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SV660P Series Servo Drive

Selection Guide

Industrial Automation | Intelligent Elevator | New Energy Vehicle | Industrial Robot | Rail Transit

Data code 19011390C00

Preface

Introduction

The SV660P series high performance AC servo drive provides a power range from 0.05 kW to 7.5 kW. The servo drive, which covers a power range from 0.05 kW to 7.5 kW, supports Modbus, CANopen and CANlink communication protocols and carries necessary communication interfaces to operate with the host controller for a networked operation of multiple servo drives. The SV680P series servo drive supports adaptive stiffness level setting, inertia auto-tuning, and vibration suppression for easy use. It allows a quiet and stable operation together with an MS1 series high-response servo motor (with low or high inertia) equipped with a 23-bit single-turn/multi-turn absolute encoder. The SV660P series servo drive serves to achieve quick and accurate position control, speed control, and torque control in automation equipment such as electronic manufacturing devices, manipulators, packing devices, and machine tools.

This selection guide introduces servo drive and motor model selections, including their features, specifications, configurations, and cable selections.

More documents

Name	Data Code	Description
SV660P Series Servo Drive Selection Guide	19011390	Provides instructions on product selection, including the list of supporting components, technical data on the drive and motor, and the selection guide of cables.
SV660P Series Servo Drive Hardware Guide	19011391	Presents electrical design guidance of the equipment, description of terminals, required certificates and standards and solutions to common EMC problems.
SV660P Series Servo Drive Commissioning Guide	19011392	This guide describes the parameters, troubleshooting, operating panel, commissioning software, and commissioning flow and steps.
SV660P Series Servo Drive Function Guide	19011393	Presents functions and parameters, including function overview, basic servo functions, adjustment and parameter list.
SV660P Series Servo Drive Communication Guide	19012201	Presents functions and parameters of the servo drive, including Modbus communication configuration, parameter descriptions, and communication application cases.
SV660P Series Servo Drive Troubleshooting Guide	19011907	Introduces faults and fault levels, the troubleshooting process, warning codes and fault codes.
SV660P Series Servo Drive Safety Guide	19011884	Presents the safety function and related certifications and standards, wiring, commissioning process, troubleshooting, and functions.
SV660P Series Servo Drive Manual Package	PS00005513	Provides information on selection, installation, commissioning, function, troubleshooting and parameters of the equipment.

Revision History

Date	Version	Description
2023-04	C00	• Updated cable model numbering rules. • Updated the model information of the optional circuit breaker.
2023-01	B01	• Added warranty information in the preface. • Changed the MS1-Z motor to MS1-R motor. • Added information of warranty in Preface. • Modified the name of the ferrite clamp. • Modified the selection table of support parts. • Modified motor selection instructions. • Modified the technical specifications.
2022-08	B00	• Added information on the electrical specifications of the drive. • Added feature AI1 to the basic drive specifications. • Modified the storage temperature range. • Improved the structure of the manual.
2022-01	A03	Added additional safety precautions in Safety Precautions.
2021-10	A02	• Merged the section on the electrical data of the brake resistor with section 3.1.1 Electrical Specifications. • Modified motor connector information in sections 4.1, 5.1, 6.1, and 7.1. • Modified TP and LZ in the motor dimensions in sections 4.2.5, 5.2.5, 6.2.5 and 7.2.5. • Modified the cable length tolerance in sections 4.3, 5.3, 6.3, and 7.3. • Modified the information on the compatible reactor for SV660PT012I in section 8.3.1. • Updated the Appendix.
2020-11	A01	• Updated the motor derating characteristic curve. • Modified the tightening torque of the drive.
2020-08	A00	First release

Access to the Guide

This guide is not delivered with the product. You can obtain the PDF version in the following way:

- *http://www.inovance.com*.
- Scan the QR code on the equipment to acquire more.

Warranty

Inovance provides warranty service within the warranty period (as specified in your order) for any fault or damage that is not caused by improper operation of the user. You will be charged for any repair work after the warranty period expires.

Within the warranty period,maintenance fee will be charged for the following damage:

- Damage caused by operations not following the instructions in the user guide
- Damage caused by fire, flood, or abnormal voltage
- Damage caused by unintended use of the product
- Damage caused by use beyond the specified scope of application of the product

- Damage or secondary damage caused by force majeure (natural disaster, earthquake, and lightning strike)

The maintenance fee is charged according to the latest Price List of Inovance. If otherwise agreed upon, the terms and conditions in the agreement shall prevail.

For details, see the Product Warranty Card.

Table of Contents

General Safety Instructions

Safety Precautions

- This section explains the safety precautions that need to be observed to use this product correctly. Before using this product, please read the instruction manual and correctly understand the relevant information of safety precautions. Failure to comply with the safety precautions may result in death, serious injury, or equipment damage.
- "CAUTION", "WARNING", and "DANGER" items in the guide only indicate some of the precautions that need to be followed; they just supplement the safety precautions.
- Use this equipment according to the designated environment requirements. Damage caused by improper use is not covered by warranty.
- Inovance shall take no responsibility for any personal injuries or property damage caused by improper use.

Safety Levels and Definitions

	Indicates that failure to comply with the notice will result in death or severe personal injuries.
	Indicates that failure to comply with the notice may result in death or severe personal injuries.
	Indicates that failure to comply with the notice may result in minor or moderate personal injuries or equipment damage.

General Safety Instructions

- Drawings in the selection guide are sometimes shown without covers or protective guards. Remember to install the covers or protective guards as specified first, and then perform operations in accordance with the instructions. Install the covers or protective guards as specified, and use the equipment in accordance with the instructions described in the user guide.
- The drawings in the guide are shown for illustration only and may be different from the product you purchased.

Unpacking
   • Do not install the equipment if you find damage, rust, or signs of use on the equipment or accessories upon unpacking.   • Do not install the equipment if you find water seepage or missing or damaged components upon unpacking.   • Do not install the equipment if you find the packing list does not conform to the equipment you received.

- Check whether the packing is intact and whether there is damage, water seepage, dampness, and deformation before unpacking.
- Unpack the package by following the unpacking sequence. Do not strike the package violently.
- Check whether there is damage, rust, or injuries on the surface of the equipment and equipment accessories before unpacking.
- Check whether the package contents are consistent with the packing list before unpacking.

Storage and Transportation

- Large-scale or heavy equipment must be transported by qualified professionals using specialized hoisting equipment. Failure to comply may result in personal injuries or equipment damage.
- Before hoisting the equipment, ensure the equipment components such as the front cover and terminal blocks are secured firmly with screws. Loosely-connected components may fall off and result in personal injuries or equipment damage.
- Never stand or stay below the equipment when the equipment is being hoisted by the hoisting equipment.
- When hoisting the equipment with a steel rope, ensure the equipment is hoisted at a constant speed without suffering from vibration or shock. Do not turn the equipment over or let the equipment stay hanging in the air. Failure to comply may result in personal injuries or equipment damage.

- Handle the equipment with care during transportation and mind your steps to prevent personal injuries or equipment damage.
- When carrying the equipment with bare hands, hold the equipment casing firmly with care to prevent parts from falling. Failure to comply may result in personal injuries.
- Store and transport the equipment based on the storage and transportation requirements. Failure to comply will result in equipment damage.
- Avoid storing or transporting the equipment in environments with water splash, rain, direct sunlight, strong electric field, strong magnetic field, and strong vibration.
- Avoid storing the equipment for more than three months. Long-term storage requires stricter protection and necessary inspections.
- Pack the equipment strictly before transportation. Use a sealed box for long-distance transportation.
- Never transport the equipment with other equipment or materials that may harm or have negative impacts on this equipment.

Installation

- The equipment can be operated by well-trained and qualified professionals only. Non-professionals are not allowed.

WARNING

- Read through the guide and safety instructions before installation.
- Do not install this equipment in places with strong electric or magnetic fields.
- Before installation, check that the mechanical strength of the installation site can bear the weight of the equipment. Failure to comply will result in mechanical hazards.
- Do not wear loose clothes or accessories during installation. Failure to comply may result in an electric shock.
- When installing the equipment in a closed environment (such as a cabinet or casing), use a cooling device (such as a fan or air conditioner) to cool the environment down to the required temperature. Failure to comply may result in equipment over-temperature or a fire.
- Do not retrofit the equipment.
- Do not fiddle with the bolts used to fix equipment components or the bolts marked in red.
- When the equipment is installed in a cabinet or final assembly, a fireproof enclosure providing both electrical and mechanical protections must be provided. The IP rating must meet IEC standards and local laws and regulations.
- Before installing devices with strong electromagnetic interference, such as a transformer, install a shielding device for the equipment to prevent malfunction.
- Install the equipment onto an incombustible object such as a metal. Keep the equipment away from combustible objects. Failure to comply will result in a fire.

CAUTION

- Cover the top of the equipment with a piece of cloth or paper during installation. This is to prevent unwanted objects such as metal chippings, oil, and water from falling into the equipment and causing faults. After installation, remove the cloth or paper on the top of the equipment to prevent over-temperature caused by poor ventilation due to blocked ventilation holes.
- Resonance may occur when the equipment operating at a constant speed executes variable speed operations. In this case, install the vibration-proof rubber under the motor frame or use the vibration suppression function to reduce resonance.

Wiring

DANGER

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- Before wiring, cut off power connections with all equipment. Residual voltage exists after power cut-off. Therefore, wait at least the time designated on the equipment warning label before further operations. Measure the DC voltage of the main circuit and make sure it is below the safe voltage, otherwise there will be the danger of electric shock.
- Do not perform wiring, remove the equipment cover, or touch the circuit board with power ON. Failure to comply will result in an electric shock.
- Check that the equipment is grounded properly. Failure to comply will result in an electric shock.

WARNING

- Do not connect the input power supply to the output end of the equipment. Failure to comply will result in equipment damage or even a fire.
- When connecting a drive to the motor, check that the phase sequences of the drive and motor terminals are consistent to prevent reverse motor rotation.
- Cables used for wiring must meet cross sectional area and shielding requirements. The shield of the cable must be reliably grounded at one end.
- Fix the terminal screws with the tightening torque specified in the user guide. Improper tightening torque may overheat or damage the connecting part, resulting in a fire.
- After wiring is done, check that all cables are connected properly and no screws, washers or exposed cables are left inside the equipment. Failure to comply may result in an electric shock or equipment damage.

CAUTION

- During wiring, follow the proper electrostatic discharge (ESD) procedure, and wear an antistatic wrist strap. Failure to comply will damage the equipment or the internal circuits of the equipment.
- Use shielded twisted pairs for the control circuit. Connect the shield to the grounding terminal of the equipment for grounding purpose. Failure to comply will result in equipment malfunction.

Power-on

DANGER

- Before power-on, check that the equipment is installed properly with reliable wiring and the motor can be restarted.
- Check that the power supply meets equipment requirements before power-on to prevent equipment damage or a fire.
- After power-on, do not open the cabinet door or protective cover of the equipment, touch any terminal, or disassemble any unit or component of the equipment. Failure to comply will result in an electric shock.

WARNING

- Perform a trial run after wiring and parameter setting to ensure the equipment operates safely. Failure to comply may result in personal injuries or equipment damage.
- Before power-on, make sure that the rated voltage of the equipment is consistent with that of the power supply. Failure to comply may resulting in a fire. Failure to comply may result in a fire.
- Before power-on, check that no one is near the equipment, motor, or machine. Failure to comply may result in death or personal injuries.

Operation

DANGER

- The equipment must be operated only by professionals. Failure to comply will result in death or personal injuries.
- Do not touch any connecting terminals or disassemble any unit or component of the equipment during operation. Failure to comply will result in an electric shock.

WARNING

- Do not touch the equipment casing, fan, or resistor with bare hands to feel the temperature. Failure to comply may result in personal injuries.
- Prevent metal or other objects from falling into the equipment during operation. Failure to comply may result in a fire or equipment damage.

Maintenance
 • Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals. • Do not maintain the equipment with power ON. Failure to comply will result in an electric shock. • Before maintenance, cut off all the power supplies of the equipment and wait for at least the time designated on the equipment warning label. • In case of a permanent magnet motor, do not touch the motor terminals immediately after power-off because the motor terminals will generate induced voltage during rotation even after the equipment power supply is off. Failure to comply will result in an electric shock.
 • Perform routine and periodic inspection and maintenance on the equipment according to maintenance requirements and keep a maintenance record.
Repair
 • Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals. • Do not repair the equipment with power ON. Failure to comply will result in an electric shock. • Before inspection and repair, cut off all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.
 • Submit the repair request according to the warranty agreement. • When the fuse is blown or the circuit breaker or earth leakage current breaker (ELCB) trips, wait for at least the time designated on the equipment warning label before power-on or further operations. Failure to comply may result in death, personal injuries or equipment damage. • When the equipment is faulty or damaged, the troubleshooting and repair work must be performed by professionals that follow the repair instructions, with repair records kept properly. • Replace quick-wear parts of the equipment according to the replacement instructions. • Do not use damaged equipment. Failure to comply may result in death, personal injuries, or severe equipment damage. • After the equipment is replaced, check the wiring and set parameters again.
Disposal
 • Dispose of retired equipment in accordance with local regulations and standards. Failure to comply may result in property damage, personal injuries, or even death. • Recycle retired equipment by observing industry waste disposal standards to avoid environmental pollution.

Additional Precautions

Cautions for the dynamic brake

- Dynamic braking can only be used for emergency stop in case of failure and sudden power failure. Do not trigger failure or power failure frequently.

- Ensure that the dynamic braking function has an operation interval of more than 5 minutes at high speed, otherwise the internal dynamic braking circuit may be damaged.
- Dynamic braking is common in rotating mechanical structures. For example, when a motor has stopped running, it keeps rotating due to the inertia of its load. In this case, this motor is in the regenerative state and short-circuit current passes through the dynamic brake. If this situation continues, the drive, and even the motor, may be burned.

Safety Label

For safe equipment operation and maintenance, comply with the safety labels on the equipment. Do not damage or remove the safety labels. See the following table for descriptions of the safety labels.

Safety Label	Description
	• Never fail to connect Protective Earth (PE) terminal. Read the manual and follow the safety instructions before use. • Do not touch terminals within 15 minutes after disconnecting the power supply to prevent the risk of electric shock. • Do not touch the heatsink with power ON to prevent the risk of burn.

1 Selection Table

1.1 Selection

Servo motor				Servo drive SV660****I			
Motor without brake	Motor with brake	Flange Size	Capacity (kW)	Voltage Class	Size	Recommended Drive Model	No.
Ratings of MS1H1 (n_N=3000rpm, n_{max} =6000rpm) series motors							
MS1H1-05B30CB-A330Z	MS1H1-05B30CB-A332Z	40	0.05	Single-phase 220 V	A	S1R6	00002
MS1H1-10B30CB-A330Z	MS1H1-10B30CB-A332Z	40	0.1				
MS1H1-20B30CB-A331R	MS1H1-20B30CB-A334R	60	0.2				
MS1H1-40B30CB- A331R	MS1H1-40B30CB- A334R	60	0.4	Single-phase 220 V		S2R8	00003
MS1H1-55B30CB- A331R	-	80	0.55	Single-phase 220 V	B	S5R5	00005
MS1H1-75B30CB- A331R	MS1H1-75B30CB- A334R	80	0.75	Single-phase 220 V		S5R5	00005
MS1H1-10C30CB- A331R	MS1H1-10C30CB- A334R	80	1.0	Single-phase/Three-phase 220 V	C	S7R6	00006
Ratings of MS1H2 (n_N=3000rpm, n_{max} =6000rpm/5000rpm) series motors							
MS1H2-10C30CB-A331R	MS1H2-10C30CB-A334R	100	1.0	Single-phase/Three-phase 220 V	C	S7R6	00006
MS1H2-10C30CD-A331R	MS1H2-10C30CD-A334R	100	1.0	Three-phase 380 V		T3R5	10001
MS1H2-15C30CB-A331R	MS1H2-15C30CB-A334R	100	1.5	Single-phase/Three-phase 220 V	D	S012	00007
MS1H2-15C30CD-A331R	MS1H2-15C30CD-A334R	100	1.5	Three-phase 380 V	C	T5R4	10002
MS1H2-20C30CB-A331R	MS1H2-20C30CB-A334R	100	2.0	Single-phase/Three-phase 220 V	D	S012	00007
MS1H2-20C30CD-A331R	MS1H2-20C30CD-A334R	100	2.0	Three-phase 380 V	D	T8R4	10003
MS1H2-25C30CD-A331R	MS1H2-25C30CD-A334R	100	2.5	Three-phase 380 V	D	T8R4	10003
MS1H2-30C30CD-A331R	MS1H2-30C30CD-A334R	130	3.0	Three-phase 380 V	D	T012	10004
MS1H2-40C30CD-A331R	MS1H2-40C30CD-A334R	130	4.0	Three-phase 380 V	E	T017	10005
MS1H2-50C30CD-A331R	MS1H2-50C30CD-A334R	130	5.0	Three-phase 380 V		T021	10006
Ratings of MS1H3 (n_N=1500rpm, n_{max} =3000rpm) series motors							
MS1H3-85B15CB-A331R	MS1H3-85B15CB-A334R	130	0.85	Single-phase/Three-phase 220 V	C	S7R6	00006
MS1H3-85B15CD-A331R	MS1H3-85B15CD-A334R	130	0.85	Three-phase 380 V		T3R5	10001
MS1H3-13C15CB-A331R	MS1H3-13C15CB-A334R	130	1.3	Single-phase/Three-phase 220 V	D	S012	00007
MS1H3-13C15CD-A331R	MS1H3-13C15CD-A334R	130	1.3	Three-phase 380 V	C	T5R4	10002
MS1H3-18C15CD-A331R	MS1H3-18C15CD-A334R	130	1.8	Three-phase 380 V	D	T8R4	10003
MS1H3-29C15CD-A331R	MS1H3-29C15CD-A334R	180	2.9	Three-phase 380 V	D	T012	10004

Servo motor				Servo drive SV660****I			
Motor without brake	Motor with brake	Flange Size	Capacity (kW)	Voltage Class	Size	Recommended Drive Model	No.
MS1H3-44C15CD-A331R	MS1H3-44C15CD-A334R	180	4.4	Three-phase 380 V	E	T017	10005
MS1H3-55C15CD-A331R	MS1H3-55C15CD-A334R	180	5.5	Three-phase 380 V		T021	10006
MS1H3-75C15CD-A331R	MS1H3-75C15CD-A334R	180	7.5	Three-phase 380 V		T026	10007
MS1H4 (n_N=3000rpm，n_{max}=6000rpm) ratings							
MS1H4-10B30CB-A330Z	MS1H4-10B30CB-A332Z	40	0.1	Single-phase 220 V	A	S1R6	00002
MS1H4-20B30CB-A331R	MS1H4-20B30CB-A334R	60	0.2				
MS1H4-40B30CB-A331R	MS1H4-40B30CB-A334R	60	0.4	Single-phase 220 V		S2R8	00003
MS1H4-55B30CB-A331R	-	80	0.55	Single-phase 220 V	B	S5R5	00005
MS1H4-75B30CB-A331R	MS1H4-75B30CB-A334R	80	0.75	Single-phase 220 V		S5R5	00005
MS1H4-10C30CB-A331R	MS1H4-10C30CB-A334R	80	1.0	Single-phase/Three-phase 220 V	C	S7R6	00006

Note

Servo motors match different series of servo drives, and the maximum speed and maximum torque output of the motor vary slightly. See the servo drive selection guide for details.

1.2 Models of MS1-R Series Motors and MS1-Z Series Motors

Flange Size	Models without brake		Models with Brake	
	MS1-Z series motor model	MS1-R series motor model	MS1-Z series motor model	MS1-R series motor model
60	MS1H1-20B30CB-A331Z	MS1H4-20B30CB-A331R	MS1H1-20B30CB-A334Z	MS1H4-20B30CB-A334R
	MS1H1-40B30CB-A331Z	MS1H4-40B30CB-A331R	MS1H1-40B30CB-A334Z	MS1H4-40B30CB-A334R
	MS1H4-40B30CB-A331Z	MS1H4-40B30CB-A331R	MS1H4-40B30CB-A334Z	MS1H4-40B30CB-A334R
	MS1H1-20B30CB-A331Z-S	MS1H4-20B30CB-A331R-S	MS1H1-20B30CB-A334Z-S	MS1H4-20B30CB-A334R-S
	MS1H1-40B30CB-A331Z-S	MS1H4-40B30CB-A331R-S	MS1H1-40B30CB-A334Z-S	MS1H4-40B30CB-A334R-S
	MS1H4-40B30CB-A331Z-S	MS1H4-40B30CB-A331R-S	MS1H4-40B30CB-A334Z-S	MS1H4-40B30CB-A334R-S
	MS1H1-20B30CB-T331Z	MS1H4-20B30CB-T331R	MS1H1-20B30CB-T334Z	MS1H4-20B30CB-T334R
	MS1H1-40B30CB-T331Z	MS1H4-40B30CB-T331R	MS1H1-40B30CB-T334Z	MS1H4-40B30CB-T334R
	MS1H4-40B30CB-T331Z	MS1H4-40B30CB-T331R	MS1H4-40B30CB-T334Z	MS1H4-40B30CB-T334R
	MS1H1-20B30CB-T331Z X6	MS1H4-20B30CB-T331R	MS1H1-20B30CB-T334Z X6	MS1H4-20B30CB-T334R
	MS1H1-40B30CB-T331Z X6	MS1H4-40B30CB-T331R	MS1H1-40B30CB-T334Z X6	MS1H4-40B30CB-T334R
	MS1H4-40B30CB-T331Z X6	MS1H4-40B30CB-T331R	MS1H4-40B30CB-T334Z X6	MS1H4-40B30CB-T334R
	-	MS1H4-20B30CB-T331R-S	-	MS1H4-20B30CB-T334R-S
	-	MS1H4-40B30CB-T331R-S	-	MS1H4-40B30CB-T334R-S

Note

- The R version of the H4 inertia model is used to replace the Z version of the H1 and H4 inertia models.
- The H1 model, ultra-small inertia type motor added to the flange size 60 and 80 of R version, is mainly used for fast point-to-point motion control applications.

Flange Size	Models without brake		Models with Brake	
	MS1-Z series motor model	MS1-R series motor model	MS1-Z series motor model	MS1-R series motor model
80	MS1H1-55B30CB-A331Z	MS1H4-55B30CB-A331R	MS1H1-75B30CB-A334Z	MS1H4-75B30CB-A334R
	MS1H1-75B30CB-A331Z	MS1H4-75B30CB-A331R	MS1H4-75B30CB-A334Z	MS1H4-75B30CB-A334R
	MS1H4-75B30CB-A331Z	MS1H4-75B30CB-A331R	MS1H1-75B30CB-A334Z-S	MS1H4-75B30CB-A334R-S
	MS1H1-10C30CB-A331Z	MS1H4-10C30CB-A331R	MS1H4-75B30CB-A334Z-S	MS1H4-75B30CB-A334R-S
	MS1H1-55B30CB-A331Z-S	MS1H4-55B30CB-A331R-S	MS1H1-75B30CB-T334Z	MS1H4-75B30CB-T334R
	MS1H1-75B30CB-A331Z-S	MS1H4-75B30CB-A331R-S	MS1H4-75B30CB-T334Z	MS1H4-75B30CB-T334R
	MS1H4-75B30CB-A331Z-S	MS1H4-75B30CB-A331R-S	MS1H1-75B30CB-T334Z X6	MS1H4-75B30CB-T334R
	MS1H1-10C30CB-A331Z-S	MS1H4-10C30CB-A331R-S	MS1H4-75B30CB-T334Z X6	MS1H4-75B30CB-T334R
	MS1H1-55B30CB-T331Z	MS1H4-55B30CB-T331R	-	MS1H4-10C30CB-A334R
	MS1H1-75B30CB-T331Z	MS1H4-75B30CB-T331R	-	MS1H4-10C30CB-A334R-S
	MS1H4-75B30CB-T331Z	MS1H4-75B30CB-T331R	-	MS1H4-10C30CB-T334R
	MS1H1-10C30CB-T331Z	MS1H4-10C30CB-T331R	-	MS1H4-75B30CB-T334R-S
	MS1H1-55B30CB-T331Z X6	MS1H4-55B30CB-T331R	-	MS1H4-10C30CB-T334R-S
	MS1H1-75B30CB-T331Z X6	MS1H4-75B30CB-T331R	-	-
	MS1H4-75B30CB-T331Z X6	MS1H4-75B30CB-T331R	-	-
	MS1H1-10C30CB-T331Z X6	MS1H4-10C30CB-T331R	-	-
	-	MS1H4-55B30CB-T331R-S	-	-
	-	MS1H4-75B30CB-T331R-S	-	-
	-	MS1H4-10C30CB-T331R-S	-	-

Note

- The R version of the H4 inertia model is used to replace the Z version of the H1 and H4 inertia models.
- The H1 model, ultra-small inertia type motor added to the flange size 60 and 80 of R version, is mainly used for fast point-to-point motion control applications.

