



## SV660N Series Servo Drive Selection Guide



Industrial  
Automation



Intelligent  
Elevator



New Energy  
Vehicle



Industrial  
Robot



Rail  
Transit



Data code 19011431C01

# Preface

## Introduction

The SV660N series high performance AC servo drive provides a power range from 0.05 kW to 7.5 kW. It supports EtherCAT communication protocol and carries Ethernet communication interfaces to work with the host controller for a networked operation of multiple servo drives.

The SV660N series servo drive supports stiffness level setting, inertia auto-tuning and vibration suppression to simplify the operation process. It allows a quiet and stable operation together with an MS1 series servo motor with low or medium inertia and a 23-bit single-turn or multi-turn absolute encoder.

The SV660N series servo drive aims to implement fast and accurate control in automation equipment such as semi-conductor manufacturing equipment, chip mounters, PCB punching machines, transport machineries, food processing machineries, machine tools, and transmission machineries.

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

## More Documents

Name	Data code	Description
SV660N Series Servo Drive Hardware Guide	PS00001741	This guide describes the installation and wiring of the drive, including pre-installation preparations, unpacking and transportation, mechanical installation, and electrical installation.
SV660N Series Servo Drive Selection Guide	PS00003006	Presents technical data and dimensions of the servo drive, and specifications and models of optional parts (installation accessories, cables, and periphery electrical parts).
SV660N Series Servo Drive Commissioning Guide	PS00001761	Presents servo commissioning, parameter descriptions, including the operating panel, commissioning software, commissioning procedure and a parameter list.
SV660N Series Servo Drive Function Guide	PS00001781	Presents functions and parameters, including function overview, basic servo functions, adjustment and parameter list.
SV660N Series Servo Drive Communication Guide	PS00002165	Presents functions and parameters of the servo drive, including EtherCAT communication configuration, parameter description, and communication application cases.
SV660N Series Servo Drive Troubleshooting Guide	PS00005569	Introduces faults and fault levels, the troubleshooting process, warning codes and fault codes.
SV660N Series Servo Drive Safety Guide	PS00006355	Presents the safety function and related certifications and standards, wiring, commissioning process, troubleshooting, and functions.
SV660N Series Servo Drive Manual Package	PS00005512	Provides information on selection, installation, commissioning, function, troubleshooting and parameters of the equipment.

## Revision History

Date	Version	Description
December 2023	C01	<ul style="list-style-type: none"> <li>• Updated the fuse and circuit breaker model selection.</li> <li>• Added shielded power cable selection and shielded cable model description.</li> <li>• Added descriptions for -FH models.</li> <li>• Added recommended shield bracket.</li> <li>• Updated document acquisition channels.</li> </ul>
April 2023	C00	<ul style="list-style-type: none"> <li>• Updated cable model naming rules.</li> <li>• Updated the model information of the optional circuit breaker.</li> </ul>
January 2023	B02	Modified the electrical specifications.
November 2022	B01	<ul style="list-style-type: none"> <li>• Switched MS1-Z motors to MS1-R motors.</li> <li>• Added warranty information in the preface.</li> <li>• Modified the name of the ferrite clamp.</li> <li>• Modified the selection table of support parts.</li> <li>• Removed the contents on the FMMU unit.</li> <li>• Modified the value of the rated output current in the electrical specifications and model number description.</li> <li>• Modified motor selection instructions.</li> </ul>
August 2022	B00	<ul style="list-style-type: none"> <li>• Added information on the electrical specifications of the drive.</li> <li>• Adjusted the manual structure.</li> </ul>
January 2022	A02	Added additional safety precautions in Safety Instructions.
October 2021	A01	<ul style="list-style-type: none"> <li>• Merged the section on the electrical data of the brake resistor with section 3.1.1 Electrical Specifications.</li> <li>• Modified motor connector information in sections 4.1, 5.1, 6.1, and 7.1.</li> <li>• Modified TP and LZ in the motor dimensions in sections 4.2.5, 5.2.5, 6.2.5 and 7.2.5.</li> <li>• Modified the cable length tolerance in sections 4.3, 5.3, 6.3, and 7.3.</li> <li>• Modified the information on the compatible reactor for SV660PT012I in section 8.3.1.</li> </ul>
November 2020	A00	First release

## Access to the guide

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

- Do keyword search at <http://www.inovance.com>.
- Scan the QR code on the equipment to acquire more.
- Scan the QR code below to install the app, where you can search for and download manuals.



## Warranty agreement

Inovance provides warranty service within the warranty period (as specified in your order) for faults or damage that occur during normal operation. Maintenance will be charged after the warranty period expires.

Within the warranty period, maintenance 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 Product Warranty Card.

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# Fundamental Safety Instructions

## Safety Precautions

- This chapter presents essential safety instructions for a proper use of the equipment. Before operating the equipment, read through the guide and comprehend all the safety instructions. 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 injury or property damage caused by improper usage.

## Safety Levels and Definitions



Indicates that failure to comply with the notice can result in death or severe personal injury.



Indicates that failure to comply with the notice may result in death or severe personal injury.



Indicates that failure to comply with the notice may result in minor or moderate personal injury or equipment damage.

## General Safety Instructions

- Drawings in the 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.
- The drawings in the guide are shown for illustration only and may be different from the product you purchased.

<b>Unpacking</b>	
	<ul style="list-style-type: none"> <li>• Do not install the equipment if you find damage, rust, or signs of use on the equipment or accessories upon unpacking.</li> <li>• Do not install the equipment if you find water seepage or missing or damaged components upon unpacking.</li> <li>• Do not install the equipment if you find the packing list does not conform to the equipment you received.</li> </ul>
	<ul style="list-style-type: none"> <li>• Check whether the packing is intact and whether there is damage, water seepage, dampness, and deformation before unpacking.</li> <li>• Unpack the package by following the unpacking sequence. Do not strike the package violently.</li> <li>• Check whether there is damage, rust, or injury on the surface of the equipment and equipment accessories before unpacking.</li> <li>• Check whether the package contents are consistent with the packing list before unpacking.</li> </ul>

### 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 injury 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 injury 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 injury or equipment damage.



- Handle the equipment with care during transportation and mind your steps to prevent personal injury 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 injury.
- 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 must be operated only by professionals with electrical knowledge. Non-professionals are not allowed.



- 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 equipments with strong electromagnetic interference, such as a transformer, install a shielding equipment 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.



- 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



- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- Before wiring, cut off all the power supplies of the equipment. and wait for at least the time designated on the equipment warning label before further operations because residual voltage still exists after power-off. After waiting for the designated time, measure the DC voltage in the main circuit to ensure the DC voltage is within the safe voltage range. Failure to comply will result in an 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 can result in electric shock.

 WARNING
<ul style="list-style-type: none"><li>• Do not connect the input power supply to the output end of the equipment. Failure to comply can result in equipment damage or even a fire.</li><li>• 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.</li><li>• Cables used for wiring must meet cross sectional area and shielding requirements. The shield of the cable must be reliably grounded at one end.</li><li>• 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.</li><li>• 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.</li></ul>
 CAUTION
<ul style="list-style-type: none"><li>• Follow the proper electrostatic discharge (ESD) procedure and wear an anti-static wrist strap to perform wiring. Failure to comply may result in damage to the equipment or to the internal circuit of the product.</li><li>• 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.</li></ul>
<b>Power-on</b>
 DANGER
<ul style="list-style-type: none"><li>• Before power-on, check that the equipment is installed and wired properly and the motor can be restarted.</li><li>• Check that the power supply meets equipment requirements before power-on to prevent equipment damage or a fire.</li><li>• 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.</li></ul>
 WARNING
<ul style="list-style-type: none"><li>• Perform a trial run after wiring and parameter setting to ensure the equipment operates safely. Failure to comply may result in personal injury or equipment damage.</li><li>• Before power-on, check that the rated voltage of the equipment is consistent with that of the power supply. Failure to comply will result in a fire.</li><li>• Before power-on, check that no one is near the equipment, motor, or machine. Failure to comply may result in death or personal injury.</li></ul>
<b>Operation</b>
 DANGER
<ul style="list-style-type: none"><li>• The equipment must be operated only by professionals. Failure to comply will result in death or personal injury.</li><li>• 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.</li></ul>
 WARNING
<ul style="list-style-type: none"><li>• Do not touch the equipment casing, fan, or resistor with bare hands to feel the temperature. Failure to comply may result in personal injury.</li><li>• Prevent metal or other objects from falling into the equipment during operation. Failure to comply may result in a fire or equipment damage.</li></ul>

<b>Maintenance</b>
<div style="border: 1px solid black; padding: 2px; display: inline-block;"> DANGER</div> <ul style="list-style-type: none"> <li>• Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.</li> <li>• Do not maintain the equipment with power ON. Failure to comply will result in an electric shock.</li> <li>• Before maintenance, cut off all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.</li> <li>• 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.</li> </ul>
<div style="border: 1px solid black; padding: 2px; display: inline-block;"> WARNING</div> <ul style="list-style-type: none"> <li>• Perform routine and periodic inspection and maintenance on the equipment according to maintenance requirements and keep a maintenance record.</li> </ul>
<b>Repair</b>
<div style="border: 1px solid black; padding: 2px; display: inline-block;"> DANGER</div> <ul style="list-style-type: none"> <li>• Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.</li> <li>• Do not repair the equipment with power ON. Failure to comply will result in an electric shock.</li> <li>• 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.</li> </ul>
<div style="border: 1px solid black; padding: 2px; display: inline-block;"> WARNING</div> <ul style="list-style-type: none"> <li>• Submit the repair request according to the warranty agreement.</li> <li>• 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 injury or equipment damage.</li> <li>• 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.</li> <li>• Replace quick-wear parts of the equipment according to the replacement instructions.</li> <li>• Do not use damaged equipment. Failure to comply may result in death, personal injury, or severe equipment damage.</li> <li>• After the equipment is replaced, check the wiring and set parameters again.</li> </ul>
<b>Disposal</b>
<div style="border: 1px solid black; padding: 2px; display: inline-block;"> WARNING</div> <ul style="list-style-type: none"> <li>• Dispose of retired equipment in accordance with local regulations and standards. Failure to comply may result in property damage, personal injury, or even death.</li> <li>• Recycle retired equipment by observing industry waste disposal standards to avoid environmental pollution.</li> </ul>

## 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. The following table describes the meaning of the safety labels.

Safety label	Description
 <p>危険 DANGER</p> <p>高压注意 Hazardous Voltage</p> <p>高温注意 High Temperature</p>	<ul style="list-style-type: none"><li>• Never fail to connect the protective earth (PE) terminal. Read through the guide and follow the safety instructions before use.</li><li>• Do not touch terminals within 15 minutes after disconnecting the power supply to prevent the risk of electric shock.</li><li>• Do not touch the heatsink with power ON to prevent the risk of burn.</li></ul>

# 1 Model Selection

## 1.1 Model 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 ( $n_N=3000$ rpm, $n_{max}=6000$ rpm) series motors							
MS1H1-05B30CB-A330R	MS1H1-05B30CB-A332R	40	0.05	Single-phase 220 V	A	S1R6	00002
MS1H1-10B30CB-A330R	MS1H1-10B30CB-A332R	40	0.1	Single-phase 220 V			
MS1H1-20B30CB-A331R	MS1H1-20B30CB-A334R	60	0.2	Single-phase 220 V			
MS1H1-40B30CB-A331R	MS1H1-40B30CB-A334R	60	0.4	Single-phase 220 V	B	S2R8	00003
MS1H1-55B30CB-A331R	-	80	0.55	Single-phase 220 V		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 ( $n_N=3000$ rpm, $n_{max}=6000$ rpm/5000 rpm) 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	T012 <sup>[1]</sup>	10004
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 <sup>[2]</sup>	10006
Ratings of MS1H3 ( $n_N=1500$ rpm, $n_{max}=3000$ rpm) motors							
MS1H3-85B15CB-A33*R	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
MS1H3-18C15CB-A331R	MS1H3-18C15CB-A334R	130	1.8	Single-phase/ Three-phase 220 V	D	S012	00007

## Model Selection

Servo motor				Servo drive SV660****1			
Motor without brake	Motor with brake	Flange size	Capacity (kW)	Voltage class	Size	Recommended drive model	No.
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
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
<b>MS1H4 ( <math>n_N=3000\text{rpm}</math>, <math>n_{\max}=6000\text{rpm}</math>) ratings</b>							
MS1H4-05B30CB-A330R	MS1H4-05B30CB-A332R	40	0.05	Single-phase 220 V	A	S1R6	00002
MS1H4-10B30CB-A330R	MS1H4-10B30CB-A332R	40	0.1	Single-phase 220 V		S1R6	00002
MS1H4-05B30CB-A331R	MS1H4-05B30CB-A334R	40	0.05	Single-phase 220 V		S1R6	00002
MS1H4-10B30CB-A331R	MS1H4-10B30CB-A334R	40	0.1	Single-phase 220 V		S1R6	00002
MS1H4-20B30CB-A331R	MS1H4-20B30CB-A334R	60	0.2	Single-phase 220 V		S1R6	00002
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

- [1] See the torque-speed characteristics of this model for T8R4 drives.
- [2] See the torque-speed characteristics of this model for T017 drives.

## 1.2 Comparison Between MS1-R Series Motor and MS1-Z Series Motor

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
40	MS1H1-05B30CB-A330Z	MS1H4-05B30CB-A330R	MS1H1-05B30CB-A332Z	MS1H4-05B30CB-A332R
	MS1H1-10B30CB-A330Z	MS1H4-10B30CB-A330R	MS1H1-10B30CB-A332Z	MS1H4-10B30CB-A332R
	MS1H4-10B30CB-A330Z		MS1H4-10B30CB-A332Z	
	MS1H1-05B30CB-T330Z	MS1H4-05B30CB-T330R	MS1H1-05B30CB-T332Z	MS1H4-05B30CB-T332R
	MS1H1-10B30CB-T330Z	MS1H4-10B30CB-T330R	MS1H1-10B30CB-T332Z	MS1H4-10B30CB-T332R
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-A334Z	
	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-A334Z-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-T334Z	
	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-T334Z X6	
	-	MS1H4-20B30CB-T331R-S	-	MS1H4-20B30CB-T334R-S
	-	MS1H4-40B30CB-T331R-S	-	MS1H4-40B30CB-T334R-S
	80	MS1H1-55B30CB-A331Z	MS1H4-55B30CB-A331R	-
MS1H1-75B30CB-A331Z		MS1H4-75B30CB-A331R	MS1H1-75B30CB-A334Z	MS1H4-75B30CB-A334R
MS1H4-75B30CB-A331Z		MS1H4-75B30CB-A331R	MS1H4-75B30CB-A334Z	
MS1H1-10C30CB-A331Z		MS1H4-10C30CB-A331R	-	MS1H4-10C30CB-A334R
MS1H1-55B30CB-A331Z-S		MS1H4-55B30CB-A331R-S	-	-
MS1H1-75B30CB-A331Z-S		MS1H4-75B30CB-A331R-S	MS1H1-75B30CB-A334Z-S	MS1H4-75B30CB-A334R-S
MS1H4-75B30CB-A331Z-S		MS1H4-75B30CB-A331R-S	MS1H4-75B30CB-A334Z-S	
MS1H1-10C30CB-A331Z-S		MS1H4-10C30CB-A331R-S	-	MS1H4-10C30CB-A334R-S
MS1H1-55B30CB-T331Z		MS1H4-55B30CB-T331R	-	-
MS1H1-75B30CB-T331Z		MS1H4-75B30CB-T331R	MS1H1-75B30CB-T334Z	MS1H4-75B30CB-T334R
MS1H4-75B30CB-T331Z		MS1H4-75B30CB-T331R	MS1H4-75B30CB-T334Z	
MS1H1-10C30CB-T331Z		MS1H4-10C30CB-T331R	-	MS1H4-10C30CB-T334R
MS1H1-55B30CB-T331Z X6		MS1H4-55B30CB-T331R	-	-
MS1H1-75B30CB-T331Z X6		MS1H4-75B30CB-T331R	MS1H1-75B30CB-T334Z X6	MS1H4-75B30CB-T334R
MS1H4-75B30CB-T331Z X6		MS1H4-75B30CB-T331R	MS1H4-75B30CB-T334Z X6	
MS1H1-10C30CB-T331Z X6		MS1H4-10C30CB-T331R	-	-
-		MS1H4-55B30CB-T331R-S	-	-
MS1H1-75B30CB-T331Z-S		MS1H4-75B30CB-T331R-S	-	MS1H4-75B30CB-T334R-S
-	MS1H4-10C30CB-T331R-S	-	MS1H4-10C30CB-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, the ultra-small inertia motor added to the flange size 40, 60, and 80 of R version (T3 model is not available for 60-/80-flange motors), is mainly used for fast point-to-point motion control applications.

## Model Selection

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
	-	MS1H2-20C30CB-T331R	-	MS1H2-20C30CB-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
	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
	MS1H3-18C15CB-A331Z	MS1H3-18C15CB-A331R	-	MS1H3-18C15CB-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	
-	MS1H3-18C15CB-T331R	-	MS1H3-18C15CB-T334R	
MS1H3-18C15CD-T331Z	MS1H3-18C15CD-T331R	MS1H3-18C15CD-T334Z	MS1H3-18C15CD-T334R	
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 SV660N Series Products

### 2.1 Product Information

#### 2.1.1 Drive Model and Nameplate

##### Model description

$\frac{\text{SV660}}{\text{①}}$ 
 $\frac{\text{N}}{\text{②}}$ 
 $\frac{\text{S}}{\text{③}}$ 
 $\frac{\text{2R8}}{\text{④}}$ 
 $\frac{\text{I-FH}}{\text{⑤}}$ 
 $\frac{\text{FH}}{\text{⑥}}$

<b>① Product series</b> SV660: SV660 series servo drive	<b>④ Rated output current</b>  S: 220 V      1R6: 1.6A 2R8: 2.8A 5R5: 5.5 A 7R6: 7.6 A 012: 11.6 A 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		<b>⑤ Installation mode</b> I: Baseplate-mounted
<b>② Product type</b> N: Network type			<b>⑥ Non-standard function</b> Blank: Standard FH: High protection FS: STO functional safety NS: Upgraded
<b>③ Voltage class</b> S: 220 V T: 380 V			

#### Note

-FH: High protection model that features high reliability for environments with cutting fluids and excessive dust.

