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SV680N-INT Series Servo Drive

Selection Guide

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

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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 SV680N-INT series servo drive is a premium servo drive featuring high speed, high precision, high performance, and commissioning-free functions. It is compliant with CE, UL, KC, EAC, UKCA, and TUV certifications. It is specially suitable for applications that require premium functions.

The drive covers a power range from 0.05 kW to 7.5 kW and supports the EtherCAT communication protocol. Used together with the host controller, multiple servo drives can be networked for operation through EtherCAT. The servo drive comes with adaptive stiffness level setting, inertia auto-tuning, and vibration suppression functions for easy use. The drive, together with an MS1 series high-response servo motor (with ultra-low, low, or medium inertia) equipped with a 23- or 26-bit single-turn/multi-turn absolute encoder, any third party servo motor, linear motor or DDR motor, serves to deliver a quiet and stable operation and accurate process control through features like fully closed-loop, internal process segment and gantry synchronization.

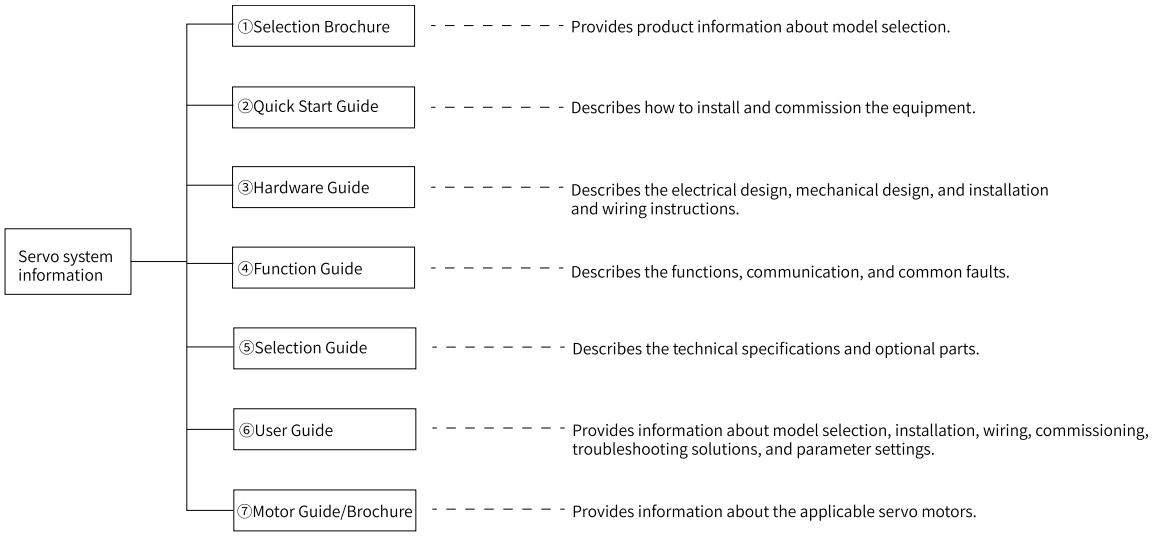
The drive also comes with features like safe torque off (STO), dynamic braking, and brake output (external relay not needed) as standard and supports extension of seven kinds of safety functions and bus safety function FSoE. The optional PINT model offers 24 V backup power for continuous safe production. This servo drive serves to achieve quick and accurate position control, speed control, and torque control through high-performance solutions for automation equipment in industries such as electronic manufacturing, lithium batteries, manipulators, packaging, and machine tools.

This guide provides information about product selection, including the list of supporting components, technical data on the drive and motor, and cable selection.

Note

The speed unit of a servo motor and a DDR motor is RPM, and that of a DDL motor is mm/s. RPM is used throughout this guide. Unless otherwise specified, an RPM value is equivalent to the mm/s one.

More documents



No.	Name	Code	Description
①	SV680-INT Series Flagship Servo Drive	19120362	Provides information about product selection, including the list of supporting components, technical data on the drive and motor, and cable selection.
②	SV680N-INT Series Servo Quick Start Guide	PS00021317	Introduces product models, installation, and quick commissioning.
③	SV680N-INT Series Servo Drive Hardware Guide	PS00021315	Describes the installation and wiring of the drive, including pre-installation preparation, unpacking and handling, mechanical installation, and electrical installation.
④	SV680N-INT Series Servo Drive Function Guide	PS00021316	Describes the functions and parameters of the product, including function overview, basic servo functions, tuning instructions, and parameter descriptions.
⑤	SV680N-INT Series Servo Drive Selection Guide	PS00021313	Provides information about product selection, including the list of supporting components, technical data on the drive and motor, and cable selection.
⑥	SV680N-INT Series Servo Drive User Guide	PS00021314	Provides information about model selection, installation, commissioning, function, troubleshooting and parameters of the equipment.
⑦	MS1-R-INT Series Servo Motor Selection Guide	PS00017523	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.
	Direct Drive Motor Stages and Drives	19120011	Describes product information, general specifications, motor selection, cable selection, certification categories, and standards of the motor.

Revision history

Date	Version	Revision
July 2026	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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Even within the warranty period, maintenance can 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
- Damage or secondary damage caused by force majeure (natural disaster, earthquake, and 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 [Standard Models]

1.1.1 List of Models (Compatible with MS1-R-INT Series Servo Motor)

Motor with 26-bit encoder

Servo motor				Servo drive SV680-INT (standard model)			
Models without brake	Models with brake	Flange size (mm)	Capacity (kW)	Voltage class (V)	Size	Recommended model	No.
Ratings of MS1H1 (n_N= 3000 rpm, n_{max}=7000 rpm) series motors							
MS1H1-05B30CB-A6/ S630R-INT	MS1H1-05B30CB-A6/S632R-INT	40	0.05	Single-phase/ Three-phase 200V	A	S1R6	00002
MS1H1-10B30CB-A6/ S630R-INT	MS1H1-10B30CB-A6/S632R-INT	40	0.1	Single-phase/ Three-phase 200V			
MS1H1-20B30CB-A6/ S631R-INT	MS1H1-20B30CB-A6/S634R-INT	60	0.2	Single-phase/ Three-phase 200V			
MS1H1-40B30CB-A6/ S631R-INT	MS1H1-40B30CB-A6/S634R-INT	60	0.4	Single-phase/ Three-phase 200V		S2R8	00003
MS1H1-55B30CB-A6/ S631R-INT	-	80	0.55	Single-phase/ Three-phase 200V	C	S5R5	00005
MS1H1-75B30CB-A6/ S631R-INT	MS1H1-75B30CB-A6/S634R-INT	80	0.75	Single-phase/ Three-phase 200V		S5R5	00005
MS1H1-10C30CB-A6/ S631R-INT	MS1H1-10C30CB-A6/S634R-INT	80	1.0	Single-phase/ Three-phase 200V	C	S7R6	00006
Ratings of MS1H2 (n_N= 3000 rpm, n_{max}= 6000 rpm) series motors							
MS1H2-10C30CB-A6/ S631R-INT	MS1H2-10C30CB-A6/S634R-INT	100	1.0	Single-phase/ Three-phase 200V	C	S7R6	00006
MS1H2-10C30CD-A6/ S631R-INT	MS1H2-10C30CD-A6/ S634R-INT	100	1.0	Three-phase 400 V		T3R5	10001
MS1H2-15C30CB-A6/ S631R-INT	MS1H2-15C30CB-A6/S634R-INT	100	1.5	Single-phase/ Three-phase 200V	D	S012	00007
MS1H2-15C30CD-A6/ S631R-INT	MS1H2-15C30CD-A6/ S634R-INT	100	1.5	Three-phase 400 V	C	T5R4	10002

Servo motor				Servo drive SV680-INT (standard model)			
Models without brake	Models with brake	Flange size (mm)	Capacity (kW)	Voltage class (V)	Size	Recommended model	No.
MS1H2-20C30CB-A6/S631R-INT	MS1H2-20C30CB-A6/S634R-INT	100	2.0	Three-phase 200 V	E	S018	00008
MS1H2-20C30CD-A6/S631R-INT	MS1H2-20C30CD-A6/S634R-INT	100	2.0	Three-phase 400 V	D	T8R4	10003
MS1H2-25C30CB-A6/S631R-INT	MS1H2-25C30CB-A6/S634R-INT	100	2.5	Three-phase 200 V	E	S022	00009
MS1H2-25C30CD-A6/S631R-INT	MS1H2-25C30CD-A6/S634R-INT	100	2.5	Three-phase 400 V	D	T012	10004
MS1H2-30C30CB-A6/S631R-INT	MS1H2-30C30CB-A6/S634R-INT	130	3.0	Three-phase 200 V	E	S022	00009
MS1H2-30C30CD-A6/S631R-INT	MS1H2-30C30CD-A6/S634R-INT	130	3.0	Three-phase 400 V	D	T012	10004
MS1H2-40C30CB-A6/S631R-INT	MS1H2-40C30CB-A6/S634R-INT	130	4.0	Three-phase 200 V	E	S027	00010
MS1H2-40C30CD-A6/S631R-INT	MS1H2-40C30CD-A6/S634R-INT	130	4.0	Three-phase 400 V		T017	10005
MS1H2-50C30CB-A6/S631R-INT	MS1H2-50C30CB-A6/S634R-INT	130	5.0	Three-phase 200 V		S027	00010
MS1H2-50C30CD-A6/S631R-INT	MS1H2-50C30CD-A6/S634R-INT	130	5.0	Three-phase 400 V		T021	10006
Ratings of MS1H3 (n_N=1500 rpm, n_{max}= 4500 rpm) series motors							
MS1H3-85B15CB-A6/S631R-INT	MS1H3-85B15CB-A6/S634R-INT	130	0.85	Single-phase/ Three-phase 200V	C	S7R6	00006
MS1H3-85B15CD-A6/S631R-INT	MS1H3-85B15CD-A6/S634R-INT	130	0.85	Three-phase 400 V		T3R5	10001
MS1H3-13C15CB-A6/S631R-INT	MS1H3-13C15CB-A6/S634R-INT	130	1.3	Single-phase/ Three-phase 200V	D	S012	00007
MS1H3-13C15CD-A6/S631R-INT	MS1H3-13C15CD-A6/S634R-INT	130	1.3	Three-phase 400 V	C	T5R4	10002
MS1H3-18C15CB-A6/S631R-INT	MS1H3-18C15CB-A6/S634R-INT	130	1.8	Three-phase 200 V	E	S018	00008
MS1H3-18C15CD-A6/S631R-INT	MS1H3-18C15CD-A6/S634R-INT	130	1.8	Three-phase 400 V	D	T8R4	10003
MS1H3-29C15CB-A6/S631R-INT	MS1H3-29C15CB-A6/S634R-INT	180	2.9	Three-phase 200 V	E	S022	00009
MS1H3-29C15CD-A6/S631R-INT	MS1H3-29C15CD-A6/S634R-INT	180	2.9	Three-phase 400 V	D	T012	10004
MS1H3-44C15CB-A6/S631R-INT	MS1H3-44C15CB-A6/S634R-INT	180	4.4	Three-phase 200 V	E	S027	00010

Servo motor				Servo drive SV680-INT (standard model)			
Models without brake	Models with brake	Flange size (mm)	Capacity (kW)	Voltage class (V)	Size	Recommended model	No.
MS1H3-44C15CD-A6/ S631R-INT	MS1H3-44C15CD-A6/ S634R-INT	180	4.4	Three-phase 400 V	E	T017	10005
MS1H3-55C15CD-A6/ S631R-INT	MS1H3-55C15CD-A6/ S634R-INT	180	5.5	Three-phase 400 V		T021	10006
MS1H3-75C15CD-A6/ S631R-INT	MS1H3-75C15CD-A6/ S634R-INT	180	7.5	Three-phase 400 V		T026	10007
Ratings of MS1H4 (n_N= 3000 rpm, n_{max}=7000 rpm) series motors							
MS1H4-05B30CB-A6/ S630R-INT	MS1H4-05B30CB-A6/S632R-INT	40	0.05	Single-phase/ Three-phase 200V	A	S1R6	00002
MS1H4-10B30CB-A6/ S630R-INT	MS1H4-10B30CB-A6/S632R-INT	40	0.1	Single-phase/ Three-phase 200V		S1R6	00002
MS1H4-05B30CB-A6/ S631R-INT	MS1H4-05B30CB-A6/S634R-INT	40	0.05	Single-phase/ Three-phase 200V		S1R6	00002
MS1H4-10B30CB-A6/ S631R-INT	MS1H4-10B30CB-A6/S634R-INT	40	0.1	Single-phase/ Three-phase 200V		S1R6	00002
MS1H4-20B30CB-A6/ S631R-INT	MS1H4-20B30CB-A6/S634R-INT	60	0.2	Single-phase/ Three-phase 200V		S1R6	00002
MS1H4-40B30CB-A6/ S631R-INT	MS1H4-40B30CB-A6/S634R-INT	60	0.4	Single-phase/ Three-phase 200V		S2R8	00003
MS1H4-40B30CD-A6/ S631R-INT	MS1H4-40B30CD-A6/ S634R-INT	60	0.4	Three-phase 400 V	B	T1R4	10029
MS1H4-55B30CB-A6/ S631R-INT	-	80	0.55	Single-phase/ Three-phase 200V	C	S5R5	00005
MS1H4-75B30CB-A6/ S631R-INT	MS1H4-75B30CB-A6/S634R-INT	80	0.75	Single-phase/ Three-phase 200V		S5R5	00005
MS1H4-75B30CD-A6/ S631R-INT	MS1H4-75B30CD-A6/ S634R-INT	80	0.75	Three-phase 400 V	B	T2R3	10031
MS1H4-10C30CB-A6/ S631R-INT	MS1H4-10C30CB-A6/S634R-INT	80	1.0	Single-phase/ Three-phase 200V	C	S7R6	00006

Note

Models of drives:

- S: 200 V voltage class
- T: 400 V voltage class
- 1R6: 1.6 A rated output current, 2R8: 2.8 A rated output current..., 026: 26 A rated output current, 027: 27 A rated output current

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

Servo motor				Servo drive SV680-INT series			
Model without brake	Model with brake	Frame size (mm)	Capacity (kW)	Voltage class	Size	Recommended model	No.
Ratings of MS1H1 (n_N= 3000 rpm, n_{max}=7000 rpm) series motors							
MS1H1-05B30CB-V630R-INT	MS1H1-05B30CB-V632R-INT	40	0.55	Single-phase/ Three-phase 200 V	A	S1R6	00002
MS1H1-10B30CB-V630R-INT	MS1H1-10B30CB-V632R-INT	40	0.1	Single-phase/ Three-phase 200 V			
MS1H1-20B30CB-V631R-INT	MS1H1-20B30CB-V634R-INT	60	0.2	Single-phase/ Three-phase 200 V			
MS1H1-40B30CB-V631R-INT	MS1H1-40B30CB-V634R-INT	60	0.4	Single-phase/ Three-phase 200 V		S2R8	00003
MS1H1-55B30CB-V631R-INT	-	80	0.55	Single-phase/ Three-phase 200 V	C	S5R5	00005
MS1H1-75B30CB-V631R-INT	MS1H1-75B30CB-V634R-INT	80	0.75	Single-phase/ Three-phase 200 V		S5R5	00005
MS1H1-10C30CB-V631R-INT	MS1H1-10C30CB-V634R-INT	80	1.0	Single-phase/ Three-phase 200 V	C	S7R6	00006
Ratings of MS1H2 (n_N= 3000 rpm, n_{max}= 6000 rpm) series motors							
MS1H2-10C30CB-V631R-INT	MS1H2-10C30CB-V634R-INT	100	1.0	Single-phase/ Three-phase 200 V	C	S7R6	00006
MS1H2-10C30CD-V631R-INT	MS1H2-10C30CD-V634R-INT	100	1.0	Three-phase 400 V		T3R5	10001

Servo motor				Servo drive SV680-INT series			
Model without brake	Model with brake	Frame size (mm)	Capacity (kW)	Voltage class	Size	Recommended model	No.
MS1H2-15C30CB-V631R-INT	MS1H2-15C30CB-V634R-INT	100	1.5	Single-phase/ Three-phase 200 V	D	S012	00007
MS1H2-15C30CD-V631R-INT	MS1H2-15C30CD-V634R-INT	100	1.5	Three-phase 400 V	C	T5R4	10002
MS1H2-20C30CB-V631R-INT	MS1H2-20C30CB-V634R-INT	100	2.0	Three-phase 200 V	E	S018	00008
MS1H2-20C30CD-V631R-INT	MS1H2-20C30CD-V634R-INT	100	2.0	Three-phase 400 V	D	T8R4	10003
MS1H2-25C30CB-V631R-INT	MS1H2-25C30CB-V634R-INT	100	2.5	Three-phase 200 V	E	S022	00009
MS1H2-25C30CD-V631R-INT	MS1H2-25C30CD-V634R-INT	100	2.5	Three-phase 400 V	D	T012	10004
MS1H2-30C30CB-V631R-INT	MS1H2-30C30CB-V634R-INT	130	3.0	Three-phase 200 V	E	S022	00009
MS1H2-30C30CD-V631R-INT	MS1H2-30C30CD-V634R-INT	130	3.0	Three-phase 400 V	D	T012	10004
MS1H2-40C30CB-V631R-INT	MS1H2-40C30CB-V634R-INT	130	4.0	Three-phase 200 V	E	S027	00010
MS1H2-40C30CD-V631R-INT	MS1H2-40C30CD-V634R-INT	130	4.0	Three-phase 400 V		T017	10005
MS1H2-50C30CB-V631R-INT	MS1H2-50C30CB-V634R-INT	130	5.0	Three-phase 200 V		S027	00010
MS1H2-50C30CD-V631R-INT	MS1H2-50C30CD-V634R-INT	130	5.0	Three-phase 400 V		T021	10006
Ratings of MS1H3 (n_N=1500 rpm, n_{max}= 4500 rpm) series motors							
MS1H3-85B15CB-V631R-INT	MS1H3-85B15CB-V634R-INT	130	0.85	Single-phase/ Three-phase 200 V	C	S7R6	00006
MS1H3-85B15CD-V631R-INT	MS1H3-85B15CD-V634R-INT	130	0.85	Three-phase 400 V		T3R5	10001
MS1H3-13C15CB-V631R-INT	MS1H3-13C15CB-V634R-INT	130	1.3	Single-phase/ Three-phase 200 V	D	S012	00007
MS1H3-13C15CD-V631R-INT	MS1H3-13C15CD-V634R-INT	130	1.3	Three-phase 400 V	C	T5R4	10002
MS1H3-18C15CB-V631R-INT	MS1H3-18C15CB-V634R-INT	130	1.8	Three-phase 200 V	E	S018	00008
MS1H3-18C15CD-V631R-INT	MS1H3-18C15CD-V634R-INT	130	1.8	Three-phase 400 V	D	T8R4	10003
MS1H3-29C15CB-V631R-INT	MS1H3-29C15CB-V634R-INT	180	2.9	Three-phase 200 V	E	S022	00009

Servo motor				Servo drive SV680-INT series			
Model without brake	Model with brake	Frame size (mm)	Capacity (kW)	Voltage class	Size	Recommended model	No.
MS1H3-29C15CD-V631R-INT	MS1H3-29C15CD-V634R-INT	180	2.9	Three-phase 400 V	D	T012	10004
MS1H3-44C15CB-V631R-INT	MS1H3-44C15CB-V634R-INT	180	4.4	Three-phase 200 V	E	S027	00010
MS1H3-44C15CD-V631R-INT	MS1H3-44C15CD-V634R-INT	180	4.4	Three-phase 400 V	E	T017	10005
MS1H3-55C15CD-V631R-INT	MS1H3-55C15CD-V634R-INT	180	5.5	Three-phase 400 V		T021	10006
MS1H3-75C15CD-V631R-INT	MS1H3-75C15CD-V634R-INT	180	7.5	Three-phase 400 V		T026	10007
Ratings of MS1H4 (n_N= 3000 rpm, n_{max}=7000 rpm) series motors							
MS1H4-05B30CB-V630R-INT	MS1H4-05B30CB-V632R-INT	40	0.05	Single/Three-phase 200 V	A	S1R6	00002
MS1H4-05B30CB-V631R-INT	MS1H4-05B30CB-V634R-INT	40	0.05	Single/Three-phase 200 V			
MS1H4-10B30CB-V630R-INT	MS1H4-10B30CB-V632R-INT	40	0.1	Single/Three-phase 200 V			
MS1H4-10B30CB-V631R-INT	MS1H4-10B30CB-V634R-INT	40	0.1	Single/Three-phase 200 V			
MS1H4-20B30CB-V631R-INT	MS1H4-10B30CB-V634R-INT	60	0.2	Single-phase/ Three-phase 200 V			
MS1H4-40B30CB-V631R-INT	MS1H4-40B30CB-V634R-INT	60	0.4	Single-phase/ Three-phase 200 V		S2R8	00003
MS1H4-55B30CB-V631R-INT	-	80	0.55	Single-phase/ Three-phase 200 V	C	S5R5	00005
MS1H4-75B30CB-V631R-INT	MS1H4-75B30CB-V634R-INT	80	0.75	Single-phase/ Three-phase 200 V		S5R5	00005
MS1H4-10C30CB-V631R-INT	MS1H4-10C30CB-V634R-INT	80	1.0	Single-phase/ Three-phase 200 V	C	S7R6	00006

Note

- Models of drives:
  - S: 200 V voltage class
  - T: 400 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 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.
- 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.

1.1.3 List of Motor Model Selection (Compatible with LMC Linear Module)

Motor model	Servo drive model SV680-INT series	Power cable length (m)				
		3	5	8	10	12
LMC88100Y1-INT LMC88-130Y1-INT LMC88-185Y1-INT LMC88-240Y1-INT	S5R5	S6-L-M160-3.0-TTS-2-INT	S6-L-M160-5.0-TTS-2-INT	S6-L-M160-8.0-TTS-2-INT	S6-L-M160-10.0-TTS-2-INT	S6-L-M160-12.0-TTS-2-INT
LMC118-130Y1-INT LMC118-185Y1-INT	S5R5	S6-L-M160-3.0-TTS-2-INT	S6-L-M160-5.0-TTS-2-INT	S6-L-M160-8.0-TTS-2-INT	S6-L-M160-10.0-TTS-2-INT	S6-L-M160-12.0-TTS-2-INT
LMC118-240Y2-INT	S7R6	S6-L-M160-3.0-TTS-2-INT	S6-L-M160-5.0-TTS-2-INT	S6-L-M160-8.0-TTS-2-INT	S6-L-M160-10.0-TTS-2-INT	S6-L-M160-12.0-TTS-2-INT
LMC118-185Y3-INT LMC118-355Y3-INT	S012	S6-L-M150-3.0-TTS-2-INT	S6-L-M150-5.0-TTS-2-INT	S6-L-M150-8.0-TTS-2-INT	S6-L-M150-10.0-TTS-2-INT	S6-L-M150-12.0-TTS-2-INT
LMC168-185Y1-INT	S5R5	S6-L-M160-3.0-TTS-2-INT	S6-L-M160-5.0-TTS-2-INT	S6-L-M160-8.0-TTS-2-INT	S6-L-M160-10.0-TTS-2-INT	S6-L-M160-12.0-TTS-2-INT
LMC168-130Y2-INT LMC168-240Y2-INT	S7R6	S6-L-M160-3.0-TTS-2-INT	S6-L-M160-5.0-TTS-2-INT	S6-L-M160-8.0-TTS-2-INT	S6-L-M160-10.0-TTS-2-INT	S6-L-M160-12.0-TTS-2-INT
LMC168-185Y3-INT LMC168-240Y4-INT	S012	S6-L-M150-3.0-TTS-2-INT	S6-L-M150-5.0-TTS-2-INT	S6-L-M150-8.0-TTS-2-INT	S6-L-M150-10.0-TTS-2-INT	S6-L-M150-12.0-TTS-2-INT
LMC188-240Y2-INT	S7R6	S6-L-M160-3.0-TTS-2-INT	S6-L-M160-5.0-TTS-2-INT	S6-L-M160-8.0-TTS-2-INT	S6-L-M160-10.0-TTS-2-INT	S6-L-M160-12.0-TTS-2-INT
LMC188-355Y3-INT LMC188-240Y4-INT	S012	S6-L-M150-3.0-TTS-2-INT	S6-L-M150-5.0-TTS-2-INT	S6-L-M150-8.0-TTS-2-INT	S6-L-M150-10.0-TTS-2-INT	S6-L-M150-12.0-TTS-2-INT
LMC188-355Y6-INT	S021	S6-L-M040-3.0-TTS-2-INT	S6-L-M040-5.0-TTS-2-INT	S6-L-M040-8.0-TTS-2-INT	S6-L-M040-10.0-TTS-2-INT	S6-L-M040-12.0-TTS-2-INT
LMC228-240Y4-INT	S012	S6-L-M150-3.0-TTS-2-INT	S6-L-M150-5.0-TTS-2-INT	S6-L-M150-8.0-TTS-2-INT	S6-L-M150- 10.0-TTS-2-INT	S6-L-M150- 12.0-TTS-2-INT
LMC228-290Y5-INT	S017	S6-L-M040-3.0-TTS-2-INT	S6-L-M040-5.0-TTS-2-INT	S6-L-M040-8.0-TTS-2-INT	S6-L-M040- 10.0-TTS-2-INT	S6-L-M040- 12.0-TTS-2-INT

1.1.4 List of Motor Model Selection (Compatible with MP Series Torque Motor)

Motor model	Servo drive SV680-INT series	Extension power cable length (3 m)	Extension power cable length (5 m)	Extension power cable length (10 m)
MP1-112F10AB-U313X-INT	S2R8	S6-L-M110-3.0-T-INT	S6-L-M110-5.0-T-INT	S6-L-M110-10.0-T-INT
MP1-140S10BB-U323X-INT	S012	S6-L-M110-3.0-T-INT	S6-L-M110-5.0-T-INT	S6-L-M110-10.0-T-INT
MP1-175S11BB-U333X-INT	S012	S6-L-M110-3.0-T-INT	S6-L-M110-5.0-T-INT	S6-L-M110-10.0-T-INT
MP1-220S15BB-U323X-INT	S012	S6-L-M0BD-3.0-INT	S6-L-M0BD-5.0-INT	S6-L-M0BD-10.0-INT
MP1-220S30BD-U323X-INT	T021	S6-L-M0BD-3.0-INT	S6-L-M0BD-5.0-INT	S6-L-M0BD-10.0-INT
MP1-220S30BD-U323L-C-INT	T026	S6-L-M0BD-3.0-INT	S6-L-M0BD-5.0-INT	S6-L-M0BD-10.0-INT

1.1.5 List of Motor Model Selection (Compatible with ISM Series Torque Motor)

Motor model	Servo drive SV680-INT series	Extension power cable length (3 m)	Extension power cable length (5 m)	Extension power cable length (10 m)
ISMT1-160F12AB-A113X-INT	S2R8	S6-L-M110-3.0-T-INT	S6-L-M110-5.0-T-INT	S6-L-M110-10.0-T-INT
ISMT1-160F12AB-A133X-INT				
ISMT1-160F45AB-A133X-INT				

1.2 Selection List [Functional Safety]

Table 1–1 Functional safety drives and compatible functional safety motors

Drive				Motor				
Voltage Class	Size	Recommended Drive Model	H01.10 No.	Motor without Brake	Motor with Brake	Flange Size (mm)	Capacity (kW)	Built-in Safety Encoder
Ratings of MS1H1 (n_N= 3000 rpm, n_{max}=7000 rpm) series motors								
Single-phase/Three-phase 200 V	A	S1R6	00002	MS1H1-05B30CB-S630R-INT	MS1H1-05B30CB-S632R-INT	40	0.05	EA33H6-B26M16-TH5N1T
				MS1H1-10B30CB-S630R-INT	MS1H1-10B30CB-S632R-INT	40	0.1	EA33H6-B26M16-TH5N1T
				MS1H1-20B30CB-S631R-INT	MS1H1-20B30CB-S634R-INT	60	0.2	EA45H8-B26M16-TH5N1T
Single-phase/Three-phase 200 V		S2R8	00003	MS1H1-40B30CB-S631R-INT	MS1H1-40B30CB-S634R-INT	60	0.4	EA45H8-B26M16-TH5N1T
Single-phase/Three-phase 200 V	C	S5R5	00005	MS1H1-55B30CB-S631R-INT	-	80	0.55	EA45H8-B26M16-TH5N1T
Single-phase/Three-phase 200 V		S5R5	00005	MS1H1-75B30CB-S631R-INT	MS1H1-75B30CB-S634R-INT	80	0.75	EA45H8-B26M16-TH5N1T

Drive				Motor				
Voltage Class	Size	Recommended Drive Model	H01.10 No.	Motor without Brake	Motor with Brake	Flange Size (mm)	Capacity (kW)	Built-in Safety Encoder
Single-phase/Three-phase 200 V	C	S7R6	00006	MS1H1-10C30CB-S631R-INT	MS1H1-10C30CB-S634R-INT	80	1.0	EA45H8-B26M16-TH5N1T
Ratings of MS1H2 (n_N= 3000 rpm, n_{max}= 6000 rpm) series motors								
Single-phase/Three-phase 200 V	C	S7R6	00006	MS1H2-10C30CB-S631R-INT	MS1H2-10C30CB-S634R-INT	100	1.0	EA79R8-B26M16-TH5Y3-FS
Three-phase 400		T3R5	10001	MS1H2-10C30CD-S631R-INT	MS1H2-10C30CD-S634R-INT	100	1.0	EA79R8-B26M16-TH5Y3-FS
Single-phase/Three-phase 200 V	D	S012	00007	MS1H2-15C30CB-S631R-INT	MS1H2-15C30CB-S634R-INT	100	1.5	EA79R8-B26M16-TH5Y3-FS
Three-phase 400 V	C	T5R4	10002	MS1H2-15C30CD-S631R-INT	MS1H2-15C30CD-S634R-INT	100	1.5	EA79R8-B26M16-TH5Y3-FS
Three-phase 200 V	E	S018	00008	MS1H2-20C30CB-S631R-INT	MS1H2-20C30CB-S634R-INT	100	2.0	EA79R8-B26M16-TH5Y3-FS
Three-phase 400 V	D	T8R4	10003	MS1H2-20C30CD-S631R-INT	MS1H2-20C30CD-S634R-INT	100	2.0	EA79R8-B26M16-TH5Y3-FS
Three-phase 200 V	E	S022	00009	MS1H2-25C30CB-S631R-INT	MS1H2-25C30CB-S634R-INT	100	2.5	EA79R8-B26M16-TH5Y3-FS
Three-phase 400 V	D	T012	10004	MS1H2-25C30CD-S631R-INT	MS1H2-25C30CD-S634R-INT	100	2.5	EA79R8-B26M16-TH5Y3-FS
Three-phase 200 V	E	S022	00009	MS1H2-30C30CB-S631R-INT	MS1H2-30C30CB-S634R-INT	130	3.0	EA79R8-B26M16-TH5Y3-FS
Three-phase 400 V	D	T012	10004	MS1H2-30C30CD-S631R-INT	MS1H2-30C30CD-S634R-INT	130	3.0	EA79R8-B26M16-TH5Y3-FS
Three-phase 200 V	E	S027	00010	MS1H2-40C30CB-S631R-INT	MS1H2-40C30CB-S634R-INT	130	4.0	EA79R8-B26M16-TH5Y3-FS
Three-phase 400 V		T017	10005	MS1H2-40C30CD-S631R-INT	MS1H2-40C30CD-S634R-INT	130	4.0	EA79R8-B26M16-TH5Y3-FS
Three-phase 200 V		S027	00010	MS1H2-50C30CB-S631R-INT	MS1H2-50C30CB-S634R-INT	130	5.0	EA79R8-B26M16-TH5Y3-FS
Three-phase 400 V		T021	10006	MS1H2-50C30CD-S631R-INT	MS1H2-50C30CD-S634R-INT	130	5.0	EA79R8-B26M16-TH5Y3-FS
Ratings of MS1H3 (n_N=1500 rpm, n_{max}= 4500 rpm) series motors								
Single-phase/Three-phase 200 V	C	S7R6	00006	MS1H3-85B15CB-S631R-INT	MS1H3-85B15CB-S634R-INT	130	0.85	EA79R8-B26M16-TH5Y3-FS
Three-phase 400 V		T3R5	10001	MS1H3-85B15CD-S631R-INT	MS1H3-85B15CD-S634R-INT	130	0.85	EA79R8-B26M16-TH5Y3-FS

Drive				Motor				
Voltage Class	Size	Recommended Drive Model	H01.10 No.	Motor without Brake	Motor with Brake	Flange Size (mm)	Capacity (kW)	Built-in Safety Encoder
Single-phase/Three-phase 200 V	D	S012	00007	MS1H3-13C15CB-S631R-INT	MS1H3-13C15CB-S634R-INT	130	1.3	EA79R8-B26M16-TH5Y3-FS
Three-phase 400 V	C	T5R4	10002	MS1H3-13C15CD-S631R-INT	MS1H3-13C15CD-S634R-INT	130	1.3	EA79R8-B26M16-TH5Y3-FS
Three-phase 200 V	D	S018	00008	MS1H3-18C15CB-S631R-INT	MS1H3-18C15CB-S634R-INT	130	1.8	EA79R8-B26M16-TH5Y3-FS
Three-phase 400 V	D	T8R4	10003	MS1H3-18C15CD-S631R-INT	MS1H3-18C15CD-S634R-INT	130	1.8	EA79R8-B26M16-TH5Y3-FS
Three-phase 200 V	E	S022	00009	MS1H3-29C15CB-S631R-INT	MS1H3-29C15CB-S634R-INT	180	2.9	EA79R8-B26M16-TH5Y3-FS
Three-phase 400 V		T012	10004	MS1H3-29C15CD-S631R-INT	MS1H3-29C15CD-S634R-INT	180	2.9	EA79R8-B26M16-TH5Y3-FS
Three-phase 200 V	E	S027	00010	MS1H3-44C15CB-S631R-INT	MS1H3-44C15CB-S634R-INT	180	4.4	EA79R8-B26M16-TH5Y3-FS
Three-phase 400 V	E	T017	10005	MS1H3-44C15CD-S631R-INT	MS1H3-44C15CD-S634R-INT	180	4.4	EA79R8-B26M16-TH5Y3-FS
Three-phase 400 V		T021	10006	MS1H3-55C15CD-S631R-INT	MS1H3-55C15CD-S634R-INT	180	5.5	EA79R8-B26M16-TH5Y3-FS
Three-phase 400 V		T026	10007	MS1H3-75C15CD-S631R-INT	MS1H3-75C15CD-S634R-INT	180	7.5	EA79R8-B26M16-TH5Y3-FS
Ratings of MS1H4 (n_N= 3000 rpm, n_{max}=7000 rpm) series motors								
Single-phase/Three-phase 200 V	A	S1R6	00002	MS1H4-05B30CB-S630R-INT	MS1H4-05B30CB-S632R-INT	40	0.05	EA33H6-B26M16-TH5N1T
Single-phase/Three-phase 200 V		S1R6	00002	MS1H4-10B30CB-S630R-INT	MS1H4-10B30CB-S632R-INT	40	0.1	EA33H6-B26M16-TH5N1T
Single-phase/Three-phase 200 V		S1R6	00002	MS1H4-05B30CB-S631R-INT	MS1H4-05B30CB-S634R-INT	40	0.05	EA33H6-B26M16-TH5N1T
Single-phase/Three-phase 200 V		S1R6	00002	MS1H4-10B30CB-S631R-INT	MS1H4-10B30CB-S634R-INT	40	0.1	EA33H6-B26M16-TH5N1T
Single-phase/Three-phase 200 V		S1R6	00002	MS1H4-20B30CB-S631R-INT	MS1H4-20B30CB-S634R-INT	60	0.2	EA45H8-B26M16-TH5N1T
Single-phase/Three-phase 200 V		S2R8	00003	MS1H4-40B30CB-S631R-INT	MS1H4-40B30CB-S634R-INT	60	0.4	EA45H8-B26M16-TH5N1T

Drive				Motor				
Voltage Class	Size	Recommended Drive Model	H01.10 No.	Motor without Brake	Motor with Brake	Flange Size (mm)	Capacity (kW)	Built-in Safety Encoder
Single-phase/Three-phase 200 V	C	S5R5	00005	MS1H4-55B30CB-S631R-INT	-	80	0.55	EA45H8-B26M16-TH5N1T
Single-phase/Three-phase 200 V		S5R5	00005	MS1H4-75B30CB-S631R-INT	MS1H4-75B30CB-S634R-INT	80	0.75	EA45H8-B26M16-TH5N1T
Single-phase/Three-phase 200 V	C	S7R6	00006	MS1H4-10C30CB-S631R-INT	MS1H4-10C30CB-S634R-INT	80	1.0	EA45H8-B26M16-TH5N1T

Note

Safety functions SS1-r/SLS/SSM/SOS/SS2/SDI require the use of a safety motor, while safety functions SS1-t/STO/SBC do not.

2 Product Information

2.1 Drive

2.1.1 Models and Nameplate

Model

SV680 ① N ② S ③ 2R8 ④ I ⑤ - GINT ⑥

① **Product series** SV680: SV680 universal servo drive	④ **Rated output current**		⑤ **Model specification** I: Standard type S: Functional safety type
② **Product type** N: EtherCAT communication type	S: 200 V	1R6: 1.6 A 2R8: 2.8 A 5R5: 5.5 A 7R6: 7.6 A 012: 12.0 A 018: 18.0 A 022: 22.0 A 027: 27.0 A	⑥ **Model specification** GINT: General (global version) PINT: Backup power supply type* (global version)
③ **Voltage class** S: 200 V T: 400 V	T: 400 V	1R4: 1.4 A 2R3: 2.3 A 3R5: 3.5 A 5R4: 5.4 A 8R4: 8.4 A 012: 12.0 A 017: 17.0 A 021: 21.0 A 026: 26.0 A	

Note

*: Backup power supply provides power to the control circuit when the main circuit is not powered, maintaining functions such as programming, connecting to backend configuration parameters, and communication.

Nameplate description

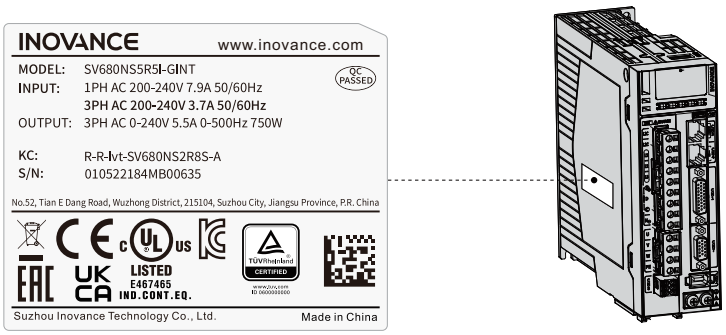


Figure 2-1 Diagram of nameplate descriptions (standard model)

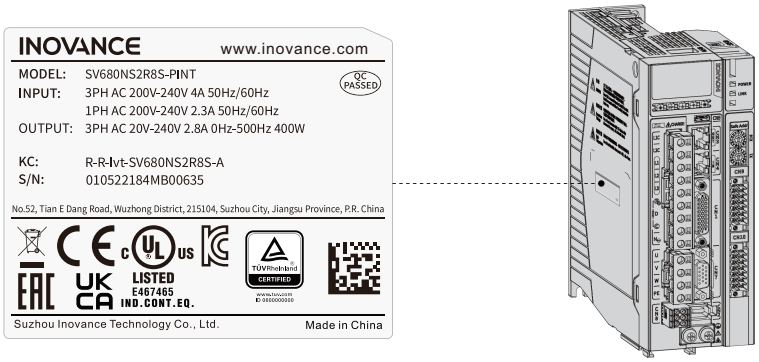


Figure 2-2 Diagram of nameplate descriptions (functional safety model)

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 ... 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 010502024S700001 indicates the drive is manufactured in July 2024.

2.1.2 Component Description [Standard Model]

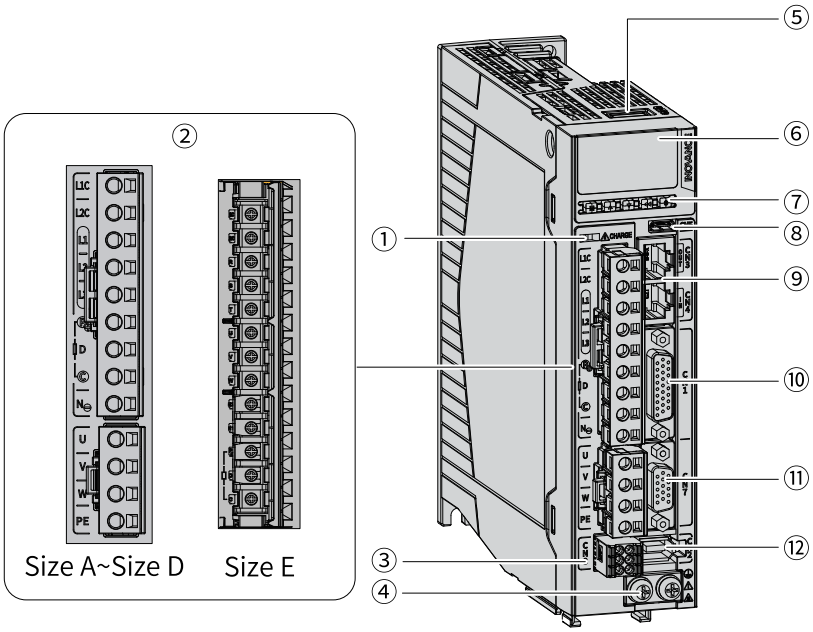


Figure 2-3 Servo drive components

Table 2–1 Description of servo drive components

No.	Component		Description
①	CHARGE (bus voltage indicator)		Indicates that electric charges are present in the bus capacitor. When the indicator turns on, charges possibly still exist in the internal capacitor of the servo unit, even if the power supply of the main circuit is OFF. To prevent electric shocks, do not touch the power supply terminals when this indicator lights up.
② (Size A to size D)	Main circuit terminal	L1C, L2C (control circuit power input terminals)	Input the control circuit power supply according to the rated voltage class on the nameplate.
		Main circuit power input terminals[1]	Input the main circuit power supply according to the rated voltage class on the nameplate.
		P ⊕ D, and C (terminals for connecting external braking resistor)[2]	When an external braking resistor is required (first remove the jumper between P ⊕ and D), connect the braking resistor between P ⊕ and C.
		P ⊕ and N ⊖ (bus terminals)	Used by the common DC bus for multiple servo drives.
		U, V, W, PE (terminals for connecting the servo motor)	Used to connect the U, V, and W phases and grounding terminal of the motor.

No.	Component		Description
② (Size E)	Main circuit terminal	L1C, L2C (control circuit power input terminals)	Input the control circuit power supply according to the rated voltage class on the nameplate.
		R, S, T (main circuit power input terminals)	Input the main circuit power supply according to the rated voltage class on the nameplate.
		P⊕ D, and C (terminals for connecting external braking resistor)	When an external braking resistor is required (first remove the jumper between P⊕ and D), connect the braking resistor between P⊕ and C.
		N2, N1 (terminals for connecting external reactor)	Terminals N1 and N2 are jumpered by default. To suppress harmonics in the power supply, remove the jumper between terminals N1 and N2 first and connect an external DC reactor between terminals N1 and N2.
		U, V, W (terminals for connecting the servo motor)	Used for wiring of the brake and motor temperature feedback.
③	Brake and PTC input terminal CN8		Used for wiring of the brake and PTC.
④	Servo drive grounding terminal		Connected to the grounding terminal of the power supply for grounding purpose.
⑤	CN6 (STO safety function terminal)		Connected to external functional safety signal for functional safety purpose.
⑥	LED display		The 5-digit 8-segment LED display is used to show the operation state and parameter setting of the servo.
⑦	Keys		M: Used to switch parameters in sequence. ▲: Increases the value of the blinking digit. ▼: Decreases the value of the blinking digit. ◀◀: Shifts the blinking position leftwards. Press and hold: Goes to the next page when the displayed number exceeds five digits. S: Saves modifications and enters the next menu.
⑧	CN5 (communication terminal)		Supports online upgrade and commissioning with the software tool when the drive is powered on.
⑨	CN3, CN4 (EtherCAT communication terminals)		CN4 (IN): Connected to the master or the last slave device. CN3 (OUT): Connected to the next slave device
⑩	CN1 (control terminal)		Used by reference input signals and other I/O signals.
⑪	CN7 (encoder feedback terminal)		Supports communication-type encoders and pulse-type encoders. Supports gantry synchronization.
⑫	CN2 (encoder feedback terminal)		Supports communication-type encoders. Supports gantry synchronization.

Note

- [1] When the main circuit power input terminals of drives with a voltage class of 200 V are L1, L2, L3, or any two among L1, L2, and L3 in case of single-phase power supplies. The main circuit power input terminals of drives with a voltage class of 400 V are R, S, and T.
- [2] The built-in braking resistor or jumper bar is not available in models S1R6 and S2R8. If an external braking resistor is needed for S1R6 and S2R8 models, connect it between terminals P⊕ and C.

