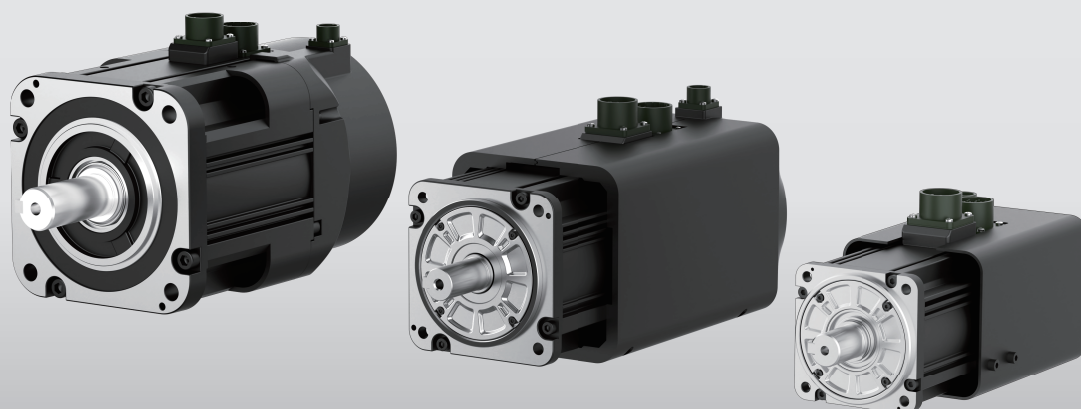




MS1-R Series Air-cooled Servo Motor Selection Guide



Industrial
Automation



Intelligent
Elevator



New Energy
Vehicle



Industrial
Robot



Rail
Transit



Data code PS00014134A00

Preface

Introduction

Thank you for purchasing the MS1-R series air-cooled servo motor.

As the latest generation of servo motors developed by Inovance, the MS1-R series air-cooled motors support a wide power range from 2 kW to 15 kW, with frame sizes covering 100 mm, 130 mm, and 180 mm. The motor offers multiple types of inertia and speed configurations and supports different types of encoders.

This motor is applicable to automation equipment requiring high-power motors with small frame size, such as printing and textile machineries. It serves to achieve fast and accurate position control, speed control, and torque control.

This user guide presents motor information, model selection, and wiring details. Contact Inovance for detailed information on the motor function and performance.

Documents provided by Inovance are subject to change without notice due to continuous product improvement.

Note

- The drawings in the user 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 user guide are shown for descriptions only and may not match the product you purchased.
- The user guide is subject to change without notice due to product upgrade, specification modifications as well as efforts to improve the accuracy and convenience of the user guide.

More information

Document name	Code	Description
MS1-R Series Air-cooled Servo Motor Selection Guide	PS00014134	Describes product information, general specifications, motor selection, cable selection, certification categories and standards of the product.
MS1-R Series Air-cooled Servo Motor Installation Guide	PS00017336	Describes the installation of the motor, including motor installation flowcharts, wiring, unpacking and handling, mechanical installation, and electrical installation.

Revision History

Date	Version	Revision
March 2025	A00	First release

Access to the Guide

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

- Do keyword search under Service and Support at www.inovance.com.
- Scan the QR code on the product with your smart phone.
- Scan the QR code below to install My Inovance app, where you can search for and download user guides.



Questions about the user guide

- Contact us if you have any questions or suggestions for this manual.
- The data and consistency of the contents in this manual have been reviewed as required. However, variance cannot be precluded entirely. The necessary revision will be made in the subsequent versions.

Warranty disclaimer

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

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

- Damage caused by operations not following the instructions in the user guide
- Damage caused by fire, flood, or unusual voltage
- Damage caused by unintended use of the product
- Damage caused by use beyond the specified scope of application of the product
- Damage or secondary damage caused by force majeure (natural disaster, earthquake, and lightning strike)

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

For details, see Product Warranty Card.

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1 Model Selection List

Applicable drive for the motor with 23-bit encoder (SV660)

Motor			Drive SV660*****			
Motor model	Frame size	Capacity	Voltage class	Size	Recommended drive model	No.
MS1V2 - Ratings of air-cooled series motors						
MS1V2-20C30CD-A331R-F	100	2	Three-phase 380 V	D	T8R4I	10003
MS1V2-26C30CD-A331R-F	100	2.6	Three-phase 380 V	D	T012I	10004
MS1V2-32C30CD-A331R-F	100	3.2	Three-phase 380 V	E	T017I	10005
MS1H2 - Ratings of air-cooled series motors						
MS1H2-42C30CD-A331R-F	130	4.2	Three-phase 380 V	E	T017I	10005
MS1H2-56C30CD-A331R-F	130	5.6	Three-phase 380 V	E	T021I	10006
MS1H2-70C30CD-A331R-F	130	7	Three-phase 380 V	E	T026I	10007
MS1V3 - Ratings of air-cooled series motors						
MS1V3-24C15CD-A331R-F	130	2.4	Three-phase 380 V	D	T012I	10004
MS1V3-30C15CD-A331R-F	130	3	Three-phase 380 V	D	T012I	10004
MS1V3-36C15CD-A331R-F	130	3.6	Three-phase 380 V	E	T017I	10005
MS1V3-45C15CD-A331R-F	130	4.5	Three-phase 380 V	E	T017I	10005
MS1V3-52C15CD-A331R-F	130	5.2	Three-phase 380 V	E	T021I	10006
MS1V3-65C15CD-A331R-F	130	6.5	Three-phase 380 V	E	T026I	10007
MS1V3-46C30CD-A331R-F	130	4.6	Three-phase 380 V	E	T017I	10005
MS1V3-55C30CD-A331R-F	130	5.5	Three-phase 380 V	E	T021I	10006
MS1V3-65C30CD-A331R-F	130	6.5	Three-phase 380 V	E	T026I	10007
MS1V3-75C30CD-A331R-F	130	7.5	Three-phase 380 V	E	T026I	10007
MS1H3 - Ratings of air-cooled series motors						
MS1H3-29C15CD-A331R-F	180	2.9	Three-phase 380 V	D	T012I	10004
MS1H3-44C15CD-A331R-F	180	4.4	Three-phase 380 V	E	T017I	10005
MS1H3-55C15CD-A331R-F	180	5.5	Three-phase 380 V	E	T021I	10006
MS1H3-75C15CD-A331R-F	180	7.5	Three-phase 380 V	E	T026I	10007
MS1H3-60C30CD-A331R-F	180	6	Three-phase 380 V	E	T021I	10006
MS1V3 - Ratings of naturally-ventilated motors						
MS1V3-20C15CD-A331R	130	2	Three-phase 380 V	D	T8R4I	10003
MS1V3-24C15CD-A33*R	130	2.4	Three-phase 380 V	D	T012I	10004
MS1V3-28C15CD-A331R	130	2.8	Three-phase 380 V	D	T012I	10004
MS1V3-30C15CD-A331R	130	3	Three-phase 380 V	D	T012I	10004
MS1V3-28C30CD-A331R	130	2.8	Three-phase 380 V	D	T012I	10004

Model Selection List

Motor			Drive SV660*****			
Motor model	Frame size	Capacity	Voltage class	Size	Recommended drive model	No.
MS1V3-32C30CD-A331R	130	3.2	Three-phase 380 V	E	T017I	10005
MS1V3-35C30CD-A331R	130	3.5	Three-phase 380 V	E	T017I	10005
MS1V3-38C30CD-A331R	130	3.8	Three-phase 380 V	E	T017I	10005
MS1V3-40C30CD-A33*R	130	4	Three-phase 380 V	E	T017I	10005

Applicable drive for the motor with 23-bit encoder (SV670N-PTC)

Motor			Drive SV670N*****-PTC			
Motor model	Frame size	Capacity	Voltage class	Size	Recommended drive model	No.
MS1V2 - Ratings of air-cooled series motors						
MS1V2-20C30CD-A331R-F	100	2	Three-phase 380 V	D	T8R4I	10003
MS1V2-26C30CD-A331R-F	100	2.6	Three-phase 380 V	D	T012I	10004
MS1V2-32C30CD-A331R-F	100	3.2	Three-phase 380 V	E	T017I	10005
MS1H2 - Ratings of air-cooled series motors						
MS1H2-42C30CD-A331R-F	130	4.2	Three-phase 380 V	E	T017I	10005
MS1H2-56C30CD-A331R-F	130	5.6	Three-phase 380 V	E	T021I	10006
MS1H2-70C30CD-A331R-F	130	7	Three-phase 380 V	E	T026I	10007
MS1V3 - Ratings of air-cooled series motors						
MS1V3-24C15CD-A331R-F	130	2.4	Three-phase 380 V	D	T012I	10004
MS1V3-30C15CD-A331R-F	130	3	Three-phase 380 V	D	T012I	10004
MS1V3-36C15CD-A331R-F	130	3.6	Three-phase 380 V	E	T017I	10005
MS1V3-45C15CD-A331R-F	130	4.5	Three-phase 380 V	E	T017I	10005
MS1V3-52C15CD-A331R-F	130	5.2	Three-phase 380 V	E	T021I	10006
MS1V3-65C15CD-A331R-F	130	6.5	Three-phase 380 V	E	T026I	10007
MS1V3-46C30CD-A331R-F	130	4.6	Three-phase 380 V	E	T017I	10005
MS1V3-55C30CD-A331R-F	130	5.5	Three-phase 380 V	E	T021I	10006
MS1V3-65C30CD-A331R-F	130	6.5	Three-phase 380 V	E	T026I	10007
MS1V3-75C30CD-A331R-F	130	7.5	Three-phase 380 V	E	T026I	10007
MS1H3 - Ratings of air-cooled series motors						
MS1H3-29C15CD-A331R-F	180	2.9	Three-phase 380 V	D	T012I	10004
MS1H3-44C15CD-A331R-F	180	4.4	Three-phase 380 V	E	T017I	10005
MS1H3-55C15CD-A331R-F	180	5.5	Three-phase 380 V	E	T021I	10006
MS1H3-75C15CD-A331R-F	180	7.5	Three-phase 380 V	E	T026I	10007

Motor			Drive SV670N*****-PTC			
Motor model	Frame size	Capacity	Voltage class	Size	Recommended drive model	No.
MS1H3-60C30CD-A331R-F	180	6	Three-phase 380 V	E	T021I	10006
MS1V3 - Ratings of naturally-ventilated motors						
MS1V3-20C15CD-A331R	130	2	Three-phase 380 V	D	T8R4I	10003
MS1V3-24C15CD-A33*R	130	2.4	Three-phase 380 V	D	T012I	10004
MS1V3-28C15CD-A331R	130	2.8	Three-phase 380 V	D	T012I	10004
MS1V3-30C15CD-A331R	130	3	Three-phase 380 V	D	T012I	10004
MS1V3-28C30CD-A331R	130	2.8	Three-phase 380 V	D	T012I	10004
MS1V3-32C30CD-A331R	130	3.2	Three-phase 380 V	E	T017I	10005
MS1V3-35C30CD-A331R	130	3.5	Three-phase 380 V	E	T017I	10005
MS1V3-38C30CD-A331R	130	3.8	Three-phase 380 V	E	T017I	10005
MS1V3-40C30CD-A33*R	130	4	Three-phase 380 V	E	T017I	10005

Applicable drive for the motor with 23-bit encoder (IS650P)

Motor			Drive IS650P*****			
Motor model	Frame size	Capacity	Voltage class	Size	Recommended drive model	No.
MS1V3 - Ratings of air-cooled series motors						
MS1V3-95C30CD-A331R-F	130	9.5	Three-phase 380 V	G	IS650P-T032I	20002
MS1H3 - Ratings of air-cooled series motors						
MS1H3-90C30CD-A331R-F	180	9	Three-phase 380 V	G	IS650P-T025I	20001
MS1H3-11D30CD-A331R-F	180	11	Three-phase 380 V	G	IS650P-T032I	20002
MS1H3-15D30CD-A331R-F	180	15	Three-phase 380 V	G	IS650P-T037I	20003

Table 1-1 Relationship between the drive and motor encoder

Drive model	Encoder type	Reference
SV660*****	A3: 23-bit multi-turn absolute encoder	SV660P Series Servo Drive Selection Guide SV660N Series Servo Drive Selection Guide SV660F Series Servo Drive Selection Guide
SV670N*****-PTC	A3: 23-bit multi-turn absolute encoder	-
IS650P*****	A3: 23-bit multi-turn absolute encoder	IS650P Series Servo Drive User Guide

Note

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

2 Product Information

2.1 Product Characteristics

- High power density to save installation space
- Maximum power reaching 15 kW (V and H motor models available)
- Optimized electromagnetic circuit and air duct structure for low temperature rise
- Equipped with a 23-bit encoder to improve the positioning accuracy of the equipment
- Compliant with Energy Efficiency Level II in China. In naturally-ventilated motors, motors rated 1500 rpm meet Energy Efficiency Level I, and motors rated 3000 rpm meet Energy Efficiency Level II.

2.2 Model and Nameplate

Model description

MS1 V3 - 75C 30C D - A3 3 1 R - F
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

① MS1 series servo motor	② Inertia and capacity H1: Low inertia, small capacity H2/V2: Low inertia, medium capacity H3/V3: Medium inertia, medium capacity H4: Medium inertia, small capacity	③ Rated power (W) One letter and two digits C: x 100 D: x 1000 Example: 75C: 7500 W
④ Rated speed (rpm) One letter and two digits B: x 10 C: x 100 Example: 30C: 3000 rpm	⑤ Voltage class (V) B: 220 D: 380	⑥ Encoder type One letter and one digit A3: 23-bit multi-turn absolute encoder
⑦ Shaft connection mode 3: Solid shaft, with key and threaded hole	⑧ Brake, reducer, oil seal 1: With oil seal but no brake 4: With oil seal and brake	⑨ Series R: R version ⑩ Cooling method -F: Fan-cooled _: Naturally-ventilated

Nameplate description

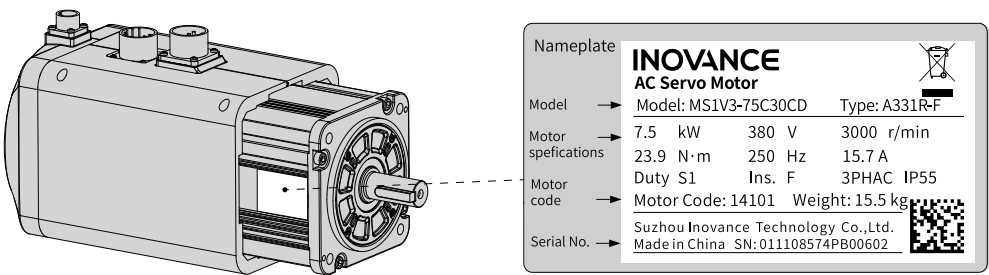


Figure 2-1 Model and nameplate

2.3 Components

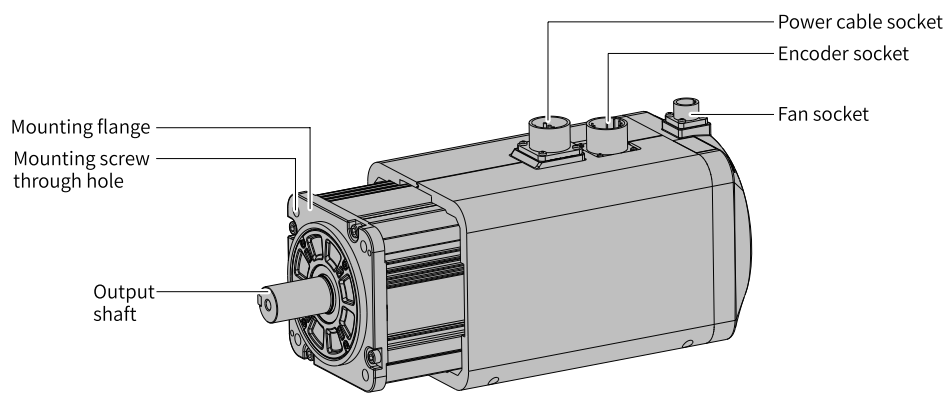


Figure 2-2 Components of the air-cooled motor

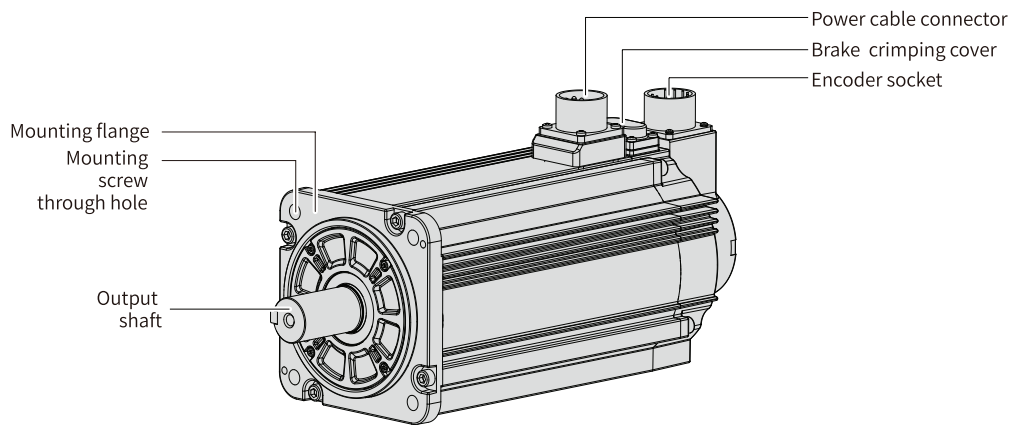


Figure 2-3 Components of naturally-ventilated motor

3 Product Specifications

3.1 Mechanical Specifications

Item		Description
Duty cycle		S1 (Continuous duty)
Vibration level ^[1]		V15
Insulation resistance		500 VDC, above 10 MΩ
Excitation mode		Permanent magnetic
Mounting method		Flange
Heat resistance level		F
Insulation voltage		1800 VAC for 1 min (380 V class)
Degree of protection		• Air-cooled motor: IP55 (except shaft opening and fan cooling components) • Naturally-ventilated motor: IP67 (except shaft opening)
Direction of rotation		Rotates counterclockwise (CCW) when viewed from the shaft extension side with the forward run command. CCW
Ambient condition	Ambient temperature	0°C to 40°C (non-frozen) (Derate based on the derating curve for temperatures above 40°C.)
	Ambient humidity	20% to 80% (without condensation)
	Installation location	• Free from corrosive or explosive gases • Well ventilated and with minimum amount of dust, waste and moisture. • Convenient for inspection and cleanup. • Derating is required only for installation altitudes higher than 1000 m. “3.3 Derating Characteristics” on page 13 • Away sources that may generate strong magnetic field • Away from heating sources such as a heating stove • Use the motor with oil seal in places with grinding fluid, oil mist, iron powders or cuttings. • The oil seal is only dust-proof. It cannot withstand the intrusion of oil for a long term. • Not applicable to vacuum environment • Not applicable to inching (not full-turn) ^[2] and may be stuck • The motor with brake may generate a pattering sound. • In upstream applications of the motor, ensure the force applied on the shaft end is lower than the allowable axial force and radial force of the motor. • The system should avoid continuous operation at natural frequency. Exceeding the allowable vibration value may damage the system.
	Storage environment	Observe the following requirements for storing a de-energized motor. • Storage temperature -20°C to +60°C (non-freezing) • Storage humidity 20% to 80% RH (without condensation)

Item		Description
Shock resistance ^[3]	Shock acceleration (taking flange side as standard)	490 m/s ²
	Number of shocks	2
Vibration resistance ^[4]	Vibration acceleration (taking flange side as standard)	14.7 m/s ² Note: Resonance that does not affect the product function or damage the product can be allowed. Avoid continuous operation of the system at natural frequency. Adjust the application and installation conditions when resonance occurs.
	Threshold of built-in PTC	Alarm temperature of the drive: 130°C

Table 3-1 Fan specifications

Frame size	Fan code	Fan type	Fan power (W)	Fan voltage (VDC)
100	23010181	Axial fan	9.6	24
130	23010305		24	24
180	23010262		115.2	24

Note

- [1] Vibration class V15 indicates that the amplitude of vibration is less than 15 µm when a motor rotates at its rated value.
- [2] For applications that require the motor shaft to swing back and forth at a certain angle, contact Inovance.
- [3] The resistance for shock in the vertical direction when the servo motor is mounted with the shaft in a horizontal position is shown in the preceding table.
- [4] The vertical, side-to-side, and front-to-back resistance for vibration in three directions when the servo motor is mounted with the shaft in a horizontal position is shown in the preceding table.
- The vibration intensity applied on the motor varies with applications.