## Nameplate

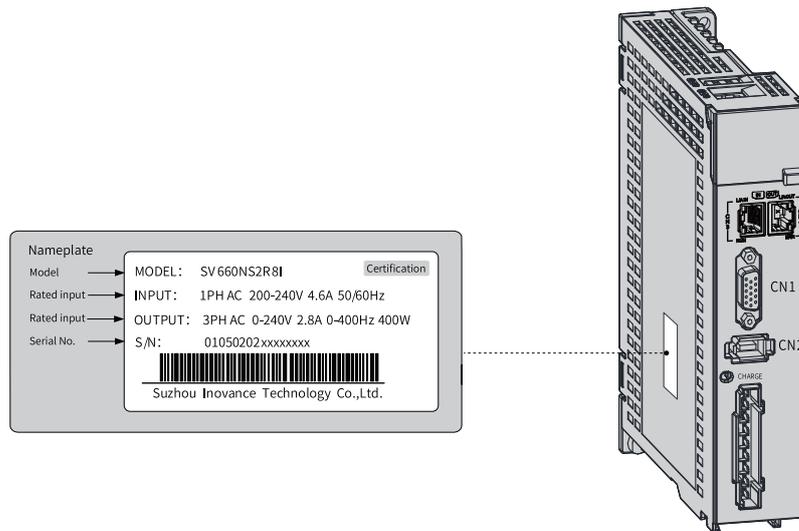


Figure 2-1 Nameplate

## Encryption of the production serial number

01050202 4 H 7 00001  
 ①      ② ③ ④      ⑤

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

Example: The S/N 010502024H700001 indicates the drive is manufactured in July, 2017.

## 2.1.2 Components

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

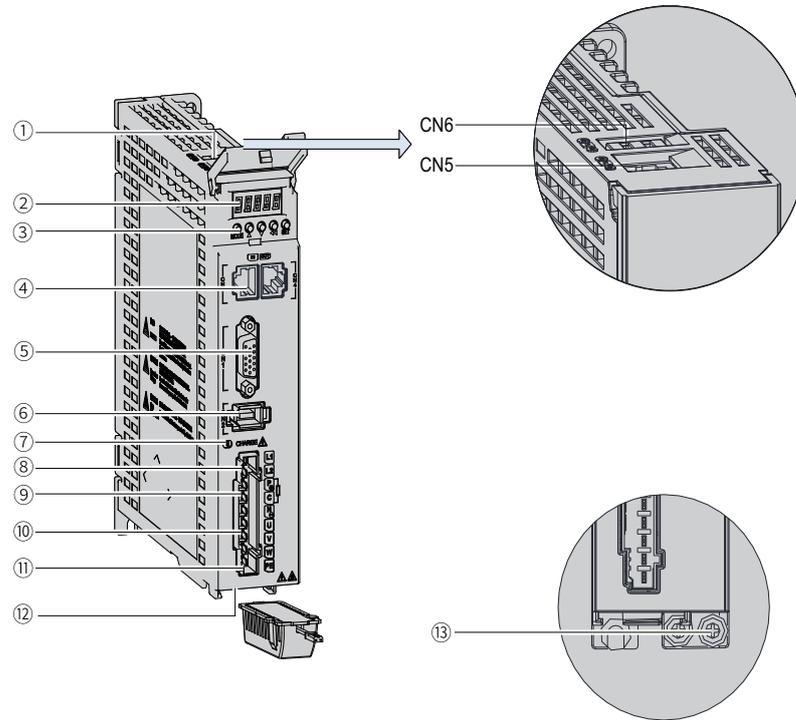


Figure 2-2 Components (SV660NS1R6I, SV660NS2R8I)

Table 2-1 Description of components (SV660NS1R6I, SV660NS2R8I)

No.	Name	Description
①	CN6 (STO safety function terminal)	Connected to external functional safety signal for functional safety purpose.
	CN5 communication terminal	Connected to RS232 communication instruction device.
②	LED display	The 5-digit 8-segment LED display is used to show servo system's running state and parameter setting.
③	Keys	<p>MODE: Used to switch parameters in sequence.</p> <p>△: Used to increase the value of the blinking bit.</p> <p>▽: Used to decrease the value of the blinking bit.</p> <p>◁: Used to shift the blinking bit leftwards.</p> <p>(Hold down: Turning to the next page when the displayed number exceeds five digits)</p> <p>SET: Used to save modifications and enter the next menu.</p>
④	CN3, CN4 (EtherCAT communication terminals)	CN3 (IN): Connected to the master or the last slave device CN4 (OUT): Connected to the next slave device
⑤	CN1 (control terminal)	Used by reference input signals and other I/O signals.
⑥	CN2 (terminal for connecting the encoder)	Connected to the motor encoder terminal.

No.	Name	Description
⑦	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 terminals when this indicator lights up.
⑧	L1, L2 (power input terminals)	See the nameplate for the rated voltage class.
⑨	P⊕, N⊖ (servo bus terminals)	Used by the common DC bus for multiple servo drives. Contact Inovance for technical support.
	P⊕, C (terminals for connecting external regenerative resistor)	If an external braking resistor is needed, connect it between terminals P⊕ and C.
⑩	U, V, W (terminals for connecting the servo motor)	Connected to U, V, and W phases of the servo motor.
⑪	Motor grounding terminal	Connected to the grounding terminal of the motor for grounding purpose.
⑫	Battery location	Used to hold the battery box of the absolute encoder.
⑬	Power supply 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.
- The CN6 STO safety function terminal is only suitable for non-standard models (-FS).

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

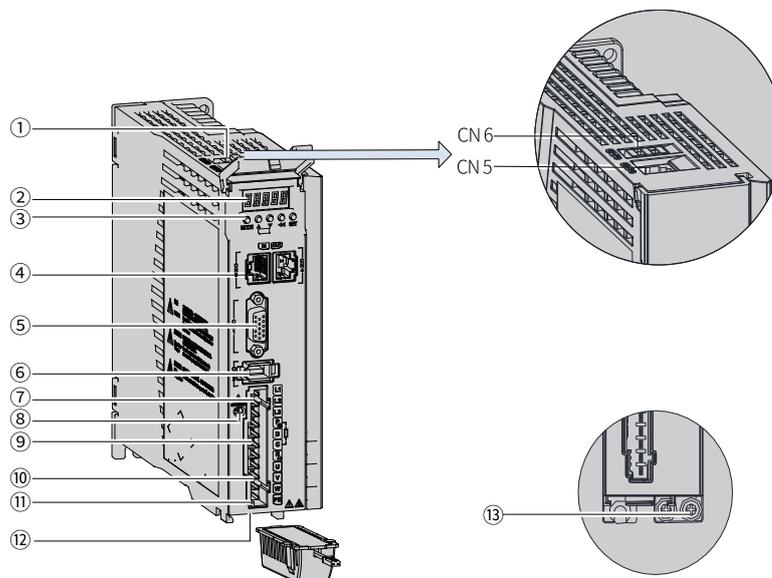


Figure 2-3 Components (SV660NS5R5I)

Table 2-2 Description of components (SV660NS5R5I)

No.	Name	Description
①	CN6 (STO safety function terminal)	Connected to external functional safety signal for functional safety purpose.
	CN5 communication terminal	Connected to RS232 communication instruction device.
②	LED display	The 5-digit 8-segment LED display is used to show servo system's running state and parameter setting.
③	Keys	<p>MODE: Used to switch parameters in sequence.</p> <p>△: Used to increase the value of the blinking bit.</p> <p>▽: Used to decrease the value of the blinking bit.</p> <p>◁: Used to shift the blinking bit leftwards.</p> <p>(Hold down: Turning to the next page when the displayed number exceeds five digits)</p> <p>SET: Used to save modifications and enter the next menu.</p>
④	CN3, CN4 (EtherCAT communication terminals)	CN3 (IN): Connected to the master or the last slave device CN4 (OUT): Connected to the next slave device
⑤	CN1 (control terminal)	Used by reference input signals and other I/O signals.
⑥	CN2 (terminal for connecting the encoder)	Connected to the motor encoder terminal.
⑦	L1, L2, L3 (power input terminals)	See the nameplate for the rated voltage class. Note: S5R5 (0.75 kW) models support single-phase 220 V input only, with a 220 V power supply connected between terminals L1 and L2.
⑧	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 terminals when this indicator lights up.
⑨	P⊕, N⊖ (servo bus terminals)	Used by the common DC bus for multiple servo drives. Contact Inovance for technical support.
	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. When an external braking resistor is needed, connect it between terminals P and C. If an external braking resistor is not needed, short terminals P and D. Size A models are not equipped with built-in braking resistor or jumper bar between terminals P and D.
⑩	U, V, W (terminals for connecting the servo motor)	Connected to U, V, and W phases of the servo motor.
⑪	Motor grounding terminal	Connected to the grounding terminal of the motor for grounding purpose.
⑫	Battery location	Used to hold the battery box of the absolute encoder.
⑬	Power supply grounding terminal	Connected to the grounding terminal of the power supply for grounding purpose.

**Note**

The CN6 STO safety function terminal is only suitable for non-standard models (-FS).

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

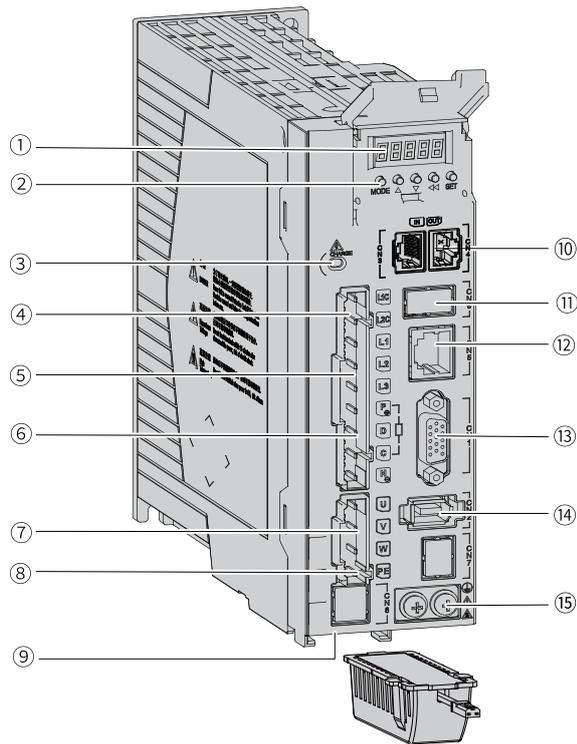


Figure 2-4 Components (SIZE C:SV660NS7R6I/SZIE D:SV660NS012I)

Table 2-3 Description of Components (SIZE C:SV660NS7R6I/SZIE D:SV660NS012I)

No.	Name	Description
①	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 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 220 V servo drive. See the nameplate for the rated voltage class.

No.	Name	Description
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. When an external braking resistor is needed, connect it between terminals P and C. If an external braking resistor is not needed, short terminals P and D. Size A models are not equipped with built-in braking resistor or jumper bar between terminals P and D.
	P⊕, N⊖ (servo bus terminals)	Used by the common DC bus for multiple servo drives. Contact Inovance for technical support.
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 (EtherCAT communication terminals)	CN3 (IN): Connected to the master or the last slave device CN4 (OUT): Connected to the next slave device
⑪	CN6 (STO safety function terminal)	Connected to external functional safety signal for functional safety purpose.
⑫	CN5 communication terminal	Connected to RS232 communication instruction device.
⑬	CN1 (control terminal)	Used by reference input signals and other I/O signals.
⑭	CN2 (terminal for connecting the encoder)	Connected to the motor encoder terminal.
⑮	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. Connect the single-phase power supply to terminal L1 and L2 for S7R6 and S012 models, without the need for derating.
- The CN6 STO safety function terminal is only suitable for non-standard models (-FS).

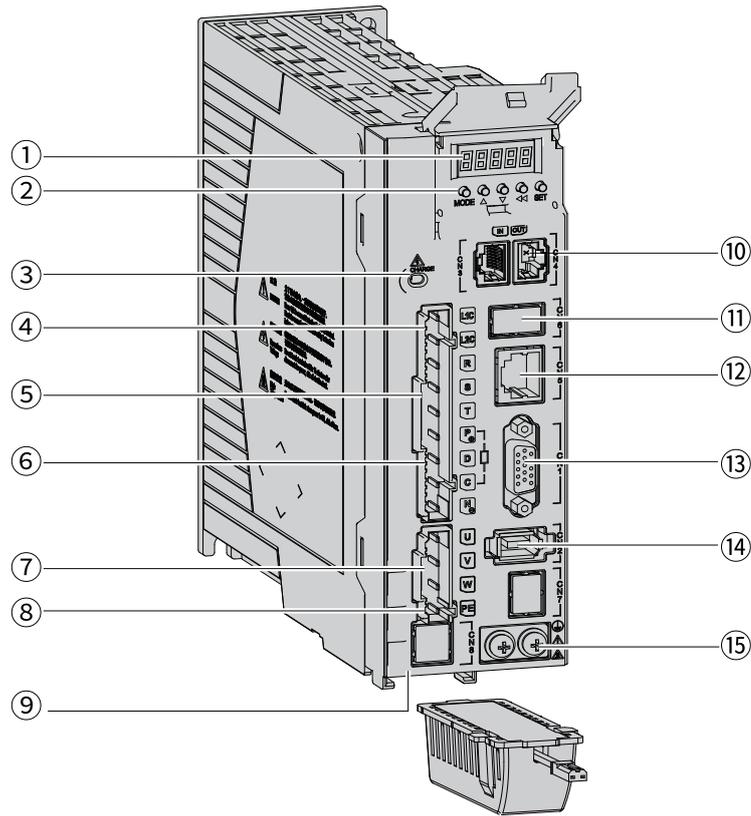


Figure 2-5 Components (size C: SV660NT3R5I, SV660NT5R4I/size D: SV660NT8R4I, SV660NT012I)

Table 2-4 Description of Components (size C:SV660NT3R5I, SV660NT5R4I/size D:SV660NT8R4I, SV660NT012I)

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

No.	Name	Description
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. When an external braking resistor is needed, connect it between terminals P and C. If an external braking resistor is not needed, short terminals P and D. Size A models are not equipped with built-in braking resistor or jumper bar between terminals P and D.
	P⊕, N⊖ (servo bus terminals)	Used by the common DC bus for multiple servo drives. Contact Inovance for technical support.
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 (EtherCAT communication terminals)	CN3 (IN): Connected to the master or the last slave device CN4 (OUT): Connected to the next slave device
⑪	CN6 (STO safety function terminal)	Connected to external functional safety signal for functional safety purpose.
⑫	CN5 communication terminal	Connected to RS232 communication instruction device.
⑬	CN1 (control terminal)	Used by reference input signals and other I/O signals.
⑭	CN2 (terminal for connecting the encoder)	Connected to the motor encoder terminal.
⑮	Servo drive grounding terminal	Connected to the grounding terminal of the power supply for grounding purpose.

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### Note

The CN6 STO safety function terminal is only suitable for non-standard models (-FS).

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

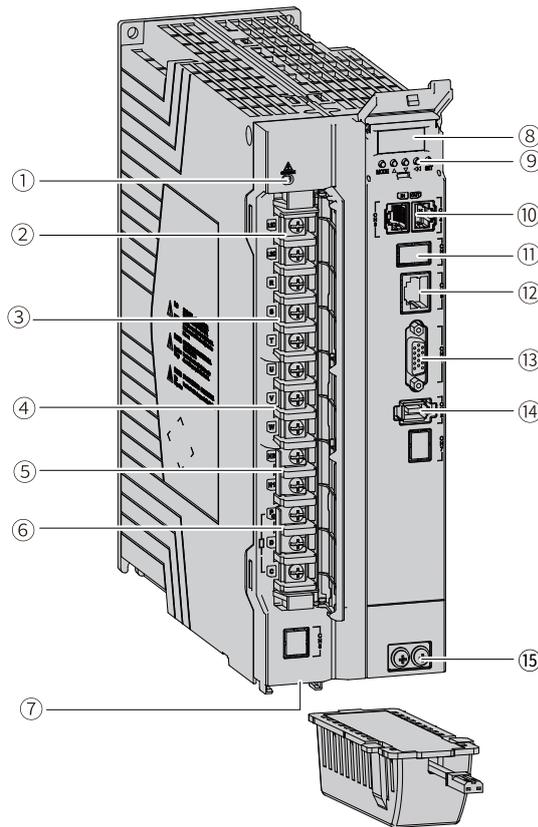


Figure 2-6 Components of servo drives in size E (SV660NT017I, SV660NT021I, SV660NT026I)

Table 2-5 Components (SV660NT017I, SV660NT021I, SV660NT026I)

No.	Name	Description
①	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 terminals when this indicator lights up.
②	L1C, L2C (control circuit power input terminals)	See the nameplate for the rated voltage class.
③	R, S, T (main circuit power input terminals)	See the nameplate for the rated voltage class.
④	U, V, W (terminals for connecting the servo motor)	Connected to U, V, and W phases of the servo motor.
⑤	N2, N1 (terminals for connecting external reactor)	Terminals N1 and N2 are jumpered by default. To suppress harmonics in the power supply, remove the jumper between terminals N1 and N2 first and connect an external DC reactor between terminals N1 and N2.
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. When an external braking resistor is needed, connect it between terminals P and C. If an external braking resistor is not needed, short terminals P and D. Size A models are not equipped with built-in braking resistor or jumper bar between terminals P and D.
⑦	Battery location	Used to hold the battery box of the absolute encoder.

No.	Name	Description
⑧	LED display	The 5-digit 8-segment LED display is used to show servo system's running state and parameter setting.
⑨	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.
⑩	CN3, CN4 (EtherCAT communication terminals)	CN3 (IN): Connected to the master or the last slave device CN4 (OUT): Connected to the next slave device
⑪	CN6 (STO safety function terminal)	Connected to external functional safety signal for functional safety purpose.
⑫	CN5 communication terminal	Connected to RS232 communication instruction device.
⑬	CN1 (control terminal)	Used by reference input signals and other I/O signals.
⑭	CN2 (terminal for connecting the encoder)	Connected to the motor encoder terminal.
⑮	Grounding terminal	Connected to the grounding terminals of the power supply and the motor for grounding purpose.

### Note

The CN6 STO safety function terminal is only suitable for non-standard models (-FS).