2.1.3 Component Description [Backup Power Supply Type]

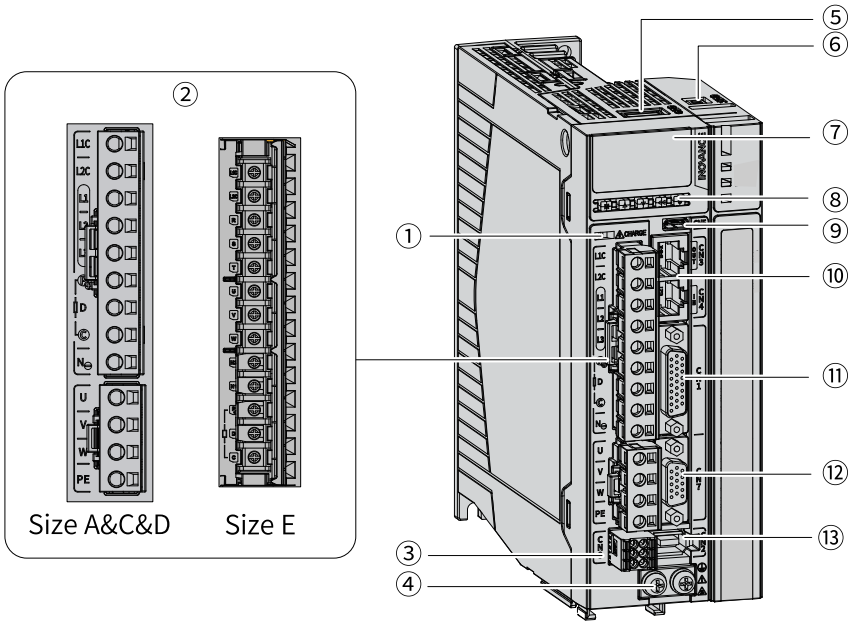


Figure 2-4 Servo drive components

Table 2–2 Description of servo drive components

No.	Component		Description
①	CHARGE (bus voltage indicator)		Indicates that electric charges are present in the bus capacitor. When the indicator turns on, charges possibly still exist in the internal capacitor of the servo unit, even if the power supply of the main circuit is OFF. To prevent electric shocks, do not touch the power supply terminals when this indicator lights up.
② (Size A&C&D)	Main circuit terminal	L1C, L2C (control circuit power input terminals)	Input the control circuit power supply according to the rated voltage class on the nameplate.
		Main circuit power input terminals[1]	Input the main circuit power supply according to the rated voltage class on the nameplate.
		P ⊕ D, and C (terminals for connecting external braking resistor)[2]	When an external braking resistor is required (first remove the jumper between P ⊕ and D), connect the braking resistor between P ⊕ and C.
		P ⊕ and N ⊖ (bus terminals)	Used by the common DC bus for multiple servo drives.
		U, V, W, PE (terminals for connecting the servo motor)	Used to connect the U, V, and W phases and grounding terminal of the motor.

No.	Component		Description
② (Size E)	Main circuit terminal	L1C, L2C (control circuit power input terminals)	Input the control circuit power supply according to the rated voltage class on the nameplate.
		R, S, T (main circuit power input terminals)	Input the main circuit power supply according to the rated voltage class on the nameplate.
		P⊕ D, and C (terminals for connecting external braking resistor)	When an external braking resistor is required (first remove the jumper between P⊕ and D), connect the braking resistor between P⊕ and C.
		N2, N1 (terminals for connecting external reactor)	Terminals N1 and N2 are jumpered by default. To suppress harmonics in the power supply, remove the jumper between terminals N1 and N2 first and connect an external DC reactor between terminals N1 and N2.
		U, V, W (terminals for connecting the servo motor)	Used for wiring of the brake and motor temperature feedback.
③	CN8 (brake and PTC input terminal)		Used for wiring of the brake and PTC.
④	Servo drive grounding terminal		Connected to the grounding terminal of the power supply for grounding purpose.
⑤	CN6 (STO safety function terminal)		Connected to external functional safety signal for functional safety purpose.
⑥	CN11 (24 V backup power input terminal)		Provides power to the control circuit when the main circuit is not powered, maintaining functions such as programming, connecting to backend configuration parameters, and communication.
⑦	LED display		The 5-digit 8-segment LED display is used to show the operation state and parameter setting of the servo.
⑧	Keys		M: Used to switch parameters in sequence. ▲: Increases the value of the blinking digit. ▼: Decreases the value of the blinking digit. ◀◀: Shifts the blinking position leftwards. Press and hold: Goes to the next page when the displayed number exceeds five digits. S: Saves modifications and enters the next menu.
⑨	CN5 (communication terminal)		Supports online upgrade and commissioning with the software tool when the drive is powered on.
⑩	CN3, CN4 (EtherCAT communication terminals)		CN4 (IN): Connected to the master or the last slave device. CN3 (OUT): Connected to the next slave device
⑪	CN1 (control terminal)		Used by reference input signals and other I/O signals.
⑫	CN7 (encoder feedback terminal)		Supports communication-type encoders and pulse-type encoders. Supports gantry synchronization.
⑬	CN2 (encoder feedback terminal)		Supports communication-type encoders. Supports gantry synchronization.

Note

- [1] When the main circuit power input terminals of drives with a voltage class of 200 V are L1, L2, L3, or any two among L1, L2, and L3 in case of single-phase power supplies. The main circuit power input terminals of drives with a voltage class of 400 V are R, S, and T.
- [2] The built-in braking resistor or jumper bar is not available in models S1R6 and S2R8. If an external braking resistor is needed for S1R6 and S2R8 models, connect it between terminals P⊕ and C.
- CN11 (24 V backup power input terminal): supported only by functional safety models and backup power supply models.

2.1.4 Component Description [Functional Safety Models]

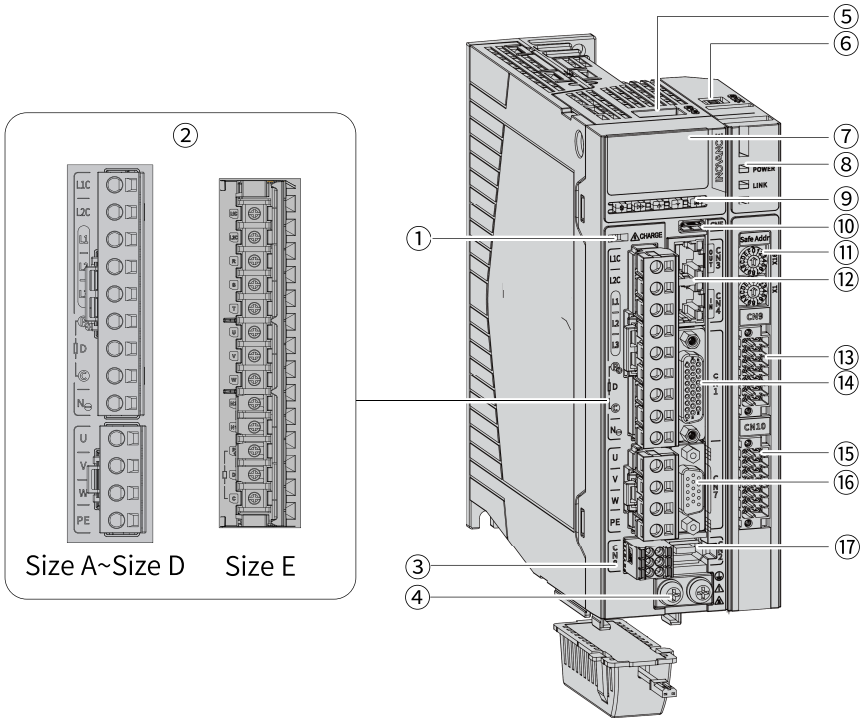


Figure 2-5 Servo drive components

Table 2–3 Description of servo drive components

No.	Component		Description
①	CHARGE (bus voltage indicator)		Indicates that electric charges are present in the bus capacitor. When the indicator turns on, charges possibly still exist in the internal capacitor of the servo unit, even if the power supply of the main circuit is OFF. To prevent electric shocks, do not touch the power supply terminals when this indicator lights up.
② (Size A to size D)	Main circuit terminal	L1C, L2C (control circuit power input terminals)	Input the control circuit power supply according to the rated voltage class on the nameplate.
		Main circuit power input terminals[1]	Input the main circuit power supply according to the rated voltage class on the nameplate.
		P⊕ D, and C (terminals for connecting external braking resistor)[2]	When an external braking resistor is required (first remove the jumper between P⊕ and D), connect the braking resistor between P⊕ and C.
		P⊕ and N⊖ (bus terminals)	Used by the common DC bus for multiple servo drives.
		U, V, W, PE (terminals for connecting the servo motor)	Used to connect the U, V, and W phases and grounding terminal of the motor.
② (Size E)	Main circuit terminal	L1C, L2C (control circuit power input terminals)	Input the control circuit power supply according to the rated voltage class on the nameplate.
		R, S, T (main circuit power input terminals)	Input the main circuit power supply according to the rated voltage class on the nameplate.
		P⊕ D, and C (terminals for connecting external braking resistor)	When an external braking resistor is required (first remove the jumper between P⊕ and D), connect the braking resistor between P⊕ and C.
		N2, N1 (terminals for connecting external reactor)	Terminals N1 and N2 are jumpered by default. To suppress harmonics in the power supply, remove the jumper between terminals N1 and N2 first and connect an external DC reactor between terminals N1 and N2.
		U, V, W (terminals for connecting the servo motor)	Used for wiring of the brake and motor temperature feedback.
③	CN8 (brake and PTC input terminal)		Used for wiring of the brake and PTC.
④	Servo drive grounding terminal		Connected to the grounding terminal of the power supply for grounding purpose.
⑤	CN6 (STO safety function terminal)		Connected to external functional safety signal for functional safety purpose.
⑥	CN11 (24 V backup power input terminal)		Provides power to the control circuit when the main circuit is not powered, maintaining functions such as programming, connecting to backend configuration parameters, and communication.
⑦	LED display		The 5-digit 8-segment LED display is used to show the operation state and parameter setting of the servo.

No.	Component	Description
⑧	Power supply indicator of the safety module	Power: When the safety module is connected and the power supply is normal, the indicator is on. LINK: Safety communication status indicator Steady ON: FSoE is ready; flashing: communication is normal; OFF: FSoE is closed.
⑨	Keys	Switches parameters in sequence. ▲: Increases the value of the blinking bit. ▼: Decreases the value of the blinking bit. ◀◀: Shifts the blinking bit leftwards (Press and hold: Move to the next page when the displayed number exceeds five digits). S: Saves modifications and enters the next menu.
⑩	CN5 (communication terminal)	Supports online upgrade and commissioning with the software tool when the drive is powered on. In USB mode, the terminal only supports download and upload of parameters, and driver firmware update; The terminal uses USB power supply. If there is a fault that cannot be completely reset, disconnect the USB power supply and drive control power, and then power on again.
⑪	FSoE ID address setting knob	Sets ID address of the slave drive for FSoE communication. Address setting method: The number on the upper knob x 16 + the number on the lower knob
⑫	CN3, CN4 (EtherCAT communication terminals)	CN4 (IN): Connected to the master or the last slave. CN3 (OUT): Connected to the next slave.
⑬	CN9 (safety module control terminal A)	Control terminal A of the safety module
⑭	CN1 (control terminal)	Used by reference input signals and other I/O signals.
⑮	CN10 (safety module control terminal B)	Command input and output terminal B of the safety module
⑯	CN7 (encoder feedback terminal)	Supports communication-type encoders and pulse-type encoders. Supports gantry synchronization.
⑰	CN2 (encoder feedback terminal)	Supports communication-type encoders. Supports gantry synchronization.

Note

- [1] When the main circuit power input terminals of drives with a voltage class of 200 V are L1, L2, L3, or any two among L1, L2, and L3 in case of single-phase power supplies. The main circuit power input terminals of drives with a voltage class of 400 V are R, S, and T.
- [2] The built-in braking resistor or jumper bar is not available in models S1R6 and S2R8. If an external braking resistor is needed for S1R6 and S2R8 models, connect it between terminals P⊕ and C.

2.2 MS1-R-INT Series Servo Motor

2.2.1 Models and Nameplate

Model

MS1 H1 - 75B 30C B - A3 3 1 R - INT
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 class** B: 200 V D: 400 V	⑥ **Encoder type** Comprised of one letter and one digit A6: 26-bit multi-turn absolute encoder S6: functional safety type 26-bit multi-turn absolute encoder 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, reducer, and oil sealing** 0: Without oil seal or brake 1: With oil seal, without brake 2: Without oil seal, with brake 4: With oil seal and brake	⑨ **Sub-series No.** R: R version ⑩ **Customized function** INT: International version

Note

- The description of the model only describes the naming conventions and does not recommend the specific motor models. For details of the model selection, see the Model Selection chapter.
- If you have other customized requirements, contact Inovance.

Nameplate description

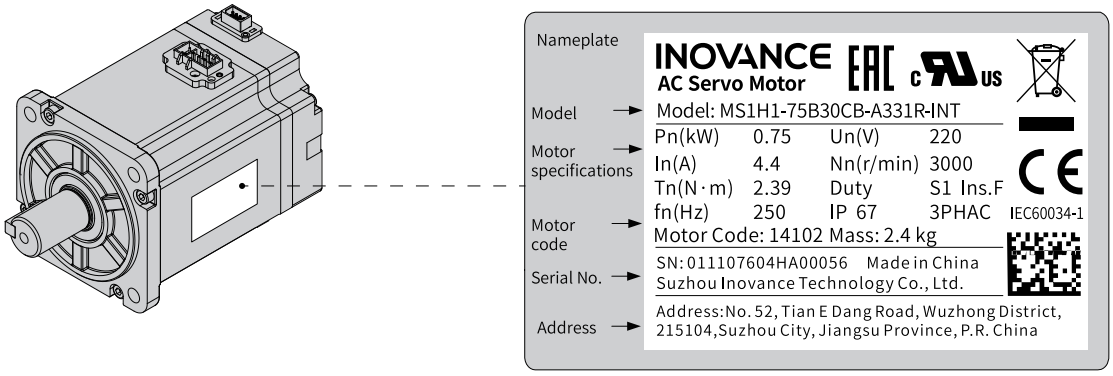


Figure 2-6 Model and Nameplate

2.2.2 Components

Motor (40-flange)

- **Terminal-type servo motor**

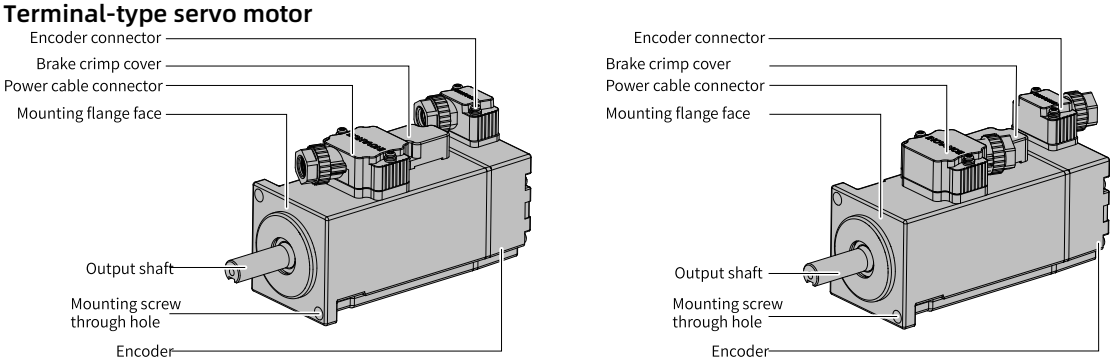


Figure 2-7 Components of terminal-type servo motors (Left: motor with front cable outlet; Right: motor with rear cable outlet)

- **Flying leads type servo motors**

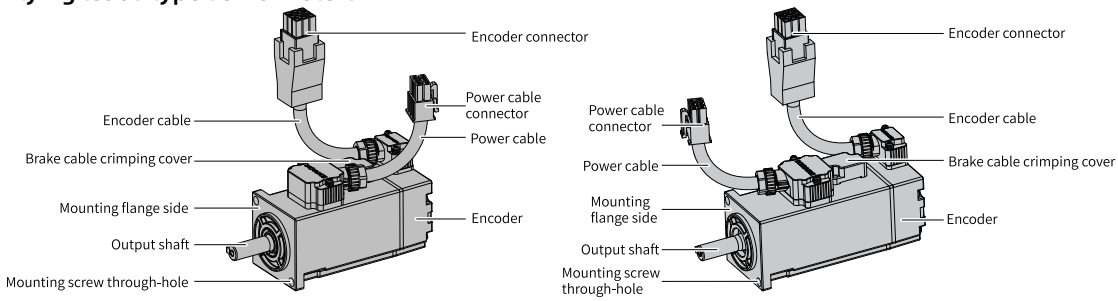


Figure 2-8 Components of the flying leads motor (left: 50 W flying leads motor, right: 100 W flying leads motor)

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**

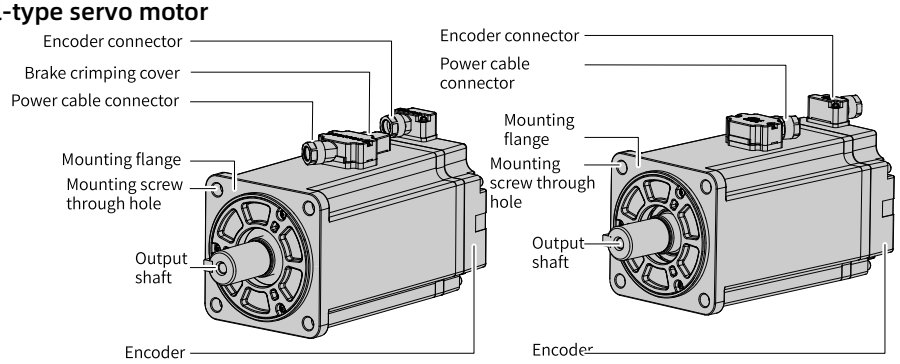


Figure 2-9 Components of terminal-type servo motors (Left: motor with front cable outlet; Right: motor with rear cable outlet)

- **Flying leads type servo motors**

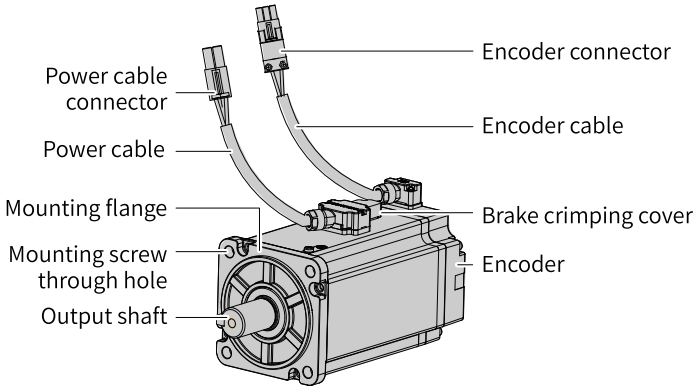


Figure 2-10 Components of the flying leads motor (front cable outlet as standard)

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

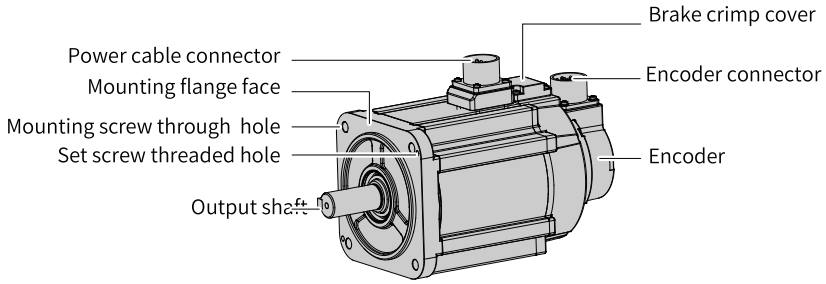


Figure 2-11 Components of servo drives in frame sizes 100/130/180

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

2.3.1 Models and Nameplate

Model Description

MS1 H1 - 75B 30C B - V3 3 1 R - INT
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: x 10 C: x 100 Example: 75B indicates 750 W.
④ **Rated speed (rpm)** Comprised of one letter and two digits B: x 10 C: x 100 Example: 30C indicates 3,000 rpm.	⑤ **Voltage class** B: 200 V D: 400 V	⑥ **Encoder type** Comprised of one letter and one digit V6: Battery-less 26-bit multi-turn absolute encoder V3: Battery-less 23-bit multi-turn absolute encoder
⑦ **Shaft connection mode** 3: Solid shaft, with key and threaded hole	⑧ **Brake, reducer, 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 oil seal and brake	⑨ **Sub-series No.** R: R version ⑩ **Custom function** INT: Global version

Note

- The description of the model only describes the naming conventions and does not recommend the specific motor models. For details of the model selection, see the Model Selection chapter.
- If you have other customized requirements, contact Inovance.

Nameplate description

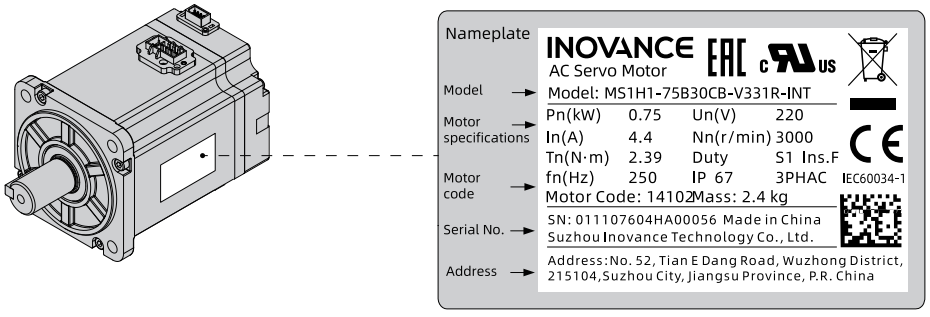


Figure 2-12 Model and Nameplate

2.3.2 Components

Motor (frame sizes 40/60/80)

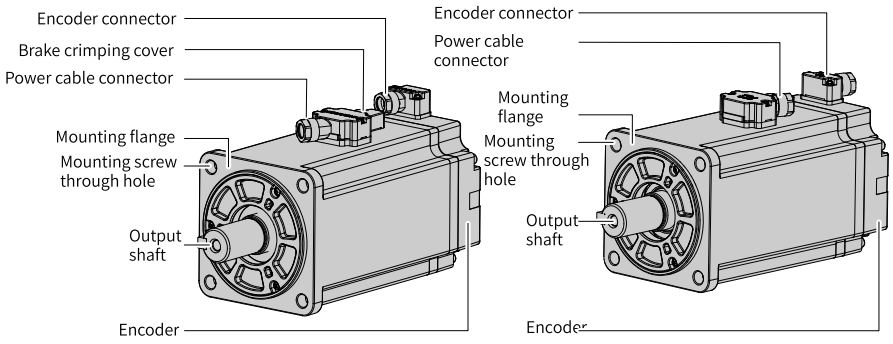


Figure 2-13 Components of servo drives in frame sizes 40/60/80 (Left: motor with front cable outlet; Right: motor with rear cable outlet)

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)

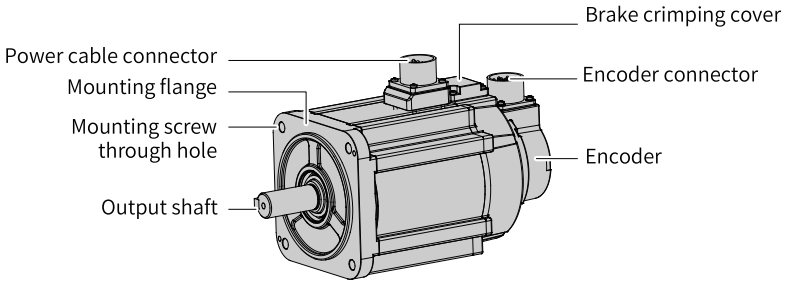


Figure 2-14 Components of servo drives in frame sizes 100/130/180

2.4 ISM Series Torque Motor

2.4.1 Model description

ISM ① T ② 1 ③ - 160 ④ F ⑤ 12A ⑥ B ⑦ - A1 ⑧ 3 ⑨ 3 ⑩ X ⑪ - INT ⑫

① **Product family** ISM: Motor	⑥ **Maximum torque (N·m)** One letter and two digits A: x 1 B: x 10 C: x 100 D: x 1000 E: x 10000 For example, 12A indicates 12 N·m.	⑨ **Installation accuracy** The mechanical deviation must be lower than this value in both the axial and radial directions. 1: Must not exceed 5 μm 2: Must not exceed 10 μm 3: Must not exceed 30 μm
② **Product type** T: torque motor		
③ **Product generation** 1: First generation 2: Second generation		
④ **Flange size** 85: 85 mm diameter 160: 160 mm diameter 208: 208 mm diameter 264: 264 mm diameter	⑦ **Voltage class (V)** B: 200 V D: 400 V	⑩ **Connector type** 1: Connector 2: Cable gland - Straight outlet of 3 m 3: Cable gland - Straight outlet of 0.3 m
⑤ **Basic structure** S: Standard, cylindrical mounting flange F: Flange, rectangle mounting flange	⑧ **Encoder type** One letter and one digit A1: 23-bit single-turn absolute encoder A3: 64-bit sine-cosine absolute encoder with Hiperface A5: 128-bit sine-cosine absolute encoder with Hiperface	⑪ **Cooling method** X: Natural cooling F: Fan cooling L: Water cooling
		⑫ **Model configuration** INT: Global version

2.4.2 Components

ISMT1-160F12AB-A133X-INT

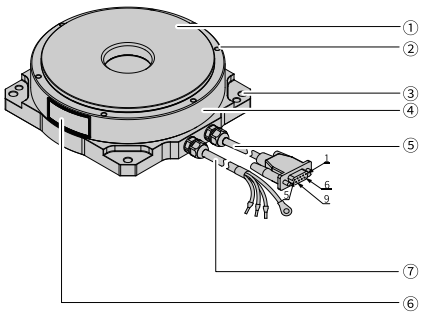
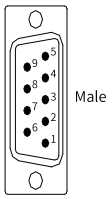


Figure 2-15 Components of ISMT1-160F12AB-A133X-INT

Table 2–4 Motor Components

<table>
<tr><th>No.</th><th>Component</th><th>Description</th></tr>
<tr><td>①</td><td>Mounting flange for rotary platen</td><td>The mounting flange that is used to install the load-side rotary platen.</td></tr>
<tr><td>②</td><td>Rotary platen positioning pin hole</td><td>The positioning pin holes that are used to install the rotary platen.</td></tr>
<tr><td>③</td><td>Stator installation pin hole</td><td>The pin holes that are used to install the stator.</td></tr>
<tr><td>④</td><td>Rotary platen</td><td>The DDR rotor.</td></tr>
<tr><td>⑤</td><td>Signal cable</td><td>
<table>
<tr><td>Pin No.</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>Pin assign-ment</td><td>PS+</td><td>PS-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Pin No.</td><td>6</td><td>7</td><td>8</td><td colspan="2">9</td></tr>
<tr><td>Pin assign-ment</td><td>-</td><td>+5 V</td><td>GND</td><td colspan="2">-</td></tr>
</table>


</td></tr>
<tr><td>⑥</td><td>Nameplate</td><td>The motor specifications.</td></tr>
<tr><td>⑦</td><td>Power cables</td><td>
<table>
<tr><td>Conductor color</td><td>White</td><td>Black</td><td>Red</td><td>Yellow/ Green</td></tr>
<tr><td>Description</td><td>U</td><td>V</td><td>W</td><td>Ground-ing</td></tr>
</table>
</td></tr>
</table>

ISMT1-160F45AB-A133X-INT

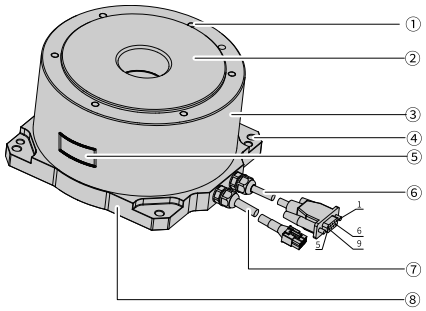
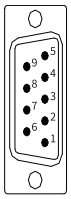


Figure 2-16 Components of ISMT1-160F45AB-A133X-INT

Table 2–5 Motor Components

No.	Component	Description
①	Rotary platen positioning pin hole	The positioning pin holes that are used to install the rotary platen.
②	Mounting flange for rotary platen	The mounting flange that is used to install the load-side rotary platen.
③	Rotary platen	The DDR rotor.
④	Stator installation pin hole	The pin holes that are used to install the stator.
⑤	Nameplate	The motor specifications.

<table>
<tr><th>No.</th><th>Component</th><th>Description</th></tr>
<tr><td>⑥</td><td>Signal cable</td><td>
<table>
<tr><td>Pin No.</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>Pin assign-ment</td><td>PS+</td><td>PS-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Pin No.</td><td>6</td><td>7</td><td>8</td><td colspan="2">9</td></tr>
<tr><td>Pin assign-ment</td><td>-</td><td>+5 V</td><td>GND</td><td colspan="2">-</td></tr>
</table>


</td></tr>
<tr><td>⑦</td><td>Power cables</td><td>
<table>
<tr><td>Conductor color</td><td>White</td><td>Black</td><td>Red</td><td>Yellow/ Green</td></tr>
<tr><td>Description</td><td>U</td><td>V</td><td>W</td><td>Ground-ing</td></tr>
</table>
</td></tr>
<tr><td>⑧</td><td>Stator</td><td>The motor stator.</td></tr>
</table>

2.5 MP Series Torque Motor

2.5.1 Model Description

M P 1 - 112 F 10A B - U3 1 3 X - INT
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫

① **Product family** M: Motor	⑥ **Maximum output torque (N·m)** One letter and two digits A: x 1 B: x 10 C: x 100 D: x 1000 E: x 10000 Example: 12 A: 12 N·m	⑨ **Installation accuracy** The mechanical deviation is lower than this value in both the axial and radial directions. 0: 3 μm max. 1: 5 μm max. 2: 10 μm max. 3: 30 μm max.
② **Product Type** P: Precision torque (direct-drive) motor		
③ **Product code** 1: 1st generation 2: 2nd generation		
④ **Frame size** 112: 112 mm diameter 140: 140 mm diameter 160: 160 mm diameter 175: 175 mm diameter 220: 220 mm diameter	⑦ **Voltage class (V)** B: 200 V D: 400 V	⑩ **Connector type** 1: Metal aviation connector 2: Cable gland - straight entry 3 m (U-type terminal) 3: Cable gland - straight entry 0.3 m (6-pin plastic terminal) 4: Cable gland - straight entry 3 m (U-type terminal)

⑤ **Basic structure**	⑧ **Encoder type**	⑪ **Cooling method**
S: Standard (cylindrical mounting flange) F: Flange (rectangle mounting flange)	One letter and one digit U3: 23-bit single-turn absolute encoder U4: 64-bit sine-cosine Hiperface interface absolute encoder U5: 128-bit sine-cosine Hiperface interface absolute encoder	X: Natural cooling F: Fan cooling L: Water cooling ⑫ **Model configuration** INT: Global version

2.5.2 Components

MP1-175S11BB-U333X-INT

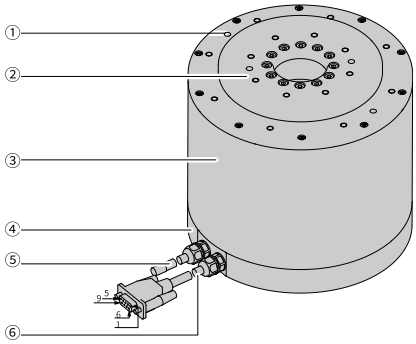
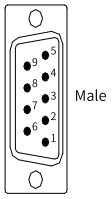


Figure 2-17 Components of MP1-175S11BB-U333X-INT

Table 2–6 Motor components

No.	Name	Remarks
①	Positioning pin hole of motor turntable	Used for mounting the turntable.
②	Mounting flange of the turntable	Used to install the flange to the turntable on the load end.
③	Turntable	DDR motor rotor
④	Stator	DDR motor stator
⑤	Power cable	Conductor color: White / Black / Red / Yellow-green Description: U / V / W / Grounding
⑥	Signal cable	Pin No. 1: Pin assignment PS+; Pin No. 2: PS-; Pin No. 3: -; Pin No. 4: -; Pin No. 5: - Pin No. 6: Pin assignment -; Pin No. 7: +5V; Pin No. 8: GND; Pin No. 9: -  Male

MP1-112F10AB-U313X-INT

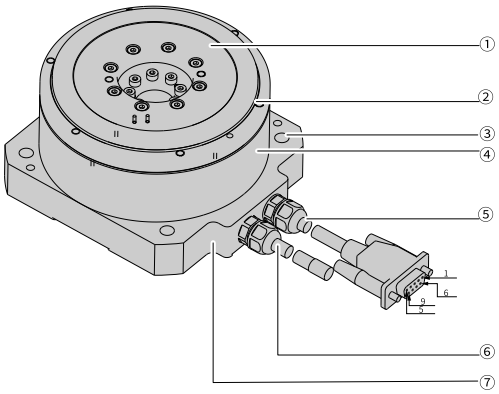
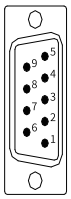


Figure 2-18 Components of MP1-112F10AB-U313X-INT

Table 2–7 Motor components

<table>
<tr><th>No.</th><th>Name</th><th>Remarks</th></tr>
<tr><td>①</td><td>Mounting flange of the turntable</td><td>Used to install the flange to the turntable on the load end.</td></tr>
<tr><td>②</td><td>Positioning pin hole of motor turntable</td><td>Used for mounting the turntable.</td></tr>
<tr><td>③</td><td>Positioning pin hole for stator</td><td>Used for mounting the stator.</td></tr>
<tr><td>④</td><td>Turntable</td><td>DDR motor rotor</td></tr>
<tr><td>⑤</td><td>Signal cable</td><td>
<table>
<tr><td>Pin No.</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>Pin assign-ment</td><td>PS+</td><td>PS-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Pin No.</td><td>6</td><td>7</td><td>8</td><td colspan="2">9</td></tr>
<tr><td>Pin assign-ment</td><td>-</td><td>+5V</td><td>GND</td><td colspan="2">-</td></tr>
</table>


</td></tr>
<tr><td>⑥</td><td>Power cable</td><td>
<table>
<tr><td>Conductor color</td><td>White</td><td>Black</td><td>Red</td><td>Yellow-green</td></tr>
<tr><td>Description</td><td>U</td><td>V</td><td>W</td><td>Ground-ing</td></tr>
</table>
</td></tr>
<tr><td>⑦</td><td>Stator</td><td>DDR motor stator</td></tr>
</table>

MP1-220S30BD-U323L-INT

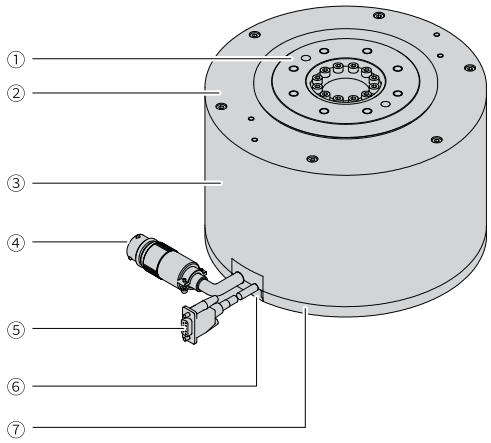
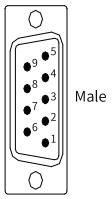


Figure 2-19 Components of MP1-220S30BD-U323L-INT

Table 2–8 Motor components

<table>
<tr><th>No.</th><th>Name</th><th>Remarks</th></tr>
<tr><td>①</td><td>Load mounting flange</td><td>Used to install the mounting flange on the load end.</td></tr>
<tr><td>②</td><td>Front end cover</td><td>Front end cover of the DDR motor stator</td></tr>
<tr><td>③</td><td>Enclosure</td><td>Stator enclosure of the DDR motor</td></tr>
<tr><td>④</td><td>Power cable</td><td>
<table>
<tr><td>Conductor color</td><td>White</td><td>Black</td><td>Red</td><td>Yellow-green</td></tr>
<tr><td>Description</td><td>U</td><td>V</td><td>W</td><td>Ground-ing</td></tr>
</table>
</td></tr>
<tr><td>⑤</td><td>Signal cable</td><td>
<table>
<tr><td>Pin No.</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>Pin assign-ment</td><td>PS+</td><td>PS-</td><td>-</td><td>PTC+</td><td>P-T-C-</td></tr>
<tr><td>Pin No.</td><td>6</td><td>7</td><td>8</td><td colspan="2">9</td></tr>
<tr><td>Pin assign-ment</td><td>-</td><td>+5V</td><td>GND</td><td colspan="2">-</td></tr>
</table>


</td></tr>
<tr><td>⑥</td><td>Crimping block</td><td>Cable limit parts</td></tr>
<tr><td>⑦</td><td>Frame size</td><td>DDR motor mounting base</td></tr>
</table>

2.6 LMC Linear Module

2.6.1 Model Description

LM C 1 - E 1 2 - 0500 PXX X - 6 003 F P 1 1 - N 221227 - INT
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭ ⑮ ⑯ ⑰ ⑱

① Product family

LM: Linear module

② Product type

C: Compact

③ Product iteration

1: First generation

2: Second generation

④ Flange size

A: 110 mm

B: 140 mm

C: 170 mm

D: 210 mm

E: 88 mm

F: 118 mm

G: 168 mm

H: 188 mm

K: 228 mm

L: 120 mm

⑤ Number of rotors

1: 1

2: 2

⑥ Color

1: Natural color

2: Black

⑩ Feedback type

1: 0.1 μm grating

2: 0.5 μm grating

3: 1 μm grating

4: 1 μm magnetic grating

5: Inovance communication-type absolute optical scale

6: Inovance communication-type magnetic scale

7: Inovance communication-type incremental optical scale

8: Others

9: Third-party RU2 series incremental grating with a resolution of 0.1 μm

A: third-party RU2 series incremental grating with a resolution of 0.5 μm

B: Third-party RU2 series incremental grating with a resolution of 1 μm

C: Third-party ABS series BiSS-C absolute grating with a resolution of 0.05 μm

D: Third-party ABS series BiSS-C absolute grating with a resolution of 0.1 μm

E: Third-party ABS series BiSS-C absolute grating with a resolution of 0.5 μm

F: Inovance ELOI series TTL incremental grating with a resolution of 0.05 μm

G: Inovance ELOI series TTL incremental grating with a resolution of 0.1 μm

H: Inovance ELOI series TTL incremental grating with a resolution of 0.5 μm

J: Inovance ELOI series TTL incremental grating with a resolution of 1 μm

⑬ Optoelectronic switch

Q: No optoelectronic switch

N: NPN type

P: PNP type

⑭ Guideway brand

1: THK

2: HIWIN

3: WON

4: SBC

⑮ Drag chain, side protective plate, and centralized lubrication system

0: Not equipped with a drag chain, a side protective plate, or a centralized lubrication system

1: Equipped with a vertical drag chain, without a side protective plate or a centralized lubrication system

2: Not equipped a drag chain or a centralized lubrication system, but with a side protective plate

3: Equipped with a vertical drag chain, a side protective plate, but without a centralized lubrication system

4: Not equipped with a drag chain or a side protective plate, but with a centralized lubrication system

5: Equipped with a vertical drag chain and a centralized lubrication system, but with a side protective plate

6: Not equipped with a drag chain, but with a side protective plate and a centralized lubrication system

7: Equipped with a vertical drag chain, a side protective plate, and a centralized lubrication system

⑦ **Itinerary** 0500: Active travel of 500 mm for single-rotor motors and 500 mm for multi-rotor motors	⑪ **Cable length** 003: 0.3 m 030: 3 m	⑯ **Design type** N: Normal R: Right mirror L: Left mirror
⑧ **Motor code** PXX: For details, see the motor code comparison table.	⑫ **Drive and Hall sensor** F: Without a Hall sensor, but with an SV680-INT N-type drive (200 V input) H: With a Hall sensor and an SV680-INT N-type drive (200 V input) L: Without a Hall sensor, but with an SV680-INT N-type drive (400 V input) N: With a Hall sensor and an SV680-INT N-type drive (400 V input)	⑰ **Design date** 221227: Date of the initial plan
⑨ **Motor wiring** 1: Y1 2: Y2 3: Y3 4: Y4 5: Y5 6: Y6		⑱ **Model/Type** INT: International version

2.6.2 Components

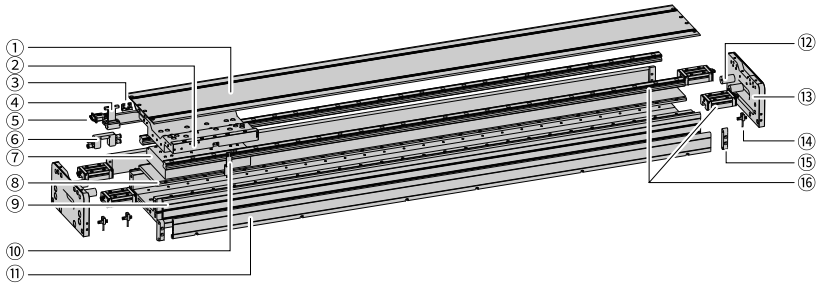


Figure 2-20 Components of LMC series linear motor

No.	Name	Remarks	No.	Name	Remarks
①	Dust-proof cover	Used to prevent dust.	⑨	Base	Indicates the linear module base.
②	Sliding table	Used to install the working load.	⑩	Photosensitive film	Detects light signals.
③	Clamp fixing block	Used to secure the wire harness.	⑪	Side protective plate	Used in the area in the protective side.
④	Mounting base of the read head	Used to hold the read head.	⑫	Urethane rubber	Used to dampen the shock of the motor.
⑤	Encoder	Used in a position feedback system.	⑬	End plate	Used for end protection and easy handling.
⑥	Centralized oil injection system	Used to supply the lubricating oil.	⑭	Optoelectronic switch	Software position limit
⑦	Integrated potting of the rotor	Provides driving force.	⑮	Fixing block on the side plate	Used to secure the components on the side plate.
⑧	Stator	Provides magnetic field.	⑯	Rail slider	Ensures linear motion of the rotor.

3 System Connection

3.1 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 start or stop the motor by using the electromagnetic contactor. As a high-inductance device, the motor may generate transient high voltage that may break down the contactor.
- When connecting an external power supply to the control circuit or a 24 VDC power supply, pay attention to the power capacity as insufficient power capacity will lead to insufficient supply current, resulting in failure of the servo drive or the brake. This is especially true when the power supply is used to power up multiple servo drives or brakes. The brake must be powered up by a 24 VDC power supply that matches the motor model and meets the brake power requirements.



Observe the following precautions when connecting the external braking resistor:

- The built-in braking resistor or jumper bar is not available in model S2R8. If an external braking resistor is required, connect it between terminals P ⊕ and C.
- Remove the jumper between terminals P ⊕ and D before using the external braking resistor. Failure to comply will result in overcurrent and damage the braking transistor.
- Do not connect the external braking resistor directly to the positive or negative pole of the bus. Failure to comply will damage the drive and result in a fire.
- Select a resistor with resistance higher than or equal to the minimum allowable value. Failure to comply will result in Er.201 (overcurrent) or damage the drive.
- Before you operate the servo drive, make sure that parameters H02.25 (braking resistor setting), H02.26 (power of external braking resistor), and H02.27 (resistance of external braking resistor) are properly set.
- Install the external braking resistor on incombustible matters, such as metal.

3.2 System connection diagram

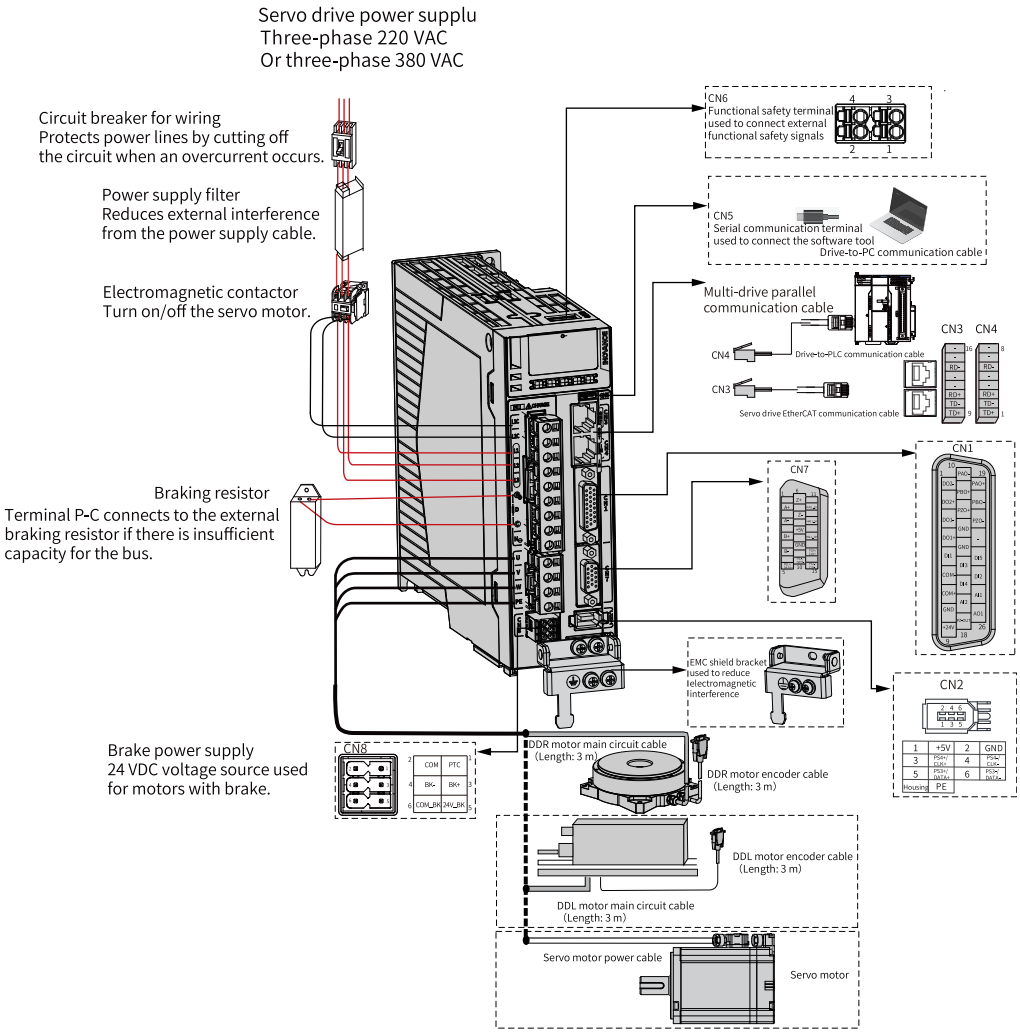


Figure 3-1 System connection diagram

Note

- CN2 is used as the encoder terminal when an Inovance rotary servo motor is connected. CN7 is used when a direct drive or purchased motor is connected.
- When an external braking resistor is required, remove the jumper bar between P⊕ and D, and connect the braking resistor between P⊕ and C. If an external braking resistor is not required, do not remove the jumper bar between P⊕ and D. Only Size A does not come with a built-in resistor or jumper bar between P⊕ and D as standard. Before use, ensure that the braking resistor parameters H02.25, H02.26, and H02.27 are set correctly.

