

SV660N Series Servo Drive Selection Guide



Preface

Introduction

The SV660N series high-performance AC servo drive covers a power range from 50 W 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 high-response 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 guide introduces servo drive and motor model selections, including their features, specifications, configurations, and cables.

More Documents

Name	Data Code
SV660N series servo drive hardware guide	19011432
SV660N series servo drive commissioning guide	19011433
SV660N series servo drive function guide	19011434
SV660N series servo drive communication Guide	19011435

Revision History

Date of revision	Version	Description
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Document Acquisition

This guide is not delivered along with the product. You can download the PDF version by visiting <http://en.inovance.cn/support/download.html>.

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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 instructions may result in death, severe personal injuries, or equipment damage.
- "CAUTION", "WARNING", and "DANGER" items in the guide only indicate some of the precautions that need to be followed; they just supplement the safety precautions.
- Use this equipment according to the designated environment requirements. Damage caused by improper use is not covered by warranty.
- Inovance shall take no responsibility for any personal injuries or property damage caused by improper use.

Safety Levels and Definitions

- | | |
|--|---|
|  DANGER | Indicates that failure to comply with the notice will result in severe personal injuries or even death. |
|  WARNING | Indicates that failure to comply with the notice may result in severe personal injuries or even death. |
|  CAUTION | Indicates that failure to comply with the notice may result in minor or moderate personal injuries or equipment damage. |

General Safety Instructions

- Drawings in the 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.

Unpacking
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">  CAUTION </div> <ul style="list-style-type: none"> ◆ Do not install the equipment if you find damage, rust, or signs of use on the equipment or accessories upon unpacking. ◆ Do not install the equipment if you find water seepage or missing or damaged components upon unpacking. ◆ Do not install the equipment if you find the packing list does not conform to the equipment you received.
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">  CAUTION </div> <ul style="list-style-type: none"> ◆ Check whether the packing is intact and whether there is damage, water seepage, damp, and deformation. ◆ Unpack the package by following the unpacking sequence. Do not strike the package violently. ◆ Check whether there are damages, rust, or injuries on the surface of the product or product accessories. ◆ Check whether the package contents are consistent with the packing list before unpacking.

Storage and Transportation

WARNING

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

CAUTION

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

Installation

DANGER

- ◆ The equipment must be operated only by professionals with electrical knowledge.

WARNING

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

 CAUTION

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

Wiring

 DANGER

- ◆ Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- ◆ Before wiring, cut off 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 will result in an electric shock.

 WARNING

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

 CAUTION

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

Power-on

 DANGER

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

 WARNING

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

Operation

 DANGER

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

 WARNING

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

Maintenance

 DANGER

- ◆ Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- ◆ Do not maintain the equipment with power ON. Failure to comply will result in an electric shock.
- ◆ Before maintenance, cut off all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.
- ◆ In case of a permanent magnet motor, do not touch the motor terminals immediately after power-off because the motor terminals will generate induced voltage during rotation even after the equipment power supply is off. Failure to comply will result in an electric shock.



 WARNING

- ◆ Perform routine and periodic inspection and maintenance on the equipment according to maintenance requirements and keep a maintenance record.

Repair


 DANGER

- ◆ Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- ◆ Do not repair the equipment with power ON. Failure to comply will result in an electric shock.
- ◆ Before inspection and repair, cut off all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.

Disposal
<p> WARNING</p> <ul style="list-style-type: none"> ◆ When the fuse is blown or the circuit breaker or earth leakage current breaker (ELCB) trips, wait for at least the time designated on the equipment warning label before power-on or further operations. Failure to comply may result in death, personal injuries or equipment damage. ◆ When the equipment is faulty or damaged, the troubleshooting and repair work must be performed by professionals that follow the repair instructions, with repair records kept properly. ◆ Replace quick-wear parts of the equipment according to the replacement instructions. ◆ Do not use damaged equipment. Failure to comply may result in death, personal injuries, or severe equipment damage. ◆ After the equipment is replaced, check the wiring and set parameters again.
<p> WARNING</p> <ul style="list-style-type: none"> ◆ Dispose of retired equipment in accordance with local regulations and standards. Failure to comply may result in property damage, personal injuries, or even death. ◆ Recycle retired equipment by observing industry waste disposal standards to avoid environmental pollution.

Safety Labels





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

Safety Label	Description
	<ul style="list-style-type: none"> ◆ Read through the safety instructions before operating the equipment. Failure to comply may result in death, personal injuries, or equipment damage. ◆ Do not touch the terminals or remove the cover with power ON or within 10 min after power-off. Failure to comply will result in an electric shock.

1 Servo Drive Models

Servo Drive Series	Control Mode	Communication Protocol	Connecting Terminal
SV660N	Cyclic synchronous position mode	EtherCAT RS232	EtherCAT RS232 STO
	Cyclic synchronous velocity mode		
	Cyclic synchronous torque mode		
	Profile position mode		
	Profile velocity mode		
	Profile torque mode		
	Homing mode		

2 Motor Models

Motor		Rated Output Capacity (kW)	Rated Speed (Maximum Rated Speed) (r/min)	Encoder	IP rating
Low inertia, small capacity	<p>MS1H1</p> 	0.05, 0.1, 0.2, 0.4, 0.55, 0.75, 1.0	3000 (6000)	A3: 23-bit multi-turn absolute encoder	IP67
Low inertia, medium capacity	<p>MS1H2</p> 	1.0, 1.5, 2.0, 2.5, 3.0, 4.0, 5.0	3000 (6000/5000)	A3: 23-bit multi-turn absolute encoder	IP67
Medium inertia, medium capacity	<p>MS1H3</p> 	0.85, 1.3, 1.8, 2.9, 4.4, 5.5, 7.5	1500 (3000)	A3: 23-bit multi-turn absolute encoder	IP67
Medium inertia, small capacity	<p>MS1H4</p> 	0.1, 0.4, 0.75	3000 (6000)	A3: 23-bit multi-turn absolute encoder	IP67

3. General Specifications

3.1 General Specifications of the Servo Drive

3.1.1 Electrical Specifications

■ Single-phase 220 V servo drives

Item	Size A		Size B
	S1R6	S2R8	S5R5
Servo drive model	S1R6	S2R8	S5R5
Power of the servo drive (W)	200	400	750
Continuous output current (Arms)	1.6	2.8	5.5
Maximum output current (Arms)	5.8	10.1	16.9
Main circuit power supply	Single-phase 200 VAC to 240 VAC, +10% to -10%, 50/60 Hz		
Main circuit energy loss (W) ^[1]	10.21	23.8	38.2
Control circuit power supply	Powered up by the bus, sharing the same power supply and rectification part with the main circuit		
Control circuit energy loss (W)	16		
Braking energy processing	External regenerative resistor available	Built-in regenerative resistor available	

■ Single-phase/Three-phase 220 V servo drives

Item	Size C	Size D
	S7R6	S012
Servo drive model	S7R6	S012
Power of the servo drive (W)	1000	1500
Continuous output current (Arms)	7.6	11.6
Maximum output current (Arms)	23	32
Main circuit power supply	Single-phase/Three-phase 200 VAC to 240 VAC, +10% to -10%, 50/60 Hz ^[2]	
Main circuit energy loss (W) ^[1]	47.32	69.84
Control circuit power supply	Single-phase 200 VAC to 240 VAC, +10 to -10%, 50/60 Hz	
Control circuit energy loss (W)	16	
Braking energy processing	Built-in regenerative resistor available	

3. General Specifications

■ Three-phase 380 V servo drives

Item	Size C		Size D		Size E		
Servo drive model	T3R5	T5R4	T8R4	T012	T017	T021	T026
Power of the servo drive (W)	1000	1500	2000	3000	5000	6000	7500
Continuous output current (Arms)	3.5	5.4	8.4	12	17	21	26
Maximum output current (Arms)	11	14	20	29.75	41.25	52.12	64.25
Main circuit power supply	Three-phase 380 VAC to 440 VAC, +10% to -10%, 50/60 Hz						
Main circuit energy loss (W) ^[1]	39.5	63.25	94.82	135.47	187.62	228.28	258.63
Control circuit power supply	Single-phase 380 VAC to 440 VAC, +10 to -10%, 50/60 Hz						
Control circuit energy loss (W)	16						
Braking energy processing	Built-in regenerative resistor available						

[1] Main circuit energy loss refers to the energy loss under rated output current of the servo drive.

[2] No derating is required when a single-phase 220 V power supply is used for models S7R6 and S012.

3.1.2 Basic Specifications

Item		Description	
Basic 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	Operating/Storage temperature ^[1]	0°C to +55°C (If the ambient temperature exceeds 45°C , derate 10% for every additional 5°C .)/-20°C to +70°C
		Operating/Storage humidity	Below 90% RH (without condensation)
		Vibration/Shock resistance	4.9 m/s ² , 19.6 m/s ²
		IP rating	IP20 (Terminals excluded, which have a rating of IP00)
		Pollution degree	PD2
Altitude		The maximum altitude is 5000 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	Performance	Speed control range	1:6000 (Under the rated torque load, the drive keeps running as long as the lower limit of the speed control range is not exceeded.)
		Speed loop bandwidth	3 kHz
		Torque control accuracy (repeatability)	±2%
		Soft startup time	0s to 65s (Acceleration and deceleration can be set separately.)
	Input signal	Speed reference	Source of network-type references: EtherCAT communication
		Torque reference	Local mode and local multi-speed supported

Item		Description	
Position Control Mode	Performance	Positioning time 1 ms to 10 ms	
	Input signal	Position reference Source of network-type references: EtherCAT communication Local mode supported	
	Digital input (DI) signal	Signal assignment can be changed	5 DIs P-OT (Positive limit switch) N-OT (Negative limit switch) HomeSwitch (Home switch) TouchProbe1 (Touch probe 1) TouchProbe2 (Touch probe 2)
			Digital output (DO) signal
Built-in functions	Overtravel prevention		The drive stops immediately when P-OT or N-OT is active.
	Protective functions		Providing protections against overcurrent, overvoltage, undervoltage, overload, main circuit detection error, heatsink over-temperature, overspeed, encoder error, CPU error, and parameter error
	LED display		Main circuit CHARGE indicator, 5-digit LED display
	Vibration suppression		Four notches (including two adaptive notches), 50 Hz to 5000 Hz
	Communication functions	Connection protocol	RS232
		Communication protocol	EtherCAT
		Multi-slave communication	Maximum number of slaves: 255
		Axis address setting	No physical knob, set to 0...255 through the software
Function		Including status display, user parameter setting, monitored value display, fault tracing display, jog and auto-tuning, and speed/torque reference signal observation	
Others		Gain tuning, fault log, jog	

[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.

3. General Specifications

3.1.3 Technical Specifications of EtherCAT Communication

	Item	Specifications
Basic performance of EtherCAT slave	Communication protocol	EtherCAT protocol
	Available services	CoE (PDO, SDO)
	Synchronization mode	DC - Distributed clock
	Physical layer	100BASE-TX
	Baud rate	100 Mbit/s (100Base-TX)
	Duplex mode	Full duplex
	Topological structure	Ring and linear
	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	A maximum of 1486 bytes per Ethernet frame
	Synchronous jitter of two slaves	< 1 us
	Refresh time	About 30 μs for 1000 DI/DOs About 100 μs for 100 servo axes Different refresh time for different interfaces
Communication code error rate	10 ⁻¹⁰ in Ethernet standard	
EtherCAT configuration unit	Number of FMMU units	8
	Number of storage synchronization management units	8
	Process data RAM	8 kB
	Distributed clock	64 bits
	EEPROM capacity	32 kbit Initialization data are written through EtherCAT master.

3.1.4 Specifications of the Regenerative Resistor

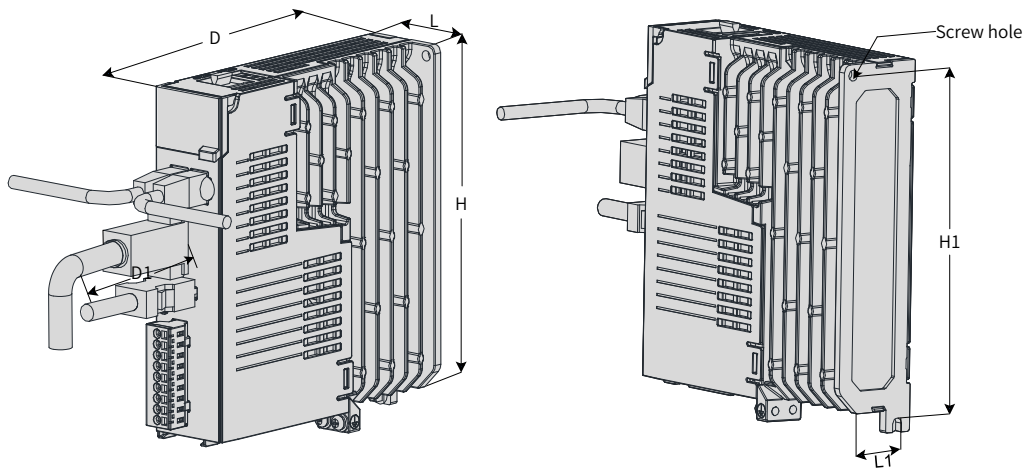
Servo Drive Model		Specifications of Built-in Regenerative Resistor		Min. Permissible Resistance of External Regenerative Resistor (Ω)	Max. Braking Energy Absorbed by the Capacitor (J)
		Resistance (Ω)	Power (W)		
Single-phase 220 V	SV660NS1R6I	-	-	50	13.15
	SV660NS2R8I	-	-	45	26.29
	SV660NS5R5I	50	50	40	22.41
Single-phase/ Three-phase 220 V	SV660NS7R6I	25	80	20	26.70
	SV660NS012I			15	26.70
Three-phase 380 V	SV660NT3R5I	100	80	80	34.28
Three-phase 380 V	SV660NT5R4I	100	80	60	34.28
	SV660NT8R4I	50	80	45	50.41
	SV660NT012I			40	
	SV660NT017I	35	100	35	82.67
	SV660NT021I			25	100.82
	SV660NT026I				100.82



Select the external regenerative resistor according to actual operating conditions.

NOTE

3.1.5 Dimension Drawing



Servo Drive 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)

3. General Specifications

Servo Drive Size	L	H	D	L1	H1	D1	Screw Hole	Tightening Torque	Weight
	Unit: mm (in.)							Unit: N·m	Unit: kg (lb.)
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)

3.2 General Specifications of the Motor

3.2.1 Mechanical Specifications

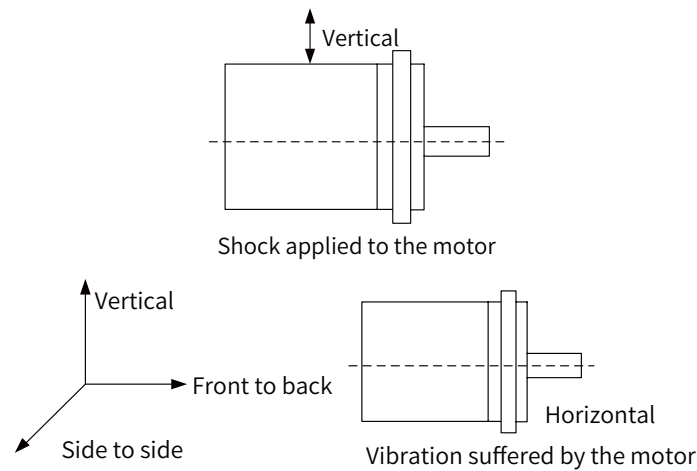
Item		Description
Duty Type		Continuous
Vibration level		V15
Insulation resistance		500 VDC, above 10 MΩ
Excitation mode		Permanent magnetic
Installation Mode		Flange
Heat resistance level		Level F
Insulation voltage		1500 VAC, 1 minute (220 V class) 1800 VAC, 1 minute (380 V class)
IP rating of the enclosure		IP67 (except the shaft opening)
Direction of rotation		Counterclockwise (CCW) for forward reference when viewed from the load side
Environment conditions	Ambient temperature	0°C to 40°C (non-freezing) (Derate based on the derating curve for temperatures above 40°C.)
	Ambient humidity	20%–80% RH (without condensation)
	Installation location	<ul style="list-style-type: none"> ◆ Free from corrosive or explosive gases ◆ Well ventilated and free of dust, waste and moisture. ◆ Convenient for inspection and cleaning ◆ Below 1000 m (Derate based on the derating curve for altitudes above 1000 m.) ◆ Away from sources that may generate strong magnetic field ◆ Away from heating sources such as a heating stove Use a motor with oil seal in places with grinding fluid, oil mist, iron powders or cuttings.
	Storage Environment	Store the Servomotor in the following environment if you store it with the power cable disconnected: Storage temperature: -20° C to +60° C (non-freezing) Storage humidity: 20% to 80% RH (without condensation)
Shock resistance ^[1]	Impact acceleration rate at flange	490 m/s ²
	Times of impact	2
Vibration resistance ^[2]	Vibration acceleration rate at flange	49 m/s ²

[1] The shock resistance for shock in the vertical direction when the motor is mounted with the shaft in a horizontal position is shown in the preceding table (air-cooled motors excluded).

[2] The vertical, side-to-side, and front-to-back vibration resistance for vibration in three directions when the motor is mounted with the shaft in a horizontal position is shown in the preceding table.



◆ The strength of the vibration that the motor can withstand depends on the application. Always check the vibration acceleration rate applied to the motor with the actual equipment.



3.2.2 Motor Overload Characteristics

The motor is compliant with NEC and CEC requirements and equipped with protective functions against overload and over-temperature.

To protect motors with different loads, set the 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 conditions occurs, change the gains based on the temperature rise condition of the motor:

- The motor operates in environments with high temperature.
- The motor is in cyclic motion featuring a short motion cycle and frequent acceleration/deceleration.

The motor overload protection curve is an inverse time curve as shown below.

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

3. General Specifications

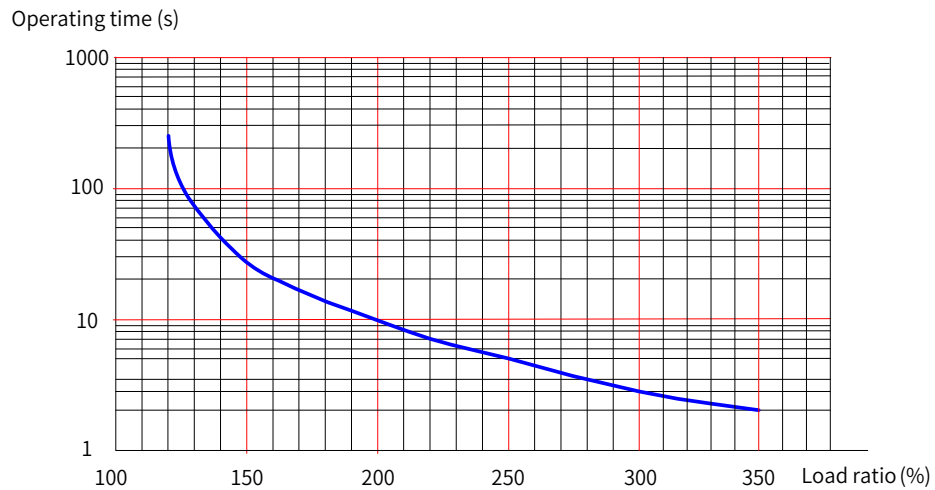


Figure 3-1 Motor overload curve



NOTE

- ◆ The maximum torque of MS1H1 and MS1H4 models is 3.5 times the rated torque.
- ◆ The maximum torque of MS1H2 models is three times the rated torque.
- ◆ The maximum torque of MS1H3 and ISMH3 models, except those of 2.9 kW, is 2.5 times the rated torque.
- ◆ For models in 2.9 kW, the maximum torque is two times the rated torque.