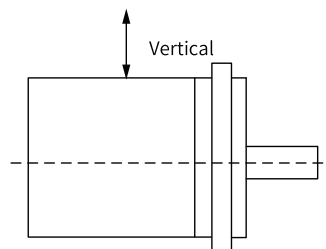


Figure 3-1 Shock applied on the motor

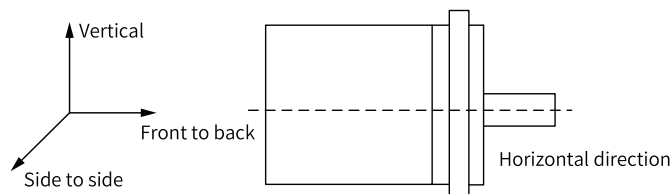


Figure 3-2 Vibration applied on the motor

3.2 Overload Characteristics

This product is compliant with NEC and CEC requirements and equipped with protective functions against motor overload and overtemperature.

To protect different load motors, 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 condition occurs, change the gains based on the temperature rise condition of the motor:

- The motor works in the environment with high ambient temperature.
- The motor is in cyclic motion featuring a short motion cycle and frequent acceleration/ deceleration.
- Overload thermal protection only occurs during continuous energized operation. You need to check the motor temperature when the drive is powered off.

Motor overload protection curve is as follows:

Load ratio (%)	Operating time (s)
115	6000
121.4	2000
127.8	1000
134.2	800
140.6	500
147	300
153.4	150
159.8	100
166.2	80
172.6	60
179.0	50
185.4	45
191.8	40
198.2	36
204.6	32
211.0	28
217.4	23
223.8	22
230.2	19
236.6	18
243.0	15
249.4	14
255.8	13
262.2	11
268.6	10
275.0	9
281.4	8
287.8	7
294.2	6

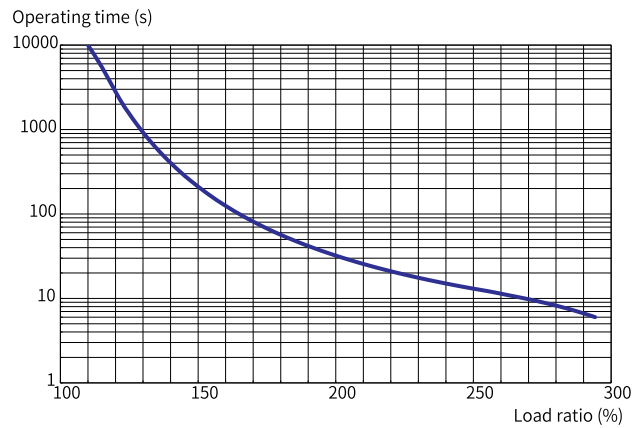


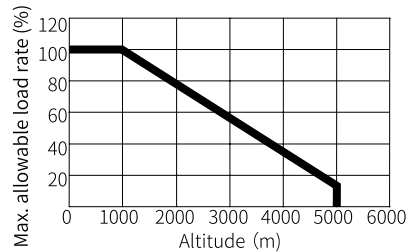
Figure 3-3 Motor overload curve

Note

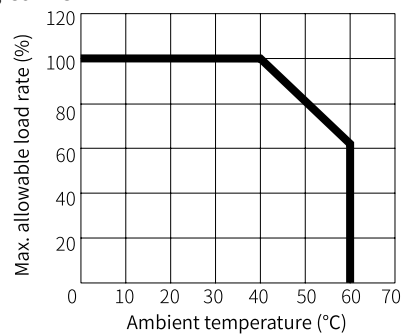
- The maximum torque of H2 models (frame size 130) and V2 models (frame size 100) is 2.3 x rated torque.
- The maximum torque of V3 models (frame size 130) is 2.5 x rated torque.
- The maximum torque of H3 models (frame size 180) is 2 x rated torque.

3.3 Derating Characteristics

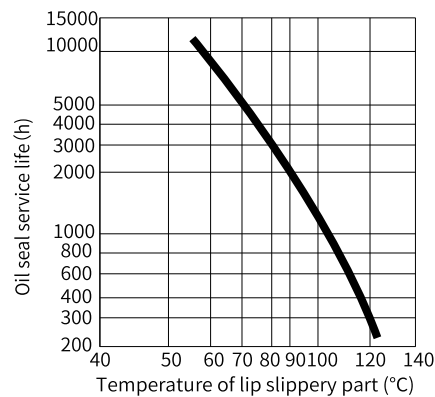
• Altitude-based derating curve



• Temperature-based derating curve



3.4 Temperature Curve of the Oil Seal



3.5 Load Moment of Inertia

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

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

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



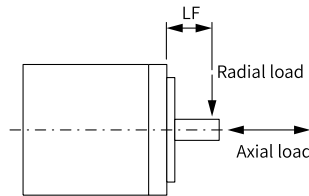
Caution

- For the built-in braking resistor of the drive, see Components.
 - Even you use a built-in resistor, the energy generated in some regenerative conditions may exceed the allowable capacity loss (W) of the resistor. In this case, an external braking resistor is required.
-

4 Motor Selection

4.1 Instructions for Model Selection

- Description of torque-speed characteristics curves:
 - All the technical data and torque-speed characteristic values in the following tables are applicable to motors working with Inovance servo drives with the armature coil temperature being 20°C.
 - Continuous duty zone: Refers to a series of states in which the motor can operate safely and continuously. The actual torque must be located in this area.
 - Intermittent duty zone: Refers to a series of states in which the motor can run in a short time when the actual torque is greater than the rated torque.
- The characteristic values are obtained in cases where the motor is installed with the following heatsink (unit: mm):
 - Frame sizes 100/130: 400 x 400 x 20 (steel)
 - Frame size 180: 550 x 550 x 30 (aluminum)
- Radial and axial loads of the motor:



- The MS1V3/H3 (frame sizes 130/180) model comes with a keyway. When the operating speed is above 3000 rpm, the motor must run with the keyway. If you need to run the motor without the keyway at speeds higher than 3000 rpm, contact Inovance.

Note

- Values inside the parentheses in sections 4.2 to 4.3 apply to the motor with brake.
 - The motor with oil seal must be derated by 10% during use.
 - The 24 VDC power supply needs to be prepared separately. The cross sectional area of DC power cables and motor brake cables of motors rated 750 W and above must be higher than 0.8 mm². To prevent malfunction of the brake, use a separate power supply for the brake, preventing voltage or current drop caused by other electrical devices during operation.
 - The brake apply time and release time vary with the discharge circuit. Check the actual action delay of the product during use. The holding brake cannot be used for braking purpose.
-

4.2 MS1V2/H2 Series Motors with Low Inertia and Medium Capacity

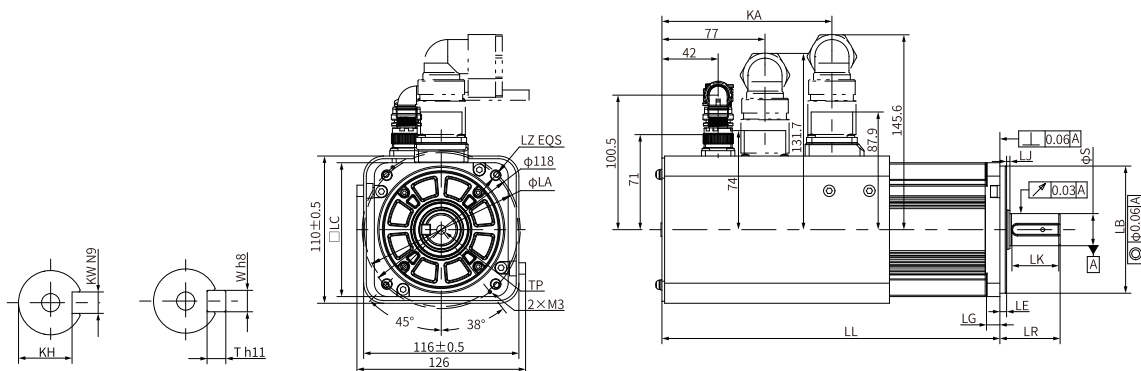
4.2.1 MS1V2-20C30CD-A331R-F

Motor specifications		Torque-Speed characteristics	
Frame size (mm)	100		
Inertia and capacity	Low inertia, medium capacity		
Rated power (kW)	2.0		
Voltage (V)	380		
Rated torque (N·m)	6.37		
Maximum torque (N·m)	14.7		
Rated current (A)	5.30	Heatsink-based derating curve	
Maximum current (A)	20		
Rated speed (rpm)	3000		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	1.28		
Rotor moment of inertia (kg·cm ²)	Motor without brake	2.35 ± 10%	
	Motor with brake	-	

Allowable load

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

Product dimensions (mm)



LC	LL	LR	LA	LZ	KA	LG	LE	LJ
100	218.5	45 ± 1	115	4 x φ7	127	10	5 ± 0.3	2.5 ± 0.75
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ95h7 ⁰ -0.035	24	M8 x 16	35 (-0.62,0)	20	8	8	7	-

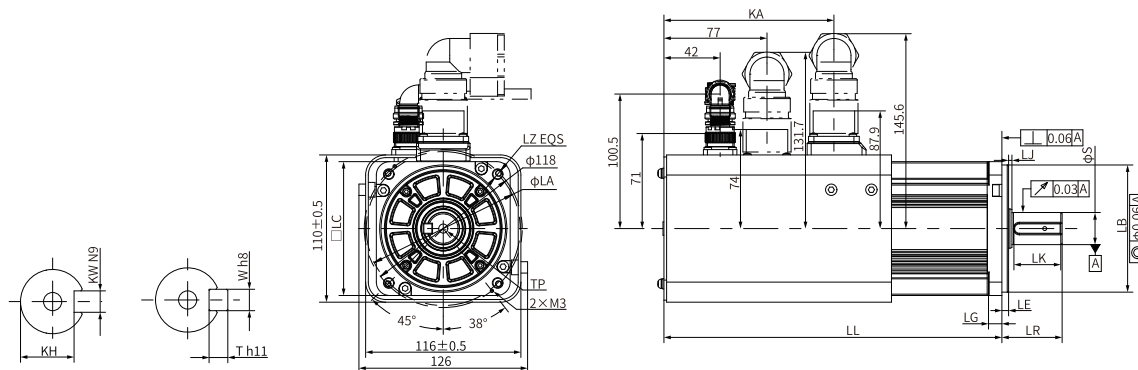
4.2.2 MS1V2-26C30CD-A331R-F

Motor specifications		Torque-Speed characteristics
Frame size (mm)	100	
Inertia and capacity	Low inertia, medium capacity	
Rated power (kW)	2.6	
Voltage (V)	380	
Rated torque (N·m)	8.28	
Maximum torque (N·m)	19.0	
Rated current (A)	6.27	Heatsink-based derating curve
Maximum current (A)	20	
Rated speed (rpm)	3000	
Maximum speed (rpm)	4500	
Torque coefficient (N·m/A)	1.41	
Rotor moment of inertia (kg·cm ²)	Motor without brake	2.92 ± 10%
	Motor with brake	-

Allowable load

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

Product dimensions (mm)



LC	LL	LR	LA	LZ	KA	LG	LE	LJ
100	234.5	45 ± 1	115	4 x φ7	127	10	5 ± 0.3	2.5 ± 0.75
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ95 h7 ⁰ -0.035	24	M8 x 16	35 (-0.62,0)	20	8	8	7	6.8

4.2.3 MS1V2-32C30CD-A331R-F

Motor specifications		Torque-Speed characteristics	
Frame size (mm)	100		
Inertia and capacity	Low inertia, medium capacity		
Rated power (kW)	3.2		
Voltage (V)	380		
Rated torque (N·m)	10.2		
Maximum torque (N·m)	23.5		
Rated current (A)	9.12		
Maximum current (A)	30		
Rated speed (rpm)	3000		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	1.18		
Rotor moment of inertia (kg·cm ²)	Motor without brake	3.5±10%	
	Motor with brake	-	

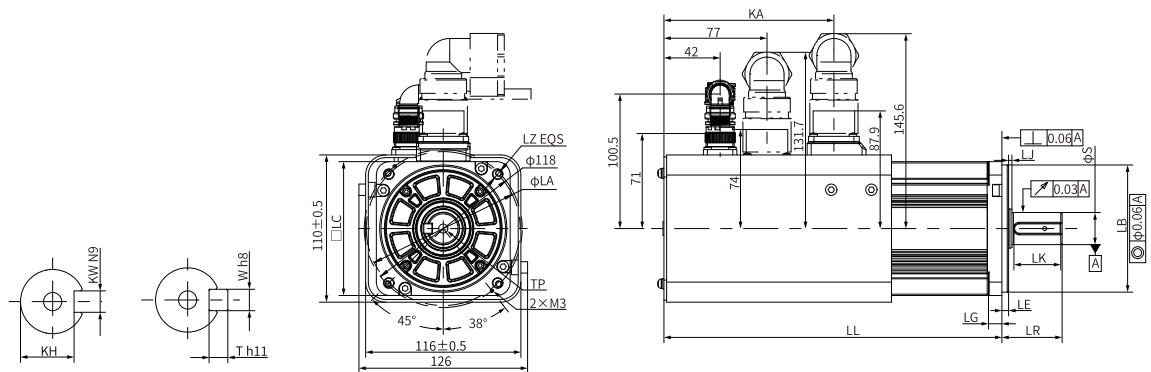
Torque-Speed characteristics	
	— A Intermittent duty zone — B Continuous duty zone

Heatsink-based derating curve	

Allowable load

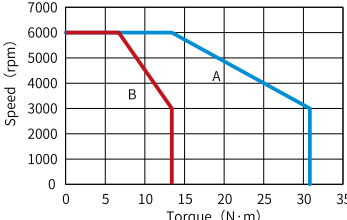
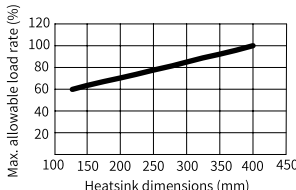
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Product dimensions (mm)



LC	LL	LR	LA	LZ	KA	LG	LE	LJ
100	252.5±1	45±1	115	4 × φ7	127	10	5±0.3	2.5±0.75
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ95 h7 ⁰ -0.035	24	M8 x 16	35 (-0.62,0)	20	8	8	7	-

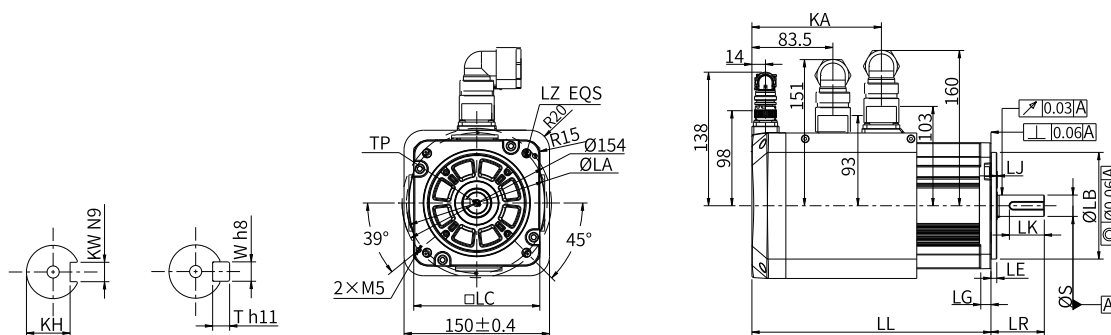
4.2.4 MS1H2-42C30CD-A331R-F

Motor specifications			Torque-Speed characteristics	
Frame size (mm)	130			
Inertia and capacity	Low inertia, medium capacity			
Rated power (kW)	4.2			
Voltage (V)	380			
Rated torque (N·m)	13.4			
Maximum torque (N·m)	30.8			
Rated current (A)	11.6			
Maximum current (A)	42		Heatsink-based derating curve 	
Rated speed (rpm)	3000			
Maximum speed (rpm)	6000			
Torque coefficient (N·m/A)	1.25			
Rotor moment of inertia (kg·cm ²)	Motor without brake	6.54±10%		
	Motor with brake	-		

