or noise than normal.
Exterior	Check for dirt and grime.	Clean off the dirt and grime with a cloth or pressurized air.	–
Measure the insulation resistance.	At least once a year	Disconnect the servomotor from the SERVOPACK and measure the insulation resistance at 500 V with an insulation resistance meter. (Measurement method: Measure the resistance between phase U, V, or W on the servomotor's power line and FG.) The insulation is normal if the resistance is 10 MΩ or higher.	If the resistance is less than 10 MΩ, contact your Yaskawa representative.
Replace the oil seal.	At least once every 5,000 hours	Contact your Yaskawa representative.	This inspection applies only to servomotors with oil seals.
Overhaul	At least once every 5 years or every 20,000 hours	Contact your Yaskawa representative.	–

9.2 Service Lives of Parts

The following table gives the standard service lives of the parts of the servomotor. Contact your Yaskawa representative using the following table as a guide. After an examination of the part in question, we will determine whether the part should be replaced. Even if the service life of a part has not expired, replacement may be required if abnormalities occur. The standard service lives in the table are only for reference. The actual service lives will depend on the application conditions and environment.

Part	Standard Service Life	Remarks
Bearing	20,000 hours	The service life is affected by operating conditions. Check for abnormal sounds and vibration during inspections.
Oil Seal	5,000 hours	The service life is affected by operating conditions. Check for oil leaks during inspections.
Brake	20,000 hours	The service life is affected by operating conditions. Check for abnormal sounds and vibration during inspections. Confirm that the brake is released when power is supplied and check for any changes in the operating time of the brake.

9.3 Disposing of Servomotors

When disposing of a servomotor, treat it as ordinary industrial waste.

However, local ordinances and national laws must be observed. Implement all labeling and warnings as a final product as required.

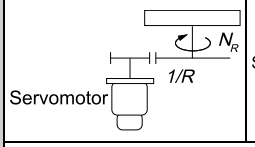
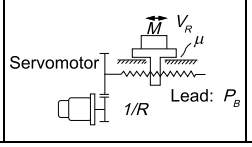
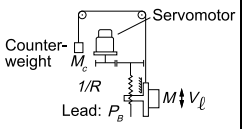
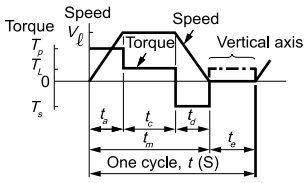
10

Appendices

The appendices provide reference information on selecting servomotor capacity.