3.2.3 Electrical Specifications of Motors with Brake

Motor Model	Holding Torque (N·m)	Supply Voltage (VDC) ±10%	Coil Resistance (Ω) ±7%	Exciting Current (A)	Release Time (ms)	Apply Time (ms)	Backlash (°)
MS1H1-05B/10B MS1H4-10B	0.32	24	94.4	0.25	≤ 20	≤ 40	≤ 1.5
MS1H1-20B/40B MS1H4-40B	1.5		75.79	0.32	≤ 20	≤ 60	≤ 1.5
MS1H1-75B/MS1H4-75B	3.2		57.6	0.42	≤ 40	≤ 60	≤ 1
MS1H2-10C/15C/20C/25C	8		25	0.96	≤ 30	≤ 85	≤ 0.5
MS1H2-30C/40C/50C	16		21.3	1.13	≤ 60	≤ 100	≤ 0.5
MS1H3-85B/13C/18C	12		29.7	0.81	≤ 60	≤ 120	≤ 0.5
MS1H3-29C/44C/55C/75C	50		14.4	1.67	≤ 100	≤ 200	≤ 0.5



NOTE



- ◆ The brake cannot share the same power supply with other electrical devices. This is to prevent malfunction of the brake due to voltage or current drop caused by other working devices.
- ◆ It is recommended to use cables with a cross-sectional area of 0.5 mm² and above.

3.2.4 Load Moment of Inertia

The load moment of inertia represents the inertia of the load. The larger the load moment of inertia is, the weaker the responsiveness is. An excessively high inertia may result in unstable motion. The allowable load moment of inertia (J_L) of the motor is restricted. The load moment of inertia is an approximate value, which may vary with the drive conditions of the motor.

When the motor is used with the load moment of inertia being exceeded, overvoltage warning will occur during deceleration. Servo units with a built-in regenerative resistor may generate a regenerative resistor overload warning. In case of such warnings, take one of the following measures:

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

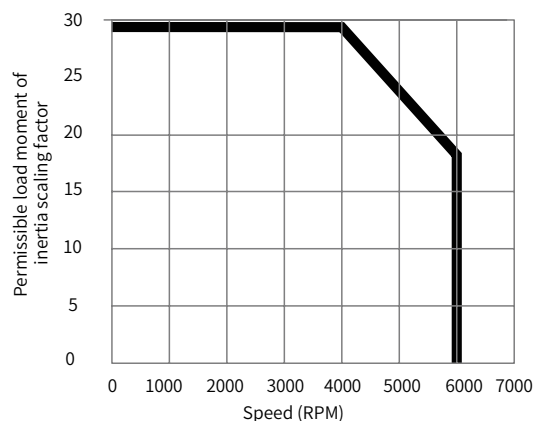
 CAUTION	
	<ul style="list-style-type: none"> ◆ Regenerative resistors are not built into servo units for 400 W or smaller servo motors. ◆ Even for servo units with built-in regenerative resistors, an external regenerative resistor is required if the energy that results from the regenerative driving conditions exceeds the allowable loss capacity (W) of the built-in regenerative resistor. Install an external regenerative resistor if the warning cannot be cleared using the above measures.

3.2.5 Allowable Load Moment of Inertia Scaling Factor for Servo Units Without Built-in Regenerative Resistor

The following diagram shows the allowable load moment of inertia scaling factor of the motor speed for servo units without built-in regenerative resistor when an external regenerative resistor is not connected.

If the servo motor exceeds the allowable load moment of inertia, an overvoltage warning may occur in the servo unit.

The following figure provides reference data for deceleration at the rated torque or higher under 200 VAC input.



4 Motors with Low Inertia and Small Capacity (MS1H1)

4.1 Model Selection

4.1.1 220 V Motors Without Brake

Servo Motor			Servo Drive (SV660N****I)				Power Cable	23-bit Single-Turn Absolute Encoder Cable	23-bit Multi-Turn Absolute Encoder Cable (Battery Options Required)
Model	Flange Size	Capacity (kW)	Voltage Class	Size	Model	Code			
Ratings of MS1H1 series motors (Vn = 3000 RPM, Vmax = 6000 RPM)									
MS1H1-05B30CB-A330Z(-S)	40	0.05	Single-phase 220 V	A	S1R6	00002	S6-L-M107-** (Front outlet) S6-L-M108-** (Rear outlet) S6-L-M100-** (Lead wire-type motor cable)	S6-L-P114-** (Front outlet) S6-L-P115-** (Rear outlet) S6-L-P110-** (Lead wire-type motor cable)	S6-L-P124-** (Front outlet) S6-L-P125-** (Rear outlet) S6-L-P120-** (Lead wire-type motor cable)
MS1H1-10B30CB-A331Z(-S)	40	0.1	Single-phase 220 V		S1R6	00002			
MS1H1-20B30CB-A331Z(-S)	60	0.2	Single-phase 220 V		S1R6	00002			
MS1H1-40B30CB-A331Z(-S)	60	0.4	Single-phase 220 V		S2R8	00003			
MS1H1-55B30CB-A331Z(-S)	80	0.55	Single-phase 220 V	B	S5R5	00005			
MS1H1-75B30CB-A331Z(-S)	80	0.75	Single-phase 220 V		S5R5	00005			
MS1H1-10C30CB-A331Z(-S)	100	1.0	Single-phase/Three-phase 220 V	C	S7R6	00006			

4 Motors with Low Inertia and Small Capacity (MS1H1)

Servo Motor Model	Connector Kit		Absolute Encoder Battery Kit (option)	Servo Drive to PC Communication Cable	Multi-Drive Communication Cable	Servo Drive to PLC Communication Cable
	I/O Connector Kit	Motor Connector				
Ratings of MS1H1 series motors (Vn = 3000 RPM, Vmax = 6000 RPM)						
MS1H1-05B30CB-A330Z(-S)	S6-C6	S6-C26 (Lead wire-type motors) Note: The motor connector is not available in terminal-type motors.	S6-C4	S6-L-T00-3.0	S6-L-T04-0.3	S6-L-T04-3.0
MS1H1-10B30CB-A331Z(-S)						
MS1H1-20B30CB-A331Z(-S)						
MS1H1-40B30CB-A331Z(-S)						
MS1H1-55B30CB-A331Z(-S)						
MS1H1-75B30CB-A331Z(-S)						
MS1H1-10C30CB-A331Z(-S)						



NOTE

- ◆ "***" represents the cable length, which can be 3.0 m, 5.0 m, or 10.0 m.
- ◆ If highly flexible cables are needed (fit for cable carriers), add a suffix "-T" to the end of the cable model number.

4.1.2 220 V Motors with Brake

Servo Motor			Servo Drive (SV660N****I)				Power Cable	23-bit Single-Turn Absolute Encoder Cable	23-bit Multi-Turn Absolute Encoder Cable (Battery options required)
Model	Flange Size	Capacity (kW)	Voltage Class	Size	Model	Code			
Ratings of MS1H1 series motors (Vn = 3000 RPM, Vmax = 6000 RPM)									
MS1H1-05B30CB-A332Z(-S)	40	0.05	Single-phase 220 V	A	S1R6	00002	S6-L-B107-** (Front outlet) S6-L-B108-** (Rear outlet) S6-L-B100-** (Lead wire-type motor cable)	S6-L-P114-** (Front outlet)	S6-L-P124-** (Front outlet)
MS1H1-10B30CB-A332Z(-S)	40	0.1	Single-phase 220 V		S1R6	00002		S6-L-P115-** (Rear outlet)	S6-L-P125-** (Rear outlet)
MS1H1-20B30CB-A334Z(-S)	60	0.2	Single-phase 220 V		S1R6	00002		S6-L-P110-** (Lead wire-type motor cable)	S6-L-P120-** (Lead wire-type motor cable)
MS1H1-40B30CB-A334Z(-S)	60	0.4	Single-phase 220 V		S2R8	00003			
MS1H1-75B30CB-A334Z(-S)	80	0.75	Single-phase 220 V	B	S5R5	00005			

4 Motors with Low Inertia and Small Capacity (MS1H1)

Servo Motor	Connector Kit		Absolute Encoder Battery Kit	Servo Drive to PC Communication Cable	Multi-Drive Communication Cable	Servo Drive to PLC Communication Cable
Model	I/O Connector Kit	Motor Connector				
Ratings of MS1H1 series motors (Vn = 3000 RPM, Vmax = 6000 RPM)						
MS1H1-05B30CB-A332Z(-S)	S6-C6	S6-C26 (Lead wire-type motors) Note: The motor connector is not available in terminal-type motors.	S6-C4	S6-L-T00-3.0	S6-L-T04-0.3	S6-L-T04-3.0
MS1H1-10B30CB-A332Z(-S)						
MS1H1-20B30CB-A334Z(-S)						
MS1H1-40B30CB-A334Z(-S)						
MS1H1-75B30CB-A334Z(-S)						



NOTE

- ◆ "***" represents the cable length, which can be 3.0 m, 5.0 m, or 10.0 m.
- ◆ If highly flexible cables are needed (fit for cable carriers), add a suffix "-T" to the end of the cable model number.

4.2 Motor Specifications

4.2.1 Motor Ratings

Servo Motor Model	Rated Output (kW) ^[1]	Rated Torque (N·m)	Maximum Torque (N·m)	Rated Current (Arms)	Maximum Current (Arms)	Rated Speed (Vn) (RPM)	Maximum Speed (V _{max}) (RPM)	Torque (N·m/Arms)	Moment of Inertia (kg·cm ²)	Voltage (V)
Ratings of MS1H1 series motors (Vn = 3000 RPM, Vmax = 6000 RPM)										
MS1H1-05B30CB	0.05	0.16	0.56	1.3	4.7	3000	6000	0.15	0.026 (0.028)	220
MS1H1-10B30CB	0.1	0.32	1.12	1.3	4.7			0.26	0.041 (0.043)	
MS1H1-20B30CB	0.2	0.64	2.24	1.5	5.8			0.46	0.207 (0.220)	
MS1H1-40B30CB	0.4	1.27	4.46	2.8	10.1			0.53	0.376 (0.390)	
MS1H1-55B30CB	0.55	1.75	6.13	3.8	15.0			0.49	1.06	
MS1H1-75B30CB	0.75	2.39	8.36	4.8	16.9			0.58	1.38 (1.43)	
MS1H1-10C30CB	1.0	3.18	11.1	7.6	28.0			0.46	1.75	

[1] The motor with oil seal must be derated by 10% during use.



NOTE

- ◆ Values inside the parentheses "()" are for the motor with brake.
- ◆ Values in the preceding table are obtained when a motor equipped with the following heatsink is working with an Inovance servo drive with temperature of the armature coil being 20° C.
MS1H1: 250 mm x 250 mm x 6 mm (aluminum)

4.2.2 Allowable Radial and Axial Loads of the Motor

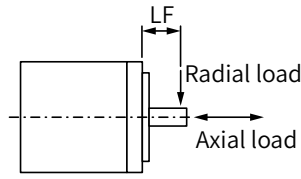


Figure 4-2 Radial and axial loads of the motor

Motor Model	Flange Size (mm)	LF (mm)	Allowable Radial Load (N)	Allowable Axial Load (N)
MS1H1-05B30CB	40	20	78	54
MS1H1-10B30CB	40	20	78	54
MS1H1-20B30CB	60	25	245	74
MS1H1-40B30CB	60	25	245	74
MS1H1-55B30CB	80	35	392	147
MS1H1-75B30CB	80	35	392	147
MS1H1-10C30CB	80	35	392	147

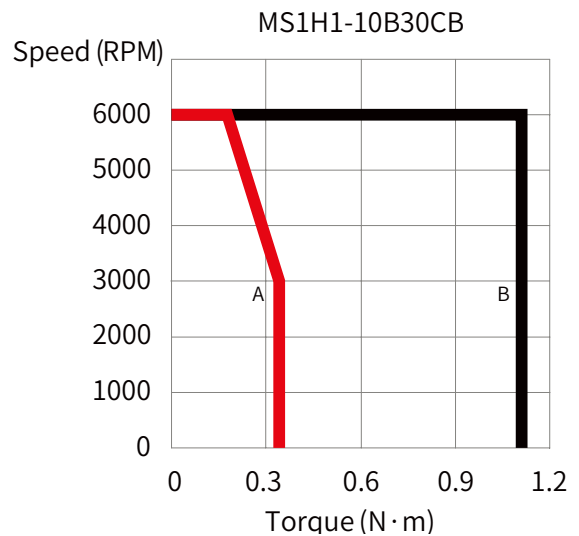
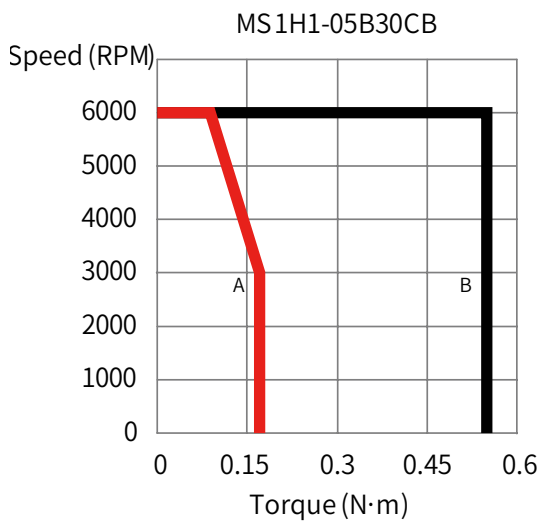
4.2.3 Electrical Specifications of Motors with Brake

Motor Model	Holding Torque (N·m)	Supply Voltage (VDC) ±10%	Coil Resistance (Ω) ±7%	Exciting Current (A)	Release Time (ms)	Apply Time (ms)	Backlash (°)
MS1H1-05B/10B	0.32	24	94.4	0.25	≤ 20	≤ 40	≤ 1.5
MS1H1-20B/40B	1.5		75.79	0.32	≤ 20	≤ 60	≤ 1.5
MS1H1-75B	3.2		57.6	0.42	≤ 40	≤ 60	≤ 1

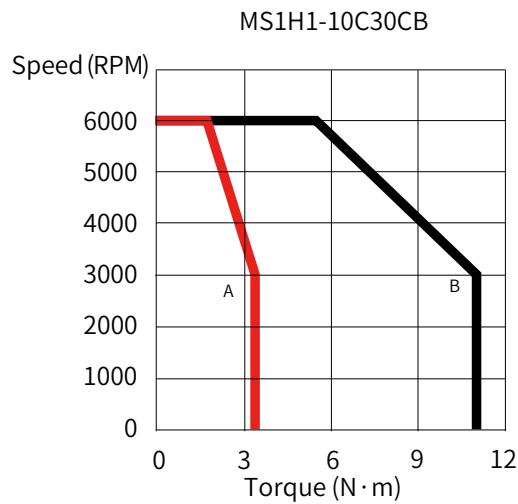
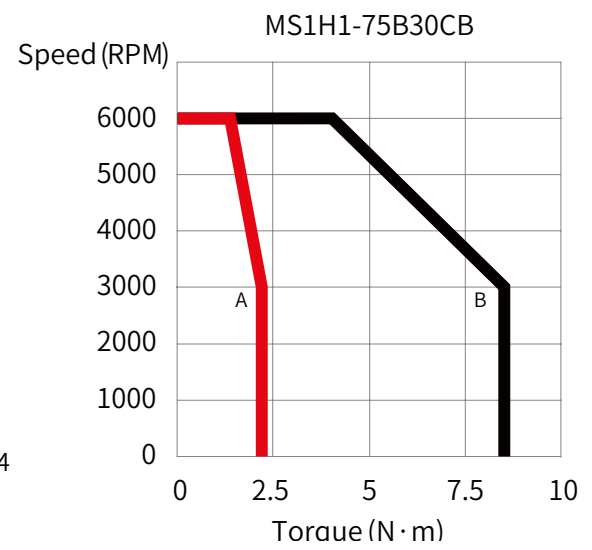
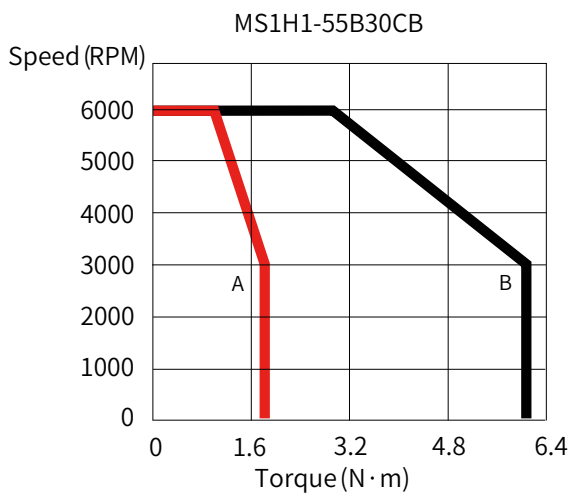
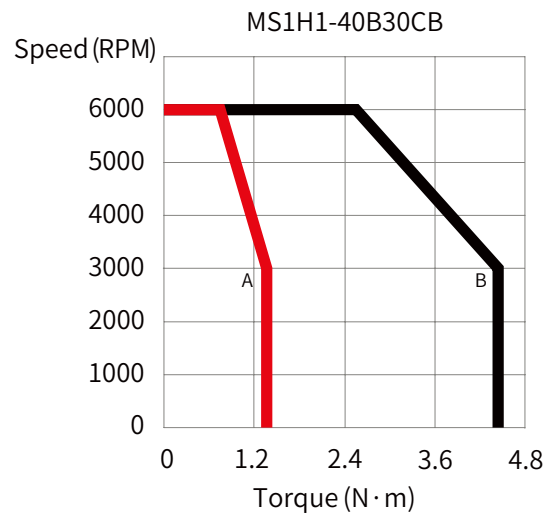
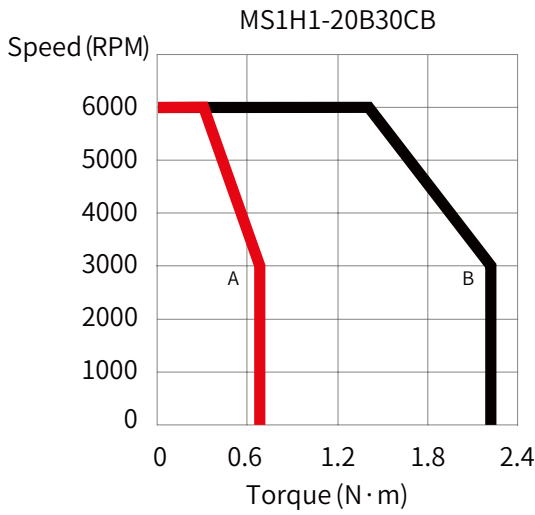
4.2.4 Motor Torque-Speed Characteristics