Allowable load

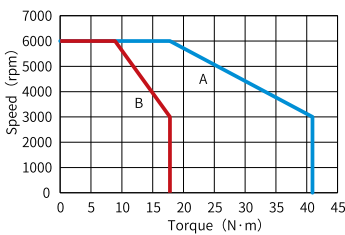
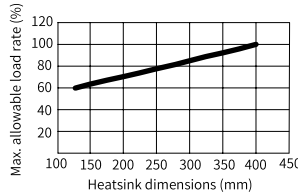
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	≤ 1176	≤ 392

Product dimensions (mm)



LC	LL	LR	LA	LZ	KA	LG	LE	LJ
130	261	63±1	145	4 x φ9	133.5	10.5	6±0.3	0.5±0.75
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ110 h7 ⁰ _{-0.035}	28	M8 x 20	53 (-0.62,0)	24	8	8	7	-

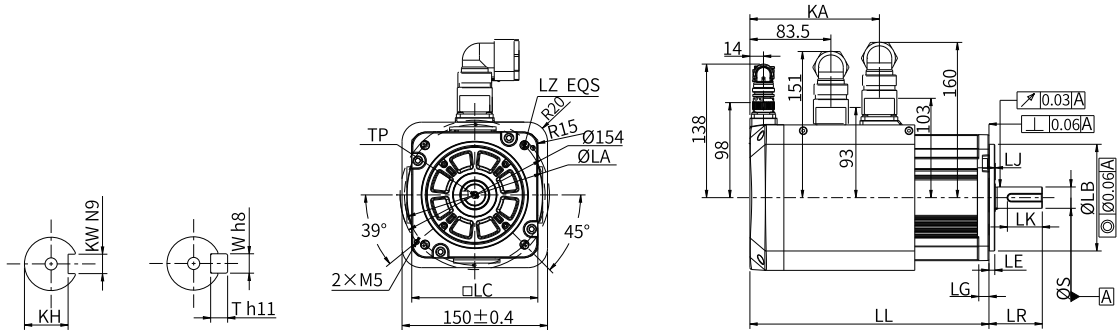
4.2.5 MS1H2-56C30CD-A331R-F

Motor specifications		Torque-Speed characteristics		
Frame size (mm)	130			
Inertia and capacity	Low inertia, medium capacity			
Rated power (kW)	5.6			
Voltage (V)	380			
Rated torque (N·m)	17.8			
Maximum torque (N·m)	40.9			
Rated current (A)	19.4		Heatsink-based derating curve	
Maximum current (A)	65			
Rated speed (rpm)	3000			
Maximum speed (rpm)	6000			
Torque coefficient (N·m/A)	1.06			
Rotor moment of inertia (kg·cm ²)	Motor without brake	9.39±10%		
	Motor with brake	-		

Allowable load

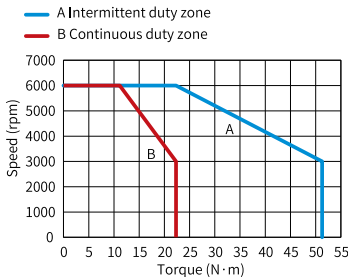
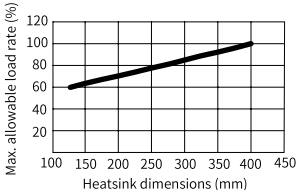
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	≤ 1176	≤ 392

Product dimensions (mm)



LC	LL	LR	LA	LZ	KA	LG	LE	LJ
130	299	63±1	145	4 x φ9	133.5	10.5	6±0.3	0.5±0.75
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ110 h7 ⁰ -0.035	28	M8 x 20	53 (-0.62,0)	24	8	8	7	-

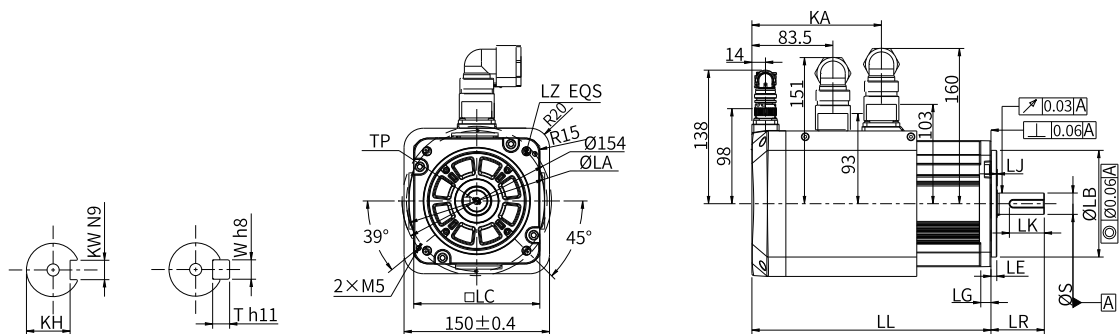
4.2.6 MS1H2-70C30CD-A331R-F

Motor specifications			Torque-Speed characteristics	
Frame size (mm)	130			
Inertia and capacity	Low inertia, medium capacity			
Rated power (kW)	7.0			
Voltage (V)	380			
Rated torque (N·m)	22.3			
Maximum torque (N·m)	51.3			
Rated current (A)	24.2		Heatsink-based derating curve	
Maximum current (A)	65			
Rated speed (rpm)	3000			
Maximum speed (rpm)	6000			
Torque coefficient (N·m/A)	1.04			
Rotor moment of inertia (kg·cm ²)	Motor without brake	11.6±10%		
	Motor with brake	-		

Allowable load

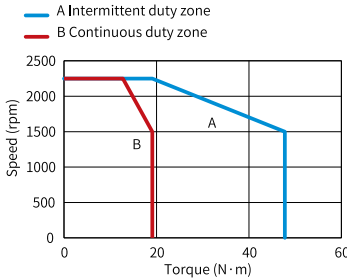
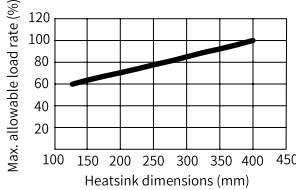
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	≤ 1176	≤ 392

Product dimensions (mm)



LC	LL	LR	LA	LZ	KA	LG	LE	LJ
130	337	63±1	145	4 x ϕ9	133.5	10.5	6±0.3	0.5±0.75
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
ϕ110 h7 ⁰ _{-0.035}	28	M8 x 20	53 (-0.62,0)	24	8	8	7	19.3

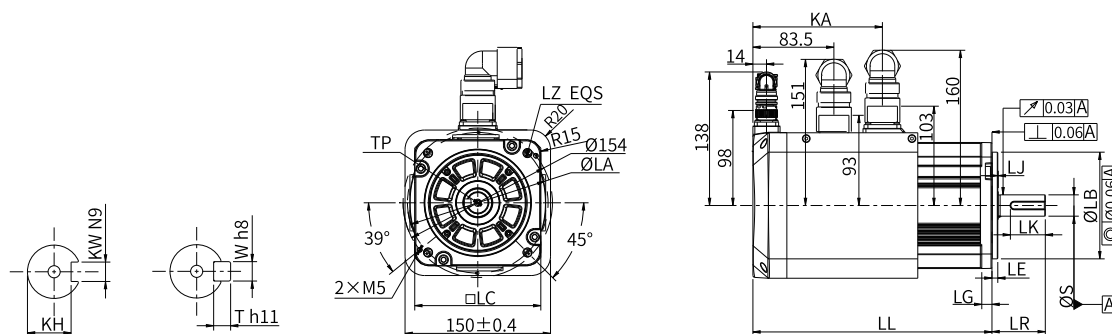
4.3.2 MS1V3-30C15CD-A331R-F

Motor specifications			Torque-Speed characteristics	
Frame size (mm)	130			
Inertia and capacity	Medium inertia, medium capacity			
Rated power (kW)	3.0			
Voltage (V)	380			
Rated torque (N·m)	19.1			
Maximum torque (N·m)	47.8			
Rated current (A)	6.58		Heatsink-based derating curve	
Maximum current (A)	18			
Rated speed (rpm)	1500			
Maximum speed (rpm)	2250			
Torque coefficient (N·m/A)	3.11			
Rotor moment of inertia (kg·cm ²)	Motor without brake	18.6±10%		
	Motor with brake	-		

Allowable load

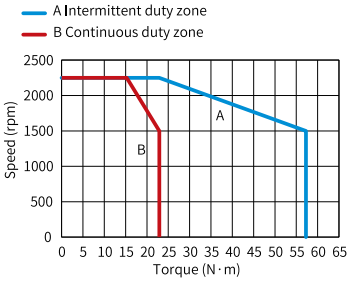
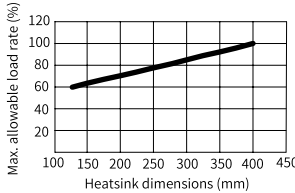
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Product dimensions (mm)



LC	LL	LR	LA	LZ	KA	LG	LE	LJ
130	261.5	55±1	145	4 x φ9	133.5	10.5	6±0.3	0.5±0.75
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ110 h7 ⁰ _{-0.035}	22	M6 x 20	35 (-0.62,0)	18	8	8	7	11

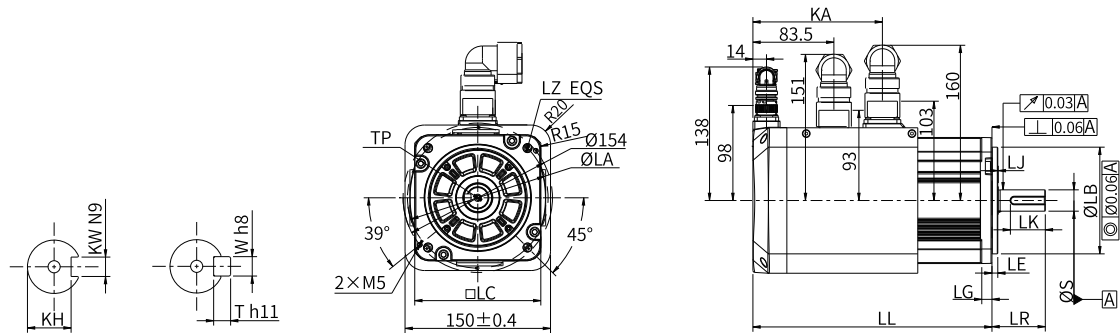
4.3.3 MS1V3-36C15CD-A331R-F

Motor specifications			Torque-Speed characteristics	
Frame size (mm)	130			
Inertia and capacity	Medium inertia, medium capacity			
Rated power (kW)	3.8			
Voltage (V)	380			
Rated torque (N·m)	22.9			
Maximum torque (N·m)	57.3			
Rated current (A)	7.88		Heatsink-based derating curve	
Maximum current (A)	28			
Rated speed (rpm)	1500			
Maximum speed (rpm)	2250			
Torque coefficient (N·m/A)	3.03			
Rotor moment of inertia (kg·cm ²)	Motor without brake	22.1 ± 10%		
	Motor with brake	-		

Allowable load

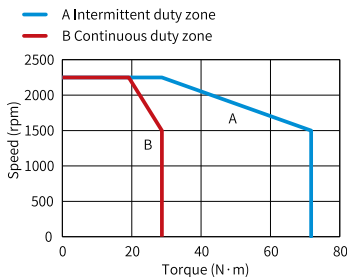
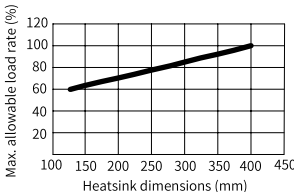
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Product dimensions (mm)



LC	LL	LR	LA	LZ	KA	LG	LE	LJ
130	276.5	55±1	145	4 x φ9	133.5	10.5	6±0.3	0.5±0.75
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ110 h7 ⁰ _{-0.035}	22	M6 x 20	35 (-0.62,0)	18	8	8	7	12

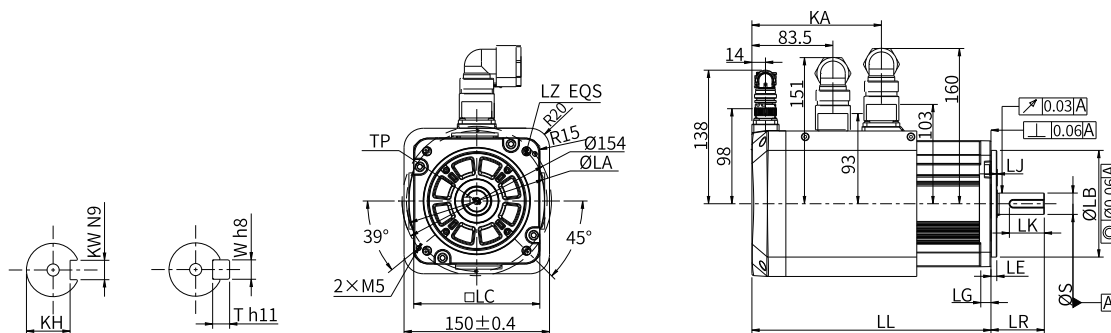
4.3.4 MS1V3-45C15CD-A331R-F

Motor specifications		Torque-Speed characteristics	
Frame size (mm)	130		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	4.5		
Voltage (V)	380		
Rated torque (N·m)	28.7		
Maximum torque (N·m)	71.8		
Rated current (A)	14.1		
Maximum current (A)	40		
Rated speed (rpm)	1500		
Maximum speed (rpm)	2250		
Torque coefficient (N·m/A)	2.19		
Rotor moment of inertia (kg·cm ²)	Motor without brake	29.4±10%	
	Motor with brake	-	

Allowable load

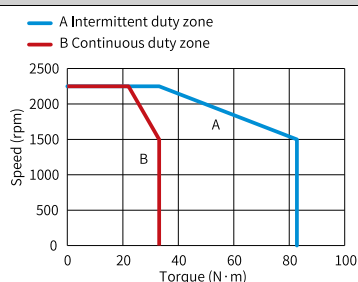
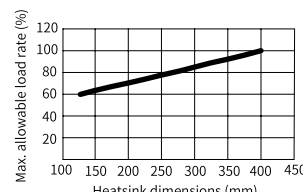
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Product dimensions (mm)



LC	LL	LR	LA	LZ	KA	LG	LE	LJ
130	306.5	55±1	145	4 x φ9	134.5	10.5	6±0.3	0.5±0.75
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ110 h7 ⁰ -0.035	22	M6 x 20	35 (-0.62,0)	18	8	8	7	14.75

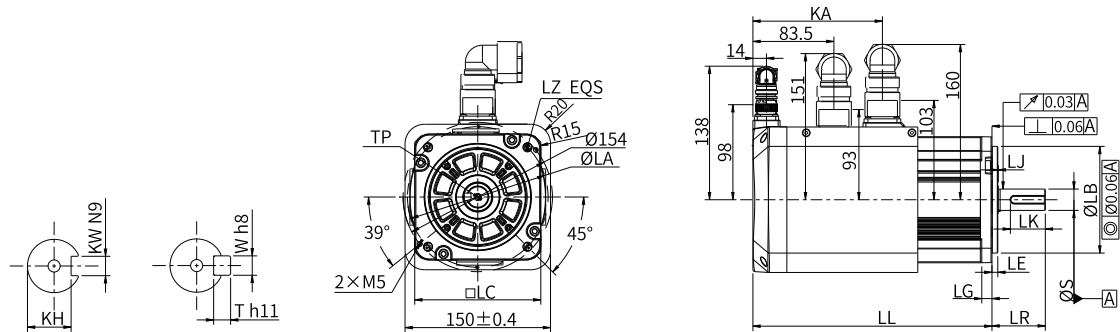
4.3.5 MS1V3-52C15CD-A331R-F

Motor specifications			Torque-Speed characteristics
Frame size (mm)	130		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	5.2		
Voltage (V)	380		
Rated torque (N·m)	33.1		
Maximum torque (N·m)	82.8		
Rated current (A)	12.8		
Heatsink-based derating curve			
Maximum current (A)	50		
Rated speed (rpm)	1500		
Maximum speed (rpm)	2250		
Torque coefficient (N·m/A)	2.72		
Rotor moment of inertia (kg·cm ²)	Motor without brake	34±10%	
	Motor with brake	-	

Allowable load

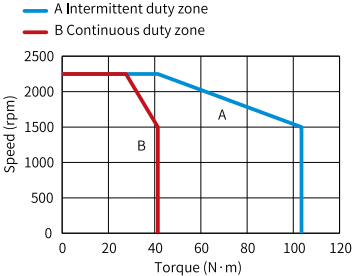
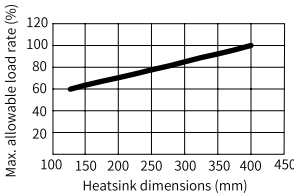
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	≤ 1470	≤ 490

Product dimensions (mm)



LC	LL	LR	LA	LZ	KA	LG	LE	LJ
130	326.5	55±1	145	4 x φ9	134.5	10.5	6±0.3	0.5±0.75
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ110 h7 ⁰ -0.035	28	M8 x 20	35 (-0.62,0)	24	8	8	7	-

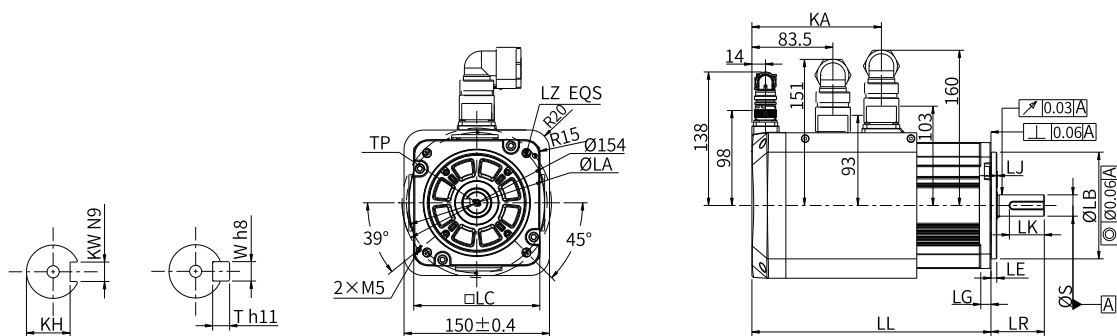
4.3.6 MS1V3-65C15CD-A331R-F

Motor specifications		Torque-Speed characteristics		
Frame size (mm)	130			
Inertia and capacity	Medium inertia, medium capacity			
Rated power (kW)	6.5			
Voltage (V)	380			
Rated torque (N·m)	41.4			
Maximum torque (N·m)	103.5			
Rated current (A)	14.1		Heatsink-based derating curve	
Maximum current (A)	42			
Rated speed (rpm)	1500			
Maximum speed (rpm)	2250			
Torque coefficient (N·m/A)	3.19			
Rotor moment of inertia (kg·cm ²)	Motor without brake	41.2±10%		
	Motor with brake	-		