Flange Size	Models without brake		Models with Brake	
	MS1-Z series motor model	MS1-R series motor model	MS1-Z series motor model	MS1-R series motor model
100	MS1H2-10C30CB-A331Z	MS1H2-10C30CB-A331R	MS1H2-10C30CB-A334Z	MS1H2-10C30CB-A334R
	MS1H2-10C30CD-A331Z	MS1H2-10C30CD-A331R	MS1H2-10C30CD-A334Z	MS1H2-10C30CD-A334R
	MS1H2-15C30CB-A331Z	MS1H2-15C30CB-A331R	MS1H2-15C30CD-A334Z	MS1H2-15C30CD-A334R
	MS1H2-15C30CD-A331Z	MS1H2-15C30CD-A331R	MS1H2-15C30CB-A334Z	MS1H2-15C30CB-A334R
	MS1H2-20C30CD-A331Z	MS1H2-20C30CD-A331R	MS1H2-20C30CD-A334Z-S4	MS1H2-20C30CD-A334R
	MS1H2-25C30CD-A331Z	MS1H2-25C30CD-A331R	MS1H2-25C30CD-A334Z-S4	MS1H2-25C30CD-A334R
	MS1H2-10C30CB-T331Z	MS1H2-10C30CB-T331R	MS1H2-10C30CB-T334Z	MS1H2-10C30CB-T334R
	MS1H2-10C30CD-T331Z	MS1H2-10C30CD-T331R	MS1H2-10C30CD-T334Z	MS1H2-10C30CD-T334R
	MS1H2-15C30CB-T331Z	MS1H2-15C30CB-T331R	MS1H2-15C30CD-T334Z	MS1H2-15C30CD-T334R
	MS1H2-15C30CD-T331Z	MS1H2-15C30CD-T331R	MS1H2-15C30CB-T334Z	MS1H2-15C30CB-T334R
	MS1H2-20C30CD-T331Z	MS1H2-20C30CD-T331R	MS1H2-20C30CD-T334Z-S4	MS1H2-20C30CD-T334R
	MS1H2-25C30CD-T331Z	MS1H2-25C30CD-T331R	MS1H2-25C30CD-T334Z-S4	MS1H2-25C30CD-T334R
130	MS1H2-30C30CD-A331Z	MS1H2-30C30CD-A331R	MS1H2-30C30CD-A334Z-S4	MS1H2-30C30CD-A334R
	MS1H2-40C30CD-A331Z	MS1H2-40C30CD-A331R	MS1H2-40C30CD-A334Z-S4	MS1H2-40C30CD-A334R
	MS1H2-50C30CD-A331Z	MS1H2-50C30CD-A331R	MS1H2-50C30CD-A334Z-S4	MS1H2-50C30CD-A334R
	MS1H2-30C30CD-T331Z	MS1H2-30C30CD-T331R	MS1H2-30C30CD-T334Z-S4	MS1H2-30C30CD-T334R
	MS1H2-40C30CD-T331Z	MS1H2-40C30CD-T331R	MS1H2-40C30CD-T334Z-S4	MS1H2-40C30CD-T334R
	MS1H2-50C30CD-T331Z	MS1H2-50C30CD-T331R	MS1H2-50C30CD-T334Z-S4	MS1H2-50C30CD-T334R
130	MS1H3-85B15CB-A331Z	MS1H3-85B15CB-A331R	MS1H3-85B15CB-A334Z	MS1H3-85B15CB-A334R
	MS1H3-85B15CD-A331Z	MS1H3-85B15CD-A331R	MS1H3-85B15CD-A334Z	MS1H3-85B15CD-A334R
	MS1H3-13C15CB-A331Z	MS1H3-13C15CB-A331R	MS1H3-13C15CB-A334Z	MS1H3-13C15CB-A334R
	MS1H3-13C15CD-A331Z	MS1H3-13C15CD-A331R	MS1H3-13C15CD-A334Z	MS1H3-13C15CD-A334R
	MS1H3-18C15CD-A331Z	MS1H3-18C15CD-A331R	MS1H3-18C15CD-A334Z	MS1H3-18C15CD-A334R
	MS1H3-85B15CB-T331Z X6	MS1H3-85B15CB-T331R	MS1H3-85B15CB-T334Z X6	MS1H3-85B15CB-T334R
	MS1H3-85B15CD-T331Z X6	MS1H3-85B15CD-T331R	MS1H3-85B15CD-T334Z X6	MS1H3-85B15CD-T334R
	MS1H3-13C15CB-T331Z X6	MS1H3-13C15CB-T331R	MS1H3-13C15CB-T334Z X6	MS1H3-13C15CB-T334R
	MS1H3-13C15CD-T331Z X6	MS1H3-13C15CD-T331R	MS1H3-13C15CD-T331Z X6	MS1H3-13C15CD-T331R
	MS1H3-18C15CD-T331Z X6	MS1H3-18C15CD-T331R	MS1H3-13C15CD-T334Z X6	MS1H3-13C15CD-T334R
	MS1H3-85B15CB-T331Z	MS1H3-85B15CB-T331R	MS1H3-18C15CD-T334Z X6	MS1H3-18C15CD-T334R
	MS1H3-85B15CD-T331Z	MS1H3-85B15CD-T331R	MS1H3-85B15CB-T334Z	MS1H3-85B15CB-T334R
	MS1H3-85B15CD-T334Z	MS1H3-85B15CD-T334R	MS1H3-85B15CD-T334Z	MS1H3-85B15CD-T334R
	MS1H3-13C15CB-T331Z	MS1H3-13C15CB-T331R	MS1H3-13C15CB-T334Z	MS1H3-13C15CB-T334R
	MS1H3-13C15CD-T331Z	MS1H3-13C15CD-T331R	MS1H3-13C15CD-T334Z	MS1H3-13C15CD-T334R
	MS1H3-18C15CD-T331Z	MS1H3-18C15CD-T331R	MS1H3-18C15CD-T334Z	MS1H3-18C15CD-T334R

Flange Size	Models without brake		Models with Brake	
	MS1-Z series motor model	MS1-R series motor model	MS1-Z series motor model	MS1-R series motor model
180	MS1H3-29C15CD-A331Z	MS1H3-29C15CD-A331R	MS1H3-29C15CD-A334Z	MS1H3-29C15CD-A334R
	MS1H3-44C15CD-A331Z	MS1H3-44C15CD-A331R	MS1H3-44C15CD-A334Z	MS1H3-44C15CD-A334R
	MS1H3-55C15CD-A331Z	MS1H3-55C15CD-A331R	MS1H3-55C15CD-A334Z	MS1H3-55C15CD-A334R
	MS1H3-75C15CD-A331Z	MS1H3-75C15CD-A331R	MS1H3-75C15CD-A334Z	MS1H3-75C15CD-A334R
	MS1H3-29C15CD-T331Z	MS1H3-29C15CD-T331R	MS1H3-29C15CD-T334Z	MS1H3-29C15CD-T334R
	MS1H3-44C15CD-T331Z	MS1H3-44C15CD-T331R	MS1H3-44C15CD-T334Z	MS1H3-44C15CD-T334R
	MS1H3-55C15CD-T331Z	MS1H3-55C15CD-T331R	MS1H3-55C15CD-T334Z	MS1H3-55C15CD-T334R
	MS1H3-75C15CD-T331Z	MS1H3-75C15CD-T331R	MS1H3-75C15CD-T334Z	MS1H3-75C15CD-T334R

2 SV660P Series

2.1 Product Information

2.1.1 Model and Nameplate

Description of the Model Number

SV660 ① P ② S ③ 2R8 ④ I ⑤ - FH ⑥

1 **Product Series** SV660: SV660 series servo drive SV630: SV630 series servo drive SV635: SV635 series servo drive	4 **Rated output current**		5 **Installation Mode** I: Base plate-mounted
2 **Product type** P: Pulse type A: CANlink type C: CANopen type	S: 220 V	1R6: 1.6 A 2R8: 2.8 A 5R5: 5.5 A 7R6: 7.6 A 012: 11.6 A	6 **Non-standard features** Blank: standard FH: High protection
3 **Voltage class** S: 220 V T: 380 V	T: 380 V	3R5: 3.5 A 5R4: 5.4 A 8R4: 8.4 A 012: 11.9 A 017: 16.5 A 021: 20.8 A 026: 25.7 A	

Description of the nameplate

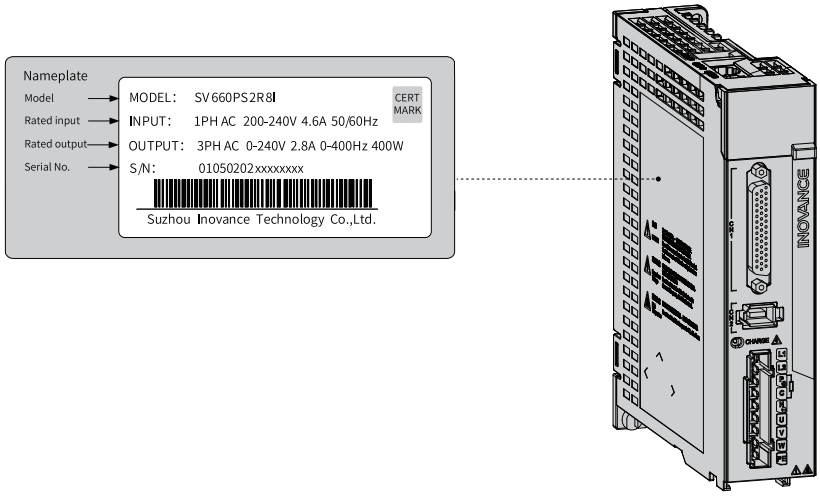


Figure 2-1 Nameplate

Encryption of the production serial number

01050202 4 P 7 00001
① ② ③ ④ ⑤

1 **Internal code** Material code	3 **Year** 9: 2009 A: 2010 ... N: 2021 P: 2022 ... Note: I/L/O/Q is not used.	5 **Lot number** 00001: 1st in current month 00002: 2nd in current month 00003: 3rd in current month ... Range: 00001 to 99999
2 **Manufacturer code** 4: Suzhou Inovance	4 **Month** 1: January 2: February ... A: October B: November C: December	

Example: The S/N 010502024P700001 indicates the drive is manufactured in July, 2022.

2.1.2 Components

2.1.2.1 Servo Drives in Size A (Rated Power: 0.2 kW to 0.4 kW)

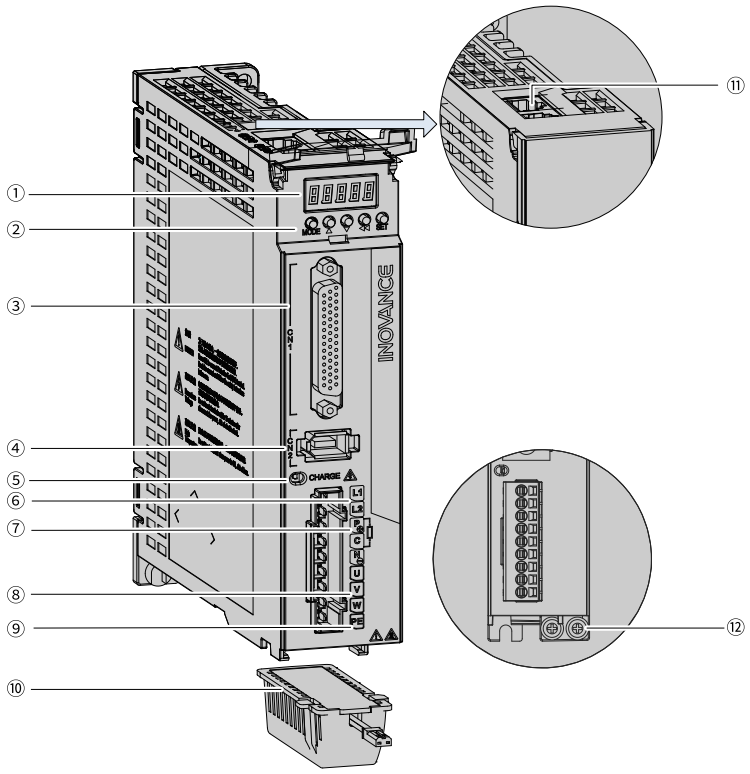


Figure 2-2 Components (SV660PS1R6I, SV660PS2R8I)

Table 2–1 Description of components (SV660PS1R6I, SV660PS2R8I)

No.	Name	Description
1	5-digit LED display	The 5-digit 8-segment LED display is used to show servo system’s running state and parameter setting.
2	Keys	MODE: Used to switch parameters in sequence. △: Used to increase the value of the blinking bit. ▽: Used to decrease the value of the blinking bit. ◁: Used to shift the blinking bit leftwards. (Hold down: Turning to the next page when the displayed number exceeds five digits) SET: Used to save modifications and enter the next menu.
3	CN1 (control terminal)	Used by reference input signals and other I/O signals.
4	CN2 (terminal for connecting the encoder)	Connected to the motor encoder terminal.
5	CHARGE (bus voltage indicator)	Indicates the electric charge is present in the bus capacitor. When the indicator turns on, charges possibly still exist in the internal capacitor of the servo unit, even if the power supply of the main circuit is OFF. To prevent electric shock, do not touch the power supply terminals when this indicator lights up.
6	L1, L2 (power input terminals)	See the nameplate for the rated voltage class.

No.	Name	Description
7	P⊕ and N⊖ (servo bus terminals)	Used by the common DC bus for multiple servo drives.
	P⊕, C (terminals for connecting external regenerative resistor)	If an external regenerative resistor is needed, connect it between terminals P⊕ and C.
8	U, V, W (terminals for connecting the servo motor)	Connected to U, V, and W phases of the servo motor.
9	Motor grounding terminal	Connected to the grounding terminal of the motor for grounding purpose.
10	Battery location	Used to hold the battery box of the absolute encoder.
11	CN3, CN4 (communication terminals)	Connected to RS232 and RS485 host controllers in parallel.
12	Servo drive grounding terminal	Connected to the grounding terminal of the power supply for grounding purpose.

Note

The built-in regenerative resistor or jumper bar is not available in models S1R6 and S2R8. If an external regenerative resistor is needed for these models, connect it between terminals P⊕ and C.

2.1.2.2 Servo Drives in Size B (Rated Power: 0.75 kW)

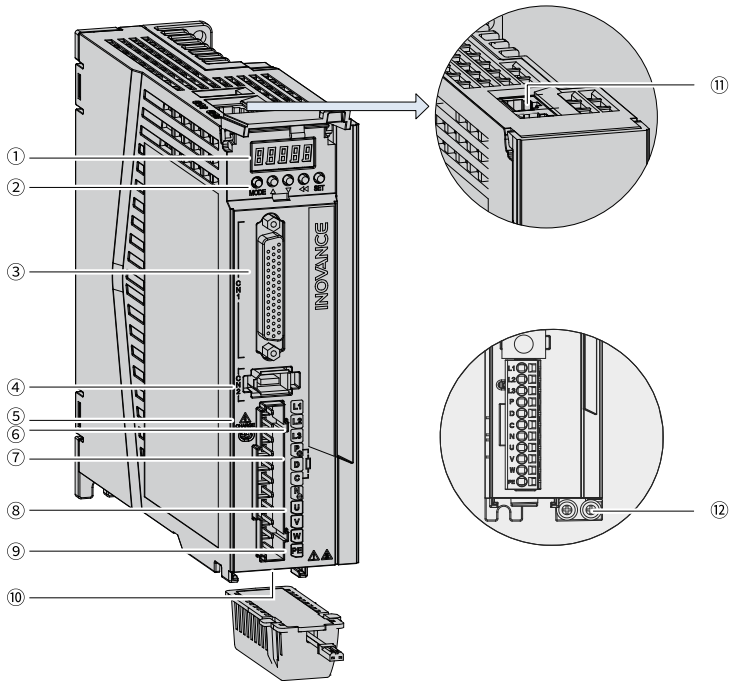


Figure 2-3 Components (SV660PS5R5I)

Table 2–2 Description of components (SV660PS5R5I)

No.	Name	Description
1	5-digit LED display	The 5-digit 8-segment LED display is used to show servo system’s running state and parameter setting.
2	Keys	MODE: Used to switch parameters in sequence. △: Used to increase the value of the blinking bit. ▽: Used to decrease the value of the blinking bit. ◁: Used to shift the blinking bit leftwards. (Hold down: Turning to the next page when the displayed number exceeds five digits) SET: Used to save modifications and enter the next menu.
3	CN1 (control terminal)	Used by reference input signals and other I/O signals.
4	CN2 (terminal for connecting the encoder)	Connected to the motor encoder terminal.
5	CHARGE (bus voltage indicator)	Indicates the electric charge is present in the bus capacitor. When the indicator turns on, charges possibly still exist in the internal capacitor of the servo unit, even if the power supply of the main circuit is OFF. To prevent electric shock, do not touch the power supply terminals when this indicator lights up.
6	L1, L2, L3 (power input terminals)	See the nameplate for the rated voltage class. Note: S5R5 (0.75kW) models support single-phase 220 V input only, with a 220 V power supply connected between terminals L1 and L2.
7	P⊕ and N⊖ (servo bus terminals)	Used by the common DC bus for multiple servo drives.
	P⊕, D, C (terminals for connecting external regenerative resistor)	Remove the jumper bar between terminals P⊕ and D before connecting an external regenerative resistor between terminals P⊕ and C.
8	U, V, W (terminals for connecting the servo motor)	Connected to U, V, and W phases of the servo motor.
9	Motor grounding terminal	Connected to the grounding terminal of the motor for grounding purpose.
10	Battery location	Used to hold the battery box of the absolute encoder.
11	CN3, CN4 (communication terminals)	Connected to RS232 and RS485 host controllers in parallel.
12	Servo drive grounding terminal	Connected to the grounding terminal of the power supply for grounding purpose.

2.1.2.3 Servo Drives in Size C and Size D (Rated Power: 1.0 kW to 3.0 kW)

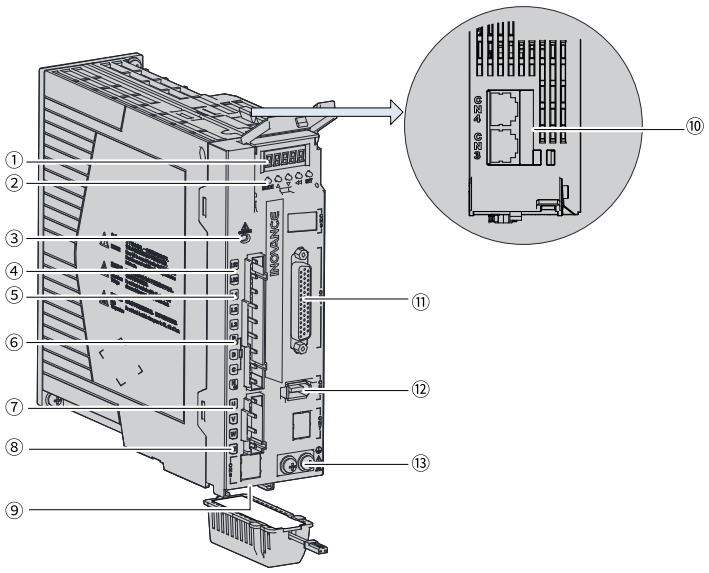


Figure 2-4 Components (SIZE C:SV660PS7R6I/SIZE D:SV660PS012I)

Table 2–3 Description of Components (SIZE C:SV660PS7R6I/SIZE D:SV660PS012I)

No.	Name	Description
1	5-digit LED display	The 5-digit 8-segment LED display is used to show servo system’s running state and parameter setting.
2	Keys	MODE: Used to switch parameters in sequence. △: Used to increase the value of the blinking bit. ▽: Used to decrease the value of the blinking bit. ◁: Used to shift the blinking bit leftwards. (Hold down: Turning to the next page when the displayed number exceeds five digits) SET: Used to save modifications and enter the next menu.
3	CHARGE (bus voltage indicator)	Indicates the electric charge is present in the bus capacitor. When the indicator turns on, charges possibly still exist in the internal capacitor of the servo unit, even if the power supply of the main circuit is OFF. To prevent electric shock, do not touch the power supply terminals when this indicator lights up.
4	L1C, L2C (control circuit power input terminals)	See the nameplate for the rated voltage class.
5	L1, L2, L3 (main circuit power input terminals)	Used as the power input terminals for a three-phase 220V servo drive. See the nameplate for the rated voltage class.
6	P⊕, D, C (terminals for connecting external regenerative resistor)	Remove the jumper bar between terminals P⊕ and D before connecting an external regenerative resistor between terminals P⊕ and C.
	P⊕ and N⊖ (servo bus terminals)	Used by the common DC bus for multiple servo drives.
7	U, V, W (terminals for connecting the servo motor)	Connected to U, V, and W phases of the servo motor.
8	Motor grounding terminal	Connected to the grounding terminal of the motor for grounding purpose.
9	Battery location	Used to hold the battery box of the absolute encoder.

No.	Name	Description
10	CN3, CN4 (communication terminals)	Connected to RS232 and RS485 host controllers in parallel.
11	CN1 (control terminal)	Used by reference input signals and other I/O signals.
12	CN2 (terminal for connecting the encoder)	Connected to the motor encoder terminal.
13	Servo drive grounding terminal	Connected to the grounding terminal of the power supply for grounding purpose.

Note

- The main circuits of models S7R6 and S012 can be connected to a single-phase or a three-phase power supply, depending on which one is available on site.
- No derating is required when a single-phase power supply is used for models S7R6 and S012.

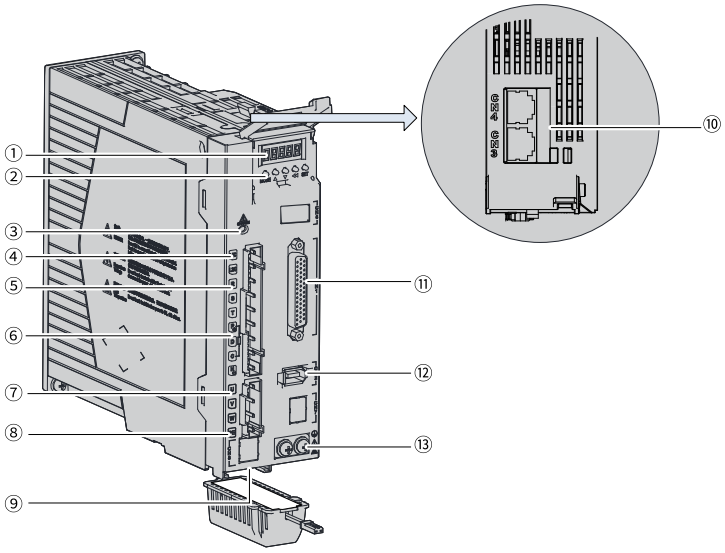


Figure 2-5 Components of servo drives in size C and size D (size C: SV660PT3R5I and SV660PT5R4I; size D: SV660PT8R4I and SV660PT012I)

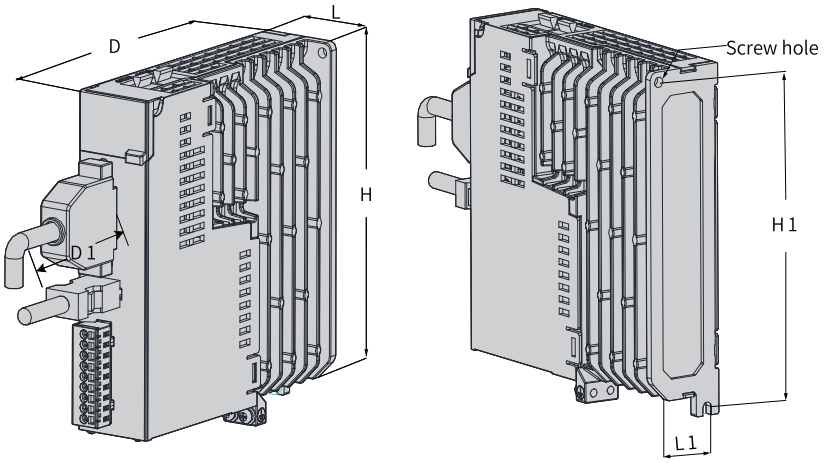
Table 2–4 Description of components (Size C: SV660PT3R5I and SV660PT5R4I; size D: SV660PT8R4I and SV660PT012I)

No.	Name	Description
1	5-digit LED display	The 5-digit 8-segment LED display is used to show servo system’s running state and parameter setting.
2	Keys	MODE: Used to switch parameters in sequence. △: Used to increase the value of the blinking bit. ▽: Used to decrease the value of the blinking bit. ◁: Used to shift the blinking bit leftwards. (Hold down: Turning to the next page when the displayed number exceeds five digits) SET: Used to save modifications and enter the next menu.

No.	Name	Description
3	CHARGE (bus voltage indicator)	Indicates the electric charge is present in the bus capacitor. When the indicator turns on, charges possibly still exist in the internal capacitor of the servo unit, even if the power supply of the main circuit is OFF. To prevent electric shock, do not touch the power supply terminals when this indicator lights up.
4	L1C, L2C (control circuit power input terminals)	See the nameplate for the rated voltage class.
5	R, S, T (main circuit power input terminals)	Used as the power input terminals for a three-phase 380 V servo drive. See the nameplate for the rated voltage class.
6	P⊕, D, C (terminals for connecting external regenerative resistor)	Remove the jumper bar between terminals P⊕ and D before connecting an external regenerative resistor between terminals P⊕ and C.
	P⊕ and N⊖ (servo bus terminals)	Used by the common DC bus for multiple servo drives.
7	U, V, W (terminals for connecting the servo motor)	Connected to U, V, and W phases of the servo motor.
8	Motor grounding terminal	Connected to the grounding terminal of the motor for grounding purpose.
9	Battery location	Used to hold the battery box of the absolute encoder.
10	CN3, CN4 (communication terminals)	Connected to RS232 and RS485 host controllers in parallel.
11	CN1 (control terminal)	Used by reference input signals and other I/O signals.
12	CN2 (terminal for connecting the encoder)	Connected to the motor encoder terminal.
13	Servo drive grounding terminal	Connected to the grounding terminal of the power supply for grounding purpose.

2.1.2.4 Servo Drives in Size E (Rated Power: 5.0 kW to 7.5 kW)

2.1.3 Product Dimensions



Size	L	H	D	L1	H1	D1	Screw Hole	Tightening Torque	Mass
	Unit: mm (in.)							Unit: N·m	Unit: kg (lb.)
A	40 (1.57)	170 (6.69)	150 (5.91)	28 (1.10)	161 (6.34)	75 (2.95)	2-M4	0.6 to 1.2	0.8 (1.76)
B	50 (1.97)	170 (6.69)	173 (6.81)	37 (1.46)	161 (6.34)	75 (2.95)	2-M4	0.6 to 1.2	1.0 (2.20)
C	55±1 (2.17±0.04)	170 (6.69)	173±1 (6.81±0.04)	44 (1.73)	160 (6.30)	75 (2.95)	2-M4	0.6 to 1.2	1.3 (2.87)
D	80±1 (3.15±0.04)	170 (6.69)	183 (7.20)	71 (2.80)	160 (6.30)	75 (2.95)	3-M4	0.6 to 1.2	1.8 (3.97)
E	90 (3.54)	250 (9.84)	230 (9.06)	78 (3.07)	240.5 (9.47)	75 (2.95)	4-M4	0.6 to 1.2	3.6 (7.94)

2.2 Pro Specifications

2.2.1 Electrical Specifications

- Single-phase 220 V drive

Item		Size A		Size B	Size C	Size D
Servo Drive Model		S1R6	S2R8	S5R5	S7R6	S012
Drive Power (kW)		0.2	0.4	0.75	1	1.5
Max. applicable motor capacity (kW)		0.2	0.4	0.75	1	1.5
Power supply equipment capacity (kVA)		1.4	2.8	4.6	6.0	8.0
Continuous output current (Arms)		1.6	2.8	5.5	7.6	11.6
Max. output current (Arms)		5.8	10.1	16.9	23.0	32.0
Main circuit	Continuous input current (Arms)	2.3	4.0	7.9	9.6	12.8
	Main circuit power supply	Single-phase 200 VAC–240 VAC, -10% to +10%, 50 Hz/60 Hz				
	Energy Loss (W)[1]	10.21	23.8	38.2	47.32	69.84
Control circuit	Control circuit power supply	Powered up by the bus, sharing the same power supply and rectification part with the main circuit				
	Energy Loss (W)[1]	16				

Item		Size A		Size B	Size C	Size D
Braking resistor	Resistance (Ω)	-	-	50	25	
	Resistor power (W)	-	-	50	80	
	Min resistance of external resistor (Ω)	40	45	40	20	15
	Max. braking energy absorbed by capacitor (J)	9.3	26.29	22.41	26.70	26.70
	Braking resistor	All models in the series support built-in and external braking resistors. But Size A does not come with a built-in braking resistor as standard				
Cooling method		Self-cooling		Air cooling		
Overvoltage class		III				

- Three-phase 220V drive

Item		Size C	Size D
Servo Drive Model		S7R6	S012
Drive Power (kW)		1	1.5
Max. applicable motor capacity (kW)		1	1.5
Power supply equipment capacity (kVA)		5.05	6.68
Continuous output current (Arms)		7.6	11.6
Max. output current (Arms)		23	32
Main circuit	Continuous input current (Arms)	5.1	8.0
	Main circuit power supply	3-phase 200 VAC–240 VAC, -10% to +10%, 50 Hz/60 Hz	
	Energy Loss (W)[1]	47.32	69.84
Control circuit	Control circuit power supply	Single-phase 200 VAC–240 VAC, -10% to +10%, 50 Hz/60 Hz	
	Energy Loss (W)[1]	16	
Braking resistor	Resistance (Ω)	25	
	Resistor power (W)	80	
	Min resistance of external resistor (Ω)	20	15
	Max. braking energy absorbed by capacitor (J)	26.70	26.70
	Braking resistor	Built-in and external resistor is supported	
Cooling mode		Air cooling	
Overvoltage class		III	

- Three-phase 380 V drive

Item	Size C		Size D		Size E		
Servo Drive Model	T3R5	T5R4	T8R4	T012	T017	T021	T026
Drive Power (kW)	1	1.5	2	3	5	6	7.5
Max. applicable motor capacity (kW)	1	1.5	2	3	5	6	7.5
Power supply equipment capacity (kVA)	6.05	9.08	10.23	15.15	22.25	25.0	31.25

Item		Size C		Size D		Size E		
Continuous output current (Arms)		3.5	5.4	8.4	11.9	16.5	20.8	25.7
Max. output current (Arms)		11	14	20	29.75	41.25	52.12	64.25
Main circuit	Continuous input current (Arms)	2.4	3.6	5.6	8.0	12.0	16.0	21.0
	Main circuit power supply	3-phase 380 VAC–440 VAC, -10% to +10%, 50 Hz/60 Hz						
	Energy Loss (W)[1]	39.5	63.25	94.82	135.47	187.62	228.28	258.63
Control circuit	Control circuit power supply	Single-phase 380 VAC–440 VAC, -10% to +10%, 50 Hz/60 Hz						
	Energy Loss (W)[1]	16						
Braking resistor	Resistance (Ω)	100	100	50	50	35	35	35
	Resistor power (W)	80	80	80	80	100	100	100
	Min resistance of external resistor (Ω)	80	60	45	40	35	25	25
	Max. braking energy absorbed by capacitor (J)	34.28	34.28	50.41	50.41	82.67	100.82	100.82
	Braking resistor	Built-in and external resistor is supported						
Cooling mode		Air cooling						
Overvoltage class		III						

Note

- [1] Main circuit energy loss refers to the energy loss under rated output current of the servo drive.
- Select the external regenerative resistor according to actual operating conditions.