## 2.1.3 Product Dimensions

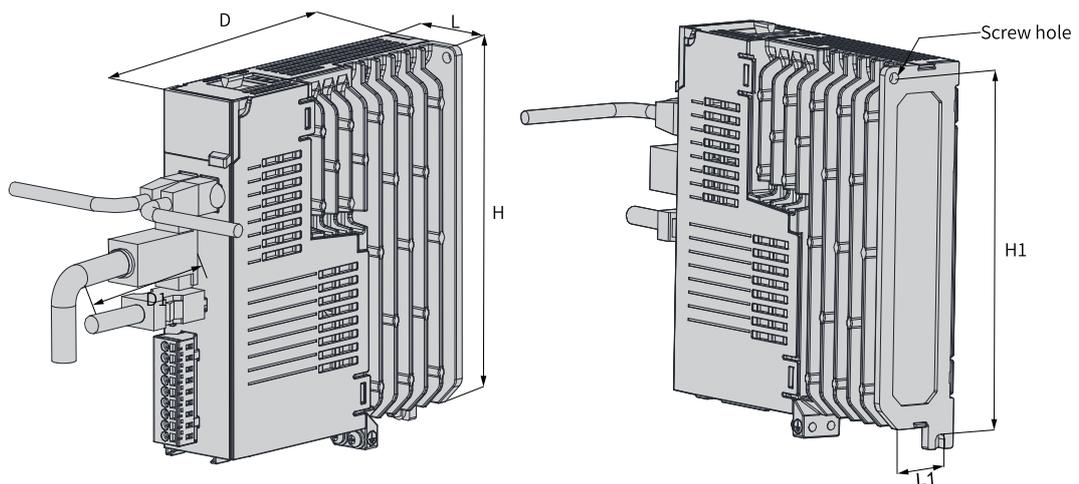


Figure 2-7 Product dimensions

Size	L	H	D	L1	H1	D1	Screw hole	Tightening torque	Weight
	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	0.6-1.2	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	0.6-1.2	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	0.6-1.2	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	0.6-1.2	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	0.6-1.2	3.6 (7.94)

## 2.2 Product Specifications

### 2.2.1 Electrical Specifications

- Single-phase 220 V drive

Item		Size A		Size B	Size C	Size D
Drive model		S1R6	S2R8	S5R5	S7R6	S012
Drive power (kW)		0.2	0.4	0.75	1	1.5
Maximum applicable motor capacity (kW)		0.2	0.4	0.75	1	1.5
Power supply 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 to 240 VAC, -10% to +10%, 50 Hz/60 Hz				
	Energy Loss (W) <sup>[1]</sup>	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) <sup>[1]</sup>	16				

Item		Size A		Size B	Size C	Size D
Braking resistor	Resistance ( $\Omega$ )	-	-	50	25	
	Resistor power (W)	-	-	50	80	
	Minimum resistance of external resistor ( $\Omega$ )	40	45	40	20	15
	Maximum 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 mode		Natural ventilation		Air cooling		
Overvoltage category		OCIII				

- Three-phase 220 V drives

Item		Size C	Size D
Drive model		S7R6	S012
Drive power (kW)		1	1.5
Maximum applicable motor capacity (kW)		1	1.5
Power supply 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	Three-phase 200 VAC to 240 VAC, -10% to +10%, 50 Hz/60 Hz	
	Energy Loss (W) <sup>[1]</sup>	47.32	69.84
Control circuit	Control circuit power supply	Single-phase 200 VAC to 240 VAC, -10% to +10%, 50 Hz/60 Hz	
	Energy Loss (W) <sup>[1]</sup>	16	
Braking resistor	Resistance ( $\Omega$ )	25	
	Resistor power (W)	80	
	Minimum resistance of external resistor ( $\Omega$ )	20	15
	Maximum braking energy absorbed by capacitor (J)	26.70	26.70
	Braking resistor	Built-in and external resistor is supported	
Cooling mode		Air cooling	
Overvoltage category		OCIII	

- Three-phase 380 V drives

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

## SV660N Series Products

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	Three-phase 380 VAC to 440 VAC, -10% to +10%, 50 Hz/60 Hz						
	Energy Loss (W) <sup>[1]</sup>	39.5	63.25	94.82	135.47	187.62	228.28	258.63
Control circuit	Control circuit power supply	Single-phase 380 VAC to 440 VAC, -10% to +10%, 50 Hz/60 Hz						
	Energy Loss (W) <sup>[1]</sup>	16						
Braking resistor	Resistance ( $\Omega$ )	100	100	50	50	35	35	35
	Resistor power (W)	80	80	80	80	100	100	100
	Minimum resistance of external resistor ( $\Omega$ )	80	60	45	40	35	25	25
	Maximum 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 category		OCIII						

### 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		
General specifications	Control mode		IGBT PWM control, sine wave current drive mode	
			220 V, 380 V: Single-phase/Three-phase full bridge 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	Ambient/Storage temperature <sup>[1]</sup>		0°C to 55°C (If the ambient temperature exceeds 45°C, derate by 10% for every additional 5°C)/-20°C to +70°C
		Ambient/Storage humidity		Below 90% RH (without condensation)
		Vibration resistance		4.9 m/s <sup>2</sup>
		Impact resistance		19.6 m/s <sup>2</sup>
		IP rating		IP20 (excluding terminals (IP00))
Pollution degree		PD2		
Altitude		Max. 2000 m For altitudes not higher than 1000 m, derating is not required For altitudes above 1000 m, derate 1% for every additional 100 m. For altitudes above 2000 m, contact Inovance.		
Speed/Torque control mode	Per for mance	Speed change ratio <sup>[2]</sup>	Load change ratio	Below 0.5% at 0% to 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.)	
	Input signal	Speed reference input		CSV/PV mode
Torque reference		CST/PT mode		
Position control mode	Per for mance	Feedforward compensation		0.0% to 100.0% (resolution: 0.1%)
		Timing window		1 to 65535 in encoder unit
	Input signal	EtherCAT communication mode		CSP mode/PP mode/HM mode
Input/Output signal	DI signal	DI signal function assignment		5 DIs
				DI1 to DI3: regular DIs (rising edge (24 V input from low to high) input delay: 100 us, falling edge (24 V input from high to low) input delay: 50 us, voltage range: 12 V–24 V)
				DI4 and DI5: fast DI (rising edge (24 V input from low to high) input delay: 30 us, falling edge (24 V input from high to low) input delay: 5 us, voltage range: 12 V to 24 V)
				The DI functions are as follows: servo enable, alarm reset, forward overtravel, reverse overtravel, home switch, emergency stop, probe
	DO signal	Output signal function selection		2 DOs
With-load capacity: 50 mA; Voltage range: 5 V to 30 V				
DO functions: servo ready, motor rotation output, comparison output, brake output, forced communication output, EDM output, fault, and alarm				

Item		Description	
Built-in functions	Stop at limit switch	The servo drive stops immediately when P-OT or N-OT signal is active.	
	Electronic gear ratio	$0.001 \leq B/A \leq 3355443.2$	
	Protective functions	Including protections against overcurrent, overvoltage, undervoltage, overload, main circuit detection error, heatsink overheat, power phase loss, overspeed, encoder error, CPU error, and parameter error	
	Safety function	DI signal function assignment	STO1 and STO2: input blocking signal of the functional safety module
		Output	EDM: safety output signal of the functional safety module
		Applicable standard	IEC 61800-5-2:2016
	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 function	Software commissioning	RJ45 Modbus
		Multi-station communication	EtherCAT
		Number of multi-station communication axes	Maximum number of slaves: 65535
		Axis address setting	No physical knob, set to 0 to 65535 through the software
Description		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 record, 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%

## 2.2.3 Technical Data of EtherCAT Communication

Item		Specification
EtherCAT Basic performance of slave	Communication protocol	EtherCAT protocol
	Service supported	CoE (PDO, SDO)
	Synchronization mode	DC - Distributed clock
	Physical layer	100BASE-TX
	Baud rate	100 Mbit/s (100Base-TX)
	Duplex mode	Full duplex
	Topology <sup>[1]</sup>	Linear, ring
	Transmission medium	Shielded cables of Cat 5e or higher
	Transmission distance	Less than 100 m between two nodes (with proper environment and cables)
	Number of slaves	Up to 65535 by protocol, not exceeding 100 in actual use
	EtherCAT frame length	44 bytes to 1498 bytes
	Process data	Max. 1,486 bytes per Ethernet frame
	Synchronous jitter of two slaves	< 1 $\mu$ s
	Update time	About 30 $\mu$ s for 1,000 digital inputs and outputs About 100 $\mu$ s for 100 servo axes Define different update time for different interfaces.
Communication code error rate	$10^{-10}$ Ethernet standard	
EtherCAT configuration unit	Number of storage synchronization management units	8
	Process data RAM	8 kB
	Distributed clock	64-bit
	EEPROM capacity	32 kbit

### Note

The -NS models do not support ring topology.

## 2.2.4 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:

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

The coefficient is as follows:

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

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

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

- $V_0$ : 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 ( $\Omega$ )
- $L_q, L_d$ : q-axis inductance (mH), d-axis inductance (mH).

## 2.2.5 Load Moment of Inertia

The load moment of inertia represents the ratio of load inertia to the rotor inertia. The higher the load inertia ratio, the weaker the responsiveness will be. An excessively high inertia ratio can result in unstable operation. The allowable load moment of inertia of the motor is restricted. This value is provided strictly as a guideline and results depend on the motor driving conditions.

An overvoltage alarm may occur during deceleration if the load moment of inertia exceeds the allowable value. For servo drives with a built-in braking resistor, an overload alarm may 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. Therefore, an external braking resistor is required.
-

## 3 MS1-R Series Motors

### 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 ⑥ ⑦⑧⑨ ⑩

① <b>MS1 series servo motor</b>	② <b>Inertia and capacity</b> H1: low inertia, small capacity H2: low inertia, medium capacity H3: medium inertia, medium capacity H4: medium inertia, small capacity	③ <b>Rated power (W)</b> One letter and two digits B: x 10 C: x 100 Example: 75B: 750 W
④ <b>Rated speed (rpm)</b> One letter and two digits B: x 10 C: x 100 Example: 30C: 3,000 rpm	⑤ <b>Voltage class (V)</b> B: 220 D: 380	⑥ <b>Encoder type</b> One letter and one digit A3: 23-bit multi-turn absolute encoder
⑦ <b>Shaft Connection Mode</b> 3: Solid shaft, with key and threaded hole	⑧ <b>Brake, Reducer and Oil Seal <sup>[1]</sup></b> 0: Without oil seal or brake 1: With oil seal but no brake 2: With brake but no oil seal 4: With oil seal and brake	⑨ <b>Series</b> R: R version ⑩ <b>Non-standard functions</b> Blank: standard S: Flying leads type -**: Other non-standard function

##### Nameplate

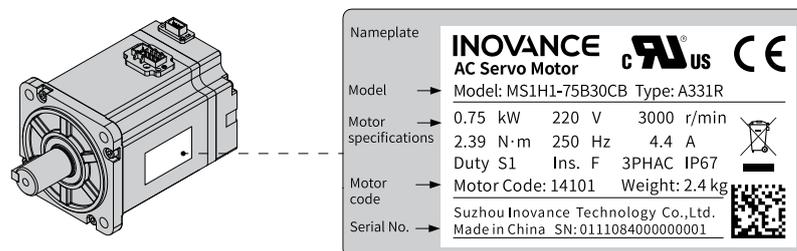


Figure 3-1 Model and Nameplate

#### 3.1.2 Components

##### Motor (40-flange)

- Terminal-type servo motor

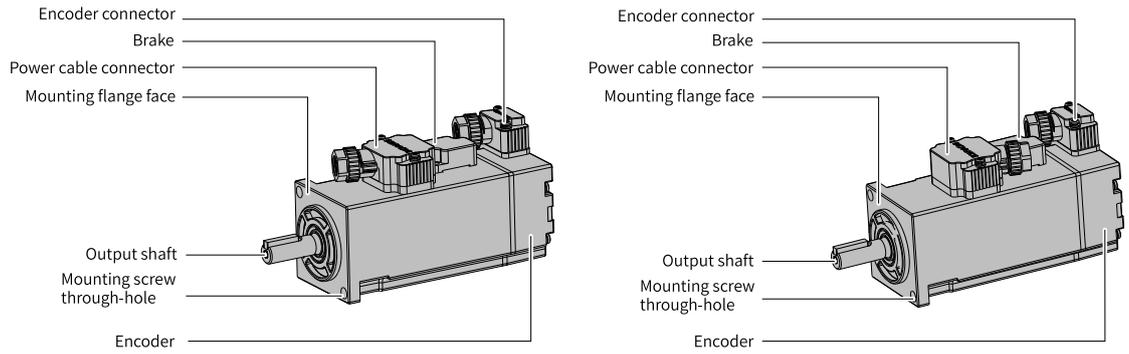


Figure 3-2 Components of a terminal-type servo motor (Left: motor with front cable outlet; Right: motor with rear cable outlet)

• **Flying leads type servo motors**

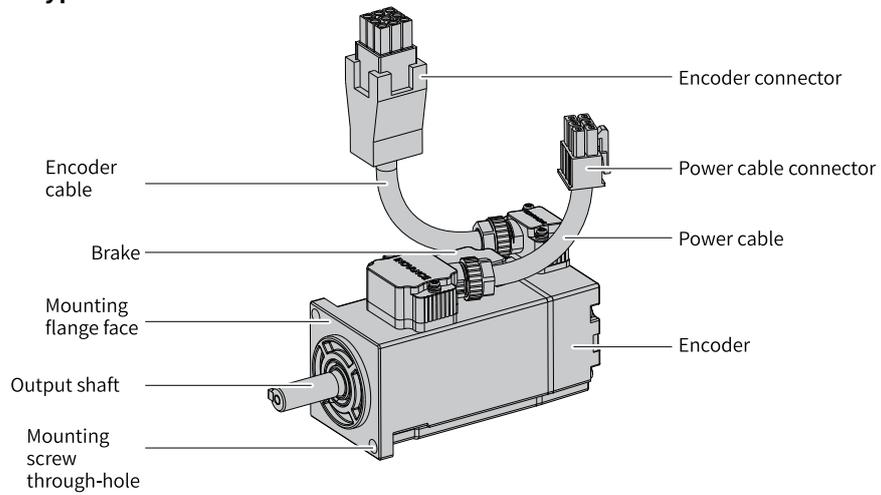


Figure 3-3 Components of flying leads type motors

**Note**

- For 50 W terminal type models, use rear outlet for power cables.
- For 100 W models, if the mounting flange face is internally stepped type, only terminal-type models can be used, which are equipped with power cables with rear outlet.

**Motor (60- and 80-flange)**

- **Terminal-type servo motor**

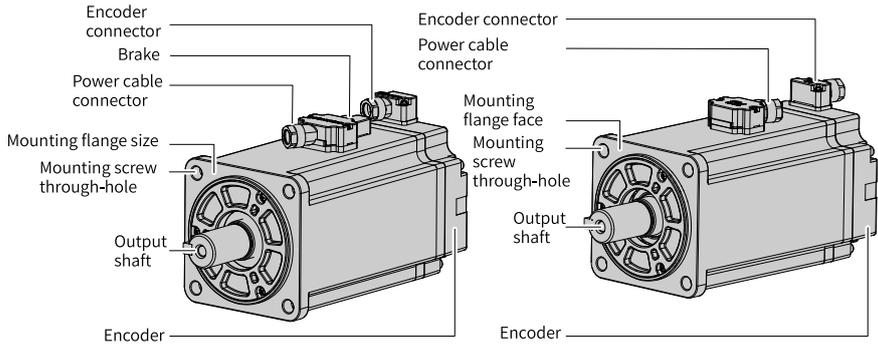


Figure 3-4 Components of a terminal-type servo motor (Left: motor with front cable outlet; Right: motor with rear cable outlet)

• **Flying leads type servo motors**

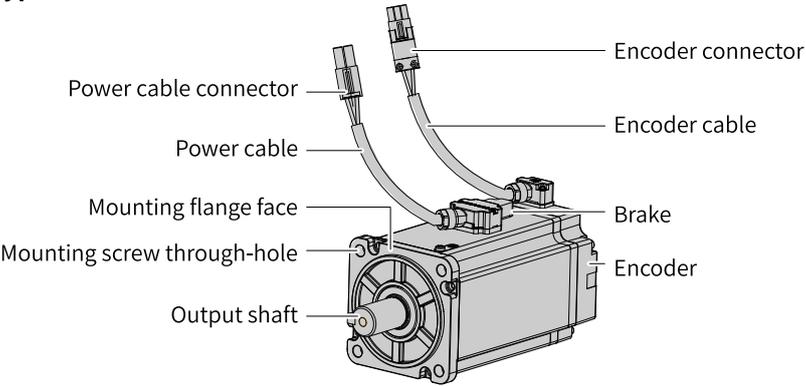


Figure 3-5 Components of flying leads type motors

**Motor (100-, 130- and 180-flange)**

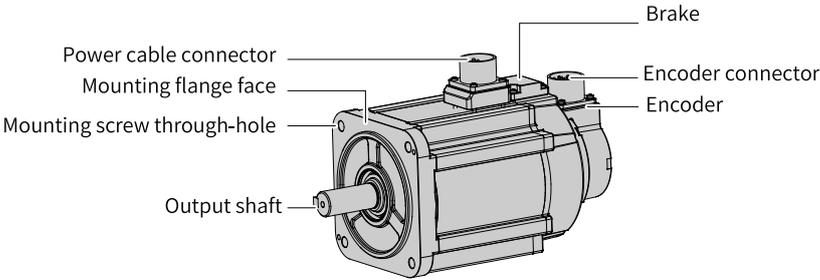


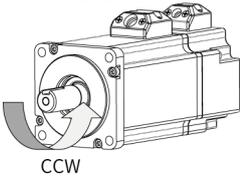
Figure 3-6 Components of servo drives in flange sizes 100/130/180

### 3.1.3 Motor Models

Motor type		Rated output capacity (kW)	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	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	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	A3: 23-bit multi-turn absolute encoder	IP67
Medium inertia, small capacity	 MS1H4	0.05, 0.1, 0.2, 0.4, 0.55, 0.75, 1.0	A3: 23-bit multi-turn absolute encoder	IP67

## 3.2 Product Specifications

### 3.2.1 Mechanical Characteristics

Item	Description
Duty type	S1 (Continuous duty)
Vibration level <sup>[1]</sup>	V15
Insulation resistance	500 VDC, above 10 MΩ
Excitation mode	Permanent magnetic
Installation mode	Flange
Heat resistance level	F
Insulation voltage	1500 VAC for 1 min (220 V class) 1800 VAC for 1 min (380 V class)
Enclosure protection mode	IP67 (excluding shaft opening and flying leads type motor connectors)
Direction of rotation	Rotates counterclockwise (CCW) when viewed from the shaft extension side with the forward run command. 

Item		Description
Environmental conditions	Ambient temperature	0°C to 40°C (non-frozen) (Derate based on the derating curve for temperatures above 40°C.)
	Ambient humidity	20% to 80% (without condensation)
	Installation location	<ul style="list-style-type: none"> <li>• Free from corrosive or explosive gases</li> <li>• Well ventilated and with minimum amount of dust, waste and moisture.</li> <li>• Convenient for inspection and cleanup.</li> <li>• Derating is required only for installation altitudes higher than 1000 m. For derating details, see <a href="#">"3.2.3 Derating Characteristics" on page 44.</a></li> <li>• Away sources that may generate strong magnetic field</li> <li>• Away from heating sources such as a heating stove</li> <li>• Use the motor with oil seal in places with grinding fluid, oil mist, iron powders or cuttings.</li> <li>• The oil seal is only dust-proof. It cannot withstand the intrusion of oil for a long term.</li> <li>• Not applicable to vacuum environment</li> <li>• Not applicable to inching condition, which may result in stuck.</li> <li>• The motor with brake may generate a pattering sound.</li> <li>• Coupler type and installation alignment requirements</li> <li>• The system should avoid continuous operation at natural frequency. Exceeding the allowable vibration value may damage the system.</li> </ul>
	Storage	Observe the following requirements when storing a de-energized motor: <ul style="list-style-type: none"> <li>• Temperature: -20°C to +60°C (non-frozen)</li> <li>• Humidity: 20% to 80% RH (without condensation)</li> </ul>
Shock resistance <sup>[3][4]</sup>	Shock acceleration (taking flange side as standard)	490 m/s <sup>2</sup>
	Number of shocks	2
Vibration resistance <sup>[2][4]</sup>	Vibration acceleration (taking flange side as standard)	Radial 49 m/s <sup>2</sup> Axial 24.5 m/s <sup>2</sup>

### Note

- [1] Vibration level V15 indicates that the amplitude of vibration is less than 15 µm when a single servo motor rotates at its rated value.
- [2] For a motor shaft mounted horizontally, the impact resistance level in the up and down directions 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.
- [4] The vibration intensity applied on the motor is affected by the transmission structure, alignment accuracy, mounting conditions, and external vibration. These factors may enhance the vibration applied on the motor. When the maximum allowable vibration limit is exceeded, the motor may fail. Therefore, take necessary measures to limit resonance.
- The vibration intensity applied on the motor varies with applications.