10.1 Reference Information for Servomotor Capacity Selection

10.1.1 Formulas Required to Select the Servomotor Capacity

<table>
<tr><th colspan="2" rowspan="2">Type of Motion</th><th rowspan="2">Rotary Motion</th><th colspan="2">Linear Motion</th></tr>
<tr><th>Horizontal Axis</th><th>Vertical Axis</th></tr>
<tr><td colspan="2">Machine Configuration</td><td> 
</td><td> 
</td><td> 
</td></tr>
<tr><td colspan="5">$N\ell$: Load shaft speed (min^{-1})
$V\ell$: Load speed (m/min)
$T\ell$: Load torque calculated at load shaft (N·m)
μ: Friction coefficient
P_B: Ball screw lead (m)
M: Linear motion section mass (kg)
M_C: Counterweight mass (kg)
$1/R$: Gear ratio
η: Mechanical efficiency
T_{pM}: Servomotor instantaneous maximum torque (N·m)</td></tr>
<tr><td colspan="2">Speed Diagram</td><td colspan="3"> 
</td></tr>
<tr><td colspan="2">Travel Amount (m)</td><td colspan="3">$R = \frac{V_\ell}{60} \cdot \frac{t_a + 2t_c + t_d}{2}$ $\left(\text{If } t_a = t_d,\ R = \frac{V_\ell}{60}(t_m - t_a) \right)$</td></tr>
<tr><td colspan="2">Load Shaft Speed (min^{-1})</td><td>$N\ell$</td><td colspan="2">$N_\ell = \frac{V_\ell}{P_B}$</td></tr>
<tr><td colspan="2">Motor Shaft Speed (min^{-1})</td><td colspan="3">$N_M = N\ell \cdot R$</td></tr>
<tr><td colspan="2">Load Torque (N·m)
(Calculated at Motor Shaft)</td><td>$T_L = \frac{T_\ell}{R \cdot \eta}$</td><td>$T_L = \frac{9.8 \times \mu \cdot M \cdot P_B}{2\pi \cdot R \cdot \eta}$</td><td>$T_L = \frac{9.8 \times (M - M_c)\ P_B}{2\pi \cdot R \cdot \eta}$</td></tr>
<tr><td rowspan="3">Load Moment of Inertia (kg·m^2)
(Calculated at Motor Shaft)</td><td colspan="4">$J_L = J_{L1} + J_{L2} + J_{L3}$</td></tr>
<tr><td>Linear Motion Section</td><td>–</td><td>$J_{L1} = M \cdot \left(\frac{P_B}{2\pi R}\right)^2$</td><td>$J_{L1} = (M + M_c) \cdot \left(\frac{P_B}{2\pi R}\right)^2$</td></tr>
<tr><td>Rotary Motion Section</td><td colspan="3">•Solid Cylinder
L (m), D (m)
$J_K = \frac{1}{8} M_K \cdot D^2$ OR $J_K = \frac{\pi}{32} \rho \cdot L \cdot D^4$
M_K: Solid cylinder mass (kg)
ρ: Density (kg/m^3)...Iron $\rho = 7.87 \times 10^3$(kg/m^3)
...Aluminum $\rho = 2.70 \times 10^3$(kg/m^3)
•Hollow Cylinder
L (m), D_o (m), D_i (m)
$J_K = \frac{1}{8} M_K (D_o^2 + D_i^2)$ OR $J_K = \frac{\pi}{32} \rho \cdot L (D_o^4 - D_i^4)$
Moment of Inertia of Rotary Motion Section Calculated at Motor Shaft
Rotary motion section at gear input shaft $J_{L2} = J_K$ Rotary motion section at gear output shaft $J_{L3} = \frac{J_K}{R^2}$</td></tr>
<tr><td colspan="2">Minimum Starting Time (s)</td><td colspan="3">$t_{am} = \frac{2\pi \cdot N_M (J_M + J_L)}{60 (T_{PM} - T_L)}$</td></tr>
</table>

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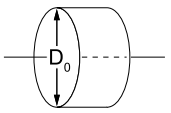
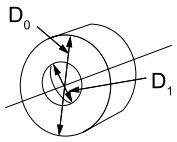
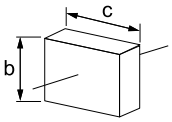
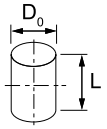
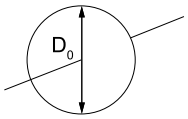
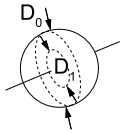
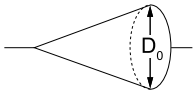
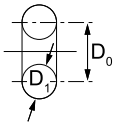
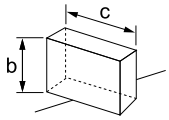
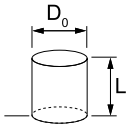
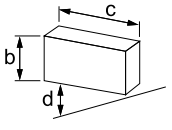
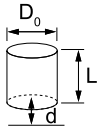
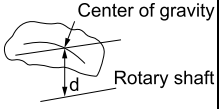
Type of Motion	Rotary Motion	Linear Motion	
		Horizontal Axis	Vertical Axis
Minimum Braking Time (s)	$t_{dm} = \frac{2\pi \cdot N_M \ (J_M + J_L)}{60 \ (\ T_{PM} + \ T_L \ )}$		
Load Moving Power (W)	$P_0 = \frac{2\pi \cdot N_M \cdot T_L}{60}$		
Load Acceleration Power (W)	$P_a = \left(\frac{2\pi}{60} \cdot N_M\right)^2 \frac{J_L}{t_a}$ $(t_a \geq t_{am})$		
Required Starting Torque (N·m)	$T_P = \frac{2\pi \cdot N_M \ (J_M + J_L)}{60 \times t_a} + T_L$ $(t_a \geq t_{am})$		
Required Braking Torque (N·m)	$T_S = \frac{2\pi \cdot N_M \ (J_M + J_L)}{60 \times t_d} - T_L$ $(t_d \geq t_{dm})$		
Effective Torque Value (N·m)	$T_{rms} = \sqrt{\frac{T_P^{\ 2} \cdot t_a + T_L^{\ 2} \cdot t_c + T_S^{\ 2} \cdot t_d}{t}}$		$T_{rms} = \sqrt{\frac{T_P^{\ 2} \cdot t_a + T_L^{\ 2} (t_c + t_e) + T_S^{\ 2} \cdot t_d}{t}}$