2.2.2 Technical Specifications

Item				Description
Basic Specifications	Control mode			IGBT PWM control, sine wave current drive mode
				220 V, 380 V: single/three-phase full pulse rectification
	Encoder feedback			23-bit multi-turn absolute encoder, which can be used as an incremental encoder in absence of the battery
	Conditions for use	Operating/Storage temperature [1]		0°C to 55 °C (average load ratio not exceeding 80% in ambient temperatures between 45°C to 55°C) (non-freezing)/ -20°C to +70 °C
		Operating/Storage humidity		Below 90%RH (without condensation)
		Vibration resistance		4.9m/s^2
		Impact resistance		19.6 m/s^2
		IP rating		IP20
		Pollution degree		PD2
		Altitude		Max. 2000m For altitudes not higher than 1000 m, derating is not required For altitude above 1000 m, derate 1% for every additional 100 m. For altitude above 2000m, contact Inovance.
Speed torque control mode	Performance	Speed change ratio [2]	Load change ratio	Below 0.5% at 0–100% load (under rated speed)
			Voltage change ratio	0.5% at rated voltage ± 10% (under rated speed)
			Temperature change ratio	Below 0.5% at 25 ± 25°C (under rated speed).
		Speed control range		1:6000 (Under the rated torque load, the servo drive keeps running as long as the lower limit of the speed control range is not exceeded.)
		Soft startup time setting		0s to 65s (Acceleration and deceleration can be set separately.)
	Input signal	Speed reference	DI signal	Speed 0 to 15 selectable through DI signal combination
		Torque reference	DI signal	-

Item				Description
Position control mode	Performance	Feedforward compensation		0% to 100.0% (resolution: 0.1%)
		Timing window		1–65535 encoder unit
	Input signal	Pulse reference	Input pulse form	Three forms: direction+pulse, phase A + phase B quadrature pulse, CW/ CCW pulse
			Input form	Differential input; open collector
			Input pulse frequency	Differential input: single: 4 Mpps, quadrature: 8 Mpps, pulse width ⩾ 0.125 us Open collector: max. single pulse frequency: 200 Kpps, pulse width must not be less than 2.5 us
		Power supply for built-in open collector [3]		+24 V (built-in 2.4 kΩ resistor)
		Multi-position reference selection		Position 0 to position 15 selectable through DI signal combination (Other terminals can be assigned with this function.)
	Position output	Output mode		Phase A, phase B: differential output
				Phase Z: differential output or open collector output
		Frequency division ratio		Any frequency division
Input/ Output signal	DI signal	DI signal function assignment		7 DIs
				DI1 to DI5: Max. input frequency is 1 kHz (decreasing when current limit resistance is greater than 2.4 kΩ); DI8 to DI9: signal input hardware delay is less than 1 ms (current limit resistance is 2.4 kΩ)
				The DI functions are as follows: Servo enable, alarm reset, gain switching, reference switching, Mode switching, zero clamp enable, position reference inhibit, pulse reference inhibit, Forward overtravel, reverse overtravel, speed limit, torque limit, Forward and reverse jog, step enable, hand wheel switching, electronic gear selection, reference direction setting, home switch, homing enable, current position as home, emergency stop, multi-position, interrupt positioning, axis control command, position deviation clearing, positioning and command completion signal clearing
	Digital output signal	Output signal function selection		5 DOs. With-load capacity: 50 mA; Voltage range: 5 V to 30 V
				The DO function is as follows: Servo ready, motor rotation signal, zero speed signal, speed consistent, speed attained, torque attained, positioning completed, positioning proximity, torque limit, speed limit, braking, warning output, fault output, warning or fault output, interrupt positioning completed, homing completed, electrical homing completed, enable completed, internal command completed, allow to write next command, and internal motion completed

Item			Description
Built-in functions	Stop at limit switch		The servo drive stops immediately when P-OT or N-OT is active
	Electronic gear ratio		0.001 ⩽ B/A ⩽ 3355443.2
	Protection		Including protections against overcurrent, overvoltage, undervoltage, overload, main circuit detection error, heatsink overheat, power phase loss, overspeed, encoder error, CPU error, and parameter error
	LED display		Main circuit CHARGE indicator, 5-digit LED display
	Vibration Suppression		5 notches (including two adaptive notches) available, 50 Hz to 8000 Hz
	Usability functions		One-key parameter tuning, adaptive parameter tuning, speed observer, and model tracking
	Communication	Software commissioning	RJ45 Modbus
		Multi-station communication	RS485
		Number of multi-station communication axes	Up to 32 for RS485
		Axis address setting	No physical knob, set through the software
		Function	Including status display, user parameter setting, monitored value display, fault tracing display, JOG and auto-tuning, speed/torque reference signal observation, and communication and motion control command setting
	Others		Gain tuning, alarm log, JOG

Note

- [1] Install the servo drive within the allowable ambient temperature range. When it is installed inside a control cabinet, the temperature inside the cabinet must also be within this range.
- [2] The speed change ratio is defined by the following formula: Speed change ratio = (No-load speed - Full-load speed) ÷ Rated speed x 100%.
- The voltage change and temperature change may result in amplifier deviation, which causes the calculated resistance value to change. Such changes is reflected by the speed change. Speed changes caused by the voltage change and the temperature change will be indicated respectively by a percentage to the rated speed.
- [3] The internal open collector power supply is not electrically insulated from the control circuit in the servo drive.

2.2.3 Dynamic Brake Characteristics

According to the motor model, initial speed and load inertia, the dynamic braking distance can be estimated. The approximate value of the dynamic braking distance can be calculated by the following formula. For the accurate value, please use the dynamic braking calculation function provided by our software.

Maximum braking distance s (turn) is:

$$s = \frac{V_0}{60}\left(t_e + (\tau_1 + \tau_2 V_0^2)\left(1 + \frac{J_L}{J_M}\right)\right)$$

The coefficient is as follows:

$$\tau_1 = \frac{2R_s J}{3p_n^2 \Psi_f^2} = \frac{10000\pi^2 R_s J}{9K_e^2}$$

$$\tau_2 = \frac{\pi^2 L_d^2 J}{4050 R_s \Psi_f^2} = \frac{100 L_d^2 \pi^4 P_n^2 J}{243 R_s K_e^2}$$

$$\Psi_f = \frac{\sqrt{6} K_e}{100 \pi P_n}$$

- V_0: Maximum feedback speed
- t_e: Dynamic brake program and relay delay
- J_L: Load moment of inertia
- J_M: Motor moment of inertia
- P_n: Number of motor pole pairs
- R_s: Stator resistance (Ω)
- L_q, L_d: q-axis inductance (mH), d-axis inductance (mH).

2.2.4 Load Moment of Inertia

The load moment of inertia represents the inertia of the load. The larger the load moment of inertia is, the weaker the responsiveness is. An excessively high inertia may result in unstable motion. The allowable load moment of inertia of the motor is restricted. This value is provided strictly as a guideline and varies with the motor driving conditions.

An overvoltage warning may occur during deceleration if the load moment of inertia exceeds the allowable value. For servo drives with a built-in regenerative resistor, an overload alarm my be present. In case of such alarms, take one of the following measures:

- Reduce the torque limit values.
- Reduce the deceleration rate.
- Reduce the maximum speed.
- Install an external braking resistor if the alarm cannot be cleared using the above measures.

- Check the drive selection guide for the built-in brake.
- Even you use a built-in resistor, the energy generated in some conditions will exceed the allowable capacity loss (W) of the resistor. In this case, an external braking resistor is required.

3 MS1-R Series Motor

3.1 Product Information

3.1.1 Model and Nameplate

Model Description

MS1 H1 - 75B 30C B A3 3 1 R - *
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

① **MS1 series servo motor**	② **Inertia and capacity** H1: low inertia, small capacity H2: low inertia, medium capacity H3: medium inertia, medium capacity H4: medium inertia, small capacity	③ **Rated power (W)** One letter and two digits B: x 10 C: x 100 Example: 75B: 750 W
④ **Rated speed (rpm)** One letter and two digits B: x 10 C: x 100 Example: 30C: 3,000 rpm	⑤ **Voltage class (V)** B: 220 D: 380	⑥ **Encoder type** One letter and one digit A6: 26-bit multi-turn absolute encoder S6: 26-bit multi-turn absolute encoder of functional safety type A3: 23-bit multi-turn absolute encoder T3: 18-bit multi-turn absolute encoder
⑦ **Shaft connection mode** 3: Solid shaft with key and threaded hole	⑧ **Brake, reducer, oil seal**[1] 0: Without oil seal + without brake 1: With oil seal + without brake 2: Without oil seal + with brake 4: With oil seal + with brake	⑨ **Series** R: R version ⑩ **Non-standard functions** _: Standard S: Flying leads type -**: Other non-standard function

Note

- [1] The standard configuration of the motor in flange size 40 does not include the oil seal. Motors of other models carry the oil seal as standard.

Nameplate description

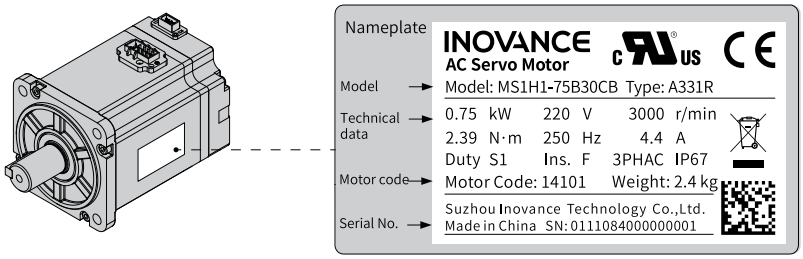


Figure 3-1 Description of the model and nameplate

3.1.2 Components

Motor (Flange sizes 40&60&80)

- **Servo motors with terminal box**

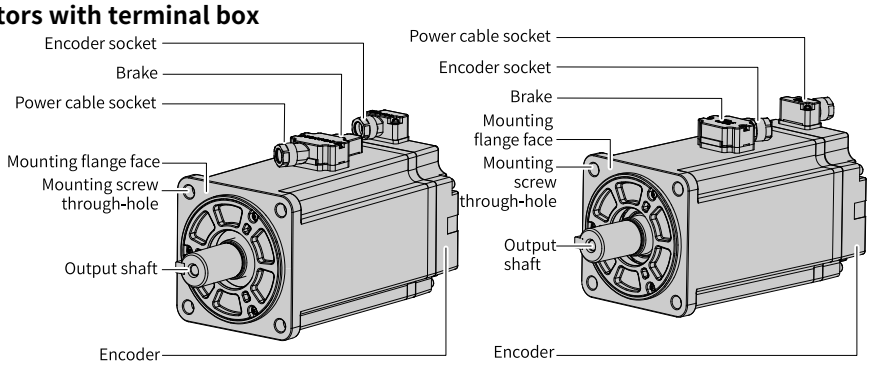


Figure 3-2 Components of motors with terminal box (left: front outlet; right: rear outlet)

- **Servo motors with flying leads**

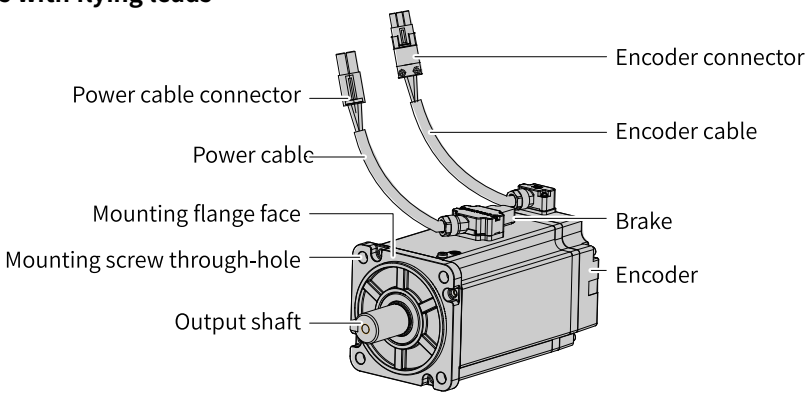


Figure 3-3 Components of motors with flying leads

Motor (Flange sizes 100&130&180)

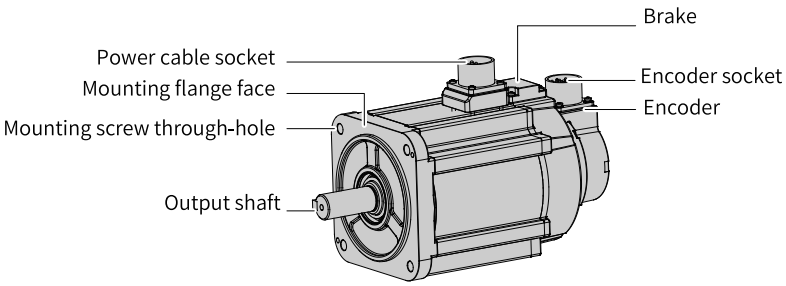


Figure 3-4 Components of servo motors in flange sizes 100/130/180

3.1.3 Motor Models

Motor type		Rated Output Capacity (kW)	Rated speed (max. speed) (RPM)	Encoder	IP rating of the enclosure
Low inertia, small capacity	MS1H1 	0.05, 0.1, 0.2, 0.4, 0.55, 0.75, 1.0	3000 (6000)	A3: 23-bit multi-turn absolute encoder	IP67
Low inertia, medium capacity	MS1H2 	1.0, 1.5, 2.0, 2.5, 3.0, 4.0, 5.0	3000 (6000)	A3: 23-bit multi-turn absolute encoder	IP67
Medium inertia, medium capacity	MS1H3 	0.85, 1.3, 1.8, 2.9, 4.4, 5.5, 7.5	1500 (3000)	A3: 23-bit multi-turn absolute encoder	IP67
Medium inertia, small capacity	MS1H4 	0.1, 0.2, 0.4, 0.55, 0.75, 1.0	3000 (6000)	A3: 23-bit multi-turn absolute encoder	IP67

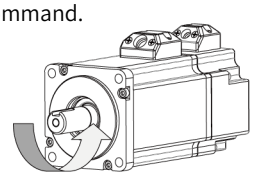
Note

40机座MS1-R系列伺服电机规划中，敬请期待!

3.2 Pro Specifications

3.2.1 Mechanical Characteristics

Item	Description
Duty type	S1(Continuous duty)
Vibration level[1]	V15

Item		Description
Insulation resistance		500 VDC, above 10 MΩ
Excitation mode		Permanent magnetic
Installation method		Flange type
Heat resistance level		F
Insulation voltage		1500 VAC, 1 min (220 V class) 1800 VAC, 1 min (380 V class)
IP rating of the enclosure		IP67 (excluding shaft opening and flying leads type motor connectors)
Direction of rotation		Rotates counterclockwise when viewed from the shaft extension side with the forward run command.  CCW
Operating conditions	Ambient temperature	0°C to 40°C (non-freezing) (Derate based on the derating curve for temperatures above 40°C.)
	Ambient humidity	20%–80% (no condensation)
	Installation location	• Free from corrosive or explosive gases • Well ventilated and with minimum amount of dust, waste and moisture • Convenient for inspection and cleanup • Derating required only for altitudes above 1000 m *"3.2.3 Derating Characteristics" on page 39* • Away from sources that may generate strong magnetic field • Away from heating sources such as a heating stove • Use the motor with oil seal in places with grinding fluid, oil mist, iron powders or cuttings. • The oil seal is only dust-proof. It cannot withstand the intrusion of oil in a long term. • No applicable to vacuum environment • Not applicable to inching condition, which may result in stuck • The motor with brake may generate a pattering sound. • Coupler type and installation alignment requirements • The system should avoid continuous operation at natural frequency. Exceeding the allowable vibration value may damage the system.
	Storage environment	Observe the following requirements for keeping a de-energized motor. • Temperature: -20°C to +60°C (non-freezing) • Humidity: 20% to 80% RH (no condensation)
Shock resistance [2]	Shock acceleration (taking flange side as standard)	490 m/s^2
	Times of shock	2
Vibration resistance[3]	Vibration acceleration (taking flange side as standard)	49 m/s^2

Note

- [1]Vibration level V15 indicates that the vibration amplitude is less than 15 μm when a single servo motor rotates at rated values.
- [2] The resistance for shock in the vertical direction when the servo motor is mounted with the shaft in a horizontal position is shown in the preceding table.
- [3] For a servo motor shaft mounted horizontally, the vibration resistance level in the up/down, left/right, and front/rear directions is shown in the preceding table.
- The strength of the vibration that the servo motor can withstand depends on the application. Check the vibration acceleration rate applied to the servo motor through the actual product.

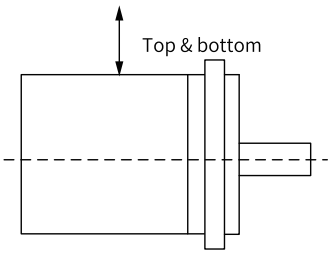


Figure 3-5 Shock applied on the motor

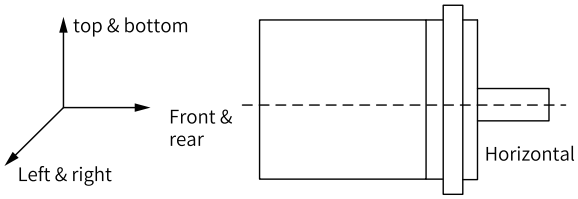


Figure 3-6 Vibration applied on the motor

3.2.2 Overload Characteristics

The equipment is compliant with NEC and CEC requirements and equipped with protective functions against overload and overtemperature.

For effective protection of different load motors, set the motor overload protection gain according to the motor overload capacity. Use the default gains in general conditions, however, when one of the following condition occurs, change the gains based on the temperature rise condition of the motor:

- The motor operates in environments with high temperature.
- The motor is in cyclic motion featuring a short motion cycle and frequent acceleration/ deceleration.
- The thermal overload protection only occurs during continuous operation. In this case, power off the drive to check the motor temperature.

The motor overload protection curve is shown in the following figure.

- **MS1H1/MS1H4**

Load ratio (%)	Operating time (s)
120	230
130	80
140	40
150	30
160	20

Load ratio (%)	Operating time (s)
170	17
180	15
190	12
200	10
210	8.5
220	7
230	6
240	5.5
250	5
300	3
350	2

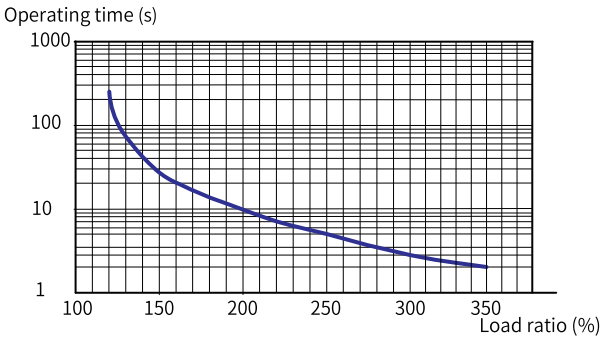


Figure 3-7 MS1H1 and MS1H4 series motor overload curves

Note

The maximum torque of MS1H1 and MS1H4 models is 3.5 times the rated torque.

- **MS1H2/MS1H3**

Load ratio (%)	Operating time (s)
115	6000
121.4	2000
127.8	1000
134.2	800
140.6	500
147	300
153.4	150
159.8	100
166.2	80
172.6	60
179.0	50
185.4	45
191.8	40
198.2	36
204.6	32
211.0	28
217.4	23
223.8	22
230.2	19
236.6	18
243.0	15

Load ratio (%)	Operating time (s)
249.4	14
255.8	13
262.2	11
268.6	10
275.0	9
281.4	8
287.8	7
294.2	6

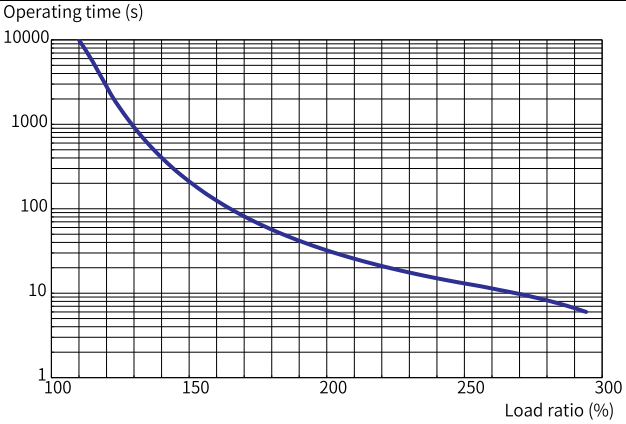


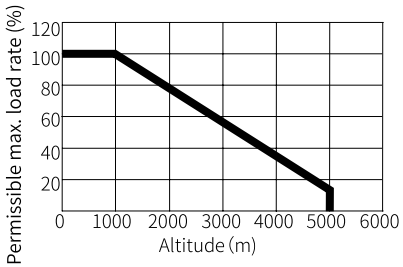
Figure 3-8 MS1H2 and MS1H3 series motor overload curves

Note

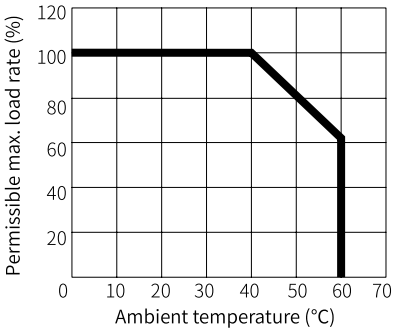
- The maximum torque of H2 models is three times the rated torque.
- The maximum torque of H3 models is 2.5 times the rated torque.

3.2.3 Derating Characteristics

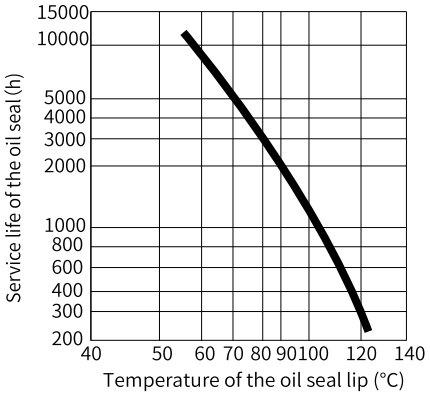
- **Altitude-based derating curve**



- **Temperature-based derating curve**

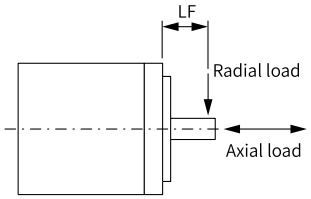


3.2.4 Temperature Curve of the Oil Seal

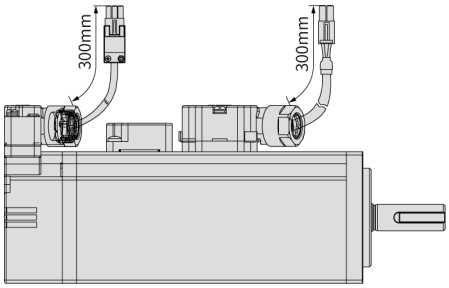


3.3 Selection Instructions

- Description of the torque-speed characteristics curve:
  - Technical data and torque/speed characteristic values in the following tables are applicable to motors working with Inovance servo drives with the the armature coil temperature being 20°C.
  - Continuous working area: refers to a series of states in which the motor can operate safely and continuously, and the actual torque must be located in this area.
  - Short-time working area: refers to a series of states in which the motor can run in a short time when the actual torque is greater than the rated torque.
- The characteristic parameter values are obtained in cases where the motor is installed with the following heatsink:
  - MS1H1/MS1H4: 250 × 250 × 6 (mm) (aluminum)
  - MS1H2-10C to 25C: 400 × 400 × 20 (mm) (steel)
  - MS1H2-30C to 50C: 400 × 400 × 20 (mm) (steel)
  - MS1H3-85B to 18C: 400 × 400 × 20 (mm) (steel)
  - MS1H3-29C to 55C: 550 × 550 × 30 ((mm) (aluminum)
  - MS1H3-75C: 700 × 700 × 30 (mm) (aluminum)
- Radial and axial loads of the motor:



- Dimensions of flying leads type motors
  The 40/60/80-flange flying leads type motor (with “-S”) provides a drain wire of about 300 mm long, as shown in the following figure.



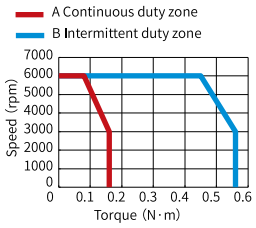
- MS1H3 (130-flange and 180-flange) comes with a key slot. When the operating speed is above 3000 rpm, the motor must run with the key. If you need to run the motor without the key, you can ask for customization from Inovance.

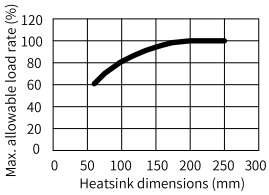
Note

- The data in the () is the value of the servo motor with the brake.
- The motor with oil seal must be derated by 10% during use.
- It is recommended that the cross sectional area of brake cables is above 0.5 mm^2.
- The brake must not share the power supply with other electrical devices. This is to prevent a malfunction of the brake due to a drop in the voltage or current when other electrical devices work in tandem.
- The holding brake cannot be used for braking purpose.
- The release time and operation time of the brake depend on the discharge circuit. Be sure to confirm the operation delay of your equipment before use.
- You need to prepare the 24 VDC power supply yourself.
- The tightening tension for terminal screws must be between **0.19 N·m to 0.21 N·m**, exceeding of which may damage the terminal.