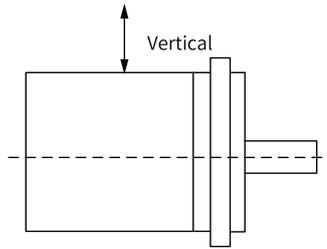


Figure 3-7 Shock that applied to the motor

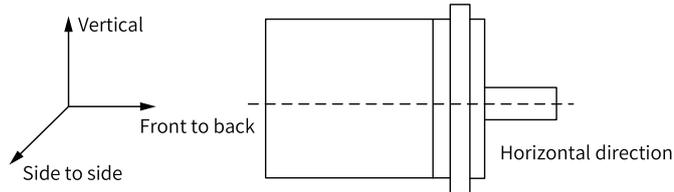


Figure 3-8 Vibration that applied to the motor

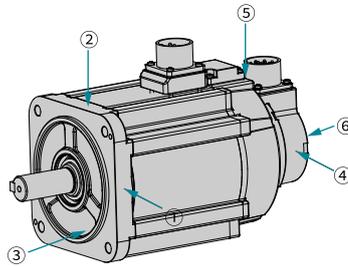


Figure 3-9 Max. allowable vibration limit of the motor

Direction	Measuring point	Limit value (10 Hz to 2000 Hz)
Radial	①②	49 m/s <sup>2</sup>
	④⑤	49 m/s <sup>2</sup>
Axial	③	24.5 m/s <sup>2</sup>
	⑥	24.5 m/s <sup>2</sup>

**Note**

The preceding vibration/shock standards cannot be applied for a long term. For long-term application needs, contact Inovance.

**3.2.2 Overload Characteristics**

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

The following overload protection curve applies to hot start at an ambient temperature of 40°C, which cannot guarantee continuous duty under 100%+ output. During use, keep the effective torque of the load within the continuous duty zone.

To protect different load motors, set motor overload protection gain based on the overload capacity of the motor. 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.
- Overload thermal protection only occurs during continuous energized operation. You need to check the motor temperature when the drive is powered off.

Motor overload protection curve is as follows:

- **MS1H1/H4 (flange size 40)**

Load ratio (%)	Operating time (s)
115	411.98
120	258.22
125	131.05
130	79.80
135	54.13
140	43.04
145	37.33
150	32.79
155	27.17
160	22.16
165	19.28
170	18.55
175	17.62
180	16.31
185	14.70
190	13.14
195	11.95
200	11.03
205	9.97
210	9.18
215	8.36
220	7.61
225	7.03
230	6.58
235	6.27
240	6.06
245	6.06
250	6.06
255	6.06
260	6.06
265	6.06
270	6.06
275	6.06
280	6.01
285	5.84
290	5.61
295	5.31
300	4.96
305	4.61
310	4.27
315	3.97
320	3.69

Load ratio (%)	Operating time (s)
325	3.36
330	3.15
335	2.97
340	2.82
345	2.70
350	2.63

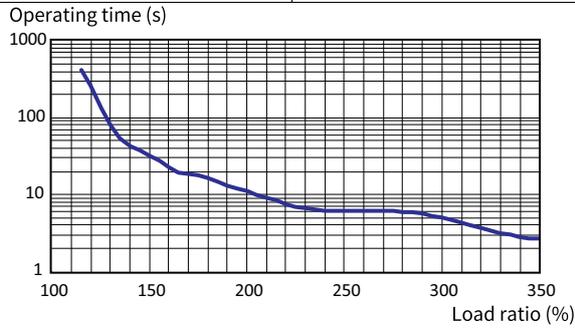


Figure 3-10 MS1H1/H4 (flange size 40) series motor overload curve

● **MS1H1/H4 (flange size 60/80)**

Load ratio (%)	Operating time (s)
120	230
130	80
140	40
150	30
160	20
170	17
180	15
190	12
200	10
210	8.5
220	7
230	6
240	5.5
250	5
300	3
350	2

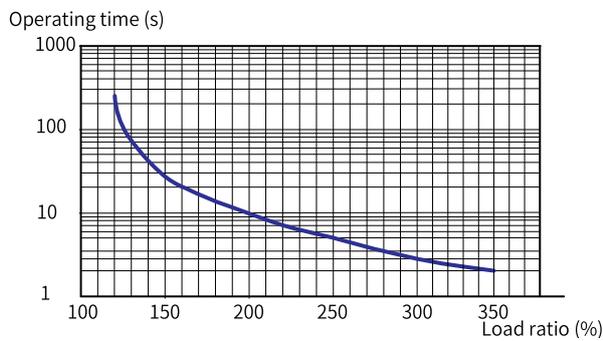


Figure 3-11 MS1H1/H4 (flange size 60/80) series motor overload curve

**Note**

The maximum torque of H1 and H4 models is the rated torque x 3.5.

● **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
249.4	14
255.8	13
262.2	11
268.6	10
275.0	9
281.4	8
287.8	7
294.2	6

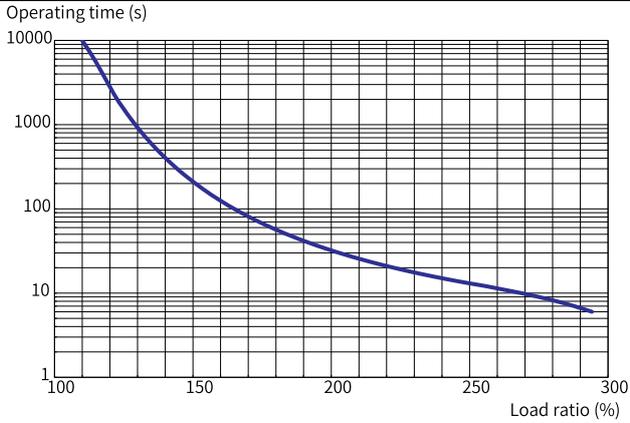


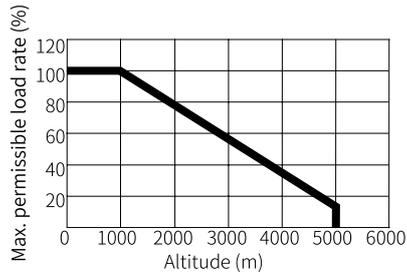
Figure 3-12 Overload curve of MS1H2 and MS1H3 series motors

**Note**

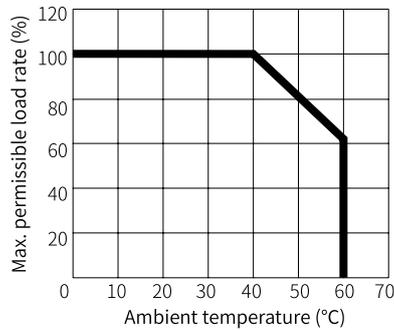
- The maximum torque of H2 models is the rated torque x 3.
- The maximum torque of H3 models is the rated torque x 2.5.

**3.2.3 Derating Characteristics**

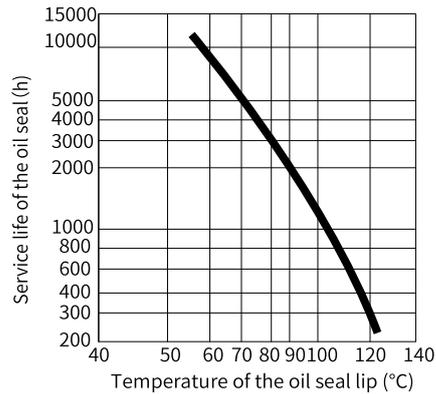
- **Altitude-based derating curve**



- **Temperature-based derating curve**



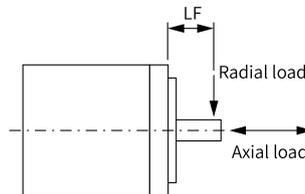
**3.2.4 Temperature Curve of the Oil Seal**



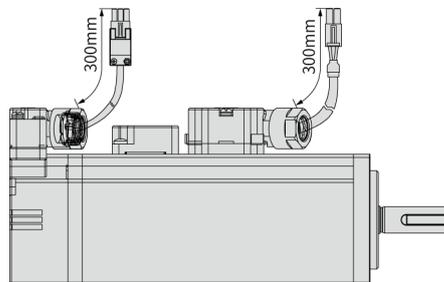
**3.3 Model Selection Instructions**

- Description of torque-speed characteristics curves:

- Technical data and torque/speed characteristic values in the following tables are applicable to motors working with Inovance servo drives with the armature coil temperature being 20°C.
  - Continuous duty zone: 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.
  - Intermittent duty zone: 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 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)
    - MS1H2-50CD and 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.



- The MS1H3 (130-flange and 180-flange) model comes with a keyway. When the operating speed is above 3000 rpm, the motor must run with the keyway. If you need to run the motor without the keyway at speeds higher than 3000 rpm, contact Inovance.

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### Note

- The motor with oil seal must be derated by 10% during use.
  - The 24 VDC power supply needs to be prepared by users. The cross sectional area of DC power cables and motor brake connection cables must be larger than 0.5 mm<sup>2</sup>. To prevent malfunction of the brake, use a separate power supply for the brake, preventing voltage or current drop caused by other electrical devices during operation.
  - The brake apply time and release time vary with the discharge circuit. Check the actual action delay of the product during use. The holding brake cannot be used for braking purpose.
-

### 3.4 MS1H1 Motors with Low Inertia and Small Capacity

#### 3.4.1 MS1H1-05B30CB-A33\*R

Motor model		Torque-Speed characteristics		
Flange size (mm)	40			
Inertia, capacity	Low inertia, small capacity			
Rated power (kW)	0.05			
Rated voltage (V)	220			
Rated torque (N·m)	0.16			
Maximum torque (N·m)	0.56			
Rated current (Arms)	1.2			
Maximum current (Arms)	4.8			
Rated speed (rpm)	3000			
Maximum speed (rpm)	7000			
Torque coefficient (N·m/Arms)	0.12			
Rotor moment of inertia (kg·cm <sup>2</sup> )	Brake-less motor			0.018
	Brake motor			0.0208

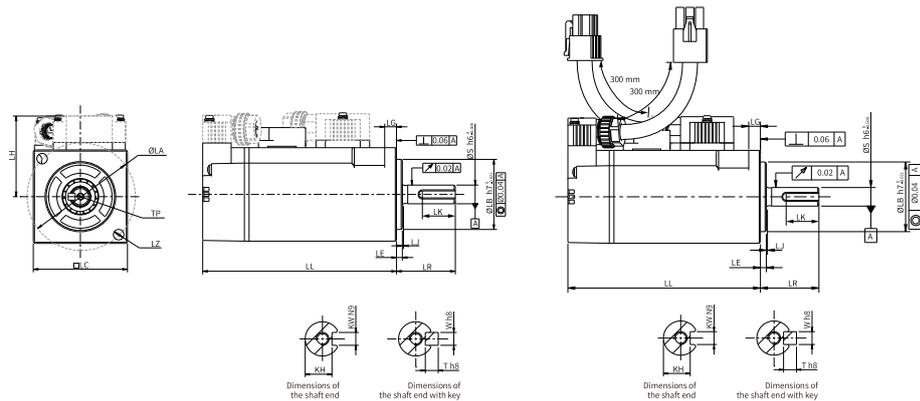
#### Electrical specifications of the motor with brake

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	6.9	83.5	0.29	≤ 40	≤ 20	≤ 1.5

#### Allowable load

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

**Product dimensions (mm)**



LL	LC	LR	LA	LZ	LH	LG	LE	LJ
55(82.3)	40	25±0.5	46	2-Ø4.5	34.5	5	2.5±0.5	0.5±0.35
S	LB	TP	LK	KH	KW	W	T	Weight (kg)
8	Ø30h7 <sup>0</sup> -0.021	M3×6	14	6.2 <sup>0</sup> -0.1	3	3	3	0.26(0.43)

**3.4.2 MS1H1-10B30CB-A33\*R**

Motor model		Torque-Speed characteristics
Flange size (mm)	40	<p>Speed (rpm) vs Torque (N·m) graph showing two duty zones: A (Continuous duty, red line) and B (Intermittent duty, blue line). Zone A shows a sharp drop in speed at low torque, while Zone B maintains a higher speed range.</p>
Inertia, capacity	Low inertia, small capacity	
Rated power (kW)	0.1	
Rated voltage (V)	220	
Rated torque (N·m)	0.32	
Maximum torque (N·m)	1.12	
Rated current (Arms)	1.2	Heatsink-based derating curve
Maximum current (Arms)	4.8	<p>Rated value reduction rate (%) vs Heatsink dimensions (mm) graph showing a curve that starts at approximately 60% reduction at 50mm and reaches 100% at 250mm.</p>
Rated speed (rpm)	3000	
Maximum speed (rpm)	7000	
Torque coefficient (N·m/Arms)	0.25	
Rotor moment of inertia (kg·cm <sup>2</sup> )	Brake-less motor	0.0316
	Brake motor	0.0345

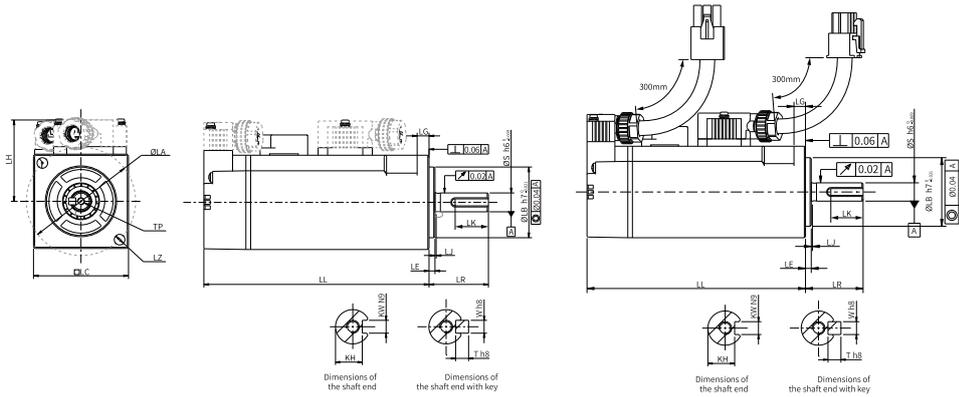
**Electrical specifications of the motor with brake**

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	6.9	83.5	0.29	≤ 40	≤ 20	≤ 1.5

**Allowable load**

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

**Product dimensions (mm)**



LL	LC	LR	LA	LZ	LH	LG	LE	LJ
67.5(94.8)	40	25±0.5	46	2-Ø4.5	34.5	5	2.5±0.5	0.5±0.35
S	LB	TP	LK	KH	KW	W	T	Weight (kg)
8	Ø30h7 <sup>0</sup> -0.021	M3×6	14	6.2 <sup>0</sup> -0.1	3	3	3	0.35(0.52)

**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			
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 <sup>2</sup> )	Motor without brake	0.094		
	Motor with brake	0.106		

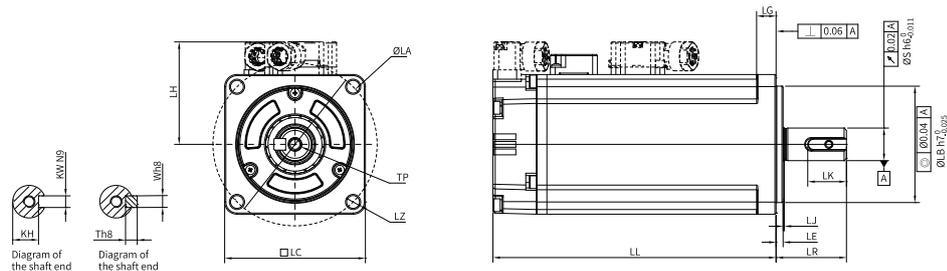
**Electrical specifications of the motor with brake**

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 <sup>0</sup> <sub>-0.025</sub>	14	M5x8	16.5	11 <sup>0</sup> <sub>-0.1</sub>	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			
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 <sup>2</sup> )	Motor without brake	0.145		
	Motor with brake	0.157		

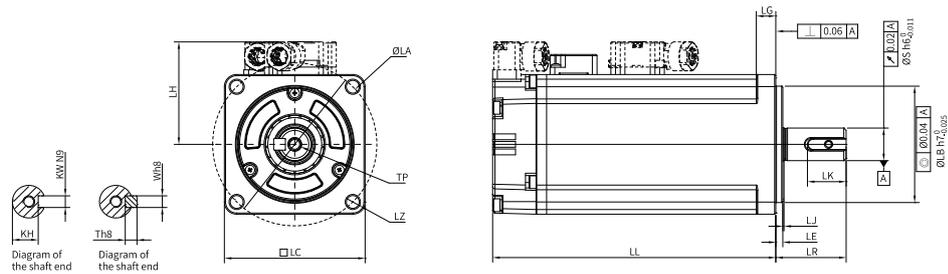
### Electrical specifications of the motor with brake

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 <sup>0</sup> -0.025	14	M5x8	16.5	11 <sup>0</sup> -0.1	5	5	5	1.11 (1.48)

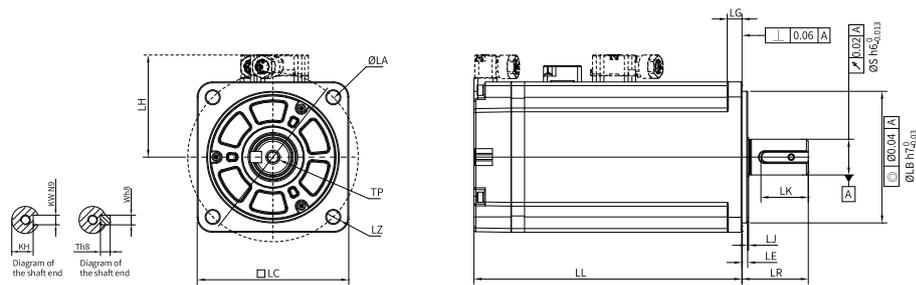
### 3.4.5 MS1H1-55B30CB-A331R

Motor specifications			Torque-Speed characteristics	
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 <sup>2</sup> )	Motor without brake	0.55		
	Motor with brake	-		

