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SV660P Series Servo Drive

Selection Guide

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

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The product/system described in this documentation may be operated only by personnel qualified for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel can identify the risks of the product/system and prevent possible dangers.

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Proper transportation, storage, assembly, installation, commissioning, operation, and maintenance are required to ensure the safe operation of the product without any problems. The required ambient conditions must be met. All operations must follow the guidelines provided in this documentation.

Preface

Introduction

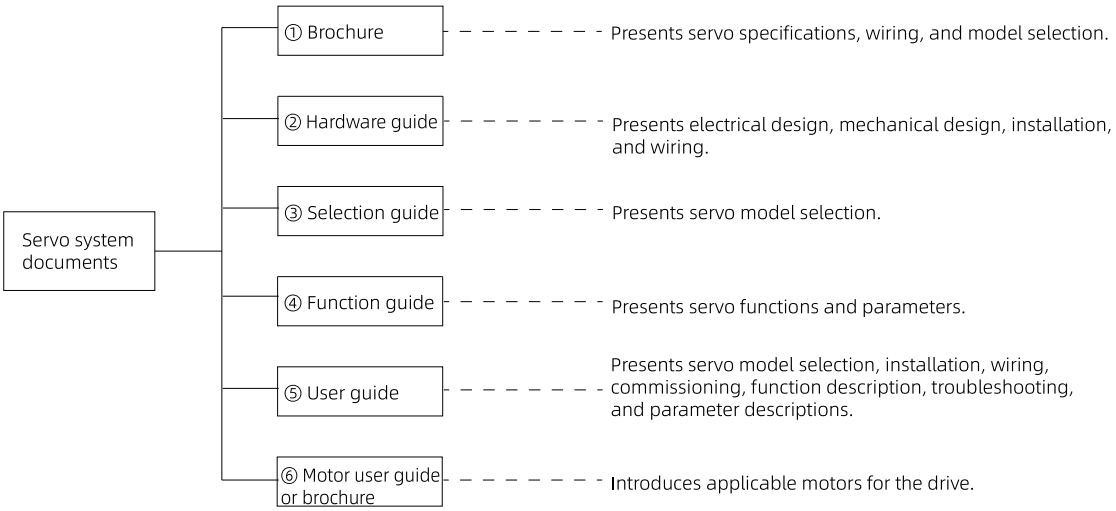
The SV660P series is a high-performance AC servo drive developed by Inovance for small and medium power applications. The servo drive covers a power range from 0.05 kW to 7.5 kW and carries Modbus communication interfaces to work with the host controller for a networked operation of multiple servo drives.

The SV660P series servo drive supports adaptive stiffness level setting, inertia auto-tuning, and vibration suppression for easy use. It allows quiet and stable operations and accurate positioning through working with an MS1 series high-response servo motor configured with a 23-bit absolute multi-turn encoder.

The SV660P series servo drive serves to achieve quick and accurate position control, speed control, and torque control in automation equipment such as electronic manufacturing devices, manipulators, packing devices, and machine tools.

This guide provides information about selection, installation, commissioning, functions, troubleshooting, and parameters of the equipment.

More documents



No.	Name	Code	Description
①	SV660 Series Servo Drive Brochure	19120119	Describes product specifications, wiring, and model selection.
②	SV660P Series Servo Drive Hardware Guide	19011391	Provides the electrical design guidance of the servo drive, descriptions of wiring terminals, certification and standard requirements, and solutions to common EMC problems.
③	SV660P Series Servo Drive Selection Guide	19011390	Provides information about product selection, including the list of supporting components, technical data on the drive and motor, and cable selection guide.
④	SV660P Series Servo Drive Function Guide	19011393	Describes the functions and parameters of the product, including function overview, basic servo functions, tuning instructions, and parameter descriptions.

No.	Name	Code	Description
⑤	SV660P Series Servo Drive User Guide	PS00005513	Provides information about model selection, installation, commissioning, function, troubleshooting and parameters of the equipment.
⑥	MS1-R Series Servo Motor Selection Guide	PS00004605	Describes product information, general specifications, motor selection, cable selection, certification categories and standards of the motor.
	MS1-R-INT Series Servo Motor with Battery-less Encoder Selection Guide	PS00019892	Describes product information, general specifications, motor selection, cable selection, certification categories and standards of the motor.
	MS1-R Series Servo Motor Installation Guide	PS00005407	Describes the installation of the motor, including motor installation flowcharts, wiring, unpacking and handling, mechanical installation, and electrical installation.

Revision history

Date	Document version	Software version	Revision
August 2026	D01	Model: SV660P Version tag: H01-00=0607.4/H00-02=000.00/DD00	**Updated:** • Updated section "Preface". • Updated section "System Wiring Diagram": Updated the wiring diagram and added the DO3 wiring diagram. • Updated section "Servo Drive Technical Data": Modified the maximum braking energy that can be absorbed by the capacitor in the electrical specifications table of drives in size D, and added the formula for calculating the energy absorbed by the capacitor. • Made minor corrections.
December 2025	D00	Model: SV660P Version tag: H01-00=0607.3/H00-02=000.00/DD00	• Made structural optimization. • Made content optimization. • Added information about MS1-R series battery-free encoder servo motors. • Deleted content related to shielding brackets. • Made minor corrections.
February 2025	C04	-	• Made minor corrections. • Updated connector kit selection.
December 2024	C03	-	• Modified applicable cable selection and cable selection table. • Added surge protector selection specifications. • Modified absolute encoder battery specifications and add explanations.
August 2024	C02	-	• Updated section "MS1-R Series Motor". • Updated the Suzhou address and added the My Inovance QR code on the cover page. • Updated cable selection.
December 2023	C01	-	• Updated the fuse and circuit breaker model selection. • Added shielded power cable model selection in the "Cable List" table. Added shielded cable model description in power cable model description. • Added descriptions for -FH models. • Added recommended shield bracket.

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

Access to the guide

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

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Warranty

Inovance provides warranty service within the warranty period (as specified in your order) for any fault or damage that is caused by proper operation of the user. Maintenance fees will be charged after the warranty period expires.

Even within the warranty period, maintenance will be charged for the following product damage:

- Damage caused by operations not following the instructions in the guide
- Damage caused by fire, flood, or abnormal voltage
- Damage caused by using the product for unintended functions
- Damage caused by using the product outside the specified scope
- Secondary damage caused by force majeure (natural disaster, earthquake, lightning strike)

When applicable, relevant maintenance fee will be charged according to the latest Price List of Inovance. If otherwise agreed upon, the agreed terms and conditions shall prevail.

For details, see the Warranty Card.

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1 Model Selection

1.1 Model Selection (Compatible with MS1-R Series Servo Motor)

Servo motor				Servo drive SV660 series			
Model without brake	Model with brake	Frame size (mm)	Capacity (kW)	Voltage class	Size	Recommended model	Drive SN (H01.10)
Ratings of MS1H1 series motors (n_N = 3000 rpm, n_{max} = 7000 rpm)							
MS1H1-03B30CB-U210R-S	-	25	0.03	Single-phase 220 V	A	S1R6	00002
MS1H1-05B30CB-A330R	MS1H1-05B30CB-A332R	40	0.05	Single-phase 220 V			
MS1H1-10B30CB-A330R	MS1H1-10B30CB-A332R	40	0.1	Single-phase 220 V			
MS1H1-20B30CB-A331R	MS1H1-20B30CB-A334R	60	0.2	Single-phase 220 V			
MS1H1-40B30CB-A331R	MS1H1-40B30CB-A334R	60	0.4	Single-phase 220 V		S2R8	00003
MS1H1-55B30CB-A331R	-	80	0.55	Single-phase 220 V	B	S5R5	00005
MS1H1-75B30CB-A331R	MS1H1-75B30CB-A334R	80	0.75	Single-phase 220 V		S5R5	00005
MS1H1-10C30CB-A331R	MS1H1-10C30CB-A334R	80	1.0	Single/Three-phase 220 V	C	S7R6	00006
MS1H1-15C30CB-A330R	-	80	1.5	Single/Three-phase 220 V	D	S012	00007
MS1H1-15C30CB-A331R	-	80	1.5	Single/Three-phase 220 V		S012	00007
Ratings of MS1H2 series motors (n_N = 3000 rpm, n_{max} = 6000 rpm)							
MS1H2-10C30CB-A331R	MS1H2-10C30CB-A334R	100	1.0	Single/Three-phase 220 V	C	S7R6	00006
MS1H2-10C30CD-A331R	MS1H2-10C30CD-A334R	100	1.0	Three-phase 380 V		T3R5	10001
MS1H2-15C30CB-A331R	MS1H2-15C30CB-A334R	100	1.5	Single/Three-phase 220 V	D	S012	00007
MS1H2-15C30CD-A331R	MS1H2-15C30CD-A334R	100	1.5	Three-phase 380 V	C	T5R4	10002
MS1H2-20C30CB-A331R	MS1H2-20C30CB-A334R	100	2.0	Single/Three-phase 220 V	D	S012	00007
MS1H2-20C30CD-A331R	MS1H2-20C30CD-A334R	100	2.0	Three-phase 380 V	D	T8R4	10003
MS1H2-25C30CD-A331R	MS1H2-25C30CD-A334R	100	2.5	Three-phase 380 V	D	T012[1]	10004

Servo motor				Servo drive SV660 series			
Model without brake	Model with brake	Frame size (mm)	Capacity (kW)	Voltage class	Size	Recommended model	Drive SN (H01.10)
MS1H2-30C30CD-A331R	MS1H2-30C30CD-A334R	130	3.0	Three-phase 380 V	D	T012	10004
MS1H2-40C30CD-A331R	MS1H2-40C30CD-A334R	130	4.0	Three-phase 380 V	E	T017	10005
MS1H2-50C30CD-A331R	MS1H2-50C30CD-A334R	130	5.0	Three-phase 380 V		T021[2]	10006
Ratings of MS1H3 series motors (n_N = 1500 rpm, n_{max} = 4500 rpm)							
MS1H3-85B15CB-A33*R	MS1H3-85B15CB-A334R	130	0.85	Single/Three-phase 220 V	C	S7R6	00006
MS1H3-85B15CD-A331R	MS1H3-85B15CD-A334R	130	0.85	Three-phase 380 V		T3R5	10001
MS1H3-13C15CB-A331R	MS1H3-13C15CB-A334R	130	1.3	Single/Three-phase 220 V	D	S012	00007
MS1H3-13C15CD-A331R	MS1H3-13C15CD-A334R	130	1.3	Three-phase 380 V	C	T5R4	10002
MS1H3-18C15CB-A331R	MS1H3-18C15CB-A334R	130	1.8	Single/Three-phase 220 V	D	S012	00007
MS1H3-18C15CD-A331R	MS1H3-18C15CD-A334R	130	1.8	Three-phase 380 V	D	T8R4	10003
MS1H3-29C15CD-A331R	MS1H3-29C15CD-A334R	180	2.9	Three-phase 380 V	D	T012	10004
MS1H3-44C15CD-A331R	MS1H3-44C15CD-A334R	180	4.4	Three-phase 380 V	E	T017	10005
MS1H3-55C15CD-A331R	MS1H3-55C15CD-A334R	180	5.5	Three-phase 380 V		T021	10006
MS1H3-75C15CD-A331R	MS1H3-75C15CD-A334R	180	7.5	Three-phase 380 V		T026	10007
Ratings of MS1H4 series motors (n_N = 3000 rpm, n_{max} = 7000 rpm)							
MS1H4-05B30CB-A330R	MS1H4-05B30CB-A332R	40	0.05	Single-phase 220 V	A	S1R6	00002
MS1H4-10B30CB-A330R	MS1H4-10B30CB-A332R	40	0.1	Single-phase 220 V		S1R6	00002
MS1H4-05B30CB-A331R	MS1H4-05B30CB-A334R	40	0.05	Single-phase 220 V		S1R6	00002
MS1H4-10B30CB-A331R	MS1H4-10B30CB-A334R	40	0.1	Single-phase 220 V		S1R6	00002
MS1H4-20B30CB-A331R	MS1H4-20B30CB-A334R	60	0.2	Single-phase 220 V		S1R6	00002
MS1H4-40B30CB-A331R	MS1H4-40B30CB-A334R	60	0.4	Single-phase 220 V		S2R8	00003

Servo motor				Servo drive SV660 series			
Model without brake	Model with brake	Frame size (mm)	Capacity (kW)	Voltage class	Size	Recommended model	Drive SN (H01.10)
MS1H4-55B30CB-A331R	-	80	0.55	Single-phase 220 V	B	S5R5	00005
MS1H4-75B30CB-A331R	MS1H4-75B30CB-A334R	80	0.75	Single-phase 220 V		S5R5	00005
MS1H4-10C30CB-A331R	MS1H4-10C30CB-A334R	80	1.0	Single/Three-phase 220 V	C	S7R6	00006

Note

- [1] See the torque-speed characteristics curves of this model for drives with T8R4. The drive parameters does not change.
- [2] See the torque-speed characteristics curves of this model for drives with T017. The drive parameters does not change.

1.2 Model Selection (Compatible with MS1-R Series Servo Motor with Battery-free Encoder)

Servo motor				Servo drive SV660 series			
Model without brake	Model with brake	Frame size (mm)	Capacity (kW)	Voltage class	Size	Recommended model	Drive SN (H01.10)
Ratings of MS1H1 series motors (n_N = 3000 rpm, n_{max} = 7000 rpm)							
MS1H1-05B30CB-V330R	MS1H1-05B30CB-V332R	40	0.05	Single/Three-phase 220 V	A	S1R6	00002
MS1H1-10B30CB-V330R	MS1H1-10B30CB-V332R	40	0.1	Single/Three-phase 220 V			
MS1H1-20B30CB-V331R	MS1H1-20B30CB-V334R	60	0.2	Single-phase 220 V			
MS1H1-40B30CB-V331R	MS1H1-40B30CB-V334R	60	0.4	Single-phase 220 V		S2R8	00003
MS1H1-55B30CB-V331R	-	80	0.55	Single-phase 220 V	B	S5R5	00005
MS1H1-75B30CB-V331R	MS1H1-75B30CB-V334R	80	0.75	Single-phase 220 V		S5R5	00005
MS1H1-10C30CB-V331R	MS1H1-10C30CB-V334R	80	1.0	Single/Three-phase 220 V	C	S7R6	00006
Ratings of MS1H2 series motors (n_N = 3000 rpm, n_{max} = 6000 rpm)							

Servo motor				Servo drive SV660 series			
Model without brake	Model with brake	Frame size (mm)	Capacity (kW)	Voltage class	Size	Recommended model	Drive SN (H01.10)
MS1H2-10C30CB-V331R	MS1H2-10C30CB-V334R	100	1.0	Single/Three-phase 220 V	C	S7R6	00006
MS1H2-10C30CD-V331R	MS1H2-10C30CD-V334R	100	1.0	Three-phase 380 V		T3R5	10001
MS1H2-15C30CB-V331R	MS1H2-15C30CB-V334R	100	1.5	Single/Three-phase 220 V	D	S012	00007
MS1H2-15C30CD-V331R	MS1H2-15C30CD-V334R	100	1.5	Three-phase 380 V	C	T5R4	10002
MS1H2-20C30CB-V331R	MS1H2-20C30CB-V334R	100	2.0	Single/Three-phase 220 V	D	S012	00007
MS1H2-20C30CD-V331R	MS1H2-20C30CD-V334R	100	2.0	Three-phase 380 V	D	T8R4	10003
MS1H2-25C30CD-V331R	MS1H2-25C30CD-V334R	100	2.5	Three-phase 380 V	D	T012[1]	10004
MS1H2-30C30CD-V331R	MS1H2-30C30CD-V334R	130	3.0	Three-phase 380 V	D	T012	10004
MS1H2-40C30CD-V331R	MS1H2-40C30CD-V334R	130	4.0	Three-phase 380 V	E	T017	10005
MS1H2-50C30CD-V331R	MS1H2-50C30CD-V334R	130	5.0	Three-phase 380 V		T021[2]	10006
Ratings of MS1H3 series motors (n_N = 1500 rpm, n_{max} = 4500 rpm)							
MS1H3-85B15CB-V331R	MS1H3-85B15CB-V334R	130	0.85	Single/Three-phase 220 V	C	S7R6	00006
MS1H3-85B15CD-V331R	MS1H3-85B15CD-V334R	130	0.85	Three-phase 380 V		T3R5	10001
MS1H3-13C15CB-V331R	MS1H3-13C15CB-V334R	130	1.3	Single/Three-phase 220 V	D	S012	00007
MS1H3-13C15CD-V331R	MS1H3-13C15CD-V334R	130	1.3	Three-phase 380 V	C	T5R4	10002
MS1H3-18C15CB-V331R	MS1H3-18C15CB-V334R	130	1.8	Single/Three-phase 220 V	D	S012	00007
MS1H3-18C15CD-V331R	MS1H3-18C15CD-V334R	130	1.8	Three-phase 380 V	D	T8R4	10003
MS1H3-29C15CD-V331R	MS1H3-29C15CD-V334R	180	2.9	Three-phase 380 V	D	T012	10004
MS1H3-44C15CD-V331R	MS1H3-44C15CD-V334R	180	4.4	Three-phase 380 V	E	T017	10005
MS1H3-55C15CD-V331R	MS1H3-55C15CD-V334R	180	5.5	Three-phase 380 V		T021	10006
MS1H3-75C15CD-V331R	MS1H3-75C15CD-V334R	180	7.5	Three-phase 380 V		T026	10007

Servo motor				Servo drive SV660 series			
Model without brake	Model with brake	Frame size (mm)	Capacity (kW)	Voltage class	Size	Recommended model	Drive SN (H01.10)
Ratings of MS1H4 series motors (n_N = 3000 rpm, n_{max} = 7000 rpm)							
MS1H4-05B30CB-V330R	MS1H4-05B30CB-V332R	40	0.05	Single/Three-phase 220 V	A	S1R6	00002
MS1H4-05B30CB-V331R	MS1H4-05B30CB-V334R	40	0.05	Single/Three-phase 220 V			
MS1H4-10B30CB-V330R	MS1H4-10B30CB-V332R	40	0.1	Single/Three-phase 220 V			
MS1H4-10B30CB-V331R	MS1H4-10B30CB-V334R	40	0.1	Single/Three-phase 220 V			
MS1H4-20B30CB-V331R	MS1H4-20B30CB-V334R	60	0.2	Single-phase 220 V			
MS1H4-40B30CB-V331R	MS1H4-40B30CB-V334R	60	0.4	Single-phase 220 V		S2R8	00003
MS1H4-55B30CB-V331R	-	80	0.55	Single-phase 220 V	B	S5R5	00005
MS1H4-75B30CB-V331R	MS1H4-75B30CB-V334R	80	0.75	Single-phase 220 V		S5R5	00005
MS1H4-10C30CB-V331R	MS1H4-10C30CB-V334R	80	1.0	Single/Three-phase 220 V		S7R6	00006

Note

- [1] See the torque-speed characteristics curves of this model for drives with T8R4. The drive parameters does not change.
- [2] See the torque-speed characteristics curves of this model for drives with T017. The drive parameters does not change.
- Models of drives:
  - S - 220 V voltage class
  - T - 380 V voltage class
  - 1R6: Rated output current = 1.6 A; 2R8: Rated output current = 2.8 A…; 026: Rated output current = 26 A; 027: Rated output current = 27 A.
- Servo motors designed to work with 23-bit (V3) or 26-bit (V6) encoders have the same dimensions.
- The MS1-R series motors equipped with the V6/V3/A6/A3 encoders have the same dimensions, except for motors in flange size 40.
- Servo 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.
- The SV660 series drive supports only 23-bit encoders.
- For models not listed in the table, confirm with Inovance technical support before placing an order.

2 System Connection

2.1 System Connection Diagram

Caution

Do not disconnect the terminals while the power supply is switched on. Failure to comply may result in electric shock or damage the drive.

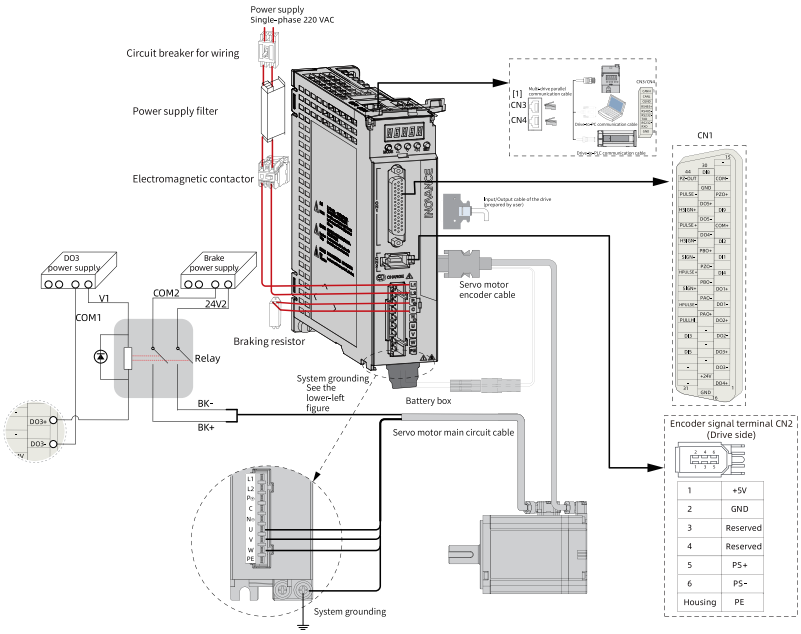


Figure 2-1 Wiring example of a single-phase 220 V system

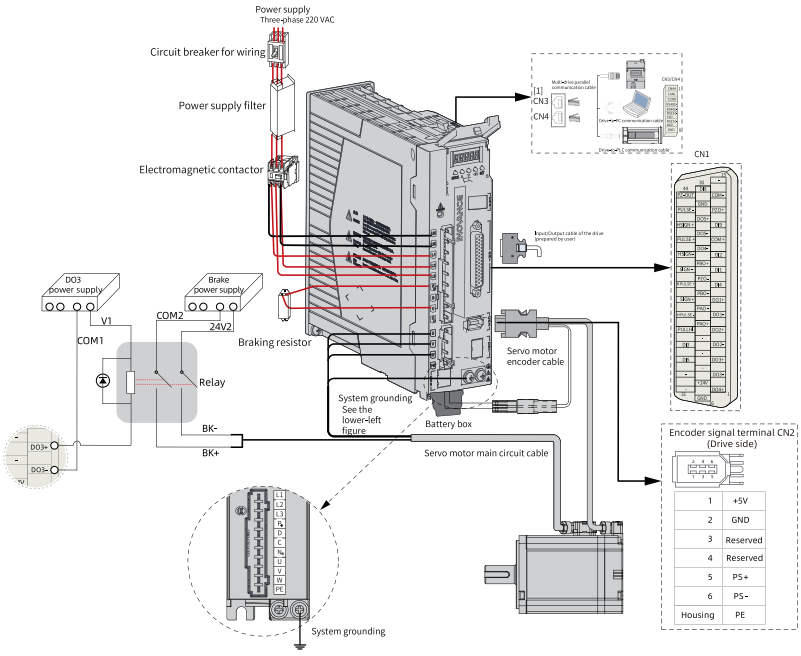


Figure 2-2 Wiring example of a three-phase 220 V system

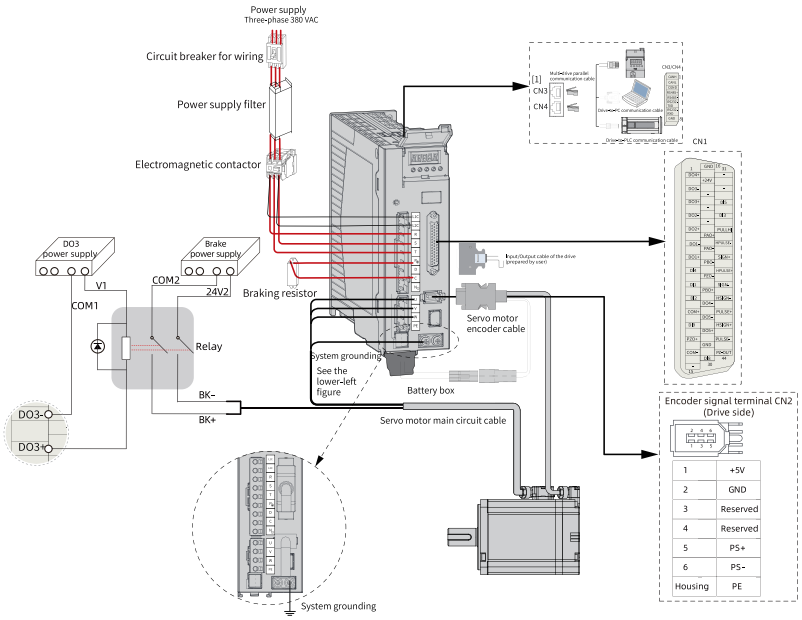


Figure 2-3 Wiring example of a three-phase 380 V system

Note

- When an external braking resistor is required (first remove the jumper between P⊕, and D, and connect it to P⊕ and C. If external brake resistor is not required, short terminals P⊕ and D. Only Size A models do not have the built-in resistor or the jumper bar for short-connecting terminals P⊕ and D as the standard. Before you use these models, ensure that braking resistor parameters H02.25, H02.26, and H02.27 are correctly configured.
- CN3 and CN4 are identical communication ports with the same pin definition, and either can be used. Among them, only CANopen model supports CANopen communication, and CANlink model supports CANlink communication.

2.2 System Composition

- The servo drive is directly connected to an industrial power supply, with no isolation such as a transformer. A fuse or circuit breaker therefore must be connected to the input power supply to prevent electric shock in the servo system. For the sake of safety, install a residual current device (RCD) to provide protections against overload and short circuit or a specialized RCD to protect the grounding cable.
- Do not use an electromagnetic contactor to start or stop the servo motor. As a high-inductance device, the motor may generate transient high voltage that may break down the contactor.
- When configuring external control power supply or brake power supply, pay attention to the following.
  - When multiple drives are paralleled to share the same power supply or multiple brakes operate simultaneously, calculate the total power needed to prevent drive system errors due to insufficient power capacity.
  - The brake power supply must be a 24 VDC power supply, with power rating matching the specific motor model and meeting the technical requirements of the braking device.
  - External control power supply and brake power supply must be independently powered to prevent the brake from disturbing control signals.

3 Product Information

3.1 Servo Drive Product Information

3.1.1 Models and Nameplate

Model description

SV660 ① P ② S ③ 2R8 ④ I ⑤ - FH ⑥

① **Product series** SV660: SV660 series servo drive	④ **Rated output current**		⑤ **Mounting method** I: Baseplate-mounted
② **Product type** P: Pulse type	S: 220 V	1R6: 1.6 A 2R8: 2.8 A 5R5: 5.5 A 7R6: 7.6 A 012: 11.6 A	⑥ **Customized function** Blank: Standard GFH: High protection INT: International version NDB: no dynamic braking
③ **Voltage class** S: 220 V T: 380 V	T: 380 V	3R5: 3.5 A 5R4: 5.4 A 8R4: 8.4 A 012: 11.9 A 017: 16.5 A 021: 20.8 A 026: 25.7 A	

Note

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

-INT: Products of the INT version support the global warranty service system by default, while other products support the Chinese warranty service system by default.

-NDB: The NDB model is required when the product is driven by loads.

Description of nameplate

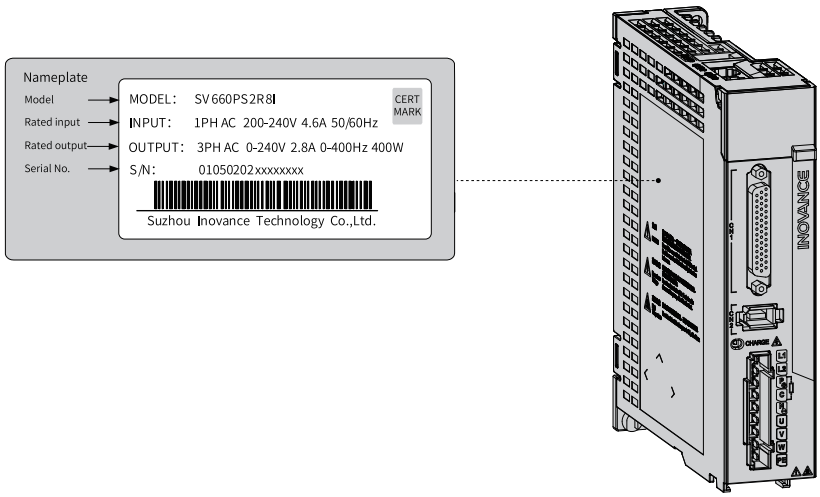


Figure 3-1 Nameplate

Description of production serial number

01050202 4 S 7 00001
① ② ③ ④ ⑤

① **Internal code** Product code	③ **Year** 9: 2009 A: 2010 ... N: 2021 S: 2024 ... Note: I/L/O/Q are skipped.	⑤ **Lot number** 00001: 1st in the month of manufacturing 00002: 2nd in the month of manufacturing 00003: 3rd in the month of manufacturing ... Range: 00001 to 99999
② **Manufacturer code** 4: Suzhou Inovance	④ **Month** 1: January 2: February ... A: October B: November C: December	

Example: S/N 010502024P700001 indicates that the drive was manufactured in July 2022.

3.1.2 Components

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

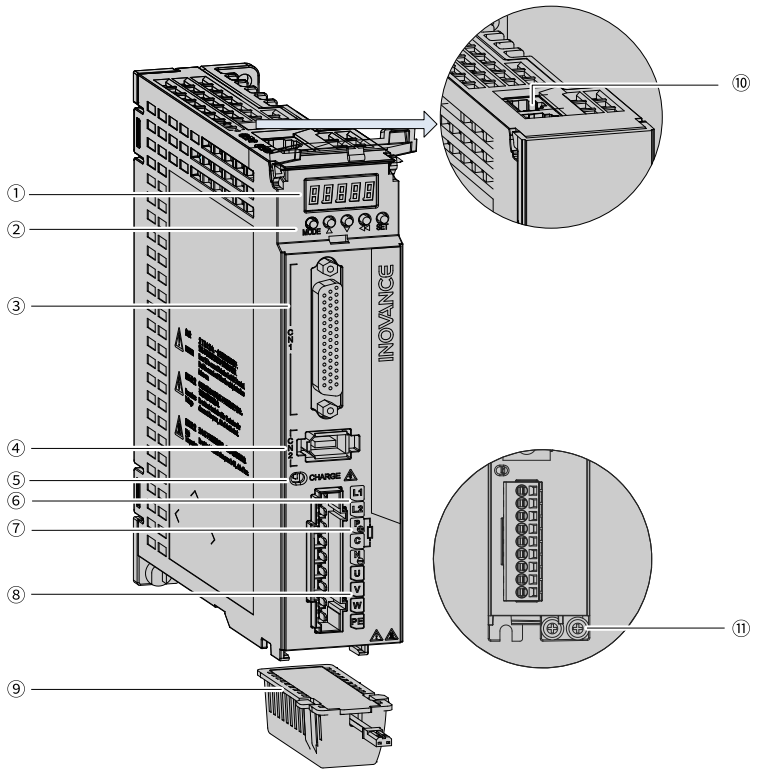


Figure 3-2 Components of servo drives in size A (SV660PS1R6I and SV660PS2R8I)

Table 3–1 Components of servo drives in size A (SV660PS1R6I and SV660PS2R8I)

No.	Component	Description
①	LED display	The 5-digit 8-segment LED display is used to show operating state and parameter setting of the drive.
②	Key operator	MODE: Used to switch parameters in sequence △: Used to increase the value of the blinking bit ▽: Used to decrease the value of the blinking bit ◁◁: Used to shift the blinking bit leftwards (Press and hold: Turning to the next page when the displayed number exceeds five digits) SET: Used to save modifications and enter the next menu.
③	CN1 (control terminal)	Used for reference input signals and other I/O signals.
④	CN2 (terminal for connecting the encoder)	Connected to the motor encoder.
⑤	CHARGE (bus voltage indicator)	Indicates the bus capacitor with charges. When this indicator is on, it indicates that electric charge may still exist in the internal capacitor of the servo unit even if the main circuit power supply is off. To avoid electric shock, do not touch the power terminals when this indicator is on.
⑥	L1, L2 (power input terminals)	See the nameplate for the rated voltage level.

No.	Component	Description
⑦	$P_{\oplus}$, $N_{\ominus}$ (servo bus terminals)	Used by the common DC bus for multiple drives. Contact Inovance for technical support.
	$P_{\oplus}$, C (terminals for connecting external braking resistor)[1]	If an external braking resistor is needed, connect it between terminals $P_{\oplus}$ and C.
⑧	U, V, W (terminals for connecting the servo motor)	Used to connect U, V, and W phases of the motor.
⑨	Battery box location	Used to hold the battery box of the absolute encoder
⑩	CN3, CN4 (communication terminals)	Connected to RS232 and RS485 host controllers in parallel.
⑪	Grounding terminal	Connected to the grounding terminal of the motor/power supply for grounding purpose.

Note

[1]: The built-in braking resistor or jumper bar is not available in models S1R6 and S2R8. If an external braking resistor is needed for these models, connect it between terminals $P_{\oplus}$ and C.

3.1.2.2 Drives in Size B (Rated Power: 0.75 kW)

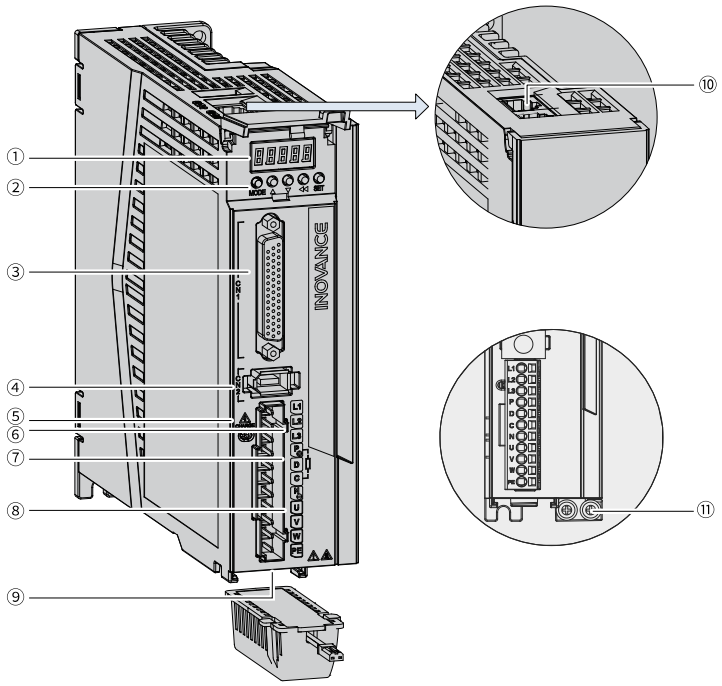


Figure 3-3 Components of servo drives in size B (SV660PS5R5I)

Table 3–2 Components of servo drives in size B (SV660PS5R5I)

No.	Component	Description
①	LED display	The 5-digit 8-segment LED display is used to show operating state and parameter setting of the drive.
②	Key operator	MODE: Used to switch parameters in sequence. △: Used to increase the value of the blinking bit ▽: Used to decrease the value of the blinking bit ◁◁: Used to shift the blinking bit leftwards (Press and hold: Turning to the next page when the displayed number exceeds five digits) SET: Used to save modifications and enter the next menu.
③	CN1 (control terminal)	Used for reference input signals and other I/O signals.
④	CN2 (terminal for connecting the encoder)	Connected to the motor encoder.
⑤	CHARGE (bus voltage indicator)	Indicates the bus capacitor with charges. When this indicator is on, it indicates that electric charge may still exist in the internal capacitor of the servo unit even if the main circuit power supply is off. To avoid electric shock, do not touch the power terminals when this indicator is on.
⑥	L1, L2, L3 (power input terminals)	See the nameplate for the rated voltage level. Note: S5R5 (0.75 kW) models support single-phase 220 V input only, with a 220 V power supply connected between terminals L1 and L2.
⑦	$P_{\oplus}$, $N_{\ominus}$ (servo bus terminals)	Used by the common DC bus for multiple drives. Contact Inovance for technical support.
	$P_{\oplus}$, D, C (terminals for connecting external braking resistor)	Remove the jumper bar between terminals $P_{\oplus}$ and D before connecting an external braking resistor between terminals $P_{\oplus}$ and C. If no external braking resistor is required, keep the jumper bar between terminals $P_{\oplus}$ and D.
⑧	U, V, W (terminals for connecting the servo motor)	Used to connect U, V, and W phases of the motor.
⑨	Battery box location	Used to hold the battery box of the absolute encoder
⑩	CN3, CN4 (communication terminals)	Connected to RS232 and RS485 host controllers in parallel.
⑪	Grounding terminal	Connected to the grounding terminal of the motor/power supply for grounding purpose.

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

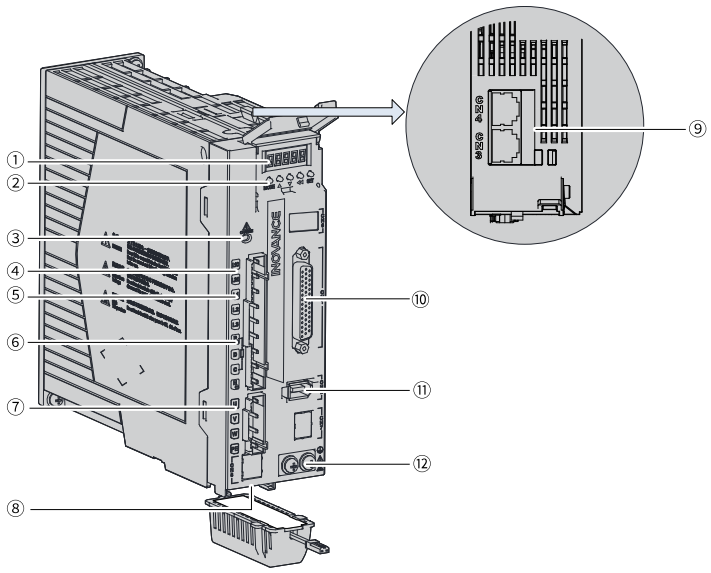


Figure 3-4 Components of servo drives in size C (SV660PS7R6I) and size D (SV660PS012I)

Table 3–3 Description of components (size C: SV660FS7R6I/size D: SV660FS012I)

No.	Component	Description
①	LED display	The 5-digit 8-segment LED display is used to show operating state and parameter setting of the drive.
②	Key operator	MODE: Used to switch parameters in sequence. △: Used to increase the value of the blinking bit ▽: Used to decrease the value of the blinking bit ◁◁: Used to shift the blinking bit leftwards (Press and hold: Turning to the next page when the displayed number exceeds five digits) SET: Used to save modifications and enter the next menu.
③	CHARGE (bus voltage indicator)	Indicates the bus capacitor with charges. When this indicator is on, it indicates that electric charge may still exist in the internal capacitor of the servo unit even if the main circuit power supply is off. To avoid electric shock, do not touch the power terminals when this indicator is on.
④	L1C, L2C (control circuit power input terminals)	Provides power supply to the control circuit as per the rated voltage class on the nameplate.
⑤	L1, L2, L3 (main circuit power input terminals)	Used as the power input terminals for a three-phase 220 V servo drive. See the nameplate for the rated voltage class.
⑥	$P_{\oplus}$, D, C (terminals for connecting external braking resistor)	Remove the jumper bar between terminals $P_{\oplus}$ and D before connecting an external braking resistor between terminals $P_{\oplus}$ and C. If no external braking resistor is required, keep the jumper bar between terminals $P_{\oplus}$ and D.
	$P_{\oplus}$, $N_{\ominus}$ (servo bus terminals)	Used by the common DC bus for multiple drives. Contact Inovance for technical support.
⑦	U, V, W (terminals for connecting the servo motor)	Used to connect U, V, and W phases of the motor.
⑧	Battery box location	Used to hold the battery box of the absolute encoder

No.	Component	Description
⑨	CN3, CN4 (communication terminals)	Connected to RS232 and RS485 host controllers in parallel.
⑩	CN1 (control terminal)	Used for reference input signals and other I/O signals.
⑪	CN2 (terminal for connecting the encoder)	Connected to the motor encoder.
⑫	Grounding terminal	Connected to the grounding terminal of the motor/power supply for grounding purpose.

Note

- The main circuits of models S7R6 and S012 can be connected to a single-phase or a three-phase power supply, depending on which one is available on site.
- For models S7R6 and S012, no derating is required when a single-phase power supply is connect to L1 and L2.

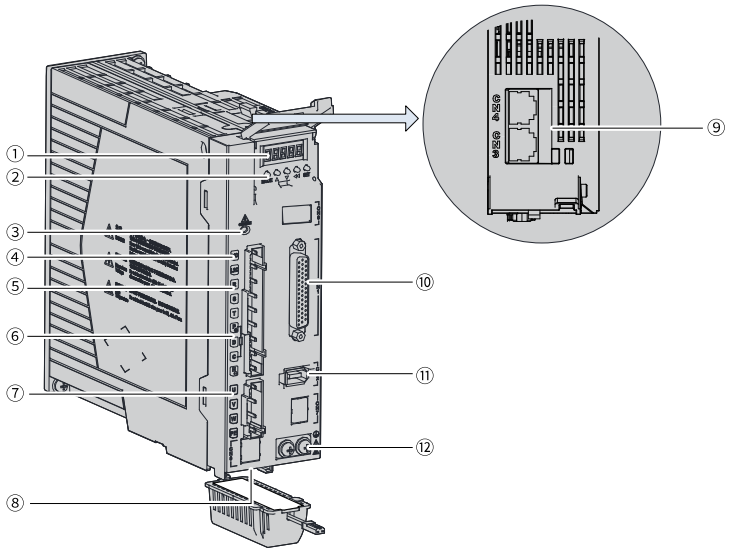


Figure 3-5 Components of servo drives in size C (SV660PT3R5I and SV660PT5R4I) and size D (SV660PT8R4I and SV660PT012I)

Table 3–4 Components of servo drives in size C (SV660PT3R5I and SV660PT5R4I) and size D (SV660PT8R4I and SV660PT012I)

No.	Component	Description
①	LED display	The 5-digit 8-segment LED display is used to show operating state and parameter setting of the drive.
②	Key operator	MODE: Used to switch parameters in sequence. △: Used to increase the value of the blinking bit ▽: Used to decrease the value of the blinking bit ◁◁: Used to shift the blinking bit leftwards (Press and hold: Turning to the next page when the displayed number exceeds five digits) SET: Used to save modifications and enter the next menu.

No.	Component	Description
③	CHARGE (bus voltage indicator)	Indicates the bus capacitor with charges. When this indicator is on, it indicates that electric charge may still exist in the internal capacitor of the servo unit even if the main circuit power supply is off. To avoid electric shock, do not touch the power terminals when this indicator is on.
④	L1C, L2C (control circuit power input terminals)	Provides power supply to the control circuit as per the rated voltage class on the nameplate.
⑤	R, S, T (main circuit power input terminals)	Used as the power input terminals for a three-phase 380 V servo drive. See the nameplate for the rated voltage class.
⑥	$P_{\oplus}$, D, C (terminals for connecting external braking resistor)	Remove the jumper bar between terminals $P_{\oplus}$ and D before connecting an external braking resistor between terminals $P_{\oplus}$ and C. If no external braking resistor is required, keep the jumper bar between terminals $P_{\oplus}$ and D.
	$P_{\oplus}$, $N_{\ominus}$ (servo bus terminals)	Used by the common DC bus for multiple drives. Contact Inovance for technical support.
⑦	U, V, W (terminals for connecting the servo motor)	Used to connect U, V, and W phases of the motor.
⑧	Battery box location	Used to hold the battery box of the absolute encoder
⑨	CN3, CN4 (communication terminals)	Connected to RS232 and RS485 host controllers in parallel.
⑩	CN1 (control terminal)	Used for reference input signals and other I/O signals.
⑪	CN2 (terminal for connecting the encoder)	Connected to the motor encoder.
⑫	Grounding terminal	Connected to the grounding terminal of the motor/power supply for grounding purpose.