3.4 Motors with Low Inertia and Small Capacity (MS1H1)

3.4.1 MS1H1-05B30CB-A33*Z

Motor specifications		Torque-Speed characteristics
Flange size (mm)	40	
Inertia, capacity	Low inertia, small capacity	
Rated power (kW)	0.05	
Rated voltage	220	
Rated torque (N·m)	0.16	
Maximum torque (N·m)	0.56	
Rated current (Arms)	1.3	Heatsink-based derating curve

Motor specifications			Torque-Speed characteristics
Maximum current (Arms)	4.70		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/Arms)	0.15		
Rotor moment of inertia (kg·cm^2)	Motor without brake	0.026	
	Motor with brake	0.028	

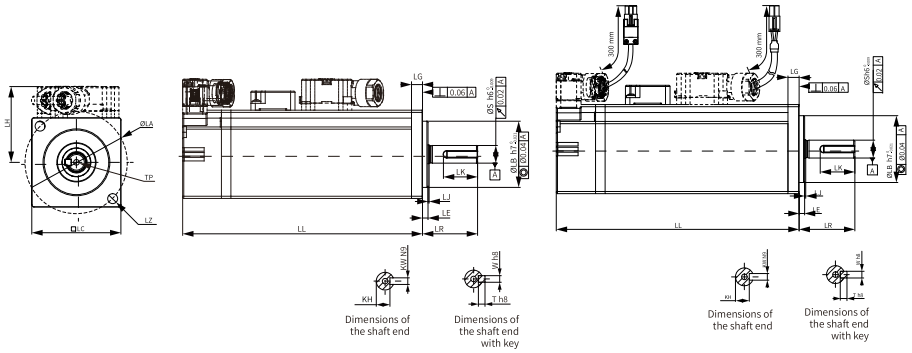
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω)(±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
0.32	24	6.1	94.4	0.25	⩽ 40	⩽ 20	⩽ 1.5

Allowable load

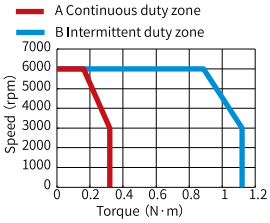
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
20	78	54

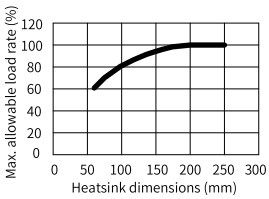
Dimensions (mm)



LL	LC	LR	LA	LZ	LH	LG	LE	LJ
65.4 (96)	40	25±0.3	46	2-Ø4.5	34.3	5	2.5±0.5	0.5±0.35
S	LB	TP	LK	KH	KW	W	T	Weight (kg)
8	Ø30h7$^{0}_{-0.021}$	M3x6	15.5	6.2-$^{0}_{}$0.1	3	3	3	0.39 (0.50)

3.4.2 MS1H1-10B30CB-A33*Z

Motor specifications		Torque-Speed characteristics
Flange size (mm)	40	
Inertia, capacity	Low inertia, small capacity	
Rated power (kW)	0.1	
Rated voltage	220	
Rated torque (N·m)	0.32	
Maximum torque (N·m)	1.12	
Rated current (Arms)	1.3	Heatsink-based derating curve

Motor specifications			Torque-Speed characteristics
Maximum current (Arms)	4.70		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/Arms)	0.26		
Rotor moment of inertia (kg·cm^2)	Motor without brake	0.041	
	Motor with brake	0.043	

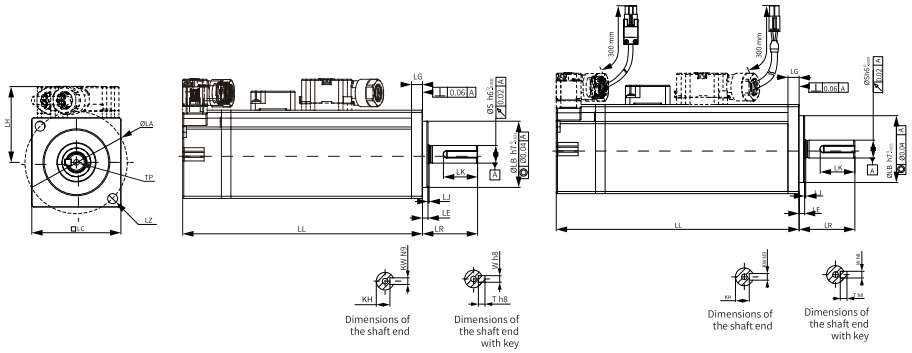
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω)(±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
0.32	24	6.1	94.4	0.25	⩽ 40	⩽ 20	⩽ 1.5

Allowable load

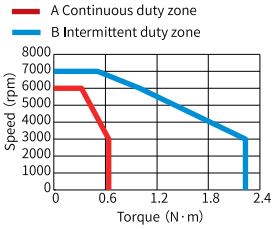
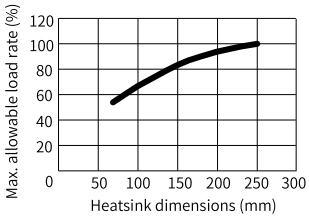
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
20	78	54

Dimensions (mm)



LL	LC	LR	LA	LZ	LH	LG	LE	LJ
78.4 (110)	40	25±0.3	46	2-Ø4.5	34.3	5	2.5±0.5	0.5±0.35
S	LB	TP	LK	KH	KW	W	T	Weight (kg)
8	Ø30h7$^{0}_{-0.021}$	M3x6	15.5	6.2$^{0}_{-0.1}$	3	3	3	0.45 (0.64)

3.4.3 MS1H1-20B30CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	60		
Inertia, capacity	Low inertia, small capacity		
Rated power (kW)	0.2		
Voltage (V)	220		
Rated torque (N·m)	0.64		
Maximum torque (N·m)	2.24		
Rated current (Arms)	1.5		Heatsink-based derating curve
Maximum current (Arms)	5.8		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/Arms)	0.46		
Rotor moment of inertia (kg·cm^2)	Motor without brake	0.094	
	Motor with brake	0.106	

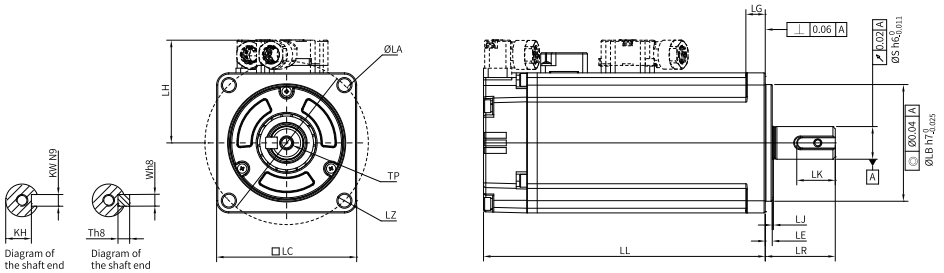
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
1.5	24	7.6	75.79	0.32	⩽ 60	⩽ 20	⩽ 1.5

Allowable load

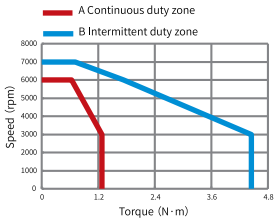
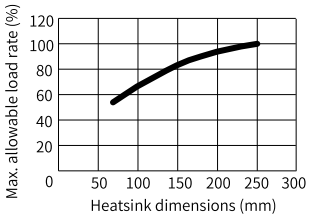
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
25	245	74

Dimensions (mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
60	75.5 (103)	30±0.5	70	4- Ø 5.5	44	8.0	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
Ø50h7$^{0}_{-0.025}$	14	M5x8	16.5	11$^{0}_{-0.1}$	5	5	5	0.80 (1.17)

3.4.4 MS1H1-40B30CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	60		
Inertia, capacity	Low inertia, small capacity		
Rated power (kW)	0.4		
Voltage (V)	220		
Rated torque (N·m)	1.27		
Maximum torque (N·m)	4.45		
Rated current (Arms)	2.5		Heatsink-based derating curve
Maximum current (Arms)	9.8		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/Arms)	0.53		
Rotor moment of inertia (kg·cm^2)	Motor without brake	0.145	
	Motor with brake	0.157	

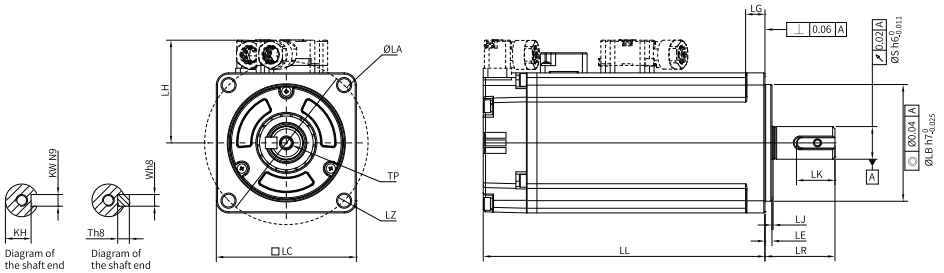
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
1.5	24	7.6	75.79	0.32	⩽ 60	⩽ 20	⩽ 1.5

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
25	245	74

Dimensions (mm)

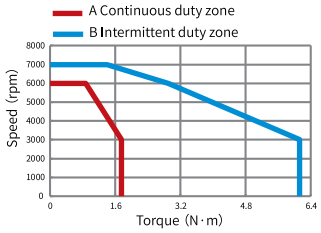


LC	LL	LR	LA	LZ	LH	LG	LE	LJ
60	93 (121)	30 ± 0.5	70	4- Ø 5.5	44	8.0	3 ± 0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
Ø50h7$^{0}_{-0.025}$	14	M5x8	16.5	11$^{0}_{-0.1}$	5	5	5	1.11 (1.48)

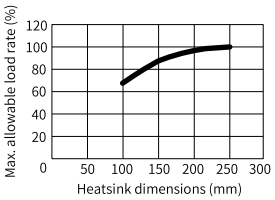
3.4.5 MS1H1-55B30CB-A331R

Motor specifications		
Flange size (mm)	80	
Inertia, capacity	Low inertia, small capacity	
Rated power (kW)	0.55	
Voltage (V)	220	
Rated torque (N·m)	1.75	
Maximum torque (N·m)	6.13	
Rated current (Arms)	3.9	
Maximum current (Arms)	15	
Rated speed (rpm)	3000	
Maximum speed (rpm)	7000	
Torque coefficient (N·m/Arms)	0.49	
Rotor moment of inertia (kg·cm^2)	Motor without brake	0.55
	Motor with brake	-

Torque-Speed characteristics



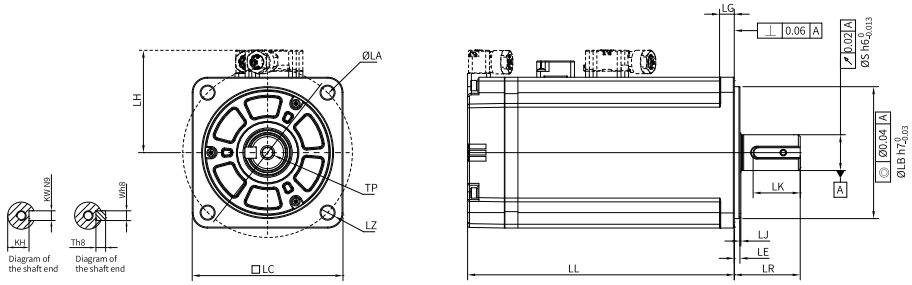
Heatsink-based derating curve



Allowable load

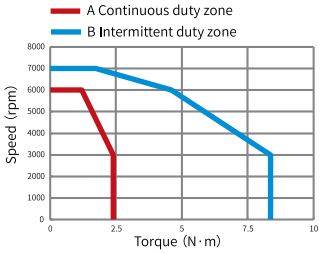
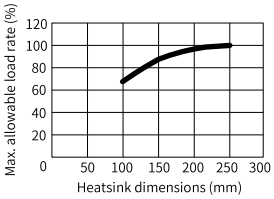
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	392	147

Dimensions (mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	96.7	25±0.5	90	4- Ø 7	54	7.5	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
Ø70h7$^{0}_{-0.03}$	19	M6 x 20	26	15.5$^{0}_{-0.1}$	6	6	6	1.88

3.4.6 MS1H1-75B30CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	80		
Inertia, capacity	Low inertia, small capacity		
Rated power (kW)	0.75		
Voltage (V)	220		
Rated torque (N·m)	2.39		
Maximum torque (N·m)	8.37		
Rated current (Arms)	4.4		Heatsink-based derating curve
Maximum current (Arms)	16.9		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/Arms)	0.58		
Rotor moment of inertia (kg·cm^2)	Motor without brake	0.68	
	Motor with brake	0.71	

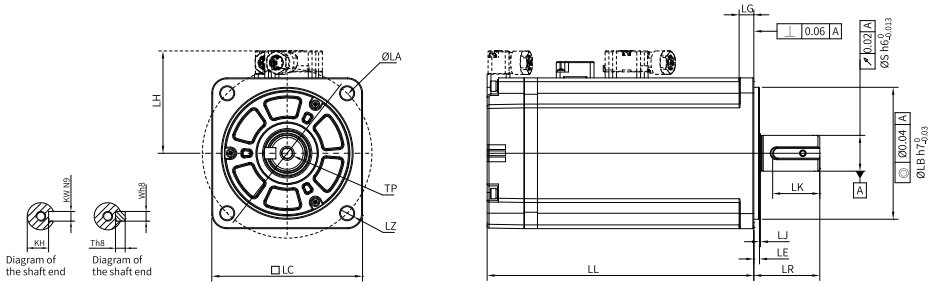
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
3.2	24	10	57.6	0.42	⩽ 60	⩽ 40	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	392	147

Dimensions (mm)

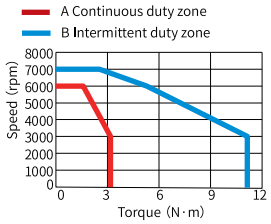


LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	107.3 (141.5)	25±0.5	90	4- Ø 7	54	7.5	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
Ø70h7$^{0}_{-0.03}$	19	M6 × 20	26	15.5$^{0}_{-0.1}$	6	6	6	2.22 (2.88)

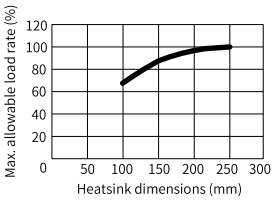
3.4.7 MS1H1-10C30CB-A33*R

Motor specifications		
Flange size (mm)	80	
Inertia, capacity	Low inertia, small capacity	
Rated power (kW)	1.0	
Voltage (V)	220	
Rated torque (N·m)	3.18	
Maximum torque (N·m)	11.13	
Rated current (Arms)	6.2	
Maximum current (Arms)	24	
Rated speed (rpm)	3000	
Maximum speed (rpm)	7000	
Torque coefficient (N·m/Arms)	0.46	
Rotor moment of inertia (kg·cm^2)	Motor without brake	0.82
	Motor with brake	0.87

Torque-Speed characteristics



Heatsink-based derating curve



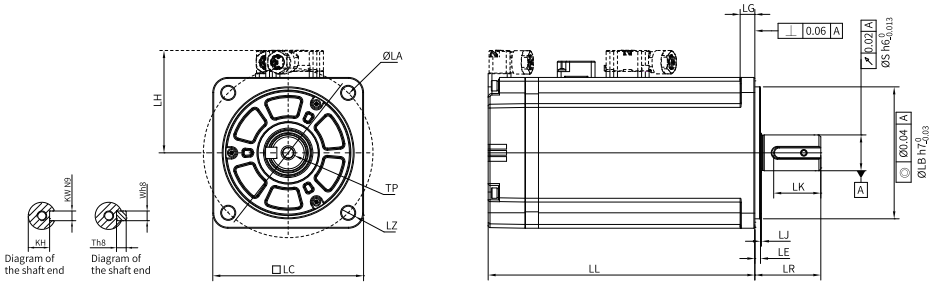
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
3.2	24	10	57.6	0.42	⩽ 60	⩽ 40	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	392	147

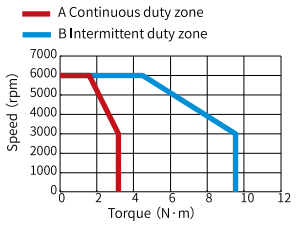
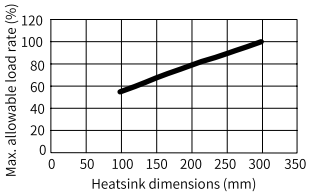
Dimensions (mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	119.2 (153.4)	25±0.5	90	4- Ø 7	54	7.5	3 ± 0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
Ø 70h7$^{0}_{-0.03}$	19	M6 × 20	26	15.5$^{0}_{-0.1}$	6	6	6	2.61 (3.27)

3.5 Motors with Low Inertia and Medium Capacity (MS1H2)

3.5.1 MS1H2-10C30CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	1.0		
Voltage (V)	220		
Rated torque (N·m)	3.18		
Maximum torque (N·m)	9.54		
Rated current (Arms)	6.4		Heatsink-based derating curve
Maximum current (Arms)	23		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/Arms)	0.54		
Rotor moment of inertia (kg·cm^2)	Motor without brake	1.78	
	Motor with brake	2.6	

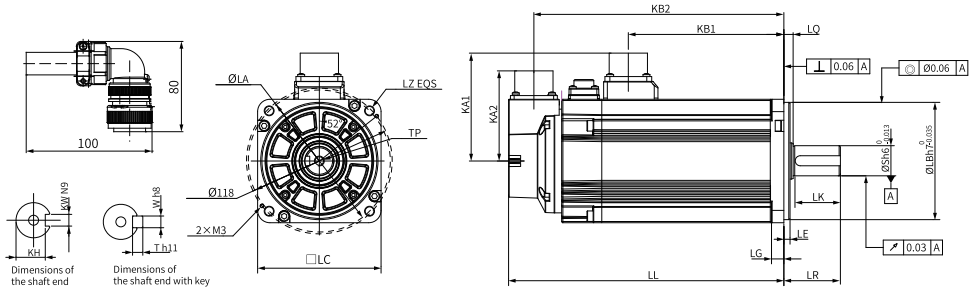
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
8	24	17.6	32.73	0.73	⩽ 100	⩽ 40	⩽ 1

Allowable load

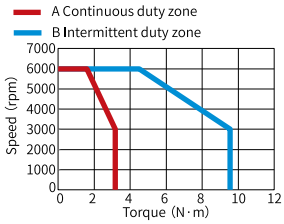
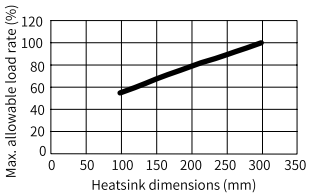
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	686	196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	144 (172)	45±1	115	4-Ø7	88	75	74	123.5 (151.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	Ø95h7$^{0}_{-0.035}$		24	M8x16	36	20$^{0}_{-0.2}$	8	8	7	3.85 (4.9)

3.5.2 MS1H2-10C30CD-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	1.0		
Voltage (V)	380		
Rated torque (N·m)	3.18		
Maximum torque (N·m)	9.54		
Rated current (Arms)	3.3		Heatsink-based derating curve
Maximum current (Arms)	11		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/Arms)	1.07		
Rotor moment of inertia (kg·cm^2)	Motor without brake	1.78	
	Motor with brake	2.6	

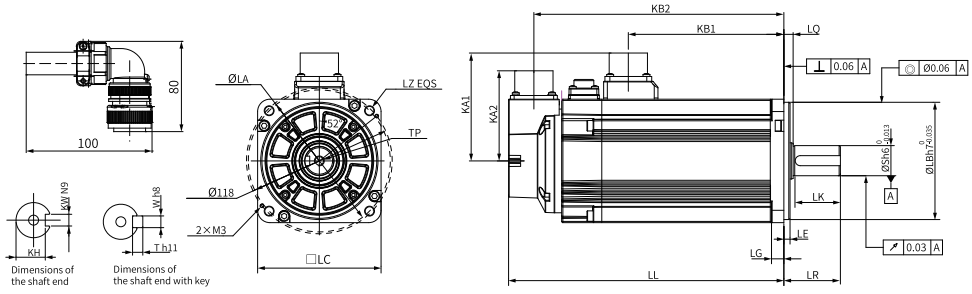
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
8	24	17.6	32.73	0.73	⩽ 100	⩽ 40	⩽ 1

Allowable load

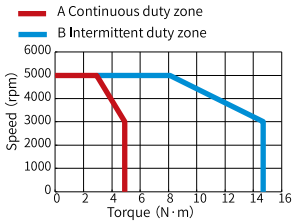
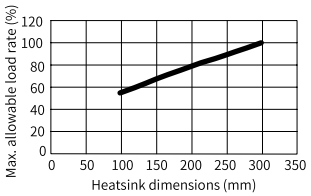
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	686	196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	144 (172)	45±1	115	4-Ø7	88	75	74	123.5 (151.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	Ø95h7$^{0}_{-0.035}$		24	M8x16	36	20$^{0}_{-0.2}$	8	8	7	3.85 (4.9)

3.5.3 MS1H2-15C30CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	1.5		
Voltage (V)	220		
Rated torque (N·m)	4.9		
Maximum torque (N·m)	14.7		
Rated current (Arms)	8.6		Heatsink-based derating curve
Maximum current (Arms)	32		
Rated speed (rpm)	3000		
Maximum speed (rpm)	5000		
Torque coefficient (N·m/Arms)	0.62		
Rotor moment of inertia (kg·cm^2)	Motor without brake	2.35	
	Motor with brake	3.17	

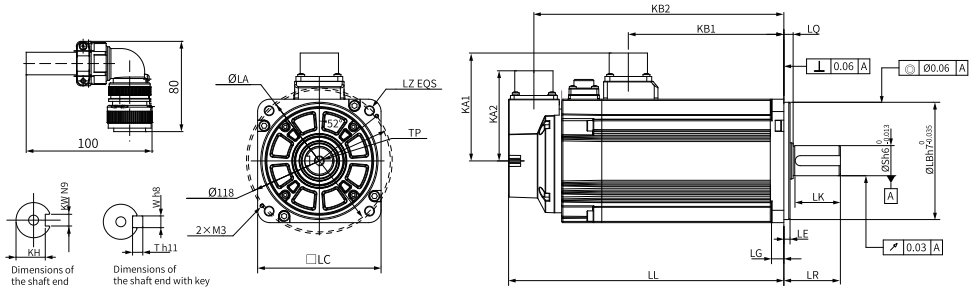
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
8	24	17.6	32.73	0.73	⩽ 100	⩽ 40	⩽ 1

Allowable load

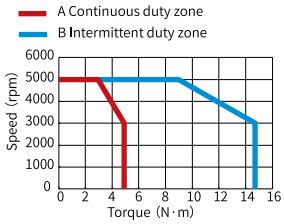
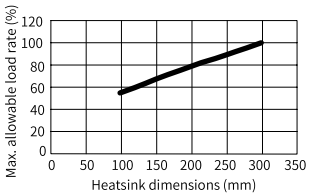
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	686	196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	161 (189)	45±1	115	4-Ø7	88	92	74	140.5 (168.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	Ø95h7$^{0}_{-0.035}$		24	M8x16	36	20$^{0}_{-0.2}$	8	8	7	4.65 (5.75)

3.5.4 MS1H2-15C30CD-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	1.5		
Voltage (V)	380		
Rated torque (N·m)	4.9		
Maximum torque (N·m)	14.7		
Rated current (Arms)	4.2		Heatsink-based derating curve
Maximum current (Arms)	14		
Rated speed (rpm)	3000		
Maximum speed (rpm)	5000		
Torque coefficient (N·m/Arms)	1.28		
Rotor moment of inertia (kg·cm^2)	Motor without brake	2.35	
	Motor with brake	3.17	

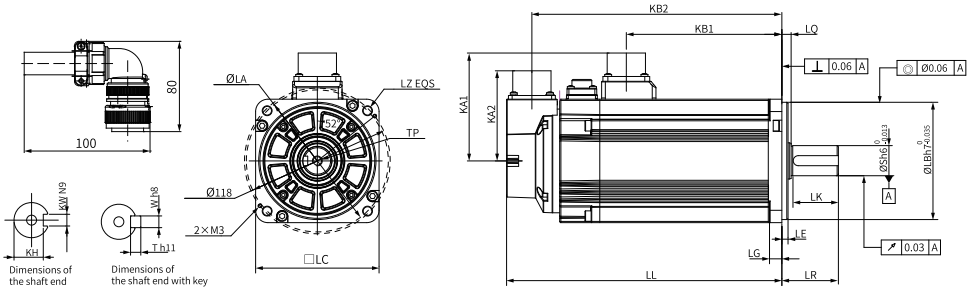
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
8	24	17.6	32.73	0.73	⩽ 100	⩽ 40	⩽ 1

Allowable load

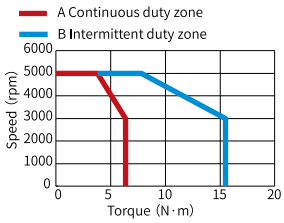
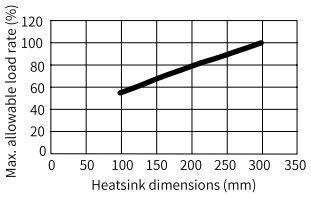
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	686	196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	161 (189)	45±1	115	4-Ø7	88	92	74	140.5 (168.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	Ø95h7$^{0}_{-0.035}$		24	M8x16	36	20$^{0}_{-0.2}$	8	8	7	4.65 (5.75)

3.5.5 MS1H2-20C30CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	2.0		
Voltage (V)	220		
Rated torque (N·m)	6.36		
Maximum torque (N·m)	15.5		
Rated current (Arms)	11.3		Heatsink-based derating curve
Maximum current (Arms)	32		
Rated speed (rpm)	3000		
Maximum speed (rpm)	5000		
Torque coefficient (N·m/Arms)	0.60		
Rotor moment of inertia (kg·cm^2)	Motor without brake	2.92	
	Motor with brake	3.74	

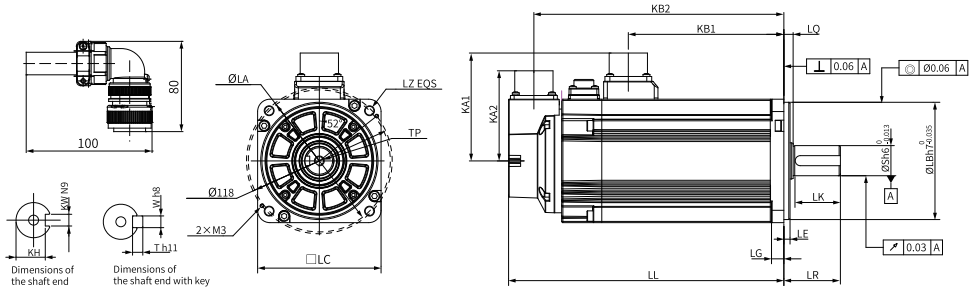
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
8	24	17.6	32.73	0.73	⩽ 100	⩽ 40	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	686	196

Dimensions (mm)

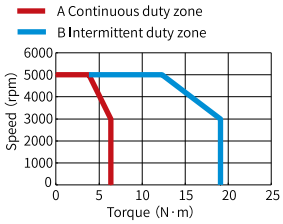


LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	177 (205)	45±1	115	4-Ø7	88	108	74	156.5 (184.5)	10	5±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	Ø95h7$^{0}_{-0.035}$		24	M8x16	36	20$^{0}_{-0.2}$	8	8	7	5.5 (6.55)

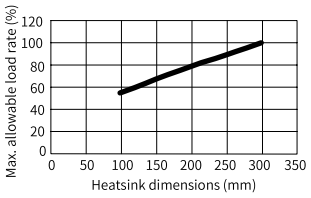
3.5.6 MS1H2-20C30CD-A33*R

Motor specifications		
Flange size (mm)	100	
Inertia, capacity	Low inertia, medium capacity	
Rated power (kW)	2.0	
Voltage (V)	380	
Rated torque (N·m)	6.36	
Maximum torque (N·m)	19.1	
Rated current (Arms)	5.6	
Maximum current (Arms)	20	
Rated speed (rpm)	3000	
Maximum speed (rpm)	5000	
Torque coefficient (N·m/Arms)	1.19	
Rotor moment of inertia (kg·cm^2)	Motor without brake	2.92
	Motor with brake	3.74

Torque-Speed characteristics



Heatsink-based derating curve



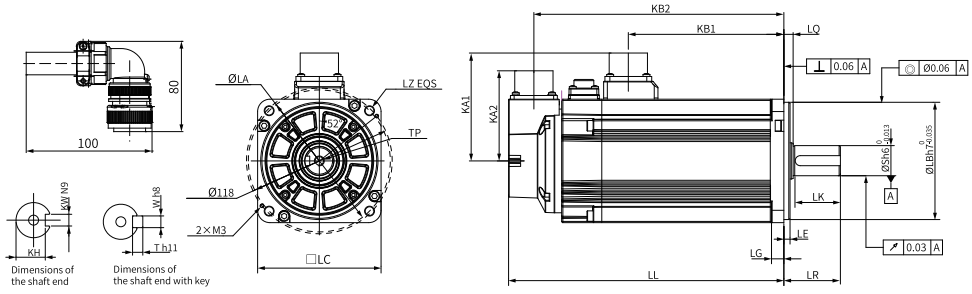
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
8	24	17.6	32.73	0.73	⩽ 100	⩽ 40	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	686	196

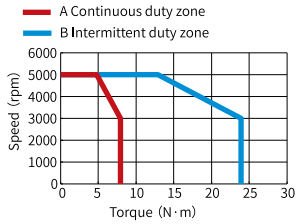
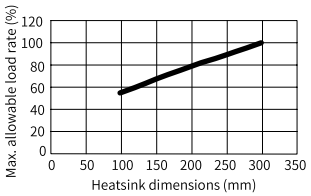
Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	177 (205)	45±1	115	4-Ø7	88	108	74	156.5 (184.5)	10	5±0.3

LJ	LB	S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	Ø95h7$^{0}_{-0.035}$	24	M8x16	36	20$^{0}_{-0.2}$	8	8	7	5.5 (6.55)

3.5.7 MS1H2-25C30CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	2.5		
Voltage (V)	220		
Rated torque (N·m)	7.96		
Maximum torque (N·m)	23.9		
Rated current (Arms)	14.7		Heatsink-based derating curve
Maximum current (Arms)	53		
Rated speed (rpm)	3000		
Maximum speed (rpm)	5000		
Torque coefficient (N·m/Arms)	0.60		
Rotor moment of inertia (kg·cm^2)	Motor without brake	3.49	
	Motor with brake	4.3	

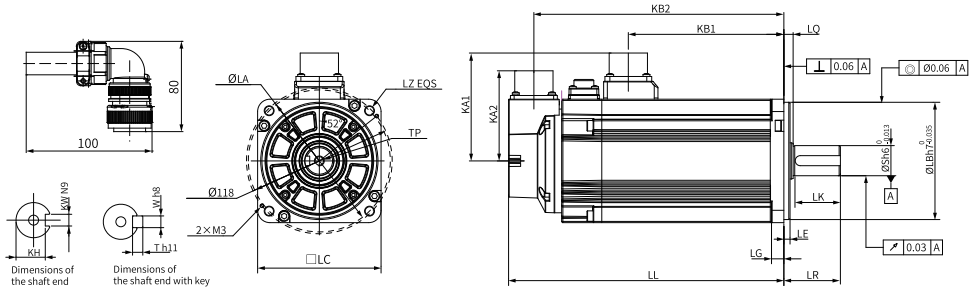
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
8	24	17.6	32.73	0.73	⩽ 100	⩽ 40	⩽ 1