10.1.2 GD² for Simple Diagrams

When Rotary Shaft Is Aligned with Center Line of Cylinder	Solid cylinder $(D^2 = D_0^{\ 2}/2)$  OR $GD^2 = 125\pi\rho LD^4$ ρ: Density (g/cm^3)...Copper: 7.866 L: Length (m) D: Diameter (m)	Hollow cylinder $D^2 = (D_0^{\ 2} + D_1^{\ 2})/2$  OR $GD^2 = 125\pi\rho L \ (D_0^{\ 4} + D_1^{\ 4})$ ρ: Density (g/cm^3) L: Length (m) D_0 , D_1 : Diameter (m)
When Rotary Shaft Runs Through Gravitational Center	Rectangular solid $D^2 = (b^2 + c^2)/3$ 	Cylindrical body $D^2 = L^2/3 + D_0^{\ 2}/4$ 
	Sphere $D^2 = \frac{2}{5} D_0^{\ 2}$ 	Hollow sphere $D^2 = \frac{2}{5} \cdot \frac{D_0^{\ 5} - D_1^{\ 3}}{D_0^{\ 3} - D_1^{\ 3}}$ 
	Cone $D^2 = \frac{3}{10} D_0^{\ 2}$ 	Wheel $D^2 = D_0^{\ 2} + \frac{3}{4} D_1^{\ 2}$ 
When Rotary Shaft Is on One End	Rectangular solid $D^2 = (4\,b^2 + C^2)/3$ 	Cylindrical body $D^2 = \frac{4}{3} L^2 + \frac{D_0^{\ 2}}{4}$ 
When Rotary Shaft Is Outside Rotating Body	Rectangular solid $D^2 = \frac{4\,b^2 + C^2}{3} + 4(bd + d^2)$ 	Cylindrical body $D^2 = \frac{4}{3} L^2 + \frac{D_0^{\ 2}}{4} + 4(dL + d^2)$ 
General Formula When Rotary Shaft Is outside Rotating Body	General formula for diameter of rotation when rotary shaft is outside rotating body $D_2^{\ 2} = D_1^{\ 2} + 4\,d^2$ D_1: Diameter of rotation when shaft that is parallel to rotary shaft and runs through center of gravity virtually operates as a rotary shaft 	

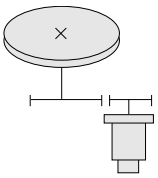
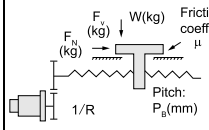
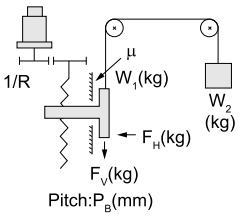
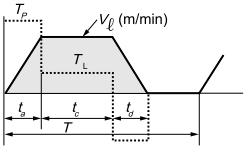
Information GD² = (Weight) × (Diameter of rotation)²