3.1.2.4 Size E Drives (rated power: 5.0 kW to 7.5 kW)

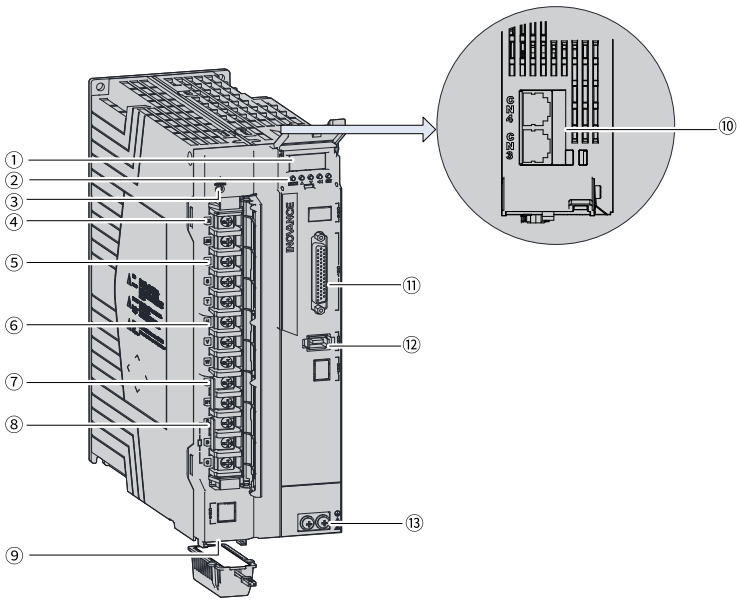


Figure 3-6 Components of servo drives in size E (SV660PT017I, SV660PT021I, SV660PT026I)

Table 3–5 Description of components (SV660PT017I, SV660PT021I, SV660PT026I)

No.	Component	Description
①	LED display	The 5-digit 8-segment LED display is used to show operating state and parameter setting of the drive.
②	Key operator	MODE: Used to switch parameters in sequence. △: Used to increase the value of the blinking bit ▽: Used to decrease the value of the blinking bit ◁◁: Used to shift the blinking bit leftwards (Press and hold: Turning to the next page when the displayed number exceeds five digits) SET: Used to save modifications and enter the next menu.
③	CHARGE (bus voltage indicator)	Indicates the bus capacitor with charges. When this indicator is on, it indicates that electric charge may still exist in the internal capacitor of the servo unit even if the main circuit power supply is off. To avoid electric shock, do not touch the power terminals when this indicator is on.
④	L1C, L2C (control circuit power input terminals)	Provides power supply to the control circuit as per the rated voltage class on the nameplate.
⑤	R, S, T (main circuit power input terminals)	Used as the power input terminals for a three-phase 380 V servo drive. See the nameplate for the rated voltage class.
⑥	U, V, W (terminals for connecting the servo motor)	Used to connect U, V, and W phases of the motor.
⑦	N2, N1 (terminals for connecting an external reactor)	N1 is shorted to N2 with a jumper by default. To suppress power supply harmonics, remove the jumper and connect an external DC reactor between N1 and N2.
⑧	$P_{\oplus}$, D, C (terminals for connecting external braking resistor)	Remove the jumper bar between terminals $P_{\oplus}$ and D before connecting an external braking resistor between terminals $P_{\oplus}$ and C. If no external braking resistor is required, keep the jumper bar between terminals $P_{\oplus}$ and D.
⑨	Battery box location	Used to hold the battery box of the absolute encoder
⑩	CN3, CN4 (communication terminals)	Connected to RS232 and RS485 host controllers in parallel.
⑪	CN1 (control terminal)	Used for reference input signals and other I/O signals.
⑫	CN2 (terminal for connecting the encoder)	Connected to the motor encoder.
⑬	Grounding terminal	Connected to the grounding terminal of the motor/power supply for grounding purpose.

3.2 MS1-R Series Servo Motor Product Information

3.2.1 Models and Nameplate

Model

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

① **MS1 series servo motor**	② **Inertia and capacity** H1: Low inertia, small capacity H2: Low inertia, medium capacity H3: Medium inertia, medium capacity H4: Medium inertia, small capacity	③ **Rated power (W)** Comprised of one letter and two digits B: × 10 C: × 100 Example: 75B means 750 W.
④ **Rated speed (rpm)** Comprised of one letter and two digits B: × 10 C: × 100 Example: 30C means 3,000 rpm.	⑤ **Voltage level (V)** B: 220 D: 380	⑥ **Encoder type** Comprised of one letter and one digit A3: 23-bit multi-turn absolute encoder U2: 20-bit single-turn absolute encoder (for 25-flange motors)
⑦ **Shaft connection mode** 3: Solid shaft, with key and threaded hole	⑧ **Brake and oil seal** 0: Without oil seal or brake 1: With oil seal but no brake 2: With brake but no oil seal 4: With brake and oil seal	⑨ **Sub-series No.** R: R version ⑩ **Customized function**[1] Blank: Standard

Note

[1] For non-standard model selection, contact Inovance.

Description of nameplate

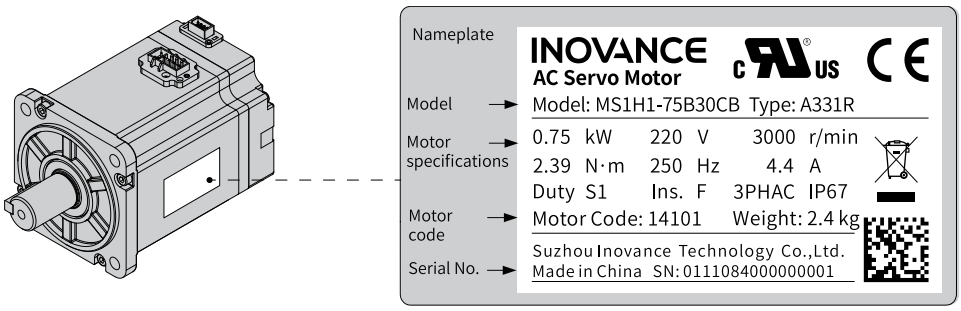


Figure 3-7 Nameplate

3.2.2 Components

Motor (40-flange)

- **Terminal-type servo motor**

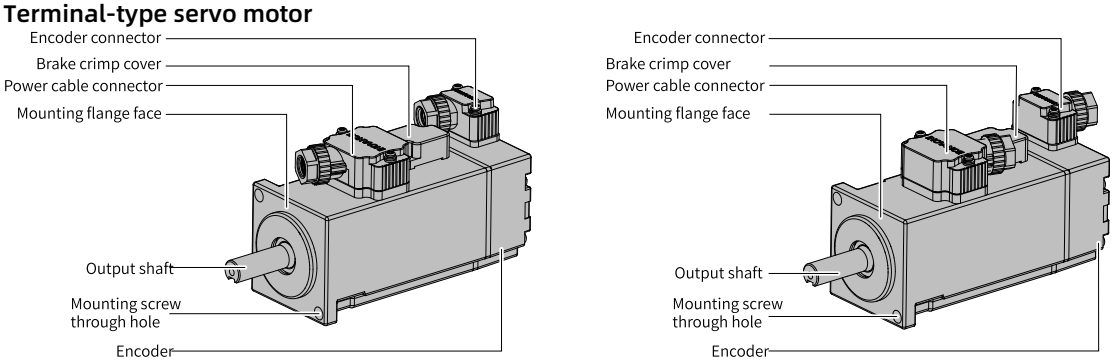


Figure 3-8 Components of terminal-type servo motors (Left: motor with front cable outlet; Right: motor with rear cable outlet)

- **Flying leads type servo motors**

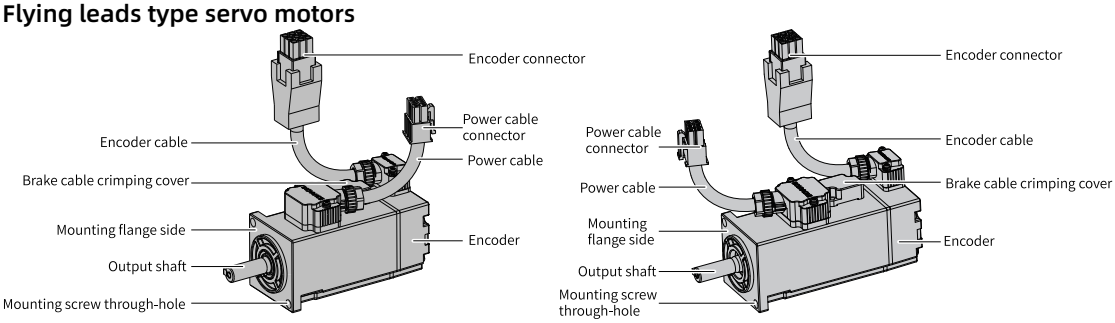


Figure 3-9 Components of the flying leads motor (left: 50 W flying leads motor, right: 100 W flying leads motor)

Note

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

Motor (60- and 80-flange)

- **Terminal-type servo motor**

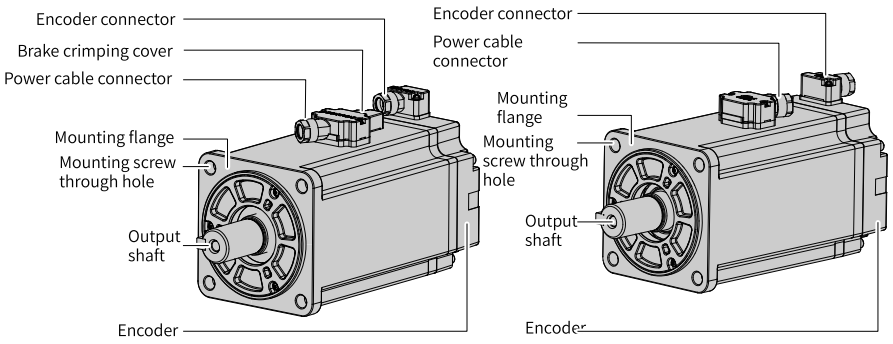


Figure 3-10 Components of terminal-type servo motors (Left: motor with front cable outlet; Right: motor with rear cable outlet)

- **Flying leads type servo motors**

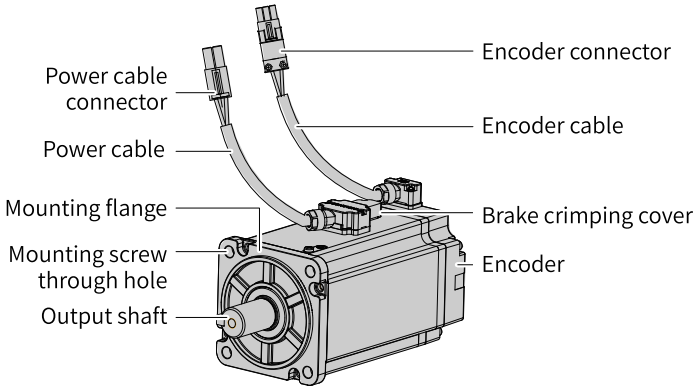


Figure 3-11 Components of the flying leads motor (front cable outlet as standard)

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

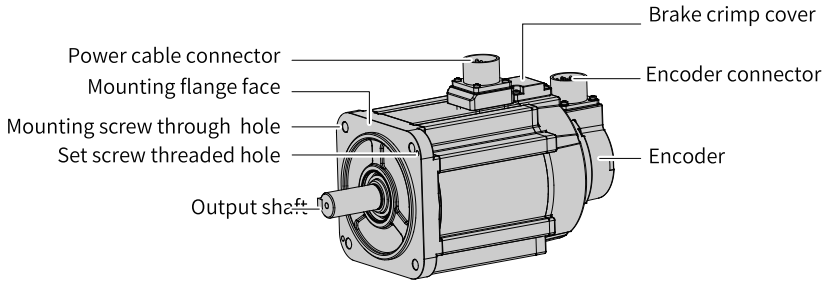


Figure 3-12 Components of servo drives in frame sizes 100/130/180

3.3 MS1-R Series Servo Motor with Battery-free Encoder

3.3.1 Models and Nameplate

Model Description

MS1 H1 - 75B 30C B - V3 3 1 R
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

① **MS1 series servo motor**	② **Inertia and capacity** H1: Low inertia and low capacity H2: Low inertia and medium capacity H3: Medium inertia, medium capacity H4: Medium inertia, small capacity	③ **Rated power (W)** One letter and two digits B: x 10 C: x 100 Example: 75B: 750 W
④ **Rated speed (rpm)** One letter and two digits B: x 10 C: x 100 Example: 30C: 3,000 rpm	⑤ **Voltage class (V)** B: 220 D: 380	⑥ **Encoder type** One letter and one digit V3: Battery-less 23-bit multi-turn absolute encoder
⑦ **Shaft connection mode** 3: Solid shaft, with key and threaded hole	⑧ **Brake and oil seal** 1: With oil seal but no brake 4: With brake and oil seal	⑨ **Sub-series** R: R version

Description of nameplate

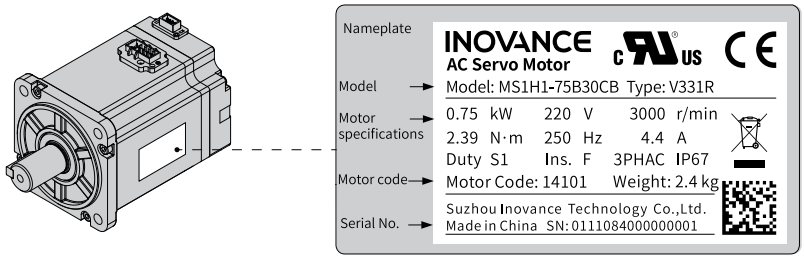


Figure 3-13 Nameplate

3.3.2 Components

Motor (frame sizes 40/60/80)

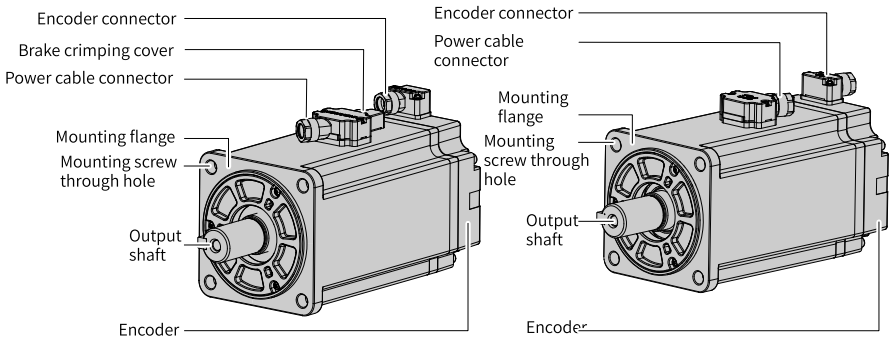


Figure 3-14 Components of servo drives in frame sizes 40/60/80 (Left: motor with front cable outlet; Right: motor with rear cable outlet)

Note

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

Motor (frame sizes 100/ 130/180)

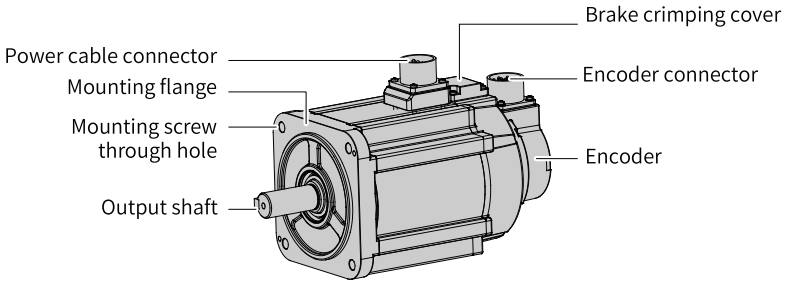


Figure 3-15 Components of servo drives in frame sizes 100/130/180

4 Servo Technical Specifications

4.1 Electrical Specifications

- Single-phase 220 V drive

Item		Size A		Size B	Size C	Size D
Drive model		S1R6	S2R8	S5R5	S7R6	S012
Drive power (kW)		0.2	0.4	0.75	1	1.5
Max. applicable motor capacity (kW)		0.2	0.4	0.75	1	1.5
Power supply equipment capacity (kVA)		1.4	2.8	4.6	6.0	8.0
Continuous output current (Arms)		1.6	2.8	5.5	7.6	11.6
Max. output current (Arms)		5.8	10.1	16.9	23.0	32.0
Main circuit [1]	Continuous input current (Arms)	2.3	4.0	7.9	9.6	12.8
	Main circuit power supply	Single-phase 200 VAC to 240 VAC, -10% to +10%, 50 Hz/60 Hz				
	Energy loss (W)[2]	10.21	23.8	38.2	47.32	69.84
	Surge current (A)	17.0	17.0	17.0	11.3	11.3
Control circuit	Control circuit power supply	No separate power supply required [4]			Single-phase 200 VAC to 240 VAC, -10% to +10%, 50 Hz/60 Hz	
	Energy loss (W)[3]	16				
Braking resistor	Resistance (Ω)	-	-	50	25	
	Power (W)	-	-	50	80	
	Minimum resistance of external resistor (Ω)	40	40	40	20	15
	Maximum braking energy absorbed by capacitor (J)[5]	7.86	15.72	22.39	32.39	47.6
	Braking resistor	All models support built-in and external braking resistors. Only drives in size A do not come with a built-in braking resistor as standard.				
Cooling method		Naturally-ventilated		Air cooling		
Overvoltage category		III				
Maximum input surge current (A)		18.65	18.65	18.65	12.44	12.44
3τ (ms) (3 × RC time constant)		19.8	39.6	56.4	122.4	180

- Three-phase 220 V drives

Item	Size C	Size D
Drive model	S7R6	S012
Drive power (kW)	1	1.5
Max. applicable motor capacity (kW)	1	1.5
Power supply equipment capacity (kVA)	5.05	6.68
Continuous output current (Arms)	7.6	11.6

Item		Size C	Size D
Max. output current (Arms)		23	32
Main circuit [1]	Continuous input current (Arms)	5.1	8.0
	Main circuit power supply	Three-phase 200 VAC to 240 VAC, -10% to +10%, 50 Hz/60 Hz	
	Energy loss (W)[2]	47.32	69.84
	Surge current (A)	11.3	11.3
Control circuit	Control circuit power supply	Single-phase 200 VAC to 240 VAC, -10% to +10%, 50 Hz/60 Hz	
	Energy loss (W)[3]	16	
Braking resistor	Resistance (Ω)	25	
	Power (W)	80	
	Minimum resistance of external resistor (Ω)	20	15
	Maximum braking energy absorbed by capacitor (J)[5]	32.39	47.6
	Braking resistor	Built-in braking resistor (external braking resistor supported)	
Cooling method		Air cooling	
Overvoltage category		III	
Maximum input surge current (A)		12.44	12.44
3τ (ms) (3 × RC time constant)		122.4	180

- Three-phase 380 V drive

Item		Size C		Size D		Size E		
Drive model		T3R5	T5R4	T8R4	T012	T017	T021	T026
Drive power (kW)		1	1.5	2	3	5	6	7.5
Max. applicable motor capacity (kW)		1	1.5	2	3	5	6	7.5
Power supply equipment capacity (kVA)		6.05	9.08	10.23	15.15	22.25	25.0	31.25
Continuous output current (Arms)		3.5	5.4	8.4	11.9	16.5	20.8	25.7
Max. output current (Arms)		11	14	20	29.75	42	55	65
Main circuit [1]	Continuous input current (Arms)	2.4	3.6	5.6	8.0	12.0	16.0	21.0
	Main circuit power supply	Three-phase 380 VAC to 440 VAC, -10% to +10%, 50 Hz/60 Hz						
	Energy loss (W)[2]	39.5	63.25	94.82	135.47	187.62	228.28	258.63
	Surge current (A)	20.7	20.7	20.7	20.7	20.7	20.7	20.7
Control circuit	Control circuit power supply	Single-phase 380 VAC to 440 VAC, -10% to +10%, 50 Hz/60 Hz						
	Energy loss (W)[3]	16						

Item		Size C		Size D		Size E		
Braking resistor	Resistance (Ω)	100	100	50	50	35	35	35
	Power (W)	80	80	80	80	100	100	100
	Minimum resistance of external resistor (Ω)	80	60	45	40	35	25	25
	Maximum braking energy absorbed by capacitor (J)[5]	28.18	34.22	50.32	50.32	82.49	100.64	100.64
	Braking resistor	Built-in braking resistor (external braking resistor supported)						
Cooling method		Air cooling						
Overvoltage category		III						
Maximum input surge current (A)		24.89	24.89	24.89	24.89	24.89	24.89	24.89
3τ (ms) (3 × RC time constant)		30.6	30.6	45	45	73.8	90	90

Note

- [1]: The main circuit of the S7R6 and S012 drives support single-phase 220 V power supplies without derating.
- [2]: Main circuit energy loss refers to the energy loss under rated output current of the drive.
- [3]: Control circuit energy loss refers to the energy loss under rated input current of the drive.
- [4]: The control circuit and power circuit of drives in size A and size B share the same input power supply (L1/L2), with power drawn from the bus and rectifier unit used jointly. Therefore, there is no independent power supply terminal.
- Select the external braking resistor according to actual operating conditions.
- [5]: The default braking threshold of a single-phase/three-phase 220 V drive is 380 V. The default braking threshold of a three-phase 380 V drive is 700 V. The maximum braking energy (E_C, J) that can be absorbed by the capacitor is determined by the power supply voltage (220 Vac or 380 Vac). Calculation formula:

$$E_C = \frac{1}{2}C\left[V_{\text{Discharge threshold voltage}}^2 - \left(V_{\text{Power supply voltage}} \times \sqrt{2}\right)^2\right]$$

When the power supply voltage changes, adjust the values proportionally for calculation.

$$E_C = E_{C\text{Original table data in the manual}} \times \frac{V_{\text{Actual discharge threshold voltage}}^2 - \left(V_{\text{Actual power supply voltage}} \times \sqrt{2}^2\right)}{V_{\text{Default discharge threshold voltage}}^2 - \left(V_{\text{Default power supply voltage}} \times \sqrt{2}^2\right)}$$

For example, assume that the energy absorbed by the capacitor of the S2R8 model servo drive at a supply voltage of 220 Vac is 15.72 J. In this case, the energy absorbed by the capacitor at a supply voltage of 240 Vac is calculated as follows:

$$E_C = 15.72 \times \frac{380^2 - (240 \times \sqrt{2})^2}{380^2 - (220 \times \sqrt{2})^2} = 9.64\text{J}$$

4.2 Technical Specifications

Item				Description
Basic specifications	Control mode			IGBT PWM control, sine wave current drive mode
				220 V, 380 V: single-phase/three-phase full wave bridge rectification
	Encoder feedback			23-bit multi-turn absolute encoder, which can be used as an incremental encoder in absence of the battery
	Conditions for use	Ambient/Storage temperature[1]		0°C to 55°C (average load ratio not exceeding 80% in ambient temperatures between 45°C to 55°C) (non-freezing)/-20°C to +70°C
		Operating/Storage humidity		Below 90%RH (without condensation)
		Vibration resistance		4.9 m/s^2
		Shock resistance		19.6 m/s^2
		IP rating		IP20
		Pollution degree		PD2
		Protection class		Class I
		Short circuit rating		5 KA, 65 KA
		Altitude		The maximum altitude is 2000 m. 1000 m and below: Derating is not needed. For altitude above 1000 m, derate 1% for every additional 100 m. For altitude above 2000m, contact Inovance.
Speed/ Torque control mode	Performance	Load change ratio		Below 0.5% at 0–100% load (rated speed)
		Voltage change ratio		0.5% at rated voltage ± 10% (rated speed)
		Speed control range		1 rpm to 6000 rpm (Under the rated torque control, the drive can keep running as long as the lower limit of the speed control range is not exceeded.)
		Soft startup time setting		0s to 65s (Acceleration and deceleration can be set separately.)
	Input signal	Speed reference input	DI signal	Speed 0 to 15 selectable through DI signal combination
		Torque reference input	DI signal	-

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

Item			Description
Built-in functions	Overtravel prevention		The drive stops immediately when P-OT or N-OT signal is active.
	Electronic gear ratio		0.001 ≤ B/A ≤ 3355443.2
	Protective functions		Protection against overcurrent, overvoltage, undervoltage, overload, main circuit detection error, heatsink overheat, power supply phase loss, overspeed, encoder error, CPU error, parameter error, and others.
	LED display		Main circuit CHARGE indicator, 5-digit LED display
	Vibration suppression		5 notches (including two adaptive notches) available, 50 Hz to 8000 Hz
	Usability functions		One-key parameter tuning, adaptive parameter tuning, speed observer, and model tracking
	Communication function	Software tool commissioning	RJ45 Modbus (RS232)
		Multi-station communication	RS485
		Number of multi-station communication axes	When using Modbus communication, the maximum number of stations is 32.
		Axis address setting	No physical knob, set through the software
		Description	Including status display, user parameter setting, monitored value display, fault tracing display, JOG and auto-tuning, and communication and motion control command setting.
	Others		Gain tuning, alarm log, and jog

Note

- [1] The environment where the servo drive is installed must be within the specified temperature range. When it is installed inside a control cabinet, the temperature inside the cabinet must also be within this range.
- The internal open collector power supply is not electrically insulated from the control circuit in the servo drive.
- The main circuit of the servo drive supports single-phase 220 V power supplies without derating.

4.3 Communication Specifications

Item		Specification
Modbus RTU slave device performance	Link layer protocol	RS485
	Application layer protocol	Modbus RTU, GBT 19582.2-2008, using custom command area
	Baud rate	115200 bps
	Duplex mode	Half-duplex
	Data format	8-N-1 (8 data bits, no parity check, 1 stop bit)

4.4 Dynamic Brake Characteristics

Calculating the approximate dynamic braking distance

The initial speed and load inertia, the dynamic braking distance can be estimated according to the motor model. The approximate value of the dynamic braking distance can be calculated by the following formula.

Maximum braking distance s (turn) is:

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

The coefficient is as follows:

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

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

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

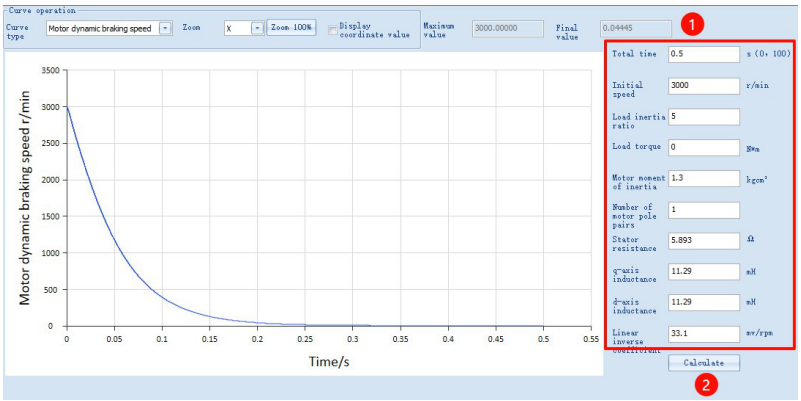
- V_0: Maximum feedback speed
- t_e: Dynamic brake program and relay delay
- J_L: Load moment of inertia
- J_M: Motor moment of inertia
- P_n: Number of motor pole pairs
- R_s: Stator resistance (Ω)
- K_e: Kelvin, unit of thermodynamic temperature
- L_q, L_d: q-axis inductance (mH), d-axis inductance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

Calculating accurate dynamic braking distance

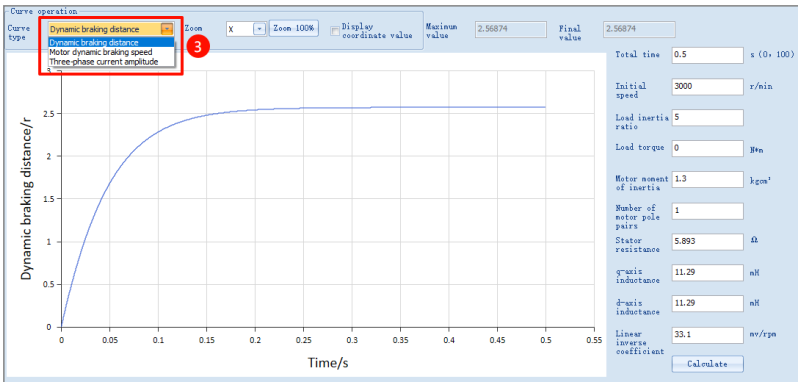
Use InoDriverShop for calculating accurate dynamic braking distance.

See detailed procedure below.

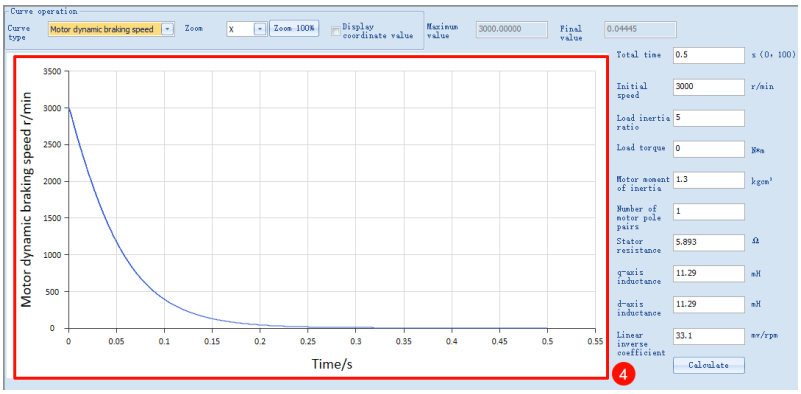
1. Set the corresponding parameters at ① according to actual motor, load, and operation parameters. The time range of the x-coordinate of the calculation chart can be adjusted by setting the total time.
2. After parameter setting is done, click "Calculate" at ② to generate dynamic braking measurement curve.



3. This function provides three dynamic braking calculation curves: dynamic braking distance-time curve (relationship between braking distance and time during dynamic braking), dynamic braking speed-time curve (relationship between motor speed and time during dynamic braking), and three-phase current amplitude-time curve (relationship between three-phase current amplitude and time during dynamic braking). You can select the curve type at ③ based on the curve needed.



4. After the curve type is selected, the curve is automatically generated at ④.



Application scenarios

To trigger dynamic braking at a motor speed of 3000 rpm and estimate how long can the motor stop (speed reduced to 0 rpm), do as follows. Set parameters at ① based on actual motor parameters. After calculation at ②, select "Dynamic motor braking speed" at ③ and a "Dynamic braking speed-time curve" will be generated automatically at ④.

4.5 Load Moment of Inertia

The load moment of inertia represents the ratio of the load inertia to the rotor inertia. The higher the load inertia ratio, the weaker the responsiveness will be. An excessively high inertia ratio can result in unstable operation. The allowable load inertia ratio of the servo motor is limited. The value is a general standard and varies according to the driving conditions of the servo motor.

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

- Reduce the torque limit value.
- 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.

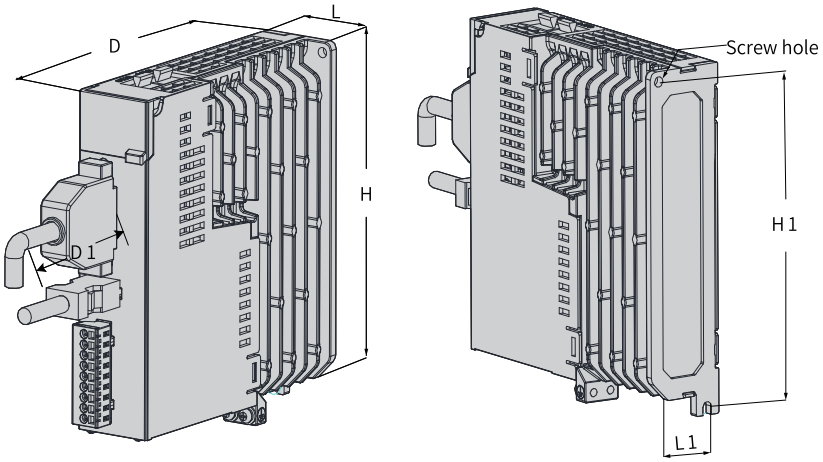
Table 4–1 Permissible load moment of inertia

Motor speed (RPM)	Drive model SV660 series											
	Size A		Size B	Size C			Size D			Size E		
	S1R6	S2R8	S5R5	S7R6	T3R5	T5R4	S012	T8R4	T012	T017	T021	T026
1500	× 20											
3000	× 20									× 10		
4500	× 20									× 5		
6000	× 20									× 5		Not supported
7000	× 20			Not supported								

Note

- Motor speed: Represents the maximum speed supported by the motor. For example, MS1H1/H4 supports up to 7000 rpm, MS1H2 supports up to 6000 rpm, and MS1H3 supports up to 4500 rpm.
- When operating at more than 10 x maximum inertia speed, setting the acceleration and deceleration time to excessively low values may trigger a drive alarm.

4.6 Product Dimensions

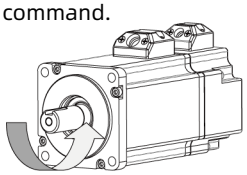


Size	L	H	D	L1	H1	D1	Tapped hole	Tightening Torque	Weight
	Unit: mm (in.)							Unit: (N·m)	Unit: kg (lb.)
A.	40 (1.57)	170 (6.69)	150 (5.91)	28 (1.10)	161 (6.34)	75 (2.95)	2 x M4	0.6 to 1.2	0.8 (1.76)
B	50 (1.97)	170 (6.69)	173 (6.81)	37 (1.46)	161 (6.34)	75 (2.95)	2 x M4	0.6 to 1.2	1.0 (2.20)
C	56 (2.20)	170 (6.69)	174 (6.85)	44 (1.73)	160 (6.30)	75 (2.95)	2 x M4	0.6 to 1.2	1.2 (2.65)
D	81 (3.19)	170 (6.69)	183 (7.20)	71 (2.80)	160 (6.30)	75 (2.95)	3xM4	0.6 to 1.2	1.8 (3.97)
E	90 (3.54)	250 (9.84)	230 (9.06)	78 (3.07)	240.5 (9.47)	75 (2.95)	4xM4	0.6 to 1.2	3.6 (7.94)

5 Motor Technical Specifications

5.1 General Specifications (MS1-R Motor)

5.1.1 Mechanical Characteristics

Item	Description
Duty type	S1 (Continuous duty)
Vibration class[1]	V15
Insulation resistance	500 VDC, above 10 MΩ
Excitation mode	Permanent magnet
Installation method	Flange
Thermal class	F (155℃)
Insulation voltage	1500 VAC, 1 minute (220 V class) 1800 VAC, 1 minute (380 V class)
IP rating	IP67 (excluding shaft opening and flying leads type motor connectors)
Direction of rotation	Rotates counterclockwise (CCW) when viewed from the shaft extension side with a forward run command.  CCW

Item		Description
Ambient condition	Ambient temperature	0°C to 40°C (non-freezing)
	Ambient humidity	20% RH to 80% RH (without condensation)
	Rated operating altitude	1000 m
	Altitude-based derating	• 1000 m and below: Derating is not needed. • For use above 1000 m, derate according to *"5.1.3 Derating Characteristics" on page 47*. For altitudes above 2000 m, install an isolation transformer at the power input end.
	Installation location	• Free from corrosive or explosive gases • Well ventilated with minimum amount of dust, waste, and moisture • Convenient for inspection and cleaning • Away from sources that may generate strong magnetic field • Away from heating sources such as heating stoves. • Use a motor with oil seal in places with grinding fluid, oil mist, iron powders or cuttings. • Oil seal protection capability: The oil seal is only dust-proof. It cannot withstand the intrusion of oil for a long term. For direct-connected reducer applications requiring long-term oil resistance on the motor oil seal, contact Inovance technical support. • Not applicable to vacuum environments. • 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 a natural frequency. Exceeding the allowable vibration value may damage the system.
	Storage environment	Observe the following requirements for storing a de-energized motor. • Temperature: -20°C to +60°C (non-freezing) • Storage humidity: 20% to 80% RH (without condensation)
Shock resistance [3][5]	Shock acceleration (taking flange side as standard)	490m/s^2
	Number of shocks	2
Vibration resistance [4][5]	Vibration acceleration (taking flange side as standard)	• Radial 49 m/s^2 • Axial 24.5 m/s^2

Note

- [1] Vibration class V15 indicates that the amplitude of vibration is lower than 15 μm when an individual motor rotates at rated values.
- [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 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.
- [5] The vibration intensity applied on the motor is affected by the transmission structure, alignment accuracy, mounting conditions, and external vibration. These factors may enhance the vibration applied on the motor. When the maximum allowable vibration limit is exceeded, the motor may fail. Therefore, take necessary measures to limit resonance.
- The vibration intensity applied on the motor varies with applications.

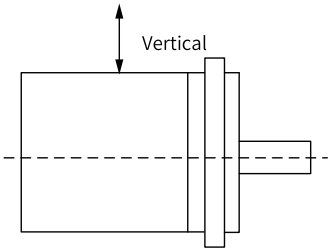


Figure 5-1 Shock applied to the servo motor

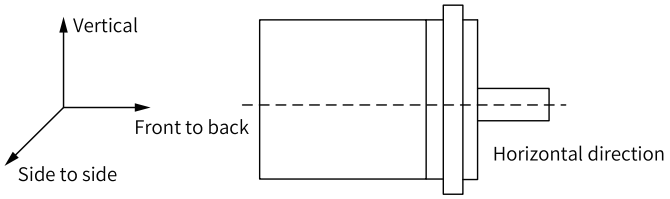


Figure 5-2 Vibration applied to the servo motor

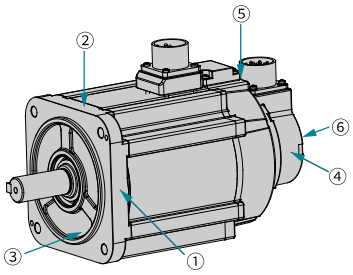


Figure 5-3 Max. allowable vibration limit of the motor

Direction	Measuring point	Limit value (10 Hz to 2000 Hz)
Radial	①②④⑤	49m/s²
Axial	③⑥	24.5m/s²

Note

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

5.1.2 Overload Characteristics

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

The following overload protection curve applies to hot start at an ambient temperature of 40℃, which cannot guarantee continuous duty in cases of 100% output or above. During use, keep the effective torque of the load within the continuous duty zone.

To protect different load motors, set the motor overload protection gain based on the overload capacity of the motor. Use the default gain in general conditions. However, when one of the following conditions occurs, change the gain based on actual motor temperature:

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

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

- **MS1H1/H4 (frame size 40/60/80)**

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

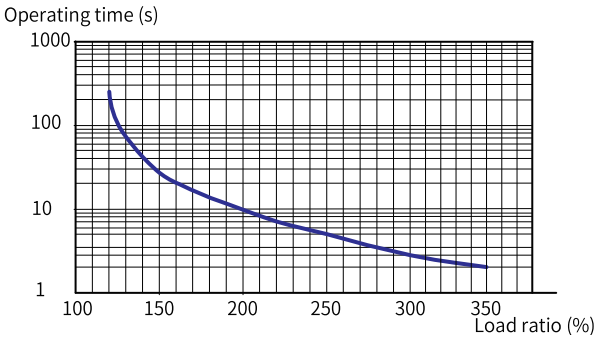


Figure 5-4 MS1H1/H4 (frame size 40/60/80) series motor overload curve

Note

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

- **MS1H2/MS1H3**

Load ratio (%)	Operating time (s)
115	6000
120	2533
125	1226
130	915
135	769
140	527
145	352
150	221
155	128
160	99
165	83
170	67
175	55
180	49
185	45
190	41
195	38
200	34
205	31
210	28
215	24
220	22
225	21
230	19
235	18
240	16
245	14
250	13
255	12
260	11
265	10
270	9
275	9
280	8
285	7
290	6
295	5
300	5

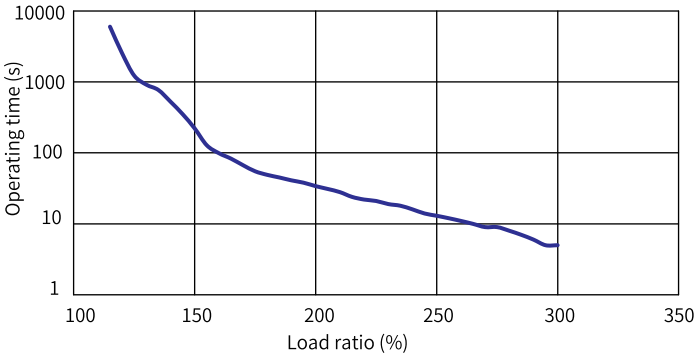


Figure 5-5 Overload curve of MS1H2 and MS1H3 series motors

Note

- The maximum torque of H2 model is 3 times the rated torque.
- The maximum torque of H3 model is 2.5 times the rated torque.

- **MS1H1-03B30CB-U210R-S**

Load ratio (%)	Operating time (s)
120	75.00
130	43.39
140	27.97
150	19.84
160	15.10
170	15.02
180	9.82
190	8.12
200	6.70
210	5.62
220	4.79
230	4.14
240	3.63
250	3.22
260	2.89
270	2.61
280	2.38
290	2.18
300	2.01
310	1.86
320	1.73
330	1.60
340	1.50
350	1.40

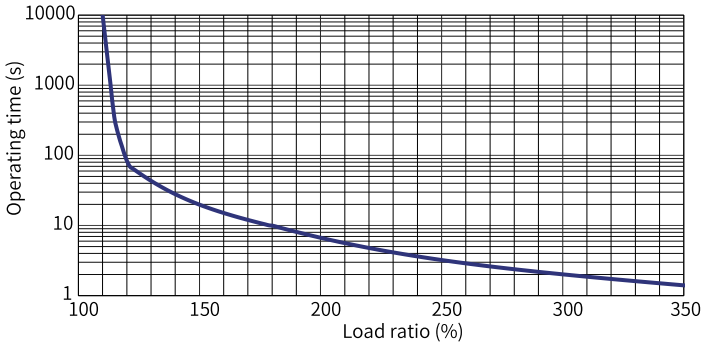


Figure 5-6 Overload curve of MS1H1-03B30CB-U210R-S series motors

5.1.3 Derating Characteristics

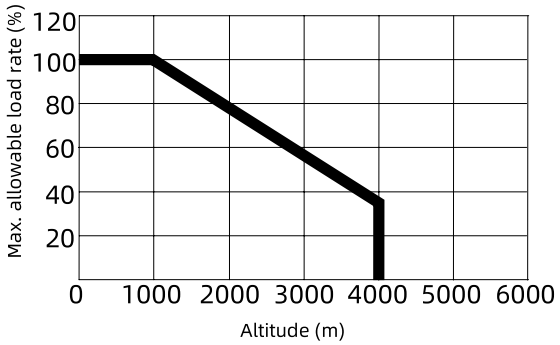
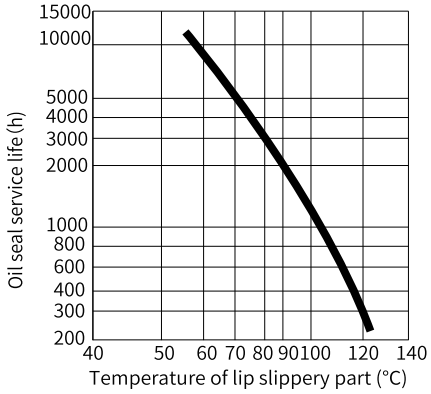


Figure 5-7 Altitude-based derating curve

5.1.4 Temperature Curve of the Oil Seal



5.1.5 Load Moment of Inertia

The load moment of inertia represents the ratio of the load inertia to the rotor inertia. The higher the load inertia ratio, the weaker the responsiveness will be. An excessively high inertia ratio can result in unstable operation. The allowable load inertia ratio of the servo motor is limited. The value is a general standard and varies according to the driving conditions of the servo motor.

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

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

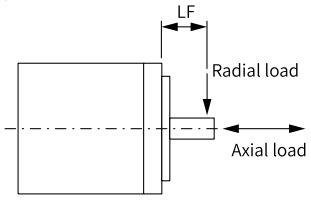
Caution

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

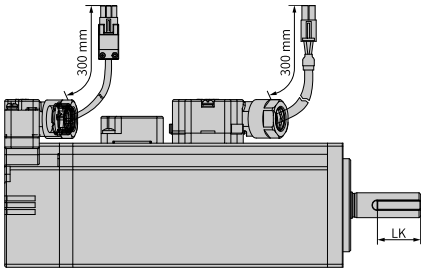
5.2 Motor Models (MS1-R Series Servo Motor)

5.2.1 Selection Precautions

- Description of torque-speed characteristics curves:
  - All parameters and torque-speed characteristic values are subject to the conditions that the motor works with an Inovance servo drive and the armature coil temperature is 20°C.
  - Continuous working area: refers to a series of states in which the motor can operate safely and continuously, and the actual torque must be located in this area.
  - Intermittent duty zone: refers to a series of states in which the motor can run within a short period of 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):
  - MS1H1 to MS1H4: 250 × 250 × 6 (aluminum)
  - MS1H2-10C to 25C: 400 × 400 × 20 (steel)
  - MS1H2-30C to 50C: 400 × 400 × 20 (steel)
  - MS1H3-85B to 18C: 400 × 400 × 20 (steel)
  - MS1H3-29C to 55C: 550 × 550 × 30 (aluminum)
  - MS1H3-75C: 700 × 700 × 30 (aluminum)
- Radial and axial loads of the motor:



- Dimensions of flying leads type motors
  Flying leads type motors with frame size 80 and below (model ended with "-S") provide a drain wire of about 300 mm in length, as shown in the following figure.



