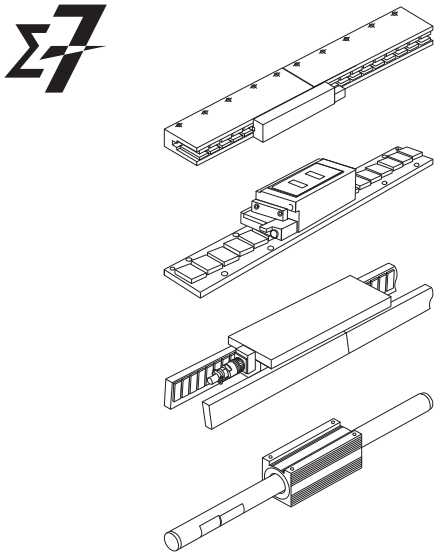
YASKAWA

Σ-7-Series AC Servo Drive

Linear Servomotor

Product Manual

Model: SGLG/SGLF/SGLT/SGLC



MANUAL NO. SIEP S800001 37A

About this Manual

This manual provides information required to select, install, connect, and maintain Linear Servomotors for Σ-7-Series AC Servo Drives.

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

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

Outline of Manual

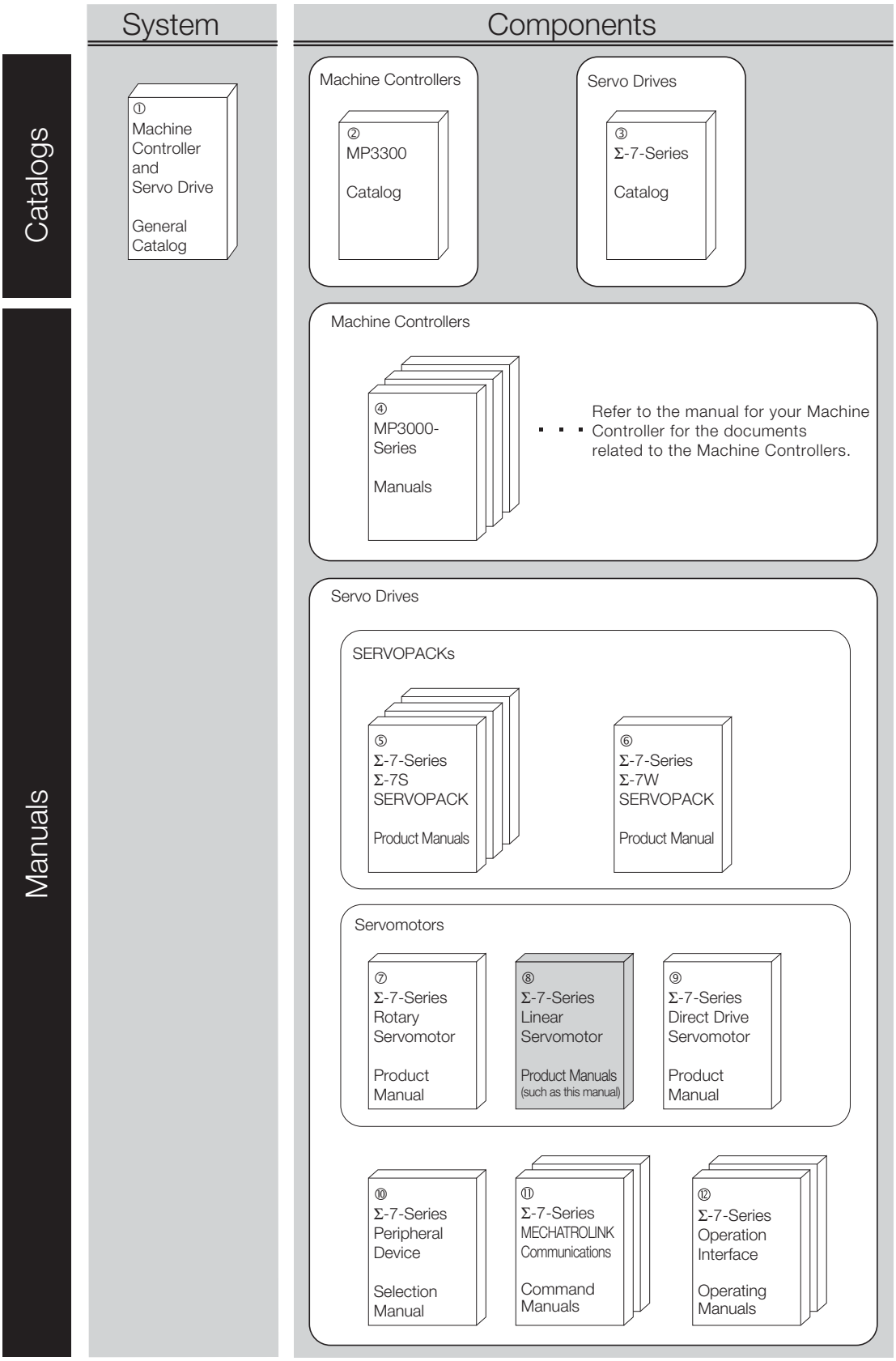
The contents of the chapters of this manual are described in the following table.

Refer to these chapters as required.

Chapter	Chapter Title	Contents
1	Basic Information on Servomotors	Provides basic information on Linear 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 SGLG Servomotors	Describes how to interpret the model numbers of SGLG Servomotors and gives their specifications, ratings, and external dimensions.
4	Specifications, Ratings, and External Dimensions of SGLF Servomotors	Describes how to interpret the model numbers of SGLF Servomotors and gives their specifications, ratings, and external dimensions.
5	Specifications, Ratings, and External Dimensions of SGLT Servomotors	Describes how to interpret the model numbers of SGLT Servomotors and gives their specifications, ratings, and external dimensions.
6	Specifications, Ratings, and External Dimensions of SGLC Servomotors	Describes how to interpret the model numbers of SGLC Servomotors and gives their specifications, ratings, and external dimensions.
7	Equipment Design Precautions	Provides precautions for equipment design.
8	Servomotor Installation	Describes the installation conditions, procedures, and precautions for Servomotors.
9	Connecting Linear Encoders	Describes the conditions and procedures for mounting linear encoders.
10	Connections between Servomotors and SERVOPACKs	Describes the cables that are used to connect the Servomotors and SERVOPACKs. It also provides information on peripheral devices and provides related precautions.
11	Maintenance and Inspection	Describes the maintenance, inspection, and disposal of a Servomotor.

Related Documents

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



Classification	Document Name	Document No.	Description
① Machine Controller and Servo Drive General Catalog	Machine Controller and Servo Drive Solutions Catalog	KAEP S800001 22	Provides detailed information required to select MP3000-Series Machine Controllers and Σ-7-Series AC Servo Drives.
② MP3300 Catalog	Machine Controller MP3300	KAEP C880725 03	Provides detailed information on MP3300 Machine Controllers, including features and specifications.
③ Σ-7-Series Catalog	AC Servo Drives Σ-7 Series	KAEP S800001 23	Provides detailed information on Σ-7-Series AC Servo Drives, including features and specifications.
④ MP3000-Series Manuals	Machine Controller MP3000 Series MP3300 Product Manual	SIEP C880725 21	Describes the functions, specifications, operating methods, maintenance, inspections, and troubleshooting of the MP3000-series MP3300 Machine Controllers.
⑤ Σ-7-Series Σ-7S SERVOPACK Product Manuals	Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual	SIEP S800001 28	Provide detailed information on selecting Σ-7-Series SERVOPACKs and information on installing, connecting, setting, performing trial operation for, tuning, and monitoring the Servo Drives.
	Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with MECHATROLINK-II Communications References Product Manual	SIEP S800001 27	
	Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual	SIEP S800001 26	
⑥ Σ-7-Series Σ-7W SERVOPACK Product Manual	Σ-7-Series AC Servo Drive Σ-7W SERVOPACK with MECHATROLINK-III Communications References Product Manual	SIEP S800001 29	
⑦ Σ-7-Series Rotary Servomotor Product Manual	Σ-7-Series AC Servo Drive Rotary Servomotor Product Manual	SIEP S800001 36	Provide detailed information on selecting, installing, and connecting the Σ-7-Series Servomotors.
⑧ Σ-7-Series Linear Servomotor Product Manual	Σ-7-Series AC Servo Drive Linear Servomotor Product Manual	This manual (SIEP S800001 37)	
⑨ Σ-7-Series Direct Drive Servomotor Product Manual	Σ-7-Series AC Servo Drive Direct Drive Servomotor Product Manual	SIEP S800001 38	

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Classification	Document Name	Document No.	Description
⑩ Σ-7-Series Peripheral Device Selection Manual	Σ-7-Series AC Servo Drive Peripheral Device Selection Manual	SIEP S800001 32	Describes the peripheral devices for a Σ-7-Series Servo System.
⑪ Σ-7-Series MECHATROLINK Communications Command Manuals	Σ-7-Series AC Servo Drive MECHATROLINK-II Communications Command Manual	SIEP S800001 30	Provides detailed information on the MECHATROLINK-II communications commands that are used for a Σ-7-Series Servo System.
	Σ-7-Series AC Servo Drive MECHATROLINK-III Communications Standard Servo Profile Command Manual	SIEP S800001 31	Provides detailed information on the MECHATROLINK-III communications standard servo profile commands that are used for a Σ-7-Series Servo System.
⑫ Σ-7-Series Operation Interface Operating Manuals	Σ-7-Series AC Servo Drive Digital Operator Operating Manual	SIEP S800001 33	Describes the operating procedures for a Digital Operator for a Σ-7-Series Servo System.
	AC Servo Drives Engineering Tool SigmaWin+ Online Manual Σ-7 Component	SIEP S800001 48	Provides detailed operating procedures for the SigmaWin+ Engineering Tool for a Σ-7-Series Servo System.

Using This Manual

◆ Technical Terms Used in This Manual

The following terms are used in this manual.

Term	Meaning
Servomotor	A Σ-7-Series Linear Servomotor.
SERVOPACK	A Σ-7-Series Servo Amplifier.
Servo Drive	The combination of a Servomotor and SERVOPACK.
Main Circuit Cable	One of the cables that connect to the main circuit terminals, including the Main Circuit Power Supply Cable, Control Power Supply Cable, and Servomotor Main Circuit Cable.

◆ Trademarks

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

◆ Visual Aids

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

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.

Example Indicates operating or setting examples.

Information Indicates supplemental information to deepen understanding or useful information.

Safety Precautions

◆ Safety Information

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

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

NOTICE

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

◆ Safety Precautions That Must Always Be Observed

■ General Precautions

⚠ DANGER

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

⚠ WARNING

- Connect the ground terminals on the SERVOPACK and Servomotor to ground poles according to local electrical codes (100 Ω or less for a SERVOPACK with a 100-VAC or 200-VAC power supply, and 10 Ω or less for a SERVOPACK with a 400-VAC power supply).
  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, 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 burn injury.
- Do not damage, pull on, apply excessive force to, place heavy objects on, or pinch cables.
  There is a risk of failure, damage, or electric shock.
- Do not use the product in an environment that is subject to water, corrosive gases, or flammable gases, or near flammable materials.
  There is a risk of electric shock or fire.

NOTICE

- Do not attempt to use a SERVOPACK or Servomotor that is damaged or that has missing parts.
- Install external emergency stop circuits that shut OFF the power supply and stops operation immediately when an error occurs.
- 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.

■ Storage Precautions

⚠ CAUTION

- Store the Magnetic Way of a Linear Servomotor in the package that was used for delivery.
- Do not place an excessive load on the product during storage. (Follow all instructions on the packages.)
  There is a risk of injury or damage.

NOTICE

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

  If you store or install the product in any of the above locations, the product may fail or be damaged.
- Although machined surfaces are covered with an anticorrosive coating, rust can develop due to storage conditions or the length of storage. If you store the product for more than six months, reapply an anticorrosive coating to machined surfaces, particularly the core.
- Consult with your Yaskawa representative if you have stored products for an extended period of time.

■ Transportation Precautions

⚠ CAUTION

- Transport the product in a way that is suitable to the mass of the product.
- Do not hold onto the cables attached to the Moving Coil when you move a Servomotor.
  There is a risk of disconnection, damage, or injury.
- Do not use the eyebolts on a SERVOPACK or Servomotor to move the machine.
  There is a risk of 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 hold onto the magnet protective cover when you move a Magnetic Way.
  There is a risk of injury from the edges of the cover. There is also a risk of deforming the cover.
- Do not place an excessive load on the product during transportation. (Follow all instructions on the packages.)
  There is a risk of injury or damage.

NOTICE

- A 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.
- If disinfectants or insecticides must be used to treat packing materials such as wooden frames, plywood, or pallets, the packing materials must be treated before the product is packaged, and methods other than fumigation must be used.
  Example: Heat treatment, where materials are kiln-dried to a core temperature of 56°C for 30 minutes or more.
  If the electronic products, which include stand-alone products and products installed in machines, are packed with fumigated wooden materials, the electrical components may be greatly damaged by the gases or fumes resulting from the fumigation process. In particular, disinfectants containing halogen, which includes chlorine, fluorine, bromine, or iodine can contribute to the erosion of the capacitors.
- 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.

■ Installation Precautions

⚠ DANGER

- The Magnetic Way of a Linear Servomotor uses a strong permanent magnet. To ensure safety and prevent accidents, observe the following precautions when you install the Linear Servomotor.
  If you have a heart pacemaker or any other electronic medical device, do not go near the location of or near a machine where the Magnetic Way of a Linear Servomotor is being used. The influence of the magnetism may cause the medical device to malfunction or fail.

⚠ CAUTION

- Make sure that there are no magnetic substances, such pieces of iron, near the worksite before you unpack or install the Magnetic Way.
  There is a risk of injury or damage to the magnets in the Magnetic Way due to the magnetic attraction of the Magnetic Way.
- Securely mount the Servomotor to the machine.
  If the Servomotor is not mounted securely, it may come off the machine during operation.
- Use all of the mounting screw holes on the Linear Servomotor to mount the Servomotor to the machine.
  There is a risk of damage or injury if the Servomotor is not mounted correctly.
- Do not use the mounting screw holes on a Linear Servomotor for any other purpose.
  There is a risk of damage or injury if the Servomotor is not mounted correctly.
- The Magnetic Way of a Linear Servomotor uses a strong permanent magnet. To ensure safety and prevent accidents, observe the following precautions when you install the Linear Servomotor.
  - Do not bring magnetic substances (including Moving Coils and tools) near the Magnetic Way. There is a risk of serious injury (such as pinching your hand) due to the large magnetic attraction exerted by the magnetic side of the Magnetic Way. Pay sufficient attention to the worksite and surrounding area to prevent magnetic substances from approaching the Magnetic Way.
  - Use only nonmagnetic tools for all work.
- Install the Servomotor or SERVOPACK in a way that will support the mass given in technical documents.
- Install SERVOPACKs, Servomotors, and regenerative 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.
- When you remove the dummy plates for reducing magnetic force from the Magnetic Way of an SGLF Linear Motor, be careful of the magnetic attraction of the Magnetic Way. Do not place the dummy plates close to the Magnetic Way after you remove them.
  There is a risk of injury, damage to the magnets in the Magnetic Way, or damage to the magnet protective cover.
- Implement safety measures, such as installing a cover so that the Linear Servomotor cannot be touched accidentally during operation.

NOTICE

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

  If you store or install the product in any of the above locations, the product may fail or be damaged.
- The Magnetic Way of a Linear Servomotor uses a strong permanent magnet. To ensure safety and prevent accidents, observe the following precautions when you install the Linear Servomotor.
  Do not work on a Magnetic Way with electronic devices (such as clocks, calculators, or computers) or magnetic storage media (such as IC cards or magnetic cards) on your person or bring such devices or media near a Magnetic Way.
  The influence of the magnetism may cause the device or media to malfunction or fail.
- 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.
- A 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.
- In an application where the Servomotor would be subjected to large quantities of water or oil, implement measures to protect the Servomotor from large quantities of liquid, such as installing covers to protect against water and oil.
- In an environment that contains magnetic substances, such iron cuttings or powder, implement measures to prevent the magnetic substances from adhering to or entering the product. Be particularly careful not to let foreign matter, such as metals, enter the gaps between a Magnetic Way and Moving Coil.
  If foreign material adheres in the gaps between a Moving Coil and Magnetic Way, operation may stop or burning may occur.

■ 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.

⚠ 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.
- Connect wires to power supply terminals and motor connection terminals securely with the specified methods and tightening torque.
  Insufficient tightening may cause wires and terminal blocks to generate heat due to faulty contact, possibly resulting in fire.
- Use shielded twisted-pair cables or screened unshielded multi-twisted-pair cables for I/O Signal Cables and Encoder Cables.
- Observe the following precautions when wiring the SERVOPACK's main circuit terminals.
  - Turn ON the power supply to the SERVOPACK only after all wiring, including the main circuit terminals, has been completed.
  - If a connector is used for the main circuit terminals, remove the main circuit connector from the SERVOPACK before you wire it.
  - Insert only one wire per insertion hole in the main circuit terminals.
  - When you insert a wire, make sure that the conductor wire (e.g., whiskers) does not come into contact with adjacent wires.

NOTICE

- Whenever possible, use the Cables specified by Yaskawa.
  If you use any other cables, confirm the rated current and application environment of your model and use the wiring materials specified by Yaskawa or equivalent materials.
- Securely tighten cable connector screws and lock mechanisms.
  Insufficient tightening may result in cable connectors falling off during operation.
- Do not bundle power lines (e.g., the Main Circuit Cable) and low-current lines (e.g., the I/O Signal Cables or Encoder Cables) together or run them through the same duct. If you do not place power lines and low-current lines in separate ducts, separate them by at least 30 cm.
  If the cables are too close to each other, malfunctions may occur due to noise affecting the low-current lines.
- For a motor with a built-in temperature sensor, use the temperature sensor to protect the motor from overheating.
- Secure the cable from the Moving Coil of the Linear Servomotor so that it moves together with the Moving Coil.
  There is a risk of cable disconnection.

■ 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.
- Forcing the motor to stop for overtravel is disabled when the Jog (Fn002), Origin Search (Fn003), or Easy FFT (Fn206) utility function is executed. Take necessary precautions.
  There is a risk of machine damage or injury.
- When an alarm occurs, the motor will coast to a stop or stop with the dynamic brake according to a setting in the SERVOPACK. The coasting distance will change with the moment of inertia of the load. Check the coasting distance during trial operation and implement suitable safety measures on the machine.
- 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

- Always turn OFF the servo before you turn OFF the power supply. If you turn OFF the main circuit power supply or control power supply during operation before you turn OFF the servo, the Servomotor will stop as follows:
  - If you turn OFF the main circuit power supply during operation without turning OFF the servo, the Servomotor will stop abruptly with the dynamic brake.
  - If you turn OFF the control power supply 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.
- Linear Servomotors do not have holding brakes. If the load mass is large or the speed is high, the coasting distance will increase even if you perform a rapid stop with a dynamic brake. Install safety devices (external brakes or stoppers) so that the ends of the moving parts of the machine will not strike anything.

NOTICE

- Always measure the vibration of the Servomotor with the Servomotor mounted to the machine and confirm that the vibration is within the allowable value.
  If the vibration is too large, the Servomotor will be damage quickly and bolts may become loose.
- 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.

■ Maintenance and Inspection Precautions

⚠ DANGER

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

⚠ WARNING

- Wiring and inspections must be performed only by qualified engineers.
  There is a risk of electric shock or product failure.

⚠ CAUTION

- Wait for six minutes after turning OFF the power supply and then make sure that the CHARGE indicator is not lit before starting wiring or inspection work. Do not touch the power supply terminals while the CHARGE lamp is lit after turning OFF the power supply because high voltage may still remain in the SERVOPACK.
  There is a risk of electric shock.

■ 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 supply 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.
- 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, install an external braking mechanism that ensures safety.

■ Disposal Precautions

⚠ CAUTION

- When you dispose of a Linear Servomotor, heat the Magnetic Way to 300°C or higher for one hour to demagnetize it.
  There is a risk of injury from the strong magnetic attraction.

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

■ General Precautions

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

Warranty

◆ Details of Warranty

■ Warranty Period

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

■ Warranty Scope

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

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

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

◆ Limitations of Liability

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

◆ Suitability for Use

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

◆ Specifications Change

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

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.

◆ North American Safety Standards (UL)

Product	Model	UL Standards (UL File No.)
SERVOPACKs*1	SGD7S	UL 61800-5-1
Rotary Servomotors*1	• SGM7A • SGM7J • SGM7P • SGM7G	UL 1004-1 UL 1004-6
Direct Drive Servomotors*1	• SGMCV	
Linear Servomotors	• SGLGW • SGLFW • SGLFW2*2 • SGLTW	UL 1004 (E165827)

*1. Certification is scheduled for April 2014.
*2. Certification is scheduled for April 2015.

◆ European Directives

Product	Model	European Directive	Harmonized Standards
SERVOPACKs*1	SGD7S	Machinery Directive 2006/42/EC	EN ISO13849-1: 2008 EN 954-1
		EMC Directive 2004/108/EC	EN 55011 group 1, class A EN 61000-6-2 EN 61000-6-4 EN 61800-3
		Low Voltage Directive 2006/95/EC	EN 50178 EN 61800-5-1
Rotary Servomotors*1	• SGM7A • SGM7J • SGM7P • SGM7G	EMC Directive 2004/108/EC	EN 55011 group 1, class A EN 61000-6-2 EN 61800-3
		Low Voltage Directive 2006/95/EC	EN 60034-1 EN 60034-5
Direct Drive Servomotors	• SGMCS-□□B, □□C, □□D, □□E (small capacity, coreless) • SGMCV	EMC Directive 2004/108/EC	EN 55011 group 1, class A EN 61000-6-2 EN 61800-3*2
		Low Voltage Directive 2006/95/EC	EN 60034-1 EN 60034-5
Linear Servomotors	• SGLG • SGLF • SGLFW2*3 • SGLT • SGLC	EMC Directive 2004/108/EC	EN 55011 group 1, class A EN 61000-6-2 EN 61000-6-4
		Low Voltage Directive 2006/95/EC	EN 60034-1

*1. Certification is scheduled for April 2014.
*2. Only the SGMCV is certified.
*3. Certification is scheduled for April 2015.

◆ Safety Standards

Product	Model	Safety Standards	Standards
SERVOPACKs	SGD7S	Safety of Machinery	EN ISO13849-1: 2008 EN 954-1 IEC 60204-1
		Functional Safety	IEC 61508 series IEC 62061 IEC 61800-5-2
		EMC	IEC 61326-3-1

Note: Certification is scheduled for April 2014.

◆ Safe Performance

Item	Standards	Performance Level
Safety Integrity Level	IEC 61508	SIL3
	IEC 62061	SILCL3
Performance Level	EN ISO 13849-1	PLe (Category 3)
Stop Category	IEC 60204-1	Stop category 0
Safety Function	IEC 61800-5-2	STO

Note: Certification is scheduled for April 2014.

Contents

6 Specifications, Ratings, and External Dimensions of SGLC Servomotors

7 Equipment Design Precautions

8 Servomotor Installation

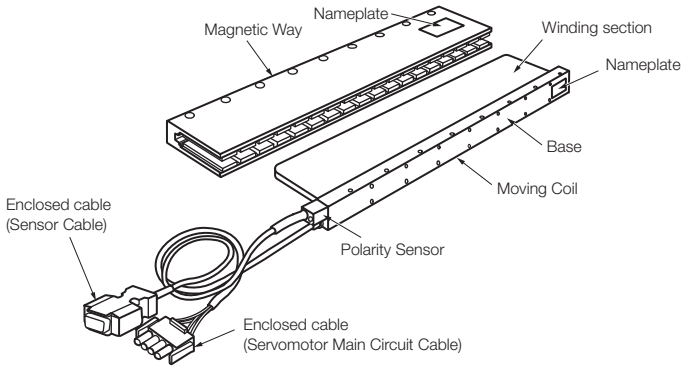
Basic Information on Servomotors

1

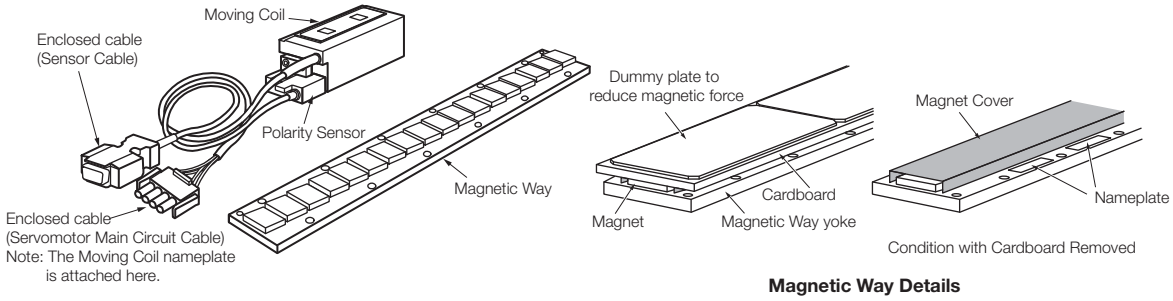
This chapter provides basic information on Linear Servomotors, including Servomotor part names and combinations with SERVOPACKs.

1.1 Servomotor Part Names

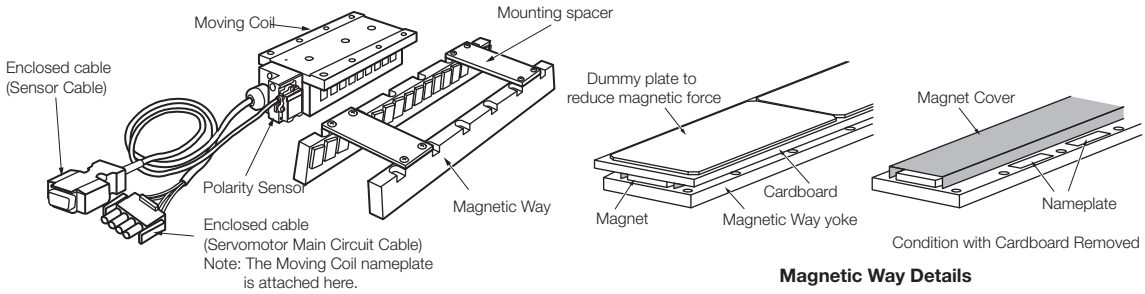
1.1.1 SGLG Servomotors



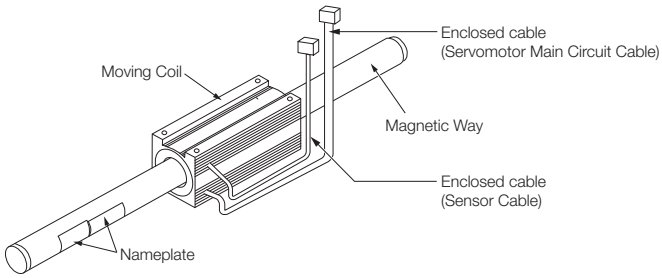
1.1.2 SGLF Servomotors



1.1.3 SGLT Servomotors



1.1.4 SGLC Servomotors

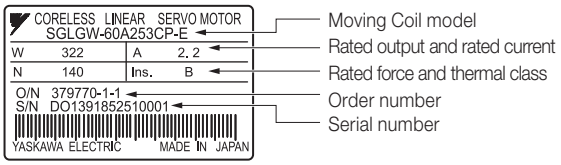


1.2 Interpreting the Nameplates

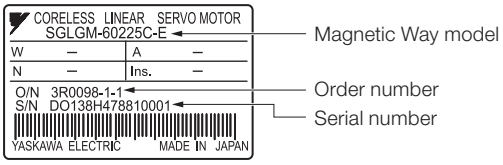
The following basic information is provided on the nameplate.

1.2.1 SGLG and SGLC Servomotors

- Moving Coils

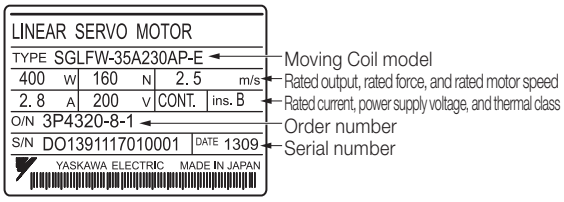


- Magnetic Ways

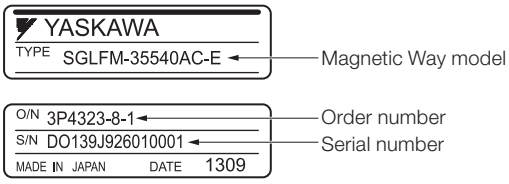


1.2.2 SGLF and SGLT Servomotors

- Moving Coils

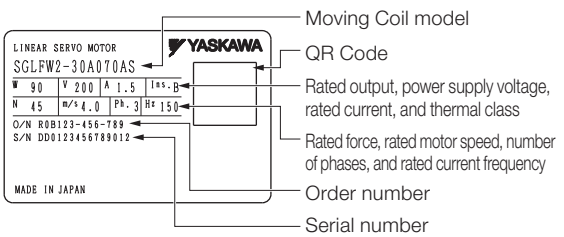


- Magnetic Ways

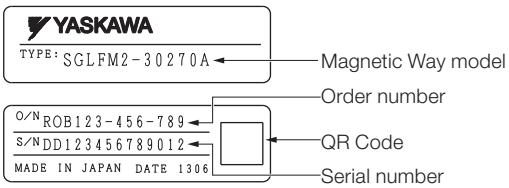


1.2.3 SGLF□2 Servomotors

- Moving Coils



- Magnetic Ways



1.3 Outline of Model Designations

1.3.1 Servomotor

This section outlines the model numbers of Σ-7-Series Servomotors. For details, refer to the chapter for your type of Servomotor.

SGL □ □ - 30 A 050 C P □

Series | 1st digit | 2nd digit | 3rd digit on

Series Σ-7-Series Servomotors

1st digit Servomotor Type

Code	Specifications	Reference
G	Coreless models	Chapter 3
F	Models with F-type iron core	Chapter 4
T	Models with T-type iron core	Chapter 5
C	Cylinder models	Chapter 6

2nd digit Moving Coil/Magnetic Way

Code	Specification
W	Moving Coil
W2	
M	Magnetic Way
M2	

3rd digit on

The specifications for the 3rd digit on depend on the Servomotor type.

1.3.2 SERVOPACKs

This section outlines the model numbers of Σ-7-Series SERVOPACKs. For details, refer to the manual for your SERVOPACK.

- Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26)
- Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-II Communications References Product Manual (Manual No.: SIEP S800001 27)
- Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)
- Σ-7-Series Σ-7W SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 29)

SGD7□ - R70 A 00 A 000

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

Series Σ-7-Series SERVOPACKs

Code	Specification
SGD7S	Single-axis SERVOPACKs
SGD7W	Two-axis SERVOPACKs

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

0.05 kW to 1.5 kW

4th digit Power Supply Voltage

- 200 VAC

5th+6th digits Interface

- Analog voltage/pulse train reference
- MECHATROLINK-II communications reference
- MECHATROLINK-III communications reference

7th digit Design Revision Order

8th+9th+10th digits Options

- Rack-mounted installation
- Varnished

1.4 Combinations of Servomotors and SERVOPACKs

Linear Servomotor Model		Rated Force N	Instantaneous Maximum Force N	SERVOPACK Model	
				SGD7S-□□□□	SGD7W-□□□□
SGLG (Coreless Models), Used with Standard-Force Magnetic Way	SGLGW-30A050C	12.5	40	R70A	1R6A
	SGLGW-30A080C	25	80	R90A	1R6A
	SGLGW-40A140C	47	140		
	SGLGW-40A253C	93	280	1R6A	
	SGLGW-40A365C	140	420	2R8A	
	SGLGW-60A140C	70	220	1R6A	
	SGLGW-60A253C	140	440	2R8A	
	SGLGW-60A365C	210	660	5R5A	
	SGLGW-90A200C	325	1300	120A	–
	SGLGW-90A370C	550	2200	180A	
	SGLGW-90A535C	750	3000	200A	
SGLG (Coreless Models), Used with High-Force Magnetic Way	SGLGW-40A140C	57	230	1R6A	
	SGLGW-40A253C	114	460	2R8A	
	SGLGW-40A365C	171	690	3R8A	5R5A
	SGLGW-60A140C	85	360	1R6A	
	SGLGW-60A253C	170	720	3R8A	5R5A
	SGLGW-60A365C	255	1080	7R6A	
SGLF (Models with F-type Iron Cores)	SGLFW-20A090A	25	86	1R6A	
	SGLFW-20A120A	40	125		
	SGLFW-35A120A	80	220		
	SGLFW-35A230A	160	440	3R8A	5R5A
	SGLFW-50A200B	280	600	5R5A	
	SGLFW-50A380B	560	1200	120A	–
	SGLFW-1ZA200B				
	SGLFW-1ZA380B	1120	2400	200A	
	SGLFW2-30A070A	45	135	1R6A	
	SGLFW2-30A120A	90	270		
	SGLFW2-30A230A*	180	540	3R8A	–
		170	500	2R8A	
	SGLFW2-45A200A	280	840	5R5A	
	SGLFW2-45A380A*	560	1680	180A	–
			1500	120A	
	SGLFW2-90A200A	560	1680		
	SGLFW2-90A380A	1120	3360	200A	
	SGLFW2-1DA380A	1680	5040		

Continued on next page.

* The force depends on the SERVOPACK that is used with the Servomotor.

Continued from previous page.

Linear Servomotor Model		Rated Force N	Instantaneous Maximum Force N	SERVOPACK Model	
				SGD7S-□□□□	SGD7W-□□□□
SGLT (Models with T-type Iron Cores)	SGLTW-20A170A	130	380	3R8A	5R5A
	SGLTW-20A320A	250	760	7R6A	
	SGLTW-20A460A	380	1140	120A	–
	SGLTW-35A170A	220	660	5R5A	
	SGLTW-35A170H	300	600		
	SGLTW-35A320A	440	1320	120A	–
	SGLTW-35A320H	600	1200		
	SGLTW-35A460A	670	2000	180A	
	SGLTW-40A400B	670	2600		
	SGLTW-50A170H	450	900	5R5A	
	SGLTW-50A320H	900	1800	120A	–
SGLC (Cylinder Models)	SGLC-D16A085A	17	60	R70A	1R6A
	SGLC-D16A115A	25	90		
	SGLC-D16A145A	34	120	R90A	
	SGLC-D20A100A	30	150	1R6A	
	SGLC-D20A135A	45	225		
	SGLC-D20A170A	60	300	2R8A	
	SGLC-D25A125A	70	280	1R6A	
	SGLC-D25A170A	105	420	2R8A	
	SGLC-D25A215A	140	560	5R5A	
	SGLC-D32A165A	90	420	2R8A	
	SGLC-D32A225A	135	630	5R5A	
	SGLC-D32A285A	180	840		

Capacity Selection

2

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

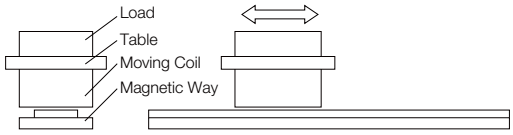
2.1 Selecting the Servomotor Capacity

Use Yaskawa's SigmaJunmaSize+, an AC servo drive capacity selection program, to select the Servomotor capacity. With the SigmaJunmaSize+, you can find the optimum Servomotor capacity by simply selecting and entering information according to instructions from a wizard.

Contact your Yaskawa representative for information on the SigmaJunmaSize+.

Refer to the following selection examples to select Servomotor capacities with manual calculations rather than with the above software.

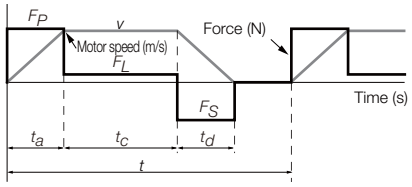
1. Mechanical Specifications



Item	Code	Value
Load Mass	m_W	1 kg
Table Mass	m_T	2 kg
Motor Speed	v	2 m/s
Feeding Distance	l	0.76 m
Friction Coefficient	μ	0.2

Item	Code	Value
Acceleration Time	t_a	0.02 s
Constant-speed Time	t_c	0.36 s
Deceleration Time	t_d	0.02 s
Cycle Time	t	0.5 s
External Force on Linear Motion Section	F	0 N

2. Operation Pattern



3. Steady-State Force (Excluding Servomotor Moving Coil)

$F_L = \{9.8 \times \mu \times (m_W + m_T)\} + F = 9.8 \times 0.2 \times (1 + 2) + 0 = 5.88$ (N)

4. Acceleration Force (Excluding Servomotor Moving Coil)

$$F_P = (m_W + m_T) \times \frac{v}{t_a} + F_L = (1 + 2) \times \frac{2}{0.02} + 5.88 = 305.88 \text{ (N)}$$

5. Provisional Selection of Linear Servomotor

① Selection Conditions

- $F_P \leq$ Maximum force × 0.9
- $F_s \leq$ Maximum force × 0.9
- $F_{rms} \leq$ Rated force × 0.9

The following Servomotor Moving Coil and Magnetic Way meet the selection conditions.

- SGLGW-60A253CP Linear Servomotor Moving Coil
- SGLGM-60□□□C Linear Servomotor Magnetic Way

② Specifications of the Provisionally Selected Servomotor

Item	Value
Maximum Force	440 (N)
Rated Force	140 (N)
Moving Coil Mass (m_M)	0.82 (kg)
Servomotor Magnetic Attraction (F_{att})	0 (N)

6. Verification of the Provisionally Selected Servomotor

- Steady-State Force

$F_L = \mu \{9.8 \times (m_W + m_T + m_M) + F_{att}\} = 0.2 \{9.8 \times (1 + 2 + 0.82) + 0\} = 7.5$ (N)

- Verification of Acceleration Force

$$F_P = (m_W + m_T + m_M) \times \frac{v}{t_a} + F_L = (1 + 2 + 0.82) \times \frac{2}{0.02} + 7.5$$

$= 389.5$ (N) ≤ Maximum force × 0.9 (= 396 N)… Satisfactory

- Verification of Deceleration Force

$$F_S = (m_W + m_T + m_M) \times \frac{v}{t_a} - F_L = (1 + 2 + 0.82) \times \frac{2}{0.02} - 7.5$$

$= 374.5$ (N) ≤ Maximum force × 0.9 (= 396 N)… Satisfactory

- Verification of Effective Force

$$F_{rms} = \sqrt{\frac{F_P^2 \cdot t_a + F_L^2 \cdot t_c + F_s^2 \cdot t_d}{t}} = \sqrt{\frac{389.5^2 \times 0.02 + 7.5^2 \times 0.36 + 374.5^2 \times 0.02}{0.5}}$$

$= 108.3$ (N) ≤ Rated force × 0.9 (= 132.3 N)… Satisfactory

7. Result

It has been verified that the provisionally selected Servomotor is applicable.

Specifications, Ratings, and External Dimensions of SGLG Servomotors

3

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

3.1 Model Designations

3.1.1 Moving Coil

S G L G W - 30 A 050 C P □

Linear Σ Series Linear Servomotors

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

1st digit Servomotor Type

Code	Specification
G	Coreless model

2nd digit Moving Coil/Magnetic Way

Code	Specification
W	Moving Coil

3rd+4th digits Magnet Height

Code	Specification
30	30 mm
40	40 mm
60	60 mm
90	86 mm

5th digit Power Supply Voltage

Code	Specification
A	200 VAC

6th+7th+8th digits Length of Moving Coil

Code	Specification
050	50 mm
080	80 mm
140	140 mm
200	199 mm
253	252.5 mm
365	365 mm
370	367 mm
535	535 mm

9th digit Design Revision Order

A, B...

10th digit Sensor Specification and Cooling Method

Code	Specifications		Applicable Models
	Polarity Sensor	Cooling Method	
None	None	Self-cooled	All models
C	None	Air-cooled	SGLGW -40A, -60A, -90A
H	Yes	Air-cooled	
P	Yes	Self-cooled	All models

11th digit Connector for Servomotor Main Circuit Cable

Code	Specification	Applicable Models
None	Connector from Tyco Electronics Japan G.K.	All models
D	Connector from Interconnectron GmbH	SGLGW -30A, -40A, -60A

Note: This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

3.1.2 Magnetic Way

S G L G M - 30 108 A □

Linear Σ Series Linear Servomotors

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

1st digit Servomotor Type

(Same as for the Moving Coil.)

2nd digit Moving Coil/Magnetic Way

Code	Specification
M	Magnetic Way

3rd+4th digits Magnet Height

(Same as for the Moving Coil.)

5th+6th+7th digits Length of Magnetic Way

Code	Specification
090	90 mm
108	108 mm
216	216 mm
225	225 mm
252	252 mm
360	360 mm
405	405 mm
432	432 mm
450	450 mm
504	504 mm

8th digit Design Revision Order

A, B, C*...

9th digit Options

Code	Specification	Applicable Models
None	Standard-force	All models
-M	High-force	SGLGM-40, -60

* The SGLGM-40 and SGLGM-60 also have a CT code.
  • C = Without mounting holes on the bottom

• CT = With mounting holes on the bottom

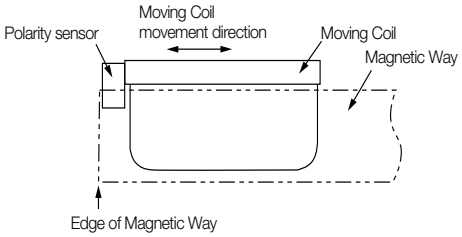
Note: This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

3.1.3 Precautions on Moving Coils with Polarity Sensors

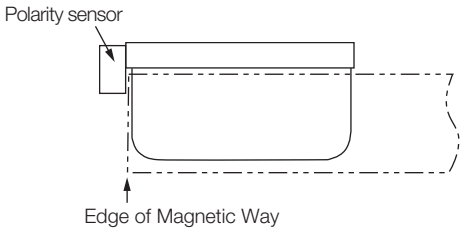
Note

When you use a Moving Coil with a Polarity Sensor, the Magnetic Way must cover the bottom of the polarity sensor. Refer to the example that shows the correct installation.
When determining the length of the Moving Coil's stroke or the length of the Magnetic Way, consider the total length (L) of the Moving Coil and the polarity sensor. Refer to the following table.

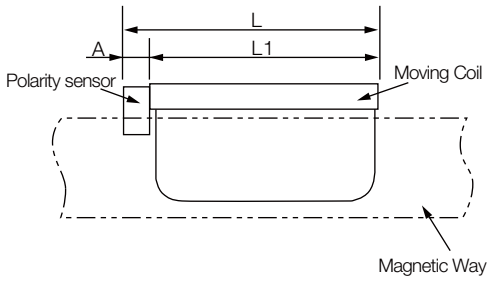
Correct Installation



Incorrect Installation



◆ Total Length of Moving Coil with Polarity Sensor



Moving Coil Model SGLGW-	Length of Moving Coil, L1 (mm)	Length of Polarity Sensor, A (mm)	Total Length, L (mm)
30A050□P□	50	0 (Included in the length of Moving Coil.)	50
30A080□P□	80		80
40A140□H□ 40A140□P□	140	16	156
40A253□H□ 40A253□P□	252.5		268.5
40A365□H□ 40A365□P□	365		381
60A140□H□ 60A140□P□	140	16	156
60A253□H□ 60A253□P□	252.5		268.5
60A365□H□ 60A365□P□	365		381
90A200□H□ 90A200□P□	199	0 (Included in the length of Moving Coil.)	199
90A370□H□ 90A370□P□	367		367
90A535□H□ 90A535□P□	535		535

3.2 Ratings and Specifications

3.2.1 Specifications: With Standard-Force Magnetic Way

Linear Servomotor Moving Coil Model SGLGW-		30A		40A			60A			90A		
		050C	080C	140C	253C	365C	140C	253C	365C	200C	370C	535C
Time Rating		Continuous										
Thermal Class		B										
Insulation Resistance		500 VDC, 10 MΩ min.										
Withstand Voltage		1,500 VAC for 1 minute										
Excitation		Permanent magnet										
Cooling Method		Self-cooled or air-cooled (Only self-cooled models are available for the SGLGW-30A.)										
Protective Structure		IP00										
Environmental Conditions	Surrounding Air Temperature	0°C to 40°C (with no freezing)										
	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 1,000 m or less. • Must be free of strong magnetic fields.										
Shock Resistance	Impact Acceleration Rate	196 m/s^2										
	Number of Impacts	2 times										
Vibration Resistance	Vibration Acceleration Rate	49 m/s^2 (the vibration resistance in three directions, vertical, side-to-side, and front-to-back)										

3.2.2 Ratings: With Standard-Force Magnetic Way

Linear Servomotor Moving Coil Model SGLGW-		30A		40A			60A			90A		
		050C	080C	140C	253C	365C	140C	253C	365C	200C	370C	535C
Rated Motor Speed (Reference Speed during Speed Control)*1	m/s	1.5	1.5	2.0	2.0	2.0	2.3	2.3	2.3	1.8	1.5	1.5
Maximum Speed*1	m/s	5.0	5.0	5.0	5.0	5.0	4.8	4.8	4.8	4.0	4.0	4.0
Rated Force*1, *2	N	12.5	25	47	93	140	70	140	210	325	550	750
Maximum Force*1	N	40	80	140	280	420	220	440	660	1300	2200	3000
Rated Current*1	Arms	0.51	0.79	0.80	1.6	2.4	1.2	2.2	3.3	4.4	7.5	10.2
Maximum Current*1	Arms	1.6	2.5	2.4	4.9	7.3	3.5	7.0	10.5	17.6	30.0	40.8
Moving Coil Mass	kg	0.10	0.15	0.34	0.60	0.87	0.42	0.76	1.1	2.2	3.6	4.9
Force Constant	N/Arms	26.4	33.9	61.5	61.5	61.5	66.6	66.6	66.6	78.0	78.0	78.0
BEMF Constant	Vrms/(m/s)/phase	8.80	11.3	20.5	20.5	20.5	22.2	22.2	22.2	26.0	26.0	26.0
Motor Constant	$N/\sqrt{W}$	3.66	5.63	7.79	11.0	13.5	11.1	15.7	19.2	26.0	36.8	45.0
Electrical Time Constant	ms	0.19	0.41	0.43	0.43	0.43	0.45	0.45	0.45	1.4	1.4	1.4
Mechanical Time Constant	ms	7.5	4.7	5.6	5.0	4.8	3.4	3.1	3.0	3.3	2.7	2.4
Thermal Resistance (with Heat Sink)	K/W	5.19	3.11	1.67	0.87	0.58	1.56	0.77	0.51	0.39	0.26	0.22
Thermal Resistance (without Heat Sink)	K/W	8.13	6.32	3.02	1.80	1.23	2.59	1.48	1.15	1.09	0.63	0.47
Magnetic Attraction	N	0	0	0	0	0	0	0	0	0	0	0
Combined Magnetic Way, SGLGM-		30□□□A		40□□□C□			60□□□C□			90□□□A		
Combined Serial Converter Unit, JZDP-□□□□-		250	251	252	253	254	258	259	260	264	265	266
Applicable SERVOPACKs	SGD7S-	R70A	R90A	R90A	1R6A	2R8A	1R6A	2R8A	5R5A	120A	180A	200A
	SGD7W-	1R6A	1R6A	1R6A	1R6A	2R8A	1R6A	2R8A	5R5A	–	–	–

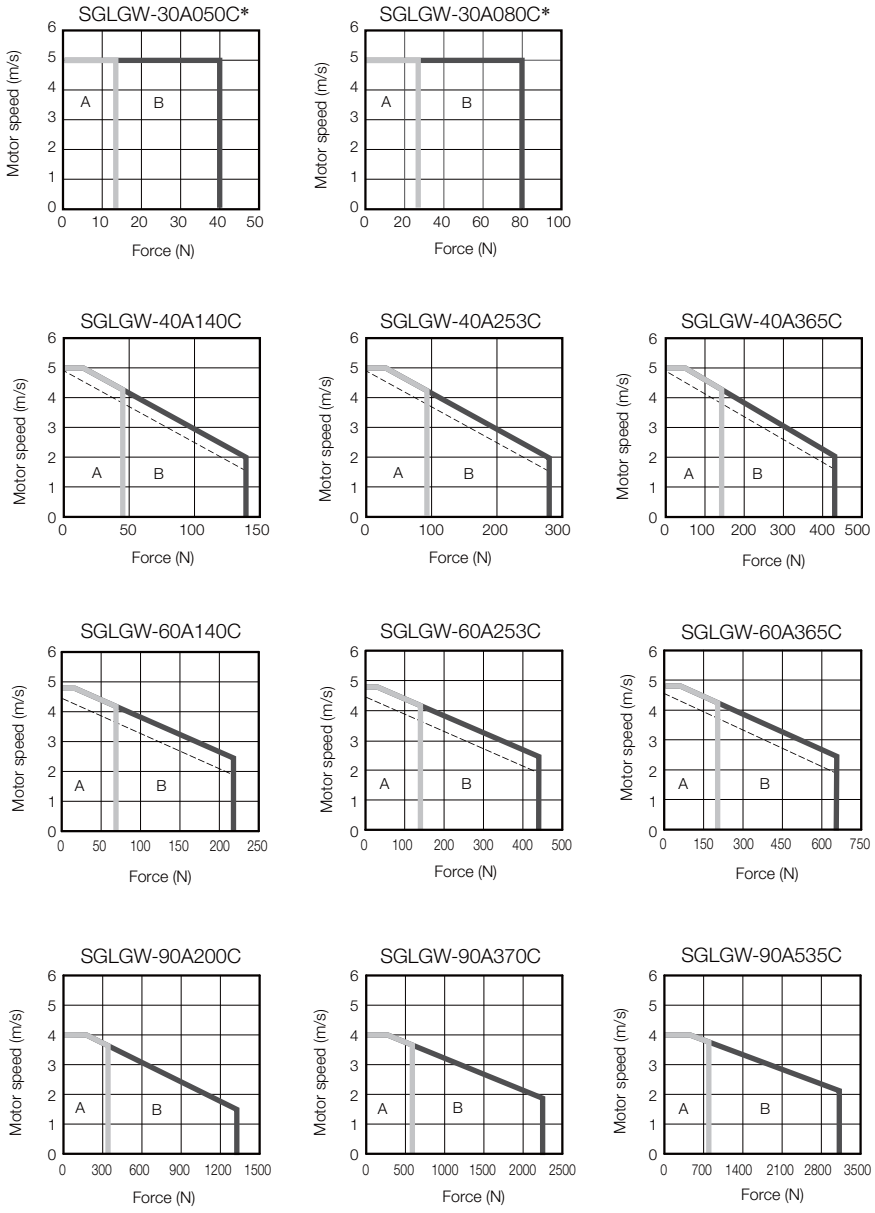
*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. The values for other items are at 20°C. These are typical values.