Allowable load

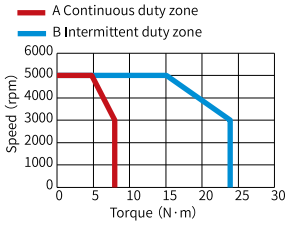
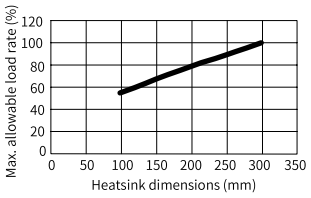
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	686	196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2 [Note]	KB2	LG	LE
100	195 (223)	45±1	115	4-Ø7	88	126	73	174.5 (202.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	Ø95h7$^{0}_{-0.035}$		24	M8x16	36	20$^{0}_{-0.2}$	8	8	7	6.3 (7.35)

3.5.8 MS1H2-25C30CD-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	2.5		
Voltage (V)	380		
Rated torque (N·m)	7.96		
Maximum torque (N·m)	23.9		
Rated current (Arms)	7.2		Heatsink-based derating curve
Maximum current (Arms)	26		
Rated speed (rpm)	3000		
Maximum speed (rpm)	5000		
Torque coefficient (N·m/Arms)	1.18		
Rotor moment of inertia (kg·cm^2)	Motor without brake	3.49	
	Motor with brake	4.3	

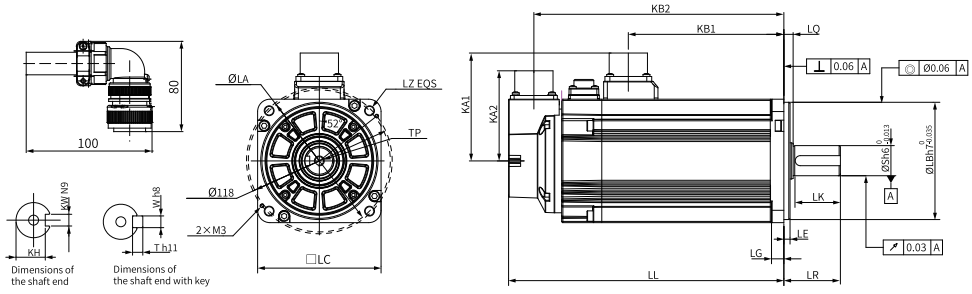
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
8	24	17.6	32.73	0.73	⩽ 100	⩽ 40	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	686	196

Dimensions (mm)

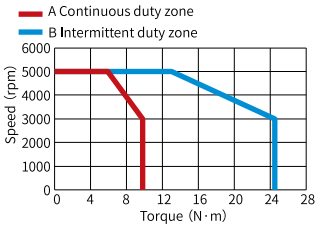


LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	195 (223)	45±1	115	4-Ø7	88	126	74	174.5 (202.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	Ø95h7$^{0}_{-0.035}$		24	M8x16	36	20$^{0}_{-0.2}$	8	8	7	6.3 (7.35)

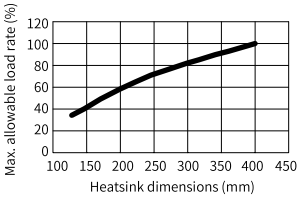
3.5.9 MS1H2-30C30CB-A33*R

Motor specifications		
Flange size (mm)	130	
Inertia, capacity	Low inertia, medium capacity	
Rated power (kW)	3.0	
Voltage (V)	220	
Rated torque (N·m)	9.8	
Maximum torque (N·m)	24.5	
Rated current (Arms)	16.6	
Maximum current (Arms)	55	
Rated speed (rpm)	3000	
Maximum speed (rpm)	5000	
Torque coefficient (N·m/Arms)	0.67	
Rotor moment of inertia (kg·cm^2)	Motor without brake	6.4
	Motor with brake	9.38

Torque-Speed characteristics



Heatsink-based derating curve



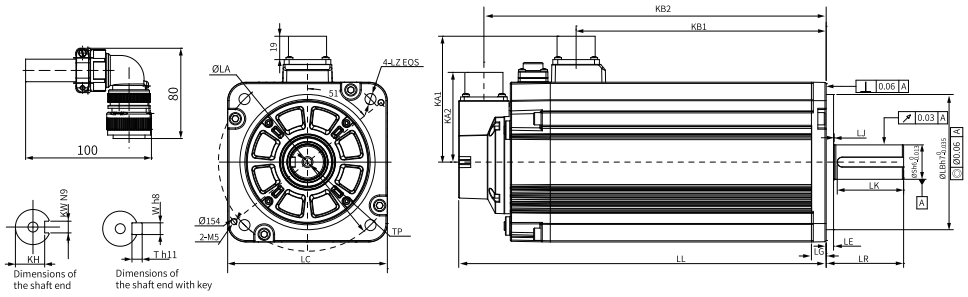
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	⩽ 120	⩽ 60	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	1176	392

Dimensions (mm)

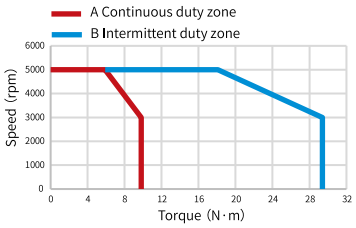


LC	LL	LR	LA	LZ	KA1	KB1	KA2 [Note]	KB2	LG	LE
130	198 (223)	63±1	145	4-Ø9	102.4	127.5	73	177.5 (202.5)	12	6±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø110h7$^{0}_{-0.035}$		28	M8 × 20	54	24$^{0}_{-0.2}$	8	8	7	10.0 (11.9)

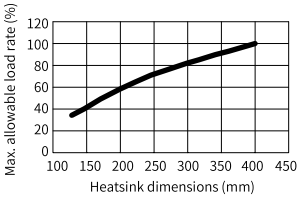
3.5.10 MS1H2-30C30CD-A33*R

Motor specifications		
Flange size (mm)	130	
Inertia, capacity	Low inertia, medium capacity	
Rated power (kW)	3.0	
Voltage (V)	380	
Rated torque (N·m)	9.8	
Maximum torque (N·m)	29.4	
Rated current (Arms)	8.9	
Maximum current (Arms)	29	
Rated speed (rpm)	3000	
Maximum speed (rpm)	6000	
Torque coefficient (N·m/Arms)	1.25	
Rotor moment of inertia (kg·cm^2)	Motor without brake	6.4
	Motor with brake	9.38

Torque-Speed characteristics



Heatsink-based derating curve



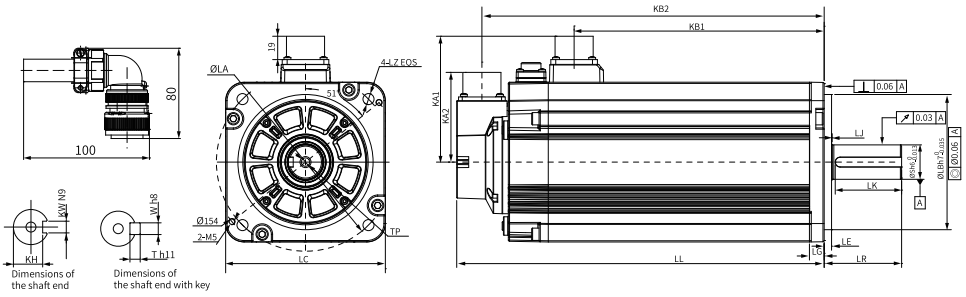
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	⩽ 120	⩽ 60	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	1176	392

Dimensions (mm)



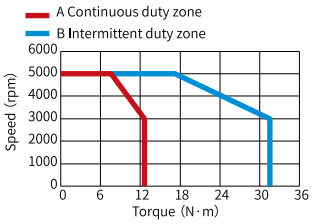
LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	198 (223)	63±1	145	4-Ø9	102.4	127.5	74	177.5 (202.5)	12	6±0.3

LJ	LB	S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø110h7$^{0}_{-0.035}$	28	M8 × 20	54	24$^{0}_{-0.2}$	8	8	7	10.0 (11.9)

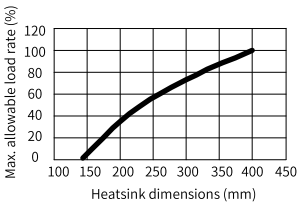
3.5.11 MS1H2-40C30CB-A33*R

Motor specifications		
Flange size (mm)	130	
Inertia, capacity	Low inertia, medium capacity	
Rated power (kW)	4.0	
Voltage (V)	220	
Rated torque (N·m)	12.6	
Maximum torque (N·m)	31.5	
Rated current (Arms)	22	
Maximum current (Arms)	67.5	
Rated speed (rpm)	3000	
Maximum speed (rpm)	5000	
Torque coefficient (N·m/Arms)	0.65	
Rotor moment of inertia (kg·cm^2)	Motor without brake	9
	Motor with brake	11.98

Torque-Speed characteristics



Heatsink-based derating curve



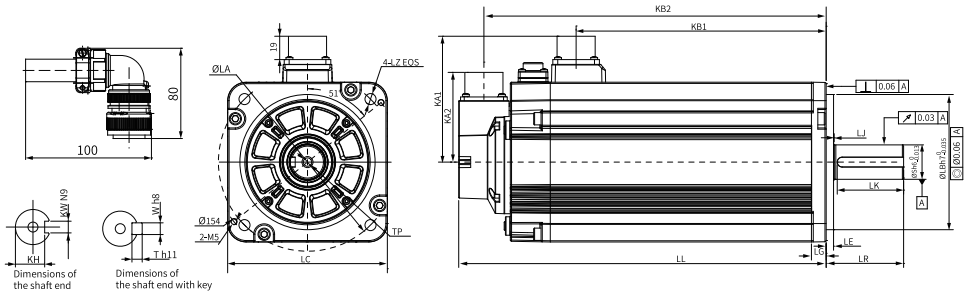
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	⩽ 120	⩽ 60	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	1176	392

Dimensions (mm)

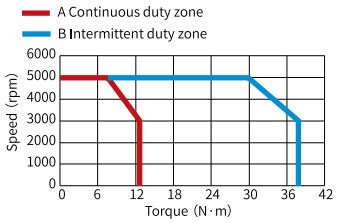


LC	LL	LR	LA	LZ	KA1	KB1	KA2 [Note]	KB2	LG	LE
130	236 (261)	63±1	145	4-Ø9	102.4	165.5	73	215.5 (240.5)	12	6±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø110h7$^{0}_{-0.035}$		28	M8 × 20	54	24$^{0}_{-0.2}$	8	8	7	13.2 (15.1)

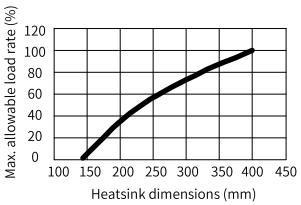
3.5.12 MS1H2-40C30CD-A33*R

Motor specifications		
Flange size (mm)	130	
Inertia, capacity	Low inertia, medium capacity	
Rated power (kW)	4.0	
Voltage (V)	380	
Rated torque (N·m)	12.6	
Maximum torque (N·m)	37.8	
Rated current (Arms)	13.5	
Maximum current (Arms)	42.5	
Rated speed (rpm)	3000	
Maximum speed (rpm)	5000	
Torque coefficient (N·m/Arms)	1.06	
Rotor moment of inertia (kg·cm^2)	Motor without brake	9
	Motor with brake	11.98

Torque-Speed characteristics



Heatsink-based derating curve



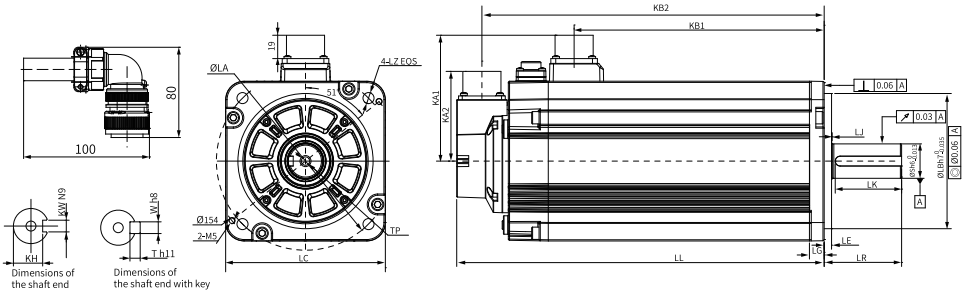
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	⩽ 120	⩽ 60	⩽ 1

Allowable load

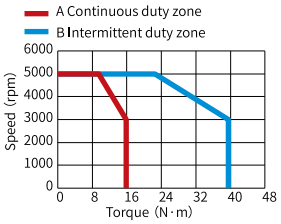
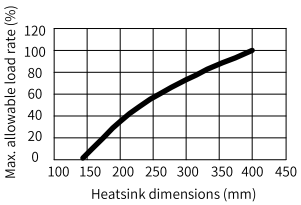
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	1176	392

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	236 (261)	63±1	145	4-Ø9	102.4	165.5	74	215.5 (240.5)	12	6±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø110h7$^{0}_{-0.035}$		28	M8 × 20	54	24$^{0}_{-0.2}$	8	8	7	13.2 (15.1)

3.5.13 MS1H2-50C30CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	130		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	5.0		
Voltage (V)	220		
Rated torque (N·m)	15.8		
Maximum torque (N·m)	39.5		
Rated current (Arms)	22		Heatsink-based derating curve
Maximum current (Arms)	67.5		
Rated speed (rpm)	3000		
Maximum speed (rpm)	5000		
Torque coefficient (N·m/Arms)	0.81		
Rotor moment of inertia (kg·cm^2)	Motor without brake	11.6	
	Motor with brake	14.58	

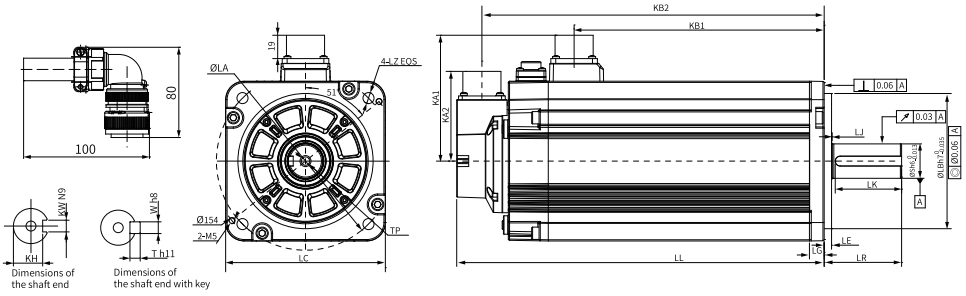
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	⩽ 120	⩽ 60	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	1176	392

Dimensions (mm)

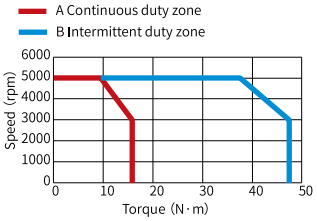


LC	LL	LR	LA	LZ	KA1	KB1	KA2 [Note]	KB2	LG	LE
130	274 (299)	63±1	145	4-Ø9	102.4	203.5	73	253.5 (278.5)	12	6±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø110h7$^{0}_{-0.035}$		28	M8 × 20	54	24$^{0}_{-0.2}$	8	8	7	16.35 (18.25)

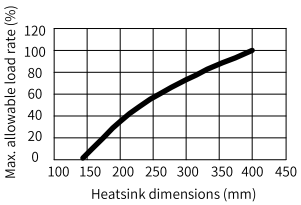
3.5.14 MS1H2-50C30CD-A33*R

Motor specifications		
Flange size (mm)	130	
Inertia, capacity	Low inertia, medium capacity	
Rated power (kW)	5.0	
Voltage (V)	380	
Rated torque (N·m)	15.8	
Maximum torque (N·m)	47.4	
Rated current (Arms)	17	
Maximum current (Arms)	52.5	
Rated speed (rpm)	3000	
Maximum speed (rpm)	5000	
Torque coefficient (N·m/Arms)	1.04	
Rotor moment of inertia (kg·cm^2)	Motor without brake	11.6
	Motor with brake	14.58

Torque-Speed characteristics



Heatsink-based derating curve



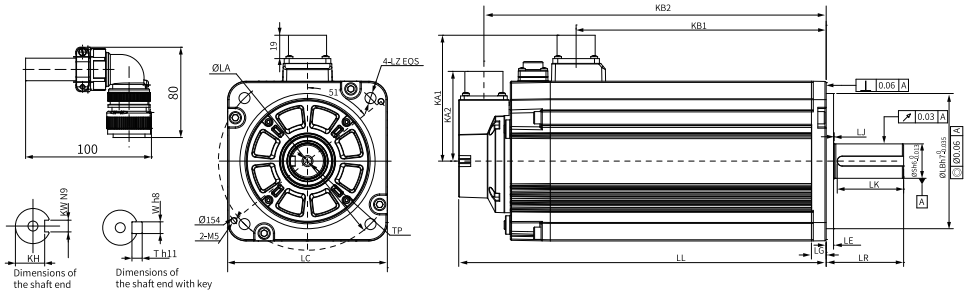
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	⩽ 120	⩽ 60	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	1176	392

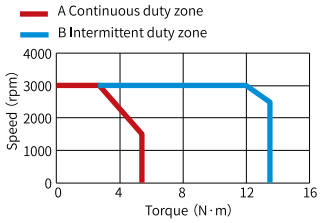
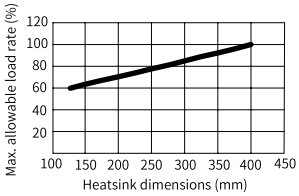
Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	274 (299)	63±1	145	4-Ø9	102.4	203.5	74	253.5 (278.5)	12	6±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø110h7$^{0}_{-0.035}$		28	M8 × 20	54	24$^{0}_{-0.2}$	8	8	7	16.35 (18.25)

3.6 Motors with Medium Inertia and Medium Capacity (MS1H3)

3.6.1 MS1H3-85B15CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	130		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	0.85		
Voltage (V)	220		
Rated torque (N·m)	5.39		
Maximum torque (N·m)	13.5		
Rated current (Arms)	6.6		Heatsink-based derating curve
Maximum current (Arms)	17.2		
Rated speed (rpm)	1500		
Maximum speed (rpm)	3000		
Torque coefficient (N·m/Arms)	0.93		
Rotor moment of inertia (kg·cm^2)	Motor without brake	13.56	
	Motor with brake	15.8	

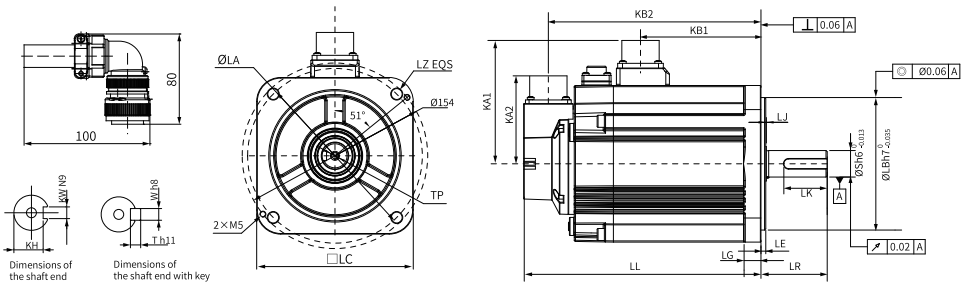
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	⩽ 120	⩽ 60	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	686	196

Dimensions (mm)

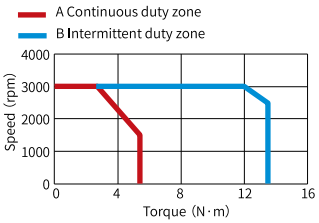


LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	142 (167)	55±1	145	4-Ø9	103	70	74	121.5 (146.5)	14	4
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø110h7$^{0}_{-0.035}$		22	M6 × 20	36	18$^{0}_{-0.2}$	8	8	7	5.8 (7.7)

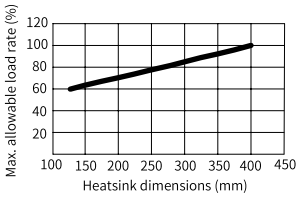
3.6.2 MS1H3-85B15CD-A33*R

Motor specifications		
Flange size (mm)	130	
Inertia, capacity	Medium inertia, medium capacity	
Rated power (kW)	0.85	
Voltage (V)	380	
Rated torque (N·m)	5.39	
Maximum torque (N·m)	13.5	
Rated current (Arms)	3.5	
Maximum current (Arms)	8.5	
Rated speed (rpm)	1500	
Maximum speed (rpm)	3000	
Torque coefficient (N·m/Arms)	1.84	
Rotor moment of inertia (kg·cm^2)	Motor without brake	13.56
	Motor with brake	15.8

Torque-Speed characteristics



Heatsink-based derating curve



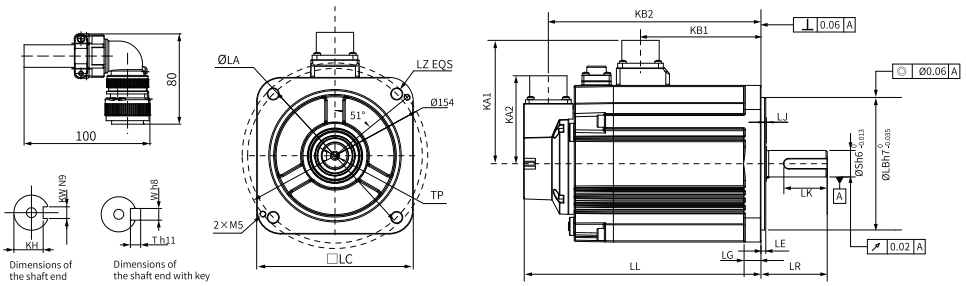
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	⩽ 120	⩽ 60	⩽ 1

Allowable load

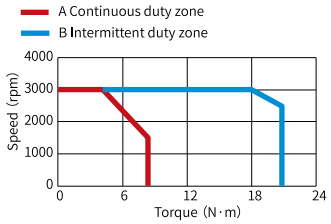
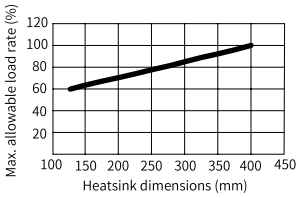
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	686	196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	142 (167)	55±1	145	4-Ø9	103	70	74	121.5 (146.5)	14	4
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø110h7$^{0}_{-0.035}$		22	M6 × 20	36	18$^{0}_{-0.2}$	8	8	7	5.8 (7.7)

3.6.3 MS1H3-13C15CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	130		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	1.3		
Voltage (V)	220		
Rated torque (N·m)	8.34		
Maximum torque (N·m)	20.85		
Rated current (Arms)	10.5		Heatsink-based derating curve
Maximum current (Arms)	27.3		
Rated speed (rpm)	1500		
Maximum speed (rpm)	3000		
Torque coefficient (N·m/Arms)	0.89		
Rotor moment of inertia (kg·cm^2)	Motor without brake	19.25	
	Motor with brake	21.5	

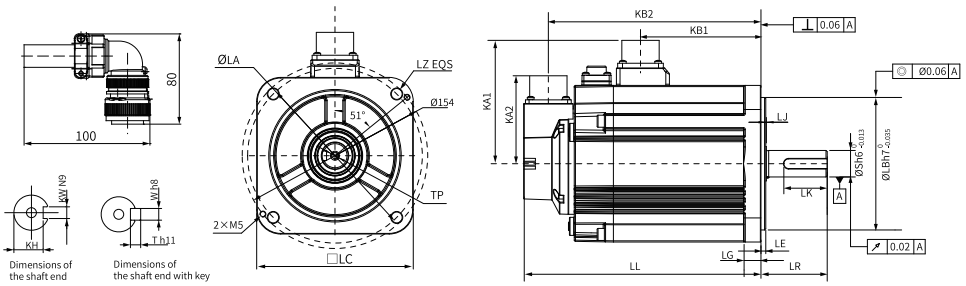
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	⩽ 120	⩽ 60	⩽ 1

Allowable load

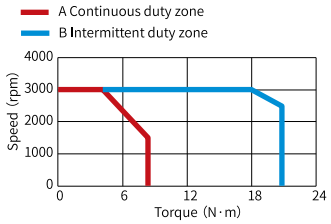
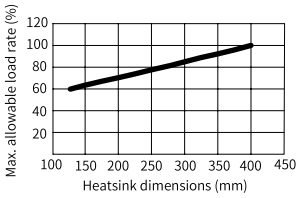
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	686	196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	157 (182)	55±1	145	4-Ø9	103	85	74	136.5 (161.5)	14	4
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø110h7$^{0}_{-0.035}$		22	M6 × 20	36	18$^{0}_{-0.2}$	8	8	7	7.1 (8.9)

3.6.4 MS1H3-13C15CD-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	130		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	1.3		
Voltage (V)	380		
Rated torque (N·m)	8.34		
Maximum torque (N·m)	20.85		
Rated current (Arms)	5.1		Heatsink-based derating curve
Maximum current (Arms)	12.6		
Rated speed (rpm)	1500		
Maximum speed (rpm)	3000		
Torque coefficient (N·m/Arms)	1.85		
Rotor moment of inertia (kg·cm^2)	Motor without brake	19.25	
	Motor with brake	21.5	

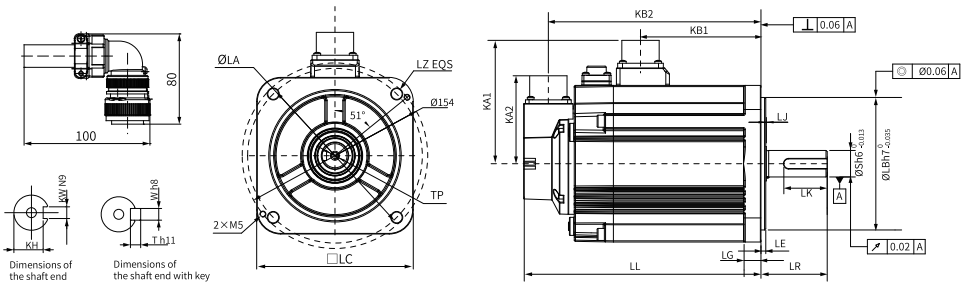
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	⩽ 120	⩽ 60	⩽ 1

Allowable load

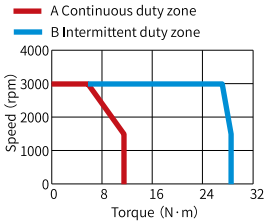
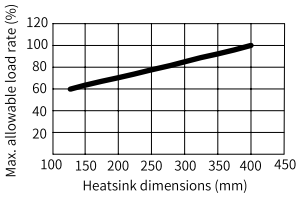
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	686	196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	157 (182)	55±1	145	4-Ø9	103	85	74	136.5 (161.5)	14	4
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø110h7$^{0}_{-0.035}$		22	M6 × 20	36	18$^{0}_{-0.2}$	8	8	7	7.1 (8.9)

3.6.5 MS1H3-18C15CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	130		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	1.8		
Voltage (V)	220		
Rated torque (N·m)	11.5		
Maximum torque (N·m)	28.75		
Rated current (Arms)	11.9		Heatsink-based derating curve
Maximum current (Arms)	32.2		
Rated speed (rpm)	1500		
Maximum speed (rpm)	3000		
Torque coefficient (N·m/Arms)	1.05		
Rotor moment of inertia (kg·cm^2)	Motor without brake	24.9	
	Motor with brake	27.2	

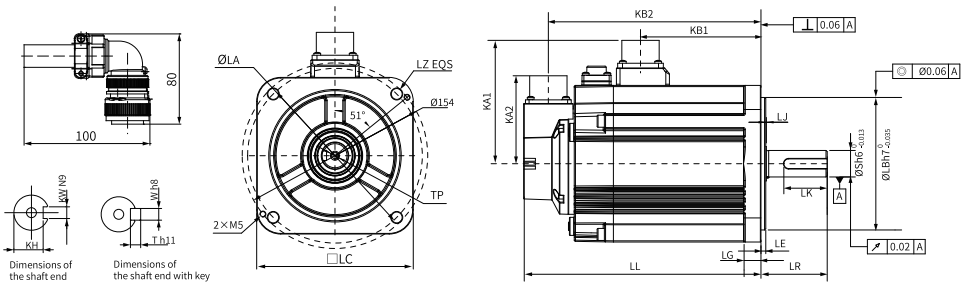
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	⩽ 120	⩽ 60	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	686	196

