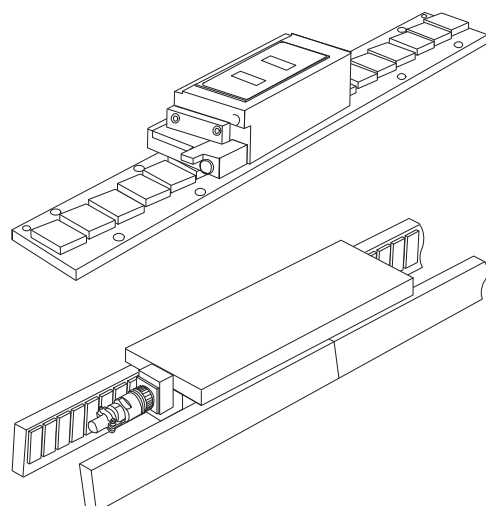


Σ -7-Series AC Servo Drive

Linear Servomotor with 400 V-Input Power Product Manual

Model: SGLF, SGLT



Basic Information on Servomotors

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Capacity Selection

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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

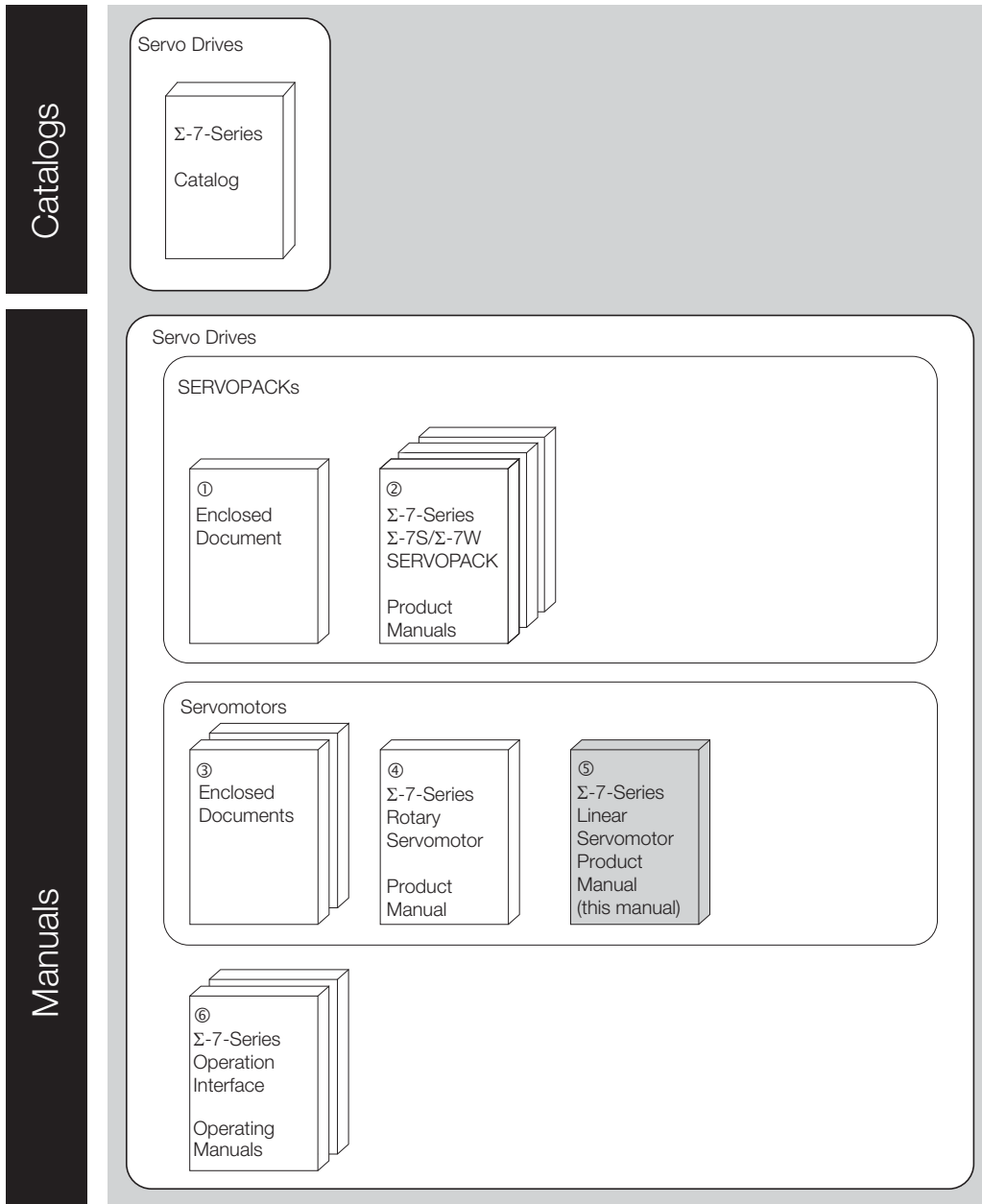
The contents of the chapters of this manual are described in the following table.

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 SGLF Servomotors	Describes how to interpret the model numbers of SGLF Servomotors and gives their specifications, ratings, and external dimensions.
4	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.
5	Equipment Design Precautions	Provides precautions for equipment design.
6	Servomotor Installation	Describes the installation conditions, procedures, and precautions for Servomotors.
7	Connecting Linear Encoders	Describes the conditions and procedures for mounting linear encoders.
8	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.
9	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 Enclosed Document	Σ -7-Series AC Servo Drive Σ -7S SERVOPACK with 400 V-Input Power Safety Precautions	TOMP C710828 02	Provides detailed information for the safe usage of Σ -7-Series SERVOPACKs.
② Σ -7-Series Σ -7S/ Σ -7W SERVOPACK Product Manuals	Σ -7-Series AC Servo Drive Σ -7S SERVOPACK with 400 V-Input Power and EtherCAT (CoE) Communications References Product Manual	SIEP S800001 80	Provide detailed information on selecting Σ -7-Series SERVOPACKs and information on installing, connecting, setting, performing trial operation for, tuning, monitoring, and maintaining the Servo Drives.
	Σ -7-Series AC Servo Drive Σ -7S SERVOPACK with 400-V Input Power and MECHATROLINK-III Communications References RJ-45 Connectors Product Manual	SIEP S8000002 14	
	Σ -7-Series AC Servo Drive Σ -7W SERVOPACK with 400-V Input Power and EtherCAT (CoE) Communications References Product Manual	SIEP S8000002 19	
③ Enclosed Documents	AC Servo Drive Rotary Servomotor Safety Precautions	TOBP C230260 00	Provides detailed information for the safe usage of Σ -7-Series Rotary Servomotors and Direct Drive Servomotors.
	AC Servomotor Linear Σ Series Safety Precautions	TOBP C230800 00	Provides detailed information for the safe usage of Σ -7-Series Linear Servomotors.
④ Σ -7-Series Rotary Servomotor Product Manual	Σ -7-Series AC Servo Drive Rotary Servomotor with 400 V-Input Power Product Manual	SIEP S800001 86	Provide detailed information on selecting, installing, and connecting the Σ -7-Series Servomotors.
⑤ Σ -7-Series Linear Servomotor Product Manual	Σ -7-Series AC Servo Drive Linear Servomotor with 400 V-Input Power Product Manual	This manual (SIEP S800001 81)	
⑥ 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.



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



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

Example Indicates operating or setting examples.

Information Indicates supplemental information to deepen understanding or useful information.

Safety Precautions

◆ Safety Information

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



DANGER

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



WARNING

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



CAUTION

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

NOTICE

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

◆ Safety Precautions That Must Always Be Observed

■ General Precautions

DANGER

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

WARNING

- 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, External Dynamic Brake Resistors, Servomotors, and other components can be very hot while power is ON or soon after the power is turned OFF. Implement safety measures, such as installing covers, so that hands and parts such as cables do not come into contact with hot components.
There is a risk of 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 radiationIf 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.
- **Make sure that the eyebolts are securely attached to the product with no looseness before you use them to move the product.**
There is a risk of injury or damage.
- **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, regenerative resistors, and External Dynamic Brake Resistors on nonflammable materials.
Installation directly onto or near flammable materials may result in fire.
- Do not step on or place a heavy object on the product.
There is a risk of failure, damage, or injury.
- Do not allow any foreign matter to enter the SERVOPACK or Servomotor.
There is a risk of failure or fire.
- 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 radiationIf 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 as 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 Servomotor will coast to a stop or stop with the dynamic brake according to the SERVOPACK Option and settings. The coasting distance will change with the moment of inertia of the load and the resistance of the External Dynamic Brake Resistor. 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.
 - If you use a SERVOPACK with the Dynamic Brake Hardware Option, the Servomotor stopping methods will be different from the stopping methods used without the Option or with other Hardware Options. For details, refer to the *Σ-7-Series AC Servo Drive Σ-7S/Σ-7W SERVOPACK with Dynamic Brake Hardware Option Specifications Product Manual*.
- 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 damaged 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

DANGER

- If the safety device (molded-case circuit breaker or fuse) installed in the power supply line operates, remove the cause before you supply power to the SERVOPACK again. If necessary, repair or replace the SERVOPACK, check the wiring, and remove the factor that caused the safety device to operate.
There is a risk of fire, electric shock, or injury.

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	North American Safety Standards (UL File No.)
SERVOPACKs	<ul style="list-style-type: none"> • SGD7S • SGD7W 	UL 61800-5-1 (E147823), CSA C22.2 No.274
Rotary Servomotors	<ul style="list-style-type: none"> • SGM7A • SGM7J • SGM7G 	UL 1004-1 UL 1004-6 (E165827)
Linear Servomotors	<ul style="list-style-type: none"> • SGLFW*¹ • SGLFW2*² • SGLTW*¹ 	UL 1004 (E165827)

*1. There are usage restrictions. Contact your Yaskawa representative for details.

*2. Certification is scheduled for June 2016.

◆ European Directives



Product	Model	European Directive	Harmonized Standards
SERVOPACKs	<ul style="list-style-type: none"> • SGD7S • SGD7W 	Machinery Directive 2006/42/EC	EN ISO13849-1: 2008/AC: 2009
		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	<ul style="list-style-type: none"> • SGM7J • SGM7A • SGM7G 	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 60034-1 EN 60034-5
Linear Servomotors	<ul style="list-style-type: none"> • SGLFW • SGLFW2 • SGLTW 	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 60034-1

Note: We declared the CE Marking based on the harmonized standards in the above table.

◆ Safety Standards



Product	Model	Safety Standards	Standards
SERVOPACKs	<ul style="list-style-type: none"> • SGD7S • SGD7W 	Safety of Machinery	EN ISO13849-1: 2008/AC: 2009 IEC 60204-1
		Functional Safety	IEC 61508 series IEC 62061 IEC 61800-5-2
		EMC	IEC 61326-3-1

◆ Safe Performance

Item	Standards	Performance Level
Safety Integrity Level	IEC 61508	SIL3
	IEC 62061	SILCL3
Probability of Dangerous Failure per Hour	IEC 61508 IEC 62061	PFH = 4.04×10^{-9} [1/h] (4.04% of SIL3)
Performance Level	EN ISO 13849-1	PLe (Category 3)
Mean Time to Dangerous Failure of Each Channel	EN ISO 13849-1	MTTFd: High
Average Diagnostic Coverage	EN ISO 13849-1	DCavg: Medium
Stop Category	IEC 60204-1	Stop category 0
Safety Function	IEC 61800-5-2	STO
Mission Time	IEC 61508	10 years
Hardware Fault Tolerance	IEC 61508	HFT = 1
Subsystem	IEC 61508	B

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Revision History

Basic Information on Servomotors

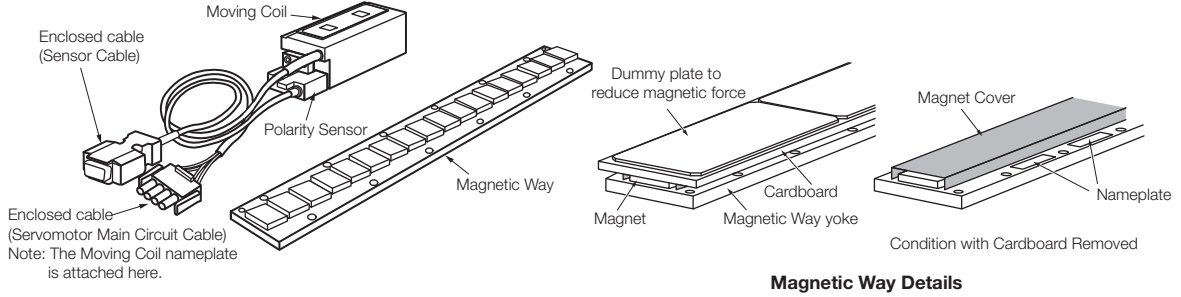
1

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

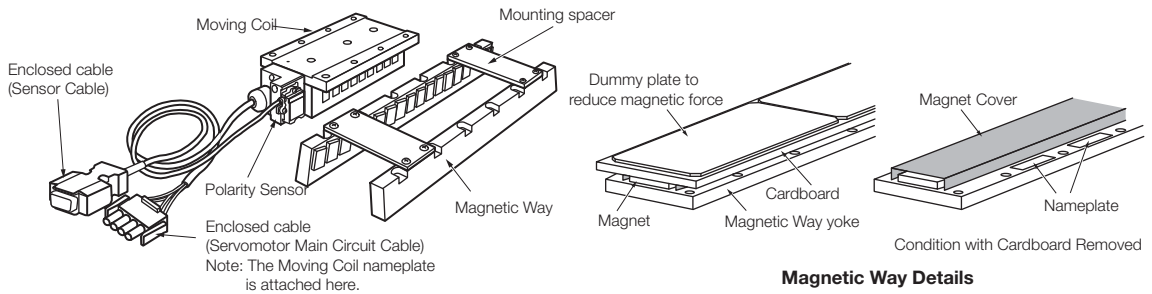
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1.1 Servomotor Part Names

1.1.1 SGLF Servomotors



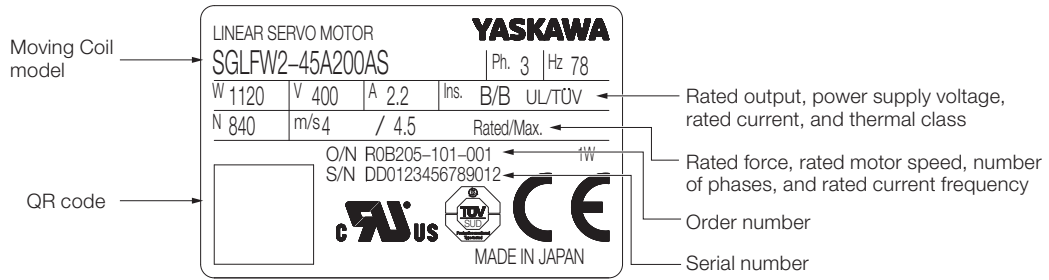
1.1.2 SGLT Servomotors



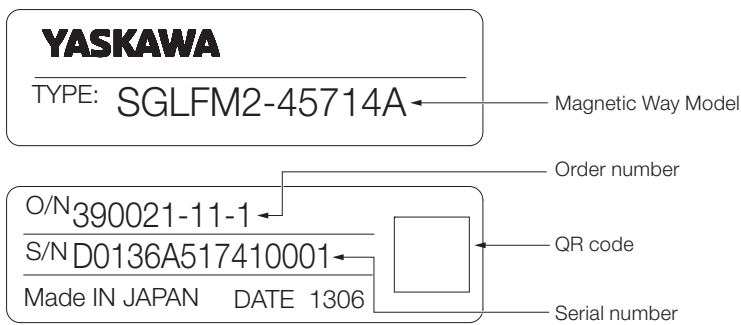
1.2 Interpreting the Nameplates

The following basic information is provided on the nameplate.

1.2.1 Moving Coils



1.2.2 Magnetic Ways



1.3 Outline of Model Designations

1.3.1 Servomotors

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

SGL □ □ - 30 D 120 A P

Series

Σ -7-Series Servomotors

1st digit

Servomotor Type

Code	Specification	Reference
F	Models with F-type iron core	Chapter 3
T	Models with T-type iron core	Chapter 4

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. Refer to the following manual for details.

- Σ -7-Series Σ -7S SERVOPACK with 400 V-Input Power and EtherCAT (CoE) Communications References Product Manual (Manual No.: SIEP S800001 80)
- Σ -7-Series Σ -7S SERVOPACK with 400-V Input Power and MECHATROLINK-III Communications References RJ-45 Connectors Product Manual (Manual No.: SIEP S800002 14)
- Σ -7-Series Σ -7W SERVOPACK with 400 V-Input Power and EtherCAT (CoE) Communications References Product-Manual (Manual No.: SIEP S800002 19)

SGD7□ - 1R9 D 30 B 000 F64

Series

Σ -7-Series SERVOPACKs

1st+2nd+3rd digits

Maximum Applicable Motor Capacity

- SGD7S: 0.5 kW to 5.0 kW
- SGD7W: 0.75 kW or 1.5 kW

4th digit

Power Supply Voltage

- 400 VAC

5th+6th digits

Interface

- EtherCAT communications references
- MECHATROLINK-III communications references and RJ-45 connectors

7th digit

Design Revision Order

8th+9th+10th digits

Hardware Options Specification

- Built-in Servomotor brake control

11th+12th+13th digits

FT/EX Specification*

- ZONE outputs

* Not supported by the SGD7W.

1.4

Combinations of Servomotors and SERVOPACKs

Linear Servomotor Model		Rated Force N	Instantaneous Maximum Force N	SERVOPACK Model	
				SGD7S-	SGD7W-
SGLF (Models with F-type Iron Cores)	SGLFW-35D120A	80	220	1R9D	2R6D
	SGLFW-35D230A	160	440	1R9D	2R6D
	SGLFW-50D200B	280	600	3R5D	–
	SGLFW-50D380B	560	1200	5R4D	5R4D
	SGLFW-1ZD200B			5R4D	5R4D
	SGLFW-1ZD380B	1120	2400	120D	–
	SGLFW2-30D070A	45	135	1R9D	2R6D
	SGLFW2-30D120A	90	270	1R9D	2R6D
	SGLFW2-30D230A	180	540	1R9D	–
	SGLFW2-45D200A	280	840	3R5D	–
	SGLFW2-45D380A	560	1680	8R4D	–
	SGLFW2-90D200A			5R4D	5R4D
	SGLFW2-90D380A	1120	3360	120D	–
	SGLFW2-90D560A	1680	5040	170D	–
	SGLFW2-1DD380A	1680	5040	170D	–
SGLT (Models with T-type Iron Cores)	SGLTW-35D170H	300	600	3R5D	–
	SGLTW-35D320H	600	1200	8R4D	–
	SGLTW-40D400B	670	2600	120D	–
	SGLTW-40D600B	1000	4000	170D	–
	SGLTW-50D170H	450	900	3R5D	–
	SGLTW-50D320H	900	1800	8R4D	–
	SGLTW-80D400B	1300	5000	170D	–

Capacity Selection

2

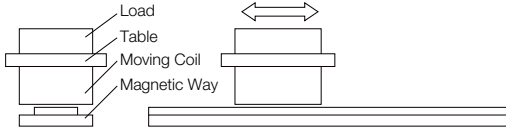
This chapter describes calculation methods to use when selecting Servomotor capacities.

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2.1 Selecting the Servomotor Capacity

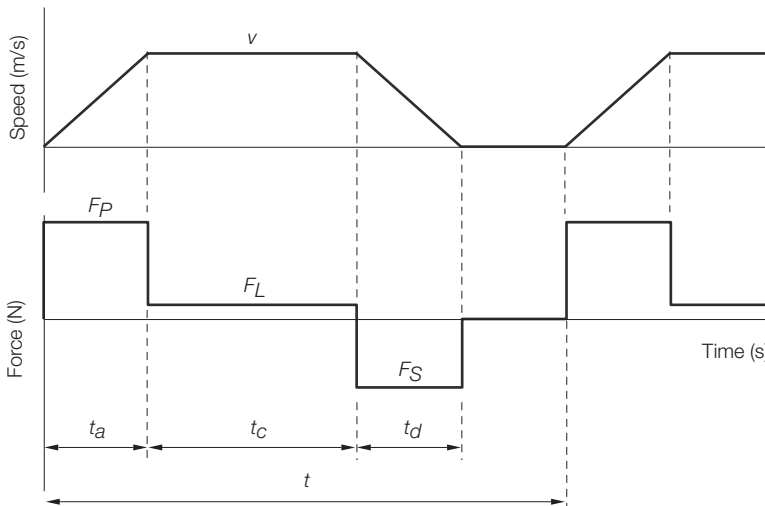
Refer to the following selection examples to select Servomotor capacities with manual calculations rather than with the above software.

1. Mechanical Specifications



Item	Code	Value	Item	Code	Value
Load Mass	m_W	1 kg	Acceleration Time	t_a	0.02 s
Table Mass	m_T	2 kg	Constant-speed Time	t_c	0.36 s
Motor Speed	v	1 m/s	Deceleration Time	t_d	0.02 s
Feeding Distance	l	0.38 m	Cycle Time	t	0.5 s
Friction Coefficient	μ	0.01	External Force on Linear Motion Section	F	0 N

2. Operation Pattern



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

$$F_L = \{9.8 \times \mu \times (m_W + m_T)\} + F = 9.8 \times 0.01 \times (1 + 2) + 0 = 0.30 \text{ (N)}$$

4. Acceleration Force (Excluding Servomotor Moving Coil)

$$F_P = (m_W + m_T) \times \frac{v}{t_a} + F_L = (1 + 2) \times \frac{1}{0.02} + 0.30 = 150.30 \text{ (N)}$$

5. Provisional Selection of Linear Servomotor

① Selection Conditions

- $F_P \leq \text{Maximum force} \times 0.9$
- $F_S \leq \text{Maximum force} \times 0.9$
- $F_{rms} \leq \text{Rated force} \times 0.9$

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

- SGLFW-35D230AP Linear Servomotor Moving Coil
- SGLFM-35□□□A Linear Servomotor Magnetic Way

② Specifications of the Provisionally Selected Servomotor

Item	Value
Maximum Force	440 (N)
Rated Force	160 (N)
Moving Coil Mass (m_M)	2.3 (kg)
Servomotor Magnetic Attraction (F_{att})	0 (N)

6. Verification of the Provisionally Selected Servomotor

- Steady-State Force

$$F_L = \mu \times \{9.8 \times (m_W + m_T + m_M) + F_{att}\} = 0.01 \times \{9.8 \times (1 + 2 + 2.3) + 1590\} = 16.4 \text{ (N)}$$

- Verification of Acceleration Force

$$F_P = (m_W + m_T + m_M) \times \frac{v}{t_a} + F_L = (1 + 2 + 2.3) \times \frac{1}{0.02} + 16.4$$

$$= 281.4 \text{ (N)} \leq \text{Maximum force} \times 0.9 (= 396 \text{ N}) \dots \text{Satisfactory}$$

- Verification of Deceleration Force

$$F_S = (m_W + m_T + m_M) \times \frac{v}{t_d} - F_L = (1 + 2 + 2.3) \times \frac{1}{0.02} - 16.4$$

$$= 248.6 \text{ (N)} \leq \text{Maximum force} \times 0.9 (= 396 \text{ N}) \dots \text{Satisfactory}$$

- Verification of Effective Force

$$F_{rms} = \sqrt{\frac{F_P^2 \cdot t_a + F_L^2 \cdot t_c + F_S^2 \cdot t_d}{t}} = \sqrt{\frac{281.4^2 \times 0.02 + 16.4^2 \times 0.36 + 248.6^2 \times 0.02}{0.5}}$$

$$= 64.4 \text{ (N)} \leq \text{Rated force} \times 0.9 (= 144 \text{ N}) \dots \text{Satisfactory}$$

7. Result

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

Specifications, Ratings, and External Dimensions of SGLF Servomotors

3

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

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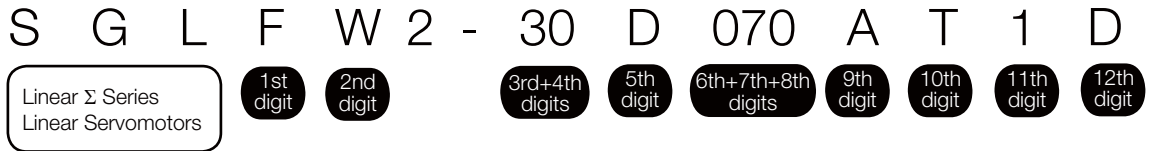
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3.1 Model Designations

3.1.1 SGLFW2 Models

◆ Moving Coil



1st digit Servomotor Type

Code	Specification
F	With F-type iron core

5th digit Power Supply Voltage

Code	Specification
D	400 VAC

10th digit Sensor Specification

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

2nd digit Moving Coil/Magnetic Way

Code	Specification
W	Moving Coil

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

11th digit Cooling Method

Code	Specification
1	Self-cooled
L	Water-cooled*

3rd+4th digits Magnet Height

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

9th digit Design Revision Order

A

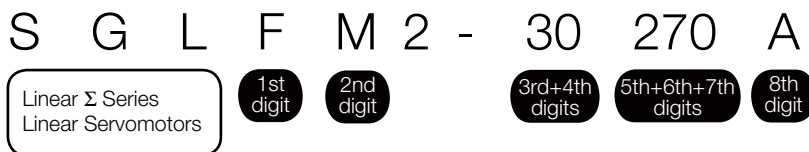
12th digit Servomotor Main Circuit Cable and Cable Length

Code	Specification
D	Phoenix Contact connectors, 300 mm
E	Phoenix Contact connectors, 500 mm

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



1st digit Servomotor Type
(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

2nd digit Moving Coil/Magnetic Way

Code	Specification
M	Magnetic Way

3rd+4th digits Magnet Height
(Same as for the Moving Coil.)