4 Servo Technical Specifications

4.1 Electrical Specifications

- Single-phase 200V drive

Item		Size A		Size C		Size D
Drive model		S1R6	S2R8	S5R5	S7R6	S012
Drive power (kW)		0.2	0.4	0.75	1.0	1.5
Max. applicable motor capacity (kW)		0.2	0.4	0.75	1.0	1.5
Power supply capacity (kVA)		1.4	2.8	4.6	6.0	8.0
Continuous output current (Arms)		1.6	2.8	5.5	7.6	12.0
Max. output current (Arms)		5.8	10.1	16.9	23.0	32.0
Main circuit	Continuous input current (Arms)	2.3	4.0	7.9	9.6	12.8
	Main circuit power supply	Single-phase 200 VAC–240 VAC, -10% to +10%, 50 Hz/60 Hz				
	Heat generation (W)[1]	12	23.8	38.2	47.32	69.84
Control circuit	Control circuit power supply	Single-phase 200 VAC–240 VAC, -10% to +10%, 50 Hz/60 Hz				
	Heat generation (W)[2]	16				
Backup power supply circuit for control circuit[3]	Power input range	24 VDC ± 15% (powered by SELV/PELV[4])				
	Power of external power supply	≥ 50 W				
Braking Resistor	Resistance (Ω)	Optional	Optional	50	25	25
	Resistor power (W)	Optional	Optional	50	80	80
	Min. resistance of external braking resistor (Ω)	40	40	40	20	15
	Maximum braking energy absorbed by capacitor (J)	9.3	18.59	32.42	32.42	47.68
	Braking resistor	All models in the series support built-in and external braking resistors, but Size A does not come with a built-in braking resistor as standard.				
Cooling method		Natural ventilation		Air cooling		
Overvoltage category		III				
Max. input surge current at power-on (A)		18.65	18.65	9.325	9.325	12.433
3τ (ms) (3 × RC time constant)[5]		23.4	46.8	163.2	163.2	180

Note

- The main circuit of S1R6, S2R8, S5R5, S7R6, and S012 servo drives support single-phase 200 V power supplies without derating.
- The maximum braking energy that can be absorbed by capacitors is calculated based on the rated input of 220 VAC.

- Three-phase 200 V drives

Item		Size A		Size C		Size D	Size E		
Drive model		S1R6	S2R8	S5R5	S7R6	S012	S018	S022	S027
Drive power (kW)		0.2	0.4	0.75	1.0	1.5	2.0	3.0	5.0
Max. applicable motor capacity (kW)		0.2	0.4	0.75	1.0	1.5	2.0	3.0	5.0
Power supply capacity (kVA)		1.21	2.42	3.84	5.05	6.68	8.33	10.42	20.08
Continuous output current (Arms)		1.6	2.8	5.5	7.6	12.0	18.0	22.0	27.0
Max. output current (Arms)		5.8	10.1	16.9	23.0	32.0	45	55	67.5
Main circuit	Continuous input current (Arms)	1.1	2.3	4.4	5.1	8.0	8.7	11.0	23.8
	Main circuit power supply	3-phase 200 VAC–240 VAC, -10% to +10%, 50 Hz/60 Hz							
	Heat generation (W)[1]	12	23.8	38.2	47.32	69.84	120	125	200
Control circuit	Control circuit power supply	Single-phase 200 VAC–240 VAC, -10% to +10%, 50 Hz/60 Hz							
	Heat generation (W)[2]	16							
Backup power supply circuit for control circuit[3]	Power input range	24 VDC ± 15% (powered by SELV/PELV[4])							
	Power of external power supply	≥ 50 W							
Braking Resistor	Resistance (Ω)	Optional	Optional	50	25	25	20	20	20
	Resistor power (W)	Optional	Optional	50	80	80	100	100	100
	Min. resistance of external braking resistor (Ω)	40	40	40	20	15	20	20	20
	Maximum braking energy absorbed by capacitor (J)	9.3	18.59	32.42	32.42	47.68	78.19	114.43	114.43
	Braking resistor	All models in the series support built-in and external braking resistors, but Size A does not come with a built-in braking resistor as standard.							
Cooling method		Natural ventilation		Air cooling					
Overvoltage category		III							
Max. input surge current (A)		18.65	18.65	9.325	9.325	12.433	12.433	12.433	12.433
3τ (ms) (3 × RC time constant)[5]		23.4	46.8	163.2	163.2	180	295.2	432	432

Note

The maximum braking energy that can be absorbed by capacitors is calculated based on the rated input of 220 VAC.

- Three-phase 400 V drive

Item		Size B		Size C		Size D		Size E		
Drive model		T1R4	T2R3	T3R5	T5R4	T8R4	T012	T017	T021	T026
Drive power (kW)		0.4	0.75	1.0	1.5	2.0	3.0	5.0	6.0	7.5
Max. applicable motor capacity (kW)		0.4	0.75	1.0	1.5	2.0	3.0	5.0	6.0	7.5
Power supply capacity (kVA)		3.4	5.96	6.05	9.08	10.23	15.15	22.25	25.0	31.25
Continuous output current (Arms)		1.4	2.3	3.5	5.4	8.4	12.0	17.0	21.0	26.0
Max. output current (Arms)		6.2	9.5	11.0	14.0	20.0	30.0	42.5	52.5	65.0
Main circuit	Continuous input current (Arms)	1.0	1.8	2.4	3.6	5.6	8.0	12.0	16.0	21.0
	Main circuit power supply	3-phase 380VAC–480 VAC, -10% to +10%, 50 Hz/60 Hz								
	Heat generation (W)[1]	16.75	26.7	39.5	63.25	94.82	135.47	187.62	228.28	258.63
Control circuit	Control circuit power supply	Single-phase 380VAC–480 VAC, -10% to +10%, 50 Hz/60 Hz								
	Heat generation (W)[2]	16								
Backup power supply circuit for control circuit[3]	Power input range	24 VDC ± 15% (powered by SELV/PELV[4])								
	Power of external power supply	≥ 50 W								
Braking Resistor	Resistance (Ω)	100	100	100	100	50	50	35	35	35
	Resistor power (W)	50	50	80	80	80	80	100	100	100
	Min. resistance of external braking resistor (Ω)	80	60	80	60	45	40	35	25	25
	Maximum braking energy absorbed by capacitor (J)	25.58		36.06	43.79	64.40	64.40	105.62	154.56	154.56
	Braking resistor	Built-in braking resistor		All the models support built-in and external braking resistors.						
Cooling method		Air cooling								
Overvoltage category		III								

Item	Size B		Size C		Size D		Size E		
Max. input surge current (A)	17.72	17.72	18.65	18.65	24.867	24.867	24.867	24.867	24.867
3τ (ms) (3 × RC time constant)[5]	23.4		33.6	40.8	45	45	73.8	108	108

Note

The maximum braking energy that can be absorbed by capacitors is calculated based on the rated input of 400 VAC.

Note

- [1]: Main circuit heat generation refers to the amount of heat generated under rated output current of the servo drive.
- [2] Control circuit heat generation refers to the heat generated under rated input current of the servo drive.
- [3] This power supply is applicable only to PINT models with backup power supplies.
- [4] If you use safety functions and a 24 V backup power supply, use SELV and PELV to maintain power supplies. SELV and PELV comply with voltage protection standards for different scenarios. SELV refers to safety extra-low voltage in an isolated system, while PELV refers to protective extra-low voltage in a protective grounding system.
- [5] RC time constant = Buffer resistor R × Bus capacitor C, which is used to indicate the power-on time (when the bus voltage reaches the stable state after a time of 3τ.
- Select an external braking resistor according to the actual operating conditions. For selection of the braking resistor, see *"6.5 Braking Resistor" on page 191*.

4.2 Technical Specifications

Item			Description
Basic specifications	Control mode		IGBT SVPWM control, sine wave current drive mode
			200 V, 400 V: Single-phase/Three-phase full bridge rectification
	Encoder feedback		Supports Inovance 23-bit/26-bit multi-turn absolute encoders and 26-bit functional safety encoders (the drive must be of the functional safety type). Other supported encoder types: **DDL motor**Inovance communication encoders, sin-cos analog encoder, ABZ incremental encoders (with TTL signal), BiSS-C encoder, SSI encoder, and EnDat 2.2 encoder **DDR motor:**Inovance communication encoders, sin-cos analog encoder, ABZ incremental encoders (with TTL signal), BiSS-C encoder, SSI encoder, and EnDat 2.2 encoder **Servo motor:**Inovance communication encoder, sin-cos analog encoder, ABZ incremental encoder (with TTL signal), BiSS-C encoder, EnDat 2.2 encoder, SSI encoder, Nikon encoder, and TAMAGAWA encoder You can use the Inovance multi-turn absolute encoder as an incremental encoder if you remove the battery. **Note:**For details, see "Debug Objects" in*SV680N-INT Series Servo Quick Start Guide*.
	Conditions for use	Operating/Storage temperature[1]	0℃ to 55℃ (average load ratio not exceeding 80% in ambient temperatures between 45℃ to 55℃) (non-freezing)/-40℃ to 70℃
		Use/Storage humidity	Below 90% RH (no condensation)
		Vibration resistance	Operation: • Displacement amplitude: 5 Hz to 8.4 Hz: 3.5 mm • Acceleration amplitude: 1 g between 8.4 Hz and 200 Hz Product package: • 5 Hz–100 Hz: 0.01g^2/Hz • 200Hz: 0.001 g^2/Hz • Grms = 1.14 g
		Impact resistance	19.6 m/s^2
		IP rating	IP20 Note: Terminals are excluded, which have an IP rating of IP00.
		Pollution degree	PD2
		Protection class	class I
		Altitude	The maximum altitude is 2000 m. • 1000 m and below: no derating. • Derating is required for altitudes above 1000 m (derate 1% for every additional 100 m) • If the altitude exceeds 2,000 m, contact Inovance

Item				Description
Speed/ Torque control mode	Performance	Speed control range		1 rpm to 10000 rpm (Under the rated torque load, the drive can keep running as long as the lower limit of the speed control range is not exceeded.)
		Torque control accuracy[2]		±1%
	Input signal	Speed reference input	EtherCAT communication mode	CSV/PV mode
			Analog reference; digital reference (H06.03)	
		Torque reference input	EtherCAT communication mode	CST/PT mode
			Analog reference; digital reference (H07.03)	
Position control mode	Input signal	EtherCAT communication mode		CSP mode/PP mode/HM mode
	Output forms			Phase A, phase B: differential output
				Phase Z: differential output or open collector output
	Position output	Frequency division ratio		Any frequency division
Input/ Output signal	DI signal	DI signal function assignment		5 DIs DI1–DI3: normal DI (rising edge (24 V input low to high) input delay: 50 us, falling edge (24 V input high to low) input delay: 200 us, voltage range: 20 V–30 V) DI4–DI5: fast DI (rising edge (24 V input low to high) input delay: 10 us, falling edge (24 V input high to low) input delay: 50 us, voltage range: 20 V–30 V)
	DO signal	Output signal function assignment		2 DOs With-load capacity: 50 mA; voltage range: 5 V to 30 V
	AI signal			AI1 voltage input: 16-bit, -10 V to +10 V; max. allowable voltage: ±12 V Sampling frequency: 4 kHz
				AI2 voltage input: 12-bit, -10 V to +10 V; max. allowable voltage: ±12 V Sampling frequency: 4 kHz
	AO signal			AO1 voltage output range: -10 V to +10 V Output frequency: 4 kHz

Item			Description
Built-in functions	Overtravel (OT) prevention		The drive stops immediately when P-OT or N-OT signal is active.
	Electronic gear ratio		0.001 ≤ B/A ≤ 26843545.6
	Protection functions		Including protections against overcurrent, overvoltage, undervoltage, overload, main circuit detection error, heatsink overheat, power phase loss, overspeed, encoder error, CPU error, parameter error, and other errors.
	Safety function	Safety function categories	STO (standard)/SS1/SBC/SOS/SS2/SLS/SDI/SSM[3]
		Applicable standard	IEC61800-5-2:2016
	LED display		Main circuit CHARGE indicator, 5-digit LED display
	Vibration suppression		5 notches (including two adaptive notches) available, 50 Hz to 8000 Hz
	Usability functions		One-key parameter tuning, adaptive parameter tuning, intelligent parameter tuning, speed observer, and model tracking
	Communication function	Software tool commissioning	Type-C
		Multi-station communication	EtherCAT, FSOE[3]
		Number of multi-station communication axes	Maximum number of slaves: 65535
		Axis address setting	Without physical knob, 0 to 65535 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.
	Other manufacturers		Gain adjustment, alarm record, jog running

Note

- [1] Install the servo drive within the allowable ambient temperature range. When it is installed inside a control cabinet, the temperature inside the cabinet must also be within this range.
- [2]: Under standard working conditions, the use of an Inovance servo motor can achieve a torque control precision of ±2%.
- [3] For S models only.

4.3 Communication Standards

EtherCAT communication specifications

Item		Specification
Basic performance of slave	Communication protocol	EtherCAT protocol
	Service supported	CoE (PDO, SDO)
	Synchronization mode	DC - Distributed clock FreeRun
	Physical layer	100Base-TX
	Baud rate	100Mbit/s (100Base-TX)
	Duplex mode	Full duplex
	Topology	Ring, linear, star, and tree
	Transmission medium	Shielded cables of Cat 5e or higher
	Transmission distance	Shorter than 100 m between two nodes (with proper environment and cables)
	Number of slaves	Up to 65535 by protocol
	EtherCAT frame length	44 bytes to 1498 bytes
	Process data	A maximum of 1486 bytes per Ethernet frame
	Synchronous jitter of two slaves	< 1 μs
	Min. sync period	250 μs
	Bit error rate	10^{-10}Ethernet standard
Configuration unit	Number of FMMU units	8
	Number of storage synchronization management units	8
	Process data RAM	8 kB
	Distributed clock	64-bit
	EEPROM capacity	32-kbit

4.4 Dynamic Brake Characteristic Curve

Calculating the approximate dynamic braking distance

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

Maximum braking distance s (turn):

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

The coefficient is as follows:

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

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

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

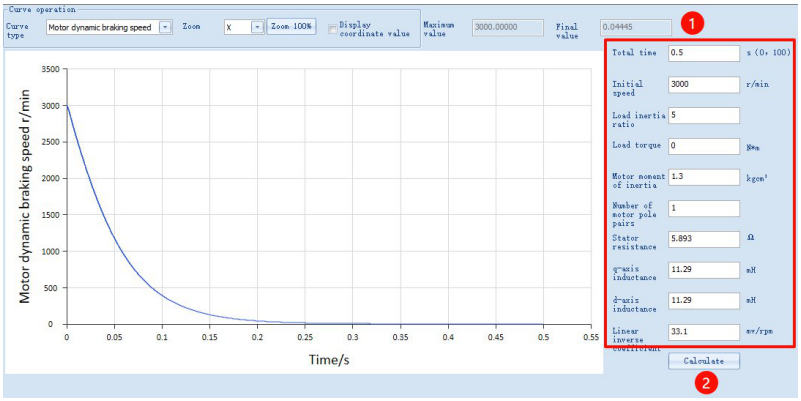
- V_0: Maximum feedback speed
- t_e: Dynamic brake program and relay delay
- J_L: Load moment of inertia
- J_M: Motor moment of inertia
- P_n: Number of motor pole pairs
- R_s: Stator resistance (Ω)
- Ke: Kelvin, unit of thermodynamic temperature
- L_q, L_d: q-axis inductance (mH), d-axis inductance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

Calculating accurate dynamic braking distance

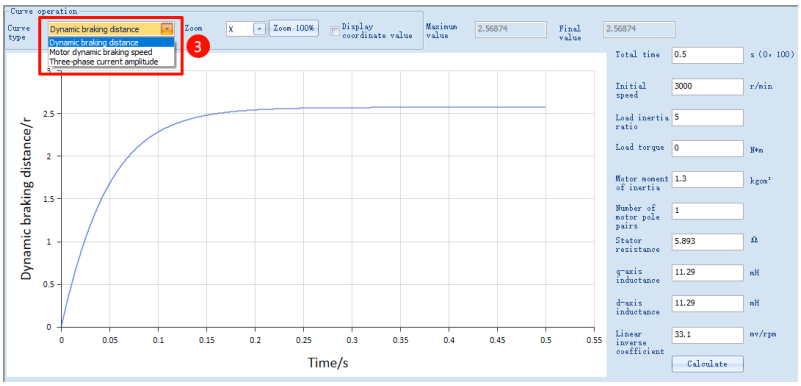
Use InoDriverShop to calculate the accurate dynamic braking distance.

Procedure:

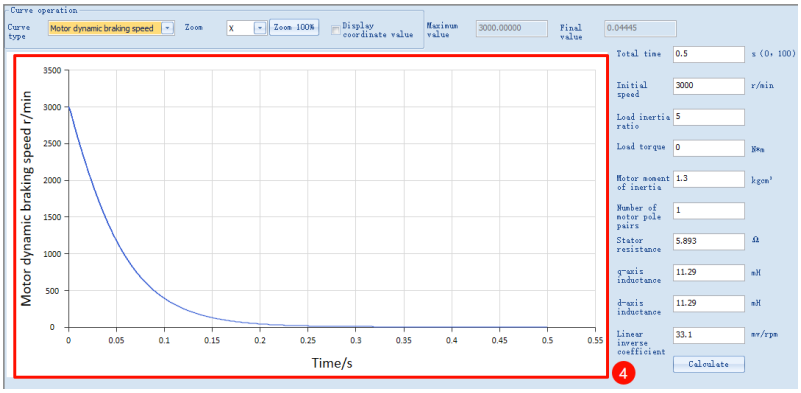
1. Set the corresponding parameters at ① according to actual motor, load, and operation parameters. The time range of the x-coordinate of the calculation chart can be adjusted by setting the total time.
2. After parameter setting is done, click "Calculate" at ② to generate dynamic braking measurement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



Applicable scenario:

To trigger dynamic braking at a motor speed of 3000 rpm and estimate how long can the motor stop (speed reduced to 0 rpm), perform 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 inertia of the load. The larger the load moment of inertia is, the weaker the responsiveness is. An excessively high inertia may result in unstable motion. The allowable load moment of inertia () of the motor is restricted. This value is provided strictly as a guideline and results depend on the motor driving conditions.

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

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

Caution

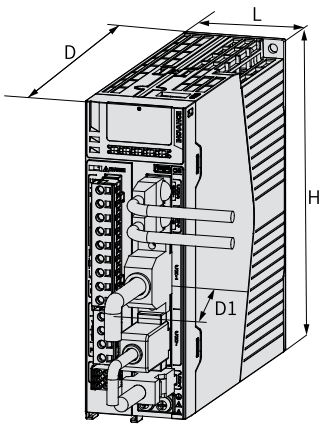
- Drives below 400 W does not provide a built-in braking resistor.
- Even if you use a built-in resistor, the energy generated in some conditions will exceed the allowable capacity loss (W) of the resistor. Therefore, an external braking resistor is required.

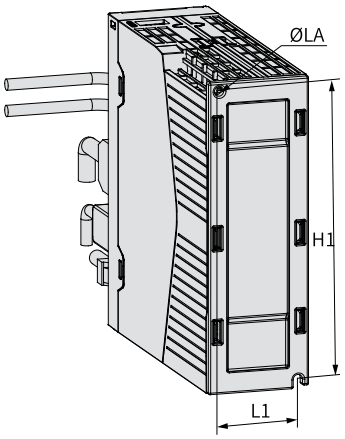
Table 4–1 Allowable load moment of inertia

Motor speed	Size A		Size B		Size C				Size D			Size E					
	S1R6	S2R8	T1R4	T2R3	S5R5	S7R6	T3R5	T5R4	S012	T8R4	T012	S018	S022	S027	T017	T021	T026
1,500 rpm	x 20																
3,000 rpm	x 20											x 10					
4,500 rpm	x 20											x 5					Not supported
6,000 rpm	x 20											x 5					Not supported
7,000 rpm	x 20		Not supported		x 20			Not supported									

Note: *Motor speed* indicates the maximum speed supported by the motor of the drive. For example, MS1H1/H4 supports 7,000 rpm, MS1H2 supports 6,000 rpm, and MS1H3 supports 4,500 rpm. When the speed exceeds 10 times of the inertia, an sufficient acceleration/deceleration time will cause drive alarms.

4.6 Product Dimensions





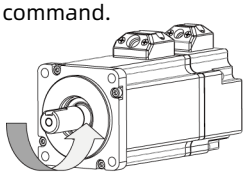
Size	L	H	D	L1	H1	D1	Φ LA	Recommended tightening torque	Weight
	Unit: mm (in.)							Unit: (N·m)	Unit: (kg)
A	45.5 (1.79)	170 (6.69)	150 (5.91)	33 (1.30)	161 (6.34)	75 (2.95)	2 × M4	1.2	0.96
B	45.5 (1.79)	170 (6.69)	180 (7.09)	34 (1.34)	160 (6.30)	75 (2.95)	2 × M4	1.2	1.2
C	55 ± 1 (2.17 ± 0.04)	170 (6.69)	173 ± 1 (6.81 ± 0.04)	44 (1.73)	160 (6.30)	75 (2.95)	2 × M4	1.2	1.3
D	80 ± 1 (3.15 ± 0.04)	170 (6.69)	183 (7.20)	71 (2.80)	160 (6.30)	75 (2.95)	3 × M4	1.2	1.8
E	90 (3.54)	250 (9.84)	230 (9.06)	78 (3.07)	240.5 (9.47)	75 (2.95)	4 × M4	1.2	3.6

5 Motor Technical Specifications

5.1 MS1-R-INT Series Servo Motor

5.1.1 General Specifications

5.1.1.1 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 (200 V class) 1800 VAC, 1 minute (400 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 *"5.1.1.3 Derating Characteristics" on page 62*. 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.

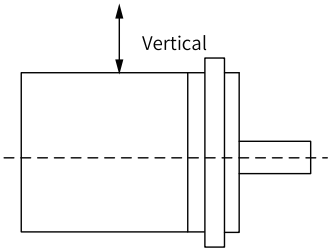


Figure 5-1 Shock applied to the servo motor

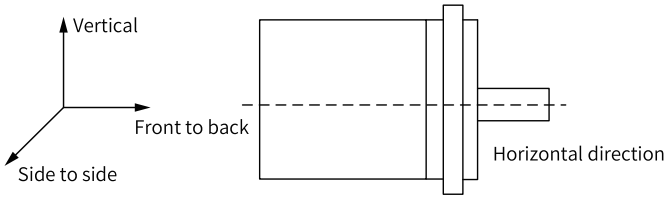


Figure 5-2 Vibration applied to the servo motor

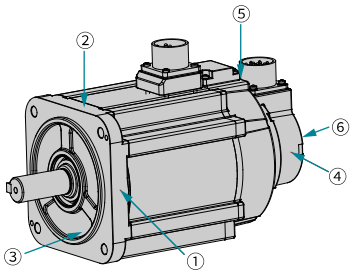


Figure 5-3 Max. allowable vibration limit of the motor

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.

5.1.1.2 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

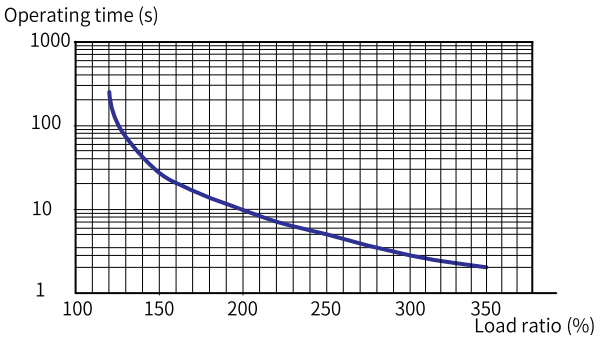


Figure 5-4 MS1H1/H4 (frame size 40/60/80) series motor overload curve

Note

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

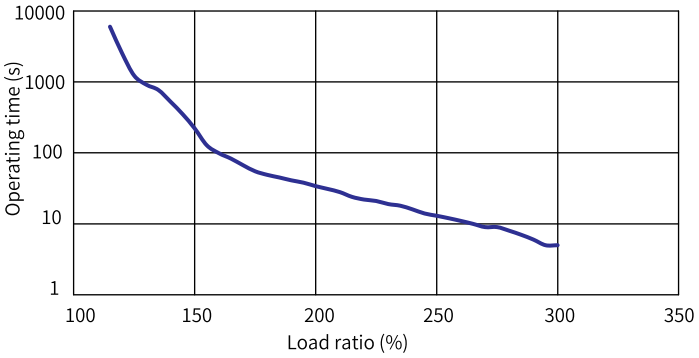


Figure 5-5 Overload curve of MS1H2 and MS1H3 series motors

Note

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

- **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

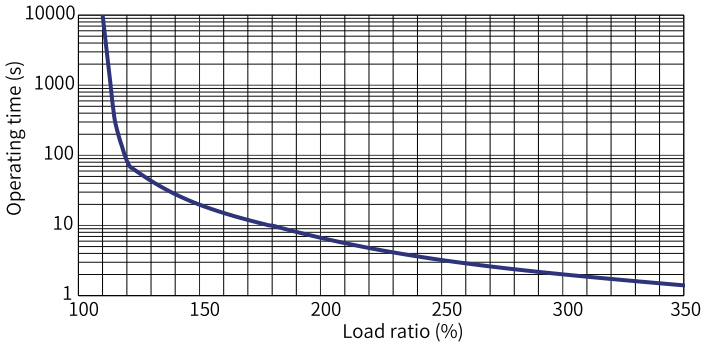


Figure 5-6 Overload curve of MS1H1-03B30CB-U210R-S series motors

5.1.1.3 Derating Characteristics

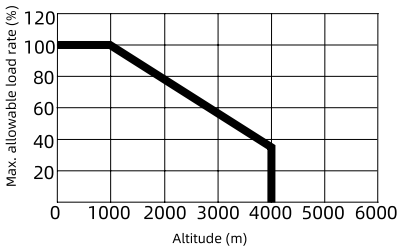
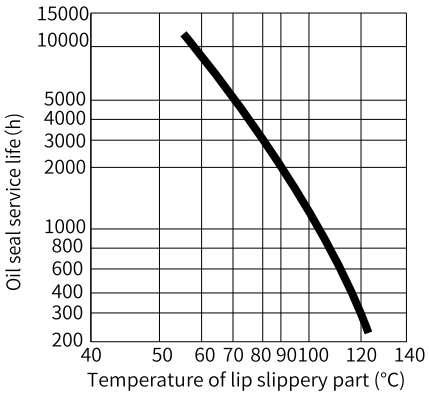


Figure 5-7 Altitude-based derating curve

5.1.1.4 Temperature Curve of the Oil Seal



5.1.1.5 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.

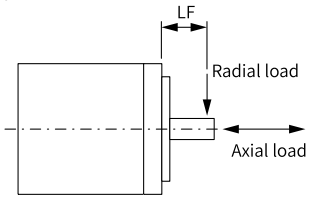
Caution

- 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.

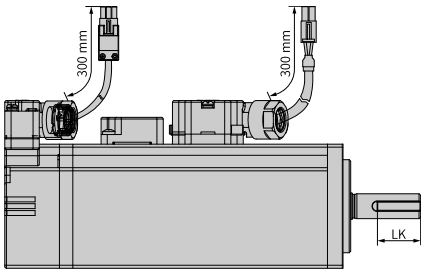
5.1.2 Model Selection (MS1-R-INT Series Servo Motor)

5.1.2.1 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.



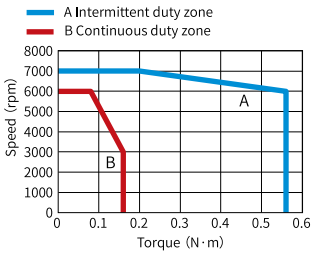
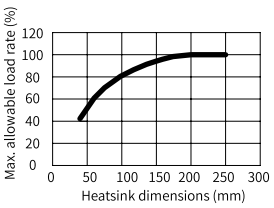
- As shown in the preceding figure, the product is marked with an LK value in the dimension diagram in the section of each model. LK indicates the length of the shaft key.
- MS1H3 (130-flange and 180-flange) comes with a key slot. When the operating speed is above 3000 rpm, the motor must run with the 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.

5.1.2.2 Low Inertia and Small Capacity (MS1H1)

5.1.2.2.1 MS1H1-05B30CB-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	40		
Inertia, capacity	Low inertia, small capacity		
Rated power (kW)	0.05		
Rated voltage (V)	220		
Rated torque (N·m)	0.16		
Maximum torque (N·m)	0.56		
Rated 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 ($kg·cm^2$)	Motor without brake	0.018 ± 10%	
	Motor with brake	0.0208 ± 10%	

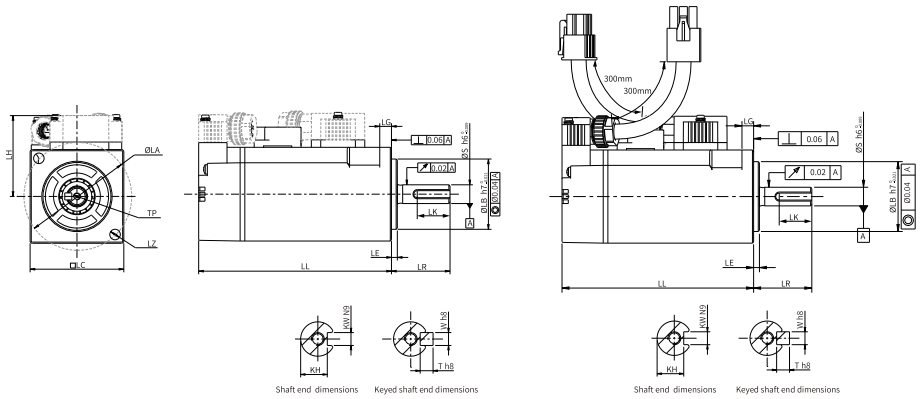
Electrical specifications of the brake

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 load

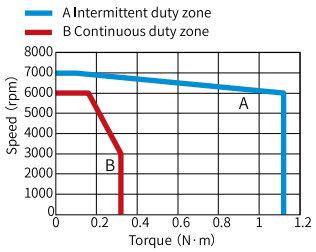
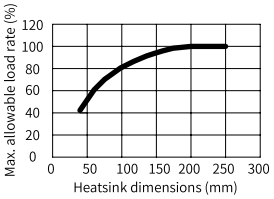
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
20	≤ 78	≤ 54

Dimensions (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)

5.1.2.2.2 MS1H1-10B30CB-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	40		
Inertia, capacity	Low inertia, small capacity		
Rated power (kW)	0.1		
Rated voltage (V)	220		
Rated torque (N·m)	0.32		
Maximum torque (N·m)	1.12		
Rated 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%	

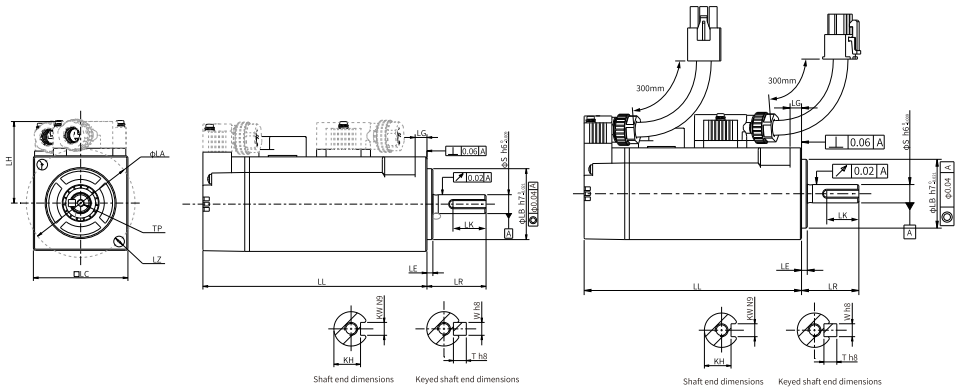
Electrical specifications of the brake

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 load

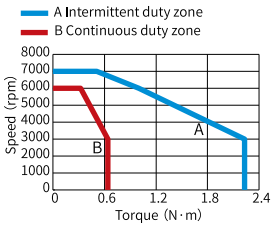
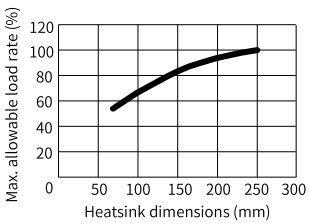
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
20	≤ 78	≤ 54

Dimensions (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)

5.1.2.2.3 MS1H1-20B30CB-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	60		
Inertia, capacity	Low inertia, small capacity		
Rated power (kW)	0.2		
Voltage (V)	220		
Rated torque (N·m)	0.64		
Maximum torque (N·m)	2.24		
Rated 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%	

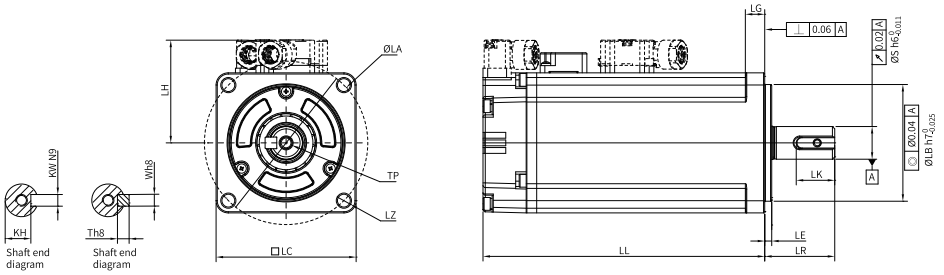
Electrical specifications of the brake

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 load

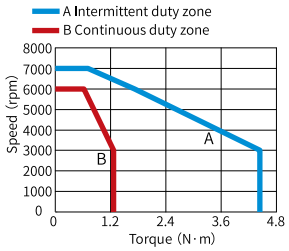
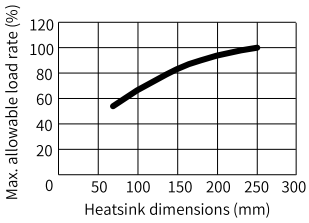
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
25	≤ 245	≤ 74

Dimensions (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)

5.1.2.2.4 MS1H1-40B30CB-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	60		
Inertia, capacity	Low inertia, small capacity		
Rated power (kW)	0.4		
Voltage (V)	220		
Rated torque (N·m)	1.27		
Maximum torque (N·m)	4.45		
Rated 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%	

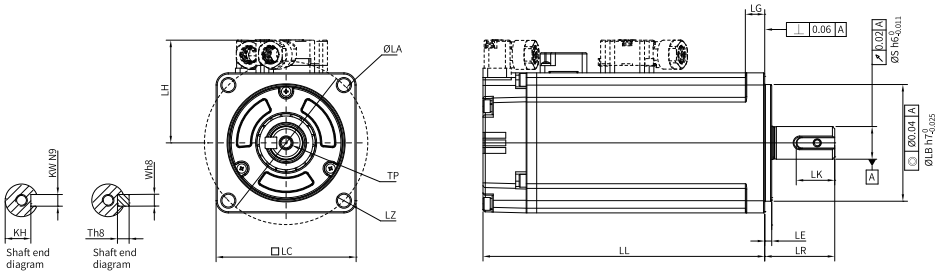
Electrical specifications of the brake

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 load

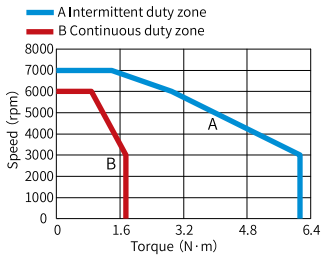
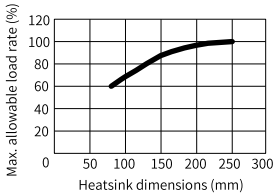
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
25	≤ 245	≤ 74

Dimensions (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)

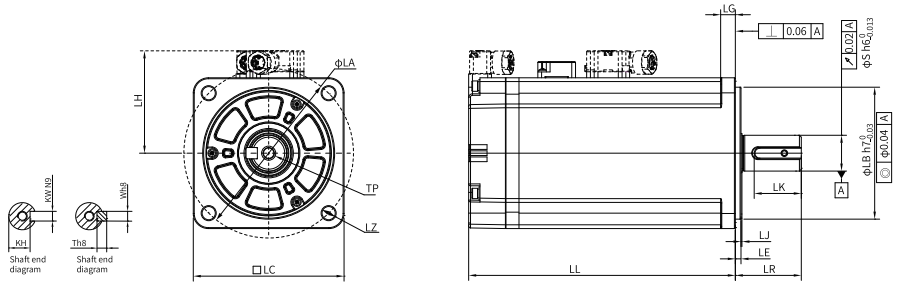
5.1.2.2.5 MS1H1-55B30CB-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	80		
Inertia, capacity	Low inertia, small capacity		
Rated power (kW)	0.55		
Voltage (V)	220		
Rated torque (N·m)	1.75		
Maximum torque (N·m)	6.13		
Rated 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 load

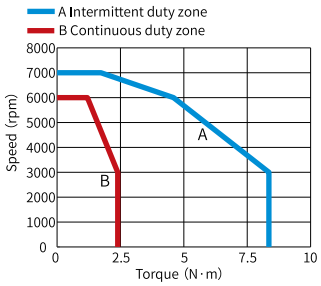
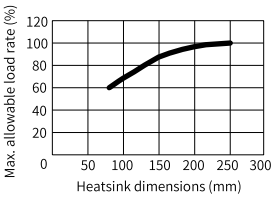
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	≤ 392	≤ 147

Dimensions (mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	96.7	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

5.1.2.2.6 MS1H1-75B30CB-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	80		
Inertia, capacity	Low inertia, small capacity		
Rated power (kW)	0.75		
Voltage (V)	220		
Rated torque (N·m)	2.39		
Maximum torque (N·m)	8.36		
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 ($kg \cdot cm^2$)	Motor without brake	0.68 ± 10%	
	Motor with brake	0.71 ± 10%	

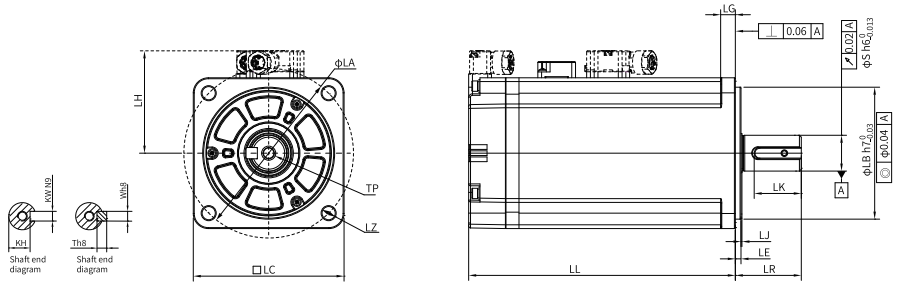
Electrical specifications of the brake

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 load

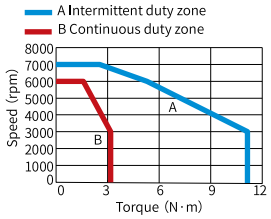
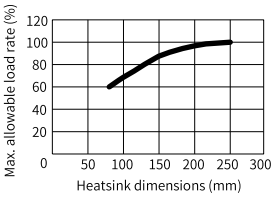
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	≤ 392	≤ 147

Dimensions (mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	107.3 (141.5)	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)

5.1.2.2.7 MS1H1-10C30CB-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	80		
Inertia, capacity	Low inertia, small capacity		
Rated power (kW)	1.0		
Voltage (V)	220		
Rated torque (N·m)	3.18		
Maximum torque (N·m)	11.1		
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%	

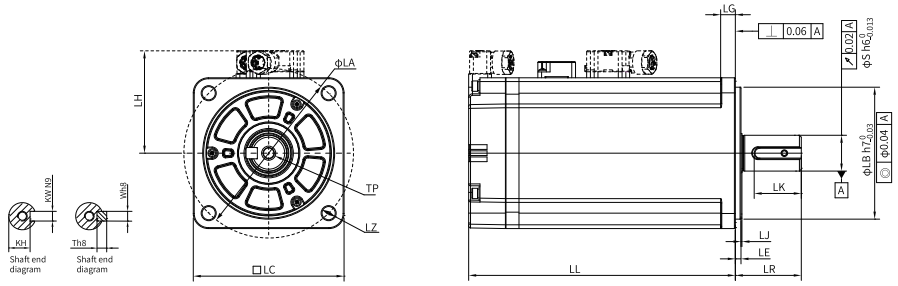
Electrical specifications of the brake

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 load

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

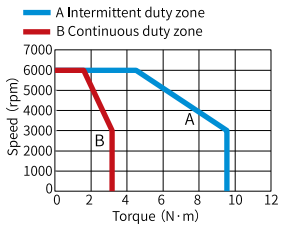
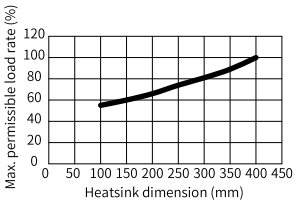
Dimensions (mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	119.2 (153.4)	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)

5.1.2.3 Low Inertia and Medium Capacity (MS1H2)

5.1.2.3.1 MS1H2-10C30CB-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	1.0		
Voltage (V)	220		
Rated torque (N·m)	3.18		
Maximum torque (N·m)	9.54		
Rated 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%	

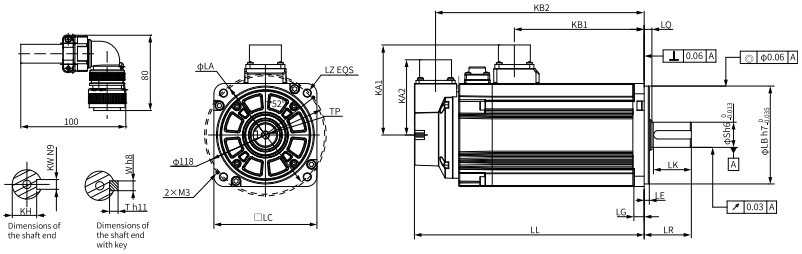
Electrical specifications of the brake

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 load

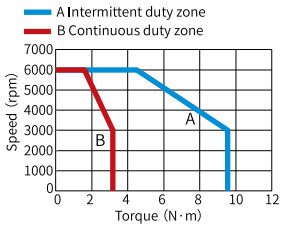
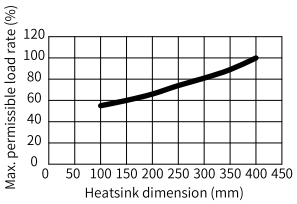
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	144 (172)	45 ± 1	115	4 × 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)

5.1.2.3.2 MS1H2-10C30CD-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	1.0		
Voltage (V)	380		
Rated torque (N·m)	3.18		
Maximum torque (N·m)	9.54		
Rated 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 ($kg \cdot cm^2$)	Motor without brake	1.78 ± 10%	
	Motor with brake	2.6 ± 10%	

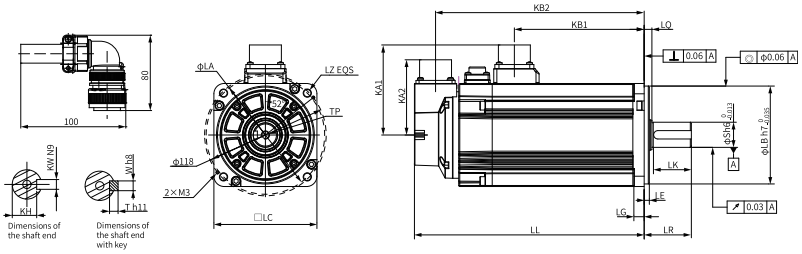
Electrical specifications of the brake

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 load

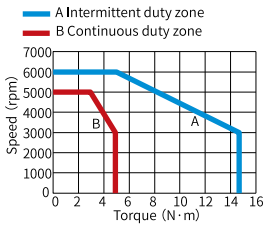
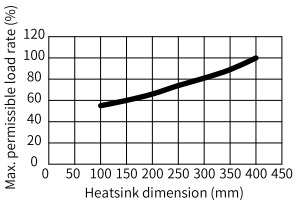
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	144 (172)	45 ± 1	115	4 × 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)