Dimensions (mm)

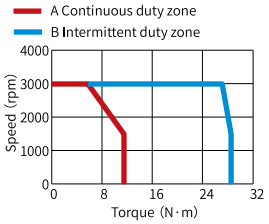


LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	172 (197)	55±1	145	4-Ø9	103	100	74	151.5 (176.5)	14	4
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø110h7$^{0}_{-0.035}$		22	M6 × 20	36	18$^{0}_{-0.2}$	8	8	7	8.5 (10.3)

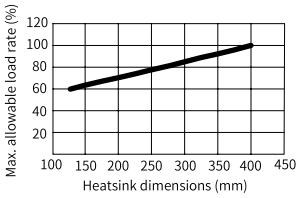
3.6.6 MS1H3-18C15CD-A33*R

Motor specifications		
Flange size (mm)	130	
Inertia, capacity	Medium inertia, medium capacity	
Rated power (kW)	1.8	
Voltage (V)	380	
Rated torque (N·m)	11.5	
Maximum torque (N·m)	28.75	
Rated current (Arms)	6.75	
Maximum current (Arms)	17.7	
Rated speed (rpm)	1500	
Maximum speed (rpm)	3000	
Torque coefficient (N·m/Arms)	1.87	
Rotor moment of inertia (kg·cm^2)	Motor without brake	24.9
	Motor with brake	27.2

Torque-Speed characteristics



Heatsink-based derating curve



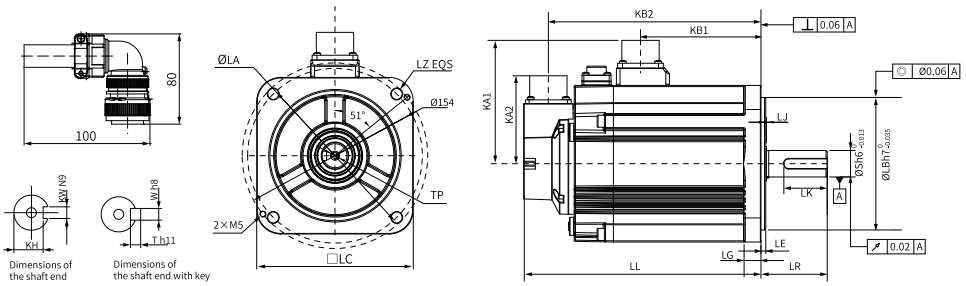
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	⩽ 120	⩽ 60	⩽ 1

Allowable load

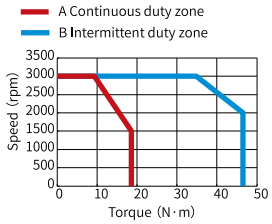
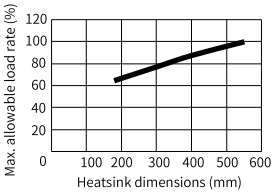
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	686	196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	172 (197)	55±1	145	4-Ø9	103	100	74	151.5 (176.5)	14	4
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø110h7$^{0}_{-0.035}$		22	M6 × 20	36	18$^{0}_{-0.2}$	8	8	7	8.5 (10.3)

3.6.7 MS1H3-29C15CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	180		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	2.9		
Voltage (V)	220		
Rated torque (N·m)	18.6		
Maximum torque (N·m)	46.5		
Rated current (Arms)	18		Heatsink-based derating curve
Maximum current (Arms)	52.5		
Rated speed (rpm)	1500		
Maximum speed (rpm)	3000		
Torque coefficient (N·m/Arms)	1.16		
Rotor moment of inertia (kg·cm^2)	Motor without brake	44.7	
	Motor with brake	52.35	

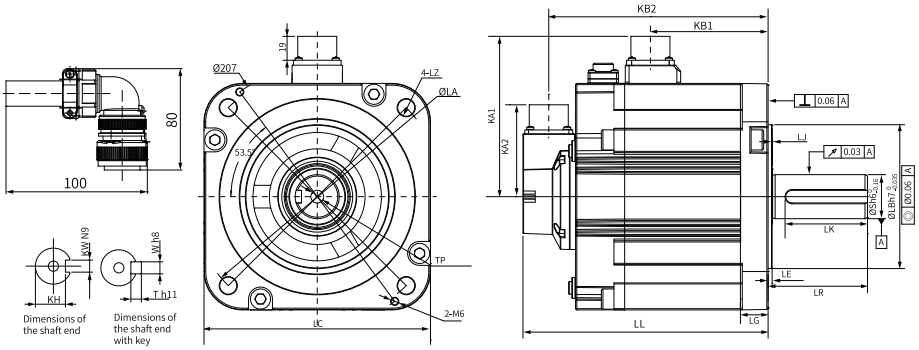
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	31	18.58	1.29	⩽ 200	⩽ 100	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	1470	490

Dimensions (mm)

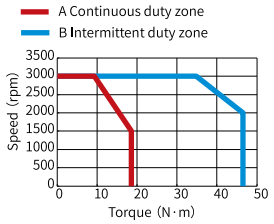


LC	LL	LR	LA	LZ	KA1	KB1	KA2 [Note]	KB2	LG	LE
180	161 (194.8)	79±1	200	4-Ø13.5	127.4	93.5	73	140.5 (174.3)	22	3.2±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø114.3h7$^{0}_{-0.035}$		35	M12x25	65	30$^{0}_{-0.2}$	10	10	8	13.8 (17.9)

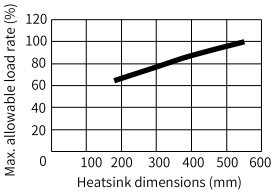
3.6.8 MS1H3-29C15CD-A33*R

Motor specifications		
Flange size (mm)	180	
Inertia, capacity	Medium inertia, medium capacity	
Rated power (kW)	2.9	
Voltage (V)	380	
Rated torque (N·m)	18.6	
Maximum torque (N·m)	46.5	
Rated current (Arms)	10.5	
Maximum current (Arms)	29.75	
Rated speed (rpm)	1500	
Maximum speed (rpm)	3000	
Torque coefficient (N·m/Arms)	1.94	
Rotor moment of inertia (kg·cm^2)	Motor without brake	44.7
	Motor with brake	52.35

Torque-Speed characteristics



Heatsink-based derating curve



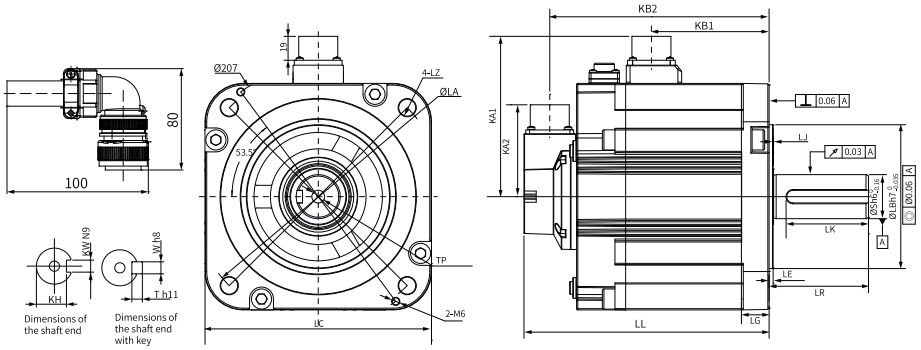
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	31	18.58	1.29	⩽ 200	⩽ 100	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	1470	490

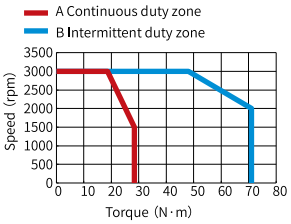
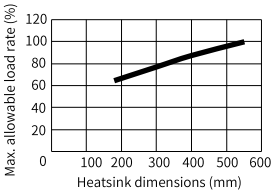
Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	161 (194.8)	79±1	200	4-Ø13.5	127.4	93.5	74	140.5 (174.3)	22	3.2±0.3

LJ	LB	S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø114.3h7$^{0}_{-0.035}$	35	M12x25	65	30$^{0}_{-0.2}$	10	10	8	13.8 (17.9)

3.6.9 MS1H3-44C15CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	180		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	4.4		
Voltage (V)	220		
Rated torque (N·m)	28.4		
Maximum torque (N·m)	71.1		
Rated current (Arms)	25.5		Heatsink-based derating curve
Maximum current (Arms)	67		
Rated speed (rpm)	1500		
Maximum speed (rpm)	3000		
Torque coefficient (N·m/Arms)	1.25		
Rotor moment of inertia (kg·cm^2)	Motor without brake	64.9	
	Motor with brake	72.55	

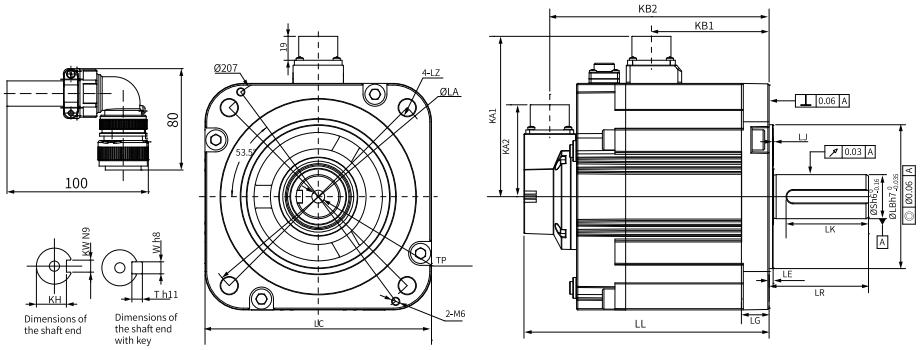
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	31	18.58	1.29	⩽ 200	⩽ 100	⩽ 1

Allowable load

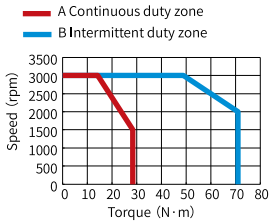
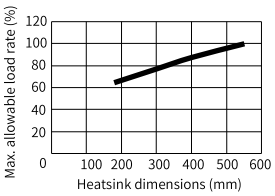
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	1470	490

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2 [Note]	KB2	LG	LE
180	184.5 (218.3)	79±1	200	4-Ø13.5	127.4	117	73	164 (197.8)	22	3.2±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø114.3h7$^{0}_{-0.035}$		35	M12x25	65	30$^{0}_{-0.2}$	10	10	8	17.4 (21.9)

3.6.10 MS1H3-44C15CD-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	180		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	4.4		
Voltage (V)	380		
Rated torque (N·m)	28.4		
Maximum torque (N·m)	71.1		
Rated current (Arms)	16		Heatsink-based derating curve
Maximum current (Arms)	42		
Rated speed (rpm)	1500		
Maximum speed (rpm)	3000		
Torque coefficient (N·m/Arms)	1.96		
Rotor moment of inertia (kg·cm^2)	Motor without brake	64.9	
	Motor with brake	72.55	

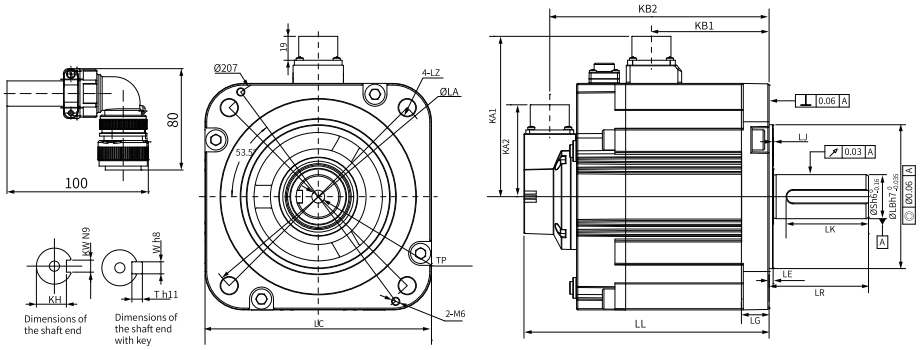
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	31	18.58	1.29	⩽ 200	⩽ 100	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	1470	490

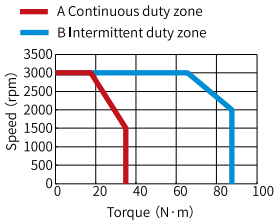
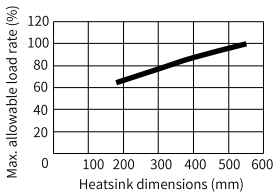
Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	184.5 (218.3)	79±1	200	4-Ø13.5	127.4	117	74	164 (197.8)	22	3.2±0.3

LJ	LB	S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø114.3h7$^{0}_{-0.035}$	35	M12x25	65	30$^{0}_{-0.2}$	10	10	8	17.4 (21.6)

3.6.11 MS1H3-55C15CD-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	180		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	5.5		
Voltage (V)	380		
Rated torque (N·m)	35		
Maximum torque (N·m)	87.6		
Rated current (Arms)	20.7		Heatsink-based derating curve
Maximum current (Arms)	52		
Rated speed (rpm)	1500		
Maximum speed (rpm)	3000		
Torque coefficient (N·m/Arms)	1.92		
Rotor moment of inertia (kg·cm^2)	Motor without brake	86.9	
	Motor with brake	94.55	

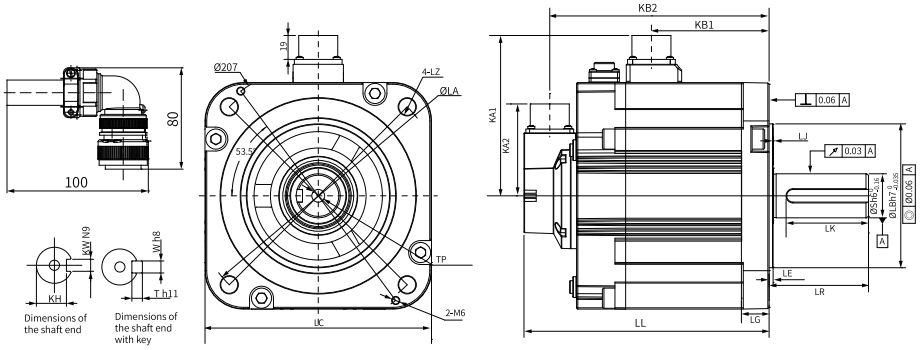
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	31	18.58	1.29	⩽ 200	⩽ 100	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
113	1764	588

Dimensions (mm)

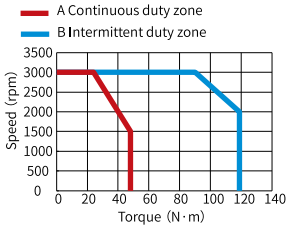


LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	208 (241.8)	113±1	200	4-Ø13.5	127.4	140.5	74	187.5 (221.3)	22	3.2±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø114.3h7$^{0}_{-0.035}$		42	M16x32	97	37$^{0}_{-0.2}$	12	12	8	21.7 (25.9)

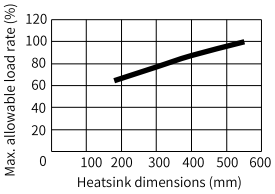
3.6.12 MS1H3-75C15CD-A33*R

Motor specifications		
Flange size (mm)	180	
Inertia, capacity	Medium inertia, medium capacity	
Rated power (kW)	7.5	
Voltage (V)	380	
Rated torque (N·m)	48	
Maximum torque (N·m)	119	
Rated current (Arms)	25	
Maximum current (Arms)	65	
Rated speed (rpm)	1500	
Maximum speed (rpm)	3000	
Torque coefficient (N·m/Arms)	2.13	
Rotor moment of inertia ($kg \cdot cm^2$)	Motor without brake	127.5
	Motor with brake	135.15

Torque-Speed characteristics



Heatsink-based derating curve



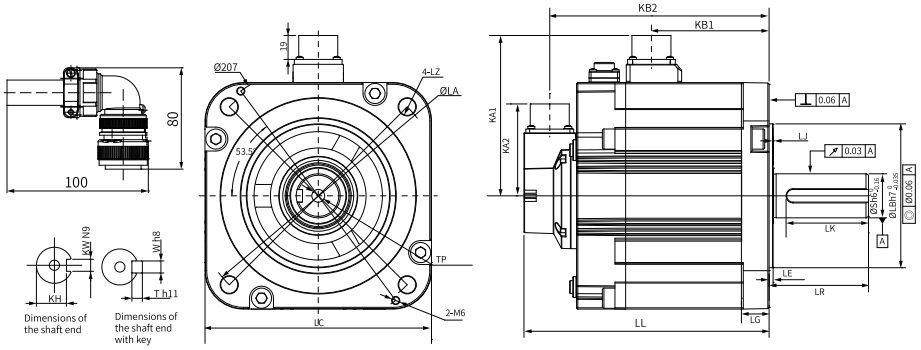
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	31	18.58	1.29	⩽ 200	⩽ 100	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
113	1764	588

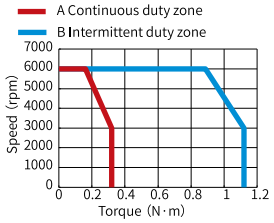
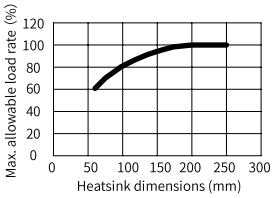
Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	255 (288.8)	113±1	200	4-Ø13.5	127.4	187.5	74	234.5 (234.5)	22	3.2±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø114.3h7$^{0}_{-0.035}$		42	M16x32	97	37$^{0}_{-0.2}$	12	12	8	29 (33.2)

3.7 Motors with Medium Inertia and Small Capacity (MS1H4)

3.7.1 MS1H4-10B30CB-A33*Z

Motor specifications			Torque-Speed characteristics
Flange size (mm)	40		
Inertia, capacity	Low inertia, small capacity		
Rated output (kW)	0.1		
Voltage (V)	220		
Rated torque (N·m)	0.32		
Maximum torque (N·m)	1.12		
Rated current (Arms)	1.3		Heatsink-based derating curve
Maximum current (Arms)	4.70		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/Arms)	0.26		
Rotor moment of inertia (kg·cm^2)	Motor without brake	0.102	
	Motor with brake	0.104	

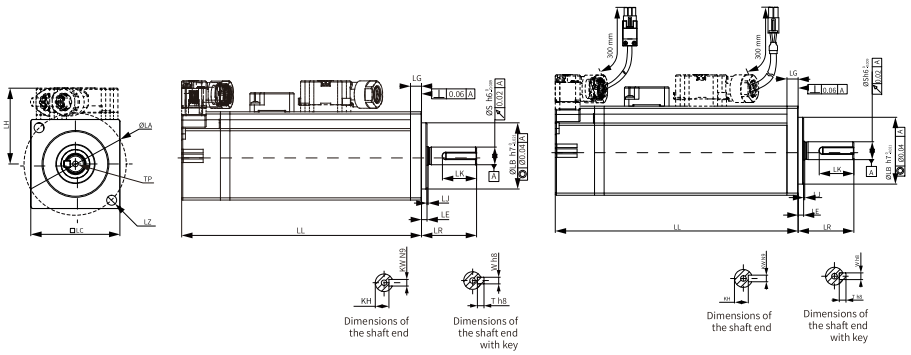
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
0.32	24	6.1	94.4	0.25	⩽ 40	⩽ 20	⩽ 1.5

Allowable load

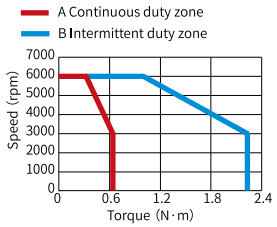
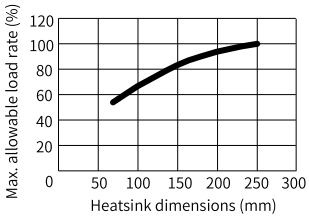
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
20	78	54

Dimensions (mm)



LL	LC	LR	LA	LZ	LH	LG	LE	LJ
91 (121.5)	40	25±0.5	46	2-Ø4.5	34.3	5	2.5±0.5	0.5±0.35
S	LB	TP	LK	KH	kW	W	T	Weight (kg)
8	Ø30h7$^{0}_{-0.021}$	M3x6	15.5	6.2$^{0}_{-0.1}$	3	3	3	0.45 (0.64)

3.7.2 MS1H4-20B30CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	60		
Inertia, capacity	Medium inertia, low capacity		
Rated power (kW)	0.2		
Voltage (V)	220		
Rated torque (N·m)	0.64		
Maximum torque (N·m)	2.24		
Rated current (Arms)	1.3		Heatsink-based derating curve
Maximum current (Arms)	5.3		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/Arms)	0.46		
Rotor moment of inertia (kg·cm^2)	Motor without brake	0.22	
	Motor with brake	0.23	

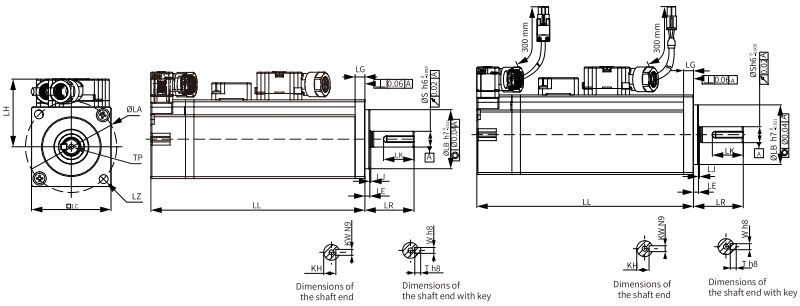
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
1.5	24	7.6	75.79	0.32	⩽ 60	⩽ 20	⩽ 1.5

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
25	245	74

Dimensions (mm)

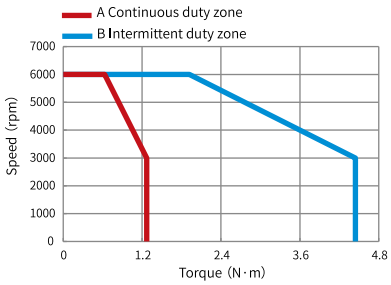


LC	LL	LR	LA	LZ	LH	LG	LE	LJ
60	73.5 (101.1)	30±0.5	70	4-Ø5.5	44	8.0	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
Ø50h7$^{0}_{-0.025}$	14	M5x8	16.5	11$^{0}_{-0.1}$	5	5	5	0.78 (1.16)

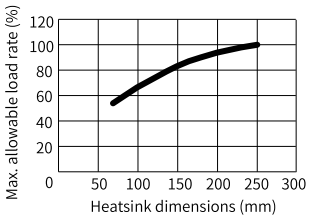
3.7.3 MS1H4-40B30CB-A33*R

Motor specifications		
Flange size (mm)	60	
Inertia, capacity	Medium inertia, low capacity	
Rated power (kW)	0.4	
Voltage (V)	220	
Rated torque (N·m)	1.27	
Maximum torque (N·m)	4.45	
Rated current (Arms)	2.4	
Maximum current (Arms)	9.2	
Rated speed (rpm)	3000	
Maximum speed (rpm)	6000	
Torque coefficient (N·m/Arms)	0.53	
Rotor moment of inertia ($kg \cdot cm^2$)	Motor without brake	0.43
	Motor with brake	0.44

Torque-Speed characteristics



Heatsink-based derating curve



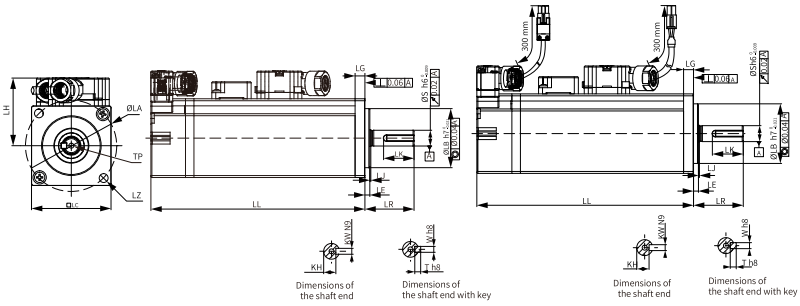
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
1.5	24	7.6	75.79	0.32	⩽ 60	⩽ 20	⩽ 1.5

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
25	245	74

Dimensions (mm)

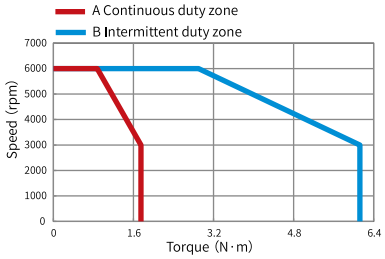


LC	LL	LR	LA	LZ	LH	LG	LE	LJ
60	92 (119.8)	30±0.5	70	4-Ø5.5	44	8.0	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
Ø50h7$^{0}_{-0.025}$	14	M5x8	16.5	11$^{0}_{-0.1}$	5	5	5	1.11 (1.48)

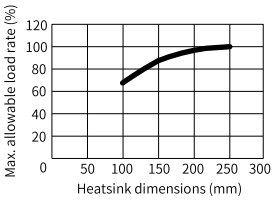
3.7.4 MS1H4-55B30CB-A331R

Motor specifications		
Flange size (mm)	80	
Inertia, capacity	Medium inertia, low capacity	
Rated power (kW)	0.55	
Voltage (V)	220	
Rated torque (N·m)	1.75	
Maximum torque (N·m)	6.13	
Rated current (Arms)	3.3	
Maximum current (Arms)	13.2	
Rated speed (rpm)	3000	
Maximum speed (rpm)	6000	
Torque coefficient (N·m/Arms)	0.49	
Rotor moment of inertia (kg·cm^2)	Motor without brake	1.12
	Motor with brake	-

Torque-Speed characteristics



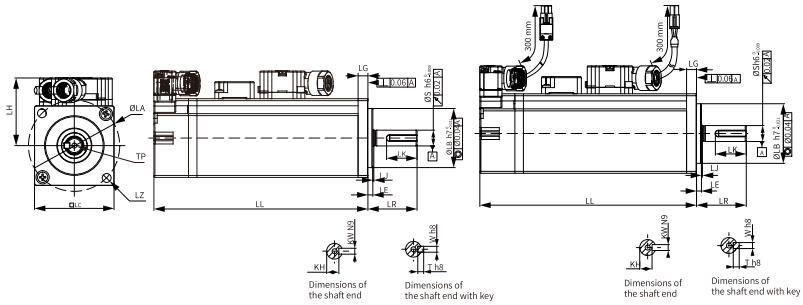
Heatsink-based derating curve



Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	392	147

Dimensions (mm)

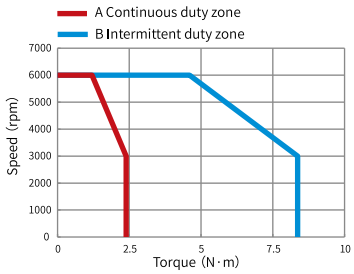


LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	96.7	25±0.5	90	4- Ø 7	54	7.5	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
Ø70h7$^{0}_{-0.03}$	19	M6 x 20	26	15.5$^{0}_{-0.1}$	6	6	6	1.85

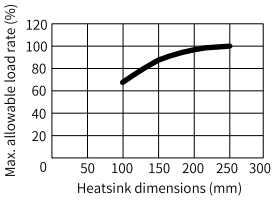
3.7.5 MS1H4-75B30CB-A33*R

Motor specifications		
Flange size (mm)	80	
Inertia, capacity	Medium inertia, low capacity	
Rated power (kW)	0.75	
Voltage (V)	220	
Rated torque (N·m)	2.39	
Maximum torque (N·m)	8.37	
Rated current (Arms)	4.4	
Maximum current (Arms)	16.9	
Rated speed (rpm)	3000	
Maximum speed (rpm)	6000	
Torque coefficient (N·m/Arms)	0.58	
Rotor moment of inertia ($kg \cdot cm^2$)	Motor without brake	1.46
	Motor with brake	1.51

Torque-Speed characteristics



Heatsink-based derating curve



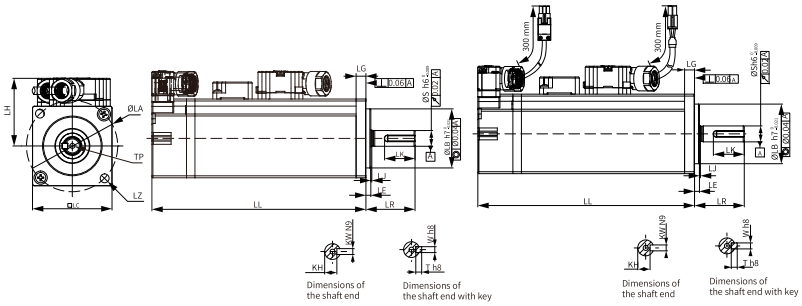
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
3.2	24	10	57.6	0.42	⩽ 60	⩽ 40	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	392	147

Dimensions (mm)

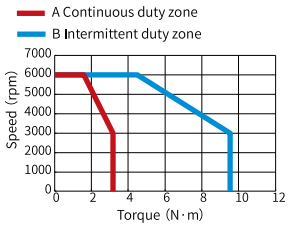


LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	107.3 (140.5)	25±0.5	90	4-Ø7	54	7.5	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
Ø70h7$^{0}_{-0.03}$	19	M6 × 20	26	15.5$^{0}_{-0.1}$	6	6	6	2.18 (2.82)

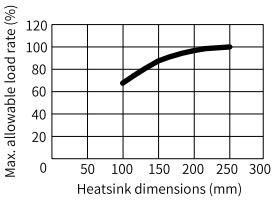
3.7.6 MS1H4-10C30CB-A33*R

Motor specifications		
Flange size (mm)	80	
Inertia, capacity	Medium inertia, low capacity	
Rated power (kW)	1.0	
Voltage (V)	220	
Rated torque (N·m)	3.18	
Maximum torque (N·m)	11.13	
Rated current (Arms)	6.5	
Maximum current (Arms)	24	
Rated speed (rpm)	3000	
Maximum speed (rpm)	6000	
Torque coefficient (N·m/Arms)	0.46	
Rotor moment of inertia ($kg \cdot cm^2$)	Motor without brake	1.87
	Motor with brake	1.97

Torque-Speed characteristics



Heatsink-based derating curve



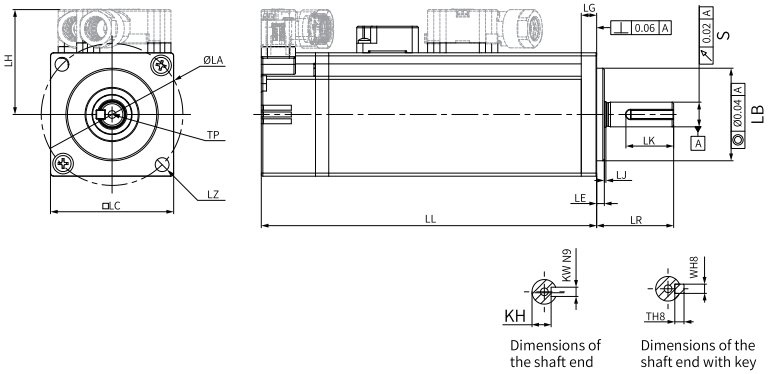
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
3.2	24	10	57.6	0.42	⩽ 60	⩽ 40	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	392	147

Dimensions (mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	118.7 (153.2)	25±0.5	90	4-Ø7	54	7.5	3 ± 0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
$Ø70h7^{0}_{-0.03}$	19	M6 x 20	26	$15.5^{0}_{-0.1}$	6	6	6	2.55 (2.9)

4 Optional parts

4.1 List of Options

Type	Name	Installation Position	Applicable Model	Description
Peripheral Electrical Components	Fuse and circuit breaker	Input side of the servo drive	All	To comply with EN 61800-5-1 and UL61800-5-1 standards, install a fuse/circuit breaker on the input side of the servo drive to prevent accidents caused by short circuit in the internal circuit.
	AC Input Reactor	Input side of the servo drive		It is used to eliminate the higher harmonics of the input side effectively and improve the power factor of the input side.
	EMC Filter	Input side of the servo drive		It is used to reduce external conduction and radiation interference of the drive.
	Magnetic ring and ferrite clamp	Output side of the drive		Reduces interferences to the outside and the bearing current.
		Signal cable		Improves the anti-interference performance of signals.