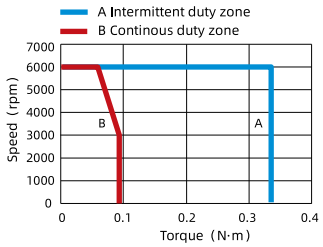
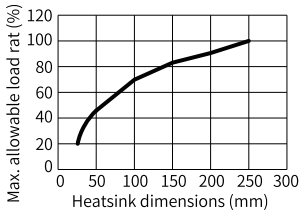
- As shown in the preceding figure, the product is marked with an LK value in the dimension diagram in the section of each model. LK indicates the length of the shaft key.
- MS1H3 (130-flange and 180-flange) comes with a key slot. When the operating speed is above 3000 rpm, the motor must run with the 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 the sections corresponding to the models are parameters of the servo motor carrying a brake.
- The motor with oil seal must be derated by 10% during use.
- Use your own DC power supply as 24 V power supply of the brake. For the cable connecting the DC power supply to the motor brake, it is recommended to use cables with a diameter of 0.2 mm^2 or above for motors with low power of 750 W or below. It is recommended to use cables with a diameter of 0.8 mm^2 or above for motors with a power of 750 W or above. The brake cannot share the power supply with other appliances to prevent the voltage or current from falling due to the simultaneous operation of other electrical appliances, which may result in brake malfunction.
- Do not share a power supply with multiple brakes. Otherwise, the coil is short-circuited after one brake is dry-worn, causing failures to start the brakes that are connected to the power supply in parallel.
- 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.

5.2.2 Low Inertia and Small Capacity (MS1H1)

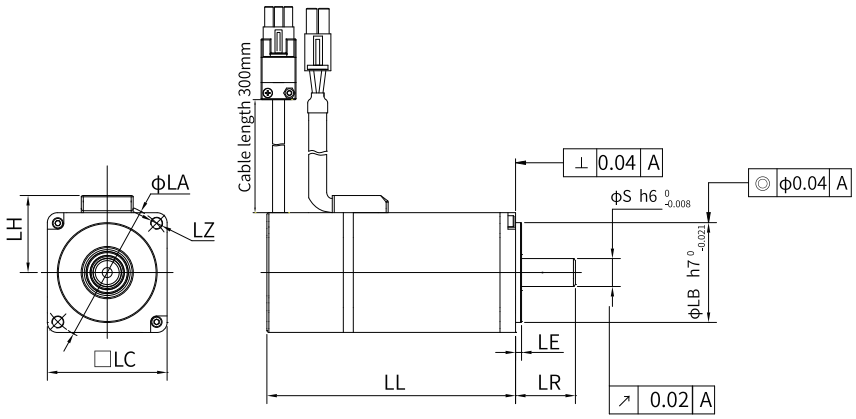
5.2.2.1 MS1H1-03B30CB-U210R-S

<table>
<tr><th colspan="3">Motor specifications</th><th>Torque-speed characteristics</th></tr>
<tr><td colspan="2">Frame size (mm)</td><td>25</td><td rowspan="7">
</td></tr>
<tr><td colspan="2">Inertia and capacity</td><td>Low inertia, small capacity</td></tr>
<tr><td colspan="2">Rated power (kW)</td><td>0.03</td></tr>
<tr><td colspan="2">Rated voltage (V)</td><td>220</td></tr>
<tr><td colspan="2">Rated torque (N·m)</td><td>0.0955</td></tr>
<tr><td colspan="2">Maximum torque (N·m)</td><td>0.33</td></tr>
<tr><td colspan="2">Rated frequency (Hz)</td><td>150</td></tr>
<tr><td colspan="2">Rated current (A)</td><td>0.93</td><td>Heatsink-based derating curve</td></tr>
<tr><td colspan="2">Maximum current (A)</td><td>3.34</td><td rowspan="6">
</td></tr>
<tr><td colspan="2">Rated speed (rpm)</td><td>3000</td></tr>
<tr><td colspan="2">Maximum speed (rpm)</td><td>6000</td></tr>
<tr><td colspan="2">Torque coefficient (N·m/A)</td><td>0.15</td></tr>
<tr><td rowspan="2">Rotor moment of inertia ($kg·cm^2$)</td><td>Motor without brake</td><td>0.00668±10 %</td></tr>
<tr><td>Motor with brake</td><td>-</td></tr>
</table>

Allowable loads

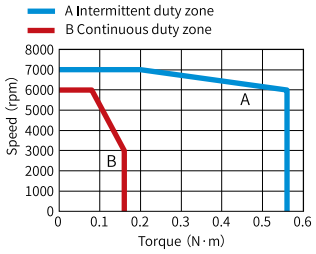
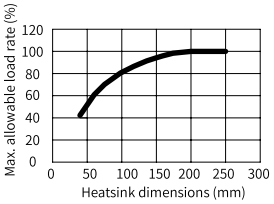
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
20	≤ 78	≤ 54

Product dimensions (in mm)



LL	LC	LR	LA	LZ	LH	LG	LE	
73.5	25	16±0.5	28	2 × ϕ3	17	-	2.5±0.3	
S	LB	TP	LK	KH	KW	W	T	Weight (kg)
5	20	-	-	-	-	-	-	0.2

5.2.2.2 MS1H1-05B30CB-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	40		
Inertia and capacity	Low inertia, small capacity		
Rated power (kW)	0.05		
Rated voltage (V)	220		
Rated torque (N·m)	0.16		
Maximum torque (N·m)	0.56		
Rated frequency (Hz)	250		
Rated current (A)	1.2		Heatsink-based derating curve
Maximum current (A)	4.8		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.15		
Rotor moment of inertia (kg·cm²)	Motor without brake	0.018±10%	
	Motor with brake	0.0208±10%	

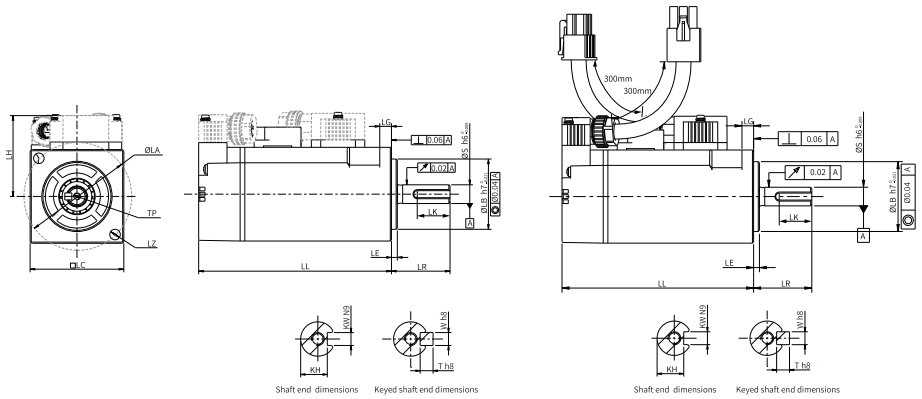
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
0.32	24	6.9	83.5	0.29	≤ 40	≤ 20	≤ 1.5

Allowable loads

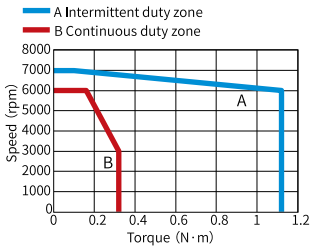
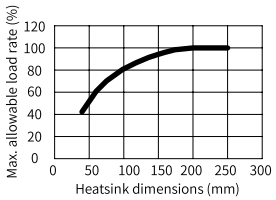
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
20	≤ 78	≤ 54

Product dimensions (in mm)



LL	LC	LR	LA	LZ	LH	LG	LE	
54.5 (81.8)	40	25±0.5	46	2 × ϕ4.5	34.5	5	2.5±0.5	
S	LB	TP	LK	KH	KW	W	T	Weight (kg)
8	30	M3 × 6	$14^{0}_{-0.36}$	$6.2^{0}_{-0.1}$	3	3	3	0.26 (0.43)

5.2.2.3 MS1H1-10B30CB-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	40		
Inertia and capacity	Low inertia, small capacity		
Rated power (kW)	0.1		
Rated voltage (V)	220		
Rated torque (N·m)	0.32		
Maximum torque (N·m)	1.12		
Rated frequency (Hz)	250		
Rated current (A)	1.2		Heatsink-based derating curve
Maximum current (A)	4.8		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.30		
Rotor moment of inertia ($kg \cdot cm^2$)	Motor without brake	0.0316±10%	
	Motor with brake	0.0345±10%	

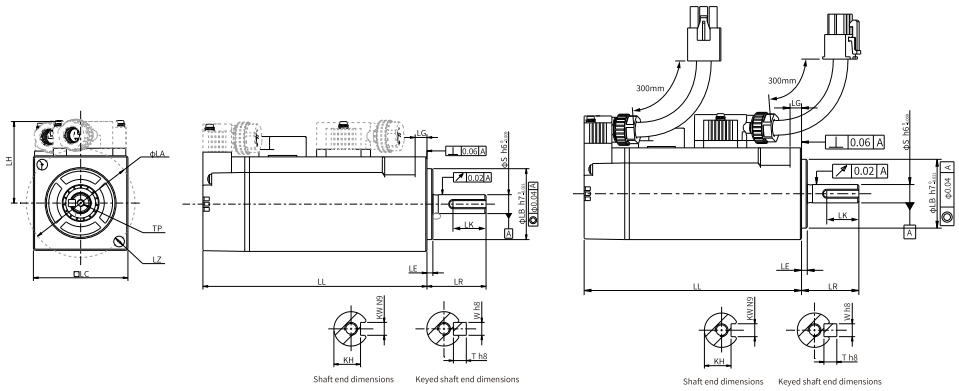
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
0.32	24	6.9	83.5	0.29	≤ 40	≤ 20	≤ 1.5

Allowable loads

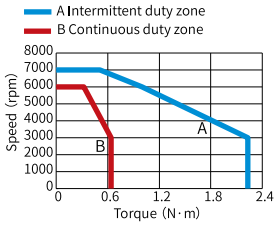
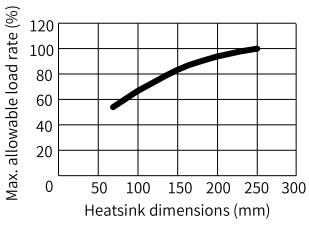
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
20	≤ 78	≤ 54

Product dimensions (in mm)



LL	LC	LR	LA	LZ	LH	LG	LE	
67 (94.3)	40	25±0.5	46	2 × ϕ4.5	34.5	5	2.5±0.5	
S	LB	TP	LK	KH	KW	W	T	Weight (kg)
8	30	M3 × 6	$14^{0}_{-0.36}$	$6.2^{0}_{-0.1}$	3	3	3	0.35 (0.52)

5.2.2.4 MS1H1-20B30CB-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	60		
Inertia and capacity	Low inertia, small capacity		
Rated power (kW)	0.2		
Voltage (V)	220		
Rated torque (N·m)	0.64		
Maximum torque (N·m)	2.24		
Rated frequency (Hz)	250		
Rated current (A)	1.5		Heatsink-based derating curve
Maximum current (A)	5.3		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.51		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	0.094±10 %	
	Motor with brake	0.106±10 %	

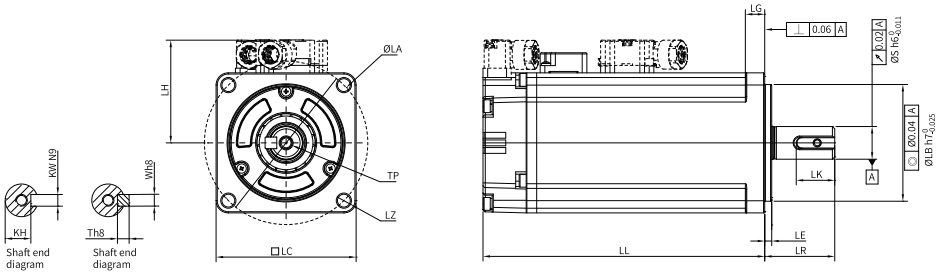
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
1.5	24	7.6	75.79	0.32	≤ 60	≤ 20	≤ 1

Allowable loads

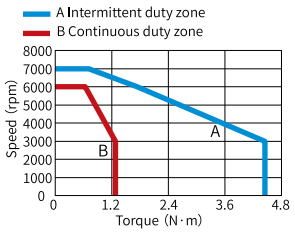
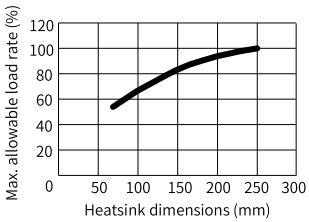
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
25	≤ 245	≤ 74

Product dimensions (in mm)



LC	LL	LR	LA	LZ	LH	LG	LE	
60	75.5 (103)	30±0.5	70	4 × ϕ5.5	44	8.0	3±0.5	
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
50	14	M5 × 12	$16^{0}_{-0.53}$	$11^{0}_{-0.1}$	5	5	5	0.80 (1.17)

5.2.2.5 MS1H1-40B30CB-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	60		
Inertia and capacity	Low inertia, small capacity		
Rated power (kW)	0.4		
Voltage (V)	220		
Rated torque (N·m)	1.27		
Maximum torque (N·m)	4.45		
Rated frequency (Hz)	250		
Rated current (A)	2.5		Heatsink-based derating curve
Maximum current (A)	9.8		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.57		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	0.145±10 %	
	Motor with brake	0.157±10 %	

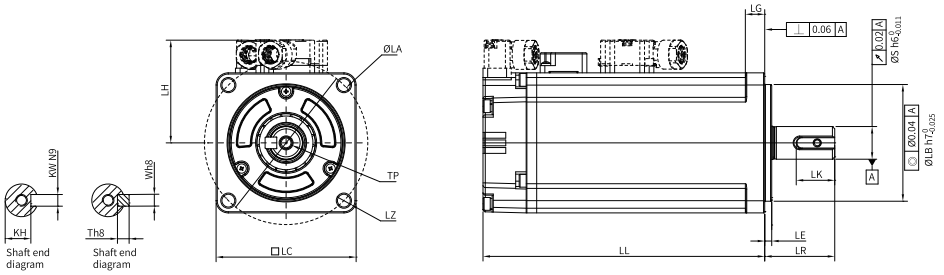
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
1.5	24	7.6	75.79	0.32	≤ 60	≤ 20	≤ 1

Allowable loads

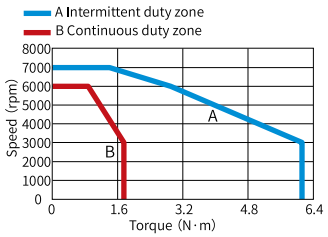
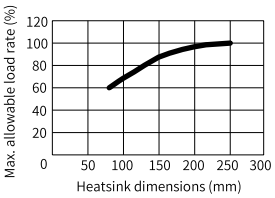
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
25	≤ 245	≤ 74

Product dimensions (in mm)



LC	LL	LR	LA	LZ	LH	LG	LE	
60	93 (121)	30±0.5	70	4 × ϕ5.5	44	8.0	3±0.5	
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
50	14	M5 × 12	$16^{0}_{-0.53}$	$11^{0}_{-0.1}$	5	5	5	1.11 (1.48)

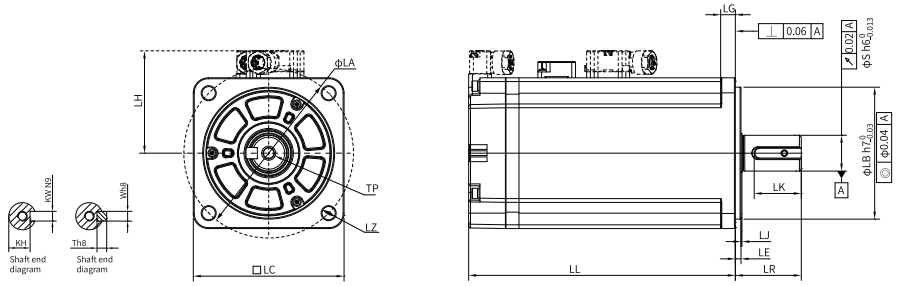
5.2.2.6 MS1H1-55B30CB-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	80		
Inertia and capacity	Low inertia, small capacity		
Rated power (kW)	0.55		
Voltage (V)	220		
Rated torque (N·m)	1.75		
Maximum torque (N·m)	6.13		
Rated frequency (Hz)	250		
Rated current (A)	3.9		Heatsink-based derating curve
Maximum current (A)	15		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.51		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	0.55±10 %	
	Motor with brake	-	

Allowable loads

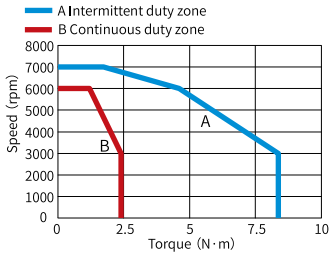
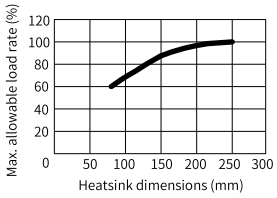
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	≤ 392	≤ 147

Product dimensions (in mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	96.7	35±0.5	90	4 × φ7	54	7.5	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
70	19	M6 × 20	$25^{0}_{-0.62}$	$15.5^{0}_{-0.1}$	6	6	6	1.88

5.2.2.7 MS1H1-75B30CB-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	80		
Inertia and capacity	Low inertia, small capacity		
Rated power (kW)	0.75		
Voltage (V)	220		
Rated torque (N·m)	2.39		
Maximum torque (N·m)	8.36		
Rated frequency (Hz)	250		
Rated current (A)	4.4		Heatsink-based derating curve
Maximum current (A)	16.9		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.62		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	0.68±10 %	
	Motor with brake	0.71±10 %	

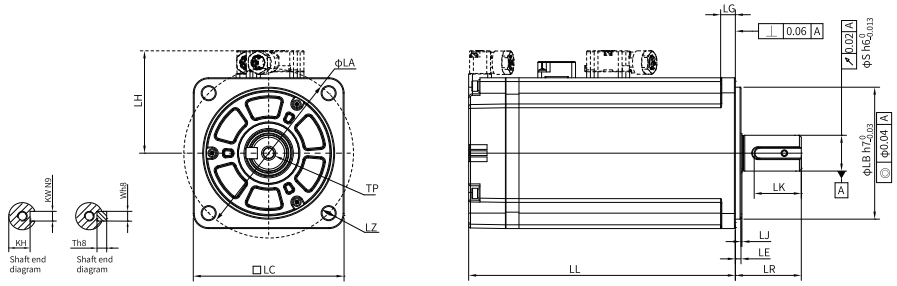
Electrical specifications of the brake

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

Allowable loads

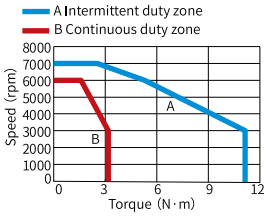
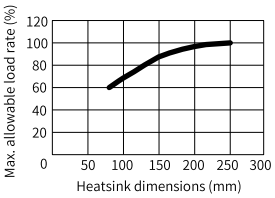
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	≤ 392	≤ 147

Product dimensions (in mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	107.3 (141.5)	35±0.5	90	4 × ϕ7	54	7.5	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
70	19	M6 × 20	$25^{0}_{-0.62}$	$15.5^{0}_{-0.1}$	6	6	6	2.22 (2.88)

5.2.2.8 MS1H1-10C30CB-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	80		
Inertia and capacity	Low inertia, small capacity		
Rated power (kW)	1.0		
Voltage (V)	220		
Rated torque (N·m)	3.18		
Maximum torque (N·m)	11.13		
Rated frequency (Hz)	250		
Rated current (A)	6.2		Heatsink-based derating curve
Maximum current (A)	24		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.59		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	0.82±10 %	
	Motor with brake	0.87±10 %	

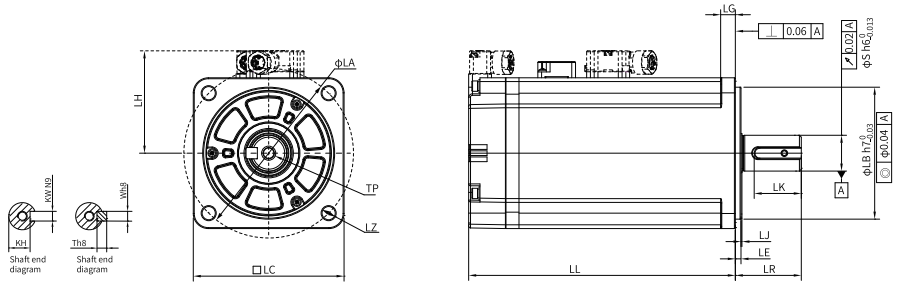
Electrical specifications of the brake

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

Allowable loads

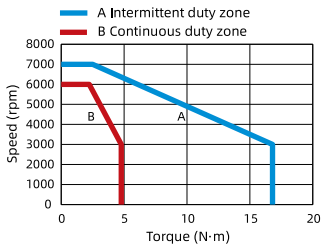
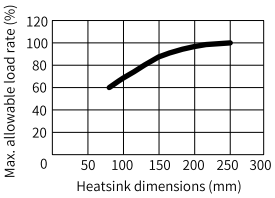
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	≤ 392	≤ 147

Product dimensions (in mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	119.2 (153.4)	35±0.5	90	4 × ϕ7	54	7.5	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
70	19	M6 × 20	$25^{0}_{-0.62}$	$15.5^{0}_{-0.1}$	6	6	6	2.61 (3.27)

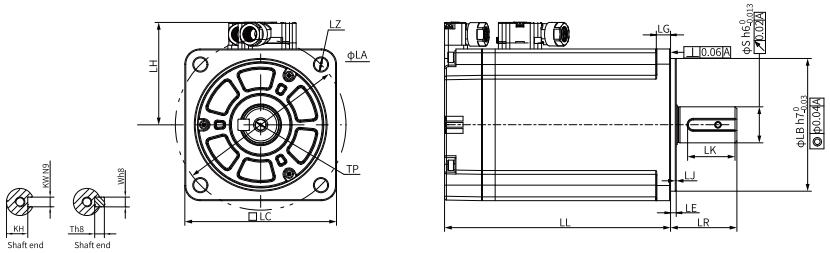
5.2.2.9 MS1H1-15C30CB-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	80		
Inertia and capacity	Low inertia, small capacity		
Rated power (kW)	1.5		
Voltage (V)	220		
Rated torque (N·m)	4.78		
Maximum torque (N·m)	16.8		
Rated frequency (Hz)	250		
Rated current (A)	6.5		Heatsink-based derating curve
Maximum current (A)	26		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.74		
Rotor moment of inertia (kg·cm^2)	Motor without brake	1.2±10%	
	Motor with brake	-	

Allowable loads

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

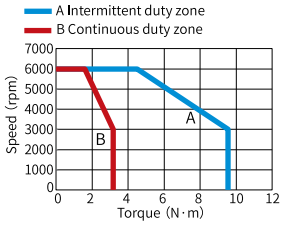
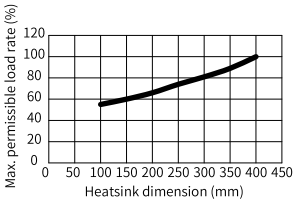
Product dimensions (in mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	155	35±0.5	90	4 × ϕ7	54	7.5	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
70	19	M6 × 20	$25^{0}_{-0.62}$	$15.5^{0}_{-0.1}$	6	6	6	3.65

5.2.3 Low Inertia and Medium Capacity (MS1H2)

5.2.3.1 MS1H2-10C30CB-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia and capacity	Low inertia, medium capacity		
Rated power (kW)	1.0		
Voltage (V)	220		
Rated torque (N·m)	3.18		
Maximum torque (N·m)	9.54		
Rated frequency (Hz)	250		
Rated current (A)	6.4		Heatsink-based derating curve
Maximum current (A)	23		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/A)	0.54		
Rotor moment of inertia (kg·cm^2)	Motor without brake	1.78±10%	
	Motor with brake	2.6±10%	

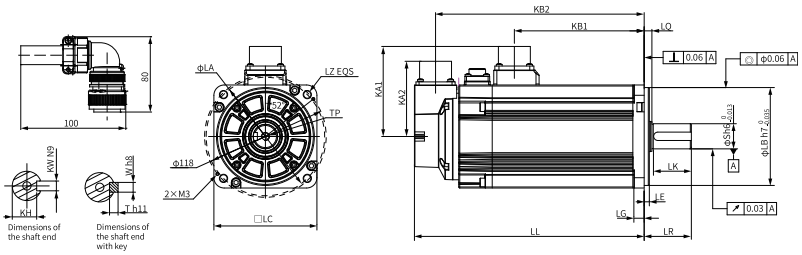
Electrical specifications of the brake

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

Allowable loads

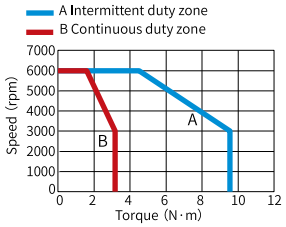
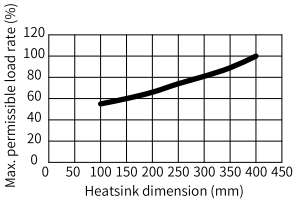
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	144 (172)	45±1	115	4 × ϕ7	88	75	73	123.5 (151.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	95		24	M8 × 16	$35^{0}_{-0.62}$	$20^{0}_{-0.2}$	8	8	7	3.85 (4.9)

5.2.3.2 MS1H2-10C30CD-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia and capacity	Low inertia, medium capacity		
Rated power (kW)	1.0		
Voltage (V)	380		
Rated torque (N·m)	3.18		
Maximum torque (N·m)	9.54		
Rated frequency (Hz)	250		
Rated current (A)	3.3		Heatsink-based derating curve
Maximum current (A)	11		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/A)	1.07		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	1.78±10%	
	Motor with brake	2.6±10%	

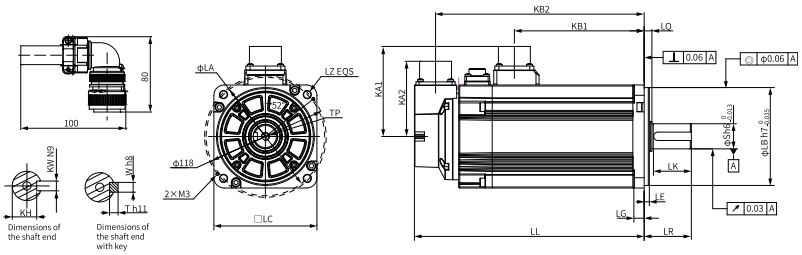
Electrical specifications of the brake

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

Allowable loads

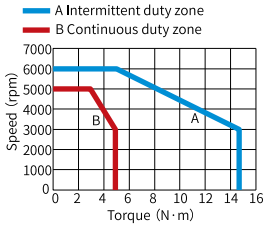
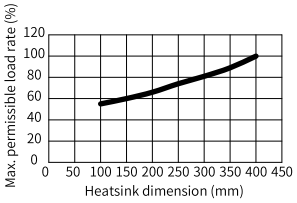
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	144 (172)	45±1	115	4 × ϕ7	88	75	73	123.5 (151.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	95		24	M8 × 16	$35^{0}_{-0.62}$	$20^{0}_{-0.2}$	8	8	7	3.85 (4.9)

5.2.3.3 MS1H2-15C30CB-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia and capacity	Low inertia, medium capacity		
Rated power (kW)	1.5		
Voltage (V)	220		
Rated torque (N·m)	4.9		
Maximum torque (N·m)	14.7		
Rated frequency (Hz)	250		
Rated current (A)	8.6		Heatsink-based derating curve
Maximum current (A)	32		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/A)	0.62		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	2.35±10%	
	Motor with brake	3.17±10%	

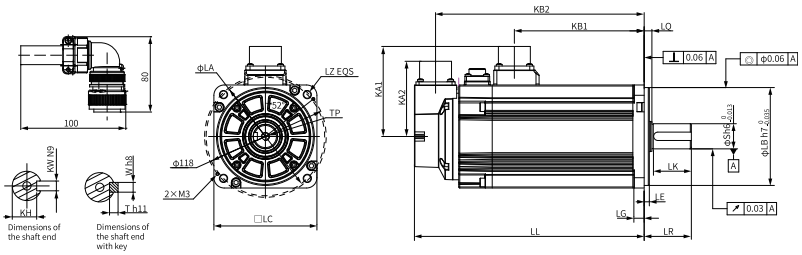
Electrical specifications of the brake

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

Allowable loads

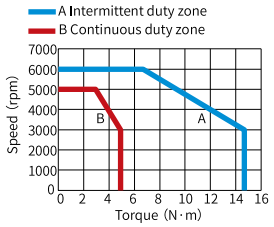
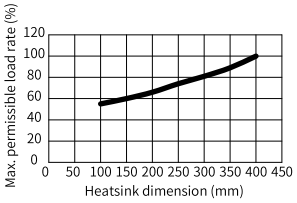
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	161 (189)	45±1	115	4 × ϕ7	88	92	73	140.5 (168.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	95		24	M8 × 16	$35^{0}_{-0.62}$	$20^{0}_{-0.2}$	8	8	7	4.65 (5.75)

5.2.3.4 MS1H2-15C30CD-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia and capacity	Low inertia, medium capacity		
Rated power (kW)	1.5		
Voltage (V)	380		
Rated torque (N·m)	4.9		
Maximum torque (N·m)	14.7		
Rated frequency (Hz)	250		
Rated current (A)	4.2		Heatsink-based derating curve
Maximum current (A)	14		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/A)	1.28		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	2.35±10%	
	Motor with brake	3.17±10%	

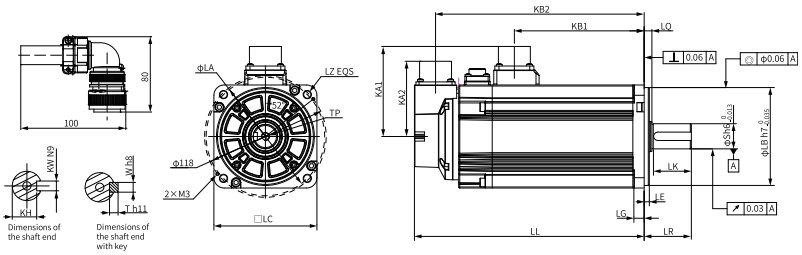
Electrical specifications of the brake

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

Allowable loads

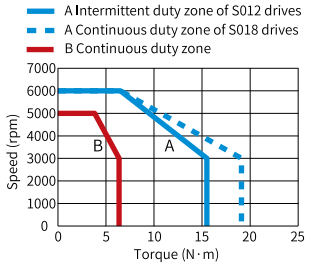
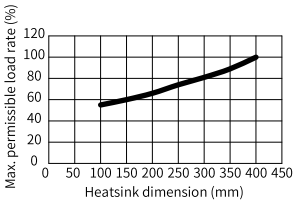
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	161 (189)	45±1	115	4 × ϕ7	88	92	73	140.5 (168.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	95		24	M8 × 16	$35^{0}_{-0.62}$	$20^{0}_{-0.2}$	8	8	7	4.65 (5.75)

5.2.3.5 MS1H2-20C30CB-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia and capacity	Low inertia, medium capacity		
Rated power (kW)	2.0		
Voltage (V)	220		
Rated torque (N·m)	6.36		
Maximum torque (N·m)	19.1		
Rated frequency (Hz)	250		
Rated current (A)	11.3		Heatsink-based derating curve
Maximum current (A)	42		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/A)	0.60		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	2.92±10%	
	Motor with brake	3.74±10%	

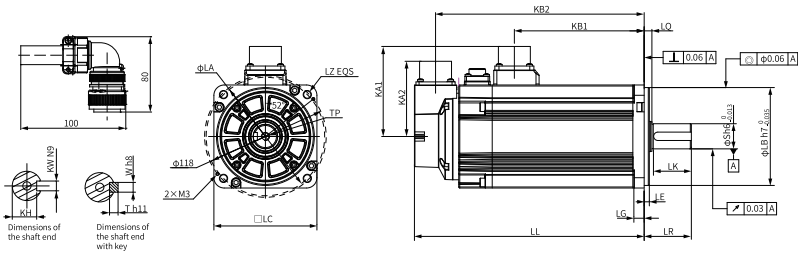
Electrical specifications of the brake

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

Allowable loads

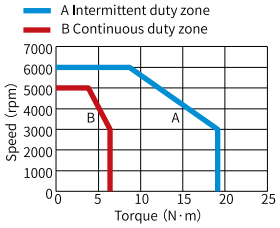
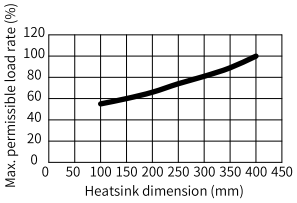
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	177 (205)	45±1	115	4 × ϕ7	88	108	73	156.5 (184.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	95		24	M8 × 16	$35^{0}_{-0.62}$	$20^{0}_{-0.2}$	8	8	7	5.5 (6.55)

5.2.3.6 MS1H2-20C30CD-A33*R

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)	6.36		
Maximum torque (N·m)	19.1		
Rated frequency (Hz)	250		
Rated current (A)	5.6		Heatsink-based derating curve
Maximum current (A)	20		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/A)	1.19		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	2.92±10%	
	Motor with brake	3.74±10%	

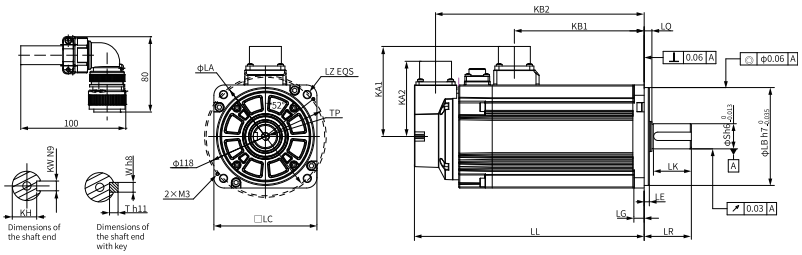
Electrical specifications of the brake

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

Allowable loads

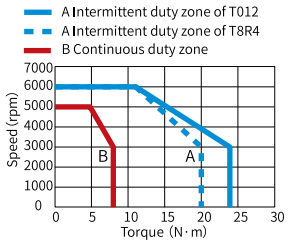
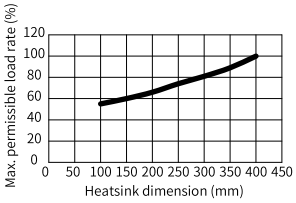
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	177 (205)	45±1	115	4 × ϕ7	88	108	73	156.5 (184.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	95		24	M8 × 16	$35^{0}_{-0.62}$	$20^{0}_{-0.2}$	8	8	7	5.5 (6.55)

5.2.3.7 MS1H2-25C30CD-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia and capacity	Low inertia, medium capacity		
Rated power (kW)	2.5		
Voltage (V)	380		
Rated torque (N·m)	7.96		
Maximum torque (N·m)	23.9		
Rated frequency (Hz)	250		
Rated current (A)	7.2		Heatsink-based derating curve
Maximum current (A)	26		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/A)	1.18		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	3.49±10%	
	Motor with brake	4.3±10%	

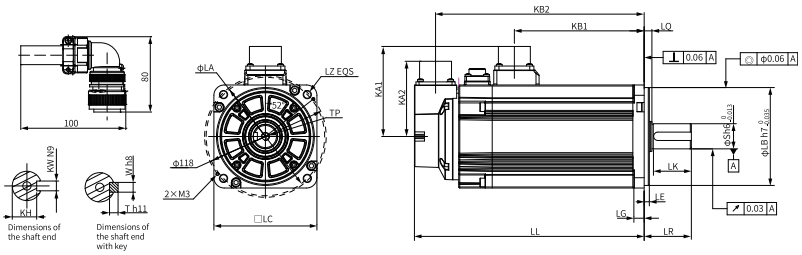
Electrical specifications of the brake

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

Allowable loads

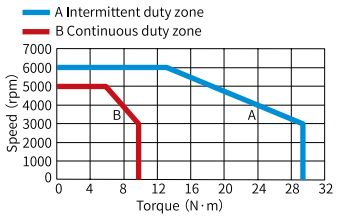
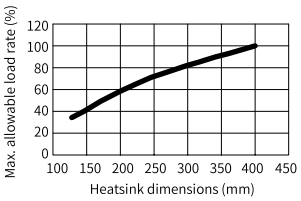
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	195 (223)	45±1	115	4 × ϕ7	88	126	73	174.5 (202.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	95		24	M8 × 16	$35^{0}_{-0.62}$	$20^{0}_{-0.2}$	8	8	7	6.3 (7.35)

5.2.3.8 MS1H2-30C30CD-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia and capacity	Low inertia, medium capacity		
Rated power (kW)	3.0		
Voltage (V)	380		
Rated torque (N·m)	9.8		
Maximum torque (N·m)	29.4		
Rated frequency (Hz)	150		
Rated current (A)	8.9		Heatsink-based derating curve
Maximum current (A)	29		
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	6.4±10%	
	Motor with brake	9.38±10%	

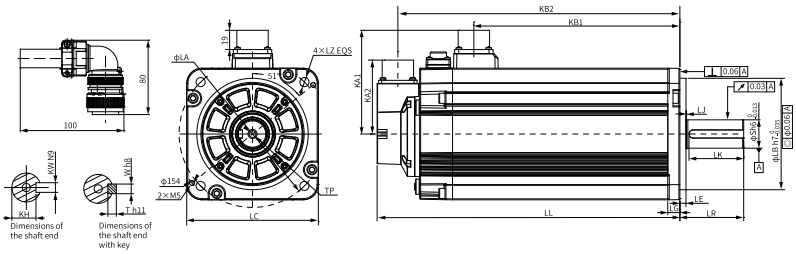
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable loads

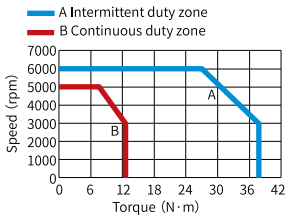
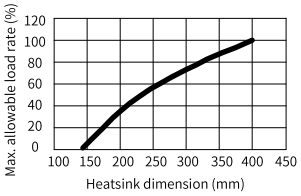
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	≤ 1176	≤ 392

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	198 (223)	63±1	145	4 × ϕ9	102.4	127.5	73	177.5 (202.5)	10.5	6±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	110		28	M8 × 20	$53^{0}_{-0.62}$	$24^{0}_{-0.2}$	8	8	7	10.0 (11.9)

5.2.3.9 MS1H2-40C30CD-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia and capacity	Low inertia, medium capacity		
Rated power (kW)	4.0		
Voltage (V)	380		
Rated torque (N·m)	12.6		
Maximum torque (N·m)	37.8		
Rated frequency (Hz)	150		
Rated current (A)	13.5		Heatsink-based derating curve
Maximum current (A)	42.5		
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±10%	
	Motor with brake	11.98±10%	

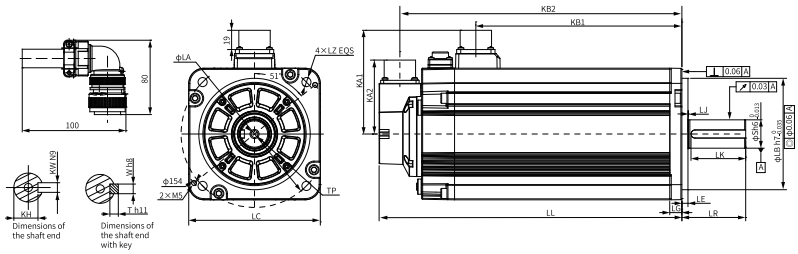
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable loads

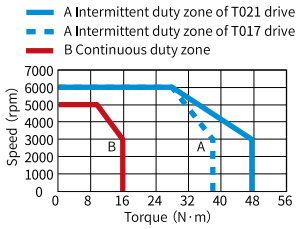
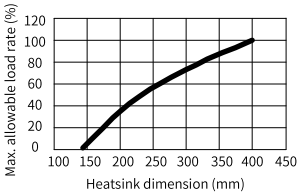
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	≤ 1176	≤ 392

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	236 (261)	63±1	145	4 × ϕ9	102.4	165.5	73	215.5 (240.5)	10.5	6±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	110		28	M8 × 20	$53^{0}_{-0.62}$	$24^{0}_{-0.2}$	8	8	7	13.2 (15.1)

5.2.3.10 MS1H2-50C30CD-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia and capacity	Low inertia, medium capacity		
Rated power (kW)	5.0		
Voltage (V)	380		
Rated torque (N·m)	15.8		
Maximum torque (N·m)	47.4		
Rated frequency (Hz)	150		
Rated current (A)	17		Heatsink-based derating curve
Maximum current (A)	52.5		
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	14.58±10%	

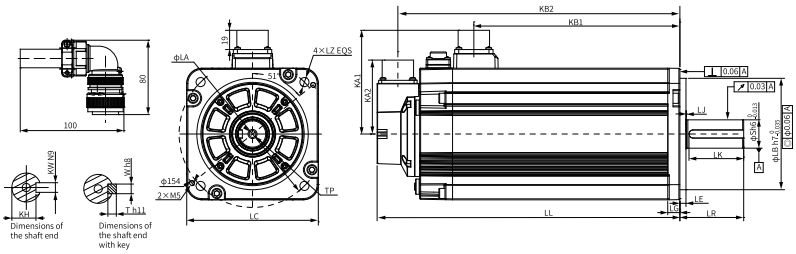
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable loads

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

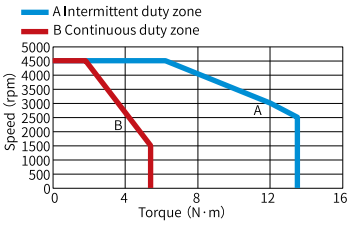
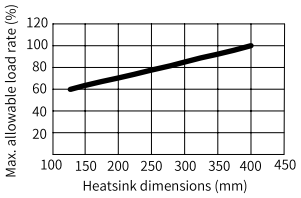
Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	274 (299)	63±1	145	4 × ϕ9	102.4	203.5	73	253.5 (278.5)	10.5	6±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	110		28	M8 × 20	$53^{0}_{-0.62}$	$24^{0}_{-0.2}$	8	8	7	16.35 (18.25)

5.2.4 Medium Inertia and Medium Capacity (MS1H3)

5.2.4.1 MS1H3-85B15CB-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	0.85		
Voltage (V)	220		
Rated torque (N·m)	5.39		
Maximum torque (N·m)	13.5		
Rated frequency (Hz)	125		
Rated current (A)	6.6		Heatsink-based derating curve
Maximum current (A)	17.2		
Rated speed (rpm)	1500		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	0.93		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	13.56±10%	
	Motor with brake	15.8±10%	

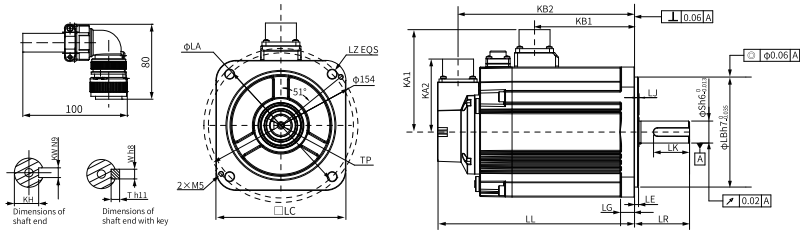
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable loads

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

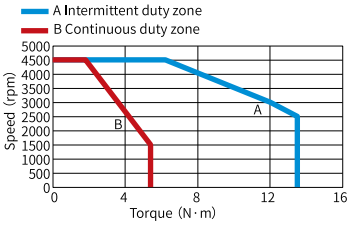
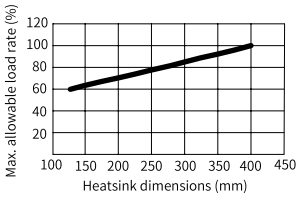
Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	142 (167)	55±1	145	4 × ϕ9	103	70	73	121.5 (146.5)	14	4

LJ	LB	S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	110	22	M6 × 20	$35^{0}_{-0.62}$	$18^{0}_{-0.2}$	8	8	7	5.8 (7.7)