### 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-Ø7	54	7.5	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
Ø70h7 <sup>0</sup> <sub>-0.03</sub>	19	M6 x 20	26	15.5 <sup>0</sup> <sub>-0.1</sub>	6	6	6	1.88

### 3.4.6 MS1H1-75B30CB-A33\*R

Motor specifications		Torque-Speed characteristics																
Flange size (mm)	80	<p>The graph shows two duty zones: A (Continuous) in red and B (Intermittent) in blue. Zone A starts at 6000 rpm for 0 torque and drops to 3000 rpm at 2.5 N·m. Zone B starts at 7000 rpm for 0 torque and drops to 3000 rpm at 8.37 N·m.</p>																
Inertia, capacity	Low inertia, small capacity																	
Rated power (kW)	0.75	<p>The graph shows the maximum allowable load rate (%) increasing from approximately 70% at 100 mm heatsink dimensions to 100% at 300 mm.</p>																
Voltage (V)	220																	
Rated torque (N·m)	2.39	<table border="1"> <tr> <td>Rated current (Arms)</td> <td>4.4</td> </tr> <tr> <td>Maximum current (Arms)</td> <td>16.9</td> </tr> <tr> <td>Rated speed (rpm)</td> <td>3000</td> </tr> <tr> <td>Maximum speed (rpm)</td> <td>7000</td> </tr> <tr> <td>Torque coefficient (N·m/Arms)</td> <td>0.58</td> </tr> <tr> <td rowspan="2">Rotor moment of inertia (kg·cm<sup>2</sup>)</td> <td>Motor without brake</td> <td>0.68</td> </tr> <tr> <td>Motor with brake</td> <td>0.71</td> </tr> </table>		Rated current (Arms)	4.4	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 <sup>2</sup> )	Motor without brake	0.68	Motor with brake	0.71
Rated current (Arms)	4.4																	
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 <sup>2</sup> )	Motor without brake	0.68																
	Motor with brake	0.71																
Maximum torque (N·m)	8.37																	
Rated current (Arms)	4.4																	
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 <sup>2</sup> )	Motor without brake	0.68																
	Motor with brake	0.71																

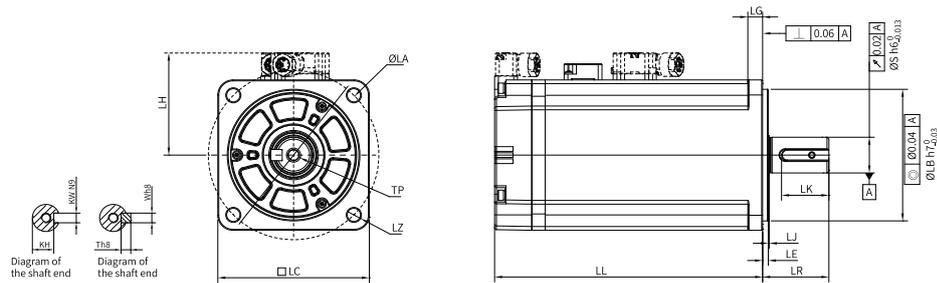
### Electrical specifications of the motor with brake

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 <sup>0</sup> <sub>-0.03</sub>	19	M6 × 20	26	15.5 <sup>0</sup> <sub>-0.1</sub>	6	6	6	2.22 (2.88)

### 3.4.7 MS1H1-10C30CB-A33\*R

Motor specifications		Torque-Speed characteristics	
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 <sup>2</sup> )	Motor without brake		
	Motor with brake	0.87	

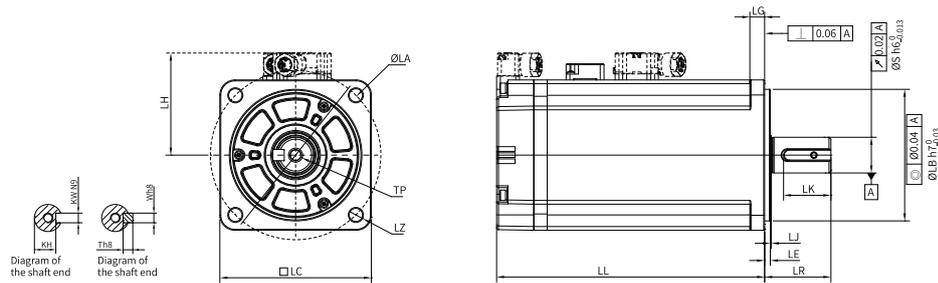
### Electrical specifications of the motor with brake

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-Ø7	54	7.5	3 ± 0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
Ø 70h7 <sup>0</sup> <sub>-0.03</sub>	19	M6 × 20	26	15.5 <sup>0</sup> <sub>-0.1</sub>	6	6	6	2.61 (3.27)

## 3.5 MS1H2 Motors with Low Inertia and Medium Capacity

### 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			
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 <sup>2</sup> )	Motor without brake			1.78
	Motor with brake			2.6

### Electrical specifications of the motor with brake

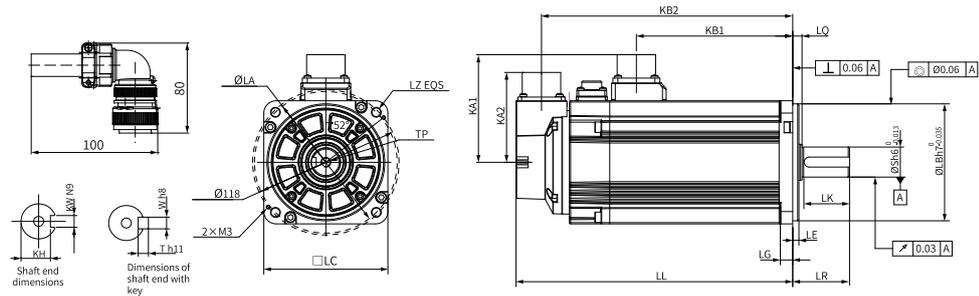
Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
8	24	17.6	32.73	0.73	≤ 100	≤ 40	≤ 1

### 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	73	123.5 (151.5)	10	5±0.3
LQ	LB	S	TP	LK	KH	KW	W	T	Weight (kg)	
7.5±0.75	Ø95h7 <sup>0</sup> -0.035	24	M8x16	36	20 <sup>0</sup> -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			
Maximum current (Arms)	32			
Rated speed (rpm)	3000			
Maximum speed (rpm)	6000			
Torque coefficient (N·m/Arms)	0.62			
Rotor moment of inertia (kg·cm <sup>2</sup> )	Motor without brake			2.35
	Motor with brake			3.17

**Electrical specifications of the motor with brake**

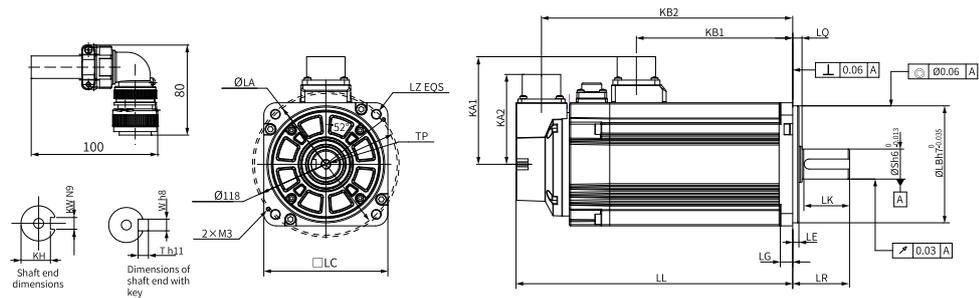
Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
8	24	17.6	32.73	0.73	≤ 100	≤ 40	≤ 1

**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	73	140.5 (168.5)	10	5±0.3
LQ	LB	S	TP	LK	KH	KW	W	T	Weight (kg)	
7.5±0.75	Ø95h7 <sup>0</sup> -0.035	24	M8x16	36	20 <sup>0</sup> -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)	19.1			
Rated current (Arms)	11.3			
Maximum current (Arms)	42			
Rated speed (rpm)	3000			
Maximum speed (rpm)	6000			
Torque coefficient (N·m/Arms)	0.60			
Rotor moment of inertia (kg·cm <sup>2</sup> )	Motor without brake			2.92
	Motor with brake			3.74

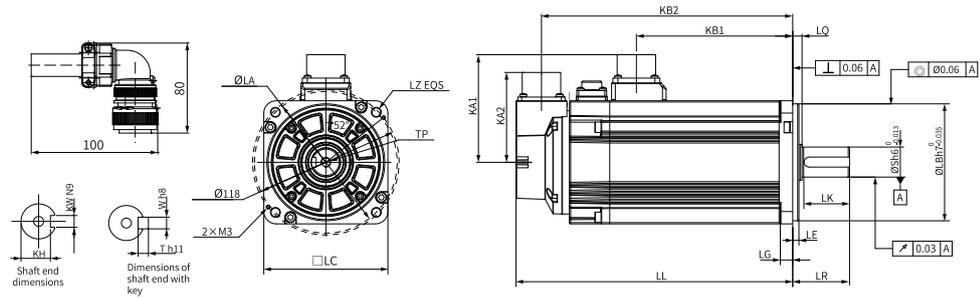
### Electrical specifications of the motor with brake

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	73	156.5 (184.5)	10	5±0.3
LJ	LB	S	TP	LK	KH	KW	W	T	Weight (kg)	
7.5±0.75	Ø95h7 <sup>0</sup> -0.035	24	M8x16	36	20 <sup>0</sup> -0.2	8	8	7	5.5 (6.55)	

### 3.5.6 MS1H2-20C30CD-A33\*R

Motor specifications		Torque-Speed characteristics		
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)	6000			
Torque coefficient (N·m/Arms)	1.19			
Rotor moment of inertia (kg·cm <sup>2</sup> )	Motor without brake			2.92
	Motor with brake			3.74

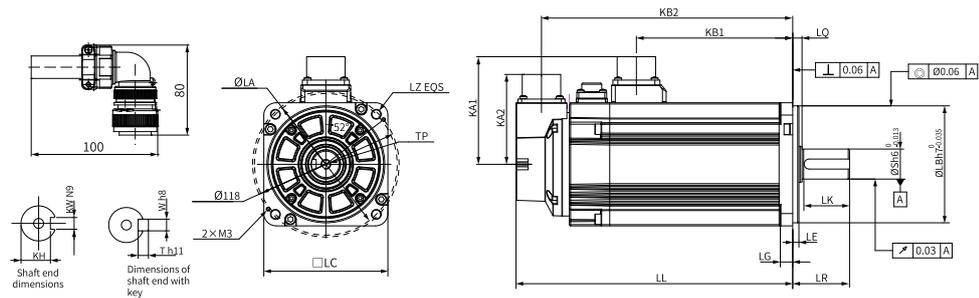
### Electrical specifications of the motor with brake

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	73	156.5 (184.5)	10	5±0.3
LJ	LB	S	TP	LK	KH	KW	W	T	Weight (kg)	
7.5±0.75	Ø95h7 <sup>0</sup> -0.035	24	M8x16	36	20 <sup>0</sup> -0.2	8	8	7	5.5 (6.55)	

**3.5.7 MS1H2-25C30CD-A33\*R**

Motor model		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		
Maximum current (Arms)	26		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/Arms)	1.18		
Rotor moment of inertia (kg·cm <sup>2</sup> )	Brake-less motor		3.49
	Brake motor		4.3

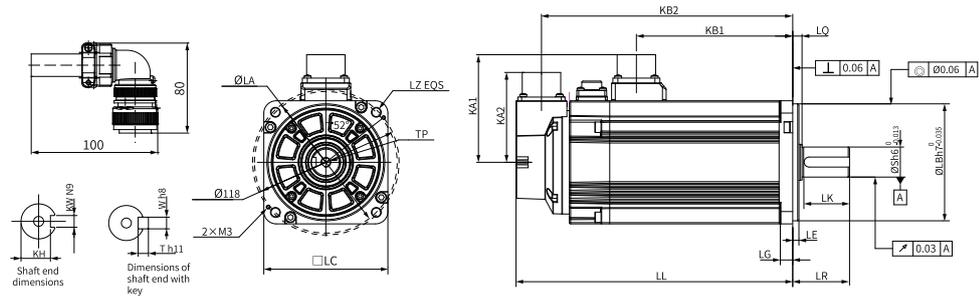
**Electrical specifications of the motor with brake**

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Coil resistance (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

**Product dimensions (mm)**



LC	LL	LR	LA	LZ	KA1	KB1	KA2	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 <sup>0</sup> -0.035	24	M8×16	36	20 <sup>0</sup> -0.2	8	8	7	6.3 (7.35)	

**3.5.8 MS1H2-30C30CD-A33\*R**

Motor specifications		Torque-Speed characteristics		
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 <sup>2</sup> )	Motor without brake			6.4
	Motor with brake			9.38

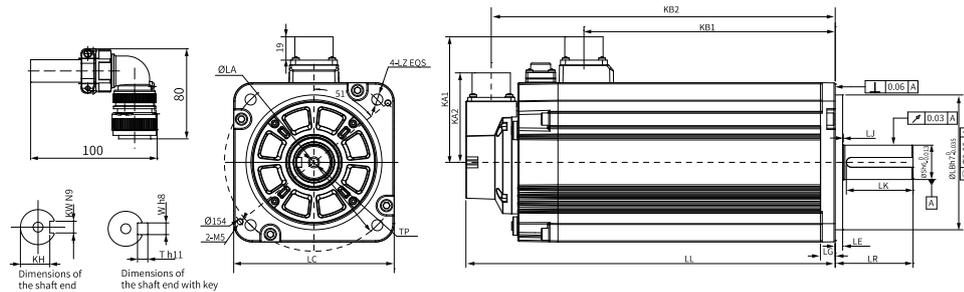
**Electrical specifications of the motor with brake**

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	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 <sup>0</sup> -0.035		28	M8 × 20	54	24 <sup>0</sup> -0.2	8	8	7	10.0 (11.9)

### 3.5.9 MS1H2-40C30CD-A33\*R

Motor specifications			Torque-Speed characteristics	
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)	6000			
Torque coefficient (N·m/Arms)	1.06			
Rotor moment of inertia (kg·cm <sup>2</sup> )	Motor without brake	9		
	Motor with brake	11.98		

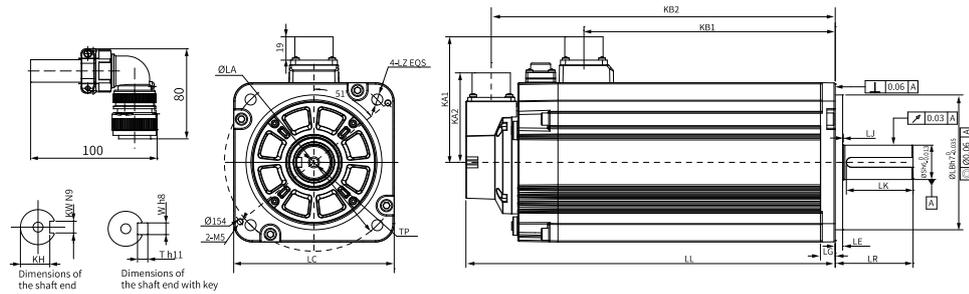
### Electrical specifications of the motor with brake

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	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 <sup>0</sup> -0.035		28	M8 × 20	54	24 <sup>0</sup> -0.2	8	8	7	13.2 (15.1)

### 3.5.10 MS1H2-50C30CD-A33\*R

Motor model		Torque-Speed characteristics	
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)	6000		
Torque coefficient (N·m/Arms)	1.04		
Rotor moment of inertia (kg·cm <sup>2</sup> )	Brake-less motor		
	Brake motor	14.58	

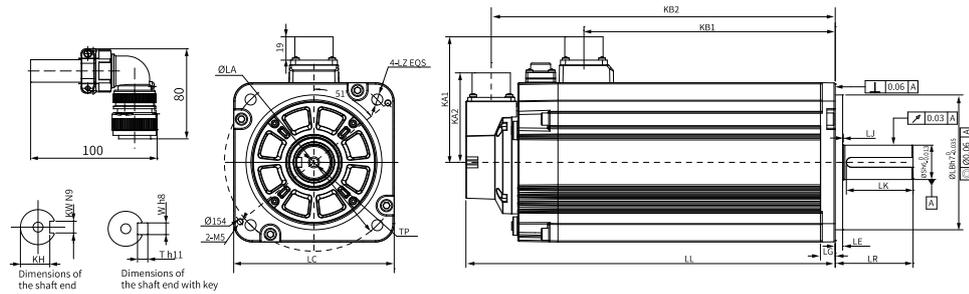
### Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Coil resistance (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

### Product 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	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 <sup>0</sup> -0.035		28	M8×20	54	24 <sup>0</sup> -0.2	8	8	7	16.35 (18.25)

## 3.6 MS1H3 Motors with Medium Inertia and Medium Capacity

### 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			
Maximum current (Arms)	17.2			
Rated speed (rpm)	1500			
Maximum speed (rpm)	4500			
Torque coefficient (N·m/Arms)	0.93			
Rotor moment of inertia (kg·cm <sup>2</sup> )	Motor without brake	13.56		
	Motor with brake	15.8		

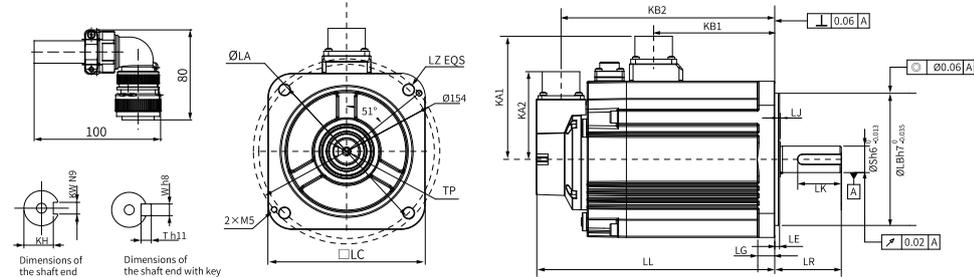
### Electrical specifications of the motor with brake

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	73	121.5 (146.5)	14	4
LJ	LB	S	TP	LK	KH	KW	W	T	Weight (kg)	
0.5±0.75	Ø110h7 <sup>0</sup> <sub>-0.035</sub>	22	M6 × 20	36	18 <sup>0</sup> <sub>-0.2</sub>	8	8	7	5.8 (7.7)	

**3.6.2 MS1H3-85B15CD-A33\*R**

Motor specifications		Torque-Speed characteristics		
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)	4500			
Torque coefficient (N·m/Arms)	1.84			
Rotor moment of inertia (kg·cm <sup>2</sup> )	Motor without brake			13.56
	Motor with brake			15.8