4.2 Cables

4.2.1 Cable Type

Regular cables

Do not bend or move regular cables during use. Bending or moving regular cables may damage the cables and lead to a series of cable-related faults such as poor contact. Secure regular cables by binding them with ties or similar. During binding, reserve certain bending radius for the cables to prevent stress.

Flexible cables

Flexible cables can move along with the drag chain without a high risk of abrasion.

Note

- Do not twist or wind the cables in the drag chain.
- Ensure cables can move freely within the bending radius. Relative movement must be allowed between cables or between cables and the guiding device.
- Cables in the drag chain can be fixed or bundled through the two unmovable ends of the drag chain.

Oil-resistant cables

Oil-resistant cables apply to applications requiring shielded power cables, such as machine tools, cutting fluids, and cutting compounds.

More information

Cables of MS1–R series motors are the same as MS1–Z series motors.

Power cables and encoder cables for terminal-type motors must be installed with specialized devices and jigs. Order the finished cables from distributors authorized by Inovance.

For more cable information, see "Cable Specifications and Models" in the hardware manual for the servo drive.

4.2.2 Model Description

Power cable

S6-L-M ① 0 ② 0 ③ 0 ④ - 3.0 ⑤ – T ⑥

① **Cable type** S6-L-B/M: Motion control power cable B: With brake M: Without brake	③ **Cross sectional area (mm²)** 0: Flange size 25/40/60/80 1: Flange size 100/130/180 2: Flange size 180 (motors of 4.4 kW and above)	⑤ **Cable length (m)** 3.0: 3 m 5.0: 5 m 10.0: 10 m
② **Connector type at drive side** 0: U-shaped cable lug 1: Pin-shaped cable lug	④ **Connector type at motor side** 0: 6-core plastic connector 1: 9-core aviation connector 2: 6-core aviation connector 7: SDC-06T series aviation connector (front outlet) 8: SDC-06T series aviation connector (rear outlet)	⑥ **Special requirements** T: Drag chain TS: Shielded flexible cable

Model of encoder cables

S6-L-P ① 0 ② 0 ③ 0 ④ - 3.0 ⑤ - T ⑥

① **Cable type** S6-L-P: Motion control encoder cable	③ **Encoder** 1: Communication-type incremental encoder 2: Communication-type multi-turn absolute encoder	⑤ **Cable length (m)** 3.0: 3 m 5.0: 5 m 10.0: 10 m
② **Connector type at drive side** 0: DB9 1: USB	④ **Connector type at motor side** 0: 9-core plastic connector 1: 9-core aviation connector 4: SDC-06T series aviation connector (front outlet) 5: SDC-06T series aviation connector (rear outlet)	⑥ **Special requirements** T: Drag chain TS: Shielded flexible cable

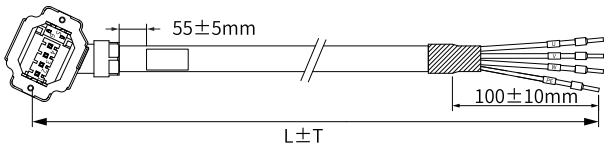
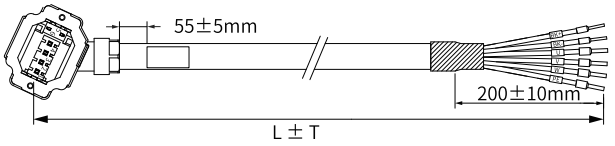
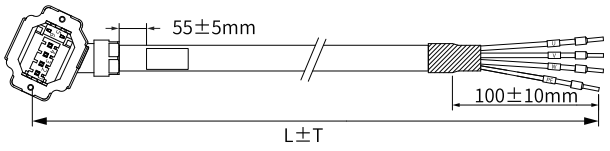
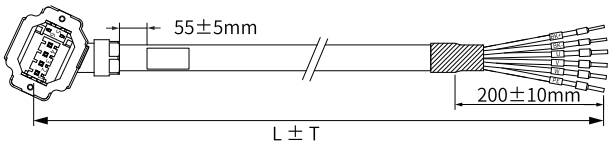
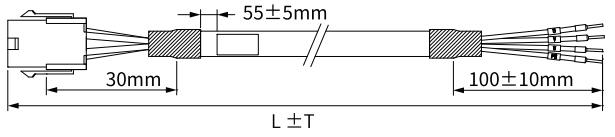
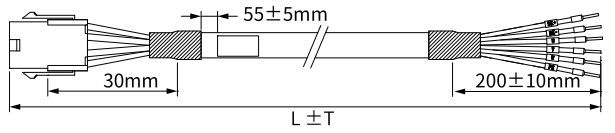
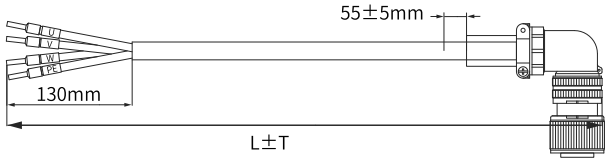
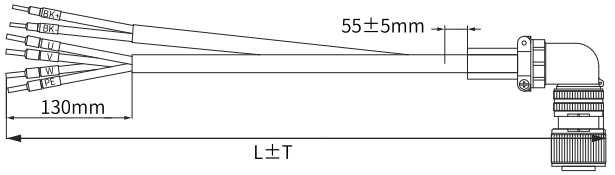
Model of communication cables

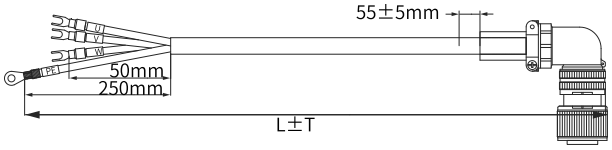
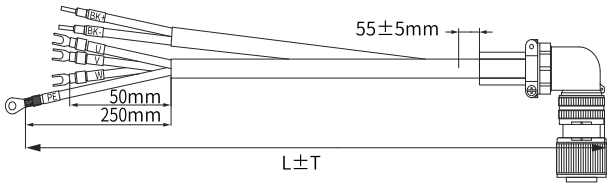
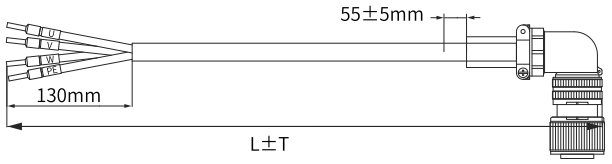
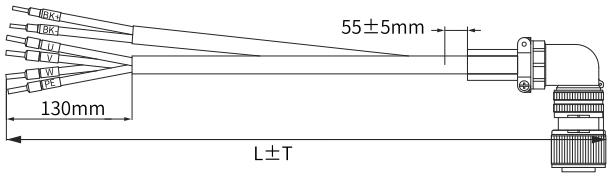
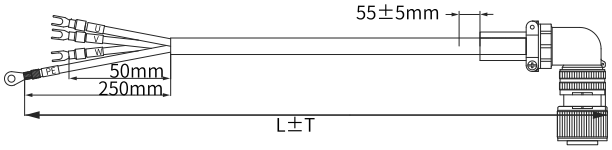
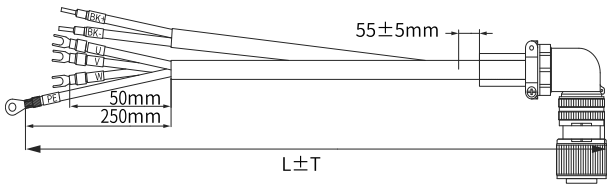
S6N-L-T ① 00 ② - 3.0 ③

① Cable type	② Cable type	③ Cable length (m)
S6-L-T: Motion control communication cable S6N-L-T: IS620F motion control encoder cable (only for servo drive PC communication cable)	00: Servo drive to PC communication cable 01: Servo drive communication cable (CAN&RS485) 02: Servo drive to PLC communication cable 03: Servo drive termination resistor cable 04: Servo drive communication cable (EtherCAT)	3.0: 3 m 5.0: 5 m 10.0: 10 m

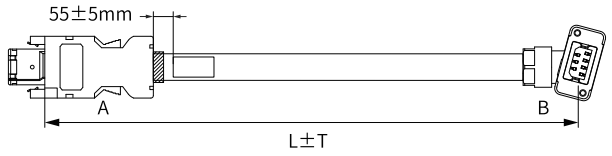
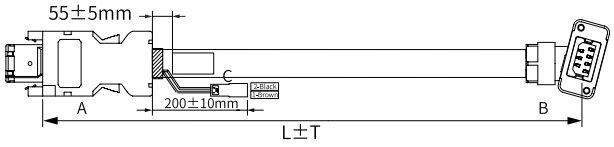
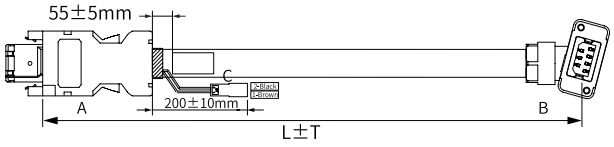
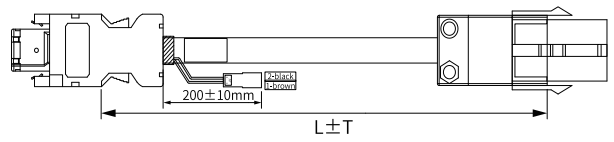
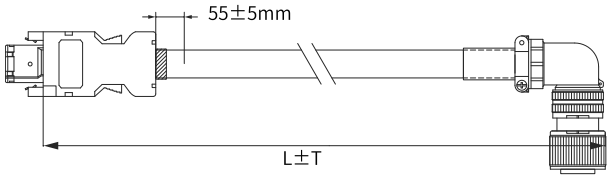
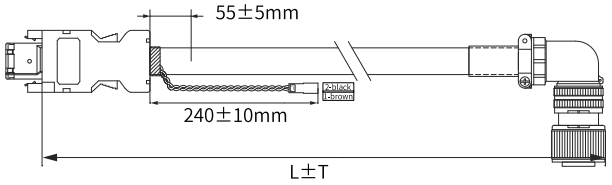
4.2.3 Cable Selection

Power cable

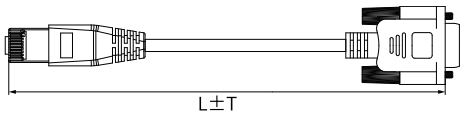
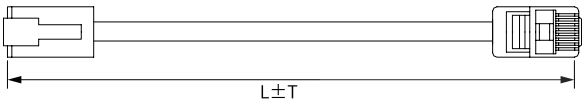
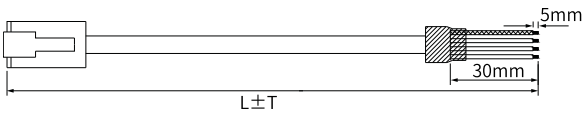
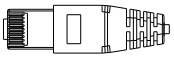
Motor Model	Cable Name		Cable Model	L Cable Length (mm)	Tolerance (T) (mm)	Illustration
MS1H1/ MS1H4 terminal-type motor	Front outlet	Power cable for motor without brake	S6-L-M107-3.0	3000	(-30.30)	
			S6-L-M107-5.0	5000	(-30.50)	
			S6-L-M107-10.0	10000	(-30.80)	
		Brake	S6-L-B107-3.0	3000	(-30.30)	
			S6-L-B107-5.0	5000	(-30.50)	
			S6-L-B107-10.0	10000	(-30.80)	
	Rear outlet	Power cable for motor without brake	S6-L-M108-3.0	3000	(-30.30)	
			S6-L-M108-5.0	5000	(-30.50)	
			S6-L-M108-10.0	10000	(-30.80)	
		Brake	S6-L-B108-3.0	3000	(-30.30)	
			S6-L-B108-5.0	5000	(-30.50)	
			S6-L-B108-10.0	10000	(-30.80)	
MS1H1/ MS1H4 lead-type (-S) motor	Power cable for motor without brake		S6-L-M100-3.0	3000	(-30.30)	
			S6-L-M100-5.0	5000	(-30.50)	
			S6-L-M100-10.0	10000	(-30.80)	
	Brake		S6-L-B100-3.0	3000	(-30.30)	
			S6-L-B100-5.0	5000	(-30.50)	
			S6-L-B100-10.0	10000	(-30.80)	
MS1H2 motor rated 3 kW or below/ MS1H3 motor rated 1.8 kW or below	Power cable for motor without brake		S6-L-M111-3.0	3000	(-30.30)	
			S6-L-M111-5.0	5000	(-30.50)	
			S6-L-M111-10.0	10000	(-30.80)	
	Brake		S6-L-B111-3.0	3000	(-30.30)	
			S6-L-B111-5.0	5000	(-30.50)	
			S6-L-B111-10.0	10000	(-30.80)	

Motor Model	Cable Name	Cable Model	L Cable Length (mm)	Tolerance (T) (mm)	Illustration
MS1H2 motor rated 4 kW/5 kW	Power cable for motor without brake	S6-L-M011-3.0	3000	(-30.30)	
		S6-L-M011-5.0	5000	(-30.50)	
		S6-L-M011-10.0	10000	(-30.80)	
	Brake	S6-L-B011-3.0	3000	(-30.30)	
		S6-L-B011-5.0	5000	(-30.50)	
		S6-L-B011-10.0	10000	(-30.80)	
MS1H3 motor rated 2.9 kW	Power cable for motor without brake	S6-L-M112-3.0	3000	(-30.30)	
		S6-L-M112-5.0	5000	(-30.50)	
		S6-L-M112-10.0	10000	(-30.80)	
	Brake	S6-L-B112-3.0	3000	(-30.30)	
		S6-L-B112-5.0	5000	(-30.50)	
		S6-L-B112-10.0	10000	(-30.80)	
MS1H3 motor rated 4.4 kW or above	Power cable for motor without brake	S6-L-M022-3.0	3000	(-30.30)	
		S6-L-M022-5.0	5000	(-30.50)	
		S6-L-M022-10.0	10000	(-30.80)	
	Brake	S6-L-B022-3.0	3000	(-30.30)	
		S6-L-B022-5.0	5000	(-30.50)	
		S6-L-B022-10.0	10000	(-30.80)	

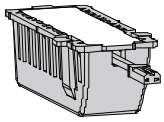
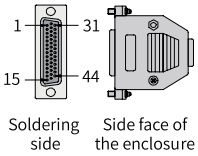
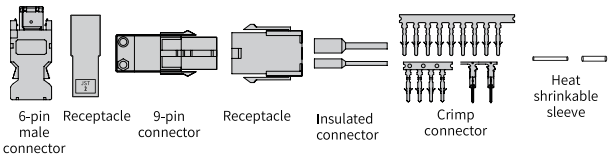
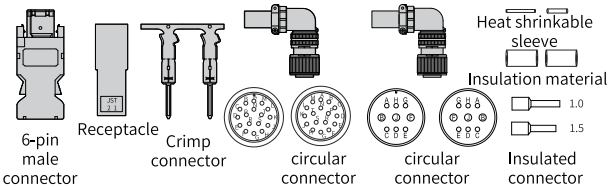
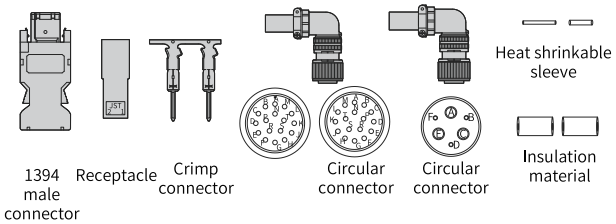
Encoder cable

Motor Model	Cable Name		Cable Model	L Cable Length (mm)	Tolerance (T) (mm)	Illustration
MS1H1/ MS1H4 terminal-type motor	Front outlet	Single-turn absolute encoder cable	S6-L-P114-3.0	3000	(-30.30)	
			S6-L-P114-5.0	5000	(-30.50)	
			S6-L-P114-10.0	10000	(-30.80)	
		Multi-turn absolute encoder cable	S6-L-P124-3.0	3000	(-30.30)	
			S6-L-P124-5.0	5000	(-30.50)	
			S6-L-P124-10.0	10000	(-30.80)	
	Rear outlet	Single-turn absolute encoder cable	S6-L-P115-3.0	3000	(-30.30)	
			S6-L-P115-5.0	5000	(-30.50)	
			S6-L-P115-10.0	10000	(-30.80)	
		Multi-turn absolute encoder cable	S6-L-P125-3.0	3000	(-30.30)	
			S6-L-P125-5.0	5000	(-30.50)	
			S6-L-P125-10.0	10000	(-30.80)	
MS1H1/MS1H4 lead-type (-S) motor		Single-turn absolute encoder cable	S6-L-P110-3.0	3000	(-30.30)	
			S6-L-P110-5.0	5000	(-30.50)	
			S6-L-P110-10.0	10000	(-30.80)	
		Multi-turn absolute encoder cable	S6-L-P120-3.0	3000	(-30.30)	
			S6-L-P120-5.0	5000	(-30.50)	
			S6-L-P120-10.0	10000	(-30.80)	
MS1H2/MS1H3 motor		Single-turn absolute encoder cable	S6-L-P111-3.0	3000	(-30.30)	
			S6-L-P111-5.0	5000	(-30.50)	
			S6-L-P111-10.0	10000	(-30.80)	
		Multi-turn absolute encoder cable	S6-L-P121-3.0	3000	(-30.30)	
			S6-L-P121-5.0	5000	(-30.50)	
			S6-L-P121-10.0	10000	(-30.80)	

Communication cables

Cable Name	Cable Model	Cable Length (mm)	Tolerance (T) (mm)	Illustration
Drive-PC communication cable	S6-L-T00-3.0	3000	(-30.30)	
Multi-drive communication cable	S6-L-T01-0.3	300	(-10.10)	
Servo drive to host controller communication cable	S6-L-T02-2.0	2000	(-20.20)	
Servo drive termination resistor connector	S6-L-T03-0.0	-	-	

Connector Kit

Name	Model	Outline Drawing
Battery kit	S6-C4A	
CN1 terminal (DB44)	S6-C8	
MS1H1 lead-type (-S) motor connector	S6-C26	
MS1H2/MS1H3 motor connector (1.8 kW and below)	S6-C29	
MS1H3 motor connector (2.9 kW and above)	S6-C39	

4.3 Peripheral Electrical Components

4.3.1 Fuse

To prevent accidents caused by short circuit, install a fuse on the input side of the drive.

Table 4–1 List of recommended fuses

Size	Drive Model SV660P****I	Rated Input Current (A)	Recommended Fuse		
			Manufacturer	Rated Current (A)	Model
Single-phase 220 V					
A	S1R6	2.3	Bussmann	15	FWP-15B
	S2R8	4		20	FWP-20B
B	S5R5	7.9		35	FWP-35C
C	S7R6	9.6		40	FWP-40C
D	S012	12.8		40	FWP-40C
Three-phase 220 V					
C	S7R6	5.1	Bussmann	50	FWP-50C
D	S012	8		50	FWP-50C
Three-phase 380 V					
C	T3R5	2.4	Bussmann	15	FWP-15B
	T5R4	3.6		20	FWP-20B
D	T8R4	5.6		20	FWP-20B
	T012	8		50	FWP-50C
E	T017	12		50	FWP-50C
	T021	16		70	FWP-70C
	T026	21		125	FWP-125C

4.3.2 Electromagnetic Contactor

Table 4–2 Recommended electromagnetic contactor models

Size	Drive Model SV660P****I	Rated Input Current	Recommended contactor		
			Manufacturer	Current (A)	Model
Single-phase 220 V					
A	S1R6	2.3	Schneider	9	LC1 D09
	S2R8	4		9	LC1 D09
B	S5R5	7.9		9	LC1 D09
C	S7R6	9.6		12	LC1 D12
D	S012	12.8		18	LC1 D18
Three-phase 220 V					
C	S7R6	5.1	Schneider	9	LC1 D09
D	S012	8		9	LC1 D09
Three-phase 380 V					
C	T3R5	2.4	Schneider	9	LC1 D09
	T5R4	3.6		9	LC1 D09
D	T8R4	5.6		9	LC1 D09
	T012	8		9	LC1 D09
E	T017	12		12	LC1 D12
	T021	16		18	LC1 D18
	T026	21		25	LC1 D25

4.3.3 Breaker

Table 4–3 Recommended circuit breaker models

Size	Drive Model SV660P****I	Rated Input Current (A)	Recommended Circuit Breaker		
			Manufacturer	Current (A)	Model
Single-phase 220 V					
A	S1R6	2.3	Schneider	4	OSMC32N2C4
	S2R8	4		6	OSMC32N2C6
B	S5R5	7.9		16	OSMC32N2C16
C	S7R6	9.6		16	OSMC32N2C16
D	S012	12.8		20	OSMC32N2C20
Three-phase 220 V					
C	S7R6	5.1	Schneider	10	OSMC32N3C10
D	S012	8		16	OSMC32N3C16
Three-phase 380 V					
C	T3R5	2.4	Schneider	4	OSMC32N3C4
	T5R4	3.6		6	OSMC32N3C6
D	T8R4	5.6		10	OSMC32N3C10
	T012	8		16	OSMC32N3C16
E	T017	12		20	OSMC32N3C20
	T021	16		25	OSMC32N3C25
	T026	21		32	OSMC32N3C32

Note

For UL-compliant products, see section Certification in the Hardware Guide for recommended fuse/circuit breaker models.

If a residual current device (RCD) is needed, select the RCD according to the following requirements:

- Use a B-type RCD because the drive may generate DC leakage current in the protective conductor.
- For each drive, use an RCD whose tripping current is not lower than 100 mA to prevent RCD malfunction due to high-frequency leakage current generated by the drive.
- When multiple drives are connected in parallel and share one RCD, select an RCD whose tripping current is not lower than 300 mA.
- Use Chint or Schneider RCDs (recommended).

4.3.4 AC Input Reactor

Selection

An AC input reactor is optional and mainly used to reduce harmonics in the input current. Install an external reactor as needed in actual applications. The following table lists the recommended manufacturers and models of input reactors.

Table 4–4 AC input reactor model selection

Size	Drive Model SV660P****I	Rated Input Current	Applicable Reactor	Inductance (mH)
Three-phase 220 V				
C	S7R6	5.1	MD-ACL-10-5-4T	5

Size	Drive Model SV660P****I	Rated Input Current	Applicable Reactor	Inductance (mH)
D	S012	8	MD-ACL-10-5-4T	5
Three-phase 380 V				
C	T3R5	2.4	MD-ACL-10-5-4T	5
	T5R4	3.6	MD-ACL-10-5-4T	5
D	T8R4	5.6	MD-ACL-10-5-4T	5
	T012	8	MD-ACL-10-5-4T	5
E	T017	12	MD-ACL-15-3-4T	3
	T021	16	MD-ACL-40-1.45-4T	1.45
	T026	21	MD-ACL-40-1.45-4T	1.45

Dimensions

- Inovance input reactors

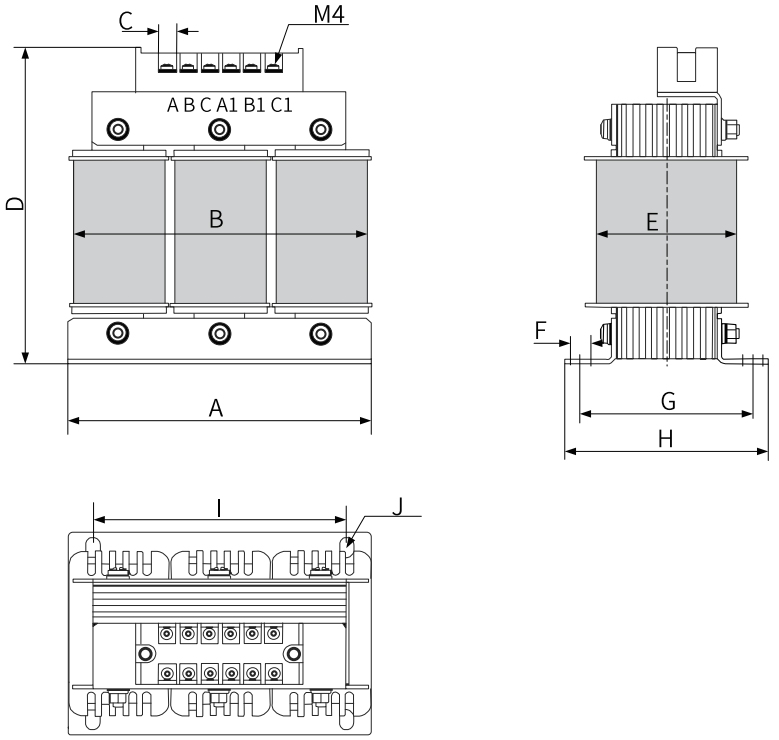


Figure 4-1 Dimensions of 10 A to 15 A AC input reactors

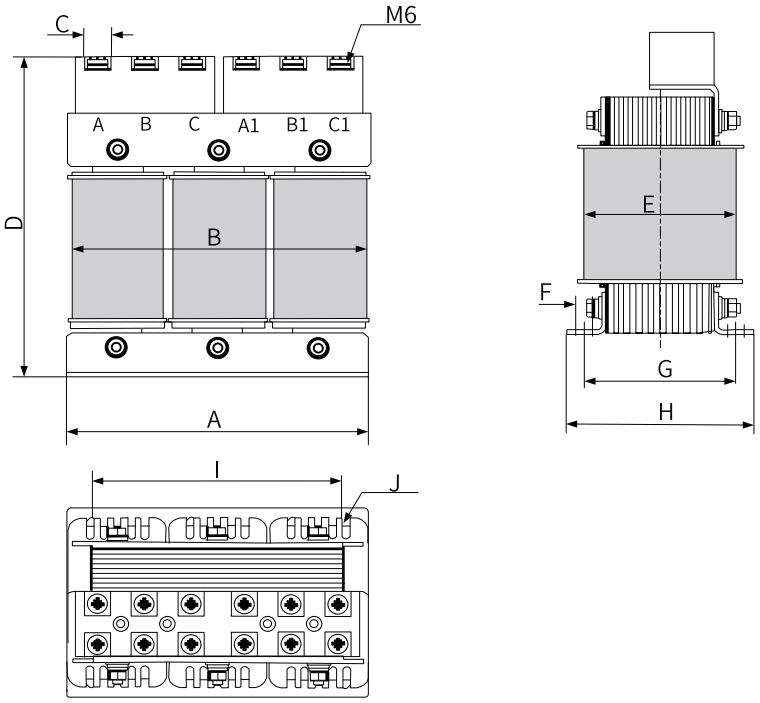


Figure 4-2 Dimensions of 40 A (1.45 mH) AC input reactors

Table 4–5 Dimensions of Inovance AC input reactors (unit: mm)

Model	A	B	C	D	E	F	G	H	I	J
MD-ACL-10-5-4T	150±2	155	8	160	80	10	85±2	100±2	125±1	Φ7 x 10
MD-ACL-15-3-4T	150±2	155	8	160	80	10	85±2	100±2	125±1	Φ7 x 10
MD-ACL-40-1.45-4T	180±2	185	16	200	105	10	95±2	117±2	150±1	Φ7 x 10

4.3.5 EMC Filter

Selection

To comply with EN IEC 61800-3 requirements in terms of radiated and conducted emission, install an EMC filter listed in the following table. EMC filter options are FN2090 and FN 3258 series EMC filters manufactured by Schaffner. Select the EMC filter according to the rated input current of the servo drive, as shown in the following table.