5.2.4.2 MS1H3-85B15CD-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	0.85		
Voltage (V)	380		
Rated torque (N·m)	5.39		
Maximum torque (N·m)	13.5		
Rated frequency (Hz)	125		
Rated current (A)	3.5		Heatsink-based derating curve
Maximum current (A)	8.5		
Rated speed (rpm)	1500		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	1.84		
Rotor moment of inertia (kg·cm²)	Motor without brake	13.56±10%	
	Motor with brake	15.8±10%	

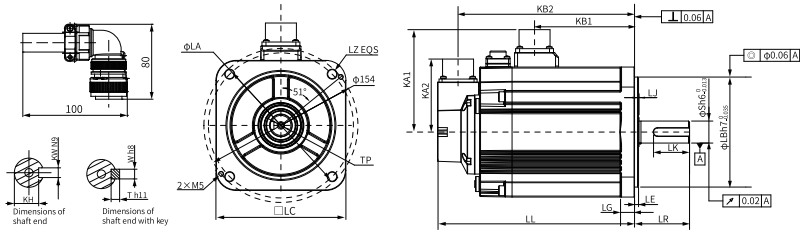
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable loads

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

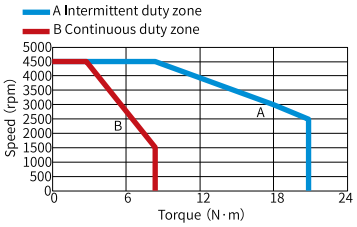
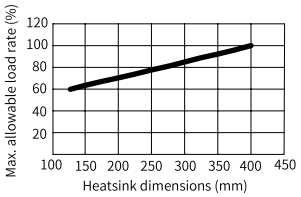
Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	142 (167)	55±1	145	4 × ϕ9	103	70	73	121.5 (146.5)	14	4

LJ	LB	S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	110	22	M6 × 20	$35^{0}_{-0.62}$	$18^{0}_{-0.2}$	8	8	7	5.8 (7.7)

5.2.4.3 MS1H3-13C15CB-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	1.3		
Voltage (V)	220		
Rated torque (N·m)	8.34		
Maximum torque (N·m)	20.85		
Rated frequency (Hz)	125		
Rated current (A)	10.5		Heatsink-based derating curve
Maximum current (A)	27.3		
Rated speed (rpm)	1500		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	0.89		
Rotor moment of inertia (kg·cm²)	Motor without brake	19.25±10%	
	Motor with brake	21.5±10%	

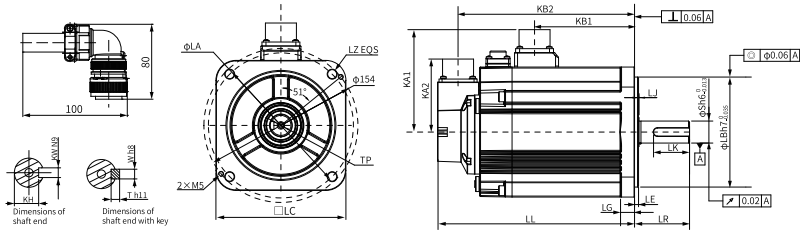
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable loads

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

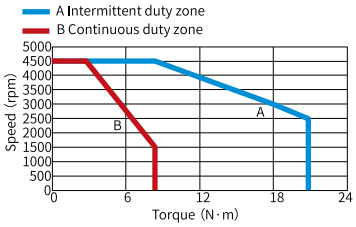
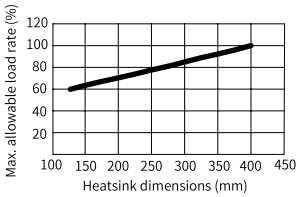
Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	157 (182)	55±1	145	4 × ϕ9	103	85	73	136.5 (161.5)	14	4

LJ	LB	S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	110	22	M6 × 20	$35^{0}_{-0.62}$	$18^{0}_{-0.2}$	8	8	7	7.1 (8.9)

5.2.4.4 MS1H3-13C15CD-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	1.3		
Voltage (V)	380		
Rated torque (N·m)	8.34		
Maximum torque (N·m)	20.85		
Rated frequency (Hz)	125		
Rated current (A)	5.1		Heatsink-based derating curve
Maximum current (A)	12.6		
Rated speed (rpm)	1500		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	1.85		
Rotor moment of inertia (kg·cm²)	Motor without brake	19.25±10%	
	Motor with brake	21.5±10%	

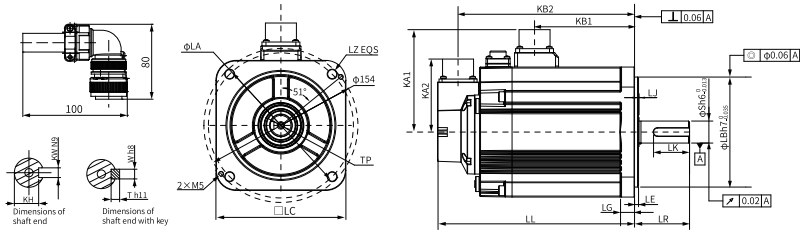
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable loads

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

Product dimensions (in mm)



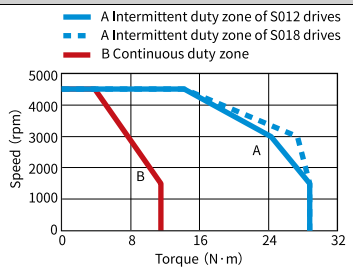
LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	157 (182)	55±1	145	4 × ϕ9	103	85	73	136.5 (161.5)	14	4

LJ	LB	S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	110	22	M6 × 20	$35^{0}_{-0.62}$	$18^{0}_{-0.2}$	8	8	7	7.1 (8.9)

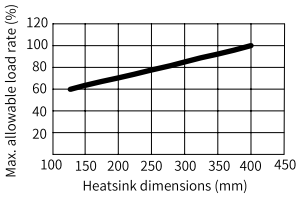
5.2.4.5 MS1H3-18C15CB-A33*R

Motor specifications		
Frame size (mm)	130	
Inertia and capacity	Medium inertia, medium capacity	
Rated power (kW)	1.8	
Voltage (V)	220	
Rated torque (N·m)	11.5	
Maximum torque (N·m)	28.75	
Rated frequency (Hz)	125	
Rated current (A)	11.9	
Maximum current (A)	32.2	
Rated speed (rpm)	1500	
Maximum speed (rpm)	4500	
Torque coefficient (N·m/A)	1.09	
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	24.9±10%
	Motor with brake	27.2±10%

Torque-speed characteristics



Heatsink-based derating curve



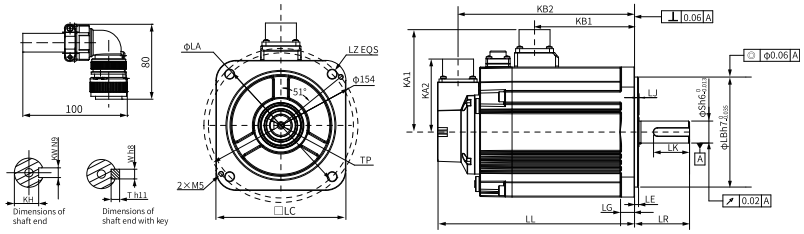
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable loads

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

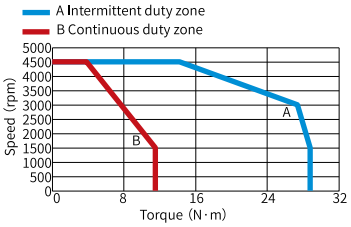
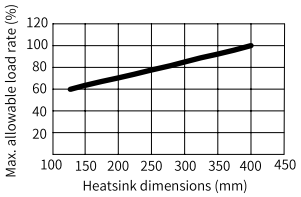
Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	172 (197)	55±1	145	4 × ϕ9	103	100	73	151.5 (176.5)	14	4

LJ	LB	S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	110	22	M6 × 20	$35^{0}_{-0.62}$	$18^{0}_{-0.2}$	8	8	7	8.5 (10.3)

5.2.4.6 MS1H3-18C15CD-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	1.8		
Voltage (V)	380		
Rated torque (N·m)	11.5		
Maximum torque (N·m)	28.75		
Rated frequency (Hz)	125		
Rated current (A)	6.75		Heatsink-based derating curve
Maximum current (A)	17.7		
Rated speed (rpm)	1500		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	1.87		
Rotor moment of inertia (kg·cm²)	Motor without brake	24.9±10%	
	Motor with brake	27.2±10%	

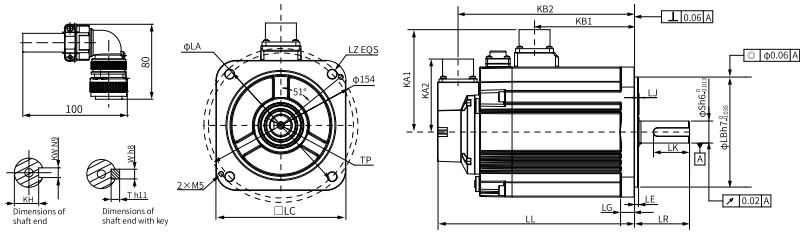
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable loads

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

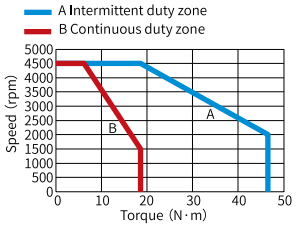
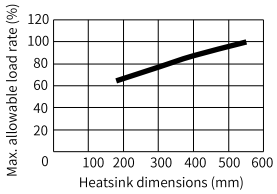
Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	172 (197)	55±1	145	4 × ϕ9	103	100	73	151.5 (176.5)	14	4

LJ	LB	S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	110	22	M6 × 20	$35^{0}_{-0.62}$	$18^{0}_{-0.2}$	8	8	7	8.5 (10.3)

5.2.4.7 MS1H3-29C15CD-A33*R

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 frequency (Hz)	125		
Rated current (A)	10.5		Heatsink-based derating curve
Maximum current (A)	29.75		
Rated speed (rpm)	1500		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	1.94		
Rotor moment of inertia (kg·cm²)	Motor without brake	44.7±10%	
	Motor with brake	52.35±10%	

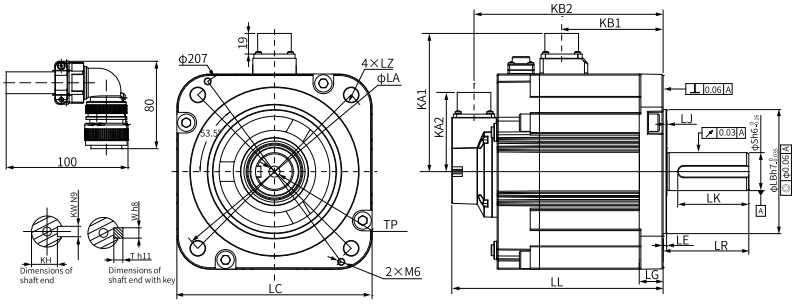
Electrical specifications of the brake

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

Allowable loads

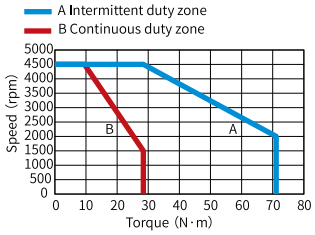
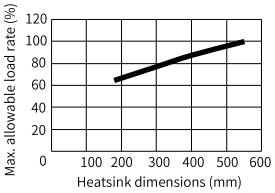
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	≤ 1470	≤ 490

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	161 (194.8)	79±1	200	4 × ϕ13.5	127.4	93.5	73	140.5 (174.3)	20.5	3.2±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.3±0.75	114.3		35	M12 × 25	$64^{0}_{-0.74}$	$30^{0}_{-0.2}$	10	10	8	13.8 (17.9)

5.2.4.8 MS1H3-44C15CD-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	180		
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 frequency (Hz)	125		
Rated current (A)	16		Heatsink-based derating curve
Maximum current (A)	42		
Rated speed (rpm)	1500		
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	72.55±10%	

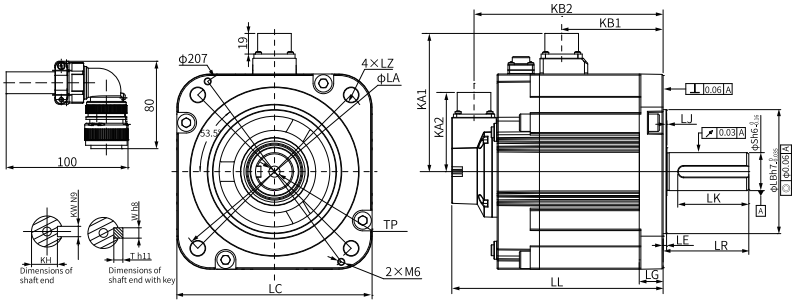
Electrical specifications of the brake

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

Allowable loads

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

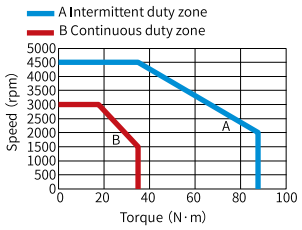
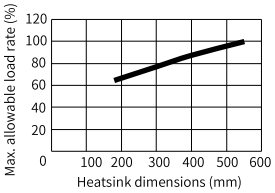
Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	184.5 (218.3)	79±1	200	4 × ϕ13.5	127.4	117	73	164 (197.8)	20.5	3.2±0.3

LJ	LB	S	TP	LK	KH	KW	W	T	Weight (kg)
0.3±0.75	114.3	35	M12 × 25	$64^{0}_{-0.74}$	$30^{0}_{-0.2}$	10	10	8	17.4 (21.6)

5.2.4.9 MS1H3-55C15CD-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	180		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	5.5		
Voltage (V)	380		
Rated torque (N·m)	35		
Maximum torque (N·m)	87.6		
Rated frequency (Hz)	125		
Rated current (A)	20.7		Heatsink-based derating curve
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	94.55±10%	

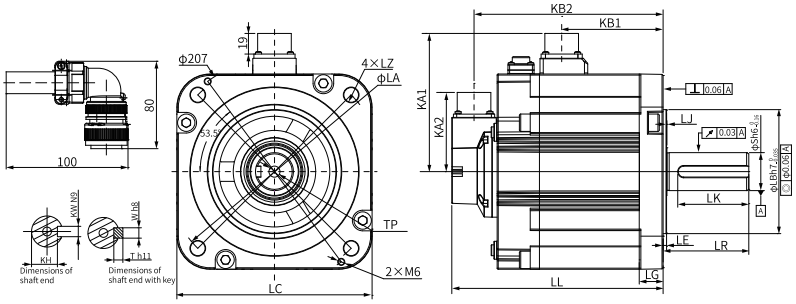
Electrical specifications of the brake

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

Allowable loads

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

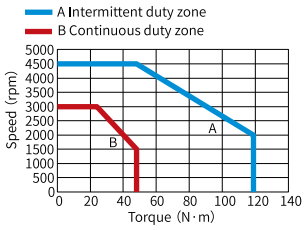
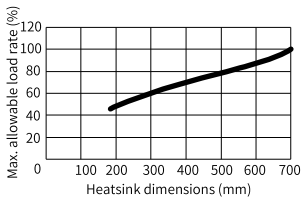
Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	208 (241.8)	113±1	200	4 × ϕ13.5	127.4	140.5	73	187.5 (221.3)	20.5	3.2±0.3

LJ	LB	S	TP	LK	KH	KW	W	T	Weight (kg)
0.3±0.75	114.3	42	M16x32	$95^{0}_{-0.87}$	$37^{0}_{-0.2}$	12	12	8	21.7 (25.9)

5.2.4.10 MS1H3-75C15CD-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	180		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	7.5		
Voltage (V)	380		
Rated torque (N·m)	48		
Maximum torque (N·m)	119		
Rated frequency (Hz)	125		
Rated current (A)	25		Heatsink-based derating curve
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	135.15±10%	

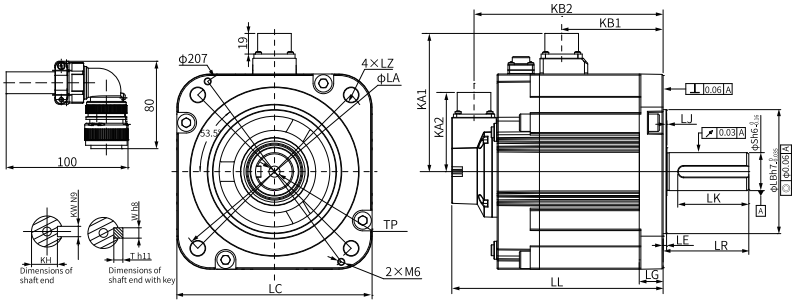
Electrical specifications of the brake

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

Allowable loads

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

Product dimensions (in mm)

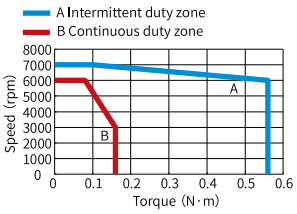
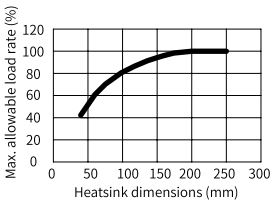


LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	255 (288.8)	113±1	200	4 × ϕ13.5	127.4	187.5	73	234.5 (268.5)	20.5	3.2±0.3

LJ	LB	S	TP	LK	KH	KW	W	T	Weight (kg)
0.3±0.75	114.3	42	M16x32	$95^{0}_{-0.87}$	$37^{0}_{-0.2}$	12	12	8	29 (33.2)

5.2.5 Medium Inertia and Small Capacity (MS1H4)

5.2.5.1 MS1H4-05B30CB-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	40		
Inertia and capacity	Medium inertia, small capacity		
Rated output (kW)	0.05		
Voltage (V)	220		
Rated torque (N·m)	0.16		
Maximum torque (N·m)	0.56		
Rated frequency (Hz)	350		
Rated current (A)	1.27		Heatsink-based derating curve
Maximum current (A)	4.78		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.15		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	0.038±10%	
	Motor with brake	0.04±10%	

Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
0.32	24	6.9	83.5	0.29	≤ 40	≤ 20	≤ 1.5

Allowable loads

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

Product dimensions (in mm)

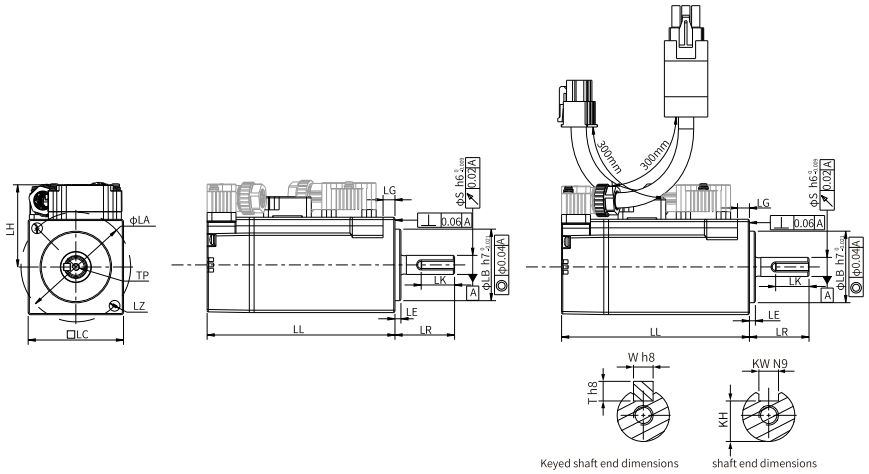


Figure 5-8 MS1H4-05B30CB-A330R and MS1H4-05B30CB-A332R

LL	LC	LR	LA	LZ	LH	LG	LE	
51 (78.3)	40	25±0.5	46	2 × ϕ4.5	34.5	5	2.5±0.5	
S	LB	TP	LK	KH	kW	W	T	Weight (kg)
8	30	M3 × 6	$14^{0}_{-0.36}$	$6.2^{0}_{-0.1}$	3	3	3	0.24 (0.40)

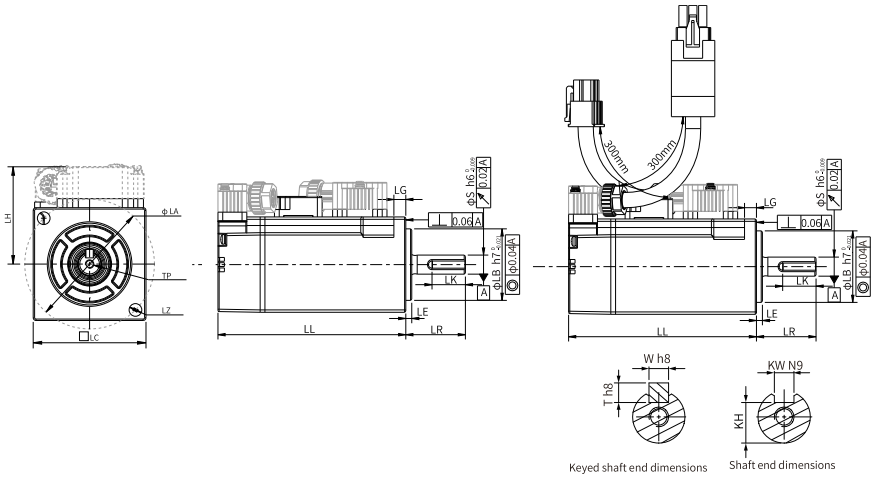
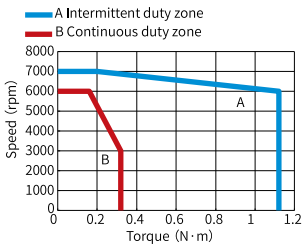
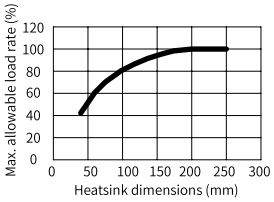


Figure 5-9 MS1H4-05B30CB-A331R and MS1H4-05B30CB-A334R

LL	LC	LR	LA	LZ	LH	LG	LE	
53.7 (81)	40	25±0.5	46	2 × ϕ4.5	34.5	5	2.5±0.5	
S	LB	TP	LK	KH	kW	W	T	Weight (kg)
8	30	M3 × 6	$14^{0}_{-0.36}$	$6.2^{0}_{-0.1}$	3	3	3	0.26 (0.42)

5.2.5.2 MS1H4-10B30CB-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	40		
Inertia and capacity	Medium inertia, small capacity		
Rated output (kW)	0.1		
Voltage (V)	220		
Rated torque (N·m)	0.32		
Maximum torque (N·m)	1.12		
Rated frequency (Hz)	350		
Rated current (A)	1.27		Heatsink-based derating curve
Maximum current (A)	4.78		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.29		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	0.072±10%	
	Motor with brake	0.074±10%	

Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
0.32	24	6.9	83.5	0.29	≤ 40	≤ 20	≤ 1.5

Allowable loads

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

Product dimensions (in mm)

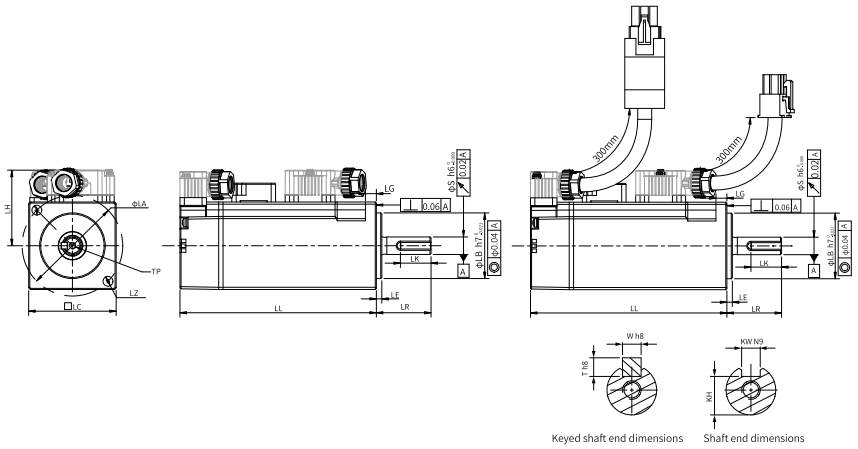


Figure 5-10 MS1H4-10B30CB-A330R and MS1H4-10B30CB-A332R

LL	LC	LR	LA	LZ	LH	LG	LE	
62 (89.3)	40	25±0.5	46	2 × ϕ4.5	34.5	5	2.5±0.5	
S	LB	TP	LK	KH	kW	W	T	Weight (kg)
8	30	M3 × 6	$14^{0}_{-0.36}$	$6.2^{0}_{-0.1}$	3	3	3	0.32 (0.48)

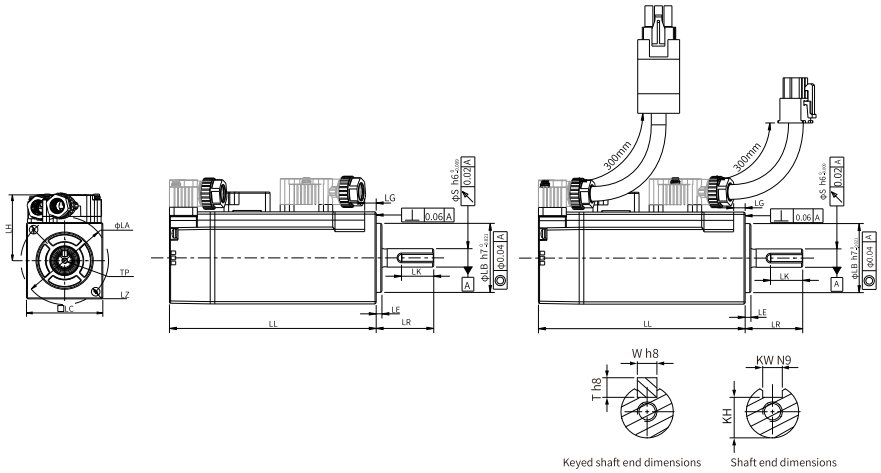
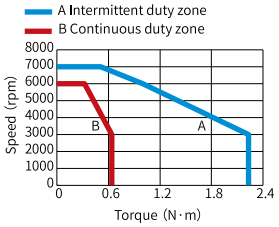
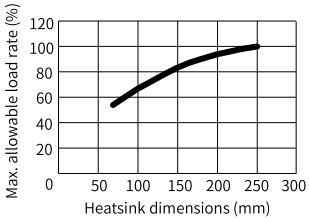


Figure 5-11 MS1H4-10B30CB-A331R and MS1H4-10B30CB-A334R

LL	LC	LR	LA	LZ	LH	LG	LE	
64.7 (92)	40	25±0.5	46	2 × ϕ4.5	34.5	5	2.5±0.5	
S	LB	TP	LK	KH	kW	W	T	Weight (kg)
8	30	M3 × 6	$14^{0}_{-0.36}$	$6.2^{0}_{-0.1}$	3	3	3	0.34 (0.50)

5.2.5.3 MS1H4-20B30CB-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	60		
Inertia and capacity	Medium inertia, small capacity		
Rated power (kW)	0.2		
Voltage (V)	220		
Rated torque (N·m)	0.64		
Maximum torque (N·m)	2.24		
Rated frequency (Hz)	250		
Rated current (A)	1.3		Heatsink-based derating curve
Maximum current (A)	5.3		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.55		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	0.22±10%	
	Motor with brake	0.23±10%	

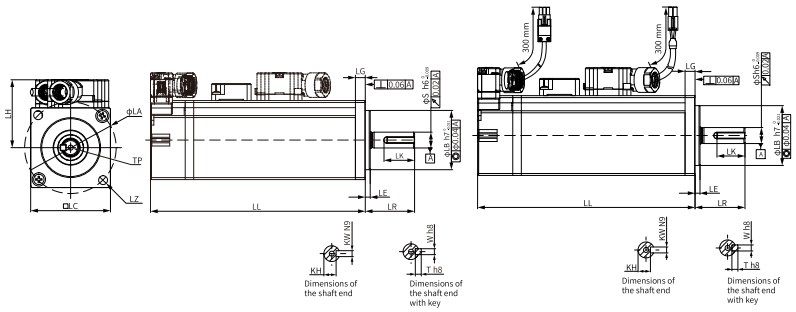
Electrical specifications of the brake

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

Allowable loads

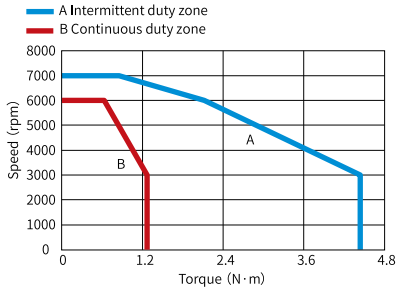
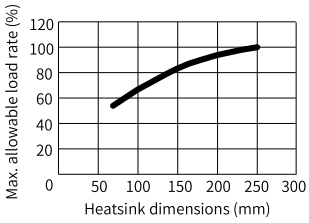
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
25	≤ 245	≤ 74

Product dimensions (in mm)



LC	LL	LR	LA	LZ	LH	LG	LE	
60	73.5 (101.1)	30±0.5	70	4 × ϕ5.5	44	8.0	3±0.5	
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
50	14	M5 × 8	$16.5^{0}_{-0.53}$	$11^{0}_{-0.1}$	5	5	5	0.78 (1.16)

5.2.5.4 MS1H4-40B30CB-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	60		
Inertia and capacity	Medium inertia, small capacity		
Rated power (kW)	0.4		
Voltage (V)	220		
Rated torque (N·m)	1.27		
Maximum torque (N·m)	4.45		
Rated frequency (Hz)	250		
Rated current (A)	2.4		Heatsink-based derating curve
Maximum current (A)	9.2		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.58		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	0.43±10%	
	Motor with brake	0.44±10%	

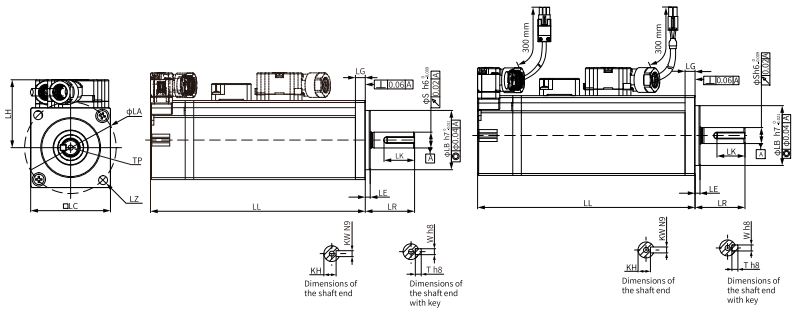
Electrical specifications of the brake

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

Allowable loads

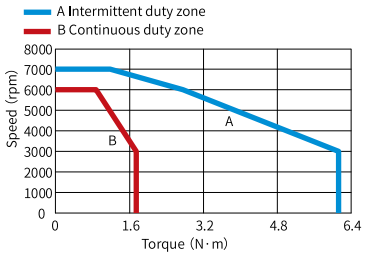
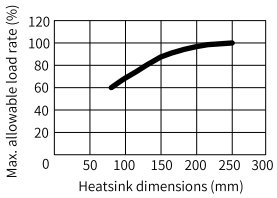
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
25	≤ 245	≤ 74

Product dimensions (in mm)



LC	LL	LR	LA	LZ	LH	LG	LE	
60	92 (119.8)	30±0.5	70	4 × ϕ5.5	44	8.0	3±0.5	
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
50	14	M5 × 8	$16.5^{0}_{-0.53}$	$11^{0}_{-0.1}$	5	5	5	1.11 (1.48)

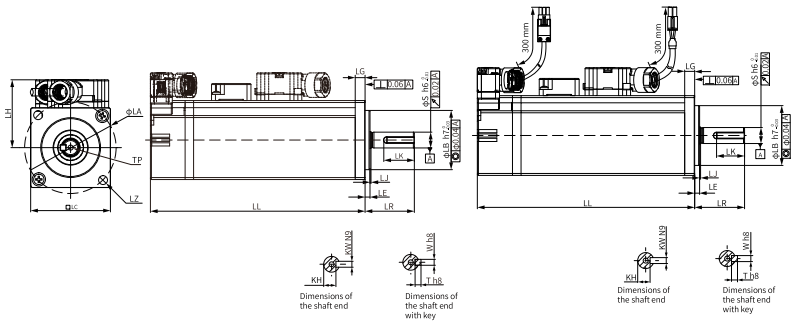
5.2.5.5 MS1H4-55B30CB-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	80		
Inertia and capacity	Medium inertia, small capacity		
Rated power (kW)	0.55		
Voltage (V)	220		
Rated torque (N·m)	1.75		
Maximum torque (N·m)	6.13		
Rated frequency (Hz)	250		
Rated current (A)	3.3		Heatsink-based derating curve
Maximum current (A)	13.2		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.58		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	1.12±10%	
	Motor with brake	-	

Allowable loads

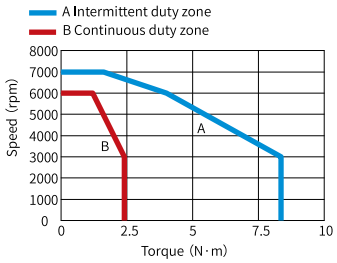
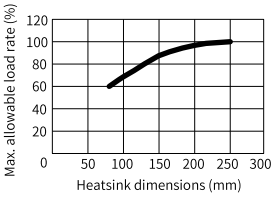
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	≤ 392	≤ 147

Product dimensions (in mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	96.7	35±0.5	90	4 × ϕ7	54	7.5	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
70	19	M6 × 20	$25^{0}_{-0.62}$	$15.5^{0}_{-0.1}$	6	6	6	1.85

5.2.5.6 MS1H4-75B30CB-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	80		
Inertia and capacity	Medium inertia, small capacity		
Rated power (kW)	0.75		
Voltage (V)	220		
Rated torque (N·m)	2.39		
Maximum torque (N·m)	8.37		
Rated frequency (Hz)	250		
Rated current (A)	4.4		Heatsink-based derating curve
Maximum current (A)	16.9		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.63		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	1.46±10%	
	Motor with brake	1.51±10%	

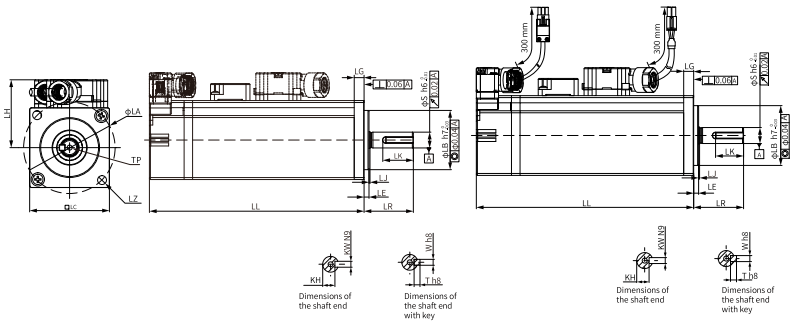
Electrical specifications of the brake

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

Allowable loads

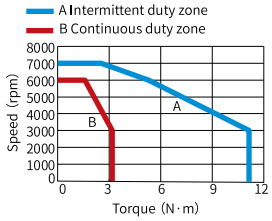
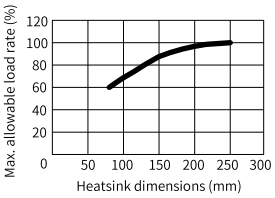
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	≤ 392	≤ 147

Product dimensions (in mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	107.3 (140.5)	35±0.5	90	4 × ϕ7	54	7.5	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
70	19	M6 × 20	$25^{0}_{-0.62}$	$15.5^{0}_{-0.1}$	6	6	6	2.18 (2.82)

5.2.5.7 MS1H4-10C30CB-A33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	80		
Inertia and capacity	Medium inertia, small capacity		
Rated power (kW)	1.0		
Voltage (V)	220		
Rated torque (N·m)	3.18		
Maximum torque (N·m)	11.13		
Rated frequency (Hz)	250		
Rated current (A)	6.5		Heatsink-based derating curve
Maximum current (A)	24		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.53		
Rotor moment of inertia (kg·cm^2)	Motor without brake	1.87±10%	
	Motor with brake	1.97±10%	

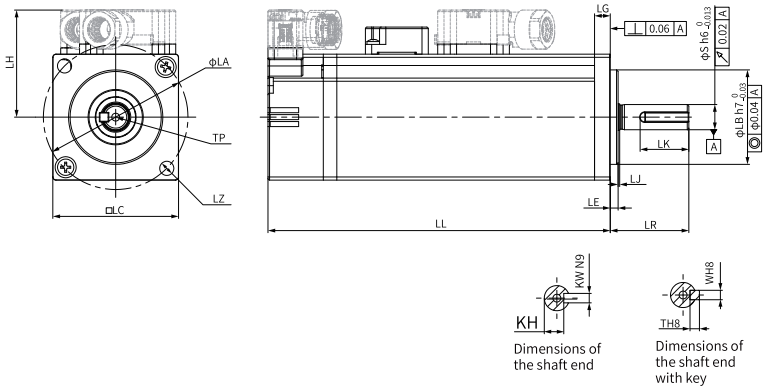
Electrical specifications of the brake

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

Allowable loads

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

Product dimensions (in mm)

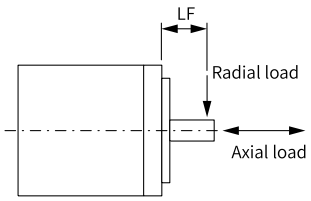


LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	118.7 (153.2)	35±0.5	90	4 × ϕ7	54	7.5	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
70	19	M6 × 20	$25^{0}_{-0.62}$	$15.5^{0}_{-0.1}$	6	6	6	2.55 (2.9)

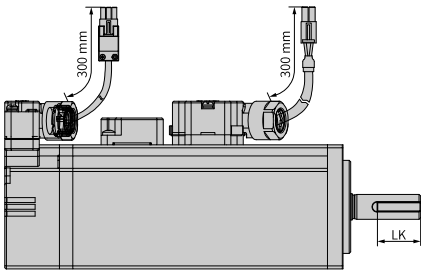
5.3 Motor Models (MS1-R Series Servo Motor with Battery-free Encoder)

5.3.1 Selection Instructions

- Description of torque-speed characteristics curves:
  - All parameters and torque-speed characteristic values are subject to the conditions that the motor works with an Inovance servo drive and the armature coil temperature is 20°C.
  - Continuous duty zone: refers to a series of states in which the motor can operate safely and continuously, and the actual torque must be located in this area.
  - Intermittent duty zone: refers to a series of states in which the motor can run within a short period of 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):
  - MS1H1/MS1H4: 250 x 250 x 6 (aluminum)
  - MS1H2-10C to 25C: 400 x 400 x 20 (steel)
  - MS1H2-30C to 50C: 400 x 400 x 20 (steel)
  - MS1H3-85B to 18C: 400 x 400 x 20 (steel)
  - MS1H3-29C to 55C: 550 x 550 x 30 (aluminum)
  - MS1H3-75C: 700 x 700 x 30 (aluminum)
- Radial and axial loads of the motor:



- Dimensions of flying leads type motors
  Flying leads type motors with frame sizes 60/80 (model ended with "-S") provide a drain wire of about 300 mm in length, as shown in the following figure.



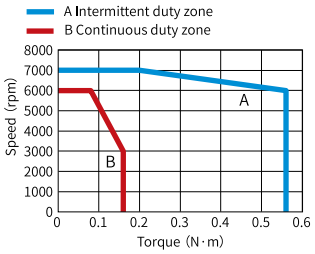
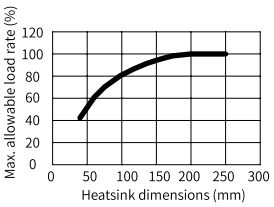
- As shown in the preceding figure, the product is marked with an LK value in the dimension diagram. LK indicates the length of the shaft key.
- MS1H3 (130-flange and 180-flange) comes with a key slot. When the operating speed is above 3000 rpm, the motor must run with the keyway. If you need to run the motor without the keyway at speeds higher than 3000 rpm, contact Inovance.

Note

- Values inside the parentheses in the following sections are parameters of the servo motor with a brake.
- The motor with oil seal must be derated by 10% during use.
- Use your own DC power supply as 24 V power supply of the brake. For the cable connecting the DC power supply to the motor brake, it is recommended to use cables with a cross-sectional area of 0.2 mm^2 or above for motors with rated 750 W or below. It is recommended to use cables with a cross-sectional area of 0.8 mm^2 or above for motors rated 750 W or above. The brake cannot share the same power supply with other appliances to prevent the voltage or current from falling due to the simultaneous operation of other electrical appliances, which may result in brake malfunction.
- Do not share a power supply among multiple brakes. Otherwise, a short-circuited coil caused by dry friction will lock other brakes that are connected to the power supply in parallel, resulting in dry friction on these brakes.
- 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.