*2. The rated forces are the continuous allowable force values at 40°C with an aluminum heat sink of the dimensions given below.

- Heat Sink Dimensions
  - 200 mm × 300 mm × 12 mm: SGLGW-30A050C, -30A080C, -40A140C, and -60A140C
  - 300 mm × 400 mm × 12 mm: SGLGW-40A253C and -60A253C
  - 400 mm × 500 mm × 12 mm: SGLGW-40A365C and -60A365C
  - 800 mm × 900 mm × 12 mm: SGLGW-90A200C, -90A370C, and -90A535C

◆ Force-Motor Speed Characteristics

A : Continuous duty zone ———— (solid lines): With three-phase 200-V input
B : Intermittent duty zone - - - - - - - - (dotted lines): With single-phase 200-V input



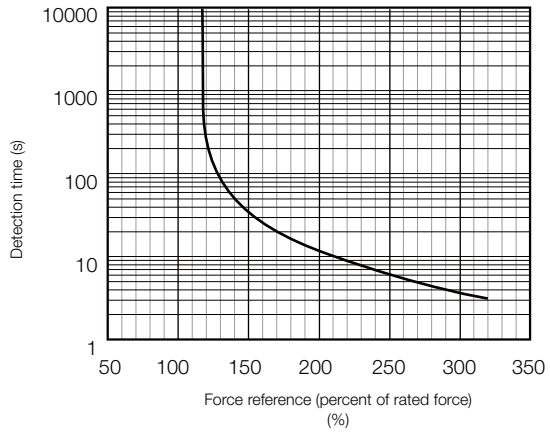
* The characteristics are the same for three-phase 200 V and single-phase 200 V.

Note: 1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. These are typical values.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective force is within the allowable range for the rated force, 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-motor speed characteristics will become smaller because the voltage drop increases.

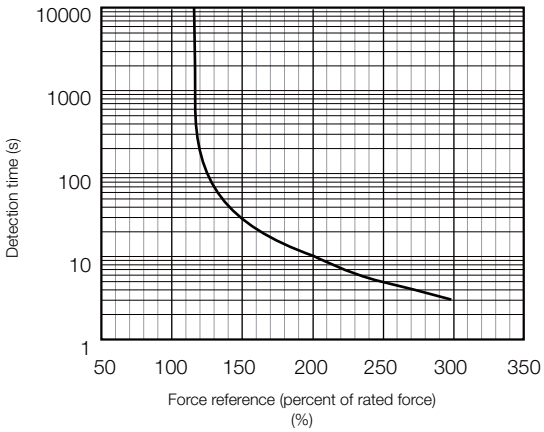
3.2.3 Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions with a Servomotor ambient temperature of 40°C.

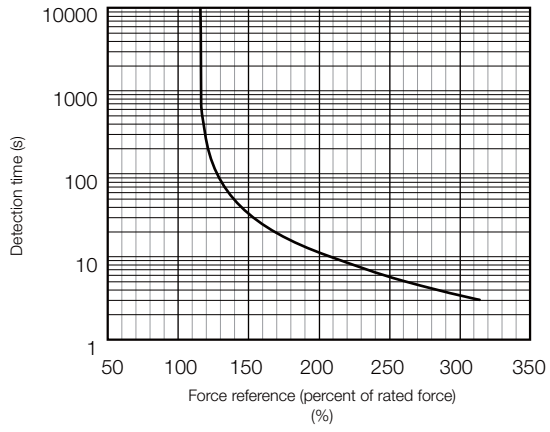
SGLGW-30A



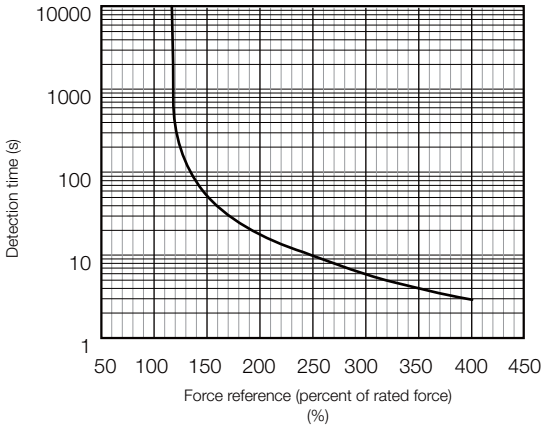
SGLGW-40A



SGLGW-60A



SGLGW-90A



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 force remains within the continuous duty zone given in ◆ *Force-Motor Speed Characteristics* on page 3-6.

3.2.4 Specifications: With High-Force Magnetic Way

Linear Servomotor Moving Coil Model SGLGW-		40A			60A		
		140C	253C	365C	140C	253C	365C
Time Rating		Continuous					
Thermal Class		B					
Insulation Resistance		500 VDC, 10 MΩ min.					
Withstand Voltage		1,500 VAC for 1 minute					
Excitation		Permanent magnet					
Cooling Method		Self-cooled or air-cooled					
Protective Structure		IP00					
Environmental Conditions	Surrounding Air Temperature	0°C to 40°C (with no freezing)					
	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 1,000 m or less. • Must be free of strong magnetic fields.					
Shock Resistance	Impact Acceleration Rate	196 m/s^2					
	Number of Impacts	2 times					
Vibration Resistance	Vibration Acceleration Rate	49 m/s^2 (the vibration resistance in three directions, vertical, side-to-side, and front-to-back)					

3.2.5 Ratings: With High-Force Magnetic Way

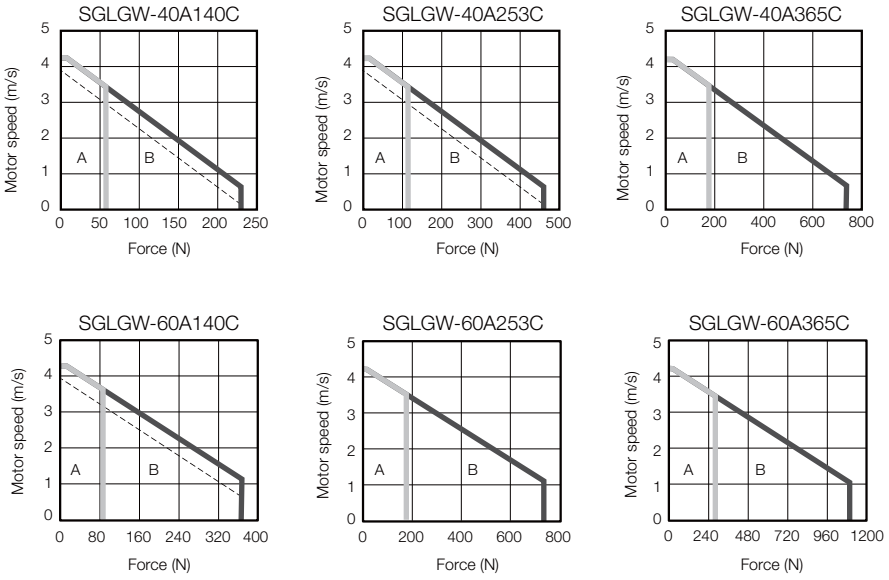
Linear Servomotor Moving Coil Model SGLGW-		40A			60A		
		140C	253C	365C	140C	253C	365C
Rated Motor Speed (Reference Speed during Speed Control)*1	m/s	1.0	1.0	1.0	1.0	1.0	1.0
Maximum Speed*1	m/s	4.2	4.2	4.2	4.2	4.2	4.2
Rated Force*1, *2	N	57	114	171	85	170	255
Maximum Force*1	N	230	460	690	360	720	1080
Rated Current*1	Arms	0.80	1.6	2.4	1.2	2.2	3.3
Maximum Current*1	Arms	3.2	6.5	9.7	5.0	10.0	14.9
Moving Coil Mass	kg	0.34	0.60	0.87	0.42	0.76	1.1
Force Constant	N/Arms	76.0	76.0	76.0	77.4	77.4	77.4
BEMF Constant	Vrms/(m/s)/phase	25.3	25.3	25.3	25.8	25.8	25.8
Motor Constant	$N/\sqrt{W}$	9.62	13.6	16.7	12.9	18.2	22.3
Electrical Time Constant	ms	0.43	0.43	0.43	0.45	0.45	0.45
Mechanical Time Constant	ms	3.7	3.2	3.1	2.5	2.3	2.2
Thermal Resistance (with Heat Sink)	K/W	1.67	0.87	0.58	1.56	0.77	0.51
Thermal Resistance (without Heat Sink)	K/W	3.02	1.80	1.23	2.59	1.48	1.15
Magnetic Attraction	N	0	0	0	0	0	0
Combined Magnetic Way, SGLGM-		40□□□C□-M			60□□□C□-M		
Combined Serial Converter Unit, JZDP-□□□□-		255	256	257	261	262	263
Applicable SERVOPACKs	SGD7S-	1R6A	2R8A	3R8A	1R6A	3R8A	7R6A
	SGD7W-	1R6A	2R8A	5R5A	1R6A	5R5A	7R6A

*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 forces are the continuous allowable force values at 40°C with an aluminum heat sink of the dimensions given below.
- Heat Sink Dimensions
  - 200 mm × 300 mm × 12 mm: SGLGW-40A140C and -60A140C
  - 300 mm × 400 mm × 12 mm: SGLGW-40A253C and -60A253C
  - 400 mm × 500 mm × 12 mm: SGLGW-40A365C and -60A365C

◆ Force-Motor Speed Characteristics

A : Continuous duty zone ———— (solid lines): With three-phase 200-V input
B : Intermittent duty zone - - - - - - - - (dotted lines): With single-phase 200-V input

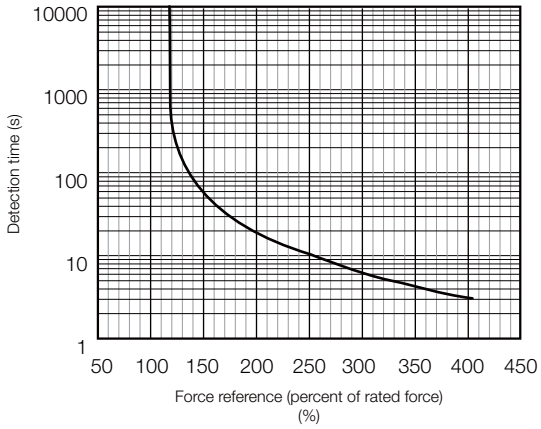


Note: 1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. These are typical values.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective force is within the allowable range for the rated force, 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-motor speed characteristics will become smaller because the voltage drop increases.

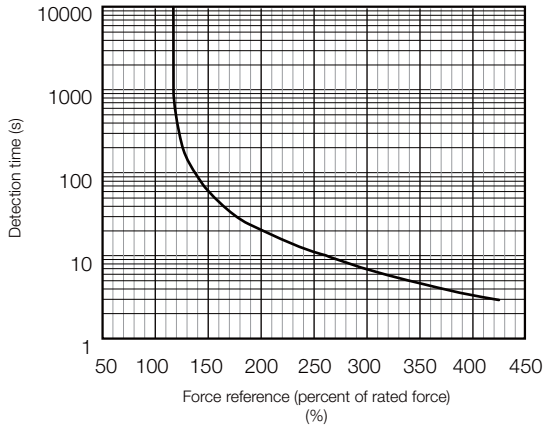
3.2.6 Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions with a Servomotor ambient temperature of 40°C.

SGLGW-40A with High-Force Magnetic Way



SGLGW-60A with High-Force Magnetic Way

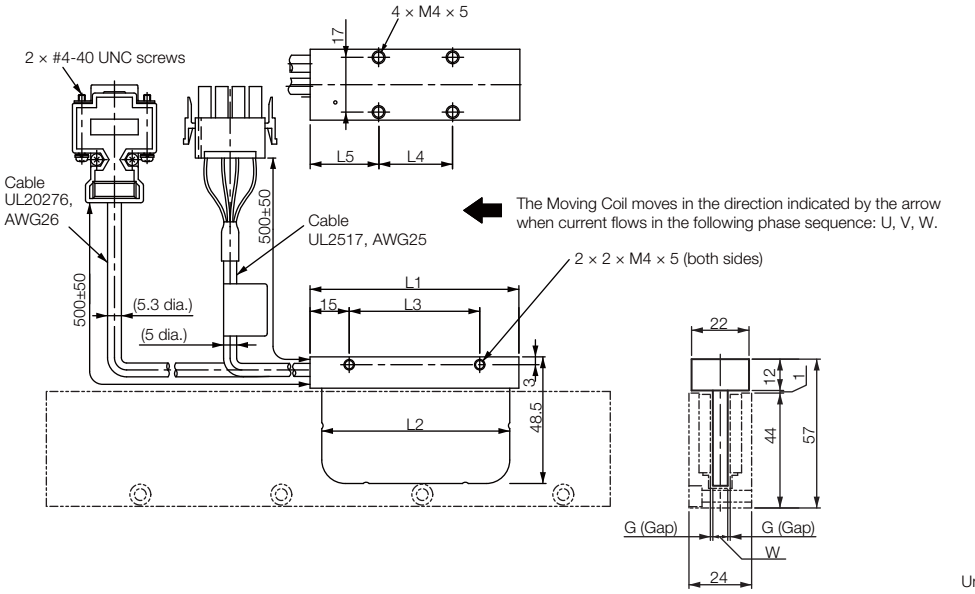


Note: The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher. Use the Servomotor so that the effective force remains within the continuous duty zone given in ◆ *Force-Motor Speed Characteristics* on page 3-9.

3.3 External Dimensions

3.3.1 SGLGW-30

◆ Moving Coils: SGLGW-30A□□□C□



Unit: mm

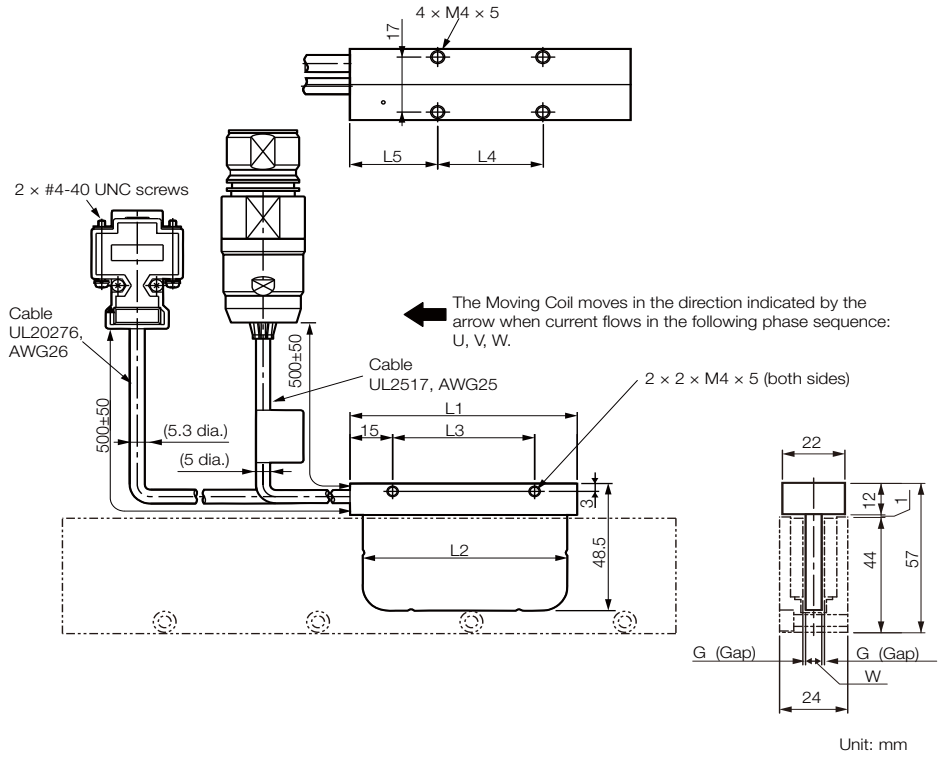
Moving Coil Model SGLGW-	L1	L2	L3	L4	L5	W	G (Gap)	Approx. Mass* [kg]
30A050C□	50	48	30	20	20	5.9	0.85	0.14
30A080C□	80	72	50	30	25	5.7	0.95	0.19

* The mass is for a Moving Coil with a Polarity Sensor.

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *SGLGW-30A□□□C□ Moving Coils* on page 3-24

◆ Moving Coils: SGLGW-30A□□□C□D



Unit: mm

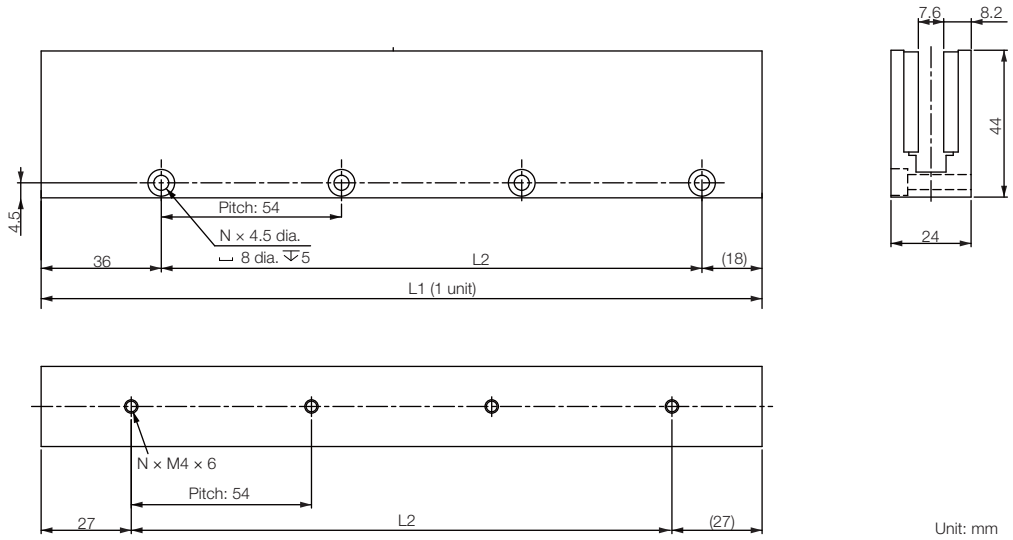
Moving Coil Model SGLGW-	L1	L2	L3	L4	L5	W	G (Gap)	Approx. Mass* [kg]
30A050C□D	50	48	30	20	20	5.9	0.85	0.14
30A080C□D	80	72	50	30	25	5.7	0.95	0.19

* The mass is for a Moving Coil with a Polarity Sensor.

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *SGLGW-30A□□□C□D Moving Coils* on page 3-25

◆ Standard-Force Magnetic Ways: SGLGM-30□□□A

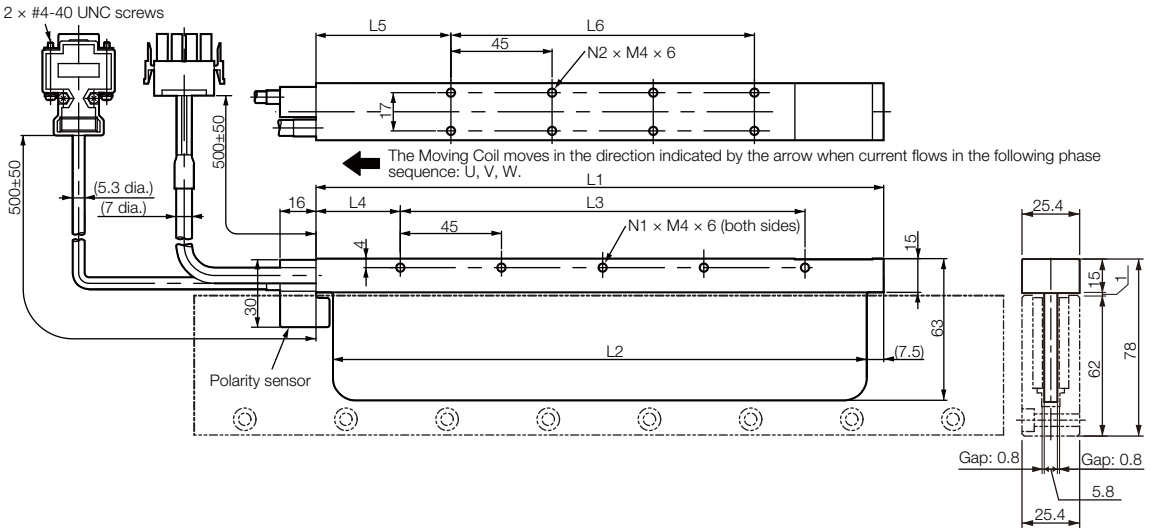


Unit: mm

Magnetic Way Model SGLGM-	L1	L2	N	Approx. Mass [kg]
30108A	$108^{-0.1}_{-0.3}$	54	2	0.6
30216A	$216^{-0.1}_{-0.3}$	162	4	1.1
30432A	$432^{-0.1}_{-0.3}$	378	8	2.3

3.3.2 SGLGW-40

◆ Moving Coils: SGLGW-40A□□□C□



Unit: mm

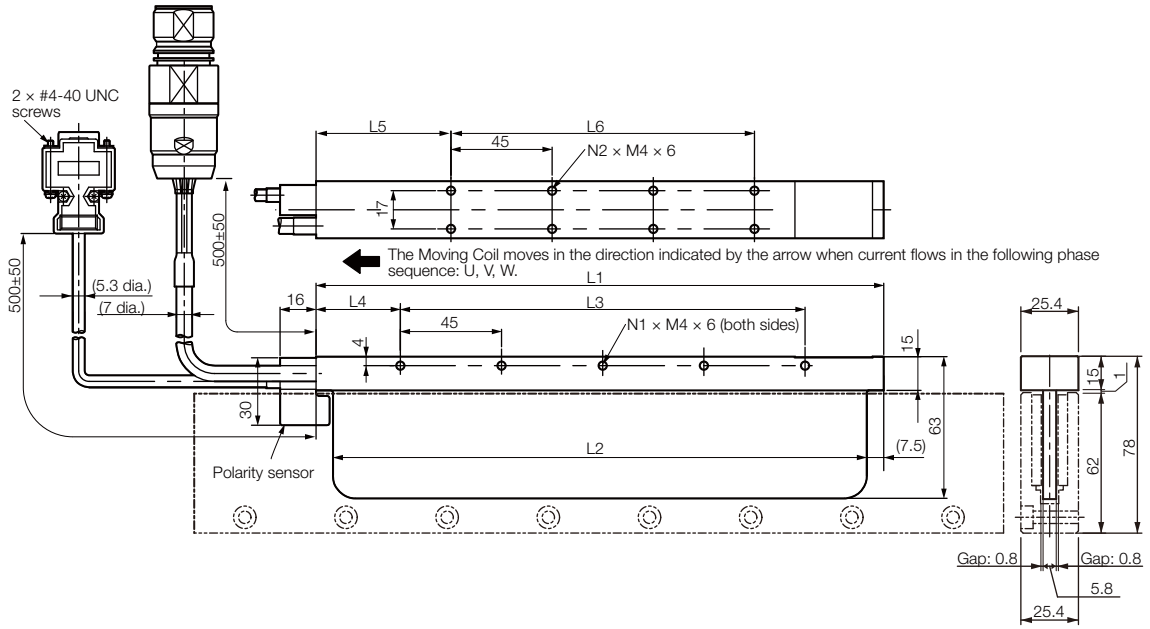
Moving Coil Model SGLGW-	L1	L2	L3	L4	L5	L6	N1	N2	Approx. Mass* [kg]
40A140C□	140	125	90	30	52.5	45	3	4	0.40
40A253C□	252.5	237.5	180	37.5	60	135	5	8	0.66
40A365C□	365	350	315	30	52.5	270	8	14	0.93

* The mass is for a Moving Coil with a Polarity Sensor.

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *SGLGW-40A□□□C□ and -60A□□□C□ Moving Coils* on page 3-26

◆ Moving Coils: SGLGW-40A□□□C□D



Unit: mm

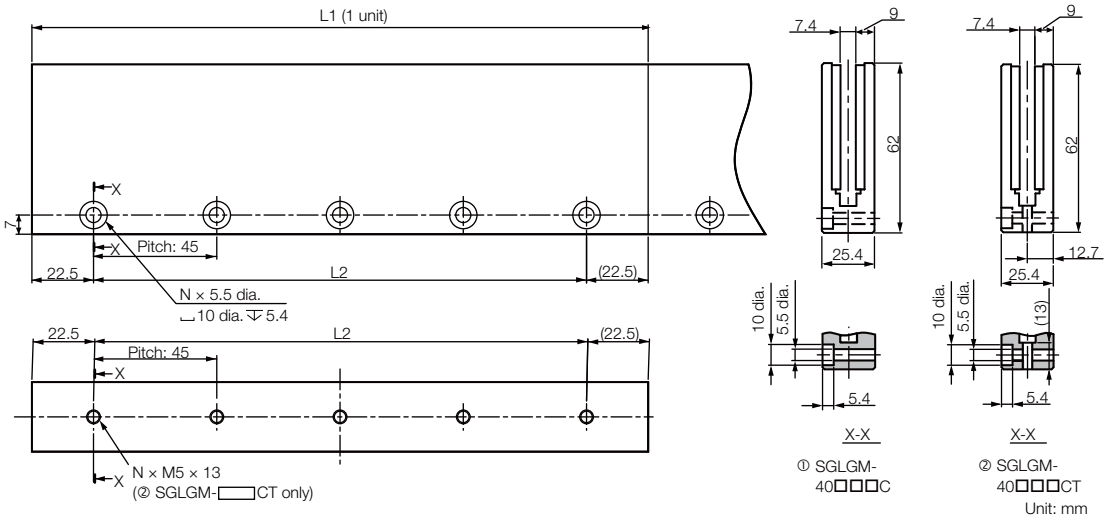
Moving Coil Model SGLGW-	L1	L2	L3	L4	L5	L6	N1	N2	Approx. Mass* [kg]
40A140C□D	140	125	90	30	52.5	45	3	4	0.40
40A253C□D	252.5	237.5	180	37.5	60	135	5	8	0.66
40A365C□D	365	350	315	30	52.5	270	8	14	0.93

* The mass is for a Moving Coil with a Polarity Sensor.

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

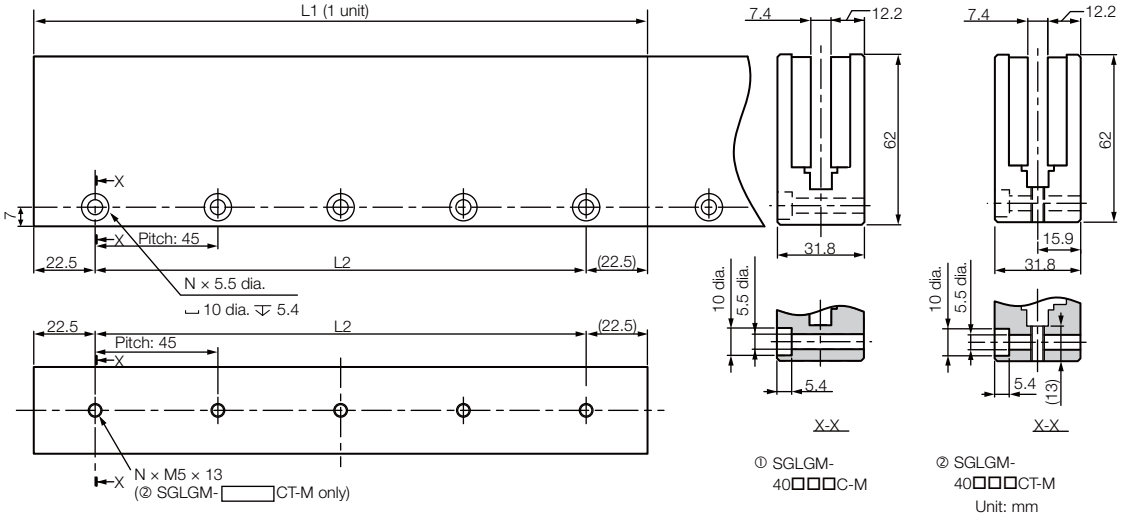
☞ ◆ *SGLGW-40A□□□C□D and -60A□□□C□D Moving Coils* on page 3-27

◆ Standard-Force Magnetic Ways: SGLGM-40□□□C (without Mounting Holes on the Bottom) SGLGM-40□□□CT (with Mounting Holes on the Bottom)



Type	Magnetic Way Model SGLGM-	L1	L2	N	Approx. Mass [kg]
Standard-Force	40090C or 40090CT	$90^{-0.1}_{-0.3}$	45	2	0.8
	40225C or 40225CT	$225^{-0.1}_{-0.3}$	180	5	2.0
	40360C or 40360CT	$360^{-0.1}_{-0.3}$	315	8	3.1
	40405C or 40405CT	$405^{-0.1}_{-0.3}$	360	9	3.5
	40450C or 40450CT	$450^{-0.1}_{-0.3}$	405	10	3.9

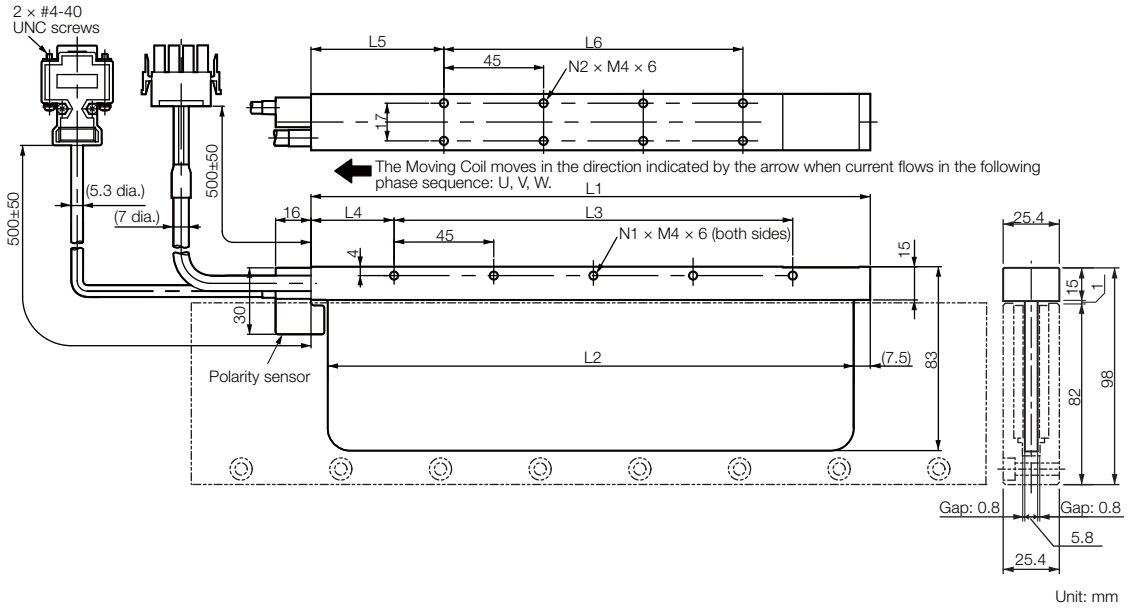
◆ High-Force Magnetic Ways: SGLGM-40□□□C-M (without Mounting Holes on the Bottom) SGLGM-40□□□CT-M (with Mounting Holes on the Bottom)



Type	Magnetic Way Model SGLGM-	L1	L2	N	Approx. Mass [kg]
High-Force	40090C-M or 40090CT-M	$90^{-0.1}_{-0.3}$	45	2	1.0
	40225C-M or 40225CT-M	$225^{-0.1}_{-0.3}$	180	5	2.6
	40360C-M or 40360CT-M	$360^{-0.1}_{-0.3}$	315	8	4.1
	40405C-M or 40405CT-M	$405^{-0.1}_{-0.3}$	360	9	4.6
	40450C-M or 40450CT-M	$450^{-0.1}_{-0.3}$	405	10	5.1

3.3.3 SGLGW-60

◆ Moving Coils: SGLGW-60A□□□C□



Unit: mm

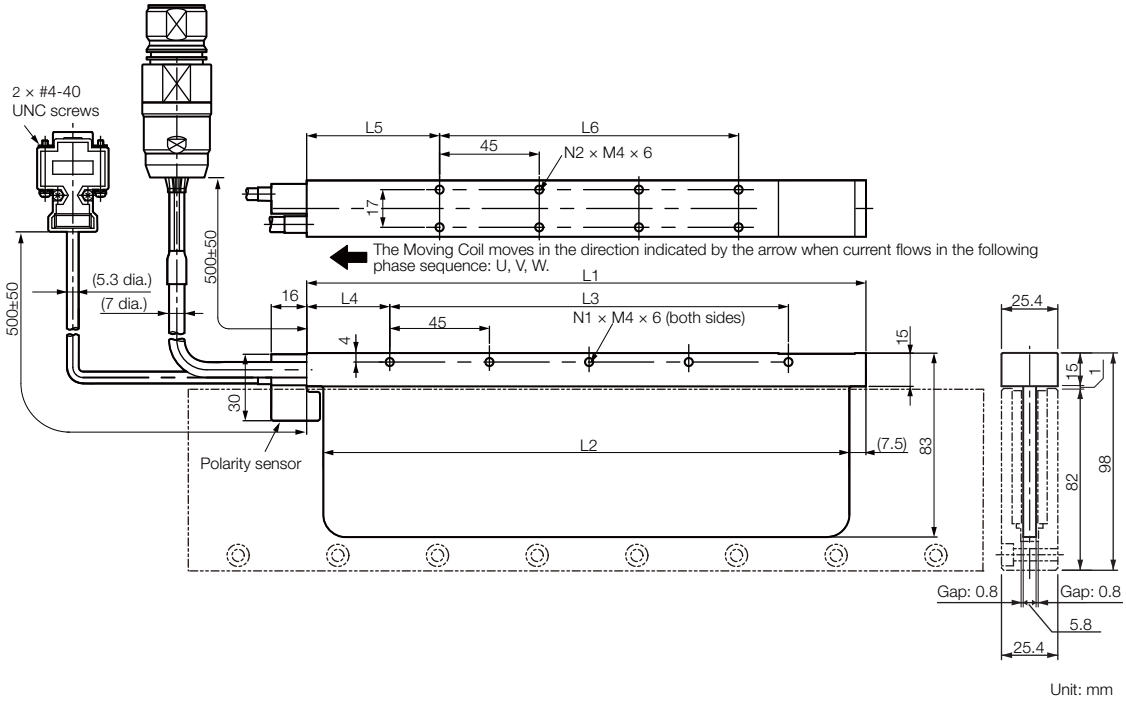
Moving Coil Model SGLGW-	L1	L2	L3	L4	L5	L6	N1	N2	Approx. Mass* [kg]
60A140C□	140	125	90	30	52.5	45	3	4	0.48
60A253C□	252.5	237.5	180	37.5	60	135	5	8	0.82
60A365C□	365	350	315	30	52.5	270	8	14	1.16

* The mass is for a Moving Coil with a Polarity Sensor.

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *SGLGW-40A□□□C□ and -60A□□□C□ Moving Coils* on page 3-26

◆ Moving Coils: SGLGW-60A□□□C□D



Unit: mm

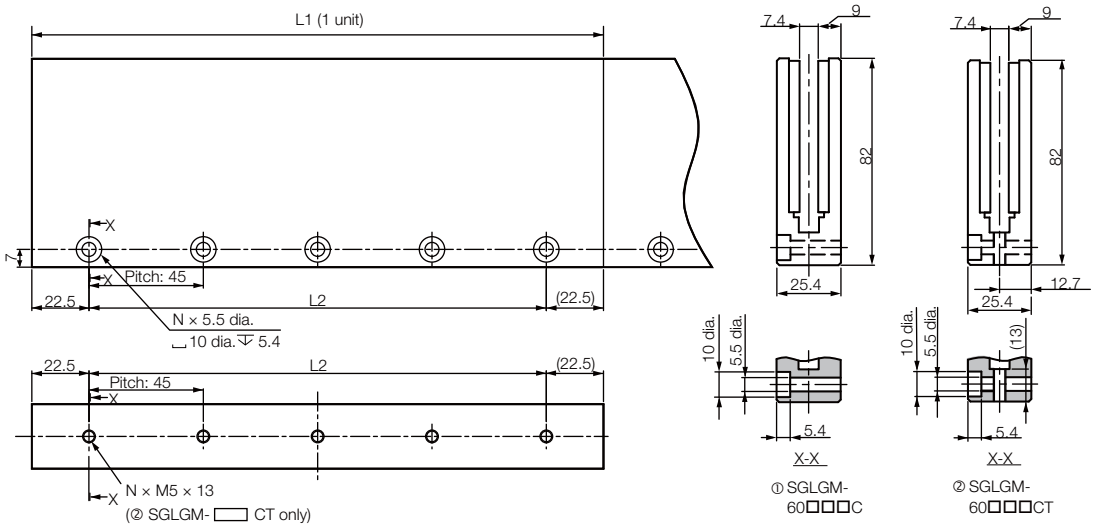
Moving Coil Model SGLGW-	L1	L2	L3	L4	L5	L6	N1	N2	Approx. Mass* [kg]
60A140C□D	140	125	90	30	52.5	45	3	4	0.48
60A253C□D	252.5	237.5	180	37.5	60	135	5	8	0.82
60A365C□D	365	350	315	30	52.5	270	8	14	1.16

* The mass is for a Moving Coil with a Polarity Sensor.

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *SGLGW-40A□□□C□D and -60A□□□C□D Moving Coils* on page 3-27

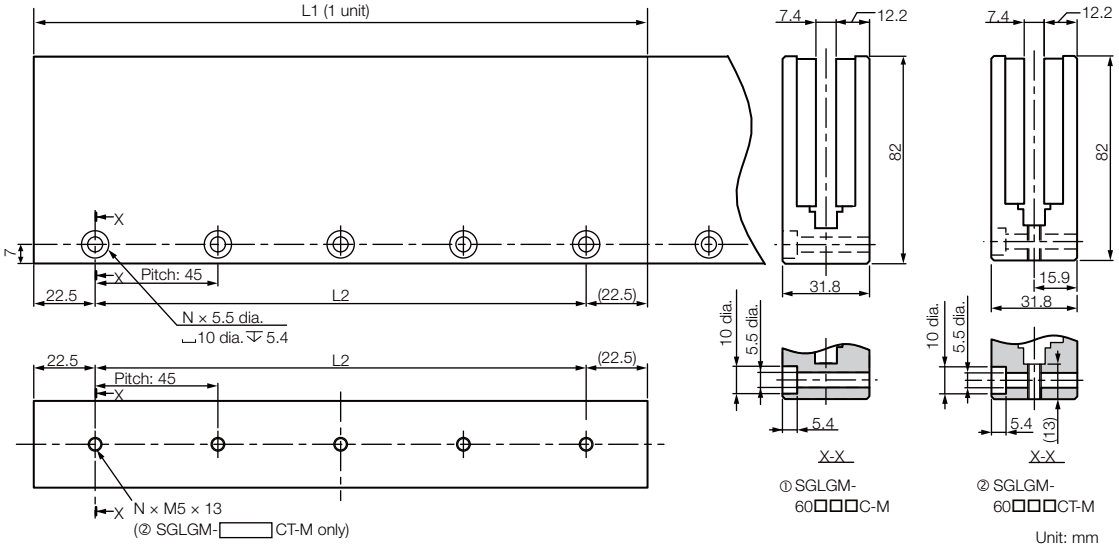
◆ Standard-Force Magnetic Ways: SGLGM-60□□□C (without Mounting Holes on the Bottom) SGLGM-60□□□CT (with Mounting Holes on the Bottom)



Unit: mm

Type	Magnetic Way Model SGLGM-	L1	L2	N	Approx. Mass [kg]
Standard-Force	60090C or 60090CT	$90^{-0.1}_{-0.3}$	45	2	1.1
	60225C or 60225CT	$225^{-0.1}_{-0.3}$	180	5	2.6
	60360C or 60360CT	$360^{-0.1}_{-0.3}$	315	8	4.1
	60405C or 60405CT	$405^{-0.1}_{-0.3}$	360	9	4.6
	60450C or 60450CT	$450^{-0.1}_{-0.3}$	405	10	5.1

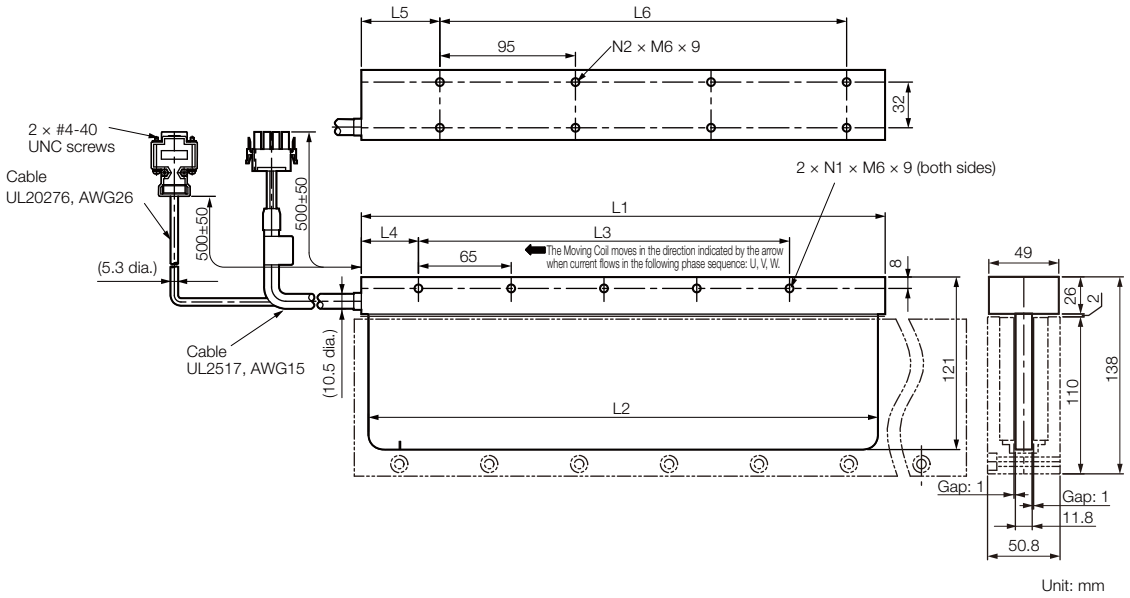
◆ High-Force Magnetic Ways: SGLGM-60□□□C-M (without Mounting Holes on the Bottom) SGLGM-60□□□CT-M (with Mounting Holes on the Bottom)



Type	Magnetic Way Model SGLGM-	L1	L2	N	Approx. Mass [kg]
High-Force	60090C-M or 60090CT-M	$90^{-0.1}_{-0.3}$	45	2	1.3
	60225C-M or 60225CT-M	$225^{-0.1}_{-0.3}$	180	5	3.3
	60360C-M or 60360CT-M	$360^{-0.1}_{-0.3}$	315	8	5.2
	60405C-M or 60405CT-M	$405^{-0.1}_{-0.3}$	360	9	5.9
	60450C-M or 60450CT-M	$450^{-0.1}_{-0.3}$	405	10	6.6

3.3.4 SGLGW-90

◆ Moving Coils: SGLGW-90A□□□C□



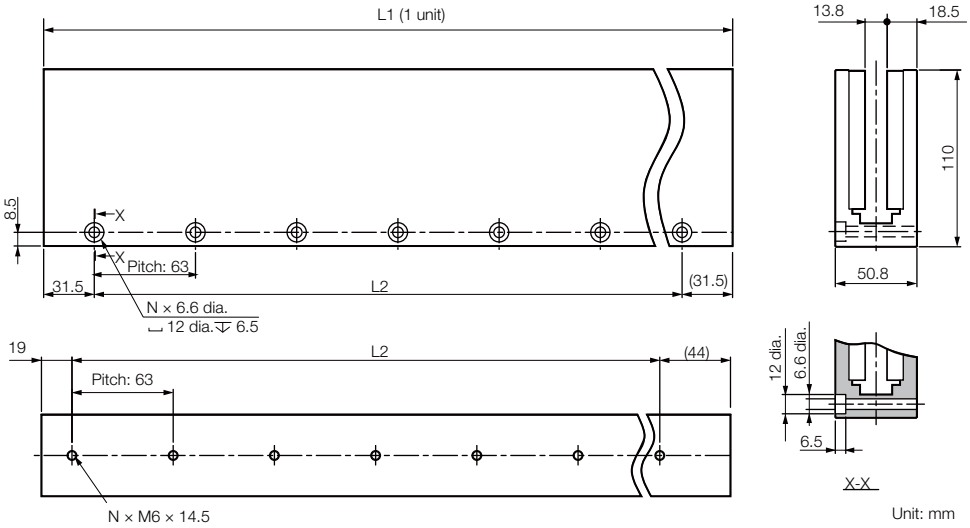
Moving Coil Model SGLGW-	L1	L2	L3	L4	L5	L6	N1	N2	Approx. Mass* [kg]
90A200C□	199	189	130	40	60	95	3	4	2.2
90A370C□	367	357	260	40	55	285	5	8	3.65
90A535C□	535	525	455	40	60	380	8	10	4.95

* The mass is for a Moving Coil with a Polarity Sensor.

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *SGLGW-90A□□□C□ Moving Coils* on page 3-28

◆ Standard-Force Magnetic Ways: SGLGM-90□□□A

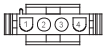


Magnetic Way Model SGLGM-	L1	L2	N	Approx. Mass [kg]
90252A	$252^{-0.1}_{-0.3}$	189	4	7.3
90504A	$504^{-0.1}_{-0.3}$	441	8	14.7

3.3.5 Connector Specifications

◆ SGLGW-30A□□□C□ Moving Coils

• Servomotor Connector

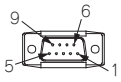


Plug: 350779-1
Pins: 350924-1 or 770672-1
From Tyco Electronics Japan G.K.

Mating Connector
Cap: 350780-1
Socket: 350925-1 or 770673-1

Pin	Signal	Wire Color
1	Phase U	Red
2	Phase V	White
3	Phase W	Blue
4	FG	Green

• Polarity Sensor Connector



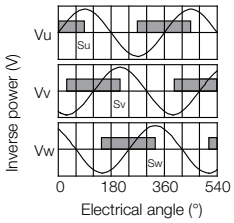
Pin connector: 17JE-23090-02 (D8C)
From DDK Ltd.

Mating Connector
Socket connector: 17JE-13090-02 (D8C)
Studs: 17L-002C or 17L-002C1

Pin	Signal	Pin	Signal
1	+5 V (power supply)	6	Not used
2	Phase U	7	
3	Phase V	8	
4	Phase W	9	
5	0 V (power supply)	–	–

• Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



◆ SGLGW-30A□□□C□D Moving Coils

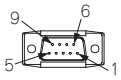
• Servomotor Connector

Extension: SROC06JMSCN169
Pins: 021.423.1020
From Interconnectron GmbH

Mating Connector
Plug: SPUC06KFSDN236
Socket: 020.030.1020

Pin	Signal	Wire Color
1	Phase U	Red
2	Phase V	White
3	Phase W	Blue
4	Not used	–
5	Not used	–
6	FG	Green

• Polarity Sensor Connector



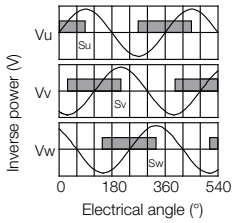
Pin connector: 17JE-23090-02 (D8C)
From DDK Ltd.

Mating Connector
Socket connector: 17JE-13090-02 (D8C)
Studs: 17L-002C or 17L-002C1

Pin	Signal	Pin	Signal
1	+5 V (power supply)	6	Not used
2	Phase U	7	
3	Phase V	8	
4	Phase W	9	
5	0 V (power supply)	–	–

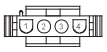
• Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



◆ SGLGW-40A□□□C□ and -60A□□□C□ Moving Coils

• Servomotor Connector

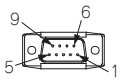


Plug: 350779-1
Pins: 350561-3 or 350690-3 (No.1 to 3)
350654-1 or 350669-1 (No. 4)
From Tyco Electronics Japan G.K.

Mating Connector
Cap: 350780-1
Socket: 350570-3 or 350689-3

Pin	Signal	Wire Color
1	Phase U	Red
2	Phase V	White
3	Phase W	Blue
4	FG	Green

• Polarity Sensor Connector



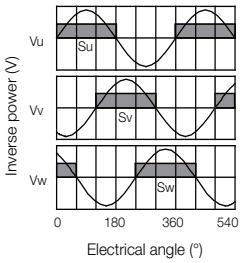
Pin connector: 17JE-23090-02 (D8C)
From DDK Ltd.

Mating Connector
Socket connector: 17JE-13090-02 (D8C)
Studs: 17L-002C or 17L-002C1

Pin	Signal	Pin	Signal
1	+5 V (power supply)	6	Not used
2	Phase U	7	
3	Phase V	8	
4	Phase W	9	
5	0 V (power supply)	–	–

• Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



◆ SGLGW-40A□□□C□D and -60A□□□C□D Moving Coils

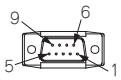
• Servomotor Connector

Extension: SROC06JMSCN169
Pins: 021.423.1020
From Interconnectron GmbH

Mating Connector
Plug: SPUC06KFSDN236
Socket: 020.030.1020

Pin	Signal	Wire Color
1	Phase U	Red
2	Phase V	White
3	Phase W	Blue
4	Not used	–
5	Not used	–
6	FG	Green

• Polarity Sensor Connector



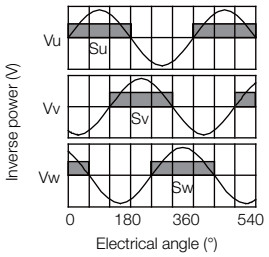
Pin connector: 17JE-23090-02 (D8C)
From DDK Ltd.

Mating Connector
Socket connector: 17JE-13090-02 (D8C)
Studs: 17L-002C or 17L-002C1

Pin	Signal	Pin	Signal
1	+5 V (power supply)	6	Not used
2	Phase U	7	
3	Phase V	8	
4	Phase W	9	
5	0 V (power supply)	–	–

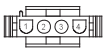
• Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



◆ SGLGW-90A□□□C□ Moving Coils

• Servomotor Connector

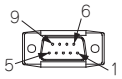


Plug: 350779-1
Pins: 350218-3 or 350547-3 (No.1 to 3)
350654-1 or 350669-1 (No. 4)
From Tyco Electronics Japan G.K.