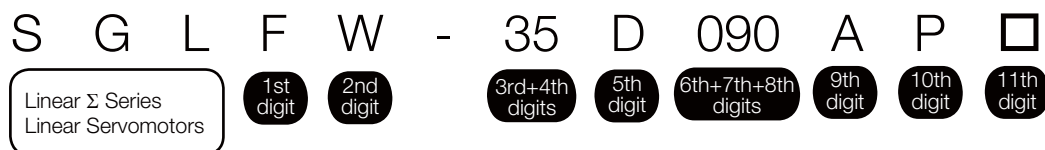
8th digit Design Revision Order

A

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 SGLFW Models

◆ Moving Coil



1st digit Servomotor Type

Code	Specification
F	With F-type iron core

5th digit Voltage

Code	Specification
D	400 VAC

10th digit Sensor Specification

Code	Specification
P	With polarity sensor
None	Without polarity sensor

2nd digit Moving Coil/Magnetic Way

Code	Specification
W	Moving Coil

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

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

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

3rd+4th digits Magnet Height

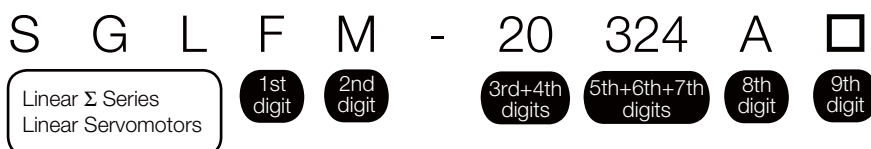
Code	Specification
35	36 mm
50	47.5 mm
1Z	95 mm

9th digit Design Revision Order

A, B ...

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



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

9th digit Options

Code	Specification
None	Without options
C	With magnet cover

8th digit Design Revision Order

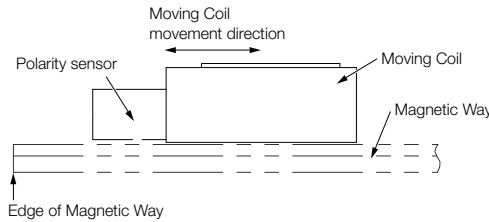
A, B ...

3.1.3 Precautions on Moving Coils with Polarity Sensors

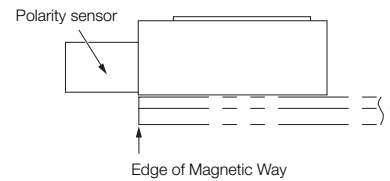


When you use a Moving Coil with a Polarity Sensor, the Magnetic Way must cover the bottom of the polarity sensor. Refer to the example that shows the correct installation. When determining the length of the Moving Coil's stroke or the length of the Magnetic Way, consider the total length (L) of the Moving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

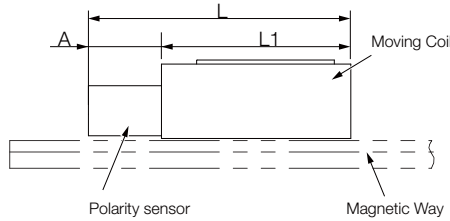
Correct Installation



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]
30D070AS	70	27	97
30D120AS	125		152
30D230AS	230		257
45D200AS	205	32	237
45D380AS	384		416
90D200AS	205	32	237
90D380AS	384		416
90D560AS	563		595
1DD380AS	384	32	416

Moving Coil Model SGLFW-	Length of Moving Coil, L1 [mm]	Length of Polarity Sensor, A [mm]	Total Length, L [mm]
35D120AP□	127	22	149
35D230AP□	235		257
50D200BP□	215	22	237
50D380BP□	395		417
1ZD200BP□	215	22	237
1ZD380BP□	395		417

3.2 Ratings and Specifications: SGLFW2 Models

3.2.1 Specifications

Linear Servomotor Moving Coil Model SGLFW2-	30D			45D		90D			1DD
	070A□	120A□	230A□	200A□	380A□	200A□	380A□	560A□	380A□
Time Rating	Continuous								
Thermal Class	B								
Insulation Resistance	500 VDC, 10 MΩ min.								
Withstand Voltage	1,800 VAC for 1 minute								
Excitation	Permanent magnet								
Cooling Method	Self-cooled and water-cooled*								
Protective Structure	IP00								
Envi- ron- men- tal Condi- tions	Surrounding Air Temperature	0°C to 40°C (with no freezing)							
	Surrounding Air Humidity	20% to 80% relative humidity (with no condensation)							
	Installation Site	<ul style="list-style-type: none"> • 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 Resis- tance	Impact Acceleration Rate	196 m/s ²							
	Number of Impacts	2 times							
Vibra- tion Resis- tance	Vibration Acceler- ation 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.

3.2.2 Ratings: SGLFW2-30D and -45D

Linear Servomotor Moving Coil Model SGLFW2-		30D			45D	
		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	280	560
Maximum Force* ¹	N	135	270	540	840	1680
Rated Current* ¹	Arms	1.4	1.5	1.5	2.2	4.3
Maximum Current* ¹	Arms	5.3	5.2	5.2	8.1	16.2
Moving Coil Mass	kg	0.6	1.0	1.8	2.9	5.5
Force Constant	N/Arms	33.3	64.5	129	137	137
BEMF Constant	V _{rms} /(m/s)/ phase	11.1	21.5	43.0	45.6	45.6
Motor Constant	N/√W	11.3	17.3	24.4	37.6	53.2
Electrical Time Constant	ms	7.6	7.3	7.3	20	20
Mechanical Time Constant	ms	4.7	3.4	3.0	2.1	1.9
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-□□□□-		651	652	653	654	655
Applicable SERVOPACKs	SGD7S-	1R9D	1R9D	1R9D	3R5D	8R4D
	SGD7W-	2R6D	2R6D	2R6D	-	-

*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.

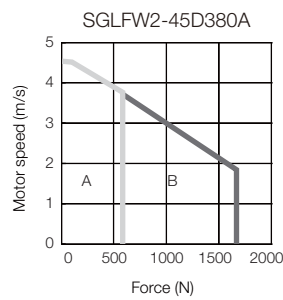
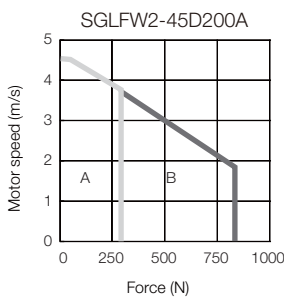
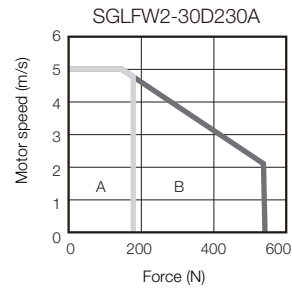
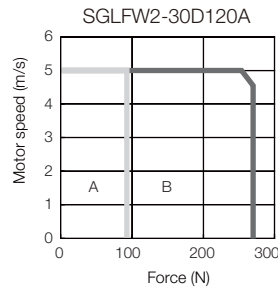
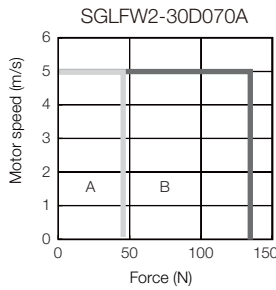
*2. The rated forces are the continuous allowable force values at a surrounding air temperature of 40°C with an aluminum heat sink of the following dimensions.

- Heat Sink Dimensions
 - 150 mm × 100 mm × 10 mm: SGLFW2-30D070A
 - 254 mm × 254 mm × 25 mm: SGLFW2-30D120A and -30D230A
 - 400 mm × 500 mm × 25 mm: SGLFW2-45D200A and -45D380A

3.2.3 Force-Motor Speed Characteristics: SGLFW2-30D and -45D

A : Continuous duty zone

B : Intermittent duty zone



- 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.

3.2.4 Ratings: SGLFW2-90D and -1DD

Linear Servomotor Moving Coil Model SGLFW2-		90D			1DD
		200A□	380A□	560A□	380A□
Rated Motor Speed (Reference Speed during Speed Control)* ¹	m/s	4.0	4.0	4.0	3.5
Maximum Speed* ¹	m/s	4.0	4.0	4.0	3.5
Rated Force* ^{1, *2}	N	560	1120	1680	1680
Maximum Force* ¹	N	1680	3360	5040	5040
Rated Current* ¹	Arms	3.8	7.7	11.5	10.9
Maximum Current* ¹	Arms	14.0	28.0	42.0	39.7
Moving Coil Mass	kg	5.3	10.1	14.9	14.6
Force Constant	N/Arms	154	154	154	163
BEMF Constant	Vrms/(m/s)/ phase	51.3	51.3	51.3	54.3
Motor Constant	N/√W	59.2	83.7	102	103
Electrical Time Constant	ms	24	24	24	25
Mechanical Time Constant	ms	1.5	1.4	1.4	1.4
Thermal Resistance (with Heat Sink)	K/W	0.45	0.21	0.18	0.18
Thermal Resistance (without Heat Sink)	K/W	1.81	1.03	0.72	0.79
Magnetic Attraction	N	4240	8480	12700	12700
Combined Magnetic Way, SGLFM2-		90□□□A			1D□□□A
Combined Serial Converter Unit, JZDP-□□□□-		657	658	659	660
Applicable SERVOPACKs	SGD7S-	5R4D	120D	170D	170D
	SGD7W-	5R4D	-	-	-

*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.

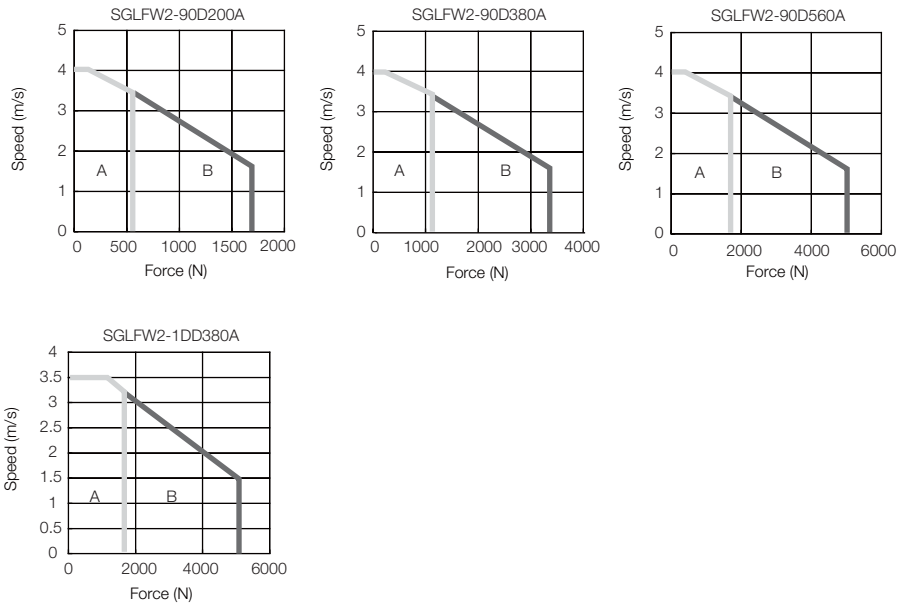
*2. The rated forces are the continuous allowable force values at a surrounding air temperature of 40°C with an aluminum heat sink of the following dimensions.

- Heat Sink Dimensions
 - 400 mm × 500 mm × 25 mm: SGLFW2-90D200A
 - 609 mm × 762 mm × 40 mm: SGLFW2-90D380A
 - 900 mm × 762 mm × 40 mm: SGLFW2-90D560A and -1DD380A

3.2.5 Force-Motor Speed Characteristics: SGLFW2-90D and -1DD

A : Continuous duty zone

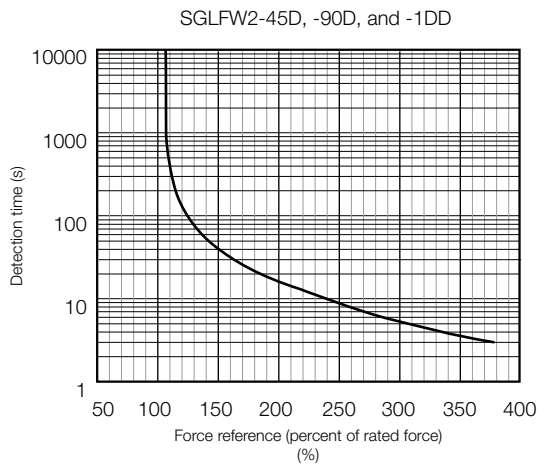
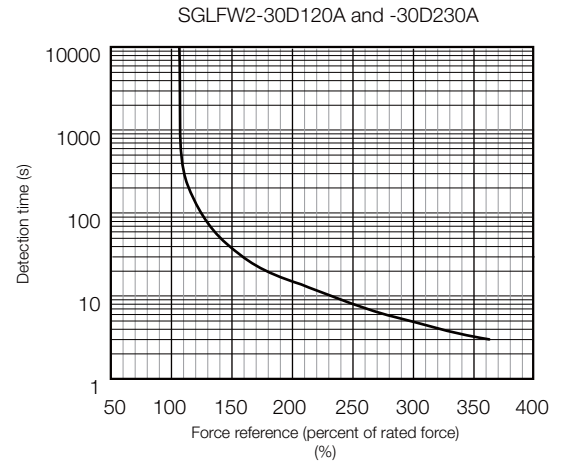
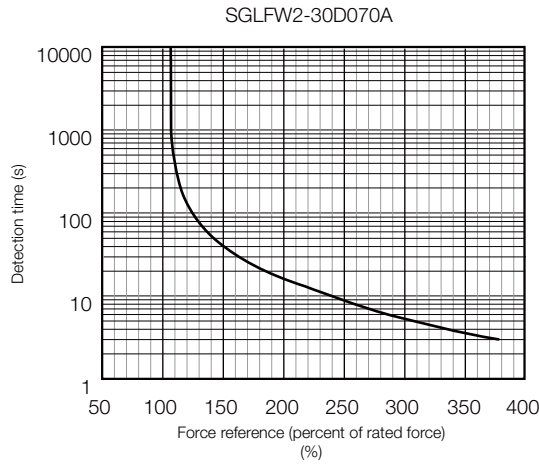
B : Intermittent duty zone



- 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 surrounding air temperature of 40°C.



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 3.2.3 Force-Motor Speed Characteristics: SGLFW2-30D and -45D or 3.2.5 Force-Motor Speed Characteristics: SGLFW2-90D and -1DD.

3.3 Ratings and Specifications: SGLFW Models

3.3.1 Specifications

Linear Servomotor Moving Coil Model SGLFW-		35D		50D		1ZD	
		120A	230A	200B	380B	200B	380B
Time Rating		Continuous					
Thermal Class		B					
Insulation Resistance		500 VDC, 10 MΩ min.					
Withstand Voltage		1,800 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	<ul style="list-style-type: none"> • 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)					

3.3.2 Ratings

Linear Servomotor Moving Coil Model SGLFW-		35D		50D		1ZD	
		120A	230A	200B	380B	200B	380B
Rated Motor Speed (Reference Speed during Speed Control)* ¹	m/s	1.5	1.5	1.5	1.5	1.5	1.5
Maximum Speed* ¹	m/s	4.5	4.5	5.0	5.0	5.0	5.0
Rated Force* ^{1, *2}	N	80	160	280	560	560	1120
Maximum Force* ¹	N	220	440	600	1200	1200	2400
Rated Current* ¹	Arms	0.6	1.3	2.3	4.5	4.9	9.8
Maximum Current* ¹	Arms	2.0	4.0	5.6	11.0	12.3	24.6
Moving Coil Mass	kg	1.3	2.3	3.5	6.9	6.4	11.5
Force Constant	N/Arms	136.0	136.0	134.7	134.7	122.6	122.6
BEMF Constant	V _{rms} /(m/s)/ phase	45.3	45.3	44.9	44.9	40.9	40.9
Motor Constant	N/ \sqrt{W}	14.2	20.1	33.4	47.2	51.0	72.1
Electrical Time Constant	ms	3.7	3.6	15.0	15.0	17.4	17.2
Mechanical Time Constant	ms	5.2	5.1	3.2	3.2	2.5	2.2
Thermal Resistance (with Heat Sink)	K/W	1.57	0.96	0.56	0.38	0.47	0.20
Thermal Resistance (without Heat Sink)	K/W	4.1	1.94	1.65	0.95	1.3	0.73
Magnetic Attraction	N	810	1590	1650	3260	3300	6520
Applicable SERVO- PACKs	SGD7S-	1R9D	1R9D	3R5D	5R4D	5R4D	120D
	SGD7W-	2R6D	2R6D	–	5R4D	5R4D	–

*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.

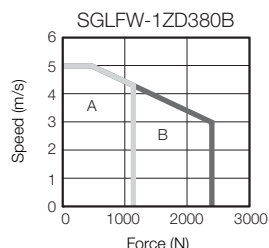
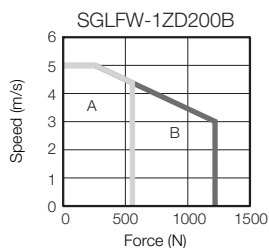
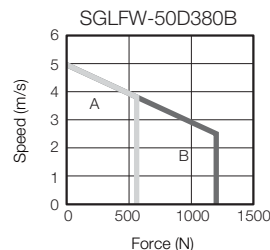
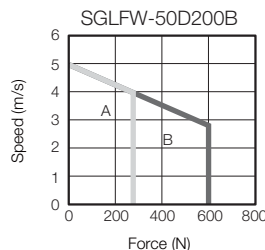
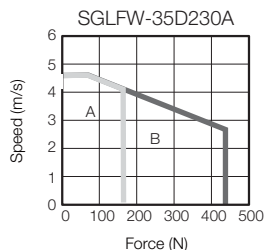
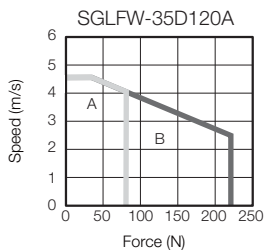
*2. The rated forces are the continuous allowable force values at a surrounding air temperature of 40°C with an aluminum heat sink of the following dimensions.

- Heat Sink Dimensions
 - 254 mm × 254 mm × 25 mm: SGLFW-35D120A and -35D230A
 - 400 mm × 500 mm × 40 mm: SGLFW-50D200B, 50D380B, and -1ZD200B
 - 600 mm × 762 mm × 50 mm: SGLFW-1ZD380B

3.3.3 Force-Motor Speed Characteristics

A : Continuous duty zone

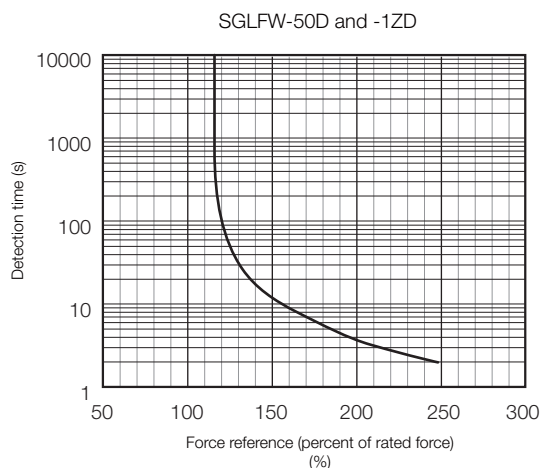
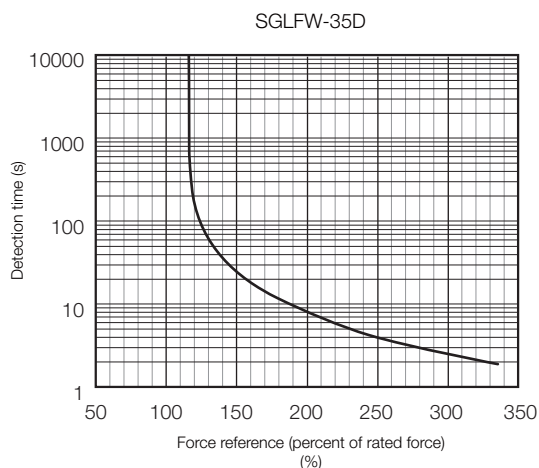
B : Intermittent duty zone



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

3.3.4 Servomotor Overload Protection Characteristics

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

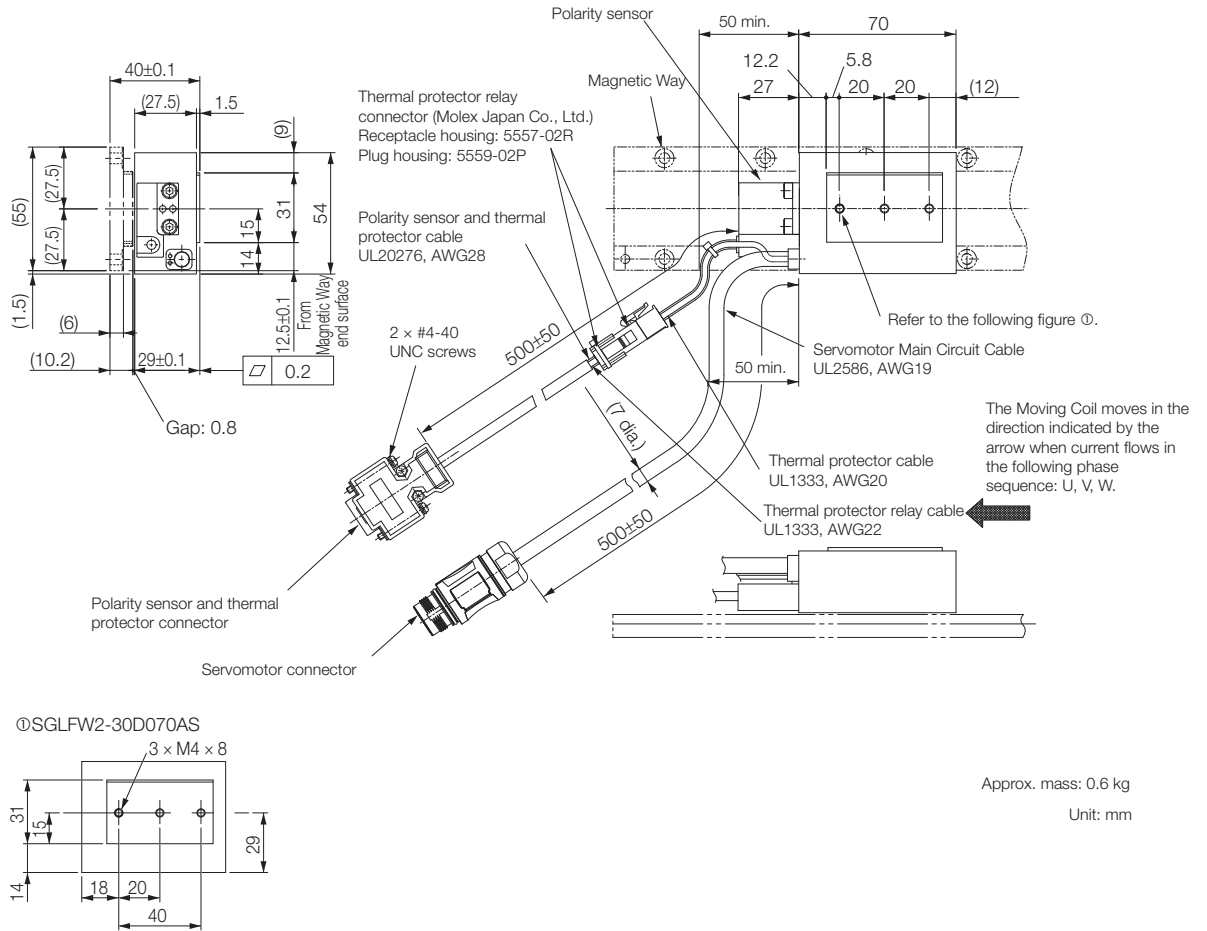


Note: The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher. Use the Servomotor so that the effective force remains within the continuous duty zone given in *Force-Motor Speed Characteristics* on page 3-14.