Allowable load

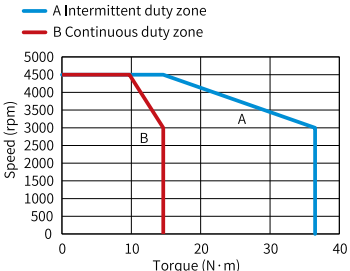
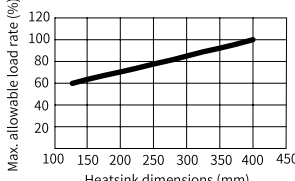
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 1176	≤ 392

Product dimensions (mm)



LC	LL	LR	LA	LZ	KA	LG	LE	LJ
130	357.5	55±1	145	4 x φ9	134.5	10.5	6±0.3	0.5±0.75
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ110 h7 ⁰ _{-0.035}	28	M8 x 20	40 (-0.62,0)	24	8	8	7	18.8

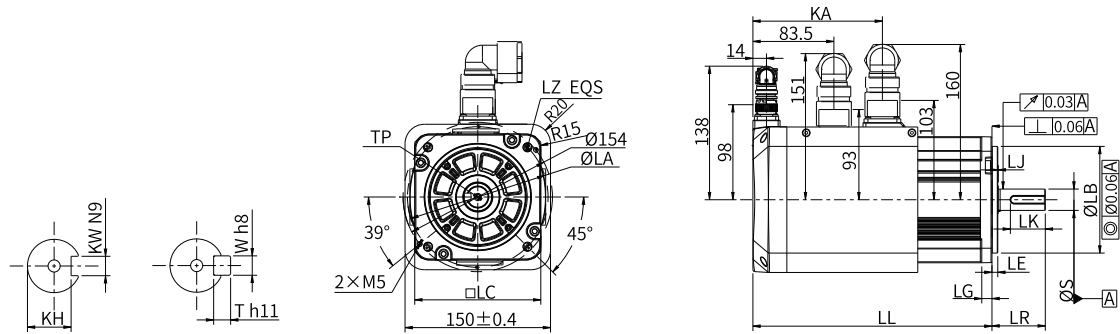
4.3.7 MS1V3-46C30CD-A331R-F

Motor specifications			Torque-Speed characteristics
Frame size (mm)	130		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	4.6		
Voltage (V)	380		
Rated torque (N·m)	14.6		
Maximum torque (N·m)	36.6		
Rated current (A)	8.38		
Maximum current (A)	28		
Heatsink-based derating curve			
Rated speed (rpm)	3000		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	1.87		
Rotor moment of inertia (kg·cm ²)	Motor without brake	14.9±10%	
	Motor with brake	-	

Allowable load

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

Product dimensions (mm)



LC	LL	LR	LA	LZ	KA	LG	LE	LJ
130	246.5	55±1	145	4 x φ9	133.5	10.5	6±0.3	0.5±0.75
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ110 h7 ⁰ -0.035	22	M6 x 20	35 (-0.62,0)	18	8	8	7	9.7

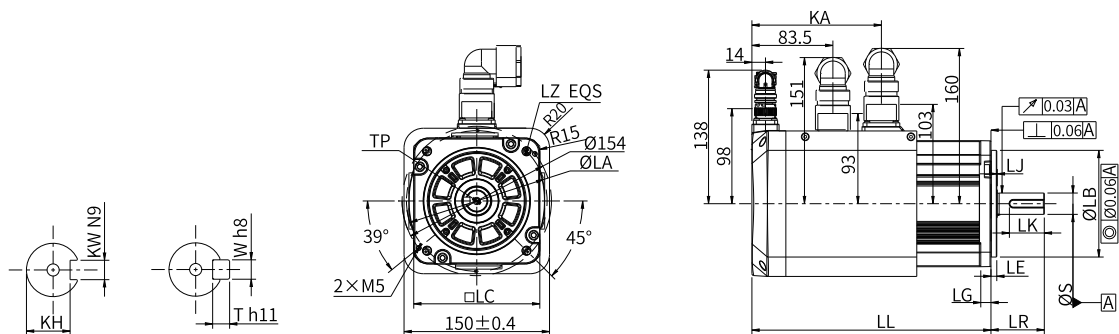
4.3.8 MS1V3-55C30CD-A331R-F

Motor specifications			Torque-Speed characteristics	
Frame size (mm)	130		A Intermittent duty zone B Continuous duty zone	
Inertia and capacity	Medium inertia, medium capacity			
Rated power (kW)	5.5			
Voltage (V)	380			
Rated torque (N·m)	17.5			
Maximum torque (N·m)	43.8			
Rated current (A)	13.8			
Maximum current (A)	42		Max. allowable load rate (%) Heatsink dimensions (mm)	
Rated speed (rpm)	3000			
Maximum speed (rpm)	4500			
Torque coefficient (N·m/A)	1.37			
Rotor moment of inertia (kg·cm ²)	Motor without brake	18.6±10%		
	Motor with brake	-		

Allowable load

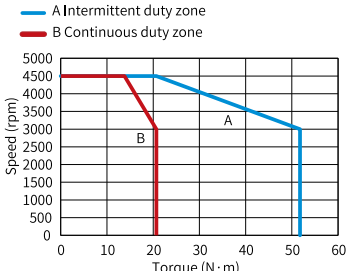
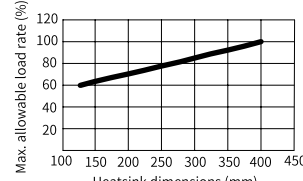
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Product dimensions (mm)



LC	LL	LR	LA	LZ	KA	LG	LE	LJ
130	261.5	55±1	145	4 x φ9	133.5	10.5	6±0.3	0.5±0.75
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ110 h7 ⁰ -0.035	22	M6 x 20	35 (-0.62,0)	18	8	8	7	11

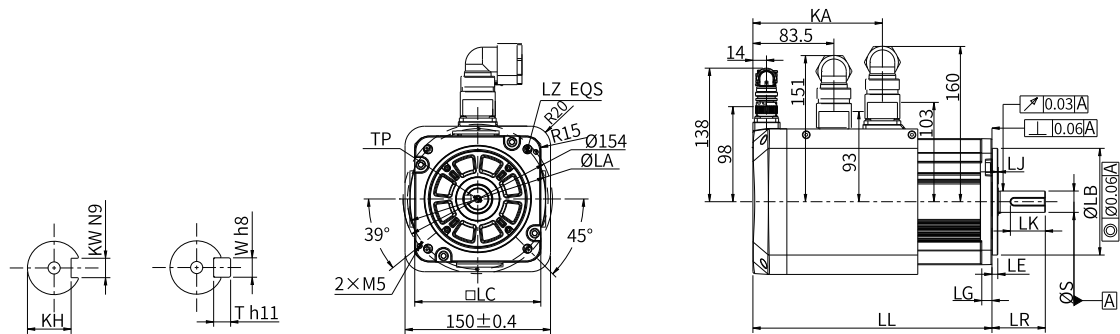
4.3.9 MS1V3-65C30CD-A331R-F

Motor specifications			Torque-Speed characteristics	
Frame size (mm)	130			
Inertia and capacity	Medium inertia, medium capacity			
Rated power (kW)	6.5			
Voltage (V)	380			
Rated torque (N·m)	20.7			
Maximum torque (N·m)	51.8			
Rated current (A)	14.2			
Maximum current (A)	42			
Rated speed (rpm)	3000			
Maximum speed (rpm)	4500			
Torque coefficient (N·m/A)	1.65			
Rotor moment of inertia (kg·cm ²)	Motor without brake	22.1 ± 10%		
	Motor with brake	-		

Allowable load

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

Product dimensions (mm)



LC	LL	LR	LA	LZ	KA	LG	LE	LJ
130	276.5	55±1	145	4 x φ9	133.5	10.5	6±0.3	0.5±0.75
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ110 h7 ⁰ -0.035	22	M6 x 20	35 (-0.62,0)	18	8	8	7	12.3

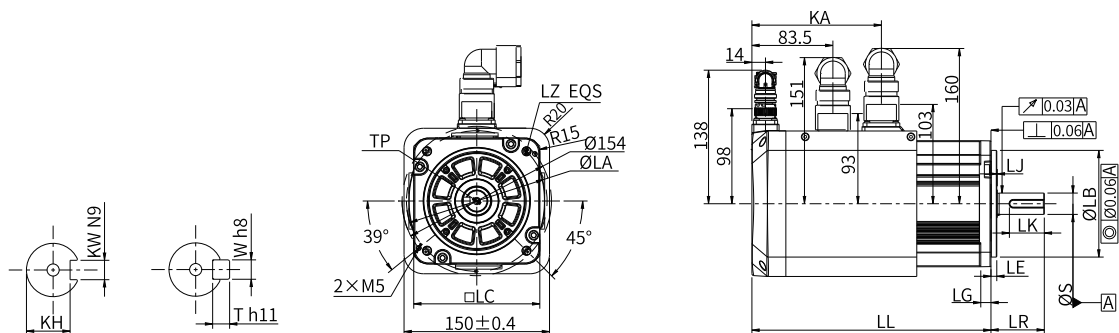
4.3.10 MS1V3-75C30CD-A331R-F

Motor specifications			Torque-Speed characteristics	
Frame size (mm)	130		— A Intermittent duty zone — B Continuous duty zone	
Inertia and capacity	Medium inertia, medium capacity			
Rated power (kW)	7.5			
Voltage (V)	380			
Rated torque (N·m)	23.9			
Maximum torque (N·m)	59.8			
Rated current (A)	15.7		Heatsink-based derating curve	
Maximum current (A)	44		Max. allowable load rate (%) Heatsink dimensions (mm)	
Rated speed (rpm)	3000			
Maximum speed (rpm)	4500			
Torque coefficient (N·m/A)	1.62			
Rotor moment of inertia (kg·cm ²)	Motor without brake	29.4±10%		
	Motor with brake	-		

Allowable load

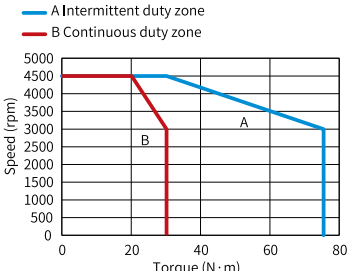
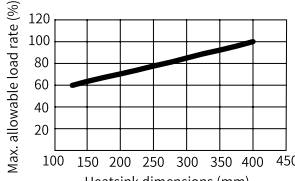
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Product dimensions (mm)



LC	LL	LR	LA	LZ	KA	LG	LE	LJ
130	306.5	55±1	145	4 x ϕ9	133.5	10.5	6±0.3	0.5±0.75
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
ϕ110 h7 ⁰ _{-0.035}	22	M6 x 20	35 (-0.62,0)	18	8	8	7	-

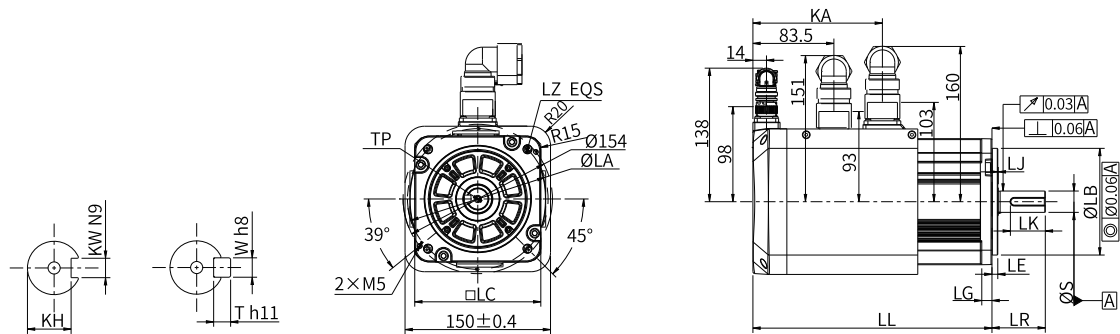
4.3.11 MS1V3-95C30CD-A331R-F

Motor specifications			Torque-Speed characteristics	
Frame size (mm)	130			
Inertia and capacity	Medium inertia, medium capacity			
Rated power (kW)	9.5			
Voltage (V)	380			
Rated torque (N·m)	30.2			
Maximum torque (N·m)	75.6			
Rated current (A)	16.4			
Maximum current (A)	49			
Rated speed (rpm)	3000			
Maximum speed (rpm)	4500			
Torque coefficient (N·m/A)	2.05			
Rotor moment of inertia (kg·cm ²)	Motor without brake	34±10%		
	Motor with brake	-		

Allowable load

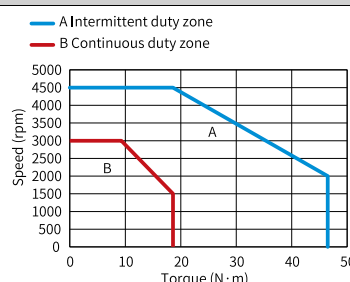
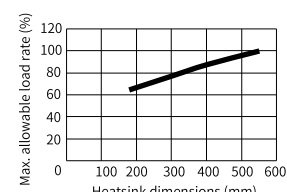
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 1176	≤ 392

Product dimensions (mm)



LC	LL	LR	LA	LZ	KA	LG	LE	LJ
130	326.5	55±1	145	4 x φ9	133.5	10.5	6±0.3	0.5±0.75
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ110 h7 ⁰ _{-0.035}	28	M8 x 20	35 (-0.62,0)	24	8	8	7	16.5

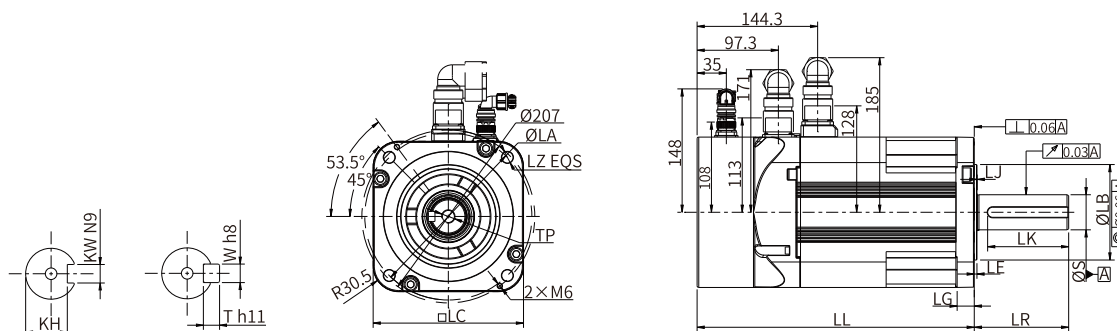
4.3.12 MS1H3-29C15CD-A331R-F

Motor specifications			Torque-Speed characteristics	
Frame size (mm)	180			
Inertia and capacity	Medium inertia, medium capacity			
Rated power (kW)	2.9			
Voltage (V)	380			
Rated torque (N·m)	18.6			
Maximum torque (N·m)	46.5			
Rated current (A)	10.5			
Maximum current (A)	29.75		Heatsink-based derating curve 	
Rated speed (rpm)	1500			
Maximum speed (rpm)	4500			
Torque coefficient (N·m/A)	1.94			
Rotor moment of inertia (kg·cm ²)	Motor without brake	44.7±10%		
	Motor with brake	-		

Allowable load

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

Product dimensions (mm)



LC	LL	LR	LA	LZ	LG	LE	LJ	
180	237.8	79±1	200	4 x φ13.5	20.5	3.2±0.3	0.3±0.75	
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ114.3 h7 ⁰ _{-0.035}	35	M12 x 25	64 (-0.74,0)	30	10	10	8	15.5

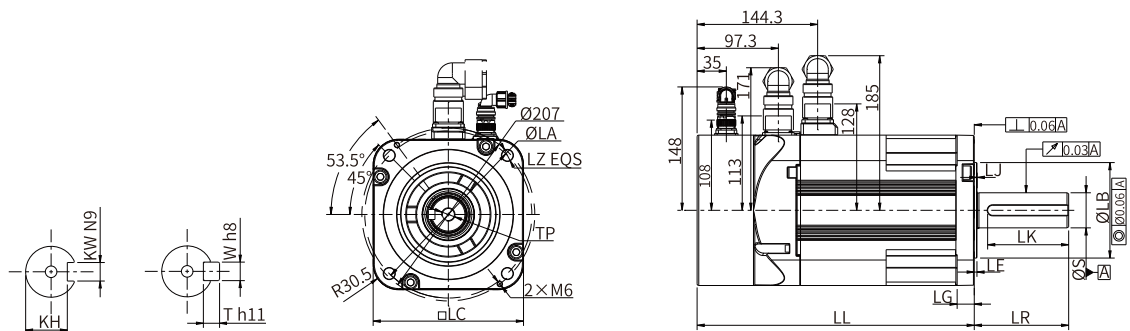
4.3.13 MS1H3-44C15CD-A331R-F

Motor specifications			Torque-Speed characteristics	
Frame size (mm)	180		— A Intermittent duty zone — B Continuous duty zone	
Inertia and capacity	Medium inertia, medium capacity			
Rated power (kW)	4.4			
Voltage (V)	380			
Rated torque (N·m)	28.4			
Maximum torque (N·m)	71.1			
Rated current (A)	16.0			
Maximum current (A)	42			
Rated speed (rpm)	1500		Max. allowable load rate (%) Heatsink dimensions (mm)	
Maximum speed (rpm)	4500			
Torque coefficient (N·m/A)	1.96			
Rotor moment of inertia (kg·cm ²)	Motor without brake	64.9±10%		
	Motor with brake	-		

Allowable load

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

Product dimensions (mm)



LC	LL	LR	LA	LZ	LG	LE	LJ	
180	261.5	79±1	200	4 x ϕ13.5	20.5	3.2±0.3	0.3±0.75	
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
ϕ114.3 h7 ⁰ _{-0.035}	35	M12 x 25	64 (-0.74,0)	30	10	10	8	19.25