Mating Connector
Cap: 350780-1
Socket: 350537-3 or 350550-3

Pin	Signal	Wire Color
1	Phase U	Red
2	Phase V	White
3	Phase W	Blue
4	FG	Green

• Polarity Sensor Connector



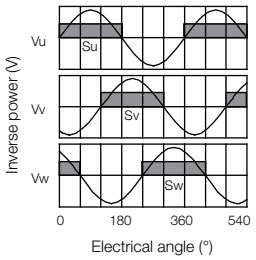
Pin connector: 17JE-23090-02 (D8C)
From DDK Ltd.

Mating Connector
Socket connector: 17JE-13090-02 (D8C)
Stud: 17L-002C or 17L-002C1

Pin	Signal	Pin	Signal
1	+5 V (power supply)	6	Not used
2	Phase U	7	
3	Phase V	8	
4	Phase W	9	
5	0 V (power supply)	–	–

• Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



Specifications, Ratings, and External Dimensions of SGLF Servomotors

4

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

4.1 Model Designations

4.1.1 SGLFW2 Models

◆ Moving Coil

S G L F W 2 - 30 A 070 A T □

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

1st digit Servomotor Type

Code	Specification
F	With F-type iron core

2nd digit Moving Coil/Magnetic Way

Code	Specification
W	Moving Coil

3rd+4th digits Magnet Height

Code	Specification
30	30 mm
45	45 mm
90	90 mm
1D	135 mm

5th digit Power Supply Voltage

Code	Specification
A	200 VAC

6th+7th+8th digits Length of Moving Coil

Code	Specification
070	70 mm
120	125 mm
200	205 mm
230	230 mm
380	384 mm

9th digit Design Revision Order

A

10th digit Sensor Specification

Code	Specification
T	Without polarity sensor, with thermal protector
S	With polarity sensor and Thermal Protector

11th digit Cooling Method

Code	Specification
None	Self-cooled
L	Water-cooled*

Note: This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

* Contact your Yaskawa representative for information on water-cooled models.

◆ Magnetic Way

S G L F M 2 - 30 270 A

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

1st digit Servomotor Type

(Same as for the Moving Coil.)

2nd digit Moving Coil/Magnetic Way

Code	Specification
M	Magnetic Way

3rd+4th digits Magnet Height

(Same as for the Moving Coil.)

5th+6th+7th digits Length of Magnetic Way

Code	Specification
270	270 mm
306	306 mm
450	450 mm
510	510 mm
630	630 mm
714	714 mm

8th digit Design Revision Order

A

4.1.2 SGLFW Models

◆ Moving Coil

S G L F W - 20 A 090 A P □

Linear Σ Series Linear Servomotors

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

1st digit Servomotor Type

Code	Specification
F	With F-type iron core

2nd digit Moving Coil/Magnetic Way

Code	Specification
W	Moving Coil

3rd+4th digits Magnet Height

Code	Specification
20	20 mm
35	36 mm
50	47.5 mm
1Z	95 mm

5th digit Voltage

Code	Specification
A	200 VAC

6th+7th+8th digits Length of Moving Coil

Code	Specification
090	91 mm
120	127 mm
200	215 mm
230	235 mm
380	395 mm

9th digit Design Revision Order

A, B ...

10th digit Sensor Specification

Code	Specification
P	With polarity sensor
None	Without polarity sensor

11th digit Connector for Servomotor Main Circuit Cable

Code	Specification	Applicable Models
None	Connector from Tyco Electronics Japan G.K.	All models
D	Connector from Interconnectron GmbH	SGLFW-35, -50, -1Z□200B

Note: This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

◆ Magnetic Way

S G L F M - 20 324 A □

Linear Σ Series Linear Servomotors

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

1st digit Servomotor Type

(Same as for the Moving Coil.)

2nd digit Moving Coil/Magnetic Way

Code	Specification
M	Magnetic Way

3rd+4th digits Magnet Height

(Same as for the Moving Coil.)

5th+6th+7th digits Length of Magnetic Way

Code	Specification
324	324 mm
405	405 mm
540	540 mm
675	675 mm
756	756 mm
945	945 mm

8th digit Design Revision Order

A, B ...

9th digit Options

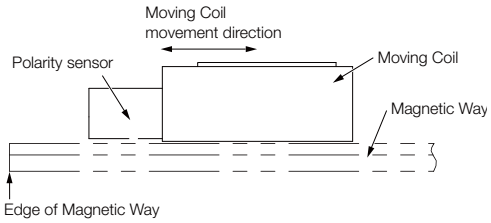
Code	Specification
None	Without options
C	With magnet cover

4.1.3 Precautions on Moving Coils with Polarity Sensors

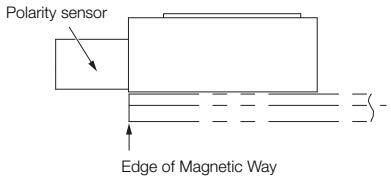
Note

When you use a Moving Coil with a Polarity Sensor, the Magnetic Way must cover the bottom of the polarity sensor. Refer to the example that shows the correct installation.
When determining the length of the Moving Coil's stroke or the length of the Magnetic Way, consider the total length (L) of the Moving Coil and the polarity sensor. Refer to the following table.

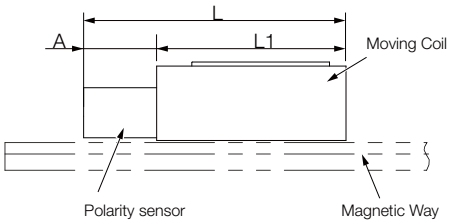
Correct Installation



Incorrect Installation



◆ Total Length of Moving Coil with Polarity Sensor



Moving Coil Model SGLFW2-	Length of Moving Coil, L1 (mm)	Length of Polarity Sensor, A (mm)	Total Length, L (mm)
30A070AS	70	27	97
30A120AS	125		152
30A230AS	230		257
45A200AS	205	32	237
45A380AS	384		416
90A200AS	205	32	237
90A380AS	384		416
1DA380AS	384	32	416

Moving Coil Model SGLFW-	Length of Moving Coil, L1 (mm)	Length of Polarity Sensor, A (mm)	Total Length, L (mm)
20A090AP	91	22	113
20A120AP	127		149
35A120AP□	127	22	149
35A230AP□	235		257
50A200BP□	215	22	237
50A380BP□	395		417
1ZA200BP□	215	22	237
1ZA380BP	395		417

4.2 Ratings and Specifications: SGLFW2 Models

4.2.1 Specifications

Linear Servomotor Moving Coil Model SGLFW2-		30A			45A		90A		1DA
		070A□	120A□	230A□	200A□	380A□	200A□	380A□	380A□
Time Rating		Continuous							
Thermal Class		B							
Insulation Resistance		500 VDC, 10 MΩ min.							
Withstand Voltage		1,500 VAC for 1 minute							
Excitation		Permanent magnet							
Cooling Method		Self-cooled and water-cooled*							
Protective Structure		IP00							
Environmental Conditions	Surrounding Air Temperature	0°C to 40°C (with no freezing)							
	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 1,000 m or less. • Must be free of strong magnetic fields.							
Shock Resistance	Impact Acceleration Rate	196 m/s^2							
	Number of Impacts	2 times							
Vibration Resistance	Vibration Acceleration Rate	49 m/s^2 (the vibration resistance in three directions, vertical, side-to-side, and front-to-back)							

* Contact your Yaskawa representative for information on water-cooled models.

4.2.2 Ratings

Linear Servomotor Moving Coil Model SGLFW2-			30A				45A		
			070A□	120A□	230A□		200A□	380A□	
Rated Motor Speed (Reference Speed during Speed Control)*1		m/s	4.0	4.0	4.0		4.0	4.0	
Maximum Speed*1		m/s	5.0	5.0	5.0		4.5	4.5	
Rated Force*1, *2		N	45	90	180	170	280	560	
Maximum Force*1		N	135	270	540	500	840	1680	1500
Rated Current*1		Arms	1.4	1.5	2.9	2.8	4.4	8.7	
Maximum Current*1		Arms	5.3	5.2	10.5	9.3	16.4	32.7	27.5
Moving Coil Mass		kg	0.50	0.90	1.7		2.9	5.5	
Force Constant		N/Arms	33.3	64.5	64.5		67.5	67.5	
BEMF Constant		Vrms/(m/s)/phase	11.1	21.5	21.5		22.5	22.5	
Motor Constant		$N/\sqrt{W}$	11.3	17.3	24.4		36.9	52.2	
Electrical Time Constant		ms	7.6	7.3	7.3		19	19	
Mechanical Time Constant		ms	3.9	3.0	2.9		2.1	2.0	
Thermal Resistance (with Heat Sink)		K/W	2.62	1.17	0.79		0.60	0.44	
Thermal Resistance (without Heat Sink)		K/W	11.3	4.43	2.55		2.64	1.49	
Magnetic Attraction		N	200	630	1260		2120	4240	
Combined Magnetic Way, SGLFM2-			30□□□A				45□□□A		
Combined Serial Converter Unit, JZDP-□□□□-			628	629	630		631	632	
Applicable SERVOPACKs	SGD7S-		1R6A	1R6A	3R8A	2R8A	5R5A	180A	120A
	SGD7W-		1R6A	1R6A	–	2R8A	5R5A	–	–

*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.

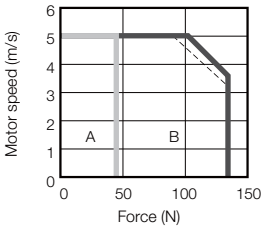
*2. The rated forces are the continuous allowable force values at 40°C with an aluminum heat sink of the dimensions given below.
- Heat Sink Dimensions
  - 150 mm × 100 mm × 10 mm: SGLFW2-30A070A
  - 254 mm × 254 mm × 25 mm: SGLFW2-30A120A and -30A230A
  - 400 mm × 500 mm × 10 mm: SGLFW2-45A200A and -45A380A

◆ Force-Motor Speed Characteristics

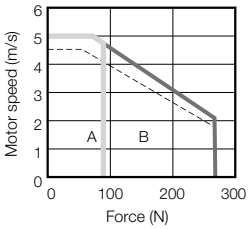
A : Continuous duty zone ——— (solid lines): With three-phase 200-V input

B : Intermittent duty zone - - - - - - (dotted lines): With single-phase 200-V input

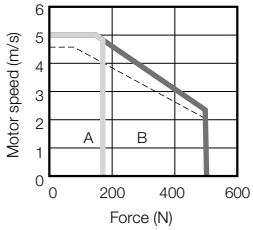
SGLFW2-30A070A



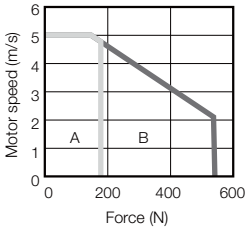
SGLFW2-30A120A



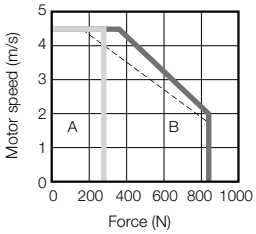
SGLFW2-30A230A
(Combined with SGD7□-2R8A)



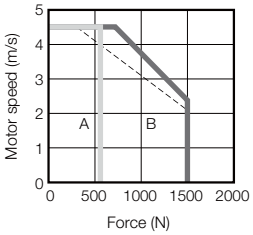
SGLFW2-30A230A
(Combined with SGD7S-3R8A)



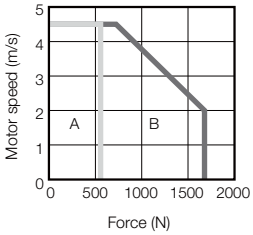
SGLFW2-45A200A



SGLFW2-45A380A
(Combined with SGD7S-120A)



SGLFW2-45A380A
(Combined with SGD7S-180A)



Note: 1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. These are typical values.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective force is within the allowable range for the rated force, 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-motor speed characteristics will become smaller because the voltage drop increases.

4.2.3 Ratings

Linear Servomotor Moving Coil Model SGLFW2-			90A		1DA
			200A□	380A□	380A□
Rated Motor Speed (Reference Speed during Speed Control)*1		m/s	4.0	4.0	2.0
Maximum Speed*1		m/s	4.0	4.0	2.5
Rated Force*1, *2		N	560	1120	1680
Maximum Force*1		N	1680	3360	5040
Rated Current*1		Arms	7.2	14.4	14.4
Maximum Current*1		Arms	26.9	53.9	53.9
Moving Coil Mass		kg	5.3	10.1	14.6
Force Constant		N/Arms	82.0	82.0	123
BEMF Constant		Vrms/(m/s)/phase	27.3	27.3	41.0
Motor Constant		$N/\sqrt{W}$	58.1	82.2	105
Electrical Time Constant		ms	24	23	25
Mechanical Time Constant		ms	1.6	1.5	1.3
Thermal Resistance (with Heat Sink)		K/W	0.45	0.21	0.18
Thermal Resistance (without Heat Sink)		K/W	1.81	1.03	0.79
Magnetic Attraction		N	4240	8480	12700
Combined Magnetic Way, SGLFM2-			90□□□A		1D□□□A
Combined Serial Converter Unit, JZDP-□□□□-			633	634	649
Applicable SERVOPACKs	SGD7S-		120A	200A	200A
	SGD7W-		–	–	–

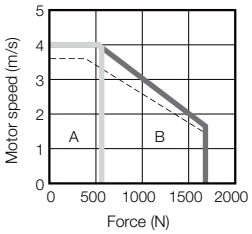
*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. The values for other items are at 20°C. These are typical values.

*2. The rated forces are the continuous allowable force values at 40°C with an aluminum heat sink of the dimensions given below.
- Heat Sink Dimensions
  - 400 mm × 500 mm × 10 mm: SGLFW2-90A200A
  - 609 mm × 762 mm × 10 mm: SGLFW2-90A380A
  - 900 mm × 762 mm × 10 mm: SGLFW2-1DA380A

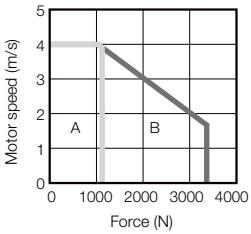
◆ Force-Motor Speed Characteristics

A : Continuous duty zone ———— (solid lines): With three-phase 200-V input
B : Intermittent duty zone - - - - - - - - (dotted lines): With single-phase 200-V input

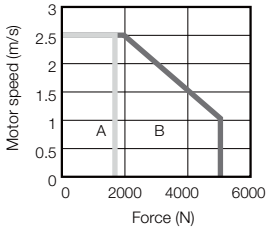
SGLFW2-90A200A



SGLFW2-90A380A



SGLFW2-1DA380A

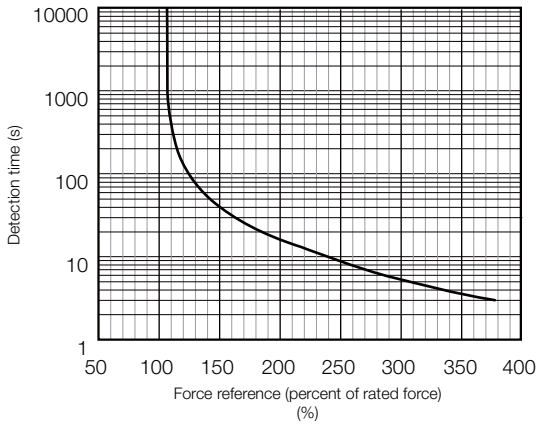


Note: 1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. These are typical values.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective force is within the allowable range for the rated force, 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-motor speed characteristics will become smaller because the voltage drop increases.

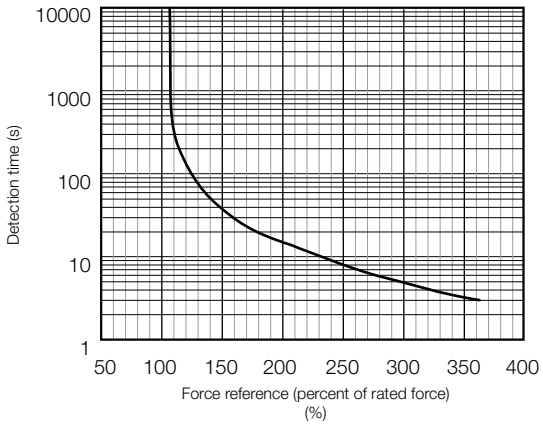
◆ Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions with a Servomotor ambient temperature of 40°C.

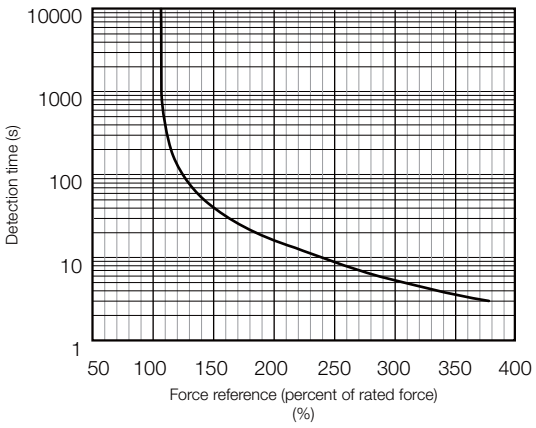
SGLFW2-30A070A



SGLFW2-30A120A and -230A



SGLFW2-45A, -90A, and -1DA



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 force remains within the continuous duty zone given in ◆ *Force-Motor Speed Characteristics on* page 4-7 *and* on page 4-9.

4.3 Ratings and Specifications: SGLFW Models

4.3.1 Specifications

Linear Servomotor Moving Coil Model SGLFW-		20A		35A		50A		1ZA	
		090A	120A	120A	230A	200B	380B	200B	380B
Time Rating		Continuous							
Thermal Class		B							
Insulation Resistance		500 VDC, 10 MΩ min.							
Withstand Voltage		1,500 VAC for 1 minute							
Excitation		Permanent magnet							
Cooling Method		Self-cooled							
Protective Structure		IP00							
Environmental Conditions	Surrounding Air Temperature	0°C to 40°C (with no freezing)							
	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 1,000 m or less. • Must be free of strong magnetic fields.							
Shock Resistance	Impact Acceleration Rate	196 m/s^2							
	Number of Impacts	2 times							
Vibration Resistance	Vibration Acceleration Rate	49 m/s^2 (the vibration resistance in three directions, vertical, side-to-side, and front-to-back)							

4.3.2 Ratings

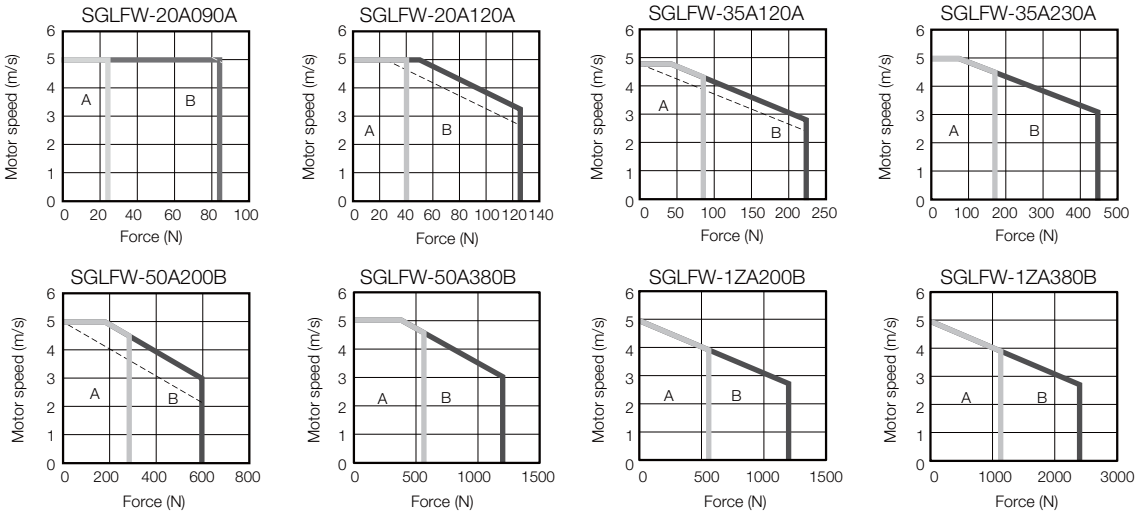
Linear Servomotor Moving Coil Model SGLFW-			20A		35A		50A		1ZA	
			090A	120A	120A	230A	200B	380B	200B	380B
Rated Motor Speed (Reference Speed during Speed Control)*1		m/s	5.0	3.5	2.5	3.0	1.5	1.5	1.5	1.5
Maximum Speed*1		m/s	5.0	5.0	5.0	5.0	5.0	5.0	4.9	4.9
Rated Force*1, *2		N	25	40	80	160	280	560	560	1120
Maximum Force*1		N	86	125	220	440	600	1200	1200	2400
Rated Current*1		Arms	0.70	0.80	1.4	2.8	5.0	10.0	8.7	17.5
Maximum Current*1		Arms	3.0	2.9	4.4	8.8	12.4	25.0	21.6	43.6
Moving Coil Mass		kg	0.70	0.90	1.3	2.3	3.5	6.9	6.4	12
Force Constant		N/Arms	36.0	54.0	62.4	62.4	60.2	60.2	69.0	69.0
BEMF Constant		Vrms/(m/s)/ phase	12.0	18.0	20.8	20.8	20.1	20.1	23.0	23.0
Motor Constant		$N/\sqrt{W}$	7.95	9.81	14.4	20.4	34.3	48.5	52.4	74.0
Electrical Time Constant		ms	3.2	3.3	3.6	3.6	16	16	18	18
Mechanical Time Constant		ms	11	9.4	6.3	5.5	3.0	2.9	2.3	2.1
Thermal Resistance (with Heat Sink)		K/W	4.35	3.19	1.57	0.96	0.56	0.38	0.47	0.20
Thermal Resistance (without Heat Sink)		K/W	7.69	5.02	4.10	1.94	1.65	0.95	1.30	0.73
Magnetic Attraction		N	310	460	810	1590	1650	3260	3300	6520
Combined Magnetic Way, SGLFM-			20□□□A□		35□□□A□		50□□□A□		1Z□□□A□	
Combined Serial Converter Unit, JZDP-□□□□-			017	018	019	020	181	182	183	184
Applicable SERVOPACKs	SGD7S-		1R6A	1R6A	1R6A	3R8A	5R5A	120A	120A	200A
	SGD7W-		1R6A	1R6A	1R6A	5R5A	5R5A	–	–	–

*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 forces are the continuous allowable force values at 40°C with an aluminum heat sink of the dimensions given below.
- Heat Sink Dimensions
  - 125 mm × 125 mm × 13 mm: SGLFW-20A090A and -20A120A
  - 254 mm × 254 mm × 25 mm: SGLFW-35A120A and -35A230A
  - 400 mm × 500 mm × 40 mm: SGLFW-50A200B, 50A380B, and -1ZA200B
  - 600 mm × 762 mm × 50 mm: SGLFW-1ZA380B

◆ Force-Motor Speed Characteristics

A : Continuous duty zone ———— (solid lines): With three-phase 200-V input
B : Intermittent duty zone - - - - - - - - (dotted lines): With single-phase 200-V input

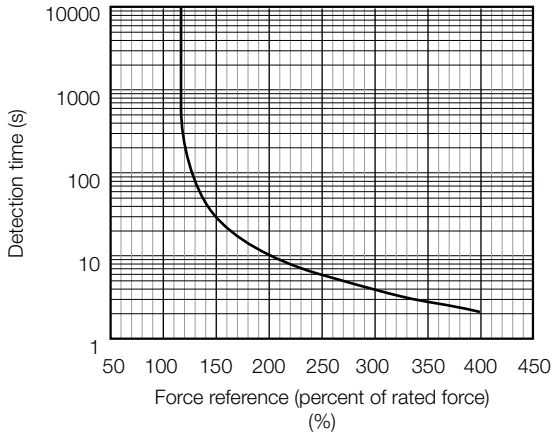


Note: 1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. These are typical values.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective force is within the allowable range for the rated force, 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-motor speed characteristics will become smaller because the voltage drop increases.

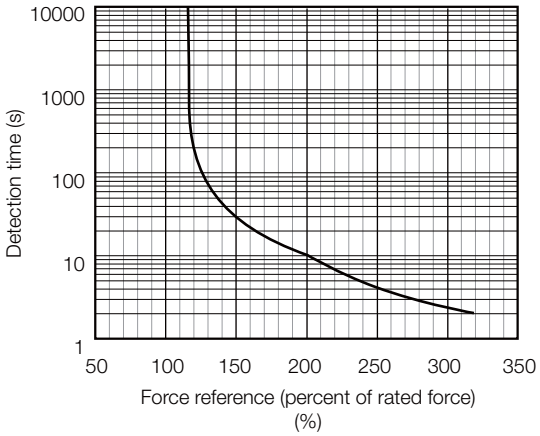
◆ Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions with a Servomotor ambient temperature of 40°C.

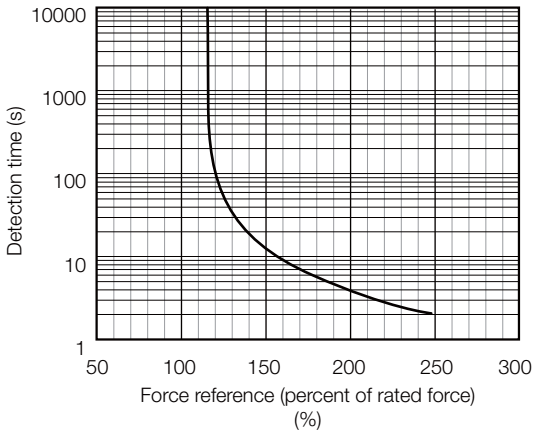
SGLFW-20A



SGLFW-35A



SGLFW-50A and -1ZA

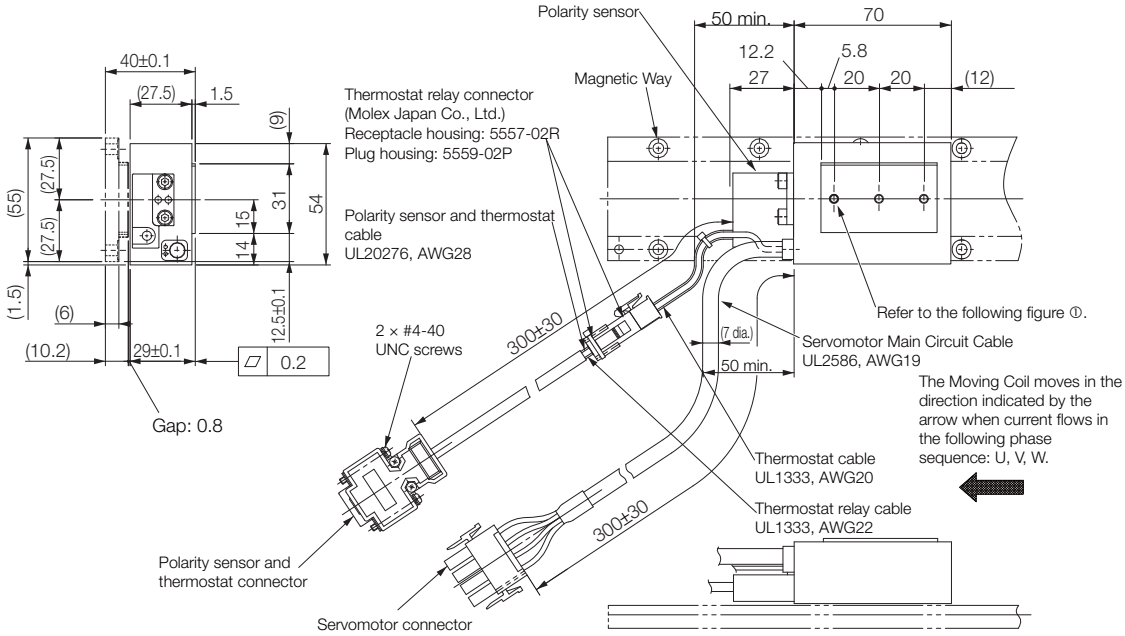


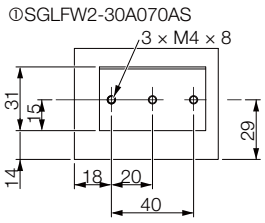
Note: The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher. Use the Servomotor so that the effective force remains within the continuous duty zone given in ◆ *Force-Motor Speed Characteristics* on page 4-12.

4.4 External Dimensions

4.4.1 SGLFW2-30

◆ Moving Coil with Polarity Sensor: SGLFW2-30A070AS





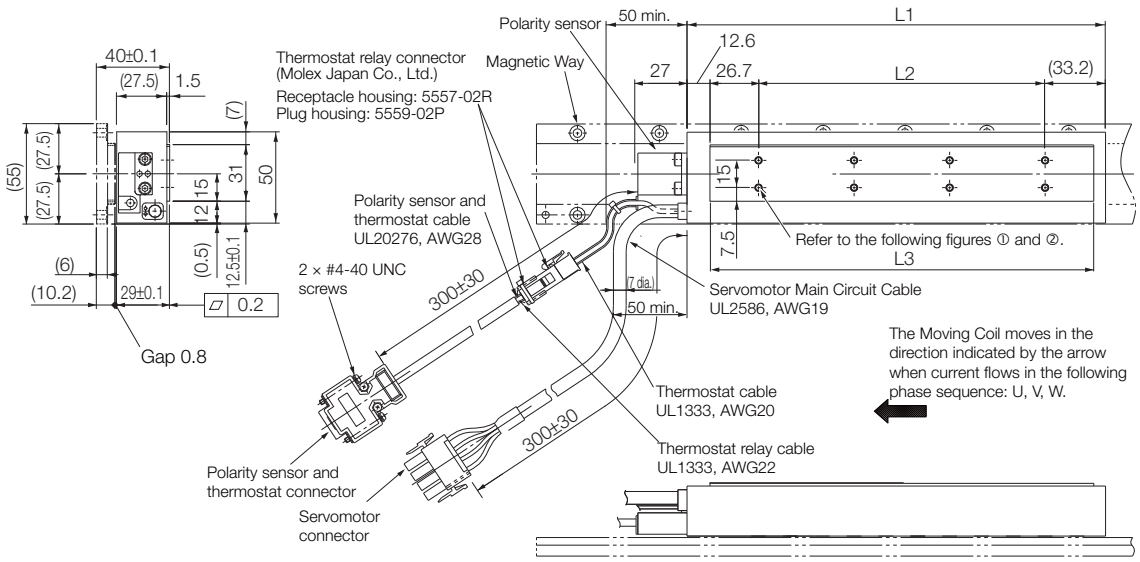
Approx. mass: 0.5 kg

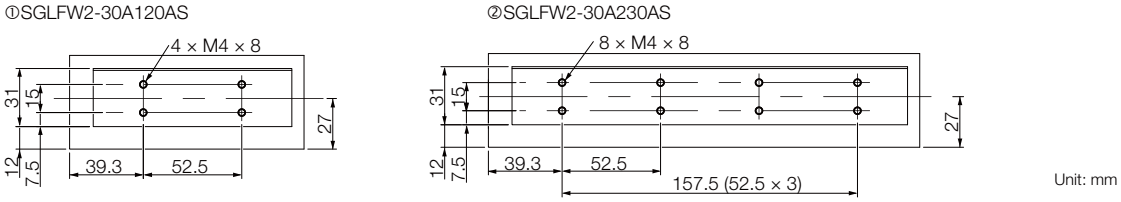
Unit: mm

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *Moving Coils with Polarity Sensors: SGLFW2-30 and -45* on page 4-39

◆ Moving Coils with Polarity Sensors: SGLFW2-30A□□□AS



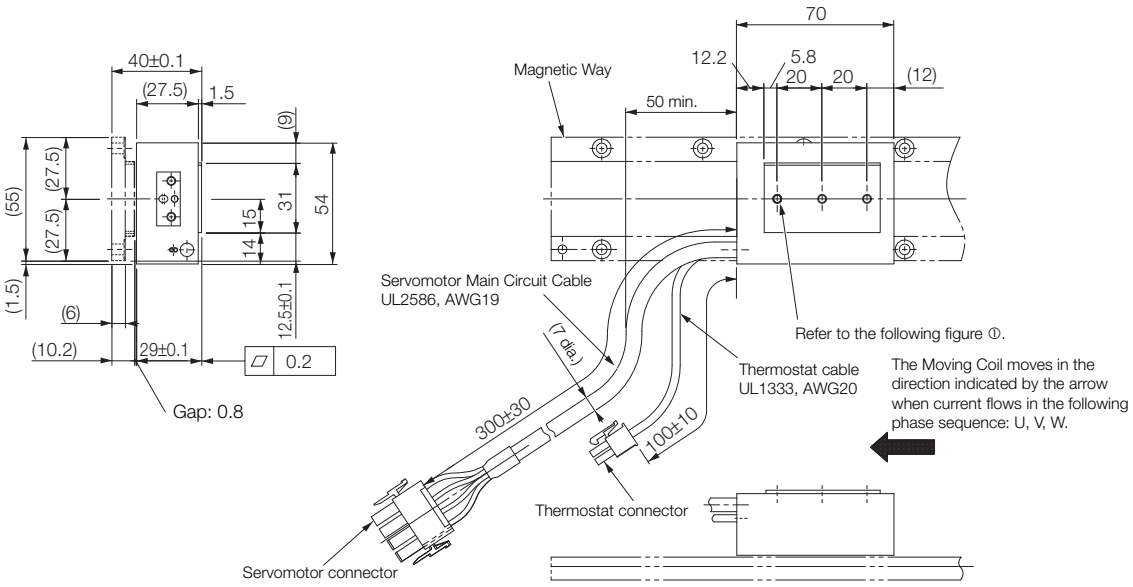


Moving Coil Model SGLFW2-	L1	L2	L3	Approx. Mass [kg]
30A120AS	125	52.5	105.9	0.9
30A230AS	230	157.5	210.9	1.7

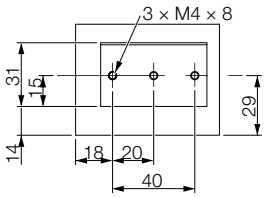
Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *Moving Coils with Polarity Sensors: SGLFW2-30 and -45* on page 4-39

◆ Moving Coil without Polarity Sensor: SGLFW2-30A070AT



①SGLFW2-30A070AT



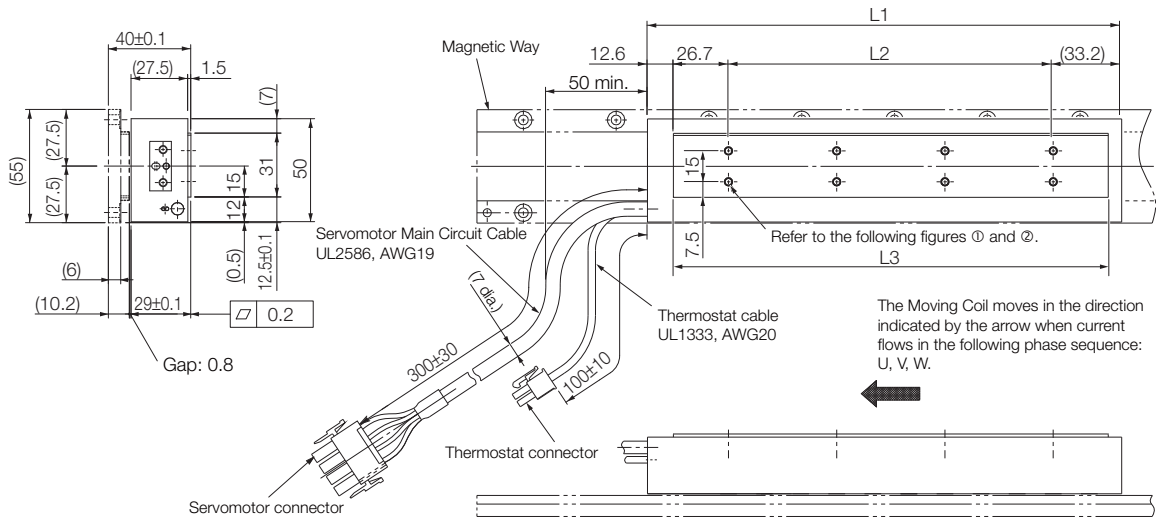
Approx. mass: 0.5 kg

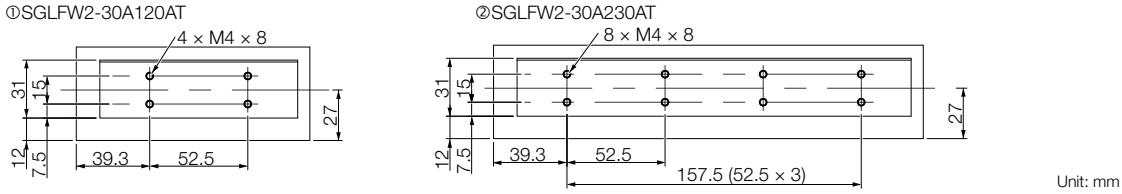
Unit: mm

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *Moving Coils without Polarity Sensors: SGLFW2-30 and -45* on page 4-40

◆ Moving Coils without Polarity Sensors: SGLFW2-30A□□□AT





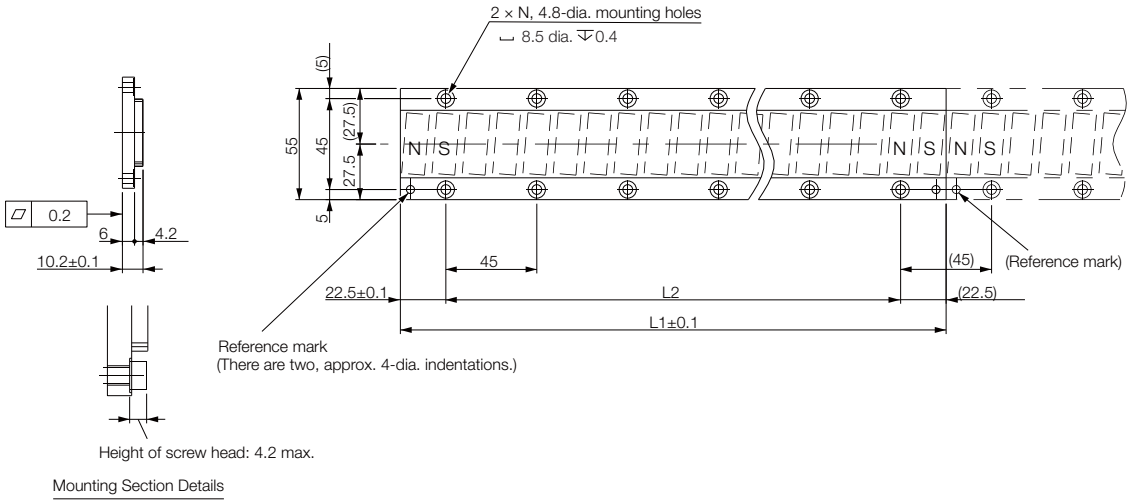
Unit: mm

Moving Coil Model SGLFW2-	L1	L2	L3	Approx. Mass [kg]
30A120AT	125	52.5	105.9	0.9
30A230AT	230	157.5	210.9	1.7

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *Moving Coils without Polarity Sensors: SGLFW2-30 and -45* on page 4-40

◆ Magnetic Ways: SGLFM2-30□□□A



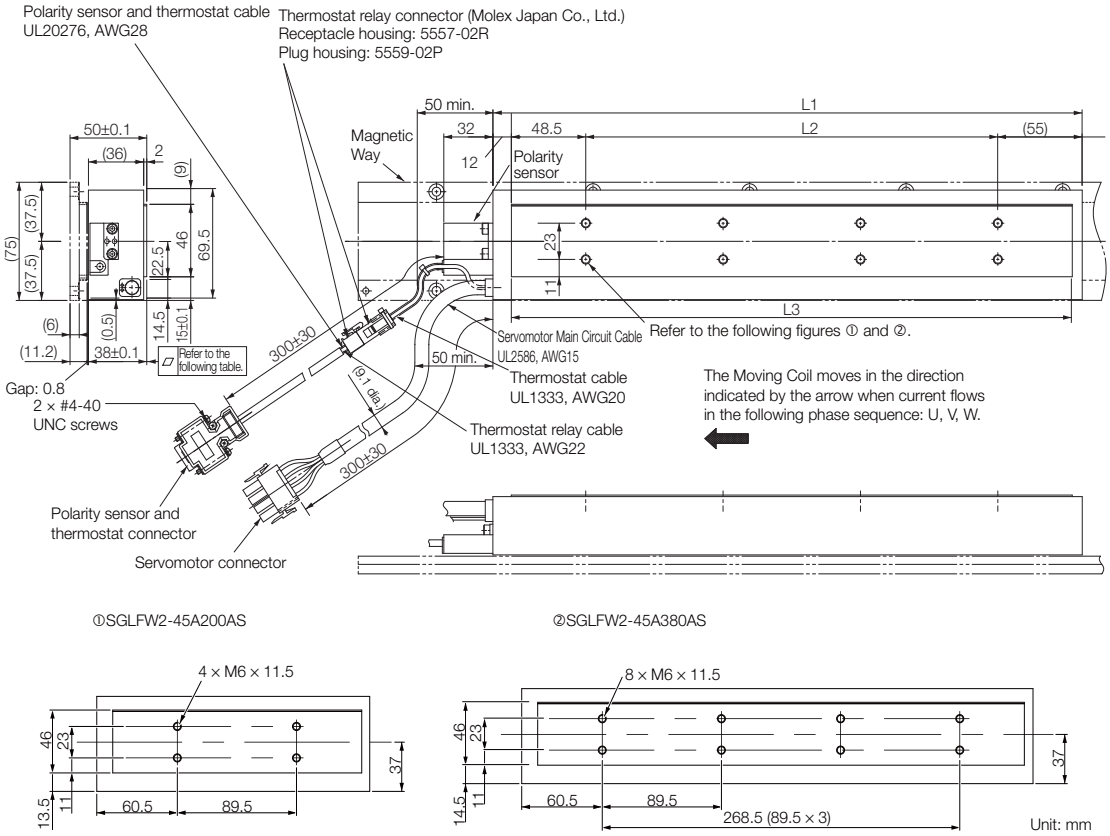
Unit: mm

Note: More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

Magnetic Way Model SGLFM2-	L1 ± 0.1	L2	N	Approx. Mass [kg]
30270A	270	225 (45 × 5)	6	0.9
30450A	450	405 (45 × 9)	10	1.5
30630A	630	585 (45 × 13)	14	2.0

4.4.2 SGLFW2-45

◆ Moving Coils with Polarity Sensors: SGLFW2-45A□□□AS

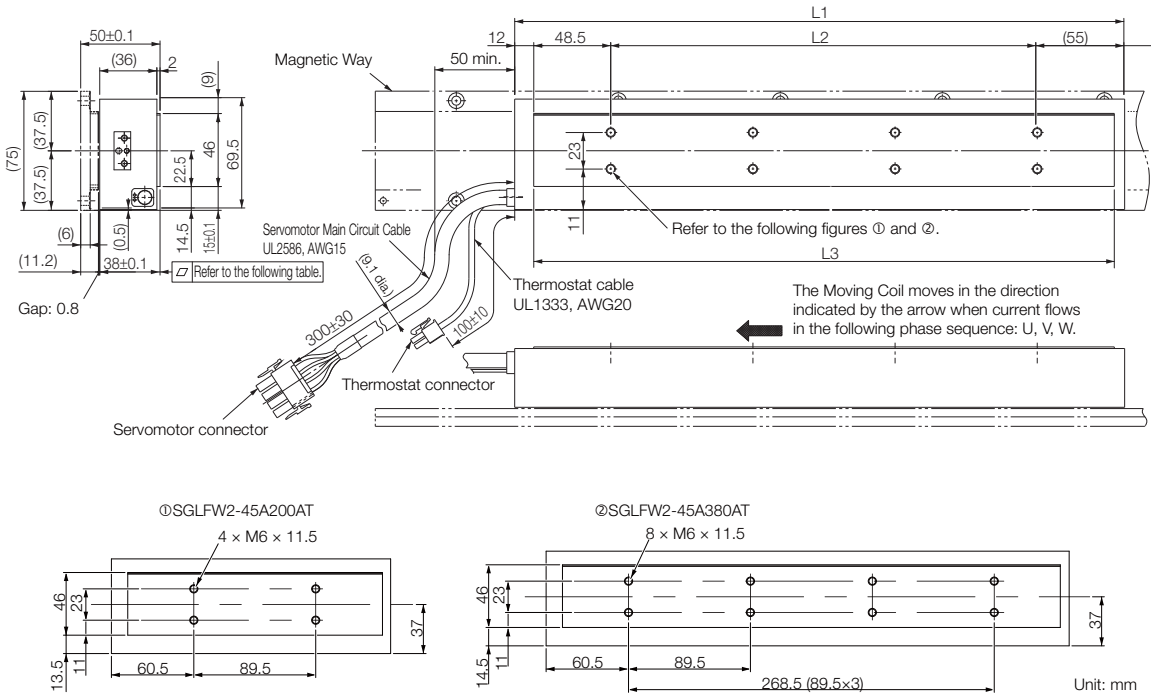


Moving Coil Model SGLFW2-	L1	L2	L3	Flatness	Approx. Mass [kg]
45A200AS	205	89.5	187	0.2	2.9
45A380AS	384	268.5	365.5	0.3	5.5

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *Moving Coils with Polarity Sensors: SGLFW2-30 and -45* on page 4-39

◆ Moving Coils without Polarity Sensors: SGLFW2-45A□□□AT

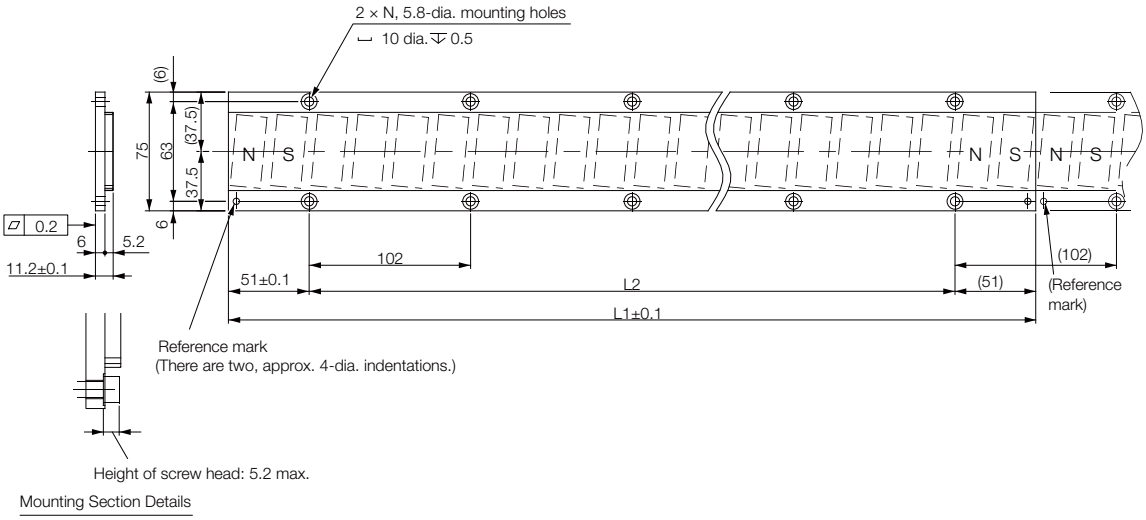


Moving Coil Model SGLFW2-	L1	L2	L3	Flatness	Approx. Mass [kg]
45A200AT	205	89.5	187	0.2	2.9
45A380AT	384	268.5	365.5	0.3	5.5

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *Moving Coils without Polarity Sensors: SGLFW2-30 and -45* on page 4-40

◆ Magnetic Ways: SGLFM2-45□□□A



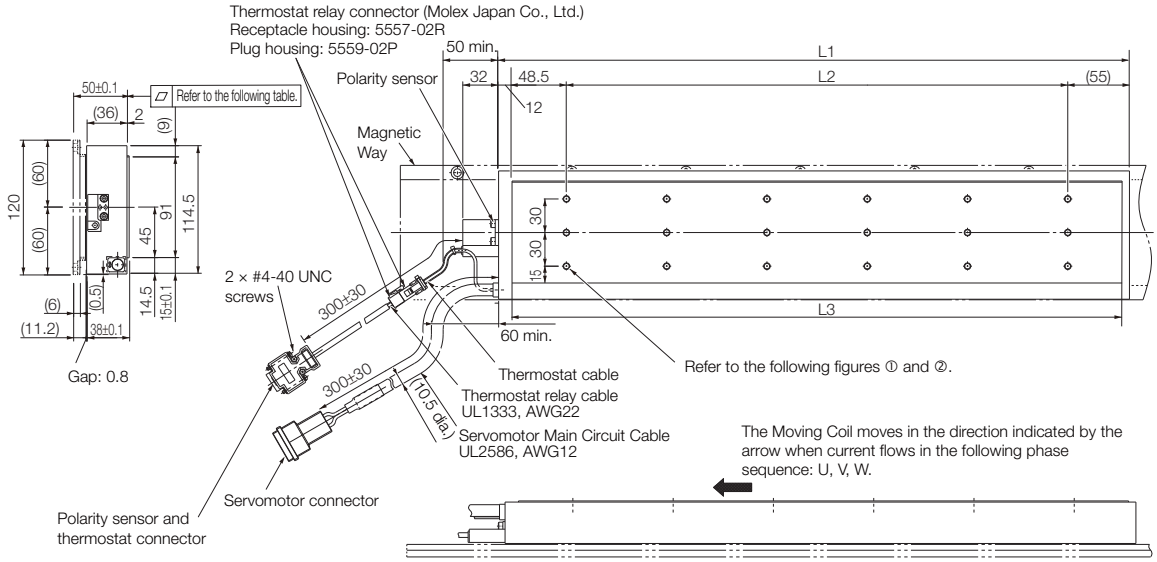
Unit: mm

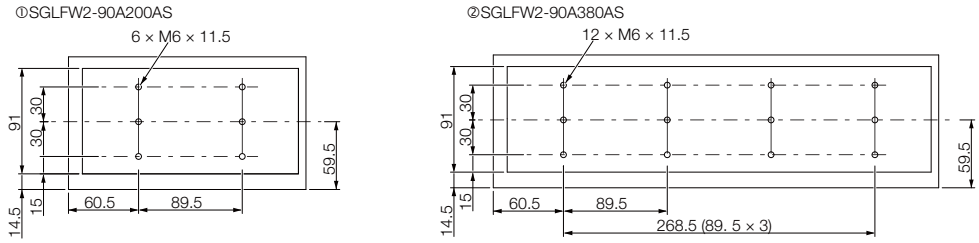
Note: More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