A █ Continuous duty zone

B █ Intermittent duty zone

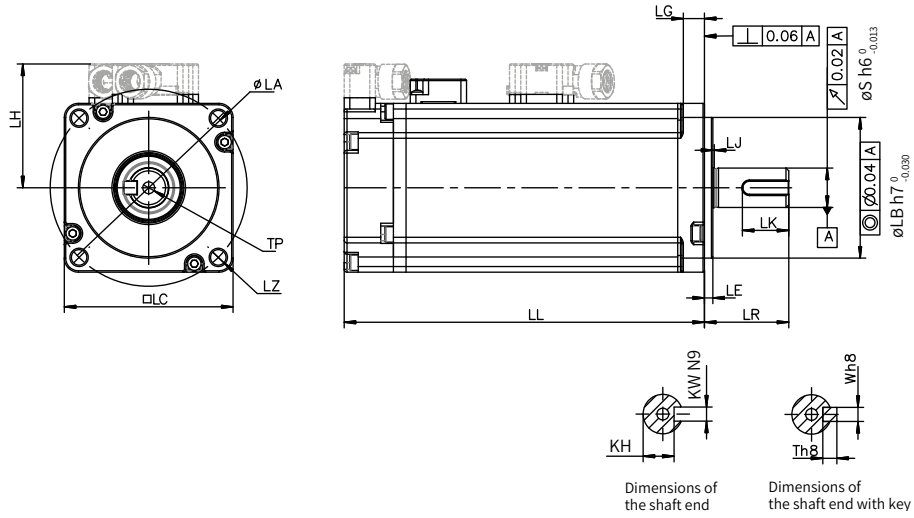


4 Motors with Low Inertia and Small Capacity (MS1H1)

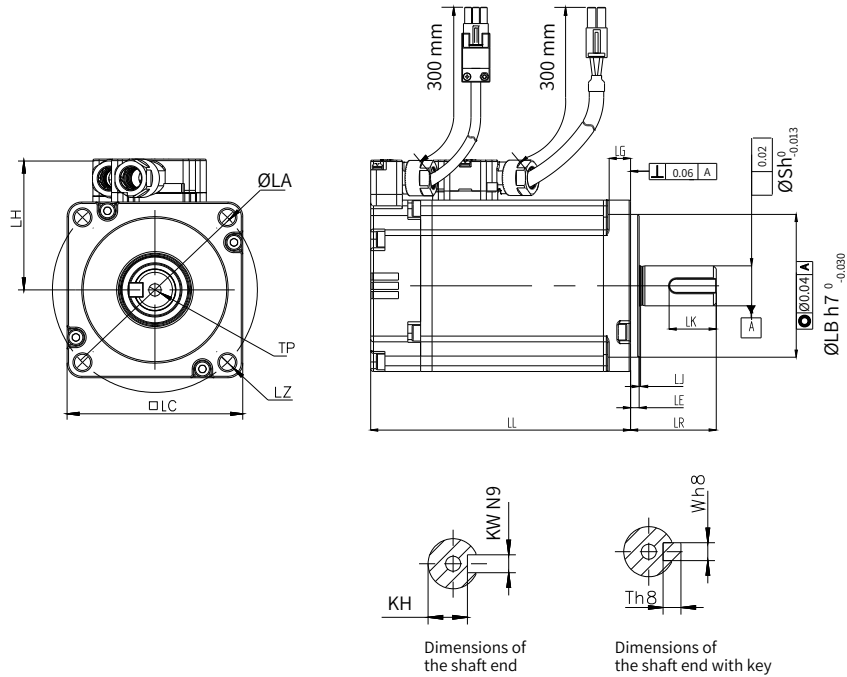


4.2.5 Dimension Drawings of MS1H1 Series Motors

■ Terminal-type motor



■ Lead wire-type motor



Motor Model	LC	LL	LR	LA	LZ	LH	LG	LE	LJ
	Unit: mm (in.)								
MS1H1-05B30CB-A330Z(-S)	40	65 (2.56)	25±0.5	46	2-φ4.5	34	5	2.5±0.5	0.5±0.35
MS1H1-05B30CB-A332Z(-S)	(1.57)	96 (3.78)	(0.98±0.02)	(1.81)	(0.08-φ0.18)	(1.34)	(0.20)	(0.10±0.02)	(0.02±0.01)
MS1H1-10B30CB-A330Z(-S)	40	77.5 (3.05)	25±0.5	46	2-φ4.5	34	5	2.5±0.5	0.5±0.35
MS1H1-10B30CB-A332Z(-S)	(1.57)	109 (4.29)	(0.98±0.02)	(1.81)	(0.08-φ0.18)	(1.34)	(0.20)	(0.10±0.02)	(0.02±0.01)
MS1H1-20B30CB-A331Z(-S)	60	72.5 (2.85)	30±0.5	70	4-φ5.5	44	7.5	3±0.5	0.5±0.35
MS1H1-20B30CB-A334Z(-S)	(2.36)	100 (3.94)	(1.18±0.02)	(2.76)	(0.16-φ0.18)	(1.73)	(0.30)	(0.12±0.02)	(0.02±0.01)

4 Motors with Low Inertia and Small Capacity (MS1H1)

Motor Model	LC	LL	LR	LA	LZ	LH	LG	LE	LJ
	Unit: mm (in.)								
MS1H1-40B30CB-A331Z(-S)	60	91 (3.58)	30±0.5	70	4-φ5.5	44	7.5	3±0.5	0.5±0.35
MS1H1-40B30CB-A334Z(-S)	(2.36)	119 (4.69)	(1.18±0.02)	(2.76)	(0.16-φ0.18)	(1.73)	(0.30)	(0.12±0.02)	(0.02±0.01)
MS1H1-55B30CB-A331Z(-S)	80	96.2	35±0.5	90	4-φ7	54	7.7	3±0.5	0.5±0.35
	(3.15)	(3.79)	(1.38±0.02)	(3.54)	(0.16-φ0.28)	(2.13)	(0.30)	(0.12±0.02)	(0.02±0.01)
MS1H1-75B30CB-A331Z(-S)	80	107 (4.21)	35±0.5	90	4-φ7	54	7.7	3±0.5	0.5±0.35
MS1H1-75B30CB-A334Z(-S)	(3.15)	140 (5.51)	(1.38±0.02)	(3.54)	(0.16-φ0.28)	(2.13)	(0.30)	(0.12±0.02)	(0.02±0.01)
MS1H1-10C30CB-A331Z(-S)	80	118.2	35±0.5	90	4-φ7	54	7.7	3±0.5	0.5±0.35
	(3.15)	(4.65)	(1.38±0.02)	(3.54)	(0.16-φ0.28)	(2.13)	(0.30)	(0.12±0.02)	(0.02±0.01)

Motor Model	S	LB	TP	LK	KH	KW	W	T	Weight
	Unit: mm (in.)								Unit: kg (lb.)
MS1H1-05B30CB-A330Z(-S)	8	30	M3x6	15.5	6.2	3	3	3	0.39 (0.86)
MS1H1-05B30CB-A332Z(-S)	(0.31)	(1.18)	(M3x0.24)	(0.61)	(0.24)	(0.12)	(0.12)	(0.12)	0.50 (1.10)
MS1H1-10B30CB-A330Z(-S)	8	30	M3x6	15.5	6.2	3	3	3	0.45 (0.99)
MS1H1-10B30CB-A332Z(-S)	(0.31)	(1.18)	(M3x0.24)	(0.61)	(0.24)	(0.12)	(0.12)	(0.12)	0.64 (1.41)
MS1H1-20B30CB-A331Z(-S)	14	50	M5x8	16.5	11	5	5	5	0.78 (1.72)
MS1H1-20B30CB-A334Z(-S)	(0.55)	(1.97)	(M3x0.31)	(0.65)	(0.43)	(0.20)	(0.20)	(0.20)	1.16 (2.56)
MS1H1-40B30CB-A331Z(-S)	14	50	M5x8	16.5	11	5	5	5	1.11 (2.45)
MS1H1-40B30CB-A334Z(-S)	(0.55)	(1.97)	(M3x0.31)	(0.65)	(0.43)	(0.20)	(0.20)	(0.20)	1.48 (3.26)
MS1H1-55B30CB-A331Z(-S)	19	70	M6x20	25	15.5	6	6	6	1.85 (4.08)
	(0.75)	(2.76)	(M3x0.79)	(0.98)	(0.61)	(0.24)	(0.24)	(0.24)	
MS1H1-75B30CB-A331Z(-S)	19	70	M6x20	25	15.5	6	6	6	2.18 (4.81)
MS1H1-75B30CB-A334Z(-S)	(0.75)	(2.76)	(M3x0.79)	(0.98)	(0.61)	(0.24)	(0.24)	(0.24)	2.82 (6.22)
MS1H1-10C30CB-A331Z(-S)	19	70	M6x20	25	15.5	6	6	6	2.55 (5.62)
	(0.75)	(2.76)	(M3x0.79)	(0.98)	(0.61)	(0.24)	(0.24)	(0.24)	

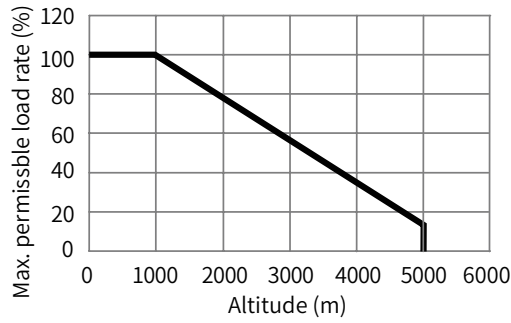


NOTE

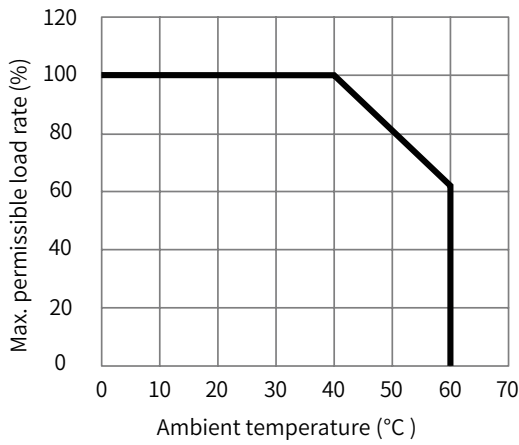
- ◆ Values inside the parentheses "()" are in British units.
- ◆ For dimension drawings of motor models ending with "-S", contact Inovance technical support.
- ◆ Dimension drawings vary with the motor model. The actual dimensions are subject to the physical product.

4.2.6 Derating Curves

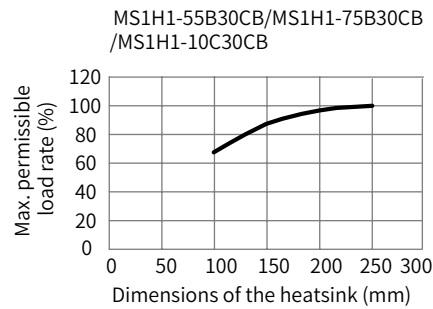
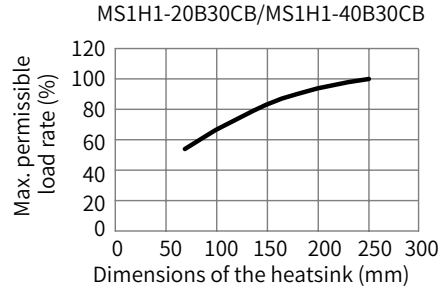
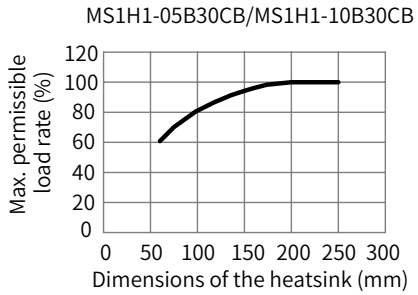
■ Altitude-based derating curve



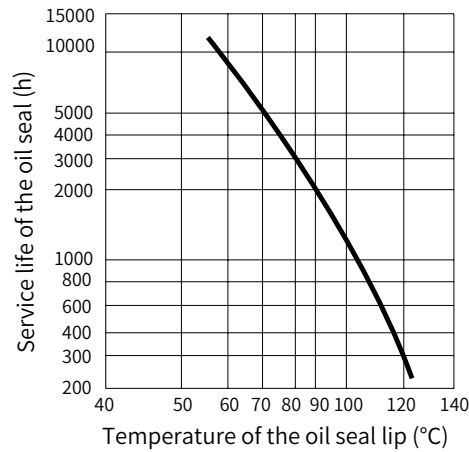
■ Temperature-based derating curve



■ Heatsink-based derating curves



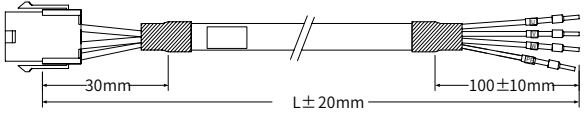
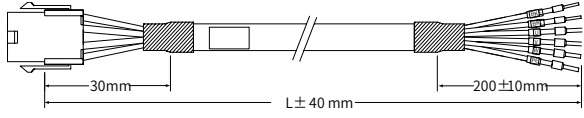
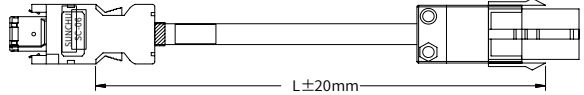
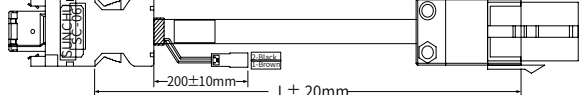
4.2.7 Service Life Curve of the Oil Seal

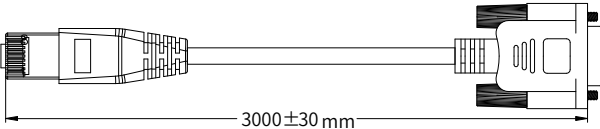
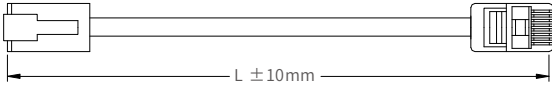
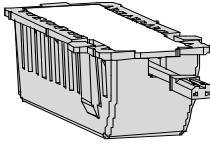
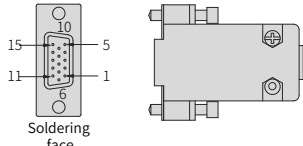
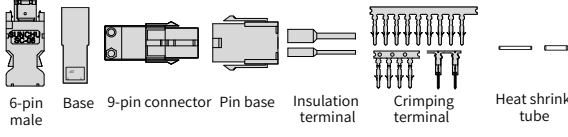


4.3 Selection of Cables and Options

Motor Model	Cable Name		Cable Model	Cable Length (mm)	Dimension Drawing of the Cable
MS1H1 terminal-type motors	Front outlet	Power cable (motor without brake)	S6-L-M107-3.0	3000	
			S6-L-M107-5.0	5000	
			S6-L-M107-10.0	10000	
		Power cable (motor with brake)	S6-L-B107-3.0	3000	
			S6-L-B107-5.0	5000	
			S6-L-B107-10.0	10000	
		Single-turn absolute encoder cable	S6-L-P114-3.0	3000	
			S6-L-P114-5.0	5000	
			S6-L-P114-10.0	10000	
		Multi-turn absolute (A3**Z) encoder cable	S6-L-P124-3.0	3000	
			S6-L-P124-5.0	5000	
			S6-L-P124-10.0	10000	
	Rear outlet	Power cable (motor without brake)	S6-L-M108-3.0	3000	
			S6-L-M108-5.0	5000	
			S6-L-M108-10.0	10000	
		Power cable (motor with brake)	S6-L-B108-3.0	3000	
			S6-L-B108-5.0	5000	
			S6-L-B108-10.0	10000	
		Single-turn absolute encoder cable	S6-L-P115-3.0	3000	
			S6-L-P115-5.0	5000	
			S6-L-P115-10.0	10000	
		Multi-turn absolute (A3**Z) encoder cable	S6-L-P125-3.0	3000	
			S6-L-P125-5.0	5000	
			S6-L-P125-10.0	10000	

4 Motors with Low Inertia and Small Capacity (MS1H1)

Motor Model	Cable Name	Cable Model	Cable Length (mm)	Dimension Drawing of the Cable
MS1H1 lead wire-type motors (-S)	Power cable (motor without brake)	S6-L-M100-3.0	3000	
		S6-L-M100-5.0	5000	
		S6-L-M100-10.0	10000	
	Power cable (motor with brake)	S6-L-B100-3.0	3000	
		S6-L-B100-5.0	5000	
		S6-L-B100-10.0	10000	
	Single-turn absolute encoder cable	S6-L-P110-3.0	3000	
		S6-L-P110-5.0	5000	
		S6-L-P110-10.0	10000	
Multi-turn absolute (A3**Z) encoder cable	S6-L-P120-3.0	3000		
	S6-L-P120-5.0	5000		
	S6-L-P120-10.0	10000		

Cable Name	Cable Model	Cable Length (mm)	Dimension Drawing of the Cable
SV660N servo drive to PC communication cable	S6-L-T00-3.0	3000	
SV660N multi-drive communication cable	S6-L-T04-0.3	300	
SV660N servo drive to host controller communication cable	S6-L-T04-3.0	3000	
Battery kit	S6-C4	-	
SV660N CN1 terminal (DB15)	S6-C6	-	
MS1H1 lead wire-type (Z-S) motor connector	S6-C26	-	

5 Motors with Low Inertia and Medium Capacity (MS1H2)

5.1 Model Selection

5.1.1 220 V/380 V Motors Without Brake

Servo Motor			Servo Drive (SV660N****I)				Power Cable	23-bit Single-Turn Absolute Encoder Cable	23-bit Multi-Turn Absolute Encoder Cable (Battery Options Required)	
Model	Flange Size	Capacity (kW)	Voltage Class	Size	Model	Code				
Ratings of MS1H2 series motors (Vn = 3000 RPM, Vmax = 6000/5000 RPM)										
MS1H2-10C30CB-A331Z	100	1.0	Single-phase/ Three-phase 220 V	C	S7R6	00006	S6-L-M111-**	S6-L-P111-**	S6-L-P121-**	
MS1H2-10C30CD-A331Z	100	1.0	Three-phase 380 V		T5R4	10002				
MS1H2-15C30CB-A331Z	100	1.5	Single-phase/ Three-phase 220 V	D	S012	00007				
MS1H2-15C30CD-A331Z	100	1.5	Three-phase 380 V	C	T5R4	10002				
MS1H2-20C30CD-A331Z	100	2.0	Three-phase 380 V	D	T8R4	10003				
MS1H2-25C30CD-A331Z	100	2.5	Three-phase 380 V		T8R4	10003				
MS1H2-30C30CD-A331Z	130	3.0	Three-phase 380 V	D	T012	10004				
MS1H2-40C30CD-A331Z	130	4.0	Three-phase 380 V	E	T017	10005				S6-L-M011-**
MS1H2-50C30CD-A331Z	130	5.0	Three-phase 380 V	E	T017	10005				

Servo Motor Model	Connector Kit		Absolute Encoder Battery Kit (Optional)	Servo Drive to PC communication cable	Multi-drive communication cable	Servo drive to host controller communication cable
	I/O Connector Kit	Motor Connector				
Ratings of MS1H2 series motors (Vn = 3000 RPM, Vmax = 6000/5000 RPM)						
MS1H2-10C30CB-A331Z	S6-C6	S6-C29	S6-C4	S6-L-T00-3.0	S6-L-T04-0.3	S6-L-T04-3.0
MS1H2-10C30CD-A331Z						
MS1H2-15C30CB-A331Z						
MS1H2-15C30CD-A331Z						
MS1H2-20C30CD-A331Z						
MS1H2-25C30CD-A331Z						
MS1H2-30C30CD-A331Z						
MS1H2-40C30CD-A331Z						
MS1H2-50C30CD-A331Z						

5.1.2 220 V/380 V Motors with Brake

Servo Motor			Servo Drive (SV660N****)				Power Cable	23-bit Single-Turn Absolute Encoder Cable	23-bit Multi-Turn Absolute Encoder Cable (Battery Options Required)	
Model	Flange Size	Capacity (kW)	Voltage Class	Size	Model	Code				
Ratings of MS1H2 series motors (Vn = 3000 RPM, Vmax = 6000/5000 RPM)										
MS1H2-10C30CB-A334Z	100	1.0	Single-phase/ Three-phase 220 V	C	S7R6	00006	S6-L-B111-**	S6-L-P111-**	S6-L-P121-**	
MS1H2-10C30CD-A334Z	100	1.0	Three-phase 380 V		T5R4	10002				
MS1H2-15C30CB-A334Z	100	1.5	Three-phase 220 V	D	S012	00007				
MS1H2-15C30CD-A334Z	100	1.5	Three-phase 380 V	C	T5R4	10002				
MS1H2-20C30CD-A334Z(-S4)	100	2.0	Three-phase 380 V	D	T8R4	10003				
MS1H2-25C30CD-A334Z(-S4)	100	2.5	Three-phase 380 V		T8R4	10003				
MS1H2-30C30CD-A334Z(-S4)	130	3.0	Three-phase 380 V	D	T012	10004				
MS1H2-40C30CD-A334Z(-S4)	130	4.0	Three-phase 380 V	E	T017	10005				S6-L-B011-**
MS1H2-50C30CD-A334Z(-S4)	130	5.0	Three-phase 380 V	E	T017	10005				

Servo Motor Model	Connector Kit		Absolute Encoder Battery Kit	Servo drive to PC Communication Cable	Multi-drive Communication Cable	Servo Drive to Host Controller Communication Cable
	I/O Connector Kit	Motor Connector				
MS1H2-10C30CB-A334Z	S6-C6	S6-C29	S6-C4	S6-L-T00-3.0	S6-L-T04-0.3	S6-L-T04-3.0
MS1H2-10C30CD-A334Z						
MS1H2-15C30CB-A334Z						
MS1H2-15C30CD-A334Z						
MS1H2-20C30CD-A334Z(-S4)						
MS1H2-25C30CD-A334Z(-S4)						
MS1H2-30C30CD-A334Z(-S4)						
MS1H2-40C30CD-A334Z(-S4)						
MS1H2-50C30CD-A334Z(-S4)						



NOTE

- ◆ "****" represents the cable length, which can be 3.0 m, 5.0 m, or 10.0 m.
- ◆ If highly flexible cables are needed (fit for cable carriers), add a suffix "-T" to the end of the cable model number.
- ◆ Motor models ending with "-S4" represents the duty type S4, indicating the motor works in S4 duty, with the motor load rate not exceeding 70%.