5.3.2 Low Inertia and Small Capacity (MS1H1)

5.3.2.1 MS1H1-05B30CB-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	40		
Inertia and capacity	Low inertia, small capacity		
Rated power (kW)	0.05		
Rated voltage (V)	220		
Rated torque (N·m)	0.16		
Maximum torque (N·m)	0.56		
Rated frequency (Hz)	250		
Rated current (A)	1.2		Heatsink-based derating curve
Maximum current (A)	4.8		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.15		
Rotor moment of inertia ($kg \cdot cm^2$)	Motor without brake	0.018±10%	
	Motor with brake	0.0208±10%	

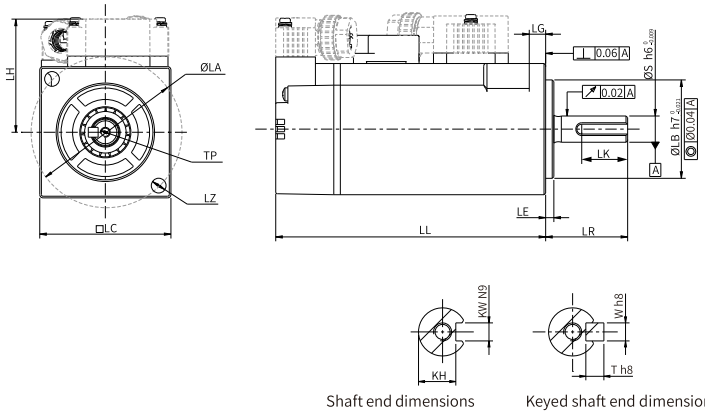
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
0.32	24	6.9	83.5	0.29	≤ 40	≤ 20	≤ 1.5

Allowable loads

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

Product dimensions (in mm)



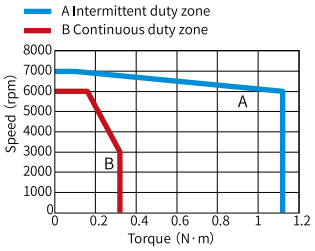
Shaft end dimensions Keyed shaft end dimensions

LL	LC	LR	LA	LZ	LH	LG	LE	
57 (84.3)	40	25±0.5	46	2 × ϕ4.5	34.5	5	2.5±0.5	
S	LB	TP	LK	KH	KW	W	T	Weight (kg)
8	30	M3 × 7	$14^{0}_{-0.36}$	$6.2^{0}_{-0.1}$	3	3	3	0.26 (0.43)

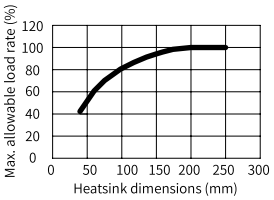
5.3.2.2 MS1H1-10B30CB-V33*R

Motor specifications		
Frame size (mm)	40	
Inertia and capacity	Low inertia, small capacity	
Rated power (kW)	0.1	
Rated voltage (V)	220	
Rated torque (N·m)	0.32	
Maximum torque (N·m)	1.12	
Rated frequency (Hz)	250	
Rated current (A)	1.2	
Maximum current (A)	4.8	
Rated speed (rpm)	3000	
Maximum speed (rpm)	7000	
Torque coefficient (N·m/A)	0.30	
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	0.0316±10%
	Motor with brake	0.0345±10%

Torque-speed characteristics



Heatsink-based derating curve



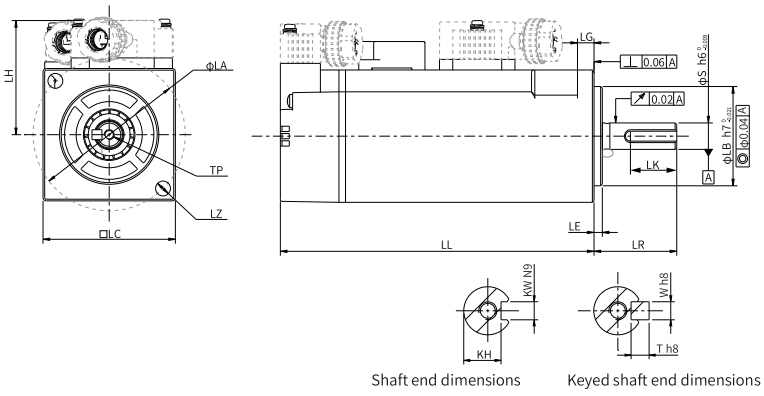
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
0.32	24	6.9	83.5	0.29	≤ 40	≤ 20	≤ 1.5

Allowable loads

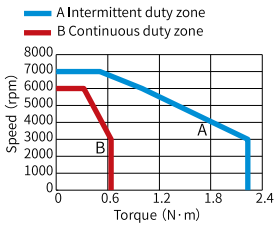
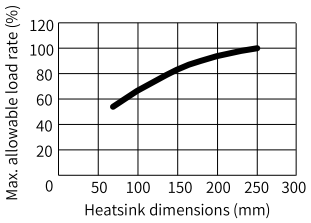
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
20	≤ 78	≤ 54

Product dimensions (in mm)



LL	LC	LR	LA	LZ	LH	LG	LE	
69.5 (96.8)	40	25±0.5	46	2 × ϕ4.5	34.5	5	2.5±0.5	
S	LB	TP	LK	KH	KW	W	T	Weight (kg)
8	30	M3 × 7	$14^{0}_{-0.36}$	$6.2^{0}_{-0.1}$	3	3	3	0.35 (0.52)

5.3.2.3 MS1H1-20B30CB-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	60		
Inertia and capacity	Low inertia, small capacity		
Rated power (kW)	0.2		
Voltage (V)	220		
Rated torque (N·m)	0.64		
Maximum torque (N·m)	2.24		
Rated frequency (Hz)	250		
Rated current (A)	1.5		Heatsink-based derating curve
Maximum current (A)	5.3		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.51		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	0.094±10 %	
	Motor with brake	0.106±10 %	

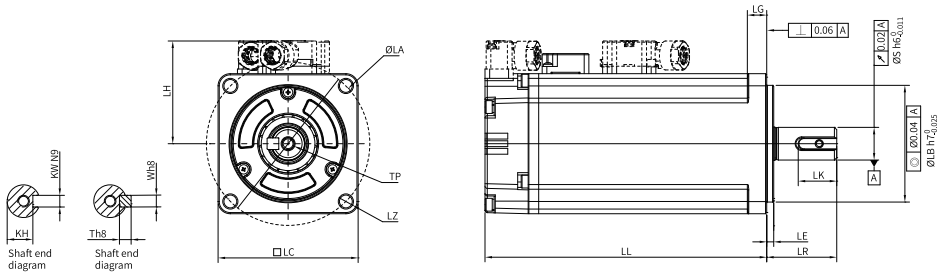
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
1.5	24	7.6	75.79	0.32	≤ 60	≤ 20	≤ 1

Allowable loads

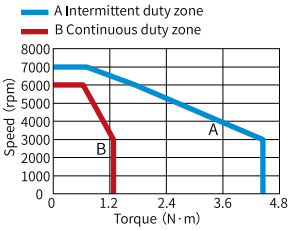
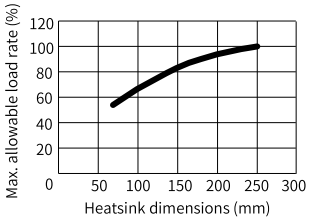
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
25	≤ 245	≤ 74

Product dimensions (in mm)



LC	LL	LR	LA	LZ	LH	LG	LE	
60	75.5 (103)	30±0.5	70	4 × ϕ5.5	44	8.0	3±0.5	
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
50	14	M5 × 12	$16^{0}_{-0.53}$	$11^{0}_{-0.1}$	5	5	5	0.80 (1.17)

5.3.2.4 MS1H1-40B30CB-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	60		
Inertia and capacity	Low inertia, small capacity		
Rated power (kW)	0.4		
Voltage (V)	220		
Rated torque (N·m)	1.27		
Maximum torque (N·m)	4.45		
Rated frequency (Hz)	250		
Rated current (A)	2.5		Heatsink-based derating curve
Maximum current (A)	9.8		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.57		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	0.145±10 %	
	Motor with brake	0.157±10 %	

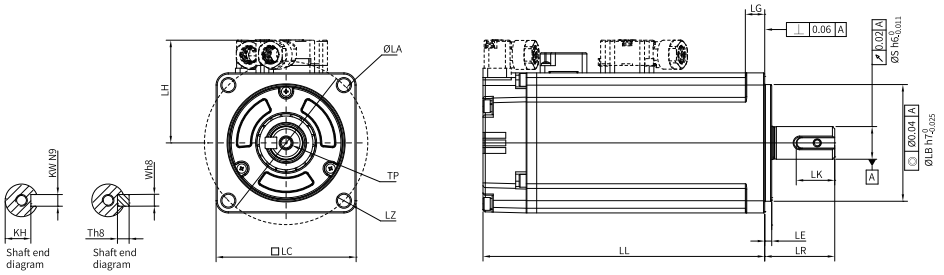
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
1.5	24	7.6	75.79	0.32	≤ 60	≤ 20	≤ 1

Allowable loads

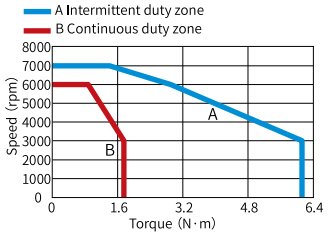
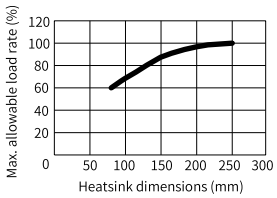
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
25	≤ 245	≤ 74

Product dimensions (in mm)



LC	LL	LR	LA	LZ	LH	LG	LE	
60	93 (121)	30±0.5	70	4 × ϕ5.5	44	8.0	3±0.5	
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
50	14	M5 × 12	$16^{0}_{-0.53}$	$11^{0}_{-0.1}$	5	5	5	1.11 (1.48)

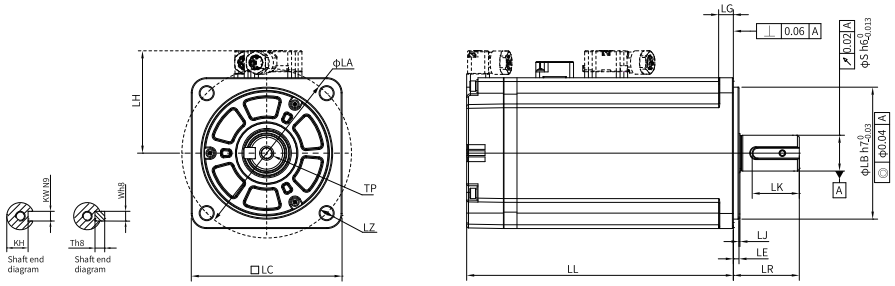
5.3.2.5 MS1H1-55B30CB-V331R

Motor specifications			Torque-speed characteristics
Frame size (mm)	80		
Inertia and capacity	Low inertia, small capacity		
Rated power (kW)	0.55		
Voltage (V)	220		
Rated torque (N·m)	1.75		
Maximum torque (N·m)	6.13		
Rated frequency (Hz)	250		
Rated current (A)	3.9		Heatsink-based derating curve
Maximum current (A)	15		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.51		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	0.55±10 %	
	Motor with brake	-	

Allowable loads

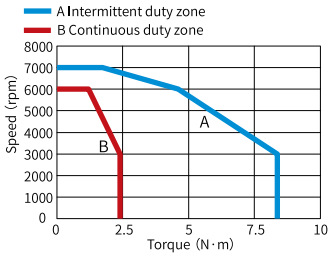
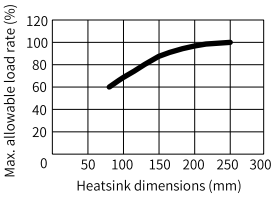
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	≤ 392	≤ 147

Product dimensions (in mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	96.7	35±0.5	90	4 × ϕ7	54	7.5	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
70	19	M6 × 20	$25^{0}_{-0.62}$	$15.5^{0}_{-0.1}$	6	6	6	1.88

5.3.2.6 MS1H1-75B30CB-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	80		
Inertia and capacity	Low inertia, small capacity		
Rated power (kW)	0.75		
Voltage (V)	220		
Rated torque (N·m)	2.39		
Maximum torque (N·m)	8.36		
Rated frequency (Hz)	250		
Rated current (A)	4.4		Heatsink-based derating curve
Maximum current (A)	16.9		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.62		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	0.68±10 %	
	Motor with brake	0.71±10 %	

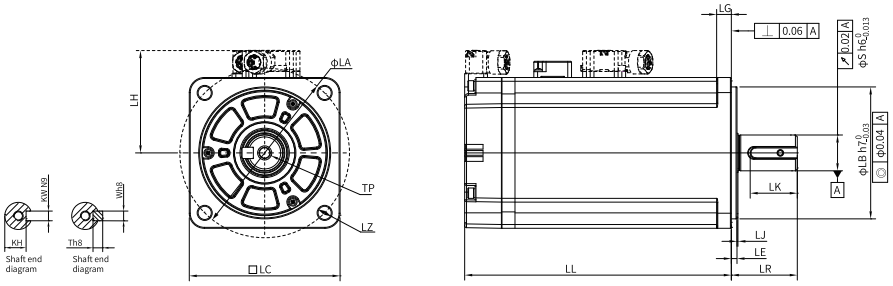
Electrical specifications of the brake

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

Allowable loads

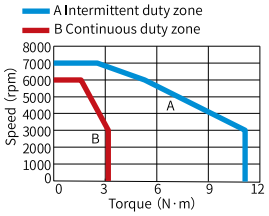
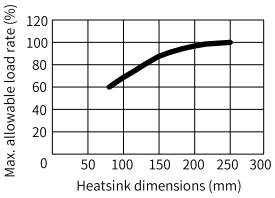
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	≤ 392	≤ 147

Product dimensions (in mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	107.3 (141.5)	35±0.5	90	4 × ϕ7	54	7.5	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
70	19	M6 × 20	$25^{0}_{-0.62}$	$15.5^{0}_{-0.1}$	6	6	6	2.22 (2.88)

5.3.2.7 MS1H1-10C30CB-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	80		
Inertia and capacity	Low inertia, small capacity		
Rated power (kW)	1.0		
Voltage (V)	220		
Rated torque (N·m)	3.18		
Maximum torque (N·m)	11.13		
Rated frequency (Hz)	250		
Rated current (A)	6.2		Heatsink-based derating curve
Maximum current (A)	24		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.59		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	0.82±10 %	
	Motor with brake	0.87±10 %	

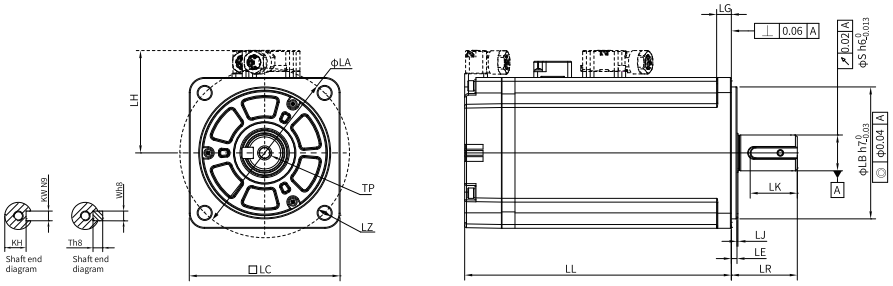
Electrical specifications of the brake

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

Allowable loads

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

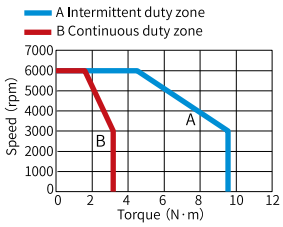
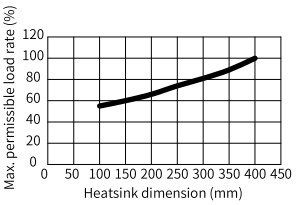
Product dimensions (in mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	119.2 (153.4)	35±0.5	90	4 × ϕ7	54	7.5	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
70	19	M6 × 20	$25^{0}_{-0.62}$	$15.5^{0}_{-0.1}$	6	6	6	2.61 (3.27)

5.3.3 Low Inertia and Medium Capacity (MS1H2)

5.3.3.1 MS1H2-10C30CB-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia and capacity	Low inertia, medium capacity		
Rated power (kW)	1.0		
Voltage (V)	220		
Rated torque (N·m)	3.18		
Maximum torque (N·m)	9.54		
Rated frequency (Hz)	250		
Rated current (A)	6.4		Heatsink-based derating curve
Maximum current (A)	23		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/A)	0.54		
Rotor moment of inertia (kg·cm^2)	Motor without brake	1.78±10%	
	Motor with brake	2.6±10%	

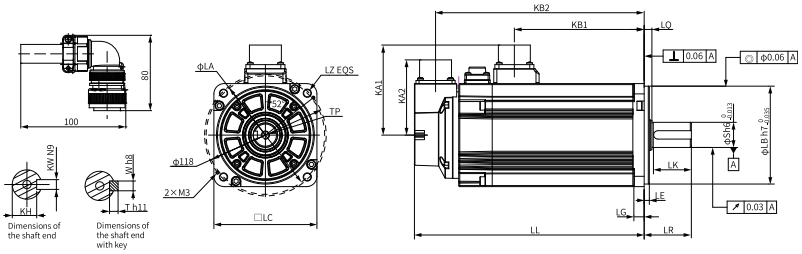
Electrical specifications of the brake

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

Allowable loads

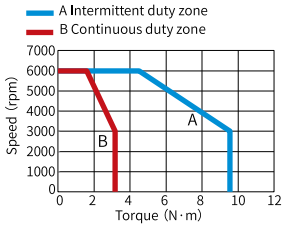
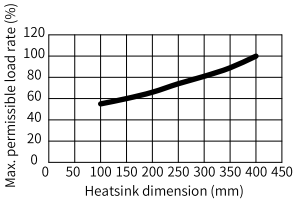
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	144 (172)	45±1	115	4 × ϕ7	88	75	73	123.5 (151.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	95		24	M8 × 16	$35^{0}_{-0.62}$	$20^{0}_{-0.2}$	8	8	7	3.85 (4.9)

5.3.3.2 MS1H2-10C30CD-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia and capacity	Low inertia, medium capacity		
Rated power (kW)	1.0		
Voltage (V)	380		
Rated torque (N·m)	3.18		
Maximum torque (N·m)	9.54		
Rated frequency (Hz)	250		
Rated current (A)	3.3		Heatsink-based derating curve
Maximum current (A)	11		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/A)	1.07		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	1.78±10%	
	Motor with brake	2.6±10%	

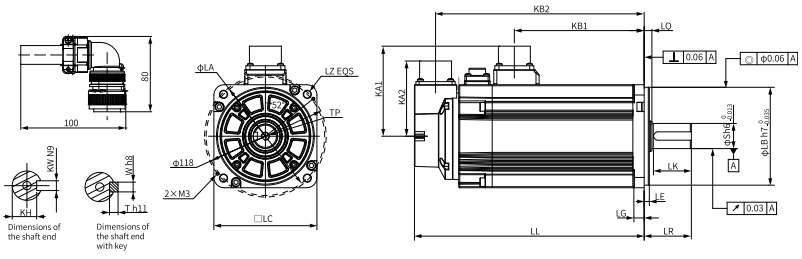
Electrical specifications of the brake

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

Allowable loads

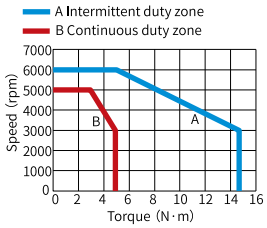
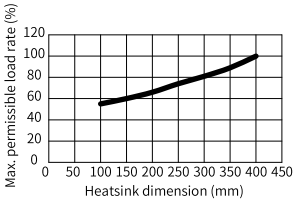
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	144 (172)	45±1	115	4 × φ7	88	75	73	123.5 (151.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	95		24	M8 × 16	$35^{0}_{-0.62}$	$20^{0}_{-0.2}$	8	8	7	3.85 (4.9)

5.3.3.3 MS1H2-15C30CB-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia and capacity	Low inertia, medium capacity		
Rated power (kW)	1.5		
Voltage (V)	220		
Rated torque (N·m)	4.9		
Maximum torque (N·m)	14.7		
Rated frequency (Hz)	250		
Rated current (A)	8.6		Heatsink-based derating curve
Maximum current (A)	32		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/A)	0.62		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	2.35±10%	
	Motor with brake	3.17±10%	

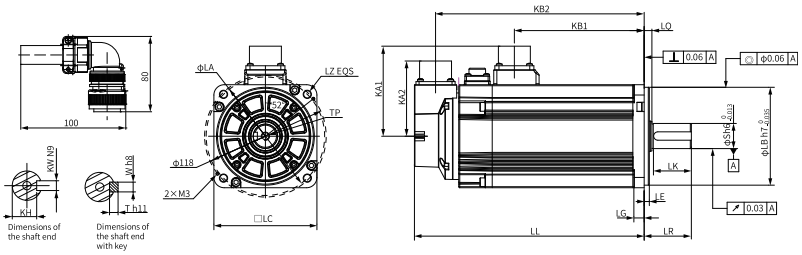
Electrical specifications of the brake

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

Allowable loads

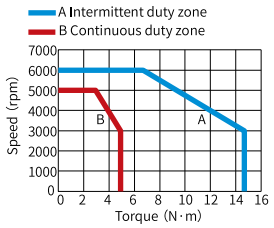
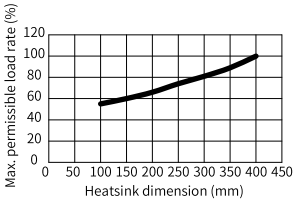
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	161 (189)	45±1	115	4 × φ7	88	92	73	140.5 (168.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	95		24	M8 × 16	$35^{0}_{-0.62}$	$20^{0}_{-0.2}$	8	8	7	4.65 (5.75)

5.3.3.4 MS1H2-15C30CD-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia and capacity	Low inertia, medium capacity		
Rated power (kW)	1.5		
Voltage (V)	380		
Rated torque (N·m)	4.9		
Maximum torque (N·m)	14.7		
Rated frequency (Hz)	250		
Rated current (A)	4.2		Heatsink-based derating curve
Maximum current (A)	14		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/A)	1.28		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	2.35±10%	
	Motor with brake	3.17±10%	

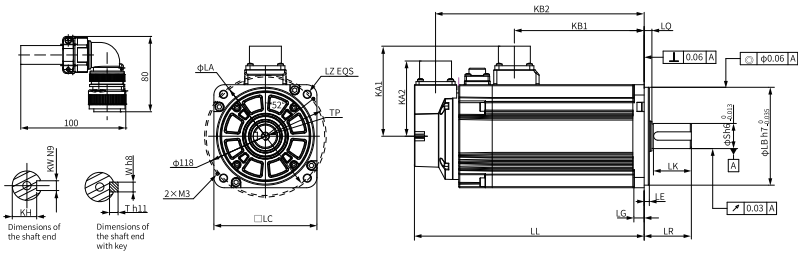
Electrical specifications of the brake

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

Allowable loads

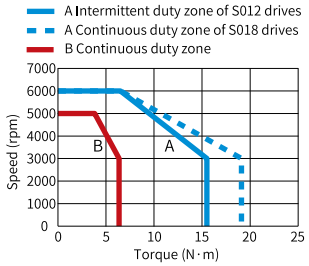
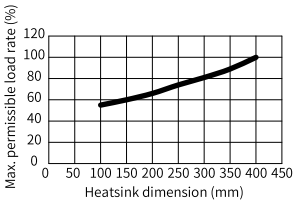
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	161 (189)	45±1	115	4 × ϕ7	88	92	73	140.5 (168.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	95		24	M8 × 16	$35^{0}_{-0.62}$	$20^{0}_{-0.2}$	8	8	7	4.65 (5.75)

5.3.3.5 MS1H2-20C30CB-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia and capacity	Low inertia, medium capacity		
Rated power (kW)	2.0		
Voltage (V)	220		
Rated torque (N·m)	6.36		
Maximum torque (N·m)	19.1		
Rated frequency (Hz)	250		
Rated current (A)	11.3		Heatsink-based derating curve
Maximum current (A)	42		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/A)	0.60		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	2.92±10%	
	Motor with brake	3.74±10%	

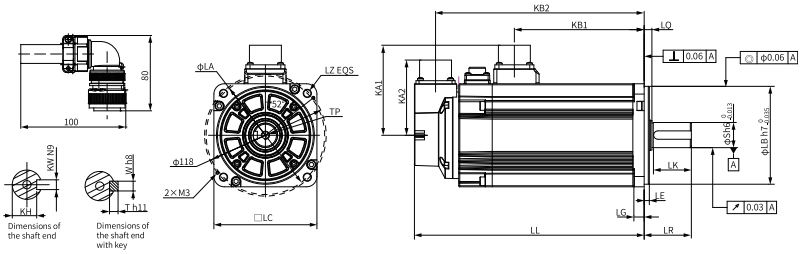
Electrical specifications of the brake

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

Allowable loads

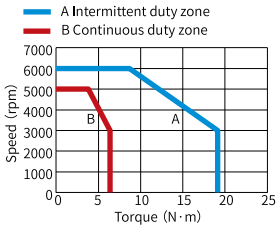
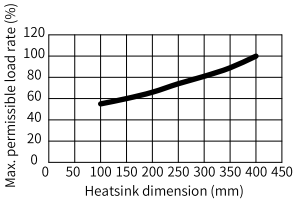
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	177 (205)	45±1	115	4 × ϕ7	88	108	73	156.5 (184.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	95		24	M8 × 16	$35^{0}_{-0.62}$	$20^{0}_{-0.2}$	8	8	7	5.5 (6.55)

5.3.3.6 MS1H2-20C30CD-V33*R

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)	6.36		
Maximum torque (N·m)	19.1		
Rated frequency (Hz)	250		
Rated current (A)	5.6		Heatsink-based derating curve
Maximum current (A)	20		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/A)	1.19		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	2.92±10%	
	Motor with brake	3.74±10%	

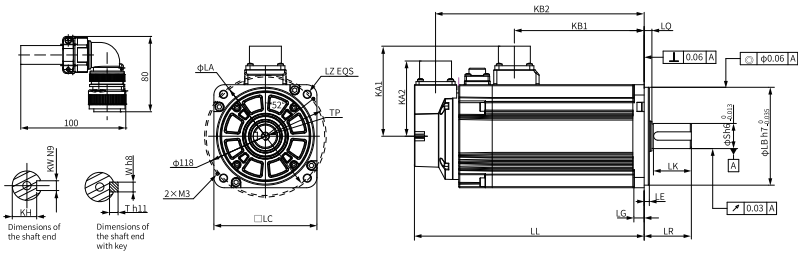
Electrical specifications of the brake

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

Allowable loads

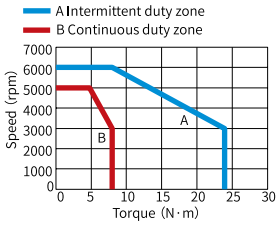
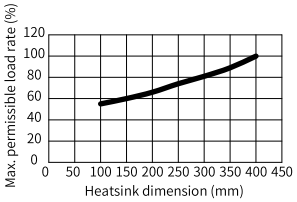
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	177 (205)	45±1	115	4 × φ7	88	108	73	156.5 (184.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	95		24	M8 × 16	$35^{0}_{-0.62}$	$20^{0}_{-0.2}$	8	8	7	5.5 (6.55)

5.3.3.7 MS1H2-25C30CB-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia and capacity	Low inertia, medium capacity		
Rated power (kW)	2.5		
Voltage (V)	220		
Rated torque (N·m)	7.96		
Maximum torque (N·m)	23.9		
Rated frequency (Hz)	250		
Rated current (A)	14.7		Heatsink-based Derating Curve
Maximum current (A)	53		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/A)	0.60		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	3.49±10%	
	Motor with brake	4.3±10%	

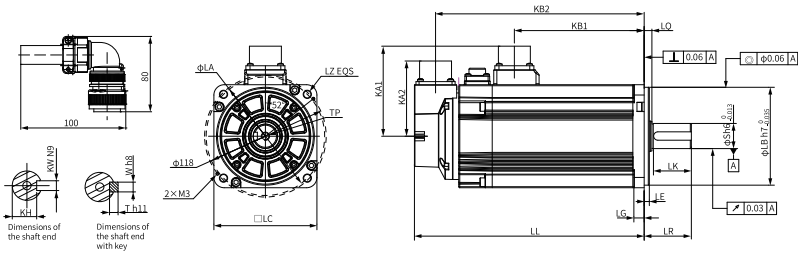
Electrical specifications of the brake

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

Allowable loads

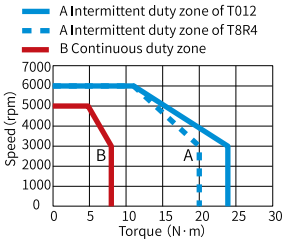
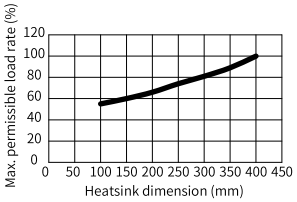
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	195 (223)	45±1	115	4 × ϕ7	88	126	73	174.5 (202.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	95		24	M8 × 16	$35^{0}_{-0.62}$	$20^{0}_{-0.2}$	8	8	7	6.3 (7.35)

5.3.3.8 MS1H2-25C30CD-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia and capacity	Low inertia, medium capacity		
Rated power (kW)	2.5		
Voltage (V)	380		
Rated torque (N·m)	7.96		
Maximum torque (N·m)	23.9		
Rated frequency (Hz)	250		
Rated current (A)	7.2		Heatsink-based derating curve
Maximum current (A)	26		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/A)	1.18		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	3.49±10%	
	Motor with brake	4.3±10%	

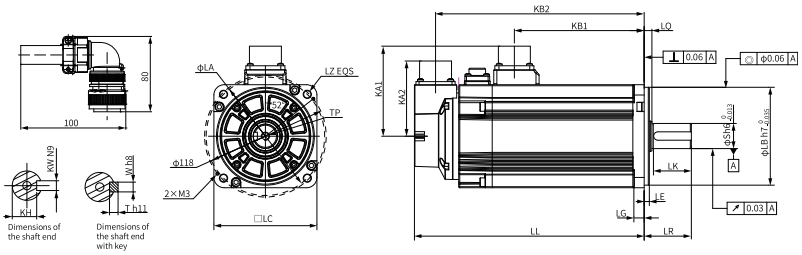
Electrical specifications of the brake

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

Allowable loads

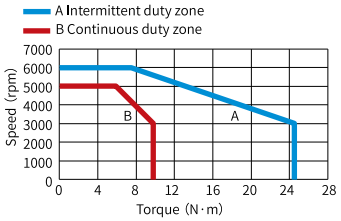
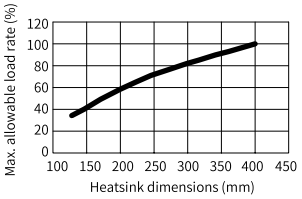
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	195 (223)	45±1	115	4 × ϕ7	88	126	73	174.5 (202.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	95		24	M8 × 16	$35^{0}_{-0.62}$	$20^{0}_{-0.2}$	8	8	7	6.3 (7.35)

5.3.3.9 MS1H2-30C30CB-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia and capacity	Low inertia, medium capacity		
Rated power (kW)	3.0		
Voltage (V)	220		
Rated torque (N·m)	9.8		
Maximum torque (N·m)	24.5		
Rated frequency (Hz)	150		
Rated current (A)	16.6		Heatsink-based Derating Curve
Maximum current (A)	55		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/A)	0.67		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	6.4±10%	
	Motor with brake	9.38±10%	

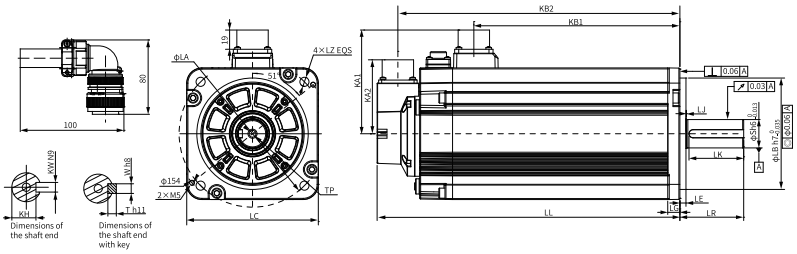
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable loads

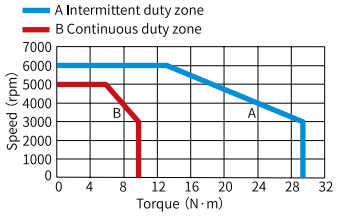
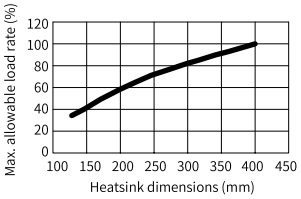
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	≤ 1176	≤ 392

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	198 (223)	63±1	145	4 × ϕ9	102.4	127.5	73	177.5 (202.5)	10.5	6±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	110		28	M8 × 20	$53^{0}_{-0.62}$	$24^{0}_{-0.2}$	8	8	7	10.0 (11.9)

5.3.3.10 MS1H2-30C30CD-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia and capacity	Low inertia, medium capacity		
Rated power (kW)	3.0		
Voltage (V)	380		
Rated torque (N·m)	9.8		
Maximum torque (N·m)	29.4		
Rated frequency (Hz)	150		
Rated current (A)	8.9		Heatsink-based derating curve
Maximum current (A)	29		
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	6.4±10%	
	Motor with brake	9.38±10%	

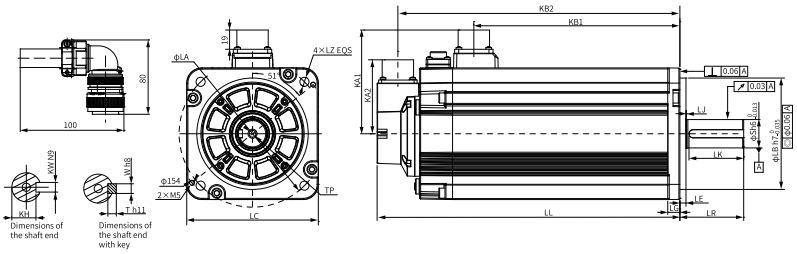
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable loads

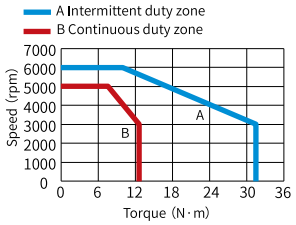
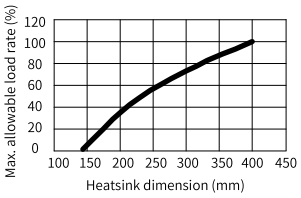
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	≤ 1176	≤ 392

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	198 (223)	63±1	145	4 × ϕ9	102.4	127.5	73	177.5 (202.5)	10.5	6±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	110		28	M8 × 20	$53^{0}_{-0.62}$	$24^{0}_{-0.2}$	8	8	7	10.0 (11.9)

5.3.3.11 MS1H2-40C30CB-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia and capacity	Low inertia, medium capacity		
Rated power (kW)	4.0		
Voltage (V)	220		
Rated torque (N·m)	12.6		
Maximum torque (N·m)	31.5		
Rated frequency (Hz)	150		
Rated current (A)	22		Heatsink-based Derating Curve
Maximum current (A)	67.5		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/A)	0.65		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	9±10%	
	Motor with brake	11.98±10%	

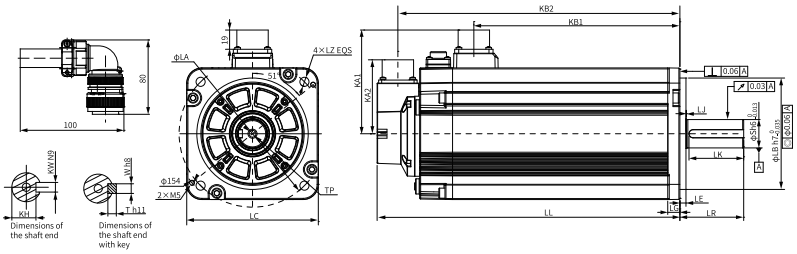
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable loads

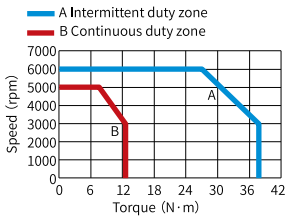
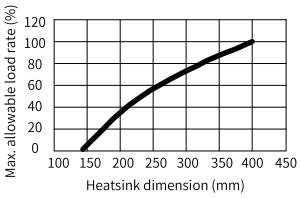
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	≤ 1176	≤ 392

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	236 (261)	63±1	145	4 × ϕ9	102.4	165.5	73	215.5 (240.5)	10.5	6±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	110		28	M8 × 20	$53^{0}_{-0.62}$	$24^{0}_{-0.2}$	8	8	7	13.2 (15.1)

5.3.3.12 MS1H2-40C30CD-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia and capacity	Low inertia, medium capacity		
Rated power (kW)	4.0		
Voltage (V)	380		
Rated torque (N·m)	12.6		
Maximum torque (N·m)	37.8		
Rated frequency (Hz)	150		
Rated current (A)	13.5		Heatsink-based derating curve
Maximum current (A)	42.5		
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±10%	
	Motor with brake	11.98±10%	

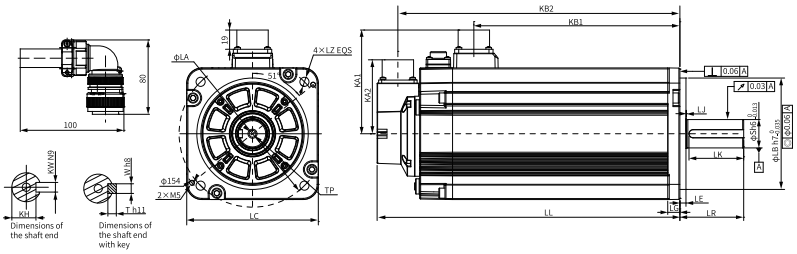
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable loads

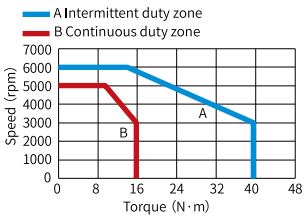
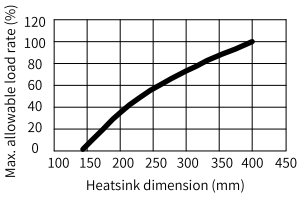
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	≤ 1176	≤ 392

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	236 (261)	63±1	145	4 × ϕ9	102.4	165.5	73	215.5 (240.5)	10.5	6±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	110		28	M8 × 20	$53^{0}_{-0.62}$	$24^{0}_{-0.2}$	8	8	7	13.2 (15.1)

5.3.3.13 MS1H2-50C30CB-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia and capacity	Low inertia, medium capacity		
Rated power (kW)	5.0		
Voltage (V)	220		
Rated torque (N·m)	15.8		
Maximum torque (N·m)	39.5		
Rated frequency (Hz)	150		
Rated current (A)	22		Heatsink-based Derating Curve
Maximum current (A)	67.5		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/A)	0.81		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	11.6±10%	
	Motor with brake	14.58±10%	

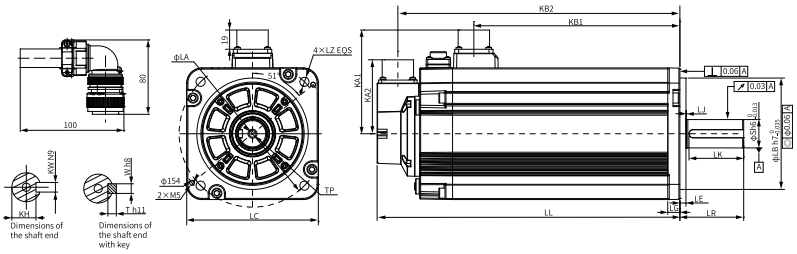
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable loads

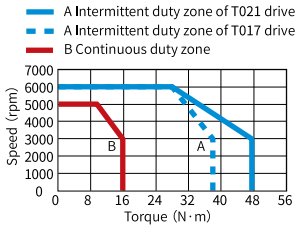
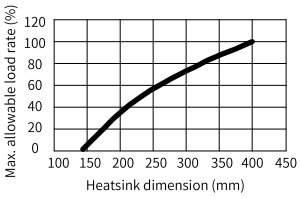
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	≤ 1176	≤ 392

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	274 (299)	63±1	145	4 × ϕ9	102.4	203.5	73	253.5 (278.5)	10.5	6±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	110		28	M8 × 20	$53^{0}_{-0.62}$	$24^{0}_{-0.2}$	8	8	7	16.35 (18.25)

5.3.3.14 MS1H2-50C30CD-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia and capacity	Low inertia, medium capacity		
Rated power (kW)	5.0		
Voltage (V)	380		
Rated torque (N·m)	15.8		
Maximum torque (N·m)	47.4		
Rated frequency (Hz)	150		
Rated current (A)	17		Heatsink-based derating curve
Maximum current (A)	52.5		
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	14.58±10%	

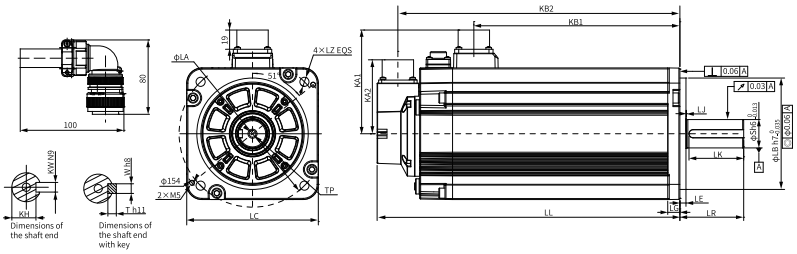
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable loads

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

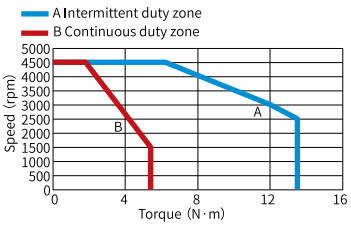
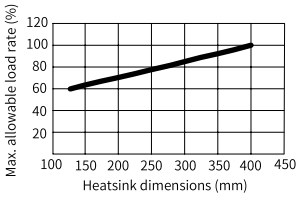
Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	274 (299)	63±1	145	4 × ϕ9	102.4	203.5	73	253.5 (278.5)	10.5	6±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	110		28	M8 × 20	$53^{0}_{-0.62}$	$24^{0}_{-0.2}$	8	8	7	16.35 (18.25)

5.3.4 Medium Inertia and Medium Capacity (MS1H3)

5.3.4.1 MS1H3-85B15CB-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	0.85		
Voltage (V)	220		
Rated torque (N·m)	5.39		
Maximum torque (N·m)	13.5		
Rated frequency (Hz)	125		
Rated current (A)	6.6		Heatsink-based derating curve
Maximum current (A)	17.2		
Rated speed (rpm)	1500		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	0.93		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	13.56±10%	
	Motor with brake	15.8±10%	

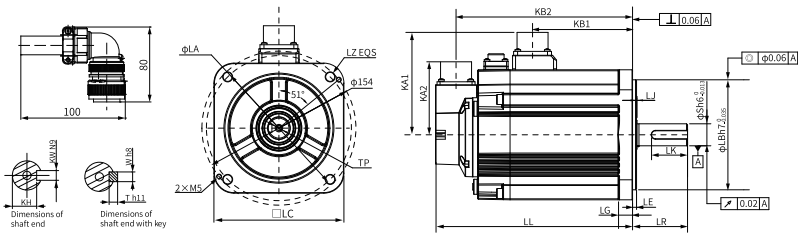
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable loads

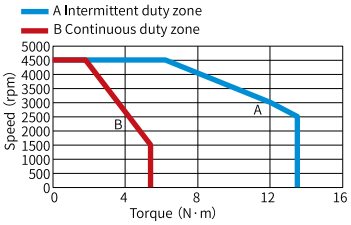
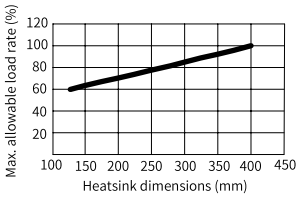
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	142 (167)	55±1	145	4 × φ9	103	70	73	121.5 (146.5)	14	4
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	110		22	M6 × 20	$35^{0}_{-0.62}$	$18^{0}_{-0.2}$	8	8	7	5.8 (7.7)

5.3.4.2 MS1H3-85B15CD-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	0.85		
Voltage (V)	380		
Rated torque (N·m)	5.39		
Maximum torque (N·m)	13.5		
Rated frequency (Hz)	125		
Rated current (A)	3.5		Heatsink-based derating curve
Maximum current (A)	8.5		
Rated speed (rpm)	1500		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	1.84		
Rotor moment of inertia (kg·cm^2)	Motor without brake	13.56±10%	
	Motor with brake	15.8±10%	

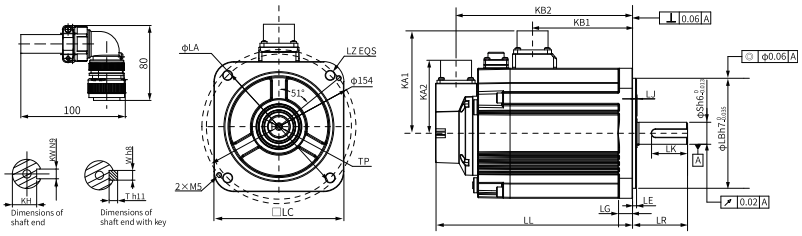
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable loads

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

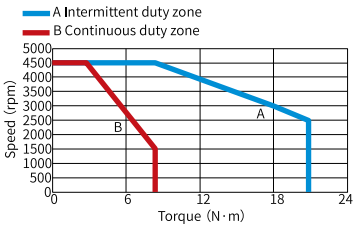
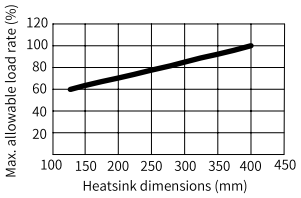
Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	142 (167)	55±1	145	4 × ϕ9	103	70	73	121.5 (146.5)	14	4

LJ	LB	S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	110	22	M6 × 20	$35^{0}_{-0.62}$	$18^{0}_{-0.2}$	8	8	7	5.8 (7.7)

5.3.4.3 MS1H3-13C15CB-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	1.3		
Voltage (V)	220		
Rated torque (N·m)	8.34		
Maximum torque (N·m)	20.85		
Rated frequency (Hz)	125		
Rated current (A)	10.5		Heatsink-based derating curve
Maximum current (A)	27.3		
Rated speed (rpm)	1500		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	0.89		
Rotor moment of inertia ($kg \cdot cm^2$)	Motor without brake	19.25±10%	
	Motor with brake	21.5±10%	

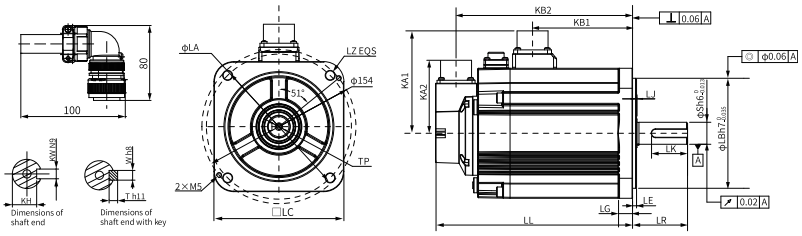
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable loads

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

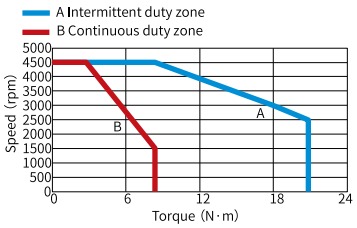
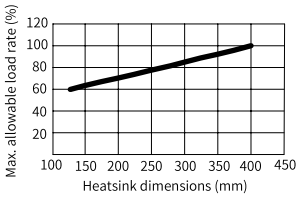
Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	157 (182)	55±1	145	4 × φ9	103	85	73	136.5 (161.5)	14	4

LJ	LB	S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	110	22	M6 × 20	$35^{0}_{-0.62}$	$18^{0}_{-0.2}$	8	8	7	7.1 (8.9)