Magnetic Way Model SGLFM2-	L1 ± 0.1	L2	N	Approx. Mass [kg]
45306A	306	204 (102 × 2)	3	1.5
45510A	510	408 (102 × 4)	5	2.5
45714A	714	612 (102 × 6)	7	3.4

4.4.3 SGLFW2-90

◆ Moving Coils with Polarity Sensors: SGLFW2-90A□□□AS





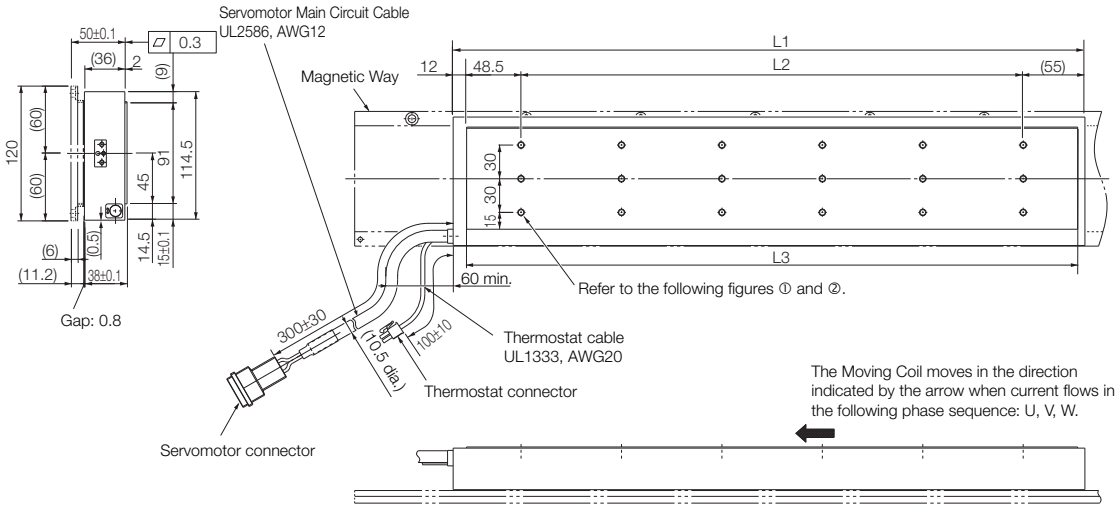
Unit: mm

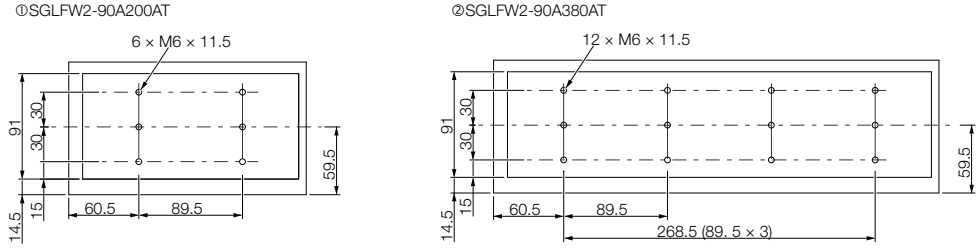
Moving Coil Model SGLFW2-	L1	L2	L3	Flatness	Approx. Mass [kg]
90A200AS	205	89.5	187	0.2	5.3
90A380AS	384	268.5	365.5	0.3	10.1

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *Moving Coils with Polarity Sensors: SGLFW2-90 and -1D* on page 4-41

◆ Moving Coils without Polarity Sensors: SGLFW2-90A□□□AT





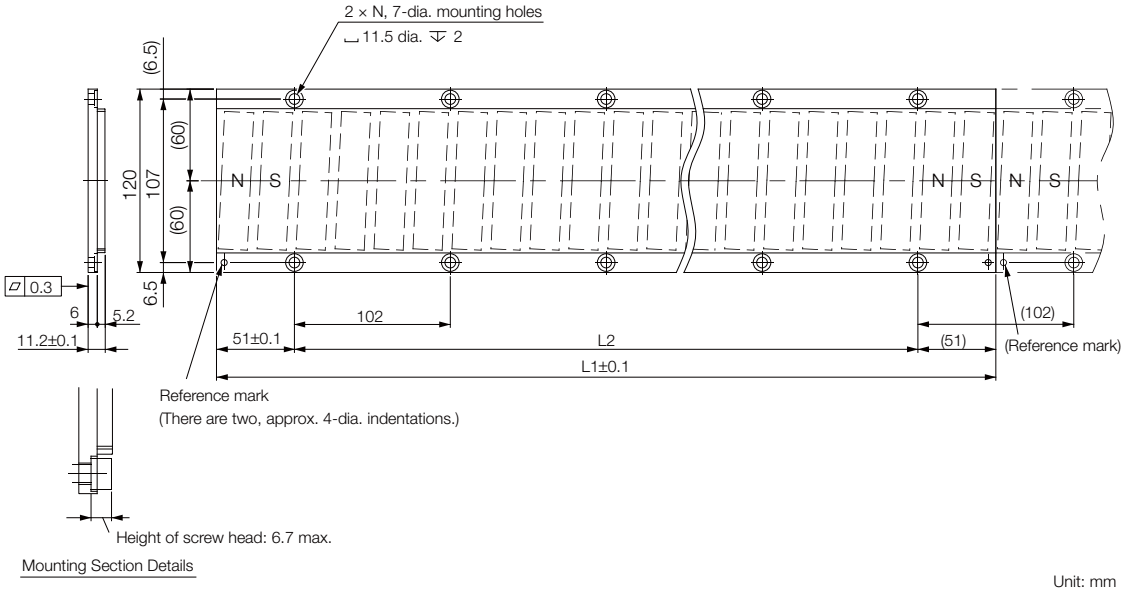
Unit: mm

Moving Coil Model SGLFW2-	L1	L2	L3	Flatness	Approx. Mass [kg]
90A200AT	205	89.5	187	0.2	5.3
90A380AT	384	268.5	365.5	0.3	10.1

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *Moving Coils without Polarity Sensors: SGLFW2-90 and -1D* on page 4-42

◆ Magnetic Ways: SGLFM2-90□□□A



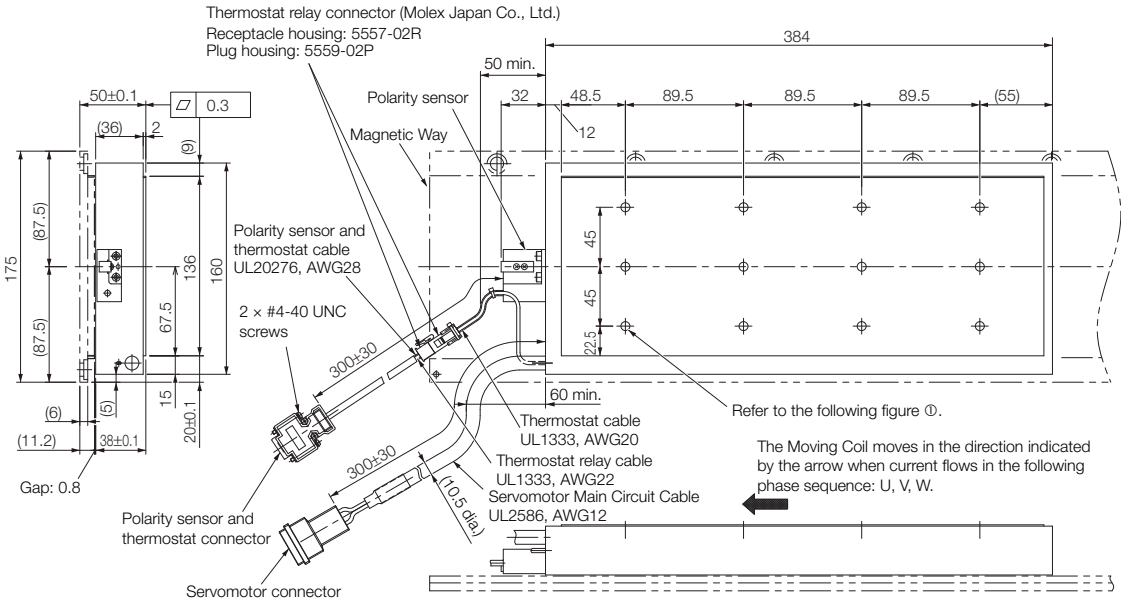
Unit: mm

Note: More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

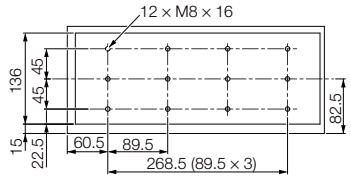
Magnetic Way Model SGLFM2-	L1±0.1	L2	N	Approx. Mass [kg]
90306A	306	204 (102 × 2)	3	2.6
90510A	510	408 (102 × 4)	5	4.2
90714A	714	612 (102 × 6)	7	5.9

4.4.4 SGLFW2-1D

◆ Moving Coil with Polarity Sensor: SGLFW2-1DA380AS



①SGLFW2-1DA380AS



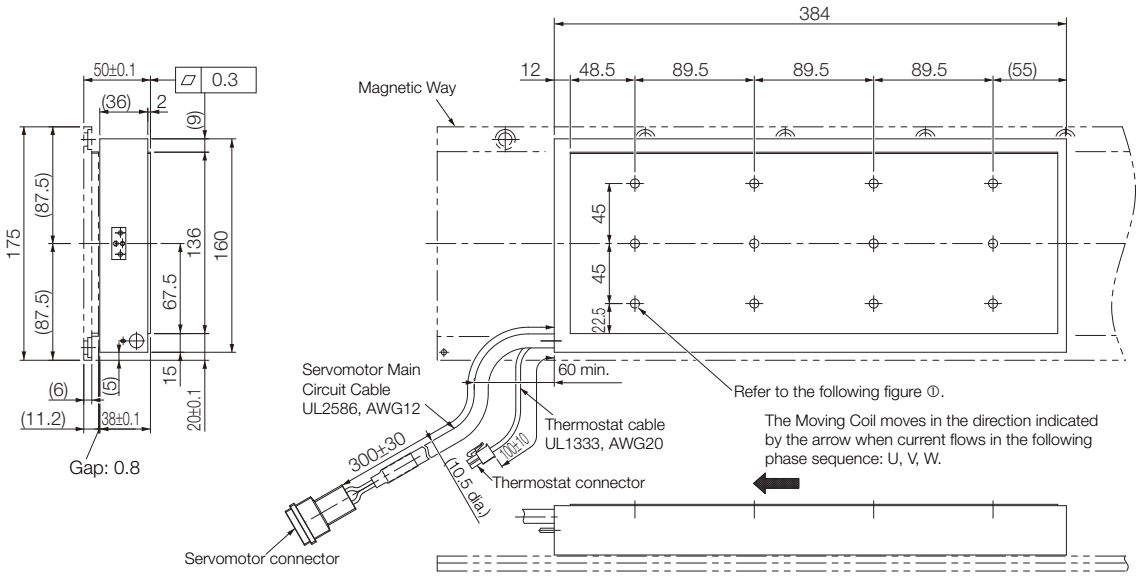
Approx. mass: 14.6 kg

Unit: mm

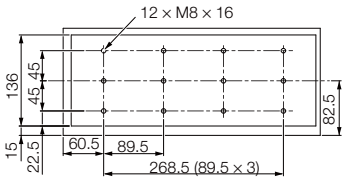
Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *Moving Coils with Polarity Sensors: SGLFW2-90 and -1D* on page 4-41

◆ Moving Coil without Polarity Sensor: SGLFW2-1DA380AT



①SGLFW2-1DA380AT



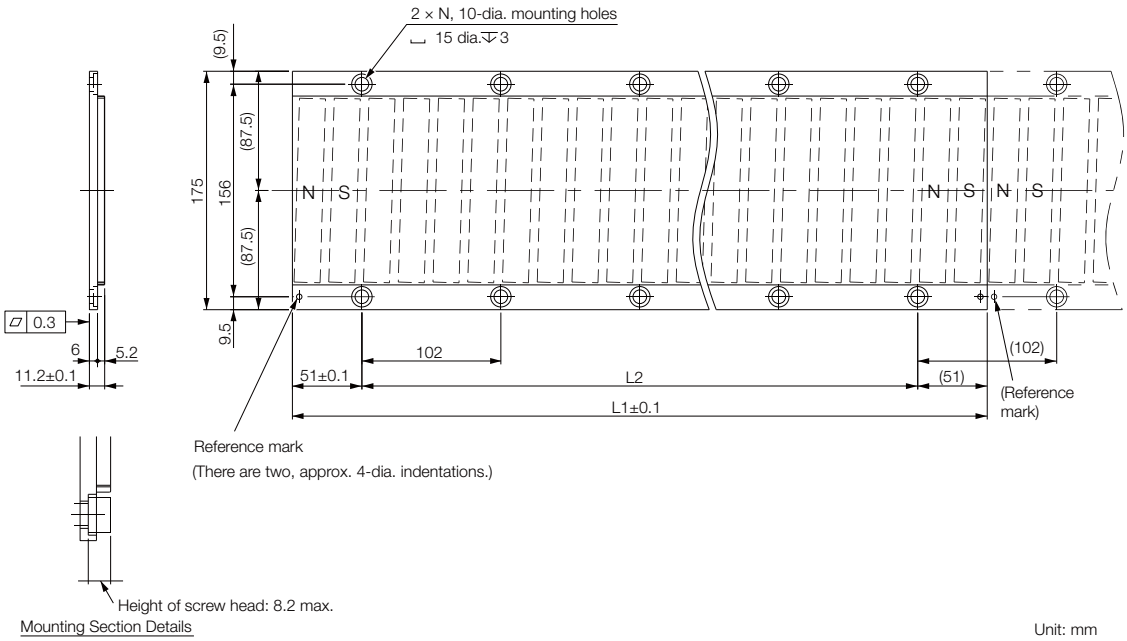
Approx. mass: 14.6 kg

Unit: mm

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *Moving Coils without Polarity Sensors: SGLFW2-90 and -1D* on page 4-42

◆ Magnetic Ways: SGLFM2-1D□□□A

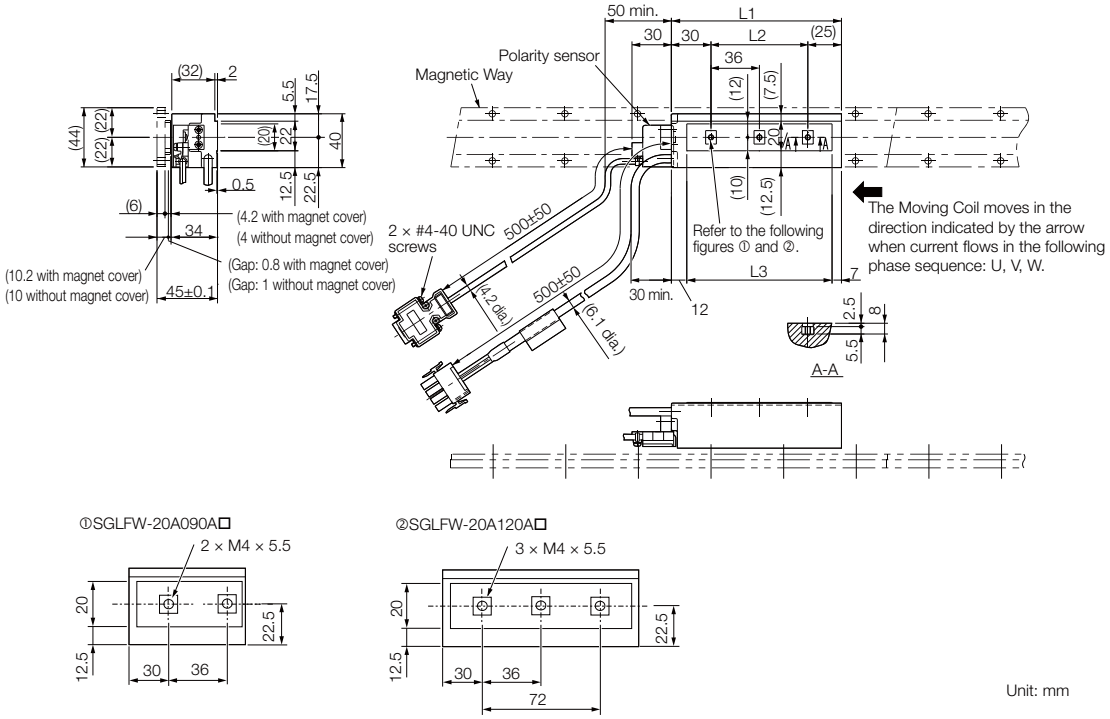


Note: More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

Magnetic Way Model SGLFM2-	L1±0.1	L2	N	Approx. Mass [kg]
1D306A	306	204 (102 × 2)	3	3.7
1D510A	510	408 (102 × 4)	5	6.2
1D714A	714	612 (102 × 6)	7	8.6

4.4.5 SGLFW-20

◆ Moving Coils: SGLFW-20A□□□A□



Unit: mm

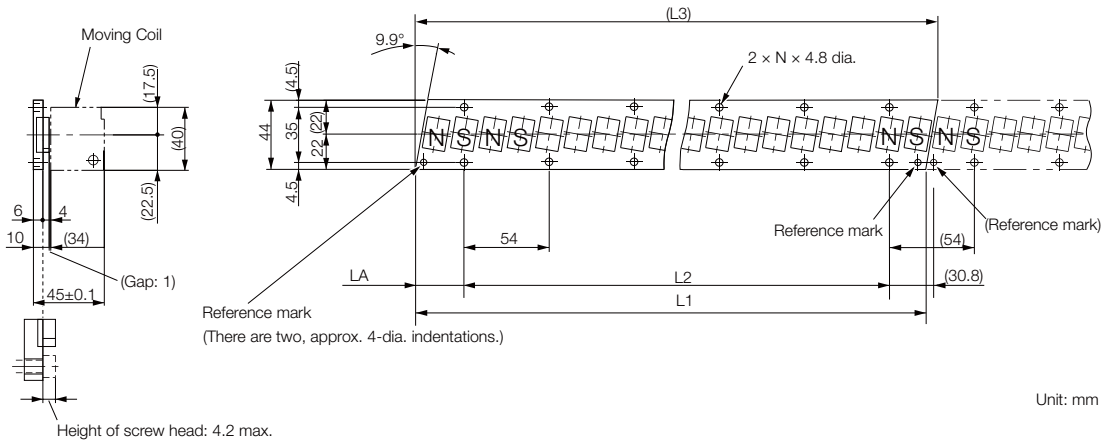
Moving Coil Model SGLFW-	L1	L2	L3	Approx. Mass [kg]
20A090A□	91	36	72	0.7
20A120A□	127	72	108	0.9

Note: The above dimensional drawing gives the dimensions for both models with polarity sensors and models without polarity sensors.

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *SGLFW-20A□□□A□ and -35A□□□A□ Moving Coils* on page 4-43

◆ Magnetic Ways: SGLFM-20□□□A

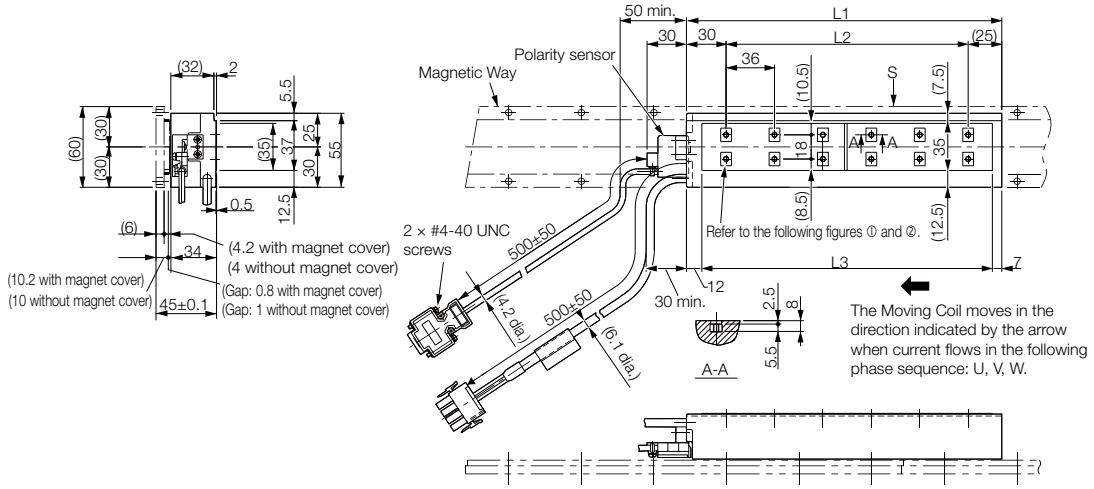


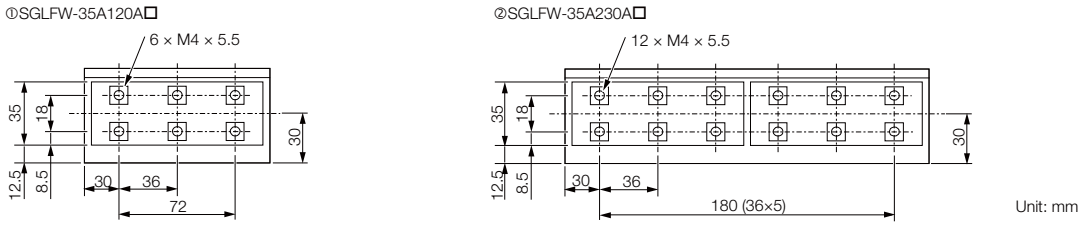
Note: More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

Magnetic Way Model SGLFM-	L1	L2	(L3)	LA	N	Approx. Mass [kg]
20324A	$324^{-0.1}_{-0.3}$	270 (54 × 5)	(331.6)	$30.8^{0}_{-0.2}$	6	0.9
20540A	$540^{-0.1}_{-0.3}$	486 (54 × 9)	(547.6)	$30.8^{0}_{-0.2}$	10	1.4
20756A	$756^{-0.1}_{-0.3}$	702 (54 × 13)	(763.6)	$30.8^{0}_{-0.2}$	14	2

4.4.6 SGLFW-35

◆ Moving Coils: SGLFW-35A□□□A□





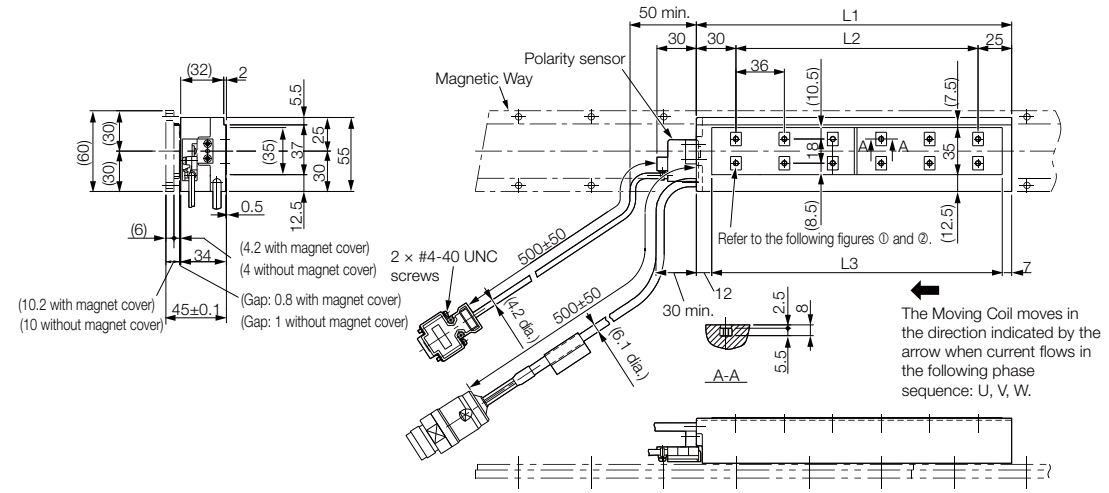
Moving Coil Model SGLFW-	L1	L2	L3	Approx. Mass [kg]
35A120A□	127	72	108	1.3
35A230A□	235	180	216	2.3

Note: The above dimensional drawing gives the dimensions for both models with polarity sensors and models without polarity sensors.

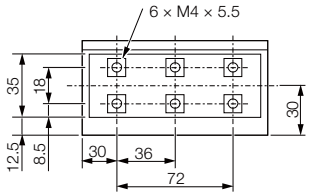
Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *SGLFW-20A□□□A□ and -35A□□□A□ Moving Coils* on page 4-43

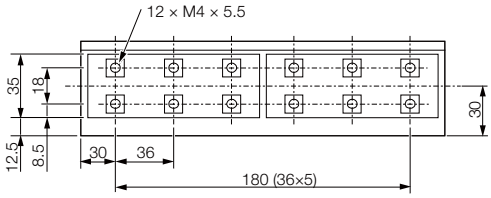
◆ Moving Coils: SGLFW-35A□□□A□D



①SGLFW-35A120A□D



②SGLFW-35A230A□D



Unit: mm

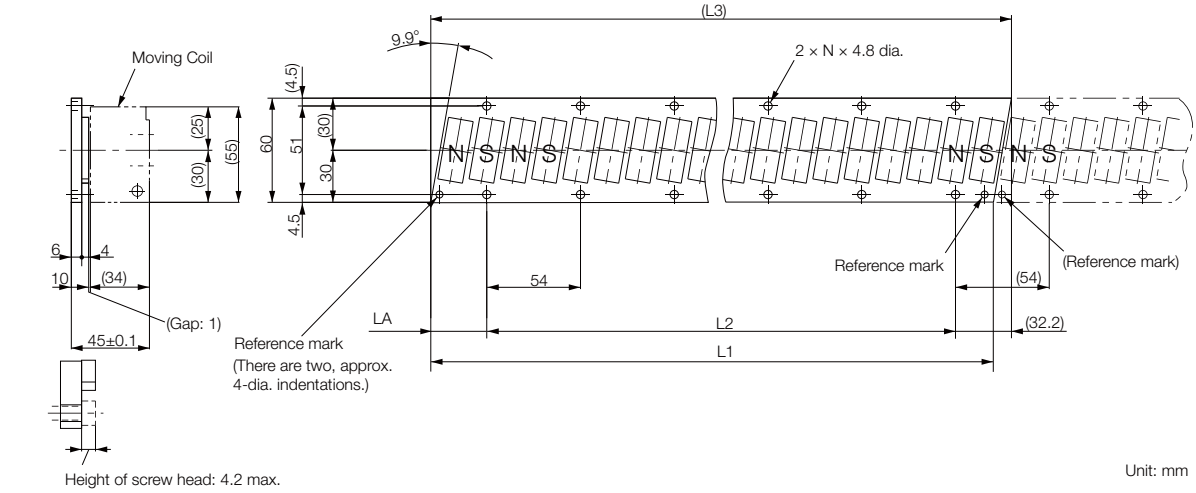
Moving Coil Model SGLFW-	L1	L2	L3	Approx. Mass [kg]
35A120A□D	127	72	108	1.3
35A230A□D	235	180	216	2.3

Note: The above dimensional drawing gives the dimensions for both models with polarity sensors and models without polarity sensors.

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *SGLFW-35A□□□A□D and -50A□□□B□D Moving Coils* on page 4-44

◆ Magnetic Ways: SGLFM-35□□□A



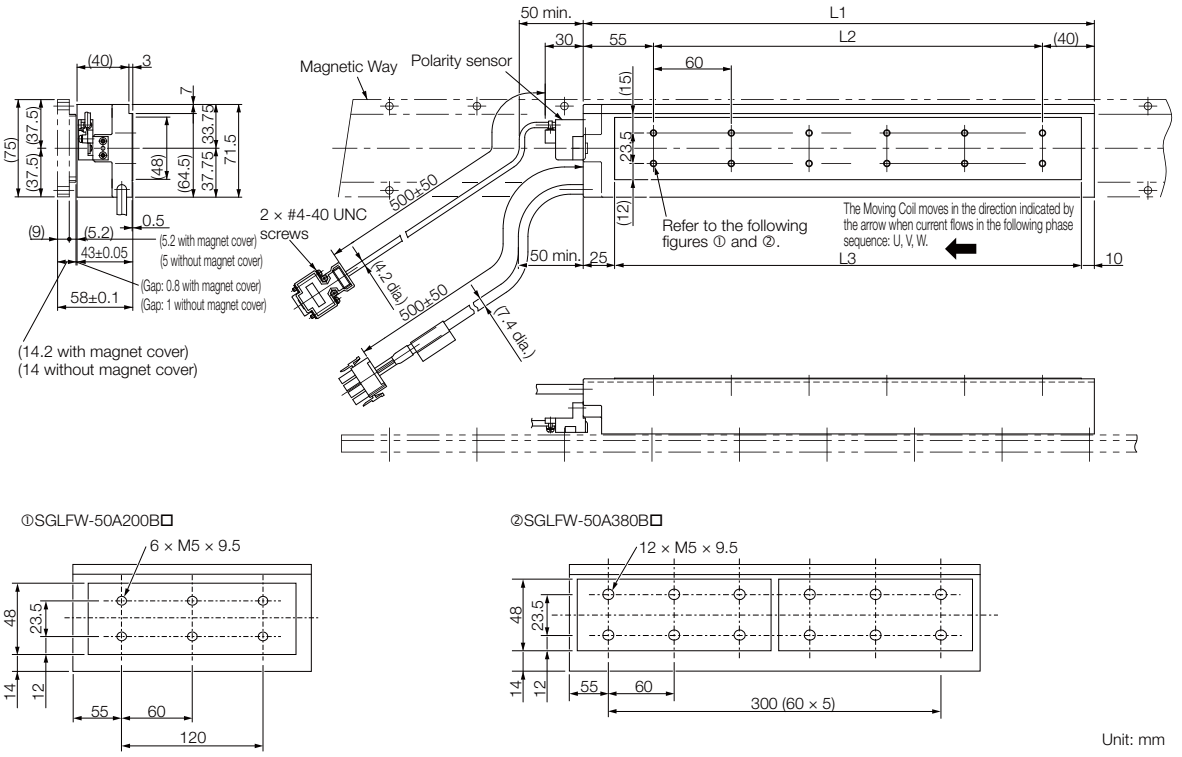
Unit: mm

Note: More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

Magnetic Way Model SGLFM-	L1	L2	(L3)	LA	N	Approx. Mass [kg]
35324A	324 $^{-0.1}_{-0.3}$	270 (54 × 5)	(334.4)	32.2 $^{0}_{-0.2}$	6	1.2
35540A	540 $^{-0.1}_{-0.3}$	486 (54 × 9)	(550.4)	32.2 $^{0}_{-0.2}$	10	2
35756A	756 $^{-0.1}_{-0.3}$	702 (54 × 13)	(766.4)	32.2 $^{0}_{-0.2}$	14	2.9

4.4.7 SGLFW-50

◆ Moving Coils: SGLFW-50A□□□B□



Unit: mm

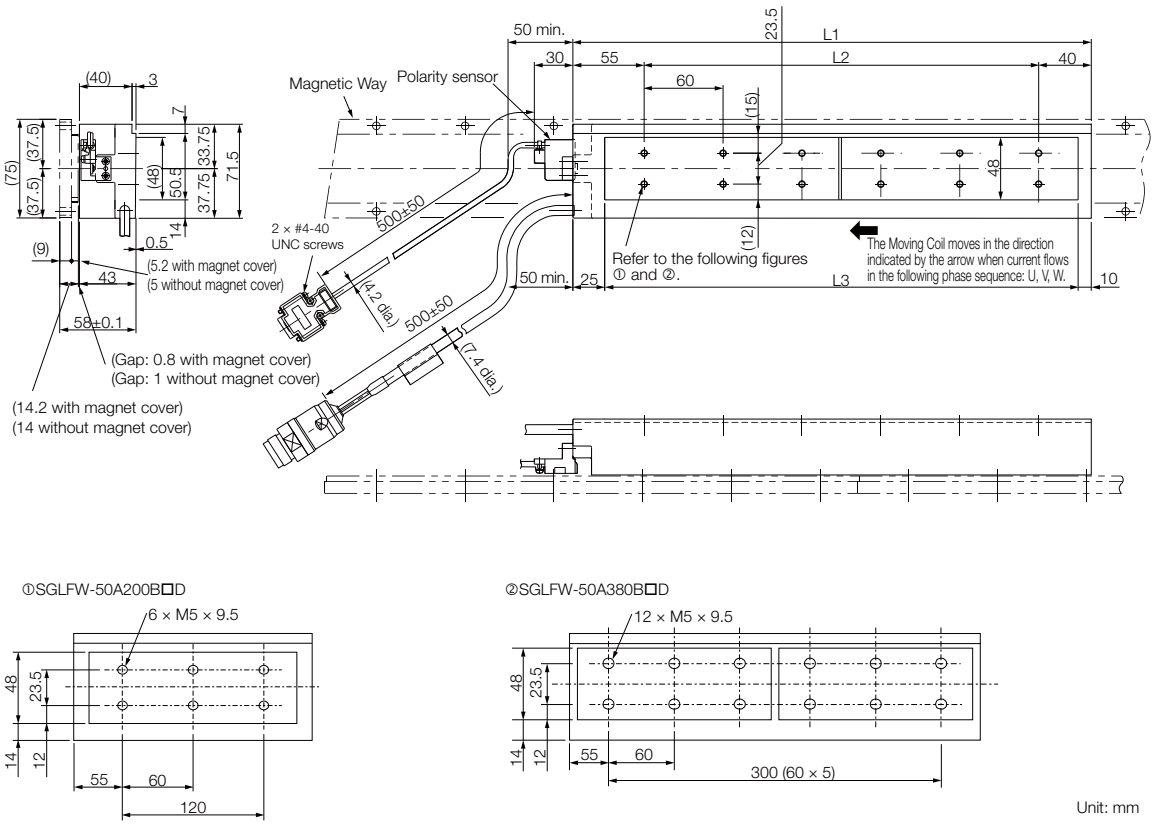
Moving Coil Model SGLFW-	L1	L2	L3	Approx. Mass [kg]
50A200B□	215	120	180	3.5
50A380B□	395	300	360	6.9

Note: The above dimensional drawing gives the dimensions for both models with polarity sensors and models without polarity sensors.

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *SGLFW-50A□□□B□ Moving Coils* on page 4-45

◆ Moving Coils: SGLFW-50A□□□B□D



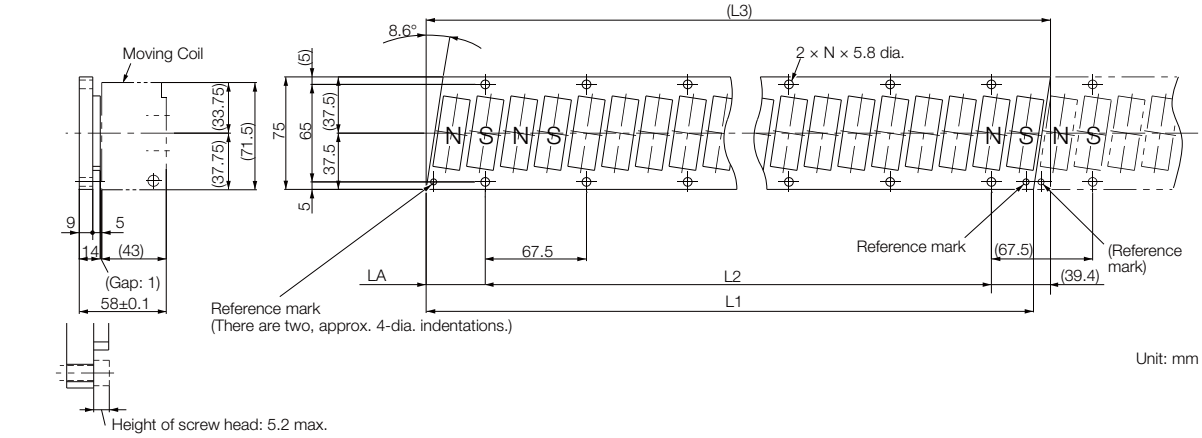
Moving Coil Model SGLFW-	L1	L2	L3	Approx. Mass [kg]
50A200B□D	215	120	180	3.5
50A380B□D	395	300	360	6.9

Note: The above dimensional drawing gives the dimensions for both models with polarity sensors and models without polarity sensors.

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *SGLFW-35A□□□A□D and -50A□□□B□D Moving Coils* on page 4-44

◆ Magnetic Ways: SGLFM-50□□□A

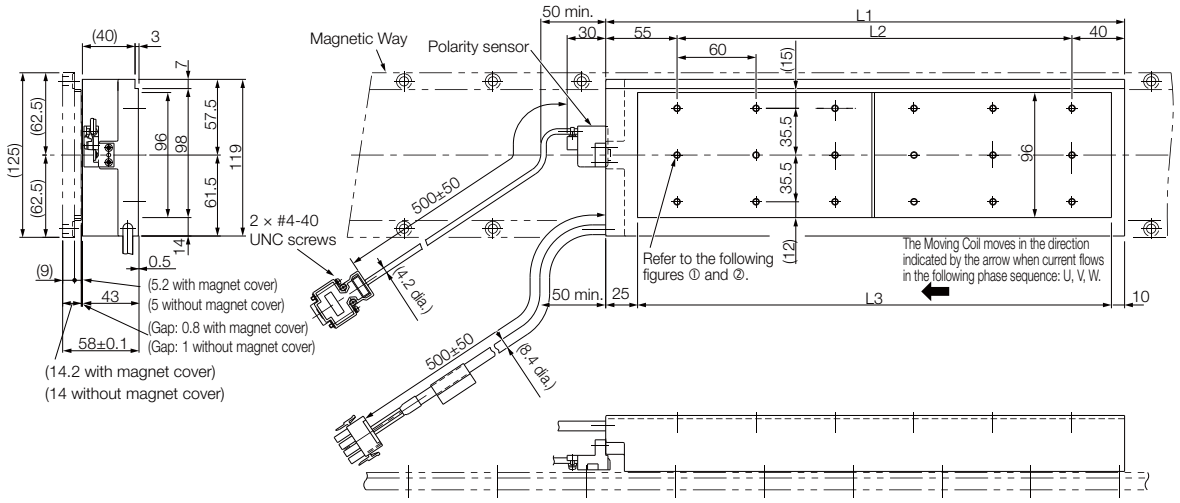


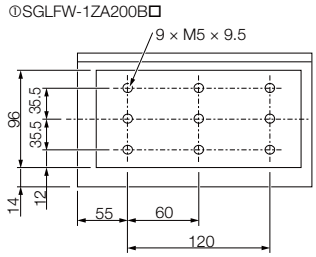
Note: More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

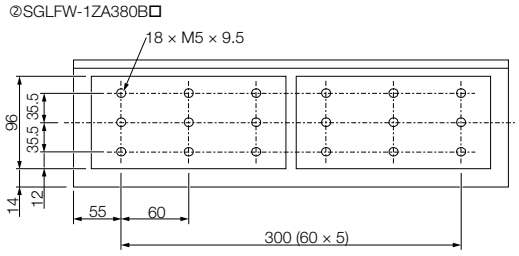
Magnetic Way Model SGLFM-	L1	L2	(L3)	LA	N	Approx. Mass [kg]
50405A	405 $^{-0.1}_{-0.3}$	337.5 (67.5 × 5)	(416.3)	39.4 $^{0}_{-0.2}$	6	2.8
50675A	675 $^{-0.1}_{-0.3}$	607.5 (67.5 × 9)	(686.3)	39.4 $^{0}_{-0.2}$	10	4.6
50945A	945 $^{-0.1}_{-0.3}$	877.5 (67.5 × 13)	(956.3)	39.4 $^{0}_{-0.2}$	14	6.5

4.4.8 SGLFW-1Z

◆ Moving Coils: SGLFW-1ZA□□□B□







Unit: mm

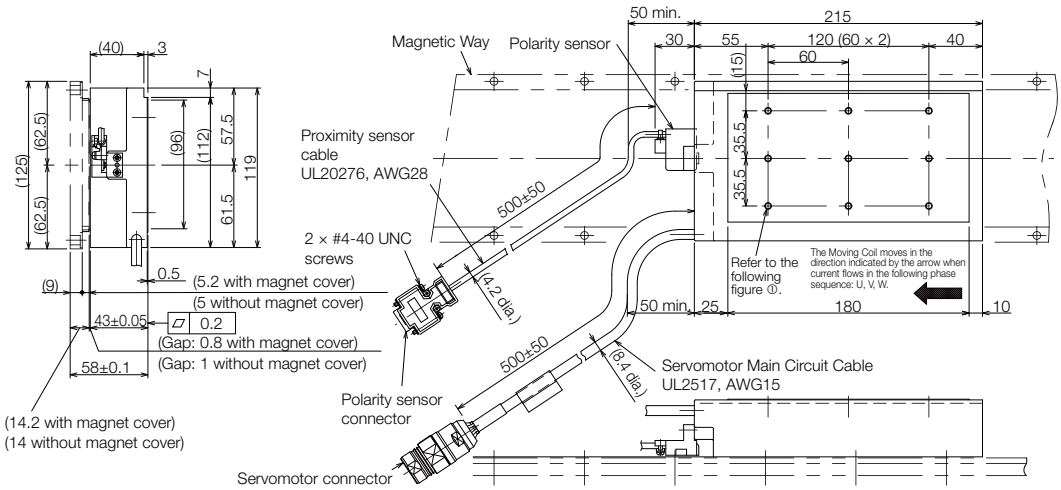
Moving Coil Model SGLFW-	L1	L2	L3	Approx. Mass [kg]
1ZA200B□	215	120	180	6.4
1ZA380B□	395	300	360	11.5

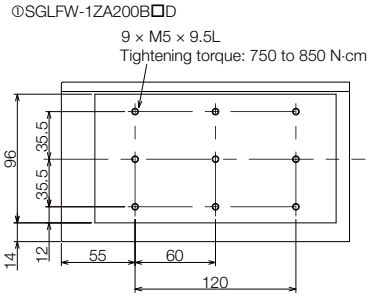
Note: The above dimensional drawing gives the dimensions for both models with polarity sensors and models without polarity sensors.

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *SGLFW-1ZA□□□B□ Moving Coils* on page 4-46

◆ Moving Coils: SGLFW-1ZA200B□D





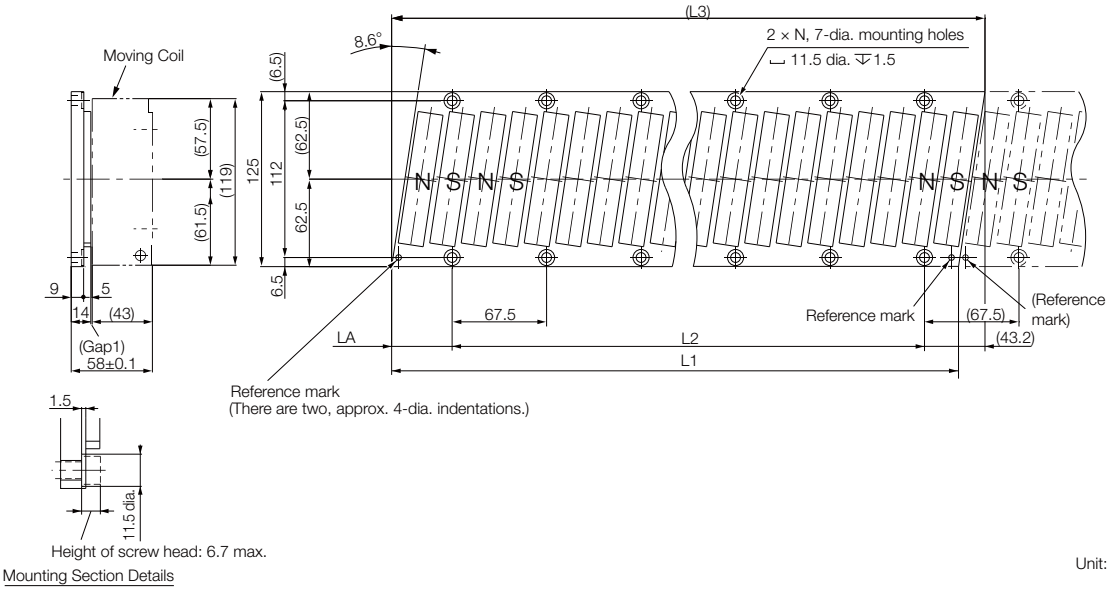
Approx. mass: 6.4 kg
Unit: mm

Note: The above dimensional drawing gives the dimensions for both models with polarity sensors and models without polarity sensors.

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *SGLFW-1ZA200B□D Moving Coils* on page 4-47

◆ Magnetic Ways: SGLFM-1Z□□□A



Unit: mm

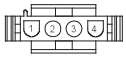
Note: More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

Magnetic Way Model SGLFM-	L1	L2	(L3)	LA	N	Approx. Mass [kg]
1Z405A	$405^{-0.1}_{-0.3}$	337.5 (67.5 × 5)	(423.9)	$43.2^{0}_{-0.2}$	6	5
1Z675A	$675^{-0.1}_{-0.3}$	607.5 (67.5 × 9)	(693.9)	$43.2^{0}_{-0.2}$	10	8.3
1Z945A	$945^{-0.1}_{-0.3}$	877.5 (67.5 × 13)	(963.9)	$43.2^{0}_{-0.2}$	14	12

4.4.9 Connector Specifications

◆ Moving Coils with Polarity Sensors: SGLFW2-30 and -45

• Servomotor Connector

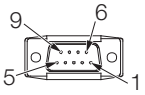


Plug: 350779-1
Pins: 350218-3 or 350547-3 (No.1 to 3)
350654-1 or 350669-1 (No. 4)
From Tyco Electronics Japan G.K.

Mating Connector
Cap: 350780-1
Socket: 350536-3 or 350550-3

Pin	Signal	Wire Color
1	Phase U	Red
2	Phase V	White
3	Phase W	Black
4	FG	Green

• Polarity Sensor and Thermostat Connector



Pin connector: 17JE-23090-02 (D8C) -CG
From DDK Ltd.

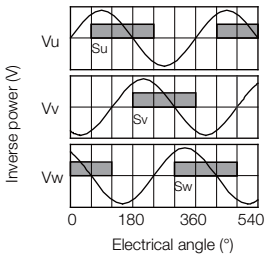
Mating Connector
Socket connector: 17JE-13090-02 (D8C) A-CG
Studs: 17L-002C or 17L-002C1

Pin	Signal
1	+5 V (thermal protector) +5 V (power supply)
2	Su
3	Sv
4	Sw
5	0 V (power supply)
6	Not used
7	
8	
9	Thermal protector

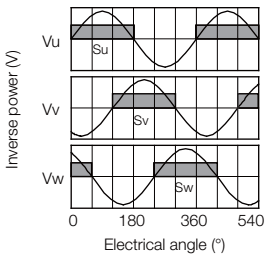
• Polarity Sensor Output Signal

The following figures show the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.

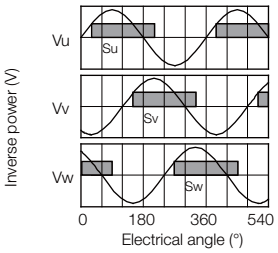
SGLFW2-30A070AS



SGLFW2-30A120AS
SGLFW2-30A230AS

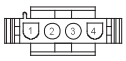


SGLFW2-45A200AS
SGLFW2-45A380AS



◆ Moving Coils without Polarity Sensors: SGLFW2-30 and -45

• Servomotor Connector

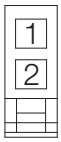


Plug: 350779-1
Pins: 350218-3 or 350547-3 (No.1 to 3)
350654-1 or 350669-1 (No. 4)
From Tyco Electronics Japan G.K.

Mating Connector
Cap: 350780-1
Socket: 350536-3 or 350550-3

Pin	Signal	Wire Color
1	Phase U	Red
2	Phase V	White
3	Phase W	Black
4	FG	Green

• Thermostat Connector



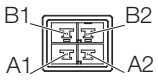
Receptacle housing: 5557-02R
Terminals: 5556T or 5556TL
From Molex Japan Co., Ltd.

Mating Connector
Plug housing: 5559-02P
Terminals: 5558T or 5558TL

Pin	Signal
1	Thermal protector
2	Thermal protector

◆ Moving Coils with Polarity Sensors: SGLFW2-90 and -1D

• Servomotor Connector

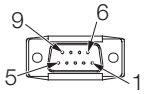


Tab housing: 1-917808-2
Contacts: 917803-2 (A1, A2, and B1)
84695-1 (B2)
From Tyco Electronics Japan G.K.

Mating Connector
Receptacle housing: 1-917807-2
Contacts: 179956-2

Pin	Signal	Wire Color
A1	Phase U	Red
A2	Phase V	White
B1	Phase W	Black
B2	FG	Green

• Polarity Sensor and Thermostat Connector



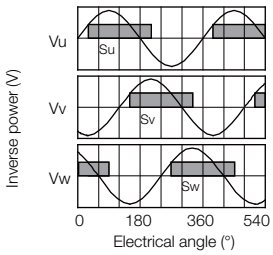
Pin connector: 17JE-23090-02 (D8C) -CG
From DDK Ltd.

Mating Connector
Socket connector: 17JE-13090-02 (D8C) A-CG
Studs: 17L-002C or 17L-002C1

Pin	Signal
1	+5 V (thermal protector) +5 V (power supply)
2	Su
3	Sv
4	Sw
5	0 V (power supply)
6	Not used
7	
8	
9	Thermal protector

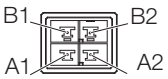
• Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



◆ Moving Coils without Polarity Sensors: SGLFW2-90 and -1D

• Servomotor Connector

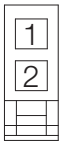


Tab housing: 1-917808-2
Contacts: 917803-2 (A1, A2, and B1)
84695-1 (B2)
From Tyco Electronics Japan G.K.

Mating Connector
Receptacle housing: 1-917807-2
Contacts: 179956-2

Pin	Signal	Wire Color
A1	Phase U	Red
A2	Phase V	White
B1	Phase W	Black
B2	FG	Green

• Thermostat Connector



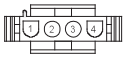
Receptacle housing: 5557-02R
Terminals: 5556T or 5556TL
From Molex Japan Co., Ltd.