5.1.2.3.3 MS1H2-15C30CB-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	1.5		
Voltage (V)	220		
Rated torque (N·m)	4.9		
Maximum torque (N·m)	14.7		
Rated 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·cm²)	Motor without brake	2.35 ± 10%	
	Motor with brake	3.17 ± 10%	

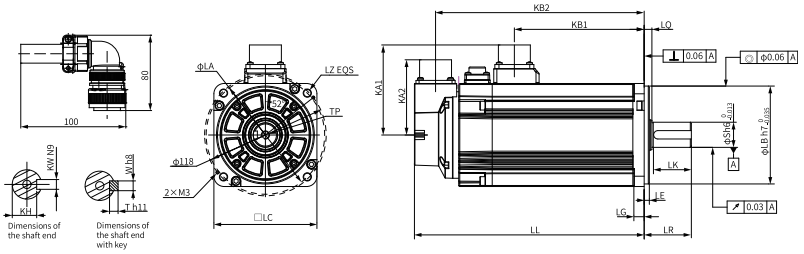
Electrical specifications of the brake

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 load

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

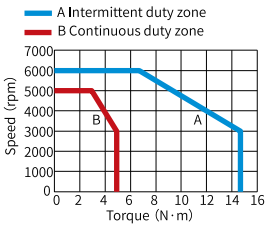
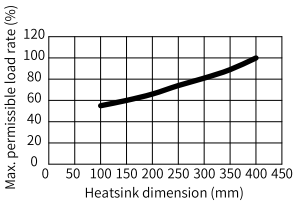
Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	161 (189)	45 ± 1	115	4 × 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)

5.1.2.3.4 MS1H2-15C30CD-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	1.5		
Voltage (V)	380		
Rated torque (N·m)	4.9		
Maximum torque (N·m)	14.7		
Rated 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 ($kg \cdot cm^2$)	Motor without brake	2.35 ± 10%	
	Motor with brake	3.17 ± 10%	

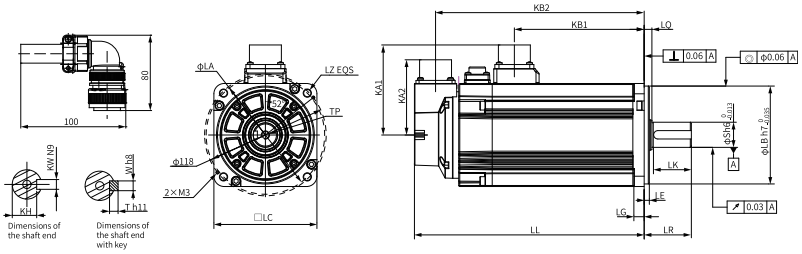
Electrical specifications of the brake

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 load

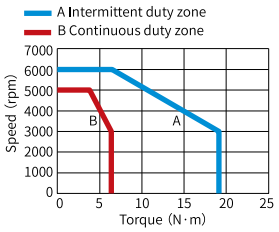
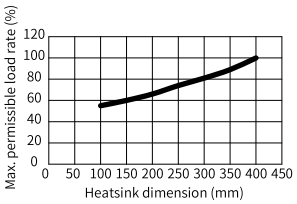
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	161 (189)	45 ± 1	115	4 × 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)

5.1.2.3.5 MS1H2-20C30CB-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	2.0		
Voltage (V)	220		
Rated torque (N·m)	6.36		
Maximum torque (N·m)	19.1		
Rated 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 ($kg \cdot cm^2$)	Motor without brake	2.92 ± 10%	
	Motor with brake	3.74 ± 10%	

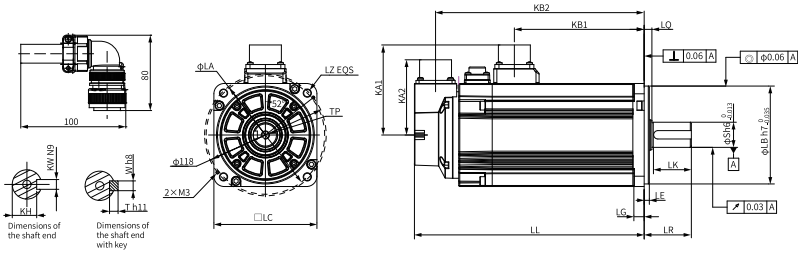
Electrical specifications of the brake

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 load

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

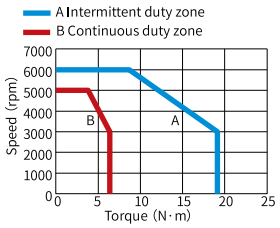
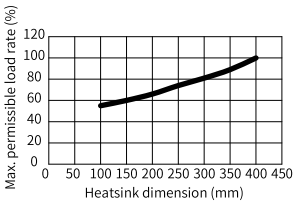
Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	177 (205)	45 ± 1	115	4 × 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)

5.1.2.3.6 MS1H2-20C30CD-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	2.0		
Voltage (V)	380		
Rated torque (N·m)	6.36		
Maximum torque (N·m)	19.1		
Rated 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 ($kg \cdot cm^2$)	Motor without brake	2.92 ± 10%	
	Motor with brake	3.74 ± 10%	

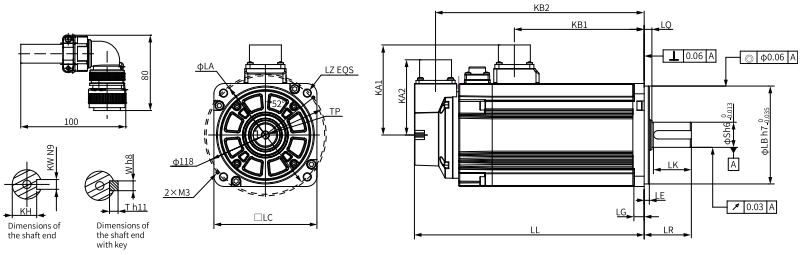
Electrical specifications of the brake

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 load

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

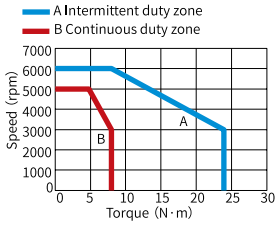
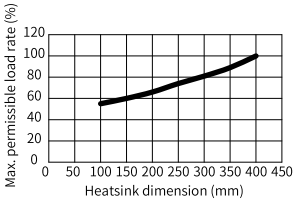
Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	177 (205)	45 ± 1	115	4 × 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)

5.1.2.3.7 MS1H2-25C30CB-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	2.5		
Voltage (V)	220		
Rated torque (N·m)	7.96		
Maximum torque (N·m)	23.9		
Rated 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 ($kg \cdot cm^2$)	Motor without brake	3.49 ± 10%	
	Motor with brake	4.3 ± 10%	

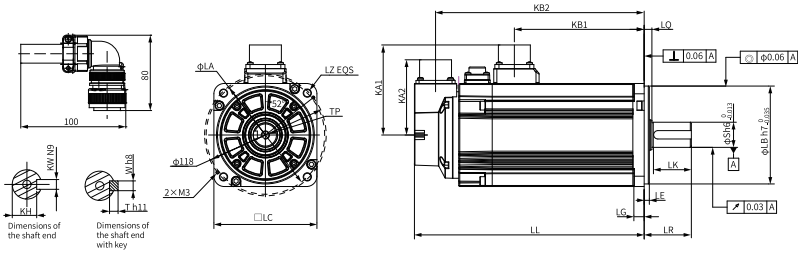
Electrical specifications of the brake

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 load

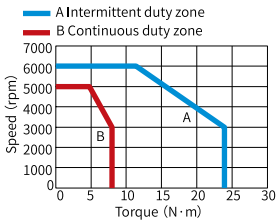
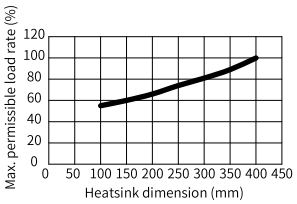
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	195 (223)	45 ± 1	115	4 × 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)

5.1.2.3.8 MS1H2-25C30CD-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	2.5		
Voltage (V)	380		
Rated torque (N·m)	7.96		
Maximum torque (N·m)	23.9		
Rated 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 ($kg \cdot cm^2$)	Motor without brake	3.49 ± 10%	
	Motor with brake	4.3 ± 10%	

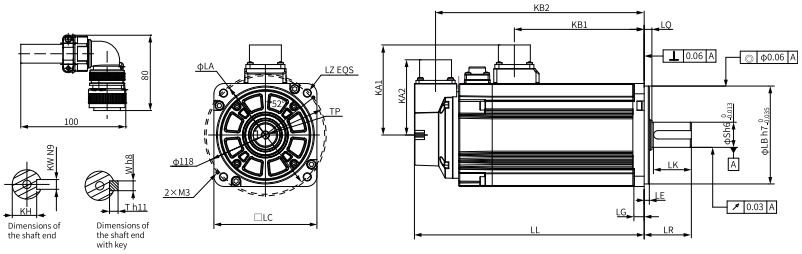
Electrical specifications of the brake

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 load

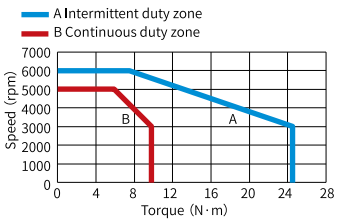
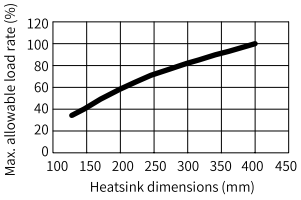
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	195 (223)	45 ± 1	115	4 × 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)

5.1.2.3.9 MS1H2-30C30CB-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	3.0		
Voltage (V)	220		
Rated torque (N·m)	9.8		
Maximum torque (N·m)	24.5		
Rated 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 ($kg \cdot cm^2$)	Motor without brake	6.4 ± 10%	
	Motor with brake	9.38 ± 10%	

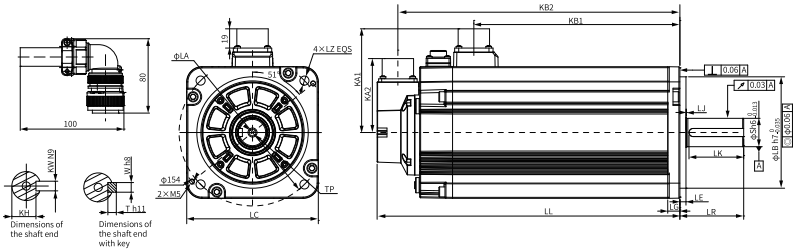
Electrical specifications of the brake

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 load

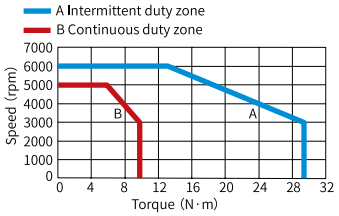
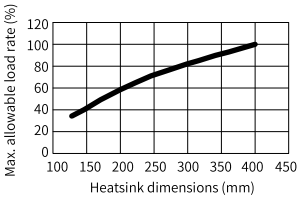
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	≤ 1176	≤ 392

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	198 (223)	63 ± 1	145	4 × 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)

5.1.2.3.10 MS1H2-30C30CD-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	3.0		
Voltage (V)	380		
Rated torque (N·m)	9.8		
Maximum torque (N·m)	29.4		
Rated 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%	

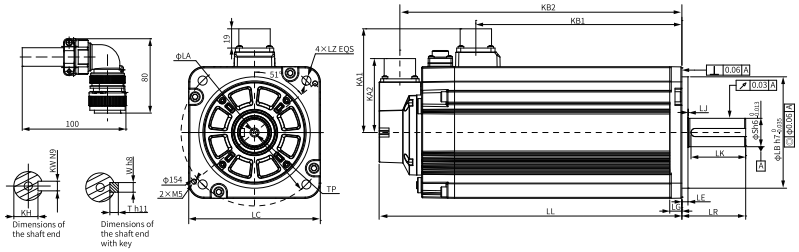
Electrical specifications of the brake

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 load

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

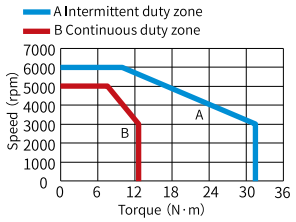
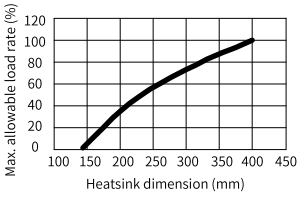
Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	198 (223)	63 ± 1	145	4 × 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)

5.1.2.3.11 MS1H2-40C30CB-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	4.0		
Voltage (V)	220		
Rated torque (N·m)	12.6		
Maximum torque (N·m)	31.5		
Rated 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%	

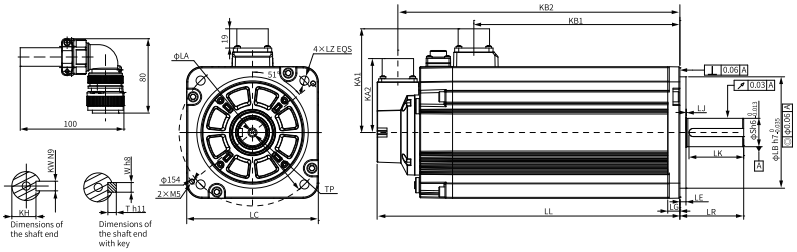
Electrical specifications of the brake

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 load

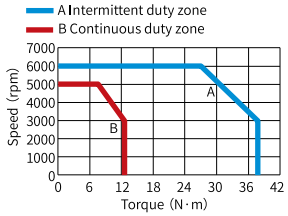
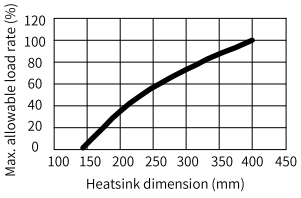
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	≤ 1176	≤ 392

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	236 (261)	63 ± 1	145	4 × 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)

5.1.2.3.12 MS1H2-40C30CD-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	4.0		
Voltage (V)	380		
Rated torque (N·m)	12.6		
Maximum torque (N·m)	37.8		
Rated 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%	

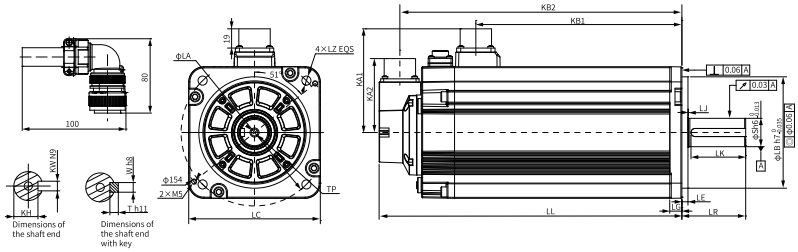
Electrical specifications of the brake

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 load

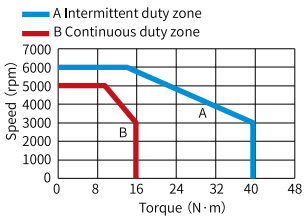
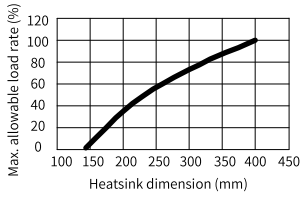
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	≤ 1176	≤ 392

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	236 (261)	63 ± 1	145	4 × 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)

5.1.2.3.13 MS1H2-50C30CB-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	5.0		
Voltage (V)	220		
Rated torque (N·m)	15.8		
Maximum torque (N·m)	39.5		
Rated 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%	

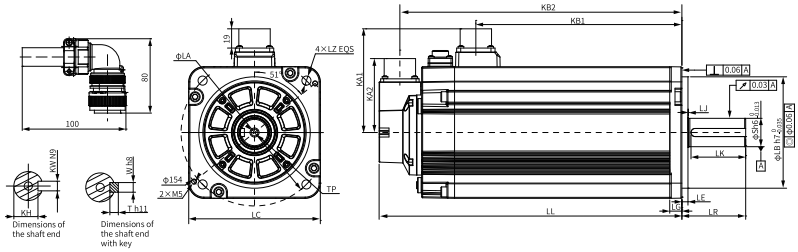
Electrical specifications of the brake

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 load

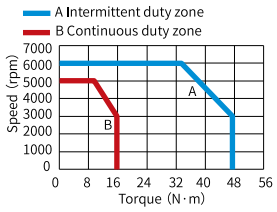
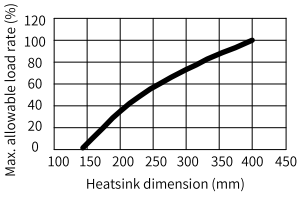
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	≤ 1176	≤ 392

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	274 (299)	63 ± 1	145	4 × 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)

5.1.2.3.14 MS1H2-50C30CD-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	5.0		
Voltage (V)	380		
Rated torque (N·m)	15.8		
Maximum torque (N·m)	47.4		
Rated 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%	

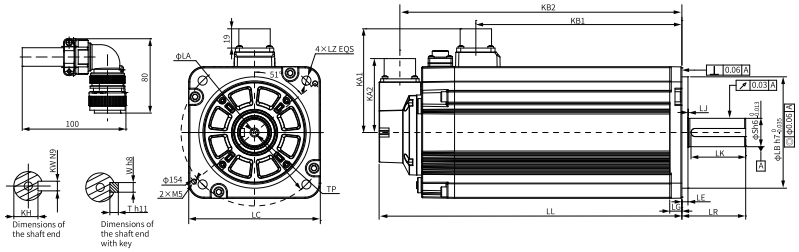
Electrical specifications of the brake

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 load

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

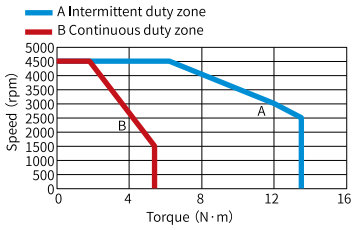
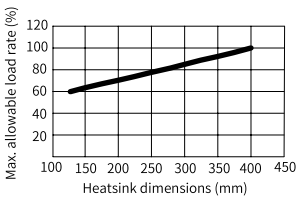
Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	274 (299)	63 ± 1	145	4 × 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)

5.1.2.4 Medium Inertia and Medium Capacity (MS1H3)

5.1.2.4.1 MS1H3-85B15CB-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	0.85		
Voltage (V)	220		
Rated torque (N·m)	5.39		
Maximum torque (N·m)	13.5		
Rated 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%	

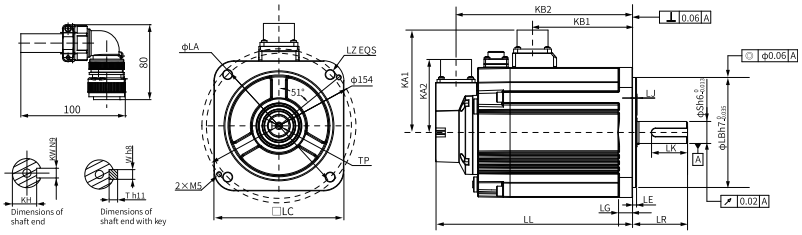
Electrical specifications of the brake

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 load

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

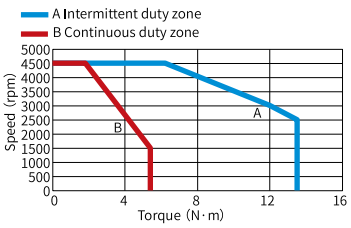
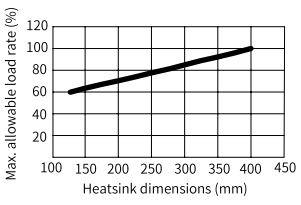
Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	142 (167)	55 ± 1	145	4 × 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)

5.1.2.4.2 MS1H3-85B15CD-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	0.85		
Voltage (V)	380		
Rated torque (N·m)	5.39		
Maximum torque (N·m)	13.5		
Rated 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%	

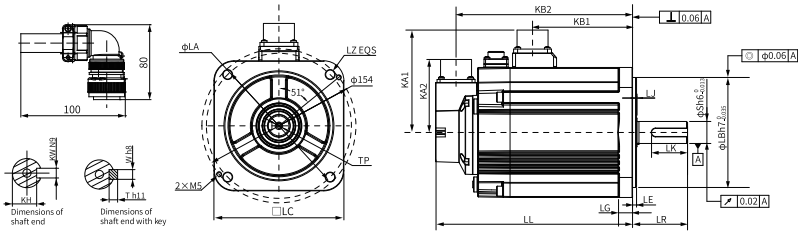
Electrical specifications of the brake

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 load

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

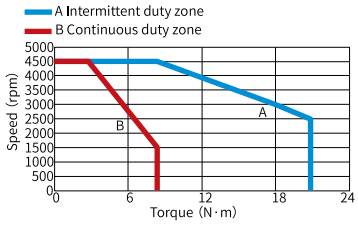
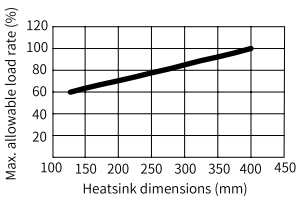
Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	142 (167)	55 ± 1	145	4 × 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)

5.1.2.4.3 MS1H3-13C15CB-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	1.3		
Voltage (V)	220		
Rated torque (N·m)	8.34		
Maximum torque (N·m)	20.85		
Rated 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 ($kg·cm^2$)	Motor without brake	19.25 ± 10%	
	Motor with brake	21.5 ± 10%	

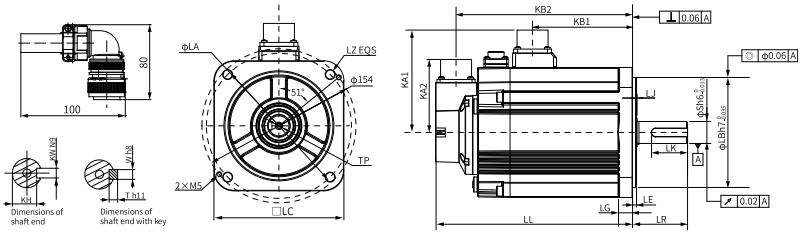
Electrical specifications of the brake

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 load

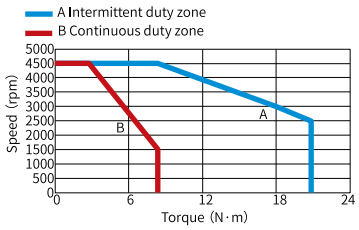
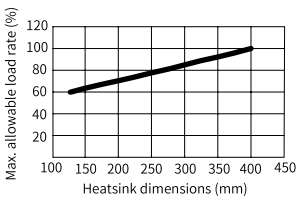
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	157 (182)	55 ± 1	145	4 × 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)

5.1.2.4.4 MS1H3-13C15CD-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	1.3		
Voltage (V)	380		
Rated torque (N·m)	8.34		
Maximum torque (N·m)	20.85		
Rated 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%	

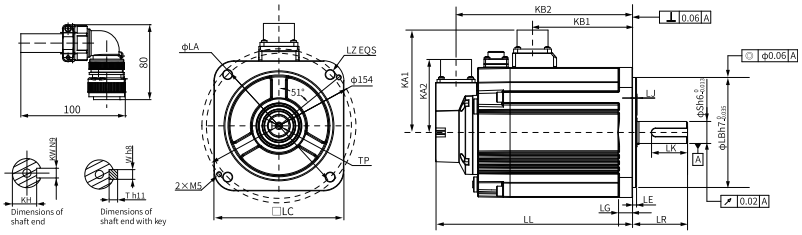
Electrical specifications of the brake

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 load

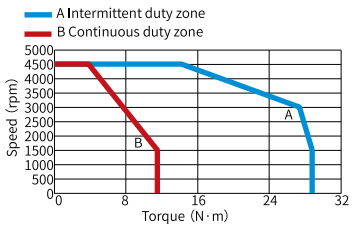
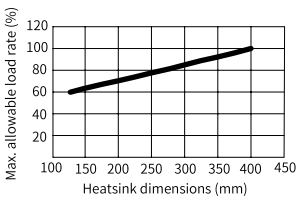
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	157 (182)	55 ± 1	145	4 × 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)

5.1.2.4.5 MS1H3-18C15CB-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	1.8		
Voltage (V)	220		
Rated torque (N·m)	11.5		
Maximum torque (N·m)	28.75		
Rated 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%	

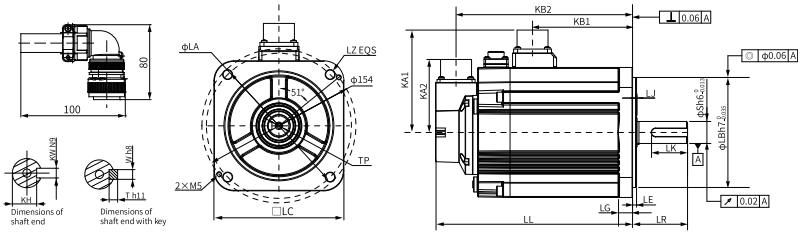
Electrical specifications of the brake

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 load

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

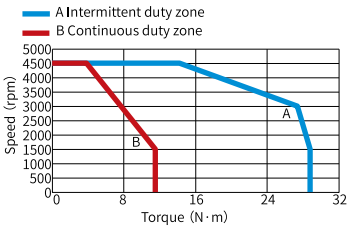
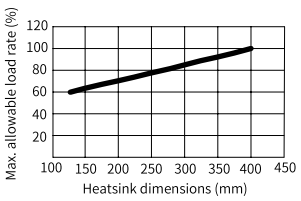
Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	172 (197)	55 ± 1	145	4 × 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)

5.1.2.4.6 MS1H3-18C15CD-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	1.8		
Voltage (V)	380		
Rated torque (N·m)	11.5		
Maximum torque (N·m)	28.75		
Rated 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%	

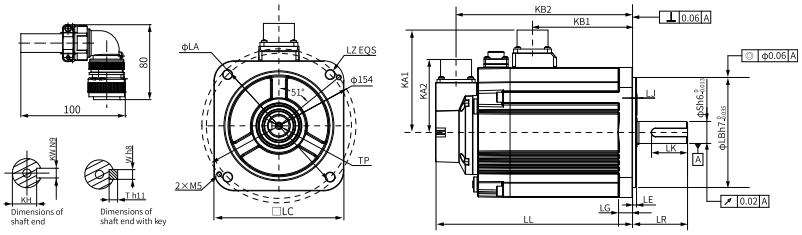
Electrical specifications of the brake

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 load

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

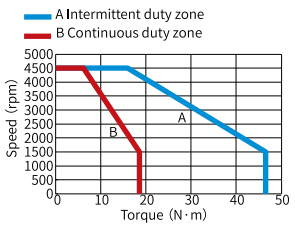
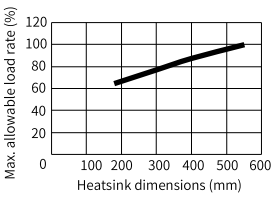
Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	172 (197)	55 ± 1	145	4 × 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)

5.1.2.4.7 MS1H3-29C15CB-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	180		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	2.9		
Voltage (V)	220		
Rated torque (N·m)	18.6		
Maximum torque (N·m)	46.5		
Rated 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%	

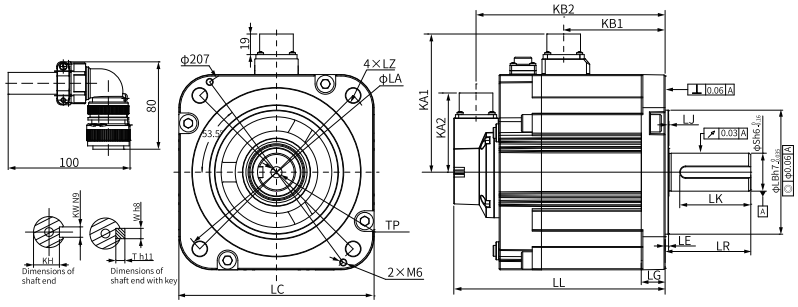
Electrical specifications of the brake

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 load

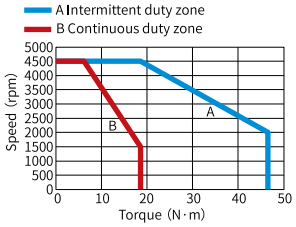
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	≤ 1470	≤ 490

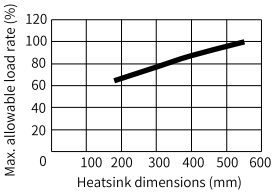
Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	161 (194.8)	79 ± 1	200	4 × 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)

5.1.2.4.8 MS1H3-29C15CD-A6/S63*R-INT

Motor specifications		Torque-speed characteristics
Frame size (mm)	180	
Inertia, capacity	Medium inertia, medium capacity	
Rated power (kW)	2.9	
Voltage (V)	380	
Rated torque (N·m)	18.6	
Maximum torque (N·m)	46.5	
Rated frequency (Hz)	125	
Rated current (A)	10.5	Heatsink-based derating curve

Motor specifications			Torque-speed characteristics
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%	

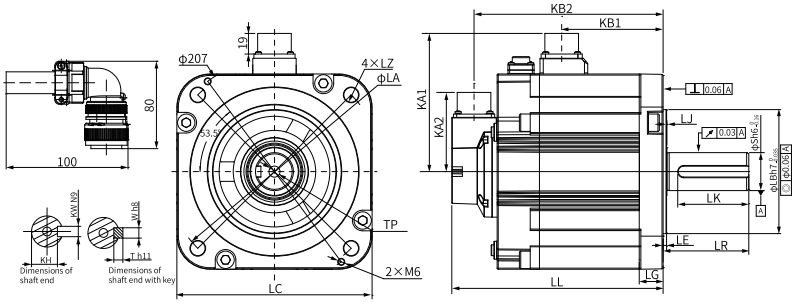
Electrical specifications of the brake

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 load

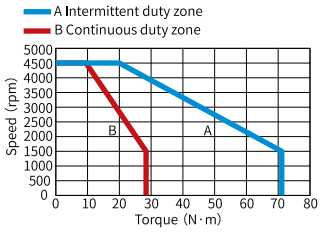
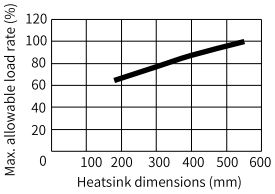
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	≤ 1470	≤ 490

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	161 (194.8)	79 ± 1	200	4 × 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)

5.1.2.4.9 MS1H3-44C15CB-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	180		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	4.4		
Voltage (V)	220		
Rated torque (N·m)	28.4		
Maximum torque (N·m)	71.1		
Rated 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%	

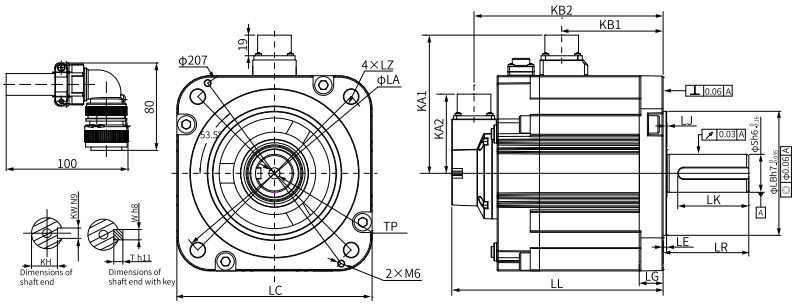
Electrical specifications of the brake

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 load

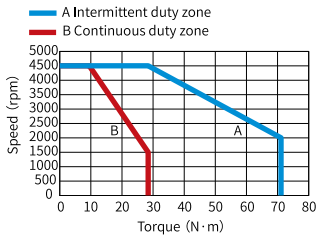
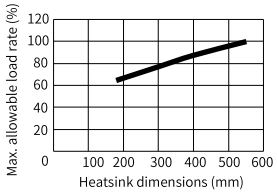
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	≤ 1470	≤ 490

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	184.5 (218.3)	79 ± 1	200	4 × 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)

5.1.2.4.10 MS1H3-44C15CD-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	180		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	4.4		
Voltage (V)	380		
Rated torque (N·m)	28.4		
Maximum torque (N·m)	71.1		
Rated 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%	

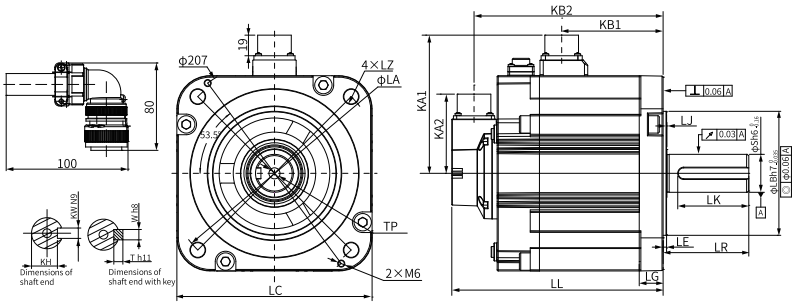
Electrical specifications of the brake

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 load

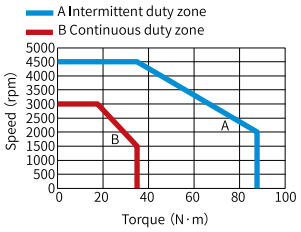
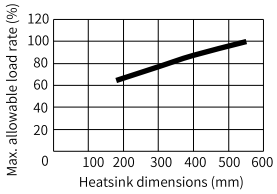
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	≤ 1470	≤ 490

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	184.5 (218.3)	79 ± 1	200	4 × 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)

5.1.2.4.11 MS1H3-55C15CD-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	180		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	5.5		
Voltage (V)	380		
Rated torque (N·m)	35		
Maximum torque (N·m)	87.6		
Rated 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%	

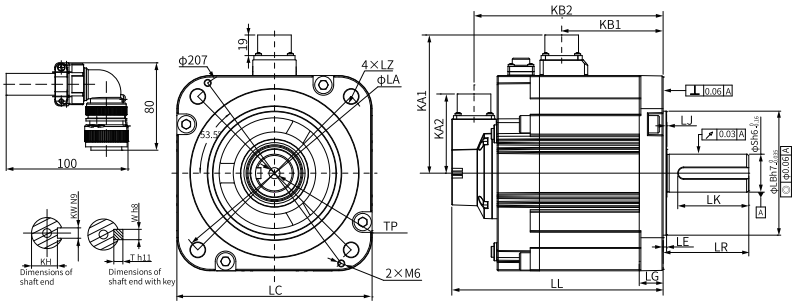
Electrical specifications of the brake

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 load

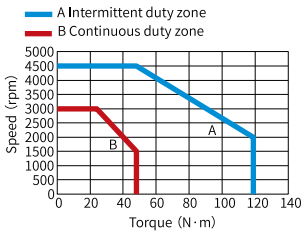
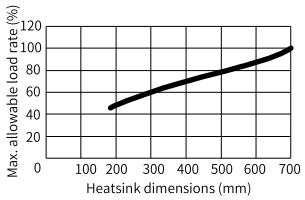
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
113	≤ 1764	≤ 588

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	208 (241.8)	113 ± 1	200	4 × 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	M16 × 32	$95^{0}_{-0.87}$	$37^{0}_{-0.2}$	12	12	8	21.7 (25.9)

5.1.2.4.12 MS1H3-75C15CD-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	180		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	7.5		
Voltage (V)	380		
Rated torque (N·m)	48		
Maximum torque (N·m)	119		
Rated 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%	

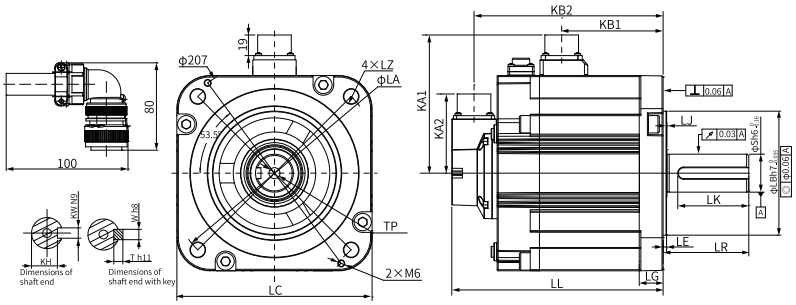
Electrical specifications of the brake

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 load

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

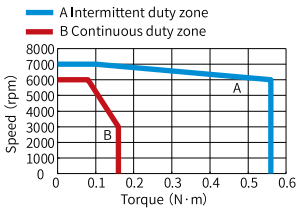
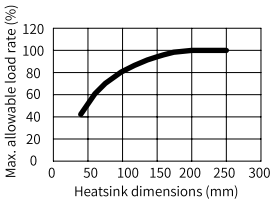
Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	255 (288.8)	113 ± 1	200	4 × 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	M16 × 32	$95^{0}_{-0.87}$	$37^{0}_{-0.2}$	12	12	8	29 (33.2)

5.1.2.5 Medium Inertia and Small Capacity (MS1H4)

5.1.2.5.1 MS1H4-05B30CB-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	40		
Inertia, capacity	Medium inertia, low capacity		
Rated output (kW)	0.05		
Voltage (V)	220		
Rated torque (N·m)	0.16		
Maximum torque (N·m)	0.56		
Rated 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)	Apply time (ms)	Release time (ms)	Backlash (°)
0.32	24	6.9	83.5	0.29	≤ 40	≤ 20	≤ 1.5

Allowable load

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

Dimensions (mm)

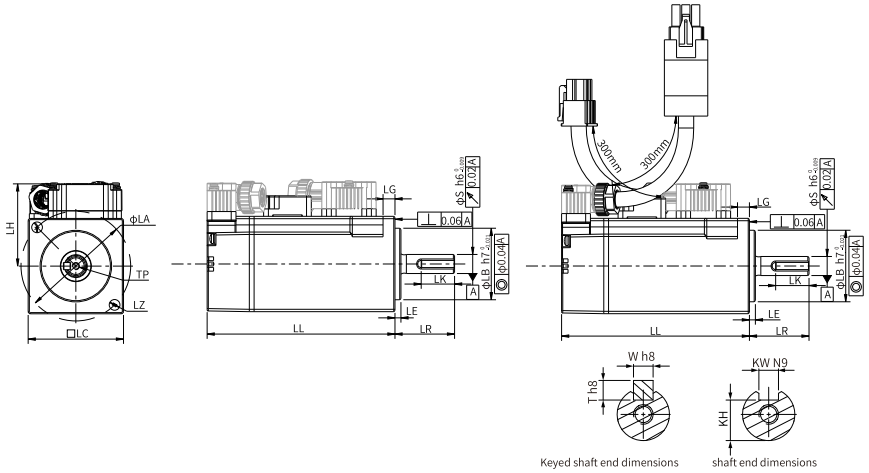


Figure 5-8 MS1H4-05B30CB-A6/S630R and MS1H4-05B30CB-A6/S632R

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)

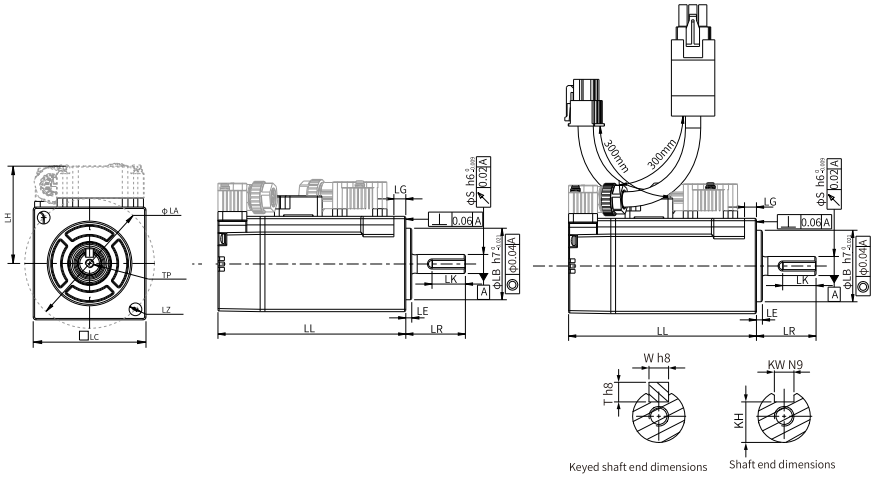
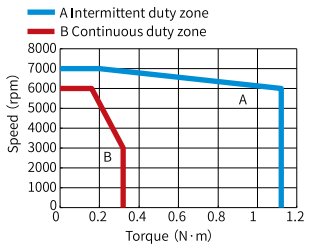
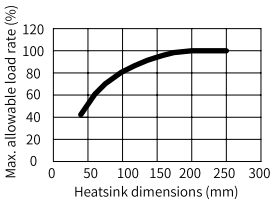


Figure 5-9 MS1H4-05B30CB-A6/S631R and MS1H4-05B30CB-A6/S634R

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)

5.1.2.5.2 MS1H4-10B30CB-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	40		
Inertia, capacity	Medium inertia, low capacity		
Rated output (kW)	0.1		
Voltage (V)	220		
Rated torque (N·m)	0.32		
Maximum torque (N·m)	1.12		
Rated 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 ($kg \cdot cm^2$)	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 load

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

Dimensions (mm)

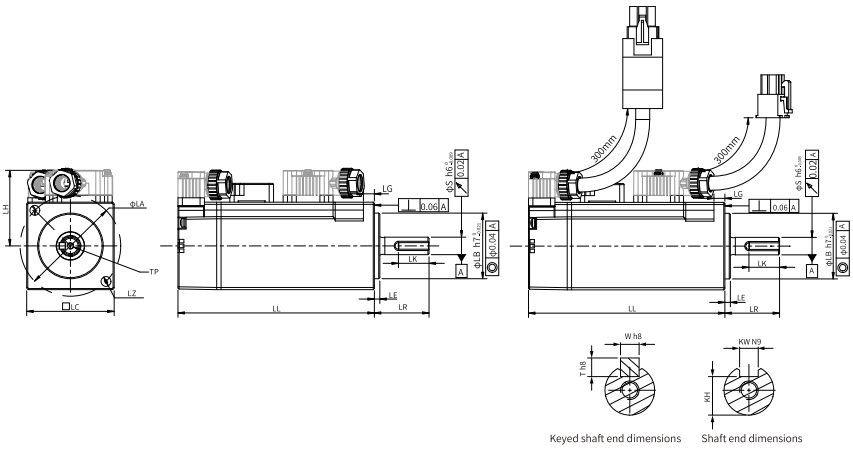


Figure 5-10 MS1H4-10B30CB-A6/S630R and MS1H4-10B30CB-A6/S632R

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)

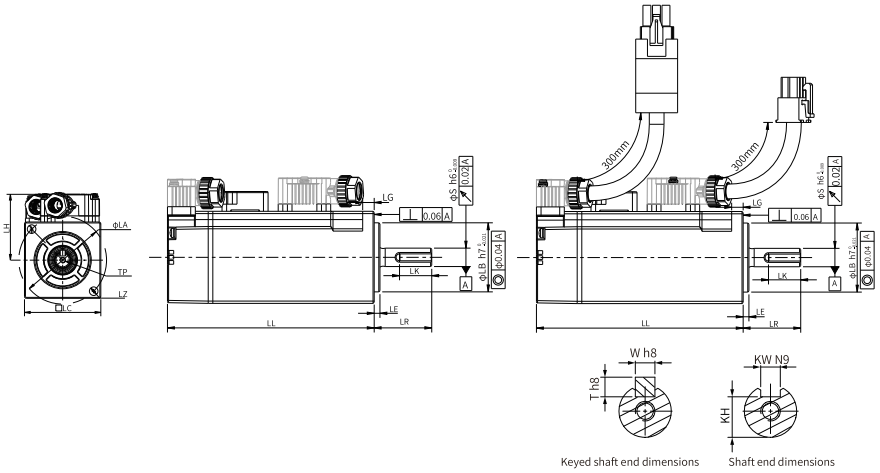
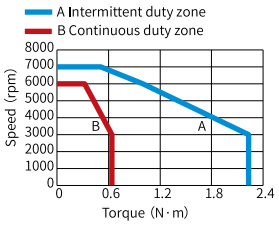
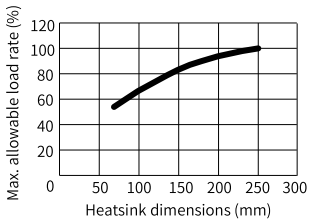


Figure 5-11 MS1H4-10B30CB-A6/S631R and MS1H4-10B30CB-A6/S634R

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)

5.1.2.5.3 MS1H4-20B30CB-A6/S63*R-INT

Motor specifications		Torque-speed characteristics
Frame size (mm)	60	
Inertia, capacity	Medium inertia, low capacity	
Rated power (kW)	0.2	
Voltage (V)	220	
Rated torque (N·m)	0.64	
Maximum torque (N·m)	2.24	
Rated frequency (Hz)	250	
Rated current (A)	1.3	Heatsink-based derating curve

Motor specifications			Torque-speed characteristics
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%	