3.4 External Dimensions

3.4.1 SGLFW2-30

◆ Moving Coil with Polarity Sensor: SGLFW2-30D070AS

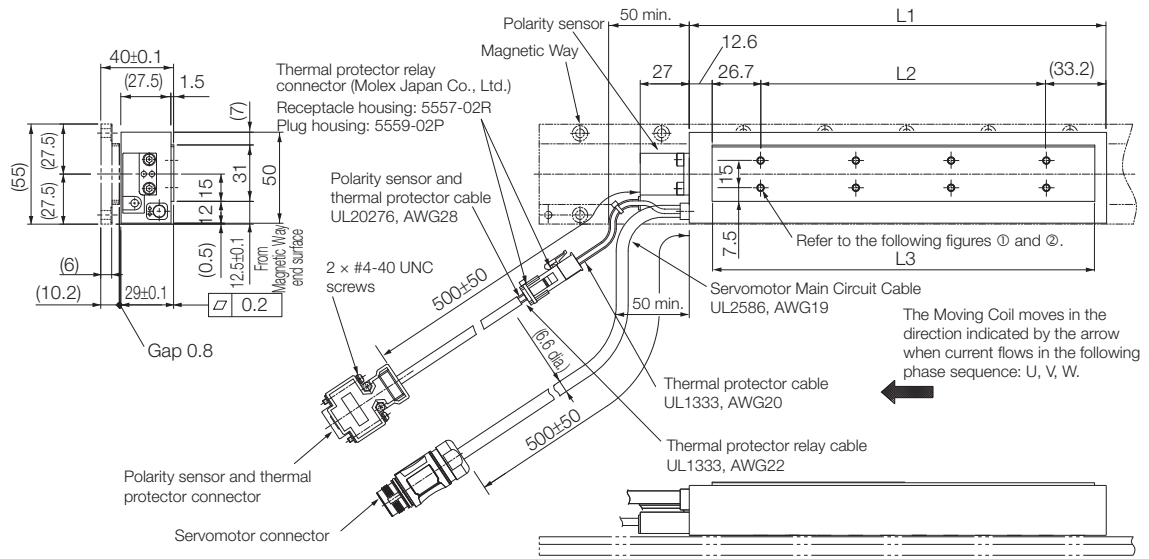


Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

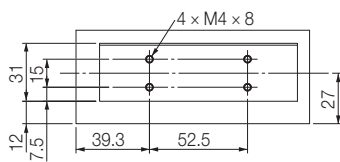
◆ Moving Coils with Polarity Sensors: SGLFW2-30 and -45 on page 3-38

Specifications, Ratings, and External Dimensions of SGLF Servomotors

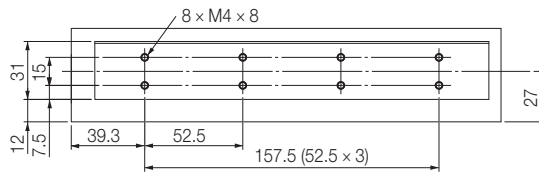
◆ Moving Coils with Polarity Sensors: SGLFW2-30D□□□AS



①SGLFW2-30D120AS



②SGLFW2-30D230AS



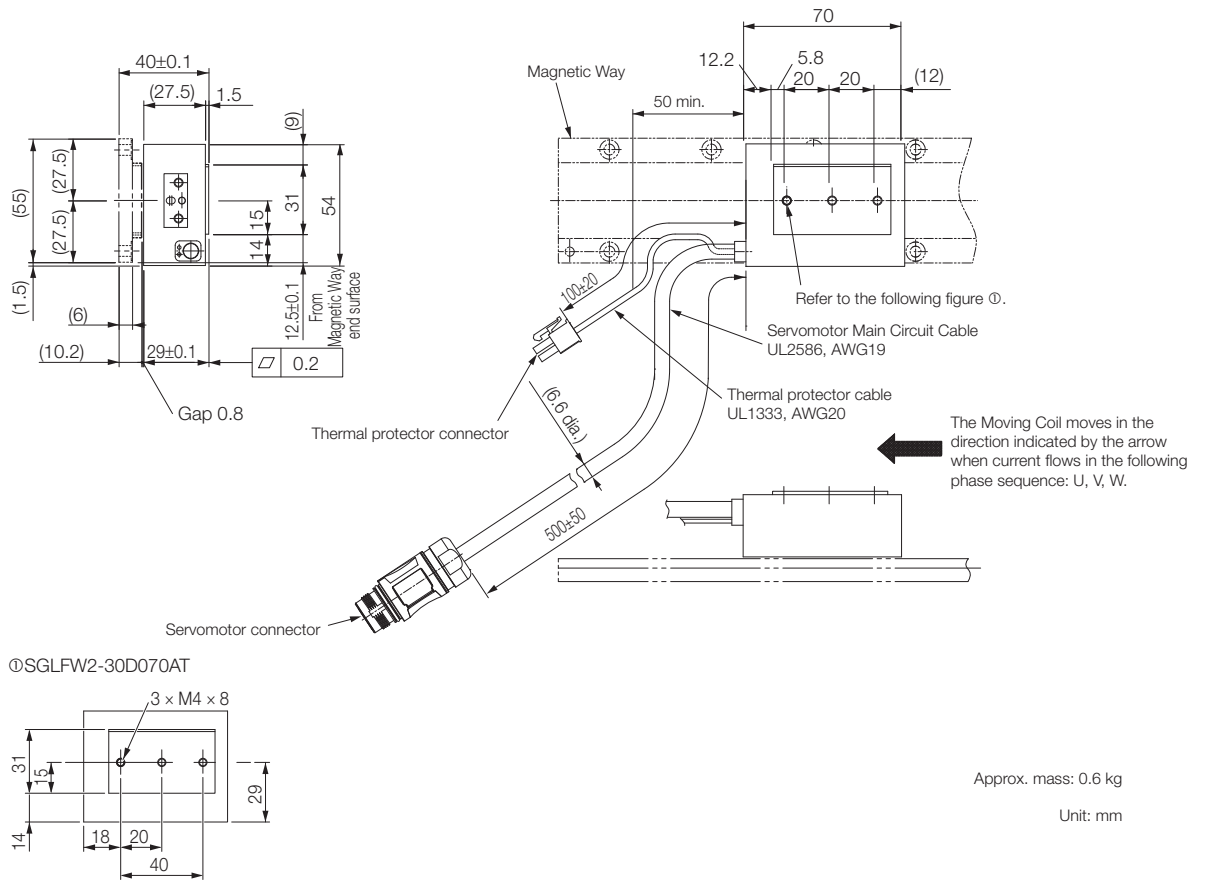
Unit: mm

Moving Coil Model SGLFW2-	L1	L2	L3	Approx. Mass [kg]
30D120AS	125	52.5	105.9	1.0
30D230AS	230	157.5	210.9	1.8

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 3-38

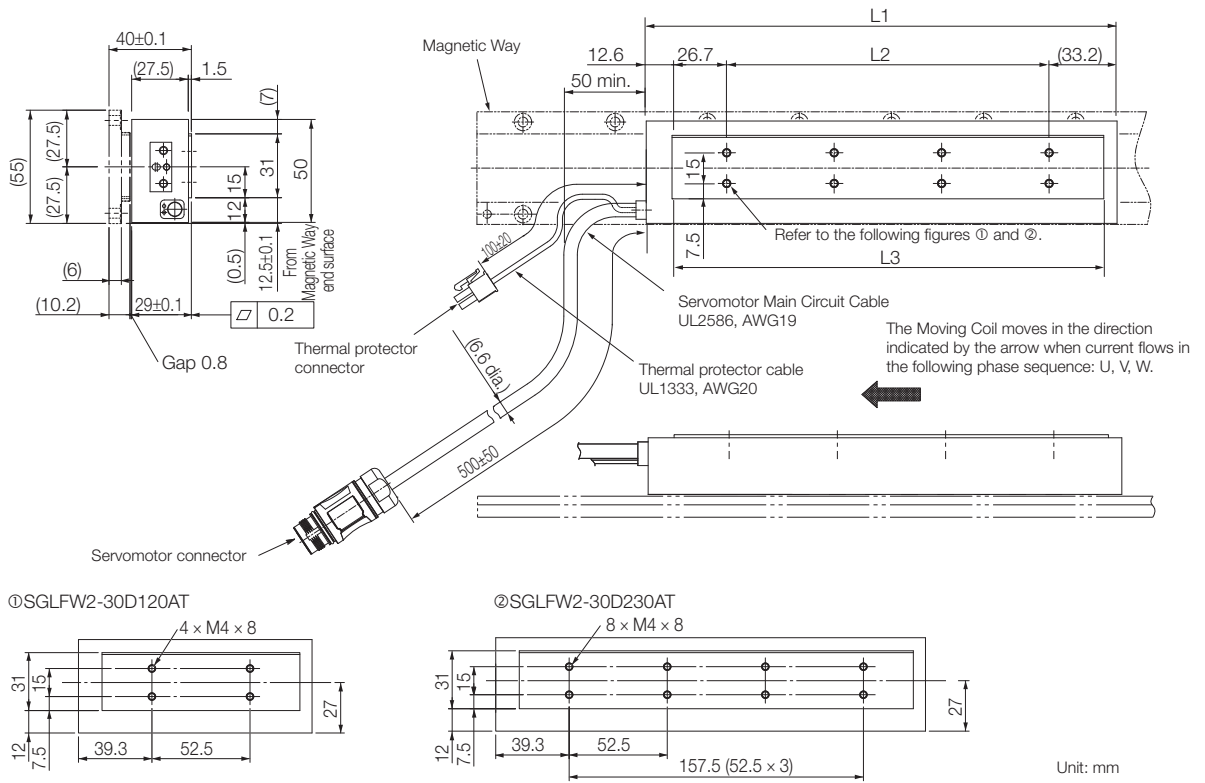
◆ Moving Coil without Polarity Sensor: SGLFW2-30D070AT



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 3-39

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

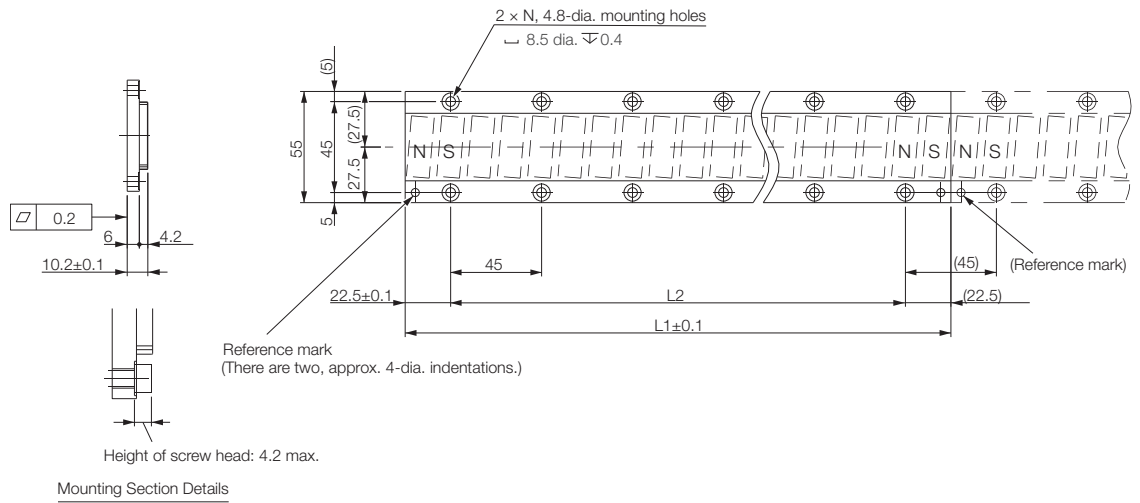


Moving Coil Model SGLFW2-	L1	L2	L3	Approx. Mass [kg]
30D120AT	125	52.5	105.9	1.0
30D230AT	230	157.5	210.9	1.8

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 3-39

◆ Magnetic Ways: SGLFM2-30□□□A



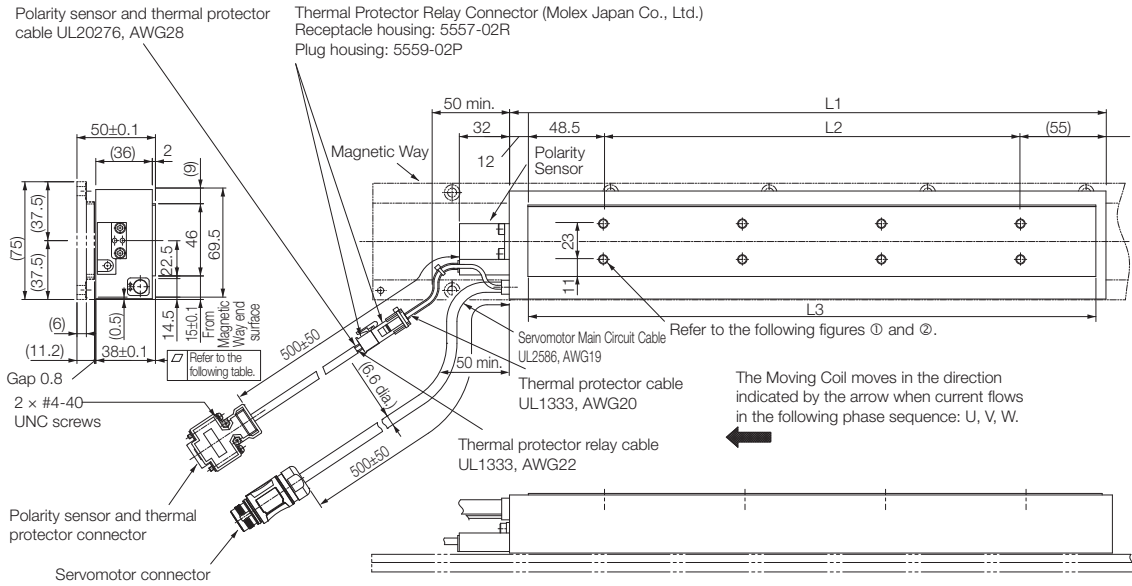
Unit: mm

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-	$L1 \pm 0.1$	$L2$	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

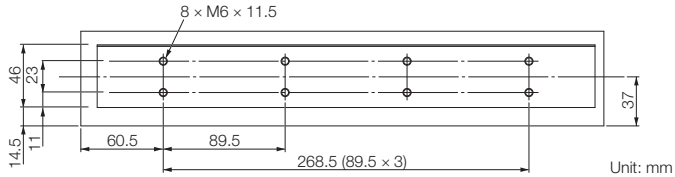
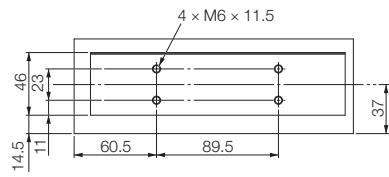
3.4.2 SGLFW2-45

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



① SGLFW2-45D200AS

② SGLFW2-45D380AS



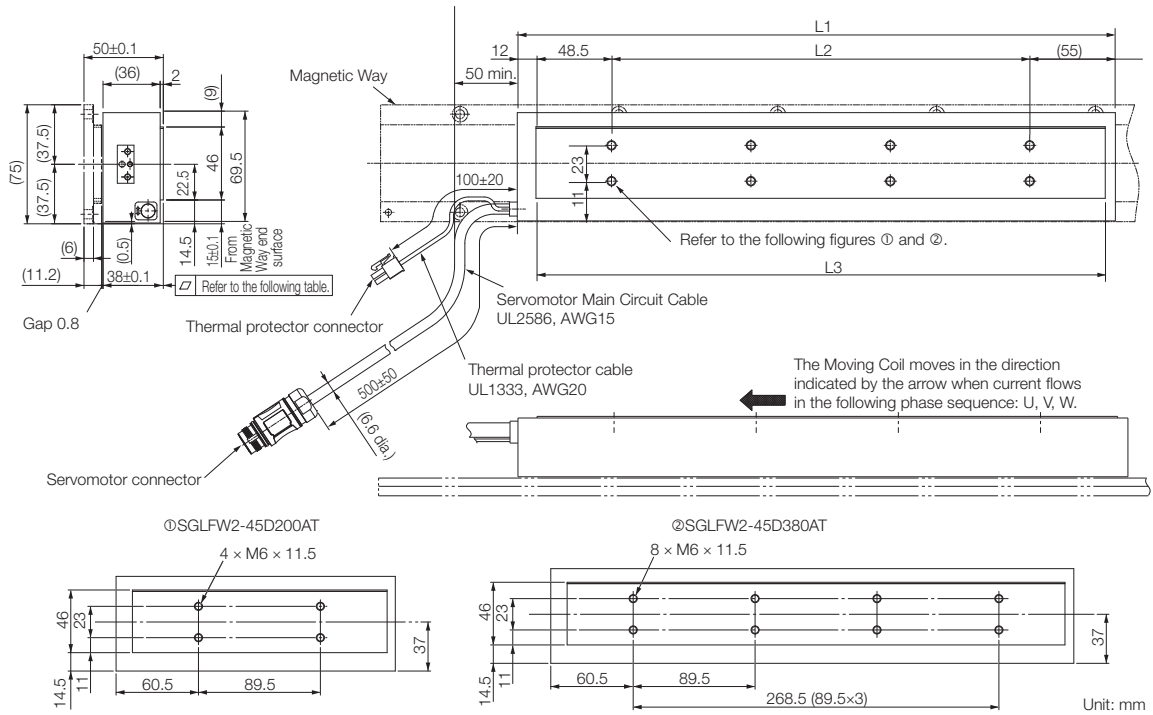
Unit: mm

Moving Coil Model SGLFW2-	L1	L2	L3	Flatness	Approx. Mass [kg]
45D200AS	205	89.5	187	0.2	2.9
45D380AS	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 3-38

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

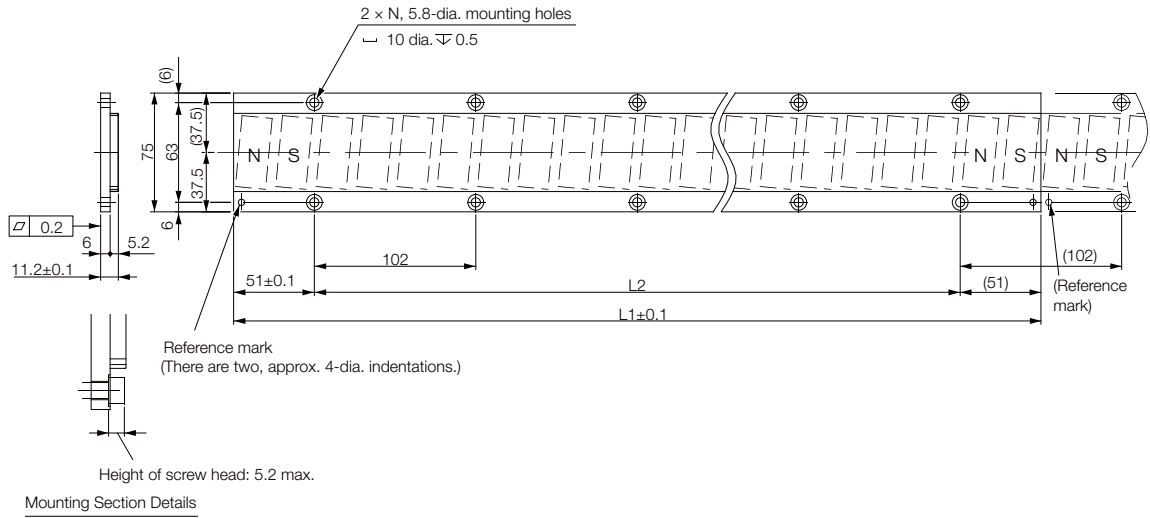


Moving Coil Model SGLFW2-	L1	L2	L3	Flatness	Approx. Mass [kg]
45D200AT	205	89.5	187	0.2	2.9
45D380AT	384	268.5	365.5	0.3	5.5

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 3-39

◆ Magnetic Ways: SGLFM2-45□□□A

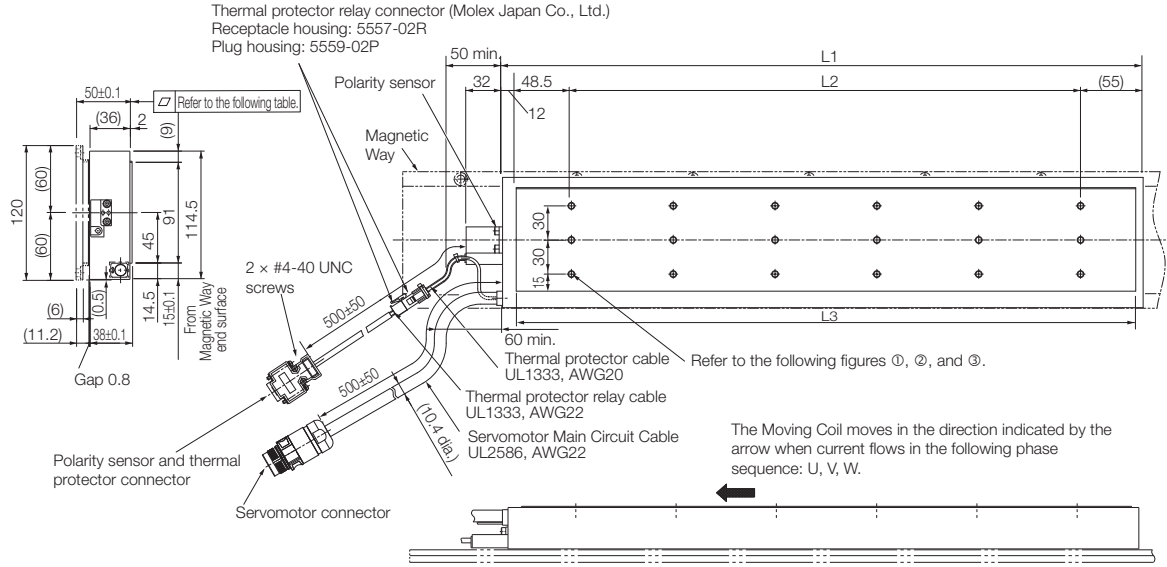


Note: More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

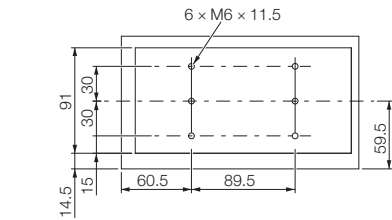
Magnetic Way Model SGLFM2-	L1 ± 0.1	L2	N	Approx. Mass [kg]
45306A	306	204 (102 × 2)	3	1.5
45510A	510	408 (102 × 4)	5	2.5
45714A	714	612 (102 × 6)	7	3.4

3.4.3 SGLFW2-90

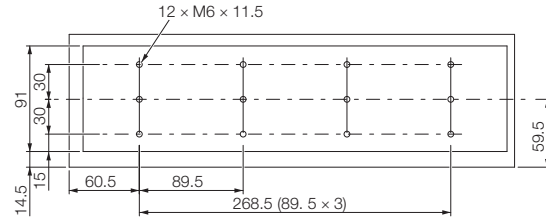
◆ Moving Coils with Polarity Sensors: SGLFW2-90D□□□AS



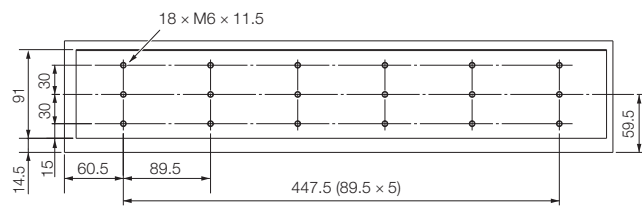
①SGLFW2-90D200AS



②SGLFW2-90D380AS




③SGLFW2-90D560AS



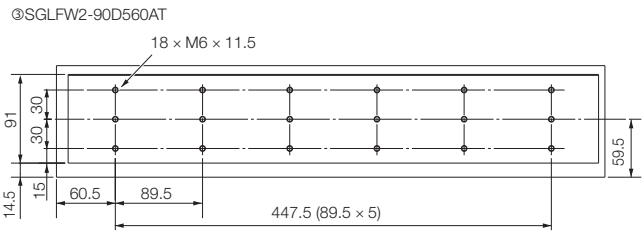
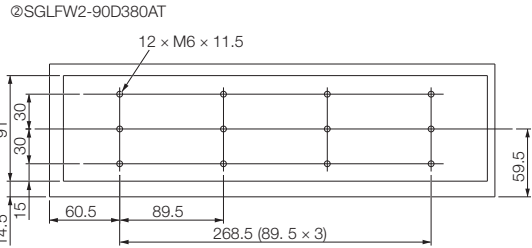
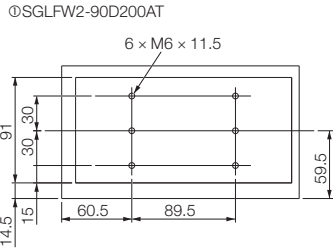
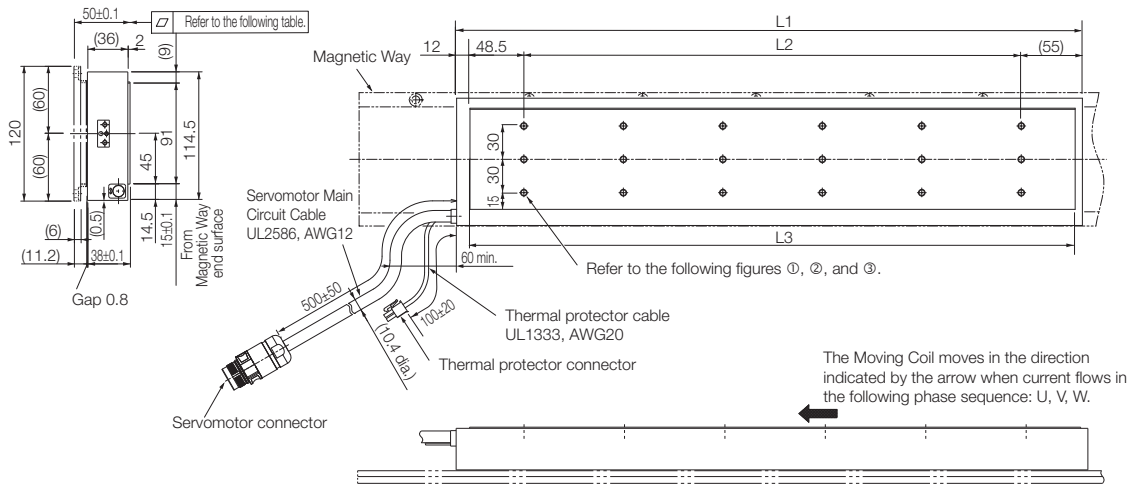
Unit: mm

Moving Coil Model SGLFW2-	L1	L2	L3	Flatness	Approx. Mass [kg]
90D200AS	205	89.5	187	0.2	5.3
90D380AS	384	268.5	365.5	0.3	10.1
90D560AS	563	447.5	544	0.3	14.9

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 3-40

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



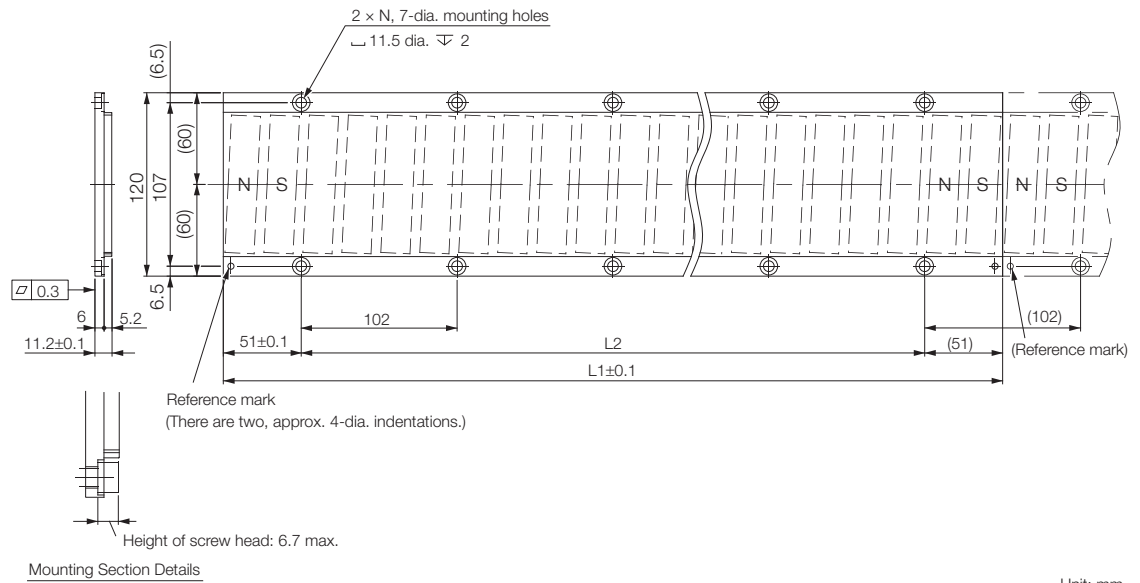
Unit: mm

Moving Coil Model SGLFW2-	L1	L2	L3	Flatness	Approx. Mass [kg]
90D200AT	205	89.5	187	0.2	5.3
90D380AT	384	268.5	365.5	0.3	10.1
90D560AT	563	447.5	544	0.3	14.9