5.3.4.4 MS1H3-13C15CD-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	1.3		
Voltage (V)	380		
Rated torque (N·m)	8.34		
Maximum torque (N·m)	20.85		
Rated frequency (Hz)	125		
Rated current (A)	5.1		Heatsink-based derating curve
Maximum current (A)	12.6		
Rated speed (rpm)	1500		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	1.85		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	19.25±10%	
	Motor with brake	21.5±10%	

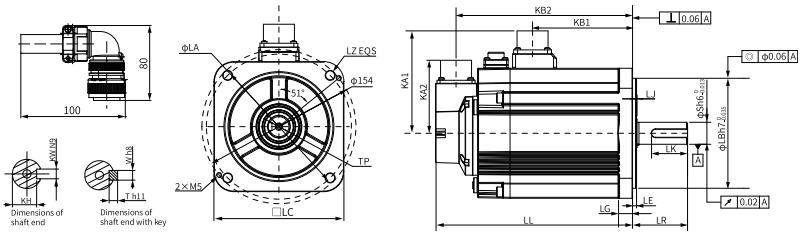
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable loads

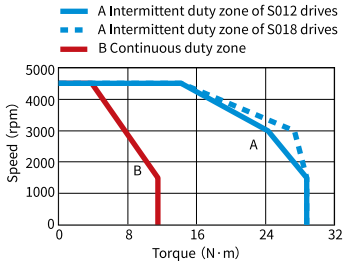
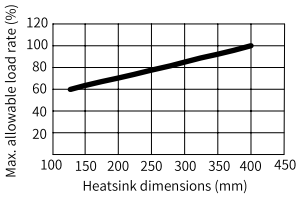
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	157 (182)	55±1	145	4 × ϕ9	103	85	73	136.5 (161.5)	14	4
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	110		22	M6 × 20	$35^{0}_{-0.62}$	$18^{0}_{-0.2}$	8	8	7	7.1 (8.9)

5.3.4.5 MS1H3-18C15CB-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	1.8		
Voltage (V)	220		
Rated torque (N·m)	11.5		
Maximum torque (N·m)	28.75		
Rated frequency (Hz)	125		
Rated current (A)	11.9		Heatsink-based derating curve
Maximum current (A)	32.2		
Rated speed (rpm)	1500		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	1.09		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	24.9±10%	
	Motor with brake	27.2±10%	

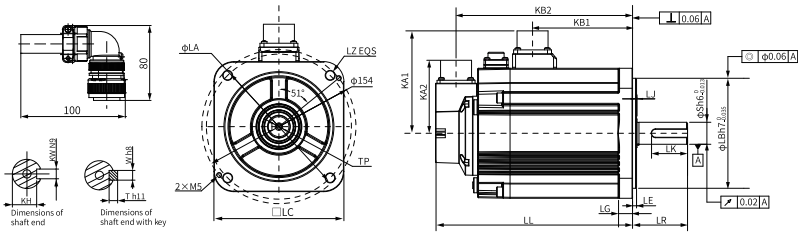
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable loads

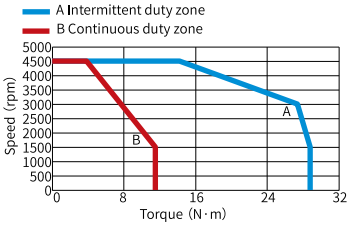
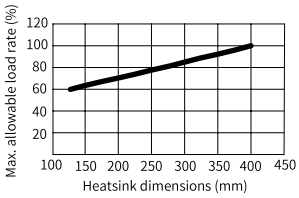
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	172 (197)	55±1	145	4 × ϕ9	103	100	73	151.5 (176.5)	14	4
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	110		22	M6 × 20	$35^{0}_{-0.62}$	$18^{0}_{-0.2}$	8	8	7	8.5 (10.3)

5.3.4.6 MS1H3-18C15CD-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	1.8		
Voltage (V)	380		
Rated torque (N·m)	11.5		
Maximum torque (N·m)	28.75		
Rated frequency (Hz)	125		
Rated current (A)	6.75		Heatsink-based derating curve
Maximum current (A)	17.7		
Rated speed (rpm)	1500		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	1.87		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	24.9±10%	
	Motor with brake	27.2±10%	

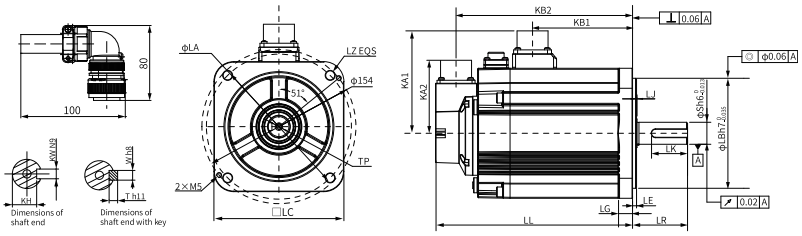
Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	≤ 120	≤ 60	≤ 1

Allowable loads

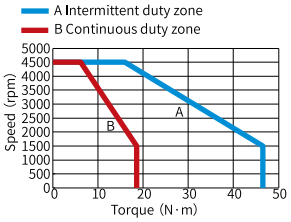
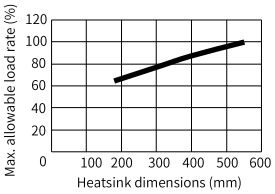
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	172 (197)	55±1	145	4 × ϕ9	103	100	73	151.5 (176.5)	14	4
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	110		22	M6 × 20	$35^{0}_{-0.62}$	$18^{0}_{-0.2}$	8	8	7	8.5 (10.3)

5.3.4.7 MS1H3-29C15CB-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	180		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	2.9		
Voltage (V)	220		
Rated torque (N·m)	18.6		
Maximum torque (N·m)	46.5		
Rated frequency (Hz)	125		
Rated current (A)	18		Heatsink-based Derating Curve
Maximum current (A)	52.5		
Rated speed (rpm)	1500		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	1.16		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	44.7±10%	
	Motor with brake	52.35±10%	

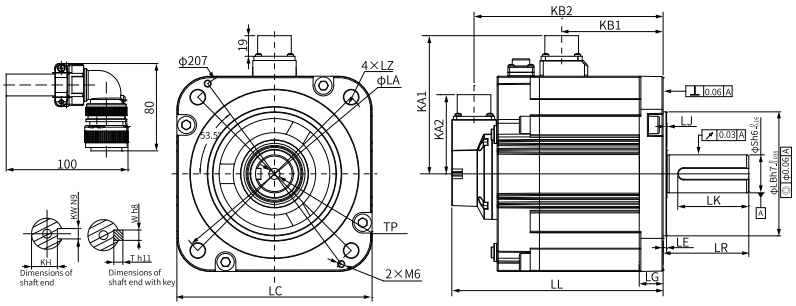
Electrical specifications of the brake

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

Allowable loads

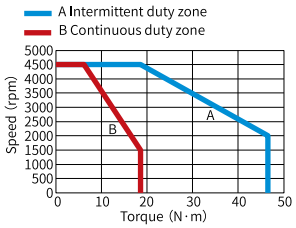
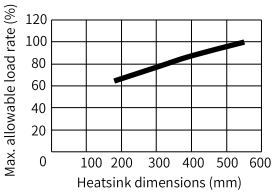
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	≤ 1470	≤ 490

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	161 (194.8)	79±1	200	4 × ϕ13.5	127.4	93.5	73	140.5 (174.3)	20.5	3.2±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.3±0.75	114.3		35	M12 × 25	$64^{0}_{-0.74}$	$30^{0}_{-0.2}$	10	10	8	13.8 (17.9)

5.3.4.8 MS1H3-29C15CD-V33*R

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 frequency (Hz)	125		
Rated current (A)	10.5		Heatsink-based derating curve
Maximum current (A)	29.75		
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	52.35±10%	

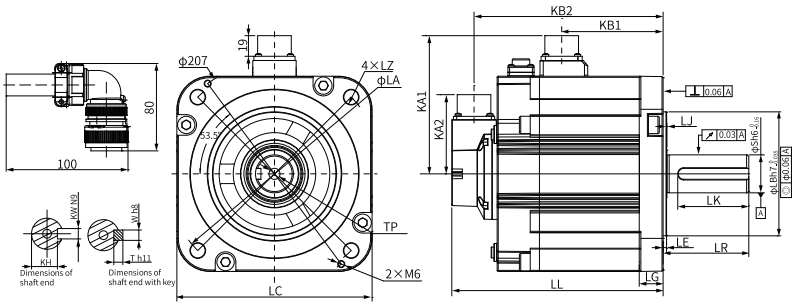
Electrical specifications of the brake

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

Allowable loads

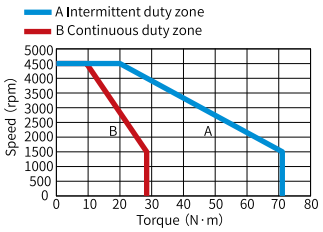
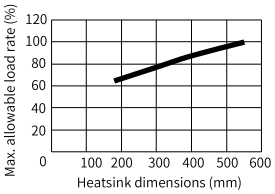
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	≤ 1470	≤ 490

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	161 (194.8)	79±1	200	4 × ϕ13.5	127.4	93.5	73	140.5 (174.3)	20.5	3.2±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.3±0.75	114.3		35	M12 × 25	$64^{0}_{-0.74}$	$30^{0}_{-0.2}$	10	10	8	13.8 (17.9)

5.3.4.9 MS1H3-44C15CB-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	180		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	4.4		
Voltage (V)	220		
Rated torque (N·m)	28.4		
Maximum torque (N·m)	71.1		
Rated frequency (Hz)	125		
Rated current (A)	25.5		Heatsink-based Derating Curve
Maximum current (A)	67		
Rated speed (rpm)	1500		
Maximum speed (rpm)	4500		
Torque coefficient (N·m/A)	1.25		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	64.9±10%	
	Motor with brake	72.55±10%	

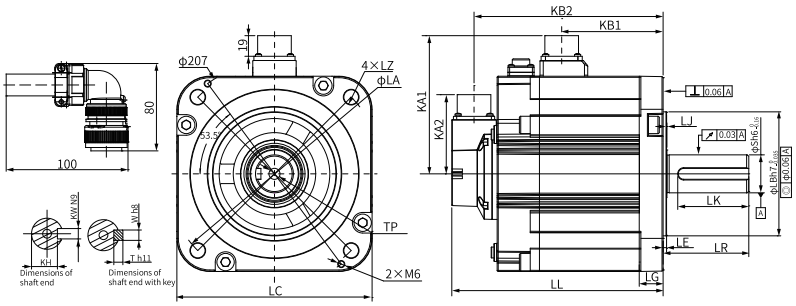
Electrical specifications of the brake

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

Allowable loads

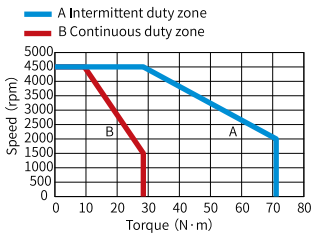
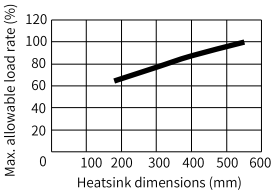
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	≤ 1470	≤ 490

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	184.5 (218.3)	79±1	200	4 × ϕ13.5	127.4	117	73	164 (197.8)	20.5	3.2±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.3±0.75	114.3		35	M12 × 25	$64^{0}_{-0.74}$	$30^{0}_{-0.2}$	10	10	8	17.4 (21.9)

5.3.4.10 MS1H3-44C15CD-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	180		
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 frequency (Hz)	125		
Rated current (A)	16		Heatsink-based derating curve
Maximum current (A)	42		
Rated speed (rpm)	1500		
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	72.55±10%	

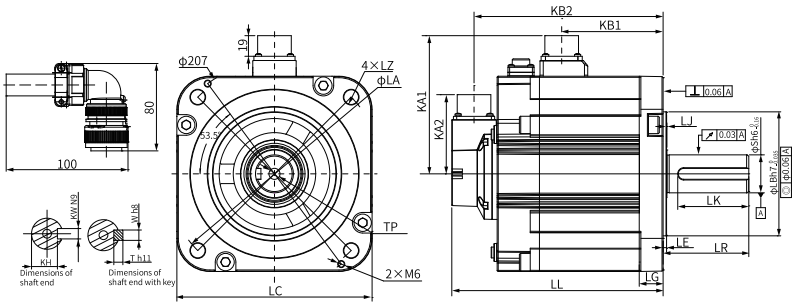
Electrical specifications of the brake

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

Allowable loads

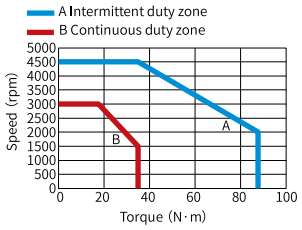
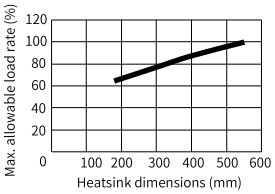
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	≤ 1470	≤ 490

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	184.5 (218.3)	79±1	200	4 × ϕ13.5	127.4	117	73	164 (197.8)	20.5	3.2±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.3±0.75	114.3		35	M12 × 25	$64^{0}_{-0.74}$	$30^{0}_{-0.2}$	10	10	8	17.4 (21.6)

5.3.4.11 MS1H3-55C15CD-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	180		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	5.5		
Voltage (V)	380		
Rated torque (N·m)	35		
Maximum torque (N·m)	87.6		
Rated frequency (Hz)	125		
Rated current (A)	20.7		Heatsink-based derating curve
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	94.55±10%	

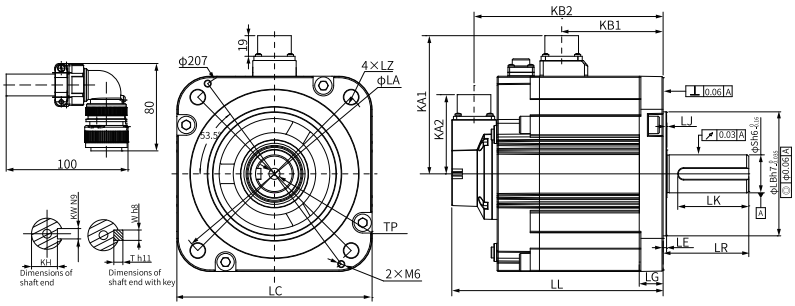
Electrical specifications of the brake

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

Allowable loads

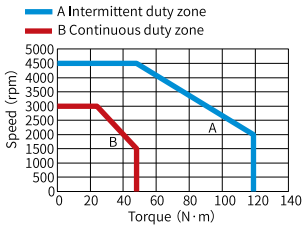
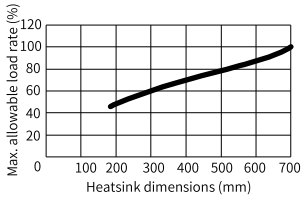
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
113	≤ 1764	≤ 588

Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	208 (241.8)	113±1	200	4 × ϕ13.5	127.4	140.5	73	187.5 (221.3)	20.5	3.2±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.3±0.75	114.3		42	M16x32	$95^{0}_{-0.87}$	$37^{0}_{-0.2}$	12	12	8	21.7 (25.9)

5.3.4.12 MS1H3-75C15CD-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	180		
Inertia and capacity	Medium inertia, medium capacity		
Rated power (kW)	7.5		
Voltage (V)	380		
Rated torque (N·m)	48		
Maximum torque (N·m)	119		
Rated frequency (Hz)	125		
Rated current (A)	25		Heatsink-based derating curve
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	135.15±10%	

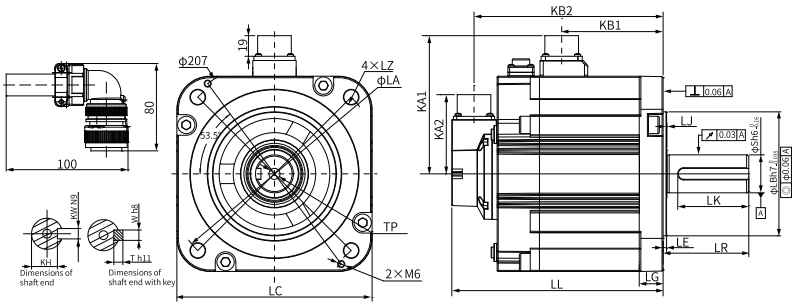
Electrical specifications of the brake

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

Allowable loads

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

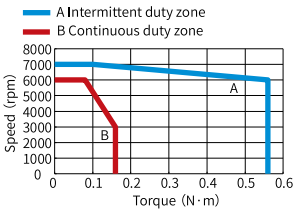
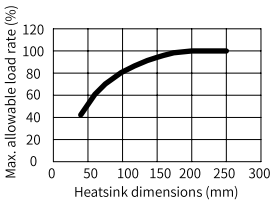
Product dimensions (in mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	255 (288.8)	113±1	200	4 × ϕ13.5	127.4	187.5	73	234.5 (268.5)	20.5	3.2±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.3±0.75	114.3		42	M16x32	$95^{0}_{-0.87}$	$37^{0}_{-0.2}$	12	12	8	29 (33.2)

5.3.5 Medium Inertia and Small Capacity (MS1H4)

5.3.5.1 MS1H4-05B30CB-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	40		
Inertia and capacity	Medium inertia, small capacity		
Rated output (kW)	0.05		
Voltage (V)	220		
Rated torque (N·m)	0.16		
Maximum torque (N·m)	0.56		
Rated frequency (Hz)	350		
Rated current (A)	1.27		Heatsink-based derating curve
Maximum current (A)	4.78		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.15		
Rotor moment of inertia ($kg \cdot cm^2$)	Motor without brake	0.038±10%	
	Motor with brake	0.04±10%	

Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Close time (ms)	Release time (ms)	Backlash (°)
0.32	24	6.9	83.5	0.29	≤ 40	≤ 20	≤ 1.5

Allowable loads

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

Product dimensions (in mm)

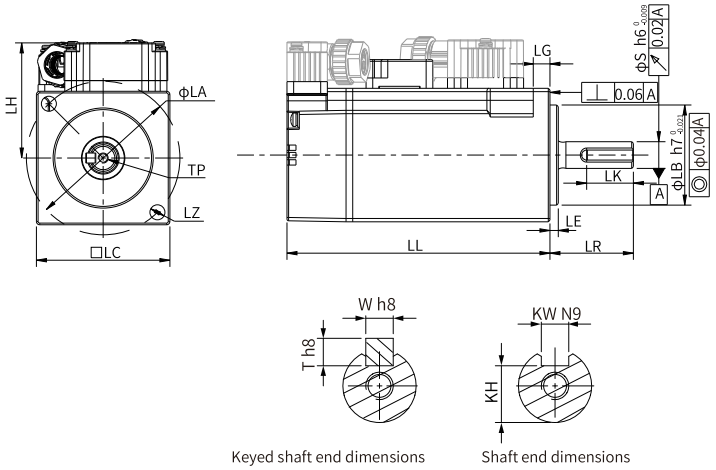


Figure 5-12 MS1H4-05B30CB-V330R and MS1H4-05B30CB-V332R

LL	LC	LR	LA	LZ	LH	LG	LE	
53.5 (80.8)	40	25±0.5	46	2 × ϕ4.5	34.5	5	2.5±0.5	
S	LB	TP	LK	KH	kW	W	T	Weight (kg)
8	30	M3 × 7	$14^{0}_{-0.36}$	$6.2^{0}_{-0.1}$	3	3	3	0.24 (0.40)

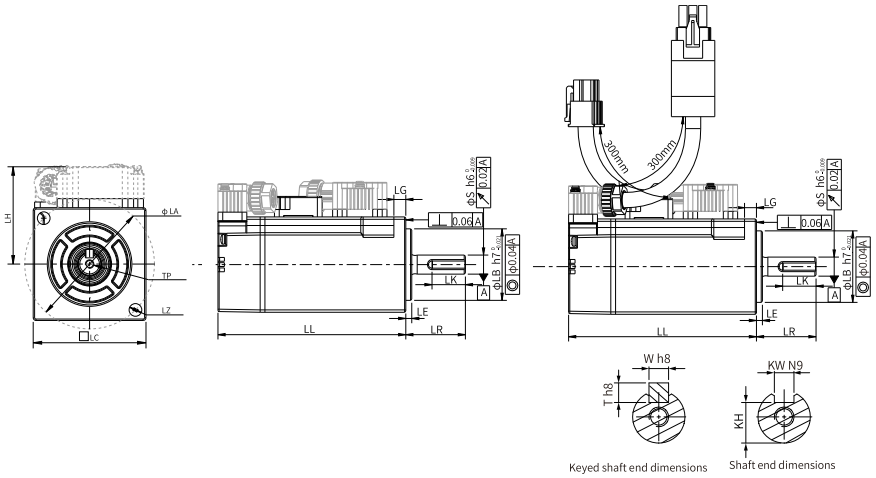
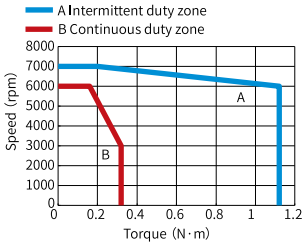
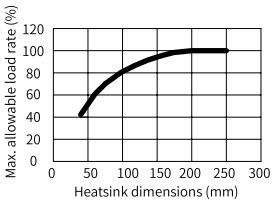


Figure 5-13 MS1H4-05B30CB-V331R and MS1H4-05B30CB-V334R

LL	LC	LR	LA	LZ	LH	LG	LE	
56.15 (83.45)	40	25±0.5	46	2 × ϕ4.5	34.5	5	2.5±0.5	
S	LB	TP	LK	KH	kW	W	T	Weight (kg)
8	30	M3 × 7	$14^{0}_{-0.36}$	$6.2^{0}_{-0.1}$	3	3	3	0.26 (0.42)

5.3.5.2 MS1H4-10B30CB-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	40		
Inertia and capacity	Medium inertia, small capacity		
Rated output (kW)	0.1		
Voltage (V)	220		
Rated torque (N·m)	0.32		
Maximum torque (N·m)	1.12		
Rated frequency (Hz)	350		
Rated current (A)	1.27		Heatsink-based derating curve
Maximum current (A)	4.78		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.29		
Rotor moment of inertia (kg·cm^2)	Motor without brake	0.072±10%	
	Motor with brake	0.074±10%	

Electrical specifications of the brake

Holding torque (N·m)	Power supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω)±10%	Excitation current (A)	Close time (ms)	Release time (ms)	Backlash (°)
0.32	24	6.9	83.5	0.29	≤ 40	≤ 20	≤ 1.5

Allowable loads

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

Product dimensions (in mm)

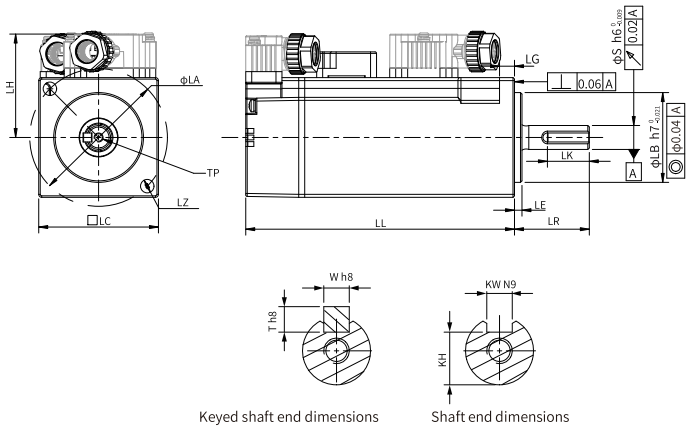


Figure 5-14 MS1H4-10B30CB-V330R and MS1H4-10B30CB-V332R

LL	LC	LR	LA	LZ	LH	LG	LE	
64.5 (91.8)	40	25±0.5	46	2 × ϕ4.5	34.5	5	2.5±0.5	
S	LB	TP	LK	KH	kW	W	T	Weight (kg)
8	30	M3 × 7	$14^{0}_{-0.36}$	$6.2^{0}_{-0.1}$	3	3	3	0.32 (0.48)

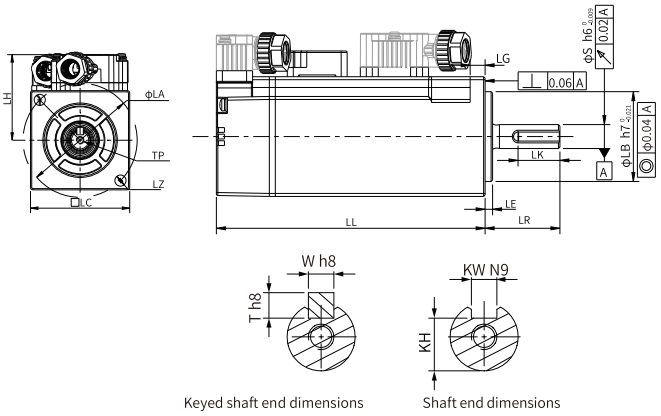
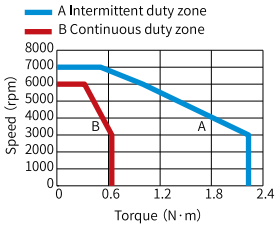
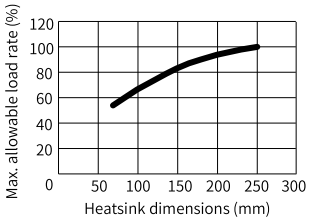


Figure 5-15 MS1H4-10B30CB-V331R and MS1H4-10B30CB-V334R

LL	LC	LR	LA	LZ	LH	LG	LE	
67.15 (94.45)	40	25±0.5	46	2 × ϕ4.5	34.5	5	2.5±0.5	
S	LB	TP	LK	KH	kW	W	T	Weight (kg)
8	30	M3 × 7	$14^{0}_{-0.36}$	$6.2^{0}_{-0.1}$	3	3	3	0.34 (0.50)

5.3.5.3 MS1H4-20B30CB-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	60		
Inertia and capacity	Medium inertia, small capacity		
Rated power (kW)	0.2		
Voltage (V)	220		
Rated torque (N·m)	0.64		
Maximum torque (N·m)	2.24		
Rated frequency (Hz)	250		
Rated current (A)	1.3		Heatsink-based derating curve
Maximum current (A)	5.3		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.55		
Rotor moment of inertia ($kg \cdot cm^2$)	Motor without brake	0.22±10%	
	Motor with brake	0.23±10%	

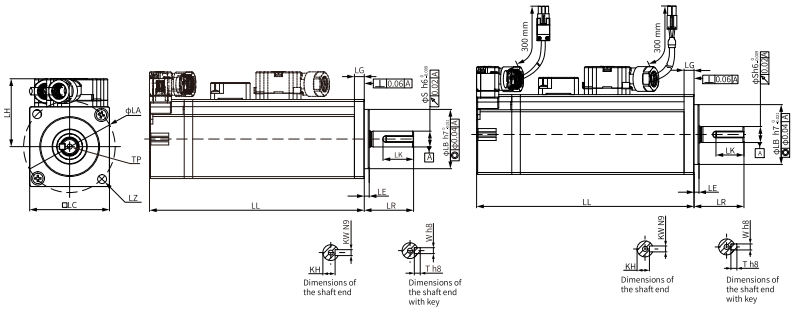
Electrical specifications of the brake

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

Allowable loads

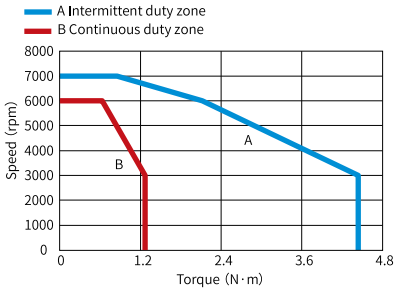
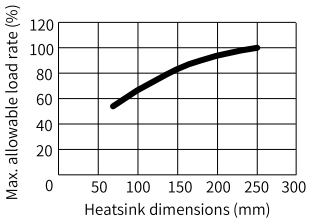
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
25	≤ 245	≤ 74

Product dimensions (in mm)



LC	LL	LR	LA	LZ	LH	LG	LE	
60	73.5 (101.1)	30±0.5	70	4 × ϕ5.5	44	8.0	3±0.5	
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
50	14	M5 × 8	$16.5^{0}_{-0.53}$	$11^{0}_{-0.1}$	5	5	5	0.78 (1.16)

5.3.5.4 MS1H4-40B30CB-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	60		
Inertia and capacity	Medium inertia, small capacity		
Rated power (kW)	0.4		
Voltage (V)	220		
Rated torque (N·m)	1.27		
Maximum torque (N·m)	4.45		
Rated frequency (Hz)	250		
Rated current (A)	2.4		Heatsink-based derating curve
Maximum current (A)	9.2		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.58		
Rotor moment of inertia ($kg \cdot cm^2$)	Motor without brake	0.43±10%	
	Motor with brake	0.44±10%	

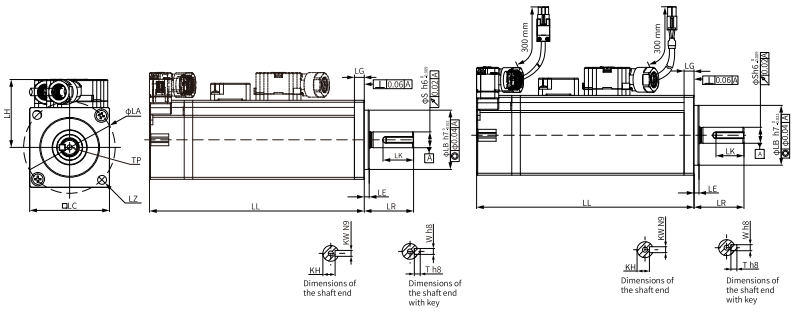
Electrical specifications of the brake

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

Allowable loads

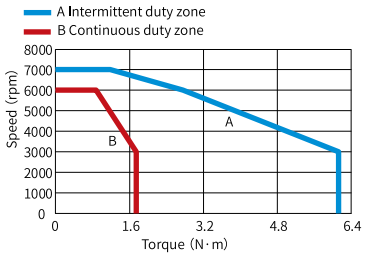
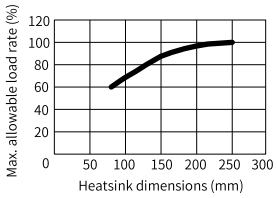
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
25	≤ 245	≤ 74

Product dimensions (in mm)



LC	LL	LR	LA	LZ	LH	LG	LE	
60	92 (119.8)	30±0.5	70	4 × ϕ5.5	44	8.0	3±0.5	
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
50	14	M5 × 8	$16.5^{0}_{-0.53}$	$11^{0}_{-0.1}$	5	5	5	1.11 (1.48)

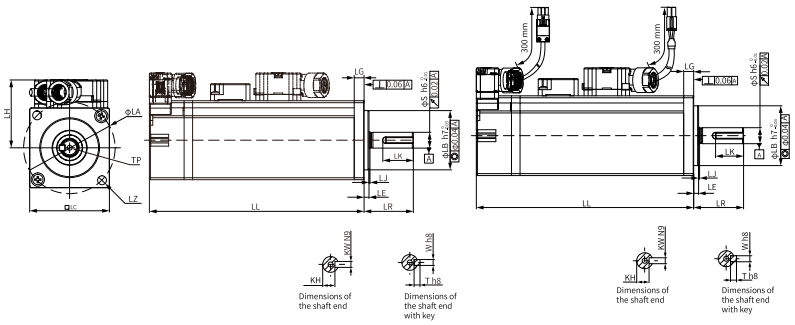
5.3.5.5 MS1H4-55B30CB-V331R

Motor specifications			Torque-speed characteristics
Frame size (mm)	80		
Inertia and capacity	Medium inertia, small capacity		
Rated power (kW)	0.55		
Voltage (V)	220		
Rated torque (N·m)	1.75		
Maximum torque (N·m)	6.13		
Rated frequency (Hz)	250		
Rated current (A)	3.3		Heatsink-based derating curve
Maximum current (A)	13.2		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.58		
Rotor moment of inertia ($kg \cdot cm^2$)	Motor without brake	1.12±10%	
	Motor with brake	-	

Allowable loads

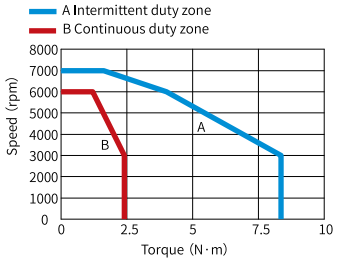
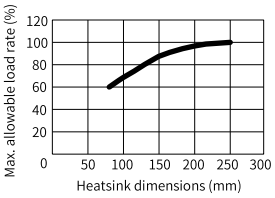
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	≤ 392	≤ 147

Product dimensions (in mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	96.7	35±0.5	90	4 × φ7	54	7.5	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
70	19	M6 × 20	$25^{0}_{-0.62}$	$15.5^{0}_{-0.1}$	6	6	6	1.85

5.3.5.6 MS1H4-75B30CB-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	80		
Inertia and capacity	Medium inertia, small capacity		
Rated power (kW)	0.75		
Voltage (V)	220		
Rated torque (N·m)	2.39		
Maximum torque (N·m)	8.37		
Rated frequency (Hz)	250		
Rated current (A)	4.4		Heatsink-based derating curve
Maximum current (A)	16.9		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.63		
Rotor moment of inertia ($kg \cdot cm^2$)	Motor without brake	1.46±10%	
	Motor with brake	1.51±10%	

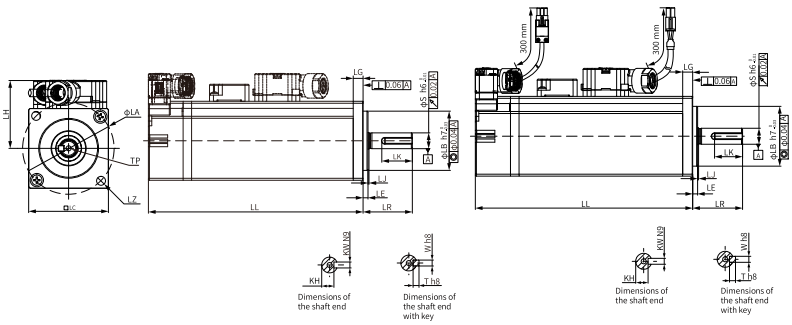
Electrical specifications of the brake

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

Allowable loads

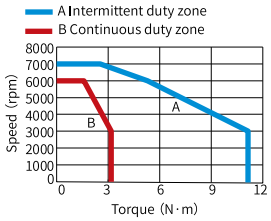
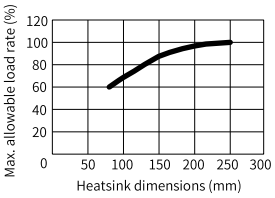
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	≤ 392	≤ 147

Product dimensions (in mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	107.3 (140.5)	35±0.5	90	4 × ϕ7	54	7.5	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
70	19	M6 × 20	$25^{0}_{-0.62}$	$15.5^{0}_{-0.1}$	6	6	6	2.18 (2.82)

5.3.5.7 MS1H4-10C30CB-V33*R

Motor specifications			Torque-speed characteristics
Frame size (mm)	80		
Inertia and capacity	Medium inertia, small capacity		
Rated power (kW)	1.0		
Voltage (V)	220		
Rated torque (N·m)	3.18		
Maximum torque (N·m)	11.13		
Rated frequency (Hz)	250		
Rated current (A)	6.5		Heatsink-based derating curve
Maximum current (A)	24		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.53		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	1.87±10%	
	Motor with brake	1.97±10%	

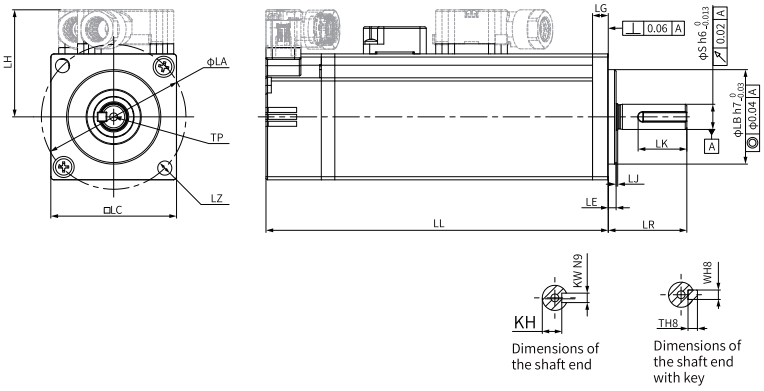
Electrical specifications of the brake

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

Allowable loads

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

Product dimensions (in mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	118.7 (153.2)	35±0.5	90	4 × ϕ7	54	7.5	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
70	19	M6 × 20	$25^{0}_{-0.62}$	$15.5^{0}_{-0.1}$	6	6	6	2.55 (2.9)

6 Options

6.1 Cables

6.1.1 Model Description

Power cable model

S6-L-M ① 0 ② 0 ③ 1 ④ - 3.0 ⑤ - T ⑥ - OR ⑦

① **Cable type** S6-L-B/M: Motion control power cable B: With brake M: Without brake	③ **Cable size (mm²)** 0: Frame sizes 25/40/60/80 1: Frame sizes 100/130/180 2: Frame size 180 (motors of 4.4 kW and above)	⑤ **Cable length** 3.0: 3 m 5.0: 5 m 10.0: 10 m
② **Connector type at drive end** 0: U-shaped cable lug 1: Pin-type cable lug	④ **Connector type at motor end** 0: 6-core plastic connector 1: 9-core aviation connector 2: 6-core aviation connector 7: MS1 custom connector (front outlet) 8: MS1 custom connector (rear outlet)	⑥ _: Fixed cable T: Flexible cable ≥ 10 million bending cycles S: Shielded TS: Shielded flexible cable ≥ 10 million bending cycles ⑦ OR: Oil-resistant

Description of encoder cable model

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

① **Cable type** S6-L-P: Motion control encoder cable	③ **Encoder application mode** 1: Communication-type incremental encoder 2: Communication-type multi-turn absolute encoder	⑤ **Cable length** 3.0: 3 m 5.0: 5 m 10.0: 10 m
② **Connector type at drive end** 0: DB9 1: USB	④ **Connector type at motor end** 0: 9-core plastic connector 1: 9-core aviation connector 4: MS1 custom connector (front outlet) 5: MS1 custom connector (rear outlet)	⑥ _: Fixed cable T: Flexible cable ≥ 10 million bending cycles ⑦ OR: Oil-resistant

Note

Encoder cables are shielded by default.

Model of communication cables

S6-L-T ① 00 ② - 3.0 ③

① Cable type	② Cable connection type	③ Cable length
S6-L-T: Motion control communication cable	00: Servo drive to PC communication cable 01: Multi-drive communication cable (CAN & RS485) 02: Servo drive to PLC communication cable 03: Drive communication termination resistor cable (CAN & RS485) 04: Servo drive network communication cable (Cat 5e) 07: Servo drive network communication cable (Cat 6A) 08: Servo drive network communication cable (Cat 7A)	0.3: 0.3 m 3.0: 3 m 5.0: 5 m 10.0: 10 m

6.1.2 Cable types

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 ≥ 5D (D: Cable diameter)

Flexible cables

Drag chain cables are special cables that are highly flexible and wear resistant. They are used to follow drag chains to move back and forth. They are also known as motion-connect cables and trailing cables.

Recommended bending radius ≥ 10D (D: Cable diameter)

Note

- Do not wind or twist the cables in the cable carrier.
- Ensure the cable can move within the bending radius. Do not move the cables forcibly. Check that a relative movement between cables or between the cable and the guiding device is allowed.
- 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 such as machine tools, cutting fluids, and cutting compounds.

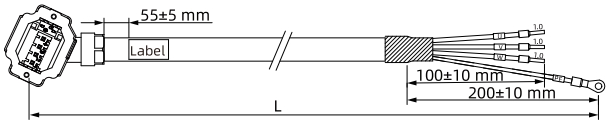
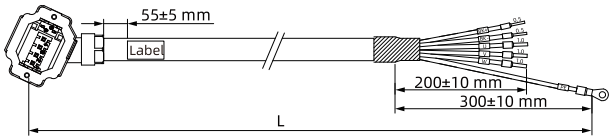
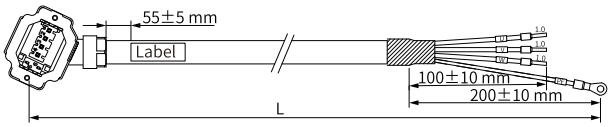
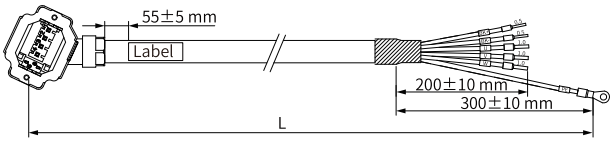
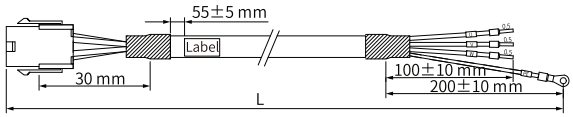
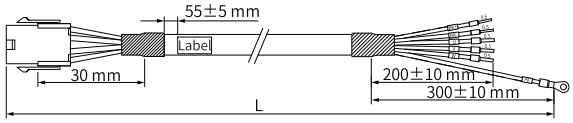
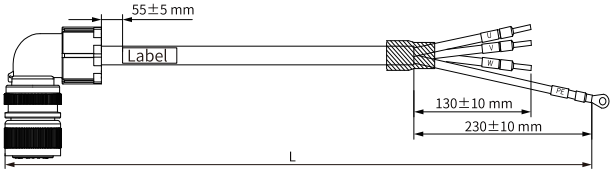
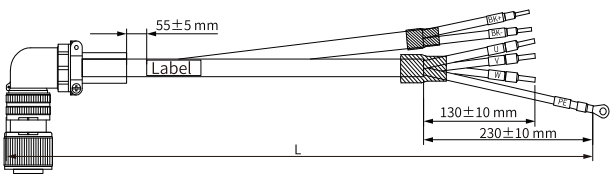
More information

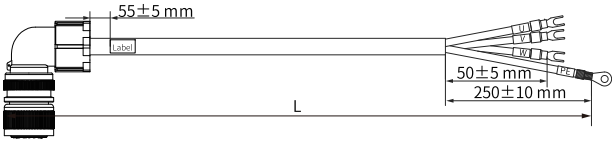
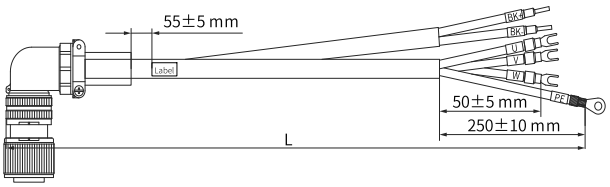
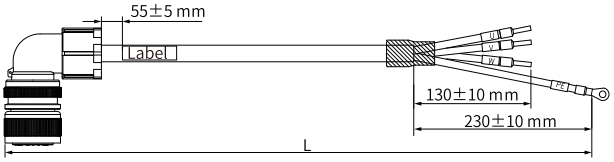
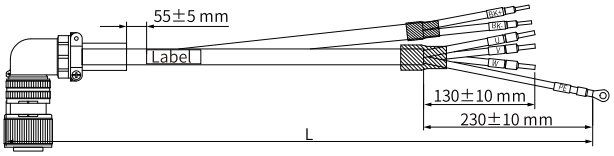
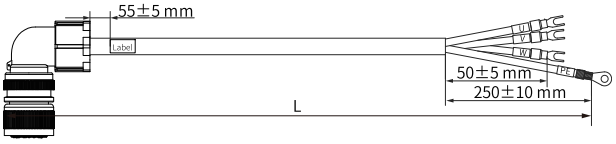
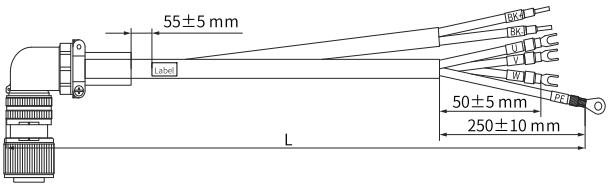
The terminal-type motor power cables and encoder cables require dedicated equipment and tooling for assembly. Order finished cables from channels authorized by Inovance.