Mating Connector
Plug housing: 5559-02P
Terminals: 5558T or 5558TL

Pin	Signal
1	Thermal protector
2	Thermal protector

◆ SGLFW-20A□□□A□ and -35A□□□A□ Moving Coils

• Servomotor Connector

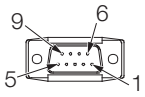


Plug: 350779-1
Pins: 350218-3 or 350547-3 (No.1 to 3)
350654-1 or 350669-1 (No. 4)
From Tyco Electronics Japan G.K.

Mating Connector
Cap: 350780-1
Socket: 350536-3 or 350550-3

Pin	Signal	Wire Color
1	Phase U	Red
2	Phase V	White
3	Phase W	Black
4	FG	Green

• Polarity Sensor Connector



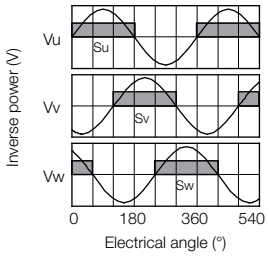
Pin connector: 17JE-23090-02 (D8C)
From DDK Ltd.

Mating Connector
Socket connector: 17JE-13090-02 (D8C)
Studs: 17L-002C or 17L-002C1

Pin	Signal
1	+5 V (thermal protector) +5 V (power supply)
2	Su
3	Sv
4	Sw
5	0 V (power supply)
6	Not used
7	
8	
9	Thermal protector

• Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



◆ SGLFW-35A□□□A□D and -50A□□□B□D Moving Coils

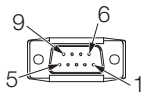
• Servomotor Connector

Extension: ARRA06AMRPN182
Pins: 021.279.1020
From Interconnectron GmbH

Mating Connector
Plug: APRA06BFRDN170
Socket: 020.105.1020

Pin	Signal
1	Phase U
2	Phase V
4	Phase W
5	Not used
6	Not used
⏚	Ground

• Polarity Sensor Connector



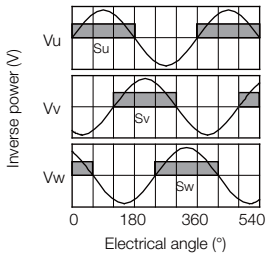
Pin connector: 17JE-23090-02 (D8C)
From DDK Ltd.

Mating Connector
Socket connector: 17JE-13090-02 (D8C)
Studs: 17L-002C or 17L-002C1

Pin	Signal	Pin	Signal
1	+5 V (power supply)	6	Not used
2	Phase U	7	
3	Phase V	8	
4	Phase W	9	
5	0 V (power supply)	–	–

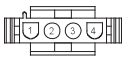
• Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



◆ SGLFW-50A□□□B□ Moving Coils

• Servomotor Connector

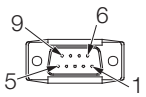


Plug: 350779-1
Pins: 350218-3 or 350547-3 (No.1 to 3)
350654-1 or 350669-1 (No. 4)
From Tyco Electronics Japan G.K.

Mating Connector
Cap: 350780-1
Socket: 350537-3 or 350550-3

Pin	Signal	Wire Color
1	Phase U	Red
2	Phase V	White
3	Phase W	Black
4	FG	Green

• Polarity Sensor Connector



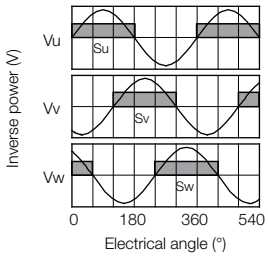
Pin connector: 17JE-23090-02 (D8C)
From DDK Ltd.

Mating Connector
Socket connector: 17JE-13090-02 (D8C)
Studs: 17L-002C or 17L-002C1

Pin	Signal
1	+5 V (thermal protector) +5 V (power supply)
2	Su
3	Sv
4	Sw
5	0 V (power supply)
6	Not used
7	
8	
9	Thermal protector

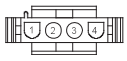
• Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



◆ SGLFW-1ZA□□□B□ Moving Coils

• Servomotor Connector

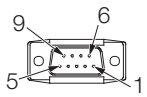


Plug: 350779-1
Pins: 350218-3 or 350547-3 (No.1 to 3)
350654-1 or 350669-1 (No. 4)
From Tyco Electronics Japan G.K.

Mating Connector
Cap: 350780-1
Socket: 350537-3 or 350550-3

Pin	Signal	Wire Color
1	Phase U	Red
2	Phase V	White
3	Phase W	Black
4	FG	Green

• Polarity Sensor Connector



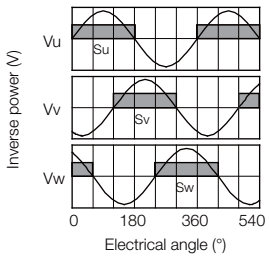
Pin connector: 17JE-23090-02 (D8C)
From DDK Ltd.

Mating Connector
Socket connector: 17JE-13090-02 (D8C)
Studs: 17L-002C or 17L-002C1

Pin	Signal	Pin	Signal
1	+5 V (power supply)	6	Not used
2	Phase U	7	
3	Phase V	8	
4	Phase W	9	
5	0 V (power supply)	–	–

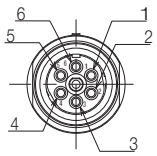
• Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



◆ SGLFW-1ZA200B□D Moving Coils

• Servomotor Connector

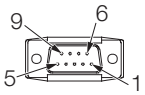


Extension: SROC06JMSCN169
Pins: 021.423.1020
From Interconnectron GmbH

Mating Connector
Plug: SPUC06KFSDN236
Socket: 020.030.1020

Pin	Signal
1	Phase U
2	Phase V
3	Phase W
4	Not used
5	Not used
6	Ground

• Polarity Sensor Connector



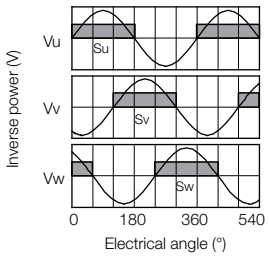
Pin connector: 17JE-23090-02 (D8C)
From DDK Ltd.

Mating Connector
Socket connector: 17JE-13090-02 (D8C)
Studs: 17L-002C or 17L-002C1

Pin	Signal	Pin	Signal
1	+5 V (power supply)	6	Not used
2	Phase U	7	
3	Phase V	8	
4	Phase W	9	
5	0 V (power supply)	–	–

• Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



Specifications, Ratings, and External Dimensions of SGLT Servomotors

5

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

5.1 Model Designations

5.1.1 Moving Coil

S G L T W - 20 A 170 A P □

Linear Σ Series Linear Servomotors

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

1st digit Servomotor Type

Code	Specification
T	With T-type iron core

2nd digit Moving Coil/Magnetic Way

Code	Specification
W	Moving Coil

3rd+4th digits Magnet Height

Code	Specification
20	20 mm
35	36 mm
40	40 mm
50	51 mm

5th digit Power Supply Voltage

Code	Specification
A	200 VAC

6th+7th+8th digits Length of Moving Coil

Code	Specification
170	170 mm
320	315 mm
400	394.2 mm
460	460 mm
600	574.2 mm

9th digit Design Revision Order

A, B …
H: High-efficiency model

10th digit Sensor Specification and Cooling Method

Code	Specifications		Applicable Models
	Polarity Sensor	Cooling Method	
None	None	Self-cooled	All models
C*	None	Water-cooled	SGLTW-40
H*	Yes	Water-cooled	
P	Yes	Self-cooled	All models

11th digit Connector for Servomotor Main Circuit Cable

Code	Specification	Applicable Models
None	Connector from Tyco Electronics Japan G.K.	SGLTW-20A□□□□□ -35A□□□□□ -50A□□□□□
	MS connector	SGLTW-40□□□□B□
	Loose lead wires with no connector	SGLTW-35A□□□H□ -50A□□□H□

* Contact your Yaskawa representative for the characteristics, dimensions, and other details on Servomotors with these specifications.

Note: This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

5.1.2 Magnetic Way

S G L T M - 20 324 A □

Linear Σ Series Linear Servomotors

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

1st digit Servomotor Type

(Same as for the Moving Coil.)

2nd digit Moving Coil/Magnetic Way

Code	Specification
M	Magnetic Way

3rd+4th digits Magnet Height

(Same as for the Moving Coil.)

5th+6th+7th digits Length of Magnetic Way

Code	Specification
324	324 mm
405	405 mm
540	540 mm
675	675 mm
756	756 mm
945	945 mm

8th digit Design Revision Order

A, B …
H: High-efficiency model

9th digit Options

Code	Specification	Applicable Models
None	Without options	–
C	With magnet cover	All models
Y	With base and magnet cover	SGLTM-20, -35*, -40

* The SGLTM-35□□□H (high-efficiency models) do not support this specification.

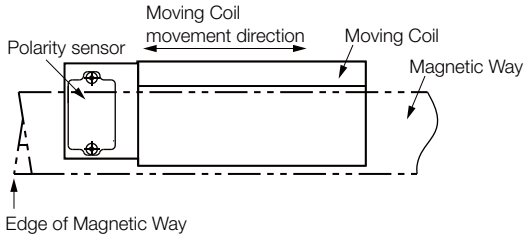
Note: This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

5.1.3 Precautions on Moving Coils with Polarity Sensors

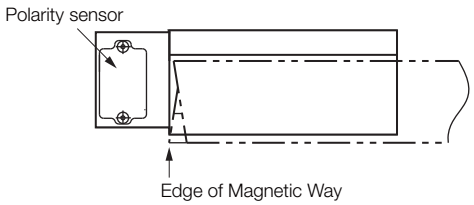
Note

When you use a Moving Coil with a Polarity Sensor, the Magnetic Way must cover the bottom of the polarity sensor. Refer to the example that shows the correct installation.
When determining the length of the Moving Coil's stroke or the length of the Magnetic Way, consider the total length of the Moving Coil and the polarity sensor. Refer to the following table.

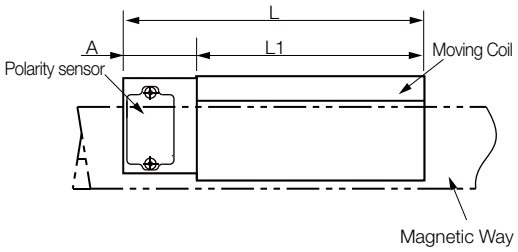
Correct Installation



Incorrect Installation



◆ Total Length of Moving Coil with Polarity Sensor



Moving Coil Model SGLTW-	Length of Moving Coil, L1 (mm)	Length of Polarity Sensor, A (mm)	Total Length, L (mm)
20A170AP□	170	34	204
20A320AP□	315		349
20A460AP□	460		494
35A170AP□	170	34	204
35A320AP□	315		349
35A460AP□	460		494
35A170HP□	170	34	204
35A320HP□	315		349
50A170HP□	170	34	204
50A320HP□	315		349
40A400BH□ 40A400BP□	394.2	26	420.2

5.2 Ratings and Specifications

5.2.1 Specifications

Linear Servomotor Moving Coil Model SGLTW-		Standard Models							High-efficiency Models			
		20A			35A			40A	35A		50A	
		170A	320A	460A	170A	320A	460A	400B	170H	320H	170H	320H
Time Rating		Continuous										
Thermal Class		B										
Insulation Resistance		500 VDC, 10 MΩ min.										
Withstand Voltage		1,500 VAC for 1 minute										
Excitation		Permanent magnet										
Cooling Method		Self-cooled										
Protective Structure		IP00										
Environmental Conditions	Surrounding Air Temperature	0°C to 40°C (with no freezing)										
	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 1,000 m or less. • Must be free of strong magnetic fields.										
Shock Resistance	Impact Acceleration Rate	196 m/s^2										
	Number of Impacts	2 times										
Vibration Resistance	Vibration Acceleration Rate	49 m/s^2 (the vibration resistance in three directions, vertical, side-to-side, and front-to-back)										

5.2.2 Ratings

Linear Servomotor Moving Coil Model SGLTW-		Standard Models							High-efficiency Models			
		20A			35A			40A	35A		50A	
		170A	320A	460A	170A	320A	460A	400B	170H	320H	170H	320H
Rated Motor Speed (Reference Speed during Speed Control)*1		3.0	3.0	3.0	2.5	2.5	2.5	1.5	2.5	2.0	2.0	2.0
Maximum Speed*1	m/s	5.0	5.0	5.0	5.0	5.0	5.0	3.1	4.8	4.8	3.2	3.1
Rated Force*1, *2	N	130	250	380	220	440	670	670	300	600	450	900
Maximum Force*1	N	380	760	1140	660	1320	2000	2600	600	1200	900	1800
Rated Current*1	Arms	2.3	4.4	6.7	3.5	7.0	10.7	7.3	5.1	10.1	5.1	10.2
Maximum Current*1	Arms	7.7	15.4	23.2	12.1	24.2	36.7	39.4	11.9	23.9	11.8	23.6
Moving Coil Mass	kg	2.5	4.6	6.7	3.7	6.8	10	15	4.9	8.8	6.0	11
Force Constant	N/Arms	61.0	61.0	61.0	67.5	67.5	67.5	99.1	64.0	64.0	95.2	95.2
BEMF Constant	Vrms/(m/s)/phase	20.3	20.3	20.3	22.5	22.5	22.5	33.0	21.3	21.3	31.7	31.7
Motor Constant	$N/\sqrt{W}$	18.7	26.5	32.3	26.7	37.5	46.4	61.4	37.4	52.9	48.6	68.7
Electrical Time Constant	ms	5.9	5.9	5.9	6.9	6.8	6.9	15	15	16	16	17
Mechanical Time Constant	ms	7.1	6.6	6.4	5.2	4.8	4.6	4.0	3.5	3.1	2.5	2.4
Thermal Resistance (with Heat Sink)	K/W	1.01	0.49	0.38	0.76	0.44	0.32	0.24	0.76	0.40	0.61	0.30
Thermal Resistance (without Heat Sink)	K/W	1.82	1.11	0.74	1.26	0.95	0.61	0.57	1.26	0.83	0.97	0.80
Magnetic Attraction*3	N	0	0	0	0	0	0	0	0	0	0	0
Magnetic Attraction on One Side*4	N	800	1590	2380	1400	2780	4170	3950	1400	2780	2000	3980
Combined Magnetic Way, SGLTM-		20□□□A□			35□□□A□			40□□□A□	35□□□H□		50□□□H□	
Combined Serial Converter Unit, JZDP-□□□□-		011	012	013	014	015	016	185	105	106	108	109
Applicable SERVOPACKs	SGD7S-	3R8A	7R6A	120A	5R5A	120A	180A	180A	5R5A	120A	5R5A	120A
	SGD7W-	5R5A	7R6A	–	5R5A	–	–	–	5R5A	–	5R5A	–

*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 forces are the continuous allowable force values at 40°C with an aluminum heat sink of the dimensions given below.

- Heat Sink Dimensions
  - 254 mm × 254 mm × 25 mm: SGLTW-20A170A and -35A170A
  - 400 mm × 500 mm × 40 mm: SGLTW-20A320A, -20A460A, -35A170H, -35A320A, -35A320H, -35A460A, and -50A170H
  - 609 mm × 762 mm × 50 mm: SGLTW-40A400B and -50A320H

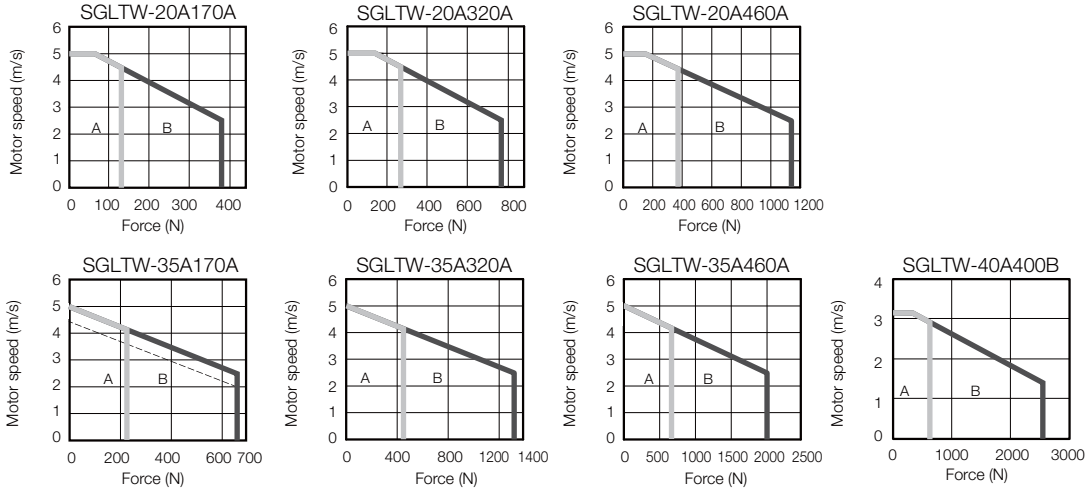
*3. The unbalanced magnetic gap that results from the Moving Coil installation condition causes a magnetic attraction on the Moving Coil.

*4. The value that is given is the magnetic attraction that is generated on one side of the Magnetic Way.

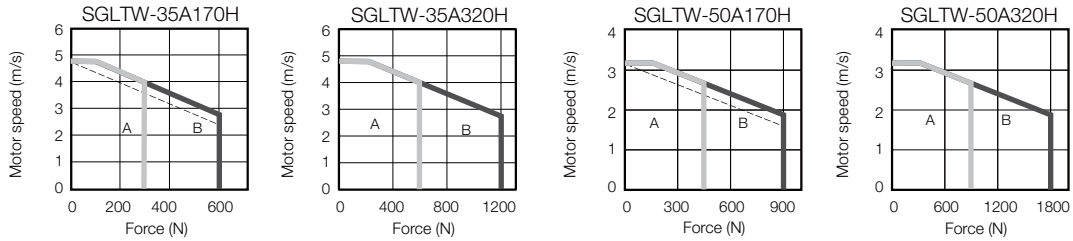
5.2.3 Force-Motor Speed Characteristics

A : Continuous duty zone ———— (solid lines): With three-phase 200-V input
B : Intermittent duty zone - - - - - - - - (dotted lines): With single-phase 200-V input

◆ Standard Models



◆ High-efficiency Models

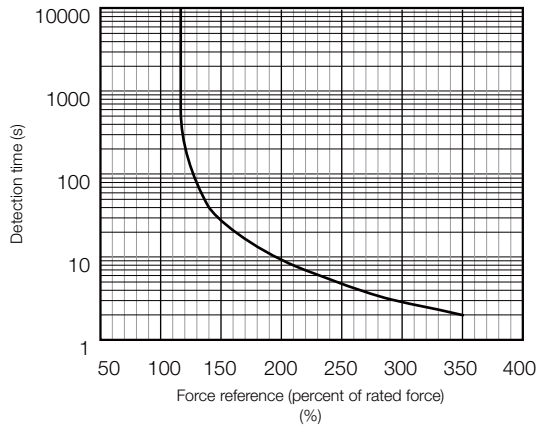


Note: 1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. These are typical values.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective force is within the allowable range for the rated force, 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-motor speed characteristics will become smaller because the voltage drop increases.

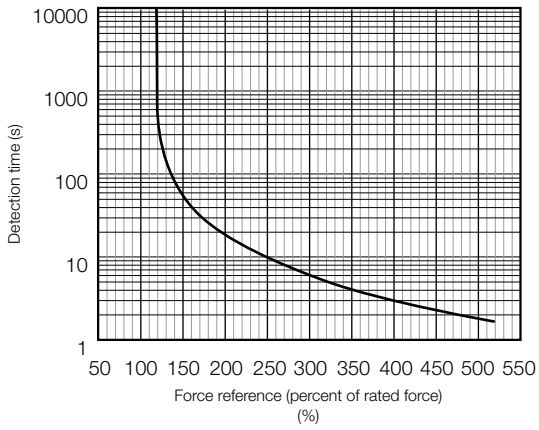
5.2.4 Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions with a Servomotor ambient temperature of 40°C.

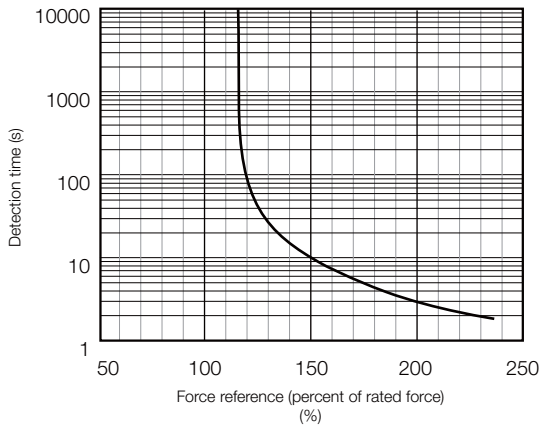
SGLTW-20A□□□A and -35A□□□A



SGLTW-40A



SGLTW-35A□□□H and -50A□□□H

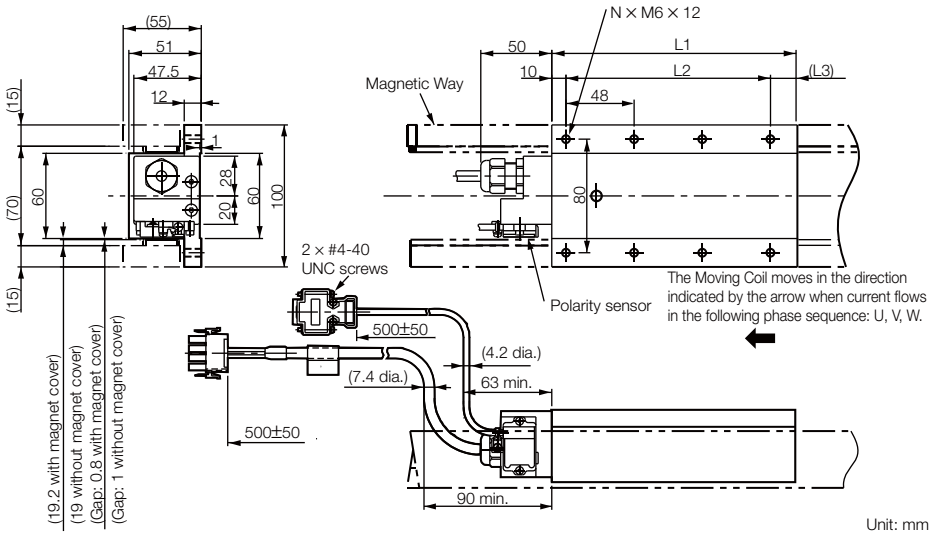


Note: The above overload protection characteristics do mean that you can perform continuous duty operation with an output of 100% or higher. Use the Servomotor so that the effective force remains within the continuous duty zone given in *5.2.3 Force-Motor Speed Characteristics* on page 5-7.

5.3 External Dimensions

5.3.1 SGLTW-20: Standard Models

◆ Moving Coils: SGLTW-20A□□□A□



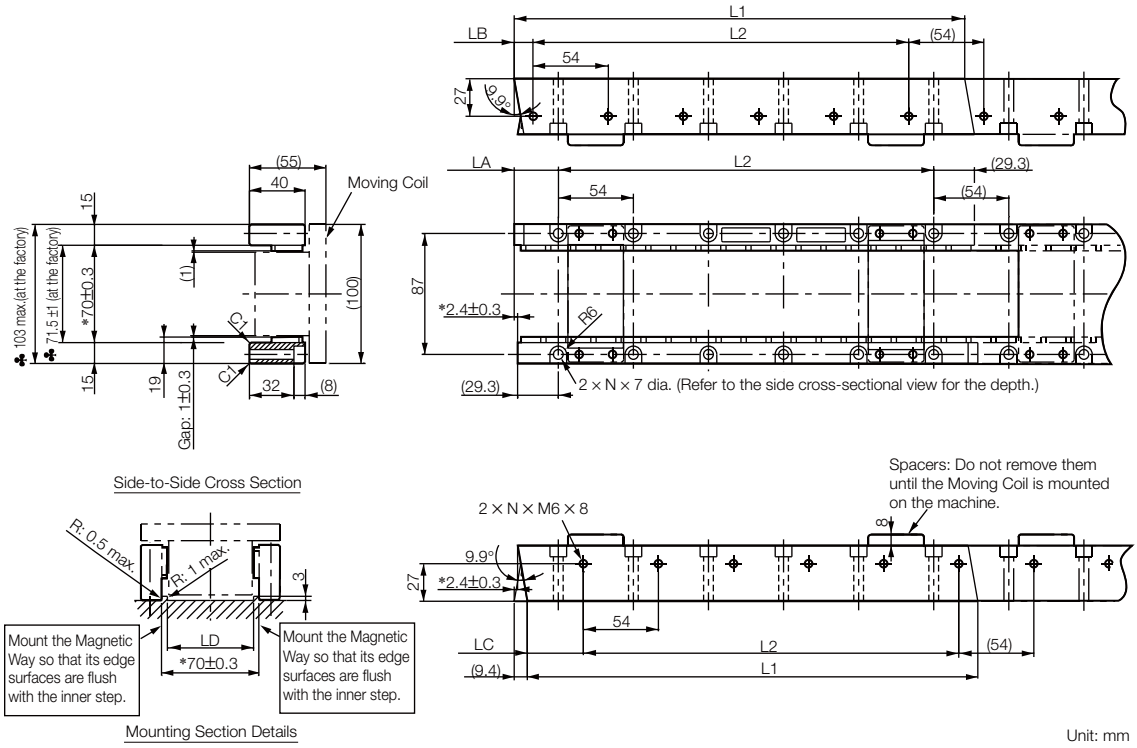
Unit: mm

Moving Coil Model SGLTW-	L1	L2	(L3)	N	Approx. Mass [kg]
20A170A□	170	144 (48 × 3)	(16)	8	2.5
20A320A□	315	288 (48 × 6)	(17)	14	4.6
20A460A□	460	432 (48 × 9)	(18)	20	6.7

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *SGLTW-20A□□□A□ and -35A□□□A□ Moving Coils* on page 5-22

◆ Magnetic Ways: SGLTM-20□□□A

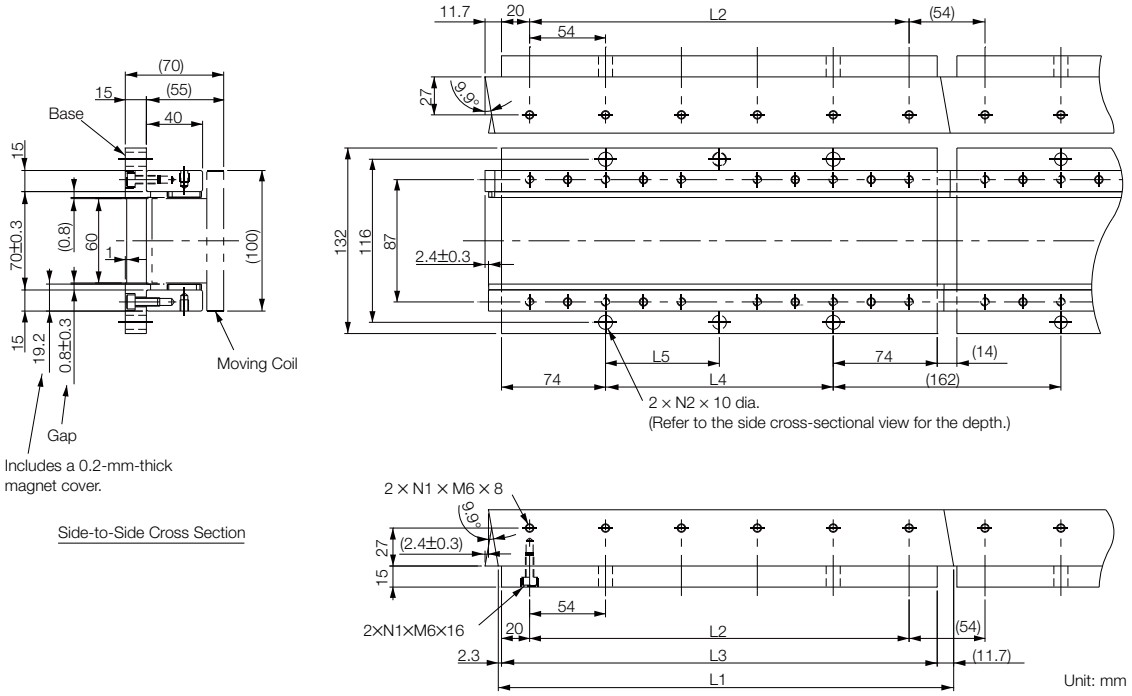


Unit: mm

Note: 1. Two Magnetic Way tracks are used together as a set. For safety, when they are shipped, the two tracks are secured to a mounting spacer made from aluminum.
2. More than one Magnetic Way can be connected.
3. Dimensions with asterisks are the distances between the Magnetic Way tracks. Install the tracks according to the specified dimensions. Observe the dimensions given in *Mounting Section Details* after installation. Dimensions when the Magnetic Way is shipped from the factory are indicated by ♣.
4. Use socket head screws of strength class 10.9 or higher for the Magnetic Way mounting screws. (Do not use stainless steel screws.)

Magnetic Way Model SGLTM-	L1	L2	LA	LB	LC	LD	N	Approx. Mass [kg]
20324A□	$324^{-0.1}_{-0.3}$	270 (54 × 5)	$31.7^{0}_{-0.2}$	$13.7^{0}_{-0.2}$	$40.3^{0}_{-0.2}$	$62^{+0.6}_{0}$	6	3.4
20540A□	$540^{-0.1}_{-0.3}$	486 (54 × 9)	$31.7^{0}_{-0.2}$	$13.7^{0}_{-0.2}$	$40.3^{0}_{-0.2}$	$62^{+0.6}_{0}$	10	5.7
20756A□	$756^{-0.1}_{-0.3}$	702 (54 × 13)	$31.7^{0}_{-0.2}$	$13.7^{0}_{-0.2}$	$40.3^{0}_{-0.2}$	$62^{+0.6}_{0}$	14	7.9

◆ Magnetic Ways with Bases: SGLTM-20□□□AY

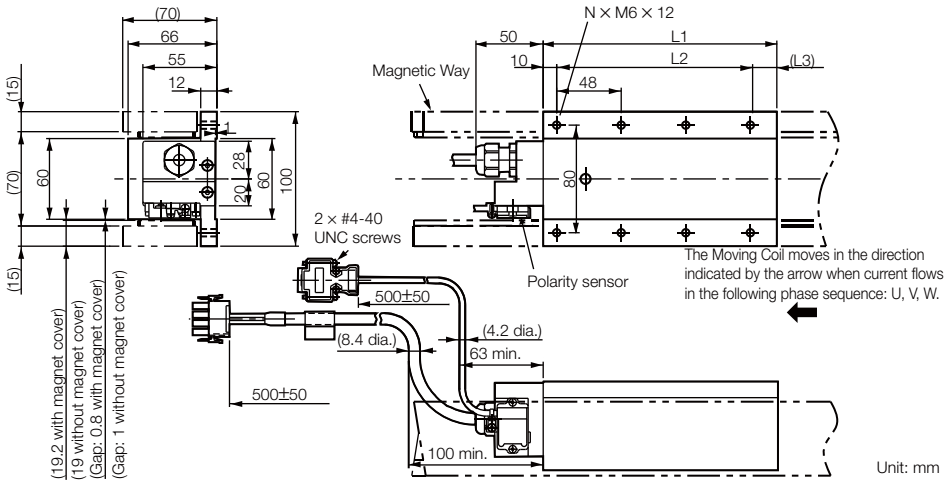


Note: Two Magnetic Way tracks are used together as a set. More than one Magnetic Way can be connected.

Magnetic Way Model SGLTM-	L1	L2	L3	L4	L5	N1	N2	Approx. Mass [kg]
20324AY	$324^{-0.1}_{-0.3}$	270	310	162	162	6	2	5.1
20540AY	$540^{-0.1}_{-0.3}$	486	526	378	189	10	3	8.5
20756AY	$756^{-0.1}_{-0.3}$	702	742	594	198	14	4	12

5.3.2 SGLTW-35: Standard Models

◆ Moving Coils: SGLTW-35A□□□A□

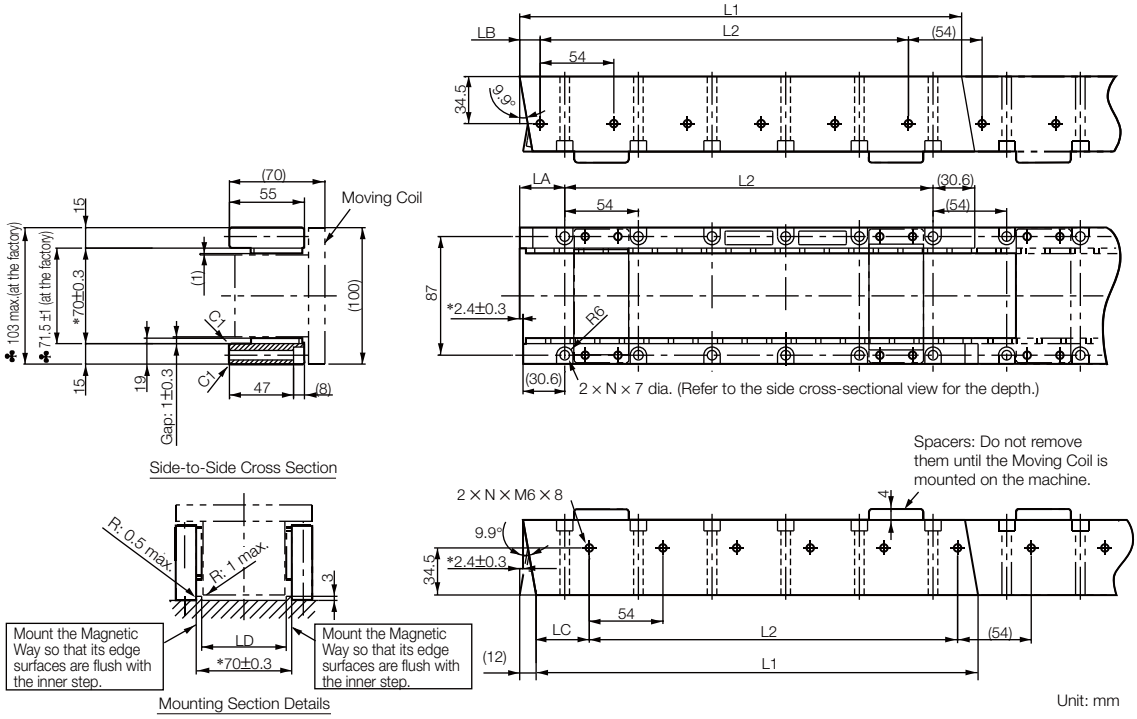


Moving Coil Model SGLTW-	L1	L2	(L3)	N	Approx. Mass [kg]
35A170A□	170	144 (48 × 3)	(16)	8	3.7
35A320A□	315	288 (48 × 6)	(17)	14	6.8
35A460A□	460	432 (48 × 9)	(18)	20	10

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *SGLTW-20A□□□A□ and -35A□□□A□ Moving Coils* on page 5-22

◆ Magnetic Ways: SGLTM-35□□□A□



Note: 1. Two Magnetic Way tracks are used together as a set. For safety, when they are shipped, the two tracks are secured to a mounting spacer made from aluminum.

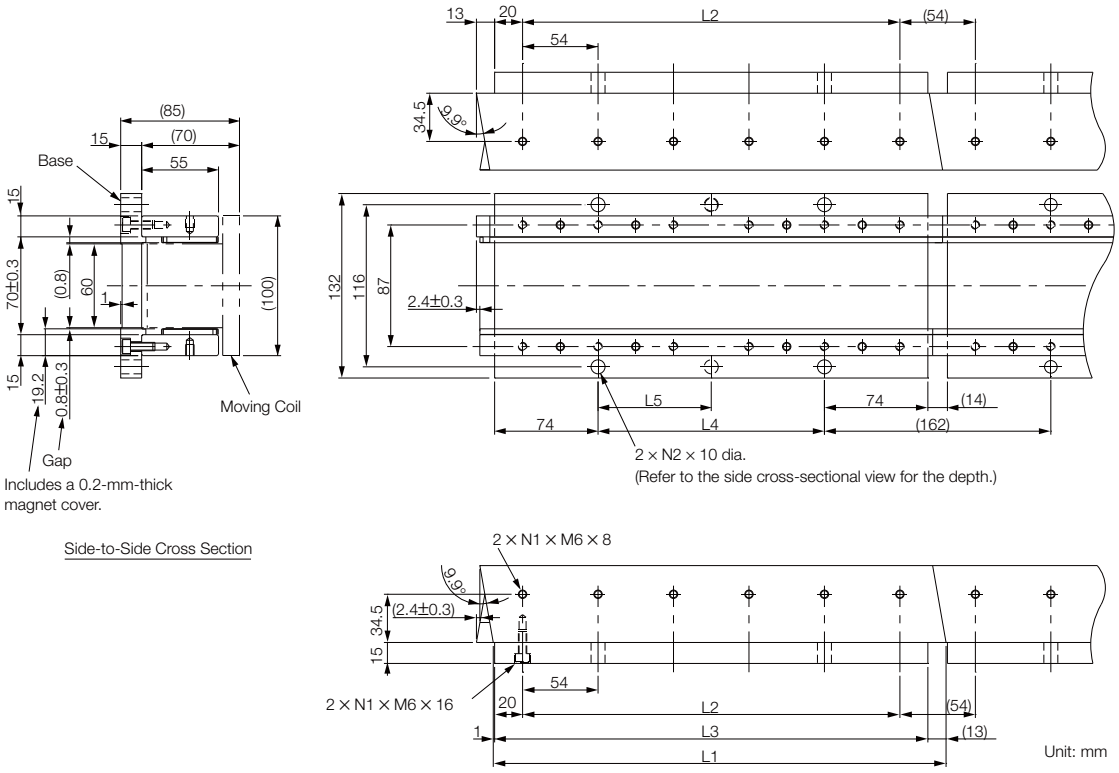
2. More than one Magnetic Way can be connected.

3. Dimensions with asterisks are the distances between the Magnetic Way tracks. Install the tracks according to the specified dimensions. Observe the dimensions given in *Mounting Section Details* after installation. Dimensions when the Magnetic Way is shipped from the factory are indicated by ♣.

4. Use socket head screws of strength class 10.9 or higher for the Magnetic Way mounting screws. (Do not use stainless steel screws.)

Magnetic Way Model SGLTM-	L1	L2	LA	LB	LC	LD	N	Approx. Mass [kg]
35324A□	$324^{-0.1}_{-0.3}$	270 (54 × 5)	$33^{0}_{-0.2}$	$15^{0}_{-0.2}$	$39^{0}_{-0.2}$	$62^{+0.6}_{0}$	6	4.8
35540A□	$540^{-0.1}_{-0.3}$	486 (54 × 9)	$33^{0}_{-0.2}$	$15^{0}_{-0.2}$	$39^{0}_{-0.2}$	$62^{+0.6}_{0}$	10	8
35756A□	$756^{-0.1}_{-0.3}$	702 (54 × 13)	$33^{0}_{-0.2}$	$15^{0}_{-0.2}$	$39^{0}_{-0.2}$	$62^{+0.6}_{0}$	14	11

◆ Magnetic Ways with Bases: SGLTM-35□□□AY

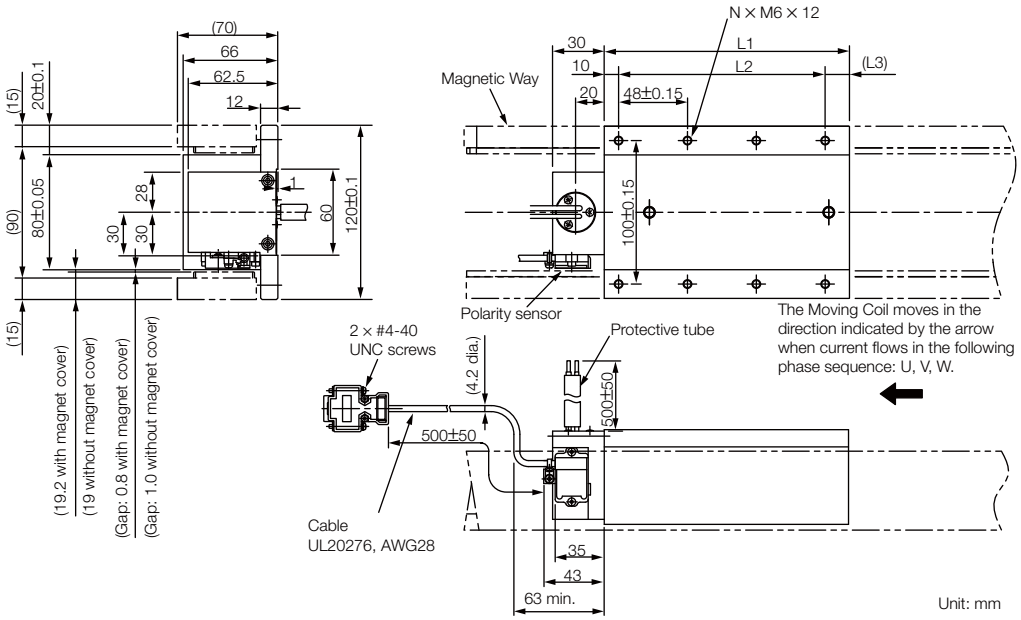


Note: Two Magnetic Way tracks are used together as a set. More than one Magnetic Way can be connected.

Magnetic Way Model SGLTM-	L1	L2	L3	L4	L5	N1	N2	Approx. Mass [kg]
35324AY	324 $^{-0.1}_{-0.3}$	270	310	162	162	6	2	6.4
35540AY	540 $^{-0.1}_{-0.3}$	486	526	378	189	10	3	11
35756AY	756 $^{-0.1}_{-0.3}$	702	742	594	198	14	4	15

5.3.3 SGLTW-35□□□□H□: High-efficiency Models

◆ SGLTW-35□□□□H□: High-efficiency Models

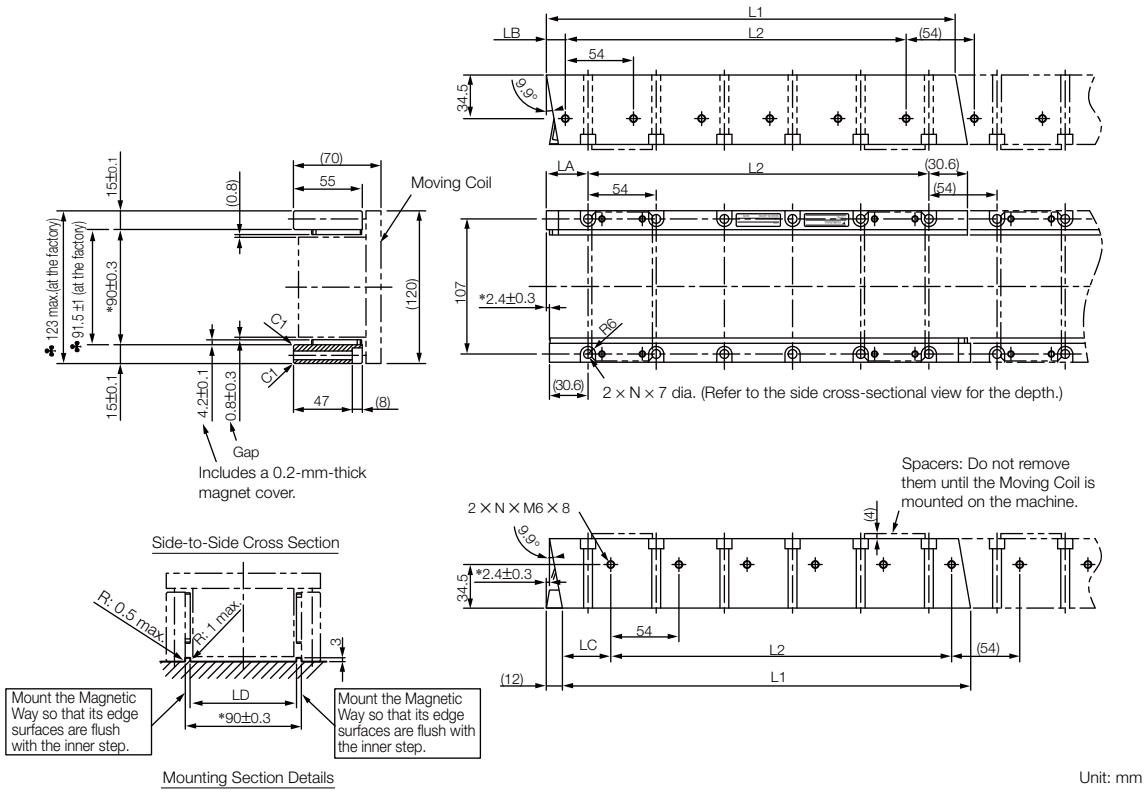


Moving Coil Model SGLTW-	L1	L2	L3	N	Approx. Mass [kg]
35A170H□	170	144 (48 × 3)	(16)	8	4.7
35A320H□	315	288 (48 × 6)	(17)	14	8.8

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *SGLTW-35A□□□H□ and -50A□□□H□ Moving Coils* on page 5-24

◆ Magnetic Ways: SGLTM-35□□□H□

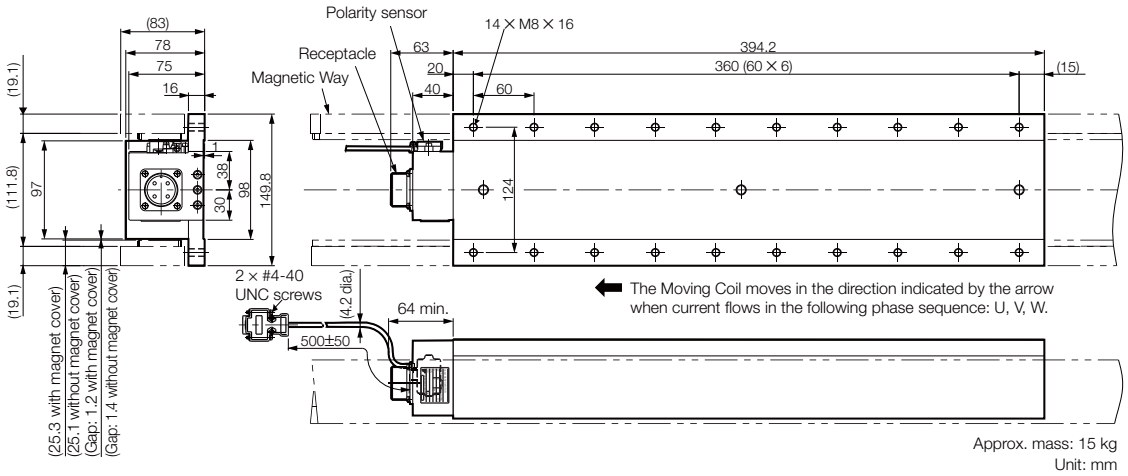


Note: 1. Two Magnetic Way tracks are used together as a set. For safety, when they are shipped, the two tracks are secured to a mounting spacer made from aluminum.
2. More than one Magnetic Way can be connected.
3. Dimensions with asterisks are the distances between the Magnetic Way tracks. Install the tracks according to the specified dimensions. Observe the dimensions given in *Mounting Section Details* after installation. Dimensions when the Magnetic Way is shipped from the factory are indicated by ♣.
4. Use socket head screws of strength class 10.9 or higher for the Magnetic Way mounting screws. (Do not use stainless steel screws.)