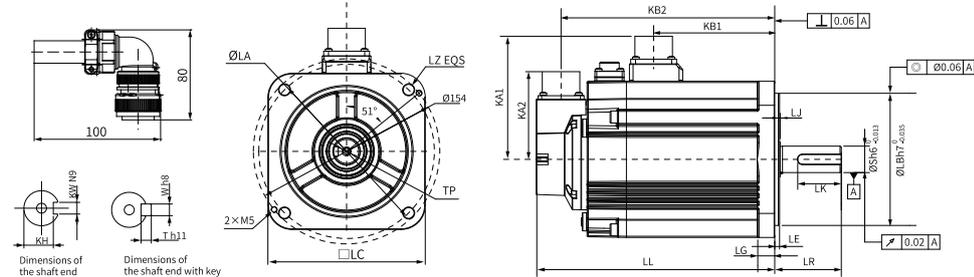
**Electrical specifications of the motor with brake**

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	73	121.5 (146.5)	14	4
LJ	LB	S	TP	LK	KH	KW	W	T	Weight (kg)	
0.5±0.75	Ø110h7 <sup>0</sup> <sub>-0.035</sub>	22	M6 × 20	36	18 <sup>0</sup> <sub>-0.2</sub>	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			
Maximum current (Arms)	27.3			
Rated speed (rpm)	1500			
Maximum speed (rpm)	4500			
Torque coefficient (N·m/Arms)	0.89			
Rotor moment of inertia (kg·cm <sup>2</sup> )	Motor without brake			19.25
	Motor with brake			21.5

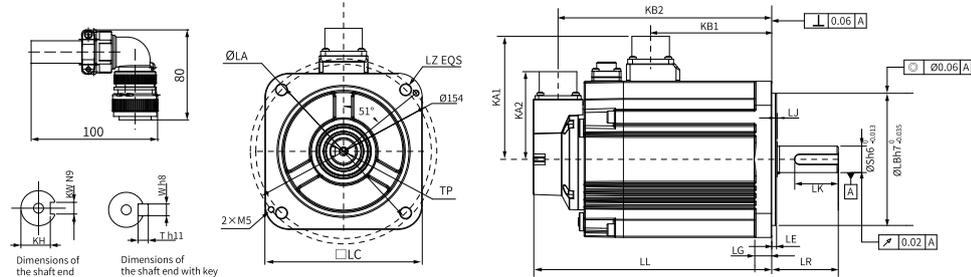
**Electrical specifications of the motor with brake**

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	73	136.5 (161.5)	14	4
LJ	LB	S	TP	LK	KH	KW	W	T	Weight (kg)	
0.5±0.75	Ø110h7 <sup>0</sup> <sub>-0.035</sub>	22	M6 × 20	36	18 <sup>0</sup> <sub>-0.2</sub>	8	8	7	7.1 (8.9)	

**3.6.4 MS1H3-13C15CD-A33\*R**

Motor specifications			Torque-Speed characteristics	
Flange size (mm)	130		<p>The graph plots Speed (rpm) on the y-axis (0 to 5000) against Torque (N·m) on the x-axis (0 to 24). Zone A (red) is the continuous duty zone, and Zone B (blue) is the intermittent duty zone. Zone A starts at 4500 rpm for 0 torque and drops to 1500 rpm at 6 N·m. Zone B starts at 4500 rpm for 0 torque and drops to 2500 rpm at 24 N·m.</p>	
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			
Maximum current (Arms)	12.6			
Rated speed (rpm)	1500			
Maximum speed (rpm)	4500			
Torque coefficient (N·m/Arms)	1.85		<p>The graph plots Max. allowable load rate (%) on the y-axis (0 to 120) against Heatsink dimensions (mm) on the x-axis (100 to 450). The curve shows a linear increase from approximately 60% at 100 mm to 100% at 450 mm.</p>	
Rotor moment of inertia (kg·cm <sup>2</sup> )	Motor without brake	19.25		
	Motor with brake	21.5		

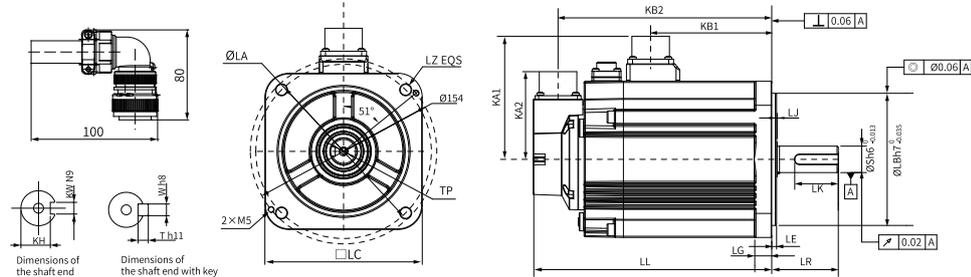
**Electrical specifications of the motor with brake**

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	73	136.5 (161.5)	14	4
LJ	LB	S	TP	LK	KH	KW	W	T	Weight (kg)	
0.5±0.75	Ø110h7 <sup>0</sup> <sub>-0.035</sub>	22	M6 × 20	36	18 <sup>0</sup> <sub>-0.2</sub>	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			
Maximum current (Arms)	32.2			
Rated speed (rpm)	1500			
Maximum speed (rpm)	4500			
Torque coefficient (N·m/Arms)	1.05			
Rotor moment of inertia (kg·cm <sup>2</sup> )	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

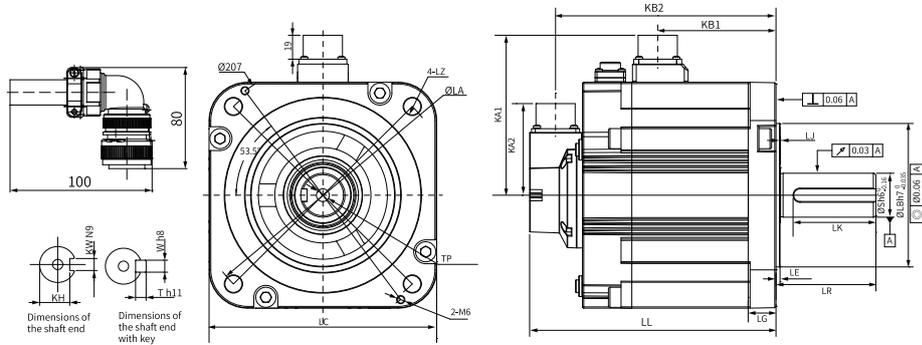




**Allowable load**

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
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	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 <sup>0</sup> <sub>-0.035</sub>	35	M12x25	65	30 <sup>0</sup> <sub>-0.2</sub>	10	10	8	13.8 (17.9)	

**3.6.8 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	Heatsink-based derating curve
Rated current (Arms)	16	
Maximum current (Arms)	42	
Rated speed (rpm)	1500	
Maximum speed (rpm)	4500	
Torque coefficient (N·m/Arms)	1.96	
Rotor moment of inertia (kg·cm <sup>2</sup> )	Motor without brake	64.9
	Motor with brake	72.55

**Electrical specifications of the motor with brake**

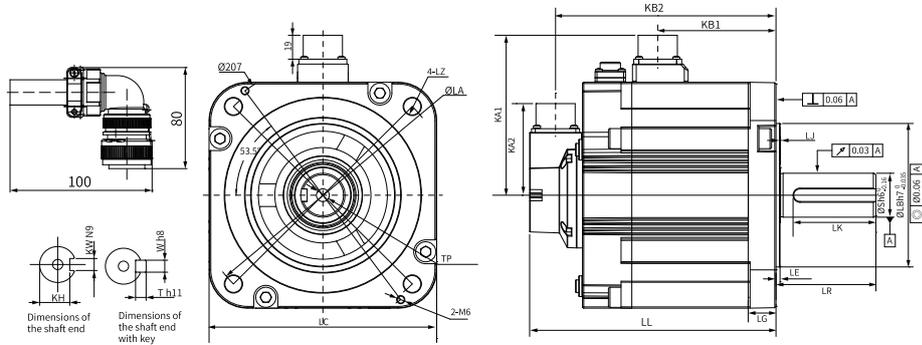
Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	31	18.58	1.29	≤ 200	≤ 100	≤ 1



**Allowable load**

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
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	73	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 <sup>0</sup> <sub>-0.035</sub>	42	M16x32	97	37 <sup>0</sup> <sub>-0.2</sub>	12	12	8	21.7 (25.9)	

**3.6.10 MS1H3-75C15CD-A33\*R**

Motor specifications		Torque-Speed characteristics
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)	4500	
Torque coefficient (N·m/Arms)	2.13	
Rotor moment of inertia (kg·cm <sup>2</sup> )	Motor without brake	127.5
	Motor with brake	135.15

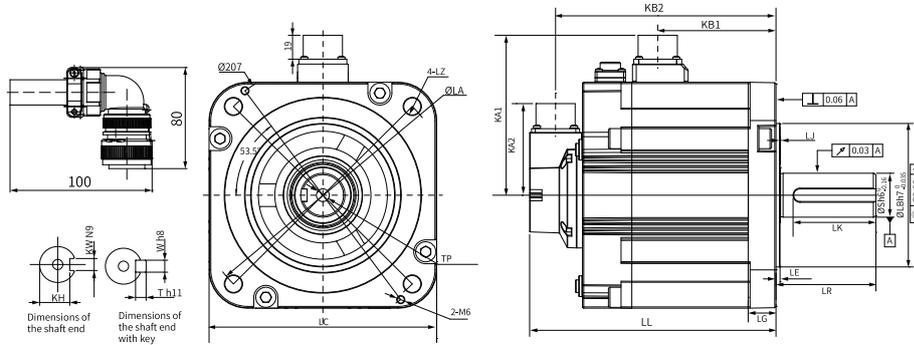
**Electrical specifications of the motor with brake**

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	73	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 <sup>0</sup> <sub>-0.035</sub>	42	M16x32	97	37 <sup>0</sup> <sub>-0.2</sub>	12	12	8	29 (33.2)	

**3.7 MS1H4 Motors with Medium Inertia and Small Capacity**

**3.7.1 MS1H4-05B30CB-A33\*R**

Motor specifications		Torque-Speed characteristics	
Flange size (mm)	40		
Inertia, capacity	Medium inertia, low capacity		
Rated output (kW)	0.05		
Voltage (V)	220		
Rated torque (N·m)	0.16		
Maximum torque (N·m)	0.56		
Rated current (Arms)	1.27		
Maximum current (Arms)	4.78		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/Arms)	0.126		
Rotor moment of inertia (kg·cm <sup>2</sup> )	Brake-less motor		0.038
	Brake motor		0.04

**Electrical specifications of the brake motor**

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	6.9	83.5	0.29	≤ 40	≤ 20	≤ 1.5

**Allowable load**

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

**Product dimensions (mm)**

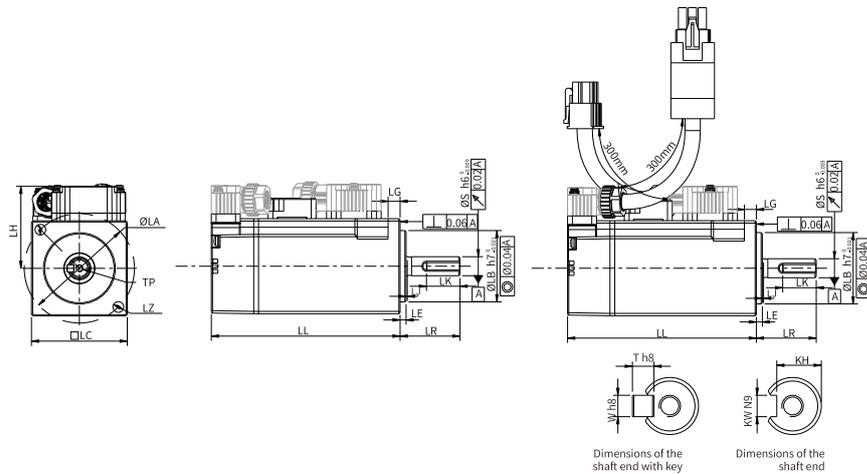


Figure 3-13 MS1H4-05B30CB-A330R and MS1H4-05B30CB-A332R

LL	LC	LR	LA	LZ	LH	LG	LE	LJ
51.5 (78.8)	40	25±0.5	46	2-Ø4.5	34.5	5	2.5±0.5	0.5±0.35
S	LB	TP	LK	KH	kW	W	T	Weight (kg)
8	Ø30h7 <sup>0</sup> -0.021	M3×6	14	6.2 <sup>0</sup> -0.1	3	3	3	0.24 (0.40)

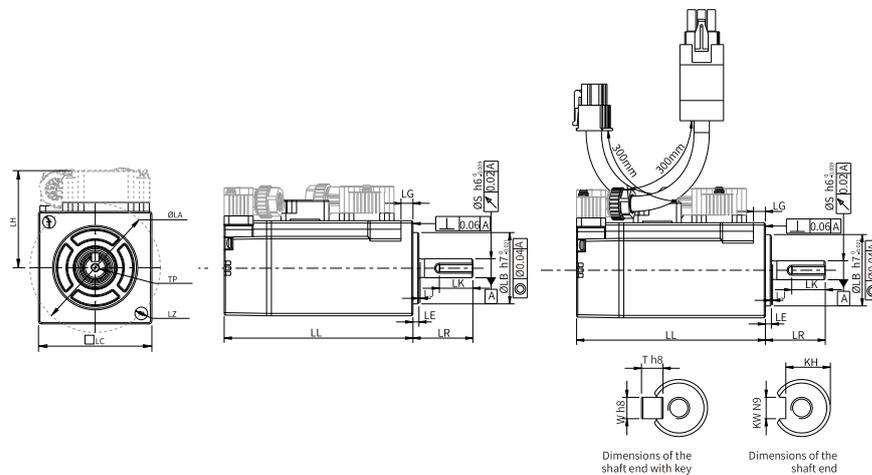


Figure 3-14 MS1H4-05B30CB-A331R and MS1H4-05B30CB-A334R

LL	LC	LR	LA	LZ	LH	LG	LE	LJ
54.2 (81.5)	40	25±0.5	46	2-Ø4.5	34.5	5	2.5±0.5	0.5±0.35
S	LB	TP	LK	KH	kW	W	T	Weight (kg)
8	Ø30h7 <sup>0</sup> <sub>-0.021</sub>	M3×6	14	6.2 <sup>0</sup> <sub>-0.1</sub>	3	3	3	0.26 (0.42)

### 3.7.2 MS1H4-10B30CB-A33\*R

Motor specifications		Torque-Speed characteristics			
Flange size (mm)	40				
Inertia, capacity	Medium inertia, low capacity				
Rated output (kW)	0.1				
Voltage (V)	220				
Rated torque (N·m)	0.32				
Maximum torque (N·m)	1.12				
Rated current (Arms)	1.27			Heatsink-based derating curve	
Maximum current (Arms)	4.78				
Rated speed (rpm)	3000				
Maximum speed (rpm)	7000				
Torque coefficient (N·m/Arms)	0.252				
Rotor moment of inertia (kg·cm <sup>2</sup> )	Brake-less motor	0.072			
	Brake motor	0.074			

### Electrical specifications of the brake motor

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	6.9	83.5	0.29	≤ 40	≤ 20	≤ 1.5

**Allowable load**

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

**Product dimensions (mm)**

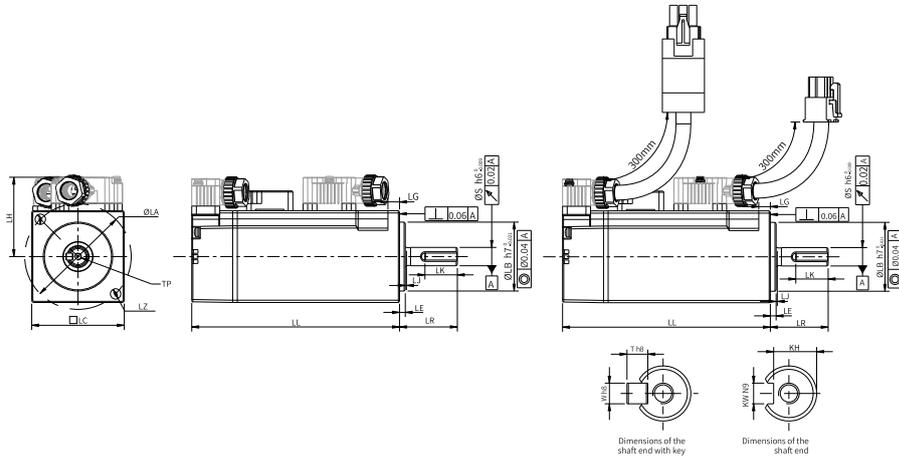


Figure 3-15 MS1H4-10B30CB-A330R and MS1H4-10B30CB-A332R

LL	LC	LR	LA	LZ	LH	LG	LE	LJ
62.5 (89.8)	40	25±0.5	46	2-Ø4.5	34.5	5	2.5±0.5	0.5±0.35
S	LB	TP	LK	KH	kW	W	T	Weight (kg)
8	Ø30h7 <sup>0</sup> -0.021	M3×6	14	6.2 <sup>0</sup> -0.1	3	3	3	0.32 (0.48)

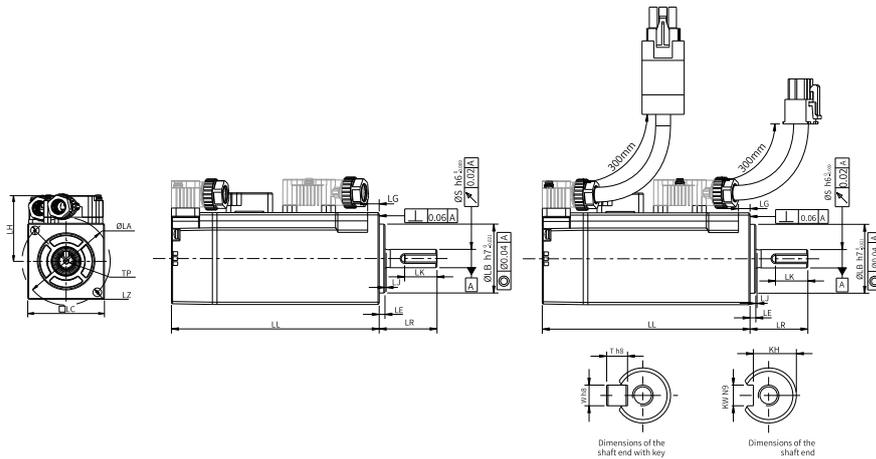


Figure 3-16 MS1H4-10B30CB-A331R and MS1H4-10B30CB-A334R

LL	LC	LR	LA	LZ	LH	LG	LE	LJ
65.2 (92.5)	40	25±0.5	46	2-Ø4.5	34.5	5	2.5±0.5	0.5±0.35
S	LB	TP	LK	KH	kW	W	T	Weight (kg)
8	Ø30h7 <sup>0</sup> <sub>-0.021</sub>	M3×6	14	6.2 <sup>0</sup> <sub>-0.1</sub>	3	3	3	0.34 (0.50)