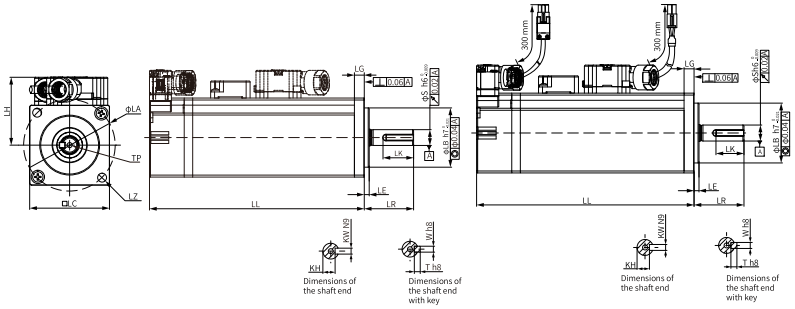
Electrical specifications of the brake

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 load

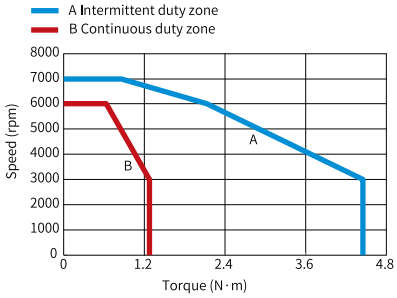
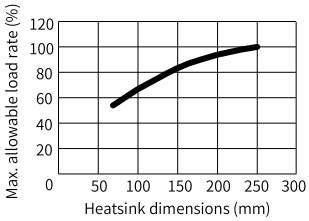
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
25	≤ 245	≤ 74

Dimensions (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)

5.1.2.5.4 MS1H4-40B30CB-A6/S63*R-INT

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%	

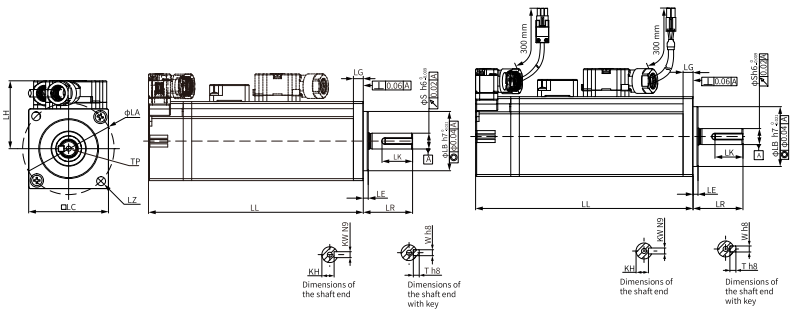
Electrical specifications of the brake

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)

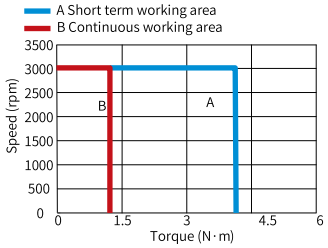


LC	LL	LR	LA	LZ	LH	LG	LE	
60	92 (119.8)	30±0.5	70	4 × ϕ5.5	44	8.0	3±0.5	
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
50	14	M5 × 8	$16.5^{0}_{-0.53}$	$11^{0}_{-0.1}$	5	5	5	1.11 (1.48)

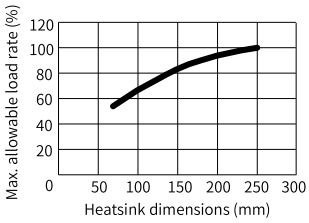
5.1.2.5.5 MS1H4-40B30CD-A6/S63*R-INT

Motor specifications		
Frame size (mm)	60	
Inertia and capacity	Medium inertia, small capacity	
Rated power (kW)	0.4	
Voltage (V)	380	
Rated torque (N·m)	1.27	
Maximum torque (N·m)	4.45	
Rated frequency (Hz)	250	
Rated current (A)	1.33	
Maximum current (A)	5.8	
Rated speed (rpm)	3000	
Maximum Speed (rpm)	3000	
Torque coefficient (N·m/A)	0.95	
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	0.43±10%
	Motor with brake	0.44±10%

Torque-speed characteristics



Heatsink-based derating curve



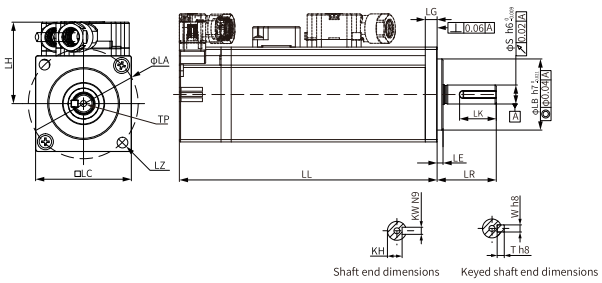
Electrical specifications of the brake

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

Allowable loads

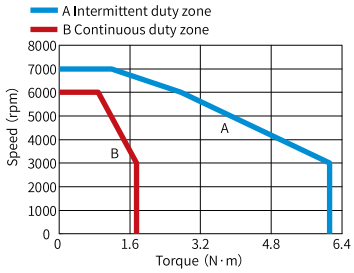
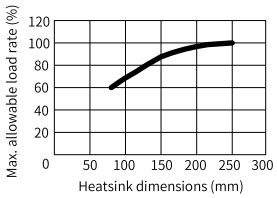
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
25	≤ 245	≤ 74

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)

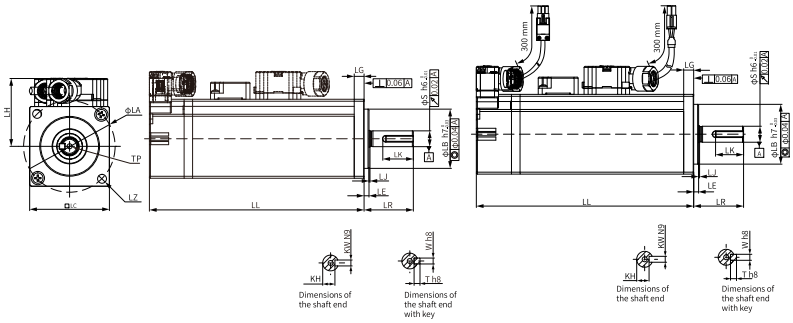
5.1.2.5.6 MS1H4-55B30CB-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	80		
Inertia, capacity	Medium inertia, low capacity		
Rated power (kW)	0.55		
Voltage (V)	220		
Rated torque (N·m)	1.75		
Maximum torque (N·m)	6.13		
Rated 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 load

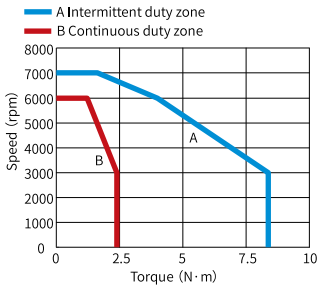
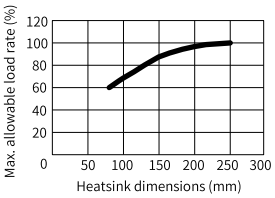
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	≤ 392	≤ 147

Dimensions (mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	96.7	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

5.1.2.5.7 MS1H4-75B30CB-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	80		
Inertia, capacity	Medium inertia, low capacity		
Rated power (kW)	0.75		
Voltage (V)	220		
Rated torque (N·m)	2.39		
Maximum torque (N·m)	8.37		
Rated 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 to 10 %	

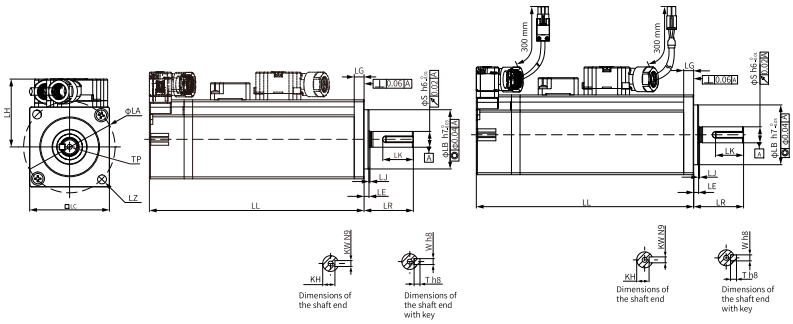
Electrical specifications of the brake

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 load

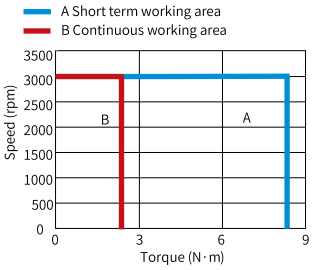
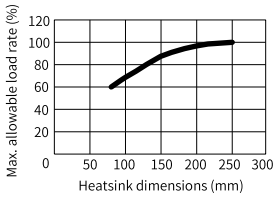
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	≤ 392	≤ 147

Dimensions (mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	107.3 (140.5)	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	$250_{-}^{0.62}$	$15.50_{-0.1}$	6	6	6	2.18 (2.82)

5.1.2.5.8 MS1H4-75B30CD-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	80		
Inertia and capacity	Medium inertia, small capacity		
Rated power (kW)	0.75		
Voltage (V)	380		
Rated torque (N·m)	2.39		
Maximum torque (N·m)	8.37		
Rated frequency (Hz)	250		
Rated current (A)	2.23		Heatsink-based derating curve
Maximum current (A)	9.1		
Rated speed (rpm)	3000		
Maximum Speed (rpm)	3000		
Torque coefficient (N·m/A)	1.07		
Rotor moment of inertia ($kg·cm^2$)	Motor without brake	1.46±10%	
	Motor with brake	1.51±10%	

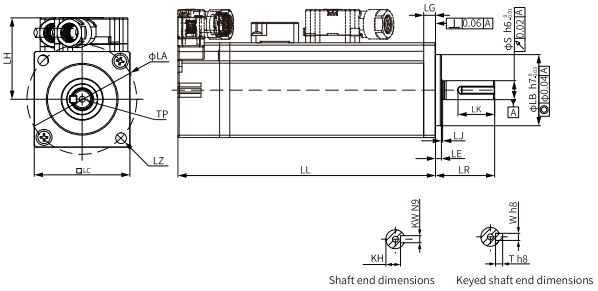
Electrical specifications of the brake

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

Allowable loads

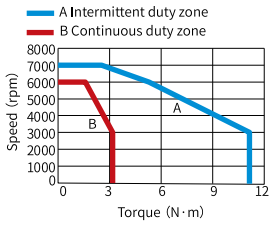
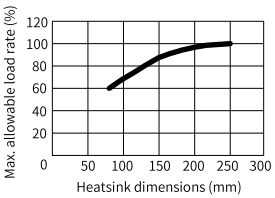
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	≤ 392	≤ 147

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)

5.1.2.5.9 MS1H4-10C30CB-A6/S63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	80		
Inertia, capacity	Medium inertia, low capacity		
Rated power (kW)	1.0		
Voltage (V)	220		
Rated torque (N·m)	3.18		
Maximum torque (N·m)	11.13		
Rated 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 ($kg \cdot cm^2$)	Motor without brake	1.87 ± 10%	
	Motor with brake	1.97 ± 10%	

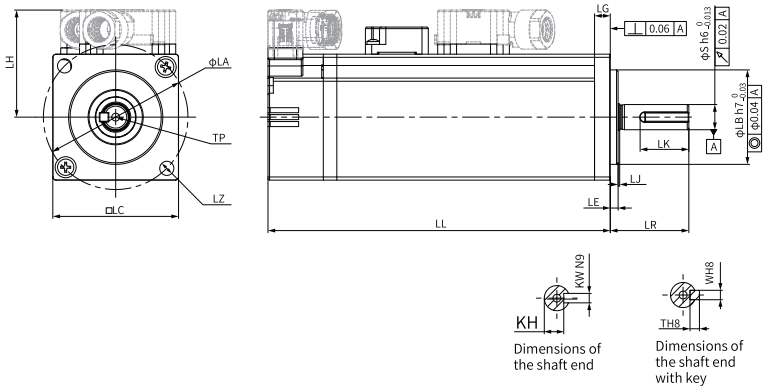
Electrical specifications of the brake

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 load

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

Dimensions (mm)

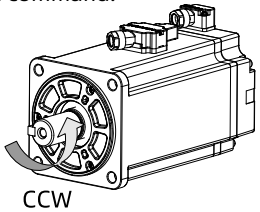


LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	118.7 (153.2)	35 ± 0.5	90	4 × ϕ7	54	7.5	3 ± 0.5	0.5 ± 0.35
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
70	19	M6 × 20	$25^{0}_{-0.62}$	$15.5^{0}_{-0.1}$	6	6	6	2.55 (2.9)

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

5.2.1 General Specifications

5.2.1.1 Mechanical Characteristics

Item	Description
Duty type	S1 (Continuous duty)
Vibration grade[1]	V15
Insulation resistance	500 VDC, above 10 MΩ
Excitation mode	Permanent magnet
Installation method	Flange
Thermal class	F
Insulation voltage	1500 VAC, 1 min (200 V class) 1800 VAC, 1 min (400 V class)
IP rating	IP67 (except the shaft opening)
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 *"5.2.1.3 Derating Characteristics" on page 114*. 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 conditions (not full-turn) [2], which may stuck the motor • 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 (flange side as standard)	490 m/s^2
	Number of shocks	2
Vibration resistance [4][5]	Vibration acceleration (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.

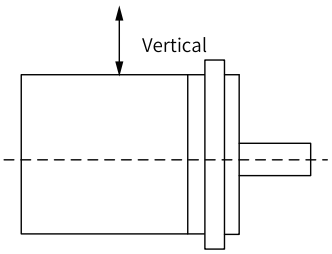


Figure 5-12 Shock applied to the servo motor

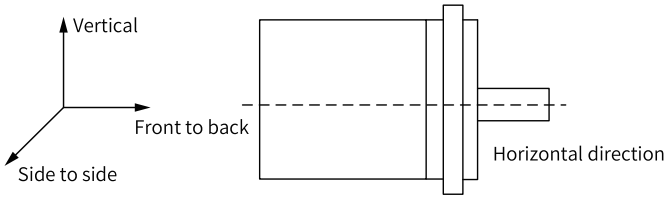


Figure 5-13 Vibration applied to the servo motor

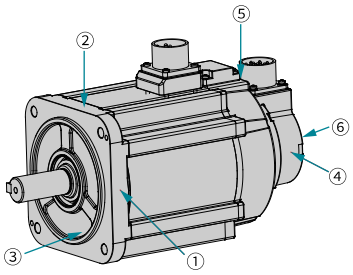


Figure 5-14 Max. allowable vibration limit of the motor

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

Note

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

5.2.1.2 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 as follows:

- **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

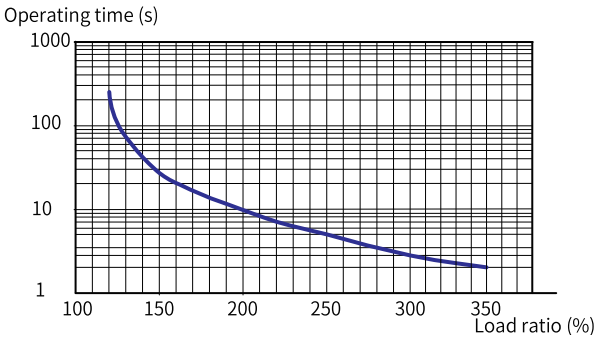


Figure 5-15 MS1H1/H4 (frame size 40/60/80) series motor overload curve

Note

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

- **MS1H2/MS1H3**

Load ratio (%)	Operating time (s)
115	6000
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
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260	11
265	10
270	9
275	9
280	8
285	7
290	6
295	5
300	5

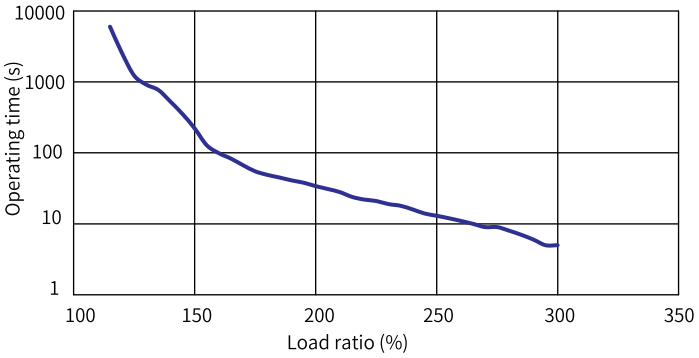


Figure 5-16 Overload curve of MS1H2 and MS1H3 series motors

Note

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

5.2.1.3 Derating Characteristics

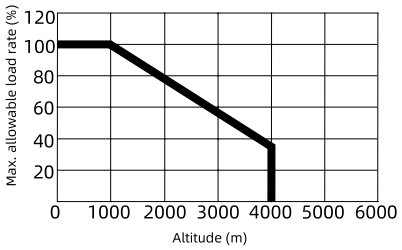
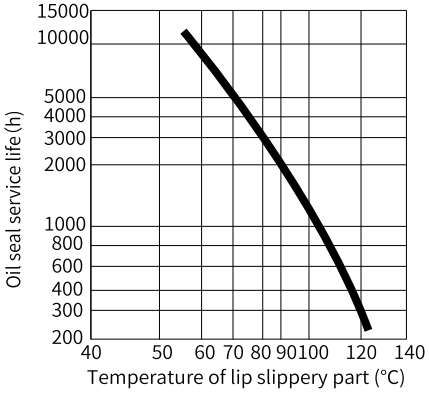


Figure 5-17 Altitude-based derating curve

5.2.1.4 Temperature Curve of the Oil Seal



5.2.1.5 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 my be reported. In cases of such alarms, take one of the following measures:

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

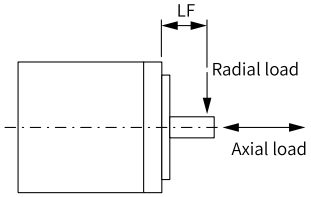
Caution

- 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.

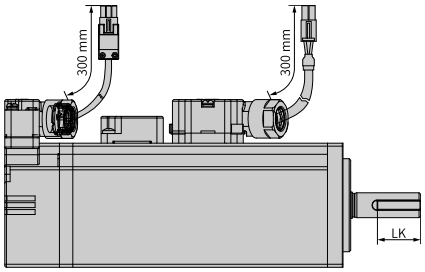
5.2.2 Model Selection (MS1-R-INT Series Servo Motor with Battery-free Encoder)

5.2.2.1 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.



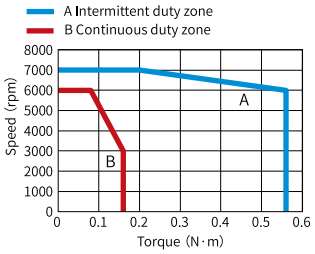
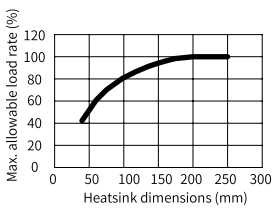
- As shown in the preceding figure, the product is marked with an LK value in the dimension diagram. LK indicates the length of the shaft key.
- MS1H3 (130-flange and 180-flange) comes with a key slot. When the operating speed is above 3000 rpm, the motor must run with the keyway. If you need to run 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.

5.2.2.2 Low Inertia and Small Capacity (MS1H1)

5.2.2.2.1 MS1H1-05B30CB-V63*R-INT

<table>
<tr><th colspan="3">Motor specifications</th><th>Torque-speed characteristics</th></tr>
<tr><td colspan="2">Frame size (mm)</td><td>40</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>0.05</td></tr>
<tr><td colspan="2">Rated voltage (V)</td><td>220</td></tr>
<tr><td colspan="2">Rated torque (N·m)</td><td>0.16</td></tr>
<tr><td colspan="2">Maximum torque (N·m)</td><td>0.56</td></tr>
<tr><td colspan="2">Rated frequency (Hz)</td><td>250</td></tr>
<tr><td colspan="2">Rated current (A)</td><td>1.2</td><td>Heatsink-based derating curve</td></tr>
<tr><td colspan="2">Maximum current (A)</td><td>4.8</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>7000</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>0.018±10%</td></tr>
<tr><td>Motor with brake</td><td>0.0208±10%</td></tr>
</table>

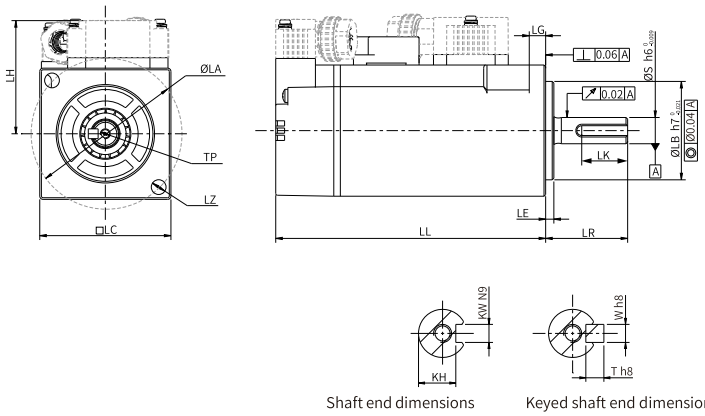
Electrical specifications of the brake

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

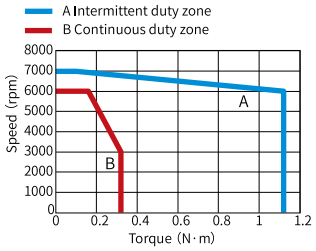
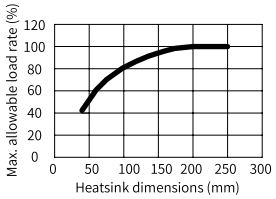
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
20	≤ 78	≤ 54

Product dimensions (in mm)



LL	LC	LR	LA	LZ	LH	LG	LE	
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)

5.2.2.2.2 MS1H1-10B30CB-V63*R-INT

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 ($kg·cm^2$)	Motor without brake	0.0316±10%	
	Motor with brake	0.0345±10%	

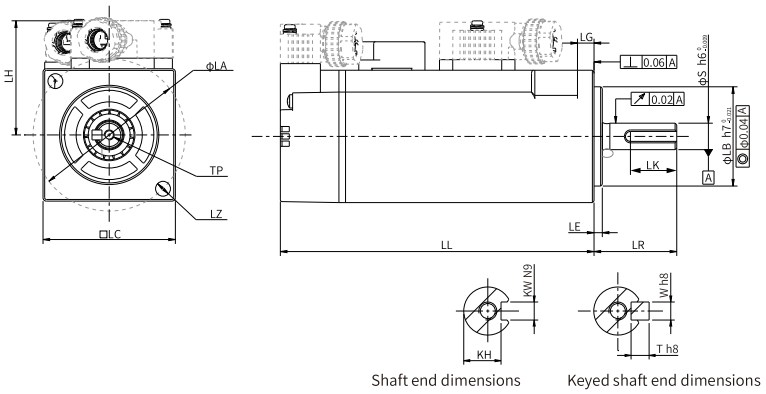
Electrical specifications of the brake

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

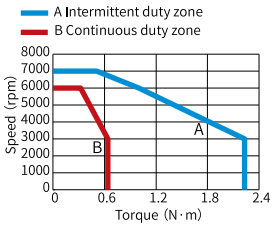
Product dimensions (in mm)

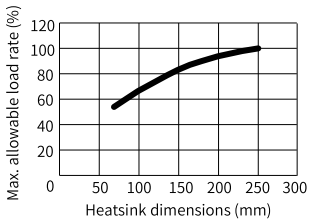


Shaft end dimensions Keyed shaft end dimensions

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)

5.2.2.2.3 MS1H1-20B30CB-V63*R-INT

Motor specifications		Torque-speed characteristics
Frame size (mm)	60	
Inertia, capacity	Low inertia, small capacity	
Rated power (kW)	0.2	
Voltage (V)	220	
Rated torque (N·m)	0.64	
Maximum torque (N·m)	2.24	
Rated frequency (Hz)	250	
Rated current (A)	1.5	Heatsink-based derating curve

Motor specifications			Torque-speed characteristics
Maximum current (A)	5.3		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/A)	0.51		
Rotor moment of inertia ($kg \cdot cm^2$)	Motor without brake	0.094 ± 10%	
	Motor with brake	0.106 ± 10%	

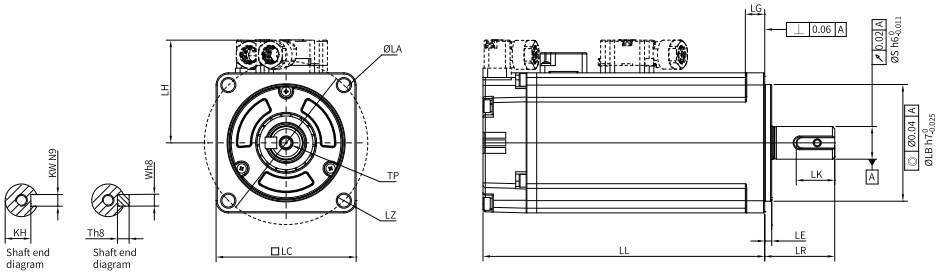
Electrical specifications of the brake

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 load

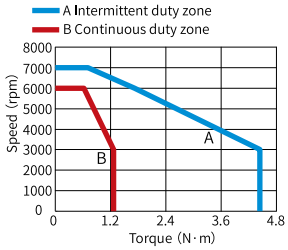
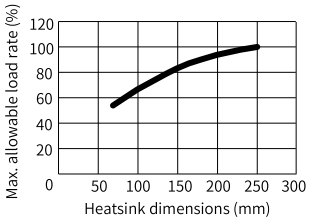
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
25	≤ 245	≤ 74

Dimensions (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)

5.2.2.2.4 MS1H1-40B30CB-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	60		
Inertia, capacity	Low inertia, small capacity		
Rated power (kW)	0.4		
Voltage (V)	220		
Rated torque (N·m)	1.27		
Maximum torque (N·m)	4.45		
Rated 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 ($kg \cdot cm^2$)	Motor without brake	0.145 ± 10%	
	Motor with brake	0.157 ± 10%	

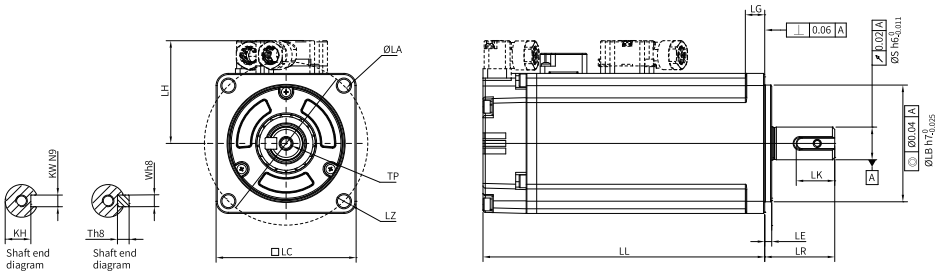
Electrical specifications of the brake

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 load

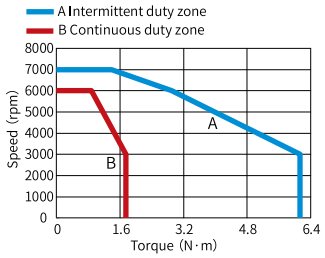
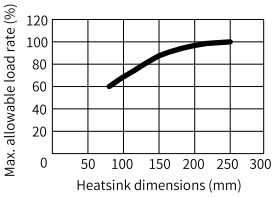
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
25	≤ 245	≤ 74

Dimensions (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)

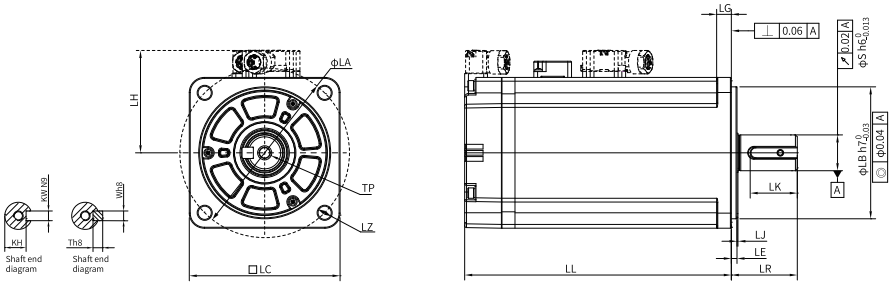
5.2.2.2.5 MS1H1-55B30CB-V631R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	80		
Inertia, capacity	Low inertia, small capacity		
Rated power (kW)	0.55		
Voltage (V)	220		
Rated torque (N·m)	1.75		
Maximum torque (N·m)	6.13		
Rated 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 ($kg \cdot cm^2$)	Motor without brake	0.55 ± 10%	
	Motor with brake	-	

Allowable load

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

Dimensions (mm)

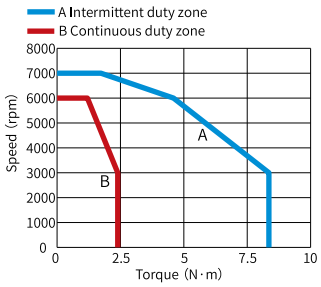


LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	96.7	35 ± 0.5	90	4 × ϕ7	54	7.5	3 ± 0.5	0.5 ± 0.35
LB	S	TP	LK	KH	kW	W	T	Weight (kg)
70	19	M6 × 20	$25^{0}_{-0.62}$	$15.5^{0}_{-0.1}$	6	6	6	1.88

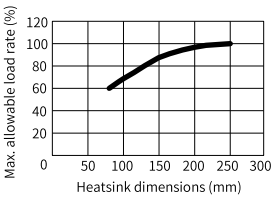
5.2.2.2.6 MS1H1-75B30CB-V63*R-INT

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

Torque-speed characteristics



Heatsink-based derating curve



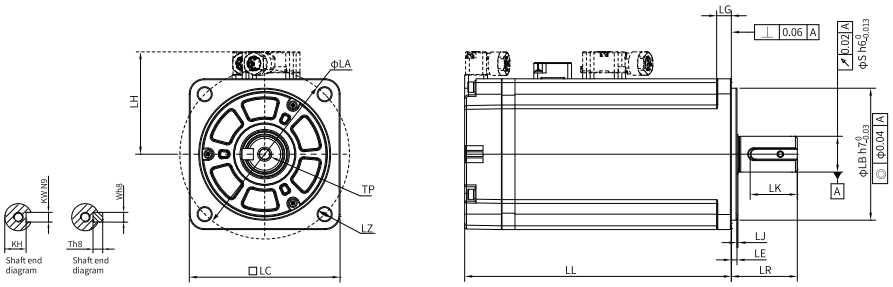
Electrical specifications of the brake

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 (°)
3.2	24	10	57.6	0.42	≤ 60	≤ 40	≤ 1

Allowable load

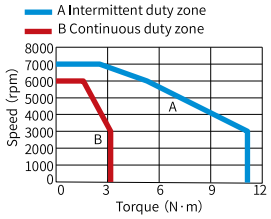
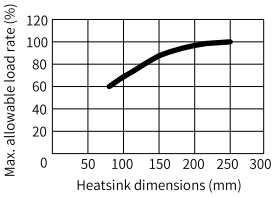
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	≤ 392	≤ 147

Dimensions (mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	107.3 (141.5)	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)

5.2.2.2.7 MS1H1-10C30CB-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	80		
Inertia, capacity	Low inertia, small capacity		
Rated power (kW)	1.0		
Voltage (V)	220		
Rated torque (N·m)	3.18		
Maximum torque (N·m)	11.1		
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 ($kg \cdot cm^2$)	Motor without brake	0.82 ± 10%	
	Motor with brake	0.87 ± 10%	

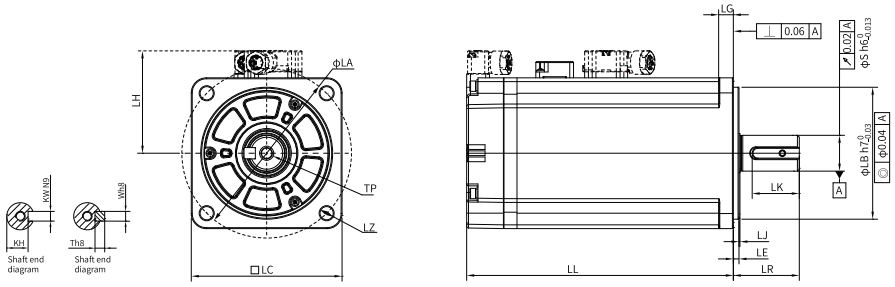
Electrical specifications of the brake

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 load

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

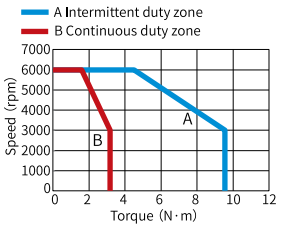
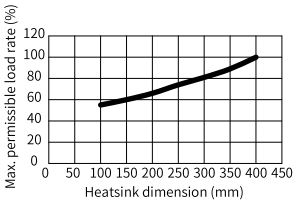
Dimensions (mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	119.2 (153.4)	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)

5.2.2.3 Low Inertia and Medium Capacity (MS1H2)

5.2.2.3.1 MS1H2-10C30CB-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	1.0		
Voltage (V)	220		
Rated torque (N·m)	3.18		
Maximum torque (N·m)	9.54		
Rated 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%	

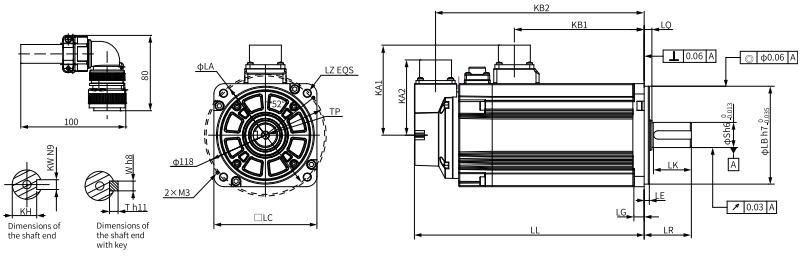
Electrical specifications of the brake

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 load

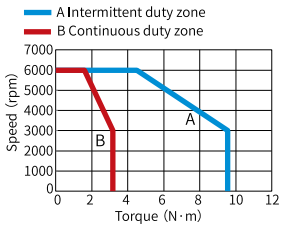
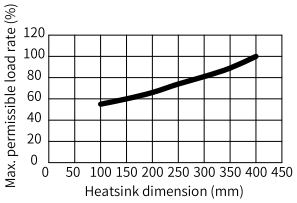
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	144 (172)	45 ± 1	115	4 × 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)

5.2.2.3.2 MS1H2-10C30CD-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	1.0		
Voltage (V)	380		
Rated torque (N·m)	3.18		
Maximum torque (N·m)	9.54		
Rated 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%	

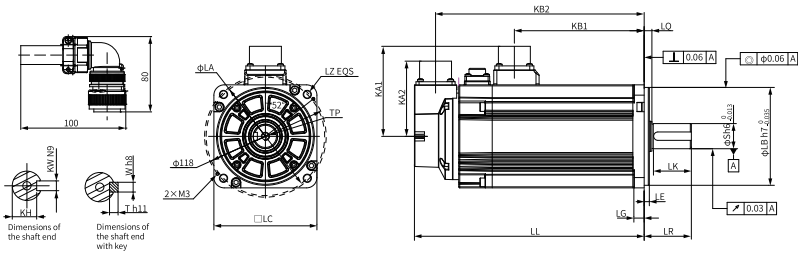
Electrical specifications of the brake

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 load

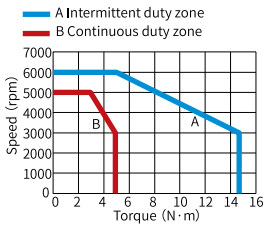
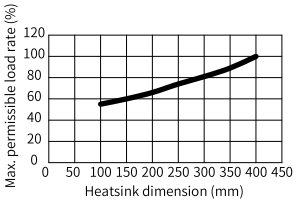
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	144 (172)	45 ± 1	115	4 × 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)

5.2.2.3.3 MS1H2-15C30CB-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	1.5		
Voltage (V)	220		
Rated torque (N·m)	4.9		
Maximum torque (N·m)	14.7		
Rated 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%	

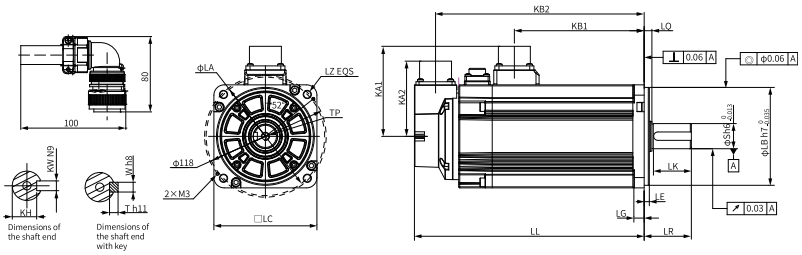
Electrical specifications of the brake

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 load

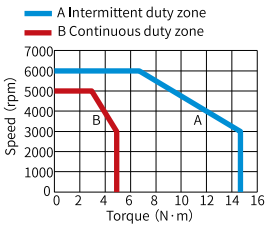
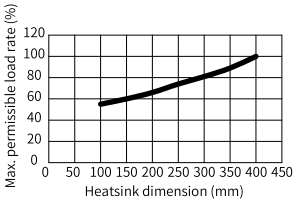
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	161 (189)	45 ± 1	115	4 × 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)

5.2.2.3.4 MS1H2-15C30CD-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	1.5		
Voltage (V)	380		
Rated torque (N·m)	4.9		
Maximum torque (N·m)	14.7		
Rated 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 ($kg \cdot cm^2$)	Motor without brake	2.35 ± 10%	
	Motor with brake	3.17 ± 10%	

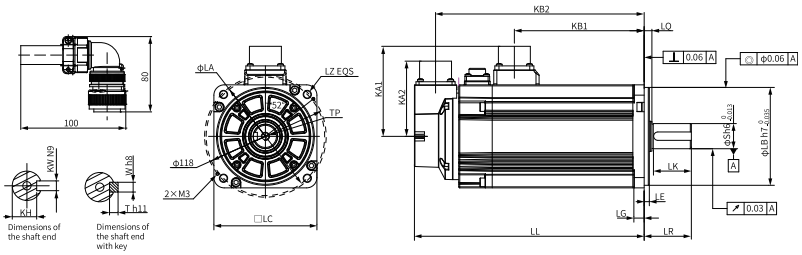
Electrical specifications of the brake

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 load

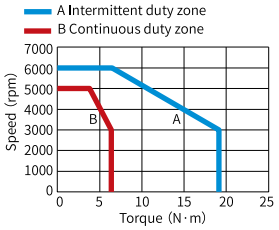
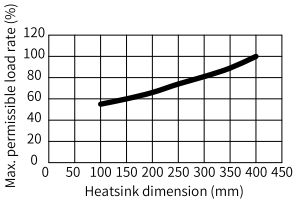
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	161 (189)	45 ± 1	115	4 × 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)

5.2.2.3.5 MS1H2-20C30CB-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	2.0		
Voltage (V)	220		
Rated torque (N·m)	6.36		
Maximum torque (N·m)	19.1		
Rated 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%	

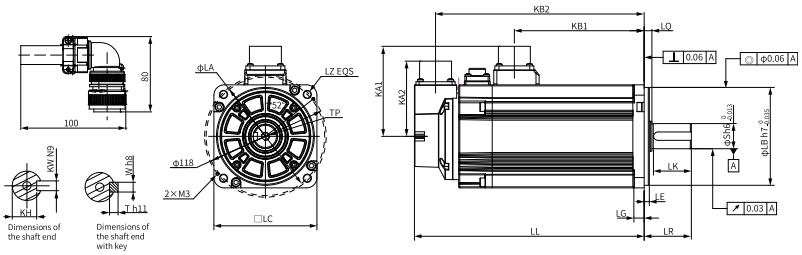
Electrical specifications of the brake

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 load

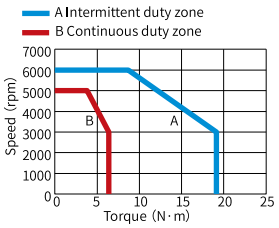
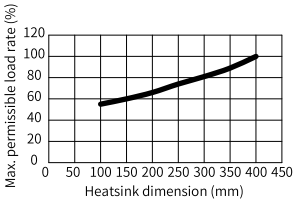
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	177 (205)	45 ± 1	115	4 × 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)

5.2.2.3.6 MS1H2-20C30CD-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	2.0		
Voltage (V)	380		
Rated torque (N·m)	6.36		
Maximum torque (N·m)	19.1		
Rated 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 ($kg \cdot cm^2$)	Motor without brake	2.92 ± 10%	
	Motor with brake	3.74 ± 10%	

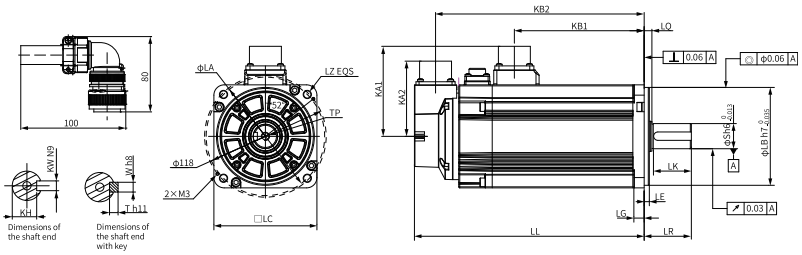
Electrical specifications of the brake

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 load

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

Dimensions (mm)

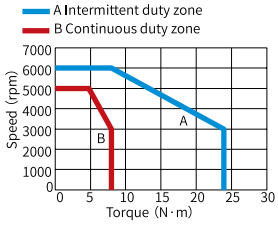


LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	177 (205)	45 ± 1	115	4 × ϕ7	88	108	73	156.5 (184.5)	10	5 ± 0.3
LQ	LB		S	TP	LK	KH	kW	W	T	Weight (kg)
7.5 ± 0.75	95		24	M8 × 16	$35^{0}_{-0.62}$	$20^{0}_{-0.2}$	8	8	7	5.5 (6.55)

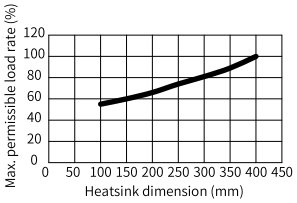
5.2.2.3.7 MS1H2-25C30CB-V63*R-INT

Motor specifications		
Frame size (mm)	100	
Inertia, capacity	Low inertia, medium capacity	
Rated power (kW)	2.5	
Voltage (V)	220	
Rated torque (N·m)	7.96	
Maximum torque (N·m)	23.9	
Rated frequency (Hz)	250	
Rated current (A)	14.7	
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%

Torque-speed characteristics



Heatsink-based derating curve



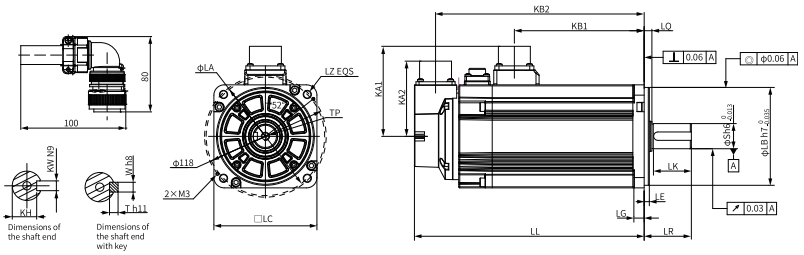
Electrical specifications of the brake

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 (°)
8	24	17.6	32.73	0.73	≤ 100	≤ 40	≤ 1

Allowable load

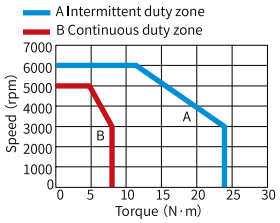
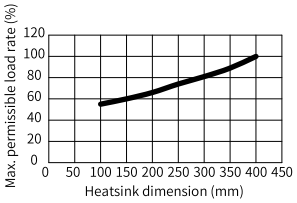
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	195 (223)	45 ± 1	115	4 × 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)

5.2.2.3.8 MS1H2-25C30CD-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	2.5		
Voltage (V)	380		
Rated torque (N·m)	7.96		
Maximum torque (N·m)	23.9		
Rated 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 ($kg \cdot cm^2$)	Motor without brake	3.49 ± 10%	
	Motor with brake	4.3 ± 10%	

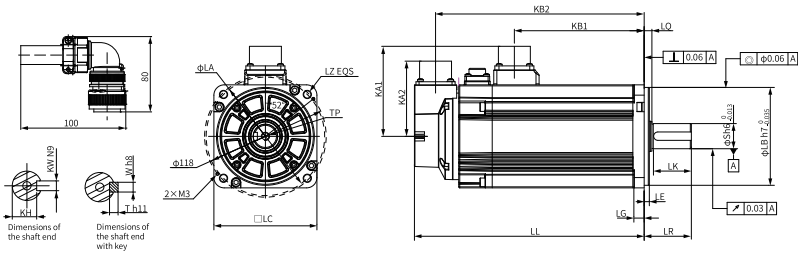
Electrical specifications of the brake

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 load

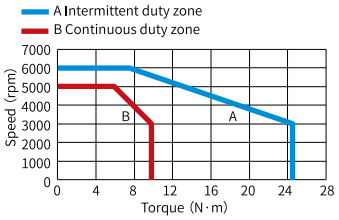
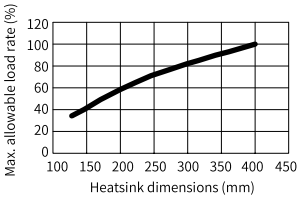
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	≤ 686	≤ 196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	195 (223)	45 ± 1	115	4 × 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)