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 3-41

◆ Magnetic Ways: SGLFM2-90□□□A

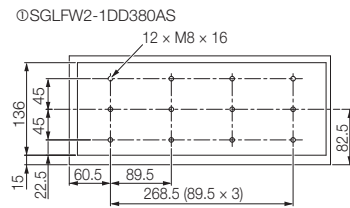
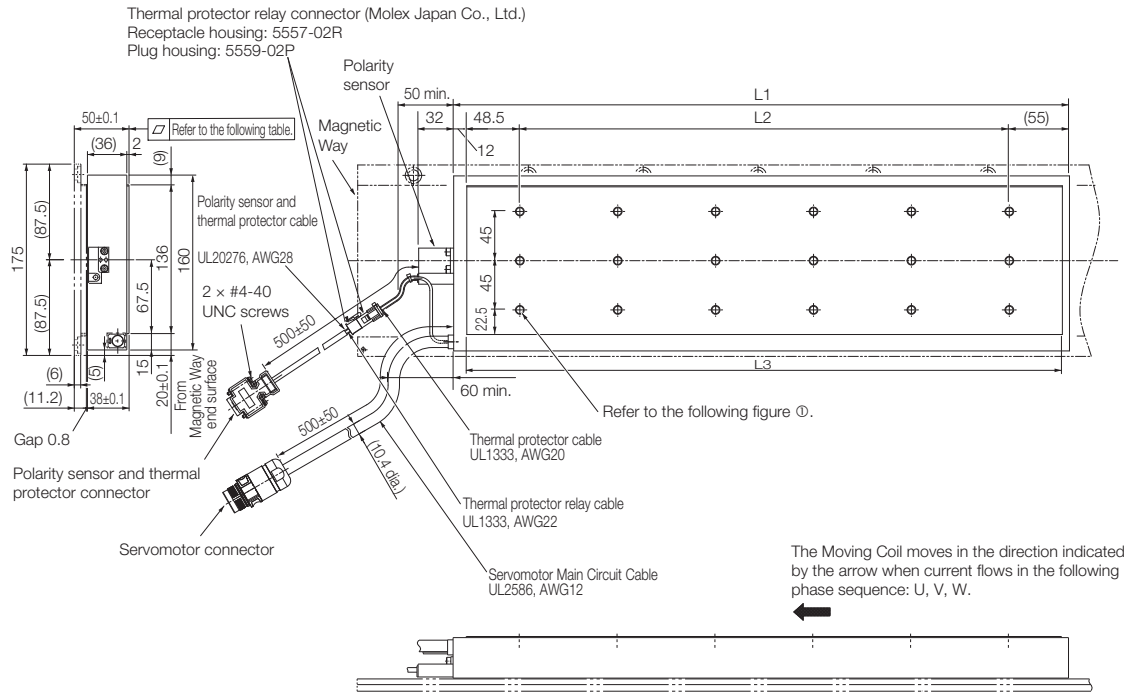


Note: More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

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

3.4.4 SGLFW2-1D

◆ Moving Coils with Polarity Sensors: SGLFW2-1DD□□□AS



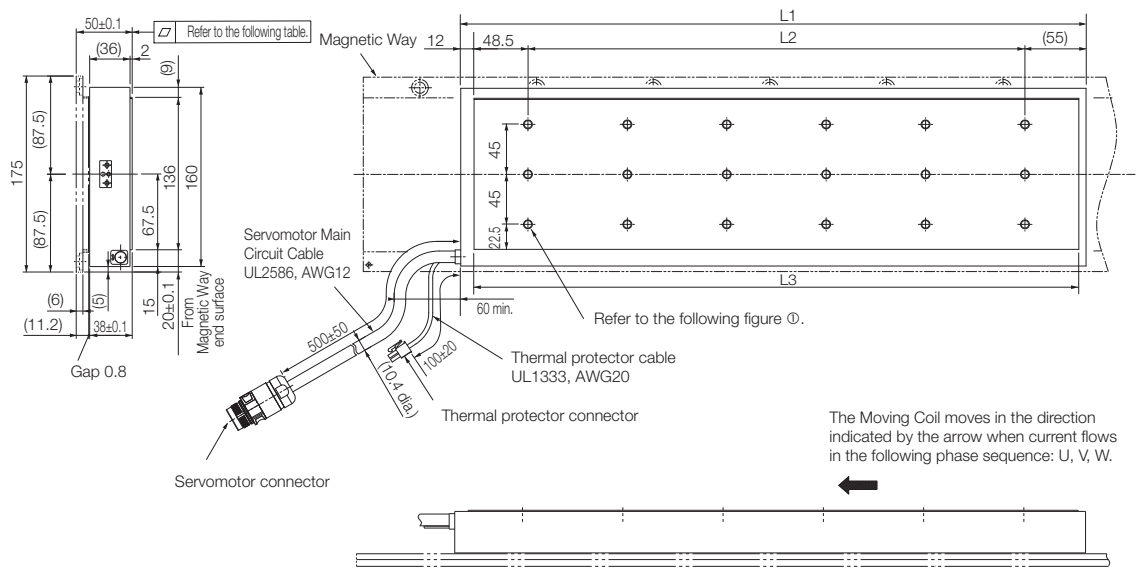
Unit: mm

Moving Coil Model SGLFW2-	L1	L2	L3	Flatness	Approx. Mass [kg]
1DD380AS	384	268.5	365.5	0.3	14.6

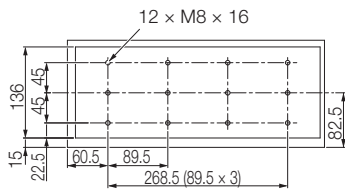
Refer to the following section for the connector specifications for the Sensor Cable and Servomotor Main Circuit Cable.

◆ Moving Coils with Polarity Sensors: SGLFW2-90 and -1D on page 3-40

◆ Moving Coils without Polarity Sensors: SGLFW2-1DD□□□AT



①SGLFW2-1DD380AT



Unit: mm

Moving Coil Model SGLFW2-	L1	L2	L3	Flatness	Approx. Mass [kg]
1DD380AT	384	268.5	365.5	0.3	14.6

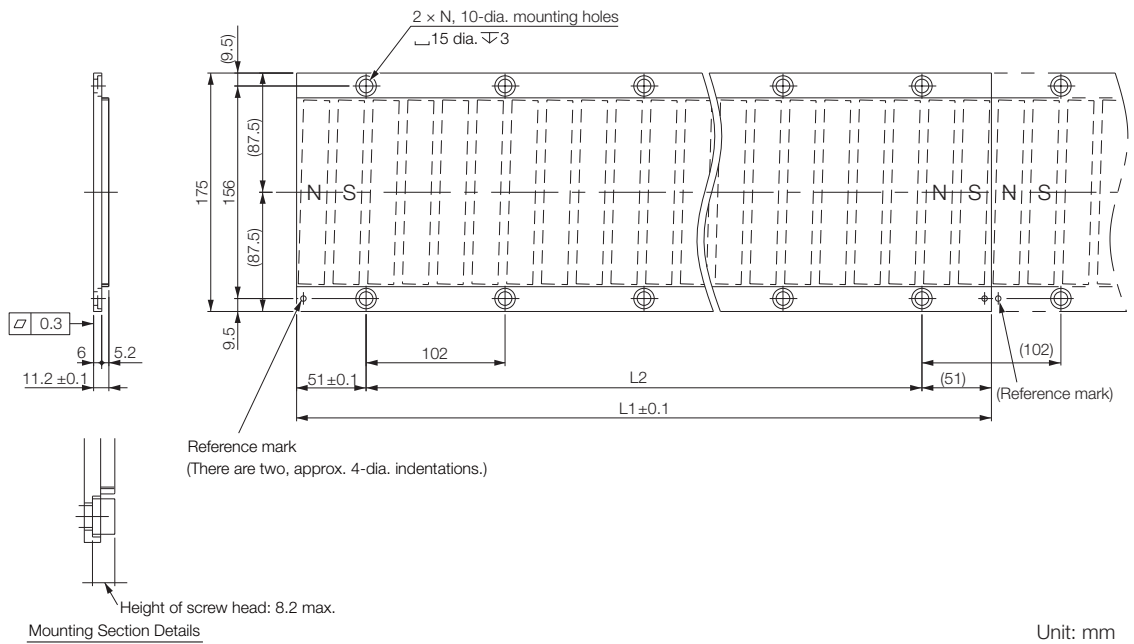
Refer to the following section for the connector specifications for the Sensor Cable and Servomotor Main Circuit Cable.

◆ Moving Coils without Polarity Sensors: SGLFW2-90 and -1D on page 3-41

3.4 External Dimensions

3.4.4 SGLFW2-1D

◆ Magnetic Ways: SGLFM2-1D□□□A

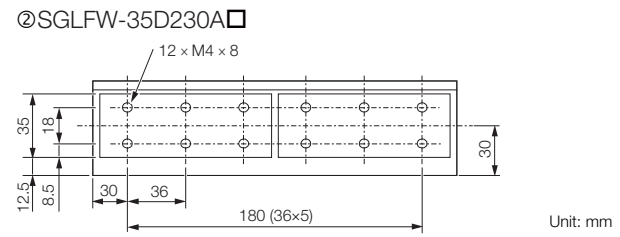
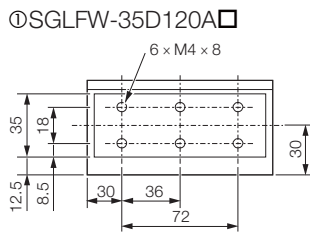
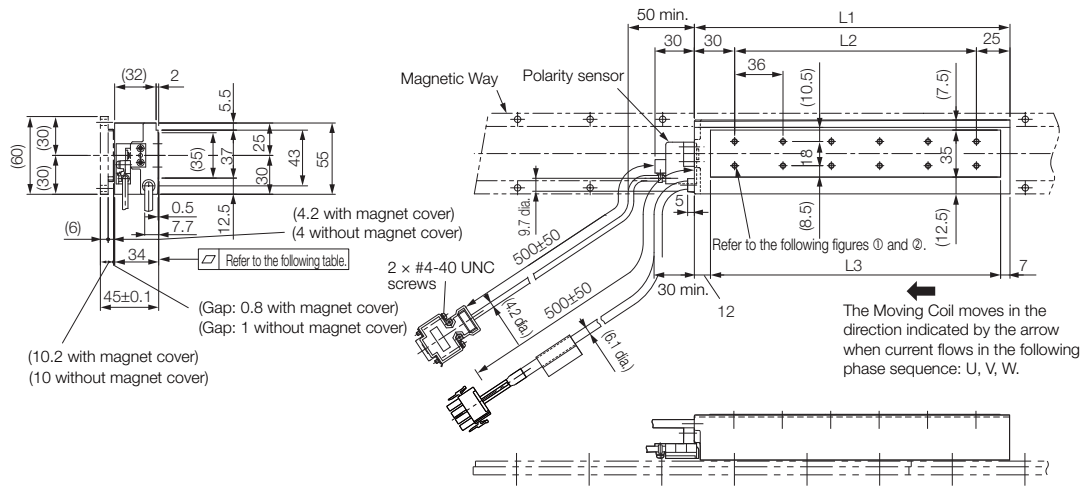


Note: More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

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

3.4.5 SGLFW-35

◆ Moving Coils: SGLFW-35D□□□A□



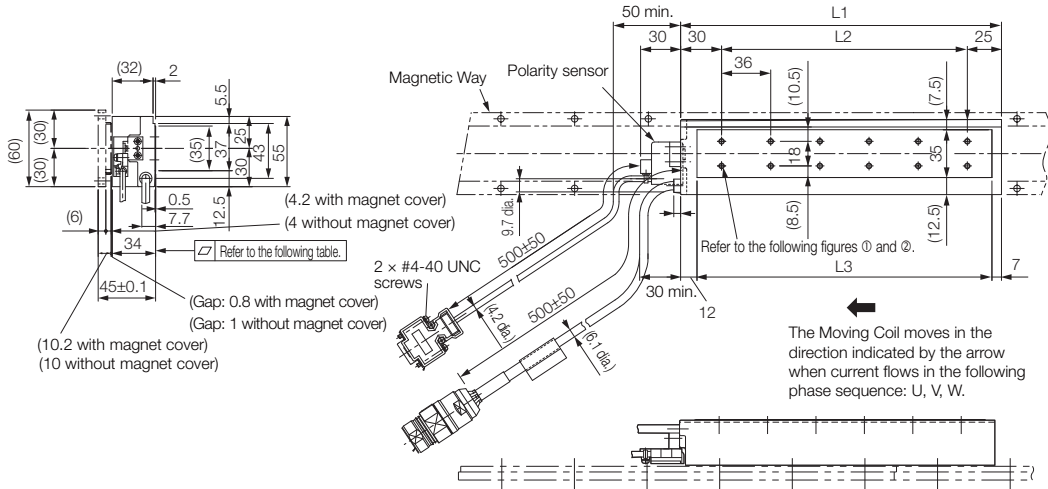
Moving Coil Model SGLFW-	L1	L2	L3	Flatness	Approx. Mass [kg]
35D120A□	127	72	108	0.1	1.3
35D230A□	235	180	216	0.2	2.3

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

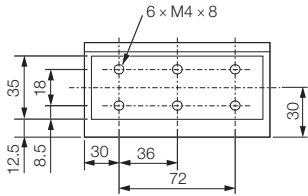
Refer to the following section for the connection specifications for the Sensor Cable and Servomotor Main Circuit Cable.

◆ SGLFW-35D□□□A□ Moving Coils on page 3-42

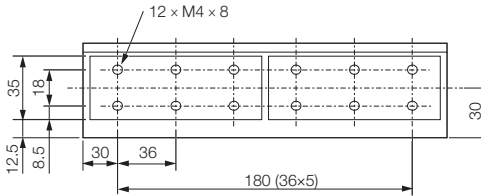
◆ Moving Coils: SGLFW-35D□□□A□□



① SGLFW-35D120A□□



② SGLFW-35D230A□□



Unit: mm

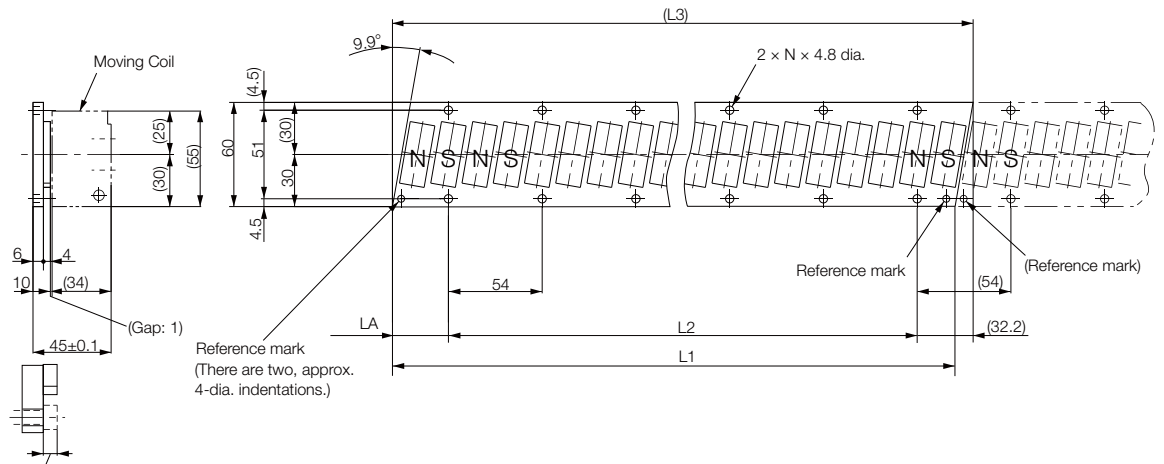
Moving Coil Model SGLFW-	L1	L2	L3	Flatness	Approx. Mass [kg]
35D120A□□	127	72	108	0.1	1.3
35D230A□□	235	180	216	0.2	2.3

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-35D□□□□A□□ and -50D□□□□B□□ Moving Coils on page 3-43

◆ Magnetic Ways: SGLFM-35□□□A



Height of screw head: 4.2 max.
Mounting Section Details

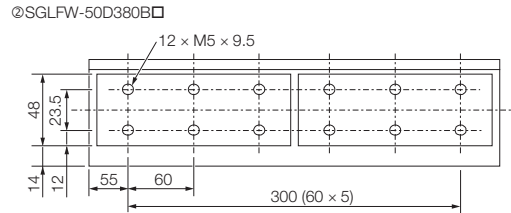
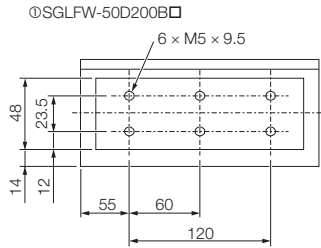
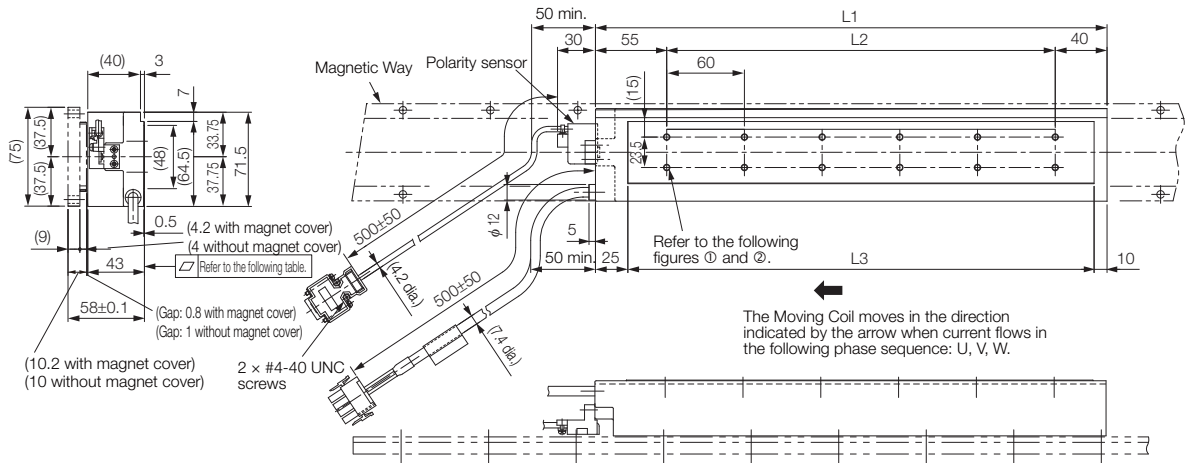
Unit: mm

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

3.4.6 SGLFW-50

◆ Moving Coils: SGLFW-50D□□□B□



Unit: mm

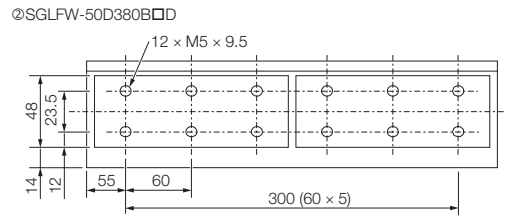
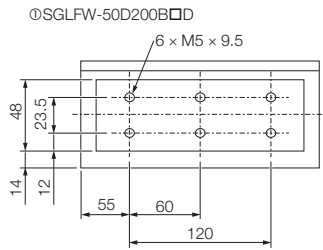
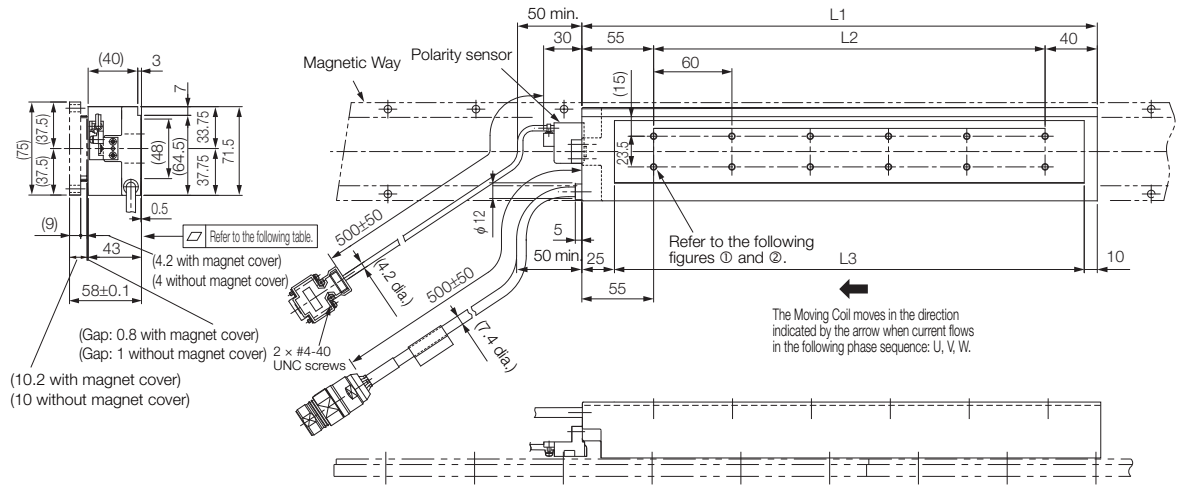
Moving Coil Model SGLFW-	L1	L2	L3	Flatness	Approx. Mass [kg]
50D200B□	215	120	180	0.2	3.5
50D380B□	395	300	360	0.3	6.9

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-50D□□□B□ Moving Coils on page 3-44

◆ Moving Coils: SGLFW-50D□□□□B□D



Unit: mm

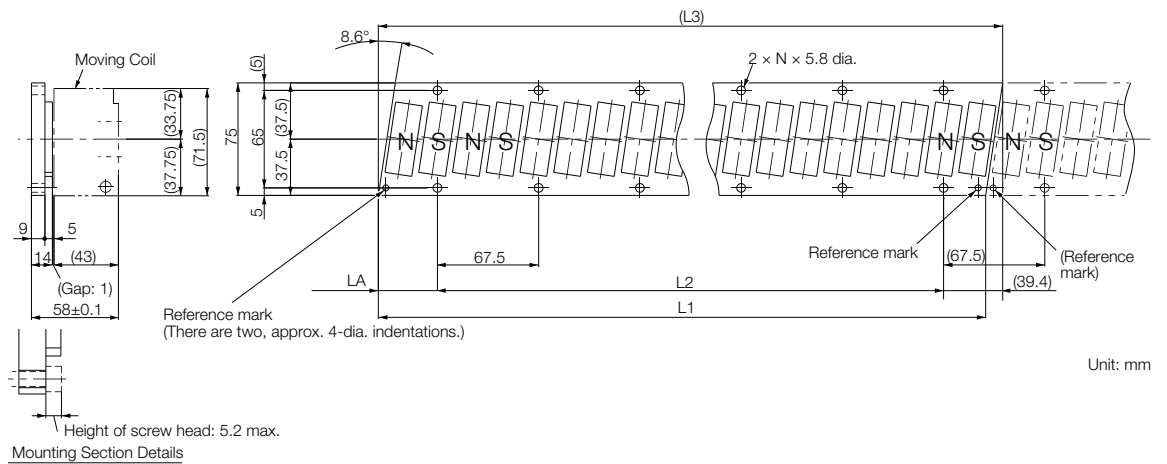
Moving Coil Model SGLFW-	L1	L2	L3	Flatness	Approx. Mass [kg]
50D200B□D	215	120	180	0.2	3.5
50D380B□D	395	300	360	0.3	6.9

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-35D□□□□A□D and -50D□□□□B□D Moving Coils on page 3-43

◆ Magnetic Ways: SGLFM-50□□□A

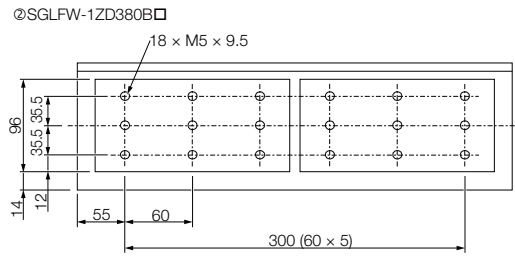
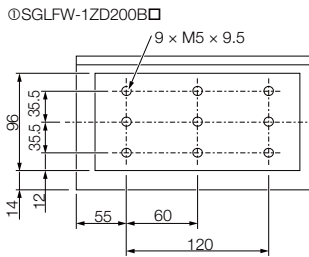
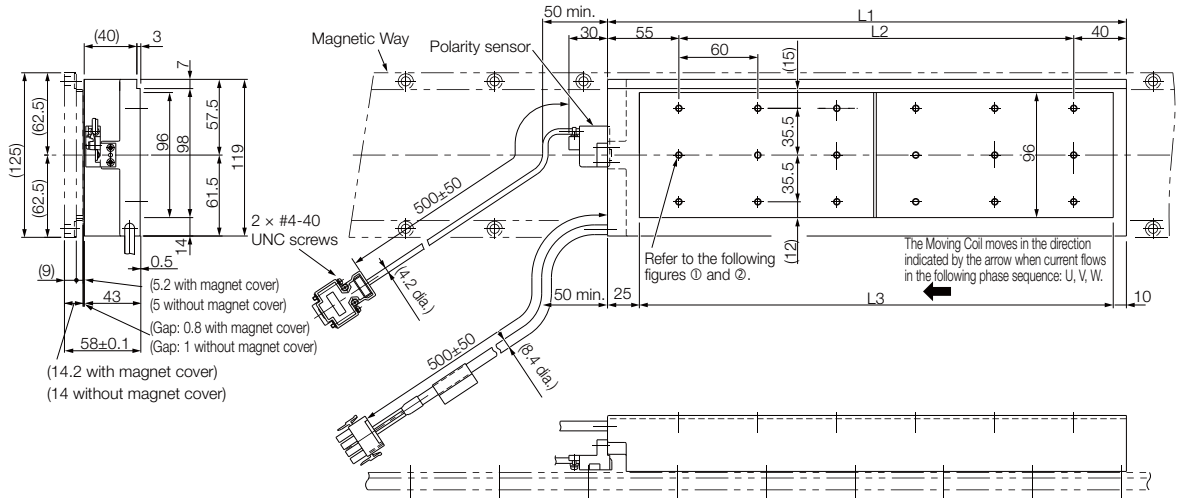