### 3.7.3 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		
Maximum current (Arms)	5.3	Heatsink-based derating curve	
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/Arms)	0.46		
Rotor moment of inertia (kg·cm <sup>2</sup> )	Motor without brake		
	Motor with brake	0.23	

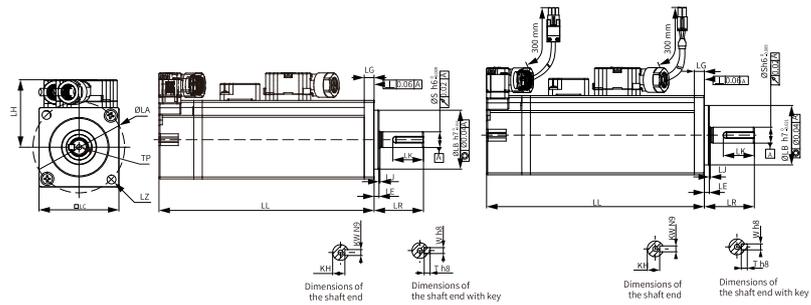
### Electrical specifications of the motor with brake

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-Ø 5.5	44	8.0	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
Ø50h7 <sup>0</sup> <sub>-0.025</sub>	14	M5x8	16.5	11 <sup>0</sup> <sub>-0.1</sub>	5	5	5	0.78 (1.16)

### 3.7.4 MS1H4-40B30CB-A33\*R

Motor specifications			Torque-Speed characteristics	
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		Heatsink-based derating curve	
Maximum current (Arms)	9.2			
Rated speed (rpm)	3000			
Maximum speed (rpm)	7000			
Torque coefficient (N·m/Arms)	0.53			
Rotor moment of inertia (kg·cm <sup>2</sup> )	Motor without brake	0.43		
	Motor with brake	0.44		

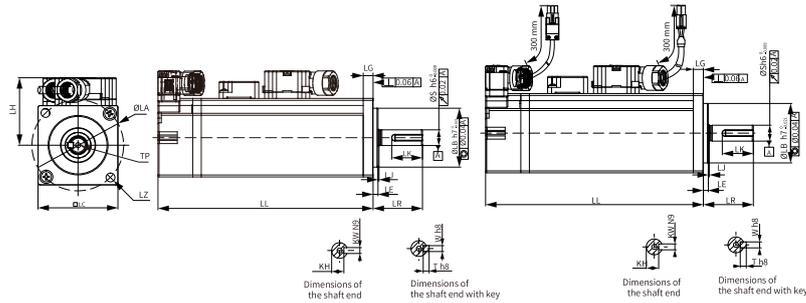
### Electrical specifications of the motor with brake

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- Ø 5.5	44	8.0	3 ± 0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
Ø50h7 <sup>0</sup> -0.025	14	M5x8	16.5	11 <sup>0</sup> -0.1	5	5	5	1.11 (1.48)

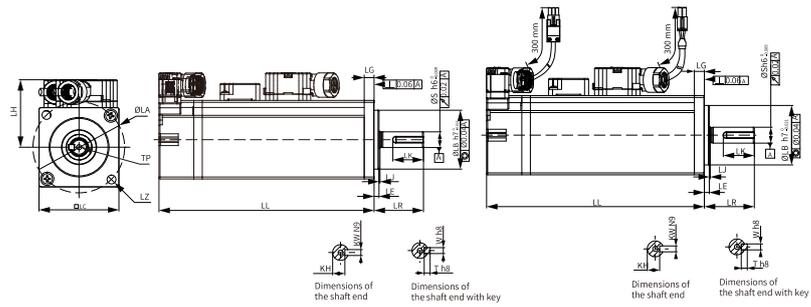
**3.7.5 MS1H4-55B30CB-A33\*R**

Motor specifications		Torque-Speed characteristics
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	Heatsink-based derating curve
Rated speed (rpm)	3000	
Maximum speed (rpm)	7000	
Torque coefficient (N·m/Arms)	0.49	
Rotor moment of inertia (kg·cm <sup>2</sup> )	Motor without brake	1.12
	Motor with brake	-

**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 <sup>0</sup> <sub>-0.03</sub>	19	M6 x 20	26	15.5 <sup>0</sup> <sub>-0.1</sub>	6	6	6	1.85

### 3.7.6 MS1H4-75B30CB-A33\*R

Motor specifications			Torque-Speed characteristics	
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		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 <sup>2</sup> )	Motor without brake	1.46		
	Motor with brake	1.51		

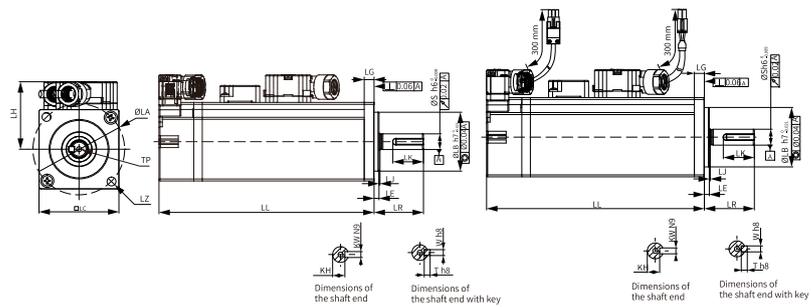
### Electrical specifications of the motor with brake

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)
Ø 70h7 <sup>0</sup> <sub>-0.03</sub>	19	M6 × 20	26	15.5 <sup>0</sup> <sub>-0.1</sub>	6	6	6	2.18 (2.82)

### 3.7.7 MS1H4-10C30CB-A33\*R

Motor specifications			Torque-Speed characteristics	
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)	7000			
Torque coefficient (N·m/Arms)	0.46			
Rotor moment of inertia (kg·cm <sup>2</sup> )	Motor without brake	1.87		
	Motor with brake	1.97		

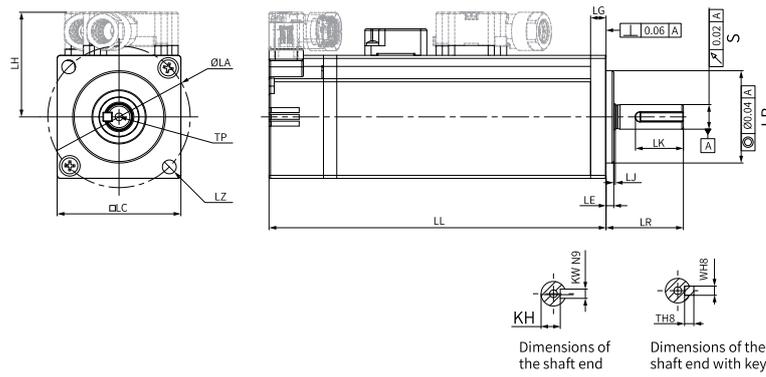
### Electrical specifications of the motor with brake

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)
$\text{Ø } 70\text{h}7^0_{-0.03}$	19	M6 x 20	26	15.5 <sup>0</sup> <sub>-0.1</sub>	6	6	6	2.55 (2.9)

## 4 Options

### 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 Applicable Cables

#### 4.2.1 Models

##### Power cable model

S6-L-M 0 0 1 - 3.0 - INT  

①
②③④
⑤
⑥

<b>① Cable type</b> S6-L-B/M: motion control power cable B: with brake M: without brake	<b>③ Cross sectional area (mm<sup>2</sup>)</b> 0: Flange sizes 25/40/60/80 1: Flange sizes 100/130/180 2: Flange size 180 (motors of 4.4 kW and above)	<b>⑤ Cable Length (m)</b> 3.0: 3 m 5.0: 5 m 10.0: 10 m
<b>② Connector type at drive side</b> 0: U-shaped cable lug 1: Needle-shaped cable lug	<b>④ Connector type at motor side</b> 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)	<b>⑥ Special requirements</b> INT: global version <sup>[1]</sup>

#### Note

[1]: The material of the global version cables complies with CE and UL certification.

## Encoder cable model

S6-L-P 1 2 1 - 3.0 - INT  
 ①      ② ③ ④      ⑤      ⑥

<b>① Cable type</b> S6-L-P: Motion control encoder cable	<b>③ Encoder</b> 1: Communication-type incremental encoder 2: Communication-type multi-turn absolute encoder	<b>⑤ Cable Length (m)</b> 3.0: 3 m 5.0: 5 m 10.0: 10 m
<b>② Connector type at drive side</b> 0: DB9 1: USB	<b>④ Connector type at motor side</b> 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)	<b>⑥ Special requirements</b> INT: global version <sup>[1]</sup>

**Note**

[1]: The material of the cables comply with CE and UL certification.

## Model number of communication cables

S6N-L-T 00 - 3.0  
 ①      ②      ③

<b>① Cable type</b> S6-L-T: Motion control communication cable  S6N-L-T: IS620F motion control encoder cable (only for servo drive to PC communication cable)	<b>② Cable connection type</b> 00: Servo drive PC communication cable 01: Servo drive network communication cable (CAN&485) 02: Servo drive to PLC communication cable 03: Servo drive communication termination resistor cable (CAN&485) 04: Servo drive network communication cable (EtherCAT)	<b>③ Cable length (m)</b> 3.0: 3 m 5.0: 5 m 10.0: 10 m
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**Note**

For cable selection, see Chapter Cable Model Selection List.

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## 4.2.2 Cable Type

### Fixed cables

Do not bend or move fixed cables during use. Bending or moving fixed cables may damage the cables and lead to a series of cable-related faults such as poor contact. Secure fixed cables through fixed binding. Certain bending radius must be available for the cables to prevent stress.

### Flexible cables

Flexible cables can move along with cable carriers without a high risk of abrasion.

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#### 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

The power cable and encoder cable of terminal-type motors require dedicated equipment and tooling for assembly. Purchase finished cables from authorized channels by Inovance.

For motor information, see the hardware guide.

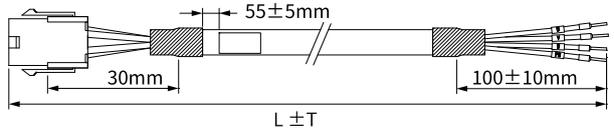
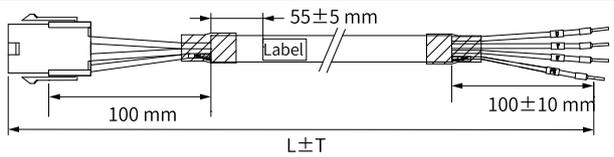
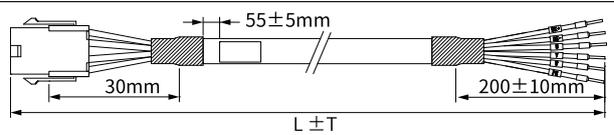
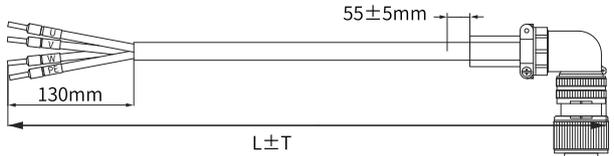
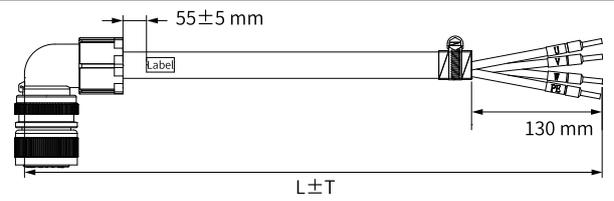
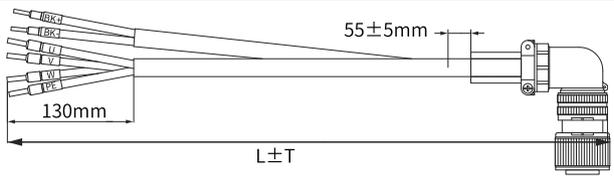
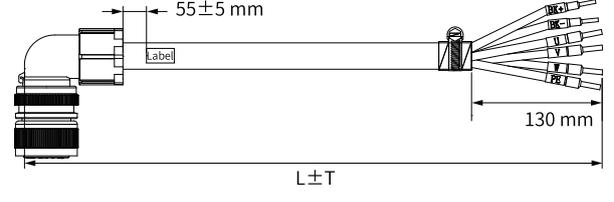
## 4.2.3 Cable Selection

### Power cable

The shielded cable must be used together with the shield bracket. For the shield bracket selection, see [“Connector kit” on page 91](#).

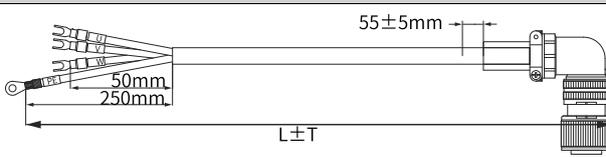
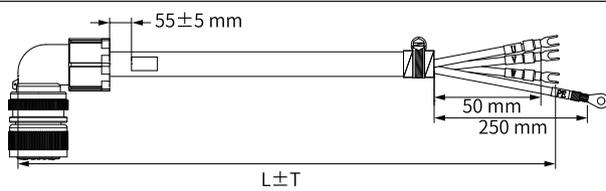
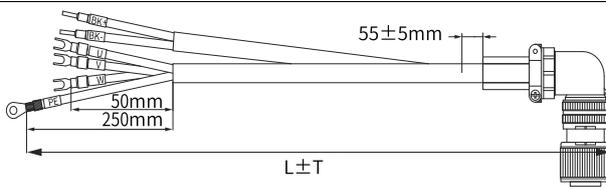
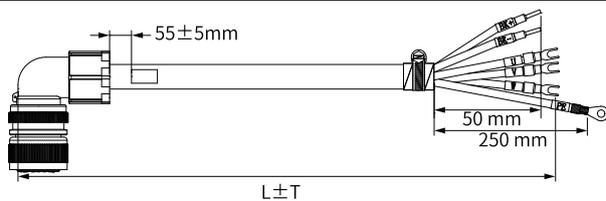
# Options

Motor model:	Cable Name	Cable model	Cable length (mm)	Tolerance (T) (mm)	Drawing	
MS1H1/ MS1H4 terminal- type motors	Front outlet	Brake- less	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- less (shielded cable)	S6-L-M107-3.0-INT	3000	(-30.30)	
			S6-L-M107-5.0-INT	5000	(-30.50)	
			S6-L-M107-10.0-INT	10000	(-30.80)	
		With 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)	
		With brake (shielded cable)	S6-L-B107-3.0-INT	3000	(-30.30)	
			S6-L-B107-5.0-INT	5000	(-30.50)	
			S6-L-B107-10.0-INT	10000	(-30.80)	
	Rear outlet	Brake- less	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- less (shielded cable)	S6-L-M108-3.0-INT	3000	(-30.30)	
			S6-L-M108-5.0-INT	5000	(-30.50)	
			S6-L-M108-10.0-INT	10000	(-30.80)	
		With 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)	
		With brake (shielded cable)	S6-L-B108-3.0-INT	3000	(-30.30)	
			S6-L-B108-5.0-INT	5000	(-30.50)	
			S6-L-B108-10.0-INT	10000	(-30.80)	

Motor model:	Cable Name	Cable model	Cable length (mm)	Tolerance (T) (mm)	Drawing
MS1H1/ MS1H4 flying leads type (-S) motor	Brake-less	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-less (shielded cable)	S6-L-M100-3.0-INT	3000	(-30.30)	
		S6-L-M100-5.0-INT	5000	(-30.50)	
		S6-L-M100-10.0-INT	10000	(-30.80)	
	With 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 motors rated 3 kW or below/ MS1H3 motors rated 1.8 kW or below	Brake-less	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-less (shielded cable)	S6-L-M111-3.0-INT	3000	(-30.30)	
		S6-L-M111-5.0-INT	5000	(-30.50)	
		S6-L-M111-10.0-INT	10000	(-30.80)	
	With 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)	
	With brake (shielded cable)	S6-L-B111-3.0-INT	3000	(-30.30)	
		S6-L-B111-5.0-INT	5000	(-30.50)	
		S6-L-B111-10.0-INT	10000	(-30.80)	

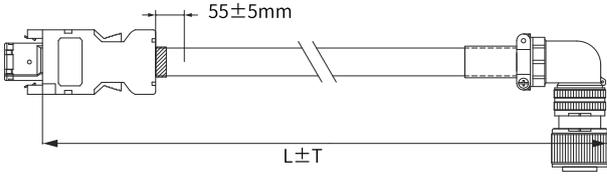
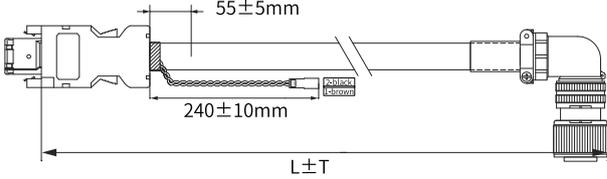
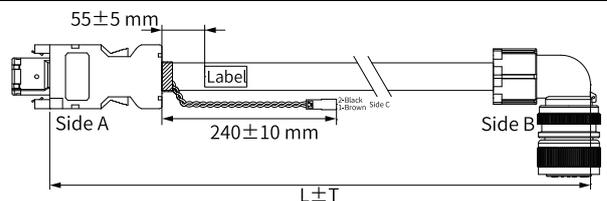
# Options

Motor model:	Cable Name	Cable model	Cable length (mm)	Tolerance (T) (mm)	Drawing
MS1H2 motor rated 4 kW/5 kW	Brake-less	S6-L-M011-3.0	3000	(-30.30)	<p>55±5mm 50mm 250mm L±T</p>
		S6-L-M011-5.0	5000	(-30.50)	
		S6-L-M011-10.0	10000	(-30.80)	
	Brake-less (shielded cable)	S6-L-M011-3.0-INT	3000	(-30.30)	<p>55±5 mm 50 mm 250 mm L±T</p>
		S6-L-M011-5.0-INT	5000	(-30.50)	
		S6-L-M011-10.0-INT	10000	(-30.80)	
	With brake	S6-L-B011-3.0	3000	(-30.30)	<p>55±5mm 50mm 250mm L±T</p>
		S6-L-B011-5.0	5000	(-30.50)	
		S6-L-B011-10.0	10000	(-30.80)	
	With brake (shielded cable)	S6-L-B011-3.0-INT	3000	(-30.30)	<p>55±5mm 50 mm 250 mm L±T</p>
		S6-L-B011-5.0-INT	5000	(-30.50)	
		S6-L-B011-10.0-INT	10000	(-30.80)	
MS1H3 motors rated 2.9 kW	Brake-less	S6-L-M112-3.0	3000	(-30.30)	<p>55±5mm 130mm L±T</p>
		S6-L-M112-5.0	5000	(-30.50)	
		S6-L-M112-10.0	10000	(-30.80)	
	Brake-less (shielded cable)	S6-L-M112-3.0-INT	3000	(-30.30)	<p>55±5 mm label 130 mm L±T</p>
		S6-L-M112-5.0-INT	5000	(-30.50)	
		S6-L-M112-10.0-INT	10000	(-30.80)	
	With brake	S6-L-B112-3.0	3000	(-30.30)	<p>55±5mm 130mm L±T</p>
		S6-L-B112-5.0	5000	(-30.50)	
		S6-L-B112-10.0	10000	(-30.80)	
	With brake (shielded cable)	S6-L-B112-3.0-INT	3000	(-30.30)	<p>55±5 mm label 130 mm L±T</p>
		S6-L-B112-5.0-INT	5000	(-30.50)	
		S6-L-B112-10.0-INT	10000	(-30.80)	