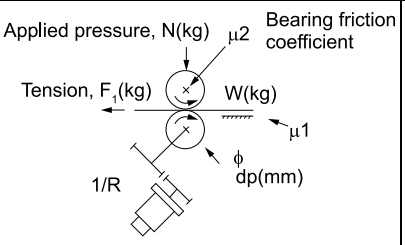
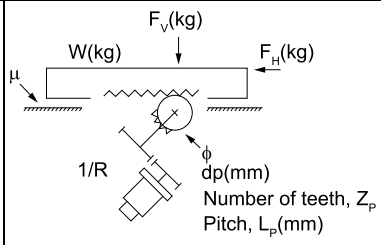
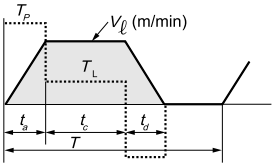
10.1.3 Conversions between Engineering Units and SI Units

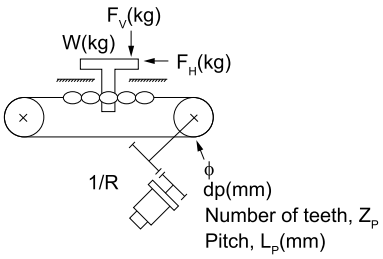
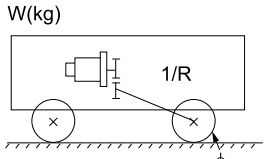
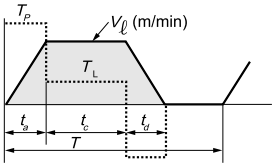
The following table provides the conversion rates between engineering units and SI units for typical physical quantities required for capacity selection.

Quantity	Engineering Unit	SI Unit	Conversion Factor
Force or load	kgf	N	1 kgf = 9.80665 N
Weight	kgf	–	The numerical values are the same for mass in the traditional unit and the SI unit. (The mass SI unit *W*kgf is used for objects in the *W*kg traditional unit.)
Mass	kgf·s^2/m	kg	
Torque	kgf·m	N·m	1 kgf·m = 9.80665 N·m
Inertia (moment of inertia)	gf·cm·s^2	kg·m^2	1 gf·cm·s^2 = 0.980665 × 10^{-4}kg·m^2
GD^2	kgf·m^2	kg·m^2	Relationship between GD^2 (kgf·m^2) and moment of inertia J (kg·m^2) $J = \frac{GD^2}{4}$