Note: More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

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

3.4.7 SGLFW-1Z

◆ Moving Coils: SGLFW-1ZD□□□B□



Unit: mm

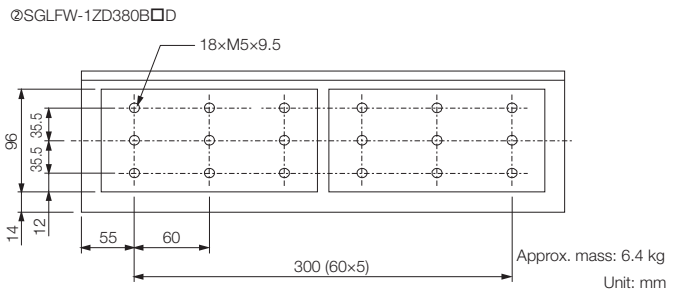
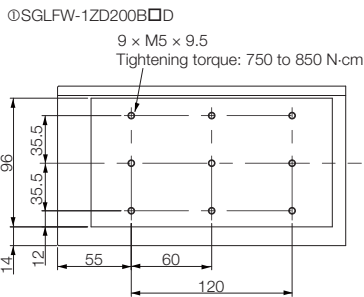
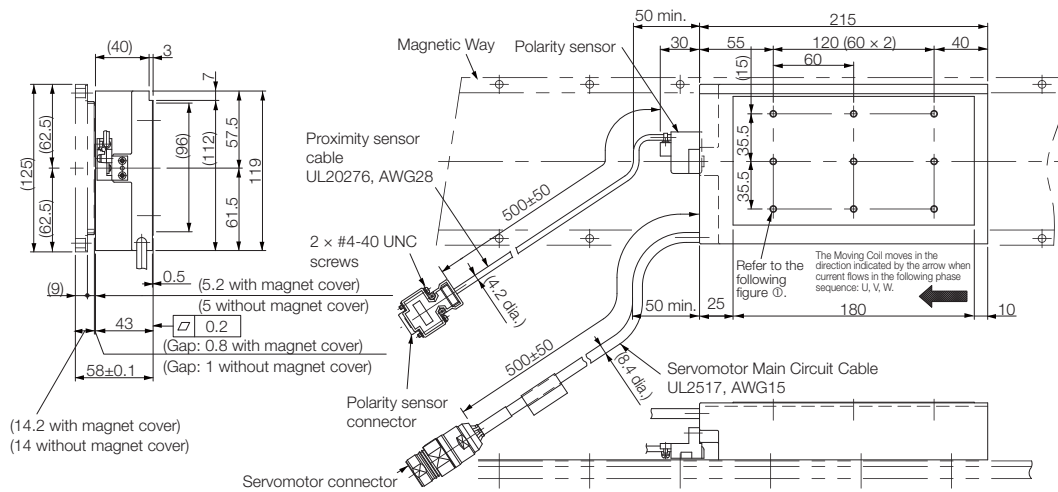
Moving Coil Model SGLFW-	L1	L2	L3	Approx. Mass [kg]
1ZD200B□	215	120	180	6.4
1ZD380B□	395	300	360	11.5

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-1ZD□□□B□ Moving Coils on page 3-45

◆ Moving Coils: SGLFW-1ZD200B□D

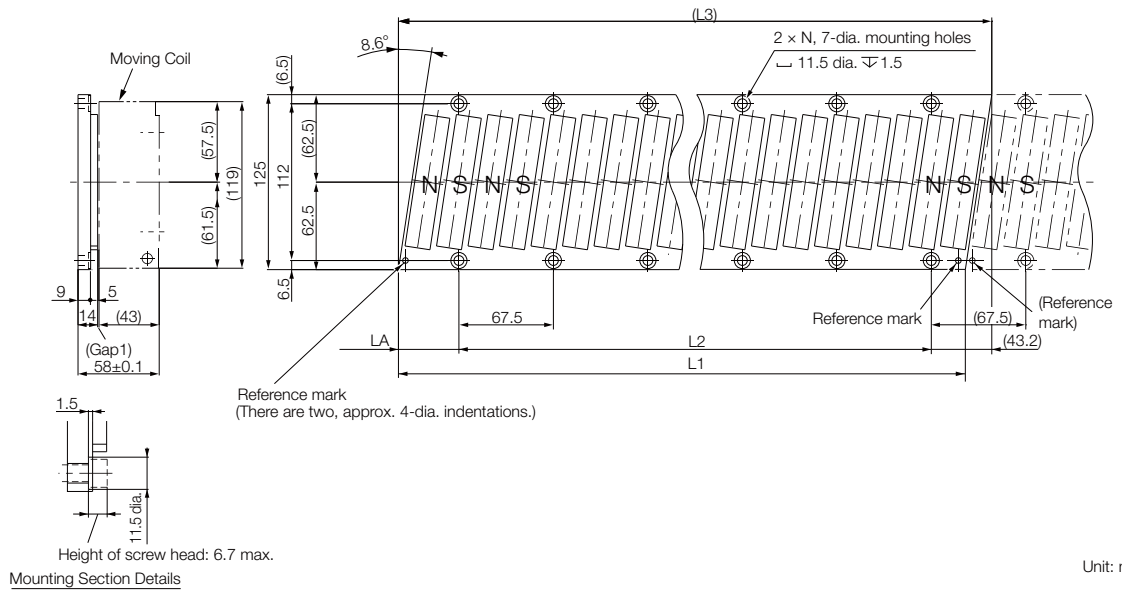


Note: The above dimensional drawing gives the dimensions for both models with polarity sensors and models without polarity sensors.

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

◆ SGLFW-1ZD200B□D Moving Coils on page 3-46

◆ Magnetic Ways: SGLFM-1Z□□□A



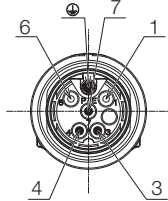
Note: More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

Magnetic Way Model SGLFM-	L1	L2	(L3)	LA	N	Approx. Mass [kg]
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

3.4.8 Connector Specifications

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

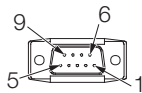
- Servomotor Connector



Connector: ST-5EP1N8A9003S (1607706)
 Contacts: ST-10KP030 (1618261)
 From Phoenix Contact

Pin	Signal
1	-
3	Phase U
4	Phase V
6	-
7	Phase W
	FG
Case	Shield

- Polarity Sensor and Thermal Protector Connector



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

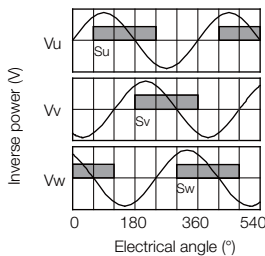
Mating Connector
 Socket connector: 17JE-13090-02 (D8C) A-CG
 Studs: 17L-002C or 17L-002C1

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

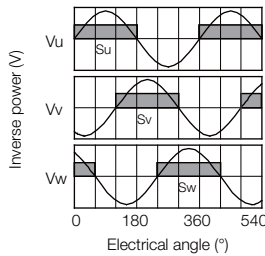
- Polarity Sensor Output Signal

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.

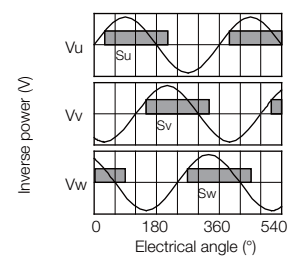
SGLFW2-30D070AS



SGLFW2-30D120AS
 SGLFW2-30D230AS

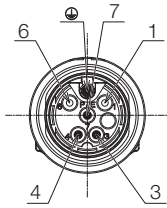


SGLFW2-45D200AS
 SGLFW2-45D380AS




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

- Servomotor Connector



Connector: ST-5EP1N8A9003S (1607706)
 Contacts: ST-10KP030 (1618261)
 From Phoenix Contact

Pin	Signal
1	–
3	Phase U
4	Phase V
6	–
7	Phase W
	FG
Case	Shield

- Thermal Protector Connector



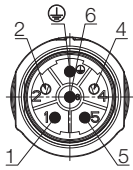
Receptacle housing: 5557-02R
 Terminals: 5556T or 5556TL
 From Molex Japan Co., Ltd.

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

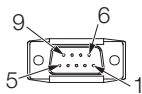
- Servomotor Connector



Connector: SF-5EP1N8A90A2 (1605496)
 Contacts: SF-7MP2000 (1605626)
 From Phoenix Contact

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

- Polarity Sensor and Thermal Protector Connector



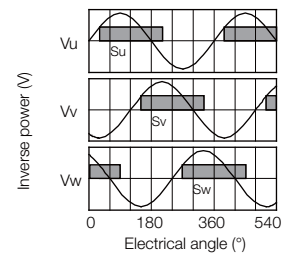
Pin connector: 17JE-23090-02 (D8C) -CG
 From DDK Ltd.

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

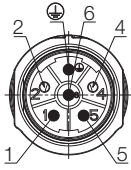
- Polarity Sensor Output Signal

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

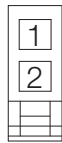
- Servomotor Connector



Connector: SF-5EP1N8A90A2 (1605496)
 Contacts: SF-7MP2000 (1605626)
 From Phoenix Contact

Pin	Signal
1	Phase V
2	-
4	-
5	Phase U
6	Phase W
	FG
Case	Shield

- Thermal Protector Connector



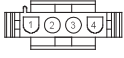
Receptacle housing: 5557-02R
 Terminals: 5556T or 5556TL
 From Molex Japan Co., Ltd.

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

Pin	Signal
1	Thermal protector
2	Thermal protector

◆ SGLFW-35D□□□A□ Moving Coils

- Servomotor Connector

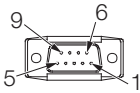


Plug: 350779-1
 Pins: 350218-3 or 350547-3 (No.1 to 3)
 350654-1 or 350669-1 (No. 4)
 From Tyco Electronics Japan G.K.

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



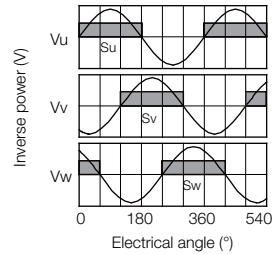
Pin connector: 17JE-23090-02 (D8C)-CG
 From DDK Ltd.

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	
7	Not used
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-35D□□□A□D and -50D□□□B□D Moving Coils

• Servomotor Connector

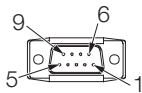


Extension: ARRA06AMRPN182
 Pins: 021.279.1020
 From Interconnectron GmbH

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



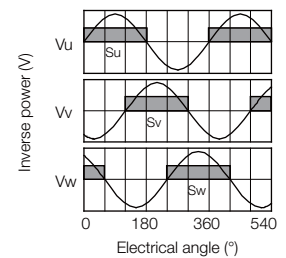
Pin connector: 17JE-23090-02 (D8C)-CG
 From DDK Ltd.

Mating Connector
 Socket connector: 17JE-13090-02 (D8C)A-CG
 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)	-	-

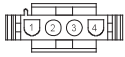
• Polarity Sensor Output Signal

The figure on the right shows the relationship between the S_u , S_v , and S_w polarity sensor output signals and the inverse power of each motor phase V_u , V_v , and V_w when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



◆ SGLFW-50D□□□B□ Moving Coils

- Servomotor Connector

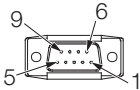


Plug: 350779-1
 Pins: 350218-3 or 350547-3 (No.1 to 3)
 350654-1 or 350669-1 (No. 4)
 From Tyco Electronics Japan G.K.

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



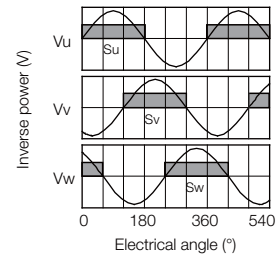
Pin connector: 17JE-23090-02 (D8C)-CG
 From DDK Ltd.

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	
7	Not used
8	
9	Thermal protector

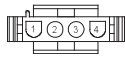
- Polarity Sensor Output Signal

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-1ZD□□□B□ Moving Coils

• Servomotor Connector

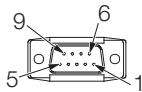


Plug: 350779-1
 Pins: 350218-3 or 350547-3 (No.1 to 3)
 350654-1 or 350669-1 (No. 4)
 From Tyco Electronics Japan G.K.

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



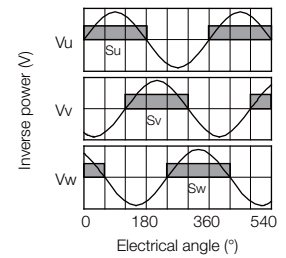
Pin connector: 17JE-23090-02 (D8C)-CG
 From DDK Ltd.

Mating Connector
 Socket connector: 17JE-13090-02 (D8C)A-CG
 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)	-	-

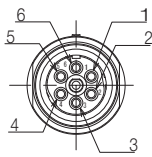
• Polarity Sensor Output Signal

The figure on the right shows the relationship between the S_u , S_v , and S_w polarity sensor output signals and the inverse power of each motor phase V_u , V_v , and V_w when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



◆ SGLFW-1ZD200B□D Moving Coils

- Servomotor Connector

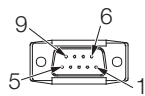


Extension: SROC06JM5CN169
 Pins: 021.423.1020
 From Interconnectron GmbH

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



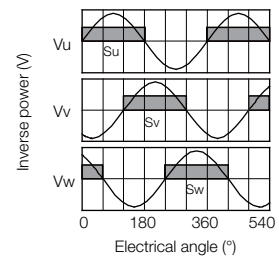
Pin connector: 17JE-23090-02 (D8C)-CG
 From DDK Ltd.

Mating Connector
 Socket connector: 17JE-13090-02 (D8C)A-CG
 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 S_u , S_v , and S_w polarity sensor output signals and the inverse power of each motor phase V_u , V_v , and V_w 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

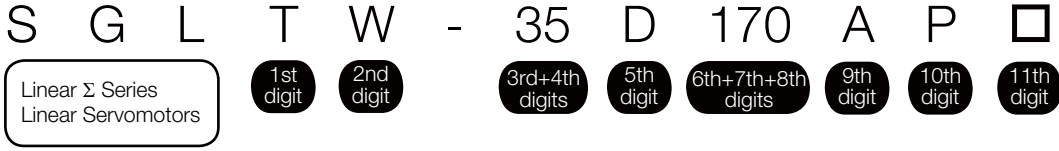
4

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

4.1	Model Designations	4-2
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4.1.2	Magnetic Way	4-2
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4.1 Model Designations

4.1.1 Moving Coil



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
35	36 mm
40	40 mm
50	51 mm
80	76.5 mm

5th digit Power Supply Voltage

Code	Specification
D	400 VAC

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

Code	Specification
170	170 mm
320	315 mm
400	394.2 mm

9th digit

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 and -80
H*	Yes	Water-cooled	
P	Yes	Self-cooled	All models

11th digit Connector for Servomotor Main Circuit Cable

Code	Specification	Applicable Models
None	MS connector	SGLTW-40□□□□B□, -80□□□□B□
D	Connector from Interconnectron GmbH	SGLTW-35D□□□□H□, -50D□□□□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.

4.1.2 Magnetic Way



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-40 and -80

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

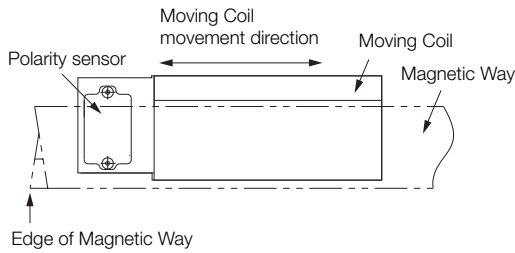
4.1.3 Precautions on Moving Coils with Polarity Sensors



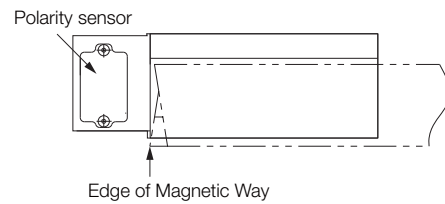
Note

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 of the Moving Coil and the polarity sensor. Refer to the following table.

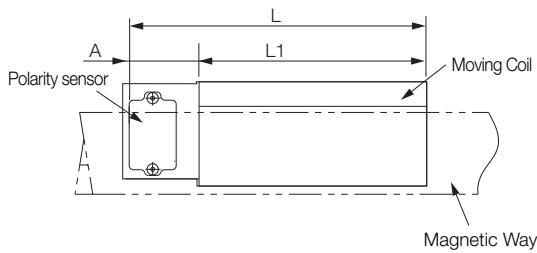
Correct Installation



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]
35D170HP□	170	34	204
35D320HP□	315		349
50D170HP□	170	34	204
50D320HP□	315		349
40D400B□□	394.2	26	420.2
40D600B□□	574.2		600.2
80D400B□□	394.2	26	420.2

4.2 Ratings and Specifications

4.2.1 Specifications

Linear Servomotor Moving Coil Model SGLTW-		Standard Models			High-efficiency Models			
		40D		80D	35D		50D	
		400B	600B	400B	170H	320H	170H	320H
Time Rating		Continuous						
Thermal Class		B						
Insulation Resistance		500 VDC, 10 M Ω min.						
Withstand Voltage		1,800 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	<ul style="list-style-type: none"> • 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)						

4.2.2 Ratings

Linear Servomotor Moving Coil Model SGLTW-		Standard Models			High-efficiency Models			
		40D		80D	35D		50D	
		400B	600B	400B	170H	320H	170H	320H
Rated Motor Speed (Reference Speed during Speed Control)* ¹		1.5	1.5	1.5	1.5	1.5	1.5	1.5
Maximum Speed* ¹	m/s	3.1	3.1	3.1	5.0	5.0	4.0	4.0
Rated Force* ^{1, *2}	N	670	1000	1300	300	600	450	900
Maximum Force* ¹	N	2600	4000	5000	600	1200	900	1800
Rated Current* ¹	Arms	3.7	5.5	7.2	3.2	6.5	3.2	6.3
Maximum Current* ¹	Arms	20.7	30.6	37.6	7.7	15.5	7.4	14.8
Moving Coil Mass	kg	15	22	24	4.7	8.8	6.0	11
Force Constant	N/Arms	196	196	194	99.6	99.6	153	153
BEMF Constant	Vrms/(m/s)/ phase	65.4	65.4	64.8	33.2	33.2	51.1	51.1
Motor Constant	N/ \sqrt{W}	59.6	73.0	85.9	36.3	51.4	48.9	69.1
Electrical Time Constant	ms	14	14	15	14	14	16	16
Mechanical Time Constant	ms	4.2	4.2	3.3	3.6	3.3	2.5	2.4
Thermal Resistance (with Heat Sink)	K/W	0.24	0.20	0.22	0.76	0.40	0.61	0.30
Thermal Resistance (without Heat Sink)	K/W	0.57	0.40	0.47	1.26	0.83	0.97	0.80
Magnetic Attraction* ³	N	0	0	0	0	0	0	0
Magnetic Attraction on One Side* ⁴	N	3950	5890	7650	1400	2780	2000	3980
Combined Magnetic Way, SGLTM-		40□□□A□		80□□□A□	35□□□H□		50□□□H□	
Combined Serial Converter Unit, JZDP-□□□□-		197	198	199	193	194	195	196
Applicable SERVOPACKs	SGD7S-	120D	170D	170D	3R5D	8R4D	3R5D	8R4D
	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 a surrounding air temperature of 40°C with an aluminum heat sink of the following dimensions.

• Heat Sink Dimensions

• 400 × 500 × 40 mm: SGLTW-35D170H, -35D320H, and -50D170H

• 609 mm × 762 mm × 50 mm: SGLTW-40D400B, -40D600B, -50D320H, and -80D400B

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

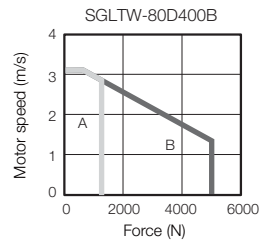
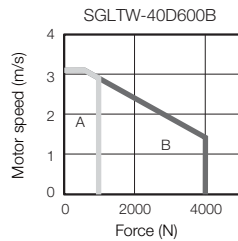
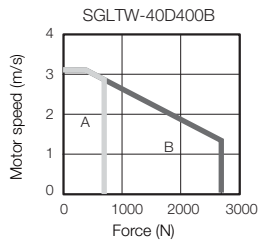
*4. The value that is given is the magnetic attraction that is generated on one side of the Magnetic Way.

4.2.3 Force-Motor Speed Characteristics

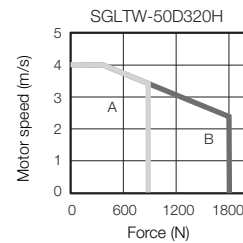
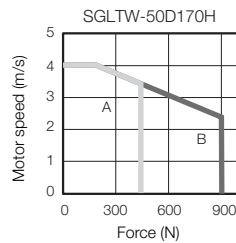
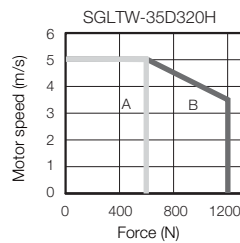
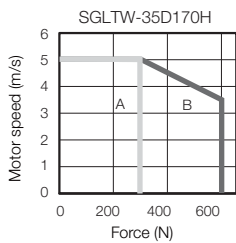
A : Continuous duty zone

B : Intermittent duty zone

◆ Standard Models



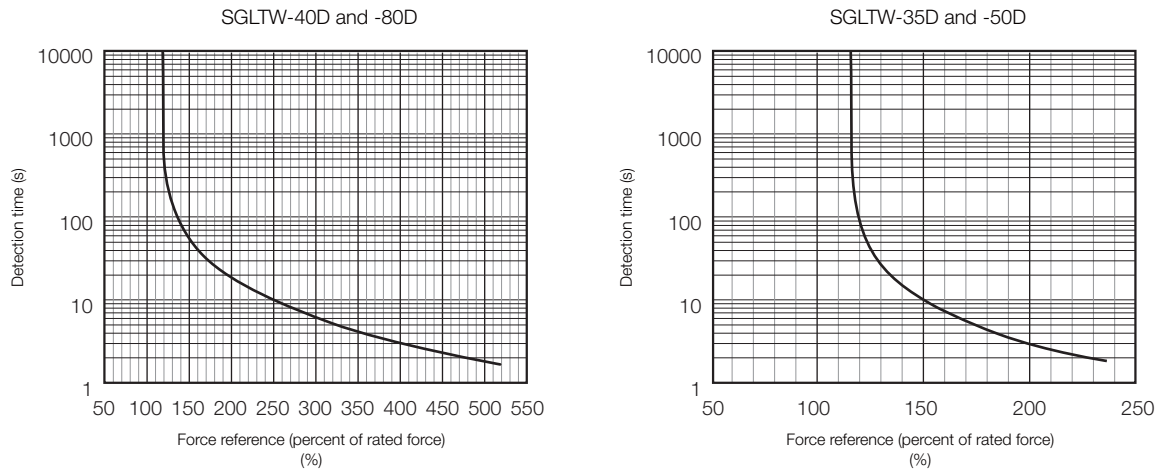
◆ High-efficiency Models



- 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. The Serial Converter Unit must be replaced to use a three-phase, 200-V input. Contact the Yaskawa technical department for details.
4. If the effective force is within the allowable range for the rated force, the Servomotor can be used within the intermittent duty zone.
5. 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.

4.2.4 Servomotor Overload Protection Characteristics

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



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 4.2.3 *Force-Motor Speed Characteristics* on page 4-6.