4.3.14 MS1H3-55C15CD-A331R-F

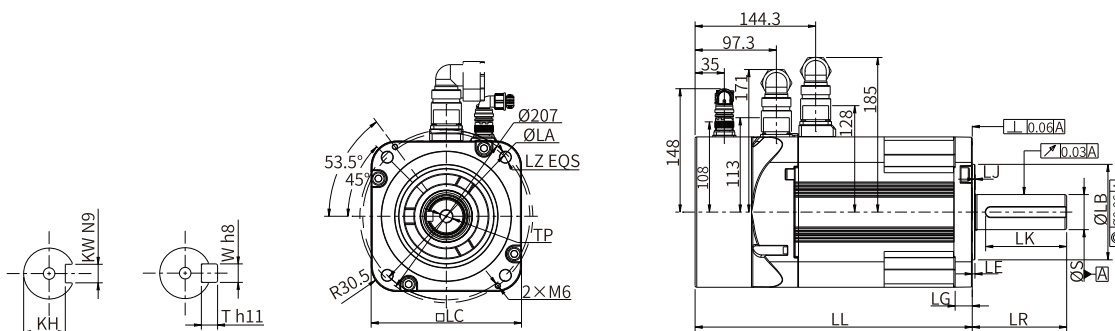
Motor specifications		Torque-Speed characteristics																						
Frame size (mm)	180		— A Intermittent duty zone — B Continuous duty zone <table border="1"><caption>Data for Torque-Speed characteristics</caption><thead><tr><th>Torque (N·m)</th><th>Speed (rpm) - Zone A</th><th>Speed (rpm) - Zone B</th></tr></thead><tbody><tr><td>0</td><td>4500</td><td>3000</td></tr><tr><td>20</td><td>4500</td><td>3000</td></tr><tr><td>40</td><td>4000</td><td>1500</td></tr><tr><td>60</td><td>3000</td><td>-</td></tr><tr><td>80</td><td>2000</td><td>-</td></tr><tr><td>90</td><td>0</td><td>-</td></tr></tbody></table>	Torque (N·m)	Speed (rpm) - Zone A	Speed (rpm) - Zone B	0	4500	3000	20	4500	3000	40	4000	1500	60	3000	-	80	2000	-	90	0	-
Torque (N·m)	Speed (rpm) - Zone A	Speed (rpm) - Zone B																						
0	4500	3000																						
20	4500	3000																						
40	4000	1500																						
60	3000	-																						
80	2000	-																						
90	0	-																						
Inertia and capacity	Medium inertia, medium capacity																							
Rated power (kW)	5.5																							
Voltage (V)	380																							
Rated torque (N·m)	35.0																							
Maximum torque (N·m)	87.6																							
Rated current (A)	20.7																							
Maximum current (A)	52																							
Rated speed (rpm)	1500																							
Maximum speed (rpm)	4500																							
Torque coefficient (N·m/A)	1.92																							
Rotor moment of inertia (kg·cm ²)	Motor without brake	86.9±10%																						
	Motor with brake	-																						

Heatsink-based derating curve															
Max. allowable load rate (%) <table border="1"><caption>Data for Heatsink-based derating curve</caption><thead><tr><th>Heatsink dimensions (mm)</th><th>Max. allowable load rate (%)</th></tr></thead><tbody><tr><td>100</td><td>65</td></tr><tr><td>200</td><td>65</td></tr><tr><td>300</td><td>75</td></tr><tr><td>400</td><td>85</td></tr><tr><td>500</td><td>95</td></tr><tr><td>600</td><td>100</td></tr></tbody></table>		Heatsink dimensions (mm)	Max. allowable load rate (%)	100	65	200	65	300	75	400	85	500	95	600	100
Heatsink dimensions (mm)	Max. allowable load rate (%)														
100	65														
200	65														
300	75														
400	85														
500	95														
600	100														

Allowable load

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

Product dimensions (mm)



LC	LL	LR	LA	LZ	LG	LE	LJ	
180	285	113±1	200	4 x Ø13.5	20.5	3.2±0.3	0.3±0.75	
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
Φ114.3 h7 ⁰ _{-0.035}	42	M16 x 32	95 (-0.87,0)	37	12	12	8	23.65

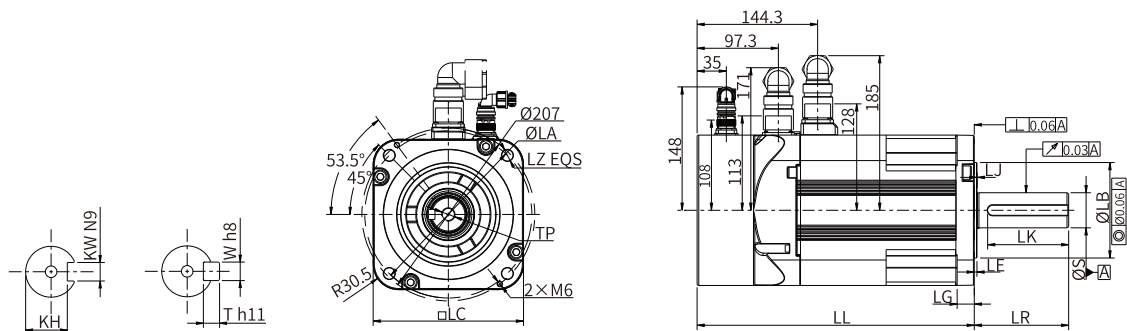
4.3.15 MS1H3-75C15CD-A331R-F

Motor specifications			Torque-Speed characteristics	
Frame size (mm)	180		— A Intermittent duty zone — B Continuous duty zone	
Inertia and capacity	Medium inertia, medium capacity			
Rated power (kW)	7.5			
Voltage (V)	380			
Rated torque (N·m)	48.0			
Maximum torque (N·m)	119.0			
Rated current (A)	25.0		Heatsink-based derating curve Max. allowable load rate (%) Heatsink dimensions (mm)	
Maximum current (A)	65			
Rated speed (rpm)	1500			
Maximum speed (rpm)	4500			
Torque coefficient (N·m/A)	2.13			
Rotor moment of inertia (kg·cm ²)	Motor without brake	127.5±10%		
	Motor with brake	-		

Allowable load

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

Product dimensions (mm)



LC	LL	LR	LA	LZ	LG	LE	LJ	
180	332	113±1	200	4 x ϕ13.5	20.5	3.2±0.3	0.3±0.75	
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
ϕ114.3 h7 ⁰ _{-0.035}	42	M16 x 32	95 (-0.87,0)	37	12	12	8	31.1

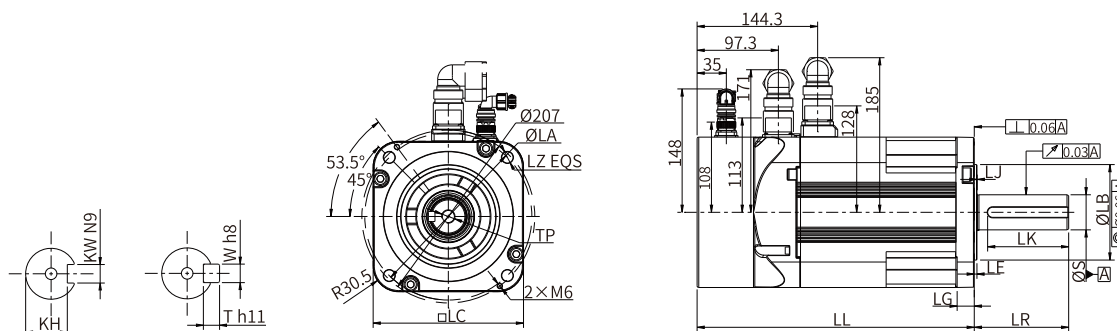
4.3.16 MS1H3-60C30CD-A331R-F

Motor specifications			Torque-Speed characteristics																			
Frame size (mm)	180		— A Intermittent duty zone — B Continuous duty zone <table border="1"><caption>Torque-Speed Characteristics Data</caption><thead><tr><th>Torque (N·m)</th><th>Speed (rpm) - Zone A</th><th>Speed (rpm) - Zone B</th></tr></thead><tbody><tr><td>0</td><td>4500</td><td>4500</td></tr><tr><td>10</td><td>4500</td><td>4500</td></tr><tr><td>20</td><td>4500</td><td>3000</td></tr><tr><td>30</td><td>3750</td><td>-</td></tr><tr><td>40</td><td>3000</td><td>-</td></tr></tbody></table>		Torque (N·m)	Speed (rpm) - Zone A	Speed (rpm) - Zone B	0	4500	4500	10	4500	4500	20	4500	3000	30	3750	-	40	3000	-
Torque (N·m)	Speed (rpm) - Zone A	Speed (rpm) - Zone B																				
0	4500	4500																				
10	4500	4500																				
20	4500	3000																				
30	3750	-																				
40	3000	-																				
Inertia and capacity	Medium inertia, medium capacity																					
Rated power (kW)	6.0																					
Voltage (V)	380																					
Rated torque (N·m)	19.1																					
Maximum torque (N·m)	38.2																					
Rated current (A)	12.0		Heatsink-based derating curve																			
Maximum current (A)	28		Max. allowable load rate (%) <table border="1"><caption>Heatsink-based Derating Curve Data</caption><thead><tr><th>Heatsink dimensions (mm)</th><th>Max. allowable load rate (%)</th></tr></thead><tbody><tr><td>100</td><td>65</td></tr><tr><td>200</td><td>65</td></tr><tr><td>300</td><td>75</td></tr><tr><td>400</td><td>85</td></tr><tr><td>500</td><td>95</td></tr><tr><td>600</td><td>100</td></tr></tbody></table>		Heatsink dimensions (mm)	Max. allowable load rate (%)	100	65	200	65	300	75	400	85	500	95	600	100				
Heatsink dimensions (mm)	Max. allowable load rate (%)																					
100	65																					
200	65																					
300	75																					
400	85																					
500	95																					
600	100																					
Rated speed (rpm)	3000																					
Maximum speed (rpm)	4500																					
Torque coefficient (N·m/A)	1.94																					
Rotor moment of inertia (kg·cm ²)	Motor without brake	44.7±10%																				
	Motor with brake	-																				

Allowable load

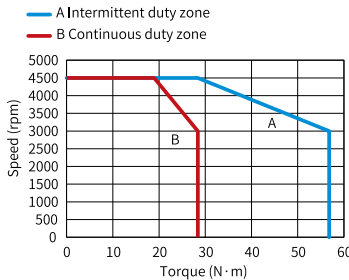
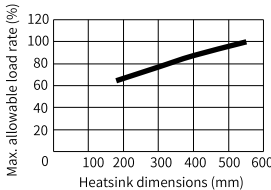
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	≤ 1470	≤ 490

Product dimensions (mm)



LC	LL	LR	LA	LZ	LG	LE	LJ	
180	237.8	79±1	200	4 x φ13.5	20.5	3.2±0.3	0.3±0.75	
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ114.3 h7 ⁰ _{-0.035}	35	M12 x 25	64 (-0.74,0)	30	10	10	8	15.5

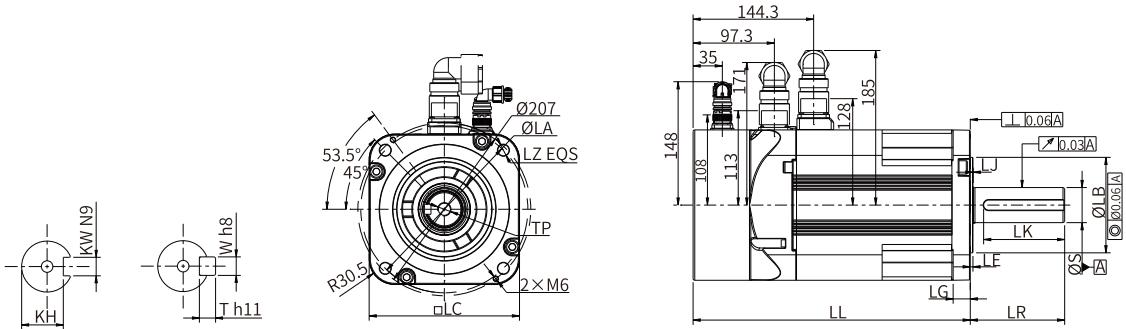
4.3.17 MS1H3-90C30CD-A331R-F

Motor specifications			Torque-Speed characteristics	
Frame size (mm)	180			
Inertia and capacity	Medium inertia, medium capacity			
Rated power (kW)	9.0			
Voltage (V)	380			
Rated torque (N·m)	28.4			
Maximum torque (N·m)	56.8			
Rated current (A)	17.1			
Maximum current (A)	42			
Rated speed (rpm)	3000			
Maximum speed (rpm)	4500			
Torque coefficient (N·m/A)	1.96			
Rotor moment of inertia (kg·cm ²)	Motor without brake	64.9±10%		
	Motor with brake	-		

Allowable load

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

Product dimensions (mm)



LC	LL	LR	LA	LZ	LG	LE	LJ	
180	261.5	79±1	200	4 x φ13.5	20.5	3.2±0.3	0.3±0.75	
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ114.3 h7 ⁰ -0.035	35	M12 x 25	64 (-0.74,0)	30	10	10	8	19.25

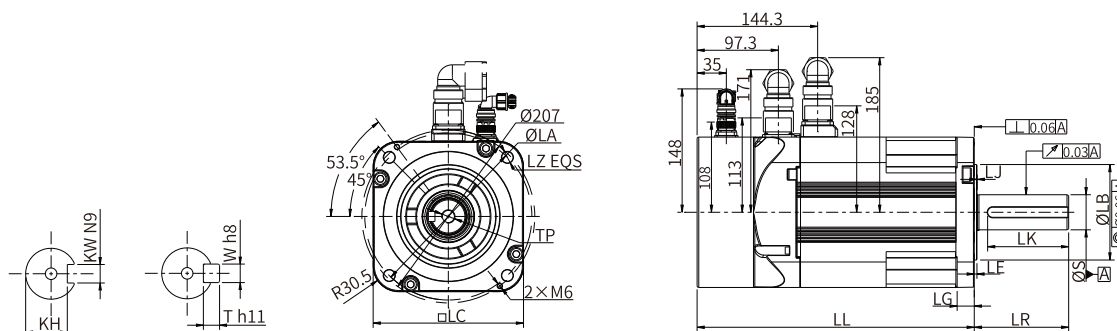
4.3.18 MS1H3-11D30CD-A331R-F

Motor specifications		Torque-Speed characteristics	
Frame size (mm)	180		— A Intermittent duty zone — B Continuous duty zone
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	11.0		
Voltage (V)	380		
Rated torque (N·m)	35.0		
Maximum torque (N·m)	70.0		
Rated current (A)	20.9		
Maximum current (A)	55		
Rated speed (rpm)	3000		Max. allowable load rate (%) Heatsink dimensions (mm)
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	1.92		
Rotor moment of inertia (kg·cm ²)	Motor without brake	86.9±10%	
	Motor with brake	-	

Allowable load

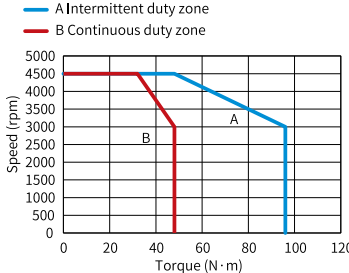
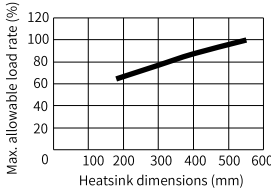
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
113	≤ 1764	≤ 588

Product dimensions (mm)



LC	LL	LR	LA	LZ	LG	LE	LJ	
180	285	113±1	200	4 x φ13.5	20.5	3.2±0.3	0.3±0.75	
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ114.3 h7 ⁰ _{-0.035}	42	M16 x 32	95 (-0.87,0)	37	12	12	8	23.65

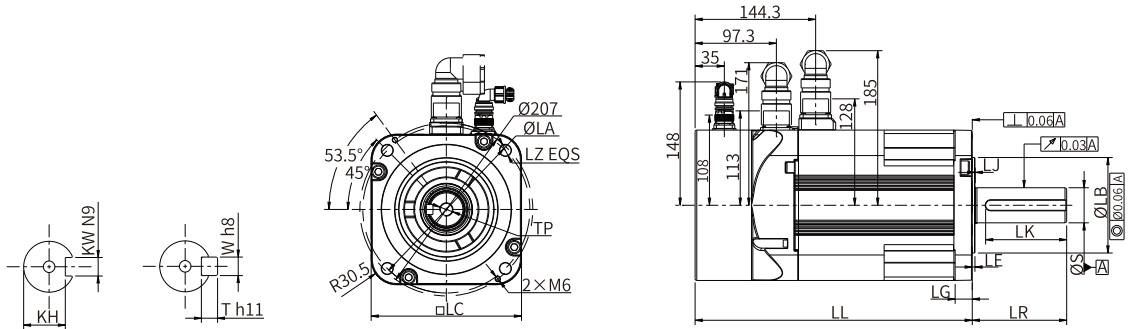
4.3.19 MS1H3-15D30CD-A331R-F

Motor specifications			Torque-Speed characteristics	
Frame size (mm)	180			
Inertia and capacity	Medium inertia, medium capacity			
Rated power (kW)	15.0			
Voltage (V)	380			
Rated torque (N·m)	48.0			
Maximum torque (N·m)	96.0			
Rated current (A)	25.9		Heatsink-based derating curve	
Maximum current (A)	65			
Rated speed (rpm)	3000			
Maximum speed (rpm)	4500			
Torque coefficient (N·m/A)	2.13			
Rotor moment of inertia (kg·cm ²)	Motor without brake	127.5±10%		
	Motor with brake	-		

Allowable load

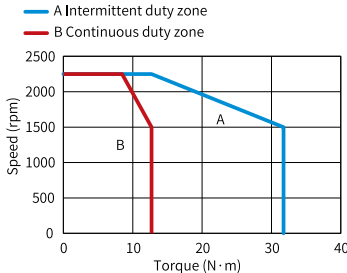
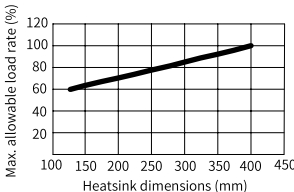
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
113	≤ 1764	≤ 588