Magnetic Way Model SGLTM-	L1	L2	LA	LB	LC	LD	N	Approx. Mass [kg]
35324H□	$324^{-0.1}_{-0.3}$	270 (54 × 5)	$33^{0}_{-0.2}$	$15^{0}_{-0.2}$	$39^{0}_{-0.2}$	$82^{+0.6}_{0}$	6	4.8
35540H□	$540^{-0.1}_{-0.3}$	486 (54 × 9)	$33^{0}_{-0.2}$	$15^{0}_{-0.2}$	$39^{0}_{-0.2}$	$82^{+0.6}_{0}$	10	8
35756H□	$756^{-0.1}_{-0.3}$	702 (54 × 13)	$33^{0}_{-0.2}$	$15^{0}_{-0.2}$	$39^{0}_{-0.2}$	$82^{+0.6}_{0}$	14	11

5.3.4 SGLTW-40: Standard Models

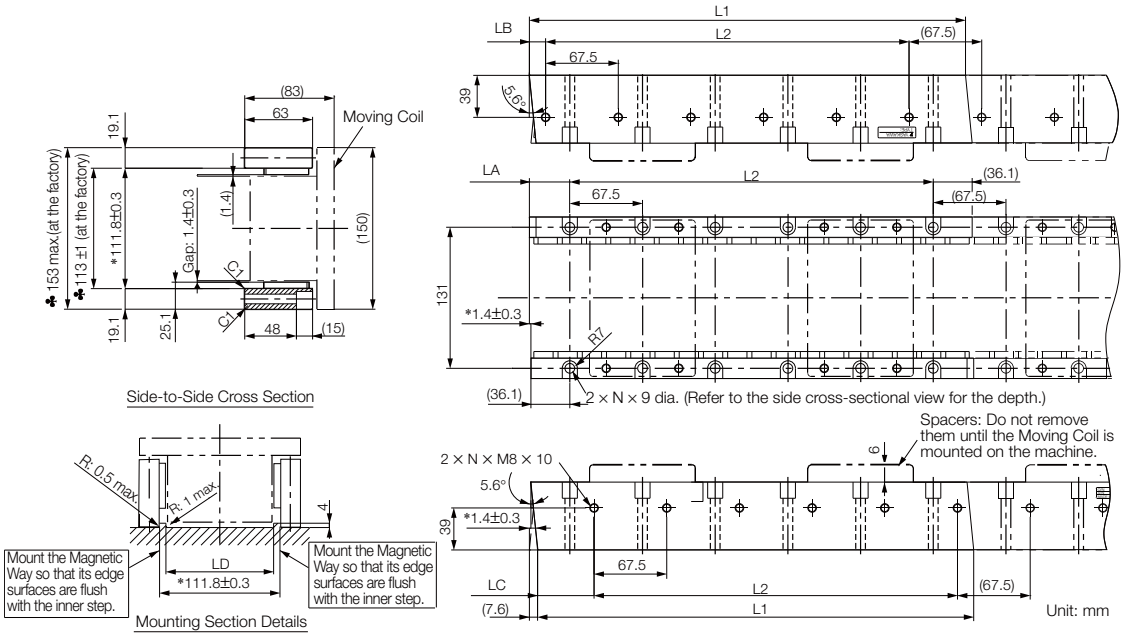
◆ Moving Coils: SGLTW-40A400B□



Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *SGLTW-40A400B□ Moving Coils* on page 5-23

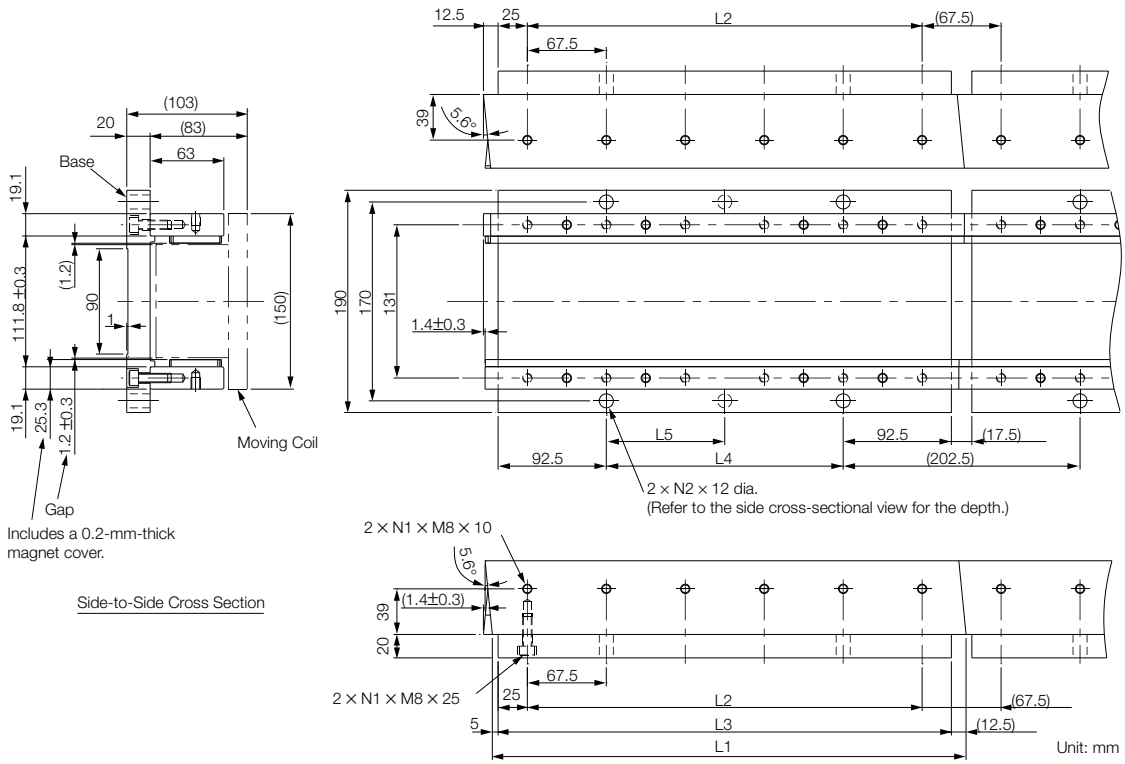
◆ Magnetic Ways: SGLTM-40□□□A□



Note: 1. Two Magnetic Way tracks are used together as a set. For safety, when they are shipped, the two tracks are secured to a mounting spacer made from aluminum.
2. More than one Magnetic Way can be connected.
3. Dimensions with asterisks are the distances between the Magnetic Way tracks. Install the tracks according to the specified dimensions. Observe the dimensions given in *Mounting Section Details* after installation. Dimensions when the Magnetic Way is shipped from the factory are indicated by ♣.
4. Use socket head screws of strength class 10.9 or higher for the Magnetic Way mounting screws. (Do not use stainless steel screws.)

Magnetic Way Model SGLTM-	L1	L2	LA	LB	LC	LD	N	Approx. Mass [kg]
40405A□	$405^{-0.1}_{-0.3}$	337.5 (67.5 × 5)	$37.5^{0}_{-0.2}$	$15^{0}_{-0.2}$	$52.5^{0}_{-0.2}$	$100^{+0.6}_{0}$	6	9
40675A□	$675^{-0.1}_{-0.3}$	607.5 (67.5 × 9)	$37.5^{0}_{-0.2}$	$15^{0}_{-0.2}$	$52.5^{0}_{-0.2}$	$100^{+0.6}_{0}$	10	15
40945A□	$945^{-0.1}_{-0.3}$	877.5 (67.5 × 13)	$37.5^{0}_{-0.2}$	$15^{0}_{-0.2}$	$52.5^{0}_{-0.2}$	$100^{+0.6}_{0}$	14	21

◆ Magnetic Ways with Bases: SGLTM-40□□□AY

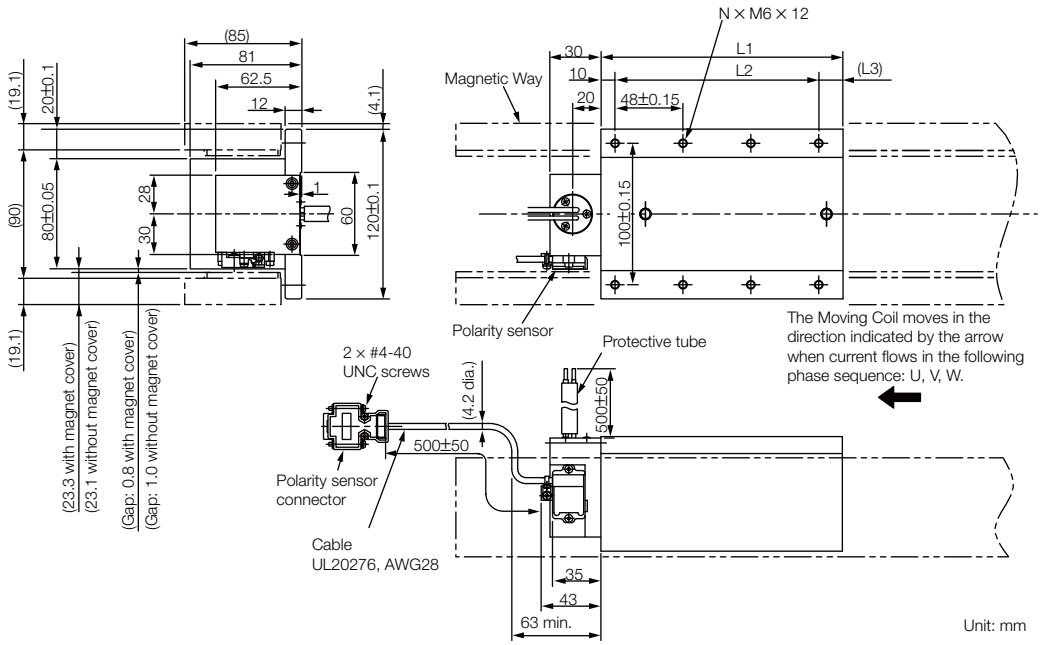


Note: Two Magnetic Way tracks are used together as a set. More than one Magnetic Way can be connected.

Magnetic Way Model SGLTM-	L1	L2	L3	L4	L5	N1	N2	Approx. Mass [kg]
40405AY	405 $^{-0.1}_{-0.3}$	337.5	387.5	202.5	202.5	6	2	13
40675AY	675 $^{-0.1}_{-0.3}$	607.5	657.5	472.5	236.25	10	3	21
40945AY	945 $^{-0.1}_{-0.3}$	877.5	927.5	742.5	247.5	14	4	30

5.3.5 SGLTW-50: High-efficiency Models

◆ Moving Coils: SGLTW-50A□□□H□

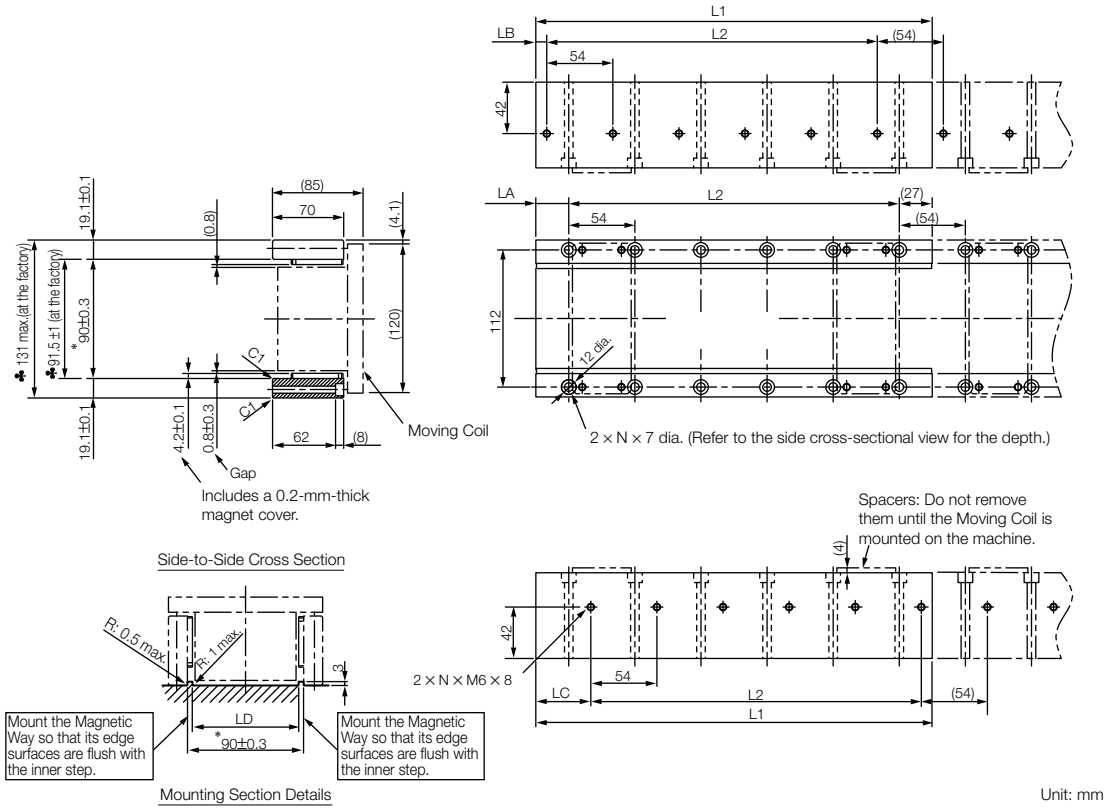


Moving Coil Model SGLTW-	L1	L2	(L3)	N	Approx. Mass [kg]
50A170H□	170	144 (48 × 3)	(16)	8	6
50A320H□	315	288 (48 × 6)	(17)	14	11

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *SGLTW-35A□□□H□ and -50A□□□H□ Moving Coils* on page 5-24

◆ Magnetic Ways: SGLTM-50□□□H□



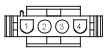
Note: 1. Two Magnetic Way tracks are used together as a set. For safety, when they are shipped, the two tracks are secured to a mounting spacer made from aluminum.
2. More than one Magnetic Way can be connected.
3. Dimensions with asterisks are the distances between the Magnetic Way tracks. Install the tracks according to the specified dimensions. Observe the dimensions given in *Mounting Section Details* after installation. Dimensions when the Magnetic Way is shipped from the factory are indicated by ♣.
4. Use socket head screws of strength class 10.9 or higher for the Magnetic Way mounting screws. (Do not use stainless steel screws.)

Magnetic Way Model SGLTM-	L1	L2	LA	LB	LC	LD	N	Approx. Mass [kg]
50324H□	$324^{-0.1}_{-0.3}$	270 (54 × 5)	$27^{0}_{-0.2}$	$9^{0}_{-0.2}$	$45^{0}_{-0.2}$	$82^{+0.6}_{0}$	6	8
50540H□	$540^{-0.1}_{-0.3}$	486 (54 × 9)	$27^{0}_{-0.2}$	$9^{0}_{-0.2}$	$45^{0}_{-0.2}$	$82^{+0.6}_{0}$	10	13
50756H□	$756^{-0.1}_{-0.3}$	702 (54 × 13)	$27^{0}_{-0.2}$	$9^{0}_{-0.2}$	$45^{0}_{-0.2}$	$82^{+0.6}_{0}$	14	18

5.3.6 Connector Specifications

◆ SGLTW-20A□□□A□ and -35A□□□A□ Moving Coils

• Servomotor Connector

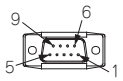


Plug: 350779-1
Pins: 350218-3 or 350547-3 (No.1 to 3)
350654-1 or 350669-1 (No. 4)
From Tyco Electronics Japan G.K.

Mating Connector
Cap: 350780-1
Socket: 350537-3 or 350550-3

Pin	Signal	Wire Color
1	Phase U	Red
2	Phase V	White
3	Phase W	Black
4	Ground	Green

• Polarity Sensor Connector



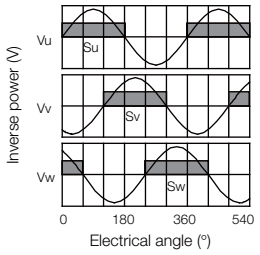
Pin connector: 17JE-23090-02 (D8C)
From DDK Ltd.

Mating Connector
Socket connector: 17JE-13090-02 (D8C)
Studs: 17L-002C or 17L-002C1

Pin	Signal	Pin	Signal
1	+5 V (DC)	6	Not used
2	Phase U	7	
3	Phase V	8	
4	Phase W	9	
5	0 V	–	–

• Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



◆ SGLTW-40A400BD Moving Coils

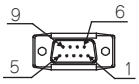
• Servomotor Connector

Receptacle: MS3102A-22-22P
From DDK Ltd.

Mating Connector
Right-angle plug: MS3108B22-22S
Straight plug: MS3106B22-22S
Cable clamp: MS3057-12A

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

• Polarity Sensor Connector



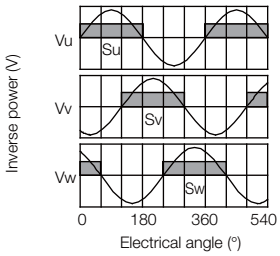
Pin connector: 17JE-23090-02 (D8C)
From DDK Ltd.

Mating Connector
Socket connector: 17JE-13090-02 (D8C)
Studs: 17L-002C or 17L-002C1

Pin	Signal	Pin	Signal
1	+5 V (power supply)	6	Not used
2	Phase U	7	
3	Phase V	8	
4	Phase W	9	
5	0 V (power supply)	–	–

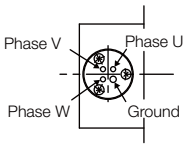
• Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



◆ SGLTW-35A□□□H□ and -50A□□□H□ Moving Coils

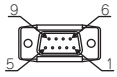
• Moving Coil Lead
Secure the lead from the Moving Coil of the Linear Servomotor so that it moves together with the Moving Coil.



(Viewed from the top surface of the Moving Coil.)

Type	Color	Symbol	Wire Diameter
Phase U	Red	U	2 mm^2
Phase V	White	V	
Phase W	Black	W	
Ground	Green	–	

• Polarity Sensor Connector



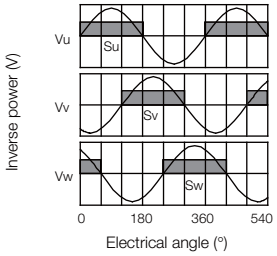
Pin connector: 17JE-23090-02 (D8C)
From DDK Ltd.

Mating Connector
Socket connector: 17JE-13090-02 (D8C)
Studs: 17L-002C or 17L-002C1

Pin	Signal	Pin	Signal
1	+5 V (DC)	6	Not used
2	Phase U	7	
3	Phase V	8	
4	Phase W	9	
5	0 V	–	–

• Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



Specifications, Ratings, and External Dimensions of SGLC Servomotors

6

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

6.1 Model Designations

6.1.1 Combination of Moving Coil and Magnetic Way

S G L C - D16 A 085 A P - 750 A

Linear Σ Series Linear Servomotors

1st digit | 2nd+3rd+4th digits | 5th digit | 6th+7th+8th digits | 9th digit | 10th digit | 11th+12th+13th digits | 14th digit

Note: This code contains four digits if the length of the Magnetic Way is 1,000 or longer.

1st digit Servomotor Type

Code	Specification
C	Cylinder model

2nd+3rd+4th digits

Outer Diameter of Magnetic Way*1

Code	Specification
D16	16 mm
D20	20 mm
D25	25 mm
D32	32 mm

5th digit Power Supply Voltage

Code	Specification
A	200 VAC

6th+7th+8th digits Length of Moving Coil*1

Code	Specification	Outer Diameter Code of Magnetic Way
085	85 mm	D16
100	100 mm	D20
115	115 mm	D16
125	125 mm	D25
135	135 mm	D20
145	145 mm	D16
165	165 mm	D32
170	170 mm	D20, D25
215	215 mm	D25
225	225 mm	D32
285	285 mm	D32

9th digit Design Revision Order of Moving Coil

A, B…

10th digit Sensor Specification

Code	Specification
P	With polarity sensor

11th+12th+13th digits Length of Magnetic Way*1

Code	Specification	Special Orders*2
300	300 mm	240 mm to 420 mm (in 30-mm increments)
350	350 mm	280 mm to 490 mm (in 35-mm increments)
450	450 mm	360 mm to 630 mm (in 45-mm increments)
510	510 mm	480 mm to 750 mm (in 30-mm increments)
590	590 mm	555 mm to 870 mm (in 35-mm increments)
600	600 mm	480 mm to 840 mm (in 60-mm increments)
750	750 mm	For Magnetic Way with outer diameter of 16 mm: 480 mm to 750 mm (in 30-mm increments)
		For Magnetic Way with outer diameter of 25 mm: 705 mm to 1,110 mm (in 45-mm increments)
870	870 mm	555 mm to 870 mm (in 35-mm increments)
1020	1020 mm	960 mm to 1,500 mm (in 60-mm increments)
1110	1110 mm	705 mm to 1,110 mm (in 45-mm increments)
1500	1500 mm	960 mm to 1,500 mm (in 60-mm increments)

14th digit Design Revision Order of Magnetic Way

A, B…

*1. There are restrictions in the allowable combinations. Refer to the following section for details.

☞ *6.1.4 List of Models* on page 6-4

*2. Contact your Yaskawa representative when you make an order.

Note: 1. Order the Moving Coil and Magnetic Way as a set. Contact your Yaskawa representative before purchasing a Moving Coil and Magnetic Way separately.
2. This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

6.1.2 Moving Coil

S G L C W - D16 A 085 A P

Linear Σ Series Linear Servomotors

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

1st digit Servomotor Type
(Same as above combinations.)

2nd digit Moving Coil/Magnetic Way

Code	Specification
W	Moving Coil

3th+4th+5th digits Outer Diameter of Magnetic Way
(Same as above combinations.)

6th digit Power Supply Voltage
(Same as above combinations.)

7th+8th+9th digits Length of Moving Coil
(Same as above combinations.)

10th digit Design Revision Order
A, B …

11th digit Sensor Specification
(Same as above combinations.)

Note: 1. Order the Moving Coil and Magnetic Way as a set. Contact your Yaskawa representative before purchasing a Moving Coil and Magnetic Way separately.
2. This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

6.1.3 Magnetic Way

S G L C M - D16 750 A

Linear Σ Series Linear Servomotors

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

1st digit Servomotor Type
(Same as above combinations.)

2nd digit Moving Coil/Magnetic Way

Code	Specification
M	Magnetic Way

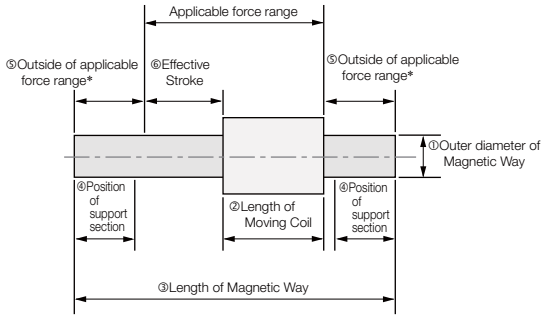
3th+4th+5th digits Outer Diameter of Magnetic Way
(Same as above combinations.)

6th+7th+8th digits Length of Magnetic Way
(Same as above combinations.)

9th digit Design Revision Order
A, B …

Note: 1. Order the Moving Coil and Magnetic Way as a set. Contact your Yaskawa representative before purchasing a Moving Coil and Magnetic Way separately.
2. This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

6.1.4 List of Models



Model SGLC-	① Outer diameter of Magnetic Way [mm]	② Length of Moving Coil [mm]	③ Length of Magnetic Way [mm]	④ Position of Support Section [mm]	⑤ Outside of Applicable Force Range* [mm]	⑥ Effective Stroke [mm]
D16A085AP-300A	16	85	300	30	37.5	140
D16A085AP-510A			510	45	52.5	320
D16A085AP-750A			750	45	52.5	560
D16A115AP-300A	16	115	300	30	37.5	110
D16A115AP-510A			510	45	52.5	290
D16A115AP-750A			750	45	52.5	530
D16A145AP-300A	16	145	300	30	37.5	80
D16A145AP-510A			510	45	52.5	260
D16A145AP-750A			750	45	52.5	500
D20A100AP-350A	20	100	350	35	45	160
D20A100AP-590A			590	50	60	370
D20A100AP-870A			870	50	60	650
D20A135AP-350A	20	135	350	35	45	125
D20A135AP-590A			590	50	60	335
D20A135AP-870A			870	50	60	615
D20A170AP-350A	20	170	350	35	45	90
D20A170AP-590A			590	50	60	300
D20A170AP-870A			870	50	60	580
D25A125AP-450A	25	125	450	45	57.5	210
D25A125AP-750A			750	60	72.5	480
D25A125AP-1110A			1110	60	72.5	840
D25A170AP-450A	25	170	450	45	57.5	165
D25A170AP-750A			750	60	72.5	435
D25A170AP-1110A			1110	60	72.5	795
D25A215AP-450A	25	215	450	45	57.5	120
D25A215AP-750A			750	60	72.5	390
D25A215AP-1110A			1110	60	72.5	750
D32A165AP-600A	32	165	600	60	75	285
D32A165AP-1020A			1020	90	105	645
D32A165AP-1500A			1500	90	105	1125
D32A225AP-600A	32	225	600	60	75	225
D32A225AP-1020A			1020	90	105	585
D32A225AP-1500A			1500	90	105	1065
D32A285AP-600A	32	285	600	60	75	165
D32A285AP-1020A			1020	90	105	525
D32A285AP-1500A			1500	90	105	1005

* The characteristics given in *6.2.3 Force-Motor Speed Characteristics* on page 6-8 will not be met when the Moving Coil is outside of applicable force range.

6.2 Ratings and Specifications

6.2.1 Specifications

Linear Servomotor Model SGLC-		D16A			D20A			D25A			D32A		
		085A	115A	145A	100A	135A	170A	125A	170A	215A	165A	225A	285A
Time Rating		Continuous											
Thermal Class		B											
Insulation Resistance		500 VDC, 10 MΩ min.											
Withstand Voltage		1,500 VAC for 1 minute											
Excitation		Permanent magnet											
Cooling Method		Self-cooled											
Protective Structure		IP00											
Environmental Conditions	Surrounding Air Temperature	0°C to 40°C (with no freezing)											
	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 1,000 m or less. • Must be free of strong magnetic fields.											
Shock Resistance	Impact Acceleration Rate	98 m/s^2											
	Number of Impacts	2 times											
Vibration Resistance	Vibration Acceleration Rate	Moving Coil: 24.5 m/s^2 (the vibration resistance in three directions, vertical, side-to-side, and front-to-back) Magnetic Way: 24.5 m/s^2 (the vibration resistance in the direction of the shaft) 4.9 m/s^2 (the vertical and horizontal vibration resistance)											
Combined Magnetic Way, SGLCM-		D16□□□A			D20□□□A			D25□□□A			D32□□□A		
Combined Serial Converter Unit, JZDP-□□□□-		354	373	356	357	358	359	360	374	362	363	364	365
Applicable SERVOPACKs	SGD7S-	R70A	R70A	R90A	1R6A	1R6A	2R8A	1R6A	2R8A	5R5A	2R8A	5R5A	5R5A
	SGD7W-	1R6A	1R6A	1R6A	1R6A	1R6A	2R8A	1R6A	2R8A	5R5A	2R8A	5R5A	5R5A

6.2.2 Ratings

Linear Servomotor Model SGLC-		D16A			D20A			D25A			D32A		
		085A	115A	145A	100A	135A	170A	125A	170A	215A	165A	225A	285A
Rated Motor Speed (Reference Speed during Speed Control)*1	m/s	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Maximum Speed*1, *3	m/s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Rated Force*1, *2	N	17	25	34	30	45	60	70	105	140	90	135	180
Maximum Force*1	N	60	90	120	150	225	300	280	420	560	420	630	840
Rated Current*1	Arms	0.59	0.53	0.66	0.98	0.98	1.2	1.4	1.8	3.5	1.6	2.8	2.8
Maximum Current*1	Arms	2.1	2.1	2.5	4.9	4.9	6.0	5.7	7.0	13.0	7.3	13.0	13.0
Moving Coil Mass	kg	0.30	0.40	0.50	0.60	0.80	1.0	1.0	1.4	1.8	1.8	2.5	3.2
Force Constant	N/ Arms	31.2	46.8	51.3	33.0	49.5	54.3	53.1	64.8	43.2	61.8	52.2	69.6
BEMF Constant	Vrms/ (m/s)/ phase	10.4	15.6	17.1	11.0	16.5	18.1	17.7	21.6	14.4	20.6	17.4	23.2
Motor Constant	$N/\sqrt{W}$	4.78	5.85	6.67	7.47	9.18	10.4	10.0	12.4	15.4	16.2	20.0	23.0
Electrical Time Constant	ms	0.18	0.18	0.17	0.38	0.32	0.41	0.18	0.59	0.65	0.98	1.0	1.1
Mechanical Time Constant	ms	13	12	11	11	9.5	9.2	10	9.1	7.6	6.9	6.3	6.0
Thermal Resistance (with Heat Sink)	K/W	3.35	2.90	1.64	1.66	1.45	1.29	1.00	0.68	0.61	0.77	0.53	0.49
Thermal Resistance (without Heat Sink)	K/W	6.79	5.24	4.26	4.35	3.38	2.76	2.99	2.29	1.81	1.87	1.43	1.16
Magnetic Attraction*4	N	0	0	0	0	0	0	0	0	0	0	0	0

*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.

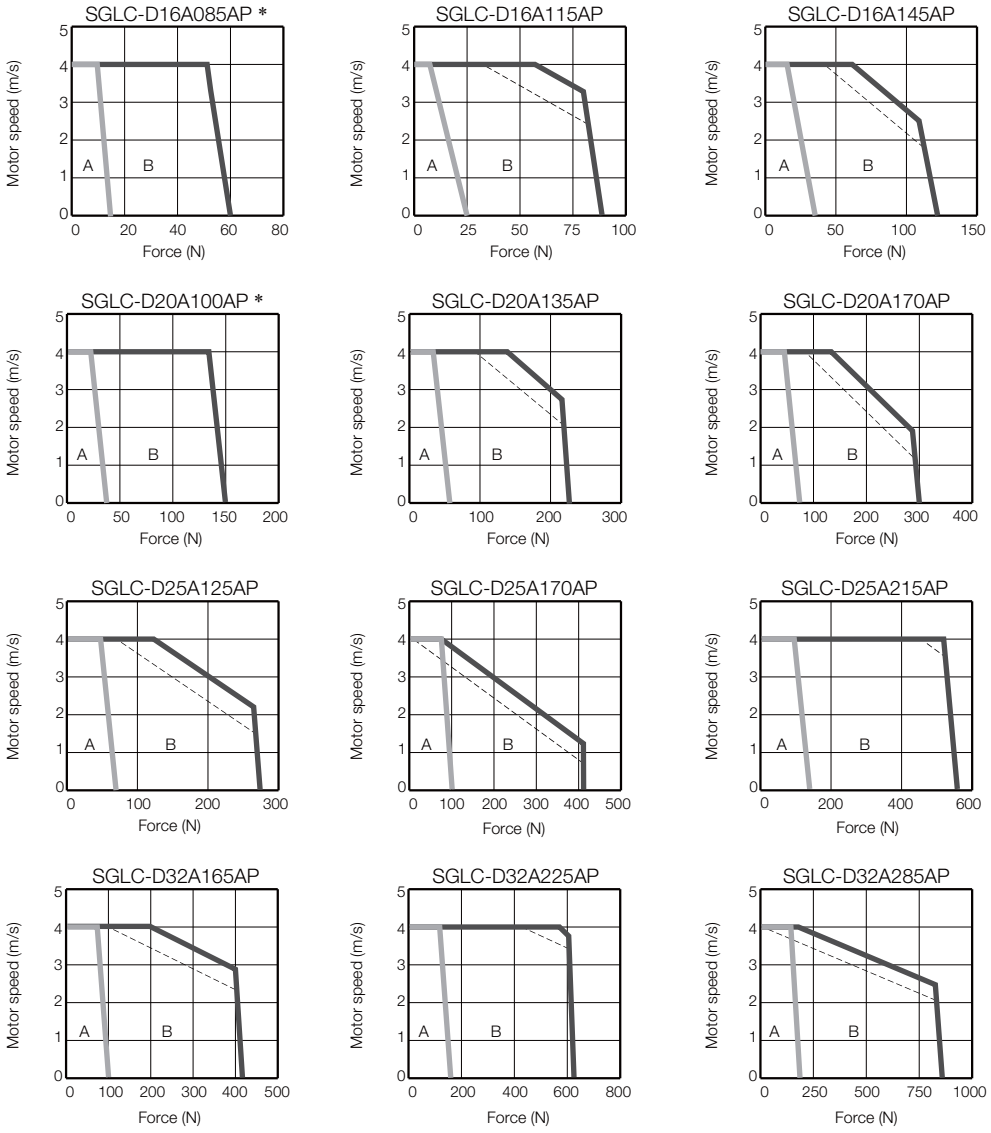
*2. The rated forces are the continuous allowable force values at 40°C with an aluminum heat sink of the dimensions given below.
- Heat Sink Dimensions
  - 100 mm × 200 mm × 12 mm: SGLC-D16A085A and -D16A115A
  - 200 mm × 300 mm × 12 mm: SGLC-D16A145A, -D20A100A, -D20A135A, and -D20A170A
  - 300 mm × 400 mm × 12 mm: SGLC-D25A125A and -D32A165A
  - 400 mm × 500 mm × 12 mm: SGLC-D25A170A, -D25A215A, -D32A225A, and -D32A285A

*3. For speed control operation with an analog voltage reference, set 1.5 m/s as the rated motor speed.

*4. This is the theoretical magnetic attraction between the Moving Coil and Magnetic Way. The unbalanced magnetic gap after installation causes a magnetic attraction.

6.2.3 Force-Motor Speed Characteristics

A : Continuous duty zone ——— (solid lines): With three-phase 200-V input
B : Intermittent duty zone - - - - - (dotted lines): With single-phase 200-V input



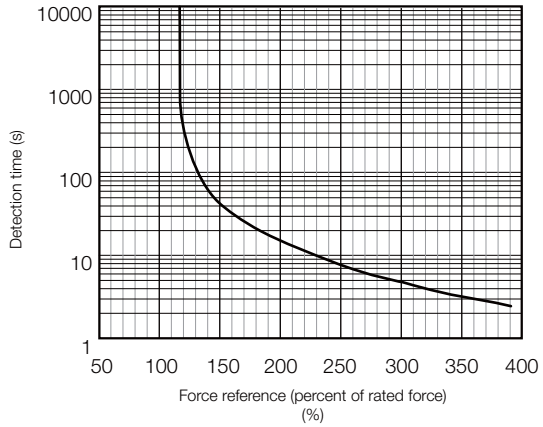
* The characteristics are the same for three-phase 200 V and single-phase 200 V.

Note: 1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. These are typical values.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective force is within the allowable range for the rated force, 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-motor speed characteristics will become smaller because the voltage drop increases.

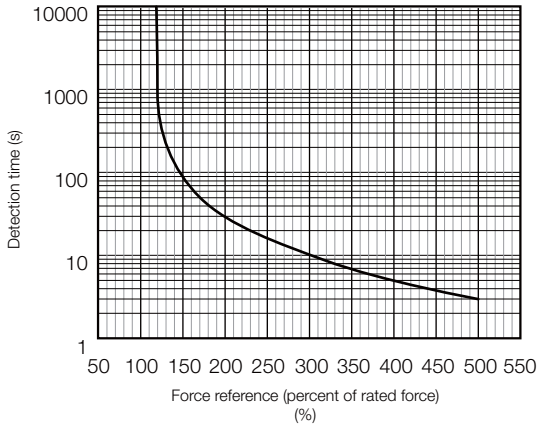
6.2.4 Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions with a Servomotor ambient temperature of 40°C.

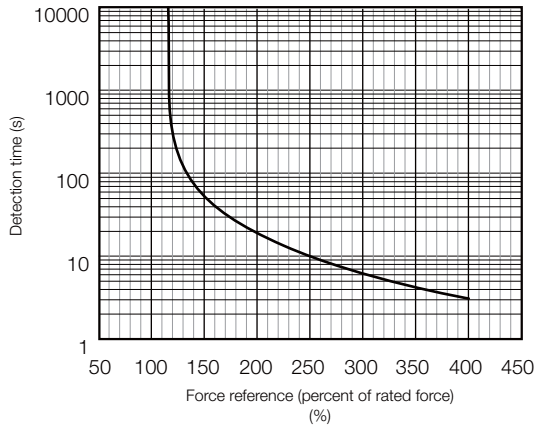
SGLCW-D16A



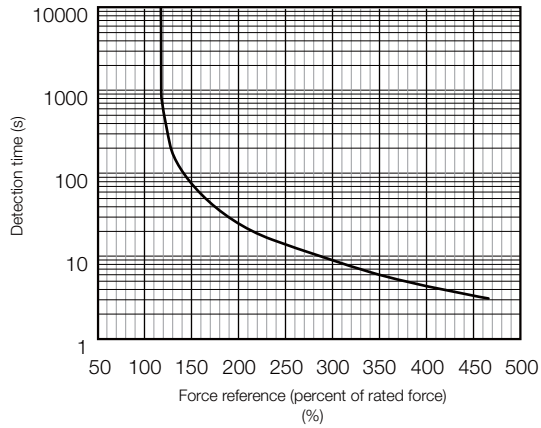
SGLCW-D20A



SGLCW-D25A



SGLCW-D32A

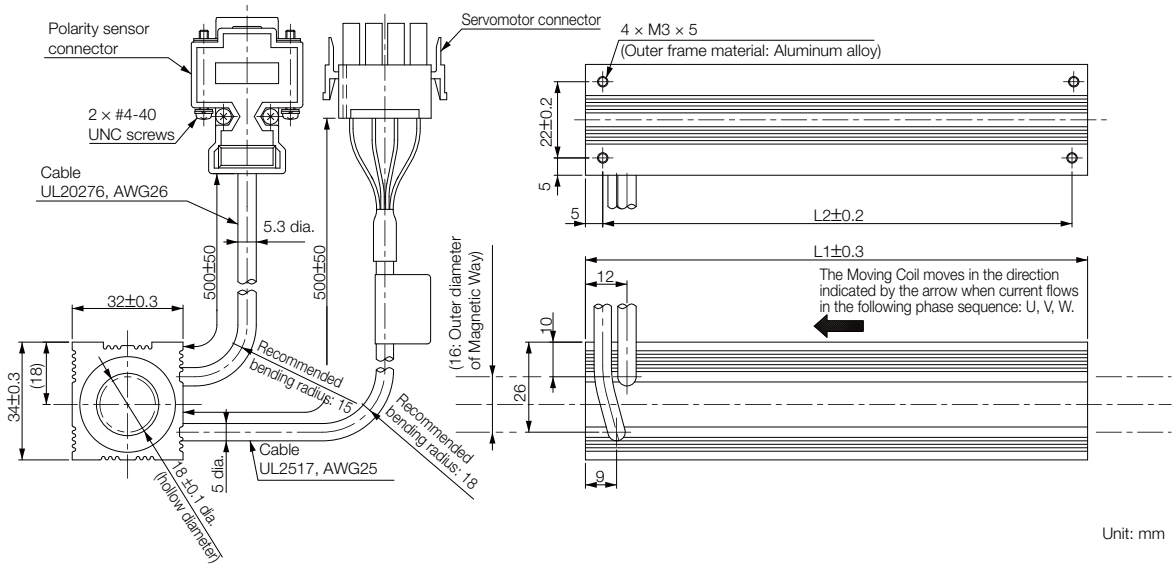


Note: The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
Use the Servomotor so that the effective force remains within the continuous duty zone given in *6.2.3 Force-Motor Speed Characteristics* on page 6-8.

6.3 External Dimensions

6.3.1 SGLC-D16

◆ Moving Coils: SGLCW-D16A□□□AP



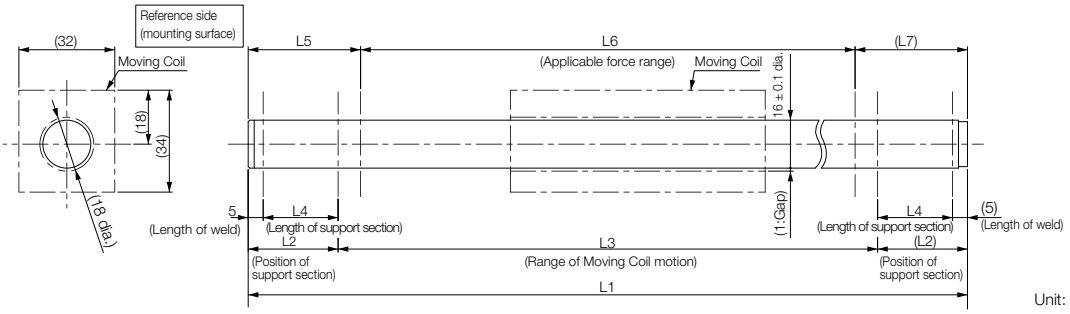
Moving Coil Model SGLCW-	L1	L2	Approx. Mass* [kg]
D16A085AP	85	75	0.3
D16A115AP	115	105	0.4
D16A145AP	145	135	0.5

* The mass is for a Moving Coil with a Polarity Sensor.

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *SGLC-D16 and -D20 Moving Coils* on page 6-18

◆ Magnetic Ways: SGLCM-D16□□□A

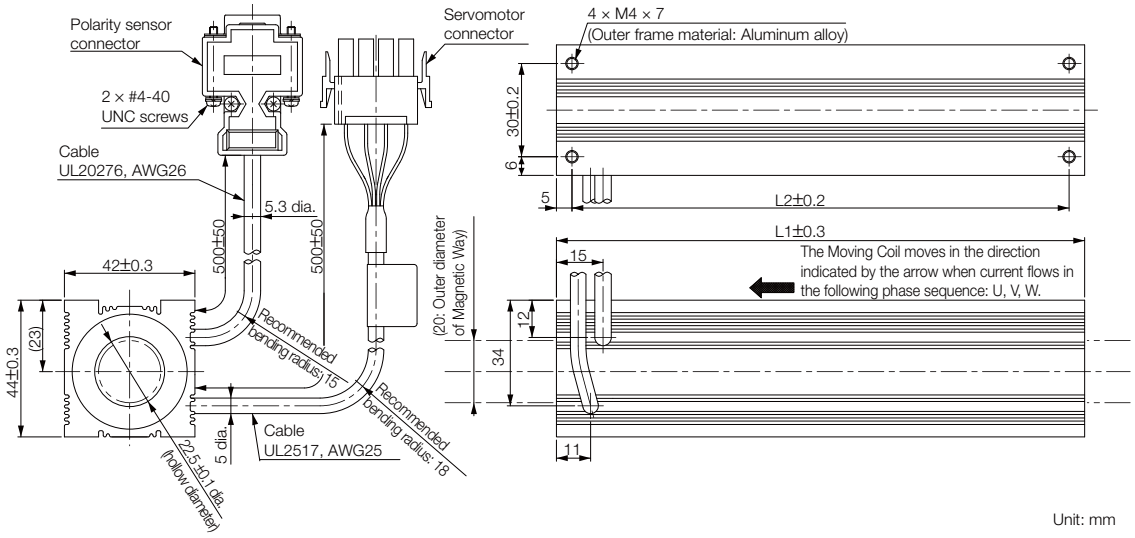


Note: The Magnetic Way will become deformed if a magnetic attraction with the Moving Coil is generated. After installation, take measures over the entire range of motion to prevent any contact between the Magnetic Way and the Moving Coil.

Magnetic Way Model SGLCM-	L1	L2	L3	L4	L5	L6	L7	Approx. Mass [kg]
D16240A	240 ± 1.6	30	180	25	37.5 ± 0.3	165 ± 1.2	37.5	0.38
D16270A	270 ± 1.6	30	210	25	37.5 ± 0.3	195 ± 1.2	37.5	0.43
D16300A	300 ± 1.6	30	240	25	37.5 ± 0.3	225 ± 1.2	37.5	0.48
D16330A	330 ± 1.6	30	270	25	37.5 ± 0.3	255 ± 1.2	37.5	0.53
D16360A	360 ± 1.6	30	300	25	37.5 ± 0.3	285 ± 1.2	37.5	0.58
D16390A	390 ± 1.6	30	330	25	37.5 ± 0.3	315 ± 1.2	37.5	0.63
D16420A	420 ± 1.6	30	360	25	37.5 ± 0.3	345 ± 1.2	37.5	0.68
D16480A	480 ± 2.5	45	390	40	52.5 ± 0.3	375 ± 2.1	52.5	0.75
D16510A	510 ± 2.5	45	420	40	52.5 ± 0.3	405 ± 2.1	52.5	0.80
D16540A	540 ± 2.5	45	450	40	52.5 ± 0.3	435 ± 2.1	52.5	0.85
D16570A	570 ± 2.5	45	480	40	52.5 ± 0.3	465 ± 2.1	52.5	0.90
D16600A	600 ± 2.5	45	510	40	52.5 ± 0.3	495 ± 2.1	52.5	0.95
D16630A	630 ± 2.5	45	540	40	52.5 ± 0.3	525 ± 2.1	52.5	1.00
D16660A	660 ± 2.5	45	570	40	52.5 ± 0.3	555 ± 2.1	52.5	1.05
D16690A	690 ± 2.5	45	600	40	52.5 ± 0.3	585 ± 2.1	52.5	1.10
D16720A	720 ± 2.5	45	630	40	52.5 ± 0.3	615 ± 2.1	52.5	1.15
D16750A	750 ± 3.0	45	660	40	52.5 ± 0.3	645 ± 2.5	52.5	1.20

6.3.2 SGLC-D20

◆ Moving Coils: SGLCW-D20A□□□AP



Unit: mm

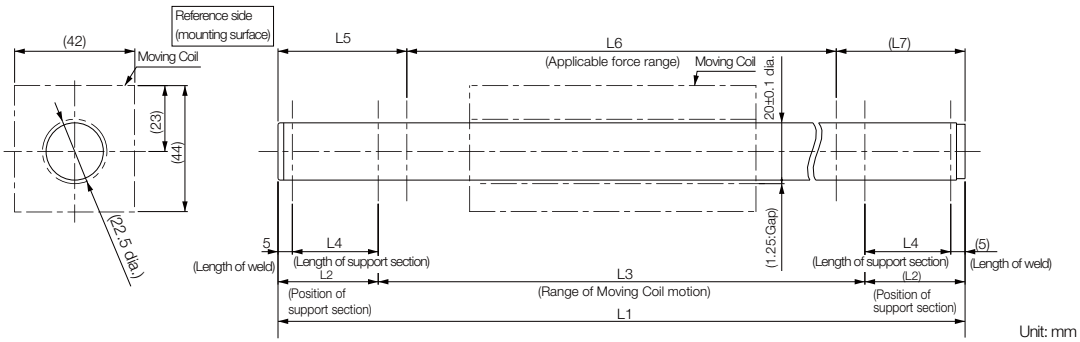
Moving Coil Model SGLCW-	L1	L2	Approx. Mass* [kg]
D20A100AP	100	90	0.6
D20A135AP	135	125	0.8
D20A170AP	170	160	1.0

* The mass is for a Moving Coil with a Polarity Sensor.

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *SGLC-D16 and -D20 Moving Coils* on page 6-18

◆ Magnetic Ways: SGLCM-D20□□□A

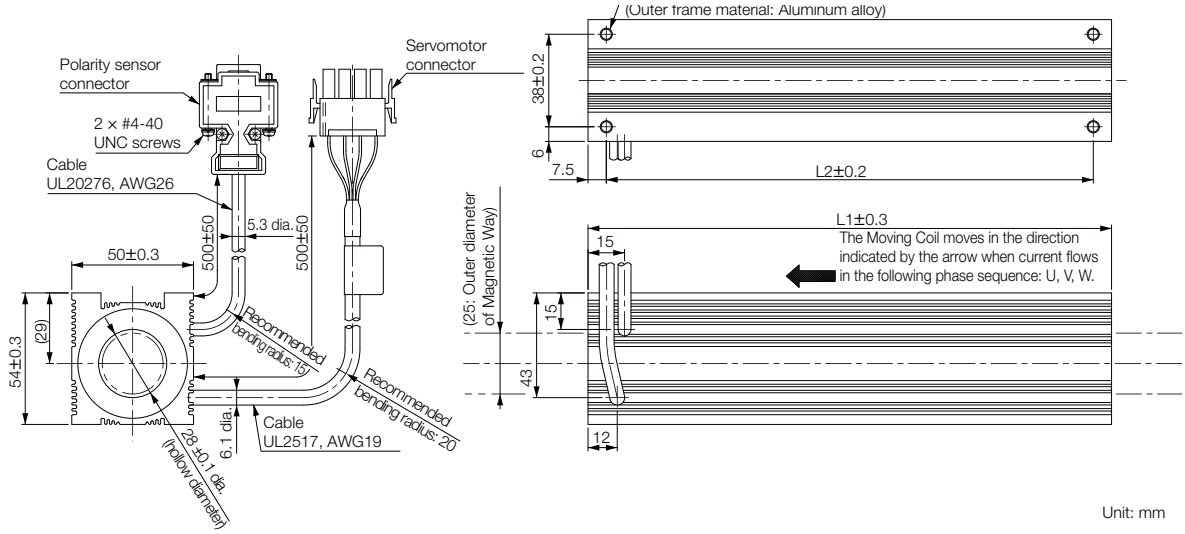


Note: The Magnetic Way will become deformed if a magnetic attraction with the Moving Coil is generated. After installation, take measures over the entire range of motion to prevent any contact between the Magnetic Way and the Moving Coil.

Magnetic Way Model SGLCM-	L1	L2	L3	L4	L5	L6	L7	Approx. Mass [kg]
D20280A	280 ± 1.6	35	210	30	45 ± 0.3	190 ± 1.2	45	0.68
D20315A	315 ± 1.6	35	245	30	45 ± 0.3	225 ± 1.2	45	0.77
D20350A	350 ± 1.6	35	280	30	45 ± 0.3	260 ± 1.2	45	0.86
D20385A	385 ± 1.6	35	315	30	45 ± 0.3	295 ± 1.2	45	0.95
D20420A	420 ± 1.6	35	350	30	45 ± 0.3	330 ± 1.2	45	1.00
D20455A	455 ± 1.6	35	385	30	45 ± 0.3	365 ± 1.2	45	1.10
D20490A	490 ± 1.6	35	420	30	45 ± 0.3	400 ± 1.2	45	1.20
D20555A	555 ± 2.5	50	455	45	60 ± 0.3	435 ± 2.1	60	1.35
D20590A	590 ± 2.5	50	490	45	60 ± 0.3	470 ± 2.1	60	1.45
D20625A	625 ± 2.5	50	525	45	60 ± 0.3	505 ± 2.1	60	1.55
D20660A	660 ± 2.5	50	560	45	60 ± 0.3	540 ± 2.1	60	1.60
D20695A	695 ± 2.5	50	595	45	60 ± 0.3	575 ± 2.1	60	1.70
D20730A	730 ± 2.5	50	630	45	60 ± 0.3	610 ± 2.1	60	1.80
D20765A	765 ± 2.5	50	665	45	60 ± 0.3	645 ± 2.1	60	1.90
D20800A	800 ± 2.5	50	700	45	60 ± 0.3	680 ± 2.1	60	2.00
D20835A	835 ± 2.5	50	735	45	60 ± 0.3	715 ± 2.1	60	2.10
D20870A	870 ± 3.0	50	770	45	60 ± 0.3	750 ± 2.5	60	2.20

6.3.3 SGLC-D25

◆ Moving Coils: SGLCW-D25A□□□AP



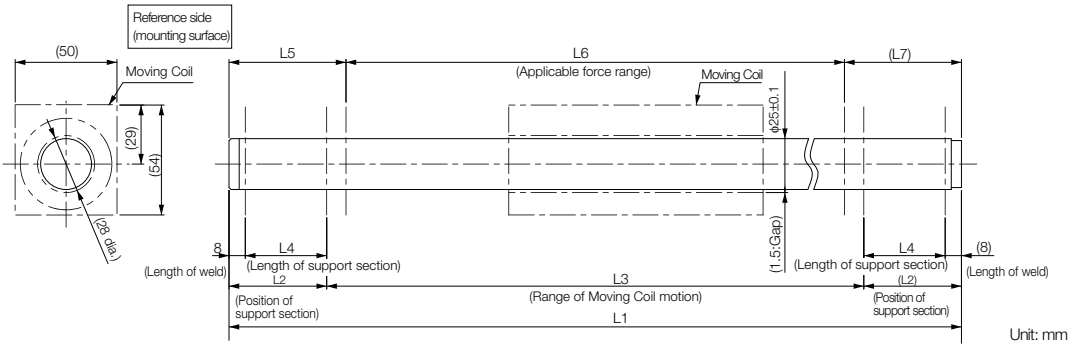
Moving Coil Model SGLCW-	L1	L2	Approx. Mass* [kg]
D25A125AP	125	110	1.0
D25A170AP	170	153	1.4
D25A215AP	215	200	1.8

* The mass is for a Moving Coil with a Polarity Sensor.