5.2.2.3.9 MS1H2-30C30CB-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	3.0		
Voltage (V)	220		
Rated torque (N·m)	9.8		
Maximum torque (N·m)	24.5		
Rated 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%	

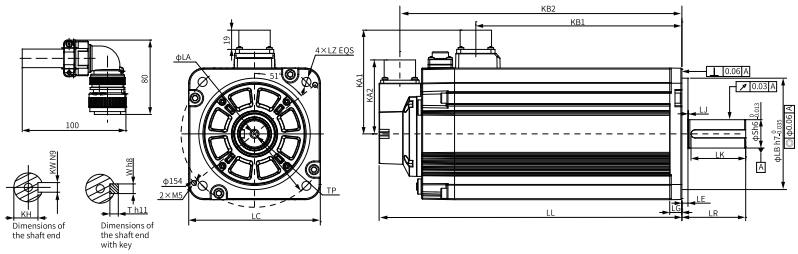
Electrical specifications of the brake

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 load

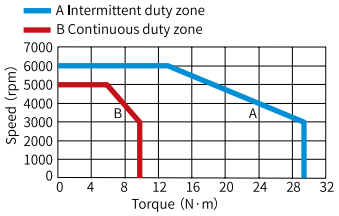
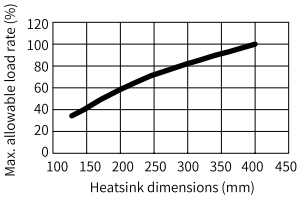
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	≤ 1176	≤ 392

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	198 (223)	63 ± 1	145	4 × 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)

5.2.2.3.10 MS1H2-30C30CD-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	3.0		
Voltage (V)	380		
Rated torque (N·m)	9.8		
Maximum torque (N·m)	29.4		
Rated 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%	

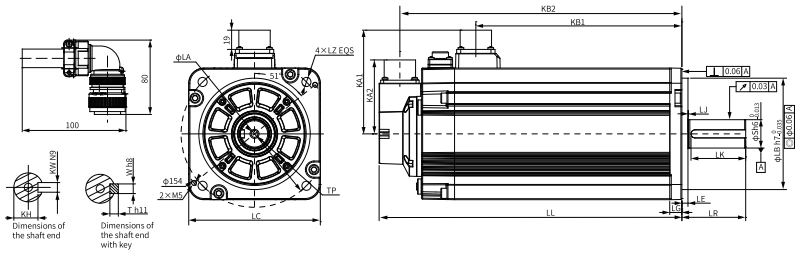
Electrical specifications of the brake

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 load

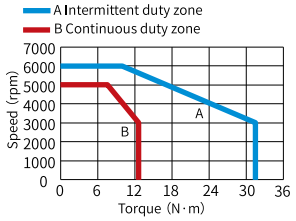
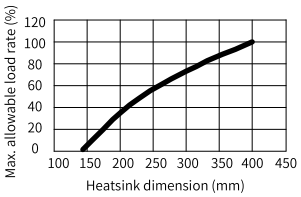
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	≤ 1176	≤ 392

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	198 (223)	63 ± 1	145	4 × 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)

5.2.2.3.11 MS1H2-40C30CB-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	4.0		
Voltage (V)	220		
Rated torque (N·m)	12.6		
Maximum torque (N·m)	31.5		
Rated 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%	

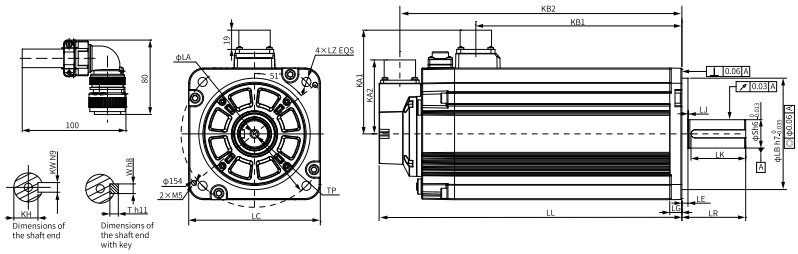
Electrical specifications of the brake

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 load

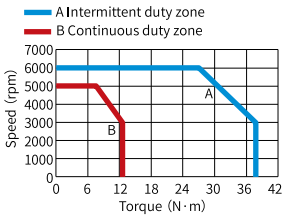
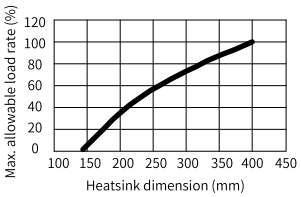
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	≤ 1176	≤ 392

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	236 (261)	63 ± 1	145	4 × 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)

5.2.2.3.12 MS1H2-40C30CD-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	4.0		
Voltage (V)	380		
Rated torque (N·m)	12.6		
Maximum torque (N·m)	37.8		
Rated 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%	

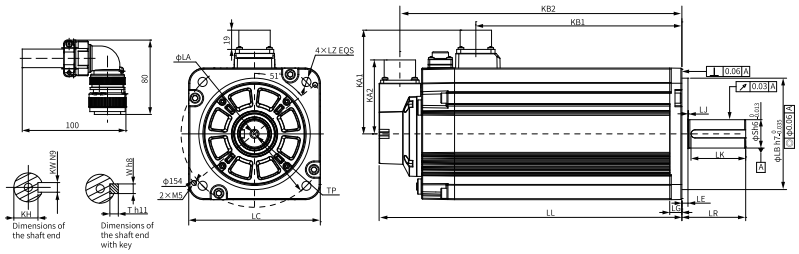
Electrical specifications of the brake

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 load

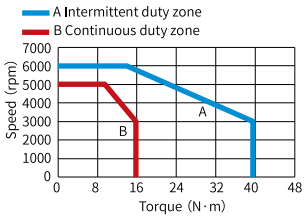
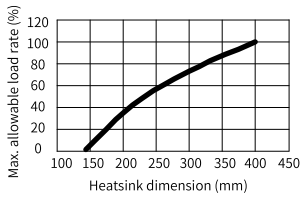
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	≤ 1176	≤ 392

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	236 (261)	63 ± 1	145	4 × 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)

5.2.2.3.13 MS1H2-50C30CB-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	5.0		
Voltage (V)	220		
Rated torque (N·m)	15.8		
Maximum torque (N·m)	39.5		
Rated 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%	

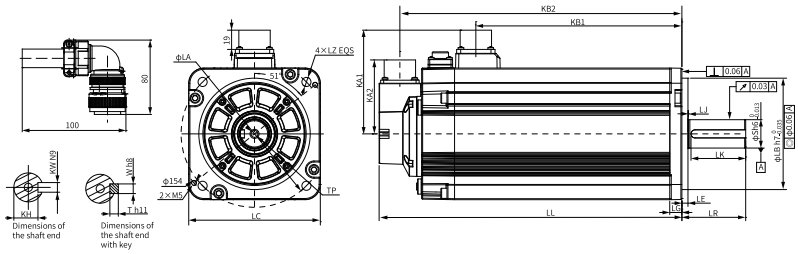
Electrical specifications of the brake

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 load

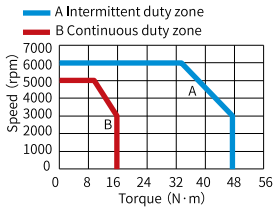
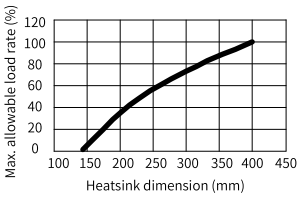
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	≤ 1176	≤ 392

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	274 (299)	63 ± 1	145	4 × 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)

5.2.2.3.14 MS1H2-50C30CD-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	5.0		
Voltage (V)	380		
Rated torque (N·m)	15.8		
Maximum torque (N·m)	47.4		
Rated 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%	

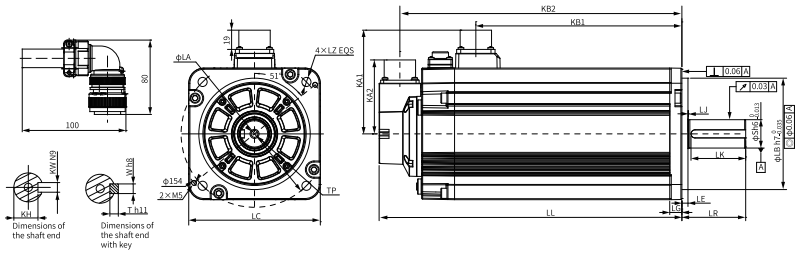
Electrical specifications of the brake

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 load

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

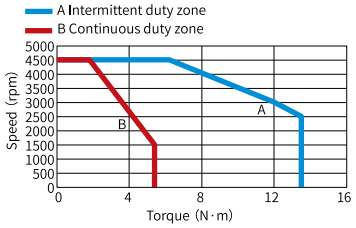
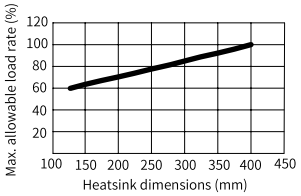
Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	274 (299)	63 ± 1	145	4 × 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)

5.2.2.4 Medium Inertia and Medium Capacity (MS1H3)

5.2.2.4.1 MS1H3-85B15CB-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	0.85		
Voltage (V)	220		
Rated torque (N·m)	5.39		
Maximum torque (N·m)	13.5		
Rated 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 ($kg \cdot cm^2$)	Motor without brake	13.56 ± 10%	
	Motor with brake	15.8 ± 10%	

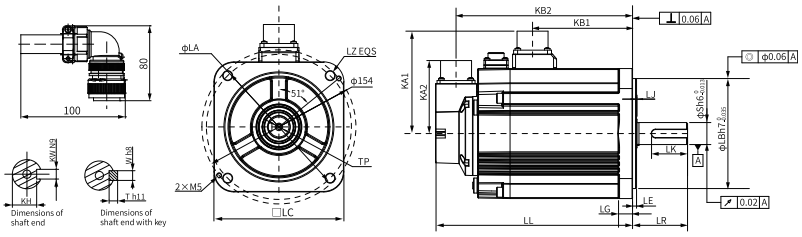
Electrical specifications of the brake

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 load

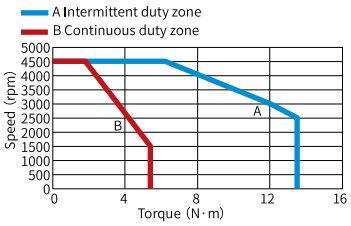
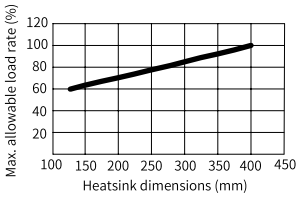
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	142 (167)	55 ± 1	145	4 × 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)

5.2.2.4.2 MS1H3-85B15CD-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	0.85		
Voltage (V)	380		
Rated torque (N·m)	5.39		
Maximum torque (N·m)	13.5		
Rated 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 ($kg \cdot cm^2$)	Motor without brake	13.56 ± 10%	
	Motor with brake	15.8 ± 10%	

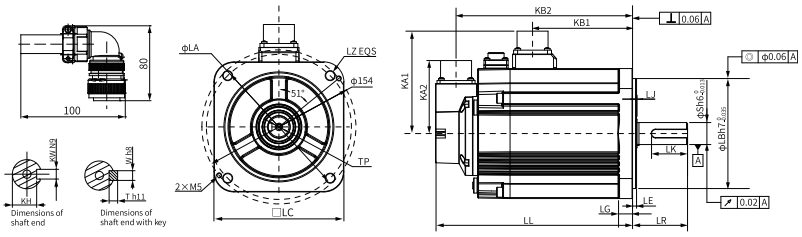
Electrical specifications of the brake

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 load

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

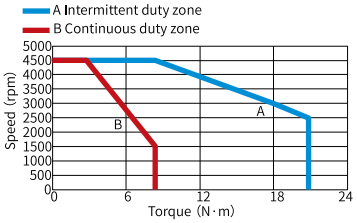
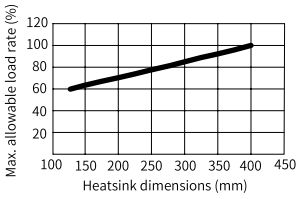
Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	142 (167)	55 ± 1	145	4 × 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)

5.2.2.4.3 MS1H3-13C15CB-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	1.3		
Voltage (V)	220		
Rated torque (N·m)	8.34		
Maximum torque (N·m)	20.85		
Rated 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 ($kg·cm^2$)	Motor without brake	19.25 ± 10%	
	Motor with brake	21.5 ± 10%	

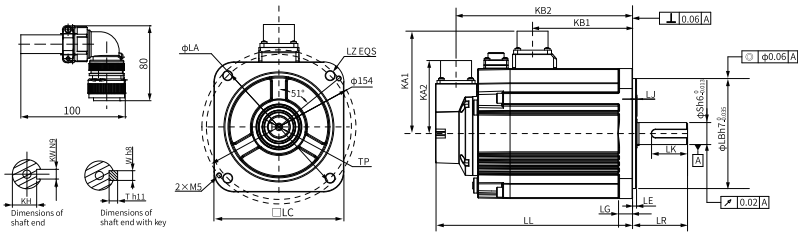
Electrical specifications of the brake

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 load

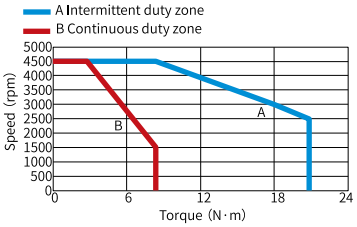
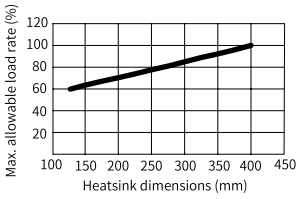
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	157 (182)	55 ± 1	145	4 × 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)

5.2.2.4.4 MS1H3-13C15CD-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	1.3		
Voltage (V)	380		
Rated torque (N·m)	8.34		
Maximum torque (N·m)	20.85		
Rated 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%	

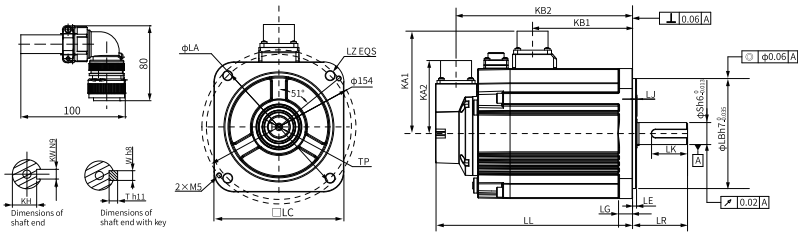
Electrical specifications of the brake

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 load

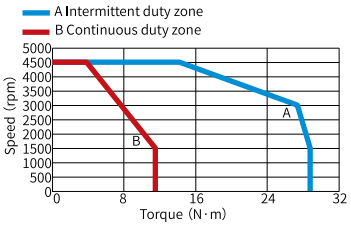
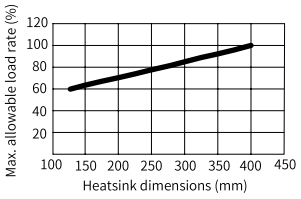
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	≤ 686	≤ 196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	157 (182)	55 ± 1	145	4 × 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)

5.2.2.4.5 MS1H3-18C15CB-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	1.8		
Voltage (V)	220		
Rated torque (N·m)	11.5		
Maximum torque (N·m)	28.75		
Rated 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%	

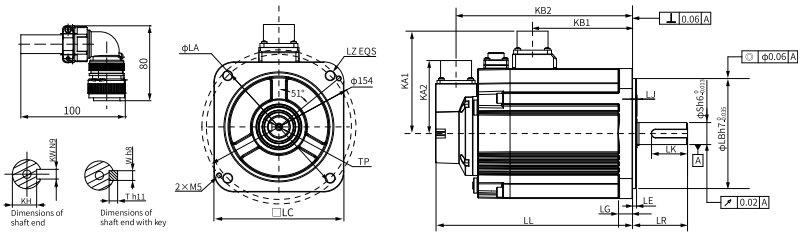
Electrical specifications of the brake

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 load

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

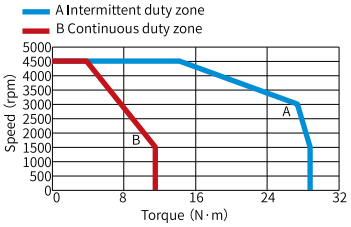
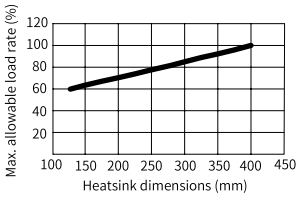
Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	172 (197)	55 ± 1	145	4 × 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)

5.2.2.4.6 MS1H3-18C15CD-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	130		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	1.8		
Voltage (V)	380		
Rated torque (N·m)	11.5		
Maximum torque (N·m)	28.75		
Rated 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%	

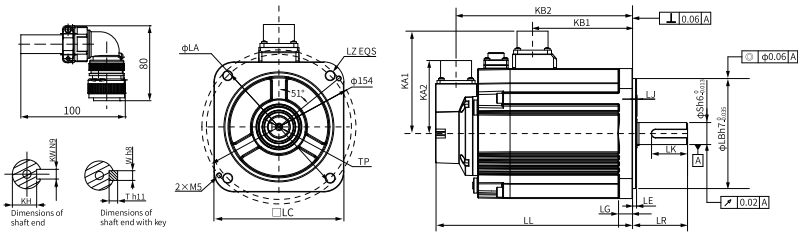
Electrical specifications of the brake

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 load

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

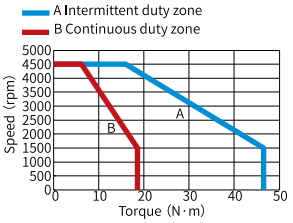
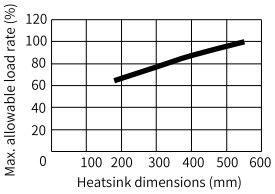
Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	172 (197)	55 ± 1	145	4 × 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)

5.2.2.4.7 MS1H3-29C15CB-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	180		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	2.9		
Voltage (V)	220		
Rated torque (N·m)	18.6		
Maximum torque (N·m)	46.5		
Rated 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%	

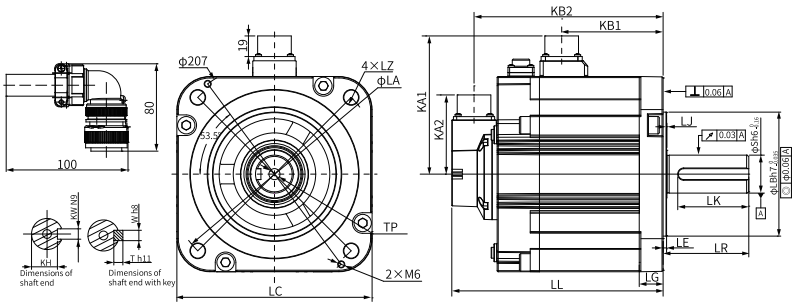
Electrical specifications of the brake

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 load

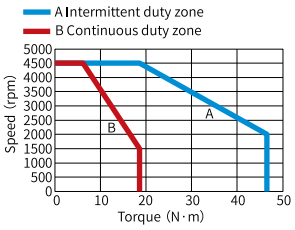
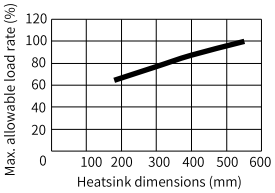
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	≤ 1470	≤ 490

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	161 (194.8)	79 ± 1	200	4 × 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)

5.2.2.4.8 MS1H3-29C15CD-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	180		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	2.9		
Voltage (V)	380		
Rated torque (N·m)	18.6		
Maximum torque (N·m)	46.5		
Rated 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 ($kg \cdot cm^2$)	Motor without brake	44.7 ± 10%	
	Motor with brake	52.35 ± 10%	

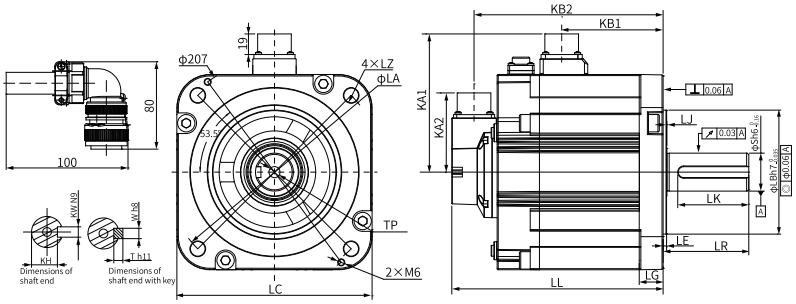
Electrical specifications of the brake

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 load

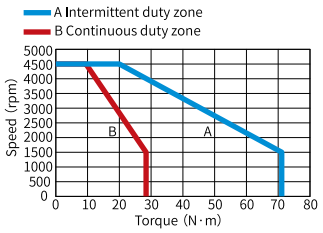
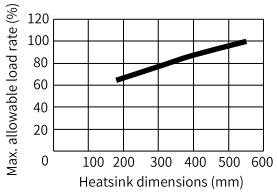
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	≤ 1470	≤ 490

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	161 (194.8)	79 ± 1	200	4 × 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)

5.2.2.4.9 MS1H3-44C15CB-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	180		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	4.4		
Voltage (V)	220		
Rated torque (N·m)	28.4		
Maximum torque (N·m)	71.1		
Rated 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%	

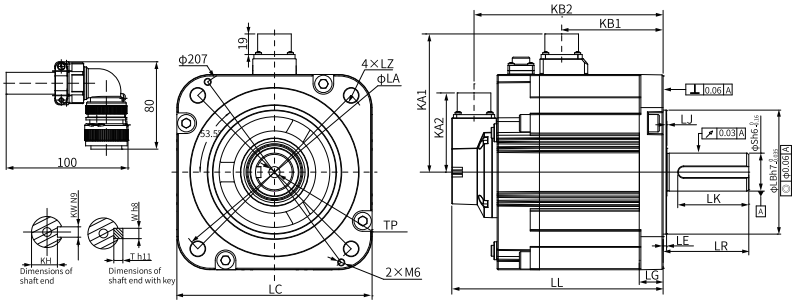
Electrical specifications of the brake

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 load

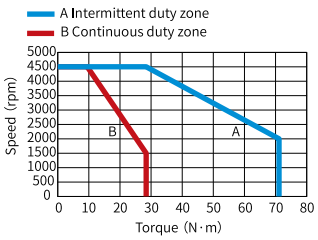
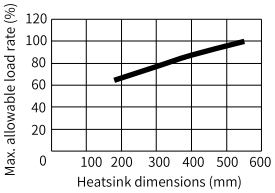
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	≤ 1470	≤ 490

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	184.5 (218.3)	79 ± 1	200	4 × 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)

5.2.2.4.10 MS1H3-44C15CD-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	180		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	4.4		
Voltage (V)	380		
Rated torque (N·m)	28.4		
Maximum torque (N·m)	71.1		
Rated 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%	

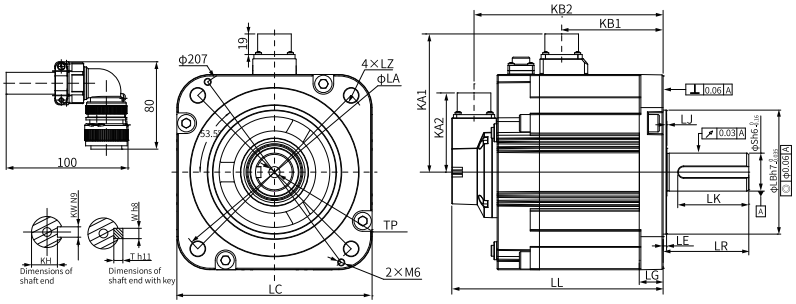
Electrical specifications of the brake

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 load

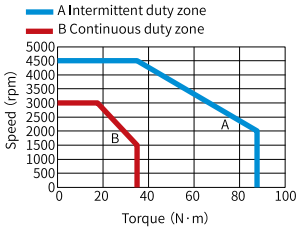
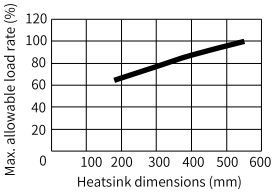
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	≤ 1470	≤ 490

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	184.5 (218.3)	79 ± 1	200	4 × 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)

5.2.2.4.11 MS1H3-55C15CD-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	180		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	5.5		
Voltage (V)	380		
Rated torque (N·m)	35		
Maximum torque (N·m)	87.6		
Rated 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 ($kg \cdot cm^2$)	Motor without brake	86.9 ± 10%	
	Motor with brake	94.55 ± 10%	

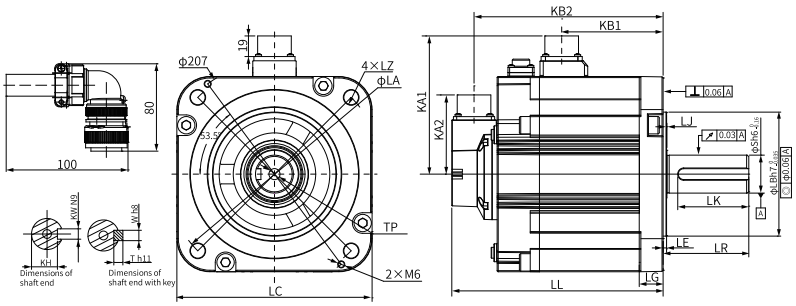
Electrical specifications of the brake

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 load

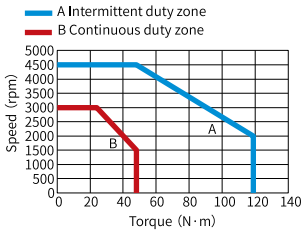
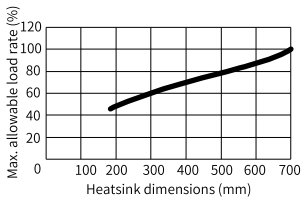
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
113	≤ 1764	≤ 588

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	208 (241.8)	113 ± 1	200	4 × 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	M16 × 32	$95^{0}_{-0.87}$	$37^{0}_{-0.2}$	12	12	8	21.7 (25.9)

5.2.2.4.12 MS1H3-75C15CD-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	180		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	7.5		
Voltage (V)	380		
Rated torque (N·m)	48		
Maximum torque (N·m)	119		
Rated 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 ($kg \cdot cm^2$)	Motor without brake	127.5 ± 10%	
	Motor with brake	135.15 ± 10%	

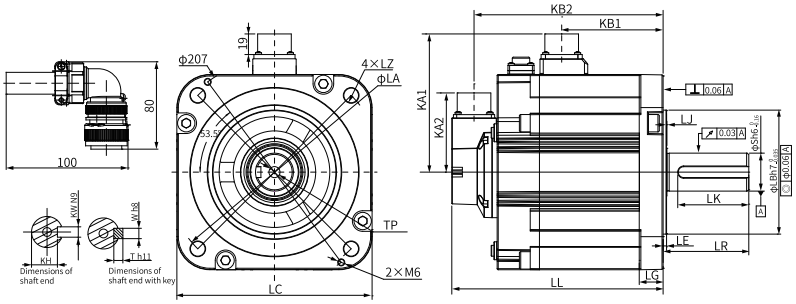
Electrical specifications of the brake

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 load

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

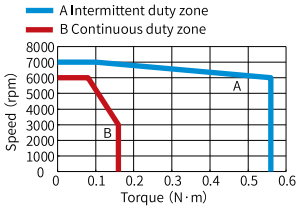
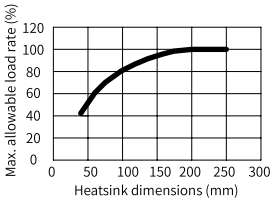
Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	255 (288.8)	113 ± 1	200	4 × 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	M16 × 32	$95^{0}_{-0.87}$	$37^{0}_{-0.2}$	12	12	8	29 (33.2)

5.2.2.5 Medium Inertia and Small Capacity (MS1H4)

5.2.2.5.1 MS1H4-05B30CB-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	40		
Inertia and capacity	Medium inertia, small capacity		
Rated output (kW)	0.05		
Rated 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·cm²)	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)

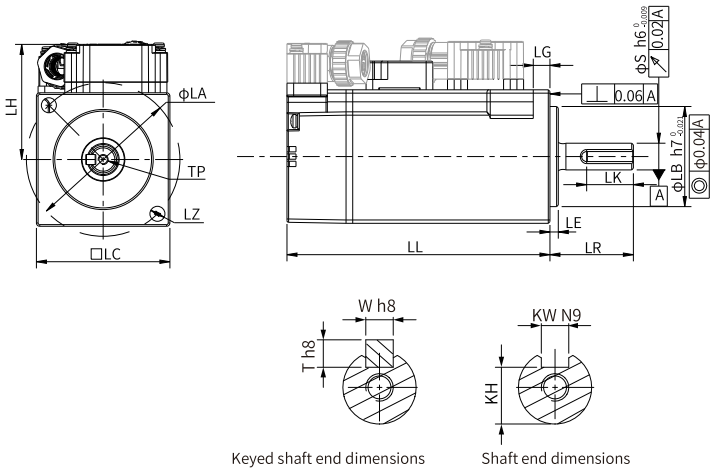


Figure 5-18 MS1H4-05B30CB-V630R-INT and MS1H4-05B30CB-V632R-INT

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)

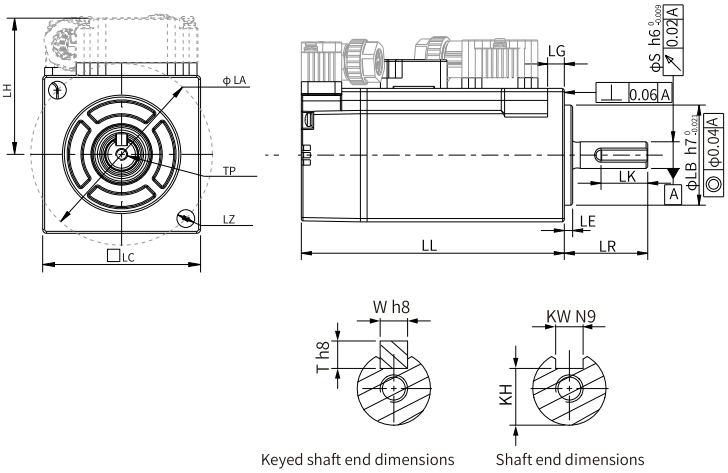
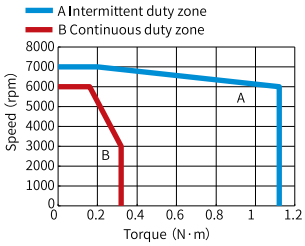
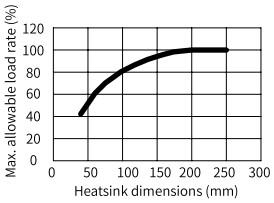


Figure 5-19 MS1H4-05B30CB-V631R-INT and MS1H4-05B30CB-V634R-INT

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)

5.2.2.5.2 MS1H4-10B30CB-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	40		
Inertia and capacity	Medium inertia, small capacity		
Rated output (kW)	0.1		
Rated 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 ($kg \cdot cm^2$)	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)

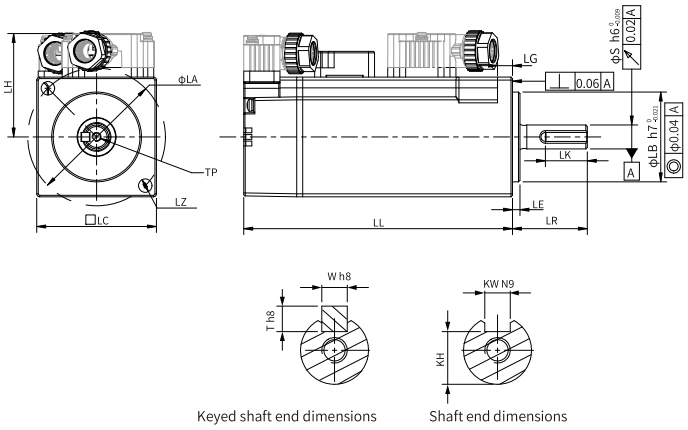


Figure 5-20 MS1H4-10B30CB-V630R-INT and MS1H4-10B30CB-V632R-INT

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)

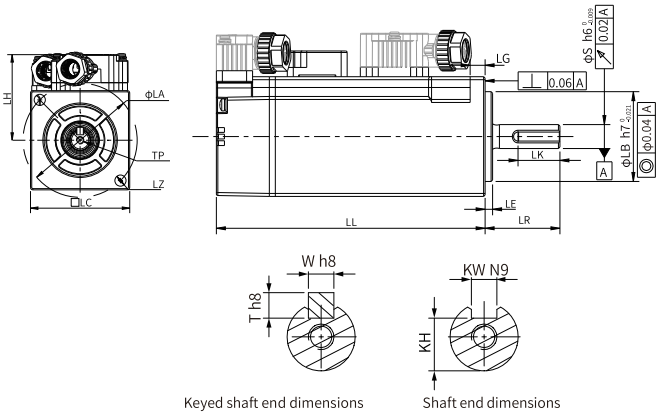
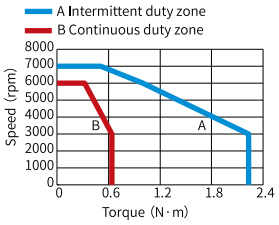
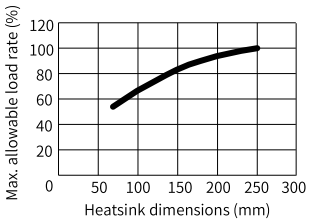


Figure 5-21 MS1H4-10B30CB-V631R-INT and MS1H4-10B30CB-V634R-INT

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)

5.2.2.5.3 MS1H4-20B30CB-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	60		
Inertia, capacity	Medium inertia, low capacity		
Rated power (kW)	0.2		
Voltage (V)	220		
Rated torque (N·m)	0.64		
Maximum torque (N·m)	2.24		
Rated 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%	

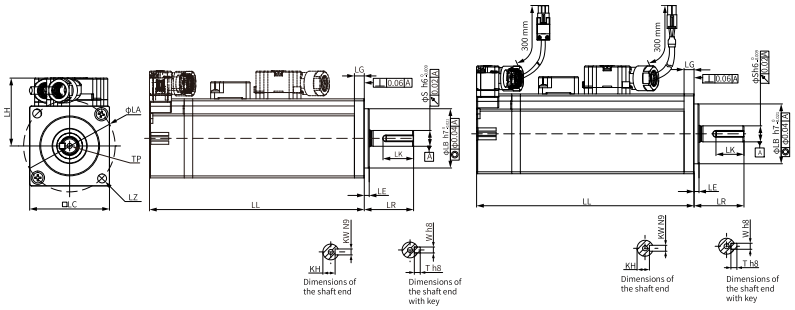
Electrical specifications of the brake

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 load

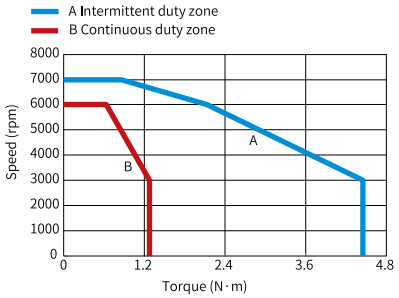
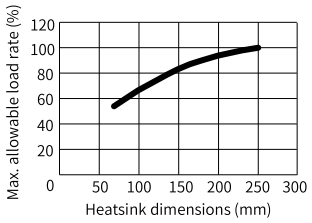
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
25	≤ 245	≤ 74

Dimensions (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)

5.2.2.5.4 MS1H4-40B30CB-V63*R-INT

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%	

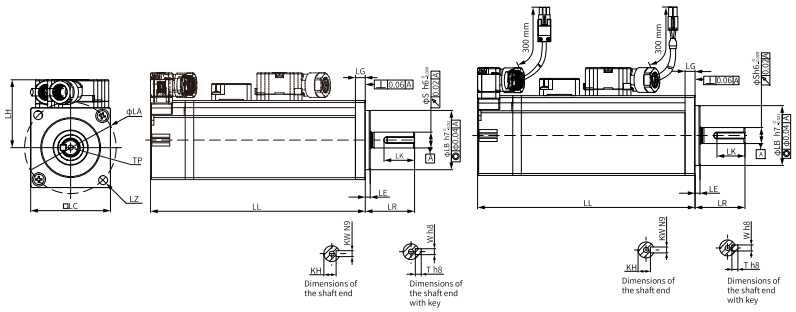
Electrical specifications of the brake

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

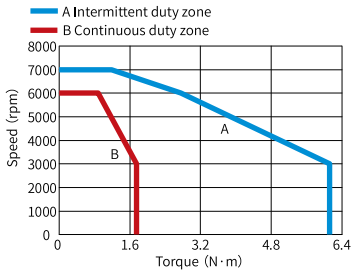
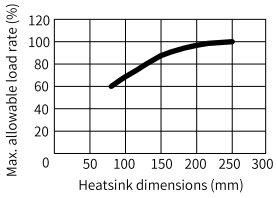
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
25	≤ 245	≤ 74

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)

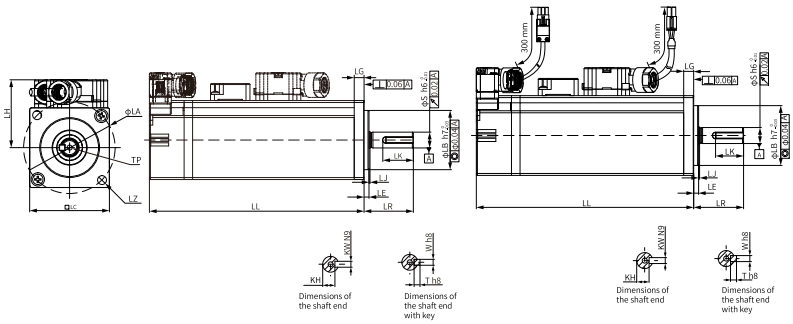
5.2.2.5.5 MS1H4-55B30CB-V631R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	80		
Inertia, capacity	Medium inertia, low capacity		
Rated power (kW)	0.55		
Voltage (V)	220		
Rated torque (N·m)	1.75		
Maximum torque (N·m)	6.13		
Rated 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 load

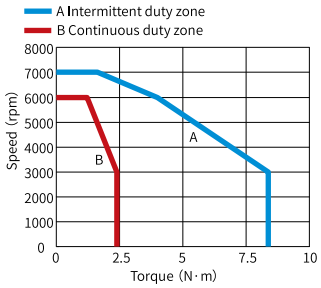
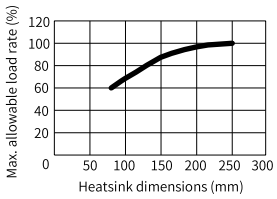
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	≤ 392	≤ 147

Dimensions (mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	96.7	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

5.2.2.5.6 MS1H4-75B30CB-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	80		
Inertia, capacity	Medium inertia, low capacity		
Rated power (kW)	0.75		
Voltage (V)	220		
Rated torque (N·m)	2.39		
Maximum torque (N·m)	8.37		
Rated 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 to 10 %	

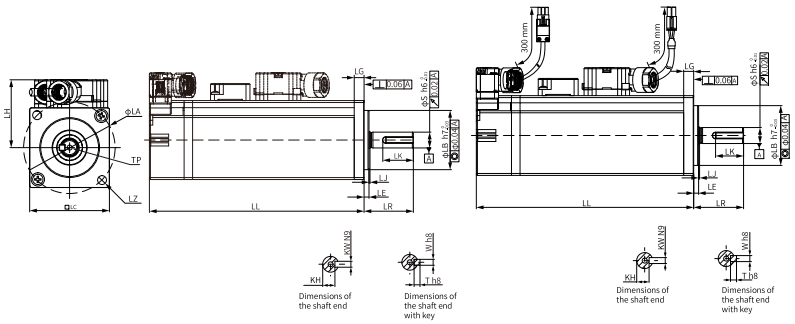
Electrical specifications of the brake

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 load

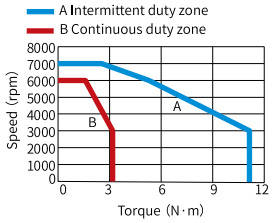
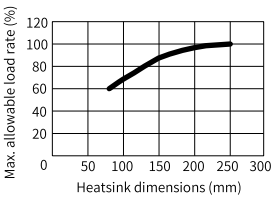
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	≤ 392	≤ 147

Dimensions (mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	107.3 (140.5)	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	250 $^{-0.62}$	15.50 $^{-0.1}$	6	6	6	2.18 (2.82)

5.2.2.5.7 MS1H4-10C30CB-V63*R-INT

Motor specifications			Torque-speed characteristics
Frame size (mm)	80		
Inertia, capacity	Medium inertia, low capacity		
Rated power (kW)	1.0		
Voltage (V)	220		
Rated torque (N·m)	3.18		
Maximum torque (N·m)	11.13		
Rated 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%	

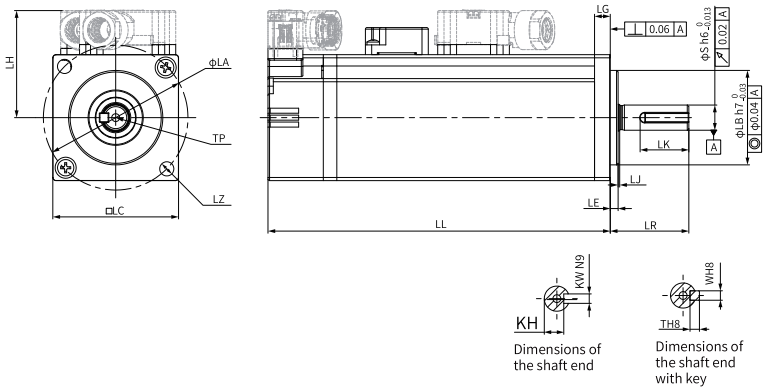
Electrical specifications of the brake

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 load

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

Dimensions (mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	118.7 (153.2)	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

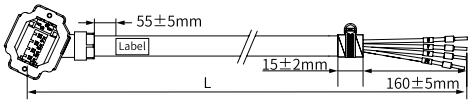
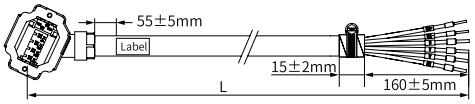
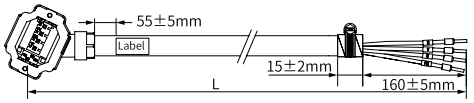
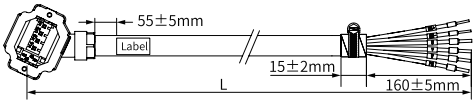
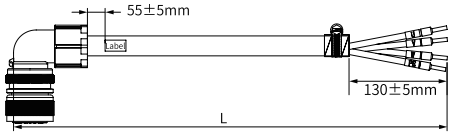
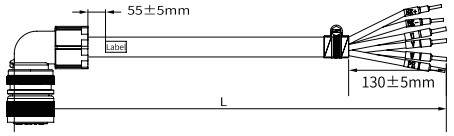
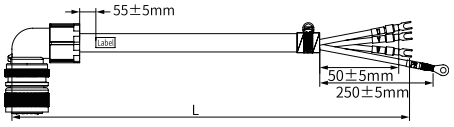
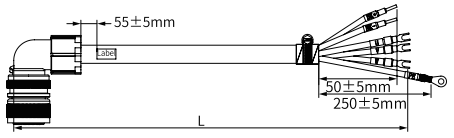
6.1.1 Power Cable

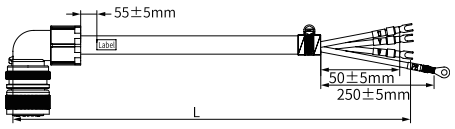
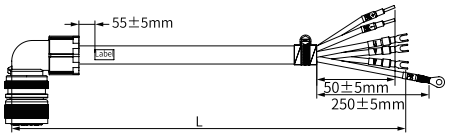
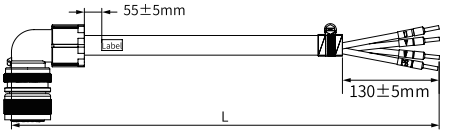
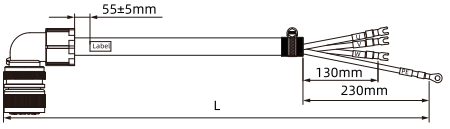
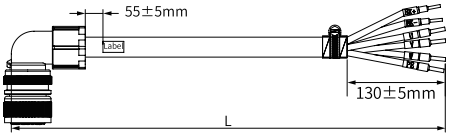
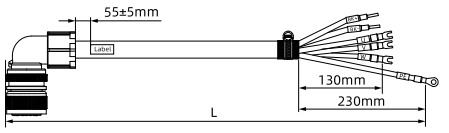
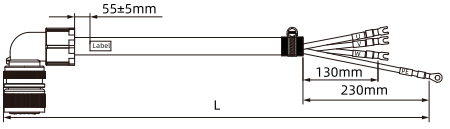
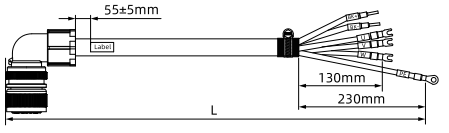
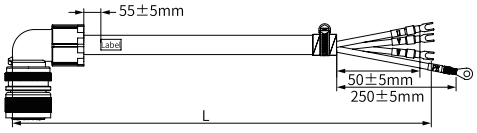
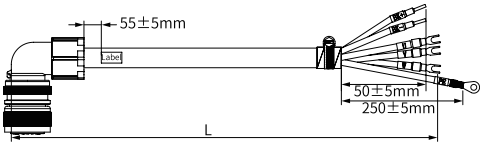
Power cable model

S6-L-M ① 0 ② 0 ③ 1 ④ - 3.0 ⑤ - A ⑥ - T ⑦ - INT ⑧

① **Cable type** S6-L-B/M: Motion control power cable B: With brake M: Without brake	③ **Cross-sectional area** 0: Flange sizes 25/40/60/80 mm 1: Flange sizes 100/130/180 mm 2: Flange size 180 mm (motors of 4.4 kW and above) 4: 4 × 2.5 mm^2 5: 4 × 1.5 mm^2 6: 4 × 0.75mm^2	⑤ **Cable length (m)** 3.0: 3 5.0: 5 10.0: 10
② **Connector type at drive side** 0: U-shaped terminal 1: Pin terminal	④ **Connector type on the 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 **Cable segmentation method** A: At mode side B: Intermediate adapter C: At drive side Blank: No segmentation
		⑦ **Special requirements** T: Cable in the flexible drag chain ≥ 10 million times TTS: Flexible drag chain shielding ≥ 20 million times TTS: Flexible drag chain shielding ≥ 20 million times Blank: Non-drag chain
		⑧ **Version** INT: International version

List of Power Cables (Compatible with MS1-R-INT Series Motor)

Motor model	Cable		Cable model	Cable length (mm)	Appearance
MS1H1/ MS1H4 motor	Front outlet	Without brake	S6-L-M107-3.0 (-T) -INT	3000	
			S6-L-M107-5.0 (-T) -INT	5000	
			S6-L-M107-10.0 (-T) -INT	10000	
		Brake	S6-L-B107-3.0 (-T) -INT	3000	
			S6-L-B107-5.0 (-T) -INT	5000	
			S6-L-B107-10.0 (-T) -INT	10000	
	Rear outlet	Without brake	S6-L-M108-3.0 (-T) -INT	3000	
			S6-L-M108-5.0 (-T) -INT	5000	
			S6-L-M108-10.0 (-T) -INT	10000	
		Brake	S6-L-B108-3.0 (-T) -INT	3000	
			S6-L-B108-5.0 (-T) -INT	5000	
			S6-L-B108-10.0 (-T) -INT	10000	
MS1H2 motors rated 3 kW or below/ MS1H3 motors rated 1.8 kW or below (400 V voltage class)	Without brake		S6-L-M111-3.0 (-T) -INT	3000	
			S6-L-M111-5.0 (-T) -INT	5000	
			S6-L-M111-10.0 (-T) -INT	10000	
	Brake		S6-L-B111-3.0 (-T) -INT	3000	
			S6-L-B111-5.0 (-T) -INT	5000	
			S6-L-B111-10.0 (-T) -INT	10000	
MS1H2 motors rated 3 kW or below/ MS1H3 motors rated 1.8 kW or below (200 V voltage class)	Without brake		S6-L-M011-3.0 (-T) -INT	3000	
			S6-L-M011-5.0 (-T) -INT	5000	
			S6-L-M011-10.0 (-T) -INT	10000	
	Brake		S6-L-B011-3.0 (-T) -INT	3000	
			S6-L-B011-5.0 (-T) -INT	5000	
			S6-L-B011-10.0 (-T) -INT	10000	

Motor model	Cable	Cable model	Cable length (mm)	Appearance
MS1H2 motors rated 4 kW/5 kW	Without brake	S6-L-M011-3.0 (-T) -INT	3000	
		S6-L-M011-5.0 (-T) -INT	5000	
		S6-L-M011-10.0 (-T) -INT	10000	
	Brake	S6-L-B011-3.0 (-T) -INT	3000	
		S6-L-B011-5.0 (-T) -INT	5000	
		S6-L-B011-10.0 (-T) -INT	10000	
MS1H3 motors (2.9 kW) (400 V voltage class)	Without brake	S6-L-M112-3.0 (-T) -INT	3000	
		S6-L-M112-5.0 (-T) -INT	5000	
		S6-L-M112-10.0 (-T) -INT	10000	
		S6-L-M012-3.0 (-T) -INT	3000	
		S6-L-M012-5.0 (-T) -INT	5000	
		S6-L-M012-10.0 (-T) -INT	10000	
	Brake	S6-L-B112-3.0 (-T) -INT	3000	
		S6-L-B112-5.0 (-T) -INT	5000	
		S6-L-B112-10.0 (-T) -INT	10000	
		S6-L-B012-3.0 (-T) -INT	3000	
		S6-L-B012-5.0 (-T) -INT	5000	
		S6-L-B012-10.0 (-T) -INT	10000	
MS1H3 motors (2.9 kW) (200 V voltage class)	Without brake	S6-L-M012-3.0 (-T) -INT	3000	
		S6-L-M012-5.0 (-T) -INT	5000	
		S6-L-M012-10.0 (-T) -INT	10000	
	Brake	S6-L-B012-3.0 (-T) -INT	3000	
		S6-L-B012-5.0 (-T) -INT	5000	
		S6-L-B012-10.0 (-T) -INT	10000	
MS1H3 (4.4 kW and above)	Without brake	S6-L-M022-3.0 (-T) -INT	3000	
		S6-L-M022-5.0 (-T) -INT	5000	
		S6-L-M022-10.0 (-T) -INT	10000	
	Brake	S6-L-B022-3.0 (-T) -INT	3000	
		S6-L-B022-5.0 (-T) -INT	5000	
		S6-L-B022-10.0 (-T) -INT	10000	

Note

If the brake cable exceeds 10 m, it is recommended to use a shielded cable.