Table 4–6 Standard EMC filter model and appearance

Filter Model		Appearance
Schaffner	FN 2090 series	
	FN3258 series	

Table 4–7 Filter model selection (Schaffner)

Size	Servo drive model SV660P****I	Rated Input Current	Applicable Filter
Single-phase 220 V			
A	S1R6	2.3	FN 2090-3-06
	S2R8	4	FN 2090-4-06
B	S5R5	7.9	FN 2090-8-06
C	S7R6	9.6	FN 2090-10-06
D	S012	12.8	FN 2090-16-06
Three-phase 220 V			
C	S7R6	5.1	FN 3258-7-44
D	S012	8	FN 3258-16-44
Three-phase 380 V			
C	T3R5	2.4	FN 3258-7-44
	T5R4	3.6	FN 3258-7-44
D	T8R4	5.6	FN 3258-7-44
	T012	8	FN 3258-16-44
E	T017	12	FN 3258-16-44
	T021	16	FN 3258-16-44
	T026	21	FN 3258-30-44

Dimensions

- Dimensions of Schaffner FN 2090 series filters

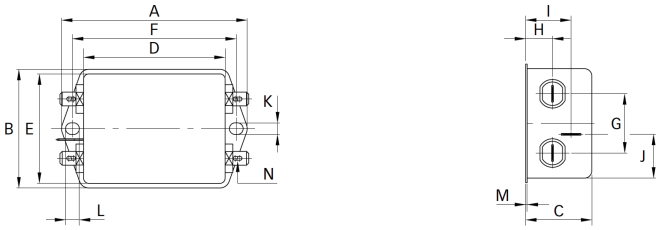


Figure 4-3 Dimensions of FN 2090 series filters (unit: mm)

Table 4–8 Dimensions of FN 2090 series filters (unit: mm)

Rated current (A)	A	B	C	D	E	F	G	H	I	J	K	L	M	N
3	85	54	30.3	64.8	49.8	75	27	12.3	20.8	19.9	5.3	6.3	0.7	6.3 x 0.8
4														
6														
8	113.5±1	57.5±1	45.4±1	94±1	56	103	25	12.4	32.4	15.5	4.4	6	1	6.3 x 0.8

- Dimensions of Schaffner FN 3287 series filters

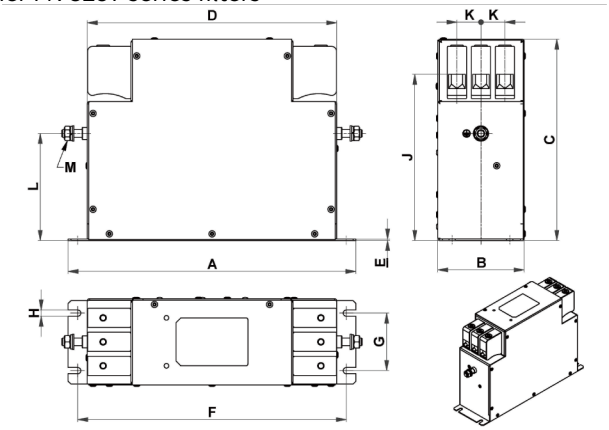


Figure 4-4 Dimension drawing of FN 3287 series filters (unit: mm)

Table 4–9 Dimensions of FN3287 filters (in mm)

Rated current (A)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	J±2 (mm)	K (mm)	L±1 (mm)	M
10	180	40	112	153	0.8	170	20	4.5	94	11	68	M5
16	200	45	112	170	0.8	185	25	5.4	102	11	76	M5
25	205	45	132	173	0.8	190	25	5.4	113	13	83	M5

4.3.6 Magnetic Ring and Magnetic Buckle

The magnetic ring is intended to be installed on the input or output side of the drive. Install the magnetic ring as close to the drive as possible. Installing the magnetic ring on the input side suppresses the noise in the input power supply system of the drive. When it is installed on the output side, it can reduce the interference generated by the drive to external devices and the bearing current.

In applications with leakage current and signal cable interference, install a magnetic ring or a ferrite clamp.

Selection

- Amorphous magnetic ring: featuring a high permeability within 1 MHz and excellent anti-interference performance, but not as low-cost as the ferrite clamp. See for details. *“ Dimensions” on page 94*
- Ferrite clamp: featuring a good interference suppression performance within a frequency band above 1MHz, applicable to low-power servo drives and signal cables, low-cost and easy to install

Magnetic ring and ferrite clamp		Appearance
Magnetic ring	DY644020H	
	DY805020H	
ferrite clamp	DYR-130-B	

Dimensions

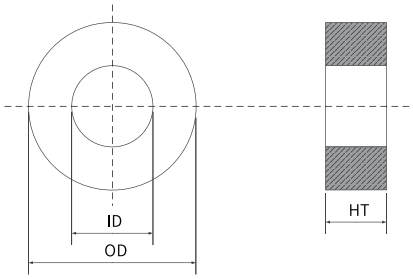


Figure 4-5 Dimensions of the magnetic ring

Table 4–10 Dimensions of the magnetic ring

Model	Size (OD×ID×HT) (mm)
DY644020H	64 × 40× 20
DY805020H	80 × 50× 20

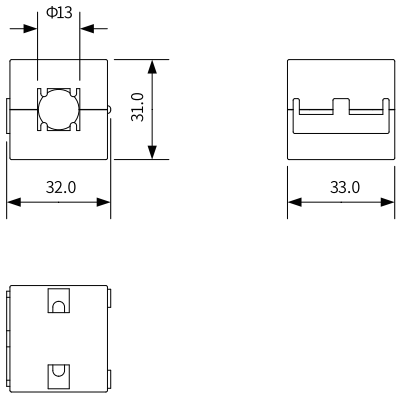


Figure 4-6 Dimensions of the ferrite clamp

Table 4–11 Dimensions of the ferrite clamp

Model	Size (Length × OD × ID) (mm)
DYR-130-B	32.0 × 31× 13

4.4 Absolute Encoder Batteries

Model selection

Select an appropriate battery according to the following table.

Table 4–12 Description of the absolute encoder battery

Battery Specifications	Item	Rated Values			Condition
		Min. Value	Typical Value	Max. Value	
Output: 3.6 V, 2500 mAh	External battery voltage (V)	3.2	3.6	5	In standby state[1]
	Circuit fault voltage (V)	-	2.6	-	In standby state
	Battery alarm voltage (V)	2.85	3	3.15	-
	Current consumed by the circuit (uA)	-	2	-	In normal operation[2]
		-	10	-	In standby state, shaft at standstill
		-	80	-	In standby state, shaft rotating
	Ambient temperature (°C)	0	-	40	Same as the motor.
	Storage temperature (°C)	-20	-	60	

The preceding values are obtained under an ambient temperature of 20°C.

Note

- [1]: The "standby state" means the encoder counts the multi-turn data by using the power from the external battery when the servo drive power supply is not switched on. In this case, data transceiving stops.
- [2]: During normal operation, the absolute encoder supports one-turn or multi-turn data counting and transceiving. Power on the servo drive after connecting the absolute encoder properly. The encoder starts data transceiving after a short delay of about 5s upon power-on. The motor speed must be lower than or equal to 10 rpm during transition from the standby state to the normal operation state (upon power-on). Otherwise, Er.740 (Encoder fault) may occur. In this case, you need to power off and on the servo drive again.

Design life of the battery

The following calculation only covers the current consumed by the encoder.

Assume that the drive works normally for T1 in a day, the motor rotates for T2 after the drive is powered off, and the motor stops rotating for T3 after power-off [unit: hour (H)].

Example:

Table 4–13 Design life of the absolute encoder battery

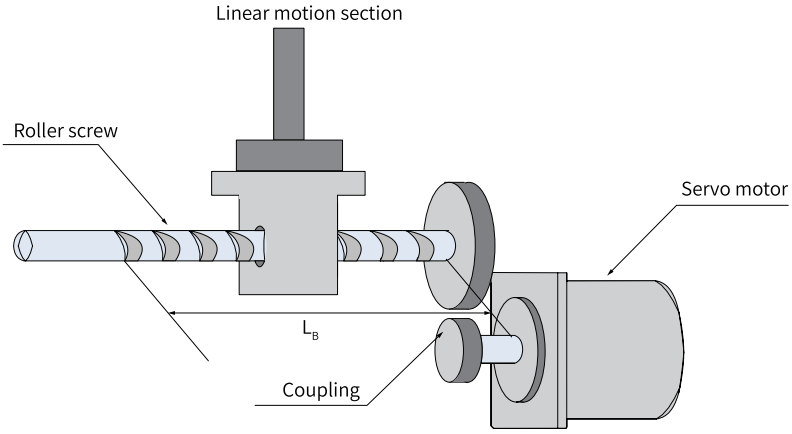
Item	Schedule 1	Schedule 2
Working Days in Different Operating Conditions in 1 Year	313	52
T1 (h)	8	0
T2 (h)	0.1	0
T3 (h)	15.9	24

Capacity consumed in 1 year = (8 h × 2 uA + 0.1 h × 80 uA + 15.9 h × 10 uA) x 313 + (0 h × 2 uA + 0 h × 80 uA +24 h × 10 uA) x 52 ≈ 70 mAh

Design life = Battery capacity ÷ Capacity consumed in 1 year = 2600 mAh ÷ 70 mAh = 37.1 years

5 Servo Motor Capacity Selection

5.1 Capacity Selection Example for Position Control



Load Speed V_L =15 m/min

Linear motion section mass (m): 80 kg

Roller screw length L_B =0.8 m

Roller screw diameter (d_B): 0.016 m

Roller screw lead (P_B): 0.005 m

Coupler weight m_c = 0.3 kg

Coupler O.D. d_c =0.03 m

Number of feeding operations (n): 40/min

Feeding distance (L): 0.25 m

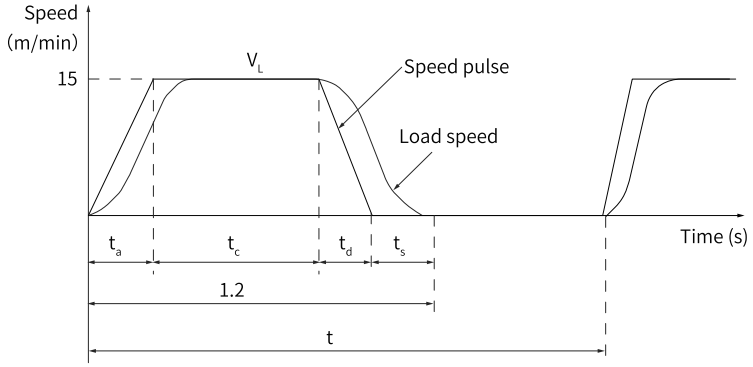
Feeding time t_m = less than 1.2s

Electrical stopping precision (δ): ±0.01 mm

Friction coefficient (μ): 0.2

Mechanical efficiency (η): 0.9 (90%)

1. **Speed diagram**



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

$$T_a = t_d, t_s = 0.1(s)$$

$$Ta = t_m - t_s - \frac{60L}{V_L} = 1.2 - 0.1 - \frac{60 \times 0.25}{15} = 0.1(s)$$

$$t_c = 1.2 - 0.1 - 0.1 \times 2 = 0.9(s)$$

2. **Speed**

- Load shaft speed

$$n_L = \frac{V_L}{P_B} = \frac{15}{0.005} = 3000\ (\text{rpm})$$

- Motor shaft speed

As the coupler is directly connected, the gear ratio (1/R) is 1:1.

$$n_M = n_L \times R = 3000 \times 1 = 3000\ (\text{rpm})$$

3. **Load torque**

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

4. **Load moment of inertia**

- Linear motion section

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

- Roller screw

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

- Coupler

$$J_C = \frac{1}{8} m_c \times d_c^4 = \frac{1}{8} \times 0.3 \times (0.03)^2 = 0.338 \times 10^{-4}(\text{kg}\cdot\text{m}^2)$$

5. **Load moving power**

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

6. **Load acceleration power**

$$P_a = \left(\frac{2\pi}{60} \times n_m\right)^2 \frac{J_L}{t_a} = \left(\frac{2\pi}{60} \times n_m\right)^2 \times \frac{J_{LI} + J_B + J_C}{t_a}$$

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

7. **Provisional settings of the servo motor**

- Selection condition

$T_L \leqslant$ Motor rated torque

$P_a + P_o =$ (1 to 2) x motor rated output

$n_M \leqslant$ motor rated speed

$J_L \leqslant$ Allowable load moment of inertia of the servo unit

Perform the following provisional selections according to preceding conditions:

Servo motor: MS1H1-20B30CB-A630R

Servo drive: SV670PS1R6I

- Specifications of the servo motor and servo drive

Rated output: 200 (W)

Rated speed: 3000 (rpm)

Rated torque: 0.64 (N·m)

Maximum transient torque: 1.95 (N·m)

Rotor moment of inertia: 0.082 x 10^{-4}kg (m^2)

Allowable load moment of inertia: 1.64 x 10^{-4} (kg·m^2)

Pulses per revolution of the encoder: 67108864 (P/R)

8. **Verification of the servo motor selected provisionally**

Verify the start torque required

$$T_p = \frac{2\pi \times n_M \times (J_M + J_L)}{60 \times t_a} + T_L = \frac{2\pi \times 3000 \times (0.082 + 1.25) \times 10^{-4}}{60 \times 0.1} + 0.139$$

$$= 0.557\ (N \cdot m) < \text{Max. instantaneous torque...Satisfactory}$$

Verify the braking torque required

$$T_s = \frac{2\pi \times n_M \times (J_M + J_L)}{60 \times t_a} - T_L = \frac{2\pi \times 3000 \times (0.082 + 1.25) \times 10^{-4}}{60 \times 0.1} - 0.139$$

$$= 0.279(N \cdot m) < \text{Max. instantaneous torque...Satisfactory}$$

Verify the effective torque value

$$T_{rms} = \sqrt{\frac{T_p^2 \times t_a + T_L^2 \times t_c + T_s^2 \times t_d}{t}}$$

$$= \sqrt{\frac{(0.557)^2 \times 0.1 + (0.139)^2 \times 0.9 + (0.279)^2 \times 0.1}{1.5}}$$

$$= 0.19\ (N \cdot m) < \text{Rated torque...Satisfactory}$$

The servo motor and servo drive selected provisionally are applicable in terms of capacity. The following analyzes position control.

9. **Electronic gear ratio (B/A)**

The electrical stopping precision (δ) is ±0.01 mm, so the position detection unit (△L) is 0.01 mm/pulse.

$$\frac{P_B}{\Delta L} \times \frac{B}{A} = \frac{5}{0.01} \times \frac{B}{A} = 67108864$$

$$\frac{B}{A} = \frac{67108864 \times 0.01}{5} = \frac{67108864}{500}$$

10. **Reference pulse frequency**

$$V_s = \frac{1000 \times V_L}{60 \times \Delta L} = \frac{1000 \times 15}{60 \times 0.01} = 25000\ (pps)$$

11. **Offset counter droop pulse**

- Set the position loop gain (K_p) to 30 (l/s).

$$\varepsilon = \frac{V_s}{K_p} = \frac{25000}{30} = 833\ (pulse)$$

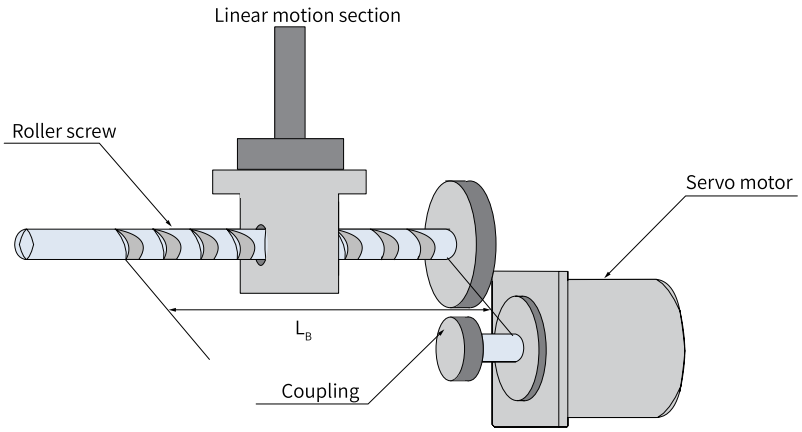
- Electrical stopping precision

$$\pm\Delta\varepsilon = \pm\frac{\varepsilon}{(\text{Servo drive control range}) \times \frac{n_M}{n_R}} = \pm\frac{833}{5000 \times \frac{3000}{3000}}$$

$$= \pm 0.17 < \pm 1\,(\text{pulse}) \pm 0.01\,(\text{mm/pulse})$$

The servo motor and servo drive selected provisionally are applicable for position control.

5.2 Capacity Selection Example for Speed Control



Load Speed V_L =15 m/min

Linear motion section mass (m): 80 kg

Roller screw length L_B =0.8 m

Roller screw diameter (d_B): 0.04 m

Roller screw lead (P_B): 0.01 m

Coupler mass (m_c): 1 kg

Coupler O.D. d_c =0.06 m

Number of feeding operations (n): 40/min

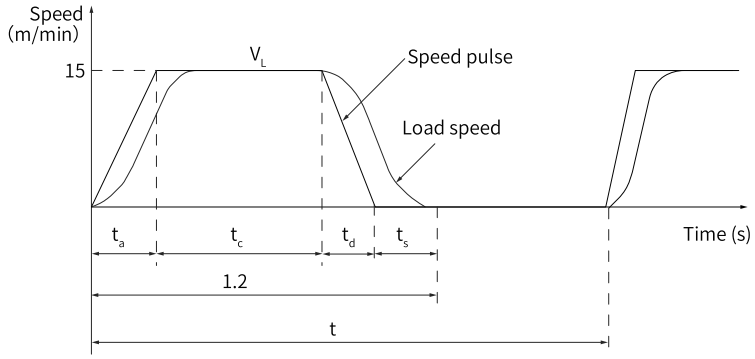
Feeding distance (L): 0.25 m

Feeding time t_m = less than 1.2s

Friction coefficient (μ): 0.2

Mechanical efficiency (η): 0.9 (90%)

1. **Speed diagram**



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

Set $t_a = t_d$

$$t_a = t_m - t_s - \frac{60 \times L}{V_L} = 1.2 - 0.1 - \frac{60 \times 0.25}{15} = 0.1(s)$$

$$t_c = 1.2 - 0.1 - 0.1 \times 2 = 0.9(s)$$

2. **Speed**

- Load shaft speed

$$n_L = \frac{V_L}{P_B} = \frac{15}{0.01} = 1500\ (rpm)$$

- Motor shaft speed

  As the coupler is directly connected, the gear ratio (1/R) is 1:1.

$$n_M = n_L \times R = 1500 \times 1 = 1500\ (rpm)$$

3. **Load torque**

$$T_L = \frac{9.8\ \mu \times m \times P_B}{2\pi \times R \times \eta} = \frac{9.8 \times 0.2 \times 80 \times 0.01}{2\pi \times 1 \times 0.9} = 0.277\ (N \cdot m)$$

4. **Load moment of inertia**

- Linear motion section

$$J_{LI} = m \times \left(\frac{P_B}{2\pi R}\right)^2 = 80 \times \left(\frac{0.01}{2\pi \times 1}\right)^2 = 2.02 \times 10^{-4}\ (kg \cdot m^2)$$

- Roller screw

$$J_B = \frac{\pi}{32} P \times L_B \times d_B^4 = \frac{\pi}{32} \times 7.87 \times 10^3 \times 1.4 \times (0.04)^4 = 27.7 \times 10^{-4}\ (kg \cdot m^2)$$

- Coupler

$$J_C = \frac{1}{8} m_c \times d_c^4 = \frac{1}{8} \times 1 \times (0.06)^2 = 4.5 \times 10^{-4}\ (kg \cdot m^2)$$

5. **Load moving power**

$$P_O = \frac{2\pi \times n_M \times T_L}{60} = \frac{2\pi \times 1500 \times 0.277}{60} = 43.6\ (W)$$

6. **Load acceleration power**

$$P_a = \left(\frac{2\pi}{60} \times n_m\right)^2 \times \frac{J_L}{t_a} = \left(\frac{2\pi}{60} \times n_m\right)^2 \times \frac{J_C + J_B + J_{LI}}{t_a}$$

$$= \left(\frac{2\pi}{60} \times 1500\right)^2 \times \frac{34.22 \times 10^{-4}}{0.1} = 844\ (W)$$

7. **Provisional settings of the servo motor**

- Selection condition

  $T_L \leqslant$ Motor rated torque

  $P_a + P_o$ = (1 to 2) x motor rated output

  $n_M \leqslant$ motor rated speed

  $J_L \leqslant$ Allowable load moment of inertia of the servo unit

  Perform the following provisional selections according to preceding conditions:

Servo motor: MS1H4-75B30CB-A630R

Servo drive: SV670PS5R5I

- Specifications of the servo motor and servo drive

Rated output: 750 (W)

Rated speed: 3000 (rpm)

Rated torque: 2.39 (N·m)

Maximum transient torque: 8.365 (N·m)

Rotor moment of inertia: 1.38×10^{-4} ($kg \cdot m^2$)

Allowable load moment of inertia: 69.58×10^{-4}kg (m^2)

8. **Verification of the servo motor selected provisionally**

Verify the start torque required

$$T_p = \frac{2\pi \times n_M \times (J_M + J_L)}{60 \times t_a} + T_L = \frac{2\pi \times 1500 \times (1.38 + 34.22) \times 10^{-4}}{60 \times 0.1} + 0.277$$

$= 5.87\ (N \cdot m) < $ Max. instantaneous torque...Satisfactory

Verify the braking torque required

$$T_s = \frac{2\pi \times n_M \times (J_M + J_L)}{60 \times t_a} - T_L = \frac{2\pi \times 1500 \times (1.38 + 34.22) \times 10^{-4}}{60 \times 0.1} - 0.277$$

$= 5.32\ (N \cdot m) <$ Max. instantaneous torque...Satisfactory

Verify the effective torque value

$$T_{rms} = \sqrt{\frac{T_p^2 \times t_a + T_L^2 \times t_c + T_s^2 \times t_d}{t}}$$

$$= \sqrt{\frac{(5.87)^2 \times 0.1 + (0.277)^2 \times 0.9 + (5.32)^2 \times 0.1}{1.5}}$$

$= 2.06(N \cdot m) <$ Rated torque…Satisfactory

9. **Selection result**

The servo motor and servo drive selected temporarily according to preceding steps are available for use. The torque diagram is as follows.

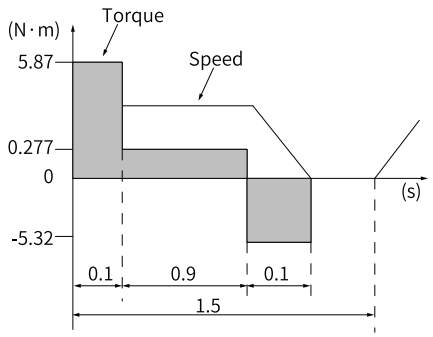


Figure 5-1 Torque diagram

6 Ordering

Table 6–1 Terminal accessory package list

Material Code	Parameter Name	Quantity
15210928	Plug-in terminal block-plug-spring clamp wiring-9P-black	1
19020818	Label-CV100-3D006-ECY-CV100 blank QR code (RoHS)	1
19021377	Label-servo drive-SV660PS2R8I-220V Input 2.8 A-SV660P pulse type servo drive terminal	1
19021600	Label-SV660PS2R8I-wiring warning	1
19033058	Bag-SIT8.840.054-40Z603GAZ-Ziplock bag for screws delivered with the 60 kW hybrid bus motor inverter	1
21020021	Plastic parts-plug wiring key-for use with servo drive power plug	1

If you need to purchase the terminal accessory package separately, see the following table for the material code of the accessory package for each model.

Table 6–2 Material code of the accessory package for each model

Material Code	Parameter Name
98050331	Accessories (sale)-S6-C40-SV660P size A terminal accessory kit
98050332	Accessories (sale)-S6-C42-SV660P size B terminal accessory kit
98050333	Accessories (sale)-S6-C44-SV660P size C&D terminal accessory kit

Note

SV660P and SV660N products share the same terminal kit.

7 Service and Support

Downloads

More product manuals, leaflets, brochures, certificates, 2D/3D drawings and other information can be downloaded in the following ways:

Do keyword search under “Service and Support-After-sales Service” at *https://www.inovance.com*“”.

Contact us

We are honored to have you as our client. You can submit basic information to us in the following way, so that we can reach you as soon as possible. We are committed to your privacy. We will never share your information with any third party.

Go to our official website (*https://www.inovance.com*), select “Service and Support-Contact Us”, and submit your information.

After-sales service

If you have product quality problems and need after-sales service, or you need to purchase spare parts, you can get the after-sales service person in your region through the following way.

Go to our official website (*https://www.inovance.com*), select “Service and Support-After-sales Service”, and submit the product category and your region.

Repair service

If a product is in trouble and needs to be repaired, you can check the maintenance instructions, submit the service request and check the service record in the following way.

Go to our official website (*https://www.inovance.com*), select “Service and Support-Repair”, and submit the repair request.

Authentication

You can authenticate Inovance products in the following way:

Go to our official website (*https://www.inovance.com*), select “Service and Support-Authentication”, and enter the 16-digit serial number.

FAQ

You can go through frequently asked questions about Inovance products in the following way:

Go to our official website (*https://www.inovance.com*) and select “Service and Support-FAQ”.

Feedback

You can submit your feedback in the following way:

Go to our official website (*https://www.inovance.com*), select “Service and Support-Feedback”, and submit your feedback.

Forum

The forum provides high-quality courses for beginners and advanced learners. You are free to learn and share there. To get access to the forum:

Go to our official website (*https://www.inovance.com*) and select **"**Service and Support-Forum**"**.

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