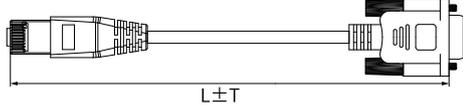
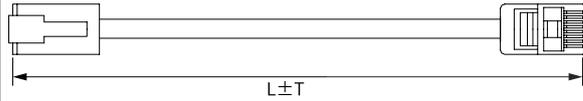
Motor model:	Cable Name	Cable model	Cable length (mm)	Tolerance (T) (mm)	Drawing
MS1H3 motors rated 4.4 kW or above	Brake-less	S6-L-M022-3.0	3000	(-30.30)	
		S6-L-M022-5.0	5000	(-30.50)	
		S6-L-M022-10.0	10000	(-30.80)	
	Brake-less (shielded cable)	S6-L-M022-3.0-INT	3000	(-30.30)	
		S6-L-M022-5.0-INT	5000	(-30.50)	
		S6-L-M022-10.0-INT	10000	(-30.80)	
	With 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)	
	With brake (shielded cable)	S6-L-B022-3.0-INT	3000	(-30.30)	
		S6-L-B022-5.0-INT	5000	(-30.50)	
		S6-L-B022-10.0-INT	10000	(-30.80)	

**Encoder cable**

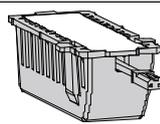
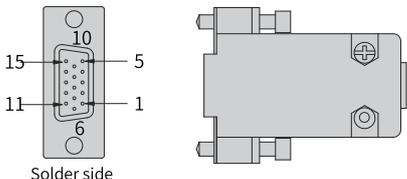
Motor model	Cable name	Cable model	Cable length (mm)	Tolerance (T) (mm)	Drawing		
MS1H1/ MS1H4 terminal- type motors	Front outlet	Single-turn absolute encoder cable	S6-L-P114-3.0	3000	(-30.30)		
			S6-L-P114-5.0	5000	(-30.50)		
			S6-L-P114-10.0	10000	(-30.80)		
		Multi-turn absolute encoder cable	S6-L-P124-3.0	3000	(-30.30)		
			S6-L-P124-5.0	5000	(-30.50)		
			S6-L-P124-10.0	10000	(-30.80)		
	Multi-turn absolute encoder cable (shielded)	S6-L-P124-3.0-INT	3000	(-30.30)			
		S6-L-P124-5.0-INT	5000	(-30.50)			
		S6-L-P124-10.0-INT	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 flying leads 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)			

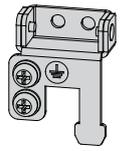
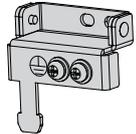
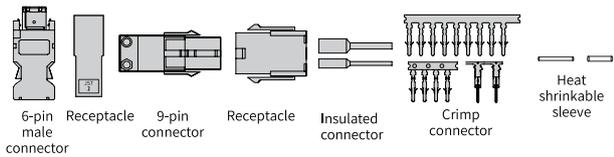
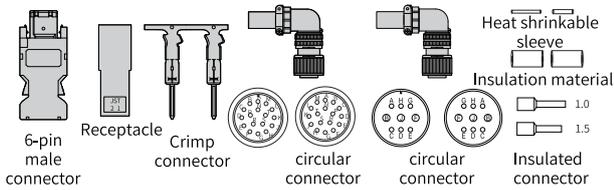
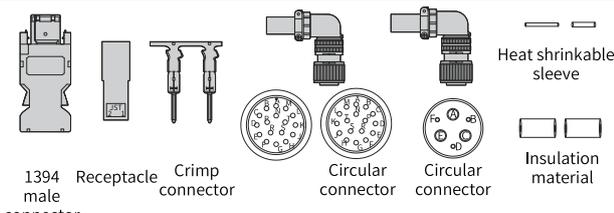
Motor model	Cable name	Cable model	Cable length (mm)	Tolerance (T) (mm)	Drawing
MS1H2/MS1H3 motor	Single-turn absolute encoder cable	S6-L-P111-3.0	3000	(-30.30)	
		S6-L-P111-5.0	5000	(-30.50)	
		S6-L-P111-10.0	10000	(-30.80)	
	Multi-turn absolute encoder cable	S6-L-P121-3.0	3000	(-30.30)	
		S6-L-P121-5.0	5000	(-30.50)	
		S6-L-P121-10.0	10000	(-30.80)	
	Multi-turn absolute encoder cable (shielded)	S6-L-P121-3.0-INT	3000	(-30.30)	
		S6-L-P121-5.0-INT	5000	(-30.50)	
		S6-L-P121-10.0-INT	10000	(-30.80)	

## Communication cables

Cable name	Cable model	Cable length (mm)	Tolerance (T) (mm)	Drawing
Servo drive to PC communication cable	S6-L-T00-3.0	3000	(-30.30)	
Servo drive network communication cable	S6-L-T04-0.3	300	(-20.20)	
Servo drive to host controller communication cable	S6-L-T04-3.0	3000	(-30.30)	

## Connector kit

Name	Model	Drawing
Battery kit	S6-C4A	
CN1 terminal (DB15)	S6-C6	

Name	Model	Drawing
Shield bracket	S6-C35 (optional for size A to size C)	
	S6-C27 (optional for size D to size E)	
MS1H1 flying leads type (-S) motor connector	S6-C26	 6-pin male connector    Receptacle    9-pin connector    Receptacle    Insulated connector    Crimp connector    Heat shrinkable sleeve
MS1H2/MS1H3 (1.8 kW and below) motor connector	S6-C29	 6-pin male connector    Receptacle    Crimp connector    circular connector    circular connector    Heat shrinkable sleeve    Insulation material    Insulated connector
MS1H3 (2.9 kW and above) motor connector	S6-C39	 1394 male connector    Receptacle    Crimp connector    Circular connector    Circular connector    Heat shrinkable sleeve    Insulation material

## 4.3 Electrical Peripherals

### 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 SV660 series servo drive	Rated input current (A)	Recommended Fuse		
			Manufacturer	Rated current (A)	Model
Single-phase 220 V					
A	S1R6	2.3	Bussmann	5	FWP-5B
	S2R8	4		10	FWP-10B
B	S5R5	7.9		20	FWP-20B
C	S7R6	9.6		20	FWP-20B
D	S012	12.8		35	FWP-35B
Three-phase 220 V					
C	S7R6	5.1	Bussmann	15	FWP-15B
D	S012	8		20	FWP-20B

Size	Drive model SV660 series servo drive	Rated input current (A)	Recommended Fuse		
			Manufacturer	Rated current (A)	Model
Three-phase 380 V					
C	T3R5	2.4	Bussmann	5	FWP-5B
	T5R4	3.6		10	FWP-10B
D	T8R4	5.6		15	FWP-15B
	T012	8		20	FWP-20B
E	T017	12		35	FWP-35B
	T021	16		35	FWP-35B
	T026	21		40	FWP-40B

### 4.3.2 Electromagnetic Contactor

Table 4-2 Recommended electromagnetic contactor models

Size	Drive model SV660 series servo drive	Rated input current (A)	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 Circuit Breaker

Table 4-3 Recommended circuit breaker models

Size	Drive model SV660 series servo drive	Rated input current (A)	Recommended circuit breaker		
			Manufacturer	Current (A)	Model
Single-phase 220 V					
A	S1R6	2.3	Schneider	4	OSMC32N2D4
	S2R8	4		6	OSMC32N2D6
B	S5R5	7.9		16	OSMC32N2D16
C	S7R6	9.6		16	OSMC32N2D16
D	S012	12.8		20	OSMC32N2D20
Three-phase 220 V					

Size	Drive model SV660 series servo drive	Rated input current (A)	Recommended circuit breaker		
			Manufacturer	Current (A)	Model
C	S7R6	5.1	Schneider	10	OSMC32N3D10
D	S012	8		16	OSMC32N3D16
Three-phase 380 V					
C	T3R5	2.4	Schneider	4	OSMC32N3D4
	T5R4	3.6		6	OSMC32N3D6
D	T8R4	5.6		10	OSMC32N3D10
	T012	8		16	OSMC32N3D16
E	T017	12		20	OSMC32N3D20
	T021	16		25	OSMC32N3D25
	T026	21		32	OSMC32N3D32

### Note

For UL-compliant products, see section "UL&cUL 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 a 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 a RCD whose tripping current is not lower than 300 mA.
- Use Chint or Schneider RCDs (recommended).

## 4.3.4 AC Input Reactor

### Model selection

An AC input reactor is optional and mainly used to reduce harmonics in the input current. In applications where harmonics need to be suppressed, install an external reactor. The following table lists the recommended manufacturers and models of input reactors.

Table 4-4 AC input reactor model selection

Size	Drive model SV660 series servo drive	Rated input current (A)	Applicable reactor	Inductance (mH)
Three-phase 220 V				
C	S7R6	5.1	MD-ACL-10-5-4T	5
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

Size	Drive model SV660 series servo drive	Rated input current (A)	Applicable reactor	Inductance (mH)
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

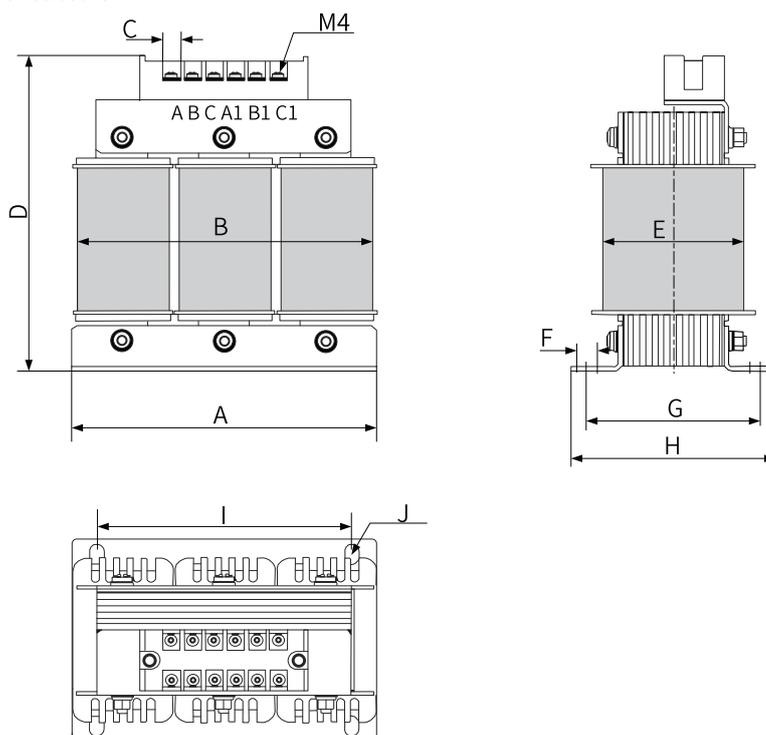


Figure 4-1 Dimensions of 10 A to 15 A AC input reactors

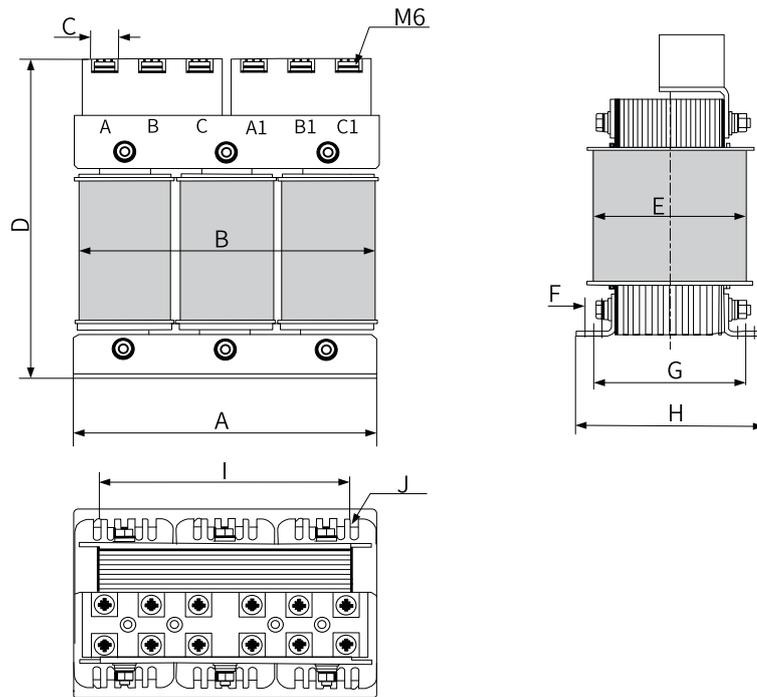


Figure 4-2 Dimensions of 40 A (1.45 mH) AC input reactors

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	Φ7×10
MD-ACL-15-3-4T	150±2	155	8	160	80	10	85±2	100±2	125±1	Φ7×10
MD-ACL-40-1.45-4T	180±2	185	16	200	105	10	95±2	117±2	150±1	Φ7×10

### 4.3.5 EMC Filter

#### Model selection

To comply with the radiated and conducted emission requirements of EN IEC 61800-3, install the 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 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	Drive model SV660 series servo drive	Rated input current (A)	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

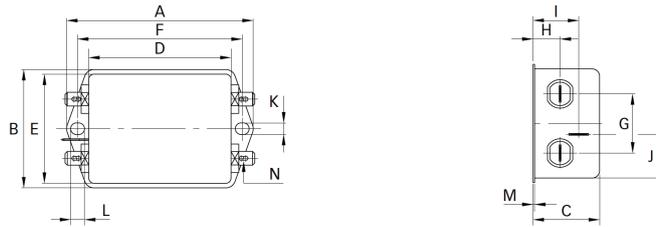


Figure 4-3 Dimensions of FN 2090 series filters (unit: mm)

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	6.3x0.8
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	6.3x0.8

- Dimensions of Schaffner FN 3287 series filters

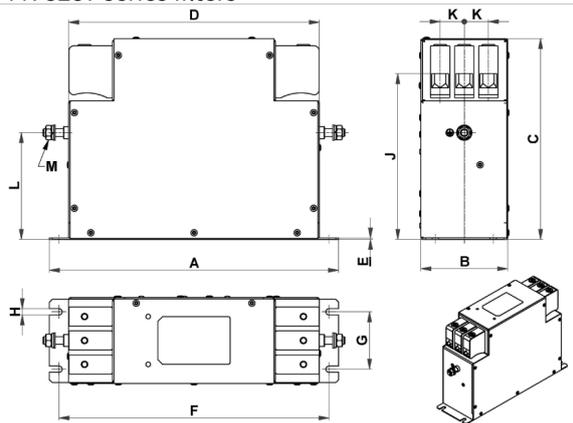


Figure 4-4 Dimension drawing of FN 3287 series filters (unit: mm)

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 Ferrite Clamp

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. When it is installed on the output side, it can reduce the interference generated by the drive to external devices and can reduce the bearing current.

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

### Model selection

- Amorphous magnetic ring: featuring high permeability when the frequency is within 1 MHz and excellent anti-interference performance, but not as low-cost as the ferrite clamp, see dimensions in [“Dimensions” on page 99](#)
- 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

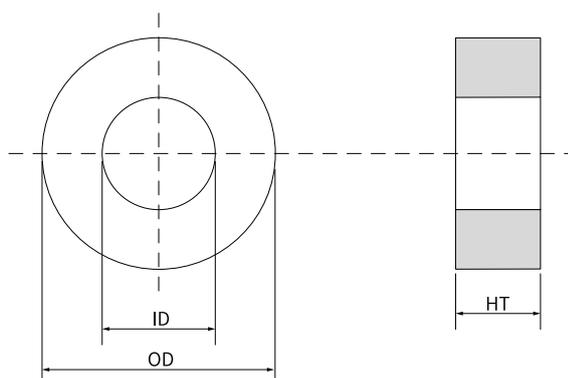


Figure 4-5 Dimensions of magnetic ring

Table 4-10 Specifications of magnetic ring

Model of magnetic ring	Dimensions (OD x ID x HT) (mm)
DY644020H	64 x 40 x 20
DY805020H	80 x 50 x 20

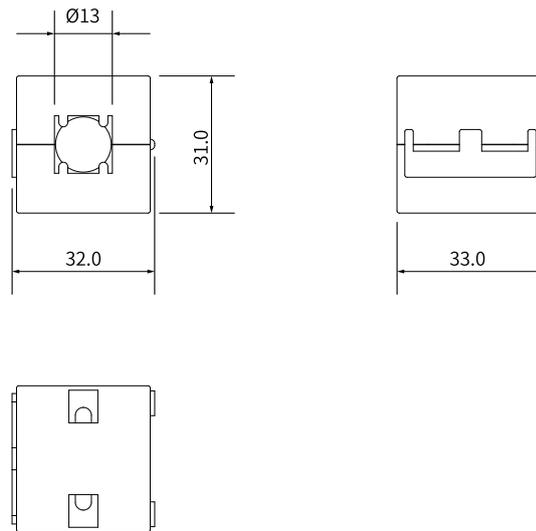


Figure 4-6 Dimensions of ferrite clamp

Table 4-11 Specifications of ferrite clamp

Model of ferrite clamp	Dimensions (Width x Outer diameter x Inner diameter) (mm)
DYR-130-B	32.0 x 31 x 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 <sup>[1]</sup>
	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 <sup>[2]</sup>
		-	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.

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### 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 =  $(8 \text{ h} \times 2 \text{ uA} + 0.1 \text{ h} \times 80 \text{ uA} + 15.9 \text{ h} \times 10 \text{ uA}) \times 313 + (0 \text{ h} \times 2 \text{ uA} + 0 \text{ h} \times 80 \text{ uA} + 24 \text{ h} \times 10 \text{ uA}) \times 52 \approx 70 \text{ mAh}$

Design life = Battery capacity  $\div$  Capacity consumed in 1 year =  $2600 \text{ mAh} \div 70 \text{ mAh} = 37.1 \text{ years}$

## 5 Ordering Guidance

Table 5–1 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 5–2 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

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### **Note**

SV660P and SV660N products share the same terminal kit.

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## 6 Service and Support

### Documentation download

Product manuals, brochures, certificates, 2D/3D drawings and other information can be downloaded in the following way:

Go to our official website <https://www.inovance.com>, choose Service and Support > Download, enter keywords, and download the documentation.“”



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