5.2 Motor Specifications

5.2.1 Motor Ratings

Servo Motor Model	Rated Output (kW) ^[1]	Rated Torque (N·m)	Maximum Torque (N·m)	Rated Current (Arms)	Maximum Current (Arms)	Rated Speed (Vn) (RPM)	Maximum Speed (V _{max}) (RPM)	Torque (N·m/Arms)	Moment of Inertia (kg·cm ²)	Voltage (V)
Ratings of MS1H2 series motors (Vn = 3000 RPM, Vmax = 6000/5000 RPM)										
MS1H2-10C30CB	1.0	3.18	9.54	7.5	23.00	3000	6000	0.47	1.87 (3.12)	220
MS1H2-15C30CB	1.5	4.90	14.7	10.8	32.00		5000	0.54	2.46 (3.71)	
MS1H2-10C30CD	1.0	3.18	9.54	3.65	11.00		6000	0.89	1.87 (3.12)	380
MS1H2-15C30CD	1.5	4.90	14.7	4.50	14.00		5000	1.07	2.46 (3.71)	
MS1H2-20C30CD	2.0	6.36	19.1	5.89	20.00		5000	1.19	3.06 (4.31)	380
MS1H2-25C30CD	2.5	7.96	23.9	7.56	25.00			1.20	3.65 (4.90)	
MS1H2-30C30CD	3.0	9.8	29.4	10.00	30.00			1.20	7.72 (10.22)	
MS1H2-40C30CD	4.0	12.6	37.8	13.60	40.80			1.12	12.1 (14.6)	
MS1H2-50C30CD	5.0	15.8	47.4	16.00	48.00			1.29	15.4 (17.9)	

[1] The motor with oil seal must be derated by 10% during use.



NOTE

- ◆ Values inside the parentheses "()" are for the motor with brake.
- ◆ Values in the preceding table are obtained when a motor equipped with the following heatsink is working with an Inovance servo drive with temperature of the armature coil being 20° C.
MS1H2-10C to 25C: 300 mm x 300 mm x 12 mm (aluminum)
MS1H2-30C to 50C: 400 mm x 400 mm x 20 mm (aluminum)

5.2.2 Allowable Radial and Axial Loads of the Motor

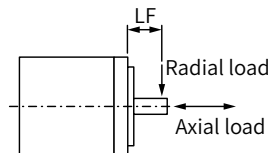


Figure 5-3 Radial and axial loads of the motor

Motor Model	Flange Size (mm)	LF (mm)	Allowable Radial Load (N)	Allowable Axial Load (N)
MS1H2-10C30CB	100	45	686	196
MS1H2-10C30CD	100	45	686	196
MS1H2-15C30CB	100	45	686	196
MS1H2-15C30CD	100	45	686	196
MS1H2-20C30CD	100	45	686	196

Motor Model	Flange Size (mm)	LF (mm)	Allowable Radial Load (N)	Allowable Axial Load (N)
MS1H2-25C30CD	100	45	686	196
MS1H2-30C30CD	130	63	980	392
MS1H2-40C30CD	130	63	1176	392
MS1H2-50C30CD	130	63	1176	392

5.2.3 Electrical Specifications of Motors with Brake

Motor Model	Holding Torque (N·m)	Supply Voltage (VDC)±10%	Coil Resistance (Ω)±7%	Exciting Current (A)	Release Time (ms)	Apply Time (ms)	Backlash (°)
MS1H2-10C/15C/20C/25C	8	24	25	0.96	≤ 30	≤ 85	≤ 0.5
MS1H2-30C/40C/50C	16		21.3	1.13	≤ 60	≤ 100	≤ 0.5



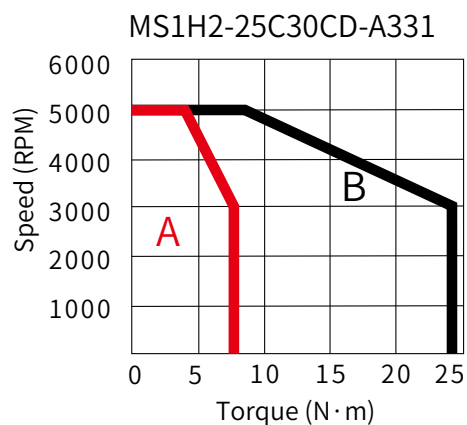
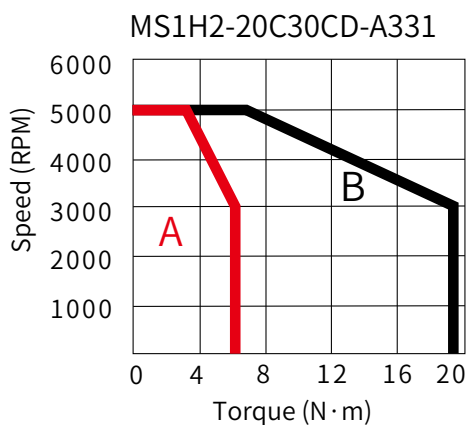
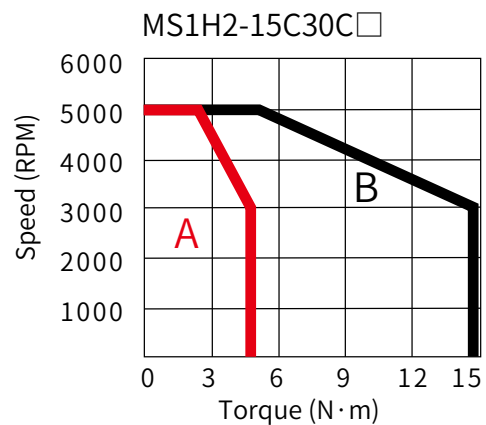
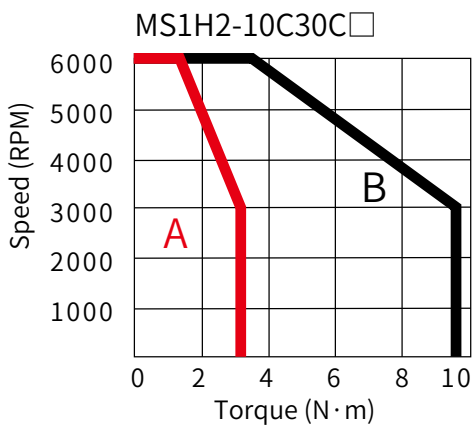
NOTE

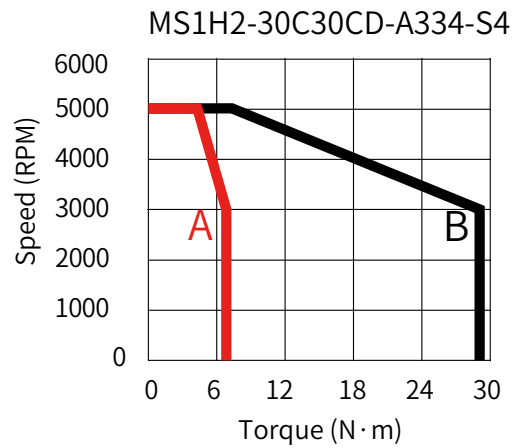
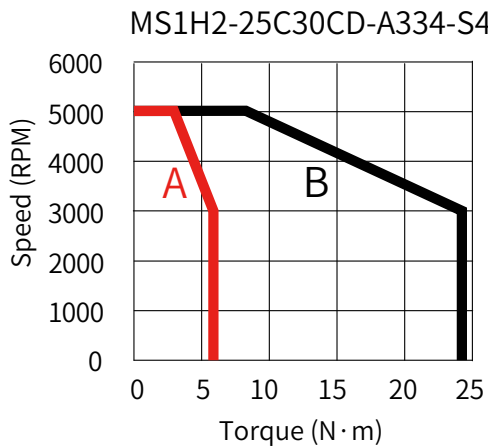
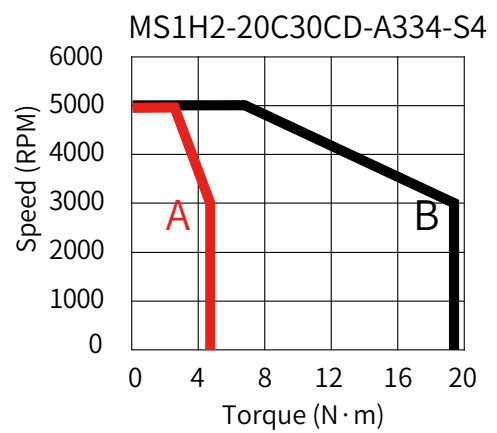
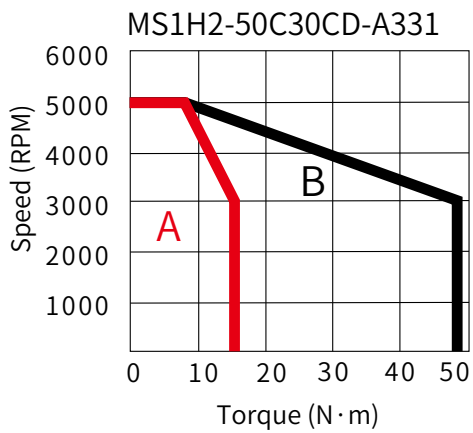
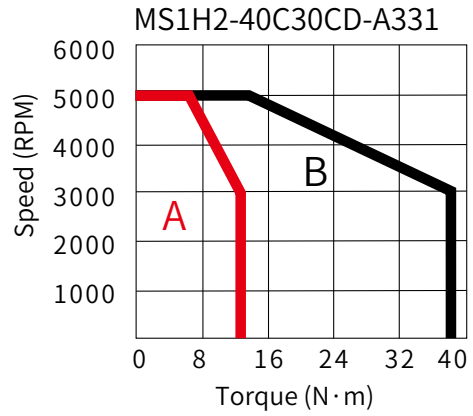
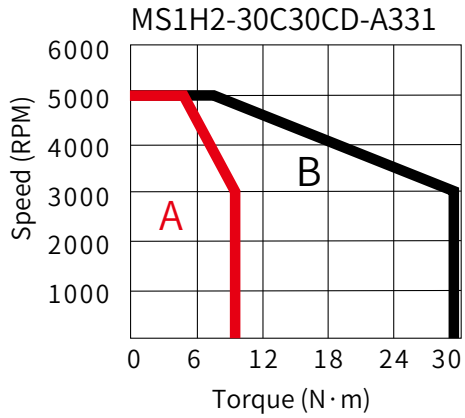
- ◆ The brake cannot share the same power supply with other electrical devices. This is to prevent malfunction of the brake due to voltage or current drop caused by other working devices.
- ◆ It is recommended to use cables with a cross-sectional area of 0.5 mm² and above.

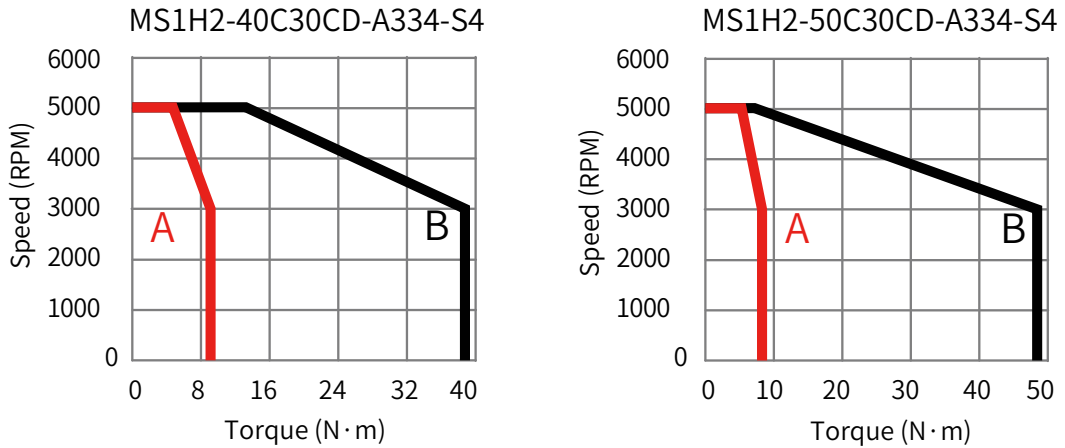
5.2.4 Motor Torque-Speed Characteristics

A █ Continuous duty zone

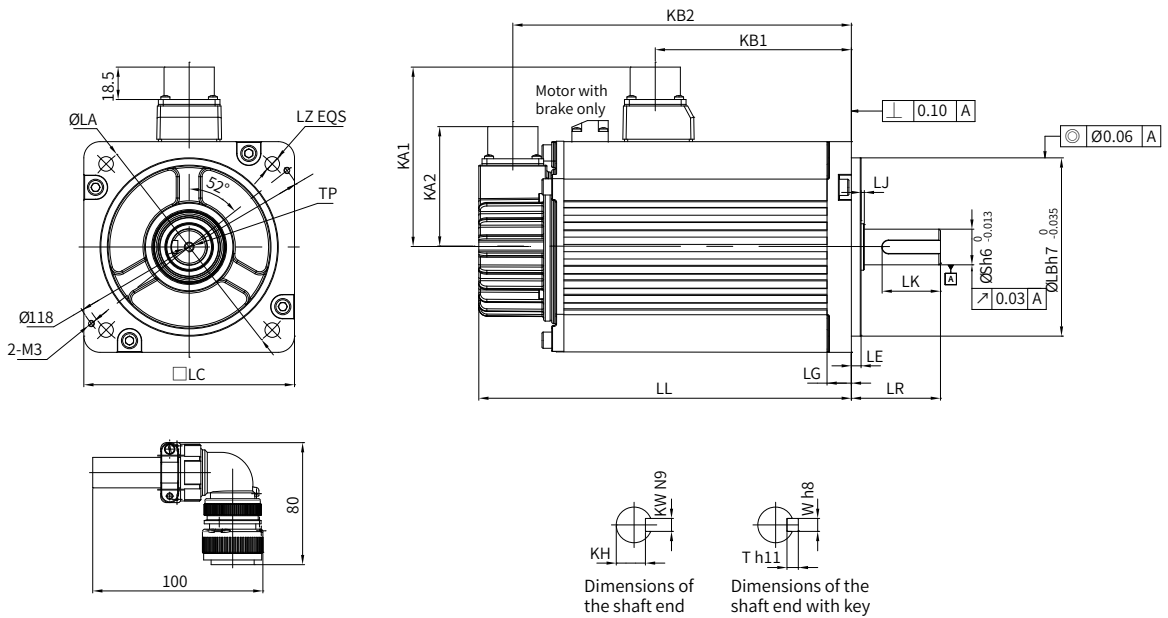
B █ Intermittent duty zone







5.2.5 Dimension Drawing of MS1H2 Series Motors



Motor Model	LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE	LJ	LB
	Unit: mm (in.)												
MS1H2-10C30CB(D)-A331Z	100 (3.94)	164 (6.46)	45±1 (1.77±0.04)	115 (4.53)	4-φ7 (0.16-φ0.28)	88 (3.46)	94.5 (3.72)	74 (2.91)	143.5 (5.65)	10 (0.39)	5±0.3 (0.20±0.01)	2.5±0.75 (0.10±0.03)	95 (3.74)
MS1H2-10C30CB(D)-A334Z		213.5 (8.41)					101 (3.98)		192.5 (5.65)				
MS1H2-15C30CB(D)-A331Z	100 (3.94)	189 (7.44)	45±1 (1.77±0.04)	115 (4.53)	4-φ7 (0.16-φ0.28)	88 (3.46)	119.5 (4.70)	74 (2.91)	168.5 (6.63)	10 (0.39)	5±0.3 (0.20±0.01)	2.5±0.75 (0.10±0.03)	95 (3.74)
MS1H2-15C30CB(D)-A334Z		239 (9.41)					128 (5.04)		219.5 (8.64)				

5 Motors with Low Inertia and Medium Capacity (MS1H2)

Motor Model	LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE	LJ	LB
	Unit: mm (in.)												
MS1H2-20C30CD-A331Z	100 (3.94)	214 (8.43)	45±1 (1.77±0.04)	115 (4.53)	4-φ7 (0.16-φ0.28)	88 (3.46)	144.5 (5.69)	74 (2.91)	193.5 (7.62)	10 (0.39)	5±0.3 (0.20±0.01)	2.5±0.75 (0.10±0.03)	95 (3.74)
MS1H2-20C30CD-A334Z(-S4)		265 (10.43)					153 (6.02)		244 (9.61)				
MS1H2-25C30CD-A331Z	100 (3.94)	240.5 (9.47)	45±1 (1.77±0.04)	115 (4.53)	4-φ7 (0.16-φ0.28)	88 (3.46)	169.5 (6.67)	74 (2.91)	218.5 (8.60)	10 (0.39)	5±0.3 (0.20±0.01)	2.5±0.75 (0.10±0.03)	95 (3.74)
MS1H2-25C30CD-A334Z(-S4)		290 (11.42)					178 (7.01)		269 (10.59)				
MS1H2-30C30CD-A331Z	130 (5.12)	209.5 (8.25)	63±1 (2.48±0.04)	145 (5.71)	4-φ9 (0.16-φ0.35)	103 (4.06)	136 (5.35)	74 (2.91)	188.5 (7.42)	14 (0.55)	6±0.3 (0.24±0.01)	0.5±0.75 (0.10±0.03)	110 (4.33)
MS1H2-30C30CD-A334Z(-S4)		265.5 (10.45)					139 (5.47)		244.5 (9.63)				
MS1H2-40C30CD-A331Z	130 (5.12)	252 (9.92)	63±1 (2.48±0.04)	145 (5.71)	4-φ9 (0.16-φ0.35)	103 (4.06)	178.5 (7.03)	74 (2.91)	231 (9.09)	14 (0.55)	6±0.3 (0.24±0.01)	0.5±0.75 (0.10±0.03)	110 (4.33)
MS1H2-40C30CD-A334Z(-S4)		308 (12.13)					181.5 (7.15)		287 (11.30)				
MS1H2-50C30CD-A331Z	130 (5.12)	294.5 (11.59)	63±1 (2.48±0.04)	145 (5.71)	4-φ9 (0.16-φ0.35)	103 (4.06)	221 (8.70)	74 (2.91)	273.5 (10.77)	14 (0.55)	6±0.3 (0.24±0.01)	0.5±0.75 (0.10±0.03)	110 (4.33)
MS1H2-50C30CD-A334Z(-S4)		350.5 (13.80)					224 (8.82)		329.5 (12.97)				

Motor Model	S	TP	LK	KH	KW	W	T	Weight	Connector Model	Power Side (Power Brake Side Included)	Encoder Side
	Unit: mm (in.)							Unit: kg (lb.)			
MS1H2-10C30CB(D)-A331Z	24 (0.94)	M8x16 (M8x0.63)	36 (1.42)	20 ⁰ _{-0.2} (0.79 ⁰ _{-0.01})	8 (0.31)	8 (0.31)	7 (0.28)	5.11 (11.27)	Aviation connector	MI-DTL-5015 series 3102E20-18P	MI-DTL-5015 series 3102E20-29P
MS1H2-10C30CB(D)-A334Z								6.41 (14.13)			
MS1H2-15C30CB(D)-A331Z	24 (0.94)	M8x16 (M8x0.63)	36 (1.42)	20 ⁰ _{-0.2} (0.79 ⁰ _{-0.01})	8 (0.31)	8 (0.31)	7 (0.28)	6.22 (13.71)			
MS1H2-15C30CB(D)-A334Z								7.52 (16.58)			
MS1H2-20C30CD-A331Z	24 (0.94)	M8x16 (M8x0.63)	36 (1.42)	20 ⁰ _{-0.2} (0.79 ⁰ _{-0.01})	8 (0.31)	8 (0.31)	7 (0.28)	7.39 (16.29)			
MS1H2-20C30CD-A334Z(-S4)								8.7 (19.18)			
MS1H2-25C30CD-A331Z	24 (0.94)	M8x16 (M8x0.63)	36 (1.42)	20 ⁰ _{-0.2} (0.79 ⁰ _{-0.01})	8 (0.31)	8 (0.31)	7 (0.28)	8.55 (18.85)			
MS1H2-25C30CD-A334Z(-S4)								9.8 (21.61)			