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

6.1.3 List of Cables

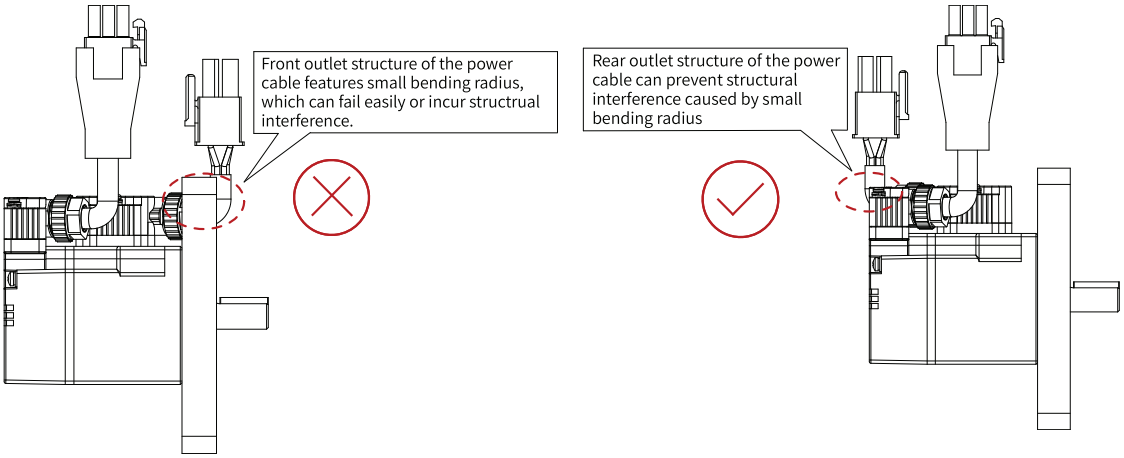
Power cables

Motor model	Cable		Cable model	Cable length (L) (mm)	Appearance
MS1H1/ MS1H4 terminal-type motor	Front outlet	Without brake	S6-L-M107-3.0	3100	
			S6-L-M107-5.0	5100	
			S6-L-M107-10.0	10100	
		Brake	S6-L-B107-3.0	3100	
			S6-L-B107-5.0	5100	
			S6-L-B107-10.0	10100	
	Rear outlet	Without brake	S6-L-M108-3.0	3100	
			S6-L-M108-5.0	5100	
			S6-L-M108-10.0	10100	
		Brake	S6-L-B108-3.0	3100	
			S6-L-B108-5.0	5100	
			S6-L-B108-10.0	10100	
MS1H1/ MS1H4 flying leads (-S) motor	Without brake		S6-L-M100-3.0	3100	
			S6-L-M100-5.0	5100	
			S6-L-M100-10.0	10100	
	Brake		S6-L-B100-3.0	3100	
			S6-L-B100-5.0	5100	
			S6-L-B100-10.0	10100	
MS1H2 motors rated 3 kW or below/ MS1H3 motors rated 1.8 kW or below	Without brake		S6-L-M111-3.0	3100	
			S6-L-M111-5.0	5100	
			S6-L-M111-10.0	10100	
	Brake		S6-L-B111-3.0	3100	
			S6-L-B111-5.0	5100	
			S6-L-B111-10.0	10100	

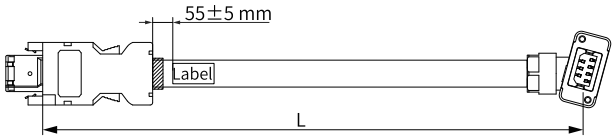
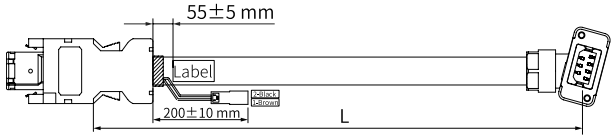
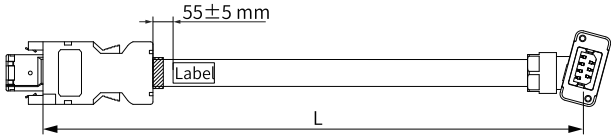
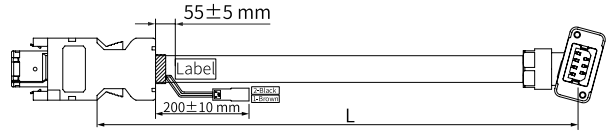
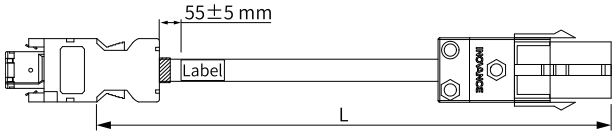
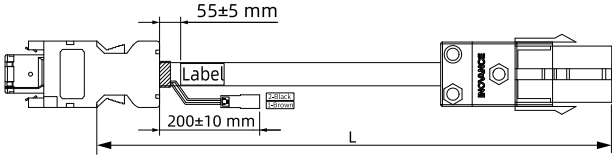
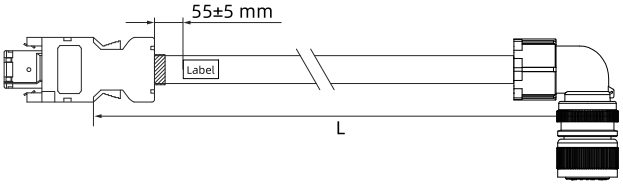
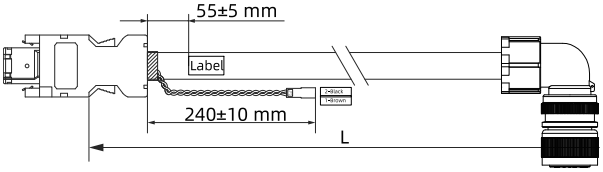
Motor model	Cable	Cable model	Cable length (L) (mm)	Appearance
MS1H2 motors rated 4 kW/5 kW	Without brake	S6-L-M011-3.0	3000	
		S6-L-M011-5.0	5000	
		S6-L-M011-10.0	10000	
	Brake	S6-L-B011-3.0	3000	
		S6-L-B011-5.0	5000	
		S6-L-B011-10.0	10000	
MS1H3 motors rated 2.9 kW	Without brake	S6-L-M112-3.0	3100	
		S6-L-M112-5.0	5100	
		S6-L-M112-10.0	10100	
	Brake	S6-L-B112-3.0	3100	
		S6-L-B112-5.0	5100	
		S6-L-B112-10.0	10100	
MS1H3 motors rated 4.4 kW and above	Without brake	S6-L-M022-3.0	3000	
		S6-L-M022-5.0	5000	
		S6-L-M022-10.0	10000	
	Brake	S6-L-B022-3.0	3000	
		S6-L-B022-5.0	5000	
		S6-L-B022-10.0	10000	

Note

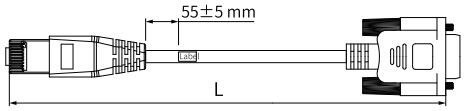
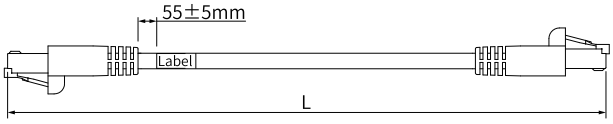
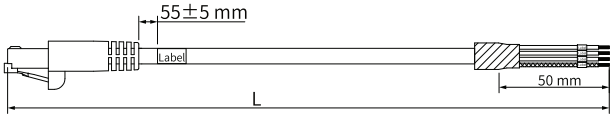
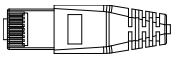
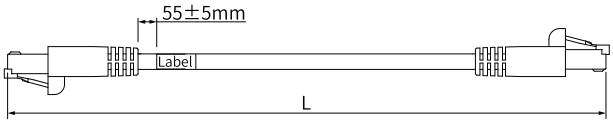
- For 50 W terminal-type models, use rear outlet for power cables.
- For 100 W models, if the mounting flange face is internally stepped type, only terminal-type models can be used, which are equipped with power cables with rear outlet.


Front outlet structure of the power cable features small bending radius, which can fail easily or incur structrual interference.
Rear outlet structure of the power cable can prevent structural interference caused by small bending radius

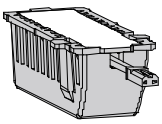
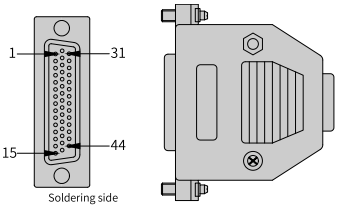
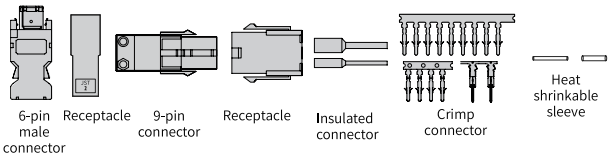
Encoder cables

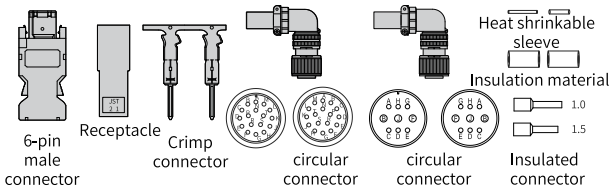
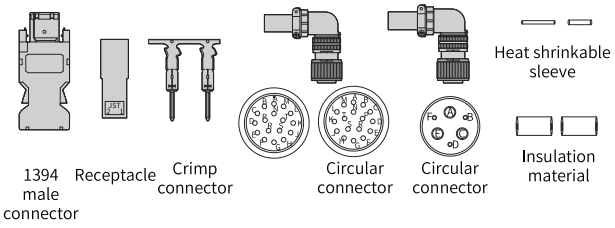
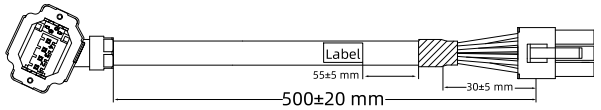
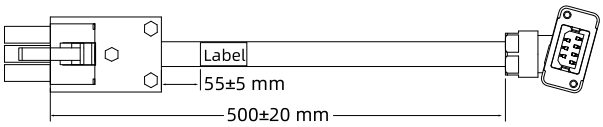
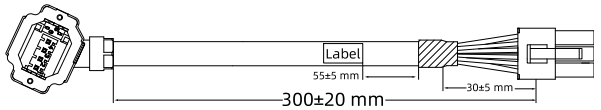
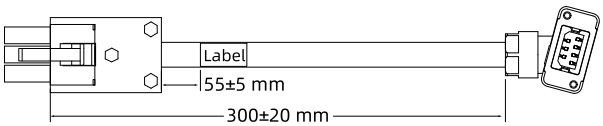
Motor model	Cable		Cable model	Cable length (L) (mm)	Appearance
MS1H1/ MS1H4 terminal-type motor	Front outlet	Single-turn absolute encoder cable	S6-L-P114-3.0	3000	
			S6-L-P114-5.0	5000	
			S6-L-P114-10.0	10000	
		Multi-turn absolute	S6-L-P124-3.0	3000	
			S6-L-P124-5.0	5000	
			S6-L-P124-10.0	10000	
	Rear outlet	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	S6-L-P125-3.0	3000	
			S6-L-P125-5.0	5000	
			S6-L-P125-10.0	10000	
MS1H1/MS1H4 flying leads (-S) motor		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	S6-L-P120-3.0	3000	
			S6-L-P120-5.0	5000	
			S6-L-P120-10.0	10000	
MS1H2/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	S6-L-P121-3.0	3000	
			S6-L-P121-5.0	5000	
			S6-L-P121-10.0	10000	

Communication cables

Cable	Cable model	Cable length (L) (mm)	Appearance
Drive-to-PC communication cable	S6-L-T00-3.0	3000	
Multi-drive communication cable (CAN & RS485)	S6-L-T01-0.3	300	
Servo drive-to-PLC communication cable	S6-L-T02-2.0	2000	
Drive communication termination resistor cable (CAN & RS485)	S6-L-T03-0.0	-	
Servo drive network communication cable (Cat 5e)	S6-L-T04-0.3	300	
Servo drive network communication cable (Cat 6A)	S6-L-T07-0.3	300	
Servo drive network communication cable (Cat 7A)	S6-L-T08-0.3	300	

6.1.4 Connector Kits

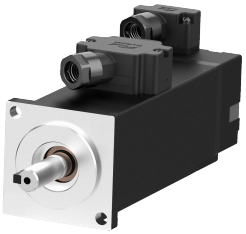
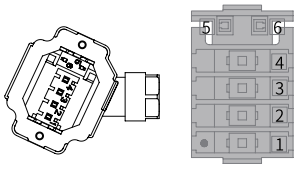
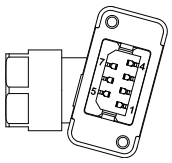
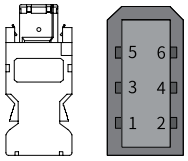
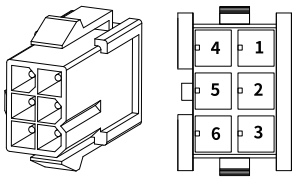
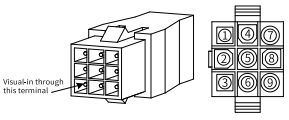
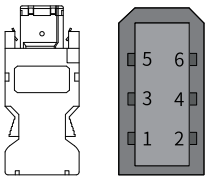
Name	Model	Drawing
Battery kit	S6-C4A	
CN1 terminal (DB44)	S6-C8	
MS1H1/MS1H4 flying leads motor connector	S6-C26	

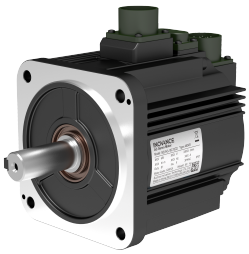
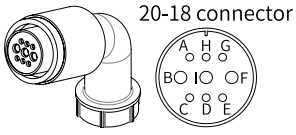
Name	Model	Drawing
MS1H2/MS1H3 (1.8 kW and below) motor connector	S6-C29	
MS1H3 motor (2.9 kW and above) connector	S6-C39	
Flying leads at motor side with power below 750 W - 500 mm	S6-C23	 
Flying leads at motor side with power below 750 W - 300 mm	S6-C24	 

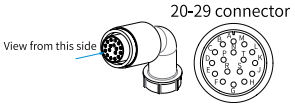
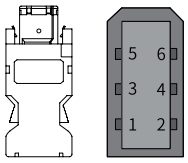
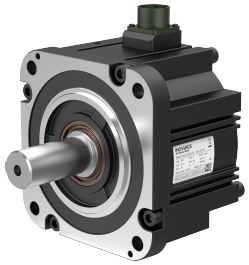
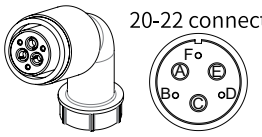
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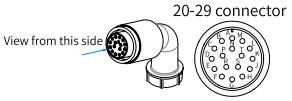
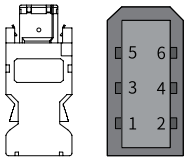
The battery-less encoder does not need the battery kit. Connecting the battery-less encoder to the battery box can damage the encoder.

6.1.5 Description of Cable Terminals

<table>
<tr><td>Name</td><td>Motor diagram</td><td colspan="3">Power cable 6-pin connector</td><td colspan="3">7-pin connector of the encoder on the motor side</td><td colspan="3">6-pin male on the drive side</td></tr>
<tr><td rowspan="10">Assignment of terminals on the terminal-type motor side (frame sizes 40/60/80)</td><td rowspan="10"></td><td colspan="3"></td><td colspan="3"></td><td colspan="3"></td></tr>
<tr><td>Pin No.</td><td>Signal name</td><td>Color</td><td>Pin No.</td><td>Signal name</td><td>Color</td><td>Pin No.</td><td>Signal name</td><td>Color</td></tr>
<tr><td>1</td><td>PE</td><td>Yellow/ Green</td><td>1</td><td>PS+</td><td>Blue</td><td>1</td><td>+5V</td><td>Red</td></tr>
<tr><td>2</td><td>W</td><td>Red</td><td>2</td><td>PS-</td><td>Purple</td><td>2</td><td>GND</td><td>Orange</td></tr>
<tr><td>3</td><td>V</td><td>Black</td><td>3</td><td>DC+</td><td>Brown</td><td>5</td><td>PS+</td><td>Blue</td></tr>
<tr><td>4</td><td>U</td><td>White</td><td>4</td><td>DC-</td><td>Black</td><td>6</td><td>PS-</td><td>Purple</td></tr>
<tr><td>5</td><td rowspan="2">Brake (polarity insensitive)</td><td>Brown</td><td>5</td><td>+5V</td><td>Red</td><td rowspan="2">Enclosure</td><td rowspan="2">PE</td><td rowspan="2">-</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Blue</td><td>6</td><td>GND</td><td>Orange</td></tr>
<tr><td>7</td><td>PE</td><td>-</td></tr>
<tr><td rowspan="10">Assignment of terminals on the flying leads motor side (frame sizes 40/60/80)</td><td rowspan="10"></td><td colspan="3">Power cable 6-pin connector</td><td colspan="3">9-pin connector of the encoder on the motor side</td><td colspan="3">6-pin male on the drive side</td></tr>
<tr><td colspan="3">
Recommendation: Plastic housing: MOLEX-50361736; Terminal: MOLEX-39000061</td><td colspan="3">
Plastic housing: AMP 172161-1; Terminal: AMP 770835-1</td><td colspan="3"></td></tr>
<tr><td>Pin No.</td><td>Signal name</td><td>Color</td><td>Pin No.</td><td>Signal name</td><td>Color</td><td>Pin No.</td><td>Signal name</td><td>Color</td></tr>
<tr><td>1</td><td>U</td><td>White</td><td>1</td><td>Battery +</td><td>Brown</td><td>1</td><td>+5V</td><td>Red</td></tr>
<tr><td>2</td><td>V</td><td>Black</td><td>4</td><td>Battery -</td><td>Black</td><td>2</td><td>GND</td><td>Orange</td></tr>
<tr><td>4</td><td>W</td><td>Red</td><td>3</td><td>PS+</td><td>Blue</td><td>5</td><td>PS+</td><td>Blue</td></tr>
<tr><td>5</td><td>PE</td><td>Yellow/ Green</td><td>6</td><td>PS-</td><td>Purple</td><td>6</td><td>PS-</td><td>Purple</td></tr>
<tr><td>3</td><td rowspan="2">Brake (polarity insensitive)</td><td>Brown</td><td>9</td><td>+5V</td><td>Red</td><td rowspan="3">Enclosure</td><td rowspan="3">PE</td><td rowspan="3">-</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Blue</td><td>8</td><td>GND</td><td>Orange</td></tr>
<tr><td>7</td><td>Shield</td><td>-</td></tr>
</table>

<table>
<tr><td rowspan="11">Assignment of terminals on the motor side (frame sizes 100/130)</td><td rowspan="11"></td><td colspan="3">Power cable connector</td><td colspan="3">Encoder cable connector</td><td colspan="3">6-pin male on the drive side</td></tr>
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MIL-DTL-5015 series 3108E20-18S aviation connector</td><td colspan="3">
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<tr><td>B</td><td>U</td><td>Blue</td><td>A</td><td>PS+</td><td>Blue</td><td>1</td><td>+5V</td><td>Red</td></tr>
<tr><td>I</td><td>V</td><td>Black</td><td>B</td><td>PS-</td><td>Purple</td><td>2</td><td>GND</td><td>Orange</td></tr>
<tr><td>F</td><td>W</td><td>Red</td><td>E</td><td>Battery +</td><td>Brown</td><td>5</td><td>PS+</td><td>Blue</td></tr>
<tr><td>G</td><td>PE</td><td>Yellow/ Green</td><td>F</td><td>Battery -</td><td>Black</td><td>6</td><td>PS-</td><td>Purple</td></tr>
<tr><td>C</td><td>Brake</td><td>Red</td><td>G</td><td>+5V</td><td>Red</td><td rowspan="3">Enclosure</td><td rowspan="3">PE</td><td rowspan="3">-</td></tr>
<tr><td rowspan="2">E</td><td rowspan="2">(polarity insensitive)</td><td rowspan="2">Black</td><td>H</td><td>GND</td><td>Orange</td></tr>
<tr><td>J</td><td>Shield</td><td>-</td></tr>
<tr><td rowspan="11">Assignment of terminals on the motor side (frame size 180)</td><td rowspan="11"></td><td colspan="3">Power cable connector</td><td colspan="3">Encoder cable connector</td><td colspan="3">6-pin male on the drive side</td></tr>
<tr><td colspan="3">

MIL-DTL-5015 series 3108E20-22S aviation connector</td><td colspan="3">
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</td></tr>
<tr><td>Pin No.</td><td>Signal name</td><td>Color</td><td>Pin No.</td><td>Signal name</td><td>Color</td><td>Pin No.</td><td>Signal name</td><td>Color</td></tr>
<tr><td>A</td><td>U</td><td>Blue</td><td>A</td><td>PS+</td><td>Blue</td><td>1</td><td>+5V</td><td>Red</td></tr>
<tr><td>C</td><td>V</td><td>Black</td><td>B</td><td>PS-</td><td>Purple</td><td>2</td><td>GND</td><td>Orange</td></tr>
<tr><td>E</td><td>W</td><td>Red</td><td>E</td><td>Battery +</td><td>Brown</td><td>5</td><td>PS+</td><td>Blue</td></tr>
<tr><td>F</td><td>PE</td><td>Yellow/ Green</td><td>F</td><td>Battery -</td><td>Black</td><td>6</td><td>PS-</td><td>Purple</td></tr>
<tr><td>B</td><td>Brake</td><td>Red</td><td>G</td><td>+5V</td><td>Red</td><td rowspan="3">Enclosure</td><td rowspan="3">PE</td><td rowspan="3">-</td></tr>
<tr><td rowspan="2">D</td><td rowspan="2">(polarity insensitive)</td><td rowspan="2">Black</td><td>H</td><td>GND</td><td>Orange</td></tr>
<tr><td>J</td><td>Shield</td><td>-</td></tr>
</table>

6.1.6 Cable Materials

6.1.6.1 Power cable material

Table 6–1 Specifications of motor output cables

MS1H1/H4 05B to 10C (0.05 kW to 1 kW)			
Cable type	Regular cable	Drag chain cable	Oil-resistant shielded drag chain cable
Cable model	S6-L-M/B***-X.X	S6-L-M/B***-X.X-T	S6-L-M/B***-X.X-TS
Cable specifications	UL2517 (rated temperature: 105°C) 4Ex20 AWG+2Cx24 AWG	UL2517 (rated temperature: 105°C) 4Ex20 AWG+2Cx24 AWG	UL2517 (rated temperature: 105°C) 4Ex20 AWG+2Cx24 AWG
	Power cable: 20 AWG (0.52 mm^2) Insulation outer diameter: ϕ1.7 mm	Power cable: 20 AWG (0.52 mm^2) Insulation outer diameter: ϕ1.7 mm	Power cable: 20 AWG (0.52 mm^2) Insulation outer diameter: ϕ1.7 mm
	Brake cable: 24 AWG (0.205 mm^2) Outer diameter of insulation: ϕ 1.1 mm	Brake cable: 24 AWG (0.205 mm^2) Outer diameter of insulation: ϕ 1.1 mm	Brake cable: 24 AWG (0.205 mm^2) Outer diameter of insulation: ϕ 1.1 mm
Sheath outer diameter	ϕ6.5±0.2 mm		
Internal structure and conductor colors			
• Fill in "X.X" in the model number with the designated cable length. • Sheath outer diameter: Refers to the overall diameter of the cable, including the conductor and insulation layer.			

Table 6–2 Specifications of motor output cables

MS1H2 10C to 50C (1 kW to 5 kW)/MS1H3 85B to 18C (0.85 kW to 1.8 kW)			
Cable type	Regular cable	Drag chain cable	Oil-resistant shielded drag chain cable
Cable model	S6-L-M/B***-X.X	S6-L-M/B***-X.X-T	S6-L-M/B***-X.X-TS
Cable specifications	UL2586 (rated temperature: 105°C) 4Ex16 AWG, 2Cx18 AWG	UL2586 (rated temperature: 105°C) 4Ex16 AWG, 2Cx18 AWG	UL2586 (rated temperature: 105°C) 4Ex16 AWG, 2Cx18 AWG
	Power cable: 16 AWG (1.31 mm^2) Outer diameter of insulation: ϕ 3.1 mm	Power cable: 16 AWG (1.31 mm^2) Outer diameter of insulation: ϕ 3.25 mm	Power cable: 16 AWG (1.31 mm^2) Outer diameter of insulation: ϕ 3.25 mm
	Brake cable: 18 AWG (0.823 mm^2) Outer diameter of insulation: ϕ 2.0 mm	Brake cable: 18 AWG (0.823 mm^2) Outer diameter of insulation: ϕ 2.15 mm	Brake cable: 18 AWG (0.823 mm^2) Outer diameter of insulation: ϕ 2.15 mm
Sheath outer diameter	ϕ9.5±0.3 mm (main circuit)	ϕ10.0±0.3 mm (main circuit)	ϕ10.5±0.3 mm (main circuit)

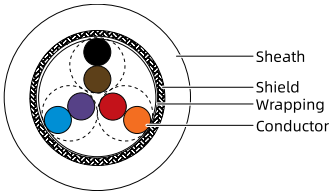
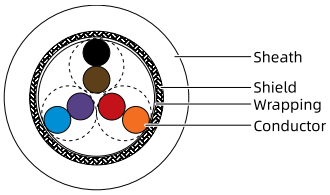
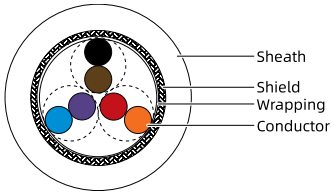
MS1H2 10C to 50C (1 kW to 5 kW)/MS1H3 85B to 18C (0.85 kW to 1.8 kW)			
Internal structure and conductor colors			
• Fill in "X.X" in the model number with the designated cable length. • Sheath outer diameter: Refers to the overall diameter of the cable, including the conductor and insulation layer.			

Table 6–3 Specifications of motor output cables

MS1H3 29C to 75C (2.9 kW to 7.5 kW)			
Cable type	Regular cable	Drag chain cable	Oil-resistant shielded drag chain cable
Cable model	S6-L-M/B***-X.X	S6-L-M/B***-X.X-T	S6-L-M/B***-X.X-TS
Cable specifications	UL2586 (rated temperature: 105°C) 4Ex12 AWG, 2Cx18 AWG	UL2586 (rated temperature: 105°C) 4Ex12 AWG, 2Cx18 AWG	UL2586 (rated temperature: 105°C) 4Ex12 AWG, 2Cx18 AWG
	Power cable: 12 AWG (3.31 mm^2) Outer diameter of insulation: ϕ 4.1 mm	Power cable: 12 AWG (3.31 mm^2) Outer diameter of insulation: ϕ 4.2 mm	Power cable: 12 AWG (3.31 mm^2) Outer diameter of insulation: ϕ 4.2 mm
	Brake cable: 18 AWG (0.823 mm^2) Outer diameter of insulation: ϕ 2.0 mm	Brake cable: 18 AWG (0.823 mm^2) Outer diameter of insulation: ϕ 2.15 mm	Brake cable: 18 AWG (0.823 mm^2) Outer diameter of insulation: ϕ 2.15 mm
Sheath outer diameter	ϕ12.2±0.4 mm (main circuit)	ϕ12.5±0.4 mm (main circuit)	ϕ13.2±0.4 mm (main circuit)
Internal structure and conductor colors			
• Fill in "X.X" in the model number with the designated cable length. • Sheath outer diameter: Refers to the overall diameter of the cable, including the conductor and insulation layer.			

6.1.6.2 Encoder cable material

Cable type	Regular cable	Drag chain cable	Oil-resistant shielded drag chain cable
Cable model	S6-L-P***-X.X	S6-L-P***-X.X-T	S6-L-P***-X.X-TS
Cable specifications	UL2517 (Rated temperature: 105°C) 3P × 26 AWG	UL2517 (Rated temperature: 105°C) 3P × 26 AWG	UL2517 (Rated temperature: 105°C) 3P × 26 AWG
	Signal cable: 26 AWG (0.12 mm^2); OD of insulation: ϕ0.5 mm	Signal cable: 26 AWG (0.12 mm^2); OD of insulation: ϕ0.5 mm	Signal cable: 26 AWG (0.12 mm^2); OD of insulation: ϕ0.5 mm

Sheath outer diameter	5.8±0.2 mm		6.0±0.2 mm
Internal structure and conductor colors			
Fill in "X.X" in the model number with the designated cable length.			

6.2 Peripheral Electrical Components

6.2.1 List of Peripheral Electrical Components

Type	Name	Installation position	Applicable model	Description
Peripheral Electrical Component	Fuse and Circuit Breaker	Input side of the drive	All models	To comply with standards EN 61800-5-1 and UL61800-5-1, install a fuse/circuit breaker on the input side of the drive to prevent accidents caused by internal short circuit.
	Electromagnetic contactor	Input side of the drive		-
	AC input reactor	Input side of the drive		Used to eliminate the high harmonics of the input side effectively and improve the power factor on the input side.
	EMC filter	Input side of the drive		Reduces the conduction and radiation interference generated by the drive to external devices.
	Magnetic ring and ferrite clamp	Output side of the drive		Reduces interference to the outside and the bearing current.
		Signal cable		Improves the anti-interference performance of signals.
	Surge protection device	Input side of the drive		Protects the drive from damage caused by lightning surge and external high-current interference.

6.2.2 Fuse (CE)

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

Table 6–4 Recommended fuse

Size	Servo drive		Recommended fuse
	Model	Continuous input current of main circuit (A)	Rated current (A)
Single-phase 220 V			
A	SV660PS1R6I	2.3	5
	SV660PS2R8I	4	12
B	SV660PS5R5I	7.9	12

Size	Servo drive		Recommended fuse
	Model	Continuous input current of main circuit (A)	Rated current (A)
C	SV660PS7R6I	9.6	15
D	SV660PS012I	12.8	20
Three-phase 220 V			
C	SV660PS7R6I	5.1	12
D	SV660PS012I	8	15
Three-phase 380 V			
C	SV660PT3R5I	2.4	5
	SV660PT5R4I	3.6	10
D	SV660PT8R4I	5.6	15
	SV660PT012I	8	15
E	SV660PT017I	12	20
	SV660PT021I	16	25
	SV660PT026I	21	30

The recommended values in the preceding table are based on the following conditions. If the conditions vary from the prerequisites described in the table, select a model according to the actual conditions.

- The ambient temperature of the device is 35°C without forced air cooling.
- The altitude is 2000 m.
- Only a single drive is installed.
- The current-carrying density of the conductor is 1.3 A/mm².

When you select a fuse, take into account the maximum input surge current parameter in the "Electrical Specifications" section of the User Guide to ensure that the fuse pre-arcing (I^2t) can withstand surge current conditions multiple times over its expected service life.

6.2.3 Circuit Breaker (CE)

Table 6–5 Recommended circuit breaker models

Size	Servo drive		Recommended circuit breaker
	Model	Continuous input current of main circuit (A)	Current (A)
Single-phase 220 V			
A	SV660PS1R6I	2.3	4
	SV660PS2R8I	4	6
B	SV660PS5R5I	7.9	16
C	SV660PS7R6I	9.6	16
D	SV660PS012I	12.8	20
Three-phase 220 V			
C	SV660PS7R6I	5.1	10
D	SV660PS012I	8	16
Three-phase 380 V			
C	SV660PT3R5I	2.4	4
	SV660PT5R4I	3.6	6
D	SV660PT8R4I	5.6	10
	SV660PT012I	8	16

Size	Servo drive		Recommended circuit breaker
	Model	Continuous input current of main circuit (A)	Current (A)
E	SV660PT017I	12	16
	SV660PT021I	16	25
	SV660PT026I	21	32

The recommended values in the preceding table are based on the following conditions. If the conditions vary from the prerequisites described in the table, select a model according to the actual conditions.

- The ambient temperature of the device is 35°C without forced air cooling.
- The altitude is 2000 m.
- Only a single drive is installed.
- The current-carrying density of the conductor is 1.3 A/mm².

When you select a circuit breaker, take into account parameter "Max. input surge current (A)" in section "Electrical Specifications" in the User Guide. Make sure that the trip characteristics curve of the circuit breaker can support the surge current working conditions.

6.2.4 Electromagnetic Contactor

Table 6–6 Recommended electromagnetic contactor model

Size	Drive model	Rated input current (A)	Recommended contactor		
			Manufacturer	Current (A)	Model
Single-phase 220 V					
A	SV660PS1R6I	2.3	Schneider	9	LC1 D09
	SV660PS2R8I	4		9	LC1 D09
B	SV660PS5R5I	7.9		9	LC1 D09
C	SV660PS7R6I	9.6		12	LC1 D12
D	SV660PS012I	12.8		18	LC1 D18
Three-phase 220 V					
C	SV660PS7R6I	5.1	Schneider	9	LC1 D09
D	SV660PS012I	8		9	LC1 D09
Three-phase 380 V					
C	SV660PT3R5I	2.4	Schneider	9	LC1 D09
	SV660PT5R4I	3.6		9	LC1 D09
D	SV660PT8R4I	5.6		9	LC1 D09
	SV660PT012I	8		9	LC1 D09
E	SV660PT017I	12		12	LC1 D12
	SV660PT021I	16		18	LC1 D18
	SV660PT026I	21		25	LC1 D25

6.2.5 AC Input Reactor

Model selection

An AC input reactor is optional and mainly used to reduce harmonic waves in the input current. In applications where strong suppression of harmonics is required, install an external reactor.

Table 6–7 AC input reactor models

Size	Drive model	Rated input current (A)	Applicable reactor (recommended)	Inductance (mH)
Three-phase 220 V				
C	SV660PS7R6I	5.1	MD-ACL-10-5-4T	5
D	SV660PS012I	8	MD-ACL-10-5-4T	5
Three-phase 380 V				
C	SV660PT3R5I	2.4	MD-ACL-10-5-4T	5
	SV660PT5R4I	3.6	MD-ACL-10-5-4T	5
D	SV660PT8R4I	5.6	MD-ACL-10-5-4T	5
	SV660PT012I	8	MD-ACL-10-5-4T	5
E	SV660PT017I	12	MD-ACL-15-3-4T	3
	SV660PT021I	16	MD-ACL-40-1.45-4T	1.45
	SV660PT026I	21	MD-ACL-40-1.45-4T	1.45

Dimensions

- Inovance input reactors

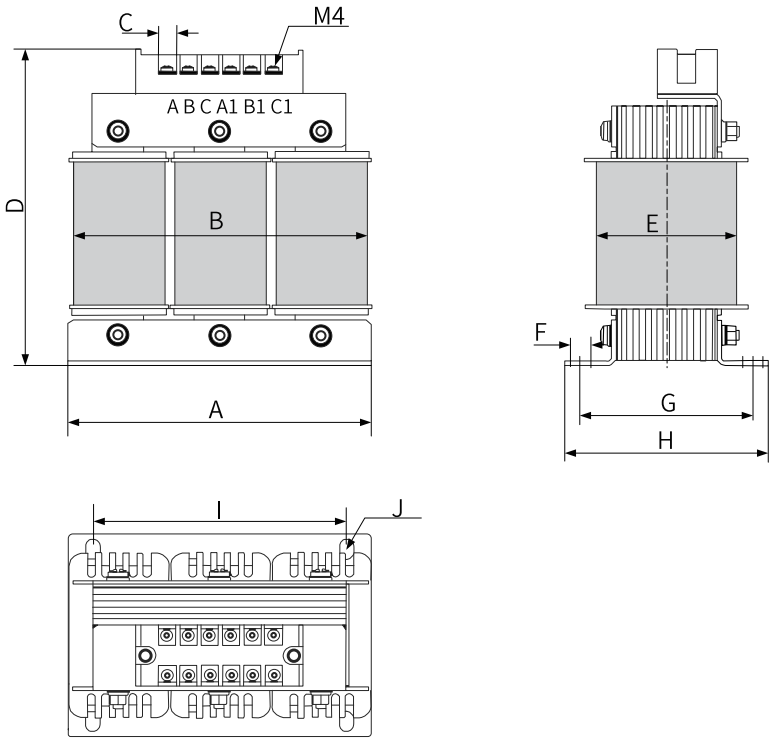


Figure 6-1 Dimensions of AC input reactors (10 A to 15 A)

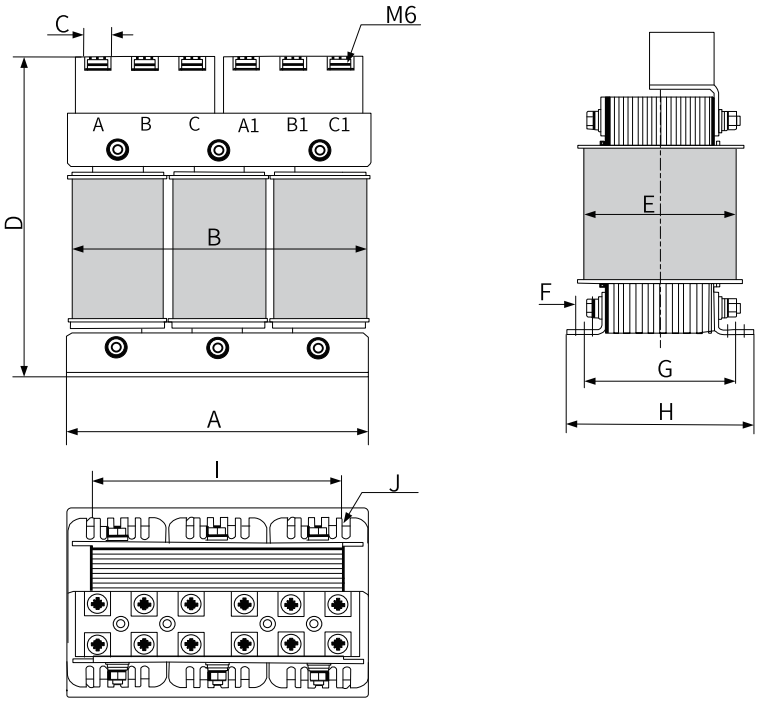


Figure 6-2 Dimensions of 40 A (1.45 mH) AC input reactors

Table 6–8 Dimensions of Inovance AC input reactors (unit: mm)

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

6.2.6 EMC Filter

Model selection

To comply with the radiated and conducted emission requirements of EN 61800-3, install an external EMC filter. The recommended EMC filters for this drive are Schaffner FN2090 and FN3287 filters. Filters of equivalent specifications and performance from other brands are also acceptable. The specifications of Schaffner FN2090 and FN3287 filters are as follows.

Table 6–9 Standard EMC filter model and appearance

Filter model (recommended)		Appearance
Schaffner	FN2090	
	FN3287	

Table 6–10 Filter model selection (Schaffner)

Size	Drive model	Rated input current (A)	Applicable Filter
Single-phase 220 V			
A	SV660PS1R6I	2.3	FN2090-10-06
	SV660PS2R8I	4	FN2090-10-06
B	SV660PS5R5I	7.9	FN2090-10-06
C	SV660PS7R6I	9.6	FN2090-10-06
D	SV660PS012I	12.8	FN2090-16-06
Three-phase 220 V			
C	SV660PS7R6I	5.1	FN3287-10-44-C28-R65
D	SV660PS012I	8	FN3287-10-44-C28-R65
Three-phase 380 V			
C	SV660PT3R5I	2.4	FN3287-10-44-C28-R65
	SV660PT5R4I	3.6	FN3287-10-44-C28-R65
D	SV660PT8R4I	5.6	FN3287-10-44-C28-R65
	SV660PT012I	8	FN3287-10-44-C28-R65
E	SV660PT017I	12	FN3287-16-44-C33-R65
	SV660PT021I	16	FN3287-16-44-C33-R65
	SV660PT026I	21	FN3287-25-33-C33-R65

Dimensions

- Dimensions of Schaffner FN 2090 series filters

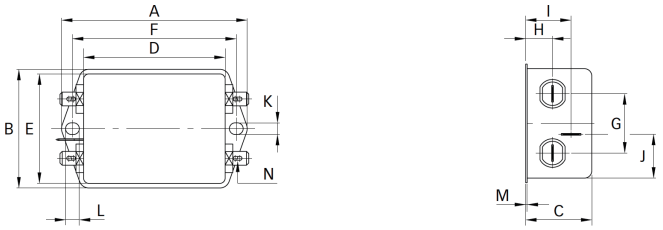


Figure 6-3 Dimensions of FN 2090 series filters (unit: mm)

Table 6–11 Dimensions of FN 2090 series filters (unit: mm)

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

- Dimensions of Schaffner FN 3287 series filters

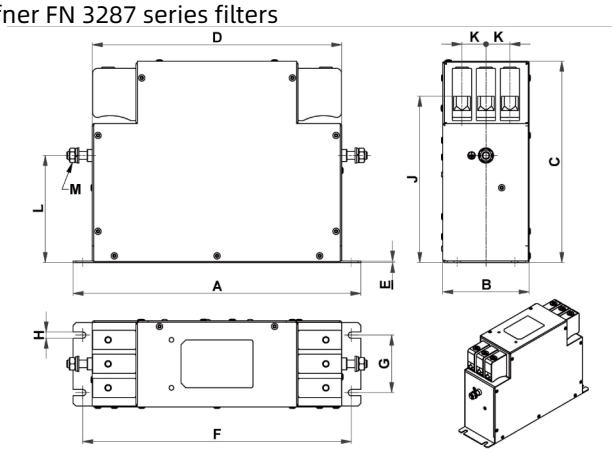


Figure 6-4 Dimension drawing of FN 3287 series filters (unit: mm)

Table 6–12 Dimensions of FN3287 filters (in mm)

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

6.2.7 Magnetic Ring and Magnetic Buckle

The magnetic ring can be installed on the input or output side of the drive. Install the magnetic ring as close to the drive as possible. Installing the magnetic ring on the input side can suppress the noise in the input power supply system of the drive. A magnetic ring on the output side is mainly used to reduce the external interference of the drive and reduce the bearing current.

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

Model selection

- Amorphous magnetic ring: featuring high permeability when the frequency is within 1 MHz and excellent anti-interference performance, but not as low-cost as the ferrite clamp. See “ *Dimensions” on page 151* for details.
- Ferrite clamp: featuring a good interference suppression performance within a frequency band above 1MHz, applicable to low-power drives and signal cables, low-cost and easy to install.