10.1.4 Application Examples by Type of Application

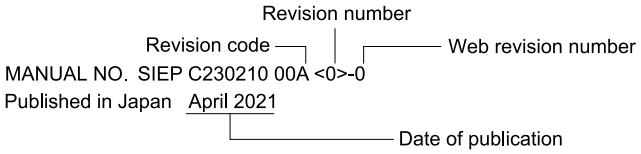
Type		Rotating Body	Horizontal Rotary Ball Screw	Vertical Ball Screw
Machine Configuration				
Load Rotation Speed $N\ell$ (min^{-1})		$N\ell$	Load speed (m/min) $\frac{1000 \times V_\ell}{P_B}$	Load speed (m/min) $\frac{1000 \times V_\ell}{P_B}$
Speed Calculated at Motor Shaft N_M (min^{-1})		$R \times N\ell$	$R \times N\ell$	$R \times N\ell$
Linear Motion GD^2 (kg·m^2)	GD$^2\ell$ Calculated at Load Shaft	–	$W \cdot \left(\frac{P_B}{1000\pi}\right)^2$	$W \cdot \left(\frac{P_B}{1000\pi}\right)^2$ 〔However, $W=W_1+W_2$〕
	GD^2_L Calculated at Motor Shaft	$GD^2_L \times \left(\frac{1}{R}\right)^2$	$GD^2_L \times \left(\frac{1}{R}\right)^2$ 〔OR $W \cdot \left(\frac{V_\ell}{\pi \cdot N_M}\right)^2$〕	$GD^2_L \times \left(\frac{1}{R}\right)^2$ 〔OR $W \cdot \left(\frac{V_\ell}{\pi \cdot N_M}\right)^2$ However, $W=W_1+W_2$〕
Load Torque (kg·m)	$T\ell$ Calculated at Load Shaft	$T\ell$	$\{\mu \cdot (W+F_V)+F_H\} \cdot \frac{P_B}{2000\pi}$	$\{\mu \cdot F_H + W_1 - W_2 + F_V\} \cdot \frac{P_B}{2000\pi}$
	T_L Calculated at Motor Shaft	$T_\ell \times \frac{1}{R} \times \frac{1}{\eta}$ ← Mechanical efficiency	$T_\ell \times \frac{1}{R} \times \frac{1}{\eta}$ ← Mechanical efficiency 〔OR $\frac{\{\mu \cdot (W+F_V)+F_H\} \cdot V_\ell}{2\pi \cdot N_M \cdot \eta}$〕	$T_\ell \times \frac{1}{R} \times \frac{1}{\eta}$ ← Mechanical efficiency 〔OR $\frac{\{\mu F_H + W_1 - W_2 + F_V\} \cdot V_\ell}{2\pi \cdot N_M \cdot \eta}$〕
Load Moving Power P_O (kW)		$\frac{T_\ell \cdot N_\ell}{973 \times \eta}$	$\frac{\{\mu \cdot (W+F_V)+F_H\} \cdot V_\ell}{6120 \times \eta}$	$\frac{\{\mu F_H + W_1 - W_2 + F_V\} \cdot V_\ell}{6120 \times \eta}$
Load Acceleration Power		$\frac{GD^2_\ell \cdot N_\ell{}^2}{365 \times 10^3 \times t_a}$ ← Acceleration time (s)	$\frac{GD^2_\ell \cdot N_\ell{}^2}{365 \times 10^3 \times t_a}$ ← Acceleration time (s)	$\frac{GD^2_\ell \cdot N_\ell{}^2}{365 \times 10^3 \times t_a}$ ← Acceleration time (s)
Starting Torque T_P (kg·m) Deceleration Torque T_S (kg·m) Effective Torque Value Trms (kg·m)			$T_P = \frac{(GD^2_M + GD^2_L) \cdot N_M}{375 \cdot t_a} + T_L$ $T_S = \frac{(GD^2_M + GD^2_L) \cdot N_M}{375 \cdot t_d} - T_L$ $T_{rms} = \sqrt{\frac{T_P{}^2 \cdot t_a + T_L{}^2 \cdot t_c + T_S{}^2 \cdot t_d}{T}}$ 〔When a load torque is applied while stopped for a vertical ball screw: $T_{rms} = \sqrt{\frac{T_P{}^2 \cdot t_a + T_L{}^2 \cdot (T - t_a - t_d) + T_S{}^2 \cdot t_d}{T}}$〕	
System Remarks		–	• The gear backlash is a problem. • Suitable for applications for which increasing system speed is not required. • A large torque can be generated by a small motor.	• Falling when $W_1 \neq W_2$ • Brake timing