List of Motor Model Selection (Compatible with LMC Linear Module)

For details about power cable models, see *"1.1.3 List of Motor Model Selection (Compatible with LMC Linear Module)" on page 15*.

List of Power Cables (Compatible with ISM Series Torque Motor)

For details about power cable models, see *"1.1.5 List of Motor Model Selection (Compatible with ISM Series Torque Motor)" on page 16*.

List of Power Cables (Compatible with MP Series Torque Motor)

For details about power cable models, see *"1.1.4 List of Motor Model Selection (Compatible with MP Series Torque Motor)" on page 16*.

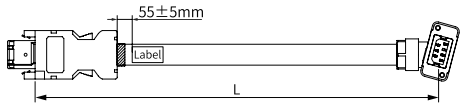
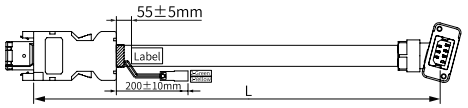
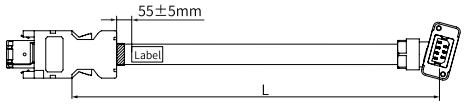
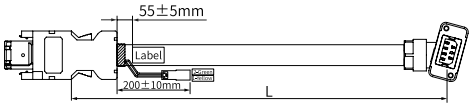
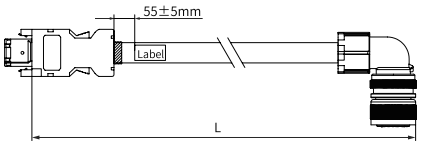
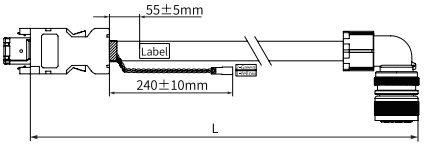
6.1.2 Encoder Cable

Encoder cable model

S6-L-P ① 1 ② 2 ③ 4 ④ - 3.0 ⑤ - A ⑥ 1 ⑦ - T ⑧ - INT ⑨

① **Cable type** S6-L-P: Encoder cable	④ **Connector type on the motor end** 1: 17-core military-spec connector 4: MS1 custom connector (front outlet) 5: MS1 custom connector (rear outlet) Q: Heidenhain safety readhead	⑦ **Total cable length** 1: Total cable length ≤ 26.4 m 2: 26.4 m < Total cable length ≤ 66.8 m (with 30 cm adapter on the motor side)
② **Connector type at drive side** 1: 1394 Connector 2: DB15 connector	⑤ **Cable length (m)** 3.0: 3 5.0: 5 10.0: 10	⑧ **Special requirements** T: Cable in the flexible drag chain ≥ 10 million times TTS: Flexible drag chain shielding ≥ 20 million times TTS: Flexible drag chain shielding ≥ 20 million times Blank: Non-drag chain
③ **Encoder application mode** 1: Communication-type incremental encoder 2: Multi-turn absolute encoder	⑥ **Cable segmentation method** A: At mode side B: Intermediate adapter C: At drive side Blank: No segmentation	⑨ **Version** INT: International version

List of Encoder Cables (Compatible with MS1-R-INT Series Motor)

Motor model	Cable		Cable model	Cable length (mm)	Appearance
MS1H1/ MS1H4 terminal-type motor	Front outlet	Single-turn absolute encoder cable	S6-L-P114-3.0 (-T) -INT	3000	
			S6-L-P114-5.0 (-T) -INT	5000	
			S6-L-P114-10.0 (-T) -INT	10000	
		Multi-turn absolute[1]	S6-L-P124-3.0 (-T) -INT	3000	
			S6-L-P124-5.0 (-T) -INT	5000	
			S6-L-P124-10.0 (-T) -INT	10000	
	Rear outlet	Single-turn absolute encoder cable	S6-L-P115-3.0 (-T) -INT	3000	
			S6-L-P115-5.0 (-T) -INT	5000	
			S6-L-P115-10.0 (-T) -INT	10000	
		Multi-turn absolute[1]	S6-L-P125-3.0 (-T) -INT	3000	
			S6-L-P125-5.0 (-T) -INT	5000	
			S6-L-P125-10.0 (-T) -INT	10000	
MS1H2/MS1H3 motors		Single-turn absolute encoder cable	S6-L-P111-3.0 (-T) -INT	3000	
			S6-L-P111-5.0 (-T) -INT	5000	
			S6-L-P111-10.0 (-T) -INT	10000	
		Multi-turn absolute[1]	S6-L-P121-3.0 (-T) -INT	3000	
			S6-L-P121-5.0 (-T) -INT	5000	
			S6-L-P121-10.0 (-T) -INT	10000	

Note

- The encoder cable is equipped with a shield as standard.
- [1]: The 6-conductor cable can be used in normal cases. The cable is reserved for compatibility with the original battery model. It is not required to be connected to the battery box during actual use.

List of Encoder Cables (Compatible with LMC Linear Module)

Readhead type	Cable length (m)				
	3	5	8	10	12
RSF-MS15 series, RU2 series, Inovance pulse-type grating (DB15, two rows), Renishaw grating, and LAMOTION RU2 grating without limits (Without Hall sensor, without limit switch)	S6-L-P23A-3.0-TTS-2-INT	S6-L-P23A-5.0-TTS-2-INT	S6-L-P23A-8.0-TTS-2-INT	S6-L-P23A-10.0-TTS-2-INT	S6-L-P23A-12.0-TTS-2-INT
RSF-MS15 series, RU2 series, Inovance pulse-type grating (DB15, two rows), Renishaw grating, and LAMOTION RU2 grating without limits (With Hall, without limit)	S6-L-P23A-3.0-TTS-2-H-INT	S6-L-P23A-5.0-TTS-2-H-INT	S6-L-P23A-8.0-TTS-2-H-INT	S6-L-P23A-10.0-TTS-2-H-INT	S6-L-P23A-12.0-TTS-2-H-INT
Inovance communication-type ELMI magnetic grating/ELOI grating (Without Hall sensor, without limit switch)	S6-L-P24D-3.0-TTS-2-INT	S6-L-P24D-5.0-TTS-2-INT	S6-L-P24D-8.0-TTS-2-INT	S6-L-P24D-10.0-TTS-2-INT	S6-L-P24D-12.0-TTS-2-INT
Inovance communication-type ELMI magnetic grating/ELOI grating (With Hall, without limit)	S6-L-P24D-3.0-TTS-2-H-INT	S6-L-P24D-5.0-TTS-2-H-INT	S6-L-P24D-8.0-TTS-2-H-INT	S6-L-P24D-10.0-TTS-2-H-INT	S6-L-P24D-12.0-TTS-2-H-INT
LAMOTION grating (RU2 series) with limit (No Hall or limit)	S6-L-P23C-3.0-TTS-2-L-INT	S6-L-P23C-5.0-TTS-2-L-INT	S6-L-P23C-8.0-TTS-2-L-INT	S6-L-P23C-10.0-TTS-2-L-INT	S6-L-P23C-12.0-TTS-2-L-INT
LAMOTION grating (RU2 series) with limit (With Hall and limit)	S6-L-P23C-3.0-TTS-2-H-L-INT	S6-L-P23C-5.0-TTS-2-H-L-INT	S6-L-P23C-8.0-TTS-2-H-L-INT	S6-L-P23C-10.0-TTS-2-H-L-INT	S6-L-P23C-12.0-TTS-2-H-L-INT
LAMOTION absolute readhead encoder cable (Without Hall sensor, without limit switch)	S6-L-P24P-3.0-TTS-INT	S6-L-P24P-5.0-TTS-INT	S6-L-P24P-8.0-TTS-INT	S6-L-P24P-10.0-TTS-INT	S6-L-P24P-12.0-TTS-INT
TSUN absolute readhead encoder cable (Without Hall sensor, without limit switch)	S6-L-P24N-3.0-TTS-INT	S6-L-P24N-5.0-TTS-INT	S6-L-P24N-8.0-TTS-INT	S6-L-P24N-10.0-TTS-INT	S6-L-P24N-12.0-TTS-INT

List of Encoder Cables (Compatible with ISM Series Torque Motor)

Motor model	Servo drive SV680-INT	Encoder extension cable length (3 m)	Encoder extension cable length (5 m)	Encoder extension cable length (10 m)
ISMT1-160F12AB-A113X-INT ISMT1-160F12AB-A133X-INT	S2R8	S6-L-P22D-3.0-TTS-INT	S6-L-P22D-5.0-TTS-INT	S6-L-P22D-10.0-TTS-INT
ISMT1-160F45AB-A133X-INT				

List of Encoder Cables (Compatible with MP Series Torque Motor)

Motor model	Servo drive SV680-INT	Extension cable length (3 m)	Extension cable length (5 m)	Extension cable length (10 m)
MP1-112F10AB-U313X-INT	S2R8	S6-L-P22D-3.0-TTS-INT	S6-L-P22D-5.0-TTS-INT	S6-L-P22D-10.0-TTS-INT
MP1-140S10BB-U323X-INT	S012	S6-L-P22D-3.0-TTS-INT	S6-L-P22D-5.0-TTS-INT	S6-L-P22D-10.0-TTS-INT
MP1-175S11BB-U333X-INT	S012	S6-L-P22D-3.0-TTS-INT	S6-L-P22D-5.0-TTS-INT	S6-L-P22D-10.0-TTS-INT
MP1-220S15BB-U323X-INT	S012	S6-L-P25G-3.0-INT	S6-L-P25G-5.0-INT	S6-L-P25G-10.0-INT
MP1-220S30BD-U323X-INT	T021	S6-L-P25G-3.0-INT	S6-L-P25G-5.0-INT	S6-L-P25G-10.0-INT
MP1-220S30BD-U323L-C-INT	T026	S6-L-P25G-3.0-INT	S6-L-P25G-5.0-INT	S6-L-P25G-10.0-INT

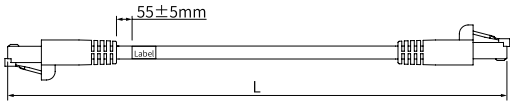
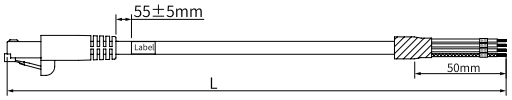
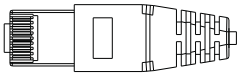
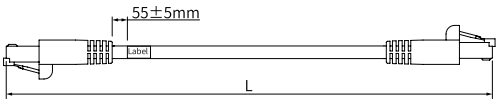
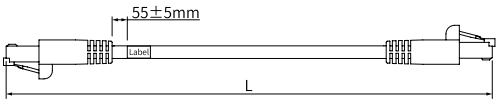
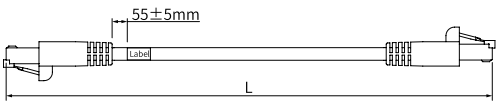
6.1.3 Communication Cable

Model number of communication cables

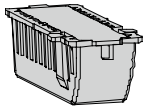
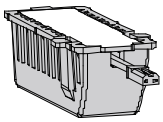
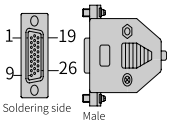
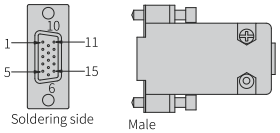
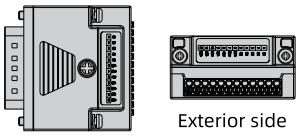
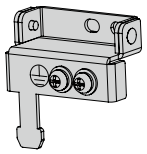
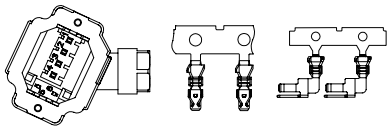
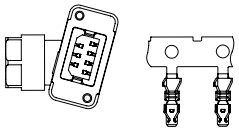
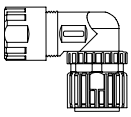
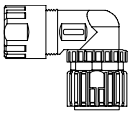
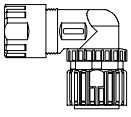
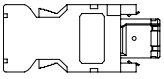
S6-L-T ① - 02 ② - 0.3 ③

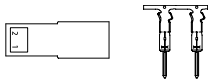
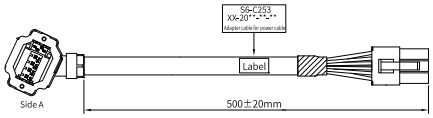
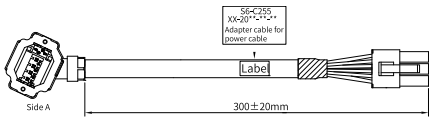
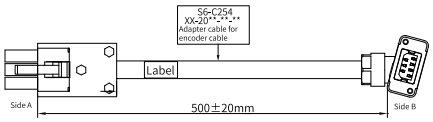
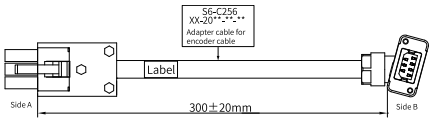
① Cable Type	② Cable type	③ Cable Length (m)
S6-L-T: Motion control communication cable	01: Servo drive multi-drive communication cable (CAN&RS485) 02: Drive-PLC communication cable 03: Servo drive communication termination resistor cable (CAN&RS485) 04: Servo drive network communication cable (CAT.5E&PROFINET) 07: Servo drive network communication cable (CAT6A&PROFINET) 08: Servo drive network communication cable (CAT7&PROFINET)	0.3: 0.3 2.0: 2 ...

List of communication cables

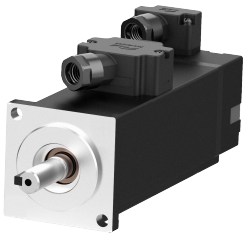
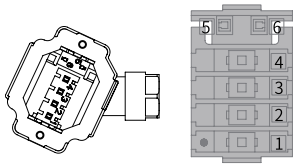
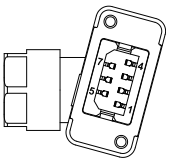
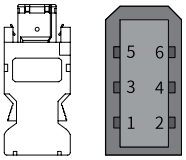
Cable Name	Cable Model	Cable Length (mm)	Illustration
Multi-drive communication cable	S6-L-T01-0.3	300	
Drive-PLC communication cable	S6-L-T02-2.0	2000	
Servo drive termination resistor connector	S6-L-T03-0.0	-	
Servo drive network communication cable (CAT.5E&PROFINET)	S6-L-T04-0.3	300	
Servo drive network communication cable (CAT.T6A&PROFINET)	S6-L-T07-0.3	300	
Servo drive network communication cable (CAT7&PROFINET)	S6-L-T08-0.3	300	

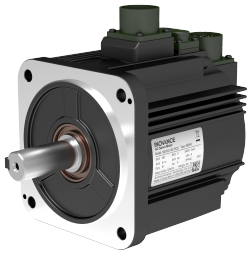
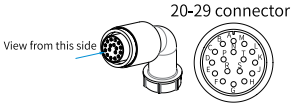
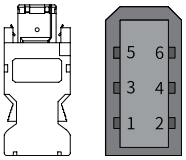
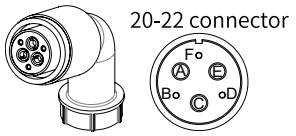
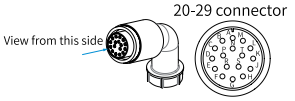
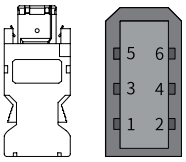
6.1.4 Connector Kits

Name	Model	Drawing
Battery box kit (without battery)	S6-C4A-NB	
Battery kit	S6-C4A	
CN1 terminal (DB26)	S6-C74	
CN7 terminal (DB15)	S6-C6	
Adapter (DB26-to-14-pin plug-in terminal)	S6-C220	
Shield bracket	S6-C25 (Optional for size A to size C) S6-C27 (Optional for size D to size E)	
Power connector at motor side with power below 750 W	S6-C246	
Encoder connector at motor side with power below 750 W	S6-C247	
Power connector for frame sizes 100 to 130 at motor side with power above 1000 W	S6-C248	
Power connector for frame size 180 at motor side with power above 1000 W	S6-C249	
Encoder connector at motor side with power above 1000 W	S6-C250	
CN2(1394)	S6-C251	

Name	Model	Drawing
Battery box connector	S6-C252	
Power flying leads at motor side with power below 750 W - 500 mm	S6-C253	
Power flying leads at motor side with power below 750 W - 300 mm	S6-C255	
Encoder flying leads at motor side with power below 750 W - 500 mm	S6-C254	
Encoder flying leads at motor side with power below 750 W - 300 mm	S6-C256	

6.1.5 Description of Cable Terminals

Name	Diagram	Power cable 6-pin connector			Motor-side encoder 7-pin connector			Drive-side 6-pin male connector		
Terminal-type motor with frame sizes 40/60/80										
		Pin No.	Signal Name	Color	Pin No.	Signal Name	Color	Pin No.	Signal Name	Color
		1	PE	Yellow/ Green	1	PS+	Gray	1	+5 V	White
		2	W	Black 3	2	PS-	Pink	2	GND	Brown
		3	V	Black 2	3	DC+	Yellow	5	PS+	Gray
		4	U	Black 1	4	DC-	Green	6	PS-	Pink
		5	Brake	White	5	+5 V	White	Enclosure	PE	-
		6	(polarity insensitive)	Brown	6	GND	Brown			
					7	PE	-			

<table>
<tr><td rowspan="8">Motors with frame sizes 100/130</td><td rowspan="8"></td><td colspan="3">Power cable connector</td><td colspan="3">Encoder cable connector of motors</td><td colspan="3">Drive-side 6-pin male connector</td></tr>
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</td><td colspan="3">
</td></tr>
<tr><td>Pin No.</td><td>Pin No.</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>
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<tr><td>I</td><td>V</td><td>Black 2</td><td>B</td><td>PS-</td><td>Pink</td><td>2</td><td>GND</td><td>Brown</td></tr>
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<tr><td>G</td><td>PE</td><td>Yellow/ Green</td><td>F</td><td>DC-</td><td>Green</td><td>6</td><td>PS-</td><td>Pink</td></tr>
<tr><td>C</td><td rowspan="2">Brake (polarity insensitive)</td><td>Black 4</td><td>G</td><td>+5 V</td><td>White</td><td rowspan="2">Enclosure</td><td rowspan="2">PE</td><td rowspan="2">-</td></tr>
<tr><td rowspan="2">E</td><td rowspan="2">Black 5</td><td>H</td><td>GND</td><td>Brown</td></tr>
<tr><td>J</td><td>Shield</td><td>-</td></tr>
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</td></tr>
<tr><td>Pin No.</td><td>Pin No.</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>Black 1</td><td>A</td><td>PS+</td><td>Gray</td><td>1</td><td>+5 V</td><td>White</td></tr>
<tr><td>C</td><td>V</td><td>Black 2</td><td>B</td><td>PS-</td><td>Pink</td><td>2</td><td>GND</td><td>Brown</td></tr>
<tr><td>E</td><td>W</td><td>Black 3</td><td>E</td><td>DC+</td><td>Yellow</td><td>5</td><td>PS+</td><td>Gray</td></tr>
<tr><td>F</td><td>PE</td><td>Yellow/ Green</td><td>F</td><td>DC-</td><td>Green</td><td>6</td><td>PS-</td><td>Pink</td></tr>
<tr><td>B</td><td rowspan="2">Brake (polarity insensitive)</td><td>Black 4</td><td>G</td><td>+5 V</td><td>White</td><td rowspan="2">Enclosure</td><td rowspan="2">PE</td><td rowspan="2">-</td></tr>
<tr><td rowspan="2">D</td><td rowspan="2">Black 5</td><td>H</td><td>GND</td><td>Brown</td></tr>
<tr><td>J</td><td>Shield</td><td>-</td></tr>
</table>

6.2 Peripheral Electrical Components

6.2.1 List of Peripheral Electrical Components

Name	Installation position	Applicable drive model	Function
Fuse and circuit breaker	Input side of the servo drive	All	To comply with EN 61800-5-1 and UL61800-5-1 standards, install a fuse/circuit breaker on the input side of the servo drive to prevent accidents caused by short circuit in the internal circuit.
Electromagnetic contactor	Input side of the servo drive		Used to connect or disconnect the circuit.
AC input reactor	Input side of the servo drive		Used to eliminate the higher harmonics of the input side effectively and improve the power factor of the input side.
EMC filter	Input side of the servo drive		Used to reduce external conduction and radiation interference of the drive.
Magnetic ring and ferrite clamp	Output side of the drive		Reduces interferences to the outside and the bearing current.
	Signal cable		Improves the anti-interference performance of signals.

6.2.2 Fuse (CE)

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

Table 6–1 Recommended fuse

Drive model SV680-INT series			Recommended fuse Rated current (A)
Size	Model	Continuous input current of main circuit (A)	
Single-phase 200 V			
A	S1R6	2.3	5
	S2R8	4.0	12
C	S5R5	7.9	12
	S7R6	9.6	15
D	S012	12.8	20
Three-phase 200 V			
A	S1R6	1.1	5
	S2R8	2.3	5
C	S5R5	4.4	12
	S7R6	5.1	12
D	S012	8.0	15
E	S018	8.7	20
	S022	11.0	20
	S027	23.8	32
Three-phase 400 V			
B	T1R4	1.0	5
	T2R3	2.1	5
C	T3R5	2.4	5
	T5R4	3.6	10

Drive model SV680-INT series			Recommended fuse Rated current (A)
Size	Model	Continuous input current of main circuit (A)	
D	T8R4	5.6	15
	T012	8.0	15
E	T017	12.0	20
	T021	16.0	25
	T026	21.0	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 Fuse (UL)

Table 6–2 Recommended protective device for the drive

Drive model SV680-INT series			Recommended non-semiconductor fuse
Size	Model	Continuous input current of main circuit (A)	Rated current (A)
Single-phase 200 V			
A	S1R6	2.3	6
	S2R8	4	10
C	S5R5	7.9	15
	S7R6	9.6	20
D	S012	12.8	20
Three-phase 200 V			
A	S1R6	1.1	6
	S2R8	2.3	6
C	S5R5	4.4	10
	S7R6	5.1	10
D	S012	8.0	15 to 20
E	S018	8.7	15 to 40
	S022	11.0	20 to 40
	S027	23.8	40
Three-phase 400 V			
B	T1R4	1.1	6 to 10
	T2R3	2.1	6 to 10
C	T3R5	2.4	6 to 10
	T5R4	3.6	6 to 10
D	T8R4	5.6	10 to 20
	T012	8.0	15 to 20

Drive model SV680-INT series			Recommended non-semiconductor fuse
Size	Model	Continuous input current of main circuit (A)	Rated current (A)
E	T017	12.0	20 to 40
	T021	16.0	30 to 40
	T026	21.0	35 to 40

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/mm^2.

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.

Fuse selection requirements:

- If the short-circuit current rating is 5 kA/65 kA and the drive size is A/C/D/E, it is recommended to use a class J or class CC fuse that complies with the UL 248 standard. If you use a class CC fuse, the maximum allowable rating of the circuit breaker is 30 A.
- If the short-circuit current rating is 5 kA/65 kA and the drive size is B, it is recommended to use a class J fuse that complies with the UL 248 standard.

6.2.4 Electromagnetic Contactor

Table 6–3 Recommended electromagnetic contactor model

Servo drive SV670NS-INT series			Recommended contactor		
Size	Model	Continuous input current of main circuit (A)	Manufacturer	Current (A)	Model
Single-phase 200 V					
A	S1R6	2.3	Schneider	9	LC1 D09
	S2R8	4.0		9	LC1 D09
C	S5R5	7.9		9	LC1 D09
	S7R6	9.6		12	LC1 D12
D	S012	12.8		18	LC1 D18
Three-phase 200 V					
A	S1R6	1.1	Schneider	9	LC1 D09
	S2R8	2.3			
C	S5R5	4.4			
	S7R6	5.1			
D	S012	8.0		9	LC1 D09
E	S018	8.7		12	LC1 D12
	S022	11.0			
	S027	23.8		25	LC1 D25
Three-phase 400 V					

Servo drive SV670NS-INT series			Recommended contactor		
Size	Model	Continuous input current of main circuit (A)	Manufacturer	Current (A)	Model
B	T1R4	1.0	Schneider	9	LC1 D09
	T2R3	1.8		9	LC1 D09
C	T3R5	2.4		9	LC1 D09
	T5R4	3.6		9	LC1 D09
D	T8R4	5.6		9	LC1 D09
	T012	8.0		9	LC1 D09
E	T017	12.0		18	LC1 D18
	T021	16.0		18	LC1 D18
	T026	21.0		25	LC1 D25

6.2.5 Circuit Breaker (CE)

Table 6–4 Recommended circuit breaker models

Drive model SV680NS-INT series			Recommended circuit breaker Rated current (A)
Size	Model	Continuous input current of main circuit (A)	
Single-phase 200 V			
A	S1R6	2.3	4
	S2R8	4.0	6
C	S5R5	7.9	16
	S7R6	9.6	16
D	S012	12.8	20
Three-phase 200 V			
A	S1R6	1.1	4
	S2R8	2.3	4
C	S5R5	4.4	6
	S7R6	5.1	10
D	S012	8.0	16
E	S018	8.7	16
	S022	11.0	16
	S027	23.8	32
Three-phase 400 V			
B	T1R4	1.1	4
	T2R3	2.1	4
C	T3R5	2.4	4
	T5R4	3.6	6
D	T8R4	5.6	10
	T012	8.0	16
E	T017	12.0	16
	T021	16.0	25
	T026	21.0	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.

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

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

6.2.6 Circuit Breaker (UL)

Table 6–5 Recommended protective device for the drive

Drive model SV680-INT series			Recommended inverse time circuit breaker (Breaking capacity 5 kA, compliant with UL 489)	Recommended inverse time circuit breaker (Breaking capacity 65 kA, compliant with UL 489)	Recommended inverse time circuit breaker[1] (Breaking capacity 5 kA or 65 kA, compliant with UL 489)
Size	Model	Continuous input current of main circuit (A)	Rated current (A)	Rated current (A)	Rated current (A)
Single-phase 200 V					
A	S1R6	2.3	5 to 15	-	≤ 40
	S2R8	4.0	8 to 15	-	≤ 40
C	S5R5	7.9	15	15	≤ 40
	S7R6	9.6	15	15	≤ 100
D	S012	12.8	20	20	≤ 100
Three-phase 200 V					
A	S1R6	1.1	5 to 15	-	≤ 40
	S2R8	2.3	5 to 15	-	≤ 40
C	S5R5	4.4	8 to 15	-	≤ 40
	S7R6	5.1	10 to 15	-	≤ 100
D	S012	8.0	15 to 20	15	≤ 100
E	S018	8.7	16 to 40	20	≤ 100
	S022	11.0	20 to 40	20	≤ 100
	S027	23.8	40	40	≤ 100
Three-phase 400 V					

Drive model SV680-INT series			Recommended inverse time circuit breaker (Breaking capacity 5 kA, compliant with UL 489)	Recommended inverse time circuit breaker (Breaking capacity 65 kA, compliant with UL 489)	Recommended inverse time circuit breaker[1] (Breaking capacity 5 kA or 65 kA, compliant with UL 489)
Size	Model	Continuous input current of main circuit (A)	Rated current (A)	Rated current (A)	Rated current (A)
B	T1R4	1.1	4 to 15	-	≤ 100
	T2R3	2.1	4 to 15	-	≤ 100
C	T3R5	2.4	5 to 15	-	≤ 100
	T5R4	3.6	7 to 15	-	≤ 100
D	T8R4	5.6	12 to 20	-[2]	≤ 100
	T012	8.0	15 to 20	15	≤ 100
E	T017	12.0	25 to 40	25	≤ 100
	T021	16.0	30 to 40	30	≤ 100
	T026	21.0	40	40	≤ 100

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.

Circuit breaker selection requirements:

- 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.
- If the short-circuit current rating is 5 kA/65 kA and the drive size is A/B/C/D/E, it is recommended to use an inverse-time circuit breaker that complies with the UL 489 standard.
- [1]: It is recommended to refer to this column when you select circuit breakers for multi-drive parallel systems.
- [2]: For this drive model, when used with a circuit breaker having a breaking capacity of 65 kA, no recommended current value is provided. However, the rated current of this circuit breaker must not exceed the maximum rated current of the selected circuit breaker with a breaking capacity of 5 kA.

6.2.7 AC Input Reactor

Model selection

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

Table 6-6 AC input reactor model selection

Servo drive SV670NS-INT series			Applicable reactor	Inductance (mH)
Size	Model	Continuous input current of main circuit (A)		
Three-phase 200 V				
A	S1R6	1.1	MD-ACL-10-5-4T	5
	S2R8	2.3	MD-ACL-10-5-4T	5
C	S5R5	4.4	MD-ACL-10-5-4T	5
	S7R6	5.1	MD-ACL-10-5-4T	5
D	S012	8.0	MD-ACL-10-5-4T	5
E	S018	8.7	MD-ACL-15-3-4T	3
	S022	11.0	MD-ACL-15-3-4T	3
	S027	23.8	MD-ACL-40-1.45-4T	1.45
Three-phase 400 V				
B	T1R4	1.0	MD-ACL-10-5-4T	5
	T2R3	1.8	MD-ACL-10-5-4T	5
C	T3R5	2.4	MD-ACL-10-5-4T	5
	T5R4	3.6	MD-ACL-10-5-4T	5
D	T8R4	5.6	MD-ACL-10-5-4T	5
	T012	8.0	MD-ACL-10-5-4T	5
E	T017	12.0	MD-ACL-15-3-4T	3
	T021	16.0	MD-ACL-40-1.45-4T	1.45
	T026	21.0	MD-ACL-40-1.45-4T	1.45

Dimensions

Inovance input reactor:

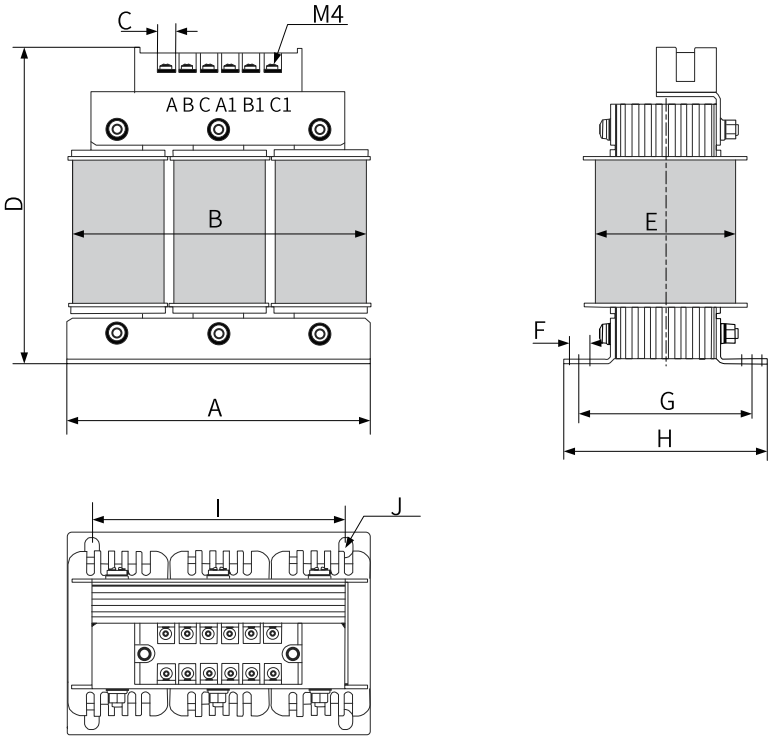


Figure 6-1 Dimensions of 10 A to 15 A AC input reactors

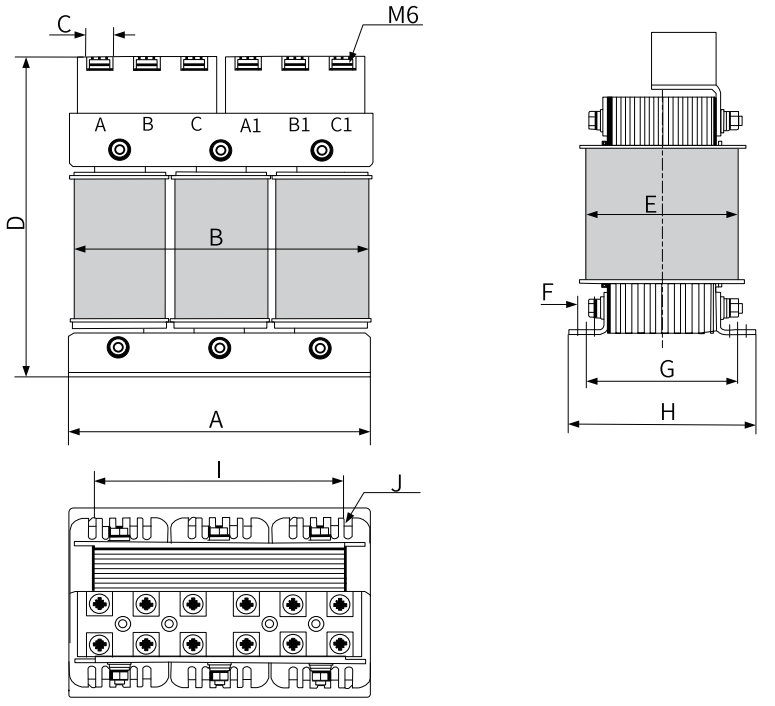


Figure 6-2 Dimensions of 40 A (1.45 mH) AC input reactors

Table 6–7 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	Ø7x10
MD-ACL-15-3-4T	150±2	155	8	160	80	10	85±2	100±2	125±1	Ø7x10
MD-ACL-40-1.45-4T	180±2	185	16	200	105	10	95±2	117±2	150±1	Ø7x10

6.2.8 EMC Filter

6.2.8.1 One EMC filter connected to one drive

- **Model selection**

  To comply with the radiated and conducted emission requirements of EN IEC 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 6–8 Standard EMC filter model and appearance

Filter model (recommended)		Appearance
Schaffner	FN2090	
	FN3287	

Table 6–9 Selection of filters

Servo drive SV680NS-INT series			Applicable filter (recommended)
Size	Model	Rated input current (A)	
Single-phase 200 V			
A	S1R6	2.3	FN2090-3-06
	S2R8	4.0	FN2090-4-06
C	S5R5	7.9	FN2090-8-06
	S7R6	9.6	FN2090-10-06
D	S012	12.8	FN2090-16-06
Three-phase 200 V			
A	S1R6	1.1	FN3287-10-44-C28-R65
	S2R8	2.3	FN3287-10-44-C28-R65
C	S5R5	4.4	FN3287-10-44-C28-R65
	S7R6	5.1	FN3287-10-44-C28-R65
D	S012	8.0	FN3287-10-44-C28-R65

Servo drive SV680NS-INT series			Applicable filter (recommended)
Size	Model	Rated input current (A)	
E	S018	8.7	FN3287-10-44-C28-R65
	S022	11.0	FN3287-16-44-C33-R65
	S027	23.8	FN3287-25-33-C33-R65
Three-phase 400 V			
B	T1R4	1.0	FN3287-10-44-C28-R65
	T2R3	1.8	FN3287-10-44-C28-R65
C	T3R5	2.4	FN3287-10-44-C28-R65
	T5R4	3.6	FN3287-10-44-C28-R65
D	T8R4	5.6	FN3287-10-44-C28-R65
	T012	8.0	FN3287-10-44-C28-R65
E	T017	12.0	FN3287-16-44-C33-R65
	T021	16.0	FN3287-16-44-C33-R65
	T026	21.0	FN3287-25-33-C33-R65

- **Dimensions**
  - Dimensions of Schaffner FN2090 filters:

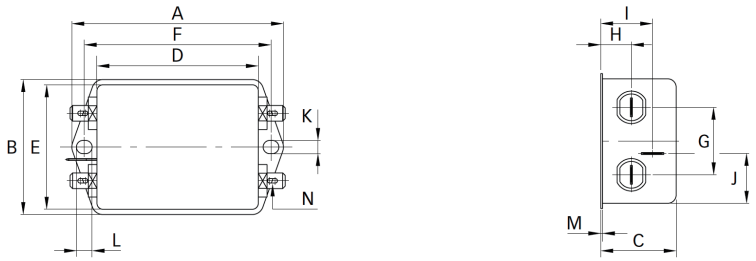


Figure 6-3 Dimensions of FN2090 filters (unit: mm)

Table 6–10 Dimensions of FN2090 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 FN3287 filters:

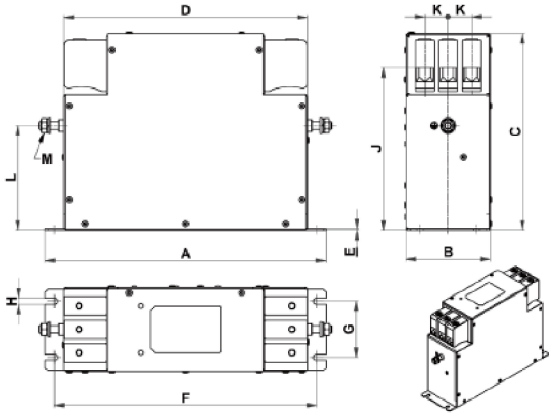


Figure 6-4 Dimensions of FN3287 filters (unit: mm)

Table 6–11 Dimensions of FN3287 filters (unit: mm)

Rated current (A)	A	B	C	D	E	F	G	H	J±2	K	L±1	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

6.2.8.2 One EMC filter connected to multiple drives

Note

An EMC filter can be connected to multiple servo drives, and is suitable for the three-phase 200 V voltage class (three-phase 200 VAC to 240 VAC, -10% to +10%, 50 Hz/60 Hz) and three-phase 400 V voltage class (three-phase 380VAC to 480 VAC, -10%~+10%, 50 Hz/60 Hz).

- **Model selection**
  - Model selection
    To connect an EMC filter to multiple drives, make sure that the following requirements are met:
    - If only one EMC filter is used, the sum of the power cable length of all drives must not exceed 100 m.
    - The number of drives to which the EMC filter is connected must not exceed 10.
    - The rated current of the EMC filter must be equal to or higher than the sum of the rated current of all drives. It is recommended to select an EMC with a rated current between 30 A and 55 A for the drives.

Note

Even if multiple servo drives are not operating simultaneously on the same EMC filter, the above-mentioned requirements must still be met, because the accumulated common-mode currents when the servo drives are enabled at zero speed can cause adverse effects such as saturation and overheating of the EMC filter.

- Keep the distance between the EMC filter and the drives as short as possible. It is recommended to keep the power cable length between the EMC filter and the drives no longer than 2 m.

- Servo drive specifications

Table 6–12 Servo drive specifications at three-phase 200 V

Specification	Size A		Size C		Size D	Size E		
Drive model	S1R6	S2R8	S5R5	S7R6	S012	S018	S022	S027
Drive power (kW)	0.2	0.4	0.75	1.0	1.5	2.0	3.0	5.0
Continuous input current of main circuit (A)	1.1	2.3	4.4	5.1	8.0	8.7	11.0	23.8
Main circuit power supply	Three-phase 200 VAC to 240 VAC, -10% to +10%, 50 Hz/60 Hz							

Table 6–13 Servo drive specifications at three-phase 400 V

Specification	Size B		Size C		Size D		Size E		
Drive model	T1R4	T2R3	T3R5	T5R4	T8R4	T012	T017	T021	T026
Drive power (kW)	0.4	0.75	1.0	1.5	2.0	3.0	5.0	6.0	7.5
Continuous input current of main circuit (A)	1.0	1.8	2.4	3.6	5.6	8.0	12.0	16.0	21.0
Main circuit power supply	Three-phase 380VAC to 480 VAC, -10% to +10%, 50 Hz/60 Hz								

- To prevent the EMC filter from operating in saturation and failing due to overheating, the SV680-INT servo drive, which is compatible with three-phase 200 V voltage class (three-phase 200 VAC to 240 VAC, -10% to +10%, 50 Hz/60 Hz) and three-phase 400 V voltage class (three-phase 380VAC to 480 VAC, -10%~ to 10%, 50 Hz/60 Hz), must be equipped with an EMC filter with a rated current between 30 A and 55 A. The recommended EMC filter for this drive is Schaffner FN3258. Other brands of EMC filters with equivalent specifications and performance can also be used, provided they meet the required specifications in *"Table 6-16" on page 184*. The specifications of Schaffner FN3258 filters are as follows.