Product dimensions (mm)



LC	LL	LR	LA	LZ	LG	LE	LJ	
180	332	113±1	200	4 x φ13.5	20.5	3.2±0.3	0.3±0.75	
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ114.3 h7 ⁰ _{-0.035}	42	M16 x 32	95 (-0.87,0)	37	12	12	8	31.1

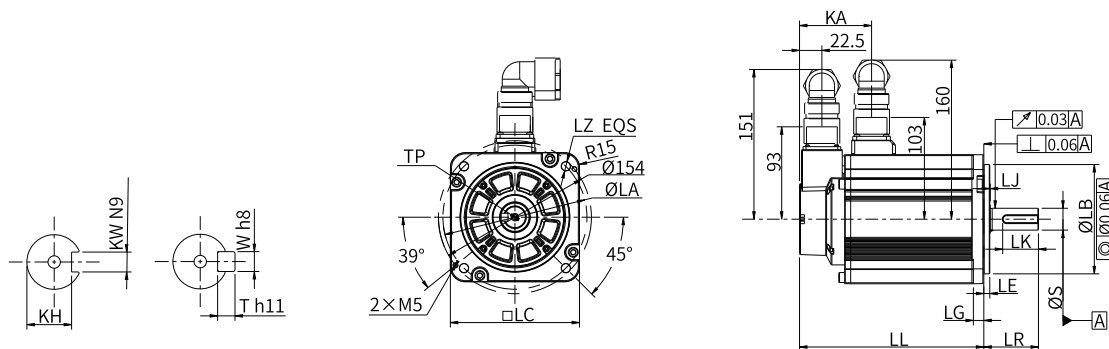
4.3.20 MS1V3-20C15CD-A331R

Motor specifications		Torque-Speed characteristics	
Frame size (mm)	130		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	2.0		
Voltage (V)	380		
Rated torque (N·m)	12.7		
Maximum torque (N·m)	31.8		
Rated current (A)	4.39		
Maximum current (A)	14		
Rated speed (rpm)	1500		
Maximum speed (rpm)	2250		
Torque coefficient (N·m/A)	3.11		
Rotor moment of inertia (kg·cm ²)	Motor without brake		
	Motor with brake	-	

Allowable load

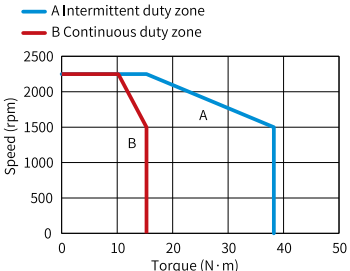
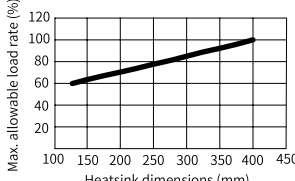
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Product dimensions (mm)



LC	LL	LR	LA	LZ	KA	LG	LE	LJ
130	200.5	55±1	145	4 x φ9	72.5	10.5	6±0.3	0.5±0.75
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ110 h7 ⁰ -0.035	22	M6 x 20	35 (-0.62,0)	18	8	8	7	8.65

4.3.21 MS1V3-24C15CD-A33*R

Motor specifications			Torque-Speed characteristics
Frame size (mm)	130		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	2.4		
Voltage (V)	380		
Rated torque (N·m)	15.3		
Maximum torque (N·m)	38.2		
Rated current (A)	5.24		
Heatsink-based derating curve			
Maximum current (A)	14		
Rated speed (rpm)	1500		
Maximum speed (rpm)	2250		
Torque coefficient (N·m/A)	3.03		
Rotor moment of inertia (kg·cm ²)	Motor without brake	22.1±10%	
	Motor with brake	23.2±10%	

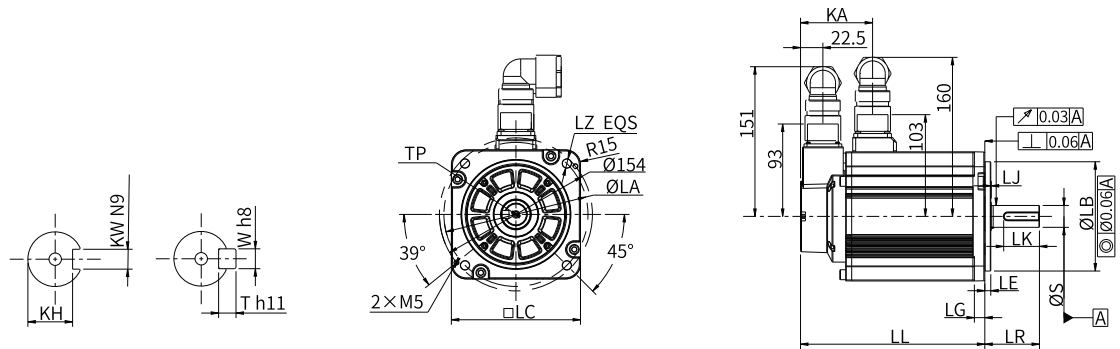
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1.0	≤ 100	≤ 60	≤ 1

Allowable load

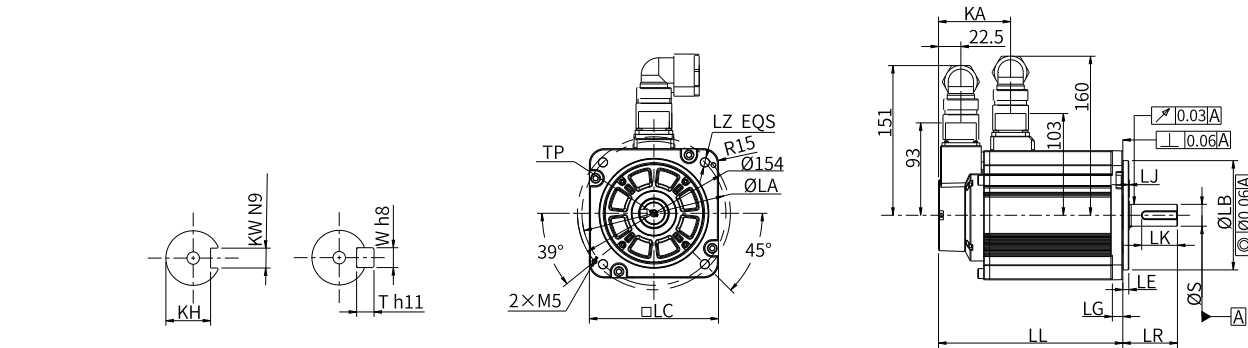
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Product dimensions (mm)



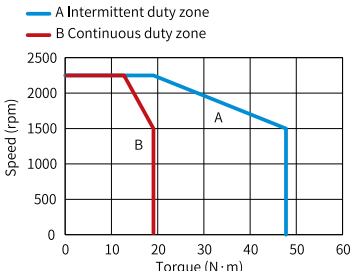
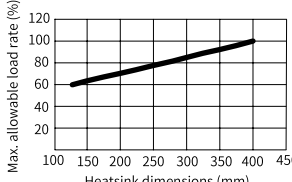
Motor specifications			Torque-Speed characteristics	
Frame size (mm)	130		The graph shows speed (rpm) on the y-axis (0 to 2500) and torque (N·m) on the x-axis (0 to 50). Zone A (Intermittent duty) is a blue line starting at 2250 rpm for 0 torque, dropping to 1500 rpm at 45 N·m. Zone B (Continuous duty) is a red line starting at 2250 rpm for 0 torque, dropping to 1500 rpm at 15 N·m, and then dropping vertically to 0 rpm at 18 N·m.	
Inertia and capacity	Medium inertia, medium capacity			
Rated power (kW)	2.8			
Voltage (V)	380			
Rated torque (N·m)	17.8			
Maximum torque (N·m)	44.5			
Rated current (A)	8.30		The graph shows max allowable load rate (%) on the y-axis (20 to 120) and heatsink dimensions (mm) on the x-axis (100 to 450). The curve starts at approximately 60% load rate for 100 mm dimensions and increases linearly to 100% load rate for 400 mm dimensions.	
Maximum current (A)	24			
Rated speed (rpm)	1500			
Maximum speed (rpm)	2250			
Torque coefficient (N·m/A)	2.19			
Rotor moment of inertia (kg·cm ²)	Motor without brake	29.4±10%		
	Motor with brake	-		

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



LC	LL	LR	LA	LZ	KA	LG	LE	LJ
130	245.5	55±1	145	4 × φ9	72.5	10.5	6±0.3	0.5±0.75
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ110 h7 ⁰ -0.035	22	M6 x 20	35 (-0.62,0)	18	8	8	7	11.85

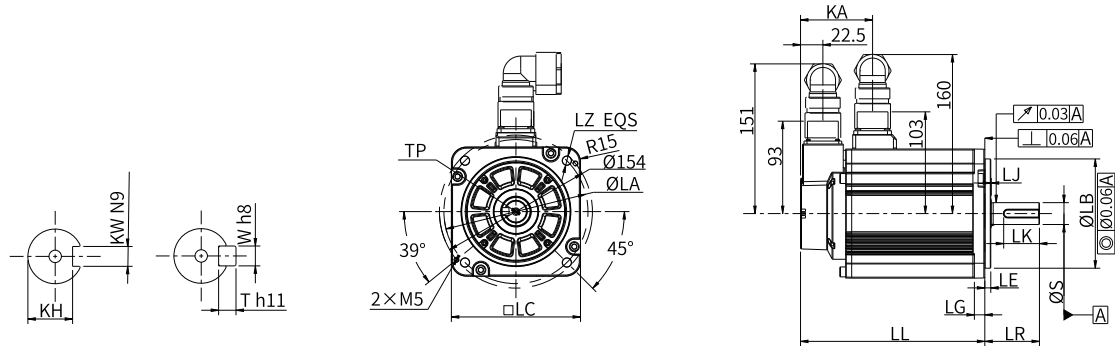
4.3.23 MS1V3-30C15CD-A331R

Motor specifications			Torque-Speed characteristics	
Frame size (mm)	130			
Inertia and capacity	Medium inertia, medium capacity			
Rated power (kW)	3			
Voltage (V)	380			
Rated torque (N·m)	19.1			
Maximum torque (N·m)	47.8			
Rated current (A)	7.14		Heatsink-based derating curve	
Maximum current (A)	20			
Rated speed (rpm)	1500			
Maximum speed (rpm)	2250			
Torque coefficient (N·m/A)	2.72			
Rotor moment of inertia (kg·cm ²)	Motor without brake	34±10%		
	Motor with brake	-		

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 1176	≤ 392

Product dimensions (mm)



LC	LL	LR	LA	LZ	KA	LG	LE	LJ
130	265.5	55±1	145	4 x φ9	72.5	10.5	6±0.3	0.5±0.75
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ110 h7 ⁰ _{-0.035}	28	M8 x 20	35 (-0.62,0)	24	8	8	7	-

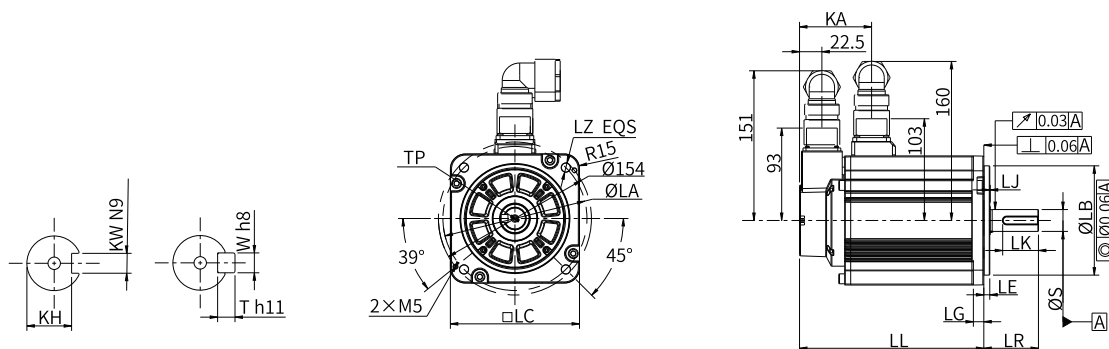
4.3.24 MS1V3-28C30CD-A331R

Motor specifications			Torque-Speed characteristics	
Frame size (mm)	130		— A Intermittent duty zone — B Continuous duty zone	
Inertia and capacity	Medium inertia, medium capacity			
Rated power (kW)	2.8			
Voltage (V)	380			
Rated torque (N·m)	8.91			
Maximum torque (N·m)	22.3			
Rated current (A)	5.13		Heatsink-based derating curve	
Maximum current (A)	14		Max. allowable load rate (%) Heatsink dimensions (mm)	
Rated speed (rpm)	3000			
Maximum speed (rpm)	4500			
Torque coefficient (N·m/A)	1.87			
Rotor moment of inertia (kg·cm ²)	Motor without brake	14.9±10%		
	Motor with brake	-		

Allowable load

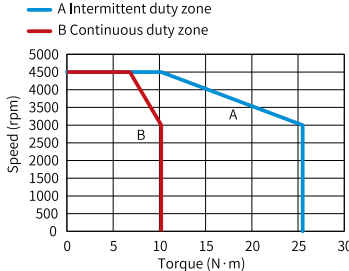
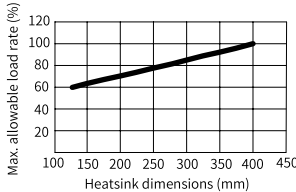
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Product dimensions (mm)



LC	LL	LR	LA	LZ	KA	LG	LE	LJ
130	185.5	55±1	145	4 x φ9	72.5	10.5	6±0.3	0.5±0.75
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ110 h7 ⁰ _{-0.035}	22	M6 x 20	35 (-0.62,0)	18	8	8	7	7.6

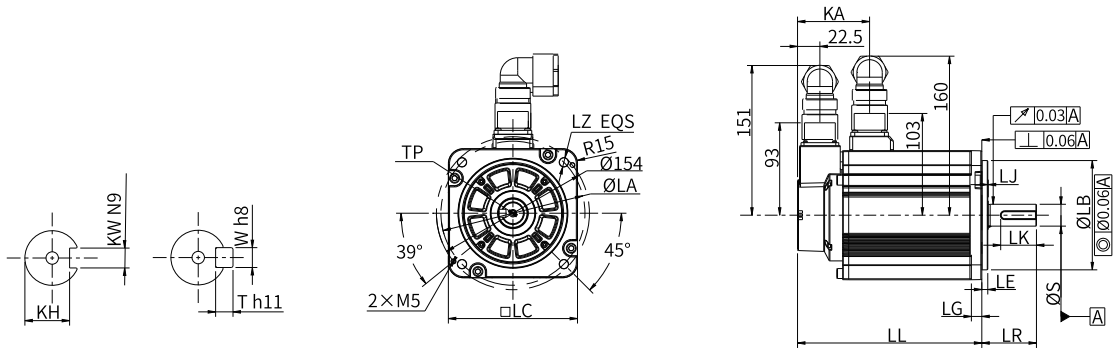
4.3.25 MS1V3-32C30CD-A331R

Motor specifications			Torque-Speed characteristics
Frame size (mm)	130		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	3.2		
Voltage (V)	380		
Rated torque (N·m)	10.2		
Maximum torque (N·m)	25.5		
Rated current (A)	8.05		
Heatsink-based derating curve			
Maximum current (A)	22		
Rated speed (rpm)	3000		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	1.37		
Rotor moment of inertia (kg·cm ²)	Motor without brake	18.6±10%	
	Motor with brake	-	

Allowable load

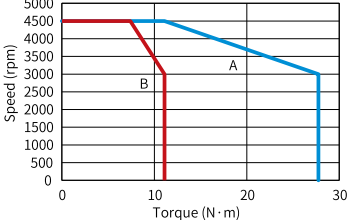
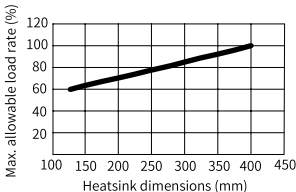
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Product dimensions (mm)



LC	LL	LR	LA	LZ	KA	LG	LE	LJ
130	200.5	55±1	145	4 x φ9	72.5	10.5	6±0.3	0.5±0.75
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ110 h7 ⁰ -0.035	22	M6 x 20	35 (-0.62,0)	18	8	8	7	8.65

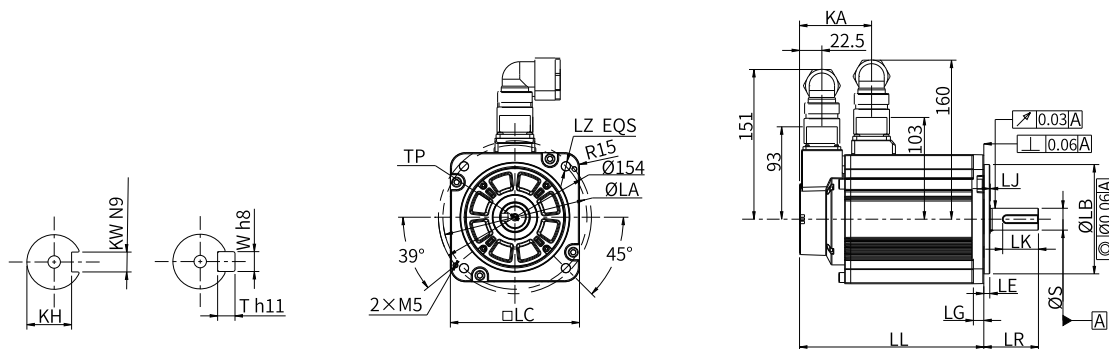
4.3.26 MS1V3-35C30CD-A331R

Motor specifications			Torque-Speed characteristics	
Frame size (mm)	130		A Intermittent duty zone B Continuous duty zone 	
Inertia and capacity	Medium inertia, medium capacity			
Rated power (kW)	3.5			
Voltage (V)	380			
Rated torque (N·m)	11.1			
Maximum torque (N·m)	27.9			
Rated current (A)	7.68			
Maximum current (A)	20		Heatsink-based derating curve	
Rated speed (rpm)	3000			
Maximum speed (rpm)	4500			
Torque coefficient (N·m/A)	1.65			
Rotor moment of inertia (kg·cm ²)	Motor without brake	22.1±10%		
	Motor with brake	-		