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *SGLC-D25 and -D32 Moving Coils* on page 6-19

◆ Magnetic Ways: SGLCM-D25□□□A

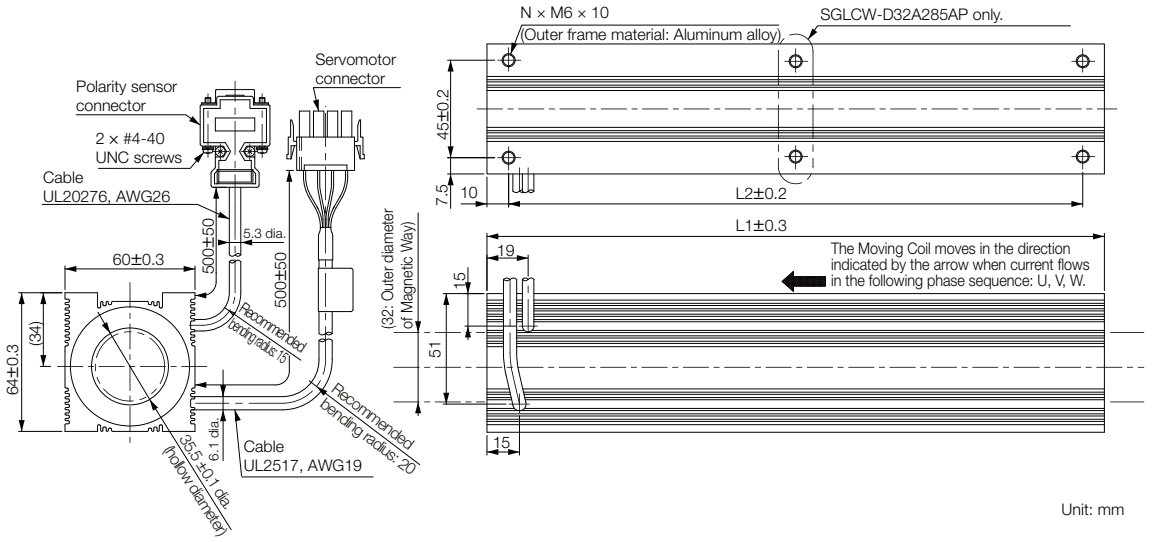


Note: The Magnetic Way will become deformed if a magnetic attraction with the Moving Coil is generated. After installation, take measures over the entire range of motion to prevent any contact between the Magnetic Way and the Moving Coil.

Magnetic Way Model SGLCM-	L1	L2	L3	L4	L5	L6	L7	Approx. Mass [kg]
D25360A	360 ± 1.6	45	270	37	57.5 ± 0.3	245 ± 1.2	57.5	1.50
D25405A	405 ± 1.6	45	315	37	57.5 ± 0.3	290 ± 1.2	57.5	1.65
D25450A	450 ± 1.6	45	360	37	57.5 ± 0.3	335 ± 1.2	57.5	1.80
D25495A	495 ± 1.6	45	405	37	57.5 ± 0.3	380 ± 1.2	57.5	1.95
D25540A	540 ± 1.6	45	450	37	57.5 ± 0.3	425 ± 1.2	57.5	2.10
D25585A	585 ± 1.6	45	495	37	57.5 ± 0.3	470 ± 1.2	57.5	2.25
D25630A	630 ± 1.6	45	540	37	57.5 ± 0.3	515 ± 1.2	57.5	2.40
D25705A	705 ± 2.5	60	585	52	72.5 ± 0.3	560 ± 2.1	72.5	2.85
D25750A	750 ± 2.5	60	630	52	72.5 ± 0.3	605 ± 2.1	72.5	3.00
D25795A	795 ± 2.5	60	675	52	72.5 ± 0.3	650 ± 2.1	72.5	3.15
D25840A	840 ± 2.5	60	720	52	72.5 ± 0.3	695 ± 2.1	72.5	3.30
D25885A	885 ± 2.5	60	765	52	72.5 ± 0.3	740 ± 2.1	72.5	3.45
D25930A	930 ± 2.5	60	810	52	72.5 ± 0.3	785 ± 2.1	72.5	3.60
D25975A	975 ± 2.5	60	855	52	72.5 ± 0.3	830 ± 2.1	72.5	3.75
D251020A	1020 ± 2.5	60	900	52	72.5 ± 0.3	875 ± 2.1	72.5	3.90
D251065A	1065 ± 2.5	60	945	52	72.5 ± 0.3	920 ± 2.1	72.5	4.05
D251110A	1110 ± 3.0	60	990	52	72.5 ± 0.3	965 ± 2.5	72.5	4.20

6.3.4 SGLC-D32

◆ Moving Coils: SGLCW-D32A□□□AP



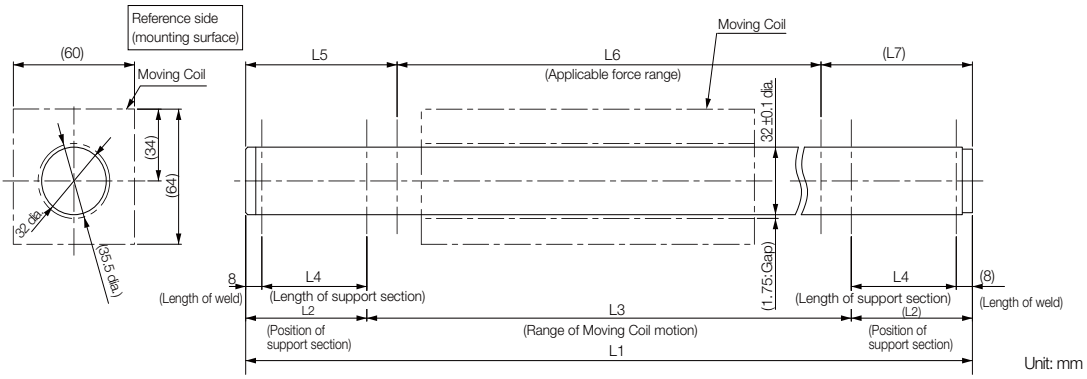
Moving Coil Model SGLCW-	L1	L2	N	Approx. Mass* [kg]
D32A165AP	165	145	4	1.8
D32A225AP	225	205	4	2.5
D32A285AP	285	265	6	3.2

* The mass is for a Moving Coil with a Polarity Sensor.

Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

☞ ◆ *SGLC-D25 and -D32 Moving Coils* on page 6-19

◆ Magnetic Ways: SGLCM-D32□□□A



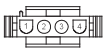
Note: The Magnetic Way will become deformed if a magnetic attraction with the Moving Coil is generated. After installation, take measures over the entire range of motion to prevent any contact between the Magnetic Way and the Moving Coil.

Magnetic Way Model SGLCM-	L1	L2	L3	L4	L5	L6	L7	Approx. Mass [kg]
D32480A	480 ± 1.6	60	360	52	75 ± 0.3	330 ± 1.2	75	3.0
D32540A	540 ± 1.6	60	420	52	75 ± 0.3	390 ± 1.2	75	3.4
D32600A	600 ± 1.6	60	480	52	75 ± 0.3	450 ± 1.2	75	3.8
D32660A	660 ± 1.6	60	540	52	75 ± 0.3	510 ± 1.2	75	4.2
D32720A	720 ± 1.6	60	600	52	75 ± 0.3	570 ± 1.2	75	4.6
D32780A	780 ± 1.6	60	660	52	75 ± 0.3	630 ± 1.2	75	5.0
D32840A	840 ± 1.6	60	720	52	75 ± 0.3	690 ± 1.2	75	5.4
D32960A	960 ± 2.5	90	780	82	105 ± 0.3	750 ± 2.1	105	5.9
D321020A	1020 ± 2.5	90	840	82	105 ± 0.3	810 ± 2.1	105	6.3
D321080A	1080 ± 2.5	90	900	82	105 ± 0.3	870 ± 2.1	105	6.7
D321140A	1140 ± 2.5	90	960	82	105 ± 0.3	930 ± 2.1	105	7.1
D321200A	1200 ± 2.5	90	1020	82	105 ± 0.3	990 ± 2.1	105	7.5
D321260A	1260 ± 2.5	90	1080	82	105 ± 0.3	1050 ± 2.1	105	7.9
D321320A	1320 ± 2.5	90	1140	82	105 ± 0.3	1110 ± 2.1	105	8.3
D321380A	1380 ± 2.5	90	1200	82	105 ± 0.3	1170 ± 2.1	105	8.7
D321440A	1440 ± 2.5	90	1260	82	105 ± 0.3	1230 ± 2.1	105	9.1
D321500A	1500 ± 3.0	90	1320	82	105 ± 0.3	1290 ± 2.5	105	9.5

6.3.5 Connector Specifications

◆ SGLC-D16 and -D20 Moving Coils

• Servomotor Connector

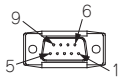


Plug: 350779-1
Pins: 350561-3 or 350690-3 (No.1 to 3)
770210-1 (No. 4)
From Tyco Electronics Japan G.K.

Mating Connector
Cap: 350780-1
Socket: 350925-1 or 770673-1

Pin	Signal	Wire Color
1	Phase U	Red
2	Phase V	White
3	Phase W	Blue
4	FG	Green

• Servomotor Connector



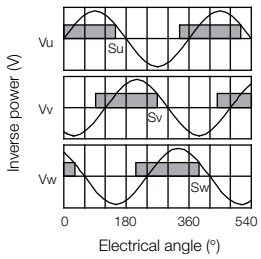
Pin connector: 17JE-23090-02 (D8C)
From DDK Ltd.

Mating Connector
Socket connector: 17JE-13090-02 (D8C)
Studs: 17L-002C or 17L-002C1

Pin	Signal	Pin	Signal
1	+5 V (power supply)	6	Not used
2	Phase U	7	
3	Phase V	8	
4	Phase W	9	
5	0 V (power supply)	–	–

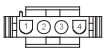
• Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



◆ SGLC-D25 and -D32 Moving Coils

• Servomotor Connector

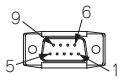


Plug: 350779-1
Pins: 350561-3 or 350690-3 (No.1 to 3)
350654-1 or 350669-1 (No. 4)
From Tyco Electronics Japan G.K.

Mating Connector
Cap: 350780-1
Socket: 350925-1 or 770673-1

Pin	Signal	Wire Color
1	Phase U	Red
2	Phase V	White
3	Phase W	Blue
4	FG	Green

• Polarity Sensor Connector



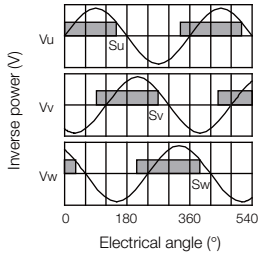
Pin connector: 17JE-23090-02 (D8C)
From DDK Ltd.

Mating Connector
Socket connector: 17JE-13090-02 (D8C)
Studs: 17L-002C or 17L-002C1

Pin	Signal	Pin	Signal
1	+5 V (power supply)	6	Not used
2	Phase U	7	
3	Phase V	8	
4	Phase W	9	
5	0 V (power supply)	–	–

• Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



Equipment Design Precautions

7

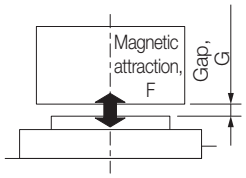
This chapter provides precautions for equipment design.

7.1 Influence of Magnetic Attraction

7.1.1 SGLF Servomotors

The Moving Coil and Magnetic Way face each other, so magnetic attraction will occur. Consider the following magnetic attractions when you design the equipment.

Moving Coil Model		Gap, G[*1] (mm)	Magnetic Attraction, F[*2] (N)
SGLFW-	20A090	0.7 (0.5)[*3]	410
	20A120		600
	35A120		1100
	35A230		2100
	50A200		2100
	50A380		4100
	1ZA200		4200
	1ZA380		6520
SGLFW2-	30A070	0.5	240
	30A120		750
	30A230		1490
	45A200		2390
	45A380		4770
	90A200		4770
	90A380		9550
	90A560		14300
	1DA380		14300
	1DA560		21500



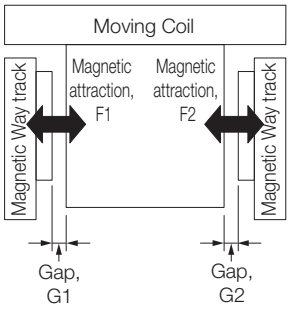
*1. Gap values are given for the design value minus 0.3 mm.
*2. The maximum force is given for the magnetic attraction.
*3. Dimensions in parentheses are for when the magnet cover is attached.

7.1.2 SGLT Servomotors

The Magnetic Way tracks are located on both sides of the Moving Coil. If the gaps on both sides of the Moving Coil are the same, the magnetic attraction is canceled. However, it is difficult to obtain the same gaps due to Servomotor precision, the precision of the user's equipment, error when assembling the Servomotor, and other factors. Consider the following magnetic attractions when you design the equipment.

Moving Coil Model SGLTW-	Magnetic Gap, G1*1 (mm)	Magnetic Gap, G2*1 (mm)	Magnetic Attraction, F1*2 (N)	Magnetic Attraction, F2*2 (N)	Difference in Magnetic Attraction, ΔF (N)
20A170	1.3 (1.1)*3	0.7 (0.5)*3	760	1030	270
20A320			1510	2040	530
20A460			2260	3050	790
35A170	1.3 (1.1)*3	0.7 (0.5)*3	1330	1800	470
35A320			2650	3570	920
35A460			4000	5400	1400
40A400	1.7 (1.5)*3	1.1 (0.9)*3	4700	5900	1200
50A170	1.3 (1.1)*3	0.7 (0.5)*3	1900	2600	700
50A320			3750	5100	1350

*1. Gap values are given for the design value plus 0.3 mm on one side and minus 0.3 mm on the other side.
*2. The maximum force is given for the magnetic attraction.
*3. Dimensions in parentheses are for when the magnet cover is attached.



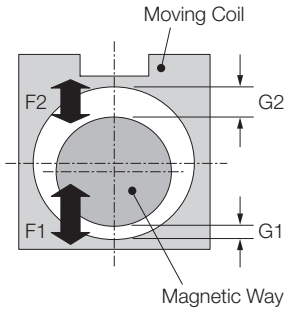
7.1.3 SGLC Servomotors

A steel yoke is embedded in the Moving Coil to generate force, so magnetic attraction occurs between the Moving Coil and Magnetic Way. If the gaps between the Moving Coil and Magnetic Way are the same, the magnetic attraction is canceled. However, it is difficult to obtain the same gaps due to Servomotor precision, deflection in the Magnetic Way, the precision of the user's equipment, error when assembling the Servomotor, and other factors. Consider the following magnetic attractions when you design the equipment.

Moving Coil Model SGLCW-	Gap Design Value (mm)	Gap, G1*1 (mm)	Gap, G2*1 (mm)	Difference in Magnetic Attraction, F1-F2*2 (N)
D16A085	1.0	0.3	1.7	20
D16A115				30
D16A145				40
D20A100	1.25	0.4	2.1	25
D20A135				38
D20A170				50
D25A125	1.5	0.5	2.5	50
D25A170				75
D25A215				100
D32A165	1.75	0.5	3.0	80
D32A225				120
D32A285				160

*1. Gap values are given for an approximately 70% shift in the design value.
*2. The maximum force is given for the magnetic attraction.

Note: Contact your Yaskawa representative for conditions other than those given above.



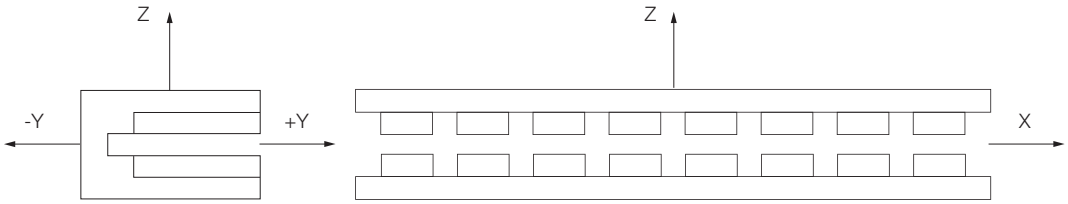
The example in the above figure shows a vertical shift in the Magnetic Way.
Magnetic attraction can work in any direction due to assembly error.

7.2 Influence of Magnetic Way Leakage Flux

The Magnetic Way has leakage flux. Particularly in locations where the leakage flux is 10 gauss or higher, the influence of the leakage flux will be strongly felt. Consider this in the equipment design. The following tables give the locations where the leakage flux will be 10 gauss for each Servomotor model.

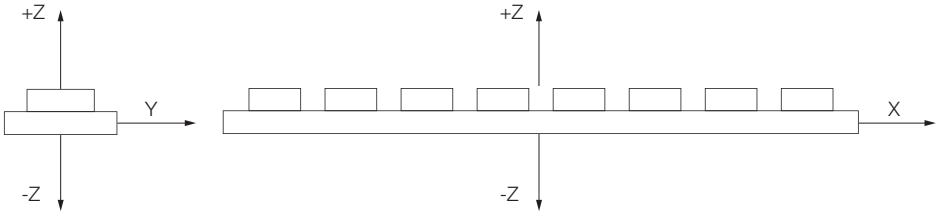
7.2.1 SGLG Servomotors

Magnetic Way Model SGLGM-	Location of 10-Gauss Leakage Flux			
	X (mm)	+Y (mm)	-Y (mm)	Z (mm)
30	25	25	5	35
40□□□C□	30	30	5	40
40□□□C□-M	50	50	5	60
60□□□C□	45	40	5	55
60□□□C□-M	65	60	5	75
90	100	85	5	115



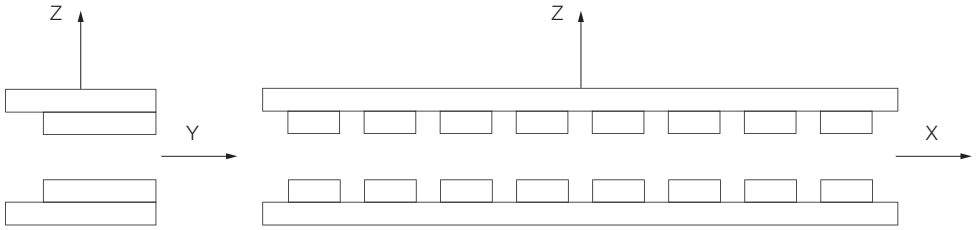
7.2.2 SGLF Servomotors

Magnetic Way Model	Location of 10-Gauss Leakage Flux			
	X (mm)	Y (mm)	+Z (mm)	-Z (mm)
SGLFM-20	60	35	65	5
SGLFM-35	70	45	85	5
SGLFM-50	90	50	105	5
SGLFM-1Z	120	60	135	5
SGLFM2-30	60	30	70	5
SGLFM2-45	90	50	105	5
SGLFM2-90	120	60	135	5
SGLFM2-1D	130	70	150	5



7.2.3 SGLT Servomotors

Magnetic Way Model SGLTM-	Location of 10-Gauss Leakage Flux		
	X (mm)	Y (mm)	Z (mm)
20	55	40	10
35□□□A	60	40	10
35□□□H	65	45	15
40	80	60	15
50	70	50	15
80	90	60	20

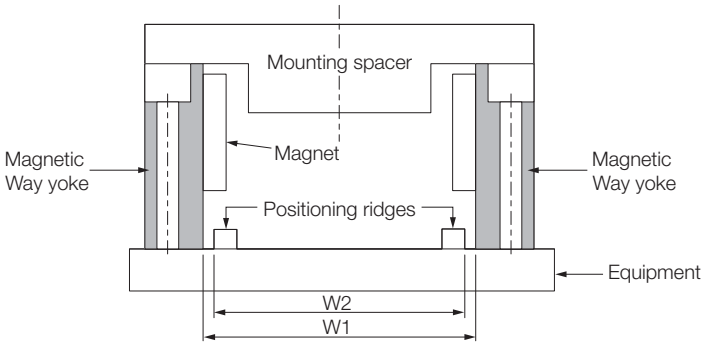


7.2.4 SGLC Servomotors

Magnetic Way Model SGLCM-	Location of 10-Gauss Leakage Flux	
	X (mm)	Y, Z (mm)
D16	65	50
D20	80	60
D25	90	70
D32	125	95

7.3 Special Precautions for SGLT Servomotors

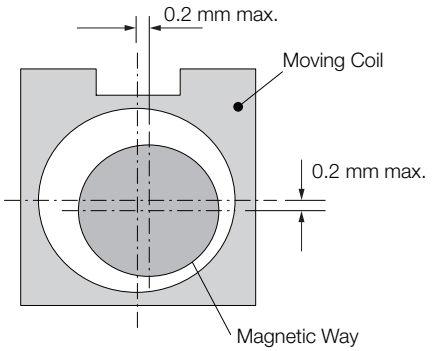
To mount the Magnetic Way, space is required between the Magnetic Way yoke and the positioning ridges on the equipment. Design the equipment with the following recommended values (W2) for the positioning ridges on the equipment.



Magnetic Way Model SGLTM-	Dimensions (mm)	
	W1 (Factory Distance between Magnetic Way Yokes)	W2 (Recommended Positioning Ridge Dimensions for Equipment)
20	71.5 ± 1	70 ± 0.15
35□□□□		
40	113 ± 1	111.8 ± 0.15
80		
35□□□H	91.5 ± 1	90 ± 0.15
50		

7.4 Special Precautions for SGLC Servomotors

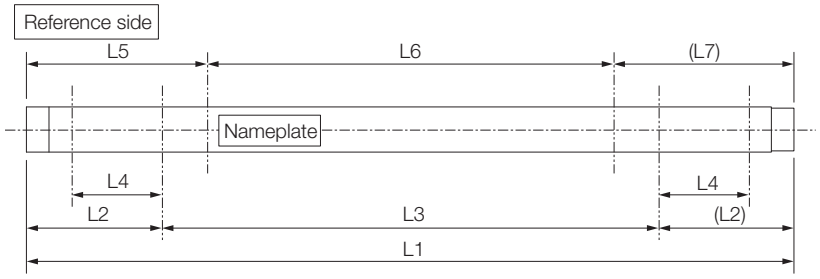
- Design the equipment so that the cross-sectional centers of the Magnetic Way and Moving Coil are offset by no more than 0.2 mm.



- Position the support section of the Magnetic Way as given in the following table.

Magnetic Way Model SGLCM-	Total Length of Magnetic Way, L1 (mm)	Position of Support Section, L2 (mm)	Driving Range of Moving Coil, L3 (mm)	Length of Support Section, L4 (mm)	Range Outside of Applicable Force Range*, L5 (mm)	Applicable Force Range, L6 (mm)	Range Outside of Applicable Force Range*, L7 (mm)
D16300	300 ± 1.6	30	240	25	37.5 ± 0.3	225 ± 1.2	37.5
D16510	510 ± 2.5	45	420	40	52.5 ± 0.3	405 ± 2.1	52.5
D16750	750 ± 3.0	45	660	40	52.5 ± 0.3	645 ± 2.5	52.5
D20350	350 ± 1.6	35	280	30	45 ± 0.3	260 ± 1.2	45
D20590	590 ± 2.5	50	490	45	60 ± 0.3	470 ± 2.1	60
D20870	870 ± 3.0	50	770	45	60 ± 0.3	750 ± 2.5	60
D25450	450 ± 1.6	45	360	37	57.5 ± 0.3	335 ± 1.2	57.5
D25750	750 ± 2.5	60	630	52	72.5 ± 0.3	605 ± 2.1	72.5
D251110	1110 ± 3.0	60	990	52	72.5 ± 0.3	965 ± 2.5	72.5
D32600	600 ± 1.6	60	480	52	75 ± 0.3	450 ± 1.2	75
D321020	1020 ± 2.5	90	840	82	105 ± 0.3	810 ± 2.1	105
D321500	1500 ± 3.0	90	1320	82	105 ± 0.3	1290 ± 2.5	105

* If any part of the Moving Coil is in this range, the specified characteristic may not be satisfied.



7.5 Specifications When Connecting More Than One Moving Coil

With a Linear Servomotor, you can connect more than one Moving Coil (i.e., connect more than one Moving Coil in parallel and drive them with one SERVOPACK). Observe the following precautions when you connect more than one Moving Coil.

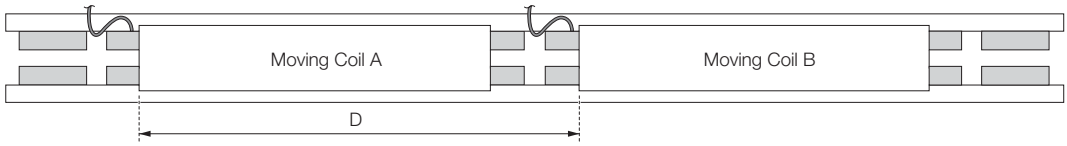
Note

The specifications for the Main Circuit Cable and Serial Converter Unit are different from the standard specifications. Contact your Yaskawa representative for details.

7.5.1 Mounting Position Precautions

Series Arrangement

Position the Moving Coils as shown in the following figure so that the current phases of the Moving Coils are aligned.



Moving Coil Model			Maximum Force (N)		Applicable SERVOPACK Model*1 SGD7S-	Dimension D (mm)
			One Moving Coil	Two Moving Coils		
SGLGW-	60A	253C	440	880	5R5A	315 + 45 × n*2
			(720)	(1440)	(120A)	315 + 45 × n*2
		365C	660	1320	120A	450+ 45 × n*2
			(1080)	(2160)	(180A)	450 + 45 × n*2
	90A	370C	2200	4400	330A	420 + 84 × n*2
		535C	3000	6000	330A	588 + 84× n*2
SGLFW-	50A	380B	1200	2400	330A	450 + 45 × n*2
	1ZA	380B	2400	4800	470A	450 + 45 × n*2
SGLFW2-	90A	380A	3360	6720	470A	459 + 51 × n*2
		560A	5040	10080	780A	663 + 51 × n*2
	1DA	380A	5040	10080	470A	459 + 51× n*2
		560A	7560	15120	780A	663 + 51 × n*2
SGLTW-	40A	400B	2600	5200	330A	405 + 45 × n*2
		600B	4000	8000	550A	585 + 45 × n*2
	80A	400B	5000	10000	550A	405 + 45 × n*2
		600B	7500	15000	780A	585 + 45 × n*2

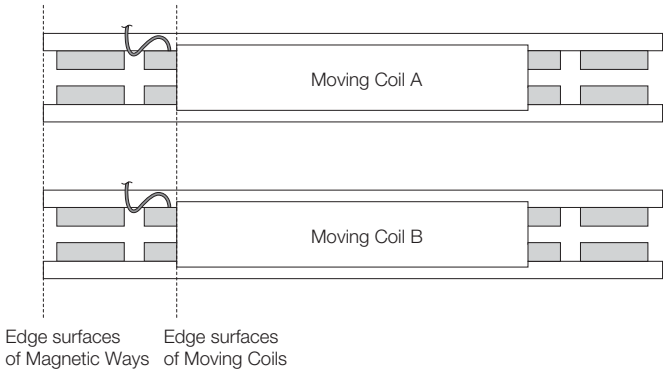
*1. This is the model number of the applicable SERVOPACK when you connect two Moving Coils. You will need to obtain an estimate for the model numbers of applicable SERVOPACKs if you want to connect three or more Moving Coils. Contact your Yaskawa representative for details.

*2. n = Number of Moving Coils arranged in series

Note: 1. The entries in parentheses are the values and model numbers for combining High-Force Moving Coils.
2. The dimensional tolerance for the separation between Moving Coils is ±0.3 mm.
3. Consult your Yaskawa representative if you want to connect Linear Servomotors that are not listed in the table.

Parallel Arrangement

Mount the Moving Coils and Magnetic Ways within a tolerance of ±0.3 mm at the edge surfaces of the Moving Coils and Magnetic Ways so that the current phases of the Moving Coil are aligned.



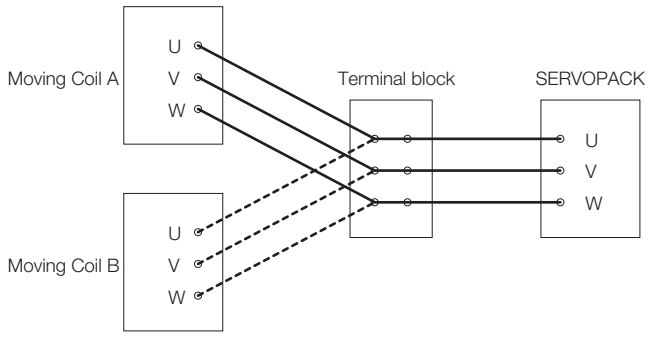
7.5.2 Connection Procedure

Note

Burnout Protection Circuit

Connect two Moving Coils in parallel as shown in the following figure. If you turn ON the power supply with only one Moving Coil connected, an overcurrent will flow and the Moving Coil may burn out. Always check the connections before you turn ON the power supply.

When you connect more than one Moving Coil, we recommend that you use a CT (current transformer) and install a burnout protection circuit. Contact your Yaskawa representative for details.



Servomotor Installation

8

This chapter describes the installation conditions, procedures, and precautions for Servomotors.

8.1 Installation Conditions

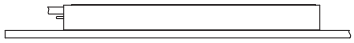
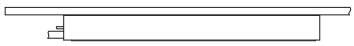
The service life of a Servomotor will be shortened or unexpected problems will occur if the Servomotor is installed incorrectly or in an inappropriate location. Always observe the following installation instructions.

8.1.1 Installation Environment

Refer to the specifications for each type of Servomotor for the mechanical specifications, protective structure, and environmental conditions related to Servomotor installation.

8.1.2 Installation Orientation

You can install the Servomotor in any orientation.

Installation Orientation	Figure	Precautions
Horizontal Direction		–
Hung		Install a mechanism on the equipment to provide protection in case the Servomotor falls off.
Vertical Direction (Stroke in Vertical Direction)		• Implement safety measures, such as attaching a counterbalance, so that the workpiece will not fall, e.g., when an alarm occurs, when overtravel occurs, or when the power supply is interrupted. • Set the parameters so that the Servomotor will stop in the zero clamping state when overtravel occurs.

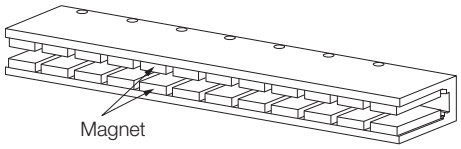
8.2 Installation Procedure

8.2.1 SGLG Servomotors (Coreless Models)

Mounting the Magnetic Way

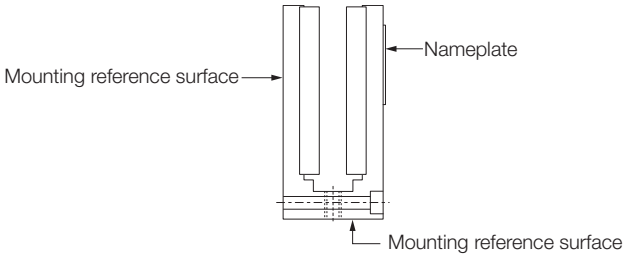
Note

The SGLG Magnetic Ways consist of C-shaped steel plates with magnets facing each other attached between them. Be careful not to let foreign matter (magnetic material) enter between the magnets.



Use the following procedure.

1. Confirm the mounting reference surfaces of the Magnetic Way and place the Magnetic Way on one of the reference surfaces. There are two mounting references surfaces, as shown in the following figure. Select the appropriate reference surface for your system.
   Note: Be careful not to pinch your hands between the equipment and the Magnetic Way.



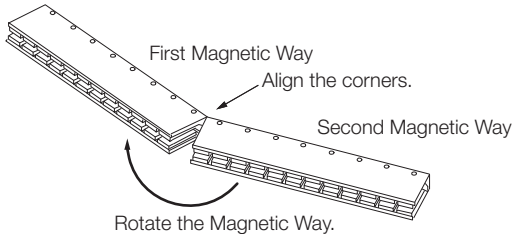
2. Press the Magnetic Way tightly against the equipment and secure it with screws.

Magnetic Way Model SGLGM-	Screw Nominal Size	Tightening Torque (N·cm)
30	M4	360 to 500
40	M5	720 to 1,010
60		
90	M6	1,220 to 1,710

Note:Use socket head screws with a strength class of 10.9.

3. Place the second Magnetic Way in line with and at least 30 mm away from the first Magnetic Way.

4. Align the corners of the connecting surfaces of the Magnetic Ways and then rotate the second Magnetic Way so that it connects to the first Magnetic Way.
   Note: The magnetic attraction will pull the Magnetic Ways together. Be careful not to pinch your fingers.



5. Secure the second Magnetic Way with screws.

6. Mount the third and any other Magnetic Ways in the same way.

This concludes the procedure.

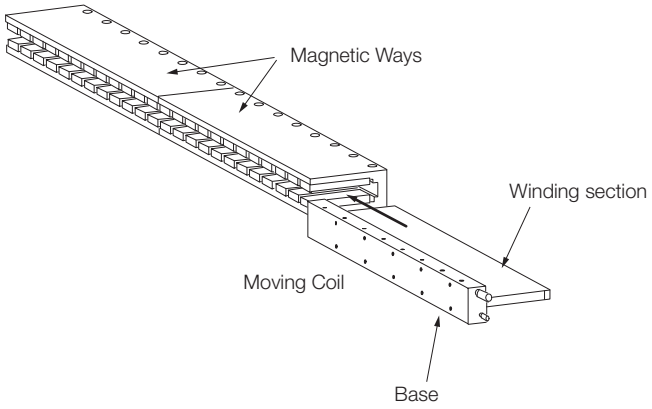
Mounting the Moving Coil


Note

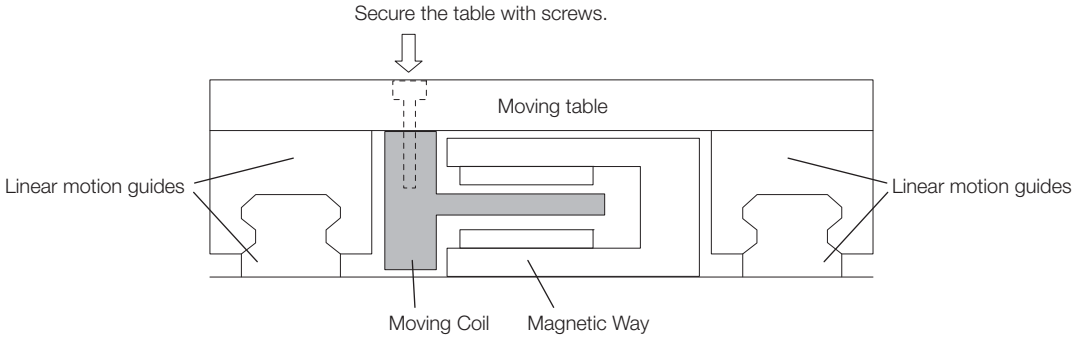
An SGLGW Moving Coil consists of an aluminum base and a winding section that is protected by plastic. Do not subject them to shock. Doing so may result in injury or equipment damage.

Use the following procedure.

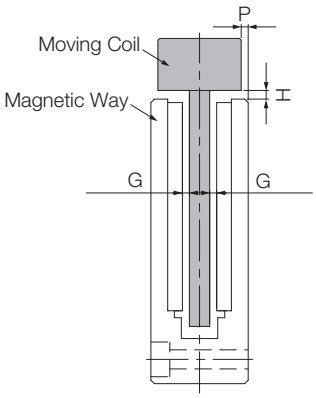
1. Insert the winding section between the magnets of the Magnetic Ways that you previously installed.



2. Attach the Moving Coil to the moving table that is supported by the linear motion guides.



3. Confirm that the gap, G, between the winding section of the Moving Coil and the magnets of the Magnetic Way are as given in the following table.



Moving Coil Model SGLGW-	Dimensions (mm)		
	H	P	G
30A050	1 ± 0.3	1 ± 0.1	0.85 ± 0.3
30A080	1 ± 0.3	1 ± 0.1	0.95 ± 0.3
40	1 ± 0.3	0 ± 0.1	0.8 ± 0.3
60	1 ± 0.3	0 ± 0.1	0.8 ± 0.3
90	2 ± 0.3	0.9 ± 0.1	1 ± 0.3

4. Move the Moving Coil back and forth to the ends of the Magnetic Ways several times and confirm the following items.
   - That the Moving Coil does not come into contact with the Magnetic Ways
   - That there is no foreign matter (magnetic material) between the magnets

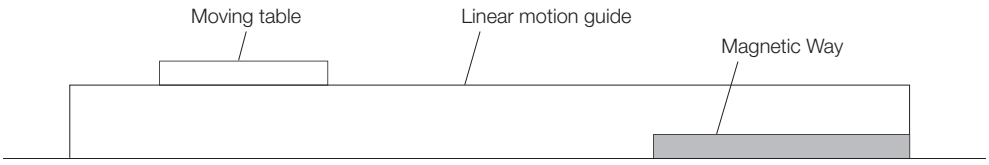
This concludes the procedure.

8.2.2 SGLF Servomotors (Models with F-type Iron Cores)

Outline

1. Mount one Magnetic Way.

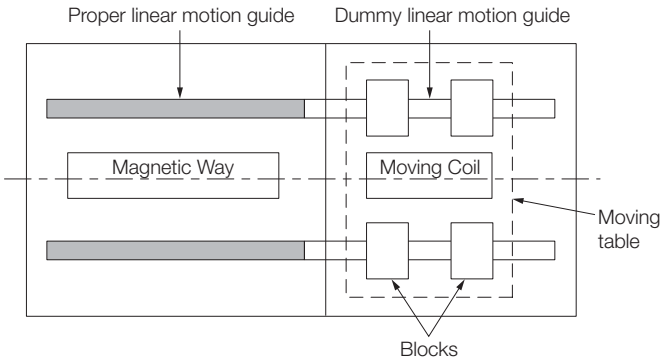
> Important
> To install the Moving Coil, you need a Magnetic Way that is longer than the Moving Coil. If one Magnetic Way is shorter than the Moving Coil, install two Magnetic Ways first and then install the Moving Coil.



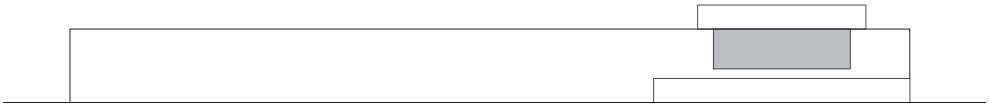
2. Separate the moving table that is supported by the linear motion guides from the Magnetic Way and attach the Moving Coil to it.

Important

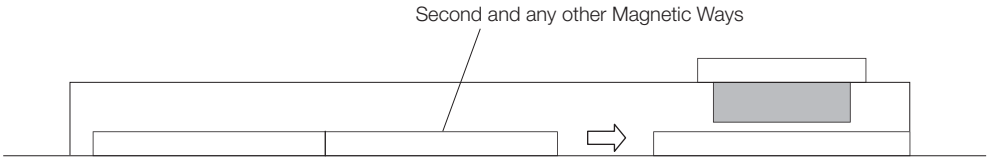
If you will use only one Magnetic Way, the linear motion guide may not be sufficiently long enough to install the Moving Coil at a location separated from the Magnetic Way. Install a dummy linear motion guide and use it to mount the Moving Coil.



3. Place the Moving Coil on top of the Magnetic Way.



4. Attach the second and any other Magnetic Ways.

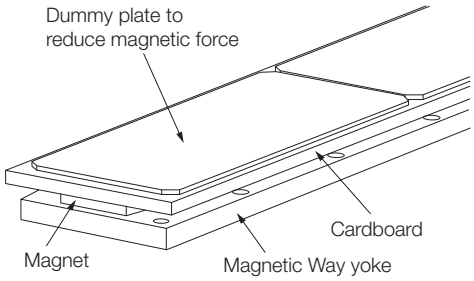


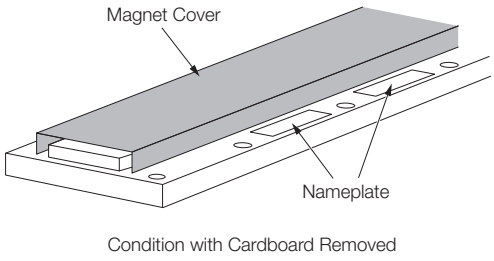
This concludes the procedure.

Mounting the First Magnetic Way

Note

When a Magnetic Way is shipped, the side with the magnets is covered with cardboard onto which thin rectangular steel plates are placed.
The steel plates are dummy plates that are used to reduce the influence of the magnetism on the surroundings. When you remove the plates, be careful not to pinch your fingers and to not damage the magnets or magnet cover.





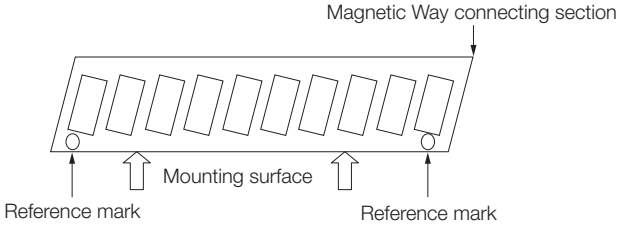
Use the following procedure.

Note

The magnets in the Magnetic Way exert a very strong magnetic attraction. Be very careful when you use steel screws, wrenches, or other metal objects.

1. Remove the dummy plates to reduce magnetic force and the cardboard from the surface of the Magnetic Way.

2. Face the reference marks on the Magnetic Way (depressions of approx. 4 mm in diameter) toward the equipment and set down the Magnetic Way.
   Note: Be careful not to pinch your hands between the equipment and the Magnetic Way.



3. Press the Magnetic Way tightly against the equipment and secure it with screws.

Magnetic Way Model	Screw Nominal Size	Tightening Torque (N·cm)	Screw Head Height, K (mm)	Reference
SGLFM-20	M4	360 to 500	4.2 max.	Figure 1
SGLFM-35				
SGLFM-50	M5	720 to 1,010	5.2 max.	
SGLFM-1Z	M6	1,220 to 1,710	6.7 max.	Figure 2
SGLFM2-30	M4	360 to 500	4.2 max.	
SGLFM2-45	M5	720 to 1,010	5.2 max.	
SGLFM2-90	M6	1,220 to 1,710	6.7 max.	
SGLFM2-1D	M8	2,970 to 4,150	8.2 max.	

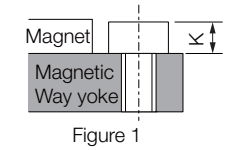


Figure 1

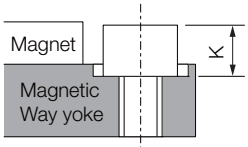


Figure 2

Note:Use socket head screws with a strength class of 10.9.

This concludes the procedure.

Mounting the Moving Coil

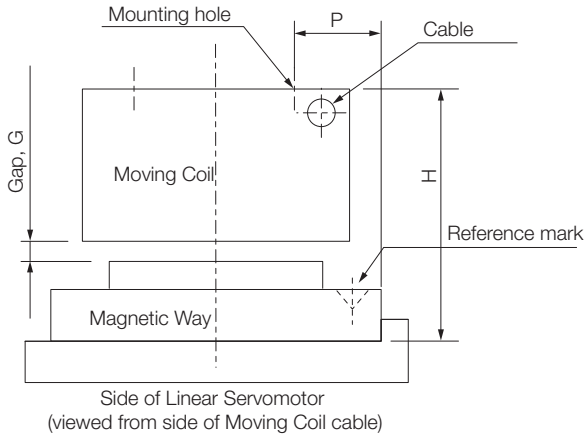

Note

An SGLF Moving Coil consists of an iron core and a winding section that is protected by plastic. Do not subject them to shock. Doing so may result in injury or equipment damage.

Use the following procedure.

1. On a line extending from the Magnetic Way that you previously mounted, attach the Moving Coil to the moving table supported by the linear motion guides.

2. Confirm that the gap, G, between the Moving Coil and the Magnetic Way are as given in the following table.



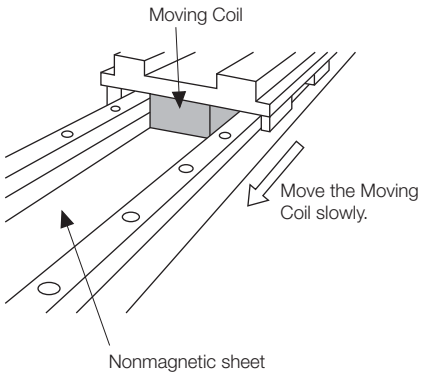
Moving Coil Model		Dimensions (mm)		
		H	P	G (Gap)
SGLFW-	20	45 ± 0.1	22 ± 0.2	1 (0.8)*
	35		21 ± 0.2	
	50	58 ± 0.1	25.8 ± 0.2	
	1Z		27 ± 0.2	
SGLFW2-	30A070	40 ± 0.1	27.5	0.8
	30A120		20	
	30A230			
	45	50 ± 0.1	26	
	90		30	
	1D		42.5	

*Dimensions in parentheses are for when the magnet cover is attached.

3. Place a thin nonmagnetic sheet in the gap between the Moving Coil and Magnetic Way. The sheet must be approximately 0.5 mm thick, and we recommend using a plastic sheet.

4. Slowly move the Moving Coil toward the Magnetic Way and confirm that there are no noises, such as noise from contact between the Moving Coil and Magnetic Way.

> Important
> As the Moving Coil approaches the Magnetic Way, magnetic attraction will pull on the Moving Coil. Be careful not to pinch your fingers or tools.



5. Move the Moving Coil back and forth to the ends of the Magnetic Ways several times and confirm the following items.
   - That the Moving Coil does not come into contact with the Magnetic Ways
   - That there is no foreign matter (magnetic material) between the magnets

6. Remove the thin nonmagnetic sheet.

7. Use a nonmagnetic gap gauge to confirm that the gap between the Moving Coil and Magnetic Way is 1 ±0.3 mm* at all locations. (We recommend a brass or stainless steel gauge.)

   *If the magnet cover is in place, the gaps should be 0.8 ±0.3 mm

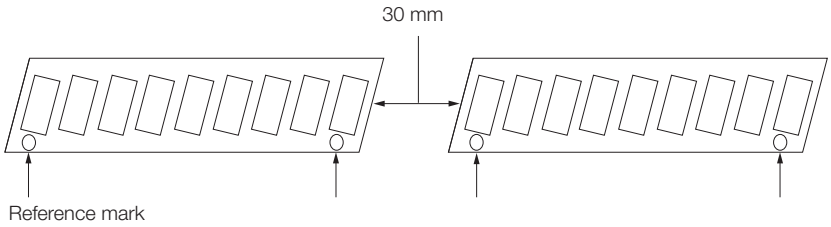
This concludes the procedure.

Mounting the Second and Any Other Magnetic Ways

Use the following procedure.

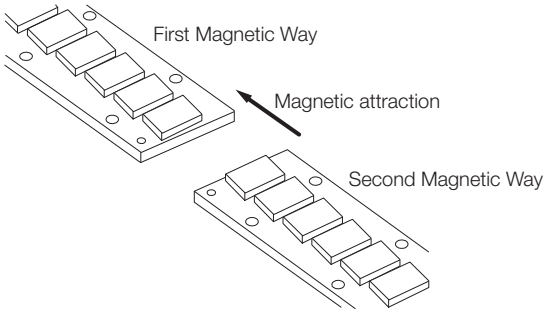
1. Place the second Magnetic Way in line with and at least 30 mm away from the first Magnetic Way.

   Note: Face the Magnetic Ways in same orientation using the locations of the reference marks as a guide (depressions of approx. 4 mm in diameter).



2. Hold down the Magnetic Way tightly, press the second Magnetic Way against the first Magnetic Way, and then secure the second Magnetic Way with screws.

   Note: The magnetic attraction will pull the Magnetic Ways together. Be careful not to pinch your fingers.



3. Mount the third and any other Magnetic Ways using steps 1 and 2, above.

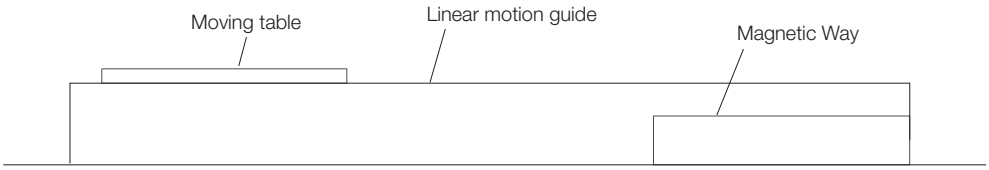
This concludes the procedure.

8.2.3 SGLT Servomotors (Models with T-type Iron Cores)

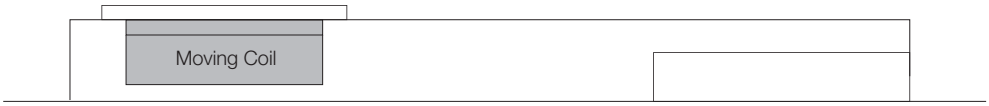
Outline

1. Mount one Magnetic Way.

> Important
>
> To install the Moving Coil, you need a Magnetic Way that is longer than the Moving Coil. If one Magnetic Way is shorter than the Moving Coil, install two Magnetic Ways first and then install the Moving Coil.

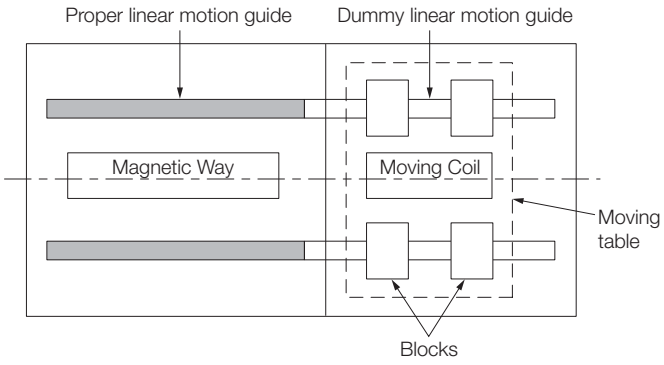


2. Separate the moving table that is supported by the linear motion guides from the Magnetic Way and attach the Moving Coil to it.

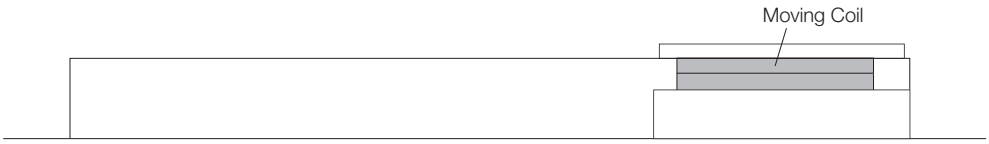


Important

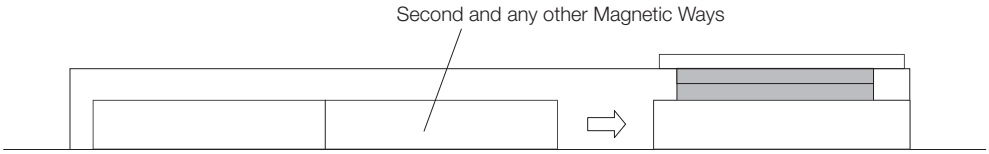
If you will use only one Magnetic Way, the linear motion guide may not be sufficiently long enough to install the Moving Coil at a location separated from the Magnetic Way. Install a dummy linear motion guide and use it to mount the Moving Coil.