Motor Model	S	TP	LK	KH	KW	W	T	Weight	Connector Model	Power Side (Power Brake Side Included)	Encoder Side
	Unit: mm (in.)							Unit: kg (lb.)			
MS1H2-30C30CD-A331Z	28 (1.10)	M8x20 (M8x0.79)	54 (2.13)	24 ⁰ _{-0.2} (0.94 ⁰ _{-0.01})	8 (0.31)	8 (0.31)	7 (0.28)	10.73 (23.66)	Aviation connector	MI-DTL-5015 series 3102E20-18P	MI-DTL-5015 series 3102E20-29P
MS1H2-30C30CD-A334Z(-S4)								13.2 (29.10)			
MS1H2-40C30CD-A331Z	28 (1.10)	M8x20 (M8x0.79)	54 (2.13)	24 ⁰ _{-0.2} (0.94 ⁰ _{-0.01})	8 (0.31)	8 (0.31)	7 (0.28)	15.43 (34.02)			
MS1H2-40C30CD-A334Z(-S4)								17.9 (39.46)			
MS1H2-50C30CD-A331Z	28 (1.10)	M8x20 (M8x0.79)	54 (2.13)	24 ⁰ _{-0.2} (0.94 ⁰ _{-0.01})	8 (0.31)	8 (0.31)	7 (0.28)	16.2 (35.71)			
MS1H2-50C30CD-A334Z(-S4)								18.7 (41.23)			

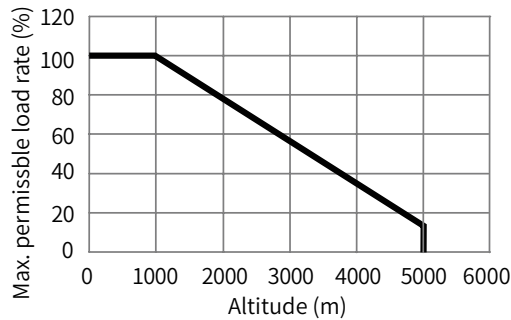


NOTE

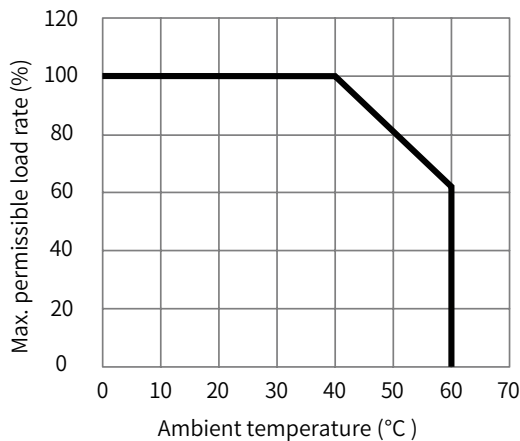
- ◆ Values inside the parentheses "(")" are in British units.
- ◆ Motor models ending with "-S4" represents the duty type S4, indicating the motor works in S4 duty, with the motor load rate not exceeding 70%.
- ◆ Dimension drawings vary with the motor model. The actual dimensions are subject to the physical product.

5.2.6 Derating Curves

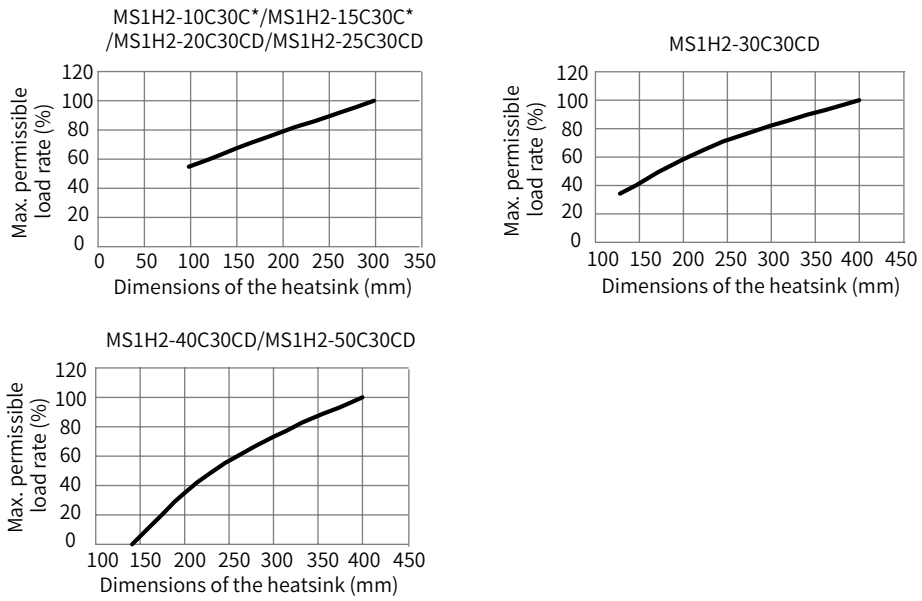
■ Altitude-based derating curve



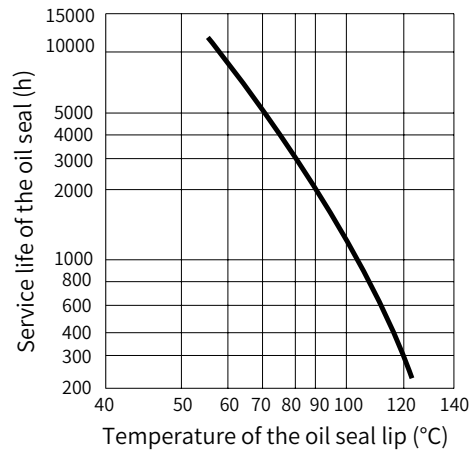
■ Temperature-based derating curve



■ Heatsink-based derating curves



5.2.7 Service Life Curve of the Oil Seal



5.3 Selection of Cables and Options

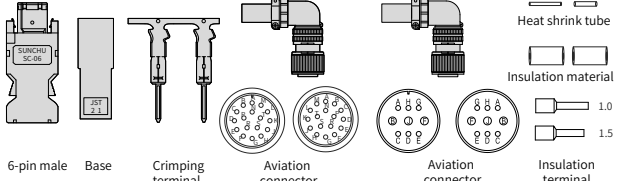
Motor Model	Cable Name	Cable Model	Cable Length (mm)	Dimension Drawing of the Cable
MS1H2 Motors	Single-turn absolute encoder cable	S6-L-P111-3.0	3000	
		S6-L-P111-5.0	5000	
		S6-L-P111-10.0	10000	
	Multi-turn absolute encoder cable	S6-L-P121-3.0	3000	
		S6-L-P121-5.0	5000	
		S6-L-P121-10.0	10000	

5 Motors with Low Inertia and Medium Capacity (MS1H2)

Motor Model	Cable Name	Cable Model	Cable Length (mm)	Dimension Drawing of the Cable
MS1H2 motors (3 kW and below)	Power cable (motor without brake)	S6-L-M111-3.0	3000	
		S6-L-M111-5.0	5000	
		S6-L-M111-10.0	10000	
	Power cable (motor with brake)	S6-L-B111-3.0	3000	
		S6-L-B111-5.0	5000	
		S6-L-B111-10.0	10000	
MS1H2 motors (4 kW/5 kW)	Power cable (motor without brake)	S6-L-M011-3.0	3000	
		S6-L-M011-5.0	5000	
		S6-L-M011-10.0	10000	
	Power cable (motor with brake)	S6-L-B011-3.0	3000	
		S6-L-B011-5.0	5000	
		S6-L-B011-10.0	10000	

Cable Name	Cable Model	Cable Length (mm)	Dimension Drawing of the Cable
SV660N servo drive to PC communication cable	S6-L-T00-3.0	3000	
SV660N multi-drive communication cable	S6-L-T04-0.3	300	
SV660N servo drive to host controller communication cable	S6-L-T04-3.0	3000	
Battery kit	S6-C4	-	
SV660N CN1 terminal (DB15)	S6-C6	-	

5 Motors with Low Inertia and Medium Capacity (MS1H2)

Cable Name	Cable Model	Cable Length (mm)	Dimension Drawing of the Cable
MS1H2 Motor Connector	S6-C29	-	 <p>The dimension drawing illustrates the assembly of the MS1H2 Motor Connector. It includes the following components and their labels:</p> <ul style="list-style-type: none"> 6-pin male: A connector housing with six pins, labeled 'SUNICAW SC-402'. Base: A rectangular component labeled 'JST 2.1'. Crimping terminal: A terminal with a crimping tool. Aviation connector: Two circular connectors, one labeled 'A' and one labeled 'E'. Heat shrink tube: A tube used for insulation. Insulation material: Two rectangular pieces of material. Insulation terminal: Two terminals labeled '1.0' and '1.5'.

6 Motors with Medium Inertia and Medium Capacity (MS1H3)

6.1 Model Selection

6.1.1 220 V/380 V Motors Without Brake

Servo Motor			Servo Drive (SV660N****I)				Power Cable	23-bit Single-Turn Absolute Encoder Cable	23-bit Multi-Turn Absolute Encoder Cable (Battery Options Required)	
Model	Flange Size	Capacity (kW)	Voltage Class	Size	Model	Code				
Ratings of MS1H3 series motors (Vn = 1500 RPM, Vmax = 3000 RPM)										
MS1H3-85B15CB-A331Z	130	0.85	Single-phase/ Three-phase 220 V	C	S7R6	00006	S6-L-M111-**	S6-L-P111-**	S6-L-P121-**	
MS1H3-85B15CD-A331Z	30	0.855	380 V	C	T3R5	10001				
MS1H3-13C15CB-A331Z	130	1.3	Single-phase/ Three-phase 220 V	D	S012	00007				
MS1H3-13C15CD-A331Z	130	1.3	380 V	C	T5R4	10002				
MS1H3-18C15CD-A331Z	130	1.8	380 V	D	T8R4	10003				
MS1H3-29C15CD-A331Z	180	2.9	380 V		T012	10004				
MS1H3-44C15CD-A331Z	180	4.4	380 V	E	T017	10005				S6-L-M022-**
MS1H3-55C15CD-A331Z	180	5.5	380 V	E	T021	10006				
MS1H3-75C15CD-A331Z	180	7.5	380 V	E	T026	10007				

6 Motors with Medium Inertia and Medium Capacity (MS1H3)

Servo Motor Model	Connector Kit		Absolute Encoder Battery Kit	Servo Drive to PC Communication Cable	Multi-drive Communication Cable	Servo Drive to Host Controller Communication Cable
	I/O Connector Kit	Motor Connector				
Ratings of MS1H3 series motors (Vn = 1500 RPM, Vmax = 3000 RPM)						
MS1H3-85B15CB-A331Z	S6-C6	S6-C29 (1.8 kW and below) S6-C39 (2.9 kW and above)	S6-C4	S6-L-T00-3.0	S6-L-T04-0.3	S6-L-T04-3.0
MS1H3-85B15CD-A331Z						
MS1H3-13C15CB-A331Z						
MS1H3-13C15CD-A331Z						
MS1H3-18C15CD-A331Z						
MS1H3-29C15CD-A331Z						
MS1H3-44C15CD-A331Z						
MS1H3-55C15CD-A331Z						
MS1H3-75C15CD-A331Z						



NOTE

- ◆ "***" represents the cable length, which can be 3.0 m, 5.0 m, or 10.0 m.
- ◆ If highly flexible cables are needed (fit for cable carriers), add a suffix "-T" to the end of the cable model number.

6.1.2 220 V/380 V Motors with Brake

Servo Motor			Servo Drive (SV660N****I)				Power Cable	23-bit Single-Turn Absolute Encoder Cable	23-bit Multi-Turn Absolute Encoder Cable (Battery Options Required)	
Model	Flange Size	Capacity (kW)	Voltage Class	Size	Model	Code				
Ratings of MS1H3 series motors (Vn = 1500 RPM, Vmax = 3000 RPM)										
MS1H3-85B15CB-A334Z	130	0.85	Single-phase/ Three-phase 220 V	C	S7R6	00006	S6-L-B111-**	S6-L-P111-**	S6-L-P121-**	
MS1H3-85B15CD-A334Z	30	0.855	380 V	C	T3R5	10001				
MS1H3-13C15CB-A334Z	130	1.3	Single-phase/ Three-phase 220 V	D	S012	00007				
MS1H3-13C15CD-A334Z	130	1.3	380 V	C	T5R4	10002				
MS1H3-18C15CD-A334Z	130	1.8	380 V	D	T8R4	10003				
MS1H3-29C15CD-A334Z	180	2.9	380 V		T012	10004				
MS1H3-44C15CD-A334Z	180	4.4	380 V	E	T017	10005				S6-L-B022-**
MS1H3-55C15CD-A334Z	180	5.5	380 V	E	T021	10006				
MS1H3-75C15CD-A334Z	180	7.5	380 V	E	T026	10007				

6 Motors with Medium Inertia and Medium Capacity (MS1H3)

Motor Model	Connector Kit		Absolute Encoder Battery Kit	Servo drive to PC Communication Cable	Multi-drive Communication Cable	Servo drive to Host Controller Communication Cable
	I/O Connector Kit	Motor Connector				
Ratings of MS1H3 series motors ($V_n = 1500$ RPM, $V_{max} = 3000$ RPM)						
MS1H3-85B15CB-A334Z	S6-C6	S6-C29 (1.8 kW and below)	S6-C4	S6-L-T00-3.0	S6-L-T04-0.3	S6-L-T04-3.0
MS1H3-85B15CD-A334Z						
MS1H3-13C15CB-A334Z						
MS1H3-13C15CD-A334Z						
MS1H3-18C15CD-A334Z		S6-C39 (2.9 kW and above)				
MS1H3-29C15CD-A334Z						
MS1H3-44C15CD-A334Z						
MS1H3-55C15CD-A334Z						
MS1H3-75C15CD-A334Z						



NOTE

- ◆ "***" represents the cable length, which can be 3.0 m, 5.0 m, or 10.0 m.
- ◆ If highly flexible cables are needed (fit for cable carriers), add a suffix "-T" to the end of the cable model number.

6.2 Motor Specifications

6.2.1 Motor Ratings

Motor Model	Rated Output (kW) ^[1]	Rated Torque (N·m)	Maximum Torque (N·m)	Rated Current (Arms)	Maximum Current (Arms)	Rated Speed (V_n) (RPM)	Maximum Speed (V_{max}) (RPM)	Torque (N·m/Arms)	Moment of Inertia (kg·cm ²)	Voltage (V)
Ratings of MS1H3 series motors ($V_n = 1500$ RPM, $V_{max} = 3000$ RPM)										
MS1H3-85B15CB	0.85	5.39	13.5	6.60	16.50	1500	3000	0.95	13.3 (14)	220
MS1H3-13C15CB	1.3	8.34	20.85	10.00	25.00			0.95	17.8 (18.5)	
MS1H3-85B15CD	0.85	5.39	13.5	3.30	8.25			1.87	13.3 (14)	380
MS1H3-13C15CD	1.3	8.34	20.85	5.00	12.50			1.87	17.8 (18.5)	
MS1H3-18C15CD	1.8	11.5	28.75	6.60	16.50			1.87	25 (25.7)	380
MS1H3-29C15CD	2.9	18.6	46.5	11.90	29.75			1.82	55 (57.2)	
MS1H3-44C15CD	4.4	28.4	71.1	16.50	40.50			1.90	88.9 (90.8)	
MS1H3-55C15CD	5.5	35.0	87.6	20.85	52.00			1.74	107 (109.5)	
MS1H3-75C15CD	7.5	48.0	119	25.70	65.00			1.99	141 (143.1)	

[1] The motor with oil seal must be derated by 10% during use.



NOTE

- ◆ Values inside the parentheses "(")" are for the motor with brake.
- ◆ Values in the preceding table are obtained when a motor equipped with the following heatsink is working with an Inovance servo drive with temperature of the armature coil being 20° C.
MS1H3-85B to 18C: 400 mm x 400 mm x 20 mm (iron)
MS1H3-29C to 75C: 360 mm x 360 mm x 25 mm (double aluminum plate)

6.2.2 Allowable Radial and Axial Loads of the Motor

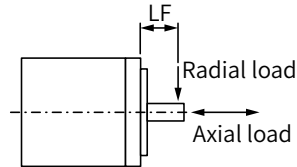


Figure 6-4 Radial and axial loads of the motor

Motor Model	Flange Size (mm)	LF (mm)	Allowable Radial Load (N)	Allowable Axial Load (N)
MS1H3-85B15CB	130	45	686	196
MS1H3-13C15CB	130	45	686	196
MS1H3-85B15CD	130	45	686	196
MS1H3-13C15CD	130	45	686	196
MS1H3-18C15CD	130	45	686	196
MS1H3-29C15CD	180	79	1470	490
MS1H3-44C15CD	180	79	1470	490
MS1H3-55C15CD	180	113	1764	588
MS1H3-75C15CD	180	113	1764	588

6.2.3 Electrical Specifications of Motors with Brake

Motor Model	Holding Torque (N·m)	Supply Voltage (VDC) ±10%	Coil Resistance (Ω) ±7%	Exciting Current (A)	Release Time (ms)	Apply Time (ms)	Backlash (°)
MS1H3-85B/13C/18C	12	24	29.7	0.81	≤ 60	≤ 120	≤ 0.5
MS1H3-29C/44C/55C/75C	50		14.4	1.67	≤ 100	≤ 200	≤ 0.5



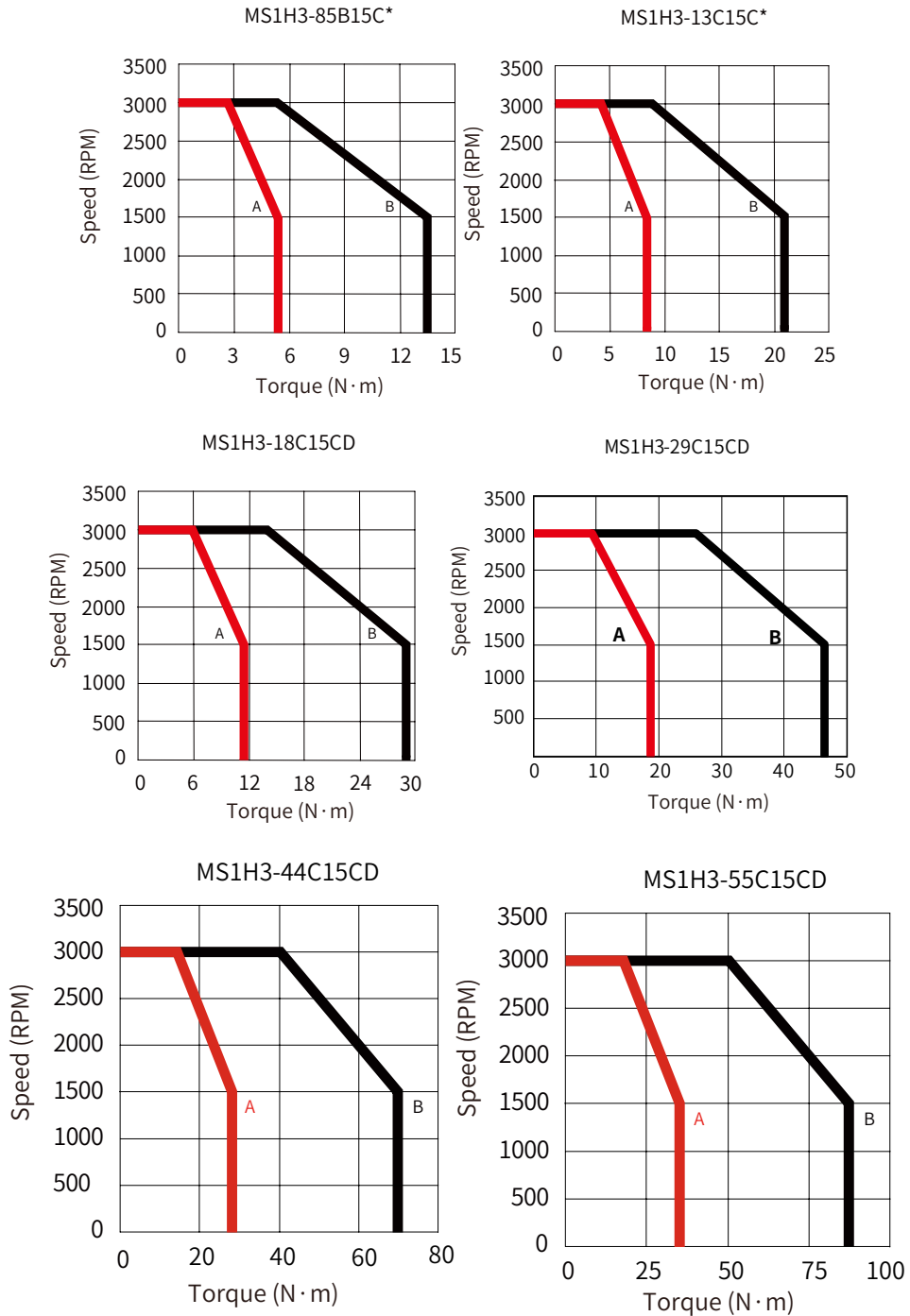
NOTE

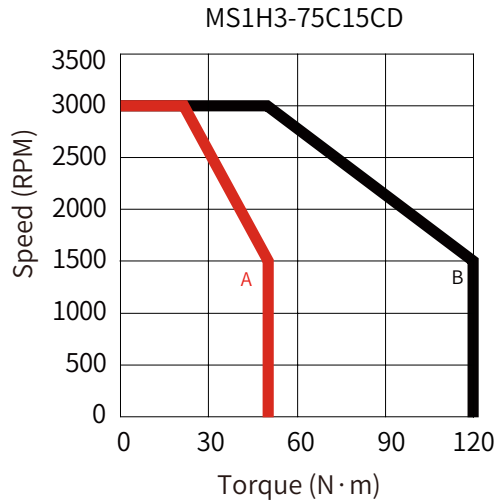
- ◆ The brake cannot share the same power supply with other electrical devices. This is to prevent malfunction of the brake due to voltage or current drop caused by other working devices.
- ◆ It is recommended to use cables with a cross-sectional area of 0.5 mm² and above.