Table 6–14 Standard EMC filter model and appearance

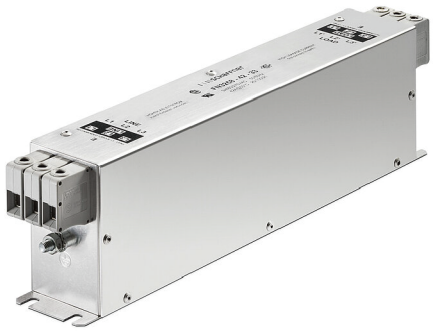
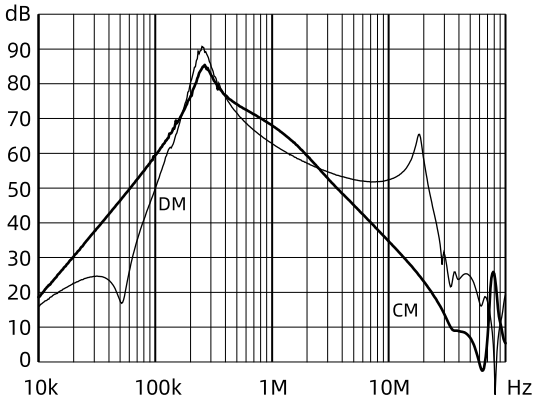
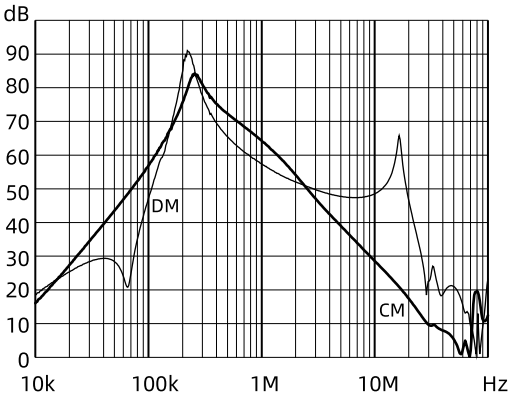
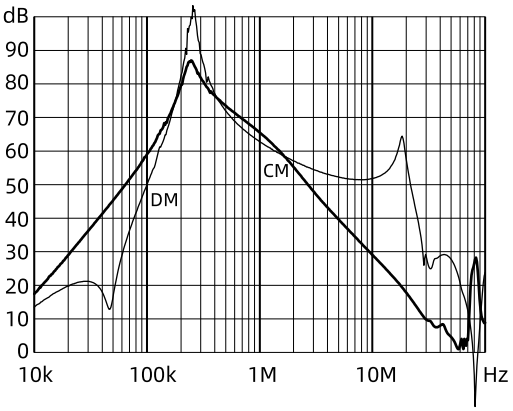
Filter model (recommended)		Appearance
Schaffner	FN3258	

Table 6–15 EMC filter specifications

Model	Rated current 50℃ (40℃) (A)	Rated drive power (kW)	Leakage current 400 VAC/50 Hz (mA)	Power loss 25 ℃/50 Hz (W)	Input/output connector terminal types and wiring requirements	Weight (kg)
FN3258-30-33	30 (32.9)	15	33.0	11.8	-33	1.2
FN3258-42-33	42 (46.0)	22	33.0	15.7	-33	1.4
FN3258-55-34	55 (60.2)	30	33.0	25.9	-34	2.0

Table 6–16 EMC filter performance

Item	Specification
Overall performance	Meets the EN55011 Class A limits, with saturation resistance for cable length exceeding 50 meters.
Input voltage class	• Maximum continuous operating voltage: FN3258 supports three-phase 380V/ 277 V AC input. • Nominal operating voltage: 400 VAC
Rated operating current	• In applications where one EMC filter is connected to multiple drives, the operating current of the three EMC filters recommended by Inovance is 30 A, 42 A, and 55 A, respectively. If you use EMC filters of other brands, the rated current must comply with the current range of the EMC filters recommended by Inovance. • The rated current must meet the requirements at 50℃.
Operating temperature range	Within the specified range of FN3258: -25℃~ to 100℃.
Leakage current requirements	≤ 4.3 mA at 480 V/520 VAC at 50Hz

Item	Specification
Attenuation performance (30 A) FN3258-30-33	The differential and common-mode attenuation performance of the 30 A EMC filter is no less than that of the Schaffner FN3258-30-33 filter. 
Attenuation performance (42 A) FN3258-42-33	The differential and common-mode attenuation performance of the 42 A EMC filter is no less than that of the Schaffner FN3258-42-33 filter. 
Attenuation performance (55 A) FN3258-55-34	The differential and common-mode attenuation performance of the 55 A EMC filter is no less than that of the Schaffner FN3258-55-34 filter. 

- Configuration example: one EMC filter connected to multiple drives
  In this example, nine drives are installed in one control cabinet. The drive model and the length of the motor power cables on-site are shown in the table below.

Model	Continuous input current of main circuit (A)	Motor power cable length (m)
T3R5	2.4	10
T3R5	2.4	15
T3R5	2.4	15

Model	Continuous input current of main circuit (A)	Motor power cable length (m)
T3R5	2.4	10
T3R5	2.4	15
T8R4	5.6	10
T8R4	5.6	20
T5R4	3.6	10
T8R4	5.6	20
Total	32.4	125

Configuration instructions:

- Based on the requirement that the length of the motor power cable for a single EMC filter should be no longer than 100 m, the total length of the motor power cables in the above table is 125 m. Therefore, they need to be divided into two groups, with the total length of the power cables in each group required to be no longer than 100 m.
- Because the minimum EMC filter supported is 30 A, the total continuous input current of the main circuit in the above table is 32.4 A. Therefore, two sets of 30 A EMC filters are configured.

Conclusion:

Table 6–17 Selection of filters

Group No.	Servo drive SV680NS-INT series			Applicable filter (recommended)	Motor power cable length (m)
	Size	Model	Rated input current (A)		
Three-phase 400 V voltage class (Three-phase 380VAC to 480 VAC, -10% to +10%, 50 Hz/60 Hz)					
1	C	T3R5	2.4 A	FN3258-30-33 (Rated current: 30 A)	10
	C	T3R5	2.4 A		15
	C	T3R5	2.4 A		15
	C	T3R5	2.4 A		10
	C	T3R5	2.4 A		15
	D	T8R4	5.6 A		10
	D	T8R4	5.6 A		20
2	C	T5R4	3.6 A	FN3258-30-33 (Rated current: 30 A)	10
	D	T8R4	5.6 A		20

Note

Under the premise of meeting the selection criteria, you can adjust the configuration as needed. For example, two of the seven servo drives in Group 1 can be moved to Group 2, adjusting Group 1 to five drives and Group 2 to four drives.

- **Dimensions**

  Dimensions of Schaffner FN3258 filters:

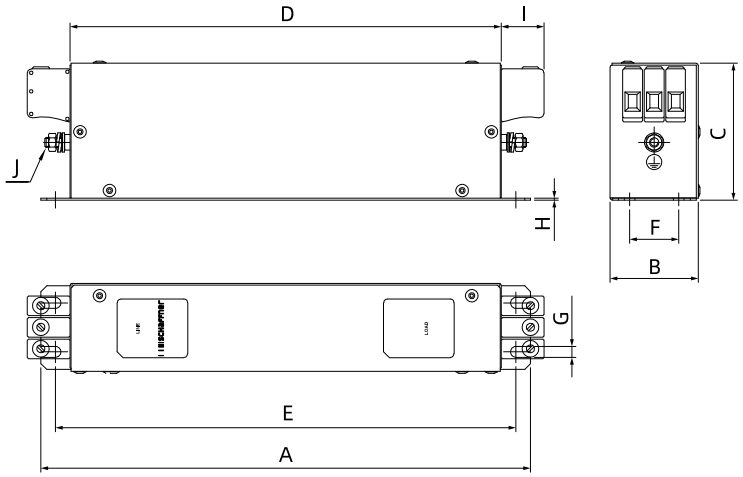


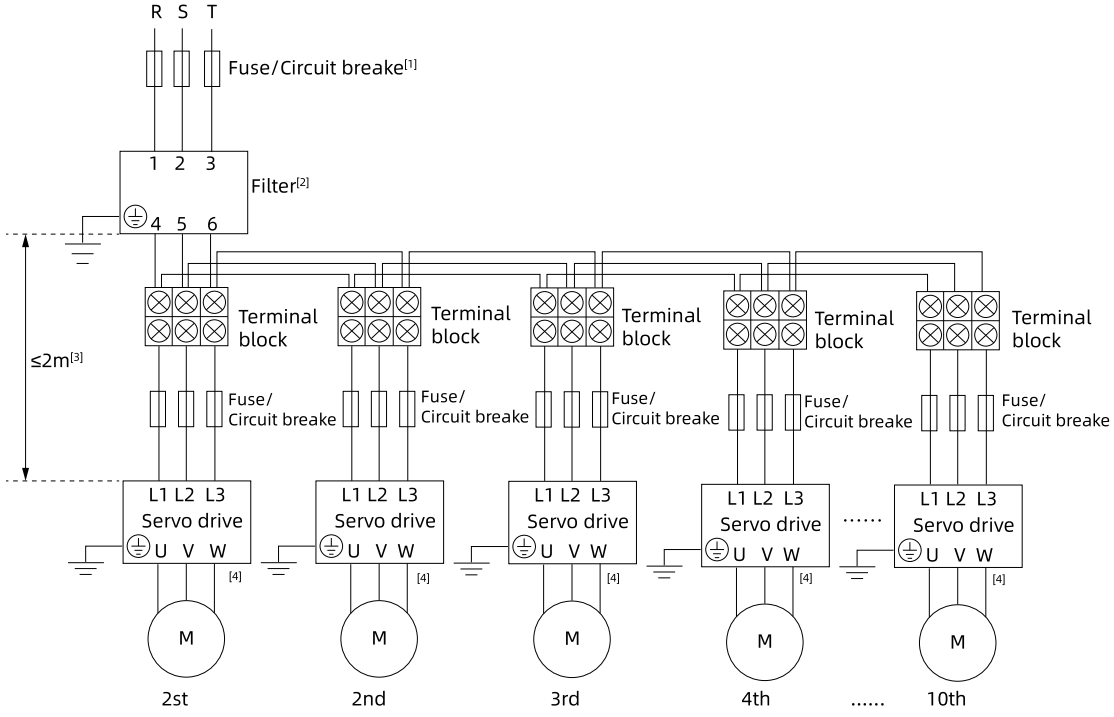
Figure 6-5 Dimensions of FN3258 filters (unit: mm)

Table 6–18 Dimensions of FN3258 filters (unit: mm)

Rated current (A)	A	B	C	D	E	F	G	H	I	J
30	270.0	50.0	85.0	240.0	255.0	30.0	5.4	1.0	25.0	M5

- **Routing requirements**

  Connect the EMC filter output cable first to the circuit breaker, and then connect the circuit breaker to the servo drive.



[1]: The rated current of the fuse/circuit breaker must be ≥ the rated current of the EMC filter ≥ the sum of the rated input currents of all connected servo drives.

[2]: The EMC filter must be selected with a rated input current between 30 A and 55 A. A single EMC filter can support up to 10 servo drives.

[3]: The distance between the EMC filter and the servo drives should be kept as short as possible.
It is recommended that the power cable length between the EMC filter and the servo drive does not exceed 2 m.

[4]: Under a single EMC filter, the total length of all servo motor power cables must not exceed 100 m.

Caution

- Ensure that the sum of the rated input currents of the servo drives is less than or equal to the rated current of the EMC filter. Otherwise, equipment damage or malfunction may occur.
- When connecting multiple servo drives to the same EMC filter, use a relay terminal block to connect the EMC filter to the servo drives. Do not bundle the terminals on the EMC filter terminal block together. Otherwise, equipment damage or malfunction may occur.
- Select a relay terminal block that allows terminals to be securely bundled, with a maximum of two terminals bundled together. Otherwise, the equipment may overheat or fail.

Warning

When multiple servo drives are connected to the same EMC filter, ensure that the cable used on the input side of the EMC filter and the cable between the EMC filter and the relay terminal block have a sufficient capacity to carry the rated current of the EMC filter. Failure to comply could result in fire accidents or electric shock.

6.2.9 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: supports high permeability when the frequency is within 1 MHz and excellent anti-interference performance, but is not as low-cost as the ferrite clamp. See “ *Dimensions” on page 189* for details.
- Ferrite clamp: supports good interference suppression performance within a frequency band above 1 MHz, and is applicable to low-power servo drives and signal cables. It is 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

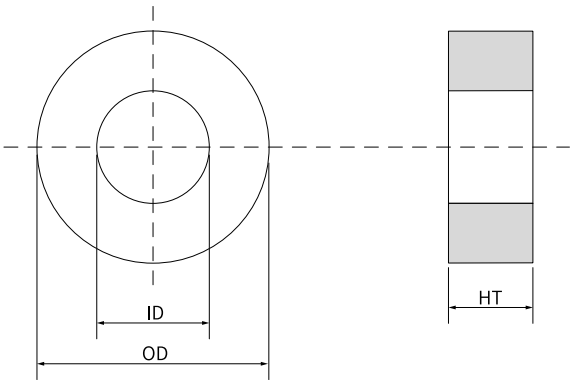


Figure 6-6 Dimensions of the magnetic ring

Table 6–19 Dimensions of the magnetic ring

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

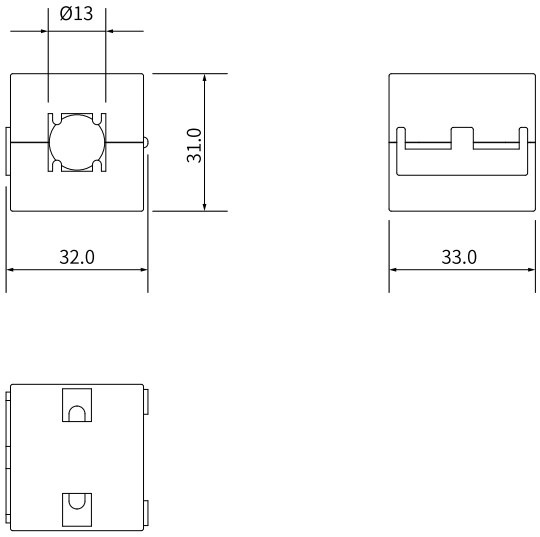


Figure 6-7 Dimensions of the magnetic buckle

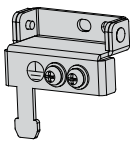
Table 6–20 Dimensions of the magnetic buckle

Model	Dimension (width × outer diameter × inner diameter) (mm)
DYR-130-B	32.0 × 31 × 13

6.3 Shield Bracket

To reduce electromagnetic interference, shield brackets and clamps are used with the drive cables.

Table 6–21 Shield bracket

Model	Outline drawing
S6-C25 (optional for size A to size C)	
S6-C27 (optional for size D to size E)	

6.4 Absolute Encoder Batteries

Selection

Select an appropriate battery according to the following table.

Table 6–22 Description of the absolute encoder battery

Specification	Item	Rating			Condition
		Min.	Typical Value	Max.	
Output: 3.6 V, 2700 mAh	External battery voltage (V)	3.2	3.6	3.8	In standby state[1]
	Circuit fault voltage (V)	-	2.6	-	In standby state
	Battery alarm voltage (V)	2.85	3	3.15	-
	Current consumed by the circuit (uA)	-	2	-	In normal operation[2]
		-	10	-	In standby state, shaft at standstill
		-	300	-	In standby state, shaft rotating
	Ambient temperature (℃)	0	-	40	Same as the motor.
	Storage temperature (℃)	0	-	30	

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

Note

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

6.5 Braking Resistor

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 6–23 Braking resistor specifications

Drive model (SV680******-*INT)	Specifications of built-in braking resistors			Min. allowable resistance of external braking resistor (Ω) (H02.21)
	Resistance (Ω)	Power (Pr) (W)	Processing power Pa (W)	
S1R6	-	-	-	40
S2R8	-	-	-	
S5R5	50	50	40	
S7R6	25	80	64	20
S012				15

Drive model (SV680******-*INT)	Specifications of built-in braking resistors			Min. allowable resistance of external braking resistor (Ω) (H02.21)
	Resistance (Ω)	Power (Pr) (W)	Processing power Pa (W)	
S018	20	100	80	20
S022				
S027				
T1R4	100	50	40	80
T2R3	100	50	40	60
T3R5	100	80	64	80
T5R4	100			60
T8R4	50			45
T012				40
T017	35	100	80	35
T021				25
T026				

Note

- The drive model (SV680******-*INT) refers to all models in this series. For example, S1R6 indicates the drive model SV680*S1R6*-*INT, including SV680NS1R6I-PINT, SV680NS1R6S-GINT, SV680NS1R6S-PINT, and SV680NS1R6S-GINT.
- By default, no built-in braking resistor is available in models S1R6 and S2R8. You can install an external braking resistor as needed or contact Inovance to order customized S1R6 and S2R8 models that carry the built-in braking resistor.
- The processing power ($P_{a)}$ of the built-in braking resistor is affected by the ambient temperature and actual load rate of the drive.

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. Figure *"Figure 6-8" on page 192* shows the motor speed curve.

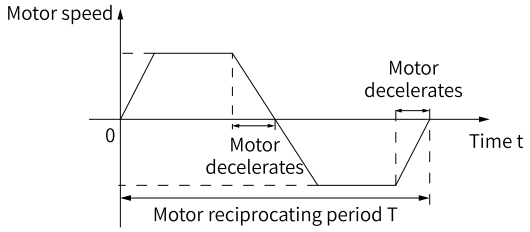


Figure 6-8 Motor speed curve

Energy calculation

The drive model S1R6 or S2R8 does not have a built-in braking resistor. They can be charged through a capacitor. 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 (SV680******-*INT)	Absorbable braking energy (W)	Remarks
S1R6	13.15	The input voltage of the main circuit power supply is 200 VAC.
S2R8	26.29	

Note

The drive model (SV680******-*INT) refers to all models in this series. For example, S1R6 indicates the drive model SV680*S1R6*-*INT, including SV680NS1R6I-PINT, SV680NS1R6S-GINT, SV680NS1R6S-PINT, and SV680NS1R6S-GINT.

- The following table shows the energy generated by a 200 V motor in decelerating from the rated speed to a standstill during no-load operation.

Table 6–24 200 V motor energy data

Capacity (kW)	Servo motor model MS1H*-*******-*****	Rotor inertia (J) (kg·cm^2)	Braking energy generated from rated speed to standstill: E_O (J)	Max. absorbable braking energy by the capacitor E_C (J)
0.05	MS1H1-05B30CB-**30R-INT	0.018±10%	0.13	9.3
	MS1H1-05B30CB-**32R-INT	0.0208±10%	0.14	
0.1	MS1H1-10B30CB-**30R-INT	0.0316±10%	0.20	9.3
	MS1H1-10B30CB-**32R-INT	0.0345±10%	0.21	
0.2	MS1H1-20B30CB-**31R-INT	0.094±10 %	0.46	9.3
	MS1H1-20B30CB-**34R-INT	0.106±10 %	0.52	
0.4	MS1H1-40B30CB-**31R-INT	0.145±10 %	0.72	18.59
	MS1H1-40B30CB-**34R-INT	0.157±10 %	0.78	
0.55	MS1H1-55B30CB-**31R-INT	0.55±10 %	2.72	32.42
0.75	MS1H1-75B30CB-**31R-INT	0.68±10 %	3.36	32.42
	MS1H1-75B30CB-**34R-INT	0.71±10 %	3.51	
1.0	MS1H1-10C30CB-**31R-INT	0.82±10 %	4.05	32.42
	MS1H1-10C30CB-**34R-INT	0.87±10 %	4.30	
1.0	MS1H2-10C30CB-**31R-INT	1.78±10%	8.80	32.42
	MS1H2-10C30CB-**34R-INT	2.6±10%	12.86	
1.5	MS1H2-15C30CB-**31R-INT	2.35±10%	11.6	47.68
	MS1H2-15C30CB-**34R-INT	3.17±10%	15.68	
2.0	MS1H2-20C30CB-**31R-INT	2.92±10%	14.44	78.19
	MS1H2-20C30CB-**34R-INT	3.74±10%	18.49	
2.5	MS1H2-25C30CB-**31R-INT	3.49±10%	17.26	114.43
	MS1H2-25C30CB-**34R-INT	4.3±10%	21.26	
3.0	MS1H2-30C30CB-**31R-INT	6.4±10%	31.65	114.43
	MS1H2-30C30CB-**34R-INT	9.38±10%	46.38	
4.0	MS1H2-40C30CB-**31R-INT	9±10%	44.51	114.43
	MS1H2-40C30CB-**34R-INT	11.98±10%	59.24	

Capacity (kW)	Servo motor model MS1H*-*******-*****	Rotor inertia (J) ($kg \cdot cm^2$)	Braking energy generated from rated speed to standstill: E_O (J)	Max. absorbable braking energy by the capacitor E_C (J)
5.0	MS1H2-50C30CB-**31R-INT	11.6±10%	57.36	114.43
	MS1H2-50C30CB-**34R-INT	14.58±10%	72.10	
0.85	MS1H3-85B15CB-**31R-INT	13.56±10%	16.45	32.42
	MS1H3-85B15CB-**34R-INT	15.8±10%	17.3	
1.3	MS1H3-13C15CB-**31R-INT	19.25±10%	22	47.68
	MS1H3-13C15CB-**34R-INT	21.5±10%	22.86	
1.8	MS1H3-18C15CB-**31R-INT	24.9±10%	30.78	78.19
	MS1H3-18C15CB-**34R-INT	27.2±10%	33.63	
2.9	MS1H3-29C15CB-**31R-INT	44.7±10%	55.26	114.43
	MS1H3-29C15CB-**34R-INT	52.35±10%	64.72	
4.4	MS1H3-44C15CB-**31R-INT	64.9±10%	80.23	114.43
	MS1H3-44C15CB-**34R-INT	72.55±10%	89.69	
0.05	MS1H4-05B30CB-**30R-INT	0.038±10%	0.19	9.3
	MS1H4-05B30CB-**32R-INT	0.04±10%	0.20	
0.1	MS1H4-10B30CB-**30R-INT	0.072±10%	0.36	9.3
	MS1H4-10B30CB-**32R-INT	0.074±10%	0.37	
0.05	MS1H4-05B30CB-**31R-INT	0.038±10%	0.19	9.3
	MS1H4-05B30CB-**34R-INT	0.04±10%	0.20	
0.1	MS1H4-10B30CB-**31R-INT	0.072±10%	0.50	9.3
	MS1H4-10B30CB-**34R-INT	0.074±10%	0.51	
0.2	MS1H4-20B30CB-**31R-INT	0.22±10%	1.09	9.3
	MS1H4-20B30CB-**34R-INT	0.23±10%	1.14	
0.4	MS1H4-40B30CB-**31R-INT	0.43±10%	2.13	18.59
	MS1H4-40B30CB-**34R-INT	0.44±10%	2.18	
0.55	MS1H4-55B30CB-**31R-INT	1.12±10%	5.54	32.42
0.75	MS1H4-75B30CB-**31R-INT	1.46±10%	7.22	32.42
	MS1H4-75B30CB-**34R-INT	1.51±10%	7.47	
1.0	MS1H4-10C30CB**31R-INT	1.87±10%	9.25	32.42
	MS1H4-10C30CB**34R-INT	1.97±10%	9.74	

- The following table shows the energy generated by a 400 V motor in decelerating from the rated speed to a standstill during no-load operation.

Table 6–25 400 V motor energy data

Capacity (kW)	Servo motor model MS1H*-*******-*****	Rotor inertia (J) (kg·m^2)	Braking energy E_O generated in decelerating from rated speed to a standstill (J)	Max. absorbable braking energy by the capacitor E_C (J)
1.0	MS1H2-10C30CD-**31R-INT	1.78±10%	8.8	36.06
	MS1H2-10C30CD-**34R-INT	2.6±10%	12.86	
1.5	MS1H2-15C30CD-**31R-INT	2.35±10%	11.62	43.79
	MS1H2-15C30CD-**34R-INT	3.17±10%	15.68	
2.0	MS1H2-20C30CD-**31R-INT	2.92±10%	14.44	64.40
	MS1H2-20C30CD-**34R-INT	3.74±10%	18.49	
2.5	MS1H2-25C30CD-**31R-INT	3.49±10%	17.26	64.40
	MS1H2-25C30CD-**34R-INT	4.3±10%	21.26	
3.0	MS1H2-30C30CD-**31R-INT	6.4±10%	31.65	64.40
	MS1H2-30C30CD-**34R-INT	9.38±10%	46.38	
4.0	MS1H2-40C30CD-**31R-INT	9±10%	44.51	105.62
	MS1H2-40C30CD-**34R-INT	11.98±10%	59.24	
5.0	MS1H2-50C30CD-**31R-INT	11.6±10%	57.36	154.56
	MS1H2-50C30CD-**34R-INT	14.58±10%	72.10	
0.85	MS1H3-85B15CD-**31R-INT	13.56±10%	16.76	36.06
	MS1H3-85B15CD-**34R-INT	15.8±10%	19.53	
1.3	MS1H3-13C15CD-**31R-INT	19.25±10%	23.8	43.79
	MS1H3-13C15CD-**34R-INT	21.5±10%	26.58	
1.8	MS1H3-18C15CD-**31R-INT	24.9±10%	30.78	64.40
	MS1H3-18C15CD-**34R-INT	27.2±10%	33.63	
2.9	MS1H3-29C15CD-**31R-INT	44.7±10%	55.26	64.40
	MS1H3-29C15CD-**34R-INT	52.35±10%	64.72	
4.4	MS1H3-44C15CD-**31R-INT	64.9±10%	80.23	105.62
	MS1H3-44C15CD-**34R-INT	72.55±10%	89.69	
5.5	MS1H3-55C15CD-**31R-INT	86.9±10%	107.43	154.56
	MS1H3-55C15CD-**34R-INT	94.55±10%	116.89	
7.5	MS1H3-75C15CD-**31R-INT	127.5±10%	157.62	154.56
	MS1H3-75C15CD-**34R-INT	135.15±10%	167.08	
0.4	MS1H4-40B30CD-**31R-INT	0.43±10%	2.12	25.58
	MS1H4-40B30CD-**34R-INT	0.44±10%	2.17	
0.75	MS1H4-75B30CD-**31R-INT	1.46±10%	7.20	25.58
	MS1H4-75B30CD-**34R-INT	1.51±10%	7.45	

Note

The asterisk (*) indicates the encoder type, which can be A3 (23-bit multi-turn absolute encoder), A6 (26-bit multi-turn absolute encoder), or S6 (26-bit multi-turn absolute encoder of functional safety type)

If the total braking time T is known, you can determine whether an external braking resistor is required and the power required using the following flowchart and formula.

Braking resistor selection for rotary motor

- **Without external load torque**

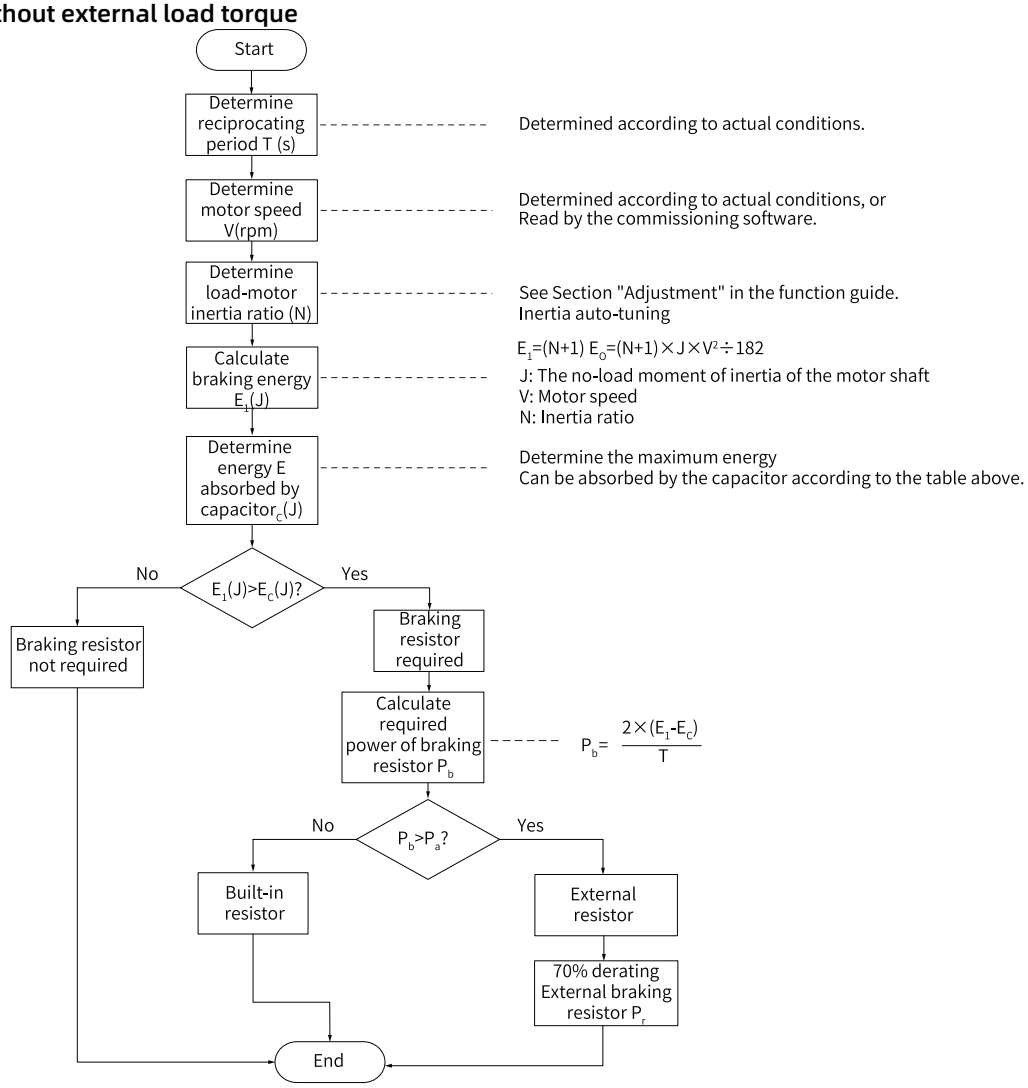


Figure 6-9 Flowchart for selecting the braking resistor

Table 6–26 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·m²	For the specific rotor inertia of MS1 series motors, see *"Table 6-24 200 V motor energy data" on page 193*
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 6-24 200 V motor energy data" on page 193*

Factor	Unit	Definition
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 6-23 Braking resistor specifications" on page 191*

Note

- Take the process in which the motor decelerates from 3000 rpm to a standstill as an example, suppose the load inertia is N x motor inertia, then the braking energy is (N+1) x E_O when the motor decelerates from 3000 rpm to 0 rpm, and the energy consumed by the braking resistor is (N+1) x EO - EC (EC represents the energy absorbed by the capacitor). The energy consumed by the braking resistor is (N + 1) x E_O - E_C (E_C represents the energy absorbed by the capacitor). Suppose the reciprocating cycle is T, then the power of the braking resistor needed is 2 x [(N + 1) x E_O - E_C]/T. See *"Table 6-24 200 V motor energy data" on page 193* and *"Table 6-25 400 V motor energy data" on page 195* for values of E_O and E_C.
- Determine whether to use the braking resistor according to the preceding figure and select a built-in or an external braking resistor as needed. Then, set H02.25 accordingly.
- The resistor with aluminum case is recommended.

Take the H1 series 750 W model as an example. Assume that the reciprocating movement period T = 2s, maximum speed = 3000 RPM, and inertia ratio = 4. In this case, the required braking resistor power is:

$$P_b = \frac{2 \times [(N+1) \times E_O - E_C]}{T} = \frac{2 \times [(4+1) \times 6.824 - 32.422]}{2} = 1.698W$$

The calculated result is smaller than the processing capacity (P_a = 40 W) of the built-in braking resistor, so a built-in braking resistor is enough.

If the inertia ratio is 10 and other conditions are the same, the required braking resistor power is:

$$P_b = \frac{2 \times [(N+1) \times E_O - E_C]}{T} = \frac{2 \times [(10+1) \times 6.824 - 32.422]}{2} = 42.642W$$

The calculated result is larger than the processing capacity (P_a = 40 W) of the built-in braking resistor. Therefore, so an external braking resistor is required. The recommended power of the external braking resistor is $P_b \div (1 - 70\%)$ = 142.14 W.

☆ Related parameters:

Parameter	Comm. address	Parameter name	Value range	Default value	Unit	Change mode
H02.21	2002-16h	Minimum allowable resistance of braking resistor	1 to 1000	40	Ω	Read-only
H02.24	2002-19h	Resistor heat dissipation coefficient	10 to 100	30	%	Real time
H02.25	2002-1Ah	Braking resistor type	0: Built-in 1: External, natural cooling 2: External, forced air cooling 3: No resistor needed	3	-	Real time

Parameter	Comm. address	Parameter name	Value range	Default value	Unit	Change mode
H02.26	2002-1Bh	Power of external braking resistor	1 to 65535	40	W	Real time
H02.27	2002-1Ch	Resistance of external braking resistor	15 to 1000	50	Ω	Real time

- Braking resistor not used
  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 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.
- 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 servo drive. Remove the jumper bar between terminals $P_\oplus$ and D, and connect the external braking resistor between terminals $P_\oplus$ and C.

  For cables applicable to external braking resistors, see sections "Cable Specifications (CE)" and "Cable Specifications (UL)" in the *SV680N-INT Series Servo Drive Hardware Guide*. Set H02.25 to 1 or 2 based on the cooling mode of the braking resistor.

  ☆ Related parameters:

Parameter	Comm. address	Parameter name	Value range	Default value	Unit	Change mode
H02.21	2002-16h	Minimum allowable resistance of braking resistor	1 to 1000	40	Ω	Read-only
H02.25	2002-1Ah	Braking resistor type	0: Built-in 1: External, natural cooling 2: External, forced air cooling 3: No resistor needed	3	-	Real time
H02.26	2002-1Bh	Power of external braking resistor	1 to 65535	40	W	Real time
H02.27	2002-1Ch	Resistance of external braking resistor	15 to 1000	50	Ω	Real time

Caution

- Set the power and resistance of the external braking resistor in H02.26 and H02.27. Otherwise, this function may be unavailable.
- Make sure that the resistance of the external braking resistor is higher than or equal to the minimum allowable resistance.
- When the braking resistor is used at its rated power rather than the processing power (average value) in environments within the specified temperature range, the temperature of the resistor will rise to above 120°C 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 based on the heat dissipation condition of the external braking resistor.

☆ Related parameters:

Parameter	Comm. address	Parameter name	Value range	Default value	Unit	Change mode
H02.24	2002-19h	Resistor heat dissipation coefficient	10 to 100	30	%	Real time

Note

Higher resistor heat dissipation coefficient indicates higher braking efficiency.

- **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.

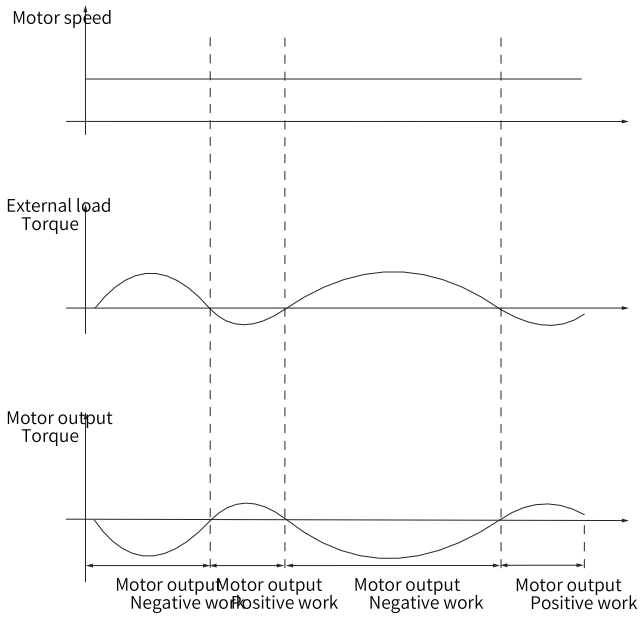


Figure 6-10 Example of the curve with external load torque

Take H1 series 750 W models (rated torque: 2.39 N·m) as an example. When the external load torque is 60% of the rated torque and the motor speed reaches 1500 RPM, the power fed back to the drive is (60% × 2.39) × (1500 × 2π/60) = 225 W. Because the braking resistor needs to be derated by 70%, the power of the external braking resistor is 225 ÷ (1 - 70%) = 750 W, with resistance being 50 Ω.

Braking resistor selection for direct drive

- **Without external load torque**

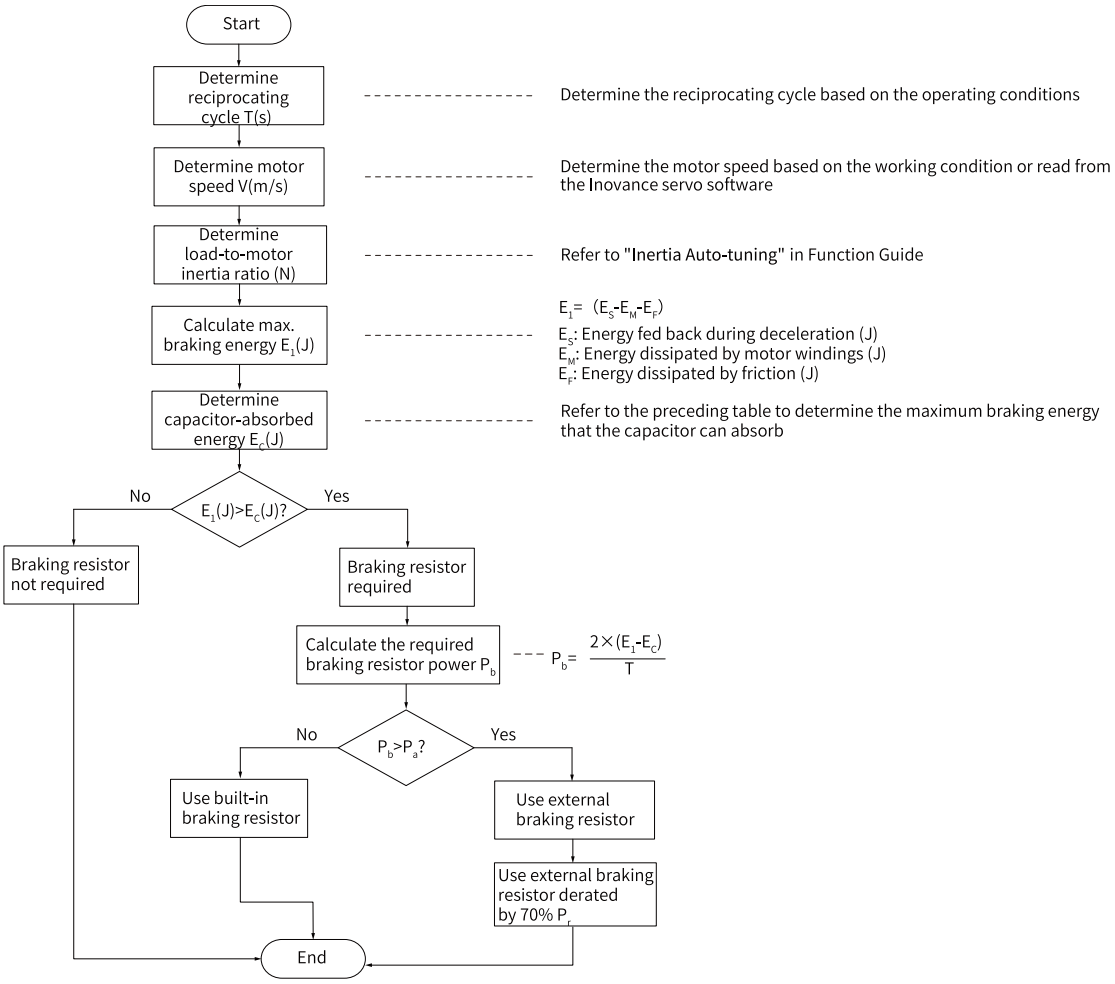


Figure 6-11 Flowchart for selecting the braking resistor

Note

- Determine whether to use a braking resistor, select a built-in or external braking resistor as needed, and then set H02.25.
- It is recommended to use a resistor enclosed by an aluminum case.

- **Calculate the energy returned at each deceleration**

$$E_S = \frac{1}{2} \times (M_M + M_L) \times (V_1^2 - V_2^2)$$

E_S: Feedback energy upon deceleration (J)

M_M: Rotor weight (kg)

M_L: Load Weight (kg)

V_1: Speed before deceleration (m/s)

V_2: Speed after deceleration (m/s)

- **Determine the energy consumed by the motor**

$$E_M = 3 \times I_M^2 \times (R_M/2) \times t_d$$

E_M: Energy consumed by motor winding (J)

I_M: Current at deceleration (A)

R_M : Motor phase resistance (Ω)

td_d : Deceleration time (s)

- **Determine the energy consumed by friction (direct drive motor friction loss is low, which can be ignored based on actual operating conditions)**

$$E_F = \frac{1}{2} \times T_f \times (V_1 - V_2) \times t_d$$

E_F : Energy consumed by friction (J)

T_f : Friction resistance (N)

V_1 : Speed before deceleration (m/s)

V_2 : Speed after deceleration (m/s)

td_d : Deceleration time (s)

- **Determine the energy consumed by the drive**

$$E_1 = E_F - E_M - E_F$$

E_1 : Energy consumed by the drive (J)

- **Determine the energy consumed by the braking resistor**
  - $E_1 > E_C$: An external braking resistor is required
  - $E_1 < E_C$: no braking resistor is required

- **Calculate the power of the braking resistor**

$$P_b = 2 \times (E_1 - E_C) / T$$
$$P_r = P_b / 0.3$$

P_b : Power needs to be processed by the braking resistor (W)

P_r : Recommended power for the braking resistor (W)

T: Repeated motor running cycle (s)

0.3: Resistor heat dissipation coefficient (set in H02.24)

- Take the S5R5 model as an example:
  Assume the following operating conditions: reciprocating cycle T = 2s, maximum running speed is 8 m/s, and a deceleration time of 0.05 s for acceleration to zero speed. The load weight is three times the motor rotor weight and the friction torque is 2.5 N·m. In the motor parameter settings, the motor rotor weight is 0.6 kg, the motor phase resistance is 1.53 Ω, and the force constant is 23.5 N/A. In this case:

  The deceleration current can be obtained through H0b.24 (Active value of phase current) when the drive monitors deceleration:

  $I_M = 15$ (A)

  Energy calculation:

$$E_S = \frac{1}{2} \times (1+3) \times 0.6 \times 8^2 = 76.8\ (J)$$
$$E_M = 3/15^2/\frac{1.53}{2} \times 0.05 = 25.82\ (J)$$
$$E_F = \frac{1}{2} \times 2.5 \times 8 \times 0.05 = 0.5\ (J)$$
$$E_1 = E_S - E_M - E_F = 50.48\ (J)$$

  Because $E_1 > E_C$, a braking resistor is required. The power of the braking resistor is as follows:

$P_b = 2 \times (50.48 - 32.42) / 2 = 18.06\ (W)$

Because $P_b < P_a$ (Processing capacity of the built-in braking resistor), the built-in braking resistor is applicable.

- **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.

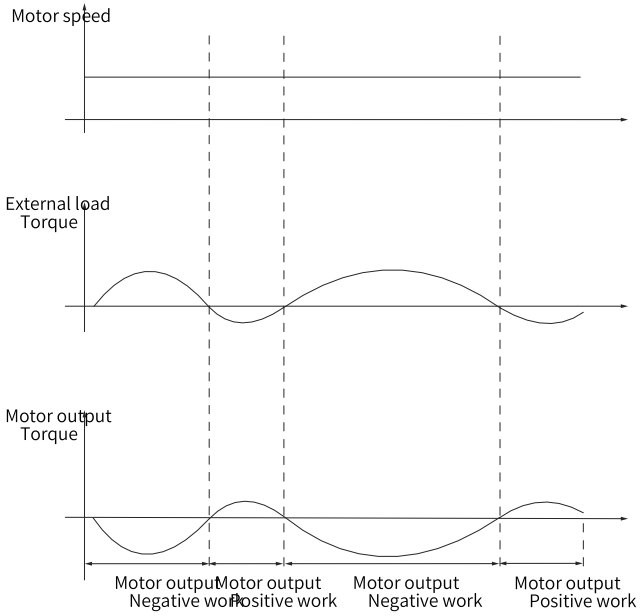


Figure 6-12 Example of the curve with external load torque

7 Certifications, Directives, and Standards

Table 7–1 Compliance list

Certification	Directive		Standard
CE certification	EMC directive	2014/30/EU	EN IEC 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	-
Functional safety certification	Machinery directive	2006/42/EC	EN ISO 13849-1 EN 61800-5-2 EN IEC 62061
	-		EN-AR-N 61508 EN IEC 61800-5-3
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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