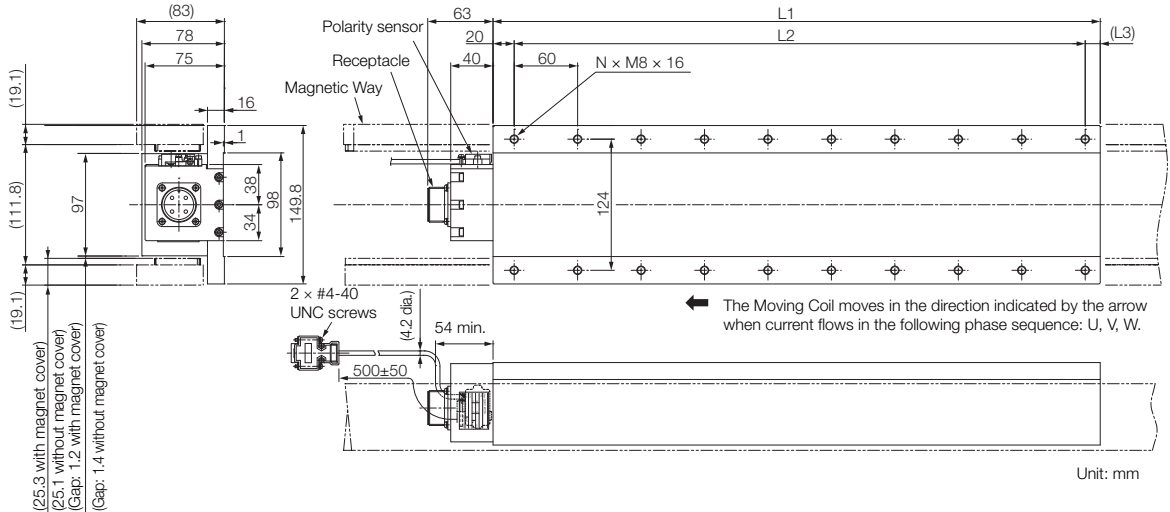
4.3 External Dimensions

4.3.1 SGLTW-40: Standard Models

4.3 External Dimensions

4.3.1 SGLTW-40: Standard Models

◆ Moving Coils: SGLTW-40D□□□B□

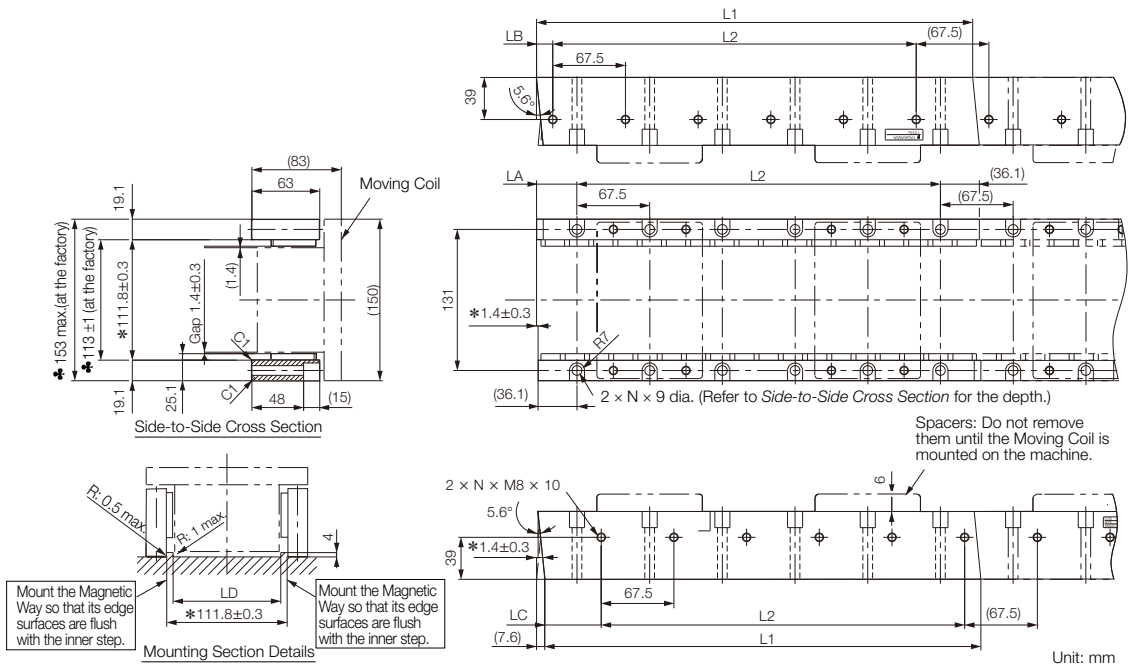


Moving Coil Model SGLTW-	L1	L2	(L3)	N	Approx. Mass [kg]
40D400B□	394.2	360 (60 × 6)	(15)	14	15
40D600B□	574.2	540 (60 × 9)	(15)	20	22

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

◆ SGLTW-40D□□□B□ and -80D□□□B□ Moving Coils on page 4-18

◆ Magnetic Ways: SGLTM-40□□□□□



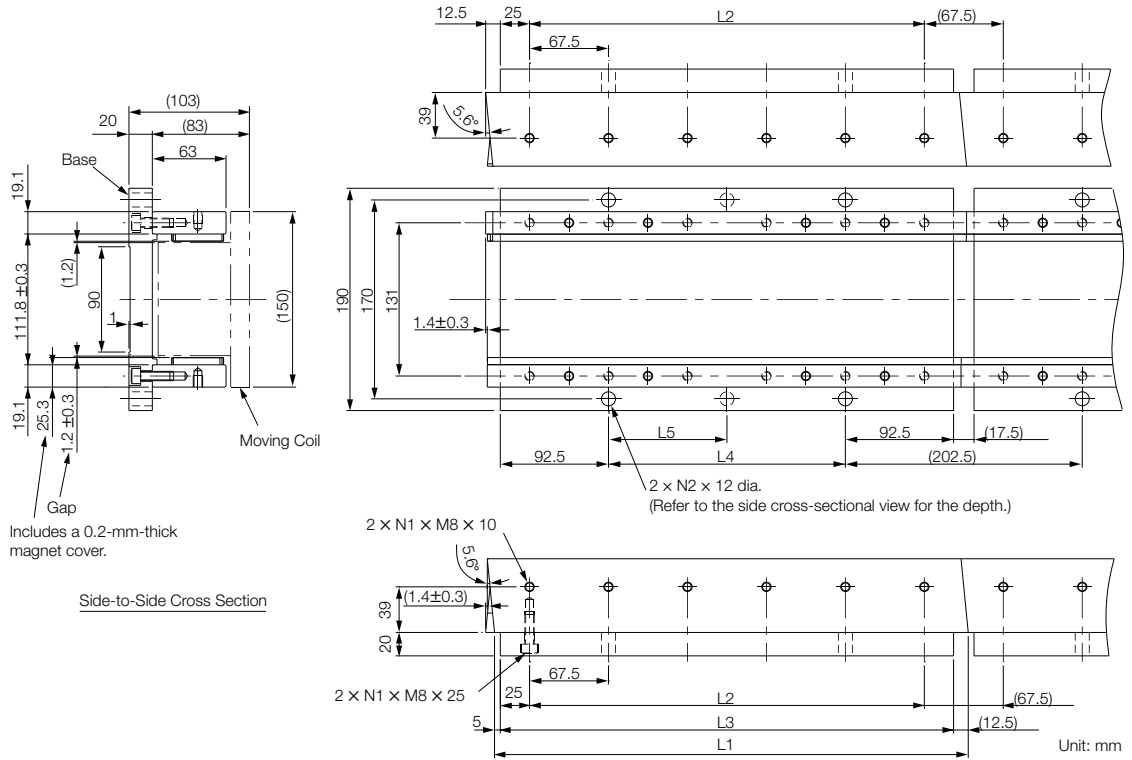
- Note: 1. Two Magnetic Way tracks are used together as a set. For safety, when they are shipped, the two tracks are secured to a mounting spacer made from aluminum.
2. More than one Magnetic Way can be connected.
3. Dimensions with asterisks are the distances between the Magnetic Way tracks. Install 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

4.3 External Dimensions

4.3.1 SGLTW-40: Standard Models

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

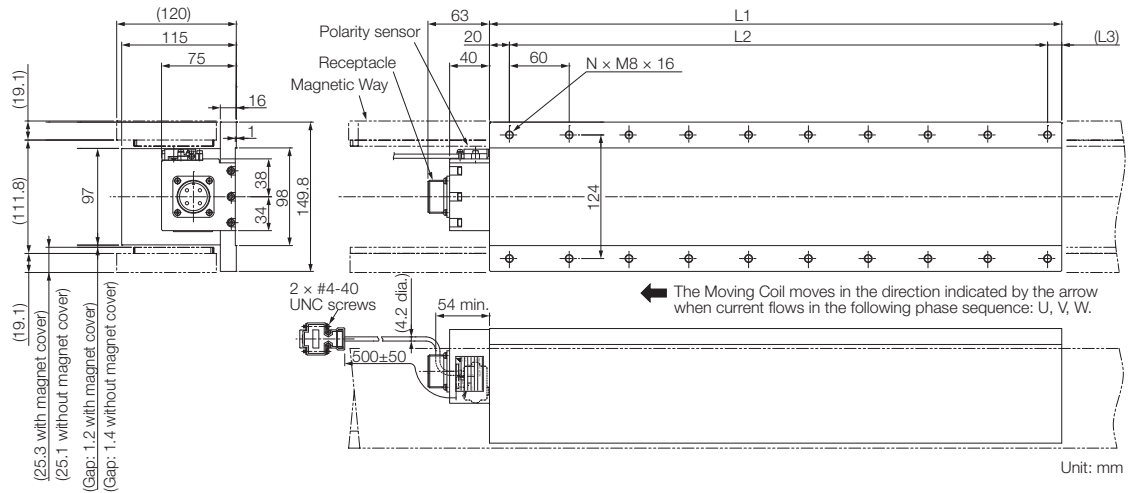


Note: Two Magnetic Way tracks are used together as a set. More than one Magnetic Way can be connected.

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

4.3.2 SGLTW-80: Standard Models

◆ Moving Coils: SGLTW-80D□□□B□



Moving Coil Model SGLTW-	L1	L2	L3	N	Approx. Mass [kg]
80D400B□	394.2	360 (60 × 6)	(15)	14	24

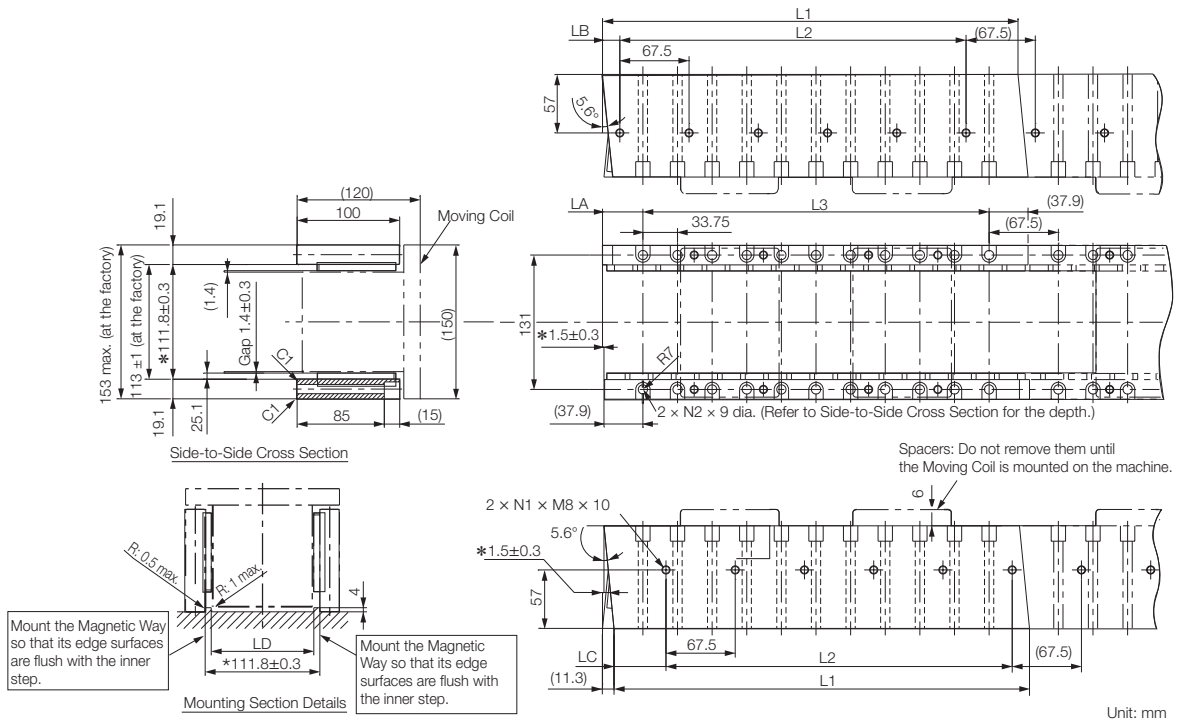
Refer to the following section for the connector specifications for the Sensor Cable and Servomotor Main Circuit Cable.

◆ SGLTW-40D□□□B□ and -80D□□□B□ Moving Coils on page 4-18

4.3 External Dimensions

4.3.2 SGLTW-80: Standard Models

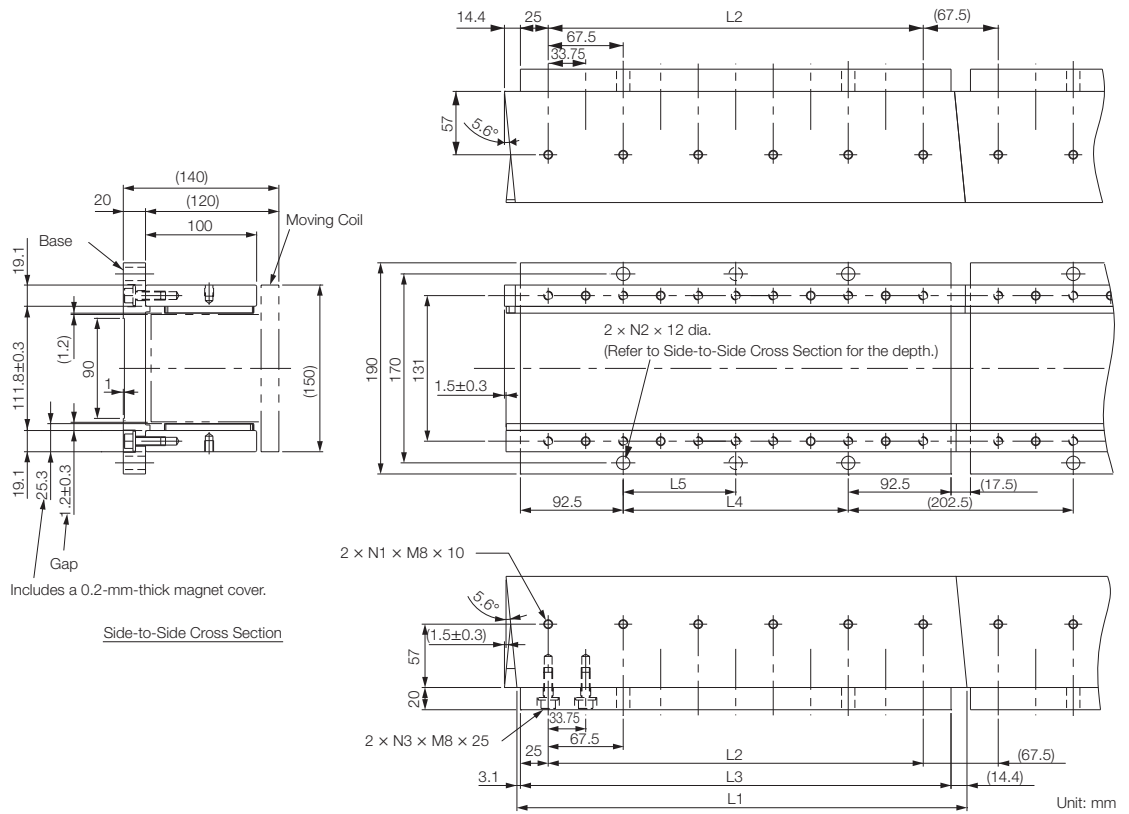
◆ Magnetic Ways: SGLTM-80□□□A□



- 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	L3	LA	LB	LC	LD	N1	N2	Approx. Mass [kg]
80405A□	405 ^{-0.1} _{-0.3}	337.5 (67.5 × 5)	337.5 (33.75 × 10)	39.4 ⁰ _{-0.2}	16.9 ⁰ _{-0.2}	50.6 ⁰ _{-0.2}	100 ^{+0.6} ₀	6	11	14
80675A□	675 ^{-0.1} _{-0.3}	607.5 (67.5 × 9)	607.5 (33.75 × 18)	39.4 ⁰ _{-0.2}	16.9 ⁰ _{-0.2}	50.6 ⁰ _{-0.2}	100 ^{+0.6} ₀	10	19	24
80945A□	945 ^{-0.1} _{-0.3}	877.5 (67.5 × 13)	877.5 (33.75 × 26)	39.4 ⁰ _{-0.2}	16.9 ⁰ _{-0.2}	50.6 ⁰ _{-0.2}	100 ^{+0.6} ₀	14	27	34

◆ Magnetic Ways with Bases: SGLTM-80□□□AY

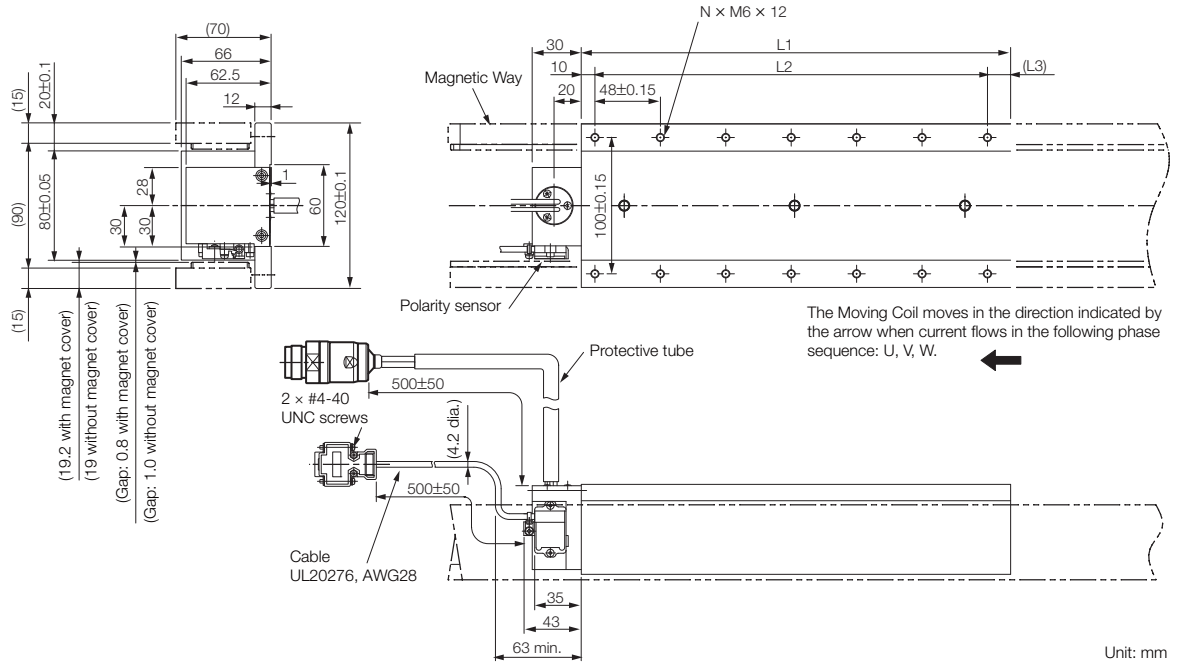


Note: Two Magnetic Way tracks are used together as a set. More than one Magnetic Way can be connected.

Magnetic Way Model SGLTM-	L1	L2	L3	L4	L5	N1	N2	N3	Approx. Mass [kg]
80405AY	405 ^{-0.1} _{-0.3}	337.5	387.5	202.5	202.5	6	2	11	18
80675AY	675 ^{-0.1} _{-0.3}	607.5	657.5	472.5	236.25	10	3	19	31
80945AY	945 ^{-0.1} _{-0.3}	877.5	927.5	742.5	247.5	14	4	27	43

4.3.3 SGLTW-35: High-efficiency Models

◆ Moving Coils: SGLTW-35D□□□H□D

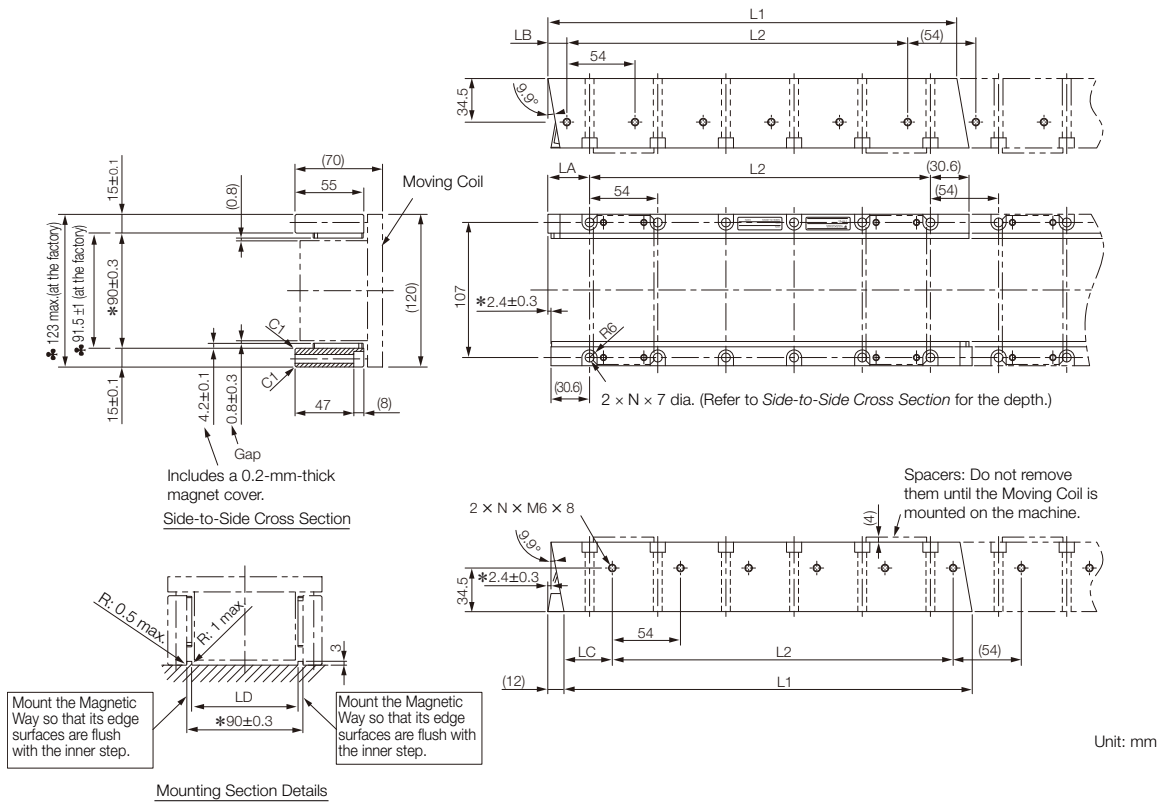


Moving Coil Model SGLTW-	L1	L2	(L3)	N	Approx. Mass [kg]
35D170H□D	170	144 (48 × 3)	(16)	8	4.7
35D320H□D	315	288 (48 × 6)	(17)	14	8.8

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

◆ SGLTW-35D□□□H□D and -50D□□□H□D Moving Coils on page 4-19

◆ Magnetic Ways: SGLTM-35□□□□H□

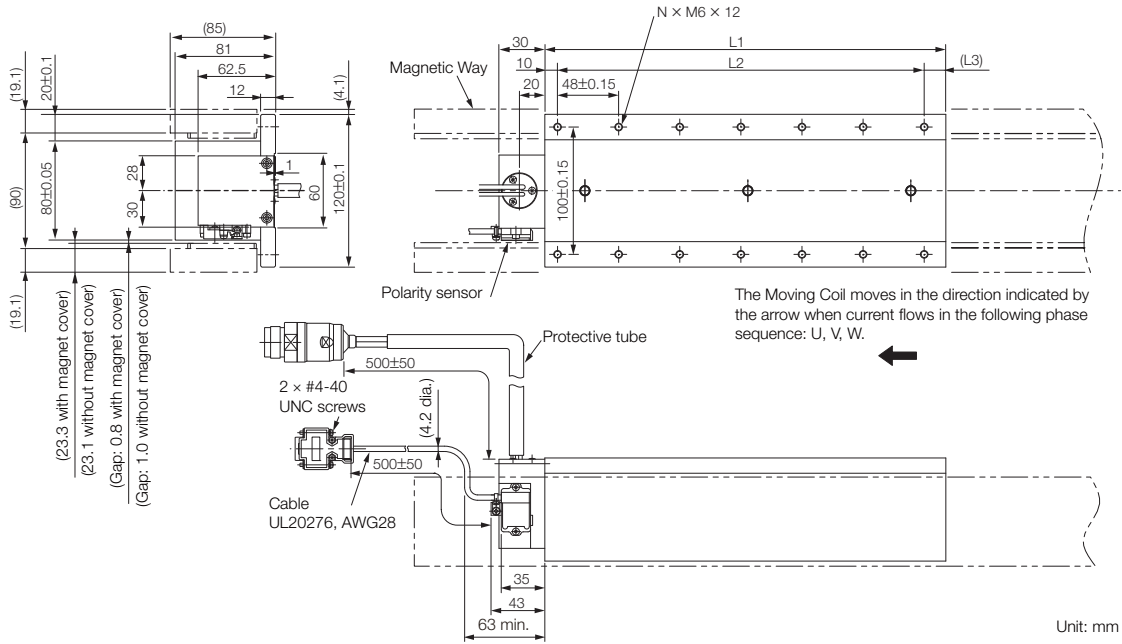


- Note: 1. Two Magnetic Way tracks are used together as a set. For safety, when they are shipped, the two tracks are secured to a mounting spacer made from aluminum.
2. More than one Magnetic Way can be connected.
3. Dimensions with asterisks are the distances between the Magnetic Way tracks. Install 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

4.3.4 SGLTW-50: High-efficiency Models

◆ Moving Coils: SGLTW-50D□□□H□D



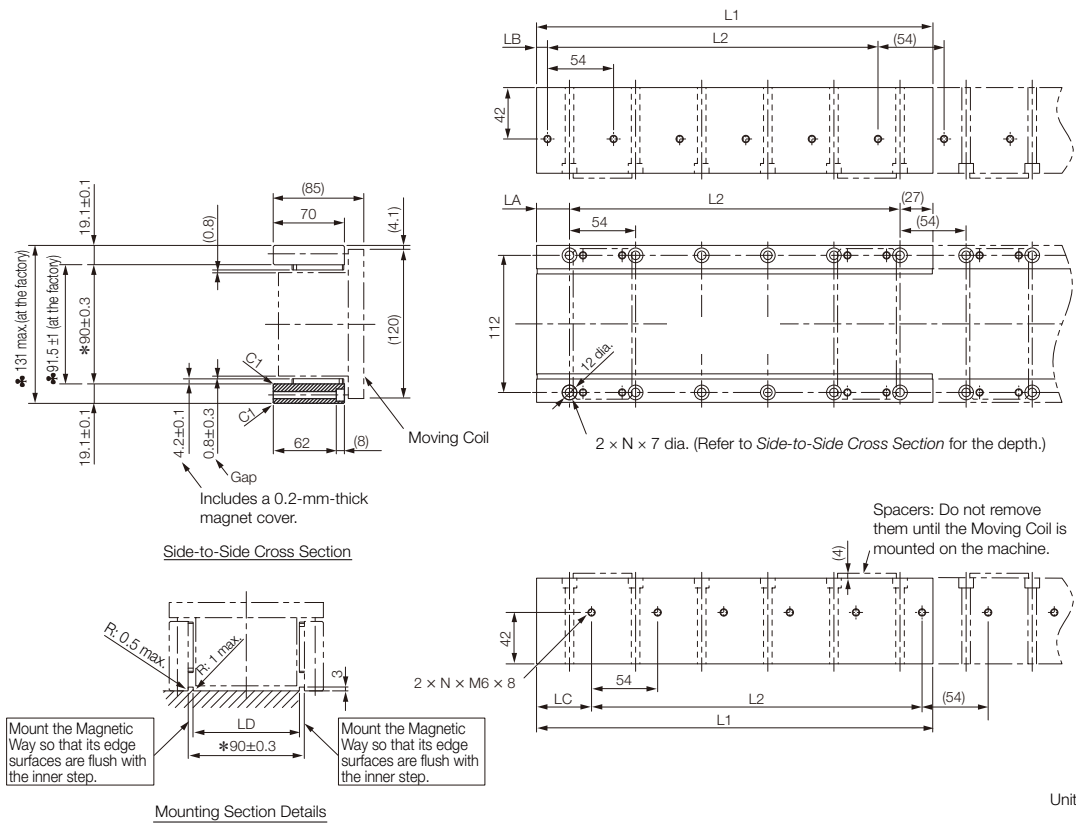
Unit: mm

Moving Coil Model SGLTW-	L1	L2	(L3)	N	Approx. Mass [kg]
50D170H□D	170	144 (48 × 3)	(16)	8	6
50D320H□D	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-35D□□□H□D and -50D□□□H□D Moving Coils on page 4-19

◆ Magnetic Ways: SGLTM-50□□□□H□



Unit: mm

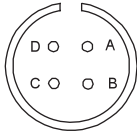
- Note: 1. Two Magnetic Way tracks are used together as a set. For safety, when they are shipped, the two tracks are secured to a mounting spacer made from aluminum.
 2. More than one Magnetic Way can be connected.
 3. Dimensions with asterisks are the distances between the Magnetic Way tracks. Install 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]
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

4.3.5 Connector Specifications

◆ SGLTW-40D□□□B□ and -80D□□□B□ Moving Coils

- Servomotor Connector

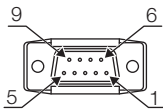


Receptacle: MS3102A-22-22P
From DDK Ltd.