Allowable load

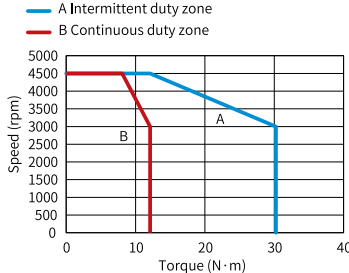
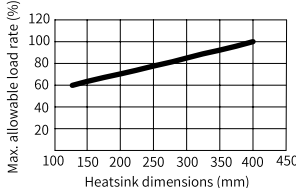
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Product dimensions (mm)



LC	LL	LR	LA	LZ	KA	LG	LE	LJ
130	215.5	55±1	145	4 x φ9	72.5	10.5	6±0.3	0.5±0.75
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ110 h7 ⁰ -0.035	22	M6 x 20	35 (-0.62,0)	18	8	8	7	9.74

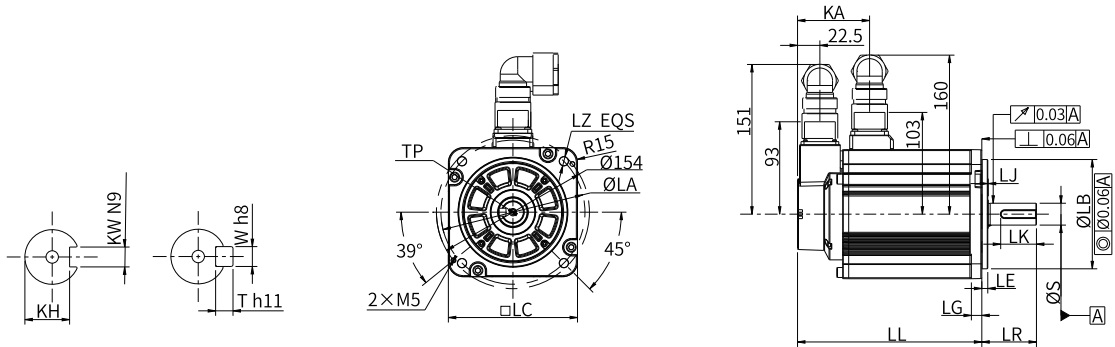
4.3.27 MS1V3-38C30CD-A331R

Motor specifications			Torque-Speed characteristics	
Frame size (mm)	130			
Inertia and capacity	Medium inertia, medium capacity			
Rated power (kW)	3.8			
Voltage (V)	380			
Rated torque (N·m)	12.1			
Maximum torque (N·m)	30.3			
Rated current (A)	7.90			
Maximum current (A)	22			
Rated speed (rpm)	3000			
Maximum speed (rpm)	4500			
Torque coefficient (N·m/A)	1.62			
Rotor moment of inertia (kg·cm ²)	Motor without brake	29.4±10%		
	Motor with brake	-		

Allowable load

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

Product dimensions (mm)



LC	LL	LR	LA	LZ	KA	LG	LE	LJ
130	245.5	55±1	145	4 x φ9	72.5	10.5	6±0.3	0.5±0.75
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ110 h7 ⁰ _{-0.035}	22	M6 x 20	35 (-0.62,0)	18	8	8	7	11.8

4.3.28 MS1V3-40C30CD-A33*R

Motor specifications			Torque-Speed characteristics																			
Frame size (mm)	130		— A Intermittent duty zone — B Continuous duty zone <table border="1"><caption>Torque-Speed Data</caption><thead><tr><th>Torque (N·m)</th><th>Speed (rpm) - Zone A</th><th>Speed (rpm) - Zone B</th></tr></thead><tbody><tr><td>0</td><td>4500</td><td>4500</td></tr><tr><td>10</td><td>4500</td><td>4500</td></tr><tr><td>12</td><td>4500</td><td>3000</td></tr><tr><td>32</td><td>3000</td><td>3000</td></tr><tr><td>32</td><td>0</td><td>3000</td></tr></tbody></table>		Torque (N·m)	Speed (rpm) - Zone A	Speed (rpm) - Zone B	0	4500	4500	10	4500	4500	12	4500	3000	32	3000	3000	32	0	3000
Torque (N·m)	Speed (rpm) - Zone A	Speed (rpm) - Zone B																				
0	4500	4500																				
10	4500	4500																				
12	4500	3000																				
32	3000	3000																				
32	0	3000																				
Inertia and capacity	Medium inertia, medium capacity																					
Rated power (kW)	4.0																					
Voltage (V)	380																					
Rated torque (N·m)	12.7																					
Maximum torque (N·m)	31.8																					
Rated current (A)	6.14																					
Maximum current (A)	20																					
Rated speed (rpm)	3000		Max. allowable load rate (%) <table border="1"><caption>Heatsink-based derating Data</caption><thead><tr><th>Heatsink dimensions (mm)</th><th>Max. allowable load rate (%)</th></tr></thead><tbody><tr><td>150</td><td>60</td></tr><tr><td>200</td><td>70</td></tr><tr><td>250</td><td>80</td></tr><tr><td>300</td><td>90</td></tr><tr><td>350</td><td>95</td></tr><tr><td>400</td><td>100</td></tr></tbody></table>		Heatsink dimensions (mm)	Max. allowable load rate (%)	150	60	200	70	250	80	300	90	350	95	400	100				
Heatsink dimensions (mm)	Max. allowable load rate (%)																					
150	60																					
200	70																					
250	80																					
300	90																					
350	95																					
400	100																					
Maximum speed (rpm)	4500																					
Torque coefficient (N·m/A)	2.06																					
Rotor moment of inertia (kg·cm ²)	Motor without brake	34±10%																				
	Motor with brake	35±10%																				

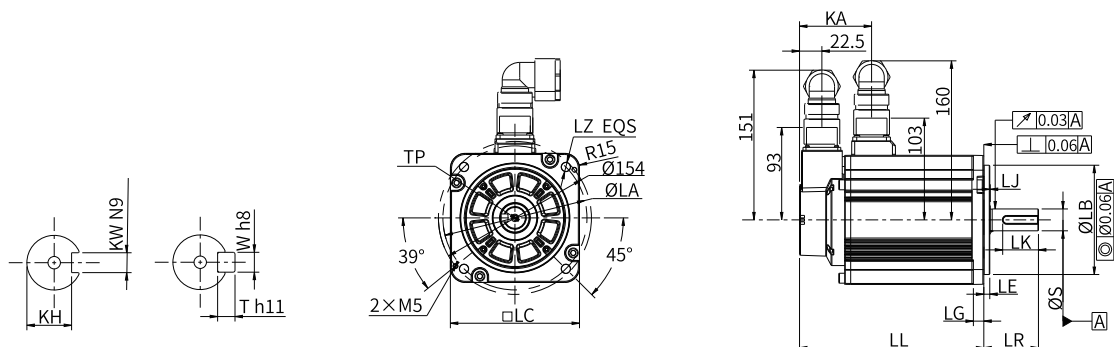
Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)±10%	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
≥ 16.5	24	24	24	1.0	≤ 100	≤ 60	≤ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 1176	≤ 392

Product dimensions (mm)



LC	LL	LR	LA	LZ	KA	LG	LE	LJ
130	265.5 (290.5)	55±1	145	4 x φ9	72.5 (97.5)	10.5	6±0.3	0.5±0.75
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
φ110 h7 ⁰ _{-0.035}	28	M8 x 20	35 (-0.62,0)	24	8	8	7	13.4 (14.8)

5 Cable Selection

5.1 Model Description

Power cable model

S6-L-M 1 1 1 - 3.0 - T - PTC
① ② ③ ④ ⑤ ⑥ ⑦

① Cable type S6-L-B/M: Motion control power cable B: With brake M: Without brake	③ Cable Size (mm²) 1: Frame sizes 100/130/180 2: Frame size 180 (motors of 4.4 kW and above)	⑤ Cable length (m) 3.0: 3 5.0: 5 10.0: 10
② Connector type at drive side 0: U-shaped cable lug 1: Pin-shaped cable lug	④ Connector type at motor side 1: 9-core aviation connector 2: 6-core aviation connector	⑥ _: Fixed cable T: Flexible cable ≥ 10 million reciprocating cycles S: Shielded TS: Shielded flexible cable ≥ 10 million reciprocating cycles ⑦ PTC: Temperature sensor OR: Oil-resistant cables

Encoder cable model

S6-L-P 0 2 1 - 3.0 - T - PTC
① ② ③ ④ ⑤ ⑥ ⑦

① Cable type S6-L-P: Motion control encoder cable	③ Encoder 1: Communication-type incremental encoder 2: Communication-type multi-turn absolute encoder	⑤ Cable length (m) 3.0: 3 5.0: 5 10.0: 10
② Connector type at drive side 0: DB9 1: USB	④ Connector type at motor side 1: 9-core aviation connector	⑥ _: Regular cable T: Flexible cable ≥ 10 million reciprocating cycles ⑦ PTC: Temperature sensor OR: Oil-resistant cables

Note

Encoder cables are shielded by default.

Model of communication cables

$\frac{S6-L-T}{①} \quad \frac{00}{②} - \frac{3.0}{③}$

① Cable type	② Communication cable connection type	③ Cable length (m)
S6-L-T: Motion control communication cable	00: Drive to PC communication cable	3.0: 3
	01: Multi-drive communication cable (CAN & RS485)	5.0: 5
	02: Drive to PLC communication cable	10.0: 10
	03: Drive communication termination resistor cable (CAN & RS485)	
	04: Drive network communication cable (CaT.5e & PROFINET)	

For details on cable selection, see "[List of Cables](#)" on page 52.

5.2 Cable Type

Fixed cables

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

Recommended bending radius $\geq 5D$ (D: Cable diameter)

Flexible cables

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

Recommended bending radius $\geq 10D$ (D: Cable diameter)

Note

- Do not twist cables inside the cable carrier.
- Ensure the cable can move within the bending radius. Do not move the cables by force. Ensure a relative movement between cables or between the cable and the guiding device is available.
- Do not fix or bundle the cables inside the cable carrier. The cables can be bundled and fixed only at two unmovable ends of the cable carrier.

Oil-resistant cables

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

More information

The R-version motor cables are the same as the cables of the previous generation of motors.

The terminal-type motor power cables and encoder cables require dedicated equipment and tooling for assembly. Order finished cables from channels authorized by Inovance.

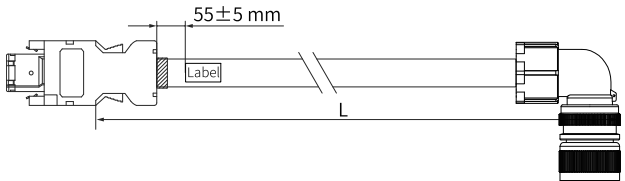
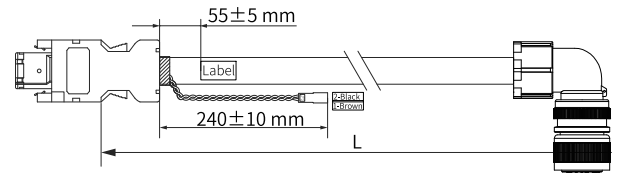
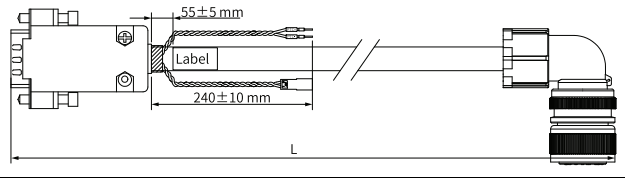
For motor information, see the hardware guide of the servo drive.

5.3 List of Cable Selection

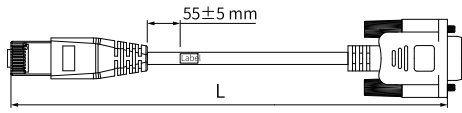
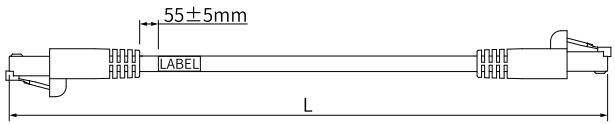
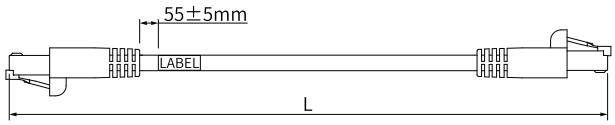
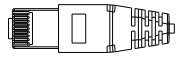
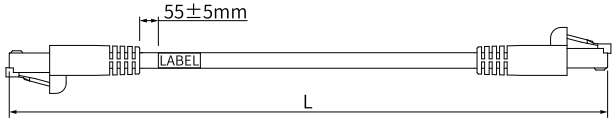
Power cable

Motor type	Frame size	Name	Cable model	Cable length (mm)	Drawing
Air-cooled motor	100/130	Without brake	S6-L-M111-3.0-PTC	3100	
			S6-L-M111-5.0-PTC	5100	
			S6-L-M111-10.0-PTC	10100	
		With brake	S6-L-B111-3.0-PTC	3100	
			S6-L-B111-5.0-PTC	5100	
			S6-L-B111-10.0-PTC	10100	
	180	Without brake	S6-L-M022-3.0-PTC	3000	
			S6-L-M022-5.0-PTC	5000	
			S6-L-M022-10.0-PTC	10000	
		With brake	S6-L-B022-3.0-PTC	3000	
			S6-L-B022-5.0-PTC	5000	
			S6-L-B022-10.0-PTC	10000	
Natural cooling motor	130	Without brake	S6-L-M111-3.0	3100	
			S6-L-M111-5.0	5100	
			S6-L-M111-10.0	10100	
		With brake	S6-L-B111-3.0	3100	
			S6-L-B111-5.0	5100	
			S6-L-B111-10.0	10100	

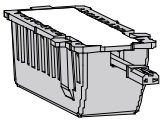
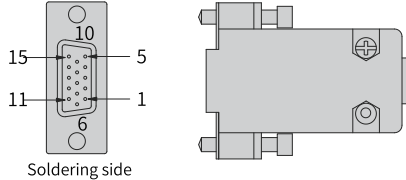
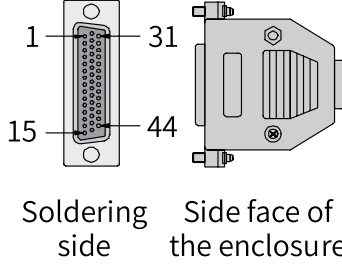
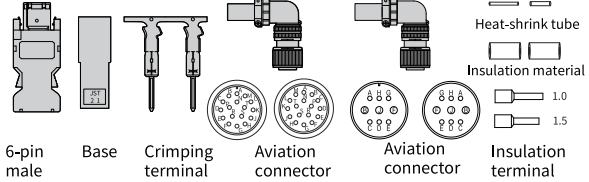
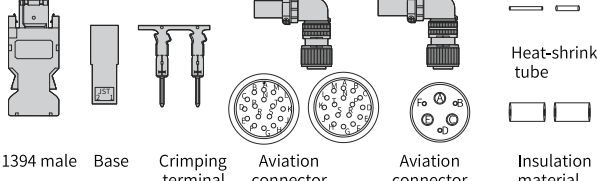
Encoder cable

Applicable drive	Name	Cable model	Cable length (mm)	Drawing
SV660* series SV670N-PTC series	Single-turn absolute	S6-L-P111-3.0	3000	
		S6-L-P111-5.0	5000	
		S6-L-P111-10.0	10000	
	Multi-turn absolute	S6-L-P121-3.0	3000	
		S6-L-P121-5.0	5000	
		S6-L-P121-10.0	10000	
IS650P series	Multi-turn absolute	S6-L-P021-3.0-PTC	3000	
		S6-L-P021-5.0-PTC	5000	
		S6-L-P021-10.0-PTC	10000	

Communication cable

Name	Cable model	Cable length (mm)	Drawing
Drive to PC communication cable	S6-L-T00-3.0	3000	
Multi-drive communication cable (for SV660P series drives)	S6-L-T01-0.3	300	
Servo drive to host controller communication cable (for SV660P models)	S6-L-T02-2.0	2000	
Termination resistor connector (for SV660P models)	S6-L-T03-0.0	-	
Servo drive network communication cable	S6-L-T04-0.3	300	
Drive to host controller communication cable	S6-L-T04-3.0	3000	

Connector kit

Name	Cable model	Cable length (mm)	Drawing
Battery kit	S6-C4A	-	
CN1 terminal (DB15)	S6-C6	-	 Soldering side
CN1 terminal (DB44) (for SV660P series drives)	S6-C8	-	 Soldering side Side face of the enclosure
Connector for motors with frame sizes 100/130	S6-C29	-	 6-pin male Base Crimping terminal Aviation connector Aviation connector Heat-shrink tube Insulation material Insulation terminal
Connector for motors with frame size 180	S6-C39	-	 1394 male Base Crimping terminal Aviation connector Aviation connector Heat-shrink tube Insulation material

5.4 Description of Cable Terminals

5.4.1 Power Cable Terminals

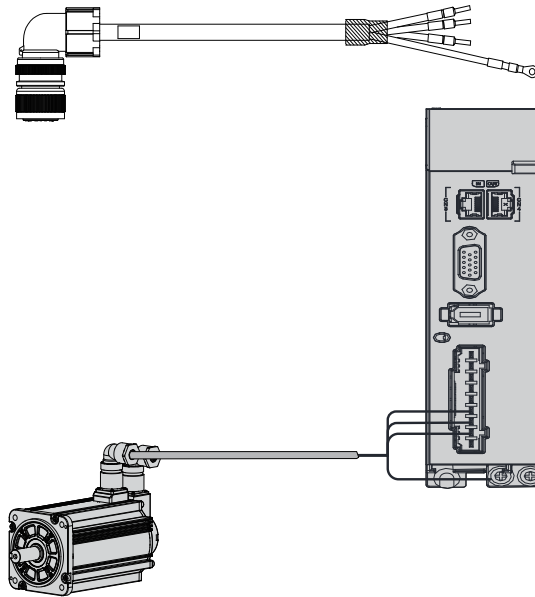
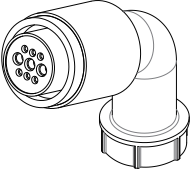
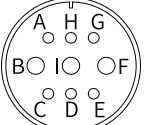
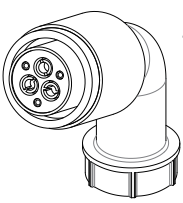
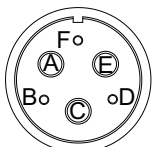


Figure 5-1 Wiring between the drive and motor

Table 5-1 Power cable connector (motor side)

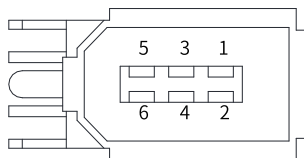
Applicable frame size	Drawing of the connector	Pin layout		
		Pin No.	Signal name	Color
100/130	 20-18 aviation connector  MIL-DTL-5015 series 3108E20-18S aviation connector	B	U	Blue
		I	V	Black
		F	W	Red
		G	PE	Yellow/Green
		C	BK+	Red
		E	BK-	Black
		A	PTC+	Red
		H	PTC-	Black
180	 20-22 aviation connector  MIL-DTL-5015 series 3108E20-22S aviation connector	A	U	Blue
		C	V	Black
		E	W	Red
		F	PE	Yellow/Green
		B	PTC+	Red
		D	PTC-	Black

Note

Power cable colors are subject to the actual product. All cable colors mentioned in this guide refer to Inovance cable colors.