Magnetic ring and magnetic buckle (recommended)			Appearance
Type	Model	Manufacturer	
Magnetic ring	DY644020H	DAYOU-TECH	
	DY805020H	DAYOU-TECH	
Magnetic buckle	DYR-130-B	Dongyang Ferrite Material Co., Ltd	

Dimensions

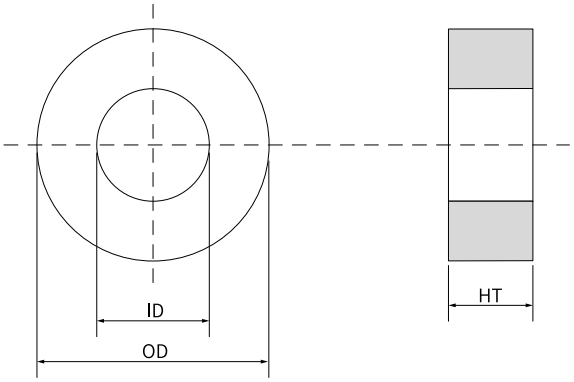


Figure 6-5 Dimensions of the magnetic ring

Table 6–13 Dimensions of the magnetic ring

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

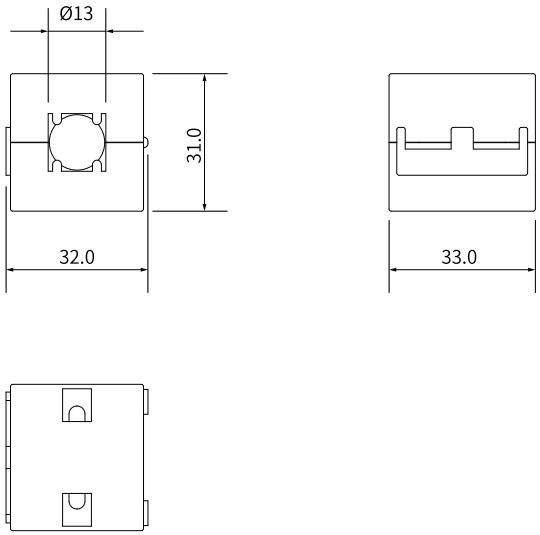


Figure 6-6 Dimensions of the magnetic buckle

Table 6–14 Dimensions of the magnetic buckle

Model	Dimension (width × outer diameter × inner diameter) (mm)
DYR-130-B	32 × 31 × 13

6.2.8 Surge Protective Device

Model selection

Table 6–15 Recommended surge protective device

Recommended surge protective device		
Manufacturer	Phase system	Model
Chengdu Pedaro	Single phase	RPM-40/1 N
Chengdu Pedaro	Three phase	RPM-40/3P

Dimensions

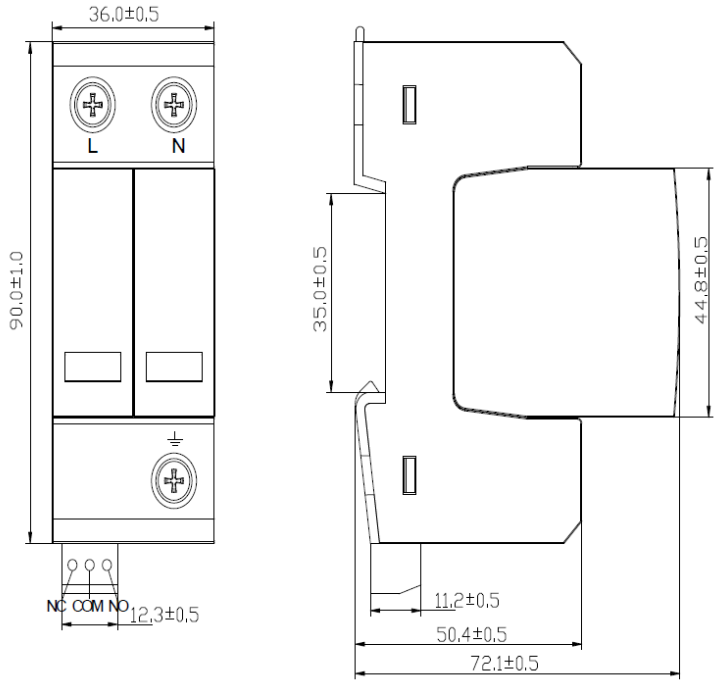


Figure 6-7 Dimensions of single-phase surge protective device (unit: mm)

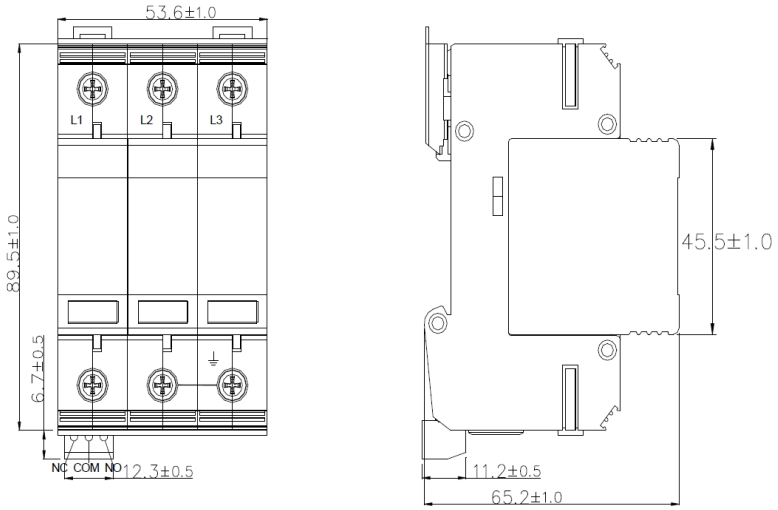


Figure 6-8 Dimensions of the three-phase surge protective device (unit: mm)

6.2.9 Residual Current Device

Selection method

During the operation of the drive, high-frequency leakage current generated by IGBT operation may affect operation of the residual current device.

See the following formula to select the residual current device.

- Rated sensitivity current (Ig) ≥ Im + Ic + Is + Iy

- Servo motor leakage current (Im)
- Power cable leakage current (Ic)
- Power frequency leakage current of the drive (Is + Iy)

Condition of the servo drive

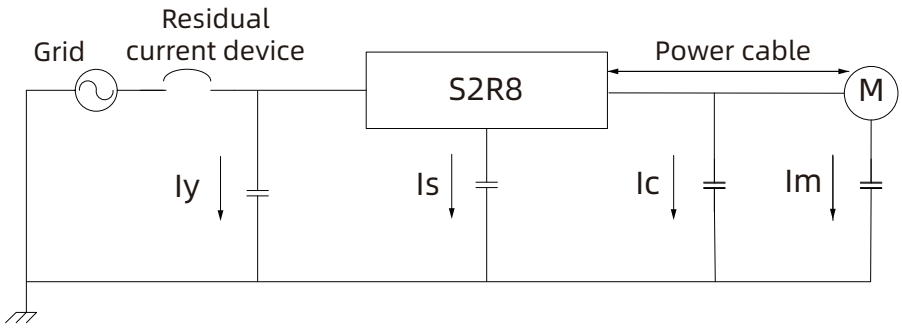


Figure 6-9 Leakage current of the drive

Example of leakage current per unit length for power cables with different cross-sectional areas

Cross-sectional area (AWG)	Leakage current per unit length (mA/m)
20	0.1
14	0.1
12	0.1

Note

Leakage current Ic (mA) for a power cable = Cable length (m) x Leakage current per unit length (mA/m)

Example of servo motor leakage current

Applicable motor model	Motor leakage current (mA)
MS1H4-40B30CB-A33*R	0.5

Motor leakage current estimation formula: Im = 1.235 × Motor power (kW)

Note

The asterisk (*) in the model number may be 1 or 4, indicating a motor with or without a brake.

Example of servo drive power frequency leakage current

Drive model	Leakage current (mA)
SV660PS1R6I SV660PS2R8I	0.35
SV660PS5R5I SV660PS7R6I SV660PS012I	0.52

Drive model	Leakage current (mA)
SV660PT3R5I SV660PT5R4I SV660PT8R4I SV660PT012I SV660PT017I	0.48
SV660PT021I SV660PT026I	0.64

Selection example

The following takes SV660PS2R8I servo drive and MS1H4-40B30CB-A331R motor with 3-m 12AWG power cables as an example.

Where:

Im = 0.5 (mA). See detailed specifications of motor leakage current in the preceding table *" Example of servo motor leakage current" on page 154*.

Ic = 0.1 × 3 = 0.3 (mA). See detailed specifications of power cable leakage current in the preceding table *" Example of leakage current per unit length for power cables with different cross-sectional areas" on page 154*.

Is + Iy = 0.35 (mA). See detailed specifications of drive power frequency leakage current in the preceding table *" Example of servo drive power frequency leakage current" on page 154*.

Therefore, the following formula applies:

Ig ≥ Im + Ic + Is + Iy

Ig ≥ 0.5 + 0.3 + 0.35

Ig ≥ 1.15 (mA)

Based on the calculation result, the rated sensitivity current (Ig) is 1.15 mA.

When only one drive is used, select a residual current device with a rated sensitivity current greater than 2 × 1.15 mA. When three servo drives are connected in parallel, select a residual current device with a rated sensitivity current greater than 2 × (3 × 1.15) mA.

Note

- In the case of n drives connected in parallel, the rated sensitivity current of the selected residual current device is: Ig = Ig1 + Ig2 + Ig3 + ... + Ign.
- The leakage current must be lower than 50% of the rated residual non-operating current of the residual current device. Therefore, during actual selection, ensure that the rated residual non-operating current of the selected residual current device > 2 × Ig.
- It is recommended to use residual current devices (RCDs) made by CHINT and Schneider.
- When a residual current device trips or leakage current occurs on site, see section "Common EMC Faults and Solutions" for specific troubleshooting recommendations regarding tripping and leakage current of residual current device.
- Leakage current is affected by the load, cable length, power supply voltage and frequency, component tolerances, and protective conductor connection. Therefore, the actual value may differ significantly from the example values in the table.

6.3 Braking Resistor

Braking resistor specifications

When the motor torque direction is opposite to the speed direction, the energy is transmitted from the motor back to the servo drive, causing rise of the bus voltage. When the bus voltage rises to the braking threshold, the energy is consumed by the braking resistor according to the braking requirements. Otherwise, the drive will be damaged. You can use either a built-in or external braking resistor. Do not use a built-in braking resistor and an external braking resistor at the same time. Specifications of the braking resistor are as follows.

Table 6–16 Braking resistor specifications

Drive model	Specifications of built-in braking resistor			External braking resistor Min. allowable resistance (Ω) (H02.21)
	Resistance (Ω)	Power Pr (W)	Processing power Pa (W)	
SV660PS1R6I	-	-	-	40
SV660PS2R8I	-	-	-	40
SV660PS5R5I	50	50	25	40
SV660PS7R6I	25	80	40	20
SV660PS012I				15
SV660PT3R5I	100	80	40	80
SV660PT5R4I	100	80	40	60
SV660PT8R4I	50	80	40	45
SV660PT012I				40
SV660PT017I	35	100	50	35
SV660PT021I				25
SV660PT026I				

Note

The built-in braking resistor is not available in S1R6 or S2R8 models. For these models, you can install an external braking resistor as needed.

- **Without external load torque**
  The kinetic energy generated upon braking of a reciprocating motor is converted into electric energy that is fed back to the bus capacitor. When the bus voltage rises above the braking voltage threshold, the braking resistor starts consuming the excessive energy fed back by the motor. The following figure takes motor no-load running from 3000 RPM to static as an example to show the motor speed curve and energy data.

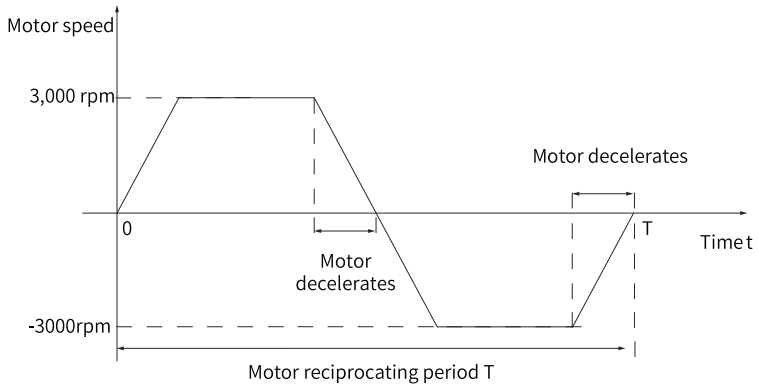


Figure 6-10 Example of motor speed curve (without external load torque)

- **External load torque applied, motor in generating state**
  When rotation directions of the motor and shaft are the same, the motor is in the motoring state. In some special applications where the motor torque direction is opposite to the rotating direction, the motor is in generating state, and pumps the electric energy back to the servo drive.

  When the load is in the continuous generating state continuously, it is recommended to use the common DC bus mode.

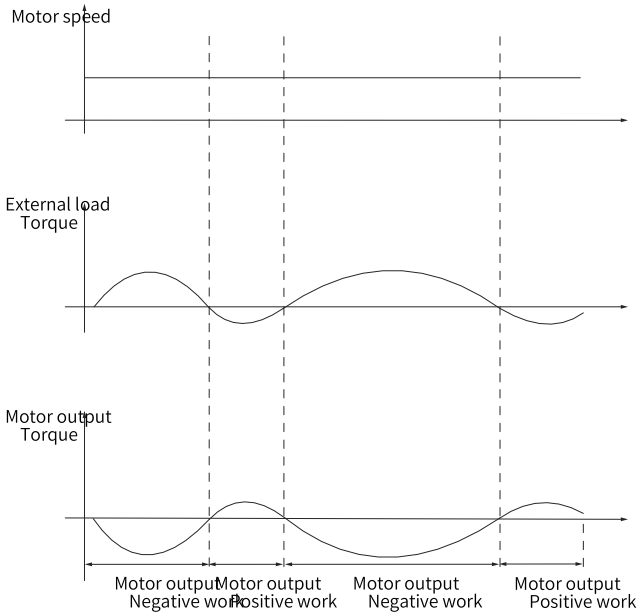


Figure 6-11 Example of the curve with external load torque

Among them, $P = FV = T/R \times 2\pi \times R \times V_1$.

Take the H1 series 400 W motor (rated torque 2.39 N·m) as an example. If the external load torque is 60% of the rated torque and the speed reaches 1500 rpm:

$$P = FV = \frac{T}{R} \times 2\pi \times R \times V_1 = (60\% \times 2.39) \times (1500 \times 2\pi/60) = 225\ W$$

Power fed back to the drive

Given that the braking resistor needs to be derated by 70%, the power of the external braking resistor must be 225/(1 - 70%) = 0.75 kW, with a resistance value of 50 Ω. Ensure the resistance value meets the minimum allowable resistance value limit condition. The minimum resistance

value allowed by the drive can be found in *"Table 6-16 Braking resistor specifications" on page 156*.

Note

F = T (torque)/R (radius)

V (linear velocity, m/s) = 2π x R (radius) x V $_1$ (rotational speed, rev/s).

- **Energy calculation**

  S1R6 and S2R8 models do not have built-in braking resistors. See section "Wiring of the Braking Resistor" in the user guide for the energy that can be charged through capacitors. An external braking resistor is needed when the rotational energy of the motor and the load exceeds the values listed in the following table.

Drive model	Processable regenerative energy	Remarks
SV660PS1R6I	13.15	The input voltage of the main circuit power supply is 220 VAC.
SV660PS2R8I	26.29	

  - The following table shows the energy generated by a 220 V motor in decelerating from the rated speed to a standstill during no-load operation.

Table 6–17 220 V motor energy data

Capacity (kW)	Servo motor model MS1H*-*******-*****	Rotor inertia J (kg·m ^{2})	Braking energy generated from rated speed to standstill: E $_O$ (J)	Max. braking energy absorbed by the capacitor E $_C$ (J)[1]
0.05	MS1H1-05B30CB-A332R	(0.028 × 10 $^{-4}$)	(0.14)	7.86
0.1	MS1H1-10B30CB-A332R	(0.043 × 10 $^{-4}$)	(0.21)	
0.2	MS1H1-20B30CB-A331R MS1H1-20B30CB-A334R	0.0938 × 10 $^{-4}$ (0.106 × 10 $^{-4}$)	0.46 (0.52)	
0.4	MS1H1-40B30CB-A331R MS1H1-40B30CB-A334R	0.145 × 10 $^{-4}$ (0.157 × 10 $^{-4}$)	0.72 (0.78)	15.72
0.55	MS1H1-55B30CB-A331R	0.55 × 10 $^{-4}$	2.72	22.39
0.75	MS1H1-75B30CB-A331R MS1H1-75B30CB-A334R	0.68 × 10 $^{-4}$ (0.71 × 10 $^{-4}$)	3.36 (3.51)	22.39
1	MS1H1-10C30CB-A331R MS1H1-10C30CB-A334R	0.82 × 10 $^{-4}$ (0.87 × 10 $^{-4}$)	4.05 (4.30)	32.39
1	MS1H2-10C30CB-A331R MS1H2-10C30CB-A334R	1.78 × 10 $^{-4}$ (2.6 × 10 $^{-4}$)	8.80 (12.86)	32.39
1.5	MS1H2-15C30CB-A331R MS1H2-15C30CB-A334R	2.35 × 10 $^{-4}$ (3.17 × 10 $^{-4}$)	11.6 (15.68)	47.6
2.0	MS1H2-20C30CB-A331R MS1H2-20C30CB-A334R	2.92 × 10 $^{-4}$ (3.74 × 10 $^{-4}$)	14.44 (18.49)	32.39
0.85	MS1H3-85B15CB-A331R MS1H3-85B15CB-A334R	13.56 × 10 $^{-4}$ (15.8 × 10 $^{-4}$)	16.45 (17.3)	32.39

Capacity (kW)	Servo motor model MS1H*-*******-*****	Rotor inertia J (kg·m ^{2})	Braking energy generated from rated speed to standstill: E_O (J)	Max. braking energy absorbed by the capacitor E_C (J)[1]
1.3	MS1H3-13C15CB-A331R MS1H3-13C15CB-A334R	19.25 × 10 $^{-4}$ (21.5 × 10 $^{-4}$)	22 (22.86)	32.39
0.1	MS1H4-10B30CB-A330Z MS1H4-10B30CB-A332Z	0.102 × 10 $^{-4}$ (0.104 × 10 $^{-4}$)	0.50 (0.51)	7.86
0.2	MS1H4-20B30CB-A331R MS1H4-20B30CB-A334R	0.22 × 10 $^{-4}$ (0.23 × 10 $^{-4}$)	1.09 (1.14)	7.86
0.4	MS1H4-40B30CB-A331R MS1H4-40B30CB-A334R	0.43 × 10 $^{-4}$ (0.44 × 10 $^{-4}$)	2.13 (2.18)	15.72
0.55	MS1H4-55B30CB-A331R	1.12 × 10 $^{-4}$	5.54	22.39
0.75	MS1H4-75B30CB-A331R MS1H4-75B30CB-A334R	1.46 × 10 $^{-4}$ (1.51 × 10 $^{-4}$)	7.22 (7.47)	22.39
1.0	MS1H4-10C30CB-A331R MS1H4-10C30CB-A334R	1.87 × 10 $^{-4}$ (1.97 × 10 $^{-4}$)	9.25 (9.74)	32.39

- The following table shows the energy generated by a 380 V motor in decelerating from the rated speed to a standstill during no-load operation.

Table 6–18 380 V motor energy data

Capacity (kW)	Servo motor model MS1H*-*******-*****	Rotor inertia J (kg·m ^{2})	Braking energy E_O (J) generated during process from no-load rated speed to a standstill (J)	Max. braking energy absorbed by the capacitor E_C (J)[1]
1.0	MS1H2-10C30CD-A331R MS1H2-10C30CD-A334R	1.78 × 10 $^{-4}$ (2.6 × 10 $^{-4}$)	8.8 (12.86)	28.18
1.5	MS1H2-15C30CD-A331R MS1H2-15C30CD-A334R	2.35 × 10 $^{-4}$ (3.17 × 10 $^{-4}$)	11.62 (15.68)	34.22
2.0	MS1H2-20C30CD-A331R MS1H2-20C30CD-A334R	2.92 × 10 $^{-4}$ (3.74 × 10 $^{-4}$)	14.44 (18.49)	50.32
2.5	MS1H2-25C30CD-A331R MS1H2-25C30CD-A334R	3.49 × 10 $^{-4}$ (4.3 × 10 $^{-4}$)	17.26 (21.26)	50.32
3.0	MS1H2-30C30CD-A331R MS1H2-30C30CD-A334R	6.4 × 10 $^{-4}$ (9.38 × 10 $^{-4}$)	31.65 (46.38)	50.32
4.0	MS1H2-40C30CD-A331R MS1H2-40C30CD-A334R	9 × 10 $^{-4}$ (11.98 × 10 $^{-4}$)	44.51 (59.24)	82.53
5.0	MS1H2-50C30CD-A331R MS1H2-50C30CD-A334R	11.6 × 10 $^{-4}$ (14.58 × 10 $^{-4}$)	57.36 (72.10)	82.49
0.85	MS1H3-85B15CD-A331R MS1H3-85B15CD-A334R	13.56 × 10 $^{-4}$ (15.8 × 10 $^{-4}$)	16.76 (19.53)	28.18

Capacity (kW)	Servo motor model MS1H*-*******-*****	Rotor inertia J (kg·m ^{2})	Braking energy E_O (J) generated during process from no-load rated speed to a standstill (J)	Max. braking energy absorbed by the capacitor E_C (J)[1]
1.3	MS1H3-13C15CD-A331R MS1H3-13C15CD-A334R	19.25×10^{-4} (21.5×10^{-4})	23.8 (26.58)	34.22
1.8	MS1H3-18C15CD-A331R MS1H3-18C15CD-A334R	24.9×10^{-4} (27.2×10^{-4})	30.78 (33.63)	50.32
2.9	MS1H3-29C15CD-A331R MS1H3-29C15CD-A334R	44.7×10^{-4} (52.35×10^{-4})	55.26 (64.72)	50.32
4.4	MS1H3-44C15CD-A331R MS1H3-44C15CD-A334R	64.9×10^{-4} (72.55×10^{-4})	80.23 (89.69)	82.53
5.5	MS1H3-55C15CD-A331R MS1H3-55C15CD-A334R	86.9×10^{-4} (94.55×10^{-4})	107.43 (116.89)	100.64
7.5	MS1H3-75C15CD-A331R MS1H3-75C15CD-A334R	127.5×10^{-4} (135.15×10^{-4})	157.62 (167.08)	100.64

Note

- Values inside the parentheses "()" are for the motor with brake.
- If the total braking time T is known, you can determine whether an external braking resistor is needed and the power required using the resistor selection flowchart and formula.
- [1]: The default braking threshold of a single-phase/three-phase 200 V drive is 380 V. The default braking threshold of a three-phase 400 V drive is 700 V. The maximum braking energy (E_C, J) that can be absorbed by the capacitor is determined by the power supply voltage (220 VAC or 380 VAC). Calculation formula:

$$E_C = \frac{1}{2}C\left[V_{\text{Discharge threshold voltage}}^{\ 2} - \left(V_{\text{Power supply voltage}} \times \sqrt{2}\right)^2\right]$$

When the power supply voltage changes, adjust the values proportionally for calculation.

$$E_C = E_{C\text{original table data in the manual}} \times \frac{V_{\text{Actual discharge threshold voltage}}^{\ 2} - \left(V_{\text{Actual power supply voltage}} \times \sqrt{2}\right)^2}{V_{\text{Default discharge threshold voltage}}^{\ 2} - \left(V_{\text{Default power supply voltage}} \times \sqrt{2}\right)^2}$$

For example, assume that the energy absorbed by the capacitor of the S2R8 model servo drive at a supply voltage of 220 Vac is 15.72 J. In this case, the energy absorbed by the capacitor at a supply voltage of 240 Vac is calculated as follows:

$$E_C = 15.72 \times \frac{380^2 - \left(240 \times \sqrt{2}\right)^2}{380^2 - \left(220 \times \sqrt{2}\right)^2} = 9.64\text{J}$$

Braking resistor selection

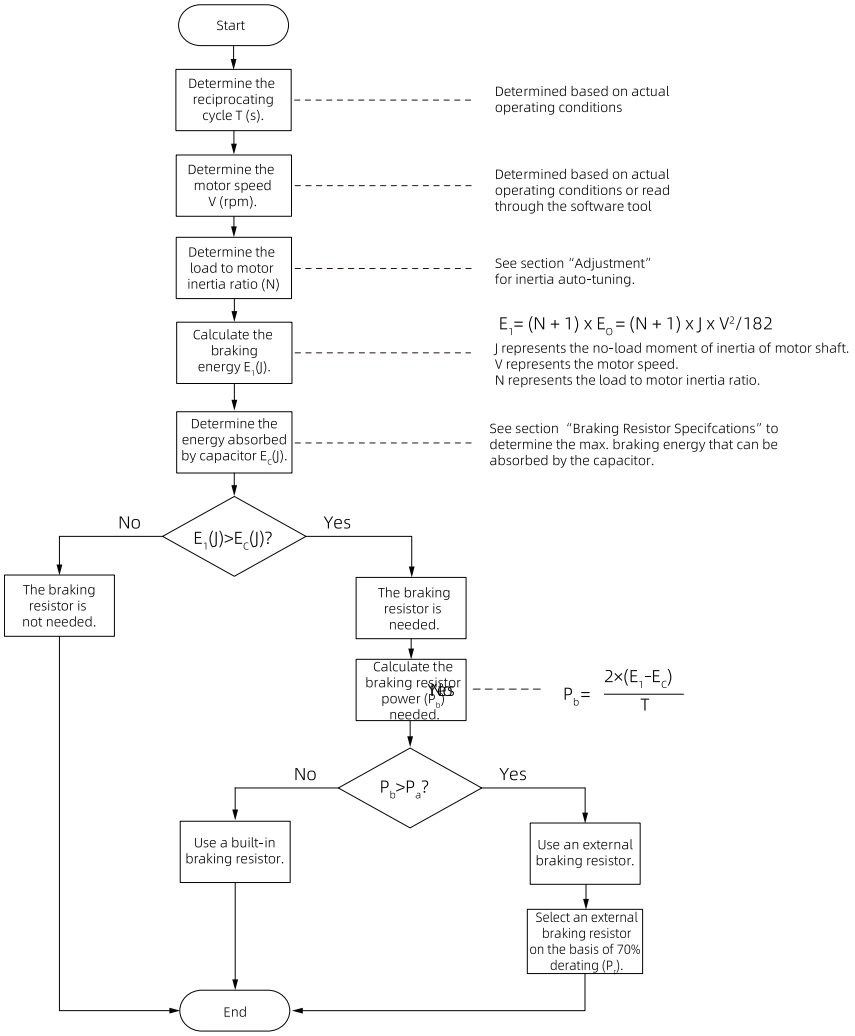


Figure 6-12 Flowchart for selecting the braking resistor (horizontal movement)

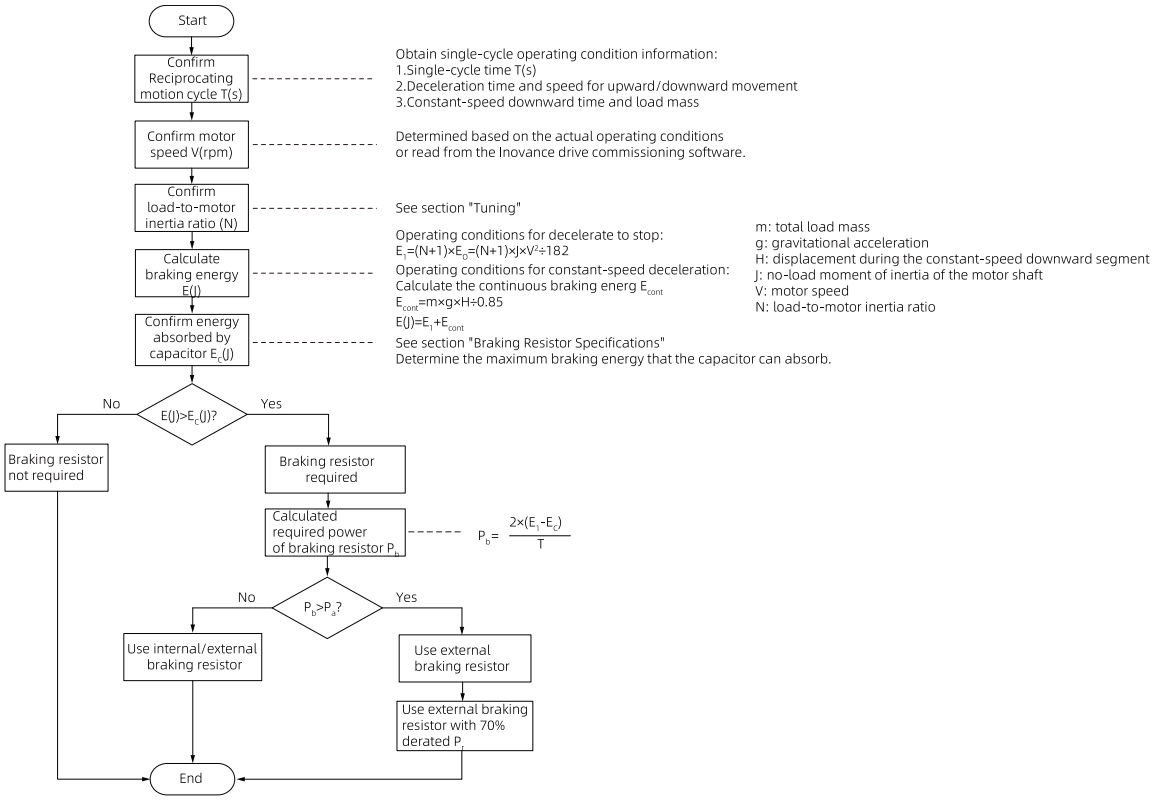


Figure 6-13 Flowchart for selecting the braking resistor (vertical axis)

Table 6–19 Description of braking resistor selection factors

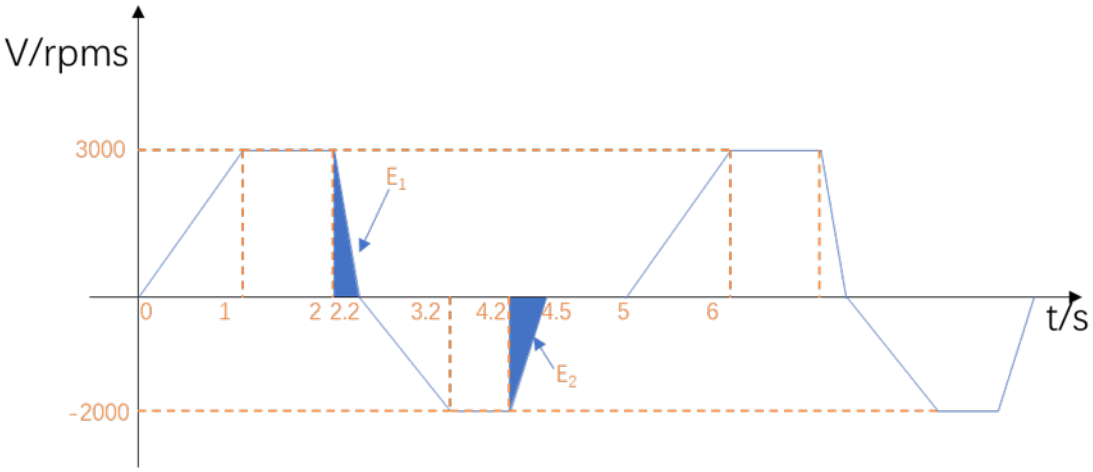
Factor	Unit	Definition
Reciprocating motion cycle T	s	Set it based on actual conditions.
Motor speed (V)	rpm	Determined based on actual operating conditions or read from the Inovance software tool.
Inertia ratio (N)	-	For details, see section "Tuning".
Rotor inertia (J)	kg·m^2	For the specific rotor inertia of MS1 series motors, see *"Table 6-17 220 V motor energy data" on page 158*
Braking energy E_1	J	$E_1 = (N + 1) \times J \times V^2 \div 182$
Energy absorbed by capacitor E_c	J	For the maximum braking energy absorbed by capacitor, see *"Table 6-17 220 V motor energy data" on page 158*
Power of braking resistor (P_b)	W	$P_b = 2 \times (E_1 - E_C) \div T$
Power of built-in braking resistor (P_a)	W	The built-in braking resistor is not available in models S1R6 or S2R8 ($P_a = 0$). For details, see *"Table 6-16 Braking resistor specifications" on page 156*

Note

- Assuming an MS1H1 brake-less 400 W motor decelerates from a rated speed of 3000 rpm to a standstill, with the load inertia being N x motor inertia, then the following formula applies during deceleration: Braking energy $E_1 = (N + 1) \times J \times V^2 \div 182 = (N + 1) \times E_0$. The energy consumed by the braking resistor is $(N + 1) \times E_0 - E_C$ joule, after subtracting the energy E_C absorbed by the capacitor. Assume that the reciprocating movement period is T, the required braking resistor power is $2 \times [(N+1) \times E_0 - E_C] \div T$. See *"Table 6-17 220 V motor energy data" on page 158* for values of E_0 and E_C.
- Based on the preceding figure, you can determine whether the braking resistor is currently in use. Then, set H02.25 accordingly.
- The resistor with aluminum case is recommended.
- For the specification of the braking resistor, see *"Table 6-16 Braking resistor specifications" on page 156*.

Application example:

1. Horizontal/Circular movement



Take the MS1H1 400 W motor without brake as an example. Assume that the reciprocating movement cycle T = 5s, and the motor first moves in the forward direction: forward acceleration for 1s, constant speed for 1s, and deceleration for 0.2s, then moves in the reverse direction: reverse acceleration for 1s, constant speed for 1s, deceleration for 0.3s, and stops for 0.5s. If the motor decelerates from the rated speed 3000 rpm to a standstill, and the load inertia is 4 times of the motor inertia, then the required braking resistor power is:

$$P_b = \frac{(E_1 - E_C) + (E_2 - E_C)}{T}$$

The braking energy per operation is calculated as follows:

$E = (N + 1) \times E_0 = (N + 1) \times J \times V^2 \div 182$

The braking energy during deceleration is generated from the process of running at the maximum speed to a standstill. Therefore:

$E_1 = (4 + 1) \times 0.145 \times 10^{-4} \times 3000^2 \div 182 = 3.58\ J$

$E_2 = (4 + 1) \times 0.145 \times 10^{-4} \times 2000^2 \div 182 = 1.59\ J$

$$P_b = \frac{(3.58 - 15.72) + (1.59 - 15.72)}{5} = -5.25W$$

The S2R8 model does not have a built-in resistor, so $P_a = 0$ W, and $P_b < P_a$, and external brake resistor is not needed.

If the inertia ratio is 40 and other conditions are the same, the required braking resistor power is:

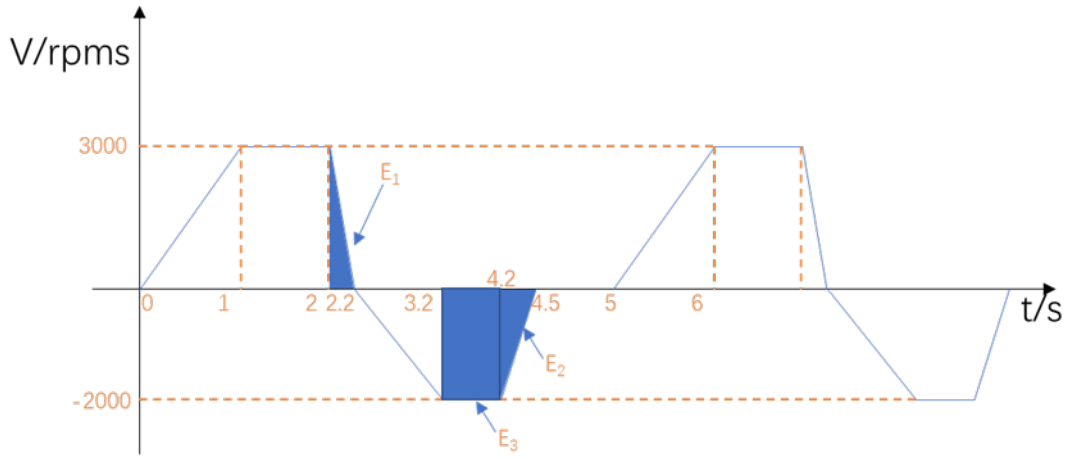
$E_1 = (40 + 1) \times 0.145 \times 10^{-4} \times 3000^2 \div 182 = 29.4\ J$

$E_2 = (40 + 1) \times 0.145 \times 10^{-4} \times 2000^2 \div 182 = 13.07\ J$

$$P_b = \frac{(29.4-15.72)+(13.07-15.72)}{5} = 2.21W$$

$P_b > 0$ W Therefore, an external braking resistor is required. The recommended power of the external braking resistor is $P_b \div (1 - 70\%) \approx 8$ W.

2. Movement of the vertical axis



Take the MS1H1 400 W motor without brake as an example. Assume that the reciprocating movement cycle T = 5s, and the motor first moves in the forward direction: forward acceleration for 1s, constant speed for 1s, and deceleration for 0.2s, then moves in the reverse direction: reverse acceleration for 1s, constant speed for 1s, deceleration for 0.3s, and stops for 0.5s. If the motor decelerates from the rated speed 3000 rpm to a standstill, the load inertia is 4 times of the motor inertia, the total load mass is 50 kg, and the displacement during constant-speed deceleration is 0.2 m, then the required braking resistor power is:

$$P_b = \frac{(E_1-E_C)+(E_2-E_C)+(E_3-E_C)}{T}$$

The braking energy per operation is calculated as follows:

$E = (N + 1) \times E_0 = (N + 1) \times J \times V^2 \div 182$

$E_{cont} = m \times g \times H \div 0.85$

The braking energy during deceleration is generated from the maximum speed to a standstill. The braking energy during constant-speed deceleration is determined by the work done to overcome the gravitational potential energy. Therefore:

$E_1 = (4 + 1) \times 0.145 \times 10^{-4} \times 3000^2 \div 182 = 3.58\ J$

$E_2 = (4 + 1) \times 0.145 \times 10^{-4} \times 2000^2 \div 182 = 1.59\ J$

$E_3 = 50 \times 9.8 \times 0.2 \div 0.85 = 23.06\ J$

$$P_b = \frac{(3.58-15.72)+(1.59-15.72)+(23.06-15.72)}{5} = -3.786W$$

The S2R8 model does not have a built-in resistor, so $P_a = 0$ W, and $P_b < P_a$, and external brake resistor is not needed.

If the inertia ratio is 40 and other conditions are the same, the required braking resistor power is:

$E_1 = (40 + 1) \times 0.145 \times 10^{-4} \times 3000^2 \div 182 = 29.4$ J

$E_2 = (40 + 1) \times 0.145 \times 10^{-4} \times 2000^2 \div 182 = 13.07$ J

$E_3 = 50 \times 9.8 \times 0.2 \div 0.85 = 23.06$ J

$$P_b = \frac{(29.4-15.72)+(13.07-15.72)+(23.06-15.72)}{5} = 6.41\text{W}$$

$P_b > 0$ W Therefore, an external braking resistor is required. The recommended power of the external braking resistor is $P_b \div (1 - 70\%) \approx 22$ W.

- **Using the built-in braking resistor**
  When $P_b < P_a$ and $E_1 > E_C$, use the built-in braking resistor. In this case, set H02.25 to 0.

  When using the built-in braking resistor, connect terminals $P_\oplus$ and D with a jumper bar.

- **Braking resistor not needed**
  When $E_1 < E_C$, no braking resistor is needed, because the braking energy can be absorbed by the bus capacitor. In this case, set H02.25 to 3.

- **Using an external braking resistor**
  When P_b is greater than P_a, use an external braking resistor. Set H02.25 to 1 or 2 based on the cooling mode of the braking resistor.

  Use the external braking resistor with 70% derated, that is, $P_r = P_b \div (1 - 70\%)$, and ensure the resistance of the braking resistor is higher than the minimum permissible resistance allowed by the drive. Remove the jumper bar between terminals $P_\oplus$ and D, and connect the external braking resistor between terminals $P_\oplus$ and C.

  For the wiring diagram and lead wire specifications of the external braking resistor, see section "Wiring of Braking Resistor". Depending on the braking resistor cooling method, set H02.25 to 1 or 2, check and set the minimum braking resistor value allowed by the drive (H02.21), external braking resistor power (H02.26), and external braking resistor resistance (H02.27).

Caution

- Set the power and resistance of the external braking resistor in H02.26 and H02.27 correctly.
- Ensure the resistance of the external braking resistor is higher than or equal to the permissible minimum resistance.
- In natural environment, when the braking resistor is used at its rated power rather than the processing power (average), the temperature of the resistor will rise to above 120℃ under continuous braking. To ensure safety, cool the resistor down through forced air cooling, or use a resistor equipped with a thermal switch. For the load characteristics of the braking resistor, consult with the manufacturer.

Set the heat dissipation coefficient (H02.24) based on the heat dissipation condition of the external braking resistor.

Note

Higher resistor heat dissipation coefficient indicates higher braking efficiency.

Related parameters

Parameter	Name	Add.	Range	Unit	Default value	Data Format	Change Method	User Permissions	Effective Way
H02.21	Smallest allowed dynamic braking resistor	0x0215	1 to 1000	Ω	40	UInt16	Unmodifiable	Ordinary user	-
	Parameter description:								
	The permissible minimum resistance of the regenerative resistor is only related to the servo drive model.								

Parameter	Name	Add.	Range	Unit	Default value	Data Format	Change Method	User Permissions	Effective Way
H02.24	Resistor heat dissipation coefficient	0x0218	10 to 100	-	30	UInt16	At stop	Ordinary user	At once
	Parameter description:								
	It sets the heat dissipation coefficient of the regenerative resistor, which is valid for both built-in and external ones. Set this parameter properly according to actual heat dissipation conditions of the resistor. Recommended value: Generally, the value of H02.24 (Resistor heat dissipation coefficient) cannot exceed 30% for natural cooling or 50% for forced air cooling.								

Parameter	Name	Add.	Range	Unit	Default value	Data Format	Change Method	User Permissions	Effective Way
H02.25	Regenerative resistor type	0x0219	0 to 3	-	0	UInt16	At stop	Ordinary user	At once

Values:

0: Built-in
1: External, natural ventilated
2: External, forced air cooling
3: Not needed

Parameter description:

It sets the mode of absorbing and releasing the braking energy.

Set value	Defines the regenerative resistor type and the mode of absorbing and releasing the braking energy.	Remarks
0	Built-in	When the calculated value of the maximum braking energy is larger than the maximum braking energy absorbed by capacitors, and the calculated value of braking power is no larger than the built-in regenerative resistor power.
1	External, naturally ventilated	When the calculated value of the maximum braking energy is larger than the maximum braking energy absorbed by capacitors, and the calculated value of braking power is larger than the built-in regenerative resistor power.
2	External, forcible cooling	When the calculated value of the maximum braking energy is larger than the maximum braking energy absorbed by capacitors, and the calculated value of braking power is larger than the built-in regenerative resistor power.
3	No resistor, using only capacitor	When the calculated value of maximum braking energy is no larger than the maximum braking energy absorbed by capacitors.

Parameter	Name	Add.	Range	Unit	Default value	Data Format	Change Method	User Permissions	Effective Way
H02.26	Power of external braking resistor	0x021A	1 to 65535	W	40	UInt16	At stop	Ordinary user	At once

Parameter description:

Defines the power of the external braking resistor.
Note: The value of this parameter cannot be lower than the calculated braking power. If the rated power of the braking resistor is higher than the actual value, a false alarm E920.0 (resistor overload) can be reported. If the rated power of the braking resistor is lower than the actual value, the resistor may be damaged.

Parameter	Name	Add.	Range	Unit	Default value	Data Format	Change Method	User Permissions	Effective Way
H02.27	Resistance of external regenera tive resistor	0x021B	1 to 1000	Ω	50	UInt16	At stop	Ordinary user	At once
	Parameter description:								
	Defines the power of the external braking resistor. Note: The value of H02.27 (Resistance of external braking resistor) must not be lower than the value of H02.21 (Permissible min. resistance of external braking resistor). Otherwise, real-time power calculation of the brake resistor can be affected. When the calculated power is lower than the actual value, the resistor may be damaged. When the calculated power is higher than the actual value, E920.0 can be reported.								

6.4 Absolute Encoder Batteries

Model selection

Select an appropriate battery according to the following table.

Table 6–20 Battery specifications for the absolute encoder

Battery specification	Item and unit	Rated value			Condition
		Min. value	Typical value	Max. value	
Output specification: 3.6 V 2700 mAh	External battery voltage (V)	3.2	3.6	3.8	In standby mode[1]
	Circuit fault voltage (V)	-	2.6	-	In standby mode
	Battery alarm voltage (V)	2.85	3	3.15	-
	Current consumed by the circuit (μA)	-	2	-	In normal operation mode[2]
		-	10	-	In standby mode, with the axis at a standstill
		-	300	-	In standby mode, with the axis operating
	Battery ambient temperature (℃)	0	-	40	Same as the motor temperature requirements
	Battery storage temperature (℃)	0	-	30	

Note

- [1]: The "standby state" means the encoder counts the multi-turn data by using the power from the external battery when the drive power supply is not switched on. In this case, data transceiving stops.
- [2]: During normal operation, the absolute encoder supports one-turn or multi-turn data counting and transceiving. After the absolute encoder is correctly connected, it can receive and send data after a short delay (about 5s) when the drive is powered on. The motor speed must be lower than or equal to 10 rpm during transition from the standby state to the normal operation state (upon power-on). Otherwise, E740 (Encoder fault) may occur. In this case, you need to power off and on the drive again.
- The preceding data is measured in the 20℃ ambient temperature.
- The battery case must be stored in a cool, clean, and dry environment, with a recommended temperature ≤ 30℃ and relative humidity ≤ 60%. Keep the battery case away from corrosive substances, fire sources, and heating sources.
- Check the encoder battery voltage when E730 or E731 is reported. In this case, connect an external 1 kΩ load to the battery for measurement.

7 Certifications, Directives, and Standards

Table 7–1 Compliance list

Certification	Directive		Standard
CE certification	EMC directive	2014/30/EU	EN 61800-3
	LVD directive	2014/35/EU	EN 61800-5-1 EN 60034-1 EN 60034-5
	RoHS directive	2011/65/EU 2015/863/EU	-
UL/cUL certification	-		UL61800-5-1 CSA C22.2 No.274 UL 1004-1 UL 1004-6 CSA C22.2 No.100

Note

The product certifications comply with the directives and standards specified in the preceding table.

8 Service and Support

Should you encounter a safety accident during the use or operation of the product, or face challenges in operating and maintaining the equipment, which remain unresolved after the relevant documentation is consulted, we provide multiple channels to ensure prompt resolution:

- Channel #1: Contact service@inovance.com.
- Channel #2: Visit https://www.inovance.com/global to access document downloads, after-sales support, spare parts ordering, repair applications, and authenticity verification services.
- Channel #3: Download My Inovance app (https://zshc-eu.inovance.com/download-pc/) where you can access products info and documentation, and query product parameters.

We are committed to providing you with quick and professional technical support, and we look forward to your satisfaction and trust.

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