6.2.4 Motor Torque-Speed Characteristics

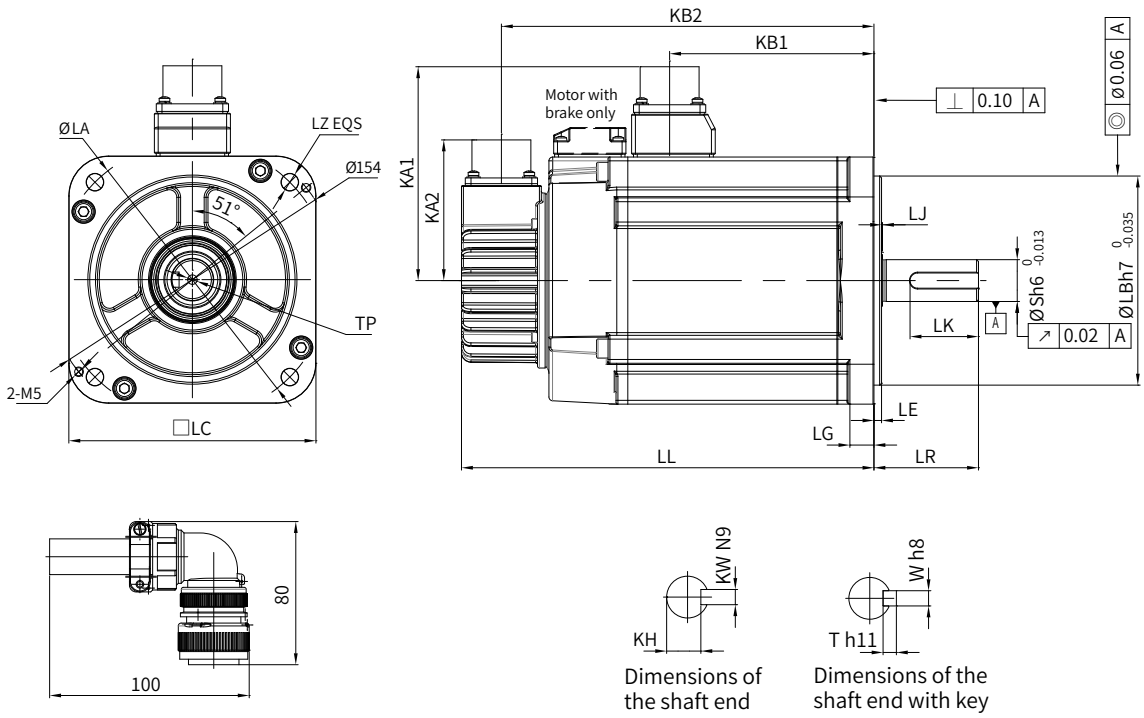
A █ Continuous duty zone

B █ Intermittent duty zone





6.2.5 Dimension Drawing of MS1H3 Series Motors



Motor Model	LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE	LJ	LB
	Unit: mm (in.)												
MS1H3-85B15CB(D)-A331Z	130 (5.12)	146 (5.75)	55±1 (2.17±0.04)	145 (5.71)	4-Φ9 (0.16- Φ0.35)	103 (4.06)	72.5 (2.85)	74 (2.91)	125 (4.92)	14 (0.55)	4 (0.16)	0.5±0.75 (0.02±0.03)	110 (4.33)
MS1H3-85B15CB(D)-A334Z		161 (6.34)											
MS1H3-13C15CB(D)-A331Z	130 (5.12)	163 (6.42)	55±1 (2.17±0.04)	145 (5.71)	4-Φ9 (0.16- Φ0.35)	103 (4.06)	89.5 (3.52)	74 (2.91)	142 (5.59)	14 (0.55)	4 (0.16)	0.5±0.75 (0.02±0.03)	110 (4.33)
MS1H3-13C15CB(D)-A334Z		178 (7.01)											

6 Motors with Medium Inertia and Medium Capacity (MS1H3)

Motor Model	LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE	LJ	LB
	Unit: mm (in.)												
MS1H3-18C15CD-A331Z	130	181 (7.13)	55±1	145	4-Φ9 (0.16- Φ0.35)	103	107.5	74	160 (6.30)	14	4	0.5±0.75	110
MS1H3-18C15CD-A334Z	(5.12)	217 (8.54)	(2.17±0.04)	(5.71)		(4.06)	(4.23)	(2.91)	196 (7.72)	(0.55)	(0.16)	(0.02±0.03)	(4.33)
MS1H3-29C15CD-A331Z	180	197 (7.76)	79±1	200	4-Φ13.5 (0.16- Φ0.53)	138	136 (5.35)	74	177 (6.97)	18	3.2±0.3	0.3±0.75	114.3
MS1H3-29C15CD-A334Z	(7.09)	273 (10.75)	(3.11±0.04)	(7.87)		(5.43)	134 (5.28)	(2.91)	253 (9.96)	(0.71)	(0.13±0.01)	(0.01±0.03)	(4.50)
MS1H3-44C15CD-A331Z	180	230 (9.06)	79±1	200	4-Φ13.5 (0.16- Φ0.53)	138	169 (6.65)	74	210 (8.27)	18	3.2±0.3	0.3±0.75	114.3
MS1H3-44C15CD-A334Z	(7.09)	307 (12.09)	(3.11±0.04)	(7.87)		(5.43)	167 (6.57)	(2.91)	286 (11.26)	(0.71)	(0.13±0.01)	(0.01±0.03)	(4.50)
MS1H3-55C15CD-A331Z	180	274 (10.79)	113±1	200	4-Φ13.5 (0.16- Φ0.53)	138	213 (8.39)	74	254 (10.00)	18	3.2±0.3	0.3±0.75	114.3
MS1H3-55C15CD-A334Z	(7.09)	350 (13.78)	(4.45±0.04)	(7.87)		(5.43)	211 (8.31)	(2.91)	330 (12.99)	(0.71)	(0.13±0.01)	(0.01±0.03)	(4.50)
MS1H3-75C15CD-A331Z	180	330 (12.99)	113±1	200	4-Φ13.5 (0.16- Φ0.53)	138	269 (10.59)	74	310 (12.20)	18	3.2±0.3	0.3±0.75	114.3
MS1H3-75C15CD-A334Z	(7.09)	407 (16.02)	(4.45±0.04)	(7.87)		(5.43)	267 (10.51)	(2.91)	386 (15.20)	(0.71)	(0.13±0.01)	(0.01±0.03)	(4.50)

Motor Model	S	TP	LK	KH	KW	W	T	Weight Unit: kg (lb.)	Connector Model	Power Side (Power Brake Side Included)	Encoder Side
	Unit: mm (in.)										
MS1H3-85B15CB(D)-A331Z	22	M6x20	36	18 ⁰ _{-0.2}	8	8	7	7 (15.43)	Aviation connector	MI-DTL-5015 series 3102E20-18P	MI-DTL-5015 series 3102E20-29P
MS1H3-85B15CB(D)-A334Z	(0.87)	(M6x0.79)	(1.42)	(0.71 ⁰ _{-0.01})	(0.31)	(0.31)	(0.28)	8 (17.64)			
MS1H3-13C15CB(D)-A331Z	22	M6x20	36	18 ⁰ _{-0.2}	8	8	7	8 (17.64)			
MS1H3-13C15CB(D)-A334Z	(0.87)	(M6x0.79)	(1.42)	(0.71 ⁰ _{-0.01})	(0.31)	(0.31)	(0.28)	9.5 (20.94)			
MS1H3-18C15CD-A331Z	22	M6x20	36	18 ⁰ _{-0.2}	8	8	7	9.5 (20.94)			
MS1H3-18C15CD-A334Z	(0.87)	(M6x0.79)	(1.42)	(0.71 ⁰ _{-0.01})	(0.31)	(0.31)	(0.28)	11 (24.25)			
MS1H3-29C15CD-A331Z	35	M12x25	65	30 ⁰ _{-0.2}	10	10	8	15 (33.07)			
MS1H3-29C15CD-A334Z	(1.38)	(M12x0.98)	(2.56)	(1.18 ⁰ _{-0.01})	(0.39)	(0.39)	(0.31)	25 (55.12)			

6 Motors with Medium Inertia and Medium Capacity (MS1H3)

Motor Model	S	TP	LK	KH	KW	W	T	Weight Unit: kg (lb.)	Connector Model	Power Side (Power Brake Side Included)	Encoder Side
	Unit: mm (in.)										
MS1H3-44C15CD-A331Z	35	M12x25	65	30 ⁰ _{-0.2}	10	10	8	19.5 (42.99)	Aviation connector	MI-DTL-5015 series 3102E20-22P	MI-DTL-5015 series 3102E20-29
MS1H3-44C15CD-A334Z	(1.38)	(M12x0.98)	(2.56)	(1.18 ⁰ _{-0.01})	(0.39)	(0.39)	(0.31)	30 (66.14)			
MS1H3-55C15CD-A331Z	42	M16x32	96	37 ⁰ _{-0.2}	12	12	8	28 (61.73)			
MS1H3-55C15CD-A334Z	(1.65)	(M16x1.26)	(3.78)	(1.46 ⁰ _{-0.01})	(0.47)	(0.47)	(0.31)	38 (83.78)			
MS1H3-75C15CD-A331Z	42	M16x32	96	37 ⁰ _{-0.2}	12	12	8	32 (70.55)			
MS1H3-75C15CD-A334Z	(1.65)	(M16x1.26)	(3.78)	(1.46 ⁰ _{-0.01})	(0.47)	(0.47)	(0.31)	42 (92.59)			

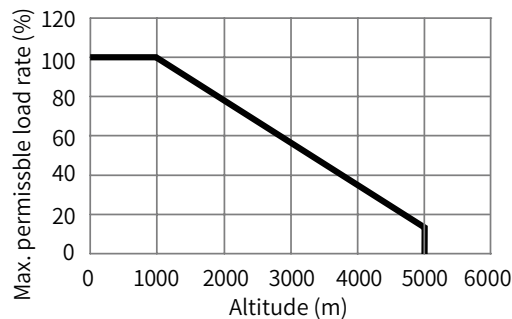


NOTE

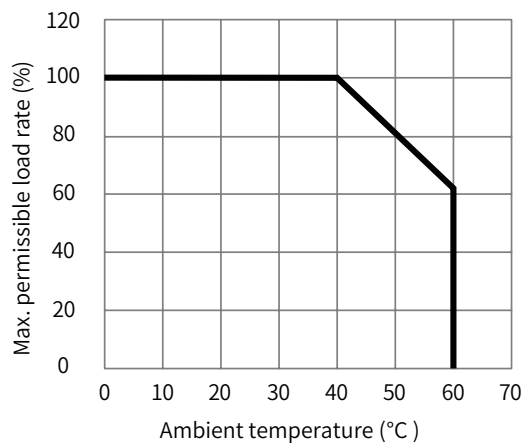
- ◆ Values inside the parentheses "(")" are in British units.
- ◆ Dimension drawings vary with the motor model. The actual dimensions are subject to the physical product.

6.2.6 Derating Curves

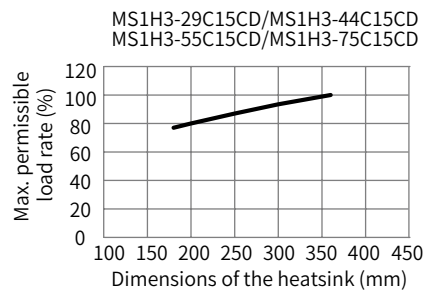
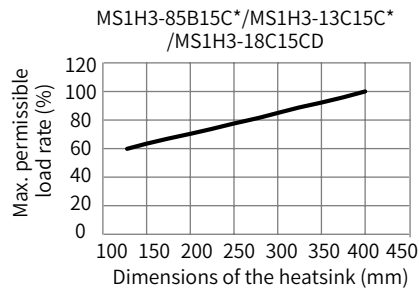
■ Altitude-based derating curve



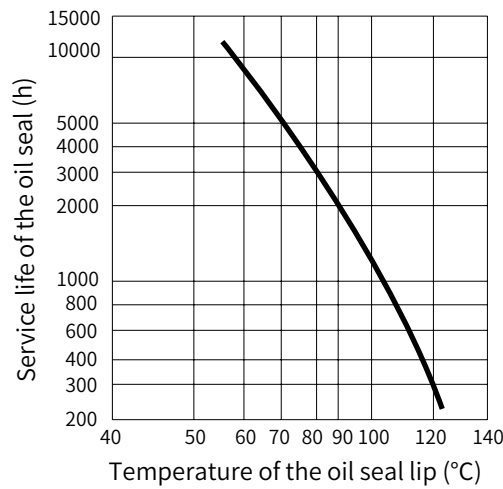
■ Temperature-based derating curve



■ Heatsink-based derating curves



6.2.7 Service Life Curve of the Oil Seal



6.3 Selection of Cables and Options

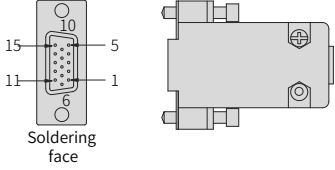
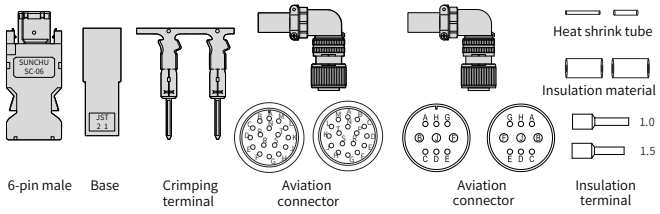
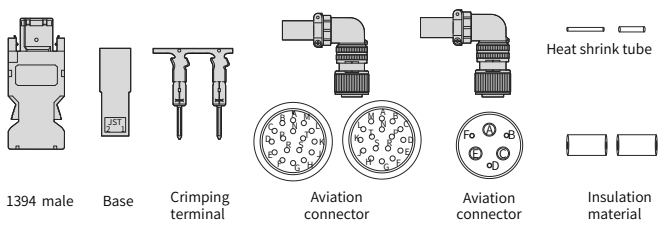
Motor Model	Cable Name	Cable Model	Cable Length (mm)	Dimension Drawing of the Cable
MS1H3 Motors	Single-turn absolute encoder cable	S6-L-P111-3.0	3000	
		S6-L-P111-5.0	5000	
		S6-L-P111-10.0	10000	
	Multi-turn absolute A3**Z encoder cable	S6-L-P121-3.0	3000	
		S6-L-P121-5.0	5000	
		S6-L-P121-10.0	10000	

6 Motors with Medium Inertia and Medium Capacity (MS1H3)

Motor Model	Cable Name	Cable Model	Cable Length (mm)	Dimension Drawing of the Cable
MS1H3 motors (1.8 kW and below)	Power cable (motor without brake)	S6-L-M111-3.0	3000	
		S6-L-M111-5.0	5000	
		S6-L-M111-10.0	10000	
	Power cable (motor with brake)	S6-L-B111-3.0	3000	
		S6-L-B111-5.0	5000	
		S6-L-B111-10.0	10000	
MS1H3 motors (2.9 kW)	Power cable (motor without brake)	S6-L-M112-3.0	3000	
		S6-L-M112-5.0	5000	
		S6-L-M112-10.0	10000	
	Power cable (motor with brake)	S6-L-B112-3.0	3000	
		S6-L-B112-5.0	5000	
		S6-L-B112-10.0	10000	
MS1H3 (4.4 kW and above)	Power cable (motor without brake)	S6-L-M022-3.0	3000	
		S6-L-M022-5.0	5000	
		S6-L-M022-10.0	10000	
	Power cable (motor with brake)	S6-L-B022-3.0	3000	
		S6-L-B022-5.0	5000	
		S6-L-B022-10.0	10000	

Cable Name	Cable Model	Cable Length (mm)	Dimension Drawing of the Cable
SV660N servo drive to PC communication cable	S6-L-T00-3.0	3000	
SV660N multi-drive communication cable	S6-L-T04-0.3	300	
SV660N servo drive to host controller communication cable	S6-L-T04-3.0	3000	
Battery kit	S6-C4	-	

6 Motors with Medium Inertia and Medium Capacity (MS1H3)

Cable Name	Cable Model	Cable Length (mm)	Dimension Drawing of the Cable
SV660N CN1 terminal (DB15)	S6-C6	-	
Connector of MS1H3 motors (1.8 kW and below)	S6-C29	-	
Connector of MS1H3 motors (2.9 kW and above)	S6-C39	-	

7 Motors with Medium Inertia and Small Capacity (MS1H4)

7.1 Model Selection

7.1.1 220 V Motors Without Brake

Servo Motor			Servo Drive (SV660N****I)				Power Cable	23-bit Single-Turn Absolute Encoder Cable	23-bit Multi-Turn Absolute Encoder Cable (Battery Options Required)
Model	Flange Size	Capacity (kW)	Voltage Class	Size	Model	Code			
Ratings of MS1H4 series motors (Vn = 3000 RPM, Vmax = 6000 RPM)									
MS1H4-10B30CB-A331Z(-S)	40	0.1	Single-phase 220 V	A	S1R6	00002	S6-L-M107-** (Front outlet)	S6-L-P114-** (Front outlet)	S6-L-P124-** (Front outlet)
MS1H4-40B30CB-A331Z(-S)	60	0.4	Single-phase 220 V	A	S2R8	00003	S6-L-M108-** (Rear outlet)	S6-L-P115-** (Rear outlet)	S6-L-P125-** (Rear outlet)
MS1H4-75B30CB-A331Z(-S)	80	0.75	Single-phase 220 V	B	S5R5	00005	S6-L-M100-** (Lead wire-type motor cables)	S6-L-P110-** (Lead wire-type motor cables)	S6-L-P120-** (Lead wire-type motor cables)

Motor Model	Connector Kit		Absolute Encoder Battery Kit	Servo Drive to PC Communication Cable	Multi-drive Communication Cable	Servo Drive to Host Controller Communication Cable
	I/O Connector Kit	Motor Connector				
Ratings of MS1H4 series motors (Vn = 3000 RPM, Vmax = 6000 RPM)						
MS1H4-10B30CB-A331Z(-S)	S6-C6	S6-C26 (for lead wire-type motors)	S6-C4	S6-L-T00-3.0	S6-L-T04-0.3	S6-L-T04-3.0
MS1H4-40B30CB-A331Z(-S)		S6-C29				
MS1H4-75B30CB-A331Z(-S)		Note: The motor connector is not available in terminal-type motors				



- ◆ "****" represents the cable length, which can be 3.0 m, 5.0 m, or 10.0 m.
- ◆ If highly flexible cables are needed (fit for cable carriers), add a suffix "-T" to the end of the cable model number.