5.4.2 Encoder Cable Terminals

Terminal layout



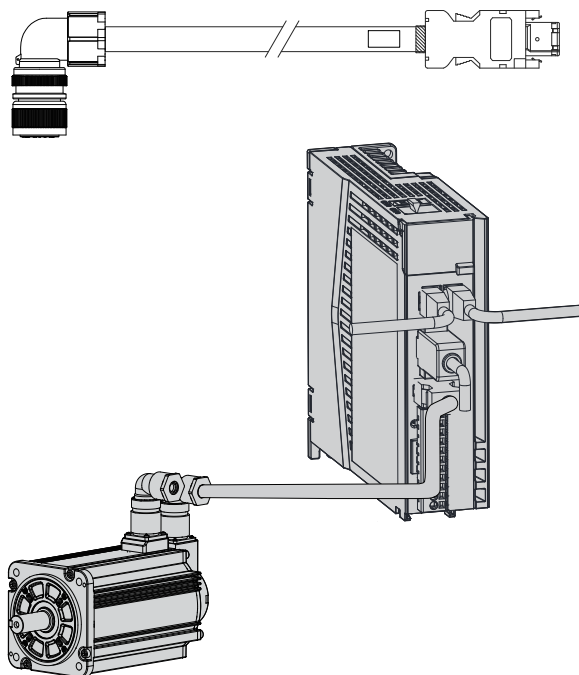
Encoder signal terminal CN2

Figure 5-2 Layout of encoder terminal pins

Table 5-2 Description of encoder terminal pins

Pin No.	Assignment	Description
1	+5 V	5 V power supply
2	GND	
3	Reserved	-
4	Reserved	-
5	PS+	Gantry synchronization signal
6	PS-	
Enclosure	PE	Shield

Description of terminals

Figure 5-3 Wiring example of absolute encoder signals^[1]

Note

- [1] The preceding figure shows the wiring of a 26-bit multi-turn absolute encoder.
- The encoder cable color is subject to the color of the actual product. Cable colors mentioned in this guide all refer to Inovance cables.

The following figure describes the drain wire color of the battery box.

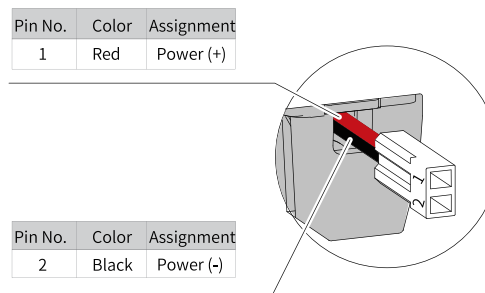
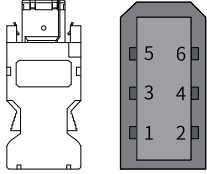
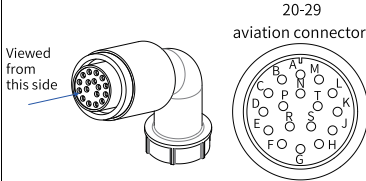
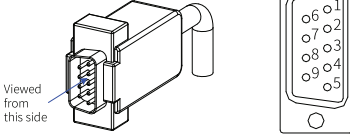
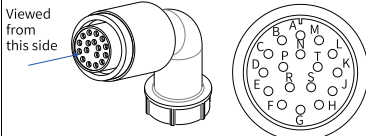


Figure 5-4 Drain wire color of the battery box

Note

- Keep the battery in environments within the required ambient temperature range and ensure the battery is in reliable contact and carries sufficient power capacity. Otherwise, encoder data loss may occur.
 - Model of the battery box (battery included): S6-C4A
-

Table 5-3 Encoder cable connector

Applicable drive	Drawing of the connector	Pin layout			
		Pin No.	Signal name	Color	Type
SV660* series SV670N-PTC series	Drive side  6-pin male (right side as the joint face)	1	+5 V	Red	Twisted pair
		2	GND	Orange	
		5	PS+	Blue	Twisted pair
		6	PS-	Purple	
		Enclosure	PE	-	-
	Motor side  20-29 aviation connector	A	PS+	Blue	Twisted pair
		B	PS-	Purple	
		E	Battery (+)	Brown	-
		F	Battery (-)	Black	
		G	+5 V	Red	-
		H	GND	Orange	
		J	Shield	-	
IS650P series	Drive side  Viewed from this side	1	PS+	-	-
		2	PS-	-	-
		7	+5 V	-	-
		8	GND	-	-
		Enclosure	Shield	-	-
	Motor side  20-29 aviation connector	A	PS+	Blue	Twisted pair
		B	PS-	Purple	
		C	-	-	-
		D	-	-	
		E	Battery (+)	Brown	-
		F	Battery (-)	Black	
		G	+5 V	Red	-
		H	GND	Orange	
		J	Shield	-	
		K	PTC+	Yellow	-
		L	PTC-	Green	-

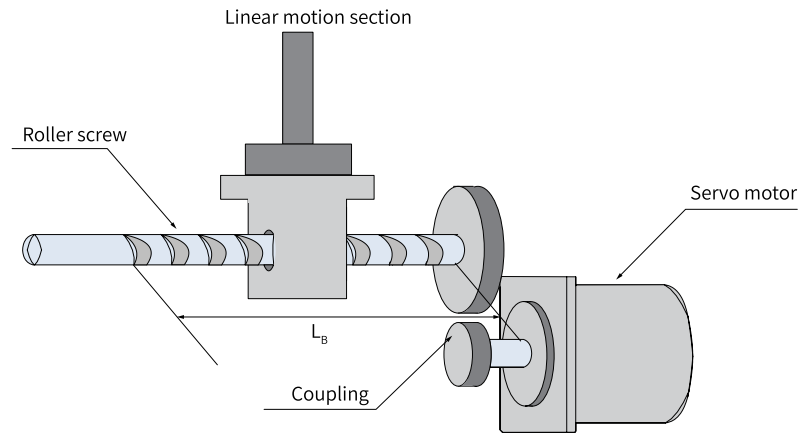
5.4.3 Fan Cable Terminals

The aviation connector of the air-cooled motor fan is delivered together with the motor. You need to solder the aviation connector by yourself. The recommended cable specifications are shown in the following table.

Frame size	Recommended cable specifications (AWG)	Description	
		Cable color	Assignment
100	24	Red	Power supply +
		Black	Power supply –
130	22	Red	Power supply +
		Black	Power supply –
180	22	Red	Power supply +
		Black	Power supply –

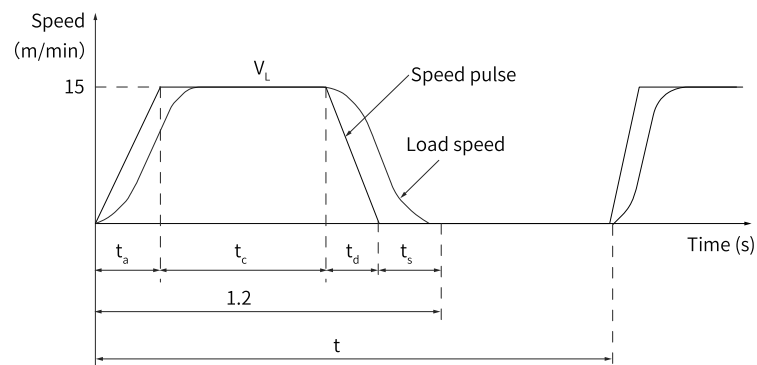
6 Servo Motor Capacity Selection

6.1 Capacity Selection Example for Position Control



Load speed (V_L) = 15 m/min
 Mass of the rectilinear motion part (m): 80 kg
 Roller screw length (L_B): 0.8 m
 Roller screw diameter (d_B): 0.016 m
 Roller screw lead (P_B): 0.005 m
 Coupling mass (m_c): 0.3 kg
 Coupling outer diameter (d_c): 0.03 m
 Times of feeding (n): 40/min
 Length of feeding (L): 0.25 m
 Feeding time (t_m) < 1.2s
 Electrical stopping precision (δ) = ± 0.01 mm
 Friction coefficient (μ): 0.2
 Mechanical efficiency (η) = 0.9 (90%)

1. Speed diagram



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

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

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

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

2. Speed

- Rotational speed of the load shaft

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

- Rotational speed of the motor shaft

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

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

3. Load torque

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

4. Load moment of inertia

- Rectilinear motion part

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

- Roller screw

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

- Coupling

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

5. Load moving power

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

6. Load acceleration power

$$\begin{aligned} P_a &= \left(\frac{2\pi}{60} \times n_m \right)^2 \frac{J_L}{t_a} = \left(\frac{2\pi}{60} \times n_m \right)^2 \times \frac{J_U + J_B + J_C}{t_a} \\ &= \left(\frac{2\pi}{60} \times 3000 \right)^2 \times \frac{1.25 \times 10^{-4}}{0.1} = 123.4 \text{ (W)} \end{aligned}$$

7. Temporary settings of the servo motor

- Selection condition

$$T_L \leq \text{Rated torque of the motor}$$

$$P_a + P_o = (1 \text{ to } 2) \times \text{Rated output of the motor}$$

$$n_M \leq \text{Rated speed of the motor}$$

$$J_L \leq \text{Allowable load moment of inertia of the servo unit}$$

Perform the following provisional selections according to preceding conditions:

Servo motor: MS1H1-20B30CB-A630R

Servo drive: SV670PS1R6I

- Specifications of the servo motor and servo drive

Rated output: 200 (W)

Rated speed: 3000 (RPM)

Rated torque: 0.64 (N·m)

Maximum instantaneous torque: 1.95 (N·m)

Rotor moment of inertia: 0.082×10^{-4} (kg·m²)

Allowable load moment of inertia: 1.64×10^{-4} (kg·m²)

Number of encoder pulses: 67108864 (P/R)

8. Confirmation of the servo motor selected temporarily

Confirm the startup torque required

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

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

Confirm the brake torque required

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

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

Confirm the effective torque value

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

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

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

The capacities of the servo motor and servo drive selected temporarily based on preceding steps are available for use. The position control analysis is as follows.

9. Electronic gear ratio (B/A)

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

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

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

10. Reference pulse frequency

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

11. Offset counter droop pulse

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

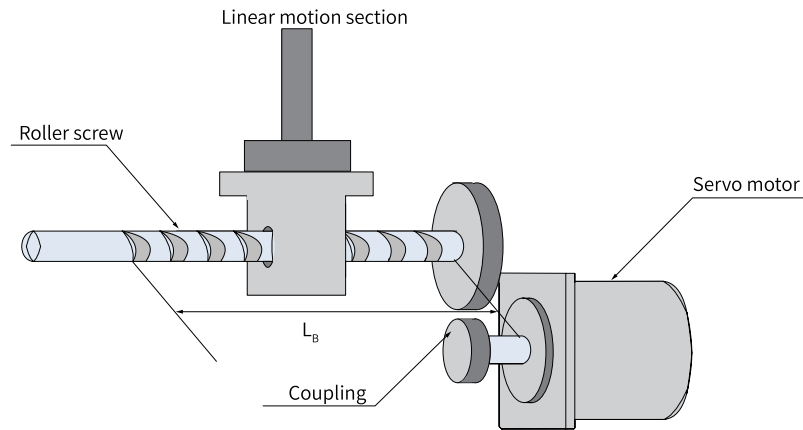
$$\varepsilon = \frac{v_s}{K_p} = \frac{25000}{30} = 833 \text{ (pulse)}$$

- Electrical stopping precision

$$\pm \Delta \varepsilon = \pm \frac{\varepsilon}{(\text{Servo drive control range}) \times \frac{n_M}{n_R}} = \pm \frac{833}{5000 \times \frac{3000}{3000}} \\ = \pm 0.17 < \pm 1 \text{ (pulse)} \pm 0.01 \text{ (mm/pulse)}$$

By observing preceding steps, the servo motor and servo drive selected temporarily for position control are available for use.

6.2 Capacity Selection Example for Speed Control



Load speed (V_L) = 15 m/min

Mass of the rectilinear motion part (m): 80 kg

Roller screw length (L_B): 0.8 m

Roller screw diameter (d_B): 0.04 m

Roller screw lead (P_B): 0.01 m

Coupling mass (m_c): 1 kg

Coupling outer diameter (d_c): 0.06 m

Times of feeding (n): 40/min

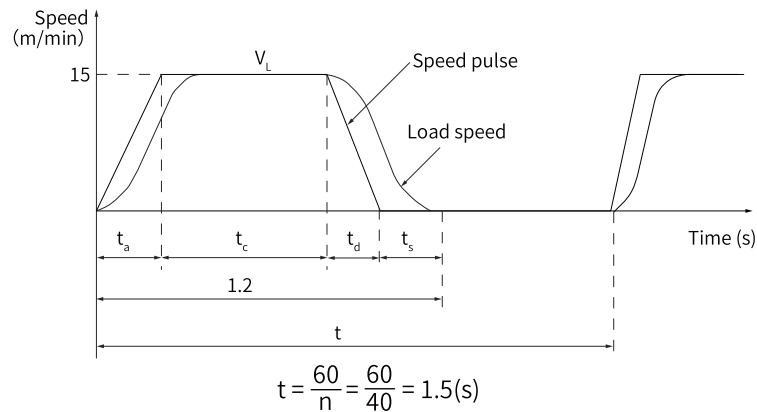
Length of feeding (L): 0.25 m

Feeding time (t_m) < 1.2s

Friction coefficient (μ): 0.2

Mechanical efficiency (η) = 0.9 (90%)

1. Speed diagram



Set t_a to the same value as t_d .

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

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

2. Speed

- Rotational speed of the load shaft

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

- Rotational speed of the motor shaft

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

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

3. Load torque

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

4. Load moment of inertia

- Rectilinear motion part

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

- Roller screw

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

- Coupling

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

5. Load moving power

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

6. Load acceleration power

$$\begin{aligned} P_a &= \left(\frac{2\pi}{60} \times n_m \right)^2 \times \frac{J_L}{t_a} = \left(\frac{2\pi}{60} \times n_m \right)^2 \times \frac{J_C + J_B + J_U}{t_a} \\ &= \left(\frac{2\pi}{60} \times 1500 \right)^2 \times \frac{34.22 \times 10^{-4}}{0.1} = 844 (\text{W}) \end{aligned}$$

7. Temporary settings of the servo motor

- Selection condition

$$T_L \leq \text{Rated torque of the motor}$$

$$P_a + P_o = (1 \text{ to } 2) \times \text{Rated output of the motor}$$

$$n_M \leq \text{Rated speed of the motor}$$

$$J_L \leq \text{Allowable load moment of inertia of the servo unit}$$

Perform the following provisional selections according to preceding conditions:

Servo motor: MS1H4-75B30CB-A630R

Servo drive: SV670PS5R5I

- Specifications of the servo motor and servo drive

Rated output: 750 (W)

Rated speed: 3000 (RPM)

Rated torque: 2.39 (N·m)

Maximum instantaneous torque: 8.365 (N·m)

Rotor moment of inertia: 1.38×10^{-4} (kg·m²)

Allowable load moment of inertia: 69.58×10^{-4} (kg·m²)

8. Confirmation of the servo motor selected temporarily

Confirm the startup torque required

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

$$= 5.87 \text{ (N·m)} < \text{Max. instantaneous torque...Satisfactory}$$

Confirm the brake torque required

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

$$= 5.32 \text{ (N·m)} < \text{Max. instantaneous torque...Satisfactory}$$

Confirm the effective torque value

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

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

$$= 2.06 \text{ (N·m)} < \text{Rated torque...Satisfactory}$$

9. Selection result

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

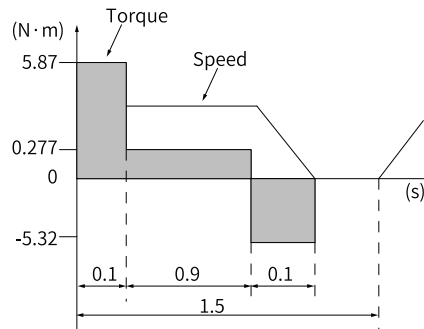


Figure 6-1 Torque diagram

7 Standards Compliance List

7.1 Standards Compliance List

CE certification

Directive	Standard	
EMC Directive 2014/30/EU	Drive	EN 61800-3
	Motor	EN 61800-6-2
		EN 61800-6-4
		EN 55011
Low Voltage Directive 2014/35/EU	Drive	EN 61800-5-1
	Motor	EN 60034-1 EN 60034-5
RoHS Directive 2011/65/EU	Drive	EN 50581
	Motor	

UL/cUL certification

Certification	Standard	
UL/cUL certification	Drive	UL61800-5-1
		C22.2 No.274-17
	Motor	UL 1004-1
		UL 1004-6 CSA C22.2 No. 100-14

Note

The drive complies with the latest version of directives and standards for CE and UL/cUL certifications.

China Energy Label

Mark	Remark
	① The China Energy Label is attached to the motor. You can scan the QR code on the label to get the filing information. ② The motor model only represents one specific model in MS1 series motors. ③ Motor efficiency values ④ Name of the standard: GB30253-2013 (Minimum allowable value of energy efficiency and energy efficiency grades for permanent magnet synchronous motors)
	⑤ Scan the QR code to access China Energy Label website, which shows the main model in the list of filing models. ⑥ Click View More to view the list of other filing models. ⑦ Displays the list of filing models and related efficiency values.



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