3. Place the Moving Coil on top of the Magnetic Way.



4. Attach the second and any other Magnetic Ways.



Mounting the First Magnetic Way

There are two types of Magnetic Ways: Magnetic Ways with mounting spacers, and Magnetic Ways with Magnetic Way yokes secured to bases.

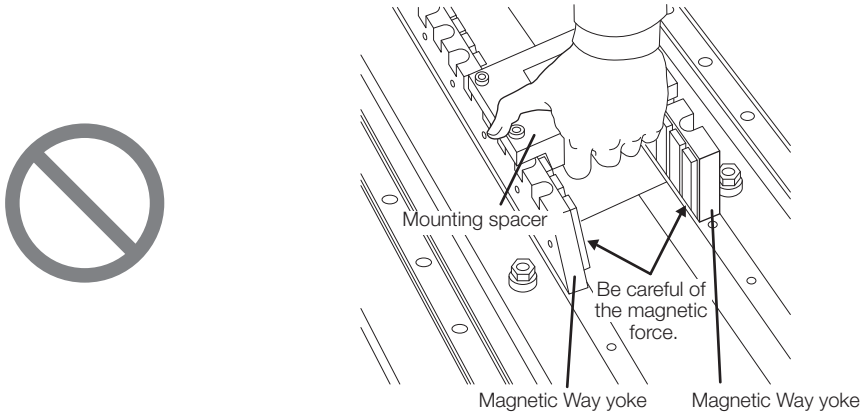
- Magnetic Ways with mounting spacers: SGLTM-□□□□□A and SGLTM-□□□□□AC
- Magnetic Ways with Magnetic Way yokes secured to bases: SGLTM-□□□□□AY

The installation procedure depends on the type of Magnetic Way.

◆ SGLTM-□□□□□A and SGLTM-□□□□□AC

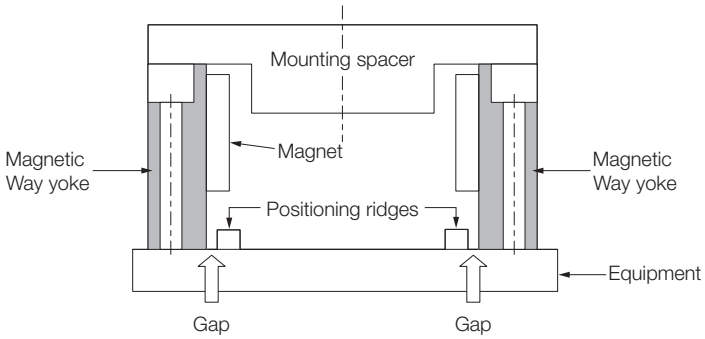
Important

When the Magnetic Way is shipped, the two Magnetic Way yokes are secured to mounting spacers made from aluminum.
Never remove these mounting spacers until the Magnetic Way is provisionally installed on the equipment.



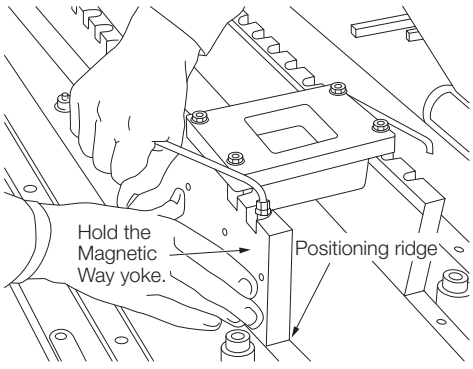
Use the following procedure.

1. Without removing the mounting spacers, place the Magnetic Way on the positioning ridges on the equipment. There should be a gap between the positioning ridges on the equipment and the Magnetic Way yokes.
   Note: Be careful not to damage the equipment and the Magnetic Way.



2. Place a mounting screw in one of the Magnetic Way yokes and secure it provisionally

3. Hold the provisionally mounted Magnetic Way yoke tightly against the positioning ridges and secure it completely with screws.



Magnetic Way Model SGLTM-	Screw Nominal Size	Tightening Torque (N·cm)
20	M6	1,220 to 1,710
35		
50		
40	M8	2,970 to 4,150
80		

Note: These values are for the following conditions.
- Equipment materials: Iron
- Use of socket head screws with a strength class of 10.9

4. Remove the bolts from mounting spacers on the side of the Magnetic Way yoke that you mounted.
5. Hold the other Magnetic Way yoke tightly against the positioning ridges and secure it completely with screws.
   Note: Be careful not to let the Magnetic Way yoke slip in the direction of Moving Coil forward movement.
6. Remove the mounting spacers. If there are Magnetic Way mounting holes in the positions where the mounting spacers were attached, secure the yokes with screws in those mounting holes as well.

This concludes the procedure.

◆ SGLTM-□□□□□AY

Use the following procedure.

1. Place the base to which the Magnetic Way yokes are attached in the specific location in the equipment.
2. Firmly secure the base to the equipment with bolts using the base mounting bolt holes.

This concludes the procedure.

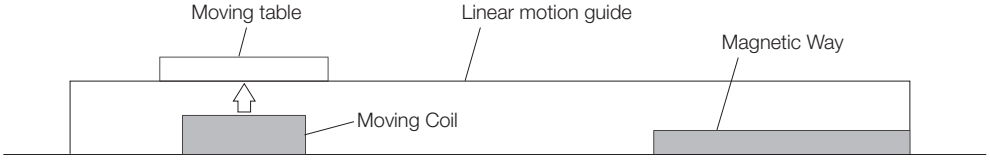
Mounting the Moving Coil


Note

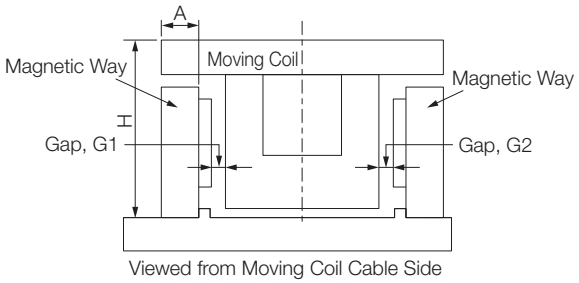
An SGLT Moving Coil consists of an aluminum or steel base, iron core, and a winding section that is protected by plastic. Do not subject them to shock. Doing so may result in injury or equipment damage.

Use the following procedure.

1. On a line extending from the Magnetic Way that you previously mounted, attach the Moving Coil to the moving table supported by the linear motion guides.



2. Confirm that the gaps, G1 and G2, between the Moving Coil and the Magnetic Way are as given in the following table.



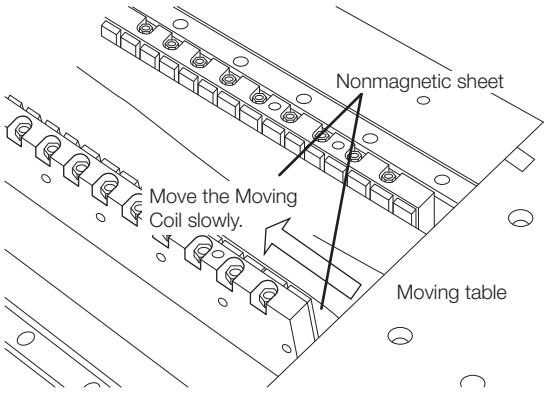
Moving Coil Model SGLTW-	Dimensions (mm)		
	H	A	G1 , G2
20	55 ± 0.3	15 ± 0.1	1 ± 0.3 (0.8 ± 0.3)*
35	70 ± 0.3		
50	85 ± 0.3	19.1 ± 0.1	
40	83 ± 0.3	19.1 ± 0.1	1.4 ± 0.3 (1.2)*
80	120 ± 0.3		

*Dimensions in parentheses are for when the magnet cover is attached.

3. Place a thin nonmagnetic sheet in the gap between the Moving Coil and Magnetic Way. The sheet must be approximately 0.5 mm thick, and we recommend using a plastic sheet.

4. Slowly move the Moving Coil attached to the moving table toward the Magnetic Way and confirm that there are no noises, such as noise from contact between the Moving Coil and Magnetic Way.

> Important
> As the Moving Coil approaches the Magnetic Way, magnetic attraction will pull on the Moving Coil. Be careful not to pinch your fingers or tools.



5. Move the Moving Coil back and forth to the ends of the Magnetic Ways several times and confirm the following items.
   - That the Moving Coil does not come into contact with the Magnetic Ways
   - That there is no foreign matter (magnetic material) between the magnets

6. Remove the thin nonmagnetic sheet.

7. Use a nonmagnetic gap gauge to confirm that the gap between the Moving Coil and Magnetic Way is 1 ±0.3 mm* at all locations. (We recommend a brass or stainless steel gauge.)

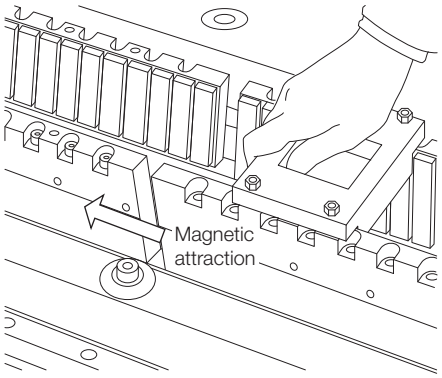
   *If the magnet cover is in place, the gaps should be 0.8 ±0.3 mm

This concludes the procedure.

Mounting the Second and Any Other Magnetic Ways

Use the following procedure.

1. Place the second Magnetic Way in line with and at least 30 mm away from the first Magnetic Way.
2. Press the second Magnetic Way against the first Magnetic Way and secure it with screws.
   Note: The magnetic attraction will pull the Magnetic Ways together. Be careful not to pinch your fingers.



3. Mount the third and any other of the Magnetic Ways using steps 1 and 2, above.

This concludes the procedure.

8.2.4 SGLC Servomotors (Cylinder Models)

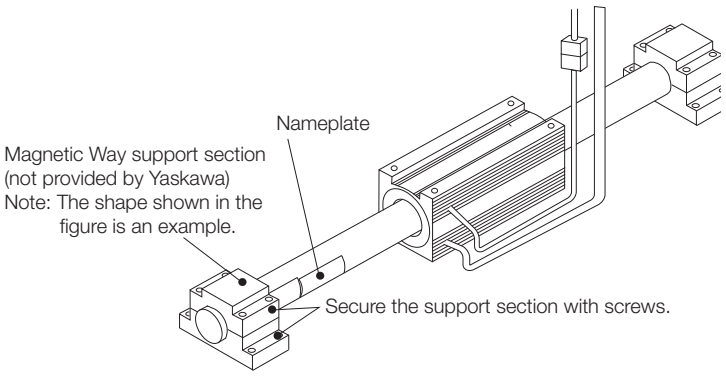
Use the following procedure.

> Important
> There are magnets built into the Magnetic Way that exert a strong magnetic attraction. Be careful not to pinch your fingers.

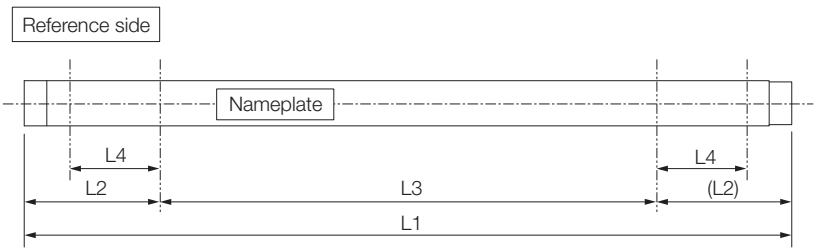
1. Mount the linear motion guides and Magnetic Way support section on the equipment.
2. The Magnetic Way and Moving Coil will already be assembled when they are delivered. Remove the assembly from the packing box.

> Important
> For safety, the Magnetic Way and Moving Coil assembly are mounted together on the equipment. Magnetic attraction will hold the Moving Coil and Magnetic Way together if you try to separate them. If separating them is unavoidable, be careful not to pinch your fingers.

3. Place both ends of the Magnetic Way in the Magnetic Way support sections and secure them with screws.
   Note: Mount them so that the nameplate reads correctly.



Magnetic Way Model SGLCM-	Total Length of Magnetic Way, L1 (mm)	Position of Support Section, L2 (mm)	Driving Range of Moving Coil, L3 (mm)	Length of Support Section, L4 (mm)
D16300A	300 ± 1.6	30	240	25
D16510A	510 ± 2.5	45	420	40
D16750A	750 ± 3.0	45	660	40
D20350A	350 ± 1.6	35	280	30
D20590A	590 ± 2.5	50	490	45
D20870A	870 ± 3.0	50	770	45
D25450A	450 ± 1.6	45	360	37
D25750A	750 ± 2.5	60	630	52
D251110A	1110 ± 3.0	60	990	52
D32600A	600 ± 1.6	60	480	52
D321020A	1020 ± 2.5	90	840	82
D321500A	1500 ± 3.0	90	1320	82



4. After you mount the moving table to the linear motion guides, move the moving table to above the Moving Coil and secure it with screws using the tightening torque given in the following table.

   Note: Route the cables carefully so that they are not caught in the Servomotor and secure them to the moving table.

Moving Coil Model SGLCW-	Screw Nominal Size	Tightening Torque (N·cm)
D16	M3	100
D20	M4	220
D25	M5	450
D32	M6	760

   Note:Use austenite stainless steel socket heads screws with a strength class of A2-70 or the equivalent.

5. Remove the plastic parts from between the Moving Coil and Magnetic Way.

   Note: The magnetic attraction will pull the Moving Coil and Magnetic Way together. Be careful not to pinch your fingers.

6. Move the moving table several times back and forth along the entire stroke and confirm that nothing comes into contact with the Magnetic Way. (There is no recommended gap.)

This concludes the procedure.

8.3 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 ambient operating temperature or altitude given in the specifications is exceeded, implement the following measures.
  - Derate the Servomotor.
    Contact your Yaskawa representative for information on derating.
  - Use external forced-air cooling for the Servomotor with a cooling fan or other means.

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.

Connecting Linear Encoders

9

This chapter describes the conditions and procedures for mounting linear encoders.

9.1 Installation Conditions for Linear Encoders

Observe the following installation conditions so that leakage flux from the Servomotor does not cause the linear encoder to malfunction.

Refer to the specifications for each type of linear encoder for the installation conditions outside a magnetic field.

Manufacturer	Model	External Magnetic Field Strength
Magnescale Co., Ltd.	SR75/77	5 mT max.
	SR85/87	
	SL710/PL101	0.5 mT max.
Mitutoyo Corporation	ST78□A	3 mT max.

Mounting location guidelines for the linear encoders are given below.

Note

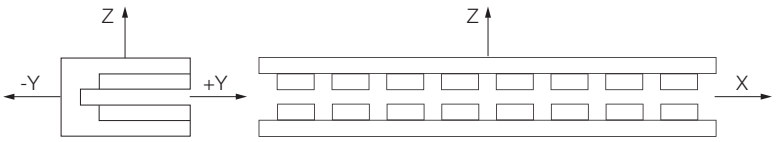
If the linear encoder mounting materials or the Magnetic Way mounting materials are magnetic materials, the magnetic field strength may exceed the specified values even for the following installation conditions. Implement the following measures.

- Use a nonmagnetic material for the structure (SUS, aluminum, etc.).
- Install a magnetic material between the Magnetic Way and the linear encoder.

If implementing the above measures is not possible, install the linear encoder in a location where the magnetic field strength is less than the specified value.

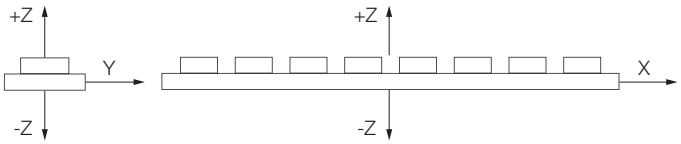
9.1.1 SGLG Servomotors

Magnetic Way Model SGLGM-	Distance from Magnetic Way			
	X (mm)	+Y (mm)	-Y (mm)	Z (mm)
30	35	35	10	50
40□□□□	45	40	10	55
40□□□□-M	65	60	10	75
60□□□□	65	55	10	75
60□□□□-M	85	75	10	100
90	130	110	10	155



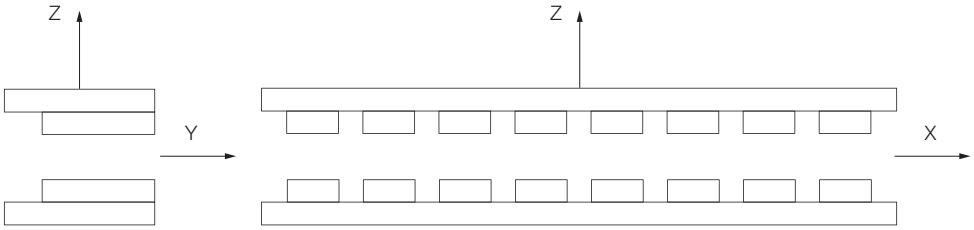
9.1.2 SGLF Servomotors

Magnetic Way Model		Distance from Magnetic Way			
		X (mm)	Y (mm)	+Z (mm)	-Z (mm)
SGLFM-	20	85	55	85	10
	35	100	65	110	10
	50	125	80	135	10
	1Z	165	95	170	10
SGLFM2-	30	85	50	95	10
	45	120	75	140	10
	90	160	90	175	10
	1D	175	90	200	10



9.1.3 SGLT Servomotors

Magnetic Way Model SGLTM-	Distance from Magnetic Way		
	X (mm)	Y (mm)	Z (mm)
20	70	50	20
35□□□A	80	55	25
35□□□H	85	60	25
50	85	65	30
40	110	80	35
80	120	80	40



9.1.4 SGLC Servomotors

Magnetic Way Model SGLCM-	Distance from Magnetic Way	
	X (mm)	Y, Z (mm)
D16	80	60
D20	100	70
D25	125	95
D32	160	115

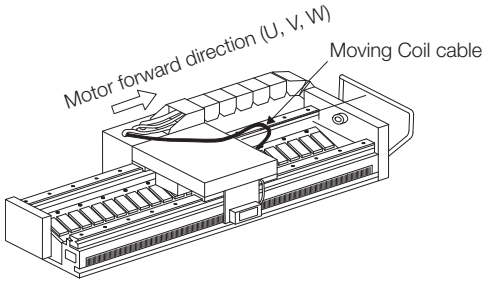
9.2 Mounting Linear Encoders

Attach the linear encoder so that the forward direction of the Servomotor is the count-up direction of the linear encoder.

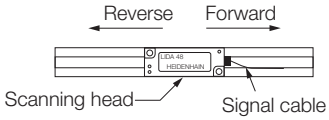
If wiring or other restrictions prevent using the same directions for the forward direction and count-up direction, set parameter Pn080 to n.□□1□ (phase-B lead and phase sequence of U, V, W).

> Important
>
> If the forward direction of the Servomotor and the count-up direction of the linear motor do not agree, the Servomotor may not operate or it may run out of control.

The forward direction for the motor is toward the side where the cable is connected. (The forward direction is the direction in which the Moving Coil moves when current flows in a phase sequence of U, V, W.)

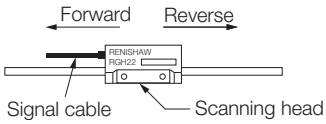


9.2.1 Linear Encoders from Heidenhain Corporation



If the linear encoder is installed as shown in the diagram on the left, the count is incremented when the scanning head moves to the right.

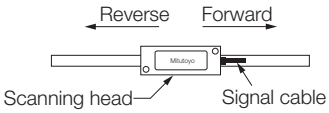
9.2.2 Linear Encoders from Renishaw PLC



If the linear encoder is installed as shown in the diagram on the left, the count is incremented when the scanning head moves to the left.

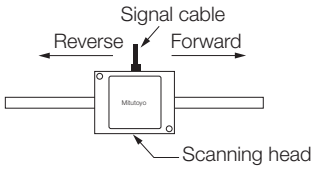
9.2.3 Absolute Linear Encoders from Mitutoyo Corporation

ST781A□, ST783A□, ST788A□, and ST789A□



If the linear encoder is installed as shown in the diagram on the left, the count is incremented when the scanning head moves to the right.

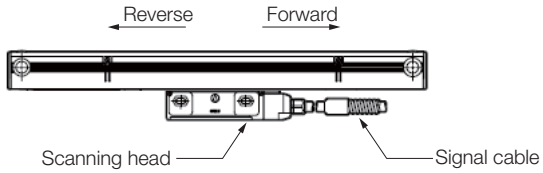
ST782A□ and ST784A□



If the linear encoder is installed as shown in the diagram on the left, the count is incremented when the scanning head moves to the right.

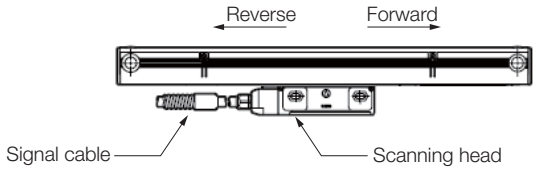
9.2.4 Linear Encoders from Magnescale Co., Ltd.

SR75-□□□R, SR85-□□□R, SR77-□□□R, and SR87-□□□R



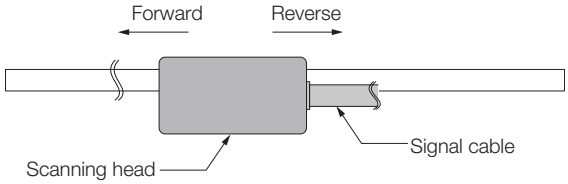
If the linear encoder is installed as shown in the diagram on the left, the count is incremented when the scanning head moves to the right.

SR75-□□□L, SR85-□□□L, SR77-□□□L, and SR87-□□□L



If the linear encoder is installed as shown in the diagram on the left, the count is incremented when the scanning head moves to the right.

SL700, SL710, SL720, and SL730



If the linear encoder is installed as shown in the diagram on the left, the count is incremented when the scanning head moves to the left.

9.3 Adjusting Linear Encoders

- Exposed Linear Encoders
  Always adjust the mounting of the scanning head. Consult the manufacturer of the linear encoder for the adjustment method.
- Sealed Linear Encoders
  No adjustment is necessary. However, you must observe the dimensional tolerances for mounting. Consult the manufacturer of the linear encoder for details.

Connections between Servomotors and SERVOPACKs

10

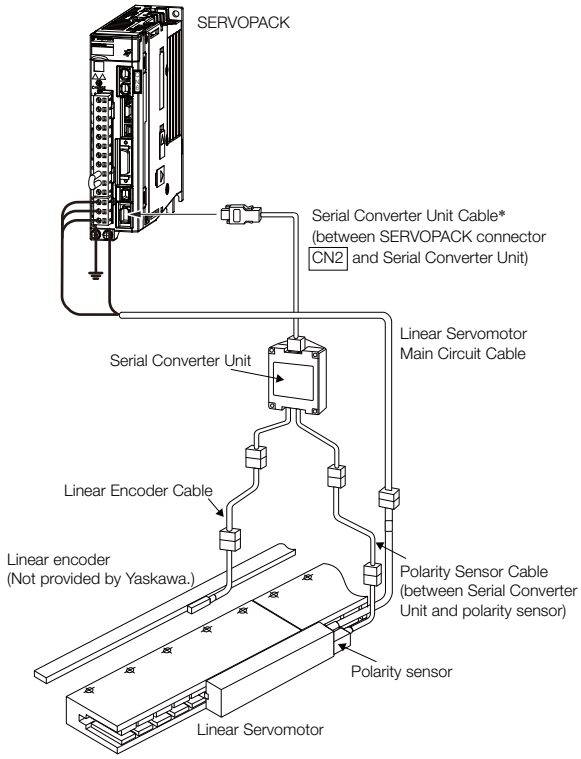
This chapter describes the cables that are used to connect the Servomotors and SERVOPACKs. It also provides information on peripheral devices and provides related precautions.

10.1 Selecting Cables

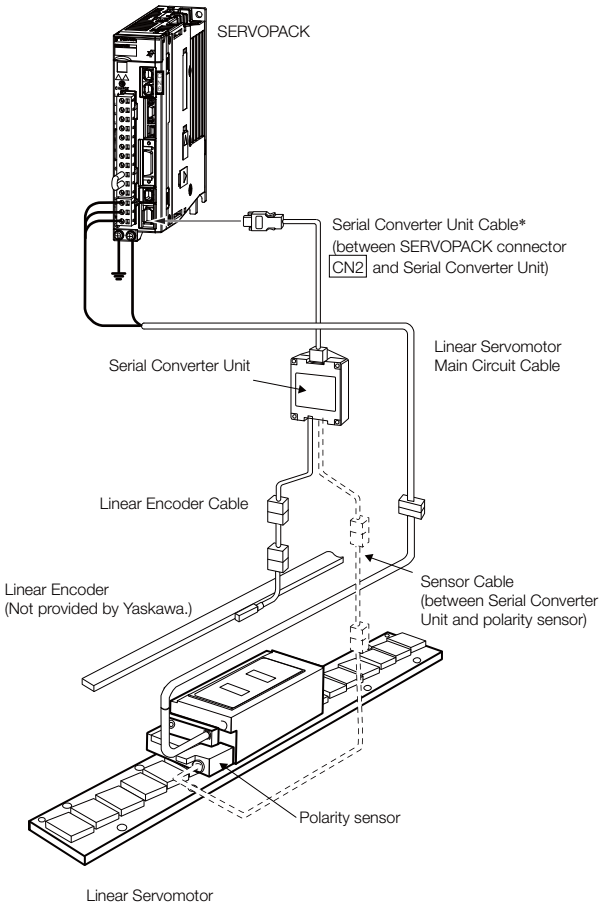
10.1.1 System Configurations

The cables shown below are required to connect a Servomotor to a SERVOPACK.

Example: SGLG Coreless Servomotors



Example: SGLFW2 Servomotors with F-type Iron Cores (with Thermal Protectors)



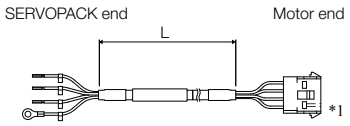
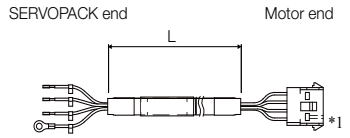
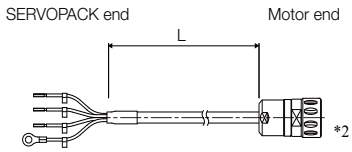
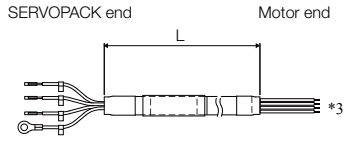
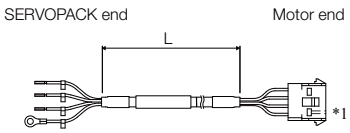
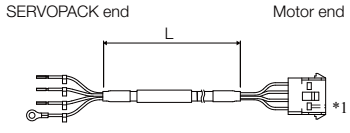
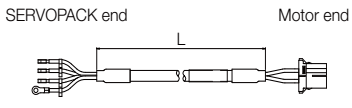
* You can connect directly to an absolute linear encoder.

Note: 1. The above system configurations are for SGLG Coreless Servomotors or SGLFW2 Servomotors with F-type Iron Cores (with thermal protectors). Refer to the manual for the Linear Servomotor for configurations with other models.

2. Refer to the *Σ-7-Series Peripheral Device Selection Manual* (Manual No.: SIEP S800001 32) for the following information.
   - Cable dimensional drawings and cable connection specifications
   - Order numbers and specifications of individual connectors for cables
   - Order numbers and specifications for wiring materials

10.1.2 Servomotor Main Circuit Cables

These Cables are available from Yaskawa Controls Co., Ltd.

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

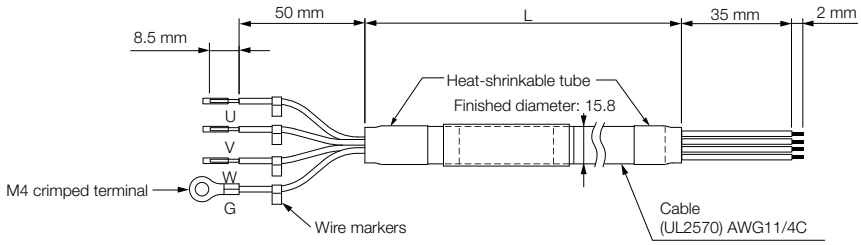
Note: Estimates are available for models other than those listed above (SGLFW2-90A□□□A□L and SGLFW2-1D□□□A□L).

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

*2. Connector from Interconnectron GmbH

*3. A connector is not provided on the Linear Servomotor end. Obtain a connector according to your specifications. Refer to the next page for information on connectors.

JZSP-CLN39-□□-E Cables



◆ Wiring Specifications

SERVOPACK Leads

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

Servomotor Connector

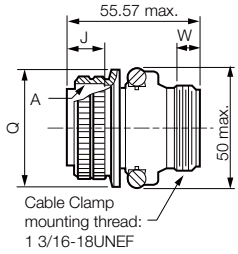
Signal	Pin
Phase U	A
Phase V	B
Phase W	C
FG	D

◆ JZSP-CLN39 Cable Connectors

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

◆ MS3106B22-2S: Straight Plug with Two-piece Shell

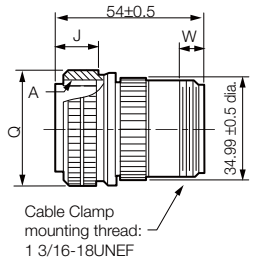
Unit: mm



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

◆ MS3106A22-2S: Straight Plug with Solid Shell

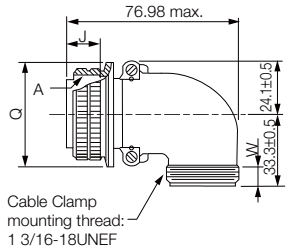
Unit: mm



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

◆ MS3108B22-2S: Right-angle Plug with Two-piece Shell

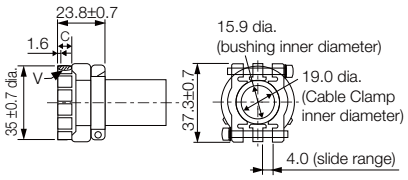
Unit: mm



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

◆ Dimensional Drawings: MS3057-12A Cable Clamp with Rubber Bushing

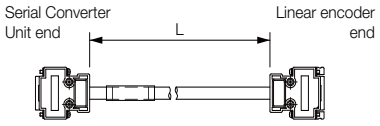
Unit: mm



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

10.1.3 Linear Encoder Cables

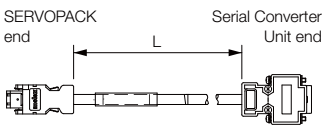
These Cables are available from Yaskawa Controls Co., Ltd.

Name	Servomotor Model	Length*	Order Number	Appearance
For linear encoder from Renishaw PLC	All Models	1 m	JZSP-CLL00-01-E	
		3 m	JZSP-CLL00-03-E	
		5 m	JZSP-CLL00-05-E	
		10 m	JZSP-CLL00-10-E	
		15 m	JZSP-CLL00-15-E	
For linear encoder from Heidenhain Corporation		1 m	JZSP-CLL30-01-E	
		3 m	JZSP-CLL30-03-E	
		5 m	JZSP-CLL30-05-E	
		10 m	JZSP-CLL30-10-E	
		15 m	JZSP-CLL30-15-E	

* When using a JZDP-G00□-□□□-E Serial Converter Unit, do not exceed a cable length of 3 m.

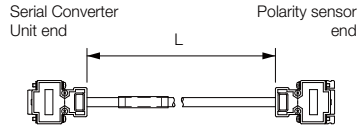
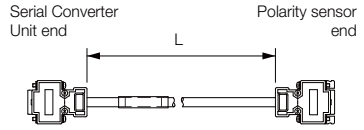
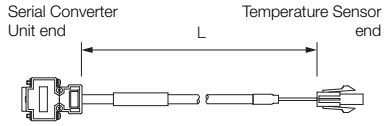
10.1.4 Serial Converter Unit Cables

These Cables are available from Yaskawa Controls Co., Ltd.

Servomotor Model	Length	Order Number	Appearance
All Models	1 m	JZSP-CLP70-01-E	
	3 m	JZSP-CLP70-03-E	
	5 m	JZSP-CLP70-05-E	
	10 m	JZSP-CLP70-10-E	
	15 m	JZSP-CLP70-15-E	
	20 m	JZSP-CLP70-20-E	

10.1.5 Sensor Cables

These Cables are available from Yaskawa Controls Co., Ltd.

Servomotor Model	Length	Order Number	Appearance
SGLGW-□□A SGLFW-□□A SGLTW-□□A SGLCW-□□A	1 m	JZSP-CLL10-01-E	
	3 m	JZSP-CLL10-03-E	
	5 m	JZSP-CLL10-05-E	
	10 m	JZSP-CLL10-10-E	
	15 m	JZSP-CLL10-15-E	
SGLFW2-□□A□□□AS□ (With Polarity Sensor)	1 m	JZSP-CL2L100-01-E	
	3 m	JZSP-CL2L100-03-E	
	5 m	JZSP-CL2L100-05-E	
	10 m	JZSP-CL2L100-10-E	
	15 m	JZSP-CL2L100-15-E	
SGLFW2-□□A□□□AT□ (Without Polarity Sensor)	1 m	JZSP-CL2TH00-01-E	
	3 m	JZSP-CL2TH00-03-E	
	5 m	JZSP-CL2TH00-05-E	
	10 m	JZSP-CL2TH00-10-E	
	15 m	JZSP-CL2TH00-15-E	

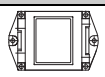
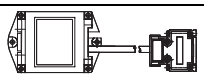
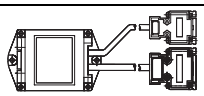
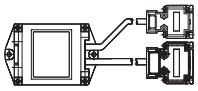
10.1.6 Serial Converter Units

Selection Table (Model Designations)

Use the following tables to select the Serial Converter Unit.

JZDP - □00□ - □□□

These Cables are available from Yaskawa Electric Corporation

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

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

Note: Refer to the *Σ-7-Series Peripheral Device Selection Manual* (Manual No.: SIEP S800001 32) for details on the Serial Converter Units.

10.2 Wiring Servomotors and SERVOPACKs

10.2.1 Wiring Precautions

⚠ CAUTION

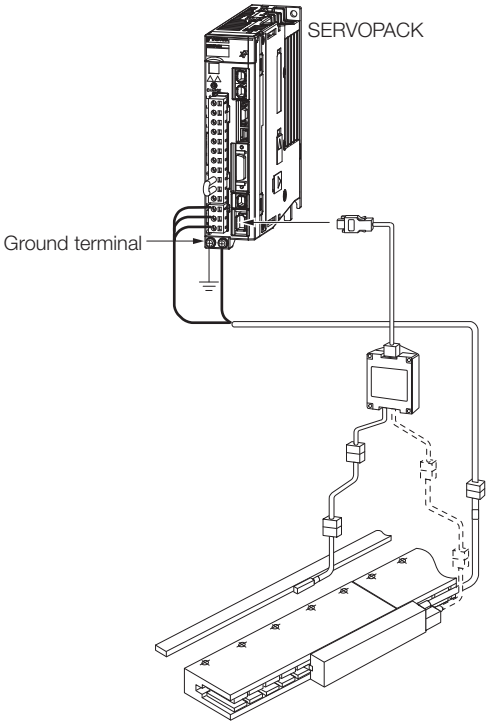
- Do not connect the Servomotor directly to an industrial power supply. Doing so will destroy the Servomotor. You cannot operate a Servomotor without a SERVOPACK that is designed for it

General Precautions

- Never perform any wiring work while the power supply is ON.
- 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.
- Separate the Servomotor Main Circuit Cable from the I/O Signal Cables and Encoder Cable by at least 30 cm.
- 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.
- 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 equipment, 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.
- 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.

Grounding Precautions

The ground terminal on the SERVOPACK is used to ground the Servomotor.



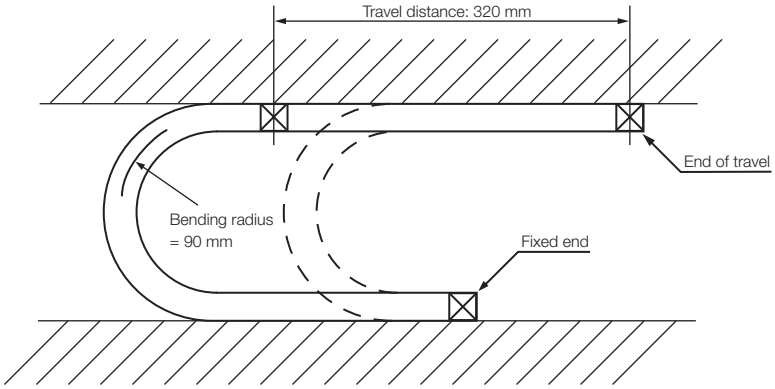
Precautions for Standard Cables

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

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

Precautions for Flexible Cables

- The Flexible Cables have a service life of 10,000,000 operations minimum when used at the recommended bending radius 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 lead wires are connected in parallel, and the number of cable return operations until a lead wire breaks are counted. One round trip is counted as one bend.



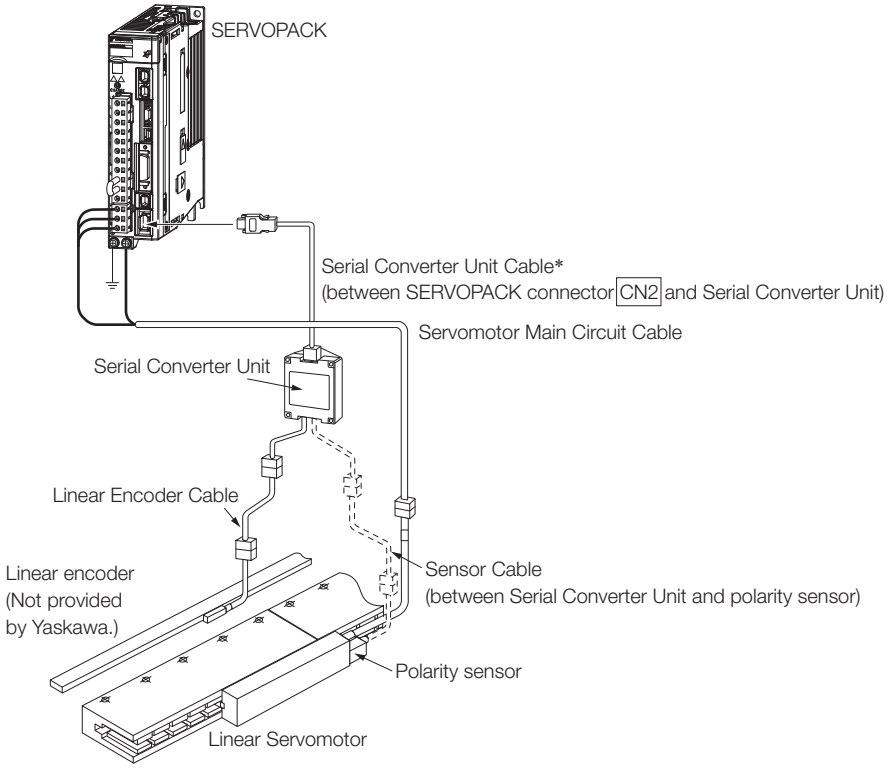
Note: The service life of a Flexible Cable indicates the number of bends while the lead wires are electrically charged for which no cracks or damage that affects the performance of the cable sheathing occur. Breaking of the shield wire is not considered.

- Straighten out the Flexible Cable when you connect it. If the cable is connected while it is twisted, it will break faster. Check the indication on the cable surface to make sure that the cable is not twisted.
- Do not secure the portions of the Flexible Cable that move. Stress will accumulate at the point that is secured, and the cable will break faster. Secure the cable in as few locations as possible.
- If a Flexible Cable is too long, looseness will cause it to break faster. 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.

10.2.2 Wiring Procedure

SGLG Servomotors

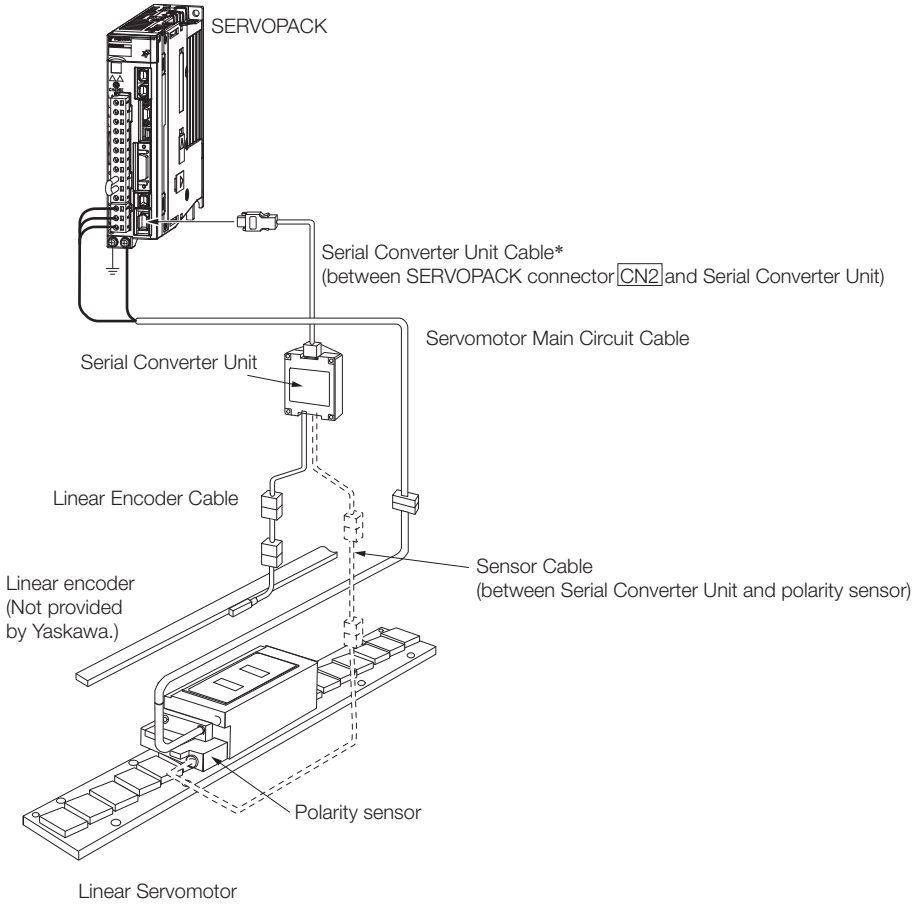
Refer to the following figures for wiring.



* You can connect directly to an absolute linear encoder.

SGLF Servomotors

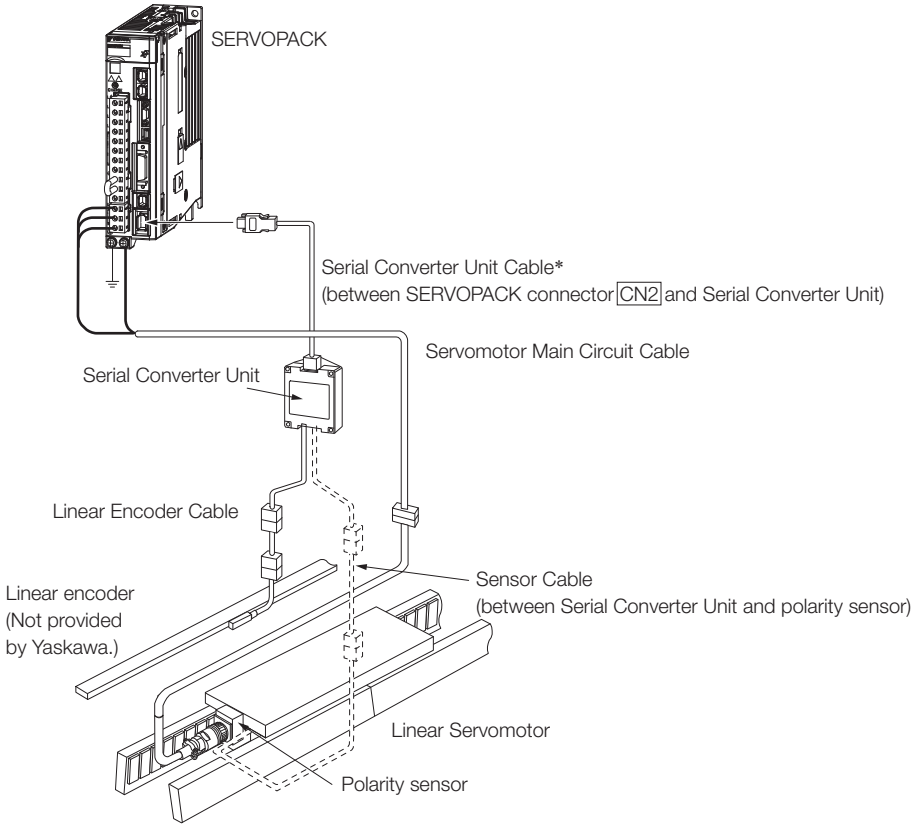
Refer to the following figures for wiring.



* You can connect directly to an absolute linear encoder.

SGLT Servomotors

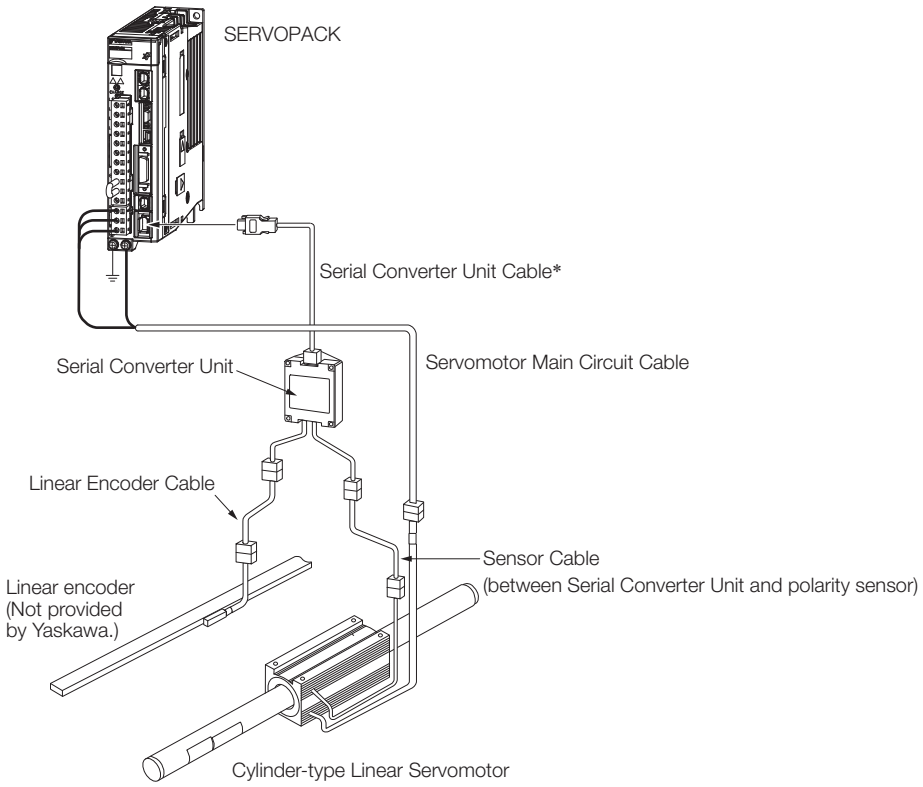
Refer to the following figures for wiring.



* You can connect directly to an absolute linear encoder.

SGLC Servomotors

Refer to the following figures for wiring.



* You can connect directly to an absolute linear encoder.

Maintenance and Inspection

11

This chapter describes the maintenance, inspection, and disposal of a Servomotor.

11.1 Periodic Inspections

11.1.1 Linear Servomotor Inspections

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.

⚠ CAUTION

- Before you perform any maintenance or inspection work, turn OFF the power supply, confirm that the CHARGE indicator on the front of the SERVOPACK has gone out, and then use a tester to check the voltage between the positive and negative terminals on the SERVOPACK. Start inspection work only after you have confirmed that the main circuit voltage has dropped.
  If there is any main circuit voltage left, the risk of electric shock still exists. Do not touch the Servomotor or any wiring.
- All inspection and maintenance work must be performed by a trained technician.
  Failure to observe this caution may result in electric shock or injury.
- Contact your Yaskawa representative for help with failures, repairs, or part replacement.

Item			Inspection Period	Basic Inspection and Maintenance Procedure	Remarks
Daily Inspections	Check for vibration and noise.		Daily	Inspect by touching and by listening in a safe location.	There should be no more vibration or noise than normal.
	Exterior	Moving Coil molded plastic	Daily	Confirm that there are no cracks, splitting, or chipping, and that there is no rubbing with the Magnetic Way.	If any abnormality is found, repair it or replace the part. Contact your Yaskawa representative.
		Cables		Make sure that there are no scratches or splitting.	
		Magnets		Make sure that there is no splitting or chipping.	
		Magnetic Way protective cover		Make sure that there is no deformation or rubbing with the Moving Coil.	
		Screws		Make sure that there are no loose screws.	Tighten any loose screws.
		Dirt and foreign matter	As required by conditions	Clean off any dirt or foreign matter with a cloth or pressurized air.	Use alcohol as a solvent.

Continued on next page.

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	Item	Inspection Period	Basic Inspection and Maintenance Procedure	Remarks
Periodic Inspections	Gaps between Moving Coil and Magnetic Way	At least once a year	Disconnect the Servomotor from the SERVOPACK and confirm that there is no foreign matter caught inside the Servomotor and that none of the gaps has increased in size since the Servomotor was first used.	–
	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. • Do not perform insulation resistance measurements or withstand voltage tests on the sensor.
	Overhaul	At least once every 5 years	Contact your Yaskawa representative.	Never attempt to disassemble or clean a Servomotor yourself.

11.1.2 Linear Encoder Inspections

Consult the manufacturer of the linear encoder for maintenance and inspection information.

11.2 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.

⚠ CAUTION

- When you dispose of a Linear Servomotor, heat the Magnetic Way to 300°C or higher for one hour to demagnetize it.
  There is a risk of injury from the strong magnetic attraction.

Revision History

The revision dates and numbers of the revised manuals are given at the bottom of the back cover.

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Σ-7-Series AC Servo Drive

Linear Servomotor
Product Manual

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