7.1.2 220 V Motors with Brake

Servo Motor			Servo Drive (SV660N****I)				Power Cable	23-bit Single-Turn Absolute Encoder Cable	23-bit Multi-Turn Absolute Encoder Cable (Battery Options Required)
Model	Flange Size	Capacity (kW)	Voltage Class	Size	Model	Code			
Ratings of MS1H4 series motors (Vn = 3000 RPM, Vmax = 6000 RPM)									
MS1H4-10B30CB-A331Z(-S)	40	0.1	Single-phase 220 V	A	S1R6	00002	S6-L-B107-** (Front outlet)	S6-L-P114-** (Front outlet)	S6-L-P124-** (Front outlet)
MS1H4-40B30CB-A334Z(-S)	60	0.4	Single-phase 220 V	A	S2R8	00003	S6-L-B108-** (Rear outlet)	S6-L-P115-** (Rear outlet)	S6-L-P125-** (Rear outlet)
MS1H4-75B30CB-A334Z(-S)	80	0.75	Single-phase 220 V	B	S5R5	00005	S6-L-B100-** (Lead wire-type motor cable)	S6-L-P110-** (Lead wire-type motor cable)	S6-L-P120-** (Lead wire-type motor cable)

Motor Model	Connector Kit		Connector Kit	Servo Drive to PC Communication Cable	Multi-drive Communication Cable	Servo Drive to Host Controller Communication Cable
	I/O Connector Kit	Motor Connector				
Ratings of MS1H4 series motors (Vn = 3000 RPM, Vmax = 6000 RPM)						
MS1H4-10B30CB-A334Z(-S)	S6-C6	S6-C26 (for lead wire-type motors)	S6-C4	S6-L-T00-3.0	S6-L-T04-0.3	S6-L-T04-3.0
MS1H4-40B30CB-A334Z(-S)		Note: The motor connector is not available in terminal-type motors				
MS1H4-75B30CB-A334Z(-S)						



NOTE

- ◆ "****" represents the cable length, which can be 3.0 m, 5.0 m, or 10.0 m.
- ◆ If highly flexible cables are needed (fit for cable carriers), add a suffix "-T" to the end of the cable model number.

7.2 Motor Specifications

7.2.1 Motor Ratings

Model	Rated Output (kW) ^[1]	Rated Torque (N·m)	Maximum Torque (N·m)	Rated Current (Arms)	Maximum Current (Arms)	Rated Speed (Vn) (RPM)	Maximum Speed (V _{max}) (RPM)	Torque (N·m/Arms)	Moment of Inertia (kg·cm ²)	Voltage (V)
MS1H4-10B30CB	0.1	0.32	1.12	1.3	4.70	3000	6000	0.26	0.102 (0.104)	220
MS1H4-40B30CB	0.4	1.27	4.46	2.80	10.10			0.53	0.657 (0.667)	
MS1H4-75B30CB	0.75	2.39	8.36	4.80	16.9			0.58	2 (2.012)	

[1] The motor with oil seal must be derated by 10% during use.



- ◆ Values inside the parentheses "()" are for the motor with brake.
- ◆ Values in the preceding table are obtained when a motor equipped with the following heatsink is working with an Inovance servo drive with temperature of the armature coil being 20° C.
MS1H4: 250 mm x 250 mm x 6 mm (aluminum)

7.2.2 Allowable Radial and Axial Loads of the Motor

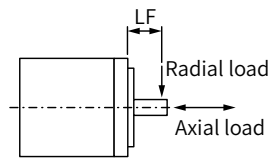


Figure 7-5 Radial and axial loads of the motor

Motor Model	Flange Size (mm)	LF (mm)	Allowable Radial Load (N)	Allowable Axial Load (N)
MS1H4-10B30CB	40	20	78	54
MS1H4-40B30CB	60	25	245	74
MS1H4-75B30CB	80	35	392	147

7.2.3 Electrical Specifications of Motors with Brake

Motor Model	Holding Torque (N·m)	Supply Voltage (VDC) ±10%	Coil Resistance (Ω) ±7%	Exciting Current (A)	Release Time (ms)	Apply Time (ms)	Backlash (°)
MS1H4-10B	0.32	24	94.4	0.25	≤ 20	≤ 40	≤ 1.5
MS1H4-40B	1.5		75.79	0.32	≤ 20	≤ 60	≤ 1.5
MS1H4-75B	3.2		57.6	0.42	≤ 40	≤ 60	≤ 1

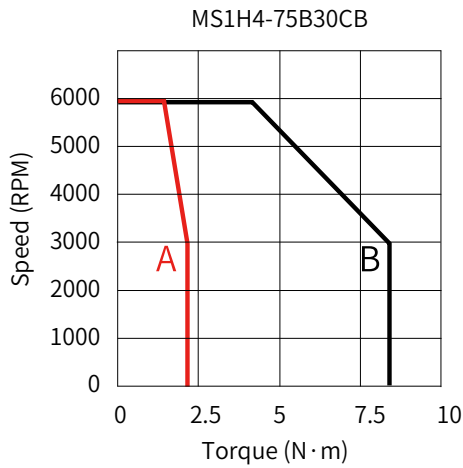
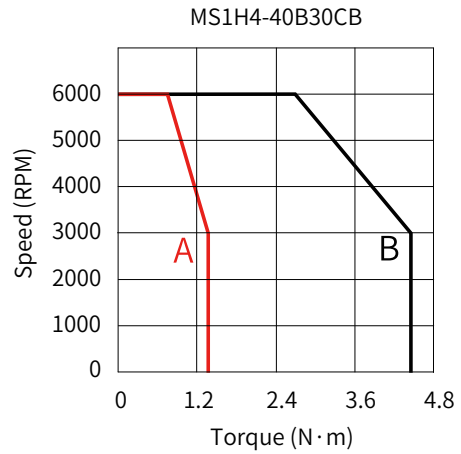
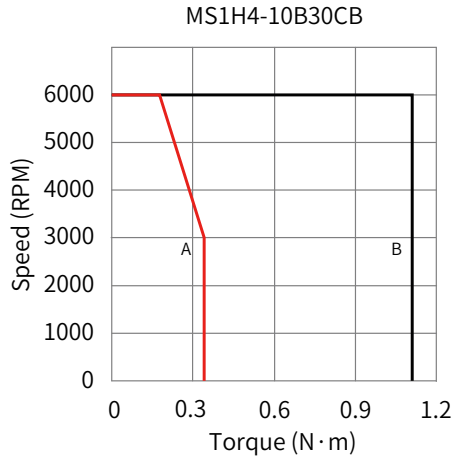


- ◆ The brake cannot share the same power supply with other electrical devices. This is to prevent malfunction of the brake due to voltage or current drop caused by other working devices.
- ◆ It is recommended to use cables with a cross-sectional area of 0.5 mm² and above.

7.2.4 Motor Torque-Speed Characteristics

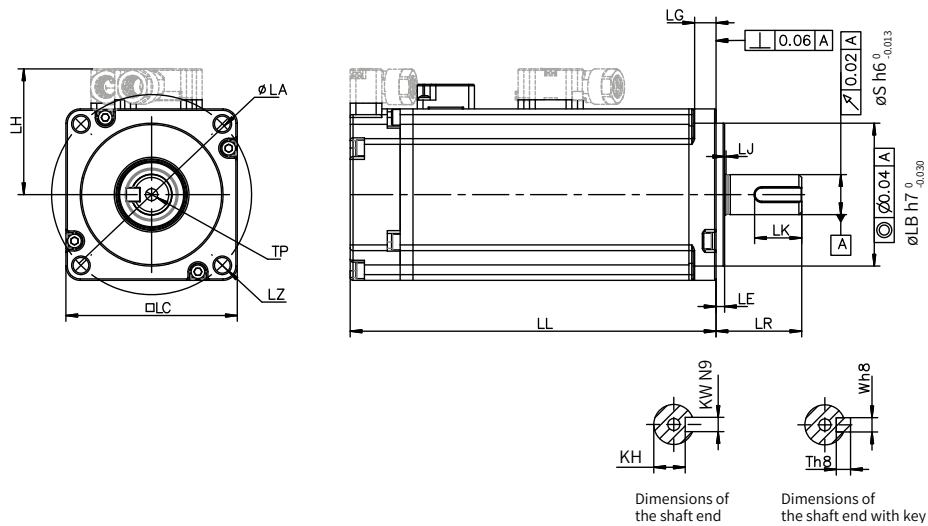
A █ Continuous duty zone

B █ Intermittent duty zone



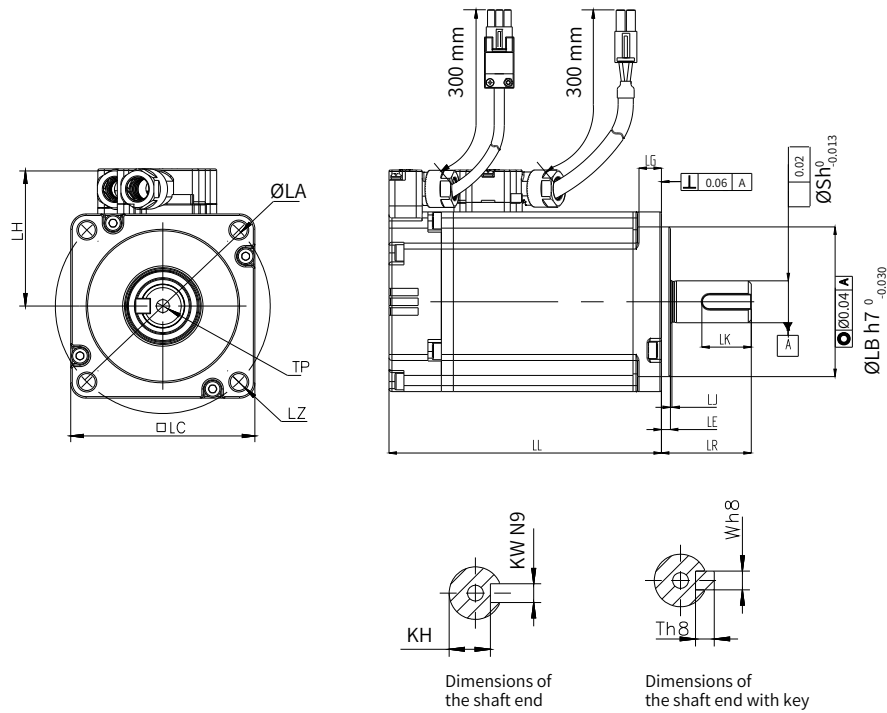
7.2.5 Dimension Drawings of MS1H4 Series Motors

■ Terminal-type motor



7 Motors with Medium Inertia and Small Capacity (MS1H4)

■ Lead wire-type motor



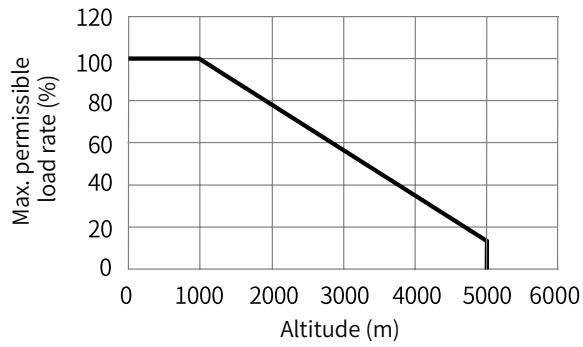
Motor Model	LC	LL	LR	LA	LZ	LH	LG	LE	LJ
	Unit: mm (in.)								
MS1H4-10B30CB-A330Z(-S)	40 (1.57)	77.5 (3.05)	25±0.5 (0.98±0.02)	46 (1.81)	2-φ4.5 (0.08-φ0.18)	34 (1.34)	5 (0.20)	2.5±0.5 (0.10±0.02)	0.5±0.35 (0.02±0.01)
MS1H4-10B30CB-A332Z(-S)		109 (4.29)							
MS1H4-40B30CB-A331Z(-S)	60 (2.36)	105 (4.13)	30±0.5 (1.18±0.02)	70 (2.76)	4-φ5.5 (0.16-φ0.22)	44 (1.73)	7.5 (0.30)	3±0.5 (0.12±0.02)	0.5±0.35 (0.02±0.01)
MS1H4-40B30CB-A334Z(-S)		128 (5.04)							
MS1H4-75B30CB-A331Z(-S)	80 (3.15)	117.5 (4.63)	35±0.5 (1.38±0.02)	90 (3.54)	4-φ7 (0.16-φ0.28)	54 (2.13)	7.7 (0.30)	3±0.5 (0.12±0.02)	0.5±0.35 (0.02±0.01)
MS1H4-75B30CB-A334Z(-S)		147.5 (5.81)							
Motor Model	LB	S	TP	LK	KH	KW	W	T	Weight
	Unit: mm (in.)								Unit: kg (lb.)
MS1H4-10B30CB-A330Z(-S)	30 (1.18)	8 (0.31)	M3x6 (M3x0.24)	15.5 (0.61)	6.2 (0.24)	3 (0.12)	3 (0.12)	3 (0.12)	0.45 (0.99)
MS1H4-10B30CB-A332Z(-S)									0.64 (1.41)
MS1H4-40B30CB-A331Z(-S)	50 (1.97)	14 (0.55)	M5x8 (M5x0.31)	16.5 (0.65)	11 (0.43)	5 (0.20)	5 (0.20)	5 (0.20)	1.27 (2.80)
MS1H4-40B30CB-A334Z(-S)									1.62 (3.57)
MS1H4-75B30CB-A331Z(-S)	70 (2.76)	19 (0.75)	M6x20 (M6x0.79)	25 (0.98)	15.5 (0.61)	6 (0.24)	6 (0.24)	6 (0.24)	2.40 (5.29)
MS1H4-75B30CB-A334Z(-S)									3.04 (6.70)



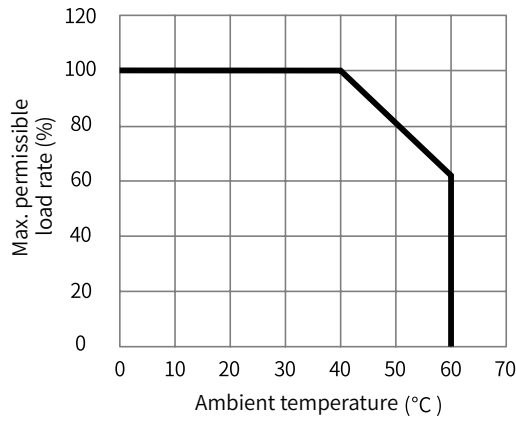
- ◆ Values inside the parentheses "(")" are in British units.
- ◆ For dimension drawings of motor models ending with "-S", contact Inovance technical support.
- ◆ Dimension drawings vary with the motor model. The actual dimensions are subject to the physical product.

7.2.6 Derating Curves

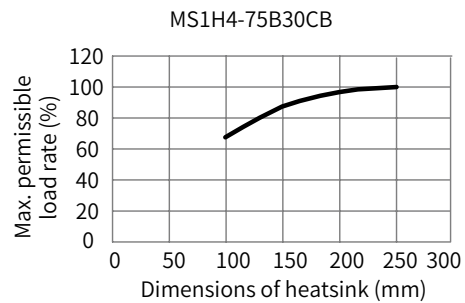
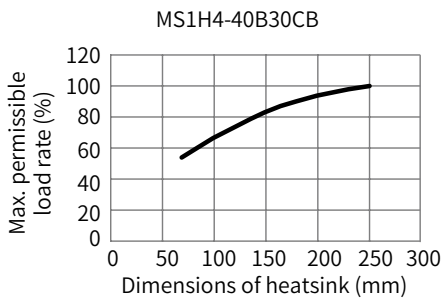
■ Altitude-based derating curve



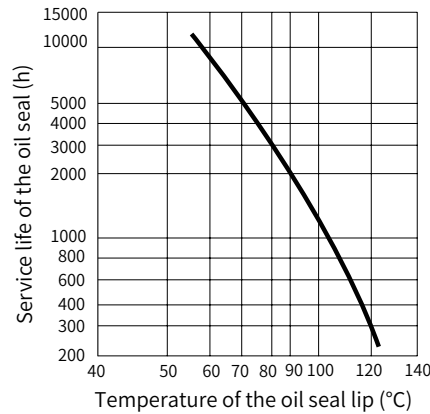
■ Temperature-based derating curve



■ Heatsink-based derating curves



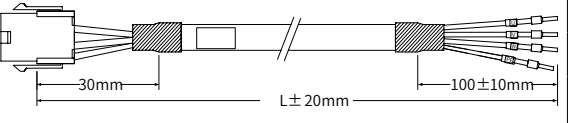
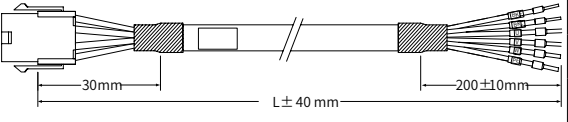
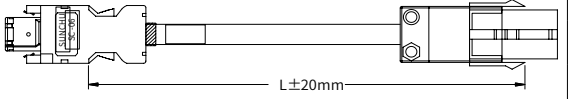
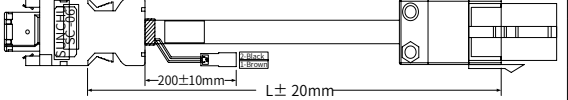
7.2.7 Service Life Curve of the Oil Seal

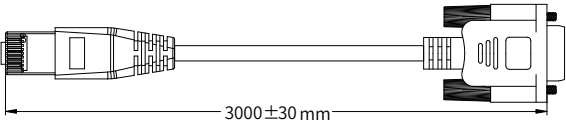
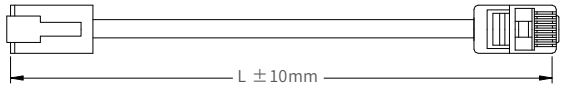
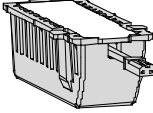
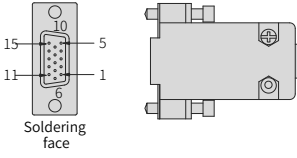
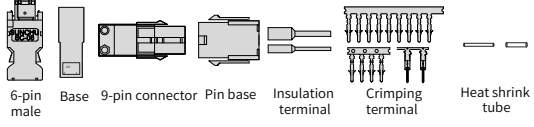


7.3 Selection of Cables and Options

Motor Model	Cable Name		Cable Model	Cable Length (mm)	Dimension Drawing of the Cable
MS1H4 terminal-type motors	Front outlet	Power cable (motor without brake)	S6-L-M107-3.0	3000	
			S6-L-M107-5.0	5000	
			S6-L-M107-10.0	10000	
		Power cable (motor with brake)	S6-L-B107-3.0	3000	
			S6-L-B107-5.0	5000	
			S6-L-B107-10.0	10000	
		Single-turn absolute encoder cable	S6-L-P114-3.0	3000	
			S6-L-P114-5.0	5000	
			S6-L-P114-10.0	10000	
		Multi-turn absolute (A3**Z) encoder cable	S6-L-P124-3.0	3000	
			S6-L-P124-5.0	5000	
			S6-L-P124-10.0	10000	
	Rear outlet	Power cable (motor without brake)	S6-L-M108-3.0	3000	
			S6-L-M108-5.0	5000	
			S6-L-M108-10.0	10000	
		Power cable (motor with brake)	S6-L-B108-3.0	3000	
			S6-L-B108-5.0	5000	
			S6-L-B108-10.0	10000	
		Single-turn absolute encoder cable	S6-L-P115-3.0	3000	
			S6-L-P115-5.0	5000	
			S6-L-P115-10.0	10000	
		Multi-turn absolute (A3**Z) encoder cable	S6-L-P125-3.0	3000	
			S6-L-P125-5.0	5000	
			S6-L-P125-10.0	10000	

7 Motors with Medium Inertia and Small Capacity (MS1H4)

Motor Model	Cable Name	Cable Model	Cable Length (mm)	Dimension Drawing of the Cable
MS1H4 lead wire-type motors (-S)	Power cable (motor without brake)	S6-L-M100-3.0	3000	
		S6-L-M100-5.0	5000	
		S6-L-M100-10.0	10000	
	Power cable (motor with brake)	S6-L-B100-3.0	3000	
		S6-L-B100-5.0	5000	
		S6-L-B100-10.0	10000	
	Single-turn absolute encoder cable	S6-L-P110-3.0	3000	
		S6-L-P110-5.0	5000	
		S6-L-P110-10.0	10000	
	Multi-turn absolute A3**Z encoder cable	S6-L-P120-3.0	3000	
		S6-L-P120-5.0	5000	
		S6-L-P120-10.0	10000	

Cable Name	Cable Model	Cable Length (mm)	Dimension Drawing of the Cable
SV660N servo drive to PC communication cable	S6-L-T00-3.0	3000	
SV660N multi-drive communication cable	S6-L-T04-0.3	300	
SV660N servo drive to host controller communication cable	S6-L-T04-3.0	3000	
Battery kit	S6-C4	-	
SV660N CN1 terminal (DB15)	S6-C6	-	
MS1H4 lead wire-type (Z-S) motor connector	S6-C26	-	

8 Optional Parts

8.1 List of Optional Parts

Type	Name	Location	Applicable Model	Function
Peripheral components	Fuse and circuit breaker	Input side of the servo drive	All	To comply with EN 61800-5-1 and UL 61800-5-1 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	All	Eliminates harmonics and improves the power factor on the input side.
	EMC filter	Input side of the servo drive	All	Reduces the conducted and radiated interference to the outside.
	Magnetic ring	Output side of the servo drive	All	Reduces the bearing current and interference to the outside.
		Signal cable	All	Improves the anti-interference performance of signals.