Type		Roll Feeder	Rack and Pinion
Machine Configuration			
Load Rotation Speed $N\ell$ (min^{-1})		$\frac{1000 \times V_\ell}{P_B}$ ← Load speed (m/min) 〔However, $P_B = \pi \cdot d_P$〕	$\frac{1000 \times V_\ell}{P_B}$ ← Load speed (m/min) 〔However, $P_B = \pi \cdot d_P$ OR $P_B = Z_P \cdot L_P$〕
Speed Calculated at Motor Shaft N_M (min^{-1})		$R \times N\ell$	$R \times N\ell$
Linear Motion GD^2 (kg·m^2)	GD$^2\ell$ Calculated at Load Shaft	$W \cdot \left(\frac{d_P}{1000}\right)^2$	$W \cdot \left(\frac{d_P}{1000}\right)^2$
	GD^2_L Calculated at Motor Shaft	$GD^2_L \times \left(\frac{1}{R}\right)^2$ 〔OR $W \cdot \left(\frac{V_\ell}{\pi \cdot N_M}\right)^2$〕	$GD^2_L \times \left(\frac{1}{R}\right)^2$ 〔OR $W \cdot \left(\frac{V_\ell}{\pi \cdot N_M}\right)^2$〕
Load Torque (kg·m)	$T\ell$ Calculated at Load Shaft	$(F_1 + \mu_1 W + \mu_2 N) \cdot \frac{d_P}{2000}$	$\{\mu \cdot (W + F_V) + F_H\} \cdot \frac{d_P}{2000}$
	T_L Calculated at Motor Shaft	$T_\ell \times \frac{1}{R} \times \frac{1}{\eta}$ ← Mechanical efficiency 〔OR $\frac{(F_1 + \mu_1 W + \mu_2 N) \cdot V_\ell}{2\pi \cdot N_M \cdot \eta}$〕	$T_\ell \times \frac{1}{R} \times \frac{1}{\eta}$ ← Mechanical efficiency 〔OR $\frac{\{\mu \cdot (W + F_V) + F_H\} \cdot V_\ell}{2\pi \cdot N_M \cdot \eta}$〕
Load Moving Power P_O (kW)		$\frac{(F_1 + \mu_1 W + \mu_2 N) \cdot V_\ell}{6120 \times \eta}$	$\frac{\{\mu \cdot (W + F_V) + F_H\} \cdot V_\ell}{6120 \times \eta}$
Load Acceleration Power		$\frac{GD^2_\ell \cdot N_\ell{}^2}{365 \times 10^3 \times t_a}$ ← Acceleration time (s)	$\frac{GD^2_\ell \cdot N_\ell{}^2}{365 \times 10^3 \times t_a}$ ← Acceleration time (s)
Starting Torque T_P (kg·m) Deceleration Torque T_S (kg·m) Effective Torque Value Trms (kg·m)		 $T_P = \frac{(GD^2_M + GD^2_L) \cdot N_M}{375 \cdot t_a} + T_L$ $T_S = \frac{(GD^2_M + GD^2_L) \cdot N_M}{375 \cdot t_d} - T_L$ $T_{rms} = \sqrt{\frac{T_P{}^2 \cdot t_a + T_L{}^2 \cdot t_c + T_S{}^2 \cdot t_d}{T}}$ 〔When a load torque is applied while stopped for a vertical ball screw: $T_{rms} = \sqrt{\frac{T_P{}^2 \cdot t_a + T_L{}^2 \cdot (T - t_a - t_d) + T_S{}^2 \cdot t_d}{T}}$〕	
System Remarks		• Feeding of coiled and sheet materials • Roller slipping affects accuracy. • A measuring roller pulse generator may also be installed separately.	• Can be used for positioning with long travel distances. • A separate pulse generator is often installed.