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



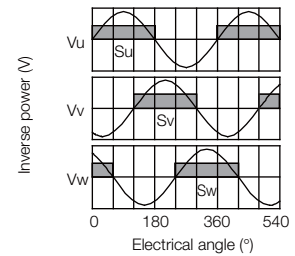
Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.

Mating Connector
Socket connector: 17JE-13090-02 (D8C)A-CG
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)	-	-

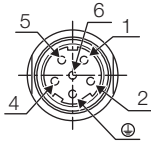
- Polarity Sensor Output Signal

The figure on the right shows the relationship between the S_u , S_v , and S_w polarity sensor output signals and the inverse power of each motor phase V_u , V_v , and V_w when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



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

- Servomotor Connector

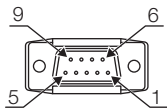


Extension: ARRA06AMRPN182
 Pins: 021.279.1020
 From Interconnectron GmbH

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 Cable



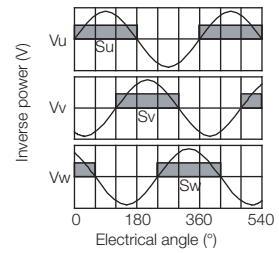
Pin Connector:
 17JE-23090-02 (D8C) -CG
 From DDK Ltd.

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

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

- Polarity Sensor Output Signals

The figure on the right shows the relationship between the S_u , S_v , and S_w polarity sensor output signals and the inverse power of each motor phase V_u , V_v , and V_w when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



Equipment Design Precautions

5

This chapter provides precautions for equipment design.

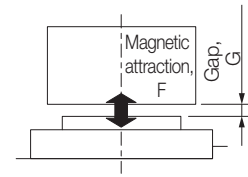
5.1	Influence of Magnetic Attraction	5-2
5.1.1	SGLF Servomotors	5-2
5.1.2	SGLT Servomotors	5-3
5.2	Influence of Magnetic Way Leakage Flux . .	5-4
5.2.1	SGLF Servomotors	5-4
5.2.2	SGLT Servomotors	5-4
5.3	Special Precautions for SGLT Servomotors . .	5-5
5.4	Specifications When Connecting More Than One Moving Coil . .	5-6
5.4.1	Mounting Position Precautions	5-6
5.4.2	Connection Procedure	5-7

5.1 Influence of Magnetic Attraction

5.1.1 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-	35D120	0.7 (0.5) ^{*3}	1100
	35D230		2100
	50D200		2100
	50D380		4100
	1ZD200		4200
	1ZD380		6520
SGLFW2-	30D070	(0.5) ^{*3}	240
	30D120		750
	30D230		1490
	45D200		2390
	45D380		4770
	90D200		4770
	90D380		9550
SGLFW2-	90D560	(0.5) ^{*3}	14300
	1DD380		14300



*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. SGLFW2 Magnetic Coils are not available without a magnet cover.

5.1.2 SGLT Servomotors

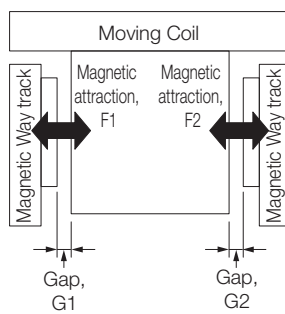
The Magnetic Way tracks are located on both sides of the Moving Coil. If the gaps on both sides of the Moving Coil are the same, the magnetic attraction is canceled. However, it is difficult to obtain the same gaps due to Servomotor precision, the precision of the user's equipment, error when assembling 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)
35D170	1.3	0.7	1330	1800	470
35D320	(1.1) ^{*3}	(0.5) ^{*3}	2650	3570	920
40D400	1.7	1.1	4700	5900	1200
40D600	(1.5) ^{*3}	(0.9) ^{*3}	7000	8700	1700
50D170	1.3	0.7	1900	2600	700
50D320	(1.1) ^{*3}	(0.5) ^{*3}	3750	5100	1350
80D400	1.7	1.1	9200	11400	2200
	(1.5) ^{*3}	(0.9) ^{*3}			

*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.

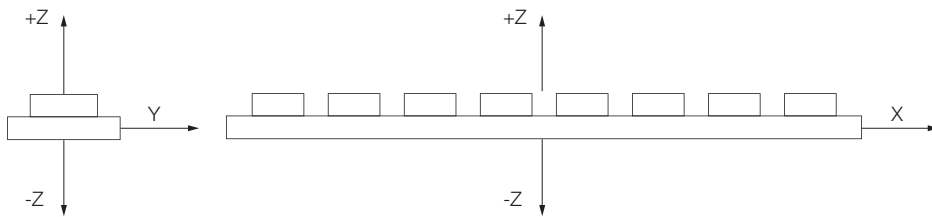


5.2 Influence of Magnetic Way Leakage Flux

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.

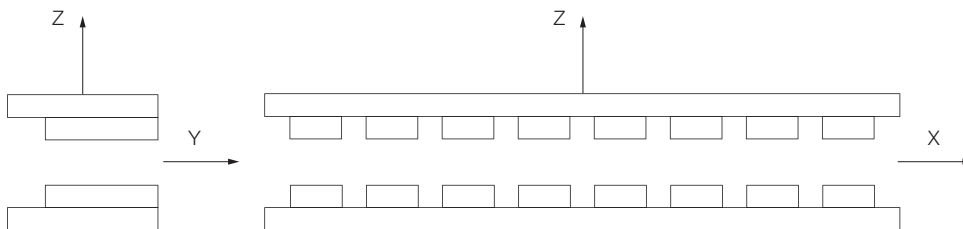
5.2.1 SGLF Servomotors

Magnetic Way Model	Location of 10-Gauss Leakage Flux			
	X (mm)	Y (mm)	+Z (mm)	-Z (mm)
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



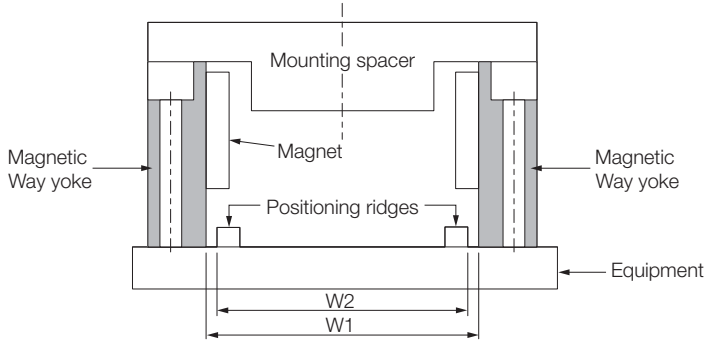
5.2.2 SGLT Servomotors

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



5.3 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)
40	113 ± 1	111.8 ± 0.15
80		
35	91.5 ± 1	90 ± 0.15
50		

5.4 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.



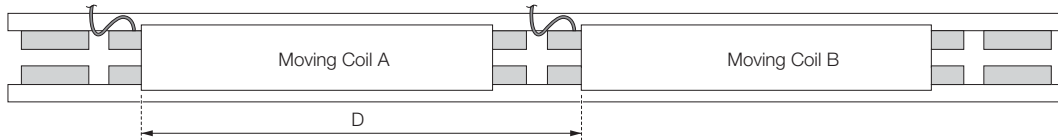
The specifications for the Main Circuit Cable and Serial Converter Unit are different from the standard specifications. Contact your Yaskawa representative for details.

Note

5.4.1 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			
SGLFW-	50D	380B	1200	2400	120D	$450 + 45 \times n^{*2}$
	1ZD	380B	2400	4800	210D	$450 + 45 \times n^{*2}$
SGLFW2-	90D	380A	3360	6720	260D	$459 + 51 \times n^{*2}$
		560A	5040	10080	370D	$663 + 51 \times n^{*2}$
	1DD	380A	5040	10080	370D	$459 + 51 \times n^{*2}$
SGLTW-	40D	400B	2600	5200	170D	$495 + 45 \times n^{*2}$
		600B	4000	8000	260D	$675 + 45 \times n^{*2}$
	80D	400B	5000	10000	370D	$495 + 45 \times n^{*2}$

*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. $n = 0, 1, 2, 3, \text{etc.}$ (integer)

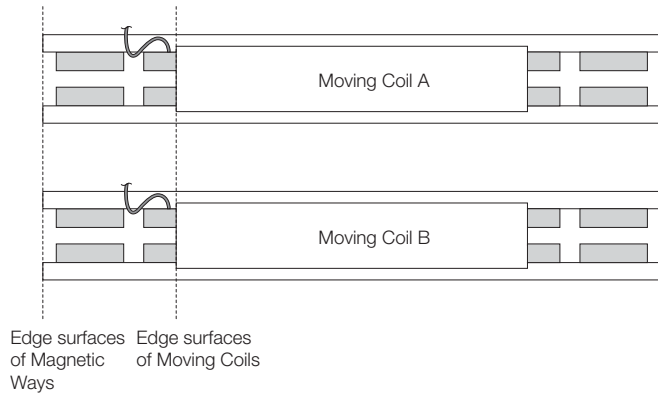
Note: 1. The entries in parentheses are the values and model numbers for combining with High-Force Magnetic Ways.

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.



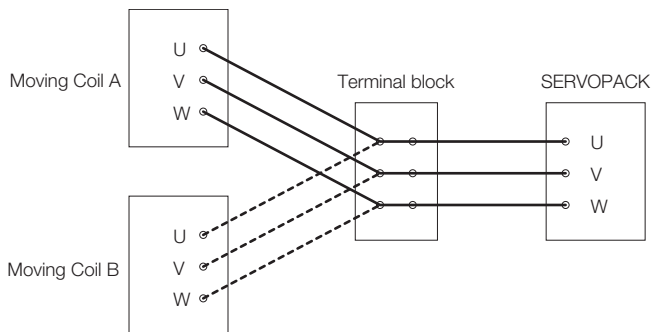
5.4.2 Connection Procedure



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

6

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

6.1	Installation Conditions	6-2
6.1.1	Installation Environment	6-2
6.1.2	Installation Orientation	6-2
6.2	Installation Procedure	6-3
6.2.1	SGLF Servomotors (Models with F-type Iron Cores)	6-3
6.2.2	SGLT Servomotors (Models with T-type Iron Cores)	6-7
6.3	Servomotor Temperature Increase	6-13

6.1 Installation Conditions

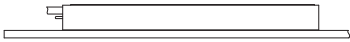
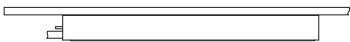

The service life of a Servomotor will be shortened or unexpected problems will occur if the Servomotor is installed incorrectly or in an inappropriate location. Always observe the following installation instructions.

6.1.1 Installation Environment

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

6.1.2 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)		<ul style="list-style-type: none"> • 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.

6.2 Installation Procedure

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

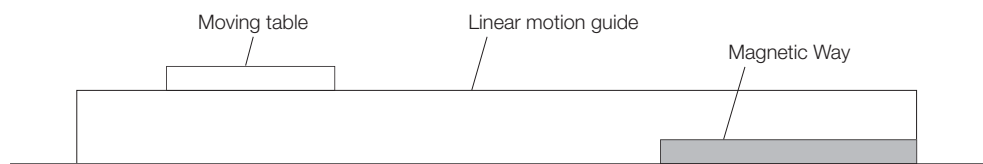
Outline

1. Mount one Magnetic Way.

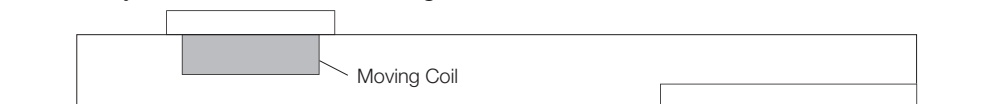


Important

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.

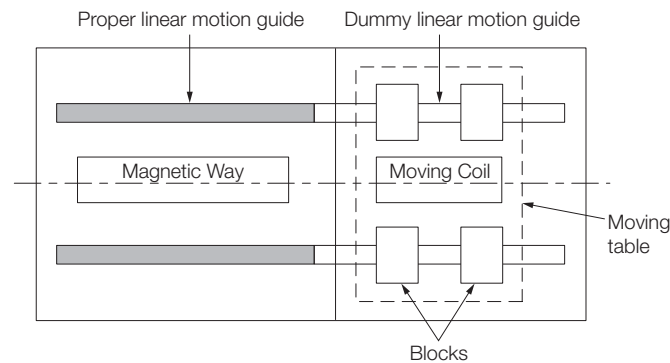


2. Separate the moving table that is supported by the linear motion guides from the Magnetic Way and attach the Moving Coil to it.

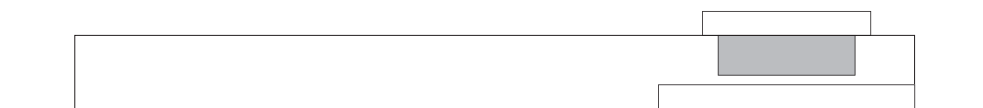


Important

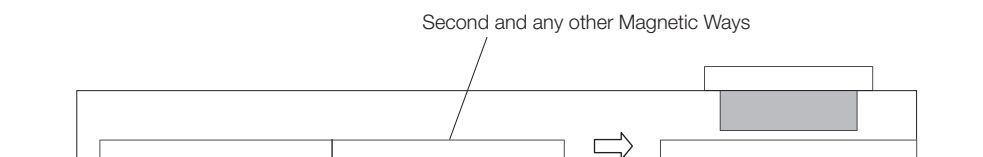
If you will use only one Magnetic Way, the linear motion guide may not be sufficiently long enough to install the Moving Coil at a location separated from the Magnetic Way. Install a dummy linear motion guide and use it to mount the Moving Coil.



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




4. Attach the second and any other Magnetic Ways.



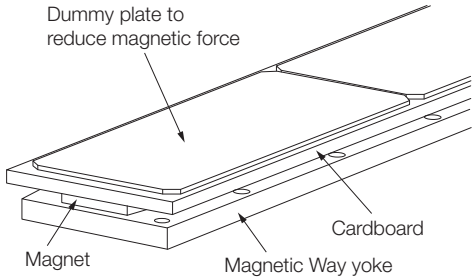
This concludes the procedure.

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.

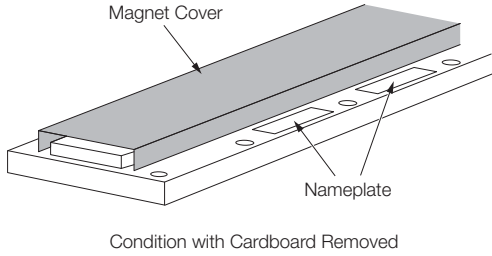


Dummy plate to reduce magnetic force

Magnet

Magnetic Way yoke

Cardboard




Magnet Cover

Nameplate

Condition with Cardboard Removed

Use the following procedure.

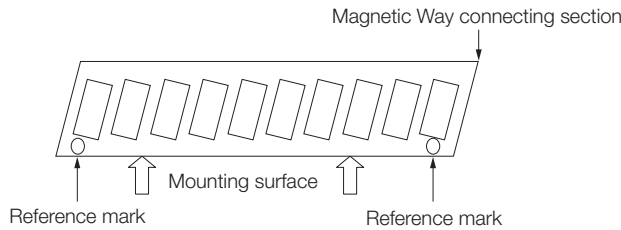


Note

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.

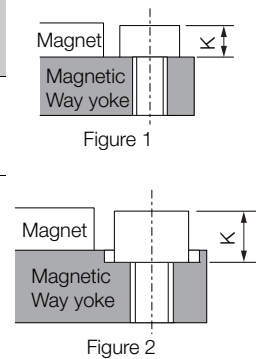
1. Remove the dummy plates to reduce magnetic force and the cardboard from the surface of the Magnetic Way.
2. Face the reference marks on the Magnetic Way (depressions of approx. 4 mm in diameter) toward the equipment and set down the Magnetic Way.

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-35	M4	360 to 500	4.2 max.	Figure 1
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.	



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

This concludes the procedure.

Mounting the Moving Coil

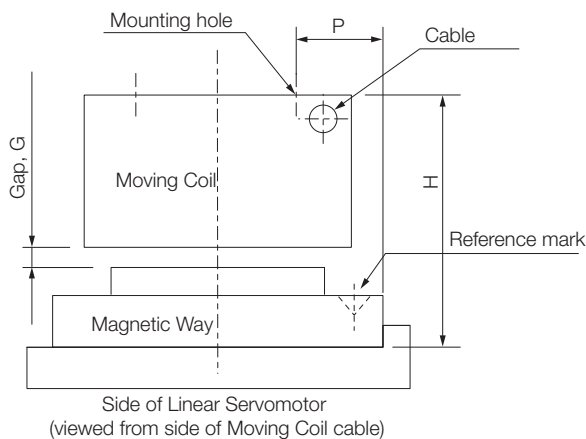


An SGLF Moving Coil consists of an iron core and a winding section that is protected by plastic. Do not subject them to shock. Doing so may result in injury or equipment damage.

Note

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-	35	45 ± 0.1	21 ± 0.2	1 $(0.8)^*$
	50	58 ± 0.1	25.8 ± 0.2	
	1Z		27 ± 0.2	
SGLFW2-	30D070	40 ± 0.1	27.5 ± 0.2	$(0.8)^*$
	30D120		20 ± 0.2	
	30D230	50 ± 0.1	26 ± 0.2	
	45		30 ± 0.2	
	90		42.5 ± 0.2	
	1D			

*Dimensions in parentheses are for when the magnet cover is attached. SGLFW2 Magnetic Coils are not available without a magnet cover.

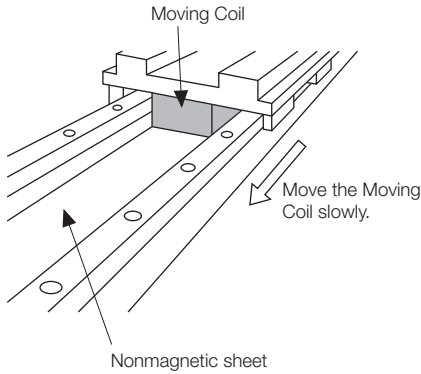
3. Place a thin nonmagnetic sheet in the gap between the Moving Coil and Magnetic Way. The sheet must be approximately 0.5 mm thick, and we recommend using a plastic sheet.

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.



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.

Important



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 $1 \pm 0.3 \text{ mm}^*$ at all locations. (We recommend a brass or stainless steel gauge.)

*If the magnet cover is in place, the gaps should be $0.8 \pm 0.3 \text{ mm}$

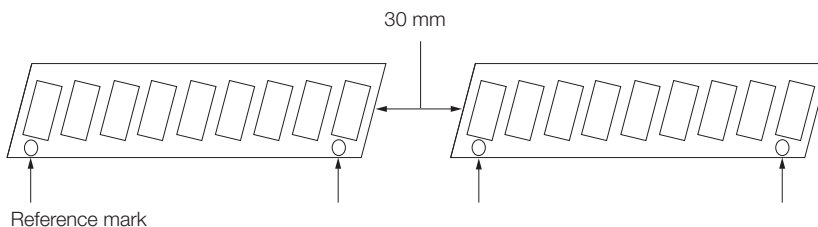
This concludes the procedure.

Mounting the Second and Any Other Magnetic Ways

Use the following procedure.

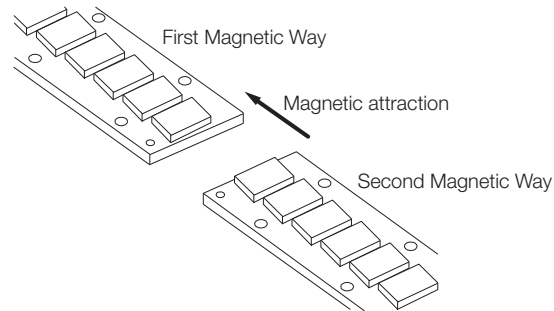
1. Place the second Magnetic Way in line with and at least 30 mm away from the first Magnetic Way.

Note: Face the Magnetic Ways in same orientation using the locations of the reference marks (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.

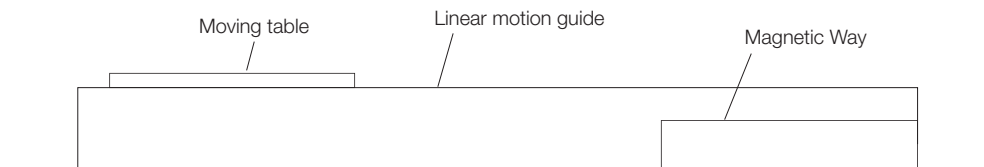
6.2.2 SGLT Servomotors (Models with T-type Iron Cores)

Outline

1. Mount one Magnetic Way.

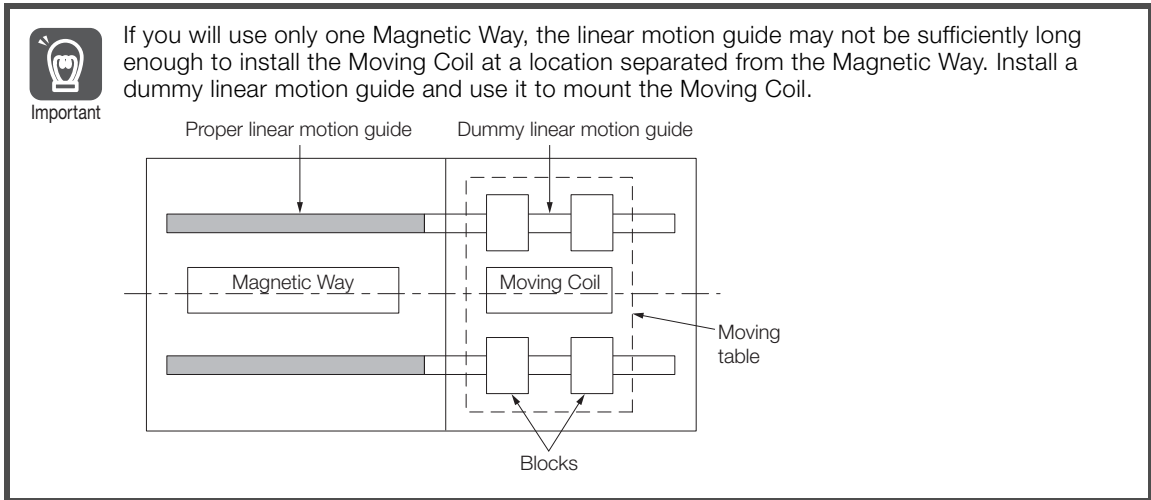


To install the Moving Coil, you need a Magnetic Way that is longer than the Moving Coil. If one Magnetic Way is shorter than the Moving Coil, install two Magnetic Ways first and then install the Moving Coil.



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

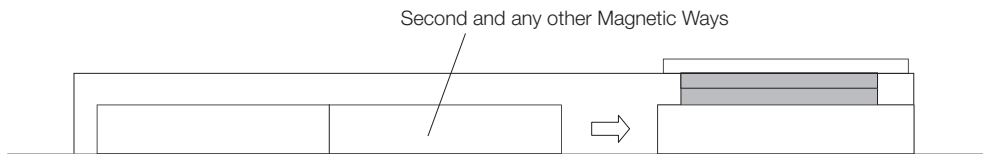




3. Place the Moving Coil on top of the Magnetic Way.



4. Attach the second and any other Magnetic Ways.



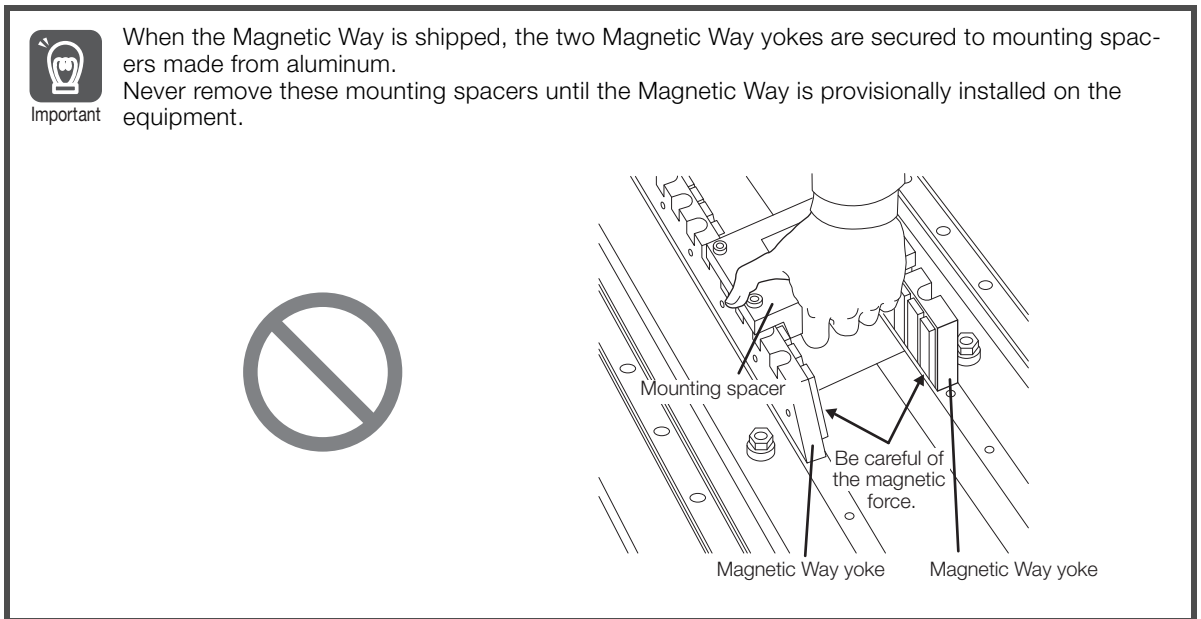
Mounting the First Magnetic Way

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.