8.2 Fuse, Contactor, and Circuit Breaker

8.2.1 Fuse

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

Table 8-1 List of recommended fuses

Servo Drive Size	Servo Drive Model	Rated Input Current (A)	Recommended Fuse		
			Manufacturer	Rated Current (A)	Model
Single-phase 220 V					
A	SV660NS1R6I	2.3	Bussmann	15	FWP-15B
	SV660NS2R8I	4		20	FWP-20B
B	SV660NS5R5I	7.9		35	FWP-35C
C	SV660NS7R6I	9.6		40	FWP-40C
D	SV660NS012I	12.8		40	FWP-40C
Three-phase 220 V					
C	SV660NS7R6I	5.1	Bussmann	50	FWP-50C
D	SV660NS012I	8		50	FWP-50C
Three-phase 380 V					
C	SV660NT3R5I	2.4	Bussmann	15	FWP-15B
	SV660NT5R4I	3.6		20	FWP-20B
D	SV660NT8R4I	5.6		20	FWP-20B
	SV660NT012I	8		50	FWP-50C
E	SV660NT017I	12		50	FWP-50C
	SV660NT021I	16		70	FWP-70C
	SV660NT026I	21		125	FWP-125C

8.2.2 Electromagnetic Contactor

Table 8-2 Recommended electromagnetic contactor models

Servo Drive Size	Servo Drive Model	Rated Input Current (A)	Recommended Contactor		
			Manufacturer	Current (A)	Model
Single-phase 220 V					
A	SV660NS1R6I	2.3	Schneider	9	LC1 D09
	SV660NS2R8I	4		9	LC1 D09
B	SV660NS5R5I	7.9		9	LC1 D09
C	SV660NS7R6I	9.6		12	LC1 D12
D	SV660NS012I	12.8		18	LC1 D18
Three-phase 220 V					
C	SV660NS7R6I	5.1	Schneider	9	LC1 D09
D	SV660NS012I	8		9	LC1 D09
Three-phase 380 V					
C	SV660NT3R5I	2.4	Schneider	9	LC1 D09
	SV660NT5R4I	3.6		9	LC1 D09
D	SV660NT8R4I	5.6		9	LC1 D09
	SV660NT012I	8		9	LC1 D09
E	SV660NT017I	12		12	LC1 D12
	SV660NT021I	16		18	LC1 D18
	SV660NT026I	21		25	LC1 D25

8.2.3 Circuit Breaker

Table 8-3 Recommended circuit breaker models

Servo Drive Size	Servo Drive Model	Rated Input Current (A)	Recommended Circuit Breaker		
			Manufacturer	Current (A)	Model
Single-phase 220 V					
A	SV660NS1R6I	2.3	Schneider	4	OSMC32N2C4
	SV660NS2R8I	4		6	OSMC32N2C6
B	SV660NS5R5I	7.9		16	OSMC32N2C16
C	SV660NS7R6I	9.6		16	OSMC32N2C16
D	SV660NS012I	12.8		20	OSMC32N2C20
Three-phase 220 V					
C	SV660NS7R6I	5.1	Schneider	10	OSMC32N3C10
D	SV660NS012I	8		16	OSMC32N3C16

Servo Drive Size	Servo Drive Model	Rated Input Current (A)	Recommended Circuit Breaker		
			Manufacturer	Current (A)	Model
Three-phase 380 V					
C	SV660NT3R5I	2.4	Schneider	4	OSMC32N3C4
	SV660NT5R4I	3.6		6	OSMC32N3C6
D	SV660NT8R4I	5.6		10	OSMC32N3C10
	SV660NT012I	8		16	OSMC32N3C16
E	SV660NT017I	12		20	OSMC32N3C20
	SV660NT021I	16		25	OSMC32N3C25
	SV660NT026I	21		32	OSMC32N3C32



For UL-compliant products, see section "UL&cUL Certification" in SV660N Series Servo Drive Hardware Guide for recommended fuse/circuit breaker models.

If an RCD is needed, select the RCD according to the following requirements:

- The servo drive may generate DC leakage current in the protective conductor, a B-type RCD therefore must be used.
- The servo drive may generate high-frequency leakage current during operation. To prevent malfunction of the RCD, install an RCD with tripping current not lower than 100 mA for each servo drive.
- When multiple servo drives connected in parallel share one RCD, select an RCD with tripping current not lower than 300 mA.
- Recommended RCD manufacturers are Siemens and Schneider.

8.3 AC Input Reactor

8.3.1 Model Selection

An AC input reactor is mainly used to reduce harmonics in the input current. You can choose whether to install an external reactor based on actual applications. The following table lists the recommended manufacturers and models of input reactors.

Table 8-4 AC input reactor model selection

Servo Drive Size	Servo Drive Model	Rated Input Current (A)	Applicable Reactor	Inductance (mH)
Three-phase 220 V				
C	SV660NS7R6I	5.1	MD-ACL-10-5-4T	5
D	SV660NS012I	8	MD-ACL-10-5-4T	5
Three-phase 380 V				
C	SV660NT3R5I	2.4	MD-ACL-10-5-4T	5
	SV660NT5R4I	3.6	MD-ACL-10-5-4T	5
D	SV660NT8R4I	5.6	MD-ACL-10-5-4T	5
	SV660NT012I	8	MD-ACL-10-5-4T	3

Servo Drive Size	Servo Drive Model	Rated Input Current (A)	Applicable Reactor	Inductance (mH)
E	SV660NT017I	12	MD-ACL-15-3-4T	3
	SV660NT021I	16	MD-ACL-40-1.45-4T	1.45
	SV660NT026I	21	MD-ACL-40-1.45-4T	1.45

8.3.2 Dimensions

■ Inovance input reactors

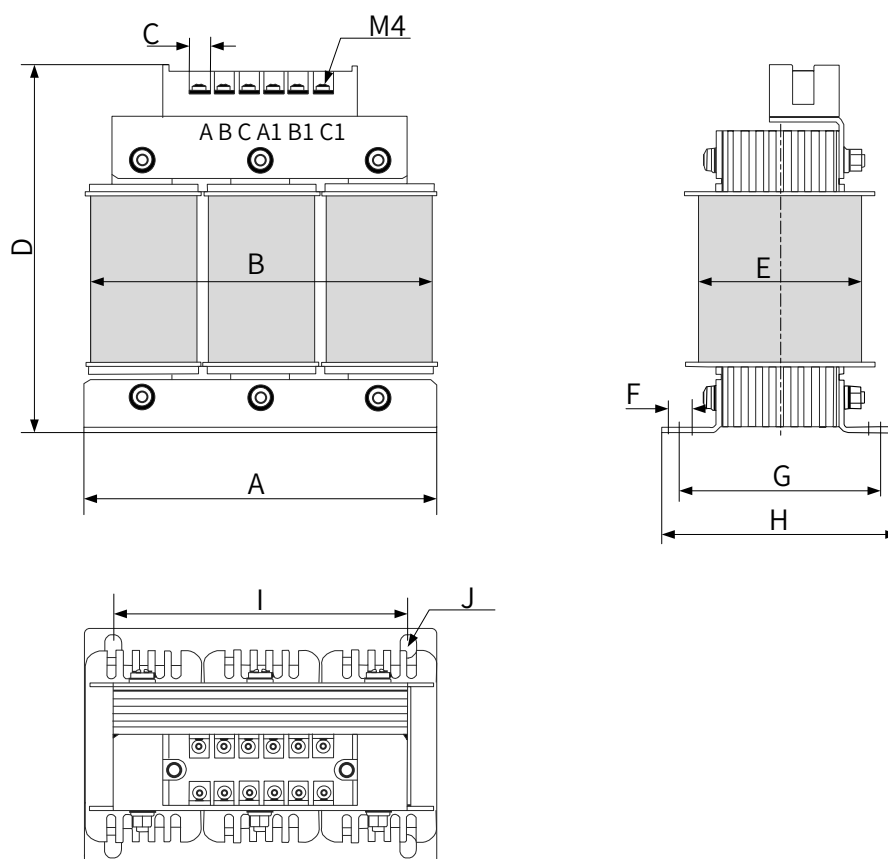


Figure 8-1 Dimensions of 10 A to 15 A AC input reactors

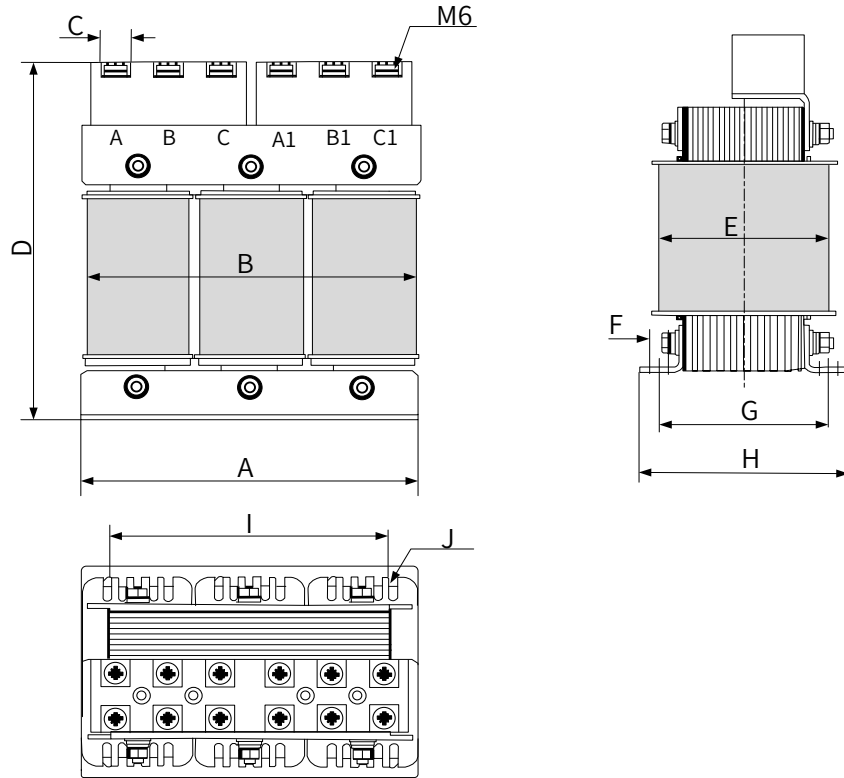


Figure 8-2 Dimensions of 40 A (1.45 mH) AC input reactors

Table 8-5 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	Φ7x10
MD-ACL-15-3-4T	150±2	155	8	160	80	10	85±2	100±2	125±1	Φ7x10
MD-ACL-40-1.45-4T	180±2	185	16	200	105	10	95±2	117±2	150±1	Φ7x10

8.4 EMC Filter

8.4.1 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 Schaffner FN 2090 and FN 3258 series EMC filters. Select the EMC filter according to the rated input current of the servo drive, as shown in the following table.

Table 8-6 Standard EMC filter model and appearance

Filter Model		Appearance
Schaffner	FN 2090 series	
	FN3258 series	

Table 8-7 Filter models (Schaffner)

Servo Drive Size	Servo Drive Model	Rated Input Current (A)	Applicable Filter
Single-phase 220 V			
A	SV660NS1R6I	2.3	FN 2090-3-06
	SV660NS2R8I	4	FN 2090-4-06
B	SV660NS5R5I	7.9	FN 2090-8-06
C	SV660NS7R6I	9.6	FN 2090-10-06
D	SV660NS012I	12.8	FN 2090-16-06
Three-phase 220 V			
C	SV660NS7R6I	5.1	FN 3258-7-44
D	SV660NS012I	8	FN 3258-16-44
Three-phase 380 V			
C	SV660NT3R5I	2.4	FN 3258-7-44
	SV660NT5R4I	3.6	FN 3258-7-44
D	SV660NT8R4I	5.6	FN 3258-7-44
	SV660NT012I	8	FN 3258-16-44
E	SV660NT017I	12	FN 3258-16-44
	SV660NT021I	16	FN 3258-16-44
	SV660NT026I	21	FN 3258-30-44

8.4.2 Dimensions

■ Dimensions of Schaffner FN 2090 series EMC filters

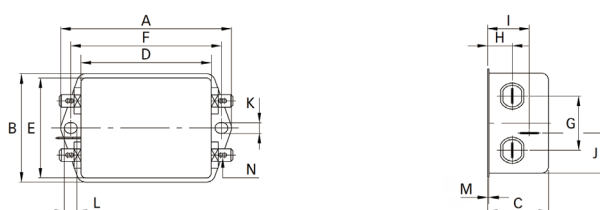


Figure 8-3 Dimension drawing of FN 2090 series filters (unit: mm)

Table 8-8 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 3258 series filters

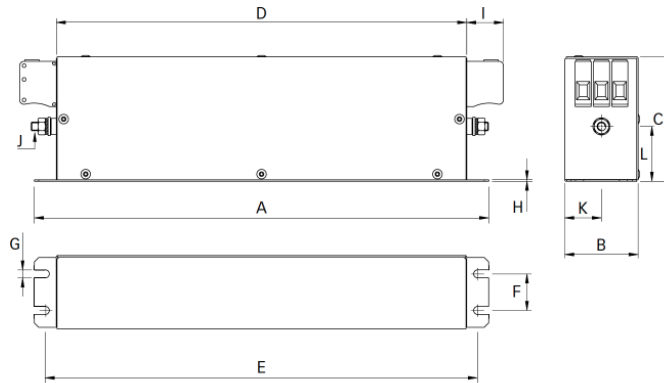


Figure 8-4 Dimension drawing of FN 3258 series filters (unit: mm)

Table 8-9 Dimensions of FN 3258 series filters (unit: mm)

Rated Current (A)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	I (mm)	J	K (mm)	L (mm)
7	190	40	70	160	180	20	4.5	1	22	M5	20	29.5
16	250	45	70	220	235	25	5.4	1	22	M5	22.5	29.5
30	270	50	85	240	255	30	5.4	1	25	M5	25	39.5

8.5 Magnetic Ring and Ferrite Clamp

8.5.1 Model Selection

The magnetic ring is intended to be installed on the input or output side of the servo drive. Install the magnetic ring as close to the servo drive as possible. Installing the magnetic ring on the input side suppresses the noise in the power supply system of the servo drive. Installing the magnetic ring on the output side reduces the bearing current and interference to the outside.

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

- Amorphous magnetic ring: featuring a high permeability within 1 M and excellent anti-interference performance, but not as low-cost as the ferrite clamp (See ["8.5.2 Dimensions"](#) for details.)
- Ferrite clamp: featuring a good interference suppression performance within a frequency band above 1 M, applicable to low-power servo drives and signal cables, low-cost and easy to install

Table 8-10 Appearance of the magnetic ring and ferrite clamp

Magnetic Ring and Ferrite Clamp		Appearance
Magnetic ring	DY644020H	
	DY805020H	
Ferrite clamp	7427122S	

8.5.2 Dimensions

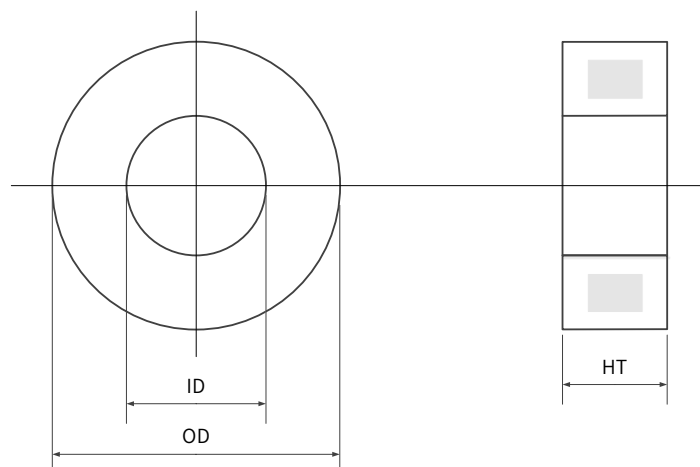


Figure 8-5 Dimension drawing of the magnetic ring

Table 8-11 Dimensions of the magnetic ring

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

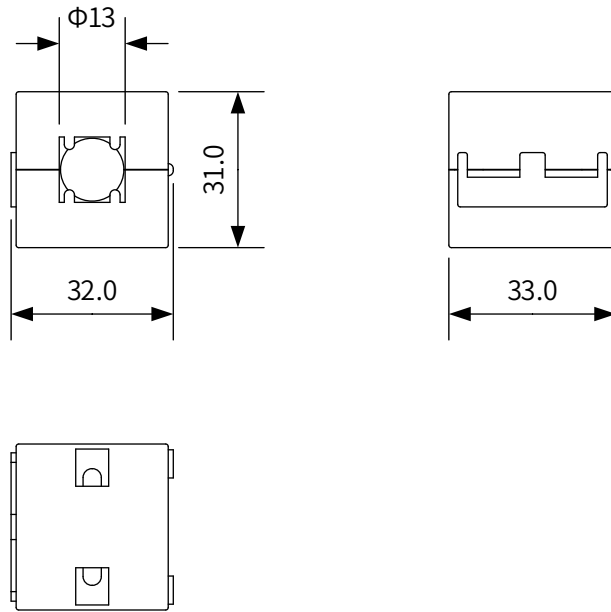


Figure 8-6 Dimension drawing of the ferrite clamp

Table 8-12 Dimensions of the ferrite clamp

Model	Dimensions (OD x ID x HT) (mm)
7427122S	32.0 x 31 x 13

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