Type		Chains and Timing Belts	Dollies
Machine Configuration			
Load Rotation Speed $N\ell$ (min^{-1})		Load speed (m/min) $\frac{1000 \times V_\ell}{P_B}$ 〔However, $P_B = \pi \cdot d_P$ OR $P_B = Z_P \cdot L_P$〕	Load speed (m/min) $\frac{1000 \times V_\ell}{P_B}$ 〔However, $P_B = \pi \cdot d_P$〕
Speed Calculated at Motor Shaft N_M (min^{-1})		$R \times N\ell$	$R \times N\ell$
Linear Motion GD^2 (kg·m^2)	GD$^2\ell$ Calculated at Load Shaft	$W \cdot \left(\frac{d_P}{1000}\right)^2$	$W \cdot \left(\frac{d_P}{1000}\right)^2$
	GD^2_L Calculated at Motor Shaft	$GD^2_L \times \left(\frac{1}{R}\right)^2$ 〔OR $W \cdot \left(\frac{V_\ell}{\pi \cdot N_M}\right)^2$〕	$GD^2_L \times \left(\frac{1}{R}\right)^2$ 〔OR $W \cdot \left(\frac{V_\ell}{\pi \cdot N_M}\right)^2$〕
Load Torque (kg·m)	$T\ell$ Calculated at Load Shaft	$\{\mu \cdot (W + F_V) + F_H\} \cdot \frac{d_P}{2000}$	$C \cdot W \frac{d_P}{2 \times 10^6}$
	T_L Calculated at Motor Shaft	$T_\ell \times \frac{1}{R} \times \frac{1}{\eta}$ ← Mechanical efficiency 〔OR $\frac{\{\mu \cdot (W + F_V) + F_H\} \cdot V_\ell}{2\pi \cdot N_M \cdot \eta}$〕	$T_\ell \times \frac{1}{R} \times \frac{1}{\eta}$ ← Mechanical efficiency 〔OR $\frac{C \cdot W \cdot V_\ell}{2 \times 10^3 \times \pi \times N_M \cdot \eta}$〕
Load Moving Power P_O (kW)		$\frac{\{\mu \cdot (W + F_V) + F_H\} \cdot V_\ell}{6120 \times \eta}$	$\frac{C \cdot W \cdot V_\ell}{6120 \times 10^3 \times \eta}$
Load Acceleration Power		$\frac{GD^2_\ell \cdot N_\ell{}^2}{365 \times 10^3 \times t_a}$ ← Acceleration time (s)	$\frac{GD^2_\ell \cdot N_\ell{}^2}{365 \times 10^3 \times t_a}$ ← Acceleration time (s)
Starting Torque T_P (kg·m) Deceleration Torque T_S (kg·m) Effective Torque Value Trms (kg·m)		 $T_P = \frac{(GD^2_M + GD^2_L) \cdot N_M}{375 \cdot t_a} + T_L$ $T_S = \frac{(GD^2_M + GD^2_L) \cdot N_M}{375 \cdot t_d} - T_L$ $T_{rms} = \sqrt{\frac{T_P{}^2 \cdot t_a + T_L{}^2 \cdot t_c + T_S{}^2 \cdot t_d}{T}}$ 〔When a load torque is applied while stopped for a vertical ball screw: $T_{rms} = \sqrt{\frac{T_P{}^2 \cdot t_a + T_L{}^2 \cdot (T - t_a - t_d) + T_S{}^2 \cdot t_d}{T}}$〕	
System Remarks		• Positioning of conveyors • Chain looseness, movement, and pitch error are problems (not suitable for frequent use). • Radial load for overtightened belt chains	• Dolly slipping

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
March 2025	G	6	0	All chapters	Addition: 400 V specification (SGMXA-15 to -50, SGMXP-02 to -15, SGMXG-05 to -1E)
				Back cover	Revision: Address
September 2023	F	5	0	1.4, Chapter 6, 8.4	Addition: Information on 1000 min^{-1} for the SGMXG
				3.2.1, 4.2.1, 5.2.1, 8.5.2	Partly revised.
				4.3.5, 4.3.6, 6.4.3	Revision: Connector dimensions
May 2023	E	4	0	All chapters	Revision: Dimensional drawings in shaft end specifications
				1.1.5	Partly revised.
				1.4	Addition: Information on SGDXT
				7.1.5, 7.2.1	Addition: Information on servomotor installation
March 2023	D	3	3	4.3.5 (2) (a), 4.3.6 (1) (2)	Partly revised.
January 2023			2	5.2.2, 5.2.3, 5.3.1 (1), 5.3.3	Partly revised.
October 2022			1	All chapters	Addition: Information on SGDXT
				4.2.2 (1)	Partly revised.
April 2022			0	All chapters	Addition: SGMXA-15 to 70, SGMXP, SGMXG-03, -05, -1A, and -1E
September 2021	C	2	0	7.3.2 (3)	Revision: Title
				7.3.2 (4)	Addition: Information on SGMXG-30
July 2021	B	1	0	All chapters	• Addition: Information on SGMXG-30, -44, -55, and -75 • Addition: Information on SGDXS-330, -470, and -550 • Partly revised.
April 2021	A	0	0	–	First edition

Σ-X-Series AC Servo Drive

Rotary Servomotor

Product Manual

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