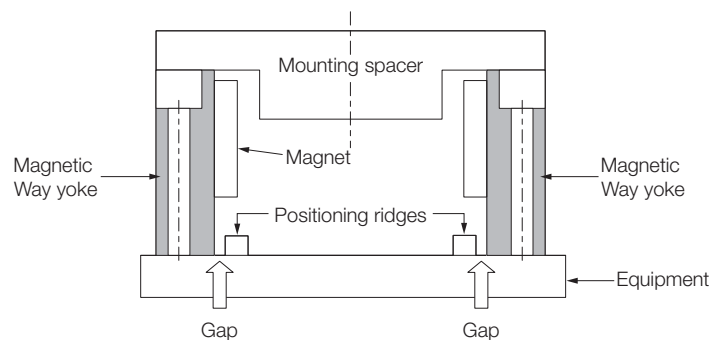
◆ SGLTM-□□□□□A and SGLTM-□□□□□AC



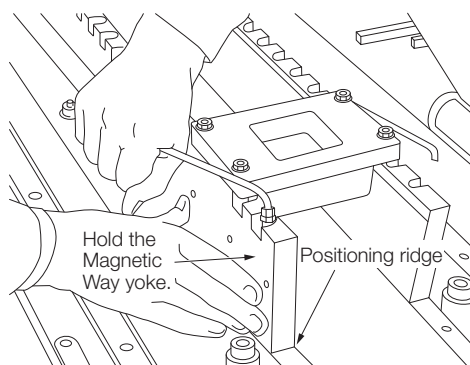
Use the following procedure.

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)
35	M6	1,220 to 1,710
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

- Remove the bolts from mounting spacers on the side of the Magnetic Way yoke that you mounted.
- 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.
- 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.

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

This concludes the procedure.

Mounting the Moving Coil

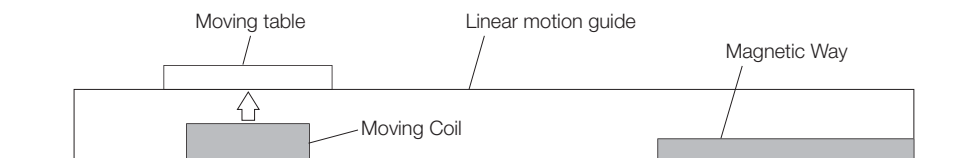


Note

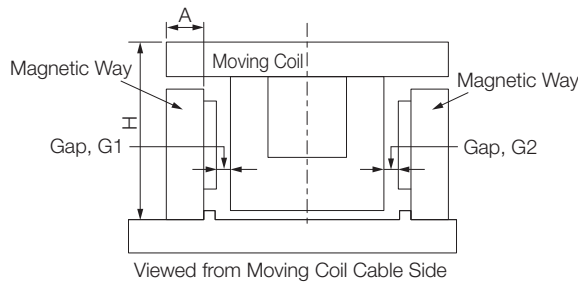
An SGLT Moving Coil consists of an aluminum or steel base, iron core, and a winding section that is protected by plastic. Do not subject them to shock. Doing so may result in injury or equipment damage.

Use the following procedure.

- 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.



- 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
35	70 ± 0.3	15 ± 0.1	1 ± 0.3
50	85 ± 0.3	19.1 ± 0.1	$(0.8 \pm 0.3)^*$
40	83 ± 0.3	19.1 ± 0.1	1.4 ± 0.3 $(1.2)^*$
80	120 ± 0.3		

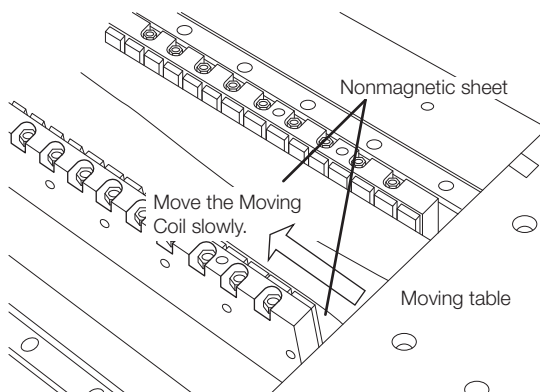
*Dimensions in parentheses are for when the magnet cover is attached.

- 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.
- 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.



- 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
- Remove the thin nonmagnetic sheet.
- 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

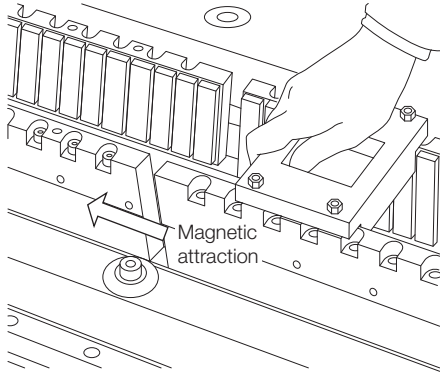
This concludes the procedure.

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.

6.3 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.



Important

Do not place packing or any other insulating material between the Servomotor and heat sink. Doing so will cause the motor temperature to increase, affect resistance to noise, and may cause motor failure.

Connecting Linear Encoders

7

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

7.1 Installation Conditions for Linear Encoders . . 7-2

- 7.1.1 SGLF Servomotors 7-2
- 7.1.2 SGLT Servomotors 7-3

7.2 Mounting Linear Encoders 7-4

- 7.2.1 Linear Encoders from Heidenhain Corporation . . 7-4
- 7.2.2 Linear Encoders from Renishaw PLC 7-4
- 7.2.3 Absolute Linear Encoders from Mitutoyo Corporation 7-5
- 7.2.4 Linear Encoders from Magnescale Co., Ltd. . . . 7-5

7.3 Adjusting Linear Encoders 7-6


7.1 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.



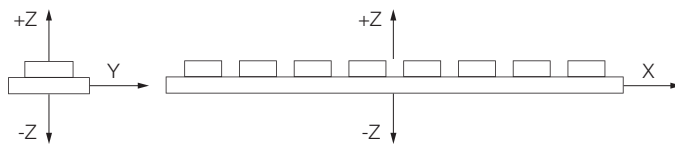
Note If the linear encoder mounting materials or the Magnetic Way mounting materials are magnetic materials, the magnetic field strength may exceed the specified values even for the following installation conditions. Implement the following measures.

- 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.

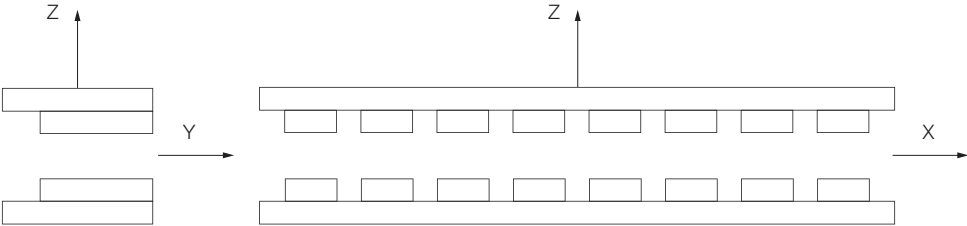
7.1.1 SGLF Servomotors

Magnetic Way Model	Distance from Magnetic Way				
	X (mm)	Y (mm)	+Z (mm)	-Z (mm)	
SGLFM-	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
SGLFM2-	1D	175	90	200	10



7.1.2 SGLT Servomotors


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



7.2 Mounting Linear Encoders

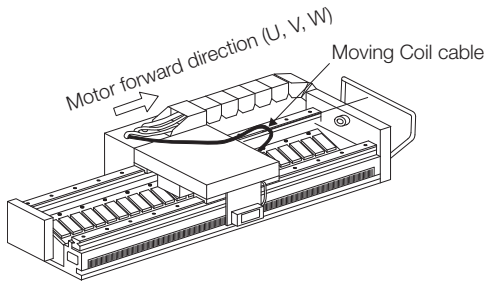
Attach the linear encoder so that the forward direction of the Servomotor is the count-up direction of the linear encoder.

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).

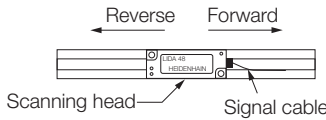


Important If the forward direction of the Servomotor and the count-up direction of the linear motor do not agree, the Servomotor may not operate or it may run out of control.

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.)

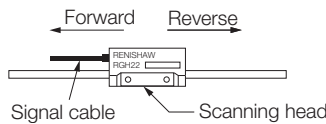


7.2.1 Linear Encoders from Heidenhain Corporation



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.

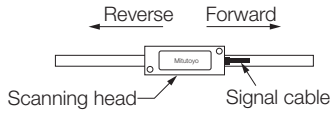
7.2.2 Linear Encoders from Renishaw PLC



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.

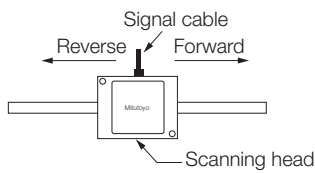
7.2.3 Absolute Linear Encoders from Mitutoyo Corporation

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.

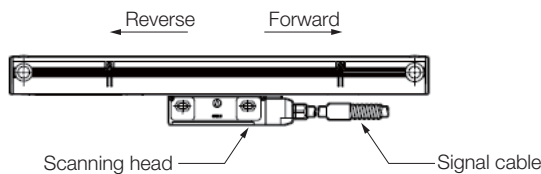
ST782A□ and ST784A□



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.

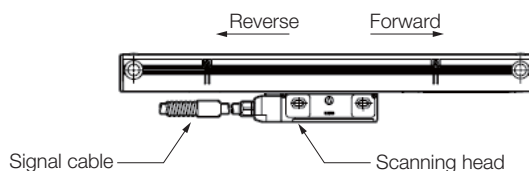
7.2.4 Linear Encoders from Magnescale Co., Ltd.

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



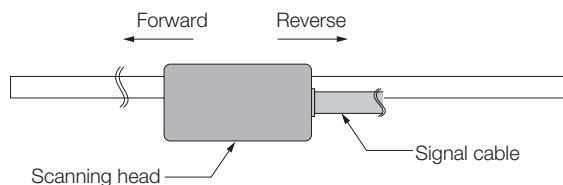
If the linear encoder is installed as shown in the diagram on the left, the count is incremented when the scanning head moves to the right.

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.

7.3 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

8

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.

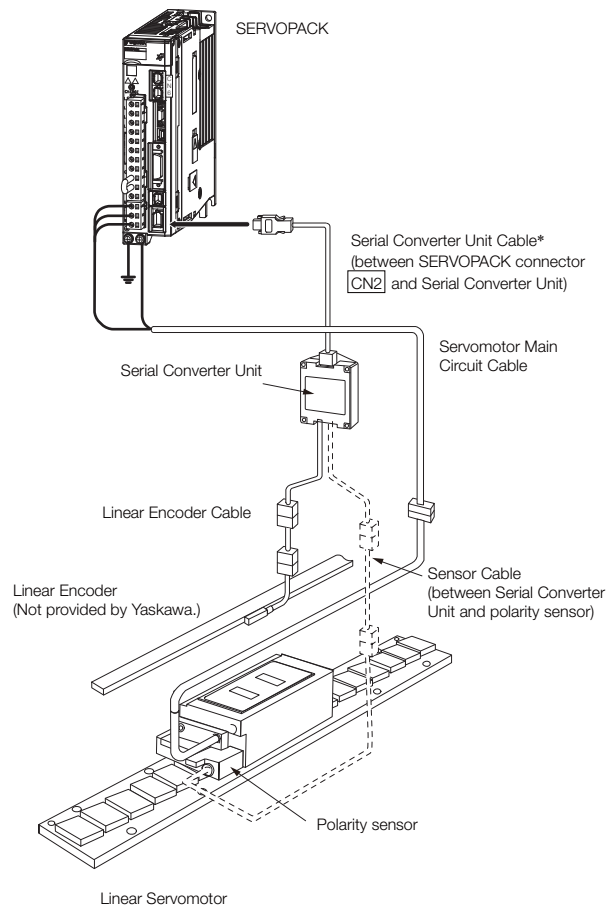
8.1	Selecting Cables	8-2
8.1.1	System Configurations	8-2
8.1.2	Linear Encoder Cables	8-3
8.1.3	Serial Converter Unit Cables	8-3
8.1.4	Sensor Cables	8-3
8.1.5	Serial Converter Units	8-4
8.2	Wiring Servomotors and SERVOPACKs . . .	8-5
8.2.1	Wiring Precautions	8-5
8.2.2	Wiring Procedure	8-8

8.1 Selecting Cables

8.1.1 System Configurations

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

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



* You can connect directly to an absolute linear encoder.

Note: 1. The above figure is for SGLFW2 Servomotors with F-type Iron Cores (with Thermal Protectors). Refer to the following section for configurations with other models.

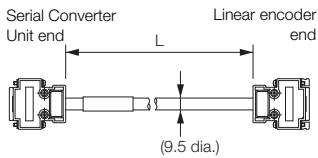
☞ 8.2.2 Wiring Procedure on page 8-8

2. Refer to the catalog 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

8.1.2 Linear Encoder Cables

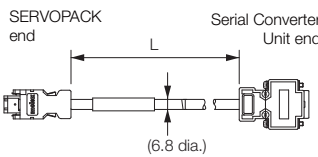
These Cables are available from Yaskawa Controls Co., Ltd.

Name	Servomotor Model	Length (L)*	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-J00□-□□□-E Serial Converter Unit, do not exceed a cable length of 3 m.

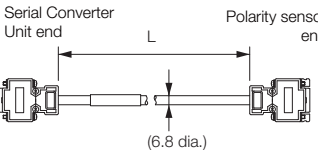
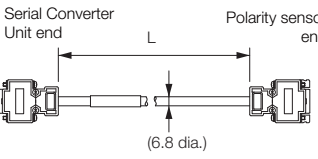
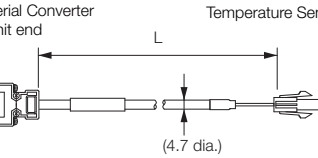
8.1.3 Serial Converter Unit Cables

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

Servomotor Model	Length (L)	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	

8.1.4 Sensor Cables

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

Servomotor Model	Length (L)	Order Number	Appearance
SGLFW-□□D SGLTW-□□D	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-□□D□□□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-□□D□□□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	

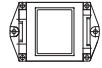
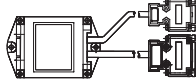
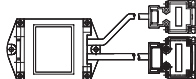
8.1.5 Serial Converter Units

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					Applicable Linear Servomotor					
Code	Appearance	Applicable Linear Encoder	Polarity Sensor	Thermal Protector	Servomotor Model		Servomotor Model			
H003 J003		From Heidenhain Corp.	None	None	SGLFW- (Models with F-type Iron Cores)	35D120A	211	SGLTW- (Models with T-type Iron Cores)	35D170H	193
						35D230A	212		35D320H	194
50D200B	189	40D400B	197							
50D380B	190	40D600B	198							
1ZD200B	191	50D170H	195							
1ZD380B	192	50D320H	196							
30D070A	651	80D400B	199							
30D120A	652									
30D230A	653									
45D200A	654									
H006 J006		From Heidenhain Corp.	Yes	Yes	SGLFW2- (Models with F-type Iron Cores)	45D380A	655			
						90D200A	657			
						90D380A	658			
						90D560A	659			
						1DD380A	660			
H008 J008		From Renishaw PLC	Yes	Yes						

Note: 1. Refer to the catalog for detailed specifications of the Serial Converter Unit.

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

8.2

Wiring Servomotors and SERVOPACKs

8.2.1

Wiring Precautions

**CAUTION**

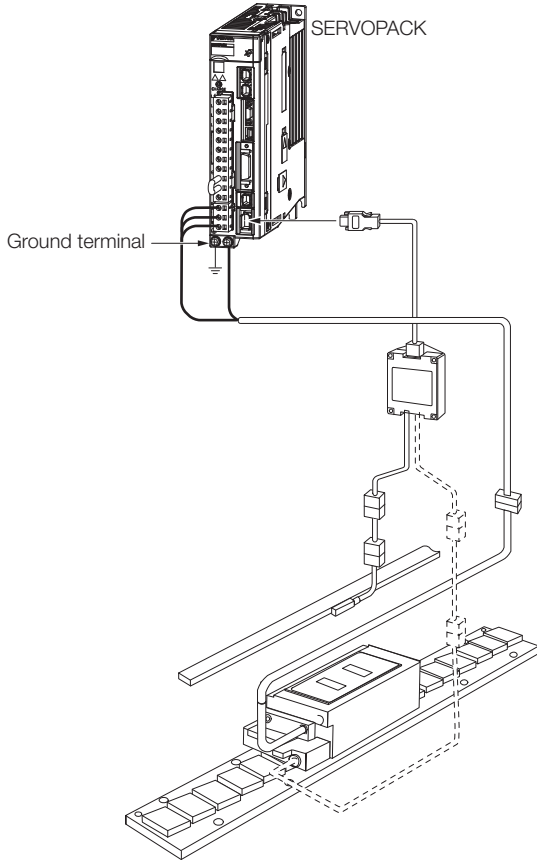
- Do not connect the Servomotor directly to an industrial power supply. Doing so will destroy the Servomotor. You cannot operate a Servomotor without a SERVOPACK that is designed for it.

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 mm² or 0.3 mm². 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.

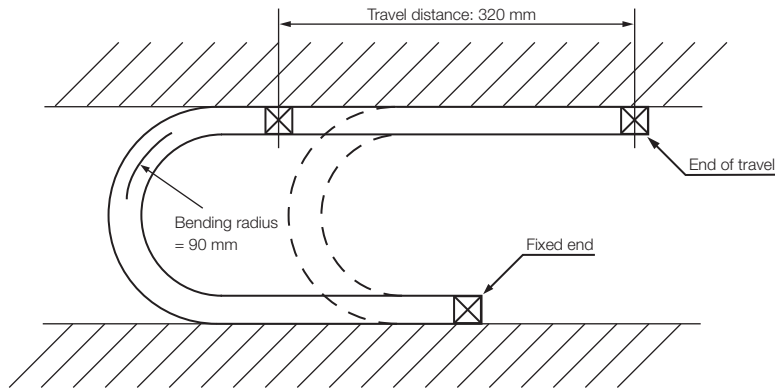
Cable Diameter	Recommended Bending Radius [R]
Less than 8 mm	15 mm min.
8 mm	20 mm min.
Over 8 mm	Cable diameter × 3 mm min.

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.



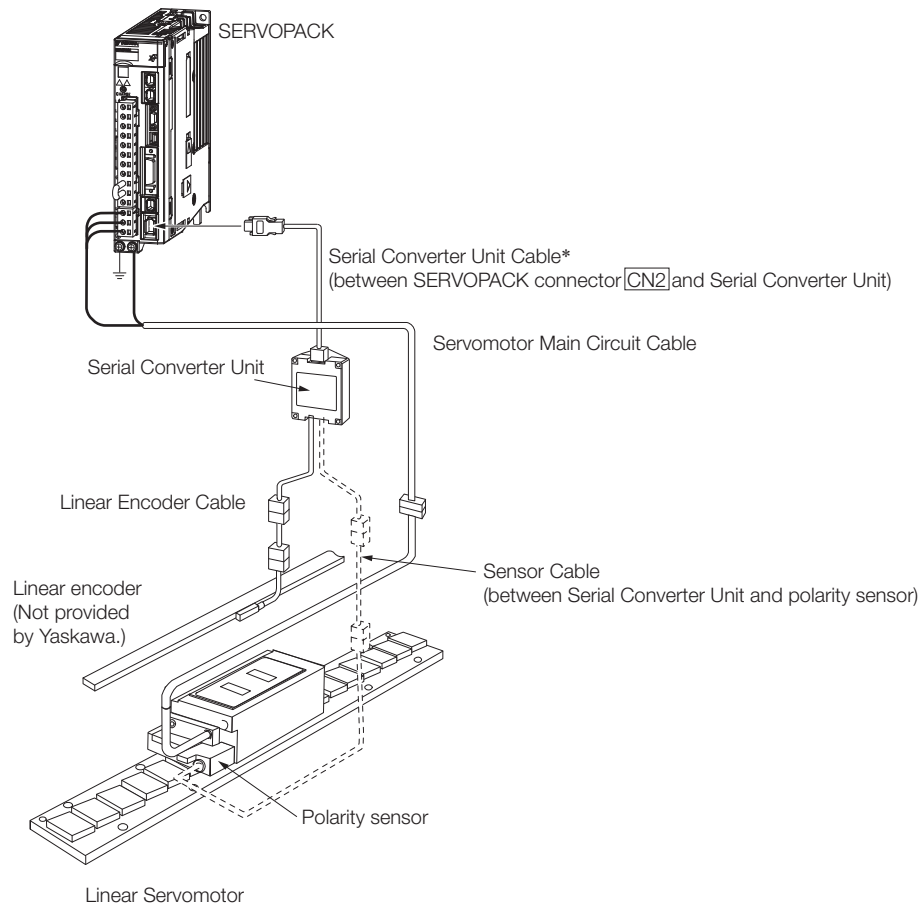
Note: The service life of a Flexible Cable indicates the number of bends while the lead wires are electrically charged for which no cracks or damage that affects the performance of the cable sheathing occur. Breaking of the shield wire is not considered.

- 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. If the Flexible Cable is too short, stress at the points where it is secured will cause it to break faster. Adjust the cable length to the optimum value.
- Do not allow Flexible Cables to interfere with each other. Interference will restrict the motion of the cables, causing them to break faster. Separate the cables sufficiently, or provide partitions between them when wiring.

8.2.2 Wiring Procedure

SGLF Servomotors

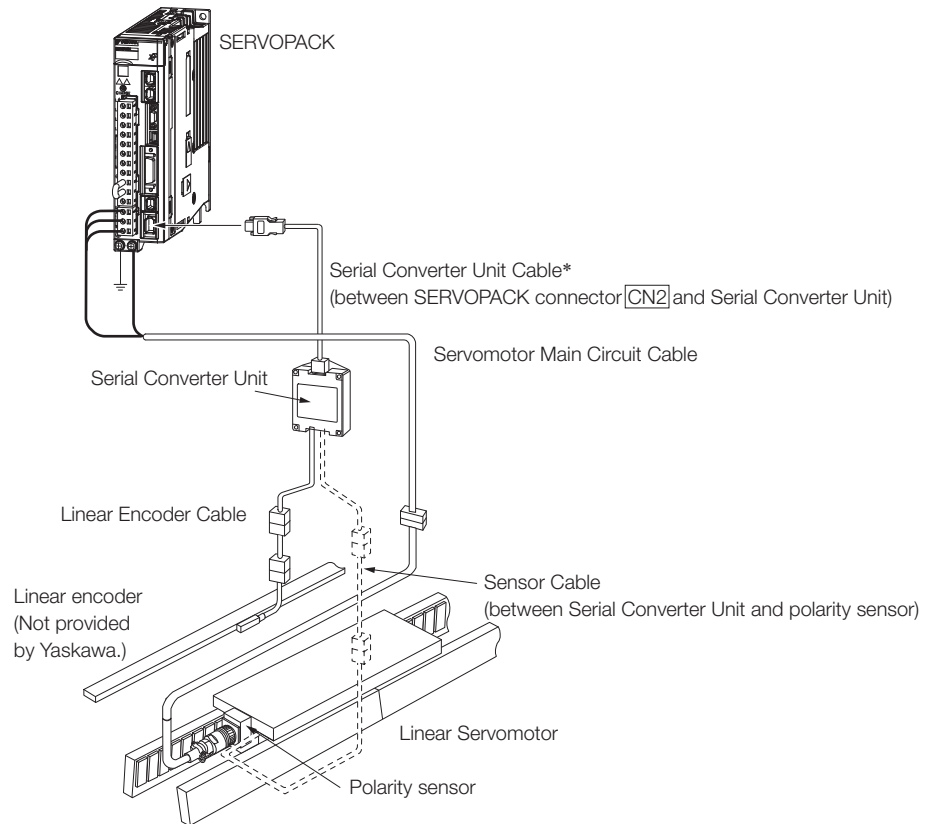
Refer to the following figures for wiring.



* 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.

Maintenance and Inspection




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

9.1	Periodic Inspections	9-2
9.1.1	Linear Servomotor Inspections	9-2
9.1.2	Linear Encoder Inspections	9-3
9.2	Disposing of Servomotors	9-4

9.1 Periodic Inspections

9.1.1 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	Daily	Moving Coil molded plastic	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.	
	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.

Continued from previous page.

	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 M Ω or higher.	<ul style="list-style-type: none"> • 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.

9.1.2 Linear Encoder Inspections

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

9.2 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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June 2016	<2>	All chapters	Addition: SGLFW2-90D560 and -1DD380; and SGLTW-40D600 and -80D400
			Addition: SGD7W SERVOPACK Models
			Partly revised.
		Back cover	Revision: Address
September 2015	<1>	Preface	Partly revised.
		Back cover	Revision: Address
June 2015	–	–	First edition

Σ-7-Series AC Servo Drive

Linear Servomotor with

400 V-Input Power

Product Manual

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In the event that the end user of this product is to be the military and said product is to be employed in any weapons systems or the manufacture thereof, the export will fall under the relevant regulations as stipulated in the Foreign Exchange and Foreign Trade Regulations. Therefore, be sure to follow all procedures and submit all relevant documentation according to any and all rules, regulations and laws that may apply.

Specifications are subject to change without notice for ongoing product modifications and improvements.

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